

Orbit Operations Checklist

STS-132 Flight Supplement

**Mission Operations Directorate
Operations Division**

**Final, Rev A
April 22, 2010**

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

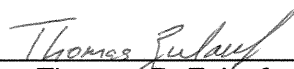


MISSION OPERATIONS DIRECTORATE

**ORBIT OPERATIONS CHECKLIST
STS-132 FLIGHT SUPPLEMENT**

FINAL, REV A
April 22, 2010

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ORBIT BURN MONITOR	DS6/D. Lenort	281-483-2644
DAP TABLES	DS6/K. Longacre	281-244-5479
MAUI – RCS FIRING SEQUENCE	DS6/K. Longacre	281-244-5479
WLES CONFIG AFTER PGSC REBOOT	DO5/R. Besser	281-244-5627

ORBIT OPERATIONS CHECKLIST
 STS-132 FLIGHT SUPPLEMENT

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 REV A 04/22/10

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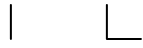
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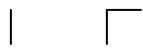
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COMM/INST

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**COMM/
INST**

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 *
- C3 * OI PCMMU PWR – 2(1) *
- CRT * √ERR MSG – 'I/O ERR PCM' *
- * 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/ORBIT BURN/FCS C/O	103/161	–
G2,S2,OPS 0	OPS 0	– /163	–
G2,S2,P9	MMU C/O	– /163	–
G9	Prelaunch PL C/O	103/180	758
G2, G8, S2	RNDZ w/MRM1 FMT (MRM/SSV/TCS) (PRIME)	103/199	780
G2, G8, S2	RNDZ w/MRM1 FMT (MRM/SSV/TCS) (B/U)	103/212	781
G2, G8, S2	MRM1 CONTINGENCY DUMP (MRM DUMP/SSV) (PRIME)	103/185	761
G2, G8, S2	MRM1 CONTINGENCY DUMP (MRM DUMP/SSV) (B/U)	103/206	768
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	UNDOCK w/UHF FMT CCSU (SSOR/SSV/TCS) (PRIME)	103/192	763
G2,G8,S2	UNDOCK w/UHF FMT CCSU (SSOR/SSV/TCS) (B/U)	103/211	770

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 *
A1L * 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
780 RNDZ w/MRM1 FMT (PRIME) TFL 199	1 2 3 4 5-FPM	2 - 9 4 506	1,2 - 5 4	OIU3 (3M) ** - TCS SSV (3) *** H-H-H *
781 RNDZ w/MRM1 FMT (BACKUP) TFL 212	1 2 3 4 5-FPM	14 3 - 19 503	4 1,2 - 5	SSV (3) *** OIU3 (3M) ** - 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 *
763 UNDOCK w/UHF FMT CCSU (PRIME) TFL 192	1 2 3 4 5-FPM	30 - 9 4 504	1,2 - 5 4	OIU7 (CCSU) ** - TCS SSV (3) *** H-H-H *
770 UNDOCK w/UHF FMT CCSU (BACKUP) TFL 211	1 2 3 4 5-FPM	14 31 - 19 502	4 1,2 - 5	SSV (3) *** OIU7 (CCSU) ** - TCS 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

Cont next page

FS 1-5

ORB OPS/132/FIN A

CONFIG	DECOM	FMT	INPUT	USE
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 *
761 MRM1 CONT. DUMP FMT (PRIME) TFL 185	1 2 3 4 5-FPM	8 - - 27 501	1,2 - - 4 -	OIU250 (MDMP) ** - - SSV (2) *** L-H-H *
768 MRM1 CONT. DUMP FMT (BACKUP) TFL 206	1 2 3 4 5-FPM	- 18 29 - 508	- 1,2 4 - -	- OIU250 (MDMP) ** SSV (2) *** - L-H-H *
758 Pre-Launch PL C/O (PRIME) TFL 180	1 2 3 4 5-FPM	28 15 9 - 505	1,2 1,2 5 - -	OIU253 ** OIU255 ** TCS - 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. MRM1 (OIU BUS 2)

LOAD FORMAT
BUS 2 BC
LOAD FORMAT

ITEM 1 +3 EXEC
ITEM 7 EXEC (*)
ITEM 1 +3 EXEC >>

6. SSOR (OIU BUS 1)

LOAD FORMAT
BUS 1 BC
LOAD FORMAT

ITEM 1 +7 EXEC
ITEM 3 EXEC (*)
ITEM 1 +7 EXEC >>

PTG

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

PTG

FS 2-1

ORB OPS/132/FIN A

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	89.1	-Y:15 R+ 297 -Z:42 P+ 182 Y+ 35	-Z:15 R+ 208 P+ 185 Y+ 50	-Y:42 R+ 15 P+ 199 Y+ 32	-Y:42 R+ 340 -Z:15 P+ 11 Y+ 308	-Z:42 R+ 245 P+ 0 Y+ 321	-Y:15 R+ 80 P+ 28 Y+ 318			
B	82.2	-Y:16 R+ 235 -Z:60 P+ 118 Y+ 313	-Z:16 R+ 163 P+ 136 Y+ 320	-Y:60 R+ 326 P+ 127 Y+ 299	-Y:60 R+ 19 -Z:16 P+ 322 Y+ 42	-Z:60 R+ 308 P+ 303 Y+ 43	-Y:16 R+ 97 P+ 330 Y+ 55			
C	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			
D	87.4	-Y:21 R+ 202 -Z:29 P+ 312 Y+ 24	-Z:21 R+ 109 P+ 328 Y+ 20	-Y:29 R+ 289 P+ 308 Y+ 10	-Y:29 R+ 75 -Z:21 P+ 149 Y+ 344	-Z:29 R+ 344 P+ 137 Y+ 334	-Y:21 R+ 160 P+ 140 Y+ 356			

STAR PAIRS PAD

FS 2-2

ORB OPS/132/FIN A

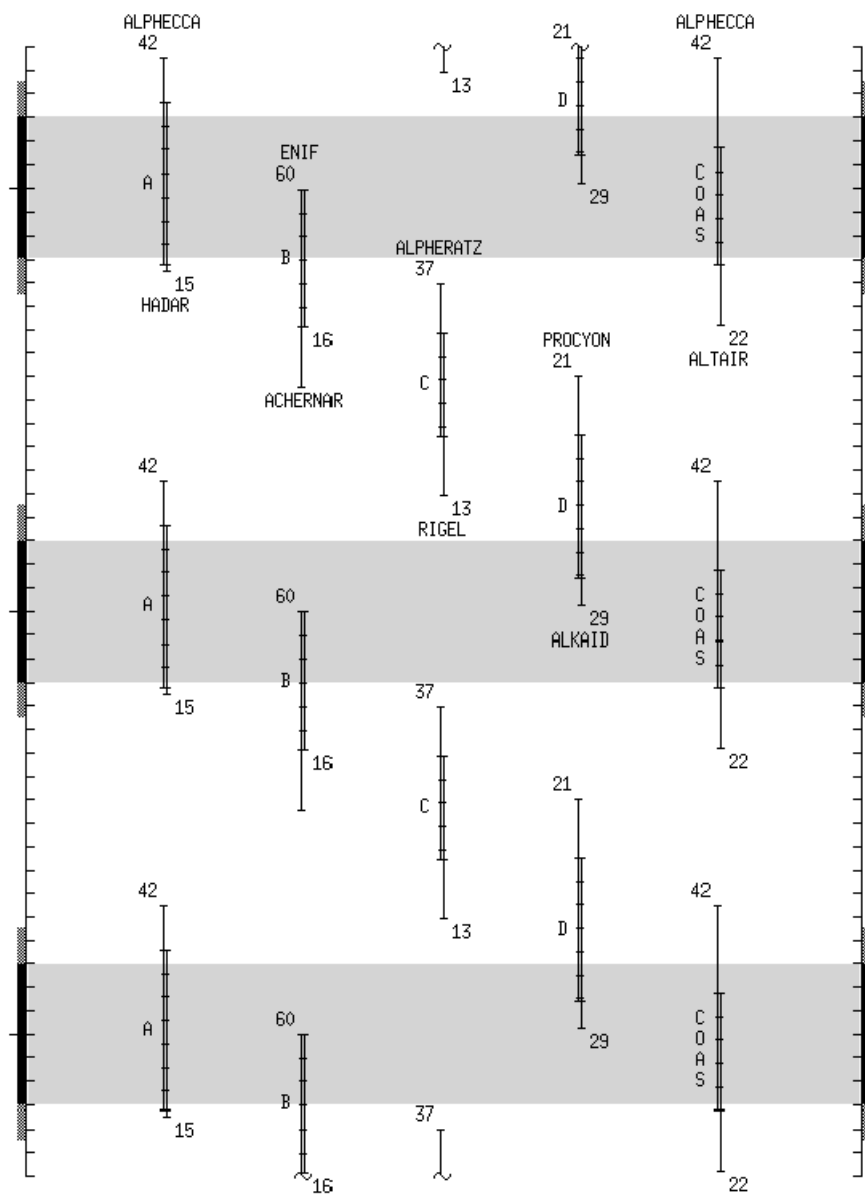
PAIR		COAS ALIGN ATTITUDE 1	ANG SEP	COAS ALIGN ATTITUDE 2
COAS	+X HUD	42 R+ 297 P+ 221 Y+ 310	NOSE UP 62.9	22 R+ 56 P+ 349 Y+ 301
	-Z COAS	42 R+ 246 P+ 4 Y+ 321	TAIL UP	22 R+ 250 P+ 27 Y+ 21

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: 05/14/10
Liftoff GMT: 134/18:19:59.000

STAR PAIRS



MET Applicable: Post OMS-2 to Nominal EOM
 Liftoff Date: 05/14/10
 Liftoff GMT: 134/18:19:59,000



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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 Att Hold)
A13		B13	Mated Stack (VRCS Deadband 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 - Light Russian Segment, from docking through MRM1 hand off to the SSRMS
3	Mated - Light Russian Segment, after MRM1 is handed off to the SSRMS through undock
4	Not Used
5	Mated - Medium Russian Segment
6	Mated - Heavy Russian Segment, from docking through MRM1 hand off to the SSRMS
7	Mated - Heavy Russian Segment, after MRM1 is handed off to the SSRMS through undock
8	Not used
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/132/FIN A

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 \rightarrow OM (0-359.99)
MON AXIS = 1 +X = 2 -X

FS 3-3

ORB OPS/132/FIN A

STS-132 DAP A CONFIGURATIONS

STS-132 DAP A1 – DAP A8 CONFIGURATIONS

	ITEM #	A1	A2	A3	A4	A5	A6	A7	A8
PRI									
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
ALT									
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
VERN									
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/132/FIN A

STS-132 DAP A9 – DAP A14 CONFIGURATIONS

	ITEM #	A9	A10	A11	A12	A13	A14
PRI							
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
ALT							
RATE DB	18 (58)	0.100	0.100	0.020 ¹	0.020 ¹	0.020 ¹	0.200
JET OPT	19 (59)	TAIL	TAIL	TAIL	TAIL	TAIL	TAIL
# JETS	20 (60)	2	2	1	1	1	1(2) ³
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
VERN							
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	X ²	X ²	X ²	1
PURPOSE		PROX/OPS FLYAROUND	DOCKING	AUTO REBOOST	MATED STACK (MNVRS, ROBO, ATT HOLD)		ORBITER ALONE SRMS/OBSS

FS 3-5

ORB OPS/132/FIN A

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 appropriate docked CNTL ACC

³ Use 1 for OBSS scan and 2 for Orbiter attitude maneuvers

STS-132 DAP B CONFIGURATIONS

STS-132 DAP B1 – DAP B8 CONFIGURATIONS

	ITEM #	B1	B2	B3	B4	B5	B6	B7	B8
PRI									
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
ALT									
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
VERN									
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/132/FIN A

STS-132 DAP B9 – DAP B13 CONFIGURATIONS

	ITEM #	B9	B10	B12	B13
PRI					
ROT RATE	30 (50)	0.1300	0.0500	0.0100 ¹	0.0100 ¹
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
ALT					
RATE DB	38 (58)	0.100	0.100	0.020 ¹	0.020 ¹
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
VERN					
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	X ²	X ²
PURPOSE		PROXOPS/ FLYAROUND	DOCKING	MATED ATT HOLD (VRCS & ALT)	MATED VRCS DB COLLAPSE

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 appropriate docked CNTL ACC

FS 3-7

ORB OPS/132/FIN A



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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

- 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 1 or 4:

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

Cont next page

FS 4-2

ORB OPS/132/FIN A

REBOOST/
DAP

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

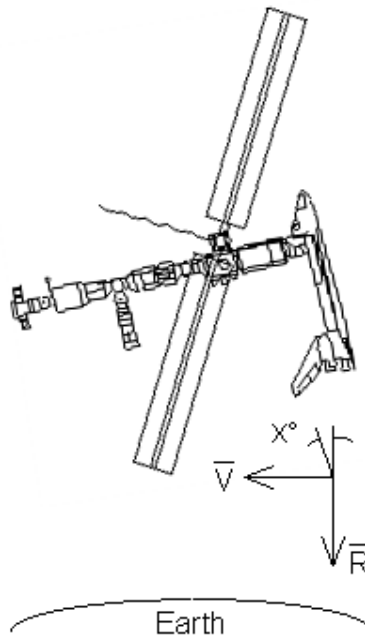
DAP: as reqd

Pri RJD LOGIC,DRIVER (sixteen) – as reqd

C3
O14,
O15,
O16

AUTO REBOOST ATTITUDE REFERENCE

ALT & VRCS ATTITUDE HOLD CONFIGURATIONS:



Configurations 1 and 4 use ALT PRCS (Pitch, $X=4^\circ$)
Configuration 2 is for Shuttle only - Do Not Use While Docked
Configuration 3 uses VRCS (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 and Maneuvers (VERN or ALT)	Mated Attitude Hold (VERN or ALT)
A12	B12

ALT not certified for loaded RMS operations

CNTL ACC selection depends on the weight of the Russian Segment due to visiting vehicle configurations and position of MT/SSRMS/ICC as described below:

	1 RS VISITING VEHICLE	2 OR 3 RS VISITING VEHICLES
SM AFT PORT EMPTY	LIGHT USE CA 2,3 ¹	MEDIUM USE CA 5 ¹
SM AFT PORT OCCUPIED [1]	MEDIUM USE CA 5 ¹	HEAVY USE CA 6, 7 ¹

¹ CNTL ACC 2, 5, or 6 from docking through MRM1 hand off to the SSRMS
CNTL ACC 3, 5, or 7 after MRM1 is handed off to the SSRMS through undock

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 >>

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

PRLA

PRLA CLOSE..... FS 6-2

PRLA

FS 6-1

ORB OPS/132/FIN A

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/132/FIN A

SDBI 1634, SLEEP-WAKE ACTIGRAPHY

- MF14K 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

- MF14K 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 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 S/N 2432 |
| 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 2496 |
| PORT
OVHD | Secure CRU B to PORT side of aft cabin with Velcro (see fig 8-3) |

Cont next page

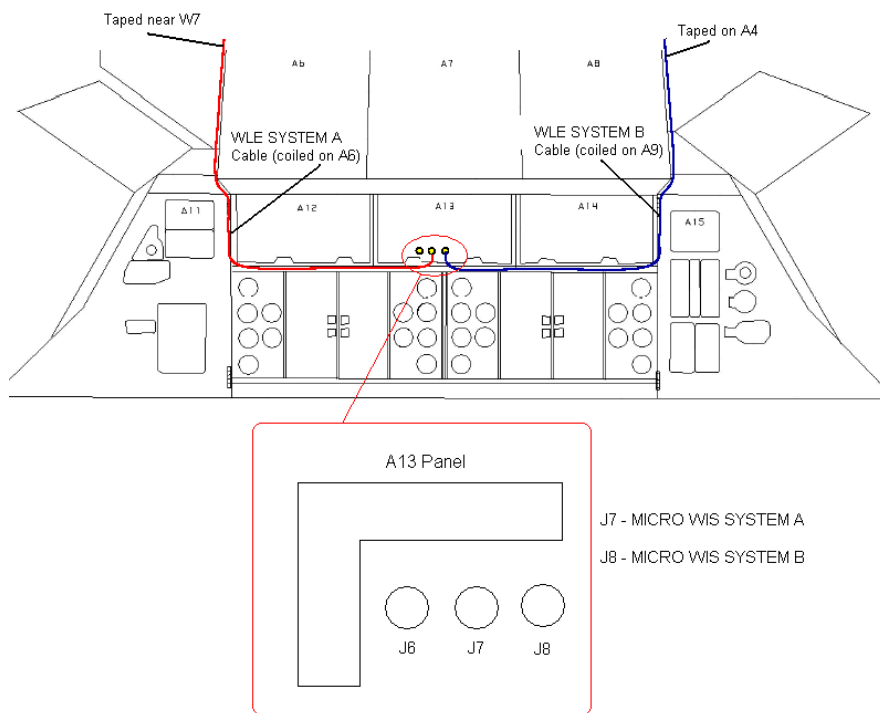


Figure 8-1.- A13 panel.

Cont next page

FS 8-3

ORB OPS/132/FIN A

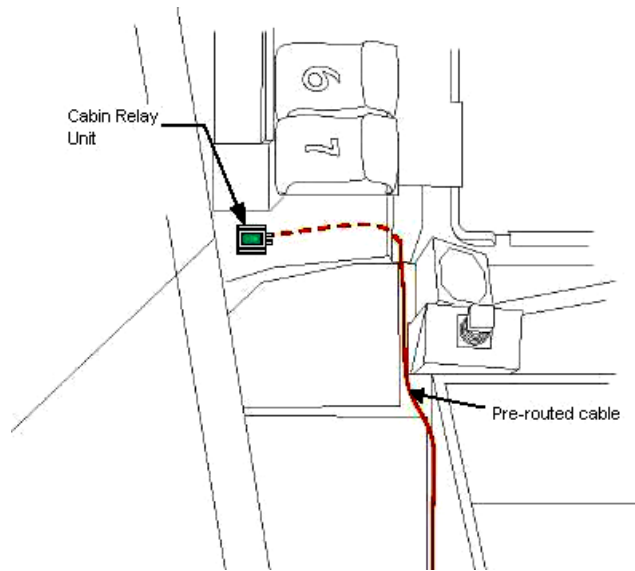


Figure 8-2.- Aft STBD location.

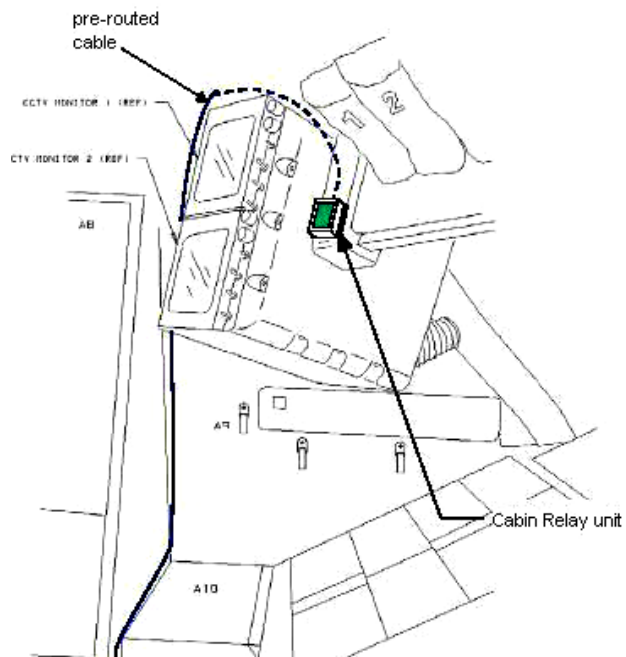


Figure 8-3.- Aft PORT location.

Cont next page

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

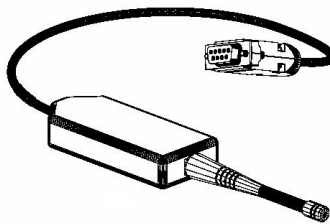


Figure 8-4.- Laptop Receiver Unit.

Cont next page

FS 8-5

ORB OPS/132/FIN A



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/132/FIN A

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

FS 8-8

ORB OPS/132/FIN A

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

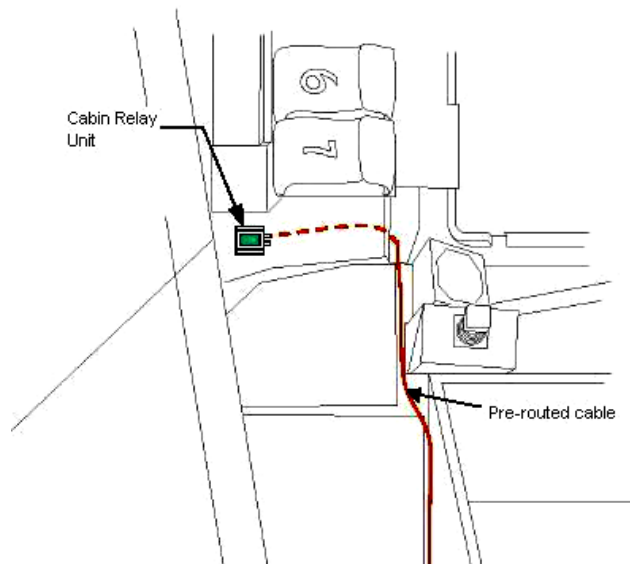


Figure 8-6.- Aft STBD location.

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FS 8-10

ORB OPS/132/FIN A

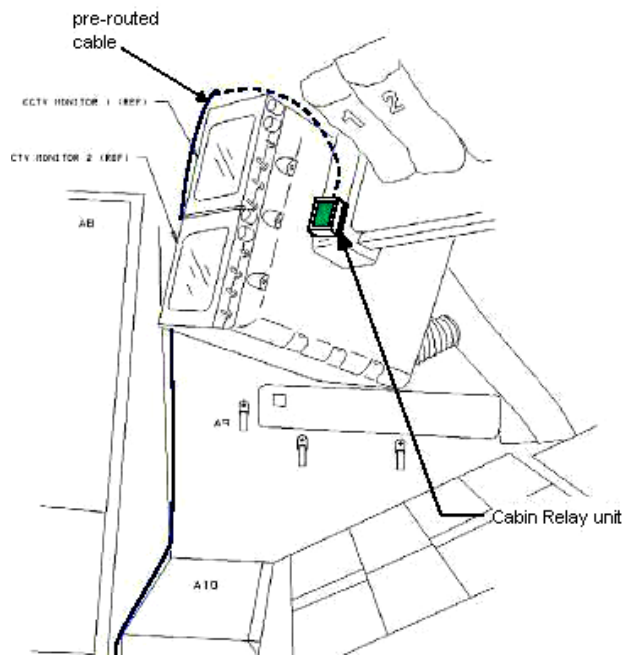


Figure 8-7.- Aft PORT location.

- 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.

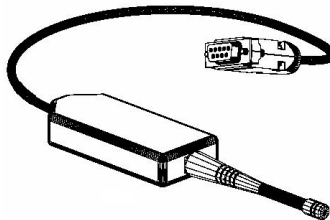


Figure 8-9.- Laptop Receiver Unit.

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

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 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

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 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
- 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 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

FS 8-14

ORB OPS/132/FIN A

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 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 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/132/FIN A

‘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 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’

Cont next page

FS 8-21

ORB OPS/132/FIN A

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/132/FIN A

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 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 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/132/FIN A

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

**P/L OF
OPP**

FS 9-1

ORB OPS/132/FIN A

MAUI 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 – 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

Cont next page

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
VERN ROT PLS – ITEM 26 +0.1 5 3 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
 DAP ROT: PULSE/PULSE/PULSE

-05:00 4. VERIFY ATTITUDE
 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

MAUI – RCS FIRING SEQUENCE

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

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 <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 (*) <u>NOTE</u> Queue the following ITEM entry on the scratch pad. Do not perform the EXEC until specified at 35 sec 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 (Past Soft Stop, hold 3 sec)	
00:48		RHC release	
00:50			DAP: VERN
01:00	R5R	RHC +yaw (10 sec firing)	
01:20	L5D	RHC -pitch (12 sec firing)	
01:40	F5R	RHC +pitch (12 sec firing)	
		FLT CNTLR PWR – OFF	Return to MAUI PROCEDURE, step 6, (ORB OPS FS, P/L OF OPP)

Cont next page

FS 9-4

ORB OPS/132/FIN A

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 or earlier 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

DAP: A/AUTO/VERN(ALT) |
TRK – ITEM 19 EXEC (CUR - *) |

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

FS 9-6

ORB OPS/132/FIN A

GNC 20 DAP CONFIG

DAP A PRI P OPTION – ITEM 15 EXEC (NOSE)
Y OPTION – ITEM 16 EXEC (NOSE)

DAP TRANS: NORM/PULSE/PULSE

-01:00 4. VERIFY ATTITUDE
Verify in attitude

F6 FLT CNTLR PWR – ON

0:00 5. WAKE BURN
DAP: PRI

Wait 20 seconds

THC +X (in) for 10 seconds

Wait 20 seconds before executing next maneuver

F6 6. MANEUVER TO RAM BURN ATTITUDE
(BIASED -ZLV-XVV)

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

DAP: B/AUTO/ALT

TRK – ITEM 19 EXEC (CUR - *)

When in attitude and if VRCS available:

DAP: A/VERN

When rates stable:

DAP: A/PRI

F6 FLT CNTLR PWR – ON

Wait 20 seconds

Cont next page

FS 9-7

ORB OPS/132/FIN A

7. RAM BURN
THC +X (in) for 10 seconds

Wait 20 seconds before executing next maneuver

F6 8. MANEUVER TO OUT-OF-PLANE BURN ATTITUDE
FLT CNTLR PWR – OFF

UNIV PTG

TGT ID – ITEM 8 +2 EXEC

BODY VECT – ITEM 14 +5 EXEC

P – ITEM 15 +9 0 EXEC

Y – ITEM 16 +0 EXEC

√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

DAP: B/AUTO/ALT

TRK – ITEM 19 EXEC (CUR - *)

When in attitude and if VRCS available:

DAP: A/VERN

When rates stable:

DAP: A/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

Cont next page

FS 9-8

ORB OPS/132/FIN A

10. CLEANUP
F6 FLT CNTLR PWR – OFF

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

DAP: VERN(ALT)

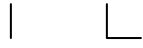
Return to FLT PLN attitude

11. RECONFIGURE TO GROUP B POWERDOWN

√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/132/FIN A

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



CUE CARD CONFIGURATION

CUE
CARDS



NOT FLOWN

FS 11-1

ORB OPS/132/FIN A

CUE
CARDS

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NOT FLOWN

FS 11-2

ORB OPS/132/FIN A

TOP

HOOK
VELCRO

LiOH CHANGEOUT

(6 crewmembers/Single Shift/FD 1-16)

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	"	8	
POST FD04	"	"	EVA 1
PRE FD04	9	"	
POST FD05	"	10	
PRE FD05	11	"	
POST FD06	"	"	EVA 2
PRE FD06	"	12	
POST FD07	13	"	
PRE FD07	"	14	
POST FD08	"	"	EVA 3
PRE FD08	STS-128	"	
POST FD09	"	STS-128	
PRE FD09	STS-128	"	
POST FD10	"	"	
MID FD10	STS-129	STS-129	HATCH CLOSE
PRE FD10	"	"	
POST FD11	15	16	Undocking
PRE FD11	17	"	
POST FD12	18	19	
PRE FD12	"	20	
POST FD13	21	22	EOM
PRE FD13	23	"	
POST FD14	24	25	EOM+1
PRE FD14	"	26	
POST FD15	27	28	EOM+2
PRE FD15	29	"	
POST FD16	30	31	EOM+3

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

ORB OPS-29a/nonRCRS/132/O/B

NOTE

This card is specifically used for the STS-132 mission with the orbiter conducting single shift operations with a crew size of 6. This changeout scheme reflects FD3 docking with ISS, Vozdukh, and dual bed CDRA operation

(reduced copy)

NOT FLOWN

FS CC 11-3

ORB OPS/132/FIN A

TOP
BACK OF 'LIOH CHANGEOUT'



HOOK
VELCRO



LIOH CANISTER STOWAGE LOCATIONS

Ascent Stowage Locations

Orbiter:

MD52M (LiOH Box): Cans 1-31 *

ISS:

STS-128 and STS-129 cans (pregathered)

* 2 LiOH cans installed in LiOH slots A and B



ORB OPS-29b/nonRCRS/132/O/B



(reduced copy)

NOT FLOWN

FS CC 11-4

ORB OPS/132/FIN A

TOP

HOOK
VELCRO

HOOK
VELCRO

ORBIT BURN MONITOR

OMS TEMP*		
FU IN P ≥	L 230 R 230	OMS ENG FAIL
≤	L 214 R 212	OMS PRPLT FAIL
or No FU IN P		
OMS PC* & OMS ↓		
ENG VLV 1 or 2 < 70		OMS ENG FAIL
or OX IN P > 227		OMS PRPLT FAIL
or OX IN P ≤ 227		OMS PRPLT FAIL
or No OX IN P		
OMS OX/FU TK P (√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
OMS N2 REG P HIGH or LOW		OMS ENG – ARM
OMS N2 TK P LOW (√[OMS/MPS])		At N2 TK P < 470: OMS ENG – ARM
OMS GMBL	PRI fail	L(R) OMS GMBL – SEC (twice)
	SEC fail	If high RCS usage: OMS ENG FAIL
GPC	<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 (twice)
	SEC GMBL lost	If high RCS usage: OMS ENG FAIL
	2 FAs lost	√MAN SHUTDN
I/O ERROR FA	1(4)	L(R) OMS GMBL – SEC ♦ I/O RESET If high RCS usage: OMS ENG FAIL
	2 FAs lost	√MAN SHUTDN
BCE STRG D	1(4)	I/O RESET (if recov: >>) If high RCS usage: L(R) OMS GMBL – SEC (twice)
GPC SET SPLIT	Non-crit burn	STOP BURN: OMS ENG(s) – OFF
	Crit burn	Go to “GPC” above
I/O ERROR PCM		OI PCMMU PWR – 2(1)
BCE BYP OA		SM I/O RESET

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

ORB OPS-31a/132/O/A

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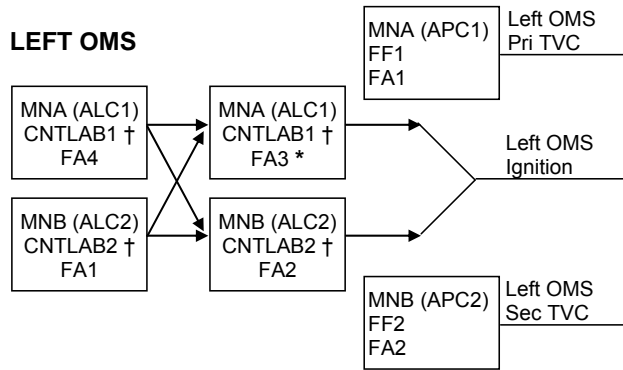
FS CC 11-5

ORB OPS/132/FIN A

TOP
BACK OF 'ORBIT BURN MONITOR'

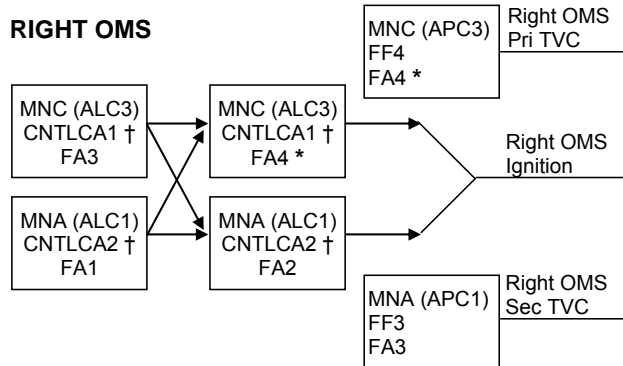


LEFT OMS



† 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

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ORB OPS/132/FIN A

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ORB OPS/132/FIN A

TOP

PILE
VELCRO

ORB OPS-41a/132/O/A

PILE
VELCRO

STS-132 DAP A1 – DAP A8 CONFIGURATIONS

	ITEM#	A1	A2	A3	A4	A5	A6	A7	A8
PRI									
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
ALT									
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
ONTIME	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
VERN									
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		NOMNL	PTC	GG		LOSS OF VERN(ALL)	LOSS OF VERN (TAIL ONLY)	RNDZ	TERMINAL PHASE

BOLD/ITALIC indicates change from I-Load.

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FS CC 11-8

ORB OPS/132/FIN A

(reduced copy)

TOP
HINGED AT BOTTOM OF
'STS-132 DAP A1 – DAP A8 CONFIGURATIONS'
HINGE

STS-132 DAP B1 – DAP B8 CONFIGURATIONS

	ITEM #	B1	B2	B3	B4	B5	B6	B7	B8
PRI									
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
ALT									
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
VERN									
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/UID CAL		RNDZ	TERMINAL PHASE

BOLD/ITALIC indicates change from I-Load.

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ORB OPS-41aa/132/O/A

HOOK
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FS CC 11-9

ORB OPS/132/IN A

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TOP
BACK OF 'STS-132 DAP A1 – DAP A8 CONFIGURATIONS'

PILE
VELCRO

ORB OPS-41b/132/O/B

PILE
VELCRO

STS-132 DAP A9 – DAP A14 CONFIGURATIONS

	ITEM #	A9	A10	A11	A12	A13	A14
PRI							
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
ALT							
RATE DB	18 (58)	0.100	0.100	0.020 ¹	0.020 ¹	0.020 ¹	0.200
JET OPT	19 (59)	TAIL	TAIL	TAIL	TAIL	TAIL	TAIL
# JETS	20 (60)	2	2	1	1	1	1(2) ³
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
VERN							
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	X ²	X ²	X ²	1
PURPOSE		PROX/OPS FLYAROUND	DOCKING	AUTO REBOOST	MATED STACK (MNVRS, ROBO, ATT HOLD)		ORBITER ALONE SRMSOBSS

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 appropriate docked CNTL ACC

³ Use 1 for OBSS scan and 2 for Orbiter attitude maneuvers

HINGE

NOT FLOWN

FS CC 11-10

ORB OPS/132/IN A

(reduced copy)

TOP
 BACK OF 'STS-132 DAP B1 – DAP B8 CONFIGURATIONS'
 HINGED AT BOTTOM OF 'STS-132 DAP A9 – DAP A14 CONFIGURATIONS'
 HINGE

STS-132 DAP B9 – DAP B13 CONFIGURATIONS

	ITEM #	B9	B10	B12	B13
PRI					
ROT RATE	30 (50)	0.1300	0.0500	0.0100 ¹	0.0100 ¹
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
ALT					
RATE DB	38 (58)	0.100	0.100	0.020 ¹	0.020 ¹
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
VERN					
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	X²	X²
PURPOSE		PROXOPS/ FLYAROUND	DOCKING	MATED ATT HOLD (VRCS & ALT)	MATED VRCS DB COLLAPSE

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 appropriate docked CNTL ACC

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ORB OPS-41bb/132/O/B

HOOK
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TOP

MAUI – RCS FIRING SEQUENCE

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

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 deselects	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 (*) NOTE Queue the following ITEM entry on the scratch pad. Do not perform the EXEC until specified at 35 sec 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 (Past Soft Stop, hold 3 sec)	
00:48		RHC release	
00:50			DAP: VERN
01:00	R5R	RHC +yaw (10 sec firing)	
01:20	L5D	RHC -pitch (12 sec firing)	
01:40	F5R	RHC +pitch (12 sec firing)	
		FLT CNTLR PWR – OFF	Return to MAUI PROCEDURE, step 6, (ORB OPS FS, P/L OF OPP)

ORB OPS-42a/132/O/C

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ORB OPS/132/FIN A



TOP
BACK OF 'MAUI - RCS FIRING SEQUENCE'

HOOK
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HOOK
VELCRO

HOOK
VELCRO



ORB OPS-42b/132/O/A



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FS CC 11-12

ORB OPS/132/FIN A

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/132/O/A

FABRICATION NOTES

Fabricate on flight approved yellow Post-it

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FS CC 11-13

ORB OPS/132/FIN A



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FS 11-14

ORB OPS/132/FIN A



Space Shuttle Program
FLIGHT DATA FILE

JSC-48036-132
FINAL, REV A



ORBIT OPS CHECKLIST

STS
132

Flight Cover (trim bottom to expose tabs)