Ascent Checklist

Mission Operations Directorate
Flight Design and Dynamics Division

Generic
March 1, 1988

NASA
National Aeronautics and Space Administration
Lyndon B. Johnson Space Center
Houston, Texas
MISSION OPERATIONS DIRECTORATE

ASCENT CHECKLIST

GENERIC
March 1, 1988

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Incorporates the following:

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**AREAS OF TECHNICAL RESPONSIBILITY**

| Area                        | Responsible Party       | Code  
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<td>Book Manager</td>
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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
ASCENT CHECKLIST
ALL VEHICLE

**LIST OF EFFECTIVE PAGES**

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(*) - Omit from flight book
(△) - See note on page
(®) - Prelift-off information required
(⊕) - Highlights required

xiii ASC/ALL/GEN
6-15........ ALL/GEN
6-16........ (A) ALL/GEN
6-17........ (A) ALL/GEN
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8-2........ (x) ALL/GEN
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CC 10-7.... ALL/GEN
CC 10-8.... ALL/GEN
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CC 10-10.... ALL/GEN
CC 10-11.... (A) ALL/GEN
CC 10-12.... (A) ALL/GEN

(©) - Highlights required
(A) - See note on page
(x) - 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
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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
-2:25:00 PRE-INGRESS SW RECONFIGURATION

NOTE
ASP configures D1 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, MO39M)
05/09 AUD VOX SENS (as needed) - adj
R10/L9 as reqd
MO42F 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 NOTE
ASP doing C/W VOL adjust,
expect MA

1-2
ASC/ALL/GEN
-1:30:00

**A**

**LCC ASTRO COMM CHECK**

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

**MCC A/G VOICE CHECK**

**B**

05/09

A/G 1 Voice Check
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**

L2

CAB VENT ISOL - OP (tb-OP)
\^VENT tb - CL

01

\^CAB PRESS - increasing to 16.7 (MA)
-1:01:00 (DEU Equivalent)

NOTE
IMU preflight align begins

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

-50:00 P
H2O BOILER PREACTIVATION

NOTE
Vent vlv operation may occur earlier or later at LCC direction

-45:00 C
CABIN VENT REDUNDANCY CHECK

-32:00 C
PASS/BFS TRANSFER PREP

3: BFS, GNC BFS MEMORY
CRT3 PASS/BFS XFER ENA - ITEM 25 EXEC
1-4 ASC/ALL/GEN
-30:00 OMS GN2 PRESS
(-50:00)
C3 OMS ENG (two) - ARM/PRESS

CABIN VENT
L2 CAB VENT ISOL - OP (tb-OP) (klaxon)
\(\checkmark\) VENT tb - OP
01 \(\checkmark\) CAB PRESS - decreasing

-25:00 A A/G VOICE CHECK
(-45:00)
Simo Voice Check (Launch Config)
Voice check with MCC
Update Abort Winds Pad, ASC Flip Book, and ALTM, 1-7 (if reqd)

-22:00 PASS/BFS TRANSFER (DEU Equivalent)
(-42:00) (ONE-SHOT TRANSFER)

1: GNC 100 GTS DISPLAY

CRT3 \(\checkmark\) ITEM 25 - (no *)
01 Report cabin pressure to OTC

NOTE
Vent vlv closure may occur earlier or later at LCC direction

-21:00 C CLOSE VENT VLVS
(-41:00)
L2 CAB VENT ISOL - CL (tb-CL)
VENT - CL (tb-CL)

1-5 ASC/ALL/GEN
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 (T-30:00)  

OPS 1 LOAD (DEU Equivalent)  

1: 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 (-29:00)  

BFS TO OPS 1  

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  

1-6 ASC/ALL/GEN
1: GNC FAULT  
2: GNC LAUNCH TRAJ  
3: BFS, GNC FAULT

P  HORIZ SIT CONFIG
2: GNC 50 HORIZ SIT  
3: BFS, GNC 50 HORIZ SIT

ALTM - ITEM 9 + ___ ____ ___

PASS ITEM  | BFS ITEM

PTI  INH  1
TAL SITE 2(3,4,5) 40/ 2(3,4,5) 40/
RTLS SITE 1 41/ 1 41/
PRI  KSC 15 3*/ KSC 15 3*/
SEC  KSC 33 4/  KSC 33 4/
TAC  59Y  5/  59Y  5/

* If RWY KSC 33 selected: *
  * 08 MLS CH tw (three) - 6 *

G&N  OVHD  6/  OVHD  6/
XEP  NEP  7/  NEP  7/
AIM  NOM  8/  NOM  8/
     (or CLSE) (or CLSE)
SPDBK  NOM  39/
TAC  INH  20/  INH  20/
DRAG H  AUT  22/  AUT  22/
ADTA H  INH  26/  INH  26/
ADTA TO G&C  INH  29/  AUT  28/
TAC  DELTA  35/  -
HUD  0  37/  -
     0  38/  -

CONFIG OMS I'CNCT (PASS/BFS)

P  CRT2  
2: GNC 51 OVERRIDE  
3: BFS OVERRIDE

ITEM 5 ___ ___ I'CNCT

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

1-7  ASC/ALL/GEN
**1: GNC LAUNCH TRAJ**

-16:00

**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

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**2: GNC SYS SUMM 1**

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

**NOTE**

-9:00

-8:00 **P AC SNSR TO MONITOR**

-7:00 **NOTE**
ACCESS ARM RETRACT
✓Seat in launch position
1-8 ASC/ALL/GEN

**2: GNC SYS SUMM 1**

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

**WEATHER UPDATE (if reqd)**
Update Abort winds, RWY and ALTM setting

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

-9:00 'GO FOR LAUNCH' - ALL

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

**NOTE**
GLS starts
-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) - cl
    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 1t - off

1-9  ASC/ALL/GEN
C HTR RECONFIG

L2 FLASH EVAP FDLN HTR (two) - OFF

-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.

1-10 ASC/ALL GEN
Replace this page with Section 2 of Flight Supplement
Replace this page with Section 2 of Flight Supplement
POST OMS 1 BURN PROCEDURES
* If Feedline Fail:
  * MECO +6 (~14:30 Nom), *
  * ET SEP - SEP *

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 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 /DAP - AUTO

P APU/ HYD SHUTDOWN (Not AOA)

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

3-2 ASC/ ALL/ GEN
* P HYD DEPRESS (AOA only) *
* F4 √BDY FLP pb - it 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

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

3-4 ASC/ALL/GEN
P MPS POWERDOWN

R2  MPS ENG PWR (six) - OFF
    He ISOL (six) - GPC
    √He I'CNECT (three) - GPC

NOTE
Expect multiple MAs for
MPS He P as regs bleed down

MPS VACUUM INERTING ACT

R2  √MPS PNEU He ISOL - OP

R4  MPS H2 PRESS LINE VENT - OP
    (Start watch)
    FILL/DRAIN LH2 OUTBD - OP
        INBD - OP
    LO2 OUTBD - OP
        INBD - OP

After 1 minute:
MPS H2 PRESS LINE VENT - GND

3-5 ASC/ALL/GEN
ET UMBILICAL DOOR CLOSURE

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

* If CTRL LINE 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
CTRL LINE LAT - STO
✓ After 6 sec, CTRL LINE 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
CTRL LINE LAT - GND
L,R DR (two) - OFF
L,R LAT (two) - OFF

3-6 ASC/ALL/GEN
If AOA: Go to AOA

NOTE
If HYD DEPRESS and not AOA, perform APU/HYD SHUTDOWN, 3-2, then:

OMS BURN PREP

P 08 L,R OMS
✓He PRESS/VAP ISOL A (two) - GPC
✓B (two) - CL
✓TK ISOL (four) - OP (tb-OP)
✓XFEED (four) - CL (tb-CL)

FRCs BURN PREP

Load DUMMY target for FRCS
attitude
RCS SEL - ITEM 4 EXEC
TIG = TTA -1:00
ΔVX = -2.1 (ITEM 19)
ΔVV = 0 (ITEM 20)
ΔVZ = -1.0 (ITEM 21)
LOAD - ITEM 22 EXEC
Mnvr to ATT (error needles)
When in attitude:
ADI ATT - REF (push)

Load External ΔV Burn Target
ΔVX = +80
ΔVV = 0
ΔVZ = 0
LOAD - ITEM 22 EXEC
TIMER - ITEM 23 EXEC
✓VGOX = negative
✓VGOY = 0
✓VGOZ = +21 ± 2
✓REF ball - 0,0,0

3-7 ASC/ALL/GEN
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 Mnvr 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

3-8 ASC/ALL/GEN
OMS 2 BURN CARDS

MS. ONLY, 4-1 ASC/ALL/GEN
OMS 2/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 ISOLA (two) - OP
wait 2 sec .................. B (two) - GPC (OP for SE burn)

ORB BURN

<table>
<thead>
<tr>
<th></th>
<th>OP</th>
<th>CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
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</tbody>
</table>

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)

△VTOT: 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 △VTOT 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

4-2 ASC/ALL/GEN
<table>
<thead>
<tr>
<th>OMS PC LOW</th>
<th>OMS ENG FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG VLV 1 or 2&gt;10% OMS V and</td>
<td></td>
</tr>
<tr>
<td>ENG VLV 1 or 2&gt;10% No OMS V</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OMS TEMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>FU IN P &gt; 232</td>
</tr>
<tr>
<td>P &lt; 187</td>
</tr>
<tr>
<td>P 198-231</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OMS PRPLT FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Fail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Sensor Fail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OMS OX/FU TK P</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK &amp; FU LOW</td>
</tr>
<tr>
<td>OX LOW</td>
</tr>
<tr>
<td>FU LOW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cycle He to maint OMS TK P 234-284</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycle He A to isolate failed leg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OMS TK P LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>(√ CRT &amp; meter)</td>
</tr>
<tr>
<td>P &gt; 640 or QTY &gt; 41%</td>
</tr>
<tr>
<td>P &lt; 640 or QTY ≤ 41%</td>
</tr>
</tbody>
</table>

<table>
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<th>OMS ENG FAIL</th>
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</thead>
<tbody>
<tr>
<td>Sensor Fail</td>
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<tbody>
<tr>
<td>(√ CRT &amp; meter)</td>
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<td>P &gt; 640 &amp; QTY &lt; 41%</td>
</tr>
<tr>
<td>P &lt; 640 or QTY ≥ 41%</td>
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</tbody>
</table>

<table>
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</thead>
<tbody>
<tr>
<td>Sensor Fail</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>OMS GMBL 1st FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd FAIL</td>
</tr>
<tr>
<td>Select SEC GMBL (swtch)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OMS ENG FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Fail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GPC1(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affected GPC MODE - STBY.HALT</td>
</tr>
<tr>
<td>FF1(4) - OFF.ON</td>
</tr>
<tr>
<td>L(4) OMS Gimbals - sel SEC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FA1(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L(4) OMS Gimbals - sel SEC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N2 REG P HIGH or LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMS ENG - ARM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N2 TK P LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>(√ CRT &amp; meter)</td>
</tr>
<tr>
<td>When N2 TK P &lt; 470:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4-3 ASC-3a/A, O/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASC/ALL/GEN</td>
</tr>
</tbody>
</table>
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

TIG-2 L,R
- He PRESS/VAP ISOLA - 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 ∆VTOT

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
- ∆VX = -2.1 (ITEM 19)
- ∆VY = 0 (ITEM 20)
- ∆VZ = -1.0 (ITEM 21)
- LOAD - ITEM 22 EXEC
- TIG-10 Mvr to ATT (error needles)
- When in attitude:
  - ADI ATT - REF (push)
  - Load External ∆V Burn Target
  - ∆VX = +80
  - ∆VY = 0
  - ∆VZ = 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

MS ONLY 4-4 ASC/ALL/GEN
POST OMS 2 BURN PROCEDURES
1: GNC OMS 2 MNVR COAST  2: GNC OMS 2 MNVR COAST  3: BFS, GNC SYS SUMM 2

C  POST BURN STATUS

NOMINAL

\[ \Delta TIG \]

B  F6/F8  FLT CNTLR PWR (two) - OFF
C3  \( \sqrt{DAP} \)  - 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
   \( \sqrt{TK} \) ISOL (four) - OP (tb-OP)
   \( \sqrt{XFEED} \) (four)  - CL (tb-CL)

5-2  ASC/ALL/GEN
MAJOR MODE CHANGE

CRT1  GNC, OPS 106 PRO

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

B C4A/  R3A
Stow ASC PKT C/L (Helmet Bag)  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 *

5-3  ASC/ALL/GEN
Replace this page with page(s) from Flight Supplement
<table>
<thead>
<tr>
<th>BURN CARD</th>
<th>OMS PRPLT PAD</th>
<th>XFEED CUE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DEORBIT BURN (2 ENG)</strong></td>
<td>OMS ENG FAIL</td>
<td>%L</td>
</tr>
<tr>
<td></td>
<td>OMS XFEED</td>
<td>ΔVTOT</td>
</tr>
<tr>
<td></td>
<td>OMS TK SW</td>
<td>ΔVTOT</td>
</tr>
<tr>
<td><strong>DEORBIT BURN (1 ENG)</strong></td>
<td>OMS TK SW</td>
<td>ΔVTOT</td>
</tr>
<tr>
<td></td>
<td>OMS PRPLT LOW</td>
<td>ΔVTOT</td>
</tr>
<tr>
<td><strong>DEORBIT BURN (RCS)</strong></td>
<td>START 1 POD FEED</td>
<td>TK ISOLS CL</td>
</tr>
<tr>
<td></td>
<td>OMS ENG FAIL (XFEED)</td>
<td>TK ISOLS OP</td>
</tr>
<tr>
<td></td>
<td>TK ISOLS CL</td>
<td>%</td>
</tr>
<tr>
<td><strong>UNBALANCED PRPLT DEORBIT BURN</strong></td>
<td>AFTER 1 POD FEED</td>
<td>ΔVTOT</td>
</tr>
<tr>
<td></td>
<td>STOP 1 POD FEED</td>
<td>TK ISOLS OP</td>
</tr>
<tr>
<td></td>
<td>OMS ENG FAIL (XFEED)</td>
<td>%L</td>
</tr>
<tr>
<td></td>
<td>OMS ENG - ARM/PRESS</td>
<td>ΔVTOT: Feed from GOOD POD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OMS He PRESS OP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TK ISOLS OP</td>
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<tr>
<td></td>
<td></td>
<td>OMS He PRESS CL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TK ISOLS CL</td>
</tr>
<tr>
<td><strong>DEORBIT BURN (MIXED XFEED)</strong></td>
<td>RCS COMPLETION, OMS ENG FAIL:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OMS XFEEDS OP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Feed from GOOD POD at ΔVTOT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OMS He PRESS OP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TK ISOLS OP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>XFEEDS CL</td>
<td></td>
</tr>
</tbody>
</table>

ASC/ALL/GEN

Page 6-4
1: GNC OMS 2 MNVR EXEC  2: GNC OMS 2 MNVR EXEC

3: BFS, GNC OMS 2 MNVR EXEC

B C4F/ Stow ASC PKT C/L
R3F Unstow ENT PKT C/L

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

Stow Ascent Cue Cards (R3A)
Transition to OPS 3 NLT TIG - 10 min

**NOTE**
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 *

---

If APUs are shutdown:

**WARNING**
Ice in WBS Steam Vent may
cause loss of APU/HYBD

**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 affected system

R2 BLR CNTLR PWR/HTR (three) - A
CNTLR (three) - ON
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 & øT 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
P OMS BURN PREP

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

RCS BURN PREP (I'cnect OMS to RCS)

P 08 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)

07 AFT L,R RCS
   XFEED (four) - OP (tb-OP)
   TK ISOL (six) - CL (tb-CL)
OMS BURN TIG ADJUST (if reqd)

CRTX LOAD - ITEM 22 EXEC
    TIMER - ITEM 23 EXEC

Determine ΔTIG (if REI - REF > 50) from OMS TARGETS

CRTX Enter new TIG

    LOAD - ITEM 22 EXEC
    TIMER - ITEM 23 EXEC

Repeat until ΔRANGE < 50

CRT3 BFS TGT

MNVR TO DEORBIT BURN ATTITUDE

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

C Mnvr to Deorbit Burn Attitude
    (√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

TIG-2 B R3A Go to DEORBIT BURN Cue Card

6-11 ASC/ALL/GEN
DEORBIT BURN and DEORBIT BURN MONITOR CARDS

MS ONLY 6-13 ASC/ALL/GEN
<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>OMS Pc LOW</td>
<td>OMS ENG FAIL</td>
</tr>
<tr>
<td>OMS ENG AND ENG VLV 1 or 2 &lt; 70%</td>
<td>OMS ENG FAIL</td>
</tr>
<tr>
<td>OMS ENG and ENG VLV 1 and 2 &gt; 70% and FU and OX TK P &gt; 185</td>
<td>OMS PRPLT FAIL</td>
</tr>
<tr>
<td>No OMS +</td>
<td>Burn to Pc = 72%, then OMS PRPLT FAIL</td>
</tr>
<tr>
<td>OMS TEMP</td>
<td>OMS ENG FAIL</td>
</tr>
<tr>
<td>FU IN P &gt; 232</td>
<td>OMS ENG FAIL</td>
</tr>
<tr>
<td>&lt; 197</td>
<td>OMS PRPLT FAIL</td>
</tr>
<tr>
<td>P 198-231</td>
<td>SENSOR FAIL</td>
</tr>
<tr>
<td>OMS OX/FU TK P</td>
<td>He PRESS/VAP ISOL (two) - OP</td>
</tr>
<tr>
<td>OX &amp; FU LOW</td>
<td>Burn to OMS +, then OMS PRPLT FAIL</td>
</tr>
<tr>
<td>OX LOW</td>
<td>Burn to OMS +, then OMS PRPLT FAIL</td>
</tr>
<tr>
<td>FU LOW</td>
<td>Burn to OMS +, then OMS PRPLT FAIL</td>
</tr>
<tr>
<td>OX &amp; FU HIGH</td>
<td>Cycle He to maint OMS TK P &gt; 234-284</td>
</tr>
<tr>
<td>Cycle He A(B) to isolate failed leg</td>
<td></td>
</tr>
<tr>
<td>OMS GMBL 1st FAIL</td>
<td>Select SEC GMBL (twice)</td>
</tr>
<tr>
<td>2nd FAIL</td>
<td>If control problems or high RCS fuel usage: AFFECTED OMS ENG - OFF XFEED if ΔVTOT &gt; 20</td>
</tr>
<tr>
<td>PASS SET FAIL/SPLIT</td>
<td>Stop burn, APUs - SHUT DN</td>
</tr>
<tr>
<td>Safe HP: IMU DLMA HP &gt;</td>
<td>Continue burn: PASS SET FAIL only - BFS engage PASS SET SPLIT only - Consult MCC on Restring IMU DLMA - Postburn, desel IMU with &quot;ACC&quot; &gt; 0.05 (PASS &amp; BFS)</td>
</tr>
<tr>
<td>or IMU DLMA HP &lt;</td>
<td></td>
</tr>
<tr>
<td>2 MN DC BUSES</td>
<td></td>
</tr>
<tr>
<td>GPC1(4)</td>
<td>GPC1(4) Mode - STBY,HALT FF1(4) - OFF,ON L(R) OMS Gimbals - sel SEC</td>
</tr>
<tr>
<td>FA1(4)</td>
<td>L(R) OMS Gimbals - sel SEC</td>
</tr>
<tr>
<td>ENT-2a/A,0,D,E/A</td>
<td></td>
</tr>
<tr>
<td>MS ONLY 6-15</td>
<td>ASC/ALL/GEN</td>
</tr>
</tbody>
</table>
UNBALANCED "f: PRPLT DEORBIT BURN

/\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
□ 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, \triangle TOT, 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 \triangle TOT
  □ 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 SH
  - THC +X (/OMS % vs RCS Burn Time)

* ENT-5a/D/A

MS ONLY 6-18 ASC/ALL/GEND
\[ \Delta TOT: \text{Return to 2 ENG, 2 POD FLOW} \]

\[ \text{TK ISOL (two)} - \text{OP (tb-OP)} \]
\[ \text{OMS XFEED (four)} - \text{CL (tb-CL)} \]
\[ \text{ENT-5c/D/A} \]

\[ \text{OMS PRPLT FAIL:} \]
- \[ \text{HP} \] > \[ \text{L} \] or \[ \text{R} \] (STOP): \[ \text{OMS ENG (two)} - \text{OFF, APUs - SHUT DN} \]
- \[ \text{Affected OMS TK ISOL (two)} \] - \[ \text{CL} \]
- \[ \text{HP} \] < \[ \text{L} \] or \[ \text{R} \] (CONTINUE): \[ \text{Failed OMS ENG - OFF} \]
- \[ \text{ITEM 18 + O EXEC} \]
- \[ \text{Affected OMS HP PRESS (two)} \] - \[ \text{CL} \]
- \[ \text{TK ISOL (two)} \] - \[ \text{CL} \]
- \[ \text{When Pc < 80%, 2nd OMS ENG - OFF} \]
- \[ \text{COMPLETE RCS (PRPLT FAIL)} \]
- \[ \text{OMS ENG FAIL (CONTINUE BURN)} \]
- \[ \text{Failed ENG - OFF} \]
- \[ \text{OMS XFEED at} \]
- \[ \text{XL} \] \[ \text{XR} \]
- \[ \text{1/2 of} \] \[ \text{\Delta VTOT} \] \[ \text{at FAIL} \]

\[ \text{RCS COMPLETION:} \]
- \[ \text{ANY OMS PRPLT FAIL:} \]
  - \[ \text{HP} \] > \[ \text{L} \] or \[ \text{R} \]: \[ \text{safe HP: APUs - SHUT DN} \]
  - \[ \text{HP} \] < \[ \text{L} \] or \[ \text{R} \]: \[ \text{safe HP: I'nnect to} \]
  - \[ \text{good OMS PRPLT} \]
  - \[ \text{THC +}X (OMS % vs RCS Burn Time) \]
  - \[ \text{OMS RECONFIG} \]
  - \[ \text{THC +}X \] to \[ \text{TGT HP or TOT AFT QTY 1} \]
  - \[ \text{If CUR HP = AFT HP} \]
  - \[ \text{THC +}X \] to \[ \text{TGT HP} \]
  - \[ \text{If CUR HP = PRI HP} \]
  - \[ \text{FRCS to PRI Site} \]
  - \[ \text{If CUR HP > PRI HP} \]
  - \[ \text{and < B/U HP} \]
  - \[ \text{FRCS to B/U Site} \]
  - \[ \text{If CUR HP > B/U HP} \]
  - \[ \text{THC +}X \] to \[ \text{B/U HP} \]
- \[ \text{MNVR to} \] \[ \text{X ATT} \] (pitch up at 3°/sec to VGOz = \[ \text{THC} \] \[ X \] \[ (+)1/4 \] \[ \text{\Delta VTOT} \]

\[ \text{BOTH OMS ENG FAIL:} \]
- \[ \text{OMS ENG(s) - OFF} \]
- \[ \text{Interconnect OMS to RCS} \]
- \[ \text{THC +}X (OMS % vs RCS Burn Time) \]
- \[ \text{OMS TK SU} \]
- \[ \text{THC +}X (OMS % vs RCS Burn Time) \]

\[ \text{CUTOFF} \]
\[ \text{+02 OMS ENG(s) - OFF} \]
\[ \text{If < 3 IMU, at} \]

* \[ \text{AFT RCS RECONFIG if INTERCONNECT} * \]

\[ \text{Trim X,Z residuals< 2 fps (<0.5 fps if shallow)} \]

\[ \text{MS ONLY} \]
\[ 6-19 \]
\[ \text{ASC/ALL/GEN} \]
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
C OMS GIMBAL POWERDOWN

Verify gimbal positions:

<table>
<thead>
<tr>
<th>L</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Y</td>
</tr>
<tr>
<td>+5.9</td>
<td>+6.4</td>
</tr>
</tbody>
</table>

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 (%)

<table>
<thead>
<tr>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00</td>
<td>0:09</td>
<td>0:27</td>
<td>0:45</td>
<td>1:03</td>
<td>1:21</td>
<td>1:39</td>
</tr>
</tbody>
</table>

TIME FROM DUMP INITIATION (M:S)

NOTE
During dump disregard FRCS qty

6-25 ASC/ALL/GEN
**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)

---

TWO JET DUMP:
F RCS PRPLT TO BE DUMPED (%)

<table>
<thead>
<tr>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:00</td>
<td>0:35</td>
<td>1:11</td>
<td>1:46</td>
<td>2:21</td>
<td>2:56</td>
<td>3:32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:50</td>
<td>4:08</td>
<td>4:43</td>
<td>5:18</td>
<td>5:54</td>
</tr>
</tbody>
</table>

TIME FROM DUMP INITIATION (M:S)
**STATE VECTOR CHANGE (if reqd)**

**CRT2 AT - ITEM 18**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

**LOAD - ITEM 16 EXEC**

wait 8 sec(min).............

**CRT3 PASS/BFS SV XFER - ITEM 17 EXEC**

**LOAD - ITEM 16 EXEC**

**HORIZ SIT CONFIG**

**ALTM - ITEM 9**

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>

**PASS ITEM** | **BFS ITEM**

| LAND SITE | 41 | 41 |
| Rwy | 3 | 3 |
| Rwy selected per DEL PAD | 4 | 4 |
| TACAN | 5 | 5 |
| G&N | OVHD 6 | OVHD 6 |
| XEP | NEP 7 | NEP 7 |
| AIM | NOM 8 | NOM 8 |
| SPDBK | NOM 39 | |
| TAC | INH 20 | INH 20 |
| DRAG H | AUT 22 | AUT 22 |
| ADTA H | INH 26 | INH 26 |
| ADTA TO G&C | INH 29 | AUT 28 |
| TAC | DELTA 35 | 0 |
| Failed TACANs deselected | ✓ | ✓ |
| HUD | 0 37 | 0 38 |

* If BFS engaged: *

* Set HSD BFS ITEMS to PASS Config *

6-27  ASC/ALL/GEN
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 √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

6-28 ASC/ALL/GEN
* 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 \( \sqrt{(tb-OP)} \)

Go to ENTRY MANEUVERS Cue Cards

6-29 ASC/ALL/GEN
**Left OMS**

- MNA CNTLCA1 FA4
- MNA CNTLCA1 FA3*
- MNB CNTLCA2 FA1
- MNB CNTLCA2 FA2

**Right OMS**

- MNC CNTLCA1 FA3
- MNC CNTLCA1 FA4*
- MNA CNTLCA2 FA1
- MNA CNTLCA2 FA2

---

*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 needle in error, TGO countdown slow,
expect 6 sec underburn ~ 6 fps/sec)*

---

**If two FA MDMs lost**

<table>
<thead>
<tr>
<th>MDMs</th>
<th>preburn: ENG-OFF</th>
<th>during burn: MAN SHUTDN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&amp;2</td>
<td>LEFT (TVC)</td>
<td>BOTH</td>
</tr>
<tr>
<td>1&amp;3</td>
<td>RIGHT (IGN)</td>
<td>LEFT</td>
</tr>
<tr>
<td>1&amp;4</td>
<td>LEFT (IGN)</td>
<td>RIGHT</td>
</tr>
<tr>
<td>2&amp;3</td>
<td>LEFT (IGN)</td>
<td>RIGHT</td>
</tr>
<tr>
<td>2&amp;4</td>
<td>RIGHT (IGN)</td>
<td>LEFT</td>
</tr>
<tr>
<td>3&amp;4</td>
<td>RIGHT (TVC)</td>
<td>BOTH</td>
</tr>
</tbody>
</table>

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

---

6-30

ASC/ALL/GEN
Replace this page with page(s) from Flight Supplement
Replace this page with page(s) from Flight Supplement
### U.S. TERMINAL FORECASTS

<table>
<thead>
<tr>
<th>DEORBIT ORBIT</th>
<th>SITE</th>
<th>LDG GMT</th>
<th>SKY/VIS/WEATHER</th>
<th>TEMP</th>
<th>WIND</th>
<th>ALTM</th>
<th>RWY</th>
<th>DA</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTLS</td>
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<td>°F</td>
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<td>AOA</td>
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<td>AOA</td>
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<td>°F</td>
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<tr>
<td>3</td>
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<td>5</td>
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### UPPER WINDS FORECAST

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<td>SURF</td>
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## CLS TERMINAL FORECASTS

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<th>SITE</th>
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<th>SKY/VIS/WEATHER</th>
<th>TEMP</th>
<th>WIND</th>
<th>ALTM</th>
<th>RWY</th>
<th>DA</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAL (1)</td>
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<td>°F</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>TAL (2)</td>
<td></td>
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<td></td>
<td>°F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MISCELLANEOUS

**NOTAMS:**

Expected rates during load relief:

- **MAX RATES:**
  - ROLL: _____ °/sec at _______
  - PITCH: _____ °/sec
  - YAW: _____ °/sec

Ignore attitude errors:

---

8-3

ASC/ALL/GEN
Replace this page with page(s) from Flight Supplement
TOP ORBIT OMS BURNS

ASC-2/A, Q/A

1/M010/202(302)
2/BURN ATT (INRTL) then REF, pb - push
3/ENG SEL
4/DAP - AUTO (PASS)/DISC
5/DAP TRANS - NORM
6/GIMBAL TRIM
7/engine: P = +0.4 y = 723 RY = +5.7

L, R OMS He PRESS/VAP ISOL A (two) - OP

wait 2 sec

B (two) - GPC (OP for SE burn)

ORB BURN A B

TIG-2 SEL OMS ENG(s) - ARM/PRESS (/P VLVs OP)

If P VLVs 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)

\[ \Delta \text{VTOT: OMS XFEED RETURN (Planned Single Engine)} \]

EXEC

: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

OMS ENG FAIL:

ASCENT or CRIT O/O (Continue Burn)

Failed ENG - OFF

OMS XFEED at 1/2 \[ \Delta \text{VTOT} \]

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:

\[ +02 \text{ OMSENG(s)} - OFF \]

Trim inplane X, Z residuals < 2 fps

FAB USE ONLY

CC 10-3

ASC/ALL/GEN
OPS 1

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

- XFEED at 1/2 ΔV OT
  - if read

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

- MM105
- CNTRL PIWR (two) - ON
- BURN ATT (INRTL) then REF, pb-push
- RCS SEL
  - Maintain PITCH ATT ERR ± 3°
  - Monitor OMS data
  - Monitor ΔV OT

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 Mnr 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
  - /VG0X = negative
  - /VG0Y = 0
  - /VG0Z = +20 ± 2
  - REF ball - 0.0,0

NOTE

- Error needles invalid during burn.
- Burn time = ~2 X TGO
- TGT HP = 80 for ASCENT
  
  - CUR HP = TGT HP
  - RELEASE THC

FAB USE ONLY

- CC 10-4

ASC/ALL/GEN
<table>
<thead>
<tr>
<th>OMS Pc LOW</th>
<th>OMS ENG FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG VLV J &amp; C 2370A</td>
<td>OMS ENG FAIL</td>
</tr>
<tr>
<td>ENG VLV 1 and 2270A</td>
<td>OMS PRPLT FAIL</td>
</tr>
<tr>
<td>No OMS</td>
<td>Sensor Fail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OMS TEMP</th>
<th>OMS ENG FAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>FU IN P &gt; 232</td>
<td>OMS ENG FAIL</td>
</tr>
<tr>
<td>P 198-231</td>
<td>Sensor Fail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OMS OX/FU TK P</th>
<th>He PRESS/VAP ISOL (two) - OP</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ENG IN P)</td>
<td>If HP &gt; 100: OMS ENG FAIL</td>
</tr>
<tr>
<td>OX &amp; FU LOW</td>
<td>If HP &lt; 100: OMS PRPLT FAIL</td>
</tr>
<tr>
<td>OX LOW</td>
<td>Burn to OMS &amp; HP &gt; 100</td>
</tr>
<tr>
<td>FU LOW</td>
<td>if HP &lt; 100: OMS PRPLT FAIL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OMS He TK P LOW</th>
<th>Cycle He to maint OMS TK P 234-284</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CRT &amp; meter)</td>
<td>Cycle He A(B) to isolate failed leg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N2 REG P HIGH or LOW</th>
<th>OMS ENG - ARM</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>N2 TK P LOW</th>
<th>OMS ENG - ARM</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CRT &amp; meter)</td>
<td>When N2 TK P &lt; 470:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OMS GMBL 1st FAIL</th>
<th>Select SEC GMBL (twice)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd FAIL</td>
<td>If control problems or high ACS fuel usage:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GPC(4)</th>
<th>Affected GPC MODE - STBY,HALT</th>
</tr>
</thead>
<tbody>
<tr>
<td>with String 1(4)</td>
<td>FF(4) - OFF,ON</td>
</tr>
<tr>
<td>FA1(4)</td>
<td>L(R) OMS Gimbals - sel SEC</td>
</tr>
</tbody>
</table>

---

FAB USE ONLY

CC 10-5

ASC/ALL/GEN
**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)

**If two FA MDMs lost**

<table>
<thead>
<tr>
<th>MDMs</th>
<th>preburn: ENG-OFF</th>
<th>during burn: MAN SHUTDN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&amp;2</td>
<td>LEFT (TVC)</td>
<td>BOTH</td>
</tr>
<tr>
<td>1&amp;3</td>
<td>RIGHT (IGN)</td>
<td>LEFT</td>
</tr>
<tr>
<td>1&amp;4</td>
<td>LEFT (IGN)</td>
<td>RIGHT</td>
</tr>
<tr>
<td>2&amp;3</td>
<td>LEFT (IGN)</td>
<td>RIGHT</td>
</tr>
<tr>
<td>2&amp;4</td>
<td>RIGHT (IGN)</td>
<td>LEFT</td>
</tr>
<tr>
<td>3&amp;4</td>
<td>RIGHT (TVC)</td>
<td>BOTH</td>
</tr>
</tbody>
</table>

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

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**CC 10-6**

**ASC/ALL/GEN**
<table>
<thead>
<tr>
<th>ASCENT/ENTRY SPEC PASS</th>
<th>ASC-5a/A,E/A</th>
<th>BFS NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPC MEMORY</td>
<td>0 BFS MEMORY</td>
<td>0</td>
</tr>
<tr>
<td>ENT CONTROL (OPS 3)</td>
<td>53</td>
<td>GNC</td>
</tr>
<tr>
<td>HORIZ SIT</td>
<td>50</td>
<td>HORIZ SIT</td>
</tr>
<tr>
<td>IMU ALIGN (301)</td>
<td>21</td>
<td>OVERRIDE</td>
</tr>
<tr>
<td>OVERRIDE</td>
<td>51</td>
<td>SM</td>
</tr>
<tr>
<td>RCS (OPS 3)</td>
<td>23</td>
<td>PL BAY DOORS</td>
</tr>
<tr>
<td>STRK/COAS CNTL (301)</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

FAB USE ONLY
CC 10-8
ASC/ALL/GEN
TOP TOP

+ + + ASC-6a/A,E/A + + +

+ FULL CLOSED +

15 ______
25 ______
35 ______
40 ______
45 ______
55 ______
65 ______
75 ______
85 ______

SPEED BRAKE CMD VS SBTC TRAILING EDGE

+ + + +

HOOK VELCRO

HOOK VELCRO

ASC-6b/A,E/A

FAB USE ONLY

CC 10-9

ASC/ALL/GEN
Replace this page with page(s) from Flight Supplement

NOT FLOWN: 10-11 ASC/ALL/GEN
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FAO
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