Spacehab Operations Checklist

STS-116

Mission Operations Directorate
Operations Division

Final
October 27, 2006

Verify this is the correct version for the pending operation (training, simulation or flight).
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**SMS FDF CHANGE NOTIFICATION**

**BOOK TITLE**
SPACEHAB OPERATIONS

**BK ISSUE (Ed, Rev, PCN)**
FINAL

**DATE INITIATED**
11/2/06

**DATE RECEIVED (PMO)**
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**SIM PACK NUMBER**
Sim-28

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11/3/06

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Sim-28

**Change is for flights (Also give SMS load if load dependent):**
STS-116

**BK ISSUE (Ed, Rev, PCN)**
FINAL

**SMS UNIQUE?**
YES

**DEVELOPMENTAL?**
NO

**INSTRUCTIONS TO USER:**
Remove pages 1-1 thru 1-10 and replace with pages 1-1 thru 1-12

**AUTHORITY FOR CHANGE**: (Approved 482 numbers, approved issue at print shop, supervisors deem mandatory, etc.): Supervisor Deems Mandatory

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**COMMENTS:**
MISSION OPERATIONS DIRECTORATE

SPACEHAB OPERATIONS CHECKLIST
STS-116

FINAL
October 27, 2006

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Incorporates the following:

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**AREAS OF TECHNICAL RESPONSIBILITY**

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# SPACEHAB OPERATIONS CHECKLIST

## STS-116

### LIST OF EFFECTIVE PAGES

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<td>4-3</td>
<td>iii</td>
</tr>
<tr>
<td>4-4</td>
<td>iv</td>
</tr>
<tr>
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<td>v</td>
</tr>
<tr>
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<td>vi</td>
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<td>(Front)</td>
<td>CC 9-3</td>
<td>SH OPS-1a/116/O/E</td>
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<td>(Back)</td>
<td>CC 9-4</td>
<td>SH OPS-1b/116/O/E</td>
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<tr>
<td>HAZARDOUS SPILL RESPONSE – SPACEHAB MODULE</td>
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<td>(Front)</td>
<td>CC 9-5</td>
<td>SH OPS-2a/116/O/D</td>
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<tr>
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<td>CC 9-6</td>
<td>SH OPS-2b/116/O/D</td>
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<tr>
<td>HAZARDOUS SPILL RESPONSE – ORBITER CABIN (WITH SH MODULE HATCH OPEN)</td>
<td></td>
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<tr>
<td>(Front)</td>
<td>CC 9-7</td>
<td>SH OPS-5a/116/O/B</td>
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<td>CC 9-8</td>
<td>SH OPS-5b/116/O/B</td>
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<td>SPACEHAB FIRE ALARMS (ASCENT/ENTRY)</td>
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<td>CC 9-9</td>
<td>SH OPS-4a/116/O/B</td>
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<td>SH OPS-4b/116/O/A</td>
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</tbody>
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## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVATION</td>
<td>1-1</td>
</tr>
<tr>
<td>ON-ORBIT SYSTEM CONFIG</td>
<td>1-2</td>
</tr>
<tr>
<td>TUNNEL CONFIG</td>
<td>1-6</td>
</tr>
<tr>
<td>MODULE CONFIG</td>
<td>1-8</td>
</tr>
<tr>
<td>ARS FAN CLAMP REMOVAL FOR NOISE REDUCTION</td>
<td>1-10</td>
</tr>
<tr>
<td>DOCKING</td>
<td>2-1</td>
</tr>
<tr>
<td>SPACEHAB PREP FOR DOCKING</td>
<td>2-2</td>
</tr>
<tr>
<td>RECONFIG POST DOCKING</td>
<td>2-4</td>
</tr>
<tr>
<td>ON-ORBIT</td>
<td>3-1</td>
</tr>
<tr>
<td>VIEWPORT</td>
<td>3-3</td>
</tr>
<tr>
<td>INNER SAFETY COVER REMOVAL</td>
<td>3-4</td>
</tr>
<tr>
<td>INSTALLATION</td>
<td>3-4</td>
</tr>
<tr>
<td>OUTER COVER OPENING</td>
<td>3-5</td>
</tr>
<tr>
<td>CLOSING</td>
<td>3-6</td>
</tr>
<tr>
<td>HEATER ACTIVATION</td>
<td>3-7</td>
</tr>
<tr>
<td>DEACTIVATION</td>
<td>3-7</td>
</tr>
<tr>
<td>PRE/POST SLEEP CONFIG</td>
<td>3-9</td>
</tr>
<tr>
<td>SPACEHAB PRE-SLEEP CONFIG</td>
<td>3-10</td>
</tr>
<tr>
<td>POST-SLEEP CONFIG</td>
<td>3-10</td>
</tr>
<tr>
<td>WAVEOFF</td>
<td>3-11</td>
</tr>
<tr>
<td>SPACEHAB INGRESS AFTER WAVEOFF</td>
<td>3-12</td>
</tr>
<tr>
<td>CLOSEOUT AFTER WAVEOFF</td>
<td>3-14</td>
</tr>
<tr>
<td>SUBSYSTEM PGSC</td>
<td>3-15</td>
</tr>
<tr>
<td>SUBSYSTEM PGSC ACTIVATION</td>
<td>3-16</td>
</tr>
<tr>
<td>DEACTIVATION</td>
<td>3-18</td>
</tr>
<tr>
<td>RECOVERY</td>
<td>3-19</td>
</tr>
<tr>
<td>PORTABLE LIGHT</td>
<td>3-21</td>
</tr>
<tr>
<td>PORTABLE LIGHT SETUP</td>
<td>3-22</td>
</tr>
<tr>
<td>STOW</td>
<td>3-22</td>
</tr>
<tr>
<td>DC VACUUM</td>
<td>3-23</td>
</tr>
<tr>
<td>DC VACUUM CLEANER SETUP</td>
<td>3-24</td>
</tr>
<tr>
<td>STOW</td>
<td>3-24</td>
</tr>
<tr>
<td>ENTRY PREP</td>
<td>4-1</td>
</tr>
<tr>
<td>ARS FAN CLAMP REPLACEMENT</td>
<td>4-2</td>
</tr>
<tr>
<td>MODULE CLOSEOUT</td>
<td>4-3</td>
</tr>
<tr>
<td>TUNNEL CONFIG</td>
<td>4-4</td>
</tr>
<tr>
<td>ENTRY SYSTEM CONFIG</td>
<td>4-5</td>
</tr>
<tr>
<td>SPACEHAB CONTINGENCY PROCEDURES</td>
<td>5-1</td>
</tr>
<tr>
<td>MN PWR KILL RECOVERY</td>
<td>5-3</td>
</tr>
<tr>
<td>MN PWR KILL RECOVERY – ARS FAN AND PUMP ON ORBITER AC</td>
<td>5-4</td>
</tr>
<tr>
<td>INVERTER AC</td>
<td>5-6</td>
</tr>
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<td>SPACEHAB TOTAL DEACT</td>
<td>5-9</td>
</tr>
<tr>
<td>MODULE CLOSEOUT</td>
<td>5-10</td>
</tr>
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<td>TUNNEL CLOSEOUT</td>
<td>5-11</td>
</tr>
<tr>
<td>SYSTEM CONFIG</td>
<td>5-12</td>
</tr>
<tr>
<td>SPACEHAB 30-MIN DEACTIVATION</td>
<td>5-17</td>
</tr>
<tr>
<td>SPACEHAB 30-MIN DEACTIVATION</td>
<td>5-18</td>
</tr>
<tr>
<td>SPACEHAB POST-FIRE EVALUATION</td>
<td>5-21</td>
</tr>
<tr>
<td>SPACEHAB POST-FIRE EVALUATION</td>
<td>5-22</td>
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<tr>
<td>TRANSFER</td>
<td>6-1</td>
</tr>
<tr>
<td>RACK FRONT STOWAGE TRAY REMOVAL</td>
<td>6-2</td>
</tr>
<tr>
<td>REPLACEMENT</td>
<td>6-3</td>
</tr>
<tr>
<td>SPACEHAB EXPERIMENTS (N/A)</td>
<td>7-1</td>
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<tr>
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<td>8-1</td>
</tr>
<tr>
<td>SUBSYSTEM FIGURES</td>
<td>8-3</td>
</tr>
<tr>
<td>EXCP PLUG-IN PLAN</td>
<td>8-11</td>
</tr>
<tr>
<td>CUE CARD CONFIG</td>
<td>9-1</td>
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# ACTIVATION

<table>
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<td>On-Orbit System Config</td>
<td>1-2</td>
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<tr>
<td>Booster Fan Bypass Setup</td>
<td>1-6</td>
</tr>
<tr>
<td>Tunnel Config</td>
<td>1-9</td>
</tr>
<tr>
<td>Module Config</td>
<td>1-11</td>
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ORBITER FLOW PROP VLVS VERIFICATION

L1
1. √FLOW PROP VLV LOOP 1,2 (two) – ctr (tb-ICH)

PREACTIVATION CHECKOUT

R1
2. √PL PRI MNC – ctr (tb-ON)
3. √AUX – ON
4. √AFT MNB – ON
5. √CAB – MNA

SSP 2
6. Verify SSP 2 config as shown below:

SSP 1
7. √cb SW PWR 2 – op
8. √ORB H2O LINE HTR PWR A – OFF (B ENA)
9. √B – OFF (A ENA)

SMOKE SENSOR A TEST – CONCENTRATION

CRT
10. √FIRE SMOKE CONC A,B (two): -0.1 to 0.5

SSP 2
11. SMOKE SENSOR B – INHB (tb-bp)
NOTE
Expect MASTER ALARM, siren, and FDA
‘215 SH SMOKE A’ msg

12. SMOKE SENSOR – TEST (hold 10 sec, release)
   L1 13. √DETECTION B PAYLOAD lt – PAYLOAD lt on
   SSP 2 14. SENSOR – RESET
   L1 15. √DETECTION B PAYLOAD lt – lt off

SMOKE SENSOR A TEST – RATE

NOTE
Expect MASTER ALARM, siren, and FDA
‘215 SH SMOKE A’ msg

SSP 2 16. SMOKE SENSOR – TEST (hold until alarm ~25 sec)
   L1 17. √DETECTION B PAYLOAD lt – PAYLOAD lt on
   SSP 2 18. SENSOR – RESET
   L1 19. √DETECTION B PAYLOAD lt – lt off
   SSP 2 20. SENSOR B – ENA (tb-gray)

SMOKE SENSOR B TEST – CONCENTRATION

   SM 215 SPACEHAB ECS
   CRT 21. √FIRE SMOKE CONC A,B (two): -0.1 to 0.5
   SSP 2 22. SMOKE SENSOR A – INHB (tb-bp)

NOTE
Expect MASTER ALARM, siren, and FDA
‘215 SH SMOKE B’ msg

23. SMOKE SENSOR – TEST (hold 10 sec, release)
   L1 24. √DETECTION B PAYLOAD lt – PAYLOAD lt on
   SSP 2 25. SENSOR – RESET
   L1 26. √DETECTION B PAYLOAD lt – lt off

SMOKE SENSOR B TEST – RATE

NOTE
Expect MASTER ALARM, siren, and FDA
‘215 SH SMOKE B’ msg

SSP 2 27. SMOKE SENSOR – TEST (hold until alarm ~25 sec)
   L1 28. √DETECTION B PAYLOAD lt – PAYLOAD lt on
   SSP 2 29. SENSOR – RESET
   L1 30. √DETECTION B PAYLOAD lt – lt off
   SSP 2 31. SENSOR A – ENA (tb-gray)

ECS ACTIVATION

   SM 215 SPACEHAB ECS
   CRT 32. √WFCEU MODE THERM, ITEM 1 – (*)
**NOTE**
Expect SM ALERT, ‘215 SH WFCEU MODE’ msg
Expect ↓ next to ITEM 1 on SPEC 215
May take up to 1 min before alarm annunciates

33. WFCEU MODE HX IN – ITEM 2 EXEC (no feedback)
34. √CMD REC – YES (for 5 sec)
35. MTR 1 ON – ITEM 32 EXEC (no feedback)
36. √WFCEU CMD REC – YES (for 5 sec)
37. FANS CABIN ORB – ITEM 66 EXEC (*)

**EPS ACTIVATION**

SSP 2
38. ORB SEC DC BUS – ON (tb-gray)
39. EXP DC BUS – ON (tb-gray)
40. – ctr

**CRT**
41. √DC VOLTS MN C > 24 and < 32
42. √BUS EMER VOLTS > 24 and < 32
43. √AUX A AMPS ≥ 0 and < 7
44. √AFT B AMPS ≥ 0 and < 7
45. √MAIN VOLTS > 24 and < 32
46. √SEC VOLTS > 24 and < 32
47. √EXP VOLTS > 24 and < 32
48. √SS AMPS > 0 and < 98
49. √WFCEU VOLTS > 24 and < 32
50. Configure Spacehab power buses on SPEC 214 per the following table:

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<td>48</td>
</tr>
<tr>
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CAUTION AND WARNING CONFIG

SH PPO2 1
R13U
51. C/W PARAM SEL tw (three) – 065
52. PARAM – ENA
53. PARAM STATUS – INH, hold
54. STATUS lt 065 – off

SH PPCO2 1
55. C/W PARAM SEL tw (three) – 075
56. PARAM – ENA
57. PARAM STATUS – INH, hold
58. STATUS lt 075 – off

SH ARS FAN DP 2
59. C/W PARAM SEL tw (three) – 085
60. PARAM – ENA
61. PARAM STATUS – INH, hold
62. STATUS lt 085 – off

SH CABIN TOTAL PRESSURE
63. C/W PARAM SEL tw (three) – 095
64. PARAM – ENA
65. PARAM STATUS – INH, hold
66. STATUS lt 095 – off
67. PARAM SEL tw (three) – 120

FLIGHT DECK CUE CARD SETUP
68. Remove two cue cards from Ziplock Bag in back of SH OPS:
   HAZARDOUS SPILL RESPONSE - SPACEHAB MODULE deploy
   on flight deck (crew preference)
   HAZARDOUS SPILL RESPONSE - ORBITER CABIN (WITH
   SPACEHAB MODULE HATCH OPEN) deploy on flight deck
   (crew preference)
BOOSTER FAN BYPASS SETUP FOR SPACEHAB

MIDDK
1. Unstow from Middeck Bag “D”:
   Spacehab Booster Fan Bypass duct
   Plastic Ties (green) (six each)
   Cap (3”)
   Velcro Straps (black) (twelve each)

EXT A/L
2. Disconnect Airlock/Tunnel Adapter I/F Duct from Airlock Floor Fitting
   (See Figure 1-1)
3. Install Cap (3”) on Airlock floor fitting

TNL ADP
4. Cut Plastic Tie (green) aft of reducer of Airlock/Tunnel Adapter I/F Duct
   (See Figure 1-2)

Figure 1-1.- Airlock/Tunnel Adapter I/F Duct (view looking aft from Airlock)

Figure 1-2.- Airlock/Tunnel Adapter I/F Duct reducer (view looking aft into
Tunnel Adapter from Airlock)
5. Remove Flex Duct (3”) with reducer (See Figure 1-3) and stow in STBD straps of Tunnel Extension (near Booster Fan)

6. Connect Booster Fan Bypass Duct for Spacehab to Tunnel Adapter Duct (4”) via Male/Male splice. Secure with Plastic Tie (See Figure 1-4 and 1-5)

7. Route Booster Fan Bypass Duct for Spacehab to middeck and secure with Velcro straps

Figure 1-3.- Airlock/Tunnel Adapter I/F Duct reducer removal (view looking aft into Tunnel Adapter from Airlock)

Figure 1-4.- Aft end of Booster Fan Bypass duct for Spacehab (Note: No screen)
Figure 1-5.- Booster Fan Bypass duct for Spacehab connected to Tunnel Adapter ducting (Port fwd view of Tunnel Adapter)
TUNNEL CONFIG

VERIFY MODULE ENVIRONMENT

<table>
<thead>
<tr>
<th>SM 214 SPACEHAB ACT/DEAC</th>
</tr>
</thead>
</table>

CRT
1. DC LIGHTS ON – ITEM 29 EXEC (no feedback)

<table>
<thead>
<tr>
<th>SM 215 SPACEHAB ECS</th>
</tr>
</thead>
</table>

2. √HALON MULTI – NO
3. √SINGLE – NO
4. √HAB P > 13.8 and < 15.4 psi
5. √PPO2 1,2 (two) > 2.7 psi

NOTE
Due to an impedance problem, PPCO2 1 is biased causing it to have a lower value

6. √HAB PPCO2 1 < 5.1 mmHg
7. √2 < 7.6 mmHg

SPACEHAB HATCH OPENING AND DUCT CONFIG

TNL ADP
8. Disconnect tunnel adapter aft flex duct from PL ISOL vlv
9. Remove cap, stow on Velcro pad near valve
10. Reconnect tunnel adapter aft flex duct to PL ISOL vlv

NOTE
Possible FDA ‘S66 CABIN O2(N2) FLO 1(2)’ msg or dP/dT klaxon alarm

SH Hatch
11. Vent Equal vlv caps (two), remove and stow
12. Equal vlv (two) – NORM
13. ∆P ≤ 0.2 psid

TNL ADP
14. PL ISOL vlv – OP
15. Open hatch per decal
16. Swing hatch from seal until locked-open catch engaged

Figure 1-6.- Tunnel config (Activation)
17. Unstow Spacehab flex duct from launch brackets
18. Remove caps (two) from inlet and outlet of flex duct, stow
19. Install Spacehab flex duct between tunnel duct inlet and PL ISOL vlv outlet using 3-in overcenter clamps (two)

**BPSMU CONFIG**

20. Unstow:
   - BPSMU
   - 8-ft BPSMU cable
21. Perform SH BPSMU CONFIG, Cue Card (stowed in back of SH OPS), then:
22. Contact MCC to verify good audio via BPSMU
23. Ingress module
MODULE CONFIG

VALVE CONFIG

Fwd Bkhd
1. CAB DEPRESS lv – cl
2. NPRV cover (two) – cl

OVHD
3. NPRV cover (two) – cl

MCP LAMP TEST

MCP
4. LAMP TEST – ON (hold)
5. C&W/FDA Its (six) – Its on
6. FSS ARMED It – It on
7. FIRE SUPPR DISCH pb – It on
8. MAIN PWR KILL pb – It on
9. CABIN TEMP (°F) – 88
10. LAMP TEST – OFF
11. Above Its – off

ARS KILL SW CONFIG

EXCP2
12. ARS – KILL ENA

SEBS CONFIG

NOTE

SEBS should be deployed such that the Mask bag zipper is partially open for quick access and the Mask hose is not blocked by any straps or bungees

FC11
13. Unstrap 0.5 CTB and temp stow near FC11 (crew preference)

FC06
14. Unstow Tissue Box if desired from Subsystem Stow 3 and deploy (crew preference)
15. Unstow foam and attach to Adapter Plate at FC11
16. Unstow SEBS
17. SEBS gauge needle location consistent with pre-flight marking on Kapton tape

FC11
18. Deploy SEBS and secure with straps
19. Connect SEBS Mask to SEBS

AC11
20. Unstow SEBS from Subsystem Stow 5
21. SEBS gauge needle location consistent with pre-flight marking on Kapton tape
22. Unstow Clamps (four) and Fixed Long Bungees (two) from Ziplock Bag (in foam cutout)

TNL ADP
23. Deploy SEBS in Tunnel Adapter (fwd port) using Clamps (four) and Fixed Long Bungees (two)
24. Connect SEBS Mask to SEBS

SUPPORT EQUIPMENT DEPLOYMENT

AC11
25. Unstow trash bags (two)
26. Unstow seat track studs and temp stow

AC08
27. Unstow Gray Tape from Subsystem Stow 4
28. Deploy trash bags using Velcro and Gray Tape (crew preference)
29. Temp stow Gray Tape for future use (crew preference)
30. Unstow VW Bag and deploy (crew preference), remove clamps from bag and temp stow
CUE CARD SETUP
SH OPS 31. Remove three cue cards from Ziplock Bag in back of SH OPS:
   SPACEHAB FIRE ALARM attach to Velcro (crew preference)
   HAZARDOUS SPILL RESPONSE – SPACEHAB MODULE attach to Velcro (crew preference)
   HAZARDOUS SPILL RESPONSE – ORBITER CABIN (WITH SPACEHAB MODULE HATCH OPEN) attach to Velcro (crew preference)

SPACEHAB SMOKE SENSOR TEST
32. Notify CDR/PLT: “Smoke Sensor Test in progress, expect Master Alarm”

NOTE
Expect FDA ‘215 SH SMOKE A,B’ msg,
MASTER ALARM, Siren (via BPSMU)

MCP 33. SMOKE SENSOR sw – TEST (wait 10 sec)
34. – NORM
35. \textasciitilde MASTER ALARM lt – It on
BPSMU 36. Verify alarm tone via BPSMU
MCP 37. \textasciitilde SMOKE SENSOR A,B ALARM lt (two) – It on
38. SMOKE SENSOR sw – RESET
39. \textasciitilde SMOKE SENSOR A,B ALARM lt (two) – It off
40. \textasciitilde MASTER ALARM lt – It off

PGSC CHECKOUT
41. Perform SUBSYSTEM PGSC ACTIVATION (ON-ORBIT), then:

If Subsystem PGSC to be powered off for power savings:
   Exit Spacehab software:
   42. Press [ALT]/[Q] to exit software
   43. [Shft]/[F10] to confirm
44. Shut down Windows
45. \textasciitilde Automatic pwr off PGSC
46. Close PGSC

Pwr Supply 47. A31P 28VDC Pwr Supply INPUT POWER sw – OFF (OUTPUT POWER lt off)

48. Notify MCC: SPACEHAB ACTIVATION complete
<table>
<thead>
<tr>
<th>DOCKING</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SPACEHAB PREP FOR DOCKING</td>
<td>2-2</td>
</tr>
<tr>
<td>RECONFIG POST DOCKING</td>
<td>2-4</td>
</tr>
</tbody>
</table>
SPACEHAB PREP FOR DOCKING

MODULE CONFIG
If Subsystem PGSC activated:
Exit Spacehab software:

FC06
1. Press [ALT]/[Q] to exit software
2. [Shift]/[F10] to confirm
3. Shut down Windows
4. √Automatic pwr off PGSC
5. Close PGSC

Pwr Supply
6. A31P 28VDC Pwr Supply INPUT POWER sw – OFF (OUTPUT POWER lt off)

EXCP1
7. cb DC3 – OFF

MCP
8. CABIN TEMP SEL tw (two) – 76

OVHD
9. √Viewport Outer Cover closed
10. √Inner Safety Cover installed
11. √HTR – OFF (LED unlit)
12. Temp stow BPSMU on SH side of hatch

SH Hatch
13. Disconnect BPSMU cable QD

TUNNEL CONFIG

NOTE
Debris screen should remain in place once duct is removed

TNL ADP (aft)
14. Disconnect Spacehab flex duct from screen assembly on tunnel duct inlet fitting and PL ISOL vlv outlet
15. Install Spacehab flex duct inlet and outlet caps that were temp stowed

TNL ADP (fwd)
16. Stow Spacehab flex duct in tunnel adapter launch brackets

SH Hatch
17. Close hatch per decal
18. Equal vlv (two) – OFF
19. Install Equal vlv caps (two)

TNL ADP (aft)
20. Disconnect tunnel adapter aft flex duct from PL ISOL vlv

21. Inspect valve/duct seals for lint/debris, clean if necessary
22. Remove PL ISOL vlv cap from Velcro pad located near valve
23. Inspect for debris, clean if necessary and replace inside duct
24. Reconnect tunnel adapter aft flex duct to PL ISOL vlv using 3-in overcenter clamp
25. PL ISOL vlv – CL

26. Relocate SEBS from tunnel adapter to middeck and temp stow

CRT
27. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)
Figure 2-1.- Tunnel config (Prep for Docking)
SPACEHAB RECONFIG POST DOCKING

VERIFY MODULE ENVIRONMENT

**SM 214 SPACEHAB ACT/DEAC**

**CRT**
1. DC LIGHTS ON – ITEM 29 EXEC (no feedback)

**SM 215 SPACEHAB ECS**
2. √HALON MULTI – NO
3. √SINGLE – NO
4. √HAB P > 13.8 and < 15.4 psi
5. √PPO2 1,2 (two) > 2.7 psi

**NOTE**
Due to an impedance problem, PPCO2 1 is biased causing it to have a lower value

6. √HAB PPCO2 1 < 5.1 mmHg
7. √2 < 7.6 mmHg

TUNNEL ADAPTER CONFIG

**Middeck**
8. Relocate SEBS from middeck to tunnel adapter and secure using Clamps (four) and Fixed Long Bungees (two)

**TNL ADP**
9. Disconnect flex duct from PL ISOL vlv
(aft)
10. Remove PL ISOL vlv cap from inside duct
11. Stow cap on Velcro pad near valve
12. Reconnect flex duct to PL ISOL vlv using 3-in overcenter clamp

**NOTE**
Possible FDA ‘S66 CABIN O2(N2) FLO 1(2)’ msg or dP/dT klaxon alarm

**SH Hatch**
13. Vent Equal vlv caps (two), remove and stow
14. Equal vlv (two) – NORM
15. ∆P ≤ 0.2 psid

**TNL ADP**
16. PL ISOL vlv – OP
(aft)

**SH Hatch**
17. Open hatch per decal
18. Swing hatch from seal until locked-open catch engaged

**TNL ADP**
19. Unstow flex duct from launch brackets
(fwd)

**SH Tunnel**
20. Remove caps (two) from inlet and outlet of flex duct, stow

**SH Tunnel**
21. Install flex duct between tunnel duct inlet and PL ISOL vlv outlet using 3-in overcenter clamps (two)
22. Reconnect BPSMU cable QD
23. Retrieve BPSMU from temp stow
24. Contact MCC to verify good audio via BPSMU

SUBSYSTEM PGSC ACTIVATION
If Subsystem PGSC to be activated:

**EXCP1**
25. Go to SUBSYSTEM PGSC ACTIVATION (ON-ORBIT), steps 11-18
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIEWPORT</td>
<td>3-3</td>
</tr>
<tr>
<td>INNER SAFETY COVER REMOVAL</td>
<td>3-4</td>
</tr>
<tr>
<td>INSTALLATION</td>
<td>3-4</td>
</tr>
<tr>
<td>OUTER COVER OPENING</td>
<td>3-5</td>
</tr>
<tr>
<td>CLOSING</td>
<td>3-6</td>
</tr>
<tr>
<td>HEATER ACTIVATION</td>
<td>3-7</td>
</tr>
<tr>
<td>DEACTIVATION</td>
<td>3-7</td>
</tr>
<tr>
<td>PRE/POST SLEEP CONFIG</td>
<td>3-9</td>
</tr>
<tr>
<td>SPACEHAB PRE-SLEEP CONFIG</td>
<td>3-10</td>
</tr>
<tr>
<td>POST-SLEEP CONFIG</td>
<td>3-10</td>
</tr>
<tr>
<td>WAVEOFF</td>
<td>3-11</td>
</tr>
<tr>
<td>SPACEHAB INGRESS AFTER WAVEOFF</td>
<td>3-12</td>
</tr>
<tr>
<td>CLOSEOUT AFTER WAVEOFF</td>
<td>3-14</td>
</tr>
<tr>
<td>SUBSYSTEM PGSC</td>
<td>3-15</td>
</tr>
<tr>
<td>SUBSYSTEM PGSC ACTIVATION</td>
<td>3-16</td>
</tr>
<tr>
<td>DEACTIVATION</td>
<td>3-18</td>
</tr>
<tr>
<td>RECOVERY</td>
<td>3-19</td>
</tr>
<tr>
<td>PORTABLE LIGHT</td>
<td>3-21</td>
</tr>
<tr>
<td>PORTABLE LIGHT SETUP</td>
<td>3-22</td>
</tr>
<tr>
<td>STOW</td>
<td>3-22</td>
</tr>
<tr>
<td>DC VACUUM</td>
<td>3-23</td>
</tr>
<tr>
<td>DC VACUUM CLEANER SETUP</td>
<td>3-24</td>
</tr>
<tr>
<td>STOW</td>
<td>3-24</td>
</tr>
</tbody>
</table>
INNER SAFETY COVER REMOVAL

1. Visually inspect glass for failures

Bottom of VP
2. Unscrew handscrews (three)
3. Remove Safety Cover

WARNING

Do not forcibly remove Inner Safety Cover
Keep Inner Safety Cover installed any time viewport not in use

4. If Inner Safety Cover not easily removable, retighten handscrews and terminate ops
5. Temp stow Inner Safety Cover

INNER SAFETY COVER INSTALLATION

VP HTR
1. √ VP HTR – OFF
CNTL PNL
2. √ VP HTR lt – lt off
3. Retrieve Safety Cover from temp stow

WARNING
Viewport glass, flange, and controls may be hot

Bottom of VP
4. Position Safety Cover to viewport flange and align handscrews with holes on flange
5. Hand tighten handscrews (three)
OUTER COVER OPENING

WARNING
Keep Outer Cover closed at any time viewport not in use
Outer Cover should not be left open more than 35 min with Sun in FOV or more than 2 hr when exposed to deep space

RAISING OUTER COVER
1. Pull handwheel collar down, turn ccw to hard stop, release
2. Rotate handwheel collar ccw until audible clicking (~6 turns)

WARNING
To prevent condensation, htr should be turned on immediately after Outer Cover opened in cold flight attitude

ROTATING OUTER COVER
3. Twist handle cw about handle axis until hard stop (~135°) and hold while rotating ccw about main shaft axis until hard stop (~180°)

WARNING
Htr should not be powered on more than 20 min with Sun in FOV

VIEWPORT HEATER
If in cold attitude (√Execute Package for htr ON times):
4. VP HTR – ON
5. √VP HTR It – It on

Figure 3-1.- Viewport opening
OUTER COVER CLOSING

WARNING
Viewport glass, flange, and controls may be hot
Htr must be deactivated before closing Outer Cover

VIEWPORT HEATER
1. √VP HTR – OFF
2. √VP HTR It – It off

ROTATING OUTER COVER
Next to VP
3. Twist handle cw about handle axis until hard stop (~135°) and hold while rotating cw about main shaft axis until hard stop (~180°)

LOWERING OUTER COVER
4. Rotate handwheel collar cw until audible clicking (~6 turns)
5. Pull handwheel collar down, turn cw until pin aligned with LOCK CENTRAL arrow, release
6. Verify handwheel lockpin engaged by wiggling handwheel collar

Figure 3-2.- Viewport closing
HEATER ACTIVATION

WARNING
Viewport heater must not be switched on in hot attitude or before Outer Cover opened

1. √Outer Cover open (visual)

<table>
<thead>
<tr>
<th>VP HTR</th>
<th>VP HTR – ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNTL PNL</td>
<td></td>
</tr>
</tbody>
</table>

3. √VP HTR lt – lt on

HEATER DEACTIVATION

WARNING
Heater should not be deactivated in cold flight attitude with open Outer Cover

<table>
<thead>
<tr>
<th>VP HTR</th>
<th>VP HTR – OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNTL PNL</td>
<td></td>
</tr>
</tbody>
</table>

2. √VP HTR lt – lt off
PRE/POST SLEEP CONFIG
SPACEHAB PRE-SLEEP CONFIG

If Subsystem PGSC activated:
Exit Spacehab software:
FC06
1. Press [ALT]/[Q] to exit software
2. [Shft]/[F10] to confirm
3. Shut down Windows
4. \(√\) Automatic pwr off PGSC
5. Close PGSC

Pwr Supply
6. A31P 28VDC Pwr Supply INPUT POWER sw – OFF (OUTPUT
   POWER lt off)

EXCP1
7. cb DC3 – OFF

If Outer Viewport Cover open:
8. Perform OUTER COVER CLOSING (ON-ORBIT), then:

   CRT
   9. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)
      or
   MCP
      LIGHTS – OFF

SPACEHAB POST-SLEEP CONFIG

CRT
1. DC LIGHTS ON – ITEM 29 EXEC (no feedback)
   or
MCP
   LIGHTS – ON

Ovhd
2. \(√\) Emergency Light Dimmer – MAX

If Subsystem PGSC to be activated:
EXCP1
3. cb DC3 – ON
Pwr Suply
4. A31P 28VDC Pwr Supply INPUT PWR sw – ON (OUTPUT
   POWER lt on)

FC06
5. PGSC pwr – on
6. \(√\) Windows displayed
7. Double-click SHUTTLE APPS folder on desktop
8. SPACEHAB folder
9. SPACEHAB MONITOR icon

   PGSC: SPACEHAB SUMMARY
10. \(√\) Spacehab tlm is present on display
11. \(√\) GMT displayed is correct

If GMT update desired:
12. Press [ALT]/[G]
13. [2] to set GMT
14. Update GMT time
15. Press [Shft]/[F10] to confirm
16. [Shft]/[F1] to return to display
SPACEHAB INGRESS AFTER WAVEOFF

1. √AIRLOCK SETUP FOR INGRESS [21] (DEORBIT PREP, DEORBIT PREP BACKOUT) performed

VERIFY MODULE ENVIRONMENT

<table>
<thead>
<tr>
<th>SM 214 SPACEHAB ACT/DEAC</th>
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<tbody>
<tr>
<td>SM 215 SPACEHAB ECS</td>
</tr>
</tbody>
</table>

CRT

2. DC LIGHTS ON – ITEM 29 EXEC (no feedback)

3. √HALON MULTI – NO

4. √SINGLE – NO

5. √HAB P > 13.8 and < 15.4 psi

6. √PPO2 1,2 (two) > 2.7 and < 3.6 psi

NOTE
Due to an impedance problem, PPCO2 1 is biased causing it to have a lower value

7. √HAB PPCO2 1 < 5.1 mmHg

8. √2 < 7.6 mmHg

SPACEHAB HATCH OPENING AND DUCT CONFIG

<table>
<thead>
<tr>
<th>TNL ADP (aft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TNL ADP (aft)</td>
</tr>
<tr>
<td>SH Hatch</td>
</tr>
</tbody>
</table>

9. Disconnect tunnel adapter aft flex duct from PL ISOL vlv

10. Remove cap, stow on Velcro pad near valve

11. Reconnect flex duct to PL ISOL vlv

NOTE
Possible FDA ‘S66 CABIN O2(N2) FLO 1(2)’ msg or dP/dT klaxon alarm

SH Hatch

12. Vent Equal vlv caps (two), remove and stow

13. Equal vlv (two) – NORM

14. ∆P ≤ 0.2 psid

TNL ADP (aft)

15. PL ISOL vlv – OP

16. Open hatch per decal

17. Swing hatch from seal until locked-open catch engaged

TNL ADP (fwd)

18. Unstow flex duct from launch brackets

SH Tunnel

19. Remove caps (two) from inlet and outlet of flex duct, stow

20. Install flex duct between tunnel duct inlet and PL ISOL vlv outlet using 3-in overcenter clamps (two)

MA16L

21. Unstow:

BPSMU

8-ft BPSMU cable

22. Perform SH BPSMU CONFIG (PHOTO/TV, BPSMU), then:
SEBS CONFIG

FC11 23. Unstrap 0.5 CTB and temp stow near FC11 (crew preference)

AC05 24. Unstow Foam, attach to Adapter Plate at FC11

25. Unstow SEBS from Subsystem Stow 3 and connect SEBS Mask to SEBS

26. SEBS gauge – FULL

FC11 27. Deploy SEBS and secure with straps

AC11 28. Unstow SEBS from Subsystem Stow 5 and connect SEBS Mask to SEBS

29. SEBS gauge – FULL

30. Unstow Clamps (four) and Fixed Long Bungees (two) from Ziplock Bag (in foam cutout)

TNL ADP 31. Deploy SEBS in Tunnel Adapter (fwd port) using Clamps (four) and Fixed Long Bungees (two)

CUE CARD SETUP

32. Remove three cue cards from Ziplock Bag in back of SH OPS:
   SPACEHAB FIRE ALARM attach to Velcro (crew preference)
   HAZARDOUS SPILL RESPONSE - SPACEHAB MODULE attach to Velcro (crew preference)
   HAZARDOUS SPILL RESPONSE - ORBITER CABIN (WITH SPACEHAB MODULE HATCH OPEN) attach to Velcro (crew preference)
SPACEHAB CLOSEOUT AFTER WAVEOFF

SECURE MODULE

TNL ADP
1. Retrieve SEBS, Clamps (four), and Fixed Long Bungees (two) from Tunnel Adapter

AC11
2. Disconnect SEBS Mask from SEBS and stow SEBS in Subsystem Stow 5
3. Stow Clamps (four), and Fixed Long Bungees (two) in Ziplock Bag (in foam cutout)

FC11
4. Unstrap SEBS

AC05
5. Disconnect SEBS Mask from SEBS, stow SEBS in Subsystem Stow 3
6. Stow foam from FC11
7. Module debris screen locations (four) for loose items/equipment

AC11
8. Stow any remaining loose equipment in Subsystem Stow 5

MCP
9. CABIN TEMP SEL tw (two) – 74

Ovhd
10. EXP VENT vlv – CL
11. Viewport Outer Cover closed
12. Inner Safety Cover installed
13. HTR – OFF (LED unlit)

CUE CARD STOW
14. Remove cue cards (three) from crew preference location

SH OPS
15. Stow cue cards in Ziplock Bag in back of SH OPS

BPSMU TEARDOWN
16. Disconnect BPSMU cable QD

MA16L
17. Stow:
   BPSMU
   8-ft BPSMU cable

TUNNEL CONFIG

NOTE
Debris screen should remain in place once duct is removed

TNL ADP (aft)
18. Disconnect flex duct from screen assembly on tunnel duct inlet fitting and PL ISOL vlv outlet
19. Install flex duct inlet and outlet caps

TNL ADP (fwd)
20. Stow flex duct in tunnel adapter launch brackets

SH Hatch
21. Close hatch per decal
22. Equal vlv (two) – OFF
23. Install Equal vlv caps (two)

TNL ADP (aft)
24. Disconnect flex duct from PL ISOL vlv
25. Inspect valve/duct seals for lint/debris, clean if necessary
26. Remove PL ISOL vlv cap from Velcro pad located near valve
27. Inspect vlv cap for debris, clean if necessary and replace inside duct
28. Reconnect flex duct to PL ISOL vlv using 3-in overcenter clamp
29. PL ISOL vlv – CL

SYSTEM CONFIG

SM 214 SPACEHAB ACT/DEAC

CRT
30. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)
SUBSYSTEM PGSC
SUBSYSTEM PGSC ACTIVATION

AC02

1. Unstow from Subsystem Stow 1:
   Subsystem PGSC (SEG33115360-303)
   PGSC Table (if desired) (9062897-501)
   A31P 28VDC Pwr Supply (SEG33116428-301)
   Enhanced A31p 16VDC Pwr Cable (SEG33116459-301)
   RS-422 Adapter (SEZ39121212-301)
   RS-422 PCMCIA Card/Cable (Quatech) (SDZ39129284-301)

CONNECT POWER CABLES

EXCP1

2. √ cb DC3 - OFF

Pwr Sply

3. √A31P 28VDC Pwr Supply INPUT PWR sw – OFF (OUTPUT PWR lt off)

FC06

4. Connect A31P 28VDC Pwr Supply J1 to pre-routed DC Pwr Cable P1
   (SED39122875-301)

5. Connect Enhanced A31p 16VDC Pwr Cable P2 to A31P 28VDC Pwr
   Supply J2

PGSC

6. Connect Enhanced A31p 16VDC Pwr Cable P1 to PGSC power port

CONNECT DATA CABLES

FC06

7. Connect RS-422 Adapter J2 to pre-routed RS-422 Data Cable P1
   (SED39126965-301)

8. Connect RS-422 PCMCIA Card/Cable CHANNEL A to RS-422
   Adapter J1

PGSC

9. Insert RS-422 PCMCIA Card into PCMCIA slot on PGSC
   (either slot is OK)

POWER UP PGSC

If PGSC Desk desired:

10. Deploy PGSC table and attach PGSC (crew preference)

EXCP1

11. cb DC3 – ON

Pwr Suply

12. A31P 28VDC Pwr Supply INPUT PWR sw – ON
   (OUTPUT PWR lt – lt on)

PGSC

13. PGSC Pwr – on

Figure 3-3.- Subsystem PGSC Cable Routing
START SPACEHAB MONITOR SOFTWARE
14. ✓Windows displayed
15. Double-click: SHUTTLE APPS folder on desktop
16. SPACEHAB folder
17. SPACEHAB MONITOR icon
18. ✓Spacehab tlm is present on display
19. Press [ALT]/[G]
20. [1] to set launch time
21. Input launch GMT - Contact MCC if time not readily available
22. Press [Shft]/[F10] to confirm
23. [2] to set GMT
24. ✓GMT displayed is correct, change if necessary
25. Press [Shft]/[F10] to confirm
26. [Shft]/[F1] to return to display
SUBSYSTEM PGSC DEACTIVATION

POWER DOWN PGSC

PGSC
Exit Spacehab software:
1. Press [ALT]/[Q] to exit software
2. Press [Shft]/[F10] to confirm
3. Shut down Windows
4. √Automatic pwr off of PGSC
5. Close PGSC

Pwr Supply
6. A31P 28VDC Pwr Supply INPUT PWR sw – OFF (OUTPUT PWR lt off)

EXCP1
7. cb DC3 – OFF

DISCONNECT PWR CABLES

FC06
8. Disconnect Enhanced A31p 16VDC Pwr Cable P1 from PGSC pwr port
9. Disconnect Enhanced A31p 16VDC Pwr Cable P2 from A31P 28VDC Pwr Supply J2
10. Disconnect A31P 28VDC Pwr Supply J1 from pre-routed DC Pwr Cable P1

AC02
11. Stow A31P 28VDC Pwr Supply and Enhanced A31p 16VDC Pwr Cable

FC06
12. Coil and stow pre-routed DC Pwr Cable

DISCONNECT DATA CABLES

AC02
13. Eject RS-422 PCMCIA Card from PCMCIA slot on PGSC
14. Disconnect RS-422 PCMCIA Card/Cable CHANNEL A from RS-422 Adapter J1
15. Disconnect RS-422 Adapter J2 from pre-routed RS-422 Data Cable P1

FC06
16. Stow RS-422 Adapter and RS-422 PCMCIA Card/Cable
17. Coil and stow pre-routed RS-422 Data Cable

If deployed:

AC02
18. Stow PGSC table
19. Stow PGSC
SUBSYSTEM PGSC RECOVERY

EXCP 1  1. cb DC3 – ON
Pwr Supply  2. A31P 28VDC Pwr Supply INPUT PWR sw – ON
            (OUTPUT PWR lt – lt on)
PGSC  3. PGSC pwr – on
       4. Windows displayed
       5. Double-click SHUTTLE APPS folder on desktop
       6. SPACEHAB folder
       7. SPACEHAB MONITOR icon
           [PGSC: SPACEHAB SUMMARY]
       8. Spacehab tlm is present on display
       9. GMT displayed is correct
       If GMT update desired:
           10. Press [ALT]/[G]
           11. [2] to set GMT
           12. Update GMT time
           13. Press [Shift]/[F10] to confirm
           14. [Shift]/[F1] to return to display
PORTABLE LIGHT
PORTABLE LIGHT SETUP

FC06  1. Unstow portable fluorescent light from Subsystem Stow 2
EXCP1  2. \(\checkmark\) cb AC1 – OFF
        3. Connect light cable to EXCP1 connector J94
        4. Route/secure cable and light as desired
        5. cb AC1 – ON
        6. Portable fluorescent light sw – ON

PORTABLE LIGHT STOW

EXCP1  1. Portable fluorescent light sw – OFF
FC06   2. cb AC1 – OFF
        3. Demate light cable from EXCP1 connector J94
        4. Stow portable fluorescent light in Subsystem Stow 2
DC VACUUM CLEANER SETUP

MF71C 1. Unstow, assemble Vacuum Cleaner, suction hose, crevice tool, and DC pwr cable

AC05 2. Unstow DC Vacuum Cleaner Y-Cable 9063176-521
3. Mate Y-Cable connector J1 to DC Vacuum pwr cable connector P1

VAC 4. √Vacuum Cleaner pwr – off
5. √Vacuum Cleaner in low pwr mode

EXCP1 6. √cb DC 1 – OFF
7. √DC 2 – OFF
8. Mate Y-Cable connector P96 to EXCP1 connector J96
9. Mate Y-Cable connector P100 to EXCP1 connector J100
10. cb DC 1 – ON
11. DC 2 – ON

VAC 12. Vacuum Cleaner pwr – on

DC VACUUM CLEANER STOW

VAC 1. Vacuum Cleaner pwr – off

EXCP1 2. cb DC 1 – OFF
3. DC 2 – OFF
4. Demate Y-Cable connectors P96, P100 from EXCP1 connectors J96, J100
5. Demate Y-Cable connector J1 from DC Vacuum pwr cable connector P1

MF71C 6. Stow Vacuum Cleaner, suction hose, crevice tool, and DC pwr cable

AC05 7. Stow DC Vacuum Cleaner Y-Cable 9063176-521
ENTRY PREP

ARS FAN CLAMP REPLACEMENT ................................................................. 4-2
MODULE CLOSEOUT .................................................................................. 4-3
TUNNEL CONFIG ...................................................................................... 4-4
ENTRY SYSTEM CONFIG .......................................................................... 4-5
ARS FAN CLAMP REPLACEMENT

TOOLS REQD: SPACEHAB
AC08
1/4-in Torque Wrench
7/16-in 6-point Deepwell Socket
1/4-in Driver Handle

AC11
D05
1. Remove Clamps from Subsystem Stow 5
2. Remove pip pins, open floor panel
3. Install Fan Clamps (two) around fan and mounting bracket
4. Torque nuts on Fan Clamps (two) to 30 in-lb (1/4-in Driver Handle, 1/4-in Torque Wrench, 7/16-in 6-point Deepwell Socket)
5. Close floor panel, replace pip pins
AC08
6. Stow tools

Figure 4-1.- Fan/HX assy (top view)
MODULE CLOSEOUT

SS PGSC DEACT
If SS PGSC deployed:
1. Perform SUBSYSTEM PGSC DEACTIVATION (ON-ORBIT), then:

PORTABLE LIGHT DEACT
If portable light deployed:
2. Portable fluorescent light sw – OFF
3. cb AC1 – OFF
4. Demate light cable from EXCP1 connector J94

EXCP1
5. Stow portable fluorescent light in Subsystem Stow 2

FC06

SECURE MODULE

TNL ADP
6. Retrieve SEBS, Clamps (four), and Fixed Long Bungees (two) from Tunnel Adapter

AC11
7. Disconnect SEBS Mask from SEBS and stow SEBS in Subsystem Stow 5
8. Stow Clamps (four), and Fixed Long Bungees (two) in Ziplock Bag (in foam cutout)
9. Remove Trash Liners from deployed Trash Bags, tape Liners shut, stow Liners in middeck wet or dry trash bags
10. Remove Trash Bags from deployed location, fold, and stow in Subsystem Stow 5

FC11
11. Unstrap SEBS

AC05
12. Disconnect SEBS Mask from SEBS, stow SEBS in Subsystem Stow 3
13. Stow Tissue Box (if used) and foam (from FC11)

AC08
14. Stow Gray Tape in Subsystem Stow 4
15. Stow VW Bag

FC11
16. Place temp stowed CTB into former SEBS location
17. Module debris screen locations (four) for loose items/equipment

AC11
18. Stow any remaining loose equipment in Subsystem Stow 5

MCP
19. CABINET TEMP SEL tw (two) – 74

Ovhd
20. \EXP VENT vlv – CL
21.\Viewport Outer Cover closed
22. \Inner Safety Cover installed
23. \HTR – OFF (LED unlit)

CUE CARD STOW
24. Remove cue cards (three) from crew preference location

SH OPS
25. Stow cue cards in Ziplock Bag in back of SH OPS

BPSMU TEARDOWN

SH Hatch
26. Disconnect BPSMU Cable QD

MA16L
27. Stow:
   BPSMU
   8-ft BPSMU Cable
Debris screen should remain in place once duct is removed

1. Disconnect Spacehab flex duct from screen assembly on tunnel duct inlet fitting and PL ISOL vlv outlet
2. Install Spacehab flex duct inlet and outlet caps

3. Stow Spacehab flex duct in tunnel adapter launch brackets

4. Close hatch per decal
5. Equal vlv (two) – OFF
6. Install Equal vlv caps (two)

7. Disconnect tunnel adapter aft flex duct from PL ISOL vlv, inspect valve/duct seals for lint/debris, clean if necessary
8. Remove PL ISOL vlv cap from Velcro pad located near valve
9. Inspect for debris, clean if necessary and replace inside duct
10. Reconnect tunnel adapter aft flex duct to PL ISOL vlv
11. PL ISOL vlv – CL

Figure 4-2.- Tunnel config (Entry Prep)
ENTRY SYSTEM CONFIG

INVERTER ACT

[SM 214 SPACEHAB ACT/DEAC]

CRT
1. DC INVERTER ON – ITEM 1 EXEC (*)

2. √BUS INV ΦA,ΦB,ΦC VOLTS (three) > 105.4 and < 124.6

ECS CONFIG

NOTE
Expect MASTER ALARM, msgs:
‘214 SH ARS FAN DP 1’
‘214 SH ARS FAN DP 2’

3. FANS ARS OFF – ITEM 61 EXEC (*)
4. INV – ITEM 63 EXEC (*)
5. ON – ITEM 67 EXEC (*)
6. ∆P 1,2 (two) > 0.2 and < 5.5

NOTE
Possible ALERT, msgs:
‘214 SH H2O FL ARS’
‘214 SH H2O FL CAB’

7. H2O PUMP 1/2 OFF – ITEM 71 EXEC (*)
8. 2 INV – ITEM 72 EXEC (*)
9. 1 ON/2 OFF – ITEM 74 EXEC (*)
10. √IN P > 30 and < 80
11. √OUT P > 40 and < 105
12. √HX H2O FLOW ARS > 75
   √CABIN > 250
13. √BUS INV ΦA,ΦB,ΦC AMPs (three) > 0 and < 2.9
14. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)
NOTE

Item 27 will remain on because relay tied to SS BUS tb on SSP2

15. Configure Spacehab power buses on SPEC 214 per the following table:

<table>
<thead>
<tr>
<th>DC</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>INVERTER 1</td>
<td></td>
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</tr>
<tr>
<td>EXP BUS 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXCP 1/2 5</td>
<td></td>
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<tr>
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<tr>
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<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM FN/LT 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RACK 1 17</td>
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<td></td>
</tr>
<tr>
<td>2</td>
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<td></td>
</tr>
<tr>
<td>UTIL AFT 21</td>
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</tr>
<tr>
<td>FWD 23</td>
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<tr>
<td>SPARE 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTB/CCTV 27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIGHTS 29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| AC            |    |     |
| UTIL 41      |    |     |
| RACK 1 43    |    |     |
|              2 |    |     |
| SPARE 1 47   |    |     |
|              2 |    |     |

MA73C:E 16. cb AC3 PL 3Φ – op
17. Verify SSP 2 config as shown below:

SSP 1
18. √cb SW PWR 2 – op
19. √ORB H2O LINE HTR PWR A – OFF (B ENA)
20. B – OFF (A ENA)

CAUTION AND WARNING CONFIG
SH CABIN FAN DP 2
If SH Cabin Fan was ON:

R13U
21. C/W PARAM SEL tw (three) – 055
22. PARAM – INH
23. PARAM STATUS – INH, hold
24. √STATUS lt 055 – on

SH PPO2 1
25. C/W PARAM SEL tw (three) – 065
26. PARAM – INH
27. PARAM STATUS – INH, hold
28. √STATUS lt 065 – on
SH PPCO2 1
29. C/W PARAM SEL tw (three) – 075
30. PARAM – INH
31. PARAM STATUS – INH, hold
32. √STATUS lt 075 – on

SH CABIN TOTAL PRESS
33. C/W PARAM SEL tw (three) – 095
34. PARAM – INH
35. PARAM STATUS – INH, hold
36. √STATUS lt 095 – on
37. PARAM SEL tw (three) – 120
38. Notify MCC:
   SPACEHAB ENTRY PREP complete
<table>
<thead>
<tr>
<th>SPACEHAB CONTINGENCY PROCEDURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MN PWR KILL RECOVERY</td>
</tr>
<tr>
<td>MN PWR KILL RECOVERY – ARS FAN AND PUMP ON ORBITER AC</td>
</tr>
<tr>
<td>MN PWR KILL RECOVERY – ARS FAN AND PUMP ON INVERTER AC</td>
</tr>
<tr>
<td>SPACEHAB TOTAL DEACT</td>
</tr>
<tr>
<td>MODULE CLOSEOUT</td>
</tr>
<tr>
<td>TUNNEL CLOSEOUT</td>
</tr>
<tr>
<td>SYSTEM CONFIG</td>
</tr>
<tr>
<td>SPACEHAB 30-MIN DEACTIVATION</td>
</tr>
<tr>
<td>SPACEHAB 30-MIN DEACTIVATION</td>
</tr>
<tr>
<td>SPACEHAB POST-FIRE EVALUATION</td>
</tr>
<tr>
<td>SPACEHAB POST-FIRE EVALUATION</td>
</tr>
</tbody>
</table>
MN PWR KILL RECOVERY
MN PWR KILL RECOVERY – ARS FAN AND PUMP ON ORBITER AC

SYSTEM SAFING

Pwr Supply 1. A31P 28VDC Pwr Supply INPUT PWR sw – OFF (OUTPUT PWR lt off)
EXCP 1 2. cb DC 3 – OFF

CRT 3. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)

PREADIVATION CHECKOUT

R1 4. √PL PRI MNC – ctr (tb-ON)
5. √AUX – ON
6. √AFT MNB – ON
7. √CAB – MNA

EPS RECOVERY

SSP 2 8. √MN PWR – NO-OP
9. √INVERTER – NO-OP
10. ORB SEC DC BUS – OFF
11. – ON (tb-gray)
12. EXP DC BUS – ON (tb-gray)
13. – ctr
14. SS DC BUS – ON (tb-gray)

CRT 15. √BUS EMER VOLTS > 24 and < 32
16. √AUX A AMPS ≥ 0 and < 7
17. √AFT B AMPS ≥ 0 and < 7
18. √MAIN VOLTS > 24 and < 32
19. √SEC VOLTS > 24 and < 32
20. √EXP VOLTS > 24 and < 32

ECS RECOVERY

21. √FANS ARS ON, ITEM 67 – (*)
22. √ORB, ITEM 65 – (*)
23. √ΔP 1,2 (two) > 0.2 and < 5.5
24. √H2O PUMP 2 ORB, ITEM 73 – (*)
25. √2 ON/1 OFF, ITEM 75 – (*)
26. √IN P > 30 and < 80
27. √OUT P > 40 and < 105
28. √HX H2O FLOW ARS > 75
29. √CABIN > 250
30. √BUS WFCEU VOLTS > 24 and < 32

31. √WFCEU MODE THERM, ITEM 1 – (*)
NOTE
Expect SM ALERT, ‘215 SH WFCEU MODE’ msg
Expect ↓ next to ITEM 1 on SPEC 215
May take up to 1 min before alarm annunciates

32. WFCEU MODE HX IN – ITEM 2 EXEC (no feedback)
33. √CMD REC – YES (for 5 sec)
34. MTR 1 ON – ITEM 32 EXEC (no feedback)
35. √WFCEU CMD REC – YES (for 5 sec)

EPS CONFIG

SM 214 SPACEHAB ACT/DEAC
36. DC LIGHTS ON – ITEM 29 EXEC (no feedback)

If SS PGSC to be repowered:
37. Go to SUBSYSTEM PGSC RECOVERY (ON-ORBIT)

If portable light to be used:
38. cb AC1 – ON
39. Portable fluorescent light sw – ON
MN PWR KILL RECOVERY – ARS FAN AND PUMP ON INVERTER AC

H2O LN HTR ACT
C3 1. √H2O LN HTRS – ON
SSP 1 2. √cb SW PWR 2 – cl
3. √ORB H2O LINE HTR PWR A – ON
4. √B – OFF (A ENA)

SYSTEM SAFING
Pwr Supply 5. A31P 28VDC Pwr Supply INPUT PWR sw – OFF (OUTPUT PWR lt off)
EXCP 1 6. cb DC 3 – OFF

CRT 7. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)

PREACTIVATION CHECKOUT
R1 8. √PL PRI MNC – ctr (tb-ON)
9. √AUX – ON
10. √AFT MNB – ON
11. √CAB – MNA

EPS RECOVERY
SSP 2 12. √MN PWR – NO-OP
13. √INVERTER – NO-OP
14. ORB SEC DC BUS – OFF
15. - ON (tb-gray)
16. EXP DC BUS – ON (tb-gray)
17. - ctr
18. SS DC BUS – ON (tb-gray)

CRT 19. √BUS EMER VOLTS > 24 and < 32
20. √AUX A AMPS ≥ 0 and < 7
21. √AFT B AMPS ≥ 0 and < 7
22. √MAIN VOLTS > 24 and < 32
23. √SEC VOLTS > 24 and < 32
24. √EXP VOLTS > 24 and < 32

ECS RECOVERY
25. FANS ARS OFF – ITEM 61 EXEC (*)
26. √INV, ITEM 63 – (*)
27. √H2O PUMP 2 INV, ITEM 72 – (*)
28. 1/2 OFF – ITEM 71 EXEC (*)
29. √BUS WFCEU VOLTS > 24 and < 32
30. √WFCEU MODE THERM, ITEM 1 – (*)

NOTE
Expect SM ALERT, ‘215 SH WFCEU MODE’ msg.
Expect ↓ next to ITEM 1 on SPEC 215
May take up to 1 min before alarm annunciates

31. WFCEU MODE HX IN – ITEM 2 EXEC (no feedback)
32. √CMD REC – YES (for 5 sec)
33. MTR 1 ON – ITEM 32 EXEC (no feedback)
34. √WFCEU CMD REC – YES (for 5 sec)
EPS CONFIG

SM 214 SPACEHAB ACT/DEAC

35. DC INVERTER ON – ITEM 1 EXEC (*)

36. \( \sqrt{\text{BUS INV} \Phi A, \Phi B, \Phi C \text{ VOLTS (three)} > 105.4 \text{ and } < 124.6} \)

37. DC LIGHTS ON – ITEM 29 EXEC (no feedback)

38. FANS ARS ON – ITEM 67 EXEC (*)

39. \( \sqrt{\Delta P 1,2 \text{ (two)} > 0.2 \text{ and } < 5.5} \)

40. H2O PUMP 2 ON/1 OFF – ITEM 75 EXEC (*)

41. \( \sqrt{\text{IN P} > 30 \text{ and } < 80} \)

42. \( \sqrt{\text{OUT P} > 40 \text{ and } < 105} \)

43. \( \sqrt{\text{HX H2O FLOW ARS} > 75} \)

44. \( \sqrt{\text{CABIN} > 250} \)

H2O LN HTR CONFIG

NOTE

Expect SM ALERT, msgs:

‘215 SH H2O HTR HAB’
‘215 SH H2O HTR ORB’

C3

45. H2O LN HTRS – OFF

SSP 1

46. ORB H2O LINE HTR PWR A – OFF(B ENA)

47. \( \sqrt{B \text{ – OFF(A ENA)}} \)

48. cb SW PWR 2 – op

If SS PGSC to be recovered:

49. Go to SUBSYSTEM PGSC RECOVERY (ON-ORBIT)

If portable light to be used:

EXCP1

50. cb AC1 – ON

51. Portable fluorescent light sw – ON
SPACEHAB TOTAL DEACT
(Powers down module except for emergency (AFT B, AUX A, CAB PL) pwr)
FAN CLAMP REPLACEMENT
1. Perform ARS FAN CLAMP REPLACEMENT (ENTRY PREP), then:

SS PGSC DEACT
If SS PGSC deployed:
2. Perform SUBSYSTEM PGSC DEACTIVATION (ON-ORBIT), then:

PORTABLE LIGHT DEACT
If portable light deployed:
3. Portable fluorescent light sw – OFF
4. cb AC1 – OFF
5. Demate light cable from EXCP1 connector J94
6. Stow portable fluorescent light in Subsystem Stow 2

SECURE MODULE
TNL ADP
7. Retrieve SEBS, Clamps (four), and Fixed Long Bungees (two) from Tunnel Adapter
AC11
8. Disconnect SEBS Mask from SEBS and stow SEBS in Subsystem Stow 5
9. Stow Clamps (four), and Fixed Long Bungees (two) in Ziplock Bag (in foam cutout)
10. Remove Trash Liners from deployed Trash Bags, tape Liners shut, stow Liners in middeck wet or dry trash bags
11. Remove Trash Bags from deployed location, fold, and stow
FC11
12. Unstrap SEBS
AC05
13. Disconnect SEBS Mask from SEBS, stow SEBS in Subsystem Stow 3
14. Stow Tissue Box (if used) and foam (from FC11)
AC08
15. Stow Gray Tape in Subsystem Stow 4
16. Stow VW Bag
FC11
17. Place temp stowed CTB into former SEBS location
18. Module debris screen locations (four) for loose items/equipment
AC11
19. Stow any remaining loose equipment in Subsystem Stow 5
Ovhd
20. EXP VENT vlv – CL
21. Viewport Outer Cover closed
22. Inner Safety Cover installed
23. HTR – OFF (lt off)

CUE CARD STOW
24. Remove cue cards (three) from crew preference location
SH OPS
25. Stow cue cards in Ziplock Bag in back of SH OPS

STOW BPSMU
SH Hatch
26. Disconnect BPSMU cable QD
MA16L
27. Stow:

BPSMU
8-ft BPSMU cable
TUNNEL CLOSEOUT

NOTE
Debris screen should remain in place once duct is removed

SH Tunnel
1. Disconnect Spacehab flex duct from screen assembly on tunnel duct inlet fitting and PL ISOL vlv outlet
2. Install Spacehab flex duct inlet and outlet caps

TNL ADP (fwd)
3. Stow Spacehab flex duct in tunnel adapter launch brackets

SH Hatch
4. Close hatch per decal
5. Equal vlv (two) – OFF
6. Install Equal vlv caps (two)

TNL ADP (aft)
7. Disconnect tunnel adapter aft flex duct from PL ISOL vlv, inspect valve/duct seals for lint/debris, clean if necessary
8. Remove PL ISOL vlv cap from Velcro pad located near valve
9. Inspect for debris, clean if necessary, and replace inside duct
10. Reconnect tunnel adapter aft flex duct to PL ISOL vlv
11. PL ISOL vlv – CL

Figure 5-1.- Tunnel Config (Total Deact)
SYSTEM CONFIG

**H2O LINE HEATERS CONFIG**

C3  1. H2O LN HTRS – ON
SSP 1  2. cb SW PWR 2 – cl

3. ORB H2O LINE HTR PWR A – ON
   \[\sqrt{B} \text{ – OFF(A ENA)}\]

   [SM 215 SPACEHAB ECS]

CRT  5. \[\sqrt{H2O LN HTR HAB STATUS} – 1\]
   6. \[\sqrt{ORB AMPS > 1}\]

**ECS CONFIG**

NOTE
Expect SM ALERT, msgs:
‘214 SH H2O FL ARS’
‘214 SH H2O FL CAB’

   [SM 214 SPACEHAB ACT/DEAC]

7. H2O PUMP 1/2 OFF – ITEM 71 EXEC (*)
8. 2 INV – ITEM 72 EXEC (*)

NOTE
Expect MASTER ALARM, msgs:
‘214 SH ARS FAN DP 1’
‘214 SH ARS FAN DP 2’

9. FANS ARS OFF – ITEM 61 EXEC (*)
10. INV – ITEM 63 EXEC (*)
11. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)
12. Configure Spacehab power buses on SPEC 214 per the following table:

<table>
<thead>
<tr>
<th>DC</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>INVERTER</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>EXP BUS</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>EXCP 1/2</td>
<td>5</td>
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<td>DM FN/LT</td>
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<tr>
<td>SPARE</td>
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<tr>
<td>PTB/CCTV</td>
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<tr>
<td>LIGHTS</td>
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</table>

<table>
<thead>
<tr>
<th>AC</th>
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<th>OFF</th>
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<tr>
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<tr>
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<td>43</td>
<td>44</td>
</tr>
<tr>
<td>2</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td>SPARE 1</td>
<td>47</td>
<td>48</td>
</tr>
<tr>
<td>2</td>
<td>49</td>
<td>50</td>
</tr>
</tbody>
</table>

MA73C:E 13. cb AC3 PL 3Φ – op

NOTE
Expect SM ALERT, msgs:
'214 SH EXP BUS V'
'214 SH WFCEU V'

SSP 2 14. EXP DC BUS – OFF (tb-bp)
15. – ctr
16. ORB SEC DC BUS – OFF (tb-bp)
17. SS DC BUS – OFF (tb-bp)
18. Verify SSP 2 config as shown below

**CAUTION AND WARNING CONFIG**

If SH Cabin Fan was ON:

R13U

19. C/W PARAM SEL tw (three) – 055
20. PARAM – INH
21. PARAM STATUS – INH, hold
22. √STATUS lt 055 – on

SH PPO2 1
23. C/W PARAM SEL tw (three) – 065
24. PARAM – INH
25. PARAM STATUS – INH, hold
26. √STATUS lt 065 – on

SH PPCO2 1
27. C/W PARAM SEL tw (three) – 075
28. PARAM – INH
29. PARAM STATUS – INH, hold
30. √STATUS lt 075 – on
SH ARS FAN DP 2
31. C/W PARAM SEL tw (three) – 085
32. PARAM – INH
33. PARAM STATUS – INH, hold
34. √STATUS lt 085 – on

SH CABIN TOTAL PRESS
35. C/W PARAM SEL tw (three) – 095
36. PARAM – INH
37. PARAM STATUS – INH, hold
38. √STATUS lt 095 – on
39. PARAM SEL tw (three) – 120

REMOVE PRIMARY PWR
R1A1
40. √PL PRI MNB tb – OFF
41. √FC3 tb – OFF

NOTE
Expect SM ALERT, msgs:
‘214 SH MN BUS V’
‘214 SH SEC BUS V’

42. PL PRI MNC – OFF (tb-OFF)
43. Notify MCC:
   SPACEHAB TOTAL DEACT complete
SPACEHAB 30-MIN DEACTIVATION
SPACEHAB 30-MIN DEACTIVATION

1. Safe Penetrators:
   - √PFE secured in brackets on fwd bulkhead, stbd of hatch opening
   - √SEBS secured at FC11

VP
2. √Viewport Outer Cover closed
3. √Inner Safety Cover installed and handscrews (three) tight

VP HTR
4. √VP HTR – OFF (lt off)

CNTL PNL

NOTE
If full 30 min not available, reserve 5-10 min for steps 11-27
and perform as much of steps 5 -10 as possible

Deactivate/Stow as time permits (If deployed):
PGSC:
5. Perform SUBSYSTEM PGSC DEACTIVATION (ON-ORBIT), then:
   Rack front trays (reattach to racks):
   6. Perform RACK FRONT STOWAGE TRAY REPLACEMENT (TRANSFER), then:
Portable Light:
7. Portable fluorescent light sw – OFF
8. cb AC1 – OFF
9. Demate light cable from EXCP1 connector J94
FC06
10. Stow portable fluorescent light in Subsystem Stow 2

TNL ADP
11. Retrieve SEBS, Clamps (four), and Fixed Long Bungees (two) from Tunnel Adapter

AC11
12. Disconnect SEBS Mask from SEBS and stow SEBS and Mask in Subsystem Stow 5
13. Stow Clamps (four) , and Fixed Long Bungees (two) in Ziplock Bag (in foam cutout)

EXCP2
14. ARS – FAN OFF

SH Hatch
15. Disconnect BPSMU Cable QD
16. Remove BPSMU and 8-ft cable from Spacehab
17. Close hatch per decal
18. Equal vlv (two) – OFF
19. Install Equal vlv caps (two)

TNL ADP
(aft)
20. Disconnect tunnel adapter aft flex duct from PL ISOL vlv
21. Remove PL ISOL vlv cap from Velcro pad located near valve
22. Replace inside duct
23. Reconnect tunnel adapter aft flex duct to PL ISOL vlv using 3-in overcenter clamp
24. PL ISOL VLV – CL

CRT
25. FANS CABIN ON – ITEM 68 EXEC (*)

MA16L
26. Stow BPSMU and 8-ft cable
27. \MCC for power config
Figure 5-2.- Tunnel Config (30-min Deact)
SPACEHAB POST-FIRE EVALUATION
NOTE
Applicable only if handheld fire extinguisher discharged in Spacehab. If Spacehab Fire Suppression System bottles discharged, Spacehab will not be reingressed.

This procedure will be used to evaluate Spacehab environment. Based on CSA-CP readings, MCC may request orbiter atmosphere cleanup steps as well.

DEPRESS ORBITER BY 0.2 PSI

SM 66 ENVIRONMENT

1. Log CABIN PRESS _____.
MO10W 2. 14.7 CAB REG INLET SYS 1(2) vlv – CL
AW82B 3. Vent, remove, stow AIRLK DEPRESS vlv cap

NOTE
Expect possible dP/dT klaxon

4. AIRLK DEPRESS vlv – 5
CRT When CABIN PRESS = 0.2 less than starting point in step 1,
AW82B 5. AIRLK DEPRESS vlv – CL
6. Reinstall AIRLK DEPRESS vlv cap

SAMPLE SPACEHAB AIR
MO69M 7. Don, activate QDM. Use longest available hose (if not already connected)
CSA-CP 8. MODE pb – press, hold until ‘RELEASE’ displayed
9. Wait ~1 min for nominal display
10. Sampling Pump sw – ON
SH Hatch 11. Position CSA-CP sensor near one Equal vlv
12. Equal vlv cap (one) removed
13. Equal vlv (one) – NORM, wait 30 sec
14. – OFF
CSA-CP 15. Record readings in air sampling table, 5-23; report to MCC
16. Doff, deactivate QDM

FOLLOW ON SAMPLES

NOTE
Repeat (as needed) every 15 min or on MCC call

17. MCC for steps 1-6 to see if additional orbiter depress reqd
18. Perform steps 7-16

CONFIGURE SUBSYSTEMS FOR ATMOSPHERIC SCRUBBING

On MCC GO:

SM 214 SPACEHAB ACT/DEAC

CRT 19. √FANS CABIN ORB, ITEM 66 – (*)
20. ON – ITEM 68 EXEC (*)
21. △P1,2 (two) > 0.2 and < 5.5
RETURN TO NOMINAL OPS
On MCC GO:

22. PL ISOL vlv – OP
23. Open hatch per decal
24. Reconnect BPSMU cable QD
25. Contact MCC to verify good audio via BPSMU

EXCP2
26. ARS – KILL ENA

Fwd Bkhd
27. CAB DEPRESS vlv – cl

SM 214 SPACEHAB ACT/DEAC

CRT
28. \(\sqrt{\text{FANS ARS ORB, ITEM 65}}\) – (*)
29. ON – ITEM 67 EXEC (*)
30. \(\sqrt[3]{\Delta P \; 1,2 \; \text{(two)}} > 0.2 \; \text{and} < 5.5\)

NOTE
Expect possible ‘S66 CAB O2 (N2) FLO 1 (2)’ msg

MO10W
31. 14.7 CAB REG INLET SYS 1(2) vlv – OP

AIR SAMPLING TABLE

NOTE
For % O2 in table below, use S78
(SM SYS SUMM 1) O2 CONC

<table>
<thead>
<tr>
<th>Time (MET)</th>
<th>O2%</th>
<th>CO</th>
<th>HCN</th>
<th>HCL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>
TRANSFER

RACK FRONT STOWAGE TRAY REMOVAL ................................................................. 6-2
REPLACEMENT ................................................................. 6-3
RACK FRONT STOWAGE TRAY REMOVAL

VW Bag
1. Remove Bungee Straps (four), temp stow

PORT/STBD Rack
2. Remove pip pins (four) from latched position on tray

3. Rotate levers (four) to disengaged position (see Figure 6-1)
4. Insert pip pins to keep levers (four) into disengaged position
5. While pulling tray slightly away from seat track, slide tray half a position up(down) so posts are in circular areas of seat track
6. Remove tray from seat track
7. Remove pip pins (four) from tray
8. Rotate levers (four) into engaged position
9. Replace pip pins (four)
10. Clamshell two trays together, then temp stow using Bungee Straps

Figure 6-1.- Lever Positions
RACK FRONT STOWAGE TRAY REPLACEMENT

1. Retrieve temporarily stowed tray
2. Remove pip pins (four) from latched position on tray
3. Rotate levers (four) into disengaged position (see Figure 6-2)
4. Replace pip pins (four) to keep levers in disengaged position before placing tray on rack front
5. Place tray into rack seat track, aligning top tray marks on both sides half a position up(down) from required number labeled on seat track (refer to Table 6-1)
6. Slide tray to locked position

<table>
<thead>
<tr>
<th>PORT/STBD Rack</th>
<th>Rack Location</th>
<th>Tray 1</th>
<th>Tray 2</th>
<th>Tray 3</th>
<th>Tray 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fwd Starboard</td>
<td>3</td>
<td>23</td>
<td>43</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Fwd Port</td>
<td>3</td>
<td>23</td>
<td>43</td>
<td>N/A</td>
</tr>
</tbody>
</table>

7. Tray engaged with seat track
8. Remove pip pins (four)
9. While holding tray in place, rotate top levers into engaged position. Repeat for bottom levers
10. Replace pip pins (four) to lock levers into engaged position
11. Stow bungee straps

Figure 6-2.- Lever Positions
SPACEHAB EXPERIMENTS

(N/A)
REFERENCE DATA

SUBSYSTEM FIGURES ........................................................................................................ 8-3
EXCP PLUG-IN PLAN ........................................................................................................ 8-11
SUBSYSTEM FIGURES

Figure 8-1.- Spacehab DC Power
Figure 8-2.- Spacehab AC Power

* INV AC BUS POWER IS REMOVED WHEN A MAIN POWER K.I. IS ISSUED, REFER TO RELAY K1 IN FIGURE 8-1
Figure 8-3.- Spacehab Emergency Power
Figure 8-4.- Spacehab Experiment Power: Bulkhead DC
Figure 8-5.- Spacehab Experiment Power: Bulkhead AC and Rack Experiments
Figure 8-6.- Spacehab Air Loop
Figure 8-7.- Spacehab Water Loop
Figure 8-8.- EXCP 1
Figure 8-9.- EXCP 2
Figure 8-10.- EXCP 3
Figure 8-11.- EXCP 4
Figure 8-12.- EXCP 5
Figure 8-13.- EXCP 6
CUE CARD CONFIG
FIRE CONFIRMATION (HATCH OPEN)  
If any of following:
- MCP SMOKE SENSOR ALARM A or B – lt – lt on
- L1 SMOKE DETECTION B PAYZ/AD lt – lt on
- CRT 715 SH SMOKE A or B – FDA msg
Visible fire or smoke smell
1. Go to step 3
Else:
2. Fire alarm caused by orbiter >> EXCP2
3. ARS – FAN OFF or
4. SM 214 SPACEHAB ACT/DEAC
5. Retrieve and strap on SEBS (do not activate)
If visible fire or smoke smell:
6. Don and activate SEBS
Orbiter Crew:
7. If docked, perform JOINT EMERGENCY EGRESS (Cue Card)
8. Remove per source (if possible), evaluate
If successful, take CSA-CP readings. √MCC >>
If no py:
 WARNING
Discharge is propulsive
US:
2. Use PFE as reqd, evaluate
If no joy:
3. MN PWR KILL pb – push (lt on)
4. Safe penetrators (if not secure):
None for STS-116
5. SM 214 SPACEHAB ACT/DEAC

FIRE CONFIRMATION (HATCH CLOSED)  
SM 215 SPACEHAB EC1
If FIRE SMOKE CONC A or B > 2:
1. Go to FIRE SUPPRESSION >>
If only one FIRE SMOKE CONC A or B > 2:
2. Perform SMOKE SENSOR B(A) TEST (for sensor < 2), then:
   - If FIRE SMOK SENSOR B(A) > 2 and increasing:
     1. Go to FIRE SUPPRESSION, steps 1-10 >>
     Else:
     4. Fire not confirmed >>
   5. Fire not confirmed >>
     If FIRE SMOKE CONC A or B > 2:
     6. Fire not confirmed
SSP 27 SMOKE SENSOR – RESET
CRT  If ALARM A or B – YES recur:
  8. √MCC

SMOKE SENSOR A TEST
SSP 2
1. SMOKE SENSOR B – INHB (tb-bp)
   NOTE
   Expect MASTER ALARM, siren, and ‘215 SH SMOKE A msg after release
2. SMOKE SENSOR – TEST (hold 10 sec, release)
3. – RESET
   NOTE
   Expect MASTER ALARM, siren, and ‘215 SH SMOKE A msg after approx 25 sec
4. SMOKE SENSOR – TEST (hold until alarm ~25 sec)
   5. – RESET
   If sensor A fails either portion of test, sensor failed:
   6. SMOKE SENSOR B – ENA (tb-gray)
   7. PCC02 or Hab temp:
   8. SMOKE SENSOR – RESET
   If sensor A passes both portions of test, sensor good

SMOKE SENSOR B TEST
SSP 2
1. SMOKE SENSOR A – INHB (tb-bp)
   NOTE
   Expect MASTER ALARM, siren, and ‘215 SH SMOKE B msg after release
2. SMOKE SENSOR – TEST (hold 10 sec, release)
3. – RESET
   NOTE
   Expect MASTER ALARM, siren, and ‘215 SH SMOKE B msg after approx 25 sec
4. SMOKE SENSOR – TEST (hold until alarm ~25 sec)
   5. – RESET
   If sensor B fails either portion of test, sensor failed:
   6. SMOKE SENSOR A – ENA (tb-gray)
   7. B – INHB (tb-bp)
   If sensor B passes both portions of test, sensor good

NOTE
One card stowed in back of SH OPS. Second card stowed in Middeck Cue Card Kit. Third card predeployed near L12

2003/06/26

SH OPS/116/FIN

(reduced copy)
**SPACEHAB CABIN LEAK ISOLATION**

**SH OVHD**
1. EXP VENT VLV – cl
2. NPRV covers (two) – cl (push firmly)

**SH FWD BKHD**
3. CDV – CL
4. NPRV covers (two) – cl (push firmly)

**CRT**
5. PPRV ISO VLV 1 CL – ITEM 87 EXEC (*)
6. 2 CL – ITEM 89 EXEC (*)
7. Perform SPACEHAB EMERGENCY EGRESS

If orbiter dP/dT positive or zero, SH Leak confirmed:

SM 215 SPACEHAB ECS

If HAB P > 10.0 and consumables permit, on MCC GO:
8. Remove Equal vlv caps (two), temp stow
9. SH HATCH Equal vlv (two) – NORM
10. Open SH HATCH
11. PL ISOL VLV – OP
12. Re-deploy BPSMU from ODS to SH, placing QD near hatch
13. Go to SPACEHAB 30-MIN DEACT (SH OPS, SH CONTINGENCY PROCS) 

If HAB P < 10.0, deactivate Spacehab:

SM 214 SPACEHAB ACT/DEAC

14. FANS ARS OFF – ITEM 51 EXEC (*)
15. Go to SPACEHAB EMERGENCY DEACT, steps 8-10

If orbiter dP/dT still negative, return to calling procedure

**SPACEHAB EMERGENCY DEACTIVATION**

**CDR/PLT perform:**

C3
1. H2O LN HTRS – ON

SSP 1
2. cb SW PWR 2 – cl
3. ORB H2O LINE HTR PWR A – ON
4. √B – OFF (A ENA)

SM 215 SPACEHAB ECS
5. H2O LN HTR HAB STATUS – 1
6. √ORB AMPS > 1

**R1**
7. cb AC3 PL 3φ – op
8. PL AUX – OFF

**SH Crew perform:**

1. Perform SPACEHAB EMERGENCY EGRESS, then:

SSP 2
10. MN PWR – KILL

**SPACEHAB EMERGENCY EGRESS**

1. Safe Penetrators (if not secured):
   - PFE secured in brackets or fwd bulkhead, stbd of hatch opening
   - SEBS secured at FC11

EXCP2
2. ARS – FAN OFF

If Viewport open:
3. Close Viewport
4. √VP HTR – OFF

5. Egress module

SH Hatch
6. Disconnect BPSMU Cable QD
7. Close, latch per decal
8. Equal vlv (two) – OFF

TNL ADP (aft)
9. PL ISOL VLV – CL

**NOTE**
One card stowed in back of SH OPS. Second card stowed in Middeck Cue Card Kit. Third card predeployed near L12
HAZARDOUS SPILL RESPONSE – SPACEHAB MODULE

LEVEL 4 (RED) MOST HAZARDOUS SPILL (NONCONTAINABLE)

1. Inform other crew, MCC – “Level 4 spill in Spacehab”

SH CLEANUP CREW:
2. Don/activate SEBS (2 crewmembers)
3. CAB DEPRESS vlv – OP
4. Safe Penetrators (if not secure): PFE
5. Egress module with SEBS
6. Disconnect BPSMU Cable QD
7. Close hatch (per decal)
8. Equal vlv (two) – OFF and install caps

FLIGHT DECK CREW:
9. FANS ARS OFF – ITEM 61 EXEC (*)
If Spacehab Cabin fan ON:
10. FANS CABIN OFF – ITEM 62 EXEC (*)

OTHER CREW:
11. PL ISOL VLV – CL
12. Evacuate to orbiter, \MCC

LEVEL 3 (ORANGE) HAZARDOUS SPILL (CONTAINABLE)

1. Inform other crew, MCC – “Level 3 spill in Spacehab”

SH CLEANUP CREW:
2. Don/activate SEBS (2 crewmembers), Silver Shield Gloves

FLIGHT DECK CREW:
3. ARLK FAN A(B) – OFF
If Booster Fan active:
4. FANS ARS OFF – ITEM 61 EXEC (*)
If Spacehab Cabin fan ON:
5. FANS CABIN OFF – ITEM 62 EXEC (*)

OTHER CREW:
6. PL ISOL VLV – CL
7. Evacuate to orbiter

CCK 8. Clean up spill w/Dry Wipes. Bag, label, stow in Wet Trash
If cleanup fails:
9. CAB DEPRESS vlv – OP
10. Safe Penetrators (if not secure): PFE
11. Egress module with SEBS
12. Disconnect BPSMU cable QD
13. Close hatch (per decal)
14. Equal vlv (two) – OFF and install caps

FLIGHT DECK CREW:
15. FANS ARS ON – ITEM 67 EXEC (*)
16. \MCC >>
17. Deactivate/doff SEBS, gloves. Stow gloves in Wet Trash
18. Inform other crew, MCC: “Spill in module cleaned up”

MO13Q 19. ARLK FAN A(B) – ON

On MCC GO:
20. FANS ARS ON – ITEM 67 EXEC (*)
21. △P 1.2 (two) > 0.2 and < 6.0
If Booster Fan in bypass config >>

(reduced copy)
HAZARDOUS SPILL RESPONSE – SPACEHAB MODULE (Cont)

**LEVEL 2 (YELLOW) HAZARDOUS SPILL**

1. Inform other crew, MCC: “Level 2(1,0) spill in Spacehab”
   - If Level 2 spill:
     - CCK 2. All crew in module don goggles, masks, Silver Shield Gloves
     - If Level 1 spill:
     - CCK 3. All crew in module don goggles, masks, latex gloves
   - If Level 0 controlled spill, >>

**FLIGHT DECK CREW:**
- If Booster Fan active:
  - MO13Q 4. ARLK FAN A(B) – OFF
  - SM 214 SPACEHAB ACT/DEAC
  - 5. FANS ARS OFF – ITEM 61 EXEC (*)
- If Spacehab Cabin fan ON:
  - 6. FANS CABIN OFF – ITEM 62 EXEC (*)

**OTHER CREW:**
- TNL ADP 7. PL ISOL VLV – CL
- CCK 8. Clean up spill w/Dry Wipes. Bag, label, stow in Wet Trash
  - If Level 2(1,0) cleanup fails:
    - Fwd Blkhd 9. CAB DEPRESS vlv – OP
    - 10. Safe Penetrators (if not secure): PFE, SEBS
    - 11. Egress module
    - SH Hatch 12. Disconnect BPSMU cable QD
    - 13. Close hatch (per decal)
    - 14. Equal vlv (two) – OFF and install caps

**FLIGHT DECK CREW:**
- **SM 214 SPACEHAB ACT/DEAC**
  - 15. FANS CABIN ON – ITEM 68 EXEC (*)
  - 16. \^MCC >>
  - 17. Doff masks, goggles, gloves. Stow gloves in Wet Trash
  - 18. Inform other crew, MCC: “Spill in module cleaned up”
- TNL ADP 19. PL ISOL VLV – OP

**FLIGHT DECK CREW:**
- **SM 214 SPACEHAB ACT/DEAC**
  - On MCC GO:
    - 20. FANS ARS ON – ITEM 67 EXEC (*)
    - 21. √ΔP 1.2 (two) > 0.2 and < 6.0
- MO13Q 22. ARLK FAN A(B) – ON

(entered copy)
HAZARDOUS SPILL RESPONSE – ORBITER CABIN
(WITH SH MODULE HATCH OPEN)

**LEVEL 4 (RED) MOST HAZARDOUS SPILL (NONCONTAINABLE)**

1. Inform other crew, MCC – "Level 4 spill in cabin"
2. All crew don/activate QDMs
3. QDM Regulator mode – EMERGENCY (red knob cw)
   - If Booster Fan active:
     - MO13Q 4. AIRLK FAN A(B) – OFF, then:
       - If hatches to ISS open:
         - 5. Simo, perform JOINT EMERGENCY EGRESS (Cue Card), continue with this proc

   - If Booster Fan active:
     - MO13Q 4. AIRLK FAN A(B) – OFF, then:
       - If hatches to ISS open:
         - 5. Simo, perform JOINT EMERGENCY EGRESS (Cue Card), continue with this proc

**LEVEL 3 (ORANGE) HAZARDOUS SPILL (CONTAINABLE)**

1. Inform other crew, MCC – "Level 3 spill in cabin"
2. All crew don/activate QDMs
3. QDM Regulator mode – Emergency (red knob cw)
   - If Booster Fan active:
     - MO13Q 4. AIRLK FAN A(B) – OFF, then:
       - If hatches to ISS open:
         - 5. Simo, perform JOINT EMERGENCY EGRESS (Cue Card), continue with this proc
     - L1 6. CAB FAN A(B) – OFF (max 30 min)
     - 7. IMU FAN B(A,C) – OFF (max 90 min)
   - OCAC 8. OCAC PWR – OFF
   - SM 214 SPACEHAB ACT/DEAC
     - 9. FANS ARS OFF – ITEM 61 EXEC (*)
     - CCK 10. Cleanup crew don Silver Shield Gloves, clean up spill w/Dry Wipes.
       - Bag, label, stow in Wet Trash
       - If cleanup fails, perform steps 14 and 15, then go to Level 4 step 6 >>
     - 11. QDM Regulator mode – NORM (red knob ccw)
     - 12. Doff Quick Don Masks, gloves. Stow gloves in Wet Trash
     - 13. Inform other crew, MCC – "Spill in cabin cleaned up"
     - L1 14. CAB FAN A(B) – ON
     - 15. IMU FAN B(A,C) – ON
     - OCAC 16. OCAC PWR – ON
     - SM 214 SPACEHAB ACT/DEAC
       - 17. FANS ARS ON – ITEM 67 EXEC (*)
       - 18. \( \Delta P1,2 \) (two) > 0.2 and < 6.0
         - If Booster Fan in bypass config >>
     - MO13Q 19. AIRLK FAN A(B) – ON
HAZARDOUS SPILL RESPONSE – ORBITER CABIN
(WITH SH MODULE HATCH OPEN)

**LEVEL 2 (YELLOW) HAZARDOUS SPILL**
1. Inform other crew, MCC – “Level 2(1,0) spill in cabin”
   If Level 2 spill:
   CCK 2. Cleanup crew in vicinity don goggles, masks, and gloves
       (√MCC for Silver Shield or latex)
   If Level 1 spill:
   CCK 3. Cleanup crew in vicinity don goggles, masks, latex gloves
   If Level 0 controlled spill, >>

   If Booster Fan active:
   MO13Q 4. AIRLK FAN A(B) – OFF, then:
   L1 5. CAB FAN A(B) – OFF (max 30 min)
   OCAC 6. IMU FAN B(A,C) – OFF (max 90 min)
   SM 214 SPACEHAB ACT/DEAC
   CCK 8. FANS ARS OFF – ITEM 61 EXEC (*) (for Level 1 and 2 only)
   9. Clean up spill w/Dry Wipes. Bag, label, stow in Wet Trash
      If Level 2(1,0) cleanup fails, perform steps 12 and 13, then go to
      Level 4 step 5 >>
   10. As reqd, doff goggles, masks, gloves. Stow gloves in Wet Trash
   11. Inform other crew, MCC – “Spill in cabin cleaned up”
   L1 12. CAB FAN A(B) – ON
   13. IMU FAN B(A,C) – ON
   OCAC 14. OCAC PWR – ON
   SM 214 SPACEHAB ACT/DEAC
   15. FANS ARS ON – ITEM 67 EXEC (*) (for Level 1 and 2 only)
   16. √ΔP1,2 (two) > 0.2 and < 6.0
      If Booster Fan in bypass config >>
   MO13Q 17. AIRLK FAN A(B) – ON

   If Booster Fan active:
   MO13Q 4. AIRLK FAN A(B) – OFF, then:
   L1 5. CAB FAN A(B) – OFF (max 30 min)
   OCAC 6. IMU FAN B(A,C) – OFF (max 90 min)
   SM 214 SPACEHAB ACT/DEAC
   CCK 8. FANS ARS OFF – ITEM 61 EXEC (*) (for Level 1 and 2 only)
   9. Clean up spill w/Dry Wipes. Bag, label, stow in Wet Trash
      If Level 2(1,0) cleanup fails, perform steps 12 and 13, then go to
      Level 4 step 5 >>
   10. As reqd, doff goggles, masks, gloves. Stow gloves in Wet Trash
   11. Inform other crew, MCC – “Spill in cabin cleaned up”
   L1 12. CAB FAN A(B) – ON
   13. IMU FAN B(A,C) – ON
   OCAC 14. OCAC PWR – ON
   SM 214 SPACEHAB ACT/DEAC
   15. FANS ARS ON – ITEM 67 EXEC (*) (for Level 1 and 2 only)
   16. √ΔP1,2 (two) > 0.2 and < 6.0
      If Booster Fan in bypass config >>
   MO13Q 17. AIRLK FAN A(B) – ON
SPACEHAB FIRE ALARMS (ASCENT/ENTRY)

BFS 206 SH LAUNCH/ENTRY

* If only one sensor available, confirmation is the following:
* CONC ≥ 1.9 and incr
* Go to step 3

If both CONC ≥ 1.9:
1. Go to step 3
Else:
2. Fire not confirmed

C3 SPACEHAB FIRE SUPPR:
3. MCP – ARM
4. – DISCH
5. FSCU – ARM
6. – DISCH
7. – NO-OP
8. – SAFE
9. MCP – NO-OP
10. – SAFE

SH OPS-4a/116/O/B

SH OPS-4b/116/O/A
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