

Orbit Operations Checklist

STS-121 Flight Supplement

**Mission Operations Directorate
Operations Division**

**Final, Rev A
June 5, 2006**

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas




United Space Alliance

MISSION OPERATIONS DIRECTORATE

**ORBIT OPERATIONS CHECKLIST
STS-121 FLIGHT SUPPLEMENT**

FINAL, REV A
June 5, 2006

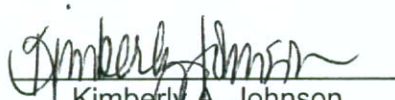
PREPARED BY:



Thomas R. Zulauf
Publication Manager

APPROVED BY:

ACCEPTED BY:



Kimberly A. Johnson
Manager, Shuttle
Procedures Management



Michael T. Hurt
FDF Manager

This document is under the configuration control of the Crew Procedures Control Board (CPCB). All proposed changes must be submitted on FDF Workflow Crew Procedure Change Request (CR) to DO3/FDF Manager.

Additional distribution of this book, for official use only, may be requested in writing to DO3/FDF Manager. The request must include justification and requester's name, organization, position, and phone number. Contractor requests are made through the NASA or DOD organization supported. Deletions, reduction in quantity, or change of address may be submitted to DO3/FDF Management Office, 281-244-1184.

Incorporates the following:			
482#:	ORB OPS-2174	ORB OPS-2182	ORB OPS-2188
	ORB OPS-2176	ORB OPS-2183	MULTI-1743
	ORB OPS-2179	ORB OPS-2184	
	ORB OPS-2180	ORB OPS-2187	

AREAS OF TECHNICAL RESPONSIBILITY

Publication Manager	DO3/T. Zulauf	281-244-0922
Alt Publication Manager	DO3/L. Giles	281-244-9068
COMM/INST	DF2/D. Brown	281-244-9058
PTG	DO4/K. Watts	281-244-5368
DAP TABLES	DF6/K. Dunn	281-483-2413
REBOOST/DAP	DF6/K. Dunn	281-483-2413
OIU	DF2/D. Brown	281-244-9058
FRED	DX3/R. Tomaro	281-483-3810
DSOs	SK/S. Irwin	281-483-5089
WLES	DO5/M. Halverson	281-483-1831
DTO-850	DF6/J. Reding	281-483-2668
DTO-852 & DTO-849	DO5/C. Goulard	284-244-0207
MAUI	DF6/K. Dunn	281-483-2413
<u>CUE CARDS:</u>		
FLIGHT DAY 3 DOCKING ORBITER with ISS CO2 ABSORBER REPLACEMENT	DF8/B. Jarvis	281-483-6808
ORBIT BURN MONITOR	DF6/D. Lenort	281-483-2644
DAP TABLES	DF6/K. Dunn	281-483-2413
MAUI – RCS FIRING SEQUENCE	DF6/K. Dunn	281-483-2413

ORBIT OPERATIONS CHECKLIST
 STS-121 FLIGHT SUPPLEMENT

LIST OF EFFECTIVE PAGES

FINAL 06/17/05
 REV A 06/05/06

Sign Off	*	121/FIN A	FS 4-5.....	121/FIN A
FS ii	*	121/FIN A	FS 4-6.....	121/FIN A
FS iii	*	121/FIN A	FS 5-1.....	121/FIN A
FS iv	*	121/FIN A	FS 5-2.....	121/FIN A
FS v	*	121/FIN A	FS 6-1.....	121/FIN A
FS vi	*	121/FIN A	FS 6-2.....	121/FIN A
FS vii		121/FIN A	FS 6-3.....	121/FIN A
FS viii		121/FIN A	FS 6-4.....	121/FIN A
FS 1-1		121/FIN A	FS 7-1.....	121/FIN A
FS 1-2		121/FIN A	FS 7-2.....	121/FIN A
FS 1-3		121/FIN A	FS 7-3.....	121/FIN A
FS 1-4		121/FIN A	FS 7-4.....	121/FIN A
FS 1-5		121/FIN A	FS 7-5.....	121/FIN A
FS 1-6		121/FIN A	FS 7-6.....	121/FIN A
FS 1-7		121/FIN A	FS 7-7.....	121/FIN A
FS 1-8		121/FIN A	FS 7-8.....	121/FIN A
FS 2-1		121/FIN A	FS 8-1.....	121/FIN A
FS 2-2		121/FIN A	FS 8-2.....	121/FIN A
FS 2-3		121/FIN A	FS 8-3.....	121/FIN A
FS 2-4		121/FIN A	FS 8-4.....	121/FIN A
FS 3-1		121/FIN A	FS 8-5.....	121/FIN A
FS 3-2		121/FIN A	FS 8-6.....	121/FIN A
FS 3-3		121/FIN A	FS 8-7.....	121/FIN A
FS 3-4		121/FIN A	FS 8-8.....	121/FIN A
FS 3-5		121/FIN A	FS 8-9.....	121/FIN A
FS 3-6		121/FIN A	FS 8-10.....	121/FIN A
FS 3-7		121/FIN A	FS 8-11.....	121/FIN A
FS 3-8		121/FIN A	FS 8-12.....	121/FIN A
FS 4-1		121/FIN A	FS 8-13.....	121/FIN A
FS 4-2		121/FIN A	FS 8-14.....	121/FIN A
FS 4-3		121/FIN A	FS 8-15.....	121/FIN A
FS 4-4		121/FIN A	FS 8-16.....	121/FIN A

* – Omit from flight book

FS 8-17	121/FIN A
FS 8-18	121/FIN A
FS 9-1	121/FIN A
FS 9-2	121/FIN A
FS 9-3	121/FIN A
FS 9-4	121/FIN A
FS 9-5	121/FIN A
FS 9-6	121/FIN A
FS 9-7	121/FIN A
FS 9-8	121/FIN A
FS 9-9	121/FIN A
FS 9-10	121/FIN A
FS 9-11	121/FIN A
FS 9-12	121/FIN A
FS 9-13	121/FIN A
FS 9-14	121/FIN A
FS 9-15	121/FIN A
FS 9-16	121/FIN A
FS 10-1	121/FIN A
FS 10-2	121/FIN A
FS 10-3	121/FIN A
FS 10-4	121/FIN A
FS 10-5	121/FIN A
FS 10-6	121/FIN A
FS 11-1	* 121/FIN A
FS 11-2	* 121/FIN A
FS CC 11-3	* 121/FIN A
FS CC 11-4	* 121/FIN A
FS CC 11-5	* 121/FIN A
FS CC 11-6	* 121/FIN A
FS CC 11-7	* 121/FIN A
FS CC 11-8	* 121/FIN A
FS CC 11-9	* 121/FIN A
FS CC 11-10	* 121/FIN A
FS CC 11-11	* 121/FIN A
FS CC 11-12	* 121/FIN A

* – Omit from flight book

ORBIT OPS CUE CARDS

<u>Title</u>	<u>Ref. Page</u>	<u>Card No.</u>
FLIGHT DAY 3 DOCKING ORBITER with ISS CO2 ABSORBER REPLACEMENT (Front)	FS CC 11-3	ORB OPS-29a/ nonRCRS/121/O/B
LiOH CANISTER STOWAGE LOCATIONS AND LiOH EXCHANGE PLAN (Back)...	FS CC 11-4	ORB OPS-29b/ nonRCRS/121/O/B
ORBIT BURN MONITOR (Front).....	FS CC 11-5	ORB OPS-31a/121/O/C
OMS FAILURES (Back)	FS CC 11-6	ORB OPS-31b/121/O/A
STS-121 DAP CONFIGURATIONS (Front/Top).....	FS CC 11-7	ORB OPS-41a/121/O/B
(Front/Bottom)	FS CC 11-8	ORB OPS-41aa/121/O/C
(Back/Top).....	FS CC 11-9	ORB OPS-41b/121/O/C
(Back/Bottom).....	FS CC 11-10	ORB OPS-41bb/121/O/D
MAUI – RCS FIRING SEQUENCE (Front).....	FS CC 11-11	ORB OPS-42a/121/O/A
(Back)	FS CC 11-12	ORB OPS-42b/121/O/A



This Page Intentionally Blank



<u>CONTENTS</u>	<u>PAGE</u>
<u>COMM/INST</u>	FS 1-1
LOAD PCMMU FORMAT.....	FS 1-2
PDI DECOM FORMAT.....	FS 1-4
OIU FORMAT/CONFIG.....	FS 1-7
<u>PTG</u>	FS 2-1
STAR PAIRS PAD.....	FS 2-2
PAIRS.....	FS 2-3
<u>DAP TABLES</u>	FS 3-1
DAP OVERVIEW.....	FS 3-2
UNIV PTG.....	FS 3-3
STS-121 DAP A CONFIGURATIONS.....	FS 3-4
B CONFIGURATIONS.....	FS 3-6
<u>REBOOST/DAP</u>	FS 4-1
AUTO REBOOST.....	FS 4-2
ATTITUDE REFERENCE.....	FS 4-4
DOCKED CONFIGURATION DAP REFERENCE	FS 4-5
<u>OIU PROCEDURES</u>	FS 5-1
OIU ACTIVATION.....	FS 5-2
DEACTIVATION.....	FS 5-2
<u>FRED</u>	FS 6-1
FRED SETUP.....	FS 6-2
STOWAGE.....	FS 6-3
<u>DETAILED SUPPLEMENTAL OBJECTIVES (DSOs) ...</u>	FS 7-1
DSO 490 (PROTOCOL B), BIOAVAILABILITY & PERFORMANCE EFFECTS OF PROMETHAZINE (PMZ) DURING SPACE FLIGHT; DSO 634, SLEEP-WAKE ACTIGRAPHY ..	FS 7-3
A. DON ACTIWATCH.....	FS 7-3
B. PMZ PROTOCOL.....	FS 7-3
C. DOFFING ACTIWATCH.....	FS 7-5
FLIGHT SLEEP LOG.....	FS 7-5
SALIVA/KSS LOG.....	FS 7-6

DSO 493, MONITORING LATENT VIRUS	
REACTIVATION AND SHEDDING	FS 7-7
SALIVA COLLECTION (ALL FLIGHT DAYS).....	FS 7-7
<u>WLE SENSORS PROCEDURES</u>	FS 8-1
ACTIVATION AND CHECKOUT	FS 8-2
DEACTIVATION AND TEARDOWN	FS 8-9
WLE LAPTOP RECEIVER UNIT (LRU) R&R	FS 8-11
CONFIGURE DATA FILE BACKUP PATH	FS 8-14
DECONFIGURE DATA FILE BACKUP PATH	FS 8-15
PREP WLES LAPTOPS FOR TRANSFER.....	FS 8-16
<u>DETAILED TEST OBJECTIVES (DTO)</u>	FS 9-1
W/B COOLING VERIFICATION (DTO-850) (CIL).....	FS 9-3
WIRELESS STRAIN GAUGE INSTRUMENTATION	
SYSTEM (WSGIS)/INSTRUMENTED WIRELESS	
INTERFACE FIXTURE (IWIF) PROCEDURES	
(DTO-852 & DTO-849)	FS 9-7
WSGIS/IWIF IV ANTENNA SETUP	FS 9-7
ACTIVATION	FS 9-7
DEACTIVATION	FS 9-11
IV ANTENNA TEARDOWN	FS 9-13
IWIF DATA DOWNLOAD	FS 9-14
<u>MAUI ANALYSIS OF UPPER-ATMOSPHERIC</u>	
<u>INJECTIONS (MAUI)</u>	FS 10-1
MAUI PROCEDURE	FS 10-2
<u>CUE CARD CONFIGURATION</u>	FS 11-1

COMM/INST

LOAD PCMMU FORMAT.....	FS 1-2
PDI DECOM FORMAT.....	FS 1-4
OIU FORMAT/CONFIG.....	FS 1-7

**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 *
C3 * OI PCMMU PWR – 2(1) *
* √ERR MSG – 'I/O ERR PCM' *
CRT * I/O RESET PCM – ITEM 5 EXEC (*) *
* Repeat steps 2 and 3 *
4. When final LOAD – CPLT:
SEL PGM – ITEM 2 EXEC (*)

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	–
G2,G8,S2	MPLM/SSV (PRIME)	103/184	760
G2,G8,S2	MPLM/SSV (B/U)	103/205	767
G2,G8,S2	RNDZ/UNDOCK [OIU/TCS/SSV] (PRIME)	103/192	763
G2,G8,S2	RNDZ/UNDOCK [OIU/TCS/SSV] (B/U)	103/211	770
G2,G8,S2	DOCKED [OIU(4AC)/SSV] (PRIME)	103/199	780
G2,G8,S2	DOCKED [OIU(4AC)/SSV] (B/U)	103/212	781
G2,G8,S2	DOCKED [OIU(4CC)/SSV] (PRIME)	103/185	761
G2,G8,S2	DOCKED [OIU(4CC)/SSV] (B/U)	103/206	768
G2,G8,S2	DOCKED [OIU(4BC)/SSV] (PRIME)	103/188	762
G2,G8,S2	DOCKED [OIU(4BC)/SSV] (B/U)	103/208	769
G2,G8,S2	OIU [H&S/SSV]	103/179	757

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
760 MPLM / SSV (PRIME) TFL 184	1 2 3 4 5-FPM	2 - - 4 502	1,2 - - 4	OIU5 (MPLM) ** - - SSV (3) *** H-H-H *
767 MPLM / SSV (BACKUP) TFL 205	1 2 3 4 5-FPM	- 3 14 - 507	- 1,2 4 -	- OIU5 (MPLM) ** SSV (3) *** - H-H-H *
763 RNDZ / UNDOCK (PRIME) TFL 192	1 2 3 4 5-FPM	30 - 9 4 503	1,2 - 5 4	OIU7 (4AUH) ** - TCS SSV (3) *** H-H-H *
770 RNDZ / UNDOCK (BACKUP) TFL 211	1 2 3 4 5-FPM	- 31 14 19 508	- 1,2 4 5	- OIU7 (4AUH) ** SSV (3) *** TCS H-H-H *
780 DOCKED OPS / NCS CBM (PRIME) TFL 199	1 2 3 4 5-FPM	6 - - 27 501	1,2 - - 4	OIU9 (4AC) ** - - SSV (2) *** H-H-H *
781 DOCKED OPS / NCS CBM (BACKUP) TFL 212	1 2 3 4 5-FPM	- 16 29 - 506	- 1,2 4 -	- OIU9 (4AC) ** SSV (2) *** - 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/121/FIN A

CONFIG	DECOM	FMT	INPUT	USE
761 DOCKED OPS / SSAS (PRIME) TFL 185	1 2 3 4 5-FPM	8 - - 27 501	1,2 - - 4	OIU9 (4CC) ** - - SSV (2) *** L-H-H *
768 DOCKED OPS / SSAS (BACKUP) TFL 206	1 2 3 4 5-FPM	- 18 29 - 506	- 1,2 4 -	- OIU9 (4CC) ** SSV (2) *** - L-H-H *
762 INT CBM / MPLM (PRIME) TFL 188	1 2 3 4 5-FPM	7 - - 27 501	1,2 - - 4	OIU9 (4BC) ** - - SSV (2) *** H-H-H *
769 INT CBM / MPLM (BACKUP) TFL 208	1 2 3 4 5-FPM	- 17 29 - 506	- 1,2 4 -	- OIU9 (4BC) ** SSV (2) *** - H-H-H *
757 OIU H&S / SSV TFL 179	1 2 3 4 5-FPM	5 15 - 4 505	1,2 1,2 - 4	OIU255 (H&S) ** OIU255 (H&S) ** - SSV (3) *** L-H-H *

* OI-GNC-SM, Orbiter Downlist Data Rates (High or Low)

** # in OIU# represents the OIU format;

(XXX) represents data type

*** # in SSV (#) represents the SSV Out Rate sw selection

LOAD OIU FORMAT/CONFIG

Determine which step is needed and complete all actions to obtain desired OIU configuration

NOTE

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

S212 OIU

1. GNC-1 PRIMARY ON LB-ORB N2-1 (OIU BUS 3)
LOAD FORMAT ITEM 1 +9 EXEC
GNC TO GNC 1 ITEM 18 +1 4 EXEC
GNC 1 TO BUS 3 ITEM 18 +1 6 EXEC
BUS 4 BC ITEM 15 EXEC (*)
BUS 3 RT ITEM 10 EXEC (*)
LOAD FORMAT ITEM 1 +9 EXEC >>
2. GNC-1 PRIMARY ON LB-ORB N2-2 (OIU BUS 4)
LOAD FORMAT ITEM 1 +9 EXEC
GNC TO GNC 1 ITEM 18 +1 4 EXEC
GNC 1 TO BUS 4 ITEM 18 +1 5 EXEC
BUS 3 BC ITEM 11 EXEC (*)
BUS 4 RT ITEM 14 EXEC (*)
LOAD FORMAT ITEM 1 +9 EXEC >>
3. GNC-2 PRIMARY ON LB-ORB N2-1 (OIU BUS 3)
LOAD FORMAT ITEM 1 +9 EXEC
GNC TO GNC 2 ITEM 18 +1 3 EXEC
GNC 2 TO BUS 3 ITEM 18 +1 8 EXEC
BUS 4 BC ITEM 15 EXEC (*)
BUS 3 RT ITEM 10 EXEC (*)
LOAD FORMAT ITEM 1 +9 EXEC >>
4. GNC-2 PRIMARY ON LB-ORB N2-2 (OIU BUS 4)
LOAD FORMAT ITEM 1 +9 EXEC
GNC TO GNC 2 ITEM 18 +1 3 EXEC
GNC 2 TO BUS 4 ITEM 18 +1 7 EXEC
BUS 3 BC ITEM 11 EXEC (*)
BUS 4 RT ITEM 14 EXEC (*)
LOAD FORMAT ITEM 1 +9 EXEC >>

Cont next page

5. MPLM
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 >>

PTG

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

PTG

FS 2-1

ORB OPS/121/FIN A

PTG

STAR PAIRS PAD									
		ATT SET 1				ATT SET 2			
PAIR	ANG SEP	DUAL S TRK		SINGLE S TRK		DUAL S TRK		SINGLE S TRK	
				-Z	-Y			-Z	-Y
A	87.8	-Y:67 R+ 296 -Z:22 P+ 219 Y+ 341	R+ 209 P+ 221 Y+ 356	-Y:22 R+ 28 P+ 234 Y+ 339	-Y:22 R+ 334 -Z:67 P+ 45 Y+ 2	R+ 249 P+ 37 Y+ 15	-Y:67 R+ 60 P+ 58 Y+ 9		
B	89.7	-Y:72 R+ 169 -Z:54 P+ 102 Y+ 337	R+ 88 P+ 115 Y+ 327	-Y:54 R+ 251 P+ 89 Y+ 328	-Y:54 R+ 95 -Z:72 P+ 294 Y+ 37	R+ 12 P+ 287 Y+ 24	R+ 195 P+ 277 Y+ 43		
C	87.8	-Y:40 R+ 143 -Z:25 P+ 255 Y+ 321	R+ 62 P+ 263 Y+ 308	-Y:25 R+ 217 P+ 236 Y+ 319	-Y:25 R+ 125 -Z:40 P+ 79 Y+ 56	R+ 38 P+ 80 Y+ 41	R+ 233 P+ 54 Y+ 54		
D	84.3	-Y:47 R+ 274 -Z:43 P+ 241 Y+ 12	R+ 186 P+ 249 Y+ 24	-Y:43 R+ 357 P+ 253 Y+ 3	-Y:43 R+ 1 -Z:47 P+ 74 Y+ 335	R+ 272 P+ 61 Y+ 343	R+ 89 P+ 83 Y+ 347		

STAR PAIRS PAD

FS 2-2

ORB OPS/121/FIN A

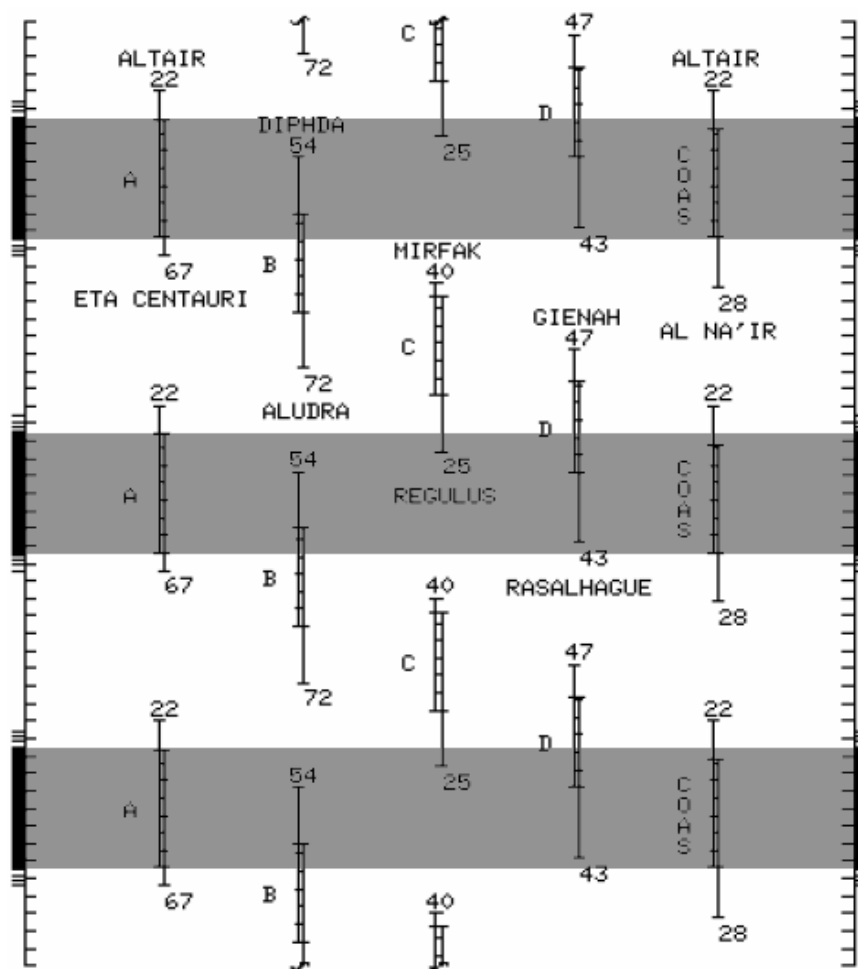
PAIR		COAS ALIGN ATTITUDE 1	ANG SEP	COAS ALIGN ATTITUDE 2
C	+X COAS	22 R+ 9 P+ 341 Y+ 298	NOSE UP 64	28 R+ 60 P+ 51 Y+ 341
D				
A	-Z COAS	22 R+ 242 P+ 64 Y+ 4	TAIL UP	28 R+ 215 P+ 111 Y+ 55
S				

SINGLE S TRK MIN MNVR OPT
TGT ID = 11-110 NAV STAR #
BODY VECTOR = 5

	-Z S TRK	-Y S TRK
P	87.7	0
Y	358	280.6

MET Applicable: 000/01:00 - 012/00:00
Date L/O: 07/01/06
GMT L/O: 182/19:43:39

STAR PAIRS



MET Applicable: 000/01:00 - 012/00:00
 Date L/O: 07/01/06
 GMT L/O: 182/19:43:39



This Page Intentionally Blank



DAP TABLES

DAP OVERVIEW	FS 3-2
UNIV PTG	FS 3-3
STS-121 DAP A CONFIGURATIONS.....	FS 3-4
B CONFIGURATIONS.....	FS 3-6

**DAP
TABLES**

DAP TABLES

DAP Overview

DAP – Purpose	DAP – Purpose
A1 – Nominal	B1 – OMS & RCS Burns (ORB OPS)
A2 – PTC	B2 – Loss of VERN (Tail Only)
A3 – GG	B3 – Loss of VERN (All)
A4 – 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 – PROX OPS/Flyaround
A10 – Docking	B10 – Docking
A11 – Auto Reboost	B11 –
A12 – Mated MNVRS & Att Hold (VRCS)	B12 – Mated MNVRS & Att Hold (PRCS)
A13 – Shuttle A/L Depress Att Cntrl (VRCS)	B13 – Shuttle A/L Depress Att Cntrl (PRCS)
A14 – Orbiter alone SRMS/OBSS Ops	B14 –
A15 –	B15 –

- CNTL ACC = 0 Orbiter alone with unloaded RMS
 = 1 Mated Control - VRCS & Shuttle A/L Pressurized
 = 2 Mated Control - ALT & Shuttle A/L Pressurized
 = 3 Mated Control - VRCS & Shuttle A/L Depressurized
 = 4 Mated Control - ALT & Shuttle A/L Depressurized
 = 5 ORM Position 1 (GMEM required)
 = 6 ORM Position 2 (GMEM required)
 = 7 ORM Position 8 (GMEM required)
 = 8 ORM Position 13 (GMEM required)
 = 9 Orbiter alone SRMS/OBSS Ops

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

FS-3-2

ORB OPS/121/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

STS-121 DAP A1 -- 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	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/121/FIN A

STS-121 DAP A9 -- A14 CONFIGURATIONS

	ITEM #	A9	A10	A11	A12	A13	A14
PRI							
ROT RATE	10 (50)	0.1300	0.0500	0.1000	0.1000	0.1000	0.2000
ATT DB	11 (51)	2.00	0.60	15.00	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	0.070	0.070	0.070	0.200
JET OPT	19 (59)	TAIL	TAIL	TAIL	TAIL	TAIL	TAIL
# JETS	20 (60)	2	2	3	3	3	1
ON TIME	21 (61)	0.08	0.08	0.08	0.08	0.08	0.08
DELAY	22 (62)	0.00	0.00	12.00	11.04	11.04	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	.050	.080	.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	1,2*	1	3	9
PURPOSE		PROX OPS/ FLYAROUND	DOCKING	AUTO REBOOST	MATED STACK & RMS OPS (VRCS)	A/L DEPRESS ATTITUDE CONTROL (VRCS)	ORBITER ALONE SRMS/OBSS
BOLD/ITALIC indicates change from I-Load. * 1 for Config 3&4, 2 for Config 1&2							

FS 3-5

ORB OPS/121/FINA

I

STS-121 DAP B1 -- 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/121/FIN A

STS-121 DAP B9 -- B13 CONFIGURATIONS

	ITEM #	B9	B10	B12	B13
PRI					
ROT RATE	30 (50)	0.1300	0.0500	0.1000	0.1000
ATT DB	31 (51)	2.00	0.60	5.00	5.00
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	0.070	0.070
JET OPT	39 (59)	TAIL	TAIL	TAIL	TAIL
# JETS	40 (60)	2	2	3	3
ON TIME	41 (61)	0.08	0.08	0.08	0.08
DELAY	42 (62)	10.00	0.00	11.04	11.04
VERN					
ROT RATE	43 (63)	0.1300	0.0500	0.1000	0.1000
ATT DB	44 (64)	1.000	0.500	3.000	3.000
RATE DB	45 (65)	.020	.020	.050	.080
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	2	4
PURPOSE		PROX OPS/ FLYAROUND	DOCKING	MATED STACK & RMS OPS (ALT)	A/L DEPRESS ATTITUDE CONTROL (ALT)

BOLD/ITALIC indicates change from I-Load.



This Page Intentionally Blank



REBOOST/DAP

AUTO REBOOST.....	FS 4-2
ATTITUDE REFERENCE.....	FS 4-4
DOCKED CONFIGURATION DAP REFERENCE	FS 4-5

**REBOOST/
DAP**

AUTO REBOOST

NOTE

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

REBOOST/
DAP

- O14:F,
O15:F,
O16:F
1. If PRCS required:
RJDA 1A L2/R2 DRIVER – OFF
RJD MANF L5/F5/R5 DRIVER – OFF
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-*)

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

If using Config 1(2):

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

Cont next page

FS 4-2

ORB OPS/121/FIN A

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(2):

GNC 20 DAP CONFIG

Enable X JETS ROT – ITEM 7 EXEC (*)

Return to FLIGHT PLAN Attitude

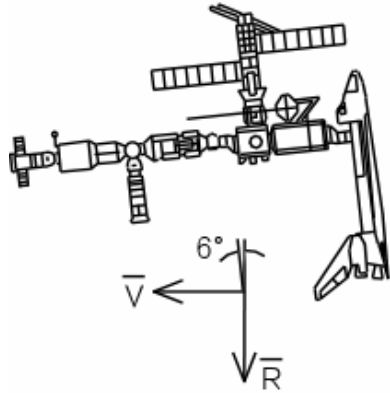
DAP: as reqd

Pri RJD LOGIC,DRIVER (sixteen) – as reqd

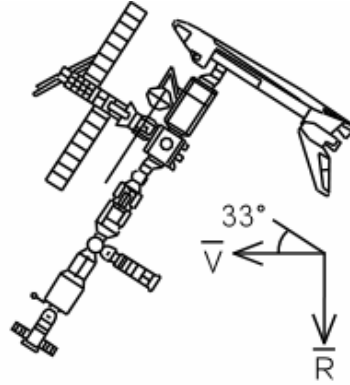
C3
O14,
O15,
O16

AUTO REBOOST ATTITUDE REFERENCE

VRCS ATTITUDE HOLD CONFIGURATIONS:

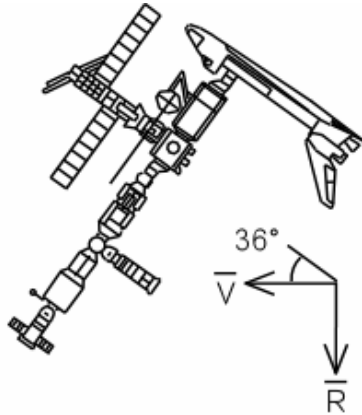


Earth
Nose up, Config 3 (VRCS)

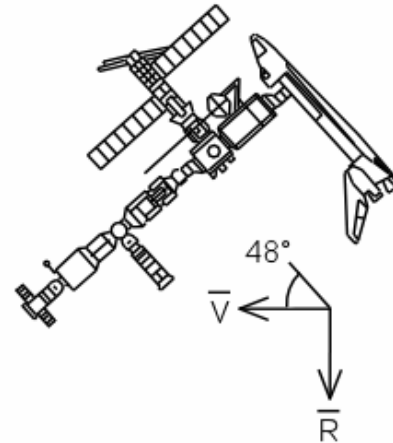


Earth
Nose up, Config 4 (+X, VRCS)

ALT ATTITUDE HOLD CONFIGURATIONS:



Earth
Nose up, Config 1 (+X, -pitch)



Earth
Nose up, Config 2 (+X)

DOCKED CONFIGURATION DAP REFERENCE

SHUTTLE AIRLOCK

PRESS (≥ 3.45 psia) DEPRESS (< 3.45 psia)

VERN	A12 (CA: 1)	A13 (CA: 3)
ALT, LO Z	B12 (CA: 2)	B13 (CA: 4)
RATE DAMPING	LVLH(INRTL), then AUTO	
RATE > 0.20	LVLH(INRTL) 6 min max FREE, LVLH(INRTL)	

NOTE

DAP A12(B12) cannot be used when shuttle airlock pressure < 3.45 psia

1. When shuttle airlock pressurized, select DAP: A12/VERN(B12/ALT, LO Z)

NOTE

Use of DAP A13(B13) when shuttle airlock pressure ≥ 3.45 psia results in degraded DAP performance and increased propellant consumption

2. Before shuttle airlock depressurized, select DAP: A13/VERN(B13/ALT, LO Z)

All DAPs can be used for attitude maintenance or maneuvering



This Page Intentionally Blank



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

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

FRED

FRED SETUP	FS 6-2
STOWAGE	FS 6-3

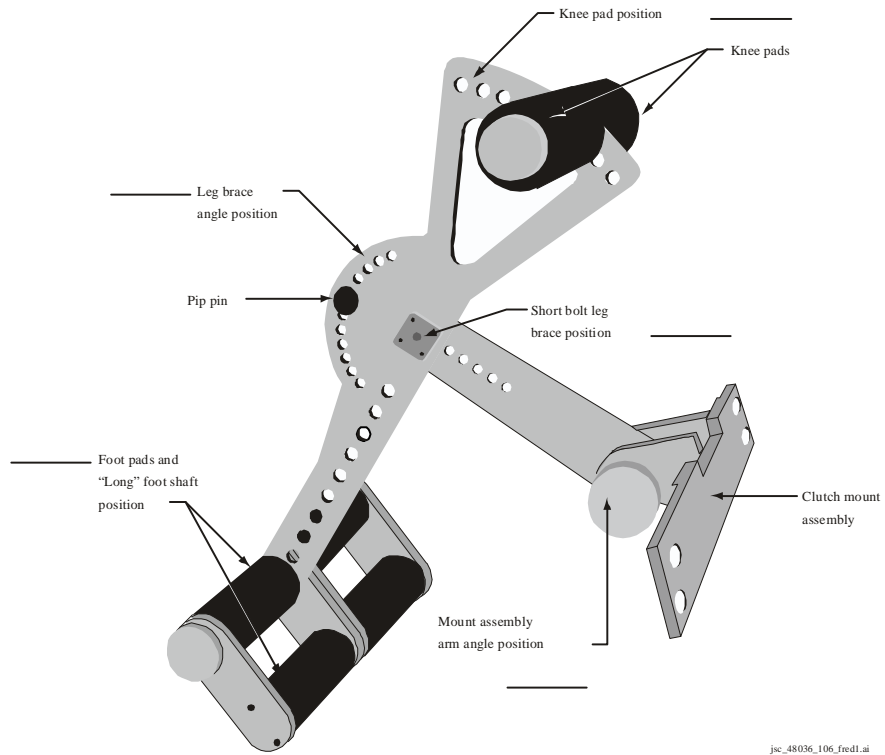
FRED

FS 6-1

ORB OPS/121/FIN A

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



jsc_48036_106_fred1.ai

FRED

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



This Page Intentionally Blank



DETAILED SUPPLEMENTARY OBJECTIVES (DSOs)

DSO 490 (PROTOCOL B), BIOAVAILABILITY
& PERFORMANCE EFFECTS OF
PROMETHAZINE (PMZ) DURING SPACE FLIGHT;
DSO 634, SLEEP-WAKE ACTIGRAPHY..... FS 7-3
A. DON ACTIWATCH..... FS 7-3
B. PMZ PROTOCOL FS 7-3
C. DOFFING ACTIWATCH FS 7-5
FLIGHT SLEEP LOG FS 7-5
SALIVA/KSS LOG FS 7-6
DSO 493, MONITORING LATENT VIRUS
REACTIVATION AND SHEDDING FS 7-7
SALIVA COLLECTION (ALL FLIGHT DAYS) FS 7-7

DSOs



This Page Intentionally Blank

DSOs



FS 7-2

ORB OPS/121/FIN A

**DSO 490 (PROTOCOL B), BIOAVAILABILITY &
PERFORMANCE EFFECTS OF PROMETHAZINE (PMZ)
DURING SPACE FLIGHT; DSO 634, SLEEP-WAKE
ACTIGRAPHY**

ASAP after entry into orbit:

A. DON ACTIWATCH

MF43G

1. Unstow: Actiwatch
FLIGHT SLEEP LOG

NOTE

If necessary to remove Actiwatch,
record doff/don time on FLIGHT
SLEEP LOG

2. Don Actiwatch on non-dominant arm and
wear continuously throughout mission
3. Deploy FLIGHT SLEEP LOG and record
required information daily (within 15 min
after waking)

NOTE

Perform B. PMZ PROTOCOL if SMS
is experienced. If unable to collect
saliva sample before taking PMZ
dose, collect saliva sample at some
other drug-free time during mission

B. PMZ PROTOCOL

MF43G

1. Unstow: Saliva Sample Kit
SALIVA/KSS LOG
2. Temp stow SALIVA/KSS LOG w/Saliva
Sample Kit

Cont next page

FS 7-3

ORB OPS/121/FIN A

3. Collect Baseline saliva sample:
 - a. Unstow appropriate saliva tube

NOTE

Do not touch cotton w/fingers.
Do not bite/chew cotton

- b. Place small cotton roll in mouth and lightly roll w/tongue ~2 min
 - c. Replace saturated cotton roll into tube
 - d. Tighten cap
 - e. Record MET on tube and on SALIVA/KSS LOG
 - f. Record additional information required on SALIVA/KSS LOG
 - g. Stow tube in Saliva Sample Kit
 - h. Temp stow Saliva Sample Kit
4. Take PMZ

If PMZ dose taken less than 8 hrs prior to sleep but before pre-sleep:

5. Collect saliva samples per SALIVA/KSS LOG until sleep time, then pick up with next sample (24 hrs) following wakeup
6. Collect remaining saliva samples per SALIVA/KSS LOG following steps 3a-h

If PMZ dose is taken during pre-sleep:

7. Collect saliva samples pre-dose (Baseline sample) just before sleep, immediately upon wakeup, 1 hr after wakeup, and at 24,36, and 48 hrs post-dose

If second PMZ dose is taken within 48 hrs:

8. Begin PMZ protocol again; record MET in second column of SALIVA/KSS LOG

MF43G

9. If last saliva sample, stow Saliva Sample Kit

Cont next page

FS 7-4

ORB OPS/121/FIN A

C. DOFFING ACTIWATCH

On final day of orbit:

MF43G

1. Remove Actiwatch, stow

NOTE

If mission length extended, continue to wear Actiwatch and complete FLIGHT SLEEP LOG as timeline permits

FLIGHT SLEEP LOG (example below) is used with both DSO 490B and DSO 634:

FLIGHT SLEEP LOG

Crew ID: _____ Actiwatch Dot Color: _____

Current Time: _____ [ddd:hh:mm (MET)]

Lights Out: _____ [ddd:hh:mm (MET)]

Lights On: _____ [ddd:hh:mm (MET)]

1. How long did you take to fall asleep last night? _____ (hrs) _____ (mins)
2. How long did you sleep last night? _____ (hrs) _____ (mins)
3. How many times did you awaken during the night? _____
4. After the end of your sleep period, how long did you remain in bed before getting up?
_____ (hrs) _____ (mins)
5. Where did you sleep last night? [Flight deck / Middeck / Spacehab / Sleepstation]
6. Was your sleep disturbed: [Yes / No] (If Yes, check all that apply)
 shuttle noise mission duties voids, # of voids: _____ other crew
 physical discomfort too hot too cold other _____
7. How did you sleep last night?
poorly | _____ | great
8. How do you feel right now?
sleepy | _____ | alert
9. Did you have any caffeine yesterday? [Yes / No] (If Yes, indicate how much)
coffee _____ (cups) caffeine pills _____ (100mg) _____ (200mg)
tea _____ (cups) caffeinated soft drinks _____ (glasses)
Indicate how long before bed your last caffeine intake was: _____ (hrs) _____ (mins)
10. Did you take any medications yesterday? [Yes / No / Decline] (If Yes, list all)

Comments:

SALIVA/KSS LOG (example below) is used with DSO 490B:

Crew Member _____	Circle dosage form: 25mg Tablet 50mg Injectable 25mg Suppository		SALIVA / KSS LOG Note: To be used only if PMZ is taken.	
	PMZ Dose One		PMZ Dose Two	
Activity Time (hr) Post-PMZ Dose	KSS	Saliva Sample MET	KSS	Saliva Sample MET
Baseline				
1				
2				
4				
8				
24				
36				
48				
(1) Rate sleepiness during last 5 mins using key (2) Record saliva collection MET				
KSS KEY				
1	2	3	4	5
very alert	alert	neutral	sleepy, no	very sleepy, great
SDD46108178-601	normal level	neither alert/sleepy	effort to stay awake	effort to stay awake

**DSO 493, MONITORING LATENT VIRUS REACTIVATION
AND SHEDDING**

SALIVA COLLECTION (ALL FLIGHT DAYS)

Immediately post-sleep (before brushing teeth):

- MF43G 1. Unstow: Saliva Kit Assy

NOTE

DO NOT touch cotton w/fingers.

DO NOT bite down or chew cotton

2. Remove Salivette Bag Assy w/cotton rolls from 'UNUSED' pocket
 3. Open Salivette Bag Assy w/cotton rolls and remove a cotton roll using fingers on the outside of the bag
 4. Lightly roll cotton in mouth w/tongue until saturated (2 min max)
 5. Replace Salivette Bag Assy w/cotton rolls in 'UNUSED' pocket
 6. Place cotton roll in Collection Bag Assy by guiding w/tongue
 7. Close seal on Collection Bag Assy, remove clamp, mix preservative w/cotton roll
 8. Reclamp across top of Collection Bag Assy
 9. Write the FD or MET on Collection Bag Assy using a Sharpie
 10. Stow Collection Bag Assy in 'USED' pocket
 11. Temp stow Saliva Kit
- MF43G 12. If last FD, stow Saliva Kit

NOTE

If mission length extended, as timeline permits, continue collecting saliva samples to end of mission or until sample Collection Bags are depleted



This Page Intentionally Blank



WLE SENSORS PROCEDURES

ACTIVATION AND CHECKOUT	FS 8-2
DEACTIVATION AND TEARDOWN	FS 8-9
WLE LAPTOP RECEIVER UNIT (LRU) R&R	FS 8-11
CONFIGURE DATA FILE BACKUP PATH	FS 8-14
DECONFIGURE DATA FILE BACKUP PATH	FS 8-15
PREP WLES LAPTOPS FOR TRANSFER.....	FS 8-16

WLE
SENSORS

ACTIVATION AND CHECKOUT

1. UNSTOW EQUIPMENT

NOTE

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

MA9J	Unstow:	
	Laptop Receiver Units (2)	
	Cabin Relay Units (2) (S/N 1664, 1728)	
	A31p laptops (2)	

2. SETUP WLE RELAY UNITS

A13	Retrieve WLE SYSTEM CABLE coiled on panel A6 Connect to MICRO WIS SYSTEM A – J7 (see fig 8-1)	
-----	--	--

W7	Connect to J1 on Cabin Relay Unit S/N 1664 and secure to STBD side of aft cabin with Velcro (see fig 8-2)	
	Verify terminator connected to J2	

A13	Retrieve WLE SYSTEM CABLE coiled on panel A9 Connect to MICRO WIS SYSTEM B – J8 (see fig 8-1)	
-----	--	--

A4	Connect to J1 on Cabin Relay Unit S/N 1728 and secure to PORT side of aft cabin with Velcro (see fig 8-3)	
	Verify terminator connected to J2	

NOTE

Green patch on Cabin Relay Unit is antenna and must face into cabin.
Software is configured to communicate with specific Relay Units on specific buses

Cont next page

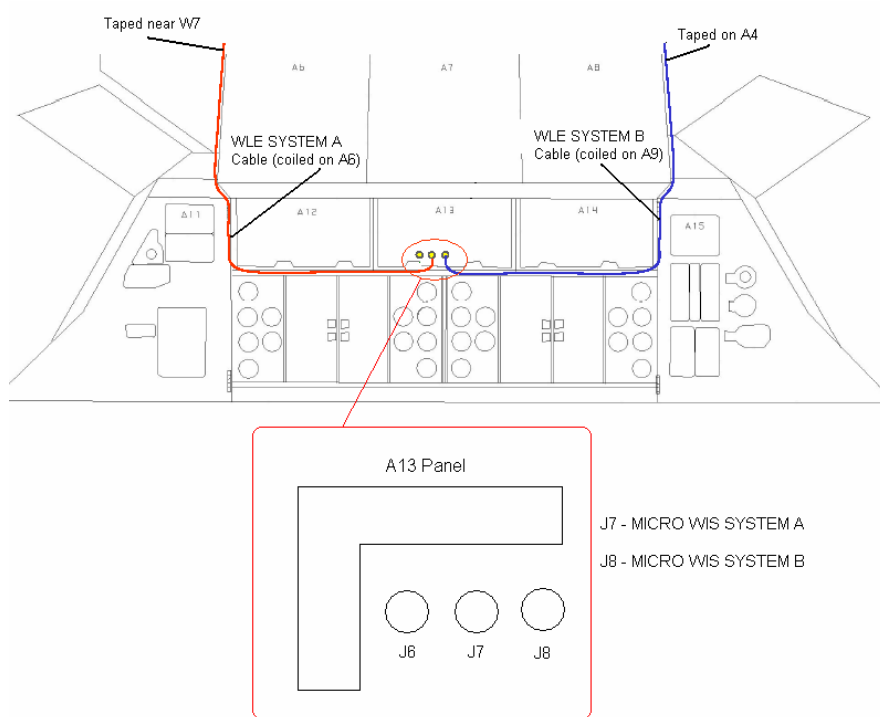


Figure 8-1.- A13 panel.

Cont next page

FS 8-3

ORB OPS/121/FIN A

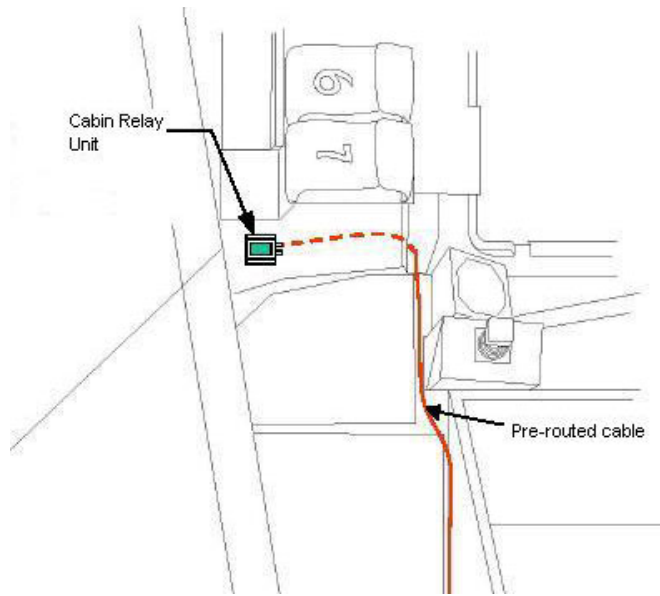


Figure 8-2.- Aft STBD location.

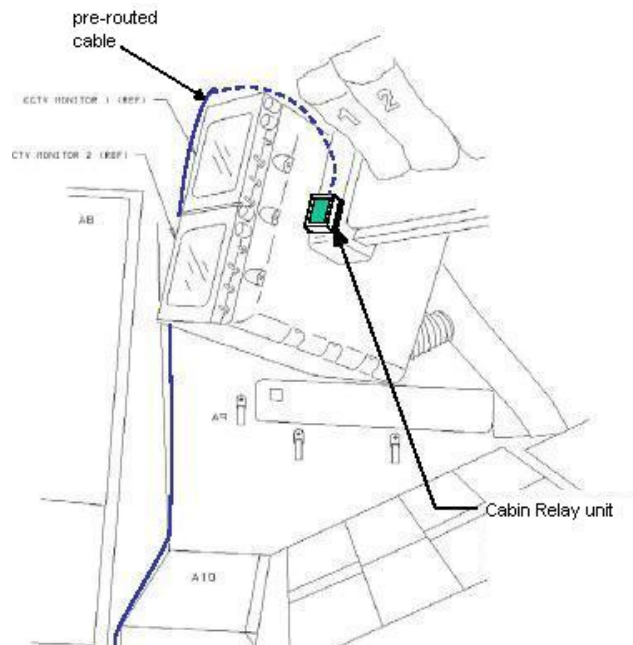


Figure 8-3.- Aft PORT location.

Cont next page

3. SETUP PRIME WLE LAPTOP

A31p

Verify laptop connected to network before proceeding with setup
If necessary, close all applications, exit Windows
Click 'Start'>'Shutdown'
Secure Laptop Receiver Unit to A31p with Velcro (see fig 8-4)

NOTE

Laptop Receiver Unit serial connector does not have thumbscrews. Tape may be used to help ensure the connector remains attached to the A31p

Connect Laptop Receiver Unit to A31p Serial port (see fig 8-5)

4. SETUP BACKUP WLE LAPTOP

A31p

Verify laptop connected to network before proceeding with setup
If necessary, close all applications, exit Windows
Click 'Start'>'Shutdown'
Secure Laptop Receiver Unit to A31p with Velcro (see fig 8-4)
Connect Laptop Receiver Unit to A31p Serial port (see fig 8-5)

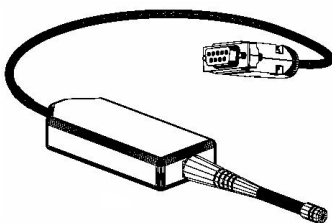


Figure 8-4.- Laptop Receiver Unit.

Cont next page

FS 8-5

ORB OPS/121/FIN A



Figure 8-5.- A31p ports.

5. LAUNCH WLE SOFTWARE

Perform for both laptops:

A31p pwr – On

Select clock from system tray

Verify time is set to GMT (Casablanca,
Monrovia), adjust if necessary

Click 'OK'

Double click 'Shuttle Apps'>'EWBMTAU-
WLEflight'

'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'

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

FS 8-6

ORB OPS/121/FIN A

6. VERIFY COMM WITH RELAY UNITS

Use prime WLES laptop

'Main'

Click 'Unit List' (left side of display)

NOTE

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

√Cabin Relay Units Unit ID 1664 and 1728 (2) 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

√Via: 'RF'

√Mode: 'Idle'

NOTE

'Last Update' times nominally update every 5 to 15 sec

If no time updates after 2 min, contact MCC-H

7. ENABLE DATA FILE BACKUP

Use prime WLES laptop

'Main'

Click 'System Settings' (left side of display)

'Directories'

At the line 'Backup Directory' click 'Browse...'

Navigate to the mapped drive for the backup WLES laptop (expected to be the "P" drive)

Navigate to 'Program Files'>'Invocon'>'EWBMTAU-WLEFlight'

Click 'OK'

Cont next page

FS 8-7

ORB OPS/121/FIN A

‘Backup Interval’

Using drop-down list, select 30 minutes

Click ‘Status’ (left side of display)

8. INITIATE COMMANDING

NOTE

The first time a user navigates to ‘Program Files’ folder, display may show information saying the program files are hidden. To view the contents of the folder, select ‘display files’ in the left-hand portion of the Windows Explorer window

Using Windows Explorer, navigate to

‘My Computer’>‘C:’>‘Program Files’>

‘Invocon’>‘EWBMTAU-WLEFlight’>‘Command’

NOTE

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

Delete file labeled ‘BLOCK.xml’

NOTE

Files appearing in the ‘Data’ folder verifies two-way communication with the Sensor Units in the orbiter wing. You may view this by using Windows Explorer to navigate to: ‘My Computer’>‘C:’>‘Program Files’>‘Invocon’>‘EWBMTAU-WLEFlight’>‘Data’

Notify MCC-H: “WLES setup complete”

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

DEACTIVATION AND TEARDOWN

A31p 1. DEACTIVATE WLE SENSORS LAPTOP 'Enhanced Wideband MicroTAU – WLEFlight 2.2'

For each WLES A31p:

Click 'Exit'

At prompt 'Are you sure you want to exit?'

click 'Yes'

Click 'Start'>'Shutdown'

Disconnect Laptop Receiver Unit from A31p

Serial port

Remove Laptop Receiver Unit from Velcro on
A31p

2. REMOVE WLE SENSOR RELAY UNITS

Remove Cabin Relay Units (2) from aft cabin (see
fig 8-6 and fig 8-7)

Disconnect Cabin Relay Units from pre-routed
cables

Coil cables, stow in launch location

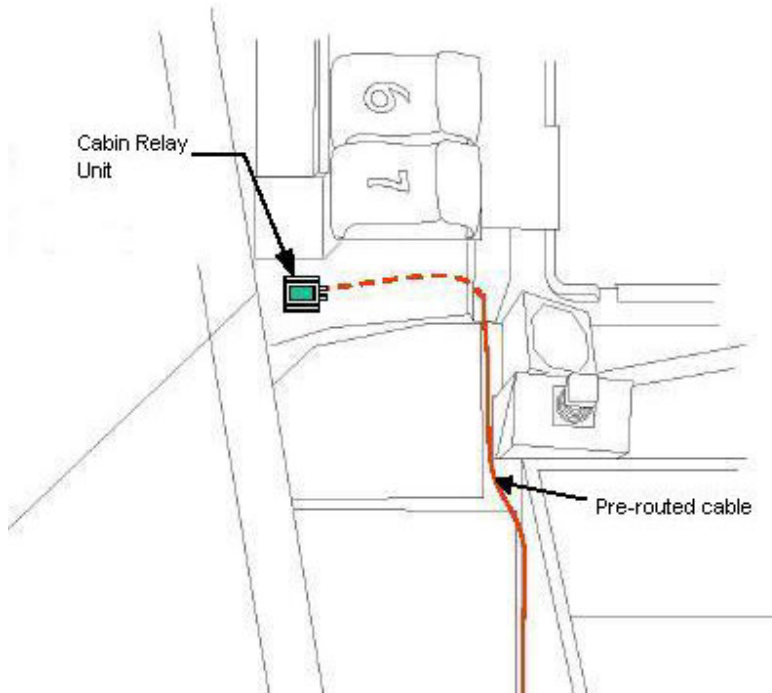


Figure 8-6.- Aft STBD location.

Cont next page

FS 8-9

ORB OPS/121/FIN A

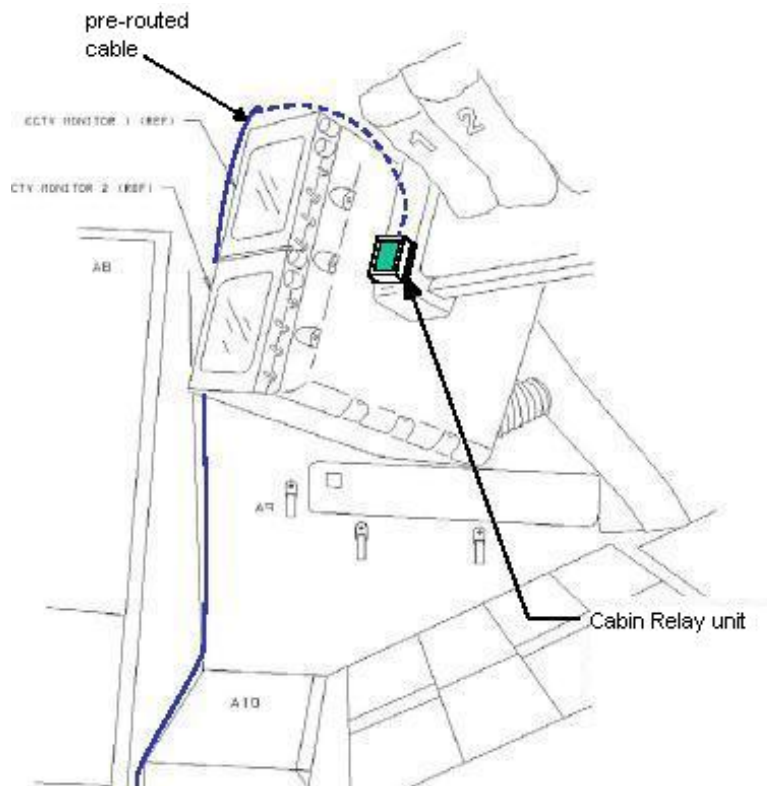


Figure 8-7.- Aft PORT location.

3. STOW EQUIPMENT

MA9J

Stow:

Laptop Receiver Units (2)

Cabin Relay Units (2)

A31p Laptops (2)

Notify MCC-H: "WLES Teardown Complete"

WLE LAPTOP RECEIVER UNIT (LRU) R&R

- A31p
1. DISCONNECT BACKUP LRU FROM LAPTOP
'Enhanced Wideband MicroTAU – WLEFlight 2.2'
Click 'Exit'
At prompt 'Are you sure you want to exit?'
click 'Yes'
Close other software applications
Click 'Start'>'Shutdown'
Disconnect Backup LRU from Backup A31p Serial
port (see fig 8-8)
Remove Backup LRU from Velcro on Backup A31p
(see fig 8-9)

NOTE

Laptop can now be restarted for use



Figure 8-8.- A31p ports.

- A31p
2. DISCONNECT PRIME LRU FROM LAPTOP
'Enhanced Wideband MicroTAU – WLEFlight 2.2'
Click 'Exit'
At prompt 'Are you sure you want to exit?',
click 'Yes'
Close other software applications
Click 'Start'>'Shutdown'

Cont next page

FS 8-11

ORB OPS/121/FIN A

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

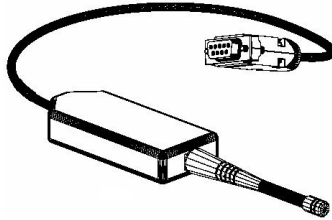


Figure 8-9.- Laptop Receiver Unit.

3. CONNECT BACKUP LRU
Connect Backup LRU to Prime WLES A31p Serial port
Secure LRU to A31p with Velcro
4. LAUNCH WLE SOFTWARE
Pwr – On
Double click ‘Shuttle Apps’>‘EWBMTAU-WLEFlight’

‘Backup Mode Selection’
Select ‘Standard’
5. VERIFY COMM WITH RELAY UNITS
‘Main’

Click ‘Unit List’ (left side of display)
√Cabin Relay Units Unit ID 1664 and 1728 (2) 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
√Via: ‘RF’
√Mode: ‘Idle’

A31p

Cont next page

FS 8-12

ORB OPS/121/FIN A

NOTE

'Last Update' times nominally
update every 5 to 15 sec

If no time updates after 2 min, contact MCC-H

Click 'Status' (left side of display)

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

- MA9J
6. STOW EQUIPMENT
Stow:
Prime (failed) LRU

CONFIGURE DATA FILE BACKUP PATH

A31p Use Prime WLES Laptop

'Main'

Click 'System Settings' (left side of display)

'Directories'

At the line 'Backup Directory' click 'Browse...'

Navigate to the mapped drive for the backup WLES laptop (expected to be the "P" drive)

Navigate to 'Program Files'>'Invocon'>'EWBMTAU-WLEFlight'

Click 'OK'

'Backup Interval'

Verify interval is set for 30 minutes

Click 'Status' (left side of display)

DECONFIGURE DATA FILE BACKUP PATH

A31p Use Prime WLES Laptop

'Main'

Click 'System Settings' (left side of display)

'Directories'

At the line 'Backup Directory' click 'Browse...'

Navigate to the 'C' drive of the Prime WLES laptop

Navigate to 'Program Files'>'Invocon'

Click 'OK'

'Backup Interval'

Verify interval is set for 30 minutes

Click 'Status' (left side of display)

PREP WLES LAPTOPS FOR TRANSFER

- A31p 1. DEACTIVATE WLE SENSORS LAPTOP(S)
'Enhanced Wideband MicroTAU – WLEFlight 2.2'

For each WLES A31p in use:

Click 'Exit'

At prompt 'Are you sure you want to exit?'

click 'Yes'

Click 'Start'>'Shutdown'

Disconnect Laptop Receiver Unit from A31p

Serial port

Remove Laptop Receiver Unit from Velcro on
A31p

- MA9J 2. STOW EQUIPMENT

Stow:

Extra Laptop Receiver Unit (1) as necessary

- _____ 3. CONNECT LRU TO 'NEW' WLES LAPTOP

√MCC-H for which laptop to use (Likely STS8 LCC)

Click 'Start'>'Shutdown'

Connect LRU to A31p Serial port

Secure LRU to A31p with Velcro

4. LAUNCH WLE SOFTWARE

Pwr – On

Double click 'Shuttle Apps'>'EWBMTAU-WLEFlight'

'Backup Mode Selection'

Select 'Standard'

Cont next page

FS 8-16

ORB OPS/121/FIN A

5. VERIFY COMM WITH RELAY UNITS

'Main'

Click 'Unit List' (left side of display)

√Cabin Relay Units Unit ID 1664 and 1728 (2) 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

√Via: 'RF'

√Mode: 'Idle'

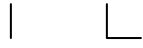
NOTE

'Last Update' times nominally
update every 5 to 15 sec

If no time updates after 2 min, contact MCC-H

Click 'Status' (left side of display)

Notify MCC-H: "WLES laptop prep for transfer
complete"



This Page Intentionally Blank



DETAILED TEST OBJECTIVES (DTO)

W/B COOLING VERIFICATION (DTO-850) (CIL)	FS 9-3
WIRELESS STRAIN GAUGE INSTRUMENTATION SYSTEM (WSGIS)/INSTRUMENTED WIRELESS INTERFACE FIXTURE (IWIF) PROCEDURES (DTO-852 & DTO-849).....	FS 9-7
WSGIS/IWIF IV ANTENNA SETUP	FS 9-7
ACTIVATION	FS 9-7
DEACTIVATION	FS 9-11
IV ANTENNA TEARDOWN	FS 9-13
IWIF DATA DOWNLOAD.....	FS 9-14

DTO



DTO

This Page Intentionally Blank



W/B COOLING VERIFICATION (DTO-850)

CAUTION

Visually verify the absence of ice accumulation on W/B 3 steam vent prior to performing this procedure

1. GNC CONFIG
O14, ASA (four) – ON
O15,
O16:F

O17:A ATVC (four) – ON
C3 √FCS CH (four) – AUTO
2. DPS CONFIG
Perform G2 TO G8 TRANSITION, steps 2-4 only,
(ORB OPS, DPS); in step 2 use “If FCS Checkout:”
steps (TFL 161)
3. APU 3 PRESTART

2: SM 86 APU/HYD

CRT2 √APU, HYD, W/B status no ‘↑’ or ‘↓’ (except HYD B/U P)
R4 √HYD BK ISOL VLV 3 tb – CL
R2 BLR N2 SPLY 3 – ON
√PWR 3 – ON
√CNTLR/HTR 3 – A(B)
HYD CIRC PUMP 3 – OFF
√cb APU FU TK VLV ENA 3 (two) – cl
√APU FU TK VLV 3 – CL
√AUTO SHTDN 3 – ENA
√SPEED SEL 3 – NORM
√OPER 3 – OFF

HYD MN PUMP PRESS 3 – LO
APU CNTLR PWR 3 – ON
FU TK VLV 3 – OP
√APU/HYD RDY 3 tb – gray

* If tb – bp, √MCC *

Cont next page

FS 9-3

ORB OPS/121/FIN A

CRT2 Verify APU 3 GG BED T < 401 degF
Notify MCC: READY FOR APU 3 START
Wait for MCC GO

4. APU 3 START

NOTE

Any previously failed actuator channel should be bypassed via ITEM 21 on FCS/DED DIS C/O display prior to APU 3 start

HYD/APU
R2 APU OPER 3 – START/RUN
√HYD PRESS ind 3 – LOW green
√APU/HYD RDY 3 tb – bp

- * If APU 3 did not start or shuts down, *
- * 'S86 APU GBX T', 'S86 APU TEMP', *
- * 'S86 APU GBX P' msgs, then go to *
- * step 5, APU 3 SHUTDOWN *

HYD/APU HYD MN PUMP PRESS 3 – NORM
√PRESS ind 3 – HI green

- * If APU 3 OIL IN TEMP > 290 and incr: *
- * BLR CNTLR/HTR 3 – B(A) *
- * If APU 3 OIL IN TEMP > 305 and incr: *
- * Go to step 5, APU 3 SHUTDOWN *

Cont next page

FS 9-4

ORB OPS/121/FIN A

5. APU 3 SHUTDOWN

On MCC GO or APU 3 OIL IN TEMP steady for
3 minutes:

R2 BLR N2 SPLY 3 – OFF
PWR 3 – OFF
APU OPER 3 – OFF
FU TK VLV 3 – CL
HYD/APU √Shutdn (HYD PRESS < 200)
R2 CNTLR PWR 3 – OFF
HYD CIRC PUMP 3 – GPC

If ELEVON PARK not reqd, go to step 7

6. ELEVON PARK

GNC 0 GPC MEMORY
CONFIG – ITEM 1 +2 EXEC
√NBAT

C3(A6U) DAP: FREE
CRT GNC, OPS 201 PRO

O14, ASA (four) – OFF

O15,
O16:F
CRT

GNC 0 GPC MEMORY
CONFIG – ITEM 1 +8 EXEC
√NBAT
GNC, OPS 801 PRO

C3(A6U) Pause ~30 sec (DAP settling), then:
DAP: A/AUTO/VERN

O16:F ASA 4 – ON

R2 HYD CIRC PUMP 1 – ON

NOTE

Elevons will be positioned within 3 min

On MCC GO:
HYD CIRC PUMP 1 – GPC

Cont next page

7. DPS RECONFIG

Perform G8 TO G2 TRANSITION, steps 1-4 only
(ORB OPS, DPS)

O17:A

8. GNC RECONFIG

ATVC (four) – OFF

If ELEVON PARK not performed:

O14,
O15,
O16:F

ASA (four) – OFF

**WIRELESS STRAIN GAUGE INSTRUMENTATION
SYSTEM (WSGIS)/INSTRUMENTED WIRELESS
INTERFACE FIXTURE (IWIF) PROCEDURES
(DTO-852 & DTO-849)**

WSGIS/IWIF IV ANTENNA SETUP

- MF71G 1. Unstow WSGIS Receiver Unit antenna and
connected 14 ft data cable
- Aft flight 2. Velcro WSGIS Receiver Unit antenna in aft stbd
deck window

NOTE

Not reqd to power off PGSC to
connect cable

- Worldmap 3. Connect 14 ft data cable to RS232 serial port
PGSC

WSGIS/IWIF ACTIVATION

A. LAUNCH IWIF-WIS S/W

1. Simo record:

Orbiter GMT ____/____/____:____:____

WORLDMAP

PGSC GMT ____/____/____:____:____

2. Close all applications
3. Double click 'Shuttle Apps'>'IWIF-WIS'
4. Wait 30-60 sec
'IWIF-WIS Control Software 1.1'
5. When "Open COM port" window appears:
Click 'OK'

Cont next page

FS 9-7

ORB OPS/121/FIN A

- | | |
|-----------------|--|
| | B. <u>ACTIVATE IWIF H/W</u> |
| PLB | 1. √EV crewmember presenting IWIF load cell for activation |
| Aft flight deck | 2. Verify IV antenna has line of sight w/IWIF antennas |
| Worldmap PGSC | 'MAIN' |

NOTE

Eleven units will always display Mode "Unknown"

3. After 15 sec:
 - √Unit Mode (4): "Idle"
 - * If < four units Mode: "Idle" *
 - * Re-orient IV antenna or EV hardware *
 - * Wait 15 sec *
 - * √Unit Mode (4): "Idle" *
 - * If no joy: *
 - * √MCC-H *
4. Click 'Start Acquisition'
5. √Unit Status (15): "Start Acquisition – Pending" |

Cont next page

NOTE

The eleven units with Mode "Unknown" will always display Status "Start Acquisition – Pending"

CAUTION

Do NOT click 'Stop Acquisition'. Clicking 'Stop Acquisition' will end data take of sensors

6. Wait 30 sec
7. √Unit Mode (4): "Acquisition Active"
8. √Unit Status (4): blank
9. Notify EV crewmember activation complete
10. Exit software
11. When "Are you sure?" box appears:
Click 'Yes'

C. LAUNCH WSGIS S/W

Aft flight deck

1. Relocate IV antenna to aft port window and verify line of sight w/SRMS

NOTE

IWIF-WIS software must be closed prior to launching WSGIS software as both use same antenna

Worldmap PGSC

2. Double-click 'Shuttle Apps'>'WSGIS'
3. Wait 30-60 sec
'WSGIS Control Software 1.0'
4. When "Open COM port" window appears:
Click 'OK'

Cont next page

D. ACTIVATE WSGIS H/W

'MAIN'

1. After 15 sec:

√Unit Mode (3): "Idle"

- * If < three units Mode: "Idle" *
- * Re-orient IV antenna *
- * Wait 15 sec *
- * √Unit Mode (3): "Idle" *
- * If no joy: *
- * √MCC-H *

2. Click 'Start Acquisition'

3. √Unit Status (3): "Start Acquisition – Pending"

CAUTION

Do NOT click 'Stop Acquisition'.
Clicking 'Stop Acquisition' will end
data take of sensors

4. Wait 30 sec

5. √Unit Mode (3): "Acquisition Active"

6. √Unit Status (3): blank

7. Exit software

8. When "Are you sure?" box appears:

Click 'Yes'

WSGIS/IWIF DEACTIVATION

- A. LAUNCH IWIF-WIS S/W
- Worldmap
PGSC
1. Close all applications
 2. Double click 'Shuttle Apps'>'IWIF-WIS'
 3. Wait 30-60 sec
'IWIF-WIS Control Software 1.1'
 4. When "Open COM port" window appears:
Click 'OK'

- B. DEACTIVATE IWIF H/W
- Aft flight
deck
1. Verify IV antenna has line of sight w/IWIF
antennas

Worldmap
PGSC

'MAIN'

NOTE

Eleven units will always
display Mode "Unknown"

2. After 15 sec:
√Unit Mode (4): "Acquisition Active"
 - * If < four units Mode: "Acquisition Active" *
 - * Re-orient IV antenna or EV hardware *
 - * Wait 15 sec *
 - * √Unit Mode (4): "Acquisition Active" *
 - * If no joy: *
 - * √MCC-H *
3. Click 'Stop Acquisition'
4. √Unit Status (15): "Stop Acquisition – Pending"

Cont next page

FS 9-11

ORB OPS/121/FIN A

NOTE

The eleven units with Mode "Unknown" will always display Status "Stop Acquisition – Pending"

5. Wait 30 sec
6. √Unit Mode (4): "Idle"
7. √Unit Status (4): blank
8. Exit software
9. When "Are you sure?" box appears:
Click 'Yes'

C. LAUNCH WSGIS S/W

Aft flight deck

1. Relocate IV antenna to aft port window and verify line of sight w/SRMS

NOTE

IWIF-WIS software must be closed prior to launching WSGIS software as both use same antenna

Worldmap PGSC

2. Double-click 'Shuttle Apps'>'WSGIS'
3. Wait 30-60 sec
'WSGIS Control Software 1.0'
4. When "Open COM port" window appears:
Click 'OK'

D. DEACTIVATE WSGIS H/W

'MAIN'

1. After 15 sec:
√Unit Mode (3): "Acquisition Active"

Cont next page

FS 9-12

ORB OPS/121/FIN A

- * If < three units Mode: "Acquisition Active" *
- * Re-orient IV antenna *
- * Wait 15 sec *
- * √Unit Mode (3): "Acquisition Active" *
- * If no joy: *
- * √MCC-H *

2. Click 'Stop Acquisition'
3. √Unit Status (3): "Stop Acquisition – Pending"
4. Wait 30 sec
5. √Unit Mode (3): "Idle"
6. √Unit Status (3): blank
7. Exit software
8. When "Are you sure?" box appears:
Click 'Yes'

WSGIS/IWIF IV ANTENNA TEARDOWN

NOTE

Not reqd to power off PGSC to
disconnect cable

- | | |
|------------------|---|
| Worldmap
PGSC | 1. Disconnect 14 ft data cable from RS232
serial port |
| | 2. Remove WSGIS Receiver Unit antenna from
deployed location |
| MF71G | 3. Stow WSGIS Receiver Unit antenna and connected
14 ft data cable |

IWIF DATA DOWNLOAD

A. ACTIVE IWIF UNITS [XXXX]

Downloaded?

1003

1004

1009

1010

B. LAUNCH IWIF-WIS S/W

Worldmap
PGSC

1. Close all applications
2. Double-click 'Shuttle Apps'>'IWIF-WIS'
3. Wait 30-60 sec
'IWIF-WIS Control Software 1.1'
4. When "Open COM port" window appears:
Click 'OK'

C. DOWNLOAD IWIF DATA TO PGSC

Worldmap
PGSC

'MAIN'

NOTE

Eleven units will always
display Mode "Unknown"

1. After 15 sec:
√Unit Mode (4): "Idle" (active units from part A)

Cont next page

FS 9-14

ORB OPS/121/FIN A

- * If < four units Mode: "Idle" *
- * Re-orient IV antenna or IWIF *
- * Wait 15 sec *
- * √Unit Mode (4): "Idle" *
- * If no joy: *
- * √MCC-H *

2. Select 'DOWNLOAD' tab

'DOWNLOAD'

3. Select 'Unit [XXXX]' from 'Unit ID' dropdown menu where [XXXX] equals unit from Part A
4. Click 'Request File Information'
5. Wait 20 sec
When "Operation Complete" window appears:
Click 'OK'

'Requesting File Information'

6. Click 'OK'
7. Verify all checkboxes next to unit to be downloaded are checked
8. Click 'Start Download' button

NOTE

Download time is approx. half the length of the data take but may be longer depending on RF link quality

9. When "Operation Complete" window appears:
Click 'OK'

'Downloading...'

10. Click 'OK'
11. Exit software
12. When "Are you sure?" box appears:
Click 'Yes'



This Page Intentionally Blank



MAUI ANALYSIS OF UPPER-ATMOSPHERIC
INJECTIONS (MAUI)

MAUI PROCEDURE FS 10-2 |

MAUI

FS 10-1

ORB OPS/121/FIN A

MAUI PROCEDURE

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

Deploy MAUI – RCS FIRING SEQUENCE
(Cue Card)

√Attitude MNVR in progress (if MNVR reqd)

GNC 20 DAP CONFIG

√DAP A1, B1 loaded

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)

TRAN PLS – ITEM 17 +0.7 3 EXEC

VERN ROT PLS – ITEM 26 +0.1 5 3 EXEC

Cont next page

FS 10-2

ORB OPS/121/FIN A

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 per Flight Plan

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 10-3

ORB OPS/121/FIN A

5. RCS FIRING SEQUENCE

NOTE

Use the table below or the cue card

MAUI – RCS FIRING SEQUENCE

<u>Timer</u>	<u>Jets Fired</u>	<u>CDR</u>	<u>PLT</u>
-03:00		Body rates: $+0.047 \leq \text{roll} \leq +0.087$ $-0.020 \leq \text{pitch} \leq +0.020$ $-0.020 \leq \text{yaw} \leq +0.020$ DAP: FREE DAP: A/PRI Inform PLT "GO" for jet deselections	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 CNTRL PWR – ON	
00:00	R1A, L1A	THC +X (in) (3 sec firing)	
00:15	F1L, L1L	THC +Y (right) (3 sec firing)	
00:30	F2R, R1R	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 (hard stop, hold 3 sec)	
00:48		RHC release	
00:50			DAP: VERN
01:00	R5R	RHC +yaw (pulse 10 sec)	
01:20	L5D	RHC -pitch (pulse 12 sec)	
01:40	F5R	RHC +pitch (pulse 12 sec)	
		FLT CNTRL PWR – OFF	Return to MAUI PROCEDURE, step 6, (ORB OPS FS, MAUI)

Cont next page

FS 10-4

ORB OPS/121/FIN A

6. CLEANUP
F6 √FLT CNTRL 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

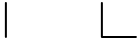
O14:E, cb DDU L (two) – op
O15:E

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



This Page Intentionally Blank





CUE CARD CONFIGURATION

CUE
CARDS



NOT FLOWN

FS 11-1

ORB OPS/121/FIN A

**CUE
CARDS**

This Page Intentionally Blank

NOT FLOWN

FS 11-2

ORB OPS/121/FIN A

TOP

HOOK
VELCRO

**FLIGHT DAY 3 DOCKING
ORBITER WITH ISS
CO2 ABSORBER REPLACEMENT**

FLIGHT DAY	POS A	POS B	CK CMLPT
LAUNCH	STS-121 1	STS-121 2	
PRE FD1	"	"	
POST FD2	STS-121 3	STS-121 4	
PRE FD2	"	STS-121 5	
POST FD3	STS-121 6	STS-121 7	
PRE FD3	STS-121 8	"	
POST FD4 (MPLM)	"	"	
PRE FD4	"	STS-121 9	
POST FD5 (EVA 1)	"	"	
PRE FD5	STS-121 10	"	
POST FD6	"	"	
PRE FD6	"	STS-121 11	
POST FD7 (EVA 2)	"	"	
PRE FD7	STS-114 32	"	
POST FD8	"	"	
PRE FD8	"	STS-114 33	
POST FD9 (EVA 3)	"	"	
PRE FD9	STS-114 34	"	
POST FD10	"	"	
PRE FD10	"	STS-114 35	
POST FD11 (MPLM)	"	"	
PRE FD11	STS-114 36	"	
POST FD12 (Undock)			
MID FD12	STS-114 37	STS-114 38*	
PRE FD12	"	STS-114 39*	
POST FD13	STS-114 40	STS-114 41	
PRE FD13	STS-114 42*		
POST FD14 (EOM)	STS-114 43	STS-114 44	
PRE FD14	"	STS-114 45	
POST FD15 (EOM+1)	STS-114 46	STS-121 19	
PRE FD15	STS-121 20	"	
POST FD16 (EOM+2)	STS-121 21	STS-121 22	
PRE FD16		STS-121 23	
POST FD17 (EOM+3)	STS-121 24	STS-121 25	

*Reseal LiOH cans w/Gray Tape and stow

(Location of canisters and LiOH Exchange plan on back)
ORB OPS-29a/nonRCRS/121/O/B

NOTE

This card is specifically used for the STS-121 mission with orbiter conducting single shift ops with crew size of 7 up/6 down. This change out scheme reflects FD3 docking with ISS and includes the energy dependent day docked operations

(reduced copy)

FAB USE ONLY

FS CC 11-3

ORB OPS/121/FIN A

TOP
BACK OF 'FLIGHT DAY 3 DOCKING
ORBITER with ISS
CO2 ABSORBER REPLACEMENT'

HOOK
VELCRO

**LiOH CANISTER STOWAGE
LOCATIONS AND LiOH EXCHANGE PLAN**

Pre-Exchange LiOH Locations

Orbiter:

MD52M (LiOH Box): STS-121 cans 1-31

MPLM:

STS-121 cans 32-41

ISS:

STS-114 cans 32-46

LiOH Exchange Plan

FD6:

A

1. MPLM: STS-121 cans 32-41 to ISS
2. LiOH Box: STS-121 cans 1-8 (used) to MPLM
3. LiOH Box: STS-121 cans 12-18 to ISS
4. ISS: STS-114 cans 32-46 to the LiOH Box

Post-Exchange LiOH Locations

Orbiter:

MD52M (LiOH Box): STS-121 cans 9-11, 19-31
STS-114 cans 32-46

MPLM:

STS-121 cans 1-8

ISS:

STS-121 cans 32-41, 12-18

ORB OPS-29b/nonRCRS/121/O/B

(reduced copy)

FAB USE ONLY

FS CC 11-4

ORB OPS/121/FIN A

TOP

HOOK
VELCRO

HOOK
VELCRO

ORBIT BURN MONITOR

OMS TEMP*	<table border="1"><tr><td></td><td>L</td><td>R</td></tr><tr><td>FU IN P ≥</td><td>225</td><td>220</td></tr><tr><td>≤</td><td>205</td><td>204</td></tr></table>		L	R	FU IN P ≥	225	220	≤	205	204	OMS ENG FAIL ----- OMS PRPLT FAIL
	L	R									
FU IN P ≥	225	220									
≤	205	204									
or No FU IN P											
OMS PC* & OMS ↓	ENG VLV 1 or 2 < 70 ----- or OX IN P > 227 OX IN P ≤ 227 or No OX IN P	OMS ENG FAIL ----- OMS PRPLT FAIL									
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 ----- SEC fail	L(R) OMS GMBL – SEC (twice) If high RCS usage: OMS ENG FAIL									
GPC	<input type="checkbox"/> (<input type="checkbox"/>) & Burning OMS aff ----- SEC GMBL lost 2 FAs lost	aff GPC PWR – OFF If SEC GMBL avail: aff MDM FF 1(4) – OFF, ON L(R) OMS GMBL – SEC (twice) If high RCS usage: OMS ENG FAIL √MAN SHUTDN									
I/O ERROR FA	1(4) ----- 2 FAs lost	L(R) OMS GMBL – SEC I/O RESET If high RCS usage: OMS ENG FAIL √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 ----- Crit burn	STOP BURN: OMS ENG(s) – OFF 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/121/O/C

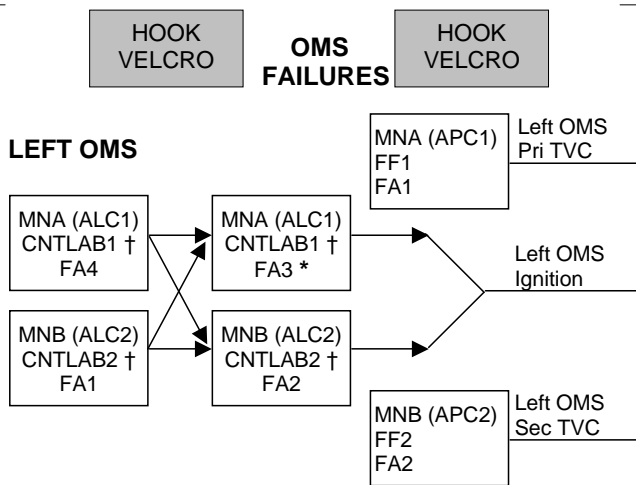
(reduced copy)

FAB USE ONLY

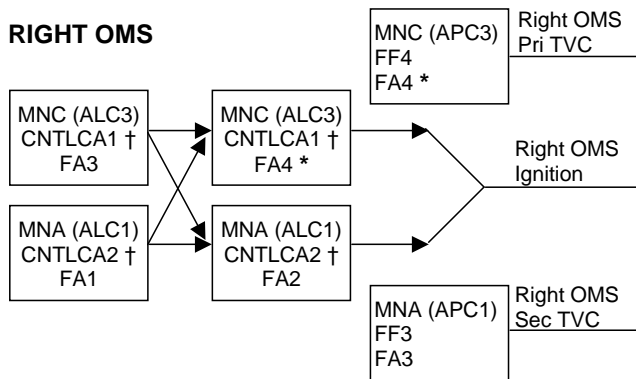
FS CC 11-5

ORB OPS/121/FIN A

TOP
BACK OF 'ORBIT BURN MONITOR'



- † 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)



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/121/O/A

FAB USE ONLY

FS CC 11-6

ORB OPS/121/FIN A

FAB USE ONLY

FS CC 11-7

ORB OPS/121/FIN A

(reduced copy)

TOP

PILE
VELCRO

ORB OPS-41a/121/O/B

PILE
VELCRO

STS-121 DAP A1 -- 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	PRE/POST DEPLOY	LOSS OF VERN (ALL)	LOSS OF VERN (TAIL ONLY)	RNDZ	TERMINAL PHASE

BOLD/ITALIC indicates change from I-Load.

HINGE

FAB USE ONLY

FS CC 11-8

ORB OPS/121/FIN A

(reduced copy)

TOP
HINGED AT BOTTOM OF
'STS-121 DAP A1 -- A8 CONFIGURATIONS'
HINGE

STS-121 DAP B1 -- 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.

HOOK
VELCRO

ORB OPS-41aa/121/O/C

HOOK
VELCRO

FAB USE ONLY

FS CC 11-9

ORB OPS/121/FIN A

(reduced copy)

TOP
BACK OF 'STS-121 DAP A1 -- A8 CONFIGURATIONS'

PILE
VELCRO

ORB OPS-41b/121/O/C

PILE
VELCRO

STS-121 DAP A9 -- A14 CONFIGURATIONS

	ITEM #	A9	A10	A11	A12	A13	A14
PRI							
ROT RATE	10 (50)	0.1300	0.0500	0.1000	0.1000	0.1000	0.2000
ATT DB	11 (51)	2.00	0.60	15.00	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	0.070	0.070	0.070	0.200
JET OPT	19 (59)	TAIL	TAIL	TAIL	TAIL	TAIL	TAIL
# JETS	20 (60)	2	2	3	3	3	1
ON TIME	21 (61)	0.08	0.08	0.08	0.08	0.08	0.08
DELAY	22 (62)	0.00	0.00	12.00	11.04	11.04	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	.050	.080	.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	1,2*	1	3	9
PURPOSE		PROX OPS/ FLYAROUND	DOCKING	AUTO REBOOST	MATED STACK & RMS OPS (VRCS)	AIL DEPRESS ATTITUDE CONTROL (VRCS)	ORBITER ALONE SRMS/OBSS
BOLD/ITALIC indicates change from I-Load. * 1 for Config 3&4, 2 for Config 1&2							

HINGE

FAB USE ONLY

FS CC 11-10

ORB OPS/121/FIN A

(reduced copy)

TOP
 BACK OF 'STS-121 DAP B1 -- B8 CONFIGURATIONS'
 HINGED AT BOTTOM OF 'STS-121 DAP A9 -- A14 CONFIGURATIONS'
 HINGE

STS-121 DAP B9 -- B13 CONFIGURATIONS

	ITEM #	B9	B10	B12	B13
PRI					
ROT RATE	30 (50)	0.1300	0.0500	0.1000	0.1000
ATT DB	31 (51)	2.00	0.60	5.00	5.00
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	0.070	0.070
JET OPT	39 (59)	TAIL	TAIL	TAIL	TAIL
# JETS	40 (60)	2	2	3	3
ON TIME	41 (61)	0.08	0.08	0.08	0.08
DELAY	42 (62)	10.00	0.00	11.04	11.04
VERN					
ROT RATE	43 (63)	0.1300	0.0500	0.1000	0.1000
ATT DB	44 (64)	1.000	0.500	3.000	3.000
RATE DB	45 (65)	.020	.020	.050	.080
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	2	4
PURPOSE		PROX OPS/ FLYAROUND	DOCKING	MATED STACK & RMS OPS (ALT)	A/L DEPRESS ATTITUDE CONTROL (ALT)

BOLD/ITALIC indicates change from I-Load.

HOOK
VELCRO

ORB OPS-41bb/121/O/D

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 deselections	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 CNTRL PWR – ON	
00:00	R1A, L1A	THC +X (in) (3 sec firing)	
00:15	F1L, L1L	THC +Y (right) (3 sec firing)	
00:30	F2R, R1R	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 (hard stop, hold 3 sec)	
00:48		RHC release	
00:50			DAP: VERN
01:00	R5R	RHC +yaw (pulse 10 sec)	
01:20	L5D	RHC -pitch (pulse 12 sec)	
01:40	F5R	RHC +pitch (pulse 12 sec)	
		FLT CNTRL PWR – OFF	Return to MAUI PROCEDURE, step 6, (ORB OPS FS, MAUI)

ORB OPS-42a/121/O/A

(reduced copy)

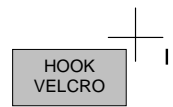
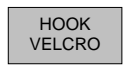
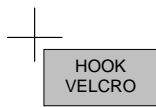
FAB USE ONLY

FS CC 11-11

ORB OPS/121/FIN A



TOP
BACK OF 'MAUI - RCS FIRING SEQUENCE'



ORB OPS-42b/121/O/A



FAB USE ONLY

(reduced copy)
FS CC 11-12

ORB OPS/121/FIN A

Space Shuttle Program
FLIGHT DATA FILE

JSC-48036-121
FINAL, REV A



ORBIT OPS CHECKLIST

STS
121

Flight Cover (trim bottom to expose tabs)