Orbit Operations Checklist

STS-129 Flight Supplement

Mission Operations Directorate
Operations Division

Final
July 27, 2009

National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas

Verify this is the correct version for the pending operation (training, simulation or flight).
Electronic copies of FDF books are available. URL: http://mod.jsc.nasa.gov/do3/FDF/index.html
List of Implemented Change Requests (482s):
ORB OPS FS-00164  ORB OPS FS-00167
ORB OPS FS-00165  ORB OPS FS-00168
ORB OPS FS-00166  ORB OPS FS-00169

Incorporate the following:
1. Replace FS iii thru FS vi
2. Replace section 2 (FS 2-1 thru FS 2-4)
3. Replace FS 3-1 & FS 3-2, FS 3-7 & FS 3-8
4. Replace section 7 (FS 7-1 thru FS 7-12)
5. Replace FS 8-1 & FS 8-2
6. Replace FS CC 11-3 & FS CC 11-4, FS CC 11-9 & FS CC 11-10

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Publication Manager

Approved by:  
Manager Flight Procedures

Accepted by: Michael Deit
FDF Manager

Encl: 30 pages

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List of Implemented Change Requests (482s):

ORB OPS FS-00160
ORB OPS FS-00161
ORB OPS FS-00162A

Incorporate the following:

1. Replace FS iii thru FS vi
2. Replace FS 3-1 & FS 3-2, FS 3-5 thru FS 3-8
3. Replace FS 4-3 thru FS 4-6
4. Replace FS 9-5 thru FS 9-10
5. Replace FS CC 11-9 & FS CC 11-10

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Manager, Flight Procedures

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FDF Manager

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MISSION OPERATIONS DIRECTORATE

ORBIT OPERATIONS CHECKLIST
STS-129 FLIGHT SUPPLEMENT

FINAL
July 27, 2009

PREPARED BY:

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APPROVED BY:  ACCEPTED BY:

Manager, Flight Procedures  Michael T. Hurt
FDF Manager

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LOAD PCMMU FORMAT

C3

1. √OI PCMMU FORMAT – GPC
   SM 62 PCMMU/PL COMM

2. FORMAT:
   CRT
   SEL FXD – ITEM 1 EXEC (*)
   SEL ID – ITEM 3 +X X X EXEC

3. √SM COMM BUF – RDY
   LOAD – ITEM 4 EXEC
   √LOAD, ITEM 4 – RUN, CPLT

   If LOAD – CPLT:
   Repeat steps 2 and 3 for second ID

   ∗ If LOAD – FAIL and ERR MSG – ‘I/O ERR MMU 1(2)’:
   ∗ Go to 5.2a, ‘I/O ERR MMU 1(2)’ (MAL, ∗
   ∗ MCC
   ∗ If LOAD – FAIL and a first load attempt:
   ∗ Repeat steps 1 and 2 for failed ID
   ∗ If LOAD – FAIL and a subsequent load attempt:
   ∗ MCC

C3
   ∗ OI PCMMU PWR – 2(1)
   ∗ ERR MSG – ‘I/O ERR PCM’
   CRT
   ∗ I/O RESET PCM – ITEM 5 EXEC (*)
   ∗ Repeat steps 2 and 3

4. When final LOAD – CPLT:
   SEL PGM – ITEM 2 EXEC (*)
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**NOTE**
LDR TFL may affect PCMMU BITE. If PCMMU or SM 2 GPC switched since last TFL, ID 64 and 128 will not reflect current state.
LOAD PDI DECOM FORMAT

[SM 62 PCMMU/PL COMM]

1. **PDI:**

   **CRT**
   - √I/O RESET – ITEM 8 (*)
   - SEL DECOM – ITEM 9 +X EXEC
   - SEL FMT – ITEM 10 +X X X EXEC
   - LOAD – ITEM 11 EXEC

   **If LOAD – CPLT:**
   - SEL INPUT – ITEM 12 +X EXEC
   - LOAD – ITEM 13 EXEC
   - Repeat step 1 for additional DECOMs/FPM

   * If LOAD – FAIL and ERR MSG – ‘I/O ERR’
   * MMU 1(2):
     - Go to 5.2a, ‘I/O ERR MMU 1(2)’ (MAL, DPS) >>
   * if LOAD – FAIL and a first load attempt:
     - Repeat step 1
   * if LOAD – FAIL and a subsequent load attempt:
   *
   **NOTE**
   * Power cycling PDI will cause PDI to lose DFLs previously loaded

   **A1L**
   - √MCC
   - S-BD PL CNTL – PNL
   - PL DATA INTLVR PWR – OFF,ON
   - ERR MSG – ‘S62 BCE BYP PL’
   - ‘S62 BCE BYP PDI’
   - S-BD PL CNTL – CMD

   **PCM:**
   - I/O RESET PCM – ITEM 5 EXEC (*)

   **CRT**
   - I/O RESET – ITEM 8 EXEC (*)
   - Repeat step 1 for all of config (XXX)
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* OI-GNC-SM, Orbiter Downlist Data Rates (High or Low)
** # in OIU# represents the OIU format; (XXX) represents data type
*** # in SSV (#) represents the SSV Out Rate sw selection
LOAD OIU FORMAT/CONFIG
Determine which step is needed and complete all actions to obtain desired OIU configuration

NOTE
A corresponding TFL/DFL CONFIG is reqd for MCC to receive telemetry. Reference S62 PCMMU/PL COMM for the last loaded HDR TFL and perform LOAD PCMMU FORMAT/LOAD PDI DECOM FORMAT for the associated CONFIG

S212 OIU

1. GNC-1 PRIMARY ON LB-ORB N2-1 (OIU BUS 3)
   LOAD FORMAT ITEM 1 +9 EXEC
   GNC TO GNC 1 ITEM 18 +1 4 EXEC
   GNC 1 TO BUS 3 ITEM 18 +1 6 EXEC
   BUS 4 BC ITEM 15 EXEC (*)
   BUS 3 RT ITEM 10 EXEC (*)
   LOAD FORMAT ITEM 1 +9 EXEC >>

2. GNC-1 PRIMARY ON LB-ORB N2-2 (OIU BUS 4)
   LOAD FORMAT ITEM 1 +9 EXEC
   GNC TO GNC 1 ITEM 18 +1 4 EXEC
   GNC 1 TO BUS 4 ITEM 18 +1 5 EXEC
   BUS 3 BC ITEM 11 EXEC (*)
   BUS 4 RT ITEM 14 EXEC (*)
   LOAD FORMAT ITEM 1 +9 EXEC >>

3. GNC-2 PRIMARY ON LB-ORB N2-1 (OIU BUS 3)
   LOAD FORMAT ITEM 1 +9 EXEC
   GNC TO GNC 2 ITEM 18 +1 3 EXEC
   GNC 2 TO BUS 3 ITEM 18 +1 8 EXEC
   BUS 4 BC ITEM 15 EXEC (*)
   BUS 3 RT ITEM 10 EXEC (*)
   LOAD FORMAT ITEM 1 +9 EXEC >>

4. GNC-2 PRIMARY ON LB-ORB N2-2 (OIU BUS 4)
   LOAD FORMAT ITEM 1 +9 EXEC
   GNC TO GNC 2 ITEM 18 +1 3 EXEC
   GNC 2 TO BUS 4 ITEM 18 +1 7 EXEC
   BUS 3 BC ITEM 11 EXEC (*)
   BUS 4 RT ITEM 14 EXEC (*)
   LOAD FORMAT ITEM 1 +9 EXEC >>

Cont next page
5. **MPLM (if flown)**
   - LOAD FORMAT ITEM 1 +5 EXEC
   - BUS 2 BC ITEM 7 EXEC (*)
   - LOAD FORMAT ITEM 1 +5 EXEC >>

6. **SSOR**
   - LOAD FORMAT ITEM 1 +7 EXEC
   - BUS 1 BC ITEM 3 EXEC (*)
   - LOAD FORMAT ITEM 1 +7 EXEC >>
## STAR PAIRS PAD

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**NET Applicable 000/00/00:45:00 to 011/00:00:00**

**Liftoff Date:** 11/15/09
**Liftoff GMT:** 320/19:29:04.000
DAP TABLES

DAP OVERVIEW ...........................................................   FS 3-2
UNIV PTG .................................................................   FS 3-3
STS-129 DAP A CONFIGURATIONS .........................   FS 3-4
B CONFIGURATIONS .........................   FS 3-6
### DAP OVERVIEW

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<th>DAP</th>
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<td>Mated Stack (VRCS Deadband Collapse)</td>
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<td>Orbiter alone SRMS/OBSS Ops</td>
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### CNTL ACC – Purpose

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DAPs for mated operations are based on analysis from GNC, PDRS, C. S. Draper Labs, and ISS Structures
UNIV PTG

TGT ID = 1 Orbiting Vehicle
= 2 Earth Center
= 3 Earth Target
  Input LAT (±90)
    LON (±180, + = East)
    ALT (-3444.0 to 20000.0 nm)
= 4 Sun Center
= 5 Celestial Target
  Input RA (0-359.99)
    DEC (±90)
= 11-110 Nav Stars

BODY VECTOR = 1 +X*
  = 2 -X*
  = 3 -Z*
  = 4 -Y Star Tracker*
  = 5 Selectable
    Input P (0-359.99)
    Y (270-359.99, 0-90)
*Input OM → OM (0-359.99)

MON AXIS = 1 +X
  = 2 -X
### STS-129 DAP A CONFIGURATIONS

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**BOLD/ITALIC** indicates change from I-Load.

1. I-loaded below keyboard limit; do not change
2. Reference DOCKED DAP REFERENCE (ORB OPS FS; REBOOST/DAP) for CNTL ACCL Selection
3. Use 1 for OBSS scan and 2 for Orbiter attitude maneuvers
## STS-129 DAP B CONFIGURATIONS

### STS-129 DAP B1 – DAP B8 CONFIGURATIONS

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**BOLD/ITALIC** indicates change from I-Load.
## STS-129 DAP B9 – DAP B13 CONFIGURATIONS

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<td>5(6,7)</td>
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**BOLD/ITALIC** indicates change from I-Load.

1. I-loaded below keyboard limit; do not change
2. Reference DOCKED DAP REFERENCE (ORB OPS FS, REBOOST/DAP) for CNTL ACCL Selection
3. Use 1 for OBSS scan and 2 for Orbiter attitude maneuvers
REBOOST/DAP

- AUTO REBOOST.......................................................... FS 4-2
- ATTITUDE REFERENCE...................... FS 4-4
- DOCKED DAP REFERENCE...................... FS 4-5
- RATE DAMPING.................................................. FS 4-6
AUTO REBOOST

NOTE
Allow 5 min between establishing reboost attitude and reboost start time for DAP accelerations to converge

1. If PRCS required:
   O14:F, RJDA 1A L2/R2 DRIVER – OFF
   O15:F, RJD MANF L5/F5/R5 DRIVER – OFF
   O16:F Pri RJD LOGIC (eight) – ON

   √MCC for GO to power up Pri Drivers
   RJD MANF L5/F5/R5 DRIVER – ON
   Pri RJD DRIVER (eight) – ON

2. Select Reboost Configuration

   [GNC 20 DAP CONFIG]
   REBOOST CFG – ITEM 8 + EXEC
   INTVL – ITEM 9 + EXEC

3. Set up Future Reboost

   [GNC UNIV PTG]
   DURATION – ITEM 27 + EXEC
   START TIME – ITEM 1 + EXEC
   RBST – ITEM 25 EXEC (FUT-*)

4. Select appropriate Reboost Rotation DAP
   When in attitude and prior to START TIME,
   C3 DAP: A11/AUTO/VERN(ALT)
   If using Config 1 or 4:

   [GNC 20 DAP CONFIG]
   Disable X JETS ROT – ITEM 7 EXEC (no *)

Cont next page

FS 4-2 ORB OPS/129/FIN
NOTE
Reboost can be aborted with an item 26 on UNIV PTG or by selecting FREE on the DAP

5. Post Reboost Configuration

If using Config 1 or 4:

GNC 20 DAP CONFIG
Enable X JETS ROT – ITEM 7 EXEC (*)

Return to FLIGHT PLAN Attitude
C3 DAP: as reqd
O14, Pri RJD LOGIC, DRIVER (sixteen) – as reqd
O15,
O16
AUTO REBOOT ATTITUDE REFERENCE

ALT & VRCS ATTITUDE HOLD CONFIGURATIONS:

Configurations 1 and 4 use ALT PRCS (Pitch, X=4°)
Configuration 2 is for SHUTTLE only - Do Not Use While Docked
Configuration 3 uses VRCS (Pitch, X=4°)
NOTE
Shuttle mated attitude control is not certified when the Shuttle Airlock is depressurized (<3.45 psia)

<table>
<thead>
<tr>
<th>Mated Attitude Hold, Maneuvers and ELC Install (VERN or ALT)</th>
<th>Mated Attitude Hold (VERN or ALT)</th>
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</thead>
<tbody>
<tr>
<td>A12</td>
<td>B12</td>
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</table>

ALT not certified for loaded RMS operations

CNTL ACCL selection is dependent upon the weight of the Russian Segment due to visiting vehicle configurations and ELC installation as described below:

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<th>Case</th>
<th>Docking Port</th>
<th>Russian Segment Weight Classification</th>
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<tr>
<td>4</td>
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</table>

CNTL ACCL 2 or 5 - Prior to ELC1 on SSRMS at Intermediate Position

CNTL ACCL 3 or 6 - After ELC 1 on SSRMS at Intermediate Position and prior to ELC 2 on SSRMS at Intermediate Position

CNTL ACCL 4 or 7 - After ELC 2 on SSRMS at Intermediate Position
RATE DAMPING

DAP: LVLH(INRTL) - Dependent on desired attitude hold
Monitor Jet Activity Light:
   For continuous Jet Activity > 6 min:
      DAP: FREE then restart this procedure
   If Jet Activity Stopped for > 5 sec for VERN (15 sec for ALT)
      DAP: FREE > 2 sec
      DAP: AUTO >>
OIU PROCEDURES

OIU ACTIVATION ..........................................................   FS 5-2
DEACTIVATION .....................................................   FS 5-2
OIU ACTIVATION

NOTE
\√MCC that steps 1 and 2 may not be reqd

1. Load PCMMU/PDI (config 760) for OIU
2. Power on PSP 1(2)
   A1L   √S-BD PL CNTL – CMD
         PWR SYS – 1(2)
         √SEL – PSP
         √PSP CMD OUTPUT – PL UMB
         CNTL – PNL,CMD
   SM 62 PCMMU/PL COMM
   I/O RESET PSP 1(2) – ITEM 6(7) EXEC (*)
3. Power on OIU 1(2)
   SSP1  OIU PWR – OIU 1(2) ON
         \tb – UP(DN)

OIU DEACTIVATION

NOTE
\√MCC for OIU ops complete

1. Possible ‘S62 PDI DECOM FAIL’ msg
2. MCC will config PCMMU and PDI as reqd

   SSP1  OIU PWR – OFF
         \tb – bp
FS 6-1 ORB OPS/129/FIN

PRLA

PRLA CLOSE................................................................. FS 6-2
PRLA CLOSE

1. If Docked and OBSS NOT grappled:
   
   **NOTE**
   When MCA LOGIC switches taken OFF, KU will mode to standby.
   MPM and MRL tbs – bp

   MA73C:A  MCA LOGIC MNC MID 2 – OFF
   :B        MNB MID 4 – OFF

   A6U  2. √PL RETEN PL SEL – 3
        √LAT 1,2,3,4,5 (five) – OFF

   CRT       SM 97 PL RETENTION
             √PL SEL 3 LAT 1,2 (eight) – ‘0’

   * If any LAT msw shows ‘1’, drive *
   * for single motor time (60 sec) *

   R13L  3. PL BAY MECH PWR SYS 1,2 (two) – ON
   A6U      RETEN LOGIC PWR SYS 1,2 (two) – ON

   **NOTE**
   Any single motor times (>30 sec)

   4. PL RETEN LAT 1,2 – LAT (tb-LAT, 60 sec max) – OFF

   5. PL RETEN LAT 3,4 – LAT (tb-LAT, 60 sec max) – OFF

   6. PL RETEN PL SEL – 1

   CRT       SM 97 PL RETENTION
             √PL SEL 1 LAT 1,2 (eight) – ‘0’

   * If any LAT msw shows ‘1’, drive *
   * for single motor time (60 sec) *

Cont next page
NOTE
Any single motor times (>30 sec)

A6U 7. PL RETEN LAT 1,2 – LAT (tb-LAT, 60 sec max) – OFF

8. PL RETEN LAT 3,4 – LAT (tb-LAT, 60 sec max) – OFF

9. PL RETEN PL SEL – MON
   LOGIC PWR SYS 1,2 (two) – OFF
   R13L BAY MECH PWR SYS 1,2 (two) – OFF

10. If MCA LOGIC switches taken OFF in step 1:
    MA73C:A MCA LOGIC MNC MID 2 – ON
    :B MNB MID 4 – ON
SHORT DURATION BIOASTRONAUTICS INVESTIGATION (SDBI)

SDBI 1634, SLEEP-WAKE ACTIGRAPHY .................... FS 7-2
DON ACTIWATCH ................................................. FS 7-2
DOFF ACTIWATCH ............................................... FS 7-2
SDBI 1900, INTEGRATED IMMUNE BLOOD COLLECTION ........................................ FS 7-3
SDBI 1900, SALIVA COLLECTION FOR INTEGRATED IMMUNE ................................ FS 7-9
SDBI 1634, SLEEP-WAKE ACTIGRAPHY

A. DON ACTIWATCH (ASAP after entry into orbit)

MA16L 1. Unstow: Actiwatch

SLEEP LOGBOOK

NOTE
Actiwatch should be worn on top of non-dominant wrist outside of clothing. Face of Actiwatch should remain uncovered at all times.

If necessary to remove Actiwatch, record doff/don time in SLEEP LOGBOOK

2. Don Actiwatch on non-dominant arm and wear continuously throughout mission

3. Deploy SLEEP LOGBOOK and record required information daily (within 15 min after waking)

B. DOFF ACTIWATCH

NOTE
If mission length extended, continue to wear Actiwatch and complete SLEEP LOGBOOK as timeline permits

On final day of orbit:

MA16L 1. Remove Actiwatch, stow in locker

2. Recover SLEEP LOGBOOK, stow in locker
SDBI 1900, INTEGRATED IMMUNE BLOOD COLLECTION

OBJECTIVE:
Integrated Immune Assessment (Integrated Immune). The purpose of this procedure is to effectively and safely perform a blood draw, process blood samples, and properly stow them to achieve Integrated Immune Experiment objectives

PARTS:
Integrated Immune Blood Collection Kit:
- Band-Aid
- Fine Point Sharpie
- Gauze
- Tourniquet
- X-Large Gloves
- Butterfly Needle
- Tube Holder

Blood Sample Sleeve:
- Blood 8.5ml ACD (yellow top tube)
- Blood 10ml EDTA (purple top tube)

Biocide Wipes
Biohazard Bag
Surgical Paper Tape, 1-in
Sharps Container

Gray Tape

WARNING
All consumable items that come in contact with blood must be discarded in Biohazard Bag (provided in kit)
All sharp items (i.e., needles) must be discarded into Sharps Container

NOTE
Any spilled blood should be cleaned up with Gauze and followed with a Biocide Wipe

Cont next page
A. SETUP FOR BLOOD SAMPLE COLLECTION

NOTE
The lid of the Integrated Immune Blood Collection Kit, when opened, can be used as a workstation on which to temp stow items via Velcro. Gray Tape can also be used.

PI Locker
1. If desired for temp stowage of supplies during blood draw, deploy about 12-inch piece of Gray Tape near location of blood draw.

2. Deploy hardware near area where activity will be performed:

MA16L Integrated Immune Blood Collection Kit:
- Band-Aid
- Fine Point Sharpie
- Gauze (1 package)
- Tourniquet
- Butterfly Needle (1)
- Tube Holder
- Blood Sample Sleeve (open sleeve and loosen tubes)
- Biocide Wipes
- Surgical Paper Tape, 1-in
- Sharps Container
- Biohazard Bag
- X-Large Gloves

3. Place Biohazard Bag in convenient location for trash disposal.

B. PERFORM BLOOD SAMPLE COLLECTION
1. Retrieve Butterfly Needle (1) and remove from package. Place package in the Biohazard Bag and temp stow.
2. Retrieve Tube Holder
   Screw Tube Holder onto threaded end of Butterfly Needle
   Temp stow Butterfly Needle/Tube Holder

3. Retrieve Gauze, open package but do not remove Gauze, temp stow Gauze package

4. Retrieve Tourniquet from Integrated Immune Blood Collection Kit
   Apply Tourniquet to subject's arm
   Using fingers find vein and select puncture site

   **WARNING**
   Operator must don X-Large Gloves prior to needle insertion and observe Universal Precautions for Handling Biohazardous Materials

5. Retrieve and don X-Large Gloves
   Retrieve and open Biocide Wipe, placing empty package in Biohazard Bag
   Cleanse area with Biocide Wipe
   Place used Biocide Wipe in Biohazard Bag

6. Retrieve Butterfly Needle/Tube Holder from temp stow
   Remove protective cover from Butterfly Needle/Tube Holder. Place cover in Biohazard Bag

   **CAUTION**
   Blood tubes must be inspected for cracks. If cracked, tubes should be discarded in the Biohazard Bag

7. Retrieve:
   Blood Sample Sleeve
   Surgical Paper Tape, 1-in

Cont next page
WARNING
Insert needle at 30 degree angle to vein to ensure proper blood flow and avoid injury
Avoid shifting needle from side to side after entering vein

NOTE
Taping of central portion of needle tubing to subject's arm is to prevent excessive movement during blood draw. Only tape tubing after needle is properly inserted in vein

8. Insert Butterfly Needle in subject's arm with bevel up. When the needle is properly inserted in the vein a flash of blood will be observed in butterfly tubing
Using strips of 1-in Surgical Paper Tape as necessary, tape central portion of Butterfly Needle tubing to subject's arm

Blood Sample Sleeve

9. Retrieve subject's empty Blood 8.5ml ACD (yellow top blood tube)

NOTE
Allow 10 sec to ensure the tube vacuum draws the appropriate volume of blood

10. Verify a flash of blood in butterfly tubing

11. Firmly push the blood tube into Tube Holder to puncture tube cap and initiate blood flow

12. When filled, detach blood tube from Tube Holder

13. Gently agitate tube for blood to mix with reagent for ~5 sec

Cont next page
14. Temp stow filled blood tube in Blood Sample Sleeve

15. Retrieve Blood 10.5ml EDTA tube (purple top) and repeat steps 11 thru 14 for the second tube

16. Loosen Tourniquet

17. Retrieve Gauze from temp stow

18. Hold Gauze to venipuncture site while simultaneously grasping wings of Butterfly Needle and removing it at same angle of insertion, applying gentle pressure to Gauze

Have subject hold Gauze on venipuncture site for 2-5 min

If taped, remove tape from arm and dispose

Slide safety shield over Butterfly Needle by holding yellow sheath and pulling wings backward

NOTE
Do not discard tube holder

19. Carefully unscrew Tube Holder from Butterfly Needle; temp stow

20. Discard used Butterfly Needle (with sharp edges facing down) in Sharps Container

21. Remove Tourniquet and stow in Integrated Immune Blood Collection Kit
22. Keep Gauze on venipuncture site for pressure bandage
   Place Band-Aid over folded Gauze
   Discard any excess Gauze and Band-Aid wrapper in Biohazard Bag

23. Retrieve filled blood tubes from Blood Sample Sleeve and label both tubes with crewmember name and GMT (e.g., Smith: GMT 168:19:48)

24. Stow blood tubes back in Blood Sample Sleeve and temp stow

25. Discard X-Large Gloves in Biohazard Bag
   Dispose of any remaining Biocide Wipes, Gauze, Gray Tape, or empty packaging used in the activity

C. STOW HARDWARE
1. Remove full Biohazard Bag, close with Gray Tape
   Discard full Biohazard Bag in appropriate disposal location

2. Stow in Integrated Immune Blood Collection Kit:
   Blood Sample Sleeve with blood samples
   Sharps Container (bottom first into pouch)
   Biocide Wipes (if any)
   Gauze (if any)
   Surgical Paper Tape, 1-in
   Fine Point Sharpie
   Tube Holder
   Remaining Band-Aid packages (if any)

3. Stow:
   MA16L Integrated Immune Blood Collection Kit
   Put away Gray Tape per crew preference
SDBI 1900, SALIVA COLLECTION FOR INTEGRATED IMMUNE

OBJECTIVE:
Integrated Immune Assessment (Integrated Immune). The purpose of this procedure is to effectively perform saliva collection to achieve Integrated Immune Experiment objectives.

PARTS:
Integrated Immune Saliva Collection Kit:
- Salivette Bag (package with cotton swabs)
- Saliva Sample Preservative Bag
- Label
- Saliva Collection Dry Booklet
- Saliva Sample Return Pouch
- Fine Point Sharpie

A. SETUP FOR SALIVA SAMPLE COLLECTION

NOTE
Any Saliva Sample Return Pouch (labeled USED and does not have crewmember data filled in) located in the Integrated Immune Saliva Collection Kit will suffice for this step.

1. Unstow:
   MA16L Integrated Immune Saliva Collection Kit: Fine Point Sharpie
   Label from plastic window of Saliva Sample Return Pouch

2. Write crewmember name on label using Fine Point Sharpie
   Return label to plastic window it was taken from
   Temp stow Fine Point Sharpie

Cont next page
B. PERFORM LIQUID SALIVA SAMPLE COLLECTION

NOTE
Liquid saliva should be collected immediately post-sleep (before brushing teeth, before breakfast, and before any liquid intake)

1. Retrieve from Integrated Immune Saliva Collection Kit:
   - Salivette Bag
   - Saliva Sample Preservative Bag

2. Temp stow Saliva Sample Preservative Bag

NOTE
Touching the Cotton Swab with fingers at any point of the data collection will contaminate the sample

3. Open Salivette Bag and by kneading and manipulating the outside of package, separate one Cotton Swab from the others and move it towards the opening of the package

4. Place Salivette Bag with Cotton Swab near mouth and then transfer Cotton Swab from package into mouth. Lightly roll Cotton Swab around mouth with tongue until saturated (2 min max). Do not bite down or chew on Cotton Swab

5. Stow Salivette Bag with remaining Cotton Swab in Integrated Immune Saliva Collection Kit

6. Retrieve Saliva Sample Preservative Bag from temp stow

7. Using mouth, place Cotton Swab in Saliva Sample Preservative Bag

Cont next page
8. Close seal on Saliva Sample Preservative Bag

   NOTE
   Ensure bag is sealed prior to mixing preservative

9. Remove clamp, mix preservative with Cotton Swab

10. Reclamp across top of Saliva Sample Preservative Bag

11. Using Fine Point Sharpie, write crewmember name and GMT on Saliva Sample Preservative Bag (e.g., Smith: GMT 168:19:48)

12. Stow sample in Saliva Sample Return Pouch (labeled with crewmember name in part A step 2) inside Integrated Immune Saliva Collection Kit

C. PERFORM DRY SALIVA COLLECTION

   NOTE
   First sample should be taken as soon after waking as is convenient

1. Retrieve from Integrated Immune Saliva Collection Kit:
   Dry Saliva Collection Book

2. Write crewmember name in name section on cover of Dry Saliva Collection Book

3. Open cover
   Select (but do not remove from book) the corresponding sheet of filter paper to the time period sample is being taken (WAKE, WAKE + 30 MINUTES, WAKE + SIX HOURS, WAKE + TEN HOURS, RETIRE) as illustrated on the cover
   Label GMT on corresponding color and time period on cover

Cont next page
NOTE
Take care not to touch other collection time's filter papers when using Dry Saliva Collection Book

4. Place filter paper in mouth and saturate filter paper with saliva

NOTE
Do not touch saturated part of filter paper while drying. Filter paper does not have to be 100% dry before stowing/temp stowing. Use crew discretion

5. Remove filter paper from mouth. Wipe excess liquid saliva from filter paper with lips
Allow to air dry

6. Temp stow Dry Saliva Collection Book or maintain on person if desired

7. For subsequent collections, retrieve Dry Saliva Collection Book from temp stow and repeat steps 3 thru 6 four times throughout the day that correspond to the remaining four time intervals from wake period

8. After collecting last dry saliva sample, open Saliva Sample Return Pouch (labeled with crew ID) inside Integrated Immune Collection Kit and stow Dry Saliva Collection Book inside Saliva Sample Return Pouch

D. STOW HARDWARE
MA16L 1. Stow: Integrated Immune Saliva Collection Kit
WING LEADING EDGE SENSORS (WLES) PROCEDURES

WLES ACTIVATION AND CHECKOUT .........................   FS 8-2
DEACTIVATION AND TEARDOWN .........................   FS 8-10
LAPTOP RECEIVER UNIT (LRU) R&R .................   FS 8-12
CABIN RELAY UNIT R&R .................................   FS 8-14
CONFIGURE WLES DATA FILE BACKUP PATH ......   FS 8-16
PREP WLES LAPTOPS FOR TRANSFER .................   FS 8-17
WLES RNDZ TOOLS CHECKOUT PREP .....................   FS 8-18
DOCK/UNDOCK RECOVERY ...............................   FS 8-18
DISABLE WLES FILE BACKUP ............................   FS 8-19
ENABLE WLES FILE BACKUP ..............................   FS 8-19
WLES ACTIVATION AND CHECKOUT

1. UNSTOW EQUIPMENT

NOTE
A31p laptops may already be unstowed as part of orbiter laptop network setup

ML60E Unstow:
Laptop Receiver Units (2)
Cabin Relay Units (2):
   CRU A (S/N 2432)
   CRU B (S/N 2496)
STS6 A31p laptop (WLES)
STS5 A31p laptop (RPOP2)

2. SETUP WLES RELAY UNITS

CAUTION
Cross-connecting CRU A to MICRO WIS SYSTEM B (and vice versa) will prevent WLES ops, though step 8 would still show good comm

NOTE
Green patch on Cabin Relay Unit is antenna and must face into cabin

A6 Unstow coiled WLE SYSTEM A cable
A13 Connect plug PNL A13 SYSTEM A to jack MICRO WIS SYSTEM A J7 (see fig 8-1)
CRU A Connect plug CABIN RELAY UNIT to J1 on CRU A (S/N 2432)
STBD Secure CRU A to STBD side of aft cabin with Velcro OVHD (see fig 8-2)

A9 Unstow coiled WLE SYSTEM B cable
A13 Connect plug PNL A13 SYSTEM B to jack MICRO WIS SYSTEM B J8 (see fig 8-1)
CRU B Connect plug CABIN RELAY UNIT to J1 on CRU B (S/N 2496)
PORT Secure CRU B to PORT side of aft cabin with Velcro OVHD (see fig 8-3)

Cont next page
Figure 8-1.- A13 panel.
Figure 8-2.- Aft STBD location.

Figure 8-3.- Aft PORT location.

Cont next page
FS 8-4 ORB OPS/129/FIN
NOTE
Laptops may be powered or unpowered.
Laptops may be connected to network or standalone

3. SETUP PRIME WLES LAPTOP
   A31p Secure Laptop Receiver Unit to A31p with Velcro
   (see fig 8-4)
   Connect Laptop Receiver Unit to A31p Serial port
   using thumbscrews (see fig 8-5)
   Verify line of sight between Laptop Receiver Unit
   and both CRUs
   Verify 5-in minimum distance between Laptop
   Receiver Unit and both CRUs

4. SETUP BACKUP WLES LAPTOP

   NOTE
   Single laptop ops are preferred over delays in activation. If problems with
   Backup Laptop occur, skip step 4

   Secure Laptop Receiver Unit to A31p with Velcro
   (see fig 8-4)
   Connect Laptop Receiver Unit to A31p Serial port
   using thumbscrews (see fig 8-5)
   Verify line of sight between Laptop Receiver Unit
   and both CRUs
   Verify 5-in minimum distance between Laptop
   Receiver Unit and both CRUs

Figure 8-4.- Laptop Receiver Unit.
5. **LAUNCH WLES SOFTWARE**
   Perform for both laptops:
   - If laptops are off, A31p pwr – On
   - Double click the time in system tray (lower-right corner)
   - ‘Date and Time Properties’
   - ‘Time Zone’
   - Time zone – (GMT) Greenwich Mean Time
   - Click ‘OK’
   - Double click ‘Shuttle Apps’>‘WLES’>‘WLES’
   - ‘Backup Mode Selection’
   - If setting up one A31p, select ‘Standard’
   - If setting up two A31p laptops:
     - For prime laptop, select ‘Primary’
     - For backup laptop, select ‘Secondary’
   - If ‘EWBMTAU-WLEFlight’ appears with message ‘Run the current command: XXXX_AA_BB_SNYYYY.xml?’:
     - Click ‘Yes’

**NOTE**
The secondary laptop lid may be closed at this time, if no longer needed for other applications. The laptops are configured so that they do not enter ‘standby’ or ‘hibernate’ mode when the lids are closed. However, due to cooling concerns, fully closing the lid is not recommended.

Cont next page
6. **VERIFY LRU INSTALLATION**

   Use prime WLES laptop

   ‘Enhanced Wideband MicroTAU – WLEFlight 3.0’
   Click ‘System Settings’ (left side of display)

   ‘Communications Settings’
   RF Receiver Port: ‘COM 1’

   Click ‘Query Receiver’
   Verify ‘Receiver found on COM1’ message appears

   * If ‘Query Receiver’ fails:
   *   * Reseat LRU
   *   * Reboot prime WLES laptop
   *   * Double click ‘Shuttle Apps’>’WLES’>
   *   * ‘WLES’
   *   * Select ‘Primary’
   *   * Repeat step 6
   *   * If no Joy, perform WLES LRU R&R, steps
   *   1-4, 6, then:

7. **VERIFY DATA FILE BACKUP**

   Use prime WLES laptop

   Verify ‘Backup Directory’ set to:
   ‘S:\Program Files\Invocon\EWBMTAU-WLEFlight’

   * If ‘Backup Directory’ not set as above:
   *   * ‘System Settings’
   *   * ‘Directories’
   *   * At the line ‘Backup Directory’ click
   *   * ‘Browse…’ (right side of display)
   *   * ‘Browse for Folder’
   *   * Navigate to WLES folder on RPOP2:
   *   * ‘My Computer’>’C on RPOP2 (S:)’> ‘Program Files’>’Invocon’>
   *   * ‘EWBMTAU-WLEFlight’
   *   * Click ‘OK’

   Verify ‘Backup Interval’ set to ‘30 minutes’
8. VERIFY COMM WITH RELAY UNITS
Use prime WLES laptop

‘Main’
Click ‘Unit List’ (left side of display)

NOTE
Each Cabin Relay Unit is identified with a
unique serial number; this number appears
as ‘Unit ID’ in the software

√ Cabin Relay Units Unit ID 2432 and 2496 present on
display in first column; scroll down as necessary
For each Cabin Relay Unit:
√ Unit ID present
√ Type: ‘Relay-GL’
√ Last Update: time is updating (every 5 to 15 sec)

* If one CRU time does not update: *
* Perform WLES CABIN RELAY UNIT R&R, *
* steps 1 thru 3, then: *
* Go to step 9 *
* If neither CRU time updates after 2 min, *
* contact MCC-H *

√ Via: ‘RF’
√ Mode: ‘Idle’

9. INITIATE COMMANDING

Double click ‘Shuttle Apps’>‘WLES’>‘WLES Data
Folder’

Double click ‘Shuttle Apps’>‘WLES’>‘WLES Cmd
Folder’

Cont next page
NOTE
Deleting ‘BLOCK.xml’ file initiates command execution. Command files disappear from this folder as they are executed.

Files appearing in the ‘Data’ folder verifies two-way communication with the Sensor Units in the orbiter wing

‘Command’
Delete file labeled ‘BLOCK.xml’
At prompt “Are you sure you want to send ‘Block.xml’ to the Recycle Bin?”, click ‘Yes’

Wait 1 minute
Verify the first data file appears in the ‘Data’ folder

Close ‘Command’ and ‘Data’ folders

10. REPORT WLES STATUS
Notify MCC-H: “WLES setup complete”

If reporting a failed and replaced CRU, include:
   Failed CRU S/N

NOTE
The laptop lid may be closed at this time, if no longer needed for other applications. The laptops are configured so that they do not enter ‘standby’ or ‘hibernate’ mode when the lids are closed. However, due to cooling concerns, fully closing the lid is not recommended
WLES DEACTIVATION AND TEARDOWN

1. **DEACTIVATE WLES LAPTOP**

   **NOTE**
   MCC will configure WLES for entry by setting all sensor units to idle mode

   **On MCC GO:**
   A31p ‘Enhanced Wideband MicroTAU – WLEFlight 3.0’

   For each WLES A31p:
   Click ‘Exit’
   At prompt ‘Are you sure you want to exit?’ click ‘Yes’
   Click ‘Start’>’Turn Off Computer…’>’Turn Off’
   Disconnect Laptop Receiver Unit from A31p Serial port
   Remove Laptop Receiver Unit from Velcro on A31p

2. **REMOVE WLES RELAY UNITS**

   Remove Cabin Relay Units (2) from aft cabin (see figs 8-6 and 8-7)
   Disconnect Cabin Relay Units from pre-routed cables
   Disconnect and coil cables, stow in launch location

---

Figure 8-6.- Aft STBD location.
Cont next page
3. **STOW EQUIPMENT**

   **ML60E**

   Stow:
   - Laptop Receiver Units (2)
   - Cabin Relay Units (2)
   Notify MCC-H: "WLES Teardown Complete"
WLES LAPTOP RECEIVER UNIT (LRU) R&R

1. DISCONNECT BACKUP LRU FROM LAPTOP
   A31p
   ‘Enhanced Wideband MicroTAU – WLEFlight 3.0’

   Click ‘Exit’
   At prompt ‘Are you sure you want to exit?’
   click ‘Yes’

   Disconnect Backup LRU from Backup A31p Serial
   port (see fig 8-8)
   Remove Backup LRU from Velcro on Backup A31p
   (see fig 8-9)

   Serial Port
   Figure 8-8.- A31p ports.
   Figure 8-9.- Laptop Receiver Unit.

2. DISCONNECT PRIME LRU FROM LAPTOP
   Disconnect Prime LRU from Prime A31p Serial port
   (see fig 8-8)
   Remove LRU from Velcro on A31p

   Cont next page
   FS 8-12 ORB OPS/129/FIN
3. **CONNECT BACKUP LRU**
   Connect Backup LRU to Prime WLES A31p Serial port
   Secure LRU to A31p with Velcro

4. **VERIFY LRU INSTALLATION**
   **A31p**
   Use prime WLES laptop
   ‘Enhanced Wideband MicroTAU – WLEFlight 3.0’
   Click ‘System Settings’ (left side of display)
   ‘Communications Settings’
   √ RF Receiver Port: ‘COM 1’
   Click ‘Query Receiver’
   Verify ‘Receiver found on COM1’ message appears

5. **VERIFY COMM WITH RELAY UNITS**
   **A31p**
   Click ‘Unit List’ (left side of display)
   √ Cabin Relay Units Unit ID 2432 and 2496 present on display in first column; scroll down as necessary
   For each Cabin Relay Unit:
   √ Unit ID present
   √ Type: ‘Relay-GL’
   √ Last Update: time is updating (every 5 to 15 sec)
   √ Via: ‘RF’
   √ Mode: ‘Idle’
   If no time updates after 2 min, contact MCC-H

6. **STOW EQUIPMENT**
   **A31p**
   Notify MCC-H: “WLES LRU R&R complete”, mark failed LRU as ‘failed’
   **ML60E**
   Stow:
   Prime (failed) LRU

---

FS 8-13 ORB OPS/129/FIN
**WLES CABIN RELAY UNIT R&R**

1. **DISCONNECT FAILED CRU AND STOW**
   - **OVHD**
     - Disconnect WLE SYSTEM cable from J1 connector on failed CRU
     - Mark failed CRU as ‘failed’ and stow in ML60E

2. **SETUP SPARE WLES RELAY UNIT**
   - **ML60E**
     - Unstow CRU SPARE (S/N 2304)
     - WLE SYSTEM cable
     - Connect plug CABIN RELAY UNIT A or B to J1 on CRU S/N 2304
   - **OVHD**
     - Secure CRU SPARE to the aft cabin with Velcro

3. **VERIFY COMM WITH SPARE RELAY UNIT**
   - **A31p**
     - Use prime WLES laptop
     - ‘Main’
     - Click ‘Unit List’ (left side of display)

   **NOTE**
   Each Cabin Relay Unit is identified with a unique serial number; this number appears as ‘Unit ID’ in the software

   √ Cabin Relay Unit Unit ID 2304 present on display in first column; scroll down as necessary
   Cabin Relay Unit:
   √ Unit ID present
   √ Type: ‘Relay-GL’
   √ Last Update: time is updating (every 5 to 15 sec)
   √ Via: ‘RF’
   √ Mode: ‘Idle’

   **NOTE**
   Loss of redundant relay path until the config file is updated by the ground

Cont next page
4. **EXIT WLES SOFTWARE ON BOTH LAPTOPS**

**On MCC GO:**

A31p On both Prime and Backup WLES laptops:

- ‘Enhanced Wideband MicroTAU – WLEFlight 3.0’
  Click ‘Exit’ (upper right side of display)

- ‘EWBMTAU – WLEFlight’
  ‘Are you sure you want to exit?’, click ‘Yes’

Notify MCC-H when complete

**NOTE**

OCA will replace the config files on both laptops

5. **LAUNCH WLES SOFTWARE**

**On MCC GO:**

A31p On both Prime and Backup WLES laptops:

- Double click ‘Shuttle Apps’>‘WLES’>‘WLES’

- ‘Backup Mode Selection’
  If setting up one A31p, select ‘Standard’

  If setting up two A31p laptops:
  - For prime laptop, select ‘Primary’
  - For backup laptop, select ‘Secondary’

  If ‘EWBMTAU-WLEFlight’ window appears with message ‘Run the current command: XXXX_AA_BB_SNYYYY.xml?’:
  - Click ‘Yes’

6. **REVERIFY COMM WITH SPARE RELAY UNIT**

Repeat step 3

7. **REPORT WLES STATUS**

Notify MCC-H: “WLES CRU R&R complete”
CONFIGURE WLES DATA FILE BACKUP PATH

NOTE
MCC will identify new backup WLES laptop to be used in place of RPOP2 (S:)

A31p Use prime WLES laptop

‘Enhanced Wideband MicroTAU – WLEFlight 3.0’
Click ‘System Settings’ (left side of display)

‘Directories’
At the line ‘Backup Directory:’ click ‘Browse…’ (right side of display)

‘Browse for Folder’
Navigate to WLES folder on RPOP2:
‘My Computer’->‘C on RPOP2 (S:)->‘Program Files’->‘Invocon’->‘EWBMTAU-WLEFlight’

Click ‘OK’

Verify ‘Backup Directory:’ set to:
‘S:\Program Files\Invocon\EWBMTAU-WLEFlight’

Verify ‘Backup Interval’ set to ‘30 minutes’

Click ‘Unit List’ (left side of display)
PREP WLES LAPTOPS FOR TRANSFER

1. DEACTIVATE WLES LAPTOP(S)
   A31p ‘Enhanced Wideband MicroTAU – WLEFlight 3.0’
   For each WLES A31p to be transferred:
   Click ‘Exit’
   At prompt ‘Are you sure you want to exit?’
   click ‘Yes’
   Click ‘Start’>’Turn Off Computer…’>’Turn Off’
   Disconnect Laptop Receiver Unit from A31p Serial port
   Remove Laptop Receiver Unit from Velcro on A31p

2. SET UP NEW WLES LAPTOPS
   √MCC-H for which laptop to use
   If Prime Laptop being transferred:
   Perform WLES ACTIVATION AND CHECKOUT,
   steps 3, 5 thru 8, then:
   If Backup Laptop being transferred:
   Perform WLES ACTIVATION AND CHECKOUT,
   steps 4 and 5, then:
   Notify MCC-H: “PREP WLES LAPTOPS FOR TRANSFER complete”
WLES RNDZ TOOLS CHECKOUT PREP

1. **DEACTIVATE BACKUP WLES LAPTOP**
   A31p
   On backup WLES laptop:
   - ‘Enhanced Wideband MicroTAU – WLEFlight 3.0’
   - Click ‘Exit’
   - At prompt ‘Are you sure you want to exit?’
     - click ‘Yes’
   - Disconnect Laptop Receiver Unit from A31p Serial port
   - Leave attached to laptop with Velcro on A31p

2. **DEACTIVATE WLES FILE BACKUP**
   On prime WLES laptop:
   - ‘Enhanced Wideband MicroTAU – WLEFlight 3.0’
   - Click ‘System Settings’ (left side of display)
     - ‘Backup Mode Selection’
     - Click ‘Standard’
     - Click ‘Unit List’ (left side of display)

WLES DOCK/UNDOCK RECOVERY

1. **RECOVER BACKUP WLES LAPTOP**
   A31p
   On backup WLES laptop:
   - Connect Laptop Receiver Unit to A31p Serial port
   If laptop is off:
     - A31p pwr – On
     - At prompt select option 1 to start WLES
   If laptop is on:
     - Double click ‘Shuttle Apps’>‘WLES’>‘WLES’
   - ‘Backup Mode Selection’
   - Click ‘Secondary’

2. **REACTIVATE WLES FILE BACKUP**
   On prime WLES laptop:
   - ‘Enhanced Wideband MicroTAU – WLEFlight 3.0’
   - Click ‘System Settings’ (left side of display)
     - ‘Backup Mode Selection’
     - Click ‘Primary’
     - Click ‘Unit List’ (left side of display)
DISABLE WLES FILE BACKUP
(SWITCH TO STANDARD MODE)

A31p On prime WLES laptop:
‘Enhanced Wideband MicroTAU – WLEFlight 3.0’
Click ‘System Settings’ (left side of display)
‘Backup Mode Selection’
Click ‘Standard’
Click ‘Unit List’ (left side of display)

ENABLE WLES FILE BACKUP
(SWITCH TO PRIMARY MODE)

A31p On prime WLES laptop:
‘Enhanced Wideband MicroTAU – WLEFlight 3.0’
Click ‘System Settings’ (left side of display)
‘Backup Mode Selection’
Click ‘Primary’
Click ‘Unit List’ (left side of display)
PAYLOADS OF OPPORTUNITY

MAUI PROCEDURE.......................................................... FS 9-2
RAMBO-2 PROCEDURE..................................................... FS 9-6
MAUI PROCEDURE

-15:00

1. MANEUVER TO START ATTITUDE or earlier (BIASED +ZLV +YVV)

Deploy MAUI – RCS FIRING SEQUENCE (Cue Card)

GNC 20 DAP CONFIG

√DAP A1, B1 loaded

UNIV PTG

TGT ID – ITEM 8 +2 EXEC
BODY VECT – ITEM 14 +5 EXEC
P – ITEM 15 +2 7 0 EXEC
Y – ITEM 16 +3 5 0 EXEC
OM – ITEM 17 +2 7 0 EXEC

TRK – ITEM 19 EXEC (CUR - *)

2. INITIATE TIMER

√MCC for start time

GNC 2 TIME

Set count down/count up timer per MCC

√MET – ITEM 2 EXEC (*)

crt timer count to – item 17 +_ _ +_ _ +_ _ +_ _ + exec

3. SETUP

O14:E, cb DDU L (two) – cl
O15:E
O14:F, Pri RJD LOGIC, DRIVER (sixteen) – ON
O15:F,
O16:F

GNC 20 DAP CONFIG

DAP A PRI P OPTION – ITEM 15 EXEC (NOSE)
ROT PLS – ITEM 13 +1.0 0 0 EXEC
TRAN PLS – ITEM 17 +0.7 3 EXEC
VERN ROT PLS – ITEM 26 +0.1 5 3 EXEC

Cont next page

FS 9-2
ORB OPS/129/FIN
Deselect Jets:

Forward RCS page – ITEM 1 EXEC
Jet DES F1D – ITEM 23 EXEC (*)
F2D – ITEM 27 EXEC (*)

C3 ✓ DAP: A/AUTO/VERN
✓ DAP TRANS: PULSE/PULSE/PULSE
✓ DAP ROT: PULSE/PULSE/PULSE

4. VERIFY ATTITUDE

-05:00 Verify in attitude

NOTE
For the following RCS firing sequence (step 5):

A. Expect total orbiter body rates (RSS) to exceed 1 deg/sec

B. Possible loss of comm due to orbiter body rates and attitude excursions

C. For any jet fail OFF, continue with firing sequence

D. Requirement is for a particular jet group, not a specific jet

E. The table in step 5 is also provided as a cue card

Cont next page
5. RCS FIRING SEQUENCE

NOTE
Use the table below or the cue card

<table>
<thead>
<tr>
<th>Timer</th>
<th>Jets Fired</th>
<th>CDR</th>
<th>PLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>-03:00</td>
<td></td>
<td></td>
<td>Configure initial setup</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GNC 23 RCS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Left RCS page – ITEM 2 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>On CDR “GO”, proceed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOTE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Expect DAP RECONF</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>mags in following actions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Deselect jets:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>JET DES L5L – ITEM 37 EXEC (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Right RCS page – ITEM 3 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>JET DES R5D – ITEM 39 EXEC (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Forward RCS page – ITEM 1 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>JET DES F5L – ITEM 37 EXEC (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOTE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Queue the following ITEM entry on</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the scratch pad. Do not perform</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>the EXEC until specified at 35 sec</td>
</tr>
<tr>
<td>-00:30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>FLT CNTLR PWR – ON</td>
<td></td>
</tr>
<tr>
<td>00:00</td>
<td>RxA, LxA</td>
<td>THC +X (in)</td>
<td>(3 sec firing)</td>
</tr>
<tr>
<td>00:15</td>
<td>Fxl, Lxl</td>
<td>THC +Y (right)</td>
<td>(3 sec firing)</td>
</tr>
<tr>
<td>00:30</td>
<td>Fxr, Rxr</td>
<td>THC -Y (left)</td>
<td>(3 sec firing)</td>
</tr>
<tr>
<td>00:35</td>
<td></td>
<td></td>
<td>When jets stop firing:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EXEC [JET DES F3D – ITEM 25 (*)]</td>
</tr>
<tr>
<td>00:45</td>
<td>F4d</td>
<td>RHC +pitch</td>
<td>(Past Soft Stop, hold 3 sec)</td>
</tr>
<tr>
<td>00:48</td>
<td></td>
<td>RHC release</td>
<td></td>
</tr>
<tr>
<td>00:50</td>
<td></td>
<td>DAP: VERN</td>
<td></td>
</tr>
<tr>
<td>01:00</td>
<td>R5r</td>
<td>RHC +yaw</td>
<td>(10 sec firing)</td>
</tr>
<tr>
<td>01:20</td>
<td>L5d</td>
<td>RHC -pitch</td>
<td>(12 sec firing)</td>
</tr>
<tr>
<td>01:40</td>
<td>F5r</td>
<td>RHC +pitch</td>
<td>(12 sec firing)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FLT CNTLR PWR – OFF</td>
<td>Return to MAUI PROCEDURE, step 6,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(ORB OPS FS, MAUI)</td>
</tr>
</tbody>
</table>

Cont next page
6. CLEANUP

F6 √FLT CNTLR PWR – OFF

GNC 23 RCS

√Forward RCS page – ITEM 1 EXEC
Reselect Jets:
  JET DES F1D – ITEM 23 EXEC (no *)
  F3D – ITEM 25 EXEC (no *)
  F2D – ITEM 27 EXEC (no *)
  F5L – ITEM 37 EXEC (no *)

Left RCS page – ITEM 2 EXEC
   JET DES L5L – ITEM 37 EXEC (no *)

Right RCS page – ITEM 3 EXEC
   JET DES R5D – ITEM 39 EXEC (no *)

GNC 20 DAP CONFIG

DAP A1 – ITEM 1 + 1 EXEC

7. SNAP LVLH ATTITUDE AND NULL RATES

When time \( \geq +03:30 \):
  DAP: A/PRI
  DAP: LVLH

When rates stable:
  DAP: VERN

Return to FLT PLN attitude

8. RECONFIGURE TO GROUP B POWERDOWN

MCC

O14:E, cb DDU L (two) – op
O15:E

O14:F, Pri RJD LOGIC, DRIVER (sixteen) – OFF
O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
O16:F
RAMBO-2 PROCEDURE

NOTE
This procedure completes a WAKE, RAM and Out-of-Plane burn. The direction of the Out-of-Plane burn is dependent upon satellite geometry and will be provided by MCC for the specific burn opportunity.

-15:00 1. MANEUVER TO WAKE BURN ATTITUDE
(BIASED +ZLV+XVV)

GNC 20 DAP CONFIG
√DAP A1, B1 loaded

UNIV PTG
TGT ID – ITEM 8 +2 EXEC
BODY VECT – ITEM 14 +5 EXEC
P – ITEM 15 +2 2 0 EXEC
Y – ITEM 16 +0 EXEC
OM – ITEM 17 +0 EXEC
TRK – ITEM 19 EXEC (CUR - *)
DAP: A/AUTO/VERN(ALT)

2. INITIATE TIMER
√MCC for burn sequence start time

GNC 2 TIME
Set count down/count up timer per MCC
√MET – ITEM 2 EXEC (*)
CRT TIMER COUNT TO – ITEM 17 +_ _ +_ _ +_ _ EXEC

3. SETUP
O14:E, cb DDU L (two) – cl
O15:E
O14:F, Pri RJD LOGIC, DRIVER (sixteen) – ON
O15:F,
O16:F

Cont next page
4. **VERIFY ATTITUDE**

-01:00 Verify in attitude

F6 FLT CNTLR PWR – ON

5. **WAKE BURN**

0:00 DAP: PRI

Wait 20 seconds

THC +X (in) for 10 seconds

Wait 20 seconds before executing next maneuver

6. **MANEUVER TO RAM BURN ATTITUDE**

(BIASED -ZLV-XVV)

F6 FLT CNTLR PWR – OFF

**UNIV PTG**

TGT ID – ITEM 8 +2 EXEC

BODY VECT – ITEM 14 +5 EXEC

P – ITEM 15 +1 2 0 EXEC

Y – ITEM 16 +0 EXEC

OM – ITEM 17 +0 EXEC

TRK – ITEM 19 EXEC (CUR - *)

DAP: B/AUTO/ALT

When in attitude and if VRCS available:

DAP: VERN

When rates stable:

DAP: PRI

F6 FLT CNTLR PWR – ON

Wait 20 seconds
7. **RAM BURN**
   THC +X (in) for 10 seconds
   
   Wait 20 seconds before executing next maneuver

8. **MANEUVER TO OUT-OF-PLANE BURN ATTITUDE**

   F6 FLT CNTLR PWR – OFF

   [$\text{UNIV PTG}$]
   
<table>
<thead>
<tr>
<th>TGT ID</th>
<th>ITEM 8 +2 EXEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>BODY VECT</td>
<td>ITEM 14 +5 EXEC</td>
</tr>
<tr>
<td>P</td>
<td>ITEM 15 +9 0 EXEC</td>
</tr>
<tr>
<td>Y</td>
<td>ITEM 16 +0 EXEC</td>
</tr>
</tbody>
</table>

   $\sqrt[3]{\text{MCC}}$ for burn omicron

   If stbd wing to velocity vector:
   
   | OM | ITEM 17 +2 7 0 EXEC |
   |-------------------|

   If port wing to velocity vector:
   
   | OM | ITEM 17 +9 0 EXEC |
   |-------------------|

   TRK – ITEM 19 EXEC (CUR - *)
   
   DAP: B/AUTO/ALT

   When in attitude and if VRCS available:
   
   DAP: VERN

   When rate stable:
   
   DAP: PRI

   F6 FLT CNTLR PWR – ON

   Wait 20 seconds

9. **OUT-OF-PLANE BURN**
   THC +X (in) for 10 seconds
   
   Wait 20 seconds before returning to VERN(ALT) below
10. CLEANUP
F6 FLT CNTLR PWR – OFF

GNC 20 DAP CONFIG
DAP A1 – ITEM 1 +1 EXEC

DAP: VERN(ALT)

Return to FLT PLN attitude

11. RECONFIGURE TO GROUP B POWERDOWN

\checkmark MCC

O14:E, cb DDU L (two) – op
O15:E

O14:F, Pri RJD LOGIC, DRIVER (sixteen) – OFF
O15:F, RJDA 1A L2/R2 MANF DRIVER – ON
O16:F
NOTE
This procedure is to be used when filling a CWC-I containing a purple card (for iodinated water). Assumes Galley Morning Config and Overnight Config performed daily. To minimize contamination possibility, avoid touching any internal parts of QDs or connections.

EQUIPMENT PREPARATION
Unstow from designated stowage when needed:
- Towel(s)
- CWC-I Fill Assembly
- 3/8" Male Hose Adapter ("-2" Adapter)
- Sample/Purge Kit
- CWC-I Bags
- Timer

A. **CWC-I FILL ASSEMBLY SET UP**

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

1. Retrieve CWC-I Fill Assembly

2. Connect R/Y QD Adapter of CWC-I Fill Assembly to free end of Tee attached to Chilled QD (#5) at QD bracket (see fig 10-1)

![Diagram of CWC-I Fill Assembly connection at ML90N.](image)

Figure 10-1.- CWC-I Fill Assembly connection at ML90N.

Cont next page
B. CWC-I FILL ASSEMBLY PURGE

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

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

   CAUTION
   Ensure Sample Adapter valve is not open prior to mating

   NOTE
   Use ONLY sampling adapter labeled for potable water sampling

2. Assemble Purge hardware as shown in fig 10-2

   Figure 10-2.- CWC-I Fill Assembly purge hardware.

3. Remove cap on Needle Adapter and attach Purge Bag

   CAUTION
   Assembly provides high flow. Throttle Sample Adapter Valve

4. Open valve on Sample Adapter and fill bag to capacity (about 12 ounces). Close valve when capacity reached

5. Disconnect Purge Bag from Needle Adapter
   Stow Purge Bag in Ziplock Bag and place in crew designated location (Fresh Food Locker)
   Replace cap on Needle Adapter

Cont next page
C. PURGE ASSEMBLY TEARDOWN
1. De-mate all connections shown in fig 10-2

2. Stow Purge Assembly hardware (place equipment in Ziplock Bags) in Sample/Purge Kit except "-2" Adapter. Return "-2" Adapter to Window Shade Bag

D. CWC-I FILL INITIATION

R11L If SPLY H2O XOVR VLV – CL (tb-bp) (water transfer config):
   1. SPLY H2O TKA OUTLET – CL (tb-CL)

If reqd, unstow CWC-I Fill Assembly:

ML90N 2. CWC-I Fill Assembly → Chilled Water Line Tee QD (#5) (see fig 10-3)

Figure 10-3.- CWC-I Fill Assembly connection at ML90N.

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

| CAUTION |
| Do not overfill CWC-I as damage to bag may occur |
| Do not detach CWC-I QD restraint during fill |

| NOTE |
| CWC-I will begin filling as soon as free end of CWC-I Fill Assembly connected to CWC-I |

Cont next page
4. Set timer for 10 min
Attach timer to Velcro square on CWC-I

5. CWC-I → CWC-I Fill Assembly (see fig 10-4)

6. Start 10 min time

E. FILL TERMINATION
After 10 min or MCC call:

ML90N
1. CWC-I ←→ CWC-I Fill Assembly
   (see fig 10-5)

2. Verify purple card (for iodinated water) is visible in all three windows:
   If samples reqd, perform CWC-I SAMPLING PROCEDURE, then proceed to step E3
   If no samples reqd, temp stow CWC-I until transfer to ISS

Cont next page
3. If filling multiple CWC-Is, repeat steps D3 thru E2 for sequential fill(s)

R11L If SPLY H2O XOVR VLV – CL (tb-bp) (water transfer config):
4. SPLY H2O TKA OUTLET – OP (tb-OP)

5. Transfer CWC-I(s) to ISS

F. CWC-I FILL TEARDOWN

NOTE
Have towels ready to absorb any liquid released when demating QDs

ML90N 1. CWC-I Fill Assembly ←→ Chilled Water Line Tee QD (#5) (see fig 10-6)

Figure 10-6.- CWC-I Fill Assembly removal.

2. Temp stow CWC-I Fill Assembly

After last CWC-I fill of day:
3. Stow CWC-I Fill Assembly in Window Shade Bag
**CWC-I SAMPLING PROCEDURE** (if reqd)

**NOTE**
Use ONLY sampling adapter labeled for potable water sampling

1. Retrieve Sample/Purge Kit and obtain Potable (blue handle) Sampling Adapter

2. Connect Sample Adapter to Sample Bag

3. Connect QD end of Sampling Adapter to CWC-I. Ensure manual valve set to open position

4. Fill sample bag full (estimate visually) by squeezing CWC-I. When complete, close manual valve and remove Sample Bag. Fill out Sample Bag label, stow in Ziplock Bag, and place in crew-designated sample stowage location

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

![Diagram](image)

*Figure 10-7.* CWC-I sample setup.
NOT FLOWN FS 11-1 ORB OPS/129/FIN
<table>
<thead>
<tr>
<th>FLIGHT DAY</th>
<th>POS A</th>
<th>POS B</th>
<th>CK CMPLT</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAUNCH</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>PRE FD01</td>
<td>&quot;</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>POST FD02</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>PRE FD02</td>
<td>6</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>POST FD03</td>
<td>&quot;</td>
<td>7</td>
<td>DOCKING</td>
</tr>
<tr>
<td>PRE FD03</td>
<td>&quot;</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>POST FD04</td>
<td>8</td>
<td>&quot;</td>
<td>EVA 1</td>
</tr>
<tr>
<td>PRE FD04</td>
<td>&quot;</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>POST FD05</td>
<td>10</td>
<td>&quot;</td>
<td>Issued Inspection</td>
</tr>
<tr>
<td>PRE FD05</td>
<td>&quot;</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>POST FD06</td>
<td>&quot;</td>
<td>STS-126___</td>
<td>EVA 3</td>
</tr>
<tr>
<td>PRE FD06</td>
<td>STS-126___</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>POST FD07</td>
<td>&quot;</td>
<td>STS-126___</td>
<td>EVA 3</td>
</tr>
<tr>
<td>PRE FD07</td>
<td>&quot;</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>POST FD08</td>
<td>STS-126___</td>
<td>&quot;</td>
<td>EVA 3</td>
</tr>
<tr>
<td>PRE FD08</td>
<td>&quot;</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>POST FD09</td>
<td>&quot;</td>
<td>STS-126___</td>
<td>HATCH CLOSE</td>
</tr>
<tr>
<td>MID FD09</td>
<td>STS-126___</td>
<td>STS-119___</td>
<td></td>
</tr>
<tr>
<td>PRE FD09</td>
<td>&quot;</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>POST FD10</td>
<td>STS-119___</td>
<td>STS-119___</td>
<td>Unlocking</td>
</tr>
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<td>PRE FD10</td>
<td>STS-119___</td>
<td>STS-119___</td>
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<tr>
<td>POST FD11</td>
<td>STS-127___</td>
<td>STS-127___</td>
<td></td>
</tr>
<tr>
<td>PRE FD11</td>
<td>&quot;</td>
<td>STS-127___</td>
<td>&quot;</td>
</tr>
<tr>
<td>POST FD12</td>
<td>STS-127___</td>
<td>STS-127___</td>
<td>EOM</td>
</tr>
<tr>
<td>PRE FD12</td>
<td>11</td>
<td>12</td>
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<tr>
<td>POST FD13</td>
<td>13</td>
<td>14</td>
<td>EOM</td>
</tr>
<tr>
<td>PRE FD13</td>
<td>&quot;</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>POST FD14</td>
<td>16</td>
<td>17</td>
<td>EOM</td>
</tr>
<tr>
<td>PRE FD14</td>
<td>18</td>
<td>19</td>
<td>EOM</td>
</tr>
<tr>
<td>POST FD15</td>
<td>20</td>
<td>21</td>
<td>EOM</td>
</tr>
</tbody>
</table>

*Re-bag and seal LiOH cans w/Gray Tape and stow (Locations of canisters on back)

---

**NOTE**

This card is specifically used for the STS-129 mission with the orbiter conducting single shift operations with a shuttle crew size of 6 until Hatch Close and a crew size of 7 after Hatch Close.
This changeout scheme reflects FD3 docking with ISS, Vozdukh, and dual bed CDRA operation.

---

**ORB OPS-29a/nonRCRS/129/O/B**

**NOT FLOWN**  FS CC 11-3  **ORB OPS/129/FIN 2**
LIOH CANISTER STOWAGE LOCATIONS

Ascent Stowage Locations

Orbiter:
- MD52M (LiOH Box): Cans 1-31 *
- MIDDECK: Cans 32-33

ISS:
- STS-126 cans 18-23
- STS-119 cans 35-39
- STS-127 cans 27-31

Entry (EOM) Stowage Locations

Orbiter:
- MIDDECK: Cans 1-23
  - STS-126 cans 18-23
  - STS-119 cans 35-39
  - STS-127 cans 27-31

* 2 LiOH cans installed in LiOH slots A and B
### ORBIT BURN MONITOR

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMS TEMP*</td>
<td>L R F U IN P ≥ 230 or ≤ 213 ≤ 212</td>
</tr>
<tr>
<td>OMS PC* &amp; OMS ↓ ENG VLV 1 or 2 &lt; 70 or OX IN P ≥ 227 or OX IN P ≤ 227 or No OX IN P</td>
<td>OMS ENG FAIL or OMS PRPLT FAIL</td>
</tr>
<tr>
<td>OMS OX/FU TK P ↓ (ENG IN P) OX/FU LOW</td>
<td>He PRESS/VAP ISOL (two) – OP If aff TK P not incr: OMS PRPLT FAIL Cycle He Ab(1) to maintain TK P 234-284</td>
</tr>
<tr>
<td>OMS OX/FU TK P ↓ OX &amp; FU HIGH</td>
<td>OMS ENG – ARM</td>
</tr>
<tr>
<td>OMS N2 REG P HIGH or LOW</td>
<td>At N2 TK P &lt; 470: OMS ENG – ARM</td>
</tr>
<tr>
<td>OMS GMBL PRI fail or &quot;SEC fail&quot;</td>
<td>L(R) OMS GMBL – SEC (twice) If high RCS usage: OMS ENG FAIL</td>
</tr>
<tr>
<td>GPC</td>
<td>aff GPC PWR – OFF If SEC GMBL avail: aff MDM FF 1(4) – OFF, ON</td>
</tr>
<tr>
<td>I/O ERROR FA</td>
<td>L(R) OMS GMBL – SEC I/O RESET If high RCS usage: OMS ENG FAIL</td>
</tr>
<tr>
<td>BCE STRG D</td>
<td>L(R) OMS GMBL – SEC I/O RESET (if recov: &gt;&gt;) If high RCS usage: OMS ENG FAIL</td>
</tr>
<tr>
<td>GPC SET SPLIT Non-crit burn or Crit burn</td>
<td>STOP BURN: OMS ENG(s) – OFF Go to &quot;GPC&quot; above</td>
</tr>
<tr>
<td>I/O ERROR PCM</td>
<td>OI PCM/MU PWR – 2(1)</td>
</tr>
<tr>
<td>BCE BYP OA</td>
<td>SM I/O RESET</td>
</tr>
</tbody>
</table>

*If XFD, BLDN, or sensor fail, monitor ENG IN P for off-nominal performance

---

**ORB OPS-31a/129/O/A**

**NOT FLOWN**

**FS CC 11-5**

**ORB OPS/129/FIN**
If two FA MDMs lost

<table>
<thead>
<tr>
<th>MDMs</th>
<th>Preburn: ENG – OFF</th>
<th>During burn: MAN SHUTDN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2</td>
<td>LEFT (TVC)</td>
<td>BOTH</td>
</tr>
<tr>
<td>1,3</td>
<td>RIGHT (IGN)</td>
<td>LEFT</td>
</tr>
<tr>
<td>1,4</td>
<td>LEFT (IGN)</td>
<td>RIGHT</td>
</tr>
<tr>
<td>2,3</td>
<td>LEFT (IGN)</td>
<td>RIGHT</td>
</tr>
<tr>
<td>2,4</td>
<td>RIGHT (IGN)</td>
<td>LEFT</td>
</tr>
<tr>
<td>3,4</td>
<td>RIGHT (TVC)</td>
<td>BOTH</td>
</tr>
</tbody>
</table>

† If CNTL AB1 or AB2 (CA1 or CA2) failed and ign path still exists at OMS fail, assume L(R) OMS ↓ is PRPLT FAIL
* If L(R) Pc failed high during burn or FA3(4) failed, at L(R) OMS fail, no guidance downmode after L(R) OMS ENG switch OFF (TGO slow, ADI needles in error, 6 ft/s underburn)

ORB OPS-31b/129/O/A

(reduced copy)
<table>
<thead>
<tr>
<th>ITEM #</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>A6</th>
<th>A7</th>
<th>A8</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROT RATE</td>
<td>10/50</td>
<td>0.2000</td>
<td>0.4000</td>
<td>0.2000</td>
<td>0.5000</td>
<td>0.2000</td>
<td>0.2000</td>
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<tr>
<td>ATT DB</td>
<td>11/51</td>
<td>5.00</td>
<td>1.00</td>
<td>0.30</td>
<td>3.00</td>
<td>5.00</td>
<td>5.00</td>
<td>2.00</td>
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**BOLD/ITALIC indicates change from I-Load.**
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**BOLD/ITALIC** indicates change from I-Load.

1. I-loaded below keyboard limit; do not change.
2. ReferenceDocked DAP Reference (ORB OPS FS, REBOOST/DAP) for CNTL ACCL Selection
3. Use 1 for OBSS scan and 2 for Orbiter attitude maneuvers
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**NOTES**

1. Bold/italic indicates change from I-Load.
2. Reference DOCKED DAP REFERENCE (ORB OPS FS, REBOOST/DAP) for CNTL ACCL Selection
3. Use 1 for OBSS scan and 2 for Orbiter attitude maneuvers

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**renders copy**
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<td>Body rates:</td>
<td>Configure initial setup</td>
<td>On CDR “GO”, proceed</td>
</tr>
<tr>
<td></td>
<td>+0.047 &lt; roll ≤ +0.087</td>
<td>GNC 23 RCS – ITEM 2 EXEC</td>
<td>NOTE</td>
</tr>
<tr>
<td></td>
<td>-0.020 &lt; pitch ≤ +0.020</td>
<td>Left RCS page – ITEM 2 EXEC</td>
<td>Expect DAP RECONF msgs in following actions</td>
</tr>
<tr>
<td></td>
<td>-0.020 &lt; yaw ≤ +0.020</td>
<td>DAP: FREE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAP: APRI</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inform PLT “GO” for jet</td>
<td></td>
<td>Deselect jets:</td>
</tr>
<tr>
<td></td>
<td>deselected</td>
<td></td>
<td>JET DES L5L – ITEM 37 EXEC (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Right RCS page – ITEM 3 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>JET DES R5D – ITEM 39 EXEC (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Forward RCS page – ITEM 1 EXEC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>JET DES F5L – ITEM 37 EXEC (*)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOTE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Queue the following ITEM entry on the scratch pad. Do not perform</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>the EXEC until specified at 35 sec</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>JET DES F3D – ITEM 25</td>
</tr>
<tr>
<td>-00:30</td>
<td>FLT CNTLR PWR – ON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>00:00</td>
<td>RXA, LXA</td>
<td>THC +X (in) (3 sec firing)</td>
<td></td>
</tr>
<tr>
<td>00:15</td>
<td>FXL, LXL</td>
<td>THC +Y (right) (3 sec firing)</td>
<td></td>
</tr>
<tr>
<td>00:30</td>
<td>FXR, RXR</td>
<td>THC -Y (left) (3 sec firing)</td>
<td></td>
</tr>
<tr>
<td>00:35</td>
<td></td>
<td></td>
<td>When jets stop firing:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EXEC [JET DES F3D – ITEM 25 (*)]</td>
</tr>
<tr>
<td>00:45</td>
<td>F4D</td>
<td>RHC +pitch</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Past Soft Stop, hold 3 sec)</td>
<td></td>
</tr>
<tr>
<td>00:48</td>
<td></td>
<td>RHC release</td>
<td></td>
</tr>
<tr>
<td>00:50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>01:00</td>
<td>RSR</td>
<td>RHC +yaw</td>
<td></td>
</tr>
<tr>
<td>01:20</td>
<td>LSD</td>
<td>RHC -pitch</td>
<td></td>
</tr>
<tr>
<td>01:40</td>
<td>FSR</td>
<td>RHC +pitch</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>02:35</td>
<td>FLT CNTLR PWR – OFF</td>
<td></td>
<td>Return to MAUI PROCEDURE, step 6,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(ORB OPS FS, MAUI)</td>
</tr>
</tbody>
</table>

*NOTE*

- Expect DAP RECONF msgs in following actions.
- Queue the following ITEM entry on the scratch pad. Do not perform the EXEC until specified at 35 sec.
- JET DES F3D – ITEM 25

ORB OPS-42a/129/O/A

(reduced copy)

NOT FLOWN

FS CC 11-11

ORB OPS/129/FIN
WLES CONFIG AFTER PGSC REBOOT

1. If window appears asking to launch WLES software:
   Click ‘1’ to launch WLES software
   Else:
   Double click ‘Shuttle Apps’>‘WLES’>‘WLES’

2. \MCC for ‘Backup Mode Selection’

3. If ‘EWBMTAU-WLEFlight’ appears with message ‘Run the current command: XXXX_AA_BB_SNYYYY.xml?’:
   Click ‘Yes’

ORB OPS-47a/129/O/A

FABRICATION NOTES
Fabricate on flight approved yellow Post-it