Payload Operations Checklist

STS–109

Mission Operations Directorate
Operations Division

Final, Rev B
January 25, 2002

National Aeronautics and Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

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MISSION OPERATIONS DIRECTORATE

PAYLOAD OPERATIONS CHECKLIST

STS–109

FINAL, REVISION B
January 25, 2002

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Book Manager

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______________________________  ________________________________
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# PAYLOAD OPERATIONS CHECKLIST

**STS–109**

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**SSE ACTIVATION**

1. **PRIMARY PAYLOAD ACT**
   R1
   √ PL PRI MNC tb – ON
   √ CAB – MNA

2. **FSS AND MULE FMDM–B PWR ON**
   L12U
cb FSS A SIDE PWR – cl

   FSS FMDM–B PWR – ON (tb–gray)
   * If FSS FMDM–B PWR tb – bp, *
   * cycle sw  *
   * If still no joy, continue  *

   L11U
cb MULE SW PWR – cl

   MULE FMDM–B PWR – ON (tb–gray)
   * If MULE FMDM–B PWR tb – bp, *
   * cycle sw  *
   * If still no joy, continue  *

3. **VERIFY SSE STATUS**

   **NOTE**
   Notify MCC of any parameter not in range, continue

   **SM 211 SSE OVERVIEW**
   SM I/O RESET EXEC
   * If FSS FMDM–B PWR or MULE FMDM–B PWR tb – bp *
   * and ‘I/O ERROR FLEX’ msg, FMDM failed:  *
   L12U
   * FSS FMDM–B PWR – OFF (tb–bp)  *
   * FMDM–A PWR – ON (tb–gray)  *
   L11U
   * MULE FMDM–B PWR – OFF (tb–bp)  *
   * FMDM–A PWR – ON (tb–gray)  *
   * SM 1 DPS UTILITY  *
   * PORT ASSIGN STRING PL 1/2 SEC – ITEM 24  *
   * EXEC (*)  *

   * If ‘I/O ERROR FLEX’ msg, go to  *
   * 1.4a ‘I/O ERROR FLEX’ (PL SYS, SSE)  *
   * If ‘BCE BYPASS’ msg, go to 1.4b ‘BCE  *
   * BYP FLEX’ (PL SYS, SSE)  *

   **SM 211 SSE OVERVIEW**
   √ PCU – blank/blank
   √ CCTV ENA OFF – *
   √ PWR OFF – *
   √ ESM A HTR ZONE 1&2,3 – no * (both)
   √ B HTR ZONE 1&2,3 – no * (both)
   √ SOPE A HTR ZONE 1&2,3 – no * (both)
   √ B HTR ZONE 1&2,3 – no * (both)
POWER
✓ FSS EPDSU 1/2 AMPS: < 3.0 (both)
✓ FMDM A/B AMPS: < .15/.5 to 1.1
✓ HTR – blank/blank
✓ HTR A1/A2 AMPS: < 0.4 (both)
✓ B1/B2 AMPS: < 0.4 (both)
✓ CCTV HTR AMPS: < .10
✓ MULE FMDM A/B AMPS: < .15/.7 to 1.3
✓ HTR – no *
✓ HTR AMPS: < 0.4
✓ ESM 1&2/3 AMPS: < 0.1 (both)
✓ SOPE 1A/2A AMPS: < 0.4 (both)
✓ 1B&2B AMPS: < 0.4
✓ 3A/3B AMPS: < 0.4 (both)
✓ SAC EPDSU AMPS: .4 to 1.4
✓ FSS EPDSU VOLTS: 24.0 to 32.0 (both)
✓ MULE PDSU VOLTS: 24.0 to 32.0
✓ SAC EPDSU VOLTS: 24.0 to 32.0 (both)

DPC
✓ DPC 1–12: – no *
✓ DPC 1–12 VOLTS: < 0.5
✓ DPC 1–12 AMPS: < 0.5

THERMAL
✓ FSS EPDSU TEMP: −20 to 50 degC (both)
✓ FMDM TEMP: −3 to 55 degC (active FMDM only)
✓ PCU TEMP: −20 to 50 degC (both)
✓ IPCU TEMP: −30 to 50 degC
✓ AMSB TEMP: −20 to 50 degC
✓ MULE PDSU TEMP: −20 to 50 degC
✓ FMDM TEMP: −3 to 55 degC (active FMDM only)
✓ SAC EPDSU TEMP: −20 to 50 degC (both)

4. FSS HEATER ACT
L12U FSS HTR PWR – PRI (tb–gray)

* If tb – bp, cycle sw *
* If still no joy, continue *

CRT ✓ POWER FSS HTR – 1/2

* If POWER FSS HTR NOT 1/2, go to *
* 1.1a POWER FSS HTR NOT 1/2 *
* (S211) (PL SYS, SSE)

✓ POWER FSS HTR A1,B1 AMPS: ≤ 0.4 (both)

* If POWER FSS HTR A1 AMPS: > 14 or POWER FSS HTR B1 *
* AMPS: > 11, then *
L12U FSS HTR PWR – OFF (tb–bp), ✓ MCC *
* If POWER FSS HTR A1 AMPS: 0.4 to 14 or POWER FSS HTR B1 *
* AMPS: 0.4 to 11, then *
* notify MCC, continue *

CCTV HTR PWR – ON (tb–gray)

* If CCTV HTR PWR tb – bp, *
* cycle sw *
* If no joy, continue *
5. MULE SURVIVAL HEATER ACT

L11U SURV HTR B PWR – ON
\* HTR PWR tb – gray
\* If SURV HTR PWR tb – bp, \*  
\* cycle sw \*  
\* If still no joy, continue \*  

6. ESM HEATER ACT

L11U ESM HTR B PWR – ON (tb–gray)
\* If ESM HTR B PWR tb – bp, \*  
\* cycle sw \*  
\* If still no joy, continue \*  

7. SOPE HEATER ACT

L11U SOPE HTR B PWR – ON (tb–gray)
\* If SOPE HTR B PWR tb – bp, \*  
\* cycle sw \*  
\* If still no joy: \*  
\* SOPE HTR B PWR – OFF (tb–bp) \*  
\* A PWR – ON (tb–gray) \*  

CRT √SOPE B HTR ZONE 1&2,3 – * (both)
√POWER MULE SOPE 1A/2A AMPS: ≤ 0.4 (both)
√1B&2A AMPS: ≤ 5.1
√3A/3B AMPS: ≤ 0.4≤ 2.6

* If POWER MULE SOPE AMPS not as expected: *

L11U √SOPE HTR B PWR – OFF (tb–bp), \*  
* √MCC \*  

CRT √POWER FSS CCTV HTR AMPS: ≤ .9
* If POWER FSS CCTV HTR AMPS: > .9, *  
L12U √ CCTV HTR PWR – OFF (tb–bp), continue *  

CRT √POWER MULE HTR – *
\* If POWER MULE HTR NOT *, go to *  
\* 1.1b POWER MULE HTR NOT *  
\* (S211) (PL SYS, SSE) *  
√POWER MULE HTR AMPS: ≤ 11
\* If POWER MULE HTR AMPS: > 11, *  

L11U SURV HTR B PWR – OFF  
\* √HTR PWR tb – bp  
\* √MCC  

CRT √ESM B HTR ZONE 1&2,3 – * (both)
√POWER MULE ESM 1&2/3 AMPS: ≤ 4/≤ 2
\* If POWER MULE ESM 1&2/3 AMPS: > 4/> 2, *  

L11U √ESM HTR B PWR – OFF (tb–bp), \*  
* √MCC \*  

CRT √POWER MULE 1B&2B AMPS: ≤ 5.1  
STM/109/Fin B
8. **SAC PWR ON**

   L12L  cb SAC A–SIDE PWR ENA – cl
   SAC B–SIDE PWR ENA – ON

9. **ASIPE HTR A ON**

   ASIPE HTR A PWR – ON (mom) (tb–UP)
   
   * If ASIPE HTR A PWR tb – bp, cycle sw *
   * If still no joy: *
   * ASIPE HTR A PWR – OFF (mom) (tb–bp) *
   * HTR B PWR – ON (mom) (tb–UP) *

   CRT  √POWER SAC EPDSU AMPS: ≤ 14

   * If POWER SAC EPDSU AMPS: > 14, *

   L12L  * ASIPE HTR A PWR – OFF (mom) (tb–bp) *
   * √MCC *

10. **SAP HTR B PWR ON**

    L12L  SAP HTR B PWR – ON (tb–gray)

    * If SAP HTR B PWR tb – bp, cycle sw *
    * If still no joy: *
    * SAP HTR B PWR – OFF (tb–bp) *
    * HTR A PWR – ON (tb–gray) *

    CRT  √POWER SAC EPDSU AMPS: ≤ 23

    * If POWER SAC EPDSU AMPS: > 23, *

    L12L  * SAP HTR B PWR – OFF (tb–bp) *
    * √MCC *

11. **OPA HTR A ON**

    L12L  SAC OPA HTR A PWR – ON (tb–gray)

    * If SAC OPA HTR A PWR tb – bp, cycle sw *
    * If still no joy: *
    * SAC OPA HTR A PWR – OFF (tb–bp) *
    * HTR B PWR – ON (tb–gray) *

    CRT  √POWER SAC EPDSU AMPS: ≤ 32

    * If POWER SAC EPDSU AMPS: > 32, *

    L12L  * SAC OPA HTR A PWR – OFF (tb–bp), *
    * √MCC *

12. **SAC EPDSU HTR PWR B ON**

    L12L  SAC EPDSU HTR PWR – B ON (tb–gray)

    * If SAC EPDSU HTR PWR tb – bp, cycle sw *
    * If still no joy: *
    * SAC EPDSU HTR PWR – OFF (tb–bp) *
    * – A ON (tb–gray) *

    CRT  √POWER SAC EPDSU AMPS: ≤ 35
13. **VERIFY MECHANISM STATUS**

<table>
<thead>
<tr>
<th>SM 212 SSE MECHANISMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ AMSB OFF – *</td>
</tr>
<tr>
<td>✓ AMSB AC AMPS: &lt; .20</td>
</tr>
<tr>
<td>✓ AMSB TEMP: −20 to 50 degC</td>
</tr>
<tr>
<td>✓ MECH – blank</td>
</tr>
<tr>
<td>✓ PIVOT LO TACH: &lt; .25 deg/min</td>
</tr>
<tr>
<td>✓ ROTATOR TACH: &lt; 0.9 deg/min</td>
</tr>
</tbody>
</table>

Notify MCC, SSE ACTIVATION complete; report any anomalies
SSE CHECKOUT

1. **SSP INTERFACE CHECKS**
   
   **SM 211 SSE OVERVIEW**
   
   **PCU ON – ITEM 1 EXEC (*)**
   
   ✓ PCU – P/S
   
   ✓ DPC 1–12 – *
       ✓ VOLTS: 33.7 to 35.3
       ✓ AMPS: ≤ 0.5
   
   * If DPC 1–12 AMPS: > 0.5, turn off affected DPC, *
   * DPC OFF – ITEM 24 +X X EXEC (no *)
   * (Refer to DPC ON/OFF INDEX NUMBERS)
   * ✓ MCC
   * If any other param(s) not in range, record MET *
   * and off nominal DPC values; notify MCC *
   * Continue *

   **NOTE**
   
   If any parameters out of limits, note and continue

   | L12U | cb SPACE TEL SW PWR – cl |
   |      | ESS/MN SW ENA – ON (tb–gray) |
   |      | MAIN BUS EXT PWR – ON (mom) (expect no tb) |
   |      | ✓ IPCU RLY CL tb – gray |
   |      | MAIN BUS EXT PWR – OFF (mom) |
   |      | ✓ IPCU RLY CL tb – bp |
   |      | ESS/MN SW ENA – OFF (tb–bp) |
   |      | RSU SURV HTR PWR – ON (tb–gray) |
   |      | – OFF (tb–bp) |
   |      | FHST SHUTTER – CL (tb–gray) |
   |      | – OP (tb–bp) |

   | CRT | PCU OFF – ITEM 2 EXEC (*) |
   |     | ✓ PCU – blank/blank |
   |     | ✓ DPC 1–12 – no * |
   |     | L12U | PCU PWR CONTR A – ON |
   |     | CRT | ✓ DPC 1–12 – * |
   |     |       |     | L12U | PCU PWR CONTR A – OFF |
   |     | CRT | ✓ DPC 1–12 – no * |
   |     |       |     | L12U | PCU PWR CONTR B – ON |
   |     | CRT | ✓ DPC 1–12 – * |
   |     |       |     | L12U | PCU PWR CONTR B – OFF |
   |     | CRT | ✓ DPC 1–12 – no * |

2. **FSS CCTV CHECK**
   
   **CCTV ENA ON – ITEM 3 EXEC (*)**
   
   **PWR ON – ITEM 5 EXEC (*)**
   
   * If CCTV ENA ON does not indicate ‘*’, *
   * re–exec ITEM 3. If still no ‘*’, continue *

   * If CCTV PWR ON does not indicate ‘*’, *
   * re–exec ITEM 5. If still no ‘*’, attempt *
   * to display Camr image on monitor. If *
   * no image, ✓ MCC
A7U
Select FSS CCTV, zoom and focus to verify Camr operational

CCTV PWR OFF – ITEM 6 EXEC (*)

* If CCTV PWR OFF not ‘*’,  
* do not perform CCTV ENA – OFF *

Wait 15 sec,  
CCTV ENA OFF – ITEM 4 EXEC (*)

3. FSS AMSB CHECKOUT

A6U
✓PL RETEN LAT 1,2 (two) – OFF  
✓LOGIC PWR SYS 1,2 (two) – OFF  
✓PL SEL – 1

R13L
✓PL BAY MECH PWR SYS 1,2 (two) – OFF

SM 212 SSE MECHANISMS

AMSB ON – ITEM 7 EXEC (B(A))

* If AMSB ON – blank,  
* record and continue *

✓AMSB AC AMPS: < 0.20
✓MECH – blank
✓SEL (ITEMS 9–19) – no *
✓STAT (ITEMS 9–19) – blank
✓PIVOT LO TACH: < 0.25 deg/min
✓ROTATOR TACH: < 0.9 deg/min
✓O/R DIS, (ITEM 22) – *

* If any parameter out of limit, ✓MCC *
Perform following ITEM entries and checks per table

NOTE
SEL field should show ‘*’ only for MECHANISM selected.
For any parameters not as expected, do not deselect;
contact MCC

<table>
<thead>
<tr>
<th>ITEM EXEC</th>
<th>MECHANISM</th>
<th>SEL</th>
<th>STAT</th>
<th>AMSB DC AMPS</th>
<th>MECH</th>
<th>SM 97 PL SEL 1, LAT/REL LATCH 2(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>DLOCK</td>
<td>9 – *</td>
<td>ENG</td>
<td>.02–.08</td>
<td>B(A)</td>
<td>01/00(10/00)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Expect ‘S212 AMSB DC AMPS’ msg</td>
</tr>
<tr>
<td>21</td>
<td>O/R ENA(*)</td>
<td>9 – *</td>
<td>RDY</td>
<td>.09–.20</td>
<td></td>
<td>00/00(00/00)</td>
</tr>
<tr>
<td>11</td>
<td>PIVOT LO</td>
<td>11 – *</td>
<td>DN</td>
<td>.02–.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Expect ‘S212 AMSB DC AMPS’ msg</td>
</tr>
<tr>
<td>21</td>
<td>O/R ENA(*)</td>
<td>11 – *</td>
<td>RDY</td>
<td>.09–.20</td>
<td></td>
<td>00/00(00/00)</td>
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<tr>
<td>22</td>
<td>O/R DIS (*)</td>
<td>11 – *</td>
<td>DN</td>
<td>.02–.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
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<tr>
<td>12</td>
<td>ROTATOR</td>
<td>12 – *</td>
<td>RDY</td>
<td>.02–.08</td>
<td></td>
<td>00/00(00/00)</td>
</tr>
<tr>
<td>14</td>
<td>B LAT 1</td>
<td>14 – *</td>
<td>OP</td>
<td>.02–.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
</tr>
<tr>
<td>15</td>
<td>B LAT 2</td>
<td>15 – *</td>
<td>OP</td>
<td>.02–.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
</tr>
<tr>
<td>16</td>
<td>B LAT 3</td>
<td>16 – *</td>
<td>OP</td>
<td>.02–.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
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<tr>
<td>17</td>
<td>UMB MN</td>
<td>17 – *</td>
<td>REL</td>
<td>.02–.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
</tr>
<tr>
<td>18</td>
<td>UMB B/U</td>
<td>18 – *</td>
<td>MAT</td>
<td>.02–.08</td>
<td>B(A)</td>
<td>01/00(10/00)</td>
</tr>
<tr>
<td>19</td>
<td>BSP</td>
<td>19 – *</td>
<td>SET</td>
<td>.02–.08</td>
<td>B(A)</td>
<td>01/00(10/00)</td>
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<tr>
<td>20</td>
<td>DESEL</td>
<td>9–19 blank</td>
<td></td>
<td>&lt; .04</td>
<td></td>
<td>00/00(00/00)</td>
</tr>
</tbody>
</table>

4. B SIDE UMBILICAL TEST

CAUTION
Operating the umbilical in a stalled condition for greater than 30 sec may result in damage to unit. An umbilical stall condition is indicated by AMSB AC AMPS > 0.6 and no mechanism motion

Perform FSS UMBILICAL SURVEY (PDRS OPS, PHOTO SURVEYS)

CCTV Monitor UMB MN operations

A6U PL RETEN LOGIC PWR SYS 2 – ON

R13L PL BAY MECH PWR SYS 2 – ON

CRT UMB MN SEL – ITEM 17 EXEC (* REL)
✓ AMSB DC AMPS: .02 to .08
✓ MECH – steady B

A6U PL RETEN LAT 2 – LAT
CRT  √MECH – flashing B
√AMSB AC AMPS: .6 to 1.0
√UMB MN STAT – RDY

* If stall condition observed (AMSB AC AMPS *
* > .6 and no mechanism motion): *
* √PL RETEN LAT 2(1) – OFF *
* √MCC *

Wait 8 sec

√UMB MN STAT – MAT
A6U  PL RETEN LAT 2 – OFF

CRT  √MECH – steady B

CCTV  Visually verify UMB in mated posn

A6U  PL RETEN LAT 2 – REL

CRT  √MECH – flashing B
√AMSB AC AMPS: .6 to 1.0
√UMB MN STAT – RDY

* If stall condition observed (AMSB AC AMPS *
* > .6 and no mechanism motion): *
* √PL RETEN LAT 2(1) – OFF *
* √MCC *

Wait 8 sec
√UMB MN STAT – REL
A6U  PL RETEN LAT 2 – OFF

CRT  √MECH – steady B
CCTV  Visually verify UMB in released posn
CRT  DESEL – ITEM 20 EXEC (√ITEMS 9–19 no *)
√AMSB DC AMPS: < .04
OFF – ITEM 8 EXEC (*)

R13L  PL BAY MECH PWR SYS 2 – OFF
A6U  RETEN LOGIC PWR SYS 2 – OFF

Notify MCC of any anomalies in SSE CHECKOUT prior to next step

5.  SSE SWAP TO A SIDE
L12U  FSS FMDM–A PWR – ON (tb–gray)

* If FSS FMDM–A PWR tb – bp, *
* cycle sw *
* If still no joy, continue *

SM 211 SSE OVERVIEW
√POWER FSS FMDM A/B AMPS: .5 to 1.1 (both)

L11U  MULE FMDM–A PWR – ON (tb–gray)
* If MULE FMDM–A PWR tb – bp, *
* cycle sw *
* If still no joy, continue *

**CRT** √POWER MULE FMDM A/B AMPS: .7 to 1.3 (both)

**SM1 DPS UTILITY**
PORT ASSIGN STRING PL 1/2 SEC – ITEM 24 EXEC (*)

* If FSS FMDM–A PWR tb – bp and accompanied by *
* ‘I/O ERROR FLEX’ msg, FSS FMDM–A failed: *
* PORT ASSIGN STRING PL 1/2 PRI – ITEM 23 EXEC (*), *
**L12U**
* FSS FMDM–A PWR – OFF (tb–bp) *
**L11U**
* MULE FMDM–A PWR – OFF (tb–bp) *
* √MCC *
* If MULE FMDM–A PWR tb – bp and accompanied by *
* ‘I/O ERROR FLEX’ msg, MULE FMDM–A failed. MULE *
* FMDM–A PWR – OFF (tb–bp). Go to SSE CHECKOUT *
* WITH FAILED MULE FMDM–A (CONTINGENCY OPS) *

6. **MULE SURVIVAL HEATER ACT**

**L11U**
SURV HTR A PWR – ON
HTR B PWR – OFF
√HTR PWR tb – gray

* If SURV HTR PWR tb – bp, *
* cycle SURV HTR A PWR sw *
* If still no joy, continue *

**CRT** √POWER MULE HTR – *

* If POWER MULE HTR not *, *
* go to 1.1b POWER MULE HTR *
* NOT *(S211) (PL SYS, SSE) *

√POWER MULE HTR AMPS: ≤ 11

**L11U**
* SURV HTR A PWR – OFF *
* √HTR PWR tb – bp *
* √MCC *

7. **ESM–A HEATER ACT**

**L11U**
ESM HTR A PWR – ON (tb–gray)

* If ESM HTR A PWR tb – bp, *
* cycle sw *
* If still no joy, continue *

**CRT** √POWER MULE ESM 1&2/3 AMPS: ≤ 4/≤ 2

* If POWER MULE ESM 1&2/3 AMPS: > 4/> 2, *
* ESM HTR A PWR – OFF (tb–bp), *
* proceed to step 8 *

**L11U**
ESM HTR B PWR – OFF (tb–bp)
8. **SOPE–A HEATER ACT**
   SOPE HTR A PWR – ON (tb–gray)
   *
   * If SOPE HTR A PWR tb – bp, *
   * cycle sw *
   * If still no joy, continue *

   **CRT**
   ✓ POWER MULE SOPE 1A/2A AMPS: ≤ 2.0/≤ 3.1
   ✓ 1B&2B AMPS: ≤ 5.1
   ✓ 3A/3B AMPS: ≤ 2.6 (both)

   * If any SOPE AMPS not as expected: *
   * SOPE HTR A PWR – OFF (tb–bp), *
   * proceed to step 9 *

   **L11U**
   SOPE HTR B PWR – OFF (tb–bp)

9. **VERIFY SSE STATUS**

   **NOTE**
   If any parameter not in range, do not perform step 10; notify MCC

   **SM 211 SSE OVERVIEW**
   ✓ PCU – blank/blank
   ✓ PCU OFF – *
   ✓ CCTV ENA OFF – *
   ✓ PWR OFF – *
   ✓ ESM A HTR ZONE 1&2,3 – * (both)
   ✓ B HTR ZONE 1&2,3 – blank (both)
   ✓ SOPE A HTR ZONE 1&2,3 – * (both)
   ✓ B HTR ZONE 1&2,3 – blank (both)

   **POWER**
   ✓ FSS EPDSU 1/2 AMPS: < 3.0 (both)
   ✓ FMDM A/B AMPS: .5 to 1.1 (both)
   ✓ HTR – 1/2
   ✓ HTR A1/A2 AMPS: < 0.4 (both)
   ✓ B1/B2 AMPS: < 0.4 (both)
   ✓ CCTV HTR AMPS: < .9
   ✓ MULE FMMD A/B AMPS: .7 to 1.3 (both)
   ✓ HTR – *
   ✓ HTR AMPS: < 11.0
   ✓ ESM 1&2/3 AMPS: < 4.0/< 2.0
   ✓ SOPE 1A/2A AMPS: < 2.0/< 3.1
   ✓ 1B&2B AMPS: < 0.4
   ✓ 3A/3B AMPS: < 2.6/< 0.4
   ✓ SAC EPDSU AMPS: < 35
   ✓ FSS EPDSU VOLTS: 24.0 to 32.0 (both)
   ✓ MULE PDSU VOLTS: 24.0 to 32.0
   ✓ SAC EPDSU VOLTS: 24.0 to 32.0 (both)

   **DPC**
   ✓ DPC 1–12 – no *
   ✓ VOLTS: < 0.5
   ✓ AMPS: < 0.5

   **THERMAL**
   ✓ FSS EPDSU TEMP: –20 to 50 degC (both)
   ✓ FMDM TEMP: –3 to 55 degC (both)
   ✓ PCU TEMP: –20 to 50 degC (both)
   ✓ IPCU TEMP: –30 to 50 degC
   ✓ AMSB TEMP: –20 to 50 degC
10. FMDM–B PWRDN
L11U MULE FMDM–B PWR – OFF (tb–bp)
* If tb – gray, note and continue *
L12U FSS FMDM–B PWR – OFF (tb–bp)
* If tb – gray, note and continue *

11. VERIFY MECH STATUS

SM 212 SSE MECHANISMS
✓ AMSB OFF – *
✓ AC AMPS: < 0.20
✓ TEMP: –20 to 50 degC
✓ MECH – blank
✓ PIVOT LO TACH: < 0.25 deg/min
✓ ROTATOR TACH: < 0.9 deg/min

12. AMSB CHECKOUT SIDE A
Repeat step 3 for A side

CRT AMSB OFF – ITEM 8 EXEC (*)

13. FSS PCU CHECKOUT

SM 211 SSE OVERVIEW
PCU ON – ITEM 1 EXEC (*)
✓ PCU – P/S
✓ DPC 1–12 – *
✓ VOLTS: 33.7 to 35.3
✓ AMPS: ≤ 0.5

* If DPC 1–12 AMPS > 0.5, *
* PCU OFF – ITEM 2 EXEC (*) *
* ✓ MCC *

PCU OFF – ITEM 2 EXEC (*)
✓ PCU – blank/blank
✓ DPC 1–12 – no *

Notify MCC, SSE CHECKOUT complete; report any anomalies
FSS PREP FOR BERTHING

1. FSS AMSB PWR ON

A6U

- PL RETEN LAT 1,2 (two) – OFF
- LOGIC PWR SYS 2(1) – OFF
- PL SEL – 1
- LOGIC PWR SYS 1(2) – ON

**SM 212 SSE MECHANISMS**

AMSDEV ON – ITEM 7 EXEC (A(B))

- If AMSB ON – blank, record and continue *

**MECH** – blank
- SEL ITEMS 9–19 – no *
- STAT ITEMS 9–19 – blank

**O/R DIS (ITEM 22)** – *

- If any param not as expected, **MCC** *

R13L

PL BAY MECH PWR SYS 1(2) – ON

2. BAPS DOWNLOCK RELEASE

**CAUTION**

Operating the downlock in a stalled condition for greater than 30 sec may result in damage to unit. A stalled condition is indicated by AMSB AC AMPS > 2 and no mechanism motion

**CCTV**
Configure CCTV to monitor downlock ops, P/TV11 FSS OPS (PHOTO/TV FS, SCENES)

**CRT**
DLOCK SEL – ITEM 9 EXEC (* ENG)

- If DLOCK STAT – *, then EOT sw failed: *
- O/R ENA – ITEM 21 EXEC (*) and continue *
- operation of downlock until observed clear *
- of BAPS pin or 20 sec max *
- Expect ‘212 AMSB DC AMPS’ msg *
- If DLOCK STAT – RDY, continue *

**AMSDEV DC AMPS:** .02 to .08
**MECH** – steady A(B)

A6U

- PL RETEN LAT 1 tb – LAT (A side only)
- 1(2) – REL (tb-bp)

**CRT**
- MECH – flashing A(B)
- AMSB AC AMPS: 2.0 to 3.75
- DLOCK STAT – RDY

- If DLOCK STAT – ENG, then BOT sw failed, continue *
- Expect ‘*’ *


1–14  PL OPS/109/FIN B
* If stall condition observed (AMSB AC AMPS > 2.0 and no mechanism motion): *
* PL RETEN LAT 1(2) – OFF *
* MCC *

Wait 24 sec

✓DLOCK STAT – DIS

* If DLOCK STAT – RDY after 30 total sec: *
* PL RETEN LAT 1(2) – OFF *
* Perform 1.3a PRIMARY MOTOR FAILS TO DRIVE MECHANISM (PL SYS, SSE) *

A6U ✓PL RETEN LAT 1 tb – REL (A side only)
1(2) – OFF

CRT ✓MECH – steady A(B)

CCTV Visually verify DLOCK clear of BAPS pin

3. PIVOT BAPS UP FOR BERTHING

**CAUTION**
Operating the pivoter in a stalled condition for greater than 30 sec may result in damage to unit. A stalled condition is indicated by AMSB AC AMPS > 0.3 and no mechanism motion

CCTV Configure CCTV to monitor pivot ops, P/TV11 FSS OPS (PHOTO/TV FS, SCENES)

CRT PIVOT LO SEL – ITEM 11 EXEC (* DN)

* If PIVOT LO STAT – *, EOT sw failed: *
* DESEL – ITEM 20 EXEC (ITEM 11 – no *) *
* Perform SSE SSR→1 FMDM SWAP A→B(B→A) *
* (PL SYS, SSE) and repeat step 3 for alt side *
* If PIVOT LO STAT – RDY, continue *

✓AMSB DC AMPS: 0.02 to 0.08
✓MECH – steady A(B)

A6U ✓PL RETEN LAT 1 tb – REL (A side only)
1(2) – LAT (tb–bp)

Start Timer

CRT ✓MECH – flashing A(B)
✓AMSB AC AMPS: 0.3 to 0.5
✓PIVOT LO STAT – RDY

* If PIVOT LO STAT – DN, BOT sw failed, continue *
* Expect ‘*’ in 23.8 min *

CCTV Visually verify BAPS motion, monitor performance

CRT ✓PIVOT LO TACH: > 2.5 deg/min
If FDA ‘S212 PVT STALL’ received, perform:

A6U  PL RETEN LAT 1(2) – OFF

1.3e ‘S212 PVT(ROT) STALL’ (PL SYS, SSE)

If PIVOT LO TACH: < 0.25 deg/min and AMSB

* AC AMPS: < 0.2, PL RETEN LAT 1(2) – OFF,

* perform 1.3a ‘PRIMARY MOTOR FAILS TO DRIVE MECHANISM’ (PL SYS, SSE)

CRT  √ PIVOT LO STAT – UP

A6U  √ PL RETEN LAT 1 tb – LAT (A side only)

1(2) – OFF

Stop Timer
Record pivot time _____:_____

CRT  √ MECH – steady A(B)

CCTV  Visually verify BAPS properly positioned

Notify MCC of pivot duration

4. AMSB PWRDN

CRT  DESEL – ITEM 20 EXEC (ITEMS 9–19; no *)

* If any MECH SEL – *, do not turn AMSB – OFF;

* notify MCC, continue

√ AMSB DC AMPS: < .04

OFF – ITEM 8 EXEC (*)

R13L  PL BAY MECH PWR SYS 1(2) – OFF

A6U  PL RETEN LOGIC PWR SYS 1(2) – OFF

Notify MCC, FSS PREP FOR BERTHING complete; report any deviation
RETRIEVAL OPS

HPGSCA INSTALL AND CONFIG .................................................. 2–2
PI CONFIG ................................................................................. 2–3
LATCH AND MATE HST ............................................................... 2–5
ACTIVATE HST EXTERNAL PWR .................................................. 2–11
HPGSCA INSTALL AND CONFIG

1. HPGSCA INSTALLATION
   L11A2  Remove HPGSCA from middeck storage
   MO30F J2 Prerouted

   A1L  √S–BD PL PWR SEL – PSP

   HPGSCA  √Expansion Chassis pwr (rear) — off
           Connect PWR cable to HPGSCA Expansion Chassis

   PDIP  Remove, stow:  HST PI NO 1(2) Turn–around Plug
           Connect:  Y–Cable to PDIP HST PI NO 1(2)

   HPGSCA  Connect:  Y–Cable ‘PGSC INPUT’ (DB9) and PGSC OUTPUT’ (DB25) to
           Expansion Chassis

2. HPGSCA PWR ON
   MO30F  DC UTIL PWR MNC – ON

   HPGSCA  Expansion Chassis pwr (rear) — on
           Laptop pwr (side) — on

           * If pwr to HPGSCA fails:     *
           * Check pwr cable connection  *
           * Press pwr sw again (both)   *

           Allow ‘Windows’/’Hubble1’ to start

           Press <F3> Hot Key

3. VERIFY SETUP AND STATUS INDICATORS
   Setup
     √Input Source  =  A
     √Bit Rate     =  32k
     √Input PCM code = BIO–L+
     √Output PCM code = BIO–L
     √Loop B/W     =  0.10%

   Signal Status
     √Sync Status  Red
     √Signal Present Red
     √Overload     Green
     √Offset       Green

           * If status indicators do not agree, call MCC *

   Velcro HPGSCA to desired middeck location, install HPGSCA RESTART
   Cue Card

4. HPGSCA PWR OFF
   HPGSCA  Laptop pwr (side) — off
           Expansion Chassis pwr (rear) — off

           Notify MCC, HPGSCA INSTALL AND CONFIG complete
PI CONFIG

PDIP  ✓HPGSCA connected into HST PI NO 1(2) stream

1. ✓PDI CONFIG

   SM 62 PCMMU/PL COMM
   ✓TFL:  179(203)
   ✓PDI config 757(765)

<table>
<thead>
<tr>
<th>DECOM</th>
<th>INPUT</th>
<th>FMT</th>
<th>FDA ENA</th>
<th>SOURCE</th>
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<tr>
<td>1</td>
<td>1(2)</td>
<td>09</td>
<td>no (*)</td>
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<td>2</td>
<td>1(2)</td>
<td>16</td>
<td>no (*)</td>
<td>4 kbps D Normal</td>
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<tr>
<td>3</td>
<td>0</td>
<td>19</td>
<td>no (*)</td>
<td>32 kbps T Normal</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>0</td>
<td>08</td>
<td>no (*)</td>
<td>32 kbps Inverted</td>
</tr>
</tbody>
</table>

5–FPM  501(509)

2. CONFIG PL COMM

   L12L  cb SW PWR – cl
   PSP BYP – ENA

   A1L ✓S–BD PL CNTL
   ✓ANT POLAR – L CIRC
   ✓XMTR PWR – LO
   ✓CH SEL INTRG 1,2 tw (six) – 701,701
   ✓MOD – OFF
   ✓PWR SEL – BOTH
   ✓PSP CMD OUTPUT – PL UMB
   ✓PWR SYS – 1(2)

3. HPGSCA PWR ON

   HPGSCA Expansion Chassis pwr (rear) – on
   Laptop pwr (side) – on

   * If pwr to HPGSCA fails: *
   * Check pwr cable connection *
   * Press pwr sw again (both) *

   Allow ‘Windows’/‘Hubble1’ to start

   Press <F3> Hot Key
4. **VERIFY HPGSCA STATE**

   **Setup**
   - Input Source = A
   - Bit Rate = 32k
   - Input PCM code = BIO–L+
   - Output PCM code = BIO–L
   - Loop B/W = 0.10%

   **Signal Status**
   - Sync Status = Red
   - Signal Present = Red
   - Overload = Green
   - Offset = Green

   * If status indicators do not agree, *
   * call MCC *

Notify MCC, PI CONFIG complete
HPGSCA ready to receive telemetry stream
LATCH AND MATE HST

WARNING
Operation of two FSS mechanisms may result in HST collision with orbiter

For any SM ALERT during FSS ops:
A6U PL RETEN LAT 1,2 (both) – OFF
R13 PL BAY MECH PWR SYS 1,2 (both) – OFF
✓ MCC

CAUTION
Operating a berthing latch in a stalled condition for greater than 30 sec may result in damage to unit. A stalled condition is indicated by AMSB AC AMPS > 2.0 and no mechanism motion

1. AMSB PWR ON
A6U ✓ PL RETEN LAT 1,2 (two) – OFF
✓ LOGIC PWR SYS 1(2) – OFF
✓ PL SEL – 1
LOGIC PWR SYS 1(2) – ON

SM 212 SSE MECHANISMS
AMSB ON – ITEM 7 EXEC (A(B))

* If AMSB ON – blank, continue *
✓ MECH – blank
✓ SEL (ITEMS 9–19) – no *
✓ STAT (ITEMS 9–19) – blank
✓ O/R DIS (ITEM 22) – *

* If any param not as expected, AMSB OFF – ITEM 8 *
* EXEC (*), and perform SSE SSR–1 FMDM SWAP *
* A→B(B→A) (PL SYS, SSE), then proceed to step 2 *
* on alt side *

R13L PL BAY MECH PWR SYS 1(2) – ON
Return to HST BERTH, step 4 (PDRS OPS FS, NOMINAL HST RETRIEVAL) or SJ HST BERTH, step 4 (PDRS OPS FS, OFF–NOMINAL HST RETRIEVAL)

2. BERTH LAT 2 PARTIAL CLOSURE
Verify with RMS operator that HST is in latch posn
CCTV Perform P/TV12 HST RETRIEVE/BERTH, OPS, FSS/HST Latching (PHOTO/TV FS, SCENES)
CAMR B(C) ✓ Berth latch 2 align and monitor operations
Start VTR
✓ DAP: FREE

CRT B LAT 2 SEL – ITEM 15 EXEC (* OP)

* If B LAT 2 STAT – * and visually observed open, *
* then EOT sw failed: *
* DESEL – ITEM 20 EXEC (ITEMS 9–19 – no *) *
* Perform SSE SSR–1 FMDM SWAP A→B(B→A) *
* (PL SYS, SSE) and complete steps 2–9 on alt side *
* If B LAT 2 STAT – RDY, continue *
AMSBD  DC  AMPS:  .02  to  .08  

MECH  —  steady A(B)

A6U  PL RETEN LAT 1  tb  —  REL (A side only)  

1(2)  —  LAT (tb–bp), drive to cage ∼8 sec

CRT  MECH  —  flashing A(B)  

AMSBD  AC  AMPS:  2.0  to  3.75

* If stall condition observed (AMSBD AC AMPS  >  2.0  and  no  mechanism  motion):  

A6U  PL RETEN LAT 1(2)  —  OFF  

*  MCC  

A6U  PL RETEN LAT 1(2)  —  OFF

CRT  B LAT 2  STAT  —  RDY  

MECH  —  blank

CCTV  Latch 2  cages  berthing  pin

*  If  latch  not  caging  berthing  pin,  perform  

*  1.3a  PRIMARY  MOTOR  FAILS  TO  DRIVE  MECHANISM  (PL  SYS,  SSE)  

3.  BERTH LAT 1  PARTIAL  CLOSURE

CCTV  Berth  LAT 1  align  and  monitor  operations

CAMR  C(D)

CRT  B LAT 1  SEL  —  ITEM 14  EXEC (* OP)

*  If  B LAT 1  STAT  —  *  and  visually  observed  open,  

*  then  EOT  sw  failed:  

*  DESEL  —  ITEM 20  EXEC (ITEMS 9–19  —  no *)  

*  Perform  SSE  SSR−1  FMDF  SWAP  A→B(B→A)  

*  (PL  SYS,  SSE)  and  complete  steps 3–9  on  alt  side  

*  If  B LAT 1  STAT  —  RDY,  continue  

AMSBD  DC  AMPS:  .02  to  .08  

MECH  —  steady A(B)

A6U  PL RETEN LAT 1  tb  —  REL (A side only)  

1(2)  —  LAT (tb–bp), drive to cage ∼8 sec

CRT  MECH  —  flashing A(B)  

AMSBD  AC  AMPS:  2.0  to  3.75

*  If stall condition observed (AMSBD AC AMPS  >  2.0  and  no  mechanism  motion):  

A6U  PL RETEN LAT 1(2)  —  OFF  

*  MCC  

A6U  PL RETEN LAT 1(2)  —  OFF

CRT  B LAT 1  STAT  —  RDY  

MECH  —  blank

CCTV  Latch 1  cages  berthing  pin
If latch not caging berthing pin, perform *
* 1.3a PRIMARY MOTOR FAILS TO 
* DRIVE MECHANISM (PL SYS, SSE) *

Return to HST BERTH, step 6 (PDRS OPS FS, NOMINAL HST RETRIEVAL) or SJ HST BERTH, step 6 (PDRS OPS FS, OFF–NOMINAL HST RETRIEVAL)

4. BERTH LAT 3 COMPLETE CLOSURE
   Verify with RMS operator that RMS in TEST MODE
   CCTV
   Latch 3 align and monitor operations
   CAMR B

   CRT
   B LAT 3 SEL – ITEM 16 EXEC (* OP)

   * If B LAT 3 STAT – * and visually observed open, *
   * then EOT sw failed:
   * DESEL – ITEM 20 EXEC (ITEMS 9–19 – no *) *
   * Perform SSE SSR–1 FMDM SWAP A→B(B→A) *
   * (PL SYS, SSE) and complete steps 4–9 on alt side *
   * If B LAT 3 STAT – RDY, continue *

   √ AMSB DC AMPS: .02 to .08
   √ MECH – steady A(B)

   A6U
   √ PL RETEN LAT 1 tb – REL (A side only)
   1(2) – LAT (tb–bp)

   CRT
   √ MECH – flashing A(B)
   √ AMSB AC AMPS: 2.0 to 3.75
   √ B LAT 3 STAT – RDY

   * If stall condition observed (AMSB AC AMPS *
   * > 2.0 and no mechanism motion): *
   A6U
   * PL RETEN LAT 1(2) – OFF *
   * √ MCC *

   * If B LAT 3 STAT – OP and motion observed, *
   * BOT sw failed. Continue and expect ‘*’ *

   Wait 18 sec,
   CRT
   √ B LAT 3 STAT – CL

   * If B LAT 3 STAT – OP or RDY after 30 total sec: *
   A6U
   * PL RETEN LAT 1(2) – OFF *
   * Perform 1.3a PRIMARY MOTOR FAILS TO *
   * DRIVE MECHANISM (PL SYS, SSE) *

   A6U
   √ PL RETEN LAT 1 tb – LAT (A side only)
   1(2) – OFF

   CRT
   √ MECH – steady A(B)

   CCTV
   Latch 3 completely closed

5. BERTH LAT 2 COMPLETE CLOSURE
   Monitor Latch 2 closure operations
   CCTV
   CAMR B(C)

   CRT
   B LAT 2 SEL – ITEM 15 EXEC (* RDY)
   √ AMSB DC AMPS: .02 to .08
If stall condition observed (AMSB AC AMPS > 2.0 and no mechanism motion):
  * PL RETEN LAT 1(2) – OFF
  * MCC

If B LAT 2 STAT – OP, BOT sw failed.
  * Continue and expect ‘*’
  
Wait 10 sec,
  * B LAT 2 STAT – CL

If B LAT 2 STAT – RDY after 30 total sec:
  * PL RETEN LAT 1(2) – OFF
  * Perform 1.3a PRIMARY MOTOR FAILS TO DRIVE MECHANISM (PL SYS, SSE)

Perform 1.3a PRIMARY MOTOR FAILS TO DRIVE MECHANISM (PL SYS, SSE)

A6U  PL RETEN LAT 1(2) – LAT
CCTV  Latch 2 completely closed

6. BERTH LAT 1 COMPLETE CLOSURE

CCTV Monitor Latch 1 closure operations
CAMR B(C),D

CRT  B LAT 1 SEL – ITEM 14 EXEC (* RDY)

AMSB DC AMPS: .02 to .08
MECH – blank

A6U  PL RETEN LAT 1(2) – LAT

CRT  MECH – flashing A(B)
AMSB AC AMPS: 2.0 to 3.75
B LAT 1 STAT – RDY

If stall condition observed (AMSB AC AMPS > 2.0 and no mechanism motion):
  * PL RETEN LAT 1(2) – OFF
  * MCC

If B LAT 1 STAT – OP, BOT sw failed.
  * Continue and expect ‘*’
  
Wait 10 sec,
  * B LAT 1 STAT – CL
** If B LAT 1 STAT – RDY after 30 total sec:* *  
** A6U  
** PL RETEN LAT 1(2) – OFF *  
** Perform 1.3a PRIMARY MOTOR FAILS TO *  
** DRIVE MECHANISM (PL SYS, SSE) *  

** A6U  
√ PL RETEN LAT 1 tb – LAT (A side only)  
1(2) – OFF  

** CRT  
√ MECH – steady A(B)  

** CCTV CAMR B(C),D  
√ Latch 1 completely closed  

** CCTV Perform P/TV12 HST RETRIEVE/BERTH, DEACT (PHOTO/TV FS, SCENES)  

Notify MCC, B LAT ops complete. Ready for ungrapple.  
RMS return to HST BERTH (PDRS OPS FS, NOMINAL HST RETRIEVAL) or  
SJ HST BERTH (PDRS OPS FS, OFF–NOMINAL HST RETRIEVAL)  

** 7. UMBILICAL DEADFACE VERIFICATION  
** SM 211 SSE OVERVIEW  
** CRT  
√ PCU – blank/blank  
√ DPC 1–12 – no *  

** L12U  
√ FHST SHUTTER – OP (tb–bp)  
√ RSU SURV HTR PWR – OFF (tb–bp)  
√ ESS/MN SW ENA – OFF (tb–bp)  
√ SSM WK LTS – OFF  

** 8. MAIN UMBILICAL MATE  
** CCTV Monitor UMB operations  
** CCTV CAMR A,B  

** CCTV Perform P/TV12 HST RETRIEVE/BERTH, OPS, FSS/HST Umbilical Mate (PHOTO/TV FS, SCENES)  

** SM 212 SSE MECHANISMS  
UMB MN SEL – ITEM 17 EXEC (* REL)  

* If UMB MN STAT – *: *  
* DESEL – ITEM 20 EXEC (ITEMS 9–19 – no *) *  
* Perform SSE SSR–1 FMDM SWAP A→B(B→A) *  
* (PL SYS, SSE) and complete steps 8,9 on alt side *  
* If UMB MN – RDY, continue *  

√ AMSB DC AMPS: .02 to .08  
√ MECH – steady A(B)  

** A6U  
√ PL RETEN LAT 1 tb – REL (A side only)  
1(2) – LAT (tb–bp)  

** CRT  
√ MECH – flashing A(B)  
√ AMSB AC AMPS: 0.6 – 1.0  
√ UMB MN STAT – RDY
* If stall condition observed (AMSB AC AMPS *
* > 0.6 and no mechanism motion): *
A6U
* PL RETEN LAT 1(2) – OFF *
* √MCC *

Wait 8 sec,

CRT
√UMB MN STAT – MAT

* If UMB MAT STAT – RDY or REL after 20 total sec: *
A6U
* PL RETEN LAT 1(2) – OFF *
* Perform 1.3a PRIMARY MOTOR FAILS TO *
* DRIVE MECHANISM (PL SYS, SSE) *

A6U
√PL RETEN LAT 1 tb – LAT (A side only)
1(2) – OFF

CRT
√MECH – steady A(B)

CCTV
Visually verify UMB mated

L12U
√MN BUS PWR ON tb – gray
√ESS BUS INT PWR tb – UP

SM 210 HST SYS
√UMB SG V INT MN BUS > 26
√ESS BUS > 26

* If either tb – bp or any UMB SG V ≤ 26, *
* √MCC *

9. AMSB PWRDND

SM 212 SSE MECHANISMS
DESEL – ITEM 20 EXEC (√ITEMS 9–19, no *)

* If any MECH SEL – *, do not turn *
* AMSB OFF; notify MCC, continue *

√AMSB DC AMPS: < .04
OFF – ITEM 8 EXEC (*)

A6U
PL RETEN LOGIC PWR SYS 1(2) – OFF

R13L
PL BAY MECH PWR SYS 1(2) – OFF

Notify MCC, LATCH AND MATE HST complete; report any anomalies
ACTIVATE HST EXTERNAL PWR

1. SETUP

L12U ✓ cb SPACE TEL SW PWR – cl
✓ FHST SHUTTER – CL (remains bp)
✓ TLM COUNT – incr
✓ EPS INT ESS BUS A,B,C – * * *

SM 210 HST SYS

SM 211 SSE OVERVIEW

PCU ON – ITEM 1 EXEC (*)

L12U

* If ‘PDI DECOM FAIL’ msg accompanied *
  * by MN BUS PWR ON tb – bp, notify *
  * MCC and hold *

CRT ✓ PCU – P/S
✓ DPC 1–12 – *
  ✓ VOLTS: 33.7 to 35.3
  ✓ AMPS: ≤ 0.5

* If DPC 1–12 AMPS: > 0.5, turn off affected DPC, *
* DPC OFF – ITEM 24 +X X EXEC (*) (DPC ON/OFF *
* INDEX NUMBERS (REF DATA)), *
* ✓ MCC *
* If any other param(s) not in range, record MET and *
* off nominal DPC values, notify MCC *

L12U ✓ FHST SHUTTER tb – gray

2. EXTERNAL PWR ACTIVATION

On MCC GO:
ESS/MN SW ENA – ON (tb–gray)
MAIN BUS EXT PWR – ON (mom) (tb–gray)
✓ IPCU REL CL tb – gray

* If either tb – bp, notify MCC, continue *
* If both tb – bp, cycle sw (up only) *
* If no joy, ✓ MCC *

CRT ✓ DPC 1–12 VOLTS: 33.8 to 35.2
  ✓ AMPS: 2–7

L12U ESS BUS EXT PWR – ON (mom) (tb–UP)

SM 210 HST SYS
✓ UMB SG V EXT MN BUS > 30
  ✓ ESS BUS > 30

3. INT ESS PWR OFF

On MCC GO:
L12U ESS BUS INT PWR – OFF (mom) (tb–bp)
ESS/MN SW ENA – OFF (tb–bp)

Notify MCC when complete
IN–BAY OPERATIONS

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PIVOT HST ........................................................................... 3–7
HGA DEPLOYMENT ................................................................. 3–11
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+SA(–SA) SDM RETRACTION .................................................. 3–16
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SINGLE (DUAL) SA SLEW

1. **SETUP**
   Set up CCTVs to monitor SA slew
   CCTV Perform P/TV14 SA MONITORING, SETUP (PHOTO/TV FS, SCENES)
   CAMR A,D
   Perform following only if VRCS available:
   - In ATT
     DAP: B11/AUTO/VERN

   **SM 210 HST SYS**
   **SLEW – blank**
   Inform MCC ready for SINGLE (DUAL) SA SLEW

2. **STOCC INITIATE SLEW**

   * For any observed uncontrolled SA motion, or *
   * if unable to go free drift on time: *
   * **SM 210 HST SYS** *
   * **SADE OFF – ITEM 11 +9 9 EXEC (OFF)** *
   * Notify MCC *

   On MCC call:
   DAP: FREE

   **STOCC CMD ± WING SLEW**
   **NOTE**
   Expect ‘S210 SADE WING’ msg in ~30 sec
   Visually verify SAs slewing

   **CRT √SLEW – +OP –OP one or both flash**

<table>
<thead>
<tr>
<th>SA MNVR SIZE (deg)</th>
<th>SLEW TIME (Motor Op, mm:ss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>08:32</td>
</tr>
<tr>
<td>20</td>
<td>09:10</td>
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<tr>
<td>30</td>
<td>10:16</td>
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<tr>
<td>45</td>
<td>11:37</td>
</tr>
<tr>
<td>60</td>
<td>12:45</td>
</tr>
<tr>
<td>90</td>
<td>14:38</td>
</tr>
<tr>
<td>100</td>
<td>15:11</td>
</tr>
<tr>
<td>105</td>
<td>15:28</td>
</tr>
<tr>
<td>180</td>
<td>19:08</td>
</tr>
</tbody>
</table>

   On MCC call:
   DAP: B11/AUTO/VERN(ALT)

   **CRT**
   * If no comm 2 min after SLEW +OP –OP not flashing: *
   * DAP: B11/AUTO/VERN(ALT) *
ROTATE HST

**WARNING**
Operation of two FSS mechanisms may result in HST collision with orbiter

For any SM ALERT during FSS ops:
- A6U PL RETEN LAT 1,2 (both) – OFF
- R13 PL BAY MECH PWR SYS 1,2 (both) – OFF
  \[\check{\text{MCC}}\]

**CAUTION**
Operating the rotator in a stalled condition for greater than 30 sec may result in damage to unit. A stalled condition is indicated by AMSB AC AMPS > 0.3 and no mechanism motion

1. **FSS AMSB PWR ON**
   - A6U: PL RETEN LAT 1,2 (two) – OFF
   - AMSB ON
   - LOGIC PWR SYS 2(1) – OFF
   - PL SEL – 1
   - LOGIC PWR SYS 1(2) – ON

   **SM 212 SSE MECHANISMS**
   - AMSB ON – ITEM 7 EXEC (A(B))
   
   ▶ MECH – blank
   ▶ SEL (ITEMS 9–19) – no *
   ▶ STAT (ITEMS 9–19) – blank
   ▶ O/R DIS (ITEM 22) – *

   * If any param not as expected, \[\check{\text{MCC}}\] *
   * If rotation reqd to continue EVA, AMSB *
   * OFF – ITEM 8 EXEC (*), perform *
   * SSE SSR–1 FMDM SWAP A→B(B→A) *
   * (PL SYS, SSE) and proceed to step 2 *

   **R13L**
   - PL BAY MECH PWR SYS 1(2) – ON

2. **HST ROTATION**
   Check HST in safe posn:
   - **SM 210 HST SYS**

<table>
<thead>
<tr>
<th>SA–2 PHYSICAL POSITION (DEGREES)</th>
<th>PIVOTER POSN (DEG)</th>
<th>ROTATOR CONSTRAINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>+V2 –6 to +6 –6 to +6</td>
<td>–6 to +6</td>
<td>75</td>
</tr>
<tr>
<td>−3.5 to +3.5 −3.5 to +3.5</td>
<td>35</td>
<td>± 20° from ±V3 FWD</td>
</tr>
<tr>
<td>−6 to +6 −6 to +6</td>
<td>35</td>
<td>± 20° from ±V2 FWD</td>
</tr>
<tr>
<td>86.5 to 93.5 86.5 to 93.5</td>
<td>35</td>
<td>± 20° from ±V2 FWD</td>
</tr>
<tr>
<td>−15 to +15 −15 to +15</td>
<td>35</td>
<td>+V2 (270°) FWD to 155° FWD</td>
</tr>
</tbody>
</table>

*NOTE: BAPS Ring ZOE prevents rotation in the area from 295° to 305°
<table>
<thead>
<tr>
<th>SA-3 PHYSICAL POSITION (DEGREES)</th>
<th>PIVOTER POSN (DEG)</th>
<th>ROTATOR CONSTRAINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>+V2</td>
<td>–V2</td>
<td></td>
</tr>
<tr>
<td>–6 to +6</td>
<td>–6 to +6</td>
<td>75</td>
</tr>
<tr>
<td>–3.5 to +3.5</td>
<td>–3.5 to +3.5</td>
<td>85</td>
</tr>
<tr>
<td>–6 to +6</td>
<td>–6 to +6</td>
<td>90</td>
</tr>
<tr>
<td>86.5 to 93.5</td>
<td>86.5 to 93.5</td>
<td>90</td>
</tr>
<tr>
<td>Not Installed</td>
<td>–90 to +90</td>
<td>90</td>
</tr>
<tr>
<td>Not Installed</td>
<td>–90 to +90</td>
<td>–V2 (90°) FWD to –V3 (180°) FWD</td>
</tr>
<tr>
<td>–72 to +72</td>
<td>–72 to +72</td>
<td>90</td>
</tr>
<tr>
<td>–90 to +90</td>
<td>–90 to +90</td>
<td>–V3 (180°) FWD to +V2 (270°) FWD</td>
</tr>
<tr>
<td>–72 to +72</td>
<td>–90 to +90</td>
<td>90</td>
</tr>
<tr>
<td>–90 to +90</td>
<td>–72 to +72</td>
<td>–V2 (90°) FWD to +V3 (360°) FWD</td>
</tr>
<tr>
<td>–90 to +90</td>
<td>–72 to +72</td>
<td>90</td>
</tr>
</tbody>
</table>

*NOTE: BAPS Ring ZOE prevents rotation in the area from 295° to 305°*

If in a configuration not identified, ✓ MCC

**NOTE**

Solar Array monitoring not reqd after both SA3s have been installed or after both SA2s have been fully retracted

CCTV Perform P/TV11 FSS OPS, OPS (PHOTO/TV FS, SCENES)
CAMR B(D), Monitor HST posn during rotation
ELBOW

**NOTE**

Attitude control allowed, if reqd, 4 min after rotation start (VRCS only) but must be in DAP: FREE prior to rotator stop. Start of rotation must occur no sooner than 4 min after stop of any preceding HST PIVOT or HST ROTATE ops. Wait period and free drift not reqd after both SA3s have been installed or after both SA2s have been fully retracted

DAP: FREE (if reqd)

**SM 212 SSE MECHANISMS**

**ROTATOR SEL – ITEM 12 EXEC (* RDY)**

* If ROTATOR STAT – CCW or CW and visually *
* verified not at EOT, then EOT sw failed: *
* O/R ENA – ITEM 21 EXEC (*), continue *

✓ AMSB DC AMPS: .02 to .08
Mnvr to reqd posn:

<table>
<thead>
<tr>
<th>TASK</th>
<th>POSN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berth</td>
<td>B(–V3)</td>
</tr>
<tr>
<td>–V2 SA3/Diode Box</td>
<td>–V2</td>
</tr>
<tr>
<td>+V2 SA3/Diode Box</td>
<td>+V2</td>
</tr>
<tr>
<td>PCU</td>
<td>–V3</td>
</tr>
<tr>
<td>ACS</td>
<td>–V2</td>
</tr>
<tr>
<td>NCS (CASH)</td>
<td>–V2</td>
</tr>
<tr>
<td>NCS (ESM)</td>
<td>–V2</td>
</tr>
<tr>
<td>NCS/radiator</td>
<td>+V2/–V3</td>
</tr>
<tr>
<td>NOBL bays 5 &amp; 6</td>
<td>+V3</td>
</tr>
<tr>
<td>NOBL bays 7 &amp; 8</td>
<td>+V3</td>
</tr>
</tbody>
</table>

FSS ROTATOR POSN CORRELATION

<table>
<thead>
<tr>
<th>POSN TO → FROM ↓</th>
<th>B (–V3) HST 180°</th>
<th>–V2 HST 90°</th>
<th>+V2 HST 270°</th>
<th>(+V3) HST 0°</th>
</tr>
</thead>
<tbody>
<tr>
<td>B (–V3) HST 180°</td>
<td>06:05 LAT</td>
<td>06:05 REL</td>
<td>12:11 LAT</td>
<td></td>
</tr>
<tr>
<td>–V2 HST 90°</td>
<td>06:05 REL</td>
<td>12:11 REL</td>
<td>06:05 LAT</td>
<td></td>
</tr>
<tr>
<td>+V2 HST 270°</td>
<td>06:05 LAT</td>
<td>12:11 LAT</td>
<td>18:16 LAT</td>
<td></td>
</tr>
<tr>
<td>(+V3) HST 0°</td>
<td>12:11 REL</td>
<td>06:05 REL</td>
<td>18:16 REL</td>
<td></td>
</tr>
</tbody>
</table>

Times based on 14.8 deg/min actual run time during previous missions

NOTE: Table contains duration of motion in mm:ss, REL LAT switch posn

A6U PL RETEN LAT 1(2) – REL or LAT (tb–bp) as reqd

CRT ✓ MECH – flashing A(B)
✓ ROTATOR STAT – RDY

CCTV ✓ Rotator posn visually
CAMR B(D)

CRT ✓ ROTATOR TACH: > 10 deg/min
✓ AMSB AC AMPS: 0.3 to 0.5

* If FDA ‘S212 ROT STALL’ received
* PL RETEN LAT 1(2) – OFF, perform
* 1.3e ‘S212 PVT(ROT) STALL’ (PL SYS, SSE)
* ✓

* If ROTATE TACH: < 0.9 deg/min and AMSB AC
* AMPS: < 0.2, PL RETEN LAT 1(2) – OFF
* perform 1.3a PRIMARY MOTOR FAILS TO
* DRIVE MECHANISM (PL SYS, SSE)
✓ DAP: FREE (if reqd)

Once at target position,
A6U  PL RETEN LAT 1(2) – OFF
CRT  ✓ MECH – blank
After 4 min (if reqd),
   DAP: B11/AUTO/VERN(ALT)

3. AMSB PWRDN
   DESEL – ITEM 20 EXEC (MECH SEL, ITEMS 9–19 no *)

   * If any MECH SEL – *, do not turn AMSB – OFF; *
   * notify MCC. Continue *

✓ AMSB DC AMPS: < .04
   OFF – ITEM 8 EXEC (*)

A6U  PL RETEN LOGIC PWR SYS 1(2) – OFF
R13L  PL BAY MECH PWR SYS 1(2) – OFF

Report to MCC when complete; report any anomalies
PIVOT HST

**WARNING**
Operation of two FSS mechanisms may result in HST collision with orbiter

For any SM ALERT during FSS ops:
- A6U PL RETEN LAT 1,2 (both) – OFF
- R13 PL BAY MECH PWR SYS 1,2 (both) – OFF
- MCC

Do not pivot up with BSP latch engaged

1. **FSS AMSB PWR ON**
   - A6U
     - PL RETEN LAT 1,2 (two) – OFF
     - LOGIC PWR SYS 2(1) – OFF
     - PL SEL – 1
     - LOGIC PWR SYS 1(2) – ON

2. **SM 212 SSE MECHANISMS**
   - AMSB ON – ITEM 7 EXEC (A(B))
     - MECH – blank
     - SEL (ITEMS 9–19) – no *
     - STAT (ITEMS 9–19) – blank
   - O/R DIS (ITEM 22) – *

   * If any param not as expected, MCC *
   * If pivot reqd to continue EVA, AMSB OFF – ITEM 8 *
   * EXEC (*), perform SSE SSR–1 FMDM SWAP *
   * A→B(B→A) (PL SYS, SSE) and proceed to step 2 *

3. **BSP LATCH RELEASE**
   - If pivoting up from 43.8°, continue; else, go to step 3
   - CRT
     - BSP SEL – ITEM 19 EXEC (*)
     - STAT – SET
     - AMSB DC AMPS: .02 to .08
     - MECH – steady A(B)
   - A6U
     - PL RETEN LAT 1(2) – REL, wait 4 sec, OFF
   - CRT
     - BSP STAT – REL
     - BSP – DIS *

   * If BSP STAT not REL and BSP DIS *, continue *
   * If BSP STAT REL and BSP DIS A, DIS B, continue *
   * Else, perform 1.3b BSP FAILS TO DISENGAGE *
   * (PL SYS, SSE) *

3. **BSP LATCH SET VERIFICATION**
   - If pivoting down to 43.8°, continue; else, go to step 4
   - BSP SEL – ITEM 19 EXEC (*)
     - AMSB DC AMPS: .02 to .08
     - BSP STAT – SET
* If BSP STAT not SET, □MCC *

□BSP – blank/blank/blank

* If BSP not blank, record and assume switch failed *
* Ignore affected status and continue *

4. HST PIVOT

**CAUTION**
Operating the pivoter in a stalled condition for
greater than than 30 sec may result in damage to unit.
A stalled condition is indicated by AMSB AC AMPS
> 0.3 and no mechanism motion

CCTV
Monitor HST posn during pivot, verify envelope clear of obstructions

**NOTE**
Solar Array monitoring not reqd after both SA3s have been
installed or after both SA2s have been fully retracted

CCTV
Perform P/TV11 FSS OPS, OPS (PHOTO/TV FS, SCENES)
CAMR B(D), ELBOW

Verify BSP pip pins removed

**NOTE**
Attitude control allowed, if reqd, 4 min after pivot start (VRCS
only). Must be in DAP: FREE prior to pivot stop. 4 min
reqd between start/stop of any HST PIVOT or HST ROTATE
ops. Wait period and free drift not reqd after both SA3s have
been installed or after both SA2s have been fully retracted

DAP: FREE (if reqd)

CRT
PIVOT LO SEL – ITEM 11 EXEC (* RDY)
\[AMS\]B DC AMPS: .02 to .08

 Maneuver to reqd posn

**FSS PIVOTER POSN CHANGES TIME CORRELATION**

<table>
<thead>
<tr>
<th>POSN TO (\rightarrow) FROM ↓</th>
<th>0°</th>
<th>43.8°</th>
<th>75°</th>
<th>85°</th>
<th>90°</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>11:35 LAT</td>
<td>19:50 LAT</td>
<td>22:29 LAT</td>
<td>23:48 LAT</td>
<td></td>
</tr>
<tr>
<td>43.8°</td>
<td>11:35 REL</td>
<td>8:15 LAT</td>
<td>10:54 LAT</td>
<td>12:13 LAT</td>
<td></td>
</tr>
<tr>
<td>75°</td>
<td>19:50 REL</td>
<td>8:15 LAT</td>
<td>2:39 LAT</td>
<td>3:58 LAT</td>
<td></td>
</tr>
<tr>
<td>85°</td>
<td>22:29 REL</td>
<td>10:54 REL</td>
<td>3:58 REL</td>
<td>1:19 LAT</td>
<td></td>
</tr>
<tr>
<td>90°</td>
<td>23:48 REL</td>
<td>12:13 REL</td>
<td>3:58 REL</td>
<td>1:19 REL</td>
<td></td>
</tr>
</tbody>
</table>

Times based on 3.8 deg/min actual run time during previous missions

**NOTE:** Duration displayed in mm:ss
Start Timer

NOTE
With BSP installed, pivoter will stall when reaching 43.8° or 90° posn and FDA will annunciate 15 sec later. 15 sec stall is reqd to preload BSP

A6U  PL RETEN LAT 1(2) – REL for pivot dn or LAT for pivot up as reqd

CRT  √MECH – flashing A(B)

CCTV CAMR B(D), ELBOW

CRT  √PIVOT LO TACH: > 2.5 deg/min
√AMSB AC AMPS: 0.3 to 0.5

* If unexpected ‘S212 PVT STALL’ msg received  *
* PL RETEN LAT 1(2) – OFF, perform  *
* 1.3e ‘S212 PVT(ROT) STALL’ (PL SYS, SSE)  *
* If PIVOT LO TACH: < 0.25 deg/min and AMSB  *
* AC AMPS: < 0.2, PL RETEN 1(2) – OFF,  *
* perform 1.3a PRIMARY MOTOR FAIL TO  *
* DRIVE MECHANISM (PL SYS, SSE)  *

√DAP: FREE (if reqd)

If pivoting to 43.8°:

Expect ‘S212 PVT STALL’ msg
A6U  PL RETEN LAT 1(2) – OFF
Stop Timer
CRT  √BSP – ENG *, RET *

* If BSP – ENG *, continue;  *
* else, perform 1.3d BSP FAILS TO ENGAGE  *
* (PL SYS, SSE)  *

If pivoting to 90°:

Expect ‘S212 PVT STALL’ msg
A6U  PL RETEN LAT 1(2) – OFF
Stop Timer

If pivoting to any intermediate posn:

At expected pivot completion time:

CCTV CAMR B(D), ELBOW
A6U  PL RETEN LAT 1(2) – OFF
Stop Timer

CRT  √MECH – blank
After 4 min, DAP: B11/AUTO/VERN(ALT) (if reqd)
5. **BSP LATCH RESET**
   - If pivoted up from 43.8°, continue; else, go to step 6
   - BSP SEL – ITEM 19 EXEC (*)
   - √AMSB DC AMPS: .02 to .08
   - √MECH – steady A(B)
   - A6U PL RETEN LAT 1(2) – LAT, wait 4 sec, OFF
   - CRT √BSP STAT – SET
   
   * If BSP STAT – * or L/A, √MCC *

6. **AMSB PWRDN**
   - DESEL – ITEM 20 EXEC (ITEMS 9–19 no *)
   
   * If any MECH SEL – *, do not turn *
   * AMSB OFF; notify MCC. Continue *

   √AMSB DC AMPS: < .04
   - OFF – ITEM 8 EXEC (*)

   - A6U PL RETEN LOGIC PWR SYS 1(2) – OFF
   - R13L PL BAY MECH PWR SYS 1(2) – OFF

   Notify MCC, PIVOT HST complete; report any anomalies
HGA DEPLOYMENT

1. SETUP

CCTV  Set up CCTVs to monitor HGA deployment (P/TV17 HST RELEASE, OPS,
      HGA Deploy (PHOTO/TV FS, SCENES))

      NOTE
      Expect MCC call immediately prior to
      commanded mechanism operations

      SM 210 HST SYS
      √ TLM COUNT  – incr
      √ HGA +V3,–V3 HNG  – STWD (both)
      √ LAT  – REL (both)

      Inform MCC ready for HGA deployment

2. HGA DEPLOYMENT

      NOTE
      HGA deployment nominally performed
      simo.  HGA mast deploy takes ~8 min

STOCC  Command ±HGA HNG  – DPLY

      SM 210 HST SYS
      √ HGA +V3,–V3 HNG  – TRAN (both)

      Visually verify both HGA masts deploying
      Note posn of HGA dish upon clearing latches

      SM 210 HST SYS
      √ HGA +V3,–V3 HNG  – DPLY (both)

STOCC  Command HGA slew to 0,0 (straight out)
      Command HGA slew to RMS/tail clearance posn
**FSS STOW WITH BSP INSTALLED**

**CAUTION**
Operating the pivoter or rotator in a stalled condition for greater than 30 sec may result in damage to unit. A stalled condition is indicated by AMSB AC AMPS > 0.3 and no mechanism motion.

1. **FSS AMSB PWR ON**

   - A6U  
     ✓ PL RETEN LAT 1,2 (two) – OFF  
     ✓ LOGIC PWR SYS 2(1) – OFF  
     ✓ PL SEL – 1  
     LOGIC PWR SYS 1(2) – ON

**SM 212 SSE MECHANISMS**
AMS B ON – ITEM 7 EXEC A(B)

   - ✓ MECH – blank  
   ✓ SEL (ITEMS 9–19) – no *  
   ✓ STAT (ITEMS 9–19) – blank  
   ✓ O/R DIS (ITEM 22) – *

* If any param not as expected, ✓MCC  
* If pivot reqd to continue EVA, AMSB OFF – ITEM 8 EXEC (*),  
* perform SSE SSR−1 FMDM A→B(B→A) (PL SYS, SSE) and  
* proceed to step 2 on alt side

2. **ROTATE BAPS**

   - CCTV Perform P/TV11 FSS OPS, OPS, FSS Config for Landing (PHOTO/TV FS, SCENES)  
   - CRT ROTATOR SEL – ITEM 12 EXEC (* RDY)

   * If ROTATOR STAT – CCW or CW and visually *  
   * verified not at EOT, then EOT sw failed: *  
   * O/R ENA – ITEM 21 EXEC (*), continue *

   ✓ AMSB DC AMPS: .02 to .08  
   ✓ AMSB AC AMPS: 0.3 to 0.5  
   ✓ ROTATOR TACH: > 10 deg/min  
   ✓ ROTATOR STAT – RDY

* If FDA ‘S212 ROT STALL’ received, PL RETEN  
* LAT 1(2) – OFF, perform 1.3e ‘S212’  
* PVT(ROT) STALL’ (PL SYS, SSE)  

* If ROTATE TACH: < 0.9 deg/min and AMSB AC  
* AMSB: < 0.2, PL RETEN LAT 1(2) – OFF,  
* perform 1.3a PRIMARY MOTOR FAILS TO  
* DRIVE MECHANISM (PL SYS, SSE)  

✓ Rotator posn visually (Berthing latch aligned with fixed target)
A6U  PL RETEN LAT 1(2) – OFF
CRT  √MECH – blank

3. **BSP LATCH SET VERIFICATION**
   - BSP SEL – ITEM 19 EXEC (*)
   - AMSB DC AMPS: .02 to .08
   - BSP STAT – SET

   * If BSP STAT not SET, √MCC *

   √BSP – blank/blank/blank/blank

   * If BSP not blank, record and assume switch failed *
   * Ignore affected status and continue *

4. **PIVOT DOWN**

   **CAUTION**
   Operating the pivoter in a stalled condition for greater than 30 sec may result in damage to unit. A stalled condition is indicated by AMSB AC AMPS > 0.3 and no mechanism motion

   CRT  PIVOT LO SEL – ITEM 11 EXEC (*) RDY
   √AMSB DC AMPS: .02 to .08

   Pivot to 43.8°

   **NOTE**
   With BSP installed, pivoter will stall when reaching 43.8° posn and FDA will annunciate 15 sec later. 15 sec stall is reqd to preload BSP

   A6U  PL RETEN LAT 1(2) – REL for 12:13
CRT  √MECH – flashing A(B)

CCTV Visually verify BAPS motion
CAMR A,B

CRT  √PIVOT LO TACH: > 2.5 deg/min
√AMSB AC AMPS: 0.3 to 0.5

   * If unexpected ‘S212 PVT STALL’ msg received, *
   * PL RETEN LAT 1(2) – OFF, perform 1.3e *
   * ‘S212 PVT(ROT) STALL’ (PL SYS, SSE) *

   * If PIVOT LO TACH: < 0.25 deg/min and AMSB *
   * AC AMPS: < 0.2, PL RETEN LAT 1(2) – *
   * OFF, perform 1.3a PRIMARY MOTOR FAILS *
   * TO DRIVE MECHANISM (PL SYS, SSE) *

   Expect ‘S212 PVT STALL’ msg:

   A6U  PL RETEN LAT 1(2) – OFF
CRT  √BSP – ENG *, RET *
* If BSP – ENG*, continue;
* else, perform 1.3d BSP FAILS TO ENGAGE *
* (PL SYS, SSE) *

CRT
✓ MECH – blank

5. AMSB PWRDN
   DESEL – ITEM 20 EXEC (ITEMS 9–19 no *)

✓ AMSB DC AMPS: < .04
   OFF – ITEM 8 EXEC (*)

   A6U
   PL RETEN PL SEL – MON
   LOGIC PWR SYS 1(2) – OFF

   R13L
   PL BAY MECH PWR SYS 1(2) – OFF

Notify MCC when complete; report any anomalies
+SA(–SA) SDM RETRACTION

1. SETUP
   CCTV
   ✓ SDM RETRACTION CCTV OVERLAY in place
   Configure CCTV to monitor SDM blankets, P/TV14 HST SA MONITORING, OPS, SA SDM RETRACTION (PHOTO/TV FS, SCENES)

   ✓ In ATT
   DAP: B/AUTO/VERN

2. RETRACT TO STOW POSITION
   [SM 210 HST SYS]
   ✓ TLM COUNT – incr
   ✓ SOLAR ARRAY DCE PWR A – * OFF
   ✓ B – * ON
   ✓ +(-) WING SDM – DPLY or TRAN

   NOTE
   Serial SDM retraction will take ~4–5 (8 min max). 3 min in ATT and in sun reqd prior to start of SDM retraction. Notify MCC ready for SDM retraction

   CAUTION
   Visually monitor blankets during retraction for anomalies per Table 1. If detected, exec following:
   SOLAR ARRAY DCE STOP – ITEM 9 EXEC
   ✓ +(-) WING – flashing
   Remain in free drift, notify MCC

On MCC call:
   DAP: FREE

   NOTE
   Expect ‘S210 DCE +(-) WING’ msg

STOCC  +(-) WING SDM – RETRACT

   [SM 210 HST SYS]
   ✓ SOLAR ARRAY +(-) WING – no flash
   ✓ SDM – TRAN

   NOTE
   SDM retraction may unexpectedly stop due to spurious microswitch trigger. SOLAR ARRAY +(-) WING – no flash may continue even though there is no motion

Visually verify SDM blankets retracting smoothly

After retraction:
   CRT  ✓ SOLAR ARRAY +(-) WING SDM – flashing
   ✓ SDM – STWD

Notify MCC, +SA(–SA) SDM RETRACTION complete
DAP: B/AUTO/VERN

MCC will complete remaining SDM retraction steps

* If motion stop, notify MCC of following:  *
  * SDM Retraction stopped, DCE STOP,  *
  * Reason + Data + Current Status + # of SPAs visible  *
  * (per Tables 1 and 2 below)  *
  * ✓ MCC for DAP config  *

Table 1

<table>
<thead>
<tr>
<th>REASON</th>
<th>DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>No drum rotation and no bistem motion for ten sec</td>
<td>Both stopped simultaneously</td>
</tr>
<tr>
<td>No drum rotation for ten sec</td>
<td></td>
</tr>
<tr>
<td>Tip displacement</td>
<td>(Port/Stbd) (inner/outer) tip</td>
</tr>
<tr>
<td>Blanket slack</td>
<td>(Port/Stbd)</td>
</tr>
<tr>
<td>Blanket over flange</td>
<td>(Inner/Outer)</td>
</tr>
<tr>
<td>Bistem kink</td>
<td>At (Port/Stbd) (inner/outer) SPA#</td>
</tr>
<tr>
<td>Obstruction (name)</td>
<td>At (Port/Stbd) (inner/outer) SPA#</td>
</tr>
<tr>
<td>Cushion roller</td>
<td>(Port/Stbd)</td>
</tr>
<tr>
<td>Thermal Shield</td>
<td>(Port/Stbd) (inner/outer)</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>CURRENT STATUS (with DATA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No anomalies visible [Wings stable, motion damped, blanket(s) tight,</td>
</tr>
<tr>
<td>bistem(s) straight]</td>
</tr>
<tr>
<td>Dynamic motion</td>
</tr>
<tr>
<td>Excessive tip deflection static</td>
</tr>
<tr>
<td>Blanket(s) slack</td>
</tr>
<tr>
<td>Bistem(s) discontinuity at SPA#</td>
</tr>
<tr>
<td>Thermal Shield Interference</td>
</tr>
</tbody>
</table>
CONFIGURE PRIME COMM STRING FOR HPGSCA

NOTE
Possible ‘S62 PDI DECOM FAIL’ msg

L12L 1. REMOVE PI DATA at PDIP
   PSP BYP – DSBL
   cb SW PWR – op

PDIP 2. INSERT HPGSCA CONNECTOR AT PDIP
   Remove Turn–Around Plug on HST PI NO 1(2)
   Connect Y–cable to HST PI NO 1(2)

HPGSCA 3. HPGSCA PWR ON
   Expansion Chassis pwr (rear) – on
   Laptop pwr (side) – on

   * If pwr to HPGSCA fails:       *
   * √Pwr cable connection       *
   * Press pwr sw again (both)    *

   Allow ‘Windows’/‘Hubble1’ to start

L12L 4. ENABLE PSP BYPASS
   cb SW PWR – cl
   PSP BYP – ENA

HPGSCA 5. CONFIGURE HPGSCA TO CURRENT HST DATA RATE
   √MCC for current data rate (if unknown)
   Depress hot key (F1–F6) for correct rate

6. STATUS INDICATORS

   Signal Status
   √Sync Status        Green
   √Signal Present     Green
   √Overload           Green
   √Offset             Green

   Report status to MCC
CONFIGURE PRIME COMM STRING FOR PSP–BYPASS ONLY

NOTE
Possible ‘S62 PDI DECOM FAIL’ msg

L12L 1. REMOVE PI DATA FROM HPGSCA
      PSP BYP – DSBL
      cb SW PWR – op

HPGSCA 2. HPGSCA PWR OFF
      Laptop pwr (side) – off
      Expansion Chassis pwr (rear) – off

PDIP 3. Insert Turnaround Plug at PDIP
      Disconnect Y–cable from HST PI NO 1(2)
      Install Turn–Around Plug on HST PI NO 1(2)

L12L 4. ENABLE PSP BYPASS
      cb SW PWR – cl
      PSP BYP – ENA

      Report status to MCC
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ORU/ORI OPERATIONS

SA SECT 1 TO BATT 1 ................................................................. 4–2
4 TO BATT 4 ................................................................. 4–2
DEADFACE +SA(−SA) .................................................. 4–3
PCU PWRDN .................................................. 4–4
PCU PWRUP .................................................. 4–5
SAP PWRDN .................................................. 4–6
DEADFACE FOC/ACS .................................................. 4–6
COSTAR FOR ESM INSTALL .................................................. 4–7
ESM PWRDN .................................................. 4–7
OPA PWRDN .................................................. 4–7
DEADFACE NICMOS/COSTAR FOR NCS INSTALL .................................................. 4–8
RSU/ECU .................................................. 4–8
SA SECT 1 TO BATT 1

[SM 210 HST SYS]
✓PSP ENA ID – 1
✓TLM COUNT – incr
✓RCVR 1(2) LOCK – *
Log CMD CT: ______
✓SA SECTS – +OFF
SA DEACT – ITEM 20 +9 8 EXEC
✓SA SECTS – ON

Log CMD CT: ______
MET: ___/___:___:___:

* If SA SECTS +OFF, command not received. *
* Reverify comm config and re-exec command *
* If still no joy, ✓MCC *

Notify EVA crewmembers, ready for +V2 Panel Deploy

SA SECT 4 TO BATT 4

[SM 210 HST SYS]
✓PSP ENA ID – 1
✓TLM COUNT – incr
✓RCVR 1(2) LOCK – *
Log CMD CT: ______
✓SA SECTS – –OFF
SA DEACT – ITEM 20 +9 9 EXEC
✓SA SECTS – ON

Log CMD CT: ______
MET: ___/___:___:___:

* If SA SECTS –OFF, command not received. *
* Reverify comm config and re-exec command *
* If still no joy, ✓MCC *

Notify EVA crewmembers, ready for –V2 Panel Deploy
DEADFACE +SA(–SA)

<table>
<thead>
<tr>
<th>SM 210 HST SYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ PSP ENA ID   – 1</td>
</tr>
<tr>
<td>✓ TLM COUNT   – incr</td>
</tr>
<tr>
<td>✓ RCVR 1(2) LOCK – *</td>
</tr>
<tr>
<td>✓ DCE PWR A/B – no*, OFF</td>
</tr>
<tr>
<td>✓ SADE – OFF</td>
</tr>
<tr>
<td>✓ SA SECTS – +OFF(–OFF)</td>
</tr>
<tr>
<td>✓ SURV HTR – OFF</td>
</tr>
<tr>
<td>✓ SADE OLD – OFF</td>
</tr>
<tr>
<td>✓ SPA – ABCDE</td>
</tr>
</tbody>
</table>

* If any parameters not as expected and NO COMM: *
  * Log CMD CT: ________ ________ *
  * Log MET: ___/___:___:___ *
  *
  * If DCE PWR A/B * or ON: *
    * DCE PWR OFF – ITEM 10 +9 9 EXEC (OFF) *
    *
  * If SADE ON: *
    * SADE OFF – ITEM 11 +9 9 EXEC (OFF) *
    *
  * If SURV HTR ON: *
    * SURV HTR – OFF *
    *
  * Log CMD CT: ____________ *
  * Log MET: ___/___:___:___ *
  *
  * If SA SECTS not +OFF(–OFF), ✓ MCC *
  * If SADE OLD not OFF, ✓ MCC *
  * If SPA not ABCDE, ✓ MCC *

Notify EVA crewmembers, SA ready for changeout
PCU PWRDN

NOTE
Perform steps 1,2 prior to battery disconnect

1. PWRDN PRECHECKS

L12U
✓ ESS BUS EXT PWR tb – UP
✓ INT PWR tb – bp
✓ FHST SHUTTER – CL (tb–gray)
✓ RSU SURV HTR PWR – OFF (tb–bp)
✓ MN BUS PWR ON tb – gray
✓ cb SPACE TEL SW PWR – cl
✓ IPCU RLY CL tb – gray
✓ MAIN BUS EXT PWR tb – gray
✓ SSM WK LTS – OFF

2. TURN OFF DPCs 3,5,7

On MCC GO:
✓ PCU PWR CONTR A,B (two) – OFF

* If PCU PWR CONTR A,B (two) – ON,
* ✓ MCC

SM 211 SSE OVERVIEW

DPC 3 OFF – ITEM 24 +7 3 EXEC
5 OFF – ITEM 24 +7 5 EXEC
7 OFF – ITEM 24 +7 7 EXEC

✓ DPC 3,5,7 – no *
✓ VOLTS: < 1.0 (after 30 sec)
✓ AMPS: < 0.5

NOTE
In order to prevent essential bus failover, first throw ESS BUS INT PWR – OFF and hold down, then throw ESS BUS EXT PWR – OFF. Hold both switches momentarily, then release both

3. HST PWRDN (POST BATTERY DEMATE)

On MCC GO:

L12U
ESS/MN SW ENA – ON (tb–gray)
Expect ‘PDI DECOM FAIL’ msg:
ESS BUS INT PWR – OFF (hold through next switch throw)
INT PWR – OFF (mom, then release both)
✓ INT PWR tb – bp
✓ EXT PWR tb – bp
MAIN BUS EXT PWR – OFF (mom) (tb–bp)
✓ IPCU RLY CL tb – bp
✓ MN BUS PWR ON tb – bp

If FHST LPS not installed, ✓ MCC

FHST SHUTTER – OP (tb–bp)
ESS/MN SW ENA – OFF (tb–bp)
cb SPACE TEL SW PWR – op
**SM 211 SSE OVERVIEW**

PCU OFF – ITEM 2 EXEC (*)
- DPC 1–12 – no *
  - VOLTS: < 1.0 (after 30 sec)
  - AMPS: < 0.5

Notify MCC, HST PWRDN complete
Notify EV, GO for PDU fuse plug and PCU connector demate

**PCU PWRUP**

Upon completion of PCU connector mate (36 connectors + SPG) and re-installation of PDU fuseplugs (all)

1. **DPC PWR ON**
   - On EV GO, notify MCC
   - If no comm, proceed:
     - L12U: cb SPACE TEL SW PWR – cl
     - FHST SHUTTER – CL (remains bp)

2. **EXTERNAL PWR ACTIVATION**
   - ESS/MN SW ENA – ON (tb–gray)
   - MAIN BUS EXT PWR – ON (mom) (tb–gray)
   - IPCU RLY CL tb – gray

   - If either tb – bp, notify MCC, continue *
   - If both tb – bp, cycle sw (up only) *
   - If no joy, MCC *

**SM 211 SSE OVERVIEW**

PCU ON – ITEM 1 EXEC (*)
- PCU – P/S
- DPC 1–12 – *
  - VOLTS: 33.7 to 35.3
  - AMPS: ≤ 0.5

- If DPC 1–12 AMPS > 0.5, turn off affected DPC, *
- DPC OFF – ITEM 24 +X EXEC (no *) (DPC *)
- ON/OFF INDEX NUMBERS (REF DATA), *
- MCC *
- If any other parameter out of range, MCC *

L12U: FHST SHUTTER tb – gray

**CRT**

DPC 1–12 VOLTS: 33.8 to 35.2
- AMPS: 2–7

**L12U**

ESS BUS EXT PWR – ON (mom) (tb–UP)
ESS/MN SW ENA – OFF (tb–bp)

**SM 210 HST SYS**

UMB SG V EXT MN BUS > 30
- ESS BUS > 30

Notify MCC when complete
3. **COMM REACQ**
   MCC and STOCC perform Comm Reacq
   
   Expect MCC GO for battery remate
   
   **NOTE**
   Do not continue to step 4 until battery reconnect has been completed. Step 4 is performed during PCU Functional Test on MCC call

4. **ACTIVATE INT ESS BUS**
   On MCC GO:
   
   **L12U**
   - ESS/MN SW ENA – ON (tb–gray)
   - ESS BUS INT PWR – ON (mom) (tb–UP)

   **SM 210 HST SYS**
   ✓ EPS INT ESS BUS A,B,C – ***

   **L12U**
   - ESS/MN SW ENA – OFF (tb–bp)
   
   PCU PWRUP complete

**SAP PWRDN**

On EV GO, after NCC has been removed from SAC

**L12L**
- SAP HTR B(A) PWR – OFF (tb–bp)

* If SAP HTR B(A) PWR tb – gray, *
  * cycle sw *
  * If still no joy, ✓MCC *

Notify MCC, SAP PWRDN complete

**DEADFAC FOC/ACS**

**SM 210 HST SYS**

✓ PSP ENA ID – 1
✓ TLM COUNT – incr
✓ RCVR 1(2) LOCK – *

Log CMD CT: __________
✓ FOC – ON
  FOC OFF – ITEM 12 +9 8 EXEC  
  – ITEM 12 +9 9 EXEC
✓ FOC – OFF

Log CMD CT: __________
MET: ___/___:___:___:

* If FOC ON, command not received. Reverify *
  * comm config and re–exec command *
  * If still no joy, ✓MCC *

Notify EVA crewmembers, ready for ACS changeout
DEADFACE COSTAR FOR ESM INSTALL

**SM 210 HST SYS**
- PSP ENA ID – 1
- TLM COUNT – incr
- RCVR 1(2) LOCK – *

Log CMD CT: ________

- COSTAR – ON
- COSTAR OFF – ITEM 14 +9 8 EXEC
- ITEM 14 +9 9 EXEC
- COSTAR – OFF

Log CMD CT: ________

MET: __/__/__:__:

* If COSTAR ON, command(s) not received.   *
* Reverify comm config and re–exec command  *
* If still no joy, √MCC                        *

Notify EVA crewmembers, ready for ESM install

**ESM PWRDN**

On EV GO, after ESM has been removed from MULE

**L11U**
- ESM HTR A(B) PWR – OFF (tb–bp)
  
  * If ESM HTR A(B) PWR tb – gray, *
  * cycle sw                        *
  * If still no joy, continue       *

**SM 211 SSE OVERVIEW**

**CRT**
- ESM HTR A(B) ZONE 1&2,3 – blank (both)
- MULE ESM 1&2,3 AMPS < 0.1 (both)

Notify MCC, ESM PWRDN complete

**OPA PWRDN**

**L12L**
- SAC OPA HTR A(B) PWR – OFF (tb–bp)
  
  * If SAC OPA HTR A(B) PWR tb – gray, *
  * cycle sw                        *
  * If still no joy, √MCC                        *

Notify MCC, OPA PWRDN complete
DEADFACE NICMOS/COSTAR FOR NCS INSTALL

DM 210 HST SYS
✓ PSP ENA ID – 1
✓ TLM COUNT – incr
✓ RCVR 1(2) LOCK – *
Log CMD CT: ______ ______

✓ NICMOS – ON
✓ COSTAR – ON
NICMOS OFF – ITEM 13 +9 8 EXEC
– ITEM 13 +9 9 EXEC
✓ NICMOS – OFF
COSTAR OFF – ITEM 14 +9 8 EXEC
– ITEM 14 +9 9 EXEC
✓ COSTAR – OFF
Log CMD CT: ______ ______
MET: ___/___:___:

* If NICMOS ON or COSTAR ON, command(s) not received. *
* Reverify comm config and re–exec command *
* If still no joy, ✓ MCC *

Notify EVA crewmembers, ready for NCS install

DEADFACE RSU/ECU

DM 210 HST SYS
✓ PSP ENA ID – 1
✓ TLM COUNT – incr
✓ RCVR 1(2) LOCK – *
Log CMD CT: ______ ______

L12U ✓ RSU SURV HTR PWR – OFF (tb–bp)

CRT ✓ RSU STAT 1,2,3 – ON
✓ MAMP 1,2,3: 84–168 mA
1 OFF – ITEM 15 +9 8 EXEC
2 OFF – ITEM 16 +9 9 EXEC
3 OFF – ITEM 17 +9 9 EXEC
✓ MAMP 1,2,3: ≤ 20 mA
✓ STAT 1,2,3 – OFF

Log CMD CT: ______ ______
MET: ___/___:___:

* If RSU STAT ON or MAMPs > 20, command not received. *
* Reverify comm config and re–exec command *
* If still no joy, ✓ MCC *

When MAMPs < 20 for 10 min (spindown complete), notify EVA
crewmembers RSU ready for changeout
CONTINGENCY OPERATIONS

FSS STOW WITHOUT BSP ................................................................. 5–2
HST JETTISON FOR RAPID SAFE ................................................. 5–5
SAC JETTISON .............................................................................. 5–11
RAC JETTISON ................................................................. 5–13
ENABLE RNDZ NAV ........................................................... 5–15
POST REL RADAR ACQUISITION ............................................. 5–15
RR NAV ................................................................. 5–15
BSP MECHANISM CHECKOUT ................................................. 5–16
SSE CHECKOUT WITH FAILED MULE FMDM–A ..................... 5–17
EVA HARDWARE/SA–2 JETTISON ............................................. 5–20
RAPID SAFING WITHOUT HST ................................................. 5–25
FSS STOW WITHOUT BSP

1. **FSS AMSB PWR ON**
   - A6U
     - PL RETEN LAT 1,2 (two) – OFF
     - LOGIC PWR SYS 2(1) – OFF
     - PL SEL – 1
     - LOGIC PWR SYS 1(2) – ON

   **SM 212 SSE MECHANISMS**
   - AMSB ON – ITEM 7 EXEC (A(B))
     - MECH – blank
     - SEL (ITEMS 9–19) – no *
     - STAT (ITEMS 9–19) – blank
     - O/R DIS (ITEM 22) – *

   - R13L
     - PL BAY MECH PWR SYS 1(2) – ON

2. **BAPS PIVOT DOWN FOR STOW**

   **CAUTION**
   Operating the pivoter in a stalled condition for greater than 30 sec may result in damage to unit. A stalled condition is indicated by AMSB AC AMPS > 0.3 and no mechanism motion

   - CCTV
     - Perform P/TV11 FSS OPS, OPS, FSS Config for Landing (PHOTO/TV FS, SCENES)

   - CRT
     - PIVOT LO SEL – ITEM 11 EXEC (* UP)
       - * If PIVOT LO STAT – *, EOT sw failed: *
       - * DESEL – ITEM 20 EXEC (ITEMS 9–19 – no *) *
       - * Perform SSE SSR–1 FMDM SWAP A→B(B→A) *
       - * (PL SYS, SSE) and continue on alt side *
       - * If PIVOT LO STAT – RDY, continue *

     - AMSB DC AMPS: .02 to .08
     - MECH – steady A(B)

   - A6U
     - PL RETEN LAT 1 tb – LAT (A side only)
       - 1(2) – REL (tb–bp)

   - CRT
     - MECH – flashing A(B)
     - PIVOT LO TACH: > 2.5 deg/min
     - AMSB AC AMPS: 0.3 to 0.5
     - PIVOT LO STAT – RDY

     - * If PIVOT LO STAT – UP, EOT sw failed, *
     - * continue *
     - * Expect “*” in 23.8 min *

   - CCTV
     - Visually verify BAPS motion; monitor performance

   - CAMR
     - A,B,C
3. **DOWNLOCK INSERTION**

**CAUTION**
Operating the downlock in a stalled condition for greater than 30 sec may result in damage to unit. A stalled condition is indicated by AMSB AC AMPS > 2.0 and no mechanism motion

**DLOCK SEL – ITEM 9 EXEC (**DIS**)

* If DLOCK STAT – *, then EOT sw failed: *
* DESEL – ITEM 20 EXEC (ITEM 9 – no *) *
* Perform SSE SSR–1 FMDM SWAP A→B(B→A) *
* (PL SYS, SSE) and continue on alt side *
* If DLOCK STAT – RDY, continue *

**CRT**
✓ PIVOT LO STAT – DN
✓ MECH – steady A(B)
Visually verify BAPS properly positioned

**A6U**
✓ PL RETEN LAT 1 tb – REL (A side only)
1(2) – OFF

✓ AMSB DC AMPS: .02 to .08
✓ MECH – steady A(B)

✓ PL RETEN LAT 1 tb – REL (A side only)
1(2) – LAT (tb–bp)

**CRT**
✓ MECH – flashing A(B)
✓ AMSB AC AMPS: 2.0 to 3.75
✓ DLOCK STAT – RDY

* If stall condition observed (AMSB AC AMPS > 2.0 and no mechanism motion): *
* PL RETEN LAT 1,2 (both) – OFF *
* MCC *

* If DLOCK STAT – DIS, continue *
* Expect ‘*’ *

Wait 24 sec,
✓ DLOCK STAT – ENG

* If DLOCK STAT – RDY after 30 total sec: *
* PL RETEN LAT 1(2) – OFF *
* Perform 1.3a PRIMARY MOTOR FAILS TO *
* DRIVE MECHANISM (PL SYS, SSE) *
A6U  √ PL RETEN LAT 1 tb – LAT (A side only)
     1(2) – OFF
CRT  √ MECH – steady A(B)

Visually verify DOWNLOCK engaged

4. AMSB PWRDN
   SM 212 SSE MECHANISMS
   DESEL – ITEM 20 EXEC (ITEMS 9–19; no *)
   √ AMSB DC AMPS: < .04
   OFF – ITEM 8 EXEC (*)

A6U  PL RETEN PL SEL – MON
     LOGIC PWR SYS 1(2) – OFF

R13L  PL BAY MECH PWR SYS 1(2) – OFF

Notify MCC, FSS STOWED
HST JETTISON FOR RAPID SAFE

1. ✓ PL BAY CONFIG
   If EVA:
     ✓ BSP pip pin removed prior to EV crew ingress
     ✓ RMS clear of payload envelope

2. DAP/TIMER SETUP
   DAP: A10/INRTL/VERN(ALT), LO Z
   O14, Pri RJD LOGIC, DRIVER (sixteen) – ON
   O15, ✓ cb MNA,C DDU AFT (two) – cl
   O16

   [SM 2 TIME]
   F7,A4 Set CRT and Event Timers counting down to SEP 1 MET _____/_____:_____:
   –10:00

3. ADI SETUP
   A6U ADI ATT – LVLH
   ERR – MED
   RATE – LO
   SENSE: – Z

4. ACTIVATE LOGIC AND MECH POWER
   ✓ PL RETEN LAT 1,2 (two) – OFF
   ✓ LOGIC PWR SYS 1,2 (two) – ON
   ✓ PL SEL – 1
   R13 PL BAY MECH PWR SYS 1,2 (two) – ON

   [SM 212 SSE MECHANISMS]
   AMSB ON – ITEM 7 EXEC (A(B))

5. PIVOT HST
   Perform this step only if pivoter not at 90°, else go to step 6
   PIVOT LO SEL – ITEM 11 EXEC (* RDY)
   A6U PL RETEN LAT 1(2) – LAT
   CRT ✓ MECH – flashing A(B)
   Pivot to 90°
   A6U PL RETEN LAT 1(2) – OFF

6. DEADFACE UMBILICAL
   L12U ESS/MN SW ENA – ON (tb–gray)
   ESS BUS INT PWR – ON (mom) (tb–UP)
   EXT PWR – OFF (mom) (tb–bp)
   MAIN BUS EXT PWR – OFF (mom) (tb–bp)
   FHST SHUTTER – OP (tb–bp)
7. **DISCONNECT UMBILICAL**

   CRT  UMB MN SEL – ITEM 17 EXEC (* MAT)
   A6U  PL RETEN LAT 1(2) – REL

   CRT  UMB MN STAT – RDY (wait 8 sec)
   STAT – REL

   A6U  PL RETEN LAT 1(2) – OFF

8. **FINAL SETUP**

   A4  Set Event Timer to count up from SEP 1 TIG

   GNC UNIV PTG
   RATES: < .1 deg/sec

   DAP: A/FREE/VERN(PRI)
   GNC 20 DAP CONFIG
   Change DAP A,B to A1,B1

   9. **OPEN BERTHING LATCHES**

      NOTE
      Perform SEP 1 BURN ASAP once LATCH 2
      open and verified clear

      SM 212 SSE MECHANISMS
      B LAT 3 SEL – ITEM 16 EXEC (* CL)

      A6U  PL RETEN LAT 1(2) – REL

      CRT  B LAT 3 STAT – RDY (wait 18 sec)
           3 STAT – OP

      A6U  PL RETEN LAT 1(2) – OFF

      CRT  B LAT 1 SEL – ITEM 14 EXEC (* CL)

      A6U  PL RETEN LAT 1(2) – REL

      CRT  B LAT 1 STAT – RDY (wait 18 sec)
           1 STAT – OP

      A6U  PL RETEN LAT 1(2) – OFF

      CRT  B LAT 2 SEL – ITEM 15 EXEC (* CL)

      A6U  PL RETEN LAT 1(2) – REL

      CRT  B LAT 2 STAT – RDY (wait 18 sec)
           2 STAT – OP

      A6U  PL RETEN LAT 1(2) – OFF

      Visually verify LATCHES open and umbilical clear
10. **HST TO SUN POINT**

If any SA–2 < 80% (4 of 5 SPAs) deployed:

- **SM 210 HST SYS**
  - PCS MODE – ITEM 7 +9 3(4) EXEC
  - SNPT DIS – NO

If both SA–2s > 80% (4 of 5 SPAs) deployed or both SA–3s installed:

**NOTE**

Expect ‘PDI DECOM FAIL’ msg

- **SM 210 HST SYS**
  - PCS MODE – ITEM 7 +9 5 EXEC
  - ITEM 7 +9 6 EXEC

11. **SEP 1 BURN**

- **A6U**
  - SENSE: –Z
  - FLT CNTLR PWR – ON
  - DAP: A1/FREE/VERN(PRI)
  - DAP TRANS: PULSE/PULSE/PULSE, LO Z

If OMS or RCS propellant leak, DAP: NORM Z

+00:00

- AFT THC: +Z (out) 1 pulse (0.1 fps)
- When HST clear of latches, DAP: A1/INRTL/VERN(PRI)

If Lo Z:
- AFT THC +Z (out) 9 pulses (0.9 fps)
If NORM Z:
- AFT THC +Z (out) 7 pulses (0.7 fps)

Record MET _____/____:_____:____

**NOTE**

Perform steps 15,16 in parallel with steps 12,13

12. **PERFORM OUT–OF–PLANE MNVR**

- **GNC UNIV PTG**
  - CRT CNCL – ITEM 21 EXEC
  - GNC, OPS 202 PRO

- **GNC ORBIT MNVR EXEC**
  - RCS SEL – ITEM 4 EXEC (*)

Set TIG to current time + 2:00 (+3:00 if NORM Z)

- TGT PEG 7 ∆Vx – ITEM 19 +0 EXEC
  - ∆Vy – ITEM 20 +2 EXEC
  - ∆Vz – ITEM 21 +0 EXEC

- LOAD – ITEM 22 EXEC
- TIMER – ITEM 23 EXEC
  - VGOZ: ≥ 0
* If VGO Z < 0:  *
* TGT PEG 7 \( \Delta Vy \) – ITEM 20 (-2) EXEC *
* LOAD – ITEM 22 EXEC *
* TIMER – ITEM 23 EXEC *
* \( VGOZ: \geq 0 \) *

Do not mnvr to burn att

A6U At TIG, deflect THC to null VGOs

13. PERFORM FINAL SEP

GNC ORBIT MNVR EXEC

CRT \( \sqrt{VGOZ} \) ≥ 0

If \( \Delta Vy \) (step 12) +2:
TV ROLL – ITEM 5 +2 0 EXEC
If \( \Delta Vy \) (step 12) –2:
TV ROLL – ITEM 5 +0 0 EXEC

Set TIG to TIG from step 12 +15:00
TGT PEG 7 \( \Delta Vx \) – ITEM 19 +3 EXEC
\( \Delta Vy \) – ITEM 20 +0 EXEC
\( \Delta Vz \) – ITEM 21 +0 EXEC

LOAD – ITEM 22 EXEC
TIMER – ITEM 23 EXEC
DAP: A/AUTO/PRI

At TIG–8:00,
MNVR – ITEM 27 EXEC (*)

A6U At TIG, deflect THC to null VGOs
FLT CNTLR PWR – OFF

14. RADAR NAV (IF DESIRED)
ENABLE RNDZ NAV, 5–15
POST REL RADAR ACQUISITION, 5–15
RR NAV, 5–15

15. ROTATOR (DUAL MOTOR DRIVE)
If B/L aligned with fixed target (+V3 FWD), go to step 16

NOTE
Rotate to align closest berthing latch to fixed target

SM 212 SSE MECHANISMS
ROTATOR SEL – ITEM 12 EXEC (* RDY)

A6U PL RETEN LAT 1(2) – REL or LAT as reqd

L12U FSS FMDM B(A) PWR – ON (tb–gray)

SM 1 DPS UTILITY
PORT ASSIGN STRING PL 1/2 PRI(SEC) – ITEM 23(24) EXEC (*)
SM 212 SSE MECHANISMS
AMSB PWR ON – ITEM 7 EXEC (*)
ROTATOR SEL – ITEM 12 EXEC (* RDY)

A6U PL RETEN LAT 2(1) – REL or LAT as reqd

CRT √MECH – flashing A,B
Complete maneuver to reqd posn

CCTV When rotator in posn:
A6U PL RETEN LAT 1,2 (two) – OFF

16. START PIVOT DN (DUAL MOTOR DRIVE)
SM 212 SSE MECHANISMS
BSP SEL – ITEM 19 EXEC (* SET)
PIVOT LO SEL – ITEM 11 EXEC (* RDY)

If step 15 not performed:
A6U PL RETEN LAT 1(2) – REL
L12U FSS FMDDM B(A) – ON

SM 1 DPS UTILITY
PORT ASSIGN STRING PL 1/2 PRI(SEC) – ITEM 23(24) EXEC (*)

SM 212 SSE MECHANISMS
AMSB PWR ON – ITEM 7 EXEC (*)
PIVOT LO SEL – ITEM 11 EXEC (* RDY)

A6U PL RETEN LAT 2(1) – REL
CRT √MECH – flashing A,B
After BSP – ENG/RET status received (6:06):
PL RETEN LAT 1,2 (two) – OFF
L Go to step 17

A6U PL RETEN LAT 2(1) – REL

SM 1 DPS UTILITY
PORT ASSIGN STRING PL 1/2 SEC(PRI) – ITEM 24(23) EXEC (*)

SM 212 SSE MECHANISMS
PIVOT LO SEL – ITEM 11 EXEC (* RDY)

A6U PL RETEN LAT 1(2) – REL
CRT √MECH – flashing A,B
After BSP–ENG/RET status received (6:06),
A6U PL RETEN LAT 1,2(two) – OFF

17. VERIFY BSP ENGAGED
CRT √BSP – ENG *
√BSP – RET (not blank)

* If BSP – ENG (no *) or *
* BSP – RET (blank), √MCC *
18. **CLOSEOUT**

A6U  
- PL RETEN LAT 1,2 (two) – OFF  
- LOGIC PWR SYS 1,2 (two) – OFF  
- PL SEL – MON

R13L  
- PL BAY MECH PWR 1,2 (two) – OFF

19. **SSE RAPID DEACT**

**NOTE**

Expect ‘I/O ERROR FLEX’ msg

R1  
- PL PRI MNC – OFF (mom) (tb–OFF)  
- CAB – OFF
SAC JETTISON

1. PRE–REL CONFIG
   ✓ PDRS MPMs deployed
   ✓ Elbow Camr stowed
   Perform HST JETTISON FOR RAPID SAFE

2. AFT STATION CONFIG FOR RELEASE
   A6U
   ADI ATT – LVLH
   ERR – MED
   RATE – LO
   SENSE: –Z
   O14, Pri RJD LOGIC, DRIVER (sixteen) – ON
   O15, cb MNA, C DDU AFT (two) – cl
   O16
   A1U
   ✓ KU CNTL – CMD
     ✓ PWR – ON
     ✓ MODE – RDR PASSIVE
     ✓ RADAR OUTPUT – LO
     sel – GPC
     SIG STRENGTH sel – KU
     SLEW RATE – as reqd
   A2
   DIGI–DIS SEL – R/RDOT
   ✓ X–PNTR SCALE – X1
   Install –Z COAS

3. MNVR TO BACKAWAY JETTISON ATT
   ✓ DAP A1, B1 loaded

   [GNC UNIV PTG]
   TGT ID: 2
   BODY VECT: 2
   OM: 180
   TRK – ITEM 19 EXEC (CUR–*)
   ERR TOT – ITEM 23 EXEC (*)
   DAP: A/AUTO/VERN, no LO Z

4. ENABLE RNDZ NAV
   ENABLE RNDZ NAV, 5–15

5. LATCH REL
   EV crewmembers disconnects carrier umbilicals
   On EV call:
   [GNC UNIV PTG]
   ✓ Rates < 0.1 deg/sec
   DAP: A/FREE/VERN (PRI)
   [GNC 33 REL NAV]
   ORB TO TGT – ITEM 10 EXEC

   EV crew opens passive latches per RMS/PRLA CONTINGENCY EVA
   (EVA, ORB CONT EVA)
Verify EVA crewmembers clear of SAC

A6U  PL RETEN PL SEL – 2
     LOGIC PWR SYS 1,2 (two) – ON
R13L  PL BAY MECH PWR SYS 1,2 (two) – ON
A6U  RETEN LAT 4 – REL (tb–bp)

After ~ 30 sec (60 sec max):
  ✓ PL RETEN LAT 4 tb – REL
     LAT 4 – OFF

R13L  PL BAY MECH PWR SYS 1,2 (two) – OFF
     RETEN LOGIC PWR SYS 1,2 (two) – OFF
     PL SEL – MON

00:00:00  6. SEP 1 BURN
A6U  ✓ SENSE: –Z
     FLT CNTLR PWR – ON
On EV call:
  AFT THC: +Z (out) 1 pulse (0.1 fps)
When separation confirmed,
  AFT THC: +Z (out) 4 pulses (0.4 fps)
     ✓ VZ –0.5 fps

00:01:00  7. SEP 2 BURN (RETROGRADE)
A6U  AFT THC: +Z (out) 15 pulses (1.5 fps)
     FLT CNTLR PWR – OFF
     DAP: A/INRTL/VERN

8. RADAR NAV (if desired)
     POST REL RADAR ACQUISITION, 5–15
     RR NAV, 5–15
RAC JETTISON

1. PRE–REL CONFIG
   √ PDRS MPMs deployed
   √ Elbow Camr stowed
   Perform HST JETTISON FOR RAPID SAFE, steps 1–18

2. AFT STATION CONFIG FOR RELEASE
   A6U
   ADI ATT – LVLH
   ERR – MED
   RATE – LO
   SENSE: –Z
   O14, Pri RJD LOGIC, DRIVER (sixteen) – ON
   O15, cb MNA, C DDU AFT (two) – cl
   O16
   A1U
   √ KU CNTL – CMD
   √ PWR – ON
   MODE – RDR PASSIVE
   RADAR OUTPUT – LO
   sel – GPC
   SIG STRENGTH sel – KU
   SLEW RATE – as reqd
   A2
   DIGI–DIS SEL – R/RDOT
   √ X–PNTR SCALE – X1
   Install –Z COAS

3. MNVR TO BACKAWAY JETTISON ATT
   √ DAP A1, B1 loaded
   
   GNC UNIV PTG
   TGT ID: 2
   BODY VECT: 2
   OM: 180
   TRK – ITEM 19 EXEC (CUR–*)
   ERR TOT – ITEM 23 EXEC (*)
   DAP: A/AUTO/VERN, no LO Z

4. ENABLE RNDZ NAV
   ENABLE RNDZ NAV, 5–15

5. ACTIVATE LATCHES
   A6U
   √ PL RETEN LAT (five) – OFF
   PL SEL – 3
   LOGIC PWR SYS 1, 2 (two) – ON
   R13L
   PL BAY MECH PWR SYS (1, 2) – ON
   SM 97 PL RETENTION
   √ RDY–FOR–LAT 1, 2, 3, 4, 5 (ten) – 1
   √ LAT 1, 2, 3, 4, 5 (ten) – 1

   * If any rel msw shows ‘1’, expect single *
   * motor time (60 sec) *

5–13
PL OPS/109/FIN B
6. **AKA RELEASE**

   **GNC UNIV PTG**
   ![Image]

   - Rates < 0.1 deg/sec
   - DAP: A/FREE/VERN(PRI)
   - **GNC 33 REL NAV**
   - ORB TO TGT – ITEM 10 EXEC

   **A6U**
   - √ PL RETEN LAT 5 tb – LAT
   - √ RDY 5 tb – gray

   Note single motor times (> 30 sec)
   - PL RETEN LAT 5 – REL (tb–REL), 60 sec max
   - OFF

7. **PRLA RELEASE**

   **A6U**
   - √ PL RETEN LAT 1,2,3,4 tb (four) – LAT
   - √ RDY 1,2,3,4 tb (four) – gray

   Note single motor times (> 30 sec)
   - PL RETEN LAT 1,2 (two) – REL (tb–REL), 60 sec max
   - OFF
   - 3,4 (two) – REL (tb–REL), 60 sec max
   - OFF

8. **SEP 1 BURN**

   **A6U**
   - √ SENSE: –Z
   - FLT CNTLR PWR – ON
   - On EV call:
     - AFT THC: +Z (out) 1 pulse (0.1 fps)
   - When separation confirmed,
     - AFT THC: +Z (out) 4 pulses (0.4 fps)
   - √ VZ –0.5 fps

9. **SEP 2 BURN (RETROGRADE)**

   **A6U**
   - AFT THC: +Z (out) 15 pulses (1.5 fps)
   - FLT CNTLR PWR – OFF
   - DAP: A/INRTL/VERN

10. **RADAR NAV** (if desired)

    POST REL RADAR ACQUISITION, 5–15
    RR NAV, 5–15

11. **PRLA CLOSURE**

    Note single motor times (> 30 sec)
    - PL RETEN LAT 1,2 (two) – LAT (tb–LAT), 60 sec max
    - OFF
    - 3,4 (two) – LAT (tb–LAT), 60 sec max
    - OFF

12. **DEACTIVATE LATCHES**

    **R13L**
    - PL BAY MECH PWR SYS 1,2 (two) – OFF
    **A6U**
    - RETEN LOGIC PWR SYS 1,2 (two) – OFF
    - PL SEL – MON
ENABLE RNDZ NAV

- MCC for target vector onboard
- **GNC 33 REL NAV**
  - RNDZ NAV ENA – ITEM 1 EXEC (*)
- SV SEL, ITEM 4 – (PROP)
- INH RNG, ITEM 18 – (*)
  - RDOT, ITEM 21 – (*)
  - Angles, ITEM 24 – (*)
- RR – ITEM 13 EXEC (*)

POST REL RADAR ACQUISITION

- **GNC 33 REL NAV**
  - KU ANT ENA – ITEM 2 EXEC (*)
- GNC I/O RESET
- **SM ANTENNA**
  - RDR RNG MIN – ITEM 6 EXEC (*)
- A1U
  - KU RADAR OUTPUT – LO
  - KU sel – GPC
  - MODE – RDR PASSIVE
  - CNTL – PNL

  * If no lock within 2 min: *
  * KU sel – AUTO TRACK *
  * SLEW – as reqd (as seen in COAS) *
  * KU SEARCH – SEARCH (tb–gray) *
  * If no lock–on within 1 min: *
  * KU sel – GPC *

POST REL RR NAV

- A1U
  - KU TRACK tb – gray
- **GNC 33 REL NAV**
  - RR – ITEM 13 (*)

  - If RATIO > 1.0
    - FORCE 3 MARKS
    - If RATIO still > 1.0, call MCC

When RATIO < 1.0 for four NAV cycles (~31 sec),
- AUTO RNG – ITEM 17 EXEC
  - RDOT – ITEM 20 EXEC
  - Angles – ITEM 23 EXEC

When updates small and stable,
- SV SEL – ITEM 4 EXEC (FLTR)

- **SM ANTENNA**
  - RDR RNG AUTO – ITEM 5 EXEC (*)
BSP MECHANISM CHECKOUT

1. **FSS AMSB PWR ON**
   A6U  
   ✓ PL RETEN LAT 1,2 (two) – OFF
   ✓ LOGIC PWR SYS 2(1) – OFF
   ✓ PL SEL – 1
   LOGIC PWR SYS 1(2) – ON

   **SM 212 SSE MECHANISMS**
   AMSB ON – ITEM 7 EXEC (A(B))
   ✓ MECH – blank
   ✓ SEL (ITEMS 9–19) – no *
   ✓ STAT (ITEMS 9–19) – blank
   ✓ O/R DIS (ITEM 22) – *

   R13L  
   PL BAY MECH PWR SYS 1(2) – ON

2. **BSP REL**
   CRT
   If BSP DIS A, DIS B or DIS *, ✓MCC
   BSP SEL – ITEM 19 EXEC (*)
   ✓ AMSB DC AMPS: .02 to .08
   ✓ MECH – steady A(B)
   ✓ BSP STAT – SET
   A6U  
   PL RETEN LAT 1(2) – REL, wait 4 sec, then OFF
   CRT  
   ✓ BSP STAT – REL

   * If BSP STAT not REL: *
   * Perform 1.3a PRIMARY MOTOR FAILS TO DRIVE MECHANISM (PL SYS, SSE) *

3. **BSP SET**
   On MCC GO:
   A6U  
   PL RETEN LAT 1(2) – LAT, wait 4 sec, then OFF
   CRT  
   ✓ BSP STAT – SET

   * If BSP STAT not SET: *
   * Perform 1.3a PRIMARY MOTOR FAILS TO DRIVE MECHANISM (PL SYS, SSE) *

4. **AMSB PWRDN**
   CRT
   DESEL – ITEM 20 EXEC (MECH SEL ITEMS 9–19 no *)

   * If any MECH SEL – *, do not turn *
   * AMSB OFF; notify MCC, continue *

   ✓ AMSB DC AMPS: < .04
   OFF – ITEM 8 EXEC (*)
   A6U  
   PL RETEN LOGIC PWR SYS 1(2) – OFF
   R13L  
   BAY MECH PWR SYS 1(2) – OFF

Notify MCC BSP MECHANISM CHECKOUT complete; report any anomalies
SSE CHECKOUT WITH FAILED MULE FMDM–A

1. **MULE SURVIVAL HEATER C/O**
   
   L11U
   
   SURV HTR A PWR – ON
   
   B PWR – OFF
   
   PWR tb – gray
   
   SURV HTR B PWR – OFF
   
   A PWR – OFF
   
   PWR tb – gray
   
   * If SURV HTR PWR tb – bp, *
   
   * cycle SURV HTR A PWR sw *
   
   * If still no joy, continue *

2. **ESM–A HEATER C/O**
   
   ESM HTR A PWR – ON (tb–gray)
   
   * If ESM HTR A PWR tb – bp, *
   
   * cycle sw *
   
   * If still no joy, continue *

   ESM HTR A PWR – OFF (tb–bp)

3. **SOPE A HEATER C/O**
   
   SOPE HTR A PWR – ON (tb–gray)
   
   * If SOPE HTR A PWR tb – bp, *
   
   * cycle sw *
   
   * If still no joy, continue *

   SOPE HTR A PWR – OFF (tb–bp)

4. **VERIFY SSE STATUS**
   
   NOTE
   
   If any parameter not in range, notify MCC

   **SM 211 SSE OVERVIEW**

   ✓ PCU – blank/blank
   
   ✓ PCU OFF – *
   
   ✓ CCTV ENA OFF – *
   
   ✓ PWR OFF – *

   **POWER**

   ✓ FSS EPDSU 1/2 AMPS: < 3.0 (both)
   
   ✓ FSS FMDM A/B AMPS: .5 to 1.1 (both)
   
   ✓ HTR – 1/2
   
   ✓ A1/A2 AMPS: < .4 (both)
   
   ✓ B1/B2 AMPS: < .4 (both)
   
   ✓ CCTV HTR AMPS: < .9
   
   ✓ SAC EPDSU AMPS: < 35
   
   ✓ FSS EPDSU VOLTS: 24.0 to 32.0 (both)
   
   ✓ SAC EPDSU VOLTS: 24.0 to 32.0 (both)
   
   ✓ DPC 1–12 – no *
   
   ✓ VOLTS: < 0.5
   
   ✓ AMPS: < 0.5
5. **AMSB CHECKOUT SIDE A**

   **SM 212 SSE MECHANISMS**
   - AMSB OFF
   - AMSB AC AMPS: < 0.20
   - AMSB TEMP: -20 to 50 degC
   - MECH
   - PIVOT LO TACH: < 0.25 deg/min
   - ROTATOR TACH: < 0.9 deg/min

**A6U**
- PL RETEN LAT 1,2 (two) – OFF
  - LOGIC PWR SYS 1,2 (two) – OFF
  - PL SEL – 1

**R13L**
- PL BAY MECH PWR SYS 1,2 (two) – OFF

**CRT**
- AMSB ON – ITEM 7 EXEC (A(B))

   * If AMSB ON – blank, *
   * record and continue  *

- AMSB AC AMPS: < .20
- MECH – blank
  - SEL (ITEMS 9–19) – no *
  - STAT (ITEMS 9–19) – blank
- PIVOT LO TACH: < .25 deg/min
- ROTATOR TACH: < .9 deg/min
- O/R DIS (ITEM 22) – *

   * If any parameter out of limit, √MCC *

Perform following ITEM ENTRIES and checks per table

**NOTE**

SEL field should show ‘*’ for only MECHANISM selected. For any parameters not as expected, do not deselect; contact MCC
<table>
<thead>
<tr>
<th>ITEM EXEC</th>
<th>MECHANISM</th>
<th>SEL</th>
<th>STAT</th>
<th>AMSB DC AMPS</th>
<th>MECH</th>
<th>SM 97 PL SEL 1, LAT/REL LATCH 2(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>DLOCK</td>
<td>9-*</td>
<td>ENG</td>
<td>.02-.08</td>
<td>B(A)</td>
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<td>21</td>
<td>O/R ENA(*)</td>
<td>9-*</td>
<td>RDY</td>
<td>.09-.20</td>
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<td></td>
</tr>
<tr>
<td>11</td>
<td>PIVOT LO</td>
<td>11-*</td>
<td>DN</td>
<td>.02-.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
</tr>
</tbody>
</table>

Expect ‘S212 AMSB DC AMPS’ msg

<table>
<thead>
<tr>
<th>ITEM EXEC</th>
<th>MECHANISM</th>
<th>SEL</th>
<th>STAT</th>
<th>AMSB DC AMPS</th>
<th>MECH</th>
<th>SM 97 PL SEL 1, LAT/REL LATCH 2(1)</th>
</tr>
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<tbody>
<tr>
<td>21</td>
<td>O/R ENA(*)</td>
<td>11-*</td>
<td>RDY</td>
<td>.09-.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>O/R DIS(*)</td>
<td>11-*</td>
<td>DN</td>
<td>.02-.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
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<tr>
<td>12</td>
<td>ROTATOR</td>
<td>12-*</td>
<td>RDY</td>
<td>.02-.08</td>
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<td></td>
</tr>
<tr>
<td>14</td>
<td>B LAT 1</td>
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<td>OP</td>
<td>.02-.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
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<tr>
<td>15</td>
<td>B LAT 2</td>
<td>15-*</td>
<td>OP</td>
<td>.02-.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
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<tr>
<td>16</td>
<td>B LAT 3</td>
<td>16-*</td>
<td>OP</td>
<td>.02-.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
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<tr>
<td>17</td>
<td>UMB MN</td>
<td>17-*</td>
<td>REL</td>
<td>.02-.08</td>
<td>B(A)</td>
<td>00/01(00/10)</td>
</tr>
<tr>
<td>18</td>
<td>UMB B/U</td>
<td>18-*</td>
<td>MAT</td>
<td>.02-.08</td>
<td>B(A)</td>
<td>01/00(10/00)</td>
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<tr>
<td>19</td>
<td>BSP</td>
<td>19-*</td>
<td>SET</td>
<td>.02-.08</td>
<td>B(A)</td>
<td>01/00(10/00)</td>
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<tr>
<td>20</td>
<td>DESEL</td>
<td>9-19</td>
<td>blank</td>
<td>&lt; .04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**AMS B OFF – ITEM 8 EXEC (*)**

6. **FSS PCU CHECKOUT**

**SM 211 SSE OVERVIEW**

PCU ON – ITEM 1 EXEC (*)

✓ PCU – P/S
 ✓ DPC 1–12 – *
    ✓ VOLTS: 33.7 to 35.3
    ✓ AMPS: ≤ 0.5

* If DPC 1–12 AMPS: > 0.5, *
* PCU OFF – ITEM 2 EXEC (*), *
* ✓ MCC

PCU OFF – ITEM 2 EXEC (*)

✓ PCU – blank/blank
 ✓ DPC 1–12 – no *

7. **FSS FMDM–A PWRDN**

**SM 1 DPS UTILITY**

PORT ASSIGN STRING PL 1/2 PRI – ITEM 23 EXEC (*)

L12U FSS FMDM–A PWR – OFF (tb–bp)

* If tb – gray, note and continue *

**SM 211 SSE OVERVIEW**

✓ POWER FSS FMDM A/B AMPS: < 0.15/.5 to 1.1

Notify MCC, SSE CHECKOUT complete; report any anomalies
EVA HARDWARE/SA–2 JETTISON

1. CONFIG HST
   Pivot FSS to 90° and rotate as reqd:
   Perform PIVOT HST (IN–BAY OPS)
   Perform ROTATE HST (IN–BAY OPS)
   ✓MCC (SA slew may be reqd)
   ✓BSP pinned

   CDR/PLT
   O14, O15, O16:E

2. ORBITER MNVR TO JETTISON ATTITUDE
   cb DDU (six) – cl
   O14, O15, O16:F
   PRI RJD DRIVER, LOGIC (sixteen) – ON
   ✓DAP: A10/AUTO/VERN(ALT)

   GNC 201 UNIV PTG
   TRK OPTION:
   TGT ID +2
   BODY VECTOR +2
   ✓P +180.0
   ✓Y +0.0
   OM +0.0
   TRK – ITEM 19 EXEC (CUR–*)

3. ACQUIRE FAILED ORU
   Configure orbiter lighting as reqd to support night jettison
   Unstow HHL

   MS
   ✓VTR recording

   SM 94 PDRS CONTROL
   ✓PL ID, ITEM 3: 4
   ✓INIT ID, ITEM 24: 4

   RHC RATE – as reqd (VERN within 10 ft)
   A8U BRAKES – OFF (tb–OFF)
   MODE – ORB LD, ENTER

If acquiring failed SA–2 from HST,
mnvr to Failed SA–2 Removal posn:

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>PITCH</th>
<th>YAW</th>
<th>ROLL</th>
<th>PL ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>−854</td>
<td>1</td>
<td>−718</td>
<td>350</td>
<td>330</td>
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<td>3</td>
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<tr>
<td>−870</td>
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<td>−715</td>
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<td>330</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>SY</td>
<td>SP</td>
<td>EP</td>
<td>WP</td>
<td>WY</td>
<td>WR</td>
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<tr>
<td>−55.2</td>
<td>+120.4</td>
<td>−126.6</td>
<td>−14.1</td>
<td>+27.4</td>
<td>−162.9</td>
<td></td>
</tr>
</tbody>
</table>

S:135°L B:30°R
STARBOARD

CDR/PLT
At SADA clamp removal:
  DAP: FREE

MS/EV
If acquiring other failed hardware,
mnvr as reqd to grasp failed ORU

4. RMS MNVR TO HARDWARE JETTISON POSN

SM 94 PDRS CONTROL

MS
PL ID – ITEM 3 +5 EXEC
  INIT ID – ITEM 24 +5 EXEC

RHC
RATE – as reqd (VERN within 10 ft)

A8U
BRAKES – OFF (tb–OFF)
MODE – ORB LD, ENTER

When hardware clear of HST:
  DAP: A/AUTO/VERN(ALT),
  FREE as reqd to maintain control of jettison hardware

Mnvr to Hardware Jettison posn:

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>PITCH</th>
<th>YAW</th>
<th>ROLL</th>
<th>PL ID</th>
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<td>−750</td>
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<td>−980</td>
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<td>330</td>
<td>0</td>
<td>4</td>
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<tr>
<td>−750</td>
<td>10</td>
<td>−980</td>
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<td>330</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>SY</td>
<td>SP</td>
<td>EP</td>
<td>WP</td>
<td>WY</td>
<td>WR</td>
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<tr>
<td>−95.4</td>
<td>+85.5</td>
<td>−40.3</td>
<td>−87.5</td>
<td>+62.7</td>
<td>−133.6</td>
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</tbody>
</table>
5. **PREP FOR RELEASE**
   - **GNC 20 DAP CONFIG**
     - REBOOST CFG – ITEM 8 +2 EXEC
     - INTVL – ITEM 9 +5.1 2 EXEC
   - **GNC UNIV PTG**
     - Set start time to current time:
       - START TIME – ITEM 1 +_ _ +_ _ +_ _ +_ _ +_ _ EXEC

   When RMS EV stable at jettison position:
   - DAP: A/AUTO/VERN(ALT)
   - √DAP TRANS: PULSE/PULSE/PULSE, LO Z

6. **HARDWARE RELEASE**
   When in jettison attitude with rates damped:
   - √MCC GO for release
   - DAP: FREE

   **SM 94 PDRS CONTROL**
   - MS
     - PL ID – ITEM 3 +4 EXEC
     - INIT ID – ITEM 24 +4 EXEC
   - RHC RATE – COARSE (RATE MIN tb–OFF)
   - A8 BRAKES – OFF (tb–OFF)
   - MODE – ORB LD, ENTER

   **NOTE**
   WY singularity should be monitored during RMS EV back-away.
   Expect MA, C/W SINGULAR It – on (WY)

   **EV**
   - Release Hardware

   **MS**
   - Mnvr RMS EV 5 ft (minimum) clear of jettisoned hardware
   - Maintain 5 ft clearance to structure during reboost
RMS EV Back–away posn:  (for reference only)

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>PITCH</th>
<th>YAW</th>
<th>ROLL</th>
<th>PL ID</th>
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<tr>
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<td>–903</td>
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<tr>
<td>–715</td>
<td>10</td>
<td>–900</td>
<td>350</td>
<td>330</td>
<td>0</td>
<td>4</td>
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<tr>
<td>SY</td>
<td>SP</td>
<td>EP</td>
<td>WP</td>
<td>WY</td>
<td>WR</td>
<td></td>
</tr>
<tr>
<td>–105.6</td>
<td>+101.2</td>
<td>–74.1</td>
<td>–87.4</td>
<td>+69.2</td>
<td>–113.9</td>
<td></td>
</tr>
</tbody>
</table>

7. REBOOST

GNC UNIV PTG

Set DURATION to 0:01:31.0

RBST – ITEM 25 EXEC (CUR*)

NOTE
Reboost firings will start 14 sec after ITEM 25.
Reboost can be aborted with an ITEM 26 on UNIV PTG.
Expect approximately 16 pulses

Report HHL Range, Rdot to MCC

8. POST–REBOOST CLEANUP

On MCC GO:

DAP: A/LVLH/VERN(ALT)

O14,O15, O16:E
cb DDU (six) – op

O14,O15, O16:F
PRI RJD DRIVER,LOGIC (sixteen) – as reqd

Return to FLIGHT PLAN attitude
RAPID SAFING WITHOUT HST

1. **PL BAY CONFIG**
   If EVA:
   - BSP pip pin removed prior to EV crew ingress
   - RMS clear of payload envelope

2. **ACTIVATE LOGIC AND MECH POWER**
   Perform this step only if FSS not stowed for entry, else go to step 7

   **A6U**
   - PL RETEN LAT 1,2 (two) – OFF
   - LOGIC PWR SYS 1,2 (two) – ON
   - PL SEL – 1

   **R13L**
   - PL BAY MECH PWR SYS 1,2 (two) – ON

   **SM 212 SSE MECHANISMS**
   AMSB PWR ON – ITEM 7 EXEC (A(B))

3. **ROTATE (DUAL MOTOR DRIVE)**
   Perform this step only if BSP installed and B/L not aligned with fixed target (+V3 FWD), else go to step 4

   **NOTE**
   Rotate to align closest berthing latch to fixed target.
   If hardstop encountered, reverse direction

   **ROTATOR SEL** – ITEM 12 EXEC (* RDY)

   **A6U**
   - PL RETEN LAT 1(2) – REL or LAT as reqd

   **L12U**
   - FSS FMDM B(A) PWR – ON (tb–gray)

   **SM 1 DPS UTILITY**
   PORT ASSIGN STRING PL 1/2 PRI(SEC) – ITEM 23(24) EXEC (*)

   **SM 212 SSE MECHANISMS**
   AMSB PWR ON – ITEM 7 EXEC (*)
   ROTATOR SEL – ITEM 12 EXEC (* RDY)

   **A6U**
   - PL RETEN LAT 2(1) – REL or LAT as reqd

   **CRT**
   - MECH – flashing A,B
   Complete rotation to reqd posn

   **CCTV**
   When rotator in posn:
   **A6U**
   - PL RETEN LAT 1,2 (two) – OFF

4. **PIVOT DOWN (DUAL MOTOR DRIVE)**

   **SM 212 SSE MECHANISMS**
   BSP SEL – ITEM 19 EXEC (* SET)
   PIVOT LO SEL – ITEM 11 EXEC (* RDY)
If step 3 not performed:
A6U  PL RETEN LAT 1(2) – REL
L12U  FSS FMDM B(A) – ON

**SM 1 DPS UTILITY**
PORT ASSIGN STRING PL 1/2 PRI(SEC) – ITEM 23(24) EXEC (*)

**SM 212 SSE MECHANISMS**
AMSB PWR ON – ITEM 7 EXEC (*)
PIVOT LO SEL – ITEM 11 EXEC (* RDY)

A6U  PL RETEN LAT 2(1) – REL
CRT  √MECH – flashing A,B
     Complete pivot to reqd posn

A6U  PL RETEN LAT 1,2 – OFF
     If BSP installed, go to step 5; else go to step 6

**PL RETEN LAT 2(1) – REL**

**SM 1 DPS UTILITY**
PORT ASSIGN STRING PL 1/2 SEC(PRI) – ITEM 24(23) EXEC (*)

**SM 212 SSE MECHANISMS**
CRT  PIVOT LO SEL – ITEM 11 EXEC (* RDY)

A6U  PL RETEN LAT 1(2) – REL
CRT  √MECH – flashing A,B
     Complete pivot to reqd posn

A6U  PL RETEN LAT 1,2 – OFF
     If BSP installed, go to step 5; else go to step 6

5. **VERIFY BSP ENGAGED**
CRT  √BSP – ENG *

   * If BSP – ENG (no *), √MCC *

6. **CLOSEOUT**
A6U  PL RETEN LOGIC PWR SYS 1,2 (two) – OFF
     PL SEL – MON
R13L  BAY MECH PWR 1,2 (two) – OFF

7. **SSE RAPID DEACT**

   **NOTE**
   Expect ‘I/O ERROR FLEX’ msg; ignore

R1  PL PRI MNC – OFF (mom) (tb–OFF)
    CAB – OFF
DEORBIT PREP

PAYLOAD DEACT .................................................. 6–2
HPGSCA STOW .................................................. 6–3
PAYLOAD REACT .................................................. 6–4
ENTRY SW LIST/VERIF ............................................. 6–4
PAYLOAD DEACT

NOTE
If any tb – gray, note and continue

1. DEACT SAC HTRS
   L12L ASIPE HTR A(B) PWR – OFF (mom) (tb–bp)
   SAC EPDSU HTR PWR – OFF (tb–bp)

   **SM 211 SSE OVERVIEW**
   √ POWER SAC EPDSU AMPS: 0.4 to 1.4

2. SAC PWR OFF
   L12L SAC B–SIDE PWR ENA – OFF
   cb SAC A–SIDE PWR ENA – op

3. DEACTIVATE CCTV HTR
   L12U CCTV HTR PWR – OFF (tb–bp)

4. DEACT FSS HTRS
   FSS HTR PWR – OFF (tb–bp)
   CRT √ POWER FSS HTR A1/A2 AMPS: < 0.4 (both)
   √ B1/B2 AMPS: < 0.4 (both)

5. DEACT MULE HTRS
   L11U SURV HTR A(B) PWR – OFF
   CRT √ POWER MULE HTR AMPS: < 0.4
   L11U SOPE HTR A(B) PWR – OFF (tb–bp)
   CRT √ MULE SOPE 1A/2A AMPS: < 0.4 (both)
   √ 1B&2B AMPS: < 0.4
   √ 3A/3B AMPS: < 0.4 (both)

6. MULE FMDM PWR OFF
   NOTE
   Expect ‘I/O ERROR FLEX’ msg
   L11U MULE FMDM–A(B) PWR – OFF (tb–bp)
   cb MULE SW PWR – op

7. FSS FMDM PWR OFF
   NOTE
   Expect ‘I/O ERROR FLEX’ msg
   L12U FSS FMDM–A(B) PWR – OFF (tb–bp)
   cb FSS A SIDE PWR – op
   √ SPACE TEL SW PWR – op

8. PAYLOAD BUS DEACT
   R1 PL PRI MNC – OFF (mom) (tb–OFF)
   CAB – OFF

Notify MCC, PL DEACT complete; report any anomalies
HPGSCA STOW

1. **DISABLE PSP–BYPASS**
   L12L   PSP BYP – DSBL
   cb SW PWR – op

2. **CONFIGURE PDIP**
   PDIP   Disconnect: Y–Cable from HST PI NO 1(2)
   Re–install: HST PI NO 1(2) Turn–Around Plug

3. **POWER OFF AND DISCONNECT HPGSCA**
   HPGSCA  Laptop pwr (side) – off
   Expansion Chassis pwr (rear) – off
   MO30F   DC UTIL PWR MNC – OFF
   Disconnect:
   PWR cable from HPGSCA Expansion Chassis
   Y–Cable ‘PGSCA INPUT’ (DB9) and ‘PGSCA OUTPUT’ (DB25)

4. **STOW HPGSCA**
   L11A2   Stow HPGSCA in middeck locker
   Notify MCC, HPGSCA stowage complete
PAYLOAD REACT

SSE
Perform SSE ACTIVATION (SSE ACT/FSS PREP)

PAYLOAD ENTRY SW LIST/VERIF

TIG–1:55
R1  √PL CAB – OFF
    √PRI MNC – ctr (tb–OFF)
    √MNB,FC3 (two) – ctr (tb–OFF)
    √AUX – OFF
    √AFT MNB – OFF
    √MNC – OFF

A6U  √PL RETEN LAT 1,2 (two) – OFF (tb–bp)
     √PL SEL – MON
     √LOGIC PWR SYS 1,2 (two) – OFF
R13L √PL BAY MECH PWR SYS 1,2 (two) – OFF

L12U (FSS)
    √PCU PWR CONTR A – OFF
        √B – OFF
    √CCTV HTR PWR – OFF (tb–bp)
    √FSS FMDM–A PWR – OFF (tb–bp)
    √FMDM–B PWR – OFF (tb–bp)
    √HTR PWR – OFF (tb–bp)
    √cb FSS A SIDE PWR – op
        √PDIP PWR 2/Ku BAND – op

(TELESCOPE)
    √ESS BUS EXT PWR – ctr (tb–bp)
        √INT PWR – ctr (tb–bp)
    √FHST SHUTTER – OP (tb–bp)
    √RSU SURV HTR PWR – OFF (tb–bp)
    √MN BUS INT PWR – ctr
        √PWR ON tb – bp
    √ESS/MN SW ENA – OFF (tb–bp)
    √IPCU RLY CL tb – bp
    √MAIN BUS EXT PWR – ctr (tb–bp)
    √SSM WK LTS – OFF
    √cb SPACE TEL SW PWR – op
        √PDIP PWR 1 – op

L12L (PSP BY–PASS)
    √PSP BYP – DSBL
    √cb SW PWR – op

(SAC)
    √ASIPE HTR A PWR – ctr (tb–bp)
        √B PWR – ctr (tb–bp)
    √SAP HTR A PWR – OFF (tb–bp)
        √B PWR – OFF (tb–bp)
    √SAC B–SIDE PWR ENA – OFF (tb–bp)
        √OPA HTR A PWR – OFF (tb–bp)
        √B PWR – OFF (tb–bp)
    √EPDSU HTR PWR – OFF (tb–bp)
    √cb SAC A–SIDE PWR ENA – op
L11U (KEEL CAM)

- KEEL CAM HTR/ILLUM – OFF
- ENABLE – OFF
- cb SW PWR – op

(MULE)

- MULE FMDM–A PWR – OFF (tb–bp)
- FMDM–B PWR – OFF (tb–bp)
- SURV HTR A PWR – OFF
- B PWR – OFF
- PWR tb – bp
- ESM HTR A PWR – OFF (tb–bp)
- B PWR – OFF (tb–bp)
- SOPE HTR A PWR – OFF (tb–bp)
- B PWR – OFF (tb–bp)
- cb MULE SW PWR – op
- KEEL CAM PWR – op

L12L (PDIP)

- Ku BAND RATE – LO
- DC PWR 1,2 CAB PL (two) – OFF

ML86B

- cb MNB MAR 1 – op
- 2 – op

ML85E

- AC S1 – OFF
- cb AC CB1 – op
- DC 10 AMP MNB S2,S3,S4 (three) – OFF
- cb DC 10 AMP MNB CB2,CB3,CB4 (three) – op
- DC 10 AMP MNB S5 – ON
- cb DC 10 AMP MNB CB5 – cl
- PUMPS – OFF
- cb PUMPS 1,2 (two) – op
HST QUICK RESPONSE

SA SLEW (INADVERTENT) .................................................. 7–2
‘S210 DCE +(-) WING’ ...................................................... 7–2
SA SLEW (INADVERTENT)

SM 210 HST SYS
SADE OFF – ITEM 11 +9 9 EXEC (OFF)
DAP: FREE
Notify MCC

‘S210 DCE +/- WING’

SM 210 HST SYS
DCE PWR OFF – ITEM 10 +9 9 EXEC
DAP: FREE
Notify MCC
REFERENCE DATA

DPC ON/OFF INDEX NUMBERS ................................................................. 8–2
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DYNAMIC DEFLECTION LIMITS (PV2 FWD) ........................................... 8–4
(+V2 FWD) ................................................................. 8–5
WORST–CASE STATIC TWIST (–V2 FWD) .................................................. 8–6
(+V2 FWD) ................................................................. 8–7

WORST–CASE STATIC TWIST (+$V2 FWD) .................................................. 8–7
## DPC ON/OFF INDEX NUMBERS

<table>
<thead>
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</table>
EXPECTED STATIC TWIST

Tip-to-Tip = 26” +/- 6”

Tip-to-Tip = 37” +/- 6”

Tip-to-Tip = 21” +/- 6”

Tip-to-Tip = 20” +/- 6”

Expected SA2 Twist (-V3 Forward) View from Aft Flight Deck
DYNAMIC DEFLECTION LIMITS (+V2 FWD)

Expected SA2 Twist (+V2 Forward) View from Camera D
WORST-CASE STATIC TWIST (-V2 FWD)

Limit of SA2 Twist (-V2 Forward) View from Camera D
WORST–CASE STATIC TWIST (+V2 FWD)

Limit of SA2 Twist (+V2 Forward) View from Camera D
CUE CARD CONFIGURATION
HPGSCA RESTART

On MCC notification, recycle HPGSCA

1. **HPGSCA PWR OFF**
   - HPGSCA laptop pwr (side) – off
   - Expansion Chassis pwr (rear) – off

2. **VERIFY HPGSCA Y–CABLE AND PWR CABLE CONNECTIONS**
   - PDIP
     - ✓ HST PI NO 1(2) connector secure
   - MO30F
     - ✓ DC UTIL PWR MNC – ON
     - ✓ DC UTIL PWR MNC outlet connector secure
   - HPGSCA
     - ✓ Y–Cable ‘PGSC INPUT’ (DB9), ‘PGSC OUTPUT’ (DB25) and pwr connectors secure

3. **HPGSCA PWR ON**
   - Expansion Chassis pwr (rear) – on
   - HPGSCA laptop pwr (side) – on
   - Allow ‘Windows’/‘Hubble1’ to start

4. **CONFIGURE HPGSCA TO CURRENT HST DATA RATE**
   - ✓ MCC for current data rate (if unknown)
   - Depress hot key (F1–F6) for correct rate

5. **VERIFY STATUS INDICATORS**

   - **Signal Status**
     - ✓ Sync Status Green
     - ✓ Signal Present Green
     - ✓ Overload Green
     - ✓ Offset Green

   - Report status to MCC