

# Orbit Operations Checklist

**Mission Operations Directorate  
Operations Division**

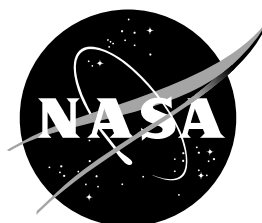
**Generic, Rev M  
October 29, 2008**

**NOTE**

For STS-126 and subsequent flights.

National Aeronautics and  
Space Administration

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



**Verify this is the correct version for the pending operation (training, simulation or flight).**  
Electronic copies of FDF books are available. URL: <http://mod.jsc.nasa.gov/do3/FDF/index.html>



ORBIT OPERATIONS

GENERIC, REV M (Oct 29, 2008)

## PCN-10 (Feb 7, 2011) Sheet 1 of 1

List of Implemented Change Requests (482s):

ASC-01953 B  
ORB OPS-02337  
ORB OPS-02338


**NOTE**

For STS-133 and subsequent flights

Incorporate the following:

1. Replace iii thru viii  
After xiv, add TEMP xiii and TEMP xiv
2. Replace 7-13 and 7-14, 7-31 and 7-32
3. After 12-2, add TEMP 12-1 and TEMP 12-2  
After 12-10, add TEMP 12-9 and TEMP 12-10  
After 12-18, add TEMP 12-17 and TEMP 12-18  
After 12-24, add TEMP 12-21 thru TEMP 12-24  
After 12-78, add TEMP 12-77 and TEMP 12-78

Prepared by:



Publication Manager

Approved by:



Manager, Flight Procedures

Accepted by:



FDF Manager

Encl: 24 pages

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ORBIT OPERATIONS

GENERIC, REV M (Oct 29, 2008)

## PCN-9 (Apr 26, 2010) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-02336

Incorporate the following:

1. Replace iii thru viii, xv and xvi
2. Replace 12-1 and 12-2  
After 12-100, add 12-101 and 12-102

**NOTE**

For STS-132 and subsequent flights

Prepared by: *Lisa A. Giles*  
Publication Manager

Approved by: *Timber Johnson*  
Manager, Flight Procedures

Accepted by: *STP*  
FDF Manager

Encl: 12 pages

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ORBIT OPERATIONS

GENERIC, REV M (Oct 29, 2008)

## PCN-8 (Feb 18, 2010) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-02333

ORB OPS-02335


**NOTE**

For STS-131 and subsequent flights

Incorporate the following:

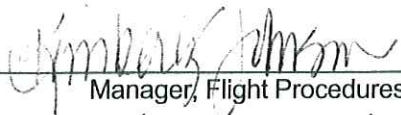
1. Replace iii thru viii; xi and xii
2. Replace section 5 (5-1 thru 5-62)  
After 5-62, add 5-63 and 5-64
3. Replace 12-39 thru 12-42

Prepared by:



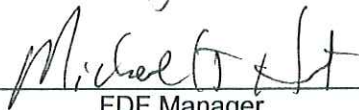
Publication Manager

Approved by:



Manager, Flight Procedures

Accepted by:



FDF Manager

Encl: 76 pages

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ORBIT OPERATIONS

GENERIC, REV M (Oct 29, 2008)

## PCN-7 (Jan 8, 2010) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-02331

Incorporate the following:

1. Replace iii thru viii
2. Replace 12-19 and 12-20

**NOTE**

For STS-130 and subsequent flights

Prepared by: Lisa A. Miles  
Publication Manager

Approved by: Candace Parvizi  
Manager, Flight Procedures

Accepted by: Stacy P.  
FDF Manager

Encl: 8 pages

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ORBIT OPERATIONS

GENERIC, REV M (Oct 29, 2008)

## PCN-6 (Oct 8, 2009) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-02329

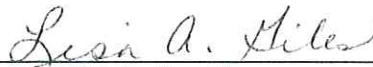
**NOTE**

For STS-129 and subsequent flights

Incorporate the following:

1. Replace iii and iv
2. Replace 3-9 and 3-10

Prepared by:



Publication Manager

Approved by:



Manager, Flight Procedures

Accepted by:



FDF Manager

Encl: 4 pages

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ORBIT OPERATIONS

GENERIC, REV M (Oct 29, 2008)

## PCN-5 (July 31, 2009) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-02328

Incorporate the following:

1. Replace iii and iv, vii and viii
2. Replace 12-77 and 12-78

**NOTE**

For STS-128 and subsequent flights

Prepared by: *Lisa A. Giles*  
Publication Manager

Approved by: *Timberly Mason*  
Manager, Flight Procedures

Accepted by: *Michael R. Holt*  
FDF Manager

Encl: 6 pages

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<b>ORBIT OPERATIONS</b>	<b>GENERIC, REV M (Oct 29, 2008)</b>
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**PCN-4 (June 23, 2009) Sheet 1 of 1**

List of Implemented Change Requests (482s):

ORB OPS-02327

<p><b>NOTE</b> For STS-128 and subsequent flights</p>
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Incorporate the following:

1. Replace iii thru viii
2. Replace 12-19 and 12-20

Prepared by:         *Lisa A. Miles*          
   Publication Manager

Approved by:         *Kimberly Johnson*          
   Manager, Flight Procedures

Accepted by:         *Kimberly Johnson*          
   FDF Manager

Encl: 8 pages

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ORBIT OPERATIONS

GENERIC, REV M (Oct 29, 2008)

## PCN-3 (May 20, 2009) Sheet 1 of 1

List of Implemented Change Requests (482s):

ORB OPS-02326

Incorporate the following:

1. Replace iii and iv
2. Replace 5-35 and 5-36, 5-41 thru 5-44

**NOTE**

For STS-127 and subsequent flights

Prepared by:



Publication Manager

Approved by:



Manager, Flight Procedures

Accepted by:



FDF Manager

Encl: 8 pages

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ORBIT OPERATIONS

GENERIC, REV M (Oct 29, 2008)

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

List of Implemented Change Requests (482s):

ORB OPS-2325      MULTI-1833  
MULTI-1834**NOTE**

For STS-119 and subsequent flights

Incorporate the following:

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

Prepared by: *Lisa A. Giles*  
Publication ManagerApproved by: *Kimberly J. Smith*  
Manager, Shuttle Procedures ManagementAccepted by: *Michael T. Holt*  
FDF Manager

Encl: 18 pages

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ORBIT OPERATIONS

GENERIC, REV M (Oct 29, 2008)

## PCN-1 (Dec 17, 2008) Sheet 1 of 1

List of Implemented Change Requests (482s):

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

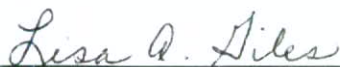
**NOTE**

For STS-119 and subsequent flights

Incorporate the following:

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

Prepared by:



Publication Manager

Approved by:



Manager, Shuttle Procedures Management

Accepted by:



FDF Manager

Encl: 12 pages

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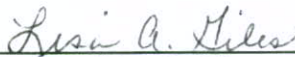
MISSION OPERATIONS DIRECTORATE

**ORBIT OPERATIONS CHECKLIST**

GENERIC, REVISION M

October 29, 2008

PREPARED BY:



\_\_\_\_\_  
Lisa A. Giles  
Publication Manager

APPROVED BY:



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



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Michael T. Hurt  
FDF Manager

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ORB OPS/ALL/GEN M

Incorporates the following:			
482#:	ORB OPS-2313	ORB OPS-2320	MULTI-1825
	ORB OPS-2317	ORB OPS-2321	
	ORB OPS-2318	ORB OPS-2322A	
	ORB OPS-2319	ORB OPS-2323	

AREAS OF TECHNICAL RESPONSIBILITY

Publication Manager	DO3/L. Giles	281-244-9068
Alternate Publication Manager	DO3/T. Zulauf	281-244-0922



ORBIT OPERATIONS CHECKLIST

**LIST OF EFFECTIVE PAGES**

GENERIC 10/30/87

REV M 10/29/08  
 PCN-1 12/17/08  
 PCN-2 01/16/09  
 PCN-3 05/20/09  
 PCN-4 06/23/09  
 PCN-5 07/31/09  
 PCN-6 10/08/09  
 PCN-7 01/08/10  
 PCN-8 02/18/10  
 PCN-9 04/26/10  
 PCN-10 02/07/11

Sign Off .....	*	ALL/GEN M	2-5 .....	ALL/GEN M
ii .....	*	ALL/GEN M	2-6 .....	ALL/GEN M
iii .....	*	ALL/GEN M,10	2-7 .....	ALL/GEN M
iv .....	*	ALL/GEN M,10	2-8 .....	ALL/GEN M
v .....	*	ALL/GEN M,10	2-9 .....	ALL/GEN M,2
vi .....	*	ALL/GEN M,10	2-10 .....	ALL/GEN M,2
vii .....	*	ALL/GEN M,10	2-11 .....	ALL/GEN M
viii .....	*	ALL/GEN M	2-12 .....	ALL/GEN M
ix .....	*	ALL/GEN M	2-13 .....	ALL/GEN M
x .....	*	ALL/GEN M	2-14 .....	ALL/GEN M
xi .....		ALL/GEN M	2-15 .....	ALL/GEN M
xii .....		ALL/GEN M,8	2-16 .....	ALL/GEN M
xiii .....		ALL/GEN M	2-17 .....	ALL/GEN M
xiv .....		ALL/GEN M	2-18 .....	ALL/GEN M
TEMP xiii .....		ALL/GEN M,10	2-19 .....	ALL/GEN M
TEMP xiv .....		134/GEN M,10	2-20 .....	ALL/GEN M
xv .....		ALL/GEN M,9	3-1 .....	ALL/GEN M
xvi .....		ALL/GEN M	3-2 .....	ALL/GEN M
1-1 .....		ALL/GEN M	3-3 .....	ALL/GEN M
1-2 .....		ALL/GEN M	3-4 .....	ALL/GEN M
1-3 .....		ALL/GEN M	3-5 .....	ALL/GEN M
1-4 .....		ALL/GEN M	3-6 .....	ALL/GEN M
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2-3 .....		ALL/GEN M	3-9 .....	ALL/GEN M
2-4 .....		ALL/GEN M	3-10 .....	ALL/GEN M,6

\* – Omit from flight book

3-11.....	ALL/GEN M	5-11.....	ALL/GEN M,8
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3-13.....	ALL/GEN M	5-13.....	ALL/GEN M,8
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4-2.....	ALL/GEN M	5-40.....	ALL/GEN M,8
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4-4.....	ALL/GEN M	5-42.....	ALL/GEN M,8
4-5.....	ALL/GEN M	5-43.....	ALL/GEN M,8
4-6.....	ALL/GEN M	5-44.....	ALL/GEN M,8
4-7.....	ALL/GEN M	5-45.....	ALL/GEN M,8
4-8.....	ALL/GEN M	5-46.....	ALL/GEN M,8
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5-6.....	ALL/GEN M,8	5-52.....	ALL/GEN M,8
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5-8.....	ALL/GEN M,8	5-54.....	ALL/GEN M,8
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5-10.....	ALL/GEN M,8	5-56.....	ALL/GEN M,8

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5-62.....	ALL/GEN M,8	7-24.....	ALL/GEN M
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5-64.....	ALL/GEN M,8	7-26.....	ALL/GEN M
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6-2.....	ALL/GEN M	7-28.....	ALL/GEN M
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6-6.....	ALL/GEN M	7-32.....	ALL/GEN M
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6-16.....	ALL/GEN M	8-2.....	ALL/GEN M
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7-2.....	ALL/GEN M	9-2.....	ALL/GEN M
7-3.....	ALL/GEN M	9-3.....	ALL/GEN M
7-4.....	ALL/GEN M	9-4.....	ALL/GEN M
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7-8.....	ALL/GEN M	10-2.....	ALL/GEN M
7-9.....	ALL/GEN M	10-3.....	ALL/GEN M
7-10.....	ALL/GEN M	10-4.....	ALL/GEN M
7-11.....	ALL/GEN M	10-5.....	ALL/GEN M
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7-16.....	ALL/GEN M	10-10.....	ALL/GEN M
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7-18.....	ALL/GEN M	10-12.....	ALL/GEN M

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10-14.....	ALL/GEN M	TEMP 12-24.....	134/GEN M,10
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10-18.....	ALL/GEN M	12-28.....	ALL/GEN M
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10-20 (4 pgs)....	ALL/GEN M	12-30.....	ALL/GEN M
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11-4.....	ALL/GEN M,2	12-34.....	ALL/GEN M
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12-2.....	ALL/GEN M,9	12-36.....	ALL/GEN M
TEMP 12-1.....	134/GEN M,10	12-37.....	ALL/GEN M
TEMP 12-2.....	134/GEN M,10	12-38.....	ALL/GEN M
12-3.....	ALL/GEN M	12-39.....	ALL/GEN M,8
12-4.....	ALL/GEN M	12-40.....	ALL/GEN M,8
12-5.....	ALL/GEN M	12-41.....	ALL/GEN M,8
12-6.....	ALL/GEN M	12-42.....	ALL/GEN M
12-7.....	ALL/GEN M	12-43.....	ALL/GEN M
12-8.....	ALL/GEN M	12-44.....	ALL/GEN M
12-9.....	ALL/GEN M	12-45.....	ALL/GEN M
12-10.....	ALL/GEN M	12-46.....	ALL/GEN M
TEMP 12-9.....	134/GEN M,10	12-47.....	ALL/GEN M
TEMP 12-10.....	ALL/GEN M,10	12-48.....	ALL/GEN M
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TEMP 12-18.....	134/GEN M,10	12-58.....	ALL/GEN M
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12-24.....	ALL/GEN M	12-64.....	ALL/GEN M
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TEMP 12-22.....	134/GEN M,10	12-66.....	ALL/GEN M,1

12-67.....	ALL/GEN M	13-7.....	ALL/GEN M
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12-74.....	ALL/GEN M	13-14.....	ALL/GEN M
12-75.....	ALL/GEN M	13-15.....	ALL/GEN M
12-76.....	ALL/GEN M	13-16.....	ALL/GEN M
12-77.....	ALL/GEN M	14-1.....	ALL/GEN M
12-78.....	ALL/GEN M,5	14-2.....	ALL/GEN M
TEMP 12-77....	ALL/GEN M,10	14-3.....	ALL/GEN M
TEMP 12-78....	134/GEN M,10	14-4.....	ALL/GEN M
12-79.....	ALL/GEN M	15-1.....	* ALL/GEN M
12-80.....	ALL/GEN M	15-2.....	* ALL/GEN M
12-81.....	ALL/GEN M	CC 15-3.....	* ALL/GEN M
12-82.....	ALL/GEN M	CC 15-4.....	* ALL/GEN M
12-83.....	ALL/GEN M	CC 15-5.....	* ALL/GEN M
12-84.....	ALL/GEN M	CC 15-6.....	* ALL/GEN M
12-85.....	ALL/GEN M	CC 15-7.....	* ALL/GEN M
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12-89.....	ALL/GEN M	15-11.....	* ALL/GEN M
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12-91.....	ALL/GEN M	CC 15-13.....	* ALL/GEN M
12-92.....	ALL/GEN M	CC 15-14.....	* ALL/GEN M
12-93.....	ALL/GEN M	CC 15-15.....	* ALL/GEN M
12-94.....	ALL/GEN M	CC 15-16.....	* ALL/GEN M
12-95.....	ALL/GEN M	CC 15-17.....	* ALL/GEN M
12-96.....	ALL/GEN M	CC 15-18.....	* ALL/GEN M
12-97.....	ALL/GEN M	CC 15-19.....	* ALL/GEN M
12-98.....	ALL/GEN M	CC 15-20.....	* ALL/GEN M
12-99.....	ALL/GEN M	15-21.....	* ALL/GEN M
12-100.....	ALL/GEN M	15-22.....	* ALL/GEN M
12-101.....	ALL/GEN M,9		
12-102.....	ALL/GEN M,9		
13-1.....	ALL/GEN M		
13-2.....	ALL/GEN M		
13-3.....	ALL/GEN M		
13-4.....	ALL/GEN M		
13-5.....	ALL/GEN M		
13-6.....	ALL/GEN M		

\* – 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/K
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 (Front).....	CC 15-8	ORB OPS-5a/O/I
CONT WASTE COLLECTION – UCD/APOLLO BAG (Back of URINE COLLECTION) .....	CC 15-9	ORB OPS-5b/O/H
PHOTO GRID OVERLAY .....	CC 15-12	ORB OPS-9a/O/B
URINE PRETREAT CHANGEOUT (Front).....	CC 15-13	ORB OPS-23a/O/F
URINE PRETREAT SETUP (Back of URINE PRETREAT CHANGEOUT).....	CC 15-14	ORB OPS-23b/O/E
ERGOMETER (Front).....	CC 15-15	ORB OPS-24a/O/A
(Back).....	CC 15-16	ORB OPS-24b/O/A
GALLEY IODINE REMOVAL ASSEMBLY (GIRA) INSTALLATION (Front).....	CC 15-17	ORB OPS-44a/O/A
CWC (CONTINGENCY WATER CONTAINER) FILL(Back of GALLEY IODINE REMOVAL ASSEMBLY (GIRA) INSTALLATION).....	CC 15-18	ORB OPS-44b/O/A

RECUMBENT SEAT KIT (RSK) INSTALLATION

(Front)..... CC 15-19    ORB OPS-43a/O/A  
(Back)..... CC 15-20    ORB OPS-43b/O/A

x                    ORB OPS/ALL/GEN M



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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**

## KU-BD ANT DEPLOY

### CAUTION

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

COMM/  
INST

A1U      √KU BD PWR – OFF  
            CNTL – PNL

R13L      √KU ANT DIRECT STO – OFF

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

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

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

PL BAY MECH PWR SYS 1,2 (two) – OFF

## KU-BD ACTIVATION

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

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

### SM ANTENNA

CRT           I/O RESET KU – ITEM 8 EXEC (\*)

#### NOTE

System warmup takes ~4 min

### SM 76 COMMUNICATIONS

When KU-BAND PWR OUT > 15 (watts), proceed

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

### 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  
            √RADAR OUTPUT – LOW

### NOTE

If docked to ISS √MCC for Traveling Wave Tube inhibit prior to next step

            KU BD PWR – ON  
            MODE – RDR PASSIVE  
            CNTL                      – PNL  
            KU BD sel                – MAN SLEW  
A2      √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

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

STOW DEPLOYED ASSEMBLY

If OBSS cradled:  
MA73C:A MCA LOGIC MNB MID 2 – OFF  
:B MNA MID 3 – OFF

R13L PL BAY MECH PWR SYS 1,2 (two) – ON  
√KU ANT tb – STO (~23 to 46 sec)  
\* If tb not STO after 46 sec, \*  
\* perform MAL, MECH, 9.3b \*

A1U KU BD PWR – OFF (Expect ‘BCE BYP KU’  
msg)  
R14:C cb MNB KU ELEC – op  
MNC KU SIG PROC – op

R13L PL BAY MECH PWR SYS 1,2 (two) – OFF  
KU ANT – GND

If MCA LOGIC switches previously taken OFF:  
MA73C:A MCA LOGIC MNB MID 2 – ON  
:B MNA MID 3 – ON

## 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/CC PWR – on (LED on)  
(VTR) ON/STANDBY – press (green LED on)  
Tape – install

O14:E,  
O16:E √cb DDU AFT (two) – cl

A6U FLT CNTLR PWR – ON

√In jettison att  
DAP TRANS: PULSE/PULSE/PULSE

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

Wait until rates damped, then:  
DAP: A1/FREE/PRI

√SENSE – as reqd

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

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

NOTE

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

A14 PYRO KU ANT – ARM

Wait 1 sec, then:  
PYRO KU ANT – JETT

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

Cont next page

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-\*)

A6U  
O14:E,  
O16:E

DAP: A1/AUTO/VERN  
FLT CNTLR PWR – OFF  
cb DDU AFT (two) – as reqd

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  
:B

MCA LOGIC MNC MID 2 – ON  
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 - R                |
|       | 2                    | - T/R, tw - R                |
|       | ICOM A               | - OFF                        |
|       | B                    | - RCV                        |
|       | √XMIT/ICOM MODE sel  | - PTT/PTT                    |
|       | √SPKR AUD TONES      | - ACCU/BYPASS                |
|       | √SPKR PWR            | - SPKR (reqd for ACCU tones) |
|       | MSTR SPKR VOL sel    | - R                          |
| MO39M | MIDDECK COMM CCU PWR | - ON                         |

**NOTE**

For ATUs connected to BPSMUs:

CDR ATU: Power - AUD

    A/G2 - OFF

A/L ATUs: Power - AUD

    A/G2 - OFF

- b. **FLIGHT DECK CONFIG (optional)**
- |     |                   |               |
|-----|-------------------|---------------|
| R10 | MS AUD PWR        | - AUD/TONE    |
|     | A/G 1             | - RCV, tw - R |
|     | 2                 | - T/R, tw - R |
|     | ICOM A,B (two)    | - OFF         |
|     | √XMIT/ICOM MODE   | - PTT/PTT     |
| A13 | √OS AUD SPKR PWR  | - SPKR        |
|     | MSTR SPKR VOL sel | - R           |
| A11 | √MS COMM CCU PWR  | - ON          |

**PRE-SLEEP AUD CONFIG (UNDOCKED)**

O6      √UHF MODE sel – OFF

FLIGHT DECK/MIDDECK AUD CONFIG

- a. MIDDECK CONFIG (reqd)
- |       |                       |                              |
|-------|-----------------------|------------------------------|
| MO42F | MIDDECK SPKR AUD PWR  | – AUD/TONE                   |
|       | A/G 1                 | – T/R, tw – R                |
|       | 2                     | – RCV, tw – R                |
|       | ICOM A,B (two)        | – OFF                        |
|       | √XMIT/ICOM MODE sel   | – PTT/PTT                    |
|       | √SPKR AUD TONES       | – ACCU/BYPASS                |
|       | √SPKR PWR             | – SPKR (reqd for ACCU tones) |
|       | MSTR SPKR VOL sel     | – R                          |
| MO39M | √MIDDECK COMM CCU PWR | – ON                         |

b. FLIGHT DECK CONFIG (optional)

NOTE

If FD ATUs connected to BPSMUs:  
BPSMU ATU: A/G 2 – OFF

- |     |                   |               |
|-----|-------------------|---------------|
| R10 | MS AUD PWR        | – AUD/TONE    |
|     | A/G 1             | – T/R, tw – R |
|     | 2                 | – RCV, tw – R |
|     | 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          |



## POST-SLEEP AUD CONFIG (DOCKED)

### MIDDECK/FLIGHT DECK SPEAKER AUD CONFIG

	a. <u>MIDDECK SPEAKER CONFIG (reqd)</u>	
MO42F	MIDDECK SPKR AUD PWR	- AUD/TONE
	A/G 1	- T/R, tw - R
	2	- RCV, tw - R
	ICOM A	- RCV
	B	- T/R
	√XMIT/ICOM MODE sel	- PTT/PTT
	√SPKR AUD SPKR PWR	- SPKR
	MSTR SPKR VOL sel	- R
MO39M	MIDDECK COMM CCU PWR	- ON

### NOTE

For ATUs connected to BPSMUs:

CDR ATU: Power - AUD/TONE

A/G2 - T/R

A/L ATUs: Power - AUD/TONE

A/G2 - T/R

	b. <u>FLIGHT DECK CONFIG (optional)</u>	
R10	MS AUD PWR	- AUD/TONE
	A/G 1	- T/R, tw - R
	2	- OFF
	A/A	- OFF
	ICOM A	- T/R
	B	- OFF
	√XMIT/ICOM MODE	- PTT/PTT
A13	√OS AUD SPKR PWR	- SPKR
	MSTR SPKR VOL sel	- R
A11	√MS COMM CCU PWR	- ON

**POST-SLEEP AUD CONFIG (UNDOCKED)**

O6           √UHF MODE sel – OFF

FLIGHT DECK/MIDDECK AUD CONFIG

- a. MIDDECK CONFIG (reqd)
- |       |                       |               |
|-------|-----------------------|---------------|
| MO42F | MIDDECK SPKR AUD PWR  | – AUD/TONE    |
|       | A/G 1                 | – T/R, tw – R |
|       | 2                     | – RCV, tw – R |
|       | ICOM A                | – T/R         |
|       | B                     | – RCV         |
|       | √XMIT/ICOM MODE sel   | – PTT/PTT     |
|       | √SPKR AUD SPKR PWR    | – SPKR        |
|       | MSTR SPKR VOL sel     | – R           |
| MO39M | √MIDDECK COMM CCU PWR | – ON          |

b. FLIGHT DECK CONFIG (optional)

NOTE

If FD ATUs connected to BPSMUs:

BPSMU ATU: A/G 2 – T/R

MS ATU: A/G 2 – OFF, ICOM B – OFF

(disregard A/G 2, ICOM B action below)

- |     |                   |               |
|-----|-------------------|---------------|
| R10 | MS AUD PWR        | – AUD/TONE    |
|     | A/G 1             | – T/R, tw – R |
|     | 2                 | – RCV, tw – R |
|     | ICOM A            | – T/R         |
|     | B                 | – RCV         |
|     | √XMIT/ICOM MODE   | – PTT/PTT     |
| A13 | √OS AUD SPKR PWR  | – SPKR        |
|     | MSTR SPKR VOL sel | – R           |
| A11 | √MS COMM CCU PWR  | – ON          |

## STD S-BD/KU-BD PNL CONFIG

If configuring for TDRS KU-BD:

Prior to configuring A1L/C3:

If KU in radar:

√/KU PWR – ON

Perform KU OPS, step 4 (Cue Card, RNDZ), then:

KU CNTL – PNL,CMD

### NOTE

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

If KU TRACK tb – bp

Perform KU-BD MANUAL ACQUISITION, 2-7, then:

		IF STDN(SGLS) <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

## 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 FS, REF PROC) 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

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

NOTE

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

3. RECONFIG PANEL A1L
- |     |                     |     |
|-----|---------------------|-----|
| A1L | S-BD PM ANT SW ELEC | - 2 |
|     | PRE AMP             | - 2 |
|     | PWR AMPL STBY       | - 2 |
|     | OPER                | - 2 |
|     | XPNDR               | - 2 |
|     | NSP PWR             | - 2 |

**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

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

NOTE

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

3. RECONFIG PANEL A1L
- |     |                     |     |
|-----|---------------------|-----|
| 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 SYSTEMS

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**CREW  
SYS**

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**PRE-SLEEP ACTIVITY**

NOTE

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

FLIGHT DECK ACTIVITY LIST

**CREW  
SYS**

- R1(A11) 1. CRYO HEATER/MANF VLV config per MCC  
1  2  3  4  5  6  7  8  9  10   
11  12  13  14  15  16
2. SM CHECKPOINT INITIATE (DPS)  
1  2  3  4  5  6  7  8  9  10   
11  12  13  14  15  16
- L1 3. CAB TEMP – adj rotary as desired (suggest 5 o'clock posn)  
If night before Entry:  
Suggest 10 o'clock posn for Entry cooling  
1  2  3  4  5  6  7  8  9  10   
11  12  13  14  15  16
- L2 4. Expect possible 'S66 CAB N2 FLO 1(2)'  
O2/N2 CNTLR VLV SYS 1(2) – OP  
1  2  3  4  5  6  7  8  9  10   
11  12  13  14  15  16

Cont next page

5. DPS/MEDS SLEEP CONFIG

R11     √IDP/CRT4 PWR        – ON  
          IDP/CRT4 MAJ FUNC – SM

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

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

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

MIDDECK ACTIVITY LIST

1. LiOH CHANGEOUT (Cue Card)

<p><b>WARNING</b>          If using ISS stockpile canisters, don PPE          to reduce possible exposure to LiOH dust</p>
--

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

Cont next page

2. WCS CLEANING (Cue Card, URINE COLLECTION)

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

MO58F

3. √PWR OFF:

TV PWR

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

4. PGSC OVERNIGHT CONFIG

√COLOR PRINTER – ON

√PAPER IN COLOR PRINTER

√OCA ROUTER – ON

√OUTLOOK APPLICATION CLOSED ON ALL PGSCs

√KFX PGSC (Prime and Backup) – On

√KFX App LAUNCHED ON KFX PGSCs (Prime and Backup)

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

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

√WLES PGSC (Prime and Backup) – On

√WLES App LAUNCHED ON WLES PGSCs (Prime and Backup)

Prime WLES \_\_\_\_\_ Backup WLES \_\_\_\_\_

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

Cont next page

3-5

ORB OPS/ALL/GEN M

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

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

6. GALLEY OVERNIGHT CONFIG (ECLS)

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

7. AIRFLOW CONFIG

- √WCS Upper Privacy Curtain is open (stowed)
- √Shade not installed in Port Interdeck accessway
- √OCAC Airflow path not obstructed
- √Duffy Ducts are fully extended and Airflow path not obstructed

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

## POST-SLEEP ACTIVITY

### NOTE

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

### MIDDECK ACTIVITY LIST

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

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

#### 2. LiOH CHANGEOUT (Cue Card)

<p><u>WARNING</u> If using ISS stockpile canisters, don PPE to reduce possible exposure to LiOH dust</p>
--

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

#### 3. MESSAGE REVIEW

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

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

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

Cont next page

5. URINE PRETREAT CHANGEOUT (Cue Card)

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

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

Cont next page

3-8

ORB OPS/ALL/GEN M



FLIGHT DECK ACTIVITY LIST

1. WINDOW SHADES

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

2. IDPs/MDUs – ON as desired (use only one IDP with three MDUs max if in GROUP B(C) PWRDN)

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

C3

3. BFC CRT DISP – OFF

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

4. ALERT TONE DURATION

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

L1

5. CAB TEMP – adj rotary as reqd

If Entry day:

CAB TEMP – full COOL

Wait 20 min

CAB TEMP CNTLR – OFF

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

L2

6. O2/N2 CNTLR VLV SYS 1(2) – AUTO

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

Cont next page

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

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

A7 8. If EVA day:  
WIRELESS VID HTR – ON

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

9. If Entry day:  
Perform FWD WINDOW AREA INSPECTION

## 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

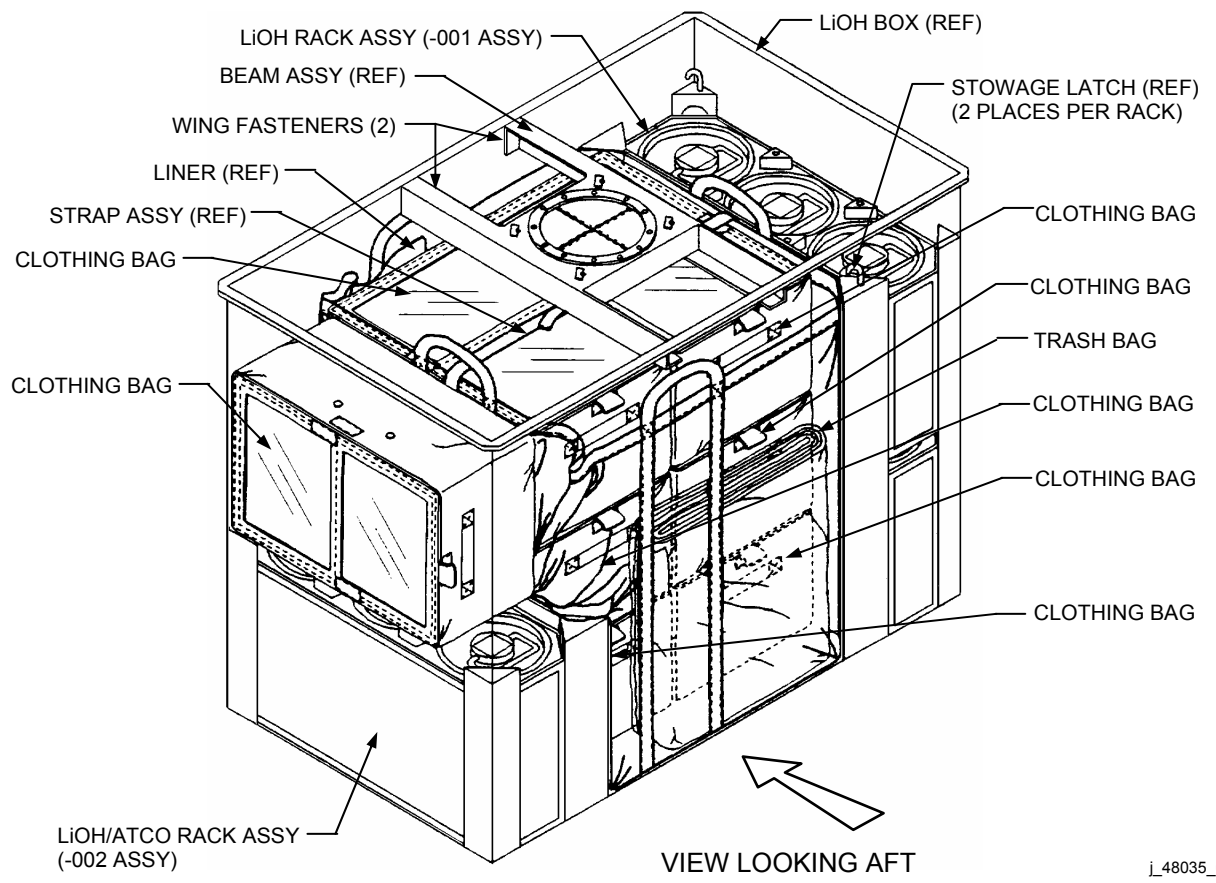
## **LiOH VOLUME INFLIGHT RECONFIG**

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

Cont next page

3-15

ORB OPS/ALL/GEN M



i\_48035\_001

## 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

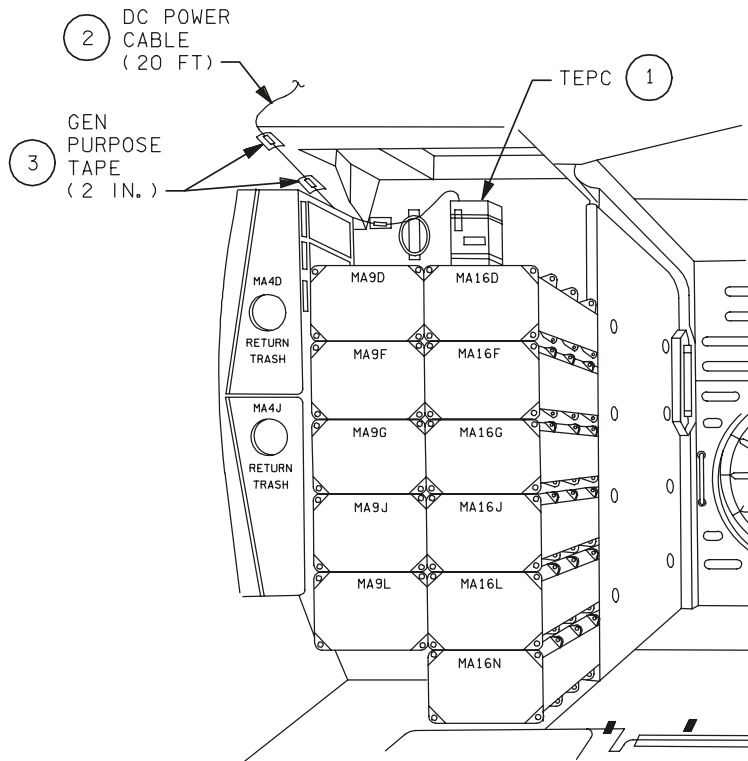
Cont next page

- 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 M

**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

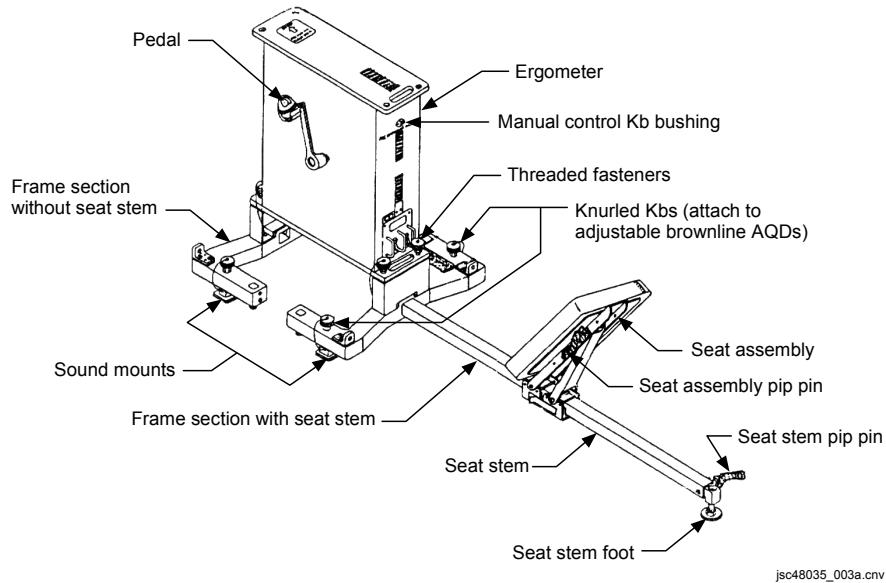


Figure 3-2.- Ergometer.

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:  
Ergometer Pedals  
Ergometer Cranks

Ergo Acc  
Bag

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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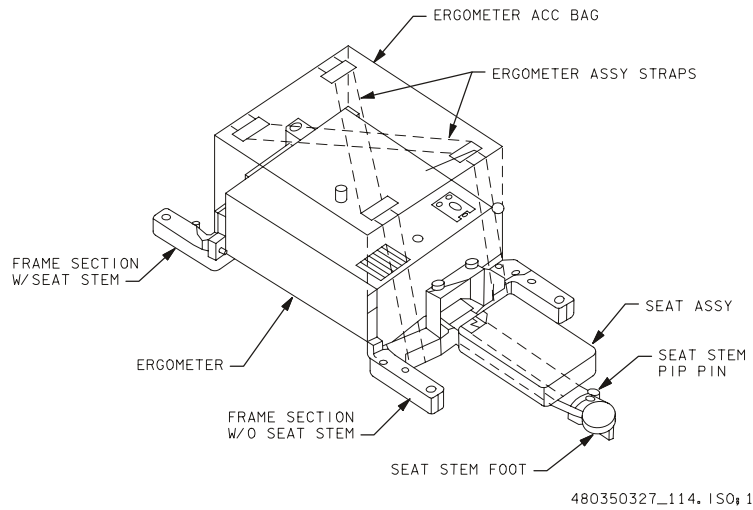


Figure 3-3.- Ergometer middeck launch/landing config (ergo assy).

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

Cont next page

NOTE

Use towels, socks for shoulder padding if desired

6. Perform exercise
7. Stow: Bungee Cords

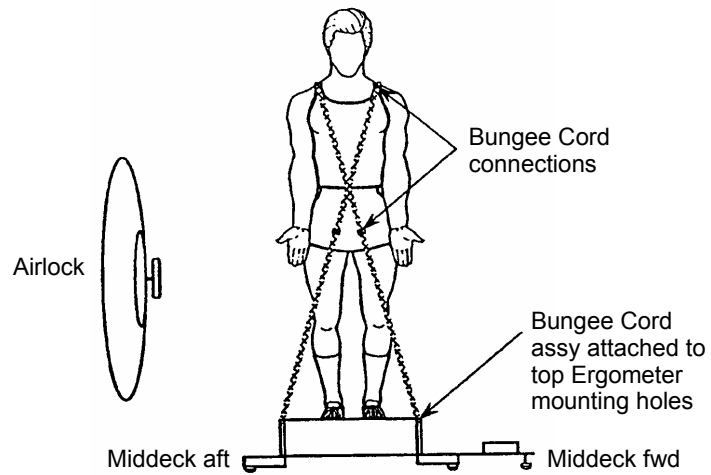


Figure 3-4.- Alternate exercise bungee attachments – front view (facing stbd).

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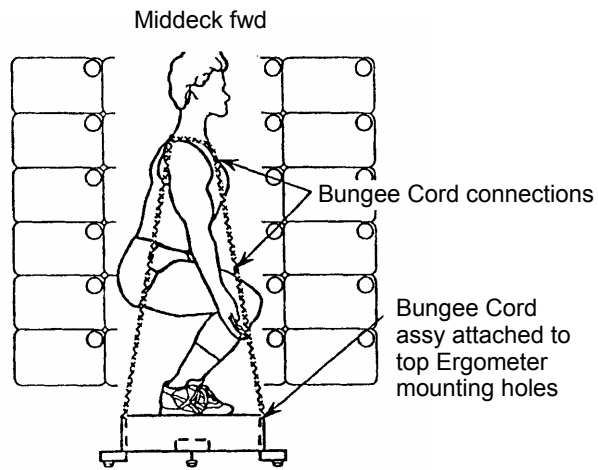


Figure 3-5.- Alternate exercise bungee attachments – side view (facing stbd).

## 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

## **CARBON DIOXIDE MONITOR: OPERATIONS FOR CARBON DIOXIDE MONITORING**

### PARTS:

CDM

Clean Filter Assy (2)

Batt Pack Assy (5)

### NOTE

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

### SETTING UP CDM

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

### ACTIVATING CDM

#### NOTE

Audible beeps occur when MODE pb is pressed during unit activation

3. Press, hold MODE pb until 'RELEASE' displayed

#### NOTE

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

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

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

Cont next page





Figure 3-6.- Carbon Dioxide Monitor.

### TAKING CDM SPOT CHECK MEASUREMENTS

#### NOTE

Spot check is conducted at mid-axis in each module or in specific locations where CO<sub>2</sub> pockets may be present.

When in normal operation (CO<sub>2</sub> concentration displayed), battery status OK or LOW can be accessed by pressing MODE pb once. Operating mode will revert to nominal display after 15 sec.

CDM battery level indicator displays a graphical representation of remaining operating time. Battery status is indicated by 0 to 8 tick marks (or "spider legs") on LCD display. As battery life is used, tick marks will disappear in counts of two. Only possible battery tick readings are 0, 2, 4, 6, or 8

Cont next page

6. Record the following:

MET \_\_\_\_\_

Sampling Location \_\_\_\_\_

CO2 Concentration \_\_\_\_\_

Batt ticks [Press MODE pb once] \_\_\_\_\_

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

DEACTIVATING CDM

8. Press, hold MODE pb until 'RELEASE' displayed

9. √CDM OFF

NOTE

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

10. Demate CDM QD and Filter Assy

11. Stow equipment

## CARBON DIOXIDE MONITOR: BATTERY CHANGEOUT

### NOTE

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

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

When in normal operation (CO<sub>2</sub> concentration displayed), battery status OK or LOW can be accessed by pressing MODE pb once. After 15 sec, display will revert back to normal viewing mode

1. Unstow:  
CDM  
Marker  
Spare Batt Pack
2. If CDM activated, deactivate:  
Press, hold MODE pb until 'RELEASE' displayed  
√CDM OFF  
If CDM not activated, go to step 3
3. Turn both fasteners on back panel ¼ turn ccw
4. Temp stow panel
5. Grasp Batt Pack pull tab, remove pack

Cont next page

NOTE

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

6. Mark Batt Pack as “DISCHARGED”
7. Install replacement Batt Pack, press firmly to seat electrodes
8. Replace panel, press firmly, turn fasteners (two) ¼ turn cw to lock
9. Stow:  
Used Batt Pack  
Marker

NOTE

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

A single beep occurs when self-check routine is complete

10. If reqd, activate CDM:  
Press, hold MODE pb until ‘RELEASE’ displayed  
Wait approx 1 min while unit runs self-check routine  
Verify display indicates CO2 concentration  
Deploy CDM as reqd  
If not reqd, stow CDM
11. Notify MCC when battery changeout is complete

## CARBON DIOXIDE MONITOR: FILTER ASSEMBLY CHANGEOUT

### NOTE

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

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

### NOTE

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

2. Demate CDM QD and Filter Assy
3. Return used Filter Assy to pouch lid
4. Remove clean Filter Assy from middeck stowage
5. Mate CDM QD and Clean Filter Assy
6. Attach Velcro tether

Cont next page

NOTE

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

A single beep occurs when self-check routine is complete

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

DPS

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

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:

CRT

If MM202: GNC, OPS 201 PRO

GNC 0 GPC MEMORY

CONFIG – ITEM 1 +2 EXEC

Assign MC 2 without modifying target set →

C3(A6U)

DAP: FREE  
VERN(ALT)

CRT

GNC, OPS 201 PRO

O6

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

C3(A6U)

DAP: as reqd

	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

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	0
		2	0	0	0
		MM 1	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)

5. If resuming KU BD RDR:  
A1U                   √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 60 TABLE MAINT  
MMU 2(1) ASSIGN – ITEM 22(21) EXEC (\*)

√MMU STATUS 2(1) – RDY

√SM COM BUFF – ‘RDY’  
CHECKPT INITIATE – ITEM 18 EXEC  
√Time updated  
√STATUS – ‘GOOD’

3. Repeat step 2 for MMU 1

4. After completion of SM CKPTs:  
√CKPT RETRV ENA – ITEM 23 EXEC (\*)

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

|

|

## ECLS

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ECLS

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**ECLS**



## SUPPLY/WASTE WATER DUMP

For SPLY H2O Dump, perform steps in sections  
A,B,D,F,H,K

For WST H2O Dump, perform steps in sections  
B,E,G,I,K

For simo SPLY/WST H2O Dump, perform all steps

### NOTE

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

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

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

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

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

### A. SUPPLY/SIMO DUMP PREP

WCS  
Outbd  
Wall

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

### NOTE

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

Cont next page

B. PRE-DUMP FDA

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

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

TABLE A

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, 5-7

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<br>WASTE H2O NOZ T A,B (two) exceed 250<br>(~8 min reheat time), continue       |
| ML31C | 8. WASTE H2O DUMP VLV – OP (tb-OP)   |
|       | <b>H. <u>SUPPLY H2O DUMP TERMINATION</u></b>   |
| 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,<br>SUPPLY H2O NOZ T A,B (two) exceed 250<br>(~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

ML31C I. WASTE H2O DUMP TERMINATION  
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 B	0620440	-82	250
	0620439	-82	250

TABLE D

SM 60 TABLE MAINT

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



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## 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 XOVER 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

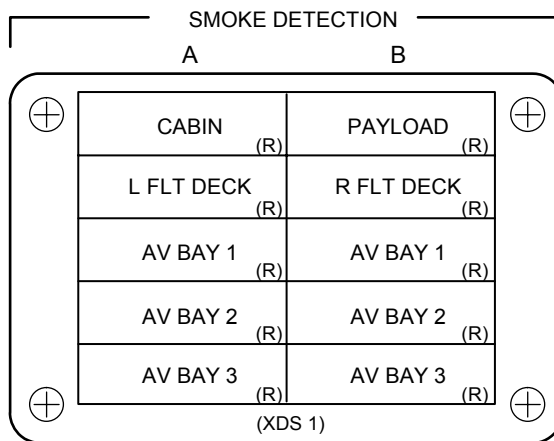
PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
EVAP TEMP TOPPING AFT	0631802	100	
FWD	0631801	100	
L DUCT	0631800	50	
NOZ	0631878	40	
R DUCT	0631810	50	
NOZ	0631879	40	

### 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

5-24 ORB OPS/ALL/GEN M,8

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)

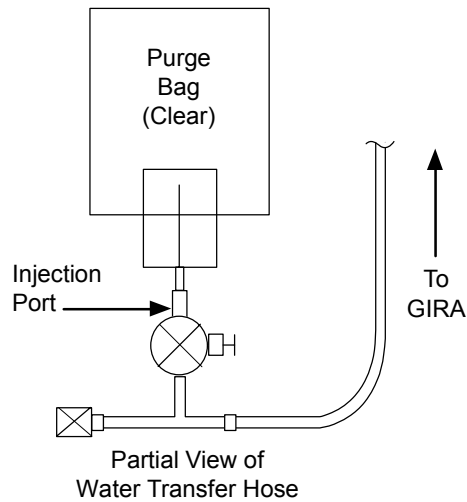
### NOTE

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

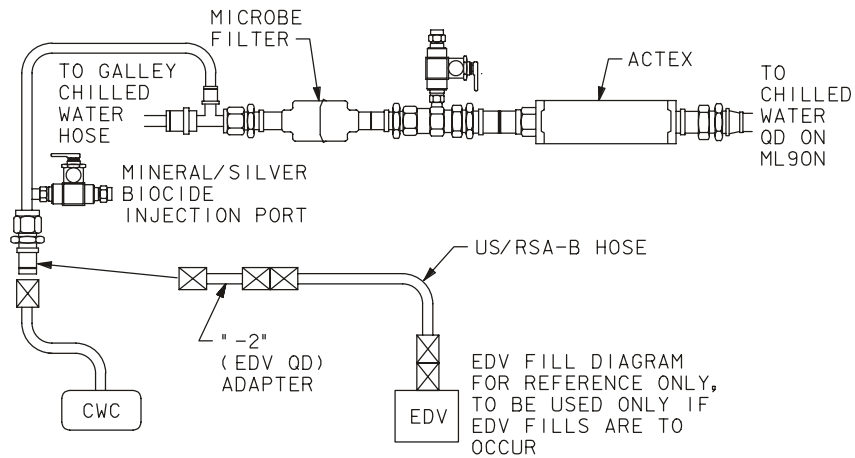
NOTE

For Potable CWCs, ALWAYS add minerals first.

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

Cont next page

- 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 flow:
  - 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

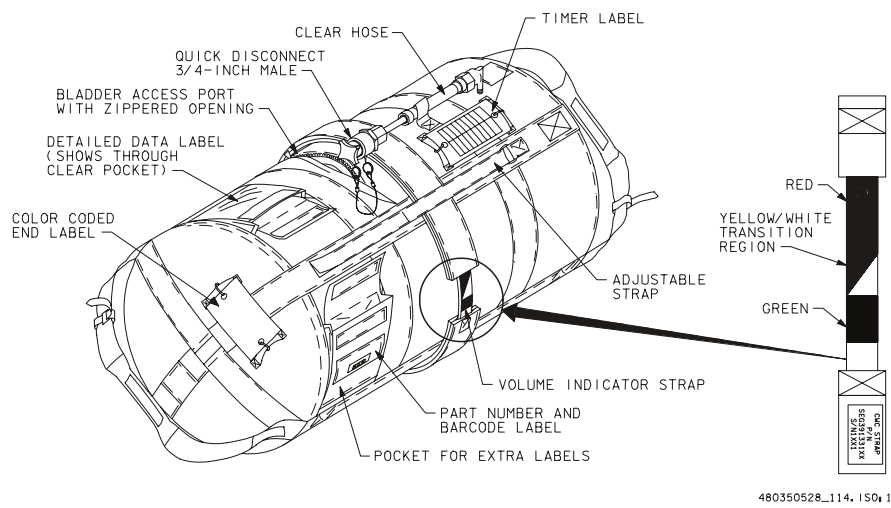


Figure 5-3.- Quantity measuring strap and CWC details.

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

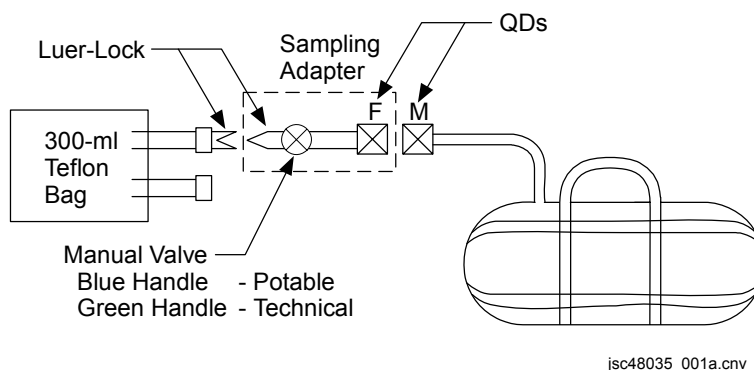


Figure 5-4.- CWC sample setup.

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-I FILL

### NOTE

This procedure is to be used when filling a CWC-I containing a purple card (for iodinated water). Assumes Galley Morning Config and Overnight Config performed daily. To minimize contamination possibility, avoid touching any internal parts of QDs or connections

### EQUIPMENT PREPARATION

Unstow from designated stowage when needed:

- Towel(s)
- Disinfectant Wipes
- R-Y Hose
- Iodinated Sample Adapter (black handle)
- 3/8" Male Hose Adapter ("-2" Adapter)
- Sample/Purge Kit
- CWC-I Bags
- Timer

### A. CWC-I FILL SET UP

#### NOTE

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

1. Retrieve R-Y Hose
2. Connect red end of R-Y Hose to free end of tee attached to Chilled Water Line QD (#5) at QD bracket (see fig 5-5)

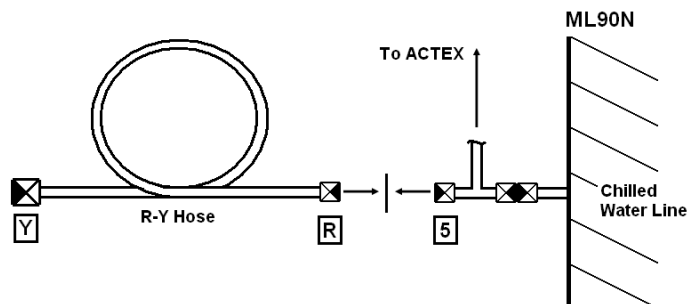


Figure 5-5.- R-Y Hose connection at ML90N.

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B. CWC-I FILL HOSE PURGE

NOTE

CWC-I FILL HOSE PURGE required only prior to first fill of mission

1. Retrieve 3/8" Male Hose Adapter ("-2" Adapter), Iodinated Sample Adapter (black handle), and Sample/Purge Kit

CAUTION

Ensure Sample Adapter valve is not open prior to mating

NOTE

Use ONLY Sample Adapter labeled for iodinated water sampling

2. Assemble Purge hardware as shown in fig 5-6

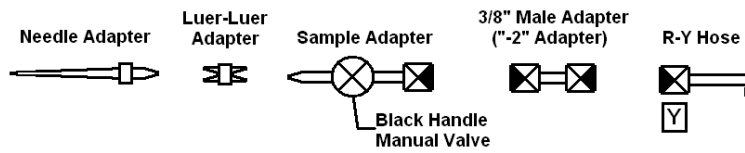


Figure 5-6.- CWC-I Fill Hose purge hardware.

3. Remove cap on Needle Adapter and attach Purge Bag

CAUTION

Assembly provides high flow.  
Throttle Sample Adapter Valve

4. Open valve on Sample Adapter and fill bag to capacity (about 12 ounces). Close valve when capacity reached
5. Disconnect Purge Bag from Needle Adapter  
Stow Purge Bag in Ziploc Bag and place in crew designated location  
Replace cap on Needle Adapter

Cont next page



C. PURGE ASSEMBLY TEARDOWN

1. De-mate all connections shown in fig 5-6  
Cap Yellow QD of R-Y Hose
2. Stow Purge Assembly hardware (place  
equipment in Ziploc Bags) in designated  
stowage location

R11L D. CWC-I FILL INITIATION  
If SPLY H2O XOVR VLV – CL (tb-bp) (Water  
Transfer Config):

1. SPLY H2O TKA OUTLET – CL (tb-CL)

ML90N If reqd, unstow R-Y Hose:  
2. Connect red end of R-Y Hose to free end of  
tee attached to Chilled Water Line QD (#5)  
at QD bracket (see fig 5-7)

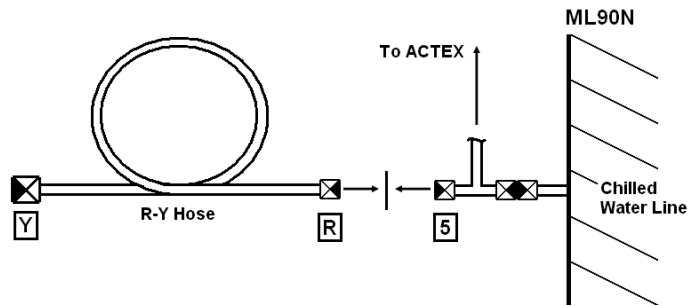


Figure 5-7.- R-Y Hose connection at ML90N.

3. Report bag barcode and serial number (located  
on CWC-I label) to MCC-H
4. Disinfect CWC-I QD and Yellow QD of R-Y Hose

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

**NOTE**  
CWC-I will begin filling as soon as  
free end of R-Y Hose connected to  
CWC-I

Cont next page

5. Set timer for 10 min  
Attach timer to Velcro square on CWC-I
6. Connect CWC-I to R-Y Hose (see fig 5-8)

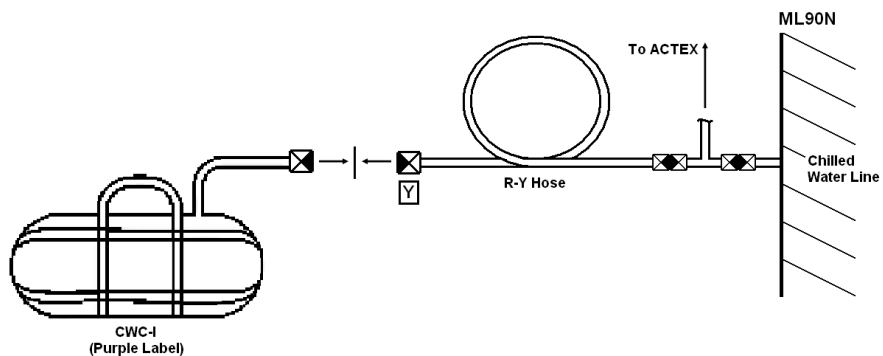


Figure 5-8.- CWC-I fill initiation.

7. Start 10 min timer

**E. CWC-I FILL TERMINATION**

After 10 min or MCC call:

ML90N

1. Disconnect CWC-I from R-Y Hose  
(see fig 5-9) and cap Yellow QD of R-Y  
Hose

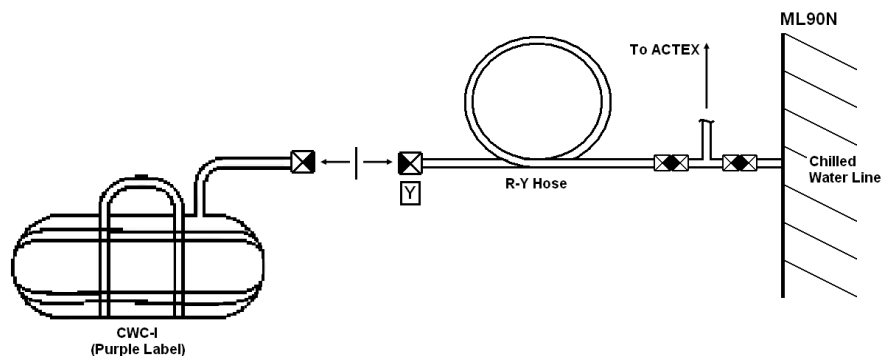


Figure 5-9.- CWC-I fill termination.

Cont next page

2. Verify purple card (for iodinated water) is visible in all three windows:  
     If sample reqd, perform CWC-I SAMPLING PROCEDURE, then proceed to step E3  
     If no sample reqd, temp stow CWC-I until transfer to ISS
3. If filling multiple CWC-I's, repeat steps D3 thru E2 for sequential fill(s)

- R11L      If SPLY H2O XOVR VLV – CL (tb-bp) (Water Transfer Config):
4. SPLY H2O TKA OUTLET – OP (tb-OP)
  5. Transfer CWC-I(s) to ISS

F. CWC-I FILL TEARDOWN

NOTE

Have towels ready to absorb any liquid released when demating QDs

- ML90N
1. Disconnect R-Y Hose from Chilled Water Line Tee QD (#5) (see fig 5-10) and cap both Red and Yellow QDs of R-Y Hose

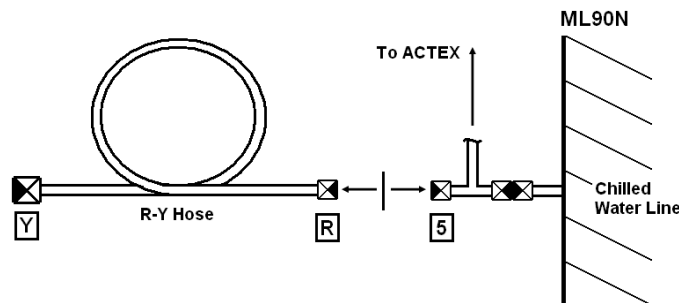


Figure 5-10.- R-Y Hose removal.

2. Temp stow R-Y Hose

After last CWC-I fill:

3. Stow R-Y Hose in designated location

CWC-I SAMPLING PROCEDURE (if reqd)

NOTE

Use ONLY sampling adapter labeled for iodinated water sampling

1. Retrieve Sample/Purge Kit and obtain Iodinated (black handle) Sample Adapter
2. Connect Sample Adapter to Sample Bag
3. Connect QD end of Sample Adapter to CWC-I. Ensure manual valve set to open position
4. Fill Sample Bag full (estimate visually) by squeezing CWC-I. When complete, close manual valve and remove Sample Bag. Fill out Sample Bag label, stow in Ziploc Bag, and place in crew-designated sample stowage location
5. Disconnect Sample Adapter from CWC-I and stow in Sample/Purge Kit. Temp stow CWC-I until transferred to ISS

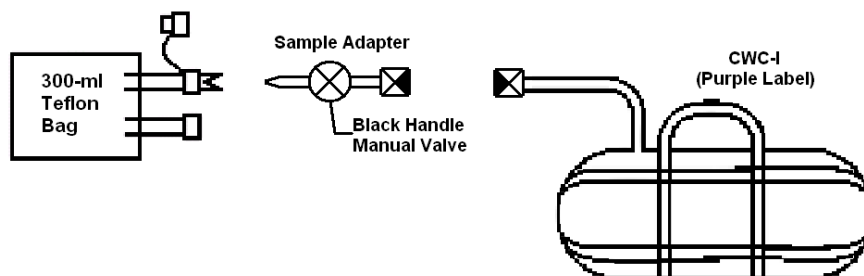


Figure 5-11.- CWC-I sample setup.

## CWC OVERBOARD DUMP

### NOTE

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

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

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

### A. DUMP PREP

#### CAUTION

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

- |                      |   |
|----------------------|---|
| ML31C                | 1. WASTE H2O DUMP ISOL VLV – CL (tb-CL)<br>√VLV – CL (tb-CL)  |
| BOB<br>CHCK          | 2. Obtain CWCs to be dumped<br>Unstow WWD filter<br>Unstow Y-Y hose   |
| WCS<br>Outbd<br>Wall | 3. Connect female end of WWD filter to Cont H2O<br>X-tie Waste QD (upper QD with yellow Velcro<br>and "WASTE" label)<br>Connect Y-Y hose to male end of WWD filter<br>Connect free end of Y-Y hose to CWC |

Cont next page

B. PRE-DUMP FDA

NOTE

Change limits via table or request MCC TMBU.

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

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
- ML31C
- CHCK  
BOB
- F. POST-DUMP RECONFIG  
1. Disconnect WWD filter from Cont H2O X-tie Waste QD and Y-Y hose from filter
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:  
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 (COOL)  
Wait until linkage can connect to the SEC(PRI) ACT (avg time ≈ 5 min), then:  
CAB TEMP CNTLR – OFF
- MD44F Pin CAB TEMP CNTL act link – SEC(PRI) ACT
- L1 CAB TEMP CNTLR – 2(1)  
sel – as reqd



## SHUTTLE CONDENSATE COLLECTION

### SETUP

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

### NOTE

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

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 dumphline and nozzle temps, otherwise dump only when MCC available to monitor. Have towels ready to absorb any liquid released when mating or demating QDs

### CAUTION

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

### 1. DUMP PREP

Obtain Payload Water Reservoirs (PWRs) to be dumped

### CAUTION

Do not detach PWR QD restraint during dump

BOB

Unstow Waste Water Dump (WWD) filter

### NOTE

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

\_\_\_\_\_

Unstow B-B hose

Unstow R-Y QD adapter

ML31C

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

Cont next page

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 B	0620520	50	250
	0620519	50	250

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) \*

Cont next page

NOTE

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

5. DUMP TERMINATION

When PWR empty:

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

6. POST-DUMP RECONFIG

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

\_\_\_\_\_

\_\_\_\_\_

BOB

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	0620520	-82	250
B	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 and SPLY H2O Dumpline Purge Device to be used after all dumps are complete

### CAUTION

Do not detach PWR QD restraint during dump

CHCK Unstow B-B hose and R-Y QD adapter  
R11L SPLY H2O DUMP ISOL VLV – CL (tb-CL)  
√VLV – CL (tb-CL)  
WCS Connect yellow end of R-Y QD adapter to Cont H2O  
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. PRE-DUMP FDA

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	90	250
	B 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) > 250
- (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)  
 WCS Disconnect R-Y QD adapter from Cont H2O X-TIE  
 Outbd POT QD  
 Wall  
 Install SPLY H2O Dumpline Purge Device into  
 CONT H2O X-TIE POT QD (lower QD with blue  
 Velcro and "POTABLE" label)

R11L SPLY H2O DUMP VLV – OP (tb-OP)  
 CRT When 'S66 SPLY H2O TEMP' msg, SUPPLY H2O  
 NOZ T A,B (two) > 250 continue:  
 R11L SPLY H2O DUMP VLV – CL (tb-CL), wait 60 sec  
 – OP (tb-OP), wait 60 sec  
 – CL (tb-CL)  
 ISOL VLV – OP (tb-OP)  
 VLV ENA/NOZ HTR – OFF  
 √VLV tb – bp

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

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

6. POST-DUMP RECONFIG  
 Disconnect B-B hose from PWR and R-Y QD  
 adapter  
 Stow empty PWR(s)  
 If additional PWR dump(s) to be performed later:  
 Temp stow B-B hose and R-Y QD adapter (place  
 equipment in Ziplock Bags)  
 If final PWR dump of flight:  
 Stow B-B hose (place in Ziplock Bag)  
 Stow R-Y QD adapter (place in Ziplock Bag)

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

SM 60 TABLE MAINT

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

**PWR FILL**

NOTE

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

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

CAUTION

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

- 2. Transfer bag(s) to orbiter galley

WATER FILL (On MCC-H Call)

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

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

SM 66 ENVIRONMENT

- CRT 4. Use SUPPLY H2O QTY A:
- 5. Log bag serial number/barcode and TKA % value before recharge. Report bag serial number/barcode to MCC-H

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 = 10% change in TKA quantity and requires ~30 min

- Galley
6. MV2 vlv → Max AMB
  7. EMU Water Recharge Bag QD →|← Orbiter Galley Aux Port

NOTE

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

CAUTION

Do not detach EMU H2O Recharge Bag QD restraint during fill

8. Set timer for 30 min  
Attach timer to Velcro square on EMU Water Recharge Bag
- CRT
9. √H2O TKA quantity decr

VERIFYING WATER FILL

After ~30 min:

SM 66 ENVIROMNENT

10. Use SUPPLY H2O QTY A:
11. Log bag serial number/barcode and TKA % value after recharge

Bag Serial Number/Barcode	H2O TKA %

NOTE

Full charge = 10% change in TKA quantity

Cont next page

- Galley
- To terminate fill:
12. EMU Water Recharge Bag ←|→ Orbiter Galley Aux Port
  13. Temp stow EMU Water Recharge Bag for transfer to ISS
  14. Repeat steps 4-13 for remaining bag(s)
- After last bag filled:
15. MV2 vlv – as reqd
- If SPLY H2O XOVR VLV – CL (tb-bp) (water transfer config):
- R11L
16. SPLY H2O TKA OUTLET – OP (tb-OP)
  17. Record fill date and quantity for bag(s) on card. Report bag(s) serial number, fill date, and quantity of bags to MCC-H as comm permits
  18. Transfer bag(s) to ISS
- E-Lk
19. Stow bag(s) in floor bins as reqd

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

(Time: 1 hr)

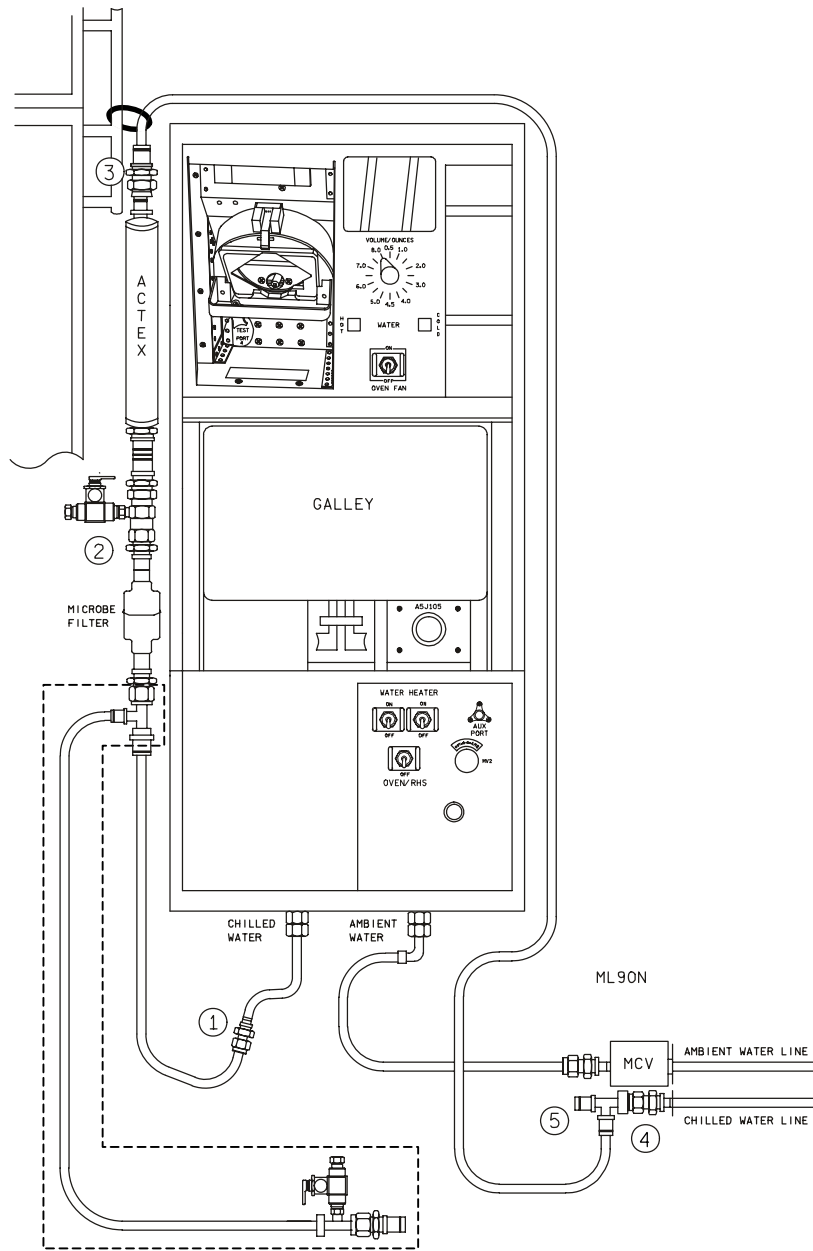
EQUIPMENT PREPARATION

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

NOTE

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

- ML90N
1. Remove tie-wrap (if present) connecting Galley Ambient and Chilled hoses  
Detach Galley Ambient and Chilled hoses from QD bracket
  2. Install MCV on Ambient (uninsulated) supply line by connecting MCV to Ambient QD at QD bracket and connecting Galley Ambient supply hose to other end of MCV (see fig 5-12)
  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 5-12)  
Ensure access to locker MF14O
  8. Circulate water through galley:  
OVEN/RHS – OFF, ON
- Galley



**NOTE**

Water Transfer Hose only present for water transfer

480350528\_112\_PNL42

Figure 5-12.- 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 | <ol style="list-style-type: none"><li>1. Remove all black Velcro/Gray Tape from Chilled line assembly and hoses<br/>Leave insulation covers in place</li></ol>  |
| ML90N          | <ol style="list-style-type: none"><li>2. Detach Galley Chilled hose (insulated) from Hose/Microbe filter (#1)<br/>Disconnect ACTEX hose from QD bracket</li><li>3. Detach Galley Ambient hose (uninsulated) from MCV<br/>Remove MCV from QD bracket<br/>Reconnect Galley Ambient and Chilled hoses to QD bracket</li><li>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)</li><li>5. Resecure Galley Ambient and Chilled hoses with tie-wrap (if present)</li><li>6. Return hardware to launch stowage location</li></ol> |

## 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, 5-22, |  
                        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  
 $\sqrt$ 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 AND INIT

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

PARAMETER NAME	C/W CH	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

- R13L If MMU GN2 SPLY ISOL VLV A tb – OP  
 2. MMU GN2 SPLY ISOL VLV A – CL (tb-CL)

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

4. O2/N2 CNTLR VLV SYS 1(2) – OP

- MO10W 5. PL N2 SYS 1,2 vlv (two) – OP

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

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

### REPRESS TERM AND RECONFIG

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

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

10. PL N2 SYS 1,2 vlv (two) – CL

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

Cont next page

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

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

PARAMETER NAME	C/W CH	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

√MCC for N2 Transfer

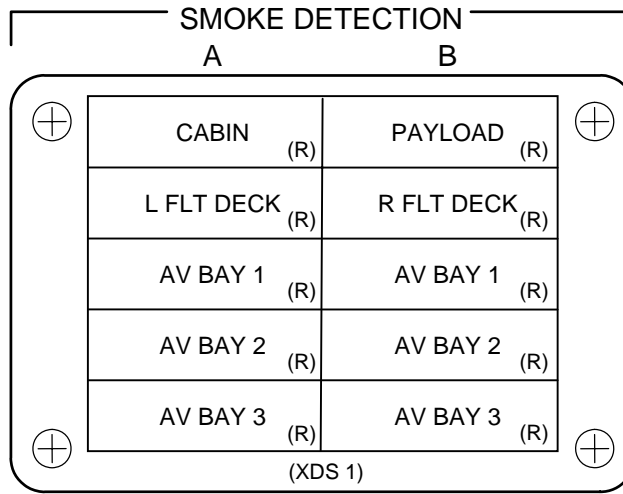
R13L 14. MMU GN2 SPLY ISOL VLV A – OP (tb-OP)

EPS

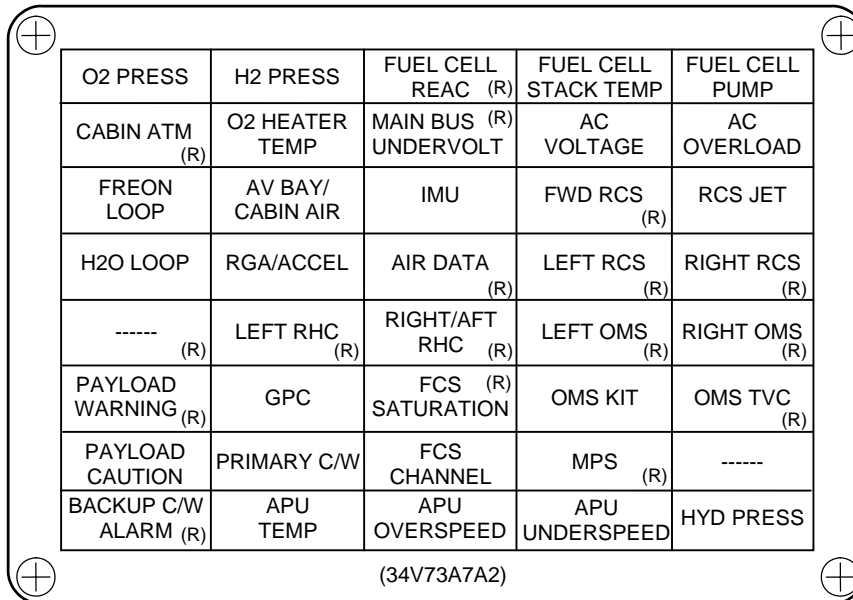
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**EPS**

# 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 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 \*

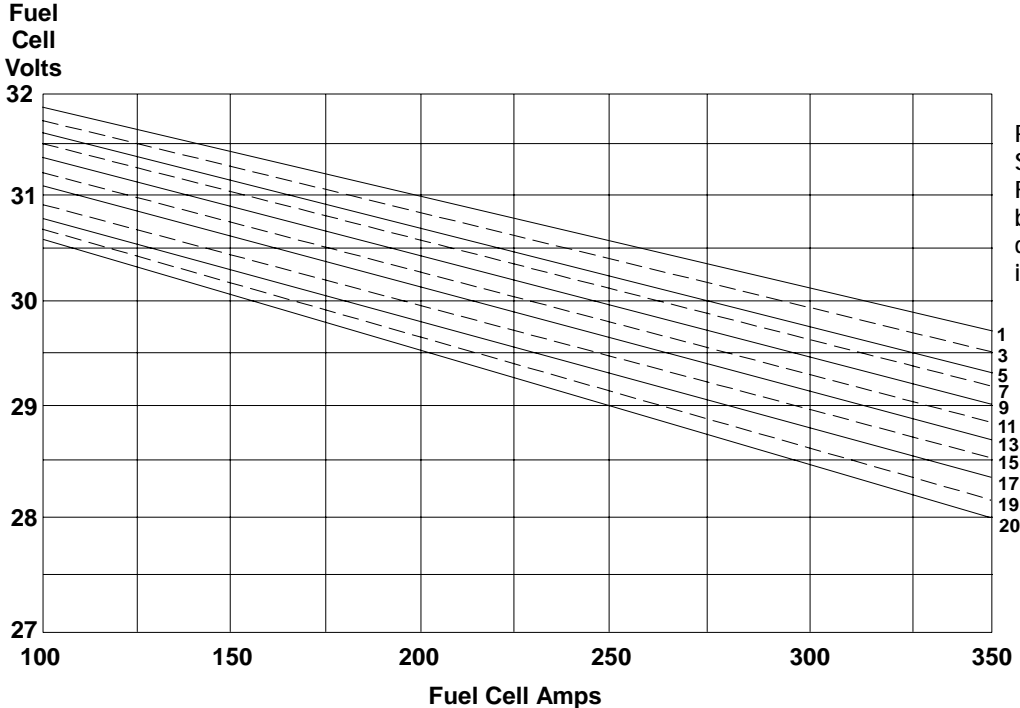
Wait 2 min  
FC PURGE VLV 1(2,3) – GPC

- 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 M

## 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 (two) – OFF, then: \*
  - \* If HTRS A(B) was in AUTO: \*
  - \* O2 TK1 HTRS B(A) – AUTO, then: \*
  - \* Go to step 6 \*
- R1 5. O2 TK1 HTRS A,B (two) – previous posn
6. O2 TK1 HTRS – RESET
7. Repeat steps 1-6 for following:  
O2 TK2 HTRS  
TK3 HTRS
- A11 O2 TK4 HTRS (if 4th tk flown)
- A15 O2 TK5 HTRS (if 5th tk flown)
8. Report results to MCC

## 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

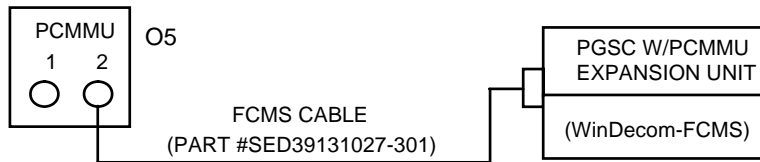
Data Cable Setup

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

Cont next page



6. Connect FCMS cable from PCMMU 2 outlet to PCMMU expansion card port on PGSC that will run WinDecom-FCMS
- ML86B:E 7. cb MNA FC PCM – cl



#### Starting WinDecom-FCMS

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

#### FCMS Application

10. Double-click 'Shuttle Apps'>'Fuel Cell Monitoring'
11. Verify data being received (data updating and GMT incrementing on FCMS display, green "GO" sign in lower right corner of PGSC display)
12. Press record button, select full rate recording option, then select OK
13. When recording complete (~12 min), notify MCC. The zip data file is in the C:\SPOCAPPS\FCMS directory

#### DEACTIVATION

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

## SSPTS OPCU ACTIVATION (OV103,105)

OPCUs require 120 V input pwr provided by ISS RPCs

Prior to OPCU activation, ISS RPCs will be enabled

OPCU telemetry is OSL when ISS RPCs are not activated

CRT

**SM 179 POWER TRANSFER**

1. VERIFY PTU MAIN BUS CONNECTIONS

A15

√PTU 1(2) tb – ON

2. ACTIVATE OPCU CONVERTER POWER

### NOTE

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

A15

OPCU 1(2) CONV – ON

3. ENABLE CREW MANUAL VOLTAGE ADJUST

### NOTE

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

A15

OPCU 1(2) V-ADJ – PNL

Repeat below action for \_\_\_\_ increments

OPCU 1(2) V-ADJ – UP(DOWN), release

CRT

√PTU 1(2) OPCU OUT VOLTS incr (decr)

4. ENABLE MCC COMMANDED VOLTAGE ADJUST

A15

OPCU 1(2) V-ADJ – CMD

┌ | | | ┌

**SSPTS OPCU DEACTIVATION (OV103,105)**

OPCU telemetry is OSL when ISS RPCs are not activated

1. DEACTIVATE OPCU CONVERTER POWER

A15            OPCU 1(2) CONV – OFF

**SSPTS APCU ACTIVATION (OV103,105)**

1. VERIFY PTU MAIN BUS CONNECTIONS

A15       √PTU 1(2) tb – ON

2. ENABLE APCU OUTPUT POWER

A15       APCU 1(2) OUTPUT – ON

3. ACTIVATE APCU CONVERTER POWER

A15       APCU 1(2) CONV – ON

CRT       SM 179 POWER TRANSFER

√PTU 1(2) APCU OUT VOLTS: 123 to 126 V  
√OUTPUT – ON

**SSPTS APCU DEACTIVATION (OV103,105)**

1. DEACTIVATE APCU CONVERTER POWER

A15       APCU 1(2) CONV – OFF

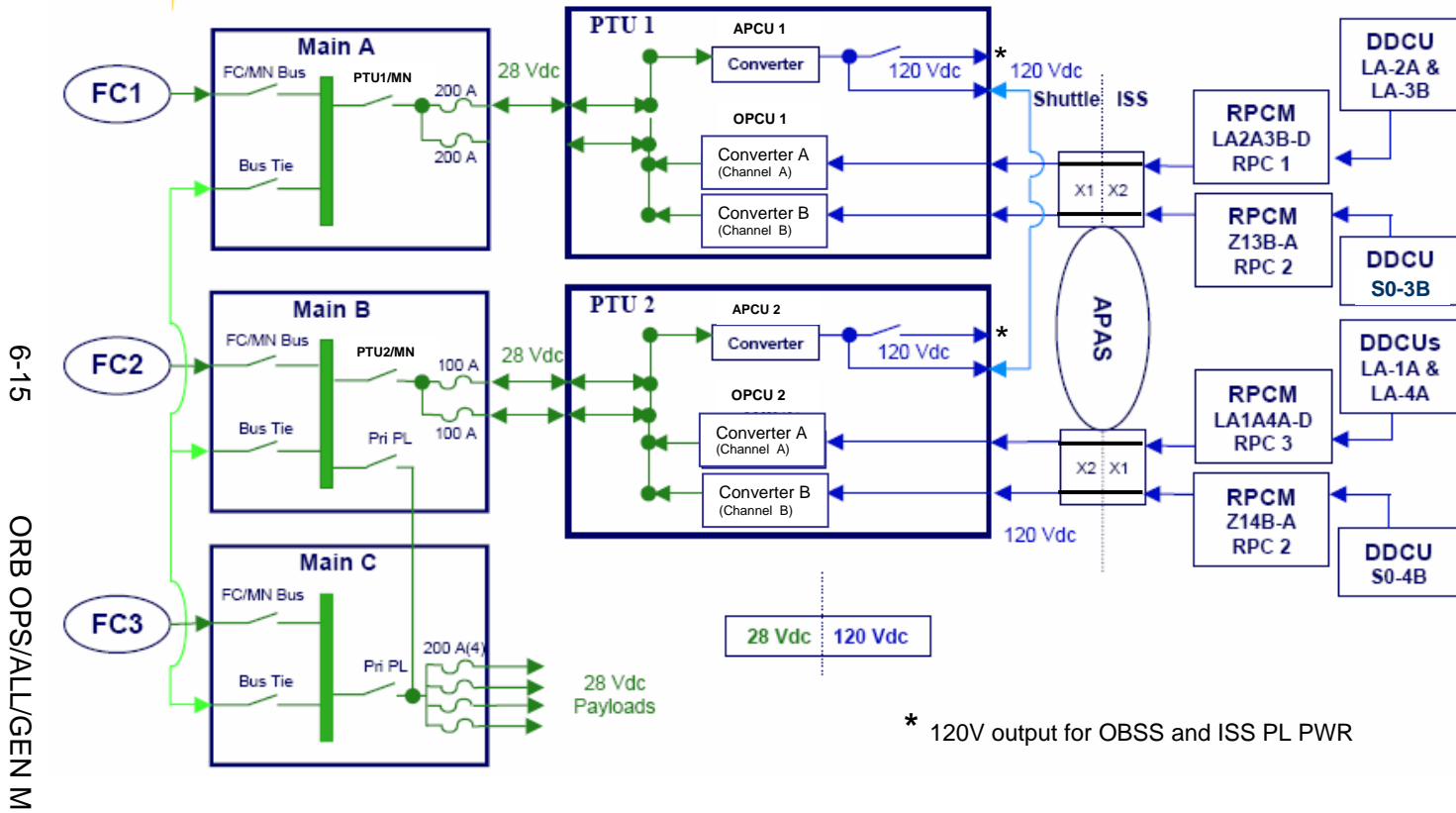
CRT       SM 179 POWER TRANSFER

√PTU 1(2) APCU OUT VOLTS: < 10 V

2. DISABLE APCU OUTPUT POWER

A15       APCU 1(2) OUTPUT – OFF

### SSPTS DIAGRAM (OV103,105)



6-15

ORB OPS/ALL/GEN M



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GNC

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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  $\leq$  0.08

SEL, ITEM 17,18 – (\*)

Wait ~1 min for new IMU  $\Delta$ ANGs

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

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

GNC 21 IMU ALIGN

CRT

- IMU 1,2,3: STAT – blank
- $\sqrt{\text{REF STAR, ITEM 13 - (*)}$
- $\sqrt{\text{TYPE, ITEM 15 - TORQUE}}$
- $\sqrt{\text{ANG 1,2,3: } \Delta X, \Delta Y, \Delta Z \leq 0.50}$
- 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 (\*)
- $\sqrt{\text{EXEC, ITEM 16 - (no *)}$
- ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (no \*)
- If not deorbit align >>

5. D/O ALIGN VERIFICATION

- When D/O align complete, mnvr to VERIF ATT (FLIGHT PLAN, Detailed Timeline), perform steps 1,2 using verif stars
- $\sqrt{\text{IMU 1,2,3 ANG } \Delta X, \Delta Y, \Delta Z < 0.1}$

- \* 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**

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

	1		2		3
ΔX( )	___.	___	( )	___.	___
ΔY( )	___.	___	( )	___.	___
ΔZ( )	___.	___	( )	___.	___

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

NOTE

Align will require 3-6 min

Report IMU align results

VERIFY GOOD IMU/IMU ALIGNMENT

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

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

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

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

**S TRK SELF-TEST, GNC 201,202,301**

Mnvr to avoid bright objects in both BOSs

**GNC 22 S TRK/COAS CNTL**

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

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

SELF-TEST – ITEM 1,2 EXEC (\*)

√S TRK -Y,-Z: SHUTTER – CL  
S PRES – (\*)  
STATUS – BITE (mom)  
SHUTTER – OP  
STATUS – ST PASS

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

STAR TRK – ITEM 3,4 EXEC (\*)

## IMU STAR OF OPPORTUNITY ALIGN

### 1. VERIFY STAR DATA

GNC 22 S TRK/COAS CNTL

- √S TABLE: TRK ID 1,2,3 for correct #s
- ANG ERR 1,2,3:  $\leq 0.08$  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
- √REF STAR, ITEM 13 – (\*)
- √TYPE, ITEM 15 – TORQUE
- √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 \*)

ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (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  
B/AUTO/PRI (loss of VERNS)

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

### NOTE

DAP in INRTL or FREE as desired for taking marks. For loss of VERNS, use B5/FREE/PRI

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

Mnvr to locate star

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

Cont next page

F6/F8 Mnv to center star in HUD boresight:  
(Center of '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  
B5/AUTO/PRI (loss of VERNs)

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

4. CONFIRMATION OF CALIBRATION

NOTE

DAP in INRTL or FREE as desired for taking  
marks. For loss of VERNs, use B5/FREE/PRI

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

Mnv to locate star

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

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

Cont next page

7-10

ORB OPS/ALL/GEN M



NOTE

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

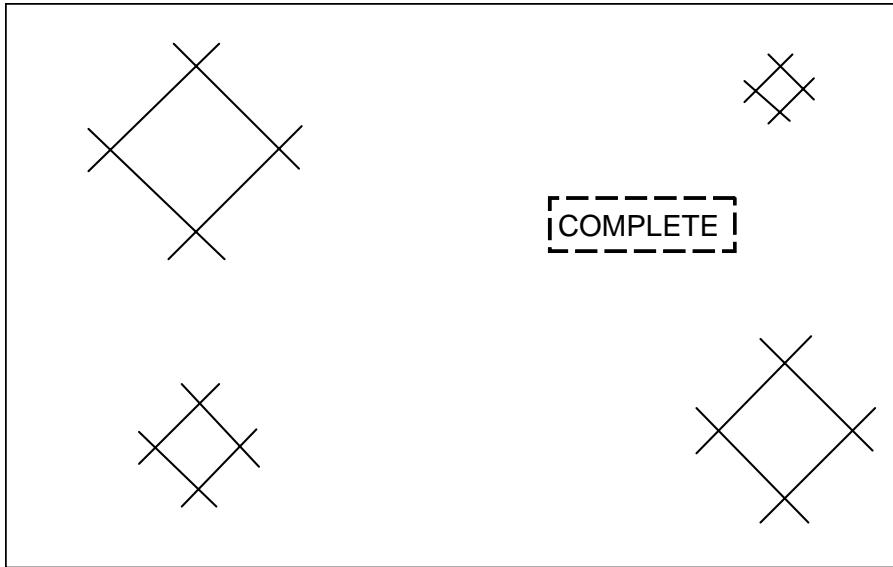
$$\sqrt{\Delta\text{BIAS}} < 0.12$$

- \* If majority of  $\Delta$ BIAS > 0.12, repeat \*
- \* steps 3 and 4. If  $\Delta$ BIAS still > 0.12, \*
- \*  $\sqrt{\text{MCC}}$  \*

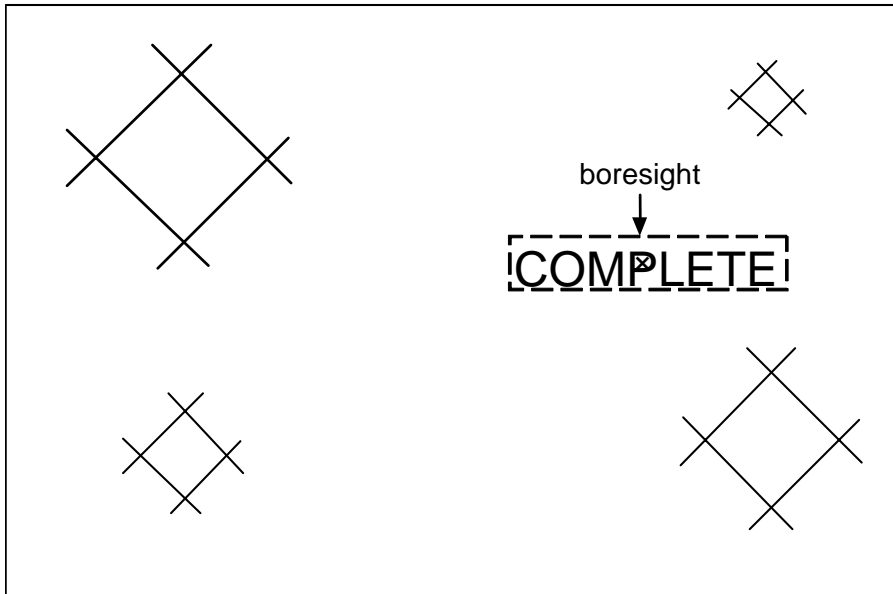
5. CLEAN UP

	COAS: DES	– ITEM 25 EXEC (*)
F6U/F8U	HUD MODE	– NORM
F3	PWR	– OFF
F6/F8	FLT CNTLR PWR	– OFF
O14,O15, O16:E	cb DDU L(R) (two)	– as reqd
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

O17 ATVC (four) – ON  
If OV103,4:

O7 TACAN 1,2,3 MODE sel (three) – GPC

O8 RA (two) – ON  
MLS (three) – ON

F3 L,R TRIM PNL (two) – ON  
HUD PWR (two) – ON

C3 √FCS CH (four) – AUTO

√DAP: A1/AUTO/VERN

If OV105:  
Perform GPS PWRUP, 7-35, for GPS 1,3 if reqd

Perform G2 TO G8 TRANSITION (DPS), then:

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

O14,O15,  
O16:F  
Go to step 7b, 7-18

Cont next page

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

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 M

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

TAC test not available for OV105.

During MLS/TAC/RA/AA test, deselect

LRU for failure indicated:

MLS,TAC,RA,AA – ‘↑’ or ‘↓’

or AA – BIAS/NULL limits exceeded

Record values of failures defined

2: GNC 40 SENSOR TEST

CRT2 √DES: (no \*)  
√STAT: blank  
√RNG,AZ,EL: no M

CONFIG FOR FREE DRIFT

F6 ADI RATE – MED  
DAP: A1/INRTL/VERN  
√R,P,Y rates  $0 \pm 0.1^\circ/\text{sec}$ , 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

STOP – ITEM 14 EXEC (\*)

If OV103,4:

O7

TACAN 1,2,3 MODE sel (three) – OFF

2. Sensor Test – RGA,ADTA

NOTE

During RGA,ADTA test, deselect LRU for failure indicated:

RGA – bias null limits exceeded,

‘↑’ or ‘↓’, or SMRD

ADTA – any ‘↑’ or ‘↓’, except temp (‘T’)

If RGA does not respond to HIGH or LOW TEST or displays ‘SMRD’ indication in STAT column:

√MCC, confirm that payload config can support

PRCS firings

Null vehicle rates

Mnvr at 0.5°/sec about appropriate axis; monitor

RGA data

If RGA responds, self-test circuitry or SMRD

| circuitry failed

If no RGA response, deselect sensor

Cont next page

CRT2

2: GNC 41 RGA/ADTA/RCS

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

Config For Free Drift

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

RGA Bias/Null Shift Test

- √R,P,Y within limits: R -0.4 to +0.4  
P/Y -0.2 to +0.2
- Refer to LIMIT VALUES TABLE, 7-23

High Test

TEST HI – ITEM 9 EXEC (\*)  
(after 10 sec, no \*)

- √No '↑' or '↓'
- If ADTA BITE, √MCC (if LOS, proceed with test)

TEST STOP – ITEM 11 EXEC (\*)

Low Test

TEST LOW – ITEM 10 EXEC (\*) (after 10 sec, no \*)

- √No '↑' or '↓'
- If ADTA BITE, √MCC (if LOS, proceed with test)

TEST STOP – ITEM 11 EXEC (\*)

DAP: A1/AUTO/VERN

Cont next page

**LIMIT VALUES TABLE**

<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

- A13/O7      3. SENSOR TEST – GPS (if reqd)  
GPS 1(2,3) PRE AMPL (two) – OFF

NOTE

√MCC if deselect of LRU for failure indicated by '↓' is reqd at end of GPS S/TEST. GPS self-test takes ~2 min to complete. 'BIT' in STAT field on SPEC 55 indicates hardware feedback and clears when test complete

Cont next page

**2: GNC 55 GPS STATUS**

√NAV – ITEM 17(18,19) (\*)

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

S/TEST – ITEM 11(12,13) EXEC (\*)

√'BIT' in STAT field after ~6 sec,

'BIT' will clear after ~2 min, FCS Checkout may be continued without waiting for completion of GPS self-test

**4. FCS MODE/CH SWITCH AND SURF TEST**

**NOTE**

During tests, FCS CH:

Fail op or fail cl – deselect failed contacts

FCS CH OVERRIDE function of a CH with failed contacts may be made operable if at least one good contact available

Proceed: √MCC when possible

FCS MODE:

Fail op – 2 op or 1 op/1 cl contacts preclude use of sw

Fail cl – 1st failure, deselect failed contact  
– 2nd failure L(R), deselect all L(R) contacts

**2: GNC 42 SWITCH/SURF**

CRT2

**NOTE**

During following tests, verify '\*' appears except as noted. If '\*' remains after releasing pb, contact failed closed

F6/F8  
C3

FLT CNTLR PWR (two) – ON

FCS CH (four) – ORIDE (wait 5 sec)

– AUTO (no \*)

Cont next page

7-24

ORB OPS/ALL/GEN M

F2/F4 PITCH pb – AUTO  
– CSS  
ROLL/YAW pb – AUTO  
– CSS  
SPDBK/THROT pb – AUTO  
BODY FLAP pb – AUTO  
L2/C3 SBTC TAKEOVER pb – push

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

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

5. ENTRY MODE SW TEST

NOTE

ENTRY MODE:

Fail op or cl – 1st, 2nd failure, deselect contact  
– 3rd failure, when in OPS 3,  
GNC 51 OVERRIDE  
– AUTO SEL – ITEM 42 EXEC (\*)

2: GNC 44 SWITCHES

CRT2

NOTE

During following tests, verify '\*' appears except as noted. If '\*' remains after releasing pb, contact failed closed

L2

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

Cont next page

6. NWS CHECK

2: GNC 45 NWS CHECK

NOTE

During following tests, verify POSITION  
A,B,C (three) values remain  $\sim 0.00^\circ$

$\sqrt{\text{POSITION A,B,C (three): } 0.00^\circ \pm 0.75^\circ}$

- a. NWS1  
L2 NWS – 1
- CRT2  $\sqrt{\text{NWS1 SYS SEL (*)}$   
 $\sqrt{\text{HYD PRESS HIGH (no *)}$   
 $\sqrt{\text{CURRENT: 1.00 to 3.15 ma}}$
- F3 ENABLE – ITEM 1 EXEC (\*)  
 $\sqrt{\text{NWS1 ENABLE A,B (two) (*)}$   
 $\sqrt{\text{NWS FAIL It – NWS FAIL It on}}$
- CRT2 RIGHT TURN – ITEM 2 EXEC (\*)  
 $\sqrt{\text{NWS1 CURRENT: 3.75 to 6.25 ma}}$
- LEFT TURN – ITEM 3 EXEC (\*)  
 $\sqrt{\text{NWS1 CURRENT: -4.25 to -1.75 ma}}$   
STOP – ITEM 4 EXEC (\*)  
 $\sqrt{\text{NWS1 CURRENT: 1.00 to 3.15 ma}}$
- b. NWS2  
L2 NWS – 2
- CRT2  $\sqrt{\text{NWS2 SYS SEL (*)}$   
 $\sqrt{\text{HYD PRESS HIGH (no *)}$   
 $\sqrt{\text{CURRENT: 1.00 to 3.15 ma}}$
- F3 ENABLE – ITEM 1 EXEC (\*)  
 $\sqrt{\text{NWS2 ENABLE A,B (two) (*)}$   
 $\sqrt{\text{NWS FAIL It – NWS FAIL It on}}$

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**

- CRT2  
F5  
CRT2
- a. THC  
Deselect L THC:  
THC L DES – ITEMS 1,2,3 EXEC (\*)  
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: A/E: 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

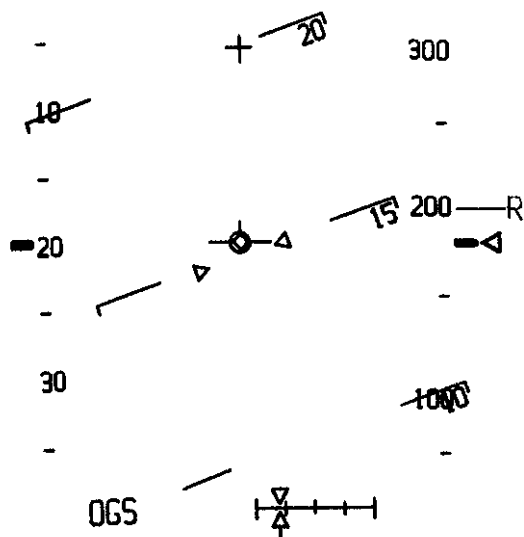
F6/F8 √Readouts for L(R) HUD DATA BUS 1,2(3,4)

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
- BRAKES (three) – OFF
- O17 ATVC (four) – OFF
- If GPS self-test performed:
  - If OV103:
    - A13 GPS PRE AMPL (two) – MNC
  - If OV104:
    - A13 GPS PRE AMPL (two) – ON
  - If OV105:
    - O7 GPS 1(2,3) PRE AMPL (two) – ON

**2: GNC 55 GPS STATUS**

- √S/TEST '↑'; if '↓' √MCC (if LOS, deselect GPS)
- INIT – ITEM 14(15,16) EXEC (\*)
- √MODE – INIT
- NAV – ITEM 17(18,19) EXEC (\*)
- √MODE – INS
- If reqd, go to GPS PWRDN, 7-35

## AFT CONTROLLER C/O

### 1. POWER UP

**GNC 25 RM ORBIT**

Deselect A THC:

THC A DES – ITEM 4,5,6 EXEC (\*)

O14:E      √cb MNA DDU AFT – cl  
 O16:E          √MNC DDU AFT – cl  
 A6U         FLT CNTLR PWR – ON

### 2. AFT DDU

O16:E      cb MNC DDU AFT – op  
 (Wait 5 sec)  
             cb MNC DDU AFT – cl

O14:E      cb MNA DDU AFT – op  
 (Wait 5 sec)  
             cb MNA DDU AFT – cl

### 3. AFT THC

A THC – deflect in each axis

√THC: '+' and '-'

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 (two) – MNC  
  
If OV104:  
A13 GPS PRE AMPL (two) – ON  
  
If OV105:  
O7 GPS 1(2,3) PRE AMPL (two) – ON
2. PWR UP GPS RECEIVER  
  
\* If GPS just PWRed off, wait \*  
\* at least 30 sec \*  
  
A13/O7 GPS 1(2,3) PWR – ON  
√ENCRYPT – NORMAL  
Wait at least 30 sec  
GNC I/O RESET
3. INITIALIZE GPS RECEIVER  
GNC 55 GPS STATUS  
√NAV – ITEM 17(18,19) (\*)  
INIT – ITEM 14(15,16) EXEC (\*)  
√MODE – INIT  
NAV – ITEM 17(18,19) EXEC (\*)  
√MODE – INS

## GPS PWRDN

1. CHECK GPS RECEIVER MODE  
SPEC 55 GPS STATUS  
√NAV – ITEM 17(18,19) (\*)
2. PWR OFF GPS RECEIVER  
A13/O7 GPS 1(2,3) PWR – OFF
3. PWR OFF GPS ANTENNA PRE-AMPS  
GPS 1(2,3) PRE AMPL (two) – OFF

## GPS SELF-TEST, GNC 201,202,301,801

- A13/O7
1. GPS ANTENNA PRE-AMP CONFIG  
GPS 1(2,3) PRE AMPL (two) – OFF
  2. PWR UP GPS RECEIVER (if reqd)
    - \* If GPS just PWRD off, wait \*
    - \* at least 30 sec \*
- A13/O7
- GPS 1(2,3) PWR – ON  
Wait at least 30 sec  
GNC I/O RESET
3. GPS SELF-TEST
    - 2: GNC 55 GPS STATUS
    - √NAV – ITEM 17(18,19) (\*)  
If “RPF” in STAT field, √MCC (if LOS, proceed with test)
    - S/TEST – ITEM 11(12,13) EXEC
    - √“BIT” in STAT field after ~6 sec  
Wait for “BIT” to clear after ~2 min
    - √S/TEST ‘↑’; if ‘↓’ deselect GPS
  4. PWR ON GPS ANTENNA PRE-AMPS
    - If OV103:  
A13 GPS PRE AMPL (two) – MNC
    - If OV104:  
A13 GPS PRE AMPL (two) – ON
    - If OV105:  
O7 GPS 1(2,3) PRE AMPL (two) – ON
  5. INITIALIZE GPS RECEIVER
    - GNC 55 GPS STATUS
    - INIT – ITEM 14(15,16) EXEC (\*)
    - √MODE – INIT
    - NAV – ITEM 17(18,19) EXEC (\*)
    - √MODE – INS

## GPS INCORPORATION

- 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, ASA (four) – OFF  
O16  
C3 √FCS CH (four) – Auto  
R2 HYD CIRC PUMP (three) – OFF
2. Initial Elevon Positioning  
Perform G2 TO G8 TRANSITION, steps 1-5 (DPS)  
C3 FCS CH 1,2,3 – OFF  
O14,O15, ASA (four) – ON  
O16  
R2 HYD CIRC PUMP X – ON  
CRT2 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, step 2 (DPS),  
then:  
C3 FCS CH 1,2,3 – AUTO  
Perform G2 TO G8 TRANSITION, step 5 (DPS),  
then:  
√Elevon positions

Cont next page

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 M

**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 M

## 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 ADI RATE (two) – MED (1 deg/sec)  
 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)  
√L,R OMS TK ISOL (four) – OP (tb-OP)

Otherwise:

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

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

CRT

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 [ ] [ ] [ ] [ ]

TV ROLL 5 [ ] [ ] [ ] [ ]

+X

-X

MULTI-AXIS

TRIM LOAD P 6 ( ) [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

LY 7 ( ) [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

RY 8 ( ) [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

WT 9 [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

TIG 10 [ ] [ ] / [ ] [ ] [ ] [ ] : [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

TGT PEG 7 ΔVX 19 ( ) [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

ΔVY 20 ( ) [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

ΔVZ 21 ( ) [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

BURN ATT

R 24 [ ] [ ] [ ] [ ]

P 25 [ ] [ ] [ ] [ ]

Y 26 [ ] [ ] [ ] [ ]

ΔVTOT [ ] [ ] [ ] [ ] [ ] [ ]

TGO [ ] [ ] [ ] [ ] [ ] [ ]

VGO X ( ) [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

VGO Y ( ) [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

VGO Z ( ) [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

HA [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

HP [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

TGT [ ] [ ] [ ] [ ] [ ] [ ] ( ) [ ] [ ] [ ] [ ] [ ]

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

L GPC OP CL

A [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

B [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

R GPC OP CL

A [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

B [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

-X RCS BURNS:

BURN ATT LVLH ATT

P 15 [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

Y 16 [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

OM 17 [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

ORBIT BURN MONITOR

GPC FILL-INS ( ) ( )

CRIT BURN

NON-CRIT BURN

MAX TIG SLIP \_\_\_ MIN.

DO NOT UPDATE TIG

UPDATE TIG AFTER \_\_\_ MIN.

NOTES

9-5 ORB OPS/ALL/GEN M

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

OMS BOTH 1	<input type="checkbox"/>	<input type="checkbox"/> +X <input type="checkbox"/> -X MULTI-AXIS	BURN ATT		ΔVTOT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L 2	<input type="checkbox"/>		R 24	<input type="checkbox"/>	TGO	<input type="checkbox"/>	:	<input type="checkbox"/>	<input type="checkbox"/>
R 3	<input type="checkbox"/>		P 25	<input type="checkbox"/>	VGO X	<input type="checkbox"/>	( )	<input type="checkbox"/>	<input type="checkbox"/>
RCS SEL 4	<input type="checkbox"/>		Y 26	<input type="checkbox"/>	VGO Y	<input type="checkbox"/>	( )	<input type="checkbox"/>	<input type="checkbox"/>
TV ROLL 5	<input type="checkbox"/>			VGO Z	<input type="checkbox"/>	( )	<input type="checkbox"/>	<input type="checkbox"/>	
TRIM LOAD P 6	<input type="checkbox"/>				HA	<input type="checkbox"/>	<input type="checkbox"/>	HP	<input type="checkbox"/>
LY 7	<input type="checkbox"/>				TGT	<input type="checkbox"/>	( )	<input type="checkbox"/>	<input type="checkbox"/>
RY 8	<input type="checkbox"/>								
WT 9	<input type="checkbox"/>								
TIG 10	<input type="checkbox"/>								
TGT PEG 7									
ΔVX 19	<input type="checkbox"/>								
ΔVY 20	<input type="checkbox"/>								
ΔVZ 21	<input type="checkbox"/>								

OVS GMBL CK:		<b>NOTES</b>	
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"/>		

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

MAX TIG SLIP ___ MIN.	<input type="checkbox"/>	DO NOT UPDATE TIG
	<input type="checkbox"/>	UPDATE TIG AFTER ___ MIN.

<b>NOTES</b>
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RCS

RCS HOT FIRE TEST .....	10-2
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VRCS PTC .....	10-9
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MULTI-AXIS RCS BURN, MM202.....	10-14
LOSS OF VERNIERS .....	10-16
RECOVERY OF VERNIERS.....	10-17
RCS REGULATOR RECONFIG .....	10-18

**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 – MED  
F6/F8 FLT CNTLR PWR – ON

### GNC 23 RCS

CRT RCS FWD – ITEM 1 EXEC (\*)  
MANF VLVS STAT OVRD  
√1 OP – ITEM 40  
√2 OP – ITEM 41  
3 CL – ITEM 42 EXEC  
4 CL – ITEM 43 EXEC  
JET DES F2U – ITEM 21 EXEC (\*)

Cont next page



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

### 1. RCS BURN PREP

O14:F,     √Pri RJD LOGIC,DRIVER (sixteen) – ON  
O15:F,  
O16:F

O14:E,     √cb DDU (six) – cl  
O15:E,  
O16:E

GNC 55 GPS STATUS

√GPS TO NAV – INH (\*)

### 2. LOAD TGT DATA AND MNVR TO BURN

ATT  
C3         DAP: B1/AUTO/VERN(PRI)

GNC UNIV PTG

CNCL – ITEM 21 EXEC  
GNC, OPS 202 PRO

1: GNC ORBIT MNVR EXEC

2: GNC SYS SUMM

Enter or verify TGT DATA per  
ORB MNVR PAD  
LOAD – ITEM 22 EXEC  
TIMER – ITEM 23 EXEC

√BURN DATA per PAD  
MNVR – ITEM 27 EXEC (\*)

### 3. BURN EXEC

TIG-3:00  
F6(F8)     ADI ERR – MED  
            RATE – HI  
            ATT – INRTL

√ADI ATT, then:  
ATT – REF  
REF pb – push

F6(F8)     FLT CNTLR PWR – ON  
C3         DAP TRANS: NORM/PULSE/PULSE

TIG-0:30     DAP: B1/INRTL/PRI

TIG    THC     Trim VGOs < 0.2 fps

Cont next page



F6(F8)  
CRT  
C3

4. POST BURN RECONFIG  
FLT CNTLR PWR – OFF  
GNC, OPS 201 PRO  
DAP TRANS: PULSE/PULSE/PULSE  
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 -X RCS BURN, MM202**

1. RCS BURN PREP

O14:F,     √Pri RJD LOGIC,DRIVER (sixteen) – ON  
O15:F,  
O16:F

O14:E,     √cb DDU (six) – cl  
O15:E,  
O16:E

GNC 55 GPS STATUS

√GPS TO NAV – INH (\*)

2. MNVR TO BURN ATT AND LOAD TGT DATA

C3         DAP: B1/AUTO/VERN(PRI)

GNC UNIV PTG

Perform Auto Mnvr to Burn Att,  
TGT ID – ITEM 8 +2 EXEC  
BODY VECTOR – ITEM 14 +5 EXEC

	Posigrade Heads Up	Retrograde Heads Up	Burn Att from MNVR PAD
P – ITEM 15	+276.0	+280.0	_____
Y – ITEM 16	+0.0	+0.0	_____
OM – ITEM 17	+180.0	+0.0	_____

Init TRK – ITEM 19 EXEC (CUR-\*)

GNC, OPS 202 PRO

1: GNC ORBIT MNVR EXEC

2: GNC SYS SUMM

Enter or verify TGT DATA per  
ORB MNVR PAD

LOAD – ITEM 22 EXEC

TIMER – ITEM 23 EXEC

√BURN DATA per PAD

Cont next page

NOTE

Ignore computed attitude,  
perform burn in current attitude

- TIG-3:00
3. BURN EXEC  
ADI ERR – MED  
RATE – HI  
ATT – LVLH  
√ADI ATT
- |   | Posigrade<br>Heads Up | Retrograde<br>Heads Up | Burn Att from<br>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

### 1. RCS BURN PREP

O14:F,     √Pri RJD LOGIC,DRIVER (sixteen) – ON  
O15:F,  
O16:F

O14:E,     √cb DDU (six) – cl  
O15:E,  
O16:E

GNC 55 GPS STATUS

√GPS TO NAV – INH (\*)

### 2. 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     DAP: B1/AUTO/PRI

TIG       If VGO Z neg:  
|    Z,X,Y THC sequence  
If VGO Z not neg:  
  X,Y,Z THC sequence

THC: Trim VGOs < 0.2 fps

Cont next page

3. POST BURN RECONFIG

FLT CNTLR PWR – OFF  
GNC, OPS 201 PRO  
DAP: VERN  
DAP: A/AUTO

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

4. RECONFIG FOR GROUP B(C)

If Group B(C) PWRDN:  
Pri RJD LOGIC, DRIVER (sixteen) – OFF  
RJDA 1A L2/R2 MANF DRIVER – ON

O14:F,  
O15:F,  
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**

GNC SYS SUMM 2

07/08

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 \_\_\_\_\_**

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-X													
MULTI-AXIS													
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R 3	<table border="1"><tr><td></td><td></td><td></td></tr></table>												
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	WT 9	<table border="1"><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>											
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BURN ATT

R 24		
P 25		
Y 26		

ΔVTOT 

			.
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TGO 

	:	
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VGO X 

( )			.
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VGO Y 

( )			.
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VGO Z 

( )			.
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TGT HA 

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 HP 

( )		
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MAX TIG SLIP \_\_\_ MIN.


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

<u>NOTES</u>

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

OMS BOTH 1	<input type="checkbox"/>	<input type="checkbox"/> +X <input type="checkbox"/> -X MULTI-AXIS	BURN ATT	<table border="1"> <tr><td>R</td><td>24</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>P</td><td>25</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>Y</td><td>26</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </table>	R	24	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	P	25	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Y	26	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<table border="1"> <tr><td>ΔVTOT</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td>.</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> <tr><td>TGO</td><td><input type="checkbox"/></td><td>:</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td></tr> </table>	ΔVTOT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	.	<input type="checkbox"/>	<input type="checkbox"/>	TGO	<input type="checkbox"/>	:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																															
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OMS HE REG TEST: <input type="checkbox"/> NONE <table border="1"> <tr> <td></td><td>L</td><td></td><td></td><td>R</td><td></td><td></td><td></td> <td colspan="2">-X RCS BURNS:</td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td>GPC</td><td>OP</td><td>CL</td><td>GPC</td><td>OP</td><td>CL</td><td>CL</td> <td>P 15</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td>R</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td> </tr> <tr> <td>A</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td> <td>Y 16</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td>P</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td> </tr> <tr> <td>B</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td><input type="checkbox"/></td> <td>OM 17</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td><td>Y</td><td><input type="checkbox"/></td><td><input type="checkbox"/></td> </tr> </table>															L			R				-X RCS BURNS:							GPC	OP	CL	GPC	OP	CL	CL	P 15	<input type="checkbox"/>	<input type="checkbox"/>	R	<input type="checkbox"/>	<input type="checkbox"/>	A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Y 16	<input type="checkbox"/>	<input type="checkbox"/>	P	<input type="checkbox"/>	<input type="checkbox"/>	B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	OM 17	<input type="checkbox"/>	<input type="checkbox"/>	Y	<input type="checkbox"/>	<input type="checkbox"/>
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<b>NOTES</b>  																																																																					

10-20

ORB OPS/ALL/GEN M

SEP MANEUVER

SEP MANEUVER..... 11-2

**SEP  
MNVR**

11-1

ORB OPS/ALL/GEN M

## SEP MANEUVER

SEP  
MNVR

- A6U
1. SET UP AFT STATION  
√SENSE -Z  
DAP: A1/INRTL/PRI  
DAP TRANS: as reqd
- O14:E,  
O16:E
- √cb DDU AFT (two) – cl
- FLT CNTLR PWR – ON
2. OBTAIN VISUAL CONTACT THRU OVHD WINDOW  
DAP ROT: as reqd  
RHC: as reqd  
  
When adequate visual contact obtained,  
DAP ROT: DISC/DISC/DISC
3. NULL CLOSING RATE  
THC: +Z (out)  
As reqd to null closing rate
- 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

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

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

1. If activating OCA Router PGSC, go to OCA SETUP, 12-8

2. Unstow (if not pre-routed):

PGSCs  
PCMMU Docking Station  
DC Pwr cables  
DC Pwr Sply cables (for laptops)  
Dock DC Pwr Sply cable (for Docking Station)  
DC Pwr Supplies, 28VDC (emerald)

If WinDecom to be run, unstow:

PCMMU data cable (if not prerouted)  
RS-232 Y data cable (if reqd)  
RS-422 Y data cable (if reqd)  
RS-422 PCMCIA cards, adapter boxes (if reqd)

PWR  
SPLY

3. √DC PWR SPLY PWR sw1 – OFF

4. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate DC Util Pwr outlet/sw to use

5. √DC UTIL PWR – OFF

### NOTE

If needed, reference PGSC figures 12-1 thru 12-4 to identify PGSC ports, connectors

6. Connect PGSC DC PWR cable from DC Util Pwr outlet to DC Pwr Sply input (J1)  
Connect DC PWR SPLY cable from DC Pwr Sply output (J2) to PGSC pwr port (align red dot on pwr cable with red dot on PGSC/Docking Station pwr port)

Cont next page

- ┌ | | | ┌
7. ✓PGSC fan (on left side of PGSC) not obstructed
  8. DC UTIL PWR – ON
  - PWR SPLY 9. DC PWR SPLY PWR sw – ON
  10. Verify DC PWR SPLY output pwr LED is lit
  11. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-7, then:
  - PGSC 12. ✓Windows shut down
  13. Repeat steps 3 thru 11 for each PGSC to be activated
  14. If PGSC to be networked, perform PGSC NETWORK, A. SETUP, 12-25 >> |
  - PGSC 15. PGSC pwr – on

Cont next page

12-4

ORB OPS/ALL/GEN M

└ | | | └

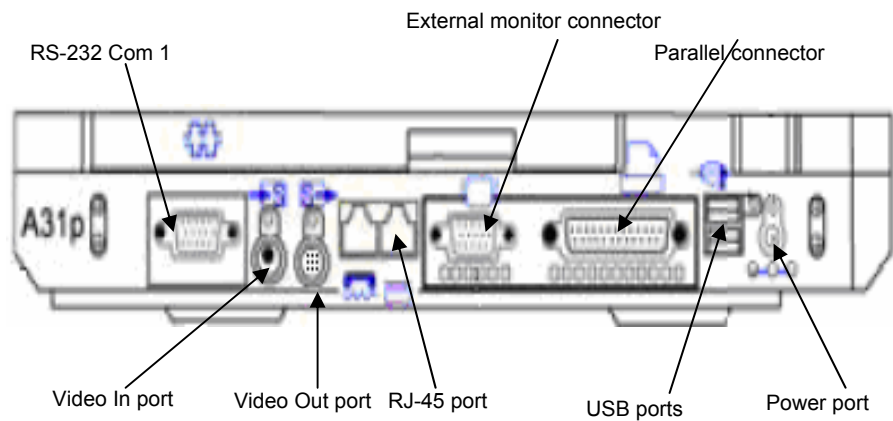


Figure 12-1.- PGSC without Docking Station.

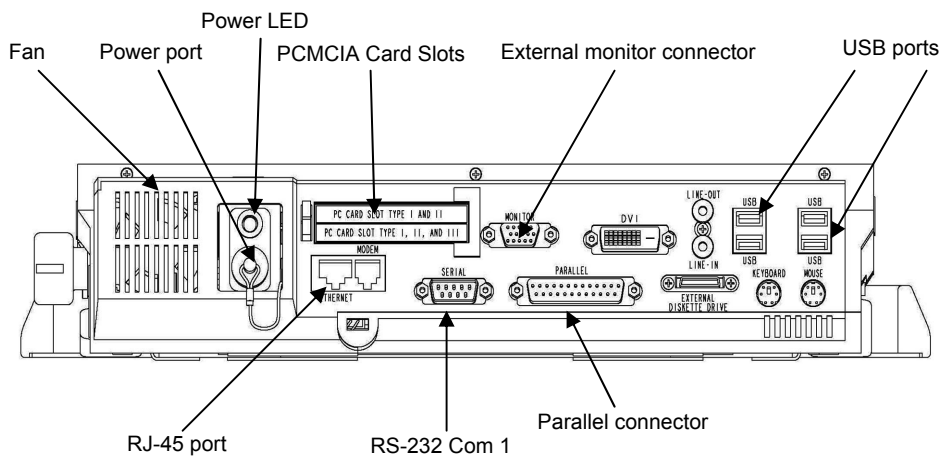


Figure 12-2.- Back of Docking Station.

## OCA AND PCMMU DOCKING STATION CARDS

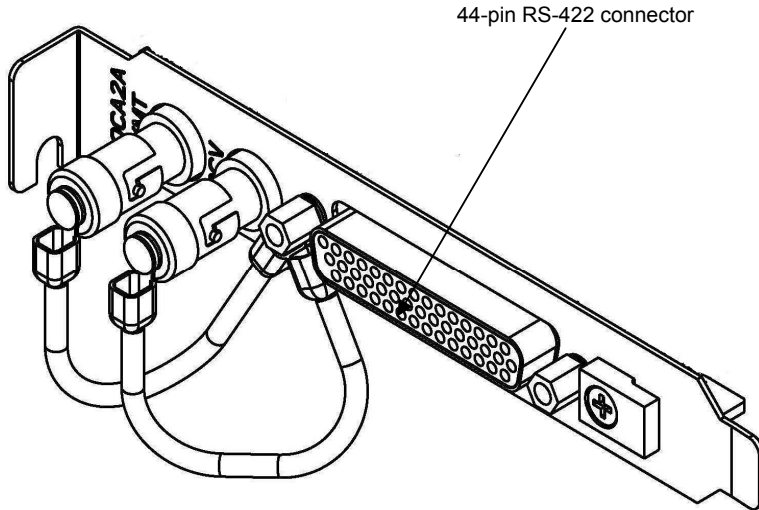


Figure 12-3.- OCA Docking Station card.

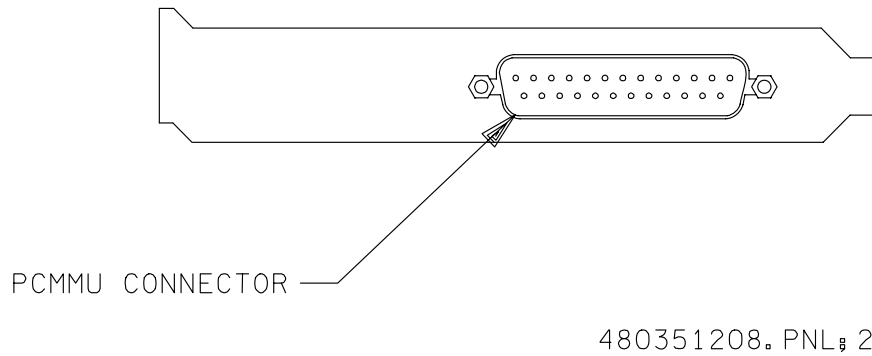


Figure 12-4.- PCMMU Docking Station card.

## PGSC HARD DISK LATE UPDATE

### NOTE

Late Update disk is intended  
for STS PGSC load only  
(i.e., not OCA Router)

Procedure assumes PGSCs  
already connected for pwr

- PGSC
1. √PGSC pwr – on
  2. Insert disk containing late PGSC updates and verify Windows recognizes disk (e.g., listen for short tone played by Windows or verify disk can be viewed in My Computer)  
  
Double-click 'Shuttle Apps'>'Late PGSC Update' to run Late Update program
  3. If referred to this procedure from OCA SETUP or PGSC ACT, follow instructions on PGSC monitor but shut down PGSC (versus restart) >>
  4. Follow instructions on PGSC monitor

## OCA SETUP

1. Unstow:
  - OCA Router PGSC
  - OCA Docking Station
  - KFX PGSC
  - DC Pwr cables (if not prerouted)
  - PGSC DC Pwr Sply cable (if not prerouted)
  - Dock DC Pwr Sply cable (if not prerouted)
  - A31p DC Pwr Supplies (2)
  - OCA I/F cable (if not prerouted)
- Docking Station (OCA) 2. ✓Blue knob (located on side of Docking Station) in Unlock position (i.e., most counterclockwise position)

### NOTE

Docking of PGSC to Docking Station should be performed over firm/flat surface

- PGSC 3. Place PGSC over blue interface plate of Docking Station ensuring bottom corners of PGSC are against two corners of blue interface plate. Move Velcro tab that is attached to PGSC's hard drive so that it does not get caught between underside of PGSC and Docking Station
4. Push down on lid to lock PGSC to Docking Station (listen for 'click' sound). Docking Station cover will slide towards PGSC
5. Verify PGSC does not separate from Docking Station
  - \* If separation occurs: \*
  - \* a. Place PGSC/Docking Station assy on \*
  - \* its side \*
  - \* b. Press simo on PGSC lid and on back of \*
  - \* Docking Station near area of locking \*
  - \* mechanism (listen for 'click' sound) \*
  - \* c. Verify PGSC does not separate from \*
  - \* Docking Station \*

Cont next page



Docking  
Station

6. Turn blue knob clockwise to Lock position

7. Config switches for Ku-band file xfer:

√MCC for:

Ku-band rate \_\_\_\_\_

Pnl location of:

PDIP Pwr cb

KuBand Rate sw

cb PDIP PWR 2 KU BAND RLY – cl

Ku BAND RATE – LO(HI)

8. Connect OCA I/F cable to OCA card (in OCA Router Docking Station) and Orbiter interfaces as follows:

P1 → OCA card 44-pin connector

P2 → L12 PDIP 1 Ku/J4

P3 → L10 DTV MUX, BYPFER CLOCK

P4 → L10 DTV MUX, BYPFER DATA

9. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate DC Util Pwr outlet/sw to use for OCA Router pwr

10. √DC UTIL PWR – OFF

11. Per PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)

a. Connect DC PWR cable from DC Util Pwr outlet to DC Pwr Sply input J1

b. Connect Docking Station DC Pwr Sply Cable from DC Pwr Sply output J2 to Docking Station pwr port J1 (align red dot on pwr cable connector to red dot on Docking Station pwr port)

12. DC UTIL PWR – ON

PWR  
SPLY

13. DC PWR SPLY PWR sw – ON

14. Verify Pwr Sply's output pwr LED is lit

Cont next page

- Docking Station 15. Verify Docking Station's pwr LED (next to pwr port) is lit

NOTE

PGSC with Docking Station can be pwr'd on/off from either PGSC pwr button or Docking Station pwr button

- PGSC 16. PGSC pwr – on

- Docking Station 17. Verify Docking Station light “” (located near Docking Station pwr button) is lit

18. Verify data rate:

Sel Start > 'OCA Control Panel Applet'  
√'OCA Control Panel App' display on desktop  
In 'OCA-FLIGHT VC-2E' section of 'OCA Control Panel App' display:  
√SEND – 2(4)M

\* If send rate out of config: \*  
\* Sel 'OCA Port Select'>'OCA \*  
\* Transmit Port and Rate'>'RS-422' \*

Docking  
Station

6. Turn blue knob clockwise to Lock position

7. Config switches for Ku-band file xfer:

√MCC for:

Ku-band rate \_\_\_\_\_

Pnl location of:

PDIP Pwr cb

KuBand Rate sw

cb PDIP PWR 2 KU BAND RLY – cl

Ku BAND RATE – LO(HI)

8. Connect OCA I/F and AMS OCA ADAPT cables to OCA card (in OCA Router Docking Station) and Orbiter interfaces as follows:

OCA I/F P1 → OCA card 44-pin connector

OCA I/F P2 → AMS OCA ADAPT J2

OCA I/F P3 → L10 DTV MUX, BYPFR CLOCK

OCA I/F P4 → L10 DTV MUX, BYPFR DATA

AMS OCA ADAPT P4 → L12 PDIP 1 Ku/J4

9. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate DC Util Pwr outlet/sw to use for OCA Router pwr

10. √DC UTIL PWR – OFF

11. Per PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)

a. Connect DC PWR cable from DC Util Pwr outlet to DC Pwr Sply input J1

b. Connect Docking Station DC Pwr Sply Cable from DC Pwr Sply output J2 to Docking Station pwr port J1 (align red dot on pwr cable connector to red dot on Docking Station pwr port)

12. DC UTIL PWR – ON

PWR  
SPLY

13. DC PWR SPLY PWR sw – ON

14. Verify Pwr Sply's output pwr LED is lit

Cont next page

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TEMP 12-9 ORB OPS/134/GEN M,10

- Docking Station 15. Verify Docking Station's pwr LED (next to pwr port) is lit

NOTE

PGSC with Docking Station can be pwr'd on/off from either PGSC pwr button or Docking Station pwr button

- PGSC 16. PGSC pwr – on

- Docking Station 17. Verify Docking Station light “” (located near Docking Station pwr button) is lit

18. Verify data rate:

Sel Start > 'OCA Control Panel Applet'  
√'OCA Control Panel App' display on desktop  
In 'OCA-FLIGHT VC-2E' section of 'OCA Control Panel App' display:  
√SEND – 2(4)M

\* If send rate out of config: \*  
\* Sel 'OCA Port Select'>'OCA \*  
\* Transmit Port and Rate'>'RS-422' \*

## OCA DOWNLINK VIA GROUND CMD

### 1. MOVE FILE(S) TO DOWNLINK DIRECTORIES

#### NOTE

Files downlinked via ground cmd  
unless MCC instructs otherwise

See OCA DIRECTORY STRUCTURE, 12-12  
See OCA FILENAMES, 12-13, for file naming  
convention

PGSC Copy(Move) desired files to appropriate subfolder in  
c:\oca-down\  
Notify MCC when complete

### 2. MONITOR KFX DOWNLINK (if desired)

When link established:

From 'KFX' window:

- √REMOTE KFX – green
- √Uplink arrow ('↑' next to send rate) – green
- √Dnlink arrow ('↓' next to send rate) – green

√KFX application activated

√File Transfer Status dialog (displayed during file xfer)

### 3. MONITOR MFX DOWNLINK (760XD only) (if desired)

If MFX application not activated:

Perform OCA S-BAND MODEM (MFX)  
ACTIVATION, 12-16, then:

If minimized:

√Icon Title displaying File Name, Send/Receive  
Status

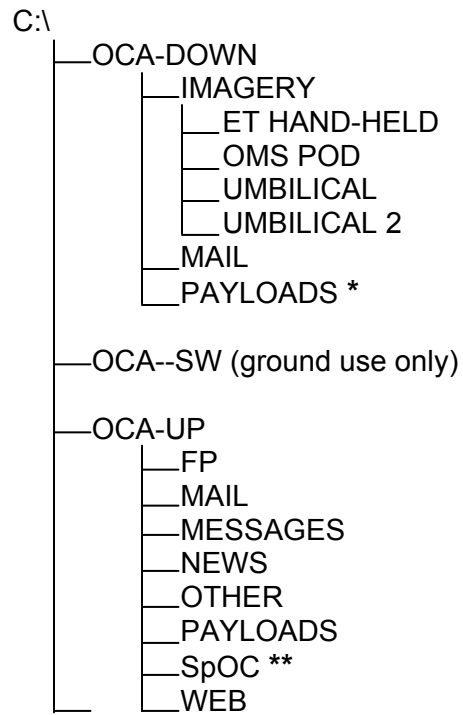
#### NOTE

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

Sel 'E' 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 file updates for SpOC applications

## **OCA FILENAMES**

### UPLINKED FILES

	<u>LOCATION</u>
SpOC updates:	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\

### DOWNLINKED FILES

	<u>LOCATION</u>
Camera images:	c:\oca-down\imagery\
Personal mail, other*:	c:\oca-down\mail\
Payload files:	c:\oca-down\payloads\

### 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

Cont next page

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ORB OPS/ALL/GEN M



√'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 (760XD ONLY)

### 1. ESTABLISH LINK

On MCC GO:

A15 PS COMM CCU PWR – OFF

L9 PS AUD PWR – AUD  
A/G 1 – OFF  
A/G 2 – T/R  
A/A – OFF  
ICOM (two) – OFF  
VOL A/G 2 tw – 0  
XMIT/ICOM MODE – PTT/PTT

#### CAUTION

Loss of A/A (UHF) will occur if OCA PGSC Modem cable connected to COMM OUTLET and A/A in T/R on ATU

O9 R AUD A/G 2 – OFF  
O5 L AUD A/G 2 – OFF  
R10 MS AUD A/G 2 – OFF  
MO42F MIDDECK SPKR AUD A/G 2 – OFF

A15 √PGSC Modem cable connected to PS COMM outlet

### 2. ACTIVATE FILE XFER S/W

OCA If PGSC not running Windows 98:  
Router Restart (or pwr on) PGSC  
PGSC Within 15 sec, click on 'STS PGSC' at 'Boot Magic' bootup menu  
Sel 'Docked (OCA Card)' config at Startup Menu, then press [ENTER]

Double-click 'Shuttle Apps'>'OCA-KFX-MFX'>'MFX-Modem File Transfer'

√'MFX' display appears

√WINDOW – OFFLINE

Arrange 'MFX' window as reqd

Cont next page

- ┌ | | | ┌
3. VERIFY PRINTER SETTINGS
- MFx PGSC Click 'Start'>'Settings'>'Printers'
- In "Printers" window, right-click "NETWORK EPSON1" printer
- On popup menu:
- Verify "Set as Default" checked
  - Verify "Use Printer Offline" NOT checked
- Close "Printers" window

## OCA SSR-1 REGAIN 2 GREEN LIGHTS

OCA

- Router
1. Rcd UPLK/DNLK colors in STATUS box of OCA Control Panel window:  
Uplink (green circle/red circle/yellow “?”): \_\_\_\_\_  
Downlink (green circle/red circle/yellow “?”): \_\_\_\_\_
  2. If AOS Ku, check Status of OCA link (via OCA Control Panel window on OCA Router) after each step below. Exit SSR and notify MCC of actions taken when 2 green lights are displayed on router

SSP

3. ✓cb PDIP 1 PWR 2 KU BAND RLY – cl

PDIP

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

OCA

Router

5. ✓OCA Router set to correct transmit rate:  
If KU BAND RATE – LO:  
| ‘OCA Port Select’>‘OCA Transmit Port and  
| Rate’>‘RS-422’>‘0-...2,000,000 bps’  
If KU BAND RATE – HI:  
| ‘OCA Port Select’>‘OCA Transmit Port and  
| Rate’>‘RS-422’>‘1-...4,000,000 bps’
6. Verify that OCA Interface Cable is well seated to both PDIP panel and OCA card in Router
7. Perform OCA LOOPBACK TEST, 12-21  
If 2 green lights observed during loopback test:  
| Cable and card are good  
| Reconnect OCA Interface Cable to PDIP panel  
| Problem downstream of OCA Interface Cable  
| ✓MCC  
If 2 green lights not observed during loopback test:  
| Possible problem with OCA card or OCA  
| Interface Cable  
| ✓MCC

- ┌ | | | ┌
3. VERIFY PRINTER SETTINGS
- MFx PGSC Click 'Start'>'Settings'>'Printers'
- In "Printers" window, right-click "NETWORK EPSON1" printer
- On popup menu:
- Verify "Set as Default" checked
  - Verify "Use Printer Offline" NOT checked
- Close "Printers" window

## OCA SSR-1 REGAIN 2 GREEN LIGHTS

OCA

Router

1. Rcd UPLK/DNLK colors in STATUS box of OCA Control Panel window:  
Uplink (green circle/red circle/yellow “?”): \_\_\_\_\_  
Downlink (green circle/red circle/yellow “?”): \_\_\_\_\_
2. If AOS Ku, check Status of OCA link (via OCA Control Panel window on OCA Router) after each step below. Exit SSR and notify MCC of actions taken when 2 green lights are displayed on router

SSP

3. √cb PDIP 1 PWR 2 KU BAND RLY – cl

PDIP

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

OCA

Router

5. √OCA Router set to correct transmit rate:  
If KU BAND RATE – LO:  
| ‘OCA Port Select’>‘OCA Transmit Port and  
| Rate’>‘RS-422’>‘0-...2,000,000 bps’  
If KU BAND RATE – HI:  
| ‘OCA Port Select’>‘OCA Transmit Port and  
| Rate’>‘RS-422’>‘1-...4,000,000 bps’
6. Verify that OCA I/F Cable is well seated to OCA card |  
in Router
7. Verify that AMS OCA ADAPT Cable is well seated |  
to both PDIP panel and OCA I/F Cable
8. Perform OCA LOOPBACK TEST, 12-21 |  
If 2 green lights observed during loopback test:  
| Cables and card are good  
| Reconnect AMS OCA ADAPT cbl to PDIP panel  
| Reconnect AMS OCA ADAPT cbl to OCA I/F cbl  
| (if reqd)  
| Problem downstream of OCA/AMS Cables  
| √MCC  
If 2 green lights not observed during loopback test:  
| Possible problem with OCA card, OCA I/F cbl  
| or AMS OCA ADAPT cbl  
| √MCC

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## RECONFIGURE OCA DOWNLINK RATE

- PDIP            A. CONFIGURE FOR KU CH 2 – 2 Mbps            |
- OCA            1. Ku BAND RATE – LO
- Router        2. If 'OCA Control Panel App' not running,  
                  sel 'Start' > 'OCA Control Panel Applet'
3. On 'OCA Control Panel App' menu bar:  
                  Sel 'OCA Port Select'>'OCA Transmit Port  
                  and Rate' >  
                  'RS-422' > '0 – Crystal Clock @ 2,000,000  
                  bps'
4. If reqd, config router boot up rate:  
                  Open 'Change Boot Up Rate' folder on  
                  desktop  
                  Double click 'Boot Up 2 Mbps' file  
                  Acknowledge message dialogs (2)
- PDIP            B. CONFIGURE FOR KU CH 3 – 4 Mbps            |
- OCA            1. Ku BAND RATE – HI
- Router        2. If 'OCA Control Panel App' not running,  
                  sel 'Start' > 'OCA Control Panel Applet'
3. On 'OCA Control Panel App' menu bar:  
                  Sel 'OCA Port Select'>'OCA Transmit Port  
                  and Rate' >  
                  'RS-422' > '1 – Crystal Clock @  
                  4,000,000 bps'
4. If reqd, config router boot up rate:  
                  Open 'Change Boot Up Rate' folder on  
                  desktop  
                  Double click 'Boot Up 4 Mbps' file  
                  Acknowledge message dialogs (2)

Cont next page

C. CONFIGURE FOR KU PL MAX - 48(36) Mbps

NOTE

√MCC prior to configuring OCA for PL MAX. This will disable DTV downlink

L10

1. Configure DTV MUX:
  - 1.1 √OCA cable P3 ('OCA2A Shuttle Cable to Shuttle Dnlk Data Mux CLK') connected to BYPFR CLOCK connector
  - 1.2 √OCA cable P4 ('OCA2A Shuttle Cable to Shuttle Dnlk Data Mux DATA') connected to BYPFR DATA connector
  - 1.3 √MUX/VTR/CC – ON

NOTE

MUX BYPASS is a 3 posn sw:  
(ACT, BYPBK, BYPFR)

- 1.4 MUX BYPASS – BYPFR (full clockwise)

OCA Router

2. If 'OCA Control Panel App' not running, sel 'Start' > 'OCA Control Panel Applet'
3. On 'OCA Control Panel App' menu bar:  
Sel 'OCA Port Select'>'OCA Transmit Port and Rate' >  
'Fiber (ISS) or PMAX (Shuttle)' >  
'6 – Crystal Aux2 Clock @ 48,000,000 bps'  
( '5 – Crystal Aux1 Clock @ 36,000,000 bps')
4. If reqd, config router bootup rate:  
Open 'Change Boot Up Rate' folder on desktop  
Double click 'Boot Up 48(36) Mbps' file  
Acknowledge message dialogs (2)

L10

D. DE-CONFIGURE FROM KU PL MAX

1. MUX/VTR/CC – ON
2. MUX BYPASS – ACT (or as reqd)
3. Perform step A(B)



## OCA LOOPBACK TEST

### NOTE

Perform on OCA Router PGSC

1. OPEN OCA CONTROL PANEL APPLET  
OCA Router PGSC Log into OCA Router  
Sel 'Start' > 'OCA Control Panel Applet'  
√'OCA Control Panel App' display on desktop
2. INTERNAL LOOPBACK TEST
  - 2.1 Initiate Test  
From 'OCA Control Panel App' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'Internal Loopback'  
  
√'OCA Control Panel App' display:  
Successful Test – Animated signal moving  
inside PC icon and 'SUCCESS' displayed  
Unsuccessful Test – 'Frowny face'  
displayed inside PC icon and 'FAILURE'  
displayed  
Inform MCC of results
  - 2.2 Terminate Test  
From 'OCA Control Panel App' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'Stop Loopback Testing'
3. EXTERNAL LOOPBACK TEST 1 (PDIP I/F)
  - 3.1 Initiate Test  
√OCA I/F cable P1 connected to OCA PC board  
44-pin connector  
Disconnect OCA I/F cable P2 from PDIP panel  
On OCA I/F cable, connect P2 to J1  
  
From 'OCA Control Panel App' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'External Loopback #1'  
Sel 'OK' to acknowledge msg about  
connecting the loopback cable

Cont next page

√'OCA Control Panel App' display:

Successful Test – 'Happy face' displayed  
inside PC icon and animated signal  
moving outside PC icon and 'SUCCESS'  
displayed

Unsuccessful Test – 'Frowny face'  
displayed inside PC icon and no animation  
outside PC icon and 'FAILURE' displayed

Inform MCC of results

### 3.2 Terminate Test

From 'OCA Control Panel App' display:

Sel 'OCA Self Tests' on menu bar

Sel 'Stop Loopback Testing'

Disconnect OCA I/F cable P2 from J1

Reconnect OCA I/F cable P2 to PDIP Ku/J4

(as reqd)

#### 4. EXTERNAL LOOPBACK TEST 2 (DTV MUX I/F)

##### 4.1 Initiate Test

√OCA I/F cable P1 connected to OCA PC board  
44-pin connector

Disconnect OCA I/F cable P3, P4 (two) from  
DTV MUX

On OCA I/F cable, connect  
P3 to J3 (PL MAX clock)  
P4 to J4 (PL MAX data)

From 'OCA Control Panel App' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'External Loopback #2'  
Sel 'OK' to acknowledge the message about  
connecting the loopback cable

√'OCA Control Panel App' display:  
Successful Test – 'Happy face' displayed  
inside PC icon and animated signal  
moving outside PC icon and 'SUCCESS'  
displayed  
Unsuccessful Test – 'Frowny face'  
displayed inside PC icon and no animation  
outside PC icon and 'FAILURE' displayed  
Inform MCC of results

##### 4.2 Terminate Test

From 'OCA Control Panel App' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'Stop Loopback Testing'

Disconnect OCA I/F cable P3,P4 from J3,J4  
(two)

Reconnect OCA I/F cable P3,P4 (two) to DTV  
MUX (as reqd)

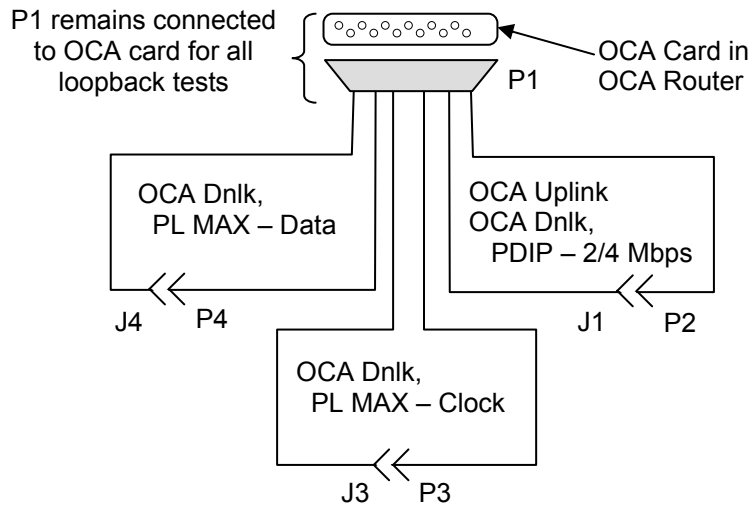


Figure 12-5.- OCA Cable Diagram – Loopback.

## OCA LOOPBACK TEST

### NOTE

Perform on OCA Router PGSC

- OCA Router PGSC
1. OPEN OCA CONTROL PANEL APPLET  
Log into OCA Router  
Sel 'Start' > 'OCA Control Panel Applet'  
√'OCA Control Panel App' display on desktop
  2. INTERNAL LOOPBACK TEST
    - 2.1 Initiate Test  
From 'OCA Control Panel App' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'Internal Loopback'  
  
√'OCA Control Panel App' display:  
Successful Test – Animated signal moving inside PC icon and 'SUCCESS' displayed  
Unsuccessful Test – 'Frowny face' displayed inside PC icon and 'FAILURE' displayed  
Inform MCC of results
    - 2.2 Terminate Test  
From 'OCA Control Panel App' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'Stop Loopback Testing'
  3. EXTERNAL LOOPBACK TEST 1 (PDIP I/F)
    - 3.1 Initiate Test of OCA and AMS Cables  
√OCA I/F cable P1 connected to OCA PC board 44-pin connector  
√AMS OCA ADAPT J2 connected to OCA I/F cable P2  
Disconnect AMS OCA ADAPT P4 from PDIP panel  
Connect AMS OCA ADAPT P4 to OCA I/F cable, J1  
  
From 'OCA Control Panel App' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'External Loopback #1'  
Sel 'OK' to acknowledge msg about connecting the loopback cable

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√'OCA Control Panel App' display:  
Successful Test – 'Happy face' displayed  
inside PC icon and animated signal  
moving outside PC icon and 'SUCCESS'  
displayed  
Unsuccessful Test – 'Frowny face'  
displayed inside PC icon and no animation  
outside PC icon and 'FAILURE' displayed  
If loopback successful,  
OCA and AMS cables are good  
Inform MCC of results  
Go to step 3.3  
If loopback not successful, go to step 3.2

3.2 Initiate Test of OCA Cable (without AMS cable)

Disconnect AMS OCA ADAPT P4 and J2 from  
OCA I/F cable, J1 and P2

Connect OCA I/F P2 to OCA I/F J1

√'OCA Control Panel App' display for loopback  
status:

If loopback successful, OCA cable is good,  
AMS cable is suspect

If loopback not successful, OCA cable is  
suspect, AMS cable may be good

√MCC

3.3 Terminate Test

From 'OCA Control Panel App' display:

Sel 'OCA Self Tests' on menu bar

Sel 'Stop Loopback Testing'

Disconnect AMS OCA ADAPT P4 from  
OCA I/F J1

Reconnect AMS OCA ADAPT P4 to  
PDIP Ku/J4

#### 4. EXTERNAL LOOPBACK TEST 2 (DTV MUX I/F)

##### 4.1 Initiate Test

√OCA I/F cable P1 connected to OCA PC board  
44-pin connector

Disconnect OCA I/F cable P3, P4 (two) from  
DTV MUX

On OCA I/F cable, connect  
P3 to J3 (PL MAX clock)  
P4 to J4 (PL MAX data)

From 'OCA Control Panel App' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'External Loopback #2'  
Sel 'OK' to acknowledge the message about  
connecting the loopback cable

√'OCA Control Panel App' display:  
Successful Test – 'Happy face' displayed  
inside PC icon and animated signal  
moving outside PC icon and 'SUCCESS'  
displayed  
Unsuccessful Test – 'Frowny face'  
displayed inside PC icon and no animation  
outside PC icon and 'FAILURE' displayed  
Inform MCC of results

##### 4.2 Terminate Test

From 'OCA Control Panel App' display:  
Sel 'OCA Self Tests' on menu bar  
Sel 'Stop Loopback Testing'

Disconnect OCA I/F cable P3,P4 from J3,J4  
(two)

Reconnect OCA I/F cable P3,P4 (two) to DTV  
MUX (as reqd)

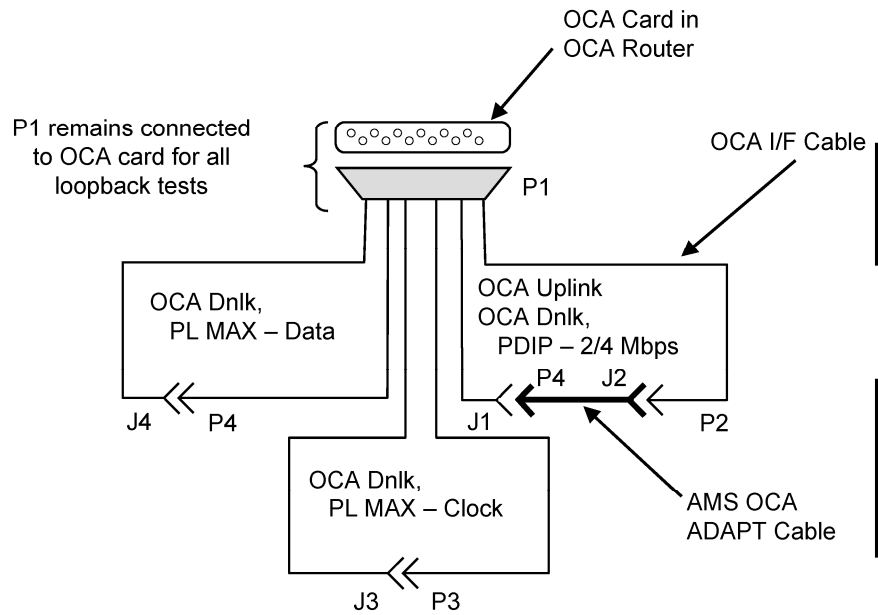


Figure TEMP 12-5.- OCA I/F Cable (with AMS OCA ADAPT Cable) – Loopback.



## PGSC NETWORK

### A. SETUP

#### NOTE

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

1. Unstow (if not pre-routed):
  - Wireless Access Point (WAP)
  - WAP DC Pwr Sply (white)
  - WAP Pwr Sply cable
  - WAP Pwr cable
  - DC Pwr cable
  - Wireless Network cards
  - RJ-45 Network cables

#### NOTE

At a minimum, network equipment should be configured for OCA Router PGSC, KFX PGSC, Wireless Access Point, and Printer

### WIRELESS ACCESS POINT SETUP

2. Configure network equipment per:
  - PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)
3. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate DC Util Pwr outlet/sw to use for Wireless Access Point pwr
4. ✓DC UTIL PWR – OFF

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ORB OPS/ALL/GEN M

5. Per Figure 12-6, PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR):
  - a. Connect DC PWR cable from DC Util Pwr outlet to Access Point DC Pwr Sply input
  - b. Connect WAP Pwr Sply Cable to WAP Pwr Cable (see fig 12-6)
  - c. Connect other end of WAP Pwr Sply Cable to DC Pwr Sply output (see fig 12-6)
  - d. Connect WAP Pwr Cable to Access Point pwr port (see fig 12-6)

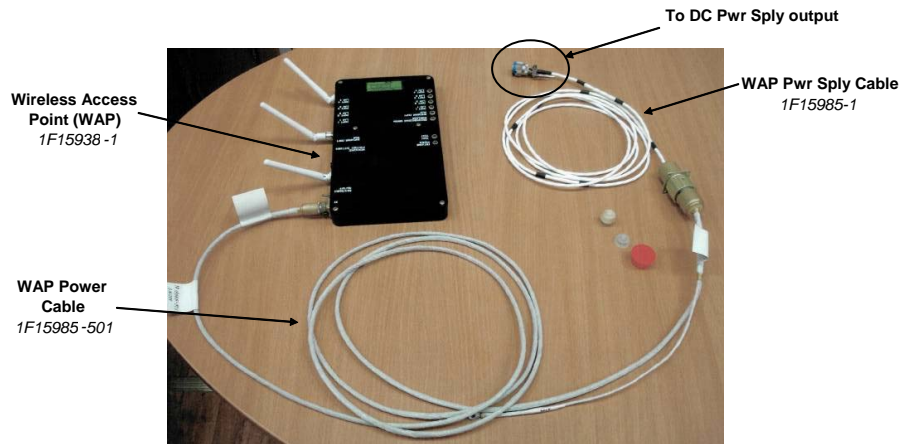


Figure 12-6.- WAP configuration.

6. DC UTIL PWR – ON
  7. DC PWR SPLY PWR sw – ON
  8. Connect RJ-45 Network cables:
    - a. From hub of Wireless Access Point to OCA Router's RJ-45 port (on Docking Station)
    - b. From hub of Wireless Access Point to KFX PGSC's RJ-45 port
    - c. From hub of Wireless Access Point to Printer's RJ-45 port
    - d. From hub of Wireless Access Point to any other PGSC planned to be on wired network (as reqd)
  9. Access Point PWR sw – ON
  10. Verify Access Point's pwr LED is lit
- Cont next page

NOTE

Use top PCMCIA card slot for wireless network card to avoid blocking accessibility to bottom PCMCIA card slot

- PGSC 11. For all PGSCs planned to be on wireless network, insert Wireless Network card into top PCMCIA card slot of PGSCs
12. If not already done, pwr on PGSCs
13. Verify network connectivity using PingMaster:  
Double-click 'Shuttle Apps'>'Network Configuration'>'PingMaster'  
√'Status' column of 'Network Primary' and 'Network Nodes' sections for networked PGSCs, Printer (if setup) and Access Point  
If status is 'Good Response' for networked PGSCs, Printer (if setup) and Access Point, press [CTRL]/[x] to exit PingMaster (if desired)
- \* If status is 'Not Responding': \*
  - \* 1. Verify proper network cable \*
  - \* connections: For RJ-45 ports with \*
  - \* connected network cables, verify \*
  - \* Access Point LAN LEDs are lit and \*
  - \* PGSC/Docking Station's RJ-45 \*
  - \* port LEDs are green \*
  - \* 2. For wireless network, verify network \*
  - \* cards are properly seated PCMCIA\* \*
  - \* card slots and PGSCs recognize \*
  - \* cards \*
  - \* 3. Recheck status in PingMaster \*
  - \* 4. If still no joy, reboot PGSCs and \*
  - \* recheck status in PingMaster \*
- KFX PGSC 14. Double-click 'Shuttle Apps'>'KFX'>'KFX – Ku-band File Transfer'  
Arrange 'KFX' window as desired

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- PGSC
- B. TEARDOWN
1. For PGSCs on wireless network, depress release button to eject wireless network card from PCMCIA card slot and remove wireless network card
  2. For PGSCs on wired network, disconnect RJ-45 network cables from RJ-45 port on PGSC or Docking Station
  3. Stow network equipment
- C. PGSC NAMING
- PGSC
1. √MCC for new PGSC name
  2. Double-click 'Shuttle Apps'>'Network Configuration'>'Rename PGSC'
  3. Sel 'Yes' to run 'Unique Client Config' program
  4. At 'Network Client Config' dialog box, sel appropriate computer name assigned by MCC
  5. Sel 'Update' button
  6. Sel 'OK' at 'Verification' and 'Update' dialog boxes
  7. Sel 'Yes' to restart PGSC

## COLOR PRINTER UNSTOW AND ASSEMBLE

### NOTE

Power off Printer when not in use

#### 1. UNSTOW

Printer  
AC PWR Cable (if reqd)  
Printer Data Cable (one of the following):  
    6-ft parallel data cable  
    25-ft parallel data cable  
    16-ft or 32-ft RJ-45 network cable  
Printer paper  
Printer Paper Feeder Tray  
Paper Output Tray

Printer 2. ASSEMBLE PRINTER  
Align arrows on Paper Feeder Tray and back of  
Printer  
Insert white tabs on Paper Feeder Tray (near  
arrows) into black outlined slots on Printer  
(see figure 12-7)  
Slide tray downward  
Attach Paper Feeder Tray to Printer (secure via  
thumbscrews)  
Attach Paper Output Tray to Printer (secure via  
thumbscrews)

3. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT  
CONFIG (REF DATA FS, UTIL PWR) or PGSC  
Usage Chart (if available) for appropriate AC Util  
Pwr outlet/sw to use

\_\_\_\_\_ 4.  AC UTIL PWR – OFF

Printer  AC PWR cable connected to AC Util Pwr panel  
Connect AC PWR cable to Printer Power Port  
(see figure 12-8)

Cont next page

If Printer to be set up as Network Printer:

Connect RJ-45 network cable to Printer Network RJ-45 Port (see figure 12-8)

Connect other end of RJ-45 network cable to LAN port of Wireless Access Point

If Printer to be set up as Local Printer:

Connect parallel cable between Printer Parallel Port and KFX PGSC Parallel Port (see figure 12-8)

Insert 8.5 x 11" paper into Paper Feeder Tray (~50 sheets)

Attach Printer to wall of desired area (example: AFD or Airlock ditch) using Velcro

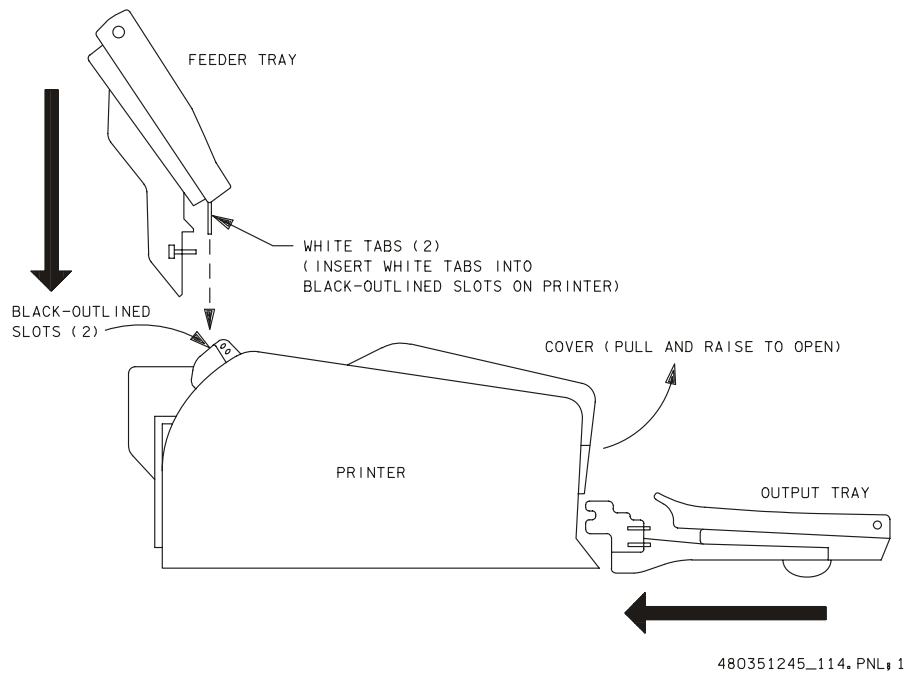
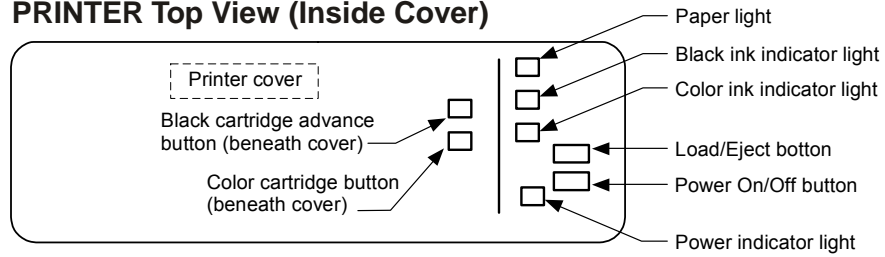
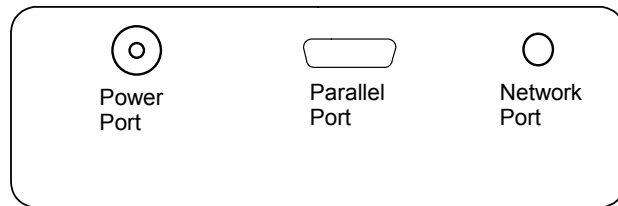


Figure 12-7.- Side view of printer and trays, ready for assembly. |

### PRINTER Top View (Inside Cover)



### PRINTER Back View



### PGSC

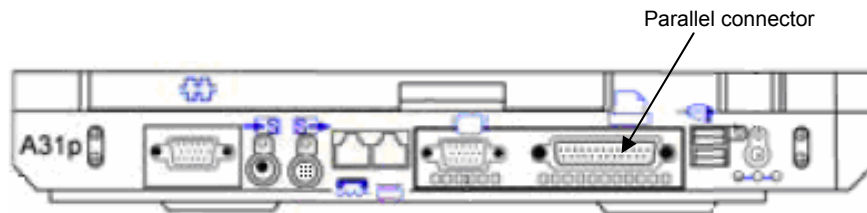


Figure 12-8.- Printer (top view/back view), PGSC (parallel port).

## COLOR PRINTER WARMUP AND SELF-TEST

### WARMUP

1. See UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR) or PGSC Usage Chart (if available) for appropriate AC Util Pwr outlet/sw to use
2. AC UTIL PWR – ON
- Printer 3. Printer pwr – on (see figure 12-8)  
√Flashing green pwr light (~5 min)
4. √Printer ready  
Ready when pwr light is steady green

### SELF-TEST

#### NOTE

After successful test print, terminate SELF-TEST by powering printer OFF

- Printer 1. Printer pwr – off
2. Press and hold Load/Eject button, then press pwr button  
Hold Load/Eject button for 3 sec after depressing pwr button, then release
3. Observe printing of one black text page and one color text page
4. √Print quality  
Look for missing sections in Nozzle Check section
5. If print quality not acceptable, go to CLEANING PRINTER HEADS, 12-37
6. If paper jam, go to COLOR PRINTER PAPER JAM, 12-34
7. If printer quality acceptable, Printer pwr – off (to terminate SELF-TEST)
8. Notify MCC: Status of SELF-TEST results



## COLOR PRINTER STOW

- 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. AC UTIL PWR – OFF
  4. Disconnect AC PWR cable from AC Util Pwr outlet, if reqd
  5. Remove paper from Paper Feeder Tray and stow it
- Printer
6. Remove Paper Feeder Tray from Printer (disconnect via thumbscrews)
  7. Remove Paper Output Tray from Printer (disconnect via thumbscrews)
  8. Disconnect AC PWR cable from Printer
  9. If Printer set up as Network Printer:  
| Disconnect RJ-45 network cable from Printer  
| Network RJ-45 Port (see figure 12-8) |  
If Printer set up as Local Printer:  
Disconnect parallel cable between Printer  
Parallel Port and KFX PGSC Parallel Port  
(see figure 12-8) |
  10. Stow:  
Printer  
AC PWR cable (if reqd)  
Printer Data cable(s)  
Printer paper  
Printer Paper Feeder Tray  
Paper Output Tray

## CHECK COLOR PRINTER SETTINGS

### NOTE

Perform following procedure to verify Printer settings on PGSC from which printing executed (i.e., settings are not on Printer)

- PGSC
1. Sel 'Start'>'Settings'>'Printers and Faxes' from Windows taskbar
  2. Right-click appropriate printer icon:  
Parallel: Local Color Printer  
Network: Network Color Printer
  3. Verify 'Set as default' selected (√)

## COLOR PRINTER PAPER JAM

- Printer
1. Printer pwr – off (press pwr button once)
  2. √Printer It – off
  3. √Paper Feeder Tray clear of obstruction  
√Paper Output Tray clear of obstruction
  4. Raise Printer cover (see figure 12-7)  
√Inside of Printer clear from obstruction
  5. If paper jam cleared, perform COLOR PRINTER WARMUP AND SELF-TEST, 12-32, then:
  6. If paper jam continues, notify MCC
  7. If reqd, go to COLOR PRINTER STOW, 12-33

## INK CARTRIDGE CHANGEOUT

### NOTE

Perform if color(black) ink cartridge light illuminated. Changeout of color and black cartridges takes ~5 min.

If color(black) ink cartridge light flashing, ink is low.

If color(black) ink cartridge light solid, ink is out

- Printer
1. ✓Printer ready (notice steady green pwr light)
  2. Raise Printer cover (see figure 12-7)

### NOTE

Printer will reset if step 4 not performed within 1 min after step 3. If reset experienced, repeat step 3

3. Press and hold "color(black) ink cartridge advance button" (~3 sec) and release. Color(black) ink cartridge will move and become accessible

### CAUTION

Do NOT squeeze ink cartridges

4. Lift tab on purple cover  
Remove color(black) ink cartridge
5. Cover opening on used cartridge with Gray Tape  
Stow old cartridge in Ziplock Bag  
Place Ziplock Bag in Printer Locker
6. Unstow new cartridge from sealed pack  
Remove small yellow plastic tab on top (Do not remove white tab; reference instructions on cartridge)

Cont next page

- 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, 12-32, to ensure proper operation

## CLEANING PRINTER HEADS (Black and/or Color)

### NOTE

Printer must be on, not printing, and appropriate ink cartridge light must not illuminate red

- Printer
1. ✓Printer pwr – on
  2. ✓Ink cartridge lt – OFF  
If ink cartridge lt flashing or solid, go to INK CARTRIDGE CHANGEOUT, 12-35

### NOTE

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

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

## PRINTER HEAD ALIGNMENT

### NOTE

Printer must be on, not printing, and appropriate ink cartridge light must not illuminate red

- Printer
1. ✓Printer pwr – on
  2. ✓Ink cartridge lt – off  
If ink cartridge lt flashing or solid, go to INK CARTRIDGE CHANGEOUT, 12-35
  3. Verify Paper Feeder Tray has at least ten sheets of paper

### NOTE

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

- PGSC
4. Sel 'Start'>'Settings'>'Printers and Faxes' from Windows taskbar
  5. Right-click appropriate printer icon:  
Parallel: Local Color Printer  
Network: Network Color Printer
  6. Verify 'Set as default' selected (✓)  
Sel 'Properties'
  7. Sel 'Utilities' tab  
Sel 'Print Head Alignment' button  
At 'Printer Head Alignment' dialog box, sel 'Next' button
  8. At second 'Printer Head Alignment' dialog box, sel 'Next' button
  9. Examine printed sheet "A"  
If alignment satisfactory, sel 'Cancel' twice to exit  
If alignment not satisfactory, follow directions on screen
  10. When alignment complete (~5 min), sel 'OK' to exit

## UMBILICAL WELL TPS CAMERA IMAGERY DOWNLOADING

### NOTE

This procedure assumes A31p laptop  
is configured for pwr, running, and  
networked

1. √MCC that camera is powered and ready
2. Unstow:
 

A17 (DTV bag)	1394 Converter (SED33117251-301) IEEE 1394 Crew Cabin cable (SED33113436-303) IEEE 1394 cable assy (firewire) (SEZ33112995-303)
------------------	---
- CONV 3. PWR sw – ON (It on)  
If no It,  
Replace batts (batt life – 4 hr)
4. Configure hardware per figure 12-9 below making  
Firewire cable connection to laptop last:

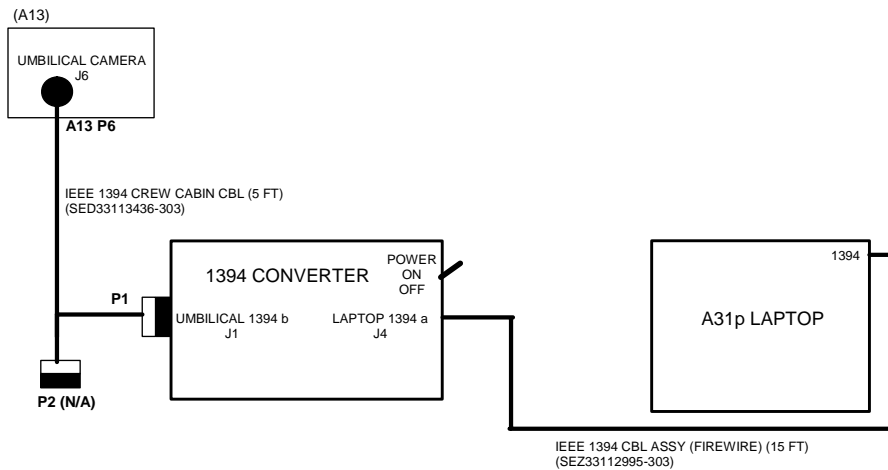


Figure 12-9.- Hardware configuration.

Cont next page

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ORB OPS/ALL/GEN M,8

- PGSC
5. √PGSC pwr – on  
If 'Found New Hardware Wizard' appears:  
Sel 'No, not this time'  
Sel 'Next'  
Sel 'Install the software automatically  
(Recommended)'  
Sel 'Next'  
Sel 'Finish'
  6. Double-click 'Shuttle Apps' > 'Image Processing' >  
'KODAK DCS Camera Manager' ("KODAK  
Professional DCS Camera Manager" box  
displayed)  
If 'DCS Camera Manager' window with 'Please wait  
while Camera Manager searches for connected  
cameras' message appears for > 30 sec:  
Sel 'Cancel'  
√MCC
  7. √'Camera Folders' tab selected
  8. √'CARD1/FOLDER01' selected (red), note image qty  
shown in "( )", expect approx 23
  9. Download:
    - a. Under 'Copy to Computer':  
√No boxes selected (**DO NOT** delete files)  
Sel 'Copy...'
    - b. Under 'Copy To':  
Sel 'c:\OCA-down\Imagery\UMBILICAL' in  
'Save in:' text box  
√'As Is' selected in 'Format:' text box  
√No '√' for 'Rename Image File(s)'  
Sel 'Save Files in "UMBILICAL"  
(“Saving Files” box displayed, est 6 min to  
download)
    - c. When “Saving Files” completed, go to “My  
Computer: c:\OCA-down\Imagery\UMBILICAL”,  
√ object qty matches “CARD1\FOLDER01” qty  
If not, √MCC

Cont next page



10. Sel 'X(Close)' to return to desktop

CONV 11. PWR sw – OFF (It off)

12. Stow Converter box,cables

NOTE

MCC will downlink images as soon as practical

## WINDECOM OPS

### A. ACT

1. Unstow data cables, cards, adapters:
  - PCMMU data cable (if not prerouted)
  - RS-232 Y data cable (if reqd)
  - RS-422 Y data cable (if reqd)
  - RS-422 PCMCIA cards, adapter boxes (if reqd)
  
- 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, 12-25

Cont next page

6. Double-click 'Shuttle Apps'>'WinDecom'> appropriate WinDecom application

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

1. On Telemetry Monitor display, sel 'Mode'>'Newman' menu option and sel 'Yes' to TIm Monitor dialog

NOTE

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

PGSC

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

2. √PGSC PCMMU card receiving data from orbiter PCMMU stream:  
From WinDecom 'TIm Pkt-Net' and/or 'TIm Pkt-Com' displays, sel 'Packets' tab and verify 'send at' GMT times are dynamic

If no joy, verify PCMMU data cable properly connected at orbiter PCMMU port and PGSC Expansion Unit PCMMU port, repeat step 2, above

√End user PGSC(s) receiving WinDecom data

Cont next page

3. Repeat A. ACT, step 2, 12-42
4. Disconnect PCMMU cable at both ends, connect backup PCMMU cable between orbiter PCMMU port and PGSC Expansion Unit PCMMU port
5. Replace WinDecom PGSC with backup PGSC with PCMMU Expansion Unit

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

6. ✓Data being sent out from network and/or com ports on WinDecom PGSC:  
From WinDecom 'Tlm Pkt-Net' and/or 'Tlm Pkt-Com' displays, sel 'Ports' tab and verify 'Bytes' indicator is dynamic
7. ✓Network, RS-232 Y, and/or RS-422 Y data cables properly connected on WinDecom and end user PGSC(s)  
If applicable, verify RS-422 PCMCIA card(s) properly inserted and RS-422 adapters properly connected
8. If sending WinDecom data via network, check network status using PingMaster:  
Double-click 'Shuttle Apps'>  
'Network Config'>'PingMaster' on any networked PGSC  
✓'Status' column of 'Network Nodes' section for WinDecom PGSC and end user PGSC(s)  
If status is 'Good Response' for networked PGSCs, press [CTRL]/[X] to exit PingMaster (if desired)  
If status is not 'Good Response':  
✓Proper network cable and card connections, then recheck status in PingMaster  
If end user application supports Telemetry Server, double-click 'Telemetry Server' icon (i.e., red stop sign or yellow circle) in system tray of each end user PGSC not receiving data  
Sel 'File' on menu bar, then sel 'Reset Server'

Cont next page

9. If end user application supports Telemetry Server and PGSC set up to receive serial data, verify port and baud rate selections:
- Double-click 'Telemetry Server' icon (i.e., red stop sign or yellow circle) in system tray of each end user PGSC not receiving data
  - Sel 'Source' on menu bar of Telemetry Server
  - √'Serial' selected (√)
  - Sel 'Port' on menu bar
  - √Com port selected (√) same as com port receiving WinDecom data
  - √Correct baud rate selected for com port:
    - Open 'Packet & TFL Info' table (from 'Shuttle Apps'>'WinDecom')
    - √Footnotes of table to determine proper baud rate for each com port, then minimize file
    - Sel 'Baud' on menu bar of Telemetry Server
    - √Baud rate selected (√) matches rate shown in footnote of table for particular com port

10. √Current TFL and WinDecom data output config can support end user application(s):
- Open 'Packet & TFL Info' table (from 'Shuttle Apps'>'WinDecom')
  - Reference table to verify current loaded TFL supports particular end user application(s)
  - √'Output' column of table for packet output from WinDecom (com ports and network), compare info to cabling on WinDecom PGSC

Cont next page

- ┌ | | |
11. If end user application supports Telemetry Server, from 'Help' on menu bar of Telemetry Server of each end user PGSC not receiving data:  
Sel 'Trouble-shooting' for more troubleshooting info

## RSAD SETUP INSTRUCTIONS

### NOTE

To prevent additional setup and troubleshooting steps, setup and start RSAD before starting DOUG. Multicast must be enabled on RSAD for DOUG to get SRMS data via packet 42. For docked ops, joint angle information is sent via packet 44 from SSRMS thru OIU to RSAD and then to DOUG. Data from SSRMS can also be received by DOUG serially via PCSDAS server application

### A. GENERAL OPERATIONS

PGSC

1. Select RSAD shortcut from 'Shuttle Apps'

2. ✓SRMS joint angles (displayed on A8 or Spec 169) agree with those displayed by RSAD  
If all angles do not agree (to the nearest tenth of a degree):

Perform RSAD TROUBLESHOOTING,  
A. RSAD JOINT ANGLES DIFFERENT THAN SRMS ANGLES, 12-50

If only WR angle does not agree (to the nearest tenth of a degree):

Perform RSAD TROUBLESHOOTING,  
B. INVALID MCIU WRR MESSAGE, 12-50

Cont next page

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ORB OPS/ALL/GEN M

## B. OBSS OPERATIONS

### NOTE

The Boom display prompts you to select a waypoints group if none is selected.

Waypoint targets should automatically update. If target does not update, use '↓' on keybd to move to next target

1. Bring up Boom display screen: Press [B] or 'Views'>'Boom'
2. Bring up target selection window: Press [F8] or 'Data'>'Select Target'. Choose group of waypoint targets from bottom half of target selection window, then click 'OK'
3. If desired, bring up Combo display screen: Press [C] or 'Views'>'Combo'



## RSAD FUNCTION KEYS SUMMARY

### GENERAL FUNCTION KEYS

[F7]	SELECT DATA SOURCE
[F8]	SELECT TARGET
[B]	BOOM VIEW
[C]	COMBO VIEW
[CTRL][H]	HIDE HCD
[CTRL][J]	HIDE JID
[CTRL][P]	HIDE POR

## RSAD TROUBLESHOOTING

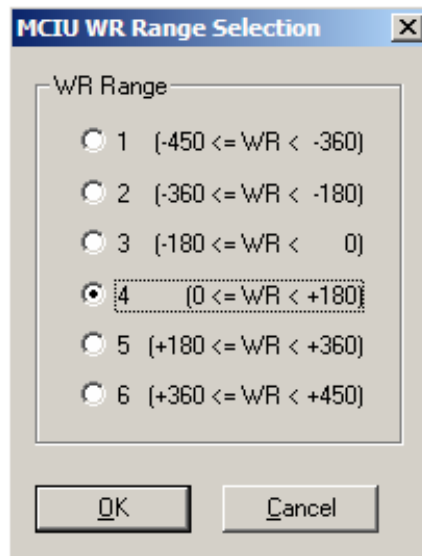
Notify MCC of problem. Then perform each step from appropriate procedure, one at a time, in order, until functionality restored

- PGSC
- A. RSAD JOINT ANGLES DIFFERENT THAN SRMS ANGLES
    - 1. If WR joint angle is the only one different, go to B. INVALID MCIU WRR MESSAGE
    - 2. √MCC for Arm ID
    - 3. 'Data'>'Select Arm ID (Joint Biases)'>'Arm ID' (in 'Arm Selection' window)
    - 4. Select 'Arm ID' as suggested by MCC, then 'OK'
  - B. INVALID MCIU WRR MESSAGE
    - 1. 'MCIU'>'Select WR Range'
    - 2. Select WR range that matches WR angle displayed on A8 or Spec 169

Cont next page

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ORB OPS/ALL/GEN M



3. If MCIU WRR message does not go away or continually reappears, √MCC

C. A YELLOW X ACROSS RSAD DISPLAY APPEARS OR SPINNER IN LOWER RIGHT-HAND CORNER OF RSAD APPLICATION NOT ROTATING

NOTE

Appearance of yellow X means RSAD is not receiving any data

1. If spinner not rotating, go to step 6
2. √Network Cable properly connected or network card seated properly for both RSAD PGSC and WinDecom PGSC

O5 (MO30F) 3. √PCMMU Cable is properly connected between correct PCMMU port and WinDecom's PCMMU board

PGSC 4. Reset Telemetry Server by double-clicking on Stop Sign in icon tray. Select 'File'>'Reset Server'. Once complete, minimize Telemetry Server window

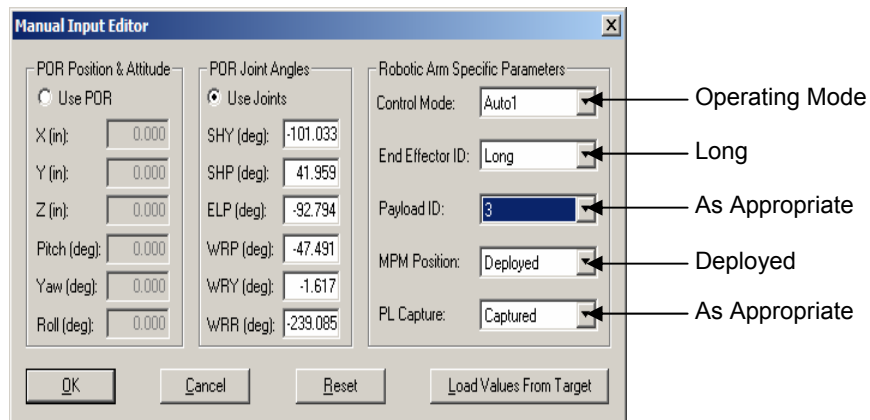
Cont next page

5. Restart RSAD application
  6. Shutdown PGSC, reseal network card or network cable, boot PGSC, and start RSAD
  7. √MCC, and upon their GO, go to D. TELEMETRY SERVER DATA REMAINS UNAVAILABLE BUT MCIU DATA IS STILL AVAILABLE
- D. TELEMETRY SERVER DATA REMAINS UNAVAILABLE BUT MCIU DATA IS STILL AVAILABLE

NOTE

Without Telemetry Server, Spec 94 target from RSAD is unavailable

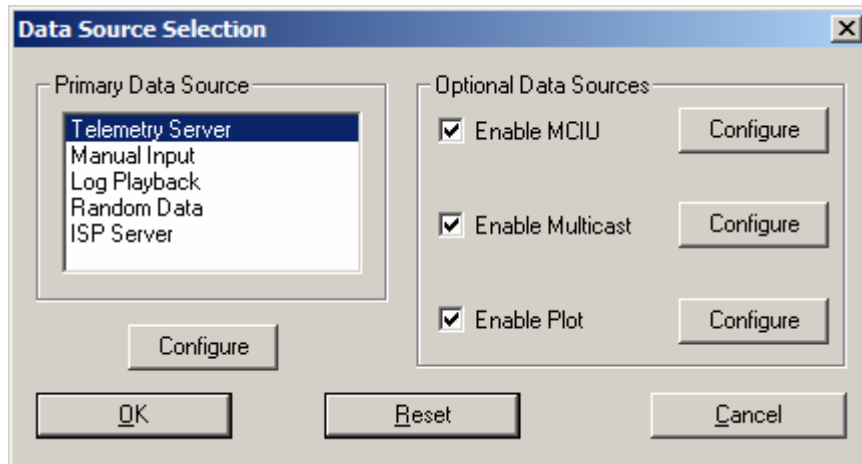
1. Select 'Data' > 'Manual Input'
2. Configure 'Robotic Arm Specific Parameters' in right column as desired and click 'OK'
3. If Control Mode, Payload ID, or Payload Capture status is changed, return to these parameters to make appropriate updates



Cont next page

If Telemetry Server data is recovered,

4. Open 'Data Source Selection' window via menu 'Data'>'Select Data Source' or [F7] function key
5. Select 'Telemetry Server', then click 'OK' to make change



E. MCIU ERROR [VALUE] ...MESSAGE OCCURS

1. ✓Card and cable as suggested by error message

NOTE

Without MCIU data, RSAD data will be delayed approx 4 sec

If MCIU data cannot be recovered:

2. Open 'Data Source Selection' window via [F7] function key
3. De-select 'Enable MCIU' checkbox
4. Click 'OK' to make change

## DOUG SETUP INSTRUCTIONS

### NOTE

To prevent additional setup and troubleshooting steps, setup and start RSAD before starting DOUG. Multicast must be enabled on RSAD for DOUG to get SRMS data via packet 42. For docked ops, joint angle information is sent via packet 44 from SSRMS thru OIU to RSAD and then to DOUG. Data from SSRMS can also be received by DOUG serially via PCSDAS server application

### A. GENERAL OPERATIONS

1. Select appropriate DOUG setup from 'Shuttle Apps'>'DOUG'
  - a. For EVA preparation, select 'EVA'
  - b. For undocked operations, select 'RMS – Data from RSAD'
  - c. For docked operations using OIU, select 'RMS\_&\_SSRMS - Data from RSAD with OIU'
  - d. For docked operations using PCSDAS data, perform D. DOCKED OPERATIONS PCSDAS SETUP, then:  
Select 'RMS\_&\_SSRMS 2 - Data from RSAD & PCSDAS'
2. Adjust volume to hear proximity alarm. It is recommended that alarm be enabled. To check proximity settings: select 'Options'>'RMS Proximity'
3. √SRMS joint angles (displayed on A8 or Spec 169) agree with those displayed by DOUG. If they do not agree (to the nearest tenth of a degree), perform DOUG TROUBLESHOOTING, A. DOUG DOES NOT MATCH RSAD JOINT ANGLES, 12-63
4. Select number of DOUG views: 'Display'>'One View', 'Two Views', or 'Three Views'

Cont next page

CAUTION

In low detail many structural items will not appear in scene and therefore will not be tracked by proximity alarm

5. To change the scene level of detail: Right click anywhere on DOUG display then 'Scene Detail'>'High' or 'Low'

NOTE

Press [b] to toggle color of target RMS

6. Display target RMS position: 'Display'>'Show RMS Target'

NOTE

RMS Proximity must be enabled for VPP to display information. To check proximity settings: 'Options'>'RMS Proximity'

7. To call up SRMS VPP display (boom distance to structure): Press [Shift]-[V]

B. OBSS OPERATIONS

NOTE

Press [b] to toggle color of target RMS

1. Display target RMS position: 'Display'>'Show RMS target'

NOTE

Restarting DOUG will make ISS stack visible

2. Bring up orbiter with no ISS stack:  
'Reconfig'>'ORBITER\_INSPECTION'>  
'FLIGHT\_DAY\_2 Configuration'

Cont next page

3. Put OBSS on SRMS:  
'Reconfig'>'ORBITER\_INSPECTION'>  
'OBSS\_GF1\_to\_SRMS'
4. (If desired) Put OBSS on SSRMS:  
'Reconfig'>'ORBITER\_INSPECTION'>  
'OBSS\_GF2\_to\_SSRMS'
5. Turn on Orbiter tiles: 'Reconfig'>'ORBITER\_ TILES'>[make selection]

NOTE

Pan/tilt values are sent to DOUG from RSAD based upon pre-planned autosequence data. Real-time pan/tilt values would have to be entered manually

6. (If desired) Change LDRI pan/tilt values:  
'JntSystems'>'LDRI-ITVC'>[enter values]

C. FOCUSED INSPECTION OPERATIONS

1. If MCC has uplinked DOUG targets, restart DOUG

NOTE

If reviewing in RMS – Data from RSAD mode, Multicast must be disabled on RSAD to allow RMS to be moved in DOUG using DOUG Targets features.

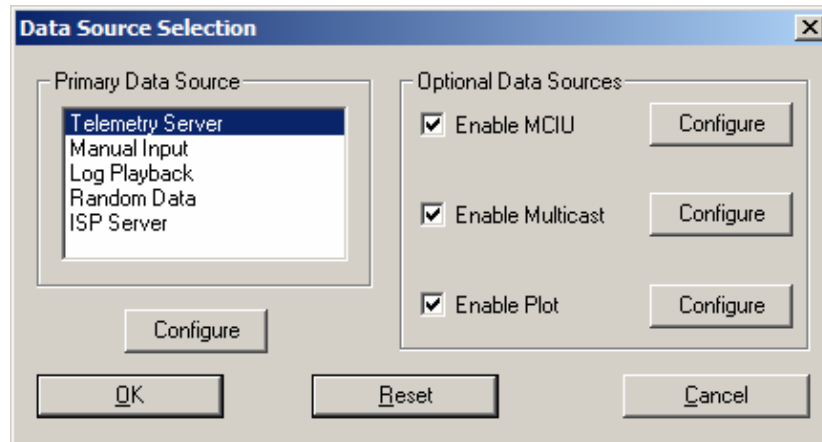
After reviewing DOUG targets, remember to re-select the 'Enable Multicast' checkbox to allow DOUG to receive updates from RSAD

If reviewing in RMS – Data from RSAD mode:

2. On RSAD, open 'Data Source Selection' window via [F7] function key
3. Deselect 'Enable Multicast' checkbox
4. Click 'OK' to make change

Cont next page





5. Turn on Orbiter tiles: 'Reconfig'  
>'ORBITER\_TILES'>[make selection]

NOTE

Damaged RCC sites will have circles  
"painted" on RCC around area of interest.  
Damaged tile sites will be painted yellow

6. To access an MCC uplinked tile state file:  
'File'>'Load Tile State'>[locate file]>'Open'

NOTE

Enabling SRMS VPP display (Press [Shift]-[v])  
will help identify positions with possible  
clearance concerns.

Using a multiple window view ('Display'> 'One  
View', 'Two Views', or 'Three Views') may help  
identify the best cameras for clearance  
monitoring.

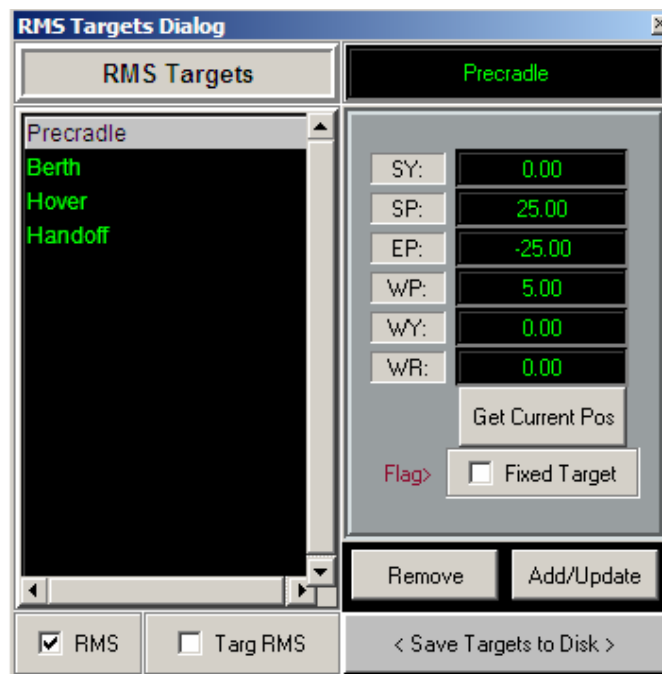
If using 'Targ RMS', VPP info will be  
unavailable.

If using 'Targ RMS', press [b] to toggle color of  
target RMS

Cont next page

If MCC has uplinked DOUG targets:

7. Access targets: 'Options'>'RMS Targets'
8. ✓'RMS' checkbox is selected
9. Select target from list
10. Press [HOME] keybd key until 'RMS TARGETS SELECTED' appears in lower left corner of DOUG window
11. Scroll thru list using [PAGE UP] and [PAGE DOWN] keybd keys



Cont next page

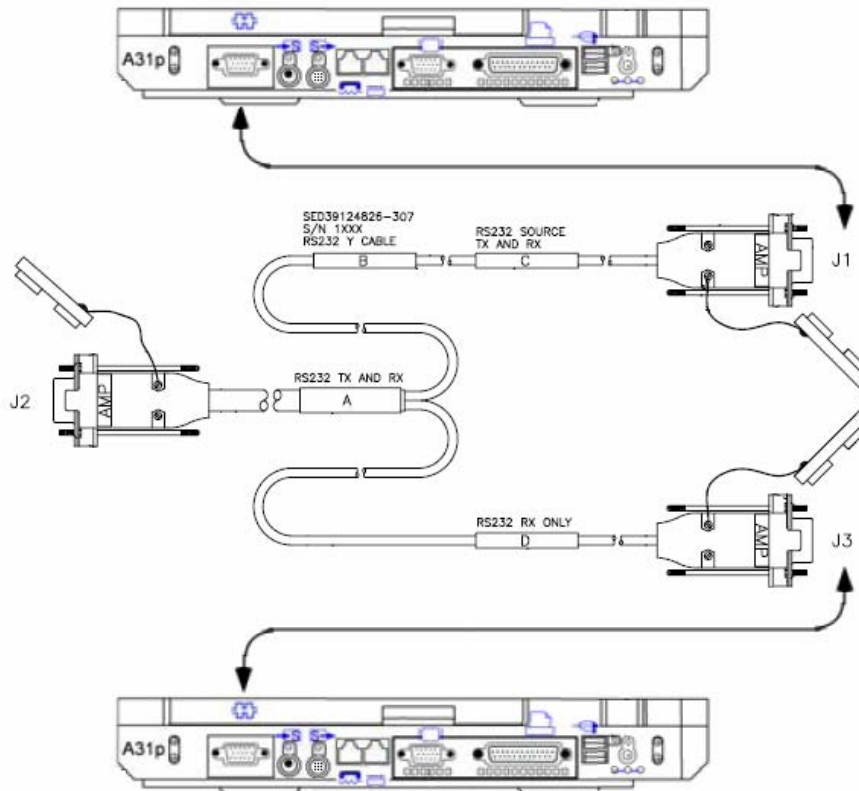
## D. DOCKED OPERATIONS PCSDAS SETUP

### NOTE

Use this procedure only to start and configure PCS laptop and PGSC DOUG application to receive and display real-time SSRMS joint angle telemetry

### CAUTION

Do not connect anything to J2 end of Y cable when connecting J3 end of RS232 Y cable (P/N SED39124826-307) to the 9-pin port labeled "COM 1" on back of DOUG PGSC and J1 end to PCS. Deviations from this configuration may cause PCS to fail to halt or application to terminate



Cont next page

PCS/DOUG 1. Connect RS232 Y Cable between PCS and DOUG. Use 6.107 PCS SETUP - SHUTTLE (SODF: JOINT OPS, COMM/DATA) to power up PCS

If PCS already running, go to step 3

PCS 2. Power up PCS machine  
When prompted click 'Use MDM time'

3. In upper left hand corner of PCS screen, click on the icon 'PCSCDS main'

PCSCDS Main Control Panel

√'Connected' and square is GREEN

Under 'PCS Connection Status':

√'Serial Transfer On' appears

\* If Serial Transfer not On: \*

\* Commands menu ► Serial Transfer \*

\* PCSDS Main Control Panel \*

\* √'Serial Transfer On' \*

4. Open MSS: SSRMS page

NOTE

It may take a few mins for PCS to transfer necessary files to open Robotics displays

If PCS Home Page does not appear automatically, click on Home Icon in upper right hand part of screen



PCS Home Page ► Robotics Icon



Wait for 'Transfer Succeeded', then minimize transfer window and proceed

RWS page ► SSRMS Icon SSRMS

Wait for 'Transfer Succeeded', then minimize transfer window and proceed

Cont next page

NOTE

The SSRMS page must be open on PCS and PCS-DAS Server must be active on PGSC in order to supply realtime SSRMS joint angle data to DOUG. None of data fields can be purple or Ms, as that data will not be supplied to DOUG

DOUG

5. Start PCS-DAS server from Shuttle Apps ►  
PCSDAS

## **DOUG FUNCTION KEYS SUMMARY**

### GENERAL FUNCTION KEYS

[b] TOGGLE TARGET ARM GHOST COLOR

[q] KEY CUE CARD

[SHIFT] [v] TOGGLE VPP DISPLAY

### CAMERA FUNCTION KEYS

[F1] CAMERA A [SHIFT] [F1] CP 3 (S1 CAMERA)

[F2] CAMERA B [SHIFT] [F2] CP 9 (P1 CAMERA)

[F3] CAMERA C [SHIFT] [F3] CP 13 (LAB  
CAMERA)

[F4] CAMERA D [SHIFT] [F4] LEE CAMERA

[F5] RMS ELBOW  
CAMERA [SHIFT] [F5] TIP ELBOW  
CAMERA

[F6] END EFFECTOR  
CAMERA [SHIFT] [F6] BASE ELBOW  
CAMERA

[F7] RSC [SHIFT] [F7] CLPTU MBS

[F8] LDRI ITVC [SHIFT] [F8] STBD

[F9] LDRI SENSOR [SHIFT] [F9] FWD

[F10] IDC [SHIFT] [F10] AFT

[F11] JIMBO CAMERA  
RMS [SHIFT] [F11] TOP

[F12] JIMBO CAMERA [SHIFT] [F12] BOTTOM

## DOUG TROUBLESHOOTING

Notify MCC of problem. Then perform each step from appropriate procedure, one at a time, in order, until functionality restored

### A. DOUG DOES NOT MATCH RSAD JOINT ANGLES

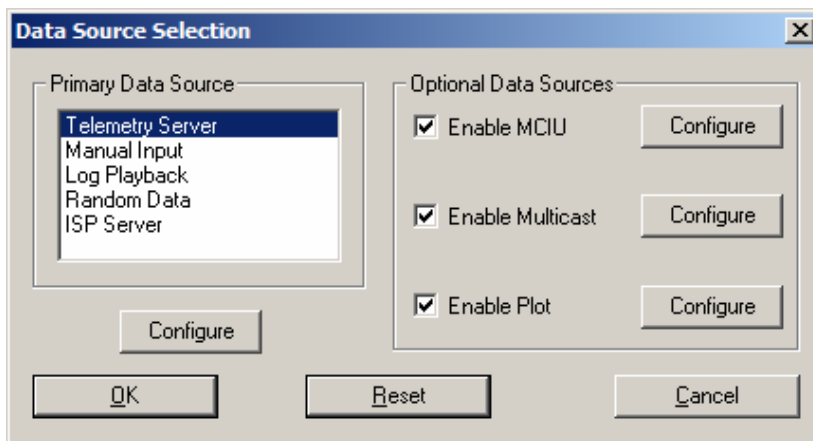
1. ✓Cables

2. Refer to RSAD TROUBLESHOOTING, C. A YELLOW X ACROSS RSAD DISPLAY APPEARS OR SPINNER IN LOWER RIGHT-HAND CORNER OF RSAD APPLICATION NOT ROTATING, 12-51

3. On RSAD, open 'Data Source Selection' window via [F7] function key

✓'Telemetry Server', 'Enable MCIU', and 'Enable Multicast' are selected

If changes are necessary, make changes, and click 'OK'



4. Restart DOUG

5. ✓MCC

## WORLDMAP INITIALIZATION

- PGSC
1. Double-click 'Shuttle Apps'>'WorldMap'
  2. If no shuttle ground track displayed:
    - If PGSC configured to receive WinDecom data:
      - Sel 'Tools'>'Update Satellite Data' menu option
      - √'Receiving Windecom data' is displayed
        - \* If 'Not receiving Windecom data' \*
        - \* displayed: \*
        - \* Sel 'Exit' to close 'Satellite Data' \*
        - \* display \*
        - \* Perform WINDECOM OPS, \*
        - \* C. TROUBLESHOOTING, 12-43 \* |
        - \* Go to step 2 \*
    - Sel 'Set GMT' button
    - √'Receiving Windecom data' is displayed
    - Sel 'Exit' to close 'System Time' display
    - Sel 'Orbit' tab
    - √'Receiving Windecom data' is displayed
    - Sel 'Exit' to close 'Satellite Data' display
  - If PGSC not configured to receive WinDecom data:
    - Sel 'Tools'>'Update Satellite Data' menu option
    - If reqd, update MET
    - Sel 'Set GMT' button
    - If reqd, update GMT
    - Sel 'Exit' to close 'System Time' display
    - Sel 'Orbit' tab
    - GNC 34 ORBIT TGT
    - Update state vector info using data from SPEC 34 display
    - Sel 'Apply'
    - Sel 'Exit' to close 'Satellite Data' display



## DEORBIT MANAGER INITIALIZATION

- PGSC 1. Double-click 'Shuttle Apps'>'Deorbit Manager'

### NOTE

Step 2 may be performed as part of Deorbit Manager Initialization if prompted at initialization (without using menu options)

2. Sel 'Update'>'Time or State Vector' menu option
- If PGSC configured to receive WinDecom data:
- Sel 'Time' tab
  - Sel 'Set GMT'
  - Verify 'Use Telemetry Time Synchronization' checked (√) on
  - √'Receiving WinDecom data' is displayed (Green)
  - Sel 'Apply'
  - Sel 'Exit' at 'TVA Server Input Dialog – View/Modify System Time' dialog
  - Verify 'Use Telemetry Time Data For This Vehicle' checked (√) on
  - √'Receiving WinDecom data' is displayed (Green)
  - Sel 'Apply'
  - Sel 'Orbit' tab
  - Verify 'Use Telemetry Orbit Data' checked (√) on
  - √'Receiving WinDecom data' is displayed (Green)
  - Sel 'Apply'
  - Sel 'Exit' at 'TVA Server Input Dialog – View/Modify Satellite Data' dialog
- If PGSC not configured to receive WinDecom data:
- Sel 'Time' tab
  - Sel 'Set GMT'
  - Set GMT value as reqd
  - Sel 'Apply'
  - Sel 'Exit' at 'TVA Server Input Dialog – View/Modify System Time' dialog
  - Set MET and/or launch values as reqd
  - Sel 'Apply'
  - Sel 'Orbit' tab

Cont next page

If reqd, update state vector information using data from SPEC 34 display  
Sel 'Apply'  
Sel 'Exit' at 'TVA Server Input Dialog – View/Modify Satellite Data' dialog

3. Sel 'Mass Properties'>'CG Manager Data' menu option  
If reqd, update OMS quantity values on 'Propellant Consumables' tab  
Sel 'OK' at 'CG Manager Data' display
4. Sel 'Mass Properties'>'Cargo Status' menu option  
If reqd, update cargo status  
Sel 'OK' at 'Cargo Status' display
5. If cabin leak:
  - \* Sel 'Cabin Leak Filter' checkbox \*
  - \* When Cabin Leak application displayed, \*
  - \* update cabin leak data as reqd \*
  - \* Minimize Cabin Leak application \*
6. In Deorbit Opportunities Table, sel desired landing site and sel 'Target' button or double-click desired landing site
7. Sel 'Mnvr PAD' button to view/copy Deorbit Maneuver PAD for selected landing site
8. When finished viewing Mnvr PAD, sel 'Close' at 'Deorbit Maneuver PAD' display
9. Repeat steps 6 thru 8 to view Mnvr PAD for other landing site as needed
10. Exit application as needed

## NETMEETING VIDEO CONFERENCING

### OBJECTIVE:

This procedure is used to configure for, initiate and terminate a NetMeeting session

Steps 1.1 and 2 set up the camera on the PGSC

Steps 1.2 and 3 set up the VLHS, if the audio will be through NetMeeting and not A/G

Steps 4 through 6 are used to start and end a NetMeeting session

#### 1. UNSTOW

1.1 Ultraport Camera

1.2 If audio will be through NetMeeting (vice A/G),  
VLHS  
VLHS To VTS Interface Cable

#### 2. ULTRAPORT CAMERA SETUP (if reqd)

If Ultraport Camera is not installed,

PGSC

2.1 Exit all applications

2.2 Perform shut down:

Sel ► Start ► Shut Down... ► Shut down ► OK

2.3 Open small cover above Interposer (refer to figure 12-10)

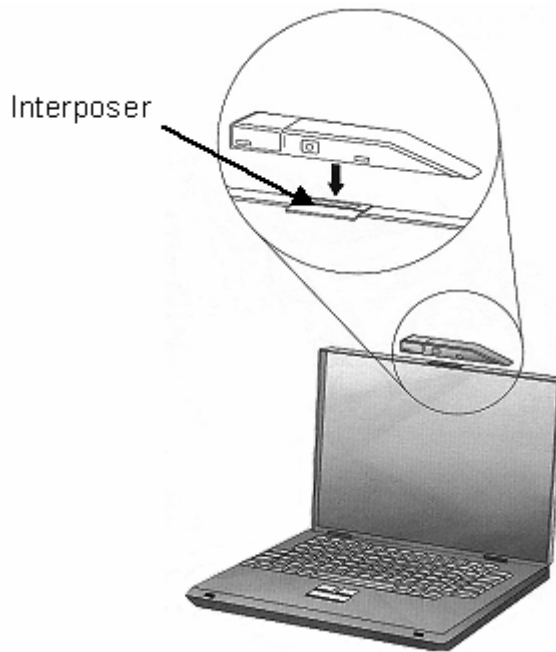


Figure 12-10.- Ultraport Camera position.

Cont next page

- Camera
- 2.4 Move and hold release latch towards angled side of Ultraport Camera Align metal legs below Ultraport Camera with holes inside Interposer  
Refer to figures 12-10 and 12-11
  - 2.5 Release latch to properly secure Ultraport Camera (refer to figure 12-11)

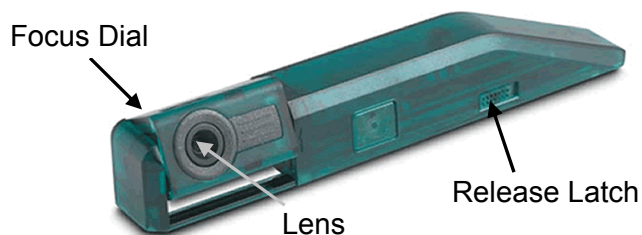


Figure 12-11.- Ultraport Camera.

- 2.6 ✓Ultraport Camera properly secured and does not disconnect
  - 2.7 Rotate lens so that lens is directed towards user (refer to figure 12-11)
3. AUDIO CONFIG THROUGH NETMEETING (if reqd)  
If audio will be through NetMeeting (vice A/G),
- Headset, PGSC
- 3.1 Configure VLHS To VTS Interface Cable and VLHS (refer to figure 12-12)
  - 3.2 Connect cable's headphone and mic jacks to PGSC (refer to figure 12-12)

Cont next page

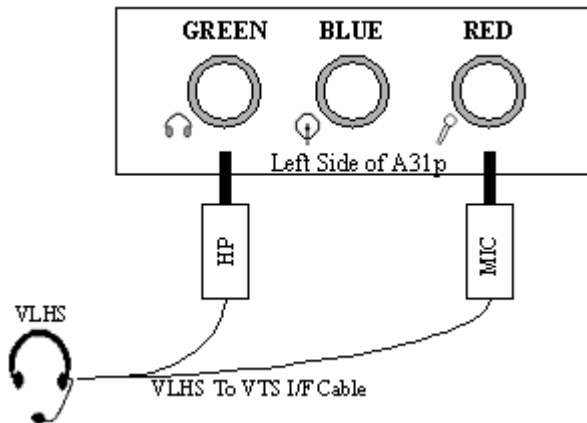


Figure 12-12.- Headset configuration.

#### 4. LAUNCHING NETMEETING

4.1 √PGSC connected to network

4.2 PGSC pwr – on

**CAUTION**  
NetMeeting may not operate properly if KFX is running on the PGSC at the same time

4.3 If running KFX on PGSC, exit KFX

4.4 Sel Shuttle Apps ► NetMeeting

NetMeeting – Not in a Call

4.5 Sel Start Video button

4.6 Verify video image from Ultraport Camera  
Adjust lens position and focus (using focus dial on top of lens assembly) as required

4.7 Inform MCC (a) ready for call and (b) which PGSC to call

**NOTE**  
MCC will initiate call

NetMeeting – Incoming call

Cont next page


4.8 Sel Accept button to receive incoming call

4.9 If desired, resize window:  
Right-click on window with incoming video  
Sel 'Window Size'  
Sel value for desired window size

NOTE

Do not disconnect the Ultraport Camera while the PGSC is powered on

5. ENDING NETMEETING SESSION

5.1 To end session, sel End Call button 

5.2 Sel Call ► Exit

5.3 If last NetMeeting session of flight:  
Disconnect VLHS To VTS Interface Cable from PGSC (if used)  
Move and hold release latch towards angled side of Ultraport Camera and remove Ultraport Camera from PGSC (refer to figure 12-11)  
Stow VLHS, VLHS To VTS Interface Cable, Ultraport Camera (as needed)

Camera

PGSC

6. RESTART KFX (if reqd)

6.1 Startup KFX on PGSC as needed

## PILOT WITH RHC (FOR A31p PGSC)

### NOTE

It is assumed PGSC (A31p) set up  
without Expansion Unit

#### A. EQUIPMENT SETUP

##### 1. Unstow:

PILOT HC  
PILOT Y-Cable  
Elastic Strap (1)  
Tie-wraps (2)  
PILOT CD  
DC PWR SPLY (760XD type, 'white brick')  
DC PWR SPLY Cable (760XD type)  
PGSC DC PWR Cable (28 Vdc)

- Towel Rack/  
Handhold
2. Secure elastic strap to Towel Rack and  
Window Handhold (right or left, to match seat  
used) with tie-wraps

### CAUTION

Once secure, pushing buckle will allow it  
to release, freeing RHC. When pushing  
buckle lever to release, keep thumb clear  
from underneath (pinch hazard)

- PILOT HC
3. Extend (pull) PILOT HC straps and position HC  
on aft portion of orbiter RHC pedestal. Secure  
lower strap over pedestal, pull strap taut and  
pull out firmly on buckle; repeat with upper  
strap

4. PILOT HC pwr – OFF (down posn)

- PWR SPLY
5. DC PWR SPLY PWR sw1 – OFF

6. See UTILITY OUTLET PLUG-IN PLAN,  
ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)  
or PGSC Usage Chart for appropriate DC Util  
Pwr outlet/sw to use for PILOT HC pwr

Cont next page

- |                   |  |
|-------------------|--|
| Pwr outlet        | 7. DC UTIL PWR – OFF (utility outlet for HC)   |
| DC PWR Cable      | 8. Connect DC PWR Cable from DC Util Pwr outlet to DC PWR SPLY (white brick) outlet (J1)               |
| DC PWR SPLY Cable | 9. Connect DC PWR SPLY Cable from DC PWR SPLY (white brick) outlet (J2) to PILOT HC (see figure 12-13) |
| PGSC              | 10. Shut down A31p PGSC  |
|                   | 11. If present, disconnect any cable from PGSC RS-232 port and secure                                  |

NOTE

PILOT Y-Cable Power Leg to PGSC remains terminated

- |               |   |
|---------------|---|
| PILOT Y-Cable | 12. Connect PILOT Y-Cable RS-232 Leg to RS-232 port<br>Connect PILOT Y-Cable Hand Controller Leg to PILOT HC (see figure 12-13)   |
| PGSC          | 13. Position and secure PGSC in front of HUD and behind elastic strap (top of display touching bottom of eyebrow panel). Duct tape can be used as needed to secure PGSC |
| Pwr outlet    | 14. DC UTIL PWR – ON (utility outlet for HC)  |
| PWR SPLY      | 15. DC PWR SPLY PWR sw1 – ON  |

B. PILOT OPERATION WITH RHC

- |          |   |
|----------|---|
| PILOT HC | 1. PILOT HC pwr – ON (up posn)                                  |
| PGSC     | 2. Press and hold down [F12] <b>WHILE</b> powering up A31p      |
|          | 3. Release [F12] after 'Preparing Boot Device List' msg appears |
|          | 4. Confirm Boot Menu appears                                    |

Cont next page



5. Insert PILOT CD into DVD/CD-ROM drive
6. Select 'CD ROM Drive' from 'Boot Menu'
7. Select 'Start PILOT in RHC Mode' from 'Windows Startup Menu'
8. Follow instructions for HC calibration (after ~30 sec)
9. Menu Selection Values:  
Modify as desired  
'Enter' twice to run sim
10. Simulation Begins (~15 sec)
  - 'z' – toggles between instruments and out-the-window displays
  - [space bar] – HUD declutter or if WOW, drag chute deploy
  - 'a' – switch to auto
  - 'c' – switch to CSS (same as HC breakout)
  - 'p' – pause sim, 'p' again resumes
11. Post Simulation
  - [space bar] – cycles through data to main menu
  - 'b' – cycles back through post run data
12. Terminate PILOT  
Enter 'q' to quit (returns to DOS prompt)
13. Remove PILOT CD
14. Shut down A31p PGSC, then use as desired
- PILOT HC 15. PILOT HC pwr – OFF (down posn)

Cont next page

- C. PILOT DISCONNECT and STOWAGE
- |               |   |
|---------------|---|
| PILOT HC      | 1. Confirm PILOT HC pwr – OFF (down posn)   |
| PGSC          | 2. Confirm PGSC pwr – OFF   |
| PWR SPLY      | 3. DC PWR SPLY PWR sw1 – OFF  |
| Pwr outlet    | 4. DC UTIL PWR – OFF (utility outlet for HC)  |
| PILOT Y-Cable | 5. Disconnect Y-Cables from PGSC and HC (remove PGSC from behind elastic if necessary)              |
| Pwr Cables    | 6. Disconnect DC PWR Cable and DC PWR SPLY Cable from DC Util Pwr outlet, DC PWR SPLY, and PILOT HC |

<p><b><u>CAUTION</u></b>          When pushing buckle lever to release, keep thumb clear from underneath (pinch hazard)</p>
---

- |                      |  |
|----------------------|--|
| PILOT HC             | 7. Unsecure HC, press buckle on top strap, loosen strap, repeat for bottom strap                   |
|                      | 8. Stow PILOT HC, Y-Cable, Boot CDs, Pwr Cables and DC PWR SPLY in original locker                 |
| Towel Rack/ Handhold | 9. Cut loose tie-wraps and elastic strap from window and secure after final on-orbit PILOT session |

- D. TROUBLESHOOTING
1. If HC appears to have bias, calibrate HC at main menu – enter ‘c’, follow onscreen instructions
  2. If DOS prompt appears or program hangs, cycle PGSC pwr and repeat B. PILOT OPERATION WITH RHC, steps 1 thru 10 above
  3. If Boot from CD fails or PILOT fails to begin (B. PILOT OPERATION WITH RHC, steps 6 thru 10), boot with spare CD

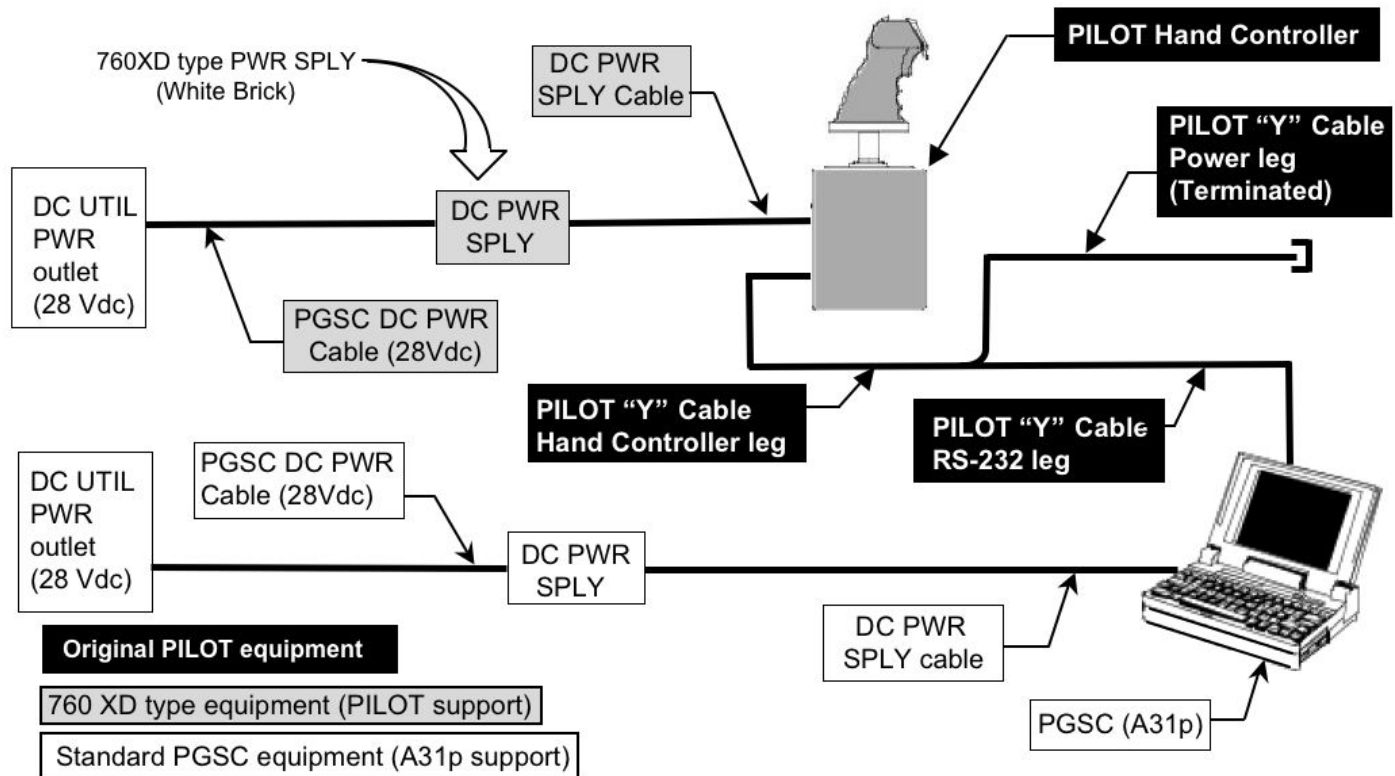


Figure 12-13.- A31p PILOT setup diagram with RHC.

## PILOT WITHOUT RHC (FOR A31p PGSC)

### NOTE

Only PILOT CD reqd

#### A. PILOT OPERATION WITHOUT RHC

1. Unstow PILOT CD
- PGSC 2. Shut down A31p PGSC
3. Press and hold down [F12] **WHILE** powering up A31p
4. Release [F12] after 'Preparing Boot Device List' msg appears
5. Confirm Boot Menu appears
6. Insert PILOT CD into DVD/CD-ROM drive
7. Select 'CD ROM Drive' from 'Boot Menu'
8. Select 'Start PILOT in KBD Mode' from 'Windows Startup Menu'
9. Menu Selection Values:

### NOTE

Sim must be in 'auto' to keep from crashing:  
Sel 'Auto' at startup (item 7)  
Otherwise, modify as desired  
'Enter' twice to run simulation

10. Simulation Begins (~15 sec)
  - 'z' – toggles between instruments and out-the-window displays
  - [space bar] – HUD declutter or if WOW, drag chute deploy
  - 'p' – pause sim, 'p' again resumes

Cont next page

- 11. Post Simulation
  - [space bar] – cycles thru data to main menu
  - 'b' – cycles back thru post run data
- 12. Terminate PILOT
  - Enter 'q' to quit (returns to DOS prompt)
- 13. Remove and stow PILOT CD
- 14. Shut down A31p PGSC, then use as desired

B. TROUBLESHOOTING

- 1. If DOS prompt appears or program hangs, cycle PGSC pwr and repeat A. PILOT OPERATION WITHOUT RHC, steps 2 thru 9 above
- 2. If Boot from CD fails or PILOT fails to begin (A. PILOT OPERATION WITHOUT RHC, steps 7 thru 10), boot with spare CD

## PGSC STATE VECTOR UPDATE WITHOUT PCMMU DATA

L/O           /      :      :            
           YEAR      DAY      HOUR      MIN      SEC

**NOTE**

If no PCMMU feed available to PGSCs, current orbiter state vector can be obtained via GPC displays in OPS 2 or OPS 3.

Press 'SPEC' on keypad to freeze data. Press 'CLEAR' to resume display changes

SET STATE VECTOR

S/V           /      :      :            
           DAY      HR      MIN      SEC

- If OPS 2:  
     SPEC 34

X( )                                        

- If OPS 3:

GNC 0 GPC MEMORY
ITEM 26 +2 1 0 EXEC

Y( )                                        

Z( )                                        

X	B9DC	VX	B9E8
Y	B9E0	VY	B9EC
Z	B9E4	VZ	B9F0

VX( )                                        

VY( )                                        

VZ( )                                        

**NOTE**

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

S/V           /      :      :            
           DAY      HR      MIN      SEC

S/V           /      :      :            
           DAY      HR      MIN      SEC

X( )                                        

X( )                                        

Y( )                                        

Y( )                                        

Z( )                                        

Z( )                                        

VX( )                                        

VX( )                                        

VY( )                                        

VY( )                                        

VZ( )                                        

VZ( )

11. Post Simulation
  - [space bar] – cycles thru data to main menu
  - 'b' – cycles back thru post run data
12. Terminate PILOT
  - Enter 'q' to quit (returns to DOS prompt)
13. Remove and stow PILOT CD
14. Shut down A31p PGSC, then use as desired

B. TROUBLESHOOTING

1. If DOS prompt appears or program hangs, cycle PGSC pwr and repeat A. PILOT OPERATION WITHOUT RHC, steps 2 thru 9 above
2. If Boot from CD fails or PILOT fails to begin (A. PILOT OPERATION WITHOUT RHC, steps 7 thru 10), boot with spare CD

## PGSC STATE VECTOR UPDATE WITHOUT PCMMU DATA

L/O                           
           YEAR      DAY      HOUR      MIN      SEC

NOTE

If no PCMMU feed available to PGSCs, current orbiter state vector can be obtained via GPC displays in OPS 2 or OPS 3.

Press 'SPEC' on keypad to freeze data. Press 'CLEAR' to resume display changes

SET STATE VECTOR

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	BA04	VX	BA10
Y	BA08	VY	BA14
Z	BA0C	VZ	BA18

VX( )                                        

VY( )                                        

VZ( )                                        

NOTE

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

S/V           /      :      :       
           DAY      HR      MIN      SEC

S/V           /      :      :       
           DAY      HR      MIN      SEC

X( )                                        

X( )                                        

Y( )                                        

Y( )                                        

Z( )                                        

Z( )                                        

VX( )                                        

VX( )                                        

VY( )                                        

VY( )                                        

VZ( )                                        

VZ( )



## BOOTING FROM A31p ULTRABAY HARD DISK

### NOTE

Internal hard disk is referred to as PM in BIOS and Ultrabay hard disk is PS. Hard disk that appears at top of BIOS boot list is disk that boots at PGSC startup

A31p  
PGSC

1. Shutdown PGSC
2. PGSC pwr – on (press [F1] when “Press F1 for IBM BIOS Setup Utility” message appears)
3. √“IBM BIOS Setup Utility” display appears
4. Using arrow keys, sel ‘Startup’ and press [ENTER]
5. Sel ‘Boot’ and press [ENTER]
6. Sel ‘+Hard Drive’ and press [ENTER]
7. If ‘...(PS)’ hard disk does not appear at top of hard drive list, sel ‘...(PM)’ and press [F5] to bring ‘...(PS)’ hard disk to top of hard drive list
8. √‘...(PS)’ appears at top of hard drive list
9. Press [F10]
10. Sel ‘Yes’ and press [ENTER] to save changes
11. √PGSC boots up

## RELOAD A31p PGSC

### OBJECTIVE:

This contingency procedure is used to reload the primary hard drive in the A31p PGSC using A31p Reload DVD located in FDF CD Kit

A31p  
PGSC

1. Shut down PGSC
2. ✓PGSC shutdown complete
3. Remove any network card or network cable from PGSC
4. Press and hold down [F12] **WHILE** powering up A31p
5. Release [F12] after 'Preparing Boot Device List' msg appears
6. ✓Boot Menu appears
7. Insert A31p Reload DVD into DVD/CD-ROM drive
8. Using arrow keys, sel 'CD-ROM drive' from boot menu and press [ENTER]
9. When prompted to overwrite hard drive, press [Y] to start reload software
10. After completion of loading, follow instructions on screen to remove Reload DVD and reboot PGSC
11. For STS PGSC load only (i.e., not OCA Router):  
Allow computer to proceed through post-loading setup (PGSC will automatically reboot three times during this stage)

Cont next page

12. If reqd, perform PGSC HARD DISK LATE UPDATE,  
12-7

13. If PGSC intended for use on STS network:

NOTE

Do not install the network card or network  
cable until PGSC NAMING is complete

- a. For PGSC NAMING, go to PGSC  
NETWORK, C. PGSC NAMING, 12-28
- b. Insert/connect network card or network cable

## A31p HARD DRIVE CHANGEOUT

On MCC GO:

### CAUTION

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

- A31p
1. Exit all applications
  2. Perform shut down:  
Sel ► Start ► Turn Off Computer... ► Turn Off
  3. √PGSC shut down complete
  4. Remove all PCMCIA cards
  5. Close A31p Laptop cover
  6. Turn A31p Laptop over so that bottom side faces up

### NOTE

For location of A31p Hard Drive refer to figure 12-14. A31p Hard Drive is attached to Hard Drive cover

Cont next page

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ORB OPS/ALL/GEN M

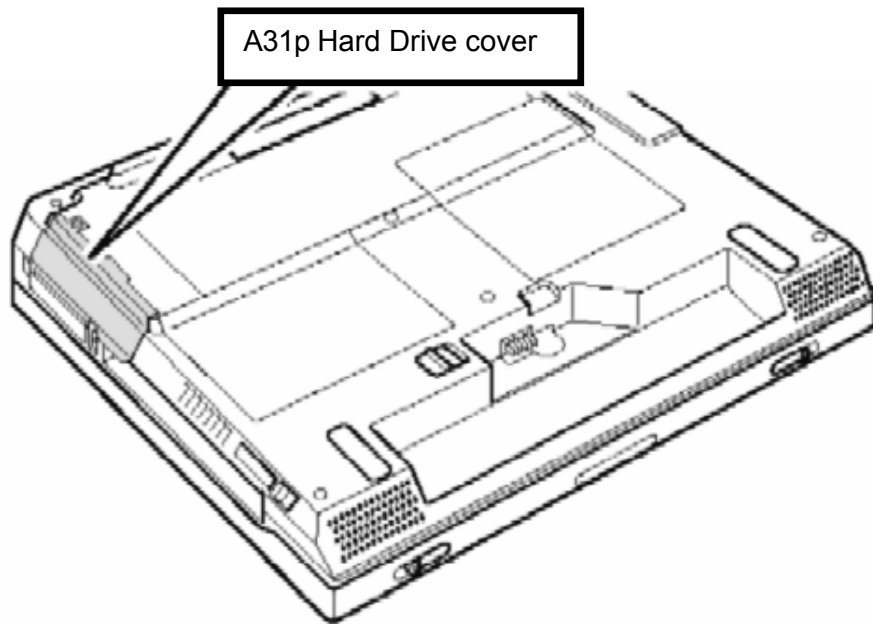


Figure 12-14.- A31p Hard Drive location.

7. Refer to figure 12-15 for removing A31p Hard Drive | Gently pull cover and A31p Hard Drive out from the A31p Laptop to remove from slot

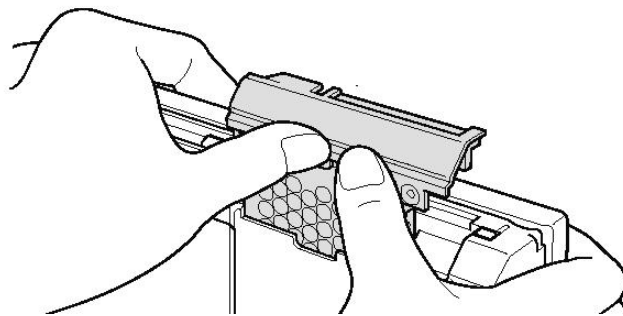


Figure 12-15.- A31p Hard Drive removal.

Cont next page

12-83

ORB OPS/ALL/GEN M

8. Remove cover from A31p Hard Drive (refer to figure 12-16)

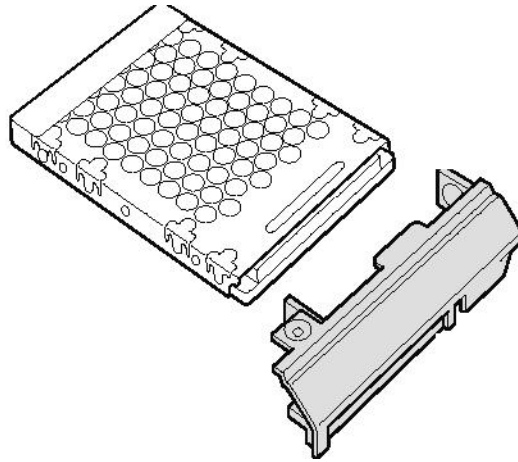


Figure 12-16.- A31p Hard Drive cover removal.

9. Attach cover to new A31p Hard Drive
10. Inspect pins on the hard drive for damage  
If damaged, report to MCC  
  
Insert A31p Hard Drive into Hard Drive slot
11. Flip A31p Laptop over to original position  
Reinsert PCMCIA cards
12. PGSC pwr – on
13. If reqd, perform PGSC HARD DISK LATE UPDATE,  
12-7
14. If PGSC is intended for use on STS network, go to  
PGSC NETWORK, C. PGSC NAMING, 12-28
15. Report procedure complete to MCC

## A31p DEVICE CHANGEOUT

### OBJECTIVE:

This procedure is used to safely remove and/or install A31p Laptop Ultrabay devices. The procedure applies to Ultrabay slots on both sides of A31p Laptop. The A31p DVD/CDRW Drive and A31p Ultrabay Adapter can be inserted into Ultrabay slots on either side.

On MCC GO:

1. Unstow required Ultrabay device(s)
- A31p 2. Exit all applications
3. Perform shut down:  
Sel ► Start ► Turn Off Computer... ► Turn Off
4. √PGSC shut down complete

### NOTE

Refer to figure 12-17 for switch and lever locations

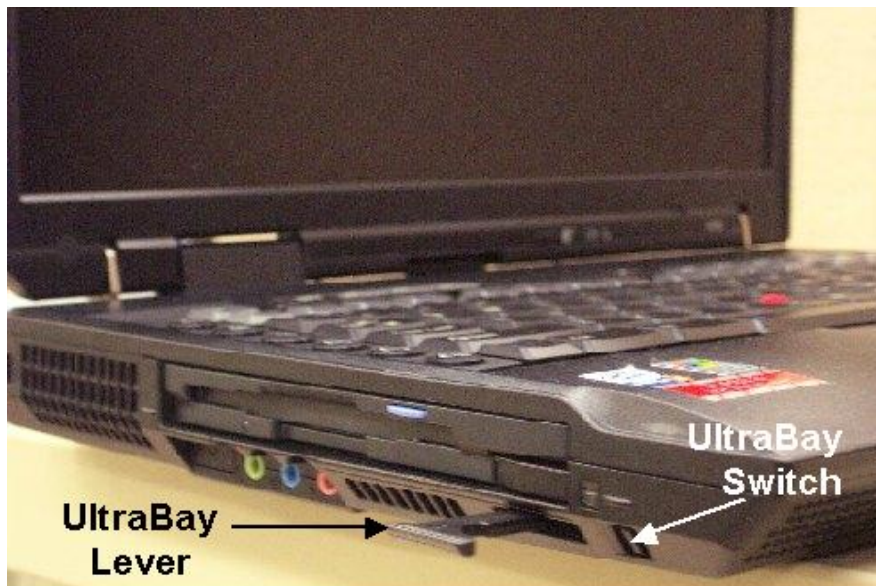


Figure 12-17.- Ultrabay location in A31p Laptop.

Cont next page

5. To discharge Ultrabay lever, pull Ultrabay switch toward front of laptop
6. To release device from bay, pull Ultrabay lever
7. Remove device from Ultrabay
8. If changeout is for spare A31p Hard Drive:

**CAUTION**

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

Ultrabay Adapter

- a. Raise black security latch (refer to figure 12-18)

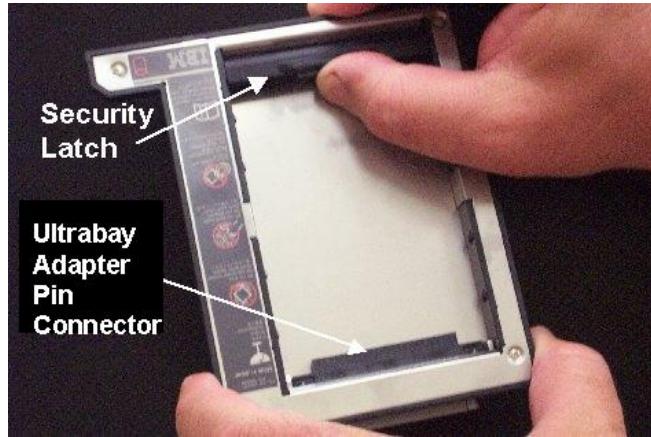


Figure 12-18.- A31p Ultrabay Adapter.

- 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 12-18)

Cont next page





Figure 12-19.- 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 12-20)



Figure 12-20.- A31p Ultrabay Adapter and A31p Hard Drive final configuration.

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

Cont next page

- 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 A31p Hard Drive:
    - If reqd, perform BOOTING FROM A31p ULTRABAY HARD DISK, 12-79
    - If reqd, perform PGSC HARD DISK LATE UPDATE, 12-7
    - If PGSC is intended for use on STS network, go to PGSC NETWORK, C. PGSC NAMING, 12-28
  13. Report procedure complete to MCC

## RELOAD 760XD PGSC

- PGSC
1. PGSC pwr – on (while holding [F1] key down)
  2. Sel 'Config' at Easy-Setup main menu
  3. Sel 'Initialize'
  4. Sel 'OK' to initialize system settings
  5. Sel 'Exit'
  6. Insert bootable PGSC Reload Diskette into floppy drive
  7. Sel 'Restart' at Easy-Setup main menu
  8. Sel 'OK'
  9. When prompted, press [Y] to overwrite hard drive
  10. Insert PGSC Reload CD when prompted
  11. When CD-ROM light stops blinking, press any key to continue (software recovery program now loading)
  12. After hard drive updated, remove PGSC Reload Diskette and remove CD
  13. Press 'Ctrl-Alt-Del' to reboot PGSC
  14. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-7
  15. If PGSC intended for use on STS network:

### NOTE

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

For PGSC NAMING, go to PGSC NETWORK, C. PGSC NAMING, 12-28

## WINDOWS KEYBOARD REF

### NOTE

Simo key combinations linked by slash marks.  
Sequential key combinations linked by commas

### WINDOWS DESKTOP

Shut down Windows	[CTRL]/[ESC], [↑], [ENTER]
Sel and open desktop icon	[CTRL]/[ESC], [ESC], [TAB], [TAB], [Arrow keys], [ENTER]
Program item icons contained in folder:	
Sel program item icon	[Arrow keys]
Start program	Sel program item, [ENTER]

### WINDOWS EXPLORER

Sel previous/next directory or subdirectory	[↑] or [↓]
Page forward/backward	[PG DN] or [PG UP]
Sel root directory	[HOME]
Sel last directory	[END]
Expand current selection (if in left pane and not expanded)	[→]
Collapse current selection (if in left pane and expanded)	[←]
Toggle between panes	[TAB] or [F6]
Refresh screen	[F5]

Cont next page

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]

## WORLDMAP KEYBOARD REF

### NOTE

Simo key combinations linked by slash marks

Help Index	[F1]
Layer Description Index	[Shift]/[F1]
Zoom in	[CTRL]/[I]
Zoom out	[CTRL]/[O]
Zoom – Back (to prior zoom level)	[CTRL]/[B]
Display full map view	[CTRL]/[F]
Center map on primary vehicle	[CTRL]/[C]
Find EOS, city, etc. in map	[F3]
Display settings for the currently selected view	[F11]
Display menu in a view	[SHIFT]/[F10] or right mouse click
Toggle panning mode on/off	[CTRL]/[P]
Toggle menu on/off	[CTRL]/[M]
Toggle toolbar on/off	[CTRL]/[T]
Toggle caption on/off	[CTRL]/[A]
Turn on all window decorations	[CTRL]/[W]
Refresh all views	[F5]
Save WorldMap configuration	[CTRL]/[S]
Exit application	[ALT]/[F4]



## **FILE SNEAKERNET BETWEEN ISS SSC AND SHUTTLE PGSC**

### **A. FROM ISS SSC TO SHUTTLE PGSC**

1. Insert a Shuttle "Late Update" PCMCIA card into an ISS SSC
2. √KFX running on SSC
3. Notify MCC of SSC number used
4. Wait for MCC to uplink files to the "To Shuttle" folder on PCMCIA card in the ISS SSC
5. Remove the "Late Update" PCMCIA card from the ISS SSC
6. Insert the "Late Update" PCMCIA card into the KFX PGSC in the Shuttle
7. On KFX PGSC desktop, double click "DistributeShuttleUplink.bat" (to copy files from the PCMCIA card to the KFX PGSC hard drive)
8. If reqd, when step 7 complete, on the KFX PGSC desktop, double click "Ex Pkg Batch #X" (to initiate printing of uplinked messages)

### **B. FROM SHUTTLE PGSC TO ISS SSC**

1. Insert a Shuttle "Late Update" PCMCIA card into a Shuttle PGSC
2. Copy desired files from PGSC hard drive to "From Shuttle" folder on the PCMCIA card
3. Remove PCMCIA card and insert into an ISS SSC
4. √KFX running on ISS SSC
5. Notify MCC which SSC contains the PCMCIA card
6. Wait for MCC to downlink all files in "From Shuttle" folder on PCMCIA card

## DOCKING/UNDOCKING A31p PGSC

### NOTE

If needed, reference PGSC figures 12-21 thru 12-23 to identify various parts of A31p Docking Station

- A. DOCKING PGSC TO DOCKING STATION
- PGSC 1. √PGSC is shutdown
2. √PGSC lid is closed
3. If DC Pwr Sply Cable connected to PGSC pwr port:
- PWR SPLY a. √DC PWR SPLY PWR sw – OFF
- Pwr outlet b. √DC UTIL PWR – OFF (for pwr to PGSC)
- PGSC c. Disconnect DC Pwr Sply Cable from PGSC pwr port and DC Pwr Sply output J2
- d. Stow DC Pwr Sply Cable as needed
- Docking Station 4. √Blue knob (located on side of Docking Station) in Unlock position (i.e., most counterclockwise position)

### NOTE

Docking of PGSC to Docking Station should be performed over firm/flat surface

- PGSC 5. Place PGSC over blue interface plate of Docking Station ensuring bottom corners of PGSC are against two corners of blue interface plate Move Velcro tab that is attached to PGSC's hard drive so that it does not get caught between underside of PGSC and Docking Station
6. Push down on lid to lock PGSC to Docking Station (listen for 'click' sound). Docking Station cover will slide towards PGSC

Cont next page

7. Verify PGSC does not separate from Docking Station

- \* If separation occurs: \*
- \* a. Place PGSC/Docking Station \*
- \* assy on its side \*
- \* b. Press simo on PGSC lid and on \*
- \* back of Docking Station near area \*
- \* of locking mechanism (listen for \*
- \* 'click' sound) \*
- \* c. Verify PGSC does not separate \*
- \* from Docking Station \*

Docking Station 8. Turn blue knob clockwise to Lock position

Pwr outlet 9. √DC UTIL PWR – OFF (for pwr to Docking Station)

PWR SPLY 10. √PGSC DC Pwr Cable connected from DC Util Pwr outlet to DC Pwr Sply input J1  
Connect Docking Station DC Pwr Sply Cable from DC Pwr Sply output J2 to Docking Station pwr port J1 (align red dot on pwr cable connector to red dot on Docking Station pwr port)

Pwr outlet 11. DC UTIL PWR – ON

PWR SPLY 12. DC PWR SPLY PWR sw – ON

13. √Pwr Sply's output pwr LED is lit

Docking Station 14. √Docking Station's pwr LED (next to pwr port) is lit

NOTE

PGSC with Docking Station can be pwr'd on/off from either PGSC pwr button or Docking Station pwr button

PGSC 15. PGSC pwr – on

Docking Station 16. Verify Docking Station light “” (located near Docking Station pwr button) is lit

Cont next page

B. UNDOCKING PGSC FROM DOCKING STATION

CAUTION  
In event of PCMMU or OCA card failure,  
or Docking Station Fan failure, overheating  
can occur

1. If undocking PGSC as a result of a failure of PCMMU or OCA card, wait 30 min before replacing card (contact MCC)
2. In event of Docking Station Fan failure, wait 50 min before replacing or removing hardware after power down (contact MCC)
- PGSC 3. Shut down PGSC
4. Close PGSC lid
- Docking Station 5. Turn blue knob (located on side of Docking Station) counterclockwise to Unlock position
6. If Docking Station has external pwr applied to it, press rectangular Eject button once (Eject button will lift up). Reference figure 12-22  
If Docking Station does not have external pwr applied to it, push Alt Eject lever (located near blue knob) towards laptop (Eject button will lift up). Reference figures 12-22 and 12-23
7. Firmly push down on rectangular Eject button to unlock and separate PGSC from Docking Station
- PGSC 8. Remove PGSC from Docking Station

Cont next page

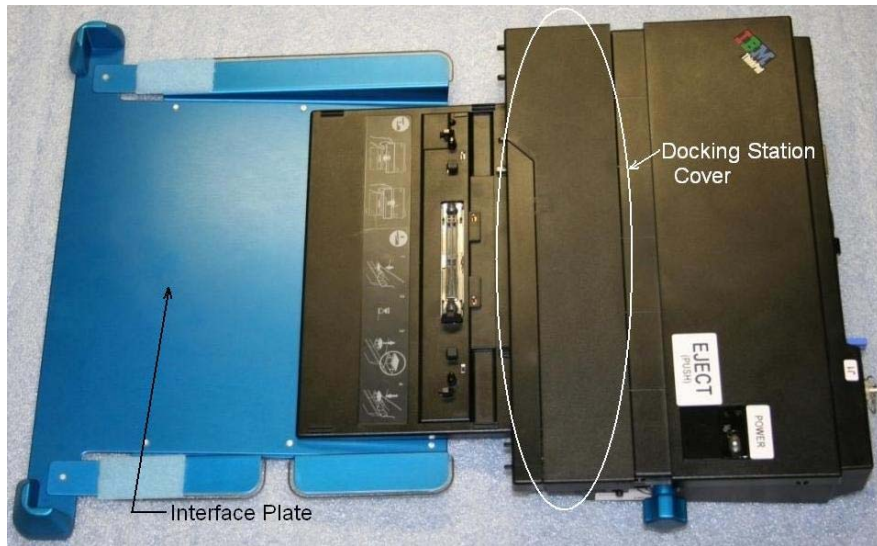


Figure 12-21.- A31p Docking Station.



Figure 12-22.- Docking Station Eject button and Power button.

Cont next page

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ORB OPS/ALL/GEN M

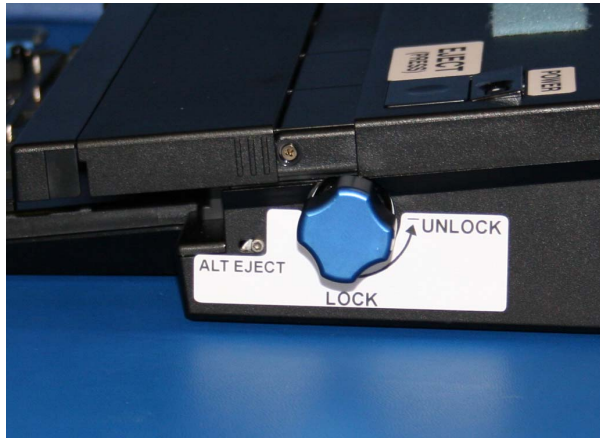


Figure 12-23.- Alt Eject lever and blue Lock/Unlock knob.

## RECONFIGURE WIRELESS ACCESS POINT

### NOTE

Only perform if new Wireless Access Point (WAP) settings required

1. Contact MCC for information:
  - a. Username
  - b. Password
  - c. WAP IP address
  - d. Location of config file
2. Connect PGSC to WAP using RJ-45 Cable
3. Open Internet Explorer on PGSC
4. Type IP address in address field, press [ENTER]
5. Enter Username and Password when prompted, click 'OK' button
6. Click 'Backup Settings' on left side of window, under Maintenance section
7. Click 'Browse' button under 'Restore Saved Settings from a File' to navigate to config file
8. Sel config file from location provided by MCC
9. Click 'Open' button
10. Click 'Restore' button and 'OK' button to accept warning message (Restoration process will take ~30 sec)
11. Close Internet Explorer



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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  
ACTIVE SAMPLING WITH PUMP AND DATA  
LOGGING ..... 13-7  
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SAMPLING PUMP BATTERY CHANGEOUT ..... 13-10  
ZERO CALIBRATION ..... 13-11  
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ALARM DISABLE/ENABLE ..... 13-14  
DATA RECORDING TABLE ..... 13-15

**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  
Sampling Pump  
Zero Filter

NOTE

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

Audible beeps occur when MODE pb depressed during unit activation

2. Activate CSA-CP  
Press,hold MODE pb until 'RELEASE' displayed

NOTE

Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete.

No O2 sensor is installed in the Shuttle CSA-CP monitor

3. √Display indicates readings for CO, HCN, HCL and record values in DATA RECORDING TABLE, 13-15

CSA-CP

Cont next page

13-2

ORB OPS/ALL/GEN M

4. If any reading higher than listed values below, proceed to step 5 for sensor rezeroing:  
CO  $\leq$  4 ppm  
HCL  $\leq$  0.4 ppm  
HCN  $\leq$  0.4 ppm  
If readings less than or equal to listed values, go to step 22
5. Mate CSA-CP to Sampling Pump. Slide CSA-CP into sampling pump bracket as far forward (toward inlet) as possible. Tighten Velcro straps
6. Unscrew, remove Sampling Pump Inlet (blue) Filter; temp stow
7. Unscrew tethered end caps on Zero Filter

NOTE

Pump inlet fitting has outside and inside threads

8. Screw end of Zero Filter cw into Sampling Pump inlet fitting until snug (arrow on Zero Filter should point toward Sampling Pump)
9. Sampling Pump sw – ON
10. After 2 min, press MODE pb (11 times) until 'GO CAL' displayed at top
11. Press "E" button  
√'SET SPAN' displayed at top  
If "E" button not pressed before 10 sec elapsed, screen will revert back to nominal screen  
Repeat step 10
12. Press "+" button  
√'ZERO' displayed at top
13. Press "E" button, verify 'ZEROING' displayed  
Wait 15 sec  
√'ZERO' displayed at top

Cont next page

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

NOTE

Damage to O-ring can occur if overtightened

19. Replace Sampling Pump Inlet Filter and tighten  
until snug

NOTE

CSA-CP can be used in active sampling  
mode using pump or in passive mode  
without pump. Use of pump provides faster  
response times for some contaminants.

Audible beeps occur when MODE pb  
depressed during unit activation or  
deactivation

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

## PASSIVE SAMPLING WITH DATA LOGGING

1. Unstow from temp:  
CSA-CP

### NOTE

Audible beeps occur when MODE pb depressed during unit activation

2. Press, hold MODE pb until 'RELEASE' displayed

### NOTE

Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

3. ✓ Display indicates readings for CO, HCN, HCL

### NOTE

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

4. Transfer CSA-CP to desired location

### NOTE

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

5. Press MODE pb (9 times) until 'LOG OFF' or 'LOG ON' displayed  
If reqd, press "+" button to reset data logger to 'LOG ON' displayed  
✓ 'LOG ON' displayed  
Notify MCC to discuss sampling plan

6. Conduct sampling session

Cont next page

7. Record value  
Notify MCC of results
8. Press, hold MODE pb until 'RELEASE' displayed  
√Unit off
9. Temp stow:  
CSA-CP

## ACTIVE SAMPLING WITH PUMP AND DATA LOGGING

1. Unstow from temp:  
CSA-CP
2. Unstow:  
Sampling Pump

### NOTE

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

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

### NOTE

Audible beeps occur when MODE pb depressed during unit activation

4. Press, hold MODE pb until 'RELEASE' displayed

### NOTE

Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

5. √Display indicates readings for CO, HCN, HCL

### NOTE

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

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

6. Sampling Pump sw – ON

Cont next page

7. Transfer active sampling assembly to desired location
8. Press MODE pb (9 times) until 'LOG OFF' or 'LOG ON' displayed  
If reqd, press "+" button to reset data logger to 'LOG ON'  
√'LOG ON' displayed  
Notify MCC to discuss sampling plan
9. Conduct active sampling session  
Record values  
Notify MCC of results
10. At end of active sampling, press, hold MODE pb until 'RELEASE' displayed  
√Unit off
11. Sampling Pump sw – OFF
12. Demate Sampling Pump and CSA-CP
13. Temp stow:  
CSA-CP
14. Stow:  
Sampling Pump



## CSA-CP BATTERY CHANGEOUT

1. If CSA-CP active:
  - Sampling Pump sw – OFF
  - Press, hold MODE pb until 'RELEASE' displayed
  - √CSA-CP offIf not active, go to step 2
2. Unstow Batt Pack
- IFM Kit 3. Unstow Marker
4. Replace battery, turn fasteners (two) on back panel 1/4 turn ccw; temp stow panel

### NOTE

Stored data maintained for max of 30 min without battery installed. All data lost if battery installation delayed more than 30 min

5. Grasp Batt Pack pull tab, remove pack
6. Mark Batt Pack DISCHARGED "YES" with marker
7. Stow Used Batt Pack
- IFM Kit 8. Stow Marker
9. Install replacement Batt Pack, press firmly to seat contacts
10. Replace panel, press firmly, turn fasteners (two) 1/4 turn cw to lock
11. If contingency, activate CSA-CP:
  - Press, hold MODE pb until 'RELEASE' displayed
  - √CSA-CP onIf not contingency, temp stow CSA-CP

## **SAMPLING PUMP BATTERY CHANGEOUT**

- IFM Kit
1. Unstow:  
    Small Flathead Screwdriver  
    Marker
  2. Unstow Spare Batt Pack
  3. Turn screw on back panel ccw 3 to 4 turns
  4. Remove panel  
    Temp stow
  5. Grasp Batt Pack pull tab, remove Batt Pack
  6. Mark Batt Pack DISCHARGED "YES" with marker
  7. Install replacement Batt Pack, press firmly to seat contacts
  8. Replace cover plate, turn screw cw until tight
- IFM Kit
9. Stow:  
    Screwdriver  
    Marker
  10. Stow Used Batt Pack

## ZERO CALIBRATION

### NOTE

Function of Zero Calibration Filter is to remove all target gases (if present) in air stream so sensors can be rezeroed. Capacity to remove target gases severely reduced if tethered filter caps not immediately replaced and tightened after use

1. Unstow from temp:  
CSA-CP  
Unstow:  
Zero Filter  
Sampling Pump

### NOTE

Audible beeps occur when MODE pb depressed during unit activation

2. Press, hold MODE pb until 'RELEASE' displayed

### NOTE

Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

3. Display indicates readings for CO, HCN, HCL
4. Mate CSA-CP to Sampling Pump. Slide CSA-CP into sampling pump bracket as far forward (toward inlet) as possible. Tighten Velcro straps
5. Unscrew, remove Sampling Pump Inlet (blue) Filter Temp stow
6. Unscrew tethered end caps on Zero Filter

### NOTE

Pump inlet fitting has outside and inside threads

Cont next page

7. Screw end of Zero Filter cw into Sampling Pump inlet fitting until snug  
Arrow on Zero Filter should point toward Sampling Pump
8. Sampling Pump sw – ON
9. After 2 min, press MODE pb (11 times) until 'GO CAL' is displayed at top
10. Press "E" button  
√'SET SPAN' displayed at top
11. Press "+" button  
√'ZERO' displayed at top
12. Press "E" button, verify 'ZEROING' displayed  
Wait 15 sec  
√'ZERO' displayed at top
13. Press MODE pb once  
After 15 sec, verify nominal display (gas concentrations)
14. Sampling Pump sw – OFF
15. Remove Zero Filter from Sampling Pump inlet  
Replace tethered endcaps and tighten finger tight

NOTE

Damage to O-ring can occur if overtightened

16. Replace Sampling Pump Inlet Filter and tighten until snug

NOTE

CSA-CP can be used in active sampling mode using pump or in passive mode without pump. Use of pump provides faster response times for some contaminants

Cont next page

- ┌ | | | ┌
17. If active sampling desired:  
| Use as configured  
If passive operation of CSA-CP desired, then:  
Demate CSA-CP from Sampling Pump
  18. Stow Zero Filter  
Stow Sampling Pump (for passive operation)  
Notify MCC
  19. Transfer CSA-CP to desired location for sampling session

## **DATA LOGGER ACTIVATION/DEACTIVATION**

### NOTE

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

- CSA-CP
1. Press MODE pb (9 times) until 'LOG ON'  
(for activation) or 'LOG OFF' (for deactivation)  
displayed
  2. Press "+" button to activate or deactivate Data  
Logger  
√'LOG ON' or 'LOG OFF' displayed, as desired

## ALARM DISABLE/ENABLE

### NOTE

Disabling CSA-CP alarm function removes audio and visual annunciation (flashing red lights) if target gas thresholds exceeded. However, any target gas concentration(s) above preset threshold(s) continue to be indicated by blinking display

1. Notify MCC prior to disabling alarm function

### NOTE

Audible beeps occur when MODE pb depressed during unit activation

2. Press, hold MODE pb until 'RELEASE' displayed

### NOTE

Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete

3. √Display indicates readings for CO, HCN, HCL

### NOTE

Operating mode reverts to nominal display after 10 sec

4. Press MODE pb (10 times) until 'MUTE' or 'UNMUTE' is displayed
5. Press "+" button to disable/enable alarms, as desired  
√Display indicates alarm enabled/disabled

**DATA RECORDING TABLE**

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 _____	



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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 M

CUE CARD  
CONFIG

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FAB USE ONLY

15-2

ORB OPS/ALL/GEN M

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 M



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 M





FAB USE ONLY

CC 15-5

ORB OPS/ALL/GEN M

(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	CARGO LOOP		
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	RGA/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/K

FAB USE ONLY

CC 15-6

ORB OPS/ALL/GEN M

(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

O2 PRESS: TK1, TK2, TK3, TK4, TK5  
 O2 HEATER TEMP: TK1, TK2, TK3, TK4, TK5  
 H2 PRESS: TK1, TK2, TK3, TK4, TK5  
 FUEL CELL REAC: FC1, FC2, FC3  
 FUEL CELL STACK TEMP: FC1, FC2, FC3  
 FUEL CELL PUMP: FC1, FC2, FC3  
 MAIN BUS UNDERVOLT: MNA, MNB, MNC  
 AC VOLTAGE: AC1, AC2, AC3  
 AC OVERLOAD: AC1, AC2, AC3  
 CABIN ATM: CABIN P, CABIN PPO2 A, CABIN PPO2 B  
 CABIN AIR: AV BAY 1 T, AV BAY 2 T, AV BAY 3 T, CAB HX OUT T  
 PAYLOAD WARNING: 1, 2, 3, 4, 5  
 H2O LOOP: 1 OUT P, 2 OUT P  
 FREON LOOP: 1 FLOW, 2 FLOW  
 FREON LOOP: 1 EVAP OUT T, 2 EVAP OUT T  
 APU OVERSPEED: APU 1, APU 2, APU 3  
 HYD PRESS: SYS 1, SYS 2, SYS 3  
 MPS: C He TK P, L He TK P, R He TK P, C He REG P, L He REG P, R He REG P, LO2 MANF P, LH2 MANF P

HOOK VELCRO (Left and Right)  
 ZIPTONED PARAM USED WHEN PUKIT INSTALLED (Diagonal lines)  
 PARAM INH IF TANKS NOT INSTALLED (Hatched)  
 PARAM INH ON-ORBIT (Black)

ORB OPS-2b/O/E

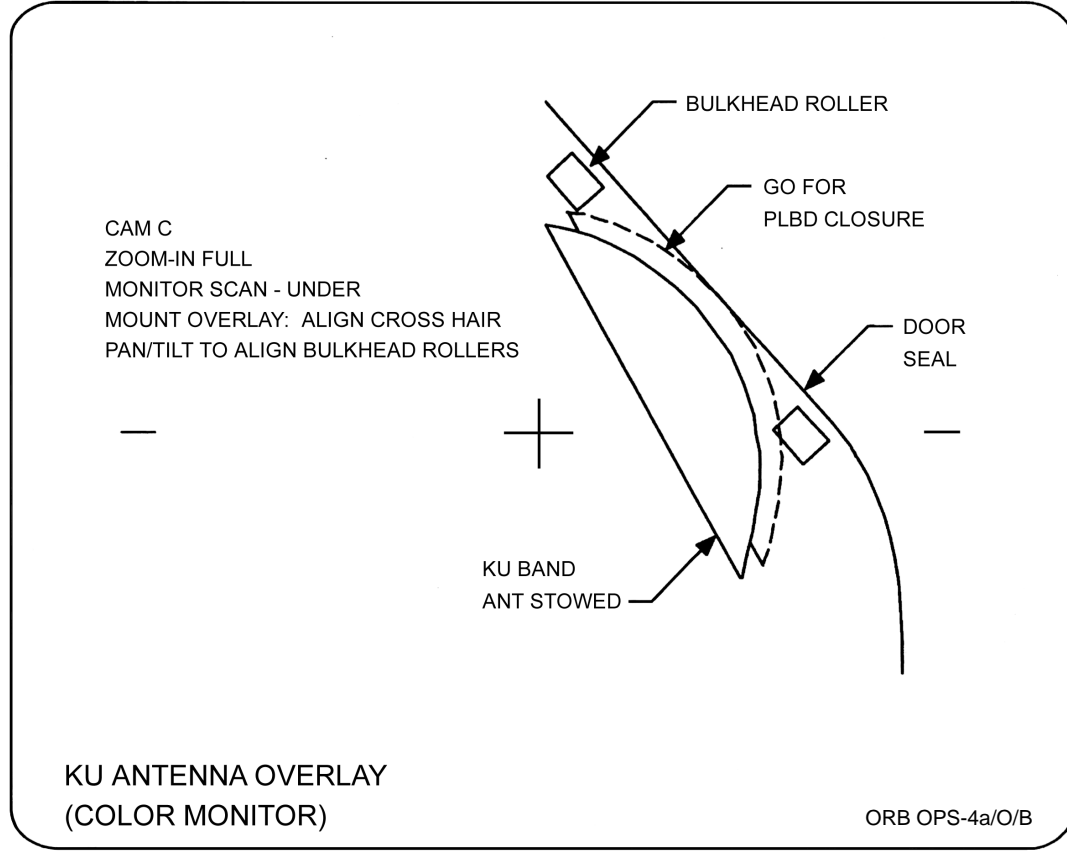
FAB USE ONLY

CC 15-7

ORB OPS/ALL/GEN M

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Fabricate as a Transparency



(reduced copy)

**URINE COLLECTION**

- √FAN SEP same as HOSE BLOCK
- √MODE – AUTO
- √CRADLE – AUTO
- Unstow hose and install urinal funnel
- √Airflow
- √WCS ON It – on
- Urinate
- Remove, clean, stow urinal funnel

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

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 (Vaness 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/I

FAB USE ONLY

CC 15-9

ORB OPS/ALL/GEN M

(reduced copy)

**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

TOP  
BACK OF 'URINE COLLECTION'

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 viv  
Discard in WCS trash module

HOOK  
VELCRO

ORB OPS-5b/O/H



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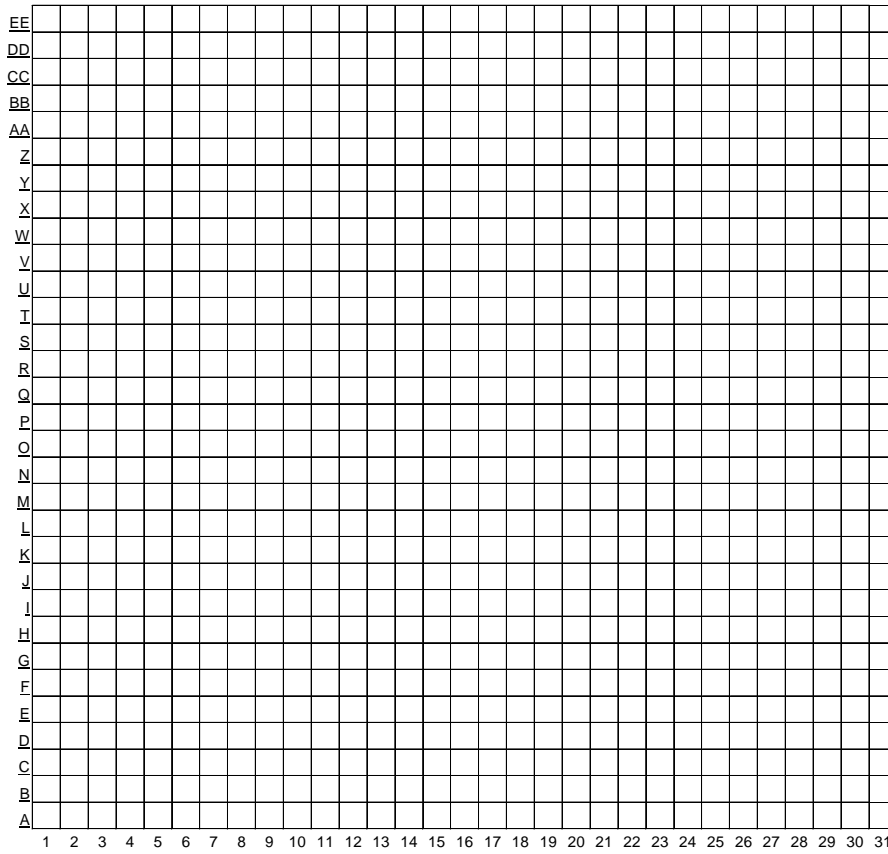


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PHOTO GRID OVERLAY



ORB OPS-9a/O/B

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FAB USE ONLY

CC 15-12

ORB OPS/ALL/GEN M



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
- Ensure locking collars on new OHS are rotated to the locked position

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

ORB OPS-23a/O/F

(reduced copy)

FAB USE ONLY

CC 15-13

ORB OPS/ALL/GEN M

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  
Ensure locking collars on new OHS are rotated to the locked position

#### URINE PRETREAT ENTRY PREP

##### NOTE

Caps will be transferred to used Oxone Hose Section (OHS). OHS is capped in 1 atm environment. Removal of caps during installation could be propulsive if cabin pressure < 14.7 psia

Unfasten empty hose section from WCS  
Remove caps from empty hose section; temp stow  
Detach used OHS from prefilter housing and hose block extension  
Place caps on used OHS  
Place used OHS in Ziplock Bag labeled 'Trash'; stow in large Ziplock Bag  
Attach empty hose section to prefilter housing and hose block extension  
Record H/N from OHS label and 'installed' MET on Cue Card for empty hose section  
Stow OHS kit for Entry

ORB OPS-23b/O/E

(reduced copy)

FAB USE ONLY

CC 15-14

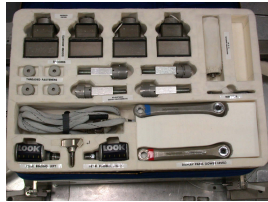
ORB OPS/ALL/GEN M

TOP

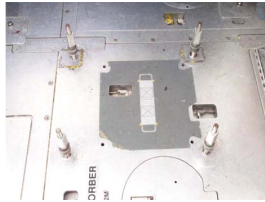
HOOK  
VELCRO

# ERGOMETER

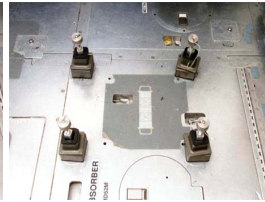
**Ergometer setup locations:**  
Seat 3 - facing stbd  
Seat 4 - facing port  
Seat 5 - facing port  
Seat 6 - facing port  
Seat 7 - facing stbd



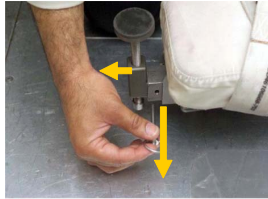
① Temp stow accessory bag at setup location. Note display panel is under pedal cranks



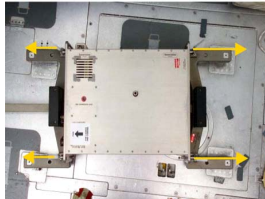
② Secure / latch AQDs onto deck studs



③ Install spacers then sound mounts. Secure loosely with knurled knobs



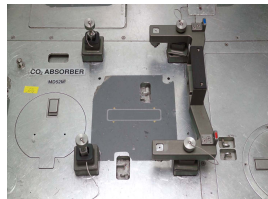
④ Remove pip pin, seat stem foot and seat, temp stow all



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 15-15

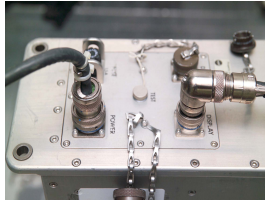
ORB OPS/ALL/GEN M

TOP, BACK OF 'ERGOMETER'

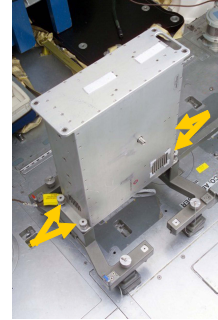
HOOK  
VELCRO



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



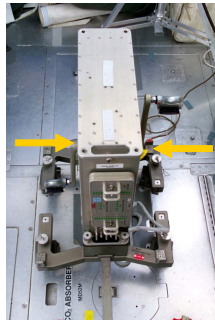
11 CAUTION:  
Ensure ergometer and power panel are OFF before making connections. Note: Steps will interrupt power to other loads on utility panel. Connect display panel to ergometer and connect Pre-routed power cable



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 turning (CW)

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 15-16

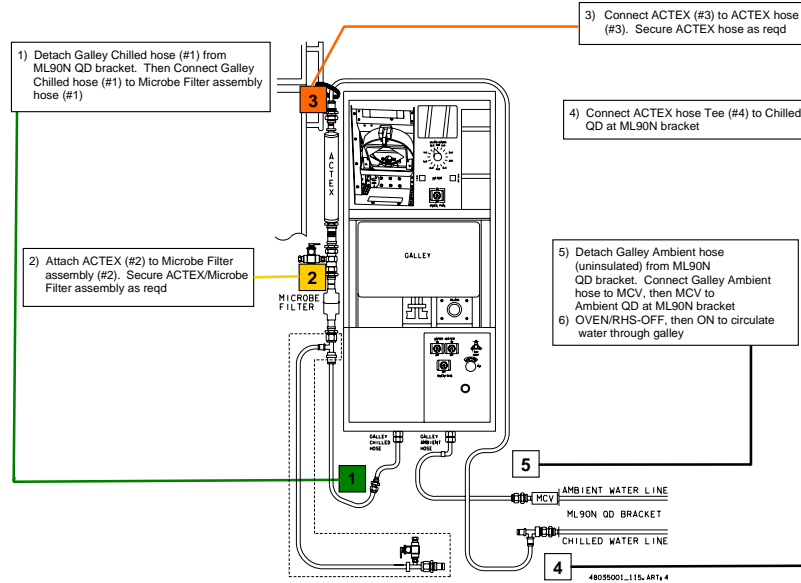
ORB OPS/ALL/GEN M

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 15-17

ORB OPS/ALL/GEN M

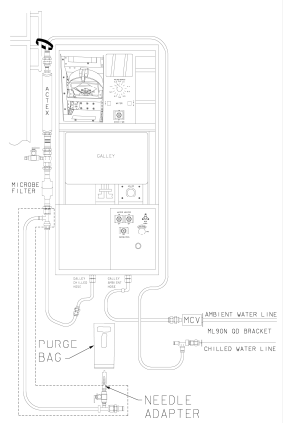
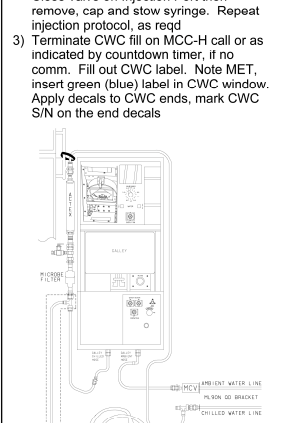
TOP, BACK OF 'GALLEY IODINE REMOVAL ASSEMBLY (GIRA) INSTALLATION'

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

WATER TRANSFER HOSE PURGE	CWC FILL	CWC SAMPLING
<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 15-18

ORB OPS/ALL/GEN M

(reduced copy)

TOP

HOOK  
VELCRO

### RECUMBENT SEAT KIT (RSK) INSTALLATION

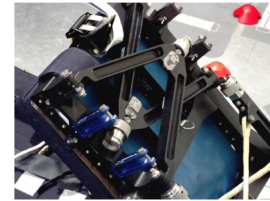
This procedure may be used to install RSK 6 or 7 (Time: 1 hr)



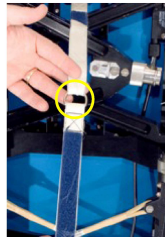
1. Unstow headrest, bushing, blue RSK ICU brackets (2) and extension strap



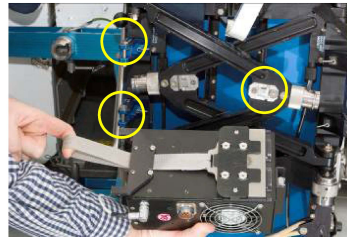
2. Install bushing into port side of seat back. Secure with spring pin



3. Replace black ICU brackets (2) on stbd seat pan (pull spring pin, slide out bracket) with blue RSK ICU brackets (2)



4. Install extension strap (loop strap through D-ring)



5. Install ICU onto blue RSK ICU brackets. Pull strap and install bottom of ICU onto bracket on top of seat leg. See next photo for config with ICU installed. Seat legs will still be folded



6. Restrain ICU and seat legs using extension strap

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(reduced copy)

TOP, BACK OF 'RECURRENT SEAT KIT (RSK) INSTALLATION'

HOOK  
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7. Install RSK headrest cushion



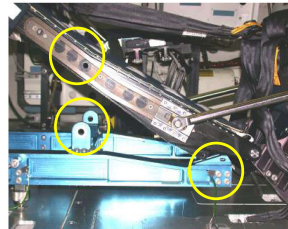
8. Open seat pan into entry config (pull gold T-handles (2) on port and stbd seat back)



9. Open deck stud collars (4) (push button, lift collars). Align collars aft of deck studs and slide rail fwd onto deck studs. Close and lock collars



10. Open middeck locker MF43K for RSK 6, MF57K for RSK 7. (Figure shows MF57K open for RSK 7)



11. Attach seat to rail. Align slots, install pip pins (4)



12. Route O2/COMM/ICU lines

**CAUTION**  
Verify ICU pwr OFF before making connections

Connect ICU pwr (per plug in plan).  
Install parachute, lumbar cushion

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ORB OPS-43b/O/A



## **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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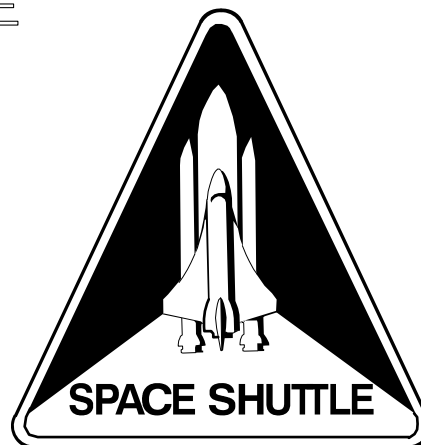
15-22

ORB OPS/ALL/GEN M



Space Shuttle Program  
FLIGHT DATA FILE

JSC-48035  
GENERIC, REV M



**ORBIT OPS  
CHECKLIST**

**STS  
ALL**

Flight Cover (trim bottom to expose tabs)