

# Orbit Operations Checklist

## STS-133 Flight Supplement

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**Mission Operations Directorate  
Operations Division**

**Final  
October 7, 2010**

National Aeronautics and  
Space Administration

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Houston, Texas





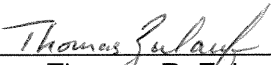
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MISSION OPERATIONS DIRECTORATE

**ORBIT OPERATIONS CHECKLIST  
STS-133 FLIGHT SUPPLEMENT**

FINAL  
October 7, 2010

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ORB OPS/133/FIN

Incorporates the following:	
482#: ORB OPS FS-00206 (S)	ORB OPS FS-00218
ORB OPS FS-00207A (S)	ORB OPS FS-00219
ORB OPS FS-00208 (S)	ORB OPS FS-00220
ORB OPS FS-00212	ORB OPS FS-00221
ORB OPS FS-00214	ORB OPS FS-00225
ORB OPS FS-00215	ORB OPS FS-00227
ORB OPS FS-00216	ORB OPS FS-00228
ORB OPS FS-00217	

S - Superseded

AREAS OF TECHNICAL RESPONSIBILITY

Publication Manager	DO3/T. Zulauf	281-244-0922
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COMM/INST	DS2/J. Scott Williams	281-483-8100
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DAP TABLES	DS6/K. Pohlkamp	281-483-2826
REBOOST/DAP	DS6/K. Pohlkamp	281-483-2826
OIU	DS2/J. Scott Williams	281-483-8100
PRLA	DS4/C. Feng	281-483-2325
SDBI	SK/S. Irwin	281-218-3071
WLES	DO5/R. Besser	281-244-5627
P/L OF OPP	DS6/K. Pohlkamp	281-483-2826
CWC OPS	DX4/O. Abotteen	281-483-2703
PGSC FS	DO4/T. Melroy	281-244-1132

CUE CARDS:

LIOH CHANGEOUT	DS4/M. FitzPatrick	281-483-0758
ORBIT BURN MONITOR	DS6/L. Schmitt	281-483-0694
DAP TABLES	DS6/K. Pohlkamp	281-483-2826
MAUI FIRING SEQUENCES	DS6/K. Pohlkamp	281-483-2826
WLES CONFIG AFTER PGSC REBOOT	DO5/R. Besser	281-244-5627

ORBIT OPERATIONS CHECKLIST  
STS-133 FLIGHT SUPPLEMENT

**LIST OF EFFECTIVE PAGES**

FINAL 10/07/10

Sign Off .....	*	133/FIN	FS 3-7 .....	133/FIN
FS ii .....	*	133/FIN	FS 3-8 .....	133/FIN
FS iii .....	*	133/FIN	FS 4-1 .....	133/FIN
FS iv .....	*	133/FIN	FS 4-2 .....	133/FIN
FS v .....	*	133/FIN	FS 4-3 .....	133/FIN
FS vi .....	*	133/FIN	FS 4-4 .....	133/FIN
FS vii .....		133/FIN	FS 4-5 .....	133/FIN
FS viii .....		133/FIN	FS 4-6 .....	133/FIN
FS 1-1 .....		133/FIN	FS 5-1 .....	133/FIN
FS 1-2 .....		133/FIN	FS 5-2 .....	133/FIN
FS 1-3 .....		133/FIN	FS 6-1 .....	133/FIN
FS 1-4 .....		133/FIN	FS 6-2 .....	133/FIN
FS 1-5 .....		133/FIN	FS 6-3 .....	133/FIN
FS 1-6 .....		133/FIN	FS 6-4 .....	133/FIN
FS 1-7 .....		133/FIN	FS 7-1 .....	133/FIN
FS 1-8 .....		133/FIN	FS 7-2 .....	133/FIN
FS 1-9 .....		133/FIN	FS 8-1 .....	133/FIN
FS 1-10 .....		133/FIN	FS 8-2 .....	133/FIN
FS 1-11 .....		133/FIN	FS 8-3 .....	133/FIN
FS 1-12 .....		133/FIN	FS 8-4 .....	133/FIN
FS 2-1 .....		133/FIN	FS 8-5 .....	133/FIN
FS 2-2 .....		133/FIN	FS 8-6 .....	133/FIN
FS 2-3 .....		133/FIN	FS 8-7 .....	133/FIN
FS 2-4 .....		133/FIN	FS 8-8 .....	133/FIN
FS 3-1 .....		133/FIN	FS 8-9 .....	133/FIN
FS 3-2 .....		133/FIN	FS 8-10 .....	133/FIN
FS 3-3 .....		133/FIN	FS 8-11 .....	133/FIN
FS 3-4 .....		133/FIN	FS 8-12 .....	133/FIN
FS 3-5 .....		133/FIN	FS 8-13 .....	133/FIN
FS 3-6 .....		133/FIN	FS 8-14 .....	133/FIN

\* – Omit from flight book

FS 8-15 .....	133/FIN	FS CC 12-3..... *	133/FIN
FS 8-16 .....	133/FIN	FS CC 12-4..... *	133/FIN
FS 8-17 .....	133/FIN	FS CC 12-5..... *	133/FIN
FS 8-18 .....	133/FIN	FS CC 12-6..... *	133/FIN
FS 8-19 .....	133/FIN	FS CC 12-7..... *	133/FIN
FS 8-20 .....	133/FIN	FS CC 12-8..... *	133/FIN
FS 8-21 .....	133/FIN	FS CC 12-9..... *	133/FIN
FS 8-22 .....	133/FIN	FS CC 12-10.... *	133/FIN
FS 8-23 .....	133/FIN	FS CC 12-11.... *	133/FIN
FS 8-24 .....	133/FIN	FS CC 12-12.... *	133/FIN
FS 9-1 .....	133/FIN	FS CC 12-13.... *	133/FIN
FS 9-2 .....	133/FIN	FS CC 12-14.... *	133/FIN
FS 9-3 .....	133/FIN	FS CC 12-15.... *	133/FIN
FS 9-4 .....	133/FIN	FS 12-16..... *	133/FIN
FS 9-5 .....	133/FIN		
FS 9-6 .....	133/FIN		
FS 9-7 .....	133/FIN		
FS 9-8 .....	133/FIN		
FS 9-9 .....	133/FIN		
FS 9-10 .....	133/FIN		
FS 9-11 .....	133/FIN		
FS 9-12 .....	133/FIN		
FS 9-13 .....	133/FIN		
FS 9-14 .....	133/FIN		
FS 9-15 .....	133/FIN		
FS 9-16 .....	133/FIN		
FS 9-17 .....	133/FIN		
FS 9-18 .....	133/FIN		
FS 10-1 .....	133/FIN		
FS 10-2 .....	133/FIN		
FS 10-3 .....	133/FIN		
FS 10-4 .....	133/FIN		
FS 11-1 .....	133/FIN		
FS 11-2 .....	133/FIN		
FS 11-3 .....	133/FIN		
FS 11-4 .....	133/FIN		
FS 12-1 .....	* 133/FIN		
FS 12-2 .....	* 133/FIN		

\* – Omit from flight book

ORBIT OPS CUE CARDS

<u>Title</u>	<u>Ref. Page</u>	<u>Card No.</u>
LIOH CHANGEOUT (Front) ..	FS CC 12-3	ORB OPS-29a/ nonRCRS/133/O/B
LIOH CANISTER STOWAGE LOCATIONS (Back) .....	FS CC 12-4	ORB OPS-29b/ nonRCRS/133/O/B
ORBIT BURN MONITOR (Front).....	FS CC 12-5	ORB OPS-31a/133/O/A
OMS FAILURES (Back).....	FS CC 12-6	ORB OPS-31b/133/O/A
STS-133 DAP CONFIGURATIONS (Front/Top).....	FS CC 12-7	ORB OPS-41a/133/O/A
(Front/Bottom) .....	FS CC 12-8	ORB OPS-41aa/133/O/A
(Back/Top).....	FS CC 12-9	ORB OPS-41b/133/O/B
(Back/Bottom).....	FS CC 12-10	ORB OPS-41bb/133/O/B
MAUI PRCS AND VRCS – RCS FIRING SEQUENCE (Front).....	FS CC 12-11	ORB OPS-42a/133/O/B
MAUI PRCS ONLY FIRING SEQUENCE (Back of MAUI PRCS AND VRCS – RCS FIRING SEQUENCE).....	FS CC 12-12	ORB OPS-42aa/133/O/A
MAUI VRCS ONLY FIRING SEQUENCE (Front).....	FS CC 12-13	ORB OPS-42b/133/O/B
(Back).....	FS CC 12-14	ORB OPS-42bb/133/O/A
WLES CONFIG AFTER PGSC REBOOT (Front).....	FS CC 12-15	ORB OPS-47a/133/O/A



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<u>CONTENTS</u>	<u>PAGE</u>
<u>COMM/INST</u> .....	FS 1-1
LOAD PCMMU FORMAT.....	FS 1-2
PDI DECOM FORMAT.....	FS 1-4
OIU FORMAT/CONFIG.....	FS 1-7
DOWNLINK OCA DATA VIA WIDE BAND ANALOG FM.....	FS 1-9
 <u>PTG</u> .....	 FS 2-1
STAR PAIRS PAD.....	FS 2-2
PAIRS.....	FS 2-3
 <u>DAP TABLES</u> .....	 FS 3-1
DAP OVERVIEW.....	FS 3-2
UNIV PTG.....	FS 3-3
STS-133 DAP A CONFIGURATIONS.....	FS 3-4
B CONFIGURATIONS.....	FS 3-6
 <u>REBOOST/DAP</u> .....	 FS 4-1
AUTO REBOOST.....	FS 4-2
ATTITUDE REFERENCE.....	FS 4-4
DOCKED DAP REFERENCE.....	FS 4-5
RATE DAMPING.....	FS 4-5
ROBOTICS ATTITUDE MAINTENANCE.....	FS 4-6
 <u>OIU PROCEDURES</u> .....	 FS 5-1
OIU ACTIVATION.....	FS 5-2
DEACTIVATION.....	FS 5-2
 <u>PRLA</u> .....	 FS 6-1
PRLA CLOSE.....	FS 6-2
 <u>SHORT DURATION BIOASTRONAUTICS</u>	
<u>INVESTIGATION (SDBI)</u> .....	FS 7-1
SDBI 1634, SLEEP-WAKE ACTIGRAPHY.....	FS 7-2

Cont next page

<u>WING LEADING EDGE SENSORS (WLES)</u>	
<u>PROCEDURES</u> .....	FS 8-1
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
LRU TROUBLESHOOTING .....	FS 8-20
<u>PAYLOADS OF OPPORTUNITY</u> .....	FS 9-1
MAUI PRCS AND VRCS PROCEDURE .....	FS 9-2
VRCS ONLY PROCEDURE .....	FS 9-6
PRCS ONLY PROCEDURE .....	FS 9-10
RAMBO-2 PROCEDURE .....	FS 9-14
<u>CWC OPS</u> .....	FS 10-1
WASTE TANK OFFLOAD TO CWC .....	FS 10-2
<u>PGSC FS</u>	
KFX DOWNLINK IN THE BLIND .....	FS 11-1
<u>CUE CARD CONFIGURATION</u> .....	FS 12-1

COMM/INST

LOAD PCMMU FORMAT.....	FS 1-2
PDI DECOM FORMAT .....	FS 1-4
OIU FORMAT/CONFIG.....	FS 1-7
DOWNLINK OCA DATA VIA WIDE BAND ANALOG FM..	FS 1-9

**COMM/  
INST**

FS 1-1

ORB OPS/133/FIN

COMM/  
INST

## LOAD PCMMU FORMAT

- C3 1. √OI PCMMU FORMAT – GPC  
SM 62 PCMMU/PL COMM
- CRT 2. FORMAT:  
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, \*  
\* DPS) >> \*
  - \* If LOAD – FAIL and a first load attempt: \*
  - \* Repeat steps 2 and 3 for failed ID \*
  - \* If LOAD – FAIL and a subsequent load \*
  - \* attempt: \*
  - \* √MCC \*
  - \* 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 (\*)

DNLIST COMPATIBILITY	PHASE	FORMAT ID 64/128	CONFIG NO.
G1,G3,BFS	(ASCENT)	102/FXD	-
G3,BFS	(ENTRY)	102/164	-
G2,G8,S2	ORBIT/ FCS C/O	103/161	-
G2,S2,OPS 0	OPS 0	- /163	-
G2,S2,P9	MMU C/O	- /163	-
G2,G8,S2	RNDZ w/UHF FMT CCSU (SSOR/SSV/TCS) (PRIME)	103/192	763
G2,G8,S2	RNDZ w/UHF FMT CCSU (SSOR/SSV/TCS) (B/U)	103/211	770
G2,G8,S2	DOCKED ISS FMT CCSH (OIU/SSV) (PRIME)	103/184	760
G2,G8,S2	DOCKED ISS FMT CCSH (OIU/SSV) (B/U)	103/205	767
G2,G8,S2	OIU C/O AND SSV RATE 4 (PRIME)	103/188	762
G2,G8,S2	OIU C/O AND SSV RATE 5 (B/U)	103/203	765
G2,G8,S2	PMM FMT (OIU/SSV) (PRIME)	103/199	780
G2,G8,S2	PMM FMT (OIU/SSV) (B/U)	103/212	781

**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 *
* *
* √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: *
CRT  * I/O RESET PCM – ITEM 5 EXEC (*) *
* PDI: *
* I/O RESET – ITEM 8 EXEC (*) *
* Repeat step 1 for all of config (XXX) *
```

CONFIG	DECOM	FMT	INPUT	USE
763 RNDZ w/UHF FMT CCSU  (PRIME) TFL 192	1 2 3 4 5-FPM	30 - 9 4 505	1,2 - 5 4	OIU7 (CCSU) ** - TCS SSV (3) *** H-H-H *
770 RNDZ w/UHF FMT CCSU  (BACKUP) TFL 211	1 2 3 4 5-FPM	14 31 - 19 503	4 1,2 - 5	SSV (3) *** OIU7 (CCSU) ** - TCS H-H-H *
760 DOCKED FMT CCSH  (PRIME) TFL 184	1 2 3 4 5-FPM	7 - - 27 501	1,2 - - 4	OIU9 (CCSH) ** - - SSV (2) *** H-H-H *
767 DOCKED FMT CCSH  (BACKUP) TFL 205	1 2 3 4 5-FPM	- 17 29 - 508	- 1,2 4 -	- OIU9 (CCSH) ** SSV (2) *** - H-H-H *
762 SSV RATE 4  (PRIME) TFL 188	1 2 3 4 5-FPM	5 - - 1 507	1,2 - - 4	OIU255 ** - - SSV (4) *** H-H-H *
765 SSV RATE 5  (BACKUP) TFL 203	1 2 3 4 5-FPM	- 15 11 - 509	- 1,2 4 -	- OIU255 ** SSV (5) *** - L-H-H *

\* 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

Cont next page

FS 1-5

ORB OPS/133/FIN

780 PMM FMT	1 2 3 4	2 - - 4	1,2 - - 4	OIU5 (1M) ** - - SSV (3) ***
(PRIME) TFL 199	5-FPM	504		H-H-H *
781 PMM FMT	1 2 3 4	14 3 - -	4 1,2 - -	SSV (3) *** OIU5 (1M) ** - -
(BACKUP) TFL 212	5-FPM	502		H-H-H *

\* 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 + <u>9</u> EXEC
GNC TO GNC 1	ITEM 18 + <u>1</u> <u>4</u> EXEC
GNC 1 TO BUS 3	ITEM 18 + <u>1</u> <u>6</u> EXEC
BUS 4 BC	ITEM 15 EXEC (*)
BUS 3 RT	ITEM 10 EXEC (*)
LOAD FORMAT	ITEM 1 + <u>9</u> EXEC >>
  
2. GNC-1 PRIMARY ON LB-ORB N2-2 (OIU BUS 4)

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

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

LOAD FORMAT	ITEM 1 + <u>9</u> EXEC
GNC TO GNC 2	ITEM 18 + <u>1</u> <u>3</u> EXEC
GNC 2 TO BUS 4	ITEM 18 + <u>1</u> <u>7</u> EXEC
BUS 3 BC	ITEM 11 EXEC (*)
BUS 4 RT	ITEM 14 EXEC (*)
LOAD FORMAT	ITEM 1 + <u>9</u> EXEC >>

Cont next page

5. PMM  
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 >>

## DOWNLINK OCA DATA VIA WIDE BAND ANALOG FM

(35 min)

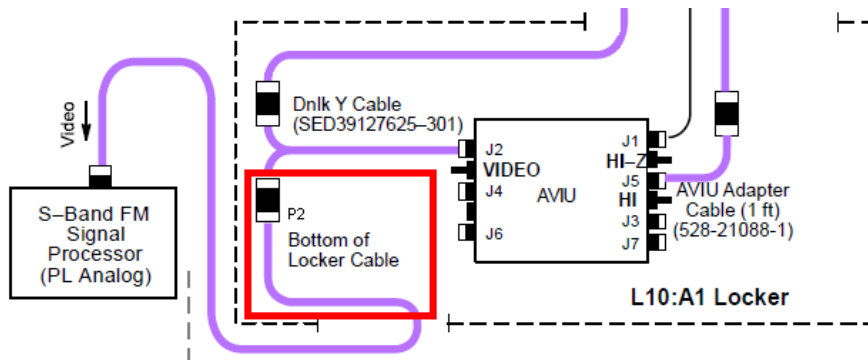
OBJECTIVE: Downlink OCA data via S-band system

LOCATION: Payload Station on aft Flight Deck (L10:A1), PDIP1 (L12)

TOOLS REQD:

TOOL            Gray Tape  
                  Kapton Tape  
                  Pin Kit (Test Jumper Leads)  
MISC            Sharpie

1. Obtain two, 5-in 22-ga Pin/Socket Test Jumper Leads from the Pin Kit
- L10:A1 2. Open locker door, locate "Bottom of Locker Cable" (see diagram below)
3. Demate Dnlk Y Cable (SED39127625-301) from Bottom of Locker Cable P2 (see diagram below)



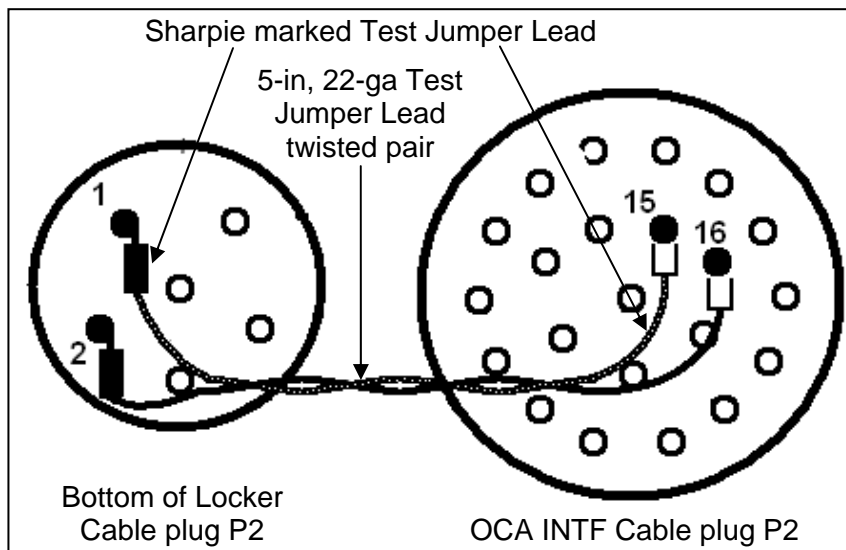
- Middeck 4. Power down the OCA Router
- L12 5. Locate OCA INTF Cable (SED16103948-301) plug P2 mated to J4 on PDIP1
6. Demate OCA INTF Cable plug P2 from J4  
Re-route OCA INTF Cable plug P2 near L10A1 to allow jumper installation in following steps (remove pre-route ties as necessary)

Cont next page

FS 1-9

ORB OPS/133/FIN

- L10:A1
7. Obtain Test Jumper Leads, mark both ends of one Lead using Sharpie
  8. Twist Test Jumper Leads together to form a twisted pair (see diagram below)
  9. Per the drawing below, install Test Jumper Lead twisted pair between the Bottom of Locker Cable plug P2 and the OCA INTF Cable plug P2 (ensure Sharpie marked Test Jumper Lead is connected between socket 1 and pin 15)



10. Using Kapton Tape, secure Test Jumper Lead/plug connections, cover unused pins/sockets on plugs
  11. Ensure connector shells are in contact for chassis ground
  12. Using Gray Tape, secure cables, plugs, jumpers  
Secure locker door as required (use caution not to pinch wiring)
- Middeck
13. Power on the OCA Router
  14. Stow tools

Cont next page

- When OCA downlink no longer required:
- Middeck 15. Power down the OCA Router
  - L10:A1 16. Remove Gray Tape, Kapton Tape as required
  - 17. Remove Test Jumper Leads from Bottom of Locker Cable and OCA INTF Cable plugs
  - 18. Mate Dnlk Y Cable (SED39127625-301) to Bottom of Locker Cable plug P2
  - L12 19. Re-route OCA INTF Cable plug P2 to PDIP1
  - 20. Mate OCA INTF Cable plug P2 to J4 on PDIP1
  - 21. Stow tools



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PTG

STAR PAIRS PAD ..... FS 2-2  
PAIRS..... FS 2-3

**PTG**

FS 2-1

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PTG

STAR PAIRS PAD										
STAR PAIR	SEP ANGLE	ATTITUDE SET 1					ATTITUDE SET 2			
		DUAL S TRK		SINGLE S TRK			DUAL S TRK		SINGLE S TRK	
				-Z	-Y				-Z	-Y
A	82.4	-Y:13 R+ 183 -Z:37 P+ 58 Y+ 357	-Z:13 R+ 100 P+ 71 Y+ 350	-Y:37 R+ 266 P+ 50 Y+ 346	-Y:37 R+ 86 -Z:13 P+ 252 Y+ 14	-Z:37 R+ 3 P+ 243 Y+ 3	-Y:13 R+ 174 P+ 240 Y+ 24			
B	89.0	-Y:51 R+ 53 -Z:55 P+ 42 Y+ 41	-Z:51 R+ 336 P+ 24 Y+ 34	-Y:55 R+ 146 P+ 34 Y+ 55	-Y:55 R+ 204 -Z:51 P+ 200 Y+ 324	-Z:55 R+ 128 P+ 218 Y+ 323	-Y:51 R+ 288 P+ 195 Y+ 309			
C	83.5	-Y:43 R+ 9 -Z:41 P+ 109 Y+ 339	-Z:43 R+ 280 P+ 95 Y+ 346	-Y:41 R+ 95 P+ 116 Y+ 352	-Y:41 R+ 266 -Z:43 P+ 275 Y+ 9	-Z:41 R+ 179 P+ 284 Y+ 21	-Y:43 R+ 350 P+ 285 Y+ 0			
D	83.8	-Y:22 R+ 345 -Z:29 P+ 133 Y+ 324	-Z:22 R+ 255 P+ 122 Y+ 335	-Y:29 R+ 76 P+ 146 Y+ 333	-Y:29 R+ 291 -Z:22 P+ 304 Y+ 21	-Z:29 R+ 204 P+ 308 Y+ 35	-Y:22 R+ 11 P+ 319 Y+ 16			

FS 2-2

ORB OPS/133/FIN

STAR PAIRS PAD

PAIR		COAS ALIGN ATTITUDE 1	ANG SEP	COAS ALIGN ATTITUDE 2
COAS	+X HUD	R+ 81 P+ 284 Y+ 47	NOSE UP 99.7	R+ 277 P+ 93 Y+ 32
	-Z COAS	R+ 96 P+ 93 Y+ 47		TAIL UP 12

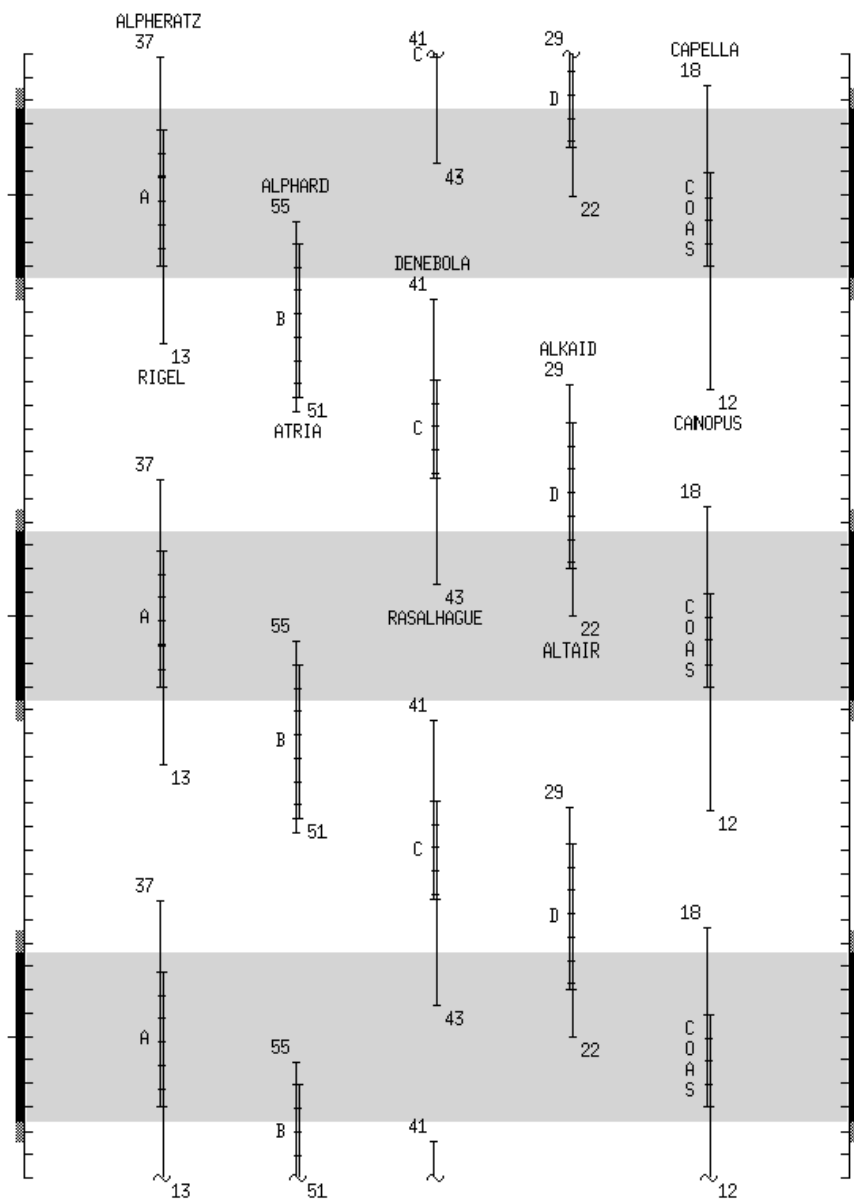
SINGLE S TRK MIN MNVR OPT  
TGT ID = 11-110 NAV STAR #

	-Z S TRK	-Y S TRK
BV	5	4
P	87.7	✓ 0
Y	358	✓ 280.57

MET Applicable Post OMS-2 to Nominal EOM  
Liftoff Date: 11/01/10  
Liftoff GMT: 305/20:40:17.000



# STAR PAIRS



MET Applicable: Post OMS-2 to Nominal EDM  
 Liftoff Date: 11/01/10  
 Liftoff GMT: 305/20:40:17.000



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DAP TABLES

DAP OVERVIEW .....	FS 3-2
UNIV PTG .....	FS 3-3
STS-133 DAP A CONFIGURATIONS.....	FS 3-4
B CONFIGURATIONS.....	FS 3-6

**DAP  
TABLES**

## DAP TABLES

### DAP OVERVIEW

DAP	Purpose	DAP	Purpose
A1	Nominal	B1	OMS & RCS Burns (ORB OPS)
A2	PTC	B2	Loss of VERN (Tail Only)
A3	GG	B3	Loss of VERN (All)
A4		B4	
A5	Loss of VERN (All)	B5	COAS/HUD CAL
A6	Loss of VERN (Tail Only)	B6	
A7	Rendezvous	B7	Rendezvous
A8	Terminal Phase	B8	Terminal Phase
A9	PROX OPS/Flyaround	B9	Flyaround
A10	Docking	B10	Docking
A11	Auto Reboost	B11	
A12	Mated Stack (Mnvr, Robotics & Att Hold)	B12	Mated Stack (Undocking and Attitude Hold)
A13		B13	Mated VRCS Db Collapse
A14	Orbiter alone SRMS/OBSS Ops	B14	
A15		B15	

CNTL ACC	Purpose
0	Orbiter alone with unloaded RMS
1	Orbiter alone SRMS/OBSS Ops
2	Mated - VRCS/ALT, Light Weight Russian Segment
3	Not used
4	Mated - VRCS/ALT, Medium Weight Russian Segment
5	Not used
6	Mated - VRCS/ALT, Heavy Weight Russian Segment
7	Not used
8	Mated - VRCS/ALT, ATV2 Docked
9	Not used

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

FS 3-2

ORB OPS/133/FIN

## UNIV PTG

TGT ID = 1 Orbiting Vehicle = 2 Earth Center = 3 Earth Target Input LAT ( $\pm 90$ ) LON ( $\pm 180$ , + = East) ALT (-3444.0 to 20000.0 nm) = 4 Sun Center = 5 Celestial Target Input RA (0-359.99) DEC ( $\pm 90$ ) = 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 $\rightarrow$ OM (0-359.99)
MON AXIS = 1 +X = 2 -X

FS 3-3

ORB OPS/133/FIN

## STS-133 DAP A CONFIGURATIONS

### STS-133 DAP A1 – DAP A8 CONFIGURATIONS

	ITEM #	A1	A2	A3	A4	A5	A6	A7	A8
<b>PRI</b>									
ROT RATE	10 (50)	0.2000	0.4000	0.2000	0.5000	0.2000	0.2000	0.2000	0.0500
ATT DB	11 (51)	5.00	1.00	0.30	3.00	5.00	5.00	2.00	2.00
RATE DB	12 (52)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
ROT PLS	13 (53)	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
COMP	14 (54)	.000	.000	.000	.000	.000	.000	.000	.000
P OPTION	15 (55)	ALL	ALL	ALL	ALL	ALL	TAIL	ALL	ALL
Y OPTION	16 (56)	ALL	ALL	TAIL	ALL	ALL	TAIL	ALL	ALL
TRAN PLS	17 (57)	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
<b>ALT</b>									
RATE DB	18 (58)	0.200	0.200	0.070	0.200	0.070	0.070	0.100	0.100
JET OPT	19 (59)	ALL	ALL	ALL	ALL	ALL	TAIL	ALL	ALL
# JETS	20 (60)	2	2	1	2	1	1	2	2
ON TIME	21 (61)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
DELAY	22 (62)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>VERN</b>									
ROT RATE	23 (63)	0.2000	0.4000	0.0080	0.2000	0.0500	0.0500	0.0160	0.0500
ATT DB	24 (64)	1.000	1.000	0.070	1.000	1.000	1.000	1.000	1.000
RATE DB	25 (65)	.020	.020	.010	.020	.020	.020	.020	.020
ROT PLS	26 (66)	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.050
COMP	27 (67)	.000	.000	.000	.000	.000	.000	.000	.000
CNTL ACC	28 (68)	0	0	0	0	0	0	0	0
PURPOSE		NOMINAL	PTC	GG		LOSS OF VERN (ALL)	LOSS OF VERN (TAIL ONLY)	RNDZ	TERMINAL PHASE

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

FS 3-4

ORB OPS/133/FIN

**STS-133 DAP A9 – DAP A14 CONFIGURATIONS**

	ITEM #	A9	A10	A11	A12	A13	A14
<b>PRI</b>							
ROT RATE	10 (50)	0.1300	0.0500	0.0500	0.0500	0.0500	0.2000
ATT DB	11 (51)	2.00	0.60	10.00	5.00	5.00	5.00
RATE DB	12 (52)	0.10	0.10	0.20	0.20	0.20	0.20
ROT PLS	13 (53)	0.100	0.100	0.100	0.040	0.040	0.100
COMP	14 (54)	.000	.000	.000	.000	.000	.000
P OPTION	15 (55)	TAIL	TAIL	TAIL	TAIL	TAIL	TAIL
Y OPTION	16 (56)	TAIL	TAIL	TAIL	TAIL	TAIL	TAIL
TRAN PLS	17 (57)	0.050	0.050	0.100	0.010	0.010	0.100
<b>ALT</b>							
RATE DB	18 (58)	0.100	0.100	0.020 <sup>1</sup>	0.020 <sup>1</sup>	0.020 <sup>1</sup>	0.200
JET OPT	19 (59)	TAIL	TAIL	TAIL	TAIL	TAIL	TAIL
# JETS	20 (60)	2	2	1	1	1	1(2) <sup>3</sup>
ON TIME	21 (61)	0.08	0.08	0.08	0.08	0.08	0.08
DELAY	22 (62)	0.00	0.00	5.00	5.00	5.00	6.00
<b>VERN</b>							
ROT RATE	23 (63)	0.1300	0.0500	0.1000	0.1000	0.1000	0.2000
ATT DB	24 (64)	1.000	0.500	5.000	3.000	3.000	3.000
RATE DB	25 (65)	.020	.020	.050	.020	.020	.200
ROT PLS	26 (66)	0.050	0.050	0.010	0.002	0.002	0.010
COMP	27 (67)	.000	.000	.000	.000	.000	.000
CNTL ACC	28 (68)	0	0	<b>6(2,4,8)</b> <sup>2</sup>	<b>6(2,4,8)</b> <sup>2</sup>	<b>2(4,6,8)</b> <sup>2</sup>	1
PURPOSE		PROX/OPS FLYAROUND	DOCKING	AUTO REBOOST	MATED STACK (MNVRS,ROBO, ATT HOLD)		ORBITER ALONE SRMS/OBSS

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

<sup>1</sup> I-loaded below keyboard limit; do not change

<sup>2</sup> Reference DOCKED DAP REFERENCE (ORB OPS FS, REBOOST/DAP) for CNTL ACC Selection

<sup>3</sup> Use 1 for OBSS scan and 2 for Orbiter attitude maneuvers

FS 3-5

ORB OPS/133/FIN

## STS-133 DAP B CONFIGURATIONS

### STS-133 DAP B1 – DAP B8 CONFIGURATIONS

	ITEM #	B1	B2	B3	B4	B5	B6	B7	B8
<b>PRI</b>									
ROT RATE	30 (50)	0.5000	0.2000	0.2000	0.2000	0.2000	0.5000	0.5000	0.0500
ATT DB	31 (51)	3.00	3.00	3.00	0.30	3.00	3.00	2.00	2.00
RATE DB	32 (52)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
ROT PLS	33 (53)	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
COMP	34 (54)	.000	.000	.000	.000	.000	.000	.000	.000
P OPTION	35 (55)	ALL	TAIL	ALL	TAIL	TAIL	ALL	ALL	ALL
Y OPTION	36 (56)	ALL	TAIL	ALL	TAIL	TAIL	ALL	ALL	ALL
TRAN PLS	37 (57)	0.100	0.020	0.020	0.020	0.020	0.020	0.050	0.050
<b>ALT</b>									
RATE DB	38 (58)	0.200	0.070	0.070	0.100	0.200	0.200	0.100	0.100
JET OPT	39 (59)	ALL	TAIL	ALL	ALL	ALL	ALL	ALL	ALL
# JETS	40 (60)	2	1	1	2	2	2	2	2
ON TIME	41 (61)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
DELAY	42 (62)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>VERN</b>									
ROT RATE	43 (63)	0.2000	0.2000	0.2000	0.0080	0.0160	0.2000	0.2000	0.0500
ATT DB	44 (64)	1.000	1.000	1.000	0.100	0.033	1.000	1.000	1.000
RATE DB	45 (65)	.020	.020	.020	.010	.020	.020	.020	.020
ROT PLS	46 (66)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.020
COMP	47 (67)	.000	.000	.000	.000	.000	.000	.000	.000
CNTL ACC	48 (68)	0	0	0	0	0	0	0	0
PURPOSE		OMS & RCS BURNS (ORB OPS)	LOSS OF VERN (TAIL ONLY)	LOSS OF VERN (ALL)		COAS/HUD CAL		RNDZ	TERMINAL PHASE

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

FS 3-6

ORB OPS/133/FIN



**STS-133 DAP B9 – DAP B13 CONFIGURATIONS**

	ITEM #	B9	B10	B12	B13
<b>PRI</b>					
ROT RATE	30 (50)	0.1300	0.0500	0.0100 <sup>1</sup>	0.0100 <sup>1</sup>
ATT DB	31 (51)	2.00	0.60	1.00	1.00
RATE DB	32 (52)	0.10	0.10	0.20	0.20
ROT PLS	33 (53)	0.040	0.040	0.040	0.040
COMP	34 (54)	.000	.000	.000	.000
P OPTION	35 (55)	TAIL	TAIL	TAIL	TAIL
Y OPTION	36 (56)	TAIL	TAIL	TAIL	TAIL
TRAN PLS	37 (57)	0.010	0.010	0.010	0.010
<b>ALT</b>					
RATE DB	38 (58)	0.100	0.100	0.020 <sup>1</sup>	0.020 <sup>1</sup>
JET OPT	39 (59)	TAIL	TAIL	TAIL	TAIL
# JETS	40 (60)	2	2	1	1
ON TIME	41 (61)	0.08	0.08	0.08	0.08
DELAY	42 (62)	10.00	0.00	5.00	5.00
<b>VERN</b>					
ROT RATE	43 (63)	0.1300	0.0500	0.0100	0.0100
ATT DB	44 (64)	1.000	0.500	1.000	0.100
RATE DB	45 (65)	.020	.020	.020	.020
ROT PLS	46 (66)	0.020	0.020	0.002	0.002
COMP	47 (67)	.000	.000	.000	.000
CNTL ACC	48 (68)	0	0	<b>6(2,4,8)</b> <sup>2</sup>	<b>6(2,4,8)</b> <sup>2</sup>
PURPOSE		PROXOPS/ FLYAROUND	DOCKING	MATED ATT HOLD (VRCS & ALT)	MATED VRCS DB COLLAPSE

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

<sup>1</sup> I-loaded below keyboard limit; do not change

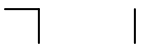
<sup>2</sup> Reference DOCKED DAP REFERENCE (ORB OPS FS, REBOOST/DAP) for CNTL ACC Selection

FS 3-7

ORB OPS/133/FIN



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REBOOST/DAP

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

**REBOOST/  
DAP**

## 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,  
DAP: A11/AUTO/VERN(ALT)

C3

If using Config 4(1):

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

REBOOST/  
DAP

Cont next page

FS 4-2

ORB OPS/133/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 4(1):

**GNC 20 DAP CONFIG**

Enable X JETS ROT – ITEM 7 EXEC (\*)

Return to FLIGHT PLAN Attitude

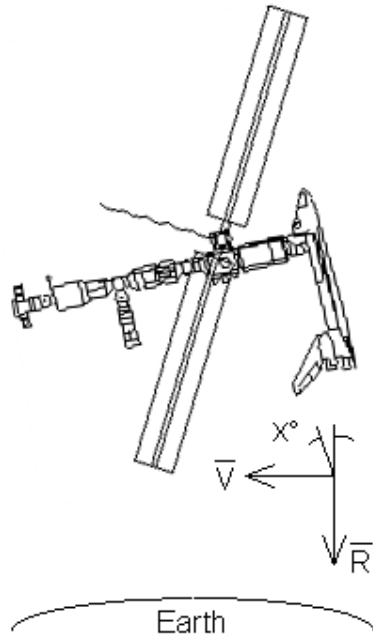
DAP: as reqd

Pri RJD LOGIC,DRIVER (sixteen) – as reqd

C3  
O14,  
O15,  
O16

## **AUTO REBOOST ATTITUDE REFERENCE**

### **ALT & VRCS ATTITUDE HOLD CONFIGURATIONS:**



### **REBOOST**

Configurations 1 & 4 are ALT PRCS only (Pitch,  $X=4^\circ$ )

Configuration 2 is for SHUTTLE ONLY - Do Not Use While Docked

Configuration 3 is VRCS only (Pitch,  $X=4^\circ$ )

## DOCKED DAP REFERENCE

### NOTE

Shuttle mated attitude control is not certified when the Shuttle Airlock is depressurized (<3.45 psia)

Mated Attitude Hold, Maneuvers and ELC/PMM Install (VERN or ALT)	Mated Attitude Hold (VERN or ALT)
A12	B12

ALT not certified for loaded RMS operations

### CNTL ACC CONFIGURATIONS FOR VERN AND ALT

CNTL ACC selection depends on the weight classification of the Russian Segment (Light, Medium or Heavy) due to ISS docking port occupancy and the presence of ATV2

If ATV2 is docked, use CNTL ACC 8

If ATV2 is not docked:

Number of Russian Vehicles Docked (and ATV2 not docked)	SM Aft Occupied	SM Aft Empty
1	Light (CNTL ACC 2)	
2 or 3	Medium (CNTL ACC 4)	Light (CNTL ACC 2)
4	Heavy (CNTL ACC 6)	

## RATE DAMPING

DAP: LVLH(INRTL) - Dependent on desired attitude hold

Monitor Jet Activity Light:

If jet activity stopped for > 5 sec for VERN (15 sec for ALT)

DAP: FREE > 2 sec

DAP: AUTO >>

For continuous jet activity > 6 min:

DAP: FREE then restart RATE DAMPING

## ROBOTICS ATTITUDE MAINTENANCE

1. DAP: LVLH
2. When no jet activity for >5 sec (Rates Damped):  
DAP: FREE > 2 sec  
DAP: AUTO
3. If continuing with Loaded Robotics Ops:  
When in attitude and no jet activity for >5 sec:  
DAP: FREE



OIU PROCEDURES

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

OIU

## 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

SSP1           OIU PWR – OFF  
                  √tb – bp

2. MCC will config PCMMU and PDI as reqd

OIU

PRLA

PRLA CLOSE..... FS 6-2

**PRLA**

FS 6-1

ORB OPS/133/FIN

## 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 LAT 1,2,3,4,5 (five) – OFF (tb-REL)  
  √PL SEL                    – 1

### SM 97 PL RETENTION

√PL SEL 1 LAT 1,2,3,4,5 (ten) – 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 (two) – LAT (tb-LAT, 60 sec max)  
  – OFF
5. PL RETEN LAT 3,4 (two) – LAT (tb-LAT, 60 sec max)  
  – OFF
6. PL RETEN PL SEL    – 3  
  √LAT 1,2,3,4 (four) tb – REL

### SM 97 PL RETENTION

√PL SEL 3 LAT 1,2,3,4 (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)

- 7. PL RETEN LAT 1,2 (two) – LAT (tb-LAT, 60 sec max)  
– OFF
- 8. PL RETEN LAT 3,4 (two) – LAT (tb-LAT, 60 sec max)  
– OFF
- R13L 9. PL RETEN LOGIC PWR SYS 1,2 (two) – OFF  
BAY MECH PWR SYS 1,2 (two) – OFF
- A6U 10. PL RETEN PL SEL – MON
- MA73C:A 11. If MCA LOGIC switches taken OFF in step 1:  
MCA LOGIC MNC MID 2 – ON  
:B MNB MID 4 – ON



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SHORT DURATION BIOASTRONAUTICS  
INVESTIGATION (SDBI)

SDBI 1634, SLEEP-WAKE ACTIGRAPHY .....	FS 7-2
DON ACTIWATCH .....	FS 7-2
DOFF ACTIWATCH .....	FS 7-2

SDBI

FS 7-1

ORB OPS/133/FIN

**SDBI 1634, SLEEP-WAKE ACTIGRAPHY**

- MF430 A. DON ACTIWATCH (ASAP after entry into orbit)  
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

- MF430 On final day of orbit:
1. Remove Actiwatch, stow in locker
  2. Recover SLEEP LOGBOOK, stow in locker

SDBI



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
LRU TROUBLESHOOTING .....	FS 8-20

**WLE  
SENSORS**

## 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 1664)

CRU B (S/N 1728)

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 S/N 1664
STBD OVHD	Secure CRU A to STBD side of aft cabin with Velcro (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 S/N 1728
PORT OVHD	Secure CRU B to PORT side of aft cabin with Velcro (see fig 8-3)

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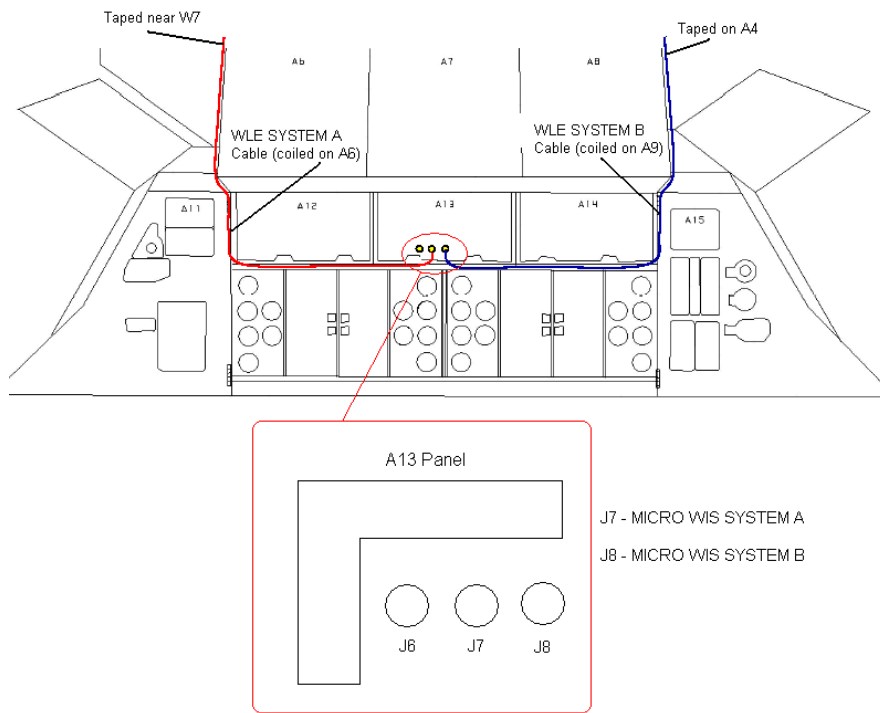


Figure 8-1.- A13 panel.

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FS 8-3

ORB OPS/133/FIN

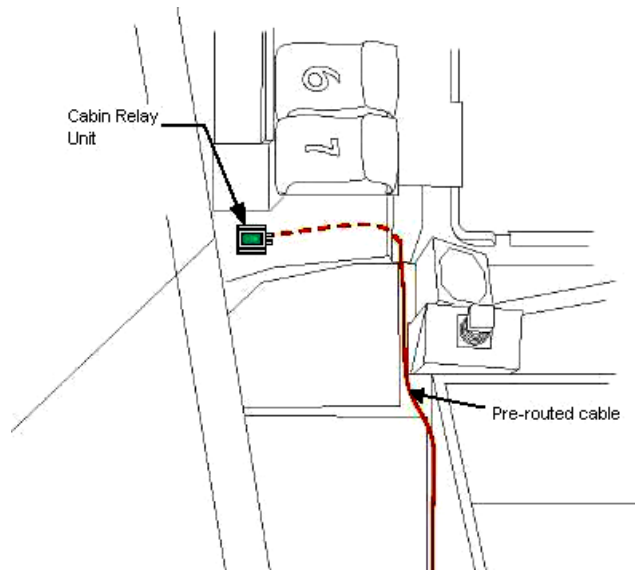


Figure 8-2.- Aft STBD location.

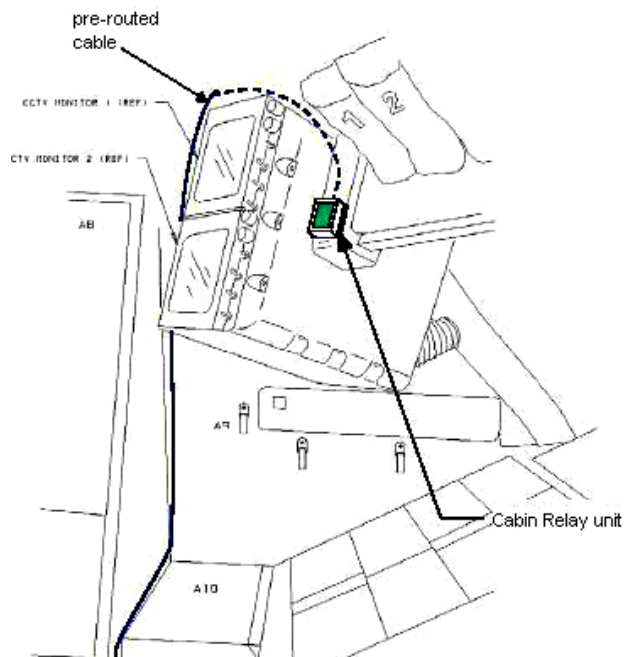


Figure 8-3.- Aft PORT location.

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NOTE

Laptops may be powered or unpowered.  
Laptops may be connected to network or standalone

A31p

3. SETUP PRIME WLES LAPTOP

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

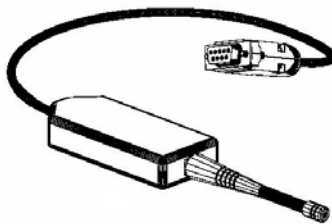


Figure 8-4.- Laptop Receiver Unit.

Cont next page

FS 8-5

ORB OPS/133/FIN



Figure 8-5.- A31p ports.

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

A31p

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'

Cont next page

FS 8-7

ORB OPS/133/FIN

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 1664 and 1728 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

FS 8-8

ORB OPS/133/FIN



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

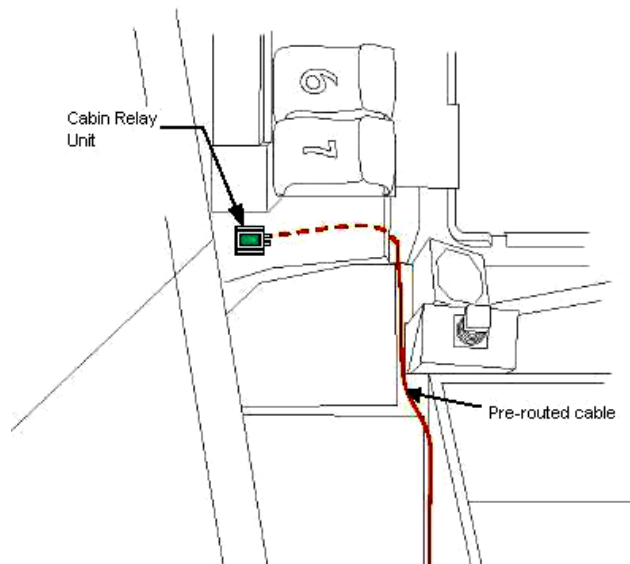


Figure 8-6.- Aft STBD location.

Cont next page

FS 8-10

ORB OPS/133/FIN

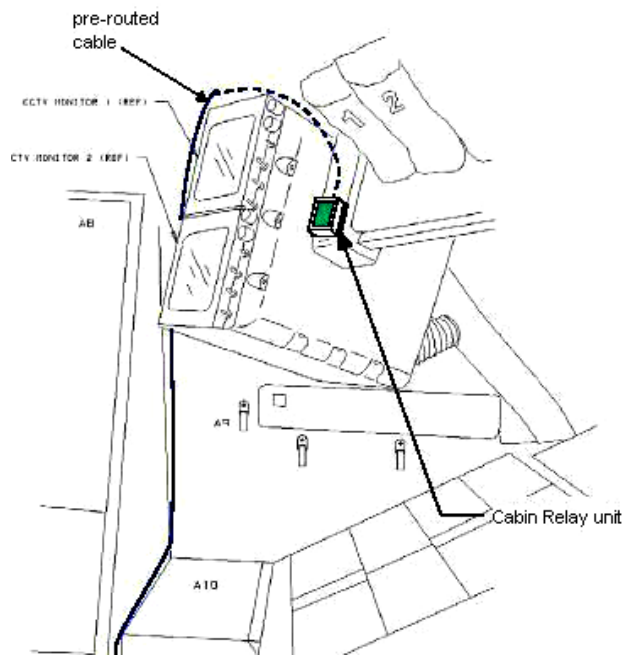


Figure 8-7.- Aft PORT location.

- ML60E
3. STOW EQUIPMENT  
 Stow:  
     Laptop Receiver Units (2)  
     Cabin Relay Units (2)  
 Notify MCC-H: "WLES Teardown Complete"

## WLES LAPTOP RECEIVER UNIT (LRU) R&R

- A31p 1. DISCONNECT BACKUP LRU FROM LAPTOP  
'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)



Figure 8-8.- A31p ports.

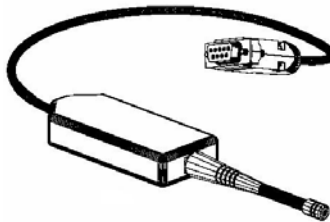


Figure 8-9.- Laptop Receiver Unit.

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/133/FIN

3. CONNECT BACKUP LRU

Connect Backup LRU to Prime WLES A31p Serial port  
Secure LRU to A31p with Velcro

A31p

4. 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

5. VERIFY COMM WITH RELAY UNITS

Click 'Unit List' (left side of display)

√Cabin Relay Units Unit ID 1664 and 1728 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

Notify MCC-H: "WLES LRU R&R complete", mark failed LRU as 'failed'

ML60E

Stow:

Prime (failed) LRU

## WLES CABIN RELAY UNIT R&R

- OVHD 1. DISCONNECT FAILED CRU AND STOW  
Disconnect WLE SYSTEM cable from J1 connector on failed CRU  
Mark failed CRU as 'failed' and stow in ML60E
- ML60E 2. SETUP SPARE WLES RELAY UNIT  
Unstow CRU SPARE (S/N 1792)  
  
WLE SYSTEM cable  
Connect plug CABIN RELAY UNIT A or B to J1 on CRU S/N 1792
- OVHD Secure CRU SPARE to the aft cabin with Velcro
- A31p 3. VERIFY COMM WITH SPARE RELAY UNIT  
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 1792 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

FS 8-14

ORB OPS/133/FIN

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

- A31p 1. DEACTIVATE WLES LAPTOP(S)  
'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

- A31p
1. DEACTIVATE BACKUP WLES LAPTOP  
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

- A31p
1. RECOVER BACKUP WLES LAPTOP  
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)

## LRU TROUBLESHOOTING

### NOTE

This procedure requires 30 min crew time or  
15 min if the ground can verify good COM 1

#### 1. VERIFY LINE OF SIGHT

Verify unobstructed line of sight between LRU and  
both CRUs

Verify 5-in minimum distance between LRU and both  
CRUs

A31p

#### 2. VERIFY COMM WITH RELAY UNITS

Use prime WLES laptop

'Enhanced Wideband MicroTAU – WLEFlight 3.0'

'Main'

Click 'Unit List' (left side of display)

√Cabin Relay Units Unit ID 1664 and 1728 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 both times updating:

Notify MCC: "Line of sight problem" >>

If both times not updating:

Notify MCC and proceed to step 3

#### 3. RESEAT LRU AND RESTART LAPTOP

Completely disconnect and then reconnect LRU  
from serial port on prime WLES laptop

If other applications are running on prime WLES  
laptop, √MCC

Cont next page

FS 8-20

ORB OPS/133/FIN

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

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

Reboot prime WLES laptop

Click ‘1’ to launch WLES Software

‘Backup Mode Selection’  
Select ‘Primary’

#### 4. VERIFY COMM WITH RELAY UNITS

‘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 ‘Timeout exceeded...’ message appears:  
Notify MCC and proceed to step 5

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

√Cabin Relay Units Unit ID 1664 and 1728 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’

Cont next page

FS 8-21

ORB OPS/133/FIN

If both times updating:

Notify MCC: "Computer problem/bad LRU connection" >>

If both times not updating:

Notify MCC and proceed to step 5

5. REPLACE FAILED LRU

Perform WLES LAPTOP RECEIVER UNIT (LRU) R&R, then:

If both times updating in LRU R&R step 5:

Notify MCC: "LRU Failure" >>

If both times not updating in LRU R&R step 5:

Notify MCC and proceed to step 6

6. EXIT SOFTWARE ON PRIME WLES LAPTOP

Use prime WLES laptop

'Enhanced Wideband MicroTAU – WLEFlight 3.0'

Click 'Exit' (upper right side of display)

'EWBMTAU – WLEFlight'

'Are you sure you want to exit?', click 'Yes'

7. RETURN BACKUP LRU TO BACKUP WLES LAPTOP

Disconnect Backup LRU from Prime A31p Serial port

Remove Backup LRU from Velcro on Prime A31p

Connect Backup LRU to Backup A31p Serial port

Secure Backup LRU to Backup A31P with Velcro

Verify unobstructed line of sight between LRU and both CRUs

Verify 5-in minimum distance between LRU and both CRUs

Cont next page

FS 8-22

ORB OPS/133/FIN

8. CONFIGURE BACKUP WLES LAPTOP AS NEW PRIME LAPTOP

Use backup WLES laptop

Double click 'Shuttle Apps'>'WLES'>'WLES'  
'Backup Mode Selection'  
Click 'Primary'

9. VERIFY COMM WITH RELAY UNITS

Use backup 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

'Main'  
Click 'Unit List' (left side of display)

√Cabin Relay Units Unit ID 1664 and 1728 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 both times updating:

Notify MCC: "Serial port hardware failure on prime WLES laptop"  
Go to step 10

If both times not updating:

√MCC >>

Cont next page

FS 8-23

ORB OPS/133/FIN

10. CONFIGURE NEW BACKUP PATH

Use backup WLES laptop

'Enhanced Wideband MicroTAU – WLEFlight 3.0'

'System Settings'

'Directories'

At the line 'Backup Directory:' click 'Browse...' (right side of display)

'Browse for Folder'

Navigate to WLES folder on WLES:

'My Computer'>'C on WLES (V:)'>'Program Files'>'Invocon'>'EWBMTAU-WLEFlight'

Click 'OK'

Verify 'Backup Directory:' set to:

'V:\Program Files\Invocon\EWBMTAU-WLEFlight'

Verify 'Backup Interval' set to '30 minutes'

Click 'Unit List' (left side of display)

Notify MCC: "LRU Troubleshooting Complete"

ML60E

Stow:

Prime LRU



PAYLOADS OF OPPORTUNITY

MAUI PRCS AND VRCS PROCEDURE.....	FS 9-2
VRCS ONLY PROCEDURE .....	FS 9-6
PRCS ONLY PROCEDURE .....	FS 9-10
RAMBO-2 PROCEDURE.....	FS 9-14

**P/L OF  
OPP**

## MAUI PRCS AND VRCS PROCEDURE

- 15:00 or earlier 1. MANEUVER TO START ATTITUDE  
(BIASED +ZLV +YVV)

### NOTE

External lights should remain OFF from 15 minutes before, until 5 minutes after the MAUI burn

P/L OF  
OPP

- A7U √PL BAY FLOOD (all) – OFF  
√ILLUMINATORS (all)– OFF

Deploy MAUI PRCS AND VRCS – 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, O15:E cb DDU L (two) – cl

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

Cont next page

FS 9-2

ORB OPS/133/FIN

GNC 20 DAP CONFIG

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

C3     √DAP: A/AUTO/VERN  
          √DAP TRANS: PULSE/PULSE/PULSE

-05:00   4. VERIFY ATTITUDE  
          Verify in attitude

DAP ROT: PULSE/PULSE/PULSE

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

FS 9-3

ORB OPS/133/FIN

## 5. MAUI PRCS AND VRCS - RCS FIRING SEQUENCE

### NOTE

Use the table below or the cue card

Reminder: All inputs are momentary

<u>Timer</u>	<u>Jets Fired</u>	<u>CDR</u>	<u>PLT</u>
-03:00		√Body rates: $+0.047 \leq \text{roll} \leq +0.087$ $-0.020 \leq \text{pitch} \leq +0.020$ $-0.020 \leq \text{yaw} \leq +0.020$ DAP: FREE DAP: A/PRI  Inform PLT "GO" for jet deselection	Configure initial setup <u>GNC 23 RCS</u> Left RCS page – ITEM 2 EXEC  On CDR "GO", proceed  <u>NOTE</u> Expect DAP RECONF msgs in following actions  Deselect jets: JET DES L5L – ITEM 37 EXEC (*) Right RCS page – ITEM 3 EXEC JET DES R5D – ITEM 39 EXEC (*) Forward RCS page – ITEM 1 EXEC JET DES F5L – ITEM 37 EXEC (*)
-00:30		FLT CNTLR PWR – ON	
00:00	RXA, LXA	THC +X (in) (3 sec firing)	
00:15	FXL, LXL	THC +Y (right) (3 sec firing)	
00:30	FXR, RXR	THC -Y (left) (3 sec firing)	
00:35			DAP: VERN
00:45	R5R	RHC +yaw (10 sec firing)	
01:05	L5D	RHC -pitch (12 sec firing)	
01:25	F5R	RHC +pitch (12 sec firing)	
		FLT CNTLR PWR – OFF	Return to MAUI PRCS AND VRCS PROCEDURE, step 6, (ORB OPS FS, <u>P/L OF OPP</u> )

Cont next page

FS 9-4

ORB OPS/133/FIN

6. CLEANUP  
F6 √FLT CNTLR PWR – OFF

GNC 23 RCS

√Forward RCS page – ITEM 1 EXEC

Reselect Jets:

JET DES 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

## MAUI VRCS ONLY PROCEDURE

- 15:00 or earlier 1. MANEUVER TO START ATTITUDE  
(BIASED -XLV +ZVV)

### NOTE

External lights should remain OFF from 15 minutes before, until 5 minutes after the MAUI burn

- A7U √PL BAY FLOOD (all) – OFF  
√ILLUMINATORS (all)– OFF

Deploy MAUI VRCS ONLY 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 +1 8 0 EXEC  
Y – ITEM 16 +0 EXEC  
OM – ITEM 17 +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

### GNC 20 DAP CONFIG

DAP A VERN ROT PLS – ITEM 26 +0.1 5 3 EXEC

- C3 √DAP: A/AUTO/VERN

Cont next page

-05:00 4. VERIFY ATTITUDE  
Verify in attitude

DAP ROT: PULSE/PULSE/PULSE

NOTE

For the following VRCS firing sequence (step 5):

- A. Possible loss of comm due to orbiter body rates and attitude excursions
- B. For any jet fail OFF, continue with firing sequence
- C. The table in step 5 is also provided as a cue card

5. VRCS ONLY FIRING SEQUENCE

NOTE

Use the table below or the cue card

Reminder: All inputs are momentary

<u>Timer</u>	<u>Jets Fired</u>	<u>CDR</u>	<u>PLT</u>
-02:00		√Body rates: $-0.020 \leq \text{roll} \leq +0.020$ $-0.087 \leq \text{pitch} \leq -0.047$ $-0.020 \leq \text{yaw} \leq +0.020$ DAP: FREE √DAP: VERN  Inform PLT "GO" for jet deselects	Configure initial setup <u>GNC 23 RCS</u> Left RCS page – ITEM 2 EXEC (*)  On CDR "GO", proceed  <u>NOTE</u> Expect DAP RECONF msgs in following actions  Deselect jets: JET DES L5L – ITEM 37 EXEC (*) Right RCS page – ITEM 3 EXEC (*) JET DES R5D – ITEM 39 EXEC (*) Forward RCS page – ITEM 1 EXEC (*) JET DES F5L – ITEM 37 EXEC (*)
-00:30		FLT CNTLR PWR – ON	
00:00	R5R	RHC +yaw (10 sec firing)	
00:20	L5D	RHC -pitch (12 sec firing)	
00:40	F5R	RHC +pitch (12 sec firing)	
		FLT CNTLR PWR – OFF	Return to MAUI VRCS ONLY PROCEDURE, step 6, (ORB OPS FS, <u>P/L OF OPP</u> )

Cont next page

6. CLEANUP  
F6 √FLT CNTLR PWR – OFF

GNC 23 RCS

√Forward RCS page – ITEM 1 EXEC

Reselect Jets:

JET DES 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  $\geq$  +02:00:

DAP: LVLH

Return to FLT PLN attitude

8. RECONFIGURE TO GROUP B POWERDOWN

√MCC

O14:E,   cb DDU L (two) – op  
O15:E





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## MAUI PRCS ONLY PROCEDURE

- 15:00 or earlier 1. MANEUVER TO START ATTITUDE  
(BIASED +ZLV +YVV)

### NOTE

External lights should remain OFF from 15 minutes before, until 5 minutes after the MAUI burn

- A7U √PL BAY FLOOD (all) – OFF  
√ILLUMINATORS (all)– OFF

Deploy MAUI PRCS ONLY 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

Cont next page

FS 9-10

ORB OPS/133/FIN

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 8 EXEC

GNC 23 RCS

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

-05:00   4. VERIFY ATTITUDE  
          Verify in attitude

NOTE

For the following PRCS 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

FS 9-11

ORB OPS/133/FIN

## 5. PRCS FIRING SEQUENCE

### NOTE

Use the table below or the cue card

Reminder: all inputs are momentary except  
RHC +pitch at 00:45

<u>Timer</u>	<u>Jets Fired</u>	<u>CDR</u>	<u>PLT</u>
-01:00		√Body rates: +0.047 ≤ roll ≤ +0.087 -0.020 ≤ pitch ≤ +0.020 -0.020 ≤ yaw ≤ +0.020 DAP: FREE DAP: A/PRI	Configure initial setup GNC 23 RCS √Forward RCS page – ITEM 1 EXEC (*)  <u>NOTE</u> Queue the following ITEM entry on the scratch pad. Do not perform the EXEC until specified at +00:35 sec  Queue JET DES F3D – ITEM 25
-00:30		FLT CNTLR PWR – ON	
00:00	RXA, LXA	THC +X (in) (3 sec firing)	
00:15	FXL, LXL	THC +Y (right) (3 sec firing)	
00:30	FXR, RXR	THC -Y (left) (3 sec firing)	
00:35			When jets stop firing: GNC 23 RCS EXEC [JET DES F3D – ITEM 25 (*)]
00:45	F4D	RHC +pitch to hardstop, hold 3 sec	
00:48		RHC release	
		FLT CNTLR PWR – OFF	Return to MAUI PRCS ONLY PROCEDURE, step 6, (ORB OPS FS, P/L OF OPP)

Cont next page

FS 9-12

ORB OPS/133/FIN

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 \*)

GNC 20 DAP CONFIG

DAP A1 – ITEM 1 +1 EXEC

7. SNAP LVLH ATTITUDE AND NULL RATES

When time ≥ +02:00:

    √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 any combination of WAKE, RAM or Out-of-Plane burns depending upon the duration of the opportunity and DoD preference. The direction of the Out-of-Plane burn is dependent upon the specific opportunity and will be provided by MCC

### ATTITUDE TABLE

Universal Pointing	RAM	WAKE	Out-of-Plane
P – ITEM 15 +	<u>1 2 0</u>	<u>2 2 0</u>	<u>8 0</u>
Y – ITEM 16 +	<u>0</u>	<u>0</u>	<u>0</u>
OM – ITEM 17 +	<u>0</u>	<u>0</u>	√MCC: <u>9 0</u> or <u>2 7 0</u>

### BURN PLAN (√MCC)

Burn	Type (RAM, WAKE, OOP)	MET TIG (hr:min:sec)
1	_____	_____
2	_____	_____
3	_____	_____

#### -15:00 or earlier 1. MANEUVER TO BURN ATTITUDE

GNC 20 DAP CONFIG

√DAP A1, B1 loaded

UNIV PTG

TGT ID – ITEM 8 +2 EXEC

BODY VECT – ITEM 14 +5 EXEC

Load P, Y and OM per the ATTITUDE TABLE above for the desired burn

DAP: A/AUTO/VERN(ALT)

TRK – ITEM 19 EXEC (CUR - \*)

Cont next page

2. INITIATE TIMER

GNC 2 TIME

Set count down/count up timer for the first burn per the BURN PLAN above (√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)

Y OPTION – ITEM 16 EXEC (NOSE)

If performing more than one burn increase the  
B DAP PRI ROT RATE to 1 deg/s:

DAP B PRI ROT RATE – ITEM 30 +1 EXEC

DAP TRANS: NORM/PULSE/PULSE

4. VERIFY ATTITUDE

-01:00    Verify in attitude

F6        FLT CNTLR PWR – ON

-00:20    DAP: PRI

Cont next page

FS 9-15

ORB OPS/133/FIN

5. RAMBO BURN

0:00 THC +X (in) for 10 seconds

F6

If performing an additional burn:

FLT CNTLR PWR – OFF

Wait 20 seconds before executing the maneuver

UNIV PTG

Load P, Y and OM per the ATTITUDE TABLE above for the next desired burn

DAP: B/AUTO/ALT

TRK – ITEM 19 EXEC (CUR - \*)

Set count down/count up timer for the next burn per the BURN PLAN above

√MET – ITEM 2 EXEC (\*)

CRT TIMER COUNT TO –

ITEM 17 +\_\_+\_\_+\_\_ EXEC

When in attitude and if VRCS available:

DAP: A/VERN

When rates stable:

DAP: A/PRI

Wait at least 20 seconds before THC inputs and until the next TIG per the BURN PLAN

F6

FLT CNTLR PWR – ON

Go to Step 5

Cont next page

FS 9-16

ORB OPS/133/FIN



6. CLEANUP

Wait 20 seconds before returning to VERN(ALT)  
below or executing a maneuver

F6 FLT CNTLR PWR – OFF

GNC 20 DAP CONFIG

DAP A1 – ITEM 1 +1 EXEC

√B1 – ITEM 2 +1 EXEC

DAP TRANS: PULSE/PULSE/PULSE

DAP: VERN(ALT)

Return to FLT PLN attitude

7. 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



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CWC OPS

WASTE TANK OFFLOAD TO CWC ..... FS 10-2

**CWC OPS**

FS 10-1

ORB OPS/133/FIN

## WASTE TANK OFFLOAD TO CWC

OBJECTIVE: Use CWC to temp store waste water in the event the waste tank is full and cannot be dumped. CWC will be dumped at a later time

### NOTE

Requires Ops 2 config and two crewmembers

LOCATION: CONT H2O X-TIE WASTE QD located on outboard WCS wall (inside WCS compartment), Volume H (MD23R); see LOWER EQUIPMENT BAY (IFM, COMPONENT LOCATIONS)

CWC OPS

### TOOLS REQD:

TOOL	Gray Tape
CHCK	8 ft Y-Y Hose
WCS	Dry Wipes (2-3)
MISC	PPE (gloves and goggles)
	36 x 36 Ziploc Bag (two)
Middeck	Contingency Water Container (CWC) (Check MCC for CWC S/N)

1. Remove contents of Vol H (MD23R), temp stow
2. Connect Y-Y Hose to CWC
3. Place CWC in one Ziploc

ML31C 4. WASTE H2O DUMP ISOL VLV – CL (tb-CL)

### NOTE

Discontinue WCS ops until procedure complete.  
Use Dry Wipes to absorb any fluid released during QD mate/demate

5. Don PPE

WCS 6. Connect Y-Y Hose to CONT H2O X-TIE WASTE QD (upper QD with yellow Velcro and "WASTE" label)

### NOTE

MCC will TMBU limits if desired

Cont next page

7. FDA limit for Waste TK to CWC transfer \_\_\_\_\_%

8. **SM 60 TABLE MAINT**

PARAMETER NAME	PARA ID	SM ALERT	
		LOW	HIGH
WASTE H2O QTY 1	0620540	<input type="checkbox"/>	-

ML31C 9. WASTE H2O DUMP ISOL VLV – OP (tb-OP)

10. Monitor CWC fill rate continuously

**SM 66 ENVIRONMENT**

11. When 'S66 WASTE H2O QTY ↓', continue

ML31C 12. WASTE H2O DUMP ISOL VLV – CL (tb-CL)

WCS 13. Leave Y-Y Hose connected to CWC, disconnect Y-Y Hose from CONT H2O X-TIE WASTE QD, cap QD

ML31C 14. WASTE H2O DUMP ISOL VLV – OP (tb-OP)

15. Leaving Y-Y Hose protruding from corner of bag, lightly press air out of Ziploc, seal bag

16. Use Gray Tape to seal area around location where Y-Y Hose exits Ziploc (see photo below)



Cont next page

17. Fold any extra portion of Ziploc flat, coil Y-Y Hose on top
18. Place bagged CWC/Y-Y Hose assembly into second Ziploc , lightly press air out of bag, seal Ziploc
19. Temp stow entire assembly in Vol H (MD23R), ensuring minimal pressure is applied to CWC
20. Stow tools

PGSC FS

KFX DOWNLINK IN THE BLIND ..... FS 11-2

**PGSC FS**

FS 11-1

ORB OPS/133/FIN

## KFX DOWNLINK IN THE BLIND

- PGSC
1. Verify with MCC that the KFX application is running on the OCA PLAN A client and that the MCC is configured for an OCA Downlink
  2. CONFIGURE KFX APPLICATION  
If reqd, enlarge KFX window

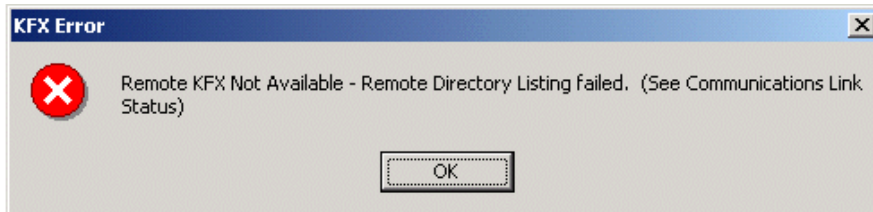
On KFX menu bar select 'View'>'Options'  
In 'Options' window click 'Network' tab  
In 'Network' tab change 'Maximum Xmit Rate' to '1500' Kbits/sec  
Click 'OK'  
Click 'Yes' when prompted for KFX S/W restart

After KFX S/W restart, on 'KFX' window:

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

3. SELECT FILE(S) TO DOWNLINK  
Use WINDOWS EXPLORER to sel files/directories to transfer  
Drag files over KFX window  
Rel mouse button

The following dialog will be displayed when the files for downlink are dragged over the KFX window:



Click 'OK'

√'KFX File Transfer Preview' display appears with selected file(s) listed

Cont next page



4. ADD ADDITIONAL FILE FOR DOWNLINK (if reqd)

- √'KFX File Transfer Preview' display active
- Sel 'add to list' button (button with documents, '+' symbols)
- √'Select Files from Transfer' display appears
- Sel desired file from file listbox
- Sel 'Select' button
- Repeat for each additional file as reqd
- Sel 'Done' button

5. REMOVE FILE FROM DOWNLINK (if reqd)

- √'KFX File Transfer Preview' display active
- Sel desired file(s) in listbox
- Sel 'delete' button (button with 'X')

6. START FILE DOWNLINK

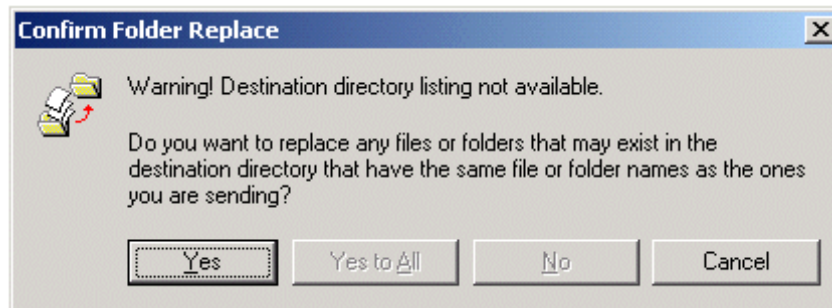
NOTE

User may halt transfer while in progress by sel 'Abort' button

- √'KFX File Transfer Preview' display active

Sel 'downlink' button (button with '↓')

The following two warning dialogs will be displayed:



Click 'Yes'

Cont next page

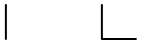
FS 11-3

ORB OPS/133/FIN



On MCC Go, click 'Ignore'  
√'File Transfer Status' display appears  
√Displaying xfer status

\* If error displayed, repeat step 6 \*



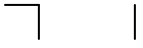
CUE CARD CONFIGURATION

CUE  
CARDS

NOT FLOWN

FS 12-1

ORB OPS/133/FIN





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**CUE  
CARDS**



NOT FLOWN

FS 12-2

ORB OPS/133/FIN



TOP

HOOK  
VELCRO

**LiOH CHANGEOUT**

(6 crewmembers/Single Shift/FD 1-15)

FLIGHT DAY	POS A	POS B	CK CMPLT
LAUNCH	1	2	
PRE FD01	"	"	
POST FD02	3 *	4	
PRE FD02	5 *	"	
POST FD03	6	7	DOCKING
PRE FD03	"	"	
POST FD04	"	"	
PRE FD04	8	"	
POST FD05	"	STS-128	EVA 1
PRE FD05	"	STS-129	
POST FD06	"	"	
PRE FD06	STS-129	"	
POST FD07	"	"	EVA 2
PRE FD07	"	STS-129	
POST FD08	STS-129	"	
PRE FD08	"	STS-129	
POST FD09	"	"	
MID FD09	STS-129 *	STS-129 *	HATCH CLOSE
PRE FD09	"	"	
POST FD10	STS-129	STS-129	
PRE FD10	STS-130 *	"	
POST FD11	STS-130	STS-130	
PRE FD11	STS-130	"	
POST FD12	STS-130	STS-130	EOM
PRE FD12	21	"	
POST FD13	22 *	23	EOM+1
PRE FD13	24	"	
POST FD14	25 *	26	EOM+2
PRE FD14	27	"	
POST FD15	28	29	EOM+3

\* Re-bag and seal LiOH cans with Gray Tape and stow  
(Location of canisters on back)

ORB OPS-29a/nonRCRS/133/O/B

NOTE

This card is specifically used for the STS-133 mission with the orbiter conducting single shift operations with an orbiter crew size of 6 and ISS crew of 6. This changeout scheme reflects FD3 docking with ISS, Vozdukh, and dual-bed CDRA operation

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FS CC 12-3

ORB OPS/133/FIN

TOP  
BACK OF 'LIOH CHANGEOUT'

HOOK  
VELCRO

**LIOH CANISTER STOWAGE LOCATIONS**

**Ascent Stowage Locations**

Orbiter:

MD52M (LiOH Box): cans 1-29 \*

ISS:

STS-128 can 72 \*\*  
STS-129 cans 22-25, 27-30, 33  
STS-130 cans 14, 17, 20-23  
STS-130 can 24 \*\*

**Entry (EOM) Stowage Locations**

Orbiter:

MD52M (LiOH Box):  
Cans 3-8, 21-29 \*  
STS-128 can 72 \*\*  
STS-129 cans 22-25, 27-30, 33  
STS-130 cans 14, 17, 20-23  
STS-130 can 24 \*\*

ISS:

Cans 9-20  
USED STS-133 cans 1, 2

\* Two LiOH cans installed in LiOH slots A and B

\*\* STS-128 can 72 has been reported missing in the past. If it cannot be found use STS-130 can 24 and report to MCC

ORB OPS-29b/nonRCRS/133/O/B

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FS CC 12-4

ORB OPS/133/FIN

TOP

HOOK  
VELCRO

HOOK  
VELCRO

**ORBIT BURN MONITOR**

<b>OMS TEMP*</b>	<b>L R</b>	
FU IN P $\geq$	225	220
$\leq$	205	204
or No FU IN P		
		OMS ENG FAIL
		OMS PRPLT FAIL
<b>OMS PC* &amp; OMS ↓</b>		
ENG VLV 1 or 2 < 70		
or OX IN P > 227		
or OX IN P $\leq$ 227		
or No OX IN P		
		OMS ENG FAIL
		OMS PRPLT FAIL
<b>OMS OX/FU TK P</b> ( $\sqrt{\text{ENG IN P}}$ )		
OX/FU LOW	He PRESS/VAP ISOL (two) – OP	
	If aff TK P not incr:	
	OMS PRPLT FAIL	
OX & FU HIGH	He PRESS/VAP ISOL (two) – CL	
	Cycle He A(B) to maintain TK P 234-284	
<b>OMS N2 REG P HIGH or LOW</b>	OMS ENG – ARM	
<b>OMS N2 TK P LOW</b>	At N2 TK P < 470:	
( $\sqrt{\text{OMS/MPS}}$ )	OMS ENG – ARM	
<b>OMS GMBL</b>	PRI fail	L(R) OMS GMBL – SEC
	SEC fail	If high RCS usage: OMS ENG FAIL
<b>GPC</b>	<input type="checkbox"/> ( <input type="checkbox"/> ) & Burning OMS aff	aff GPC PWR – OFF
		If SEC GMBL avail:
		aff MDM FF 1(4) – OFF, ON
		L(R) OMS GMBL – SEC
	SEC GMBL lost	If high RCS usage: OMS ENG FAIL
	2 FAs lost	$\sqrt{\text{MAN SHUTDN}}$
<b>I/O ERROR FA</b>	1(4)	L(R) OMS GMBL – SEC
		♦ I/O RESET
		If high RCS usage: OMS ENG FAIL
	2 FAs lost	$\sqrt{\text{MAN SHUTDN}}$
<b>BCE STRG D</b>		I/O RESET (if recov: >>)
	1(4)	If high RCS usage:
		L(R) OMS GMBL – SEC
<b>GPC SET SPLIT</b>	Non-crit burn	STOP BURN: OMS ENG(s) – OFF
	Crit burn	Go to "GPC" above
<b>I/O ERROR PCM</b>		OI PCMMU PWR – 2(1)
<b>BCE BYP OA</b>		SM I/O RESET

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

ORB OPS-31a/133/O/A

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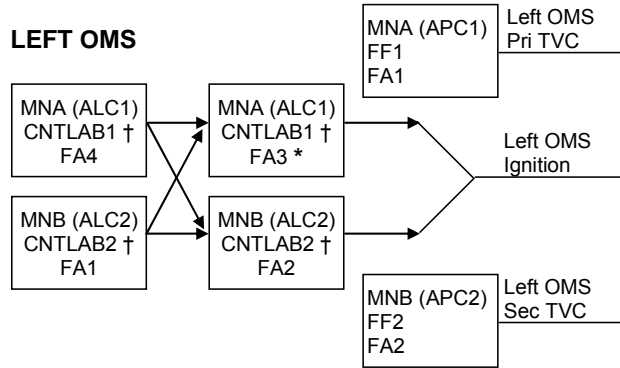
FS CC 12-5

ORB OPS/133/FIN

TOP  
BACK OF 'ORBIT BURN MONITOR'

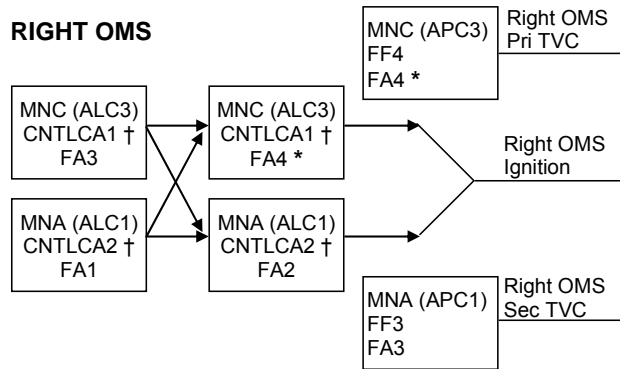


**LEFT OMS**



† 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)

**RIGHT OMS**



If two FA MDMs lost		
MDMs	Preburn: ENG – OFF	During burn: MAN SHUTDN
1,2	LEFT (TVC)	BOTH
1,3	RIGHT (IGN)	LEFT
1,4	LEFT (IGN)	RIGHT
2,3	LEFT (IGN)	RIGHT
2,4	RIGHT (IGN)	LEFT
3,4	RIGHT (TVC)	BOTH

ORB OPS-31b/133/O/A

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NOT FLOWN

FS CC 12-6

ORB OPS/133/FIN



NOT FLOWN

FS CC 12-7

ORB OPS/133/FIN

(reduced copy)

TOP

PILE  
VELCRO

ORB OPS-41a/133/O/A

PILE  
VELCRO

**STS-133 DAP A1 – DAP A8 CONFIGURATIONS**

	ITEM#	A1	A2	A3	A4	A5	A6	A7	A8
<b>PRI</b>									
ROT RATE	10 (50)	0.2000	0.4000	0.2000	0.5000	0.2000	0.2000	0.2000	0.0500
ATT DB	11 (51)	5.00	1.00	0.30	3.00	5.00	5.00	2.00	2.00
RATE DB	12 (52)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
ROT PLS	13 (53)	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
COMP	14 (54)	.000	.000	.000	.000	.000	.000	.000	.000
P OPTION	15 (55)	ALL	ALL	ALL	ALL	ALL	TAIL	ALL	ALL
Y OPTION	16 (56)	ALL	ALL	TAIL	ALL	ALL	TAIL	ALL	ALL
TRAN PLS	17 (57)	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
<b>ALT</b>									
RATE DB	18 (58)	0.200	0.200	0.070	0.200	0.070	0.070	0.100	0.100
JET OPT	19 (59)	ALL	ALL	ALL	ALL	ALL	TAIL	ALL	ALL
# JETS	20 (60)	2	2	1	2	1	1	2	2
ON TIME	21 (61)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
DELAY	22 (62)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>VERN</b>									
ROT RATE	23 (63)	0.2000	0.4000	0.0080	0.2000	0.0500	0.0500	0.0160	0.0500
ATT DB	24 (64)	1.000	1.000	0.070	1.000	1.000	1.000	1.000	1.000
RATE DB	25 (65)	.020	.020	.010	.020	.020	.020	.020	.020
ROT PLS	26 (66)	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.050
COMP	27 (67)	.000	.000	.000	.000	.000	.000	.000	.000
CNTL ACC	28 (68)	0	0	0	0	0	0	0	0
PURPOSE		NOMINAL	PTC	GG		LOSS OF VERN (ALL)	LOSS OF VERN (TAIL ONLY)	RNDZ	TERMINAL PHASE

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

HINGE

NOT FLOWN

FS CC 12-8

ORB OPS/133/FIN

(reduced copy)

TOP  
HINGED AT BOTTOM OF  
'STS-133 DAP A1 – DAP A8 CONFIGURATIONS'  
HINGE

**STS-133 DAP B1 – DAP B8 CONFIGURATIONS**

	ITEM #	B1	B2	B3	B4	B5	B6	B7	B8
<b>PRI</b>									
ROT RATE	30 (50)	0.5000	0.2000	0.2000	0.2000	0.2000	0.5000	0.5000	0.0500
ATT DB	31 (51)	3.00	3.00	3.00	0.30	3.00	3.00	2.00	2.00
RATE DB	32 (52)	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
ROT PLS	33 (53)	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
COMP	34 (54)	.000	.000	.000	.000	.000	.000	.000	.000
P OPTION	35 (55)	ALL	TAIL	ALL	TAIL	TAIL	ALL	ALL	ALL
Y OPTION	36 (56)	ALL	TAIL	ALL	TAIL	TAIL	ALL	ALL	ALL
TRAN PLS	37 (57)	0.100	0.020	0.020	0.020	0.020	0.020	0.050	0.050
<b>ALT</b>									
RATE DB	38 (58)	0.200	0.070	0.070	0.100	0.200	0.200	0.100	0.100
JET OPT	39 (59)	ALL	TAIL	ALL	ALL	ALL	ALL	ALL	ALL
# JETS	40 (60)	2	1	1	2	2	2	2	2
ON TIME	41 (61)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
DELAY	42 (62)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>VERN</b>									
ROT RATE	43 (63)	0.2000	0.2000	0.2000	0.0080	0.0160	0.2000	0.2000	0.0500
ATT DB	44 (64)	1.000	1.000	1.000	0.100	0.033	1.000	1.000	1.000
RATE DB	45 (65)	.020	.020	.020	.010	.020	.020	.020	.020
ROT PLS	46 (66)	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.020
COMP	47 (67)	.000	.000	.000	.000	.000	.000	.000	.000
CNTL ACC	48 (68)	0	0	0	0	0	0	0	0
PURPOSE		O/S & RCS BURNS (ORB OPS)	LOSS OF VERN (TAIL ONLY)	LOSS OF VERN (ALL)		COAS/HUD CAL		RNDZ	TERMINAL PHASE

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

HOOK  
VELCRO

ORB OPS-41aa/133/O/A

HOOK  
VELCRO

NOT FLOWN

FS CC 12-9

ORB OPS/133/FIN

(reduced copy)

TOP  
BACK OF 'STS-133 DAP A1 – DAP A8 CONFIGURATIONS'

PILE  
VELCRO

ORB OPS-41b/133/O/B

PILE  
VELCRO

STS-133 DAP A9 – DAP A14 CONFIGURATIONS

	ITEM #	A9	A10	A11	A12	A13	A14
<b>PRI</b>							
ROT RATE	10 (50)	0.1300	0.0500	0.0500	0.0500	0.0500	0.2000
ATT DB	11 (51)	2.00	0.60	10.00	5.00	5.00	5.00
RATE DB	12 (52)	0.10	0.10	0.20	0.20	0.20	0.20
ROT PLS	13 (53)	0.100	0.100	0.100	0.040	0.040	0.100
COMP	14 (54)	.000	.000	.000	.000	.000	.000
P OPTION	15 (55)	TAIL	TAIL	TAIL	TAIL	TAIL	TAIL
Y OPTION	16 (56)	TAIL	TAIL	TAIL	TAIL	TAIL	TAIL
TRAN PLS	17 (57)	0.050	0.050	0.100	0.010	0.010	0.100
<b>ALT</b>							
RATE DB	18 (58)	0.100	0.100	0.020 <sup>1</sup>	0.020 <sup>1</sup>	0.020 <sup>1</sup>	0.200
JET OPT	19 (59)	TAIL	TAIL	TAIL	TAIL	TAIL	TAIL
# JETS	20 (60)	2	2	1	1	1	1(2) <sup>3</sup>
ON TIME	21 (61)	0.08	0.08	0.08	0.08	0.08	0.08
DELAY	22 (62)	0.00	0.00	5.00	5.00	5.00	6.00
<b>VERN</b>							
ROT RATE	23 (63)	0.1300	0.0500	0.1000	0.1000	0.1000	0.2000
ATT DB	24 (64)	1.000	0.500	5.000	3.000	3.000	3.000
RATE DB	25 (65)	.020	.020	.050	.020	.020	.200
ROT PLS	26 (66)	0.050	0.050	0.010	0.002	0.002	0.010
COMP	27 (67)	.000	.000	.000	.000	.000	.000
CNTL ACC	28 (68)	0	0	<b>6(2,4,8)</b> <sup>2</sup>	<b>6(2,4,8)</b> <sup>2</sup>	<b>2(4,6,8)</b> <sup>2</sup>	1
PURPOSE		PROX/OPS FLYAROUND	DOCKING	AUTO REBOOST	MATED STACK (MNVRS,ROBO, ATT HOLD)		ORBITER ALONE SRMS/OBSS

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

<sup>1</sup> I-loaded below keyboard limit; do not change

<sup>2</sup> Reference DOCKED DAP REFERENCE (ORB OPS FS, REBOOST/DAP) for CNTL ACC Selection

<sup>3</sup> Use 1 for OBSS scan and 2 for Orbiter attitude maneuvers

-----  
HINGE

NOT FLOWN

FS CC 12-10

ORB OPS/133/FIN

(reduced copy)

TOP  
 BACK OF 'STS-133 DAP B1 – DAP B8 CONFIGURATIONS'  
 HINGED AT BOTTOM OF 'STS-133 DAP A9 – DAP A14 CONFIGURATIONS'  
 HINGE

**STS-133 DAP B9 – DAP B13 CONFIGURATIONS**

	ITEM #	B9	B10	B12	B13
<b>PRI</b>					
ROT RATE	30 (50)	0.1300	0.0500	0.0100 <sup>1</sup>	0.0100 <sup>1</sup>
ATT DB	31 (51)	2.00	0.60	1.00	1.00
RATE DB	32 (52)	0.10	0.10	0.20	0.20
ROT PLS	33 (53)	0.040	0.040	0.040	0.040
COMP	34 (54)	.000	.000	.000	.000
P OPTION	35 (55)	TAIL	TAIL	TAIL	TAIL
Y OPTION	36 (56)	TAIL	TAIL	TAIL	TAIL
TRAN PLS	37 (57)	0.010	0.010	0.010	0.010
<b>ALT</b>					
RATE DB	38 (58)	0.100	0.100	0.020 <sup>1</sup>	0.020 <sup>1</sup>
JET OPT	39 (59)	TAIL	TAIL	TAIL	TAIL
# JETS	40 (60)	2	2	1	1
ON TIME	41 (61)	0.08	0.08	0.08	0.08
DELAY	42 (62)	10.00	0.00	5.00	5.00
<b>VERN</b>					
ROT RATE	43 (63)	0.1300	0.0500	0.0100	0.0100
ATT DB	44 (64)	1.000	0.500	1.000	0.100
RATE DB	45 (65)	.020	.020	.020	.020
ROT PLS	46 (66)	0.020	0.020	0.002	0.002
COMP	47 (67)	.000	.000	.000	.000
CNTL ACC	48 (68)	0	0	<b>6(2.4.8)</b> <sup>2</sup>	<b>6(2.4.8)</b> <sup>2</sup>
PURPOSE		PROXOPS/ FLYAROUND	DOCKING	MATED ATTHOLD (VRCS & ALT)	MATED VRCS DB COLLAPSE

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

<sup>1</sup> I-loaded below keyboard limit; do not change

<sup>2</sup> Reference DOCKED DAP REFERENCE (ORB OPS FS, REBOOST/DAP) for CNTL ACC Selection

HOOK  
VELCRO

ORB OPS-41bb/133/O/B

HOOK  
VELCRO

TOP

**MAUI PRCS AND VRCS – RCS FIRING SEQUENCE**

Reminder: All inputs are momentary

PILE  
VELCRO

HINGE

Timer	Jets Fired	CDR	PLT
-03:00		Body rates: $+0.047 \leq \text{roll} \leq +0.087$ $-0.020 \leq \text{pitch} \leq +0.020$ $-0.020 \leq \text{yaw} \leq +0.020$ DAP: FREE DAP: A/PRI  Inform PLT "GO" for jet deselection	Configure initial setup GNC 23 RCS Left RCS page – ITEM 2 EXEC  On CDR "GO", proceed  NOTE Expect DAP RECONF msgs in following actions  Deselect jets: JET DES L5L – ITEM 37 EXEC (*) Right RCS page – ITEM 3 EXEC JET DES R5D – ITEM 39 EXEC (*) Forward RCS page – ITEM 1 EXEC JET DES F5L – ITEM 37 EXEC (*)
-00:30		FLT CNTLR PWR – ON	
00:00	RXA, LXA	THC +X (in) (3 sec firing)	
00:15	FXL, LXL	THC +Y (right) (3 sec firing)	
00:30	FXR, RXR	THC -Y (left) (3 sec firing)	
00:35			DAP: VERN
00:45	R5R	RHC +yaw (10 sec firing)	
01:05	L5D	RHC -pitch (12 sec firing)	
01:25	F5R	RHC +pitch (12 sec firing)	
		FLT CNTLR PWR – OFF	Return to MAUI PRCS AND VRCS PROCEDURE, step 6, (ORB OPS FS, P/L OF OPP)

ORB OPS-42a/133/O/B

PILE  
VELCRO

(reduced copy)

NOT FLOWN

FS CC 12-11

ORB OPS/133/FIN

TOP  
BACK OF MAUI PRCS AND VRCS - RCS FIRING SEQUENCE

HOOK  
VELCRO

HOOK  
VELCRO

HOOK  
VELCRO

**MAUI PRCS ONLY FIRING SEQUENCE**

Reminder: All inputs are momentary except RHC +pitch at 00:45

Timer	Jets Fired	CDR	PLT
-01:00		Body rates: $+0.047 \leq \text{roll} \leq +0.087$ $-0.020 \leq \text{pitch} \leq +0.020$ $-0.020 \leq \text{yaw} \leq +0.020$ DAP: FREE DAP: A/PRI	Configure initial setup [GNC 23 RCS] Forward RCS page – ITEM 1 EXEC (*)  NOTE Queue the following ITEM entry on the scratch pad. Do not perform the EXEC until specified at +00:35 sec  Queue JET DES F3D – ITEM 25
-00:30		FLT CNTLR PWR – ON	
00:00	RXA, LXA	THC +X (in) (3 sec firing)	
00:15	FXL, LXL	THC +Y (right) (3 sec firing)	
00:30	FXR, RXR	THC -Y (left) (3 sec firing)	
00:35			When jets stop firing: [GNC 23 RCS] EXEC [JET DES F3D – ITEM 25 (*)]
00:45	F4D	RHC +pitch to hardstop, hold 3 sec	
00:48		RHC release	
		FLT CNTLR PWR – OFF	Return to MAUI PRCS ONLY PROCEDURE, step 6, (ORB OPS FS, P/L OF OPP)

HINGE

PILE  
VELCRO

ORB OPS-42aa/133/O/A

(reduced copy)

NOT FLOWN
FS CC 12-12
ORB OPS/133/FIN

TOP

HOOK  
VELCRO

HOOK  
VELCRO

HOOK  
VELCRO

**MAUI VRCS ONLY FIRING SEQUENCE**

Reminder: All inputs are momentary

HINGED TO RIGHT SIDE OF MAUI PRCS ONLY FIRING SEQUENCE

HINGE

Timer	Jets Fired	CDR	PLT
-02:00		√Body rates: -0.020 ≤ roll ≤ +0.020 -0.087 ≤ pitch ≤ -0.047 -0.020 ≤ yaw ≤ +0.020 DAP: FREE √DAP: VERN  Inform PLT "GO" for jet deselects	Configure initial setup [GNC 23 RCS] Left RCS page – ITEM 2 EXEC (*)  On CDR "GO", proceed  <u>NOTE</u> Expect DAP RECONF msgs in following actions  Deselect jets: JET DES L5L – ITEM 37 EXEC (*) Right RCS page – ITEM 3 EXEC (*) JET DES R5D – ITEM 39 EXEC (*) Forward RCS page – ITEM 1 EXEC (*) JET DES F5L – ITEM 37 EXEC (*)
-00:30		FLT CNTLR PWR – ON	
00:00	R5R	RHC +yaw (10 sec firing)	
00:20	L5D	RHC -pitch (12 sec firing)	
00:40	F5R	RHC +pitch (12 sec firing)	
		FLT CNTLR PWR – OFF	Return to MAUI VRCS ONLY PROCEDURE, step 6, (ORB OPS FS, P/L OF OPP)

ORB OPS-42b/133/O/B

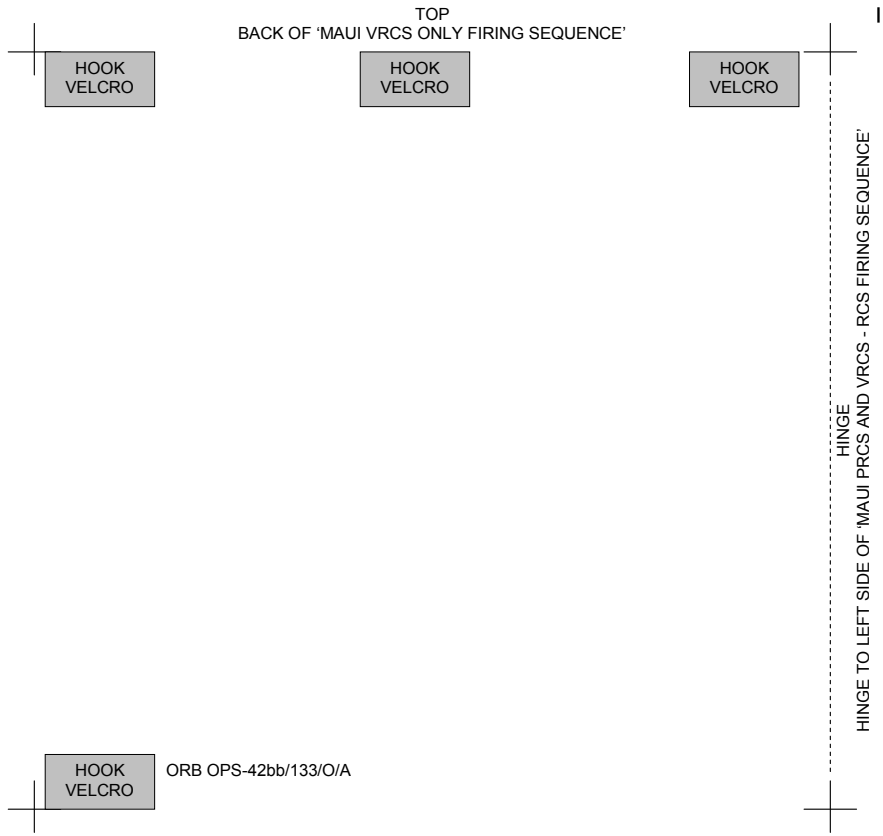
HOOK  
VELCRO

(reduced copy)

NOT FLOWN

FS CC 12-13

ORB OPS/133/FIN



NOT FLOWN

(reduced copy)  
FS CC 12-14

ORB OPS/133/FIN



TOP

**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/133/O/A

FABRICATION NOTES

Fabricate on flight approved yellow Post-it

NOT FLOWN

(reduced copy)

FS CC 12-15

ORB OPS/133/FIN



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FS 12-16

ORB OPS/133/FIN



Space Shuttle Program  
FLIGHT DATA FILE

JSC-48036-133  
FINAL



# ORBIT OPS CHECKLIST

STS  
**133**

Flight Cover (trim bottom to expose tabs)