

Ascent Checklist

STS-109

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

**Final
August 24, 2001**

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas



ASCENT C/L STS-109**FINAL (Aug 24, 2001)****PCN-2 (Jan 23, 2002) Sheet 1 of 1**

List of Implemented Change Requests (482s):

ASC-1574 MULTI-1582
ASC-1617
ASC-1618

Incorporate the following:

1. Replace v thru viii
2. Replace FB 2-9 & FB 2-10
3. Replace 6-35 & 6-36
4. Replace 9-7 & 9-8, 9-29 & 9-30

Prepared by: _____
Book Manager

Lead Ascent GPO

Approved by: _____
Chief, Ascent/Descent Dynamics Branch

Encl: 12 pages

File this PCN immediately behind the front cover as a permanent record

MISSION OPERATIONS DIRECTORATE

**ASCENT CHECKLIST
STS-109**

FINAL
August 24, 2001

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This document is under the configuration control of the Crew Procedures Control Board (CPCB). All proposed changes must be submitted on JSC Form 482 to DO3/FDF Manager.

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ASC/109/FIN

Incorporates the following:

482#: NONE

AREAS OF TECHNICAL RESPONSIBILITY

Book Manager	DM4/A. Riley	483-7752
Switch List	CA4/J. Branson	244-8596
Entry	DM4/M. Trump	483-8029
Cue Cards	DO3/H. Scott	483-0670

NOTES

1. The trajectory data in this checklist is for the STS-109 One Cycle to Flight Profile and is based on the November environment.
2. The Handover/Ingress Switch List gives the vehicle configuration at LCC/MCC handover (SRB Ignition) and flight crew ingress (T-3:00). If there is a switch position difference between ingress and handover, the ingress position will be boxed beside the handover position.
3. The time reference used in the Prelaunch procedures is the T- (Time to Launch) that LCC uses. This time does not reflect planned holds. The second time referenced in parentheses reflects the planned holds. The mission elapsed time (MET) has MET = 0 at SRB ignition.
4. Normal Flight Procedures are for liftoff through the OMS 2 burn.
5. The Abort to Orbit (ATO) procedures and the Backup Flight System (BFS) procedures are integrated into the appropriate parts of this checklist.
6. AOA procedures terminate with ENTRY MANEUVERS Cue Cards.
7. Ascent Flip Book for the CDR and PLT will be fabricated from the FB pages in section 2.
8. Ascent related cue cards are contained in this document. The cue cards are listed in the Ascent Cue Card section. Some cards are printed in the body of the checklist for MS use and also in the Cue Card Config section for reference of crop marks and fabrication instructions. The size, shape and Velcro location of the cue cards are controlled by the Cue Card Book Manager.
9. Mission STS-109 is flown with vehicle OV102.

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ASCENT CHECKLIST
STS-109

LIST OF EFFECTIVE PAGES

FINAL 08/24/01
PCN-1 12/21/01
PCN-2 01/23/02

Sign Off	*	109/FIN	FB 2-4	109/FIN
ii	*	109/FIN	FB 2-5	109/FIN 1
iii	*	109/FIN	FB 2-6	109/FIN
iv	*	109/FIN	FB 2-7	109/FIN
v	*	109/FIN 2	FB 2-8	109/FIN
vi	*	109/FIN 2	FB 2-9	109/FIN
vii	*	109/FIN 2	FB 2-10	109/FIN 2
viii	*	109/FIN	FB 2-11	109/FIN
ix	*	109/FIN 1	FB 2-12	<input checked="" type="checkbox"/> 109/FIN 1
x	*	109/FIN	FB 2-13	109/FIN
xi		109/FIN	FB 2-14	<input checked="" type="checkbox"/> 109/FIN 1
xii		109/FIN	FB 2-15	109/FIN
1-1		109/FIN	FB 2-16	109/FIN 1
1-2		109/FIN	FB 2-17	109/FIN 1
1-3		109/FIN	FB 2-18	109/FIN
1-4		109/FIN	FB 2-19	109/FIN
1-5		109/FIN 1	FB 2-20	109/FIN
1-6		109/FIN	FB 2-21	109/FIN
1-7		109/FIN	FB 2-22	109/FIN
1-8		109/FIN	2-23	109/FIN
1-9		109/FIN	2-24	109/FIN
1-10	<input checked="" type="checkbox"/>	109/FIN	2-25	109/FIN
1-11		109/FIN	2-26	109/FIN
1-12		109/FIN	2-27	109/FIN
1-13		109/FIN	2-28	109/FIN
1-14		109/FIN	2-29	* 109/FIN
2-1		109/FIN	2-30	* 109/FIN
FB 2-2		109/FIN	2-31	* 109/FIN
FB 2-3		109/FIN	2-32	* 109/FIN

- * - Omit from flight book
 - Prelift-off information required

2-33	.....	*	109/FIN	6-17	.....	109/FIN
2-34	.....	*	109/FIN	6-18	.....	109/FIN
2-35	.....	*	109/FIN	6-19	.....	109/FIN
2-36	.....	*	109/FIN	6-20	.....	109/FIN
2-37	.....	*	109/FIN	6-21	.....	109/FIN
2-38	.....	*	109/FIN	6-22	.....	109/FIN
3-1	.....		109/FIN	6-23	.....	109/FIN
3-2	.....		109/FIN	6-24	.....	109/FIN
3-3	.....		109/FIN	6-25	.....	109/FIN
3-4	.....		109/FIN	6-26	.....	109/FIN
3-5	.....		109/FIN	6-27	.....	109/FIN
3-6	.....		109/FIN	6-28	.....	109/FIN
3-7	.....		109/FIN	6-29	.....	109/FIN
3-8	.....		109/FIN	6-30	.....	109/FIN
4-1	.....		109/FIN	6-31	.....	109/FIN
4-2	.....		109/FIN	6-32	.....	109/FIN
4-3	.....		109/FIN	6-33	.....	109/FIN
4-4	.....		109/FIN	6-34	.....	109/FIN
5-1	.....		109/FIN	6-35	.....	109/FIN 2
5-2	.....		109/FIN	6-36	.....	109/FIN
5-3	.....		109/FIN	6-37	.....	109/FIN
5-4	.....		109/FIN	6-38	.....	109/FIN
6-1	.....		109/FIN	6-39	.....	109/FIN
6-2	.....		109/FIN	6-40	.....	109/FIN
6-3	.....		109/FIN	7-1	.....	109/FIN
6-4	.....		109/FIN	7-2	.....	109/FIN
6-5	.....		109/FIN	7-3	.....	109/FIN
6-6	.....		109/FIN	7-4	.....	109/FIN
6-7	.....		109/FIN	7-5	.....	109/FIN
6-8	.....		109/FIN	7-6	.....	109/FIN
6-9	.....		109/FIN	7-7	.....	109/FIN
6-10	.....		109/FIN	7-8	.....	109/FIN 1
6-11	.....		109/FIN	7-9	.....	109/FIN 1
6-12	.....		109/FIN	7-10	.....	109/FIN
6-13	.....		109/FIN	7-11	.....	109/FIN
6-14	.....		109/FIN	7-12	.....	109/FIN
6-15	.....		109/FIN	8-1	.....	109/FIN
6-16	.....		109/FIN	8-2	.....	109/FIN

* – Omit from flight book

8-3	☒	109/FIN	10-1	*	109/FIN
8-4	☒	109/FIN	CC 10-2	*	109/FIN
8-5	☒	109/FIN	CC 10-3	*	109/FIN
8-6	☒	109/FIN	CC 10-4	*	109/FIN
8-7	☒	109/FIN	CC 10-5	*	109/FIN
8-8	☒	109/FIN	CC 10-6	*	109/FIN
9-1	*	109/FIN 1	CC 10-7	*	109/FIN
9-2	*	109/FIN 1	CC 10-8	*	109/FIN
9-3	*	109/FIN 1	CC 10-9	*	109/FIN
9-4	*	109/FIN 1	CC 10-10	*	109/FIN
9-5	*	109/FIN 1	CC 10-11	*	109/FIN
9-6	*	109/FIN 1	CC 10-12	*	109/FIN
9-7	*	109/FIN 1	CC 10-13	*	109/FIN
9-8	*	109/FIN 2	CC 10-14	*	109/FIN
9-9	*	109/FIN 1	CC 10-15	*	109/FIN
9-10	*	109/FIN 1	CC 10-16	*	109/FIN
9-11	*	109/FIN 1	CC 10-17	*	109/FIN
9-12	*	109/FIN 1	CC 10-18	*	109/FIN
9-13	*	109/FIN 1	CC 10-19	*	109/FIN
9-14	*	109/FIN 1	CC 10-20	*	109/FIN
9-15	*	109/FIN 1	CC 10-21	*	109/FIN
9-16	*	109/FIN 1	CC 10-22	*	109/FIN
9-17	*	109/FIN 1	CC 10-23	*	109/FIN
9-18	*	109/FIN 1	CC 10-24	*	109/FIN
9-19	*	109/FIN 1	CC 10-25	*	109/FIN
9-20	*	109/FIN 1	CC 10-26	*	109/FIN
9-21	*	109/FIN 1	CC 10-27	*	109/FIN
9-22	*	109/FIN 1	CC 10-28	*	109/FIN
9-23	*	109/FIN 1	CC 10-29	*	109/FIN
9-24	*	109/FIN 1	CC 10-30	*	109/FIN
9-25	*	109/FIN 1	CC 10-31	*	109/FIN
9-26	*	109/FIN 1	CC 10-32	*	109/FIN 1
9-27	*	109/FIN 1	CC 10-33	*	109/FIN 1
9-28	*	109/FIN 1	CC 10-34	*	109/FIN 1
9-29	*	109/FIN 1	CC 10-35	*	109/FIN 1
9-30	*	109/FIN 2	10-36	*	109/FIN 1
9-31	*	109/FIN 1			
9-32	*	109/FIN 1			

☒ - Prelift-off information required
 * - Omit from flight book

ASCENT CUE CARDS

<u>Title</u>	<u>Ref. Page</u>	<u>Card No.</u>
ADI ERROR/RATE SWITCH		
ASCENT (Front)	CC 10-2	ASC-1a/A,E/C
ENTRY (Back)	CC 10-2	ASC-1b/A,E/C
ASCENT/ENTRY SPEC		
(Front)	CC 10-3	ASC-2a/A,E/D
(Back)	CC 10-3	ASC-2b/A,E/B
SPEED BRAKE CMD		
(Front)	CC 10-4	ASC-3a/A,E/C
(Back)	CC 10-4	ASC-3b/A,E/B
CONTINGENCY ABORT (Front) ..	CC 10-5	ASC-4a/109/A/A
RTLS CONT (Back)	CC 10-6	ASC-4b/109/A/A
OMS BURN MONITOR (Front) ...	CC 10-7	ASC-5a/109/A,O/A
OMS FAILURES (Back)	CC 10-8	ASC-5b/A,O,E/H
OMS 2/ORBIT OMS BURNS		
(Front)	CC 10-9	ASC-6a/109/A,O/A
OPS 1 RCS BURN (Back)	CC 10-10	ASC-6b/109/A,O/A
ASCENT ADI - NOMINAL		
(Front)	CC 10-11	ASC-14a/109/A/A
ENTRY ALPHA - KSC 15		
(Back)	CC 10-11	ASC-14b/109/A,E/A
AOA DEORBIT BURN (2 ENG)		
(Top/Front)	CC 10-12	ASC-8a/A/D
(Bottom/Front)	CC 10-13	ASC-8aa/109/A/A
AOA DEORBIT BURN (1 ENG)		
(Top/Back)	CC 10-14	ASC-8b/A/A
(Bottom/Back)	CC 10-15	ASC-8bb/109/A/A
AOA DEORBIT BURN (RCS)		
(Top/Front)	CC 10-16	ASC-7a/A/A
(Bottom/Front)	CC 10-17	ASC-7aa/109/A/A
(Top/Back)	CC 10-18	ASC-7b/A/A
(Bottom/Back)	CC 10-19	ASC-7bb/A/A
TAL REDESIGNATION		
BYD (Front)	CC 10-20	ASC-9a/109/A/A
(Back)	CC 10-21	ASC-9b/109/A/A
BEN (Front)	CC 10-22	ASC-10a/109/A/A
(Back)	CC 10-23	ASC-10b/109/A/A
ASCENT/ABORT SUMMARY		
(Front)	CC 10-24	ASC-11a/109/A/A
(Back)	CC 10-24	ASC-11b/A/A

EMERGENCY EGRESS		
(Front)	CC 10-25	ASC-15a/A,E/C
(Back)	CC 10-26	ASC-15b/A,E/C
ESCAPE PANEL EGRESS		
(Front)	CC 10-27	ASC-16a/A,E/C
(Back)	CC 10-27	ASC-16b/A,E/B
GPC/FCS CHANNEL CONFIG		
(Front)	CC 10-28	ASC-17a/A,O,E/A
(Back)	CC 10-28	ASC-17b/A,O,E/A
PANEL R14 (OV102)		
(Front)	CC 10-29	ASC-20a/A,O,E/D
(Back)	CC 10-30	ASC-20b/A,O,E/A
LOC/BREAK UP	CC 10-31	ASC-21a/A/A
EMERGENCY EGRESS (OVERSIZED)		
(Top/Front)	CC 10-32	ASC-25a/A,E/A
(Bottom/Front)	CC 10-33	ASC-25aa/A,E/A
(Top/Back)	CC 10-34	ASC-25b/A,E/A
(Bottom/Back)	CC 10-35	ASC-25bb/A,E/A
 <u>PLT & CDR Ascent</u>		
<u>Flip Book</u>	FB 2-2 thru FB 2-22	

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PRELAUNCH PROCEDURES

PRELAUNCH PROCEDURES

ABORT/RECYCLE PROCEDURES

NOTE

These recycle procedures will be used inside T-5 min

OTC (or NTD) will call for BFS Safing, SRB Safing, APU Shutdn, Heater Reconfig (Aerosurface positioning complete), MPS He Reconfig, OMS/RCS Reconfig, RCS Driver and OMS Safing, and Main Bus Switch Safing as reqd

C **BFS SAFING (On NTD call)**

O6 GPC MODE 5 – HALT
Report BFS Safing complete

MS1 **SRB SAFING (On NTD call – if reqd)**

O17 MEC 1 – OFF
. . . Wait 2 sec, then . . .
MEC 2 – OFF
Report SRB Safing complete

P **APU SHUTDN (On OTC call)**

R2 APU OPER (three) – OFF
FUEL TK VLV (three) – CL
✓Shutdn (Hyd Press)
CNTLR PWR (three) – OFF
HYD CIRC PUMP (three) – GPC

Report APU Shutdn complete

C **HEATER RECONFIG (On OTC call)**

L2 FLASH EVAP FDLN HTR (two) – 2

Report Heater Reconfig complete

PRE-
LAUNCH

NOTE

Numerous non time-critical steps
for recycle will be individually
called by OTC

P MPS He RECONFIG (On OTC call)

R2 MPS He ISOL A,B (six) – GPC
PNEU He ISOL – GPC

Report MPS He Reconfig complete

P OMS/RCS RECONFIG (On OTC call)

O8 L,R OMS
✓TK ISOL (four) – GPC (tb-OP)
✓XFEED (four) – GPC (tb-CL)
FWD RCS
He PRESS (two) – GPC (tb-OP)
✓TK ISOL (two) – GPC (tb-OP)
✓MANF ISOL 1,2,3,4,5 – GPC
(tb-OP)

O7 AFT L,R RCS
He PRESS (four) – GPC (tb-OP)
✓TK ISOL (six) – GPC (tb-OP)
✓MANF ISOL 1,2,3,4,5 (ten) – GPC
(tb-OP)

Report OMS/RCS Reconfig complete

C, **RCS DRIVER AND OMS SAFING**
MS2 **(On OTC call)**

MS2 O14:F RJD DRIVER (three) – OFF
 LOGIC (three) – OFF
 L OMS ENG VLV – OFF
O15:F RJD DRIVER (two) – OFF
 LOGIC (two) – OFF
O16:F RJD DRIVER (four) – OFF
 LOGIC (three) – OFF
 R OMS ENG VLV – OFF

C C3 OMS ENG (two) – OFF

Report RCS Driver and OMS Safing
complete

MS2 **MAIN BUS SWITCH SAFING (On OTC call)**

O13:A cb ESS 1BC MNA CONTR – op
 :C cb ESS 2CA MNB CONTR – op
 :E cb ESS 3AB MNC CONTR – op
O14:B cb MNA MNC CONTR – op
O15:B cb MNB MNA CONTR – op
O16:B cb MNC MNB CONTR – op

Report Main Bus Switch Safing
complete

1: GNC GPC MEMORY	2: GNC 104 GND IMU CNTL/MON
3: GNC GPC MEMORY	

-3:00:00
(Hold)

PRE-INGRESS SW RECONFIG

ASP configures OI PCMMU PWR - 1*** (C3).
 ESS BUS SOURCE FC (three) - ON, AC
 BUS SNSR (three) - OFF (1 sec) then AUTO
 TRIP (R1), cb APU FU TK VLV ENA (six) - cl (R2).
 OTC will call: (~2 min) ESS BUS SOURCE FC
 (three) - OFF, AC BUS SNSR (three) - OFF
 (1 sec) then MON (R1), cb ESS MN CONTR
 (three) - cl (O13), cb MN CONTR (three) - cl
 (O14,O15,O16), cb AC1 H2O LOOP PUMP
 1 A/2(three) - op (L4)

PAYLOAD ACTIVATION

A6U PL RETEN PL SEL - 1

NAVAIDS ACTIVATION

O8 MLS CH pb/tw (three) - 6
 RADAR ALTM (two) - ON
 O7 TACAN CH pb/tw (three) - 059Y
 ANT SEL (three) - AUTO
 MODE (three) - GPC

If OV102:
 A12 GPS PWR - ON
 PRE AMPL UPPER - ON
 LOWER - ON
 ✓ENCRYPT - NORMAL

-2:25:00 A
(-3:15:00)

INGRESS ORBITER & SEATS

During seat ingress COMM
 PWR - ON (L5,R6)
 CCU PWR - ON (A11,A15,MO39M)

O5,O9, AUD VOX SENS (as needed) - adj as reqd
 R10,L9, Contact LCC (OTC & NTD) and MCC on
 MO42F A/G 1

1: GNC GPC MEMORY	2: GNC 104 GND IMU CNTL/MON
3: GNC GPC MEMORY	

Install ASC Flip Cards
 ✓ Cue Card positions

-2:10:00
 (-3:00:00)

POST INGRESS SW RECONFIG

ASP turns on RCS 1,2,3,4
 DRIVERS (eight) (O14,O15,O16),
 OMS ENG VLV (two) (O14,O16),
 GPC OUTPUT 5 – B/U (O6)

NOTE

ASP doing C/W VOL adjust,
 expect MA

-1:57:00
 (-2:47:00)

(IDP Equivalent)

NOTE

IMU preflight align begins

-1:35:00 A
 (-2:25:00)

LCC ASTRO COMM CHECK

LCC will contact all crew on A/G 1,
 A/G 2, ICOM A, ICOM B then A/A

A MCC A/G VOICE CHECK

B A/G 1 Voice Check
 O5,O9 L,R AUD A/G 2 (two) – OFF
 A/A (two) – OFF
 Voice check with MCC

A/G 2 Voice Check
 L,R AUD A/G 2 (two) – T/R
 1 (two) – OFF
 Voice check with MCC

A/A Voice Check
 L,R AUD A/A (two) – T/R
 A/G 2 (two) – OFF
 Voice check with MCC

1: GNC GPC MEMORY	2: GNC 104 GND IMU CNTL/MON
3: GNC GPC MEMORY	

A Simo Voice Check (Launch Config)
O5,O9, L,R AUD A/G 1 (two) – T/R
R10,L9, 2 (two) – T/R
MO42F Voice check with MCC

NOTE

Side hatch closure

–1:10:00 C **CABIN LEAK CHECK**
(–2:00:00)

L2 CAB VENT ISOL – OP (tb–OP)
√tb – CL

O1 √CAB PRESS – incr to 16.7 (MA)

NOTE

Flt crew functions from this point on will be initiated by a call from OTC to proceed. Flt crew will report back to OTC after completion

–45:00 C **CABIN VENT REDUNDANCY CONFIG**
(–1:35:00)

NOTE

Vent vlv operation may occur earlier or later at LCC direction

L2 CAB VENT ISOL – CL (tb–CL)
VENT – OP (tb–OP)

–40:00 C **CABIN VENT**
(–1:30:00)

L2 CAB VENT ISOL – OP (tb–OP)
(klaxon)

√tb – OP
O1 √PRESS – decr

1: GNC GPC MEMORY	2: GNC 104 GND IMU CNTL/MON
3: GNC GPC MEMORY	

-32:00 C **PASS/BFS TRANSFER PREP**
(-1:22:00)

O6 ✓GPC MODE 5 – STBY (tb–RUN)
C3 ✓BFC CRT SEL: 3+1
DISP – ON

3: GNC BFS MEMORY

CRT3 PASS/BFS XFER ENA – ITEM 25 EXEC
✓ITEM 25 (*)

NOTE

‘*’ blanks when transfer is complete
(~10 min)

-30:00 C **OMS GN2 PRESS**
(-1:20:00)

C3 OMS ENG (two) – ARM/PRESS

P **WSB GN2 SUPPLY ACTIVATION**

R2 BLR N2 SPLY (three) – ON

-25:00 A **A/G VOICE CHECK**
(-1:15:00)

Simo Voice Check (Launch Config)
Voice check with MCC

Update Abort Winds Pad, ASC Flip
Book, and ALTM, 1–10 (if reqd)

NOTE

Cabin Press Reporting and vent vlv
closure may occur earlier or later at
LCC direction

-22:00 C **REPORT CABIN PRESS**
(-1:12:00)

3: BFS, SM SYS SUMM 1

CRT3,O1 Report cabin pressure (two) to OTC

3: BFS, GNC BFS MEMORY

C **CLOSE VENT VLVS**

L2 CAB VENT ISOL – CL (tb–CL)
VENT – CL (tb–CL)

1–8

ASC/109/FIN

1: GNC GPC MEMORY	2: GNC 104 GND IMU CNTL/MON
3: BFS, GNC BFS MEMORY	

NOTE

At T-20 there will be a planned
10-min hold

TRAJECTORY UPDATE

✓MCC for max rates and trajectory
config, 8-7

-20:00 **OPS 1 LOAD (IDP Equivalent)**
(-1:00:00)

1: GNC LAUNCH TRAJ	2: GNC LAUNCH TRAJ
1: GNC 0 GPC MEMORY	
1: GNC FAULT	

Report faults other than from unpwr
equipment

CRT1 GNC, SPEC 99 PRO

NOTE

Gnd-controlled Fuel Cell purge

-18:30 C **BFS TO OPS 1**
(-58:30)

3: BFS, GNC FAULT

CRT3 GNC, SPEC 99 PRO
O6 GPC MODE 5 – RUN (tb-RUN)

CRT3 GNC, OPS 101 PRO

3: BFS, GNC LAUNCH TRAJ
3: BFS, GNC FAULT

Report faults other than from unpwr
equipment

CRT3 GNC, SPEC 99 PRO

1: GNC FAULT	2: GNC LAUNCH TRAJ
--------------	--------------------

3: BFS, GNC FAULT

2: GNC 50 HORIZ SIT

3: BFS, GNC 50 HORIZ SIT

-17:00 P **HORIZ SIT CONFIG**
 (-57:00)

ALTM - ITEM 9 +

		.		
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	<u>PASS ITEM</u>		<u>BFS ITEM</u>	
PTI	INH	✓1		
TAL SITE (MCC)	2(3,5)	✓40	2(3,5)	✓40
RTLS SITE	1	✓41	1	✓41
PRI (MCC)	KSC 15	✓3	KSC 15	✓3
SEC (MCC)	KSC 33	✓4	KSC 33	✓4
TAC	-59	✓5	-59	✓5
RA	blank	✓46		
TAEM TGT				
G&N	OVHD	✓6	OVHD	✓6
HSI	blank		blank	
XEP	NEP	✓7	NEP	✓7
AIM	NOM	✓8	NOM	✓8
	(or CLSE)		(or CLSE)	
SPDBK	NOM	✓39		
TAC	INH	✓20	INH	✓20
GPS	INH	✓43	INH	✓43
DRAG H	AUT	✓22	AUT	✓22
ADTA H	INH	✓26	INH	✓26
ADTA TO G&C	INH	✓29	AUT	✓28
TAC	DELTA	✓35		
AIF_G	INH	✓48		

1: GNC LAUNCH TRAJ	2: GNC SYS SUMM 1
--------------------	-------------------

3: BFS, GNC SYS SUMM 2

C CONFIG CONT ABORT YAW STEER

CRT1 ✓ITEM 5

E	N	A
---	---	---

1: GNC LAUNCH TRAJ	2: GNC SYS SUMM 1
3: BFS, GNC SYS SUMM 2	

-16:00 P **MPS He RECONFIG**
 (-56:00)
 R2 MPS He ISOL A,B (six) – OP
 PNEU He ISOL – OP

-15:00 **CONFIG OMS/RCS XFEED VLVS**
 (-55:00)

NOTE
 OMS/RCS XFEED vlvs
 reconfigured for launch by LPS.
 At T-9 there will be a planned
 40 min hold

WEATHER UPDATE (if reqd)

Update Abort winds, RWY and ALTM
 setting

-9:00
 (~-17:00) P **CLEAR HARDWARE C/W MEMORY**
 C3 C/W MEM – CLEAR

-9:00 MS1
 (~-15:00) Activate V10 Recorder

-9:00 **'GO FOR LAUNCH' (All)**
 C2 EVENT TIMER – START
 F7 ✓TIME ind – counting down

NOTE
 GLS starts

-8:00 P **CONNECT ESS BUSES TO FC (GLS ✓ @ T-7:24)**
 R1 ESS BUS SOURCE FC (three) – ON

-7:30 NOTE
 Access arm retract
 ✓Seat in launch position
 ✓LES zippers and gloves
 Cinch down shoulder harness and lap
 belt

1: GNC LAUNCH TRAJ 2: GNC SYS SUMM 1

3: BFS, GNC SYS SUMM 2

3: BFS, SM SYS SUMM 2

-6:15 P **APU PRE START (GLS ✓ @ T-5:25)**

- R2 ✓BLR N2 SPLY (three) – ON
- ✓PWR (three) – ON
- ✓CNTLR/HTR (three) – A
- ✓APU AUTO SHUTDN (three) – ENA
- CNTLR PWR (three) – ON
- HYD MN PUMP PRESS (three) – LO
- ✓APU SPEED SEL (three) – NORM
- ✓OPER (three) – OFF
- ✓FUEL TK VLV (three) – CL
- ✓HYD CIRC PUMP (three) – GPC
- ✓cb APU FU TK VLV ENA (six) – cl
- APU FUEL TK VLV (three) – OP
- ✓APU/HYD RDY tb (three) – gray

* If any tb not gray, consult *
* LCC before continuing *

-5:00 P **APU START (GLS ✓ @ T-4:05)**

- R2 APU OPER (three) – START/RUN
- | |
|-------------|
| HYD/
APU |
|-------------|

 ✓HYD PRESS ind (three) – LO green
- R2 ✓APU/HYD RDY tb (three) – bp
- HYD MN PUMP PRESS (three) – NORM
- | |
|-------------|
| HYD/
APU |
|-------------|

 ✓PRESS ind (three) – HI green
- R2 CIRC PUMP (three) – OFF
- F7 ✓PRESS lt – off

1: GNC LAUNCH TRAJ	2: GNC SYS SUMM 1
3: BFS, SM SYS SUMM 2	

C HTR RECONFIG

L2 FLASH EVAP FDLN HTR (two) – OFF

NOTE

Motion/Vibration may be felt in crew module due to Main Engine gmb1 profile cks at –3:25 and move to start at –3:10

–2:30 **P CLEAR C/W MEMORY**

2: GNC FAULT	
3: BFS, GNC FAULT	

Verify no unexpected errors
 CRT2, GNC, SPEC 99 PRO
 CRT3

2: GNC SYS SUMM 1	
3: BFS, GNC SYS SUMM 1	

C3 C/W MEM – CLEAR

–2:00 **A SUIT PREP**

✓Tabs/Visor – cl/LES O2 – ON

MS1 ICOM RCDR – ON (if reqd)

— | |

| | —

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| | —



ASCENT PROCEDURES

**BAILOUT
EGRESS**



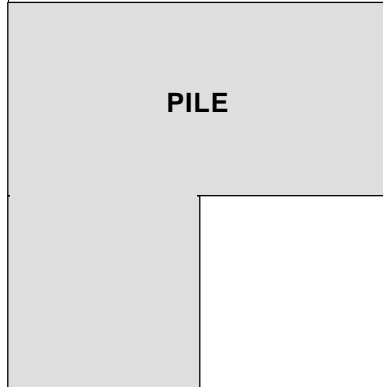
MS ONLY

2-1

ASC/109/FIN



TAB TITLE BLANK ON THIS PAGE ONLY
TOP
MOUNT ON LEFT SIDE OF BACKBOARD FACING
'BAILOUT MODE 8'



**ASCENT FLIP BOOK
(EMERGENCY EGRESS)**

**PRELAUNCH
MODE 1**

TABS - RELEASE
VISOR - CLOSE / LOCK
LES O2 - ON
GREEN APPLE - PULL
KNEEBOARDS - REMOVE
COOLING - DISCONNECT
RESTRAINT - RELEASE
PARACHUTE (four) - RELEASE
COMM - DISCONNECT
LES O2 - DISCONNECT
EGRESS SEAT
SLIDEWIRE BASKETS

**POST LANDING
MODE 5**

TABS - RELEASE
VISOR - CLOSE / LOCK
LES O2 - ON
GREEN APPLE - PULL
KNEEBOARDS - REMOVE
COOLING - DISCONNECT
RESTRAINT - RELEASE
PARACHUTE (four) - RELEASE
COMM - DISCONNECT
(G-SUIT CLIP - PULL)
LES O2 - DISCONNECT
PLT - PWR DOWN
EGRESS SEAT
SLIDE/ESCAPE PANEL

TOP

HOOK

ASC

**BAILOUT
MODE 8**

REPORT POSITION

MACH < .95, OPS 305/603

SB – AUTO; BF – AUTO

FLY 185–195 KEAS, $\Phi = 0^\circ$

ABORT MODE – ATO

ABORT PBI – PUSH

P,R/Y – AUTO

FLT CNTLR PWR (two) – OFF

~50K FT

TABS – RELEASE

VISOR – CLOSE / LOCK

LES O2 – ON

GREEN APPLE – PULL

~40K FT

MS3 – VENT CABIN

CDR,PLT SEATS – LOWER

KNEEBOARDS – REMOVE

COOLING – DISCONNECT

RESTRAINT – RELEASE

D-RING – UNCOVER

~30K FT

MS3 – JETTISON HATCH

COMM – DISCONNECT

(G-SUIT CLIP – PULL)

LES O2 – DISCONNECT

EGRESS SEAT

POLE – DEPLOY

D-RING – HOOK UP

BAILOUT

FB 2–3

ASC/109/FIN

TOP
BACK OF 'EMERGENCY EGRESS'

BAILOUT
EGRESS

PILE

SYS FLIGHT RULES

	RTLS	TAL
OMS – 2 He TKs		X
– 1 OX & 1 FU TKs (diff pods)		X
– 2 OX or 2 FU TKs		X
APU/HYD – Impending loss of all capability	X	X
CABIN LEAK – (–EQ dP/dT > .15)	X	X
CRYO – All O2(H2)	X	X
2 FREON LOOPS ↓ [Accum Qty (↓ and decr) and/or Flow (↓)]	X	X
2 MAIN BUSES ↓	X	
THERMAL WINDOW PANE	X	

NO COMM MODE BOUNDARIES

NEG RETURN (104)	8200	2 ENG BYD (104)	5600
PRESS TO ATO (104)	8200	ABORT TAL BYD (5)	
PRESS TO MECO (104)	11100	EO VI	<input type="text"/>
SE OPS 3 BYD (109)	12000	SE OPS 3 BYD (109) (5)	<input type="text"/>
SE BYD (104)	14100	SE BYD (104) (5)	<input type="text"/>
NEG MRN (104)	14600	2 ENG BEN (104)	5900
SE PRESS (104)	16200	ABORT TAL BEN (2)	
NEG BEN (104)	18500	EO VI	<input type="text"/>
LAST PRE MECO TAL	23000	SE OPS 3 BYD (109)(12)	<input type="text"/>
LAST TAL		SE BEN (109) (2)	<input type="text"/>
AML	23800	2 ENG MRN (104)	6300
LRB	24400	ABORT TAL MRN (3)	
BYD	24800	EO VI	<input type="text"/>
KIN	24800	SE OPS 3 BEN (109)(11)	<input type="text"/>
AHS	25000	SE BEN (104) (2)	<input type="text"/>
		SE MRN (109) (3)	<input type="text"/>

HOOK

ASCENT PROCEDURES

R180

LVLH

.83M	✓ P _C → 72%
1.12M	✓ P _C → 104%

- P_C < 50+5 s ✓SRB SEP (Backup AUTO SEP 2:21)
- ✓TMECO
- * If NOT STABLE (10 sec): *
- * NO COMM – CSS & MAN THROT *
- Close suit O2, open visor
- 3:00 ✓EVAP OUT (T < 60)

OMS 1
TGTING

- * If systems ABORT reqd: *
- * RTLS at 3:40 or *
- * TAL select prior to 23000 (BYD GO) *
- * or 18500 (BYD N/A) *
- * Otherwise manual MECO 23700 (BYD GO) *
- * or AOA (BYD N/A) *

V_I = 13.6 K

- ✓Roll Heads Up
- * If Man Throttle (3 eng): *
- * Man Shutdn at 25990 *
- * If 1 eng: *
- * TRAJ ✓SERC ON *
- * When MPS PRPLT = 2%: *
- * MAN THROT, P_C → 67% *
- * Man Shutdn at C/O mark *

MECO
MECO+20 s

- ✓V_I = 26114
- ✓ET SEP
- * If 'SEP INH': *
- * ET SEP – MAN *
- * OPS 104 – PRO (✓BFS 104) *
- * If rates > .7, .7, .7: *
- * | Null rates *
- * | ET SEP – SEP *
- * If rates < .7, .7, .7: *
- * Assume feedline fail *

MM104+2 s

- If HA > 287:
- +X xlation for 11 sec
- ✓TGTS
- ✓ASC PKT for failures
- If OMS 1 not reqd:
- OMS ENG (two) – OFF
- Go to POST OMS 1

TOP
BACK OF 'ASCENT PROCEDURES'



PILE



OMS 1 TARGETING

ASC

OMS 1 not reqd for Direct Insertion
w/Nominal MECO
(See OMS 2 Targeting)



FB 2-6

ASC/109/FIN



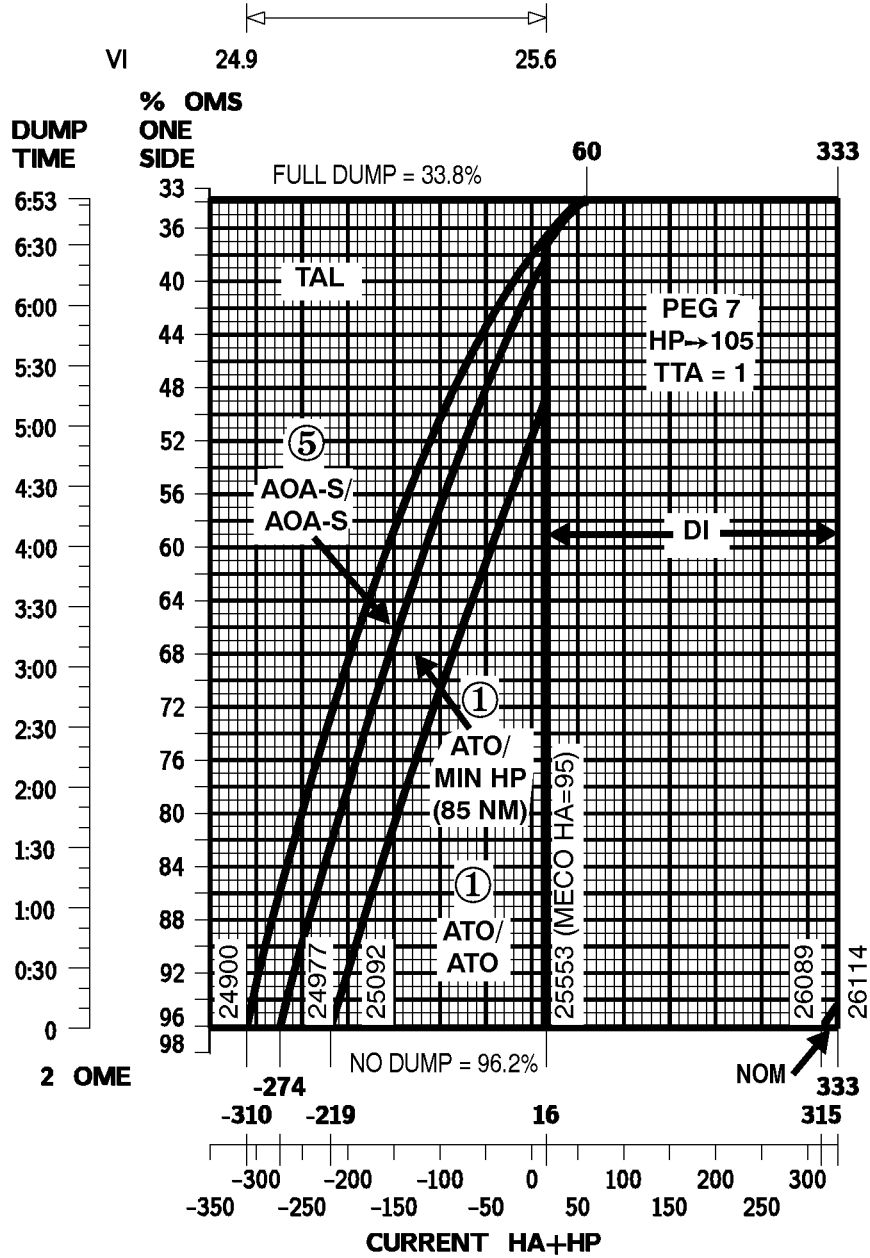
TOP

STS-109 OCF CY OMS 1/2 TGTING

HOOK

OMS 1 TIG:

TTA=2



PILE

OMS 1 BURN

OMS 1
TGTING

```

* IF TIG LATER THAN MECO + 6 min:
*   MECO + 4 min: ✓BDY FLP pb – It off (MPS dump complete)
*                 ✓MCC for APU shutdn (if time permits)
* FEEDLINE FAIL:
*   If TIG > MECO + 6 min:
*     TIG-1:30 or MECO + 6 min (whichever comes first):
*     ET SEP – SEP >>
*   If TIG < MECO + 6 min:
*     MPS PRPLT DUMP SEQ – STOP
*     TIG-1:30: ET SEP – SEP
*     Post ET SEP –Z xlation:
*     MPS PRPLT DUMP SEQ – GPC
* 1 OMS ENG FAIL and ΔVTOT > 500:
*   Burn good OMS + l'cnct both OMS to RCS, THC +X at TIG

```

DAP – AUTO/DISC

MNVR – BURN ATT (✓INRTL)

OMS XFEED (four) – OP

✓CNTLR PWR (two) – ON

✓OMS ENG (two) – ARM/PRESS

Note ΔVTOT _____ TIG :

-:15 EXEC

:00 TIG; start watch (✓P_C, ΔVTOT, ENG VLVs)

```

* OMS ENG FAIL:
* Failed ENG – OFF
* If ΔVTOT < 500:
*   At QTY = 5%, good OMS TK ISOL (two) – CL
* If ΔVTOT > 500:
*   RCS XFEED (four) – OP
*   RCS TK ISOL (six) – CL
*   THC +X
*   At first QTY = 5%, good OMS TK ISOL (two) – CL
*   At second QTY = 5%, THC – Release
* RCS COMPLETION:
* Interconnect to either
* OMS that was ENG FAIL
* THC +X (OMS% vs RCS ΔV)
* OMS TK SW (if reqd)

```

CUTOFF

```

+:02 OMS ENG (two) – OFF
Trim inplane X,Z residuals < 2 fps
OMS XFEED (four) – CL (✓RCS straightfeed)

```

HOOK

OMS 1 BURN MONITOR

OMS TEMP* FU IN P ≥	L	R	OMS ENG FAIL
	225	221	
	≤		OMS ENG FAIL (PRPLT FAIL if 1 Pod Feed)
	211	200	
or No FU IN P			
OMS PC* & OMS ↓ (BFS: ✓ accel)			OMS ENG 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 Good OMS Qty = 5% OMS XFEED (four) – CL
OX & FU HIGH			He PRESS/VAP ISOL (two) – CL OMS XFEED (four) – CL Cycle He A(B) to maintain TK P 234–284
OMS He TK P LOW (✓ OMS/MPS)			At He P < 640 ✓ OMS XFEED (four) – OP Aff OMS TK ISOL (two) – CL At Good OMS Qty = 5% OMS TK ISOL (four) – OP XFEED (four) – CL
OMS N2 REG P HIGH or LOW			OMS ENG – ARM
OMS N2 TK P LOW (✓ OMS/MPS)			At N2 TK P < 470: OMS ENG – ARM
OMS GMBL	PRI fail		L(R) OMS GMBL – SEC (twice)
	SEC fail		If high RCS usage: OMS ENG FAIL
GPC	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		If high RCS usage: OMS ENG FAIL
	2 FAs lost		✓ MAN SHUTDN
I/O ERROR FA	1(4)		L(R) OMS GMBL – SEC
			I/O RESET (if recov: BFS I/O RESET) If high RCS usage: OMS ENG FAIL
	2 FAs lost		✓ MAN SHUTDN
BCE STRG D			I/O RESET (if recov: >>)
	1(4)		If high RCS usage: L(R) OMS GMBL – SEC (twice)
I/O ERROR PCM			OI PCMMU PWR – 2(1)

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

**OMS 2
TGTING**

TOP
BACK OF 'OMS 1 BURN MONITOR'

PILE

OMS 2 TARGETING
(DIR INSERTION)

OMS 1
BURN

FAILURE	OMS 2 TARGET
OMS - 2 N2 TKs (Perform burn Single OMS Eng) - 1 or 2 OMS ENGs - 1 He TK - 1 PRPLT TK EPS - MNA & B, MNB & C MNA & C ET SEP	PEG 7; TTA = 1 CUTOFF HP = 85
OMS - 2 OX or 2 FU TKs - 1 OX & 1 FU TK diff PODs - 2 He TKs	AOA
2 FREON LOOPS [Accum Qty (↓ and decr) and/or Flow (↓)] 2 H2O LOOPS CABIN LEAK (-EQ dP/dT ≥ .08)	AOA
APU/HYD - impending loss of all capability	AOA
CRYO - All O2(H2)	AOA

OMS

He	%	He	%
4800	96.1	2560	40
4560	90	2160	30
4160	80	1760	20
3760	70	1360	10
3360	60	960	0
2960	50		

HOOK

ATO

NOTE

These tables apply only after ATO OMS 1 burn
(ITGT = ①, AOA to EDW). Assumes OMS and ARCS deorbit

DUAL POD - OMS REQUIRED				
Includes 9.1 % Unusable (4.6 % per pod)				
POST OMS 1 HP	ATO OMS 2 & STEEP D/O BURN (%)	MIN HP OMS 2 & SHALLOW D/O BURN (%)	AOA STEEP D/O BURN (%)	AOA SHALLOW D/O BURN (%)
95	35.6	14.7	33.5	23.7
90	37.5	13.6	31.8	21.9
85	39.1	13.3	29.9	19.9
80	40.4	14.2	27.7	17.5
75	41.7	15.6	25.7	15.5
70	42.8	16.9	23.7	13.4
65	43.6	18.0	21.7	11.5
60	---	19.2	20.1	9.7
55	---	---	---	9.1

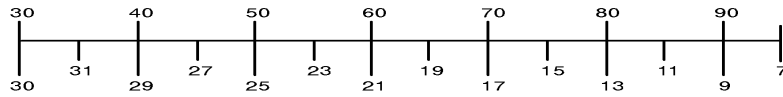
STS-109 OCF CY

SINGLE POD - OMS REQUIRED				
Includes 4.6 % Unusable				
POST OMS 1 HP	ATO OMS 2 & STEEP D/O BURN (%)	MIN HP OMS 2 & SHALLOW D/O BURN (%)	AOA STEEP D/O BURN (%)	AOA SHALLOW D/O BURN (%)
95	31.0	10.2	29.0	19.1
90	32.9	9.0	27.3	17.3
85	34.6	8.7	25.3	15.3
80	35.9	9.7	23.1	12.9
75	37.1	11.0	21.1	10.9
70	38.3	12.3	19.1	8.8
65	39.1	13.5	17.2	7.0
60	---	14.6	15.6	5.1
55	---	---	---	4.6

RTLS

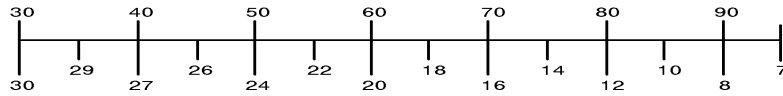
OMS BLOWDOWN

LEFT OMS GAGE QTY (%)



LEFT OMS BLDN EQUIV (%)

RIGHT OMS GAGE QTY (%)



RIGHT OMS BLDN EQUIV (%)

PILE

RTLS CDR

Abort initiated:
After 2:30 (2 eng)
At 3:40 (3 eng)

ABORT RTLS

- * No joy: *
- * OPS 601 PRO *

✓GUIDANCE STATUS on RTLS TRAJ
Expect PPA when GUID % to go = 0

- * If GUID 'INHB': *
- * ✓UNCONVERGED GUID TABLE *
- * MAN PPA per PRPLT *
- * REMAINING *
- * After GUID CONVERGE: *
- * P,R/Y AUTO/AUTO THROTTLE *

After PPA: ✓BFS ITEM 1 (*)

✓Bugs, V_{rel} , Waypoint 1

Pitchdn ($\beta = 0^\circ, \alpha = -2^\circ$)

SPDBK @ 3000 FT

WINDS

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

MECO

MECO

- ET SEP (MECO + 16 sec)
- ✓MM602 ($\alpha > 10^\circ$ and SEP + 10 sec)
- ✓P,R/Y, SPDBK, BDY FLP – AUTO
- $\alpha = 50^\circ$ until ~ 1.8g, maintain 2.2g

Adjust seat

- $\dot{H} > -320$ ✓ α vs Mach
- $V = 5$ AIR DATA PROBES (two) – Deploy (✓Heat)
- ✓RUD, AIL TRIM
- $M = 3.2$ ✓SPDBK → 65%
- $M = 2.7$ L HUD PWR – ON

* If $M < 2.5$, P CSS for ADTA to G&C incorp *

- $M = 2.0$ Ensure ADTA to G&C else THETA limits
- $M = 0.9$ P,R/Y – CSS, ✓SPDBK CMD vs POS
- ✓NWS – 1
- Lock Inertia Reels

POST LANDING: ENT, POST LDG

**OMS 2
TGTING**

HOOK

RTLS PLT

If CSS: Man THROT
 Man MECO

✓P_C = 104% (2 eng)/69% (3 eng)
 ✓DUMP

UNCONVERGED GUIDANCE TABLE

ENG OUT	OUTBOUND INITIAL θ	PITCHAROUND at % (8°/sec)	FLYBACK INITIAL θ
Liftoff	60°	44%	64°
:30	56°	47%	63°
1:00	57°	47%	63°
:30	56°	48%	62°
2:00	49°	51%	61°
:30	42°	51%	52°
3:00	38°	52%	50°
:30	34°	53%	48°
4:00	Last RTLS	52%	46°

✓P_C at PPA + 20 sec

* If P_C = 104% (2 eng): *
 * G51 MAX THROT – ITEM 4 *

Pitchdn: ✓P_C → 67%

MECO ----- **MECO**

KEAS = 77 ✓SPDBK → 81%
 ✓ET DOORS – Closed and latched (MECO +1:30)
 ✓ET SEP, SRB SEP – AUTO
 Adjust seat
 ✓TACANS, INCORPORATE
 * If KSC TACAN Fail: *
 * TACAN Ch 73X (OMN), ITEM 5 EXEC *

G51 ✓AIR DATA, INCORPORATE

MM603 HYD MPS/TVC ISOL VLV (three) – CL
 (hold 5 sec) ✓tb – CL
 H = 85K MLS (three) – ON
 If Rwy 33(15): MLS CH (three) – 6(8)
 I/O RESET
 M = 2.7 R HUD PWR – ON
 M = 0.9 ✓R FLT CNTLR PWR – ON
 Lock Inertia Reels
 M = 0.7 ✓LG EXTEND ISOL VLV – OP
 H = 10K ✓BDY FLP – TRAIL
 LES Visors – Down
 POST LANDING: ENT, POST LDG

TAL

TOP
BACK OF 'RTL5 PLT'

PILE

TAL CDR

If $V_1 > 23000$ manual MECO 23700 , go to post MECO

ABORT TAL

$G50$ \checkmark SITE & RWY (PASS/BFS), \checkmark HDG

SITE	RWY	TACANS	ITEM 5	MLS	LENGTH
2	BEN 36/18	BEN 108	MAK 80 (DME)	6/-	13720/12720
3	MRN 20/02	MRN 100	AOG 23	6/-	11929/11729
4	OOY 36/18	BYD 121	YF 78 (DME)	-/-	10647
5	BYD 32/14	BYD 121	BJ76 (DME)	6/-	12016/11816
7	AML 01/19	CVS 100 (DME)	CVS 100 (DME)	-/-	9728
8	GDV 03L LRB 04	TGN 103 -	- ROB 85 (DME)	- -	9827 10000
9	KIN 24/06	BZ 78 (DME)	BZ 78 (DME)	-/-	14422/11812
10	AHS 18/36	HSV 87	HSV 87	-/-	12256/12821
11	*BEN 36 AAT 02	BEN 108 -	- TMS 72 (DME)	6 -	13720 10870
12	*BYD 32 GSA 29	BYD 121 -	- RKL 20	6 -	12016 11786
13	*MRN 20 MCO 18R	MRN 100 -	- TTS 59Y	6 -	11929 11204

*LO XRNG

* If second eng fails: $TRAJ$ \checkmark SERC ON *
* $G50$ \checkmark SITE (\checkmark Redes card) *

$V_1 = 15.4K$ \checkmark Roll Heads Up

MECO

MECO+20 s
MECO+37 s

BFS - C/O BUG (V_1 .24.0K)
 \checkmark ET SEP, \checkmark AUTO -Z TRANS
 \checkmark MM104
Abort TAL (if reqd)
 $G50$ \checkmark TAL Site selected
If post-MECO TAL, \checkmark Site; HI/LO Energy (TAL PLT)
 $\checkmark \theta > 15^\circ$, $Y = 0 \pm 30^\circ$; RATES $< .5^\circ/\text{sec}$
PASS, OPS 301 PRO (\checkmark 304)
* No joy in 68 sec: BFS - ENGAGE *
* BFS, OPS 301 PRO *

MECO

MM304

\checkmark Roll Heads Up
BFS, OPS 301 PRO (\checkmark 304)
 $G50$ \checkmark SITE, RWY, TACAN
S/B & ALTM (PASS/BFS)
 \checkmark BUGS, HDG, RANGE, $\alpha = 43^\circ$

* Low energy: $TRAJ$ ITEM 3 (Lo Energy ENA) *
* If MECO $V_1 < 21.2K$: *
* Pitch - CSS, $\alpha = 40^\circ$ *
* At $\dot{H} = 400$: AUTO *
* If 42/man 37: Pitch - CSS at $\alpha = 37^\circ$ *
* Pitch - AUTO at end of 2nd pullout *

$V = 10$ \checkmark SPDBK \rightarrow 81% **SPDBK @ 3000 FT**
 $V = 7$ Go to ENTRY MANEUVERS
(Cue Card)

WINDS

50K	/
38	/
28	/
20	/
12	/
7	/
3	/
1	/
SURF	/
ALT	
AIM PT	
SPDBK	

RTL5

HOOK

TAL PLT

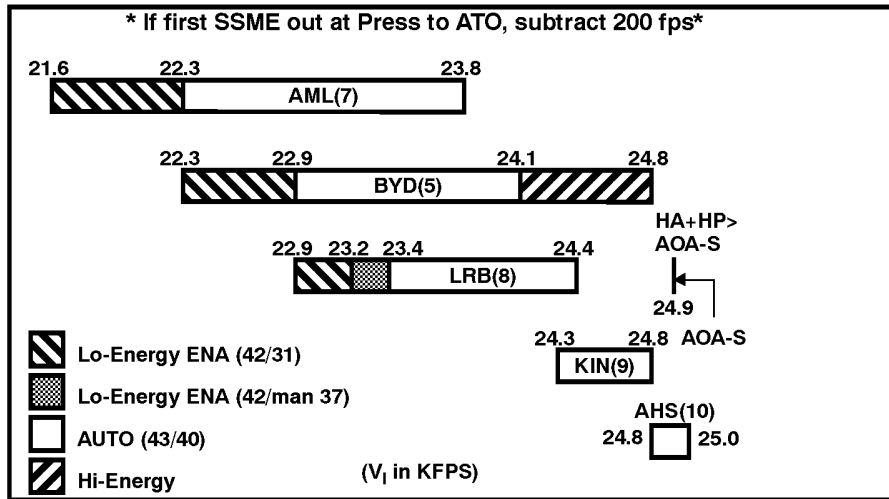
✓OMS DUMP

- * If second eng fail: *
- * **G51** MAX THROT (if reqd) *
- * DUMP ARM, START *
- * If OMS He PRESS < 2K: DUMP STOP *
- * Failed ME SHUTDN pb (two) – push *

✓AUTO THROT

- * If second eng fail or Stuck TAL: *
- * When MPS PRPLT = 2%: *
- * MAN THROT, P_C → 67% *
- * Man Shutdn at C/O mark *

----- MECO ----- BFS – C/O BUG (V_I ~ 24.0K) ----- MECO -----



109 OCF

----- **MM304** -----

- ✓OMS DUMP
- ✓ET DOORS – Closed and latched (MM304 +1:30)

V = 19 HYD MPS/TVC ISOL VLV (three) – CL
 (hold 5 sec) ✓tb – CL

V = 10 * If RCS < **57** % either side: *

* **G51** AFT RCS INH, ITEM 13 EXEC *

V = 7 MLS (three) – ON (✓channels)
 I/O RESET
 Go to ENTRY MANEUVERS (Cue Card)

**HI-ENER
TAL**

PILE

HIGH-ENERGY TAL CDR

MM104

ABORT TAL

G50 TAL Site Selected

$\theta > 15^\circ$, $Y = 0^\circ \pm 30^\circ$

PASS, OPS 301 PRO (304)

MM304

VREL

VREL	ROLL (CSS)	ALPHA (CSS)
$VREL \geq 23,400$	180°	80° ($\theta = 280^\circ$)
$22,900 \leq VREL < 23,400$	180°	55°
$VREL < 22,900$	0°	55°

$\dot{H} = -200 \downarrow$ If Alpha = 80°, push to Alpha = 55° ($\theta = \sim 305^\circ$)

$\dot{H} = -700 \downarrow$ Roll Heads Up, maintain Alpha = 55°

$\dot{H} = -500 \uparrow$ R/Y – AUTO (Roll toward site)
Limit roll to 90° until V = 6:
TRAJ Roll CMD > 90° R/Y CSS @ 90°
< 90° R/Y AUTO

Orbiter bug When commanded drag () < 40:
below upper Pitch down at 0.5°/sec, center pitch needle,
line P – AUTO

V = 6 If energy still high:
Pitch down at 1°/sec, center pitch needle,
P – AUTO

Go to ENTRY MANEUVERS (Cue Card)

TAL

HIGH-ENERGY TAL PLT

HOOK

PWRD
BDA

----- MM304 -----

BFS, OPS 301 PRO (✓304)
 G50 ✓SITE, RWY, TACAN, S/B, ALTM
 (PASS/BFS)

✓BUGS, HDG, RANGE

✓ET DOORS – Closed and latched
 (MM304 +1:30)

Guid Init:
 (D = 3, q̄ = 8,
 EAS = 48)

*
 * If no comm & Commanded Drag (←) ≥

BYD
40

, *
 * G50 Select LRB 04 (Site 8, secondary) *
 *

V = 19 HYD MPS/TVC ISOL VLV (three) – CL
 (hold 5 sec) ✓tb – CL

V = 10 * If RCS < 57 % either side: *
 * G51 AFT RCS INH, ITEM 13 EXEC *

V = 10 ✓SPDBK → 81%

V = 7 MLS (three) – ON (✓channels)
 I/O RESET

Go to ENTRY MANEUVERS (Cue Card)

TOP
BACK OF 'HIGH-ENERGY TAL PLT'

HI-ENER
TAL

PILE

POWERED BERMUDA

G51 MAX THROT

- ✓ADI (two) – REF
- ✓ θ REF → 60°, Yaw → 45°
- ✓Roll to Heads Up

G50 Select TARGET and TACAN

- When EAS > 4 and incr:
- ✓Yaw to course pointer
 - ✓Pitch down at 3°/sec
 - ✓MECO, ET SEP

ET SEP

+8s: CSS, pull to $\alpha = 58^\circ$ at 4°/sec, AUTO

- ✓MM602 (BFS, OPS 602 PRO)

Go to BERMUDA ENTRY

2EO BERMUDA (28.5°)

VELOCITY (Vi)	SITE	LOCATION	RWY	TACANS
*~7.2 – 9.4 (no yaw)	6	BERMUDA	BDA 30	BDA 86 (DME)
9.4 – 12.2 (yaw)			BDA 12	BDA 86 (DME)

*Probable bailout region

3EO BERMUDA (28.5°)

MM602 VEL (Vrel)	SITE	LOCATION	RWY	TACANS
*SRB SEP – 18.1	6	BERMUDA	BDA 30 BDA 12	BDA 86 (DME) BDA 86 (DME)

*Probable bailout region

HOOK

BERMUDA ENTRY

If 3 EO BDA OR 2 OUT SECOND GREEN:

G50 Select TARGET and TACAN
 BFS, OPS 602 PRO

VERT SIT ✓ITEM 1 (ENA)

Before NZ Hold:

RHC/PNL TRIM – ENA
 If $M < 5$, ✓AIL/RUD TRIM
 Expect $20^\circ \leq \alpha \leq 58^\circ$

**ABORT
 DUMPS**

Nz Hold:

Expect prebank = 20° if TGT Nz < $-3.3g$ and $\Delta AZ > 20^\circ$

At $\dot{H} = -600 \uparrow$ expect initial bank $2x\Delta AZ$ (70° max)

If $E/W \geq STN$, expect bank = 70° until ΔAZ increased to 30°
 past site, then $2x\Delta Az$

G50 ✓TACANS, INCORPORATE

M < 5, and g < 2: ADTA PROBES – Deploy

G50 INCORPORATE Air Data ASAP
 ✓SPDBK, SHORT FIELD (ITEM 39) if reqd

M = 3.2: ✓OPS 603

Select UHF–G T/R

NO COMM BDA LNDG CRITERIA

@H = 70K, ✓Range:

- * If 28 NM > Range > 54 NM: *
- * Go to BAILOUT *

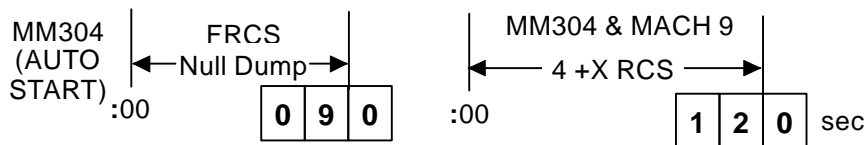
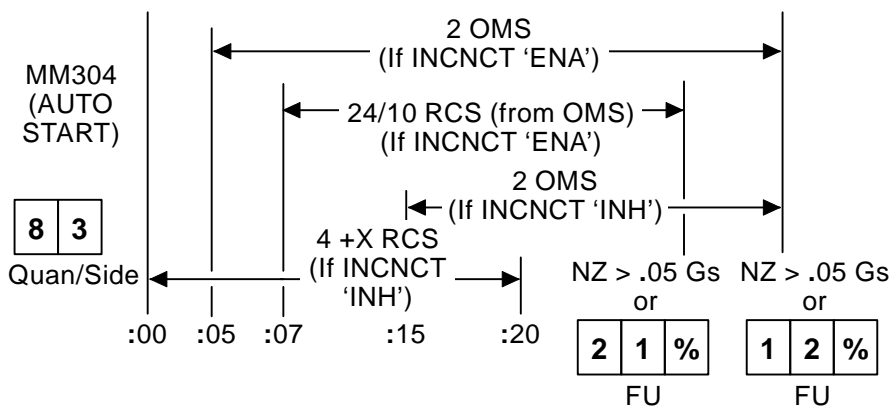
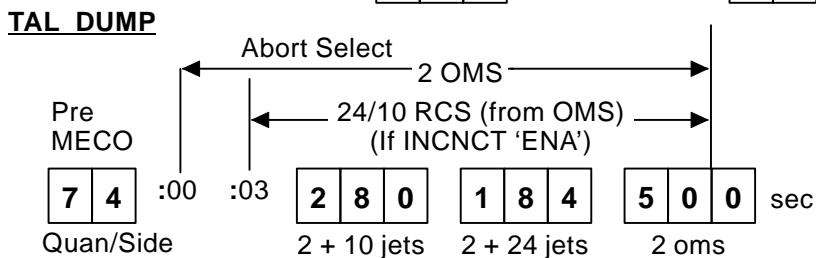
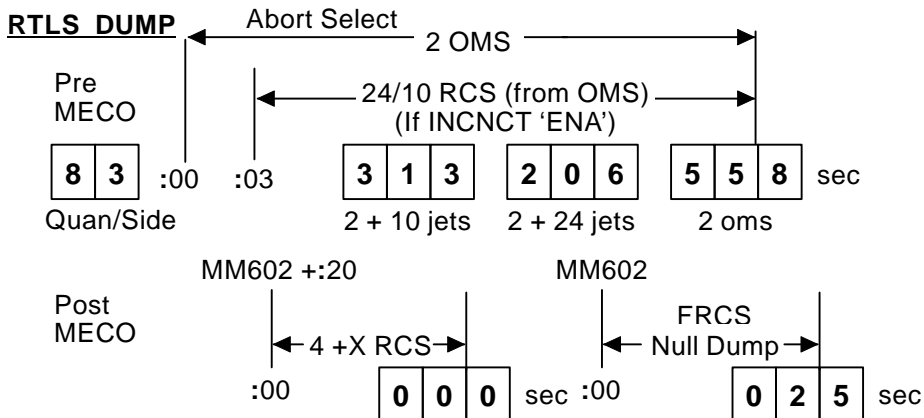
Go to RTLS (enter POST–MECO M = 2.7 step) or BAILOUT

TOP
BACK OF 'BERMUDA ENTRY'

PWRD
BDA

PILE

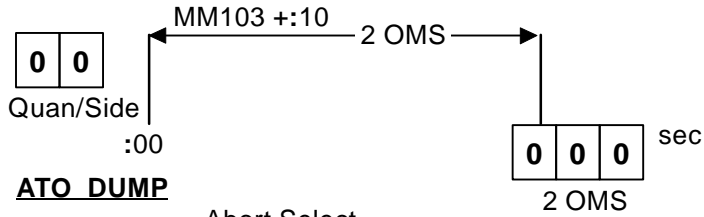
RTLS/TAL DUMPS



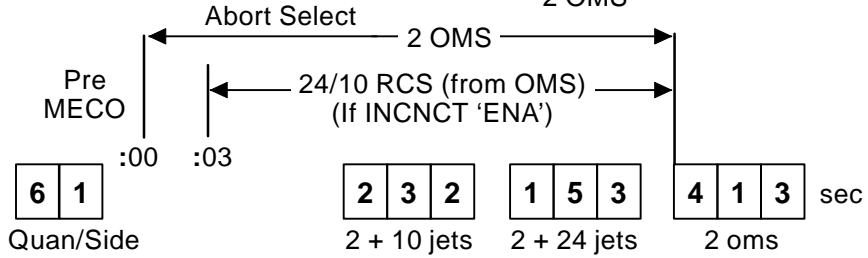
ASSIST/ATO/**G51** DUMPS



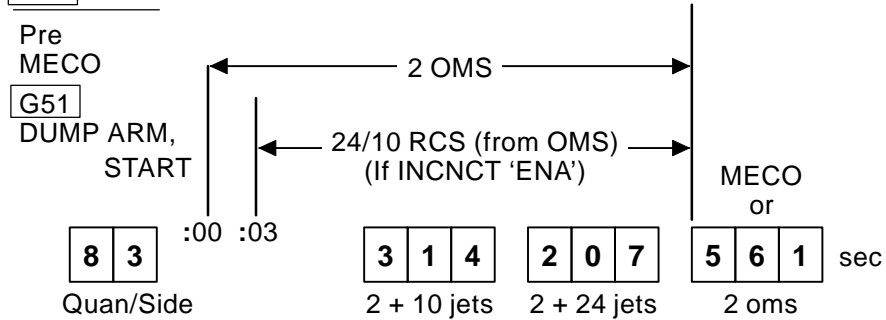
ASSIST DUMP



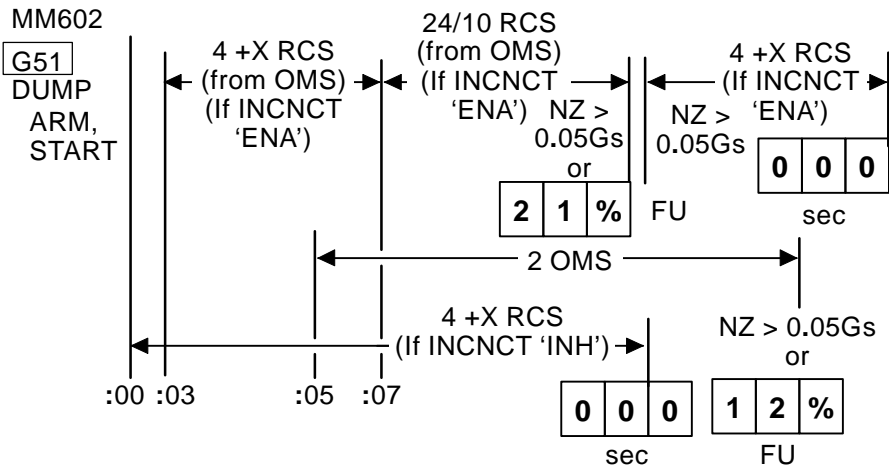
ATO DUMP



G51 DUMP



PWRD
 CCS



TOP
BACK OF 'ASSIST/ATO/G51 DUMPS'

PILE

POWERED CSS

**UPHILL/TAL CSS
MAN THROT**
(If MET < 1:30, engage BFS)

Man MECO @ BFS C/O Tic

\dot{H} 601

If TAL: $\dot{H} = +100$

Max H = 400 - 420K
for early TAL

M > 20 Work $+\dot{H}$

Yaw to \uparrow until 2:30

Then \uparrow uphill

or \uparrow if TAL

✓ TAL HDG

BYD 358/002

BEN 022/338

MRN 028/332

Roll heads up @
13.6 uphill
15.4 TAL

Idle @ 2%
or
C/O bug alive

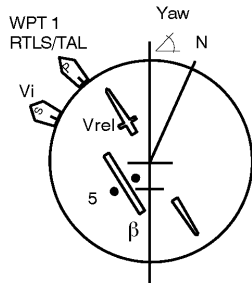
\uparrow
3g
Throt

70

Incr $\theta \sim 10^\circ$ if 1 eng fail

If CSS: Man Throt
Man MECO

**ABORT
DUMPS**



**RTLS CSS
MAN THROT** (If MET < 1:30, engage BFS)

1 eng @ 104 = 4%/min.

Post PPA

2 eng = 100%
3 eng = 69%

Pre PPA

2 eng = 104%
3 eng = 69%

\dot{H} control
Use θ then
Throttle

\uparrow Yaw to \uparrow

**-1200 max
neg. \dot{H}**

PPA on PRPLT

✓ Rate Hi

8°/sec

✓ Rate Med

PPD

Idle & Pitch DN to
horiz ($\alpha -2$)

Man MECO @ C/O Tic

Hold FWD stick till SEP

Zero β

TGTH = +800
@ PPD

Post SEP
Pull to $\alpha = 50$
TGT Nz ~ 2.2g

✓ PRPLT
if < 26% (-60 sec)
or < 18% (Vrel=0)
throt up

AFTER ABORT
Fly RTLS FB
Outbound θ

PC < 50
Hands off

1st Stage use θ on ASC
Cue Card +3° if 1 EO

If CSS: Man Throt
Man MECO

ASCENT CUE CARDS

ASC CUE
CARDS

MS ONLY

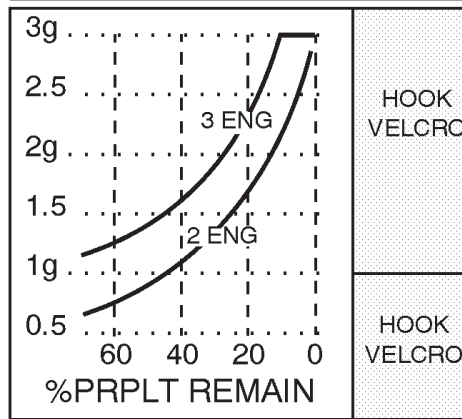
2-23

ASC/109/FIN

ASC CUE
CARDS

ASCENT ADI - NOMINAL

TIME	θ	\dot{H}	H	(109 OCF CY)
0:30	67	649	9K	
0:50	61	981	26K	
1:10	53	1423	50K	
1:30	38	1881	83K	
1:50	30	2188	124K	



-STAGING-

V_1	θ	\dot{H}	H	ASC-14a/109/A/A
6	21	1886	191K	
7	17	1399	258	
8	14	1032	299	
9	12	739	324	
10	10	502	340	
12	7	158	355	
14	5	-48	356	
16	26	-110	354	
18	24	-126	350	
20	22	-51	348	
22	20	97	348	
24	19	304	352	
26114	14	601	367	

ENTRY ALPHA

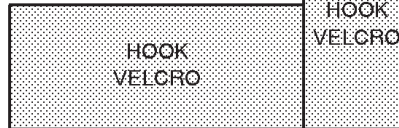
VR	α_{ref}	R	H	H _{ref}	Rref
25	40	4296	400		
24	HI 40 LO	2762	247	-43	R85
23	43 40 37	2255	238	-59	74
22	43 40 37	1871	231	-77	67
21	43 40 37	1572	226	-98	L62
20	43 40 37	1339	218	-114	61
19	43 40 37	1153	211	-134	61
18	43 40 37	999	204	-156	61
17	43 40 37	874	197	-174	62
16	43 40 37	771	191	-184	63

KSC 15

MAX L/D	
M	α
3	17
2	15
1	12

(109 OCF CY)

ASC-14b/109/A,E/A



15	43 40 37	688	185	-198	64
14	43 40 37	615	179	-126	63
13	43 40 37	547	175	-136	61
12	43 40 37	484	171	-151	58
11	42 39 36	424	165	-196	56
10	41 38 35	374	161	-174	R50
9	39 36 33	325	156	-206	43
8	37 34 31	276	148	-239	39
7	33 30 27	230	139	-267	38
6	30 27 24	183	128	-273	39
5	26 23 20	142	115	-275	41
4	23 20 18	107	103	-263	L39
3	19 16 15	74	88	-248	35
2.5	14	61	81	-242	
2	13	50	74	-273	
1.5	10	39	65	-321	
1	8	27	50	-268	

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MS ONLY

2–26

ASC/109/FIN

— | |

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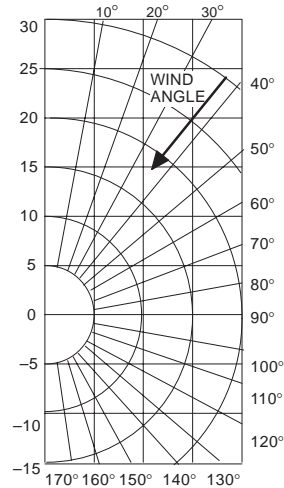
ENTRY MANEUVERS

FLIGHT CONDITIONS	MANEUVER
EI-5	✓LVLH ATT GNC, OPS 304 PRO * If PREBANK, R/Y – CSS * * Roll at 1°/sec to <input type="text"/> <input type="text"/> <input type="text"/> * * Maintain PREBANK ± 5° * If previous OMS OX TK or He TK or RCS OX TK leak: <input type="text"/> 51 VENT DOORS – OP PTI – ENA at EI-5 when applicable
$\bar{q} = 1$	(AOA) HYD MN PUMP PRESS (three) – NORM
'Guidance Box' @ $\bar{q} \sim 8$ or $D \sim 3$	CLOSED LOOP GUIDANCE ____:____:____ * If PREBANK: P,R/Y – AUTO * Begin AIL trim monitoring
D = 11	✓DRAG H (FORCE if editing)
V = 19K	✓MPS/TVC ISOL VLV – CL
V = 15K	✓NAVAIDS (I/O RESET if reqd) * If ELS: UHF MODE – G T/R *
V = 12K	RAD BYP VLV MODE (two) – AUTO CNTLR LOOP (two) – AUTO B(A)
V = 10K	✓SPDBK to 81%
$\Delta A_z = 10.5^\circ$	FIRST ROLL REVERSAL <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>

ENT-6a/E/L

FLIGHT CONDITIONS	MANEUVER
V = 7K	√TACAN status
V = 5K	ADTA PROBES – DEPLOY (√HEAT) Begin AIL and RUD trim monitoring
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 = 0.9	P, R/Y – CSS as reqd √SPDBK CMD vs POS √R FLT CNTLR – ON √NWS – 1 Lock Inertia Reels MAX Nz <input type="text"/> . <input type="text"/> <input type="text"/>
M = 0.7	√LG EXTEND ISOL VLV – OP
h = 15K	√MLS
h = 10K	√A/L, TABS/VISORS – CL/LES O2 – ON (KSC)
MAIN GEAR TD	√SPDBK – 100%
DEROT INIT	DRAG CHUTE pb (two) – ARM,DPY (simo)
NOSE GEAR TD	SRB SEP – MAN/AUTO and depress pb √Auto Load Relief √HYD BRAKE ISOL VLV (three) – OP
V = 60 KGS	DRAG CHUTE JETT pb – JETT
STOP	Go to ENT C/L, POST LANDING PROCEDURES

ORBITER XWIND LIMITS



Enter chart using
max Gust Velocity

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

ENT-6b/E/P

CONT
ABORT

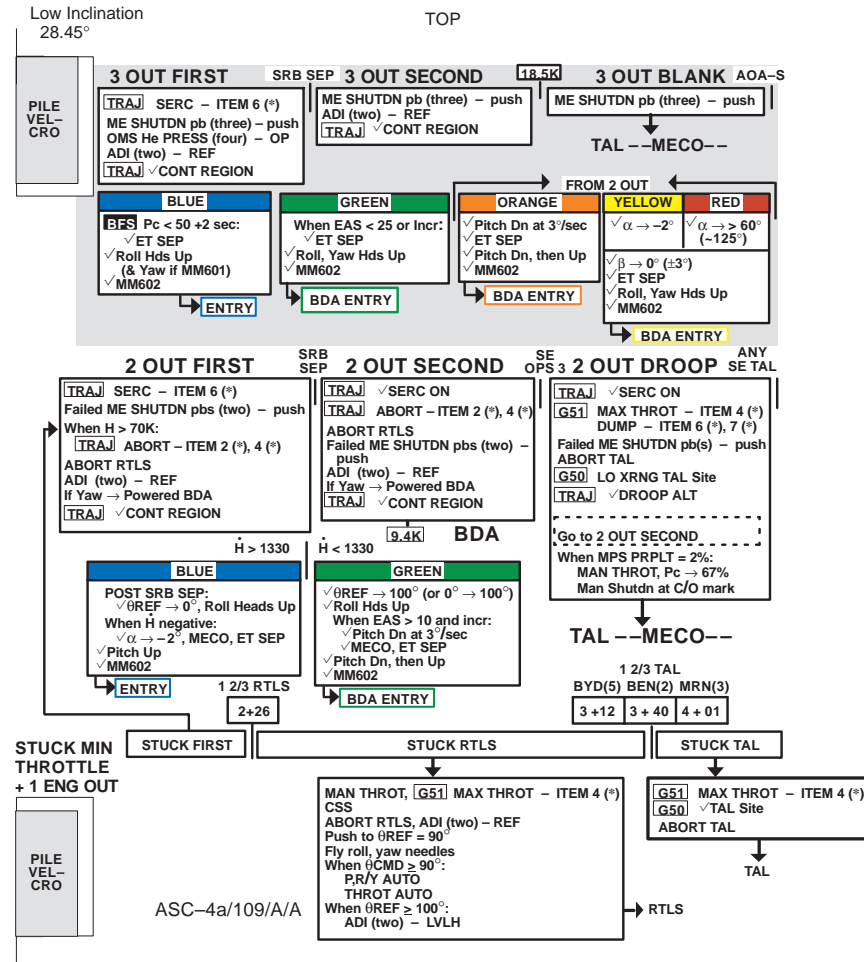
ABORT CUE CARDS

NOT FLOWN

2-29

ASC/109/FIN

CONTINGENCY ABORT



NOT FLOWN

2-30

ASC/109/FIN

CONTINGENCY ABORT

PILE
VEL-
CRO

ENTRY/MM602

VERT SIT INH ECAL -
ITEM 1 (INH)

Before NZ Hold

RHC/PNL TRIM - ENA

If $M < 5$,

✓ AIL/RUD TRIM

If $M < 3$, S/B = 65%

Expect $20^\circ \leq \alpha \leq 58^\circ$

After NZ Hold (NZ < 2g)

$M \leq 5$, ADTA PROBES - Deploy

Monitor - M/α

(M2 → 1: $\theta = 0^\circ$ by $M = .95$)

M	> 12	9	6	3	.95
α	40	35	26	18	12

✓ Air Data

G50 Incorp Air Data ASAP

Select UHF-G T/R

BAILOUT

When $M = .95$:

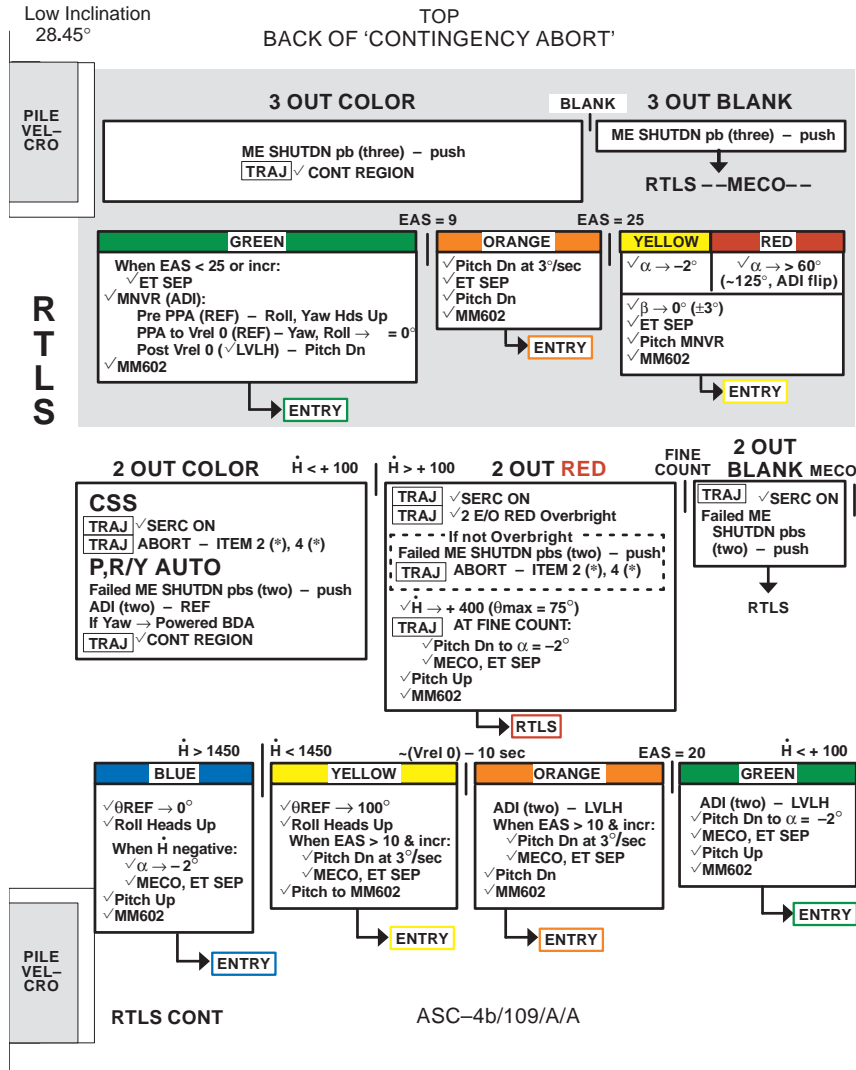
P,R/Y CSS

OPS 603 PRO

Go to BAILOUT

ASC-4a/109/A/A

RTLS CONTINGENCY



NOT FLOWN

2-32

ASC/109/FIN

RTLS CONT

ENTRY/MM602

VERT SIT INH ECAL
ITEM 1 (INH)

Before NZ Hold
RHC/PNL TRIM – ENA
✓ AIL/RUD TRIM

PILE
VEL-
CRO

If $M < 3$, $S/B = 65\%$

Expect $20^\circ \leq \alpha \leq 58^\circ$

After NZ Hold (NZ < 2g)
 $M \leq 5$, ADTA PROBES – Deploy
Monitor – M/α

(M2 → 1: $\theta = 0^\circ$ by $M = .95$)

M	> 8	6	4	2	.95
α	32	26	20	15	12

✓ Air Data

G50 Incorp Air Data ASAP

Select UHF-G T/R

BAILOUT

When $M = .95$:
P,R/Y CSS
OPS 603 PRO

Go to BAILOUT

ASC-4b/109/A/A

**BYD TAL REDESIGNATION
(109 OCF CYC)**

1st E.O. VI		5600	5700	5800	5900	6000	6100	6200
SE OPS 3 BYD 109	(5)	10600	10700	10700	10800	10800	10900	10900
SE BYD 104	(5)	16200	16000	15700	15500	15200	15000	14700

1st E.O. VI		6300	6400	6500	6600	6700	6800	6900
SE OPS 3 BYD 109	(5)	11000	11100	11100	11200	11200	11200	11300
SE BYD 104	(5)	14500	14200	14000	13900	13700	13600	13500

1st E.O. VI		7000	7100	7200	7300	7400	7500	7600
SE OPS 3 BYD 109	(5)	11300	11300	11400	11400	11400	11400	11500
SE BYD 104	(5)	13400	13300	13300	13300	13300	13300	13300

1st E.O. VI		7700	7800	7900	8000	8100	8200
SE OPS 3 BYD 109	(5)	11500	11500	11500	11600	11600	11600
SE BYD 104	(5)	13300	13300	13300	13300	13300	13300

ASC-9a/109/A/A

NOT FLOWN

2-34

ASC/109/FIN

**BEN TAL REDESIGNATION
(109 OCF CYC)**

1st E.O. VI		5900	6000	6100	6200	6300	6400	6500
SE OPS 3 BYD 109	(12)	11000	11000	11000	11100	11200	11300	11400
SE BEN 109	(2)	16800	16500	16300	16000	15700	15400	15100

1st E.O. VI		6600	6700	6800	6900	7000	7100	7200
SE OPS 3 BYD 109	(12)	11400	11400	11400	11400	11400	11400	11400
SE BEN 109	(2)	14800	14600	14400	14200	14100	13900	13800

1st E.O. VI		7300	7400	7500	7600	7700	7800	7900
SE OPS 3 BYD 109	(12)	11400	11400	11400	11400	11400	11400	11400
SE BEN 109	(2)	13800	13700	13700	13700	13700	13700	13700

1st E.O. VI		8000	8100	8200
SE OPS 3 BYD 109	(12)	11400	11400	11400
SE BEN 109	(2)	13700	13600	13600

ASC-10a/109/A/A

NOT FLOWN

2-35

ASC/109/FIN

**MRN TAL REDESIGNATION
(109 OCF CYC)**

1st E.O. VI		6300	6400	6500	6600	6700	6800	6900
SE OPS 3 BEN 109	(11)	10800	10800	10800	10800	10900	10900	11000
SE BEN 104	(2)	16100	15900	15700	15500	15300	15100	14900
SE MRN 109	(3)	17200	16900	16700	16400	16100	15900	15600

1st E.O. VI		7000	7100	7200	7300	7400	7500	7600
SE OPS 3 BEN 109	(11)	11100	11200	11200	11300	11400	11400	11400
SE BEN 104	(2)	14700	14500	14400	14300	14200	14100	14100
SE MRN 109	(3)	15400	15200	15000	14900	14800	14700	14700

1st E.O. VI		7700	7800	7900	8000	8100	8200
SE OPS 3 BEN 109	(11)	11500	11500	11500	11600	11600	11600
SE BEN 104	(2)	14000	14000	13900	13900	13900	13800
SE MRN 109	(3)	14600	14600	14600	14600	14500	14500

ASC-10b/109/A/A

NOT FLOWN

2-36

ASC/109/FIN

NOT FLOWN

TOP

ASCENT/ABORT SUMMARY (109 OCF CYC)

3 EO

SRB
SEP

~18.5

24.9

BLUE	BERMUDA				TAL
FIRST STAGE	SECOND STAGE	BDA	DRP	TAL	PRESS

2 EO

NEG
RTN
8.2

9.4

12.0
SE
OPS 3

14.1
SE
BYD

16.2
SE
PTM

1EO/NOM

2 ENG
BYD
5.6

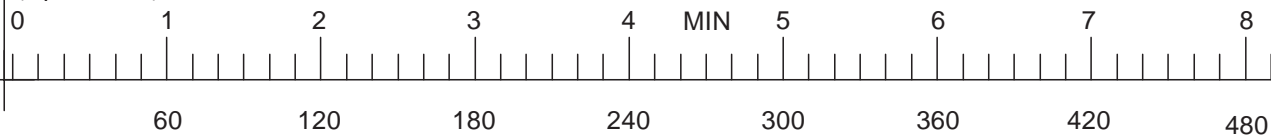
PTA
8.2

PTM
11.1

MECO
26.11

(V_I in KFPS)

ASC-11a/109/A/A



External scale not flown. To be removed in fab process

ASC/109/FIN

2-37

— | |

| | —

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NOT FLOWN

2–38

ASC/109/FIN

— | |

| | —

POST OMS 1 BURN PROCEDURES

**POST
OMS 1**

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

C POST BURN STATUS

NOMINAL OMS 1 TIG TO MCC :

- * **C ALPHA MANAGEMENT (if reqd)** *
- * *
- * If underspeed (ATO or AOA-S) OMS 1 *
- * and Post OMS 1 HP ≤ 75 nm: *
- * Maneuver to LVLH R000, P340, Y000 *
- * (maintain LVLH P = 0 ± 20) *
- * After 10 min: *
- * Maneuver to LVLH P = 340 *
- * After 10 min: *
- * Maneuver to Burn Attitude *

P MPS DUMP

POST
OMS 1

F4 ✓BDY FLP pb – It off (MPS dump complete)
(MECO +4 min)

- * If Feedline Fail: *
- * MECO + 6 min (~14:30 Nom), *
- * ET SEP – SEP *

R4 HYD MPS/TVC ISOL VLV (1,2,3; 5 sec interval) –
CL (hold each 5 sec)✓tb – CL

ET PHOTO MANEUVER

C ✓MCC, ADI – REF, Pitch up 2°/sec until ET in
O/H WINDOW $\theta_{REF} \sim 100^\circ$

B F6,F8 FLT CNTLR PWR (two) – OFF
C3 ✓DAP – AUTO

- IF AOA •
-
- If two Freon Loops ↓ or two H2O Loops ↓: •
- Go to SYS AOA •
- Otherwise, go to AOA •
-

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

- * If no comm and MPS dump complete: *
- * HYD MN PUMP PRESS (three) – *
- * LO (MA) *

P APU/HYD SHUTDN (✓MCC)

- R2 ✓APU AUTO SHUTDN (three) – ENA
BLR PWR (three) – OFF
N2 SPLY (three) – OFF
APU OPER (1,2,3; 5 sec interval) – OFF (MA)
FUEL TK VLV (three) – CL
✓Shutdn (Hyd Press)
CNTLR PWR (three) – OFF

TAIL ONLY CONTROL (✓MCC)

	2: GNC 23 RCS
--	---------------

CRT2 OVRD FWD RCS MANF STATs 1,2,3,4 – CL

FES & HEATER ACTIVATION

- C L1 FLASH EVAP CNTLR PRI A – ON
L2 FDLN HTR (two) – 1
- P R1 O2 TK1,2 HTRS B (two) – AUTO
H2 TK1,2 HTRS B (two) – AUTO
- MS1 A12 APU HTR TK/FU LINE/H2O SYS 1A,2A,3A
(three) – AUTO

AC BUS SNSR

- R1 AC BUS SNSR (three) – OFF (1 sec),
then AUTO TRIP

MAJOR MODE CHANGE

CRT1 GNC, OPS 105 PRO

1: GNC OMS 2 MNVR EXEC	2: GNC OMS 2 MNVR EXEC
3: BFS, GNC OMS 2 MNVR EXEC	

1: GNC OMS 2 MNVR EXEC	2: GNC OMS 2 MNVR EXEC
3: BFS, GNC OMS 2 MNVR EXEC	

B OMS 2 BURN SETUP

✓OMS 2 TARGETING, Flip Book

CRT1 TRIM LOAD – ITEM 6 +0.4 –5.7 +5.7 EXEC

- * For single eng burn (good eng): *
- * TRIM LOAD LY – ITEM 7 +5.2 EXEC *
- * RY – ITEM 8 –5.2 EXEC *
- * OMS L – ITEM 2 EXEC *
- * R – ITEM 3 EXEC *
- * For RCS burn: *
- * RCS SEL – ITEM 4 EXEC *

NOTE

Onboard computed TIG may vary slightly but is acceptable

✓Targets, OMS TARGETS

LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC

CRT3 ✓BFS TGT

1: GNC OMS 2 MNVR EXEC	2: GNC OMS 2 MNVR EXEC
3: BFS, GNC OMS 2 MNVR EXEC	

P MPS PWRDN/ISOL

R2 MPS ENG PWR L (two) – OFF
 CTR (two) – OFF
 R (two) – OFF
 He ISOL (six) – GPC
 √I'CNCT (three) – GPC

NOTE

Expect multiple MAs for MPS He P
as regs bleed down

MPS GH2 INERTING

R4 MPS H2 PRESS LINE VENT – OP
(Start watch)
After 1 min:
 MPS H2 PRESS LINE VENT – GND

1: GNC OMS 2 MNVR EXEC	2: GNC OMS 2 MNVR EXEC
3: BFS, GNC OMS 2 MNVR EXEC	

P ET UMBILICAL DOOR CLOSURE

* If Feedline fail, ✓MCC before closure *

WARNING
 ET CTRLINE LATCHES must be stowed prior to L,R DR closure to prevent door drive damage

NOTE

Double times for single motor operation

- R2 ET UMB
- DR MODE – GPC/MAN
 - CTRLINE LAT – STO
 - ✓After 6 sec, DR CTRLINE LAT tb – STO
- * If DR CTRLINE LAT does not *
 * stow within 14 sec: *
 * DR CTRLINE LAT – GND *
 * ✓MCC *
- L,R DR (two) – CL (tb–bp)
 - ✓After 24 sec, L,R DR tb (two) – CL
- * If doors do not close: ✓MCC *
- L,R LAT (two) – LAT (tb–bp)
 - ✓After 6 sec, L,R LAT tb (two) – LAT
- * If doors do not latch: ✓MCC *
- DR MODE – GPC
 - CTRLINE LAT – GND
 - L,R DR (two) – OFF
 - LAT (two) – OFF

1: GNC OMS 2 MNVR EXEC | 2: GNC OMS 2 MNVR EXEC

3: BFS, GNC OMS 2 MNVR EXEC

OMS BURN PREP

- * For single eng burn/No PROP *
- * failures: *
- * XFEED failed eng PROP to *
- * good eng *

- P O8 L,R OMS
✓He PRESS/VAP ISOL A (two) – GPC
B (two) – CL
✓TK ISOL (four) – GPC (tb–OP)
✓XFEED (four) – GPC (tb–CL)
- B Wedge Install OMS 2/ORBIT BURN and OMS 2 BURN MONITOR Cue Cards (F6,F8)
- If FRCS reqd,
Go to OPS 1 RCS BURN (Cue Card)

OMS 2 BURN ATTITUDE MNVR

- B F6,F8 ✓ADI ATT (two) – INRTL
RATE (two) – 1
- C Mnv to OMS 2 Burn Attitude

3: BFS, GNC SYS SUMM 2

B SEAT SAFING AND ADJUSTMENT

Adjust Back Angle

- TIG–2> B Go to OMS 2/ORBIT BURN (Cue Card)

— | |

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OMS 2 BURN CARDS

OMS 2

MS ONLY

4-1

ASC/109/FIN

OMS 2 BURN MONITOR

OMS TEMP* FU IN P	L	R	
	≥ 225	221	OMS ENG FAIL
	≤ 211	200	OMS PRPLT FAIL
or No FU IN P			
OMS PC* & OMS↓ (BFS: √ accel)			OMS ENG FAIL
ENG VLV 1 or 2 < 70			
or OX IN P > 227			
OX IN P ≤ 227			OMS PRPLT FAIL
or No OX IN P			
OMS OX/FU TK P (√ ENG IN P)			He PRESS/VAP ISOL (two) – OP
OX/FU LOW			If aff TK P not incr:
			He PRESS/VAP ISOL (two) – CL
			At PC < 72 or OMS TEMP or HP > 85:
			OMS PRPLT FAIL
OX & FU HIGH			He PRESS/VAP ISOL (two) – CL
			Cycle He A(B) to maintain TK P 234–284
OMS He TK P LOW			At He P < 640 or QTY ≤ 41:
(√ OMS/MPS)			If HP < 85: OMS XFEED from good OMS
			At HP > 85: OMS PRPLT FAIL
OMS N2 REG P HIGH or LOW			OMS ENG – ARM
OMS N2 TK P LOW			At N2 TK P < 470: OMS ENG – ARM
(√ OMS/MPS)			
OMS GMBL	PRI fail		L(R) OMS GMBL – SEC (twice)
	SEC fail		If high RCS usage: OMS ENG FAIL
GPC	1(4) &		aff GPC PWR – OFF
	Burning OMS aff		If SEC GMBL avail:
			aff MDM FF 1(4) – OFF, ON
			L(R) OMS GMBL – SEC (twice)
	SEC GMBL lost		If high RCS usage: OMS ENG FAIL
	2 FAs lost		√ MAN SHUTDN
I/O ERROR FA	1(4)		L(R) OMS GMBL – SEC
			I/O RESET (if recov: BFS I/O RESET)
			If high RCS usage: OMS ENG FAIL
	2 FAs lost		√ MAN SHUTDN
BCE STRG D			I/O RESET (if recov: >>)
	1(4)		If high RCS usage:
			L(R) OMS GMBL – SEC (twice)
I/O ERROR PCM			OI PCMMU PWR – 2(1)

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

ASC–5a/109/A,O/A

MS ONLY

4–2

ASC/109/FIN

OMS 2

OMS 2/ ORBIT OMS BURNS

- ✓MM105/202(302)
- Enter TGO +5 sec (2 eng) or TGO +10 sec (1 eng)
- ✓BURN ATT (INRTL) then REF, pb – push
- ✓ENG SEL ✓DAP TRANS – NORM (MM202)
- CNTL PWR (two) – ON ✓DAP – AUTO(PASS)/DISC
- ✓GMBL TRIM
- 2 engine: P = +0.4 LY = -5.7 RY = +5.7
- 1 engine: P = +0.4 LY = +5.2 RY = -5.2
- L,R OMS He PRESS/VAP ISOL A (two) – OP
- ...Wait 2 sec...
- L,R OMS HE PRESS/VAP ISOL B (two) – GPC (OP for SE
- GPC OP CL burn)

ORB BURN	A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	B	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TIG-2 SEL OMS ENG(s) – ARM/PRESS (✓P VLVs OP)
 If P VLV CL: Aff OMS ENG – OFF

WARNING

Do not burn aff engine if:
 OMS N2 TK P < 470(564) (NONCRIT BURN)
 He TK P < 640
 FU ENG IN P < 216(244)
 OX ENG IN P < 151(244)

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ΔVTOT: OMS XFEED RETURN (Planned Single Engine)
--------------------------	--------------------------	--------------------------	---

–:15 EXEC
 If OMS ENG P_C MSG and non critical burn: Aff ENG – OFF
 If Leaking OMS PROP, burn RCS +X TIG – 15 sec to OMS IGN + 1 sec

:00 TIG; start watch (✓P_C, ΔVTOT, ENG VLVs)

```

* OMS PRPLT FAIL: *
* HP < 85 (CONTINUE BURN): *
* Failed OMS ENG – OFF *
*   ✓XFEED (two) – CL *
*   TK ISOL (two) – CL *
*   He PRESS (two) – CL *
* HP > 85 (STOP BURN): *
* OMS ENG (two) – OFF *
*   ✓ Failed OMS XFEED (two) – CL *
*   TK ISOL (two) – CL *
*   He PRESS (two) – CL *
* OMS ENG FAIL: *
* ASCENT or CRIT O/O (Continue Burn) *
* Failed ENG – OFF *
* OMS XFEED at → 1/2 ΔVTOT    *
*                        at FAIL *
* RCS COMPLETION: (Hp < 85) or CRIT O/O *
* Interconnect to either OMS that was ENG FAIL *
* THC +X (Hp = 85) *
* Post burn, AFT RCS RECONFIG *
  
```

CUTOFF
 +:02 OMS ENG(s) – OFF (if < 3 IMU, at :)

Trim	OMS 2	TAIL ONLY CNTL	Orbit
Residuals:	VGO X < 0.2 fps VGO Y,Z < 2 fps	VGO X < +0.2 fps	All axes < 0.2 fps

ASC-6a/109/A,O/A

OPS 1 RCS BURN

AFT RCS

✓RCS BURN CONFIG:
 OMS TK ISOL (all) – OP OMS TK
 L(R) OMS XFEED (two) – OP switch at
 R(L) OMS XFEED (two) – CL 1/2 ΔVTOT
 AFT L,R RCS XFEED (four) – OP (If reqd)
 TK ISOL (six) – CL

TIG-2 L,R OMS He PRESS/VAP ISOL A – OP
 ... Wait 2 sec ...

L,R OMS He PRESS/VAP ISOL B – OP

✓MM105

CNTLR PWR (two) – ON

✓BURN ATT (INRTL) then REF, pb – push

✓RCS SEL

DAP: INRTL/DISC

:00 + X

Maintain PITCH ATT ERR ± 3°

Monitor OMS data

Monitor ΔVTOT

CUTOFF Release THC

CNTLR PWR (two) – OFF

FWD RCS

```

. . . . .
. FRCS BURN PREP .
. Load DUMMY target for FRCS attitude .
. RCS SEL – ITEM 4 EXEC .
. TIG @ TTA = 2:00 or as reqd .
. ΔVX = -2.1 (ITEM 19) .
. ΔVY = 0 (ITEM 20) .
. ΔVZ = +1.0 (ITEM 21) .
. LOAD – ITEM 22 EXEC .
. TIG-10 Auto Mnvr to ATT .
. When in attitude: .
. ADI ATT – REF (push) .
. Load External ΔV Burn Target .
. ΔVX = +80 .
. ΔVY = 0 .
. ΔVZ = 0 .
. LOAD – ITEM 22 EXEC .
. TIMER – ITEM 23 EXEC .
. ✓VGOX = negative .
. ✓VGOY = 0 .
. ✓VGOZ = +21 ± 2 .
. ✓REF ball – 0,0,0 .
. . . . .
  
```

NOTE

Error needles invalid during burn

Burn time = ~2X TGO

TGT Hp = for ASCENT

--:30 CNTLR PWR (two) – ON

DAP: INRTL/DISC

:00 -X

CUTOFF CUR HP = TGT HP , release THC

CNTLR PWR (two) – OFF

ASC-6b/109/A,O/A

POST OMS 2 BURN PROCEDURES

**POST
OMS 2**

5-1

ASC/109/FIN

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

C POST BURN STATUS

NOMINAL

Δ TIG

	:		
--	---	--	--

B F6,F8 FLT CNTLR PWR (two) – OFF
 C3 \checkmark DAP: AUTO

C OMS TVC GMBL CHECK

CRT1 SECONDARY CHECK
 Perform SEC L,R then PRI L,R GMBL CK

P OMS/RCS POST BURN RECONFIG

- O7 AFT L,R RCS
 - He PRESS A (two) – GPC (tb-OP)
 - B (two) – CL (tb-CL)
 - TK ISOL (six) – OP (tb-OP)
 - MANF ISOL 1,2,3,4 (eight) – OP (tb-OP)
 - XFEED (four) – CL (tb-CL)
- O8 FWD RCS
 - He PRESS A – GPC (tb-OP)
 - B – CL (tb-CL)
 - TK ISOL (two) – OP (tb-OP)
 - MANF ISOL 1,2,3,4 (four) – OP (tb-OP)
- L,R OMS
 - He PRESS/VAP ISOL (four) – CL
 - TK ISOL (four) – OP (tb-OP)
 - XFEED (four) – CL (tb-CL)

POST
OMS 2

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

MPS LH2 VACUUM INERTING/MANF PRESS CHECKOUT

- R4 1. MPS FILL/DRAIN LH2 OUTBD – CL
...Wait 15 sec, then...
- 2. MPS FILL/DRAIN LH2 OUTBD – OP
- 3. INBD – OP
...Wait 1 min, then...
- 4. MPS FILL/DRAIN LH2 OUTBD – CL
...Wait 15 sec, then...
- 5. MPS FILL/DRAIN LH2 OUTBD – GND
- 6. INBD – GND
- R2 7. MPS He I'CNCT CTR – OUT OP
- R4 8. LH2 MANF PRESS – OP (start watch)
...Wait 8 to 10 sec, then...
- 9. LH2 MANF PRESS – GPC
- R2 10. MPS PNEU He ISOL – GPC
- 11. He I'CNCT CTR – GPC

MAJOR MODE CHANGE

CRT1 GNC, OPS 106 PRO

1: GNC OMS 2 MNVR COAST	2: GNC OMS 2 MNVR COAST
-------------------------	-------------------------

- B C4A, Stow ASC PKT (Helmet Bag)
- R3A Unstow ORBIT Cue Cards & ORB PKT
- * If ATO, ✓MCC for procedure changes *
- * If Rev 3 deorbit reqd, go to CONT *
- * DEORB, LAUNCH DAY ORBIT 3 *

Go to POST INSERT, POST INSERTION

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AOA PADS

**AOA
PADS**

6-1

ASC/109/FIN

DIRECT INSERTION AOA DEL PAD

DEORBIT									
PRPLT					()				
BURN CUE CARD:									
OMS ENG FAIL XFEED QTY CUE					%L		%R		
TOT AFT QTY 1 (%)							9 9		
TOT AFT QTY 2 (%)							6 0		
FLIP ΔV							7 2		
AFT ΔV							2 6		
B/U SITE							N O R		
FRCS: DUMP TO % (USE TIME AS CUE)					<input type="checkbox"/> OX		<input type="checkbox"/> FU		
ENTRY / LANDING									
EI - 5 MM303 INRTL ATT (6-30)					R		P		Y
MM304 PREBANK (ENT MNVR Cue Card)					<input type="checkbox"/> L		<input type="checkbox"/> R		
ALTM SET (6-34)							. . .		
CLG INIT							: : :		
EXPECTED AIL TRIM					<input type="checkbox"/> L		<input type="checkbox"/> R		
VREL 1ST REVERSAL							. . .		
XCG AT TD							. . .		
LAND SITE		RWY				50K /			
						38K /			
<input type="checkbox"/> L		<input type="checkbox"/> OVHD		deg		28K /			
<input type="checkbox"/> R		<input type="checkbox"/> STRT		TAC		20K /			
ΔT MACH .95 TO HAC		MAX Nz		Nz LIMIT		12K /			
:		.		.		7K /			
AIMPOINT		SPEEDBRAKE				3K /			
<input type="checkbox"/> NOM		<input type="checkbox"/> NOM		% @ 3K		1K /			
<input type="checkbox"/> CLOSE-IN		<input type="checkbox"/> S.F.				SURFACE /			
REMARKS:									

AOA
PADS

W/OMS 1 AOA DEL PAD

DEORBIT																											
PRPLT					()																						
BURN CUE CARD:																											
OMS ENG FAIL XFEED QTY CUE					%L		%R																				
TOT AFT QTY 1 (%)							9 9																				
TOT AFT QTY 2 (%)							6 0																				
FLIP HP =			()	+	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">2 4</td><td style="width: 50%; text-align: center;">OR</td><td style="width: 50%; text-align: center;">1 1</td></tr> <tr><td style="width: 50%; text-align: center;">1 0</td><td style="width: 50%;"></td><td style="width: 50%; text-align: center;">0 5</td></tr> <tr><td colspan="2" style="text-align: center; font-size: small;">ΔHP (REDES SITE)</td><td colspan="2" style="text-align: center; font-size: small;">ΔHP (PRI SITE)</td></tr> </table>	2 4	OR	1 1	1 0		0 5	ΔHP (REDES SITE)		ΔHP (PRI SITE)		+	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">3 6</td></tr> <tr><td colspan="2" style="text-align: center; font-size: small;">(FLIP ΔV / 2)</td></tr> </table>	3 6	(FLIP ΔV / 2)		=						
2 4	OR	1 1																									
1 0		0 5																									
ΔHP (REDES SITE)		ΔHP (PRI SITE)																									
3 6																											
(FLIP ΔV / 2)																											
AFT HP =			()	+	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%; text-align: center;">1 3</td></tr> <tr><td colspan="2" style="text-align: center; font-size: small;">(AFT ΔV / 2)</td></tr> </table>	1 3	(AFT ΔV / 2)		=																		
1 3																											
(AFT ΔV / 2)																											
B/U SITE							N O R																				
FRCS: DUMP TO % (USE TIME AS CUE)					<input type="checkbox"/> OX	<input type="checkbox"/> FU																					
ENTRY / LANDING																											
EI - 5 MM303 INRTL ATT (6-30)					R		P		Y																		
MM304 PREBANK (ENT MNVR Cue Card)					<input type="checkbox"/> L	<input type="checkbox"/> R																					
ALTM SET (6-34)							.																				
CLG INIT							:																				
EXPECTED AIL TRIM					<input type="checkbox"/> L	<input type="checkbox"/> R																					
VREL 1ST REVERSAL							.																				
XCG AT TD							.																				
LAND SITE			RWY		<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 50%;">50K</td><td style="width: 50%;">/</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>SURFACE</td><td>/</td></tr> </table>					50K	/	38K	/	28K	/	20K	/	12K	/	7K	/	3K	/	1K	/	SURFACE	/
50K	/																										
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7K	/																										
3K	/																										
1K	/																										
SURFACE	/																										
<input type="checkbox"/> L	<input type="checkbox"/> OVHD	deg			MLS																						
<input type="checkbox"/> R	<input type="checkbox"/> STRT	TAC																									
ΔT MACH .95 TO HAC		MAX Nz		Nz LIMIT		WINDS: (ENT MNVR Cue Card)																					
:		.		.																							
AIMPOINT		SPEEDBRAKE																									
<input type="checkbox"/> NOM	<input type="checkbox"/> NOM	%		@ 3K																							
<input type="checkbox"/> CLOSE-IN	<input type="checkbox"/> S.F.																										
REMARKS:																											

DEORBIT MNVR PAD

OMS BOTH	1	
L	2	
R	3	
RCS SEL	4	
TV ROLL	5	

TRIM LOAD

P	6					
LY	7					
RY	8					
WT	9					
TIG	10					

TGT PEG 4

C1	14					
C2	15					
HT	16					
⊖T	17					
PRPLT	18					

BURN ATT

R	24		
P	25		
Y	26		
REI			
TXX			

ΔVTOT				
TGO				

VGO	X					
VGO	Y					
VGO	Z					

TGT	HA			HP		
-----	----	--	--	----	--	--

NOTES

RCS I'CNCT:

	L OMS → RCS
	R OMS → RCS
	NONE

6-4

ASC/109/FIN

BURN CARD

OMS PRPLT PAD

<p>DEORBIT BURN (1 ENG)</p>	<p>OMS XFEED RETURN at $\Delta VTOT$ = <input type="text"/><input type="text"/><input type="text"/> or <input type="text"/> <input type="text"/><input type="text"/> at <input type="text"/><input type="text"/><input type="text"/> %</p>
<p>DEORBIT BURN (RCS)</p>	<p>RCS I'CNCT TK SW at $\Delta VTOT$ = <input type="text"/><input type="text"/><input type="text"/> OMS PRPLT LOW: $\Delta VTOT$ = <input type="text"/><input type="text"/><input type="text"/></p>
<p>UNBALANCED PRPLT DEORBIT BURN</p>	<p>INITIAL CONFIG: <input type="checkbox"/> TK ISOLs - CL While feeding 2 OMS from 1 POD: OMS PRPLT FAIL: Secure <input type="checkbox"/> OMS Secure <input type="checkbox"/> OMS Interconnect <input type="checkbox"/> OMS to RCS THC + X for <input type="text"/> : <input type="text"/><input type="text"/> If <input type="checkbox"/> (XFEED) ENG '↓' When <input type="checkbox"/> OMS QTY: 5%: <input type="checkbox"/> OMS TK ISOL (two) - OP 4%: <input type="checkbox"/> OMS TK ISOL (two) - CL If <input type="checkbox"/> (STRAIGHT FEED) ENG '↓' OMS ENG FAIL: At $\Delta VTOT$ = <input type="text"/><input type="text"/><input type="text"/> or <input type="text"/> <input type="text"/><input type="text"/> at <input type="text"/><input type="text"/><input type="text"/> % <input type="checkbox"/> TK ISOL (two) - OP <input type="checkbox"/> TK ISOL (two) - CL Return to 2 ENG, 2 POD FLOW: At $\Delta VTOT$ = <input type="text"/><input type="text"/><input type="text"/> <input type="checkbox"/> TK ISOLs - OP OMS ENG FAIL: (XFEED CUE) OMS QTY <input type="text"/><input type="text"/> %L or <input type="text"/><input type="text"/> %R</p>
<p>DEORBIT BURN (MIXED XFEED)</p>	<p>FEED FROM GOOD POD: At $\Delta VTOT$ = <input type="text"/><input type="text"/><input type="text"/> or <input type="text"/> <input type="text"/><input type="text"/> at <input type="text"/><input type="text"/><input type="text"/> % <input type="checkbox"/> OMS He PRESS (two) - OP TK ISOL (two) - OP XFEED (two) - OP Secure <input type="checkbox"/> OMS OMS PRPLT LOW: AFT RCS RECONFIG at $\Delta VTOT$ = <input type="text"/><input type="text"/><input type="text"/> OMS ENG FAIL: <input type="checkbox"/> OMS He PRESS (two) - OP TK ISOL (two) - OP <input type="checkbox"/> OMS XFEED (two) - CL</p>



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AOA PROCEDURES

AOA

1: GNC OMS 2 MNVR EXEC	2: GNC OMS 2 MNVR EXEC
3: BFS, GNC OMS 2 MNVR EXEC	

P HYD DEPRESS

- R4 HYD MPS/TVC ISOL VLV (three) – CL
- R2 ✓APU SPEED SEL (three) – NORM
- ✓AUTO SHUTDN (three) – ENA
- HYD MN PUMP PRESS (three) – LO (MA)

FES AND HEATER ACTIVATION

- C L2 FLASH EVAP FDLN HTR (two) – 1
- P R1 O2 TK1,2 HTRS B (two) – AUTO
- H2 TK1,2 HTRS B (two) – AUTO
- MS1 A12 APU HTR TK/FU LINE/H2O SYS 1A,2A,3A
(three) – AUTO

AC BUS SNSR

- R1 AC BUS SNSR (three) – OFF (1 sec),
then AUTO TRIP

MAJOR MODE CHANGE

- CRT1 GNC, OPS 105 PRO

Select any AOA LTGT (3–12) to set AOA flag,
but do not load until OPS 3

1: GNC OMS 2 MNVR EXEC	2: GNC OMS 2 MNVR EXEC
3: BFS, GNC OMS 2 MNVR EXEC	

NOTE

Manually entered tgt data will be carried over to OPS 3 except: PASS, BFS ITEMS 5 and 18 (ILL ENTRY).

Transition to OPS 3 NLT TIG-10 min

C4F, Stow ASC PKT
 R3A Stow ASCENT Cue Cards
 R3F Unstow ENT PKT

F6,F8 Install AOA DEORBIT BURN and DEORBIT BURN MONITOR Cue Cards (R3A)

IF APUs SHUTDN:

<p>WARNING Ice in WSB Steam Vent may cause loss of APU/HYD</p>
--

P APU STEAM VENT HEATER ACT

3: BFS, SM SYS SUMM 2

✓APU OIL IN TEMP (three) < 230 degF
 ✓OUT TEMP (three) < 230 degF

NOTE

If any temp > 230, wait until temp < 230 in aff system

R2 ✓BLR CNTLR/HTR (three) – A
 PWR (three) – ON
 N2 SPLY (three) – ON

1: GNC OMS 2 MNVR EXEC | 2: GNC OMS 2 MNVR EXEC

3: BFS, GNC OMS 2 MNVR EXEC

P MPS ISOL

R2 MPS He ISOL (six) – GPC
 PNEU He ISOL – GPC
 ✓He I'CNCT (three) – GPC

NOTE

Expect multiple MAs for MPS He P
as regs bleed down

MPS GH2 INERTING

R4 MPS H2 PRESS LINE VENT – OP
 (Start watch)
 After 1 min:
 MPS H2 PRESS LINE VENT – GND

1: GNC OMS 2 MNVR EXEC	2: GNC OMS 2 MNVR EXEC
3: BFS, GNC OMS 2 MNVR EXEC	

P ET UMBILICAL DOOR CLOSURE

* If Feedline fail, ✓MCC before closure *

<p>WARNING ET CTRLINE LATCHES must be stowed prior to L,R DR closure to prevent door drive damage</p>

* If ET Doors will not manually close and latch, prior to OPS 3 transition:

2: GNC 51 OVERRIDE

* ET UMB DR CLOSE – ITEM 40(30) EXEC *

NOTE

Double times for single motor operation

R2

ET UMB

DR MODE – GPC/MAN
CTRLINE LAT – STO
✓After 6 sec, DR CTRLINE LAT tb – STO

* If DR CTRLINE LAT does not stow within 14 sec, DR CTRLINE LAT – GND ✓MCC *

L,R DR (two) – CL (tb–bp)
✓After 24 sec, L,R DR tb – CL

* If doors do not close: ✓MCC *

L,R LAT (two) – LAT (tb–bp)
✓After 6 sec, L,R LAT tb – LAT

* If doors do not latch: ✓MCC *

DR MODE – GPC
CTRLINE LAT – GND
L,R DR (two) – OFF
LAT (two) – OFF

1: GNC OMS 2 MNVR EXEC	2: GNC OMS 2 MNVR EXEC
3: BFS, GNC OMS 2 MNVR EXEC	

RECONFIG DPS FOR ENTRY

<p>CAUTION If recovering string(s) due to failed GPC(s), all FCS CH(s) to AUTO prior to OPS 301 PRO</p>

CRT1 GNC, OPS 301 PRO (✓DAP)
 CRT3 BFS, GNC, OPS 301 PRO

CRT1 GNC, OPS 302 PRO

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

✓RWY Selection
 AOA RWY OPTIONS

ALL INCLINATIONS				
SITE	RWY	TACANS	ITEM 5	MLS
1	KSC 15 KSC 33	TTS 59Y	OMN 73	8 6
20	NOR 17 NOR 23	SNG 121Y	HMN 92	6 6
21	NOR 05 NOR 35	SNG 121Y	HMN 92	- -
22	EDW 15 EDW 33	EDW 111	LHS 21	6 #
23	EDW 22 EDW 04	EDW 111	LHS 21	8/† 6
24	EDW 23L EDW 18L	EDW 111	LHS 21	# #
25	KSC 15 KSC 33	COF 97	LAL 107	8 6

#MSBLS Jr. Channel 6 – Requires Uplink
 †MSBLS Jr. Channel 8 – Requires Uplink

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

1: GNC DEORB MNVR EXEC

B OMS 2 BURN SETUP

CRT1 ✓Or enter Target (steep or shallow based on ΔV capability) from OMS TARGETS or MCC

TRIM LOAD – ITEM 6 +0.4 -5.7 +5.7 EXEC

*	For single eng burn (good eng):	*
*	TRIM LOAD LY – ITEM 7 + <u>5.2</u> EXEC	*
*	RY – ITEM 8 - <u>5.2</u> EXEC	*
*	OMS L – ITEM 2 EXEC	*
*	R – ITEM 3 EXEC	*
*	For RCS burn:	*
*	RCS SEL – ITEM 4 EXEC	*

NOTE

Onboard computed TIG and θ_t may vary slightly and are acceptable if REI is correct

LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC

CRT3 ✓BFS TGT

Fill in AOA DEORBIT BURN CARDS from AOA DEL PAD, 6–2 or 6–3

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

C OMS TVC GMBL CHECK
(Perform during S-band AOS)

CRT1 SECONDARY CHECK

Perform SEC L,R then PRI L,R GMBL CK

- * If down arrow(s) or M(s): *
- * Select good GMBL *

SEAT ADJUSTMENT

Adjust Back Angle

P OMS BURN PREP

- * For single eng burn/No PROP failures: *
- * XFEED failed eng PROP to good eng *

- O8 L,R OMS
 √He PRESS/VAP ISOL A (two) – GPC
 B (two) – CL
 √TK ISOL (four) – GPC (tb–OP)
 √XFEED (four) – GPC (tb–CL)

```

. . . . .
.   RCS BURN PREP (I'CNCT OMS to RCS) .
.
.   P O8   L,R OMS .
.           He PRESS/VAP ISOL (four) – CL .
.           TK ISOL (four)         – OP (tb–OP) .
.           L OMS XFEED (two)     – OP (tb–OP) .
.           R OMS XFEED (two)     – CL (tb–CL) .
.   O7   AFT L,R RCS .
.           XFEED (four)         – OP (tb–OP) .
.           TK ISOL (six)         – CL (tb–CL) .
. . . . .

```


1: GNC DEORB MNVR EXEC | 2: GNC DEORB MNVR EXEC

3: BFS, DEORB MNVR EXEC

OMS BURN TIG ADJUST (if reqd)

CRTX LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC

Determine Δ TIG (if REI – REF > 50)
from OMS TARGETS

CRTX Enter new TIG

LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC

Repeat until Δ RANGE < 50

CRT3 BFS TGT

MNVR TO DEORBIT BURN ATTITUDE

B F6,F8 ADI ATT (two) – INRTL
 ERR (two) – 5
 RATE (two) – 5

C Mnv to Deorbit Burn Attitude
(ADI ATT with CRT BURN ATT)

3: BFS, GNC SYS SUMM 2

TIG-2 B R3A Go to AOA DEORBIT BURN (Cue Card)

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**DEORBIT
CARDS**

AOA DEORBIT BURN AND DEORBIT BURN MONITOR CARDS

MS ONLY

6-17

ASC/109/FIN

DEORBIT CARDS

DEORBIT BURN MONITOR

OMS TEMP*	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">L</td> <td style="padding: 2px;">R</td> </tr> <tr> <td style="padding: 2px;">FU IN P ≥ 225</td> <td style="padding: 2px;">221</td> </tr> <tr> <td style="padding: 2px;">≤ 211</td> <td style="padding: 2px;">200</td> </tr> </table>	L	R	FU IN P ≥ 225	221	≤ 211	200	
L	R							
FU IN P ≥ 225	221							
≤ 211	200							
		OMS ENG FAIL						
		OMS PRPLT FAIL						
or No FU IN P								
OMS PC* & OMS ↓ (BFS: √accel)	ENG VLV 1 or 2 < 70	OMS ENG FAIL						
	or OX IN P > 227							
	OX IN P ≤ 227	OMS PRPLT FAIL						
or No OX IN P								
OMS OX/FU TK P (√ENG IN P)	OX/FU LOW	He PRESS/VAP ISOL (two) – OP If aff TK P not incr: 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	L(R) OMS GMBL – SEC (twice)						
	SEC fail	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 √MAN SHUTDN						
	2 FAs lost							
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 ⇒ <input type="checkbox"/>	STOP BURN: OMS ENG(s) – OFF >>						
	BELOW SAFE HP ⇒ <input type="checkbox"/>	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						
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/109/A,O,D,E/A

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MS ONLY

6–19

ASC/109/FIN

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**AOA
DEORBIT
BURN (2 ENG)**

- ✓MM302 ✓OMS BOTH
- Enter TGO + 5 sec
- ✓TRIM: P +0.4, LY -5.7, RY +5.7
- L,R OMS He PRESS/VAP ISOL A (two) – GPC
- B (two) – OP
- ✓DAP – AUTO(PASS)/DISC
- ADI – LVLH(REF)/HI/MED
- FLT CNTLR PWR (two) – ON

- TIG-2 OMS ENG (two) – ARM/PRESS
- :15 EXEC
- :15 If OMS AFT QTY < 11%, THC +X to OMS IGN + 1 sec
- :00 Start watch (✓P_C, ΔVTOT, ENG VLVs)

- * **OMS PRPLT FAIL (CONTINUE BURN):** *
- * Failed OMS ENG – OFF *
- * ITEM 18 +Q EXEC *
- * When good OMS QTY: *
- * 5%: L, R OMS XFEED (four) – OP *
- * 4%: Good OMS TK ISOL (two) – CL *
- * If OMS P_C < 80 or OMS TEMP, *
- * OMS ENG – OFF *
- * ✓ADI – LVLH, center needles *
- * RCS COMPLETION *
- * **OMS ENG FAIL:** *
- * Failed OMS ENG – OFF *
- * OMS XFEED at 1/2 ΔVTOT at fail

--	--	--

 *
- * or OMS QTY

--	--

 %L or

--	--

 %R *
- * **2nd OMS FAIL (ENG or PRPLT):** *
- * Failed OMS ENG – OFF *
- * If PRPLT FAIL: *
- * Secure aff OMS *
- * ITEM 18 +Q EXEC *
- * ✓ADI – LVLH, center needles *
- * Interconnect good OMS to RCS *
- * THC +X (✓OMS% vs RCS Burn Time) *
- * RCS I'CNCT TK SW (N/A for OMS PRPLT FAIL) *
- * THC +X (✓OMS% vs RCS Burn Time) *
- * AFT RCS RECONFIG *
- * RCS COMPLETION *

ASC-8a/A/D

HINGE

----- HINGE -----

* **RCS COMPLETION:** *

* If DIRECT INSERTION: *

* THC +X to Δ VTOT = 0 or TOT AFT QTY 1 % *

* At AFT QTY 1 THC +X to FLIP Δ V or *

* if CUR Δ VTOT: TOT AFT QTY 2 % then *

* FRCS COMPLETION *

* FLIP ----- *

* Δ V FRCS COMPLETION *

* AFT ----- *

* Δ V THC +X to TGT Δ V *

* TGT ----- *

* Δ V *

* If W/OMS 1: *

* THC +X to TGT HP or TOT AFT QTY 1 % *

* At AFT QTY 1 THC +X to FLIP HP or *

* if CUR HP: TOT AFT QTY 2 % then *

* FRCS COMPLETION *

* FLIP ----- *

* HP FRCS COMPLETION *

* AFT ----- *

* HP THC +X to TGT HP *

* TGT ----- *

* HP *

* **FRCS COMPLETION:** *

* Mnvr to -X Att (pitch up at 3°/sec to VGOz = +1/4 Δ VTOT) *

* THC -X to Δ VTOT = 0 or FRCS depletion (JETS FAIL OFF) *

CUTOFF

+ :02 OMS ENG(s) - OFF (If < 3 IMU, at :)

 * AFT RCS RECONFIG if INTERCONNECT *

 Trim X,Z residuals < 2 fps (< 0.5 fps if shallow)

ASC-8aa/109/A/A

**AOA
DEORBIT
BURN (1 ENG)**

- ✓MM302 ✓OMS L or R
- ✓OMS BURN CONFIG (L or R XFEED)
Enter TGO + 10 sec
- ✓TRIM: P +0.4, LY +5.2, RY -5.2
L,R OMS He PRESS/VAP ISOL A (two) - OP
 ... Wait 2 sec ... B (two) - OP
- ✓DAP - AUTO(PASS)/DISC
ADI - LVLH(REF)/HI/MED
FLT CNTLR PWR (two) - ON
- TIG-2 Good OMS ENG - ARM/PRESS
 - :15 EXEC
 - :15 If OMS AFT QTY < 11%, THC +X to OMS IGN + 1 sec
 - :00 Start watch (✓P_c, ΔVTOT, ENG VLVs)

OMS XFEED RETURN at ΔVTOT =
 or at %
 L,R OMS TK ISOL (four) - OP
 XFEED (four) - CL

- * **OMS PRPLT FAIL (CONTINUE BURN):** *
- * OMS ENG - OFF *
- * ITEM 18 +0 EXEC *
- * Secure aff OMS *
- * ✓ADI - LVLH, center needles *
- * Interconnect good OMS to RCS *
- * THC +X (✓OMS% vs RCS Burn Time) *
- * AFT RCS RECONFIG *
- * RCS COMPLETION *
- * **OMS ENG FAIL (CONTINUE BURN):** *
- * OMS ENG - OFF *
- * ✓ADI - LVLH, center needles *
- * Interconnect OMS to RCS *
- * THC +X (✓OMS% vs RCS Burn Time) *
- * RCS I'CNCT TK SW *
- * THC +X (✓OMS% vs RCS Burn Time) *
- * AFT RCS RECONFIG *
- * RCS COMPLETION *
- * **RCS +X JET FAIL OFF:** *
- * ITEM 18 +0 EXEC *
- * G23 Resel jet *

ASC-8b/A/A

HINGE

HINGE

* **RCS COMPLETION:** *

* If DIRECT INSERTION: *

* THC +X to $\Delta VTOT = 0$ or TOT AFT QTY 1 % *

* *

* At AFT QTY 1 THC +X to FLIP ΔV or *

* if CUR $\Delta VTOT$: TOT AFT QTY 2 % then *

* FRCS COMPLETION *

* FLIP ----- *

* ΔV FRCS COMPLETION *

* AFT ----- *

* ΔV THC +X to TGT ΔV *

* TGT ----- *

* ΔV *

* If W/OMS 1: *

* THC +X to TGT HP or TOT AFT QTY 1 % *

* *

* At AFT QTY 1 THC +X to FLIP HP or *

* if CUR HP: TOT AFT QTY 2 % then *

* FRCS COMPLETION *

* FLIP ----- *

* HP FRCS COMPLETION *

* AFT ----- *

* HP THC +X to TGT HP *

* TGT ----- *

* HP *

* **FRCS COMPLETION:** *

* Mnv r to -X Att (pitch up at 3°/sec to VGOz = +1/4 $\Delta VTOT$) *

* THC -X to $\Delta VTOT = 0$ or FRCS depletion (JETS FAIL OFF) *

CUTOFF

+ :02 OMS ENG – OFF (If < 3 IMU, at :)

* AFT RCS RECONFIG if INTERCONNECT *

Trim X,Z residuals < 2 fps (< 0.5 fps if shallow)

ASC-8bb/109/A/A

AOA DEORBIT BURN (RCS)

- ✓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
 Maintain PITCH ATT ERR $\pm 3^\circ$
 Monitor $\Delta VTOT$:

RCS I'CNCT TK SW at $\Delta VTOT =$
 R OMS XFEED (two) – OP
 L OMS XFEED (two) – CL

OMS PRPLT LOW

• AFT RCS RECONFIG AT $\Delta VTOT =$ •
 • RCS COMPLETION •

- * **OMS PRPLT FAIL (MULTIPLE JETS FAIL OFF):** *
- * Secure aff OMS *
- * ITEM 18 +0 EXEC *
- * G23 Resel jets *
- * Interconnect good OMS to RCS *
- * THC +X (✓OMS% vs RCS Burn Time) *
- * AFT RCS RECONFIG *
- * RCS COMPLETION *
- * **RCS +X JET FAIL OFF:** *
- * ITEM 18 +0 EXEC *
- * G23 Resel jet *

ASC-7a/A/A

 HINGE

HINGE

* **RCS COMPLETION:** *

* If DIRECT INSERTION: *

* THC +X to $\Delta VTOT = 0$ or TOT AFT QTY 1 % *

* At AFT QTY 1 if CUR $\Delta VTOT$: THC +X to FLIP ΔV or *

* TOT AFT QTY 2 % then *

* FRCS COMPLETION *

* FLIP ----- *

* ΔV FRCS COMPLETION *

* AFT ----- *

* ΔV THC +X to TGT ΔV *

* TGT ----- *

* ΔV *

* If W/OMS 1: *

* THC +X to TGT HP or TOT AFT QTY 1 % *

* At AFT QTY 1 if CUR HP: THC +X to FLIP HP or *

* TOT AFT QTY 2 % then *

* FRCS COMPLETION *

* FLIP ----- *

* HP FRCS COMPLETION *

* AFT ----- *

* HP THC +X to TGT HP *

* TGT ----- *

* HP *

* **FRCS COMPLETION:** *

* Mvnr to -X Att (pitch up at 3°/sec to VGOz = +1/4 $\Delta VTOT$) *

* THC -X to $\Delta VTOT = 0$ or FRCS depletion (JETS FAIL OFF) *

CUTOFF:
VGOx = 0, release THC
AFT RCS RECONFIG
Trim Inplane X,Z residuals < 2 fps (< 0.5 if shallow)

ASC-7aa/109/A/A

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MS ONLY

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ASC/109/FIN

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POST D/O
BURN

AOA POST DEORBIT BURN

6-27

ASC/109/FIN

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

B F6,F8 FLT CNTLR PWR (two) – OFF
 C3 ✓DAP: AUTO

P OMS/RCS POST BURN RECONFIG

POST D/O
BURN

```

: . . . . . :
: IF I'CNCT :
: Perform I'CNCT RETURN :
: (ENT PKT, RCS) :
: . . . . . :

```

O7 AFT L,R RCS
 ✓He PRESS (four) – OP (tb-OP)
 ✓TK ISOL (six) – GPC (tb-OP)
 MANF ISOL 1,2,3,4 (eight) – OP (tb-OP)
 ✓XFEED (four) – GPC (tb-CL)

O8 FWD RCS
 TK ISOL (two) – OP (tb-OP)
 L,R OMS
 He PRESS/VAP ISOL (four) – CL
 TK ISOL (four) – OP (tb-OP)

* If OMS PRPLT FAIL: *
 * ✓Aff TK ISOL (two) – CL *

XFEED (four) – CL (tb-CL)

Determine Prebank
 Determine ΔHP (CUR HP – TGT HP)

Use RECOVERY PREBANK TABLES
 Record Prebank on ENTRY MANEUVERS
 Cue Card

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

RECOVERY PREBANK TABLES (EDW)

NOTE: APPLICABLE ONLY IF OMS 1 REQD

(ATO/AOA steep entries) **EDW**

ΔHP	0	5	(11)
PREBANK	0	45	70

RED
NOR

17	21	25	29	33
90	100	115	140	175
NOR N/A				

↓

(ATO/AOA steep entries) **Redesignate NOR**

ΔHP			
PREBANK			

12	18	(24)	31	37	41
35	70	85	105	140	180

↓

(ATO/AOA shallow entries) **EDW**

ΔHP	0	3	(5)
PREBANK	90	100	110

RED
NOR

7	9	10	11	12
120	135	145	155	170
NOR N/A				

↓

(ATO/AOA shallow entries) **Redesignate NOR**

ΔHP			
PREBANK			

6	8	(10)	12	13	16
95	105	115	130	140	180

109 OCF

C POST BURN STATUS

NOMINAL Δ TIG

			:			
--	--	--	---	--	--	--

P CRT2 **GNC, OPS 303 PRO**

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

MPS LH2 INERTING

- R4 1. MPS FILL/DRAIN LH2 INBD – OP
 ...Wait 15 sec, then...
 2. MPS FILL/DRAIN LH2 INBD – GND

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

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

- * If UNDERBURN or no DEL PAD, manually *
- * mnvr to LVLH R001, Y358, P per table *

TIME to EI (min)	LVLH PITCH (deg)
20	339
	343
	347
	351
	355
15	359
	3
	7
	11
	15
10	19
	23
	27
	31
	35
5	39

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

C OMS GMBL PWRDN (PASS ONLY)

CRT1 Verify GMBL positions:
 L R
 P +5.9 +5.9
 Y +6.4 -6.4
 GMBL OFF – ITEM 32 EXEC
 – ITEM 33 EXEC

1: GNC 53 CONTROLS	2: BFS, GNC SYS SUMM 2
3: GNC DEORB MNVR COAST	

C SECONDARY ACTUATOR CHECK
(IF TIME PERMITS)

NOTE

If port does not bypass during check, bypass affected port after check:
 SEC ACT BYPASS – ITEM 8 +X X EXEC
If affected port still does not bypass:
 SEC ACT RESET – ITEM 9 +X X EXEC

- R2 1. HYD MN PUMP PRESS (one) – NORM
- CRT3 2. SURF DRIVE ON, ITEM 39 EXEC (*), wait at least 5 sec
- SPI ✓SPI: Stop drive test when elevon posns within +12° to -27°:
 SURF DRIVE OFF, ITEM 40 EXEC (*)
- CRT1 3. ✓POS STIM ENA, ITEM 7 – (no *)
- C3 4. ✓FCS CH 1,2,3,4 – AUTO
- CRT1 5. SEC ACT CK, CH 1 – ITEM 1 EXEC (*)
 CK START – ITEM 5 EXEC (*)
- 6. ✓All CH 1 ports bypass ‘↓’
 STOP – ITEM 6 EXEC (*)
- C3 7. FCS CH 1 – ORIDE
- CRT1 ✓All CH 1 ports reset no ‘↓’
- C3 FCS CH 1 – AUTO
- 8. Repeat steps 5 thru 7 for CH 2,3,4
- R2 9. HYD MN PUMP PRESS (three) – LO

1: GNC 53 CONTROLS	2: BFS, GNC SYS SUMM 2
3: GNC DEORB MNVR COAST	

1: GNC 23 RCS	2: GNC DEORB MNVR COAST
3: BFS, GNC SYS SUMM 2	

P FRCS DUMP

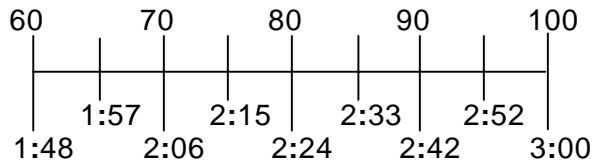
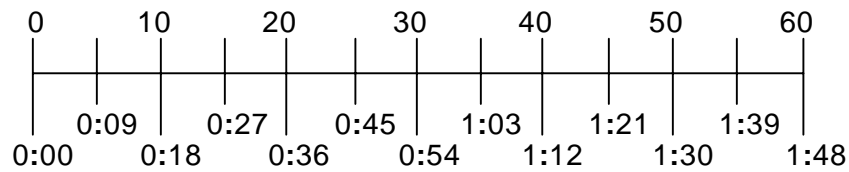
NOTE

Use BFS qtys for all calculations

Determine FRCS 'DUMP TO %' using lowest of OX or FU qty (calculator or DEL PAD)

FOUR JET DUMP:

FRCS PRPLT TO BE DUMPED (%)



TIME FROM DUMP INITIATION (M:S)

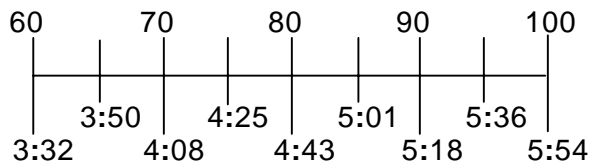
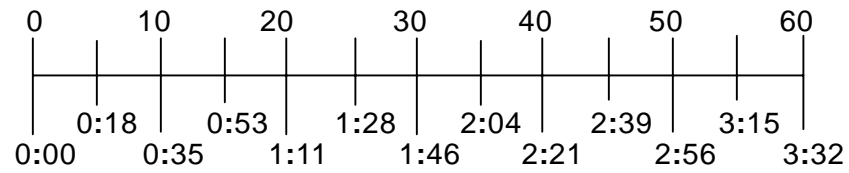
NOTE

During dump, disregard FRCS qty

1: GNC 23 RCS	2: GNC DEORB MNVR COAST
3: BFS, GNC SYS SUMM 2	

TWO JET DUMP:

FRCS PRPLT TO BE DUMPED (%)



TIME FROM DUMP INITIATION (M:S)

NOTE

During dump, disregard FRCS qty

CRT2 FWD RCS ARM – ITEM 36 EXEC
DUMP – ITEM 37 EXEC
(Start watch)
When dump time achieved:
FWD RCS OFF – ITEM 38 EXEC

1: GNC DEORB MNVR COAST

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

3: BFS, GNC SYS SUMM 2

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 (AOA DEL PAD)	✓41	✓41
RWY (AOA DEL PAD)	✓3	✓3
	✓4	✓4
TAC (per AOA RWY)	✓5	✓5
RA	blank ✓46	
TAEM TGT		
G&N	OVHD ✓6	blank
HSI	blank	blank
XEP	NEP ✓7	NEP ✓7
AIM (AOA DEL PAD)	NOM ✓8 (or CLSE)	NOM ✓8 or (CLSE)
SPDBK	NOM ✓39	
TAC	INH ✓20	INH ✓20
GPS	INH ✓43	INH ✓43
DRAG H	AUT ✓22	AUT ✓22
ADTA H	INH ✓26	INH ✓26
ADTA TO G&C	INH ✓29	AUT ✓28
TAC	DELTA ✓35	
DES any failed TACANS	✓	✓
AIF_G	INH ✓48	

* If BFS engaged: *
* Set HSD BFS ITEMS to PASS Config *

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

ENTRY SW CHECK

- B F6,F8 Stow AOA DEORBIT BURN Cue Cards (R3A)
- R3A Install ENTRY Cue Cards

NOTE

If NAVAIDS 'OFF' due to PKT C/L PWRDN, switch 'ON' per pwrdn procedure

- P O7
 - ✓TACAN MODE (three) – GPC
 - ✓ANT SEL (three) – AUTO
 - CH (three) –

111

 – (EDW)
 - | |
|------|
| 059Y |
|------|

 – (KSC)
 - | |
|------|
| 121Y |
|------|

 – (NOR)
- O8
 - ✓RADAR ALTM (two) – ON
 - MLS (three) – ON (PASS)
 - ✓CH (three) – 8

EDW 22	KSC 15
--------	--------
 - 6

KSC 33	EDW 15	EDW 04
--------	--------	--------
 - | | |
|--------|--------|
| NOR 17 | NOR 23 |
|--------|--------|
- C L2
 - I/O RESET
 - ✓CAB RELIEF (two) – ENA (tb-ENA)
 - ✓ANTISKID – ON
 - ✓NWS – 1
 - ✓ENTRY MODE – AUTO
 - | |
|--------------------|
| 3: GNC 51 OVERRIDE |
|--------------------|
 - ✓ROLL MODE – AUTO
- B L2,C3
 - ✓SBTC (two) – full fwd
 - ✓SRB SEP – AUTO
 - ✓ET SEP – AUTO
- F6,F8
 - ✓AIR DATA (two) – NAV
 - ✓ADI ERR (two) – 5
 - ✓RATE (two) – 5
 - ✓HSI SEL MODE (two) – ENTRY
- C F6
 - ✓SOURCE (two) – NAV, 1
- P F8
 - ✓SOURCE (two) – NAV, 2
- B F3
 - ✓TRIM RHC/PNL (two) – INH
 - ✓PNL (two) – ON
- F6,F8
 - ✓RADAR ALTM (two) – 1(C), 2(P)

1: GNC DEORB MNVR COAST	2: GNC 50 HORIZ SIT
3: GNC 51 OVERRIDE	

- * **If APUs shutdn:** *
- * Perform APU RESTART *
- * (ENT PKT, APU/HYD), then: *

PRE EI CHECKLIST

- * If only one APU running: *
- * Good HYD MN PUMP PRESS – LO *
- * Delay MM304 transition to EI-2 *
- * Just prior to transition: *
- * Good HYD MN PUMP PRESS – NORM *
- * APU SPEED SEL – HI *
- * *
- * If less than four PASS GPCs, config FCS *
- * CHs so that each GPC cmds equal number *
- * of CHs. See table on POST OPS 3/ *
- * GRTLs TRANSITION RESTRING (Cue *
- * Card) *
- *

GNC 53 CONTROLS

 *
- * *
- * Config SURF FBK (See table on POST *
- * OPS 3/GRTLs TRANSITION RESTRING *
- * (Cue Card) *

2: GNC 51 OVERRIDE

~EI-5 CRT2 VENT DOOR CNTL CL – ITEM 44 EXEC

2: GNC DEORB MNVR COAST

3: BFS, GNC DEORB MNVR COAST

R1 AC BUS SNSR (three) – OFF (1 sec), MON

B F6,F8 FLT CNTLR PWR (two) – ON

Go to ENTRY MANEUVERS (Cue Card)

OMS FAILURE

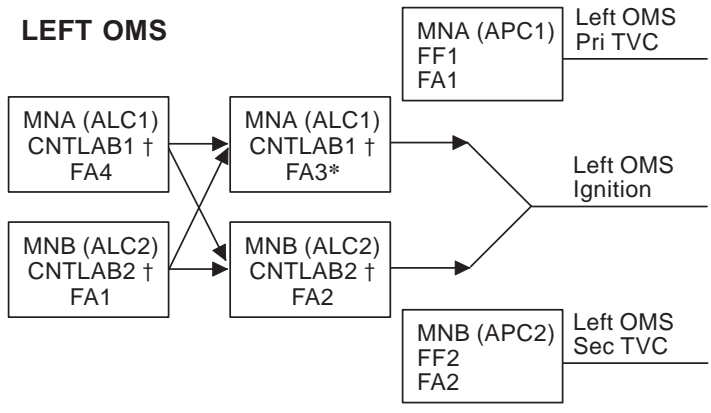
**OMS
FAILURE**

MS ONLY

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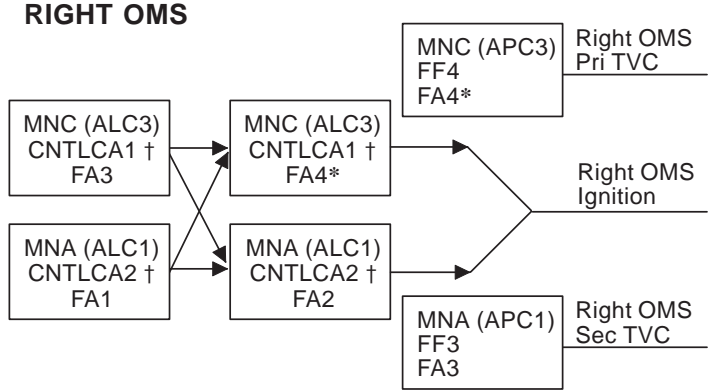
ASC/109/FIN

OMS FAILURES



† 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)

OMS FAILURE



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

ASC-5b/A,O,E/H

OMS/RCS ΔV

**OMS/
RCS ΔV**

OMS He PRESS/ Δ V/BURN TIME

OMS% GAGE	OMS He Press	OMS Δ V	RCS Δ V	RCS BURN MIN:SEC
96.1	4800	480	397	14:44
95	4760	474	392	14:33
90	4560	449	371	13:45
85	4360	423	350	12:57
80	4160	397	329	12:09
75	3960	371	307	11:21
70	3760	345	286	10:33
65	3560	319	265	09:45
60	3360	293	243	08:57
55	3160	267	222	08:08
50	2960	241	200	07:20
45	2760	215	179	06:32
40	2560	189	157	05:44
35	2360	162	135	04:56
30	2160	136	113	04:08
25	1960	109	92	03:20
20	1760	83	70	02:32
15	1560	56	47	01:43
10	1360	29	25	00:54
5	1160	2	2	00:04

**OMS/
RCS Δ V**

OMS-2/AOA ΔV	
ARCS ΔV =	$0.7 \times [L\% + R\% - AFT QTY 1]$
FRCS ΔV =	$0.8 \text{ fps} \times \text{FRCS } \%$
OMS ΔV =	$5.1 \text{ fps} \times \text{OMS } \%$

NOTE: Uses assumed vehicle weight of 255,332 lb

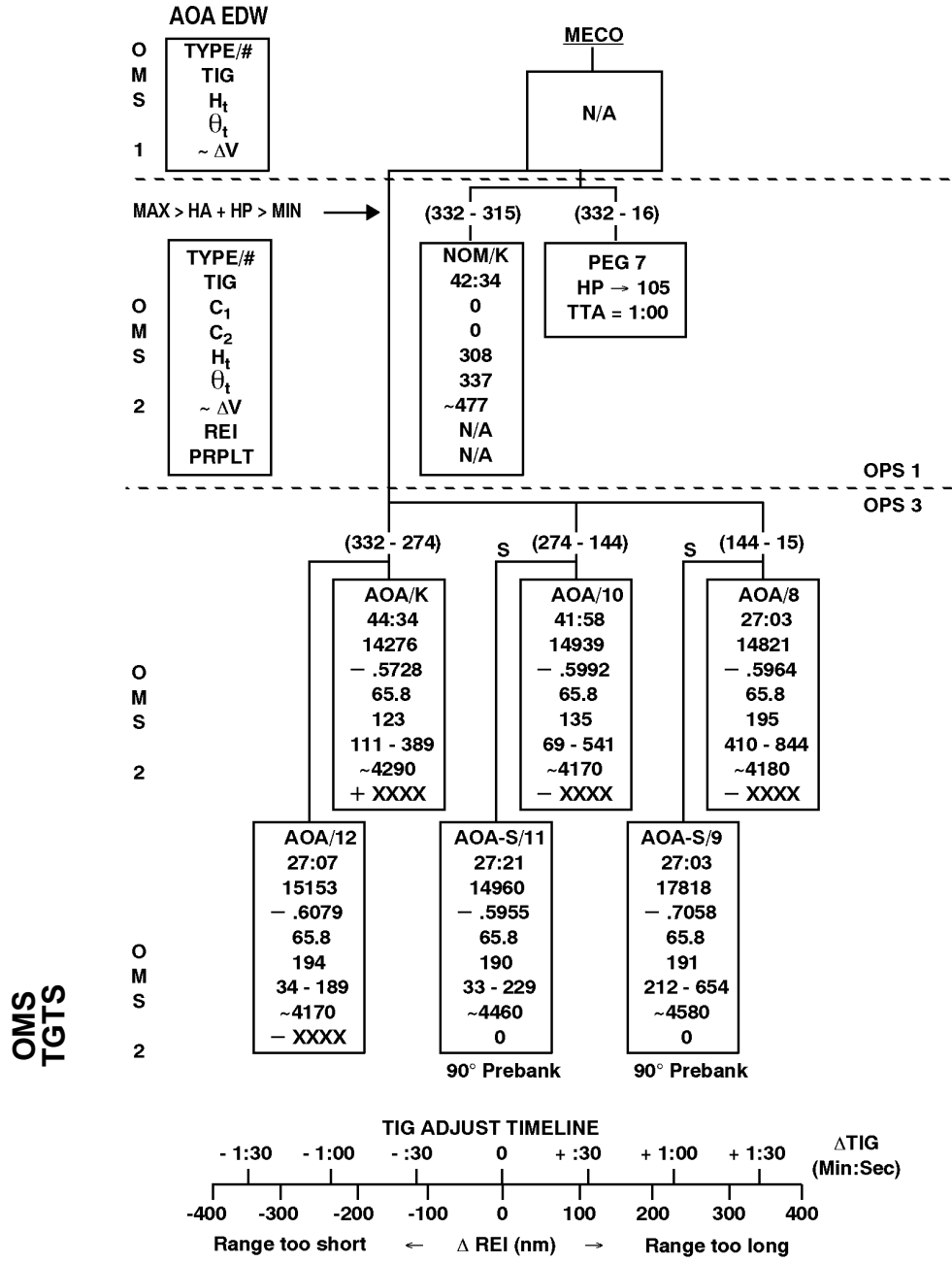
OMS TARGETS, COMM COVERAGE, LAND SITES

**OMS
TGTS**

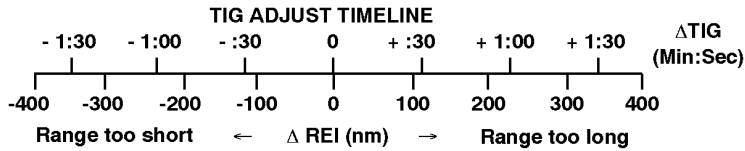
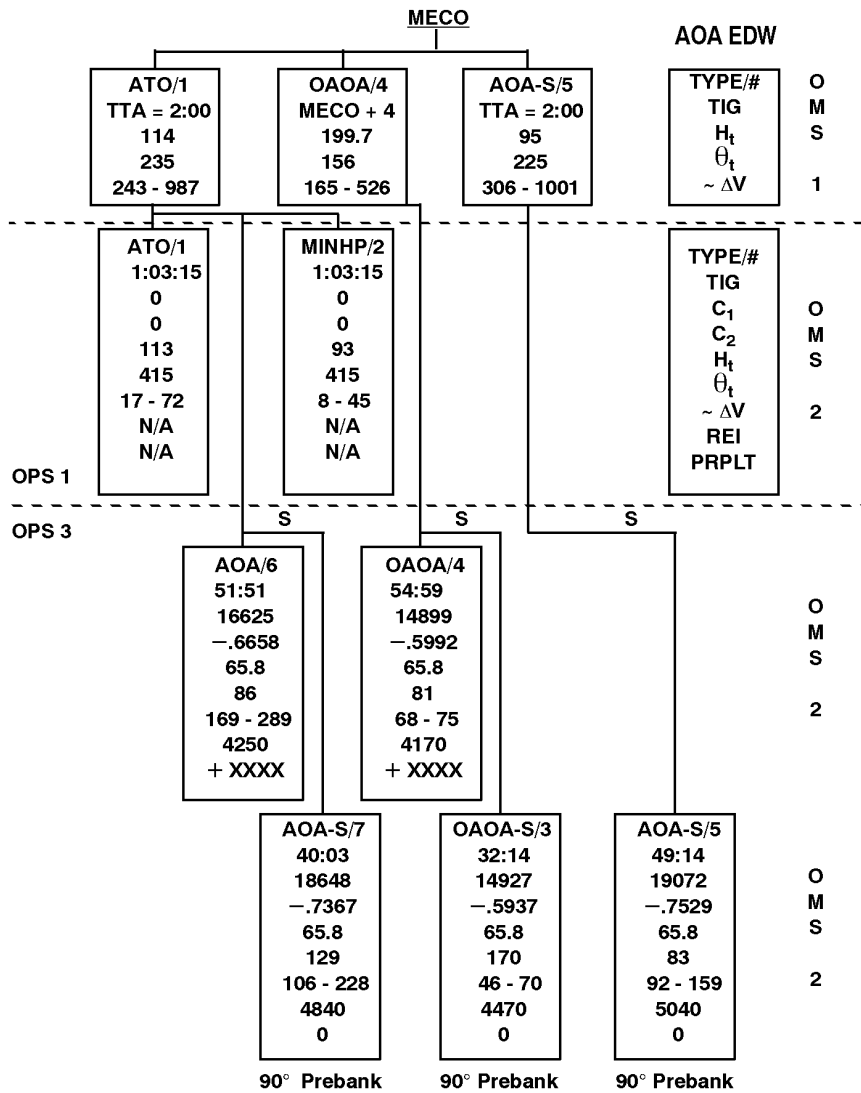
7-1

ASC/109/FIN

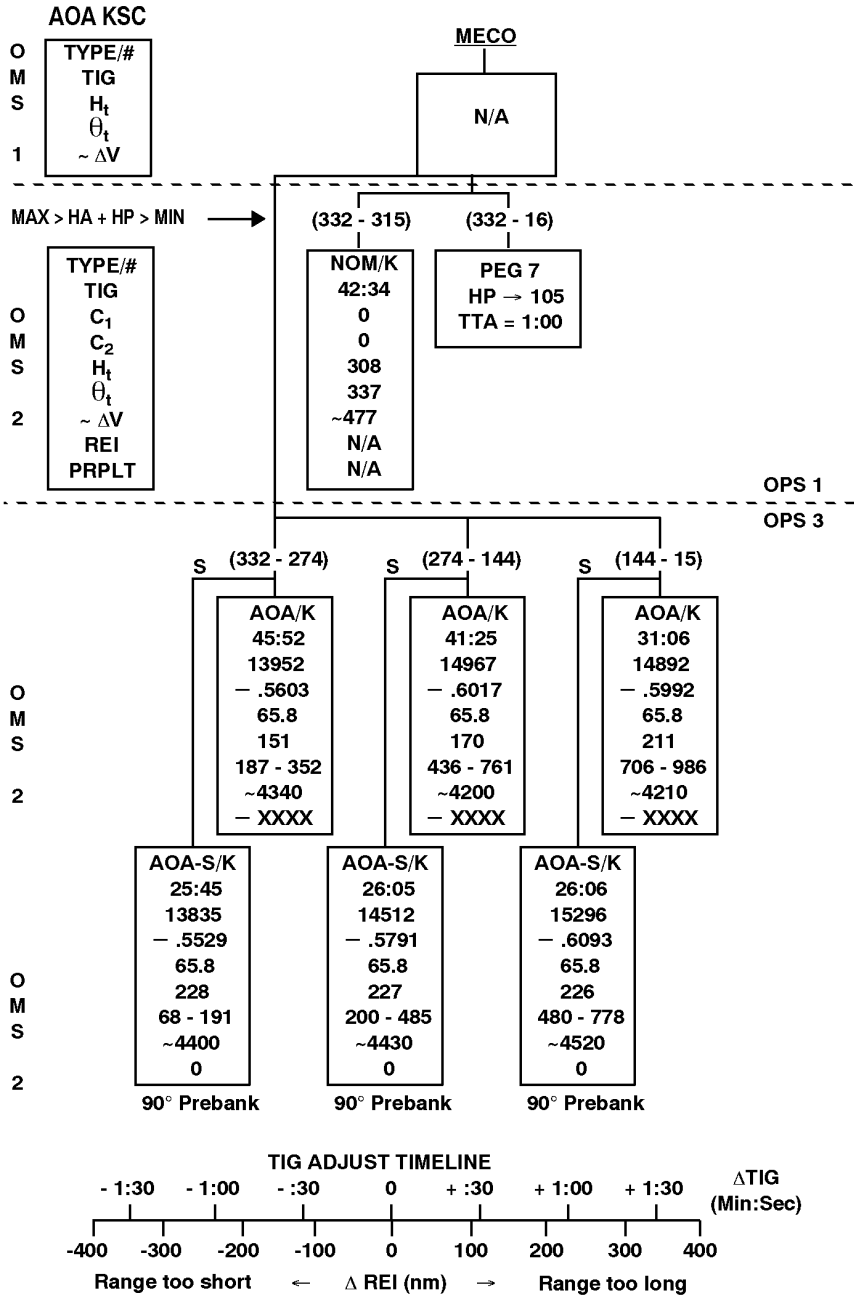
STS-109 OCF CY OMS TARGETS - DIRECT INSERTION



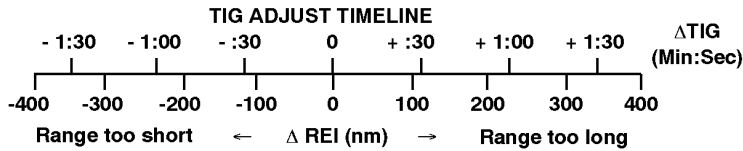
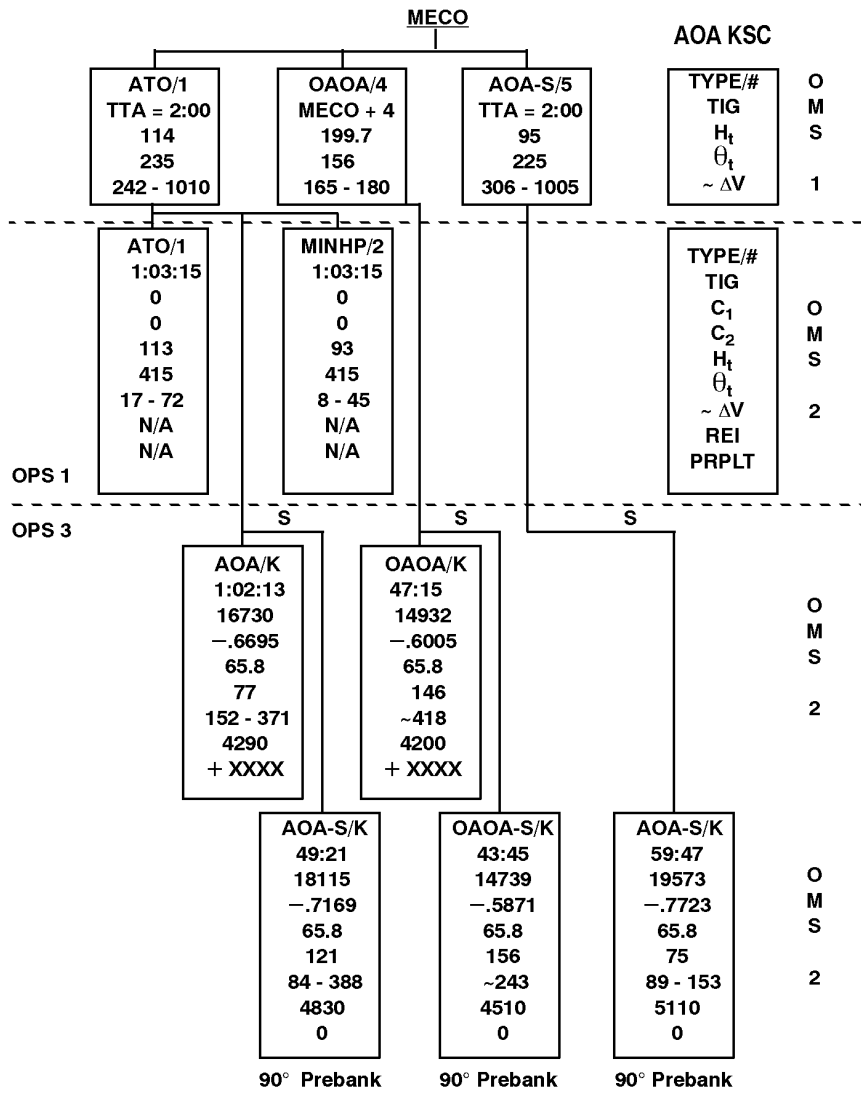
STS-109 OCF CY OMS TARGETS - W/OMS 1



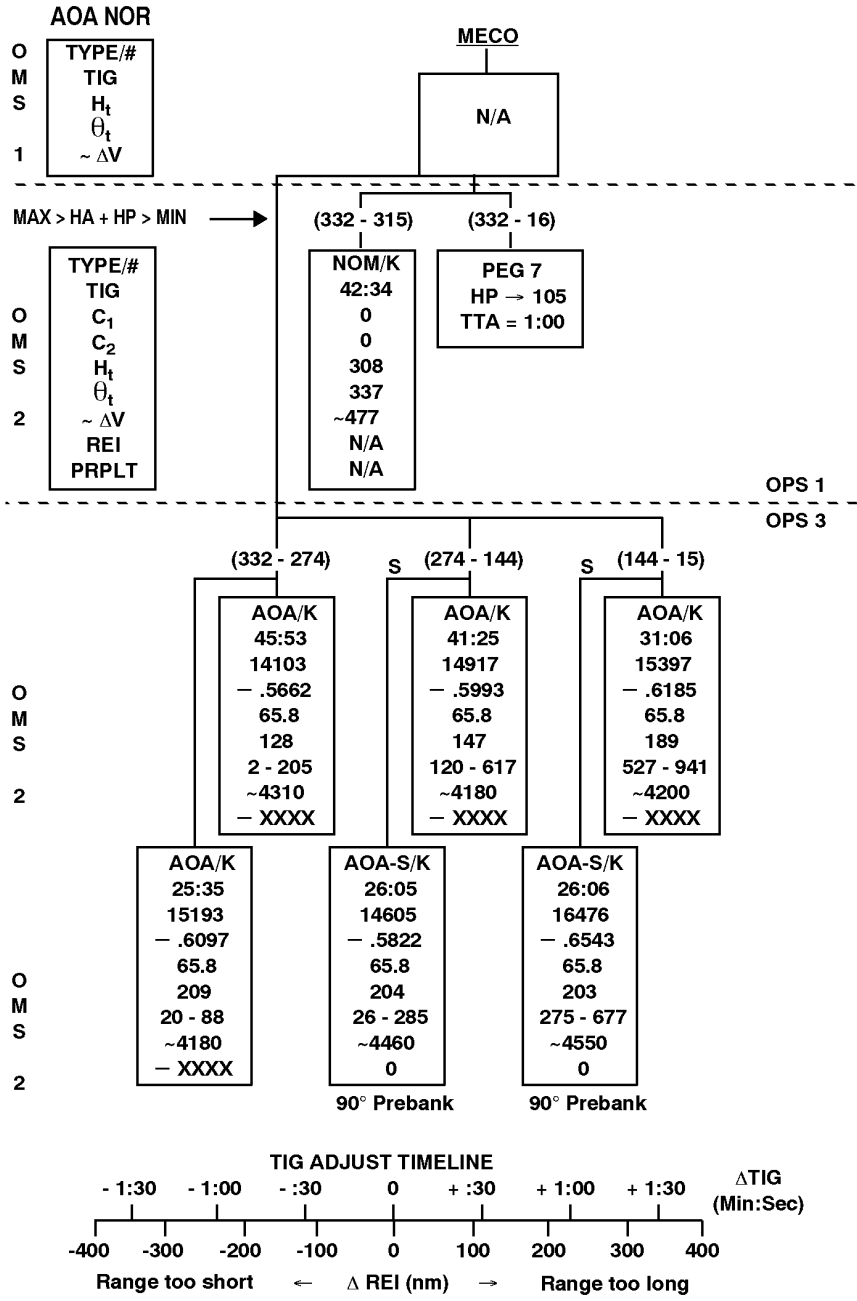
STS-109 OCF CY OMS TARGETS - DIRECT INSERTION



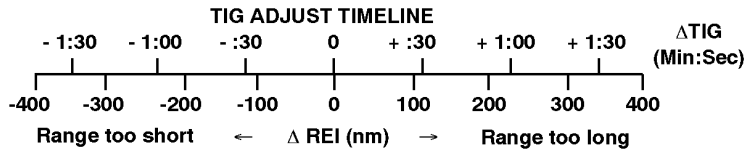
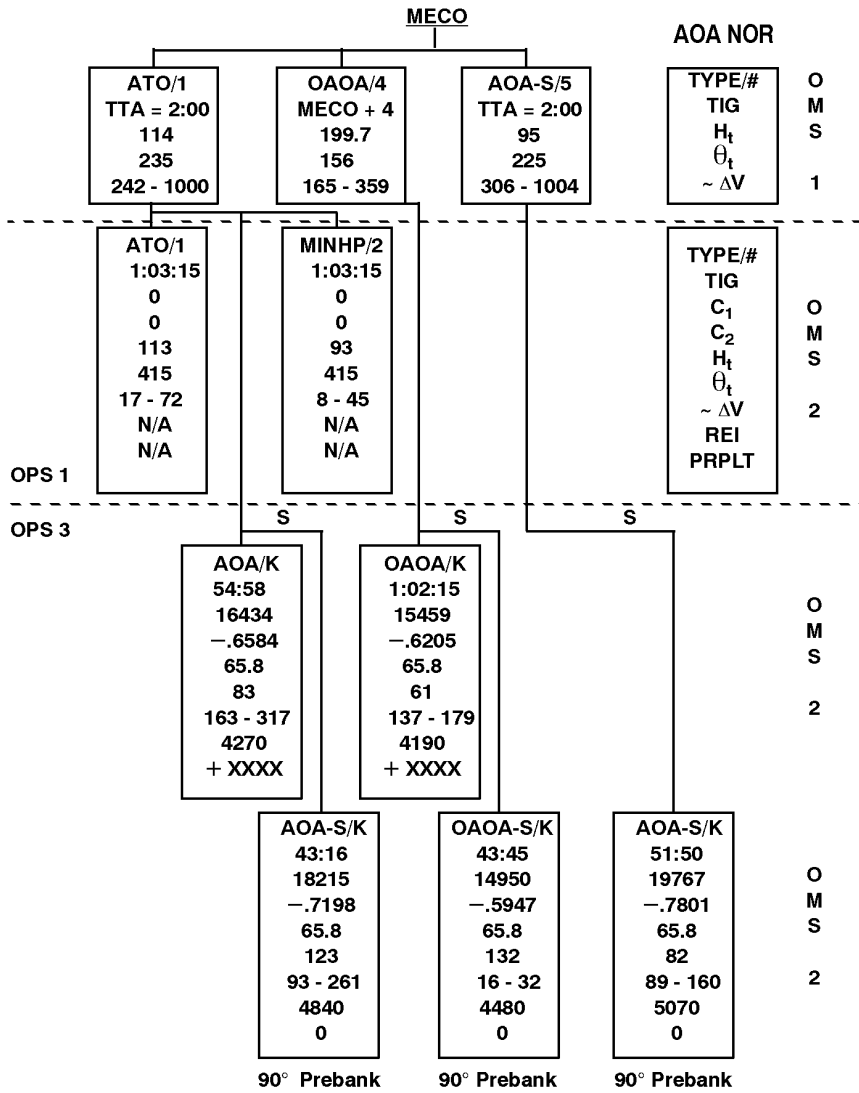
STS-109 OCF CY OMS TARGETS - W/OMS 1



STS-109 OCF CY OMS TARGETS - DIRECT INSERTION

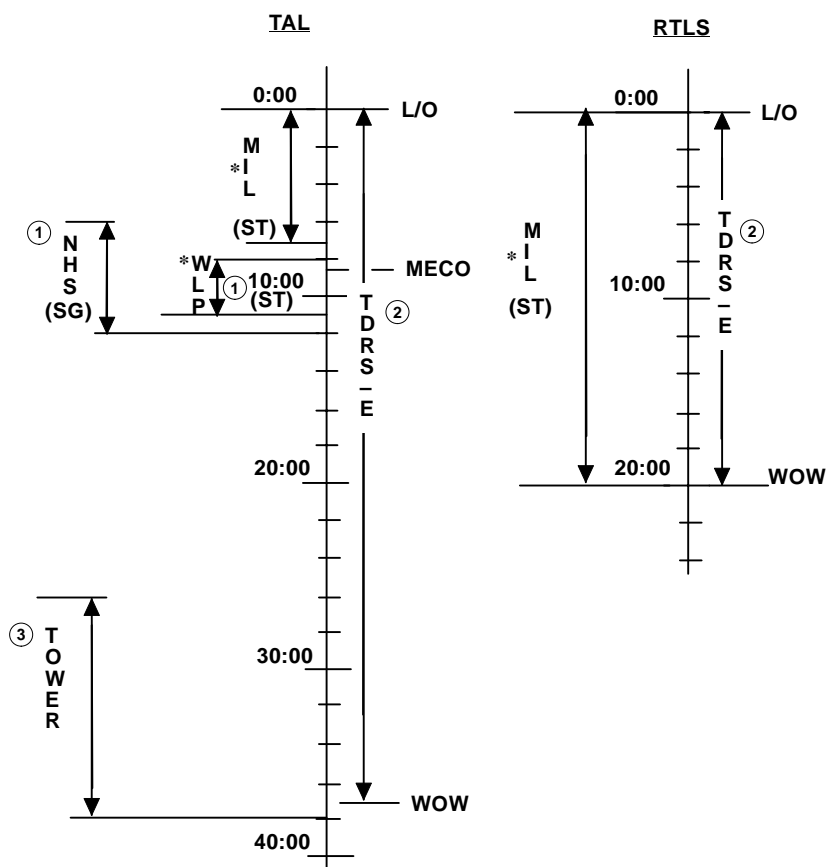


STS-109 OCF CY OMS TARGETS - W/OMS 1



**COMM
COVER**

COMMUNICATION COVERAGE – (TAL/RTLS)



MODE

ST – STDN
 SG – SGLS

*UHF available

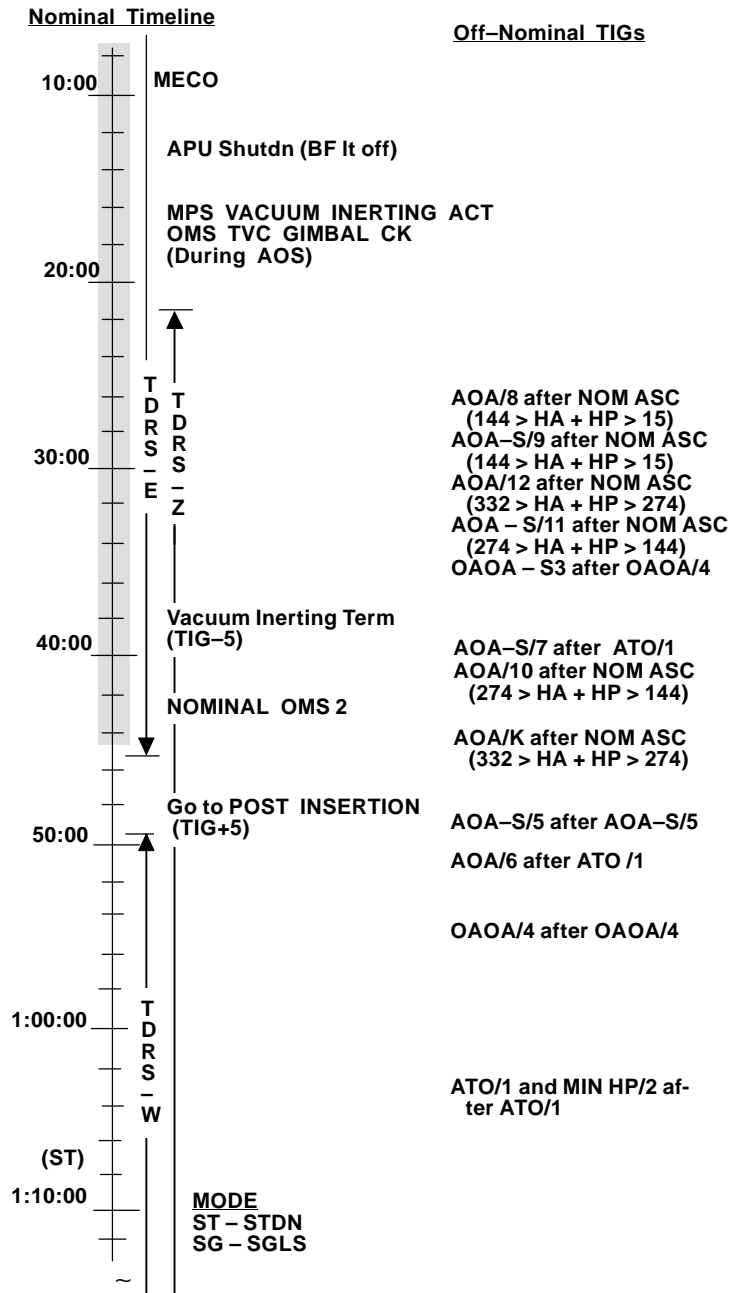
NOTE: ① NHS/WLP coverage only on high inclinations

② ET blocks coverage until vehicle upright

③ Tower UHF installed at all TAL sites

COMM
 COVER

COMMUNICATION COVERAGE – (AOA to EDW)



LAND
SITE

**STS-109
LANDING SITE TABLE
(OPS 1/6/3)
(28.45° to 30.9° INCLINATION)**

SITE	LOCATION	RWY	TACANS		MLS CH	LG
				ITEM 5		
1	KSC	KSC 15 KSC 33	TTS 59Y	OMN 73	8 6	15000 15000
2	BEN GUERIR	BEN 36 BEN 18	◆BEN 108	MAK 80 (DME)	◆6 -	13720 12720
3	MORON	MRN 20 MRN 02	MRN 100	AOG 23	◆6 -	11929 11729
4	DAKAR	OOY 36 OOY 18	◆BYD 121	YF 78 (DME)	- -	10647 10647
5	BANJUL	BYD 32 BYD 14	◆BYD 121	BJ 76 (DME)	◆6 -	12016 11816
6	BERMUDA	BDA 30 BDA 12	BDA 86 (DME)	BDA 86 (DME)	- -	8892 9212
7	AMILCAR CABRAL	AML 01 AML 19	CVS 100 (DME)	CVS 100 (DME)	- -	9728 9728
8	LAS PALMAS MONROVIA	GDV 03L LRB 04	TGN 103 -	- ROB 85 (DME)	- -	9827 10000
9	KINSHASA	KIN 24 KIN 06	BZ 78 (DME)	BZ 78 (DME)	- -	14422 11812
10	HOEDSPRUIT	AHS 18 AHS 36	HSV 87	HSV 87	- -	12256 12821
11	*BEN GUERIR TAMANRASSET	BEN 36 AAT 02	◆BEN 108 -	- TMS 72 (DME)	◆6 -	13720 10870
12	*BANJUL SOUDA	BYD 32 GSA 29	◆BYD 121 -	- RKL 20	◆6 -	12016 11786
13	*MORON ORLANDO	MRN 20 MCO 18R	MRN 100 -	- TTS 59Y	◆6 -	11929 11204

◆Available for TAL Only

FADS version 002

*Reduced Crossrange TAL Site

**STS-109
LANDING SITE TABLE
(OPS 1/6/3)
(28.45° to 30.9° INCLINATION)**

S I T E	LOCATION	RWY	TACANS		MLS CH	LG
				ITEM 5		
14	KING KHALID DIEGO GARCIA	KKI 15R JDG 31	RIY 92	-	-	13164
			-	NKW 57	-	12003
15	AMBERLEY TINDAL	AMB 15 PTN 14	AMB 94	-	-	9200
			-	TDL 70	-	9003
16	ANDERSEN HAO	GUA 06L HAO 12	UAM 54	-	-	10555
			-	HAO 85 (DME)	-	10089
17	HONOLULU	HNL 08R HNL 26L	HNL 95	CKH 86	-	11000
					-	11000
18	DYESS	DYS 16 DYS 34	ABI 84	MQP 124	-	13500
					-	13500
19	NASSAU	YNN 14 YNN 32	ZQA 74 (DME)	ZQA 74 (DME)	-	10293
					-	10230
20	NORTHROP	NOR 17 NOR 23	SNG 121Y	HMN 92	6	15000
					6	15000
21	NORTHROP	NOR 05 NOR 35	SNG 121Y	HMN 92	-	15000
					-	15000
22	EDWARDS	EDW 15 EDW 33	EDW 111	LHS 21	6	16300
					#	16300
23	EDWARDS	EDW 22 EDW 04	EDW 111	LHS 21	8/†	14995
					6	13995
24	EDWARDS	EDW 23L EDW 18L	EDW 111	LHS 21	#	15000
					#	15000
25	KSC	KSC 15 KSC 33	COF 97	LAL 107	8	15000
					6	15000

MSBLS Jr. Channel 6 - Requires Uplink FADS version O02

† MSBLS Jr. Channel 8 - Requires Uplink

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WEATHER PADS

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ASC/109/FIN

**WEATHER
PADS**

**WEATHER
PADS**

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CONUS TERMINAL FORECASTS RTLS – ORB

↓ RTLS ACL 1–10

DEORBIT ORBIT	SITE	LDG GMT	SKY	VIS/WX	T/TD (°F)	WIND	ALTM	DA	REMARKS
RTLS									
AOA (1)									
AOA (2)									

UPPER WINDS FORECAST

FIRST DAY PLS

ALT	RTLS	AOA (1)	AOA (2)	AOA (3)	ORB: DEORB:
50K	/	/	/	/	/
38K	/	/	/	/	/
28K	/	/	/	/	/
20K	/	/	/	/	/
12K	/	/	/	/	/
7K	/	/	/	/	/
3K	/	/	/	/	/
1K	/	/	/	/	/
SFC	/	/	/	/	/

ACL FB 2-14

TAL/CONUS TERMINAL FORECASTS

DEORBIT ORBIT	SITE	LDG GMT	SKY	VIS/WX	T/TD (°F)	WIND	ALTM	DA	REMARKS
TAL (1)									
TAL (2)									
TAL (3)									

UPPER WINDS FORECAST

ALT	TAL (1)	TAL (2)	TAL (3)			
50K	/	/	/			
38K	/	/	/			
28K	/	/	/			
20K	/	/	/			
12K	/	/	/			
7K	/	/	/			
3K	/	/	/			
1K	/	/	/			
SFC	/	/	/			

ELS TERMINAL FORECASTS (Site Generated)

SITE	ID	LDG GMT	SKY	VIS/WX	WIND	ALTM	REMARKS

ELS TERMINAL FORECASTS (Site Generated) (Cont)

SITE	ID	LDG GMT	SKY	VIS/WX	WIND	ALTM	REMARKS

BLOCK 1 TRAJECTORY MESSAGE

DEORB ORB	APPROX TIG	SITE/RWY	OOP TIG WINDOW	
			OPEN	CLOSE
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

MAX RATES (1st STAGE)	MISCELLANEOUS
NOTE: IGNORE ATTITUDE ERRORS DURING LOAD RELIEF	NOTAMS:
ROLL _____ °/sec at _____	_____
PITCH _____ °/sec at _____	_____
YAW _____ °/sec	_____
TRAJECTORY LOFTING (2nd STAGE)	_____
LOFTED/DEPRESSED _____ kft at VI _____ K fps	_____

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SWITCH LIST FOR HANDOVER INGRESS

FWD	MIDDECK	AFT
L5 9-3	ML86B 9-12	R12L 9-20
L side OVHD	ML85E 9-14	R11U 9-20
Flood 9-3	SORG 9-14	R11L 9-20
L4 9-3	OPS 9-14	R10 9-21
L1 9-3	MO13Q 9-14	R13U 9-21
L2 9-3	ML31C 9-15	R13L 9-21
S1 9-4	ML26C 9-15	A1U 9-21
F1 9-4	ML18F 9-15	A1L 9-22
F2 9-4	ML30N 9-15	A1R 9-22
F6U(HUD) 9-4	MA73C 9-15	AFT MDU 9-22
F3 9-4	MO10W 9-15	A6U 9-23
F8U(HUD) 9-4	WCS 9-16	A6L 9-23
F4 9-4	MO30F 9-16	A2 9-24
F6 9-4	MO32M 9-16	A7U 9-24
F7 9-5	MO39M 9-16	A7L 9-24
F8 9-5	MO42F 9-16	A4 9-24
F9 9-6	MO51F 9-16	A8U 9-25
R1 9-6	MO58F 9-16	A8L 9-25
R2 9-6	MO52J 9-17	A3 9-25
R4 9-7	MO69M 9-17	L9 9-26
R6 9-7	MD44F 9-17	L10U 9-27
R side OVHD	MIDDECK	L11UL 9-27
Flood 9-7	FLOOR 9-17	L11UR 9-27
C2 9-7	MO63P 9-17	L12UL 9-27
C3 9-7	MIDDECK (TEPC) . 9-18	L12UR 9-27
C5 9-7	AIRLOCK	L12LL 9-27
S2 9-7	AW18A 9-19	L12LR 9-27
C6 9-8	AW18D 9-19	L12 9-27
C7 9-8	AW18H 9-19	R12U 9-27
O1 9-8	AW82B 9-19	A15 9-28
O2 9-8	AW82D 9-19	A14 9-28
O3 9-8	AW82H 9-19	A13 9-28
O5 9-8	TW58T 9-19	A12 9-28
O6 9-8	A/L IN HATCH ... 9-19	A11 9-29
O7 9-9	A/L OUT HATCH . 9-19	R14 9-29
O8 9-9	SH/SL HATCH ... 9-19	HARDWARE
O9 9-9	EXT A/L ODS	C/W 9-30
O13 9-9	HATCH 9-19	MEDS CONFIG
O14 9-10	TNL ADP	FOR INGRESS . 9-31
O15 9-10	HATCH 9-19	
O16 9-10		
O17 9-11		
O19 9-11		

SW LIST

NOT FLOWN

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ASC/109/FIN 1

NOTES

- HANDOVER from LCC occurs at SRB Ignition (LCC to MCC Handover)
- INGRESS denotes switch status prior to beginning of PRE-INGRESS SW RECONFIGURATION (at T-3:00 (hold)) if different than HANDOVER
- - - - - - denotes physical break in panel structure
- Radiator flow valve, indicated by *, is in full radiator flow position and unpowered to allow maximum radiator flow capability if required
- Radiator isolation valve, indicated by ****, is configured in radiator flow and unpowered
- Talkbacks on panels L2, R11, R13, A6, and ML31C indicated by ** are bp because cbs on ML86B, A6, and O16 open. Position of valves indicated below:

```

L2:      O2 EMER          - CL
R11L:    SPLY H2O DUMP ISOL VLV - CL
          VLV            - CL
          GALLEY SPLY VLV - CL

R13L:    MMU GN2 SPLY ISOL VLV A - CL
          B              - CL

A6L:     VEST DEP VLV SYS 1 VENT ISOL - CL
          VENT          - CL
          2 VENT ISOL - CL
          VENT          - CL

ML31C:   WASTE H2O TK1 DRAIN VLV - CL
          DUMP ISOL VLV - CL
          VLV            - CL
          VAC VENT ISOL VLV CNTL - CL
    
```

- Before turning OI PCMMU PWR switch on C3, indicated by ***, to OFF, notify LCC so gnd power can be connected; also notify LCC before turning it to 1 after crew ingress
- PL RETEN PL SEL switch on panel A6U will nominally be 1 for deployable payload missions using only a single PL SEL position but will be MON until PRE-INGRESS SW CONFIG. All other missions will be in MON (Fit Rule A10.1.15-1)
- Circuit Breaker snapping color codes:
 - { R } - Red - open all times
 - { G } - Green - open on-orbit only
 - { Y } - Yellow - open ascent, closed per procedure
 - { O } - Orange - open orbit thru entry
 - { } - Blank (no ring) - always closed or as required
- STS-109 options affecting switch list:
 - 1) OV102
 - 2) GMTLO
 - 3) Orbit incln = 28.45°
 - 4) Payload: HST SM-3B
 - 5) Crew size of (7)
 - 6) Installed: (5) TK CRYO sets, SORG, Ku Ant, GN2 (5), RMS, L/W MAR
 - 7) Options N/R: OIU, P/L RCDR, ODS
- Changes are with respect to STS-104 Switch List as published in FIN 1

FWD FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

L5 L COMM PWR - ON OFF

L side OVHD Flood - BRT

L4: All cbs - cl { } except:
 :B All cbs - op {Y}
 :F cb AC1 H2O LOOP PUMP 1 A/2 (three) - op {R} cl
 :J cb AC3 SIG CONDR (two) - op {Y}
 :N cb AC2 ΦC RAD ISOL A (OV102,4,5) - cl { }
 AC3 ΦC RAD ISOL B (OV102,4,5) - cl { }
 :P cb AC2 ΦC TACAN 2 (OV105) - op {R} |
 AC3 ΦC TACAN 3 (OV103,5) - op {R}
 blank cbs (three) (OV104) - op {R}
 :Q cb AC1 ΦC LTG INST OS - op {Y}
 AC2 ΦC LTG NUMERIC OS - op {Y}
 AC3 LTG (three) - op {Y}

L1 HUM SEP A - OFF
 B - ON
 CAB TEMP sel - COOL
 CNTLR - OFF
 FAN A - ON
 B - OFF
 IMU FAN A,C (two) - OFF
 B - ON
 H2O PUMP LOOP 1 (two) - OFF,B
 2 - ON
 LOOP BYP MAN (two) - ctr
 MODE (two) - MAN

L1 AV BAY 1,3 FAN A (two) - OFF
 B (two) - ON
 2 FAN A - ON
 B - OFF
 FLOW PROP VLV LOOP (two) - ctr (tb-ICH)
 FREON PUMP LOOP (two) - B
 RAD CNTLR OUT TEMP - NORM
 LOOP (two) - OFF*
 BYP VLV MAN SEL (two) - ctr (tb-BYP)
 MODE (two) - MAN
 NH3 CNTLR A - OFF
 B - PRI/GPC
 H2O ALT PRESS - CL
 FLASH EVAP CNTLR PRI A - GPC
 B - OFF
 SEC (two) - A SPLY,OFF
 HI LOAD EVAP - ENA
 TOP EVAP HTR NOZ (two) - A AUTO
 DUCT sel - A
 HI LOAD DUCT HTR sel - A

 FIRE SUPPR AV BAY (three) - SAFE
 pb (three) - lt off
 SMOKE DETN lts (ten) - off
 SNSR - dn
 CKT TEST - OFF

L2 CAB RELIEF (two) - ctr (tb-ENA)
 VENT (two) - ctr (tb-CL)

FWD FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

L2	FLASH EVAP FDLN HTR SPLY (two) – OFF 2 ANTISKID – ON NWS – 1 BDY FLP – AUTO/OFF ENTRY MODE – AUTO TRIM R,P,Y (three) – ctr FREON ISOL MODE – OFF LOOP 1,2 (two) – ctr **** SBTC – full forward O2 SYS SPLY (two) – ctr (tb-OP) EMER – ctr (tb-bp)** XOVR SYS (two) – OP N2 SYS (four) – ctr (tb-OP) O2/N2 CNTLR VLV SYS 1 – OP 2 – CL PPO2 SNSR/VLV – NORM	F3 L HUD PWR – OFF TRIM RHC/PNL – INH PNL – ON NWS FAIL It – off ANTISKID FAIL It – off R TRIM RHC/PNL – INH PNL – ON HUD PWR – OFF DRAG CHUTE pb (six) – It off
S1	CDR SEAT PWR BUS SEL – AC2 (up) CONTR (two) – ctr	F8U R HUD MODE – NORM MAN BRT sel – mid range HUD BRT – as reqd
F1	DC UTIL PWR MNB – OFF AC UTIL PWR AC1 – OFF	F4 All pb Its off except: BDY FLP pb – AUTO It off SPDBK/THROT pb – AUTO It off PITCH pb – AUTO It off ROLL/YAW pb – AUTO It off
F2	All pb Its off except: BDY FLP pb – AUTO It off SPDBK/THROT pb – AUTO It off PITCH pb – AUTO It off ROLL/YAW pb – AUTO It off	F6 (OV103,5) INST PWR – FLT/MPS OFF DATA BUS sel – 3 AIR DATA – NAV ADI ATT – REF ERR – MED RATE – MED LDG GEAR pb (two) – It off tb (three) – UP HSI SEL MODE – ENTRY SOURCE (two) – NAV,1
F6U	L HUD MODE – NORM MAN BRT sel – mid range HUD BRT – as reqd	

FWD FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

<p>F6 (OV103,5)</p> <p>BFC - dn</p> <p>ABORT MODE - OFF</p> <p style="padding-left: 20px;">pb - lt off</p> <p>RCS CMD lts (three) - off</p> <p>RANGE SAFE ARM lt - off</p> <hr/> <p>F6 (OV102,4)</p> <p>BFC - right</p> <p>HUD DATA BUS - 1</p> <p>MDU PWR (two) - ON</p> <p style="padding-left: 20px;">BRT sel (two) - as reqd</p> <p>LDG GEAR pb (two) - lt off</p> <p style="padding-left: 20px;">tb (three) - UP</p> <p>HSI SEL MODE - ENTRY</p> <p style="padding-left: 20px;">SOURCE (two) - NAV,1</p> <p>RDR ALTM - 1</p> <p>FLT CNTLR PWR - ON</p> <p>ADI ATT - REF</p> <p style="padding-left: 20px;">ERR - MED</p> <p style="padding-left: 20px;">RATE - MED</p> <p>ABORT MODE - OFF</p> <p style="padding-left: 20px;">pb - lt off</p> <p>RCS CMD lts (three) - off</p> <p>RANGE SAFE ARM lt - off</p> <p>AIR DATA - NAV</p> <hr/> <p>F7 (OV103,5)</p> <p>CRT BRT sel (three) - as reqd</p> <p style="padding-left: 20px;">tb (six) - black</p> <p>OMS PRESS N2/He TK sel - He</p> <p>FLT CNTLR PWR - ON</p> <p>RADAR ALTM - 1</p> <p>MN ENG STAT lts (six) - off</p> <p>MPS PRESS He sel - TK</p> <p>C/W matrix lts - off all off except HYD PRESS</p>	<p>F7 (OV102,4)</p> <p>MDU PWR (five) - ON</p> <p style="padding-left: 20px;">BRT sel (five) - as reqd</p> <p>MN ENG STAT lts (six) - off</p> <p>C/W matrix lts - off all off except HYD PRESS</p> <hr/> <p>F8 (OV 103,5)</p> <p>INST PWR - ON OFF</p> <p>DATA BUS sel - 4</p> <p>AIR DATA - NAV</p> <p>ADI ATT - REF</p> <p style="padding-left: 20px;">ERR - MED</p> <p style="padding-left: 20px;">RATE - MED</p> <p>LDG GEAR pb (two) - lt off</p> <p style="padding-left: 20px;">tb (three) - UP</p> <p>HSI SEL MODE - ENTRY</p> <p style="padding-left: 20px;">SOURCE (two) - NAV,2</p> <p>FLT CNTLR PWR - ON</p> <p>RDR ALTM - 2</p> <p>APU sel (two) - FUEL,1</p> <hr/> <p>F8 (OV102,4)</p> <p>HUD DATA BUS - 4</p> <p>MDU PWR (two) - ON</p> <p style="padding-left: 20px;">BRT sel (two) - as reqd</p> <p>LDG GEAR pb (two) - lt off</p> <p style="padding-left: 20px;">tb (three) - UP</p> <p>HSI SEL MODE - ENTRY</p> <p style="padding-left: 20px;">SOURCE (two) - NAV,2</p> <p>FLT CNTLR PWR - ON</p> <p>RAD ALTM - 2</p> <p>ADI ATT - REF</p> <p style="padding-left: 20px;">ERR - MED</p> <p style="padding-left: 20px;">RATE - MED</p> <p>AIR DATA - NAV</p>	
NOT FLOWN	9-5	ASC/109/FIN 1

FWD FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

<p>F9 AC Volts sel - as reqd DC Volt/Amp sel - VOLTS MNA</p> <hr/> <p>R1 CNTL BUS PWR (three) - dn ESS BUS SOURCE MN (three) - ON FC (three) - ON OFF FC/MN BUS (three) - ctr (tb-ON) MN BUS TIE (three) - ctr (tb-OFF) PL CAB - OFF PRI MNC - ctr (tb-OFF) MNB,FC3 (two) - ctr (tb-OFF) AUX - OFF AFT MNB - OFF MNC - OFF INV PWR (three) - ctr (tb-ON) INV/AC BUS (three) - ctr (tb-ON) cb AC CONTR (nine) - op { } AC BUS SNSR (three) - MON</p> <hr style="border-top: 1px dashed black;"/> <p>R1 (CRYO) O2 MANF VLV (two) - ctr (tb-OP) TK1,2 HTRS A (two) - AUTO B (two) - OFF RESET/TEST (two) - ctr TK3 HTRS (two) - OFF RESET/TEST - ctr FC REAC (three) - ctr tb (six) - OP FC (three) - ctr RDY tb (three) - gray</p>	<p>R1 FC COOL PUMP ΔP tb (three) - gray H2 MANF VLV (two) - ctr (tb-OP) TK1,2 HTRS A (two) - AUTO B (two) - OFF TK3 HTRS (two) - OFF</p> <hr/> <p>R2 MPS PRPLT DUMP (two) - GPC ENG PWR (six) - ON He ISOL (six) - OP GPC PNEU L ENG He XOVR - GPC He ISOL - OP GPC LH2 ULL PRESS - AUTO He I'CNCT (three) - GPC APU/HYD RDY tb (three) - bp APU OPER (three) - START/RUN OFF SPEED SEL (three) - NORM HYD MN PUMP PRESS (three) - NORM cb APU FU TK VLV ENA (six) - cl { } op HYD CIRC PUMP (three) - OFF GPC APU CNTLR PWR (three) - ON OFF FUEL TK VLV (three) - OP CL AUTO SHUTDN (three) - ENA BLR CNTLR/HTR (three) - A PWR (three) - ON N2 SPLY (three) - ON OFF ET UMB DR MODE - GPC CTRLINE LAT - GND (tb-bp) L,R DR (two) - OFF (tb-OP) LAT (two) - OFF (tb-REL)</p> <hr/>
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FWD FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

R4	HYD BRAKE HTR (three) - OFF ISOL VLV (three) - GPC (tb-CL) MPS/TVC ISOL VLV (three) - ctr (tb-OP) LG/NWS HYD SYS - AUTO 1/2 LG EXTEND ISOL VLV - GPC (tb-CL) MPS ENG CNTLR HTR (three) - OFF MANF PRESS (two) - GPC FILL/DRAIN (four) - GND H2 PRESS LINE VENT - GND LO2 PREVLV (three) - GPC LH2 PREVLV (three) - GPC FDLN RLF ISOL (two) - GPC	C3	MN ENG VIB SHUTDN (OV102) - INH LIMIT SHUTDN - AUTO TRIM R,P,Y (three) - ctr SBTC - full forward DAP - all off SRB SEP - AUTO ET SEP - AUTO AUD CTR - 1 OI PCMMU PWR - 1 OFF*** FORMAT - GPC S-BD PM CNTL - CMD ANT sel - GPC AIR DATA PROBE (two) - STO FC REAC VLV (three) - dn cb FC REAC VLV CL ENA (three) - op {R} UPLK - ENA MSTR MADS PWR (OV103,4,5) - ON OEX PWR (OV102) - ON C/W MEM - ctr MODE - NORM RTG PUMP (OV103,4 - no SH) - PRI SHORT ENA (two) (OV104 - no SH) - DSBL SHORT (two) (OV104 - no SH) - OFF PL SAFING (four) (OV103 - no SH) - SAFE (five) (OV102,5 - no SH) - SAFE SH FIRE SUPPR ARM (two) (SH only) - SAFE DISCH (two) (SH only) - NO-OP H2O LN HTR (SH only) - OFF EMER LTG - OFF/ON
R6		C5	
R COMM PWR - ON OFF		DIRECT O2 vlv - CL	
R side OVHD Flood - BRT		S2	
C2	CRT PWR (OV103,5) (three) - ON IDP/CRT PWR (OV102,4) (three) - ON MAJ FUNC (three) - GNC SEL (two) - as reqd EVENT TIMER MODE - DN CNTL - ctr TIMER SET pb (four) - 0900 TIMER - ctr	PL SEAT PWR BUS SEL - AC3 (dn) CONTR (two) - ctr	
C3	OMS ENG (two) - ARM/PRESS OFF BFC CRT DISP - ON OFF SEL - 3+1 FCS CH (four) - AUTO BDY FLP - AUTO/OFF AIR DATA PROBE STO (two) - INH		

FWD FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

C6	LEH O2 vlv (four) - OP		
C7	LEH O2 SPLY vlv (two) - OP		
O1	COAS - OFF AIR TEMP sel - CAB HX OUT H2O PUMP OUT PRESS sel - LOOP 2 FREON sel - LOOP 1 O2/N2 FLOW sel - SYS 1 O2 PPO2 sel - SNSR A		
O2	CRYO O2 HTR ASSY TEMP sel - TK1 1 O2/H2 sel - TK1 FC STACK TEMP sel - 1		
O3	RCS/OMS PRESS sel - RCS He X 10 PRPLT QTY sel - OMS FUEL MSN TIME - MET		
O5	L AUD TACAN ID (two) - OFF,1 VOX SENS sel - as reqd A/G (two) - T/R A/A - T/R ICOM (two) - T/R PWR - AUD/TONE CNTL sel - NORM XMIT/ICOM MODE sel - as reqd (PTT/VOX recommended) VOL pb (five) - as reqd TACAN pb - 5 PAGE - dn	O6	LTG PNL sel (two) - OFF - (1/4 brt if night launch) INST L/CTR sel - OFF - (1/4 brt if night launch) OVHD sel - as reqd - (1/4 brt if night launch) L GLRSHLD FLOOD sel (two) - VAR, as reqd L SEAT/CTR CNSL FLOOD sel (two) - OFF,BRT S TRK DR CNTL (two) - OFF POS tb (two) - CL PWR (two) - OFF UHF SPLX/EVA XMIT FREQ - 259.7/414.2 PWR AMP - ON SPLX SQUELCH - ON EVA STRING - 1 ENCRYPT - OFF MODE - SPLX ANNUN LAMP TEST - ctr BUS SEL ACA 1 - MNA 2/3 - MNB INTEN sel (two) - BRT,MED MTU - AUTO DEU (OV103,5) (four) - dn INT DISP PROC (OV102,4) (four) - dn MDM PL1,2 (two) - ON PL3 - OFF FA (four) - ON FF (four) - ON

FWD FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

O6 GPC PWR (five) - ON
 OUTPUT 1,2,3,4 (four) - NORM (tb-gray)
 5 - B/U NORM (tb-bp)
 IPL SOURCE - OFF
 GPC MODE 1,2,3,4 (four) - RUN (tb-RUN)
 5 - RUN STBY (tb-RUN)

O7 TACAN MODE sel (three) - GPC OFF
 ANT SEL (three) - AUTO as is
 CH pb/tw (three) - 059Y as is
 AFT L RCS He PRESS (two) - OP (tb-OP)
 TK ISOL (three) - GPC (tb-OP)
 MANF ISOL (five) - GPC (tb-OP)
 XFEED (two) - GPC (tb-CL)
 MSTR RCS XFEED - OFF
 AFT R RCS He PRESS (two) - OP (tb-OP)
 TK ISOL (three) - GPC (tb-OP)
 MANF ISOL (five) - GPC (tb-OP)
 XFEED (two) - GPC (tb-CL)

O8 RADAR ALTM (two) - ON OFF
 MLS (three) - OFF
 MLS CH pb/tw (three) - 6 as is
 R SEAT/CTR CNSL FLOOD sel (two) - OFF,BRT
 LTG PNL R sel (three) - OFF
 - (1/4 brt if night launch)
 NUMERIC sel - BRT
 - (1/4 brt if night launch)
 R GLRSHLD FLOOD sel (two) - VAR, as reqd

O8 OMS KIT He PRESS/VAP ISOL (two) - CL
 TK ISOL (two) - CL (tb-bp)
 L OMS He PRESS/VAP ISOL (two) - GPC
 TK ISOL (two) - GPC (tb-OP)
 XFEED A - GPC (tb-CL)
 B - GPC (tb-CL) (tb-OP)
 R OMS He PRESS/VAP ISOL (two) - GPC
 TK ISOL (two) - GPC (tb-OP)
 XFEED (two) - GPC (tb-CL)
 FWD RCS He PRESS (two) - OP (tb-OP)
 TK ISOL (two) - GPC (tb-OP)
 MANF ISOL (five) - GPC (tb-OP)
 ANNUN LAMP TEST - ctr

O9 R AUD PWR - AUD/TONE
 A/G (two) - T/R
 A/A - T/R
 ICOM (two) - T/R
 VOX SENS sel - as reqd
 TACAN ID (two) - OFF, as reqd
 PAGE - dn
 VOL pb (five) - as reqd
 VOL TACAN pb - 5
 XMIT/ICOM MODE sel - as reqd (PTT/VOX
 recommended)
 CNTL sel - NORM

O13: All cbs - cl { } except:
 :A,C,E cb ESS MN CONTR (three) - cl { } op

FWD FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

<p>O14:A BRAKES MNA - ON RGA 1 - ON IMU 1 - ON FC1 CNTLR - ON</p> <p>:B,C,D,E All cbs - cl { } except: :B cb MNA MNC CONTR - cl { } <input type="checkbox"/> :C cb TACAN 1 (OV102,3,5) - op {R} MNA RAD ISOL CONTR (OV102,4,5) - cl { } :D cb MNA GPS PRE AMPL (two)(OV102) - op {R} UC (OV103,5) - op {R} LC (OV103,5) - cl { } GPS 1 PRE AMPL (two)(OV104) - op {R} CAB VENT - cl {O} ISOL - cl {O}</p> <p>:E cb MNA ADTA 1 - cl {G} ACCEL 1 - cl {G} DDU AFT - op {Y}</p> <p>:F MMU 1 - ON RJDA 1A L2/R2 LOGIC - ON DRIVER - ON <input type="checkbox"/> 2A L4/R4 LOGIC - ON DRIVER - ON <input type="checkbox"/> RJDF 1B F1 LOGIC - ON DRIVER - ON <input type="checkbox"/> L OMS ENG VLV - ON <input type="checkbox"/> ASA 1 - ON</p> <hr/> <p>O15:A BRAKES MNB - ON RGA (two) - ON IMU 2 - ON FC2 CNTLR - ON</p> <p>:B,C,D,E All cbs - cl { } except: :B cb MNB MNA CONTR - cl { } <input type="checkbox"/></p> <p>NOT FLOWN</p>	<p>O15:C cb TACAN 2 (OV102,3) - op {R} MNB UTIL PWR F1/MO13Q - cl { } :E ADTA 2 - cl {G} ACCEL 2 - cl {G} DDU R - cl {G} blank cb (OV102) - op {R}</p> <p>:F MMU 2 - ON RJDA 1B L1/L5/R1 LOGIC - ON L1/R1 DRIVER - ON <input type="checkbox"/> RJDF 1A F2 LOGIC - ON DRIVER - ON <input type="checkbox"/> ASA 2 - ON ACCEL 4 - ON</p> <hr/> <p>O16:A BRAKES MNC - ON RGA 3 - ON IMU 3 - ON FC3 CNTLR - ON</p> <p>:B,C,D,E All cbs - cl { } except: :B cb MNC MNB CONTR - cl { } <input type="checkbox"/> :C cb TACAN 3 (OV102) - op {R} :D cb MNC GPS PRE AMPL (two)(OV102) - op {R} UC (OV103,5) - cl { } LC (OV103,5) - op {R} GPS 3 PRE AMPL (two)(OV104) - op {R} O2 EMER - op {R}</p> <p>:E cb MNC ADTA 3,4 (two) - cl {G} DDU R - cl {G} AFT - op {Y}</p> <p>:F RJDA 2B L3/R3/R5 LOGIC - ON L3/R3 DRIVER - ON <input type="checkbox"/> RJDF 2A F3 LOGIC - ON DRIVER - ON <input type="checkbox"/></p> <p style="text-align: right;">ASC/109/FIN 1</p>
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FWD FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

O16:F	RJDF 2B F4/F5 LOGIC	- ON	
	F4 DRIVER	- ON	OFF
	R OMS ENG VLV	- ON	OFF
	ASA 3,4 (two)	- ON	
	ACCEL 3	- ON	
	RJD MANF L5/F5/R5/DRIVER	- OFF	
<hr/>			
O17:A	ATVC (four)	- ON	
:B	EIU (three)	- ON	
:C	SIG CONDR FREON A	- AC2	
	B	- AC3	
	OL 1/2	- ON	
	OR 1/2	- ON	
:D	SIG CONDR OA 1/2/3	- ON	
	MDM OA 1/2/3	- ON	
	MEC (two)	- ON	
<hr/>			
O19	TV PWR	- ON	OFF
	DC UTIL PWR MNA	- ON	
	COAS PWR	- OFF	
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MIDDECK SWITCH LIST FOR HANDOVER INGRESS

<p>ML86B:A cb MNA SPLY H2O TKA INLET - cl { }</p> <p style="padding-left: 100px;">TKB OUTLET - cl { }</p> <p style="padding-left: 100px;">WASTE H2O DUMP VLV/NOZ HTR - op {Y}</p> <p style="padding-left: 100px;">H2O LINE HTR A - op {Y}</p> <p style="padding-left: 100px;">MNB SPLY H2O TKB INLET - cl { }</p> <p style="padding-left: 100px;">TKC OUTLET - cl { }</p> <p style="padding-left: 100px;">DUMP ISOL - op {Y}</p> <p style="padding-left: 100px;">B SPLY ISOL VLV - cl { }</p> <p style="padding-left: 100px;">H2O LINE HTR B - op {Y}</p> <p style="padding-left: 100px;">MNC SPLY H2O TKA OUTLET - cl { }</p> <p style="padding-left: 100px;">TKC INLET - cl { }</p> <p style="padding-left: 100px;">DUMP VLV/NOZ HTR - op {Y}</p> <p style="padding-left: 100px;">XOVR VLV - cl { }</p> <p style="padding-left: 100px;">GALLEY SPLY - op {Y}</p> <p>:B cb MNA WASTE H2O TK1 VLV - cl { }</p> <p style="padding-left: 100px;">SPLY H2O TKD OUTLET - cl { }</p> <p style="padding-left: 100px;">WASTE H2O DUMP ISOL - op {Y}</p> <p style="padding-left: 100px;">VAC VENT ISOL VLV - op {Y}</p> <p style="padding-left: 100px;">WCS CNTLR - op {Y}</p> <p style="padding-left: 100px;">GALLEY OVEN - op {Y}</p> <p style="padding-left: 100px;">MNB WASTE H2O TK1 DRAIN - op {R}</p> <p style="padding-left: 100px;">SPLY H2O TKD INLET - cl { }</p> <p style="padding-left: 100px;">VAC VENT NOZ HTR - op {Y}</p> <p style="padding-left: 100px;">ISOL VLV - op {Y}</p> <p style="padding-left: 100px;">WCS CNTLR - op {Y}</p> <p style="padding-left: 100px;">GALLEY H2O HTR - op {Y}</p> <p>:C cb MNA EXT ARLK HTR LINE ZN1 - op {Y}</p> <p style="padding-left: 100px;">ZN2 - op {Y}</p> <p style="padding-left: 100px;">STRUC - op {Y}</p> <p style="padding-left: 100px;">VEST - op {Y}</p>	<p>ML86B:C cb MNB EXT ARLK HTR LINE ZN1 - op {Y}</p> <p style="padding-left: 100px;">ZN2 - op {Y}</p> <p style="padding-left: 100px;">H2O S/O VLV - cl { }</p> <p style="padding-left: 100px;">STRUC - op {Y}</p> <p style="padding-left: 100px;">VEST - op {Y}</p> <p style="padding-left: 100px;">MNC EXT ARLK HTR LINE ZN1 - op {Y}</p> <p style="padding-left: 100px;">ZN2 - op {Y}</p> <p>:D MNA PYRO JETT SYS A KU ANT - op {R}</p> <p style="padding-left: 100px;">FC PCM - op cl {Y}</p> <p style="padding-left: 100px;">MMU GN2 SPLY ISOL VLV A - op {R}</p> <p style="padding-left: 100px;">PORT HTR A - op {R}</p> <p style="padding-left: 100px;">STBD HTR A - op {R}</p> <p style="padding-left: 100px;">MNB PYRO JETT SYS A PORT RMS - op {R}</p> <p style="padding-left: 100px;">MMU GN2 SPLY ISOL VLV B - op {R}</p> <p style="padding-left: 100px;">PORT HTR B - op {R}</p> <p style="padding-left: 100px;">STBD HTR B - op {R}</p> <p style="padding-left: 100px;">MNC PYRO JETT SYS B KU ANT - op {R}</p> <p style="padding-left: 100px;">PORT RMS - op {R}</p> <p style="padding-left: 100px;">STBD RMS - op {R}</p> <p>:E MNA EMU 2 H2O SPLY - op {Y}</p> <p style="padding-left: 100px;">WASTE - op {Y}</p> <p style="padding-left: 100px;">CO2 SYS 1 CNTLR (OV102) - op {Y}</p> <p style="padding-left: 100px;"> (OV104,5) - op {R}</p> <p style="padding-left: 100px;">FLOOD TNL ADAPT 2 - op {R}</p> <p style="padding-left: 100px;"> - (op {Y} if</p> <p style="padding-left: 100px;"> SL MOD or</p> <p style="padding-left: 100px;"> SH flow)</p>
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ASC/109/FIN 1

MIDDECK SWITCH LIST FOR HANDOVER INGRESS

<p>ML86B:G cb ESS 1BC FLOOD AIRLK 2 - op {Y}</p> <p style="padding-left: 100px;">TNL ADAPT 1 - op {R}</p> <p style="padding-left: 100px;">- (op {Y} if SL MOD or SH flown)</p> <p style="padding-left: 50px;">CRYO CNTLR TK4 (two) (OV103,4,5) - op {R}</p> <p style="padding-left: 100px;">- (cl { } if TK4 flown)</p> <p style="padding-left: 50px;">CNTLR TK4/5 (two) (OV102) - op {R}</p> <p style="padding-left: 100px;">- (cl { } if TK4/5 flown)</p> <p style="padding-left: 50px;">QTY TK4 (two) - op {R}</p> <p style="padding-left: 100px;">- (cl { } if TK4 flown)</p> <p style="padding-left: 50px;">2CA CRYO CNTLR TK5 (two) (OV103,4,5) - op {R}</p> <p style="padding-left: 100px;">- (cl { } if TK5 flown)</p> <p style="padding-left: 50px;">QTY TK5 (two) - op {R}</p> <p style="padding-left: 100px;">- (cl { } if TK5 flown)</p> <p style="padding-left: 50px;">unlabeled cb (two) (OV102) - op {R}</p> <p style="padding-left: 50px;">3AB CRYO CNTLR TK3 (two) - cl { }</p> <p style="padding-left: 100px;">QTY TK3 (two) - cl { }</p> <hr/> <p>ML85E (MUP - if reqd)</p> <p style="padding-left: 20px;">AC S1 - OFF</p> <p style="padding-left: 20px;">cb AC CB1 - op {Y}</p> <p style="padding-left: 20px;">DC 10 AMP MNB S2 - OFF</p> <p style="padding-left: 20px;">S3 - OFF</p> <p style="padding-left: 20px;">S4 - OFF</p>	<p>ML85E DC 10 AMP MNB S5 - ON</p> <p style="padding-left: 20px;">cb DC 10 AMP MNB CB2 - op {Y}</p> <p style="padding-left: 40px;">CB3 - op {Y}</p> <p style="padding-left: 40px;">CB4 - op {Y}</p> <p style="padding-left: 40px;">CB5 - cl { }</p> <p style="padding-left: 20px;">PUMPS S6 - OFF</p> <p style="padding-left: 20px;">cb PUMPS (two) - op {Y}</p> <hr/> <p>SORG (NOTE: Panel deleted if Galley not flown)</p> <p style="padding-left: 20px;">OVEN FAN - OFF</p> <p style="padding-left: 20px;">H2O HOT(COLD) pb (two) - lt off</p> <p style="padding-left: 40px;">VOL sel - as reqd</p> <p style="padding-left: 20px;">MV2 - as reqd</p> <p style="padding-left: 20px;">REHYD STA Lever - CL, latched</p> <p style="padding-left: 20px;">OVEN/RHS - OFF</p> <p style="padding-left: 20px;">H2O HTR (two) - OFF</p> <p style="padding-left: 20px;">AUX PORT - cap installed</p> <p style="padding-left: 20px;">TEST PORT 4 - cap installed</p> <p style="padding-left: 20px;">ELECT TEST PORT - cap installed</p> <p style="padding-left: 20px;">OVEN DOOR - CL</p> <hr/> <p>OPS WATER DISPENSER (deleted if Galley flown)</p> <p style="padding-left: 20px;">H2O SEL VLV - OFF</p> <p style="padding-left: 20px;">Quantity Sel - 8</p> <p style="padding-left: 20px;">lt/pb - lt off</p> <p style="padding-left: 20px;">BYPASS VLV - as is</p> <hr/> <p>MO13Q MIDDECK FLOODS 1,2,3,5,7 (five) - OFF</p> <p style="padding-left: 40px;">EXT A/L (two) (OV102) - OFF</p> <p style="padding-left: 40px;">9,10 (two) (OV103,4,5) - OFF</p> <p style="padding-left: 40px;">4,6,8 (three) - ON</p> <p style="padding-left: 40px;">MO13Q LTG - OFF</p> <p style="padding-left: 20px;">AIRLK FAN (two) - OFF</p>
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ASC/109/FIN 1

MIDDECK SWITCH LIST FOR HANDOVER INGRESS

MO13Q	H2O S/O VLV - ctr (tb-OP) AIRLK 2 - OFF/ON TNL ADAPT 1 - OFF/ON DC UTIL PWR MNB - ON AC UTIL PWR AC3 - OFF		
ML31C	WASTE H2O TK1 DRAIN VLV - ctr (tb-bp)** VLV - ctr (tb-OP) DUMP ISOL VLV - ctr (tb-bp)** VLV - ctr (tb-bp)** VLV ENA/NOZ HTR - OFF SPLY H2O TKD INLET - ctr (tb-OP) OUTLET - ctr (tb-OP) VAC VENT ISOL VLV BUS SEL - MNA CNTL - ctr (tb-bp)** NOZ HTR - OFF		
ML26C	SPLY H2O GN2 TKA SPLY vlv - CL TK VENT vlv - VENT		
ML18F	EMER LTG - ON/OFF WMC FLOOD - OFF		
ML30N	Neg Press Relief vlv cap (two) - installed/seated		
MA73C:A,B	MCA LOGIC MNA (four) - ON MNB (six) - ON MNC (four) - ON :C,D All cbs - cl { } :E All cbs - op {Y} except: cb AC2 PL 3Φ - op {Y} AC3 PL 3Φ - op {Y}		
		MA73C:F	cb AC1 RMS PRI ΦA - op {Y} - (op {R} if no RMS flown) MUP/MAR 3Φ (OV102) - op {Y} MAR 3Φ (OV103,4,5) - op {Y} OPS INST HYD ACTR ΦC - cl { } AC2 RMS B/U ΦA - op {Y} - (op {R} if no RMS flown) L SEAT 3Φ - cl { } OPS INST HYD ACTR ΦC - cl { } AC3 L SEAT 3Φ - cl { } :G All cbs - op {R} (OV102,5) except: All cbs - op {Y} (OV103,4) except: cb AC2 R SEAT 3Φ - cl { } AC3 GALLEY FAN (three) - op {Y} R SEAT 3Φ - cl { } blank switch - dn :H,I All cbs - cl { } :I AFT POD VLV LOGIC (three) - ON
		MO10W	14.7 CAB REG INLET vlv (two) - CL PPO2 CNTLR (two) - NORM O2 REG INLET vlv (two) - CL H2O TK N2 REG INLET vlv (two) - OP PL N2 vlv (two) - CL O2 EMER vlv - CL N2 XOVR vlv - CL H2O TK N2 ISOL vlv (two) - OP PL O2 vlv (two) - CL

MIDDECK SWITCH LIST FOR HANDOVER INGRESS

WCS	AUTO INHIBIT/AUTO – AUTO COMMODE CNTL – DN/OFF MODE – AUTO VAC VLV – CL FAN BYP (two) – OFF SEP – OFF HOSE BLOCK – SEP 1 COMPACTOR ANGLE – ~0 or < 10%	MO51F	(CO2 RMVL SYS (RCRS) – OV102,4,5) CNTLR lts (four) – off MNA – OFF AC1 – ctr CNTLR 1 MODE – ctr COM INSTR – OFF MNC – OFF AC3 – ctr CNTLR 2 MODE – ctr All cbs (six)(OV102) – op {Y} (OV104,5) – op {R}
<hr/>		<hr/>	
MO30F	DC UTIL PWR MNC – ON		
MO32M	LEH O2 5 vlv – CL (OP if seat 5 flown) 6 vlv – CL (OP if seat 6 flown)		
MO39M	MIDDECK COMM CCU PWR – ON OFF		
MO42F	MIDDECK AUD PWR (OV102) – AUD/TONE SPKR AUD PWR (OV103,4,5) – AUD/TONE A/G (two) – T/R A/A – T/R ICOM (two) – T/R VOX SENS sel – as reqd MSTR SPKR VOL sel – as reqd PAGE – dn VOL pb (five) – as reqd XMIT/ICOM MODE sel – as reqd (PTT/PTT recommended) TONES – ACCU/BYP SPKR PWR – OFF GPC MEM DUMP sel – OFF BYP TONE VOL – as reqd	MO58F	(OV103,4,5) TV PWR – OFF
		MO58F	(OV102) AIRLK 1 B/U PWR – OFF A/G 1 – T/R A/G 2 – RCV A/A – T/R ICOM (two) – T/R VOX SENS sel – as reqd PAGE – dn VOL pb (five) – as reqd XMIT/ICOM MODE sel – as reqd (PTT/VOX recommended) TV PWR – OFF
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MIDDECK SWITCH LIST FOR HANDOVER INGRESS

MO52J	DC UTIL PWR MNA - ON	
	AC UTIL PWR AC1 - OFF	
	MSTR ALARM pb - It off	
<hr/>		
MO69M	LEH O2 7 vlv - CL (OP if seat 7 flown)	
	8 vlv - CL	
<hr/>		
MD44F	CAB TEMP CNTL LINK - PRI ACT (pinned)	
	vlv - FULL COOL (ccw by using AUTO TEMP CNTLR 1)	
	SEC ACT - FULL HEAT (cw by using AUTO TEMP CNTLR 2)	
<hr/>		
	MIDDECK FLOOR (OV103,4,5)	
	EMU O2 ISOL VLV - CL	
	CAB PURGE VLV - CL	
	ISOL VLV - CL	
<hr/>		
MO63P	(OV104)	|
	cb CB2/J2 - op {Y}	
	CB3/J3 - op {Y}	
	CB4/J4 - op {Y}	
	CB5/J5 - op {Y}	
	CB6/J6 - op {Y}	
	RLY PWR - op {Y}	
	J2 - off	
	J3 - off	
	J4 - off	
	J5 - off	
	J6 - off	
	Left select - 10A	
	Right select - 10A	

NOT FLOWN

9-17

ASC/109/FIN 1

MIDDECK EXPERIMENTS SWITCH LIST FOR HANDOVER **INGRESS**

MIDDECK (TEPC)
SW-1 - OFF

NOT FLOWN

9-18

ASC/109/FIN 1

AIRLOCK SWITCH LIST FOR HANDOVER INGRESS

AW18A	LTG FLOOD 1,3,4 (three) – OFF 2 – ON/OFF	
AW18D	AIRLK AUD PWR – OFF A/G 1 – T/R A/G 2 – RCV A/A – T/R ICOM (two) – T/R PAGE – dn VOL pb (five) – as reqd CNTL – NORM VOX SENS sel – as reqd MSTR VOL 1 sel – MAX XMIT/ICOM MODE sel – PTT/VOX MSTR VOL 2 sel – MAX	
AW18H	PWR/BATT CHGR EMU BUS SEL (two) – OFF MODE (two) – OFF INPUT – EMU 1	
AW82B	AIRLK DEPRESS vlv – CL cap – installed O2 vlv (two) – CL	
AW82D	EMU H2O (four) – ctr (tb–CL) CCU PWR (two) – OFF	
AW82H	EMU H2O SPLY WASTE reg (two) – REGULATING	
TW58T	(NOTE: Panel deleted if SL or SH not flown) TNL LTG FLOOD 1 – ON/OFF 2,3,4 (three) – OFF ADP PL ISOL VLV – CL cap – installed	

TW58T	TNL FAN – OFF cb TNL FAN – op { Y } – (op { R } if SH flown) TNL LIGHT – OFF	
	AIRLOCK INNER HATCH Actuator Handle – LAT Lock Lever – LOCK Equal vlv (two) – NORM cap (two) – installed	
	AIRLOCK OUTER HATCH (if SH/SL – C HATCH) Actuator Handle – LAT Lock Lever – LOCK Equal vlv (two) – OFF cap (two) – installed	
	SH/SL HATCH (D HATCH) (if SH or SL flown) Actuator Handle – LAT Lock Lever – LOCK Equal vlv (two) – OFF cap (two) – installed	
	EXT AIRLOCK UPPER HATCH (if EXT A/L flown) Actuator Handle – LAT Lock Lever – LOCK Equal vlv (two) – OFF cap (two) – installed	
	TUNNEL ADAPTER HATCH (if flown) Actuator Handle – LAT Lock Lever – LOCK Equal vlv (two) – OFF cap (two) – installed	

NOT FLOWN

AFT FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

R12L **NOTE:** Panel may be blank if no PL requirement
(See 9-26 or 9-27)

R11U	FC GPC PURGE SEQ - dn (tb-bp)	
	PURGE HTR - GPC	
	VLVS (three) - GPC	
	STARTUP HTR (three) - ENA	
	H2O LINE HTR - A AUTO	
	RELIEF HTR - A AUTO	
	(OV102,4)	|
	MDU PWR - ON	
	BRT sel - as reqd	
R11L	CRT4 PWR (OV103,5) - OFF	
	MAJ FUNC (OV103,5) - SM	
	IDP/CRT4 PWR (OV102,4) - ON	
	MAJ FUNC (OV102,4) - SM	
	ENCRYPTOR - NORM	
	MS AUD CNTL - NORM	
	SPLY H2O TKA INLET - ctr (tb-OP)	
	OUTLET - ctr (tb-CL)	
	TKB INLET - ctr (tb-OP)	
	OUTLET - ctr (tb-OP)	
	TKC INLET - ctr (tb-OP)	
	OUTLET - ctr (tb-OP)	

AFT FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

R11L	SPLY H2O DUMP ISOL VLV	- ctr (tb-bp)**	R13U	C/W LIMIT SET VALUE pb (three)	- 000
	VLV	- ctr (tb-bp)**		LIMIT	- LOWER
	ENA/NOZ HTR	- OFF		FUNC	- ctr
	XOVR VLV	- ctr (tb-CL)		PARAM	- ctr
	GALLEY SPLY VLV	- ctr (tb-bp)**	-----		
	B SPLY ISOL VLV	- ctr (tb-OP)	R13L	PL BAY DR SYS (two)	- DSBL
R10	MS AUD PWR	- AUD/TONE		MECH PWR SYS (two)	- OFF
	A/G (two)	- T/R		DR	- STOP (tb-as is)
	A/A	- T/R		RAD LAT CNTL (two)	- OFF (tb-LAT)
	ICOM (two)	- T/R		CNTL (two)	- OFF (tb-STO)
	VOX SENS sel	- as reqd		KU ANT DIRECT STO	- OFF
	PAGE	- dn		ANT	- GND (tb-STO)
	VOL pb (five)	- as reqd			- (GND (tb-bp) if not flown)
	XMIT/ICOM MODE sel	- as reqd (PTT/VOX recommended)		MMU GN2 SPLY ISOL VLV (two)	- ctr (tb-bp)**
	LTG PNL sel	- OFF	-----		
	FLOOD sel (two)	- ON,BRT - (OFF,BRT if night launch)	A1U	SLEW AZM	- ctr
	BIOMED CH 1 sel	- MIDDECK CTR		ELEV	- ctr
	2 sel	- MIDDECK R		RATE	- SLOW
R13U	C/W TONE VOL (two)	- as is		SIG STRENGTH sel	- S-BD PM
	PARAM STATUS	- ctr		KU tb (three)	- bp
	MEM	- ctr		sel (two)	- MAN SLEW,dn
	LAMP TEST	- ctr		PWR	- OFF
	PARAM SEL pb (three)	- 120		MODE	- RDR PASSIVE
	dP/dT SNSR (OV102)	- CAB		RADAR OUTPUT	- HI
				CNTL	- CMD
				SIG PROC HDR	- TV
				LDR	- OPS RCDR
				TAGS	- CLEAR

AFT FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

A1L	S-BD PL CNTL	- CMD		A1R	OPS RCDRS	PNL CNTL tb (two)	- bp
	ANT POLAR	- L CIRC				MODE (two)	- RCD (tb-RCD) tb-bp
	XMTR PWR	- LO				sel	- MAN
	CH SEL pb (two)	- 701	|			PWR (two)	- ON
	FREQ SWEEP	- OFF				ANOM SEQ	- OFF (tb-bp)
	MOD	- OFF			S-BD FM CNTL		- CMD
	PWR SYS	- OFF			ANT		- GPC
	SEL	- PSP			PWR		- 1
	PSP CMD OUTPUT	- PL UMB			DATA SOURCE sel		- ME
	PL DATA INTLVR PWR	- ON			PL RCDR PNL CNTL tb		- bp (gray if not flown)
	S-BD PM ANT SW ELEC	- 1			FUNC		- OPERATE
	PRE AMPL	- 1			MODE sel		- STOP (tb-bp)
	PWR AMPL STBY	- 1			PWR		- OFF
	OPER	- 1			SPEED sel		- 1
	MODE sel	- STDN HI			AUD CTR VOICE RCD SEL CH 1 sel		- ICOM A
	XPNDR	- 1			2 sel		- ICOM B
	NSP DATA RATE XMIT	- HI			DOCK RING (seven)		- OFF
	RCV	- HI			SL (seven)		- OFF
	UPLK DATA	- S-BD			UHF A/G (two)		- OFF
	CODING XMIT	- OFF			A/A		- OFF
	RCV	- ON			PL BAY OUTLETS ICOM (two)		- OFF
	PWR	- 1		<hr/>			
	ENCRYPTION PWR	- ON		AFT MDU	(OV102,4)		
	MODE	- SEL		MDU PWR		- OFF	
	SEL	- RCV		BRT sel		- as reqd	

NOT FLOWN

9-22

ASC/109/FIN 1

AFT FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

A6U	DAP - all off SENSE: -Z FLT CNTLR PWR - OFF DATA BUS sel (OV103,5) - 1 Unused rotary sw (OV102,4) - full cw ADI ATT - INRTL ERR - MED RATE - MED OS LTG FLOOD sel (two) - ON,BRT PNL sel - OFF INST sel - OFF NUMERIC sel - OFF ANNUN BUS SEL - OFF LAMP TEST - ctr INTEN sel (two) - VAR,MED EVENT TIMER SET pb (four) - as reqd MODE - UP CNTL - ctr TIMER - ctr PL RETEN LOGIC PWR (two) - OFF PL SEL - 1 MON LAT 1,2,3,4,5 (five) - OFF (tb-bp) RDY 1,2,3,4,5 tb (five) - bp	A6L	(DSP) (OV103,4,5) cb ESS SYS PWR CNTL (two) - op { Y } DEP (four) - op { Y } DOCK LT (four) - op { Y } MN LOG (six) - op { Y } PMA 2/3 GRP 1 HOOKS SYS A (two) - op { R } B (two) - op { R } 2 HOOKS SYS A (two) - op { R } B (two) - op { R } SYS PWR (two) - ctr (tb-OFF) PMA 2/3 HOOKS (two) - ctr (tb-bp) PYRO PWR (two) - OFF PSU PWR (two) - OFF VEST DEP VLV (four) - ctr (tb-bp)** LTS (four) - OFF
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AFT FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

A2	DIGI-DIS SEL - EL/AZ X-PNTR SCALE - X10		
<hr/>			
A7U	MSTR ALARM pb - It off PL BAY FLOOD (eight) - OFF RMS SPOT (two) (OV103) - OFF CAMR (two) (OV103) - ELBOW PORT RMS LIGHT (OV102,4,5) - OFF CAMR (OV102,4,5) - ELBOW WIRELESS VIDEO (two) (OV102,4,5) - OFF TV CAMR PWR (five) - ctr (tb-OFF) PWR CNTL - CMD CONTR UNIT - OFF DNLK - ENA SYNC - NORM VID IN pb (thirteen) - It off OUT pb (eight) - It off CAMR CMD PAN/TILT - LO RATE FOCUS - ctr ZOOM - ctr IRIS - ctr TILT - ctr PAN - ctr ALC pb (three) - It off GAMMA pb (three) - It off	|	A7L (OV103,4,5) (A6L ISS flights) cb MADS PWR MNB - cl { } MADS RCDR PWR - PCM/WB ENA PB FWD - CMD STRAIN GAGE - PCM ENA WB/ACIP PCM - CMD PCM - CMD RCD MODE - SAMPLE FDM CNTL - DATA MAN CALBR sel - DC 0 ACIP HTR (OV102) - OFF ACIP HTR - OFF OEX EQUIP - ON SILTS HTR - OFF cb SILTS CAMR AC3ΦA - op {R} SILTS PWR - OFF MADS FDM CNTL - DATA MAN CALBR sel - DC 0
<hr/>			
A7L	(APDS CNTL PNL) (OV103,4,5) | CNTL PNL PWR (three) - OFF HTRS/DCU PWR (three) - OFF APDS PWR (three) - OFF (It off) STATUS lts (thirty-six) - off PYROS (three) - OFF (It off) PYRO CIRC PROT OFF lts (two) - off		A7L ACIP HTR (OV102) - OFF ACIP HTR - ON OEX EQUIP - OFF cb SILTS CAMR AC3ΦA - op {R} SILTS PWR - OFF MADS FDM CNTL - DATA MAN CALBR sel - DC 0
<hr/>			
A4	MSN TIMER sel - MET		

AFT FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

<p>A8U (This panel may be replaced or deleted if RMS not flown)</p> <ul style="list-style-type: none"> RMS Mode lts (twelve) - off BRAKES - ON (tb-OFF) SAFING - AUTO (tb-bp) MODE sel - TEST AUTO SEQ - ctr <li style="padding-left: 20px;">lts (two) - off S/W STOP tb - gray C/W TONE VOL - as reqd <li style="padding-left: 20px;">lts (eleven) - off MSTR ALARM pb - lt off RATE MIN tb - OFF <li style="padding-left: 20px;">HOLD tb - OFF <li style="padding-left: 20px;">SCALE tb - gray EE MODE - OFF <li style="padding-left: 20px;">MAN CONTR - ctr <li style="padding-left: 20px;">tb (six) - bp B/U JOINT sel - SY <li style="padding-left: 20px;">PL REL - OFF <li style="padding-left: 20px;">DR - ctr PARAM sel - PORT TEMP LTG ANNUN/NUM sel (two) - VAR,LO <li style="padding-left: 20px;">PNL/INST sel - OFF JOINT sel - CRIT TEMP SINGLE/DIRECT DR - ctr SHDLR BRACE REL - ctr (tb-bp) <hr style="border-top: 1px dashed black;"/>	<p>A8L (This panel may be deleted if RMS not flown)</p> <ul style="list-style-type: none"> STBD RMS - OFF (tb-bp) <li style="padding-left: 20px;">RETEN LAT - OFF (tb-bp) <li style="padding-left: 20px;">HTR (two) - OFF <li style="padding-left: 20px;">R-F-L tb (three) - bp RMS SEL - OFF <li style="padding-left: 20px;">PWR - OFF PORT RMS - OFF (tb-STO) <li style="padding-left: 20px;">- (OFF (tb-bp) if no MPMs present) <li style="padding-left: 20px;">HTR (two) - OFF <li style="padding-left: 20px;">RETEN LAT - OFF (tb-LAT) <li style="padding-left: 20px;">- (OFF (tb-bp) if no MRLs present) <li style="padding-left: 20px;">R-F-L tb (three) - gray <li style="padding-left: 20px;">- (bp if no RMS flown) RMS RHC RATE - VERN <hr/> <p>A3</p> <ul style="list-style-type: none"> MON CONTRAST (two) - ctr <li style="padding-left: 20px;">BRT (two) - ctr <li style="padding-left: 20px;">COLOR (two) - as reqd <li style="padding-left: 20px;">TINT (two) - as reqd <li style="padding-left: 20px;">FUNCTION (two) - ctr <li style="padding-left: 20px;">PWR (two) - OFF <hr/>
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AFT FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

L9 PS FLOOD sel (two) - ON,BRT
- (OFF,BRT if night launch)
AUD PWR - AUD/TONE
A/G (two) - T/R
A/A - T/R
ICOM (two) - T/R
VOX SENS sel - as reqd
PAGE - dn
VOL pb (five) - as reqd
XMIT/ICOM MODE sel - as reqd (PTT/VOX
PTT/PTT |
recommended)

NOT FLOWN

9-26

ASC/109/FIN 1

AFT FLIGHT DECK PAYLOADS SWITCH LIST FOR HANDOVER INGRESS

<p>L10U (AVIU) SYNC/VIDEO - VIDEO HI-Z/75 - HI-Z PWR SELECT - HI</p> <hr/> <p>L11UL SSP-3 (KEEL CAM) cb SW PWR - op KEEL CAM HTR/ILLUM - OFF ENABLE - OFF</p> <hr/> <p>L11UR SSP-3 (MULE) Verify all tbs bp MULE FMDM-A,B PWR (two) - OFF SURV HTR A,B PWR (two) - OFF cb MULE SW PWR - op KEEL CAM PWR - op ESM HTR A,B PWR (two) - OFF SOPE HTR A,B PWR (two) - OFF</p> <hr/> <p>L12UL (FSS) Verify all tbs bp PCU POWER CONTR-A,B (two) - OFF NOT USED SW - OFF cb FSS A SIDE PWR - op PDIP PWR 2/Ku BAND - op CCTV HTR PWR - OFF FSS FMDM-A,B PWR (two) - OFF HTR PWR - OFF</p> <hr/> <p>L12UR (TELESCOPE) Verify all tbs bp ESSENTIAL BUS EXTERNAL PWR - ctr INTERNAL PWR - ctr</p>	<p>L12UR FHST SHUTTER - OP RSU SURV HTR PWR - OFF MN BUS INT PWR - ctr ESS/MN SW ENA - OFF cb SPACE TEL SW PWR - op PDIP PWR 1 - op IPCU RLY CL tb - bp MAIN BUS EXT PWR - ctr SSM WK LTS - OFF</p> <hr/> <p>L12LL (PSP BY-PASS) PSP BY-PASS - DSBL cb SW PWR - op</p> <hr/> <p>L12LR (SAC) Verify all tbs bp ASIPE HTR A,B PWR (two) - ctr SAP HTR A,B PWR (two) - OFF cb SAC A-SIDE PWR ENA - op SAC B-SIDE PWR ENA - OFF OPA HEATER A,B PWR (two) - OFF EPDSU HTR PWR - OFF</p> <hr/> <p>L12 (PDIP) Ku BAND RATE - OFF DC PWR 1,2 (two) - OFF Turn-around plugs installed in J101 and J103</p> <hr/> <p>R12U (VPU) VPU PWR SW - OFF</p>
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NOTE: L10,L11,L12, - All unspecified/unlabeled switches - dn (2 posn)/ctr (3 posn),
 R7,A6,A7L, tb - bp, cb - op, rotaries - as reqd
 R12

AFT FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

<p>A15 (All Veh)</p> <p>PS COMM CCU PWR - OFF ON</p> <p>DC UTIL PWR MNC - OFF</p> <p>AC UTIL PWR AC3 - OFF</p> <p>A15: (OV103,4,5)</p> <p>:A CRYO TK5 HTRS (four) - OFF</p> <p style="margin-left: 100px;">O2 RESET/TEST - ctr</p> <p>A15: (OV102,4,5)</p> <p>:B cb PPCA CONT PWR (two) - op { R }</p> <p style="margin-left: 100px;">- (op { Y } if</p> <p style="margin-left: 100px;">EDO pallet flown)</p> <p>:C PALLET PWR (two) - ctr (tb-OFF)</p> <p style="margin-left: 100px;">HTRS (two) - OFF</p> <p style="margin-left: 100px;">HTRS (sixteen) - OFF</p> <p>:D,E, O2 RESET/TEST (four) - ctr</p> <p style="margin-left: 100px;">F,G</p> <p>:H,I, cb PALLET ESS (sixteen) - op { R }</p> <p style="margin-left: 100px;">J,K - (cl { } if</p> <p style="margin-left: 100px;">EDO pallet flown)</p> <p style="margin-left: 100px;">HTR SNSR (eight)</p> <p style="margin-left: 100px;">- op { R }</p> <p style="margin-left: 100px;">- (op { Y } if</p> <p style="margin-left: 100px;">EDO pallet flown)</p> <hr/> <p>A14 RCS/OMS HTR FWD RCS - OFF</p> <p style="margin-left: 40px;">L POD (two) - A OFF, B OFF</p> <p style="margin-left: 40px;">R POD (two) - A OFF, B OFF</p> <p style="margin-left: 40px;">OMS KIT - OFF</p> <p style="margin-left: 80px;">CRSFD LINES (two) - A AUTO,</p> <p style="margin-left: 100px;">B AUTO</p> <p style="margin-left: 40px;">FWD RCS JET (five) - AUTO</p> <p style="margin-left: 40px;">AFT RCS JET (five) - AUTO</p> <p style="margin-left: 40px;">PYRO (twelve) - SAFE</p> <p style="margin-left: 40px;">RMS LAT - SAFE</p> <hr/>	<p>A13 (OV103,4,5)</p> <p>OS AUD MSTR SPKR VOL sel - as reqd</p> <p style="margin-left: 40px;">SPKR PWR - OFF</p> <p>GPS PRE AMPL UC (OV103,5) - MNC</p> <p style="margin-left: 40px;">LC (OV103,5) - MNA</p> <p style="margin-left: 80px;">(two) (OV104) - ON</p> <p style="margin-left: 40px;">PWR (OV103,4,5) - ON OFF</p> <p>GPS/SIGI PWR (OV103,5) - OFF</p> <p>blank sw (OV104) - dn</p> <p>GPS ENCRYPT (OV103,4,5) - NORM</p> <p>GPS/SIGI ENCRYPT (OV103,5) - NORM</p> <p>blank sw (OV104) - dn</p> <p>A13 (OV102)</p> <p>OS AUD PWR - OFF</p> <p style="margin-left: 40px;">A/G (two) - T/R</p> <p style="margin-left: 40px;">A/A - T/R</p> <p style="margin-left: 40px;">ICOM (two) - OFF</p> <p style="margin-left: 40px;">VOX SENS sel - as reqd</p> <p style="margin-left: 40px;">MSTR SPKR VOL sel - as reqd</p> <p style="margin-left: 40px;">PAGE - dn</p> <p style="margin-left: 40px;">VOL pb (five) - as reqd</p> <p style="margin-left: 40px;">XMIT/ICOM MODE sel - as reqd (PTT/PTT</p> <p style="margin-left: 80px;">recommended)</p> <p style="margin-left: 40px;">SPKR PWR - OFF</p> <hr/> <p>A12 APU HTR GAS GEN/FUEL PUMP (three) - OFF</p> <p style="margin-left: 40px;">LUBE OIL LINE (three) - OFF</p> <p style="margin-left: 40px;">TK/FU LINE/H2O SYS (six) - OFF</p> <p>LG ARM/DN RESET - dn</p> <p>FC3 STRUCT RTN - ctr (tb-ON)</p> <p>GPS (OV102)</p> <p style="margin-left: 40px;">PWR - ON OFF</p> <p style="margin-left: 40px;">ENCRYPT - NORMAL</p>
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NOT FLOWN

9-28

ASC/109/FIN 1

AFT FLIGHT DECK SWITCH LIST FOR HANDOVER INGRESS

A12	GPS PRE AMPL (OV102) UPPER - ON LOWER - ON HYD HTR A (four) - AUTO B (four) - OFF CIRC PUMP PWR 1 - MNA 2 - MNB 3 - MNC	|	R14:	All cbs - cl { } except: If no EDO Pallet flown on OV102 :B cb MNA PALLET DSC 1A/2B - op {R} MNB PALLET DSC 1B - op {R} MNC PALLET DSC 2A - op {R} If no EDO Pallet flown on OV104,5 :B cb MNA PALLET DSC 1A/2B - op {R} 3A - op {R} MNB PALLET DSC 1B - op {R} 4B - op {R} MNC PALLET DSC 2A - op {R} 3B/4A - op {R} If one EDO Pallet flown on OV104,5 :B cb MNA PALLET DSC 3A - op {R} MNB PALLET DSC 4B - op {R} MNC PALLET DSC 3B/4A - op {R} :C cb MNA UHF EVA - op {Y} MNB KU ELEC - op {Y} ANT HTR - op {Y} CABLE HTR - op {R} MNC UHF EVA - op {Y} KU SIG PROC - op {Y}	|
A11	(OV103,4,5) CRYO TK4 HTR (four) - OFF O2 RESET/TEST - ctr MS COMM CCU PWR - ON OFF DC UTIL PWR MNC - ON	|	:B	All cbs - op {Y} except: :D cb MNB VPU - op {Y} MNC TV CAB - cl :E MNA STBD RMS TV D (three) - op {Y} MNB PORT RMS TV RMS (three) - op {Y} - (op {R} if no PORT RMS flown)	|
A11	(OV102) CRYO TK4/5 HTR (four) - OFF O2 TK 4/5 RESET/TEST - ctr MS COMM CCU PWR - ON OFF OS COMM CCU PWR - OFF DC UTIL PWR MNC - ON	|	:C	:D MNB KU ELEC - op {Y} ANT HTR - op {Y} CABLE HTR - op {R} MNC UHF EVA - op {Y} KU SIG PROC - op {Y}	|
A11	(OV105) PALLET HTRS C,D (two) - OFF TK10 HTRS (four) - OFF O2 RESET/TEST - ctr TK11 HTRS (four) - OFF O2 RESET/TEST - ctr TK12 HTRS (four) - OFF O2 RESET/TEST - ctr TK13 HTRS (four) - OFF O2 RESET/TEST - ctr	|	:D	:E MNA STBD RMS TV D (three) - op {Y} MNB PORT RMS TV RMS (three) - op {Y}	|
A11	(OV104) CRYO TK SEL (eight) - ctr All cbs (104,5) - op {R}	|	:F	ESS 1BC LDG GEAR ARM/DN RESET - op {R}	|

NOT FLOWN

9-29

ASC/109/FIN 1

HARDWARE CAUTION & WARNING CONFIGURATION

UPPER LIMIT CHANGE

	<u>TO</u>
4 CABIN PRESS	3.90 V/15.52 psia (OV102) 3.85 V/15.40 psia (OV103) 3.90 V/15.53 psia (OV104) 3.85 V/15.29 psia (OV105)
7 OMS TK P OX-L	3.60 V/288 psi (OV102,3,4) 3.70 V/296 psi (OV105)
17 OMS TK P FU-L	3.60 V/288 psi
37 OMS TK P OX-R	3.60 V/288 psi
39 MPS He Reg 1A P	4.00 V/811.4 psia (OV103) 4.10 V/814.5 psia (OV104) 4.10 V/808.4 psia (OV105)
47 OMS TK P FU-R	3.60 V/288 psi
49 MPS He Reg 2A P	4.10 V/805.6 psia (OV102) 4.00 V/808.1 psia (OV103) 4.10 V/814.6 psia (OV105)
55 CAB FAN ΔP	4.85 V/0.2" H2O (if SH flown)
59 MPS He Reg 3A P	4.00 V/811.5 psia (OV105)
65 PPO2 #1	2.30 V/2.7 psi (if SH flown)
74 CABIN FAN ΔP	4.25 V/6.80" H2O
75 POCO2 #2	3.80 V/7.6 mmHg (if SH flown)
79 MANF P LH2	3.25 V/65 psi
85 ARS FAN ΔP	4.85 V/0.2" H2O (if SH flown)
95 CAB TOTAL PRESS	1.55 V/13.8 psi (if SH flown)
107 FREON LOOP 1 EVAP OUT T	4.30 V/115.2 °F
117 FREON LOOP 2 EVAP OUT T	4.30 V/115.2 °F

LOWER LIMIT CHANGE

	<u>TO</u>
4 CABIN PRESS	3.45 V/13.73 psia (OV102) 3.45 V/13.80 psia (OV103) 3.45 V/13.74 psia (OV104) 3.45 V/13.71 psia (OV105)
39 MPS He Reg 1A P	3.35 V/681.9 psia (OV103) 3.45 V/678.7 psia (OV105)
49 MPS He Reg 2A P	3.45 V/675.8 psia (OV102) 3.35 V/677.8 psia (OV103) 3.45 V/684.6 psia (OV105)
59 MPS He Reg 3A P	3.35 V/680.0 psia (OV105)
74 CABIN FAN ΔP	2.60 V/4.16" H2O
106 FREON FLOW 1	0.80 V/1186 lb/hr
116 FREON FLOW 2	0.80 V/1186 lb/hr

INHIBIT

- 8 APU 1 EGT
- 18 APU 2 EGT
- 28 APU 3 EGT
- 30 CRYO O2 P TK4/5 (if TK4 and TK5 not flown)
- 40 CRYO O2 P TK5 (unless OV103,4,5 and TK5 flown)
- 55 CAB FAN ΔP (if SH flown)
- 61 CRYO O2 HTR1 TK4 (if TK4 and TK5 not flown)
- 65 PPO2 (if SH flown)
- 71 CRYO O2 HTR2 TK4 (if TK4 and TK5 not flown)
- 75 POCO2 (if SH flown)
- 77 OMS PBK OXID TK ULL P
- 80 CRYO H2 P TK4/5 (if TK4 and TK5 not flown)
- 81 CRYO O2 HTR1 TK5 (unless OV103,4,5 and TK5 flown)
- 85 ARS FAN ΔP (if SH flown unpowered)
- 87 OMS PBK FUEL TK ULL P
- 90 CRYO H2 ΔP TK5 (unless OV103,4,5 and TK5 flown)
- 95 CAB TOTAL PRESS (if SH flown)

NOT FLOWN

9-30

ASC/109/FIN 2

MEDS CONFIGURATION FOR INGRESS

MDU	View Angle	Port Config	Selected Port	Flight Critical Bus	Display	Edgekey Menu
CRT1	positive	auto	primary	3	DPS	DPS
CRT2	positive	auto	primary	2	DPS	DPS
CRT3	positive	auto	primary	4	DPS	DPS
CRT4	negative	auto	primary	1	DPS	DPS
CDR1	positive	auto	primary	4	HSI/AMI	Data Bus Select
CDR2	positive	auto	primary	3	Comp ADI/HSI	Data Bus Select
MFD1	positive	auto	primary	3	HYD/APU	Subsystem
MFD2	positive	auto	primary	4	OMS/MPS	Subsystem
PLT1	positive	auto	primary	4	Comp ADI/HSI	Data Bus Select
PLT2	positive	auto	primary	4	HYD/APU	Subsystem
AFD1	negative	auto	n/a	n/a	n/a	n/a

— | |

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NOT FLOWN

9–32

ASC/109/FIN 1

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| | —

CUE CARD CONFIG

**CUE CARD
CONFIG**

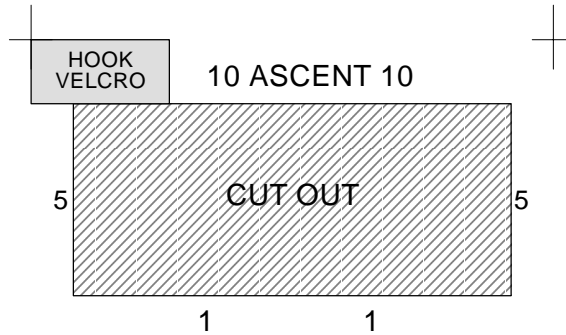
FAB USE ONLY

10-1

ASC/109/FIN

CUE CARD
CONFIG

TOP



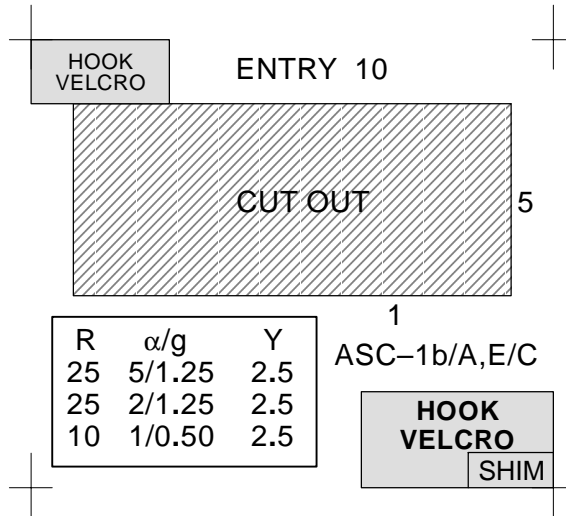
**ADI ERROR/RATE
SWITCH**

ASC-1a/A,E/C



TOP

BACK OF 'ADI ERROR/RATE SWITCH'



ASC-1b/A,E/C



FAB USE ONLY

CC 10-2

ASC/109/FIN

TOP

ASCENT/ENTRY SPEC PASS	NO.	ASC-2a/A,E/D BFS	NO.
GPC MEMORY	0	BFS MEMORY	0
IMU ALIGN (301)	21	<u>GNC</u>	
STRK/COAS CNTL (301)	22	HORIZ SIT	50
RCS (OPS 3)	23	OVERRIDE	51
HORIZ SIT	50	GPS STATUS	55
OVERRIDE	51	<u>SM</u>	
ENT CONTROL (OPS 3)	53	PL BAY DOORS	63
GPS STATUS	55		

TOP
BACK OF 'ASCENT/ENTRY SPEC'

HOOK
VELCRO
SHIM

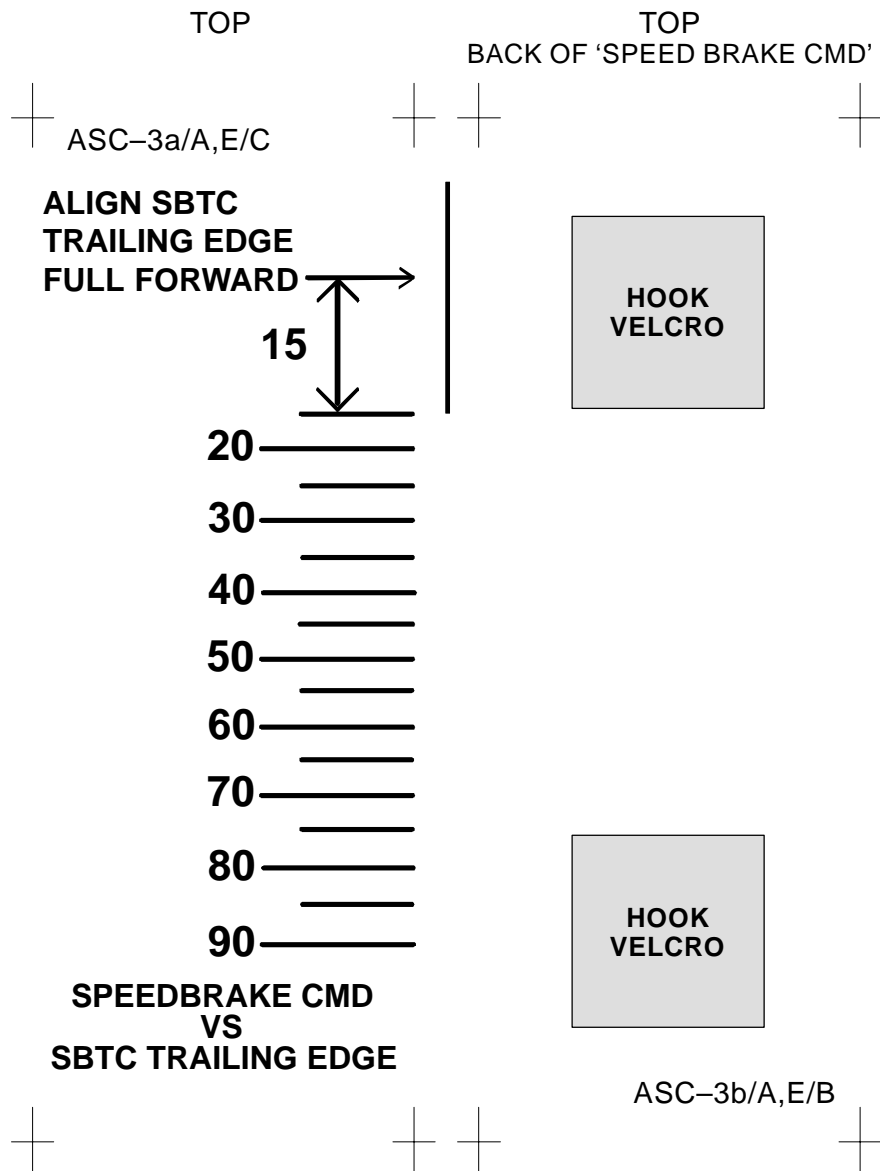
HOOK
VELCRO
SHIM

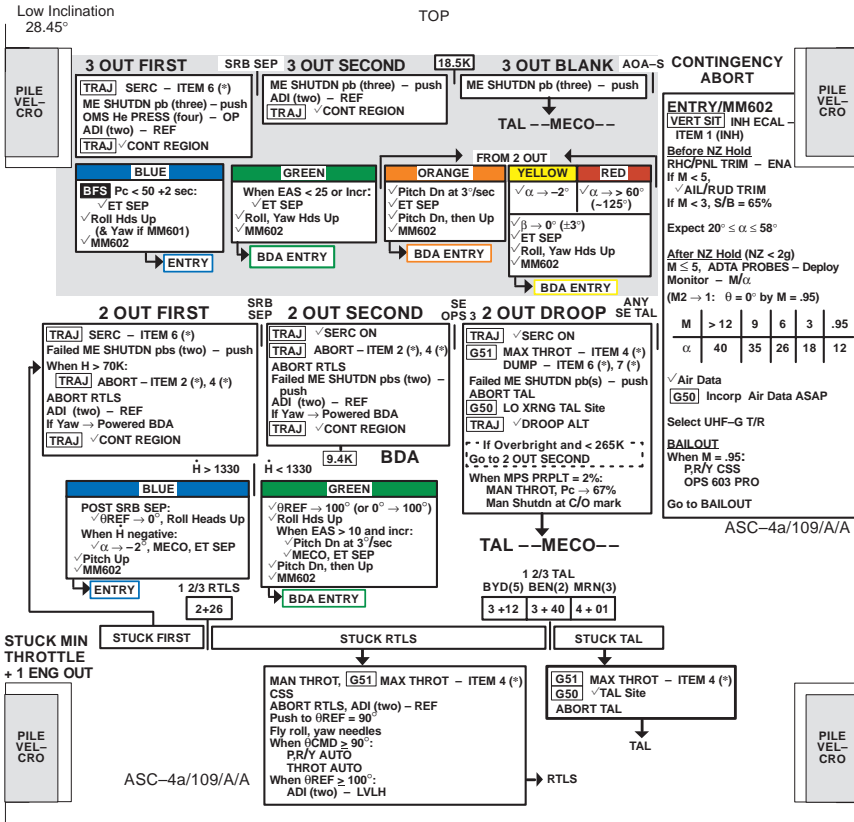
ASC-2b/A,E/B

FAB USE ONLY

CC 10-3

ASC/109/FIN



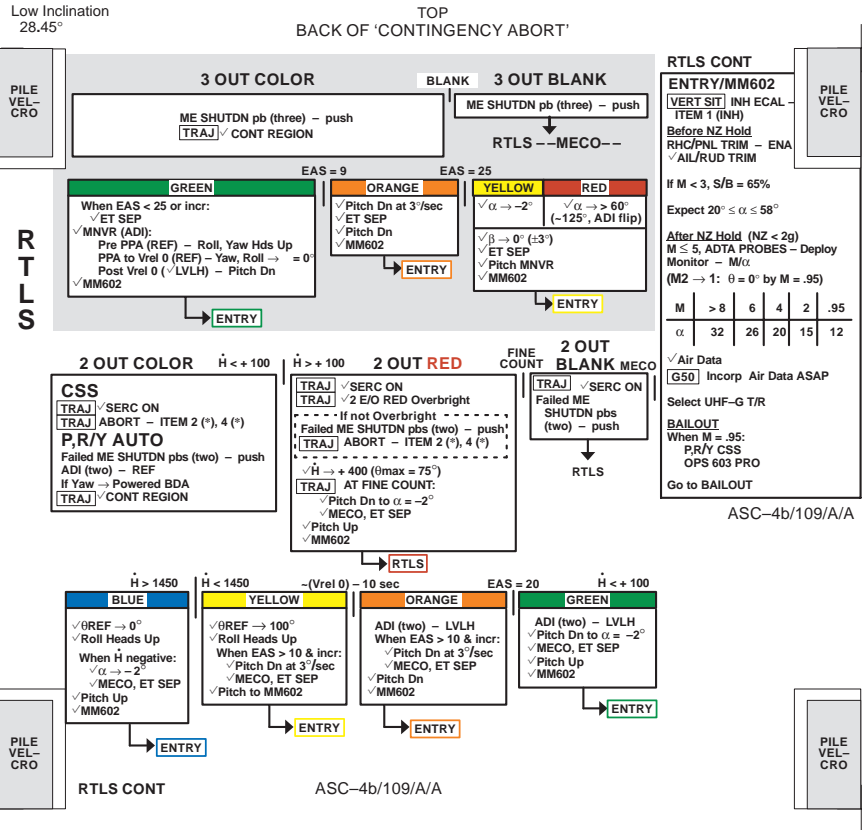


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FAB USE ONLY

CC 10-5

ASC/109/FIN



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FAB USE ONLY

CC 10-6

ASC/109/FIN

TOP

HOOK
VELCRO

**OMS 2
BURN
MONITOR**

HOOK
VELCRO

OMS TEMP*	L	R	
FU IN P ≥	225	221	OMS ENG FAIL
≤	211	200	OMS PRPLT FAIL
or No FU IN P			
OMS PC* & OMS↓ (BFS: √ accel)			OMS ENG FAIL
ENG VLV 1 or 2 < 70			
or OX IN P > 227			OMS PRPLT FAIL
OX IN P ≤ 227			
or No OX IN P			
OMS OX/FU TK P (√ ENG IN P)			He PRESS/VAP ISOL (two) – OP
OX/FU LOW			If aff TK P not incr:
			He PRESS/VAP ISOL (two) – CL
			At PC < 72 or OMS TEMP or HP > 85:
			OMS PRPLT FAIL
OX & FU HIGH			He PRESS/VAP ISOL (two) – CL
			Cycle He A(B) to maintain TK P 234–284
OMS He TK P LOW			At He P < 640 or QTY ≤ 41:
(√ OMS/MPS)			If HP < 85: OMS XFEED from good OMS
			At HP > 85: OMS PRPLT FAIL
OMS N2 REG P HIGH or LOW			OMS ENG – ARM
OMS N2 TK P LOW			At N2 TK P < 470: OMS ENG – ARM
(√ OMS/MPS)			
OMS GMBL	PRI fail	L(R) OMS GMBL – SEC (twice)	
	SEC fail	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	If high RCS usage: OMS ENG FAIL	
	2 FAs lost	√ MAN SHUTDN	
I/O ERROR FA	1(4)	L(R) OMS GMBL – SEC	
		I/O RESET (if recov: BFS I/O RESET)	
		If high RCS usage: OMS ENG FAIL	
	2 FAs lost	√ MAN SHUTDN	
BCE STRG D		I/O RESET (if recov: >>)	
	1(4)	If high RCS usage:	
		L(R) OMS GMBL – SEC (twice)	
I/O ERROR PCM			OI PCMMU PWR – 2(1)

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

ASC-5a/109/A,O/A

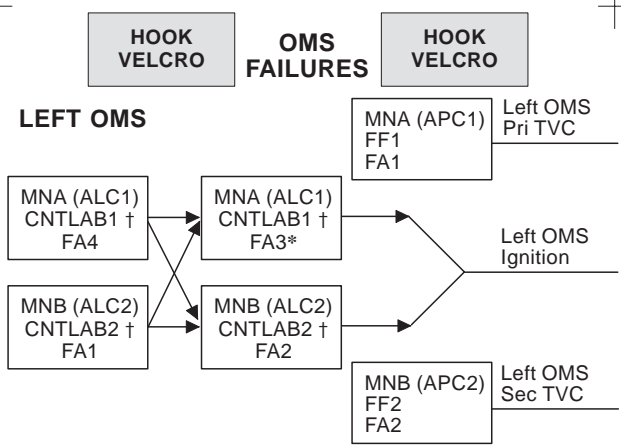
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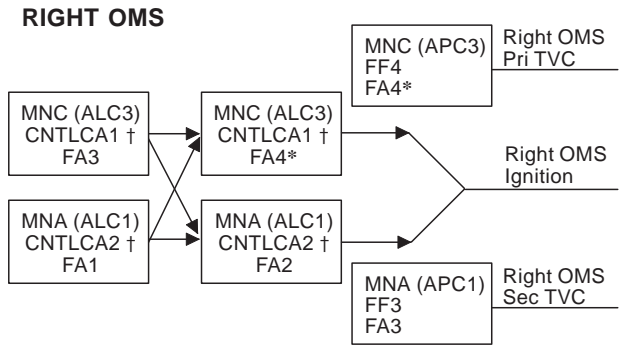
CC 10-7

ASC/109/FIN

TOP
BACK OF 'OMS 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

ASC-5b/A,O,E/H

(reduced copy)

FAB USE ONLY

CC 10-8

ASC/109/FIN

TOP

HOOK VELCRO	OMS 2/ ORBIT OMS BURNS	HOOK VELCRO
----------------	---------------------------------------	----------------

- ✓ MM105/202(302)
- Enter TGO +5 sec (2 eng) or TGO +10 sec (1 eng)
- ✓ BURN ATT (INRTL) then REF, pb – push
- ✓ ENG SEL ✓ DAP TRANS – NORM (MM202)
- CNTL PWR (two) – ON ✓ DAP – AUTO(PASS)/DISC
- ✓ GMBL TRIM
- 2 engine: P = +0.4 LY = -5.7 RY = +5.7
- 1 engine: P = +0.4 LY = +5.2 RY = -5.2
- L,R OMS He PRESS/VAP ISOL A (two) – OP
- ... Wait 2 sec. ...
- L,R OMS HE PRESS/VAP ISOL B (two) – GPC (OP for SE burn)

ORB BURN

A			
B			

TIG-2 SEL OMS ENG(s) – ARM/PRESS (✓P VLVs OP)
If P VLV CL: Aff OMS ENG – OFF

WARNING

Do not burn aff engine if:
OMS N2 TK P < 470(564) (NONCRIT BURN)
He TK P < 640
FU ENG IN P < 216(244)
OX ENG IN P < 151(244)

--	--	--	--

ΔVTOT: OMS XFEED RETURN (Planned Single Engine)

-:15 EXEC
If OMS ENG P_C MSG and non critical burn: Aff ENG – OFF
If Leaking OMS PROP, burn RCS +X TIG – 15 sec to OMS IGN + 1 sec

:00 TIG; start watch (✓P_C, ΔVTOT, ENG VLVs)

```
*
* OMS PRPLT FAIL:
* HP < 85 (CONTINUE BURN):
*   Failed OMS ENG – OFF
*   ✓ XFEED (two) – CL
*   TK ISOL (two) – CL
*   He PRESS (two) – CL
* HP > 85 (STOP BURN):
*   OMS ENG (two) – OFF
*   ✓ Failed OMS XFEED (two) – CL
*   TK ISOL (two) – CL
*   He PRESS (two) – CL
* OMS ENG FAIL:
*   ASCENT or CRIT O/O (Continue Burn)
*   Failed ENG – OFF
*   OMS XFEED at → 1/2 ΔVTOT [ ] [ ] [ ]
*   at FAIL [ ] [ ] [ ]
* RCS COMPLETION: (Hp < 85 or CRIT O/O)
*   Interconnect to either OMS that was ENG FAIL
*   THC +X (Hp = 85 )
*   Post burn, AFT RCS RECONFIG
*
*
*
*
*
*
*
```

CUTOFF
+:02 OMS ENG(s) – OFF (if < 3 IMU, at [] [] []) Trim

Residuals:	OMS 2 VGO X < 0.2 fps VGO Y,Z < 2 fps	TAIL ONLY CNTL VGO X < +0.2 fps	Orbit All axes < 0.2 fps
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ASC-6a/109/A,O/A

(reduced copy)

FAB USE ONLY

CC 10-9

ASC/109/FIN

TOP
BACK OF 'OMS2/ORBIT OMS BURNS'



AFT RCS

- ✓RCS BURN CONFIG:
 - OMS TK ISOL (all) – OP OMS TK
 - L(R) OMS XFEED (two) – OP switch at
 - R(L) OMS XFEED (two) – CL 1/2 ΔVTOT
 - AFT L,R RCS XFEED (four) – OP (If reqd)
 - TK ISOL (six) – CL

TIG-2 L,R OMS He PRESS/VAP ISOL A – OP
 ... Wait 2 sec ...

- L,R OMS He PRESS/VAP ISOL B – OP
- ✓MM105
- CNTRLR PWR (two) – ON
- ✓BURN ATT (INRTL) then REF, pb – push
- ✓RCS SEL

DAP: INRTL/DISC
:00 + X
 Maintain PITCH ATT ERR ± 3°
 Monitor OMS data

CUTOFF Monitor ΔVTOT
 Release THC
 CNTRLR PWR (two) – OFF

FWD RCS

FRCS BURN PREP

- Load DUMMY target for FRCS attitude
- RCS SEL – ITEM 4 EXEC
- TIG @ TTA = 2:00 or as reqd
- ΔVX = -2.1 (ITEM 19)
- ΔVY = 0 (ITEM 20)
- ΔVZ = +1.0 (ITEM 21)
- LOAD – ITEM 22 EXEC
- TIG-10 Auto Mnvr to ATT
- When in attitude:
 - ADI ATT – REF (push)
- Load External ΔV Burn Target
- ΔVX = +80
- ΔVY = 0
- ΔVZ = 0
- LOAD – ITEM 22 EXEC
- TIMER – ITEM 23 EXEC
- ✓VGOX = negative
- ✓VGOY = 0
- ✓VGOZ = +21 ± 2
- ✓REF ball – 0,0,0

NOTE

Error needles invalid during burn
Burn time = ~2X TGO
TGT Hp = for ASCENT

--:30 CNTRLR PWR (two) – ON
 DAP: INRTL/DISC
:00 -X
CUTOFF CUR HP = TGT HP , release THC
 CNTRLR PWR (two) – OFF

ASC-6b/109/A,O/A

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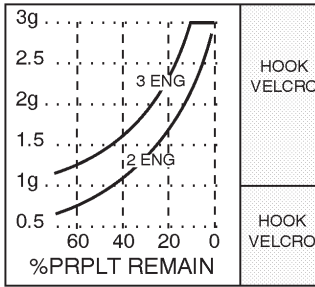
CC 10-10

ASC/109/FIN

TOP

ASCENT ADI - NOMINAL

TIME	θ	\dot{H}	H	(109 OCF CY)
0:30	67	649	9K	
0:50	61	981	26K	
1:10	53	1423	50K	
1:30	38	1881	83K	
1:50	30	2188	124K	



-STAGING-

V_i	θ	\dot{H}	H	ASC-14a/109/A/A
6	21	1886	191K	
7	17	1399	258	
8	14	1032	299	
9	12	739	324	
10	10	502	340	
12	7	158	355	
14	5	-48	356	
16	26	-110	354	
18	24	-126	350	
20	22	-51	348	
22	20	97	348	
24	19	304	352	
26114	14	601	367	

TOP
BACK OF 'ASCENT
ADI - NOMINAL'

ENTRY ALPHA

VR	α_{ref}	R	H	H _{ref}	R _{ref}
25	40	4296	400		
24	HI 40 LO	2762	247	-43	R85
23	43 40 37	2255	238	-59	74
22	43 40 37	1871	231	-77	67
21	43 40 37	1572	226	-98	L62
20	43 40 37	1339	218	-114	61
19	43 40 37	1153	211	-134	61
18	43 40 37	999	204	-156	61
17	43 40 37	874	197	-174	62
16	43 40 37	771	191	-184	63

KSC 15

MAX L/D	
M	α
3	17
2	15
1	12

ASC-14b/109/A,E/A

VR	α_{ref}	R	H	H _{ref}	R _{ref}
15	43 40 37	688	185	-198	64
14	43 40 37	615	179	-126	63
13	43 40 37	547	175	-136	61
12	43 40 37	484	171	-151	58
11	42 39 36	424	165	-196	56
10	41 38 35	374	161	-174	R50
9	39 36 33	325	156	-206	43
8	37 34 31	276	148	-239	39
7	33 30 27	230	139	-267	38
6	30 27 24	183	128	-273	39
5	26 23 20	142	115	-275	41
4	23 20 18	107	103	-263	L39
3	19 16 15	74	88	-248	35
2.5	14	61	81	-242	
2	13	50	74	-273	
1.5	10	39	65	-321	
1	8	27	50	-268	

(reduced copy)

FAB USE ONLY

CC 10-11

ASC/109/FIN

TOP



- ✓MM302 ✓OMS BOTH
- Enter TGO + 5 sec
- ✓TRIM: P +0.4, LY -5.7, RY +5.7
- L,R OMS He PRESS/VAP ISOL A (two) - GPC
- B (two) - OP
- ✓DAP - AUTO(PASS)/DISC
- ADI - LVLH(REF)/HI/MED
- FLT CNTLR PWR (two) - ON

- TIG-2 OMS ENG (two) - ARM/PRESS
- :15 EXEC
- :15 If OMS AFT QTY < 11%, THC +X to OMS IGN + 1 sec
- :00 Start watch (✓P_C, ΔVTOT, ENG VLVs)

- * **OMS PRPLT FAIL (CONTINUE BURN):** *
- * Failed OMS ENG - OFF *
- * ITEM 18 +Q EXEC *
- * When good OMS QTY: *
- * 5%: L, R OMS XFEED (four) - OP *
- * 4%: Good OMS TK ISOL (two) - CL *
- * If OMS P_C < 80 or OMS TEMP, *
- * OMS ENG - OFF *
- * ✓ADI - LVLH, center needles *
- * RCS COMPLETION *
- * **OMS ENG FAIL:** *
- * Failed OMS ENG - OFF *
- * OMS XFEED at 1/2 ΔVTOT at fail *
- * or OMS QTY %L or %R *
- * **2nd OMS FAIL (ENG or PRPLT):** *
- * Failed OMS ENG - OFF *
- * If PRPLT FAIL: *
- * Secure aff OMS *
- * ITEM 18 +Q EXEC *
- * ✓ADI - LVLH, center needles *
- * Interconnect good OMS to RCS *
- * THC +X (✓OMS% vs RCS Burn Time) *
- * RCS I'CNCT TK SW (N/A for OMS PRPLT FAIL) *
- * THC +X (✓OMS% vs RCS Burn Time) *
- * AFT RCS RECONFIG *
- * RCS COMPLETION *

ASC-8a/A/D

HINGE

(reduced copy)

FAB USE ONLY

CC 10-12

ASC/109/FIN

TOP
HINGED AT BOTTOM OF
'AOA DEORBIT BURN (2 ENG)'

HINGE

```

* RCS COMPLETION: *
* If DIRECT INSERTION: *
*   THC +X to ΔVTOT = 0 or TOT AFT QTY 1   % *
* *
*   At AFT QTY 1      THC +X to FLIP ΔV or *
*   if CUR ΔVTOT:    TOT AFT QTY 2   % then *
*                   FRCS COMPLETION *
* *
*   FLIP   ----- *
*   ΔV     FRCS COMPLETION *
* *
*   AFT   ----- *
*   ΔV     THC +X to TGT ΔV *
* *
*   TGT   ----- *
*   ΔV     *
* *
* If W/OMS 1: *
*   THC +X to TGT HP or TOT AFT QTY 1   % *
* *
*   At AFT QTY 1      THC +X to FLIP HP or *
*   if CUR HP:        TOT AFT QTY 2   % then *
*                   FRCS COMPLETION *
* *
*   FLIP   ----- *
*   HP     FRCS COMPLETION *
* *
*   AFT   ----- *
*   HP     THC +X to TGT HP *
* *
*   TGT   ----- *
*   HP     *
* *
* FRCS COMPLETION: *
*   Mnvr to -X Att (pitch up at 3°/sec to VGOz = +1/4 ΔVTOT) *
*   THC -X to ΔVTOT = 0 or FRCS depletion (JETS FAIL OFF) *

```

```

CUTOFF
+ :02 OMS ENG(s) - OFF (If < 3 IMU, at  :  )
* AFT RCS RECONFIG if INTERCONNECT *
Trim X,Z residuals < 2 fps (< 0.5 fps if shallow)

```

ASC-8aa/109/A/A

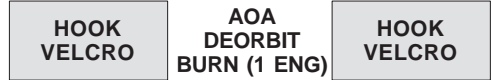
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FAB USE ONLY

CC 10-13

ASC/109/FIN

TOP
BACK OF 'AOA DEORBIT BURN (2 ENG)'



- ✓MM302 ✓OMS L or R
- ✓OMS BURN CONFIG (L or R XFEED)
- Enter TGO + 10 sec
- ✓TRIM: P +0.4, LY +5.2, RY -5.2
- L,R OMS He PRESS/VAP ISOL A (two) - OP
- ... Wait 2 sec ... B (two) - OP
- ✓DAP - AUTO(PASS)/DISC
- ADI - LVLH(REF)/HI/MED
- FLT CNTLR PWR (two) - ON
- TIG-2 Good OMS ENG - ARM/PRESS
- :15 EXEC
- :15 If OMS AFT QTY < 11%, THC +X to OMS IGN + 1 sec
- :00 Start watch (✓P_c, ΔVTOT, ENG VLVs)

OMS XFEED RETURN at ΔVTOT =
 or at %
 L,R OMS TK ISOL (four) - OP
 XFEED (four) - CL

- * **OMS PRPLT FAIL (CONTINUE BURN):**
- * OMS ENG - OFF
- * ITEM 18 +0 EXEC
- * Secure aff OMS
- * ✓ADI - LVLH, center needles
- * Interconnect good OMS to RCS
- * THC +X (✓OMS% vs RCS Burn Time)
- * AFT RCS RECONFIG
- * RCS COMPLETION
- * **OMS ENG FAIL (CONTINUE BURN):**
- * OMS ENG - OFF
- * ✓ADI - LVLH, center needles
- * Interconnect OMS to RCS
- * THC +X (✓OMS% vs RCS Burn Time)
- * RCS I'CNCT TK SW
- * THC +X (✓OMS% vs RCS Burn Time)
- * AFT RCS RECONFIG
- * RCS COMPLETION
- * **RCS +X JET FAIL OFF:**
- * ITEM 18 +0 EXEC
- * Resel jet

ASC-8b/A/A

HINGE

(reduced copy)

FAB USE ONLY

CC 10-14

ASC/109/FIN

TOP
HINGED AT BOTTOM OF
'AOA DEORBIT BURN (1 ENG)'

HINGE

* **RCS COMPLETION:**

* If DIRECT INSERTION:

* THC +X to $\Delta VTOT = 0$ or TOT AFT QTY 1 %

* At AFT QTY 1 if CUR $\Delta VTOT$:
 * THC +X to FLIP ΔV or
 * TOT AFT QTY 2 % then
 * FRCS COMPLETION

* FLIP
 * ΔV

FRCS COMPLETION

* AFT
 * ΔV

THC +X to TGT ΔV

* TGT
 * ΔV

* If W/OMS 1:

* THC +X to TGT HP or TOT AFT QTY 1 %

* At AFT QTY 1 if CUR HP:
 * THC +X to FLIP HP or
 * TOT AFT QTY 2 % then
 * FRCS COMPLETION

* FLIP
 * HP

FRCS COMPLETION

* AFT
 * HP

THC +X to TGT HP

* TGT
 * HP

* **FRCS COMPLETION:**

* Mnr to -X Att (pitch up at 3°/sec to VGOz = +1/4 $\Delta VTOT$)
 * THC -X to $\Delta VTOT = 0$ or FRCS depletion (JETS FAIL OFF)

CUTOFF

+ :02 OMS ENG - OFF (If < 3 IMU, at :)
 * AFT RCS RECONFIG if INTERCONNECT *
 Trim X,Z residuals < 2 fps (< 0.5 fps if shallow)

ASC-8bb/109/A/A

(reduced copy)

FAB USE ONLY

CC 10-15

ASC/109/FIN

TOP

**AOA
DEORBIT
BURN (RCS)**

- ✓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
 Maintain PITCH ATT ERR $\pm 3^\circ$

Monitor $\Delta VTOT$:
 RCS I'CNCT TK SW at $\Delta VTOT =$
 R OMS XFEED (two) – OP
 L OMS XFEED (two) – CL

OMS PRPLT LOW
 AFT RCS RECONFIG AT $\Delta VTOT =$
 RCS COMPLETION

- * **OMS PRPLT FAIL (MULTIPLE JETS FAIL OFF):** *
- * Secure aff OMS *
- * ITEM 18 +0 EXEC *
- * G23 Resel jets *
- * Interconnect good OMS to RCS *
- * THC +X (\checkmark OMS% vs RCS Burn Time) *
- * AFT RCS RECONFIG *
- * RCS COMPLETION *
- * **RCS +X JET FAIL OFF:** *
- * ITEM 18 +0 EXEC *
- * G23 Resel jet *

ASC-7a/A/A

HINGE

(reduced copy)

FAB USE ONLY

CC 10-16

ASC/109/FIN

TOP
HINGED AT BOTTOM OF
'AOA DEORBIT BURN (RCS)'

HINGE

```

* RCS COMPLETION: *
* If DIRECT INSERTION: *
*   THC +X to ΔVTOT = 0 or TOT AFT QTY 1    % *
* * * * *
*   At AFT QTY 1           THC +X to FLIP ΔV or *
*   if CUR ΔVTOT:         TOT AFT QTY 2    % then *
*   FRCS COMPLETION *
* * * * *
*   FLIP   ----- *
*   ΔV               FRCS COMPLETION *
* * * * *
*   AFT   ----- *
*   ΔV               THC +X to TGT ΔV *
* * * * *
*   TGT   ----- *
*   ΔV     *
* * * * *
* If W/OMS 1: *
*   THC +X to TGT HP or TOT AFT QTY 1    % *
* * * * *
*   At AFT QTY 1           THC +X to FLIP HP or *
*   if CUR HP:             TOT AFT QTY 2    % then *
*   FRCS COMPLETION *
* * * * *
*   FLIP   ----- *
*   HP               FRCS COMPLETION *
* * * * *
*   AFT   ----- *
*   HP               THC +X to TGT HP *
* * * * *
*   TGT   ----- *
*   HP     *
* * * * *
* FRCS COMPLETION: *
*   Mnvr to -X Att (pitch up at 3°/sec to VGOz = +1/4 ΔVTOT) *
*   THC -X to ΔVTOT = 0 or FRCS depletion (JETS FAIL OFF) *
* * * * *
CUTOFF:
VGOx = 0, release THC
AFT RCS RECONFIG
Trim Inplane X,Z residuals < 2 fps (< 0.5 if shallow)

```

ASC-7aa/109/A/A

(reduced copy)

FAB USE ONLY

CC 10-17

ASC/109/FIN

TOP
BACK OF 'AOA DEORBIT BURN (RCS)'

HOOK
VELCRO

HOOK
VELCRO

ASC-7b/A/A

HINGE

(reduced copy)

FAB USE ONLY

CC 10-18

ASC/109/FIN

TOP
HINGED AT BOTTOM OF
BACK OF 'AOA DEORBIT BURN (RCS)'
HINGE



ASC-7bb/A/A



(reduced copy)

FAB USE ONLY

CC 10-19

ASC/109/FIN

TOP



**BYD TAL REDESIGNATION
(109 OCF CYC)**

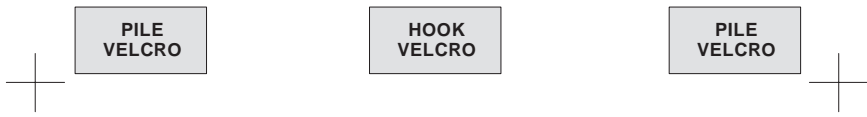
1st E.O. VI		5600	5700	5800	5900	6000	6100	6200
SE OPS 3 BYD 109	(5)	10600	10700	10700	10800	10800	10900	10900
SE BYD 104	(5)	16200	16000	15700	15500	15200	15000	14700

1st E.O. VI		6300	6400	6500	6600	6700	6800	6900
SE OPS 3 BYD 109	(5)	11000	11100	11100	11200	11200	11200	11300
SE BYD 104	(5)	14500	14200	14000	13900	13700	13600	13500

1st E.O. VI		7000	7100	7200	7300	7400	7500	7600
SE OPS 3 BYD 109	(5)	11300	11300	11400	11400	11400	11400	11500
SE BYD 104	(5)	13400	13300	13300	13300	13300	13300	13300

1st E.O. VI		7700	7800	7900	8000	8100	8200
SE OPS 3 BYD 109	(5)	11500	11500	11500	11600	11600	11600
SE BYD 104	(5)	13300	13300	13300	13300	13300	13300

ASC-9a/109/A/A



(reduced copy)

FAB USE ONLY

CC 10-20

ASC/109/FIN



(reduced copy)
CC 10-21

FAB USE ONLY ASC/109/FIN



TOP

HOOK
VELCRO

HOOK
VELCRO

HOOK
VELCRO

**BEN TAL REDESIGNATION
(109 OCF CYC)**

1st E.O. VI	5900	6000	6100	6200	6300	6400	6500
SE OPS 3 BYD 109 (12)	11000	11000	11000	11100	11200	11300	11400
SE BEN 109 (2)	16800	16500	16300	16000	15700	15400	15100

1st E.O. VI	6600	6700	6800	6900	7000	7100	7200
SE OPS 3 BYD 109 (12)	11400	11400	11400	11400	11400	11400	11400
SE BEN 109 (2)	14800	14600	14400	14200	14100	13900	13800

1st E.O. VI	7300	7400	7500	7600	7700	7800	7900
SE OPS 3 BYD 109 (12)	11400	11400	11400	11400	11400	11400	11400
SE BEN 109 (2)	13800	13700	13700	13700	13700	13700	13700

1st E.O. VI	8000	8100	8200
SE OPS 3 BYD 109 (12)	11400	11400	11400
SE BEN 109 (2)	13700	13600	13600

HOOK
VELCRO

HOOK
VELCRO

ASC-10a/109/A/A

HOOK
VELCRO

(reduced copy)

FAB USE ONLY

CC 10-22

ASC/109/FIN

TOP
BACK OF 'BEN TAL REDESIGNATION'

HOOK
VELCRO

HOOK
VELCRO

HOOK
VELCRO

**MRN TAL REDESIGNATION
(109 OCF CYC)**

1st E.O. VI		6300	6400	6500	6600	6700	6800	6900
SE OPS 3 BEN 109	(11)	10800	10800	10800	10800	10900	10900	11000
SE BEN 104	(2)	16100	15900	15700	15500	15300	15100	14900
SE MRN 109	(3)	17200	16900	16700	16400	16100	15900	15600

1st E.O. VI		7000	7100	7200	7300	7400	7500	7600
SE OPS 3 BEN 109	(11)	11100	11200	11200	11300	11400	11400	11400
SE BEN 104	(2)	14700	14500	14400	14300	14200	14100	14100
SE MRN 109	(3)	15400	15200	15000	14900	14800	14700	14700

1st E.O. VI		7700	7800	7900	8000	8100	8200
SE OPS 3 BEN 109	(11)	11500	11500	11500	11600	11600	11600
SE BEN 104	(2)	14000	14000	13900	13900	13900	13800
SE MRN 109	(3)	14600	14600	14600	14600	14500	14500

HOOK
VELCRO

HOOK
VELCRO

ASC-10b/109/A/A

HOOK
VELCRO

(reduced copy)

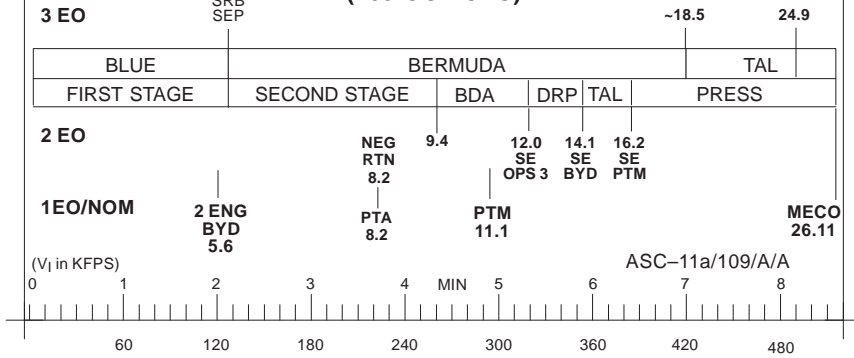
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CC 10-23

ASC/109/FIN

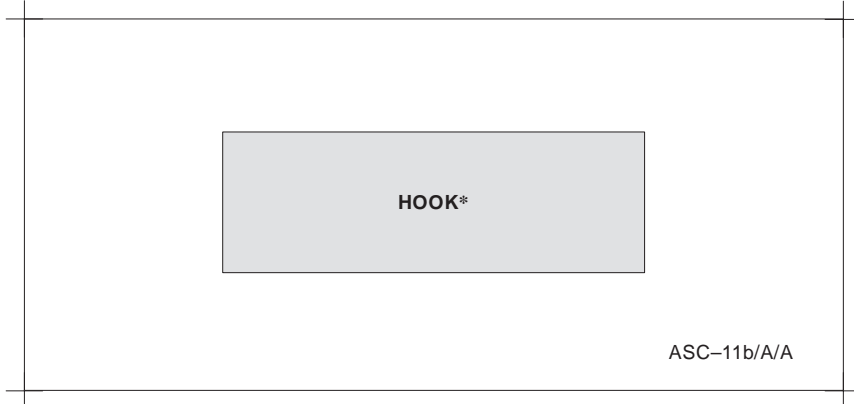
TOP

ASCENT/ABORT SUMMARY (109 OCF CYC)



External scale not flown. To be removed in fab process

TOP BACK OF 'ASCENT/ABORT SUMMARY'



*NOTE: A shim, consisting of 1 inch x 3 inch piece of hook Velcro adhered to the back of a corresponding piece of pile Velcro, is required for the MS1 posn

(reduced copy)

FAB USE ONLY

CC 10-24

ASC/109/FIN

TOP

EMERGENCY EGRESS

PRELAUNCH MODE 1	BAILOUT MODE 8
TABS - RELEASE	REPORT POSITION
VISOR - CLOSE / LOCK	MACH < .95, OPS 305/603
LES O2 - ON	SB - AUTO; BF - AUTO
GREEN APPLE - PULL	FLY 185-195 KEAS, $\Phi = 0^\circ$
KNEEBOARDS - REMOVE	ABORT MODE - ATO
COOLING - DISCONNECT	ABORT PBI - PUSH
RESTRAINT - RELEASE	P,R/Y - AUTO
PARACHUTE (four) - RELEASE	FLT CNTLR PWR (two) - OFF
COMM - DISCONNECT	<u>-50K FT</u>
LES O2 - DISCONNECT	TABS - RELEASE
EGRESS SEAT	VISOR - CLOSE / LOCK
SLIDEWIRE BASKETS	LES O2 - ON
	GREEN APPLE - PULL
	<u>-40K FT</u>
POST LANDING MODE 5	MS3 - VENT CABIN
TABS - RELEASE	CDR,PLT SEATS - LOWER
VISOR - CLOSE / LOCK	KNEEBOARDS - REMOVE
LES O2 - ON	COOLING - DISCONNECT
GREEN APPLE - PULL	RESTRAINT - RELEASE
KNEEBOARDS - REMOVE	D-RING - UNCOVER
COOLING - DISCONNECT	<u>-30K FT</u>
RESTRAINT - RELEASE	MS3 - JETTISON HATCH
PARACHUTE (four) - RELEASE	COMM - DISCONNECT
COMM - DISCONNECT	(G-SUIT CLIP - PULL)
(G-SUIT CLIP - PULL)	LES O2 - DISCONNECT
LES O2 - DISCONNECT	EGRESS SEAT
PLT - PWR DOWN	POLE - DEPLOY
EGRESS SEAT	D-RING - HOOK UP
SLIDE/ESCAPE PANEL	BAILOUT

ASC-15a/A,E/C

(reduced copy)

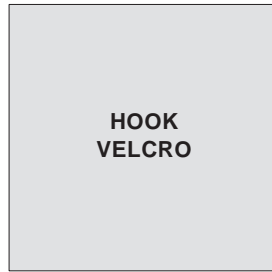
FAB USE ONLY

CC 10-25

ASC/109/FIN



TOP
BACK OF 'EMERGENCY EGRESS'



HOOK
VELCRO



ASC-15b/A,E/C



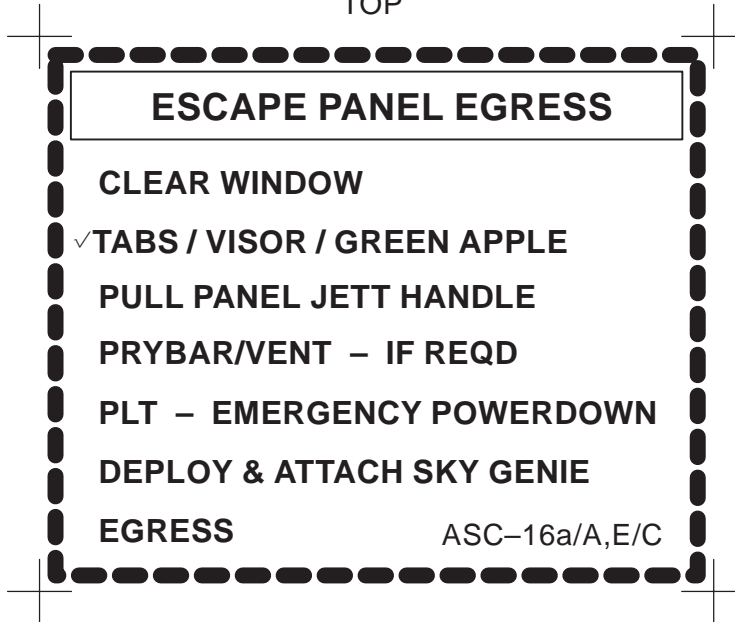
FAB USE ONLY

(reduced copy)
CC 10-26

ASC/109/FIN

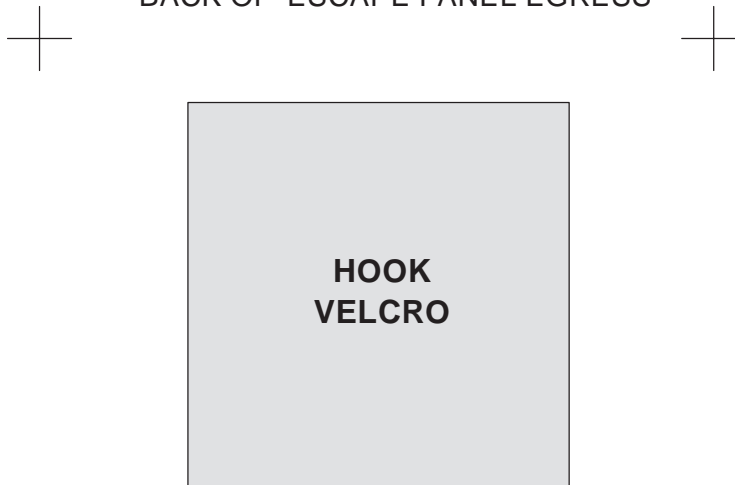


TOP



TOP

BACK OF 'ESCAPE PANEL EGRESS'



ASC-16b/A,E/B

FAB USE ONLY

CC 10-27

ASC/109/FIN

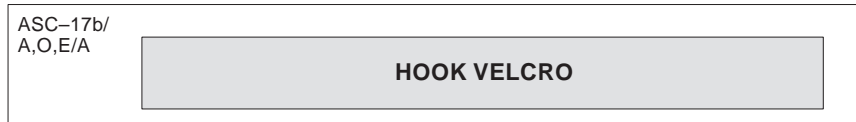
GPC/FCS CHANNEL CONFIGURATION

TOP

GPC

G P C	G P C	G P C	G P C	ASC-17a/ A,O,E/A
Delay 2 sec between each switch throw (AUTO ↔ ORIDE)				

TOP
BACK OF 'GPC'



Fabrication Notes

1. Cut to exact outside edge
2. Cover GPC boxes w/Scotch tape

(reduced copy)

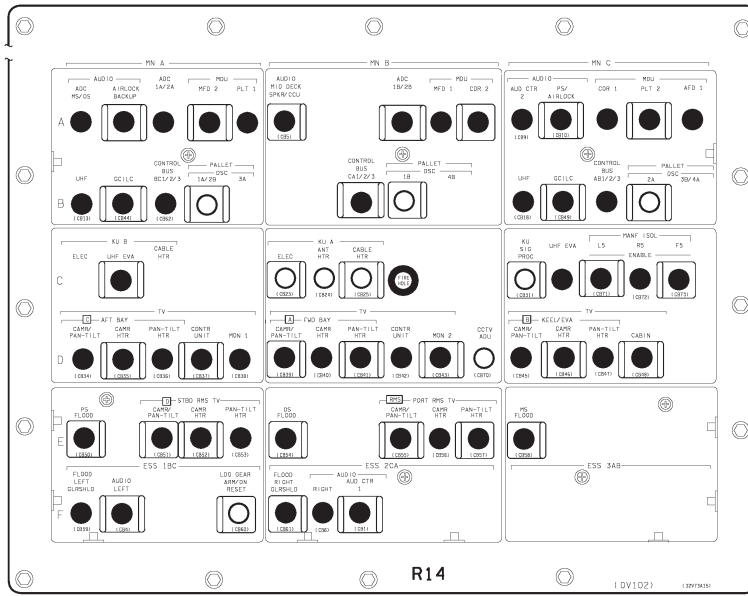
FAB USE ONLY

CC 10-28

ASC/109/FIN

TOP
 PANEL R14 - OV102 ONLY

OV102 ONLY



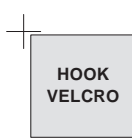
ASC-20a/A,O,E/D

(reduced copy)

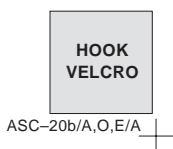
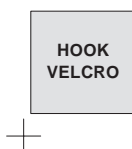
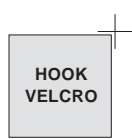
FAB USE ONLY

CC 10-29

ASC/109/FIN



TOP
BACK OF 'PANEL R14 - OV102 ONLY'



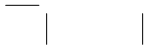
ASC-20b/A,O,E/A

(reduced copy)

FAB USE ONLY

CC 10-30

ASC/109/FIN



TOP

LOC/BREAK-UP

BEFORE 'GO AT THROTTLEUP'

- GREEN APPLE
- JETTISON HATCH
- BAILOUT
- PULL RIP CORD

'GO AT THROTTLEUP' TO SRB SEP

- GREEN APPLE
- VENT
- 'G' SPIKE
- JETTISON HATCH
- ✓ ALT/SUIT
- BAILOUT (BELOW 40 K)
- PULL RIP CORD

AFTER SRB SEP

- GREEN APPLE
- GO TO MIDDECK
- VENT
- 'G' SPIKE
- JETTISON HATCH
- ✓ ALT/SUIT
- BAILOUT (BELOW 40 K)
- PULL RIP CORD

ASC-21a/A/A

NOTE: This crew kneeboard card is optional and has no back facing

(reduced copy)

FAB USE ONLY

CC 10-31

ASC/109/FIN

FAB USE ONLY

CC 10-32

ASC/109/FIN 1

(reduced copy)

HOOK
VELCRO

TOP

EMERGENCY EGRESS

HOOK
VELCRO

PRELAUNCH MODE 1

TABS – RELEASE
VISOR – CLOSE / LOCK
LES O2 – ON
GREEN APPLE – PULL
KNEEBOARDS – REMOVE
COOLING – DISCONNECT
RESTRAINT – RELEASE
PARACHUTE (four) – RELEASE
COMM – DISCONNECT
LES O2 – DISCONNECT
EGRESS SEAT
SLIDEWIRE BASKETS

BAILOUT MODE 8

REPORT POSITION
MACH < .95, OPS 305/603
SB – AUTO; BF – AUTO
FLY 185–195 KEAS, $\Phi = 0^\circ$
ABORT MODE – ATO
ABORT PBI – PUSH
P,R/Y – AUTO
FLT CNTLR PWR (two) – OFF
~50K FT
TABS – RELEASE
VISOR – CLOSE / LOCK
LES O2 – ON
GREEN APPLE – PULL

ASC-25a/A,E/A

HINGE

FAB USE ONLY

CC 10-33

ASC/109/FIN 1

(reduced copy)

TOP, HINGED AT BOTTOM OF 'EMERGENCY EGRESS'
HINGE

**POST LANDING
MODE 5**

**TABS – RELEASE
VISOR – CLOSE / LOCK
LES O2 – ON
GREEN APPLE – PULL
KNEEBOARDS – REMOVE
COOLING – DISCONNECT
RESTRAINT – RELEASE
PARACHUTE (four) – RELEASE
COMM – DISCONNECT
(G-SUIT CLIP – PULL)
LES O2 – DISCONNECT
PLT – PWR DOWN
EGRESS SEAT
SLIDE/ESCAPE PANEL**

~40K FT

**MS3 – VENT CABIN
CDR,PLT SEATS – LOWER
KNEEBOARDS – REMOVE
COOLING – DISCONNECT
RESTRAINT – RELEASE
D-RING – UNCOVER**

~30K FT

**MS3 – JETTISON HATCH
COMM – DISCONNECT
(G-SUIT CLIP – PULL)
LES O2 – DISCONNECT
EGRESS SEAT
POLE – DEPLOY
D-RING – HOOK UP
BAILOUT**

ASC-25aa/A,E/A

PILE
VELCRO

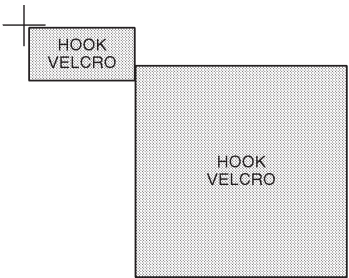
PILE
VELCRO

FAB USE ONLY

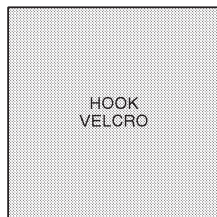
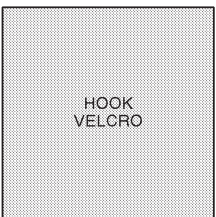
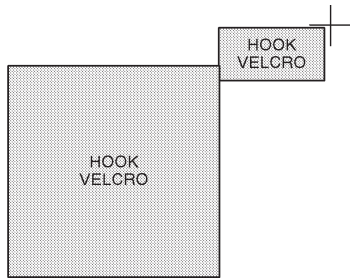
CC 10-34

ASC/109/FIN 1

(reduced copy)



TOP
BACK OF 'EMERGENCY EGRESS'



ASC-25b/A,E/A



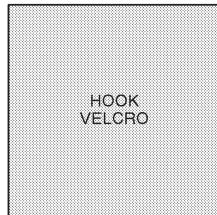
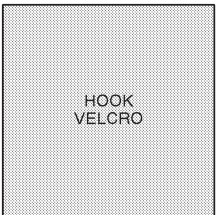
FAB USE ONLY

CC 10-35

ASC/109/FIN 1

(reduced copy)

TOP, HINGED AT BOTTOM OF BACK OF 'EMERGENCY EGRESS'
HINGE



ASC-25bb/A,E/A



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FAB USE ONLY

10–36

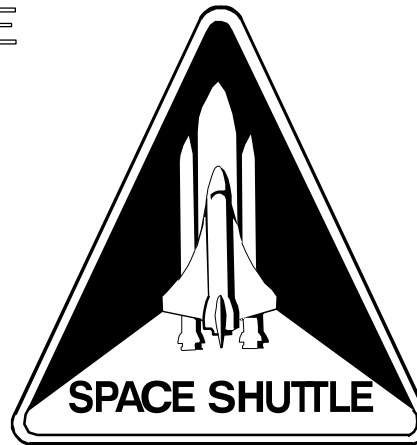
ASC/109/FIN 1

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| | —

Space Shuttle Program
FLIGHT DATA FILE

JSC-48005-109
FINAL



ASCENT CHECKLIST

STS
109

Flight Cover (trim bottom to expose tabs)