

# Orbit Operations Checklist

## STS-127 Flight Supplement

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**Mission Operations Directorate  
Operations Division**

**Final  
May 20, 2009**

National Aeronautics and  
Space Administration

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





JSC-48036-127

MISSION OPERATIONS DIRECTORATE

**ORBIT OPERATIONS CHECKLIST  
STS-127 FLIGHT SUPPLEMENT**

FINAL  
May 20, 2009

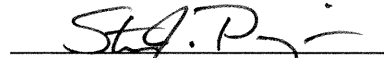
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ORB OPS/127/FIN

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	ORB OPS FS-00133	ORB OPS FS-00141
	ORB OPS FS-00138	ORB OPS FS-00142
	ORB OPS FS-00143	ORB OPS FS-00144
	ORB OPS FS-00145	ORB OPS FS-00145

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MAUI	DS6/K. Longacre	281-244-5479
CWC-I FILL	DS4/K. Rogers	281-483-1395
FRED	DX4/R. Tomaro	281-483-3810
<u>CUE CARDS:</u>		
LIOH CHANGEOUT	DS4/K. Rogers	281-483-1395
ORBIT BURN MONITOR	DS6/M. Anderson	281-244-1343
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. Carroll	281-244-0914

ORBIT OPERATIONS CHECKLIST  
STS-127 FLIGHT SUPPLEMENT

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ORBIT OPS CUE CARDS

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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 1 and 2 for failed ID \*
  - \* If LOAD – FAIL and a subsequent load \*
  - \* attempt: \*
  - \* √MCC \*
  - \* OI PCMMU PWR – 2(1) \*
  - \* √ERR MSG – 'I/O ERR PCM' \*
  - C3 \* I/O RESET PCM – ITEM 5 EXEC (\*) \*
  - CRT \* 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/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

**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
763 RNDZ w/UHF FMT CCSU  (PRIME) TFL 192	1 2 3 4 5-FPM	30 - 9 4 503	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 - 19 502	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 - 506	- 1,2 4 -	- OIU9 (CCSH) ** SSV (2) *** - H-H-H *
762 SSV RATE 4  (PRIME) TFL 188	1 2 3 4 5-FPM	5 - - 1 505	1,2 - - 4	OIU255 ** - - SSV (4) *** H-H-H *
765 SSV RATE 5  (BACKUP) TFL 203	1 2 3 4 5-FPM	- 15 11 - 507	- 1,2 4 -	- OIU255 ** SSV (5) *** - L-H-H *
758 Pre-Launch PL C/O  (PRIME) TFL 180	1 2 3 4 5-FPM	28 15 9 - 504	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. MPLM (if flown)  
LOAD FORMAT ITEM 1 +5 EXEC  
BUS 2 BC ITEM 7 EXEC (\*)  
LOAD FORMAT ITEM 1 +5 EXEC >>
6. SSOR  
LOAD FORMAT ITEM 1 +7 EXEC  
BUS 1 BC ITEM 3 EXEC (\*)  
LOAD FORMAT ITEM 1 +7 EXEC >>



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PTG

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

**PTG**

FS 2-1

ORB OPS/127/FIN

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	91.7	-Y:28 R+ 301 -Z:48 P+ 117 Y+ 28	-Z:28 R+ 211 P+ 118 Y+ 43	-Y:48 R+ 22 P+ 134 Y+ 26	-Y:48 R+ 334 -Z:28 P+ 303 Y+ 315	-Z:48 R+ 240 P+ 295 Y+ 328	-Y:28 R+ 74 P+ 320 Y+ 323			
B	87.2	-Y:14 R+ 35 -Z:69 P+ 217 Y+ 7	-Z:14 R+ 311 P+ 202 Y+ 6	-Y:69 R+ 122 P+ 217 Y+ 22	-Y:69 R+ 233 -Z:14 P+ 19 Y+ 350	-Z:69 R+ 148 P+ 33 Y+ 355	-Y:14 R+ 321 P+ 24 Y+ 336			
C	91.1	-Y:37 R+ 89 -Z:89 P+ 252 Y+ 21	-Z:37 R+ 3 P+ 243 Y+ 9	-Y:89 R+ 183 P+ 238 Y+ 30	-Y:89 R+ 179 -Z:37 P+ 59 Y+ 351	-Z:89 R+ 93 P+ 72 Y+ 343	-Y:37 R+ 265 P+ 49 Y+ 340			
D	84.1	-Y:63 R+ 223 -Z:84 P+ 190 Y+ 352	-Z:63 R+ 140 P+ 204 Y+ 355	-Y:84 R+ 309 P+ 191 Y+ 338	-Y:84 R+ 45 -Z:63 P+ 28 Y+ 8	-Z:84 R+ 322 P+ 13 Y+ 5	-Y:63 R+ 131 P+ 26 Y+ 22			

STAR PAIRS PAD

FS 2-2

ORB OPS/127/FIN

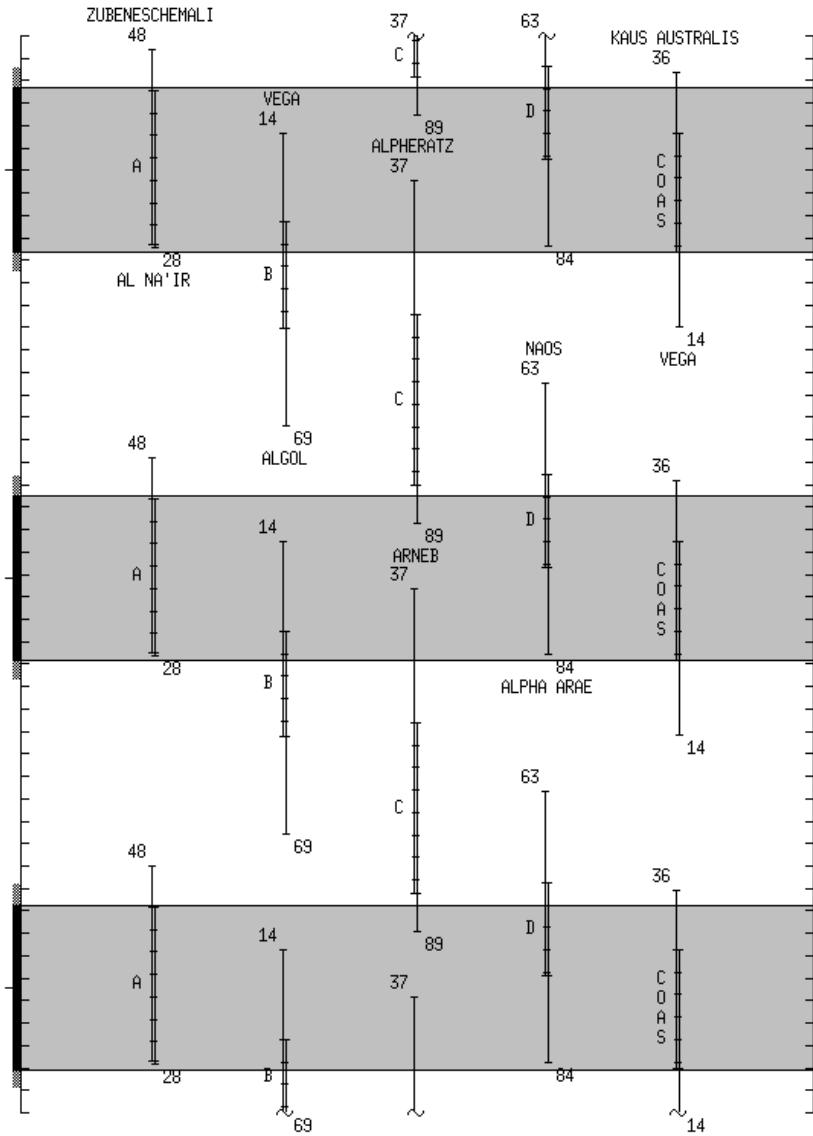
PAIR		COAS ALIGN ATTITUDE 1	ANG SEP	COAS ALIGN ATTITUDE 2
COAS	+X HUD	R+ 279 P+ 280 Y+ 305	NOSE UP 73.2	R+ 82 P+ 86 Y+ 309
	-Z COAS	R+ 261 P+ 87 Y+ 321	TAIL UP	R+ 262 P+ 97 Y+ 34

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: 06/13/09  
Liftoff GMT: 164/11:14:50.000

# STAR PAIRS



MET Applicable: Post OMS-2 to Nominal EOM  
 Liftoff Date: 06/13/09  
 Liftoff GMT: 164/11:14:50.000



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DAP TABLES

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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	Pre/Post Deploy	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	
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 - SSRMS/MT/ICC not at WS 8. No RS Vehicle SM AFT
3	Mated - SSRMS/MT/ICC at WS 8. No RS Vehicle SM AFT
4	Mated - SSRMS/MT/ICC not at WS 8. RS Vehicle SM AFT
5	Mated - SSRMS/MT/ICC at WS 8. RS Vehicle SM AFT
6	Not used
7	Not used
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/127/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 →    OM (0-359.99)
MON AXIS = 1 +X = 2 -X

FS 3-3

ORB OPS/127/FIN

## STS-127 DAP A CONFIGURATIONS

### STS-127 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	PRE/POST DEPLOY	LOSS OF VERN (ALL)	LOSS OF VERN (TAIL ONLY)	RNDZ	TERMINAL PHASE

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

FS 3-4

ORB OPS/127/FIN

**STS-127 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	0.035 <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	7.04	7.04	7.04	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	.050	.050	.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>4(5)</b> <sup>2</sup>	<b>4(5)</b> <sup>2</sup>	<b>4(5)</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> CA4 – MT/SSRMS/ICC not at Worksite 8. RS vehicle SM AFT  
CA5 – MT/SSRMS/ICC at Worksite 8. RS vehicle SM AFT

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

FS 3-5

ORB OPS/127/FIN

**STS-127 DAP B CONFIGURATIONS**

**STS-127 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/127/FIN

**STS-127 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	7.04	7.04
<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	1.000
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>4(5)</b> <sup>2</sup>	<b>4(5)</b> <sup>2</sup>
PURPOSE		PROXOPS/ FLYAROUND	DOCKING	MATED MNVRS (VRCS & ALT)	

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

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

<sup>2</sup> CA4 – MT/SSRMS/ICC not at Worksite 8. RS vehicle SM AFT  
CA5 – MT/SSRMS/ICC at Worksite 8. RS vehicle SM AFT

FS 3-7

ORB OPS/127/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

**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 1:

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

REBOOST/  
DAP

Cont next page

FS 4-2

ORB OPS/127/FIN



NOTE

Reboost can be aborted with an item 26 on UNIV PTG or by selecting FREE on the DAP

5. Post Reboost Configuration

If using Config 1:

**GNC 20 DAP CONFIG**

Enable X JETS ROT – ITEM 7 EXEC (\*)

Return to FLIGHT PLAN Attitude

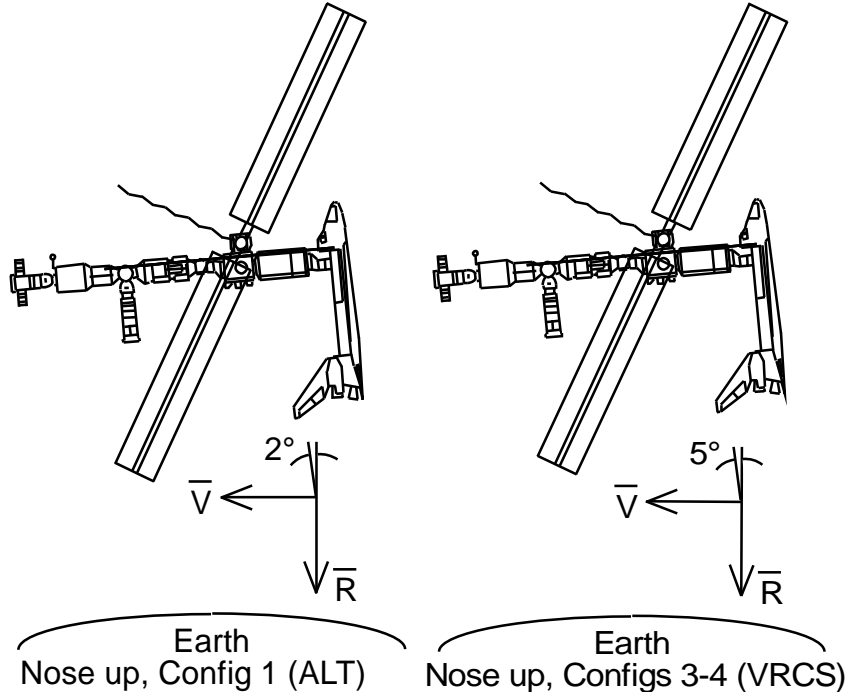
DAP: as reqd

Pri RJD LOGIC,DRIVER (sixteen) – as reqd

C3  
O14,  
O15,  
O16

## AUTO REBOOST ATTITUDE REFERENCE

### ALT & VRCS ATTITUDE HOLD CONFIGURATIONS:



Configuration 1 is ALT PRCS only  
Configuration 2 is for SHUTTLE only - Do Not Use While Docked  
Configurations 3 and 4 are identical and VRCS only

## DOCKED DAP REFERENCE

SHUTTLE AIRLOCK PRESS ( $\geq 3.45$ psia)		SHUTTLE AIRLOCK DEPRESS ( $< 3.45$ psia)
Mated Attitude Hold and Maneuvers (VERN or ALT)	Mated Attitude Hold (VERN or ALT)	VERN or ALT
A12	B12	Not Certified

ALT not certified for loaded RMS operations (JLE, JEF, ICC, and all loaded JEM RMS ops)

### CNTL ACC CONFIGURATIONS FOR VERN AND ALT

If there is no vehicle at the SM aft docking port:

CNTL ACC 2: Post dock, until MT/SSRMS/ICC at worksite 8,  
Post ICC return to PLB until undock

CNTL ACC 3: When the MT/SSRMS and ICC are at worksite 8

If there is a vehicle at the SM aft docking port:

CNTL ACC 4: Post dock, until MT/SSRMS/ICC at worksite 8,  
Post ICC return to PLB, until undock

CNTL ACC 5: When the MT/SSRMS and ICC are at worksite 8

## 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

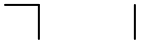
If Jet Activity Stopped for  $> 5$  sec for VERN (15 sec for ALT)

DAP: FREE  $> 2$  sec

DAP: AUTO  $>>$



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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/127/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 PL SEL – 1  
√LAT 1,2,3,4,5 (five) – OFF

SM 220 JEM-EF LATCH

CRT √PL SEL 1 LAT 1,2 (four) – '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 – LAT (tb-LAT, 60 sec max)  
– OFF
5. PL RETEN LAT 2 – LAT (tb-LAT, 60 sec max)  
– OFF

PRLA

6. PL RETEN PL SEL – MON

R13L 7. PL RETEN LOGIC PWR SYS 1,2 (two) – OFF  
BAY MECH PWR SYS 1,2 (two) – OFF

- MA73C:A 8. If MCA LOGIC switches taken OFF in step 1:  
:B MCA LOGIC MNC MID 2 – ON  
MNB MID 4 – ON



SHORT DURATION BIOASTRONAUTICS  
INVESTIGATION (SDBI)

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

SDBI

**SDBI 1634, SLEEP-WAKE ACTIGRAPHY**

- MF28G      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

- MF28G      On final day of orbit:
1. Remove Actiwatch, stow in locker
  2. Recover SLEEP LOGBOOK, stow in locker

## **SDBI 1900, INTEGRATED IMMUNE BLOOD COLLECTION**

### **OBJECTIVE:**

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

### **PARTS:**

Integrated Immune Blood Collection Kit:

Band-Aid

Fine Point Sharpie

Gauze

Tourniquet

X-Large Gloves

Butterfly Needle

Tube Holder

Blood Sample Sleeve:

Blood 8.5ml ACD (yellow top tube)

Blood 10ml EDTA (purple top tube)

Biocide Wipes

Biohazard Bag

Surgical Paper Tape, 1-in

Sharps Container

Gray Tape

### **WARNING**

All consumable items that come in contact with blood must be discarded in Biohazard Bag (provided in kit)

All sharp items (i.e., needles) must be discarded into Sharps Container

### **NOTE**

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

Cont next page

FS 7-3

ORB OPS/127/FIN

A. SETUP FOR BLOOD SAMPLE COLLECTION

NOTE

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

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

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

MA16F Integrated Immune Blood Collection Kit: |  
Band-Aid  
Fine Point Sharpie  
Gauze (1 package)  
Tourniquet  
Butterfly Needle (1)  
Tube Holder  
Blood Sample Sleeve (open sleeve and loosen tubes)  
Biocide Wipes  
Surgical Paper Tape, 1-in  
Sharps Container  
Biohazard Bag  
X-Large Gloves

3. Place Biohazard Bag in convenient location for trash disposal

B. PERFORM BLOOD SAMPLE COLLECTION

1. Retrieve Butterfly Needle (1) and remove from package. Place package in the Biohazard Bag and temporarily store

Cont next page

FS 7-4

ORB OPS/127/FIN

2. Retrieve Tube Holder  
Screw Tube Holder onto threaded end of  
Butterfly Needle  
Temp stow Butterfly Needle/Tube Holder
3. Retrieve Gauze, open package but do not  
remove Gauze, temp stow Gauze package
4. Retrieve Tourniquet from Integrated Immune  
Blood Collection Kit  
Apply Tourniquet to subject's arm  
Using fingers find vein and select puncture site

<p><b><u>WARNING</u></b> Operator must don X-Large Gloves prior to needle insertion and observe Universal Precautions for Handling Biohazardous Materials</p>
---

5. Retrieve and don X-Large Gloves  
Retrieve and open Biocide Wipe, placing empty  
package in Biohazard Bag  
Cleanse area with Biocide Wipe  
Place used Biocide Wipe in Biohazard Bag
6. Retrieve Butterfly Needle/Tube Holder from temp  
stow  
Remove protective cover from Butterfly  
Needle/Tube Holder. Place cover in Biohazard  
Bag

<p><b><u>CAUTION</u></b> Blood tubes must be inspected for cracks. If cracked, tubes should be discarded in the Biohazard Bag</p>
---

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

Cont next page

WARNING

Insert needle at 30 degree angle to vein to ensure proper blood flow and avoid injury

Avoid shifting needle from side to side after entering vein

NOTE

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

8. Insert Butterfly Needle in subject's arm with bevel up. When the needle is properly inserted in the vein a flash of blood will be observed in butterfly tubing

Using strips of 1-in Surgical Paper Tape as necessary, tape central portion of Butterfly Needle tubing to subject's arm

Blood  
Sample  
Sleeve

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

NOTE

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

10. Verify a flash of blood in butterfly tubing
11. Firmly push the blood tube into Tube Holder to puncture tube cap and initiate blood flow
12. When filled, detach blood tube from Tube Holder
13. Gently agitate tube for blood to mix with reagent for ~5 sec

Cont next page

FS 7-6

ORB OPS/127/FIN

- ┌ | | | ┌
- Blood Sample Sleeve
14. Temp stow filled blood tube in Blood Sample Sleeve
  15. Retrieve Blood 10.5ml EDTA tube (purple top) and repeat steps 11 thru 14 for the second tube
  16. Loosen Tourniquet
  17. Retrieve Gauze from temp stow
  18. Hold Gauze to venipuncture site while simultaneously grasping wings of Butterfly Needle and removing it at same angle of insertion, applying gentle pressure to Gauze
- Have subject hold Gauze on venipuncture site for 2-5 min
- If taped, remove tape from arm and dispose
- Slide safety shield over Butterfly Needle by holding yellow sheath and pulling wings backward

NOTE

Do not discard tube holder

19. Carefully unscrew Tube Holder from Butterfly Needle; temp stow
20. Discard used Butterfly Needle (with sharp edges facing down) in Sharps Container
21. Remove Tourniquet and stow in Integrated Immune Blood Collection Kit

Cont next page

FS 7-7

ORB OPS/127/FIN

└ | | | └

22. Keep Gauze on venipuncture site for pressure bandage  
Place Band-Aid over folded Gauze  
Discard any excess Gauze and Band-Aid wrapper in Biohazard Bag

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

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

25. Discard X-Large Gloves in Biohazard Bag

Dispose of any remaining Biocide Wipes, Gauze, Gray Tape, or empty packaging used in the activity

C. STOW HARDWARE

1. Remove full Biohazard Bag, close with Gray Tape

Discard full Biohazard Bag in appropriate disposal location

2. Stow in Integrated Immune Blood Collection Kit:

Blood Sample Sleeve with blood samples

Sharps Container (bottom first into pouch)

Biocide Wipes (if any)

Gauze (if any)

Surgical Paper Tape, 1-in

Fine Point Sharpie

Tube Holder

Remaining Band-Aid packages (if any)

3. Stow:

MA16F

Integrated Immune Blood Collection Kit

Put away Gray Tape per crew preference



**SDBI 1900, SALIVA COLLECTION FOR INTEGRATED IMMUNE**

OBJECTIVE:

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

PARTS:

Integrated Immune Saliva Collection Kit:

Salivette Bag (package with cotton swabs)

Saliva Sample Preservative Bag

Label

Saliva Collection Dry Booklet

Saliva Sample Return Pouch

Fine Point Sharpie

A. SETUP FOR SALIVA SAMPLE COLLECTION

NOTE

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

- MF28G
1. Unstow:  
Integrated Immune Saliva Collection Kit:  
Fine Point Sharpie  
Label from plastic window of Saliva Sample Return Pouch
  2. Write crewmember name on label using Fine Point Sharpie  
Return label to plastic window it was taken from  
Temp stow Fine Point Sharpie

Cont next page

FS 7-9

ORB OPS/127/FIN

B. PERFORM LIQUID SALIVA SAMPLE COLLECTION

NOTE

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

1. Retrieve from Integrated Immune Saliva Collection Kit:  
Salivette Bag  
Saliva Sample Preservative Bag
2. Temp stow Saliva Sample Preservative Bag

NOTE

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

3. Open Salivette Bag and by kneading and manipulating the outside of package, separate one Cotton Swab from the others and move it towards the opening of the package
4. Place Salivette Bag with Cotton Swab near mouth and then transfer Cotton Swab from package into mouth. Lightly roll Cotton Swab around mouth with tongue until saturated (2 min max). Do not bite down or chew on Cotton Swab
5. Stow Salivette Bag with remaining Cotton Swab in Integrated Immune Saliva Collection Kit
6. Retrieve Saliva Sample Preservative Bag from temp stow
7. Using mouth, place Cotton Swab in Saliva Sample Preservative Bag

Cont next page

8. Close seal on Saliva Sample Preservative Bag

NOTE

Ensure bag is sealed prior to mixing preservative

9. Remove clamp, mix preservative with Cotton Swab
10. Reclamp across top of Saliva Sample Preservative Bag
11. Using Fine Point Sharpie, write crewmember name and GMT on Saliva Sample Preservative Bag (e.g., Smith: GMT 168:19:48)
12. Stow sample in Saliva Sample Return Pouch (labeled with crewmember name in part A step 2) inside Integrated Immune Saliva Collection Kit

C. PERFORM DRY SALIVA COLLECTION

NOTE

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

1. Retrieve from Integrated Immune Saliva Collection Kit:  
Dry Saliva Collection Book
2. Write crewmember name in name section on cover of Dry Saliva Collection Book
3. Open cover  
Select (but do not remove from book) the corresponding sheet of filter paper to the time period sample is being taken (WAKE, WAKE + 30 MINUTES, WAKE + SIX HOURS, WAKE + TEN HOURS, RETIRE) as illustrated on the cover

Label GMT on corresponding color and time period on cover

Cont next page

NOTE

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

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

NOTE

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

5. Remove filter paper from mouth. Wipe excess liquid saliva from filter paper with lips  
Allow to air dry
6. Temp stow Dry Saliva Collection Book or maintain on person if desired
7. For subsequent collections, retrieve Dry Saliva Collection Book from temp stow and repeat steps 3 thru 6 four times throughout the day that correspond to the remaining four time intervals from wake period
8. After collecting last dry saliva sample, open Saliva Sample Return Pouch (labeled with crew ID) inside Integrated Immune Collection Kit and stow Dry Saliva Collection Book inside Saliva Sample Return Pouch

D. STOW HARDWARE

MF28G

1. Stow: Integrated Immune Saliva Collection Kit |

WING LEADING EDGE SENSORS (WLES) PROCEDURES

WLES ACTIVATION AND CHECKOUT.....	FS 8-2
DEACTIVATION AND TEARDOWN.....	FS 8-10
LAPTOP RECEIVER UNIT (LRU) R&R.....	FS 8-12
CONFIGURE WLES DATA FILE BACKUP PATH.....	FS 8-14
PREP WLES LAPTOPS FOR TRANSFER.....	FS 8-15
WLES RNDZ TOOLS CHECKOUT PREP.....	FS 8-16
DOCK/UNDOCK RECOVERY.....	FS 8-16
DISABLE WLES FILE BACKUP .....	FS 8-17
ENABLE WLES FILE BACKUP .....	FS 8-17

**WLE  
SENSORS**

## WLES ACTIVATION AND CHECKOUT

### 1. UNSTOW EQUIPMENT

#### NOTE

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

	Unstow:
MA9G	Laptop Receiver Units (2) Cabin Relay Units (2): CRU A (S/N 1920) CRU B (S/N 1984)
ML60E	STS7 A31p laptop (WLES) STS6 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 1920
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 1984
PORT OVHD	Secure CRU B to PORT side of aft cabin with Velcro (see fig 8-3)

Cont next page

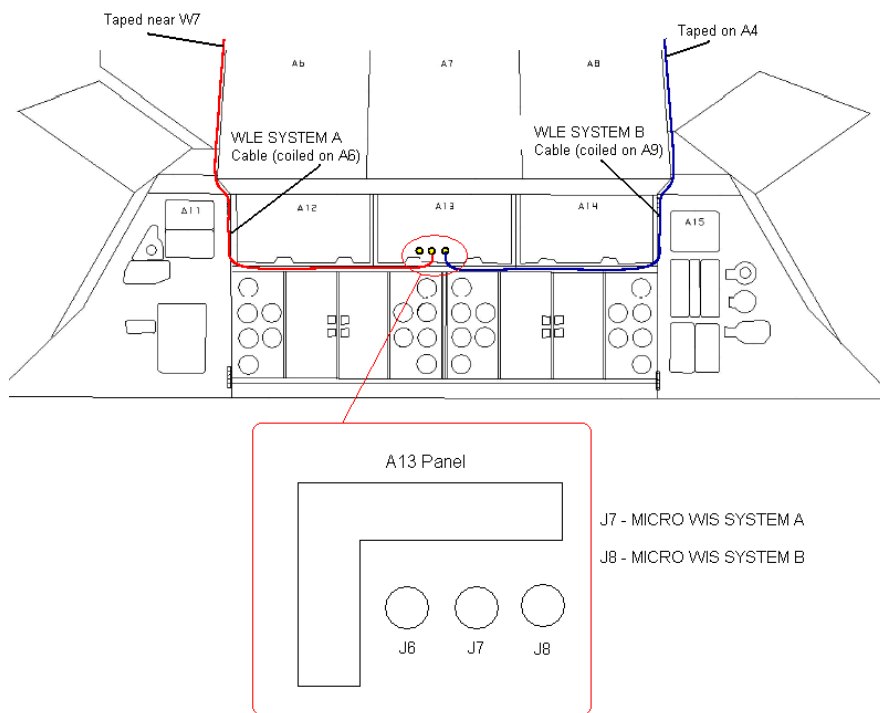


Figure 8-1.- A13 panel.

Cont next page

FS 8-3

ORB OPS/127/FIN

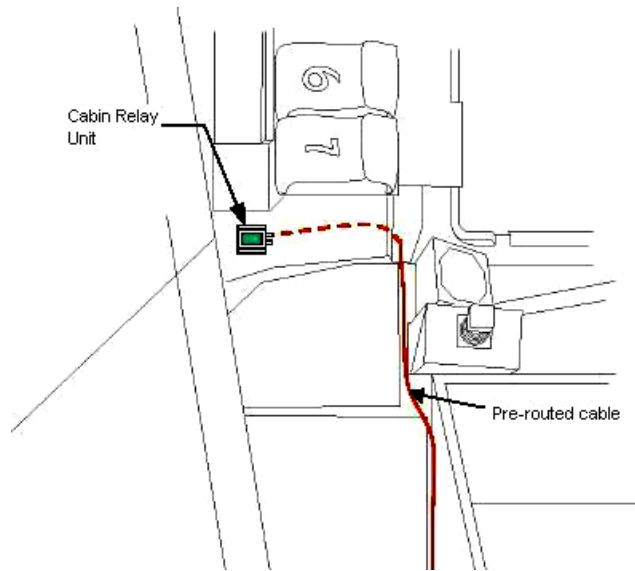


Figure 8-2.- Aft STBD location.

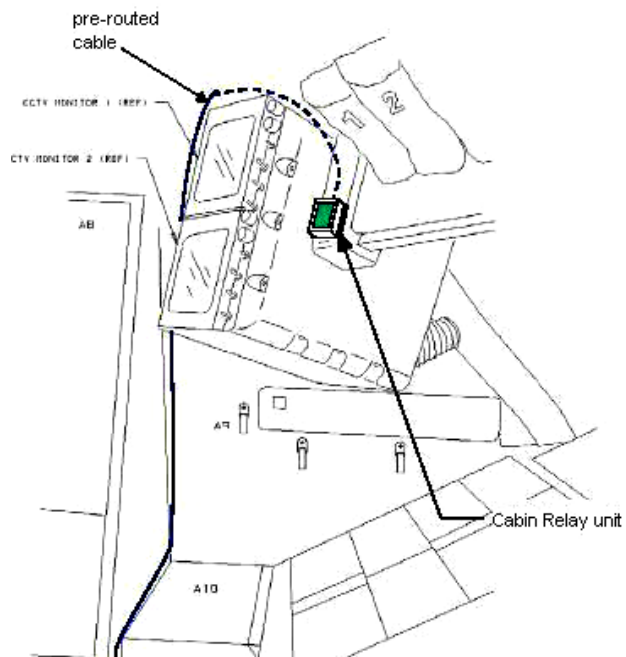


Figure 8-3.- Aft PORT location.

Cont next page

FS 8-4

ORB OPS/127/FIN



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

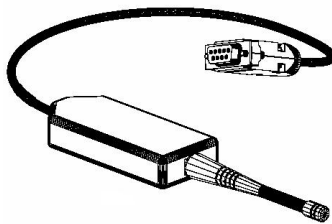


Figure 8-4.- Laptop Receiver Unit.

Cont next page

FS 8-5

ORB OPS/127/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

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/127/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 1920 and 1984 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 updates: \*
- \* | Continue procedure \*
- \* | Report off-nominal CRU status in step 10 \*
- \* | \*
- \* 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/127/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 off-nominal CRU status, include:

Unit ID

Type

Last Update (updating or static)

Via

Mode

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

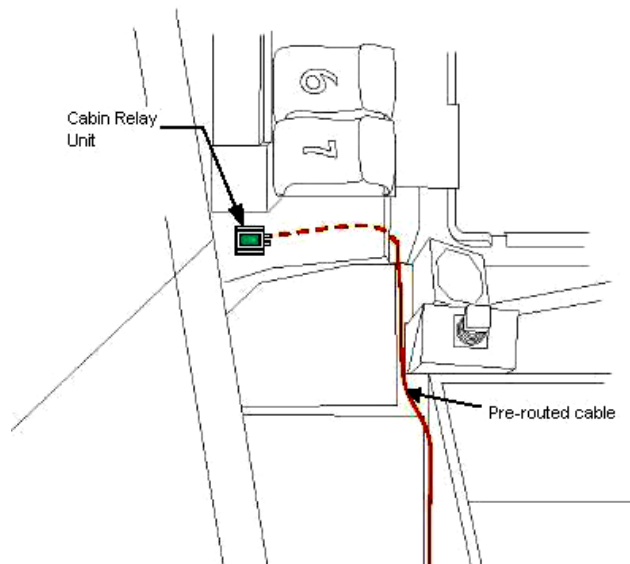


Figure 8-6.- Aft STBD location.

Cont next page

FS 8-10

ORB OPS/127/FIN

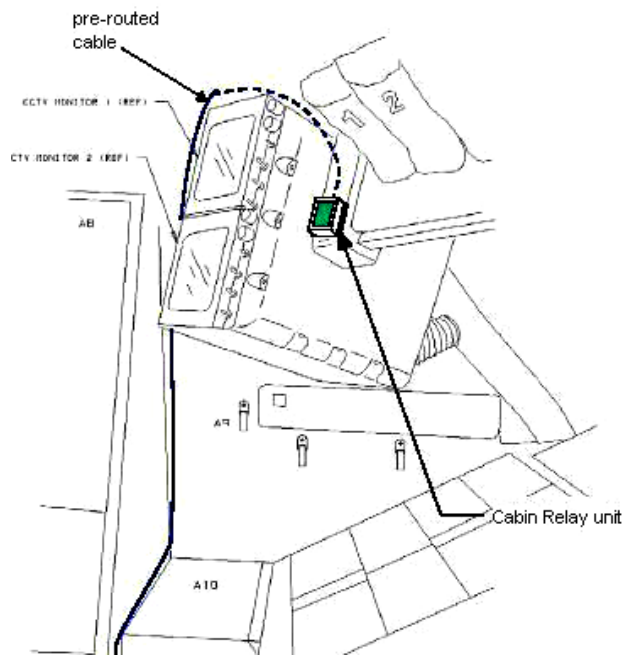


Figure 8-7.- Aft PORT location.

MA9G

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.

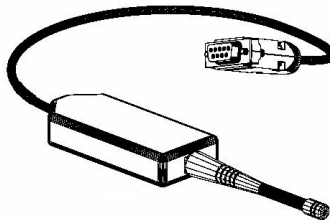


Figure 8-9.- Laptop Receiver Unit.

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/127/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 1920 and 1984 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

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

MA9G

6. STOW EQUIPMENT

Stow:  
Prime (failed) LRU

## 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)



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MAUI ANALYSIS OF UPPER-ATMOSPHERIC  
INJECTIONS (MAUI)

MAUI PROCEDURE ..... FS 9-2

**MAUI**

FS 9-1

ORB OPS/127/FIN

## MAUI PROCEDURE

MAUI

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

Deploy MAUI – RCS FIRING SEQUENCE  
(Cue Card)

GNC 20 DAP CONFIG

√DAP A1, B1 loaded

UNIV PTG

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

TRK – ITEM 19 EXEC (CUR - \*)

2. INITIATE TIMER

√MCC for start time

GNC 2 TIME

Set count down/count up timer per MCC

√MET – ITEM 2 EXEC (\*)

CRT TIMER COUNT TO – ITEM 17 +    +    +     
EXEC

3. SETUP

O14:E, cb DDU L (two) – cl  
O15:E

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

GNC 20 DAP CONFIG

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

Cont next page



**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

FS 9-3

ORB OPS/127/FIN

## 5. RCS FIRING SEQUENCE

### NOTE

Use the table below or the cue card

### MAUI – RCS FIRING SEQUENCE

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, MAUI)

Cont next page

FS 9-4

ORB OPS/127/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 \*)  
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



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CWC-I FILL



CWC-I FILL ..... FS 10-2

**CWC-I  
FILL**

FS 10-1

ORB OPS/127/FIN



## CWC-I FILL

### NOTE

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

### EQUIPMENT PREPARATION

Unstow from designated stowage when needed:

- Towel(s)
- Two 3/8" Male Hose Adapters ("-2" Adapters)
- R/Y QD Adapter
- 8' Y/Y Hose
- Sample/Purge Kit
- CWC-I Bags
- Timer

CWC-I  
FILL

#### A. CWC-I FILL ASSEMBLY SET UP (see fig 10-1)

### NOTE

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

1. Retrieve R/Y QD Adapter, 3/8" Male Hose Adapter ("-2" Adapter) and 8' Y/Y Hose
2. Configure CWC-I Fill Assembly as shown in fig 10-1

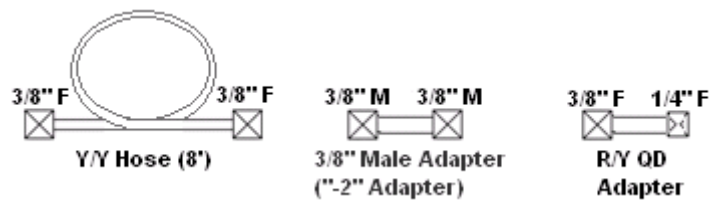


Figure 10-1.- CWC-I Fill Assembly.

Cont next page

FS 10-2

ORB OPS/127/FIN

- ML90N
3. Connect R/Y QD Adapter to free end of Tee attached to Chilled QD (#4 on GIRA Cue Card) at QD bracket (see fig 10-2)

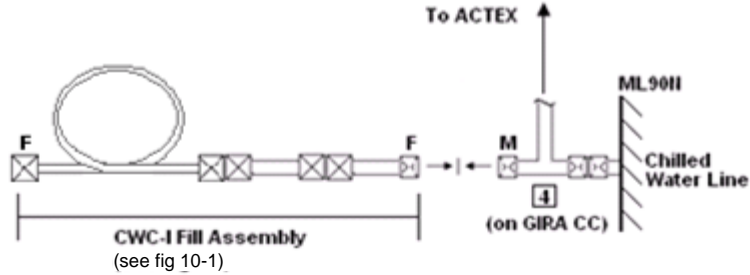


Figure 10-2.- CWC-I Fill Assembly connection at ML90N.

B. CWC-I FILL ASSEMBLY PURGE (see fig 10-3)

NOTE

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

GIRA Tray

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

CAUTION

Ensure Sample Adapter valve is not open prior to mating

NOTE

Use ONLY sampling adapter labeled for potable water sampling

2. Assemble Purge hardware as shown in fig 10-3

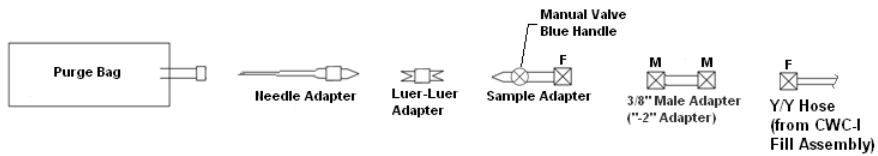


Figure 10-3.- CWC-I Fill Assembly purge hardware.

Cont next page

FS 10-3

ORB OPS/127/FIN

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

C. PURGE ASSEMBLY TEARDOWN (see fig 10-3)

1. De-mate all connections shown in fig 10-3
2. Stow Purge Assembly hardware (place equipment in Ziplock Bags) in Sample/Purge Kit except “-2” Adapter. Return “-2” Adapter to GIRA Tray

D. CWC-I FILL INIT (see fig 10-4)

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

R11L

1. SPLY H2O TKA OUTLET – CL (tb-CL)

If reqd, unstow CWC-I Fill Assembly from Sample/Purge Kit:

ML90N

2. CWC-I Fill Assembly →|← Chilled Water Line Tee QD (#4 on GIRA Cue Card) (see fig 10-4)

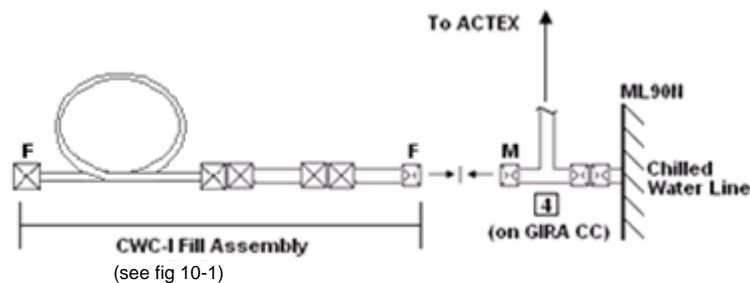


Figure 10-4.- CWC-I Fill Assembly connection at ML90N.

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

<b>CAUTION</b>
Do not overfill CWC-I as damage to bag may occur
Do not detach CWC-I QD restraint during fill

**NOTE**

CWC-I will begin filling as soon as free end of CWC-I Fill Assembly connected to CWC-I. Do not perform Galley ops while CWC-I is connected to CWC-I Fill Assembly

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

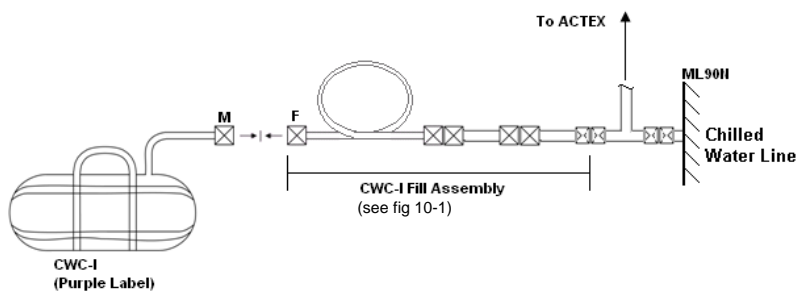


Figure 10-5.- CWC-I fill setup.

5. Set timer for 10 min  
Attach timer to Velcro square on CWC-I

Cont next page

FS 10-5

ORB OPS/127/FIN

E. FILL TERMINATION

After 10 min or MCC call:

- ML90N 1. CWC-I ←|→ CWC-I Fill Assembly (see fig 10-6)

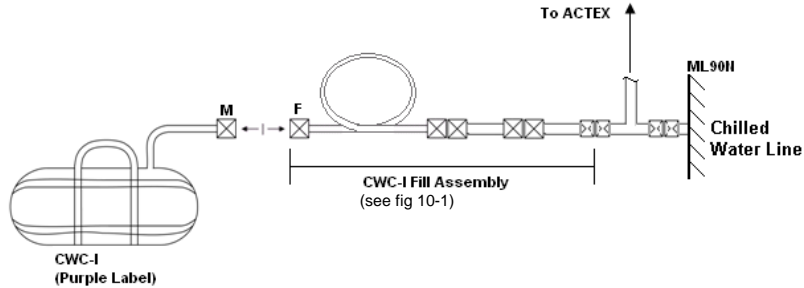


Figure 10-6.- CWC-I fill termination.

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

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

Cont next page

FS 10-6

ORB OPS/127/FIN

- After last CWC-I fill of day:
- ML90N 5. CWC-I Fill Assembly ←|→ Chilled Water Line Tee QD (#4 on GIRA Cue Card)(see fig 10-7)

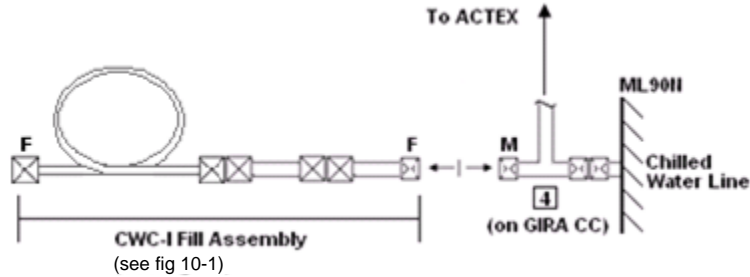


Figure 10-7.- CWC-I Fill Assembly removal.

6. Temp stow CWC-I Fill Assembly still assembled in Sample/Purge Kit
7. Transfer CWC-I(s) to ISS

F. CWC-I FILL TEARDOWN

NOTE

Have towels ready to absorb any liquid released when demating QDs

- ML90N
1. De-mate all connections shown in fig 10-8
  2. Stow R/Y QD Adapter, "-2" Adapter, and Y/Y QD Hose in Ziplock Bags

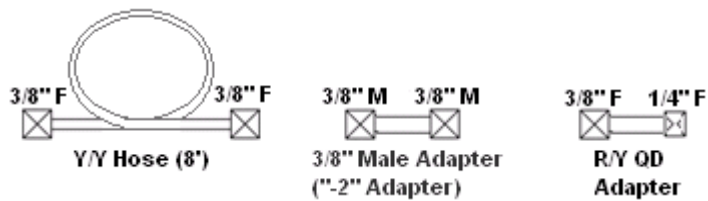


Figure 10-8.- CWC-I fill assembly.

CWC-I SAMPLING PROCEDURE (if reqd) (see fig 10-9)

NOTE

Use ONLY sampling adapter labeled for potable water sampling

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

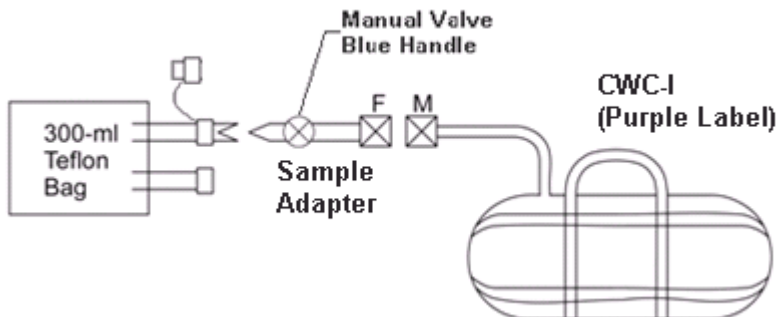


Figure 10-9.- CWC-I sample setup.

FRED

FRED SETUP ..... FS 11-2  
STOWAGE ..... FS 11-2

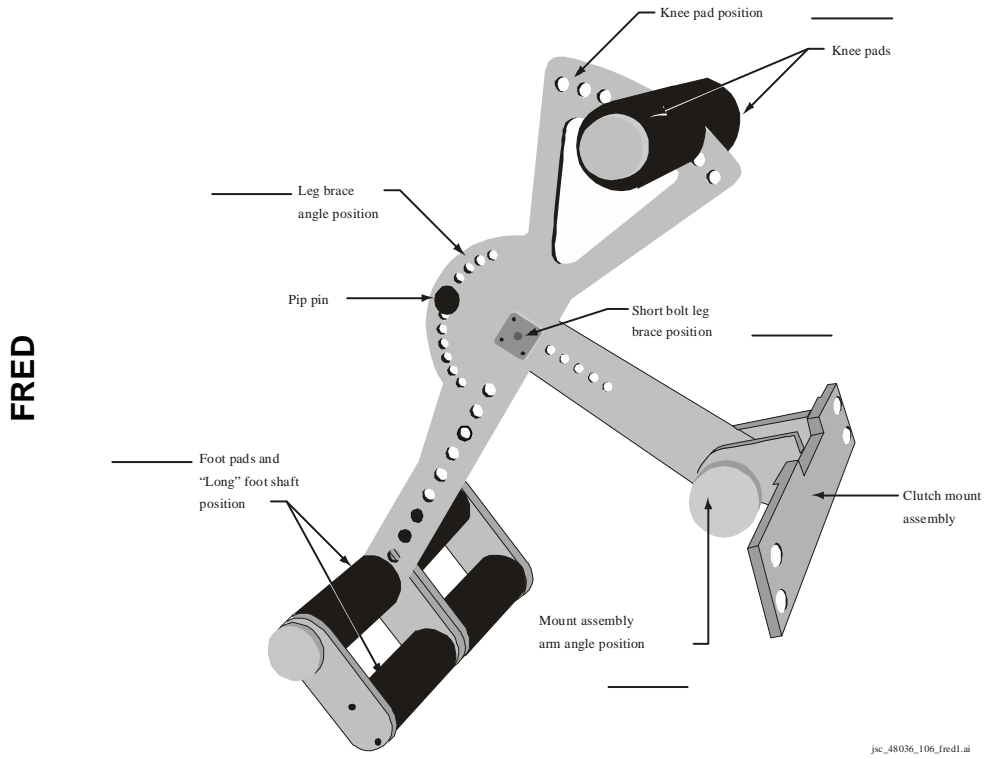
**FRED**

FS 11-1

ORB OPS/127/FIN

## FRED SETUP

1. Unstow FRED tray and FRED leg brace
- A8L 2. Attach clutch bracket mount assy below aft panel A8 with captive fasteners (four)
3. Assemble FRED as shown and adjust to desired position. Note positions



## FRED STOWAGE

1. Disassemble FRED and set clutch bracket mount assy to #8 angle position
2. Stow FRED in locker tray cushion. Re-adjust clutch bracket mount assy as required
3. Stow leg brace



CUE CARD CONFIGURATION

CUE  
CARDS

NOT FLOWN

FS 12-1

ORB OPS/127/FIN





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**CUE  
CARDS**



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FS 12-2

ORB OPS/127/FIN





TOP

HOOK  
VELCRO

**LIQH CHANGEOUT**

(7 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	6 *	
POST FD03	"	7	DOCKING
PRE FD03	8	"	
POST FD04	"	9	
PRE FD04	10	"	
POST FD05	"	11	
PRE FD05	12	"	
POST FD06	"	13	
PRE FD06	STS-124	"	
POST FD07	"	STS-124	
PRE FD07	STS-126	"	
POST FD08	"	STS-126	
PRE FD08	STS-126	"	
POST FD09	"	STS-126	
PRE FD09	STS-126	"	
POST FD10	"	STS-126	
PRE FD10	STS-126	"	
POST FD11	"	STS-126	
PRE FD11	STS-126	"	
POST FD12	"	STS-126	
PRE FD12	STS-126	"	
POST FD13	"	STS-126	
PRE FD13	STS-126	"	
POST FD14	"	STS-126	
MID FD14	STS-126	STS-126	HATCH CLOSE
PRE FD14	"	"	
POST FD15	STS-126	STS-126	
PRE FD15	14 *	15 *	

\*Reseal LIQH cans w/Gray Tape and stow  
(Locations of canisters on back)

ORB OPS-29a/nonRCRS/127/O/B

NOTE

This card is specifically used for the STS-127 mission with the orbiter conducting single shift operations with a shuttle crew size of 7 and ISS crew size 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/127/FIN

TOP  
BACK OF 'LIOH CHANGEOUT'

HOOK  
VELCRO

**LIOH CHANGEOUT (cont)**

(7 crewmembers/Single Shift/FD 16-20)

FLIGHT DAY	POS A	POS B	CK CMPLT
POST FD16	16	17	
PRE FD16	"	18	
POST FD17	19	20	EOM
PRE FD17	21 *	22 *	
POST FD18	23	24	EOM+1
PRE FD18	25	"	
POST FD19	26	27	EOM+2
PRE FD19	28 *	29 *	
POST FD20	30	31	EOM+3

\*Reseal LiOH cans w/Gray Tape and stow

**LIOH CANISTER STOWAGE LOCATIONS**

**Ascent Stowage Locations**

Orbiter:

MD52M (LiOH): Cans 1-31 \*

ISS:

NOD1S4\_D2/E2/F2: STS-124 cans 27,28  
STS-126 cans 24-33, 35-42

**Entry (EOM) Stowage Locations**

Orbiter:

MD52M (LiOH): Cans 14-31 \*  
STS-126 cans 29-33, 35-42

ISS:

NOD1S4\_D2/E2/F2: Cans 1-13  
STS-124 cans 27,28  
STS-126 cans 24-28

\* 2 LiOH cans installed in LiOH slots A and B

ORB OPS-29b/nonRCRS/127/O/B

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FS CC 12-4

ORB OPS/127/FIN

TOP

HOOK  
VELCRO

HOOK  
VELCRO

**ORBIT BURN MONITOR**

<b>OMS TEMP*</b>		
FU IN P ≥	L 219   R 220	OMS ENG FAIL
≤	L 201   R 208	OMS PRPLT FAIL
or No FU IN P		
<b>OMS PC* &amp; OMS ↓</b>		
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		
<b>OMS OX/FU TK P (√ENG IN P)</b>		
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> (√[OMS/MPS])		At N2 TK P < 470: 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	√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	√MAN SHUTDN
<b>BCE STRG D</b>	1(4)	I/O RESET (if recov: >>) 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/127/O/A

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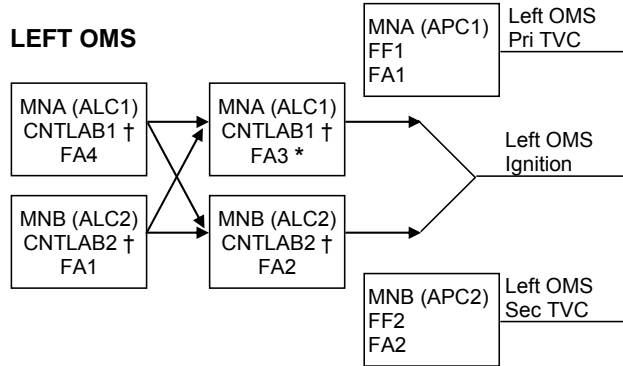
FS CC 12-5

ORB OPS/127/FIN

TOP  
BACK OF 'ORBIT BURN MONITOR'

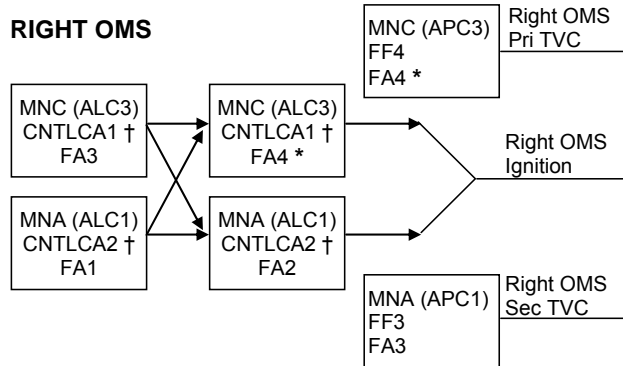


**LEFT OMS**



- † 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/127/O/A

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FS CC 12-6

ORB OPS/127/FIN

NOT FLOWN

FS CC 12-7

ORB OPS/127/FIN

(reduced copy)

TOP

PILE  
VELCRO

ORB OPS-41a/127/O/B

PILE  
VELCRO

**STS-127 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
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
<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	PREPOST DEPLOY	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/127/FIN

(reduced copy)

TOP  
HINGED AT BOTTOM OF  
'STS-127 DAP A1 – DAP A8 CONFIGURATIONS'  
HINGE

**STS-127 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)		COASHUD CAL		RNDZ	TERMINAL PHASE

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

HOOK  
VELCRO

ORB OPS-41aa/127/O/A

HOOK  
VELCRO

NOT FLOWN

F5 CC 12-9

ORB OPS/127/FIN

(reduced copy)

TOP  
BACK OF 'STS-127 DAP A1 – DAP A8 CONFIGURATIONS'

PILE  
VELCRO

ORB OPS-41b/127/O/B

PILE  
VELCRO

STS-127 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	0.035 <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	7.04	7.04	7.04	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	.050	.050	.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>4(5)</b> <sup>2</sup>	<b>4(5)</b> <sup>2</sup>	<b>4(5)</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> CA4 – MT/SSRMS/ICC not at Worksite 8. RS vehicle SM AFT

CA5 – MT/SSRMS/ICC at Worksite 8. RS vehicle SM AFT

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

-----  
HINGE

NOT FLOWN

FS CC 12-10

ORB OPS/127/FIN

(reduced copy)

TOP  
 BACK OF 'STS-127 DAP B1 – DAP B8 CONFIGURATIONS'  
 HINGED AT BOTTOM OF 'STS-127 DAP A9 – DAP A14 CONFIGURATIONS'  
 HINGE

**STS-127 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	7.04	7.04
<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	1.000
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>4(5)<sup>2</sup></b>	<b>4(5)<sup>2</sup></b>
PURPOSE		PROXOPS/ FLYAROUND	DOCKING	MATED M/WRS (VPCS & ALT)	

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

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

<sup>2</sup> CA4 – MT/SSRMS/ICC not at Worksite 8. RS vehicle SM AFT  
 CA5 – MT/SSRMS/ICC at Worksite 8. RS vehicle SM AFT

HOOK  
VELCRO

ORB OPS-41bb/127/O/B

HOOK  
VELCRO



TOP

MAUI – RCS FIRING SEQUENCE

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, MAUI)

ORB OPS-42a/127/O/A

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FS CC 12-11

ORB OPS/127/FIN



TOP  
BACK OF 'MAUI - RCS FIRING SEQUENCE'

HOOK  
VELCRO

HOOK  
VELCRO

HOOK  
VELCRO



ORB OPS-42b/127/O/A



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(reduced copy)  
FS CC 12-12

ORB OPS/127/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/127/O/A

FABRICATION NOTES

Fabricate on flight approved yellow Post-it

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FS CC 12-13

ORB OPS/127/FIN



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FS 12-14

ORB OPS/127/FIN



Space Shuttle Program  
FLIGHT DATA FILE

JSC-48036-127  
FINAL



# ORBIT OPS CHECKLIST

STS  
**127**

Flight Cover (trim bottom to expose tabs)