

Ascent Checklist

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

**Generic
March 1, 1988**

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MISSION OPERATIONS DIRECTORATE

ASCENT CHECKLIST

GENERIC
March 1, 1988

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ASC/ALL/GEN

Incorporates the following:

482#:	ASC-550B	FDF-829B
	ASC-564	FDF-852
		FDF-854B

AREAS OF TECHNICAL RESPONSIBILITY

Book Manager	DM3/R. Walsh	483-1968
Switchlist & Prelaunch & Powered Flight & OMS Burns & AOA	DM3/R. Walsh DM3/H. Scott DM3/D. Hannsz	483-1968 483-1965 483-1983
Contingency Aborts & TAL & RTLS	DM3/D. Bentley DG66/C. Lewis	483-1966 483-2697
Deorbit Burns	DM3/J. Patterson	483-1987
Entry	DM5/W. Anderson	483-8036
Cue Cards	DG4/S. Jones	483-2582

NOTES

1. The Handover/Ingress Switch List gives the vehicle configuration at LCC/MCC handover (tower clear) and flight crew ingress (T-1:50). If there is a switch position difference between ingress and handover, the ingress position will be boxed beside the handover position.
2. 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.
3. Normal Flight Procedures are for liftoff through the OMS 2 burn.
4. The Abort to Orbit (ATO) Procedures and the Backup Flight System (BFS) Procedures are integrated into the appropriate parts of this checklist.
5. AOA procedures terminate with ENTRY MANEUVERS Cue Cards.
6. Two dots (..) immediately to the right indicates material is highlighted in the flight FDF.
7. Exact duplicates of cue cards used in Ascents & Aborts are included in the Ascent Checklist to aid the third crewman as backup support for the pilot and commander. These cue cards are copies of cue cards in the Cue Card Section.

(Cont next page)

8. Ascent related cue cards are contained in this document. The cue cards are listed in the Cue Card Section. Some cards are printed in the body of the checklist for MS use and also in the Cue Card Section for reference of crop marks and fabrication instructions.
9. This checklist is a Generic book and is not complete for a specific flight. Incorporate the Flight Supplement for the specific flight of interest using the instructions in the Flight Supplement to obtain a complete checklist.
10. The size, shape and velcro location of the cue cards are controlled by the cue card Book Manager.

Replace this page with page(s) from Flight Supplement

Replace this page with page(s) from Flight Supplement

ASCENT CHECKLIST
ALL VEHICLE

LIST OF EFFECTIVE PAGES

GENERIC 03/01/88

Sign Off....*	ALL/GEN	3-4.....	ALL/GEN
ii.....*	ALL/GEN	3-5.....	ALL/GEN
iii.....*	ALL/GEN	3-6.....	ALL/GEN
iv.....*	ALL/GEN	3-7.....⊗	ALL/GEN
v.....*Δ	ALL/GEN	3-8.....	ALL/GEN
vi.....*Δ	ALL/GEN	4-1.....	ALL/GEN
xiii.....*	ALL/GEN	4-2.....⊗	ALL/GEN
xiv.....*	ALL/GEN	4-3.....	ALL/GEN
xv.....*	ALL/GEN	4-4.....⊗	ALL/GEN
xvi.....*	ALL/GEN	5-1.....	ALL/GEN
xvii.....	ALL/GEN	5-2.....	ALL/GEN
xviii.....	ALL/GEN	5-3.....⊗	ALL/GEN
1-1.....	ALL/GEN	5-4.....	ALL/GEN
1-2.....	ALL/GEN	6-1.....Δ	ALL/GEN
1-3.....	ALL/GEN	6-2.....Δ	ALL/GEN
1-4.....	ALL/GEN	6-3.....	ALL/GEN
1-5.....	ALL/GEN	6-4.....	ALL/GEN
1-6.....	ALL/GEN	6-5.....	ALL/GEN
1-7.....☒	ALL/GEN	6-6.....	ALL/GEN
1-8.....	ALL/GEN	6-7.....Δ	ALL/GEN
1-9.....	ALL/GEN	6-8.....Δ	ALL/GEN
1-10.....	ALL/GEN	6-9.....	ALL/GEN
2-1.....Δ	ALL/GEN	6-10.....	ALL/GEN
2-2.....Δ	ALL/GEN	6-11.....	ALL/GEN
3-1.....	ALL/GEN	6-12.....	ALL/GEN
3-2.....	ALL/GEN	6-13.....	ALL/GEN
3-3.....	ALL/GEN	6-14.....⊗	ALL/GEN

- (*) - Omit from flight book
- (Δ) - See note on page
- (☒) - Preflight-off information required
- (⊗) - Highlights required

6-15.....	ALL/GEN
6-16.....⊗	ALL/GEN
6-17.....⊗	ALL/GEN
6-18.....⊗	ALL/GEN
6-19.....⊗	ALL/GEN
6-20.....	ALL/GEN
6-21.....	ALL/GEN
6-22.....	ALL/GEN
6-23.....Δ	ALL/GEN
6-24.....Δ	ALL/GEN
6-25.....	ALL/GEN
6-26.....	ALL/GEN
6-27.....	ALL/GEN
6-28.....	ALL/GEN
6-29.....	ALL/GEN
6-30.....	ALL/GEN
7-1.....Δ	ALL/GEN
7-2.....Δ	ALL/GEN
8-1.....	ALL/GEN
8-2.....⊗	ALL/GEN
8-3.....⊗	ALL/GEN
8-4.....	ALL/GEN
9-1.....Δ	ALL/GEN
9-2.....Δ	ALL/GEN
CC 10-1.....Δ	ALL/GEN
CC 10-2.....Δ	ALL/GEN
CC 10-3.....	ALL/GEN
CC 10-4.....	ALL/GEN
CC 10-5.....	ALL/GEN
CC 10-6.....	ALL/GEN
CC 10-7.....	ALL/GEN
CC 10-8.....	ALL/GEN
CC 10-9.....	ALL/GEN
CC 10-10.....	ALL/GEN
CC 10-11.....Δ	ALL/GEN
CC 10-12.....Δ	ALL/GEN

(⊗) - Highlights required
 (Δ) - See note on page
 (⊗) - Prelift-off information required

ASCENT CUE CARDS

Powered Performance

Contingency Abort.....FS CC 10-1 FLT SUPPL
 RTLS Contingency (Back of
 Contingency Abort).....FS CC 10-2 FLT SUPPL

Misc

OMS 2/Orbit OMS Burns.....CC 10-3 ASC-2a/A,0/A
 OPS 1 RCS Burn (Back of
 OMS 2/Orbit OMS Burns)...CC 10-4 ASC-2b/A,0/A
 OMS Burn Monitor.....CC 10-5 ASC-3a/A,0/A
 OMS Failures (Back of OMS
 Burn Monitor).....CC 10-6 ASC-3b/A,0,E/A
 ADI Error/Rate
 Switch (Front).....CC 10-7 ASC-4a/A,E/A
 (Back).....CC 10-7 ASC-4b/A,E/A
 Ascent/Entry Spec (Front).CC 10-8 ASC-5a/A,E/A
 (Back)..CC 10-8 ASC-5b/A,E/A
 Speed Brake Command
 (Front).....CC 10-9 ASC-6a/A,E/A
 (Back).....CC 10-9 ASC-6b/A,E/A
 Entry Alpha.....FS CC 10-11 FLT SUPPL
 Ascent ADI-Nominal (Back
 of Entry Alpha).....FS CC 10-11 FLT SUPPL
 TAL Redesignation
 BEN (Front).....FS CC 10-12 FLT SUPPL
 MRN (Back).....FS CC 10-12 FLT SUPPL

PLT & CDR Ascent Flip Book..FB 2-1

thru
 FB 2-16... FLT SUPPL

10-10-1964

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10-10-1964

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NORMAL PROCEDURES - PRELAUNCH

RECYCLE PROCEDURES

NOTE

These recycle procedures will be used inside T-5 min

Test Conductor calls for BFS safing, APU Shutdown and Heater Activation (Aerosurface positioning complete)

C BFS SAFING

If BFS in MM102:
06 GPC 5 MODE - HALT

P APU SHUTDOWN

R2 APU OPER (three) - OFF
FUEL TK VLV (three) - CL
✓Shutdn (Hyd Press)
CNTLR PWR (three) - OFF

C HEATER ACTIVATION

L2 FLASH EVAP FDLN HTR (two) - 2

Report APU Shutdown and Heater Activation Complete

NOTE

Numerous non time-critical steps for recycle will be individually called by the Test Conductor

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

-2:25:00 PRE-INGRESS SW RECONFIGURATION

NOTE

ASP configures OI PCMMU
PWR - 1***(C3), RCS/OMS HTR
FWD,AFT RCS JET 1,2,3,4
(eight) - OFF (A14), ESS
BUS SOURCE FC (three) - ON,
AC BUS SNSR (three) - OFF
(1 sec) then AUTO TRIP (R1)

**-1:50:00 A INGRESS ORBITER & SEATS
(-2:10:00)**

NOTE

During seat ingress COMM
PWR - ON (L5, R6)
CCU PWR - ON (A11, A15, M039M)

05/09 AUD VOX SENS (as needed) - adj
R10/L9 as reqd
M042F Contact LCC (OTC & NTD) on A/G 1

**-1:45:00 POST INGRESS SW RECONFIGURATION
(-2:05:00)**

NOTE

ASP turns on RCS 1,2,3,4
DRIVERS (eight) (014,015
& 016), OMS ENG VLV (two)
(014,016), GPC OUTPUT 5 - B/U
(06), TACAN MODE (three) - GPC
(07), RADAR ALTM (two) - ON (08)

Install ASC Flip Cards and Ascent
ADI Cards

✓Cue Card positions

**-1:35:00
(-1:55:00)**

NOTE

ASP doing C/W VOL adjust,
expect MA

PRE-
LAUNCH

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

-1:30:00 A **LCC ASTRO COMM CHECK**
 (-1:50:00)

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
 05/09 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
 A/G 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

A Simo Voice Check (Launch Config)
 L,R AUD A/G 1 (two) - T/R
 A/G 2 (two) - T/R
 Voice check with MCC

NOTE

Side hatch closure

-1:10:00 C **CABIN LEAK CHECK**
 (-1:30:00)

L2 CAB VENT ISOL - OP (tb-OP)
 ✓VENT tb - CL

01 ✓CAB PRESS - increasing to 16.7 (MA)

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

-1:01:00 (DEU Equivalent)
(-1:21:00)

✓ 2: GNC 104 GND IMU CNTL/MON

NOTE

IMU preflight align begins

NOTE

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

-50:00 P H2O BOILER PREAMPLIFICATION
(-1:10:00)

R2 ✓BLR PWR(three) - ON
 N2 SPLY (three) - ON

NOTE

Vent vlv operation may occur earlier or later at LCC direction

-45:00 C CABIN VENT REDUNDANCY CHECK
(-1:05:00)

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

-32:00 C PASS/BFS TRANSFER PREP
(-52:00)

3: GNC GPC MEMORY

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

3: BFS, GNC BFS MEMORY

CRT3 PASS/BFS XFER ENA - ITEM 25 EXEC

1: GNC 100 GTS DISPLAY	2: GNC 104 GND IMU CNTL/MON
3: BFS, GNC BFS MEMORY	

NOTE

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

-20:00 **OPS 1 LOAD (DEU Equivalent)**
(-30:00)

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

Report faults other than from
unpowered equipment

CRT1 GNC, SPEC 99 PRO

NOTE

Gnd-Controlled Fuel Cell Purge

-19:00 **BFS TO OPS 1**
(-29:00)

3: BFS, GNC FAULT

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

CRT3 GNC, OPS 101 PRO

3: BFS, GNC LAUNCH TRAJ 1
3: BFS, GNC FAULT

Report faults other than from
unpowered equipment

CRT3 GNC, SPEC 99 PRO

1: GNC LAUNCH TRAJ 2: GNC SYS SUMM 1

3: BFS, GNC SYS SUMM 2

-16:00
(-26:00)

MPS He RECONFIGURATION

R2 MPS He ISOL A,B (six) - OP
 PNEU He ISOL - OP

CONFIG OMS/RCS XFEED VLVS

NOTE

OMS/RCS XFEED vlvs are reconfigured for launch by LPS

C CRT3 Report RCS QTYs F,L,R OXID,FU

	OXID	FU
F		
L		
R		

3: BFS, SM SYS SUMM 2

NOTE

At T-9 there will be a planned 10 min hold

WEATHER UPDATE (if reqd)

Update Abort winds, RWY and ALTM setting

-9:00

'GO FOR LAUNCH' - All

C2 EVENT TIMER - START
F7 ✓EVENT TIME ind - counting down

NOTE

GLS starts

-8:00

P AC SNSR TO MONITOR

R1 AC BUS SNSR (three) - OFF (1 sec),
 then MONITOR

-7:00

NOTE

ACCESS ARM RETRACT

✓Seat in launch position

1-8

ASC/ALL/GEN

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

-6:00 P APU PRE START

- R4 ✓HYD LG RET/CIRC VLV - CL
- R2 ✓BLR N2 SPLY (three) - ON
 - ✓PWR (three) - ON
 - ✓CNTLR/HTR (three) - A
 - ✓APU AUTO SHUT DN (three) - ENA
 - CNTL PWR (three) - ON
 - HYD MN PUMP PRESS (three) - LO
 - ✓APU SPEED SEL (three) - NORM
 - ✓OPER (three) - OFF
 - ✓FUEL PUMP/VLV COOL (two) - OFF
 - ✓FUEL TK VLV (three) - CL
 - ✓HYD CIRC PUMP (three) - GPC
 - ✓cb APU FU TK VLV ENA (six) - c1
 - APU FUEL TK VLV (three) - OP
 - ✓APU/HYD RDY tb (three) - gray

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

-5:00 > APU START

- R2 APU OPER (three) - START/RUN
- F8 ✓HYD PRESS ind (three) - LO green
- R2 ✓READY TO START tb (three) - bp
 - HYD MN PUMP PRESS (three) - NORM
- F8 ✓HYD PRESS ind (three) - HI green
- R2 HYD CIRC PUMP (three) - OFF
- F7 ✓HYD 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

3: BFS, SM SYS SUMM 1

-4:00 A CLOSE VISOR

NOTE

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

-2:30 P CLEAR C/W MEMORY

2: GNC 99 FAULT

3: BFS, GNC 99 FAULT

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

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

C3 C/W MEM - CLEAR

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of Flight Supplement

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of Flight Supplement

CONFIDENTIAL

POST
OMS 1

POST OMS 1 BURN PROCEDURES

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

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

C POST BURN STATUS

NOMINAL

OMS 1 TIG TO MCC

POST
OMS 1

	:		
--	---	--	--

- * **C ALPHA MANAGEMENT (if reqd)** *
- * *
- * If underspeed ATO or AOA-S OMS 1 *
- * and Post OMS 1 HP ≤ 75 nm: *
- * Maneuver to LVLH R180, P340, Y000 *
- * (maintain LVLH P = 0 ± 20) *
- * After 10 minutes: *
- * Maneuver to LVLH P = 340 *
- * After 10 minutes: *
- * Maneuver to Burn Attitude *

- B F7/F8 FLT CNTLR PWR (two) - OFF
- C3 \checkmark DAP - AUTO

P APU/HYD SHUTDOWN (Not AOA)

- F4 \checkmark BDY FLP pb - 1t off (MPS stowed)
(~2 min 21 sec)
- R4 HYD MPS/TVC ISOL VLV (three) - CL
Hold 5 sec \checkmark (tb-CL)
- R2 \checkmark APU AUTO SHUT DN (three) - ENA
 - BLR PWR (three) - OFF
 - N2 SPLY (three) - OFF
 - APU OPER (three) - OFF (MA)
 - FUEL TK VLV (three) - CL
 - \checkmark Shutdn (Hyd Press)
 - CNTLR PWR (three) - OFF (MA)
 - FUEL PUMP/VLV COOL A - AUTO

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

3: BFS, GNC SYS SUMM 2

- * P HYD DEPRESS (AOA only) *
- * *
- * F4 ✓BDY FLP pb - 1t off (MPS stowed) *
- * (~2 min 21 sec) *
- * R4 HYD MPS/TVC ISOL VLV (three) - CL *
- * Hold 5 sec ✓(tb-CL) *
- * R2 ✓APU SPEED SEL (three) - NORM *
- * ✓AUTO SHUT DN (three) - ENA *
- * HYD MN PUMP PRESS (three) - LO (MA) *

FES & HEATER ACTIVATION

- C L1 FLASH EVAP CNTLR PRI A - ON
(not AOA)
- L2 FLASH EVAP FDLN HTR (two) - 1
- P R1 O2 TK1,2 HTRS A (two) - AUTO
H2 TK1,2 HTRS A (two) - 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

NOTE
Consult ASC PKT C/L for
failures that occurred
during ascent

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 *
- * XFEED: Failed engine Prop to good *
- * engine *
- * For RCS burn: *
- * RCS SEL - ITEM 4 EXEC *

NOTE

Onboard computed TIG may vary slightly but is acceptable

NOTE

If AOA, verify/enter appropriate ABORT TGT number in MM105 but do not LOAD targets until OPS 3

- * If BFS, do not manually *
- * enter targeting data *
- * (ITEMS 5-18) until MM301 *

✓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 ET UMBILICAL DOOR CLOSURE

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

* If CTRLINE LATCHES do not stow, *
* or doors do not close, or doors *
* do not latch, contact MCC *
* If NO COMM, prior to OPS 2 or *
* 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, CTRLINE LAT tb - STO
L,R DR (two) - CL (tb-bp)
After 24 sec, L,R DR tb - CL

L,R LAT (two) - LAT (tb-bp)
After 6 sec, L,R LAT tb - LAT
MODE - GPC

CTRLINE LAT - GND
L,R DR (two) - OFF
L,R LAT (two) - OFF

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

B Wedge Install OMS 2/ORBIT BURN and OMS BURN MONITOR Cue Cards (F6/F8)

OMS 2 BURN ATTITUDE MNVR

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

3: BFS, GNC SYS SUMM 2

B SEAT SAFING AND ADJUSTMENT

Open Visor
Remove from pocket and install:
Panel Jettison T-Handle Pin
Adjust Back Angle
Take antimotion sickness
medication

TIG-5 P VACUUM INERTING TERMINATE

R4 MPS FILL/DRAIN
LH2,LO2 OUTBD (two) - CL
Wait 10 sec - GND
LH2,LO2 INBD (two) - GND

R2 MPS PNEU He ISOL - GPC

* If MPS PRPLT DUMP B/U LH2 VLV *
* sw was set to OP, set sw to CL *

TIG-2 ▶ B Go to OMS 2/ORBIT BURN Cue Card

OMS 2

OMS 2 BURN CARDS

MS ONLY

4-1

ASC/ALL/GEN

HOOK
VELCRO

**OMS 2/
ORBIT OMS
BURNS**

HOOK
VELCRO

ASC-2a/A,O/A

- ✓MM105/202(302)
- ✓BURN ATT (INRTL) then REF, pb - push
- ✓ENG SEL CNTL PWR (two) - ON ..
- ✓DAP - AUTO(PASS)/DISC ✓DAP TRANS - NORM
- ✓GIMBAL 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 B (two) - GPC (OP for SE burn)

	GPC	OP	CL
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 affected engine if:
 OMS N2 TK P < 470(523) (NONCRIT
 He TK P < 640 BURN)
 FU ENG IN P < 216(244)
 OX ENG IN P < 151(244)

OMS 2

ΔVTOT: OMS XFEED RETURN (Planned Single Engine)

- :15 EXEC ..
- If OMS ENG Pc MSG and non critical burn - Affected Eng - OFF
- If Leaking OMS PROP burn RCS + X TIG -15 sec to OMS IGN + 1 sec
- :00 TIG .. (✓Pc, PVTOT, ENG VLVs; start watch)
- * **OMS PRPLT FAIL:** *
- * **HP < 100 (CONTINUE BURN):** *
- * Failed OMS ENG - OFF *
- * ✓XFEED (two) - CL *
- * TK ISOL (two) - CL *
- * He PRESS (two) - CL *
- * **HP > 100 (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 < 80 or CRIT O/O) *
- * Interconnect to either OMS that was ENG FAIL *
- * THC + X (Hp = 80) *
- * Post burn, AFT RCS RECONFIG *
- CUTOFF ..
- + :02 OMS ENG(s) - OFF
- Trim inplane X,Z residuals < 2 fps

MS ONLY

ASC/ALL/GEN

HOOK
VELCRO

**OMS
BURN
MONITOR**

HOOK
VELCRO

OMS Pc LOW OMS ↓ AND ENG VLV 1 or 2 < 70% ----- OMS ↓ and ENG VLV 1 and 2 > 70% ----- No OMS ↓	OMS ENG FAIL ----- OMS PRPLT FAIL ----- Sensor Fail
OMS TEMP FU IN P > 232 ----- P < 197 ----- P 198-231	OMS ENG FAIL ----- OMS PRPLT FAIL ----- Sensor Fail
OMS OX/FU TK P (✓ENG IN P) OX & FU LOW ----- OX LOW ----- FU LOW ----- OX & FU	He PRESS/VAP ISOL (two) - OP If Tk P no incr: OMS PRPLT FAIL When HP > 100: OMS ENG (two) - OFF ----- If HP > 100: OMS PRPLT FAIL If HP < 100: Burn to OMS ↓ then OMS PRPLT FAIL ----- If HP > 100: OMS PRPLT FAIL If HP < 100: He PRESS/VAP ISOL (two) - CL Burn to OMS ↓ or HP = 100. then OMS PRPLT FAIL ----- Cycle He to maint OMS TK P 234-284 Cycle He A(B) to isolate failed leg
OMS He TK P LOW (✓CRT & meter) P > 640 & QTY > 41% ----- P < 640 or QTY ≤ 41%	✓Leaking OMS TK ISOL (two) - OP ✓He PRESS/VAP ISOL (two) - OP L,R OMS XFEED (four) - OP Good OMS TK ISOL (two) - CL He PRESS/VAP ISOL (two) - CL When P < 640 or QTY ≤ 41% continue ----- ✓Good OMS TK ISOL (two) - OP ✓He PRESS/VAP ISOL (two) - OP L,R OMS XFEED (four) - OP Failed OMS TK ISOL (two) - CL He PRESS/VAP ISOL (two) - CL
N2 REG P HIGH or LOW	OMS ENG - ARM
N2 TK P LOW (✓CRT & meter)	When N2 TK P < 470: OMS ENG - ARM
OMS GMBL 1st FAIL 2nd FAIL	Select SEC GMBL (twice) ----- If control problems or high RCS fuel usage: OMS ENG FAIL
GPC1(4) with String 1(4)	Affected GPC MODE - STBY.HALT FF1(4) - OFF.ON L(R) OMS Gimbals - sel SEC
FA1(4)	L(R) OMS Gimbals - sel SEC

MS ONLY

4-3

ASC-3a/A,O/A

ASC/ALL/GEN

HOOK
VELCRO

**OPS 1
RCS BURN**

HOOK
VELCRO

AFT RCS

ASC-2b/A;O/A

✓RCS BURN CONFIG:
OMS TK ISOL (all) - OP
L(R) OMS XFEED (two) - OP
R(L) OMS XFEED (two) - CL
AFT L,R RCS XFEED (four) - OP
TK ISOL (six) - CL

XFEED at
1/2 ΔVTOT
(if reqd)

--	--	--

TIG-2 L,R

He PRESS/VAP ISOL A - OP
...Wait 2 sec... B - OP

✓MM105
✓CNTLR PWR (two) - ON
✓BURN ATT (INRTL) then REF, pb-push
✓RCS SEL

:00 + X "
Maintain PITCH ATT ERR ± 3°
Monitor OMS data
Monitor ΔVTOT

CUTOFF RELEASE THC "

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 Mnvr to ATT (error needles)

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 = +20 ± 2

✓REF ball - 0,0,0

NOTE

Error needles invalid during burn.

Burn time = ~2X TGO

TGT Hp = 80 for ASCENT

:00 -X "
CUTOFF CUR HP = TGT HP

--	--	--

 RELEASE THC

[Faint, mostly illegible text, possibly bleed-through from the reverse side of the page]

POST OMS 2 BURN PROCEDURES

**POST
OMS 2**

1: GNC OMS 2 MNVR COAST	2: GNC OMS 2 MNVR COAST
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 GIMBAL CHECK

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

P OMS/RCS POST BURN RECONFIGURATION

- 07 AFT L,R RCS
 - He PRESS A (two) - GPC (tb-OP)
 - B (two) - CL (tb-CL)
 - TK ISOL (six) - OP (tb-OP)
 - XFEED (four) - CL (tb-CL)
- 08 FWD RCS
 - He PRESS A - GPC (tb-OP)
 - B - CL (tb-CL)
- L,R OMS
 - He PRESS/VAP ISOL (four) - CL
 - \checkmark TK ISOL (four) - OP (tb-OP)
 - \checkmark XFEED (four) - CL (tb-CL)

POST
 OMS 2

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

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 C/L (Helmet Bag)
R3A Unstow ORBIT Cue Cards & ORB PKT C/L

Go to POST INSERT, POST INSERTION ..

- * If ATO, go to POST INSERT, *
- * ATO POST INSERTION *
- * If Rev 3 deorbit required, *
- * go to DEORBIT PREP, ORBIT *
- * 3 DEORBIT PREP *

THE UNITED STATES OF AMERICA
DEPARTMENT OF JUSTICE
FEDERAL BUREAU OF INVESTIGATION

WASHINGTON, D. C. 20535

MEMORANDUM FOR THE DIRECTOR, FBI
FROM: SAC, [illegible]
SUBJECT: [illegible]

[illegible text]

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Flight Supplement

Replace this page with page(s) from
Flight Supplement

6-2

ASC/ALL/GEN

6-3

ASC/ALL/GEN

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

		/		:		:		.	
--	--	---	--	---	--	---	--	---	--

PEG 4 TGTS

C1 14

--	--	--	--	--	--

C2 15

()		.			
-----	--	---	--	--	--

HT 16

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

ΘT 17

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

PRPLT 18

()					
-----	--	--	--	--	--

DEORBIT MNVR PAD

MNVR ATT

R 24

--	--	--

P 25

--	--	--

Y 26

--	--	--

REI

--	--	--	--

TXX

	:		
--	---	--	--

ΔVTOT

		.	
--	--	---	--

TGO

	:		
--	---	--	--

VGO X ()

		.	
--	--	---	--

VGO Y ()

		.	
--	--	---	--

VGO Z ()

		.	
--	--	---	--

HA HP

TGT

		()		
--	--	-----	--	--

NOTES

RCS I'CONNECT:

	L OMS → RCS
	R OMS → RCS
	NONE

AOA PROCEDURES

AOA

Replace this page with page(s) from
Flight Supplement

Replace this page with page(s) from
Flight Supplement

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

1: GNC DEORB MNVR EXEC

✓Or enter Target from OMS TARGETS

NOTE

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

CRT1 LOAD - ITEM 22 EXEC
 TIMER - ITEM 23 EXEC

CRT3 ✓BFS TGT

C OMS TVC GIMBAL 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

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

3: BFS, GNC OMS 2 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 \checkmark BFS TGT

MNVR TO DEORBIT BURN ATTITUDE

B F6/F8 \checkmark ADI ATT (two) - INRTL
 \checkmark ERR (two) - 5
 \checkmark RATE (two) - 5

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

TIG-10 P VACUUM INERTING TERMINATE

R4 MPS FILL/DRAIN
LH2,LO2 OUTBD (two) - CL
Wait 10 sec... - GND
LH2,LO2 INBD (two) - GND

R2 MPS PNEU He ISOL - GPC

3: BFS, GNC SYS SUMM 2

TIG-2 B R3A Go to DEORBIT BURN Cue Card

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DEORBIT BURN and DEORBIT BURN MONITOR CARDS

MS ONLY

6-13

ASC/ALL/GEN

ENT-4a/
D/A

HOOK
VELCRD

DEORBIT
BURN (2 ENG)

HOOK
VELCRD

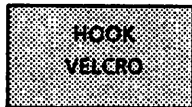
√MM302 .. √OMS BOTH CNTLR PWR (two) - ON
Enter TGO + 5 sec
√TRIM: P + 0.0, LY - 5.7, RY + 5.7
√DAP - AUTO (PASS)/DISC .. ADI - LVLH/HI/MED
L,R OMS He PRESS/VAP ISOL A (two) - OP
B (two) - GPC ..

TIG-2 OMS ENG (two) - ARM/PRESS ..
-:15 EXEC .. (NO EXEC > TIG + [] : [] [])
-:15 If OMS AFT QTY < 11%, THC + X to OMS IGN + 1 sec
:00 TIG .. (√Pc, ΔVTOT, ENG VLVs; start watch)

- * If no OMS ignition, APUs - SHUT DN
- * **OMS PRPLT FAIL:**
- * HP > [] [] [] L or [] [] [] R (STOP):
- * OMS ENG (two) - OFF, APUs - SHUT DN
- * Affected OMS TK ISOL (two) - CL
- * HP < [] [] [] L or [] [] [] R (CONTINUE):
- * Failed OMS ENG - OFF
- * ITEM 18 + 0 EXEC
- * Affected OMS He PRESS (two) - CL
- * TK ISOL (two) - CL
- * When Pc < 80%, 2nd OMS ENG - OFF
- * Complete RCS (PRPLT FAIL)
- * **OMS ENG FAIL (CONTINUE BURN):**
- * Failed ENG - OFF
- * OMS XFEED at [] [] [] %L [] [] [] %R $\frac{1}{2}$ of ΔVTOT at FAIL [] [] []
- * **RCS COMPLETION:**
- * **ANY OMS PRPLT FAIL:**
- * If HP > [] [] [] , safe HP: APUs - SHUT DN
- * If HP < [] [] [] , safe HP: l'nect to good OMS PRPLT
- * THC + X (√OMS % vs RCS Burn Time)
- * AFT RCS RECONFIG
- * THC + X to TGT HP or TOT AFT QTY 1 [] [] [] %
- * If CUR HP ≤ AFT HP [] [] [] , THC + X to TGT HP
- * If CUR HP ≤ PRI HP [] [] [] , FRCS to PRI Site
- * If CUR HP > PRI HP [] [] [] & ≤ B/U HP [] [] [] ,
- * FRCS to B/U Site
- * If CUR HP > B/U HP [] [] [] , THC + X to B/U HP [] [] []
- * or TOT AFT QTY 2 [] [] [] ; FRCS to B/U Site
- * MNVR to -X ATT (pitch up at 3°/sec to VGOz = (+) $\frac{1}{2}$ ΔVTOT)
- * THC - X
- * **BOTH OMS ENG FAIL:**
- * OMS ENG - OFF
- * Interconnect OMS to RCS
- * THC + X (√OMS % vs RCS Burn Time)
- * OMS TK SW
- * THC + X (√OMS % vs RCS Burn Time)
- * **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)



DEORBIT BURN MONITOR



OMS Pc LOW OMS ↓ AND ENG VLV 1 or 2 < 70%	OMS ENG FAIL
OMS ↓ and ENG VLV 1 and 2 > 70% and FU and OX TK P > 185 < 185	OMS PRLT FAIL Burn to Pc=72%, then OMS PRPLT FAIL Sensor Fail
No OMS ↓	
OMS TEMP FU IN P > 232 < 197 P 198-231	OMS ENG FAIL OMS PRPLT FAIL SENSOR FAIL
OMS OX/FU TK P OX & FU LOW OX LOW	He PRESS/VAP ISOL (two) - OP Burn to OMS ↓, then OMS PRPLT FAIL
FU LOW	He PRESS/VAP ISOL (two) - CL Burn to OMS ↓, then OMS PRPLT FAIL
OX & FU HIGH	Cycle He to maint OMS TK P234-284 Cycle He A(B) to isolate failed leg
OMS GMBL 1st FAIL 2nd FAIL	Select SEC GMBL (twice) If control problems or high RCS fuel usage: Affected OMS ENG - OFF XFEED if ΔVTOT > 20
PASS SET FAIL/SPLIT or Safe HP: IMU DLMA HP > <input type="checkbox"/> <input type="checkbox"/> or HP < <input type="checkbox"/> <input type="checkbox"/> 2 MN DC BUSES	Stop burn, APUs - SHUT DN Continue burn: PASS SET FAIL only - BFS engage PASS SET SPLIT only - Consult MCC on Restriring IMU DLMA - Postburn, dese1 IMU with "ACC" > 0.05 (PASS & BFS)
GPC1(4)	GPC1(4) Mode - STBY,HALT FF1(4) - OFF,ON L(R) OMS Gimbals - sel SEC
FA1(4)	L(R) OMS Gimbals - sel SEC

ENT-2a/A,0,D,E/A

MS ONLY

6-15

ASC/ALL/GEN

ENT-4b/
D/A

HOOK
VELCRO

DEORBIT BURN (1 ENG)

HOOK
VELCRO

✓MM302 .. ✓OMS L or R CNTLR PWR (two) - ON
 Enter TGO + 10 sec
 ✓TRIM: P + 0.0, LY + 5.2, RY - 5.2
 ✓DAP - AUTO (PASS)/DISC .. ADI - LVLH/HI/MED
 L,R OMS He PRESS/VAP ISOL A (two) - OP
Wait 2 sec..... B (two) - OP

TIG-2 OMS ENG (good) - ARM/PRESS : [] : [] []
 -:15 EXEC .. (NO EXEC > TIG + [] : [] [])
 -:15 IF OMS AFT QTY < 11%, THC + X to OMS IGN + 1 sec
 :00 TIG .. (✓Pc, ΔVTOT, ENG VLVs; start watch)
 * If no OMS ignition, APUs SHUT DN *

[] [] [] ΔVTOT: OMS XFEED RETURN
 [] [] [] %

*** OMS PRPLT FAIL:**

HP > [] [] , safe HP (STOP):
 Failed OMS ENG - OFF, APUs - SHUT DN
 Affected OMS He PRESS (two) - CL
 TK ISOL (two) - CL

HP > [] [] , safe HP (CONTINUE):
 Failed OMS ENG - OFF
 ITEM 18 + 0 EXEC
 Affected OMS He PRESS (two) - CL
 TK ISOL (two) - CL
 XFEED (two) - CL
 Complete RCS (PRPLT FAIL)

*** OMS ENG FAIL (CONTINUE BURN):**
 Failed ENG - OFF
 Complete RCS (OMS ENG FAIL)

*** RCS COMPLETION:**
*** OMS PRPLT FAIL:**
 Interconnect to good OMS PRPLT
 THC + X (✓OMS % vs RCS Burn Time)
 AFT RCS RECONFIG

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

IF CUR HP ≤ AFT HP [] [] , THC + X to TGT HP

IF CUR HP ≤ PRI HP [] [] , FRCS to PRI Site

IF CUR HP > PRI HP [] [] & ≤ B/U HP [] []
 FRCS to B/U Site

IF CUR HP > B/U HP [] [] , THC + X to B/U HP [] []
 or TOT AFT QTY 2 [] [] ; FRCS to B/U Site

MNVR to -X ATT (pitch up at 3°/sec to VGOz =
 THC - X (+) ΔVTOT)

*** OMS ENG FAIL:**
 Interconnect OMS to RCS [] [] [] ΔVTOT
 THC + X, OMS TK SW at [] [] []
 THC + X (✓OMS % vs RCS Burn Time)

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)

HOOK
VELCRO

DEORBIT
BURN
(RCS)

HOOK
VELCRO

ENT-3a/
D/A

/MM302 .. /RCS SEL CNTLR PWR (two) - ON
/DAP - DISC .. ADI - LVLH/MED/MED
/RCS BURN CONFIG

TIG-2 L,R OMS He PRESS/VAP ISOL A (two) - OP
.....Wait 2 sec.....B (two) - OP
:00 +X .. (No Deorbit > TIG + [] : [] [])

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

[] [] []

OMS TK SW:

$\Delta VTOT$

R OMS XFEED (two) - OP
L OMS XFEED (two) - CL

* OMS PRPLT FAIL: *
* Affected OMS He PRESS (two) - CL *
* TK ISOL (two) - CL *
* XFEED (two) - CL *
* HP > [] [] , safe HP (STOP BURN): *
* APUs - SHUT DN *
* HP < [] [] , safe HP (CONTINUE): *
* ITEM 18 +Q EXEC *
* *
* *

..If OMS PRPLT LOW.....

Release THC at \rightarrow [] [] $\Delta VTOT$
Aft RCS RECONFIG
THC +X to TGT HP or TOT AFT QTY 1 [] [] [] %
If CUR HP \leq AFT HP [] [] , THC +X to TGT HP
If CUR HP \leq PRI HP [] [] , FRCS to PRI Site
If CUR HP > PRI HP [] [] & \leq B/U HP [] [] ,
FRCS TO B/U Site
If CUR HP > B/U HP [] [] , THC +X to [] []
B/U HP [] []
or TOT AFT QTY 2 [] [] ; FRCS to B/U Site
MNVR to -X ATT (pitch up at $3^\circ/\text{sec}$ to $VGOz =$
(+)1/4 $\Delta VTOT$)
THC -X

CUTOFF $VGOx = 0$, RELEASE THC ..
AFT RCS RECONFIG
Trim inplane X,Z RESIDUALS < 2 fps
(< 0.5 fps if shallow)

HOOK
VELCRO

UNBALANCED
PRPLT
DEORBIT
BURN

HOOK
VELCRO

✓MM302 ** ✓OMS BOTH CNTLR PWR (two) - ON
Enter TGO + 5 sec
✓TRIM: P +0.0, LY -5.7, RY +5.7
✓DAP - AUTO (PASS)/DISC ** ADI - LVLH/HI/MED
Feed 2 ENG from 1 POD
L,R OMS He PRESS/VAP ISOL A (two) - OP
B (two) - GPC **
 TK ISOL (two) - CL (tb-CL)
OMS XFEED (four) - OP (tb-OP)

TIG-2 OMS ENG (two)- ARM/PRESS **
-:15 EXEC ** (NO EXEC > TIG + :)
-:15 If OMS AFT QTY < 11%, THC +X to OMS IGN +1 sec
:00 TIG ** (✓Pc, ΔVTOT, ENG VLVs; start watch)
* If no OMS ignition, APUs - SHUT DN *

- * OMS PRPLT FAIL (STOP BURN):
- * OMS ENG (two) - OFF, APUs - SHUT DN
- * Affected OMS TK ISOL (two) - CL
- * XFEED (two) - CL
- * OMS ENG FAIL (CONTINUE BURN):
- * Failed OMS ENG - OFF
- * TK ISOL (two) - OP at → ΔVTOT
- * TK ISOL (two) - CL %
- * BOTH OMS ENG FAIL (CONTINUE BURN):
- * OMS ENGS - OFF
- * Interconnect OMS to RCS
- * THC +X (✓OMS % vs RCS Burn Time)
- * OMS TK SW
- * THC +X (✓OMS % vs RCS Burn Time)

ENT-5a/D/A

HINGE

MS ONLY

6-18

ASC/ALL/GEN

[][] [][]

ΔVTOT: Return to 2 ENG, 2 POD FLOW

[][] TK ISOL (two) - OP (tb-OP)

OMS XFEED (four) - CL (tb-CL)

ENT-5c/D/A

*** OMS PRPLT FAIL:**

HP > [][] L or [][] R (STOP):

OMS ENG (two) - OFF, APUs - SHUT DN

Affected OMS TK ISOL (two) - CL

HP < [][] L or [][] R (CONTINUE):

Failed OMS ENG - OFF

ITEM 18 +0 EXEC

Affected OMS He PRESS (two) - CL

TK ISOL (two) - CL

When Pc < 80%, 2nd OMS ENG - OFF

COMPLETE RCS (PRPLT FAIL)

*** OMS ENG FAIL (CONTINUE BURN):**

Failed ENG - OFF

OMS XFEED at [][] %L [][] %R 1/2 of ΔVTOT at FAIL

RCS COMPLETION:

ANY OMS PRPLT FAIL:

If HP > [][] safe HP: APUs - SHUT DN

< [][] safe HP: I'cnect to good OMS PRPLT

THC +X (/OMS % vs RCS Burn Time)

AFT RCS RECONFIG

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

If CUR HP ≤ AFT HP [][] → THC +X to TGT HP

If CUR HP ≤ PRI HP [][] → FRCS to PRI Site

If CUR HP > PRI HP [][] and ≤ B/U HP [][]

FRCS TO B/U Site

If CUR HP > B/U HP [][] → THC +X to B/U HP [][]

or TOT AFT QTY 2 [][] → FRCS to B/U Site

MNVR to -X ATT (pitch up at 3"/sec to VGOz =

THC -X (+)1/4 ΔVTOT)

*** BOTH OMS ENG FAIL:**

OMS ENGS - OFF

Interconnect OMS to RCS

THC +X (/OMS % vs RCS Burn Time)

OMS TK SH

THC +X (/OMS % vs RCS Burn Time)

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)

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MS ONLY

6-20

ASC/ALL/GEN

... ..

... ..

... ..

... ..

... ..

AOA POST DEORB BURN

... ..

... ..

P/DEORB
BURN

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

P OMS/RCS POST BURN RECONFIGURATION

.....
 . If I'CNCT .
 . Perform I'CNCT RETURN .
 . (ASC PKT C/L, RCS) .

07. AFT L,R RCS
 ✓He PRESS (four)- OP (tb-OP)
 ✓TK ISOL (six) - GPC (tb-OP)
 ✓XFEED (four) - GPC (tb-CL)

08 L,R OMS
 He PRESS/VAP ISOL (four) - CL
 ✓TK ISOL (four) - OP (tb-OP)
 * If OMS PRPLT FAIL: *
 * ✓Affected TK ISOL (two) - CL *
 ✓XFEED (four) - CL (tb-CL)

Determine Prebank
 Determine ΔHP (CUR HP - TGT HP)

Use PREBANK TABLE
 Record Prebank on ENT MNVR Cue
 Card

P/DEORB
 BURN

Replace this page with page(s) from
Flight Supplement

Replace this page with page(s) from
Flight Supplement

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

C OMS GIMBAL POWERDOWN

Verify gimbal positions:

	L	R
P	+5.9	+5.9
Y	+6.4	-6.4

CRT1 GMBL OFF - ITEM 32 EXEC
 - ITEM 33 EXEC

P FORWARD RCS DUMP

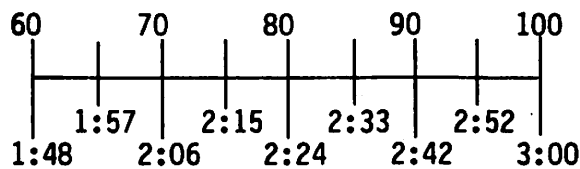
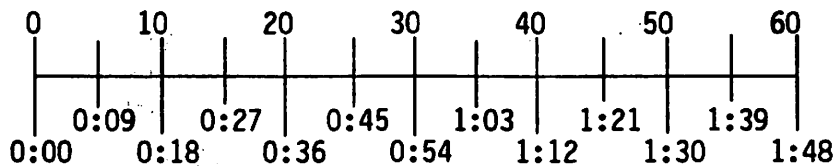
NOTE

Use BFS Qtys for
 all calculations

Determine FWD RCS 'DUMP TO %' using
 lowest of Ox or Fu qty (calculator,
 cg wheel, or DEL PAD)

FOUR JET DUMP:

F RCS PRPLT TO BE DUMPED (%)



TIME FROM DUMP INITIATION (M:S)

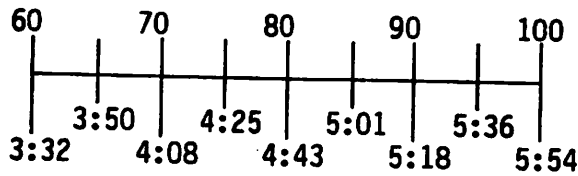
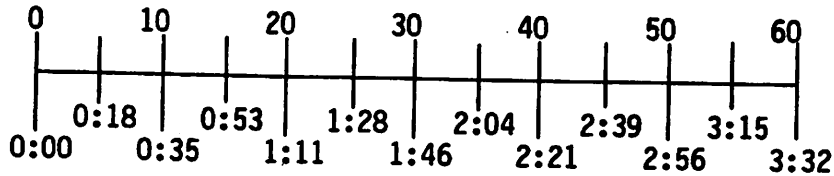
NOTE

During dump disregard
 FRCS qty

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

TWO JET DUMP:

F RCS 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:
OFF - ITEM 38 EXEC

ISOLATE FWD RCS

When dump complete:

08 FWD RCS
MANF ISOL 1,2,3,4 (four) - CL
(tb-CL)

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

ENTRY SW CHECK

- B F6/F8 Stow Deorbit Burn Cue Cards (R3A)
- R3A Install Entry Cue Cards

NOTE

If NAVAIDS 'OFF' due to
PKT C/L PWRDN, do not
switch 'ON' until V = 15K

- P 07 ✓TACAN MODE (three) - GPC
 - ✓ANT SEL (three) - AUTO
 - CH (three) - 111X (EDW)
 - 059Y (KSC)
 - 121Y (NOR)
- 08 ✓RADAR ALTM (two) - ON
 - MLS (three) - ON (PASS)
 - ✓MLS CH (three) - 8 (EDW22, KSC15, NOR17)
 - 6 (EDW17, KSC33)
- C L2 I/O RESET EXEC
 - ✓CAB RELIEF (two) - ENA (tb-ENA)
 - ✓ANTISKID - ON
 - ✓NWS - GPC
 - ✓ENTRY MODE - AUTO

3: GNC 51 OVERRIDE

- ✓ENTRY R MODE - AUTO
- B L2/C3 ✓SBTC - full fwd
- C3 ✓SRB SEP - AUTO
- ✓ET SEP - AUTO
- F6/F8 ✓AIR DATA - NAV
- ✓ADI ERR - 5
- ✓RATE - 5
- ✓HSI SEL MODE - ENTRY
- C F6 ✓SOURCE (two) - NAV, 1
- P F8 ✓SOURCE (two) - NAV, 2
- B F3 ✓TRIM RHC/PNL (two) - INH
- ✓PNL (two) - ON
- F7/F8 ✓RADAR ALTM - 1(C), 2(P)
- ✓FLT CNTLR PWR (two) - ON

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

3: GNC 51 OVERRIDE

OMS
FAILURE

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

PRE EI CHECKLIST

- * If only one APU running: *
- * Good HYD MAIN PUMP PRESS - LOW *
- * Delay MM304 transition to EI-2 *
- * Just prior to transition: *
- * Good HYD MAN PUMP PRESS - NORM *
- * APU SPEED SEL - HIGH *

- * If 3 PASS GPC configuration: *
- * Config FCS CH(s): each GPC cmds *
- * equal no. of CH(s) *

2: GNC 51 OVERRIDE

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

2: GNC DEORB MNVR COAST

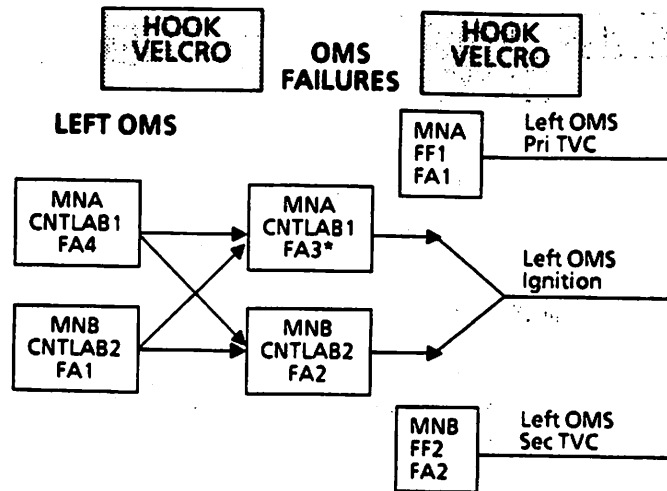
3: BFS, GNC DEORB MNVR COAST

R1 AC BUS SNSR (three) - OFF (1 sec),
then MONITOR

R4 HYD LG HYD ISOL VLV 3 - OP
Hold 5 sec ✓(tb-OP)

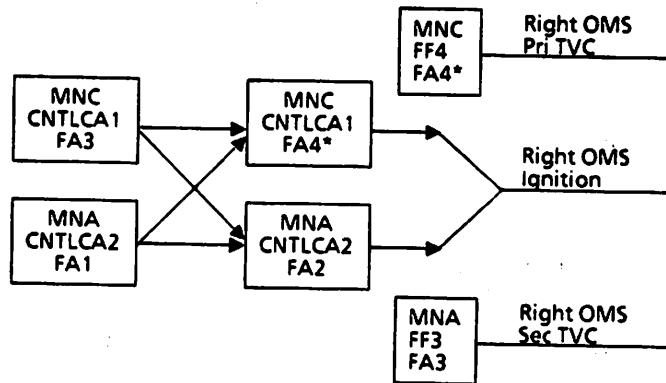
Go to ENTRY MANEUVERS Cue Cards

OMS FAILURE



*Loss of FA3(4) or Pc Fail High:
 Guidance will not downmode to single engine logic with closure of Left (Right) Arm/Press Switch.
 (Guidance needles in error, TGO countdown slow, expect 6 sec underburn ~ 6 ft/sec)

RIGHT OMS



If two FA MDMs lost		
MDMs	preburn: ENG-OFF	during burn: MAN SHUTDN
1&2	LEFT (TVC)	BOTH
1&3	RIGHT (IGN)	LEFT
1&4	LEFT (IGN)	RIGHT
2&3	LEFT (IGN)	RIGHT
2&4	RIGHT (IGN)	LEFT
3&4	RIGHT (TVC)	BOTH

ASC-3b/A,0,E/A

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WEATHER PADS

8-1

ASC/ALL/GEN

WEATHER
PADS

**WEATHER
PADS**

U. S. TERMINAL FORECASTS

↓ RTLS ACL pg 1-7

DEORBIT ORBIT	SITE	LDG GMT	SKY/VIS/WEATHER	TEMP	WIND	ALTM	RWY	DA	REMARKS
RTLS				°F					
AOA				°F					
AOA				°F					
2				°F					
3				°F					
4				°F					
5				°F					
6				°F					

UPPER WINDS FORECAST

ALT	RTLS	TAL (1):	TAL (2):	AOA (1):	AOA (2):	ORB : DEORB :
50K						
40K						
30K						
20K						
7K						
SURF						

ACL pg

FB 2-10

FB 2-

FB 2-

8-2

ASC/ALL/GEN

CLS TERMINAL FORECASTS

↓ TAL(1) ACL pg FB 2-
TAL(2) ACL pg FB 2--

DEORBIT ORBIT	SITE	LDG GMT	SKY/VIS/WEATHER	TEMP	WIND	ALTM	RWY	DA	REMARKS
TAL (1)				°F					
TAL (2)				°F					
				°F					
				°F					
				°F					
				°F					
				°F					

MISCELLANEOUS

NOTAMS: _____

EXPECTED RATES DURING LOAD RELIEF

	DEORB/ORB	APPROX TIG	RWY	HP ADJ TIG
MAX RATES: ROLL _____ °/sec at _____	_____	_____	_____	_____
PITCH _____ °/sec	_____	_____	_____	_____
YAW _____ °/sec	_____	_____	_____	_____
IGNORE ATTITUDE ERRORS	_____	_____	_____	_____

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ASC/ALL/GEN

TOP

HOOK
VELCRO

**OMS 2/
ORBIT OMS
BURNS**

HOOK
VELCRO

ASC-2a/A,O/A

✓MM105/202(302)
 ✓BURN ATT (INRTL) then REF, pb - push
 ✓ENG SEL CNTL PWR (two) - ON ..
 ✓DAP - AUTO(PASS)/DISC ✓DAP TRANS - NORM
 ✓GIMBAL 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 B (two) - GPC (OP for SE
 burn)

GPC OP CL

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 affected engine if:
 OMS N2 TK P < 470(523) (NONCRIT
 He TK P < 640 BURN)
 FU ENG IN P < 216(244)
 OX ENG IN P < 151(244)

--	--	--

ΔVTOT: OMS XFEED RETURN (Planned Single Engine)

Re -:15 EXEC ..
 If OMS ENG Pc MSG and non critical burn - Affected
 Eng - OFF
 If Leaking OMS PROP burn RCS + X TIG -15 sec to
 OMS IGN + 1 sec
 :00 TIG .. (✓Pc, PVTOT, ENG VLVs; start watch)
 * **OMS PRPLT FAIL:** *
 * **HP < 100 (CONTINUE BURN):** *
 * Failed OMS ENG - OFF *
 * ✓XFEED (two) - CL *
 * TK ISOL (two) - CL *
 * He PRESS (two) - CL *
 * **HP > 100 (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 < 80 or CRIT O/O) *
 * Interconnect to either OMS that was ENG FAIL *
 * THC + X (Hp = 80) *
 * Post burn, AFT RCS RECONFIG *
 CUTOFF ..
 +:02 OMS ENG(s) - OFF
 Trim inplane X,Z residuals < 2 fps

FAB USE ONLY

CC 10-3

ASC/ALL/GEN

TOP
BACK OF 'OMS2/ORBIT OMS BURNS'

HOOK
VELCRO

OPS 1
RCS BURN

HOOK
VELCRO

AFT RCS

✓RCS BURN CONFIG:

- OMS TK ISOL (all) - OP
- L(R) OMS XFEED (two) - OP
- R(L) OMS XFEED (two) - CL
- AFT L,R RCS XFEED (four) - OP
- TK ISOL (six) - CL

ASC-2b/A,O/A

XFEED at
1/2 ΔVTOT
(if reqd)

--	--	--

TIG-2 L,R

- He PRESS/VAP ISOL A - OP
- ...Wait 2 sec... B - OP

✓MM105

- ✓CNTLR PWR (two) - ON
- ✓BURN ATT (INRTL) then REF, pb-push
- ✓RCS SEL

:00 + X "

- Maintain PITCH ATT ERR ± 3°
- Monitor OMS data
- Monitor ΔVTOT

CUTOFF RELEASE THC "

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 Mnvr to ATT (error needles)

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 = +20 ± 2
- ✓REF ball - 0,0,0

NOTE

- Error needles invalid during burn.
- Burn time = ~2X TGO
- TGT Hp = 80 for ASCENT

:00 -X "
CUTOFF CUR HP = TGT HP

--	--	--

, RELEASE THC

FAB USE ONLY

CC 10-4

ASC/ALL/GEN

TOP

HOOK
VELCRO

OMS
BURN
MONITOR

HOOK
VELCRO

OMS Pc LOW OMS ↓ AND ENG VLV 1 or <70% OMS ↓ and ENG VLV 1 and >>70% No OMS ↓	OMS ENG FAIL ----- OMS PRPLT FAIL ----- Sensor Fail
OMS TEMP FU IN P > 232 P < 197 P 198-231	OMS ENG FAIL ----- OMS PRPLT FAIL ----- Sensor Fail
OMS OX/FU TK P (✓ENG IN P) OX & FU LOW ----- OX LOW ----- FU LOW ----- OX & FU	He PRESS/VAP ISOL (two) - OP If Tk P no incr: OMS PRPLT FAIL When HP > 100: OMS ENG (two) - OFF ----- If HP > 100: OMS PRPLT FAIL If HP < 100: Burn to OMS ↓ then OMS PRPLT FAIL ----- If HP > 100: OMS PRPLT FAIL If HP < 100: He PRESS/VAP ISOL (two) - CL Burn to OMS ↓ or HP = 100, then OMS PRPLT FAIL ----- Cycle He to maint OMS TK P 234-284 Cycle He A(B) to isolate failed leg
OMS He TK P LOW (✓CRT & meter) P > 640 & QTY > 41% ----- P < 640 or QTY ≤ 41%	✓Leaking OMS TK ISOL (two) - OP ✓He PRESS/VAP ISOL (two)-OP L.R OMS XFEED (four) - OP Good OMS TK ISOL (two) - CL He PRESS/VAP ISOL (two) - CL When P < 640 or QTY ≤ 41% continue ✓Good OMS TK ISOL (two) - OP ✓He PRESS/VAP ISOL (two)-OP L.R OMS XFEED (four) - OP Failed OMS TK ISOL (two) - CL He PRESS/VAP ISOL (two)-CL
N2 REG P HIGH or LOW	OMS ENG - ARM
N2 TK P LOW (✓CRT & meter)	When N2 TK P < 470: OMS ENG - ARM
OMS GMBL 1st FAIL 2nd FAIL	Select SEC GMBL (twice) If control problems or high RCS fuel usage: OMS ENG FAIL
GPC1(4) with String 1(4)	Affected GPC MODE - STBY,HALT FF1(4) - OFF.ON L(R) OMS Gimbals - sel SEC
FA1(4)	L(R) OMS Gimbals - sel SEC

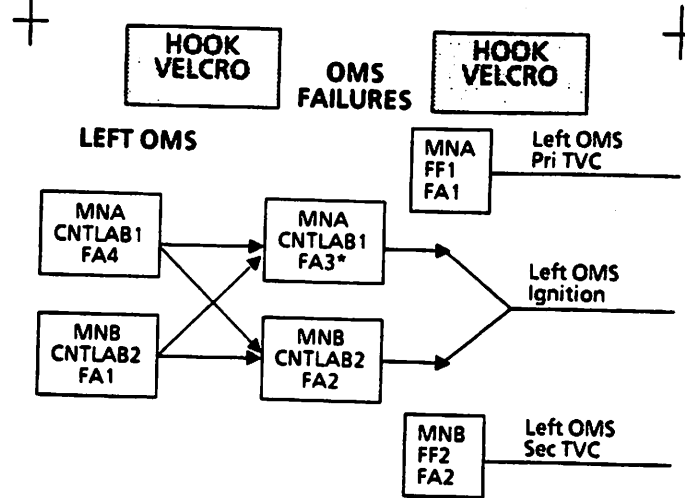
ASC-3a/A,O/A

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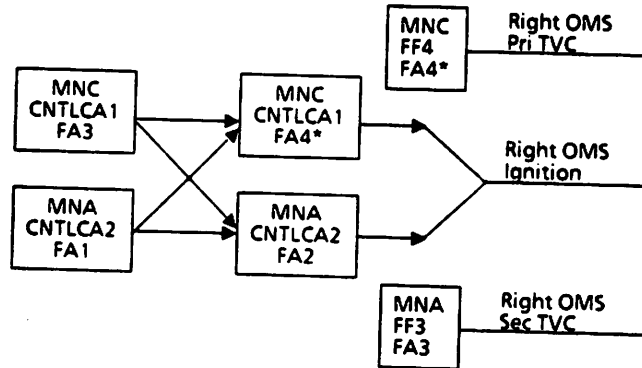
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TOP
BACK OF 'OMS BURN MONITOR'



*Loss of FA3(4) or Pc Fail High:
Guidance will not downmode to single engine logic with closure of Left (Right) Arm/Press Switch.
(Guidance needles in error, TGO countdown slow, expect 6 sec underburn ~ 6 ft/sec)

RIGHT OMS



If two FA MDMs lost		
MDMs	preburn: ENG-OFF	during burn: MAN SHUTDN
1&2	LEFT (TVC)	BOTH
1&3	RIGHT (IGN)	LEFT
1&4	LEFT (IGN)	RIGHT
2&3	LEFT (IGN)	RIGHT
2&4	RIGHT (IGN)	LEFT
3&4	RIGHT (TVC)	BOTH

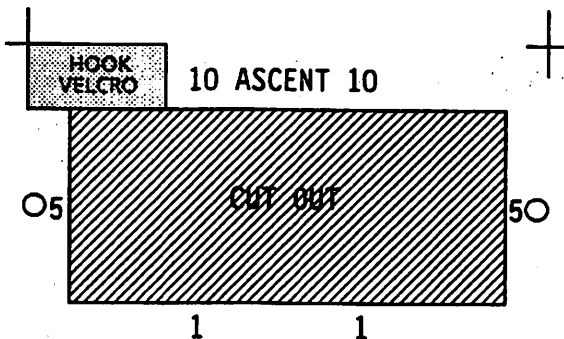
ASC-3b/A,0,E/A

FAB USE ONLY

CC 10-6

ASC/ALL/GEN

TOP

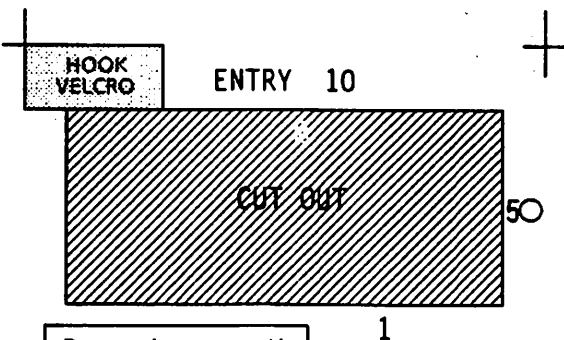


ADI ERROR/RATE SWITCH

ASC-4a/A,E/A



TOP
BACK OF 'ADI ERROR/RATE SWITCH'



R	a/g	Y
25	5/1.25	2.5
25	2/1.25	2.5
10	1/0.50	2.5

ASC-4b/A,E/A



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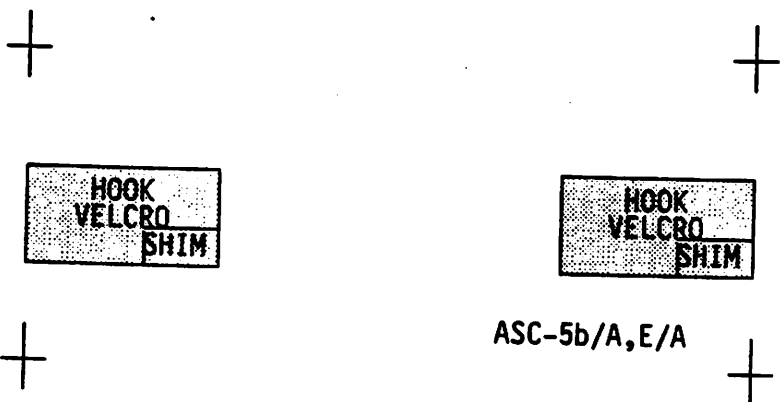
CC 10-7

ASC/ALL/GEN

TOP

ASCENT/ENTRY SPEC PASS	NO.	ASC-5a/A,E/A BFS	NO.
GPC MEMORY	0	BFS MEMORY	0
ENT CONTROL (OPS 3)	53		
HORIZ SIT	50	GNC	
IMU ALIGN (301)	21	HORIZ SIT	50
OVERRIDE	51	OVERRIDE	51
RCS (OPS 3)	23	SM	
STRK/COAS CNTL (301)	22	PL BAY DOORS	63

TOP
BACK OF 'ASCENT/ENTRY SPEC'



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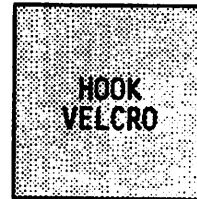
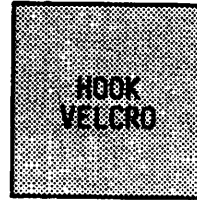
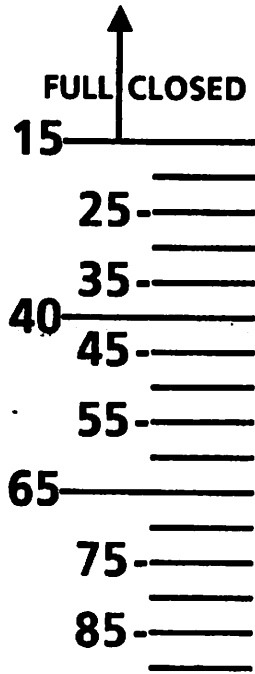
TOP

TOP
BACK OF 'SPEED BRAKE COMMAND'

+ ASC-6a/A,E/A

+ +

+



SPEED BRAKE CMD
vs
SBTC TRAILING EDGE

ASC-6b/A,E/A

+

+ +

+

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