

Entry Checklist

STS-123 Flight Supplement

**Mission Operations Directorate
Flight Design and Dynamics Division**

**Final
November 20, 2007**

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

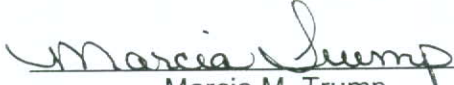


MISSION OPERATIONS DIRECTORATE

**ENTRY CHECKLIST
STS-123 FLIGHT SUPPLEMENT**

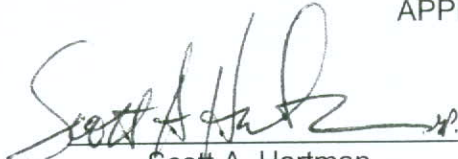
FINAL
November 20, 2007

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

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Incorporates the following:
482#: NONE – Establishes baseline

AREAS OF TECHNICAL RESPONSIBILITY

Book Manager	DM43/M. Trump	281-483-8029
Deorbit Burn to Entry Interface	DM43/G. Pogue	281-483-8067
Contingency Procedures and Entry Interface thru Rollout	DM43/G. Pogue	281-483-8067

NOTE

This Flight Supplement must be integrated into the generic Entry Checklist to have a complete document for flight. Insert the Flight Supplement (FS) pages in the proper numerical order in the generic Entry Checklist by using the List of Effective Pages (LOEP) which provides the sequence for merging pages to create a complete Entry Checklist.

ENTRY CHECKLIST
STS-123 FLIGHT SUPPLEMENT

LIST OF EFFECTIVE PAGES

FINAL 11/20/07

Sign Off	* generic	3-9	generic
ii	* generic	3-10	generic
Sign Off	* 123/FIN	3-11	generic
FS iv	* 123/FIN	3-12	generic
v	* generic	3-13	generic
vi	* generic	3-14	generic
vii	* generic	FS 3-15	123/FIN
viii	* generic	FS 3-16	123/FIN
ix	* generic	FS 3-17	123/FIN
x	* generic	FS 3-18	123/FIN
FS xi	* 123/FIN	3-19	generic
FS xii	* 123/FIN	3-20	generic
FS xiii	* 123/FIN	3-21	generic
FS xiv	* 123/FIN	3-22	generic
xv	generic	3-23	generic
xvi	generic	3-24	generic
1-1 (3 pgs)	† generic	3-25	generic
1-2 (3 pgs)	† generic	3-26	generic
2-1	generic	3-27	generic
2-2 (6 pgs)	† generic	3-28	generic
2-3 (6 pgs)	† generic	FS 3-29	123/FIN
2-4	generic	FS 3-30	123/FIN
FS 2-5	123/FIN	3-31	generic
FS 2-6	123/FIN	3-32	generic
FS 3-1	123/FIN	FS 3-33	123/FIN
FS 3-2	123/FIN	FS 3-34	123/FIN
FS 3-3	123/FIN	3-35	generic
FS 3-4	123/FIN	3-36	generic
3-5	generic	3-37	generic
3-6	generic	3-38	generic
FS 3-7	123/FIN	3-39	generic
FS 3-8	123/FIN	3-40	generic

* – Omit from flight book

† – Extra pages in crew copy only

3-41.....	generic	5-23.....	generic
3-42.....	generic	5-24.....	generic
3-43.....	generic	6-1.....	generic
3-44.....	generic	6-2.....	generic
4-1.....	generic	6-3.....	generic
4-2.....	generic	6-4.....	generic
4-3.....	generic	7-1.....*	generic
4-4.....	generic	7-2.....*	generic
FS 4-5.....	123/FIN	FS 8-1.....*	123/FIN
FS 4-6.....	123/FIN	FS CC 8-2.....*	123/FIN
FS 4-7.....	123/FIN	FS CC 8-3.....*	123/FIN
FS 4-8.....	123/FIN	FS CC 8-4.....*	123/FIN
FS 4-9.....	123/FIN	CC 8-5.....*	generic
FS 4-10.....	123/FIN	CC 8-6.....*	generic
4-11.....	generic	CC 8-7.....*	generic
4-12.....	generic	CC 8-8.....*	generic
5-1.....	generic	CC 8-9.....*	generic
5-2.....	generic	CC 8-10.....*	generic
5-3.....	generic	CC 8-11.....*	generic
5-4.....	generic	CC 8-12.....*	generic
5-5.....	generic	CC 8-13.....*	generic
5-6.....	generic	CC 8-14.....*	generic
5-7.....	generic	CC 8-15.....*	generic
5-8.....	generic	CC 8-16.....*	generic
5-9.....	generic	FS CC 8-17.....*	123/FIN
5-10.....	generic	FS CC 8-18.....*	123/FIN
5-11.....	generic	CC 8-19.....*	generic
5-12.....	generic	8-20.....*	generic
5-13.....	generic	CC 8-21.....*	generic
5-14.....	generic	CC 8-22.....*	generic
5-15.....	generic	FS CC 8-23.....*	123/FIN
5-16.....	generic	FS CC 8-24.....*	123/FIN
5-17.....	generic		
5-18.....	generic		
FS 5-19.....	123/FIN		
FS 5-20.....	123/FIN		
5-21.....	generic		
5-22.....	generic		

* – Omit from flight book

ENTRY CUE CARDS

<u>Title</u>	<u>Ref. Page</u>	<u>Card No.</u>
DEORBIT BURN FLIGHT		
RULES (Front).....	FS CC 8-2	ENT-1a/123/D/A
(Back).....	FS CC 8-3	ENT-1b/123/D/A
DEORBIT BURN (RCS)		
(Front)	FS CC 8-4	ENT-3a/D/L
(Back).....	CC 8-6	generic
DEORBIT BURN (2 ENG)		
(Front)	CC 8-8	generic
DEORBIT BURN (1 ENG)		
(Back).....	CC 8-10	generic
UNBALANCED PRPLT		
DEORBIT BURN		
(Front)	CC 8-12	generic
DEORBIT BURN (MIXED		
XFEED) (Back).....	CC 8-14	generic
ENTRY MANEUVERS		
(Front)	CC 8-16	generic
(Back).....	FS CC 8-17	ENT-6b/123/E/A
ENTRY NO-GO CHECKLIST		
(Front)	FS CC 8-18	ENT-7a/E/K
EMERGENCY EGRESS		
(Back).....	CC 8-19	generic
ENTRY CONTROL		
(Front)	CC 8-21	generic
(Back).....	CC 8-22	generic
DEORBIT BURN MONITOR		
(Front)	FS CC 8-23	ENT-2a/123/A,O,D,E/A
OMS FAILURES (Back)....	FS CC 8-24	ENT-2b/123/A,O,D,E/A



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OMS/
RCS ΔV

OMS/RCS ΔV

FS 2-5

ENT/123/FIN



OMS He PRESS/ Δ V/BURN TIME

**OMS/
RCS Δ V**

OMS% GAGE	OMS He Press *	OMS Δ V	RCS Δ V	RCS BURN MIN:SEC
50	3210	272	227	7:20
40	2810	213	178	5:44
38	2730	201	168	5:25
36	2650	189	158	5:06
34	2570	177	149	4:47
32	2490	165	139	4:28
30	2410	154	129	4:09
28	2330	142	119	3:49
26	2250	130	109	3:30
24	2170	118	99	3:11
22	2090	106	89	2:52
20	2010	94	79	2:33
18	1930	82	69	2:14
16	1850	70	59	1:54
14	1770	58	49	1:34
12	1690	45	39	1:15
10	1610	33	28	0:55
8	1530	21	18	0:35
6	1450	9	8	0:16
5	1410	3	3	0:06

* He pressure not valid until 1 hr after last burn

ΔV CAPABILITY	
ARCS Δ V fps =	$\boxed{0.8} \times [L\% + R\% - \text{AFT QTY } 1]$
FRCS Δ V fps =	$\boxed{0.9} \times \text{FRCS } \%$
OMS Δ V fps =	$\boxed{5.9} \times \text{OMS } \%$

NOTE: Uses assumed vehicle weight of 220,596 lb



DEORBIT BURN

DEORBIT
BURN



FS 3-1

ENT/123/FIN

**STS-123 LANDING SITE TABLE
(50° to 63.5° INCLINATION)**

**DEORBIT
BURN**

S I T E	LOCATION	RWY	MLS CH	LG	+ OVR RUN
1	KSC	KSC 15 KSC 33	8 6	15000 15000	1000 1000
2	BEN GUERIR	BEN 36 BEN 18	- -	13720 13220	0 1000
3	MORON AB	MRN 20 MRN 02	◆6 -	11730 11730	1000 1000
4	ZARAGOZA	ZZA 30L ZZA 12R	◆6 -	12200 12200	1000 1010
5	MYRTLE BEACH	MYR 36 MYR 18	- -	9500 9500	1000 1000
6	WILMINGTON	ILM 06 ILM 24	- -	7500 7500	0 0
7	CHERRY POINT	NKT 32L NKT 23R	- -	7110 7100	800 880
8	OCEANA NAS	NTU 32R NTU 23L	- -	7500 11500	0 0
9	WALLOPS	WAL 28 WAL 04	- -	7510 8750	0 0
10	DOVER AFB	DOV 32 DOV 19	- -	12400 9100	0 0
11	ATLANTIC CITY	ACY 31 ACY 13	- -	9500 9500	0 0
12	BEN GUERIR	BEN 36 BEN 18	- -	13720 13220	0 1000
13	*MORON AB	MRN 20 MRN 02	◆6 -	11730 11730	1000 1000
14	*ZARAGOZA	ZZA 30L ZZA 12R	◆6 -	12200 12200	1000 1010
15	GABRESKI	FOK 06 FOK 24	- -	8500 8500	1000 1000

◆ Available for TAL Only

* LO XRNG TAL Site **Length** after displaced threshold

**STS-123 LANDING SITE TABLE
(50° to 63.5° INCLINATION)**

S I T E	LOCATION	RWY	MLS CH	LG	+ OVR RUN
16	OTIS ANGB	FMH 32 FMH 23	- -	9000 7500	0 0
17	PEASE INT'L	PSM 34 PSM 16	- -	10020 10020	0 0
18	HALIFAX INT'L	YHZ 23 YHZ 32	- -	8800 7700	0 0
19	STEPHENVILLE	YJT 09 YJT 27	- -	9500 9500	0 0
20	ST JOHNS INT'L	YYT 29 YYT 11	- -	8500 8500	0 0
21	GANDER INT'L	YQX 21 YQX 31	- -	9700 8900	0 0
22	GOOSE BAY	YYR 26 YYR 34	- -	10550 9080	0 0
23	LAJES	LAJ 15 LAJ 33	- -	10870 10870	970 990
24	BEJA	BEJ 01L BEJ 19R	- -	10820 10820	0 900
25	KEFLAVIK	IKF 20 IKF 29	- -	9520 9560	0 0
26	SHANNON	INN 06 INN 24	- -	9540 9540	0 0
27	FAIRFORD	FFA 27 FFA 09	- -	9490 9490	990 970
28	KOLN-BONN	KBO 14L KBO 32R	- -	12020 12020	0 0
29	ISTRES AB	FMI 33 FMI 15	◆6 -	11300 12300	3960 0
30	ESENBOGA	ESN 03R ESN 21L	- -	11800 11800	0 0

◆ Available for TAL Only

Length after displaced threshold

**STS-123 LANDING SITE TABLE
(50° to 63.5° INCLINATION)**

S I T E	LOCATION	RWY	MLS CH	LG	+ OVR RUN
31	KING KHALID	KKI 15R	-	13300	0
		KKI 33L	-	13300	0
32	DIEGO GARCIA	JDG 31	-	12000	950
		JDG 13	-	12000	950
33	AMBERLEY TINDAL RAAF	AMB 15	-	9500	0
		PTN 14	-	8500	0
34	YOKOTA AB	JTY 36	-	11000	1000
		JTY 18	-	11000	1000
35	ANDERSEN AFB	GUA 06L	-	10560	1050
		GUA 24R	-	10560	1000
36	WAKE ISLAND	WAK 28	-	9360	0
		WAK 10	-	9360	0
37	HONOLULU	HNL 08R	-	11500	0
		HNL 26L	-	11500	0
38	ELMENDORF	EDF 24	-	9500	0
		EDF 06	-	9500	0
39	HAO ATOLL	HAO 12	-	10390	0
		HAO 30	-	10390	0
40	EDW TEMP	EDT 22R	8	12000	1000
		EDT 04L	6	12000	1000
41	ASCENSION	HAW 13	-	9520	0
		HAW 31	-	9520	0
42	NORTHROP	NOR 17	6	15000	Lkbd
		NOR 23	6	15000	Lkbd
43	NORTHROP	NOR 05	-	15000	Lkbd
		NOR 35	-	15000	Lkbd
44	EDWARDS AFB	EDW 15	-	16300	Lkbd
		EDW 18L	-	15000	Lkbd
45	EDWARDS AFB	EDW 22	8/†	15010	0
		EDW 04	6	14010	1800

† MSBLS Jr. Ch 8 - Requires Uplink

Length after displaced threshold

1: GNC DEORB MNVR COAST	2: GNC 50 HORIZ SIT
3: BFS, GNC 50 HORIZ SIT	

HORIZ SIT CONFIG

ALTM – ITEM 9 +

		.		
--	--	---	--	--

	<u>PASS ITEM</u>		<u>BFS ITEM</u>	
PTI	INH	√1		
LAND SITE (DEL PAD)		√41		√41
RWY (DEL PAD)		√3		√3
		√4		√4
TAEM TGT				
G&N	OVHD	√6	blank	
HSI	blank		blank	
XEP	NEP	√7	NEP	√7
AIM (DEL PAD)	NOM	√8	NOM	√8
	(or CLSE)		or (CLSE)	
SPDBK	NOM	√39		
NAV				
GPS	INH	√43	INH	√43
DRAG H	AUT	√22	AUT	√22
ADTA H	INH	√26	INH	√26
MLS	AUT	√50		
G&C				
GPS	INH	√48		
ADTA	INH	√29	AUT	√28

- * If BFS engaged: *
- * Set BFS HSD ITEMS to PASS config *

G51 SEL ATMOSPHERE:
 incl ≤ 50° ITEM 22 EXEC
 incl > 50° SEL ITEM NR (table)

Hemi	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
N Desc	23	23	23	23	22	24	24	24	22	23	23	23
S Asc	24	24	22	23	23	23	23	23	23	23	22	24
N Asc	22											
S Desc												

1: GNC DEORB MNVR COAST | 2: GNC 50 HORIZ SIT

3: GNC 51 OVERRIDE

- √ELEVON AUTO – ITEM 17 (*)
- √SSME REPOS – ITEM 19 (ENA)
- √WRAP MODE – ITEM 45 (ENA)
- If PLB holding > 10K lb:
 - FILTER ALT – ITEM 21 EXEC (*)

3: BFS, GNC 51 OVERRIDE

- √ELEVON AUTO – ITEM 17 (*)
- √SSME REPOS – ITEM 19 (ENA)
- √WRAP MODE – ITEM 45 (ENA)
- If PLB holding > 10K lb:
 - √FILTER ALT – ITEM 21 (*)

- * DES any failed/comm faulted *
- * IMU, RGA, AA, or SURF feedback *

2: GNC DEORB MNVR COAST

3: BFS, GNC DEORB MNVR COAST

- √BFS GMBL sel config same as PASS GMBL sel config



DEORBIT BURN CARDS

**BURN
CARDS**

MS ONLY

FS 3-15

ENT/123/FIN



DEORBIT BURN FLIGHT RULES
ONE-ORBIT LATE AVAILABLE ENT-1a/123/D/A

**BURN
CARDS**

FAILURE	PRE TIG		POST TIG
	Delay (max)		Stop Burn, > Safe HP
	One Orbit	One Day	
APU/HYD			
1 No APU operating .....	... X ...	.....
DPS			
2 RDNT fail, Split.....	.....	...X...	.....X
3 1 GPC.....	... X ...	.....
4 BFS .....	.....	...X...	
5 GPC BITE (Multiple GPCs) .....	.....	...X...	
ECLS			
6 2 Av Bay Fans in Bay 3.....	... X ...	.....
7 2 Av Bay Fans in Bay 1 or 2.....	.....	...X...	
ELEC			
8 H2 Manf or TK leak (not in depleted tk(s) _____).....	... X ...	.....
9 2 MN Buses.....	.....	...X...	.....X
10 CNTL CA1 (No BFS Engage in GPC 3/5).....	.....	...X...	
11 Multi Φ AC BUS (unshorted) .....	... X ...	.....
GNC			
12 1 MLS (if reqd), IMU, or GPS (C-band not avail).....	... X ...	.....
13 IMU Dilemma.....	.....	...X...	.....X
14 RHC Dilemma .....	... X ...	.....
15 2 IMUs (Not targeting EDW/NOR) .....	.....	...X...	
16 2 ADTAs (Winds > 80kts or Dynamic Wx)....	... X ...	.....
HOOK VELCRO			HOOK VELCRO
17 2 FCS Channels (same surface) (Not targeting NOR/EDW) .....	... X ...	.....
18 2 AAs, RGAs (Not targeting EDW/NOR) .....	... X ...	.....
OMS			
19 Prplt Tank .....	... X ...	.....	.....X ①
20 Ignition (neither eng ignites).....	... X ...	.....
21 Both OMS Eng fail.....	.....	.....	.....X ②
22 Prplt Lk after LAST LOS.....	perigee adjust		
AFT RCS			
23 2 jets, same direction, same pod .....	... X ...	.....
24 Prplt Lk after LAST LOS.....	... X ...	.....
25 1 AFT RCS PROP TK fail .....	... X ...	.....
COMM			
26 MCC GO for DEORBIT not rcvd .....	.....	...X...	

① Stop Burn > OMS PRPLT FAIL HP (Ref: DEL PAD/BURN Card)
 ② Stop Burn > OMS ENG FAIL HP (Ref: DEL PAD/BURN Card)

DEORBIT BURN FLIGHT RULES
ONE-ORBIT LATE NOT AVAILABLE ENT-1b/123/D/A

FAILURE	PRE TIG	POST TIG
	Delay (max)	Stop Burn, > Safe HP
	One Day	
APU/HYD		
1 No APU operating .....	..... X	
DPS		
2 RDNT fail, Split.....	..... X .....	.....X
3 1 GPC.....	..... X	
4 BFS .....	..... X	
5 GPC BITE (Multiple GPCs) .....	..... X	
ECLS		
6 2 Av Bay Fans in Bay 3.....	..... X	
7 2 Av Bay Fans in Bay 1 or 2.....	..... X	
ELEC		
8 H2 Manf or TK leak (not in depleted tk(s) .....	..... X	
9 2 MN Buses.....	..... X .....	.....X
10 CNTL CA1 (No BFS Engage in GPC 3/5).....	..... X	
11 Multi Φ AC BUS (unshorted) .....	..... X	
GNC		
12 1 MLS (if reqd), IMU, or GPS (C-band not avail) .....	..... X	
13 IMU Dilemma.....	..... X .....	.....X
14 RHC Dilemma .....	..... X	
15 2 IMUs (Not targeting EDW/NOR) .....	..... X	
16 2 ADTAs (Winds > 80kts or Dynamic Wx) .....	..... X	
HOOK VELCRO		HOOK VELCRO
17 2 FCS Channels (same surface) (Not targeting NOR/EDW) .....	..... X	
18 2 AAs, RGAs (Not targeting EDW/NOR) .....	..... X	
OMS		
19 Prplt Tank.....	..... X .....	.....X ①
20 Ignition (neither eng ignites).....	..... X .....	.....X ②
21 Both OMS Eng fail.....	..... X .....	.....X ②
22 Prplt Lk after LAST LOS.....	perigee adjust	
AFT RCS		
23 2 jets, same direction, same pod .....	..... X	
24 Prplt Lk after LAST LOS.....	..... X	
25 1 AFT RCS PROP TK fail .....	..... X	
COMM		
26 MCC GO for DEORBIT not rcvd .....	..... X	

① Stop Burn > OMS PRPLT FAIL HP (Ref: DEL PAD/BURN Card)
 ② Stop Burn > OMS ENG FAIL HP (Ref: DEL PAD/BURN Card)

DEORBIT BURN MONITOR

OMS TEMP* FU IN P \geq <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; text-align: center;">L</td> <td style="width: 20px; text-align: center;">R</td> </tr> <tr> <td style="text-align: center;">219</td> <td style="text-align: center;">220</td> </tr> <tr> <td style="text-align: center;">\leq</td> <td style="text-align: center;">208</td> </tr> </table> or No FU IN P	L	R	219	220	\leq	208	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; text-align: center;">L</td> <td style="width: 20px; text-align: center;">R</td> </tr> <tr> <td style="text-align: center;">219</td> <td style="text-align: center;">220</td> </tr> <tr> <td style="text-align: center;">\leq</td> <td style="text-align: center;">208</td> </tr> </table>	L	R	219	220	\leq	208	OMS ENG FAIL ----- OMS PRPLT FAIL -----
L	R													
219	220													
\leq	208													
L	R													
219	220													
\leq	208													
OMS PC* & OMS ↓ (BFS: $\sqrt{\text{accel}}$) ENG VLV 1 or 2 < 70 or OX IN P > 227 ----- OX IN P \leq 227 or No OX IN P		OMS ENG FAIL ----- OMS PRPLT FAIL -----												
OMS OX/FU TK P ($\sqrt{\text{ENG IN P}}$) OX/FU LOW ----- OX & FU HIGH		He PRESS/VAP ISOL (two) – OP If aff TK P not incr: He PRESS/VAP ISOL (two) – CL At PC < 72 or OMS TEMP: OMS PRPLT FAIL ----- He PRESS/VAP ISOL (two) – CL Cycle He A(B) to maintain TK P 234-284 -----												
OMS GMBL PRI fail ----- SEC fail		L(R) OMS GMBL – SEC (twice) ----- If high RCS usage: OMS ENG FAIL -----												
GPC 1(4) & 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 ----- $\sqrt{\text{MAN SHUTDN}}$ -----												
I/O ERROR FA 1(4) ----- 2 FAs lost		L(R) OMS GMBL – SEC ----- I/O RESET (if recov: BFS I/O RESET) If high RCS usage: OMS ENG FAIL ----- $\sqrt{\text{MAN SHUTDN}}$ -----												
BCE STRG D ----- 1(4)		I/O RESET (if recov: >>) ----- If high RCS usage: L(R) OMS GMBL – SEC (twice) -----												
RM DLMA IMU or GPC SET SPLIT or 2 MN BUSES	ABOVE SAFE HP \Rightarrow <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="width: 20px; height: 15px;"></td> <td style="width: 20px; height: 15px;"></td> </tr> </table> ----- BELOW SAFE HP \Rightarrow			STOP BURN: OMS ENG(s) – OFF >> ----- IMU DLMA: After C/O: $\sqrt{\text{timer}}$ G21 If any IMU ACC > 0.03: aff IMU – desel I'cnct OMS to RCS ($\sqrt{\text{RCS Burn Time}}$) THC +X to TGT HP (EOM) or 3.5 x timer at C/O (AOA) SET SPLIT: Go to "GPC" above -----										
I/O ERROR PCM		OI PCMMU PWR – 2(1) -----												

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

ENT-2a/123/A,O,D,E/A

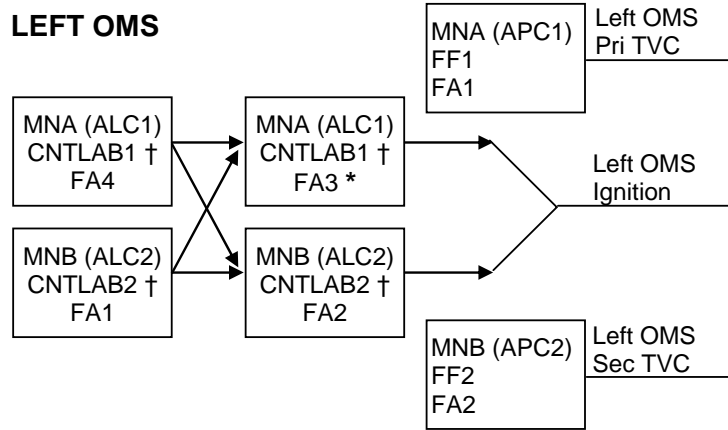
MS ONLY

FS 3-29

ENT/123/FIN

OMS FAILURES

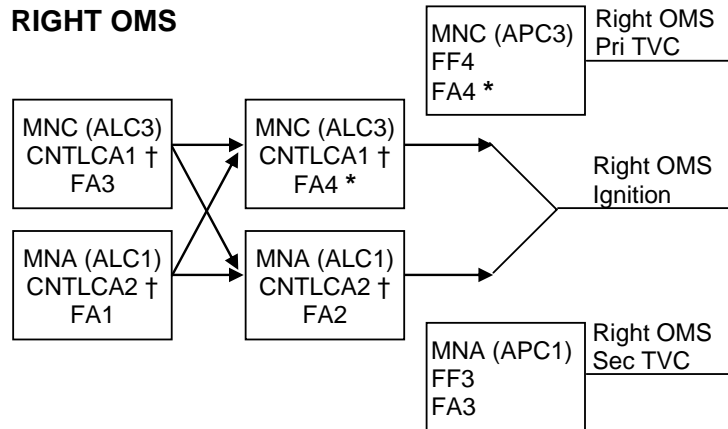
LEFT OMS



† 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) P_C 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

ENT-2b/123/A,O,D,E/A

MS ONLY

FS 3-30

ENT/123/FIN

1: GNC DEORB MNVR EXEC	2: GNC DEORB MNVR EXEC
3: BFS, GNC SYS SUMM 2	

- * **UNDERBURN** *
- * Determine Δ HP (CUR HP – TGT HP) *
- * Record prebank on ENTRY MANEUVERS Cue Card *

* **PREBANK TABLE EDW (HA = 187 NM)** *

EDW										
Δ HP	0	4	8	12	REDES.	13	14	(15)	REDES.	
PREBANK	0	85	105	130	NOR ELS	140	155	175	YR	
NOR					IF NOR NOGO					
G50 ITEM 41 +4 2, \sqrt RWY 17										
Δ HP		10	11	13	14	15	17	(19)	REDES.	
PREBANK		100	105	115	125	130	150	180	YR	
YR										
G50 ITEM 41 +2 2, \sqrt RWY 26										
Δ HP					16	18	20	23	(26)	28
PREBANK					75	85	95	115	145	180

* **PREBANK TABLE KSC (HA = 187 NM)** *

KSC										
Δ HP	0	3	5	7	9	11	13	(15)	REDES.	
PREBANK	0	65	90	100	110	120	140	170	YQX	
YQX										
G50 ITEM 41 +2 1, \sqrt RWY 21										
Δ HP							16	22	(25)	RED.
PREBANK							95	135	170	INN
INN										
G50 ITEM 41 +2 6, \sqrt RWY 06										
Δ HP									26	28
PREBANK									135	180

123 OCF

1: GNC DEORB MNVR EXEC	2: GNC DEORB MNVR EXEC
3: BFS, GNC SYS SUMM 2	

C CRT1 **GNC, OPS 303 PRO**

1: GNC DEORB MNVR COAST	2: GNC DEORB MNVR COAST
-------------------------	-------------------------

C CRT1 √Uplinked INRTL EI-5 MM303 ATT with DEL PAD

- * If no deorbit TGT uplink, enter INRTL EI-5 *
- * MM303 ATT from DEL PAD *
- * R – ITEM 24 + _____ *
- * P – ITEM 25 + _____ *
- * Y – ITEM 26 + _____ *

Mnvr to EI-5 ATT – ITEM 27 EXEC (*)	TIME to EI (min)	LVLH PITCH (deg)
	20	339
		343
		347
* If UNDERBURN or no *		351
* DEL PAD, manually *		355
* mnvr to LVLH R 001, *	15	359
* Y 358, P per table *		3
		7
		11
		15
	10	19
		23
		27
		31
		35
	5	39

C **OMS GMBL PWRDN (PASS ONLY)**

CRT1 Verify GMBL positions:

	<u>L</u>	<u>R</u>
P	+5.9	+5.9
Y	+6.4	-6.4

GMBL OFF – ITEM 32 EXEC
 – ITEM 33 EXEC

FLIGHT CONDITIONS	MANEUVER			
V = 7K	G50 √GPS, INCORPORATE * If ELS: UHF MODE – G T/R *			
V = 5K	ADTA PROBES – DEPLOY (√HEAT) Begin AIL and RUD trim monitoring			
M = 3.5	If previous OMS OX TK, He TK, or RCS OX TK leak: G51 VENT DOOR CNTL OPEN – ITEM 43 EXEC			
M = 2.7	√APUs HUD PWR (two) – ON			
* If M < 2.5; P CSS for ADTA to G&C incorp *				
M = 2.0	Ensure ADTA to G&C else √Theta limits			
M < 1.0	√R FLT CNTLR – ON P,R/Y – CSS as reqd √SPDBK CMD vs POS √NWS – 1 Lock Inertia Reels MAX Nz <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 15px;"></td><td style="width: 20px; height: 15px;"></td><td style="width: 20px; height: 15px;"></td></tr></table>			
M = 0.7	√LG EXTD ISO VLV – OP			
h = 15K	√MLS			
h = 10K	√A/L (KSC – Tabs, Visors, Suit O2)			
h = 2K	LDG GEAR ARM pb – push (ARM It on)			
h = 300	LDG GEAR DN pb – push (DN It on)			
MAIN GEAR TD	√SPDBK – 100%			
V = 195 KEAS	DRAG CHUTE ARM, DPY pb (two) – push (simo) (All Its on)			
V = 185 KEAS	DEROTATE			
NOSE GEAR TD	SRB SEP – MAN/AUTO and depress pb √Auto Load Relief √HYD BK ISOL VLV (three) – OP			
MIDFIELD and V < 140 KGS	BRAKE as required (8-10 fps ² , -0.25 to -0.3G)			
* If 5K' remaining and V > 140 KGS – MAX BRAKING *				
V = 60 KGS	DRAG CHUTE JETT pb – push (JETT1,JETT2 It on)			
V = 40 KGS	BRAKE < 6 fps ² (-0.2G) (Antiskid cutout)			
WHEEL STOP	Go to ENT C/L, <u>POST LANDING PROCEDURES</u>			

ENT-6b/123/E/A
(Partial)

MS ONLY

FS 4-5

ENT/123/FIN



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MS ONLY

FS 4-6

ENT/123/FIN



DRAG CHUTE DEPLOY

MCC Call	Flight Condition
Early	Main Gear TD
NOMINAL	195 KEAS
Late	Post-Nose Gear TD Xwind DTO
Emergency Only	No Deploy Except CDR call
NO DEPLOY prior to MGTD > 230 KEAS < 80 KGS Xwind > 15 kts	

FAILED TIRE TECHNIQUE

Post-MGTD	P – AUTO
185 KEAS	Deploy drag chute
180 KEAS	√Auto derotation
NGTD	Max RHC roll away from failed tire

50K	/
38K	/
28K	/
20K	/
12K	/
7K	/
3K	/
1K	/
SURF	/

ENT-6b/123/E/A
(Partial)

ENTRY
MISC

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MS ONLY

FS 4-8

ENT/123/FIN

ENTRY ALPHA

VR	α ref	R	H	Href	Rref
25	HI 40 LO 4430	400			
24	HI 40 LO 2614	248	-46	L79	
23	43 40 37 2144	240	-64	69	
22	43 40 37 1792	233	-83	63	
21	43 40 37 1509	227	-106	60	
20	43 40 37 1292	220	-123	59	
19	43 40 37 1117	213	-146	59	
18	43 40 37 974	208	-169		R60
17	43 40 37 861	200	-187		62
16	43 40 37 768	193	-196		64

KSC 15

MAX L/D	
M	α
3	17
2	15
1	12

(123 OCF CY)

HOOK
VELCRO

ASC-14b/123/A,E/A

HOOK
VELCRO

HOOK
VELCRO

15	43 40 37 686	187	-118		64
14	43 40 37 613	183	-127		62
13	43 40 37 545	179	-136		60
12	43 40 37 483	174	-152		58
11	42 39 36 426	168	-194		57
10	41 38 35 376	164	-173	L50	
9	39 36 33 325	158	-208	44	
8	37 34 31 279	151	-238	40	
7	33 30 27 230	141	-266	39	
6	30 27 24 183	129	-272	40	
5	26 23 20 142	116	-274	40	
4	23 20 18 106	104	-263		R41
3	19 16 15 74	90	-248		38
2.5	14	60	82	-252	
2	14	50	77	-261	
1.5	10	39	68	-313	
1	8	27	52	-267	

HOOK VELCRO

MS ONLY

FS 4-9

ENT/123/FIN



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MS ONLY

FS 4-10

ENT/123/FIN



1:	2:
3:	

POST LANDING PAYLOAD ACTIVITIES

N/A



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CUE CARD
CONFIG

ENTRY CUE CARD CONFIG

FAB USE ONLY

FS 8-1

ENT/123/FIN

DEORBIT BURN FLIGHT RULES
ONE-ORBIT LATE AVAILABLE ENT-1a/123/D/A

FAILURE	PRE TIG		POST TIG
	Delay (max)		Stop Burn, > Safe HP
	One Orbit	One Day	
APU/HYD			
1 No APU operating .....	... X ...	.....
DPS			
2 RDNT fail, Split.....	.....	...X...	.....X
3 1 GPC.....	... X ...	.....
4 BFS .....	.....	...X...	
5 GPC BITE (Multiple GPCs).....	.....	...X...	
ECLS			
6 2 Av Bay Fans in Bay 3.....	... X ...	.....
7 2 Av Bay Fans in Bay 1 or 2.....	.....	...X...	
ELEC			
8 H2 Manf or TK leak (not in depleted tk(s)).....	... X ...	.....
9 2 MN Buses.....	.....	...X...	.....X
10 CNTL CA1 (No BFS Engage in GPC 3/5).....	.....	...X...	
11 Multi Φ AC BUS (unshorted) .....	... X ...	.....
GNC			
12 1 MLS (if reqd), IMU, or GPS (C-band not avail).....	... X ...	.....
13 IMU Dilemma.....	.....	...X...	.....X
14 RHC Dilemma .....	... X ...	.....
15 2 IMUs (Not targeting EDW/NOR) .....	.....	...X...	
16 2 ADTAs (Winds > 80kts or Dynamic Wx)....	... X ...	.....
HOOK VELCRO			HOOK VELCRO
17 2 FCS Channels (same surface) (Not targeting NOR/EDW) .....	... X ...	.....
18 2 AAs, RGAs (Not targeting EDW/NOR) .....	... X ...	.....
OMS			
19 Prplt Tank.....	... X ...	.....	.....X ①
20 Ignition (neither eng ignites).....	... X ...	.....
21 Both OMS Eng fail.....	.....	.....	.....X ②
22 Prplt Lk after LAST LOS.....	perigee adjust		
AFT RCS			
23 2 jets, same direction, same pod .....	... X ...	.....
24 Prplt Lk after LAST LOS.....	... X ...	.....
25 1 AFT RCS PROP TK fail .....	... X ...	.....
COMM			
26 MCC GO for DEORBIT not rcvd .....	.....	...X...	

① Stop Burn > OMS PRPLT FAIL HP (Ref: DEL PAD/BURN Card)

② Stop Burn > OMS ENG FAIL HP (Ref: DEL PAD/BURN Card)

(reduced copy)

TOP
BACK OF 'DEORBIT BURN FLIGHT RULES'

DEORBIT BURN FLIGHT RULES
ONE-ORBIT LATE NOT AVAILABLE ENT-1b/123/D/A

FAILURE	PRE TIG	POST TIG
	Delay (max)	Stop Burn, > Safe HP
	One Day	
APU/HYD		
1 No APU operating .....	..... X	
DPS		
2 RDNT fail, Split.....	..... X .....	.....X
3 1 GPC.....	..... X	
4 BFS .....	..... X	
5 GPC BITE (Multiple GPCs).....	..... X	
ECLS		
6 2 Av Bay Fans in Bay 3.....	..... X	
7 2 Av Bay Fans in Bay 1 or 2.....	..... X	
ELEC		
8 H2 Manf or TK leak (not in depleted tk(s).....)	..... X	
9 2 MN Buses.....	..... X .....	.....X
10 CNTL CA1 (No BFS Engage in GPC 3/5).....	..... X	
11 Multi Φ AC BUS (unshorted) .....	..... X	
GNC		
12 1 MLS (if reqd), IMU, or GPS (C-band not avail) .....	..... X	
13 IMU Dilemma.....	..... X .....	.....X
14 RHC Dilemma .....	..... X	
15 2 IMUs (Not targeting EDW/NOR) .....	..... X	
16 2 ADTAs (Winds > 80kts or Dynamic Wx) .....	..... X	
HOOK VELCRO		HOOK VELCRO
17 2 FCS Channels (same surface) (Not targeting NOR/EDW) .....	..... X	
18 2 AAs, RGAs (Not targeting EDW/NOR) .....	..... X	
OMS		
19 Prplt Tank.....	..... X .....	.....X ①
20 Ignition (neither eng ignites).....	..... X .....	.....X ②
21 Both OMS Eng fail.....	..... X .....	.....X ②
22 Prplt Lk after LAST LOS.....	perigee adjust	
AFT RCS		
23 2 jets, same direction, same pod .....	..... X	
24 Prplt Lk after LAST LOS.....	..... X	
25 1 AFT RCS PROP TK fail .....	..... X	
COMM		
26 MCC GO for DEORBIT not rcvd .....	..... X	

① Stop Burn > OMS PRPLT FAIL HP (Ref: DEL PAD/BURN Card)

② Stop Burn > OMS ENG FAIL HP (Ref: DEL PAD/BURN Card)

(reduced copy)

FAB USE ONLY

FS CC 8-3

ENT/123/FIN

TOP

HOOK
VELCRO

DEORBIT
BURN
(RCS)

HOOK
VELCRO

√MM302 √RCS SEL
√RCS BURN CONFIG (L OMS I'CNCT)
L,R OMS He PRESS/VAP ISOL A (two) – OP
..... Wait 2 sec B (two) – OP
√DAP – INRTL/DISC
ADI – LVLH(REF)/MED/MED
FLT CNTLR PWR (two) – ON

TIG THC +X (No Deorbit > TIG + :)
Maintain PITCH ATT ERR ± 3°
Monitor ΔVTOT:
RCS I'CNCT TK SW at ΔVTOT =
R OMS XFEED (two) – OP
L OMS XFEED (two) – CL

OMS PRPLT LOW
AFT RCS RECONFIG AT ΔVTOT =
RCS COMPLETION

*** OMS PRPLT FAIL (MULTIPLE JETS FAIL OFF):**

* Secure aff OMS *

* STOP BURN: *

* SAFE APU_s – SHUT DN *

* HP *

* CONTINUE BURN: *

* ITEM 18 +0 EXEC *

* Resel jets *

* Interconnect good OMS to RCS *

* THC +X (√OMS% vs RCS Burn Time) *

* AFT RCS RECONFIG *

* RCS COMPLETION *

* **RCS +X JET FAIL OFF:** *

* STOP BURN: *

* SAFE APU_s – SHUT DN *

* HP *

* CONTINUE BURN: *

* ITEM 18 +0 EXEC *

* Resel jets *

ENT-3a/D/L

HINGE

(reduced copy)

FAB USE ONLY

FS CC 8-4

ENT/123/FIN

TOP
BACK OF 'ENTRY MANEUVERS'

	FLIGHT CONDITIONS	MANEUVER	DRAG CHUTE DEPLOY																												
HOOK VELCRO	V = 7K	G50 √GPS, INCORPORATE * If ELS: UHF MODE – G T/R *	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>MCC Call</th> <th>Flight Condition</th> </tr> </thead> <tbody> <tr> <td>Early</td> <td>Main Gear TD</td> </tr> <tr> <td>NOMINAL</td> <td>195 KEAS</td> </tr> <tr> <td>Late</td> <td>Post-Nose Gear TD Xwind DTO</td> </tr> <tr> <td>Emergency Only</td> <td>No Deploy Except CDR call</td> </tr> </tbody> </table>	MCC Call	Flight Condition	Early	Main Gear TD	NOMINAL	195 KEAS	Late	Post-Nose Gear TD Xwind DTO	Emergency Only	No Deploy Except CDR call																		
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	M = 3.5	If previous OMS OX TK, He TK, or RCS OX TK leak: G51 VENT DOOR CNTL OPEN – ITEM 43 EXEC																													
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	* If M < 2.5, P CSS for ADTA to G&C incorp *																														
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M < 1.0	√R FLT CNTLR – ON P,R/Y – CSS as reqd √SPDBK CMD vs POS √NWS – 1 Lock Inertia Reels MAX N ₂ 																														
M = 0.7	√LG EXT D ISO VLV – OP																														
h = 15K	√MLS																														
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V = 185 KEAS	DEROTATE																														
NOSE GEAR TD	SRB SEP – MAN/AUTO and depress pb √Auto Load Relief √HYD BK ISOL VLV (three) – OP																														
MIDFIELD and V < 140 KGS	BRAKE as required (8-10 fps ² , -0.25 to -0.3G)																														
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WHEEL STOP	Go to ENT C/L, <u>POST LANDING PROCEDURES</u>																														
				<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">FAILED TIRE TECHNIQUE</th> </tr> </thead> <tbody> <tr> <td>Post-MGTD</td> <td>P – AUTO</td> </tr> <tr> <td>185 KEAS</td> <td>Deploy drag chute</td> </tr> <tr> <td>180 KEAS</td> <td>√Auto derotation</td> </tr> <tr> <td>NGTD</td> <td>Max RHC roll away from failed tire</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr><td>50K</td><td>/</td></tr> <tr><td>38K</td><td>/</td></tr> <tr><td>28K</td><td>/</td></tr> <tr><td>20K</td><td>/</td></tr> <tr><td>12K</td><td>/</td></tr> <tr><td>7K</td><td>/</td></tr> <tr><td>3K</td><td>/</td></tr> <tr><td>1K</td><td>/</td></tr> <tr><td>SURF</td><td>/</td></tr> </tbody> </table> <p style="text-align: center;">ENT-6b/123/E/A</p>	FAILED TIRE TECHNIQUE		Post-MGTD	P – AUTO	185 KEAS	Deploy drag chute	180 KEAS	√Auto derotation	NGTD	Max RHC roll away from failed tire	50K	/	38K	/	28K	/	20K	/	12K	/	7K	/	3K	/	1K	/	SURF
FAILED TIRE TECHNIQUE																															
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1K	/																														
SURF	/																														

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ENT/123/FIN

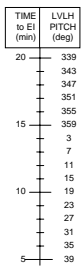
TOP

HOOK
VELCRO

HOOK
VELCRO

ENTRY NO-GO CHECKLIST

FAILURE OF:	AERO PTI DTO	AUTO FCS MODE	XWIND DTC ①
APU/HYD: 1 APU.....			X
2 APUs.....			X
DISPLAYS: 2 ADIs.....	X		
CDR HUD.....			X ②
CONTROLLERS:			
RHC: 1L.....			X
2L & 2R.....	X		X
RPTA: 2L or 2R.....	X		X
SNC: 2 AAs (LAT).....	X	X ③	X
2 RAs.....	X (M < 2.5)		X
2 AAs (NORM).....			X
2 RAs.....			X
2 R DDU PWIR SPLY.....			X
2 IMU (or 1 IMU + BITE).....	X		X
2 ADTAs.....			X
ADTA NOT INCORP OR DLMA.....	X (M < 2)		X
MLS NOT INCORP.....	X (< 6K ft)		X
DPS: 2 FCS CH (same surface).....	X		X ④
1 GPC (not restrung).....			X ④
2 GPC (restrung).....	X	X ④	X ④
2 GPC (not restrung).....	X	X ④	X ④
1 FF.....			X
2 FF.....	X	X ④	X
RCS: 2 FA.....	X		X
LEAK (AFT - during ENT).....	X		X
2 YAW JETs (same side).....	X		X
MIN RCS QTY.....	X		X
TRIM: All > ± 2.0 deg.....	X		X
DOWNMODE:			
FCS problem.....	X	X	X
ADA.....	X		X
PLB: PLBD Latch Gang.....	X		X
LDC/DECEL:			
Tire Leak.....			X
HYD BRAKE ISOL VLV.....			X
< 100% Brake.....			X
NWS.....			X
ENERGY - OFF NOMINAL:			
Roll Ref Alert.....	X		X
Above Upper Traj Line.....	X		X
MCC GCA, or VEL & PSN update.....	X	X	X
No ALL by 6K ft.....	X		X
DATA: SOLID STATE RECORDERS... X (LOS)			
XWIND:			
< 10 Knots Peak.....			X
> 15 Knots Peak.....			X
> 10 Knots Gust.....			X
GROUND SYSTEMS:			
No Runway Aim Point.....			X



HOOK
VELCRO

HOOK
VELCRO

HOOK
VELCRO

HOOK
VELCRO

- NOTES**
- ① Consider runway redesignation (M > 6) to avoid Xwind landing
 - ② GO if PAPI and BALL BAR available
 - ③ Pitch AUTO mode NO-GO for M < 2.5
 - ④ GO if only string 4 affected

ENT-7a/E/K

(reduced copy)

FAB USE ONLY

FS CC 8-18

ENT/123/FIN

TOP

HOOK
VELCRO

HOOK
VELCRO

**DEORBIT
BURN
MONITOR**

OMS TEMP*	<table border="1"> <tr> <td></td> <td>L</td> <td>R</td> </tr> <tr> <td>FU IN P ≥</td> <td>219</td> <td>220</td> </tr> <tr> <td>≤</td> <td>201</td> <td>208</td> </tr> </table>		L	R	FU IN P ≥	219	220	≤	201	208	OMS ENG FAIL ----- OMS PRPLT FAIL
	L	R									
FU IN P ≥	219	220									
≤	201	208									
or No FU IN P											
OMS PC* & OMS ↓ (BFS: √accel)	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: He PRESS/VAP ISOL (two) – CL At PC < 72 or OMS TEMP: OMS PRPLT FAIL									
	OX & FU HIGH	He PRESS/VAP ISOL (two) – CL Cycle He A(B) to maintain TK P 234-284									
OMS GMBL	PRI fail SEC fail	L(R) OMS GMBL – SEC (twice) If high RCS usage: OMS ENG FAIL									
GPC	1(4) & Burning OMS aff	aff GPC PWR – OFF If SEC GMBL avail: aff MDM FF 1(4) – OFF,ON L(R) OMS GMBL – SEC (twice)									
	SEC GMBL lost 2 FAs lost	If high RCS usage: OMS ENG FAIL √MAN SHUTDN									
I/O ERROR FA	1(4)	L(R) OMS GMBL – SEC I/O RESET (if recov: BFS I/O RESET) If high RCS usage: OMS ENG FAIL									
	2 FAs lost	√MAN SHUTDN									
BCE STRG D	1(4)	I/O RESET (if recov: >>) If high RCS usage: L(R) OMS GMBL – SEC (twice)									
RM DLMA IMU or	ABOVE SAFE HP ⇒ <input type="checkbox"/> <input type="checkbox"/>	STOP BURN: OMS ENG(s) – OFF >>									
GPC SET SPLIT or	BELOW SAFE HP ⇒	IMU DLMA: After C/O: √timer <input type="checkbox"/> G21 If any IMU ACC > 0.03: aff IMU – desel I'cnct OMS to RCS (√RCS Burn Time) THC +X to TGT HP (EOM) or 3.5 x timer at C/O (AOA) SET SPLIT: Go to "GPC" above									
2 MN BUSES		OI PCMMU PWR – 2(1)									
I/O ERROR PCM											

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

ENT-2a/123/A,O,D,E/A

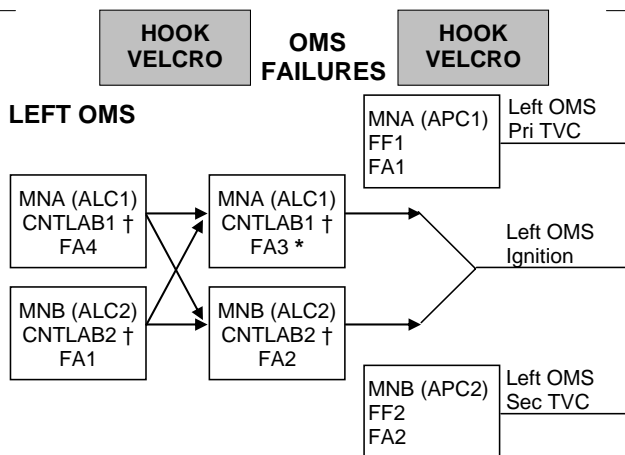
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FS CC 8-23

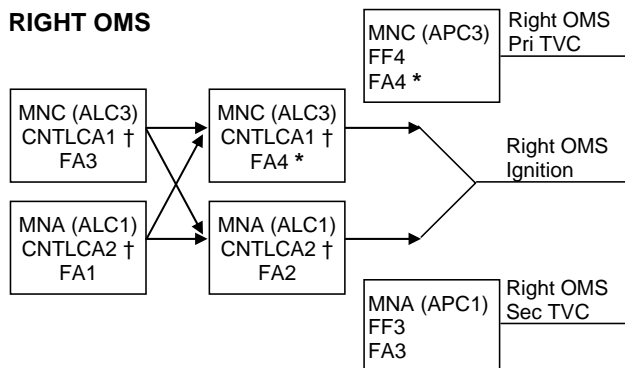
ENT/123/FIN

TOP
BACK OF 'DEORBIT 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) P_c 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

ENT-2b/123/A,O,D,E/A

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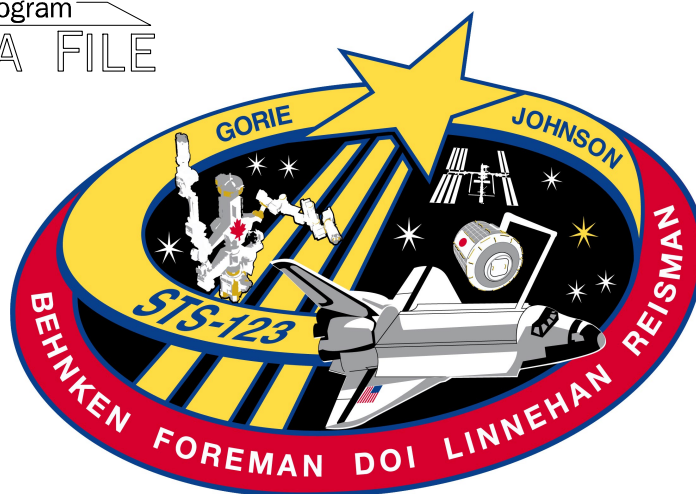
FAB USE ONLY

FS CC 8-24

ENT/123/FIN

Space Shuttle Program
FLIGHT DATA FILE

JSC-48020-123
FINAL



ENTRY CHECKLIST

STS
123

Flight Cover (trim bottom to expose tabs)