

Spacehab Operations Checklist

STS-118

**Mission Operations Directorate
Operations Division**

**Final, Rev A
July 18, 2007**

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas



United Space Alliance

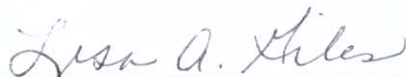
MISSION OPERATIONS DIRECTORATE

**SPACEHAB OPERATIONS CHECKLIST
STS-118**

FINAL, REVISION A

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PREPARED BY:



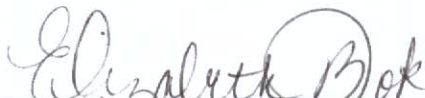
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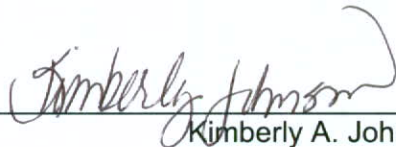


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	SH OPS-0227	SH OPS-0237	
	SH OPS-0228	SH OPS-0238	
	SH OPS-0229	SH OPS-0239 (S)	
	SH OPS-0230	SH OPS-0240	
	SH OPS-0231	SH OPS-0241	
	SH OPS-0232	SH OPS-0242	
	SH OPS-0233	SH OPS-0243	
	SH OPS-0234	SH OPS-0244	
	SH OPS-0235		

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SPACEHAB OPERATIONS CHECKLIST
STS-118

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REV A 07/18/07

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* – Omit from flight book

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ACTIVATION

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ACTIVATION

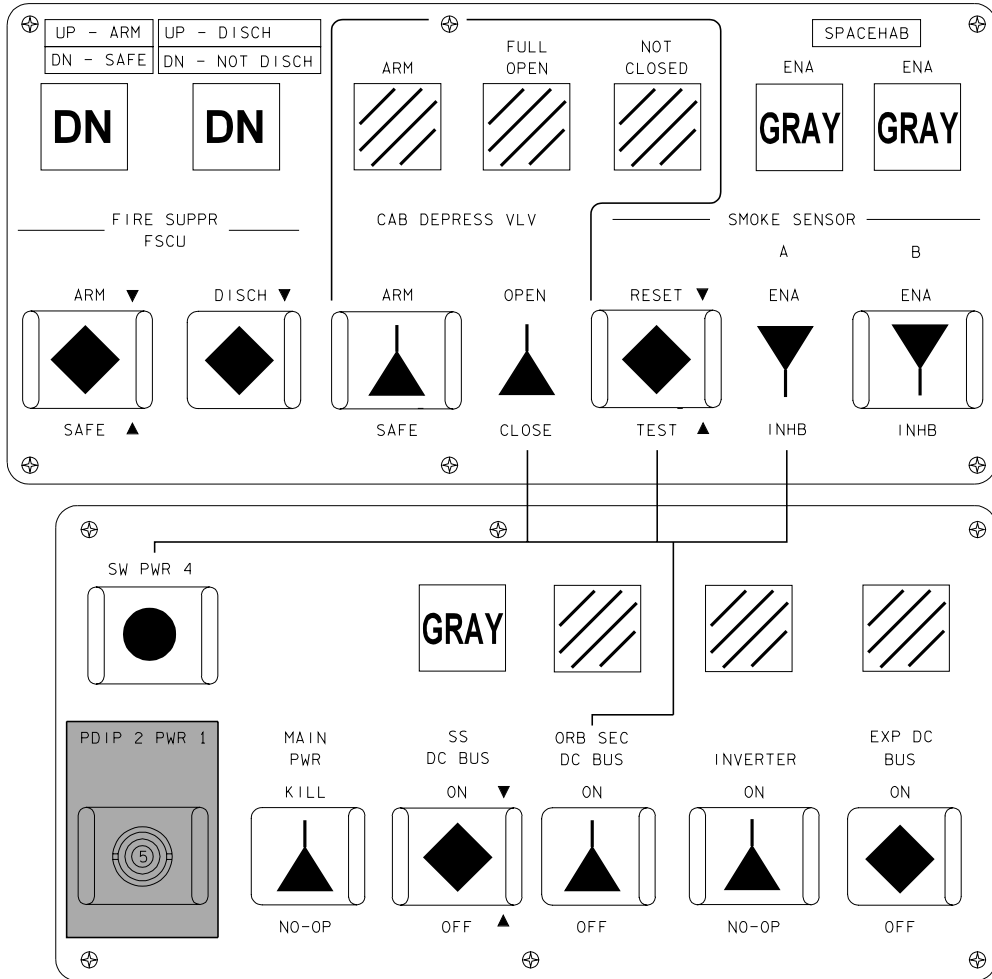
ON-ORBIT SYSTEM CONFIG

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:



480890102_118. PNL# 2

- 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

SM 215 SPACEHAB ECS

- 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

- L1 12. SMOKE SENSOR – TEST (hold 10 sec, release)
- SSP 2 13. √DETECTION B PAYLOAD It – PAYLOAD It on
- L1 14. SENSOR – RESET
- 15. √DETECTION B PAYLOAD It – It 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 It – PAYLOAD It on
- SSP 2 18. SENSOR – RESET
- L1 19. √DETECTION B PAYLOAD It – It 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

- L1 23. SMOKE SENSOR – TEST (hold 10 sec, release)
- SSP 2 24. √DETECTION B PAYLOAD It – PAYLOAD It on
- L1 25. SENSOR – RESET
- 26. √DETECTION B PAYLOAD It – It 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 It – PAYLOAD It on
- SSP 2 29. SENSOR – RESET
- L1 30. √DETECTION B PAYLOAD It – It 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)
SM 214 SPACEHAB ACT/DEAC
- 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

SM SYS SUMM 1

CRT

- 41. √DC VOLTS MN C > 24 and < 32
SM 214 SPACEHAB ACT/DEAC
- 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:

DC	ON	OFF
INVERTER	1 _____	2 * _____
EXP BUS	3 * _____	4 _____
EXCP 1/2	5 * _____	6 _____
3	7 _____	8 * _____
4	9 _____	10 * _____
5	11 _____	12 * _____
6	13 _____	14 * _____
DM FN/LT	15 _____	16 * _____
RACK 1	17 _____	18 * _____
2	19 _____	20 * _____
UTIL AFT	21 _____	22 * _____
FWD	23 * _____	24 _____
SPARE	25 _____	26 * _____
PTB/CCTV	27 * _____	28 _____
LIGHTS	29 _____	30 _____
AC		
UTIL	41 _____	42 * _____
RACK 1	43 _____	44 * _____
2	45 _____	46 * _____
SPARE 1	47 * _____	48 _____
2	49 _____	50 * _____

CAUTION AND WARNING CONFIG

R13U

SH PPO2 1

- 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. PARAM 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 or greater

FLIGHT DECK AND MIDDECK 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

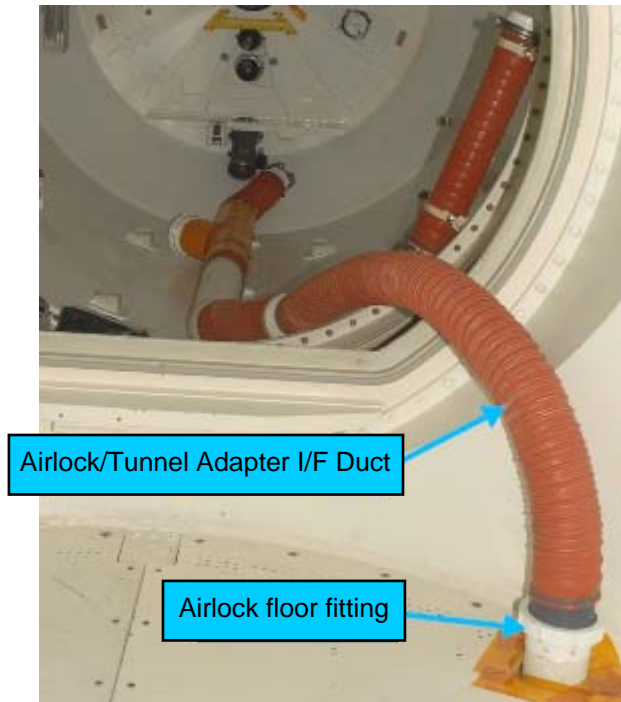


Figure 1-1.- Airlock/Tunnel Adapter I/F Duct (view looking aft from Airlock)

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

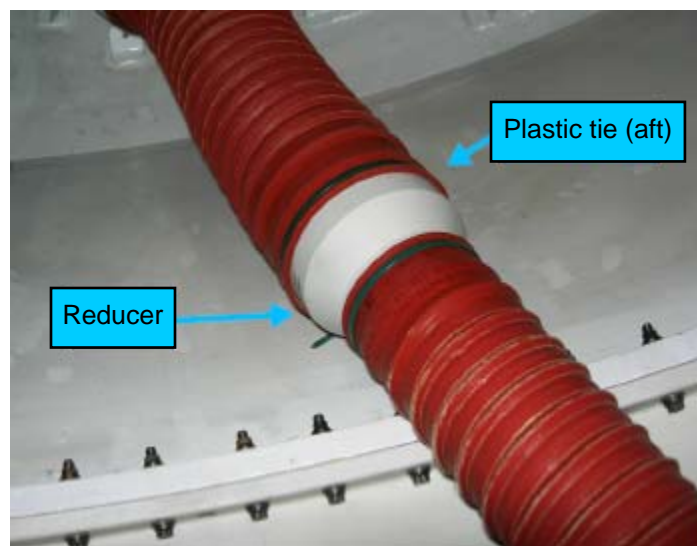


Figure 1-2.- Airlock/Tunnel Adapter I/F Duct reducer (view looking aft into Tunnel Adapter from Airlock)

TNL ADP
(fwd)

5. Remove Flex Duct (3") with reducer (See Figure 1-3) and stow in STBD straps of Tunnel Extension (near Booster Fan)



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

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 1-4.- Aft end of Booster Fan Bypass duct for Spacehab (Note: No screen)

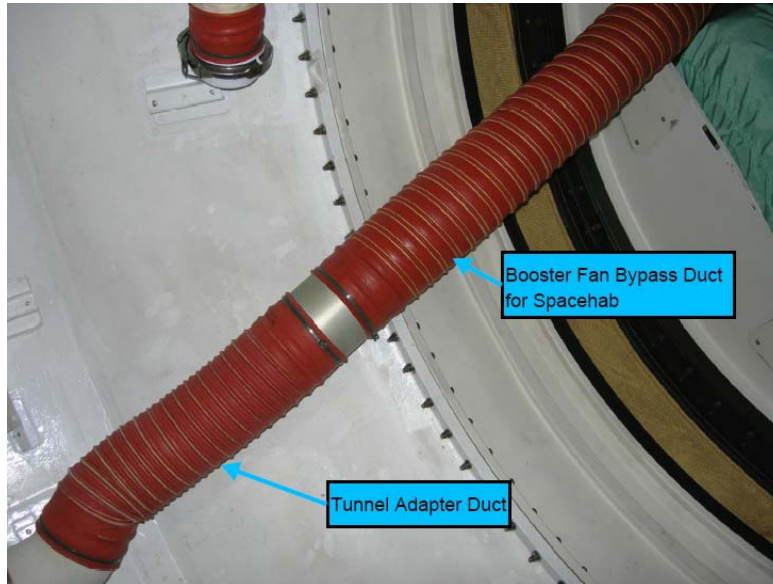


Figure 1-5.- Booster Fan Bypass duct for Spacehab connected to Tunnel Adapter ducting (Port fwd view of Tunnel Adapter)

TUNNEL CONFIG

VERIFY MODULE ENVIRONMENT

CRT

- SM 214 SPACEHAB ACT/DEAC**
1. DC LIGHTS ON – ITEM 29 EXEC (no feedback)
- SM 215 SPACEHAB ECS**
2. $\sqrt{\text{HALON MULTI}} - \text{NO}$
 3. $\sqrt{\text{SINGLE}} - \text{NO}$
 4. $\sqrt{\text{HAB P}} > 13.8$ and < 15.4 psi
 5. $\sqrt{\text{PPO2 1,2 (two)}} > 2.7$ psi

NOTE

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

6. $\sqrt{\text{HAB PPCO2 1}} < 5.1$ mmHg
7. $\sqrt{2} < 7.6$ mmHg

SPACEHAB HATCH OPENING AND DUCT CONFIG

TNL ADP
(aft)

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

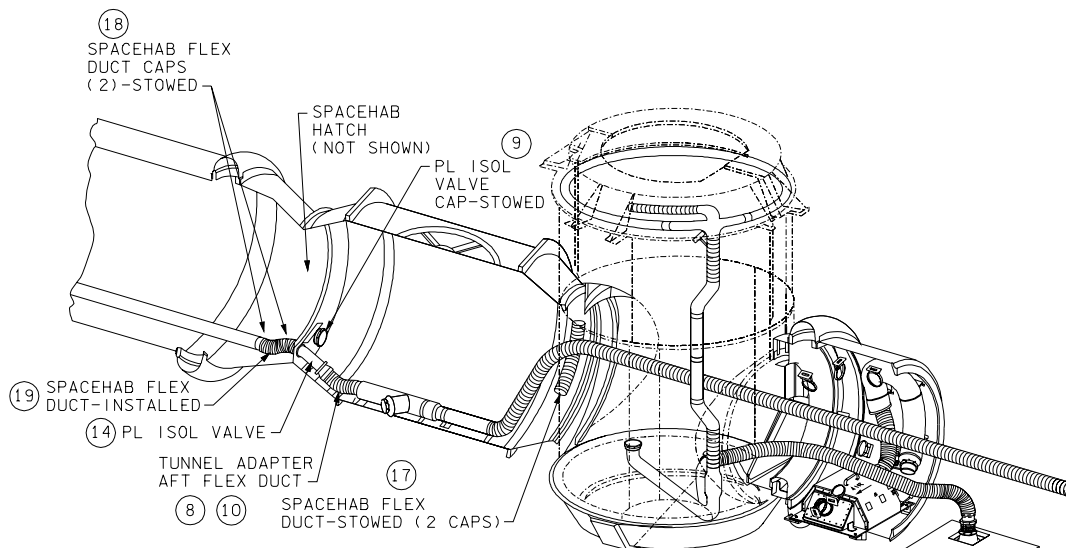
Possible FDA 'S66 CABIN O2(N2) FLO 1(2)' msg or dP/dT klaxon alarm

SH Hatch

11. Vent Equal vlv caps (two), remove and stow
12. Equal vlv (two) – NORM
13. $\sqrt{\Delta P} \leq 0.2$ psid
14. PL ISOL vlv – OP

TNL ADP
(aft)

15. Open hatch per decal
16. Swing hatch from seal until locked-open catch engaged



NOTE: CIRCLED NUMBERS INDICATE APPLICABLE PROCEDURE STEPS

48089106_118. ISO: 4

Figure 1-6.- Tunnel config (Activation)

- TNL ADP
(fwd)
17. Unstow Spacehab flex duct from launch brackets
18. Remove caps (two) from inlet and outlet of flex duct, and secure with Velcro straps to outer shell of duct
- SH Tunnel
19. Install Spacehab flex duct between tunnel duct inlet and PL ISOL vlv outlet using 3-in overcenter clamps (two)

BPSMU CONFIG

- MF43C
20. Unstow:
 BPSMU
21. Perform SPACEHAB BPSMU AUDIO ONLY, Cue Card (stowed in back of SH OPS), then: |
22. Contact MCC to verify good audio via BPSMU
23. Ingress module

MODULE CONFIG

- Fwd Bkhd VALVE CONFIG
1. √CAB DEPRESS vlv – cl
2. NPRV cover (two) – cl
3. NPRV cover (two) – cl
- OVHD
- MCP MCP LAMP TEST
4. LAMP TEST – ON (hold)
5. √C&W/FDA lts (six) – lts on
6. √FSS ARMED lt – lt on
7. √FIRE SUPPR DISCH pb – lt on
8. √MAIN PWR KILL pb – lt on
9. √CABIN TEMP (°F) – 88
10. LAMP TEST – OFF
11. √Above lts – off

- EXCP2 ARS KILL SW CONFIG
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 on foam backing and secure by crossing the adapter plate straps as shown in the following figure



Figure 1-7.- SEBS cross-strapping

- AC11 19. Connect SEBS Mask to SEBS
20. Unstow SEBS from Subsystem Stow 5

- 21. ✓SEBS gauge needle location consistent with pre-flight marking on Kapton tape
- 22. Unstow Adjustable Bungees (two) from Ziplock Bag
- 23. Deploy SEBS in Tunnel Adapter (stbd) using Adjustable Bungees (two)
- 24. Connect SEBS Mask to SEBS

TNL ADP

SUPPORT EQUIPMENT DEPLOYMENT

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

AC11

FC02

CUE CARD SETUP

- 31. Remove four 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)
 - VIEWPORT OUTER COVER OPENING/CLOSING attach to Velcro (crew preference)

SH OPS

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)

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

MCP

BPSMU

MCP

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. ✓Automatic pwr off PGSC
- 46. Close PGSC
- 47. A31P 28VDC Pwr Supply INPUT POWER sw – OFF (OUTPUT POWER It off)

Pwr Supply

- 48. Notify MCC: SPACEHAB ACTIVATION complete

DOCKING

SPACEHAB PREP FOR DOCKING 2-2
RECONFIG POST DOCKING..... 2-4

DOCKING

SPACEHAB PREP FOR DOCKING

MODULE CONFIG

If Subsystem PGSC activated:

Exit Spacehab software:

- | | | |
|------------|--|--|
| FC06 | <ol style="list-style-type: none">1. Press [ALT]/[Q] to exit software2. [Shft]/[F10] to confirm3. Shut down Windows4. √Automatic pwr off PGSC5. Close PGSC | |
| Pwr Supply | <ol style="list-style-type: none">6. A31P 28VDC Pwr Supply INPUT POWER sw – OFF (OUTPUT POWER It off) | |
| EXCP1 | <ol style="list-style-type: none">7. cb DC3 – OFF | |
| MCP | <ol style="list-style-type: none">8. CABIN TEMP SEL tw (two) – 76 | |
| OVHD | <ol style="list-style-type: none">9. √Viewport Outer Cover closed10. √Inner Safety Cover installed11. √HTR – OFF (LED unlit)12. Temp stow BPSMU and cable on Orbiter side of Spacehab hatch | |

TUNNEL CONFIG

NOTE

Debris screen should remain in place once duct is removed

- | | | |
|------------------|---|--|
| TNL ADP
(aft) | <ol style="list-style-type: none">13. Disconnect Spacehab flex duct from screen assembly on tunnel duct inlet fitting and PL ISOL vlv outlet14. Retrieve inlet and outlet caps, previously velcroed to outer shell of duct, and install on each end of the Spacehab flex duct using 3-in overcenter clamps (two) | |
| TNL ADP
(fwd) | <ol style="list-style-type: none">15. Stow Spacehab flex duct in tunnel adapter launch brackets | |
| SH Hatch | <ol style="list-style-type: none">16. Close hatch per decal17. Equal vlv (two) – OFF18. Install Equal vlv caps (two) | |
| TNL ADP
(aft) | <ol style="list-style-type: none">19. Disconnect tunnel adapter aft flex duct from PL ISOL vlv20. Inspect valve/duct seals for lint/debris, clean if necessary21. Remove PL ISOL vlv cap from Velcro pad located near valve22. Inspect for debris, clean if necessary and replace inside duct23. Reconnect tunnel adapter aft flex duct to PL ISOL vlv using 3-in overcenter clamp24. PL ISOL vlv – CL | |
| | <ol style="list-style-type: none">25. Relocate SEBS from tunnel adapter to middeck and temp stow26. Unstrap Booster Fan Bypass Duct for Spacehab (inlet) from middeck and relocate/secure in Tunnel Adapter | |
| CRT | <div style="border: 1px solid black; padding: 2px; display: inline-block;">SM 214 SPACEHAB ACT/DEAC</div> <ol style="list-style-type: none">27. DC LIGHTS OFF – ITEM 30 EXEC (no feedback) | |

DOCKING

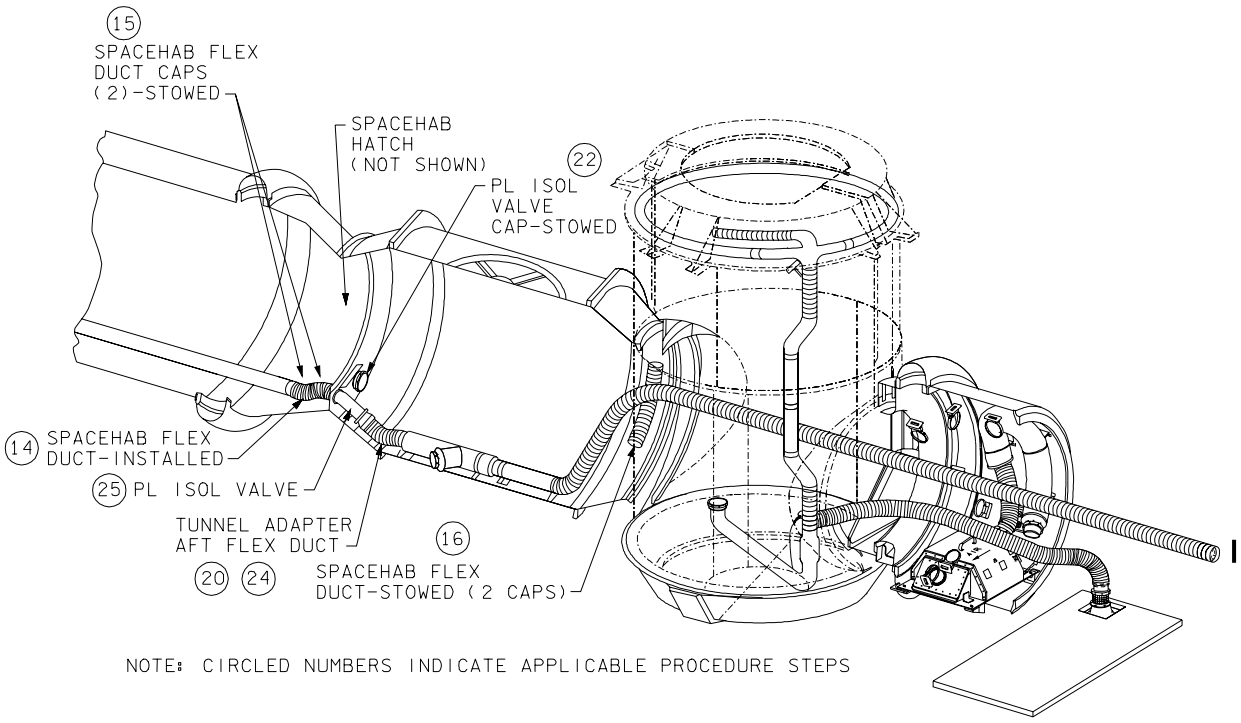


Figure 2-1.- Tunnel config (Prep for Docking)

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. $\sqrt{\text{HALON MULTI}} - \text{NO}$
3. $\sqrt{\text{SINGLE}} - \text{NO}$
4. $\sqrt{\text{HAB P}} > 13.8$ and < 15.4 psi
5. $\sqrt{\text{PPO2 1,2 (two)}} > 2.7$ psi

NOTE

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

6. $\sqrt{\text{HAB PPCO2 1}} < 5.1$ mmHg
7. $\sqrt{2} < 7.6$ mmHg

TUNNEL ADAPTER CONFIG

- TNL ADP
8. Relocate inlet of Booster Fan Bypass Duct for Spacehab to middeck and secure with Velcro straps
 9. Relocate SEBS from middeck to tunnel adapter and secure using Adjustable Bungees (two)
 10. Disconnect flex duct from PL ISOL vlv
 11. Remove PL ISOL vlv cap from inside duct
 12. Stow cap on Velcro pad near valve
 13. 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
14. Vent Equal vlv caps (two), remove and stow
 15. Equal vlv (two) – NORM
 16. $\sqrt{\Delta P} \leq 0.2$ psid

TNL ADP (aft)

17. PL ISOL vlv – OP

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

TNL ADP (fwd)

20. Unstow flex duct from launch brackets

- SH Tunnel
21. Remove caps (two) from inlet and outlet of flex duct, stow
 22. Install flex duct between tunnel duct inlet and PL ISOL vlv outlet using 3-in overcenter clamps (two)
 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

ON-ORBIT

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ON-ORBIT

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VIEWPORT

VIEWPORT

INNER SAFETY COVER REMOVAL

1. Visually inspect glass for failures
- Bottom of VP
2. Unscrew handscrews (three)
 3. Remove Safety Cover

<p style="text-align: center;"><u>WARNING</u></p> <p>Do not forcibly remove Inner Safety Cover</p> <p>Keep Inner Safety Cover installed any time viewport not in use</p>
--

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

<p style="text-align: center;"><u>WARNING</u></p> <p>Viewport glass, flange, and controls may be hot</p>
--

- 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

<p>WARNING Keep Outer Cover closed at any time viewport not in use</p>
<p>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</p>

Next to VP

RAISING OUTER COVER

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

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

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°)

<p>WARNING Htr should not be powered on more than 20 min with Sun in FOV</p>

VIEWPORT HEATER

If in cold attitude (√Execute Package for htr ON times):

VP HTR
CNTL PNL

4. VP HTR – ON

5. √VP HTR It – It on

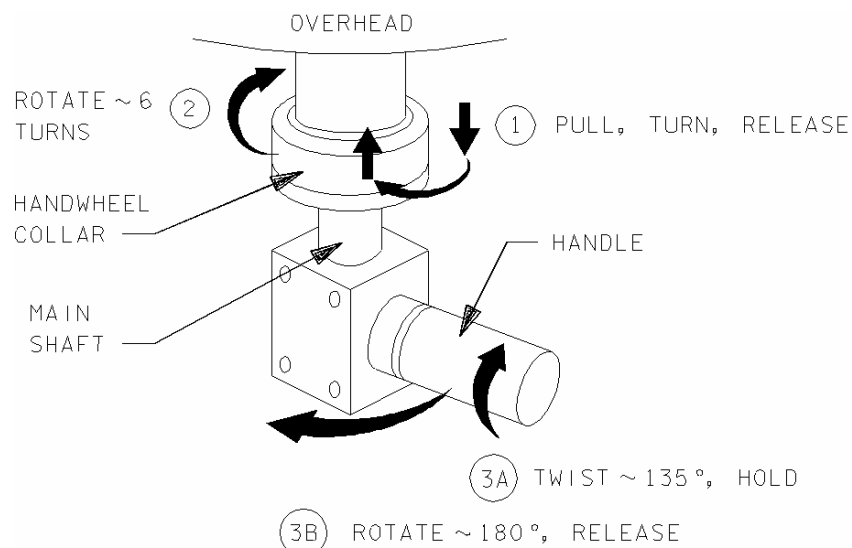
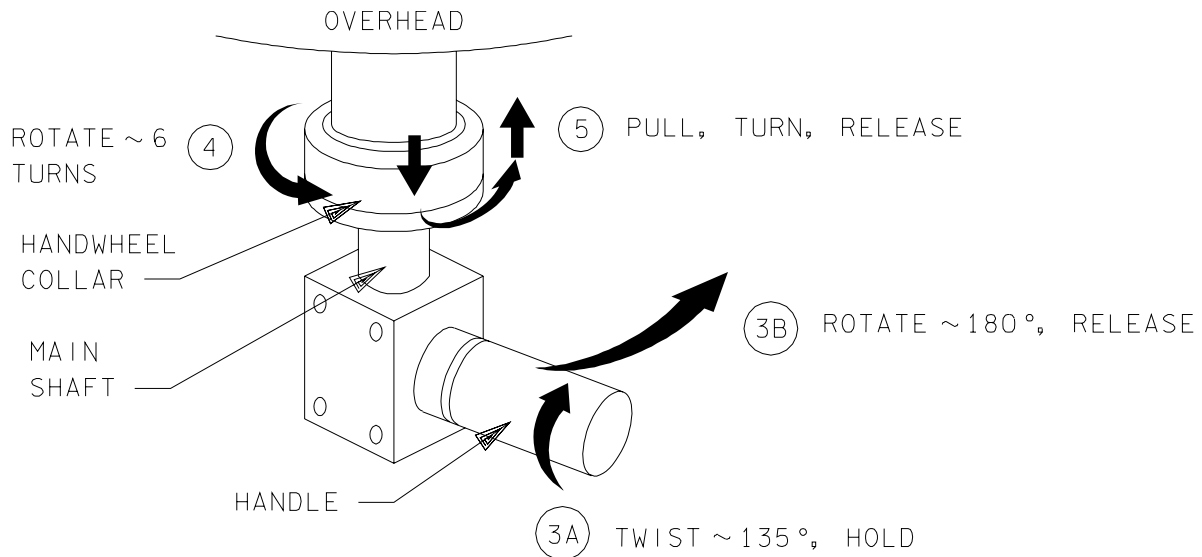


Figure 3-1.- Viewport opening

OUTER COVER CLOSING

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

- VP HTR
CNTL PNL
- VIEWPORT HEATER
1. √VP HTR – OFF
 2. √VP HTR It – It off
- Next to VP
- ROTATING OUTER COVER
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



48089001_118. ART# 1

Figure 3-2.- Viewport closing

HEATER ACTIVATION

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

- VP HTR
CNTL PNL
1. √Outer Cover open (visual)
 2. VP HTR – ON
 3. √VP HTR It – It on

HEATER DEACTIVATION

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

- VP HTR
CNTL PNL
1. VP HTR – OFF
 2. √VP HTR It – It off

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PRE/POST SLEEP CONFIG

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 It off)
 - EXCP1 7. cb DC3 – OFF

If Outer Viewport Cover open:

- 8. Perform OUTER COVER CLOSING (ON-ORBIT), then:
 - SM 214 SPACEHAB ACT/DEAC
 - CRT 9. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)
 - or
 - MCP LIGHTS – OFF

SPACEHAB POST-SLEEP CONFIG

- SM 214 SPACEHAB ACT/DEAC
- 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 It on)
- FC06 5. PGSC pwr – on
- 6. √Windows displayed
- 7. Double-click SHUTTLE APPS folder on desktop
- 8. SPACEHAB folder
- 9. SPACEHAB SS MONITOR icon
- PGSC: SPACEHAB SUMMARY

NOTE

Press [ALT]/[Enter] to toggle full screen mode if desired

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

WAVEOFF

SPACEHAB INGRESS AFTER WAVEOFF

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

VERIFY MODULE ENVIRONMENT

- | | |
|-----|--|
| CRT | <ol style="list-style-type: none"> 2. <u>SM 214 SPACEHAB ACT/DEAC</u>
DC LIGHTS ON – ITEM 29 EXEC (no feedback)
<u>SM 215 SPACEHAB ECS</u> 3. \checkmarkHALON MULTI – NO 4. \checkmarkSINGLE – NO 5. \checkmarkHAB P > 13.8 and < 15.4 psi 6. \checkmarkPPO2 1,2 (two) > 2.7 |
|-----|--|

NOTE

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

7. \checkmark HAB PPCO2 1 < 5.1 mmHg
8. \checkmark 2 < 7.6 mmHg

FLIGHT DECK CUE CARD SETUP

9. Remove two cue cards from Ziplock Back 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)

SPACEHAB HATCH OPENING AND DUCT CONFIG

- | | |
|---------------|---|
| TNL ADP (aft) | <ol style="list-style-type: none"> 10. Disconnect tunnel adapter aft flex duct from PL ISOL vlv 11. Remove cap, stow on Velcro pad near valve 12. 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 | <ol style="list-style-type: none"> 13. Vent Equal vlv caps (two), remove and stow 14. Equal vlv (two) – NORM 15. $\checkmark$$\Delta P \leq 0.2$ psid |
| TNL ADP (aft) | <ol style="list-style-type: none"> 16. PL ISOL vlv – OP 17. Open hatch per decal 18. Swing hatch from seal until locked-open catch engaged |
| TNL ADP (fwd) | <ol style="list-style-type: none"> 19. Unstow flex duct from launch brackets 20. Remove caps (two) from inlet and outlet of flex duct, stow |
| SH Tunnel | <ol style="list-style-type: none"> 21. Install flex duct between tunnel duct inlet and PL ISOL vlv outlet using 3-in overcenter clamps (two) |
| MF43C | <ol style="list-style-type: none"> 22. Unstow:
BPSMU 23. Perform SPACEHAB BPSMU AUDIO ONLY, Cue Card (stowed in back of SH OPS), then: |

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 24. Unstrap 0.5 CTB and temp stow near FC11 (crew preference)
- FC06 25. Unstow Foam, attach to Adapter Plate at FC11
- 26. Unstow SEBS from Subsystem Stow 3
- 27. ✓SEBS gauge needle location consistent with pre-flight marking on Kapton tape
- FC11 28. Deploy SEBS on foam backing and secure by crossing the adapter plate straps as shown in the following figure



Figure 3-3.- SEBS cross-strapping

- AC11 29. Connect SEBS Mask to SEBS
- 30. Unstow SEBS from Subsystem Stow 5
- 31. ✓SEBS gauge needle location consistent with pre-flight marking on Kapton tape
- TNL ADP 32. Unstow Adjustable Bungees (two) from Ziplock Bag
- 33. Deploy SEBS in Tunnel Adapter (stbd) using Adjustable Bungees (two)
- 34. Connect SEBS Mask to SEBS

CUE CARD SETUP

- 35. 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 AC11 1. Retrieve SEBS and Adjustable Bungees (two) from Tunnel Adapter
- 2. Disconnect SEBS Mask from SEBS and stow SEBS in Subsystem Stow 5
- 3. Stow Adjustable Bungees (two) in Ziplock Bag
- FC11 4. Unstrap SEBS
- FC06 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

- SH OPS 14. Remove cue cards (three) from crew preference location
- 15. Stow cue cards in Ziplock Bag in back of SH OPS

BPSMU TEARDOWN

- 16. Disconnect BPSMU cable QD
- 17. Stow:
 - BPSMU
 - 42 ft BPSMU Audio #1 Cable
 - 35 ft BPSMU Audio #1 Cable
 - 44 ft BPSMU Audio #1 Cable
 - 4 ft BPSMU Audio #1 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. Retrieve inlet and outlet caps, previously velcroed to outer shell of duct, and install on each end of the Spacehab flex duct using 3-in overcenter clamps (two)
- TNL ADP (fwd) 20. Stow Spacehab 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)

FLIGHT DECK CUE CARD STOW

- 31. Remove Spacehab Hazardous Spill cue cards (two) from crew preference location
- 32. Stow cue cards in Ziplock Bag in back of SH OPS

SUBSYSTEM PGSC

SUBSYSTEM PGSC ACTIVATION

- AC02
- Unstow from Subsystem Stow 1:
 Subsystem PGSC (SEG33115360-303)
 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)
 RF Network Card (SEZ39129739-303)

CONNECT POWER CABLES

- EXCP1
Pwr Sply
FC06
- √cb DC3 – OFF
 - √A31P 28VDC Pwr Supply INPUT PWR sw – OFF (OUTPUT PWR It off)
 - Connect A31P 28VDC Pwr Supply J1 to pre-routed DC Pwr Cable P1 (SED39122875-301)
 - Connect Enhanced A31p 16VDC Pwr Cable P2 to A31P 28VDC Pwr Supply J2
- PGSC
- Connect Enhanced A31p 16VDC Pwr Cable P1 to PGSC power port

CONNECT DATA CABLES

- FC06
- Connect RS-422 Adapter J2 to pre-routed RS-422 Data Cable P1 (SED39126965-301)
 - √Connect RS-422 PCMCIA Card/Cable CHANNEL A to RS-422 Adapter J1
- PGSC
- Insert RS-422 PCMCIA Card into lower PCMCIA slot on PGSC
 - Insert RF Network Card into upper PCMCIA slot on PGSC

POWER UP PGSC

- EXCP1
Pwr Sply
- cb DC3 – ON
 - A31P 28VDC Pwr Supply INPUT PWR sw – ON (OUTPUT PWR It on)
- PGSC
- PGSC Pwr – on

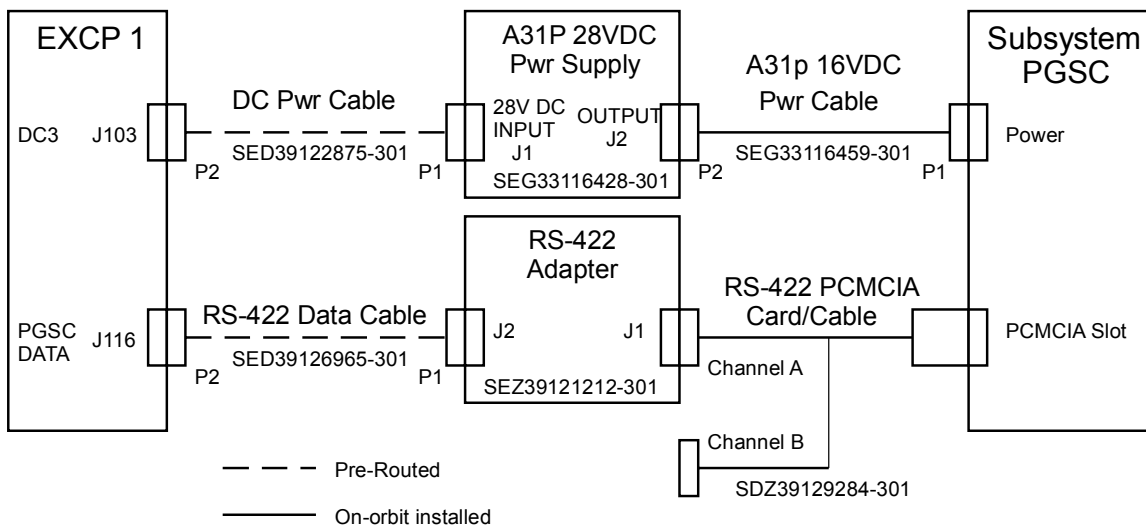


Figure 3-4.- Subsystem PGSC Cable Routing

START SPACEHAB MONITOR SOFTWARE

14. √Windows displayed
15. Double-click: SHUTTLE APPS folder on desktop
16. SPACEHAB folder
17. SPACEHAB SS MONITOR icon

PGSC: SPACEHAB SUMMARY

NOTE

Press [ALT]/[Enter] to toggle full screen mode if desired

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

	<u>POWER DOWN PGSC</u>
PGSC	Exit Spacehab software: <ol style="list-style-type: none">1. Press [ALT]/[Q] to exit software2. Press [Shft]/[F10] to confirm3. Shut down Windows4. √Automatic pwr off of PGSC5. Close PGSC
Pwr Supply EXCP1	<ol style="list-style-type: none">6. A31P 28VDC Pwr Supply INPUT PWR sw – OFF (OUTPUT PWR It off)7. cb DC3 – OFF
	<u>DISCONNECT PWR CABLES</u>
FC06	<ol style="list-style-type: none">8. Disconnect Enhanced A31p 16VDC Pwr Cable P1 from PGSC pwr port9. Disconnect Enhanced A31p 16VDC Pwr Cable P2 from A31P 28VDC Pwr Supply J210. Disconnect A31P 28VDC Pwr Supply J1 from pre-routed DC Pwr Cable P1
AC02	<ol style="list-style-type: none">11. Stow A31P 28VDC Pwr Supply and Enhanced A31p 16VDC Pwr Cable in Subsystem Stow 1
FC06	<ol style="list-style-type: none">12. Coil and stow pre-routed DC Pwr Cable
	<u>DISCONNECT DATA CABLES</u>
	<ol style="list-style-type: none">13. Eject RS-422 PCMCIA Card and RF Network Card from PCMCIA slot on PGSC14. Disconnect RS-422 Adapter J2 from pre-routed RS-422 Data Cable P1
AC02	<ol style="list-style-type: none">15. Stow RS-422 Adapter, RS-422 PCMCIA Card/Cable, and RF Network Card
FC06	<ol style="list-style-type: none">16. Coil and stow pre-routed RS-422 Data Cable
	If PGSC to be transferred to ISS: <ol style="list-style-type: none">17. Transfer per the Transfer List
	If PGSC to be stowed in Spacehab: <ol style="list-style-type: none">18. Stow PGSC in Subsystem Stow 1
AC02	

SUBSYSTEM PGSC RECOVERY

- | | | |
|------------------------|---|------------------------|
| EXCP 1 | 1. cb DC3 – ON | |
| Pwr Supply | 2. A31P 28VDC Pwr Supply INPUT PWR sw – ON
(OUTPUT PWR It – It on) | |
| PGSC | 3. PGSC pwr – on | |
| | 4. √Windows displayed | |
| | 5. Double-click SHUTTLE APPS folder on desktop | |
| | 6. SPACEHAB folder | |
| | 7. SPACEHAB SS MONITOR icon | |
| | <table border="1"><tr><td>PGSC: SPACEHAB SUMMARY</td></tr></table> | PGSC: SPACEHAB SUMMARY |
| PGSC: SPACEHAB SUMMARY | | |

NOTE

Press [ALT]/[Enter] to toggle full screen mode if desired

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 [Shft]/[F10] to confirm
 14. [Shft]/[F1] to return to display

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PORTABLE LIGHT

PORTABLE LT

PORTABLE LIGHT SETUP

- | | | |
|-------|--|--|
| FC01 | 1. Unstow portable fluorescent light from Subsystem Stow 2 | |
| EXCP1 | 2. √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

- | | | |
|-------|--|--|
| | 1. Portable fluorescent light sw – OFF | |
| EXCP1 | 2. cb AC1 – OFF | |
| | 3. Demate light cable from EXCP1 connector J94 | |
| FC01 | 4. Stow portable fluorescent light in Subsystem Stow 2 | |

PORTABLE LT

DC VACUUM

DC VACUUM

DC VACUUM CLEANER SETUP

- | | | |
|-------|--|--|
| MA9F | 1. Unstow, assemble Vacuum Cleaner, suction hose, crevice tool, and DC pwr cable | |
| FC06 | 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 | |
| MA9F | 6. Stow Vacuum Cleaner, suction hose, crevice tool, and DC pwr cable | |
| FC06 | 7. Stow DC Vacuum Cleaner Y-Cable 9063176-521 | |

SPACEHAB DEBRIS SCREEN

I

SH DEBRIS
SCREEN

SPACEHAB DEBRIS SCREEN CHECK

I

OBJECTIVE: Check potential debris collection sites in middeck and Spacehab module; clean as reqd

UNSTOW AS REQD: ORBITER

MA9F Vacuum Cleaner
Suction Hose
Crevice Tool

MF28K Gray Tape

SPACEHAB

FC02 Flat Tip Screwdriver (long), 3/16-in blade; gray tape; from Subsystem Stow 4

A. Middeck/Tunnel/Spacehab Debris Screen and Duct Debris Check

NOTE

Estimated time to complete entire part A is 20 min

MIDDECK 1. ✓ Inlet screen of Booster Fan Bypass Duct for Spacehab for blockage (ref. Figure 3-5). Remove debris if present (gray tape, vacuum as reqd)

NOTE

Expect MASTER ALARM, msgs:

'214 SH ARS FAN DP 1'

'214 SH ARS FAN DP 2'

CRT

SM 214 SPACEHAB ACT/DEAC

2. FANS ARS OFF – ITEM 61 EXEC (*)

SH Tunnel

3. Disconnect Spacehab Flex Duct from tunnel duct inlet and PL ISOL vlv outlet (ref. Figure 3-5)

NOTE

Debris screen should remain in place once duct is removed

4. ✓ Debris screen in tunnel duct for debris
If debris present, clean debris screen with gray tape (If vacuum cleaner reqd, perform DC VACUUM CLEANER SETUP)
5. Reconnect Spacehab Flex Duct to tunnel duct inlet and PL ISOL vlv outlet

CRT

SM 214 SPACEHAB ACT/DEAC

6. FANS ARS ON - ITEM 67 EXEC (*)

SH Module

7. ✓ Module debris screens (four locations) for blockage (ref. Figure 3-6)
8. Clean blocked debris screens with tape as reqd
9. Report results to MCC

NOTE

MCC will verify Fan ΔP to determine if Part B reqd.

Estimated time to complete entire part B is 40 min

SH DEBRIS
SCREEN

SPACEHAB DEBRIS SCREEN CHECK (Cont)

B. Access Spacehab Inlet Muffler Debris Screens

CAUTION
Pip pins in subfloor are noncaptive

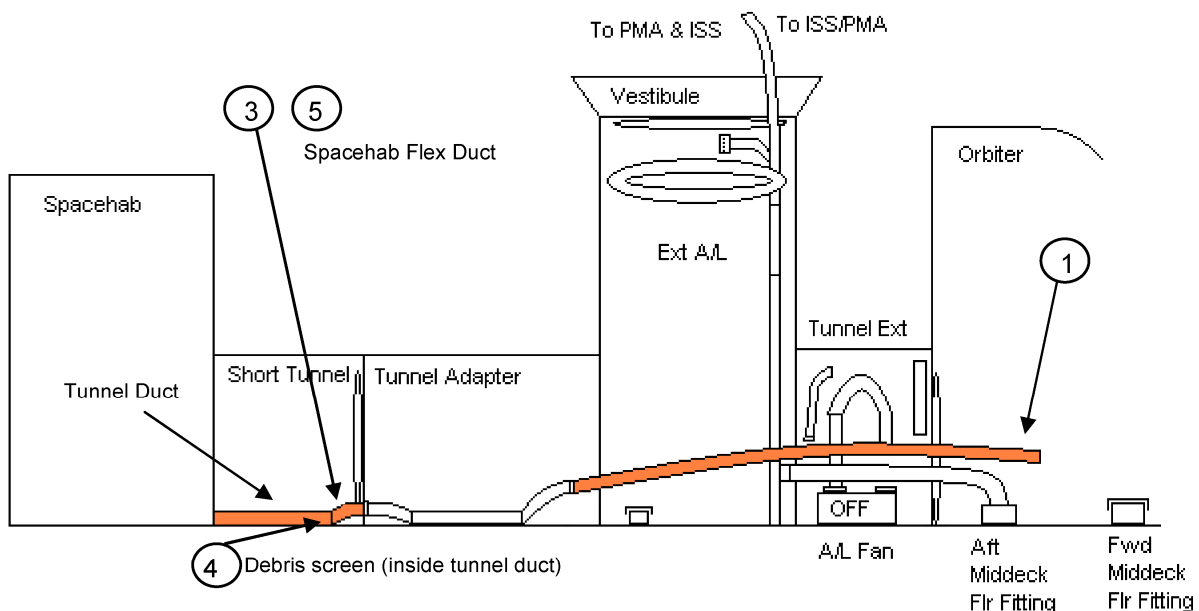
On MCC GO:

- D05
10. Remove pip pins (two), open floor panel, temp stow pip pins in floor panel
 11. Loosen 1/4-turn captive fasteners (ten) on inlet muffler (screwdriver) (ref. Figure 3-7)

NOTE

Spring-loaded pip pin removal not required

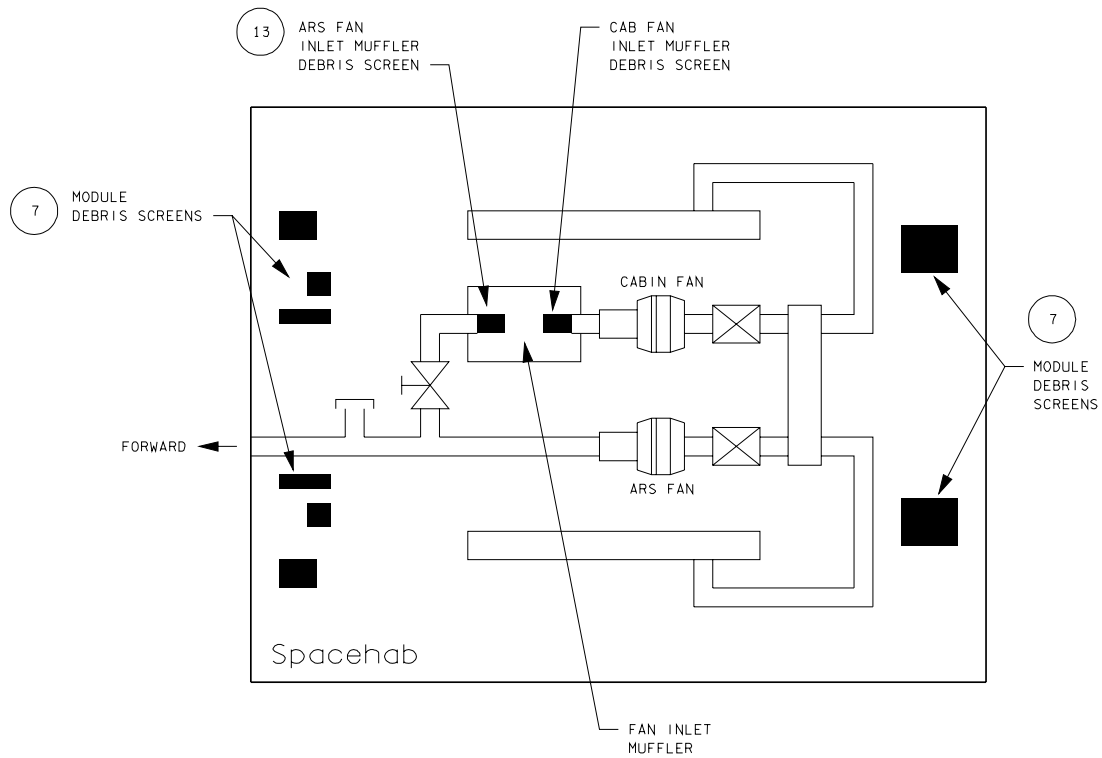
12. Lift and rotate cover to access ARS fan inlet muffler
 13. ✓ARS fan inlet muffler debris screen for blockage (ref. Figure 3-6)
If debris present, clean debris screens with gray tape (If vacuum cleaner reqd, perform DC VACUUM CLEANER SETUP)
 14. Replace Muffler cover:
Lift and rotate cover back in place
Push cover down and tighten 1/4-turn captive fasteners (ten) (screwdriver) (ref. Figure 3-7)
 15. Close floor panel, replace pip pins (two)
- FC02
16. Stow tools in Subsystem Stow 4 (perform DC VACUUM CLEANER STOW as reqd)
 17. Report results to MCC



Note: Circled numbers indicate applicable procedure steps.
Orange-colored ducting is ducting actually touched in this procedure.

Figure 3-5.- On-Orbit Duct Config

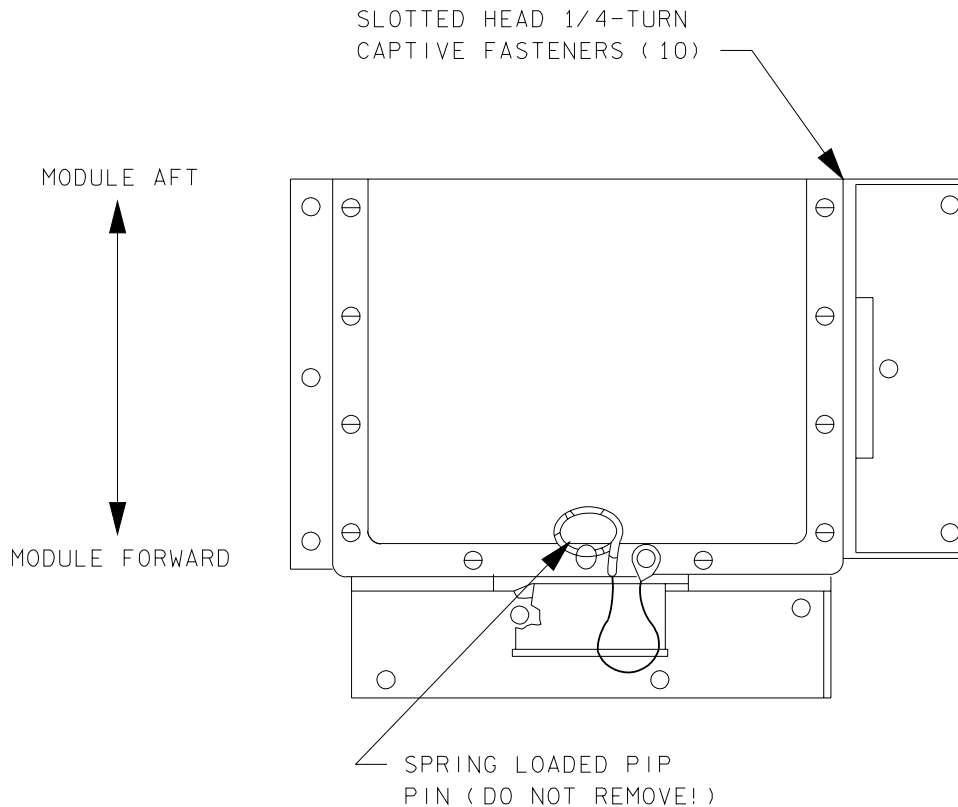
SPACEHAB DEBRIS SCREEN CHECK (Cont)



48089618_118. ART# 2

Note: Circled numbers indicate applicable procedure steps.

Figure 3-6.- Debris screen locations



48089619_118. ART# 1

Figure 3-7.- Muffler cover (top view)

ENTRY PREP

MODULE CLOSEOUT 4-2
TUNNEL CONFIG..... 4-3
BOOSTER FAN BYPASS TEARDOWN FOR SPACEHAB..... 4-4
ENTRY SYSTEM CONFIG 4-5

MODULE CLOSEOUT

SS PGSC DEACT

If SS PGSC deployed:

1. Perform SUBSYSTEM PGSC DEACTIVATION (ON-ORBIT), then:

PORTABLE LIGHT DEACT

If portable light deployed:

- | | | |
|-------|--|--|
| EXCP1 | 2. Portable fluorescent light sw – OFF | |
| | 3. cb AC1 – OFF | |
| | 4. Demate light cable from EXCP1 connector J94 | |
| FC01 | 5. Stow portable fluorescent light in Subsystem Stow 2 | |

SECURE MODULE

- | | | |
|---------|---|--|
| TNL ADP | 6. Retrieve SEBS, Adjustable Bungees (two) from Tunnel Adapter | |
| AC11 | 7. Disconnect SEBS Mask from SEBS and stow SEBS in Subsystem Stow 5 | |
| | 8. Stow Adjustable Bungees (two) in Ziplock Bag | |
| | 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. Remove seat track studs and stow | |
| FC06 | 12. Unstrap SEBS | |
| | 13. Disconnect SEBS Mask from SEBS, stow SEBS in Subsystem Stow 3 | |
| | 14. Stow Tissue Box (if used) and foam (from FC11) | |
| FC02 | 15. Stow Gray Tape in Subsystem Stow 4 | |
| | 16. Remove clamps and stow in VW Bag, stow VW Bag | |
| FC11 | 17. Place temp stowed CTB into former SEBS location | |
| AC11 | 18. ✓Module debris screen locations (four) for loose items/equipment | |
| | 19. Stow any remaining loose equipment in Subsystem Stow 5 | |
| MCP | 20. CABIN TEMP SEL tw (two) – 74 | |
| Ovhd | 21. ✓EXP VENT vlv – CL | |
| | 22. ✓Viewport Outer Cover closed | |
| | 23. ✓Inner Safety Cover installed | |
| | 24. ✓HTR – OFF (LED unlit) | |

CUE CARD STOW

- | | | |
|--------|---|--|
| SH OPS | 25. Remove cue cards (four) from crew preference location | |
| | 26. Stow cue cards in Ziplock Bag in back of SH OPS | |

BPSMU TEARDOWN

- | | | |
|-------------|-------------------------------|--|
| SH Hatch | 27. Disconnect BPSMU Cable QD | |
| | 28. Stow: | |
| MF43C | BPSMU | |
| MD Aft Wall | 42 ft BPSMU Audio #1 Cable | |
| | 35 ft BPSMU Audio #1 Cable | |
| | 44 ft BPSMU Audio #1 Cable | |
| | 4 ft BPSMU Audio #1 Cable | |

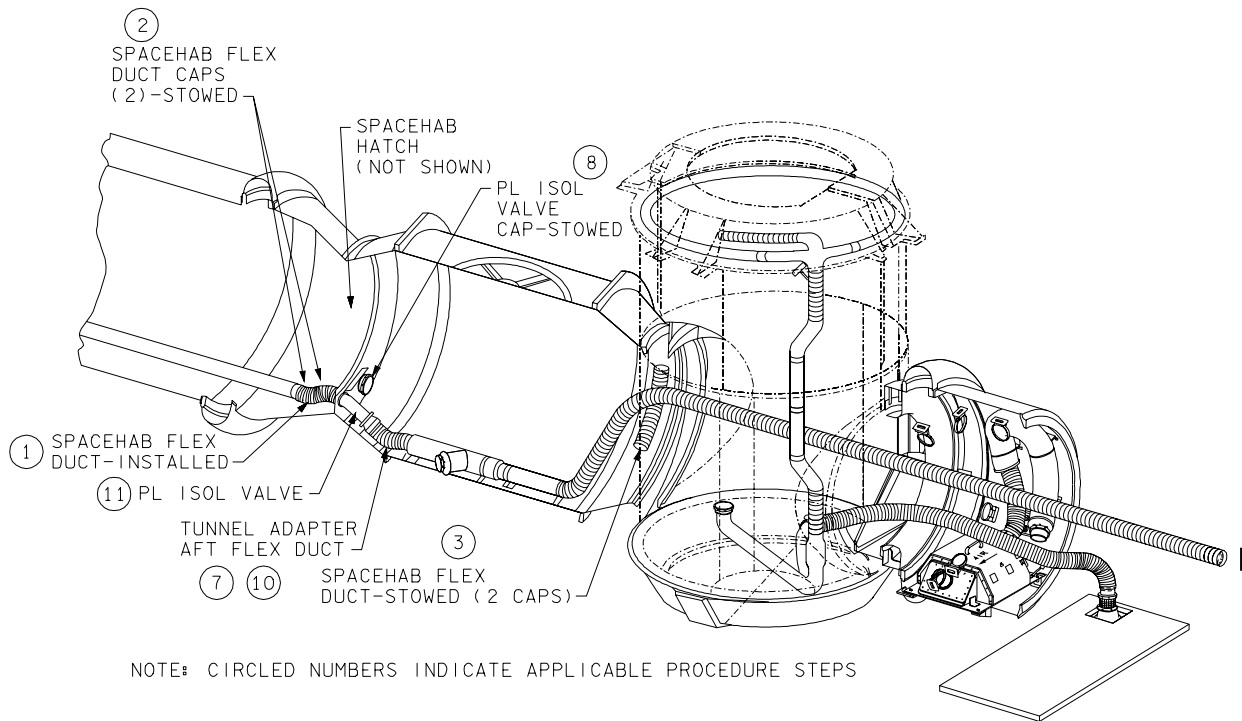
ENTRY PREP

TUNNEL CONFIG

NOTE

Debris screen should remain in place once duct is removed

- | | |
|---------------|---|
| SH Tunnel | <ol style="list-style-type: none"> 1. Disconnect Spacehab flex duct from screen assembly on tunnel duct inlet fitting and PL ISOL vlv outlet 2. Retrieve inlet and outlet caps, previously velcroed to outer shell of duct, and install on each end of the Spacehab flex duct using 3-in overcenter clamps (two) |
| TNL ADP (fwd) | <ol style="list-style-type: none"> 3. Stow Spacehab flex duct in tunnel adapter launch brackets |
| SH Hatch | <ol style="list-style-type: none"> 4. Close hatch per decal 5. Equal vlv (two) – OFF 6. Install Equal vlv caps (two) |
| TNL ADP (aft) | <ol style="list-style-type: none"> 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 |



48089404_118. ISO; 4

Figure 4-1.- Tunnel config (Entry Prep)

BOOSTER FAN BYPASS TEARDOWN FOR SPACEHAB

- | | |
|------------------|--|
| MIDDK
TNL EXT | 1. Unstow:
Plastic Tie (green) from Middeck Bag "D"
Airlock/Tunnel Adapter I/F duct from Tunnel Extension wall |
| TNL ADP
(fwd) | 2. Cut Plastic Tie (green) aft of Male/Male splice of Booster Fan Bypass duct for Spacehab |
| | 3. Disconnect Booster Fan Bypass duct for Spacehab from the Tunnel Adapter duct |
| | 4. Connect reducer of Airlock/Tunnel Adapter I/F duct to Tunnel Adapter duct and secure with Plastic Tie |
| EXT A/L | 5. Remove Cap from Airlock floor fitting |
| | 6. Connect Airlock/Tunnel Adapter I/F duct to Airlock floor fitting |
| MIDDK | 7. Stow Booster Fan Bypass duct for Spacehab, Cap in Middeck Bag "D" |

ENTRY SYSTEM CONFIG

INVERTER ACT

SM 214 SPACEHAB ACT/DEAC

CRT

1. DC INVERTER ON – ITEM 1 EXEC (*)
2. $\sqrt{\text{BUS INV } \Phi A, \Phi B, \Phi C \text{ VOLTS (three) } > 105.4 \text{ and } < 124.6}$

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

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. $\sqrt{\text{IN P } > 30 \text{ and } < 80}$
11. $\sqrt{\text{OUT P } > 40 \text{ and } < 105}$
12. $\sqrt{\text{HX H2O FLOW ARS } > 75}$
 $\sqrt{\text{CABIN } > 250}$
13. $\sqrt{\text{BUS INV } \Phi A, \Phi B, \Phi C \text{ AMPS (three) } > 0 \text{ and } < 2.9}$
14. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)

EPS CONFIG

NOTE

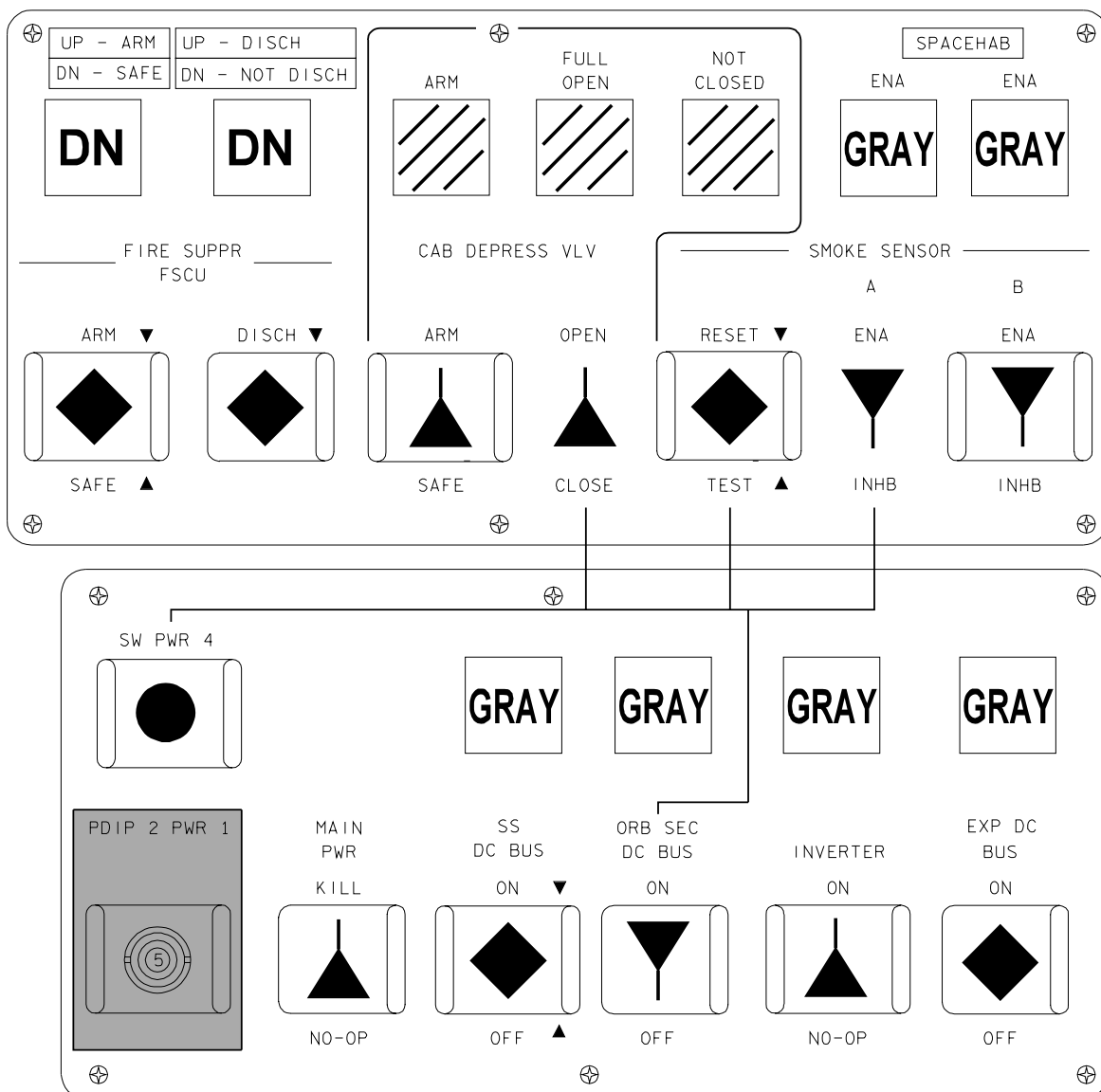
Item 27 will remain on because relay tied to SS BUS tb on SSP 2

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

DC	ON	OFF
INVERTER	1 <u>*</u>	2 <u> </u>
EXP BUS	3 <u>*</u>	4 <u> </u>
EXCP 1/2	5 <u> </u>	6 <u>*</u>
3	7 <u> </u>	8 <u>*</u>
4	9 <u> </u>	10 <u>*</u>
5	11 <u> </u>	12 <u>*</u>
6	13 <u> </u>	14 <u>*</u>
DM FN/LT	15 <u> </u>	16 <u>*</u>
RACK 1	17 <u> </u>	18 <u>*</u>
2	19 <u> </u>	20 <u>*</u>
UTIL AFT	21 <u> </u>	22 <u>*</u>
FWD	23 <u> </u>	24 <u>*</u>
SPARE	25 <u> </u>	26 <u>*</u>
PTB/CCTV	27 <u>*</u>	28 <u> </u>
LIGHTS	29 <u> </u>	30 <u> </u>
AC		
UTIL	41 <u> </u>	42 <u>*</u>
RACK 1	43 <u> </u>	44 <u>*</u>
2	45 <u> </u>	46 <u>*</u>
SPARE 1	47 <u> </u>	48 <u>*</u>
2	49 <u> </u>	50 <u>*</u>

MA73C:E

16. cb AC3 PL 3Φ – op



480890407_118.PNL; 2

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 It 055 – on

SH PPO2 1

- 25. C/W PARAM SEL tw (three) – 065
- 26. PARAM – INH
- 27. PARAM STATUS – INH, hold
- 28. √STATUS It 065 – on

SH PPCO2 1

29. C/W PARAM SEL tw (three) – 075
30. PARAM – INH
31. PARAM STATUS – INH, hold
32. √STATUS It 075 – on

SH CABIN TOTAL PRESS

33. C/W PARAM SEL tw (three) – 095
34. PARAM – INH
35. PARAM STATUS – INH, hold
36. √STATUS It 095 – on
37. PARAM SEL tw (three) – 120 or greater

FLIGHT DECK CUE CARD STOW

38. Remove Spacehab Hazardous Spill cue cards (two) from crew preference location
39. Stow cue cards in Ziplock Bag in back of SH OPS
40. Notify MCC:
SPACEHAB ENTRY PREP complete

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MN PWR KILL RECOVERY

MN PWR KILL RECOVERY – ARS FAN AND PUMP ON ORBITER AC

MN PWR KILL
RECOVERY

- SYSTEM SAFING
- Pwr Supply
EXCP 1
1. A31P 28VDC Pwr Supply INPUT PWR sw – OFF (OUTPUT PWR It off)
 2. cb DC 3 – OFF
- CRT
- SM 214 SPACEHAB ACT/DEAC
3. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)

- PREACTIVATION 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
- SM 214 SPACEHAB ACT/DEAC
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
- SM 214 SPACEHAB ACT/DEAC
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
- SM 215 SPACEHAB ECS
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)
- 37. FANS CABIN ORB – ITEM 66 EXEC (*)
- 38. AC SPARE 1 ON – ITEM 47 EXEC (*)

If SS PGSC to be repowered:

- 39. Perform SUBSYSTEM PGSC RECOVERY (ON-ORBIT), then:

If portable light to be used:

- 40. cb AC1 – ON
- 41. Portable fluorescent light sw – ON

EXCP1

MN PWR KILL RECOVERY – ARS FAN AND PUMP ON INVERTER AC

- C3
SSP 1
- H2O LN HTR ACT
1. √H2O LN HTRS – ON
 2. √cb SW PWR 2 – cl
 3. √ORB H2O LINE HTR PWR A – ON
 4. √B – OFF (A ENA)
- Pwr Supply
EXCP 1
- SYSTEM SAFING
5. A31P 28VDC Pwr Supply INPUT PWR sw – OFF (OUTPUT PWR It off)
 6. cb DC 3 – OFF
- CRT
- SM 214 SPACEHAB ACT/DEAC
7. DC LIGHTS OFF – ITEM 30 EXEC (no feedback)
- R1
- PREACTIVATION CHECKOUT
8. √PL PRI MNC – ctr (tb-ON)
 9. √AUX – ON
 10. √AFT MNB – ON
 11. √CAB – MNA
- SSP 2
- EPS RECOVERY
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
- SM 214 SPACEHAB ACT/DEAC
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
- SM 215 SPACEHAB ECS
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. $\sqrt{\Delta P \text{ 1,2 (two) } > 0.2 \text{ and } < 5.5}$
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
SSP 1

45. H2O LN HTRS – OFF
46. ORB H2O LINE HTR PWR A – OFF(B ENA)
47. \sqrt{B} – OFF(A ENA)
48. cb SW PWR 2 – op

If SS PGSC to be recovered:

49. Perform SUBSYSTEM PGSC RECOVERY (ON-ORBIT), then:

If portable light to be used:

EXCP1

50. cb AC1 – ON
51. Portable fluorescent light sw – ON

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SPACEHAB TOTAL DEACT

(Powers down module except for emergency (AFT B, AUX A, CAB PL) pwr)

MODULE CLOSEOUT

SS PGSC DEACT

If SS PGSC deployed:

1. Perform SUBSYSTEM PGSC DEACTIVATION (ON-ORBIT), then:

PORTABLE LIGHT DEACT

If portable light deployed:

- | | | |
|-------|--|--|
| EXCP1 | 2. Portable fluorescent light sw – OFF | |
| | 3. cb AC1 – OFF | |
| | 4. Demate light cable from EXCP1 connector J94 | |
| FC01 | 5. Stow portable fluorescent light in Subsystem Stow 2 | |

SECURE MODULE

- | | | |
|-----------------|---|--|
| TNL ADP
AC11 | 6. Retrieve SEBS and Adjustable Bungees (two) from Tunnel Adapter | |
| | 7. Disconnect SEBS Mask from SEBS and stow SEBS in Subsystem Stow 5 | |
| | 8. Stow Adjustable Bungees (two) in Ziplock Bag | |
| | 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 | |
| | 11. Remove seat track studs and stow | |
| FC11 | 12. Unstrap SEBS | |
| FC06 | 13. Disconnect SEBS Mask from SEBS, stow SEBS in Subsystem Stow 3 | |
| | 14. Stow Tissue Box (if used) and foam (from FC11) | |
| FC02 | 15. Stow Gray Tape in Subsystem Stow 4 | |
| | 16. Remove clamps and stow in VW Bag, stow VW Bag | |
| FC11 | 17. Place temp stowed CTB into former SEBS location | |
| | 18. √Module debris screen locations (four) for loose items/equipment | |
| AC11
Ovhd | 19. Stow any remaining loose equipment in Subsystem Stow 5 | |
| | 20. √EXP VENT vlv – CL | |
| | 21. √Viewport Outer Cover closed | |
| | 22. √Inner Safety Cover installed | |
| | 23. √HTR – OFF (It off) | |

CUE CARD STOW

- | | | |
|--------|---|--|
| SH OPS | 24. Remove cue cards (four) from crew preference location | |
| | 25. Stow cue cards in Ziplock Bag in back of SH OPS | |

STOW BPSMU AND PD100 CC

- | | | |
|----------------------|---|--|
| SH Hatch | 26. If reqd, disconnect PD100 CC cable QD and stow CC and cable in A17 DTV Bag | |
| | 27. Disconnect BPSMU cable QD | |
| MF43C
MD Aft Wall | 28. Stow:
BPSMU
42-ft BPSMU Audio #1 Cable
35-ft BPSMU Audio #1 Cable
44-ft BPSMU Audio #1 Cable
4-ft BPSMU Audio #1 Cable | |

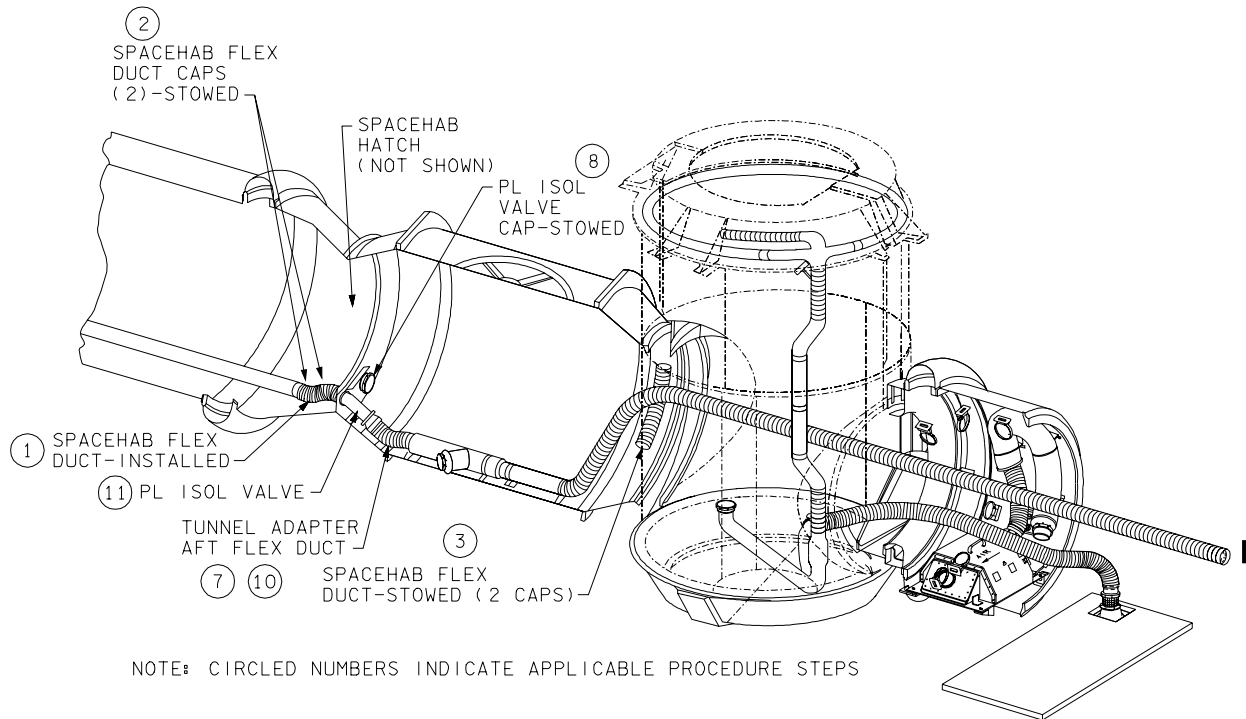
SPACEHAB
TOTAL DEACT

TUNNEL CLOSEOUT

NOTE

Debris screen should remain in place once duct is removed

- | | |
|---------------|--|
| SH Tunnel | <ol style="list-style-type: none"> 1. Disconnect Spacehab flex duct from screen assembly on tunnel duct inlet fitting and PL ISOL vlv outlet 2. Retrieve inlet and outlet caps, previously velcroed to outer shell of duct, and install on each end of the Spacehab flex duct using 3-in overcenter clamps (two) |
| TNL ADP (fwd) | <ol style="list-style-type: none"> 3. Stow Spacehab flex duct in tunnel adapter launch brackets |
| SH Hatch | <ol style="list-style-type: none"> 4. Close hatch per decal 5. Equal vlv (two) – OFF 6. Install Equal vlv caps (two) |
| TNL ADP (aft) | <ol style="list-style-type: none"> 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 |



48089404_118. ISO: 4

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

SYSTEM CONFIG

- C3
SSP 1
- H2O LINE HEATERS CONFIG
1. H2O LN HTRS – ON
 2. cb SW PWR 2 – cl
 3. ORB H2O LINE HTR PWR A – ON
 4. \sqrt{B} – OFF(A ENA)
- 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:

DC	ON	OFF
INVERTER	1 _____	2 _____*
EXP BUS	3 _____*	4 _____
EXCP 1/2	5 _____	6 _____*
3	7 _____	8 _____*
4	9 _____	10 _____*
5	11 _____	12 _____*
6	13 _____	14 _____*
DM FN/LT	15 _____	16 _____*
RACK 1	17 _____	18 _____*
2	19 _____	20 _____*
UTIL AFT	21 _____	22 _____*
FWD	23 _____	24 _____*
SPARE	25 _____	26 _____*
PTB/CCTV	27 _____	28 _____*
LIGHTS	29 _____	30 _____
AC		
UTIL	41 _____	42 _____*
RACK 1	43 _____	44 _____*
2	45 _____	46 _____*
SPARE 1	47 _____	48 _____*
2	49 _____	50 _____*

MA73C:E

13. cb AC3 PL 3Φ – op

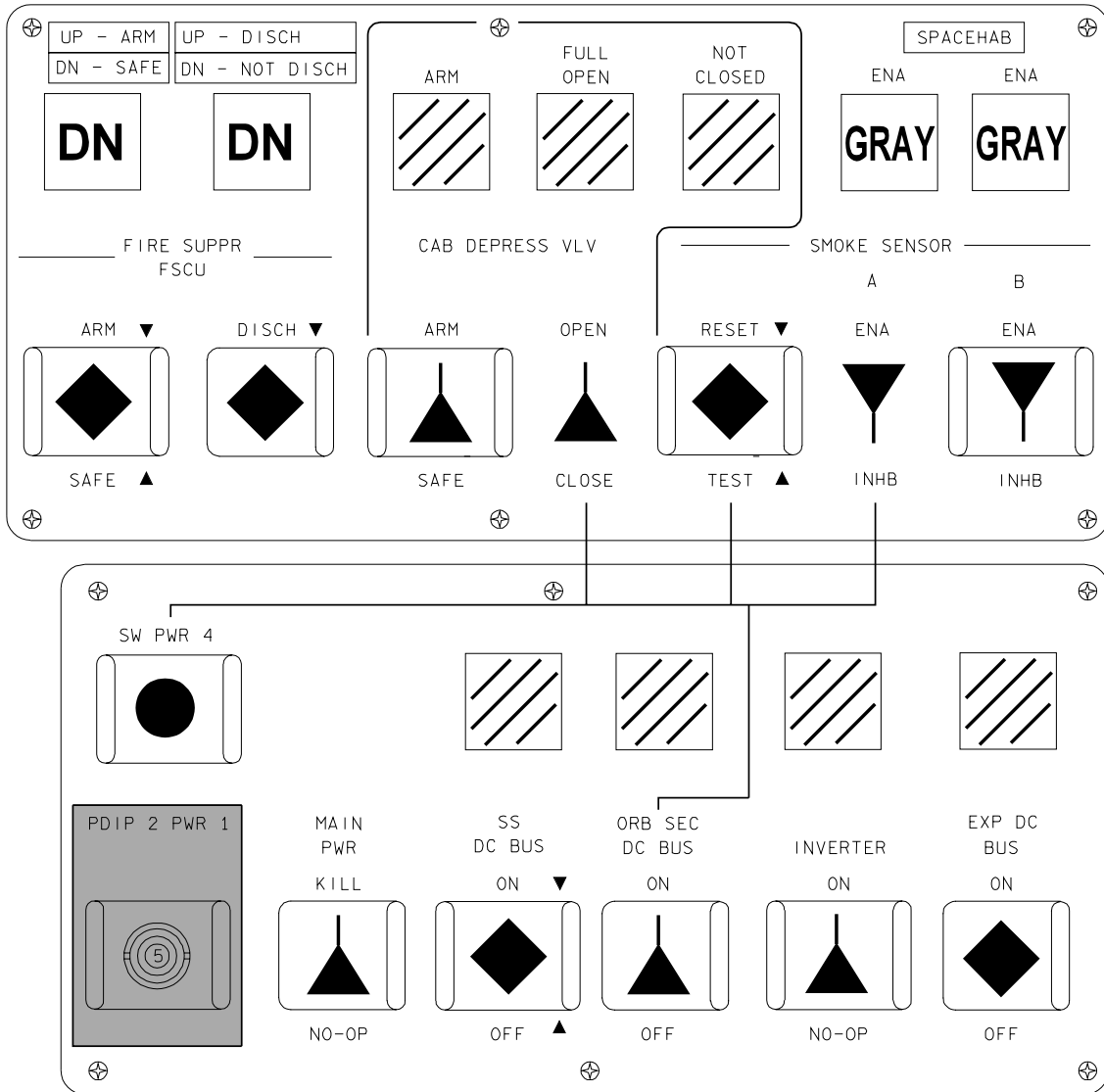
NOTE

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



480890103_118. PNL; 2

CAUTION AND WARNING CONFIG

If SH Cabin Fan was ON:

R13U

SH CABIN FAN DP 2

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

SH PPO2 1

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

SH PPCO2 1

27. C/W PARAM SEL tw (three) – 075
28. PARAM – INH
29. PARAM STATUS – INH, hold
30. √STATUS It 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 It 085 – on

SH CABIN TOTAL PRESS

35. C/W PARAM SEL tw (three) – 095
36. PARAM – INH
37. PARAM STATUS – INH, hold
38. √STATUS It 095 – on
39. PARAM SEL tw (three) – 120 or greater

REMOVE PRIMARY PWR

R1

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)

FLIGHT DECK CUE CARD STOW

43. Remove Spacehab Hazardous Spill cue cards (two) from crew preference location
44. Stow cue cards in Ziplock Bag in back of SH OPS
45. Notify MCC:
SPACEHAB TOTAL DEACT complete

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SPACEHAB 30-MIN DEACTIVATION

SH 30-MIN
DEACT

SPACEHAB 30-MIN DEACTIVATION

- | | |
|--------------------|---|
| VP | 1. Safe Penetrators:
√PFE secured in brackets on fwd bulkhead, stbd of hatch opening
√SEBS secured at FC11 (cross-strapped)
√OBSS OSE Boom Stands (two) secured at AS01 and AS03 or transferred to ISS |
| VP HTR
CNTL PNL | 2. √Viewport Outer Cover closed
3. √Inner Safety Cover installed and handscrews (three) tight
4. √VP HTR – OFF (It off) |

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:

- | | |
|-----------------|---|
| EXCP 1 | 7. Portable fluorescent light sw – OFF |
| | 8. cb AC1 – OFF |
| | 9. Demate light cable from EXCP1 connector J94 |
| FC01 | 10. Stow portable fluorescent light in Subsystem Stow 2 |
| TNL ADP
AC11 | 11. Retrieve SEBS and Adjustable Bungees (two) from Tunnel Adapter |
| | 12. Disconnect SEBS Mask from SEBS and stow SEBS and Mask in Subsystem Stow 5 |
| | 13. Stow Adjustable Bungees (two) in Ziplock Bag |

NOTE

Expect MASTER ALARM, msgs:

‘214 SH ARS FAN DP 1’

‘214 SH ARS FAN DP 2’

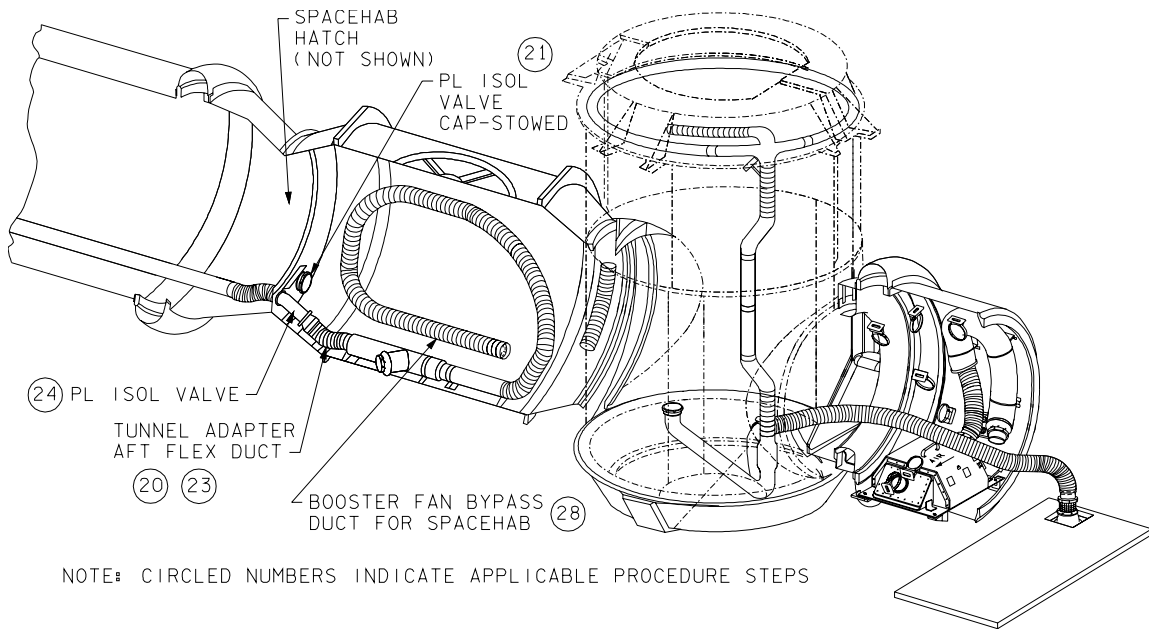
- | | |
|------------------|---|
| EXCP2 | 14. ARS – FAN OFF |
| | 15. If reqd, disconnect PD100 CC cable QD and stow CC and cable in A17 DTV Bag |
| SH Hatch | 16. Disconnect BPSMU Cable QD |
| | 17. Remove BPSMU and 8-ft cable from Spacehab |
| | 18. Close hatch per decal |
| | 19. Equal vlv (two) – OFF |
| | 20. Install Equal vlv caps (two) |
| TNL ADP
(aft) | 21. Disconnect tunnel adapter aft flex duct from PL ISOL vlv |
| | 22. Remove PL ISOL vlv cap from Velcro pad located near valve |
| | 23. Replace inside duct |
| | 24. Reconnect tunnel adapter aft flex duct to PL ISOL vlv using 3-in overcenter clamp |
| | 25. PL ISOL VLV – CL |

SH 30-MIN DEACT

CRT
MF43C

SM 214 SPACEHAB ACT/DEAC

26. FANS CABIN ON – ITEM 68 EXEC (*)
27. Stow BPSMU and 8-ft cable
28. Unstrap Booster Fan Bypass Duct for Spacehab (inlet) from middeck and relocate/secure in Tunnel Adapter
29. ✓MCC for power config



48089405_118. ISO; 5

Figure 5-2.- Tunnel Config (30-min Deact)

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SPACEHAB POST-FIRE EVALUATION

SH POST-FIRE
EVALUATION

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

MO10W
AW82B

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

NOTE

Expect possible dP/dT klaxon

CRT
AW82B

4. AIRLK DEPRESS vlv – 5
- When CABIN PRESS = 0.2 less than starting point in step 1:
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

SH Hatch

10. Sampling Pump sw – ON
11. Position CSA-CP sensor near one Equal vlv

CSA-CP

12. √Equal vlv cap (one) removed
13. Equal vlv (one) – NORM, wait 30 sec
14. – OFF
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. √ΔP1,2 (two) > 0.2 and < 5.5

SH POST-FIRE
EVALUATION

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ARS FAN CLAMP

ARS FAN CLAMP

ARS FAN CLAMP REMOVAL FOR NOISE REDUCTION

TOOLS REQD: SPACEHAB
 FC02 1/4-in Ratchet Wrench
 7/16-in 6-point Deepwell Socket

- D05
1. Remove pip pins, open floor panel
 2. Loosen nuts on Fan Clamps (two) enough to allow Clamps to expand.
 DO NOT REMOVE NUTS (1/4-in Ratchet, 7/16-in 6-point Deepwell Socket)
 3. Release T-handle on both Clamps, remove Clamps
- AC11
4. Close floor panel, replace pip pins
 5. Temp stow Clamps (two) in Subsystem Stow 5
- FC02
6. Stow tools

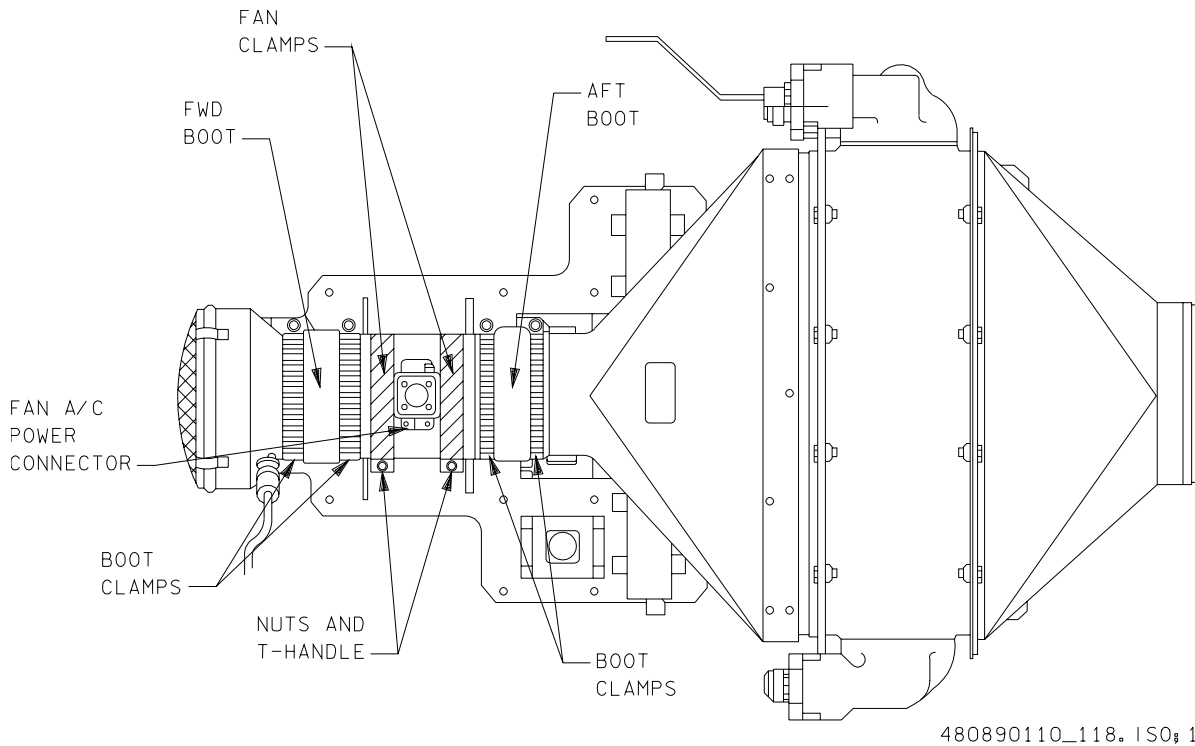


Figure 5-3.- Fan/HX assy (top view)

ARS FAN CLAMP REPLACEMENT

TOOLS REQD: SPACEHAB
FC02 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
- FC02
6. Stow tools

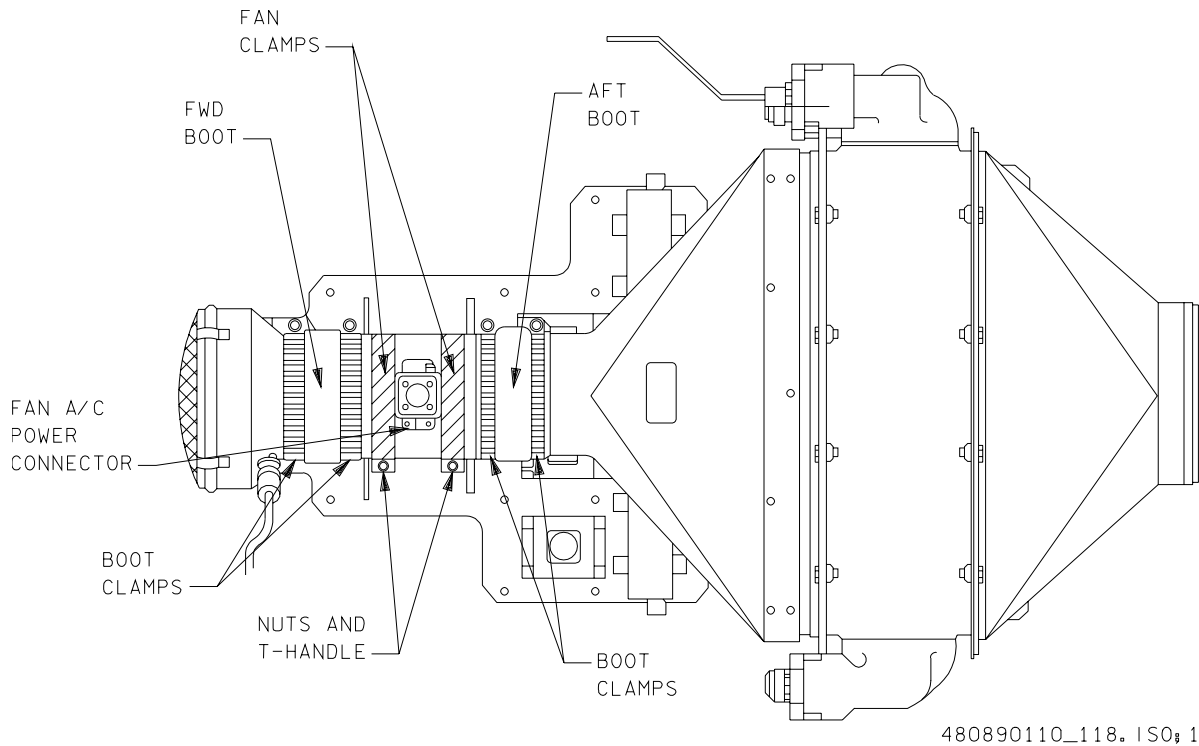


Figure 5-4.- Fan/HX assy (top view)

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TRANSFER

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

TRANSFER

RACK FRONT STOWAGE TRAY REMOVAL

VW Bag
PORT/STBD
Rack

1. Remove Bungee Straps (four), temp stow
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

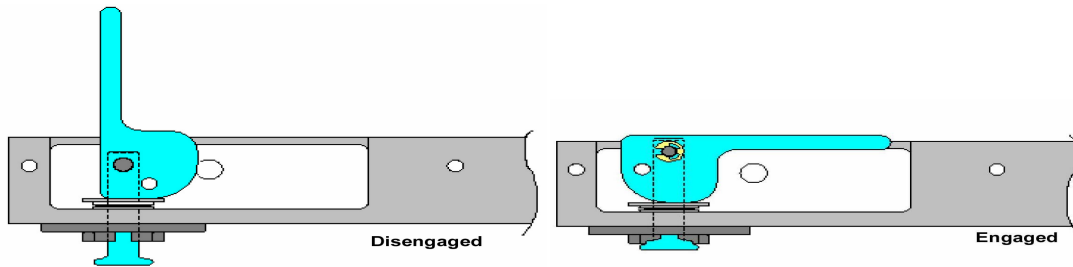


Figure 6-1.- Lever Positions

RACK FRONT STOWAGE TRAY REPLACEMENT

PORT/STBD
Rack

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 6-1. Alignment For Rack Front Stowage Tray to Seat Track Position

Rack Location	Tray 1	Tray 2	Tray 3	Tray 4
Fwd Starboard	3	23	43	63
Fwd Port	3	23	43	N/A

VW Bag

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

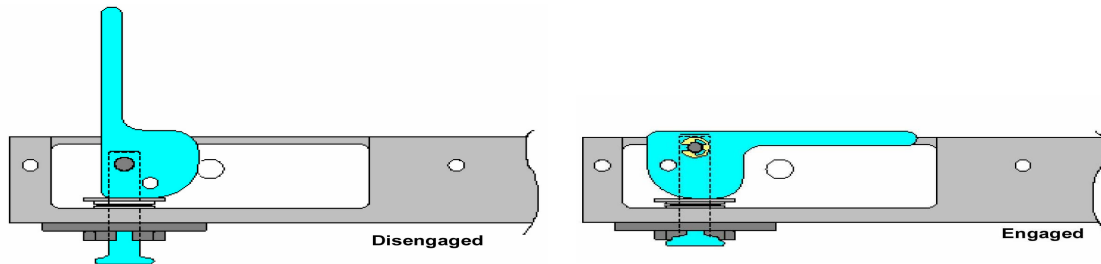


Figure 6-2.- Lever Positions

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SPACEHAB EXPERIMENTS

(N/A)

EXPERIMENTS

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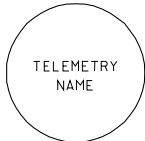
REFERENCE DATA

SUBSYSTEM FIGURES.....	8-3
EXCP PLUG-IN PLAN	8-11
SPACEHAB DUCT CONFIGURATIONS.....	8-17


REFERENCE
DATA

REFERENCE DATA

REF DATA LEGEND


TELEMETRY BUBBLES:  TELEMETRY BUBBLES ARE SHOWN FOR SENSORS THAT THE CREW CAN SEE ON THEIR SPEC PAGES. SENSORS THAT HAVE NO TELEMETRY BUBBLE INDICATE THAT THE TELEMETRY IS AVAILABLE TO THE GROUND, BUT IS NOT AVAILABLE TO THE CREW

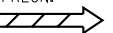
TELEMETRY DESCRIPTION:
 SPEC: abc = CREW SPEC PAGE NUMBER abc
 FDA: "xyz" = FDA MESSAGE (xyz) ASSOCIATED WITH THIS TELEMETRY
 <v OR >w = FDA LIMITS (v IS LOWER LIMIT, w IS UPPER LIMIT)
 MAL: d = MALFUNCTION NUMBER "d" IN THE SH OPS C/L


TELEMETRY SOURCES:  SENSOR TYPE Y
 Y: V = VOLTAGE
 I = CURRENT
 T = TEMPERATURE
 P = PRESSURE OR PARTIAL PRESSURE
 S = SMOKE
 D = DEWPOINT
 F = FLOWRATE
 Q = QUANTITY
 H = POSITION
 ΔP = DELTA PRESSURE


AIR/WATER LOOP SYMBOLS:

AIR LOOP:  ARROW INDICATES DIRECTION OF FLOW

WATER LOOP:  ARROW INDICATES DIRECTION OF FLOW


FREON:  ARROW INDICATES DIRECTION OF FLOW

HEATER:  SYMBOL USED TO REPRESENT WATER LINE HEATERS, NOT MEANT TO INDICATE ACTUAL NUMBER OF HEATERS, BUT RATHER TO SHOW WHERE THEY ARE FUNCTIONALLY


QUICK DISCONNECT:  SYMBOL USED TO REPRESENT QUICK DISCONNECTS THAT THE CREW MIGHT ACCESS IN A PUBLISHED IFM. OD'S THAT ARE NOT ACCESSED ARE NOT SHOWN

CIRCUIT SYMBOLS:

FUSE:  FXX = FUSE NUMBER (SOME FUSES DO NOT HAVE NUMBERS)
 YY A = FUSE RATING IN AMPS

CIRCUIT BREAKER (PUSH/PULL TYPE):  CBXX = CIRCUIT BREAKER NUMBER
 YY A = CIRCUIT BREAKER RATING IN AMPS

CIRCUIT BREAKER (SWITCH TYPE):  DCXX = CIRCUIT BREAKER NUMBER (ON EXCP)
 YY A = CIRCUIT BREAKER RATING IN AMPS

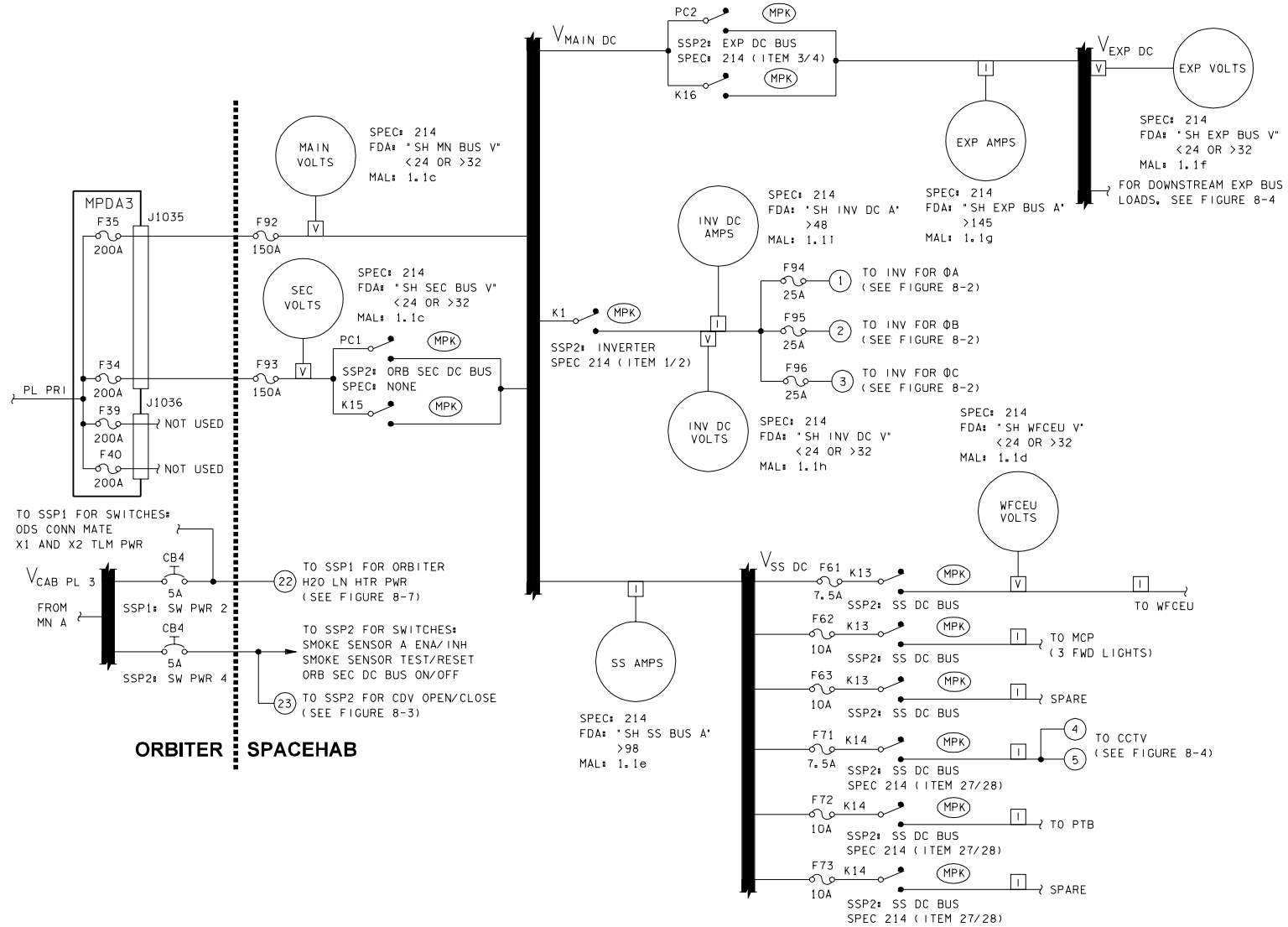
RELAY:  XXX = RELAY DESIGNATION XXX (SOME RELAYS DO NOT HAVE NUMBERS)
 K = RELAY, PC = POWER CONTACTOR
 LOCATION = LOCATION AT WHICH RELAY IS CONTROLLED
 PANEL: xyz
 PANEL = STANDARD SWITCH PANEL (SSP), C3A5, R1, ETC.
 xyz = NOMENCLATURE ON SSP
 SPEC xyz (ITEM A/B)
 SPEC xyz = CREW SPEC PAGE NUMBER
 ITEM A/B = ITEM ENTRIES ON SPEC (ON/OFF)

BUS:  V_{xyz}
 V_{xyz} = BUS NAME xyz

MAIN POWER KILL:  THIS SYMBOL IS PLACED BY ALL RELAYS THAT ARE AFFECTED BY A MAIN POWER KILL SIGNAL. THE MAIN POWER KILL SIGNAL CAUSES THE AFFECTED RELAYS TO OPEN

48089602_118. SCH: 1

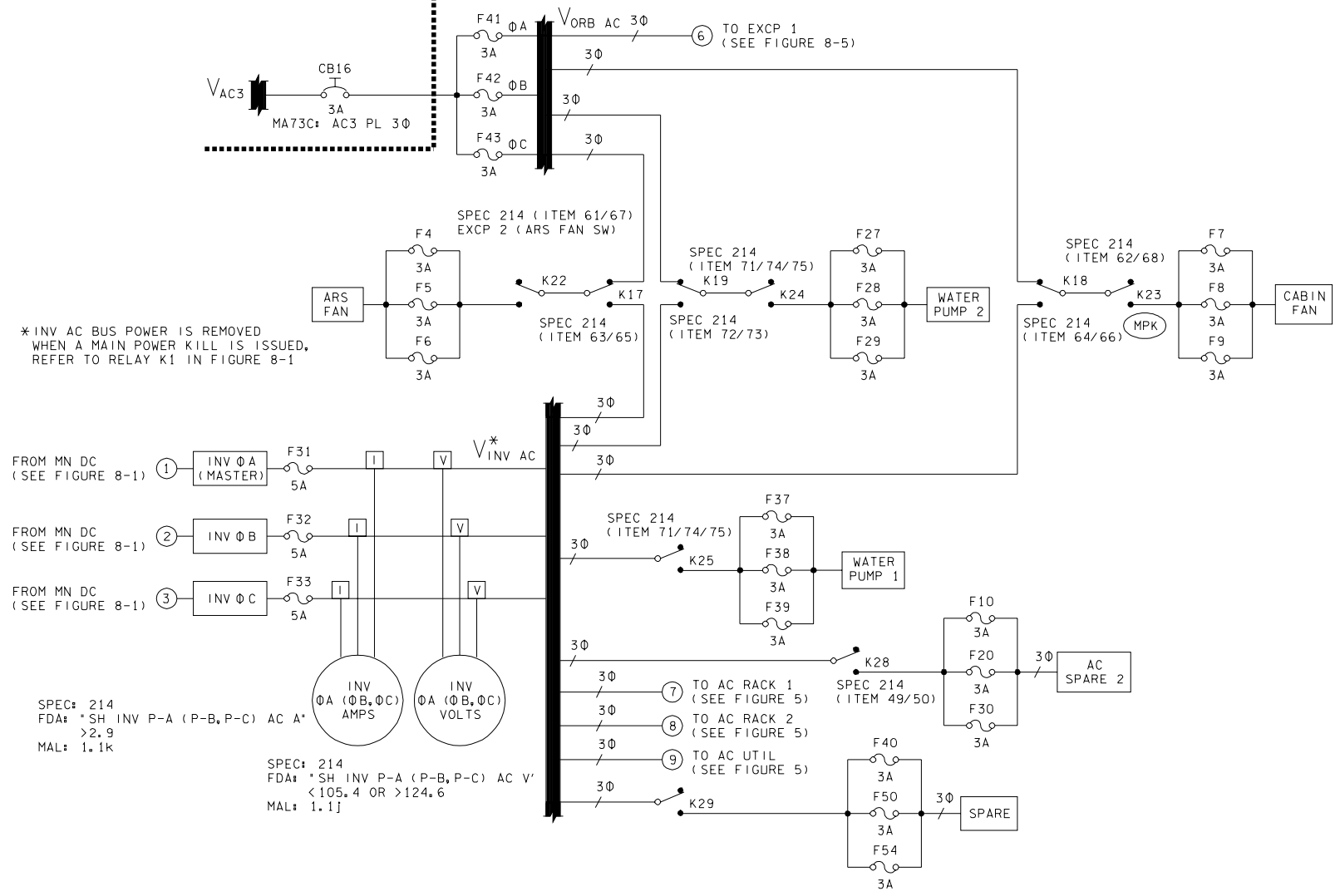
SUBSYSTEM FIGURES



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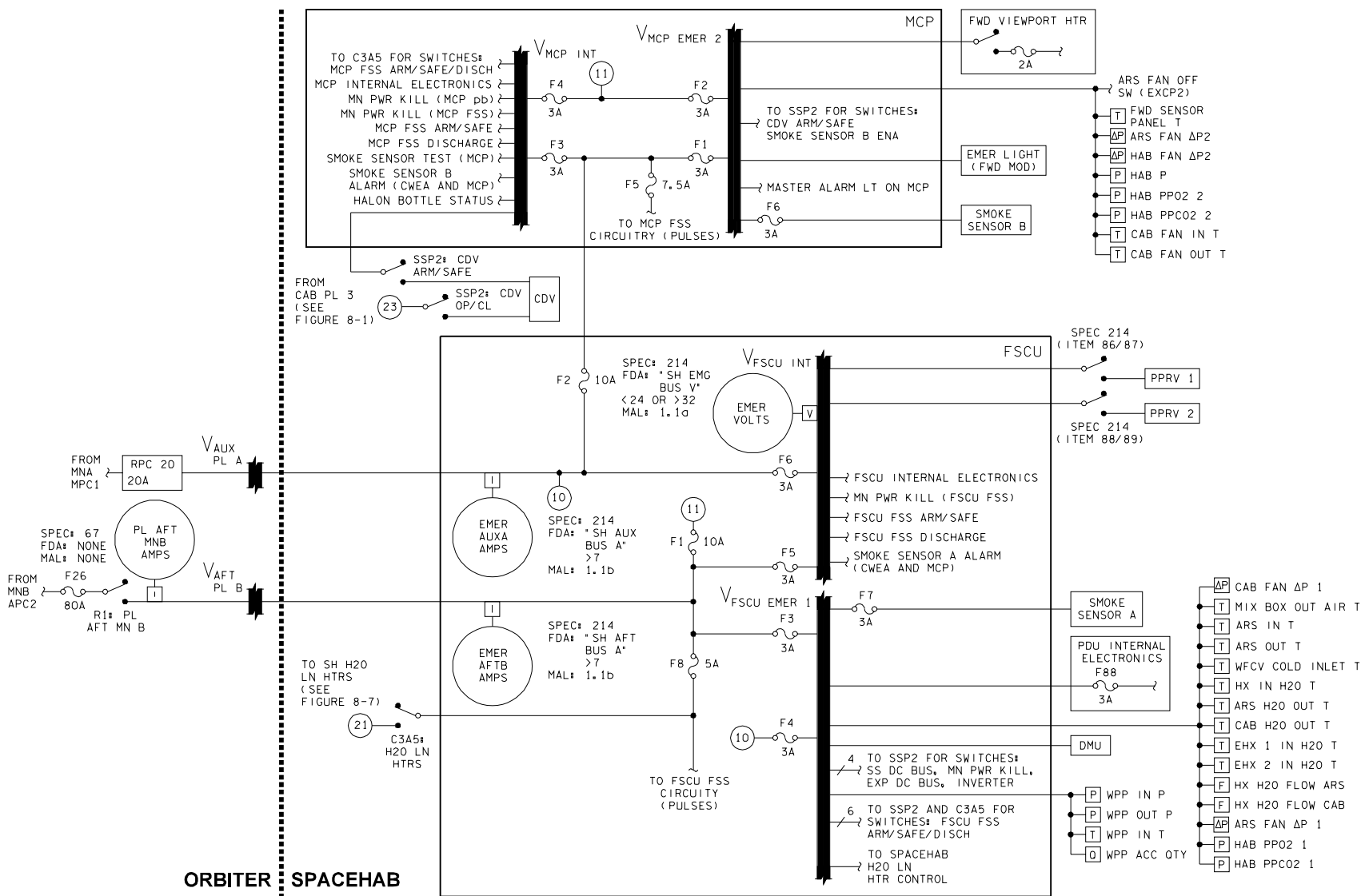
Figure 8-1.- Spacehab DC Power

ORBITER | SPACEHAB



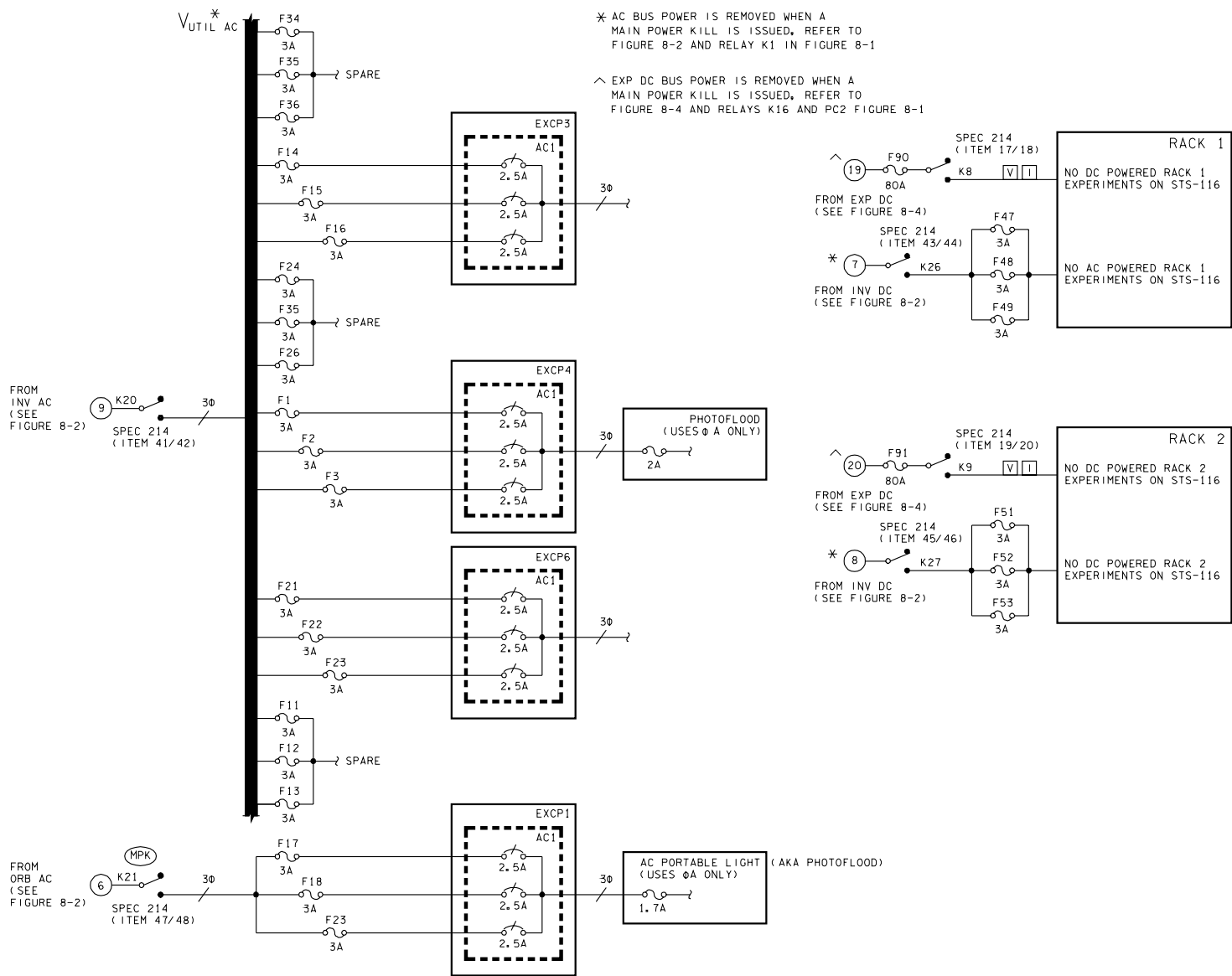
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Figure 8-2.- Spacehab AC Power



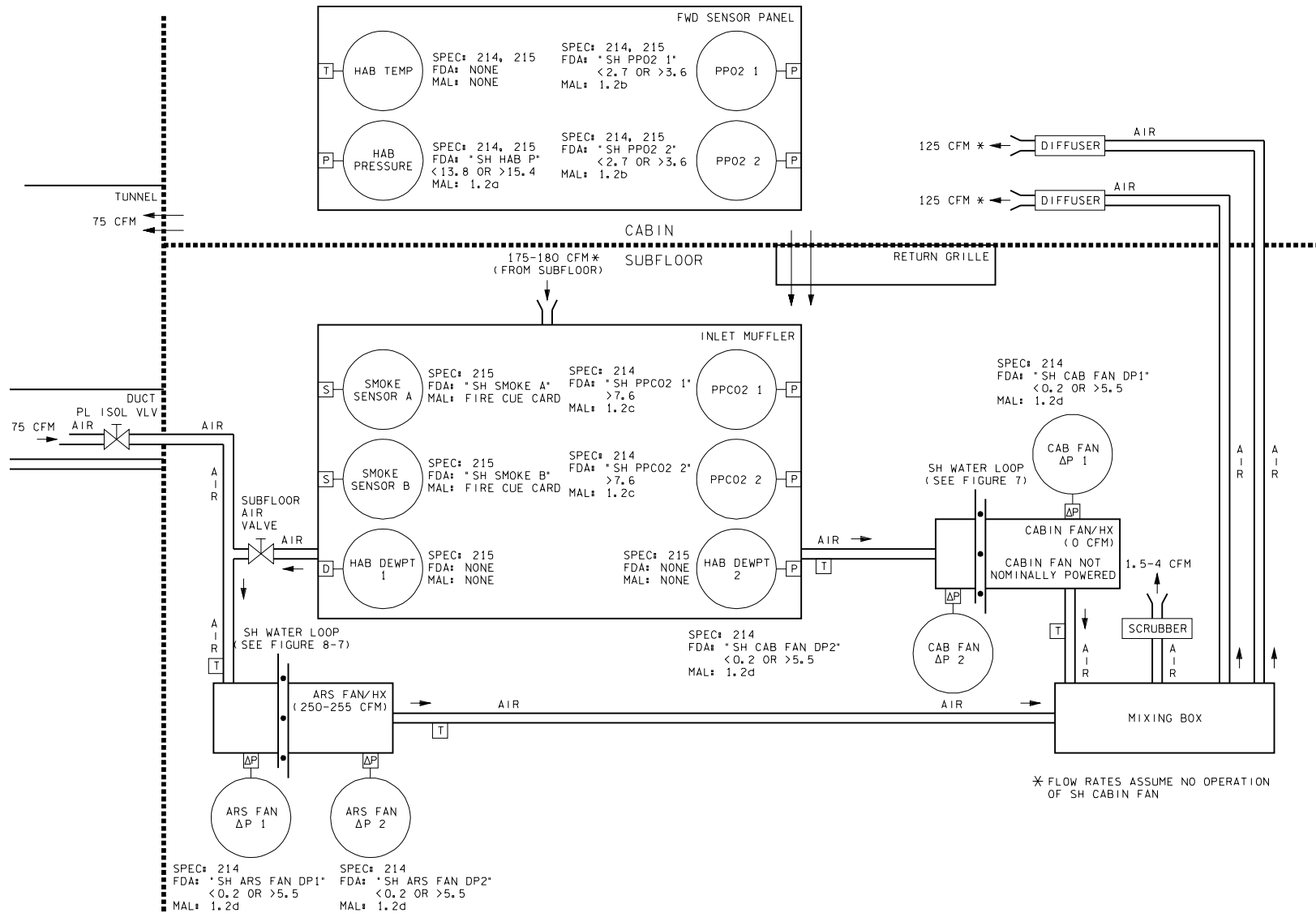
48089605_118, SCH 1

Figure 8-3.- Spacehab Emergency Power



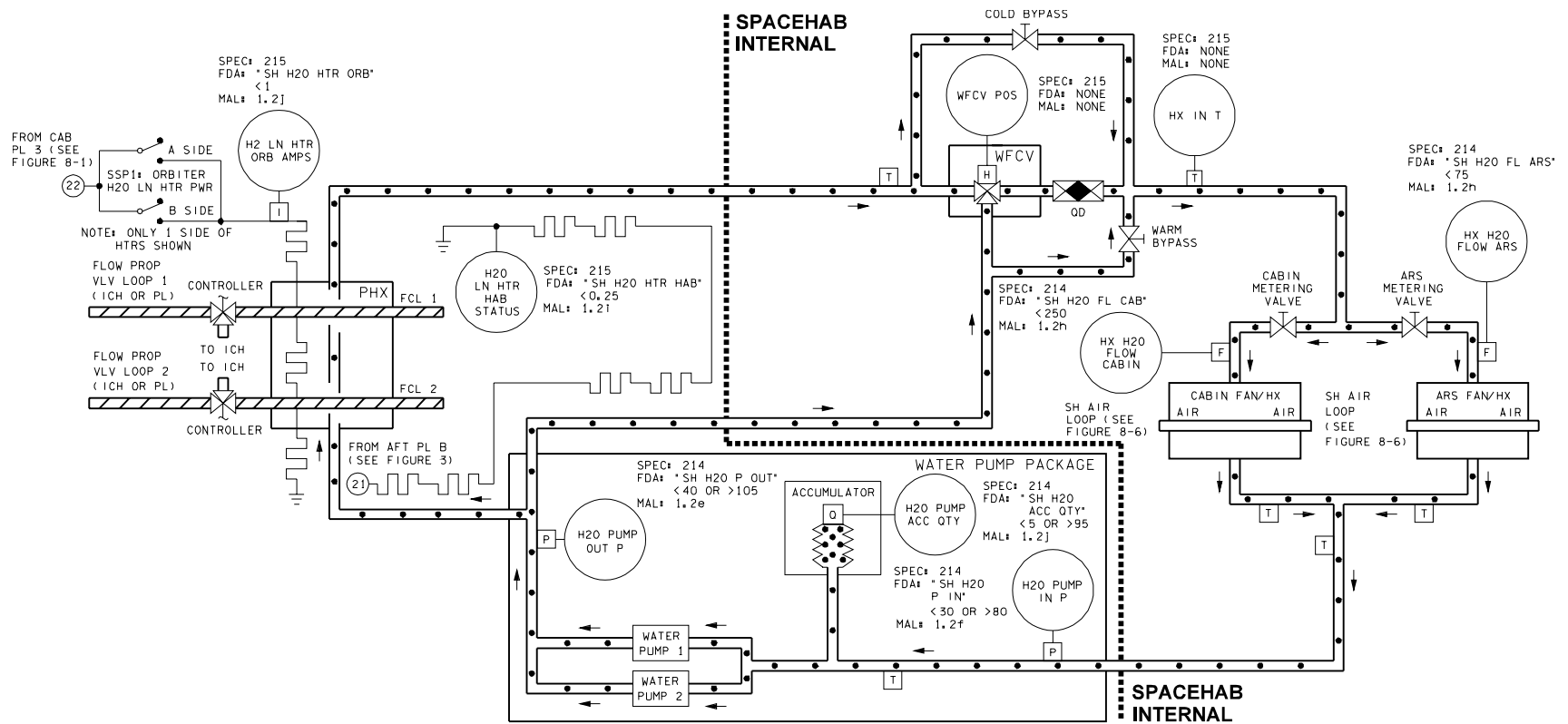
48089606_118, SCH 2

Figure 8-5.- Spacehab Experiment Power: Bulkhead AC and Rack Experiments



48089607_118, SCH: 2

Figure 8-6.- Spacehab Air Loop



48089608_118_SCH 1

Figure 8-7.- Spacehab Water Loop

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EXCP PLUG-IN PLAN

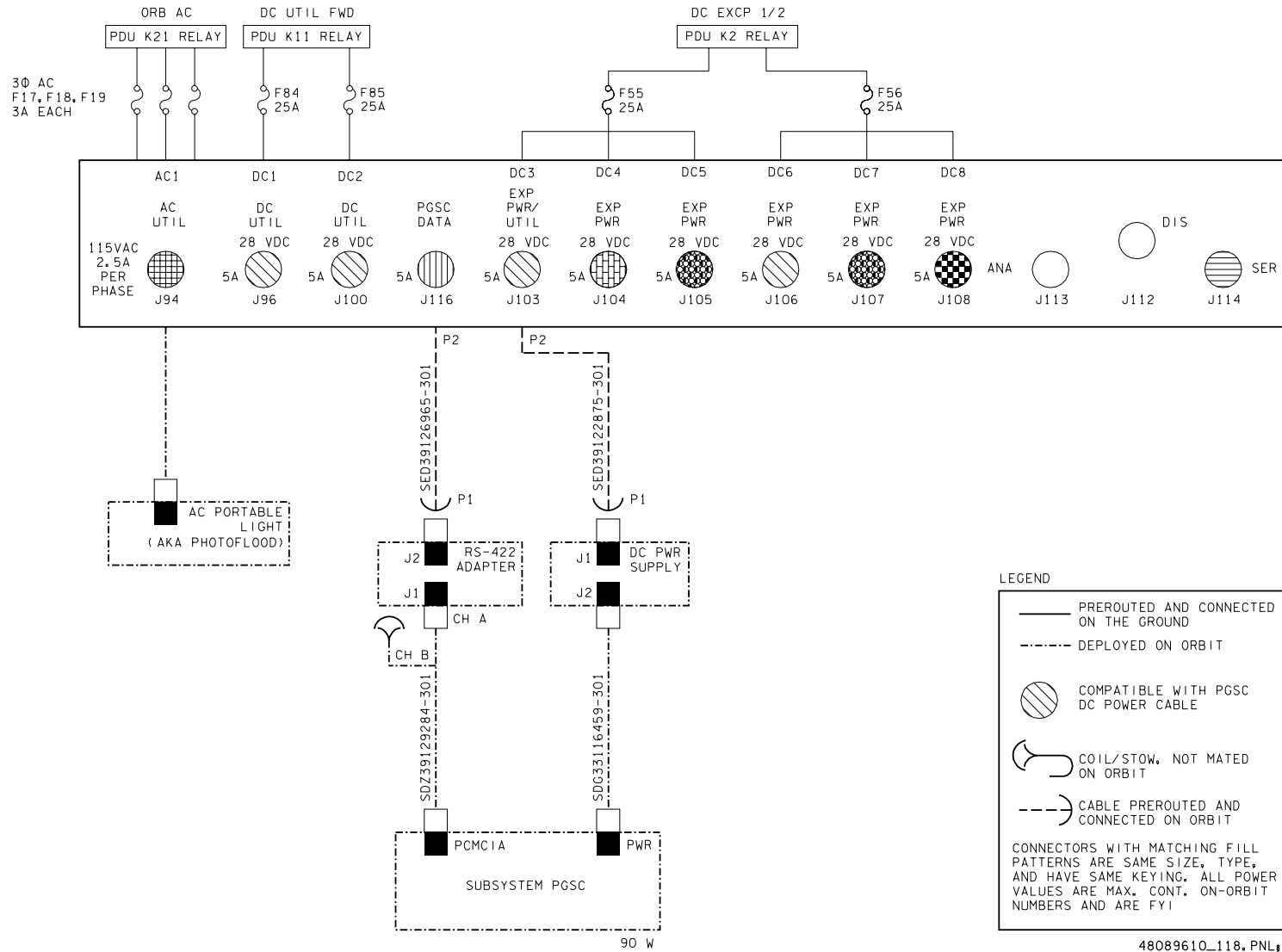
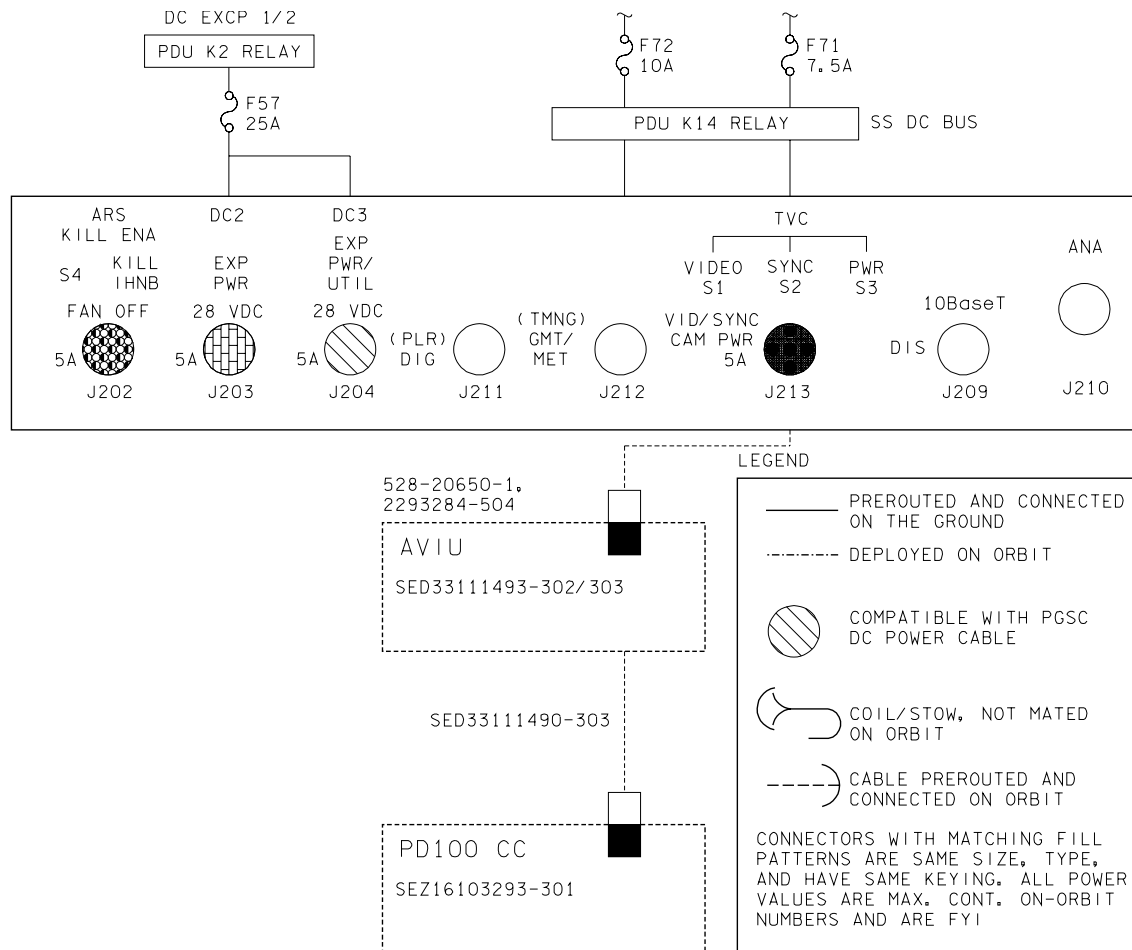
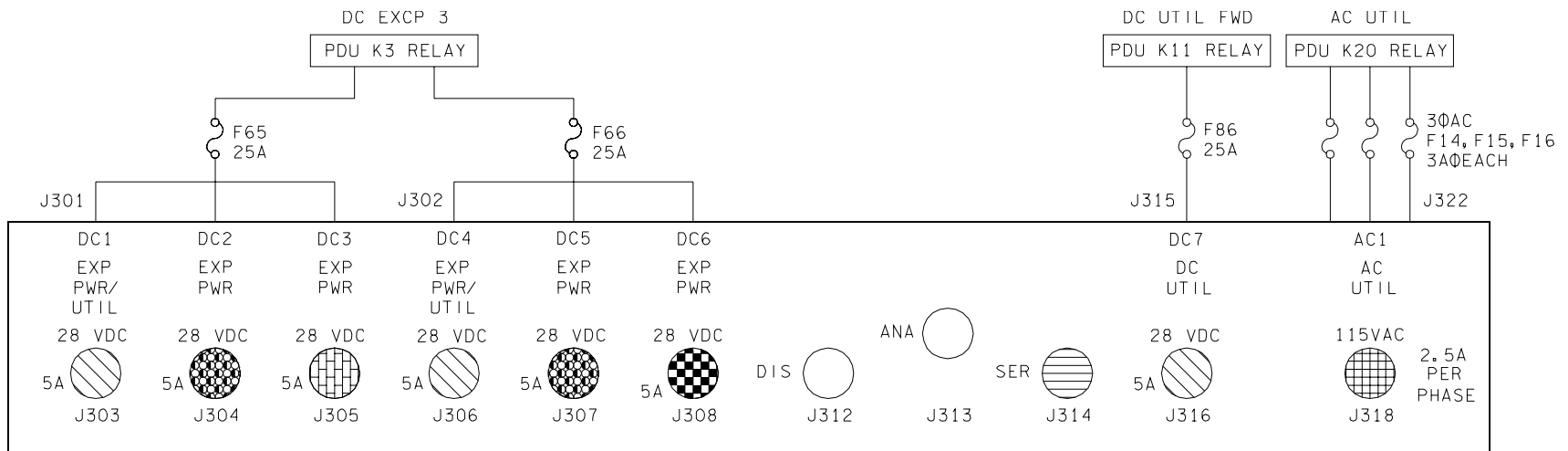


Figure 8-8.- EXCP 1

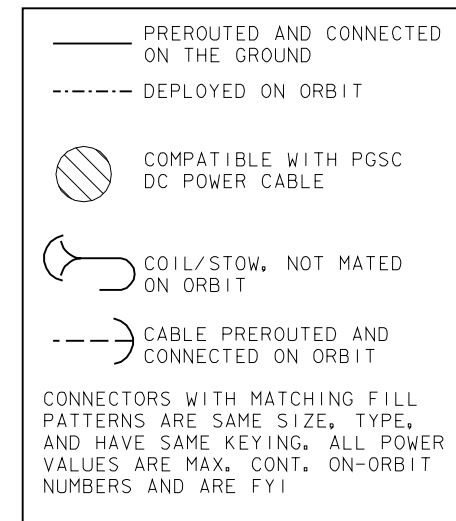


48089615_118. PNL 4

Figure 8-9.- EXCP 2

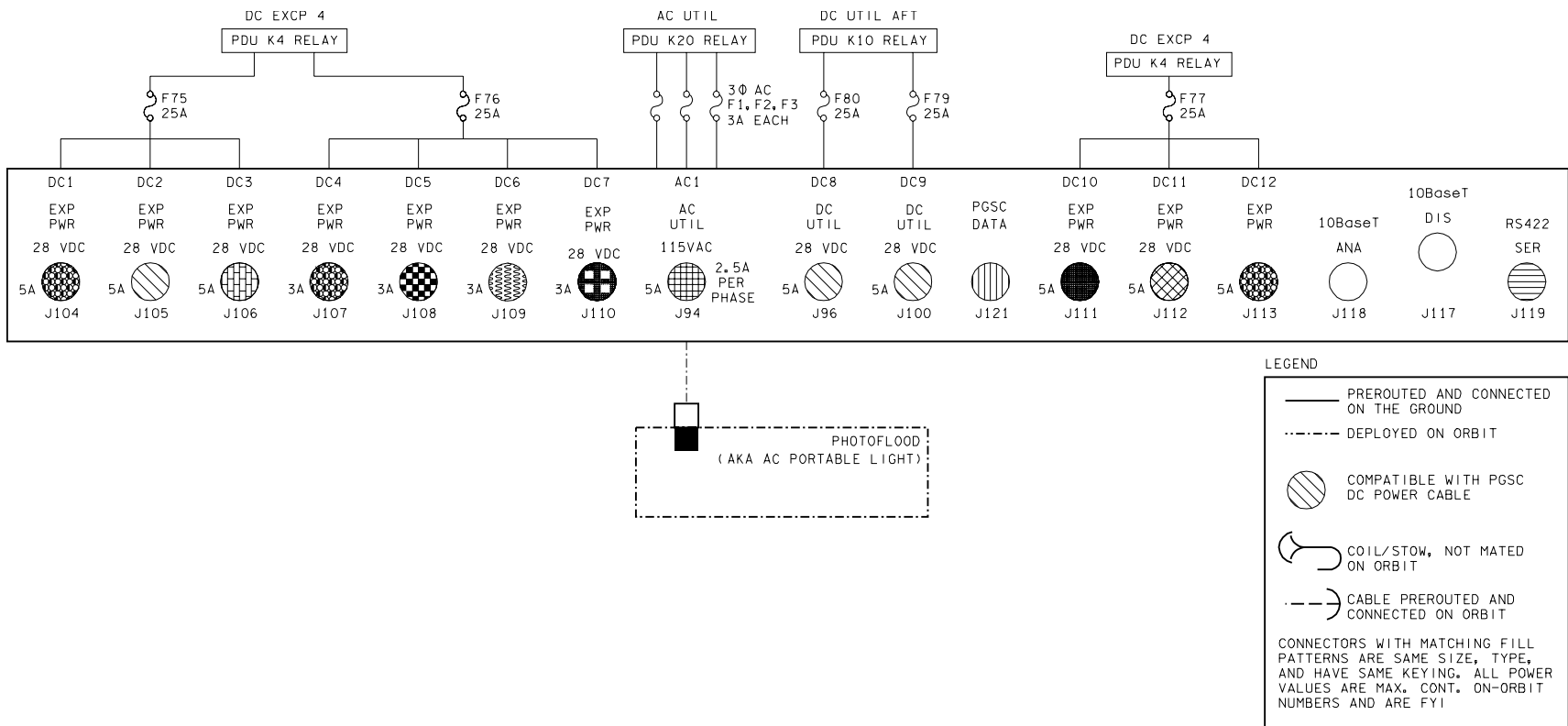


LEGEND



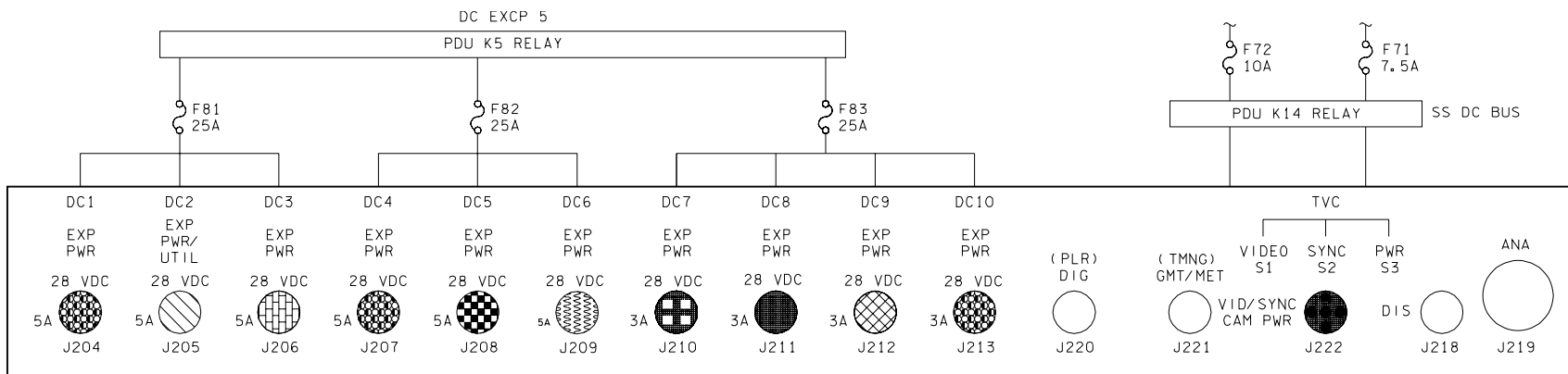
48089611_118. PNL, 1

Figure 8-10.- EXCP 3

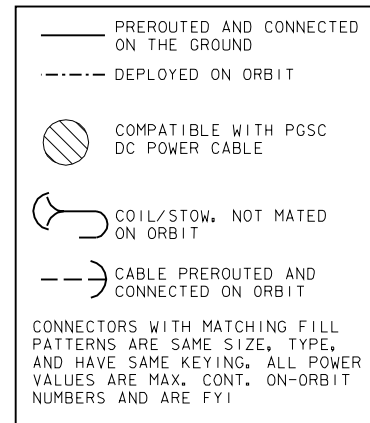


48089616_118, PNL 2

Figure 8-11.- EXCP 4

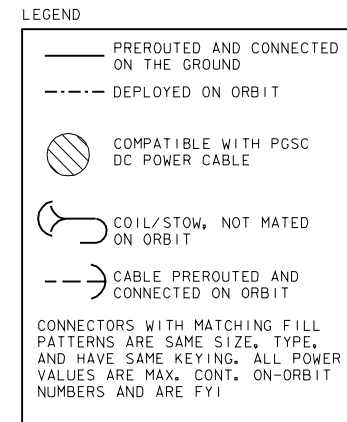
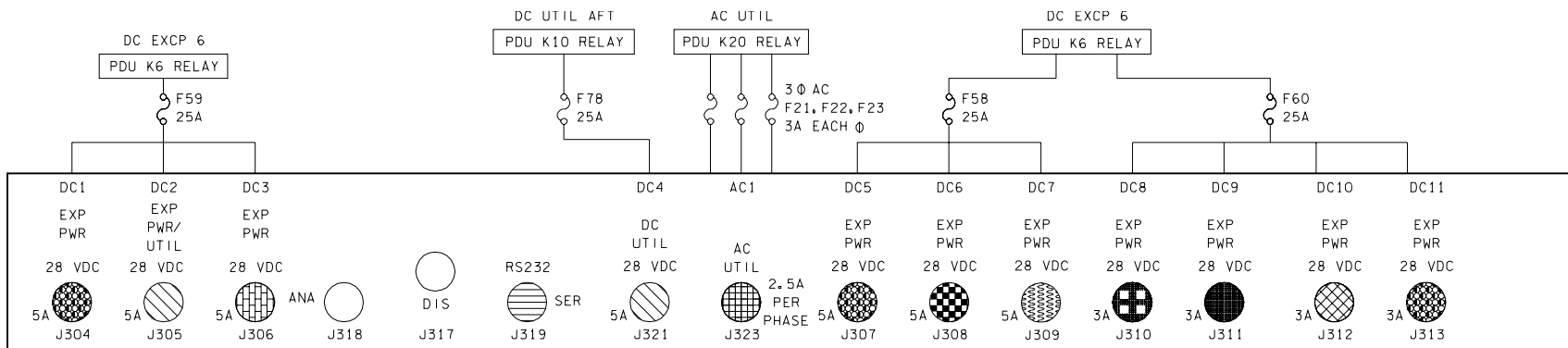


LEGEND



48089612_118. PNL# 1

Figure 8-12.- EXCP 5



48089613_118, PNL 1

Figure 8-13.- EXCP 6

SPACEHAB DUCT CONFIGURATIONS

All shuttle & Spacehab flex ducting is depicted in orange. Uncolored segments denote permanent or ducting that is untouched during the addressed phase. Each major phase of the mission has been depicted graphically showing the final ducting configuration at the conclusion of the associated procedure. All duct labels reflect the FDF nomenclature.

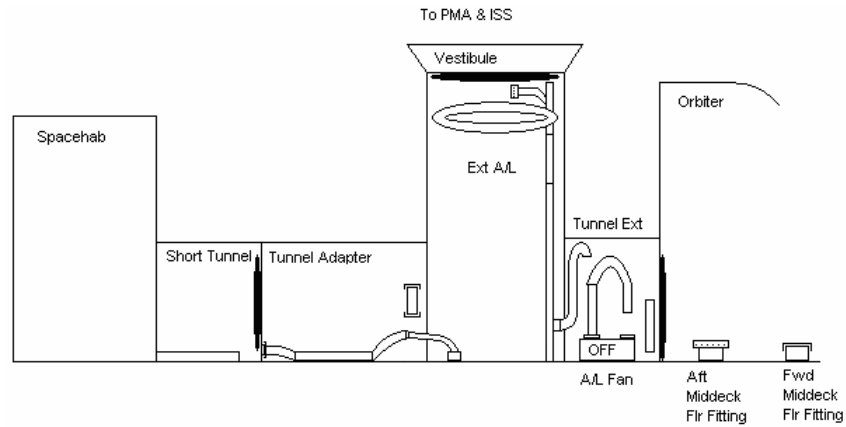


Figure 8-14.- Ascent Config

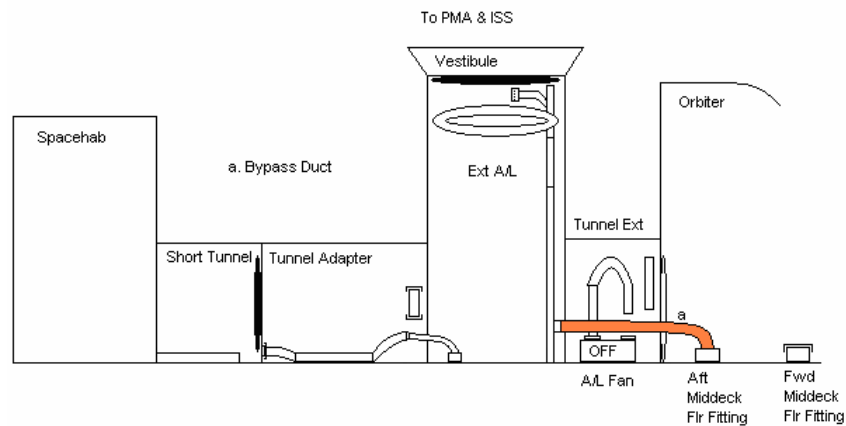


Figure 8-15.- Post Insertion

SPACEHAB DUCT CONFIGURATIONS (Cont)

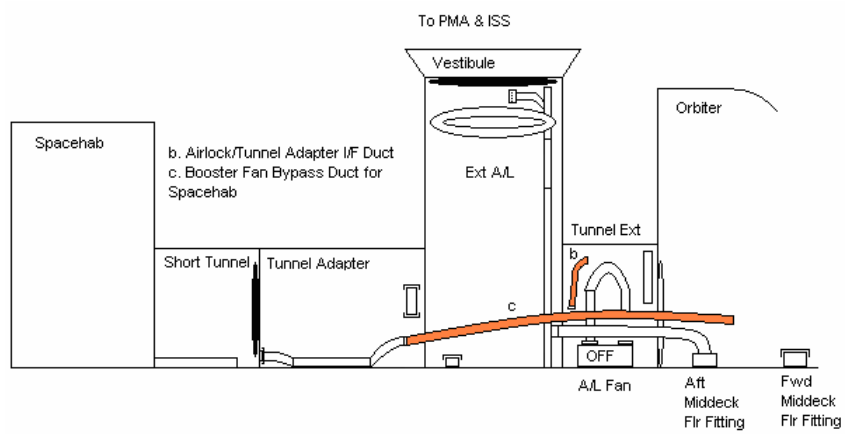


Figure 8-16.- Booster Fan Bypass Setup for Spacehab

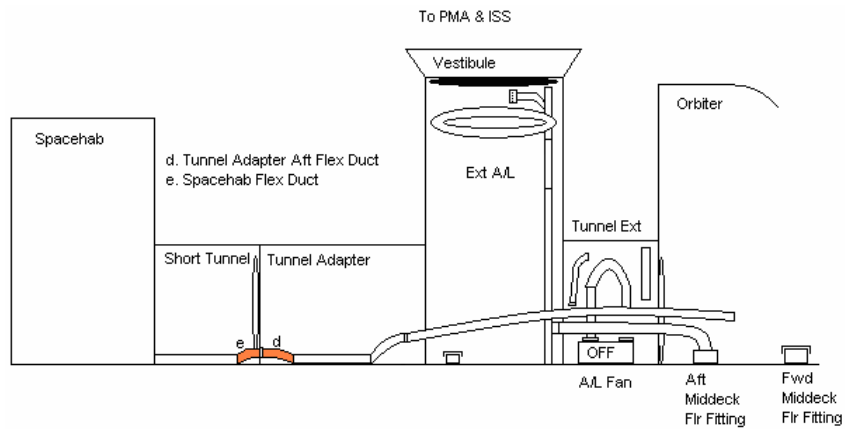


Figure 8-17.- Tunnel Config (Activation)

SPACEHAB DUCT CONFIGURATIONS (Cont)

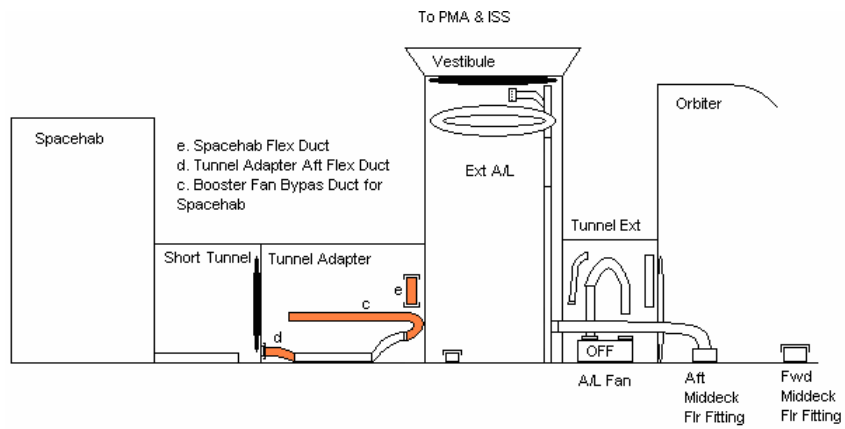


Figure 8-18.- Spacehab Prep for Docking

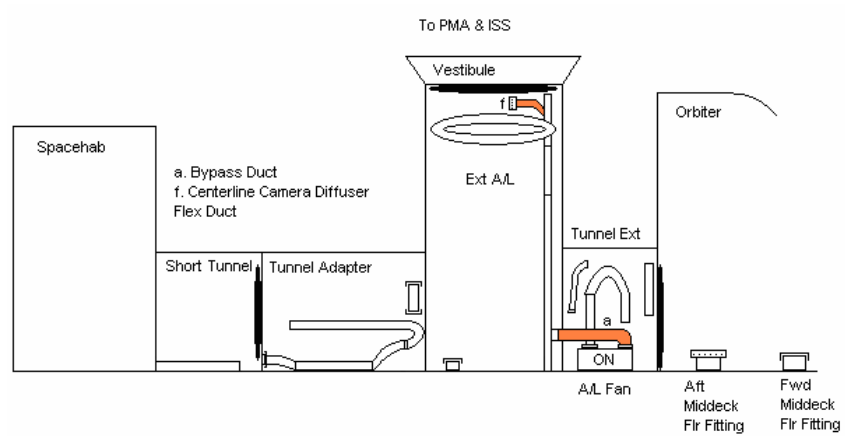


Figure 8-19.- Airlock Fan Act and ODS Volume Prep

SPACEHAB DUCT CONFIGURATIONS (Cont)

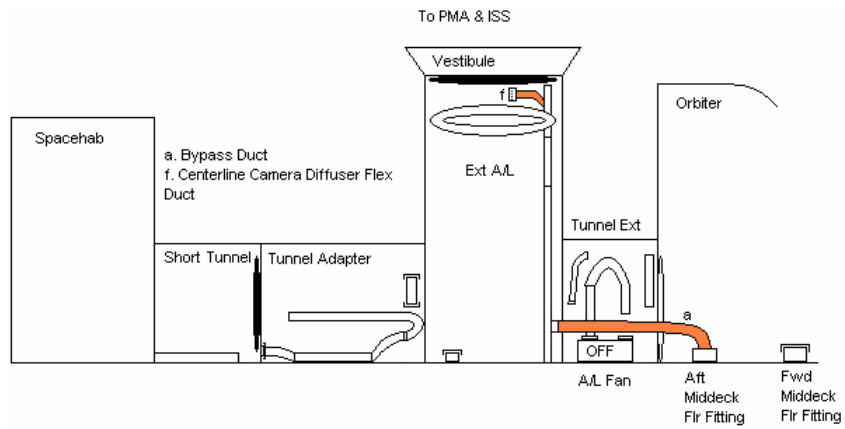


Figure 8-20.- Airlock Prep for Ingress – Bypass Config

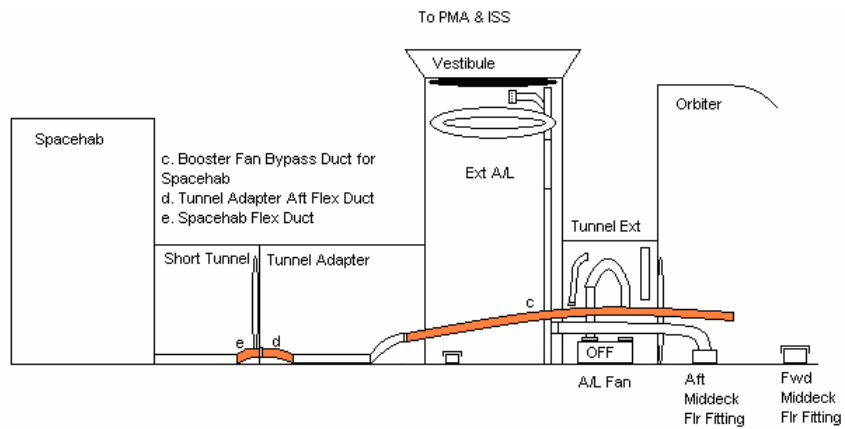


Figure 8-21.- Spacehab Reconfig Post Docking

SPACEHAB DUCT CONFIGURATIONS (Cont)

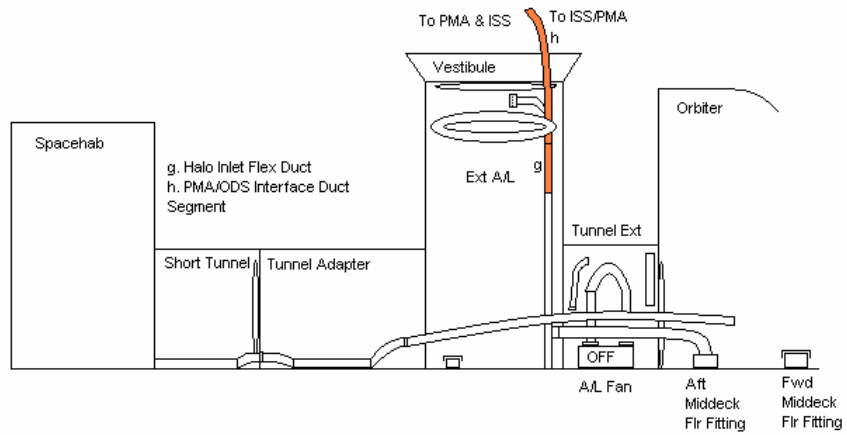


Figure 8-22.- 2.106 Hatch Open and Duct Install (Bypass Config)

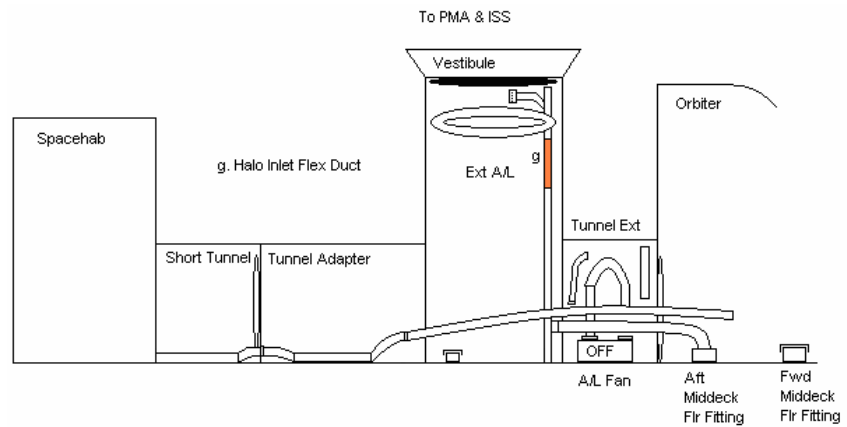


Figure 8-23.- 4.103 Duct Removal and Hatch Close (Bypass Config)

SPACEHAB DUCT CONFIGURATIONS (Cont)

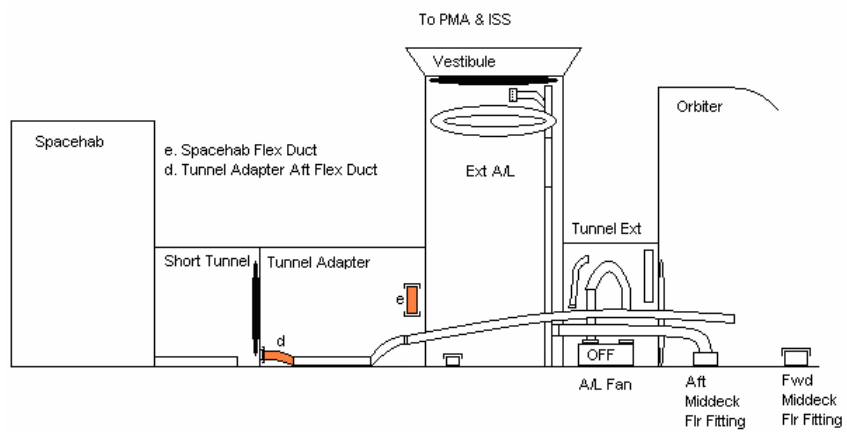


Figure 8-24.- Tunnel Config (Entry Prep)

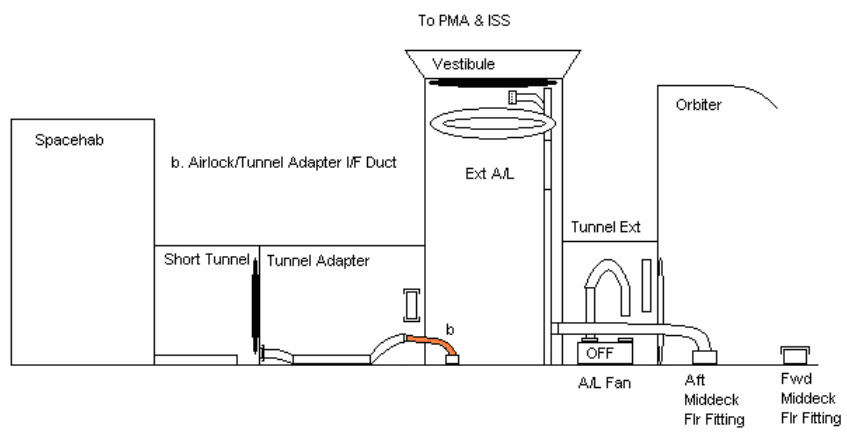


Figure 8-25.- Booster Fan Bypass Teardown for Spacehab

SPACEHAB DUCT CONFIGURATIONS (Cont)

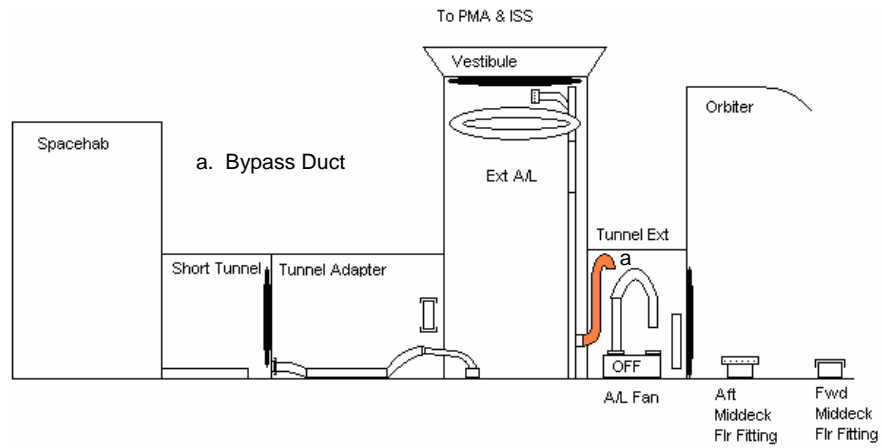


Figure 8-26.- D/O Prep

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CUE CARD CONFIG

CUE CARD
CONFIG

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(reduced copy)

TOP

FIRE CONFIRMATION (HATCH OPEN)		FIRE SUPPRESSION		SPACEHAB FIRE ALARM
MCP L1 CRT	<p>If any of following: SMOKE SENSOR ALARM A or B It – It on SMOKE DETECTION B PAYLOAD It – It on '215 SH SMOKE A or B' FDA msg Visible fire or smoke smell 1. Go to step 3</p> <p>Else: 2. Fire alarm caused by orbiter >></p>	C3	<p>SPACEHAB FIRE SUPPR: 1. MCP, FSCU (two) – ARM 2. (two) – DISCH 3. (two) – NO-OP 4. (two) – SAFE</p>	
EXCP2	<p>3. ARS – FAN OFF or SM 214 SPACEHAB ACT/DEAC FANS ARS OFF – ITEM 61 EXEC (*) Retrieve and strap on SEBS (do not activate)</p> <p>4. If visible fire or smoke smell: 5. Don and activate SEBS Orbiter Crew: 6. If docked, perform JOINT EMERGENCY EGRESS (Cue Card) 7. Remove pwr source (if possible), evaluate If successful, take CSA-CP readings, √MCC >> If no joy:</p>	SSP 1	<p>5. H2O LN HTRS – ON 6. cb SW PWR 2 – cl 7. ORB H2O LINE HTR PWR A – ON 8. √B – OFF(A ENA) SM 215 SPACEHAB ECS 9. √H2O LN HTR HAB STATUS – 1 10. √ORB AMPS > 1 On MCC call (if AOS) or indications of fire still exist (increasing smoke conc, PPO2 or SH temp):</p>	
MCP Fwd Blkhd	<p>8. Use PFE as reqd, evaluate If no joy: 9. MN PWR KILL pb – push (It on) 10. CAB DEPRESS VLV – OP 11. Safe penetrators (if not secure): OBSS OSE Boom Stands (two) 12. Egress module with SEBS, PFE, & BPSMU 13. If reqd, disconnect PD100 CC cable QD 14. Close hatch per decal 15. Equal vlv (two) – OFF 16. PL ISOL VLV – CL 17. Inform CDR/PLT, "Module secured" SM 214 SPACEHAB ACT/DEAC</p>	SSP 2	<p>11. CAB DEPRESS VLV – ARM (tb-gray) – OPEN (tb-gray after 3 min) 12. cb AC3 PL 3Φ – op 13. PL AUX – OFF</p>	
SH Hatch	<p>18. √FANS CABIN ORB – ITEM 66 EXEC (*) 19. FANS CABIN ON – ITEM 68 EXEC (*) SM 215 SPACEHAB ECS If indications of fire still exist (increasing smoke conc, PPO2, or Hab temp): 20. Go to FIRE SUPPRESSION >> If no visible fire or smoke smell: 21. √MCC</p>	MA73C:E R1		
TNL ADP				
CRT				
<p>WARNING Discharge is propulsive</p>		<p>SMOKE SENSOR A TEST SSP2 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) – 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. A – INHB (tb-bp) If sensor A passes both portions of test, sensor good</p>		
<p>FIRE CONFIRMATION (HATCH CLOSED) BFS 206 SH LAUNCH/ENTRY SM 215 SPACEHAB ECS If FIRE SMOKE CONC A,B (both) > 2: 1. Go to FIRE SUPPRESSION >> If only one FIRE SMOKE CONC A(B) > 2: 2. Perform SMOKE SENSOR B(A) TEST (for sensor < 2), then: If Sensor B(A) fails test (for sensor < 2): If FIRE SMOKE CONC A(B) > 2 and increasing: 3. Go to FIRE SUPPRESSION, steps 1-10 >> Else: 4. Fire not confirmed >> If Sensor B(A) passes test (for sensor < 2): 5. Fire not confirmed >> If FIRE SMOKE CONC A,B (both) < 2: 6. Fire not confirmed</p>		<p>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</p>		
SSP 2	7. SMOKE SENSOR – RESET			
CRT	<p>If ALARM A(B) – YES recurs: 8. √MCC</p>			
		<p>HOOK VELCRO</p>		
		<p>SH OPS-1a/118/O/D</p>		

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BACK OF 'SPACEHAB FIRE ALARM'

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. SM 215 SPACEHAB ECS
- 6. PPRV ISO VLV 1 CL – ITEM 87 EXEC (*)
- 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:

- SH HATCH 8. Remove Equal vlv caps (two), temp stow
- 9. SH HATCH Equal vlv (two) – NORM
- TNL ADP 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:

- 14. Go to SPACEHAB EMERGENCY DEACT, steps 1-8, 10 >>

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

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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)
- 5. SM 215 SPACEHAB ECS
- 6. √H2O LN HTR HAB STATUS – 1
- 7. √ORB AMPS > 1
- MA73C:E R1 7. cb AC3 PL 3φ – op
- 8. PL AUX – OFF

SH Crew perform:

- 9. Perform SPACEHAB EMERGENCY EGRESS, then:
- SSP 2 10. MN PWR – KILL

SPACEHAB EMERGENCY EGRESS

- 1. Safe Penetrators (if not secured):
 - √PFE secured in brackets on fwd bulkhead, stbd of hatch opening
 - √SEBS secured at FC11 (cross-strapped)
 - √OBSS OSE Boom Stands (two) secured at AS01 and AS03 or transferred to ISS
- EXCP2 2. ARS – FAN OFF
- If Viewport open:
- VP 3. Close Viewport
- 4. √VP HTR – OFF
- 5. Egress module with BPSMU, ensuring a clear hatchway
- SH Hatch 6. If reqd, disconnect PD100 CC cable QD
- 7. Close, latch per decal
- 8. Equal vlv (two) – OFF
- TNL ADP (aft) 9. PL ISOL VLV – CL
- If not returning to Spacehab Module:
- SH Hatch MF43C 10. Disconnect BPSMU cable QD
- MD Aft Wall Stow: BPSMU
 - 42 ft BPSMU Audio #1 Cable
 - 35 ft BPSMU Audio #1 Cable
 - 44 ft BPSMU Audio #1 Cable
 - 4 ft BPSMU Audio #1 Cable

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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)
 Fwd Blkhd 3. CAB DEPRESS vlv – OP
 4. Safe Penetrators (if not secure): PFE, OBSS OSE Boom Stands (two)
 5. Egress module with SEBS and BPSMU, ensuring a clear hatchway
 SH Hatch 6. If reqd, disconnect PD100 CC cable QD
 7. Close hatch (per decal)
 8. Equal vlv (two) – OFF and install caps
FLIGHT DECK CREW:
 SM 214 SPACEHAB ACT/DEAC
 9. FANS ARS OFF – ITEM 61 EXEC (*)
 If Spacehab Cabin fan ON:
 10. FANS CABIN OFF – ITEM 62 EXEC (*)
OTHER CREW:
 TNL ADP 11. PL ISOL VLV – CL
 (aft) 12. Evacuate to orbiter, √MCC

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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:
 If Booster Fan active:
 MO13Q 3. ARLK FAN A(B) – OFF
 SM 214 SPACEHAB ACT/DEAC
 4. FANS ARS OFF – ITEM 61 EXEC (*)
 If Spacehab Cabin fan ON:
 5. FANS CABIN OFF – ITEM 62 EXEC (*)
OTHER CREW:
 TNL ADP 6. PL ISOL VLV – CL
 (aft) 7. Evacuate to orbiter
 CCK 8. Clean up spill w/Dry Wipes. Bag, label, stow in Wet Trash
 If cleanup fails:
 Fwd Blkhd 9. CAB DEPRESS vlv – OP
 10. Safe Penetrators (if not secure): PFE, OBSS OSE Boom Stands (two)
 11. Egress module with SEBS and BPSMU, ensuring a clear hatchway
 SH Hatch 12. If reqd, disconnect PD100 CC 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 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”
 TNL ADP 19. PL ISOL VLV – OP
 (aft)
FLIGHT DECK CREW:
 On MCC GO:
 SM 214 SPACEHAB ACT/DEAC
 20. FANS ARS ON – ITEM 67 EXEC (*)
 21. √ΔP 1,2 (two) > 0.2 and < 5.5
 If Booster Fan in bypass config >>
 MO13Q 22. ARLK FAN A(B) – ON

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HAZARDOUS SPILL RESPONSE – SPACEHAB MODULE (Cont)

LEVEL 2 (YELLOW) HAZARDOUS SPILL
LEVEL 1 (BLUE) LEAST HAZARDOUS SPILL
LEVEL 0 (GREEN) NONHAZARDOUS SPILL

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

If Level 1 spill:

If Level 0 controlled spill, >>

FLIGHT DECK CREW:
If Booster Fan active:

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:

7. PL ISOL VLV – CL

8. Clean up spill w/Dry Wipes. Bag, label, stow in Wet Trash
If Level 2(1,0) cleanup fails:

9. CAB DEPRESS vlv – OP
10. Safe Penetrators (if not secure): PFE, SEBS (cross-straped at FC11), OBSS OSE Boom Stands (two)
11. Egress module with BPSMU, ensuring a clear hatchway
12. If reqd, disconnect PD100 CC 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"

19. PL ISOL VLV – OP

FLIGHT DECK CREW:
On MCC GO:
SM 214 SPACEHAB ACT/DEAC

20. FANS ARS ON – ITEM 67 EXEC (*)
21. √ΔP 1,2 (two) > 0.2 and < 5.5

If Booster Fan in bypass config >>

22. ARLK FAN A(B) – ON

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**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:
 4. AIRLK FAN A(B) – OFF, then:
- MO13Q If hatches to ISS open:
 5. Simo, perform JOINT EMERGENCY EGRESS (Cue Card), continue with this proc
- L1 6. CAB TEMP sel – COOL
- WCS 7. MODE – COMMODE/MANUAL/EMU
8. COMMODE CNTL – PULL UP (wait 15 sec), PUSH FWD
- OCAC 9. √OCAC PWR – ON
10. Perform SPACEHAB EMERGENCY EGRESS (Cue Card)
11. √MCC

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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:
 4. AIRLK FAN A(B) – OFF, then:
- MO13Q 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
- CCK 9. FANS ARS OFF – ITEM 61 EXEC (*)
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. √ΔP1,2 (two) > 0.2 and < 5.5
- If Booster Fan in bypass config >>
- MO13Q 19. AIRLK FAN A(B) – ON

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

- LEVEL 2 (YELLOW) HAZARDOUS SPILL**
 - LEVEL 1 (BLUE) LEAST HAZARDOUS SPILL**
 - LEVEL 0 (GREEN) NONHAZARDOUS 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)
 - 6. IMU FAN B(A,C) – OFF (max 90 min)
 - OCAC 7. OCAC PWR – OFF
 - 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. $\sqrt{\Delta P_{1,2}}$ (two) > 0.2 and < 5.5
 - If Booster Fan in bypass config >>
 - MO13Q 17. AIRLK FAN A(B) – ON

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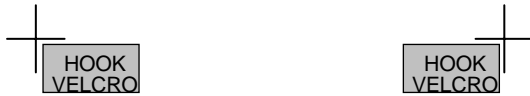
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**SPACEHAB FIRE ALARMS
(ASCENT/ENTRY)**

BFS 206 SH LAUNCH/ENTRY

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

If both CONC \geq 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

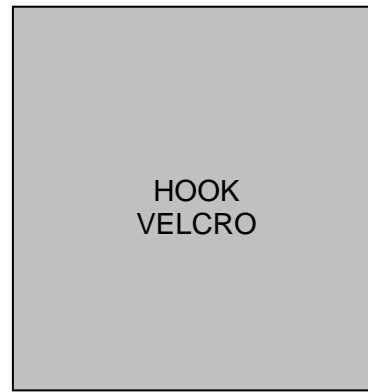
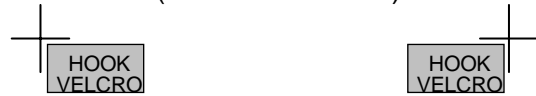


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**BACK OF 'SPACEHAB FIRE ALARMS
(ASCENT/ENTRY)**



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VIEWPORT 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

- Next to VP
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

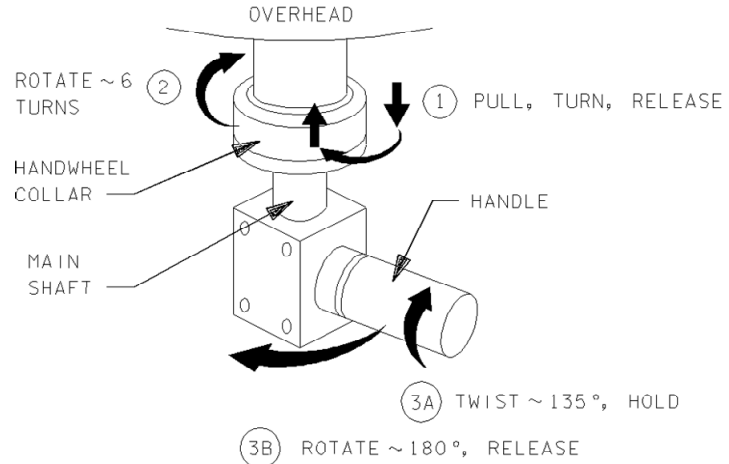
3. Twist handle cw about handle axis until hard stop (~135°) and hold while rotating ccw about main shaft axis until hard stop (~180°)

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

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



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BACK OF 'VIEWPORT OUTER COVER OPENING'

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VIEWPORT OUTER COVER CLOSING

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

VP HTR
CNTL PNL

VIEWPORT HEATER

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

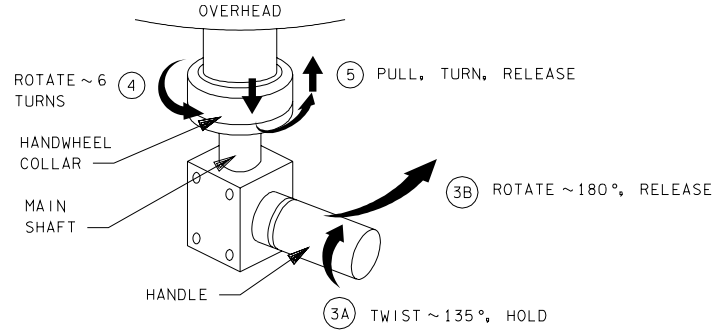
Next to VP

ROTATING OUTER COVER

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



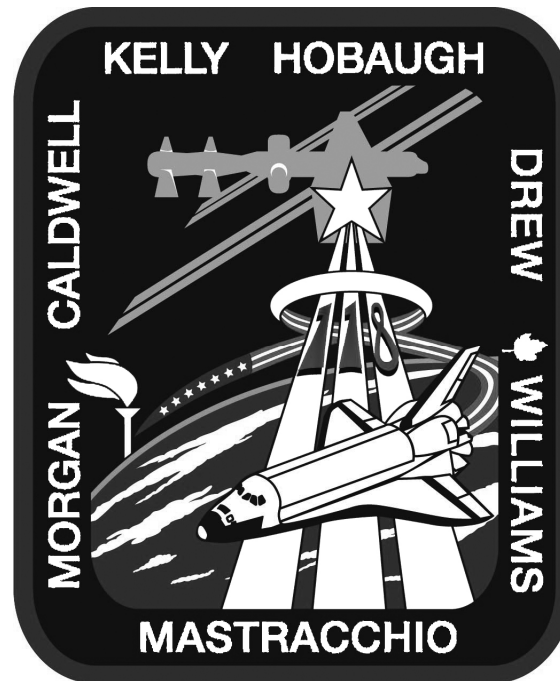
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**SPACEHAB OPS
CHECKLIST**

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