

# Ascent Checklist

## STS-116

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

**Final, Rev A  
July 18, 2005**

National Aeronautics and  
Space Administration

**Lyndon B. Johnson Space Center**  
Houston, Texas



|  |  |  |   |                                 |
|--|--|--|---|---------------------------------|
| <b>SMS FDF CHANGE NOTIFICATION</b>   |  | <b>SIM PACK</b><br>434   | DATE INITIATED<br>10/4/06   | DATE RECEIVED (PMO)<br>10/13/06 |
| BOOK TITLE<br>Ascent Checklist   |  | BK ISSUE (Ed, Rev, PCN)<br>116 FINA, 2   | SIM PACK NUMBER<br>SIM-434  |                                 |
| Change is for flights (Also give SMS load if load dependent):<br>STS-116.1B load   |  | SMS UNIQUE?<br><input checked="" type="checkbox"/> YES <input type="checkbox"/> NO               | DEVELOPMENTAL?<br><input type="checkbox"/> YES <input checked="" type="checkbox"/> NO |                                 |
| FABRICATED ITEM CHANGE? <input type="checkbox"/> NONE <input checked="" type="checkbox"/> CUE CARDS <input type="checkbox"/> TRANSPARENCIES <input type="checkbox"/> Other _____   |  |  |   |                                 |
| INSTRUCTIONS TO USER:<br>1. Replace pages 2-35 through 2-40.<br>2. Replace pages 10-5 and 10-6.  |  |  |   |                                 |
| AUTHORITY FOR CHANGE* (Approved 482 numbers, approved issue at print shop, supervisors deem mandatory, etc.):<br>The crew procedure for the Stuck RTLS 109% abort was changed at the 9/29/06 Ascent/Entry Flight Techniques Panel. |  |  |   |                                 |
| *Refer to Crew Procedures Management Plan  |  |  |   |                                 |
| OTHER AFFECTED FDF BOOKS<br>None   |  | Are all SIM PACKS submitted? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO |   |                                 |
| IMPLEMENTATION REQUIREMENTS  |  | <input type="checkbox"/> Limited Distribution (List in comments)                                 | <input type="checkbox"/> NO EARLIER THAN _____ (Date and/or Sim ID)                   |                                 |
|  |  |  | <input checked="" type="checkbox"/> NO LATER THAN 10/16/06 (Date and/or Sim ID)       |                                 |
| BOOK MGR (Signature/Date)<br>Allison McCagg 10/12/06   | SUPERVISOR (if required, Signature/Date)<br>[Signature] 10/12/06 | FDF COORD or FDF MGR (Signature/Date)<br>Renee M. Cross 10/13/06                                 |   |                                 |
| COMMENTS:  |  |  |   |                                 |

ASCENT C/L STS-116

FINAL, Rev A (July 18, 2005)

## PCN-2 (Sept 25, 2006) Sheet 1 of 1

List of Implemented Change Requests (482s):

ASC-1737                      MULTI-1761D  
ASC-1738B  
ASC-1751

Incorporate the following:


1. Replace v thru viii
2. Replace FB 2-15 & FB 2-16, FB 2-19 thru FB 2-22, 2-31 thru 2-34
3. Replace 3-1 & 3-2

Prepared by:

  
Book Manager 09/18/06

  
Lead Ascent GPO 09/18/06

Approved by:

  
Chief, Ascent/Descent Dynamics Branch 9/18/06

Encl: 16 pages

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



ASCENT C/L STS-116

FINAL, Rev A (July 18, 2005)

## PCN-1 (May 18, 2006) Sheet 1 of 1

List of Implemented Change Requests (482s):

ASC-1719                MULTI-1711B  
ASC-1720                MULTI-1741C  
ASC-1721  
ASC-1723A  
ASC-1726  
ASC-1728  
ASC-1730

Incorporate the following:

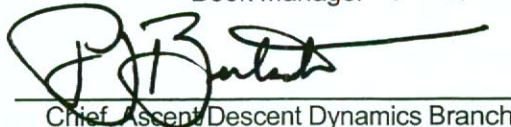
1. Replace v thru viii
2. Replace 1-5 & 1-6, 1-11 & 1-12
3. Replace FB 2-7 & FB 2-8, FB 2-11 thru FB 2-14, FB 2-17 & FB 2-18, 2-31 thru 2-40
4. Replace 3-3 & 3-4, 3-7 & 3-8
5. Replace 6-15 & 6-16, 6-29 & 6-30
6. Replace 7-7 thru 7-10
7. Replace (A)CC 10-5 thru (C)CC 10-6 (6 pgs)

Prepared by:

  
Book Manager 05/16/06

  
Lead Ascent GPO 05/16/06

Approved by:

  
Chief, Ascent/Descent Dynamics Branch

Encl: 44 pages

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



MISSION OPERATIONS DIRECTORATE

**ASCENT CHECKLIST  
STS-116**


FINAL, REVISION A  
July 18, 2005

PREPARED BY:

  
Allison R. McCagg  
Book Manager

APPROVED BY:

  
J. K. (Ken) Patterson  
Lead Ascent GPO

  
R. J. Bertsch  
Chief, Ascent/Descent Dynamics Branch

This document is under the configuration control of the Crew Procedures Control Board (CPCB). All proposed changes must be submitted via FDF Workflow.

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

ASC/116/FIN A

|                                   |
|-----------------------------------|
| Incorporates the following:       |
| 482#: None - Establishes baseline |

AREAS OF TECHNICAL RESPONSIBILITY

|              |                |              |
|--------------|----------------|--------------|
| Book Manager | DM4/A. McCagg  | 281-483-7752 |
| Switch List  | CA4/J. Branson | 281-244-8596 |
| Entry        | DM4/M. Trump   | 281-483-8029 |
| Cue Cards    | DO3/C. Pierce  | 281-483-6087 |



## NOTES

1. The STS-116 trajectory data in this checklist is based on the STS-116 One Cycle to Flight load and the May 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-116 is flown with vehicle OV103.



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ASCENT CHECKLIST  
STS-116

**LIST OF EFFECTIVE PAGES**

|       |          |
|-------|----------|
| FINAL | 01/16/04 |
| REV A | 07/18/05 |
| PCN-1 | 05/18/06 |
| PCN-2 | 09/25/06 |

|                |                                     |             |               |   |
|----------------|-------------------------------------|-------------|---------------|---|
| Sign Off ..... | *                                   | 116/FIN A   | FB 2-5 .....  | 116/FIN A                                       |
| ii.....        | *                                   | 116/FIN A   | FB 2-6 .....  | 116/FIN A                                       |
| iii.....       | *                                   | 116/FIN A   | FB 2-7 .....  | 116/FIN A                                       |
| iv.....        | *                                   | 116/FIN A   | FB 2-8 .....  | 116/FIN A,1                                     |
| v .....        | *                                   | 116/FIN A,2 | FB 2-9 .....  | 116/FIN A                                       |
| vi.....        | *                                   | 116/FIN A,2 | FB 2-10 ..... | 116/FIN A                                       |
| vii.....       | *                                   | 116/FIN A,2 | FB 2-11 ..... | 116/FIN A                                       |
| viii.....      | *                                   | 116/FIN A,1 | FB 2-12 ..... | <input checked="" type="checkbox"/> 116/FIN A,1 |
| ix.....        | *                                   | 116/FIN A   | FB 2-13 ..... | 116/FIN A,1                                     |
| x .....        | *                                   | 116/FIN A   | FB 2-14 ..... | <input checked="" type="checkbox"/> 116/FIN A   |
| xi.....        |                                     | 116/FIN A   | FB 2-15 ..... | 116/FIN A,2                                     |
| xii.....       |                                     | 116/FIN A   | FB 2-16 ..... | 116/FIN A                                       |
| 1-1 .....      |                                     | 116/FIN A   | FB 2-17 ..... | 116/FIN A,1                                     |
| 1-2 .....      |                                     | 116/FIN A   | FB 2-18 ..... | 116/FIN A                                       |
| 1-3 .....      |                                     | 116/FIN A   | FB 2-19 ..... | 116/FIN A,2                                     |
| 1-4 .....      |                                     | 116/FIN A   | FB 2-20 ..... | 116/FIN A,2                                     |
| 1-5 .....      |                                     | 116/FIN A,1 | FB 2-21 ..... | 116/FIN A,2                                     |
| 1-6 .....      |                                     | 116/FIN A   | FB 2-22 ..... | 116/FIN A                                       |
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| 1-8 .....      |                                     | 116/FIN A   | FB 2-24 ..... | 116/FIN A                                       |
| 1-9 .....      |                                     | 116/FIN A   | FB 2-25 ..... | 116/FIN A                                       |
| 1-10.....      | <input checked="" type="checkbox"/> | 116/FIN A   | FB 2-26 ..... | 116/FIN A                                       |
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| FB 2-2 .....   |                                     | 116/FIN A   | 2-32.....     | 116/FIN A,2                                     |
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| FB 2-4 .....   |                                     | 116/FIN A   | 2-34.....     | 116/FIN A                                       |

\* – Omit from flight book

– Prelift-off information required

|           |   |             |           |             |
|-----------|---|-------------|-----------|-------------|
| 2-35..... | * | 116/FIN A   | 6-13..... | 116/FIN A   |
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| 3-7.....  |   | 116/FIN A   | 6-31..... | 116/FIN A   |
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| 6-6.....  |   | 116/FIN A   | 7-6.....  | 116/FIN A   |
| 6-7.....  |   | 116/FIN A   | 7-7.....  | 116/FIN A   |
| 6-8.....  |   | 116/FIN A   | 7-8.....  | 116/FIN A,1 |
| 6-9.....  |   | 116/FIN A   | 7-9.....  | 116/FIN A,1 |
| 6-10..... |   | 116/FIN A   | 7-10..... | 116/FIN A,1 |
| 6-11..... |   | 116/FIN A   | 8-1.....  | 116/FIN A   |
| 6-12..... |   | 116/FIN A   | 8-2.....  | 116/FIN A   |

\* – Omit from flight book

|                |                                     |             |                |   |           |
|----------------|-------------------------------------|-------------|----------------|---|-----------|
| 8-3.....       | <input checked="" type="checkbox"/> | 116/FIN A   | CC 10-29 ..... | * | 116/FIN A |
| 8-4.....       | <input checked="" type="checkbox"/> | 116/FIN A   | CC 10-30 ..... | * | 116/FIN A |
| 8-5.....       | <input checked="" type="checkbox"/> | 116/FIN A   | CC 10-31 ..... | * | 116/FIN A |
| 8-6.....       | <input checked="" type="checkbox"/> | 116/FIN A   | CC 10-32 ..... | * | 116/FIN A |
| 8-7.....       | <input checked="" type="checkbox"/> | 116/FIN A   | CC 10-33 ..... | * | 116/FIN A |
| 8-8.....       |                                     | 116/FIN A   | CC 10-34 ..... | * | 116/FIN A |
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| (C)CC 10-6.... | *                                   | 116/FIN A,1 |                |   |           |
| CC 10-7.....   | *                                   | 116/FIN A   |                |   |           |
| CC 10-8.....   | *                                   | 116/FIN A   |                |   |           |
| CC 10-9.....   | *                                   | 116/FIN A   |                |   |           |
| CC 10-10.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-11.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-12.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-13.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-14.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-15.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-16.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-17.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-18.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-19.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-20.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-21.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-22.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-23.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-24.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-25.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-26.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-27.....  | *                                   | 116/FIN A   |                |   |           |
| CC 10-28.....  | *                                   | 116/FIN A   |                |   |           |

– 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/D      |
| ENTRY (Back).....          | CC 10-2          | ASC-1b/A,E/D      |
| ASCENT/ENTRY SPEC          |                  |                   |
| (Front).....               | CC 10-3          | ASC-2a/A,E/E      |
| (Back).....                | CC 10-3          | ASC-2b/A,E/C      |
| SPEED BRAKE CMD            |                  |                   |
| (Front).....               | CC 10-4          | ASC-3a/A,E/D      |
| (Back).....                | CC 10-4          | ASC-3b/A,E/C      |
| CONTINGENCY ABORT          |                  |                   |
| CDR (Front).....           | (A)CC 10-5       | ASC-30a/116/A/C   |
| RTLS CONTINGENCY           |                  |                   |
| CDR (Back).....            | (A)CC 10-6       | ASC-30b/116/A/C   |
| CONTINGENCY ABORT          |                  |                   |
| PLT (Front).....           | (B)CC 10-5       | ASC-31a/116/A/C   |
| RTLS CONTINGENCY           |                  |                   |
| PLT (Back).....            | (B)CC 10-6       | ASC-31b/116/A/C   |
| CONTINGENCY ABORT          |                  |                   |
| MS (Front).....            | (C)CC 10-5       | ASC-32a/116/A/C   |
| RTLS CONTINGENCY           |                  |                   |
| MS (Back).....             | (C)CC 10-6       | ASC-32b/116/A/C   |
| OMS 2 BURN MONITOR (Front) | CC 10-7          | ASC-5a/116/A,O/A  |
| OMS FAILURES (Back).....   | CC 10-8          | ASC-5b/A,O,E/I    |
| OMS 2/ORBIT OMS BURNS      |                  |                   |
| (Front).....               | CC 10-9          | ASC-6a/116/A,O/B  |
| OPS 1 RCS BURN (Back)..... | CC 10-10         | ASC-6b/116/A,O/B  |
| ASCENT ADI – NOMINAL       |                  |                   |
| (Front).....               | CC 10-11         | ASC-14a/116/A/A   |
| ENTRY ALPHA – KSC 15       |                  |                   |
| (Back).....                | CC 10-11         | ASC-14b/116/A,E/A |
| AOA DEORBIT BURN (2 ENG)   |                  |                   |
| (Top/Front).....           | CC 10-12         | ASC-8a/A/E        |
| (Bottom/Front).....        | CC 10-13         | ASC-8aa/116/A/A   |
| AOA DEORBIT BURN (1 ENG)   |                  |                   |
| (Top/Back).....            | CC 10-14         | ASC-8b/A/B        |
| (Bottom/Back).....         | CC 10-15         | ASC-8bb/116/A/A   |
| AOA DEORBIT BURN (RCS)     |                  |                   |
| (Top/Front).....           | CC 10-16         | ASC-7a/A/B        |
| (Bottom/Front).....        | CC 10-17         | ASC-7aa/116/A/A   |
| (Top/Back).....            | CC 10-18         | ASC-7b/A/B        |
| (Bottom/Back).....         | CC 10-19         | ASC-7bb/A/B       |

|                              |          |                 |
|------------------------------|----------|-----------------|
| ZZA TAL REDESIGNATION        |          |                 |
| (Front).....                 | CC 10-20 | ASC-9a/116/A/A  |
| ECAL – ZZA or MRN PRIME TAL  |          |                 |
| (Back).....                  | CC 10-21 | ASC-9b/116/A/B  |
| MRN TAL REDESIGNATION        |          |                 |
| (Front).....                 | CC 10-22 | ASC-10a/116/A/A |
| ECAL – ZZA or MRN PRIME TAL  |          |                 |
| (Back).....                  | CC 10-23 | ASC-10b/116/A/B |
| BEN TAL REDESIGNATION        |          |                 |
| (Front).....                 | CC 10-24 | ASC-12a/116/A/A |
| ECAL – BEN PRIME TAL         |          |                 |
| (Back).....                  | CC 10-25 | ASC-12b/116/A/A |
| ASCENT/ABORT SUMMARY         |          |                 |
| (Front).....                 | CC 10-26 | ASC-11a/116/A/A |
| (Back).....                  | CC 10-26 | ASC-11b/A/C     |
| EMERGENCY EGRESS             |          |                 |
| (Front).....                 | CC 10-27 | ASC-15a/A,E/I   |
| (Back).....                  | CC 10-28 | ASC-15b/A,E/E   |
| ESCAPE PANEL EGRESS          |          |                 |
| (Front).....                 | CC 10-29 | ASC-16a/A,E/D   |
| (Back).....                  | CC 10-29 | ASC-16b/A,E/C   |
| GPC/FCS CHANNEL CONFIG       |          |                 |
| (Front).....                 | CC 10-30 | ASC-17a/A,O,E/B |
| (Back).....                  | CC 10-30 | ASC-17b/A,O,E/B |
| PANEL R14 – OV103 ONLY       |          |                 |
| (Front).....                 | CC 10-31 | ASC-18a/A,O,E/G |
| (Back).....                  | CC 10-32 | ASC-18b/A,O,E/C |
| LOC/BREAK-UP.....            | CC 10-33 | ASC-21a/A/D     |
| EMERGENCY EGRESS (OVERSIZED) |          |                 |
| (Top/Front).....             | CC 10-34 | ASC-25a/A,E/F   |
| (Bottom/Front).....          | CC 10-35 | ASC-25aa/A,E/D  |
| (Top/Back).....              | CC 10-36 | ASC-25b/A,E/B   |
| (Bottom/Back).....           | CC 10-37 | ASC-25bb/A,E/B  |
| EMERGENCY EGRESS (RUSSIAN)   |          |                 |
| (Top/Front).....             | CC 10-38 | ASC-26a/A,E/D   |
| (Bottom/Front).....          | CC 10-39 | ASC-26aa/A,E/C  |
| (Top/Back).....              | CC 10-40 | ASC-26b/A,E/B   |
| (Bottom/Back).....           | CC 10-41 | ASC-26bb/A,E/B  |

PLT & CDR Ascent

|                        |                     |
|------------------------|---------------------|
| <u>Flip Book</u> ..... | FB 2-2 thru FB 2-26 |
|------------------------|---------------------|



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| OMS FAILURE .....                                       | 6-37        |
| OMS/RCS $\Delta V$ .....                                | 6-39        |
| OMS TARGETS, COMM COVERAGE, LAND SITES .....            | 7-1         |
| WEATHER PADS .....                                      | 8-1         |
| SWITCH LIST .....                                       | 9-1         |
| CUE CARD CONFIG .....                                   | 10-1        |



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PRELAUNCH PROCEDURES

**PRE-  
LAUNCH**



## 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  
FU TK VLV (three) – CL  
√Shutdn (HYD PRESS < 200)  
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

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 (five) – 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           2CA MNB CONTR – op  
      :E           3AB MNC CONTR – op  
O14:B MNA MNC CONTR – op  
O15:B MNB MNA CONTR – op  
O16:B 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),  
INST PWR – FLT/MPS (F6) (OV103,5),  
INST PWR – ON (F8) (OV103,5). 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 – MON

### 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 OV103:

A13 √GPS PRE AMPL UC – MNC  
√LC – MNC  
PWR – ON  
√GPS/SIGI PWR – OFF  
√GPS ENCRYPT – NORM  
√GPS/SIGI ENCRYPT – NORM

-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  
(-1:22:00)

**PASS/BFS TRANSFER PREP**

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  
(-1:20:00)

**OMS GN2 PRESS**

C3    OMS ENG (two) – ARM/PRESS

**P    WSB GN2 SUPPLY ACTIVATION**

R2    BLR N2 SPLY (three) – ON

-25:00    A  
(-1:15:00)

**A/G VOICE CHECK**

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  
(-1:12:00)

**REPORT CABIN PRESS**

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: 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  
(-1:00:00)

**OPS 1 LOAD (IDP Equivalent)**

|                     |                    |
|---------------------|--------------------|
| 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

-18:30 C  
(-58:30)

**BFS TO OPS 1**

|                   |
|-------------------|
| 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 + 

|  |  |   |  |  |
|--|--|---|--|--|
|  |  | . |  |  |
|--|--|---|--|--|

|                | <u>PASS ITEM</u> |     | <u>BFS ITEM</u> |     |
|----------------|------------------|-----|-----------------|-----|
| PTI            | INH              | √1  |                 |     |
| TAL SITE (MCC) | 2(3,4)           | √40 | 2(3,4)          | √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)       |     |
| 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  
(-56:00)

P      **MPS He RECONFIG**

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

NOTE

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

C      **√INTERCOM VOICE**

√Intercom voice with all crewmembers  
prior to entering T-9 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

(~15:00)

MS1

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

√ACES 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
- √HYD CIRC PUMP (three)      – GPC
- √cb APU FU TK VLV ENA (six)      – cl
- √APU FU TK VLV (three)      – CL
- √AUTO SHTDN (three)      – ENA
- √SPEED SEL (three)      – NORM
- √OPER (three)      – OFF
- HYD MN PUMP PRESS (three)      – LO
- APU CNTLR PWR (three)      – ON
- FU 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 It – 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

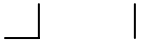
|                        |
|------------------------|
| 2: GNC SYS SUMM 1      |
| 3: BFS, GNC SYS SUMM 1 |

C3 C/W MEM – CLEAR

-2:00 **A SUIT PREP**

√Tabs/visor – cl/LES O2 – ON

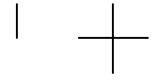
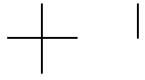
MS1 ICOM RCDR – ON (if reqd)



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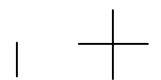
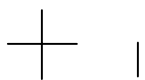




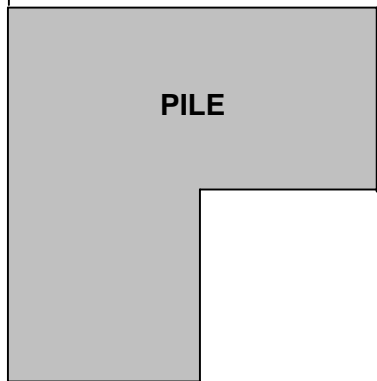


ASCENT PROCEDURES  
(FLIP BOOK)

**BAILOUT  
EGRESS**



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
- SUIT O2 – ON
- GREEN APPLE – PULL
- KNEEBOARDS – REMOVE
- COOLING – DISCONNECT
- SEAT RESTRAINT – RELEASE
- PARACHUTE (four) – RELEASE
- COMM – DISCONNECT
- SUIT O2 – DISCONNECT
- EGRESS SEAT
- HATCH – OPEN MANUALLY
- SLIDEWIRE BASKETS

**POST LANDING  
MODE 5**

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

HOOK

ASC

- BAILOUT  
MODE 8**
- REPORT POSITION**  
 $\sqrt{\text{MACH}} < 1.0$   
 P, R/Y – CSS  
 OPS 305/603 PRO (if reqd)  
 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  
 SUIT O2 – ON  
 GREEN APPLE – PULL
- ~40K FT**
- MS3 – VENT CABIN  
 CDR,PLT SEATS – LOWER  
 KNEEBOARDS – REMOVE  
 COOLING – DISCONNECT  
 SEAT RESTRAINT – RELEASE  
 D-RING – UNCOVER
- ~30K FT**
- MS3 – JETTISON HATCH  
 COMM – DISCONNECT  
 (G-SUIT CLIP – PULL)  
 SUIT O2 – DISCONNECT  
 EGRESS SEAT  
 POLE – DEPLOY  
 D-RING – HOOK UP  
 BAILOUT

TOP  
BACK OF 'EMERGENCY EGRESS'

BAILOUT  
EGRESS

PILE

**SYS FLIGHT RULES**

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

**NO COMM MODE BOUNDARIES**

|                            |       |                                |                          |
|----------------------------|-------|--------------------------------|--------------------------|
| <b>NEG RETURN (104)</b>    | 8200  | <b>2 ENG ZZA (104)</b>         | 5800                     |
| <b>PRESS TO ATO (104)</b>  | 9900  | <b>ABORT TAL ZZA (4)</b>       |                          |
| <b>SE OPS 3 (109)</b>      | 12100 | <b>EO VI</b>                   | <input type="text"/>     |
| <b>SE ZZA (104)</b>        | 14200 | <b>SE OPS 3 ZZA (109) (14)</b> | <input type="text"/>     |
| <b>PRESS TO MECO (104)</b> | 14900 | <b>SE ZZA (104)</b>            | (4) <input type="text"/> |
| <b>NEG BEN (2 @ 67)</b>    | 18400 | <b>2 ENG MRN (104)</b>         |                          |
| <b>SE PRESS (104)</b>      | 18600 | <b>ABORT TAL MRN (3)</b>       |                          |
| <b>NEG MRN (2 @ 67)</b>    | 20000 | <b>EO VI</b>                   | <input type="text"/>     |
| <b>LAST PRE MECO TAL</b>   | 23000 | <b>SE OPS 3 MRN (109) (13)</b> | <input type="text"/>     |
| <b>LAST TAL</b>            |       | <b>SE MRN (104)</b>            | (3) <input type="text"/> |
| YJT                        | 20100 | <b>2 ENG BEN (104)</b>         |                          |
| YYT                        | 20200 | <b>ABORT TAL BEN (2)</b>       |                          |
| YQX                        | 21900 | <b>EO VI</b>                   | <input type="text"/>     |
| LAJ                        | 23400 | <b>SE OPS 3 BEN (109) (12)</b> | <input type="text"/>     |
| IKF                        | 23700 | <b>SE BEN (104)</b>            | (2) <input type="text"/> |
| INN                        | 24100 |                                |                          |
| MRN, BEJ, FFA              | 24300 |                                |                          |
| FMI, KBO                   | 24500 |                                |                          |
| ESN                        | 24900 |                                |                          |
| ZZA                        | 25000 |                                |                          |
| KKI                        | 25100 |                                |                          |
| JDG                        | 25200 |                                |                          |

**ASCENT PROCEDURES**

**HOOK**

R180

LVLH

.82M

√P<sub>c</sub> → 72%

1.09M

√P<sub>c</sub> → 104%

P<sub>c</sub> < 50+5 s

√SRB SEP (Backup AUTO SEP 2:21)

√TMECO

- \* If NOT STABLE (10 sec): \*
- \* NO COMM – CSS & MAN THROT \*

MM103+10 s

√OMS assist

Close suit O2, open visor

3:00

√EVAP OUT (T < 60)

- \* If Systems ABORT reqd: \*
- \* RTLS at 3:40 or \*
- \* TAL Select prior to 23000 \*
- \* Otherwise Manual MECO 23700 \*

V<sub>I</sub> = 13.2K

√Roll Heads Up

- \* If Man Throttle (3 eng): \*
- \* Man Shutdn at 25700 \*
- \* If 1 eng: \*
- \* TRAJ √SERC ON \*
- \* When MPS PRPLT = 2%: \*
- \* MAN THROT, P<sub>c</sub> → 67% \*
- \* Man MECO @ CO mark **BFS** \*

MECO

√V<sub>I</sub> = 25819

MECO+20 s

√ET SEP

- \* If 'SEP INH': \*
- \* ET SEP – MAN \*
- \* If Rates > .7,.7,.7: \*
- \* MPS PRPLT DUMP SEQ – STOP \*
- \* Null rates \*
- \* ET SEP – SEP \*
- \* Post ET Sep -Z xlation: \*
- \* MPS PRPLT DUMP SEQ – GPC \*
- \* If Rates < .7,.7,.7: \*
- \* Assume Feedline Fail \*
- \* If V<sub>I</sub> < 25760 or BFS Engaged: \*
- \* OPS 104 – PRO (√BFS 104) \*
- \* NOTE: Expect – 'Illegal Entry' (PASS) \*
- \* 'Illegal TIG' (BFS) \*

► MM104+2 s

If ET Sep complete and HA > 72 :  
+X xlation for 11 sec

√TGTS

√ASC PKT for failures

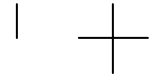
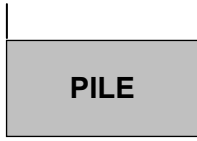
If OMS 1 not reqd:

OMS ENG (two) – OFF

Go to POST OMS 1

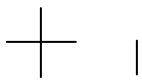
**OMS 1  
TGTING**

TOP  
BACK OF 'ASCENT PROCEDURES'



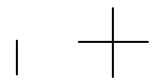
ASC

STS-116  
OMS 1/2 TARGETING  
RENDEZVOUS RECOVERY  
(TBS)



FB 2-6

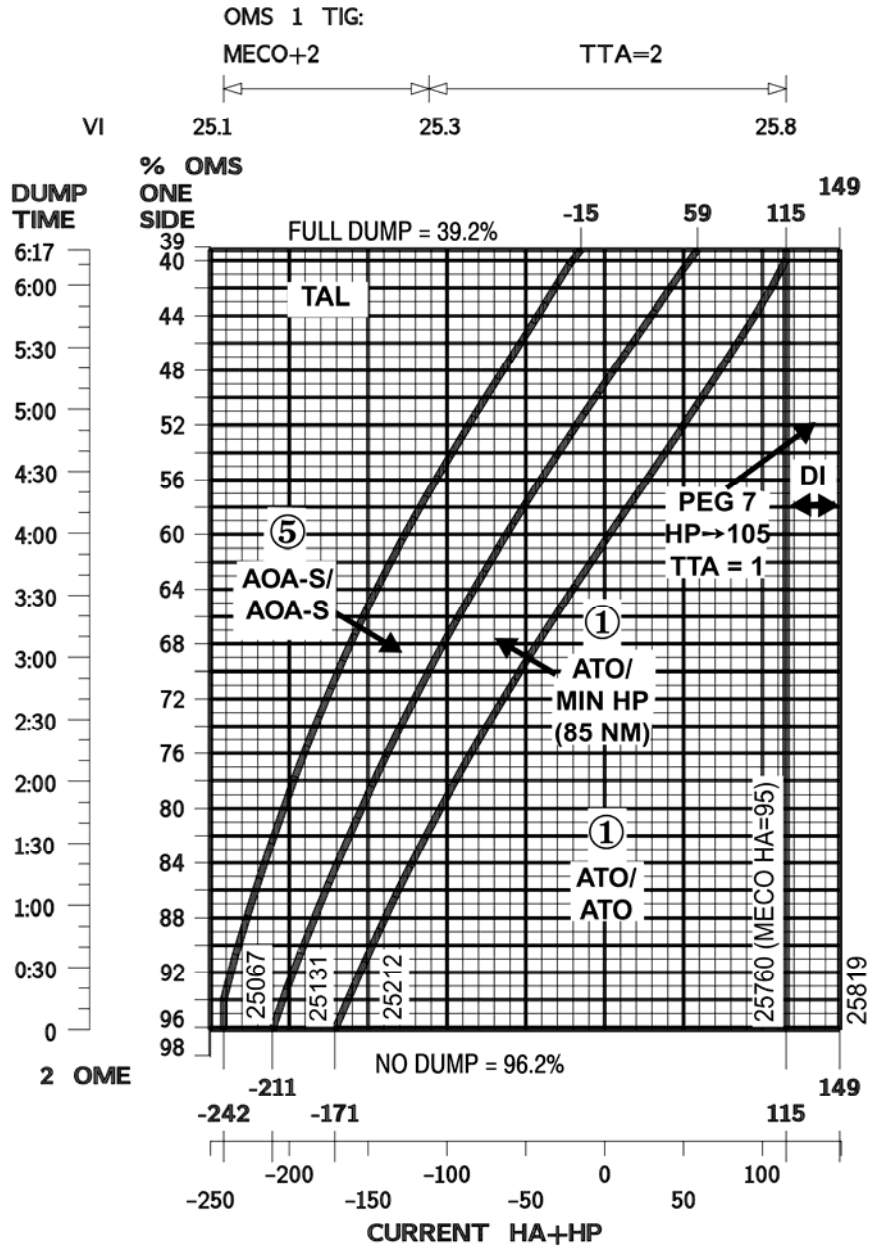
ASC/116/FIN A



TOP

# STS-116 OCFR1 CY OMS 1/2 TGTING

HOOK



OMS 1  
BURN

POST NOMINAL  
OMS ASSIST

% OMS/SIDE  
79

DUMP TIME  
1 : 57

FB 2-7

ASC/116/FIN A

PILE

OMS 1 BURN

OMS 1  
TGTING

\* **IF TIG LATER THAN MECO + 6 min:**  
\* MECO + 4 min:  $\sqrt{\text{BDY FLP pb - It off (MPS dump complete)}}$  \*  
\*  $\sqrt{\text{MCC for APU shutdn (if time permits)}}$  \*  
\* **FEEDLINE FAIL:** \*  
\* Expect 'Illegal Entry' (PASS)/'Illegal TIG' (BFS) @ tgt select \*  
\* pre ET Sep; input TIG manually & LOAD tgt \*  
\* 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  $\Delta\text{VTOT} > 500$ :** \*  
\* Burn good OMS + l'cnct both OMS to RCS, THC +X at TIG \*

DAP - AUTO/DISC  
 $\sqrt{\text{ENG/TRIM CONFIG, LOAD TGTS, MNVR - ( $\sqrt{\text{INRTL}}$ )}}$  |  
OMS XFEED (four) - OP  
 $\sqrt{\text{CNTLR PWR (two) - ON}}$   
 $\sqrt{\text{OMS ENG (two) - ARM/PRESS}}$   
Note  $\Delta\text{VTOT}$  \_\_\_ \_\_\_ : \_\_\_ \_\_\_

-:15 EXEC  
:00 TIG; start watch ( $\sqrt{\text{Pc, } \Delta\text{VTOT, ENG VLVs}}$ )

\* **OMS ENG FAIL:** \*  
\* Failed ENG - OFF \*  
\* If  $\Delta\text{VTOT} < 500$ : \*  
\* At QTY = 5%, good OMS TK ISOL (two) - CL \*  
\* If  $\Delta\text{VTOT} > 500$ : \*  
\* 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  $\Delta\text{V}$ ) \*  
\* OMS TK SW (if reqd) \*

**CUTOFF**  
+:02 OMS ENG (two) - OFF  
Trim inplane X,Z residuals < 2 fps  
OMS XFEED (four) - CL ( $\sqrt{\text{RCS straightfeed}}$ )



HOOK

**OMS 1 BURN MONITOR**

|   |  |   |     |   |   |   |     |     |   |
|---|--|---|-----|---|---|---|-----|-----|---|
| <b>OMS TEMP*</b><br>FU IN P ≥ <table border="1"><tr><td>L</td><td>R</td></tr><tr><td>225</td><td>220</td></tr></table><br>≤ <table border="1"><tr><td>L</td><td>R</td></tr><tr><td>205</td><td>204</td></tr></table><br>or No FU IN P | L  | R | 225 | 220   | L | R | 205 | 204 | OMS ENG FAIL<br>OMS ENG FAIL (PRPLT FAIL if 1 Pod Feed) |
| L   | R  |   |     |   |   |   |     |     |   |
| 225   | 220  |   |     |   |   |   |     |     |   |
| L   | R  |   |     |   |   |   |     |     |   |
| 205   | 204  |   |     |   |   |   |     |     |   |
| <b>OMS PC* &amp; OMS ↓</b> (BFS: √accel)  | OMS ENG FAIL   |   |     |   |   |   |     |     |   |
| <b>OMS OX/FU TK P</b> (√ENG IN P)<br>OX/FU LOW  | He PRESS/VAP ISOL (two) – OP<br>If aff TK P not incr:<br>He PRESS/VAP ISOL (two) – CL<br>At Good OMS Qty = 5%<br>OMS XFEED (four) – CL |   |     |   |   |   |     |     |   |
| OX & FU HIGH  | He PRESS/VAP ISOL (two) – CL<br>OMS XFEED (four) – CL<br>Cycle He A(B) to maintain TK P 234-284  |   |     |   |   |   |     |     |   |
| <b>OMS He TK P LOW</b><br>(√ <table border="1"><tr><td>O</td><td>M</td><td>S</td></tr></table> )  | O  | M | S   | At He P < 640<br>√OMS XFEED (four) – OP<br>Aff OMS TK ISOL (two) – CL<br>At Good OMS Qty = 5%<br>OMS TK ISOL (four) – OP<br>XFEED (four) – CL |   |   |     |     |   |
| O   | M  | S |     |   |   |   |     |     |   |
| <b>OMS N2 REG P HIGH or LOW</b>   | OMS ENG – ARM  |   |     |   |   |   |     |     |   |
| <b>OMS N2 TK P LOW</b><br>(√ <table border="1"><tr><td>O</td><td>M</td><td>S</td></tr></table> )  | O  | M | S   | At N2 TK P < 470: OMS ENG – ARM   |   |   |     |     |   |
| O   | M  | S |     |   |   |   |     |     |   |
| <b>OMS GMBL</b>   | PRI fail<br>L(R) OMS GMBL – SEC (twice)<br>SEC fail<br>If high RCS usage: OMS ENG FAIL   |   |     |   |   |   |     |     |   |
| <b>GPC</b>  | 1(4) &<br>Burning OMS aff<br>aff GPC PWR – OFF<br>If SEC GMBL avail:<br>aff MDM FF 1(4) – OFF,ON<br>L(R) OMS GMBL – SEC (twice)        |   |     |   |   |   |     |     |   |
| SEC GMBL lost<br>2 FAs lost   | If high RCS usage: OMS ENG FAIL<br>√MAN SHUTDN   |   |     |   |   |   |     |     |   |
| <b>I/O ERROR FA</b>   | 1(4)<br>L(R) OMS GMBL – SEC<br>I/O RESET (if recov: BFS I/O RESET)<br>If high RCS usage: OMS ENG FAIL                                  |   |     |   |   |   |     |     |   |
| 2 FAs lost  | √MAN SHUTDN  |   |     |   |   |   |     |     |   |
| <b>BCE STRG D</b>   | 1(4)<br>I/O RESET (if recov: >>)<br>If high RCS usage:<br>L(R) OMS GMBL – SEC (twice)  |   |     |   |   |   |     |     |   |
| <b>I/O ERROR PCM</b>  | OI PCMMU PWR – 2(1)  |   |     |   |   |   |     |     |   |

OMS 2  
TGTING

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

TOP  
BACK OF 'OMS 1 BURN MONITOR'

PILE

**OMS 2 TARGETING**  
(DIR INSERTION)

**OMS 1  
BURN**

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

OMS

| He   | %  | He   | %  |
|------|----|------|----|
| 4800 | 96 | 2960 | 50 |
| 4560 | 90 | 2560 | 40 |
| 4160 | 80 | 2160 | 30 |
| 3760 | 70 | 1760 | 20 |
| 3360 | 60 | 1360 | 10 |
|      |    | 960  | 0  |

TOP

HOOK

ATO

NOTE

These tables apply only after ATO OMS 1 burn  
(ITGT = ①, AOA to KSC ). 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                                       | 52.3                           | 38.0                                | 57.6                   | 41.1                     |
| 90                                       | 53.7                           | 35.7                                | 55.3                   | 38.0                     |
| 85                                       | 55.3                           | 34.3                                | 53.0                   | 35.2                     |
| 80                                       | 57.2                           | 33.9                                | 50.4                   | 32.4                     |
| 75                                       | 59.2                           | 35.6                                | 47.4                   | 29.5                     |
| 70                                       | 61.0                           | 37.6                                | 44.4                   | 27.1                     |
| 65                                       | 62.2                           | 38.9                                | 42.0                   | 25.3                     |
| 60                                       | 63.0                           | 40.3                                | 41.4                   | 23.2                     |
| 55                                       | 63.4                           | 41.4                                | 42.3                   | 21.2                     |
| 50                                       | 64.1                           | 42.6                                | 42.1                   | 19.4                     |
| 45                                       | ---                            | 44.0                                | 44.7                   | 17.6                     |

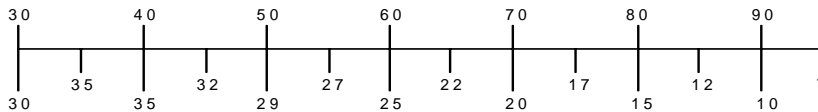
STS-116 OCFR1 CY

| 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                        | 47.7                           | 33.5                                | 53.1                   | 36.6                     |
| 90                        | 49.1                           | 31.2                                | 50.7                   | 33.5                     |
| 85                        | 50.7                           | 29.7                                | 48.4                   | 30.6                     |
| 80                        | 52.6                           | 29.3                                | 45.9                   | 27.8                     |
| 75                        | 54.6                           | 31.0                                | 42.8                   | 24.9                     |
| 70                        | 56.4                           | 33.0                                | 39.8                   | 22.6                     |
| 65                        | 57.6                           | 34.4                                | 37.5                   | 20.7                     |
| 60                        | 58.5                           | 35.7                                | 36.8                   | 18.6                     |
| 55                        | 58.9                           | 36.8                                | 37.8                   | 16.6                     |
| 50                        | 59.5                           | 38.0                                | 37.6                   | 14.9                     |
| 45                        | ---                            | 39.4                                | 40.1                   | 13.0                     |

RTL

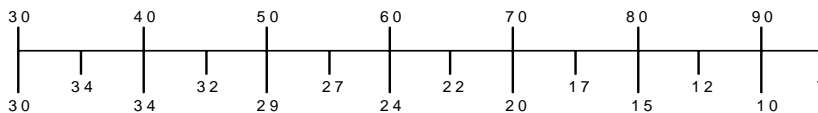
OMS BLOWDOWN

LEFT OMS GAGE QTY (%)



LEFT OMS BLDN EQUIV (%)

RIGHT OMS GAGE QTY (%)



RIGHT OMS BLDN EQUIV (%)

FB 2-11

ASC/116/FIN A

**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 'INHIB': \*
- \* √UNCONVERGED GUID TABLE \*
- \* MAN PPA per PRPLT \*
- \* REMAINING \*
- \* After GUID CONVERGE: \*
- \* P,R/Y AUTO/AUTO THROTTLE \*

**WINDS**

|                        |   |
|------------------------|---|
| 50K                    | / |
| 38                     | / |
| 28                     | / |
| 20                     | / |
| 12                     | / |
| 7                      | / |
| 3                      | / |
| 1                      | / |
| SURF                   | / |
| <b>SPDBK @ 3000 FT</b> |   |

After PPA: √BFS ITEM 1 (\*)

TRAJ √Bugs, HSI √, 

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

----- **MECO** ----- **MECO** -----

**OMS 2  
TGTING**

- √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

$\dot{H} > -320 \uparrow$  VERT SIT √ $\alpha$  vs Mach  
V = 5K √RUD, AIL TRIM  
& EAS < 333 ↓ AIR DATA PROBE (two) – Deploy (√Heat) |

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 < 1.0 P,R/Y – CSS, √SPDBK CMD vs POS  
√NWS – 1

Lock Inertia Reels

POST LANDING: ENT, POST LDG

RTLS PLT

HOOK

If CSS: MAN THROT  
Man MECO

$\sqrt{P_c} = 104\%$  (2 eng)/69% (3 eng)  
 $\sqrt{DUMP}$

**UNCONVERGED GUIDANCE TABLE**

| ENG OUT | OUTBOUND INITIAL $\theta$ | PITCHAROUND at % (8°/sec) | FLYBACK INITIAL $\theta$ |
|---------|---------------------------|---------------------------|--------------------------|
| 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°                      |

$\sqrt{P_c}$  at PPA + 20 sec

- \* If  $P_c = 104\%$  (2 eng): \*
- \* **G51** MAX THROT – ITEM 4 (\*) \*

Pitchdn:  $\sqrt{P_c} \rightarrow 67\%$

**MECO** ----- **MECO**

KEAS = 77  $\sqrt{SPDBK} \rightarrow 81\%$   
 $\sqrt{ET}$  DOORS – Closed and latched (MECO +1:30)  
 $\sqrt{ET}$  SEP, SRB SEP – AUTO  
 Adjust seat  
 $\sqrt{TACANS}$ , INCORPORATE

- \* If KSC TACAN Fail: \*
- \* TACAN Ch 073X (OMN), ITEM 5 EXEC \*

**G51**  $\sqrt{AIR}$  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 < 1.0  $\sqrt{R}$  FLT CNTLR PWR – ON  
 Lock Inertia Reels

M = 0.7  $\sqrt{LG}$  EXTD ISO VLV – OP  
 H = 10K  $\sqrt{BDY}$  FLP – TRAIL  
 $\sqrt{A/L}$  (KSC – Tabs, Visors, Suit O2)

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  
 $G50$   $\sqrt{SITE \& RWY (PASS/BFS)}$ ,  $\sqrt{HDG}$

|         |     |
|---------|-----|
| TAL     | HDG |
| ZZA 010 |     |
| MRN 016 |     |
| BEN 022 |     |

\*LO XRNG

| 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/- | 11730/11730 |
| 4    | ZZA 30L/12R  | ZZA 64       | ZZA 77 (DME)  | 6/- | 12200/12200 |
| 12   | *BEN 36/18   | BEN 108      | MAK 80 (DME)  | 6/- | 13720/12720 |
| 13   | *MRN 20/02   | MRN 100      | AOG 23        | 6/- | 11730/11730 |
| 14   | *ZZA 30L/12R | ZZA 64       | ZZA 77 (DME)  | 6/- | 12200/12200 |
| 19   | YJT 09/27    | YJT 78       | YDF 80 (DME)  | -/- | 9500/9500   |
| 20   | YYT 29/11    | UYT 23       | YYT 82 (DME)  | -/- | 8500/8500   |
| 21   | YQX 22/31    | YQX 74       | IQX 32 (DME)  | -/- | 9700/8900   |
| 23   | LAJ 15/33    | TRM 109      | LAJ 45        | -/- | 10870/10870 |
| 24   | BEJ 01L/19R  | MOJ 37       | BEJ 105       | -/- | 10820/10820 |
| 25   | IKF 20/29    | KEF 57       | IRE 28 (DME)  | -/- | 9520/9560   |
| 26   | INN 06/24    | SHA 80 (DME) | CRN 37 (DME)  | -/- | 9540/9540   |
| 27   | FFA 27/09    | FFA 81       | BZN 56        | -/- | 9490/9490   |
| 28   | KBO 14L/32R  | GIX 18       | DOR 23Y (DME) | -/- | 12020/12020 |
| 29   | FMI 33/15    | NIM 53       | ITR 104       | -/- | 11800/12300 |
| 30   | ESN 03R/21L  | BAG 78 (DME) | BUK 90 (DME)  | -/- | 11800/11800 |
| 31   | KKI 15R/33L  | RIY 92       | KIA 80        | -/- | 13300/13300 |
| 32   | JDG 31/13    | NKW 57       | NKW 57        | -/- | 12000/12000 |

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

$V_1 = 15.0K$   $\sqrt{Roll Heads Up}$

----- MECO  $V_1 \sim 24.0K @ CO mark$  **BFS** ----- MECO -----

MECO+20 s  $\sqrt{ET SEP, \sqrt{AUTO -Z TRANS}}$   
MECO+37 s  $\sqrt{MM104}$

**Abort TAL (if reqd):**

$\sqrt{TAL flag set: G50 ITEM 41 = TAL SITE (any site)}$   
 $\sqrt{MECO V_1 vs HI/LO Energy (TAL PLT)}$   
 $\sqrt{Rates < .5^\circ/sec; \theta > 15^\circ, Y = 0 \pm 30^\circ}$   
**PASS, OPS 301 PRO ( $\sqrt{304}$ )**

\* No joy in 68 sec: BFS - ENGAGE \*  
\* BFS, OPS 301 PRO \*

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

BFS, OPS 301 PRO ( $\sqrt{304}$ )  
 $G50$   $\sqrt{SITE, RWY, TACAN}$   
S/B & ALTM (PASS/BFS)

$TRAJ$   $\sqrt{BUGS, HSI \sqrt{H}}$ , RANGE,  $AMI$   $\sqrt{\alpha = 43^\circ}$

\* Low energy:  $TRAJ$  ITEM 3 (Lo Energy ENA)\*

$V = 10K$   $\sqrt{SPDBK \rightarrow 81\%}$   
 $V = 7K$  Go to **ENTRY MANEUVERS**  
(Cue Card)

|                        |   |
|------------------------|---|
| SURF WIND              | / |
| <b>SPDBK @ 3000 FT</b> |   |
| ALTM                   |   |
| AIM PT                 |   |
| SPDBK                  |   |

RTL5

TAL PLT

HOOK

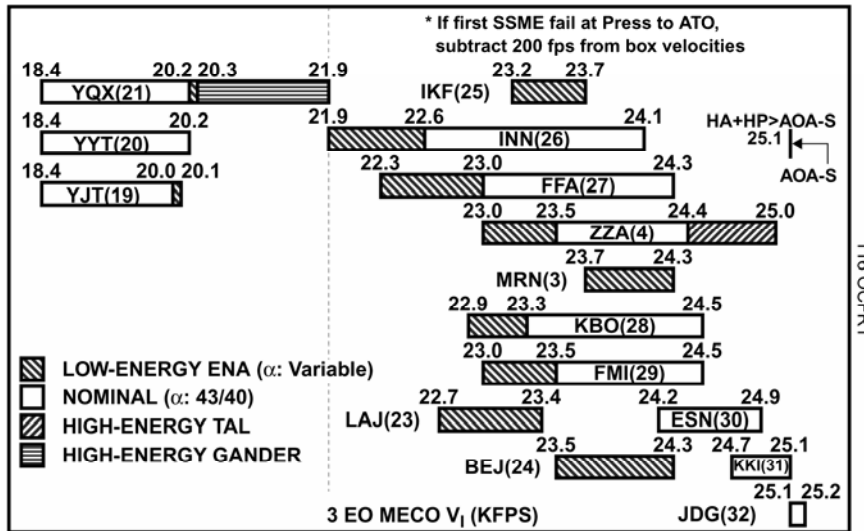
√OMS DUMP

- \* If second eng fail: \*
- \* **G51** DUMP – ITEM 6 (\*), 7 (\*) \*
- \* 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<sub>C</sub> → 67% \*
- \* Man MECO @ CO mark **BFS** \*

----- MECO -- V<sub>1</sub> ~24.0K @ CO mark **BFS** ----- MECO -----



MM304

√OMS DUMP

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

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

V = 10K \* If RCS < **N/A** % either side: \*  
 \* **G51** AFT RCS INH, ITEM 13 EXEC \*

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

ECAL

TOP  
BACK OF 'TAL PLT'

PILE

**POWERED ECAL**

**G51** √MAX THROT – ITEM 4 (\*)


√ADI (two) – REF

√θ → 60°, Yaw → 45°

√Roll to Heads Up

**G50** Select SITE and TACAN

When EAS > 4 and incr:

√Yaw to 

√Pitch down at 3°/sec

√MECO, ET SEP

**ET SEP + 8s: CSS, pull to α = 58° at 4°/sec, AUTO**

√MM602 (BFS, OPS 602 PRO)

Go to ECAL ENTRY

**2 E/O ECAL (51.6°)**

| Velocity (VI)           |   |                             | Location      | Site | RWY     | TACANs     |
|-------------------------|---|-----------------------------|---------------|------|---------|------------|
| IP - 2:30               | In Plane                                | IP + 2:30                   |               |      |         |            |
| *5.3-6.8                | *5.3-6.7                                | *5.3-6.7<br>6.8-7.3         | Wilmington    | 6    | ILM 06  | ILM 117    |
| *6.8-8.6                | *6.7-6.9<br>6.9-8.1<br>*8.1-8.4<br>RTLS | 6.7-7.9<br>*7.9-8.0<br>RTLS | Cherry Point  | 7    | NKT 32L | EWN 83 (D) |
| *8.6-9.7                | *8.4-8.6<br>8.6-9.3                     | *8.0-8.1<br>8.1-9.8         | Oceana NAS    | 8    | NTU 32R | NFE 19Y    |
| *9.7-10.5               | 9.2-9.9<br>*9.9-10.2                    | 8.6-10.5                    | Wallops       | 9    | WAL 28  | SBY 49     |
|                         | *10.2-10.5                              | 9.5-11.2                    | Atlantic City | 11   | ACY 31  | CYN 81     |
|                         | 10.5-12.3                               | 10.1-12.7                   | Gabreski      | 15   | FOK 06  | HTO 83     |
| *10.5-10.9<br>10.9-13.3 | 10.7-13.4                               | 10.5-13.7                   | Otis ANGB     | 16   | FMH 32  | BOS 74     |
|                         | 11.5-13.2                               | 11.1-13.9                   | Pease Int'l   | 17   | PSM 34  | ENE 118    |

\*Probable bailout region

(D) - DME only

**3 E/O ECAL (51.6°)**

| MM 602 Velocity (Vrel)  |                         |                                 | Location        | Site | RWY     | TACANs     |
|-------------------------|-------------------------|---------------------------------|-----------------|------|---------|------------|
| IP - 2:30               | In Plane                | IP + 2:30                       |                 |      |         |            |
| *5.3-6.6                | *5.3-6.6                | *5.3-6.7                        | Wilmington      | 6    | ILM 06  | ILM 117    |
| *6.6-8.9                | *6.6-8.7                | *6.7-7.3<br>7.3-8.0<br>*8.0-8.6 | Cherry Point    | 7    | NKT 32L | EWN 83 (D) |
| *8.9-10.2               | *8.7-10.0               | *8.6-9.7                        | Oceana NAS      | 8    | NTU 32R | NFE 19Y    |
| *10.2-10.9              | *10.0-10.7              | *9.7-10.6                       | Wallops         | 9    | WAL 28  | SBY 49     |
|                         | *10.7-11.0              | *10.6-11.0                      | Atlantic City   | 11   | ACY 31  | CYN 81     |
| *10.9-11.9<br>11.9-13.9 | *11.0-11.6<br>11.6-14.4 | *11.0-11.2<br>11.2-14.7         | Otis ANGB       | 16   | FMH 32  | BOS 74     |
|                         | 11.8-12.4               | 11.2-13.0                       | Gabreski        | 15   | FOK 06  | HTO 83     |
|                         | 12.8-13.8               | 12.9-14.2                       | Pease Int'l     | 17   | PSM 34  | ENE 118    |
| 13.5-17.2               | 13.3-17.4               | 13.1-17.2                       | Halifax Int'l   | 18   | YHZ 24  | UAW 38     |
| 15.2-18.0               | 15.0-18.0               | 14.9-18.0                       | Stephenville    | 19   | YJT 09  | YJT 78     |
| 15.4-18.0               | 15.3-18.0               | 15.3-18.0                       | St. Johns Int'l | 20   | YYT 29  | UYT 23     |
| 15.5-18.0               | 15.4-18.0               | 15.2-18.0                       | Gander Int'l    | 21   | YQX 22  | YQX 74     |
|                         |                         | 17.3-17.6                       | Goose Bay       | 22   | YYR 26  | UYR 40     |

\*Probable bailout region

(D) - DME only

TAL



HOOK

HI-ENER  
GANDER

**ECAL ENTRY**

**If 3 OUT ECAL or 2 OUT SECOND GREEN:**

**G50 Select SITE and TACAN  
BFS, OPS 602 PRO**

**Before NZ Hold:**

**RHC/PNL TRIM – ENA  
If M < 5, √AIL/RUD TRIM**

**BFS, G50 √SITE and TACAN**

**Nz Hold:**

Expect prebank = 20° if TGT Nz < ~3.3g and ΔAZ > 20°  
At H = -600 ↑ expect initial bank 2xΔAZ (70° max)  
If E/W ≥ STN, expect bank = 70° until ΔAZ increased to 15-30°  
past site, then 2xΔAz

**G50 √TACANS, INCORPORATE**

**M < 5 and EAS < 333 ↓:**

**AIR DATA PROBE (two) – Deploy (√Heat)**

**G50 INCORPORATE Air Data ASAP**

**M = 3.2: √OPS 603**

**Select UHF-G T/R**

**NO COMM ECAL LNDG CRITERIA**

**@H = 70K, √Range:**

- \* If Range < 28 nm or Range > 54 nm: \*
- \* P, R/Y CSS \*
- \* Bank (≤ 30°) to HDG 120° \*
- \* Go to BAILOUT \*

**G50 √SPDBK (ITEM 39) per ECAL LANDING Table**

**ECAL LANDING:**

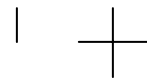
| Runway Length + Ovrn | Spdbk | MGTD | Distance |
|----------------------|-------|------|----------|
| ≥ 11,000'            | NOM   | 205  | 2500     |
| ≥ 8500 to < 11,000'  | SHORT | 205  | 1500     |
| < 8500'              | ELS   | 195  | 1000     |

**MAIN GEAR TD: EARLY CHUTE, DEROTATE, √SPDBK – 100%**

**NOSE GEAR TD: BRAKE – as reqd**

- \* If 5K' remaining and V > 140 KGS – MAX BRAKING \*
- \* (smooth application, not < 2 sec) \*

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



ECAL



PILE

**HIGH-ENERGY GANDER CDR**

MM104

**Abort TAL:**

√TAL flag set: **G50** ITEM 41 = TAL SITE (any site)  
√Rates < .5°/sec;  $\theta > 15^\circ$ ,  $Y = 0 \pm 30^\circ$   
**PASS, OPS 301 PRO (√304)**

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

MM304

P, R/Y – CSS  
√VREL

| VREL          | ROLL (CSS) | ALPHA (CSS) |
|---------------|------------|-------------|
| VREL ≥ 19,900 | 0°         | 55°         |
| VREL < 19,900 | 0°         | 50°         |

$\dot{H} = -800 \uparrow$

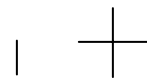
Roll towards site ( $\phi \sim 80^\circ$ ), initial target  $\dot{H} = -350$ ,  
hold initial Alpha per table  
**G50** Hold 3.0g Nz using roll

- \* If Nz ≥ 3.5: \*
- \*     Reduce Alpha ( $40^\circ < \alpha < 55^\circ$ ) and \*
- \*      $\dot{H}$  until Nz < 3.5 \*

**Orbiter bug  
below  
upper line  
or V = 6K**

Pitch down at 1°/sec, center needles,  
P, R/Y – AUTO

Go to ENTRY MANEUVERS (Cue Card)



## HIGH-ENERGY GANDER PLT

HOOK

## -----MM304-----

BFS, OPS 301 PRO (√304)

**G50** Select Site YQX – ITEM 41 +2 1**TRAJ** √BUGS, **HSI** √  $\hat{H}$ , RANGE√ET DOORS – closed and latched  
(MM304 +1:30) **$\dot{H} = -800\uparrow$**  Monitor  $\dot{H}$ , Nz**When  $\dot{H}$   
stabilizes** Ensure Nz stays < 3.5**Monitor  
Traj** Report when orbiter bug reaches upper line**Orbiter bug  
below  
upper line  
or V = 6K** Monitor pitchdown at 1°/sec to center needles,  
√P,R/Y – AUTO**V = 19K** HYD MPS/TVC ISOL VLV (three) – CL  
(hold 5 sec, tb-CL)**V = 15K** **G50** √RWY, TACAN, S/B, ALTM  
(PASS/BFS)**V = 10K** \* If RCS < **N/A** % either side: \*  
\* **G51** AFT RCS INH, ITEM 13 EXEC \***V = 10K** √SPDBK → 81%  
Go to ENTRY MANEUVERS (Cue Card)HI-ENER  
TAL



PILE

**HIGH-ENERGY TAL CDR**

MM104

**Abort TAL:**

√TAL flag set: G50 ITEM 41 = TAL SITE (any site)  
 √Rates < .5°/sec;  $\theta > 15^\circ$ ,  $Y = 0 \pm 30^\circ$   
**PASS, OPS 301 PRO (√304)**

**HI-ENER  
GANDER**

**MM304**

MM304

P, R/Y – CSS  
 √VREL

| VREL                        | ROLL (CSS) | ALPHA (CSS)                  |
|-----------------------------|------------|------------------------------|
| $VREL \geq 23,800$          | 180°       | 80° ( $\theta = 280^\circ$ ) |
| $23,300 \leq VREL < 23,800$ | 180°       | 55°                          |
| $VREL < 23,300$             | 0°         | 55°                          |

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

**Earlier of** Roll Heads Up, maintain Alpha = 55°

$\dot{H} = -700 \downarrow$   
**or Guid Init**

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

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

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

Go to ENTRY MANEUVERS (Cue Card)



## HIGH-ENERGY TAL PLT

HOOK

## -----MM304-----

BFS, OPS 301 PRO (√304)

[G50] If [FMI] GO TAL Site – Select [FMI] –  
ITEM 41 + [29]

Otherwise, select best Wx site [ZZA] (Site 4)  
or [FMI]

[TRAJ] √BUGS, [HSI] √<sup>H</sup>, RANGE

√ET DOORS – closed and latched  
(MM304 +1:30)

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

- \* If no comm and [ZZA/FMI] \*
- \* initial Commanded Drag (←) ≥ [35] , \*
- \* [G50] Select Site [ESN] – ITEM 41 + [30] \*
- \* \*

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

V = 15K [G50] √RWY, TACAN, S/B, ALTM  
(PASS/BFS)

V = 10K \* If RCS < [N/A] % either side: \*

\* [G51] AFT RCS INH, ITEM 13 EXEC \*

V = 10K √SPDBK → 81%

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

Go to ENTRY MANEUVERS (Cue Card)

ABORT  
DUMPS

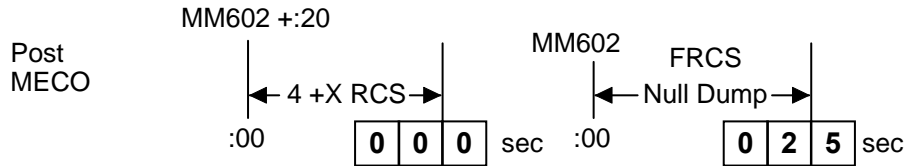
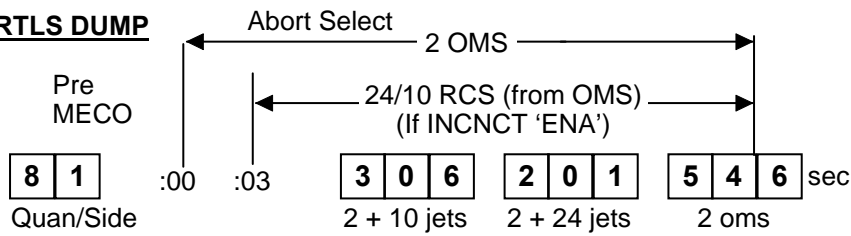
TOP  
BACK OF 'ECAL ENTRY'

**PILE**

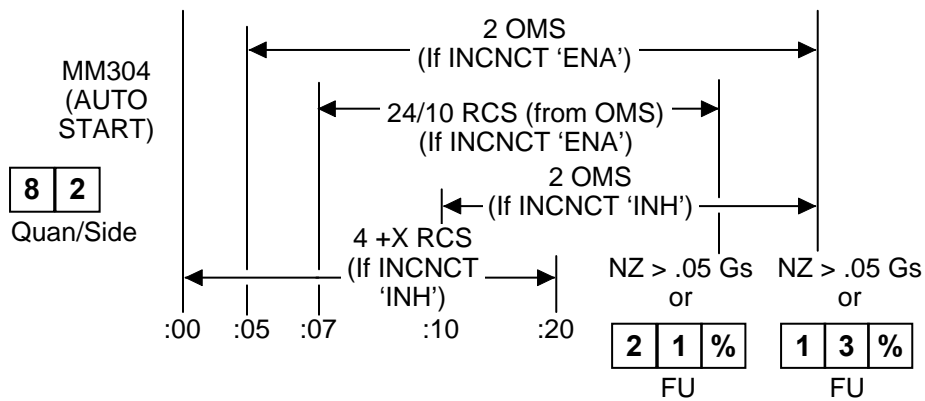
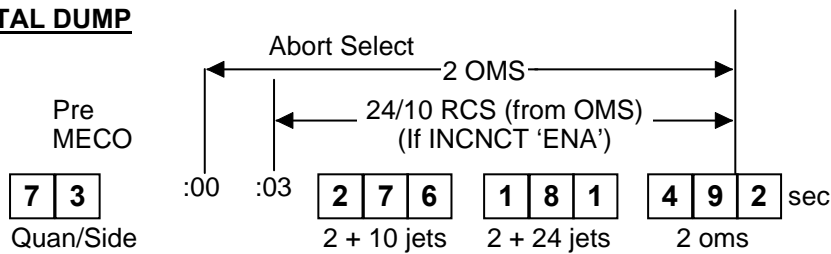
**RTLS/TAL DUMPS**

HI-ENER  
TAL

**RTLS DUMP**

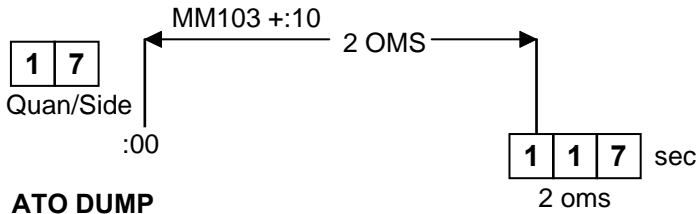


**TAL DUMP**

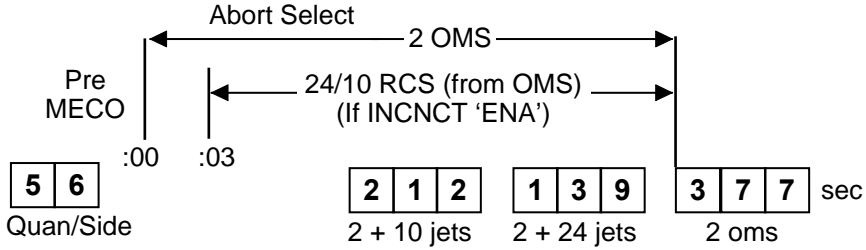




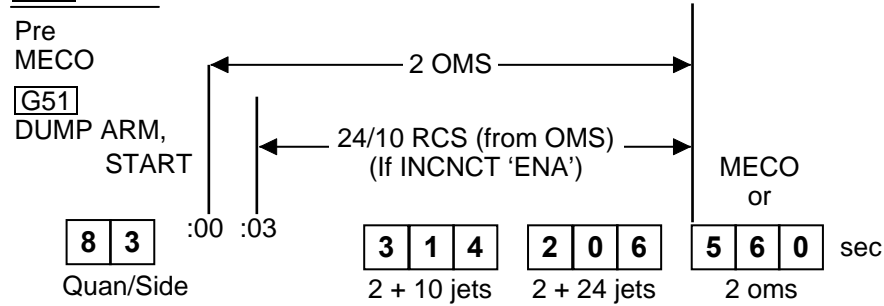
**ASSIST/ATO/G51 DUMPS**  
**ASSIST DUMP**



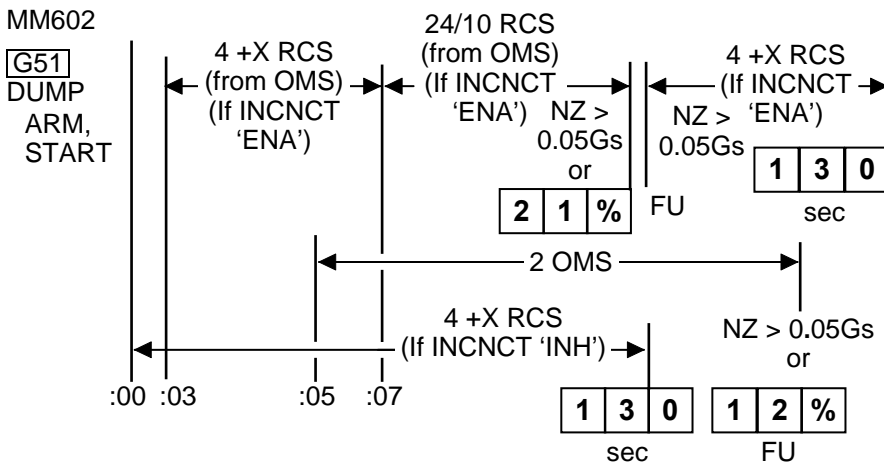
**ATO DUMP**



**G51 DUMP**



PWRD  
CSS



TOP  
BACK OF 'ASSIST/ATO/G51 DUMPS'



CSS & MAN THROT  
(IF MET < 1:30, ENGAGE BFS)

Yaw to  $\triangle E$  until 2:30  
Then  $\triangle I$  uphill  
or  $\triangle R$  if TAL

| If TAL $\sqrt{HDG}$ |     |
|---------------------|-----|
| ZZA                 | 010 |
| MRN                 | 016 |
| BEN                 | 022 |

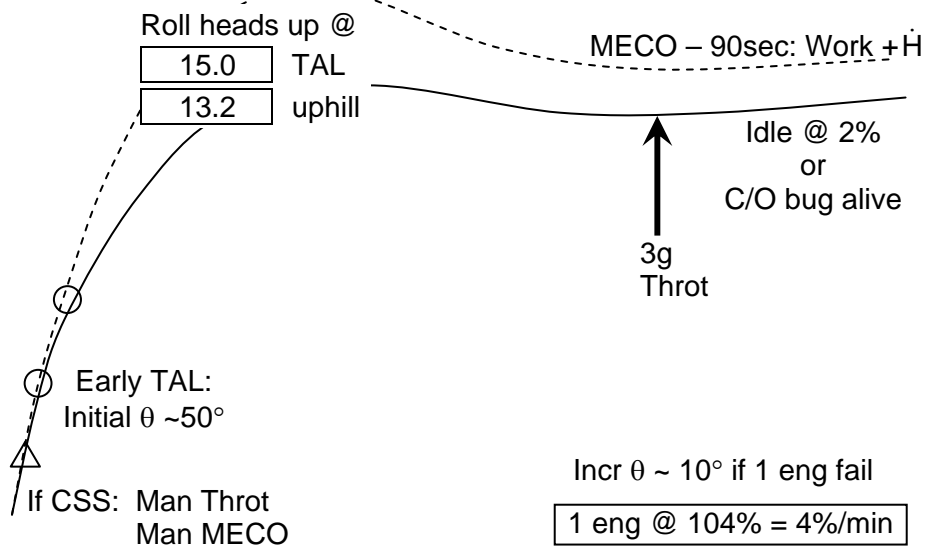
Man MECO @ CO mark **BFS**

$\dot{H} =$  274

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

Max H = 400 – 420K  
for early TAL

ABORT  
DUMPS





# POWERED CSS – RTLS



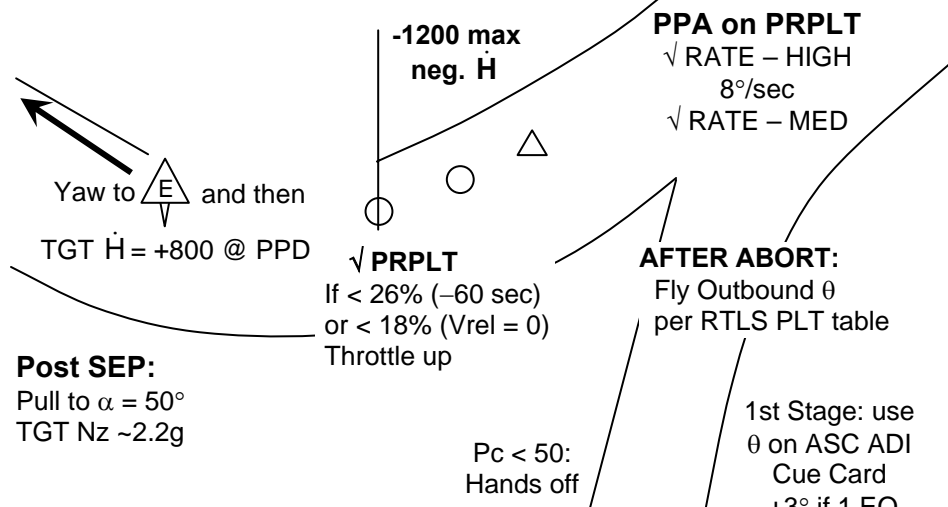
CSS & MAN THROT  
(IF MET < 1:30, ENGAGE BFS)

| Post PPA     | Pre PPA      |
|--------------|--------------|
| 2 eng = 100% | 2 eng = 104% |
| 3 eng = 69%  | 3 eng = 69%  |

**PPD**  
Idle & Pitch DN to  
horiz ( $\alpha -2^\circ$ )  
**Man MECO @ CO mark**  
Hold FWD stick until SEP

**R** Yaw to **R**

H control:  
Use  $\theta$  then  
Throttle



Yaw to **E** and then  
TGT  $\dot{H} = +800$  @ PPD

**Post SEP:**  
Pull to  $\alpha = 50^\circ$   
TGT Nz ~2.2g

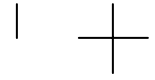
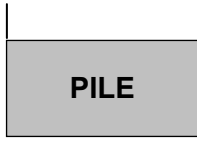
$\checkmark$  **PRPLT**  
If < 26% (-60 sec)  
or < 18% ( $V_{rel} = 0$ )  
Throttle up

Pc < 50:  
Hands off

1 eng @ 104% = 4%/min

If CSS: Man Throt  
Man MECO

TOP  
BACK OF 'POWERED CSS – RTLS'



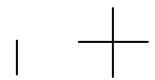
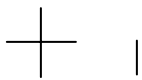
**PILE**

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**PWRD  
CSS**

FB 2-26

ASC/116/FIN A





ASCENT/ENTRY CUE CARDS

**ASC/ENT  
CUE CARDS**



MS ONLY

2-27

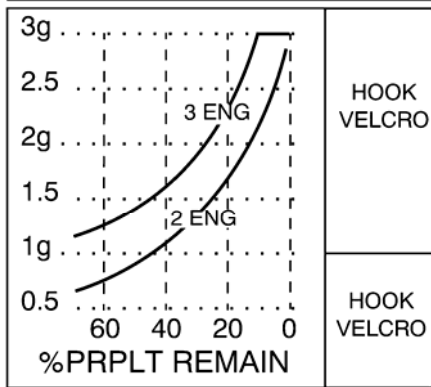
ASC/116/FIN A



ASC/ENT  
CUE CARDS

### ASCENT ADI - NOMINAL

| TIME | $\theta$ | H    | $\dot{H}$ | (116 OCFR1 CY) |
|------|----------|------|-----------|----------------|
| 0:30 | 68       | 9K   | 656       |                |
| 0:50 | 61       | 26K  | 993       |                |
| 1:10 | 53       | 50K  | 1429      |                |
| 1:30 | 39       | 84K  | 1892      |                |
| 1:50 | 30       | 125K | 2195      |                |



-STAGING-

| $V_I$ | $\theta$ | H    | $\dot{H}$ |                 |
|-------|----------|------|-----------|-----------------|
| 6     | 19       | 217K | 1721      |                 |
| 7     | 16       | 274  | 1270      |                 |
| 8     | 13       | 309  | 921       |                 |
| 9     | 11       | 331  | 638       |                 |
| 10    | 9        | 345  | 407       |                 |
| 12    | 6        | 356  | 66        |                 |
| 14    | 9        | 355  | -143      |                 |
| 16    | 25       | 350  | -226      |                 |
| 18    | 23       | 344  | -263      |                 |
| 20    | 21       | 339  | -214      |                 |
| 22    | 19       | 337  | -102      |                 |
| 24    | 17       | 337  | 66        |                 |
| 25819 | 13       | 345  | 274       | ASC-14a/116/A/A |

### ENTRY ALPHA

| VR | $\alpha_{ref}$ | R    | H   | H <sub>ref</sub> | R <sub>ref</sub> |
|----|----------------|------|-----|------------------|------------------|
| 25 | 40             | 4396 | 400 |                  |                  |
| 24 | HI 40 LO       | 2623 | 246 | -46              | L79              |
| 23 | 43 40 37       | 2166 | 238 | -63              | 69               |
| 22 | 43 40 37       | 1809 | 232 | -82              | 62               |
| 21 | 43 40 37       | 1534 | 225 | -103             | 59               |
| 20 | 43 40 37       | 1309 | 219 | -119             | 58               |
| 19 | 43 40 37       | 1130 | 212 | -141             | 58               |
| 18 | 43 40 37       | 988  | 205 | -162             | 59               |
| 17 | 43 40 37       | 869  | 198 | -180             | 60               |
| 16 | 43 40 37       | 767  | 192 | -191             | 61               |

## KSC 15

| MAX L/D |          |
|---------|----------|
| M       | $\alpha$ |
| 3       | 17       |
| 2       | 15       |
| 1       | 12       |

116 OCFR1 CY

ASC-14b/116/A,E/A

|                |                |
|----------------|----------------|
| HOOK<br>VELCRO | HOOK<br>VELCRO |
|----------------|----------------|

|     |          |     |     |      |     |
|-----|----------|-----|-----|------|-----|
| 15  | 43 40 37 | 685 | 186 | -203 | 63  |
| 14  | 43 40 37 | 612 | 180 | -127 | 61  |
| 13  | 43 40 37 | 544 | 177 | -137 | 58  |
| 12  | 43 40 37 | 481 | 173 | -153 | 56  |
| 11  | 42 39 36 | 424 | 167 | -195 | R54 |
| 10  | 41 38 35 | 372 | 164 | -174 | 49  |
| 9   | 39 36 33 | 322 | 157 | -209 | 46  |
| 8   | 37 34 31 | 274 | 149 | -242 | 43  |
| 7   | 33 30 27 | 227 | 140 | -271 | 42  |
| 6   | 30 27 24 | 183 | 128 | -275 | L42 |
| 5   | 26 23 20 | 143 | 117 | -273 | 40  |
| 4   | 23 20 18 | 105 | 103 | -264 | 42  |
| 3   | 19 16 15 | 74  | 89  | -248 | R35 |
| 2.5 | 14       | 60  | 82  | -273 |     |
| 2   | 12       | 49  | 75  | -282 |     |
| 1.5 | 9        | 37  | 64  | -331 |     |
| 1   | 8        | 28  | 50  | -263 |     |



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MS ONLY

2-30

ASC/116/FIN A



### ENTRY MANEUVERS

| FLIGHT CONDITIONS  | MANEUVER  |
|--|---|
| EI-5   | √LVLH ATT<br>GNC, OPS 304 PRO<br>* If PREBANK, R/Y – CSS *<br>* Roll at 1°/sec to <input type="text"/> <input type="text"/> <input type="text"/> *<br>* Maintain PREBANK ±5° *<br>If previous OMS OX TK, He TK, or RCS OX TK leak:<br><input type="text"/> G51 VENT DOOR CNTL OPEN – ITEM 43 EXEC<br>(AOA) <input type="text"/> SPI When SB position – 0%:<br>√HYD MN PUMP PRESS (three) – LO |
| $\bar{q} = 1$  | (AOA) HYD MN PUMP PRESS (three) – NORM  |
| 'Guidance Box' @<br>$\bar{q} \sim 8$<br>or<br>$D \sim 3$ | CLOSED LOOP GUIDANCE ____:____:____<br>* If PREBANK: P,R/Y – AUTO *<br>Begin AIL trim monitoring  |
| V = 24K  | If previous OMS OX TK, He TK, or RCS OX TK leak:<br><input type="text"/> G51 VENT DOOR CNTL CLOSE – ITEM 44 EXEC  |
| D = 11   | √DRAG H (FORCE if editing)  |
| V = 19K  | √HYD MPS/TVC ISOL VLV SYS (three) – CL  |
| V = 15K  | √NAVAIDS (I/O RESET if reqd)  |
| V = 12K  | RAD BYP VLV MODE (two) – AUTO<br>CNTLR LOOP (two) – AUTO B(A)   |
| V = 10K  | √SPDBK to 81%   |
| $\Delta Az = 10.5^\circ$                                 | FIRST ROLL REVERSAL <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>  |

ENT-6a/E/O

**ENT  
MNVR**

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

ENT-6b/E/W  
(Partial)

ENT  
MNV



**DRAG CHUTE DEPLOY**

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

**FAILED TIRE TECHNIQUE**

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

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

ENT-6b/E/W  
(Partial)



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MS ONLY

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ASC/116/FIN A



CONT  
ABORT

ABORT CUE CARDS

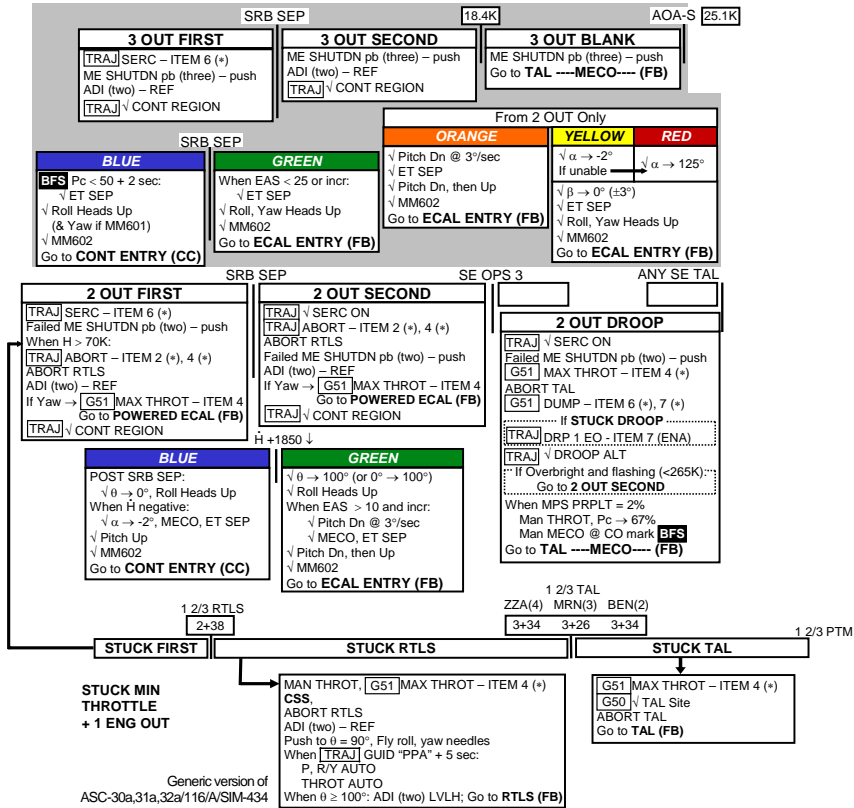
NOT FLOWN

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ASC/116/FIN A

# CONTINGENCY ABORT

High Inclination  
51.6°



# CONTINGENCY ABORT

**CONT ENTRY / MM602**

VERT SIT | INH ECAL/BDA –  
ITEM 1 (INH)

Before NZ Hold  
RHC/PNL TRIM – ENA  
If  $M < 5$ ,  
√ AIL/RUD TRIM  
If  $M < 3$ , S/B = 65%

$M \leq 5$  and  $EAS < 333$  ↓  
ADTA PROBES – Deploy  
G50 | Incorp Air Data ASAP

M2 → 1:  $\theta = 0^\circ$  by  $M = 1.0$

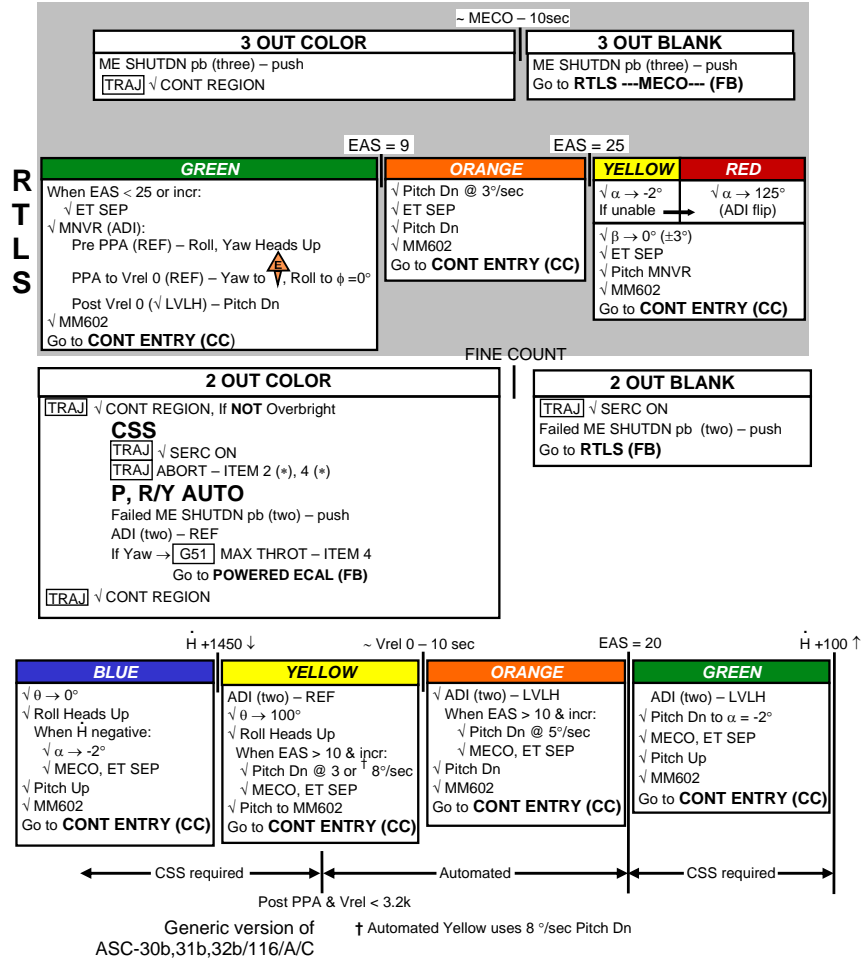
Select UHF – G T/R

When  $M < 1.0$   
Go to **BAILOUT (FB)**

Generic version of  
ASC-30a,31a,32a/116/A/SIM-434

# RTLS CONTINGENCY

High Inclination  
51.6°



# RTLS CONTINGENCY

**CONT ENTRY / MM602**

**VERT SIT** –

If ECAL/BDA – INH  
 √ Theta Limits after Nz Hold

If ECAL/BDA – ENA  
 ITEM 1 (INH)

**Before NZ Hold**  
 RHC/PNL TRIM – ENA

If M < 5,  
 √ AIL/RUD TRIM

If M < 3, S/B = 65%

M ≤ 5 and EAS < 333 ↓  
 ADTA PROBES – Deploy  
**G50** Incorp Air Data ASAP

M2 → 1:  $\theta = 0^\circ$  by M = 1.0

Select UHF – G T/R

When M < 1.0  
 Go to **BAILOUT (FB)**

Generic version of  
ASC-30b,31b,32b/116/A/C

**RED**

√ ADI (two) – LVLH  
 √ H → +400 ( $\theta_{max} = 75^\circ$ )

**TRAJ** AT FINE COUNT:  
 √ Pitch Dn to  $\alpha = -2^\circ$   
 √ MECO, ET SEP

√ Pitch Up  
 √ MM602  
 Go to **RTLS ---MECO--- (FB)**

← Automated →

**ZZA TAL REDESIGNATION  
(116 OCFR1 CYC)**

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 5800  | 5900  | 6000  | 6100  | 6200  | 6300  | 6400  |
| SE OPS 3 ZZA 109 | (14) | 10800 | 10800 | 10900 | 10900 | 10900 | 11000 | 11000 |
| SE ZZA 104       | (4)  | 17500 | 17300 | 17100 | 16800 | 16600 | 16400 | 16200 |

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 6500  | 6600  | 6700  | 6800  | 6900  | 7000  | 7100  |
| SE OPS 3 ZZA 109 | (14) | 11000 | 11000 | 11100 | 11100 | 11100 | 11200 | 11200 |
| SE ZZA 104       | (4)  | 15900 | 15700 | 15500 | 15300 | 15000 | 14800 | 14600 |

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 7200  | 7300  | 7400  | 7500  | 7600  | 7700  | 7800  |
| SE OPS 3 ZZA 109 | (14) | 11200 | 11200 | 11300 | 11300 | 11300 | 11300 | 11400 |
| SE ZZA 104       | (4)  | 14500 | 14300 | 14100 | 14000 | 13900 | 13800 | 13700 |

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 7900  | 8000  | 8100  | 8200  | 8300  | 8400  | 8500  |
| SE OPS 3 ZZA 109 | (14) | 11400 | 11400 | 11400 | 11400 | 11500 | 11500 | 11500 |
| SE ZZA 104       | (4)  | 13600 | 13600 | 13500 | 13500 | 13400 | 13400 | 13400 |

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 8600  | 8700  | 8800  | 8900  | 9000  | 9100  | 9200  |
| SE OPS 3 ZZA 109 | (14) | 11500 | 11500 | 11500 | 11600 | 11600 | 11600 | 11600 |
| SE ZZA 104       | (4)  | 13400 | 13400 | 13400 | 13400 | 13500 | 13500 | 13500 |

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 9300  | 9400  | 9500  | 9600  | 9700  | 9800  | 9900  |
| SE OPS 3 ZZA 109 | (14) | 11600 | 11600 | 11600 | 11700 | 11700 | 11700 | 11700 |
| SE ZZA 104       | (4)  | 13500 | 13500 | 13500 | 13500 | 13500 | 13500 | 13500 |

ASC-9a/116/A/A

NOT FLOWN

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ASC/116/FIN A



**ECAL – ZZA or MRN PRIME TAL**

|                  |            |             |             |             |             |             |             |
|------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>5.6</b> | <b>5.8</b>  | <b>6.0</b>  | <b>6.2</b>  | <b>6.4</b>  | <b>6.6</b>  | <b>6.8</b>  |
| CHERRY POINT (7) |            | 6.7 - 7.0   | 6.7 - 7.2   | 6.8 - 7.3   | 6.8 - 7.4   | 6.9 - 7.5   | 6.9 - 7.6   |
| OTIS ANGB (16)   |            | 10.3 - 11.1 | 10.3 - 11.2 | 10.2 - 11.3 | 10.2 - 11.5 | 10.2 - 11.6 | 10.2 - 11.6 |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>7.0</b>  | <b>7.2</b>  | <b>7.4</b>  | <b>7.6</b>  | <b>7.8</b>  | <b>8.0</b>  | <b>8.2</b>  |
| CHERRY POINT (7) | 7.0 - 7.7   | 7.2 - 7.8   | 7.4 - 7.9   | 7.6 - 7.9   | 7.8 - 8.0   | 8.0 - 8.0   |             |
| GABRESKI (15)    |             |             |             |             | 10.5 - 10.7 | 10.4 - 10.8 | 10.3 - 11.0 |
| OTIS ANGB (16)   | 10.2 - 11.7 | 10.2 - 11.8 | 10.2 - 11.9 | 10.2 - 12.0 | 10.2 - 12.1 | 10.2 - 12.1 | 10.3 - 12.2 |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>8.4</b>  | <b>8.6</b>  | <b>8.8</b>  | <b>9.0</b>  | <b>9.2</b>  | <b>9.4</b>  | <b>9.6</b>  |
| OCEANA NAS (8)   |             | 8.6 - 9.0   | 8.8 - 9.1   | 9.0 - 9.2   | 9.2 - 9.3   |             |             |
| WALLOPS (9)      |             |             |             | 9.4 - 9.6   | 9.2 - 9.7   | 9.4 - 9.8   | 9.6 - 9.8   |
| GABRESKI (15)    | 10.3 - 11.1 | 10.3 - 11.2 | 10.3 - 11.3 | 10.4 - 11.3 | 10.4 - 11.4 | 10.4 - 11.5 | 10.4 - 11.5 |
| OTIS ANGB (16)   | 10.3 - 12.3 | 10.3 - 12.3 | 10.3 - 12.4 | 10.4 - 12.4 | 10.4 - 12.5 | 10.5 - 12.6 | 10.5 - 12.6 |
| PEASE INT'L (17) | 11.3 - 11.7 | 11.3 - 11.9 | 11.3 - 12.0 | 11.3 - 12.1 | 11.3 - 12.2 | 11.3 - 12.2 | 11.3 - 12.3 |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>9.8</b>  | <b>10.0</b> | <b>10.2</b> | <b>10.4</b> | <b>10.6</b> | <b>10.8</b> | <b>11.0</b> |
| WALLOPS (9)      | 9.8 - 9.9   |             |             |             |             |             |             |
| GABRESKI (15)    | 10.4 - 11.6 | 10.5 - 11.7 | 10.5 - 11.7 | 10.5 - 11.8 | 10.6 - 11.8 | 10.8 - 11.9 | 11.0 - 11.9 |
| OTIS ANGB (16)   | 10.5 - 12.7 | 10.5 - 12.7 | 10.6 - 12.8 | 10.6 - 12.8 | 10.7 - 12.9 | 10.8 - 12.9 | 11.0 - 12.9 |
| PEASE INT'L (17) | 11.3 - 12.4 | 11.4 - 12.5 | 11.4 - 12.5 | 11.5 - 12.6 | 11.5 - 12.6 | 11.5 - 12.7 | 11.5 - 12.7 |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>11.2</b> | <b>11.4</b> | <b>11.6</b> | <b>11.8</b> | <b>12.0</b> | <b>12.2</b> | <b>12.4</b> |
| GABRESKI (15)    | 11.2 - 12.0 | 11.4 - 12.0 | 11.6 - 12.1 | 11.8 - 12.2 | 12.0 - 12.2 | 12.2 - 12.3 |             |
| OTIS ANGB (16)   | 11.2 - 13.0 | 11.4 - 13.0 | 11.6 - 13.1 | 11.8 - 13.1 | 12.0 - 13.2 | 12.2 - 13.2 | 12.4 - 13.2 |
| PEASE INT'L (17) | 11.5 - 12.8 | 11.5 - 12.8 | 11.6 - 12.9 | 11.8 - 12.9 | 12.0 - 13.0 | 12.2 - 13.0 | 12.4 - 13.0 |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>12.6</b> | <b>12.8</b> | <b>13.0</b> | <b>13.2</b> | <b>13.4</b> | <b>13.6</b> | <b>13.8</b> |
| OTIS ANGB (16)   | 12.6 - 13.3 | 12.8 - 13.3 | 13.0 - 13.4 | 13.2 - 13.4 | 13.4 - 13.4 |             |             |
| PEASE INT'L (17) | 12.6 - 13.1 | 12.8 - 13.1 | 13.0 - 13.1 |             |             |             |             |

ASC-9b/116/A/B

NOT FLOWN

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ASC/116/FIN A

**MRN TAL REDESIGNATION  
(116 OCFR1 CYC)**

| 1st E.O. VI      |      | 5700  | 5800  | 5900  | 6000  | 6100  | 6200  | 6300  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 10900 | 10900 | 11000 | 11000 | 11000 | 11100 | 11100 |
| SE MRN 104       | (3)  | 17200 | 17000 | 16800 | 16600 | 16300 | 16100 | 15900 |

| 1st E.O. VI      |      | 6400  | 6500  | 6600  | 6700  | 6800  | 6900  | 7000  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 11100 | 11100 | 11200 | 11200 | 11200 | 11300 | 11300 |
| SE MRN 104       | (3)  | 15700 | 15500 | 15200 | 15000 | 14800 | 14600 | 14400 |

| 1st E.O. VI      |      | 7100  | 7200  | 7300  | 7400  | 7500  | 7600  | 7700  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 11300 | 11300 | 11400 | 11400 | 11400 | 11400 | 11400 |
| SE MRN 104       | (3)  | 14200 | 14100 | 13900 | 13800 | 13700 | 13600 | 13500 |

| 1st E.O. VI      |      | 7800  | 7900  | 8000  | 8100  | 8200  | 8300  | 8400  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 11500 | 11500 | 11500 | 11500 | 11500 | 11500 | 11500 |
| SE MRN 104       | (3)  | 13400 | 13400 | 13300 | 13300 | 13300 | 13300 | 13200 |

| 1st E.O. VI      |      | 8500  | 8600  | 8700  | 8800  | 8900  | 9000  | 9100  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 11500 | 11600 | 11600 | 11600 | 11600 | 11600 | 11600 |
| SE MRN 104       | (3)  | 13200 | 13300 | 13300 | 13300 | 13300 | 13300 | 13300 |

| 1st E.O. VI      |      | 9200  | 9300  | 9400  | 9500  | 9600  | 9700  | 9800  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 11600 | 11600 | 11600 | 11600 | 11700 | 11700 | 11700 |
| SE MRN 104       | (3)  | 13400 | 13400 | 13400 | 13400 | 13400 | 13400 | 13400 |

| 1st E.O. VI      |      | 9900  |
|------------------|------|-------|
| SE OPS 3 MRN 109 | (13) | 11700 |
| SE MRN 104       | (3)  | 13400 |

ASC-10a/116/A/A

NOT FLOWN

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ASC/116/FIN A

**ECAL – ZZA or MRN PRIME TAL**

| 1st EO VI (KFPS) | 5.6 | 5.8         | 6.0         | 6.2         | 6.4         | 6.6         | 6.8         |
|------------------|-----|-------------|-------------|-------------|-------------|-------------|-------------|
| CHERRY POINT (7) |     | 6.7 - 7.0   | 6.7 - 7.2   | 6.8 - 7.3   | 6.8 - 7.4   | 6.9 - 7.5   | 6.9 - 7.6   |
| OTIS ANGB (16)   |     | 10.3 - 11.1 | 10.3 - 11.2 | 10.2 - 11.3 | 10.2 - 11.5 | 10.2 - 11.6 | 10.2 - 11.6 |

| 1st EO VI (KFPS) | 7.0         | 7.2         | 7.4         | 7.6         | 7.8         | 8.0         | 8.2         |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CHERRY POINT (7) | 7.0 - 7.7   | 7.2 - 7.8   | 7.4 - 7.9   | 7.6 - 7.9   | 7.8 - 8.0   | 8.0 - 8.0   |             |
| GABRESKI (15)    |             |             |             |             | 10.5 - 10.7 | 10.4 - 10.8 | 10.3 - 11.0 |
| OTIS ANGB (16)   | 10.2 - 11.7 | 10.2 - 11.8 | 10.2 - 11.9 | 10.2 - 12.0 | 10.2 - 12.1 | 10.2 - 12.1 | 10.3 - 12.2 |

| 1st EO VI (KFPS) | 8.4         | 8.6         | 8.8         | 9.0         | 9.2         | 9.4         | 9.6         |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| OCEANA NAS (8)   |             | 8.6 - 9.0   | 8.8 - 9.1   | 9.0 - 9.2   | 9.2 - 9.3   |             |             |
| WALLOPS (9)      |             |             |             | 9.4 - 9.6   | 9.2 - 9.7   | 9.4 - 9.8   | 9.6 - 9.8   |
| GABRESKI (15)    | 10.3 - 11.1 | 10.3 - 11.2 | 10.3 - 11.3 | 10.4 - 11.3 | 10.4 - 11.4 | 10.4 - 11.5 | 10.4 - 11.5 |
| OTIS ANGB (16)   | 10.3 - 12.3 | 10.3 - 12.3 | 10.3 - 12.4 | 10.4 - 12.4 | 10.4 - 12.5 | 10.5 - 12.6 | 10.5 - 12.6 |
| PEASE INT'L (17) | 11.3 - 11.7 | 11.3 - 11.9 | 11.3 - 12.0 | 11.3 - 12.1 | 11.3 - 12.2 | 11.3 - 12.2 | 11.3 - 12.3 |

| 1st EO VI (KFPS) | 9.8         | 10.0        | 10.2        | 10.4        | 10.6        | 10.8        | 11.0        |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| WALLOPS (9)      | 9.8 - 9.9   |             |             |             |             |             |             |
| GABRESKI (15)    | 10.4 - 11.6 | 10.5 - 11.7 | 10.5 - 11.7 | 10.5 - 11.8 | 10.6 - 11.8 | 10.8 - 11.9 | 11.0 - 11.9 |
| OTIS ANGB (16)   | 10.5 - 12.7 | 10.5 - 12.7 | 10.6 - 12.8 | 10.6 - 12.8 | 10.7 - 12.9 | 10.8 - 12.9 | 11.0 - 12.9 |
| PEASE INT'L (17) | 11.3 - 12.4 | 11.4 - 12.5 | 11.4 - 12.5 | 11.5 - 12.6 | 11.5 - 12.6 | 11.5 - 12.7 | 11.5 - 12.7 |

| 1st EO VI (KFPS) | 11.2        | 11.4        | 11.6        | 11.8        | 12.0        | 12.2        | 12.4        |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| GABRESKI (15)    | 11.2 - 12.0 | 11.4 - 12.0 | 11.6 - 12.1 | 11.8 - 12.2 | 12.0 - 12.2 | 12.2 - 12.3 |             |
| OTIS ANGB (16)   | 11.2 - 13.0 | 11.4 - 13.0 | 11.6 - 13.1 | 11.8 - 13.1 | 12.0 - 13.2 | 12.2 - 13.2 | 12.4 - 13.2 |
| PEASE INT'L (17) | 11.5 - 12.8 | 11.5 - 12.8 | 11.6 - 12.9 | 11.8 - 12.9 | 12.0 - 13.0 | 12.2 - 13.0 | 12.4 - 13.0 |

| 1st EO VI (KFPS) | 12.6        | 12.8        | 13.0        | 13.2        | 13.4        | 13.6 | 13.8 |
|------------------|-------------|-------------|-------------|-------------|-------------|------|------|
| OTIS ANGB (16)   | 12.6 - 13.3 | 12.8 - 13.3 | 13.0 - 13.4 | 13.2 - 13.4 | 13.4 - 13.4 |      |      |
| PEASE INT'L (17) | 12.6 - 13.1 | 12.8 - 13.1 | 13.0 - 13.1 |             |             |      |      |

ASC-10b/116/A/B

NOT FLOWN

2-43

ASC/116/FIN A

**BEN TAL REDESIGNATION  
(116 OCFR1 CYC)**

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 5700  | 5800  | 5900  | 6000  | 6100  | 6200  | 6300  |
| SE OPS 3 BEN 109 | (12) | 10700 | 10700 | 10800 | 10800 | 10800 | 10900 | 10900 |
| SE BEN 104       | (2)  | 17200 | 17000 | 16800 | 16600 | 16400 | 16200 | 15900 |

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 6400  | 6500  | 6600  | 6700  | 6800  | 6900  | 7000  |
| SE OPS 3 BEN 109 | (12) | 10900 | 10900 | 11000 | 11000 | 11000 | 11100 | 11100 |
| SE BEN 104       | (2)  | 15700 | 15500 | 15300 | 15100 | 14900 | 14700 | 14500 |

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 7100  | 7200  | 7300  | 7400  | 7500  | 7600  | 7700  |
| SE OPS 3 BEN 109 | (12) | 11100 | 11100 | 11200 | 11200 | 11200 | 11200 | 11300 |
| SE BEN 104       | (2)  | 14300 | 14200 | 14000 | 13900 | 13800 | 13700 | 13600 |

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 7800  | 7900  | 8000  | 8100  | 8200  | 8300  | 8400  |
| SE OPS 3 BEN 109 | (12) | 11300 | 11300 | 11300 | 11300 | 11400 | 11400 | 11400 |
| SE BEN 104       | (2)  | 13500 | 13500 | 13400 | 13400 | 13400 | 13400 | 13400 |

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 8500  | 8600  | 8700  | 8800  | 8900  | 9000  | 9100  |
| SE OPS 3 BEN 109 | (12) | 11500 | 11500 | 11600 | 11600 | 11600 | 11600 | 11600 |
| SE BEN 104       | (2)  | 13400 | 13400 | 13400 | 13400 | 13400 | 13400 | 13400 |

|                  |      |       |       |       |       |       |       |       |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| 1st E.O. VI      |      | 9200  | 9300  | 9400  | 9500  | 9600  | 9700  | 9800  |
| SE OPS 3 BEN 109 | (12) | 11600 | 11600 | 11600 | 11700 | 11700 | 11700 | 11700 |
| SE BEN 104       | (2)  | 13500 | 13500 | 13500 | 13500 | 13500 | 13500 | 13500 |

|                  |      |       |  |  |  |  |  |  |
|------------------|------|-------|--|--|--|--|--|--|
| 1st E.O. VI      |      | 9900  |  |  |  |  |  |  |
| SE OPS 3 BEN 109 | (12) | 11700 |  |  |  |  |  |  |
| SE BEN 104       | (2)  | 13500 |  |  |  |  |  |  |

ASC-12a/116/A/A

NOT FLOWN

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ASC/116/FIN A

**ECAL - BEN PRIME TAL**

|                  |     |           |           |           |           |           |           |
|------------------|-----|-----------|-----------|-----------|-----------|-----------|-----------|
| 1st EO VI (KFPS) | 5.6 | 5.8       | 6.0       | 6.2       | 6.4       | 6.6       | 6.8       |
| CHERRY POINT (7) |     | 6.5 - 6.8 | 6.6 - 7.0 | 6.7 - 7.2 | 6.7 - 7.3 | 6.8 - 7.4 | 6.9 - 7.5 |
| OTIS ANGB (16)   |     |           |           |           |           |           |           |
| GABRESKI (15)    |     |           |           |           |           |           |           |
| PEASE INT'L (17) |     |           |           |           |           |           |           |

|                  |           |           |           |           |           |     |             |
|------------------|-----------|-----------|-----------|-----------|-----------|-----|-------------|
| 1st EO VI (KFPS) | 7.0       | 7.2       | 7.4       | 7.6       | 7.8       | 8.0 | 8.2         |
| CHERRY POINT (7) | 7.0 - 7.6 | 7.2 - 7.7 | 7.4 - 7.7 | 7.6 - 7.8 | 7.8 - 7.9 |     |             |
| OTIS ANGB (16)   |           |           |           |           |           |     | 11.0 - 11.3 |
| GABRESKI (15)    |           |           |           |           |           |     |             |
| PEASE INT'L (17) |           |           |           |           |           |     |             |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | 8.4         | 8.6         | 8.8         | 9.0         | 9.2         | 9.4         | 9.6         |
| CHERRY POINT (7) |             |             |             |             |             |             |             |
| OTIS ANGB (16)   | 10.9 - 11.4 | 10.9 - 11.6 | 10.9 - 11.7 | 10.9 - 11.8 | 10.9 - 11.8 | 10.9 - 11.9 | 10.9 - 12.0 |
| GABRESKI (15)    |             |             |             |             |             |             |             |
| PEASE INT'L (17) |             |             |             |             |             |             |             |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | 9.8         | 10.0        | 10.2        | 10.4        | 10.6        | 10.8        | 11.0        |
| CHERRY POINT (7) |             |             |             |             |             |             |             |
| OTIS ANGB (16)   | 10.9 - 12.1 | 10.9 - 12.2 | 10.9 - 12.2 | 10.9 - 12.4 | 10.9 - 12.4 | 10.9 - 12.5 | 11.0 - 12.5 |
| GABRESKI (15)    |             |             |             | 11.0 - 11.3 | 11.0 - 11.5 | 11.0 - 11.6 | 11.0 - 11.7 |
| PEASE INT'L (17) |             |             |             |             |             |             |             |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | 11.2        | 11.4        | 11.6        | 11.8        | 12.0        | 12.2        | 12.4        |
| CHERRY POINT (7) |             |             |             |             |             |             |             |
| OTIS ANGB (16)   | 11.2 - 12.6 | 11.4 - 12.7 | 11.6 - 12.7 | 11.8 - 12.8 | 12.0 - 12.9 | 12.2 - 13.0 | 12.4 - 13.0 |
| GABRESKI (15)    | 11.2 - 11.9 | 11.4 - 12.0 | 11.6 - 12.0 | 11.8 - 12.1 | 12.0 - 12.2 | 12.2 - 12.2 |             |
| PEASE INT'L (17) | 12.1 - 12.1 | 12.0 - 12.4 | 12.0 - 12.6 | 12.0 - 12.8 | 12.0 - 12.9 | 12.2 - 13.0 | 12.4 - 13.0 |

|                  |             |             |             |             |             |      |      |
|------------------|-------------|-------------|-------------|-------------|-------------|------|------|
| 1st EO VI (KFPS) | 12.6        | 12.8        | 13.0        | 13.2        | 13.4        | 13.6 | 13.8 |
| CHERRY POINT (7) |             |             |             |             |             |      |      |
| OTIS ANGB (16)   | 12.6 - 13.1 | 12.8 - 13.2 | 13.0 - 13.3 | 13.2 - 13.3 | 13.4 - 13.4 |      |      |
| GABRESKI (15)    |             |             |             |             |             |      |      |
| PEASE INT'L (17) | 12.6 - 13.0 | 12.8 - 13.0 | 13.0 - 13.1 |             |             |      |      |

ASC-12b/116/A/A

NOT FLOWN

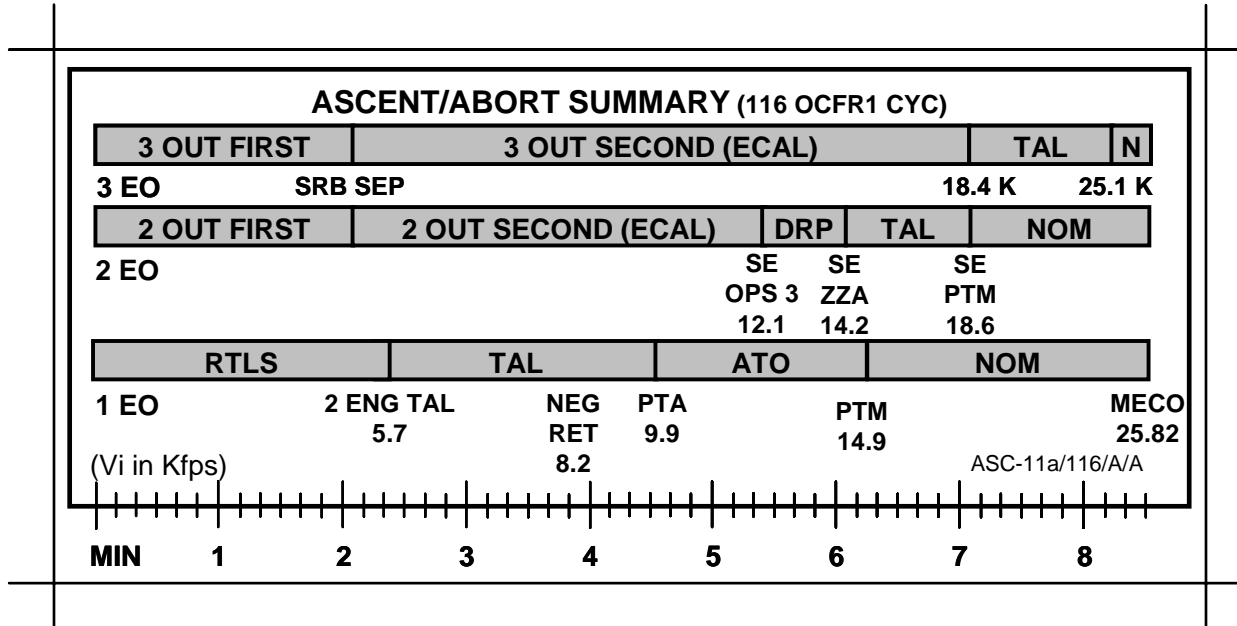
2-45

ASC/116/FIN A

NOT FLOWN

2-46

ASC/116/FIN A





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 |                        |

**ET PHOTO MANEUVER/MPS DUMP**

- \* If OMS 1 Burn performed, go to \*
- \* POST BURN STATUS \*

B           √MCC,  
              ADI – REF

- \* If Feedline Fail: \*
- \*   √MCC GO for +X and Pitch Mnvr \*
- \*    At MECO + 6 min:       (14:23 Nom) \*
- \*    ET SEP – SEP \*
- \*    At MM104 + 2 sec \*
- \*    +X xlation for 11 sec \*
- \*    At OMS 1 TIG:         (16:05 Nom) \*
- \*    Pitch up at 2°/sec until ET in O/H \*
- \*    window (P ~110°) \*
- \*    Go to MPS DUMP complete \*

If NO-GO for Photo Pitch Mnvr, go to MPS DUMP complete; do not pitch

**MPS DUMP start**                               (MECO + 2:03)

C           At OMS 1 TIG + 30 sec:               (MECO + 2:33)  
  (10:56 Nom)

C3           DAP – INRTL: R (DISC), P (PULSE), Y (DISC),  
              Orbiter pitches up

Control pitch rate 2°/sec to 3°/sec

- \* If no pitch rate, go to MPS DUMP complete \*

When ET in O/H window (MS call or P ~90°):

P – DISC

Adjust pitch photo att as reqd for MS

P           **MPS DUMP complete**

F4           √BDY FLP pb – It off (MECO + 4 min) (12:24 Nom)

- \* C    If no pitch rate, \*
- \*    P – DISC \*
- \*    Pitch up at 2°/sec until ET \*
- \*    in O/H window (P ~85°) \*

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 When MPS dump complete:  
R4 HYD MPS/TVC ISOL VLV (1,2,3; 5 sec interval) –  
CL (hold each 5 sec, tb-CL)

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

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

**P APU/HYD SHUTDN**

R2 √MCC  
√APU AUTO SHTDN (three) – ENA  
BLR PWR (three) – OFF  
N2 SPLY (three) – OFF  
APU OPER (1,2,3; 5 sec interval) – OFF (MA)  
FU TK VLV (three) – CL  
√Shutdn (HYD PRESS < 200)  
CNTLR PWR (three) – OFF  
√HYD MN PUMP PRESS (three) – NORM

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

### 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 LN/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**

**NOTE**

Expect multiple MAs for MPS He P  
as regs bleed down

R2            MPS ENG PWR L (two)    – OFF  
   CTR (two) – OFF  
   R (two)     – OFF  
   He ISOL (six)     – GPC  
   PNEU He ISOL    – GPC  
    $\sqrt{\text{He I'CNCT}}$  (three)    – GPC

**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, CTRLINE LAT tb – STO

\* If CTRLINE LAT does not stow within 12 sec: \* |

\* CTRLINE LAT – GND \* |

\* √MCC \* |

CTRLINE LAT – GND |

L,R DR (two) – CL (tb-bp) |

√After 24 sec, L,R DR tb (two) – CL |

\* If doors do not close within 48 sec: \* |

\* L,R DR (two) – OFF \* |

\* √MCC \* |

L,R DR (two) – OFF |

LAT (two) – LAT (tb-bp) |

√After 6 sec, L,R LAT tb (two) – LAT |

\* If doors do not latch within 12 sec: \* |

\* L,R LAT (two) – OFF \* |

\* √MCC \* |

L,R LAT (two) – OFF |

MODE – GPC |

|                             |                        |
|-----------------------------|------------------------|
| 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 OMS 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 MNVR – ITEM 27 EXEC (\*)

|                        |
|------------------------|
| 3: BFS, GNC SYS SUMM 2 |
|------------------------|

**B SEAT SAFING AND ADJUSTMENT**

Adjust Back Angle

- TIG-5 B Go to OMS 2/ORBIT OMS BURN  
 (Cue Card)



OMS 2 BURN CARDS

OMS 2

MS ONLY

4-1

ASC/116/FIN A



### OMS 2 BURN MONITOR

|  |  |   |     |     |     |     |                                      |
|--|--|---|-----|-----|-----|-----|--------------------------------------|
| <b>OMS TEMP*</b><br>FU IN P ≥ <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; text-align: center;">L</td><td style="width: 20px; text-align: center;">R</td></tr><tr><td style="text-align: center;">225</td><td style="text-align: center;">220</td></tr></table><br>≤ <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; text-align: center;">205</td><td style="width: 20px; text-align: center;">204</td></tr></table><br>or No FU IN P | L  | R   | 225 | 220 | 205 | 204 | OMS ENG FAIL<br><hr/> OMS PRPLT FAIL |
| L  | R  |   |     |     |     |     |                                      |
| 225  | 220  |   |     |     |     |     |                                      |
| 205  | 204  |   |     |     |     |     |                                      |
| <b>OMS PC* &amp; OMS ↓</b> (BFS: √accel)<br>ENG VLV 1 or 2 < 70<br>or OX IN P > 227<br><hr/> OX IN P ≤ 227<br>or No OX IN P  | OMS ENG FAIL<br><hr/> OMS PRPLT FAIL   |   |     |     |     |     |                                      |
| <b>OMS OX/FU TK P</b> (√ENG IN P)<br>OX/FU LOW<br><hr/> OX & FU HIGH   | He PRESS/VAP ISOL (two) – OP<br>If aff TK P not incr:<br>He PRESS/VAP ISOL (two) – CL<br>At PC < 72 or OMS TEMP or HP > <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; text-align: center;">85</td></tr></table> :<br>OMS PRPLT FAIL<br><hr/> He PRESS/VAP ISOL (two) – CL<br>Cycle He A(B) to maintain TK P 234-284 | 85  |     |     |     |     |                                      |
| 85   |  |   |     |     |     |     |                                      |
| <b>OMS He TK P LOW</b><br>(√ <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; text-align: center;">OMS/MPS</td></tr></table> )   | OMS/MPS  | At He P < 640 or QTY ≤ 41:<br>If HP < <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; text-align: center;">85</td></tr></table> : OMS XFEED from good OMS<br>At HP > <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; text-align: center;">85</td></tr></table> : OMS PRPLT FAIL | 85  | 85  |     |     |                                      |
| OMS/MPS  |  |   |     |     |     |     |                                      |
| 85   |  |   |     |     |     |     |                                      |
| 85   |  |   |     |     |     |     |                                      |
| <b>OMS N2 REG P HIGH or LOW</b>  | OMS ENG – ARM  |   |     |     |     |     |                                      |
| <b>OMS N2 TK P LOW</b><br>(√ <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; text-align: center;">OMS/MPS</td></tr></table> )   | OMS/MPS  | At N2 TK P < 470: OMS ENG – ARM   |     |     |     |     |                                      |
| OMS/MPS  |  |   |     |     |     |     |                                      |
| <b>OMS GMBL</b><br>PRI fail<br>SEC fail  | L(R) OMS GMBL – SEC (twice)<br>If high RCS usage: OMS ENG FAIL   |   |     |     |     |     |                                      |
| <b>GPC</b> <b>1(4) &amp;</b><br>Burning OMS aff  | aff GPC PWR – OFF<br>If SEC GMBL avail:<br>aff MDM FF 1(4) – OFF,ON<br>L(R) OMS GMBL – SEC (twice)   |   |     |     |     |     |                                      |
| SEC GMBL lost<br>2 FAs lost  | If high RCS usage: OMS ENG FAIL<br>√MAN SHUTDN   |   |     |     |     |     |                                      |
| <b>I/O ERROR FA</b> <b>1(4)</b>  | L(R) OMS GMBL – SEC<br>I/O RESET (if recov: BFS I/O RESET)<br>If high RCS usage: OMS ENG FAIL  |   |     |     |     |     |                                      |
| 2 FAs lost   | √MAN SHUTDN  |   |     |     |     |     |                                      |
| <b>BCE STRG D</b> <b>1(4)</b>  | I/O RESET (if recov: >>)<br>If high RCS usage:<br>L(R) OMS GMBL – SEC (twice)  |   |     |     |     |     |                                      |
| <b>I/O ERROR PCM</b>   | OI PCMMU PWR – 2(1)  |   |     |     |     |     |                                      |

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

ASC-5a/116/A,O/A

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  
 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 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<sub>C</sub> 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<sub>C</sub>, 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<br>VGO Y,Z < 2 fps | VGO X < +0.2 fps | All axes < 0.2 fps |

ASC-6a/116/A,O/B

## 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  
 TIMER – ITEM 23 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 = 85 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/116/A,O/B

POST OMS 2 BURN PROCEDURES

**POST  
OMS 2**

5-1

ASC/116/FIN A

|                        |                        |
|------------------------|------------------------|
| 1: GNC OMS 2 MNVR EXEC | 2: GNC OMS 2 MNVR EXEC |
| 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 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)  |  |
|    | $\sqrt$ MANF ISOL 1,2,3,4 (eight) | – GPC (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)  |  |
|    | $\sqrt$ MANF ISOL 1,2,3,4 (four)  | – GPC (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 |                        |

**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/116/FIN A



## DIRECT INSERTION AOA DEL PAD

| DEORBIT                           |  |  |  |   |                             |   |                             |           |   |
|-----------------------------------|--|--|--|---|-----------------------------|---|-----------------------------|-----------|---|
| PRPLT                             |  |  |  |   | ( )                         |   |                             |           |   |
| BURN CUE CARD:                    |  |  |  |   |                             |   |                             |           |   |
| OMS ENG FAIL XFEED QTY CUE        |  |  |  |   | %L                          |   | %R                          |           |   |
| TOT AFT QTY 1 (%)                 |  |  |  |   | 2                           |   | 2                           |           | 3 |
| TOT AFT QTY 2 (%)                 |  |  |  |   |                             |   | 5                           |           | 3 |
| FLIP ΔV                           |  |  |  |   |                             |   | 4                           |           | 9 |
| AFT ΔV                            |  |  |  |   |                             |   |                             |           | 0 |
| B/U SITE                          |  |  |  |   | N                           |   | /                           | A         |   |
| 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                         |  | <input type="checkbox"/> <input type="checkbox"/>                            |  | RWY   |                             | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |                             | 50K /     |   |
| <input type="checkbox"/> L        |  | <input type="checkbox"/> OVHD  |  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> deg |                             | <input type="checkbox"/> <input type="checkbox"/> MLS   |                             | 38K /     |   |
| <input type="checkbox"/> R        |  | <input type="checkbox"/> STRT  |  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> TAC |                             |   |                             | 28K /     |   |
| ΔT MACH < 1 TO HAC                |  | <input type="checkbox"/> : <input type="checkbox"/> <input type="checkbox"/> |  | MAX Nz  |                             | <input type="checkbox"/> . <input type="checkbox"/>   |                             | 20K /     |   |
|                                   |  |  |  | Nz LIMIT  |                             | <input type="checkbox"/> . <input type="checkbox"/>   |                             | 12K /     |   |
| ΔT HAC INIT TO H = 20K            |  | <input type="checkbox"/> : <input type="checkbox"/> <input type="checkbox"/> |  |   |                             |   |                             | 7K /      |   |
|                                   |  |  |  |   |                             |   |                             | 3K /      |   |
|                                   |  |  |  |   |                             |   |                             | 1K /      |   |
| AIMPOINT                          |  | SPEEDBRAKE   |  |   |                             |   |                             | SURFACE / |   |
| <input type="checkbox"/> NOM      |  | <input type="checkbox"/> NOM   |  | <input type="checkbox"/> <input type="checkbox"/> % @ 3K  |                             |   |                             |           |   |
| <input type="checkbox"/> CLOSE-IN |  | <input type="checkbox"/> S.F.  |  |   |                             |   |                             |           |   |
| REMARKS:                          |  |  |  |   |                             |   |                             |           |   |

AOA  
PADS



# W/OMS 1 AOA DEL PAD

| <u>DEORBIT</u>   |   |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
|--|---|--|--|--|-----------------------------|---|-----------------------------|---------|--|---|---|--|--|---|---|---|---|---|---|--|--|
| PRPLT  |   |  |  |  | ( )                         |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| BURN CUE CARD:   |   |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| OMS ENG FAIL XFEED QTY CUE   |   |  |  |  | %L                          |   | %R                          |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| TOT AFT QTY 1 (%)  |   |  |  |  |                             |   | 2 2 3                       |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| TOT AFT QTY 2 (%)  |   |  |  |  |                             |   | 5 3                         |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| FLIP HP = ( ) TGT HP + <input type="checkbox"/> <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr><tr><td> </td><td> </td></tr></table> OR <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>1</td><td>9</td></tr><tr><td>0</td><td>7</td></tr></table> <span style="margin-left: 5px;">STEEP</span><br><span style="margin-left: 5px;">SHALLOW</span> + <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>2</td><td>5</td></tr></table> = <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table><br><small>( <math>\frac{\text{FLIP } \Delta V}{2}</math> )</small> |   |  |  |  |                             |   |                             |         |  |   |   |  |  | 1 | 9 | 0 | 7 | 2 | 5 |  |  |
|  |   |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
|  |   |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| 1  | 9 |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| 0  | 7 |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| 2  | 5 |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
|  |   |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| AFT HP = ( ) TGT HP + <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td>0</td></tr></table> = <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td> </td><td> </td></tr></table><br><small>( <math>\frac{\text{AFT } \Delta V}{2}</math> )</small>  |   |  |  |  |                             |   |                             |         |  |   | 0 |  |  |   |   |   |   |   |   |  |  |
|  | 0 |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
|  |   |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| B/U SITE   |   |  |  |  | N / A                       |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| FRCS: DUMP TO % (USE TIME AS CUE)  |   |  |  |  | <input type="checkbox"/> OX |   | <input type="checkbox"/> FU |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| <u>ENTRY / LANDING</u>   |   |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| 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  |   | <input type="checkbox"/> <input type="checkbox"/>                          |  | RWY  |                             | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |                             | 50K     |  | / |   |  |  |   |   |   |   |   |   |  |  |
| <input type="checkbox"/> L   |   | <input type="checkbox"/> OVHD  |  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> deg |                             | <input type="checkbox"/> <input type="checkbox"/> MLS   |                             | 38K     |  | / |   |  |  |   |   |   |   |   |   |  |  |
| <input type="checkbox"/> R   |   | <input type="checkbox"/> STRT  |  | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> TAC |                             |   |                             | 28K     |  | / |   |  |  |   |   |   |   |   |   |  |  |
| $\Delta T$ MACH < 1 TO HAC   |   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |  | MAX Nz   |                             | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  |                             | 20K     |  | / |   |  |  |   |   |   |   |   |   |  |  |
|  |   |  |  | Nz LIMIT   |                             | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>  |                             | 12K     |  | / |   |  |  |   |   |   |   |   |   |  |  |
| $\Delta T$ HAC INIT TO H = 20K   |   | <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> |  |  |                             |   |                             | 7K      |  | / |   |  |  |   |   |   |   |   |   |  |  |
|  |   |  |  |  |                             |   |                             | 3K      |  | / |   |  |  |   |   |   |   |   |   |  |  |
|  |   |  |  |  |                             |   |                             | 1K      |  | / |   |  |  |   |   |   |   |   |   |  |  |
| AIMPOINT   |   | SPEEDBRAKE   |  |  |                             |   |                             | SURFACE |  | / |   |  |  |   |   |   |   |   |   |  |  |
| <input type="checkbox"/> NOM   |   | <input type="checkbox"/> NOM   |  | <input type="checkbox"/> <input type="checkbox"/> % @ 3K                       |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| <input type="checkbox"/> CLOSE-IN  |   | <input type="checkbox"/> S.F.  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |
| <u>REMARKS:</u>  |   |  |  |  |                             |   |                             |         |  |   |   |  |  |   |   |   |   |   |   |  |  |

6-4

ASC/116/FIN A

### 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

θT 17

PRPLT 18 ( )

#### BURN ATT

R 24

P 25

Y 26

REI

TXX

#### ΔVTOT

TGO

VGO X ( ) .

VGO Y ( ) .

VGO Z ( ) .

HA HP

TGT

#### NOTES

##### RCS I'CNCT:

L OMS → RCS

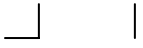
R OMS → RCS

NONE

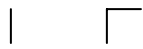
BURN CARD

OMS PRPLT PAD

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



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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 SHTDN (three)         – ENA
- HYD MN PUMP PRESS (three) – LO (MA)

**FES & 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 LN/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 I\_TGT (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><u>WARNING</u><br/>         Ice in W/B Steam Vent may cause loss of APU/HYD</p> |
|--|

**P W/B STEAM VENT HTR 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**

NOTE

Expect multiple MAs for MPS He P  
as regs bleed down

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

**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><b>WARNING</b><br/> ET CTRLINE LATCHES must be<br/> stowed prior to L,R DR closure to<br/> 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<br>MODE – GPC/MAN<br>CTRLINE LAT – STO<br>√After 6 sec, CTRLINE LAT tb – STO<br><br>* If CTRLINE LAT does not stow within 12 sec: *<br>* CTRLINE LAT – GND *<br>* √MCC *<br><br>CTRLINE LAT – GND<br>L,R DR (two) – CL (tb-bp)<br>√After 24 sec, L,R DR tb (two) – CL<br><br>* If doors do not close within 48 sec: *<br>* L,R DR (two) – OFF *<br>* √MCC *<br><br>L,R DR (two) – OFF<br>LAT (two) – LAT (tb-bp)<br>√After 6 sec, L,R LAT tb (two) – LAT<br><br>* If doors do not latch within 12 sec: *<br>* L,R LAT (two) – OFF *<br>* √MCC *<br><br>L,R LAT (two) – OFF<br>MODE – GPC |
|----|--|

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

**RECONFIG DPS FOR ENTRY**

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

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<br>KSC 33  | TTS 59Y  | OMN 73 | 8<br>6   |
| 42               | NOR 17<br>NOR 23  | SNG 121Y | HMN 92 | 6<br>6   |
| 43               | NOR 05<br>NOR 35  | SNG 121Y | HMN 92 | -<br>-   |
| 44               | EDW 15<br>EDW 18L | EDW 111  | LHS 21 | -<br>-   |
| 45               | EDW 22<br>EDW 04  | EDW 111  | LHS 21 | 8/†<br>6 |

† 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  $\Delta V$  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  $\theta_t$  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  $\Delta$ TIG (if REI – REF > 50)  
from OMS TARGETS

CRTX Enter new TIG

LOAD – ITEM 22 EXEC  
TIMER – ITEM 23 EXEC

Repeat until  $\Delta$ RANGE < 50

CRT3  $\sqrt$ BFS TGT

**MNVR TO DEORBIT BURN ATTITUDE**

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

C MNVR – ITEM 27 EXEC (\*)  
( $\sqrt$ ADI ATT with CRT BURN ATT)

3: BFS, GNC SYS SUMM 2

TIG-5 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/116/FIN A

DEORBIT CARDS

## DEORBIT BURN MONITOR

|  |   |     |                                |     |     |     |   |
|--|---|-----|--------------------------------|-----|-----|-----|---|
| <b>OMS TEMP*</b><br>FU IN P $\geq$ <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; text-align: center;">L</td><td style="width: 20px; text-align: center;">R</td></tr><tr><td style="text-align: center;">225</td><td style="text-align: center;">220</td></tr><tr><td style="text-align: center;">205</td><td style="text-align: center;">204</td></tr></table><br>$\leq$<br>or No FU IN P | L   | R   | 225                            | 220 | 205 | 204 | Oms Eng Fail<br>-----<br>Oms PRPLT Fail |
| L  | R   |     |                                |     |     |     |   |
| 225  | 220   |     |                                |     |     |     |   |
| 205  | 204   |     |                                |     |     |     |   |
| <b>OMS PC* &amp; OMS</b> ↓ (BFS: √accel)<br>ENG VLV 1 or 2 < 70<br>or        OX IN P > 227<br>OX IN P ≤ 227<br>or No OX IN P   | Oms Eng Fail<br>-----<br>Oms PRPLT Fail   |     |                                |     |     |     |   |
| <b>OMS OX/FU TK P</b> (√ENG IN P)<br>OX/FU LOW   | He PRESS/VAP ISOL (two) – OP<br>If aff TK P not incr:<br>He PRESS/VAP ISOL (two) – CL<br>At PC < 72 or OMS TEMP:<br>Oms PRPLT Fail  |     |                                |     |     |     |   |
| OX & FU HIGH   | He PRESS/VAP ISOL (two) – CL<br>Cycle He A(B) to maintain TK P 234-284  |     |                                |     |     |     |   |
| <b>OMS GMBL</b>  | PRI fail        L(R) OMS GMBL – SEC (twice)<br>SEC fail        If high RCS usage: OMS ENG FAIL  |     |                                |     |     |     |   |
| <b>GPC</b> <b>1(4) &amp;</b><br>Burning OMS aff  | aff GPC PWR – OFF<br>If SEC GMBL avail:<br>aff MDM FF 1(4) – OFF,ON<br>L(R) OMS GMBL – SEC (twice)  |     |                                |     |     |     |   |
| SEC GMBL lost<br>2 FAs lost  | If high RCS usage: OMS ENG FAIL<br>√MAN SHUTDN  |     |                                |     |     |     |   |
| <b>I/O ERROR FA</b> <b>1(4)</b>  | L(R) OMS GMBL – SEC<br>I/O RESET (if recov: BFS I/O RESET)<br>If high RCS usage: OMS ENG FAIL   |     |                                |     |     |     |   |
| 2 FAs lost   | √MAN SHUTDN   |     |                                |     |     |     |   |
| <b>BCE STRG D</b>  | I/O RESET (if recov: >>)<br><b>1(4)</b><br>If high RCS usage:<br>L(R) OMS GMBL – SEC (twice)  |     |                                |     |     |     |   |
| <b>RM DLMA IMU</b><br>or<br><b>ABOVE SAFE</b><br>HP ⇒ <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; height: 15px;"></td><td style="width: 20px; height: 15px;"></td></tr></table>   |   |     | STOP BURN: OMS ENG(s) – OFF >> |     |     |     |   |
|  |   |     |                                |     |     |     |   |
| <b>GPC SET SPLIT</b><br>or<br><b>2 MN BUSES</b> <b>BELOW SAFE</b><br>HP ⇒  | IMU DLMA:<br>After C/O: √timer <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 20px; text-align: center;">G21</td></tr></table><br>If any IMU ACC > 0.03: aff IMU – desel<br>I'cnct OMS to RCS (√RCS Burn Time)<br>THC +X to TGT HP (EOM) or<br>3.5 x timer at C/O (AOA)<br>SET SPLIT: Go to "GPC" above | G21 |                                |     |     |     |   |
| G21  |   |     |                                |     |     |     |   |
| <b>I/O ERROR PCM</b>   | OI PCMMU PWR – 2(1)   |     |                                |     |     |     |   |

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

ENT-2a/116/A,O,D,E/A

MS ONLY

6-18

ASC/116/FIN A





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MS ONLY

6-19

ASC/116/FIN A



**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<sub>c</sub>, ΔVTOT, ENG VLVs)

- \* **OMS PRPLT FAIL (CONTINUE BURN):** \*
- \* Failed OMS ENG – OFF \*
- \* ITEM 18 +0 EXEC \*
- \* When good OMS QTY: \*
- \*     5%: L, R OMS XFEED (four) – OP \*
- \*     4%: Good OMS TK ISOL (two) – CL \*
- \*     If OMS P<sub>c</sub> < 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 +0 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/E

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  $\Delta V$  or \*  
 \* if CUR  $\Delta VTOT$ : TOT AFT QTY 2    % then \*  
 \* FRCS COMPLETION \*  
 \* \*  
 \* FLIP   ----- \*  
 \*  $\Delta V$    FRCS COMPLETION \*  
 \* \*  
 \* AFT   ----- \*  
 \*  $\Delta V$    THC +X to TGT  $\Delta V$  \*  
 \* \*  
 \* TGT   ----- \*  
 \*  $\Delta V$    \*  
 \* \*  
 \* 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:** \*  
 \* 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(s) – OFF (If < 3 IMU, at  :  )  
 \* AFT RCS RECONFIG if INTERCONNECT \*  
 Trim X,Z residuals < 2 fps (< 0.5 fps if shallow)

ASC-8aa/116/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<sub>C</sub>, 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 good 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/B \*

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  $\Delta V$  or

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

\*                             FRCS COMPLETION

\*     FLIP   -----

\*      $\Delta V$      FRCS COMPLETION

\*     AFT   -----

\*      $\Delta V$      THC +X to TGT  $\Delta V$

\*     TGT   -----

\*      $\Delta V$

\* 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  $\Delta VTOT$ )

\*     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/116/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 ± 3°  
Monitor ΔVTOT

RCS I'CNCT TK SW at ΔVTOT =   
R OMS XFEED (two) – OP  
L OMS XFEED (two) – CL

**OMS PRPLT LOW**  
AFT RCS RECONFIG AT ΔVTOT =   
RCS COMPLETION

- \* **OMS PRPLT FAIL (MULTIPLE JETS FAIL OFF):** \*
- \*    Secure aff OMS \*
- \*    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 jets \*

ASC-7a/A/B

HINGE

MS ONLY

6-24

ASC/116/FIN A

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  $\Delta V$  or \*  
\* if CUR  $\Delta VTOT$ : TOT AFT QTY 2    % then \*  
\* FRCS COMPLETION \*  
\* \*  
\* FLIP   ----- \*  
\*  $\Delta V$    FRCS COMPLETION \*  
\* \*  
\* AFT   ----- \*  
\*  $\Delta V$    THC +X to TGT  $\Delta V$  \*  
\* \*  
\* TGT   ----- \*  
\*  $\Delta V$    \*  
\* \*  
\* 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  $\Delta VTOT$ ) \*  
\* 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 fps if shallow)  
ASC-7aa/116/A/A



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**POST D/O  
BURN**

AOA POST DEORBIT BURN

6-27

ASC/116/FIN A



|                        |                        |
|------------------------|------------------------|
| 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 (KSC)** \*

\* NOTE: APPLICABLE ONLY IF OMS 1 REQD \*

\* (ATO/AOA steep entries) **KSC** \*

|             |   |    |    |     |     |      |     |     |     |
|-------------|---|----|----|-----|-----|------|-----|-----|-----|
| $\Delta$ HP | 0 | 4  | 8  | 12  | 16  | (19) | 22  | 25  | 28  |
| PREBANK     | 0 | 50 | 80 | 100 | 110 | 120  | 135 | 150 | 175 |

\* (ATO/AOA shallow entries) **KSC** \*

|             |    |     |     |     |     |     |     |     |     |
|-------------|----|-----|-----|-----|-----|-----|-----|-----|-----|
| $\Delta$ HP | 0  | 1   | 3   | 4   | 5   | 6   | (7) | 8   | 9   |
| PREBANK     | 90 | 105 | 120 | 125 | 135 | 145 | 155 | 165 | 175 |

\* 116OCFRI \*

**C POST BURN STATUS**

NOMINAL

$\Delta$ TIG

|  |   |  |  |
|--|---|--|--|
|  | : |  |  |
|--|---|--|--|

P CRT2 **GNC, OPS 303 PRO**

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

|                         |                         |
|-------------------------|-------------------------|
| 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 below \*

| TIME<br>to EI<br>(min) | LVLH<br>PITCH<br>(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 (ON MCC GO)**

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

SPL √SPL: 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 |                        |

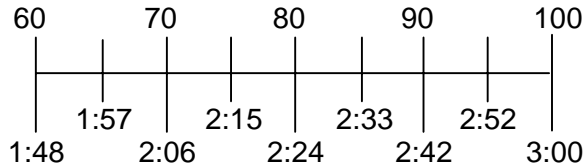
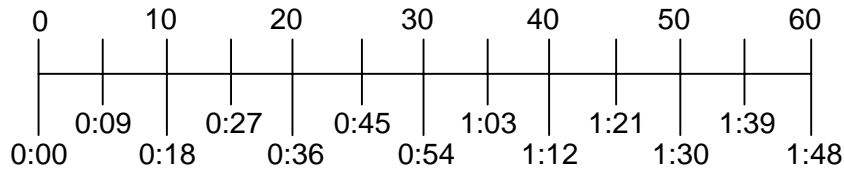
|                        |                         |
|------------------------|-------------------------|
| 1: GNC 23 RCS          | 2: GNC DEORB MNVR COAST |
| 3: BFS, GNC SYS SUMM 2 |                         |

**P FRCS DUMP**

Determine FWD RCS '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)

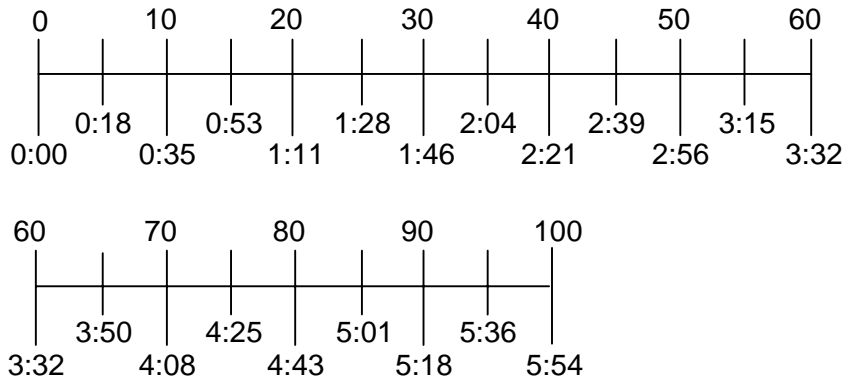
NOTE

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  | 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 |                 |
| 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 pwrnd procedure

P 07 √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 |
| KSC 33 | EDW 04 |
| NOR 17 | NOR 23 |

  
– 6

I/O RESET

C L2 √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  
C3 √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 shut down:** \*
- \* Perform APU RESTART \*
- \* (ENT PKT, APU/HYD) \*

**PRE EI CHECKLIST**

- \* If less than four PASS GPCs, config FCS \*
- \* CHs so that each GPC cmd equals 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 DEORB MNVR COAST      |  |
| 3: BFS, GNC DEORB MNVR COAST |  |

- B F6,F8 FLT CNTLR PWR (two) – ON
  - P If SECONDARY ACTUATOR CHECK performed:
  - R2 HYD MN PUMP PRESS (one) – NORM
- Go to ENTRY MANEUVERS (Cue Card)



OMS FAILURE

**OMS  
FAILURE**



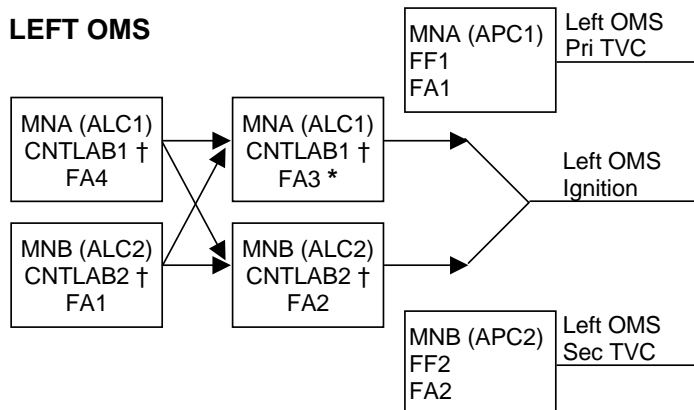
MS ONLY

6-37

ASC/116/FIN A

## OMS FAILURES

### LEFT OMS

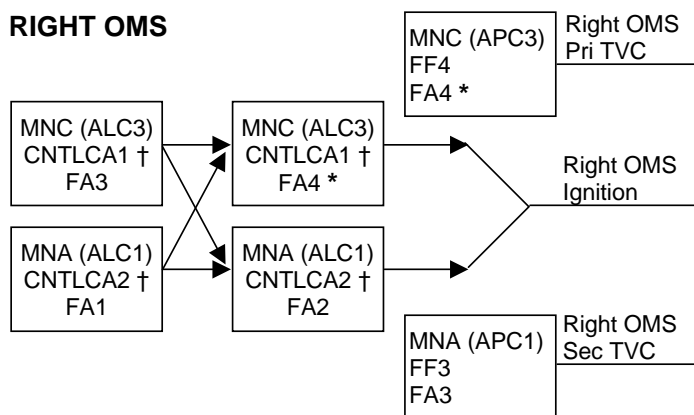


† If CNTL AB1 or AB2 (CA1 or CA2) failed and ign path still exists at OMS fail, assume L(R) OMS ↓ is PRPLT FAIL

\* If L(R) P<sub>c</sub> 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

### RIGHT OMS



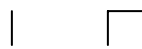
| If two FA MDMs lost |                       |                            |
|---------------------|-----------------------|----------------------------|
| MDMs                | Preburn:<br>ENG – OFF | During burn:<br>MAN SHUTDN |
| 1,2                 | LEFT (TVC)            | BOTH                       |
| 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/I



OMS/RCS ΔV

**OMS/  
RCS ΔV**



**OMS He PRESS/ $\Delta$ V/BURN TIME**

| OMS% GAGE | OMS He Press | OMS $\Delta$ V | RCS $\Delta$ V | RCS BURN MIN:SEC |
|-----------|--------------|----------------|----------------|------------------|
| 96.1      | 4800         | 484            | 399            | 14:44            |
| 95        | 4760         | 479            | 394            | 14:33            |
| 90        | 4560         | 453            | 373            | 13:45            |
| 85        | 4360         | 427            | 351            | 12:57            |
| 80        | 4160         | 401            | 330            | 12:09            |
| 75        | 3960         | 375            | 309            | 11:21            |
| 70        | 3760         | 348            | 287            | 10:33            |
| 65        | 3560         | 322            | 266            | 09:45            |
| 60        | 3360         | 296            | 244            | 08:56            |
| 55        | 3160         | 270            | 223            | 08:08            |
| 50        | 2960         | 243            | 201            | 07:20            |
| 45        | 2760         | 217            | 179            | 06:32            |
| 40        | 2560         | 190            | 158            | 05:44            |
| 35        | 2360         | 164            | 136            | 04:56            |
| 30        | 2160         | 137            | 114            | 04:08            |
| 25        | 1960         | 110            | 92             | 03:20            |
| 20        | 1760         | 83             | 70             | 02:32            |
| 15        | 1560         | 56             | 48             | 01:43            |
| 10        | 1360         | 29             | 25             | 00:54            |
| 5         | 1160         | 2              | 2              | 00:04            |

**OMS/  
RCS  $\Delta$ V**

| <b>OMS-2/AOA <math>\Delta</math>V</b>  |  |
|--|--|
| <b>ARCS <math>\Delta</math>V fps =</b> | $\boxed{0.7} \times [L\% + R\% - \text{AFT QTY } 1]$ |
| <b>FRCS <math>\Delta</math>V fps =</b> | $\boxed{0.8} \times \text{FRCS } \%$                 |
| <b>OMS <math>\Delta</math>V fps =</b>  | $\boxed{5.2} \times \text{OMS } \%$                  |

**NOTE:** Uses assumed vehicle weight of  $\boxed{254,212}$  lb

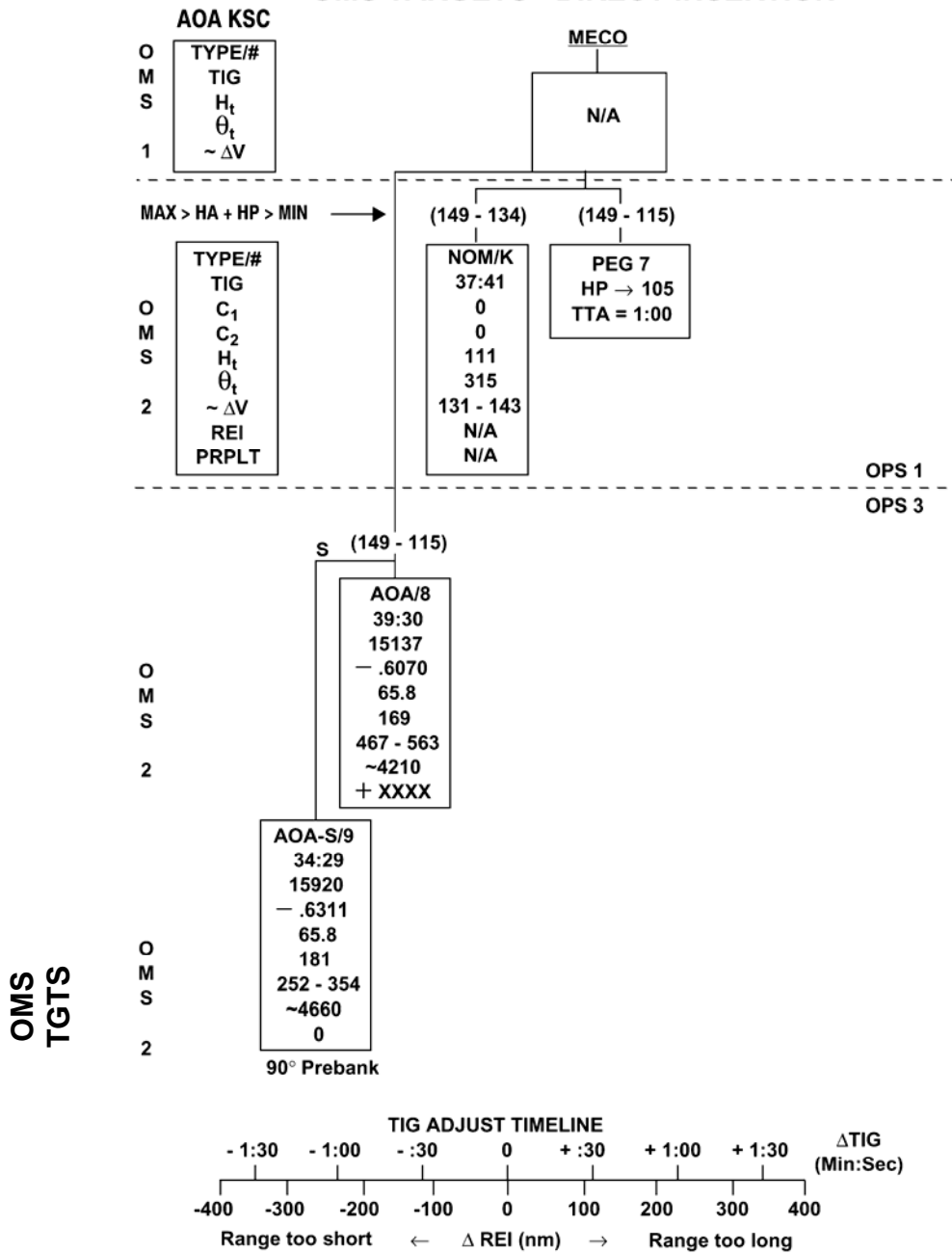


OMS TARGETS, COMM COVERAGE, LAND SITES

**OMS  
TGTS**

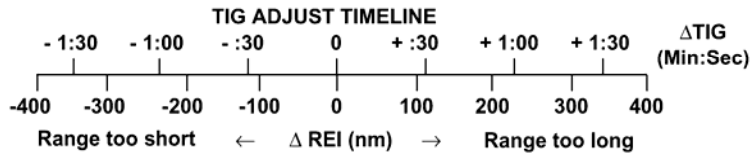
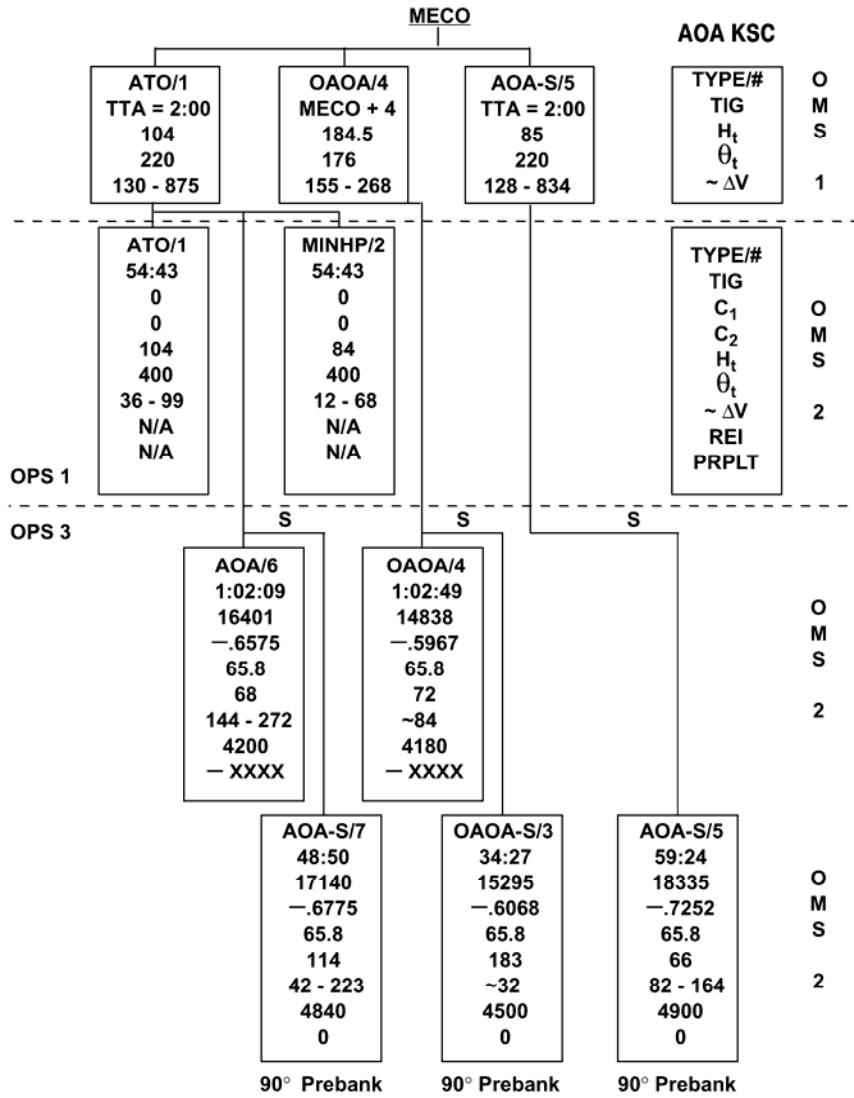


# STS-116 OCFR1 CY OMS TARGETS - DIRECT INSERTION

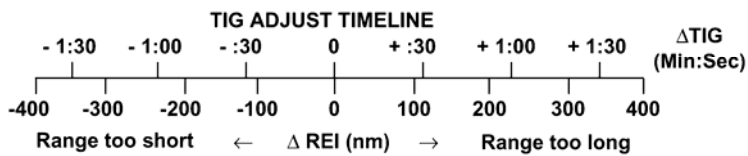
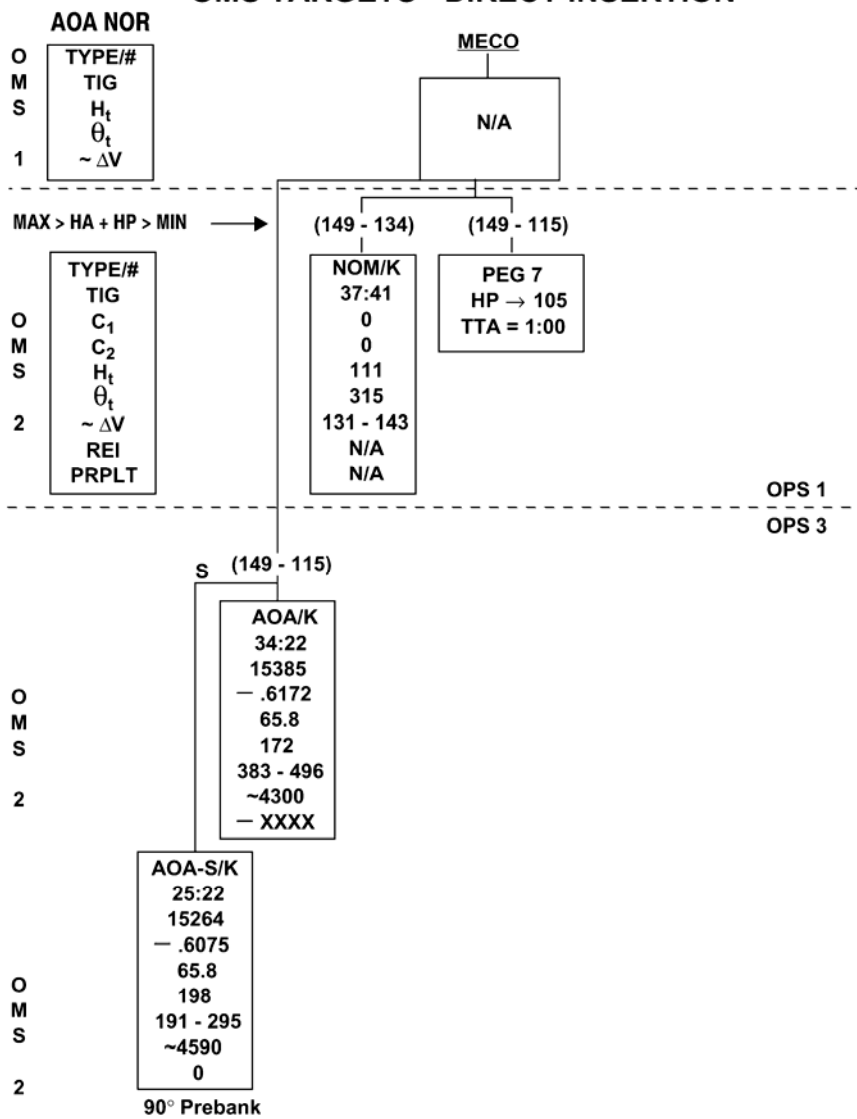




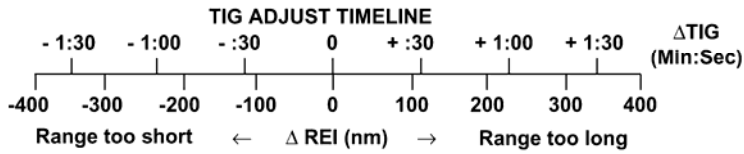
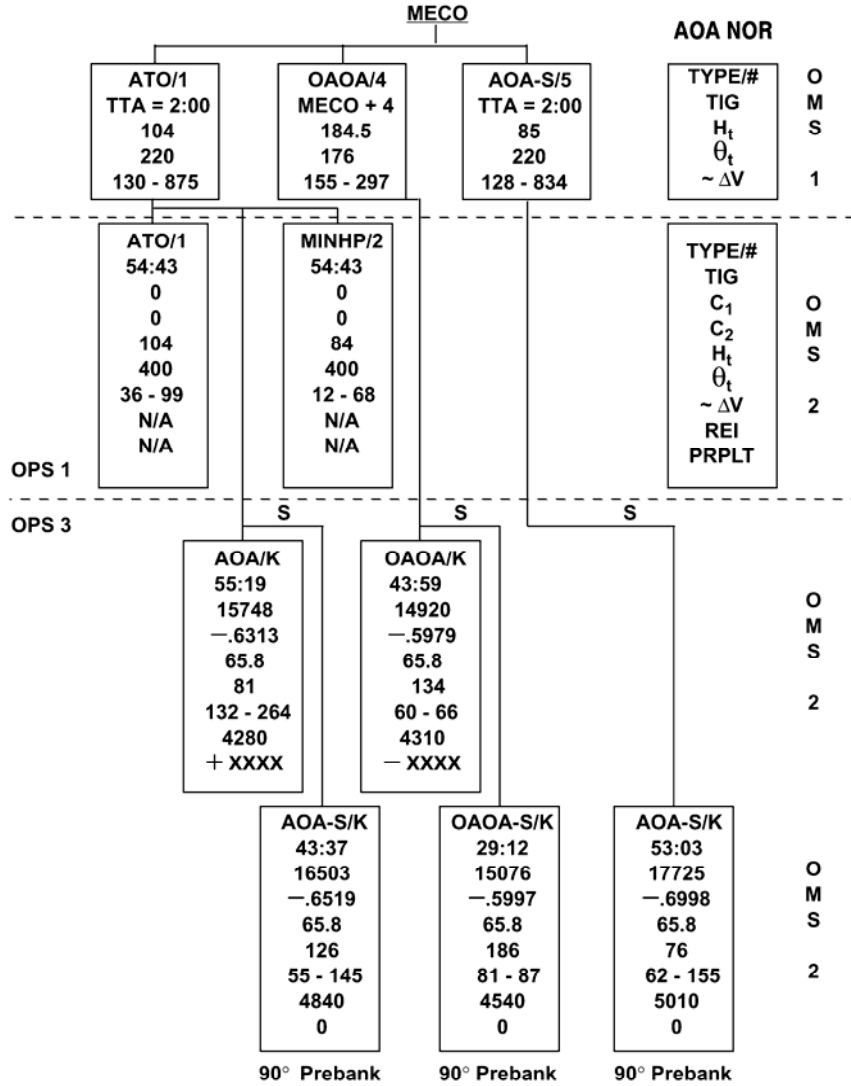
# STS-116 OCFR1 CY OMS TARGETS - W/OMS 1



# STS-116 OCFR1 CY OMS TARGETS - DIRECT INSERTION

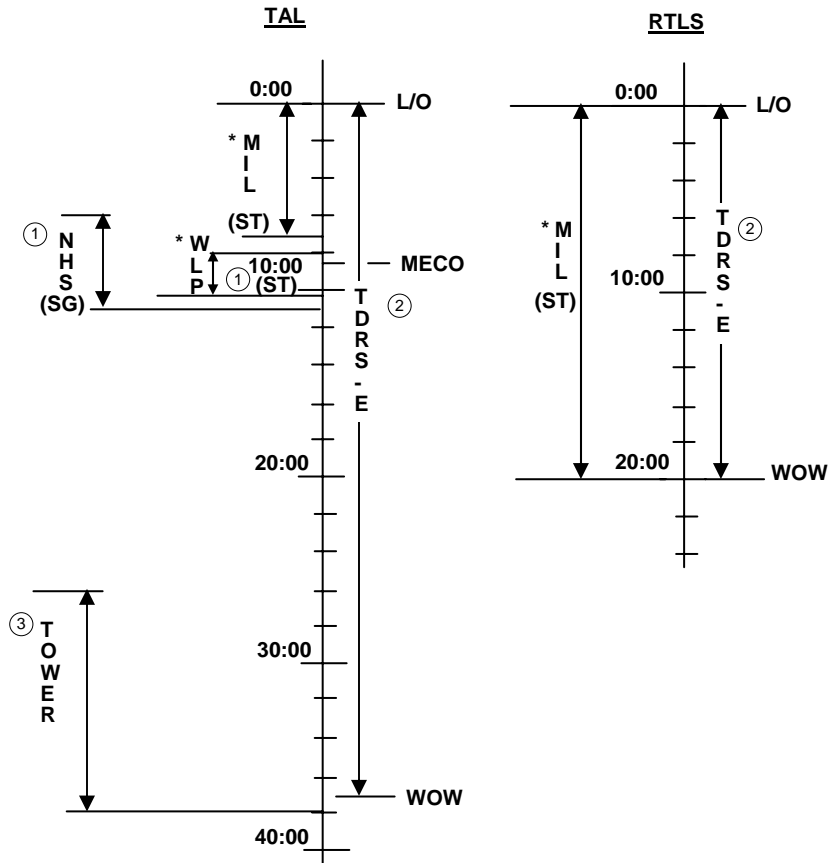


# STS-116 OCFR1 CY OMS TARGETS - W/OMS 1



**COMM  
COVER**

## COMMUNICATION COVERAGE – (TAL/RTLS)



**MODE**

ST – STDN  
SG – SGLS

\*UHF available

**NOTE:** ① NHS/WLP coverage only on high inclinations

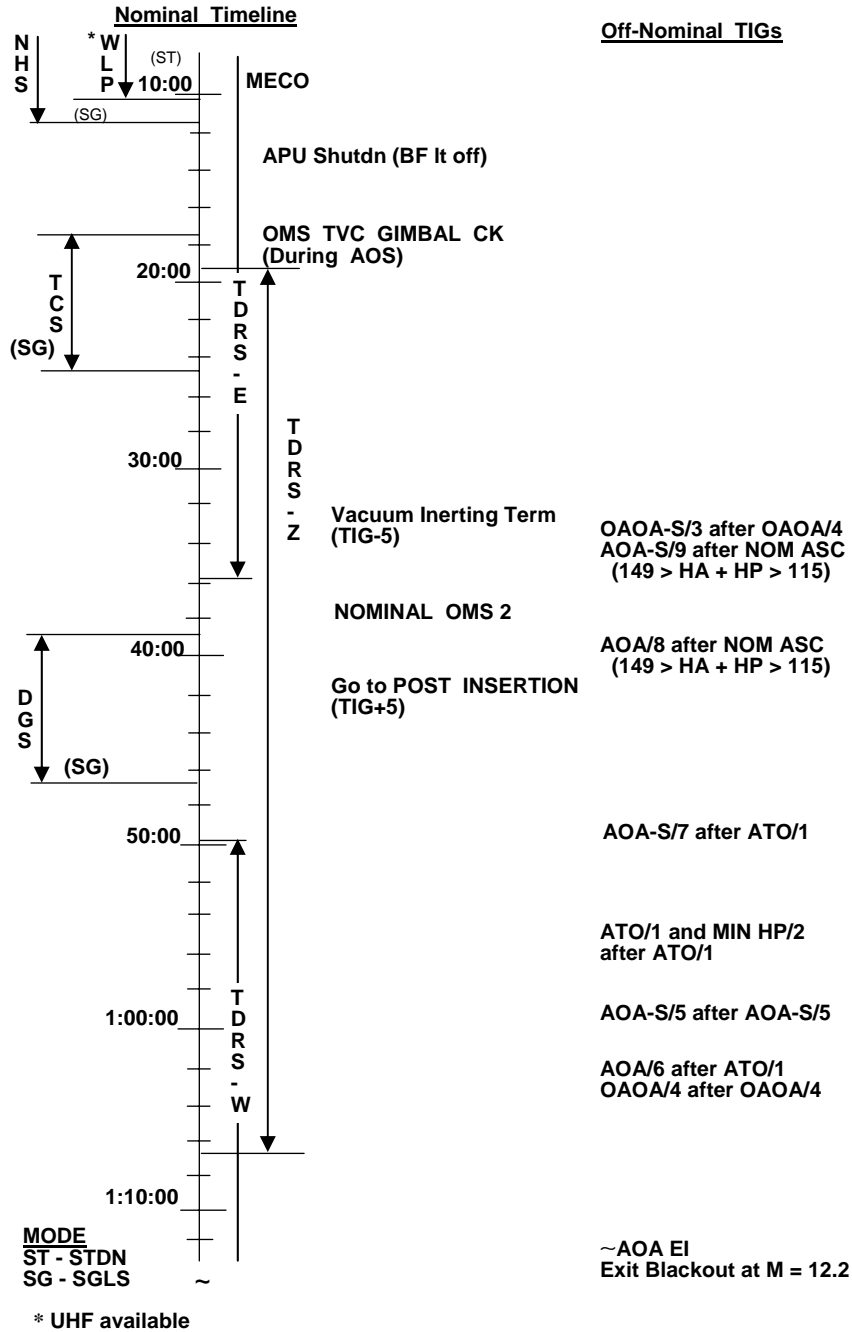
② ET blocks coverage until vehicle upright

③ Tower UHF installed at all TAL sites

**COMM  
COVER**

# COMMUNICATION COVERAGE – (AOA to **KSC**)

LAND  
SITE



STS-116 LANDING SITE TABLE  
(50° to 63.5° INCLINATION)

| SITE | LOCATION      | RWY                | TACANS   |           | MLS<br>CH | LG             | +<br>OVR<br>RUN |
|------|---------------|--------------------|----------|-----------|-----------|----------------|-----------------|
|      |               |                    |          | ITEM 5    |           |                |                 |
| 1    | KSC           | KSC 15<br>KSC 33   | TTS 59Y  | OMN 73    | 8<br>6    | 15000<br>15000 | 1000<br>1000    |
| 2    | BEN GUERIR    | BEN 36<br>BEN 18   | ◆BEN 108 | MAK 80 ■  | ◆6<br>-   | 13720<br>12720 | 0<br>1000       |
| 3    | MORON AB      | MRN 20<br>MRN 02   | MRN 100  | AOG 23    | ◆6<br>-   | 11730<br>11730 | 1000<br>1000    |
| 4    | ZARAGOZA      | ZZA 30L<br>ZZA 12R | ZZA 64   | ZZA 77 ■  | ◆6<br>-   | 12200<br>12200 | 1000<br>1010    |
| 5    | MYRTLE BEACH  | MYR 36<br>MYR 18   | ILM 117  | FLO 99    | -<br>-    | 9500<br>9500   | 1000<br>1000    |
| 6    | WILMINGTON    | ILM 06<br>ILM 24   | ILM 117  | DIW 107 ■ | -<br>-    | 7500<br>7500   | 0<br>0          |
| 7    | CHERRY POINT  | NKT 32L<br>NKT 23R | EWN 83 ■ | NCA 101   | -<br>-    | 7110<br>7100   | 800<br>880      |
| 8    | OCEANA NAS    | NTU 32R<br>NTU 23L | NFE 19Y  | NGU 48    | -<br>-    | 7500<br>11500  | 0<br>0          |
| 9    | WALLOPS       | WAL 28<br>WAL 04   | SBY 49   | SWL 71    | -<br>-    | 7510<br>8750   | 0<br>0          |
| 10   | DOVER AFB     | DOV 32<br>DOV 19   | SIE 95   | DQO 87    | -<br>-    | 8650<br>9100   | 0<br>0          |
| 11   | ATLANTIC CITY | ACY 31<br>ACY 13   | CYN 81   | SIE 95    | -<br>-    | 9500<br>9500   | 0<br>0          |
| 12   | *BEN GUERIR   | BEN 36<br>BEN 18   | ◆BEN 108 | MAK 80 ■  | ◆6<br>-   | 13720<br>12720 | 0<br>1000       |
| 13   | *MORON AB     | MRN 20<br>MRN 02   | MRN 100  | AOG 23    | ◆6<br>-   | 11730<br>11730 | 1000<br>1000    |
| 14   | *ZARAGOZA     | ZZA 30L<br>ZZA 12R | ZZA 64   | ZZA 77 ■  | ◆6<br>-   | 12200<br>12200 | 1000<br>1010    |
| 15   | GABRESKI      | FOK 06<br>FOK 24   | HTO 83   | TMU 45Y ■ | -<br>-    | 8500<br>8500   | 1000<br>1000    |

◆ Available for TAL Only

\* LO XRNG TAL Site

■ DME

Length after displaced threshold

**STS-116 LANDING SITE TABLE  
(50° to 63.5° INCLINATION)**

| S<br>I<br>T<br>E | LOCATION       | RWY     | TACANS   |           | MLS<br>CH | LG    | +<br>OVR<br>RUN |
|------------------|----------------|---------|----------|-----------|-----------|-------|-----------------|
|                  |                |         |          | ITEM 5    |           |       |                 |
| 16               | OTIS ANGB      | FMH 32  | BOS 74   | PVD 103   | -         | 9000  | 0               |
|                  |                | FMH 23  |          |           | -         | 7500  | 0               |
| 17               | PEASE INT'L    | PSM 34  | ENE 118  | BOS 74    | -         | 10020 | 0               |
|                  |                | PSM 16  |          |           | -         | 10020 | 0               |
| 18               | HALIFAX INT'L  | YHZ 24  | UAW 38   | YHZ 98 ■  | -         | 8800  | 0               |
|                  |                | YHZ 33  |          |           | -         | 7700  | 0               |
| 19               | STEPHENVILLE   | YJT 09  | YJT 78   | YDF 80 ■  | -         | 9500  | 0               |
|                  |                | YJT 27  |          |           | -         | 9500  | 0               |
| 20               | ST JOHNS INT'L | YYT 29  | UYT 23   | YYT 82 ■  | -         | 8500  | 0               |
|                  |                | YYT 11  |          |           | -         | 8500  | 0               |
| 21               | GANDER INT'L   | YQX 22  | YQX 74   | IQX 32 ■  | -         | 9700  | 0               |
|                  |                | YQX 31  |          |           | -         | 8900  | 0               |
| 22               | GOOSE BAY      | YYR 26  | UYR 40   | YYR 120 ■ | -         | 10550 | 0               |
|                  |                | YYR 34  |          |           | -         | 9080  | 0               |
| 23               | LAJES          | LAJ 15  | TRM 109  | LAJ 45    | -         | 10870 | 970             |
|                  |                | LAJ 33  |          |           | -         | 10870 | 990             |
| 24               | BEJA           | BEJ 01L | MOJ 37   | BEJ 105   | -         | 10820 | 0               |
|                  |                | BEJ 19R |          |           | -         | 10820 | 900             |
| 25               | KEFLAVIK       | IKF 20  | KEF 57   | IRE 28 ■  | -         | 9520  | 0               |
|                  |                | IKF 29  |          |           | -         | 9560  | 0               |
| 26               | SHANNON        | INN 06  | SHA 80 ■ | CRN 37 ■  | -         | 9540  | 0               |
|                  |                | INN 24  |          |           | -         | 9540  | 0               |
| 27               | FAIRFORD       | FFA 27  | FFA 81   | BZN 56    | -         | 9490  | 990             |
|                  |                | FFA 09  |          |           | -         | 9490  | 970             |
| 28               | KOLN/BONN      | KBO 14L | GIX 18   | DOR 23Y ■ | -         | 12020 | 0               |
|                  |                | KBO 32R |          |           | -         | 12020 | 0               |
| 29               | LE TUBE        | FMI 33  | NIM 53   | ITR 104   | -         | 11800 | 3960            |
|                  |                | FMI 15  |          |           | -         | 12300 | 0               |
| 30               | ESENBOGA       | ESN 03R | BAG 78 ■ | BUK 90 ■  | -         | 11800 | 0               |
|                  |                | ESN 21L |          |           | -         | 11800 | 0               |

■ DME

Length after displaced threshold

**STS-116 LANDING SITE TABLE  
(50° to 63.5° INCLINATION)**

| S<br>I<br>T<br>E | LOCATION                | RWY                | TACANS      |             | MLS<br>CH | LG    | +<br>OVR<br>RUN |
|------------------|-------------------------|--------------------|-------------|-------------|-----------|-------|-----------------|
|                  |                         |                    |             | ITEM 5      |           |       |                 |
| 31               | KING KHALID             | KKI 15R<br>KKI 33L | RIY 92      | KIA 80      | -         | 13300 | 0               |
|                  |                         |                    |             |             | -         | 13300 | 0               |
| 32               | DIEGO GARCIA            | JDG 31<br>JDG 13   | NKW 57      | NKW 57      | -         | 12000 | 950             |
|                  |                         |                    |             |             | -         | 12000 | 950             |
| 33               | AMBERLEY<br>TINDAL RAAF | AMB 15<br>PTN 14   | AMB 94<br>- | -<br>TDL 70 | -         | 9500  | 0               |
|                  |                         |                    |             |             | -         | 8500  | 0               |
| 34               | YOKOTA AB               | JTY 36<br>JTY 18   | SHT 19      | NJA 98      | -         | 11000 | 1000            |
|                  |                         |                    |             |             | -         | 11000 | 1000            |
| 35               | ANDERSEN AFB            | GUA 06L<br>GUA 24R | UAM 54      | UNZ 100     | -         | 10560 | 1050            |
|                  |                         |                    |             |             | -         | 10560 | 1000            |
| 36               | WAKE ISLAND             | WAK 28<br>WAK 10   | AWK 82      | AWK 82      | -         | 9360  | 0               |
|                  |                         |                    |             |             | -         | 9360  | 0               |
| 37               | HONOLULU                | HNL 08R<br>HNL 26L | HNL 95      | NGF 93      | -         | 11500 | 0               |
|                  |                         |                    |             |             | -         | 11500 | 0               |
| 38               | ELMENDORF               | EDF 24<br>EDF 06   | EDF 81      | BGQ 72      | -         | 9500  | 0               |
|                  |                         |                    |             |             | -         | 9500  | 0               |
| 39               | HAO ATOLL               | HAO 12<br>HAO 30   | HAO 85 ■    | HAO 85 ■    | -         | 10390 | 0               |
|                  |                         |                    |             |             | -         | 10390 | 0               |
| 40               | RIO GALLEGOS            | AWG 25<br>AWG 07   | GAL 114 ■   | GAL 114 ■   | -         | 10900 | 0               |
|                  |                         |                    |             |             | -         | 10900 | 0               |
| 41               | ASCENSION               | HAW 14<br>HAW 32   | ASI 59      | ASI 59      | -         | 9500  | 0               |
|                  |                         |                    |             |             | -         | 9500  | 0               |
| 42               | NORTHROP                | NOR 17<br>NOR 23   | SNG 121Y    | HMN 92      | 6         | 15000 | Lkbd            |
|                  |                         |                    |             |             | 6         | 15000 | Lkbd            |
| 43               | NORTHROP                | NOR 05<br>NOR 35   | SNG 121Y    | HMN 92      | -         | 15000 | Lkbd            |
|                  |                         |                    |             |             | -         | 15000 | Lkbd            |
| 44               | EDWARDS AFB             | EDW 15<br>EDW 18L  | EDW 111     | LHS 21      | -         | 16300 | Lkbd            |
|                  |                         |                    |             |             | -         | 15000 | Lkbd            |
| 45               | EDWARDS AFB             | EDW 22<br>EDW 04   | EDW 111     | LHS 21      | 8/†       | 15010 | 0               |
|                  |                         |                    |             |             | 6         | 14010 | 1800            |

† MSBLS Jr. Ch 8 - Requires Uplink

■ DME

Length after displaced threshold



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WEATHER PADS

8-1

ASC/116/FIN A

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**WEATHER  
PADS**

**WEATHER  
PADS**

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**CONUS TERMINAL FORECASTS RTLS - ORB**

↓ RTLS ACL pg 1-10

| DEORB<br>ORBIT | SITE | LDG<br>GMT | SKY | VIS/WX | T/TD<br>(°F) | WIND<br>(MAG) | ALTM | DA | REMARKS |
|----------------|------|------------|-----|--------|--------------|---------------|------|----|---------|
| RTLS           |      |            |     |        |              |               |      |    |         |
| AOA (1)        |      |            |     |        |              |               |      |    |         |
| AOA (2)        |      |            |     |        |              |               |      |    |         |
|                |      |            |     |        |              |               |      |    |         |
|                |      |            |     |        |              |               |      |    |         |
|                |      |            |     |        |              |               |      |    |         |
|                |      |            |     |        |              |               |      |    |         |
|                |      |            |     |        |              |               |      |    |         |
|                |      |            |     |        |              |               |      |    |         |
|                |      |            |     |        |              |               |      |    |         |

**UPPER WINDS FORECAST (SFC=MAG, OTHER LEVELS=TRUE)**

FIRST DAY PLS

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

TAL ( ) data to ACL FB 2-14

**TAL/CONUS TERMINAL FORECASTS**

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

**UPPER WINDS FORECAST (SFC=MAG, OTHER LEVELS=TRUE)**

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

**ELS TERMINAL FORECASTS (Site Generated)**

|  | <b>SITE</b> | <b>ID</b> | <b>LDG<br/>GMT</b> | <b>SKY</b> | <b>VIS/WX</b> | <b>WIND<br/>(TRUE)</b> | <b>ALTM</b> | <b>REMARKS</b> |
|--|-------------|-----------|--------------------|------------|---------------|------------------------|-------------|----------------|
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |
|  |             |           |                    |            |               |                        |             |                |

**ELS TERMINAL FORECASTS (Site Generated) (Cont)**

| SITE | ID | LDG<br>GMT | SKY | VIS/WX | WIND<br>(TRUE) | ALTM | REMARKS |
|------|----|------------|-----|--------|----------------|------|---------|
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |
|      |    |            |     |        |                |      |         |

**BLOCK 1 TRAJECTORY MESSAGE**

| DEORB<br>ORB  | APPROX TIG | SITE/RWY | OOP TIG WINDOW              |       |
|---|------------|----------|-----------------------------|-------|
|   |            |          | OPEN                        | CLOSE |
|   |            |          |                             |       |
|   |            |          |                             |       |
|   |            |          |                             |       |
|   |            |          |                             |       |
|   |            |          |                             |       |
|   |            |          |                             |       |
| <b><u>MAX RATES (1st STAGE)</u></b>                           |            |          | <b><u>MISCELLANEOUS</u></b> |       |
| <b><u>NOTE:</u> IGNORE ATTITUDE ERRORS DURING LOAD RELIEF</b> |            |          | NOTAMS: _____               |       |
| ROLL _____°/sec at _____                                      |            |          | _____                       |       |
| PITCH _____°/sec at _____                                     |            |          | _____                       |       |
| YAW _____°/sec  |            |          | _____                       |       |
| <b><u>TRAJECTORY LOFTING (2nd STAGE)</u></b>                  |            |          |                             |       |
| LOFTED/DEPRESSED _____ K ft at VI _____ K fps                 |            |          |                             |       |

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**SW LIST**

SWITCH LIST



9-1

ASC/116/FIN A

**SW LIST**

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CUE CARD CONFIG

**CUE CARD  
CONFIG**

FAB USE ONLY

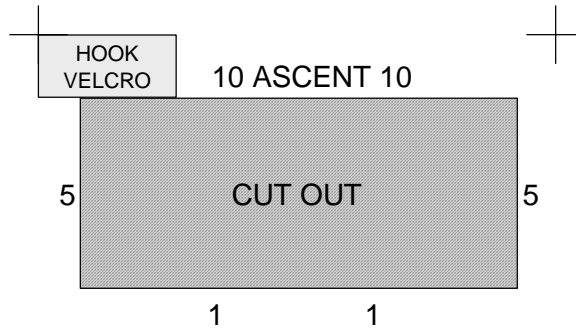
10-1

ASC/116/FIN A



CUE CARD CONFIG

TOP



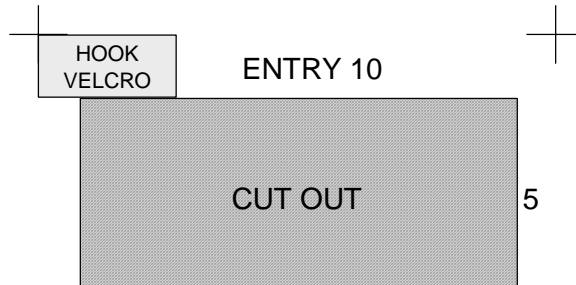
**ADI ERROR/RATE SWITCH**

ASC-1a/A,E/D



TOP

BACK OF 'ADI ERROR/RATE SWITCH'



| R  | $\alpha/g$ | Y   |
|----|------------|-----|
| 25 | 5/1.25     | 2.5 |
| 25 | 2/1.25     | 2.5 |
| 10 | 1/0.50     | 2.5 |

1  
ASC-1b/A,E/D



FAB USE ONLY

CC 10-2

ASC/116/FIN A

TOP

| <b>ASCENT/ENTRY SPEC<br/>PASS</b> | <b>NO.</b> | <b>ASC-2a/A,E/E<br/>BFS</b> | <b>NO.</b> |
|-----------------------------------|------------|-----------------------------|------------|
| 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         |                             |            |

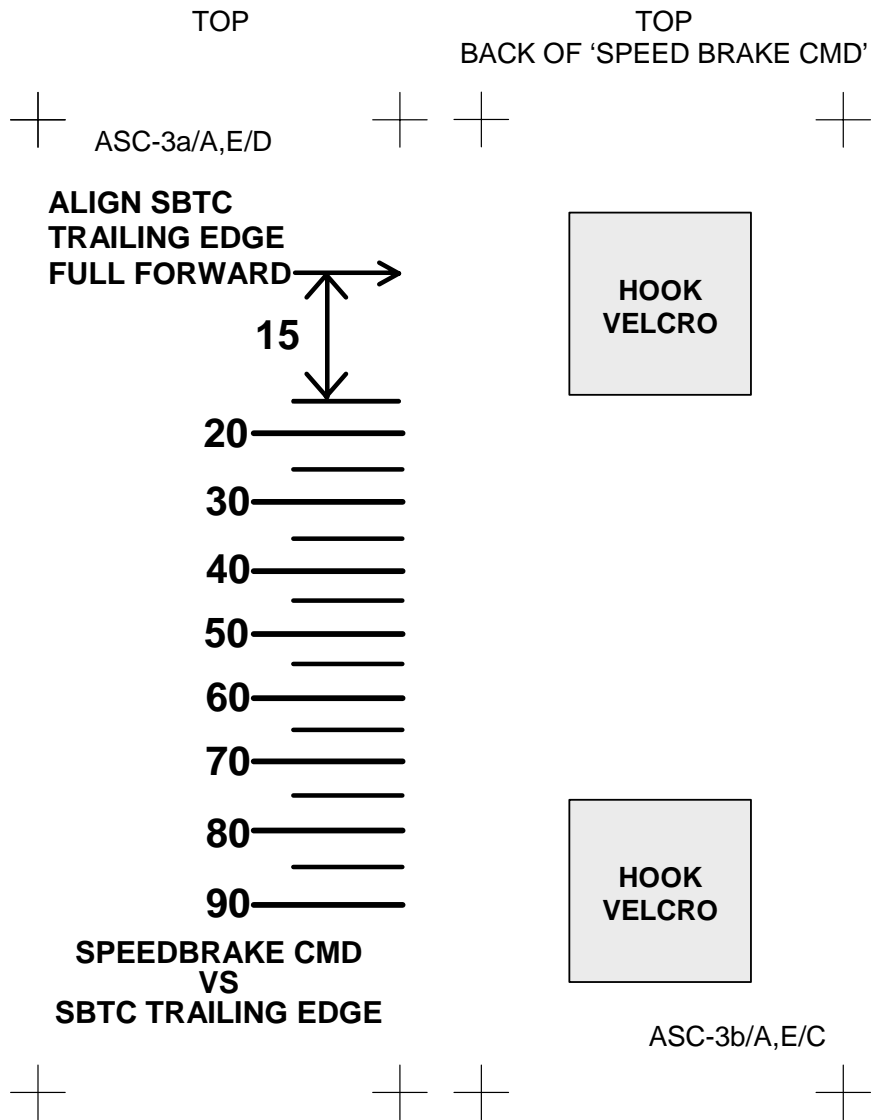
TOP  
BACK OF 'ASCENT/ENTRY SPEC'



FAB USE ONLY

CC 10-3

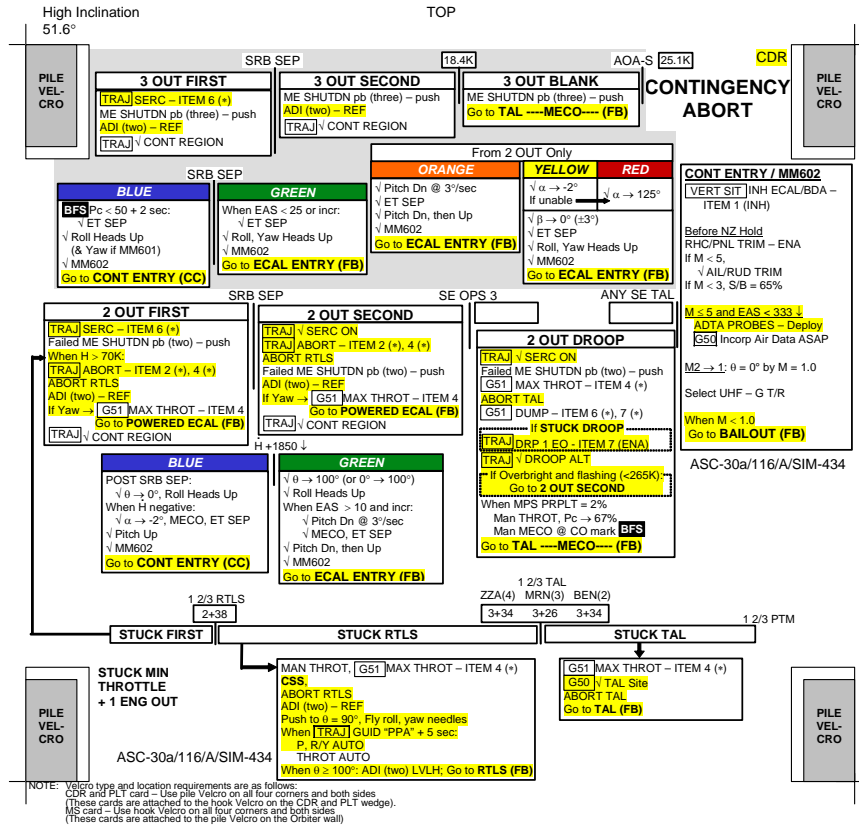
ASC/116/FIN A



FAB USE ONLY

CC 10-4

ASC/116/FIN A



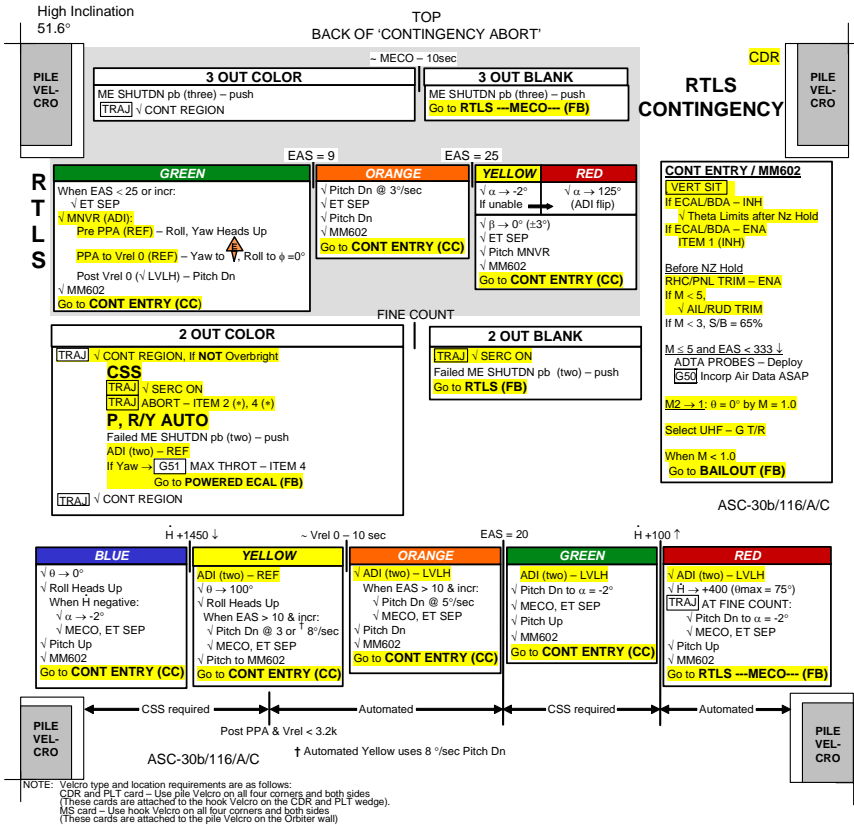
FAB USE ONLY

(reduced copy)

(A)CC 10-5

CDR

ASC/116/SIM-434

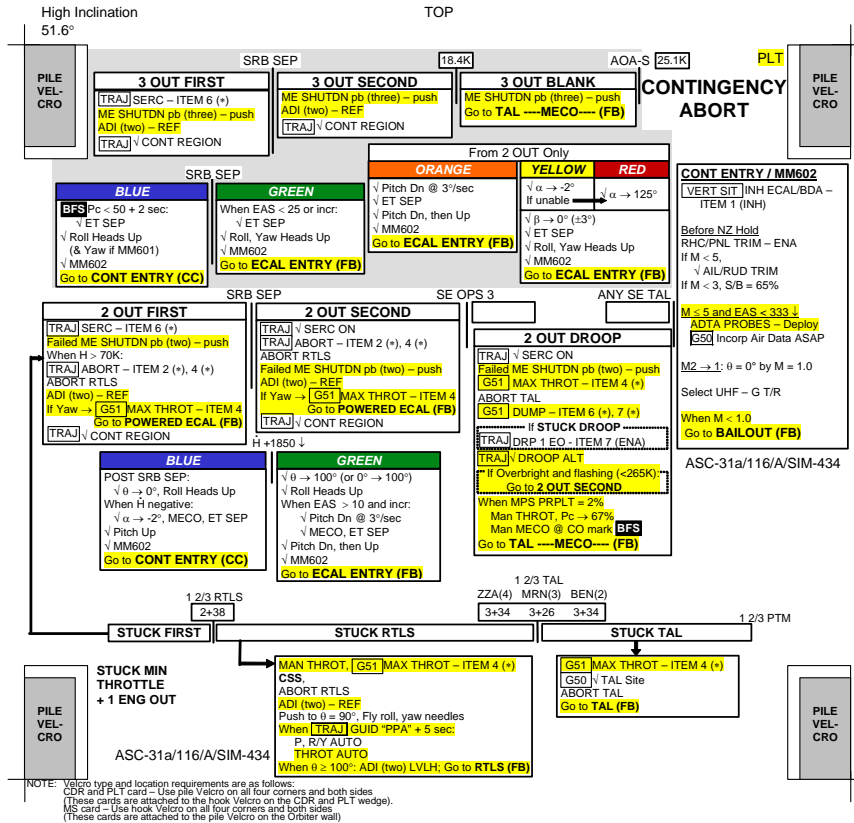


FAB USE ONLY

(reduced copy)  
(A)CC 10-6

**CDR**  
ASC/116/FIN A,1





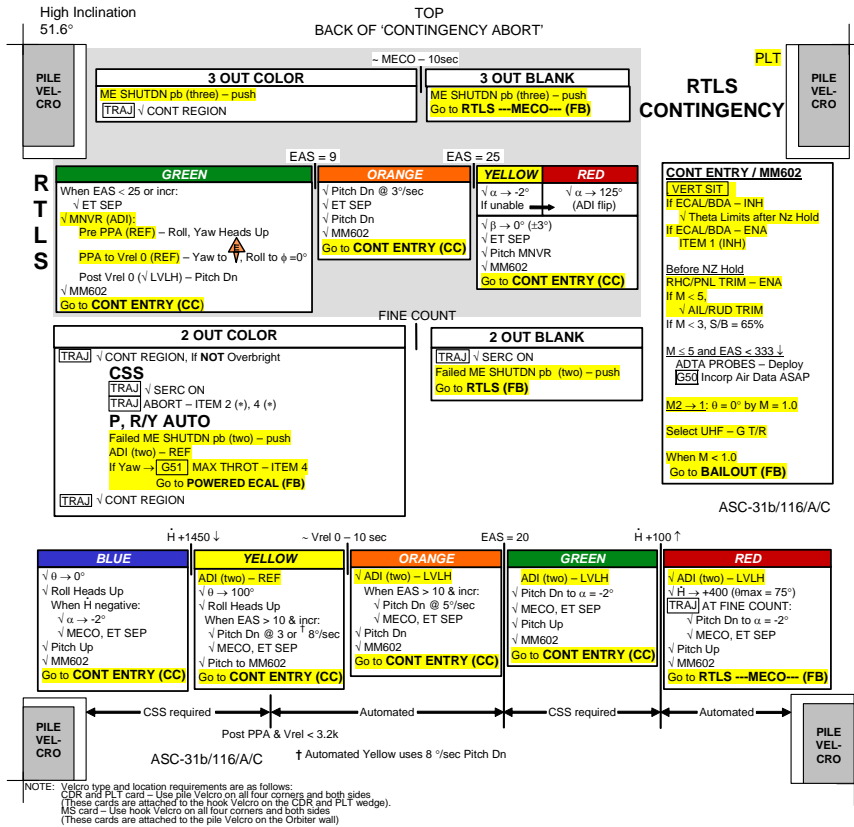
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PLT

FAB USE ONLY

(B)CC 10-5

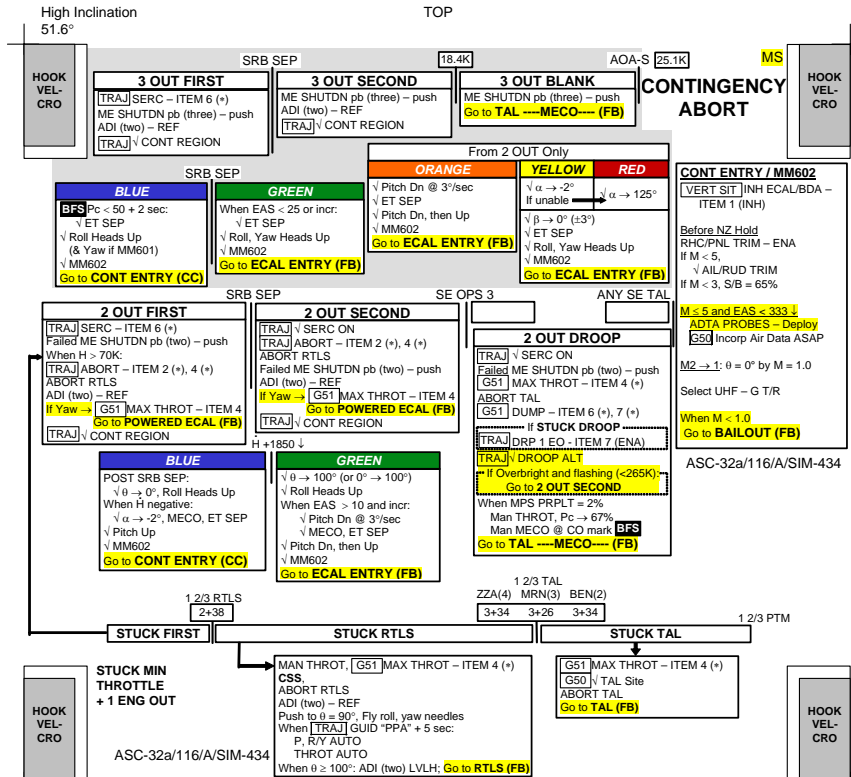
ASC/116/SIM-434



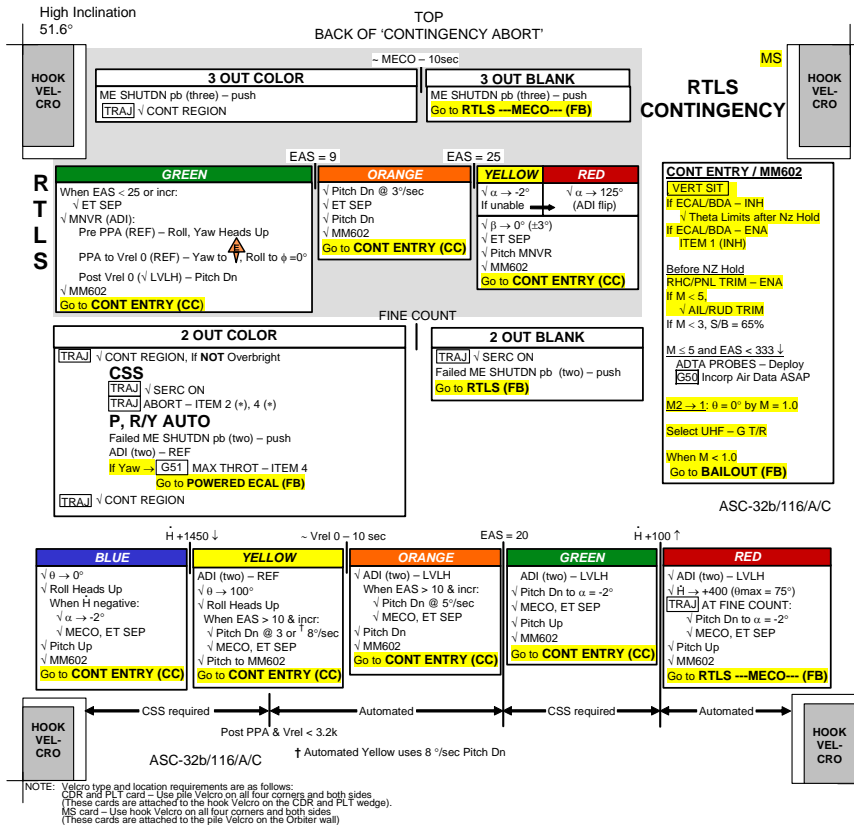
FAB USE ONLY

(reduced copy)  
(B)CC 10-6

PLT  
ASC/116/FIN A,1



NOTE: Velcro type and location requirements are as follows:  
 CDR and PLT card - Use pile Velcro on all four corners and both sides  
 (These cards are attached to the hook Velcro on the CDR and PLT wedge)  
 MS card - Use hook Velcro on all four corners and both sides  
 (These cards are attached to the pile Velcro on the Orbiter wall)



FAB USE ONLY

(reduced copy)  
(C)CC 10-6

MS  
ASC/116/FIN A,1

TOP

HOOK  
VELCRO
**OMS 2  
BURN  
MONITOR**
HOOK  
VELCRO

|  |   |   |     |     |     |     |                                |
|--|---|---|-----|-----|-----|-----|--------------------------------|
| <b>OMS TEMP*</b><br>FU IN P ≥ <table style="display: inline-table; border-collapse: collapse;"><tr><td style="border: 1px solid black; padding: 0 5px;">L</td><td style="border: 1px solid black; padding: 0 5px;">R</td></tr><tr><td style="border: 1px solid black; padding: 0 5px;">225</td><td style="border: 1px solid black; padding: 0 5px;">220</td></tr></table><br>≤ <table style="display: inline-table; border-collapse: collapse;"><tr><td style="border: 1px solid black; padding: 0 5px;">205</td><td style="border: 1px solid black; padding: 0 5px;">204</td></tr></table><br>or No FU IN P | L   | R | 225 | 220 | 205 | 204 | OMS ENG FAIL<br>OMS PRPLT FAIL |
| L  | R   |   |     |     |     |     |                                |
| 225  | 220   |   |     |     |     |     |                                |
| 205  | 204   |   |     |     |     |     |                                |
| <b>OMS PC* &amp; OMS ↓</b> (BFS: √accel)<br>ENG VLV 1 or 2 < 70<br>or<br>OX IN P > 227<br>OX IN P ≤ 227<br>or No OX IN P   | OMS ENG FAIL<br>OMS PRPLT FAIL  |   |     |     |     |     |                                |
| <b>OMS OX/FU TK P</b> (√ENG IN P)<br>OX/FU LOW<br>OX & FU HIGH   | He PRESS/VAP ISOL (two) – OP<br>If aff TK P not incr:<br>He PRESS/VAP ISOL (two) – CL<br>At PC < 72 or OMS TEMP or HP > 85:<br>OMS PRPLT FAIL<br>He PRESS/VAP ISOL (two) – CL<br>Cycle He A(B) to maintain TK P 234-284 |   |     |     |     |     |                                |
| <b>OMS He TK P LOW</b><br>(√OMS/MPS)   | At He P < 640 or QTY ≤ 41:<br>If HP < 85: OMS XFEED from good OMS<br>At HP > 85: OMS PRPLT FAIL   |   |     |     |     |     |                                |
| <b>OMS N2 REG P HIGH or LOW</b><br><b>OMS N2 TK P LOW</b><br>(√OMS/MPS)  | OMS ENG – ARM<br>At N2 TK P < 470: OMS ENG – ARM  |   |     |     |     |     |                                |
| <b>OMS GMBL</b><br>PRI fail<br>SEC fail  | L(R) OMS GMBL – SEC (twice)<br>If high RCS usage: OMS ENG FAIL  |   |     |     |     |     |                                |
| <b>GPC</b><br>1(4) &<br>Burning OMS aff<br>SEC GMBL lost<br>2 FAs lost   | aff GPC PWR – OFF<br>If SEC GMBL avail:<br>aff MDM FF 1(4) – OFF, ON<br>L(R) OMS GMBL – SEC (twice)<br>If high RCS usage: OMS ENG FAIL<br>√MAN SHUTDN   |   |     |     |     |     |                                |
| <b>I/O ERROR FA</b><br>1(4)<br>2 FAs lost  | L(R) OMS GMBL – SEC<br>I/O RESET (if recov: BFS I/O RESET)<br>If high RCS usage: OMS ENG FAIL<br>√MAN SHUTDN  |   |     |     |     |     |                                |
| <b>BCE STRG D</b><br>1(4)  | I/O RESET (if recov: >>)<br>If high RCS usage:<br>L(R) OMS GMBL – SEC (twice)   |   |     |     |     |     |                                |
| <b>I/O ERROR PCM</b>   | OI PCMMU PWR – 2(1)   |   |     |     |     |     |                                |

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

ASC-5a/116/A,O/A

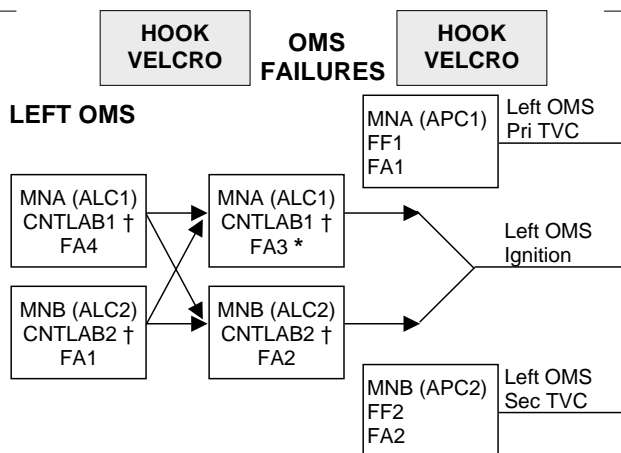
(reduced copy)

FAB USE ONLY

CC 10-7

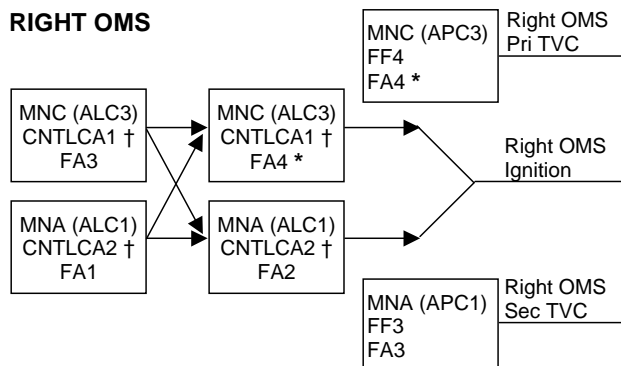
ASC/116/FIN A

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<sub>c</sub> 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:<br>ENG – OFF | During burn:<br>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/I

(reduced copy)

FAB USE ONLY

CC 10-8

ASC/116/FIN A

TOP

|                        |                                       |                        |
|------------------------|---------------------------------------|------------------------|
| <b>HOOK<br/>VELCRO</b> | <b>OMS 2/<br/>ORBIT OMS<br/>BURNS</b> | <b>HOOK<br/>VELCRO</b> |
|------------------------|---------------------------------------|------------------------|

√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 |  |  |  |
| 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<sub>c</sub> 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<sub>c</sub>, 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 X < +0.2 fps | All axes < 0.2 fps |
|            | VGO Y,Z < 2 fps |                  |                    |

ASC-6a/116/A,O/B

(reduced copy)

FAB USE ONLY

CC 10-9

ASC/116/FIN A

TOP  
BACK OF 'OMS2/ORBIT OMS BURNS'



**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
- OMS TK switch at 1/2 ΔVTOT (If reqd)
- 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
- Monitor ΔVTOT
- CUTOFF 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
- TIMER – ITEM 23 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 = 85 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/116/A,O/B

(reduced copy)

FAB USE ONLY

CC 10-10

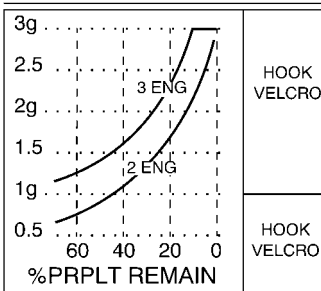
ASC/116/FIN A



TOP

**ASCENT ADI - NOMINAL**

| TIME | $\theta$ | H    | $\dot{H}$ | (116 OCFR1 CY) |
|------|----------|------|-----------|----------------|
| 0:30 | 68       | 9K   | 656       |                |
| 0:50 | 61       | 26K  | 993       |                |
| 1:10 | 53       | 50K  | 1429      |                |
| 1:30 | 39       | 84K  | 1892      |                |
| 1:50 | 30       | 125K | 2195      |                |



-STAGING-

| $V_i$ | $\theta$ | H    | $\dot{H}$ | ASC-14a/116/A/A |
|-------|----------|------|-----------|-----------------|
| 6     | 19       | 217K | 1721      |                 |
| 7     | 16       | 274  | 1270      |                 |
| 8     | 13       | 309  | 921       |                 |
| 9     | 11       | 331  | 638       |                 |
| 10    | 9        | 345  | 407       |                 |
| 12    | 6        | 356  | 66        |                 |
| 14    | 9        | 355  | -143      |                 |
| 16    | 25       | 350  | -226      |                 |
| 18    | 23       | 344  | -263      |                 |
| 20    | 21       | 339  | -214      |                 |
| 22    | 19       | 337  | -102      |                 |
| 24    | 17       | 337  | 66        |                 |
| 25819 | 13       | 345  | 274       |                 |

TOP  
BACK OF 'ASCENT  
ADI - NOMINAL'

**ENTRY ALPHA**

| VR | $\alpha_{ref}$ | R       | H   | $\dot{H}_{ref}$ | Rref |
|----|----------------|---------|-----|-----------------|------|
| 25 | 40             | 4396    | 400 |                 |      |
| 24 | HI 40          | LO 2623 | 246 | -46             | L79  |
| 23 | 43 40          | 37 2166 | 238 | -63             | 69   |
| 22 | 43 40          | 37 1809 | 232 | -82             | 62   |
| 21 | 43 40          | 37 1534 | 225 | -103            | 59   |
| 20 | 43 40          | 37 1309 | 219 | -119            | 58   |
| 19 | 43 40          | 37 1130 | 212 | -141            | 58   |
| 18 | 43 40          | 37 988  | 205 | -162            | 59   |
| 17 | 43 40          | 37 869  | 198 | -180            | 60   |
| 16 | 43 40          | 37 767  | 192 | -191            | 61   |

**KSC 15**

| MAX L/D |          |
|---------|----------|
| M       | $\alpha$ |
| 3       | 17       |
| 2       | 15       |
| 1       | 12       |

ASC-14b/116/A,E/A

|             |             |
|-------------|-------------|
| HOOK VELCRO | HOOK VELCRO |
| HOOK VELCRO | HOOK VELCRO |

|     |       |        |     |      |     |
|-----|-------|--------|-----|------|-----|
| 15  | 43 40 | 37 685 | 186 | -203 | 63  |
| 14  | 43 40 | 37 612 | 180 | -127 | 61  |
| 13  | 43 40 | 37 544 | 177 | -137 | 58  |
| 12  | 43 40 | 37 481 | 173 | -153 | 56  |
| 11  | 42 39 | 36 424 | 167 | -195 | R54 |
| 10  | 41 38 | 35 372 | 164 | -174 | 49  |
| 9   | 39 36 | 33 322 | 157 | -209 | 46  |
| 8   | 37 34 | 31 274 | 149 | -242 | 43  |
| 7   | 33 30 | 27 227 | 140 | -271 | 42  |
| 6   | 30 27 | 24 183 | 128 | -275 | L42 |
| 5   | 26 23 | 20 143 | 117 | -273 | 40  |
| 4   | 23 20 | 18 105 | 103 | -264 | 42  |
| 3   | 19 16 | 15 74  | 89  | -248 | R35 |
| 2.5 | 14    | 60     | 82  | -273 |     |
| 2   | 12    | 49     | 75  | -282 |     |
| 1.5 | 9     | 37     | 64  | -331 |     |
| 1   | 8     | 28     | 50  | -263 |     |

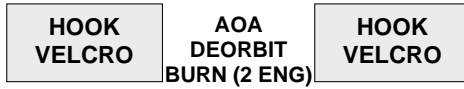
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FAB USE ONLY

CC 10-11

ASC/116/FIN A

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<sub>c</sub>, 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<sub>c</sub> < 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/E

HINGE

(reduced copy)

FAB USE ONLY

CC 10-12

ASC/116/FIN A

TOP  
HINGED AT BOTTOM OF  
'AOA DEORBIT BURN (2 ENG)'  
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  $\Delta V$  or  
\* if CUR  $\Delta VTOT$ :                      TOT AFT QTY 2   % then  
\* FRCS COMPLETION

\* FLIP   -----  
\*  $\Delta V$     FRCS COMPLETION

\* AFT   -----  
\*  $\Delta V$     THC +X to TGT  $\Delta V$

\* TGT   -----  
\*  $\Delta V$

\* 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:**

\* Mnv 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(s) – OFF (If < 3 IMU, at : )  
\* AFT RCS RECONFIG if INTERCONNECT \*  
Trim X,Z residuals < 2 fps (< 0.5 fps if shallow)

ASC-8aa/116/A/A

(reduced copy)

FAB USE ONLY

CC 10-13

ASC/116/FIN A

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<sub>c</sub>, 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 good 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/B

HINGE

(reduced copy)

FAB USE ONLY

CC 10-14

ASC/116/FIN A



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 ± 3°  
          Monitor ΔVTOT

RCS I'CNCT TK SW at ΔVTOT =   
R OMS XFEED (two) – OP  
L OMS XFEED (two) – CL

**OMS PRPLT LOW**  
AFT RCS RECONFIG AT ΔVTOT =   
RCS COMPLETION

- \* **OMS PRPLT FAIL (MULTIPLE JETS FAIL OFF):** \*
- \*   Secure aff OMS \*
- \*   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 jets \*

HINGE

ASC-7a/AB

(reduced copy)

FAB USE ONLY

CC 10-16

ASC/116/FIN A

TOP  
HINGED AT BOTTOM OF  
'AOA DEORBIT BURN (RCS)'  
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  $\Delta V$  or  
\* if CUR  $\Delta VTOT$ :                      TOT AFT QTY 2   % then  
\*    FRCS COMPLETION \*

\* FLIP   -----  
\*  $\Delta V$                            FRCS COMPLETION \*

\* AFT   -----  
\*  $\Delta V$                                       THC +X to TGT  $\Delta V$  \*

\* TGT   -----  
\*  $\Delta V$                                       \*

\* 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:** \*

\* Mnv 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 fps if shallow)

ASC-7aa/116/A/A

(reduced copy)

FAB USE ONLY

CC 10-17

ASC/116/FIN A



TOP  
 BACK OF 'AOA DEORBIT BURN (RCS)'



**HOOK  
 VELCRO**

**HOOK  
 VELCRO**



HINGE

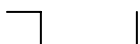
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 CC 10-18

ASC/116/FIN A





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



ASC-7bb/A/B



FAB USE ONLY

(reduced copy)  
CC 10-19

ASC/116/FIN A

TOP

PILE  
VELCRO

HOOK  
VELCRO

PILE  
VELCRO

**ZZA TAL REDESIGNATION  
(116 OCFR1 CYC)**

| 1st E.O. VI      |      | 5800  | 5900  | 6000  | 6100  | 6200  | 6300  | 6400  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 ZZA 109 | (14) | 10800 | 10800 | 10900 | 10900 | 10900 | 11000 | 11000 |
| SE ZZA 104       | (4)  | 17500 | 17300 | 17100 | 16800 | 16600 | 16400 | 16200 |

| 1st E.O. VI      |      | 6500  | 6600  | 6700  | 6800  | 6900  | 7000  | 7100  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 ZZA 109 | (14) | 11000 | 11000 | 11100 | 11100 | 11100 | 11200 | 11200 |
| SE ZZA 104       | (4)  | 15900 | 15700 | 15500 | 15300 | 15000 | 14800 | 14600 |

| 1st E.O. VI      |      | 7200  | 7300  | 7400  | 7500  | 7600  | 7700  | 7800  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 ZZA 109 | (14) | 11200 | 11200 | 11300 | 11300 | 11300 | 11300 | 11400 |
| SE ZZA 104       | (4)  | 14500 | 14300 | 14100 | 14000 | 13900 | 13800 | 13700 |

| 1st E.O. VI      |      | 7900  | 8000  | 8100  | 8200  | 8300  | 8400  | 8500  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 ZZA 109 | (14) | 11400 | 11400 | 11400 | 11400 | 11500 | 11500 | 11500 |
| SE ZZA 104       | (4)  | 13600 | 13600 | 13500 | 13500 | 13400 | 13400 | 13400 |

| 1st E.O. VI      |      | 8600  | 8700  | 8800  | 8900  | 9000  | 9100  | 9200  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 ZZA 109 | (14) | 11500 | 11500 | 11500 | 11600 | 11600 | 11600 | 11600 |
| SE ZZA 104       | (4)  | 13400 | 13400 | 13400 | 13400 | 13500 | 13500 | 13500 |

| 1st E.O. VI      |      | 9300  | 9400  | 9500  | 9600  | 9700  | 9800  | 9900  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 ZZA 109 | (14) | 11600 | 11600 | 11600 | 11700 | 11700 | 11700 | 11700 |
| SE ZZA 104       | (4)  | 13500 | 13500 | 13500 | 13500 | 13500 | 13500 | 13500 |

ASC-9a/116/A/A

PILE  
VELCRO

HOOK  
VELCRO

PILE  
VELCRO

(reduced copy)

FAB USE ONLY

CC 10-20

ASC/116/FIN A

TOP  
BACK OF 'ZZA TAL REDESIGNATION'

**HOOK  
VELCRO**

**HOOK  
VELCRO**

**HOOK  
VELCRO**

**ECAL – ZZA or MRN PRIME TAL**

| 1st EO VI (KFPS) | 5.6 | 5.8         | 6.0         | 6.2         | 6.4         | 6.6         | 6.8         |
|------------------|-----|-------------|-------------|-------------|-------------|-------------|-------------|
| CHERRY POINT (7) |     | 6.7 - 7.0   | 6.7 - 7.2   | 6.8 - 7.3   | 6.8 - 7.4   | 6.9 - 7.5   | 6.9 - 7.6   |
| OTIS ANGB (16)   |     | 10.3 - 11.1 | 10.3 - 11.2 | 10.2 - 11.3 | 10.2 - 11.5 | 10.2 - 11.6 | 10.2 - 11.6 |

| 1st EO VI (KFPS) | 7.0         | 7.2         | 7.4         | 7.6         | 7.8         | 8.0         | 8.2         |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CHERRY POINT (7) | 7.0 - 7.7   | 7.2 - 7.8   | 7.4 - 7.9   | 7.6 - 7.9   | 7.8 - 8.0   | 8.0 - 8.0   |             |
| GABRESKI (15)    |             |             |             |             | 10.5 - 10.7 | 10.4 - 10.8 | 10.3 - 11.0 |
| OTIS ANGB (16)   | 10.2 - 11.7 | 10.2 - 11.8 | 10.2 - 11.9 | 10.2 - 12.0 | 10.2 - 12.1 | 10.2 - 12.1 | 10.3 - 12.2 |

| 1st EO VI (KFPS) | 8.4         | 8.6         | 8.8         | 9.0         | 9.2         | 9.4         | 9.6         |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| OCEANA NAS (8)   |             | 8.6 - 9.0   | 8.8 - 9.1   | 9.0 - 9.2   | 9.2 - 9.3   |             |             |
| WALLOPS (9)      |             |             |             | 9.4 - 9.6   | 9.2 - 9.7   | 9.4 - 9.8   | 9.6 - 9.8   |
| GABRESKI (15)    | 10.3 - 11.1 | 10.3 - 11.2 | 10.3 - 11.3 | 10.4 - 11.3 | 10.4 - 11.4 | 10.4 - 11.5 | 10.4 - 11.5 |
| OTIS ANGB (16)   | 10.3 - 12.3 | 10.3 - 12.3 | 10.3 - 12.4 | 10.4 - 12.4 | 10.4 - 12.5 | 10.5 - 12.6 | 10.5 - 12.6 |
| PEASE INT'L (17) | 11.3 - 11.7 | 11.3 - 11.9 | 11.3 - 12.0 | 11.3 - 12.1 | 11.3 - 12.2 | 11.3 - 12.2 | 11.3 - 12.3 |

| 1st EO VI (KFPS) | 9.8         | 10.0        | 10.2        | 10.4        | 10.6        | 10.8        | 11.0        |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| WALLOPS (9)      | 9.8 - 9.9   |             |             |             |             |             |             |
| GABRESKI (15)    | 10.4 - 11.6 | 10.5 - 11.7 | 10.5 - 11.7 | 10.5 - 11.8 | 10.6 - 11.8 | 10.8 - 11.9 | 11.0 - 11.9 |
| OTIS ANGB (16)   | 10.5 - 12.7 | 10.5 - 12.7 | 10.6 - 12.8 | 10.6 - 12.8 | 10.7 - 12.9 | 10.8 - 12.9 | 11.0 - 12.9 |
| PEASE INT'L (17) | 11.3 - 12.4 | 11.4 - 12.5 | 11.4 - 12.5 | 11.5 - 12.6 | 11.5 - 12.6 | 11.5 - 12.7 | 11.5 - 12.7 |

| 1st EO VI (KFPS) | 11.2        | 11.4        | 11.6        | 11.8        | 12.0        | 12.2        | 12.4        |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| GABRESKI (15)    | 11.2 - 12.0 | 11.4 - 12.0 | 11.6 - 12.1 | 11.8 - 12.2 | 12.0 - 12.2 | 12.2 - 12.3 |             |
| OTIS ANGB (16)   | 11.2 - 13.0 | 11.4 - 13.0 | 11.6 - 13.1 | 11.8 - 13.1 | 12.0 - 13.2 | 12.2 - 13.2 | 12.4 - 13.2 |
| PEASE INT'L (17) | 11.5 - 12.8 | 11.5 - 12.8 | 11.6 - 12.9 | 11.8 - 12.9 | 12.0 - 13.0 | 12.2 - 13.0 | 12.4 - 13.0 |

| 1st EO VI (KFPS) | 12.6        | 12.8        | 13.0        | 13.2        | 13.4        | 13.6 | 13.8 |
|------------------|-------------|-------------|-------------|-------------|-------------|------|------|
| OTIS ANGB (16)   | 12.6 - 13.3 | 12.8 - 13.3 | 13.0 - 13.4 | 13.2 - 13.4 | 13.4 - 13.4 |      |      |
| PEASE INT'L (17) | 12.6 - 13.1 | 12.8 - 13.1 | 13.0 - 13.1 |             |             |      |      |

ASC-9b/116/A/B

**HOOK  
VELCRO**

**HOOK  
VELCRO**

**HOOK  
VELCRO**

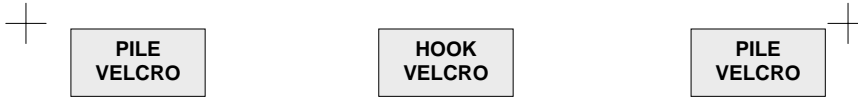
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CC 10-21

ASC/116/FIN A

TOP



**MRN TAL REDESIGNATION  
(116 OCFR1 CYC)**

| 1st E.O. VI      |      | 5700  | 5800  | 5900  | 6000  | 6100  | 6200  | 6300  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 10900 | 10900 | 11000 | 11000 | 11000 | 11100 | 11100 |
| SE MRN 104       | (3)  | 17200 | 17000 | 16800 | 16600 | 16300 | 16100 | 15900 |

| 1st E.O. VI      |      | 6400  | 6500  | 6600  | 6700  | 6800  | 6900  | 7000  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 11100 | 11100 | 11200 | 11200 | 11200 | 11300 | 11300 |
| SE MRN 104       | (3)  | 15700 | 15500 | 15200 | 15000 | 14800 | 14600 | 14400 |

| 1st E.O. VI      |      | 7100  | 7200  | 7300  | 7400  | 7500  | 7600  | 7700  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 11300 | 11300 | 11400 | 11400 | 11400 | 11400 | 11400 |
| SE MRN 104       | (3)  | 14200 | 14100 | 13900 | 13800 | 13700 | 13600 | 13500 |

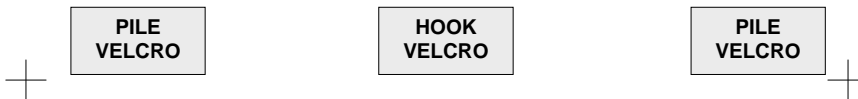
| 1st E.O. VI      |      | 7800  | 7900  | 8000  | 8100  | 8200  | 8300  | 8400  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 11500 | 11500 | 11500 | 11500 | 11500 | 11500 | 11500 |
| SE MRN 104       | (3)  | 13400 | 13400 | 13300 | 13300 | 13300 | 13300 | 13200 |

| 1st E.O. VI      |      | 8500  | 8600  | 8700  | 8800  | 8900  | 9000  | 9100  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 11500 | 11600 | 11600 | 11600 | 11600 | 11600 | 11600 |
| SE MRN 104       | (3)  | 13200 | 13300 | 13300 | 13300 | 13300 | 13300 | 13300 |

| 1st E.O. VI      |      | 9200  | 9300  | 9400  | 9500  | 9600  | 9700  | 9800  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 MRN 109 | (13) | 11600 | 11600 | 11600 | 11600 | 11700 | 11700 | 11700 |
| SE MRN 104       | (3)  | 13400 | 13400 | 13400 | 13400 | 13400 | 13400 | 13400 |

| 1st E.O. VI      |      | 9900  |
|------------------|------|-------|
| SE OPS 3 MRN 109 | (13) | 11700 |
| SE MRN 104       | (3)  | 13400 |

ASC-10a/116/A/A



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ASC/116/FIN A

TOP  
BACK OF 'MRN TAL REDESIGNATION'

**HOOK  
VELCRO**

**HOOK  
VELCRO**

**HOOK  
VELCRO**

**ECAL – ZZA or MRN PRIME TAL**

|                  |            |             |             |             |             |             |             |
|------------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>5.6</b> | <b>5.8</b>  | <b>6.0</b>  | <b>6.2</b>  | <b>6.4</b>  | <b>6.6</b>  | <b>6.8</b>  |
| CHERRY POINT (7) |            | 6.7 - 7.0   | 6.7 - 7.2   | 6.8 - 7.3   | 6.8 - 7.4   | 6.9 - 7.5   | 6.9 - 7.6   |
| OTIS ANGB (16)   |            | 10.3 - 11.1 | 10.3 - 11.2 | 10.2 - 11.3 | 10.2 - 11.5 | 10.2 - 11.6 | 10.2 - 11.6 |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>7.0</b>  | <b>7.2</b>  | <b>7.4</b>  | <b>7.6</b>  | <b>7.8</b>  | <b>8.0</b>  | <b>8.2</b>  |
| CHERRY POINT (7) | 7.0 - 7.7   | 7.2 - 7.8   | 7.4 - 7.9   | 7.6 - 7.9   | 7.8 - 8.0   | 8.0 - 8.0   |             |
| GABRESKI (15)    |             |             |             |             | 10.5 - 10.7 | 10.4 - 10.8 | 10.3 - 11.0 |
| OTIS ANGB (16)   | 10.2 - 11.7 | 10.2 - 11.8 | 10.2 - 11.9 | 10.2 - 12.0 | 10.2 - 12.1 | 10.2 - 12.1 | 10.3 - 12.2 |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>8.4</b>  | <b>8.6</b>  | <b>8.8</b>  | <b>9.0</b>  | <b>9.2</b>  | <b>9.4</b>  | <b>9.6</b>  |
| OCEANA NAS (8)   |             | 8.6 - 9.0   | 8.8 - 9.1   | 9.0 - 9.2   | 9.2 - 9.3   |             |             |
| WALLOPS (9)      |             |             |             | 9.4 - 9.6   | 9.2 - 9.7   | 9.4 - 9.8   | 9.6 - 9.8   |
| GABRESKI (15)    | 10.3 - 11.1 | 10.3 - 11.2 | 10.3 - 11.3 | 10.4 - 11.3 | 10.4 - 11.4 | 10.4 - 11.5 | 10.4 - 11.5 |
| OTIS ANGB (16)   | 10.3 - 12.3 | 10.3 - 12.3 | 10.3 - 12.4 | 10.4 - 12.4 | 10.4 - 12.5 | 10.5 - 12.6 | 10.5 - 12.6 |
| PEASE INT'L (17) | 11.3 - 11.7 | 11.3 - 11.9 | 11.3 - 12.0 | 11.3 - 12.1 | 11.3 - 12.2 | 11.3 - 12.2 | 11.3 - 12.3 |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>9.8</b>  | <b>10.0</b> | <b>10.2</b> | <b>10.4</b> | <b>10.6</b> | <b>10.8</b> | <b>11.0</b> |
| WALLOPS (9)      | 9.8 - 9.9   |             |             |             |             |             |             |
| GABRESKI (15)    | 10.4 - 11.6 | 10.5 - 11.7 | 10.5 - 11.7 | 10.5 - 11.8 | 10.6 - 11.8 | 10.8 - 11.9 | 11.0 - 11.9 |
| OTIS ANGB (16)   | 10.5 - 12.7 | 10.5 - 12.7 | 10.6 - 12.8 | 10.6 - 12.8 | 10.7 - 12.9 | 10.8 - 12.9 | 11.0 - 12.9 |
| PEASE INT'L (17) | 11.3 - 12.4 | 11.4 - 12.5 | 11.4 - 12.5 | 11.5 - 12.6 | 11.5 - 12.6 | 11.5 - 12.7 | 11.5 - 12.7 |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>11.2</b> | <b>11.4</b> | <b>11.6</b> | <b>11.8</b> | <b>12.0</b> | <b>12.2</b> | <b>12.4</b> |
| GABRESKI (15)    | 11.2 - 12.0 | 11.4 - 12.0 | 11.6 - 12.1 | 11.8 - 12.2 | 12.0 - 12.2 | 12.2 - 12.3 |             |
| OTIS ANGB (16)   | 11.2 - 13.0 | 11.4 - 13.0 | 11.6 - 13.1 | 11.8 - 13.1 | 12.0 - 13.2 | 12.2 - 13.2 | 12.4 - 13.2 |
| PEASE INT'L (17) | 11.5 - 12.8 | 11.5 - 12.8 | 11.6 - 12.9 | 11.8 - 12.9 | 12.0 - 13.0 | 12.2 - 13.0 | 12.4 - 13.0 |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | <b>12.6</b> | <b>12.8</b> | <b>13.0</b> | <b>13.2</b> | <b>13.4</b> | <b>13.6</b> | <b>13.8</b> |
| OTIS ANGB (16)   | 12.6 - 13.3 | 12.8 - 13.3 | 13.0 - 13.4 | 13.2 - 13.4 | 13.4 - 13.4 |             |             |
| PEASE INT'L (17) | 12.6 - 13.1 | 12.8 - 13.1 | 13.0 - 13.1 |             |             |             |             |

ASC-10b/116/A/B

**HOOK  
VELCRO**

**HOOK  
VELCRO**

**HOOK  
VELCRO**

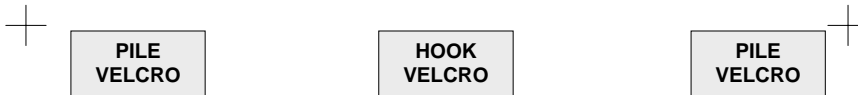
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CC 10-23

ASC/116/FIN A

TOP



**BEN TAL REDESIGNATION  
(116 OCFR1 CYC)**

| 1st E.O. VI      |      | 5700  | 5800  | 5900  | 6000  | 6100  | 6200  | 6300  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 BEN 109 | (12) | 10700 | 10700 | 10800 | 10800 | 10800 | 10900 | 10900 |
| SE BEN 104       | (2)  | 17200 | 17000 | 16800 | 16600 | 16400 | 16200 | 15900 |

| 1st E.O. VI      |      | 6400  | 6500  | 6600  | 6700  | 6800  | 6900  | 7000  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 BEN 109 | (12) | 10900 | 10900 | 11000 | 11000 | 11000 | 11100 | 11100 |
| SE BEN 104       | (2)  | 15700 | 15500 | 15300 | 15100 | 14900 | 14700 | 14500 |

| 1st E.O. VI      |      | 7100  | 7200  | 7300  | 7400  | 7500  | 7600  | 7700  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 BEN 109 | (12) | 11100 | 11100 | 11200 | 11200 | 11200 | 11200 | 11300 |
| SE BEN 104       | (2)  | 14300 | 14200 | 14000 | 13900 | 13800 | 13700 | 13600 |

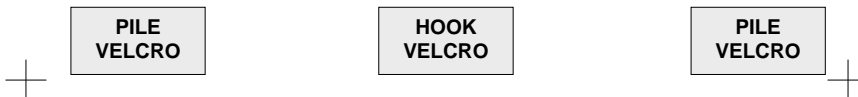
| 1st E.O. VI      |      | 7800  | 7900  | 8000  | 8100  | 8200  | 8300  | 8400  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 BEN 109 | (12) | 11300 | 11300 | 11300 | 11300 | 11400 | 11400 | 11400 |
| SE BEN 104       | (2)  | 13500 | 13500 | 13400 | 13400 | 13400 | 13400 | 13400 |

| 1st E.O. VI      |      | 8500  | 8600  | 8700  | 8800  | 8900  | 9000  | 9100  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 BEN 109 | (12) | 11500 | 11500 | 11600 | 11600 | 11600 | 11600 | 11600 |
| SE BEN 104       | (2)  | 13400 | 13400 | 13400 | 13400 | 13400 | 13400 | 13400 |

| 1st E.O. VI      |      | 9200  | 9300  | 9400  | 9500  | 9600  | 9700  | 9800  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| SE OPS 3 BEN 109 | (12) | 11600 | 11600 | 11600 | 11700 | 11700 | 11700 | 11700 |
| SE BEN 104       | (2)  | 13500 | 13500 | 13500 | 13500 | 13500 | 13500 | 13500 |

| 1st E.O. VI      |      | 9900  |
|------------------|------|-------|
| SE OPS 3 BEN 109 | (12) | 11700 |
| SE BEN 104       | (2)  | 13500 |

ASC-12a/116/A/A



(reduced copy)

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CC 10-24

ASC/116/FIN A

TOP  
BACK OF 'BEN TAL REDESIGNATION'

HOOK  
VELCRO

HOOK  
VELCRO

HOOK  
VELCRO

ECAL - BEN PRIME TAL

|                  |     |           |           |           |           |           |           |
|------------------|-----|-----------|-----------|-----------|-----------|-----------|-----------|
| 1st EO VI (KFPS) | 5.6 | 5.8       | 6.0       | 6.2       | 6.4       | 6.6       | 6.8       |
| CHERRY POINT (7) |     | 6.5 - 6.8 | 6.6 - 7.0 | 6.7 - 7.2 | 6.7 - 7.3 | 6.8 - 7.4 | 6.9 - 7.5 |
| OTIS ANGB (16)   |     |           |           |           |           |           |           |
| GABRESKI (15)    |     |           |           |           |           |           |           |
| PEASE INT'L (17) |     |           |           |           |           |           |           |

|                  |           |           |           |           |           |     |             |
|------------------|-----------|-----------|-----------|-----------|-----------|-----|-------------|
| 1st EO VI (KFPS) | 7.0       | 7.2       | 7.4       | 7.6       | 7.8       | 8.0 | 8.2         |
| CHERRY POINT (7) | 7.0 - 7.6 | 7.2 - 7.7 | 7.4 - 7.7 | 7.6 - 7.8 | 7.8 - 7.9 |     |             |
| OTIS ANGB (16)   |           |           |           |           |           |     | 11.0 - 11.3 |
| GABRESKI (15)    |           |           |           |           |           |     |             |
| PEASE INT'L (17) |           |           |           |           |           |     |             |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | 8.4         | 8.6         | 8.8         | 9.0         | 9.2         | 9.4         | 9.6         |
| CHERRY POINT (7) |             |             |             |             |             |             |             |
| OTIS ANGB (16)   | 10.9 - 11.4 | 10.9 - 11.6 | 10.9 - 11.7 | 10.9 - 11.8 | 10.9 - 11.8 | 10.9 - 11.9 | 10.9 - 12.0 |
| GABRESKI (15)    |             |             |             |             |             |             |             |
| PEASE INT'L (17) |             |             |             |             |             |             |             |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | 9.8         | 10.0        | 10.2        | 10.4        | 10.6        | 10.8        | 11.0        |
| CHERRY POINT (7) |             |             |             |             |             |             |             |
| OTIS ANGB (16)   | 10.9 - 12.1 | 10.9 - 12.2 | 10.9 - 12.2 | 10.9 - 12.4 | 10.9 - 12.4 | 10.9 - 12.5 | 11.0 - 12.5 |
| GABRESKI (15)    |             |             |             | 11.0 - 11.3 | 11.0 - 11.5 | 11.0 - 11.6 | 11.0 - 11.7 |
| PEASE INT'L (17) |             |             |             |             |             |             |             |

|                  |             |             |             |             |             |             |             |
|------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1st EO VI (KFPS) | 11.2        | 11.4        | 11.6        | 11.8        | 12.0        | 12.2        | 12.4        |
| CHERRY POINT (7) |             |             |             |             |             |             |             |
| OTIS ANGB (16)   | 11.2 - 12.6 | 11.4 - 12.7 | 11.6 - 12.7 | 11.8 - 12.8 | 12.0 - 12.9 | 12.2 - 13.0 | 12.4 - 13.0 |
| GABRESKI (15)    | 11.2 - 11.9 | 11.4 - 12.0 | 11.6 - 12.0 | 11.8 - 12.1 | 12.0 - 12.2 | 12.2 - 12.2 |             |
| PEASE INT'L (17) | 12.1 - 12.1 | 12.0 - 12.4 | 12.0 - 12.6 | 12.0 - 12.8 | 12.0 - 12.9 | 12.2 - 13.0 | 12.4 - 13.0 |

|                  |             |             |             |             |             |      |      |
|------------------|-------------|-------------|-------------|-------------|-------------|------|------|
| 1st EO VI (KFPS) | 12.6        | 12.8        | 13.0        | 13.2        | 13.4        | 13.6 | 13.8 |
| CHERRY POINT (7) |             |             |             |             |             |      |      |
| OTIS ANGB (16)   | 12.6 - 13.1 | 12.8 - 13.2 | 13.0 - 13.3 | 13.2 - 13.3 | 13.4 - 13.4 |      |      |
| GABRESKI (15)    |             |             |             |             |             |      |      |
| PEASE INT'L (17) | 12.6 - 13.0 | 12.8 - 13.0 | 13.0 - 13.1 |             |             |      |      |

ASC-12b/116/A/A

HOOK  
VELCRO

HOOK  
VELCRO

HOOK  
VELCRO

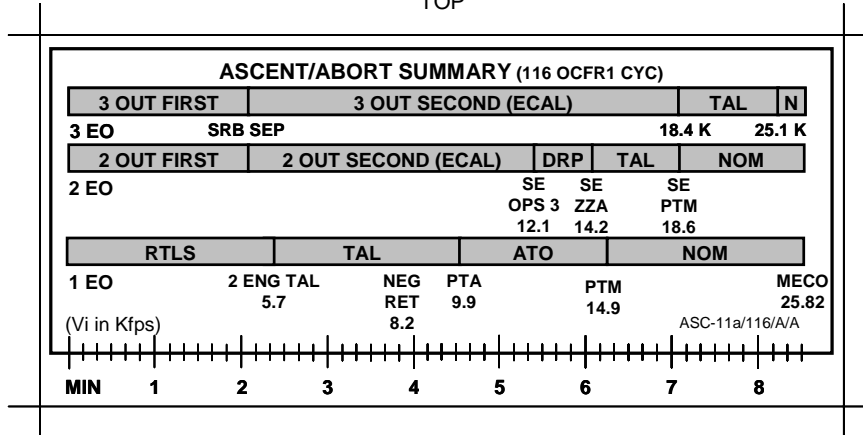
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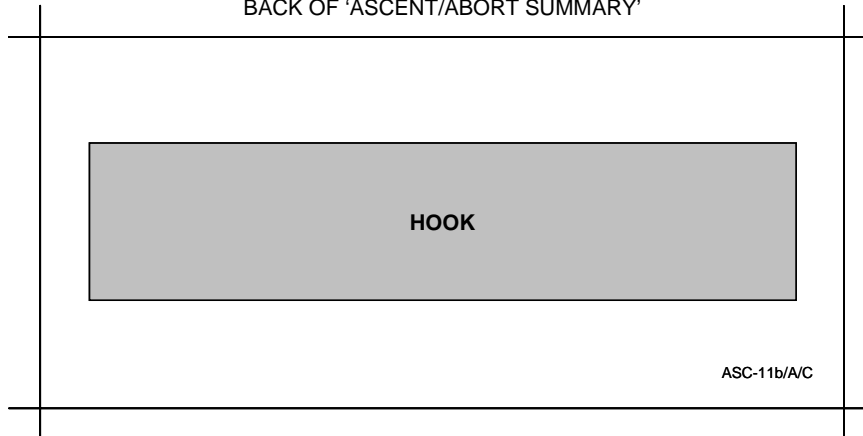
CC 10-25

ASC/116/FIN A

TOP



TOP  
BACK OF 'ASCENT/ABORT SUMMARY'



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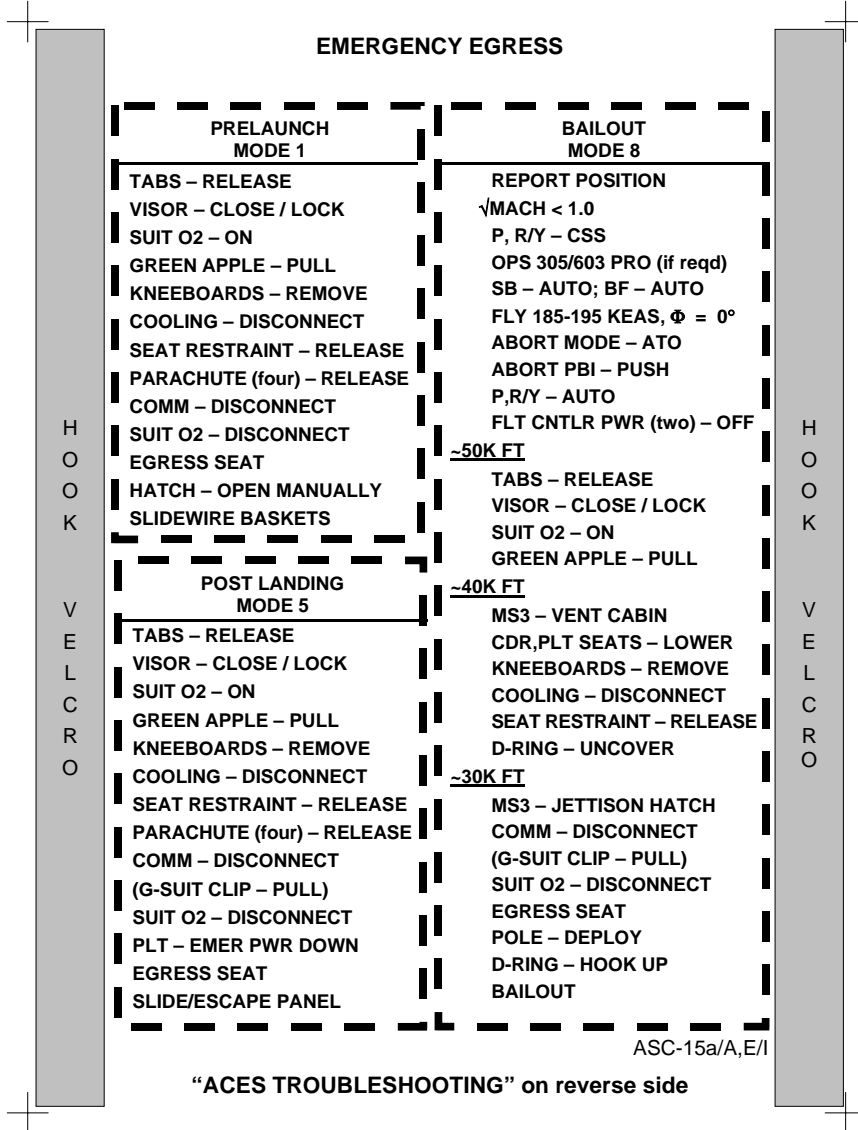
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CC 10-26

ASC/116/FIN A



TOP



(reduced copy)

FAB USE ONLY

CC 10-27

ASC/116/FIN A

TOP  
BACK OF "EMERGENCY EGRESS"

**ACES TROUBLESHOOTING (ASCENT/ENTRY)**

LOSS OF COMM

If LOSS OF XMIT:

NOTE

O2 helmet flow automutes microphones (i.e., inhalation, open or leaking visor, leaking neck dam)

1. ✓TABS – IN
2. ✓Helmet pressure visor seal not obstructed
3. ✓MIC placement
4. ✓CCU PWR – ON

| POWER BUS   | ATU        |
|-------------|------------|
| ESS BUS 1BC | CDR        |
| ESS BUS 2CA | PLT        |
| MNA         | MS STATION |
| MNB         | MIDDECK    |
| MNC         | PS STATION |

If LOSS OF RECEIVE:

5. HIU VOL – MAX
6. ✓All cable connections mated properly:  
CCA-to-Helmet I/F cable  
Comm pigtail  
HIU  
Comm panel
7. ✓ATU Config (Flight Deck as applicable):  
A/G1, A/G2, A/A, ICOM A, ICOM B – T/R  
MODE – PTT/VOX  
VOX SENS – 2-4  
A/G1, A/G2 tw – 9  
A/A, ICOM A, ICOM B tw – 5

LOSS OF SUIT PRESSURE

1. ✓TABS – IN
2. ✓VISOR – CLOSED/LOCKED
3. ✓Helmet properly attached
4. ✓Gloves properly attached
5. ✓BIP plug secured
6. ✓Suit zipper fully zipped

LOSS OF SUIT O2

1. ✓O2 hose connected to ACES O2 manifold
2. ✓LEH O2 viv – OP (Flight Deck)
3. ✓O2 hose connected properly at LEH O2 (Flight Deck)

INADVERTENT EOS ACTIVATION (After T-2:00)

1. Remain on shuttle LEH O2
2. Keep visor closed and locked through MECO

NOTE

Prior to opening visor, disconnect EOS O2 line (with locking collar clip) from O2 manifold to prevent EOS O2 flow

ASC-15b/A,E/E

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O  
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C6

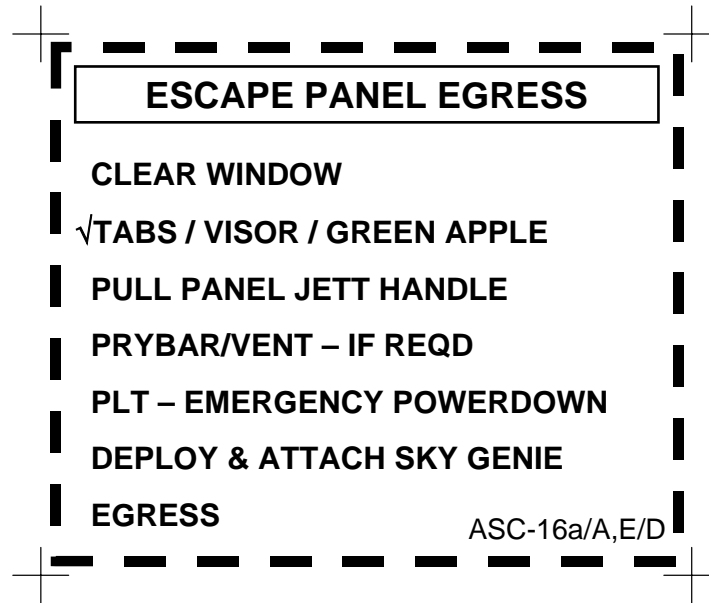
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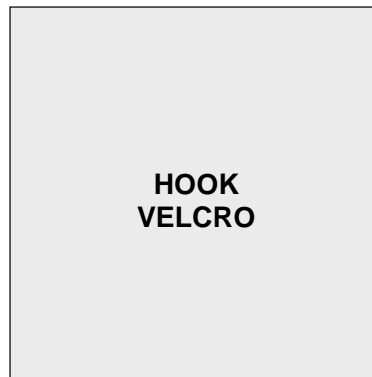
CC 10-28

ASC/116/FIN A

TOP



TOP  
BACK OF 'ESCAPE PANEL EGRESS'



ASC-16b/A,E/C



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FAB USE ONLY

CC 10-29

ASC/116/FIN A

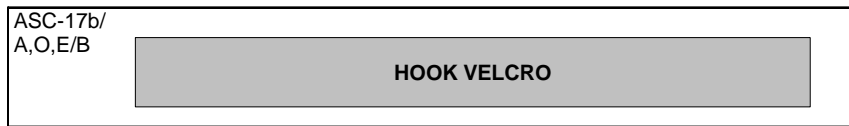
GPC/FCS CHANNEL CONFIGURATION

TOP

GPC

|  |     |     |     |                     |
|--|-----|-----|-----|---------------------|
| GPC  | GPC | GPC | GPC | ASC-17a/<br>A,O,E/B |
| 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 with Scotch tape

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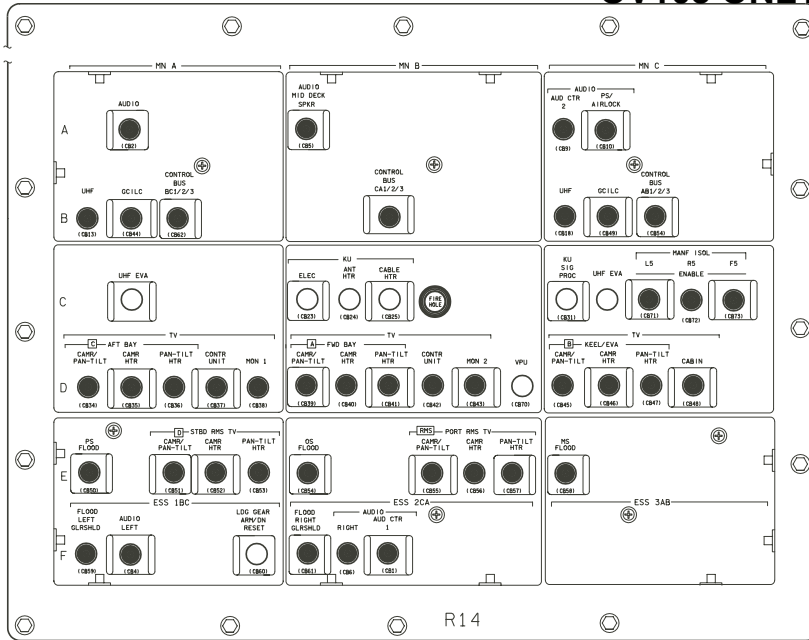
FAB USE ONLY

CC 10-30

ASC/116/FIN A

TOP  
PANEL R14 - OV103 ONLY

**OV103 ONLY**



R14

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ASC-18a/A,O,E/G

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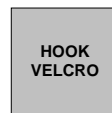
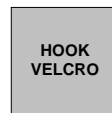
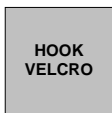
FAB USE ONLY

CC 10-31

ASC/116/FIN A



TOP  
 BACK OF 'PANEL R14 - OV103 ONLY'



ASC-18b/A,O,E/C



(reduced copy)

FAB USE ONLY

CC 10-32

ASC/116/FIN A



TOP

## LOC/BREAK-UP

### BEFORE 'GO AT THROTTLEUP'

- GREEN APPLE  
LOCK INERTIA REEL
- JETTISON HATCH
- BAILOUT
- PULL RIP CORD

### 'GO AT THROTTLEUP' TO SRB SEP

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

### AFTER SRB SEP

- √ TABS/VISOR/GREEN APPLE  
LOCK INERTIA REEL
- GO TO MIDDECK
- VENT
- 'G' SPIKE
- JETTISON HATCH
- √ ALT/SUIT
- BAILOUT (BELOW 40 K)
- PULL RIP CORD

ASC-21a/A/D

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

(reduced copy)

FAB USE ONLY

CC 10-33

ASC/116/FIN A

FAB USE ONLY

CC 10-34

ASC/116/FIN A

(reduced copy)

TOP

**EMERGENCY EGRESS**

| HOOK<br>VELCRO | PRELAUNCH<br>MODE 1   | HOOK<br>VELCRO  |
|----------------|---|---|
|                | <p><b>TABS – RELEASE</b><br/><b>VISOR – CLOSE / LOCK</b><br/><b>SUIT O2 – ON</b><br/><b>GREEN APPLE – PULL</b><br/><b>KNEEBOARDS – REMOVE</b><br/><b>COOLING – DISCONNECT</b><br/><b>SEAT RESTRAINT – RELEASE</b><br/><b>PARACHUTE (four) – RELEASE</b><br/><b>COMM – DISCONNECT</b><br/><b>SUIT O2 – DISCONNECT</b><br/><b>EGRESS SEAT</b><br/><b>HATCH – OPEN MANUALLY</b><br/><b>SLIDEWIRE BASKETS</b></p> | <p style="text-align: center;"><b>BAILOUT<br/>MODE 8</b></p> <p><b>REPORT POSITION</b><br/><b>√MACH &lt; 1.0</b><br/><b>P,R/Y – CSS</b><br/><b>OPS 305/603 PRO (if reqd)</b><br/><b>SB – AUTO; BF – AUTO</b><br/><b>FLY 185-195 KEAS, <math>\Phi = 0^\circ</math></b><br/><b>ABORT MODE – ATO</b><br/><b>ABORT PBI – PUSH</b><br/><b>P,R/Y – AUTO</b><br/><b>FLT CNTLR PWR (two) – OFF</b><br/><b>~50K FT</b><br/><b>TABS – RELEASE</b><br/><b>VISOR – CLOSE / LOCK</b><br/><b>SUIT O2 – ON</b><br/><b>GREEN APPLE – PULL</b></p> <p style="text-align: right;">ASC-25a/A,E/F</p> |
|                | HINGE   |   |



FAB USE ONLY

CC 10-35

ASC/116/FIN A

(reduced copy)

TOP, HINGED AT BOTTOM OF 'EMERGENCY EGRESS'  
HINGE

**POST LANDING  
MODE 5**

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

PILE  
VELCRO

**~40K FT**

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

**~30K FT**

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

ASC-25aa/A,E/D

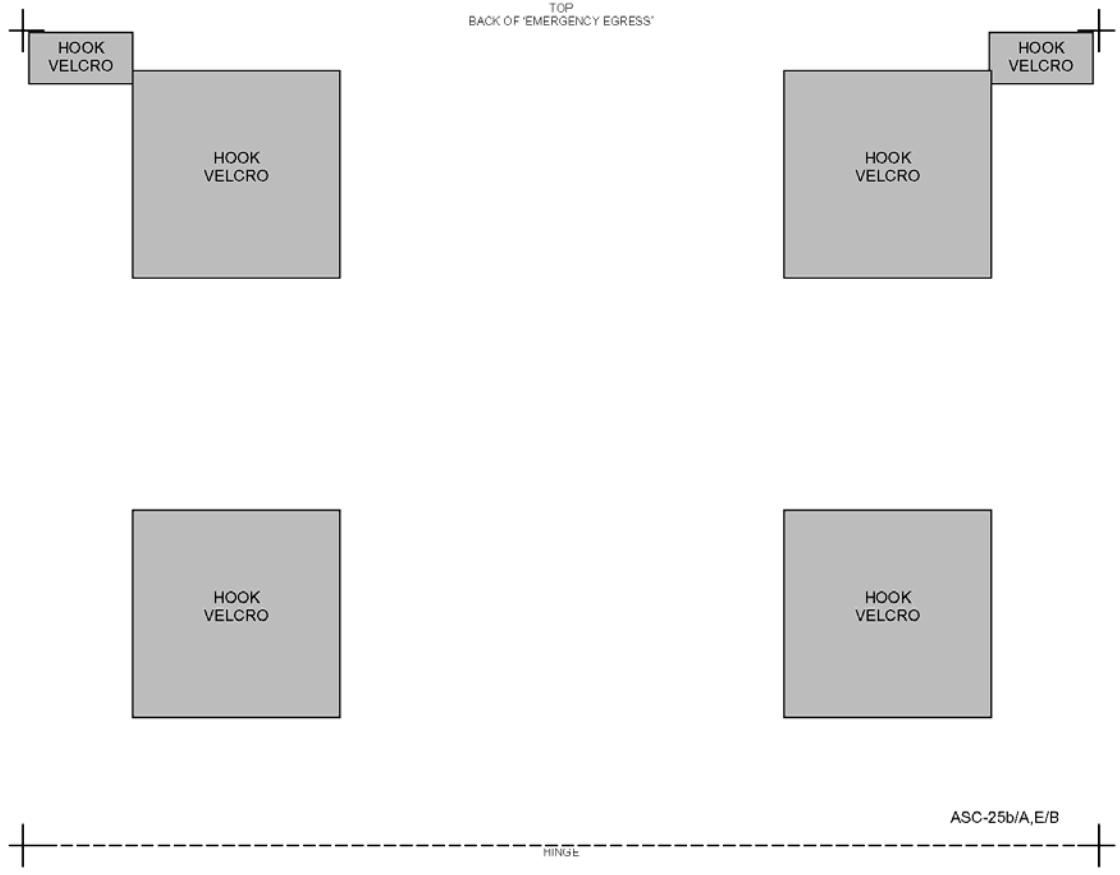
PILE  
VELCRO

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CC-10-36

ASC/116/FIN A

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FAB USE ONLY

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CC 10-37

ASC/116/FIN A



ASC-25bb/A,E/B



FAB USE ONLY

СС 10-38

ASC/116/FIN A

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HOOK  
VELCRO

ВЕРХ

## АВАРИЙНОЕ ПОКИДАНИЕ

HOOK  
VELCRO

### РЕЖИМ 1 ДО СТАРТА

ЯЗЫЧКИ ШЕЙНОЙ ПРОКЛАДКИ - УБРАТЬ  
ШЛЕМ - ОПУСТИТЬ/ ЗАКРЫТЬ  
СК O2 - ВКЛ  
ЗЕЛЕНый ШАРИК - ПОТЯНУТЬ  
НАКОЛЕННЫЕ ПЛАНШЕТЫ - УБРАТЬ  
СИСТЕМУ ОХЛАЖДЕНИЯ - ОТСОЕДИНИТЬ  
ПРИВЯЗНЫЕ РЕМНИ КРЕСЛА - ОСВОБОДИТЬ  
ПАРАШЮТ (четыре) - ОТСТЕГНУТЬ  
СВЯЗЬ - ОТСОЕДИНИТЬ  
СК O2 - ОТСОЕДИНИТЬ  
ПОКИНУТЬ КРЕСЛО  
ЛЮК – ОТКРЫТЬ ВРУЧНУЮ  
ИСПОЛЬЗОВАТЬ ЛЮЛЬКУ ДЛЯ СПУСКА

### РЕЖИМ 8 АВАРИЙНОЕ ДЕСАНТИРОВАНИЕ

СООБЩИТЬ ПОЛОЖЕНИЕ  
 $\sqrt{\text{ЧИСЛО МАХА}} < 1,0$   
ТАНГАЖ, РЫСКАНИЕ/КРЕН - CSS  
OPS 305/603 PRO (если необходимо)  
А/Д ТОРМОЗ - АВТО; ПОСАД. ЩИТОК - АВТО  
ВЫБРАТЬ СКОРОСТЬ 185-195 KEAS,  $\Phi = 0^\circ$   
ABORT MODE - АТО  
КН АВОРТ - НАЖАТЬ  
ТАНГАЖ, РЫСКАНИЕ/КРЕН - АВТО  
ТМБ FLT CNTLR PWR (два) - ВЫКЛ  
-50 ТЫСЯЧ ФУТОВ  
ЯЗЫЧКИ ШЕЙНОЙ ПРОКЛАДКИ - УБРАТЬ  
ШЛЕМ - ОПУСТИТЬ/ ЗАКРЫТЬ  
СК O2 - ВКЛ  
ЗЕЛЕНый ШАРИК - ПОТЯНУТЬ

ASC-26a/A,E/D

НИЗ

FAB USE ONLY

CC 10-39

ASC/116/FIN A

(reduced copy)

TOP, HINGED AT BOTTOM OF 'EMERGENCY EGRESS'  
HINGE

**РЕЖИМ 5  
ПОСЛЕ ПОСАДКИ**

ЯЗЫЧКИ ШЕЙНОЙ ПРОКЛАДКИ - УБРАТЬ  
ШЛЕМ - ОПУСТИТЬ/ ЗАКРЫТЬ  
СК O2 - ВКЛ  
ЗЕЛЕНЬ ШАРИК - ПОТЯНУТЬ  
НАКОЛЕННЫЕ ПЛАНШЕТЫ - УБРАТЬ  
СИСТЕМУ ОХЛАЖДЕНИЯ - ОТСОЕДИНИТЬ  
ПРИВЯЗНЫЕ РЕМНИ КРЕСЛА - ОСВОБОДИТЬ  
ПАРАШЮТ (четыре) - ОТСТЕГНУТЬ  
СВЯЗЬ - ОТСОЕДИНИТЬ  
(СНЯТЬ КОНТРОВКУ С КЛАПАНА ППК)  
СК O2 - ОТСОЕДИНИТЬ  
ПИЛОТ – ЭКСТРЕННО ОТКЛЮЧИТЬ ПИТАНИЕ  
ПОКИНУТЬ КРЕСЛО  
ИСПОЛЬЗОВАТЬ СКЛИЗ/ВЫХОДНУЮ  
ПАНЕЛЬ

PILE  
VELCRO

**~40 ТЫСЯЧ ФУТОВ**  
MS3 - СБРОСИТЬ ДАВЛЕНИЕ В КАБИНЕ  
КРЕСЛА КЭ И ПИЛОТА - ВНИЗ  
НАКОЛЕННЫЕ ПЛАНШЕТЫ - УБРАТЬ  
СИСТЕМУ ОХЛАЖДЕНИЯ - ОТСОЕДИНИТЬ  
ПРИВЯЗНЫЕ РЕМНИ КРЕСЛА - ОСВОБОДИТЬ  
D-ОБРАЗНОЕ КОЛЬЦО - НАЙТИ  
**~30 ТЫСЯЧ ФУТОВ**  
MS3 - ОТСТРЕЛИТЬ ЛЮК  
СВЯЗЬ - ОТСОЕДИНИТЬ  
(СНЯТЬ КОНТРОВКУ С КЛАПАНА ППК)  
СК O2 - ОТСОЕДИНИТЬ  
ПОКИНУТЬ КРЕСЛО  
РАЗЛОЖИТЬ НАПРАВЛЯЮЩУЮ ШТАНГУ  
D-ОБРАЗНОЕ КОЛЬЦО - ПРИСТЕГНУТЬ  
ПОКИНУТЬ КОРАБЛЬ

ASC-26aa/A,E/C

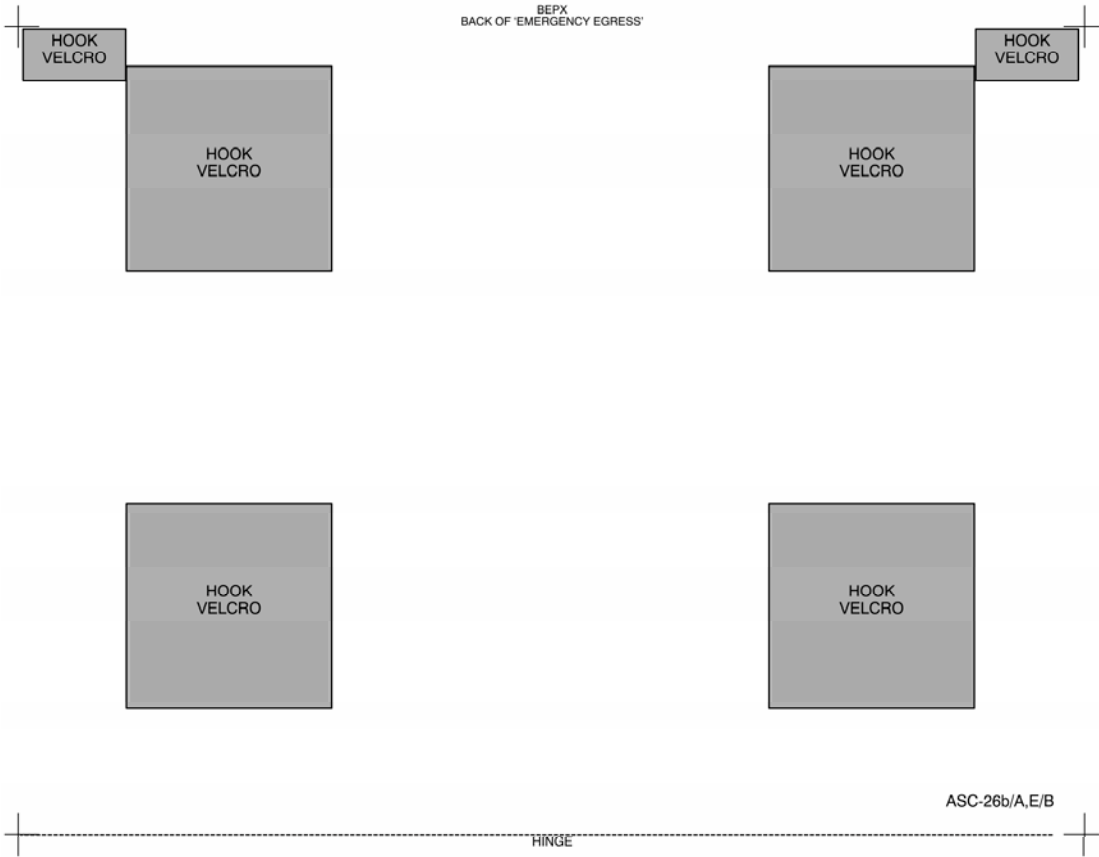
PILE  
VELCRO

FAB USE ONLY

CC 10-40

ASC/116/FIN A

(reduced copy)



FAB USE ONLY

(reduced copy)  
CC 10-41

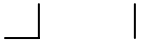
ASC/116/FIN A

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



ASC-26bb/A,E/B





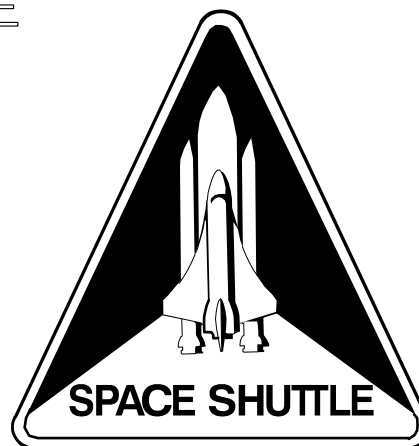
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Space Shuttle Program  
FLIGHT DATA FILE

JSC-48005-116  
FINAL, REV A



# ASCENT CHECKLIST

STS  
**116**

Flight Cover (trim bottom to expose tabs)