Orbit Operations Checklist

Mission Operations Directorate
Operations Division

Generic, Rev L
February 14, 2007

NOTE
For STS-117 and subsequent flights.

Lyndon B. Johnson Space Center
Houston, Texas

National Aeronautics and Space Administration

NASA

United Space Alliance

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
List of Implemented Change Requests (482s):

ORB OPS-2260
ORB OPS-2261A
ORB OPS-2262
ORB OPS-2263

Incorporate the following:

1. Replace iii thru x
2. Replace 6-9 & 6-10
3. Replace 12-43 thru 12-46, 12-57 & 12-58
   After 12-62, add 12-62a thru 12-62d
4. Replace CC 15-13 & CC 15-14

NOTE
For STS-118 and subsequent flights

Prepared by: 

[Signature]
Publication Manager

Approved by: 

[Signature]
Manager, Shuttle Procedures Management

Accepted by: 

[Signature]
FDF Manager

Encl: 22 pages

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

ORB OPS-2249  ORB OPS-2255  MULTI-1788
ORB OPS-2250  ORB OPS-2256  MULTI-1789
ORB OPS-2251B ORB OPS-2257
ORB OPS-2253  ORB OPS-2258
ORB OPS-2254  ORB OPS-2259

Incorporate the following:

1. Replace iii thru xvi
2. Replace 3-1 thru 3-8, 3-33 thru 3-38
3. Replace 5-37 thru 5-44
4. Replace 6-1 & 6-2, 6-11 & 6-12
   After 6-12, add 6-13 thru 6-16
5. Delete 7-3 thru 7-6
   After 7-2, add (OI-30) A7-3 thru (OI-32) B7-6 (8 pages)
   Replace 7-13 & 7-14, 7-19 thru 7-38
6. Replace 10-1 & 10-2, 10-9 thru 10-20
   Delete 10-21 & 10-22
7. Replace 12-1 thru 12-6, 12-11 thru 12-16, 12-23 thru 12-100
   Delete 12-101 thru 12-104
8. Replace 13-3 & 13-4
9. Replace CC 15-13 & CC 15-14
   Delete 15-19 & 15-20
   Add CC 15-19 thru 15-22 (4 pages)

Prepared by: 
Publication Manager

Approved by: 
Manager, Shuttle Procedures Management

Accepted by: 
FDF Manager

Endl: 186 pages

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List of Implemented Change Requests (482s):
ORB OPS-2246A   MULTI-1775B
ORB OPS-2252

Incorporate the following:
1. Replace iii thru viii
2. Replace 7-13 & 7-14

NOTE
For STS-117 and subsequent flights

Prepared by: April Jones
Publication Manager

Approved by: Kimberly Johnson
Manager, Shuttle Procedures Management

Accepted by: [Signature]
FDF Manager

Encl: 16 pages

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MISSION OPERATIONS DIRECTORATE

ORBIT OPERATIONS CHECKLIST

GENERIC, REVISION L
February 14, 2007

PREPARED BY:

April Jones
Publication Manager

APPROVED BY:

Kimberly A. Johnson
Manager, Shuttle
Procedures Management

Michael T. Hurt
PDF Manager

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AREAS OF TECHNICAL RESPONSIBILITY

Publication Manager  DO3/A. Jones  281-483-1861
Alt Book Manager   DO3/T. Zulauf   281-244-0922
### ORBIT OPERATIONS CHECKLIST

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APU HEATER RECONFIG

A12  APU HTR 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, \( \sqrt{\text{MCC}} \) for possible bus tie reconfiguration:

   R1
   MN BUS TIE ___ – ON
   ___ – OFF

   R2
   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))

   R2
   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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**KU-BD ANT DEPLOY**

<table>
<thead>
<tr>
<th>COMM/ INST</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A1U</td>
<td>√KU BD PWR – OFF</td>
</tr>
<tr>
<td></td>
<td>CNTL – PNL</td>
</tr>
<tr>
<td>R13L</td>
<td>√KU ANT (direct) STO – OFF</td>
</tr>
</tbody>
</table>

- 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

2-3 ORB OPS/ALL/GEN L
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.

<table>
<thead>
<tr>
<th>Action</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>R13L</td>
<td>√ PL BAY MECH PWR SYS 1,2 (two) – OFF</td>
</tr>
<tr>
<td>A1U</td>
<td>√ CNTL CMD</td>
</tr>
<tr>
<td></td>
<td>KU BD PWR – ON</td>
</tr>
<tr>
<td></td>
<td>MODE – RDR PASSIVE</td>
</tr>
<tr>
<td></td>
<td>CNTL – PNL</td>
</tr>
<tr>
<td></td>
<td>KU BD sel – MAN SLEW</td>
</tr>
<tr>
<td>A2</td>
<td>√ DIGI DIS SEL – EL/AZ</td>
</tr>
<tr>
<td>A1U</td>
<td>SLEW RATE – as reqd</td>
</tr>
<tr>
<td></td>
<td>SLEW ELEV – as reqd</td>
</tr>
<tr>
<td>A2</td>
<td>R/EL ind: -27.0 (± 1°)</td>
</tr>
<tr>
<td>A1U</td>
<td>SLEW AZM – as reqd</td>
</tr>
<tr>
<td>A2</td>
<td>RR/AZM ind: -123.0 (± 1°)</td>
</tr>
</tbody>
</table>

**LOCK GIMBALS**

**NOTE**

KU ANT sw must remain in STOW until STOW DEPLOYED ASSEMBLY complete.

**DAP:** VERN(FREE)

<table>
<thead>
<tr>
<th>Action</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>R13L</td>
<td>KU ANT – STO</td>
</tr>
<tr>
<td>A2</td>
<td>R/EL ind: -29.0 (± 1°)</td>
</tr>
<tr>
<td></td>
<td>RR/AZM ind: -125.0 (± 1°)</td>
</tr>
</tbody>
</table>

00:00

Start Event Timer

A2 Monitor KU ANT gimbal angles for 50 sec (gimbal lock test), then:

* If KU ANT gimbal movement occurs *
* within 50 sec, and/or if gimbal *
* angles incorrect after 50 sec, *
* perform MAL, MECH, 9.3c *

**DAP:** as reqd

Cont next page
STOW DEPLOYED ASSEMBLY

R13L PL BAY MECH PWR SYS 1,2 (two) – ON
KU ANT tb – STO (~23 to 46 sec)

* If tb not STO after 46 sec,
* perform MAL, MECH, 9.3b *

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

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

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

1. SETUP

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

2. ANTENNA STEERING

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

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

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

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

   CNTL – CMD
KU-BD ANT JETTISON

NOTE
Jettison between sunrise and noon if possible

AUTO MNVR TO -XLV
GNC UNIV PTG
√START TIME at least 15 min prior to sunrise
√TGT ID: +2
BODY VECT: +2
OM: +0
START TRK – ITEM 19 EXEC (CUR-*)
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
2-8 ORB OPS/ALL/GEN L
PL BAY FLOOD – as reqd

L10 (√)
(VTR)
(MUX)

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

A6U FLT CNTLR PWR – ON

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

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

Wait until rates damped, then:
DAP: A1/FREE/PRI
√SENSE – as reqd

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

L10 (VTR)

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

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

A14 PYRO KU ANT – ARM

Wait 1 sec, then:
PYRO KU ANT – JETT

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

Cont next page

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

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

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

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

CLEANUP

L10 (VTR)
STOP pb – press

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

DAP: A1/AUTO/VERN
FLT CNTLR PWR – OFF

Perform DEACTIVATION (Cue Card, TV) as reqd

A7
PL BAY FLOOD – as reqd

A14
PYRO KU ANT (two) – SAFE

ML86B:D cb MNA PYRO JETT SYS A KU ANT – op
MNC PYRO JETT SYS B KU ANT – op

MA73C:A MCA LOGIC MNC MID 2 – ON
:B MNB MID 4 – ON
PRE-SLEEP AUD CONFIG (DOCKED)

MIDDECK/FLIGHT DECK SPEAKER AUD CONFIG

a. MIDDECK SPEAKER CONFIG (reqd)

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

| MO39M | MIDDECK COMM CCU PWR | – ON |

All WCCS leg units – off

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

b. FLIGHT DECK CONFIG (optional)

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

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

| A11   | MS COMM CCU PWR | – ON |

All WCCS leg units – off

Cont next page
c. **TONE CHECKS** (optional)

**MO42F**

√MIDDECK SPKR AUD PWR – AUD/TONE

Set off alert tone and adjust speaker volume as reqd

**NOTE**

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

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

**IDP/CRT PWR – OFF, ON**

**NOTE**

If during sleep period, SM ALERT annunciated with no fault msg, MCC has no cmd capability. √MCC. If no joy, go to COMM LOST (ORB PKT, COMM)
## PRE-SLEEP AUD CONFIG (UNDOCKED)

O6  
√UHF MODE sel – OFF

### FLIGHT DECK/MIDDECK AUD CONFIG

#### a. MIDDECK CONFIG (reqd)

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

MO39M  
MIDDECK COMM CCU PWR – ON
All WCCS leg units – off

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

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

A13  
OS AUD SPKR PWR – SPKR
MSTR SPKR VOL sele – R

A11  
MS COMM CCU PWR – ON
All WCCS leg units – off

#### c. TONE CHECKS (optional)

MO42F  
√MIDDECK SPKR AUD PWR – AUD/TONE
Set off alert tone and adjust speaker volume as reqd

Cont next page

2-13  ORB OPS/ALL/GEN L
NOTE
If IDP not initially on, wait ~30 sec after IDP/CRT pwr-on before turning off unit
If desired, alert tone duration may be adjusted via a SPEC 2, Item 23 entry

IDP/CRT PWR – OFF, ON

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

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

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

If WCCS operation:

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

Perform STD VLHS/HIU CONFIG
(NO SPEAKER)

STD VLHS/HIU CONFIG (NO SPEAKER)

| XX | XX AUD PWR         | – AUD/TONE   |
| A/G 1 | – T/R, tw – 2   |
| A/G 2 | – RCV, tw – 2   |
| A/A | – RCV, tw – 2   |
| ICOM A,B (two) | – T/R, tw – 2 |
| XMIT/ICOM MODE | – PTT/PTT |

| XX | XX CCU PWR       | – ON        |
| A13 | OS AUD SPKR PWR | – OFF       |
| MSTR SPKR VOL sel | – MIN |
| MO42F | MIDDECK SPKR AUD TONES | – ACCU/BYPASS |
| SPKR PWR – OFF |
| MSTR SPKR VOL sel – MIN |

NOTE
Unused audio loops either RCV or OFF.
Unused VLHS comm systems either disconnected or CCU PWR – OFF and HIU VOL – 0
STD S-BD/KU-BD PNL CONFIG

If configuring for TDRS KU-BD:

Prior to configuring A1L/C3:
 If KU in radar:
 √ KU PWR – ON
 Perform KU OPS, step 4 (Cue Card, RNDZ), then:
 KU CNTL – PNL, CMD

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

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

<table>
<thead>
<tr>
<th>IF</th>
<th>IF</th>
<th>IF</th>
</tr>
</thead>
<tbody>
<tr>
<td>STDN(SGLS) S-BD</td>
<td>TDRS S-BD</td>
<td>TDRS KU-BD</td>
</tr>
<tr>
<td>A1L</td>
<td>NSP DATA RATE XMIT  – HI</td>
<td>HI</td>
</tr>
<tr>
<td></td>
<td>RCV – HI</td>
<td>HI</td>
</tr>
<tr>
<td>UPLK DATA – S-BD</td>
<td>S-BD</td>
<td>KU</td>
</tr>
<tr>
<td>CODING XMIT – OFF</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>RCV – OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>S-BD PM MODE sel – STDN LO (SGLS)</td>
<td>TDRS DATA</td>
<td></td>
</tr>
<tr>
<td>C3 S-BD PM CNTL – PNL, CMD</td>
<td>PNL, CMD</td>
<td>PNL, CMD</td>
</tr>
</tbody>
</table>

 NOTE
 If S-BD mode TDRS or STDN HI, xmit may be delayed 3 min for PA warmup. Receive not affected

2-16 ORB OPS/ALL/GEN L
## STD HANDHELD MIC/SPEAKER CONFIG

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

#### FLIGHT DECK CONFIG

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Power Mode</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>R10 MS AUD PWR</td>
<td>- AUD/TONE</td>
<td></td>
</tr>
<tr>
<td>A/G 1</td>
<td>- T/R, tw – 2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>- RCV, tw – 2</td>
<td></td>
</tr>
<tr>
<td>A/A</td>
<td>- RCV, tw – 2</td>
<td></td>
</tr>
<tr>
<td>ICOM A,B (two)</td>
<td>- RCV, tw – 2</td>
<td></td>
</tr>
<tr>
<td>XMIT/ICOM MODE</td>
<td>- PTT/PTT</td>
<td></td>
</tr>
<tr>
<td>A13 OS AUD SPKR PWR</td>
<td>- SPKR</td>
<td></td>
</tr>
<tr>
<td>MSTR SPKR VOL sel</td>
<td>- 8</td>
<td></td>
</tr>
<tr>
<td>A11 MS COMM CCU PWR</td>
<td>- ON</td>
<td></td>
</tr>
<tr>
<td>All WCCS leg units</td>
<td>- off</td>
<td></td>
</tr>
</tbody>
</table>

#### MIDDECK CONFIG

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Power Mode</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>MO42F MIDDECK SPKR AUD</td>
<td>- T/R, tw – 2</td>
<td></td>
</tr>
<tr>
<td>A/G 1</td>
<td>- RCV, tw – 2</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>- RCV, tw – 2</td>
<td></td>
</tr>
<tr>
<td>A/A</td>
<td>- RCV, tw – 2</td>
<td></td>
</tr>
<tr>
<td>ICOM A,B (two)</td>
<td>- RCV, tw – 2</td>
<td></td>
</tr>
<tr>
<td>XMIT/ICOM MODE sel</td>
<td>- PTT/PTT</td>
<td></td>
</tr>
<tr>
<td>SPKR PWR</td>
<td>- SPKR</td>
<td></td>
</tr>
<tr>
<td>MSTR SPKR VOL sel</td>
<td>- 8</td>
<td></td>
</tr>
<tr>
<td>MO39M MIDDECK COMM CCU PWR</td>
<td>- ON</td>
<td></td>
</tr>
<tr>
<td>All WCCS leg units</td>
<td>- off</td>
<td></td>
</tr>
</tbody>
</table>
STD WCCS CONFIG

ACTIVATION
Unstow and assemble WCCS leg units

| XX | XX AUD PWR | – AUD/TONE |
| A/G 1 | – T/R, tw – 5 |
| A/G 2 | – RCV, tw – 2 |
| A/A | – RCV, tw – 5 |
| ICOM A | – T/R, tw – 5 |
| B | – OFF, tw – 5 |

| XX AUD XMIT/ICOM MODE | – PTT/PTT |

| A13 | OS AUD SPKR PWR | – OFF |
| MSTR SPKR VOL sel | – MIN |

| MO42F | MIDDECK SPKR AUD SPKR PWR | – OFF |
| VOL sel | – MIN |

| XX | XX CCU PWR | – OFF |

Connect AIU cables to CCU outlets

| XX CCU PWR | – ON |

| A1U | MODE SEL | – as reqd |
| Green pwr It | – ON |

| CRU | CHNL | – Designated chnl (see Cue Card, WCCS COMM PLAN) |
| VOLUME | – as reqd |

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

DEACTIVATION

| A1U | MODE SEL | – OFF |
| Green pwr It | – OFF |

| CRU | VOLUME | – OFF |

| XX | XX CCU PWR | – OFF |

Disconnect AIU cables from CCU outlets

Disassemble, stow WCCS leg units
ICOM RECORDER OPS

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

2. PLAYBACK
   RCDR Tape rewound
   ATU XMIT/ICOM MODE – PTT/VOX
   VOX SENS – MAX
   ICOM A(B) – T/R
   RCDR PLAY – depress
   \√ Tape motion, voice quality
   When complete, STOP – depress
LANDING-1 COMM C/O

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

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

2. ENTRY VIDEO C/O CONFIG
   If ENTRY VIDEO SETUP (PHOTO/TV, MINI-CAM) configured:
       Connect Mini-Cam cables to HUD Mini-Cam Extension Cable
   O19  TV PWR – ON
   L10(MUX)  √VTR/CC PWR – on (LED on)
(VTR)  √ON/STANDBY – push (green LED on)
   √Entry Mini-Cam AVIU J1 output to VTR IN
   √V10 connected to VTR MONITOR
   V10  PWR – ON
   F3   R HUD PWR – ON
   F8U  MODE – TEST
        BRT – MAN DAY
        BRT sel – as reqd (VTR mon)

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

3. NORMAL UHF CONFIG

O6
\UHF SPLX SQUELCH – ON
MODE sel – OFF

ATUxx
AUD A/A – RCV

4. VIDEO RECONFIG

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

Connect Mini-Cam cable to Handheld Mini-Cam

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

TDRS → STDN _____/____:____:____

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

TDRS → STDN _____/____:____:____

EAST COAST
SITE → SITE (STDN) _____/____:____:____

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

1. VERIFY PANEL A1L CONFIG
   - S-BD PM ANI 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
   - S-BD PM CNTL – PNL, CMD

   Perform comm check with MCC-H

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

3. RECONFIG PANEL A1L
   - S-BD PM ANI 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

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

2. RECONFIG COMM STRINGS

   - MCC ready for reconfig
   - Expect ‘BCE STRG 1 NSP’ msg

   C3  S-BD PM CNTL – PNL, CMD

   Perform comm check with MCC-H

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

3. RECONFIG PANEL A1L

   A1L  S-BD PM ANT SW ELEC – 1
        PRE AMP – 1
        PWR AMPL STBY – 1
        OPER – 1
        XPNDR – 1
        NSP PWR – 1

2-23         ORB OPS/ALL/GEN L
CREW SYSTEMS

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3-1 ORB OPS/ALL/GEN L,2
PRE-SLEEP ACTIVITY

FLIGHT DECK ACTIVITY LIST

1. If reqd, SUPPLY WATER DUMP (ECLS) (√MCC)
   CRYO HEATER/MANF VLV config per MCC
   R1(A11)

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<thead>
<tr>
<th>1</th>
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2. If FD1 and PPO2 < 3.20:
   MO69M
   √LEH O2 8 vlv – CL
   Insert O2 Bleed Orifice Assembly into LEH O2 8 QD
   LEH O2 8 vlv – OP
   C7
   √SPLY 1,2 vlv – OP

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</table>

3. SM CHECKPOINT INITIATE (DPS)
   L1
   4. CAB TEMP – adj rotary as desired (suggest 5 o'clock posn)
   If night before Entry:
      Suggest 10 o'clock posn for Entry cooling

<table>
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<th>1</th>
<th>2</th>
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4. CAB TEMP – adj rotary as desired (suggest 5 o'clock posn)
   If night before Entry:
      Suggest 10 o'clock posn for Entry cooling

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<td>15</td>
<td>16</td>
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</tr>
</tbody>
</table>

5. If 14.7 CAB REG INLET SYS 1(2) VLV – OP (PCS active):
   MO10W
   Expect possible ‘S66 CAB N2 FLO 1(2)’
   O2/N2 CNTLR VLV SYS 1(2) – OP
   L2

<table>
<thead>
<tr>
<th>1</th>
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<th>4</th>
<th>5</th>
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<td>16</td>
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</tbody>
</table>

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

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

R11
- IDP/CRT4 PWR – ON
- IDP/CRT4 MAJ FUNC – SM
- SM ANTENNA
- All AFT MDUs PWR – OFF
- IDP/CRT4 PWR sw – OFF

C2
- IDP/CRT1 PWR sw – ON
- IDP/CRT2 PWR sw – ON
- IDP/CRT2 MAJ FUNC – GNC
- GNC UNIV PTG
- All FWD MDUs except CRT 1, MDU PWR – OFF
- IDP/CRT2 PWR sw – OFF

Set CRT Wake-up Time/Alert Tone Duration:
- CRT1
  - GNC(SM) 2 TIME
  - TONE MSN T – ITEM 3 +hh +mm +ss EXEC
  - DURATION – ITEM 23 +XX EXEC

Perform ERR LOG resets:
- GNC 0 GPC MEMORY
  - ITEM 48 EXEC
- SM 0 GPC MEMORY
  - ITEM 48 EXEC

C3
- BFC CRT SEL – 1+2
  - DISP – ON

F7
- CRT1 – OFF

C2
- IDP/CRT1 PWR sw – OFF

Cont next page
7. √PWR OFF:
   A3  TV MON
   A7  CAMERAS
   O19 PWR CONTROLLER
   O19 Recording Devices/Camcorders
   O19 PLB LIGHTS
   O19 DDUs

8. WINDOW SHADES/FILTERS
   O19 2 3 4 5 6 7 8 9 10
   O19 11 12 13 14 15 16

9. LIGHTING
   O19 2 3 4 5 6 7 8 9 10
   O19 11 12 13 14 15 16

10. Pri RJDF DRIVER, LOGIC (eight) – OFF
    O19 2 3 4 5 6 7 8 9 10
    O19 11 12 13 14 15 16

11. Pri RJDA DRIVER, LOGIC (eight) – OFF
    O19 RJDA 1A L2/R2 MANF DRIVER – ON
    O19 2 3 4 5 6 7 8 9 10
    O19 11 12 13 14 15 16

MIDDECK ACTIVITY LIST
1. FOOD PREP/POST
   O19 2 3 4 5 6 7 8 9 10
   O19 11 12 13 14 15 16

2. CO2 ABSORBER REPLACEMENT (Cue Card)
   O19 2 3 4 5 6 7 8 9 10
   O19 11 12 13 14 15 16
3. HOUSEKEEPING

4. WCS CLEANING (Cue Card, URINE COLLECTION)

5. SET UP EQUIPMENT FOR NEXT DAY’S ACTIVITIES

6. √PWR OFF:
   MO58F TV PWR

7. MISSION NOTES

8. TYPE PERSONAL MESSAGES, if desired

9. PGSC OVERNIGHT CONFIG
   √COLOR PRINTER – ON
   √PAPER IN COLOR PRINTER
   √OCA ROUTER – ON
   √KFX PGSC (Prime and Backup) – On
   √KFX LAUNCHED ON KFX PGSCs (Prime and Backup)
   √OUTLOOK APPLICATION CLOSED ON ALL PGSC’s
      Prime KFX ________ Backup KFX ________

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

<table>
<thead>
<tr>
<th>1 2 3 4 5 6 7 8 9 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>

11. LIGHTING

<table>
<thead>
<tr>
<th>1 2 3 4 5 6 7 8 9 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>

12. GALLEY OVERNIGHT CONFIG (ECLS)

<table>
<thead>
<tr>
<th>1 2 3 4 5 6 7 8 9 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>

13. 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

<table>
<thead>
<tr>
<th>1 2 3 4 5 6 7 8 9 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>


POST-SLEEP ACTIVITY

MIDDECK ACTIVITY LIST
1. GALLEY MORNING CONFIG (ECLS)
   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
2. LIGHTING (minimize if in GROUP B(C) PWRDN)
   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
3. CO2 ABSORBER REPLACEMENT (Cue Card)
   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
4. MESSAGE REVIEW
   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
5. POST-SLEEP AUD CONFIG (COMM/INST)
   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
6. If FD2 and Bleed Orifice not installed:
   MO69M √
   LEH O2 8 vlv – CL
   Insert O2 Bleed Orifice Assembly into LEH O2 8
   QD
   LEH O2 8 vlv – OP
   C7 √
   SPLY 1,2 vlv – OP
   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
7. FOOD PREP/POST
   1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16
8. HOUSEKEEPING

9. URINE PRETREAT CHANGEOUT (Cue Card)

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

1. LIGHTING (minimize if in GROUP B(C) PWRDN)
   1   2  3  4  5  6  7  8  9  10
   11 12 13 14 15 16

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

3. IDPs/MDUs – ON as desired (use only one IDP with three MDUs max if in GROUP B(C) PWRDN)
   1   2  3  4  5  6  7  8  9  10
   11 12 13 14 15 16

C3 4. BFC CRT DISP – OFF
   1   2  3  4  5  6  7  8  9  10
   11 12 13 14 15 16

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

L1 6. CAB TEMP – adj rotary as reqd
   If Entry day:
   CAB TEMP – full COOL
   Wait 20 min
   CAB TEMP CNTLR – OFF
   1   2  3  4  5  6  7  8  9  10
   11 12 13 14 15 16

MO10W 7. If 14.7 CAB REG INLET SYS 1(2) vlv – OP
   (PCS active):
   O2/N2 CNTLR VLV SYS 1(2) – AUTO
   1   2  3  4  5  6  7  8  9  10
   11 12 13 14 15 16

Cont next page
8. If planned, perform l’CNCT: L(R) OMS to RCS (ORB PKT, RCS), then:

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

9. If not GROUP B(C) PWRDN:

```
O14:F, Pri RJDF DRIVER,LOGIC (eight) – ON
O15:F,               
O16:F               
```

10. If not GROUP B(C) PWRDN:

```
O14:F, Pri RJDA DRIVER,LOGIC (eight) – ON
O15:F,               
O16:F               
```

11. If reqd, SUPPLY WATER DUMP (ECLS) (√MCC)

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

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

OCAC

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

2. Loosen fabric shroud via Velcro attach points

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

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

5. Center OCAC in stbd interdeck accessway

6. Place port arm pad in upper groove

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

   NOTE
   Port arm may need adjustment to accommodate OCAC fit

8. √OCAC fit secure

9. Secure fabric shroud to surrounding accessway

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

    DC UTIL PWR – ON

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

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

2. OCAC PWR – OFF  
   √RPM – 0

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

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

5. Secure fabric shroud to OCAC

6. Stow OCAC
OCAC MAL

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

1. Open LiOH Door

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

3. Unfasten strap from buckle

4. Remove Clothing Bags (seven)

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

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

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

8. Reinstall beam

9. Place hand inside liner and mate Velcro on outside
   of liner to Velcro on Nomex Bag
   Spread bag out while mating Velcro

Cont next page
TISSUE EQUIVALENT PROPORTIONAL COUNTER (TEPC)

A. POWER ON

NOTE
PDB (P1) needs to be connected after launch

MO52J 1. √ DC UTIL PWR MNA – ON
TEPC
Av Bay 3A 2. PWR sw 1 – ON

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

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

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

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

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

When time permits:

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

   If dose not incrementing, perform
   C. MALFUNCTION, step 5, 3-20

7. Notify MCC of MET

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

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

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

::00
Display 1

hh:mm:ss _______.__ μG
________m _______μG/h
→
Time Total Dose
Elapsed Time Dose Rate

::15
Display 2

hh:mm:ss _______.__ μG
DD.MM.YY _______μG/h
→
Time Total Dose
Date Dose Rate

::30
Display 3

hh:mm:ss _______.__ μG
__% __E _______μG/h
→
Time Total Dose
Memory Errors Dose Rate

::45
Display 4

hh:mm:ss _______.__ μG
> ________ _______μG/h
→
Time Total Dose
Flags Dose Rate

Cont next page
B. POWERDOWN

TEPC

1. PWR sw 1 – OFF

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

MO52J
2. DC UTIL PWR MNA – OFF

3. Record TEPC deactivation MET

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

1. Green LED not ON (no display)

   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 switchbox  √Fuse (F1/F2)

   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

√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

3-20 ORB OPS/ALL/GEN L
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 L
TEPC DISPLAY LOGSHEET

NOTE
Report units as well as values

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<tr>
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<th>GMT</th>
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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 (AQQDs) (4)
   - Spacers (4)

3. Attach AQQDs (four) to seat floor studs
   - Install spacers and then sound mounts on AQQDs
   - 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 AQQDs 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

![Diagram of Ergometer]

Figure 3-2.- Ergometer.

12. Unstow: Threaded fasteners (four)

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

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

14. Unstow:
   Ergo Acc Bag
   Ergometer Pedals
   Ergometer Cranks

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

   NOTE
   Install RED on RIGHT,
   BLUE on LEFT

16. DC UTIL PWR MNC – ON

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

19. Adjust seat assy for subject comfort

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

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

22. Perform exercise

23. Ergometer ON/OFF – OFF

Cont next page
RECONFIG/STOW

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

1. DC UTIL PWR MNC – OFF

2. Disconnect prerouted Ergometer Pwr cable, secure

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

4. Ergo Acc Bag
   Detach Ergometer Display Panel cable,
   Ergometer pedales, cranks, stow

5. Remove Threaded Fasteners, stow

6. Remove Ergometer from frame, temp stow

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

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

9. Unscrew Knurled Kbs (four)

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

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

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

13. Unstow: Pip pins

Cont next page
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

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

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
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).
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
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 ≈ 5 to 10 cm) in sampling location
7. Detach monitors from area location
8. Seal monitoring surfaces with APPLY TO STOP labels (on back of monitors)
9. Record date and time in STOP spaces
10. Stow used monitors in RETURN BAG in FMK
11. Stow FMK
CARBON DIOXIDE MONITOR: OPERATIONS FOR
CARBON DIOXIDE MONITORING

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

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

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

ACTIVATING CDM

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

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

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

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

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

Cont next page
TAKING CDM SPOT CHECK MEASUREMENTS

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

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

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

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

1. Unstow:
   CDM
   Marker
   Spare Batt Pack

2. If CDM activated, deactivate:
   Press, hold MODE pb until ‘RELEASE’ displayed
   √CDM OFF
   If CDM not activated, go to step 3

3. Turn both fasteners on back panel ¼ turn ccw

4. Temp stow panel

5. Grasp Batt Pack pull tab, remove pack

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

6. Mark Batt Pack as “DISCHARGED”

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

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

9. Stow:
   Used Batt Pack
   Marker

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

A single beep occurs when self-check routine is complete

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

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

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

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

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

2. Demate CDM QD and Filter Assy

3. Return used Filter Assy to pouch lid

4. Remove clean Filter Assy from middeck stowage

5. Mate CDM QD and Clean Filter Assy

6. Attach Velcro tether

Cont next page
3-37 ORB OPS/ALL/GEN L,2
NOTE
Audible beeps occur when MODE pb is pressed during unit activation.

A single beep occurs when self-check routine is complete

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

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

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

1. If RNDZ NAV enabled: Go to step 7
2. CONFIG FOR SET CONTRACTION
   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
   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
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

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<tr>
<th>Current</th>
<th>Dual G2</th>
<th>Triple G2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPC 2</td>
<td>12000</td>
<td>12300</td>
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</tbody>
</table>

- C3(A6U) DAP: FREE
- VERN(ALT)

- CRT GNC, OPS 201 PRO
- O6 GPC MODE – STBY (tb-bp)
- – RUN (tb-RUN)
- L 1 0 0
- MM 1 1 1

b. Create G2FD GPC

- Perform step 4 if GPC not currently reqd

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

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

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

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

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

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

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

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

Cont next page
5. **CONFIG CLEANUP**

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

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

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

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

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

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

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

5. G8 OPS TRANSITION
   CRT
   If MM202: GNC, OPS 201 PRO

   GNC 0 GPC MEMORY
   CONFIG – ITEM 1 +8 EXEC

   Assign MC8

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</table>

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

4-6 ORB OPS/ALL/GEN L
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 √

<table>
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<th>GNC 0 GPC MEMORY</th>
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</thead>
<tbody>
<tr>
<td>CONFIG – ITEM 1 +2 EXEC</td>
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Assign MC2

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<th>Triple G8</th>
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</table>

C3(A6U) DAP: FREE

C3(A6U) 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)

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 1 DPS UTILITY]
   MMU 2(1) ASSIGN – ITEM 4(3) EXEC (*)
   √MMU STATUS 2(1) – RDY
   [SM 60 TABLE MAINT]
   √SM COM BUFF – ‘RDY’
   CHECKPT INITIATE – ITEM 18 EXEC
   √Time updated
   √STATUS – ‘GOOD’

3. Repeat step 2 for MMU 1

4. After completion of SM CKPTs:
   [SM 1 DPS UTILITY]
   √CKPT RETRVR ENA – ITEM 12 EXEC (*)

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

4-8 ORB OPS/ALL/GEN L
SUPPLY/WASTE WATER DUMP ................................. 5-2
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SUPPLY/WASTE WATER DUMP

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

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

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

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

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

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

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
B. PRE-DUMP FDA

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

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

TABLE A

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

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

TABLE B

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

*Limits TMBU’d on orbit to provide leak and overfill detection
C. SIMO DUMP H2O TK N2 REG CONFIG

MO10W

If performing simo SPLY/WST H2O Dump:

H2O TK N2 REG INLET SYS 1, SYS 2 vlv (two) – OP

D. SUPPLY H2O DUMP NOZZLE HTR ACTIVATION

SM 66 ENVIRONMENT

CRT

1. √SUPPLY H2O DMP LN T ≥ 65

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

ML86B:A

R11L

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

E. WASTE H2O DUMP NOZZLE HTR ACTIVATION

SM 66 ENVIRONMENT

CRT

1. √WASTE H2O DMP LN T > 50

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

ML86B:A

ML31C

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

Cont next page
F. SUPPLY H2O DUMP INITIATION

SM 66 ENVIRONMENT

CAUTION
Tile debonding may occur if nozzle temps exceed 350 degF

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

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

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

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

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

G. WASTE H2O DUMP INITIATION

SM 66 ENVIRONMENT

CAUTION
Tile debonding may occur if nozzle temps exceed 350 degF

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

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

Cont next page 5-5 ORB OPS/ALL/GEN L
If ‘S66 WASTE H2O TEMP’ msg, WASTE H2O NOZ T A(B) ‘↓’ then:

ML31C 6. WASTE H2O DUMP VLV – CL (tb-CL)

ML31C 8. WASTE H2O DUMP VLV – OP (tb-OP)

H. SUPPLY H2O DUMP TERMINATION

R11L 1. SUPPLY H2O DUMP ISOL VLV – CL (tb-CL)

R11L 4. SUPPLY H2O DUMP VLV – CL (tb-CL), wait 60 sec

R11L 5. – OP (tb-OP), wait 60 sec

R11L 6. – CL (tb-CL)

R11L 7. ISOL VLV – OP (tb-OP)

R11L 8. VLV ENA/NOZ HTR – OFF

R11L 9. √VLV tb – bp
CRT 10. √SUPPLY H2O NOZ T A,B (two) – not incr

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

ML86B:A

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

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

I. WASTE H2O DUMP TERMINATION

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

CRT 2. √QTY 1 not decr

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

ML31C

* 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

1. H2O TK N2 REG INLET SYS 2 v lv – CL

If PCS2 active:

2. H2O TK N2 REG INLET SYS 1 v lv – 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>
<thead>
<tr>
<th>TABLE C</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
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<tr>
<td>SUPPLY H2O NOZ T</td>
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<tr>
<td>B</td>
<td>0620439</td>
<td>-82</td>
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<th>TABLE D</th>
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<th>PARAMETER NAME</th>
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<th>SM ALERT</th>
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<td>WASTE H2O NOZ T</td>
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<tr>
<td>B</td>
<td>0620519</td>
<td>-82</td>
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</table>

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

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

1. DUMP INITIATION
L1 FLASH EVAP CNTLR PRI A,B,SEC (three) – OFF
RAD CNTLR OUT TEMP – HI
O1 When FREON EVAP OUT TEMP ind > 50 degF,
L1 FLASH EVAP CNTLR PRI A(B) – ON
O1 After 1 min, \sqrt{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
<table>
<thead>
<tr>
<th>CABIN TEMP CONTROL</th>
<th>SM 88 APU/ENVIRON THERM</th>
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</thead>
<tbody>
<tr>
<td>CREW ACTION</td>
<td>Δ TEMP EXPECTED</td>
</tr>
</tbody>
</table>

\[^{\text{MCC}}\]

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

\[^{\text{MCC}}\]
CO2 RMVL SYS CNTLR CONFIG:
ACT 1/DEACT 2 (ACT 2/DEACT 1)

NOTE
Hardware only available on OV104 and OV105

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

MO51F CNTLR 2(1) MODE – STBY (hold 3 sec)
Wait 6 sec
√ CNTLR 2(1) OPER lt – lt off
√ FAIL lt – FAIL lt on
MNC(MNA) – OFF
√ CNTLR 2(1) FAIL lt – lt off
AC3(AC1) – OFF (hold 3 sec)
cb AC3(AC1) ΦA(ΦC) (three) – op
AC1(AC3) ΦA(ΦC) (three) – cl
AC1(AC3) – ON (hold 3 sec)
MNA(MNC) – ON
CNTLR 1(2) MODE – OPER (hold 3 sec)
Wait 6 sec
√ CNTLR 1(2) OPER lt – OPER lt on
√ COM INSTR – ON

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

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

2. √SPLY H2O XOVR VLV – OP (tb-OP)

L1 3. FLASH EVAP CNTLR PRI A,B – OFF
    SEC (two) – A SPLY,ON
    √HI LOAD DUCT HTR sel – B
    EVAP – ENA

4. RAD BYP VLV MODE 1,2 (two) – MAN
    MAN SEL 1,2 (two) – BYP
    (tb-BYP ~3 sec)
    RAD CNTLR LOOP 1,2 (two) – OFF
    After 2.5 min,
    O1 √FREON EVAP OUT TEMP ind: 62 ± 2 degF

L1 5. HI LOAD EVAP – OFF
    After 2.5 min,
    O1 √FREON EVAP OUT TEMP ind: 62 ± 2 degF

L1 6. HI LOAD EVAP – ENA

7. FLASH EVAP CNTLR SEC (two) – A SPLY,OFF
    PRI B – ON
    After 2.5 min,
    O1 √FREON EVAP OUT TEMP ind: 39 ± 1 degF

L1 8. √FLOW PROP VLV LOOP 1,2 (two) tb – ICH

9. RAD CNTLR OUT TEMP – NORM

5-12 ORB OPS/ALL/GEN L
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
   HI LOAD DUCT HTR sel – B
   √HI LOAD EVAP – ENA
   TOP EVAP HTR DUCT sel – A/B
   SEC (two) – A SPLY,ON
4. RAD BYP VLV MODE 1,2 (two) – MAN
   MAN SEL 1,2 (two) – BYP
   RAD CNTLR LOOP 1,2 (two) – OFF
   (tb-BYP ~3 sec)
   After 2.5 min,
   O1
   √FREON EVAP OUT TEMP ind: 62 ± 2 degF
   L1
5. FLASH EVAP CNTLR SEC – OFF
   HI LOAD EVAP – OFF
   Wait 2 min
6. FLASH EVAP CNTLR SEC – ON
   Wait 30 sec
   FLASH EVAP CNTLR SEC – OFF
   Wait 30 sec
7. Repeat step 6 two additional times (three total),
   then:
   FLASH EVAP CNTLR SEC – ON

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

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

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

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

11. RAD CNTLR OUT TEMP – NORM
RAD DEPLOY

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

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

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

<table>
<thead>
<tr>
<th>DESIRED ACTION</th>
<th>cb CONFIG</th>
</tr>
</thead>
</table>
| Deploy PORT RAD | cb MCA PWR
| | AC1 3Φ MID 3 – op |
| | AC2 3Φ MID 2 – op |
| | AC3 3Φ MID 2 – op |
| Deploy STBD RAD | cb MCA PWR
| | AC1 3Φ MID 1 – op |
| | AC2 3Φ MID 4 – op |
| | AC3 3Φ MID 4 – op |

2. UNLATCH PANELS
R13L
√RAD LAT CNTL SYS A,B (two) – OFF
√CNTL SYS A,B (two) – OFF
√RAD,LAT PORT,STBD tb (four) match current RAD config
PL BAY MECH PWR SYS 1,2 (two) – ON

RAD LAT CNTL SYS A,B (two) – REL
 (√Deploying RAD LAT tb(s)-bp, ~30 sec REL)
RAD LAT CNTL SYS A,B (two) – OFF

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

3. **DEPLOY PANELS**
   RAD CNTL SYS A,B (two) – DPY
   (Deploying RAD tb(s)-bp, ~50 sec DPY)
   RAD CNTL SYS A,B (two) – OFF
   * If deploying RAD tb(s) not bp after 10 sec and no motion, or
   * If RAD panel(s) in transit and no motion, or
   * If deploying RAD tb not DPY within 50 sec:
   *  RAD CNTL SYS A,B (two) – OFF
   * Perform MAL, MECH, 9.2b
   PL BAY MECH PWR SYS 1,2 (two) – OFF

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

<table>
<thead>
<tr>
<th>COMPLETED ACTION</th>
<th>cb CONFIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>PORT RAD Deployed</td>
<td>cb MCA PWR&lt;br&gt;AC1 3Φ MID 3 – cl&lt;br&gt;AC2 3Φ MID 2 – cl&lt;br&gt;(unless RMS uncradled)&lt;br&gt;AC3 3Φ MID 2 – cl</td>
</tr>
<tr>
<td>STBD RAD Deployed</td>
<td>cb MCA PWR&lt;br&gt;AC1 3Φ MID 1 – cl&lt;br&gt;AC2 3Φ MID 4 – cl&lt;br&gt;AC3 3Φ MID 4 – cl&lt;br&gt;(unless RMS uncradled)</td>
</tr>
</tbody>
</table>
RAD STOW

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

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

1. CONFIG CBS
If stowing single RAD and opposite RAD deployed,

MA73C: config cbs:
C,D

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

2. STOW PANELS

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

PL BAY MECH PWR SYS 1,2 (two) – ON

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

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

3. **LATCH PANELS**
   RAD LAT CNTL SYS A,B (two) – LAT
   √Stowing RAD LAT tb-bp, ~30 sec, LAT
   RAD LAT CNTL SYS A,B (two) – OFF

   * If stowing RAD LAT tb not LAT in 60 sec:
     * RAD LAT CNTL SYS A,B (two) – OFF
     * Perform MAL, MECH, 9.2a

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

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

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

√EMU O2 ISOL VLV – CL

Floor

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

1. FES Deactivation
   L1  Flash Evap Cntlr Pri A,B – OFF
   SEC – OFF
   Wait 30 min, or on MCC GO, proceed

2. FDA Reset
   If comm, MCC will TMBU limits as reqd
   If no comm, change limits via table

   SM 60 Table MAINT

<table>
<thead>
<tr>
<th>Parameter Name</th>
<th>Para ID</th>
<th>SM Alert</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAP Temp Topping AFT</td>
<td>0631802</td>
<td>-10</td>
</tr>
<tr>
<td>FWD</td>
<td>0631801</td>
<td>-10</td>
</tr>
<tr>
<td>L Duct</td>
<td>0631800</td>
<td>-10</td>
</tr>
<tr>
<td>NOZ</td>
<td>0631878</td>
<td>-10</td>
</tr>
<tr>
<td>R Duct</td>
<td>0631810</td>
<td>-10</td>
</tr>
<tr>
<td>NOZ</td>
<td>0631879</td>
<td>-10</td>
</tr>
</tbody>
</table>

3. Heater Deactivation
   L1  Top Evap HTR Duct sel – OFF
   NOZ L,R (two) – OFF
TOPPING FES STARTUP

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

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

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

   SM 60 TABLE MAINT

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>PARA ID</th>
<th>SM ALERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVAP TEMP TOPPING AFT</td>
<td>0631802</td>
<td>100</td>
</tr>
<tr>
<td>FWD</td>
<td>0631801</td>
<td>100</td>
</tr>
<tr>
<td>L DUCT</td>
<td>0631800</td>
<td>50</td>
</tr>
<tr>
<td>NOZ</td>
<td>0631878</td>
<td>40</td>
</tr>
<tr>
<td>R DUCT</td>
<td>0631810</td>
<td>50</td>
</tr>
<tr>
<td>NOZ</td>
<td>0631879</td>
<td>40</td>
</tr>
</tbody>
</table>

3. FES STARTUP
   SM SYS SUMM 2
   CRT If FREON EVAP OUT TEMP > 41 and ≤ 47 degF:
   L1 RAD CNTLR OUT TEMP – HI
   CRT When FREON EVAP OUT TEMP > 50 degF,
   L1 RAD CNTLR OUT TEMP – NORM, then
   immediately:
   FLASH EVAP CNTLR PRI A(B) – ON
   CRT If FREON EVAP OUT TEMP ≤ 41 or > 47 degF:
   L1 FLASH EVAP CNTLR PRI A(B) – ON
SMOKE DETN CKT TEST

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

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

Cont next page
CKT TEST A PART 2
SMOKE DETN CKT TEST – A
√FIRE SUPPR AV BAY pb (three) – It 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) – It on
Wait at least 5 sec (no more than 10 sec)
SMOKE DETN CKT TEST – OFF
√FIRE SUPPR AV BAY pb (three) – It 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) – It 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
5-23 ORB OPS/ALL/GEN L
<table>
<thead>
<tr>
<th>CRT Verify:</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMOKE 1/A 2/B</td>
</tr>
<tr>
<td>CABIN -0.5 to +0.5</td>
</tr>
<tr>
<td>L/R FD -0.5 to +0.5</td>
</tr>
<tr>
<td>AV BAY 1 2 3</td>
</tr>
<tr>
<td>-0.5 to +0.5</td>
</tr>
</tbody>
</table>

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
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.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>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)</td>
</tr>
</tbody>
</table>

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

![Diagram of CWC or EDV fill setup]

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

**FILL TERMINATION**

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

2. To terminate fill, disconnect CWC from Water Transfer Hose. Flow to CWC will stop when this action performed

Cont next page
3. If no samples reqd, fill out CWC label and temp stow CWC until transferred to ISS. If samples reqd, fill out CWC label, then go to CWC SAMPLING PROCEDURE and/or CARTRIDGE ASSEMBLY SAMPLING PROCEDURE.

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

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

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

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

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

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

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

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

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

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

EDV TANK FILL PROCEDURE (see fig 5-2)

NOTE
Procedure assumes WATER TRANSFER HOSE PURGE already completed

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

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

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

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

NOTE
For Potable EDVs, ALWAYS add minerals first

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

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

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

8. Remove fill indicator from fitting and replace plug. Install other plug on “Supply Pressure” (ПОДАЧА ДАБЛЕНИЯ) fitting. Reinstall cap on tank hose fitting on lid (if cap present). Label EDV as reqd using spare labels from kit, then temp stow EDV until transferred to ISS
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)

BOB
2. Obtain CWCs to be dumped

CHCK
Unstow WWD filter

WCS
Unstow Y-Y hose

Outbd Wall
3. Connect female end of WWD filter to Cont H2O X-tie Waste QD (upper QD with yellow Velcro and “WASTE” label)

Outbd
Connect Y-Y hose to male end of WWD filter

Wall
Connect free end of Y-Y hose to CWC
B. PRE-DUMP FDA

NOTE
Change limits via table or request MCC TMBU.

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

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

On MCC GO, proceed to step C

C. HEATER ACTIVATION

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

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

* If WASTE H2O DMP LN T ≤ 50, *
* enable 2nd htr: *
ML86B:A
* cb MNB(MNA) H2O LINE *
* HTR B(A) – cl *

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

D. DUMP INITIATION

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. √ NOZ T A,B (two) – not incr

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

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

E. DUMP TERMINATION
   Terminate on MCC call, or if no comm, upon any signs of CWC collapse

   ML31C 1. WASTE H2O DUMP VLV – CL (tb-CL)
   Disconnect CWC from Y-Y hose, and temp stow empty CWC

   CRT 2. When WASTE H2O NOZ T A,B (two) > 250 (~8 min),
   ML31C 3. WASTE H2O DUMP VLV ENA/NOZ HTR – OFF
   4. \WASTE H2O DUMP VLV tb – bp

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

Cont next page

5-34 ORB OPS/ALL/GEN L
F. POST-DUMP RECONFIG

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

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

G. STOW CWC HARDWARE

If additional CWC dump(s) to be performed later:

1. Temp stow WWD filter (unless dumping PWR immediately following) (place filter in Ziplock Bag) and Y-Y hose

If final CWC/PWR dump of flight:

CHCK 2. Stow Y-Y hose

BOB 3. Stow WWD filter (place filter in Ziplock Bag)

H. POST-DUMP FDA CLEANUP

Change limits via table or request MCC TMBU:

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

CABIN TEMP CONTROLLER RECONFIG – 2(1)

L1 CAB TEMP sel – WARM
Wait 10 sec, then:
CAB TEMP CNTLR – OFF

MD44F Pin CAB TEMP CNTL act link – SEC(PRI) ACT

L1 CAB TEMP CNTLR – 2(1)
    sel – as reqd
SHUTTLE CONDENSATE COLLECTION

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

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

   Middeck
   Flr 4. Attach Y-Y Hose to Condensate QD
   ML31C 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

5-36  ORB OPS/ALL/GEN L
PWR DUMP-WASTE LINE

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

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

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

CAUTION
Do not detach PWR (EMU H2O Recharge Bag) QD restraint during dump.

BOB Unstow Waste Water Dump (WWD) filter

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

Unstow B-B hose
Unstow R-Y QD adapter

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

WCS Connect female end of WWD filter to Cont H2O Outbd X-tie Waste QD (upper QD with yellow Velcro Wall 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
```

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

3. HEATER ACTIVATION

```
SM 66 ENVIRONMENT
```

\[ WASTE H2O DMP LN T > 50 \]

* If WASTE H2O DMP LN T \( \leq 50 \),
  * enable second heater:

\[ \text{cb MNB(MNA) H2O LINE HTR B(A) – cl} \]

\[ \text{ML86B:A} \]

\[ \text{ML31C} \]

\[ \text{WASTE H2O DUMP VLV ENA/NOZ HTR – ON} \]

\[ \text{VLV – CL (tb-CL)} \]

\[ \text{ISOL VLV – CL (tb-CL)} \]

\[ \text{CAUTION} \]

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):
```

\[ \text{ML31C} \]

\[ \text{WASTE H2O DUMP VLV – OP (tb-OP)} \]

\[ \text{CRT} \]

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

If dumping multiple PWRs sequentially:

When PWR empty:

\[ \text{ML31C} \]

\[ \text{WASTE H2O DUMP VLV – CL (tb-CL)} \]

\[ \text{Disconnect empty PWR and temp stow} \]

\[ \text{Connect next PWR} \]

\[ \text{CRT} \]

\[ \text{When WASTE H2O NOZ T A,B (two) > 150,} \]

\[ \text{ML31C} \]

\[ \text{WASTE H2O DUMP VLV – OP (tb-OP)} \]

If ‘S66 WASTE H2O TEMP’, WASTE H2O NOZ T A(B) \( \downarrow \) msgs:

\[ \text{ML31C} \]

\[ \text{WASTE H2O DUMP VLV – CL (tb-CL)} \]

\[ \text{CRT} \]

\[ \text{When WASTE H2O NOZ T A,B (two) > 250} \]

\[ \text{(~8 min),} \]

\[ \text{ML31C} \]

\[ \text{WASTE H2O DUMP VLV – OP (tb-OP)} \]

Cont next page

5-38 ORB OPS/ALL/GEN L,2
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)
   BOB  Stow WWD filter (place in Ziplock Bag)

7. POST-DUMP FDA CLEANUP
Change limits via table, or request MCC TMBU:
SM 60 TABLE MAINT

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

5-39  ORB OPS/ALL/GEN L,2
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 (EMU H2O Recharge Bag) QD restraint during dump

CHCK
Unstow B-B hose and R-Y QD adapter
R11L
SPLY H2O DUMP ISOL VLV – CL (tb-CL)
WCS
Connect yellow end of R-Y QD adapter to Cont H2O X-tie Potable QD (lower QD with blue Velcro and “POTABLE” label)
Outbd
Connect B-B hose to free end of R-Y QD adapter
Wall
Connect free end of B-B hose to PWR

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

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

Proceed to step 3

Cont next page
3. HEATER ACTIVATION

[SM 66 ENVIRONMENT]

\( \sqrt{\text{SUPPLY H2O DMP LN T} > 65} \)

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

ML86B:A

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

R11L SPLY H2O DUMP VLV ENA/NOZ HTR – ON
\( \sqrt{VLV – CL (tb-CL)} \)
\( \sqrt{ISOL VLV – CL (tb-CL)} \)

4. DUMP INITIATION

CRT When SUPPLY H2O NOZ T A,B (two) > 250
(8-10 min):

R11L SPLY H2O DUMP VLV – OP (tb-OP)

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

CAUTION
Tile debonding may occur if nozzle temps exceed 350 degF

If dumping multiple PWRs sequentially:
When PWR empty:

R11L SPLY H2O DUMP VLV – CL (tb-CL)
Disconnect empty PWR and temp stow
Connect next PWR

CRT When SUPPLY H2O NOZ T A,B (two) > 150,
R11L SPLY H2O DUMP VLV – OP (tb-OP)

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

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

5-42 ORB OPS/ALL/GEN L
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)

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):

3. SPLY H2O TKA OUTLET – CL (tb-CL)

4. Use SUPPLY H2O QTY A:

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

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

   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:

10. Use SUPPLY H2O QTY A:

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

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

NOTE
Full charge = 10% change in TKA quantity

Cont next page
To terminate fill:

Galley 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):


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 5-5)

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

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

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

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

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

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

5-46 ORB OPS/ALL/GEN L
Figure 5-5.- GIRA config (connections and routing).

NOTE
Water Transfer Hose only present for water transfer
GALLEY OVERNIGHT CONFIG  (Time: 5 min)

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

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

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

GALLEY MORNING CONFIG  (Time: 5 min)

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

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

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

Retrieve Galley Water Sample Kits from ________________:

1. Unpackage Luer adapter and Sample Bag from one kit
2. Remove tethered cap from bag sample port
3. Affix Luer adapter to Sample Bag
4. Wipe RHS needle with Wet Wipe
5. Fill one Sample Bag with 8 oz hot water
6. Detach Luer adapter from Sample Bag
7. Replace cap on bag sample port
8. Fill out label (circle hot or cold, record MET)
9. Return Sample Bag and Luer adapter to Galley Water Sample Kit
10. Repeat steps 1 thru 9 EXCEPT, in step 5, fill Sample Bag with 8 oz chilled water
11. Stow Sample Kits in an empty fresh food locker
GIRA STOWAGE  
(Time: 15 min)

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

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

ML90N
2. Detach Galley Chilled hose (insulated) from Hose/Microbe filter (#1)
   Disconnect ACTEX hose from QD bracket

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

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

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

6. Return hardware to launch stowage location
NOMINAL H2O CONFIG

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

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

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

A. PRE-DUMP FDA

If comm, MCC will TMBU nozzle limits and provide duration as reqd
If no comm, change limits via table:

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

B. CWC VENTING

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

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

SM 66 ENVIRONMENT

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

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

5. SPLY H2O DUMP VLV – OP (tb-OP)

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

8. SPLY H2O DUMP VLV – CL (tb-CL)

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

10. √SUPPLY H2O NOZ T A,B (two) – not incr
* If SUPPLY H2O NOZ T A,B (two) incr: *
ML86B:A
* cb MNC SPLY H2O DUMP VLV/NOZ *
* HTR – op *

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

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

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

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

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C/W</th>
<th>H/W C/W</th>
<th>H/W &amp; B/U C/W</th>
<th>PARA ID</th>
<th>B/U C/W</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>H/W LO</td>
<td>H/W HI</td>
<td>ENA/INH</td>
<td>ENA</td>
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<tr>
<td>CABIN O2 FLOW 1</td>
<td>14</td>
<td>4.90</td>
<td>4.90</td>
<td>INH</td>
<td>INH</td>
</tr>
<tr>
<td>L2</td>
<td>2</td>
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<td>4.90</td>
<td>4.90</td>
<td>INH</td>
<td>INH</td>
</tr>
</tbody>
</table>

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>PARAMETER NAME</th>
<th>C/W</th>
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<tr>
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<td>ENA</td>
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<td>4.90</td>
<td>4.90</td>
<td>ENA</td>
<td>ENA</td>
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<tr>
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</table>

5-55 ORB OPS/ALL/GEN L
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 [ ]

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<th>C/W CH</th>
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<th>H/W &amp; B/U C/W</th>
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<th>B/U C/W</th>
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<td>4.9</td>
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2. N2 SYS 1(2) REG INLET – CL (tb-CL)
√\2(1) REG INLET – OP (tb-OP)

3. O2/N2 CNTLR VLV SYS 1(2) – OP

MO10W 4. PL N2 SYS 1,2 vlv (two) – OP

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

6. 14.7 CAB REG INLET SYS 1(2) vlv – OP

REPRESS TERM AND RECONFIG

MO10W 7. 14.7 CAB REG INLET SYS 1,2 vlv (two) – CL

8. O2 REG INLET SYS 1(2) vlv – OP

9. PL N2 SYS 1,2 vlv (two) – CL

L2 10. N2 SYS 1,2 REG INLET (two) – OP (tb-OP)

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

Cont next page
 Reset C/W, FDA limits per table

MCC for uplink of SM ALERT TMBU. Changes enclosed in [ ]

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<th>C/W CH</th>
<th>H/W LO</th>
<th>C/W HI</th>
<th>H/W &amp; B/U ENA/INH</th>
<th>PARA ID</th>
<th>B/U C/W</th>
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<tr>
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<td>2</td>
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<td>64</td>
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</table>
FORWARD STATION

O6/O8 ANNUN LAMP TEST – L, hold
√78 lights – illuminated:

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

O6/O8 ANNUN LAMP TEST – R, hold
√61 lights – illuminated:
F4 MSTR ALARM (1)
Aerodynamic controls (7)
DRAG CHUTE (1)
F3 ANTISKID FAIL (1)
DRAG CHUTE (2)
F8 LDG GEAR (2)
F7 MN ENG STAT (3)
C/W panel – partial (20)
C3 DAP PANEL (24)

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
6-3 ORB OPS/ALL/GEN L
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)
   VID OUT (8)
   CAMR CMD ALC (3)
   GAMMA (3)

C/W STATUS

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

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

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

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

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

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

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

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

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

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

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

If both RMS htrs active >>

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

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

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

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

CAUTION

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

1. TURN ON PURGE HEATERS

R11U FC PURGE HTR – ON

SM 69 FUEL CELLS

CRT √PURGE LN O2 T > 69
   √H2 T1 > 79
   √T2 > 40

2. MANUAL PURGE SEQUENCE

   NOTE
   Fuel cells must be purged separately

CRT FC 1(2,3) FLOW O2 – note
   H2 – note

R11U FC PURGE VLV 1(2,3) – OP

CRT √FC 1(2,3) FLOW O2 – incr ~3.3 (max)
   √H2 – incr ~0.6 (max)

   * If any flow ‘↑’ alarm,          *

R11U * (aff) FC PURGE VLV – CL *

Wait 2 min
FC PURGE VLV 1(2,3) – GPC

CRT √FC 1(2,3) FLOW O2 – decr ~3.3 (max)
   √H2 – decr ~0.6 (max)

Repeat step 2 for FCs 2 and 3
Wait at least 30 min, then continue

3. TURN OFF PURGE HEATERS

R11U FC PURGE HTR – GPC

6-7 ORB OPS/ALL/GEN L
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

Fuel Cell Volts

Fuel Cell Amps
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
   O2 TK4 HTRS (if 4th tk flown)
   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 fcDDDHHMM.fcv and be compressed as fcDDDHHMM.zip where 'DDDHHMM' refers to the GMT of the first data point. Recorded data files will contain single cell voltages from all three fuel cells.

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

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

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

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

Data Cable Setup
5. If PCMMU 2 outlet in use, disconnect cable from PCMMU 2 outlet
6. Connect FCMS cable (part #SED39131027-301) from PCMMU 2 outlet to PCMMU expansion card port on PGSC that will run WinDecom-FCMS

ML86B:E 7. cb MNA FC PCM – cl

![Diagram]

Starting WinDecom-FCMS
9. After 30-45 sec, expect TLM Monitor, TLM Pkt-net, and TLM Pkt-com windows to appear (possibly minimized). Data should be incrementing in TLM Pkt-net window

FCMS Application
11. Verify data being received (data updating and GMT incrementing on FCMS display, green “GO” sign in lower right corner of PGSC display)
12. Press record button, select full rate recording option, then select OK
13. When recording complete (~12 min), select YES in the popup window to copy zip data file (fcDDDHMM.zip) from C:\SPOCAPPS\FCMS directory to KFX PGSC *:\OCA_DOWN directory. Notify MCC

DEACTIVATION
ML86B:E 1. cb MNA FC PCM – op
2. Close FCMS application
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

1. VERIFY PTU MAIN BUS CONNECTIONS

A15

√PTU 1(2) tb – ON

2. ACTIVATE OPCU CONVERTER POWER

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

A15

OPCU 1(2) CONV – ON

3. ENABLE CREW MANUAL VOLTAGE ADJUST

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

A15

OPCU 1(2) V-ADJ – PNL

Repeat below action for ____ increments

OPCU 1(2) V-ADJ – UP(DOWN), release

CRT

√PTU 1(2) OPCU OUT VOLTS incr (decr)

4. ENABLE MCC COMMANDED VOLTAGE ADJUST

A15

OPCU 1(2) V-ADJ – CMD

6-12 ORB OPS/ALL/GEN L,2
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)

- **Main A**
  - PTU1/MN
  - Converter A (Channel A)
  - Converter B (Channel B)
  - APCU 1
  - PCU 2
  - OPCU 1
  - OPCU 2

- **Main B**
  - PTU2/MN
  - Converter A (Channel A)
  - Converter B (Channel B)

- **Main C**
  - Converter A (Channel A)
  - Converter B (Channel B)

- **PTU 1**
  - 23 Vdc
  - 120 Vdc

- **PTU 2**
  - 28 Vdc
  - 120 Vdc

- **Converter B**
  - Channel B

- **APCU 1**
  - 120 Vdc

- **OPCU 1**
  - Shuttle
  - ISS

- **OPCU 2**
  - X1
  - X2

- **APAS**
  - X2
  - X1

- **26 Vdc**
  - 120 Vdc

- **120V output for OBSS and ISS PL PWR**
GNC

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ALIGNMENT – IMU/IMU .............................................. 7-4
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IMU ALIGN – S TRK, GNC 201,202,301

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

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

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

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

Cont next page
3. **CHECK IMU \( \Delta \)ANGs**

<table>
<thead>
<tr>
<th><strong>GNC 21 IMU ALIGN</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>CRT IMU 1,2,3: STAT – blank</td>
</tr>
<tr>
<td>( \sqrt{\text{STAR ALIGN, ITEM 13 – (*)} )</td>
</tr>
<tr>
<td>( \sqrt{\text{ANG 1,2,3: } \Delta X, \Delta Y, \Delta Z \leq 0.50} )</td>
</tr>
</tbody>
</table>

If no comm, record \( \Delta \)ANGs

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

**CAUTION**

If \( \Delta X, \Delta Y, \Delta Z \) still \( > 0.50 \) for two or more IMUs, DO NOT TORQUE PLATFORMS EXCEPT UNDER MCC INSTRUCTIONS

4. **ALIGN IMUs**

| ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*) |
| EXEC – ITEM 16 EXEC (*) |
| \( \sqrt{\text{EXEC, ITEM 16 – (no *)} \) |

If not deorbit align >>

5. **D/O ALIGN VERIFICATION**

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

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

* If \( \Delta X, \Delta Y, \Delta Z \geq 0.1 \), \( \sqrt{\text{MCC}} \) *

* If no comm, repeat steps 1-5 *
IMU ALIGNMENT – IMU/IMU

NOTE
Procedure must be accomplished in GNC OPS 2 or 3

GNC 21 IMU ALIGN
IMU/IMU – ITEM 14 + (REF IMU) EXEC

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

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

NOTE
Align will require 3-6 min

Report IMU align results

VERIFY GOOD IMU/IMU ALIGNMENT
✓ EXEC, ITEM 16 – (no *)
IMU/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,
STAR ALIGN – ITEM 13 EXEC (*)

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

Mnvr to avoid bright objects in both BOSs

GNC 22 S TRK/COAS CNTL

CRT

√S TRK -Y,-Z: STATUS – (no BITE)

SHUTTER – OP

* If SHUTTER – CL:

* ITEM 15(16) – EXEC (*)

* ITEM 15(16) – EXEC (no *)

SELF-TEST – ITEM 1,2 EXEC (*)

√S TRK -Y,-Z: SHUTTER – CL

S PRES – (*)

STATUS – BITE (mom)

SHUTTER – OP

STATUS – ST PASS

* If STATUS – ST FAIL, repeat *

* SELF-TEST *

* If still FAIL, use only if directed *

* by MCC *

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

1. VERIFY STAR DATA
   √S TABLE: TRK ID 1,2,3 for correct #s
   ANG ERR 1,2,3: ≤ 0.08 for correct #s
   SEL, ITEM 17,18,19 – (*) for correct #s

2. CHECK IMU ΔANGs
   [GNC 21 IMU ALIGN]
   IMU 1,2,3: STAT – blank
   √STAR ALIGN, ITEM 13 – (*)
   √ANG 1,2,3: ΔX,ΔY,ΔZ ≤ 0.50
   CAUTION
   If ANG ΔX,ΔY,ΔZ > 0.50 for any IMU, DO NOT TORQUE PLATFORMS EXCEPT UNDER MCC INSTRUCTIONS

3. ALIGN IMUs
   ALIGN IMU 1(2,3) – ITEM 10(11,12) EXEC (*)
   EXEC – ITEM 16 EXEC (*)
   √EXEC, ITEM 16 – (no *)
* Single tracker procedure
* TERM/IDLE, ITEM 9(10) – (*)
* Good S TRK, STAR TRK – ITEM 3(4) EXEC (*)
* S TABLE CLR – ITEM 20 EXEC
* 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

4. CHECK IMU ΔANGs

GNC 21 IMU ALIGN
CRT
IMU 1,2,3: STAT – blank
REF STAR, ITEM 13 – (*)
TYPE, ITEM 15 – TORQUE
ANG 1,2,3: ΔX,ΔY,ΔZ ≤ 0.50
If no comm, record ΔANGs

* If ANG ΔX,ΔY,ΔZ > 0.50 for two or more IMUs, repeat steps 1,2,3

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

5. 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 *)
If not deorbit align >>

6. D/O ALIGN VERIFICATION
When D/O align complete, mnvr to VERIF ATT
(FLIGHT PLAN, Detailed Timeline), perform steps 1,2 using verif stars
IMU 1,2,3 ANG ΔX,ΔY,ΔZ < 0.1

* If ANG ΔX,ΔY,ΔZ ≥ 0.1, MCC
* If no comm, repeat steps 1-5

OI-32
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

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>ΔX</td>
<td>ΔY</td>
<td>ΔZ</td>
</tr>
</tbody>
</table>

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

NOTE
Align will require 3-6 min

Report IMU align results

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

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

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

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

OI-32
S TRK SELF-TEST, GNC 201,202,301

Mnvr to avoid bright objects in both BOSs

<table>
<thead>
<tr>
<th>GNC 22 S TRK/COAS CNTL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRT</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

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

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

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

1. **VERIFY STAR DATA**
   - √S TABLE: TRK ID 1,2,3 for correct #s
   - ANG ERR 1,2,3: ≤ 0.08 for correct #s
   - SEL, ITEM 17,18,19 – (*) for correct #s

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

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

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

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

1. **COAS CALIBRATION PREP**

   - **O1(O19) COAS – ON**
   - √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

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

   - NOTE
     - Take minimum three verif marks to ensure ΔBIAS consistency

   - DAP: A1/AUTO/VERN

Cont next page

7-7 ORB OPS/ALL/GEN L
3. **CALIBRATE COAS**

   CRT Rcd CAL +X(-Z) \( \Delta \text{BIAS} \): ___.___ ___
   UPDATE – ITEM 28(29) EXEC, Rcd MET ___/___ ___:___ ___
   \( \sqrt{\Delta \text{BIAS}} \) goes to zero

4. **VERIFICATION**

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

   Mnvr to locate star

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

   Mnvr to center star in COAS:
   F6 ATT REF pb – push
   (A6U)

   **NOTE**

   Take minimum three verif marks
   to ensure \( \Delta \text{BIAS} \) consistency

   \( \sqrt{\Delta \text{BIAS}} < 0.12 \)

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

5. **CLEAN UP**

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

   \( \sqrt{\text{Data transcribed into FLIGHT PLAN}} \)

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

   Reconfig to FLIGHT PLAN DAP
   7-8 ORB OPS/ALL/GEN L
HUD CALIBRATION, GNC 201

1. HUD PREP
   Remove L(R) HUD Cover
   
   F3  L(R) HUD PWR – ON
   F6U(F8U)  MODE – TEST

   Wait ~15 sec for final symbology of test mode display (see HUD BORESIGHT DESIGNATION, 7-12)
   √Final test mode display symbology

   * If final test mode symbology not in agreement with diagram, notify MCC *

   L(R) HUD BRT – MAN NIGHT
   MAN BRT – as reqd

   C3  √DAP:  A/AUTO/VERN
   Change DAP A,B to A1,B5

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

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

   F6/F8  FLT CNTLR PWR – ON

2. MARK ON STAR
   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)

Cont next page
Mnvr to center star in HUD boresight:
(P’ in ‘COMPLETE’, see HUD BORESIGHT DESIGNATION, 7-12)

F6/F8
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

3. **CALIBRATE HUD**

CRT
Rcd CAL $+$X $\Delta$BIAS: ___.___ ___
UPDATE – ITEM 28 EXEC,
Rcd MET ____/____ ____:
$\sqrt{\Delta$BIAS goes to zero

4. **VERIFICATION**

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

Mnvr to locate star

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

Mnvr to center star in HUD boresight:

F6/F8
ATT REF pb – push

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

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

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

Cont next page
5. **CLEAN UP**
   - **COAS:** DES – ITEM 25 EXEC (*)
   - **F6U/F8U HUD MODE:** NORM
   - **F3 PWR:** OFF
   - **F6/F8 FLT CNTLR PWR:** OFF
   - **O14,O15, cb DDU L(R) (two) – as reqd**

   √ Data transcribed into FLIGHT PLAN

   **CERT**
   - 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
Final symbology of HUD test mode display

HUD boresight designation

7-12 ORB OPS/ALL/GEN L
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
A12 APU HTR GAS GEN/FUEL PUMP X – OFF
If circ pump will be used:
O14, √ASA (four) – OFF
O15, ACCEL 3,4 (two) – ON
O16 BRAKES (three) – ON
L2 ANTISKID – ON
O17 ATVC (four) – ON
If OV103,4:
O7 TACAN 1,2,3 MODE sel (three) – GPC
O8 RA (two) – ON
       MLS (three) – ON
F3 L,R TRIM PNL (two) – ON
       HUD PWR (two) – ON
C3 √FCS CH (four) – AUTO

√DAP: A1/AUTO/VERN

If OV105:
   Perform GPS PWRUP, 7-35, for GPS 1,3 if reqd
   Perform G2 TO G8 TRANSITION (DPS), then:
If using circ pump for part 1:
   FCS CH 2,3 – OFF
   ASA (four) – ON
O14,O15, O16:F
   Go to step 7b, 7-18

Cont next page

7-13 ORB OPS/ALL/GEN L,2
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 L
1. FCS C/O PREP  
   C2  
   Set EVENT TIMER to 00:00, count UP

2. APU PRESTART  
   CRT2  
   √APU, HYD, W/B status no '↑' or '↓' (except HYD B/U)

   If SYS 1:  
   R4  
   √LG EXTD ISO VLV tb – CL
   √HYD BK ISOL VLV X tb – CL
   R2  
   CIRC PUMP (three) – OFF
   BLR N2 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
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 PRESS ind X – LOW green**

   R2  **APU/HYD RDY X tb – bp**

   * If APU did not start, go to step 6 *

   **HYD MN PUMP PRESS X – NORM**
   √**HYD PRESS ind X – HI green**

   √**SM 87 HYD THERMAL**
   √**SW VLV ELEV (four) per table**
   √**RUD/SPDBK per table**

<table>
<thead>
<tr>
<th>If HYD SYS 1</th>
<th>If HYD SYS 2</th>
<th>If HYD SYS 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(*)</td>
<td>2(*)</td>
<td>3(*)</td>
</tr>
<tr>
<td>1(*)</td>
<td>2(*)</td>
<td>3(*)</td>
</tr>
</tbody>
</table>

4. **AEROSURFACE DRIVE**

   CRT1  **SURF DR START – ITEM 10 EXEC (*)**

   Verify all surfaces cycling for 30 sec

   **NOTE**

   POS ‘↓’ may be indicated until HYD SYS is warm

   * If FCS CH failure (‘↓’ port status), *
   * reset affected FCS CH: *
   * FCS CH – ORIDE,AUTO *

   After 30 sec of aerosurface drive,
   **SURF DR STOP – ITEM 11 EXEC (*)**

   √Surfaces not moving

   Cont next page
5. **SECONDARY ACTUATOR CHECK (APU)**

**NOTE**

If a port does not bypass during check, bypass affected port after APU shutdn:
- SEC ACT BYPASS – ITEM 21 +X X EXEC

If affected port still does not bypass:
- SEC ACT RESET – ITEM 22 +X X EXEC

CRT1

a. √POS STIM ENA, ITEM 20 – (*)

C3  
b. √FCS CH 1,2,3,4 – AUTO

CRT1  
c. SEC ACT CK, CH 1 – ITEM 15 EXEC (*)

d. √All CH 1 ports bypass (‘↓’)
- STOP – ITEM 19 EXEC (*)

C3  
e. FCS CH 1 – ORIDE

CRT1  
√All CH 1 ports reset (no ‘↓’)

C3  
f. Repeat steps c thru e for CH 2,3,4

CRT1  
g. NEG STIM – ITEM 20 EXEC (no *)

h. Repeat steps b thru f

6. **APU SHUTDOWN**

On MCC GO for APU SHUTDN:

R2  
BLR N2 SPLY X – OFF
- PWR (three) – OFF
- APU OPER X – OFF
- FU TK VLV X – CL
- √Shutdn (hyd press < 200)
- CNTLR PWR X – OFF
- HYD CIRC PUMP (three) – GPC

A12  
APU HTR GAS GEN/FUEL PUMP X – A AUTO

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.

   a. Perform G8 TO G2 TRANSITION (DPS), then:
   - O14, O15, ASA (four) – OFF
   - Perform G2 TO G8 TRANSITION (DPS), then:
   - C3 √ FCS CH 1,4 – AUTO
   - 2,3 – OFF
   - O14, O15, O16:F
   - ASA (four) – ON
   - O16:F
   - √ HYD BK ISOL VLV X tb – CL
   - R4 √ 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° ± 0.8°

   CRT1
   - d. SEC ACT CK, CH1 – ITEM 15 EXEC (*)
   - Wait 5 sec
   - Cont next page
e. Turn off FCS CH not being checked:
   C3   FCS CH (three) – OFF
   CRT2  √All elevons move to U1.5° ± 0.8°
   
   * If any elevon drives past 0°, turn on all *
   * FCS CHs to stop movement *
   * FCS CH (four) – AUTO *
   * Expect AERO DRIVE msg. Continue *
   * procedure and report to MCC *

f. STOP – ITEM 19 EXEC (*)
   CRT1  √All elevons move to U7.5° ± 0.8°

C3   g. Config FCS CHs for check of next CH:
   (Config switches in sequence shown)

<table>
<thead>
<tr>
<th>NEXT CH</th>
<th>FCS CH SWITCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>AUTO</td>
</tr>
<tr>
<td>3</td>
<td>AUTO</td>
</tr>
<tr>
<td>4</td>
<td>AUTO</td>
</tr>
</tbody>
</table>

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

9. HYDRAULIC SYSTEM RECONFIG
   R2   HYD CIRC PUMP (three) – GPC

10. FCS CH RECONFIG
    a. Perform G8 TO G2 TRANSITION (DPS), then:
       C3   FCS CH 1,2,3 – AUTO
       √4   – AUTO

    b. Perform G2 TO G8 TRANSITION (DPS), then:
       Continue with part 2, 7-20

Cont next page
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
\( \sqrt{\text{DES}} \): (no *)
\( \sqrt{\text{STAT}} \): blank
\( \sqrt{\text{RNG,AZ,EL}} \): no M

CONFIG FOR FREE DRIFT

F6
ADI RATE – LO
DAP: A1/INRTL\( \sqrt{\text{VERN}} \)
\( \sqrt{\text{R,P,Y}} \) rates 0 ± 0.1°/sec, then:
DAP: FREE

AA Bias/Null Shift Test

CRT2
\( \sqrt{Y,Z} \) 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 (\( \sqrt{\text{no ‘↑’ or ‘↓’}} \)). See LIMIT VALUES TABLE, 7-21

Cont next page
LIMIT VALUES TABLE

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

NOTE
Values from 182.1 to 182.5 will be displayed as 2.1 to 2.5

STOP – ITEM 14 EXEC (*)
If OV103,4:

07 TACAN 1,2,3 MODE sel (three) – OFF

2. Sensor Test – RGA,ADTA

NOTE
During RGA,ADTA test, deselect LRU for failure indicated:
- RGA – bias null limits exceeded,
- ↑ or ↓, or SMRD
- ADTA – any ↑ or ↓, except temp (‘T’)

If RGA does not respond to HIGH or LOW TEST or displays ‘SMRD’ indication in STAT column:
√MCC, confirm that payload config can support PRCS firings
Null vehicle rates
Mnvr at 0.5°/sec about appropriate axis; monitor RGA data
If RGA responds, self-test circuitry or SMRD circuitry failed
If no RGA response, deselect sensor

Cont next page
2: GNC 41 RGA/ADTA/RCS

CRT2
√ DES: (no *)
√ STAT: blank
√ PS, PαC, PαU, PαL, T – no M

Config For Free Drift
√ R, P, Y rates 0 ± 0.1°/sec
√ DAP: FREE

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

High Test
TEST HI – ITEM 9 EXEC (*)
  (after 10 sec, no *)
√ No ‘↑’ or ‘↓’
  If ADTA BITE, √MCC (if LOS, proceed with test)

TEST STOP – ITEM 11 EXEC (*)

Low Test
TEST LOW – ITEM 10 EXEC (*) (after 10 sec, no *)
√ No ‘↑’ or ‘↓’
  If ADTA BITE, √MCC (if LOS, proceed with test)

TEST STOP – ITEM 11 EXEC (*)
DAP: A1/AUTO/VERN

Cont next page
### LIMIT VALUES TABLE

#### HIGH TEST LIMITS

<table>
<thead>
<tr>
<th>RGA</th>
<th>P</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>+9.4 to +10.6</td>
<td>+9.4 to +10.6</td>
</tr>
<tr>
<td>ADTA</td>
<td>PαC</td>
<td>PαU</td>
</tr>
<tr>
<td>PS</td>
<td>24.887 to 24.889</td>
<td>29.527 to 29.531</td>
</tr>
</tbody>
</table>

#### LOW TEST LIMITS

<table>
<thead>
<tr>
<th>RGA</th>
<th>P</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>-9.4 to -10.6</td>
<td>-9.4 to -10.6</td>
</tr>
<tr>
<td>ADTA</td>
<td>PαC</td>
<td>PαU</td>
</tr>
<tr>
<td>PS</td>
<td>29.527 to 29.531</td>
<td>21.708 to 21.712</td>
</tr>
</tbody>
</table>

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

**NOTE**

√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
2: GNC 55 GPS STATUS

ΔNAV – ITEM 17(18,19) (*)
If 'RPF' in STAT field, ΔMCC (if LOS, proceed with test)
S/TEST – ITEM 11(12,13) EXEC (*)
Δ'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: ΔMCC when possible

FCS MODE:
Fail op – 2 op or 1 op/1 cl contacts preclude use of sw
Fail cl – 1st failure, deselect failed contact
– 2nd failure L(R), deselect all L(R) contacts

2: GNC 42 SWITCH/SURF

CRT2

NOTE
During following tests, verify ‘*’ appears except as noted. If ‘*’ remains after releasing pb, contact failed closed

F6/F8 FLT CNTLR PWR (two) – ON
C3 FCS CH (four) – ORIDE (wait 5 sec)
– AUTO (no *)
F2/F4

PITCH pb – AUTO
– CSS
ROLL/YAW pb – AUTO
– CSS
SPDBK/THROT pb – AUTO
BODY FLAP pb – AUTO
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

NOTE
During following tests, verify ‘*’ appears except as noted. If ‘*’ remains after releasing pb, contact failed closed

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

Cont next page
7-25 ORB OPS/ALL/GEN L,2
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

\( \sqrt{\text{NWS1 SYS SEL (*)}} \)

\( \sqrt{\text{HYD PRESS HIGH (no *)}} \)

\( \sqrt{\text{CURRENT: } 1.00 \text{ to } 3.15 \text{ ma}} \)

ENABLE – ITEM 1 EXEC (*)

\( \sqrt{\text{NWS1 ENABLE A,B (two) (*)}} \)

F3

\( \sqrt{\text{NWS FAIL lt – NWS FAIL lt on}} \)

CRT2

RIGHT TURN – ITEM 2 EXEC (*)

\( \sqrt{\text{NWS1 CURRENT: } 3.75 \text{ to } 6.25 \text{ ma}} \)

LEFT TURN – ITEM 3 EXEC (*)

\( \sqrt{\text{NWS1 CURRENT: } -4.25 \text{ to } -1.75 \text{ ma}} \)

STOP – ITEM 4 EXEC (*)

\( \sqrt{\text{NWS1 CURRENT: } 1.00 \text{ to } 3.15 \text{ ma}} \)

b. **NWS2**

L2

NWS – 2

CRT2

\( \sqrt{\text{NWS2 SYS SEL (*)}} \)

\( \sqrt{\text{HYD PRESS HIGH (no *)}} \)

\( \sqrt{\text{CURRENT: } 1.00 \text{ to } 3.15 \text{ ma}} \)

ENABLE – ITEM 1 EXEC (*)

\( \sqrt{\text{NWS2 ENABLE A,B (two) (*)}} \)

F3

\( \sqrt{\text{NWS FAIL lt – NWS FAIL lt on}} \)

Cont next page
CRT2

RIGHT TURN – ITEM 2 EXEC (*)
√NWS2 CURRENT: 3.75 to 6.25 ma
LEFT TURN – ITEM 3 EXEC (*)
√NWS2 CURRENT: -4.25 to -1.75 ma
STOP – ITEM 4 EXEC (*)
√NWS2 CURRENT: 1.00 to 3.15 ma

L2
NWS – OFF

7. CONTROLLER AND SWITCH TEST

NOTE
During cntlr/sw test,
THC: One TX(TY,TZ) failed CLOSED –
reselete all contacts (failed contact last)
One TX(TY,TZ) failed OPEN –
reselete good contacts only
Multi +TX,-TX,+TY,-TY,+TZ,-TZ
failures – reselect good contacts only

SPDBK L(R): Deselect failed xdcrs
After 2nd L(R) failure,
use other side

RUD PED L(R): One failure – deselect failed xdcr
Multi L(R) failures –
deselect all L(R) xdcrs

RHC L(R): One xdcr failure – reselect good xdcrs only
Multi L(R) failures – reselect good xdcrs L(R) and F7(F8)
FLT CNTLR PWR – OFF

BDY FLP L(R): Fail close, deselect all L(R) contacts

Cont next page
RHC or PNL TRIM L(R): If contact failed, deselect failed contact row

2: GNC 43 CONTROLLERS
a. THC
   Deselect L THC:
   CRT2
   L THC – deflect in each axis
   F5
   THO L DES – ITEMS 1,2,3 EXEC (*)
   √THC: ‘+’ and ‘-’
   Reselect THC contacts:
   THO L – ITEM 1,2,3 EXEC (no *)

b. L SBTC
   L SBTC – full aft; √ > 95%
   – full fwd; √ < 15%

c. Rudder/Brake
   RUD PED – full L; √ > 87% and ch Δ < 9%
   – full R; √ > 80% and ch Δ < 9%
   – null; between L 14% and R 4%
   BK PED – depress to verify unrestricted movement (~20 to 25°)

d. L Body Flap Switch
   L2
   BDY FLP – UP,DN
   CRT2
   √BDY FLP UP,DN – ‘*’

e. L RHC
   Deselect L RHC:
   CRT2
   L RHC – deflect to hardstop in each axis
   √RHC L: R,P – → 92%
   Y → 88%
   Reselect RHC CHs:
   CRT2
   RHC L DES – ITEM 23,24,25 EXEC (no *)

f. L RHC Trim Switch
   L RHC Trim – deflect sw in each axis
   √RHC TRIM L: R – R/L
   P – U/D

Cont next page
g. **L Panel Trim Switches**

- **L2**
  - 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 cntrlrs/sws:

  - RHC R DES – ITEM 26,27,28

i. **DDUs**

- **O14:E cb MNA DDU L – op**
- **O16:E cb MNC DDU R – op**
  (Wait 5 sec)
- **O14:E cb MNA DDU L – cl**
- **O16:E cb MNC DDU R – cl**
- **O15:E cb 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
  - with three MDUs max if in GROUP B(C) PWDRDN)

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**
- 
  
  \(\sqrt{\text{PITCH AUTO,CSS lt (two)}}\) – on
- \(\sqrt{\text{ROLL/YAW AUTO,CSS lt (two)}}\) – on
- \(\sqrt{\text{SPDDBK/THROT AUTO,MAN lt (two)}}\) – on
- \(\sqrt{\text{BDY FLP AUTO,MAN lt (two)}}\) – on

**Test Terminate**

**CRT1** MODE LT OFF – ITEM 8 EXEC (*)

**F6/F8** FLT CNTLR PWR (two) – OFF

Display/DPS Reconfig

Perform G8 TO G2 TRANSITION (DPS), then:

**F3**
- L,R TRIM PNL (two) – OFF
- HUD PWR (two) – OFF

**C3**
- FCS CH (four) – AUTO

**O8**
- MLS (three) – OFF
- RA (two) – OFF

**O14, O15**
- RGA (four) – OFF
- 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

**L2**
- ANTISKID – 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**

- \(\sqrt{\text{S/TEST \text{↑}}\); if \(\text{↓}\) \text{MCC (if LOS, deselect GPS)}
- INIT – ITEM 14(15,16) EXEC (*)
- MODE – INIT
- NAV – ITEM 17(18,19) EXEC (*)
- MODE – INS

If reqd, go to GPS PWRDN, 7-35

7-31 ORB OPS/ALL/GEN L,2
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 ‘-’

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<th>AFT CONTROLLER C/O</th>
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<td>RIGHT</td>
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<td>DOWN</td>
</tr>
<tr>
<td>DISP</td>
<td>+X</td>
<td>-X</td>
<td>+Z</td>
<td>-Z</td>
<td>-Y</td>
<td>+Y</td>
</tr>
</tbody>
</table>

* During THC test,
* One TX(TY,TZ) failed CLOSED – reselect
* all contacts (failed contact last)
* One TX(TY,TZ) failed OPEN – reselect
* good contacts only
* Multi +TX,-TX,+TY,-TY,+TZ,-TZ
* failures – reselect good contacts only

Reselect A THC contacts:
   THC A DES – ITEM 4,5,6 EXEC (no *)

Cont next page
4. **AFT RHC**

Deselect A RHC:

- CRT RHC A DES – ITEM 13,14,15 EXEC (*)
- A RHC – deflect to hardstop in each axis
- √RHC A: R,P > 92%
  - Y > 88%

  * During RHC test,
  * One xdcr failure – reselect good xdcrs
  * only
  * Multi RHC failures – reselect good xdcr,

- A6U
  * FLT 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)

2. ASA 4 – ON

3. Perform G8 TO G2 TRANSITION (DPS)

4. HYD CIRC PUMP 1 – ON

NOTE
Elevons will be positioned within 3 min

On MCC GO,
HYD CIRC PUMP 1 – GPC
GPS PWRUP

1. CHECK GPS ANTENNA PRE-AMP CONFIG
   If OV103:
   A13 GPS PRE AMPL (two) – MNC
   If OV104:
   A13 GPS PRE AMPL (two) – ON
   If OV105:
   O7 GPS 1(2,3) PRE AMPL (two) – ON

2. PWR UP GPS RECEIVER
   * If GPS just PWRed off, wait *
   * at least 30 sec *
   A13/O7 GPS 1(2,3) PWR – ON
   GNC I/O RESET
   ENCRYPT – NORMAL
   Wait at least 30 sec

3. INITIALIZE GPS RECEIVER
   GNC 55 GPS STATUS
   NAV – ITEM 17(18,19) (*)
   INIT – ITEM 14(15,16) EXEC (*)
   MODE – INIT
   NAV – ITEM 17(18,19) EXEC (*)
   MODE – INS

GPS PWRDN

1. CHECK GPS RECEIVER MODE
   SPEC 55 GPS STATUS
   NAV – ITEM 17(18,19) (*)

2. PWR OFF GPS RECEIVER
   A13/O7 GPS 1(2,3) PWR – OFF

3. PWR OFF GPS ANTENNA PRE-AMPS
   GPS 1(2,3) PRE AMPL (two) – OFF

7-35 ORB OPS/ALL/GEN L,2
GPS SELF-TEST, GNC 201,202,301,801

1. GPS ANTENNA PRE-AMP CONFIG
   A13/O7 GPS 1(2,3) PRE AMPL (two) – OFF

2. PWR UP GPS RECEIVER (if reqd)
   * If GPS just PWRD off, wait *
   * at least 30 sec *
   A13/O7 GPS 1(2,3) PWR – ON
   Wait at least 30 sec
   GNC I/O RESET

3. GPS SELF-TEST
   2:  GNC 55 GPS STATUS
   √NAV – ITEM 17(18,19) (*)
   If “RPF” in STAT field, √MCC (if LOS, proceed with test)
   S/TEST – ITEM 11(12,13) EXEC
   √“BIT” in STAT field after ~6 sec
   Wait for “BIT” to clear after ~2 min
   √S/TEST ‘↑’; if ‘↓’ deselect GPS

4. PWR ON GPS ANTENNA PRE-AMPS
   If OV103:
   A13 GPS PRE AMPL (two) – MNC
   If OV104:
   A13 GPS PRE AMPL (two) – ON
   If OV105:
   O7 GPS 1(2,3) PRE AMPL (two) – ON

5. INITIALIZE GPS RECEIVER
   GNC 55 GPS STATUS
   INIT – ITEM 14(15,16) EXEC (*)
   √MODE – INIT
   NAV – ITEM 17(18,19) EXEC (*)
   √MODE – INS

7-36 ORB OPS/ALL/GEN L,2
1. GPS functioning properly:
   - CRT GNC SPEC 55 GPS STATUS
   - √ STAT = BLANK or BATT
   - √ MODE = INS
   - √ DG FAIL = BLANK
   - √ QA1 P1 σ ≤ 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 (ΔH, ΔDR, ΔCR) < 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 ± 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
   CRT2 SEC ACT CK, CH 4 – ITEM 18 EXEC (*)
   √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
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
OMS

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

1. OMS BURN PREP
   C2 Wedge
   Install OMS-2/ORBIT OMS BURNS
   Cue Cards (two) and ORBIT BURN MONITOR Cue Cards (two) (F6,F8)

   GNC 55 GPS STATUS
   √GPS TO NAV – INH (*)

   CRT
   If OPS 2:
   1: GNC 20 DAP CONFIG
      √DAP Config A1,B1
   1: GNC UNIV PTG
      CNCL – ITEM 21 EXEC
      GNC, OPS 202 PRO
   1: GNC ORBIT MNVR EXEC
   2: GNC SYS SUMM 2

   If OPS 3:
   GNC, OPS 302 PRO
   1: GNC DEORB MNVR EXEC
   3: BFS, GNC SYS SUMM 2

   OMS/MPS
   √OMS PRESS He TK L,R > 1500 psia
   √N2 TK L(R) > 564 psia

   WARNING
   If OMS PRESS not within limits, do not execute on-orbit burn

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

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

Cont next page

9-2 ORB OPS/ALL/GEN L
2. **LOAD TGT DATA**
   Load TGT DATA per Burn Pad
   LOAD – ITEM 22 EXEC
   TIMER – ITEM 23 EXEC
   \BURN DATA per Burn Pad
   C3 DAP: If OPS 2, B/AUTO/VERN
   If OPS 3, AUTO
   CRT1 MNVR – ITEM 27 EXEC (*)

3. **PERFORM OMS BURN**
   **TIG-4**
   If xfeed Burn:
   O8   \L(R) OMS TK ISOL (two) – OP (tb-OP)
   \R(L) OMS TK ISOL (two) – CL (tb-CL)
   \L,R OMS XFEED B (two) – OP (tb-OP)
   If straight feed:
   \L,R OMS TK ISOL (four) – OP (tb-OP)
   F6/F8 FLT CNTLR PWR (two) – ON
   Perform OMS-2/ORBIT OMS BURNS (Cue Card), then:

4. **OMS POST BURN RECONFIGURATION**
   CRT1 Perform OMS TVC GMBL CK, as reqd
   * If down arrow(s) or M(s), *
   * select good GMBL *
   F6/F8 FLT CNTLR PWR (two) – OFF
   O14:E, cb DDU (six) – as reqd
   O15:E, O16:E
   O8 L,R OMS He PRESS/VAP ISOL (four) – CL

Cont next page
If feeding ICNCT:
\[ \n\sqrt{L(R)} \text{ OMS XFEED A} - \text{CL (tb-CL)} \\
\sqrt{B} - \text{OP (tb-OP)} \\
\sqrt{R(L)} \text{ OMS XFEED (two)} - \text{CL (tb-CL)} \]

Otherwise:
\[ \text{L,R OMS XFEED (four)} - \text{CL (tb-CL)} \\
\text{TK ISOL (four)} - \text{OP (tb-OP)} \]

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

5. RECONFIG FOR GROUP B(C)
If Group B(C) PWRDN:
\[ \text{O14:F, } \text{Pri RJD LOGIC, DRIVER (sixteen)} - \text{OFF} \]
\[ \text{O15:F, } \text{RJDA 1A L2/R2 MANF DRIVER} - \text{ON} \]
O16:F
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RCS HOT FIRE TEST

NOTE
If RMS not cradled, verify RMS not in jet impingement zone (√MCC if desired)

1. CONFIGURE FOR JET TEST
   DAP: A1/INRTL/VERN

2. PERFORM RCS JET TEST
   Wait 3 sec between pulses
   Monitor CRT for JET FAIL msgs
   Monitor ADI rates to verify jet on or jet fail

   NOTE
   If failed RCS JET detected, wait 30 sec before next pulse,
   deselect any failed RCS JET not auto deselected, complete TEST,
   then go to MAL, RCS 10.1a (MAL, RCS)

O14, Pri RJD LOGIC, DRIVER (sixteen) – ON
O15, √cb MNA, B DDU L (two) – cl
O16
DAP TRANS: PULSE/PULSE/PULSE
DAP: A/FREE/PRI
F6 ADI RATE – LO
F6/F8 FLT CNTLR PWR – ON

GNC 23 RCS
CRT
RCS FWD – ITEM 1 EXEC (*)
MANF VLVS STAT OVRD
√1 OP – ITEM 40
√2 OP – ITEM 41
3 CL – ITEM 42 EXEC
4 CL – ITEM 43 EXEC
JET DES F2U – ITEM 21 EXEC (*)

Cont next page
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 EXEC
  √4 CL – ITEM 43 EXEC

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

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

10-3          ORB OPS/ALL/GEN L
Perform following pulse sequence twice:

THC: +X, 1 PULSE (fires jets L3A,R3A)
    -X, 1 PULSE (fires jet F3F)
    -Z, 1 PULSE (fires jets F3D,F4D,L3D,R3D)
    +Y, 1 PULSE (fires jets F3L,L3L)
    -Y, 1 PULSE (fires jets F4R,R3R)
Perform following pulse sequence twice:

THC: +Z, 1 PULSE (fires jets F3U,L4U,R4U)
- Z, 1 PULSE (fires jets F3D,F4D,L4D,R4D)
+ Y, 1 PULSE (fires jets F3L,L4L)
- Y, 1 PULSE (fires jets F4R,R4R)

DAP: A/INRTL/VERN
F6/F8 FL T CNTLR PWR – OFF

3. RECONFIGURE JET SELECT

\[ \sqrt{RCS L, ITEM 2 – (*)} \]
MANF VLVS STAT OVRD
1 OP – ITEM 40 EXEC
2 OP – ITEM 41 EXEC
3 OP – ITEM 42 EXEC
\[ \sqrt{4} \] 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
\[ \sqrt{4} \] OP – ITEM 43

RCS F – ITEM 1 EXEC (*)
MANF VLVS STAT OVRD
1 OP – ITEM 40 EXEC
2 OP – ITEM 41 EXEC
\[ \sqrt{4} \] OP – ITEM 43

4. CONFIG FOR VERN MANIFOLD VLV TEST

R14:C cb MNC MANF ISOL L5,R5,F5 ENA (three) – op

5. PERFORM TEST

NOTE
If any vernier manifold closes, ignore DAP RECONFIG msg, reopen affected manifold, complete TEST, and notify MCC

O7,O8 L,R,F RCS MANF ISOL 5 (three) – CL (tb-OP)

6. CLEANUP

R14:C cb MNC MANF ISOL L5,R5,F5 ENA (three) – cl
O14,O15, Pri RJD LOGIC, DRIVER (sixteen) – as reqd
O16 \[ \sqrt{cb} \] MNA,B DDU L (two) – as reqd
Reconf to FLIGHT PLAN DAP

10-5 ORB OPS/ALL/GEN L
GG FREE DRIFT

1. AUTO MNVR TO ATTITUDE
   Change DAP A,B to A3,B3
   DAP: B3/AUTO/VERN(ALT)

   GNC UNIV PTG
   √TGT ID, ITEM 8 – 2
   BODY VECT – ITEM 14 +5 EXEC
   Load Body Vector P,Y,OM (per table, 10-7)
   TRK – ITEM 19 EXEC (CUR-*)
   √ERR TOT, ITEM 23 – (*)

2. ESTABLISH FREE DRIFT
   F6,F8
   √Att mnvr complete
   ADI ATT – LVLH
   L1
   FLASH EVAP CNTLR PRI A,B (two) – OFF
   √SEC – OFF
   √HI LOAD DUCT HTR – OFF
   If VERN jets available:
     DAP: A3/AUTO/VERN
     Wait 3 min
     DAP: FREE
   If VERN jets not available:
     DAP: A3/AUTO/ALT
     Wait 30 sec
     When -0.01 < Roll Rate < 0.01, then:
     DAP: FREE
     Rcd MET _____/______ _____:____ _____:____

   NOTE
   If FREON EVAP OUT TEMP > 60, execute
   PRIORITY PWRDN GROUP A and
   subsequent (ORB PKT, PRIOR PWRDN) to
   maintain FREON EVAP OUT TEMP ≤ 55

Cont next page
3. VEHICLE RECOVERY AND FES RESTART
   DAP: A3/FREE/VERN(ALT)
   If VERN jets available:
   O14:F, O15:F, O16:F
   \sqrt{All RJD LOGIC, DRIVER (seventeen) – ON}
   If VERN jets not available:
   \sqrt{Pri RJD LOGIC, DRIVER (sixteen) – ON}

   F6,F8
   ADI ATT – as reqd
   Reconfig to FLIGHT PLAN DAP
   DAP: INRTL
   If FES reqd:
   CRT(O1) If FREON EVAP OUT TEMP > 41
   and \leq 47 degF:
   L1 RAD_CNTL_02R_TEMP = HI
   CRT(O1) When FREON EVAP OUT TEMP > 50 degF,
   L1 RAD_CNTL_02R_TEMP = NORM, then
   immediately:
   FLASH EVAP_CNTL PRI A(B) – ON
   CRT(O1) If FREON EVAP OUT TEMP \leq 41 or > 47 degF:
   L1 FLASH EVAP_CNTL PRI A(B) – ON

   GRAVITY GRADIENT BODY VECTORS

<table>
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<tr>
<th>ATT ID</th>
<th>EXEC DATA</th>
<th>BODY RATES (±0.002)</th>
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</thead>
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<tr>
<td></td>
<td>P  Y  OM  R  P  Y</td>
<td></td>
</tr>
<tr>
<td>+ X L V</td>
<td>PLBD</td>
<td>A  357.51  0.97  249.18  0.002  0.024  -0.062</td>
</tr>
<tr>
<td></td>
<td>NORTH</td>
<td>B  355.23  110.91 -0.002  0.024  0.062</td>
</tr>
<tr>
<td>- X L V</td>
<td>PLBD</td>
<td>C  177.51  0.77  69.09  0.002  -0.024 -0.062</td>
</tr>
<tr>
<td></td>
<td>NORTH</td>
<td>D  177.51  359.03 290.82 -0.002 -0.024  0.062</td>
</tr>
</tbody>
</table>
PRCS PTC

1. MNVR TO PTC ATTITUDE

   NOTE
   If crew sleep, use Tail-only control for all DAPs

   DAP: A1/AUTO/ALT

   CRT
   GNC UNIV PTG
   TGT ID – ITEM 8 +4 EXEC
   BODY VECT – ITEM 14 +5 EXEC
   P – ITEM 15 +2 7 0 EXEC
   Y – ITEM 16 +0 EXEC
   OM – ITEM 17 +2 7 0 EXEC
   TRK – ITEM 19 EXEC (CUR-*)

2. INITIATE PTC ROTATION

   GNC 20 DAP CONFIG
   Change DAP A to A2

   CRT
   GNC UNIV PTG
   BODY VECT – ITEM 14 +1 EXEC
   ROT – ITEM 20 EXEC (CUR-*)

3. TERMINATE PTC ROTATION

   GNC UNIV PTG
   CNCL – ITEM 21 EXEC
   Reconfig to FLIGHT PLAN DAP
VRCS PTC

1. **MNVR TO PTC ATTITUDE**
   DAP: A1/AUTO/VERN
   
   **GNC UNIV PTG**
   CRT
   TGT ID – ITEM 8 +4 EXEC
   BODY VECT – ITEM 14 +5 EXEC
   P – ITEM 15 +2 7 0 EXEC
   Y – ITEM 16 +0 EXEC
   OM – ITEM 17 +2 7 0 EXEC
   TRK – ITEM 19 EXEC (CUR-*)

2. **INITIATE PTC ROTATION**
   When in attitude:
   
   **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/RATE – MED
   ATT – INRTL
   \ADI ATT, then:
   ATT – REF
   REF pb – push
   F6(F8) FLT CNTLR PWR – ON
   C3 DAP TRANS: NORM/PULSE/PULSE
   TIG-0:30 DAP: B1/INRTL/PRI
   TIG THC Trim VGOs < 0.2 fps

Cont next page
10-10 ORB OPS/ALL/GEN L,2
4. POST BURN RECONFIG
   F6(F8) FLT CNTLR PWR – OFF
   CRT GNC, OPS 201 PRO
   C3 DAP TRANS: PULSE/PULSE/PULSE
        DAP: as reqd
   O14:E, cb DDU (six) – as reqd
   O15:E,
   O16:E

5. RECONFIG FOR GROUP B(C)
   If Group B(C) PWRDN:
   O14:F, Pri RJD LOGIC, DRIVER (sixteen) – OFF
   O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
   O16:F
ON-ORBIT -X RCS BURN, MM202

1. RCS BURN PREP

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

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

\GNC 55 GPS STATUS
\√GPS TO NAV – INH (*)

2. MNVR TO BURN ATT AND LOAD TGT DATA

C3 DAP: B1/AUTO/VERN(PRI)

[\GNC UNIV PTG ]
Perform Auto Mnvr to Burn Att,
TGT ID – ITEM 8 +2 EXEC
BODY VECTOR – ITEM 14 +5 EXEC

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

Init TRK – ITEM 19 EXEC (CUR-*)

GNC, OPS 202 PRO

1: GNC ORBIT MNVR EXEC
2: GNC SYS SUMM ]
Enter or verify TGT DATA per
ORB MNVR PAD
LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC
\BURN DATA per PAD

Cont next page
10-12 ORB OPS/ALL/GEN L,2
NOTE
Ignore computed attitude,
perform burn in current attitude

3. **BURN EXEC**

<table>
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<th>TIG-3:00</th>
<th>ADI ERR/RATE – MED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ATT – LVLH</td>
</tr>
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\sqrt{ADI ATT}

<table>
<thead>
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<th>Posigrade Heads Up</th>
<th>Retrograde Heads Up</th>
<th>Burn Att from MNVR PAD</th>
</tr>
</thead>
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<tr>
<td>R +180.0  +0.0</td>
<td>P +186.0  +350.0</td>
<td>Y +0.0  +0.0</td>
</tr>
</tbody>
</table>

F6/F8 FLT CTNLR PWR – ON
DAP TRANS: NORM/PULSE/PULSE

TIG-0:30> DAP: B1/INRTL/PRI
ADI ATT – REF
 REF pb – push

TIG THC: Trim VGOs < 0.2 fps

4. **POST BURN RECONFIG**

F6/F8 FLT CTNLR PWR – OFF
GNC, OPS 201 PRO
DAP TRANS: PULSE/PULSE/PULSE
C3 DAP: as reqd

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

5. **RECONFIG FOR GROUP B(C)**
If Group B(C)_PWRDN:

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

10-13 orb ops/all/gen l,2
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:
   O14:F, Pri RJD LOGIC, DRIVER (sixteen) – OFF
   O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
   O16:F
LOSS OF VERNIERS

NOTE
DAPs called out in this procedure should only be used if flight-specific loss of VERN DAPs not specified in flight-specific checklists (Deploy, RNDZ, PDRS, EVA). Use Tail-only for crew sleep; Nose and Tail for all other times.

1. CONFIG DAP
   \(\sqrt{\text{DAP}: \text{FREE}}\)

   If Tail-only control desired:
   \(\sqrt{\text{Change DAP A,B to A6,B2}}\)

   If Nose and Tail control desired:
   \(\sqrt{\text{Change DAP A,B to A5,B3}}\)

2. ESTABLISH CONTROL
   \[\text{O14:F,} \sqrt{\text{Pri RJD LOGIC,DRIVER (sixteen) – ON}}\]
   \[\text{O15:F,} \sqrt{\text{RJD L5/F5/R5 DRIVER – OFF}}\]
   \[\text{O16:F} \sqrt{\text{DAP: A/FREE/ALT}}\]
   \[\text{A/AUTO/ALT}\]
RECOVERY OF VERNIERS

DAP: FREE

1. CONFIG DAP
   Reconfig to FLIGHT PLAN DAP

2. CONFIG FOR VERNIER(PRIMARY) CONTROL
   O16:F
   RJD L5/F5/R5 DRIVER – ON
   Wait 5 sec
   DAP: A/AUTO/VERN(PRI)
RCS REGULATOR RECONFIG

O7/O8

He PRESS A (three) – OP (tb-OP)
B (three) – OP (tb-OP)
A (three) – CL (tb-CL)
B (three) – GPC (tb-OP)
SEP MANEUVER

SEP MANEUVER

11-2
SEP MANEUVER

1. SET UP AFT STATION
   A6U
   √SENSE -Z
   DAP: A1/INRTL/PRI
   DAP TRANS: as reqd

   F6/F8
   FLT CNTLR PWR – ON

2. OBTAIN VISUAL CONTACT THRU OVHD WINDOW
   DAP ROT: as reqd
   RHC: as reqd

   When adequate visual contact obtained,
   DAP ROT: DISC/DISC/DISC

3. NULL CLOSING RATE
   THC: +Z (out)
   As reqd to null closing rate

4. PERFORM RR ACQ (if desired)
   A1U
   KU MODE – RDR PASSIVE
   RADAR OUTPUT – LO
   sel – AUTO TRK
   CNTL – PNL

   Slew antenna to target

   KU SEARCH – SEARCH (tb-gray)

   If no lock-on within 1 min,
   repeat SEARCH as convenient
5. OBTAIN ~1 FPS OPENING RATE
   A6U
   DAP TRANS: NORM/NORM/NORM
   * If Norm Z sep desired:  *
   *      DAP: no LO Z      *
   *      THC: +Z (out) for 3 sec  *
   * If LO Z sep desired (MCC call): *
   *      DAP: LO Z        *
   *      THC: +Z (out) for 25 sec  *

6. PERFORM OUT-OF-PLANE MNVR
   GNC UNIV PTG
   CRT
   CNCL – ITEM 21 EXEC
   GNC, OPS 202 PRO
   GNC ORBIT MNVR EXEC
   RCS SEL – ITEM 4 EXEC (*)
   * If time critical,              *
   *      Set TIG to current time +2.00  *
   * If not time critical,          *
   *      Set TIG to current time +22.00 *

   TGT PEG 7 ΔVx – ITEM 19 +0 EXEC
           ΔVy – ITEM 20 +2 EXEC
           ΔVz – ITEM 21 +0 EXEC
   LOAD – ITEM 22 EXEC
   TIMER – ITEM 23 EXEC

   √VGO Z ≥ 0; if VGO Z < 0
   *      TGT PEG 7 ΔVy – ITEM 20 -2 EXEC  *
   *      LOAD – ITEM 22 EXEC             *
   *      TIMER – ITEM 23 EXEC           *
   *      √VGO Z ≥ 0                    *

   Do NOT MNVR to BURN ATT
   A6U  √DAP: no LO Z
   At TIG, deflect THC to null VGOs
   Cont next page

   11-3  ORB OPS/ALL/GEN L
7. PERFORM FINAL SEP

   VIR: GNC ORBIT MNVR EXEC
   CRT RCS SEL – ITEM 4 (*)

   If ΔVY (block 6) +2:
   TV ROLL – ITEM 5 +2 7 0 EXEC
   If ΔVY (block 6) -2:
   TV ROLL – ITEM 5 +0 9 0 EXEC

Set TIG to TIG from step 6 +15:00
TGT PEG 7 ΔVx – ITEM 19 +3 EXEC
    ΔVy – ITEM 20 +0 EXEC
    ΔVz – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC
DAP: B1/AUTO/PRI

At TIG-8:00, MNVR – ITEM 27 EXEC (*)

A6U At TIG, deflect THC to null VGOs
FLT CNTLR PWR – OFF

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

A6U DAP: A/AUTO/VERN

CRT GNC, OPS 201 PRO

GNC UNIV PTG

TGT ID: 2
BODY VECT: 3
OM: 0
START TRK – ITEM 19 EXEC (CUR-*)
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PGSC ACT

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

Figure 12-1.- Strain relief off. Figure 12-2.- Strain relief on.

A. PGSC WITH EXPANSION UNIT
1. If activating OCA Router PGSC, go to OCA SETUP, 12-11
2. Unstow:
   PGSC with Expansion Unit
   AC PWR cable

   If PGSC to be networked:
   PCMCIA Ethernet card, adapter assemblies
   Ethernet cables
   Network T-connectors
   Network terminators (two)
   Network barrel connectors (if reqd)

   If WinDecom to be run:
   PCMMU data cable (if not prerouted)
   RS-232 Y data cable (if reqd)
   RS-422 Y data cable (if reqd)
   RS-422 PCMCIA cards, adapter boxes (if reqd)

Cont next page

   12-3 ORB OPS/ALL/GEN L
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

(F1
(MO13Q, A15, MO52J, ML85E)

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

5. Connect PGSC AC PWR cable from AC Util Pwr outlet to Expansion Unit Pwr port.

6. √PGSC Expansion Unit fan/louver not obstructed.

7. If multiple PGSCs to be powered from same AC Util Pwr outlet, repeat steps 2 thru 6 for each PGSC to be powered from same outlet.

8. AC UTIL PWR – ON.

9. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9, then:

10. √Windows shut down

PGSC

11. Repeat steps 1 thru 10 for each PGSC to be networked.

12. If PGSC to be networked, go to PGSC NETWORK, A. INITIAL SETUP, 12-27 >>

PGSC

13. PGSC pwr – on.

14. Sel appropriate Expansion Unit config at Startup Menu, then press [ENTER].

15. Go to appropriate application setup procedure (e.g., WINDECOM OPS, 12-46, and/or WORLDMAP INITIALIZATION, 12-65), as needed >>

12-4 ORB OPS/ALL/GEN L,2
B. PGSC WITHOUT EXPANSION UNIT

1. Unstow:
   - PGSC
   - DC PWR SPLY
   - DC PWR cable
   - DC PWR SPLY cable
   If PGSC to be networked:
     - PCMCIA Ethernet card, adapter assemblies
     - Ethernet cables
     - Network T-connectors
     - Network terminators (two)
     - Network barrel connectors (if reqd)

2. \( \sqrt{\text{DC PWR SPLY PWR sw1 – OFF}} \)

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

4. \( \sqrt{\text{DC UTIL PWR – OFF}} \)

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

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

6. \( \sqrt{\text{PGSC fan/louver (at center rear of PGSC) not}} \)
   obstructed

Cont next page
7. If multiple PGSCs to be powered from same DC Util Pwr outlet, repeat steps 2 thru 6 for each PGSC to be powered from same outlet

8. DC UTIL PWR – ON

9. DC PWR SPLY PWR sw1 – ON (lt on)

10. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9, then:

11. Windows shut down

12. Repeat steps 1 thru 11 for each PGSC to be networked

13. If PGSC to be networked, perform PGSC NETWORK, A. INITIAL SETUP, 12-27

14. PGSC pwr – on

15. Go to appropriate application setup procedure (e.g., WORLDMAP INITIALIZATION, 12-65), as needed
Figure 12-3.- PGSC without Expansion Unit.

Figure 12-4.- PGSC with Expansion Unit.
OCA AND PCMMU EXPANSION CARDS

Figure 12-5.- OCA Expansion card.

Figure 12-6.- PCMMU Expansion card.
If performing late update on STS PGSC portion of OCA Router PGSC hard disk:

If running Windows NT (OCA Router software):

1. Press [CNTL]/[ALT]/[DEL]
   Sel ‘Shut Down’ at ‘Logon Information’
   dialog box
   √‘Shutdown’ radio button selected at
   ‘Shutdown Computer’ dialog box
   Sel ‘OK’
   When prompted:
   Sel ‘Restart’ button
   Within 15 sec after ‘Boot Magic’ boot-up
   menu appears, click on ‘STS PGSC’
   Sel ‘Docked (OCA Card)’ config at
   Startup Menu, then press [ENTER]
   Go to step 4

If running Windows 98 on OCA Router PGSC:

2. Go to step 4

If performing late update on STS PGSC hard disk:

3. √PGSC pwr – on

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

4. Insert PCMCIA card containing late PGSC updates
5. 'PCMCIA card' icon appears in system tray

* If 'PCMCIA card' icon does not appear in system tray:
  * PCMCIA card properly inserted with correct side up (bottom release button extends outward and can be folded in)
  * If no joy, eject PCMCIA card and reinset
  * If still no joy:
    * Shut down Windows
    * Eject PCMCIA card
    * Power up in Windows (not OCA Router)
    * Repeat steps 4 and 5

6. Double-click ‘Shuttle Apps’>‘Late PGSC Update’

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

8. Follow instructions on PGSC monitor
OCA SETUP

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

   NOTE
   At a minimum, network equipment should be configured for OCA Router and KFX PGSCs.
   Network must always be properly terminated when connected to powered PGSCs.

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

2. If time permits for PGSC shutdown and bootup process:
   - PGSC Shut down Windows
     - Go to step 6
   - if time not available, proceed with step 3

3. Click on ‘PCMCIA card’ icon in system tray
   - Click on popup window displaying ‘Stop NAME_OF_NETWORK_CARD’, wait for prompt

4. Press [ENTER] at network card dialog box displaying ‘You may safely remove this device’

5. Remove PCMCIA Ethernet card from PCMCIA card slot

6. Repeat steps 2 thru 5 for each PGSC on network

Cont next page
OCA ROUTER PGSC SETUP

7. Config network equipment for OCA Router PGSC, KFX PGSC, and Color Printer (if reqd) per:
   Figure 12-9
   PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)

8. Config switches for Ku-band file xfer:
   √ MCC for:
   Ku-band rate _______
   Pnl location of:
   PDIP Pwr cb
   KuBand Rate sw
   _______ cb PDIP PWR 2 KU BAND RLY – cl
   _______ Ku BAND RATE – LO(HI)

9. Config PGSC Modem cable (if MFX ops reqd) and OCA I/F cable per figure 12-7

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

11. √ AC UTIL PWR – OFF

12. Connect AC PWR cable between AC Util Pwr outlet and OCA Router PGSC per:
    PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)

   NOTE
   Following step will prevent unnecessary pwrdn of AC Util Pwr outlet

Cont next page

12-12 ORB OPS/ALL/GEN L,2
13. If reqd, perform COLOR PRINTER UNSTOW AND ASSEMBLE, 12-33, then:

14. AC UTIL PWR – ON

15. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9, then:

16. \Windows shut down

17. Insert PCMCIA Ethernet card into PCMCIA card slot

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

18. PGSC pwr – on

19. Press [CTRL]/[ALT]/[DEL] to log onto Windows NT

Password field blank on ‘Logon Information’ dialog box
Sel ‘OK’
Wait ~10 sec for logon sequence to complete

20. Verify data rate:
   Double-click ‘OCA Control Panel Applet’ icon on desktop

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

Cont next page

12-13 ORB OPS/ALL/GEN L,2
‘Local OCA Card-1’ display on desktop
In ‘OCA-FLIGHT VC-2D’ section of ‘Local OCA Card-1’ display:
√SEND – 2(4)M

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

KFX PGSC SETUP

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

22. √DC UTIL PWR – OFF

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

24. DC UTIL PWR – ON

25. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9, then:

26. √Windows shut down

27. Insert PCMCIA Ethernet card into PCMCIA card slot

28. PGSC pwr – on

Cont next page

12-14 ORB OPS/ALL/GEN L
29. Repeat steps 27 and 28 for each PGSC to be added to network.

30. If reqd, perform COLOR PRINTER WARMUP AND SELF-TEST, 12-36, then:

31. Verify network connectivity using PingMaster:
   Double-click ‘Shuttle Apps’>‘Network Config’>‘PingMaster’
   √ ‘Status’ column of ‘Network Primary’ and ‘Network Nodes’ sections for networked PGSCs
   If status is ‘Good Response’ for networked PGSCs, press [CTRL]/[x] to exit PingMaster
   (if desired)

   * If status is not ‘Good Response’, verify
   * proper network cable and card
   * connections, then recheck status in
   * PingMaster

   KFX

   PGSC 32. Double-click ‘Shuttle Apps’>‘KFX’
   Arrange ‘KFX’ window as desired
Figure 12-7.- OCA cable diagram. (Ku-band or A/G 2)
OCA DOWNLINK VIA GROUND CMD

1. MOVE FILE(S) TO DOWNLINK DIRECTORIES

   NOTE
   Files downlinked via ground cmd
   unless MCC instructs otherwise

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

   PGSC Copy(Move) desired files to c:\oca-down\dcs(payloads)
   Notify MCC when complete

2. MONITOR KFX DOWNLINK (if desired)
   When link established:
   From ‘KFX’ window:
   \REMOTE KFX – green
   \Uplink arrow (‘↑’ next to send rate) – green
   \Dnlink arrow (‘↓’ next to send rate) – green
   \KFX application activated
   \File Transfer Status dialog (displayed during file xfer)

3. MONITOR MFX DOWNLINK (if desired)
   If MFX application not activated:
   Perform OCA S-BAND MODEM (MFX)
   ACTIVATION, 12-21, then:
   If minimized:
   \Icon Title displaying File Name, Send/Receive
   Status

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

   Sel ‘File’ on menu bar of MFX application
   \Show Status During File Xfers – (\)
   \Z MODEM(1K-X MODEM) display appears
   \Displaying File Name, Send/Receive Status

   12-17 ORB OPS/ALL/GEN L
OCA DIRECTORY STRUCTURE

C:\
  __OCA-DOWN
  |   __DCS
  |   __MAIL
  |   ___PAYLOADS *
  
  __OCA--SW (ground use only)

__OCA-UP
  |   __FP
  |   __MAIL
  |   __MESSAGES
  |   __NEWS
  |   __OTHER
  |   ___PAYLOADS
  |   ___SpOC **
  |   __WEB

* PAYLOADS Directory: Directory may contain flight-specific subdirectory

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

UPLINKED FILES

SpOC updates: a:\uplink\ (c:\oca-up\spoc)
Ops notes: c:\oca-up\other\opsxxxxxx.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

Camera images: c:\oca-down\dcs\nPersonal mail, other*: c:\oca-down\mail\nPayload files: c:\oca-down\payloads\n
STD FILENAMES

filename.doc
filename.txt
filename.bmp
filename.pcx
famcdr01.doc*
cdfam02.doc*
fltcdr02.doc*

WORD documents only
ASCII text file (NOTEPAD or WORD)
Graphics file (Paint)
Graphics file (Paint)
family mail: CDR → family on FD01
family mail: family → CDR on FD02
message: CDR → FLT Director on FD02

*Outlook OST files are nominally used for personal mail. If Outlook is not working properly, the above file locations and nomenclature will be used.

NOTE

Do not downlink medical data. Downlink directories will be cleared of all files at end of each OCA session. To retain archive copy of downlink msgs, save in personal directory
OCA KU-BAND (KFX) MANUAL DOWNLINK

1. CONFIGURE S/W FOR FILE DOWNLINK
   PGSC
   If reqd, enlarge ‘KFX’ window
   From ‘KFX’ window:
   ✔REMOTE KFX – green
   ✔Uplink arrow (‘↑’ next to send rate) – green
   ✔Dnlink arrow (‘↓’ next to send rate) – green

2. SELECT FILE(S) TO DOWNLINK
   Use WINDOWS EXPLORER to sel files/directories to transfer
   Drag files over KFX window
   Rel mouse button
   ✔‘KFX File Transfer Preview’ display appears with selected file(s) listed

3. ADD ADDITIONAL FILE FOR DOWNLINK (if reqd)
   ✔‘KFX File Transfer Preview’ display active
   Sel ‘add to list’ button (button with documents, ‘+’ symbols)
   ✔‘Select Files for Transfer’ display appears
   Sel desired file from file listbox
   Sel ‘Select’ button
   Repeat for each additional file as reqd
   Sel ‘Done’ button

4. REMOVE FILE FROM DOWNLINK (if reqd)
   ✔‘KFX File Transfer Preview’ display active
   Sel desired file(s) in listbox
   Sel ‘delete’ button (button with ‘X’)

5. START FILE DOWNLINK
   NOTE
   User may halt transfer while in progress by sel ‘Abort’ button
   ✔‘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 *

12-20 ORB OPS/ALL/GEN L
**OCA S-BAND MODEM (MFX) ACTIVATION**

1. **ESTABLISH LINK**
   
   On MCC GO:
   
   A15  PS COMM CCU PWR – OFF
   
   L9   PS AUD PWR – AUD
       A/G 1 – OFF
       A/G 2 – T/R
       A/A – OFF
       ICOM (two) – OFF
       VOL A/G 2 tw – 0
       XMIT/ICOM MODE – PTT/PTT

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

   O9   R AUD A/G 2 – OFF
   O5   L AUD A/G 2 – OFF
   R10  MS AUD A/G 2 – OFF
   MO42F MIDDECK SPKR AUD A/G 2 – OFF
   
   A15 √ PGSC Modem cable connected to PS COMM outlet

2. **ACTIVATE FILE XFER S/W**
   
   OCA  If PGSC not running Windows 98:
   
   Router  Restart (or pwr on) PGSC
   
   PGSC  Within 15 sec, click on ‘STS PGSC’ at ‘Boot Magic’ bootup menu
       Sel ‘Docked (OCA Card)’ config at Startup Menu,
       then press [ENTER]

   Double-click ‘Shuttle Apps’>`OCA-KFX-MFX`>
   ‘MFX-Modem File Transfer’
   
   √‘MFX’ display appears
   
   √WINDOW – OFFLINE
   
   Arrange ‘MFX’ window as reqd

   Cont next page
3. **VERIFY PRINTER SETTINGS**

MFX PGSC

Click ‘Start’>‘Settings’>‘Printers’

In “Printers” window, right-click “NETWORK EPSON1” printer

On popup menu:
- Verify “Set as Default” checked
- Verify “Use Printer Offline” NOT checked

Close “Printers” window
OCA SSR-1 REGAIN 2 GREEN LIGHTS

OCA Router 1. Rcd UPLK/DNLK colors in STATUS box of OCA Control Panel window:
   Uplink (green circle/red circle/yellow “?”): _______
   Downlink (green circle/red circle/yellow “?”): _______

2. Check Status of OCA link (via OCA Control Panel window on OCA Router) after each step below.
   Exit SSR and notify MCC of actions taken when 2 green lights are displayed on router.

SSP 3. √ cb PDIP PWR 1(2) KU BAND RLY – cl

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

OCA Router 5. √ OCA Router set to correct transmit rate:
   If KU channel 2:
     ‘Control’>’Transmit Rate’>‘2 Mbps OCA…’
   If KU channel 3:
     ‘Control’>’Transmit Rate’>‘4 Mbps OCA…’

6. Verify that OCA Interface Cable is well seated to both PDIP panel and OCA card in Router

7. Perform OCA LOOPBACK TEST, 12-25
   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
RECONFIGURE OCA/KFX FOR KU CHANNEL 3(2)

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

PDIP
1. Ku BAND RATE – HI(LO)

OCA
2. On ‘Local OCA Card-1’ window:
   If changing to Ku Ch 3:
   Sel ‘Control’>’Transmit Rate’>’4 Mbps OCA
   Internal clock (Shuttle Ku channel 3)’
   If changing to Ku Ch 2:
   Sel ‘Control’>’Transmit Rate’>’2 Mbps OCA
   Internal clock (Shuttle Ku channel 2)’

3. If reqd, config router bootup rate:
   a. Open ‘Change Transmit Rate’ folder on
top
   b. If changing to Ku Ch 3:
      Double click ‘Boot Up 4 Mbps’ file
      If changing to Ku Ch 2:
      Double click ‘Boot Up 2 Mbps’ file
   c. Acknowledge message dialog

KFX
4. On “KFX” window:
   PGSC
   Sel ‘View’>‘Options’
   Sel ‘Network’ tab
   Change ‘Maximum Xmit rate’ to 4000(2000)
   Click ‘OK’
   Click ‘Yes’ in response to “Restart KFX ?” dialog
OCA LOOPBACK TEST

NOTE
Perform procedure on OCA Router
PGSC running in Windows NT

1. LOGON TO WINDOWS NT
OCA Router
Press [CTRL]/[ALT]/[DEL] to log onto Windows NT
PGSC
Sel ‘OK’ on ‘Logon Information’ dialog box
Wait ~10 sec for logon sequence to complete
Double-click ‘OCA Control Panel Applet’ icon on
desktop
√ ‘Local OCA Card-1’ display on desktop

2. INITIATE INTERNAL LOOPBACK TEST
From ‘Local OCA Card-1’ display:
Sel ‘OCA Self Tests’ on menu bar
Sel ‘Internal Loopback’
√ ‘Local OCA Card-1’ display:
Successful Test – Animated signal moving inside
PC icon
Unsuccessful Test – ‘Frowny face’ displayed
inside PC icon
Inform MCC of results

3. TERMINATE INTERNAL LOOPBACK TEST
From ‘Local OCA Card-1’ display:
Sel ‘OCA Self Tests’ on menu bar
Sel ‘Stop Loopback Testing’

4. INITIATE EXTERNAL LOOPBACK TEST
Disconnect OCA I/F cable from PDIP panel
Connect PDIP end of OCA I/F cable to loopback port
on PGSC end of cable
See figure 12-8 for cable config

From ‘Local OCA Card-1’ display:
Sel ‘OCA Self Tests’ on menu bar
Sel ‘External Loopback #1’

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

5. TERMINATE EXTERNAL LOOPBACK TEST
From ‘Local OCA Card-1’ display:
Sel ‘OCA Self Tests’ on menu bar
Sel ‘Stop Loopback Testing’

Figure 12-8.- OCA cable diagram – loopback.
PGSC NETWORK

A. INITIAL SETUP

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

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

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

2. Unstow:
   PCMCIA Ethernet card, adapter assemblies
   Ethernet cables
   Network T-connectors
   Network terminators (2)
   Network barrel connectors (if reqd)

3. Configure network equipment per:
   Figure 12-9
   PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)
   √ Network properly terminated

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

4. Insert PCMCIA Ethernet card into any PCMCIA card slot of unpowered PGSCs

5. PGSC pwr – on

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

7. If PGSC locks up during bootup or during
   network ops:
   * √PCMCIA Ethernet cards properly
     inserted into PCMCIA card slots
   * √Adapters properly mated to network
   * √T-connectors
   * √Network cables and terminators
   * properly mated to T-connectors

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

   NOTE
   Windows will attempt to connect to all
   mapped drives

9. Repeat steps 4 thru 8 for each PGSC to be
   networked
10. Verify network connectivity using PingMaster:
   Double-click ‘Shuttle Apps’>'Network Config'>‘PingMaster’
   √ ‘Status’ column of ‘Network Primary’ and ‘Network Nodes’ sections for networked PGSCs
   If status is ‘Good Response’ for networked PGSCs, press [CTRL]/[x] to exit PingMaster (if desired)

   * If status is not ‘Good Response’, *
   * verify proper network cable and *
   * card connections, then recheck *
   * status in PingMaster *

11. For each networked PGSC, go to appropriate application setup procedure (e.g., WINDECOM OPS, 12-46 and/or WORLDMAP INITIALIZATION, 12-65) as needed >>

B. RECONFIG

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

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

   1. If reqd, unstow additional network cables, cards, adapters, terminators, and T-connectors

   2. If OCA Router PGSC on network and running Windows NT:
      Press [CTRL]/[ALT]/[DEL] to log onto Windows NT
      Sel ‘Shut Down’ at ‘Logon Information’ dialog box
      Sel ‘OK’

      When prompted:
      PGSC pwr – off

      Cont next page
      12-29 ORB OPS/ALL/GEN L,2
3. If time available for shutdown and bootup process of non-OCA Router PGSCs on network:
   Shut down Windows
   Go to step 7
If time not available, proceed with step 4

4. Click on ‘PCMCIA card’ icon in system tray
   Click on popup window displaying ‘Stop NAME_OF_NETWORK_CARD’, wait for prompt

5. Press [ENTER] at network card dialog box displaying ‘You may safely remove this device’

6. Remove PCMCIA Ethernet card from PCMCIA card slot

7. Repeat steps 3 thru 6 for each PGSC on network

   NOTE
   Network must always be properly terminated when connected to powered PGSCs

8. Reconfigure network cables, cards, adapters, terminators, and T-connectors per:
   Figure 12-9
   PGSC Usage Chart (if available) or UTILITY OUTLET PLUG-IN PLAN, ON-ORBIT CONFIG (REF DATA FS, UTIL PWR)
   \Network properly terminated

9. Insert PCMCIA Ethernet cards into PCMCIA card slots of all PGSCs to be networked

10. If PGSC powered off:
    PGSC pwr – on
    If reqd, sel appropriate Expansion Unit config at Startup Menu, then press [ENTER]

11. Perform A. INITIAL SETUP, steps 8 thru 11, 12-28

Cont next page
C. TEARDOWN

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

D. PGSC NAMING

1. √MCC for new PGSC name
2. Double-click ‘Shuttle Apps’>‘Network Config’>‘Rename PGSC’
3. Sel ‘Yes’ to run ‘Unique Client Config’ program
4. At ‘Network Client Config’ dialog box, sel appropriate computer name assigned by MCC
5. Sel ‘Update’ button
6. Sel ‘OK’ at ‘Verification’ and ‘Update’ dialog boxes
7. Sel ‘Yes’ to restart PGSC
Figure 12-9.- Network setup diagram.
COLOR PRINTER UNSTOW AND ASSEMBLE

NOTE
Power off Printer when not in use

1. UNSTOW
   Printer
   AC PWR Cable (if reqd)
   Printer Data Cable (one of the following):
      - 6-ft parallel data cable
      - 25-ft parallel data cable
      - 25-ft network data cable and T-connector
   Printer paper
   Printer Paper Feeder Tray
   Paper Output Tray

2. ASSEMBLE PRINTER
   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 12-10)
   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
   √ AC PWR cable connected to AC Util Pwr panel
   Connect AC PWR cable to Printer Power Port
      (see figure 12-11)

   NOTE
   Network must always be properly terminated when connected to powered PGSCs

Cont next page
If Printer to be set up as Network Printer:
Connect network cable, T-connector to Printer
Network Port (see figure 12-11)
Connect other end of network cable to
T-connector of networked PGSC

If Printer to be set up as Local Printer:
Connect parallel cable between Printer Parallel
Port and KFX PGSC Parallel Port (see figure
12-11)

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

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

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

Figure 12-10.- Side view of printer and trays, ready for assembly.
Figure 12-11.- 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
3. √OCA Router PGSC pwr – on
4. Printer pwr – on (see figure 12-11) √Flashing green pwr light (~5 min)
5. √Printer ready
   Ready when pwr light is steady green

SELF-TEST

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

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, 12-41
6. If paper jam, go to COLOR PRINTER PAPER JAM, 12-38
7. If printer quality acceptable, Printer pwr – off (to terminate SELF-TEST)
8. Notify MCC: Status of SELF-TEST results
COLOR PRINTER STOW

1. Printer pwr – off (press pwr button once)
   Printer lt – off
   Wait for unit to stop moving. Printer head should be at right side and locked into place

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

3. Verify PGSCs powered from same pwr outlet as Color Printer are shutdown

4. AC UTIL PWR – OFF

5. Disconnect AC PWR cable from AC Util Pwr outlet, if reqd

6. Remove paper from Paper Feeder Tray and stow it

7. Remove Paper Feeder Tray from Printer (disconnect via thumbscrews)

8. Remove Paper Output Tray from Printer (disconnect via thumbscrews)

9. Disconnect AC PWR cable from Printer

10. If Printer set up as Network Printer:
    Disconnect network cable, T-connector from Printer Network Port (see figure 12-11)
    If Printer set up as Local Printer:
        Disconnect parallel cable between Printer Parallel Port and KFX PGSC Parallel Port (see figure 12-11)

11. Stow:
    Printer
    AC PWR cable (if reqd)
    Printer Data cable(s)
    Printer paper
    Printer Paper Feeder Tray
    Paper Output Tray

   12-37 ORB OPS/ALL/GEN L,2
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’ from Windows taskbar
2. Right-click appropriate printer icon:
   Parallel: Local Color Printer
   Network: Network Color Printer
3. Verify ‘Set as default’ selected (√)

NOTE
Steps 4 thru 7 apply to 760XD PGSC only

4. Sel ‘Properties’
5. Sel ‘Main’ tab
6. Verify ‘Automatic’ selected (∗)
7. Sel ‘OK’ to exit

COLOR PRINTER PAPER JAM

Printer
1. Printer pwr – off (press pwr button once)
2. √Printer lt – off
3. √Paper Feeder Tray clear of obstruction
   √Paper Output Tray clear of obstruction
4. Raise Printer cover (see figure 12-10)
   √Inside of Printer clear from obstruction
5. If paper jam cleared, perform COLOR PRINTER WARMUP AND SELF-TEST, 12-36, then:
6. If paper jam continues, notify MCC
7. If reqd, go to COLOR PRINTER STOW, 12-37
INK CARTRIDGE CHANGEOUT

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

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

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

1. Printer ready (notice steady green pwr light)

2. Raise Printer cover (see figure 12-10)

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, 12-36, 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, 12-39

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

PGSC
3. Sel ‘Start’>‘Settings’>‘Printers’ 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. If 760XD, sel ‘Utility’ tab
   If A31p, 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, 12-39
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’ 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. If 760XD, sel ‘Utility’ tab
   If A31p, 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. Two downloads will be performed to assure uncorrupted images are downloaded.

1. MCC that camera is powered and ready

2. Unstow:
   A16 1394 Converter (SED33117251-301)
   (DTV bag) IEEE 1394 Crew Cabin cable (SED33113436-303)
   IEEE 1394 cable assy (firewire) (SEZ33112995-303)

CONV

3. PWR sw – ON (lt on)
   If no lt,
   Replace batts (batt life – 4 hr)

4. Configure hardware per figure 12-12 below making Firewire cable connection to laptop last:

   (A13)
   UMBILICAL CAMERA J6
   A13 P6

   IEEE 1394 CREW CABIN CBL (5 FT)
   (SED33113436-303)

   1394 CONVERTER

   POWER
   ON
   OFF

   UNBILICAL 1394 b
   J1

   LAPTOP 1394 a
   J4

   IEEE 1394 CBL ASSY (FIREWIRE) (15 FT)
   (SEZ33112995-303)

   A31p LAPTOP

   (A13)
   P1

Figure 12-12.- Hardware configuration.
5. \textit{PGSC pwr} – on
   If ‘Found New Hardware Wizard’ appears:
     Sel ‘Next’
     Sel ‘Search for a suitable driver for my device (recommended)’
     Sel ‘Next’
     Sel ‘Specify a location’
     Sel ‘Next’
     Sel ‘Browse’ button
     Sel ‘c:\Program Files\Kodak\KODAK DCS Camera Manager\DCS Camera Drivers\ProDriver’ directory
     Sel ‘Open’
     Sel ‘OK’
     Sel ‘Next’
     Sel ‘Finish’

6. Double-click ‘Shuttle Apps’>’KODAK DCS Camera’> ‘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 30

9. Under ‘Copy to Computer’:
   √No boxes selected (DO NOT delete files)
   Sel ‘Copy...’
10. First download:
   a. Under ‘Copy To’:
      Sel ‘c:\Oca-down\Dcs\UMBILICAL’ in ‘Save in:’ text box
      √ ‘As Is’ selected in ‘Format:’ text box
      √ No ‘√’ for ‘Rename Image File(s)’
      Sel ‘Save Files in “UMBILICAL”’
      (“Saving Files” box displayed, est 6 min to download)
   b. When “Saving Files” completed, go to “My Computer: c:\Oca-down\Dcs\UMBILICAL”,
      √ object qty matches “CARD1\FOLDER01” qty
      If not, √ MCC

11. Second download:
   a. Under ‘Copy To’:
      Sel ‘c:\Oca-down\Dcs\UMBILICAL 2’ in ‘Save in:’ text box
      √ ‘As Is’ selected in ‘Format:’ text box
      √ No ‘√’ for ‘Rename Image File(s)’
      Sel ‘Save Files in “UMBILICAL 2”’
      (“Saving Files” box displayed, est 6 min to download)
   b. When “Saving Files” completed, go to “My Computer: c:\Oca-down\Dcs\UMBILICAL 2”,
      √ object qty matches “CARD1\FOLDER01” qty
      If not, √ MCC

12. Sel ‘X(Close)’ to return to desktop

CONV 13. PWR sw – OFF (lt off)

14. 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

2. √OI 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

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, 12-27

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 Tlm Monitor dialog

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

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

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

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

   √End user PGSC(s) receiving WinDecom
   data

Cont next page
3. Repeat A. ACT, step 2, 12-46
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
1. Select appropriate RSAD shortcut from ‘Shuttle Apps’ > ‘RSAD folder’

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, 12-54

   If only WR angle does not agree (to the nearest tenth of a degree):
   Perform RSAD TROUBLESHOOTING,
   B. INVALID MCIU WRR MESSAGE, 12-54
B. OBSS OPERATIONS

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

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

1. Bring up Boom display screen: Press [B] or ‘Views’>‘Boom’

2. Bring up target selection window: Press [F8] or ‘Data’>‘Select Target’. Choose group of waypoint targets from bottom half of target selection window, then click ‘OK’

3. If desired, bring up Combo display screen: Press [C] or ‘Views’>‘Combo’
RSAD FUNCTION KEYS SUMMARY

GENERAL FUNCTION KEYS

[F7] SELECT DATA SOURCE

[F8] SELECT TARGET

[B] BOOM VIEW

[C] COMBO VIEW

[CTRL][H] HIDE HCD

[CTRL][J] HIDE JID

[CTRL][P] HIDE POR
RSAD TROUBLESHOOTING

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

A. RSAD JOINT ANGLES DIFFERENT THAN SRMS ANGLES
   1. If WR joint angle is the only one different, go to B. INVALID MCIU WRR MESSAGE

   2. √MCC for Arm ID
       3. ‘Data’>'Manual Input’>'Arm ID’ (lower right corner of ‘Manual Input Editor’ window)
       4. Select ‘Arm ID’ as suggested by MCC, then ‘OK’
       5. Open ‘Data Source Selection’ window via [F7] function key. Select ‘Telemetry Server’, then click ‘OK’ to make change

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
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 not receiving any data

1. If spinner not rotating, go to step 6

2. √Cables and verify network card seated properly

3. √Cable is in correct PCMMU port

4. Reset telemetry server by double-clicking on Stop Sign in icon try. Select ‘File’>‘Reset Server’. Once complete, minimize Telemetry Server window
5. Restart RSAD application

6. Shutdown PGSC, reseat network card, 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
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, select ‘RMS & SSRMS - Data from RSAD with OIU’ or ‘RMS & SSRMS - Data from RSAD & PCSDAS’

   To receive PCSDAS data, perform
   D. DOCKED OPERATIONS PCSDAS SETUP, then:

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, 12-64

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

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

NOTE
Press [b] to toggle color of target RMS

6. Display target RMS position: ‘Display’>‘Show RMS Target’

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

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

B. OBSS OPERATIONS

NOTE
Press [b] to toggle color of target RMS

1. Display target RMS position: ‘Display’>‘Show RMS target’

NOTE
Restarting DOUG will make ISS stack visible

2. Bring up orbiter with no ISS stack: ‘Reconfig’>‘ORBITER_INSPECTION’> ‘FLIGHT_DAY_2 Configuration’
3. Put OBSS on SRMS:
   ‘Reconfig’>'ORBITER_INSPECTION’>
   ‘OBSS_GF1_to_SRMS’

4. (If desired) Put OBSS on SSRMS:
   ‘Reconfig’>'ORBITER_INSPECTION’>
   ‘OBSS_GF2_to_SSRMS’

5. Turn on Orbiter tiles: ‘Reconfig’>'ORBITER_TILES’>[make selection]

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

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

C. FOCUSED INSPECTION OPERATIONS
1. If MCC has uplinked DOUG targets, restart DOUG

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

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

If reviewing in RMS – Data from RSAD mode:
2. On RSAD, open ‘Data Source Selection’ window via [F7] function key
3. Deselect ‘Enable Multicast’ checkbox
4. Click ‘OK’ to make change
5. Turn on Orbiter tiles: ‘Reconfig’
   >'ORBITER_TILES'>[make selection]

   **NOTE**
   Damaged RCC sites will have circles
   “painted” on RCC around area of interest.
   Damaged tile sites will be painted yellow.

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

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

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

   If using ‘Targ RMS’, VPP info will be
   unavailable.

   If using ‘Targ RMS’, press [b] to toggle color of
   target RMS.
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
D. DOCKED OPERATIONS PCSDAS SETUP

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

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

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

If PCS already running, go to step 3

PCS

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

3. In upper left hand corner of PCS screen, click on the icon ‘PCSCDS main’
   ![PCSCDS Main Control Panel]
   \(\checkmark\) ‘Connected’ and square is GREEN
   Under ‘PCS Connection Status’:
   \(\checkmark\) ‘Serial Transfer On’ appears

   * If Serial Transfer not On:
     * Commands menu ► Serial Transfer
     * ![PCSDS Main Control Panel]
     * \(\checkmark\) ‘Serial Transfer On’

4. Open MSS: SSRMS page

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

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

   ![PCS Home Page ► Robotics Icon]

   Wait for ‘Transfer Succeeded’, then minimize transfer window and proceed

   ![RWS page ► SSRMS Icon]

   Wait for ‘Transfer Succeeded’, then minimize transfer window and proceed

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.

CAUTION
Be ready to select current PCS Recon version within 10 sec of bringing up the StartDAS server or server may not initialize correctly.

5. Start PCS-DAS server from Shuttle Apps ▶
   StartDAS
   √Version is PCS.Rxx.xxxxx (where Rxx.xxxxx is the current PCS Recon release) and start server
   Close window once it says ‘Server Started’ and green DAS icon appears down in system tray
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

12-63 ORB OPS/ALL/GEN L,2
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, 12-55

   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

12-64 ORB OPS/ALL/GEN L,2
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, 12-47
     * 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
   Steps 2 and 3 may be performed as part of Deorbit Manager Initialization if prompted at initialization (without using menu options)

2. Sel ‘Update’>‘Shuttle State Vector’ menu option
   If PGSC configured to receive WinDecom data:
   At bottom of ‘Update Shuttle State Vector’ display, verify ‘Use Telemetry Vector’ checked (√) on
   √ Receiving telemetry from WinDecom’ is displayed
   Sel ‘Exit’ at ‘Update Shuttle State Vector’ display
   If PGSC not configured to receive WinDecom data:
   If reqd, update state vector info using data from SPEC 34 display
   Sel ‘Apply’
   Sel ‘Exit’ at ‘Update Shuttle State Vector’ display

3. Sel ‘Update’>‘GMT or Launch Time Values’ menu option
   If PGSC configured to receive WinDecom data:
   At bottom of ‘Update Time Values’ display, verify ‘Use Telemetry Time Data’ checked (√) on
   √ Receiving telemetry from WinDecom’ is displayed
   Sel ‘Exit’ at ‘Update Time Values’ display
   If PGSC not configured to receive WinDecom data:
   Set GMT, MET, and/or launch values as reqd
   Sel ‘Apply’
   Sel ‘Exit’ at ‘Update Time Values’ display

4. Sel ‘Mass Properties’>‘CG Manager Data’ menu option
   If reqd, update OMS quantity values on ‘Propellant Consumables’ tab
   Sel ‘OK’ at ‘CG Manager Data’ display
   Cont next page
5. Sel ‘Mass Properties’ > ‘Cargo Status’ menu option  
   If reqd, update cargo status  
   Sel ‘OK’ at ‘Cargo Status’ display

6. If cabin leak:
   * Sel ‘Cabin Leak Filter’ checkbox  
   * When Cabin Leak application displayed,  
   * update cabin leak data as reqd  
   * Minimize Cabin Leak application

7. In Deorbit Opportunities Table, sel desired landing  
   site and sel ‘Target’ button or double-click desired  
   landing site

8. Sel ‘Mnvr PAD’ button to view/copy Deorbit  
   Maneuver PAD for selected landing site

9. When finished viewing Mnvr PAD, sel ‘Close’ at  
   ‘Deorbit Maneuver PAD’ display

10. Repeat steps 7 thru 9 to view Mnvr PAD for other  
    landing site as needed

11. Exit application as needed
NETMEETING VIDEO CONFERENCING

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

1. UNSTOW
   Ultraport Camera
   VLHS
   VLHS To VTS Interface Cable

2. CONFIGURING ULTRAPORT CAMERA
   2.1 Exit all applications
   2.2 Perform shut down:
       Sel ➤ Start ➤ Shut Down… ➤ Shut down ➤ OK
   2.3 Open small cover above Interposer (refer to figure 12-13)

Figure 12-13.- Ultraport Camera position.

Cont next page
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 12-13 and 12-14.

2.5 Release latch to properly secure Ultraport Camera (refer to figure 12-14).

2.6 Ultraport Camera properly secured and does not disconnect.

2.7 Rotate lens so that lens is directed towards user (refer to figure 12-14).

3. Configure VLHS To VTS Interface Cable and VLHS PGSC as shown in figure 12-15. Connect cable’s headphone and mic jacks to PGSC as shown in figure 12-15.
4. **LAUNCHING NETMEETING**

4.1 PGSC connected to network

4.2 PGSC pwr – on

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

4.3 If running KFX on any PGSC, exit KFX

4.4 Sel Shuttle Apps ▶ NetMeeting

**NetMeeting – Not in a Call**

4.5 Sel Start Video button 🎥

4.6 Verify video image from Ultraport Camera

4.7 Inform MCC ready for call

**NOTE**
MCC will initiate call

**NetMeeting – Incoming call**

Cont next page
4.8 Select Accept button to receive incoming call.

4.9 If desired, resize window:
   - Right-click on window with incoming video
   - Select 'Window Size'
   - Select 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, select End Call button.

5.2 Select Call ► Exit.

5.3 If last NetMeeting session of flight:
   - Disconnect VLHS To VTS Interface Cable from PGSC
   - Move and hold release latch towards angled side of Ultraport Camera and remove Ultraport Camera from PGSC (refer to figure 12-14)
   - Stow VLHS, VLHS To VTS Interface Cable, Ultraport Camera (as needed)

6. Startup KFX on appropriate PGSC as needed.
PILOT WITH RHC

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

A. EQUIPMENT SETUP

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

Towel Rack/Handhold

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

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

PILOT HC

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

PGSC

4. Shut down Windows

PWR SPLY

5. DC PWR SPLY PWR sw1 – off

F1

6. DC UTIL PWR – OFF (utility outlet for PGSC)

PGSC

7. If present, disconnect any cable from PGSC RS-232 port and secure

8. Disconnect DC PWR SPLY cable from PGSC pwr port

PILOT HC

9. PILOT HC pwr – OFF (down posn)

Cont next page
PILOT Y-Cable
10. Connect PILOT Y-Cable to PGSC RS-232 port
Connect PILOT Y-Cable to PGSC pwr port
Connect PILOT Y-Cable to PILOT HC (see figure 12-16)

11. Connect DC PWR SPLY cable to PILOT HC

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

PGSC
12. Position and secure PGSC in front of HUD and behind elastic strap (top of display touching bottom of eyebrow panel). Duct tape can be used as needed to secure PGSC

F1
13. DC UTIL PWR – ON (utility outlet for PGSC)

PWR SPLY
14. DC PWR SPLY PWR sw1 – ON

B. **PILOT OPERATION WITH RHC**
PGSC
1. PGSC pwr – on

PILOT HC
2. PILOT HC pwr – ON (up position)

PGSC
3. Double-click ‘Shuttle Apps’> ‘PILOT w/RHC’
   Agree to quit all Windows Apps

4. Follow instructions for HC calibration
   (after ~30 sec)

5. Menu Selection Values:
   Modify as desired
   ‘Enter’ twice to run sim

Cont next page
6. Simulation Begins (~15 sec)
   `z` – toggles between instruments and out-the-window displays
   [space bar] – HUD declutter or if WOW, drag chute deploy
   `a` – switch to auto
   `c` – switch to CSS (same as HC breakout)
   `p` – pause sim, `p` again resumes

7. Post Simulation
   [space bar] – cycles through data to main menu
   `b` – cycles back through post run data

8. Terminate PILOT
   Enter `q` to quit (returns to Windows)

   PILOT HC

9. PILOT HC pwr – OFF (down posn)

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

C. PILOT DISCONNECT and STOWAGE

   PILOT HC
   1. Confirm PILOT HC pwr – OFF (down posn)

   PGSC
   2. Shut down Windows

   PWR SPLY
   3. DC PWR SPLY PWR sw1 – OFF

   F1
   4. DC UTIL PWR – OFF (utility outlet for PGSC)

   PILOT Y-Cable
   5. Disconnect cables from PGSC and HC
      (remove PGSC from behind elastic if necessary)

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

Cont next page
PILOT HC
6. Unsecure HC, press buckle on top strap, loosen strap, repeat for bottom strap

7. Stow PILOT HC and Y-Cable in original locker

8. Cut loose tie-wraps and elastic strap from window and secure after final on-orbit PILOT session

PGSC
9. Reconfigure PGSC as desired

D. TROUBLESHOOTING
1. If HC appears to have bias, calibrate HC at main menu – enter ‘c’, follow onscreen instructions

2. If DOS prompt appears (sometimes after bad sim crash), enter ‘win’ to restart Windows

3. If program hangs:
   Enter [CTRL]/[C] to get to DOS prompt, once at prompt, restart Windows (step 2), restart PILOT normally
   If [CTRL]/[C] does not work, force Windows restart with [CTRL]/[ALT]/[DELETE] simo
Figure 12-16.- Pilot with RHC setup diagram.

NOTE
DC PWR SPLY Cable is disconnected from PGSC and reconnected to Pilot Hand Controller.
PILOT WITHOUT RHC

NOTE
No PILOT equipment reqd,
only PGSC with STS load

A. PILOT OPERATION WITHOUT RHC

PGSC
1. Double-click ‘Shuttle Apps’> ‘PILOT w/out RHC’
Agree to quit all Windows Apps

2. Menu Selection Values:

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

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

4. Post Simulation
   [space bar] – cycles thru data to
   main menu
   ‘b’ – cycles back thru post
   run data

5. Terminate PILOT
   Enter ‘q’ to quit (returns to Windows)

B. TROUBLESHOOTING
1. If DOS prompt appears (sometimes after bad
   sim crash), enter ‘win’ to restart Windows

Cont next page
2. If program hangs:
   Enter [CTRL]/[C] to get to DOS prompt, once
   at prompt, restart Windows (step 1), restart
   PILOT normally
   If [CTRL]/[C] does not work, force Windows
   restart with [CTRL]/[ALT]/[DELETE] simo
PCMCIA CARD REMOVAL

PGSC  
1. If RS-422 PCMCIA card:
   - Shut down Windows
   - Power off completed
   - Go to step 5

2. Single-click ‘PCMCIA Card’ icon in system tray

3. Click on popup window displaying ‘Stop NAME_OF_CARD’, wait for prompt

4. Press [ENTER] at dialog box displaying ‘You may safely remove this device’

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

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

6. Remove PCMCIA card
PGSC STATE VECTOR UPDATE WITHOUT PCMMU DATA

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

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

SET STATE VECTOR

1. If OPS 2:
   SPEC 34

2. If OPS 3:
   GNC 0 GPC MEMORY
   ITEM 26 +2 1 0 EXEC
   X  BC56  VX  BC62
   Y  BC5A  VY  BC66
   Z  BC5E  VZ  BC6A

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

12-80   ORB OPS/ALL/GEN L,2
PGSC DEACT

1. Floppy disk drive – empty
   Stow floppy disk(s) in originating locker

2. If running Windows NT (OCA Router software) on OCA Router PGSC:
   Press [CNTL]/[ALT]/[DEL]
   Sel ‘Shut Down’ at ‘Logon Information’ dialog box
   Sel ‘OK’
   When prompted:
   PGSC pwr – off
   Go to step 6

3. Close any running applications
   Shut down Windows
   Automatic pwr off of PGSC

   If no Expansion Unit attached:
   PWR SPLY
   4. DC PWR SPLY PWR sw1 – OFF (lt off)
   F1
   (MO13Q, A11, A15, MO30F, O19, L12, MO52J, ML85E)

   IfExpansion Unit attached:
   F1
   6. AC UTIL PWR – OFF
   (MO13Q, A15, MO52J, ML85E)

7. Disconnect cables

8. Stow PGSC assembly, PGSC accessories
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 1. Shutdown PGSC
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 hard drive in the A31p PGSC using A31p Reload Media located in FDF CD Kit.

A31p PGSC

1. Shutdown PGSC

2. PGSC pwr – on (press [F12] when “Press F12 to choose temporary boot device” message appears)

3. Boot Menu appears

4. Insert A31p Reload Media into DVD/CD-ROM drive

5. Sel ‘CD-ROM drive’ from boot menu and press [ENTER]

6. When prompted to overwrite hard drive, press [Y] to start reload software

7. After completion of loading, follow instructions on screen to remove Reload Media and reboot PGSC

8. Allow computer to proceed through mini-setup (the computer will reboot automatically after this stage is completed)

9. Sel ‘Next’ from Network Identification Wizard window

10. From Network Identification Wizard / “Users of This Computer” window; perform the following:
   a. Verify radio button for ‘Windows always assumes the following user has logged onto this computer:’ is selected
   b. Verify user name is PGSCx
   c. Verify password field is blank
   d. Sel ‘Next’
11. Sel ‘Finish’ from Completing the Network Identification Wizard window

12. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9

13. 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, D. PGSC NAMING, 12-31
A31p HARD DRIVE CHANGEOUT

On MCC GO:

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

A31p

1. Exit all applications

2. Perform shut down:
   Sel ► Start ► Shut Down… ► Shut down ► OK

3. √PGSC shut down complete

4. Remove all PCMCIA cards

5. Close A31p Laptop cover

6. Turn A31p Laptop over so that bottom side faces up

NOTE
For location of A31p Hard Drive refer to figure 12-17. A31p Hard Drive is attached to Hard Drive cover
7. Refer to figure 12-18 for removing A31p Hard Drive. Gently pull cover and A31p Hard Drive out from the A31p Laptop to remove from slot.
8. Remove cover from A31p Hard Drive (refer to figure 12-19)

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

9. Attach cover to new A31p Hard Drive

10. Inspect pins on the hard drive for damage
    If damaged, report to MCC
    Insert A31p Hard Drive into Hard Drive slot

11. Flip A31p Laptop over to original position
    Reinsert PCMCIA cards

12. PGSC pwr – on

13. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9

14. If PGSC is intended for use on STS network, go to
    PGSC NETWORK, D. PGSC NAMING, 12-31

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)
2. Exit all applications
3. Perform shut down:
   - Sel ➤ Start ➤ Shut Down… ➤ Shut down ➤ OK
4. PGSC shut down complete

NOTE
Refer to figure 12-20 for switch and lever locations

Figure 12-20.- Ultrabay location in A31p Laptop.
5. To discharge Ultrabay lever, pull Ultrabay switch toward front of laptop

6. To release device from bay, pull Ultrabay lever

7. Remove device from Ultrabay

8. If changeout is for spare A31p Hard Drive:

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

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

   b. Separate A31p Hard Drive from A31p Ultrabay Adapter pin connector and remove A31p Hard Drive from Ultrabay Adapter

   c. Insert spare A31p Hard Drive (label side face up) while aligning hard drive pins to A31p Ultrabay Adapter pin connector (refer to figure 12-22)
d. Slide hard drive pins gently into Ultrabay Adapter pin connector until firmly in place.

e. Close down black security latch until locked in place (refer to figure 12-23).

f. Black security latch does not protrude from A31p Ultrabay Adapter.
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, 12-82
   If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9
   If PGSC is intended for use on STS network, go to PGSC NETWORK, D. PGSC NAMING, 12-31
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, 12-9
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, D. PGSC NAMING, 12-31
760XD PGSC HARD DISK SWAP

PGSC
1. If running Windows NT (OCA Router software) on OCA Router PGSC:
   Press [CNTL]/[ALT]/[DEL]
   Sel ‘Shut Down’ at ‘Logon Information’ dialog box
   √ ‘Shutdown’ radio button selected at ‘Shutdown Computer’ dialog box
   Sel ‘OK’
   When prompted:
      PGSC pwr – off
   Go to step 3

2. Shut down Windows
   √Automatic pwr off of PGSC

3. Open PGSC monitor to 180°
   Slide two side latches back and hold latches in back posn
   Open Keyboard

   CAUTION
   Some components under Keyboard contain sharp edges

4. Remove hard disk (right component):
   Pull plastic tape to expose hard disk drive handle
   Slide thumbs under handle
   Lift to remove

5. Insert new hard disk:
   Press only on shaded area until it snaps into connector
   Push hard disk drive handle under lip
   Stow old hard disk drive in carrying case

6. Close keyboard

7. PGSC pwr – on

8. If reqd, perform PGSC HARD DISK LATE UPDATE, 12-9

9. If PGSC intended for use on STS network,
go to PGSC NETWORK, D. PGSC NAMING, 12-31
760XD PGSC SWAP ON EXPANSION UNIT

PGSC1  1. Shut down Windows
        ✓Automatic pwr off of PGSC

        2. Close PGSC monitor

        3. Firmly turn security key to ‘eject’ position until PGSC
           slides away from Expansion Unit

        4. Remove, stow PGSC

PGSC2  5. ✓Sliding door of PGSC Sys Expansion connector – op

        6. Slide PGSC onto Expansion Unit

        7. Push PGSC back, connecting PGSC Sys Expansion
           connector to Expansion Unit connector

        8. ✓Connection secure

        9. Security key – locked

       10. PGSC pwr – on
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]
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]
Display full map view [CTRL]/[F]
Center map on primary vehicle [CTRL]/[C]
Find EOS, city, etc. in map [F3]
Display settings for the currently selected view [F11]
Display menu in a view [SHIFT]/[F10] or right mouse click
Toggle panning mode on/off [CTRL]/[P]
Toggle menu on/off [CTRL]/[M]
Toggle toolbar on/off [CTRL]/[T]
Toggle border on/off [CTRL]/[B]
Toggle caption on/off [CTRL]/[A]
Turn on all window decorations [CTRL]/[W]
Save WorldMap configuration [CTRL]/[S]
Exit application [ALT]/[F4]

12-99    ORB OPS/ALL/GEN L,2
This Page Intentionally Blank
COMPOUND SPECIFIC ANALYZER – COMBUSTION PRODUCTS (CSA-CP)

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COMPOUND SPECIFIC ANALYZER – COMBUSTION PRODUCTS CHECKOUT AND ZERO CALIBRATION OPS

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

1. Unstow:
   CSA-CP
   Sampling Pump
   Zero Filter
   NOTE
   MODE pb (black) located between two red alarm lights.
   Audible beeps occur when MODE pb depressed during unit activation

2. Activate CSA-CP
   Press, hold MODE pb until ‘RELEASE’ displayed
   NOTE
   Wait ~1 min while unit runs self-check routine. A single beep occurs when self-check routine complete.
   No O2 sensor is installed in the Shuttle CSA-CP monitor

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

Cont next page
13-2 ORB OPS/ALL/GEN L
4. If any reading higher than listed values below, proceed to step 5 for sensor rezeroing:
   \[ CO \leq 4 \text{ ppm} \]
   \[ HCL \leq 0.4 \text{ ppm} \]
   \[ HCN \leq 0.4 \text{ ppm} \]
   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. Dement 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

   13-4 ORB OPS/ALL/GEN L,2
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. \checkmark 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 off
   - If not active, go to step 2

2. Unstow Batt Pack

IFM Kit

3. Unstow Marker

4. Replace battery, turn fasteners (two) on back panel
   - 1/4 turn ccw; temp stow panel

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

5. Grasp Batt Pack pull tab, remove pack

6. Mark Batt Pack DISCHARGED “YES” with marker

7. Stow Used Batt Pack

IFM Kit

8. Stow Marker

9. Install replacement Batt Pack, press firmly to seat contacts

10. Replace panel, press firmly, turn fasteners (two) 1/4 turn cw to lock

11. If contingency, activate CSA-CP:
   - Press, hold MODE pb until ‘RELEASE’ displayed
   - CSA-CP on

   If not contingency, temp stow CSA-CP
SAMPLING PUMP BATTERY CHANGEOUT

IFM Kit 1. Unstow:
   Small Flathead Screwdriver
   Marker

2. Unstow Spare Batt Pack
3. Turn screw on back panel ccw 3 to 4 turns
4. Remove panel
   Temp stow
5. Grasp Batt Pack pull tab, remove Batt Pack
6. Mark Batt Pack DISCHARGED “YES” with marker
7. Install replacement Batt Pack, press firmly to seat contacts
8. Replace cover plate, turn screw cw until tight

IFM Kit 9. Stow:
   Screwdriver
   Marker
10. Stow Used Batt Pack
ZERO CALIBRATION

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

1. Unstow from temp:
   - CSA-CP

   Unstow:
   - Zero Filter
   - Sampling Pump

   NOTE
   Audible beeps occur when MODE pb depressed during unit activation

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

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

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

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

5. Unscrew, remove Sampling Pump Inlet (blue) Filter
   Temp stow

6. Unscrew tethered end caps on Zero Filter

   NOTE
   Pump inlet fitting has outside and inside threads

Cont next page
7. Screw end of Zero Filter cw into Sampling Pump inlet fitting until snug
   Arrow on Zero Filter should point toward Sampling Pump

8. Sampling Pump sw – ON

9. After 2 min, press MODE pb (11 times) until ‘GO CAL’ is displayed at top

10. Press “E” button
    √‘SET SPAN’ displayed at top

11. Press “+” button
    √‘ZERO’ displayed at top

12. Press “E” button, verify ‘ZEROING’ displayed
    Wait 15 sec
    √‘ZERO’ displayed at top

13. Press MODE pb once
    After 15 sec, verify nominal display (gas concentrations)

14. Sampling Pump sw – OFF

15. Remove Zero Filter from Sampling Pump inlet
    Replace tethered endcaps and tighten finger tight

   NOTE
   Damage to O-ring can occur if overtightened

16. Replace Sampling Pump Inlet Filter and tighten until snug

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

Cont next page
17. If active sampling desired:
   Use as configured
   If passive operation of CSA-CP desired, then:
   Demate CSA-CP from Sampling Pump

18. Stow Zero Filter
    Stow Sampling Pump (for passive operation)
    Notify MCC

19. Transfer CSA-CP to desired location for sampling session

DATA LOGGER ACTIVATION/DEACTIVATION

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

CSA-CP
1. Press MODE pb (9 times) until ‘LOG ON’ (for activation) or ‘LOG OFF’ (for deactivation) displayed

2. Press ‘+’ button to activate or deactivate Data Logger
   ‘LOG ON’ or ‘LOG OFF’ displayed, as desired
ALARM DISABLE/ENABLE

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

1. Notify MCC prior to disabling alarm function

NOTE
Audible beeps occur when MODE pb depressed during unit activation

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

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

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

NOTE
Operating mode reverts to nominal display after 10 sec

4. Press MODE pb (10 times) until ‘MUTE’ or ‘UNMUTE’ is displayed

5. Press “+” button to disable/enable alarms, as desired
   √Display indicates alarm enabled/disabled
### DATA RECORDING TABLE

<table>
<thead>
<tr>
<th>MET</th>
<th>LOCATION</th>
<th>DATA READINGS</th>
<th>REMARKS</th>
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<tbody>
<tr>
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<td>1. CO _______</td>
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<td>3. HCL _______</td>
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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
ACTIVATION
VOL 3B
1. Unstow:
   Audio Dosimeter
2. Slide front panel up ~1 inch on audio Dosimeter
3. O/I sw → I (on)

NOTE
Front panel LED will light for ~10 sec while circuits test battery, then flash at intervals of ~2 sec to show circuits functioning

4. √'BATT OK’ appears in top left of display and does not blink after ~10 sec
   √'0:00 time’ appears on display

SOUND LEVEL METER (SLM) MODE
1. Depress and release front black pb until ‘SLM dB’ appears on display

NOTE
Do not read SLM dB data when talking. This may interfere with real-time decibel measurement.

An ‘OFL’ (memory overflow) msg may appear momentarily on display if Dosimeter measures sound ≥ 99 dB. Ignore msg and continue measurements

2. Hold mic in front of desired location for ~10 sec to take measurement

3. Record:
   SLM dB ____________dB
   Location _______________
   MET Time ____/____:____:____

4. Call down recorded data to MCC

14-2 ORB OPS/ALL/GEN L
**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 \( \geq 99 \text{ dB} \) or if Dosimeter has been on \( \geq 20 \text{ hr.} \) 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 CONFIGURATION
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<tr>
<th>CREW/CHNL WALL UNIT</th>
<th>A/G1</th>
<th>A/G2</th>
<th>A/A</th>
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<th>ICOM B</th>
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ORB OPS-1a/O/B

(reduced copy)
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<th>OPS</th>
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<td>CONTROLLERS</td>
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<td>DAP CONFIG</td>
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<td>66 ENVIRONMENT</td>
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<td>RCS</td>
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<td>77 EVA - MMU/FSS</td>
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<td>41</td>
<td>RGA/ADTA/RCS</td>
<td>X</td>
<td>6 GPC/BUS STATUS</td>
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<td>RM ORBIT</td>
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<td>SENSOR TEST</td>
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<td>3 TRK/COAS_CNTL</td>
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<td>85 MASS MEMORY R/W</td>
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<td>SWITCHES</td>
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<td>62 PCMMU/PL COMM</td>
</tr>
<tr>
<td>42</td>
<td>SWITCH/SURF</td>
<td>X</td>
<td>94 PDRS CONTROL</td>
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<tr>
<td>55</td>
<td>GPS STATUS</td>
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<td>95 PDRS OVERRIDE</td>
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</tbody>
</table>

ORBIT SPEC (R11) 900-902 TEXT SPEC INDEX

(reduced copy)
KU ANTENNA OVERLAY
(COLOR MONITOR)
URINE COLLECTION (w/o UMS)
- FAN SEP same as HOSE BLOCK
- MODE – AUTO
- CRADLE – AUTO
  Unstow hose and install urinal funnel
  Airflow
  WCS ON lt – on
  Urinate
  Remove, clean, stow urinal funnel

NOTE
  FAN SEP will run for ~30 sec after hose stowage
  Slow hose in cradle
  WCS ON lt – 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 lt – on
  COMMODE CNTL – UP (wait 15 sec)
  – FWD
  Ensure proper seal, restrain body
  Urinate/delicate
  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
  Slow hose in cradle
  MODE – AUTO
  WCS ON lt – off

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

WCS COMPACTOR OPS (DUAL-VANE)
- Tools reqd: 1/4-in Torque Wrench
  6-in Extension
  1/4-in to 3/8-in Adapter
- Set Torque Wrench to 50 in-lb (first or second compaction)
- MODE – AUTO

FIRST COMPACTION
  Rotate Compactor crank – cw. Stop when torque limit obtained
  At completion of compaction, net clear of transport tube. If torque limit reached while gauge in yellow region, MCC before proceeding to CONTINGENCY OPS

SECOND COMPACTION
  Rotate Compactor crank – ccw. Stop when torque limit obtained
  At completion of compaction, net clear of transport tube. If torque limit reached while gauge in yellow region, MCC before proceeding to CONTINGENCY OPS

- CONTINGENCY OPS (Vanes will not rotate or jammed)
  - MODE – COMMODE/MANUAL/EMU (airflow)
  - COMMODE CNTL – UP (wait 20 sec)
  - WCS ON lt – on
  - WCS ON lt – off
  - WCS CNTL – UP (wait 5 min)
  - WCS CNTL – OFF (BACK/DN)
  - MODE – AUTO
  - MCC
  - If vanes cry or jam, MCC

When complete:
  - COMMODE CNTL – OFF (BACK/DN)
  - MODE – AUTO
  - WCS ON lt – off

Stow tools
CONT WASTE COLLECTION – UCD/APOLLO BAG

NOTE
WCS Compactor Ops must be performed before stowing Apollo Bags in commode

- Unstow Bags
- Complete urination in UCD
- Remove Apollo Bag Seal Cover
- Seal to buttocks and defecate
- Force gas out and seal
- Stow Apollo Bag in commode or wet trash
- Stow UCD in wet trash

FAN SEP SWITCHING

- MODE – AUTO
- CRADLE – AUTO
- Hose stowed in cradle
- WCS ON it – off
- FAN SEP SEL sw – OFF
- HOSE BLOCK – SEP 2(1)

NOTE
In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete

- FAN SEP SEL sw – 2(1)
  - If airflow still low or if no airflow, √MCC

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)

Commode:

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

ORB OPS-5b/O/G
URINE COLLECTION (w/UMS)
Y-Vlv – WCS
WCS/UMS sw – WCS
Install urinal funnel
\FAN SEP same as HOSE BLOCK
\MODE – WCS/EMU (airflow)
Urinate
Remove, clean, stow urinal funnel

CAUTION
Allow FAN SEP to run for
30 sec before proceeding
WCS/UMS sw – UMS
Y-Vlv – UMS

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

NOTE
No WCS Trash Can airflow until slide vlv cl
COMMODE CNTL – OFF (BACK/DN)
Remove, clean, stow urinal funnel
Clean seat as reqd
Seal WCS trash bag, place in WCS trash module
Place new bag in WCS trash can

CAUTION
Allow FAN SEP to run for
30 sec before proceeding
WCS/UMS sw – UMS
Y-Vlv – UMS

NOTE
This Cue Card to fly for missions manifesting WCS, UMS

WCS COMPACTOR OPS (DUAL-VANE)
Tools reqd: 1/4-in Torque Wrench
4-in Extension
Set Torque Wrench to 3/8-in Adapter
MODE – OFF

FIRST COMPACATION
Rotate Compactor crank – cw. Stop when torque limit obtained. At completion of compaction, vnet clear of transport tube. If torque limit reached while gauge in yellow region, go to CONTINGENCY OPS

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

CONTINGENCY OPS
(Vanes won’t rotate or jamed vane)
MODE – WCS/EMU (airflow)
COMMODE CNTL – UP (wait 20 sec)
– FWD
– FWD

Allow 5 min for commode contents to soften,
then realtempt compaction. If no joy, attempt compaction every 5 min. If still no joy, inspect vanes for attached debris. If debris present,
remove/redistribute using scraper tool (wear gloves). Re-attempt compaction. If still no joy,

\MCC
If compactor net blocking transport tube, use

* scissors to cut elastic net to clear tube
When complete:

COMMODE CNTL – DN
MODE – OFF

Stow tools
UMS CONT WASTE COLLECTION – UCD/APOLLO BAG

NOTE
WCS Compactor Ops must be performed before stowing Apollo Bags in commode

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

FAN SEP FAILURE

CAUTION
Do not run both FAN SEPARATORS at same time

If low or no airflow in WCS:
MODE – OFF
HOSE BLOCK – SEP 2(1)

NOTE
In next step, alternate fan sep will turn on for 30 sec. Normal ops may proceed after 30-sec run complete

FAN SEP SEL sw – 2(1)
MODE – WCS/EMU (airflow)

If airflow still low or if no airflow, MCC

WCS CLEANING

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

Commode:
Use Sanitation Agent/Dry Wipes to clean seat and transport tube above gate vlv
Discard in WCS trash module
Fabricate as a Transparency

PHOTO GRID OVERLAY

(reduced copy)

FAB USE ONLY  CC 15-12  ORB OPS/ALL/GEN L
URINE PRETREAT CHANGEOUT

NOTE
Caps will be transferred to used Ozone 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

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URINE PRETREAT SETUP

NOTE
Caps will be transferred to used Oxone Hose Section (OHS). OHS is capped in 1 atm environment. Removal of caps during installation could be propulsive if cabin pressure < 14.7 psia

Retrieve OHS kit, temp stow large Ziplock Bag
Retrieve new OHS from large Ziplock Bag
Remove Combitherm Bag from OHS
Record H/N from OHS label and ‘installed’ MET on Cue Card for new OHS
Remove caps from new OHS; temp stow
Detach empty urinal hose section from prefilter housing and hose block extension
Place caps on empty hose section
Fasten empty hose section to WCS via Velcro strap
Attach new OHS to prefilter housing and hose block extension
Ensure locking collars on new OHS are rotated to the locked position

URINE PRETREAT ENTRY PREP

NOTE
Caps will be transferred to used Oxone Hose Section (OHS). OHS is capped in 1 atm environment. Removal of caps during installation could be propulsive if cabin pressure < 14.7 psia

Unfasten empty hose section from WCS
Remove caps from empty hose section; temp stow
Detach used OHS from prefilter housing and hose block extension
Place caps on used OHS
Place used OHS in Ziplock Bag labeled ‘Trash’; stow in large Ziplock Bag
Attach empty hose section to prefilter housing and hose block extension
Record H/N from OHS label and ‘installed’ MET on Cue Card for empty hose section
Stow OHS kit for Entry
Ergometer setup locations:
Seat 3 - facing stbd
Seat 4 - facing port
Seat 5 - facing port
Seat 6 - facing port
Seat 7 - facing stbd

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

1. Secure / latch AQDs onto deck studs
2. Install spacers then sound mounts. Secure loosely with knurled knobs
3. Remove pip pin, seat stem foot and seat, temp stow all
4. Remove pip pins (4) securing ergometer to frame and temp stow ergometer
5. Release frame from seat 8 deck studs via AQDs (4); push button and lift collar. Disassemble frame by sliding seat stem and forward sections apart
6. Loosely secure frame onto AQDs, with knurled knobs
7. Loosely secure frame with seat stem onto AQDs with knurled knobs
8. Install seat onto seat stem

HOOK VELCRO ORB OPS-24a/OVA
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


11. Secure ergometer to frame using threaded fasteners (A) and hexagonal wrench. (Note: cables will be on bottom and ON/OFF and MANUAL/REMOTE switches toward seated user). Tighten knurled knobs.

12. Install seat stem foot. Secure with pip pin and tighten by turning (CW).

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


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

(reduced copy)
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.

1) Detach Galley Chilled hose (#1) from ML90N QD bracket. Then Connect Galley Chilled hose (#1) to Microbe Filter assembly hose (#1).

2) Attach ACTEX (#2) to Microbe Filter assembly (#2). Secure ACTEX/Microbe Filter assembly as reqd.

3) Connect ACTEX hose (#3) to ACTEX hose (#3). Secure ACTEX hose as reqd.

4) Connect ACTEX hose Tee (#4) to Chilled QD at ML90N bracket.

5) Detach Galley Ambient hose (unsulated) from ML90N QD bracket. Connect Galley Ambient hose to MCV, then MCV to Ambient QD at ML90N bracket.

6) OVEN/RHS-OFF, then ON to circulate water through galley.

NOTE
Water Transfer Hose only present for flights where water transfer is scheduled.
CWC Fill

1. For Potable CWC Fill mixed Minerals, then Silver Solution. For Technical CWC Fill, inject Silver Solution ONLY. Unstrip CWC Fill Mixed and/or Silver Solution Kit(s). As per, report condition of CWC Fill to MOG. 
   Connect CWC Fill to Water Transfer Hose QD. Start 30 minute countdown clock.
2. Attach syringe to injection port. Open valve on injection port and completely inject solution. Fully withdraw syringe plunger, then refill residual solution. Close valve on injection port then remove cap and syringe. Repeat injection protocol, as needed.
3. Terminate CWC Fill on MCC-H cell or as indicated by countdown timer, if no longer. Fill CWC label. Note MET, insert green (60x) label in CWC window. Apply decals to CWC end, mark CWC Fill on this end decals.

CWC Sampling

If sample required, remove Sample Adapter and Sample Bags from Sample/Fill Kit. Connect Sample Fill to appropriate adapter. Collect Potable, Technical, CWC Fill from injection port. Connect Adapter & Sample Bag to CWC Fill then OPEN valve on sample adapter. Squeeze CWC Fill to fill bag to specified level. Close valve, remove Sample Bag from adapter and label with 60x label, secure in Ziplock Bag and store in crew designated location. Detach Adapters from Sample Adapter.
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
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
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
Flight Cover (trim bottom to expose tabs)