

EVA Checklist

STS-130 Flight Supplement

**Mission Operations Directorate
EVA, Robotics, and Crew Systems
Operations Division**

**Final, Rev A
January 14, 2010**

NOTE

This supplement is to be integrated into the generic edition to provide a complete document for the specific flight. Some pages in the generic edition may be replaced with supplemental pages identified as 'TEMP'. These generic pages, if any, must be retained for use on future flights.

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas



MISSION OPERATIONS DIRECTORATE

**EVA CHECKLIST
STS-130 FLIGHT SUPPLEMENT**

FINAL, REVISION A
January 14, 2010

PREPARED BY:

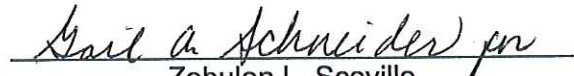


Alexandros D. Kanelakos
Book Manager

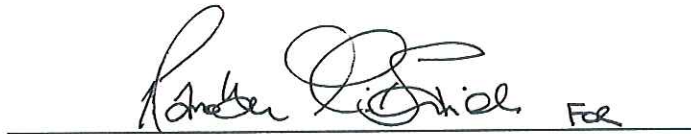
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Incorporates the following:		
482#:	EVA FS-00327A	EVA FS-00333A
	EVA FS-00328A	EVA FS-00334A
	EVA FS-00329B	EVA FS-00335A
	EVA FS-00330A	EVA FS-00337A
	EVA FS-00331A	
	EVA FS-00332A	

AREAS OF TECHNICAL RESPONSIBILITY

Book Manager

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281-483-8687

EVA CHECKLIST
STS-130 FLIGHT SUPPLEMENT

LIST OF EFFECTIVE PAGES

FINAL 12/04/09
REV A 01/14/10

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iv	*	generic	3-8	generic
FS v	*	130/FIN A	3-9	generic
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FS 7-27	⊗	130/FIN A	FS 7-83		130/FIN A
FS 7-28	⊗	130/FIN A	FS 7-84		130/FIN A
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FS 7-34		130/FIN A	FS 7-90		130/FIN A
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FS 7-76		130/FIN A	TEMP FS 8-2	⊗	ALL/FIN A

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8-4	generic	12-4	generic
8-5	generic	12-5	generic
8-6	generic	12-6	generic
8-7	generic	12-7	generic
8-8	generic	12-8	generic
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FS 8-10	⊗ 130/FIN A	12-10	generic
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FS 8-24	⊗ 130/FIN A	12-24	generic
FS 8-25	⊗ 130/FIN A	12-25	generic
FS 8-26	130/FIN A	12-26	generic
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FS 16-26.....	⊗ 130/FIN A	FS 18-36.....	130/FIN A
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FS 18-59	130/FIN A
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FS 18-61	⊗ 130/FIN A
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FS 18-63	⊗ 130/FIN A
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FS 18-73	⊗ 130/FIN A
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FS 18-75	130/FIN A
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FS 18-79	130/FIN A
FS 18-80	130/FIN A
FS 18-81	130/FIN A
FS 18-82	⊗ 130/FIN A
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FS 18-84	⊗ 130/FIN A
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FS 18-86	⊗ 130/FIN A
FS 18-87	⊗ 130/FIN A
FS 18-88	130/FIN A
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19-6	generic
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19-11	generic
19-12	generic
19-13	generic
19-14	generic
20-1	* generic
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EVA CUE CARDS

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AIRLOCK CONFIG

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AIRLOCK
CONFIG

AIRLOCK PREP (50 min)

MF28G	Retrieve or unstow following equipment:
IFM Tool Kit	3/8-in breaker bar, 4-in ext w/3/8-in drive
Vol H	1/2-in socket w/3/8-in drive
	EMU Equipment Bag – attach to middeck wall
	Helmet Lights
	EVA Bag
	Contamination Detection Kit (location flight specific)
<hr/> FDF Locker	Cuff Checklists (2) – stow in EMU Equipment Bag
	<u>DEPRESS/REPRESS</u> Cue Card

- AW18A
1. ✓ Inner hatch Equal vlv (two) – OFF
 2. LTG FLOOD (four) – ON
 3. Remove from airlock, as reqd:
 - Airlock Stowage Bag
 - Airlock Floor Pallet using 3/8-in breaker bar, 4-in ext w/3/8-in drive, and 1/2-in socket w/3/8-in drive
 4. Stow Vol H Bags in Vol H
 5. Transfer to airlock:
 - EVA Bag – install on airlock wall
 - DEPRESS/REPRESS Cue Card
 - Helmet Lights
 - Contamination Detection Kit – install on airlock wall
 6. Install IVA foot restraint, as reqd
 7. Unbuckle SCU straps, Velcro SCU to wall
 8. Install EMU lights on helmets (EMU 1, EMU 2) and perform pull test to verify latches fully seated in helmet brackets
 9. Disconnect helmets from Airlock EMUs, temp stow
 10. Remove comm caps from LTA Restraint Bags and connect to electrical harnesses
 11. Install helmets (not reqd if proceeding directly to EMU Checkout)
 12. Remove LTA Restraint Bags
 13. Disconnect waist rings; remove and stow any equipment stowed in HUT/LTA
 14. Stow LTA Restraint Bags on AAPs
 15. ✓ Thermal cover clear of waist ring
 16. Waist ring – engage posn
 17. Connect LTA to HUT, lock
 18. Remove 20-g Crash Bag from middeck EMU, as reqd

EMU CHECKOUT PREP (30 min)

- Airlock
1. LTG FLOOD (four) – on
 2. If necessary, remove Airlock Floor Bag from Airlock
 3. Unbuckle SCU straps, Velcro SCU to wall
 4. Disconnect helmets from EMUs, temp stow
 5. ✓DIDB restraint bags installed
 6. Remove comm caps (4) from LTA Restraint Bags (kangaroo pouches)
For EMU 3004 – Port Side (Be)
Connect comm cap Be1 to EMU electrical harness
Temp stow comm cap Be2 (for Be ECOK, step 9)
For EMU 3005 – Starboard Side (Pk)
Connect comm cap Pk1 to EMU electrical harness
Temp stow comm cap Pk2 (for Pk ECOK, step 9)
 7. Disconnect LTA Restraint Bag straps from AAP; temp stow
 8. Disconnect waist rings; remove Be, Pk ECOKs
 9. Stow comm caps: Be2 in Be ECOK, Pk2 in Pk ECOK
 10. Remove EVA Sys Xfer Bag from Be ECOK
 11. Temp stow Be, Pk ECOKs and Eva Sys Xfer Bag in Airlock
 12. Temp stow LTA Restraint Bags on AAPs (bottom)
 13. Install full DIDB in Restraint Bag (Velcroed in HUT)
 14. ✓Thermal cover clear of waist rings
 15. Waist rings – engage position
 16. Connect LTAs to HUTs, lock
- Middeck
Vol H
(MD23R)
17. Unstow:
Inboard Bag:
From EMU Equipment Bag
SCOFs (2) – Temp stow for EMU Checkout
LTA Donning Handles (2) – Temp stow for EMU Checkout
EMU Servicing Kit s/n 5005 – Stow in EVA Sys Xfer Bag
- Airlock
18. Temp stow ECOKs and EVA Sys Xfer Bag for “EVA Prep for Transfer to ISS”
 19. Unstow ISS EVA Cuff C/L (2) from SODF locker
Stow Be and Pk C/L on EMUs, left arm

LTA RESTRAINT STRAP REMOVAL (15 min)

NOTE

May be performed on EMU 1 and 2 simultaneously.
Perform steps as reqd for current EMU config

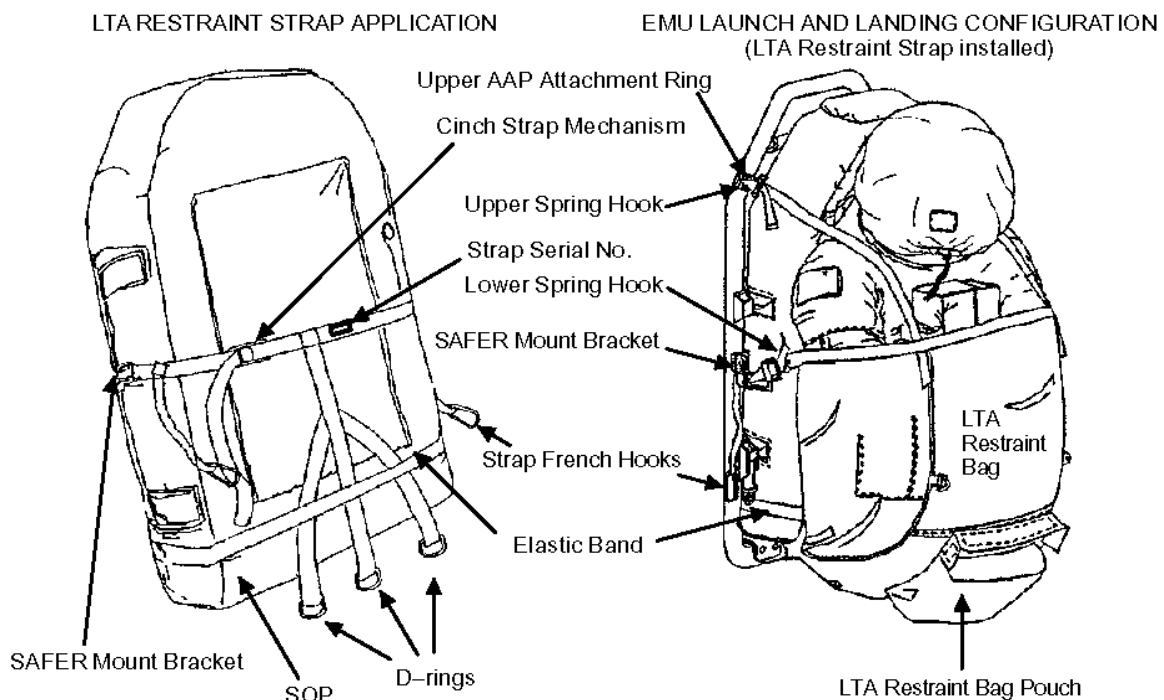
1. As reqd, remove comm cap from LTA Restraint Bag; temp stow
2. Remove EMU from AAP
3. Disconnect all restraint attachments from SAFER mount brackets (two)
4. Loosen cinch strap mechanism, remove SAFER mount brackets
5. Remove strap from PLSS
6. Stow strap in LTA Restraint Bag Pouch with D-rings (three) connected
7. Engage EMU in AAP
8. Stow LTA Restraint Bag/strap

LTA RESTRAINT STRAP INSTALLATION (15 min)

NOTE

May be performed on EMU 1 and 2 simultaneously. Perform steps as reqd for current EMU config. Procedure written to install in Launch/Landing config shown below

1. Unstow LTA Restraint Bag/strap
2. Remove EMU from AAP
3. Install SAFER mount brackets (two)
4. Install elastic band of strap around SOP
5. Tighten cinch strap mechanism
6. Attach strap French hooks (two) to SAFER mount brackets
7. Engage EMU in AAP
8. Stow LTA, suit arms inside LTA Restraint Bag
9. Connect upper spring hooks (two) over suit shoulders to upper AAP attachment rings (two)
10. Connect lower spring hooks (two) around suit arms to SAFER mount brackets (two)
11. Tighten all LTA bag straps with bag as high as possible on EMU



NOTE

French hooks should be attached to SAFER mount brackets for launch and landing

EVA PREP FOR TRANSFER TO ISS (90 min)

Middeck
Vol H (MD23R)

1. Restow:
Inboard Bag:
EMU Equipment Bag
LTA Donning Handles (2)

BOTH EMUs/
DCM

2. √PWR – SCU
3. √PURGE vlv – op (up)
4. √WATER – OFF, switch guard installed
5. √O2 ACT – OFF

Airlock/
Middeck

6. Retrieve the following:

Be ECOK
Pk ECOK
Bag "G"
EVA Sys Xfer Bag
NH3 Jumpers (4) w/caps (8) and booties (8) (from Bag C)
NH3 MLI (from Bag D)

7. Take B/U gloves (Be2 and Pk2) out of Bag G and stow in respective ECOKs
8. Take LiOH s/n 2016 from Bag I (A/L Floor Bag) and stow in Bag G
9. Take Be and Pk EVA 3 ziplock bags from Bag I Contingency ECOK (Be/Pk), and stow in respective ECOKs
10. Verify items according to tables below:

<u>BAG "G"</u>	
<input type="checkbox"/> LiOHs (3) <input type="checkbox"/> DIDBs (4) (empty) <input type="checkbox"/> EMU Battery 2088 (for EVA 2, then rotation) <input type="checkbox"/> BTA (for rotation only) <input type="checkbox"/> EVA Task Xfer Bag (from Be ECOK) <input type="checkbox"/> Adjustable Equipment Tethers (16) <input type="checkbox"/> Gap Spanners -301 (1) <input type="checkbox"/> Gap Spanners -303 (4) <input type="checkbox"/> Gap Spanners -305 (2) <input type="checkbox"/> Gap Spanners -307 (2) <input type="checkbox"/> 5/16 (rigid) Socket-7 ext <input type="checkbox"/> 3/8 Drive Ratchet w/7/16 (rigid) Socket	<input type="checkbox"/> NH3 Jumper Bag <input type="checkbox"/> OIH Bags (OIH Equipment Tether on each) (2) <input type="checkbox"/> Wire Ties (short) (20) <input type="checkbox"/> Wire Ties (long) (8) <input type="checkbox"/> P104 Terminator <input type="checkbox"/> P1FGB Terminator <input type="checkbox"/> P2FGB Terminator <input type="checkbox"/> P1FGB MLI <input type="checkbox"/> P2FGB MLI <input type="checkbox"/> P612 MLI Cap <input type="checkbox"/> P612 Dust Cap <input type="checkbox"/> J6XX Dust Cap <input type="checkbox"/> J6YY Dust Cap

<u>EMU 3004 (Be)</u>	<u>EMU 3005 (Pk)</u>
<input type="checkbox"/> DIDB Restraint Bag (with full DIDB) <input type="checkbox"/> Comm Cap (Be1) (installed during EMU C/O prep) <input type="checkbox"/> Helmet (√sun shade down, cover installed) <input type="checkbox"/> Valsalva <input type="checkbox"/> EMU Gloves (Be1) <input type="checkbox"/> Cuff C/L (installed during EMU C/O prep) <input type="checkbox"/> Wrist Mirror (2) <input type="checkbox"/> LTA	<input type="checkbox"/> DIDB Restraint Bag (with full DIDB) <input type="checkbox"/> Comm Cap (Pk1) (installed during EMU C/O prep) <input type="checkbox"/> Helmet (√sun shade down, cover installed) <input type="checkbox"/> Valsalva <input type="checkbox"/> EMU Gloves (Pk1) <input type="checkbox"/> Cuff C/L (installed during EMU C/O prep) <input type="checkbox"/> Wrist Mirror (2) <input type="checkbox"/> LTA

EVA PREP FOR TRANSFER TO ISS (90 min) (Cont)

<u>EVA Sys Xfer Bag</u>
<input type="checkbox"/> EMU Servicing Kit s/n 5005 <p style="text-align: center;"><u>Add to Xfer Bag from Temp Stow Location</u></p> <input type="checkbox"/> SCOFs (2) <p style="text-align: center;"><u>Add to Xfer Bag from FDF and SODF Lockers</u></p> <input type="checkbox"/> ISS EVA Systems Checklist (2) – BROWN and NO stripe (GREEN remains in locker for IV) <input type="checkbox"/> FDF: EVA Checklist (1) – BROWN stripe (ORANGE remains in locker for IV) <input type="checkbox"/> SODF Depress/Repress CC (2) <input type="checkbox"/> <u>STS-130 CONSUMABLES TRACKING CUE CARD/ STS-130 BATTERY RECHARGE CUE CARD</u> <input type="checkbox"/> <u>EXPEDITED SUIT DOFFING/EMERGENCY UNDOCKING EVA TRANSFER</u> (Cue Card) <input type="checkbox"/> Ammonia Contamination CC <input type="checkbox"/> Old SODF ziplock (empty) <input style="border: 1px solid red;" type="checkbox"/> EVA PREBREATHE CUE CARD

<u>ECOKs</u>	
<input type="checkbox"/> ECOK (Be) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Be EVA 1, 2, *3 Ziplock Bag <input type="checkbox"/> <input type="checkbox"/> MAGs (w/Ziplock Bags) (2 per EVA) <input type="checkbox"/> <input type="checkbox"/> TCUs (top, bottom) <input type="checkbox"/> <input type="checkbox"/> Socks <input type="checkbox"/> <input type="checkbox"/> Wristlets <input type="checkbox"/> <input type="checkbox"/> Comfort Gloves <input type="checkbox"/> EV identifier stripes (EV1) (Bag 2 only) <input type="checkbox"/> Mission patch (STS-130) <input type="checkbox"/> US flag <input type="checkbox"/> LCVG (Be1)(with biomed sternal harness and signal conditioner) – stowed after EMU C/O <input type="checkbox"/> B/U Comm Cap (Be2) <input type="checkbox"/> B/U Gloves (Be2) <p>*NOTE: Be EVA 3 Ziplock will be found in the contingency ECOK, stowed in A/L Floor Bag I in step 9</p>	<input type="checkbox"/> ECOK (Pk) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Pk EVA 1, 2, *3 Ziplock Bags <input type="checkbox"/> <input type="checkbox"/> MAGs (w/Ziplock Bags) (2 per EVA) <input type="checkbox"/> <input type="checkbox"/> TCUs (top, bottom) <input type="checkbox"/> <input type="checkbox"/> Socks <input type="checkbox"/> <input type="checkbox"/> Wristlets <input type="checkbox"/> <input type="checkbox"/> Comfort Gloves <input type="checkbox"/> EV identifier stripes (EV2) (Bag 2 only) <input type="checkbox"/> Mission patch (STS-130) <input type="checkbox"/> US flag <input type="checkbox"/> Croakie <input type="checkbox"/> LCVG (Pk1) (with biomed sternal harness and signal conditioner) – stowed after EMU C/O <input type="checkbox"/> B/U Comm Cap (Pk2) <input type="checkbox"/> B/U Gloves (Pk2) <p>*NOTE: Pk EVA 3 Ziplock will be found in the contingency ECOK, stowed in A/L Floor Bag I in step 9</p>

POST DOCKING EVA TRANSFER AND RECONFIG (60 min)

NOTE

This procedure assumes that transfer items were preconfigured per EVA PREP FOR TRANSFER TO ISS. To avoid confusion, Old SCOFs, BTA and SODF should have been pregathered prior to this procedure

1. Transfer the following EVA equipment to ISS:

Item	Final Destination	Transfer Status
EMU 3004 (Be)	E-Lk aft EDDA	
EMU 3005 (Pk)	E-Lk fwd EDDA	
ECOK (Be)	E-Lk	
ECOK (Pk)	E-Lk	
EVA Sys Xfer Bag	E-Lk	
Bag "G"	Node 1	
NH3 Jumpers (4)	C-Lk	
NH3 MLI	C-Lk	

EVA Sys
Xfer Bag

2. Unstow following Items and position in E-Lk/C-Lk
 - STS-130 CONSUMABLES TRACKING CUE CARD/ STS-130 BATTERY RECHARGE CUE CARD
 - ISS EVA Systems Checklist (2) (Brown Stripe and NO stripe)
 - DEPRESS/REPRESS (Cue Card) (2) (one in C-LK, and one in E-LK)
 - FDF EVA Checklist STS-130 (Brown Stripe)
 - EXPEDITED SUIT DOFFING CUE CARD/EMERGENCY UNDOCKING EVA TRANSFER (Cue Card)
 - Ammonia Contamination CC (place in C-LK staging bag)
 - Install SCOFs into EMU Equipment bag (on A/L wall)

NOTE

Don't swap EMU Servicing Kit until post last EVA.
(Remains in bag)

3. If not already complete, stow pre-gathered SODF items in 'Pre-gather for STS-130' bag
 - ISS EVA Systems Checklist – OLD COPY
 - Ammonia Contamination CC – OLD COPY
 - DEPRESS/REPRESS (Cue Card) (2) – OLD COPY
 - BTA 1008
 - SCOFs (2) (1003,1006)
4. Transfer BTA 1008 to shuttle MA16G. Check completion box on EMERGENCY UNDOCKING EVA TRANSFER (Cue Card)

5. Install Helmet Lights/EMU TV assembly per STS-130 CONSUMABLES TRACKING CUE CARD
6. Install BTA (from Bag 'G') into MO2 'Prep and Ops' bag s/n 1038, in outside pocket
7. Report transfer status to **MCC-H** as time permits

POST EVA RECONFIG AND TRANSFER TO SHUTTLE (150 min)

NOTE

Figures in the Nominal Sizing Matrix FS 12-30 and FS 12-31 may be used for reference.

This procedure assumes the following procedure has been completed following EVA 3: {1.240 POST EVA} (SODF: ISS EVA SYS: EVA PREP/POST)

EMUs 3004,
3005

1. Remove the following and stow in MO2 'Prep and Ops' bag s/n 1038:
 - REBAs
 - Helmet Light EHIP batteries
 - Metox Canisters
 - EMU battery s/n's 2086, 2087

~~2. Install used LiOH from EVA 1 (REF: STS-130 CONSUMABLES TRACKING CUE CARD)~~

3. Remove Cuff C/L from EMUs; stow in EVA Sys Xfer Bag

4. Remove B/U gloves (Be2 and Pk2) from ECOKs and place in Bag G

EMU 3004

5. Install EMU battery 2083 (from MO2 bag s/n 1038 'EVA Prep and Ops') in EMU

5a. Install used LiOH from EVA 1 (REF: STS-130 CONSUMABLES TRACKING CUE CARD)

6. Connect Be gloves

7. Remove Helmet Lights and EMU TV
Temp stow items in ISS Equipment Lock

8. Helmet ←|→ HUT

9. Remove Comm Cap and stow in Be ECOK

10. Helmet →|← HUT

11. ✓Helmet installed, sun shades down, cover installed

12. Insert Be LCVG into ECOK. Install ECOK into HUT

13. Connect LTA

14. Remove boots (stow in MO2 'Soft Goods' bag s/n 1010)

15. Install boots s/n 214 (from 'Pre-gather for STS-130' bag)

16. Remove EMU 3004 from EDDA and temp stow for transfer to shuttle

EMU 3018

17. Install on FWD EDDA

EMU 3005

18. Disconnect Helmet and remove comm cap. Stow Comm Cap in Pk ECOK

P & I

POST EVA RECONFIG AND TRANSFER TO SHUTTLE (150 min) (Cont)

- EMU 3005/
3018
19. Swap the following:
- LTAs except boots
(Boots s/n 219 stay on EMU 3018, boots s/n 230 stay on EMU 3005)
 - Lower Arms
 - Gloves
- Refer to FS 12-31. Verify serial numbers and sizing for Pk down suit (EMU 3018)

19a. Install used LiOH from EVA 1 (REF: STS-130 CONSUMABLES TRACKING CUE CARD)

- EMU 3018
20. Install EMU battery ~~2084~~ **2085** (from MO2 bag s/n 1038 'EVA Prep and Ops') in EMU

21. Remove EMU 3018 from EDDA and temp stow for transfer to shuttle
22. Remove EMU Servicing Kit s/n 5005 from EVA Sys Xfer Bag, and deploy in A/L

23a. Stow all but six (6) lint free wipes from EMU Servicing Kit (s/n 5005) in ziplock bag; temp stow ziplock bag in A/L EMU Equipment bag

23. Take signal conditioner s/n 121 out of EMU Servicing Kit s/n 5005 and place in EMU Servicing Kit s/n 5004
24. Config/verify items listed below are in specified bags. Transfer bags and EMUs to shuttle. Report transfer complete to **MCC-H**

Bag "G"	
<ul style="list-style-type: none"> <input type="checkbox"/> Expended LiOHs (3) <input type="checkbox"/> EMU Battery 2084 <input type="checkbox"/> Be2 Gloves <input type="checkbox"/> Pk2 Gloves <input type="checkbox"/> EMU Comfort Patch Kit (labeled 'Launched on STS-126') (located in outside pocket of MO2 bag s/n 1010) <input type="checkbox"/> NH3 Jumper Bag <ul style="list-style-type: none"> <input type="checkbox"/> Cupola MLI (2) 	<ul style="list-style-type: none"> <input type="checkbox"/> EVA Task Xfer Bag <ul style="list-style-type: none"> <input type="checkbox"/> Adjustable Equipment Tethers (16) (s/ns 1013, 1014, 1015, 1036, 1037, 1082, 1087, 1088, 1089, 1095, 1096, 1097, 1098, 1099, 1100, 1101) <input type="checkbox"/> 5/16 (rigid) Socket-7 ext (s/n 1007) <input type="checkbox"/> Used Ties (long) <input type="checkbox"/> Used Wire Ties (short) <input type="checkbox"/> OIH Bags (OIH Equipment Tether on each) (2) (s/n 1002, 1004) <input type="checkbox"/> PCBM Contamination Covers (8) <input type="checkbox"/> NOD3 Avionics Cable Dust Caps (8) <input type="checkbox"/> NOD3 Avionics Jack Dust Caps (10) <input type="checkbox"/> Female QD Caps (8) <input type="checkbox"/> Male QD Caps (8) <input type="checkbox"/> NPV IVA Caps (2) <input type="checkbox"/> Terminator IVA Caps (3) <input type="checkbox"/> J104 Dust Cap <input type="checkbox"/> J104 MLI Strap <input type="checkbox"/> NOD3 Avionics MLI (2) <input type="checkbox"/> NOD3 NH3 MLI (2)

POST EVA RECONFIG AND TRANSFER TO SHUTTLE (150 min) (Cont)

<u>EMU 3004 (Be)</u>	<u>EMU 3018 (Pk)</u>
<input type="checkbox"/> DIDB Restraint Bag	<input type="checkbox"/> DIDB Restraint Bag
<input type="checkbox"/> Helmet (√sun shade down, cover installed)	<input type="checkbox"/> Helmet (√sun shade down, cover installed)
<input type="checkbox"/> Valsalva	<input type="checkbox"/> Valsalva
<input type="checkbox"/> EMU Gloves (Be1)	<input type="checkbox"/> EMU Gloves (Pk1)
<input type="checkbox"/> Wrist Mirror (2)	<input type="checkbox"/> Wrist Mirror (2)
<input type="checkbox"/> EMU Battery s/n 2083	<input type="checkbox"/> EMU Battery s/n 2085
<input type="checkbox"/> LiOH (2003)	<input type="checkbox"/> LiOH (2004)
<input type="checkbox"/> LTA	<input type="checkbox"/> LTA

<u>EVA SYS Xfer Bag</u>
<input type="checkbox"/> SODF: ISS EVA Systems Checklist (Brown stripe)
<input type="checkbox"/> FDF: EVA Checklist (Brown stripe)
<input type="checkbox"/> <u>STS-130 CONSUMABLES TRACKING CUE CARD/STS-130 BATTERY RECHARGE CUE CARD</u>
<input type="checkbox"/> <u>EXPEDITED SUIT DOFFING CUE CARD/EMERGENCY UNDOCKING EVA TRANSFER</u> (Cue Card)
<input type="checkbox"/> EMU Servicing Kit s/n 5004 (labeled 'For use and return on STS-130')
<input type="checkbox"/> Cuff C/L (2)
<input type="checkbox"/> Items from 'Pre-gather for STS-130' bag (leave bag on ISS)
<input type="checkbox"/> SCOFs (2) (s/n's 1003/1006)
<input type="checkbox"/> ISS EVA Systems Checklist – OLD COPY
<input type="checkbox"/> Ammonia Contamination CC – OLD COPY
<input type="checkbox"/> <u>DEPRESS/REPRESS</u> (Cue Card) (2) – OLD COPY

EVA PREBREATHE CUE CARD

EVA UNPACK AND STOW (60 min)

I

NOTE

This procedure assumes that transfer items were preconfigured per EVA PREP FOR TRANSFER TO SHUTTLE

1. Unpack and stow items per table below; report status to MCC when complete:

Item	Initial Location (After Transfer)	Final Destination (On Shuttle)	Transfer Status (Cplt/Not Cplt)
<input type="checkbox"/> EMU 3004 (Be)		Stbd – AAP	
<input type="checkbox"/> EMU 3018 (Pk)		Port – AAP	
<input type="checkbox"/> Bag G	Middeck	Middeck	
<input type="checkbox"/> EMU Servicing Kit <input type="checkbox"/> SCOF (2)	EVA Sys Transfer Bag	Vol H Inboard (MD23R)	
<input type="checkbox"/> ISS EVA Systems Checklist (BROWN stripe) <input type="checkbox"/> <u>EXPEDITED SUIT DOFFING CUE CARD/ EMERGENCY UNDOCKING EVA TRANSFER (Cue Card)</u> <input type="checkbox"/> <u>STS-130 CONSUMABLES TRACKING CUE CARD/STS-130 BATTERY RECHARGE CUE CARD</u> <input type="checkbox"/> ISS EVA Systems Checklist – OLD COPY <input type="checkbox"/> Ammonia Contamination CC – OLD COPY <input type="checkbox"/> <u>DEPRESS/REPRESS (Cue Card) (2) – OLD COPY</u> <input type="checkbox"/> Cuff C/L (2) <input type="checkbox"/> <u>EVA PREBREATHE CUE CARD</u>	EVA Sys Transfer Bag	SODF Locker	
<input type="checkbox"/> FDF: EVA Checklist (BROWN stripe)	EVA Sys Transfer Bag	FDF Locker	
<input type="checkbox"/> Empty EVA Systems Transfer Bag	Middeck	Bag G	
<input type="checkbox"/> LiOH 2016	Bag G	Bag I	

P & I

SAFER CHECKOUT AND SWAP (45 min)

I

NOTE

SAFER 1005 stays on ISS in A/L Stowage Bag.
SAFER 1003 will be returned in Launch/Landing Bag (CTB Triple) with foam cutouts

- | | | |
|------------|-----|---|
| SAFER 1003 | | 1. Retrieve from stowed location and remove from A/L Stowage Bag |
| SAFER 1005 | | 2. Retrieve bag with SAFER from Node 3 |
| | | 3. Remove wire ties – long (30) and stow in A/L10_attic |
| | | 4. Remove Med ORU Bag and stow in A/L100_behind closeout |
| | | 5. Remove SAFER 1005 |
| | | 6. Perform SAFER CHECKOUT (<u>CHECKOUTS</u>) |
| | | Temp stow power switch guard |
| | | Stow SAFER and <u>SAFER CHECKOUT RESULTS</u> Cue Card in A/L Stowage Bag |
| SAFER 1003 | HCM | 7. Install power switch guard |
| | PM | 8. ✓Inhibitor installed, properly engaged |
| | | 9. ✓MAN ISOL vlv – CL (up) |
| | | 10. Install SAFER 1003 in Launch/Landing Bag |
| | | Refer to figures 1, 2, and 3, for stowage configuration |
| | | 11. Install SAFER 1003 <u>SAFER CHECKOUT RESULTS</u> Cue Card in Launch/Landing Bag |



Figure 1.- SAFER stow and configuration.



Figure 2.- SAFER foam block.

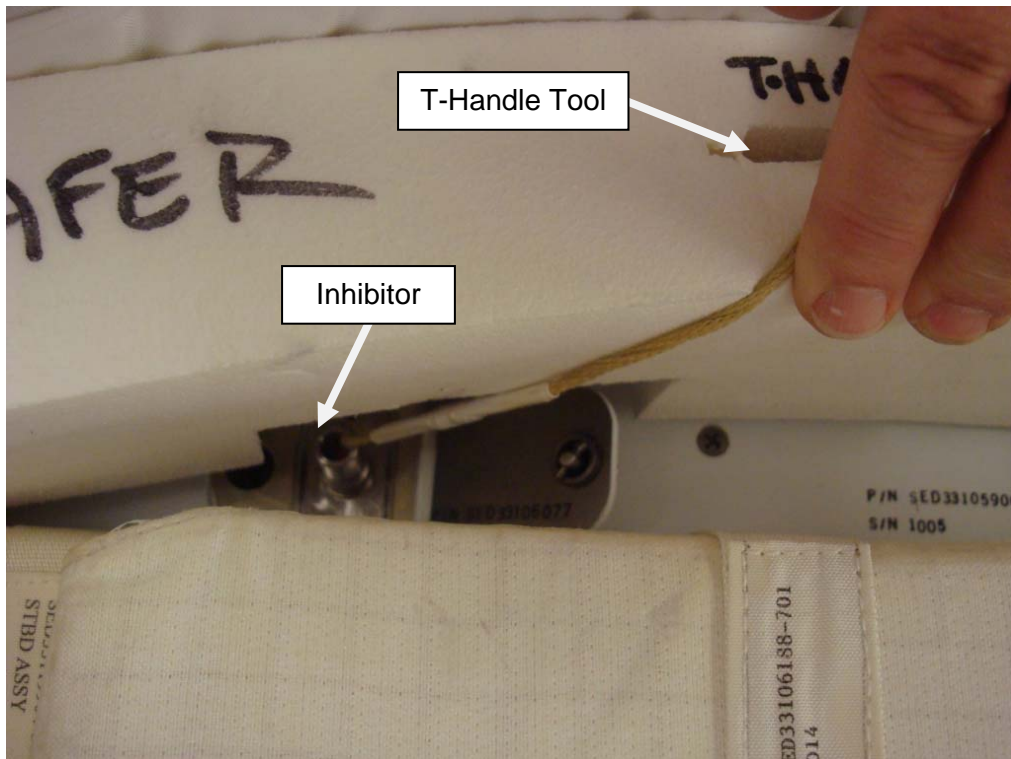


Figure 3.- T-Handle tool lanyard routing.

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TIMELINES

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STS-130 EVA SUMMARY TIMELINES FS 7-3

EVA 1

STS-130 (20A) EVA 1 TIMELINE..... FS 7-5

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EVA 1 INHIBIT PAD..... FS 7-7

EVA 1 NOTES/CAUTIONS/WARNINGS FS 7-9

EVA 1 FLIGHT SPECIFIC NOTES/CAUTIONS/WARNINGS FS 7-16

EVA 1 TOOL CONFIG FS 7-17

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EVA 1 EGRESS/SETUP FS 7-21

EVA 1 NODE 3 UNBERTH PREP..... FS 7-24

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EVA 1 NODE 3 AVIONICS CABLES INSTALL/NODE 3 LTA CABLE INSTALL.... FS 7-29

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EVA 2 FLIGHT SPECIFIC NOTES/CAUTIONS/WARNINGS FS 7-55

EVA 2 TOOL CONFIG FS 7-56

EVA 2 AIRLOCK CONFIG FS 7-58

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EVA 2 NH3 MLI LAYOUT..... FS 7-61

EVA 2 NH3 JUMPER INSTALL..... FS 7-62

EVA 2 NH3 MLI INSTALL FS 7-64

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EVA 2 NH3 MLI CLOSURE..... FS 7-66

EVA 2 NODE 3 OUTFITTING FS 7-67

EVA 2 CLEANUP/INGRESS FS 7-70

EVA QD OPS CUE CARD FS CC 7-79

EVA 3

STS-130 (20A) EVA 3 TIMELINE..... FS 7-81

EVA 3 BRIEFING CARD FS 7-82

EVA 3 INHIBIT PAD..... FS 7-83

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EVA 3 FLIGHT SPECIFIC NOTES/CAUTIONS/WARNINGS FS 7-92

EVA 3 TOOL CONFIG FS 7-93

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TIMELINES

GET-AHEADS

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TIMELINES

STS-130 EVA SUMMARY TIMELINES

EVA 1

00:00	01:00	02:00	03:00	04:00	05:00	06:00	06:30		
EV1 (Be) Post/Depress	Egress/Setup	NODE 3 Unberth Prep	NH3 Bag Ops	OTP Removal		NODE 3 Avionics Cable Install	Get-ahead	Cleanup/Ingress	Pre/Repress
EV2 (Pk) Post/Depress	Egress/Setup	NODE 3 Unberth Prep	NH3 Bag Ops	OTP Removal		NODE 3 LTA Cable Install	Get-ahead	Cleanup/Ingress	Pre/Repress

EVA 2

00:00	01:00	02:00	03:00	04:00	05:00	06:00	06:30					
EV1 (Be) Post/Depress	Egress/Setup	NH3 MLI Layout	NH3 Jumper Install	NH3 MLI Install	Open LAB Loop A QDs	NH3 MLI Closure	Keel Pin Cover Install	NOD3 CBM OPS	Trunnion Cover Install	Gap Spanner Install	Cleanup/Ingress	Pre/Repress
EV2 (Pk) Post/Depress	Egress/Setup	NH3 MLI Layout	NH3 Jumper Install	NH3 MLI Install	Open NOD3 Loop A QDs	NH3 MLI Closure	NOD3 OIH Install		NPV Install	Cleanup/Ingress	Pre/Repress	

EVA 3

00:00	01:00	02:00	03:00	04:00	05:00	06:00	06:30					
EV1 (Be) Post/Depress	Egress/Setup	Open Loop B QDs	NODE 3 LTA Cable Disconnect	Cupola MLI Bag Setup	Cupola MLI Removal	NODE 3 OIH/OI WIF Install		VSC Video Cable Install	NOD2 CBM OPS	Get-ahead P1 P-Clamp Release	Cleanup/Ingress	Pre/Repress
EV2 (Pk) Post/Depress	Egress/Setup	PMA3 Heater/Data Cable Install		Cupola MLI Removal	Cupola Launch Lock Release	APFR Relocate	VSC Video Cable Install		Get-ahead P1 P-Clamp Release	Cleanup/Ingress	Pre/Repress	

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STS-130 (20A) EVA 1 TIMELINE

PET HR : MIN	IV/SSRMS	EV1 (Be)	EV2 (Pk)	
00:00		POST DEPRESS (00:05)	POST DEPRESS (00:05)	00:00
		EGRESS/SETUP (00:45)	EGRESS/SETUP (00:35)	
	<ul style="list-style-type: none"> ✓ MCC-H GO for NODE 3 DEACT APCU 1, 2 CONV (two) – OFF SM 179 POWER TRANSFER 	<ul style="list-style-type: none"> • NODE 1 Port CBCS Flap Open (00:05) • OTP Bag Stow (00:15) 		
01:00	<ul style="list-style-type: none"> ✓ PTU 1, 2 APCU OUT VOLTS < 10 V APCU 1, 2 OUTPUT (two) – OFF 	<u>NODE 3 UNBERTH PREP (00:45)</u> <ul style="list-style-type: none"> • PCBM Contamination Cover Removal (00:45) 	<u>NODE 3 UNBERTH PREP (01:00)</u> <ul style="list-style-type: none"> • 1553 BUS Terminator Install (00:20) • Orbiter LTA Cable Removal (00:25) • Orbiter LTA Cable Stow in TSA (00:15) 	01:00
02:00		<u>NH3 BAG OPS (00:55)</u> <ul style="list-style-type: none"> • PLB Cleanup (00:30) • NH3 MLI Bag Ops (00:25) 	<u>NH3 BAG OPS (00:50)</u> <ul style="list-style-type: none"> • PLB Cleanup (00:30) • NH3 Jumper Bag Ops (00:20) 	02:00
03:00	<ul style="list-style-type: none"> • Verify OTP inhibits complete 	<u>OTP REMOVAL (01:55)</u> <ul style="list-style-type: none"> • OTP Removal Setup (00:30) • OTP Removal (00:20) • OTP Stow (00:40) 	<u>OTP REMOVAL (01:55)</u> <ul style="list-style-type: none"> • OTP Removal Setup (00:30) • OTP Removal (00:20) • OTP Stow (00:40) 	03:00
04:00		<ul style="list-style-type: none"> • OTP Cleanup (00:25) 	<ul style="list-style-type: none"> • OTP Cleanup (00:25) 	04:00
05:00	<ul style="list-style-type: none"> • Verify NOD3 Avionics inhibits complete • Verify NOD3 LTA inhibits complete 	<u>NODE 3 AVIONICS CABLES INSTALL (01:20)</u> <ul style="list-style-type: none"> • NOD3 Ch 1/4 Avionics Dust Caps Demate (00:20) • NOD3 Ch 1/4 Avionics Mate (00:15) • NOD3 Ch 12/3 Avionics Dust Caps Demate (00:10) • NOD3 Ch 2/3 Avionics Mate (00:35) 	<u>NODE 3 LTA CABLES INSTALL (01:00)</u> <ul style="list-style-type: none"> • P612 NOD3 LTA Cable Install (00:25) • P602 NOD3 LTA Cable Install (00:35) 	05:00
			<u>GET-AHEAD (00:35)</u>	
06:00		<u>GET-AHEAD (00:15)</u>		06:00
		<u>CLEANUP/INGRESS (00:25)</u>	<u>CLEANUP/INGRESS (00:25)</u>	
06:30		<u>PRE REPRESS (00:05)</u>	<u>PRE REPRESS (00:05)</u>	06:30

P & I

EVA 1 BRIEFING CARD

Generic STS-130 EVA Brief: (release folks as you can)

1. Campout (wake-up and start per the timeline to keep ground/flight team in sync) (EV1)
 - Bio-med prior to opening hatch if possible
 - Food requests?
2. Task IV visits A/L to verify tools on suits per timeline: When? (Task IV)
3. Suit-up IVs verify bag/tools in A/L per EVA specific Section 8 (Suit-up IVs)
 - Help required for SAFER install?
 - Pictures?
4. Communications protocol (EV1)
 - (EV1/EV2 during depress/repress, "Break-Break" for messages/emergency response)
 - Lost communication
5. Summary timeline (include get-ahead tasks at end) (Task IV)
6. EVA specific hazards Task IV)
7. First actions (EV1 and EV2)
8. EVA specific concerns (if not addressed during summary timeline brief) (EV1 and All)
9. Retreat plan/path (rapid return, incapacitated, lost crewmember-SAFER ops) (EV1)
10. Lost tools (velocity and direction estimate, when last seen) (EV1)
11. Communications plan for Arm ops (if required) (EVs/IV/M1/R1)
12. Hopping, safety tether awareness, stability and control, get-ahead risk, fatigue

EVA 1 INHIBIT PAD

Orbiter

ALL EVAs	
TCS {prior to egress}	
IV L12	1. √TCS POWER – OFF Install Switch Guard to remain there for all 3 EVAs
KU-Band Antenna {prior to egress}	
MCC-H – INCO	
	1. √KU-BAND Mask – active 2. √KU-BAND EVA Protect Box – active
RCS {prior to egress}	
	If EV crew < 27 feet from FRCS
IV	1. √DAP: VERN, FREE, LO Z
O14,15,16	2. √RJDF F1, F2, F3, F4 MANF DRIVER (four) – OFF LOGIC (four) – OFF
MCC-H – Prop	
IV	3. √Above RCS config 4. √RCS F – ITEM 1 EXEC (*) √JET DES F1U – ITEM 17 (*) F3U – ITEM 19 (*) F2U – ITEM 21 (*)
LOCATION DEPENDENT INHIBITS	
Orbiter LTA Cable Disconnect {prior to task}	
{Expect inhibits in place just prior to LTA cable disconnect (starts 01:45 thermal clock for LCS); do not remove inhibits until crew clear of hot SPDU connector}	
IV	1. Verify MCC-H GO , perform NODE 3 HEATER DEACT:
A15	APCU 1, 2 CONV (two) – OFF
CRT	SM 179 POWER TRANSFER
	√PTU 1, 2 APCU OUT VOLTS: < 10 V
A15	APCU 1, 2 OUTPUT (two) – OFF

Ground

ALL EVAs	
Ground Radar {prior to egress}	
MCC-H – TOPO	
	1. √TOPO console, ground radar restrictions in place for EVA

USOS

ALL EVAs	
PCU {prior to egress}	
	NOTE PCUs may require up to a 1-hour warmup period before they are operational.
MCC-H – Phalcon	
	1. √PCUs (two) operational in discharge mode and one of the following: a. CCS PCU EVA hazard control FDIR enabled. b. No more than two arrays unshunted and oriented < 105° from velocity vector.
	If one or both PCUs failed
	2. No more than two arrays unshunted and oriented < 105° from velocity vector.
CUCU {prior to egress}	
IV – (LAB104)	
	1. √cb POWER A, B [two] – OPEN
	2. √cb LINK 1,2 [two] – OPEN
LOCATION DEPENDENT INHIBITS	
LAB Window (PLB translation and Bag setup) {prior to egress}	
IV	EV crew less than 10 feet from window or in window FOV, close window shutter
SSPTS {not expected}	
MCC-H – Phalcon	
	If EV crew working within 2 feet of SSPTS cables
	1. RPCM LA1A4A D RPC 3 – Open, Close Cmd Inhibit
	2. RPCM LA2A3B D RPC 1 – Open, Close Cmd Inhibit
	3. RPCM Z14B A RPC 2 – Open, Close Cmd Inhibit
	4. RPCM Z13B A RPC 2 – Open, Close Cmd Inhibit
Mobile Transporter (OTP) {prior to egress}	
MCC-H – ROBO	
	EV crew < 1.5 meters from MT
	1. √MT latched

EVA 1 INHIBIT PAD (Cont)

USOS (Cont)

LOCATION DEPENDENT INHIBITS

SPDM (OTP) *{prior to egress}*

MCC-H – ROBO

1. √SPDM in Keep Alive configuration
2. √PSU – Operational
3. √SACU1(2) – Keep Alive
4. √Body Prime(Redundant) – Keep Alive
5. √SPDM Arm 1(2) – Keep Alive

NODE 3 LTA Cable Connect *{prior to egress}*

MCC-H – THOR

1. P602 Mate – RPCM N1-RS2-B – RPCs 1-5, 12-16
RPC – Open and Close Command Inhibited
2. P1/P612 Demate/mate – RPCM N1-RS1-B – RPCs 1,2,15,16
RPC – Open and Close Command Inhibited

NODE 3 Avionics Cable Connect *{prior to egress}*

MCC-H – Phalcon

1. J113 Connector – MBSU 1 RBI 13 OPEN
2. J108 Connector – MBSU 2 RBI 2 OPEN
3. J114 Connector – MBSU 2 RBI 13 OPEN
4. J101 Connector – MBSU 4 RBI 4 OPEN
5. J103 Connector – RPCM S01A-D – RPC 3
RPC – Open and Close Command Inhibited
6. J110 Connector – RPCM S02B-D – RPC 3
RPC – Open and Close Command Inhibited

~~COL~~

~~ALL EVAs~~

~~Ham Radio *{prior to egress}*~~

- ~~**IV**~~
- ~~1. ARISS (Ham Radio) – Deactivate or VHF (144-146 MHz) TX only~~

JEM

ALL EVAs

ICS-EF Antenna *{prior to egress}*

SSIPC

1. ICS MOD Off
2. ICS UPC Off
3. ICS HPA Off
4. ICS Stored Commands Cleared

RSOS

ALL EVAs

SM Antennas *{prior to egress}*

MCC-M

1. GTS – Deactivate

IV

2. ARISS (Ham Radio) – Deactivate or VHF (144-146 MHz) TX only

IMPULSE *{prior to egress}*

MCC-M

1. IMPULSE (ИПИ-100) – Is not activated

EVAs ON PMA1 OR RSOS (LOCATION DEPENDENT)

Soyuz (docked to FGB) Thrusters (NOD1/PMA translation path) *{prior to egress}*

MCC-M

1. √Soyuz manifolds (four) – closed ЭКО1, ЭКО2, ЭКГ1, ЭКГ2
2. √Soyuz MCS unpowered
3. √Soyuz Attitude Control Thruster Valves (fifty-two) – closed
4. √Soyuz Main Engine Valves (K1, K2, K3, K4, K5, K6) – closed

EVA 1 NOTES/CAUTIONS/WARNINGS

NOTES

1. Bolt install: Report torque and turns
2. Bolt release: Report torque and turns if different from published range
3. EVA connectors: After disconnection and prior to connection; verify pin and EMI band integrity; verify connector free of FOD
4. Inspect QDs for damage prior to mating
5. Toolbox doors must be closed with one latch per door when EV crew not in immediate vicinity
6. Avoid contact with OBSS striker bars (Vitrolube coating)
7. 85-ft safety tether retract force may affect body positioning

CAUTION

ISS Generic Constraints

- A. Avoid inadvertent contact with
1. Grapple fixture shafts (drylube)
 2. PIP pins
 3. Passive UMAs
 4. MBS/SSRMS/SPDM/JEMRMS taped radiative surfaces: VDU, ACU, JEU, LEU, MCU, CRPCMs, and Cameras
 5. SPDM SJEU, EP, OTCM, LEU, and LEE VDU Radiator surfaces
 6. OTSD
- B. Electrical cables
1. Avoid bend radii < 10 times cable diameter
- C. Fiber optic cables
1. Avoid bend radii < 10 times cable diameter
 2. Avoid pulling on cable during mate/demate
- D. Fluid line flex hoses and QDs
1. Avoid bend radii < 14 in for hoses with a diameter \geq 1 in
 2. Additional care should be taken to not exceed bend radii when applying loads at the flexible hose to rigid tube stub interfaces
 3. Ensure fluid QD booties are fully closed prior to leaving worksite; wire tie if reqd
 4. Avoid bend radii < 5 in for hoses with diameter < 1 in on LAB, S0, S1, P1, and 10 in for hoses with diameter < 1 in on all other elements

CAUTION

ISS Generic Constraints (Cont)

- E. For structural reasons
1. Avoid vigorous body motions, quick grabs and kickoffs against tether restraints
 2. Avoid performing shaking motions (sinusoidal functions) more than four cycles
- F. Other
1. ITT Cannon connector: On demated connectors, do not rotate collar or manipulate cable/connector using collar or connector tool
 2. MLI handholds are not rated for crewmember translation loads

EVA 1 NOTES/CAUTIONS/WARNINGS (Cont)

CAUTION

ISS Truss Constraints

A. Avoid inadvertent contact with

1. CETA lights (Z-93 paint) [LAB,S1,NODE 1]
2. Deployed TUS cable [Nadir CETA rail]
3. S0 aft face radiator
4. GPS antennas (S13 paint) [S0,JLP]
5. UHF antennas [LAB,P1]
6. ETCS radiator flexhoses and panels [S1,P1]
7. EETCS/PV radiator flexhoses, bellows and panels [P6,P4,S4,S6]
8. SASA RF group [S1,P1]
9. Heat pipe radiators [Z1]
10. PCU cathode and HCA ports [Z1]
11. Ku-Band antenna (SGANT) dish [Z1]
12. CMG cover/shells [Z1]
13. FPMU [S1]
14. SASA high and low gain antennas and radiator surfaces [Z1]
15. Deployed MISSEs

B. For structural reasons

1. Avoid kicking S1/P1 radiator beam. If any of these occur, wait 2 to 5 min to allow structural response to dissipate

CAUTION

ISS Truss Constraints (Cont)

C. Other

1. WIS antennas: Do not use as handholds [NODE 1,LAB,P6,Z1]
2. Lubricant from Ku-Band SGANT gimbals [Z1], CMGs [Z1], and RTAS ground strap fasteners [P6,P4,S4,S6] can contaminate EMU
3. Prevent inadvertent contact of the tether shuttle with ETRS when the P3 tether shuttle stop is raised away from the rail

CAUTION

ISS U.S. Pressurized Elements Constraints

A. Avoid inadvertent contact with

1. EVA crane [PMA1]
2. TCS reflectors [PMA2,PMA3]
3. APAS hardware [PMA2,PMA3]
4. CETA lights (Z-93 paint) [LAB,S1,NODE 1]
5. UHF antennas [LAB,P1]
6. Open CBM petal covers and LAB window shutter
7. S0/NODE 2 fluid tray hardlines at NODE 2 end, which are limited to 25 lb

B. Other

1. WIS antennas: Do not use as handholds [NODE 1,LAB,P6,Z1]
2. CBM petal covers may not be used as handholds unless both launch restraint pins are engaged

EVA 1 NOTES/CAUTIONS/WARNINGS (Cont)

CAUTION

ISS I.P. Elements Constraints

COL

- A. Avoid inadvertent contact with
1. COL ARISS and AIS antennas [COL-Nadir]

JEM

- A. Avoid inadvertent contact with
1. GPS antennas (S13 paint) [S0,JLP]
 2. Open JPM window shutter
 3. JTVE, WVE/EVE, JEF VE cameras
 4. JEMRMS taped radiative surfaces [JEU,EE,Cameras]
 5. JEM A/L target and pins
 6. JEF ORUs and EFUs (paint and lubricant)
 7. MAXI front and top panel (paint)
 8. SEDA-AP sensors (HIT, SDOM, and AOM) and MPAC & SEED
 9. Trunnions and UCMs (paint and lubricant) [JEF Payloads]
 10. RAIDS covers on end of HREP
 11. ICS-EF Ka-Band antenna dish
- B. For structural reasons
1. Avoid kicking MMOD shields between JLP and JPM
 2. Avoid tool impact on ICS-EF sensor

CAUTION

Shuttle Constraints

- A. Avoid inadvertent contact with
1. OBSS and SRMS composite sections joint torque arms, grapple fixture shafts, and cable harnesses
 2. LCS (silver Teflon) and LDRI (silver Teflon) and ITVC (gold foil) [OBSS]
 3. WVS antenna [ODS truss and PLB sill]
 4. Payload bay and camera wire harnesses, cables, cable guides, and connectors
- B. No touch
1. LDRI diffuser [OBSS]
 2. OBSS saddle contacts (when OBSS unberthed) [OBSS]
 3. Monkey fur [PLB]
 4. Cameras: Metallic surfaces [PLB]
 5. Ku-Band antenna black dish and gold thermal blankets [PLB]

EVA 1 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

ISS Generic Constraints

- A. Avoid inadvertent contact with
 - 1. Grapple fixture targets and target pins
- B. Pinch
 - 1. NZGL connector linkage. Use caution when mating/locking
 - 2. ITT Cannon connector rotating housing
- C. QDs
 - 1. If QD is in FID when valve is opened (bail fwd), QD will leak and fluid line may whip
 - 2. Do not rotate if in mated/valve open configuration
- D. Sharp Edges
 - 1. Inner edges of WIF sockets
 - 2. APFR active WIF probes
 - 3. Mating surfaces of EVA connectors
Avoid side loads during connector mating
 - 4. Back side of MMOD shield fasteners
 - 5. Spring loaded captive EVA fasteners (e.g., 6B-boxes, BMRRM, RTAS, SARJ Covers); the end of the spring may protrude
 - 6. SPDM OTCM gripper jaws
 - 7. Keep hands away from SSRMS, LEE/POA/SPDM LEE opening, snares, and PDGF curvic coupling (teeth)
 - 8. MMOD strikes on ISS exterior

WARNING

ISS Generic Constraints (Cont)

- E. Thermal
 - 1. EVA connectors with booties may become hot if left uncovered. Handling may need to be limited
 - 2. Turn off glove heaters when comfortable temperature reached to prevent bladder damage. Do not pull fingers out of gloves when heaters are on
 - 3. Uncovered trunnion pins may be hot
 - 4. SSRMS/MBS/SPDM operating cameras and lights may radiate large amounts of heat
 - 5. Do not touch EMU protective visor if temperature has been < -134 degF for > 15 min
 - 6. No EMU boot contact with foot restraint when temperature < -120 degF or > 200 degF
 - 7. PDGF surfaces may not meet touch temperature requirements for unlimited contact when $\beta \leq -70$ or $\beta \geq 70$
- F. Electrical Shock
 - 1. Do not touch SPDM CLPA 1 electrical connector prior to camera installation

WARNING

ISS Truss Constraints

- A. Avoid inadvertent contact
 - 1. SSU, ECU, beta gimbal platform, mast canister, SAW blanket boxes unless the beta gimbal is locked and the motor is turned off
 - 2. Stay inboard of SARJ when active
 - 3. Stay 2 ft from S1/P1 radiator beam rotational envelope when beam is free to rotate
 - 4. Stay 5 ft from moving MT on face 1
- B. RF radiation exposure
 - 1. Stay 3.6 ft from S-Band (SASA) high gain antenna when powered [S1,P1]
 - 2. Stay 1.3 ft from S-Band (SASA) low gain antenna when powered [S1,P1]
 - 3. Stay 1 ft from UHF antenna when powered [LAB,P1]
- C. Sharp Edges
 - 1. Solar array blanket box [P6,S6]
 - 2. Fastener threads on back of Z1 U-jumper male FQD panel, if nutplate cap missing
 - 3. Outboard MT rail attachment lug near P6 handrail 5333 and gap spanner
 - 4. P2 connector on EWIS box TAA-06 [Zenith/Forward Corner 1 of P5 – SARJ at 0 deg]
 - 5. Nickel coated braided copper ground straps may contain frayed wires [P6,P4,S4,S6]
 - 6. MMOD strikes on Z1 toolboxes

EVA 1 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

ISS Truss Constraints (Cont)

D. Electrical Shock

1. Stay ≥ 2 ft from ungrounded floating connectors if powered
MBS cross-connect jumpers
(translate past these using UMA handrails)
S0 EVA power cables (inside S0 Bay 00 Face 4, Bay 01 Face 3)
ESP-2 jumper (inside S0 Bay 03 Face 4)

E. Thermal

1. ELC may exceed touch temperatures when $\beta > 75$ deg

WARNING

ISS U.S. Pressurized Elements Constraints

A. Handrails

1. Handrails previously used for MISSE attachment may not be used as a safety tether point [A/L endcone 564 and 566, A/L Tank 2 Nad/Fwd and Port/Fwd, P6 5389]

B. Pinch

1. EV side of IV Hatch during Hatch operation (also snag hazard) [A/L]
2. LAB window shutter and CBM petal cover linkages during operation

C. RF radiation exposure

1. Stay 1 ft from UHF antenna when powered [LAB, P1]

D. Sharp Edges

1. PMA umbilical launch restraints – exposed bolt threads
2. Adjustable fuse tether (Fish Stringer) buckles stowed in Node Bag
3. Port/Aft portion of A/L circular HR [HR 0506]
4. A/L HR 0537 (Eq Lock Zenith)

E. Thermal

1. PMA handrails may be hot. Handling may need to be limited
2. Stay ≥ 1 ft away from PMAs and MMOD shields > 270 degF if EMU sun visor up; limit time to 15 min or less if > 300 degF
3. Stay at least 0.5 ft away from PMA and MMOD shields > 325 degF
4. No EMU TMG contact with PMAs and MMOD shields > 320 degF

WARNING

ISS U.S. Pressurized Elements Constraints (Cont)

F. Electrical Shock

1. Stay ≥ 2 ft from ungrounded floating connectors if powered. SSPTS connectors include NOD1 Stbd/Fwd HR 0130, LAB Stbd/Fwd HR 0273, PMA2 Stbd

EVA 1 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

ISS I.P. Elements Constraints

COL

A. Avoid inadvertent contact with

1. SOLAR [COL EPF]

B. Thermal

1. Columbus end cones may violate touch temperature constraints when $-75 \leq \beta \leq -60$ or $60 \leq \beta \leq 75$

JEM

A. Avoid inadvertent contact with

1. ICS-EF sensors

B. Pinch

1. JPM window shutter linkages during operation
2. JEM cameras (JVTEs, EVE, WVE, and JEF VEs)
3. JEM EFU latching arms
4. JEF SSE latch
5. ICS-EF antenna boom
6. SEDA-AP mast
7. SMILES antenna rotating area
8. HREP hinge sides and RAIDS pinch areas

WARNING

ISS I.P. Elements Constraints (Cont)

JEM (Cont)

C. Sharp Edges

1. Interior of JEMRMS HRMs
2. JEMRMS EE opening and snares
3. JEM A/L hatch corners
4. ICS-EF AHM gears
5. MAXI visual star camera
6. SMILES baffles (two), baffle base bare bolts, and Cold Sky Terminator (CST)
7. HREP baffles (four) [Star tracker aperture Zenith and three instrument baffles Aft]

D. RF radiation exposure

1. Stay 0.3 ft from Fwd/Aft JPM PROX antenna

E. Thermal

1. JPM Port End Cones and JLP Port Nadir may violate touch temperature constraints when $\beta > 60$ deg
2. JEMRMS/JTVE/JEFVE operating cameras and lights may radiate large amounts of heat

WARNING

Shuttle Constraints

A. Arcing/Molten Debris

1. Stay ≥ 2 ft from exposed EFGF connector when OBSS berthed, powered, and EFGF not grappled [PLB]
2. Stay ≥ 2 ft from exposed Stbd Fwd MPM contacts [PLB]
3. Stay above PLB sill when within 1 ft of powered ROEU connector [PLB]

B. Pinch

1. PRLA operation [PLB]

C. RF radiation exposure

1. Stay 3.28 ft from S-Band antenna when powered
2. Stay 1 ft from top and side of UHF PLB antenna radome surface when in high powered mode [ODS truss]
3. Stay 0.33 ft from top and side of UHF PLB antenna radome surface when in low powered mode [ODS truss]
4. Remain below the level of the PLB door mold line for first 20 in Aft of Fwd bulkhead when S-Band antenna powered [PLB]
5. Remain on the inboard side of the Stbd slidewire (sill handrails if slidewire not installed) for first 20 ft Aft of Fwd bulkhead when Ku-Band antenna powered [PLB]

EVA 1 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

Shuttle Constraints (Cont)

D. Sharp Edges

1. PRLA grounding wipers [PLB]
2. LDRI baffles (also an entrapment hazard) [OBSS]
3. Keep hands away from SRMS EE opening and snares
4. TCS connector backshells have exposed threads [ODS]

E. Thermal

1. Illuminated PLB lights; do not touch
2. OBSS grapple fixture shafts/cams may be hot. Limit handling if required
3. Stay 27 ft from PRCS when powered
4. Stay 3 ft from VRCS when powered
5. Stay 3 ft from APU when operating

F. Contamination

1. Stay out of the immediate vicinity of leaking jet or APU

G. Lasers

1. Do not look at LDRI diffuser or LCS laser aperture window

EVA 1 FLIGHT SPECIFIC NOTES/CAUTIONS/WARNINGS

NOTES

1. J107 dust cap does not get removed

EVA 1 TOOL CONFIG

EV 1

- Adj Equip Tether (L wrist)
- MWS
 - BRT (L)
 - RET (eq-eq)
 - Wire Tie (2)
 - T-Bar
 - RET (eq-eq)
 - RET w/PIP Pin
 - Adj Equip Tether
 - Wire Tie (2)
 - Small ISS Trash Bag
 - Gap Spanner #1 (-307)
 - Swing Arm (R)
 - RET (eq-eq) (to Lg Trash Bag PIP Pin ring)
 - PCBM Lg Trash Bag**
 - Adj Equip Tether (Lg-eq)
 - Adj Equip Tether
 - Wire Tie (long) (2)
 - Wire Tie (short) (bottom)
 - Camera Bracket (outside bag)
 - EVA Camera
- D-ring Extender (2, R & L D-ring)
 - 85-ft Safety Tether (R D-ring Ext)
- Waist Tether (2, R on D-ring to ST & L on D-ring Ext)
- SAFER
- WVS

EV 2

- Adj Equip Tether (L wrist)
- MWS
 - BRT (L)
 - RET (eq-eq)
 - Wire Tie (2 out, 1 in)
 - T-Bar
 - RET (eq-eq)
 - P612 Dust Cap (in trash bag)
 - RET w/PIP Pin
 - Adj Equip Tether
 - Wire Tie (2)
 - Small ISS Trash Bag
 - Swing Arm (R)
 - RET (eq-eq)
 - PGT [B7 25.5 ft-lb, CAL, MTL 30.5]
 - PGT Battery s/n _____
 - 7/16 (wobble) Socket-6 ext
 - D-ring Extender (2, R & L D-ring)
 - 85-ft Safety Tether (L D-ring Ext)
 - Spare 85-ft Safety Tether (R D-ring Ext)
 - Waist Tether (2, R on D-ring Ext & L on D-ring to ST)
 - SAFER
 - WVS

AIRLOCK CONFIG

- RET (Lg-eq)
 - PCBM Lg Trash Bag (EV1)**
 - RET (eq-eq) (to Lg Trash Bag PIP Pin ring)
 - Adj Equip Tether (Lg-eq)
 - Adj Equip Tether
 - Wire Tie (long) (2)
 - PCBM Contamination Covers (8)
 - Wire Tie (short) (bottom)
 - Spare 85-ft Safety Tethers (2)
- RET (Lg-eq)
 - OTP Crewlock Bag (EV1)**
 - RET w/PIP Pin (outside)
 - Spare 85-ft Safety Tether (outside)
 - Ratchet Wrench (no palm wheel)
 - 7/16 (rigid) Socket-2 ext
 - Pry Bar
 - Square Scoop (2 out, 1 in)
 - LDTD Tethers (2 out, 1 in), √strap 1/2 way extended

Tether Counts: (RED RETs)

RETs (eq-eq) = 16	Adj Equip Tethers = 26
RETs (Lg-eq) = 4	Adj Equip Tethers (Lg-eq) = 2
RET w/PIP Pin = 4	Fish Stringers = 2

NOTE: Prior to use, inspect the following hardware:

- Use shuttle Adj Equipment Tether allotment for Jumper and MLI Bas
- RET cords for fraying
- Load Alleviating Straps (Safety Tether/Waist Tether); ref FS 8-16
- Trash Bag: Bristle deformation/damage and Hinge damage, after having stowed tools in trash bag
- BRT joint screws not loose
- IV caps removed on all connectors
- Bails aft on QDs
- Detent buttons secured on QDs

EVA 1 TOOL CONFIG (Cont)

AIRLOCK CONFIG (Cont)

- RET (Lg-eq)
 - NH3 Jumper Bag** (flap between each jumper) (EV2)
 - Adj Equip Tether (3) (outside, 2 on hinge side, 1 on front left corner) (from shuttle)
 - RET (3) (eq-eq) (internal loops)
 - NH3 Jumpers (3) (M2, M4, M3 (bottom) – NOD3/bent end on RET) (QD caps installed)
 - Wire Tie (long) (3) (integral to bag and on each jumper to prevent uncoiling)
 - Fish Stringer (sm hook attached to M1 LAB-end bail; 1 Lg hook attached outside bag)
 - RET (eq-eq)
 - Male N2 Vent Tool
 - Fish Stringer (sm hook attached to M1 NOD3-end bail, 1 Lg hook on internal loop and other Lg hook attached outside bag)
 - NH3 Jumpers (M1) (QD caps installed)
 - Adj (Lg-eq) (Jumper #1 midpoint)
 - Wire Tie (long) (integral to bag on jumper to prevent uncoiling)
 - Cap Crewlock Bag**
 - Adj Equip Tethers (4) (clove hitch on internal RETs) (from shuttle)
 - RET (eq-eq)
 - 1-in Bail Lever Drive

AIRLOCK CONFIG (Cont)

- RET (Lg-eq)
 - NH3 MLI Bag** (Lg ORU Bag) – stays outside for Cupola (EV1)
 - Adj Equip Tether (3) (outside, 2 on front, 1 shortened on hinge side) (from shuttle)
 - Camera Bracket (tether to outside bag)
 - EVA Camera (constrained w/outside Adj Equip Tether from MLI Bag; stuffed inside bag)
 - RET (eq-eq) (outside)
 - Avionics Lg Trash Bag** (constrained w/outside Adj Equip Tether from MLI Bag; stuffed inside bag)
 - RET (eq-eq) (2) (inside) (1 free, 1 to MLI)
 - NH3 MLI (√top Velcro tabs folded over, √Loop A/B-end on top, LAB-end on bottom, LAB grounding pin out port side, Loop A and B grounding pins out stbd side and in Loop A pocket)
 - Adj Equip Tether (4) (2 on each LAB-end side MLI, 1 on Loop A-end to Loop B-end, 1 on Loop B-end) (from shuttle)
 - Adj Equip Tether (2) (across middle and top of MLI to hold in bag) (from shuttle)
 - Gap Spanner α (-305) (1)
 - Gap Spanner β, γ, δ (-303) (3)
 - Gap Spanner ε (-301) (1)

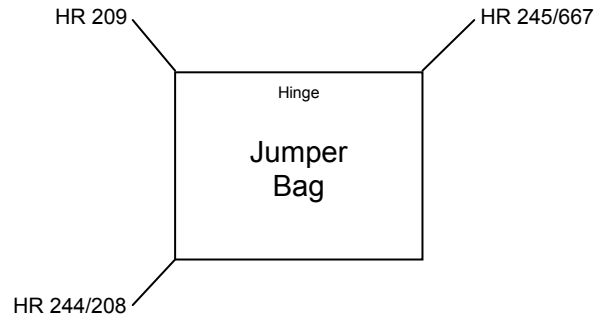
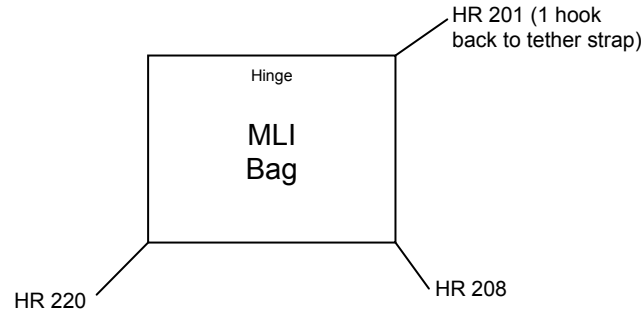
AIRLOCK CONFIG (Cont)

- RET (Lg-eq)
 - Avionics Crewlock Bag** (EV2/EV1)
 - RET (eq-eq) (outside)
 - RET (w/PIP Pin) (inside)
 - Wire Tie (long) (inside)
 - RET (eq-eq) (internal D-ring/outside handle)
 - J104 Velcro Strap
 - Adj Equip Tether (internal RET)
 - J104 Dust Cap
 - J104 1553 BUS Terminator
 - Adj Equip Tether (internal RET)
 - J6XX Dust Cap (hook mouth away from structure)
 - J6YY Dust Cap
 - Square Scoop (1)
 -
 - Adj Equip Tether (internal RET)
 - J1FGB MLI
 - J2FGB MLI
 - J103 Dust Cap
 - Adj Equip Tether (internal RET)
 - J1FGB 1553 BUS Terminator
 - J2FGB 1553 BUS Terminator
 - Adj Equip Tether (internal D-ring)
 - Wire Tie Caddy (9, __ left)
 - Gap Spanner #2 (-303)
 - Avionics Lg Trash Bag** (attached to Crewlock Bag)
 - RET (eq-eq) (outside)
 - NOD3 Avionics Cable Dust Caps (8)
 - NOD3 Avionics Jack Dust Caps (9)
 - NOD3 Avionics MLI thermal covers (2)

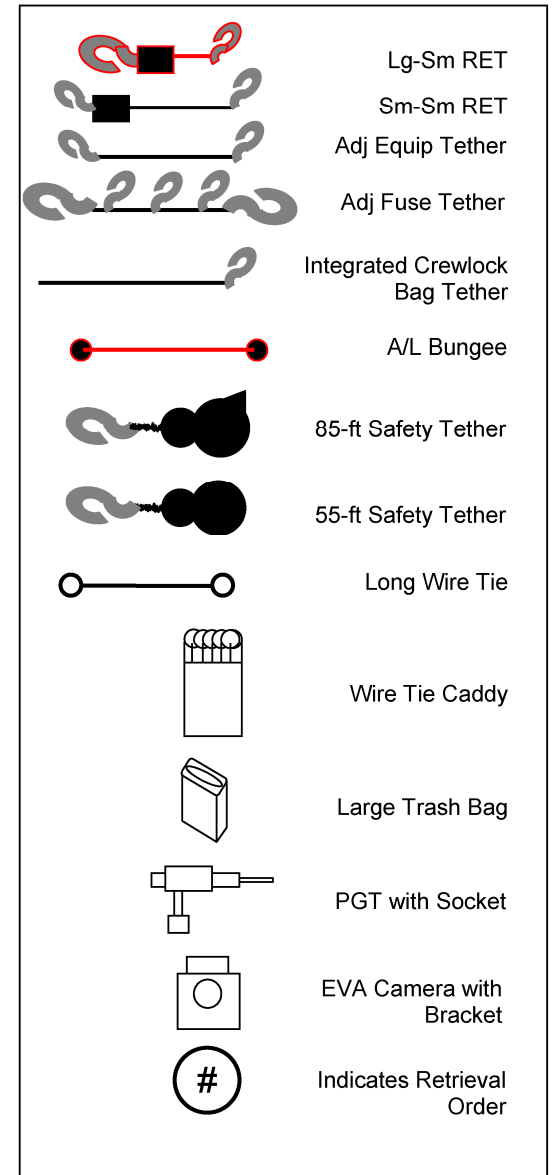
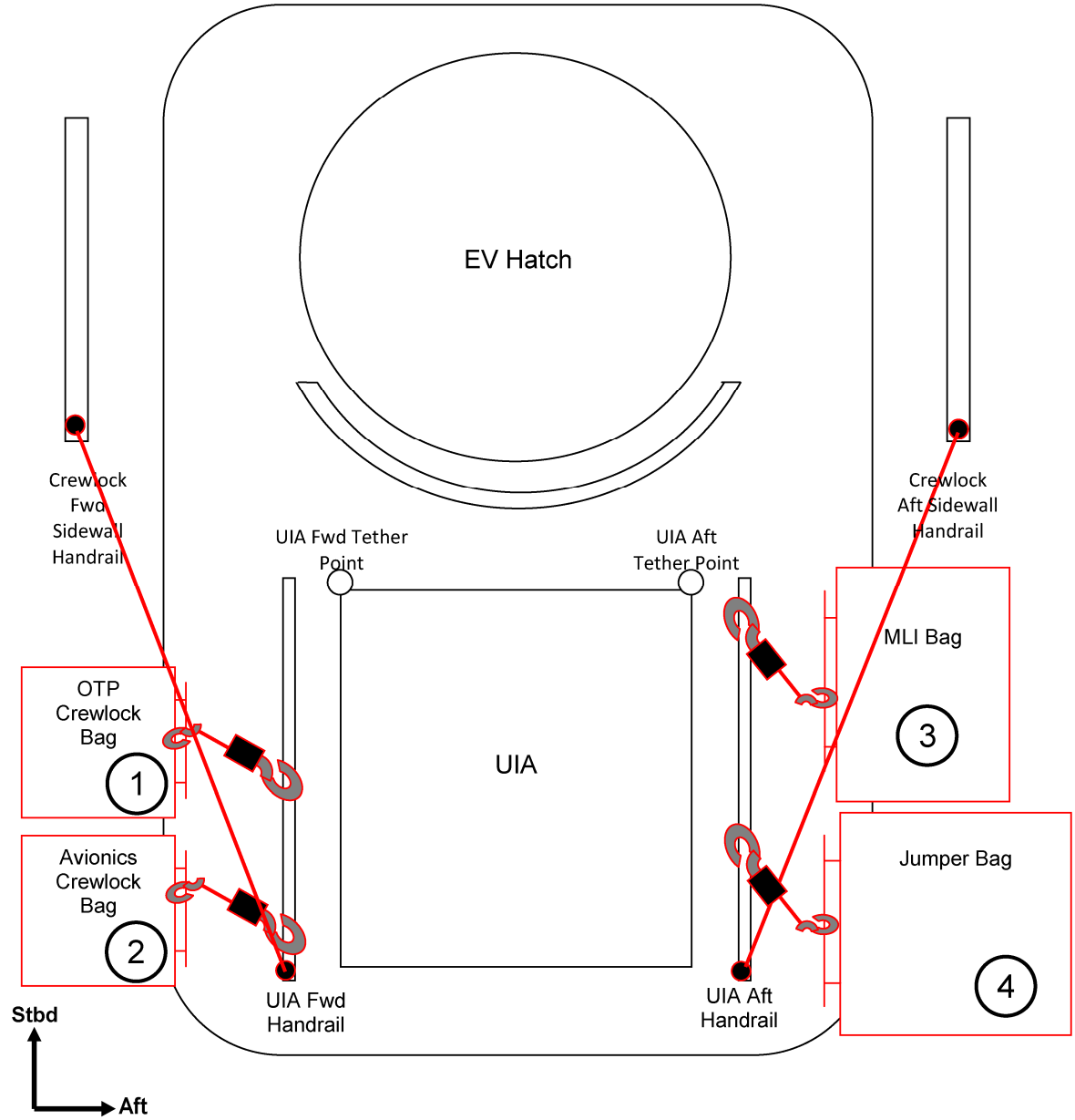
EVA 1 TOOL CONFIG (Cont)

AIRLOCK CONFIG (Cont)

- Staging Bag
 - Fish Stringer Tether
 - Wire Tie Caddy
 - Velcro/Tape Caddy
 - PGT
 - PGT Battery s/n _____
 - 7/16 (wobble) Socket-6 ext s/n _____
 - Vise Grips
 - Ratchet Wrench
 - 7/16 (rigid) Socket-9 ext
 - Needle Nose Pliers
 - Spare 55-ft Safety Tether
 - Hammer**
 - Fish Stringer Tether
 - Connector Cleaner Tool Kit
 - Connector Pin Straightener
 - Probe
 - Pry Bar**
 - MWS Key Strap Assy
 - Long Duration Tie-Down Tethers (2)**
 - Shuttle A/L Ratchet Wrench w/7/16 Socket (PRLA)**
- IV Bag
 - Towels (2)
 - Contamination Detection Kit
 - GP Caddy (2)
 - Adjustable Thermal Mittens (2)
 - Socket Caddy (hatch cont)
 - RET (eq-eq) (Black)
 - 1/2 Socket-8 ext
 - 7/16 (wobble) Socket-6 ext (spare)
 - DCM Plug (SAFER Hardmount) (2)
 - RET (eq-eq, Black) (2)

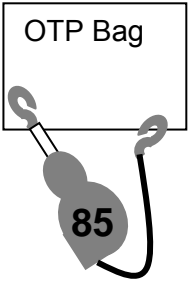
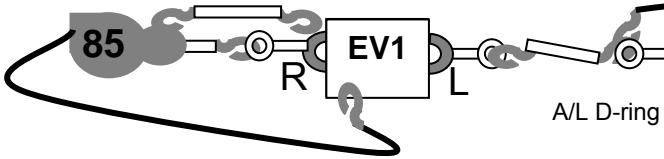
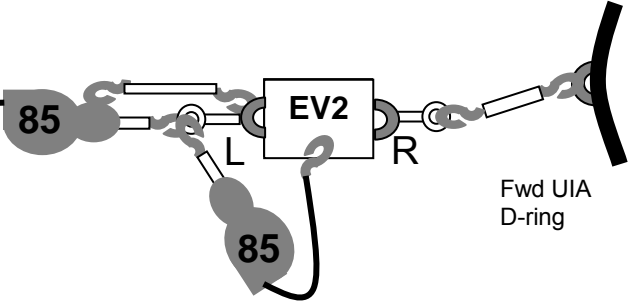


EVA 1 AIRLOCK CONFIG



Tool Legend

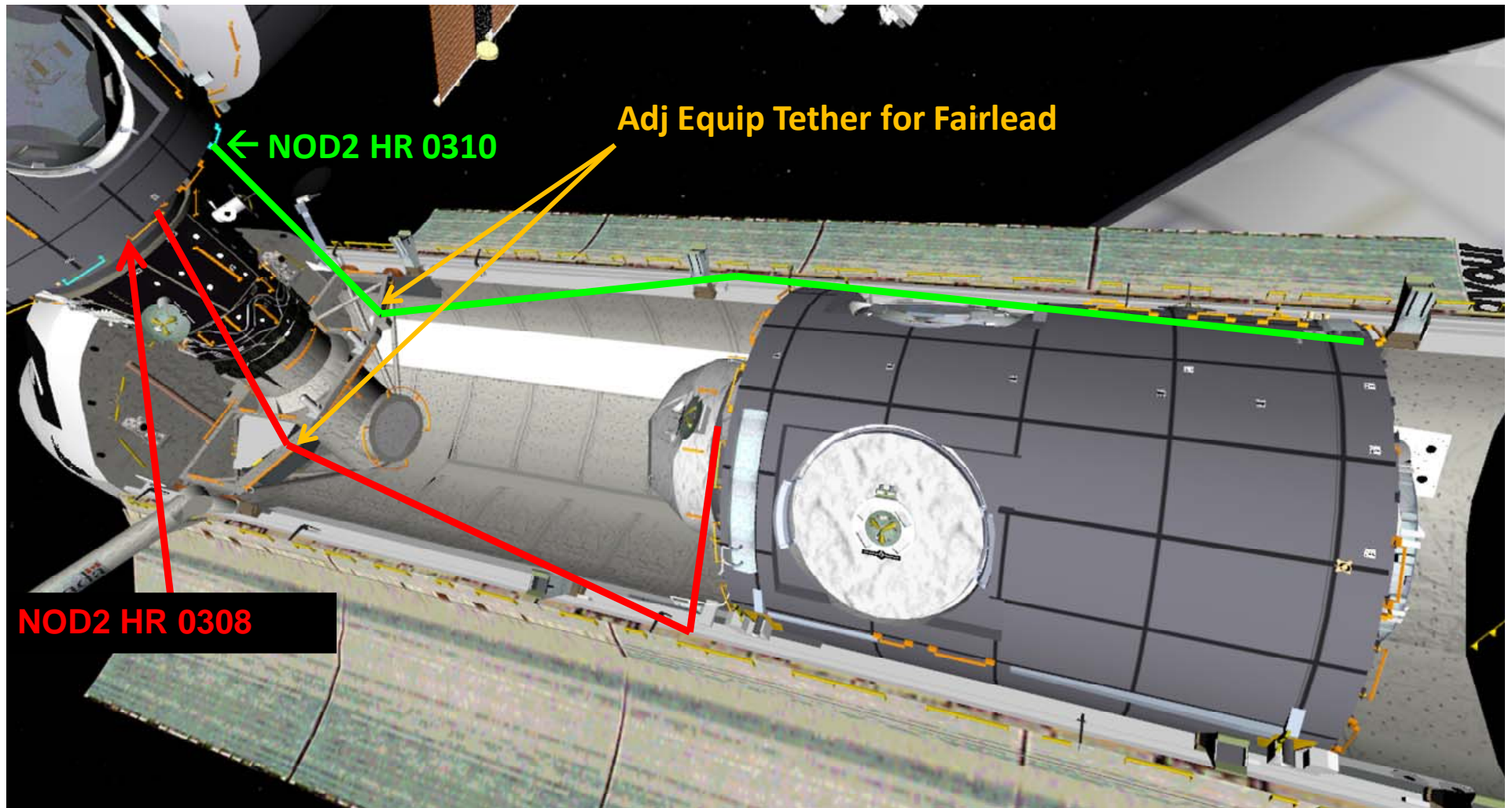
EVA 1 EGRESS/SETUP (00:45/00:35)

IV	EV1 (Be)	EV2 (Pk)
		
	<p>Initial Conditions:</p> <ul style="list-style-type: none"> <input type="checkbox"/> R D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> A/L 85-ft Safety Tether to MWS <input type="checkbox"/> Waist Tether to A/L Safety Tether ERCM <input type="checkbox"/> L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> Waist Tether to A/L D-ring Ext <p><input type="checkbox"/> Hooks closed and locked (Safety Tether reel ends, A/L Safety Tether anchor, L Waist Tether)</p> 	<p>Initial Conditions:</p> <ul style="list-style-type: none"> <input type="checkbox"/> R D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> Waist Tether to fwd UIA D-ring <input type="checkbox"/> L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> A/L 85-ft Safety Tether to A/L D-ring Ext <input type="checkbox"/> Spare 85-ft Safety Tether to MWS <input type="checkbox"/> Waist Tether to A/L Safety Tether ERCM <p><input type="checkbox"/> Hooks closed and locked (Safety Tether reel ends, R Waist Tether)</p>
	<p>EGRESS (00:15)</p> <ol style="list-style-type: none"> 1. Open A/L thermal cover 2. Egress A/L 3. Attach EV1 Safety Tether to aft A/L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel unlocked 4. Release Waist Tether from A/L D-ring Ext 5. Relocate EV2 Safety Tether anchor from internal A/L D-ring Ext to fwd A/L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> Hook closed and locked <input type="checkbox"/> Reel unlocked 	<p>EGRESS (00:15)</p>
<ol style="list-style-type: none"> 1. Post crew egress: WVS Software: Select page – RF camera Sel ‘Advanced Controls’ S-Band Level (two) – Max 	<ol style="list-style-type: none"> 6. Stow OTP Crewlock Bag on BRT 7. Receive Avionics Crewlock Bag 	<ol style="list-style-type: none"> 1. Transfer OTP Crewlock Bag to EV1, A/L RET to A/L D-ring ext 2. Transfer Avionics Crewlock Bag to EV1, A/L RET to A/L D-ring ext 3. Egress A/L 4. Close A/L thermal cover


EVA 1 EGRESS/SETUP (00:45/00:35) (Cont)

IV	EV1 (Be)	EV2 (Pk)
2. √SAFER handles down (MAN ISO vlv (L) – open; HCM (R) – closed)	8. √SAFER handles down 9. √ERCA green LED (if no WVS) 10. √Tethers and Tools	5. √SAFER handles down 6. √ERCA green LED (if no WVS) 7. √Tethers and Tools
3. √ MCC-H GO for NODE 3 DEACT A15 4. APCU 1, 2 CONV (two) – OFF SM 179 POWER TRANSFER CRT √PTU 1, 2 APCU OUT VOLTS < 10 V A15 APCU 1, 2 OUTPUT (two) – OFF	<p><u>SETUP (00:10)</u></p> <p>11. Transfer Avionics Crewlock Bag to EV2 12. Translate to LAB HR 0231, EV2 leads 13. Install Gap Spanner #1 (LAB HR 0231 (fwd) → LAB HR 0232 (fwd))</p> <p>NODE 1 PORT CBCS FLAP OPEN (00:05) 14. Translate to NOD1 Port CBCS flap 15. Expose mating Velcro 16. Release flap fastener snap 17. Open CBCS flap, secure with mating Velcro and snap 18. √Velcro secure</p>	<p><u>SETUP (00:20)</u></p> <p>8. Perform translation adaptation</p> <p>9. Stow Avionics Crewlock Bag on BRT 10. Translate to NOD2 nadir endcone via port nadir route 11. Perform Safety Tether swap on NOD2 HR 0308 (fwd endcone) 12. √Spare Safety Tether <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel unlocked 13. √Waist Tether <input type="checkbox"/> Lg hook closed and locked on ERCM 14. Stow A/L Safety Tether on HR ____ 15. Fairlead on port ODS HR using Adj Equip Tether</p>
5. On completion of IV step 4, give EV2 GO for 1153 install and LTA cable disconnect	<p><u>OTP BAG STOW (00:15)</u></p> <p>19. Translate to stbd CETA Cart via CETA spur 20. Stow OTP Crewlock Bag on zenith HR on stbd CETA Cart, retrieve spare 85-ft Safety Tether 21. Translate to NOD2 nadir endcone 22. Perform Safety Tether swap on NOD2 HR 0310 (fwd endcone) 23. √Spare Safety Tether <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel hook closed and locked <input type="checkbox"/> Reel unlocked 24. √Waist Tether <input type="checkbox"/> Lg hook closed and locked on ERCM 25. Stow A/L Safety Tether on HR ____ 26. Fairlead on stbd ODS HR using Adj Equip Tether 27. Translate to NOD3 PCBM covers (PLB aft) via stbd sill</p>	16. On IV GO , translate to SPDU (PLB port, bay 7) via port sill



EVA 1 EGRESS/SETUP (00:45/00:35) (Cont)



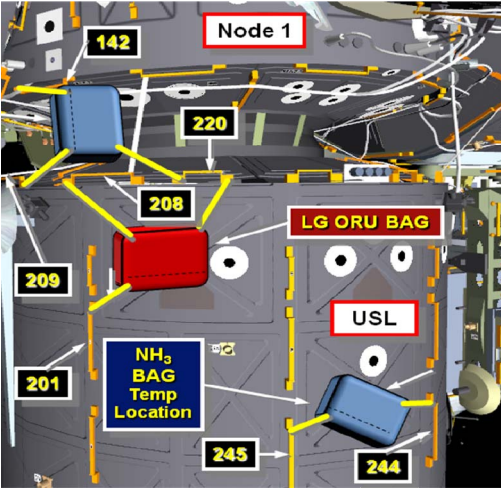
EVA 1 NODE 3 UNBERTH PREP (00:45/01:00)

IV/SSRMS	EV1 (Be)	EV2 (Pk)
<p>1. Point PLB camera away from EV1 if too close</p> 	<p><u>PCBM CONTAMINATION COVER REMOVAL</u> (00:45)</p> <ol style="list-style-type: none"> 1. Perform Glove Inspection 2. Remove PCBM Contamination Covers (8) <ol style="list-style-type: none"> a. Attach RET to Cover b. Remove Cover and stow in Lg Trash Bag c. Secure Cover with Wire Tie (long) d. Remove RET from Cover e. <input type="checkbox"/> Visually inspect PCBM sealing surface <p>Cover Number: <input type="checkbox"/>1 <input type="checkbox"/>2 <input type="checkbox"/>3 <input type="checkbox"/>4 <input type="checkbox"/>5 <input type="checkbox"/>6 <input type="checkbox"/>7 <input type="checkbox"/>8</p> <ol style="list-style-type: none"> 3. Cinch Adj Equip Tether around Lg Trash Bag 4. Notify IV, when clear of NOD3 	<p><u>1553 BUS TERMINATOR INSTALL</u> (00:20)</p> <ol style="list-style-type: none"> 1. Perform Glove Inspection 2. Open TA-clamps (3) on NODE 3 3. Remove orbiter LTA cable from clamps, close clamps 4. Translate to NOD3 J104 5. RET to and remove J104 Velcro strap (use Crewlock Bag RET) 6. On IV GO, tether to and open NODE 3 Port Avionics MLI thermal cover 7. Stow J104 Velcro Strap in Avionics Crewlock Bag 8. Tether to J104 Dust Cap with Avionics Crewlock Bag clove hitch Adj Equip Tether 9. <input type="checkbox"/> Dust Cap ← → J104 10. Retrieve 1553 BUS Terminator from Avionics Crewlock Bag 11. <input type="checkbox"/> 1553 BUS Terminator → ← J104 12. Stow Dust Cap in Avionics Crewlock Bag 13. Ensure grounding strap conductive Velcro mated 14. Re-install NOD3 Port Avionics MLI (Velcro)

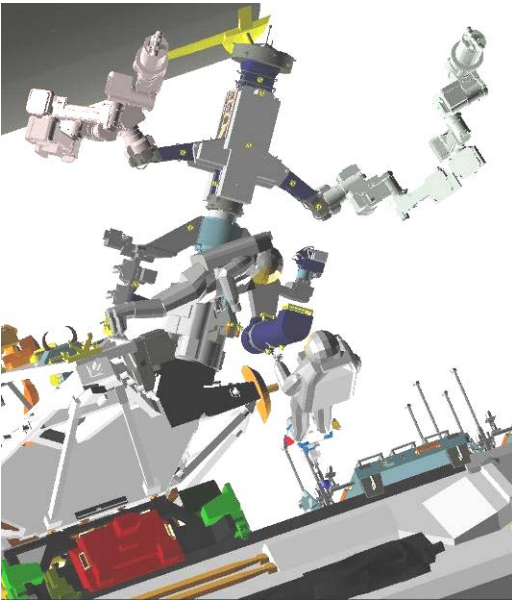
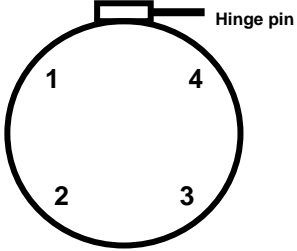
EVA 1 NODE 3 UNBERTH PREP (00:45/01:00) (Cont)

IV/SSRMS	EV1 (Be)	EV2 (Pk)
		<p>ORBITER LTA CABLE REMOVAL (00:25)</p> <ol style="list-style-type: none"> 15. Translate to NOD3 end of orbiter LTA cable, w/Avionics Crewlock Bag 16. RET around LTA cable; release tape (captive to cable) from module 17. Demate connectors, use RET to restrain cables <ul style="list-style-type: none"> <input type="checkbox"/> J6XX ← → P6XX <input type="checkbox"/> J6YY ← → P6YY 18. Mate Dust Caps (2) on J6XX and J6YY; check RET orientation <ul style="list-style-type: none"> <input type="checkbox"/> Dust Cap → ← J6XX <input type="checkbox"/> Dust Cap → ← J6YY 19. Install NOD3 J6XX/J6YY MLI thermal cover; secure Velcro 20. Coil orbiter LTA cable, restrain with integral wire tie (continue coiling as needed) 21. Translate to SPDU sill bracket 22. Remove orbiter LTA cable from clamp, close clamp 23. Demate connectors <ul style="list-style-type: none"> <input type="checkbox"/> J1 ← → P1 <input type="checkbox"/> J2 ← → P2 24. Secure remaining cable with 2nd integral Wire Tie
<ol style="list-style-type: none"> 2. When both EVs clear of NOD3, notify MCC-H and SSRMS EVs clear for NOD3 Unberth Ops 3. √EVs clear of 2 ft KOZ of SPDU 4. When EVs out of SPDU 2 ft KOZ, perform the following: <p>A15 APCU 2 OUTPUT – ON APCU 2 CONV – ON</p> <ul style="list-style-type: none"> <input type="checkbox"/> Avionics Crewlock Bag (EV2/EV1) <ul style="list-style-type: none"> <input type="checkbox"/> RET (eq-eq) (outside) <input type="checkbox"/> RET (eq-eq) (inside) <ul style="list-style-type: none"> <input type="checkbox"/> Wire Tie (long) (inside) <input type="checkbox"/> RET (eq-eq) (internal D-ring/outside handle) <ul style="list-style-type: none"> <input type="checkbox"/> J104 Velcro Strap <input type="checkbox"/> Adj Equip Tether (internal RET) <ul style="list-style-type: none"> <input type="checkbox"/> J104 Dust Cap <input type="checkbox"/> Adj Equip Tether (internal RET) 		<p>ORBITER LTA CABLE STOW IN TSA (00:15)</p> <ol style="list-style-type: none"> 25. Translate to port TSA 26. Notify IV when clear of NOD3 27. Release latches (4) on Port TSA door (¼-turns) 28. Open TSA door and flight specific door 29. Tether LTA Cable with integral Adj Equip Tether, stow in flight specific cushion 30. Close flight specific cushion and TSA door 31. Rotate latches (4) to locked position (¼-turns), verify arrows align 32. Perform Avionics Crewlock Bag Inventory

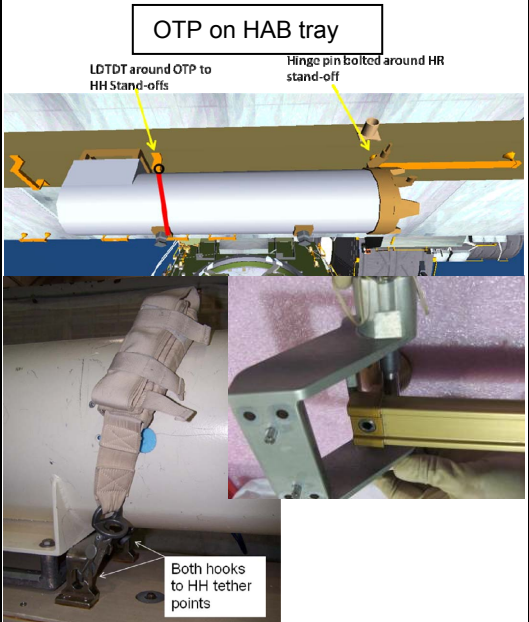
EVA 1 NH3 BAG OPS (00:55/00:50)

IV	EV1	EV2
	<p><u>PLB CLEANUP (00:30)</u></p> <ol style="list-style-type: none"> Retrieve Adj Equip Tether from stbd ODS HR Translate to NODE 2 HR 0310 Perform Safety Tether swap to A/L Safety Tether √A/L Safety Tether <ul style="list-style-type: none"> <input type="checkbox"/> Reel hook closed and locked <input type="checkbox"/> Reel unlocked √Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Lg hook closed and locked on ERCM Stow spare Safety Tether anchor on MWS Translate to A/L Stow PCBM Lg Trash Bag on A/L HR 0550 (port of hatch on E/L) Stow spare 85-ft Safety Tethers on Lg Trash Bag Perform Glove Inspection 	<p><u>PLB CLEANUP (00:30)</u></p> <ol style="list-style-type: none"> Retrieve Adj Equip Tether from port ODS HR Translate to NODE 2 HR 0308 Perform Safety Tether swap to A/L Safety Tether √A/L Safety Tether <ul style="list-style-type: none"> <input type="checkbox"/> Reel hook closed and locked <input type="checkbox"/> Reel unlocked √Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Lg hook closed and locked on ERCM Stow spare Safety Tether anchor on MWS Translate to A/L Stow Avionics Crewlock Bag on A/L HR 0555 (fwd of hatch) Stow spare 85-ft Safety Tethers on PCBM Lg Trash Bag, leave RET (eq-eq) Perform Glove Inspection
<ol style="list-style-type: none"> When EV1 clear of NOD1 port, notify SSRMS Operator 	<p><u>NH3 MLI BAG OPS (00:25)</u></p> <ol style="list-style-type: none"> Open thermal cover Retrieve NH3 MLI Bag, stow on BRT Close A/L thermal cover √SAFER handles down Translate to LAB HR 0219 (aft/nadir) via aft route Stow NH3 MLI Bag (Lg ORU Bag) on LAB HR 0208 (zenith), HR 0201 (aft), and HR 0220 (nadir), hinge fwd Stow EVA Camera and Bracket from NH3 MLI Bag, on swing arm Stow RET and Avionics Lg Trash Bag on MWS Translate to NOD1 aft endcone Notify IV when clear of port NOD1 Stow Avionics Lg Trash Bag on NOD1 HR 0106 (port circumferential HR on aft endcone) 	<p><u>NH3 JUMPER OPS (00:20)</u></p> <ol style="list-style-type: none"> Open thermal cover Retrieve NH3 Jumper Bag, stow on BRT Close A/L thermal cover √SAFER handles down Translate to LAB HR 0244 (nadir) via fwd route Stow NH3 Jumper Bag on LAB HR 0244 (aft) and HR 0245 (aft)

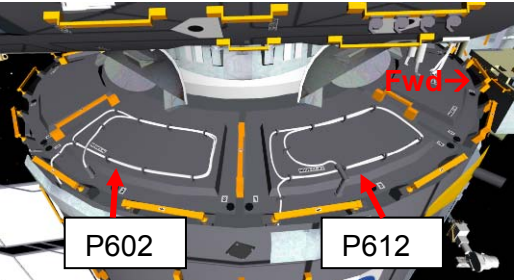
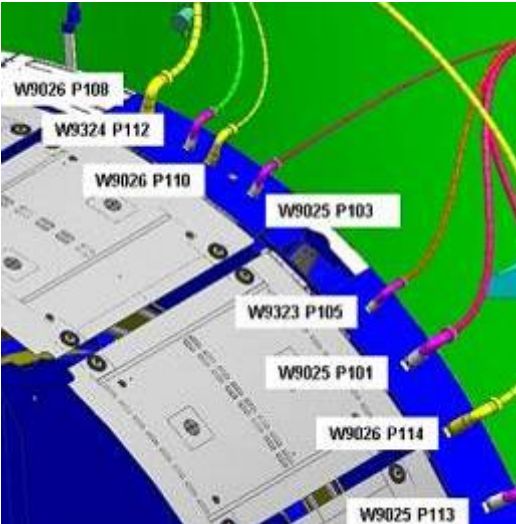
EVA 1 OTP REMOVAL (01:55)

IV	EV1 (Be)	EV2 (Pk)
<p>1. Verify OTP inhibits complete</p>   <p>OTP interface</p>	<p><u>OTP REMOVAL SETUP</u> (00:30)</p> <ol style="list-style-type: none"> 1. Translate to stbd CETA cart via CETA spur 2. Engage parking brake on CETA Cart (left handle) 3. ✓CETA Cart brake handles clear of worksite 4. Retrieve Square Scoop and Ratchet Wrench from OTP Crewlock Bag 5. Install Square Scoop on SPDM outrigger (FSE 5) 6. Perform Glove Inspection 7. Break torque on EDFs and hinge pin with Ratchet Wrench <p><u>OTP REMOVAL</u> (00:20)</p> <ol style="list-style-type: none"> 8. Receive PGT from EV2 (or use ratchet wrench) 9. Release and remove EDFs #1 and #4 [B7,CCW2,30.5], ~5 turns <ul style="list-style-type: none"> ☐ 7/16-in (wobble) Socket-6-in ext ☐ (25.5 ft-lb, 30 RPM) 10. Stow EDF #4 in “pull tab” MLI loop 11. Release and remove hinge pin [B4,CCW2,30.5], ~10 turns <ul style="list-style-type: none"> ☐ 7/16-in (wobble) Socket-6-in ext ☐ (19.4 ft-lb, 30 RPM) 12. Transfer PGT back to EV2, as required 13. Remove Square Scoop from SPDM outrigger 14. When clear of OTP, give EV2 GO to release EDFs 15. Stow Square Scoop and Ratchet Wrench in OTP Crewlock Bag 16. Retrieve LDTD Tether from OTP Crewlock Bag 	<p><u>OTP REMOVAL SETUP</u> (00:30)</p> <ol style="list-style-type: none"> 1. Translate to stbd CETA Cart via CETA spur 2. Engage parking brake on CETA Cart (left handle) 3. ✓CETA swing arm #1 = [0 degrees] 4. ✓CETA WIF 1 to bumper port, WIF fwd (ref-[12,GG]) 5. ✓APFR in WIF 1 [6,OO,E,6] <ul style="list-style-type: none"> ☐ Black on Black ☐ Pull test 6. Transfer OTP Crewlock Bag for access in APFR 7. Retrieve Square Scoop from OTP Crewlock Bag 8. Ingress APFR, verify access to Crewlock Bag 9. Install Square Scoop on OTP (handle pointing toward EDF interface); do not remove EV2 RET 10. Perform Glove Inspection <p><u>OTP REMOVAL</u> (00:20)</p> <ol style="list-style-type: none"> 11. Transfer PGT to EV1 <p><u>OTP REMOVAL</u> (00:20)</p> <ol style="list-style-type: none"> 12. Receive PGT from EV1 13. On EV1 GO, release and remove EDF #2, #3 [B7,CCW2,30.5], ~5 turns <ul style="list-style-type: none"> ☐ 6-in ext wobble 7/16-in ☐ (25.5 ft-lb, 30 RPM) 14. Remove OTP from SPDM



EVA 1 OTP REMOVAL (01:55) (Cont)

IV	EV1 (Be)	EV2 (Pk)
	<p><u>OTP STOW</u> (00:40)</p> <p>17. RET and BRT to Square Scoop on OTP</p> <p>18. Translate to HAB tray via gap spanner; EV2 leads</p> <p>19. Release Square Scoop from BRT, keep on RET</p> <p>20. Position OTP (square grid port and facing tray)</p> <p>21. Install hinge pin around horizontal HAB HR (port), finger tighten</p> <p>22. Receive PGT from EV2</p> <p>23. Drive hinge pin [B4,CW2,30.5], ~10 turns</p> <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (19.4 ft-lb, 30 RPM) <p>24. Release Square Scoop, stow on BRT</p> <p>25. Transfer PGT to EV2</p> <p>26. Route LDTD Tether around OTP</p> <ul style="list-style-type: none"> <input type="checkbox"/> Stbd of port micro square <input type="checkbox"/> Hooks to HH standoff <input type="checkbox"/> If reqd, hook to LDTD Tether point through HH <p>27. Cinch LDTD Tether</p>	<p><u>OTP STOW</u> (00:40)</p> <p>15. Position OTP for EV1 to BRT</p> <p>16. Release RET from Square Scoop</p> <p>17. When OTP clear, soft dock EDFs 1, 2 and 3</p> <p>18. Egress APFR</p> <p>19. Collapse Ingress Aid; stow against APFR boot plate</p> <p>20. Translate to HAB tray via gap spanner; EV2 leads</p> <p>21. Position OTP (square grid port and facing tray)</p> <p>22. Steady OTP</p> <p>23. Transfer PGT to EV1</p> <p>24. Steady OTP</p> <p>25. Receive PGT from EV1, stow on swing arm</p> <p>26. Route LDTD Tether around OTP</p> <ul style="list-style-type: none"> <input type="checkbox"/> Stbd of port micro square <input type="checkbox"/> Hooks to HH standoffs <input type="checkbox"/> If reqd, hook to LDTD Tether point through HH <p>27. Cinch LDTD Tether</p> <p>28. Close flaps over buckle and fold excess tether in Velcro straps</p>
<p><input type="checkbox"/> OTP Crewlock Bag (EV1)</p> <ul style="list-style-type: none"> <input type="checkbox"/> RET w/PIP Pin (outside) <input type="checkbox"/> Ratchet Wrench (no palm wheel) <ul style="list-style-type: none"> <input type="checkbox"/> 7/16 (rigid) Socket-2 ext <input type="checkbox"/> Pry Bar <input type="checkbox"/> Square Scoop (2 out, 1 in) <input type="checkbox"/> LDTD Tethers (2 out, 1 in), √strap 1/2 way extended 	<p><u>OTP CLEANUP</u> (00:25)</p> <p>28. Translate to A/L, stow Square Scoop in Avionics Crewlock Bag (A/L HR 0555, fwd of hatch)</p> <p>29. Stow Avionics Crewlock Bag on BRT</p> <p>30. Translate to NOD3 nadir stbd endcone via aft route</p> <p>31. Stow Avionics Crewlock Bag on NOD3 HR 0619 (aft/nadir and stbd)</p> <p>32. Perform Glove Inspection</p>	<p><u>OTP CLEANUP</u> (00:25)</p> <p>29. Translate to stbd CETA Cart</p> <p>30. Perform OTP Crewlock Bag Inventory</p> <p>31. Stow OTP Crewlock Bag on BRT</p> <p>32. Position CETA Cart brake handles pointing fwd</p> <p>33. Disengage parking brake with brake pedal (2 taps)</p> <p>34. Translate to A/L, stow OTP Crewlock Bag on A/L HR 0555 (fwd of hatch)</p> <p>35. Perform Glove Inspection</p>

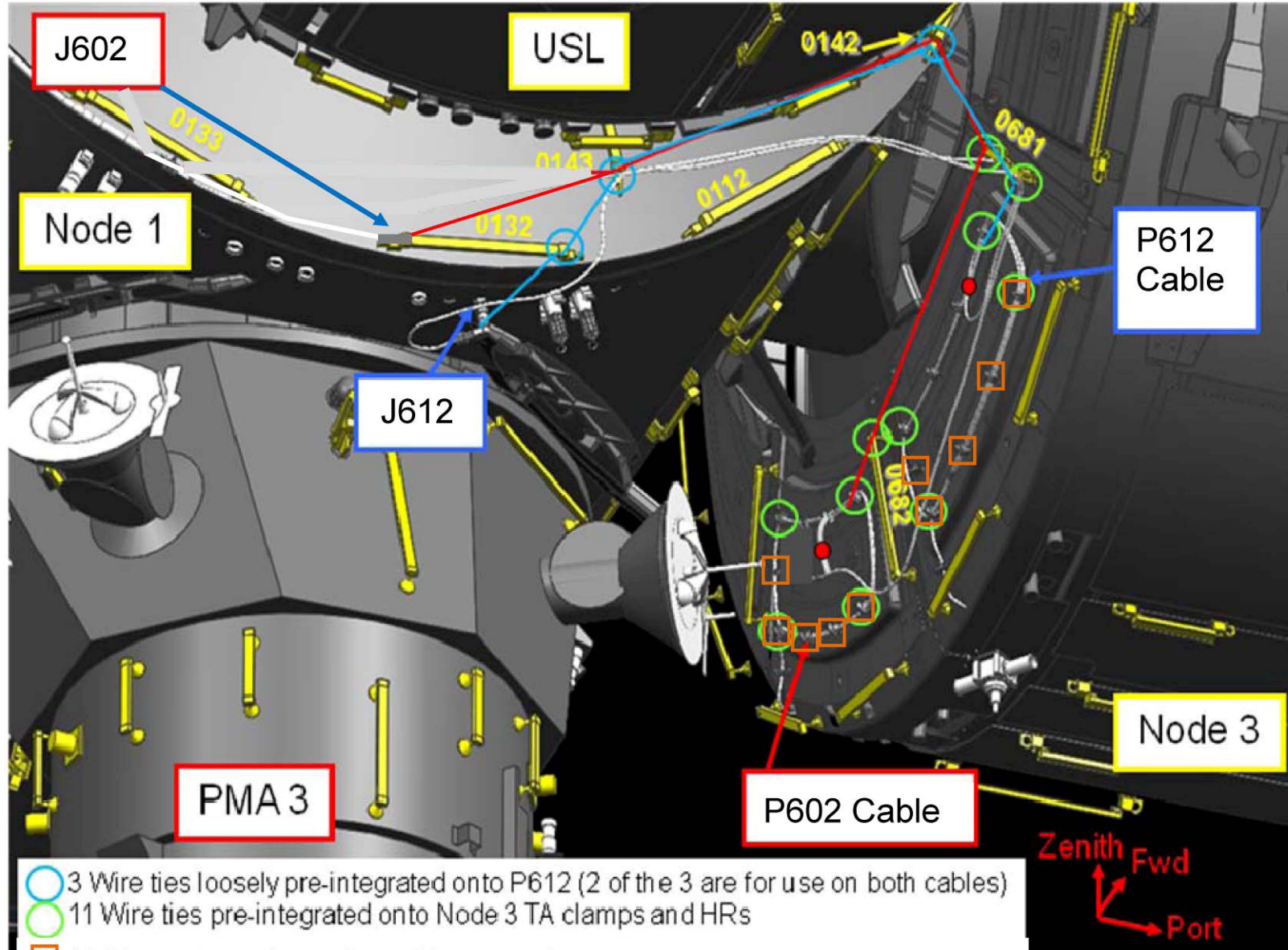
EVA 1 NODE 3 AVIONICS CABLES INSTALL (01:20)/NODE 3 LTA CABLE INSTALL (01:00)

IV	EV1	EV2
<p>1. Verify NOD3 Avionics inhibits complete 2. Verify NOD3 LTA inhibits complete</p> 	<p><u>NOD3 CH 1/4 AVIONICS DUST CAPS DEMATE</u> (00:20)</p> <ol style="list-style-type: none"> 1. Configure Avionics Lg Trash Bag 2. Remove aft Avionics MLI, stow in Avionics Lg Trash Bag 3. Remove nadir Avionics MLI, stow in Avionics Lg Trash Bag 4. Remove NOD3 ch 1/4 avionics jack Dust Caps (4 caps tied together, J103 not tied), stow in Avionics Lg Trash Bag <ul style="list-style-type: none"> <input type="checkbox"/> J113 ← → cap <input type="checkbox"/> J114 ← → cap (2/3 cable) <input type="checkbox"/> J101 ← → cap <input type="checkbox"/> J105 ← → cap <input type="checkbox"/> J103 ← → cap (goes in Crewlock Bag) 5. Remove NOD3 ch 1/4 avionics cable Dust Caps (4), stow in Avionics Lg Trash Bag <ul style="list-style-type: none"> <input type="checkbox"/> P113 ← → cap <input type="checkbox"/> P101 ← → cap <input type="checkbox"/> P105 ← → cap <input type="checkbox"/> P103 ← → cap 	<p><u>P612 NOD3 LTA CABLE INSTALL</u> (00:25)</p> <ol style="list-style-type: none"> 1. Translate to NOD1 HR 0112 (port/nadir) via fwd route 2. Move Gap Spanner from LAB HR 0208 to NOD1 HR 0112 (stbd) 3. Release TA-clamps (9) on P612 LTA cable 4. Remove loose cable from clamps 5. Demate LTA cable P612 ← → dummy receptacle (NOD3) 6. Route P612 to NOD1 7. Demate P1 ← → J612 (A/L shell heater cable form NOD1) 8. Stow P1 (A/L shell heater cable) with Wire Tie from BRT on NOD1 HR 0132 9. Mate Dust Cap → ← P1 (from Small Trash Bag) 10. Mate P612 → ← J612 (NOD3 LTA cable to NOD1) 11. Configure MLI as reqd 12. Use pre-integrated Wire Ties to route P612 on NOD1 HR 0132 (port), 0143 (nadir), and 0142 (nadir), keep slack on NOD3 side
	<p><u>NOD3 CH 1/4 AVIONICS MATE</u> (00:15)</p> <ol style="list-style-type: none"> 6. Release Wire Ties holding cable 1/4 to NOD1 HR 0107/0118 7. Route cables to NOD3 nadir avionics panel (HR 0670) 8. Mate the following connectors: <ul style="list-style-type: none"> <input type="checkbox"/> P113 → ← J113 (1/4 cable) – power <input type="checkbox"/> P101 → ← J101 (1/4 cable) – power <input type="checkbox"/> P105 → ← J105 (1/4 cable) <input type="checkbox"/> P103 → ← J103 (1/4 cable) 	

EVA 1 NODE 3 AVIONICS CABLES INSTALL (01:20)/NODE 3 LTA CABLE INSTALL (01:00) (Cont)

IV	EV1	EV2
	<p style="text-align: center;"><u>NOTE</u></p> <p>J107 dust cap does not get removed</p> <p><u>NOD3 CH 2/3 AVIONICS DUST CAPS DEMATE</u> (00:10)</p> <p>9. Remove NOD3 ch 2/3 avionics jack Dust Caps (1 set tied together), stow in Avionics Lg Trash Bag</p> <ul style="list-style-type: none"> <input type="checkbox"/> J1FGB ← → cap <input type="checkbox"/> J110 ← → cap <input type="checkbox"/> J112 ← → cap <input type="checkbox"/> J2FGB ← → cap <input type="checkbox"/> J108 ← → cap <p>10. Remove NOD3 ch 2/3 avionics cable Dust Caps (4), stow in Avionics Lg Trash Bag</p> <ul style="list-style-type: none"> <input type="checkbox"/> P114 ← → cap <input type="checkbox"/> P110 ← → cap <input type="checkbox"/> P112 ← → cap <input type="checkbox"/> P108 ← → cap 	<p><u>P602 NOD3 LTA CABLE INSTALL</u> (00:35)</p> <p>13. Translate to NOD3 P602 (aft loop)</p> <p>14. Release TA-clamps (9) on P602 LTA cable (aft)</p> <p>15. Remove loose cable from clamps</p> <p>16. Demate LTA cable P602 ← → dummy receptacle</p> <p>17. Route P602 to NOD1</p> <p>18. Mate P602 → ← J602 (y-jumper)</p> <p>19. Use pre-integrated Wire Ties to route P602 on NOD1 HR 0143 (nadir) and 0142 (nadir), keep slack on NOD3 side</p> <p>20. Use pre-integrated Wire Tie to route P612 on HR 0681 (nadir), keep slack on NOD3 side</p> <p>21. Use pre-integrated Wire Ties to route P602 on HR 0681 (zenith) and HR 0682 (zenith), keep slack on NOD3 side</p>
	<p><u>NOD3 CH 2/3 AVIONICS MATE</u> (00:35)</p> <p>11. Release Wire Ties holding cable 2/3 to NOD1 HR 0106/0118</p> <p>12. Route cables to NOD3 aft avionics panel (HR 0671)</p> <p>13. Mate the following connectors:</p> <ul style="list-style-type: none"> <input type="checkbox"/> P114 → ← J114 (2/3 cable) – power <input type="checkbox"/> P110 → ← J110 (2/3 cable) <input type="checkbox"/> P112 → ← J112 (2/3 cable) <input type="checkbox"/> P108 → ← J108 (2/3 cable) – power <input type="checkbox"/> P1 FGB Terminator → ← J1 FGB (from Avionics Crewlock Bag) <input type="checkbox"/> P2 FGB Terminator → ← J2 FGB (from Avionics Crewlock Bag) <p>14. Stow J103 Dust Cap in Avionics Crewlock Bag</p> <p>15. Retrieve P2 FGB BUS Terminator MLI from Avionics Crewlock Bag</p> <p>16. Install MLI over P2 FGB BUS terminator</p> <p>17. ✓Velcro connected and MLI not covering label</p> <p>18. Retrieve P1 FGB BUS Terminator MLI from Avionics Crewlock Bag</p> <p>19. Install MLI over P1 FGB BUS terminator</p> <p>20. ✓Velcro connected and MLI not covering label</p> <p>21. Install Wire Ties to route both sets of cables as reqd (NOD3 HR 0671 and 0672)</p> <p>22. Retrieve Gap Spanner #2 from Avionics Crewlock Bag</p> <p>23. Install Gap Spanner #2 (NOD1 HR 0106 (zenith) → NOD3 HR 0673 (zenith))</p>	<p>22. Close 10 nadir TA-clamps</p> <p>23. Move Gap Spanner from NOD1 HR 0112 (stbd) to LAB HR 0220 (port)</p>

EVA 1 NODE 3 LTA CABLE INSTALL (01:00)



EVA GET-AHEAD (00:15/00:35)

IV	EV1	EV2
	<u>GET-AHEAD</u> 1. Reference FS 7 – GET-AHEADS	<u>GET-AHEAD</u> 1. Reference FS 7 – GET-AHEADS

EVA 1 CLEANUP/INGRESS (00:25)

IV	EV1 (Be)	EV2 (Pk)
1. Record number of Wire Ties left in Wire Tie Caddy ____	<u>CLEANUP</u> (00:10) 1. Perform Lg Trash Bag Inventory 2. Perform Avionics Crewlock Bag Inventory 3. Perform Tool Inventory 4. Stow Avionics Crewlock Bag/Lg Trash Bag on BRT 5. Translate to A/L	<u>CLEANUP</u> (00:10) 1. Perform Tool Inventory 2. Translate to A/L
	<u>INGRESS</u> (00:15)	<u>INGRESS</u> (00:15) 3. Open thermal cover 4. Retrieve OTP Crewlock Bag from A/L circular HR 0506 (outboard); stow in A/L 5. Ingress A/L 6. Attach Waist Tether to UIA fwd D-ring 7. ✓Waist Tether <input type="checkbox"/> Hook closed and locked
	6. Transfer Avionics Crewlock Bag/Lg Trash Bag to EV2 7. Retrieve PCBM Lg Trash Bag from A/L HR 0550, transfer to EV2	8. Receive Avionics Crewlock Bag/Lg Trash Bag from EV1; stow in A/L 9. Receive PCBM Lg Trash Bag from EV1, stow in A/L
	8. On EV2 GO, relocate EV2 Safety Tether anchor point from fwd A/L D-ring to A/L D-ring Ext 9. Attach Waist Tether to A/L D-ring Ext 10. ✓Waist Tether <input type="checkbox"/> Hook closed and locked 11. Release Safety Tether from aft A/L D-ring, attach to MWS	10. Give EV1 GO to relocate EV2 Safety Tether
	12. On EV2 GO, ingress A/L 13. Close thermal cover (Velcro tab)	11. Give EV1 GO to ingress
2. Perform WVS PWR DWN (PHOTO/TV, <u>WVS Cue Card</u>)	14. Remove SCU from stowage pouch 15. Remove DCM cover 16. Connect SCU to DCM, ✓locked	12. Remove SCU from stowage pouch 13. Remove DCM cover 14. Connect SCU to DCM, ✓locked
	<u>NOTE</u> A TCV setting 8 – Max C minimizes time for SCU cooling	

EVA 1 CLEANUP/INGRESS (00:25) (Cont)

IV	EV1 (Be)	EV2 (Pk)
	<p>17. Water – OFF (fwd); expect “H2O IS OFF” msg</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"><p style="text-align: center;"><u>CAUTION</u> Do not close hatch until EMU water off for 2 min</p></div> <p>18. Verify no hardware blocking the hatch 19. EV Hatch Handle – verify position per hatch decal 20. EV Hatch – close and lock 21. Go to PRE-REPRESS (<u>DEPRESS/REPRESS</u> Cue Card)</p>	<p>15. Water – OFF (fwd); expect “H2O IS OFF” msg</p>

EVA 1 TASK DATA – NOD1 PORT CBCS FLAP

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:05

Notes:

1. No inspection required

Timeline Considerations:

1. Must be opened prior to NOD3 berthing to NOD1 port; can be deferred to prior to Bag ops by EV1



EVA 1 TASK DATA – PCBM CONTAMINATION COVERS

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:45

Tools:

EV1
Lg Trash Bag
Adj Equip Tether (Lg-eq)
Wire Tie (long) (2)

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
PCBM Contamination Cover	683-13603-1 (2)		N/A
	683-13603-2 (2)		
	683-13603-3 (2)		
	683-13603-4 (2)		

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
PCBM Contamination Cover	1.9	45 x 3.0 x 1.0

Notes:

1. Numbers on covers numbered clockwise
2. Covers fit in Lg Trash Bag oriented so sealing surface sides face the sides of the trash bag
3. IV to point PLB cameras away from EV1 to prevent camera damage

Timeline Considerations:

1. Notify IV when clear of NOD3 for SSRSM Ops (Unberth NOD3 from PLB)



EVA 1 TASK DATA – 1553 BUS TERMINATOR

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:20

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
J104 Velcro Strap	3113ND315		
J104 Dust Cap	NZGL-RPC-N-15-LP		
J104 1553 BUS Terminator	P104-PMA3		104-PMA3

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
J104 Velcro Strap	0.1	6.0 x 2.0 x 0.1
J104 Dust Cap	1.0	1.5 x 3.0 x 3.0
J104 1553 BUS Terminator	0.44	6.9 x 1.7 x 1.7

EVA Connectors:

Harness	From	To	Clamps (#)	Conn Size	Function
J104 1553 BUS Terminator	N/A	NOD3 J104	0	15	

Notes:

1. Port Avionics MLI not captive
2. Grounding strap on MLI has magnetic velcro

Timeline Considerations:

1. Task must be completed prior to internal routing of 1553 cables for Robotics SSRMS termination



EVA 1 TASK DATA – ORBITER LTA (SPDU) CABLE

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:40

Tools:

EV2
Wire Ties (2, integral to wire harness)

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
LTA Cable	683-52013-2 683-52014-2		Wire Harness (W013) Wire Harness (W014)
J6XX, J6YY Dust Caps	1F00918-1		N/A

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
LTA Cable	1.99 2.15	126.0 x 1.5 x 1.5 140.0 x 1.5 x 1.5
J6XX, J6YY Dust Caps	1.0	1.5 x 3.5 x 3.5

EVA Connectors:

Harness	From	To	Clamps (#)	Conn Size	Function
LTA Cable – Wire Harness (W013/W014)	PLB SPDU	NOD3 J6XX, J6YY	3 (2 on NOD3, 1 on SPDU bracket)	17	NOD3 heater power

Inhibits:

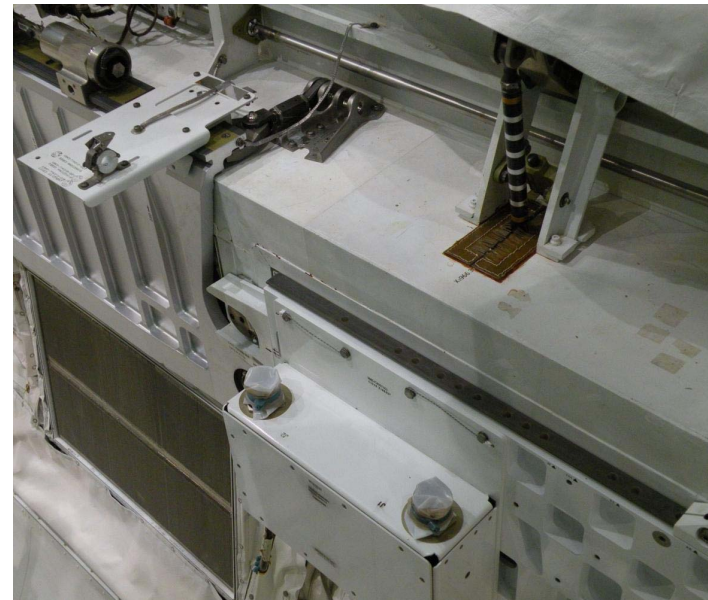
ORU/Task	Location	Inhibit
LTA Cable	Prior to removing LTA cable from NOD3 and SPDU bracket on PLB sill	A15 APCU 1, 2 CONV (two) – OFF SM 179 POWER TRANSFER CRT √PTU 1, 2 APCU OUT VOLTS < 10 V A15 APCU 1, 2 OUTPUT (two) – OFF

Notes:

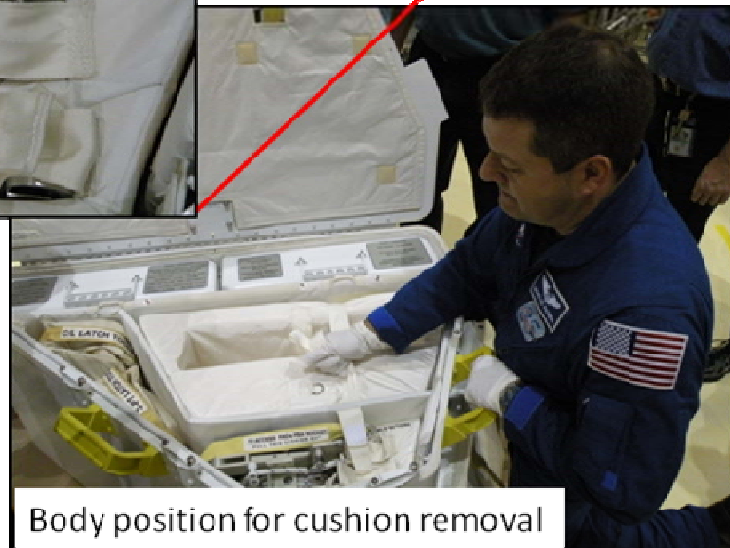
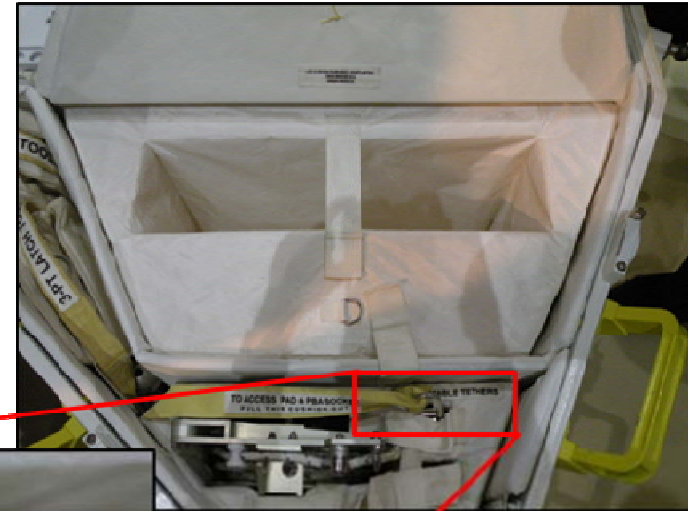
- Orbiter LTA MLI captive
- Two Wire Ties installed on Orbiter LTA Cable to aid in coiling; Wire Ties are anchored approximately 20-in apart on NOD3 side of cable
- Two Orbiter LTA Cables are tied together
- Cables secured to NODE 3 near connectors with tape (tape captive to cable)
- One Shuttle Style Adj Equip Tether is configured with 1 hook attached to PBAS/PAD cushion handle; other hook for LTA Cable
- Jettison of cushion may be required in order to stow T-RAD

Timeline Considerations:

- If having trouble with stowage in TSA, cable can be coiled up and stowed inside or strapped outside on the Crewlock bag; cable then returned inside via the airlock
- Notify IV when clear of NOD3 for SSRSM Ops (Unberth NOD3 from PLB)



EVA 1 TASK DATA – ORBITER LTA (SPDU) CABLE (Cont)



EVA 1 TASK DATA – NH3 JUMPER BAG

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:50

Tools:

EV2
Adj Equip Tethers

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
NH3 Jumper Bag	684-014024-0001		LAB-to-NOD3 Fluid Line Bag

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
NH3 Jumper Bag	8.6 (empty)	24 x 24 x 15.5

Notes:

1. The Jumper Bag can collapse and fit in the A/L attic with the other ORU bags if required

Timeline Considerations:

1. Mnvr: 10 min for PRLA/AKA, 100 min for ROBO, and 50 min for OSO

EVA 1 TASK DATA – OTP REMOVAL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	N/A
Two EV Crew	N/A	01:55

Tools:

EV1 & EV2	EV1 & EV2
PGT w/7/16 (wobble) Socket-6 ext	LDTD Tethers (2) (contingency)
Square Scoops (2)	Prybar (contingency)
	Ratchet Wrench w/7/16 (rigid) Socket-2 ext (contingency)
	RET (Lg-eq) (contingency)

OTSD:

Task	WIF	OTSD Setting
Initial stowage location	S0-7	Passive Carriage = 6 WIF Clocking = 7
Final stowage location	S0-11	Passive Carriage = 5 WIF Clocking = 6

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
OTP	78	18.8 x 59.6 x 14.8

EVA Fasteners:

Fastener Name	Label	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
EDFs	1-4	7/16	4	27.5	15.6	33.0	4-5	30
Hinge Pin	N/A	7/16	1	19.4	19.4	35.0	10.5	30

Inhibits:

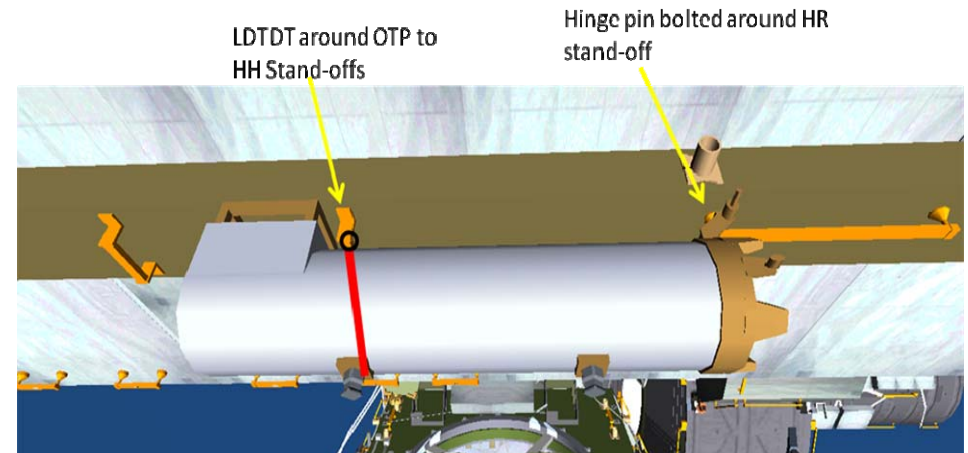
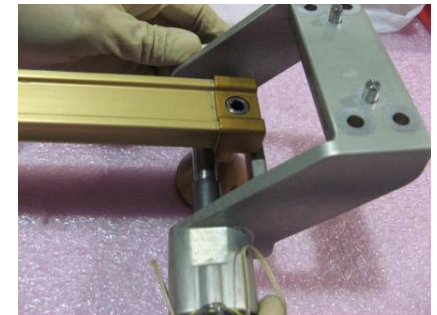
ORU/Task	Location	Inhibit
OTP Removal	MBS PDGF #2	1. PSU operational 2. All other SPDM components in keep-alive power

Notes:

- SPDM Configuration:
BR=0
Arm1 SR = -90,-45,+60,-65,-45,+15,0 = WR
Arm2 SR = -100,0,-30,-65,+12,+8,0 = WR

Timeline Considerations:

- Contingency Tie-Down on the CETA Cart can be found in section 16
- OTP stowage on OTSD takes approximately the same time as stowage on CETA Cart
- Temp stow of OTP on something other than OTSD may require additional restraints on latter EVAs
- Mnvr: 10 min for PRLA/AKA, 100 min for ROBO, and 50 min for OSO



EVA 1 TASK DATA – NODE 3 LTA CABLE INSTALL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	01:00
Two EV Crew	N/A	00:45

Tools:

EV2
Wire Ties (integral to HRs and LTA cables)

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
P612 Dust Cap	NZGL-PPC-N-21-R		N/A

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
P612 Dust Cap	0.454	3.2 x 1.9 x 1.9

EVA Connectors:

Harness	From	To	Clamps (#)	Conn Size	Function
P612	NODE 3	J612	10	21	NODE 3 heater power
P602	NODE 3	J602	10	21	NODE 3 heater power
P1	J612	Dust Cap	N/A	21	NODE 3 heater power

Inhibits:

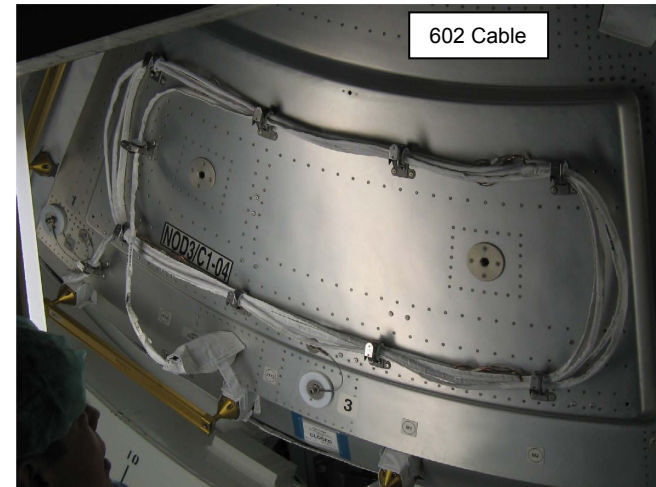
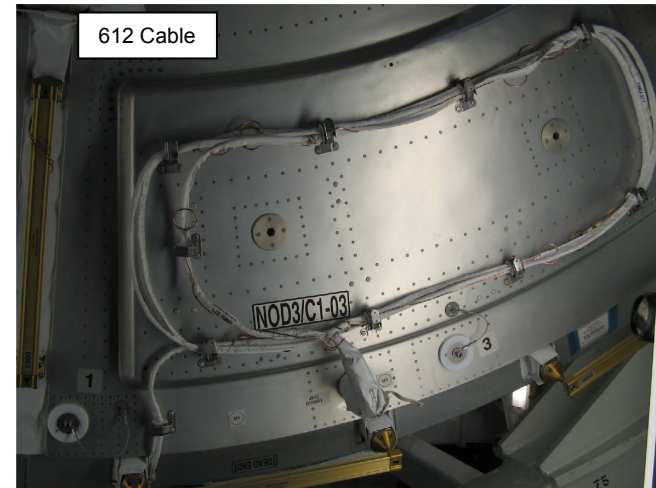
ORU/Task	Location	Inhibit
P612	Prior to demating P1 from NOD1 J612	612 Demate/mate – RPCM N1-RS1-B – RPCs 1,2,15,16 RPC – Open and Close Command Inhibited
P602	Prior to removing dust cap from J602 NOD1/ESP-2 Y-jumper	602 Mate – RPCM N1-RS2-B – RPCs 1-5, 12-16 RPC – Open and Close Command Inhibited

Notes:

- No FPP (floating connector) bootie is required for J602/P602 because P602 is built with a grounding cable within the MLI sheath

Timeline Considerations:

- This task can be shortened if EV1 assists EV2



EVA 1 TASK DATA – NODE 3 AVIONICS INSTALL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	01:20
Two EV Crew	N/A	01:00

Tools:

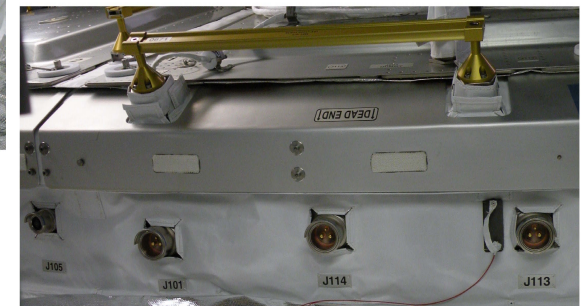
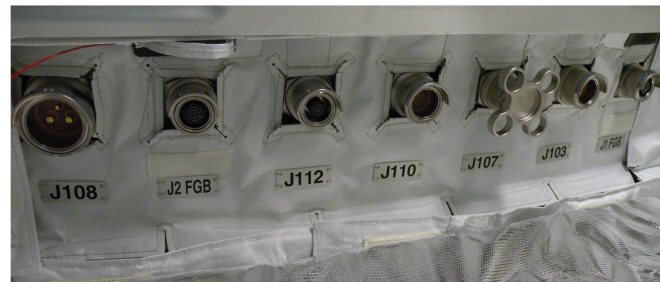
EV1
Lg Trash Bag
Wire Ties (integral to avionics cables)
Wire Tie Caddy

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
Chn 1/4 Cable	684-014123-0001		W9025, W9323
Chn 2/3 Cable	684-014125-0001		W9026, W9324
Chn 1/4 Dust Caps (Cable/Jack)			
Chn 2/3 Dust Caps (Cable/Jack)			
P1/P2 FGB 1553 BUS Terminator	P1-FGB, P2-FGB		P1-FGB, P2-FGB
P1/P2 FGB 1553 BUS Terminator MLI	3123ND335 3123ND337		J1-FGB, J2-FGB
NOD3 Avionics MLI	3113ND333 3113ND331		J108 – J2 FGB J105 – J113

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
Chn 1/4 Cable	60.5	675
Chn 2/3 Cable	60.5	710
Chn 1/4 Dust Caps (Cable/Jack)		
Chn 2/3 Dust Caps (Cable/Jack)		
P1/P2 FGB 1553 BUS Terminator	0.66	7.9 x 1.8 x 1.8
P1/P2 FGB 1553 BUS Terminator MLI	0.10	21.2 x 24.2 x 0.5
NOD3 Avionics MLI	1.0 1.0	30 x 6 x .1 30 x 6 x .1



EVA Connectors:

Harness	From	To	Clamps (#)	Conn Size	Function
P113	Cap	NOD3 J113	0	25	NODE 3 power
P101	Cap	NOD3 J101	0	25	NODE 3 power
P105	Cap	NOD3 J105	0	15	NODE 3 power
P103	Cap	NOD3 J103	0	17	NODE 3 power
P114	Cap	NOD3 J114	0	25	NODE 3 power
P110	Cap	NOD3 J110	0	17	NODE 3 power
P112	Cap	NOD3 J112	0	15	NODE 3 power
P108	Cap	NOD3 J108	0	25	NODE 3 power
P1 FGB	N/A	NOD3 J1 FGB	0	15	BUS Termination
P2 FGB	N/A	NOD3 J2 FGB	0	15	BUS Termination

Inhibits:

ORU/Task	Location	Inhibit
NOD3 Avionics Install	Prior to demating dust caps from NOD3 J113, J101, J114, J108	J113 Connector – MBSU 1 RBI 13 OPEN J108 Connector – MBSU 2 RBI 2 OPEN J114 Connector – MBSU 2 RBI 13 OPEN J101 Connector – MBSU 4 RBI 4 OPEN

Notes:

1. Inhibits for J105, J103, J110, J112 are not incorporated due to the fact that these cables carry data; inhibits are not needed due to low voltage

EVA 2

STS-130 (20A) EVA 2 TIMELINE

PET HR : MIN	IV	EV1 (Be)	EV2 (Pk)	
00:00		POST DEPRESS (00:05)	POST DEPRESS (00:05)	00:00
		EGRESS/SETUP (00:35)	EGRESS/SETUP (00:35)	
		NH3 MLI LAYOUT (00:20)	NH3 MLI LAYOUT (00:20)	
01:00		NH3 JUMPER INSTALL (01:25)	NH3 JUMPER INSTALL (01:25)	01:00
		<ul style="list-style-type: none"> • F1 Jumper Route/Vent (00:15) • F2 Jumper Route/Vent (00:10) • NOD3 Loop A QD Mate (00:20) • F4 Jumper Route/Vent (00:10) • F3 Jumper Route/Vent (00:10) • NOD3 Loop B QD Mate (00:20) 	<ul style="list-style-type: none"> • F1 Jumper Route/Vent (00:15) • F2 Jumper Route/Vent (00:10) • LAB Loop A QD Mate (00:20) • F4 Jumper Route/Vent (00:10) • F3 Jumper Route/Vent (00:10) • NOD3 Loop B QD Mate (00:20) 	
02:00		NH3 MLI INSTALL (00:45)	NH3 MLI INSTALL (00:45)	02:00
		<ul style="list-style-type: none"> • NOD3 Side NH3 MLI Install (00:15) • NH3 MLI Interface Closure (00:10) • Gap Spanner Install (00:20) 	<ul style="list-style-type: none"> • LAB Side NH3 MLI Install (00:25) • Gap Spanner Install (00:20) 	
03:00	<ul style="list-style-type: none"> • Verify Loop A shutdown complete 	OPEN NOD3 LOOP A QDS (00:20)	OPEN LAB LOOP A QDS (00:20)	03:00
		<ul style="list-style-type: none"> • NOD3 Loop A QDs Open (00:20) 	<ul style="list-style-type: none"> • LAB Loop A QDs Open (00:20) 	
04:00	<ul style="list-style-type: none"> • Verify Port TRRJ locked 	NH3 MLI CLOSURE (00:40)	NH3 MLI CLOSURE (00:30)	04:00
		<ul style="list-style-type: none"> • NOD3 Loop A Hood Closure (00:10) • NOD3 Loop B Hood Closure (00:10) • NH3 Jumper Cleanup (00:20) 	<ul style="list-style-type: none"> • LAB Hood Closure (00:15) • NH3 Jumper Cleanup (00:15) 	
05:00	<ul style="list-style-type: none"> • Verify NPV inhibit complete 	NODE 3 OUTFITTING (01:50)	NODE 3 OUTFITTING (02:00)	05:00
		<ul style="list-style-type: none"> • Keel Pin Cover Install (00:15) • NOD3 Nadir CBCS Flap Open (00:05) • NOD3 Nadir CBM Petal Deploy (00:15) • Trunnion Cover Install (01:00) 	<ul style="list-style-type: none"> • NOD3 OIH Install (01:20) 	
06:00		CLEANUP/INGRESS (00:25)	CLEANUP/INGRESS (00:25)	06:00
06:30		PRE REPRESS (00:05)	PRE REPRESS (00:05)	06:30

EVA 2 BRIEFING CARD

Generic STS-130 EVA Brief: (release folks as you can)

1. Campout (wake-up and start per the timeline to keep ground/flight team in sync) (EV1)
 - Bio-med prior to opening hatch if possible
 - Food requests?
2. Task IV visits A/L to verify tools on suits per timeline: When? (Task IV)
3. Suit-up IVs verify bag/tools in A/L per EVA specific Section 8 (Suit-up IVs)
 - Help required for SAFER install?
 - Pictures?
4. Communications protocol (EV1)
 - (EV1/EV2 during depress/repress, "Break-Break" for messages/emergency response)
 - Lost communication
5. Summary timeline (include get-ahead tasks at end) (Task IV)
6. EVA specific hazards Task IV)
7. First actions (EV1 and EV2)
8. EVA specific concerns (if not addressed during summary timeline brief) (EV1 and All)
9. Retreat plan/path (rapid return, incapacitated, lost crewmember-SAFER ops) (EV1)
10. Lost tools (velocity and direction estimate, when last seen) (EV1)
11. Communications plan for Arm ops (if required) (EVs/IV/M1/R1)
12. Hopping, safety tether awareness, stability and control, get-ahead risk, fatigue

EVA 2 INHIBIT PAD

Orbiter

ALL EVAs KU-Band Antenna {prior to egress} MCC-H – INCO <ol style="list-style-type: none"> √KU-BAND Mask – active √KU-BAND EVA Protect Box – active 	
RCS {prior to egress} IV O14,15,16 MCC-H – Prop IV	If EV crew < 27 feet from FRCS <ol style="list-style-type: none"> √DAP: VERN, FREE, LO Z √RJDF F1, F2, F3, F4 MANF DRIVER (four) – OFF LOGIC (four) – OFF √Above RCS config √RCS F – ITEM 1 EXEC (*) √JET DES F1U – ITEM 17 (*) F3U – ITEM 19 (*) F2U – ITEM 21 (*)

Ground

ALL EVAs Ground Radar {prior to egress} MCC-H – TOPO <ol style="list-style-type: none"> √TOPO console, ground radar restrictions in place for EVA
--

USOS

ALL EVAs PCU {prior to egress} <table border="1" style="margin-left: 20px;"> <tr> <td style="text-align: center;">NOTE</td> </tr> <tr> <td>PCUs may require up to a 1-hour warmup period before they are operational.</td> </tr> </table>	NOTE	PCUs may require up to a 1-hour warmup period before they are operational.
NOTE		
PCUs may require up to a 1-hour warmup period before they are operational.		
MCC-H – Phalcon <ol style="list-style-type: none"> √PCUs (two) operational in discharge mode and one of the following: <ol style="list-style-type: none"> CCS PCU EVA hazard control FDIR enabled. No more than two arrays unshunted and oriented < 105° from velocity vector. If one or both PCUs failed <ol style="list-style-type: none"> No more than two arrays unshunted and oriented < 105° from velocity vector. 		

USOS (Cont)

ALL EVAs CUCU {prior to egress} IV – (LAB104) <ol style="list-style-type: none"> √cb POWER A, B [two] – OPEN √cb LINK 1,2 [two] – OPEN
LOCATION DEPENDENT INHIBITS LAB Window (Setup and NH3 Jumper/MLI Tasks) {prior to egress} IV <p>EV crew less than 10 feet from window or in window FOV, close window shutter</p>
Open Loop A Jumpers {prior to task} MCC-H – THOR <p>ETCS Loop A Shutdown per 2.510 ETCS Loop A(B) Pump Module Shutdown (SODF: TCS: Nominal: ETCS)</p>
Port TRRJ (OIH/NPV/Trunnion Cover Install) {prior to task} MCC-H – THOR <ol style="list-style-type: none"> √DLA (1) – LOCKED (-90 thru 0 or 90 thru 115)
NPV Install {prior to task} MCC-H – ECLSS <p>PCS - Node 3: ECLSS: PCA: PCA Commands Node 3 PCA Commands</p> <ol style="list-style-type: none"> 'PCA' Verify State – Monitor 'Positive Pressure Relief' Verify Status – Inhibited

COL

ALL EVAs Ham Radio {prior to egress} IV <ol style="list-style-type: none"> ARISS (Ham Radio) – Deactivate or VHF (144-146 MHz) TX only

JEM

ALL EVAs ICS-EF Antenna {prior to egress} SSIPC <ol style="list-style-type: none"> ICS MOD Off ICS UPC Off ICS HPA Off ICS Stored Commands Cleared
--

EVA 2 INHIBIT PAD (Cont)

RSOS

ALL EVAs

SM Antennas *{prior to egress}*

MCC-M 1. GTS – Deactivate

IV 2. ARISS (Ham Radio) – Deactivate or VHF (144-146 MHz) TX only

IMPULSE *{prior to egress}*

MCC-M 1. IMPULSE (ИПИ-100) – Is not activated

EVAs ON PMA1 OR RSOS (LOCATION DEPENDENT)

Soyuz (docked to FGB) Thrusters (NOD1/PMA translation path) *{prior to egress}*

MCC-M 1. √Soyuz manifolds (four) – closed

ЭКО1, ЭКО2, ЭКГ1, ЭКГ2

2. √Soyuz MCS unpowered

3. √Soyuz Attitude Control Thruster Valves (fifty-two) – closed

4. √Soyuz Main Engine Valves (K1, K2, K3, K4, K5, K6) – closed

EVA 2 NOTES/CAUTIONS/WARNINGS

NOTES

1. Bolt install: Report torque and turns
2. Bolt release: Report torque and turns if different from published range
3. EVA connectors: After disconnection and prior to connection; verify pin and EMI band integrity; verify connector free of FOD
4. Inspect QDs for damage prior to mating
5. Toolbox doors must be closed with one latch per door when EV crew not in immediate vicinity
6. Avoid contact with OBSS striker bars (Vitrolube coating)
7. 85-ft safety tether retract force may affect body positioning

CAUTION

ISS Generic Constraints

- A. Avoid inadvertent contact with
1. Grapple fixture shafts (drylube)
 2. PIP Pins
 3. Passive UMAs
 4. MBS/SSRMS/SPDM taped radiative surfaces: VDU, ACU, JEU, LEU, MCU, CRPCMs, and Cameras
 5. SPDM SJEU, EP, OTCM, LEU, and LEE VDU radiator surfaces
 6. OTSD
- B. Electrical cables
1. Avoid bend radii < 10 times cable diameter
- C. Fiber optic cables
1. Avoid bend radii < 10 times cable diameter
 2. Avoid pulling on cable during mate/demate
- D. Fluid line flex hoses and QDs
1. Avoid bend radii < 14 in for hoses with a diameter \geq 1 in
 2. Additional care should be taken to not exceed bend radii when applying loads at the flexible hose to rigid tube stub interfaces
 3. Ensure fluid QD booties are fully closed prior to leaving worksite; wire tie if reqd
 4. Avoid bend radii < 5 in for hoses with diameter < 1 in on LAB, S0, S1, P1, and 10 in for hoses with diameter < 1 in on all other elements

CAUTION

ISS Generic Constraints (Cont)

- E. For structural reasons
1. Avoid vigorous body motions, quick grabs and kickoffs against tether restraints
 2. Avoid performing shaking motions (sinusoidal functions) more than four cycles
- F. Other
1. ITT Cannon connector: On demated connectors, do not rotate collar or manipulate cable/connector using collar or connector tool
 2. MLI handholds are not rated for crewmember translation loads

EVA 2 NOTES/CAUTIONS/WARNINGS (Cont)

CAUTION

ISS Truss Constraints

A. Avoid inadvertent contact with

1. CETA lights (Z-93 paint)
[LAB,S1,NODE 1]
2. Deployed TUS cable [Nadir CETA rail]
3. S0 aft face radiator
4. GPS antennas (S13 paint) [S0,JLP]
5. UHF antennas [LAB,P1]
6. ETCS radiator flexhoses and panels [S1,P1]
7. EETCS/PV radiator flexhoses, bellows and panels [P6,P4,S4,S6]
8. SASA RF group [S1,P1]
9. Heat pipe radiators [Z1]
10. PCU cathode and HCA ports [Z1]
11. Ku-Band antenna (SGANT) dish [Z1]
12. CMG cover/shells [Z1]
13. FPMU [S1]
14. SASA high and low gain antennas and radiator surfaces [Z1]
15. Deployed MISSEs

B. For structural reasons

1. Avoid kicking S1/P1 radiator beam.
If any of these occur, wait 2 to 5 min to allow structural response to dissipate

CAUTION

ISS Truss Constraints (Cont)

C. Other

1. WIS antennas: Do not use as handholds [NODE 1,LAB,P6,Z1]
2. Lubricant from Ku-Band SGANT gimbals [Z1], CMGs [Z1], and RTAS ground strap fasteners [P6,P4,S4,S6] can contaminate EMU
3. Prevent inadvertent contact of the tether shuttle with ETRS when the P3 tether shuttle stop is raised away from the rail

CAUTION

ISS U.S. Pressurized Elements Constraints

A. Avoid inadvertent contact with

1. EVA crane [PMA1]
2. TCS reflectors [PMA2,PMA3]
3. APAS hardware [PMA2,PMA3]
4. CETA lights (Z-93 paint)
[LAB,S1,NODE 1]
5. UHF antennas [LAB,P1]
6. Open CBM petal covers and
LAB window shutter
7. S0/NODE 2 fluid tray hardlines at NODE 2 end, which are limited to 25 lb

B. Other

1. WIS antennas: Do not use as handholds [NODE 1,LAB,P6,Z1]
2. CBM petal covers may not be used as handholds unless both launch restraint pins are engaged

EVA 2 NOTES/CAUTIONS/WARNINGS (Cont)

CAUTION

ISS I.P. Elements Constraints

COL

- A. Avoid inadvertent contact with
1. COL ARISS and AIS antennas [COL-Nadir]

JEM

- A. Avoid inadvertent contact with
1. GPS antennas (S13 paint) [S0,JLP]
 2. Open JPM window shutter
 3. JTVE, WVE/EVE, JEF VE cameras
 4. JEMRMS taped radiative surfaces [JEU,EE,Cameras]
 5. JEM A/L target and pins
 6. JEF ORUs and EFUs (paint and lubricant)
 7. MAXI front and top panel (paint)
 8. SEDA-AP sensors (HIT, SDOM, and AOM) and MPAC & SEED
 9. Trunnions and UCMs (paint and lubricant) [JEF Payloads]
 10. RAIDS covers on end of HREP
 11. ICS-EF Ka-Band antenna dish
- B. For structural reasons
1. Avoid kicking MMOD shields between JLP and JPM
 2. Avoid tool impact on ICS-EF sensor

CAUTION

Shuttle Constraints

- A. Avoid inadvertent contact with
1. OBSS and SRMS composite sections joint torque arms, grapple fixture shafts, and cable harnesses
 2. LCS (silver Teflon) and LDRI (silver Teflon) and ITVC (gold foil) [OBSS]
 3. WVS antenna [ODS truss and PLB sill]
 4. Payload bay and camera wire harnesses, cables, cable guides, and connectors
- B. No touch
1. LDRI diffuser [OBSS]
 2. OBSS saddle contacts (when OBSS unberthed) [OBSS]
 3. Monkey fur [PLB]
 4. Cameras: Metallic surfaces [PLB]
 5. Ku-Band antenna black dish and gold thermal blankets [PLB]

EVA 2 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

ISS Generic Constraints

- A. Avoid inadvertent contact with
1. Grapple fixture targets and target pins
- B. Pinch
1. NZGL connector linkage. Use caution when mating/locking
 2. ITT Cannon connector rotating housing
- C. QDs
1. If QD is in FID when valve is opened (bail fwd), QD will leak and fluid line may whip
 2. Do not rotate if in mated/valve open configuration
- D. Sharp Edges
1. Inner edges of WIF sockets
 2. APFR active WIF probes
 3. Mating surfaces of EVA connectors
Avoid side loads during connector mating
 4. Back side of MMOD shield fasteners
 5. Spring loaded captive EVA fasteners (e.g., 6B-boxes, BMRRM, RTAS, SARJ Covers); the end of the spring may protrude
 6. SPDM OTCM gripper jaws
 7. Keep hands away from SSRMS LEE/POA/SPDM LEE opening, snares, and PDGF curvic coupling (teeth)
 8. MMOD strikes on ISS exterior

WARNING

ISS Generic Constraints (Cont)

- E. Thermal
1. EVA connectors with booties may become hot if left uncovered.
Handling may need to be limited
 2. Turn off glove heaters when comfortable temperature reached to prevent bladder damage. Do not pull fingers out of gloves when heaters are on
 3. Uncovered trunnion pins may be hot
 4. SSRMS/MBS/SPDM operating cameras and lights may radiate large amounts of heat
 5. Do not touch EMU protective visor if temperature has been < -134 degF for > 15 min
 6. No EMU boot contact with foot restraint when temperature < -120 degF or > 200 degF
 7. PDGF surfaces may not meet touch temperature requirements for unlimited contact when $\beta \leq -70$ or $\beta \geq 70$
- F. Electrical Shock
1. Do not touch SPDM CLPA 1 electrical connector prior to camera installation

WARNING

ISS Truss Constraints

- A. Avoid inadvertent contact
1. SSU, ECU, beta gimbal platform, mast canister, SAW blanket boxes unless the beta gimbal is locked and the motor is turned off
 2. Stay inboard of SARJ when active
 3. Stay 2 ft from S1/P1 radiator beam rotational envelope when beam is free to rotate
 4. Stay 5 ft from moving MT on face 1
- B. RF radiation exposure
1. Stay 3.6 ft from S-Band (SASA) high gain antenna when powered [S1,P1]
 2. Stay 1.3 ft from S-Band (SASA) low gain antenna when powered [S1,P1]
 3. Stay 1 ft from UHF antenna when powered [LAB,P1]
- C. Sharp Edges
1. Solar array blanket box [P6,S6]
 2. Fastener threads on back of Z1 U-jumper male FQD panel, if nutplate cap missing
 3. Outboard MT rail attachment lug near P6 handrail 5333 and gap spanner
 4. P2 connector on EWIS box TAA-06 [Zenith/Forward Corner 1 of P5 – SARJ at 0 deg]
 5. Nickel coated braided copper ground straps may contain frayed wires [P6,P4,S4,S6]
 6. MMOD strikes on Z1 toolboxes

EVA 2 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

ISS Truss Constraints (Cont)

D. Electrical Shock

1. Stay ≥ 2 ft from ungrounded floating connectors if powered
MBS cross-connect jumpers (translate past these using UMA handrails)
S0 EVA power cables (inside S0 Bay 00 Face 4, Bay 01 Face 3)
ESP-2 jumper (inside S0 Bay 03 Face 4)

E. Thermal

1. ELC may exceed touch temperatures when $\beta > 75$ deg

WARNING

ISS U.S. Pressurized Elements Constraints

A. Handrails

1. Handrails previously used for MISSE attachment may not be used as a safety tether point [A/L endcone 564 and 566, A/L Tank 2 Nad/Fwd and Port/Fwd, P6 5389]

B. Pinch

1. EV side of IV Hatch during Hatch operation (also snag hazard) [A/L]
2. LAB window shutter and CBM petal cover linkages during operation

C. RF radiation exposure

1. Stay 1 ft from UHF antenna when powered [LAB, P1]

D. Sharp Edges

1. PMA umbilical launch restraints – exposed bolt threads
2. Adjustable fuse tether (Fish Stringer) buckles stowed in Node Bag
3. Port/Aft portion of A/L circular HR [HR 0506]
4. A/L HR 0537 (Eq Lock Zenith)

E. Thermal

1. PMA handrails may be hot. Handling may need to be limited
2. Stay ≥ 1 ft away from PMAs and MMOD shields > 270 degF if EMU sun visor up; limit time to 15 min or less if > 300 degF
3. Stay at least 0.5 ft away from PMA and MMOD shields > 325 degF
4. No EMU TMG contact with PMAs and MMOD shields > 320 degF

WARNING

ISS U.S. Pressurized Elements Constraints (Cont)

F. Electrical Shock

1. Stay ≥ 2 ft from ungrounded floating connectors if powered. SSPTS connectors include NOD1 Stbd/Fwd HR 0130, LAB Stbd/Fwd HR 0273, PMA2 Stbd

EVA 2 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

ISS I.P. Elements Constraints

COL

- A. Avoid inadvertent contact with
 - 1. SOLAR [COL EPF]
- B. Thermal
 - 1. Columbus end cones may violate touch temperature constraints when $-75 \leq \beta \leq -60$ or $60 \leq \beta \leq 75$

JEM

- A. Avoid inadvertent contact with
 - 1. ICS-EF sensors
- B. Pinch
 - 1. JPM window shutter linkages during operation
 - 2. JEM cameras (JVTEs, EVE, WVE, and JEF VEs)
 - 3. JEM EFU latching arms
 - 4. JEF SSE latch
 - 5. ICS-EF antenna boom
 - 6. SEDA-AP mast
 - 7. SMILES antenna rotating area
 - 8. HREP hinge sides and RAIDS pinch areas

WARNING

ISS I.P. Elements Constraints (Cont)

JEM (Cont)

- C. Sharp Edges
 - 1. Interior of JEMRMS HRMs
 - 2. JEMRMS EE opening and snares
 - 3. JEM A/L hatch corners
 - 4. ICS-EF AHM gears
 - 5. MAXI visual star camera
 - 6. SMILES baffles (two), baffle base bare bolts, and Cold Sky Terminator (CST)
 - 7. HREP baffles (four) [Star tracker aperture Zenith and three instrument baffles Aft]
- D. RF radiation exposure
 - 1. Stay 0.3 ft from Fwd/Aft JPM PROX antenna
- E. Thermal
 - 1. JPM Port End Cones and JLP Port Nadir may violate touch temperature constraints when $\beta > 60$ deg
 - 2. JEMRMS/JTVE/JEFVE operating cameras and lights may radiate large amounts of heat

WARNING

Shuttle Constraints

- A. Arcing/Molten Debris
 - 1. Stay ≥ 2 ft from exposed EFGF connector when OBSS berthed, powered, and EFGF not grappled [PLB]
 - 2. Stay ≥ 2 ft from exposed Stbd Fwd MPM contacts [PLB]
 - 3. Stay above PLB sill when within 1 ft of powered ROEU connector [PLB]
- B. Pinch
 - 1. PRLA operation [PLB]
- C. RF radiation exposure
 - 1. Stay 3.28 ft from S-Band antenna when powered
 - 2. Stay 1 ft from top and side of UHF PLB antenna radome surface when in high powered mode [ODS truss]
 - 3. Stay 0.33 ft from top and side of UHF PLB antenna radome surface when in low powered mode [ODS truss]
 - 4. Remain below the level of the PLB door mold line for first 20 in Aft of Fwd bulkhead when S-Band antenna powered [PLB]
 - 5. Remain on the inboard side of the Stbd slidewire (sill handrails if slidewire not installed) for first 20 ft Aft of Fwd bulkhead when Ku-Band antenna powered [PLB]

EVA 2 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

Shuttle Constraints (Cont)

D. Sharp Edges

1. PRLA grounding wipers [PLB]
2. LDRI baffles (also an entrapment hazard) [OBSS]
3. Keep hands away from SRMS EE opening and snares
4. TCS connector backshells have exposed threads [ODS]

E. Thermal

1. Illuminated PLB lights; do not touch
2. OBSS grapple fixture shafts/cams may be hot. Limit handling if required
3. Stay 27 ft from PRCS when powered
4. Stay 3 ft from VRCS when powered
5. Stay 3 ft from APU when operating

F. Contamination

1. Stay out of the immediate vicinity of leaking jet or APU

G. Lasers

1. Do not look at LDRI diffuser or LCS laser aperture window

EVA 2 FLIGHT SPECIFIC NOTES/CAUTIONS/WARNINGS

NOTES

CAUTION

- A. Fluid QDs
1. 20-min QD exposure to direct sun without thermal covers can cause seal damage
 2. Once jumpers have been pressurized:
 - a. Do not translate on gap spanners restraining NH3 MLI and jumpers
 - b. Do not tether or BRT to handrails with attached gap spanners restraining NH3 MLI and Jumpers
excluding LAB HR 0219

WARNING

- A. Keep-Out Zone
1. Expect small amount of NH3 crystals to be visible when removing cap from male QD
 2. CBM Petals will spring open if latches are not engaged

EVA 2 TOOL CONFIG

EV1

- Adj Equip Tether (L wrist)
- MWS
 - BRT (L)
 - RET (eq-eq)
 - Wire Tie (2)
 - T-Bar
 - RET (eq-eq)
 - RET w/PIP Pin
 - Adj Equip Tether (1)
 - Wire Tie (2)
 - Small ISS Trash Bag
 - Swing Arm (R)
 - Camera Bracket
 - Camera
- D-ring Extender (2, R & L D-ring)
 - 85-ft Safety Tether (R D-ring Ext)
- Waist Tether (2, R on D-ring to ST & L on D-ring Ext)
- SAFER
- WVS

Tether Counts: (RED RETs)

RETs (eq-eq) = 16 Adj Equip Tethers = 25
 RETs (Lg-eq) = 5 Adj Equip Tethers (Lg-eq) = 1
 RET w/PIP Pin = 4 Fish Stringers = 2

NOTE: Prior to use, inspect the following hardware:

- RET cords for fraying
- Load Alleviating Straps (Safety Tether/Waist Tether); ref FS 8-16
- Trash Bag: Bristle deformation/damage and Hinge damage, after having stowed tools in trash bag
- IV caps removed on all connectors

EV2

- Adj Equip Tether (L wrist)
- MWS
 - BRT (L)
 - RET (eq-eq)
 - Wire Tie (2)
 - T-Bar
 - RET (eq-eq)
 - RET w/PIP Pin
 - Adj Equip Tether (1)
 - Wire Tie (2)
 - Small ISS Trash Bag
 - Swing Arm (R)
 - RET (eq-eq)
 - PGT [A2 3.8 ft-lb, CAL, MTL 30.5] s/n _____
 - PGT Battery s/n _____
 - 7/16 (wobble) Socket-6 ext
- D-ring Extender (2, R & L D-ring)
 - 85-ft Safety Tether (L D-ring Ext)
- Waist Tether (2, R on D-ring Ext & L on D-ring to ST)
- SAFER
- WVS

AIRLOCK CONFIG

- RET (Lg-eq)
 - OIH Bag (EV2)
 - Zip Tie (secure lid)
 - Integral Tether (strap through 2nd loop on opposite side of bag; hook to 1st loop and 1/4-turn receptacle on C/L bag)
 - OIH Adj Tether (1 hook to 1st loop and 1/4-turn receptacle on C/L bag; 2 hook to 3rd loop and D-ring on C/L bag; strap through 2nd loop)
 - Adj Equip Tether (clove hitch)
 - OIHs (2, 0633, 0634)
 - OIHs (6)
 - Crewlock Bag
 - RET (outside bag, D-ring opposite integral strap)
 - NPV Cover Plate
 - NPV (ensure vent open ref FS 8-24)
 - NPV MLI
 - Base MLI (on integral tether)
 - RET w/PIP Pin
 - 5/16 (rigid) Socket-7 ext
 - Wire-tie Caddy (VSC get-ahead) (9, __ left)

AIRLOCK CONFIG

- RET (Lg-eq)
 - Trunnion Cover Crewlock Bag (EV1)
 - RET (eq-eq) (outside)
 - RET (eq-eq)
 - MMOD T-handle tool (short)
 - RET (eq-eq)
 - Keel Pin Cover (#5 (top))
 - Trunnion Covers (4) (#3, #2, #4, #1 (bottom))
 - Adj Equip Tether (clove hitched to int D-ring)
 - Wire-tie Caddy (VSC get-ahead) (9, __ left)
 - Gap Spanner #3 (-305) (on bottom of trunnion covers)
 - RET (Lg-eq)
 - PGT [A2 3.8 ft-lb, CAL, MTL 30.5] s/n _____
 - PGT Battery s/n _____
 - 7/16 (wobble) Socket-6 ext
 - RET (Lg-eq)
 - NH3 Jumper Bag (EV1)
 - Adj Equip Tether (3) (outside)
 - RET (3) (internal loops)
 - Fish Stringer (NOD3)
 - NOD3 MLI (2)
 - NOD3-end Male QD Caps (4)
 - Adj Equip Tether (2) (from MLI)
 - Fish Stringer (LAB)
 - RET (eq-eq)
 - Male N2 Vent Tool
 - LAB-end Male QD Caps (4)
 - Adj Equip Tether (2) (from MLI)
 - Adj Equip Tether (2) (from MLI Bag)
 - Adj (Lg-sm) (Jumper midpoint)
 - Wire Tie (4) (long) (integral to bag)
 - Cap Crewlock Bag
 - Adj Equip Tethers (4) (clove hitch on internal RETs)
 - Female QD Caps (8)
 - RET (eq-eq)
 - 1-in Bail Lever Drive
 - Trunnion Cover Crewlock Bag (EV1)
 - RET (eq-eq) (outside)
 - RET (eq-eq) (2)
 - MMOD T-handle tool (short)
 - Adj Equip Tether

EVA 2 TOOL CONFIG (Cont)

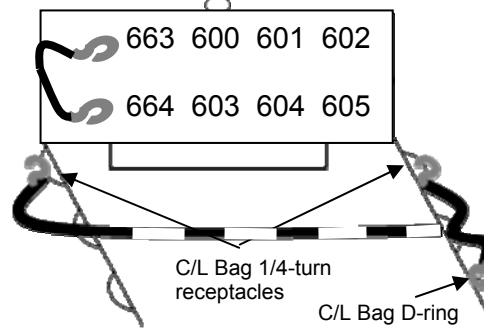
AIRLOCK CONFIG (Cont)

- RET (Lg-eq)
 - Contingency Crewlock Bag**
 - RET w/PIP Pin (outside)
 - Ratchet Wrench (no palm wheel)
 - 7/16 (rigid) Socket-2 ext
 - 1-in QD Release Tool
 - 1-in Button Depress Tool
 - Aft Key Tool (AKT)
 - Connector Cleaner Tool Kit
- RET (Lg-eq)
 - Get-ahead OIH Bag (EV1)**
 - Zip Tie (secure lid)
 - Integral Tether (strap through 2nd loop on opposite side of bag; hook to 1st loop)
 - OIHs (5)
 - Adj Equip Tether (2) (clove hitch)
 - OI WIFS (3)
 - OIH (0612)
- Staging Bag
 - Fish Stringer Tether
 - Wire Tie Caddy (used for VSC get-ahead task)**
 - Velcro/Tape Caddy
 - PGT
 - PGT Battery s/n _____
 - 7/16 (wobble) Socket-6 ext
 - Vise Grips
 - Ratchet Wrench
 - 7/16 (rigid) Socket-9 ext
 - Needle Nose Pliers
 - Spare 85-ft Safety Tethers (2)**
 - Hammer**
- Fish Stringer Tether
 - Connector Cleaner Tool Kit**
 - Connector Pin Straightener
 - Probe
 - Pry Bar**
 - MWS Key Strap Assy
 - Long Duration Tie-Down Tethers (1)**
 - Shuttle A/L Ratchet Wrench w/7/16 Socket**
(move to Vol H Outboard Bag; check completion box on EMERGENCY UNDOCKING EVA TRANSFER (Cue Card))

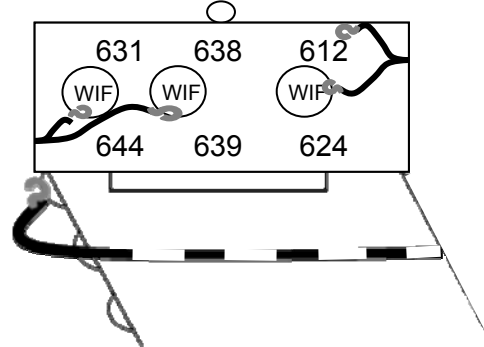
AIRLOCK CONFIG (Cont)

- IV Bag
 - Towels (2)
 - Contamination Detection Kit
 - GP Caddy (2)
 - Adjustable Thermal Mittens (2)
 - Socket Caddy (hatch cont)
 - RET (eq-eq) (Black)
 - 1/2 Socket-8 ext
 - 7/16 (wobble) Socket-6 ext (spare)
 - DCM Plug (SAFER Hardmount) (2)
 - RET (eq-eq, Black) (2)

OIH Bag (EV2)



OIH Bag (EV1)



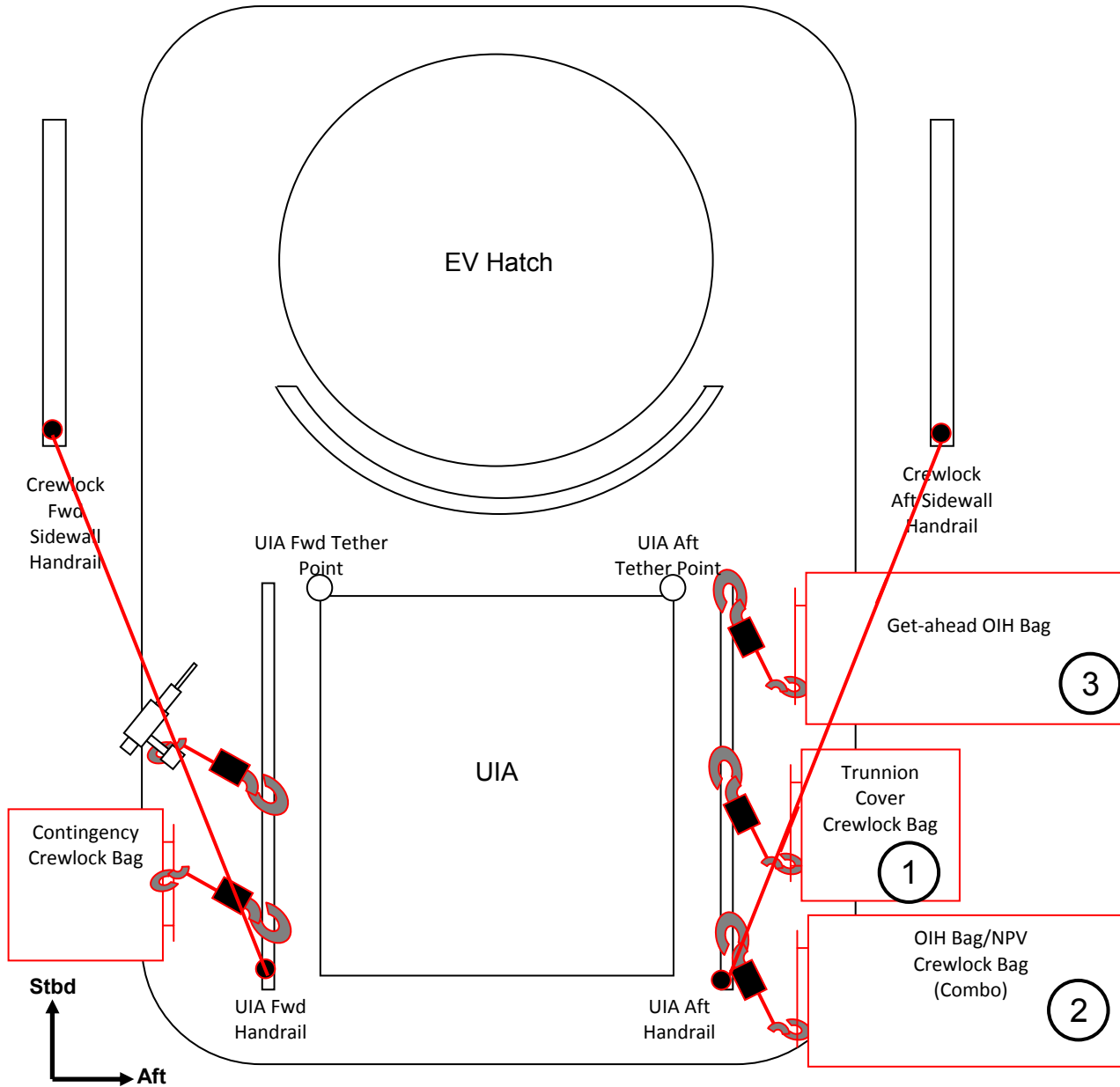
EXTERNAL CONFIG

- LAB HR 0244/0245
- NH3 Jumper Bag** (flap between each jumper)
 - Adj Equip Tether (3) (outside bag)
 - RET (3) (eq-eq) (internal loops)
 - NH3 Jumpers (3) (M2, M4, M3 (bottom) – NOD3/bent end on RET) (QD caps installed)
 - Wire Tie (3) (long) (integral to bag and on each jumper to prevent uncoiling)
 - Fish Stringer (sm hook attached to M1 LAB-end bail; 1 Lg hook attached outside bag)
 - RET (eq-eq)
 - Male N2 Vent Tool
 - Fish Stringer (sm hook attached to M1 NOD3-end bail; 1 Lg hook on internal loop and other Lg hook attached outside bag)
 - NH3 Jumper (M1) (QD cap installed)
 - Adj (Lg-eq) (Jumper #1 midpoint)
 - Wire Tie (long) (integral to bag on jumper to prevent uncoiling)
 - Cap Crewlock Bag**
 - Adj Equip Tethers (4) (clove hitch on internal RETs)
 - RET (eq-eq)
 - 1-in Bail Lever Drive

LAB HR 0201/0208/0220

- NH3 MLI Bag** (Lg ORU Bag) – stays outside for Cupola
 - Adj Equip Tether (3) (outside)
 - RET (eq-eq) (2) (inside, 1 free, 1 to MLI)
 - NH3 MLI (√top Velcro tabs folded over, √Loop A/B-end on top, LAB-end on bottom, LAB grounding pin out port side, Loop A and B grounding pins out stbd side and in Loop A pocket)
 - Adj Equip Tether (4) (2 on each LAB-end side MLI, 1 on Loop A-end to Loop B-end, 1 on Loop B-end)
 - Adj Equip Tether (2) (across middle and top of MLI to hold in bag)
 - Gap Spanner α (-305) (1)
 - Gap Spanner β, γ, δ (-303) (3)
 - Gap Spanner ε (-301) (1)

EVA 2 AIRLOCK CONFIG



	Lg-Sm RET
	Sm-Sm RET
	Adj Equip Tether
	Adj Fuse Tether
	Integrated Crewlock Bag Tether
	A/L Bungee
	85-ft Safety Tether
	55-ft Safety Tether
	Long Wire Tie
	Wire Tie Caddy
	Large Trash Bag
	PGT with Socket
	EVA Camera with Bracket
	Indicates Retrieval Order

Tool Legend

EVA 2 EGRESS/SETUP (00:35)

IV	EV1 (Be)	EV2 (Pk)
	<p>Initial Conditions:</p> <ul style="list-style-type: none"> <input type="checkbox"/> R D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> A/L 85-ft Safety Tether to MWS <input type="checkbox"/> Waist Tether to A/L Safety Tether ERCM <input type="checkbox"/> L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> Waist Tether to A/L D-ring Ext <input type="checkbox"/> Hooks closed and locked (Safety Tether reel end, L Waist Tether) 	<p>Initial Conditions:</p> <ul style="list-style-type: none"> <input type="checkbox"/> R D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> Waist Tether to fwd UIA D-ring <input type="checkbox"/> L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> A/L 85-ft Safety Tether anchor to A/L D-ring Ext <input type="checkbox"/> Waist Tether to A/L Safety Tether ERCM <input type="checkbox"/> Hooks closed and locked (Safety Tether reel end, R Waist Tether)
	<p><u>EGRESS</u> (00:15)</p> <ol style="list-style-type: none"> 1. Open A/L thermal cover 2. Egress A/L 3. Attach EV1 Safety Tether to aft A/L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel unlocked 4. Release Waist Tether from A/L D-ring Ext 5. Relocate EV2 Safety Tether from internal A/L D-ring Ext to fwd A/L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel unlocked 	<p><u>EGRESS</u> (00:15)</p>
<ol style="list-style-type: none"> 1. Post crew egress: WVS Software: Select page – RF camera Sel ‘Advanced Controls’ S-Band Level (two) – Max 	<ol style="list-style-type: none"> 6. Stow Trunnion Cover Crewlock Bag from EV2 on BRT 7. Transfer OIH Bag/Crewlock Bag to EV2 	<ol style="list-style-type: none"> 1. Transfer Trunnion Cover Crewlock Bag to EV1 2. Transfer OIH Bag/Crewlock Bag to EV1 3. Egress A/L 4. Close A/L thermal cover 5. Receive OIH Bag/Crewlock Bag from EV1, stow on BRT

EVA 2 EGRESS/SETUP (00:35) (Cont)

IV	EV1 (Be)	EV2 (Pk)
2. √SAFER handles down (MAN ISO vlv (L) – open; HCM (R) – closed)	8. √SAFER handles down 9. √ERCA green LED (if no WVS) 10. √Tethers and Tools	6. √SAFER handles down 7. √ERCA green LED (if no WVS) 8. √Tethers and Tools
	<p>SETUP (00:20)</p> 11. Translate to NOD3 HR 0619 (stbd/aft HR) via aft route 12. Stow Trunnion Cover Crewlock Bag on NOD3 HR 0619 13. If Jumper Bag not relocated on EVA 1 <ol style="list-style-type: none"> Translate to receive NH3 Jumper Bag (LAB HR 0208) Relocate NH3 Jumper Bag from Lab nadir to LAB HR 0209 (nadir) and NOD3 HR 0667 (zenith) with Adj Equip Tethers (2), hinge zenith 14. Perform Glove Inspection	<p>SETUP (00:20)</p> 9. Translate to NOD3 HR 0665 (zenith/fwd HR) via fwd route 10. Stow OIH/Crewlock Bag on NOD3 HR 0665 11. If Jumper Bag not relocated on EVA 1 <ol style="list-style-type: none"> Translate to NH3 Jumper Bag (LAB HR 0244/0245) Relocate NH3 Jumper Bag from Lab nadir to LAB HR 0208 (stbd) with Adj Equip Tether (1), hinge zenith 12. Verify APFR; LAB WIF 4 [1,RR,F,12] 13. Perform Glove Inspection

EVA 2 NH3 MLI LAYOUT (00:20)

IV					EV1 (Be)	EV2 (Pk)
√	G-S	1st HR	2nd HR	SN	<p><u>NH3 MLI LAYOUT</u> (00:20)</p> <ol style="list-style-type: none"> Translate to receive Gap Spanners Install Gap Spanners (ϵ, δ, γ) to 1st HR per table Receive NOD3 side NH3 MLI Attach NOD3 side NH3 MLI to NOD3 HR 0669 (fwd) and 0670 (aft), using Adj Equip Tethers (2) (D and E) Route Gap Spanner γ from NOD1 HR 0112 (port) → 0142 (stbd) 	<p><u>NH3 MLI LAYOUT</u> (00:20)</p> <ol style="list-style-type: none"> Open NH3 MLI Bag, secure lid Install Gap Spanners (β, α) to 1st HR per table Release Adj Equip Tether restraining 1st half MLI in Bag Deploy NOD3 side NH3 MLI to EV1 Release Adj Equip Tether restraining 2nd half MLI in Bag, tend MLI till EV1 has NOD3 end attached and MLI configured on NOD1 Attach Lab side NH3 MLI to LAB HR 0218 (stbd) and 0219 (port), using Adj Equip Tethers (2) (A and B) Route Gap Spanner α from NOD2 HR 0219 (port) → 0232 (aft)
	α	0219 (port)	0232 (aft)	-305		
	β	0220 (port)	0220 (stbd)	-303		
	γ	0112 (port)	0142 (stbd)	-303		
	δ	0128 (fwd)	0111 (fwd)	-303		
	ϵ	0111 (aft)	0110 (fwd)	-301		

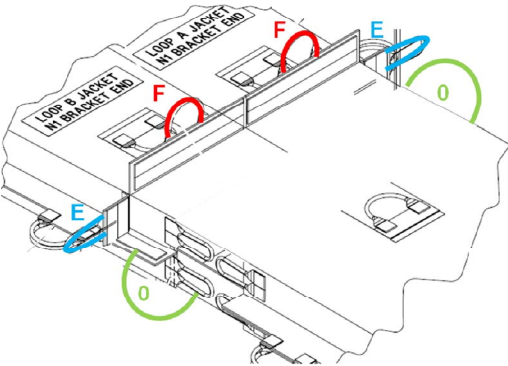
EVA 2 NH3 JUMPER INSTALL (01:25)

IV	EV1 (Be)	EV2 (Pk)
	<div style="border: 2px solid black; padding: 5px; margin-bottom: 5px;"> <p>WARNING Expect small amount of NH3 crystals to be visible when removing cap from male QD</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>CAUTION Once jumpers have been pressurized: a. Do not translate on gap spanners restraining NH3 MLI and jumpers b. Do not tether or BRT to handrails with attached gap spanners restraining NH3 MLI and Jumpers excluding LAB HR 0219 20-min QD exposure to direct sun without thermal covers can cause seal damage</p> </div>	
	<p><u>F1 JUMPER ROUTE/VENT (00:15)</u> 1. √NH3 Jumper Bag tethers cinched on HRs 2. Open NH3 Jumper Bag, secure lid 3. Remove F1 QD Jumper Caps (2) (pull back on release ring to demate), stow in Crewlock Bag</p>	<p><u>F1 JUMPER ROUTE/VENT (00:15)</u></p>
	<p>4. Transfer LAB Fish Stringer (w/LAB end of F1 jumper and Vent Tool) to EV2</p>	<p>1. Receive LAB Fish Stringer from EV1</p>
	<p>5. Relocate NOD3 Fish Stringer (w/NOD3 end of F1 jumper) to HR 0669 and 0670 6. Route F1 jumper under gap spanner y 7. Attach sm Adj Equip Tether hook (C) (on jumper #1 midpoint) to NOD1 HR 0111 (fwd)</p>	<p>2. Attach Fish Stringer to LAB HR 0218 and 0219 3. Route F1 jumper under gap spanner α 4. Stabilize on LAB HR 0219 5. Retrieve Vent Tool from Fish Stringer; remove QD cap 6. Perform Block A – Vent OPS for F1: <u>EVA QD OPS CUE CARD</u></p>
	<p><u>F2 JUMPER ROUTE/VENT (00:10)</u> 8. Translate to Jumper Bag 9. Remove F2 QD Jumper Caps (2) (pull back on release ring to demate), stow in Crewlock Bag</p>	<p><u>F2 JUMPER ROUTE/VENT (00:10)</u></p>
	<p>10. Transfer LAB end of F2 jumper to EV2 11. Route NOD3 end of F2 jumper to NOD3 Fish Stringer 12. Route F2 jumper under gap spanner y</p>	<p>7. Receive LAB end of F2 jumper from EV1 8. Attach F2 QD bail to LAB Fish Stringer 9. Route F2 jumper under gap spanner α</p>
	<p>13. Attach F2 midpoint to NOD1 HR 0111 Adj Equip Tether (C) (Lg hook)</p>	<p>10. Perform Block A – Vent OPS for F2: <u>EVA QD OPS CUE CARD</u> 11. Install QD cap on Vent Tool</p>
	<p><u>NOD3 LOOP A QD MATE (00:20)</u> 14. Remove NOD3 M1/M2 MLI, stow on Fish Stringer 15. Perform Block B – Mate Ops for NOD3 F1/M1 (aft QD): <u>EVA QD OPS CUE CARD</u> 16. Perform Block B – Mate Ops for NOD3 F2/M2:</p>	<p><u>LAB LOOP A QD MATE (00:20)</u> 12. Open LAB MLI QD cozy 13. Ingress APFR; LAB WIF 4 [1,RR,F,12]</p>

EVA 2 NH3 JUMPER INSTALL (01:25) (Cont)

IV	EV1 (Be)	EV2 (Pk)
	<u>EVA QD OPS CUE CARD</u>	
		14. Perform Block B – Mate Ops for LAB F1/M1 (stbd QD): <u>EVA QD OPS CUE CARD</u> 15. Perform Block B – Mate Ops for LAB F2/M2: <u>EVA QD OPS CUE CARD</u>
	<u>F4 JUMPER ROUTE/VENT (00:10)</u> 17. Translate to NH3 Jumper Bag 18. Remove F4 QD Jumper Caps (2) (pull back on release ring to demate QD); stow in Crewlock Bag	<u>F4 JUMPER ROUTE/VENT (00:10)</u>
Potential Get-aheads: <input type="checkbox"/> Stage C/Lk Bag tethers for caps <input type="checkbox"/> Relocate Adj Eq Tethers (2) from MLI bag to jumper bag <input type="checkbox"/> Close NH3 MLI bag <input type="checkbox"/> Route NH3 lines inside MLI	19. Transfer LAB end of F4 jumper to EV2 20. Route NOD3 end of F4 jumper to NOD3 Fish Stringer 21. Route F4 jumper under gap spanner γ 22. Attach F4 midpoint to NOD 1 HR 0111 Adj Equip Tether (C) (Lg hook)	16. Receive LAB end of F4 jumper from EV1 17. Attach F4 QD bail to LAB Fish Stringer 18. Route F4 jumper under gap spanner α 19. Retrieve Vent Tool from LAB Fish Stringer; remove QD cap 20. Perform Block A – Vent OPS for F4: <u>EVA QD OPS CUE CARD</u>
	<u>F3 JUMPER ROUTE/VENT (00:10)</u> 23. Translate to NH3 Jumper Bag 24. Remove F3 QD Jumper Caps (2) (pull back on release ring to demate QD); stow in Crewlock Bag	<u>F3 JUMPER ROUTE/VENT (00:10)</u>
	25. Transfer LAB end of F3 jumper to EV2 26. Route NOD3 side F3 jumper to NOD3 Fish Stringer 27. Route F3 jumper under gap spanner γ 28. Attach F3 midpoint to NOD 1 HR 0111 Adj Equip Tether (C) (Lg hook)	21. Receive LAB end of F3 jumper from EV1 22. Attach F3 QD bail to LAB Fish Stringer 23. Route F3 jumper under gap spanner α 24. Perform Block A – Vent OPS for F3: <u>EVA QD OPS CUE CARD</u> 25. Install QD cap on Vent Tool
	<u>NOD3 LOOP B QD MATE (00:20)</u> 29. Translate to NOD3 M3/M4 30. Remove NOD3 M3/M4 MLI, stow on Fish Stringer 31. Perform Block B – Mate Ops for F4/M4 (aft QD): <u>EVA QD OPS CUE CARD</u> 32. Perform Block B – Mate Ops for F3/M3: <u>EVA QD OPS CUE CARD</u>	<u>LAB LOOP B QD MATE (00:20)</u> 26. BRT to LAB HR 0219 27. Move F4/M4 to RET
	33. ✓MLI around NOD3 QD panel securely attached	28. Perform Block B – Mate Ops for F4/M4 (stbd QD): <u>EVA QD OPS CUE CARD</u> 29. Move F3/M3 to RET 30. Perform Block B – Mate Ops for F3/M3: <u>EVA QD OPS CUE CARD</u>

EVA 2 NH3 MLI INSTALL (00:45)

IV	EV1 (Be)	EV2 (Pk)																														
	<p><u>NOD3 SIDE NH3 MLI INSTALL</u> (00:15)</p> <ol style="list-style-type: none"> 1. Perform Glove Inspection 2. Close Loop B MLI around M3 and M4 jumpers 3. Mate Loop B MLI side Velcro tabs 4. ✓ Tabs (1→6) are aligned 5. Close Loop A MLI around M1 and M2 jumpers 6. Mate Loop A MLI side Velcro tabs 7. ✓ Tabs (1→8) are aligned <p><u>NH3 MLI INTERFACE CLOSURE</u> (00:10)</p> <ol style="list-style-type: none"> 8. Retrieve Adj Equip Tether <input type="checkbox"/> Jumper Midpoint Lg-sm on NOD1 HR 0111 (C) 9. Mate LOOP A side to LAB side Velcro tabs (2) (E,F,0) 10. Install Loop A MLI grounding PIP pin in HR Bracket side hole stbd side of MLI 11. Mate LOOP B side to LAB side Velcro tabs (2) (E,F,0) 12. Install Loop B MLI grounding PIP pin in HR Bracket side hole stbd side of MLI 13. Install LAB MLI grounding PIP pin in HR Bracket side hole port side of MLI 14. <input type="checkbox"/> Perform WVS survey of bracket interface 	<p><u>LAB SIDE NH3 MLI INSTALL</u> (00:25)</p> <ol style="list-style-type: none"> 1. Perform Glove Inspection 2. Close LAB MLI around all 4 jumpers 3. Mate LAB MLI side Velcro tabs 4. ✓ Tabs (1→14) are aligned 5. ✓ Silver KAAAN side nadir 																														
	<p><u>GAP SPANNER INSTALL</u> (00:20)</p> <ol style="list-style-type: none"> 15. Install Gap Spanners around NH3 MLI, smooth creases 	<p><u>GAP SPANNER INSTALL</u> (00:20)</p> <ol style="list-style-type: none"> 6. Install Gap Spanners around NH3 MLI, smooth creases 																														
<ol style="list-style-type: none"> 1. Verify ETCS Loop A shutdowns complete; give EVs GO to open QDs 	<table border="1"> <thead> <tr> <th>Installed ✓</th> <th>Gap Spanner</th> <th>1st HR</th> <th>2nd HR</th> <th>SN</th> </tr> </thead> <tbody> <tr> <td></td> <td>α</td> <td>0219 (port)</td> <td>0232 (aft)</td> <td>-305</td> </tr> <tr> <td></td> <td>β</td> <td>0220 (port)</td> <td>0220 (stbd)</td> <td>-303</td> </tr> <tr> <td></td> <td>γ</td> <td>0112 (port)</td> <td>0142 (stbd)</td> <td>-303</td> </tr> <tr> <td></td> <td>δ</td> <td>0128 (fwd)</td> <td>0111 (fwd)</td> <td>-303</td> </tr> <tr> <td></td> <td>ε</td> <td>0111 (aft)</td> <td>0110 (fwd)</td> <td>-301</td> </tr> </tbody> </table>		Installed ✓	Gap Spanner	1st HR	2nd HR	SN		α	0219 (port)	0232 (aft)	-305		β	0220 (port)	0220 (stbd)	-303		γ	0112 (port)	0142 (stbd)	-303		δ	0128 (fwd)	0111 (fwd)	-303		ε	0111 (aft)	0110 (fwd)	-301
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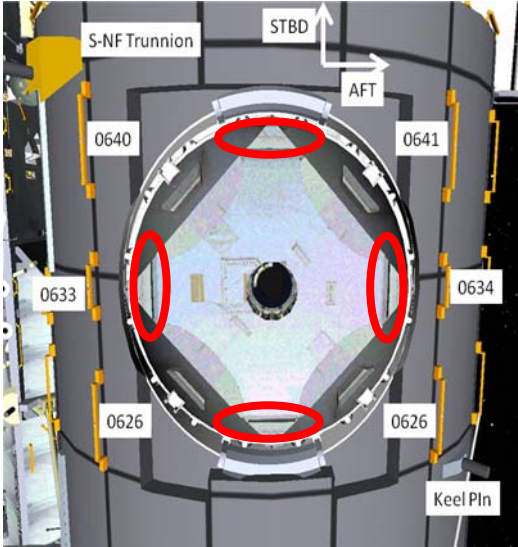
EVA 2 OPEN LOOP A QDs (00:20)

IV	EV1 (Be)	EV2 (Pk)
	<p><u>NOD3 LOOP A QD OPEN</u> (00:20)</p> <p>1. Perform NOD3 Nadir CBM Ops as time permits</p>	<p><u>LAB LOOP A QD OPEN</u> (00:20)</p> <p>1. If reqd, ingress APFR</p> <p>2. On IV GO, perform Block C – Open Valve Ops for LAB M1/F1: <u>EVA QD OPS CUE CARD</u></p> <p>3. Perform Block C – Open Valve Ops for LAB M2/F2: <u>EVA QD OPS CUE CARD</u></p>
	<p>2. On IV GO, perform Block C – Open Valve Ops for NOD3 M1/F1: <u>EVA QD OPS CUE CARD</u></p> <p>3. Perform Block C – Open Valve Ops for NOD3 M2/F2: <u>EVA QD OPS CUE CARD</u></p>	<p>4. If reqd, egress APFR (avoid contact with jumpers)</p> <p>5. Retract APFR ingress aid and position against module</p>
<p>1. Once all bails are open, give MCC-H GO to restart ETCS LOOP A</p>	<p>4. √MLI around NOD3 QD panel securely attached</p> <p>5. Relocate NOD3 Fish stringer for MLI install (HR 0669)</p>	



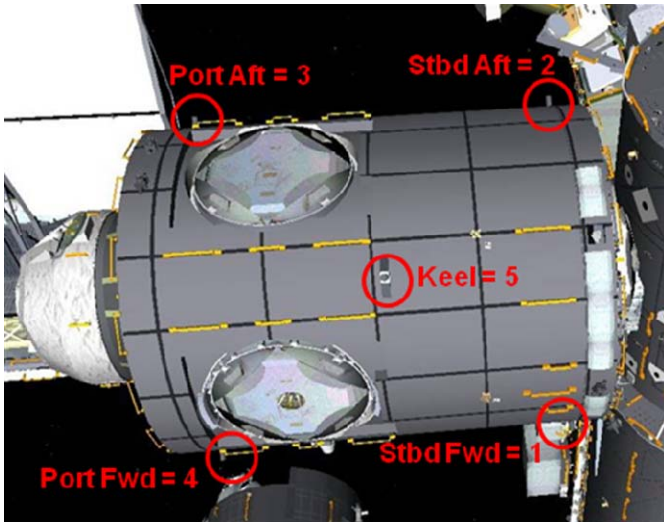

EVA 2 NH3 MLI CLOSURE (00:40/00:30)

IV	EV1 (Be)	EV2 (Pk)																									
<ul style="list-style-type: none"> <input type="checkbox"/> NH3 Jumper Bag (EV1) <ul style="list-style-type: none"> <input type="checkbox"/> Adj Equip Tether (3) (outside) <input type="checkbox"/> RET (3) (internal loops) <input type="checkbox"/> Fish Stringer (NOD3) <ul style="list-style-type: none"> <input type="checkbox"/> NOD3 MLI (2) <input type="checkbox"/> NOD3-end Male QD Caps (4) <input type="checkbox"/> Adj Equip Tether (2) (from MLI) <input type="checkbox"/> Fish Stringer (LAB) <ul style="list-style-type: none"> <input type="checkbox"/> RET (eq-eq) <ul style="list-style-type: none"> <input type="checkbox"/> Male N2 Vent Tool <input type="checkbox"/> LAB-end Male QD Caps (4) <input type="checkbox"/> Adj Equip Tether (2) (from MLI) <input type="checkbox"/> Adj Equip Tether (2) (from MLI Bag) <input type="checkbox"/> Adj (Lg-sm) (Jumper midpoint) <input type="checkbox"/> Wire Tie (4) (long) (integral to bag) <input type="checkbox"/> Cap Crewlock Bag <ul style="list-style-type: none"> <input type="checkbox"/> Adj Equip Tethers (4) (clove hitch on internal RETs) <ul style="list-style-type: none"> <input type="checkbox"/> Female QD Caps (8) <input type="checkbox"/> RET (eq-eq) <ul style="list-style-type: none"> <input type="checkbox"/> 1-in Bail Lever Drive 	<p><u>NOD3 LOOP A MLI CLOSURE (00:10)</u></p> <ol style="list-style-type: none"> 1. Close Loop A hood 2. Secure hood over QDs with cinch hook 3. <input type="checkbox"/> Perform WVS survey of QD interface √No gaps 4. Retrieve Adj Equip Tether (1) <ul style="list-style-type: none"> <input type="checkbox"/> Loop A MLI to NOD3 HR 0670 (E) <p><u>NOD3 LOOP B MLI CLOSURE (00:10)</u></p> <ol style="list-style-type: none"> 5. Close Loop B hood 6. Secure hood over QDs with cinch hook 7. <input type="checkbox"/> Perform WVS survey of QD interface √No gaps 8. Retrieve Adj Equip Tether (1) <ul style="list-style-type: none"> <input type="checkbox"/> Loop B MLI to NOD3 HR 0669 (D) 9. √MLI final config (Loop A, Loop B) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Loop A</th> <th>Loop B</th> </tr> </thead> <tbody> <tr> <td>Side tabs mated</td> <td></td> <td></td> </tr> <tr> <td>QD hoods cinched</td> <td></td> <td></td> </tr> <tr> <td>Bracket interface</td> <td></td> <td></td> </tr> <tr> <td>Grounding PIP Pins</td> <td></td> <td></td> </tr> </tbody> </table>		Loop A	Loop B	Side tabs mated			QD hoods cinched			Bracket interface			Grounding PIP Pins			<p><u>LAB MLI CLOSURE (00:15)</u></p> <ol style="list-style-type: none"> 1. Close LAB hood 2. Secure MLI around lines with secondary cinch strap 3. Secure hood over QDs with cinch hook 4. <input type="checkbox"/> Perform WVS survey of QD interface √No gaps 5. Retrieve Adj Equip Tethers (2) <ul style="list-style-type: none"> <input type="checkbox"/> LAB MLI to LAB HR 0218 and 0219 (A and B) 6. √MLI final config (LAB): <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>LAB</th> </tr> </thead> <tbody> <tr> <td>Side tabs mated</td> <td></td> </tr> <tr> <td>QD hoods cinched</td> <td></td> </tr> <tr> <td>Bracket interface</td> <td></td> </tr> <tr> <td>Grounding PIP Pins</td> <td></td> </tr> </tbody> </table>		LAB	Side tabs mated		QD hoods cinched		Bracket interface		Grounding PIP Pins	
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<ol style="list-style-type: none"> 1. Verify Port TRRJ locked, give EVs GO for outfitting ops 	<p><u>JUMPER CLEANUP (00:20)</u></p> <ol style="list-style-type: none"> 10. Retrieve Fish Stringer from NOD3 HR 0669 11. Stow Fish Stringer and Adj Equip Tethers (2) in NH3 Jumper Bag 12. Relocate Adj Equip Tethers (2) from inside NH3 MLI Bag to NH3 Jumper Bag 13. Perform NH3 Jumper Bag inventory 14. Close NH3 Jumper Bag 15. Perform NH3 MLI Bag inventory 16. Close NH3 MLI Bag 17. Perform Glove Inspection 	<p><u>JUMPER CLEANUP (00:15)</u></p> <ol style="list-style-type: none"> 7. Retrieve Fish Stringer from LAB HR 0219 8. Stow Adj Equip Tethers (2) on Fish Stringer 9. Inventory Fish Stringer 10. Stow Fish Stringer in NH3 Jumper Bag 11. Perform Glove Inspection 																									

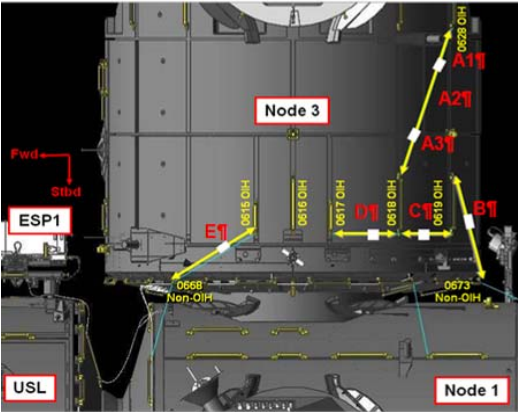
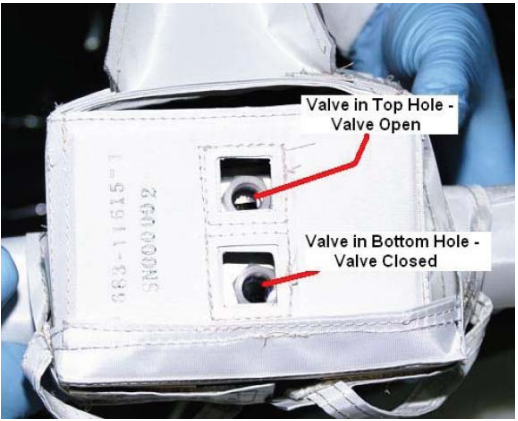
EVA 2 NODE 3 OUTFITTING (01:50/02:00)

IV	EV1 (Be)	EV2 (Pk)																																													
<p>1. Use Camera B & C for Keel Pin views</p>	<p>KEEL PIN COVER INSTALL (00:15)</p> <ol style="list-style-type: none"> Retrieve Keel Pin Cover #5 from Trunnion Cover Crewlock Bag (NOD3 HR 0619) Translate to Keel Pin (points aft/nadir) Open Velcro flaps around keel pin (2) Attach Keel Pin Cover #5 (tether loops stbd) Attach Velcro flaps onto cover √Velcro secure 	<p>NOD 3 OIH INSTALL (01:20)</p> <ol style="list-style-type: none"> On IV GO, translate to NOD3 HR 0665; BRT to HR Install OIHs in the following order, per block D – OIH Install: <table border="1"> <thead> <tr> <th>√</th> <th>OIH</th> <th>Location Type</th> <th>Fwd/stbd bolt Trq (ft-lb)/ Turns</th> <th>Aft/port bolt Trq (ft-lb)/ Turns</th> </tr> </thead> <tbody> <tr> <td></td> <td>0664</td> <td>Circumferential</td> <td></td> <td></td> </tr> <tr> <td></td> <td>0663</td> <td>Circumferential</td> <td></td> <td></td> </tr> <tr> <td></td> <td>0600</td> <td>Longitudinal</td> <td></td> <td></td> </tr> <tr> <td></td> <td>0601</td> <td>Longitudinal</td> <td></td> <td></td> </tr> <tr> <td></td> <td>0602</td> <td>Longitudinal</td> <td></td> <td></td> </tr> <tr> <td></td> <td>0603</td> <td>Longitudinal</td> <td></td> <td></td> </tr> <tr> <td></td> <td>0604</td> <td>Longitudinal</td> <td></td> <td></td> </tr> <tr> <td></td> <td>0605</td> <td>Longitudinal</td> <td></td> <td></td> </tr> </tbody> </table> <div style="border: 1px solid black; padding: 5px; background-color: #e0e0e0;"> <p align="center">Block D – OIH Install</p> <ol style="list-style-type: none"> √Soft dock armed √Label and orientation matches module Install OIH; √fully seated Drive bolts (2) [A2,CW2,30.5] ~8 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (3.8 ft-lb, 30 RPM) √Fully seated </div>	√	OIH	Location Type	Fwd/stbd bolt Trq (ft-lb)/ Turns	Aft/port bolt Trq (ft-lb)/ Turns		0664	Circumferential				0663	Circumferential				0600	Longitudinal				0601	Longitudinal				0602	Longitudinal				0603	Longitudinal				0604	Longitudinal				0605	Longitudinal		
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<p>2. Use Camera B & C for CBM views</p> <p align="center">NODE 3 Nadir CBM</p> 	<p>NOD3 NADIR CBCS FLAP OPEN (00:05)</p> <ol style="list-style-type: none"> Translate to NOD3 Nadir CBCS flap Expose mating Velcro Release flap fastener snap Open CBCS flap, secure with mating Velcro and snap √Velcro secure <p>NOD3 NADIR CBM PETAL DEPLOY (00:15)</p> <div style="border: 2px solid black; padding: 5px; text-align: center;"> <p>WARNING</p> <p>CBM Petals will spring open if latches are not engaged</p> </div> <ol style="list-style-type: none"> Release launch locks (2) for all 4 petals <ul style="list-style-type: none"> <input type="checkbox"/> Port (2) <input type="checkbox"/> Stbd (2) <input type="checkbox"/> Fwd (2) <input type="checkbox"/> Aft (2) <input type="checkbox"/> Visually inspect ACBM sealing surface, if petals open 																																														

EVA 2 NODE 3 OUTFITTING (01:50/02:00) (Cont)

IV	EV1 (Be)	EV2 (Pk)
<p>3. Verify NPV inhibit complete; give EV2 GO for Vent Plate Removal</p> <div style="background-color: #4a86e8; color: white; padding: 5px;"> <p>Block E – Trunnion Cover Install</p> <ol style="list-style-type: none"> 1. Retrieve T-handle Tool and Trunnion Cover from Trunnion Cover Crewlock Bag (NOD1 HR 0118) 2. Translate to worksite 3. Mate ¼-turn fasteners (2) (use alignment markings on covers) 4. Secure Velcro </div>	<p><u>TRUNNION COVER INSTALL</u> (01:00)</p> <p>14. On IV GO, install Trunnion Covers per Block E – Trunnion Cover Install</p> <ul style="list-style-type: none"> <input type="checkbox"/> #3 P-ZA <input type="checkbox"/> #2 S-ZA (BRT to NOD3 HR 0677) (1 of 2 fasteners) <input type="checkbox"/> #4 P-NF <input type="checkbox"/> #1 S-NF <p>15. Perform Glove Inspection</p> <p>16. Stage Gap Spanner #3 (NOD3 HR 0667 (nadir) → LAB HR 0208 (zenith))</p>	<p><u>NPV VENT PLATE REMOVAL</u> (00:20)</p> <ol style="list-style-type: none"> 3. Translate to HR 0608 (fwd/circ HR – port endcone) 4. Stow OIH/Crewlock Bag on HR 0608 5. RET to Vent Plate with OIH Crewlock Bag RET 6. Swap PGT Socket to 5/16-in (rigid) Socket-7-in ext 7. On IV GO, release Vent Plate bolts (4) [A5,CCW2,30.5] ~10 turns <ul style="list-style-type: none"> <input type="checkbox"/> 5/16-in (rigid) Socket-7-in ext <input type="checkbox"/> (7.0 ft-lb, 30 RPM) 8. Retrieve base MLI from OIH Crewlock Bag 9. Attach MLI to Vent Plate, stow in Crewlock Bag 10. Swap PGT Socket to 7/16-in (wobble) Socket-6-in ext
 		

EVA 2 NODE 3 OUTFITTING (01:50/02:00) (Cont)

IV	EV1 (Be)	EV2 (Pk)																																																					
 	<p><u>NOD3 GAP SPANNER CLEANUP</u> (00:15)</p> <p>17. Remove tape on gap spanner per table below; stow in Small Trash Bag</p> <table border="1" style="width:100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: center;">Tape #</th> <th style="text-align: center;">HR (stand off)</th> <th style="text-align: center;">HR (stand off)</th> <th style="text-align: center;">√ Removed</th> <th style="text-align: center;">√ Turn Test</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A1</td> <td>NOD3</td> <td>NOD3</td> <td rowspan="3" style="text-align: center;">(3 pieces)</td> <td></td> </tr> <tr> <td style="text-align: center;">A2</td> <td>0618</td> <td>0628</td> <td></td> </tr> <tr> <td style="text-align: center;">A3</td> <td>(port)</td> <td>(stbd)</td> <td></td> </tr> <tr> <td style="text-align: center;">B</td> <td>NOD3 0673 (zenith)</td> <td>NOD3 0619 (port)</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">C</td> <td>NOD3 0619 (stbd)</td> <td>NOD3 0618 (stbd)</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">D</td> <td>NOD3 0618 (stbd)</td> <td>NOD3 0617 (stbd)</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">E</td> <td>NOD3 0615 (stbd)</td> <td>NOD3 0668 fwd)</td> <td></td> <td></td> </tr> </tbody> </table>	Tape #	HR (stand off)	HR (stand off)	√ Removed	√ Turn Test	A1	NOD3	NOD3	(3 pieces)		A2	0618	0628		A3	(port)	(stbd)		B	NOD3 0673 (zenith)	NOD3 0619 (port)			C	NOD3 0619 (stbd)	NOD3 0618 (stbd)			D	NOD3 0618 (stbd)	NOD3 0617 (stbd)			E	NOD3 0615 (stbd)	NOD3 0668 fwd)			<p><u>ACS NPV INSTALL</u> (00:20)</p> <ol style="list-style-type: none"> 11. Retrieve NPV from OIH Crewlock Bag 12. √NPV is open (valve position in outboard hole) 13. Soft dock NPV to alignment guide (tether point outboard) 14. Open NPV thermal cover lid 15. Hand start bolts 2-3 turns using X pattern 16. Drive NPV bolts (4), using X pattern [A3,CW2,30.5] 12-13 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (4.8 ft-lb, 30 RPM) <table border="1" style="width:100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="text-align: center;">Bolt</th> <th style="text-align: center;">Trq (ft-lb)</th> <th style="text-align: center;">Turns</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">1</td><td></td><td></td></tr> <tr><td style="text-align: center;">2</td><td></td><td></td></tr> <tr><td style="text-align: center;">3</td><td></td><td></td></tr> <tr><td style="text-align: center;">4</td><td></td><td></td></tr> </tbody> </table> <ol style="list-style-type: none"> 17. Close NPV thermal cover 18. Perform OIH Bag/Crewlock Bag inventory 19. Stow OIH Bag/Crewlock Bag on BRT 20. Perform Glove Inspection 	Bolt	Trq (ft-lb)	Turns	1			2			3			4		
Tape #	HR (stand off)	HR (stand off)	√ Removed	√ Turn Test																																																			
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1																																																							
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EVA 2 CLEANUP/INGRESS (00:25)

IV	EV1 (Be)	EV2 (Pk)
	<p><u>CLEANUP</u> (00:10)</p> <ol style="list-style-type: none"> 1. Stow Trunnion Cover Crewlock Bag on NH3 Jumper Bag 2. Perform Tool Inventory 3. BRT to NH3 Jumper Bag 4. Install Gap Spanner #3 (NOD3 HR 0667 (nadir) → LAB HR 0208 (zenith)) 5. Translate to A/L 	<p><u>CLEANUP</u> (00:10)</p> <ol style="list-style-type: none"> 1. If time, relocate MLI Bag near NOD3 nadir CBM (HR 641) 2. If time, move Gap Spanner from LAB HR 0200 to NOD1 HR 0112 (port) 3. Perform Tool Inventory 4. Translate to A/L
	<p><u>INGRESS</u> (00:15)</p>	<p><u>INGRESS</u> (00:15)</p> <ol style="list-style-type: none"> 5. Open thermal cover 6. Stow OIH/Crewlock Bag in A/L 7. Ingress A/L 8. Attach Waist Tether to UIA fwd D-ring 9. √Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Hook closed and locked
	<ol style="list-style-type: none"> 6. Transfer NH3 Jumper Bag to EV2 7. On EV2 GO, relocate EV2 Safety Tether anchor point from fwd A/L D-ring to A/L D-ring Ext 8. Attach Waist Tether to A/L D-ring Ext 9. √Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Hook closed and locked 10. Release Safety Tether from aft A/L D-ring, attach to MWS 	<ol style="list-style-type: none"> 10. Receive NH3 Jumper Bag from EV1, stow in A/L 11. Give EV1 GO to relocate EV2 Safety Tether
	<ol style="list-style-type: none"> 11. On EV2 GO, ingress A/L 12. Close thermal cover (Velcro tab) 	<ol style="list-style-type: none"> 12. Give EV1 GO to ingress
<ol style="list-style-type: none"> 1. Perform WVS PWR DWN (PHOTO/TV, <u>WVS Cue Card</u>) 	<ol style="list-style-type: none"> 13. Remove SCU from stowage pouch 14. Remove DCM cover 15. Connect SCU to DCM, √locked 	<ol style="list-style-type: none"> 13. Remove SCU from stowage pouch 14. Remove DCM cover 15. Connect SCU to DCM, √locked

EVA 2 CLEANUP/INGRESS (00:25) (Cont)

IV	EV1 (Be)	EV2 (Pk)
	<p><u>NOTE</u> A TCV setting 8 – Max C minimizes time for SCU cooling</p>	
	<p>16. Water – OFF (fwd); expect “H2O IS OFF” msg</p> <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;"><u>CAUTION</u> Do not close hatch until EMU water off for 2 min</p> </div> <p>17. Verify no hardware blocking the hatch 18. EV Hatch Handle – verify position per hatch decal 19. EV Hatch – close and lock 20. Go to PRE-REPRESS (<u>DEPRESS/REPRESS</u> Cue Card)</p>	<p>16. Water – OFF (fwd); expect “H2O IS OFF” msg</p>

EVA 2 TASK DATA – NH3 JUMPER VENT AND INSTALL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	N/A
Two EV Crew	N/A	01:25

Tools:

EV1	EV2
Fish Stringer	Fish Stringer
Adj Equip Tether (Lg-eq)	Vent Tool

Foot Restraints:

Task	WIF	APFR Setting
NH3 Loop A Mate (EV2 LAB side)	LAB 04	[1,RR,F,12]
NH3 Loop A Mate (Node 3 side)	NOD3 07	[4,PP,D,1]
NH3 Loop B Mate (Node 3 side)	NOD3 07	[6,PP,E,12]

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
M1, M2, M3, M4	683-99525		M1, M2, M3, M4
QD booties	683-63447-2 (right) 683-63447-3 (left)		F#/M#
Male QD Dust Caps	683-99529-1		N/A
Female QD Dust Caps	505581-161		N/A

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
M1, M2, M3, M4	25	240 x 4 x 4
QD booties	0.2	10 x 16 x 0.1
Male QD Dust Caps		0.26" diameter
Female QD Dust Caps	0.88	2.7 x 2.4 x 2.1

EVA Connectors:

Harness	From	To	Clamps (#)	Conn Size	Function
M1/M2 Jumpers	LAB M1/M2	NOD3 M1/M2	1 each	1"	NOD3 Primary Cooling

Inhibits:

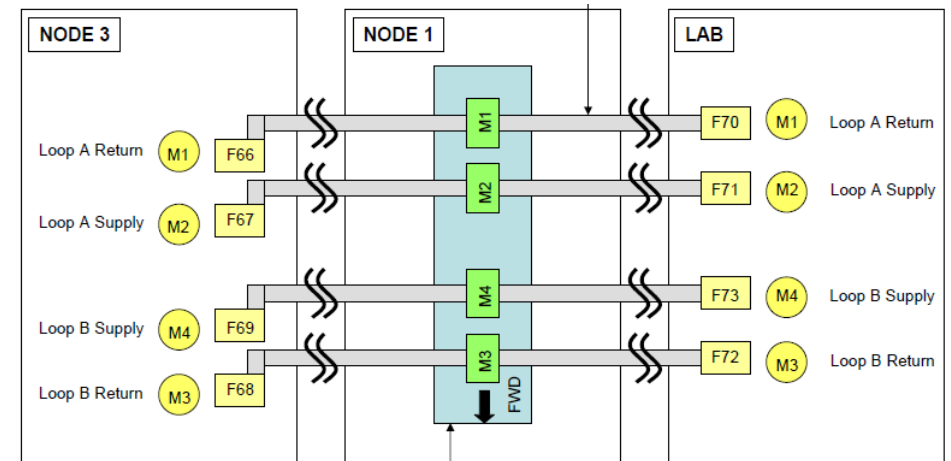
ORU/Task	Location	Inhibit
M1/M2 jumper install	Prior to opening LAB QD	ETCS Loop A Shutdown per 2.510 ETCS Loop A(B) Pump Module Shutdown (SODF: TCS: Nominal: ETCS)

Notes:

1. QD booties are captive to jumpers
2. LAB Male QD displacement from center axis: M1 to M2 measured 4.79", M3 to M4 measured 4.79", M2 to M4 measured 6.6"
3. Female QD caps/plugs are required for EVA to prevent damage/FOD
4. NH3 lines pressurized at about 377 psia when bails opened
5. Line pressure with NOD3 side QD (only) open = ~ 100 psi
6. Line pressure with LAB side QD open (Loop shut down) = ~ 390 psi
7. Line pressure with LAB side QD open (Loop NOT shut down) = ~ 440 psi

Timeline Considerations:

1. QDs may be opened in any order



EVA 2 TASK DATA – NH3 MLI INSTALL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	N/A
Two EV Crew	N/A	01:55+00:40

Tools:

EV1	EV2
Wire Ties (integral to NOD1 HR bracket)	Wire Ties (integral to NOD1 HR bracket)
Adj Equip Tethers	Adj Equip Tethers

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
NH3 MLI	683-99527-1,2,3		Loop B Jacket, Loop A Jacket, LAB Jacket

Mass & Dimensions:

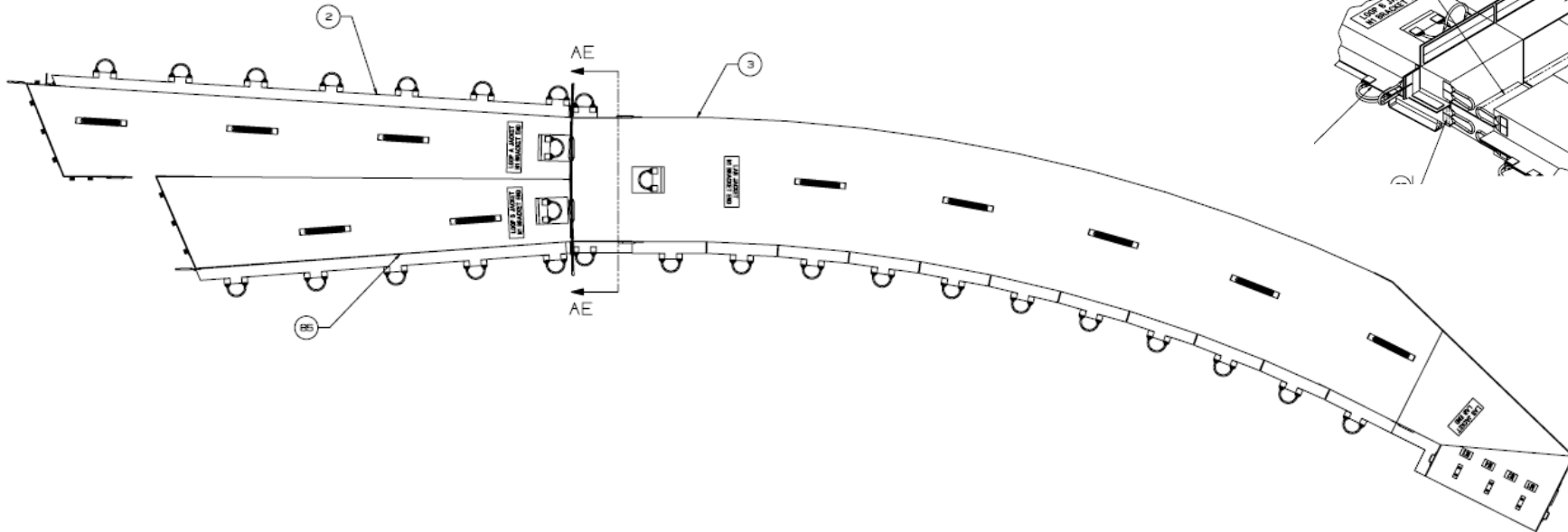
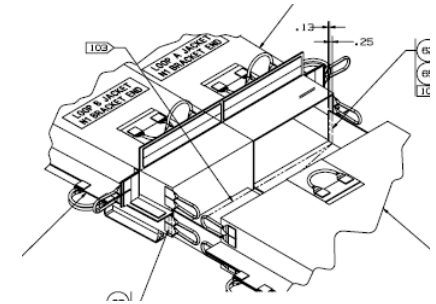
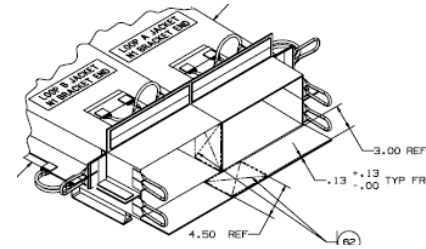
ORU	Mass (lb)	Dimensions (in)
NH3 MLI	38	240 x 24 x 1

Notes:

1. Desire 6" of clearance from PMM trunnion scuff plate (note PMM not present for flight)
2. Handrail bracket has 4 grounding locations on the sides of the bracket

Timeline Considerations:

1. Time before needing to have the MLI jackets installed when QD bootie not installed is 20 min above beta 55 and 1 orbit below beta 55, trending towards up to 3 orbits at beta 0 and below



EVA 2 TASK DATA – KEEL PIN/TRUNNION COVER INSTALL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	01:05
Two EV Crew	N/A	00:45



Tools:

EV1
MMOD T-handle Tool (short)

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
Keel Pin Cover	3150ND333-401		Keel Pin Cover 5
Trunnion Covers (4)	3153ND161-401 3153ND171-401 3153ND251-401 3153ND261-401		See photos

EVA Fasteners:

Fastener Name	Label	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
Trunnion Cover 1/4-Turn grounding fasteners	U → L	1/4" Allen	2/cover				1/4	N/A

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
Keel Pin Cover	0.37	17.8 x 5.9 x 7.8
Trunnion Covers (4)	0.80	34.5 x 18 x 8.2



Inhibits:

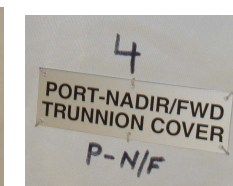
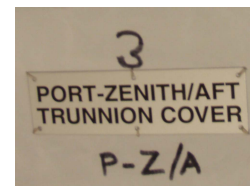
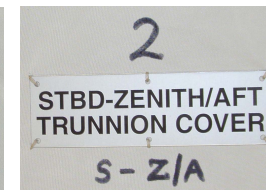
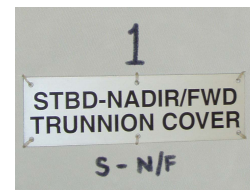
ORU/Task	Location	Inhibit
Trunnion Cover Install	Prior to task	Port TRRJ √DLA (1) – LOCKED (-90 thru 0 or 90 thru 115)

Notes:

1. Trunnion Covers and Keel Pin Cover good with just Velcro mated

Timeline Considerations:

1. Required prior to end of EVA 3



EVA 2 TASK DATA – NODE 3 CBM PREP

Estimated Task Duration:

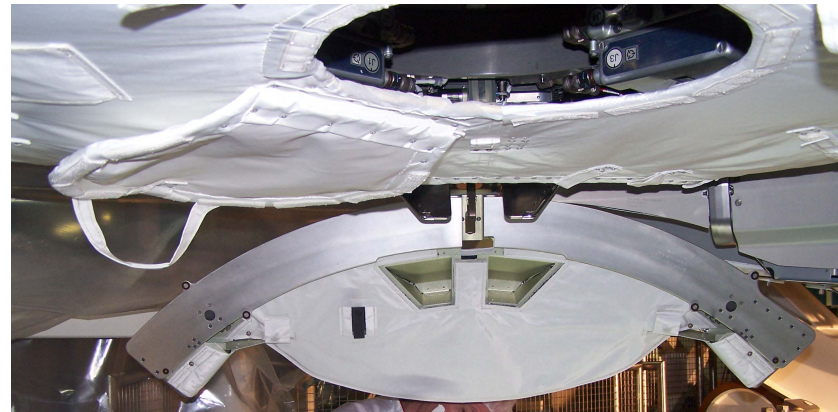
	With RMS	Without RMS
One EV Crew	N/A	00:20

Tools:

EV1
Adj Equip Tether

Timeline Considerations:

1. Must be opened prior to Cupola berthing to NOD3 nadir; can be accomplished by either crewmember



EVA 2 TASK DATA – NODE 3 OIH INSTALL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	01:20

Tools:

EV2
PGT w/7/16 (wobble) Socket-6 ext

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
OIH (24")	SEG33106351-301		602, 603, 605
OIH (18.9")	SEG33106351-313		663, 664
OIH (12")	SEG33106351-305		600, 601, 604

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
OIH (24")	1.95	2.4 x 2 x 31.5
OIH (18.9")	1.80	19 x 1.7 x 3.1
OIH (12")	1.6	17 x 3.2 x 2.2

EVA Fasteners:

Fastener Name	Label	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
OIH Bolts	N/A	7/16	2/OIH	1.5-5.5	5.5	21.3	8-9.5	30

Notes:

1. Safety tethering to on-orbit installed OIHs, specifically those installed with a PGT setting of 'A2,' is acceptable

EVA 2 TASK DATA – NPV INSTALL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:40

Tools:

EV2
PGT w/7/16 (wobble) Socket-6 ext
5/16 (rigid) Socket-7 ext

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
NPV	683-60453-3		
NPV Cover Plate	220F01107-003		
NPV MLI	683-11615-24		
NPV Base MLI	683-11615-25	0001	

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
NPV	3.57	12.2 x 6.3 x 5.1
NPV Cover Plate	1.0	4.0 x 5.0 x 0.8
NPV MLI	0.4	11 x 6.7 x 9.8
NPV Base MLI	0.3	8.3 x 2 x 7.9

EVA Fasteners:

Fastener Name	Label	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
NPV		7/16	4	4.8	N/A	8.3	12-13	30
NPV Cover Plate		5/16	4	N/A	7.0	11.2	10	30

Inhibits:

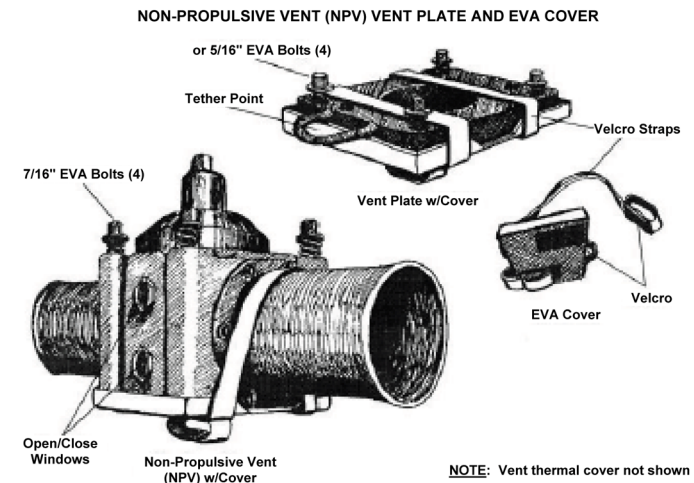
ORU/Task	Location	Inhibit
NPV Install	Prior to task	Port TRRJ √DLA (1) – LOCKED (-90 thru 0 or 90 thru 115)
NPV Install	Prior to vent plate removal	PCS - Node 3: ECLSS: PCA: PCA Commands Node 3 PCA Commands 1. 'PCA' Verify State – Monitor 2. 'Positive Pressure Relief' Verify Status – Inhibited

Notes:

1. Thermal stabilization dwell may be required if holes do not align
2. NPV is launched in NOD3
3. Valve open/close bolt has machine/wear markings on it
4. Small metal debris shavings were noticed on O-ring during CEIT
5. The NPV base MLI will be removed from the NPV and installed on the NPV Cover Plate assy. If there is a problem with the NPV, the NPV Cover Plate would be re-installed to protect sealing surface
6. H2, CO2, and MCA NPVs (3) are contingency only, and are not launched on 20A

Timeline Considerations:

1. If internal valve is unable to be check out correctly, the NPV is required to depress the Cupola volume; priority of this task will be raised so that it is to be completed right after NH3 MLI Closure Task



EVA 2 TASK DATA – NODE 3 GAP SPANNER INSTALL/CLEANUP

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:20

ORU Identification:

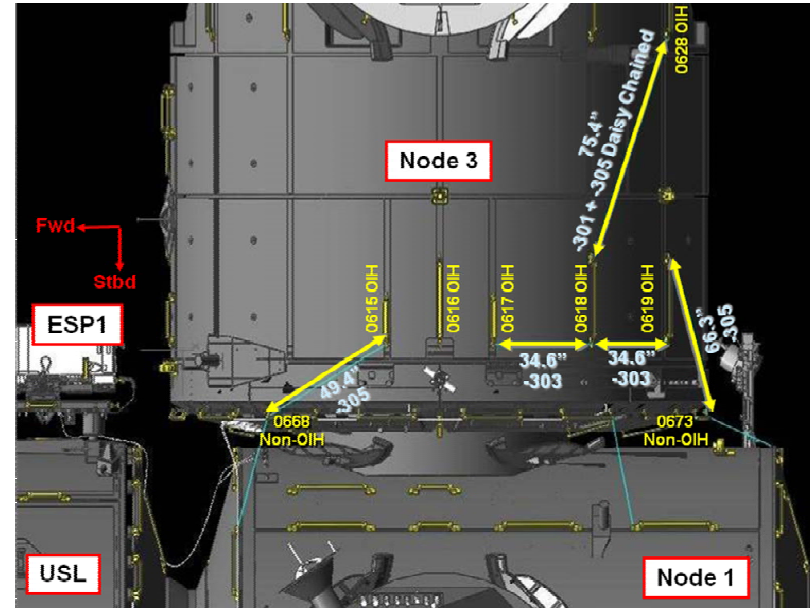
ORU	Part Number	Serial Number	EVA Label
On-orbit Installed Gap Spanner	SEG33109930-305		
Ground Installed Gap Spanner	SEG33109931-301		
	SEG33109931-303		
	SEG33109931-305		

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
On-orbit Installed Gap Spanner	1.1	48 x 2.2 x 0.9
Ground Installed Gap Spanner	1.1	31.75 x 2.2 x 0.9
		46.5 x 2.2 x 0.9
		74 x 2.2 x 0.9

Notes:

- Two Gap Spanners are installed during EVA 1; 1 is installed on EVA 2 during cleanup



EVA QD OPS CUE CARD

TOP


HOOK
VELCRO

EVA QD OPS CUE CARD


Block A – Vent Ops

- 1. Remove female QD bootie
- 2. Inspect male and female QDs for debris or damage
- 3. On female QD:
 - √Detent button – up
 - √Locking collar – locked position
 - √Fwd white band – not visible
- 4. Mate QD
 - √Fwd white band – visible
- 5. Perform snapback test
 - √Fwd white band visible
- 6. Perform pull test
- 7. Perform visual gap test
- 8. Locking collar – unlocked
- 9. Open valve (press detent button and push bail to forward position)
 - √Aft white band visible
 - √Detent button – up
- 10. Wait 10 sec for venting
- 11. Push bail fwd significant force while pressing detent button, then move bail aft (close valve)
 - √Fwd white band visible
 - √Detent button up
- 12. Locking collar – locked
- 13. Pull back on release ring and demate QD
 - √Release ring – retracted
 - √Fwd white band not visible
- 14. Inspect male and female QD for debris or damage
- 15. Install female QD bootie

Block B – Mate Ops

- □□□□ 1. Tether and remove Male QD Cap (3 turns), stow on Fish Stringer
- □□□□ 2. Check for kinks/twists
- □□□□ 3. Remove female QD bootie
- □□□□ 4. Inspect male and female QDs for debris or damage
- □□□□ 5. On female QD:
 - √Detent button – up
 - √Locking collar – locked position
 - √Fwd white band – not visible
- □□□□ 6. Assess side loads
- □□□□ 7. Mate QD
 - √Fwd white band – visible
- □□□□ 8. Perform snapback test
 - √Fwd white band – visible
- □□□□ 9. Perform pull test
- □□□□ 10. Perform visual gap test and  WVS survey
- □□□□ 11. Remove Fish Stringer
- □□□□ 12. Install female QD bootie

Block C – Open Valve Ops

- □□□□ 1. Remove female QD bootie
- □□□□ 2. Verify no kinks in line
- □□□□ 3. Locking collar – unlocked
 - √QD clocking (LAB=aft, NOD3=port)
- □□□□ 4. Open valve (press detent button and push bail to forward position)
 - √Aft white band visible
 - √Detent button – up
- □□□□ 5. Locking collar – locked
- □□□□ 6. Install female QD bootie
 - √For good closure (wire tie as reqd)
- □□□□ 7.  Perform WVS survey of QD interface

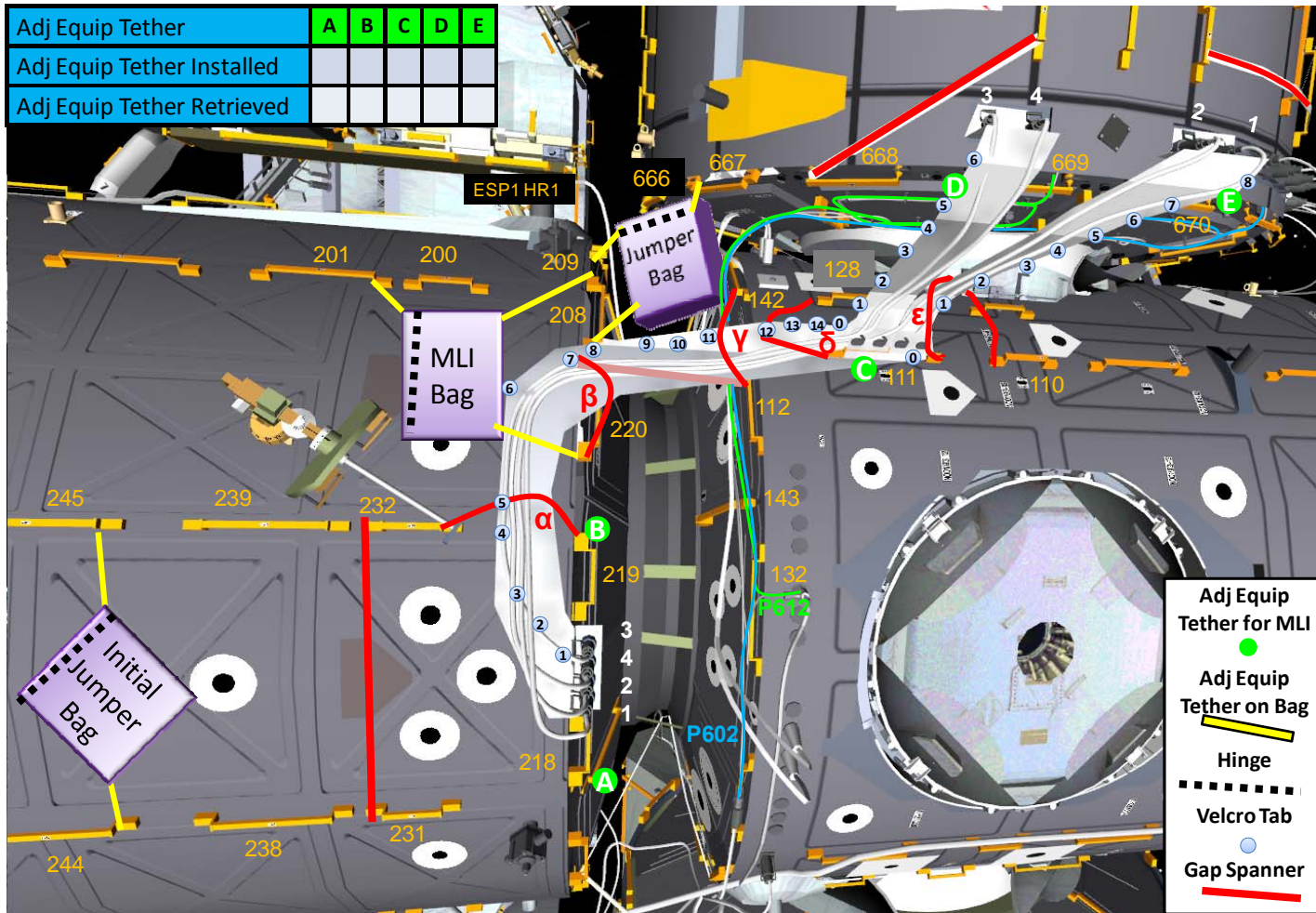
EVA-4a/130/O/B I

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EVA QD OPS CUE CARD (Cont)

TOP
BACK OF 'EVA QD OPS CUE CARD'

HOOK
VELCRO



EVA-4b/130/O/B

(reduced copy)

STS-130 (20A) EVA 3 TIMELINE

PET HR : MIN	IV	EV1 (Be)	EV2 (Pk)	
00:00		<u>POST DEPRESS</u> (00:05)	<u>POST DEPRESS</u> (00:05)	00:00
		<u>EGRESS/SETUP</u> (00:25)	<u>EGRESS/SETUP</u> (00:25)	
	<ul style="list-style-type: none"> Verify TRRJ inhibits complete 	<u>OPEN LOOP B QDS</u> (00:30)	<u>PMA3 HEATER/DATA CABLE INSTALL</u> (01:00)	
		<ul style="list-style-type: none"> LAB Side Loop B QD Open (00:15) NOD3 Side Loop B QD Open (00:15) 	<ul style="list-style-type: none"> PMA3 Cable Disconnect from PMA3 (00:35) 	
01:00	<ul style="list-style-type: none"> Verify Loop B shutdown complete Verify PMA3 cable inhibits complete 	<u>NODE 3 LTA CABLE DEMATE</u> (00:30)	<ul style="list-style-type: none"> PMA3 Cable Connect to NOD3 (00:25) 	01:00
	<ul style="list-style-type: none"> Verify LTA inhibits complete 	<ul style="list-style-type: none"> Demate NOD3 LTA P612 Cable (00:15) Cupola MLI Bag Setup (00:15) 		
		<u>CUPOLA MLI REMOVAL</u> (01:10)	<u>CUPOLA MLI REMOVAL</u> (01:10)	
		<ul style="list-style-type: none"> Cupola Grounding Fastener Release (00:20) 	<ul style="list-style-type: none"> Cupola Grounding Fastener Release (00:20) 	
02:00		<ul style="list-style-type: none"> Assy 1 MLI Roll (00:25) 	<ul style="list-style-type: none"> Assy 1 MLI Roll (00:25) 	02:00
		<ul style="list-style-type: none"> Assy 2 MLI Roll (00:25) 	<ul style="list-style-type: none"> Assy 2 MLI Roll (00:25) 	
		<u>NODE 3 OUTFITTING</u> (01:20)	<u>CUPOLA LAUNCH LOCK RELEASE</u> (01:00)	
		<ul style="list-style-type: none"> OI WIF Install (00:15) OIH Install (00:45) Outfitting Cleanup (00:10) NOD3 NH3 Jumper/MLI Closeout (00:10) 	<ul style="list-style-type: none"> Cupola Launch Lock Release (00:40) 	
03:00			<ul style="list-style-type: none"> APFR Relocate (00:20) 	03:00
		<u>VSC VIDEO CABLE ROUTING</u> (01:00)	<u>VSC VIDEO CABLE ROUTING</u> (01:20)	
	<ul style="list-style-type: none"> Verify Russian inhibits complete Verify VSC Video cable inhibits complete 	<ul style="list-style-type: none"> S0 Side VSC Video Cable Route (00:30) S0 VSC Video Cable Mate (00:15) VSC Video Cleanup (00:15) 	<ul style="list-style-type: none"> Bag Setup (00:20) FGB Side VSC Video Cable Route (00:45) VSC Video Cable Cleanup (00:15) 	04:00
04:00				
		<u>GET-AHEAD P1 FHRC P-CLAMPS</u> (01:00)	<u>GET-AHEAD P1 FHRC P-CLAMPS</u> (01:00)	
		<ul style="list-style-type: none"> NOD2 Zenith CBCS Flap Closure (00:20) FHRC Hose Box P-clamp Release (00:40) 	<ul style="list-style-type: none"> FHRC Stinger P-clamp Release (01:00) 	
05:00				05:00
		<u>CLEANUP/INGRESS</u> (00:25)	<u>CLEANUP/INGRESS</u> (00:25)	
06:00				06:00
		<u>PRE REPRESS</u> (00:05)	<u>PRE REPRESS</u> (00:05)	
06:30				06:30

EVA 3

EVA 3 BRIEFING CARD

Generic STS-130 EVA Brief: (release folks as you can)

1. Campout (wake-up and start per the timeline to keep ground/flight team in sync) (EV1)
 - Bio-med prior to opening hatch if possible
 - Food requests?
2. Task IV visits A/L to verify tools on suits per timeline: When? (Task IV)
3. Suit-up IVs verify bag/tools in A/L per EVA specific Section 8 (Suit-up IVs)
 - Help required for SAFER install?
 - Pictures?
4. Communications protocol (EV1)
 - (EV1/EV2 during depress/repress, "Break-Break" for messages/emergency response)
 - Lost communication
5. Summary timeline (include get-ahead tasks at end) (Task IV)
6. EVA specific hazards Task IV)
7. First actions (EV1 and EV2)
8. EVA specific concerns (if not addressed during summary timeline brief) (EV1 and All)
9. Retreat plan/path (rapid return, incapacitated, lost crewmember-SAFER ops) (EV1)
10. Lost tools (velocity and direction estimate, when last seen) (EV1)
11. Communications plan for Arm ops (if required) (EVs/IV/M1/R1)
12. Hopping, safety tether awareness, stability and control, get-ahead risk, fatigue

EVA 3 INHIBIT PAD

Orbiter

ALL EVAs	
KU-Band Antenna {prior to egress} MCC-H – INCO <ol style="list-style-type: none"> √KU-BAND Mask – active √KU-BAND EVA Protect Box – active 	
RCS {prior to egress}	
If EV crew < 27 feet from FRCS	
IV	<ol style="list-style-type: none"> √DAP: VERN, FREE, LO Z √RJDF F1, F2, F3, F4 MANF DRIVER (four) – OFF LOGIC (four) – OFF
O14,15,16	
MCC-H – Prop	
IV	<ol style="list-style-type: none"> √Above RCS config √RCS F – ITEM 1 EXEC (*) √JET DES F1U – ITEM 17 (*) F3U – ITEM 19 (*) F2U – ITEM 21 (*)

Ground

ALL EVAs	
Ground Radar {prior to egress} MCC-H – TOPO <ol style="list-style-type: none"> √TOPO console, ground radar restrictions in place for EVA 	

USOS

ALL EVAs	
PCU {prior to egress}	
NOTE PCUs may require up to a 1-hour warmup period before they are operational.	
MCC-H – Phalcon	
<ol style="list-style-type: none"> √PCUs (two) operational in discharge mode and one of the following: <ol style="list-style-type: none"> CCS PCU EVA hazard control FDIR enabled. No more than two arrays unshunted and oriented < 105° from velocity vector. 	
If one or both PCUs failed	
<ol style="list-style-type: none"> No more than two arrays unshunted and oriented < 105° from velocity vector. 	

USOS (Cont)

ALL EVAs	
CUCU {prior to egress} IV – (LAB104) <ol style="list-style-type: none"> √cb POWER A, B [two] – OPEN √cb LINK 1,2 [two] – OPEN 	
LOCATION DEPENDENT INHIBITS	
LAB Window (APFR relocate) {prior to egress}	
IV	EV crew less than 10 feet from window or in window FOV, close window shutter.
SSPTS {not expected}	
MCC-H – Phalcon	
If EV crew working within 2 feet of SSPTS cables	
<ol style="list-style-type: none"> RPCM LA1A4A D RPC 3 – Open, Close Cmd Inhibit RPCM LA2A3B D RPC 1 – Open, Close Cmd Inhibit RPCM Z14B A RPC 2 – Open, Close Cmd Inhibit RPCM Z13B A RPC 2 – Open, Close Cmd Inhibit 	
NODE 3 LTA Cable Disconnect {prior to egress}	
MCC-H – THOR	
<ol style="list-style-type: none"> P612/P1 Demate/mate – RPCM N1-RS1-B – RPCs 1,2,15,16 RPC – Open and Close Command Inhibited 	
Open Loop B Jumpers {prior to task}	
MCC-H – THOR	
<ol style="list-style-type: none"> ETCS Loop B shutdown per 2.510 ETCS Loop B Pump Module Shutdown (SODF: TCS: Nominal: ETCS) 	
Port TRRJ (NOD3 Outfitting, PMA3 Cable Install, P1 P-Clamps) {prior to egress}	
MCC-H – THOR	
<ol style="list-style-type: none"> √DLA (1) – LOCKED (0 degrees) 	
PMA3 Cable Install {prior to egress}	
MCC-H – Phalcon	
<ol style="list-style-type: none"> √RPCM N32A2B_B2 RPCs 4-13 RPC – Open and Close Command Inhibited DDCU N32A or DDCU N32B Converter Off 	
Cupola Windows (Cupola Launch Lock Release) {prior to task}	
IV	EV crew less than 10 feet from window or in window FOV, coordinate shutter opening/closing with EV crew and minimize time shutter is open.

EVA 3 INHIBIT PAD (Cont)

GOL

ALL EVAs

~~Ham Radio {prior to egress}~~

- ~~**IV** 1. ~~ARISS (Ham Radio) Deactivate or VHF (144-146 MHz) TX only~~~~

JEM

ALL EVAs

ICS-EF Antenna {prior to egress}

- SSIPC**
1. ICS MOD Off
 2. ICS UPC Off
 3. ICS HPA Off
 4. ICS Stored Commands Cleared

RSOS

ALL EVAs

SM Antennas {prior to egress}

- MCC-M** 1. GTS – Deactivate
- IV** 2. ARISS (Ham Radio) – Deactivate

IMPULSE {prior to egress}

- MCC-M** 1. IMPULSE (ИПИ-100) – Is not activated

EVAs ON PMA1 OR RSOS (LOCATION DEPENDENT)

Soyuz (docked to FGB) Thrusters (NOD1/PMA translation path and VSC Video) {prior to egress}

- MCC-M**
1. √Soyuz manifolds (four) – closed
ЭКО1, ЭКО2, ЭКГ1, ЭКГ2
 2. √Soyuz MCS unpowered
 3. √Soyuz Attitude Control Thruster Valves (fifty-two) – closed
 4. √Soyuz Main Engine Valves (K1, K2, K3, K4, K5, K6) – closed

FGB Antennas (VSC Video) {prior to egress}

- MCC-M** 1. √FGB KURS P [КУРС P] – Deactivated

Soyuz (docked to FGB) Antennas (VSC Video) {prior to egress}

- MCC-M** 1. √Soyuz KURS A [КУРС A] – Deactivated

RSOS (Cont)

ADDITIONAL ANTENNA INHIBITS FOR EVAs ON RSOS (LOCATION DEPENDENT)

FGB Antennas (VSC Video) {prior to egress}

- MCC-M**
1. √TORU [ТОРУ] – Deactivated
 2. √KURS A [КУРС A] – Deactivated

EVA 3 NOTES/CAUTIONS/WARNINGS

NOTES

1. Bolt install: Report torque and turns
2. Bolt release: Report torque and turns if different from published range
3. EVA connectors: After disconnection and prior to connection; verify pin and EMI band integrity; verify connector free of FOD
4. Inspect QDs for damage prior to mating
5. Toolbox doors must be closed with one latch per door when EV crew not in immediate vicinity
6. Avoid contact with OBSS striker bars (Vitrolube coating)
7. 85-ft safety tether retract force may affect body positioning

CAUTION

ISS Generic Constraints

- A. Avoid inadvertent contact with
1. Grapple fixture shafts (drylube)
 2. PIP Pins
 3. Passive UMAs
 4. MBS/SSRMS/SPDM taped radiative surfaces: VDU, ACU, JEU, LEU, MCU, CRPCMs, and Cameras
 5. SPDM SJEU, EP, OTCM, LEU, and LEE VDU radiator surfaces
 6. OTSD
- B. Electrical cables
1. Avoid bend radii < 10 times cable diameter
- C. Fiber optic cables
1. Avoid bend radii < 10 times cable diameter
 2. Avoid pulling on cable during mate/demate
- D. Fluid line flex hoses and QDs
1. Avoid bend radii < 14 in for hoses with a diameter ≥ 1 in
 2. Additional care should be taken to not exceed bend radii when applying loads at the flexible hose to rigid tube stub interfaces
 3. Ensure fluid QD booties are fully closed prior to leaving worksite; wire tie if reqd
 4. Avoid bend radii < 5 in for hoses with diameter < 1 in on LAB, S0, S1, P1, and 10 in for hoses with diameter < 1 in on all other elements

WARNING

ISS Generic Constraints (Cont)

- E. For structural reasons
1. Avoid vigorous body motions, quick grabs and kickoffs against tether restraints
 2. Avoid performing shaking motions (sinusoidal functions) more than four cycles
- F. Other
1. ITT Cannon connector: On demated connectors, do not rotate collar or manipulate cable/connector using collar or connector tool
 2. MLI handholds are not rated for crewmember translation loads

EVA 3 NOTES/CAUTIONS/WARNINGS (Cont)

CAUTION

ISS Truss Constraints

- A. Avoid inadvertent contact with
1. CETA lights (Z-93 paint) [LAB,S1,NODE 1]
 2. Deployed TUS cable [Nadir CETA rail]
 3. S0 aft face radiator
 4. GPS antennas (S13 paint) [S0,JLP]
 5. UHF antennas [LAB,P1]
 6. ETCS radiator flexhoses and panels [S1,P1]
 7. EETCS/PV radiator flexhoses, bellows and panels [P6,P4,S4,S6]
 8. SASA RF group [S1,P1]
 9. Heat pipe radiators [Z1]
 10. PCU cathode and HCA ports [Z1]
 11. Ku-Band antenna (SGANT) dish [Z1]
 12. CMG cover/shells [Z1]
 13. FPMU [P1]
 14. SASA high and low gain antennas and radiator surfaces [Z1]
 15. Deployed MISSEs
- B. For structural reasons
1. Avoid kicking S1/P1 radiator beam. If any of these occur, wait 2 to 5 min to allow structural response to dissipate

CAUTION

ISS Truss Constraints (Cont)

- C. Other
1. WIS Antennas: Do not use as handholds [NODE 1,LAB,P6,Z1]
 2. Lubricant from Ku-Band SGANT gimbals [Z1], CMGs [Z1], and RTAS ground strap fasteners [P6,P4,S4,S6] can contaminate EMU
 3. Prevent inadvertent contact of the tether shuttle with ETRS when the P3 tether shuttle stop is raised away from the rail

CAUTION

ISS U.S. Pressurized Elements Constraints

- A. Avoid inadvertent contact with
1. EVA crane [PMA1]
 2. TCS reflectors [PMA2,PMA3]
 3. APAS hardware [PMA2,PMA3]
 4. CETA lights (Z-93 paint) [LAB,S1,NODE 1]
 5. UHF antennas [LAB,P1]
 6. Open CBM petal covers and LAB window shutter
 7. S0/NODE 2 fluid tray hardlines at NODE 2 end, which are limited to 25 lb
- B. Other
1. WIS antennas: Do not use as handholds [NODE 1,LAB,P6,Z1]
 2. CBM petal covers may not be used as handholds unless both launch restraint pins are engaged

EVA 3 NOTES/CAUTIONS/WARNINGS (Cont)

CAUTION

ISS I.P. Elements Constraints

COL

- A. Avoid inadvertent contact with
1. COL ARISS and AIS antennas [COL-Nadir]

JEM

- A. Avoid inadvertent contact with
1. GPS antennas (S13 paint) [S0,JLP]
 2. Open JPM window shutter
 3. JTVE, WVE/EVE, JEF VE cameras
 4. JEMRMS taped radiative surfaces [JEU,EE,Cameras]
 5. JEM A/L target and pins
 6. JEF ORUs and EFUs (paint and lubricant)
 7. MAXI front and top panel (paint)
 8. SEDA-AP sensors (HIT, SDOM, and AOM) and MPAC & SEED
 9. Trunnions and UCMs (paint and lubricant) [JEF Payloads]
 10. RAIDS covers on end of HREP
 11. ICS-EF Ka-Band antenna dish
- B. For structural reasons
1. Avoid kicking MMOD shields between JLP and JPM
 2. Avoid tool impact on ICS-EF sensor

CAUTION

Shuttle Constraints

- A. Avoid inadvertent contact with
1. OBSS and SRMS composite sections joint torque arms, grapple fixture shafts, and cable harnesses
 2. LCS (silver Teflon) and LDRI (silver Teflon) and ITVC (gold foil) [OBSS]
 3. WVS antenna [ODS truss and PLB sill]
 4. Payload bay and camera wire harnesses, cables, cable guides, and connectors
- B. No touch
1. LDRI diffuser [OBSS]
 2. OBSS saddle contacts (when OBSS unberthed) [OBSS]
 3. Monkey fur [PLB]
 4. Cameras: Metallic surfaces [PLB]
 5. Ku-Band antenna black dish and gold thermal blankets [PLB]

EVA 3 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

ISS Generic Constraints

- A. Avoid inadvertent contact with
 - 1. Grapple fixture targets and target pins
- B. Pinch
 - 1. NZGL connector linkage. Use caution when mating/locking
 - 2. ITT Cannon connector rotating housing
- C. QDs
 - 1. If QD is in FID when valve is opened (bail fwd), QD will leak and fluid line may whip
 - 2. Do not rotate if in mated/valve open configuration
- D. Sharp Edges
 - 1. Inner edges of WIF sockets
 - 2. APFR active WIF probes
 - 3. Mating surfaces of EVA connectors
Avoid side loads during connector mating
 - 4. Back side of MMOD shield fasteners
 - 5. Spring loaded captive EVA fasteners (e.g., 6B-boxes, BMRRM, RTAS, SARJ Covers); the end of the spring may protrude
 - 6. SPDM OTCM gripper jaws
 - 7. Keep hands away from SSRMS LEE/POA/SPDM LEE opening, snares, and PDGF curvic coupling (teeth)
 - 8. MMOD strikes on ISS exterior

WARNING

ISS Generic Constraints (Cont)

- E. Thermal
 - 1. EVA connectors with booties may become hot if left uncovered. Handling may need to be limited
 - 2. Turn off glove heaters when comfortable temperature reached to prevent bladder damage. Do not pull fingers out of gloves when heaters are on
 - 3. Uncovered trunnion pins may be hot
 - 4. SSRMS/MBS/SPDM operating cameras and lights may radiate large amounts of heat
 - 5. Do not touch EMU protective visor if temperature has been < -134 degF for > 15 min
 - 6. No EMU boot contact with foot restraint when temperature < -120 degF or > 200 degF
 - 7. PDGF surfaces may not meet touch temperature requirements for unlimited contact when $\beta \leq -70$ or $\beta \geq 70$
- F. Electrical Shock
 - 1. Do not touch SPDM CLPA 1 electrical connector prior to camera installation

WARNING

ISS Truss Constraints

- A. Avoid inadvertent contact
 - 1. SSU, ECU, beta gimbal platform, mast canister, SAW blanket boxes unless the beta gimbal is locked and the motor is turned off
 - 2. Stay inboard of SARJ when active
 - 3. Stay 2 ft from S1/P1 radiator beam rotational envelope when beam is free to rotate
 - 4. Stay 5 ft from moving MT on face 1
- B. RF radiation exposure
 - 1. Stay 3.6 ft from S-Band (SASA) high gain Antenna when powered [S1,P1]
 - 2. Stay 1.3 ft from S-Band (SASA) low gain Antenna when powered [S1,P1]
 - 3. Stay 1 ft from UHF Antenna when powered [LAB,P1]
- C. Sharp Edges
 - 1. Solar array blanket box [P6,S6]
 - 2. Fastener threads on back of Z1 U-jumper male FQD panel, if nutplate cap missing
 - 3. Outboard MT rail attachment lug near P6 handrail 5333 and gap spanner
 - 4. P2 connector on EWIS box TAA-06 [Zenith/Forward Corner 1 of P5 – SARJ at 0 deg]
 - 5. Nickel coated braided copper ground straps may contain frayed wires [P6,P4,S4,S6]
 - 6. MMOD strikes on Z1 toolboxes

EVA 3 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

ISS Truss Constraints (Cont)

D. Electrical Shock

1. Stay ≥ 2 ft from ungrounded floating connectors if powered MBS cross-connect jumpers (translate past these using UMA handrails)
S0 EVA power cables (inside S0 Bay 00 Face 4, Bay 01 Face 3)
ESP-2 jumper (inside S0 Bay 03 Face 4)

E. Thermal

1. ELC may exceed touch temperatures when $\beta > 75$ deg

WARNING

ISS U.S. Pressurized Elements Constraints

A. Handrails

1. Handrails previously used for MISSE attachment may not be used as a safety tether point [A/L endcone 564 and 566, A/L Tank 2 Nad/Fwd and Port/Fwd, P6 5389]

B. Pinch

1. EV side of IV Hatch during Hatch operation (also snag hazard) [A/L]
2. LAB window shutter and CBM petal cover linkages during operation

C. RF radiation exposure

1. Stay 1 ft from UHF antenna when powered [LAB,P1]

D. Sharp Edges

1. PMA umbilical launch restraints – exposed bolt threads
2. Adjustable fuse tether (Fish Stringer) buckles stowed in Node bag
3. Port/Aft portion of A/L circular HR [HR 0506]
4. A/L HR 0537 (Eq Lock Zenith)

E. Thermal

1. PMA handrails may be hot. Handling may need to be limited
2. Stay ≥ 1 ft away from PMAs and MMOD shields > 270 degF if EMU sun visor up; limit time to 15 min or less if > 300 degF
3. Stay at least 0.5 ft away from PMA and MMOD shields > 325 degF
4. No EMU TMG contact with PMAs and MMOD shields > 320 degF

WARNING

ISS U.S. Pressurized Elements Constraints (Cont)

F. Electrical Shock

1. Stay ≥ 2 ft from ungrounded floating connectors if powered. SSPTS connectors include NOD1 Stbd/Fwd HR 0130, LAB Stbd/Fwd HR 0273, PMA2 Stbd

EVA 3 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

ISS I.P. Elements Constraints

COL

A. Avoid inadvertent contact with

1. SOLAR [COL EPF]

B. Thermal

1. Columbus end cones may violate touch temperature constraints when $-75 \leq \beta \leq -60$ or $60 \leq \beta \leq 75$

JEM

A. Avoid inadvertent contact with

1. ICS-EF sensors

B. Pinch

1. JPM window shutter linkages during operation
2. JEM cameras (JVTEs, EVE, WVE, and JEF VEs)
3. JEM EFU latching arms
4. JEF SSE latch
5. ICS-EF antenna boom
6. SEDA-AP mast
7. SMILES antenna rotating area
8. HREP hinge sides and RAIDS pinch areas

WARNING

ISS I.P. Elements Constraints (Cont)

JEM (Cont)

C. Sharp Edges

1. Interior of JEMRMS HRMs
2. JEMRMS EE opening and snares
3. JEM A/L hatch corners
4. ICS-EF AHM gears
5. MAXI visual star camera
6. SMILES baffles (two), baffle base bare bolts, and Cold Sky Terminator (CST)
7. HREP baffles (four) [Star tracker aperture Zenith and three instrument baffles Aft]

D. RF radiation exposure

1. Stay 0.3 ft from Fwd/Aft JPM PROX antenna

E. Thermal

1. JPM Port End Cones and JLP Port Nadir may violate touch temperature constraints when $\beta > 60$ deg
2. JEMRMS/JTVE/JEFVE operating cameras and lights may radiate large amounts of heat

WARNING

Shuttle Constraints

A. Arcing/Molten Debris

1. Stay ≥ 2 ft from exposed EFGF connector when OBSS berthed, powered, and EFGF not grappled [PLB]
2. Stay ≥ 2 ft from exposed Stbd Fwd MPM contacts [PLB]
3. Stay above PLB sill when within 1 ft of powered ROEU connector [PLB]

B. Pinch

1. PRLA operation [PLB]

C. RF radiation exposure

1. Stay 3.28 ft from S-Band Antenna when powered
2. Stay 1 ft from top and side of UHF PLB Antenna radome surface when in high powered mode [ODS truss]
3. Stay 0.33 ft from top and side of UHF PLB Antenna radome surface when in low powered mode [ODS truss]
4. Remain below the level of the PLB door mold line for first 20 in Aft of Fwd bulkhead when S-Band Antenna powered [PLB]
5. Remain on the inboard side of the Stbd slidewire (sill handrails if slidewire not installed) for first 20 ft Aft of Fwd bulkhead when Ku-Band Antenna powered [PLB]

EVA 3 NOTES/CAUTIONS/WARNINGS (Cont)

WARNING

Shuttle Constraints (Cont)

D. Sharp Edges

1. PRLA grounding wipers [PLB]
2. LDRI baffles (also an entrapment hazard) [OBSS]
3. Keep hands away from SRMS EE opening and snares
4. TCS connector backshells have exposed threads [ODS]

E. Thermal

1. Illuminated PLB lights; do not touch
2. OBSS grapple fixture shafts/cams may be hot. Limit handling if required
3. Stay 27 ft from PRCS when powered
4. Stay 3 ft from VRCS when powered
5. Stay 3 ft from APU when operating

F. Contamination

1. Stay out of the immediate vicinity of leaking jet or APU

G. Lasers

1. Do not look at LDRI diffuser or LCS laser aperture window

EVA 3 FLIGHT SPECIFIC NOTES/CAUTIONS/WARNINGS

CAUTION

A. Fluid QDs

1. 20-min QD exposure to direct sun without thermal covers can cause seal damage

WARNING

A. Fluid QDs

1. Expect small crystals of NH₃ to be present when removing cap from male QD; notify **MCC-H** if large amount of crystals or if see continuous flow of crystals or NH₃
2. Once jumpers have been pressurized:
 - a. Do not translate on gap spanners restraining NH₃ MLI and jumpers
 - b. Do not tether or BRT to handrails with attached gap spanners restraining NH₃ MLI and Jumpers
excluding LAB HR 0219

EVA 3 TOOL CONFIG

EV1

- Adj Equip Tether (L wrist)
- MWS
 - BRT (L)
 - RET (eq-eq)
 - Wire Tie (3)
 - T-Bar
 - RET (eq-eq)
 - RET w/PIP Pin
 - Adj Equip Tether (1)
 - P612 MLI cap
 - Wire Tie (2)
 - Small Station Trash Bag
 - S0 Dust Caps (3)
 - Swing Arm (R)
 - RET (eq-eq)
 - PGT [A5 7.0 ft-lb, CAL, MTL 30.5]
 - s/n _____
 - PGT Battery s/n _____
 - 7/16 (wobble) Socket-6 ext
- D-ring Extender (2, R & L D-ring)
 - 85-ft Safety Tether (R D-ring Ext)
- Waist Tether (2, R on D-ring to ST & L on D-ring Ext)
- SAFER
- WVS

Tether Counts: (Red RETs)	
RETs (eq-eq) = 14	Adj Equip Tethers = 14
RETs (Lg-eq) = 5	Adj Equip Tethers (Lg-eq) = 0
RET w/PIP Pin = 5	Fish Stringers = 0
NOTE: Prior to use, inspect the following hardware:	
<input type="checkbox"/> RET cords for fraying	
<input type="checkbox"/> Load Alleviating Straps (Safety Tether/Waist Tether); ref FS 8-16	
<input type="checkbox"/> Trash Bag: Bristle deformation/damage and Hinge damage, after having stowed tools in trash bag	
<input type="checkbox"/> IV caps removed on all connectors	

EV2

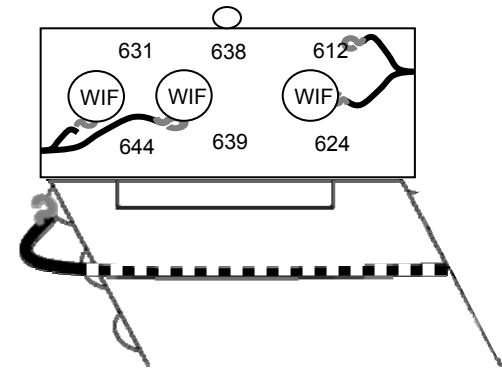
- Adj Equip Tether (L wrist)
- MWS
 - BRT (L)
 - RET (eq-eq)
 - Wire Tie (3)
 - T-Bar
 - RET (eq-eq)
 - PMA3 Connector Cap (in trash bag)
 - RET w/PIP Pin
 - PMA3 Connector Cap (in trash bag)
 - Adj Equip Tether (1)
 - Wire Tie (2)
 - Small Station Trash Bag
 - Swing Arm (R)
 - RET (eq-eq)
 - PGT [B6 24.0 ft-lb, CAL, MTL 30.5]
 - s/n _____
 - PGT Battery s/n _____
 - 7/16 (wobble) Socket-6 ext
- D-ring Extender (2, R & L D-ring)
 - 85-ft Safety Tether (L D-ring Ext)
- Waist Tether (2, R on D-ring Ext & L on D-ring to ST)
- SAFER
- WVS

AIRLOCK CONFIG

- RET (Lg-eq)
 - VSC Bag (Med ORU Bag) (EV2)
 - Adj Equip Tethers (2) (outside)
 - RET (eq-eq)
 - VSC Video Cable (add midpoint marker between where wire tie #2 and #3 initially anchored; reverse wire ties #2 and #3 so anchor is near connector ends; coil last 10 ft of FGB side w/additional wire tie)
- NOTE
- Midpoint is ~37 ft, 9 inches from FGB back shell and 32 ft, 10 inches from S0 backshells
- VSC Video Cable Dust Caps (3)
 - Wire Tie (long) (wire tie caps together)
 - Adj Equip Tether (1) clove hitched inside bag
 - Wire Tie (long) (wire tie caps together)
 - VSC Video Cable Dust Caps (3)
 - RET (eq-eq)
 - Wire Tie Caddy (9, __ left)
 - RET (eq-eq)
 - Wire Tie Caddy (9, __ left)

AIRLOCK CONFIG (Cont)

- RET (Lg-eq)
 - OIH Bag (EV1)
 - RET (eq-eq) (outside)
 - Zip Tie (secure lid)
 - Integral Tether (strap through 2nd loop on opposite side of bag; hook to 1st loop and 1/4-turn receptacle on C/L bag)
 - Adj Equip Tether (2) (clove hitch)
 - OI WIFS (3)
 - OIH (0612)
 - OIHs (5)
 - RET (eq-eq)
 - Bail Lever Drive
 - Adj Equip Tether (outside)
 - Camera Bracket (outside)
 - EVA Camera
 - MLI Bag (Lg ORU Bag)
 - Adj Equip Tethers (3) (outside)
 - RET (2) (eq-eq) (inside)
 - Cupola MLI (2)



EVA 3 TOOL CONFIG (Cont)

AIRLOCK CONFIG (Cont)

- RET (Lg-eq)
 - EVA Camera (EV2)
 - Camera Bracket
- RET (Lg-eq)
 - P-Clamp Crewlock Bag (EV2)**
 - RET (eq-eq) (outside)
 - Gap Spanner #4 (-307)
 - RET w/PIP Pin
 - 7/16 (wobble) Socket-12 ext
 - RET w/PIP Pin
 - 7/16 (wobble) Socket-18 ext
 - Ratchet Wrench (no palm wheel)
 - Socket 7/16-2-in ext
 - Spare 85-ft Safety Tether
- RET (Lg-eq)
 - Contingency Bag**
 - RET w/PIP pin (outside)
 - 1-in QD Release Tool
 - 1-in Button Depress Tool
 - Aft Key Tool (AKT)
 - Connector Cleaner Tool Kit
- Spare 85-ft Safety Tether

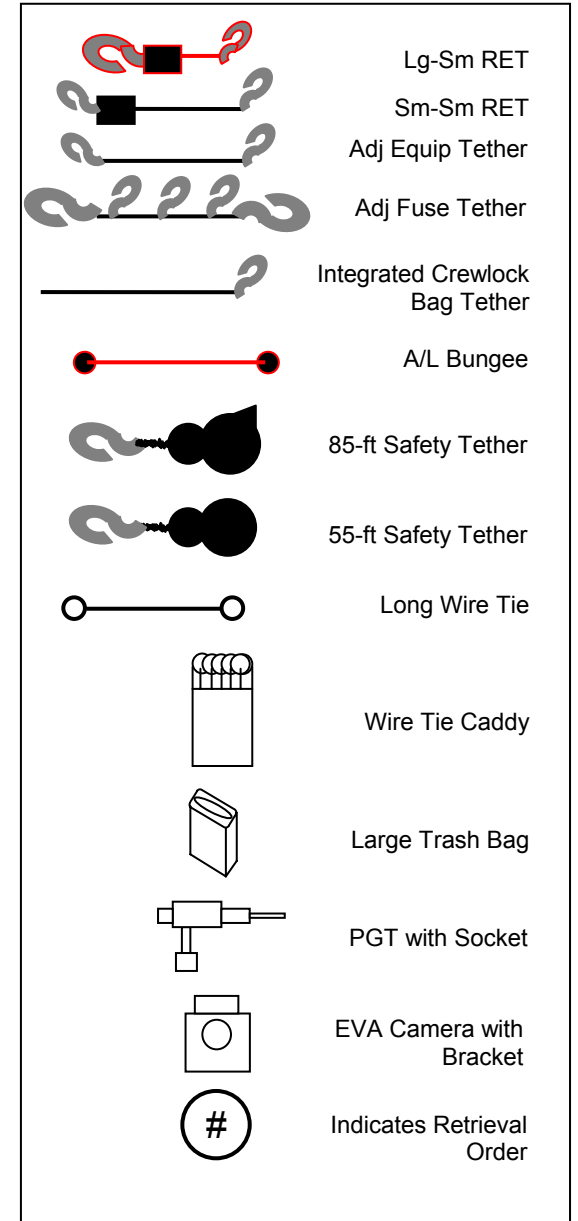
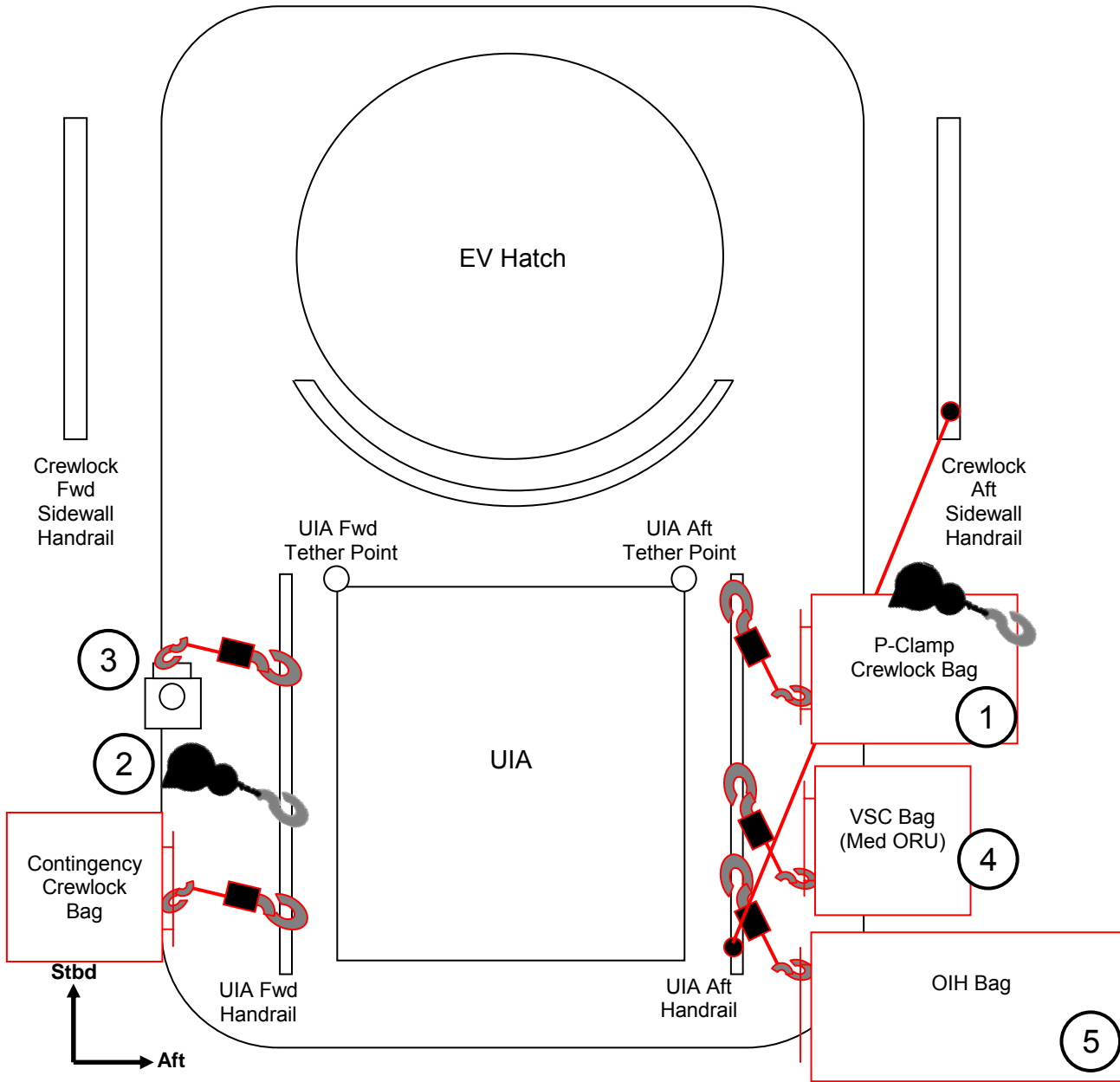
AIRLOCK CONFIG (Cont)

- Staging Bag
 - Fish Stringer Tether
 - Wire Tie Caddy (used for VSC task)**
 - Velcro/Tape Caddy
 - PGT s/n _____
 - PGT Battery s/n _____
 - 7/16 (wobble) Socket-6 ext
 - Vise Grips
 - Ratchet Wrench
 - 7/16 (rigid) Socket-9 ext
 - Needle Nose Pliers
 - Spare 55-ft Safety Tether
 - Hammer**
 - Fish Stringer Tether
 - Connector Cleaner Tool Kit**
 - Connector Pin Straightener
 - Probe
 - Pry Bar**
 - MWS Key Strap Assy
 - Long Duration Tie-Down Tethers (1)**
 - Shuttle A/L Ratchet Wrench w/7/16 Socket (moved to Vol H Outboard Bag)**
- IV Bag
 - Towels (2)
 - Contamination Detection Kit
 - GP Caddy (2)
 - Adjustable Thermal Mittens (2)
 - Socket Caddy (hatch cont)
 - RET (eq-eq) (Black)
 - 1/2 Socket-8 ext
 - 7/16 (wobble) Socket-6 ext (spare)
 - DCM Plug (SAFER Hardmount) (2)
 - RET (eq-eq, Black) (2)

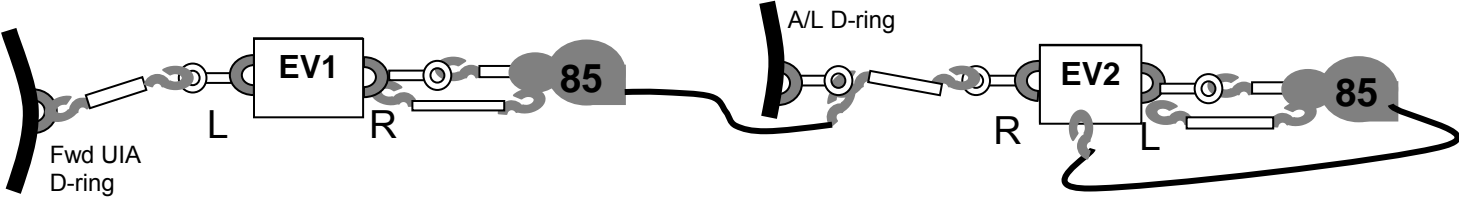
EXTERNAL CONFIG

- LAB HR 0201/0208/0220
- NH3 MLI Bag** (Lg ORU Bag) – stays outside for Cupola
 - Adj Equip Tether (3) (outside)
 - RET (eq-eq) (2)

EVA 3 AIRLOCK CONFIG



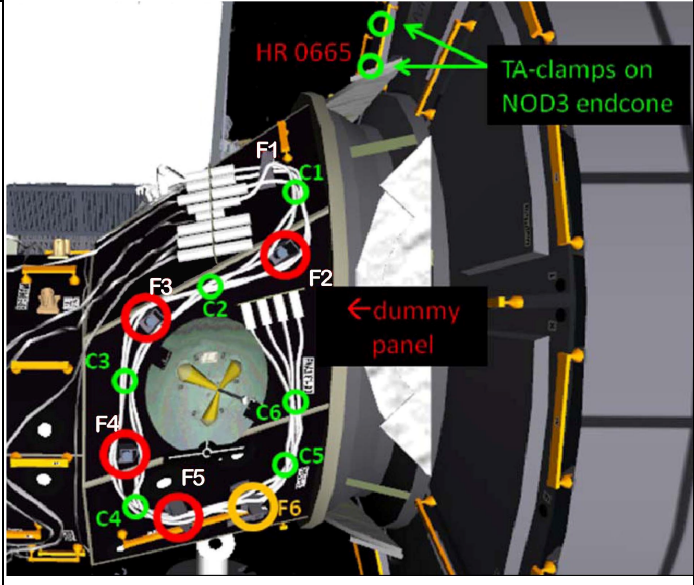
EVA 3 EGRESS/SETUP (00:25)

IV	EV1 (Be)	EV2 (Pk)
		
	<p>Initial Conditions:</p> <ul style="list-style-type: none"> <input type="checkbox"/> R D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> A/L 85-ft Safety Tether to A/L D-ring Ext <input type="checkbox"/> Waist Tether to A/L Safety Tether ERCM <input type="checkbox"/> L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> Waist Tether to fwd UIA Tether Point <input type="checkbox"/> Hooks closed and locked (Safety Tether reel end, L Waist Tether) 	<p>Initial Conditions:</p> <ul style="list-style-type: none"> <input type="checkbox"/> R D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> Waist Tether to A/L D-ring Ext <input type="checkbox"/> L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> D-ring Ext <ul style="list-style-type: none"> <input type="checkbox"/> A/L 85-ft Safety Tether to MWS <input type="checkbox"/> Waist Tether to A/L Safety Tether ERCM <input type="checkbox"/> Hooks closed and locked (Safety Tether reel end, R Waist Tether)
	<p><u>EGRESS</u> (00:15)</p>	<p><u>EGRESS</u> (00:15)</p> <ol style="list-style-type: none"> 1. Open A/L thermal cover 2. Egress A/L 3. Attach EV2 Safety Tether to aft A/L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> Hook closed and locked <input type="checkbox"/> Reel unlocked 4. Release Waist Tether from A/L D-ring Ext 5. Relocate EV1 Safety Tether anchor from internal A/L D-ring Ext to fwd A/L D-ring <ul style="list-style-type: none"> <input type="checkbox"/> Hook closed and locked <input type="checkbox"/> Reel unlocked
<ol style="list-style-type: none"> 1. Post crew egress: WVS Software: Select page – RF camera Sel ‘Advanced Controls’ S-Band Level (two) – Max 	<ol style="list-style-type: none"> 1. Transfer P-Clamp Crewlock Bag with spare 85-ft Safety Tether to EV2 2. Transfer EVA Camera to EV2 3. Transfer VSC Bag to EV2 	<ol style="list-style-type: none"> 6. Receive P-Clamp Crewlock Bag with spare 85-ft Safety Tether from EV1; stow on A/L HR 0559 (aft of hatch) 7. RET to and stow EVA Camera on MWS 8. Receive VSC Bag from EV1; stow on BRT

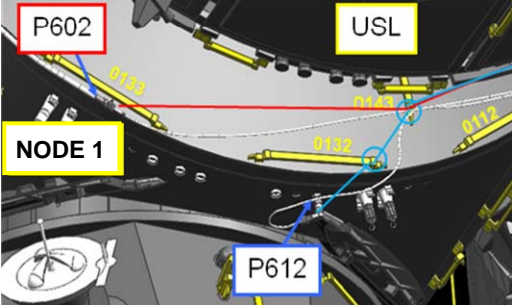
EVA 3 EGRESS/SETUP (00:25) (Cont)

IV	EV1 (Be)	EV2 (Pk)
	4. Transfer OIH Bag to EV2 5. Egress A/L 6. Close A/L thermal cover	9. Receive OIH Bag from EV1
	7. Receive OIH Bag from EV2, stow on BRT	10. Transfer OIH Bag to EV1
2. √SAFER handles down (MAN ISO vlv (L) – open; HCM (R) – closed)	8. √SAFER handles down 9. √ERCA green LED (if no WVS) 10. √Tethers and Tools	11. √SAFER handles down 12. √ERCA green LED (if no WVS) 13. √Tethers and Tools
3. Verify TRRJ inhibits complete	<u>SETUP</u> (00:10) 11. Translate to NOD3 HR 0600 (zenith/fwd) via fwd route 12. Stow OIH Bag on NOD3 HR 0600 13. Translate to LAB end of NH3 Jumpers 14. Perform Glove Inspection	<u>SETUP</u> (00:10) 14. Translate to NOD3 stbd endcone via aft route 15. Stow VSC Bag on NOD1 HR 0118 (radial port) 16. Translate to NOD3 port endcone (gap spanner) 17. Stow EVA Camera on NOD3 HR 0646 (nadir) 18. Perform Glove Inspection

EVA 3 OPEN LOOP B QDs (00:30) & NODE 3 LTA CABLE DISCONNECT (00:30)/PMA3 CABLE INSTALL (01:00)

IV	EV1 (Be)	EV2 (Pk)
<ol style="list-style-type: none"> Verify ETCS Loop B shutdowns complete; give EV1 GO to open QDs Verify PMA3 cable inhibits complete 	<p><u>LAB SIDE LOOP B QD OPEN (00:15)</u></p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p style="text-align: center;">CAUTION</p> <p>Once jumpers have been pressurized:</p> <ol style="list-style-type: none"> Do not translate on gap spanners restraining NH3 MLI and jumpers Do not tether or BRT to handrails with attached gap spanners restraining NH3 MLI and Jumpers </div> <p>20-min QD exposure to direct sun without thermal covers can cause seal damage</p> <ol style="list-style-type: none"> Open LAB NH3 MLI hood 	<p><u>PMA3 CABLE DISCONNECT FROM PMA3 (00:35)</u></p> <ol style="list-style-type: none"> Release cable stanchion brackets (4) [B6,CCW2,30.5] 10.5-14 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (24.0 ft-lb, 30 RPM) <input type="checkbox"/>F2 <input type="checkbox"/>F3 <input type="checkbox"/>F4 <input type="checkbox"/>F5 <input type="checkbox"/>F6 (18-19 turns) Release F6 bracket from soft dock Attach MWS EE to cables Release PMA3 cable connectors (4) and booties <ul style="list-style-type: none"> <input type="checkbox"/> P601 ← → dummy panel <input type="checkbox"/> P602 ← → dummy panel <input type="checkbox"/> P603 ← → dummy panel <input type="checkbox"/> P608 ← → dummy panel
<p style="border: 1px solid red; padding: 2px; display: inline-block;">excluding LAB HR 0219</p>	<ol style="list-style-type: none"> On IV GO, perform Block C – Open Valve Ops for M4/F4 <u>EVA QD OPS CUE CARD</u> Perform Block C – Open Valve Ops for M3/F3 <u>EVA QD OPS CUE CARD</u> Close LAB hood Cinch hood and attach hook <input type="checkbox"/> Perform WVS survey of QD interface 	<ol style="list-style-type: none"> Install Dust Caps (2) on P603 and P608 ; reinstall booties Release all TA-clamps (6) <ul style="list-style-type: none"> <input type="checkbox"/>C1 <input type="checkbox"/>C2 <input type="checkbox"/>C3 <input type="checkbox"/>C4 <input type="checkbox"/>C5 <input type="checkbox"/>C6
<ol style="list-style-type: none"> Once all bails are open, give MCC-H GO to RESTART ETCS LOOP B Verify LTA inhibits complete 	<p><u>NOD3 SIDE LOOP B QD OPEN (00:15)</u></p> <ol style="list-style-type: none"> Open Loop B NH3 MLI hood Perform Block C – Open Valve Ops for M4/F4 <u>EVA QD OPS CUE CARD</u> Perform Block C – Open Valve Ops for M3/F3 Close Loop B NH3 MLI hood Cinch hood, attach hook <input type="checkbox"/> Perform WVS survey of QD interface 	

EVA 3 OPEN LOOP B QDs (00:30) & NODE 3 LTA CABLE DISCONNECT (00:30)/PMA3 CABLE INSTALL (01:00) (Cont)

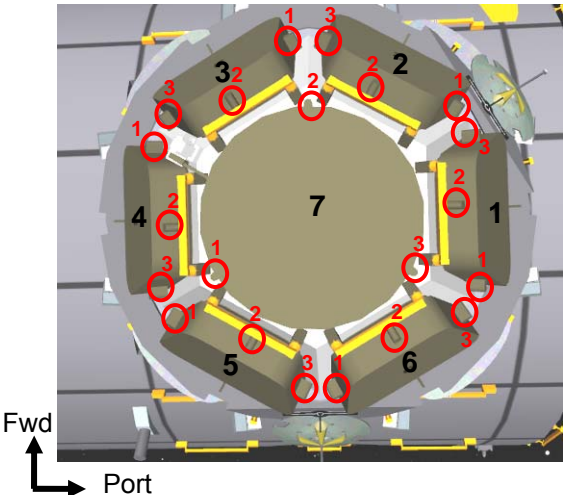
IV	EV1 (Be)	EV2 (Pk)
	<p><u>NOD3 LTA P612 CABLE DEMATE</u> (00:15)</p> <ol style="list-style-type: none"> 13. Translate to NOD1 HR 0132 14. ✓If Wire Tie required to stow P612 (NOD3) on NOD1 HR 0132 15. Demate P612 ← → J612 (NOD3 ← → NOD1) 16. Stow P612 (NOD3) with Wire Tie on NOD1 HR 0132 17. Demate P1 ← → dust cap (A/L ← → dust cap) 18. Mate P612 → ← dust cap (NOD3 → ← dust cap) 19. Mate P1 → ← J612 (A/L → ← NOD1) 20. Secure cables with Wire Tie as reqd 21. Configure booties (2) as reqd 22. Install P612 MLI Cap 	<p><u>PMA3 CABLE CONNECT TO NOD3</u> (00:25)</p> <ol style="list-style-type: none"> 7. Translate to NOD3 Port Avionics MLI 8. Tether to and open MLI 9. Remove Dust Caps on J106 and J103; stow in Small Trash Bag 10. Mate PMA3 heater cable <ul style="list-style-type: none"> ☐ P602 → ← NOD3 J106 11. Mate PMA3 data cable <ul style="list-style-type: none"> ☐ P601 → ← NOD3 J103 12. Ensure NOD3 Port Avionics MLI grounding strap conductive Velcro mated 13. Re-install NOD3 Port Avionics MLI (Velcro) 14. Bundle unmated PMA3 heater cable connectors (2) and Wire Tie to NOD3 HR 0655 (maintain bend radius, > 10 times cable diameter) 15. Close NOD3 TA-clamps (2) around PMA3 cable 16. ☐ Perform WVS survey
<ol style="list-style-type: none"> 5. On EV2 GO, give MCC-H GO for PMA3 heater activation 	<p><u>CUPOLA MLI BAG SETUP</u> (00:15)</p> <ol style="list-style-type: none"> 23. Retrieve MLI Bag (LAB HR 0201, 0208, 0220) 24. Translate to Cupola 25. Temp stow MLI Bag on nadir surface of Cupola using Adj Equip Tethers (under Cupola MLI) 26. Tether Assy 1 to MLI Bag using RET 27. Tether Assy 2 to MLI Bag using RET 	<ol style="list-style-type: none"> 17. Give IV GO for PMA3 heater activation

11a. Reinstall booties on P601 and P602


EVA 3 CUPOLA MLI REMOVAL (01:10)

IV				EV1 (Be)	EV2 (Pk)
Panel	Bolt 1	Bolt 2	Roll	<u>CUPOLA GROUNDING FASTENER RELEASE</u> (00:20)	<u>CUPOLA GROUNDING FASTENER RELEASE</u> (00:20)
1					1. Translate to Cupola
2					2. Use Adj Tether to fairlead on NOD3 HR 0646
3				1. Perform Glove Inspection	3. Perform Glove Inspection
4				2. Release ground fasteners (6) [A5,CCW2,30.5] 12 turns	4. Release ground fasteners (6) [A5,CCW2,30.5] 12 turns
5				<input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext	<input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext
6				<input type="checkbox"/> (7.0 ft-lb, 30 RPM)	<input type="checkbox"/> (7.0 ft-lb, 30 RPM)
				<u>ASSY 1 MLI ROLL</u> (00:25) 3. Perform Block F – MLI Roll and Fold Ops, 2 panels 4. Use Adj Equipment Tether to fairlead as reqd	<u>ASSY 1 MLI ROLL</u> (00:25) 5. Perform Block F – MLI Roll and Fold Ops, 1 panel 6. Translate to Nadir surface of Cupola 7. Assist EV1 in restraining panel rolls
				5. Separate Velcro joining Ass'y 1 to Ass'y 2 6. Stow Ass'y 1 in MLI Bag	8. Separate Velcro joining Ass'y 1 to Ass'y 2 9. Stow Ass'y 1 in MLI Bag
				<u>ASSY 2 MLI ROLL</u> (00:25) 7. Perform Block F – MLI Roll and Fold Ops, 2 panels	<u>ASSY 2 MLI ROLL</u> (00:25) 10. Perform Block F – MLI Roll and Fold Ops, 1 panel 11. Translate to Nadir surface of Cupola 12. Assist EV1 in restraining panel rolls
				8. Stow Ass'y 2 in MLI Bag	13. Stow Ass'y 2 in MLI Bag 14. Perform Glove Inspection
				<div style="border: 1px solid black; background-color: #d9ead3; padding: 5px;"> <p style="text-align: center;">Block F – MLI Roll and Fold Ops</p> <ol style="list-style-type: none"> 1. Release Velcro from panel 2. Roll panel, avoid rolling up Velcro straps 3. Restrain roll with one Velcro strap </div>	

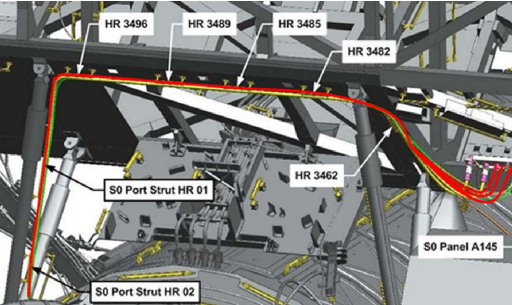
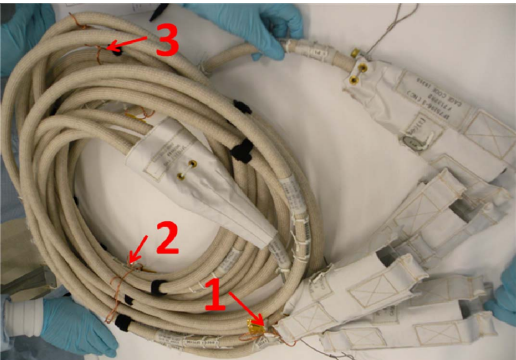
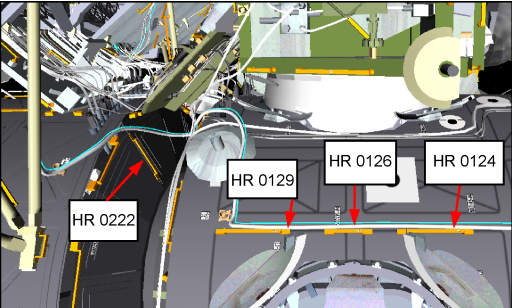
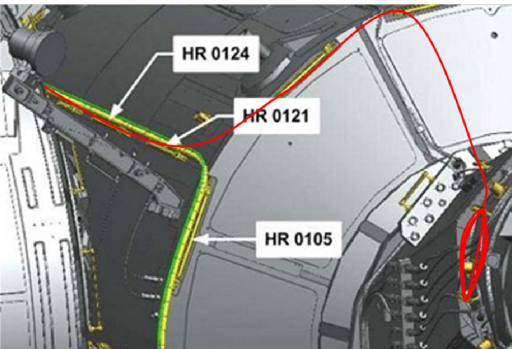
EVA 3 NODE 3 OUTFITTING (01:20)/CUPOLA LAUNCH LOCK RELEASE (01:00)

IV		EV1 (Be)				EV2 (Pk)																																			
<p align="center">Block G – OI WIF Install</p> <ol style="list-style-type: none"> Retrieve OI WIF from Crewlock Bag Slide OI WIF onto dovetail fitting √Both spring plungers are down Perform pull test 		<p><u>NODE 3 OI WIF INSTALL</u> (00:15)</p> <ol style="list-style-type: none"> Transfer MLI Bag to HR 0625 (fwd/nadir) Translate to NOD3 HR 0600 (stbd endcone fwd/zenith) via fwd route Perform Glove Inspection Install OI WIFs in the following order per Block G – OI WIF Install: <ul style="list-style-type: none"> <input type="checkbox"/> 01 <input type="checkbox"/> 02 Install OIH 0612 per Block D – OIH Install: <ul style="list-style-type: none"> <input type="checkbox"/> 0612 Install OI WIF per Block G – OI WIF Install: <ul style="list-style-type: none"> <input type="checkbox"/> 06 				<p><u>CUPOLA LAUNCH LOCK RELEASE</u> (00:40)</p> <p align="center"><u>NOTE</u></p> <p>Window Cover may not be used as translation aid once launch locks are removed</p> <ol style="list-style-type: none"> Release Cupola launch lock bolts (3 per cover) [A4,CCW2,30.5], 8 turns; bolts will spring out <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (6.3 ft-lb, 30 RPM) 																																			
√	OIH	Bolt 1		Bolt 2																																					
		Torque (ft-lb)	Turns	Torque (ft-lb)	Turns																																				
	0612																																								
	0638																																								
	0631																																								
	0624																																								
	0639																																								
	0644																																								
<p align="center">Block D – OIH Install</p> <ol style="list-style-type: none"> Install OIH (soft dock armed) √OIH label # and orientation matches mount # √Fully seated Drive OIH bolts (2) [A2,CW2,30.5] ~8 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (3.8 ft-lb, 30 RPM) √Fully seated 		<p><u>NODE 3 OIH INSTALL</u> (00:45)</p> <ol style="list-style-type: none"> Translate to NOD3 port endcone Retrieve and install OIHs in the following order per Block D – OIH Install: <ul style="list-style-type: none"> <input type="checkbox"/> 0638 <input type="checkbox"/> 0631 <input type="checkbox"/> 0624 Translate to port/fwd trunnion (cover #4) Install OIH 0639 per Block D – OIH Install: <ul style="list-style-type: none"> <input type="checkbox"/> 0639 Translate to port/aft trunnion (cover #3) Install OIH 0644 per Block D – OIH Install: <ul style="list-style-type: none"> <input type="checkbox"/> 0644 				<table border="1"> <thead> <tr> <th>Cover</th> <th>Bolt 1</th> <th>Bolt 2</th> <th>Bolt 3</th> </tr> </thead> <tbody> <tr><td>1</td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td></tr> </tbody> </table>				Cover	Bolt 1	Bolt 2	Bolt 3	1				2				3				4				5				6				7			
Cover	Bolt 1	Bolt 2	Bolt 3																																						
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7																																									
<ol style="list-style-type: none"> Notify IVA crew when EV crew clear of Cupola shutters 																																									

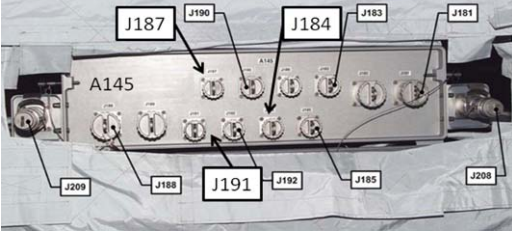
EVA 3 NODE 3 OUTFITTING (01:20)/CUPOLA LAUNCH LOCK RELEASE (01:00) (Cont)

IV	EV1 (Be)	EV2 (Pk)
<ul style="list-style-type: none"> <input type="checkbox"/> OIH Bag (EV1) <ul style="list-style-type: none"> <input type="checkbox"/> RET (eq-eq) (outside) <input type="checkbox"/> OIH Adj Tether <input type="checkbox"/> Adj Equip Tether (2) (clove hitch) <input type="checkbox"/> RET (eq-eq) <ul style="list-style-type: none"> <input type="checkbox"/> Bail Lever Drive <input type="checkbox"/> Adj Equip Tether (outside) 	<p><u>OUTFITTING CLEANUP</u> (00:10)</p> <ol style="list-style-type: none"> 13. Perform OIH Bag Inventory 14. Translate to NOD3 HR 0625 (fwd nadir) 15. Attach OIH bag to MLI Bag 16. Retrieve EVA Camera from OIH Bag <p><u>NOD3 NH3 JUMPER/MLI CLOSEOUT</u> (00:10)</p> <ol style="list-style-type: none"> 17. Translate to NOD3 nadir 18.  Take pictures of NH3 Jumper/MLI configuration 19. Translate to NOD3 HR 0625 (fwd/nadir) 20. Perform Glove Inspection 	<p><u>APFR RELOCATE</u> (00:20)</p> <ol style="list-style-type: none"> 2. Retrieve EVA Camera and Adj Equip Tether from NOD3 HR 0646 3. Translate to LAB WIF 4 (port/nadir side) via aft route and nadir of A/L 4. Retrieve APFR, stow on BRT 5. Translate to STBD A/L toolbox 6. Install APFR [<u>L,RR,F,12</u>] (WIF Zenith, bootplate outboard) <ul style="list-style-type: none"> <input type="checkbox"/> Black on Black <input type="checkbox"/> Pull test 7. Position Ingress aid against boot plate

EVA 3 VSC VIDEO CABLE ROUTING (01:00)/(01:20)

IV	EV1 (Be)	EV2 (Pk)
<p>1. Verify Russian inhibits complete</p> 		<p>VSC VIDEO CABLE SETUP (00:20)</p> <ol style="list-style-type: none"> 1. Translate to A/L HR 0559 (aft of hatch) 2. BRT to VSC Bag 3. Translate to NOD3 HR 0678 (zenith/stbd) via aft route 4. Stow VSC Bag on NOD3 HR 0678 5. Perform Glove Inspection 6. Open VSC Bag 7. Release S0 bundle (Wire Tie #2)
	<p>S0 SIDE VSC VIDEO CABLE ROUTE (00:30)</p> <ol style="list-style-type: none"> 1. Retrieve Wire Tie Caddy 2. Pre-install Wire ties, as required 3. Receive S0 bundle from EV2 4. Attach MWS EE to S0 bundle 5. Route VSC Video Cable to following handrails <ul style="list-style-type: none"> <input type="checkbox"/> NOD1 HR 0139 (midpoint) <input type="checkbox"/> LAB HR 0222 <input type="checkbox"/> LAB strut HR 02 (nadir) <input type="checkbox"/> LAB strut HR 01 (zenith) <input type="checkbox"/> S0 HR 3496 <input type="checkbox"/> S0 HR 3489 <input type="checkbox"/> S0 HR 3485 <input type="checkbox"/> S0 HR 3482 <input type="checkbox"/> S0 HR 3462 	<p>FGB SIDE VSC VIDEO CABLE ROUTE (00:45)</p> <ol style="list-style-type: none"> 8. Retrieve Wire Tie Caddy
		<ol style="list-style-type: none"> 9. Transfer S0 bundle to EV1 10. Attach MWS EE to FGB bundle 11. Release bag RET from cable 12. Route VSC Video Cable to following handrails (follow Ch 2/3 Avionics Cable) <ul style="list-style-type: none"> <input type="checkbox"/> NOD1 HR 0129 <ul style="list-style-type: none"> <input type="checkbox"/> NOD1 HR 0126 (only if can reach) <input type="checkbox"/> NOD1 HR 0124 (only if can reach) <input type="checkbox"/> NOD1 HR 0121 <input type="checkbox"/> NOD1 HR 0104 <input type="checkbox"/> NOD1 HR 0103 <input type="checkbox"/> APAS cable (NOD1 endcone) <input type="checkbox"/> PMA1 HR 0006 13. Verify 10-ft bundle reaches PMA1 HR 0008 (aft standoff) 14. Restrain remaining bundle <ul style="list-style-type: none"> <input type="checkbox"/> PMA1 HR 0006

EVA 3 VSC VIDEO CABLE ROUTING (01:00)/(01:20) (Cont)

IV	EV1 (Be)	EV2 (Pk)
	<p><u>S0 SIDE VSC VIDEO CABLE MATE</u> (00:15)</p> <ol style="list-style-type: none"> 6. Remove S0 panel A145 dust caps (3); stow in small trash bag <ul style="list-style-type: none"> <input type="checkbox"/> J191 <input type="checkbox"/> J184 <input type="checkbox"/> J187 7. Remove S0 side VSC Video Cable Dust Caps (3) (wire-tied together); stow on Adj Equip Tether <ul style="list-style-type: none"> <input type="checkbox"/> P191 <input type="checkbox"/> P184 <input type="checkbox"/> P187 8. Mate VSC Video connectors to S0 panel A145 <ul style="list-style-type: none"> <input type="checkbox"/> P191 → ← J191 <input type="checkbox"/> P184 → ← J184 <input type="checkbox"/> P187 → ← J187 9. Install connector booties 	
<ul style="list-style-type: none"> <input type="checkbox"/> VSC Bag (Med ORU Bag) <ul style="list-style-type: none"> <input type="checkbox"/> Adj Equip Tethers (2) (outside) <input type="checkbox"/> Adj Equip Tethers (clove hitch inside) <ul style="list-style-type: none"> <input type="checkbox"/> VSC Video Cable Dust Caps (3) <input type="checkbox"/> RET (eq-eq) <ul style="list-style-type: none"> <input type="checkbox"/> EVA Camera <input type="checkbox"/> RET (eq-eq) <ul style="list-style-type: none"> <input type="checkbox"/> Wire Tie Caddy (9, __ left) <input type="checkbox"/> RET (eq-eq) <ul style="list-style-type: none"> <input type="checkbox"/> Wire Tie Caddy (9, __ left) 	<p><u>VSC VIDEO CABLE CLEANUP</u> (00:15)</p> <ol style="list-style-type: none"> 10. Translate to VSC Bag 11. Stow VSC Cable dust caps and Wire Tie Caddy in VSC Bag; report Wire Tie Count 12. Translate to MLI/OIH Bag (HR 0625 (fwd nadir)) 13. BRT to MLI/OIH Bag 14. Translate to A/L via fwd route 	<p><u>VSC VIDEO CABLE CLEANUP</u> (00:15)</p> <ol style="list-style-type: none"> 15. Translate to VSC Bag 16. Stow Wire Tie Caddy on VSC Bag; report Wire Tie Count 17. Perform VSC Bag Inventory 18. Stow VSC Bag on BRT 19. Translate to A/L via aft route

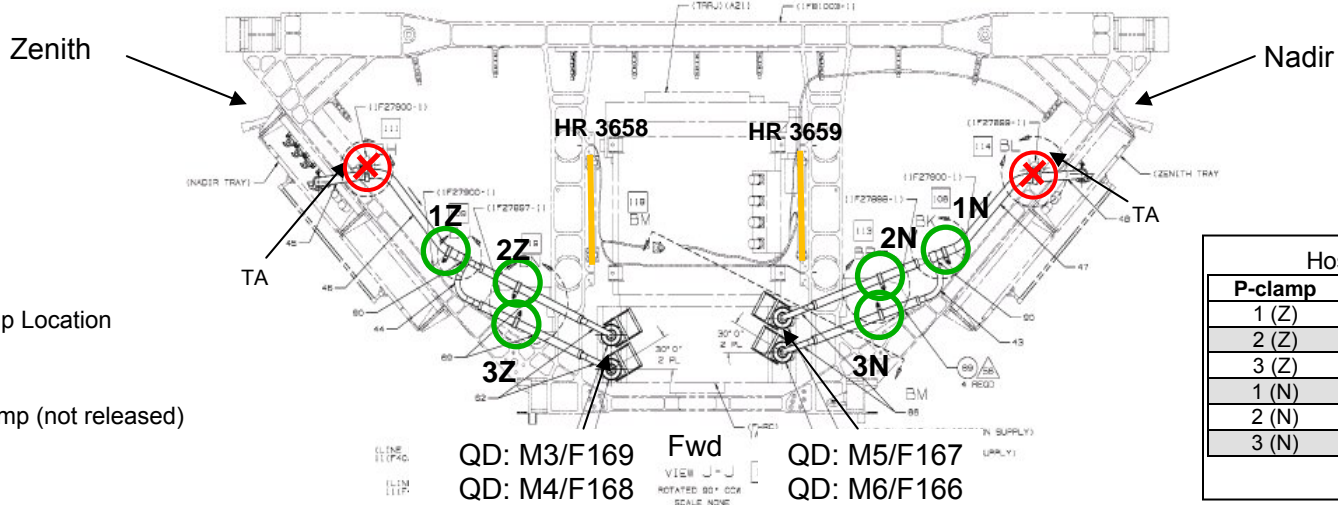
EVA 3 GET-AHEAD FHRC P-CLAMP RELEASE/NODE 2 ZENITH CBCS FLAP (01:00)

IV	EV1 (Be)	EV2 (Pk)																																
	<p>NOD2 ZENITH CBCS FLAP CLOSURE (00:20)</p> <ol style="list-style-type: none"> 1. Stow MLI/OIH Bag on A/L HR 0555 (fwd of hatch) 2. Retrieve spare 85-ft Safety Tether from outside of P-Clamp Crewlock Bag (A/L HR 0559) 3. Perform Glove Inspection 4. Translate to NOD2 Zenith CBCS flap via stbd zenith route 5. Release mating Velcro and snap 6. Close CBCS flap, secure with mating Velcro and snap 7. Close mating Velcro flap 8. ✓Velcro secure 																																	
<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="4">Hose Box</th> </tr> <tr> <th>✓</th> <th>P-Clamp</th> <th>Tool</th> <th>Socket</th> </tr> </thead> <tbody> <tr> <td></td> <td>1 (Z)</td> <td>PGT</td> <td>6-in ext</td> </tr> <tr> <td></td> <td>2 (Z)</td> <td>PGT</td> <td>6-in ext</td> </tr> <tr> <td></td> <td>3 (Z)</td> <td>Ratchet</td> <td>2-in ext</td> </tr> <tr> <td></td> <td>1 (N)</td> <td>PGT</td> <td>6-in ext</td> </tr> <tr> <td></td> <td>2 (N)</td> <td>PGT</td> <td>6-in ext</td> </tr> <tr> <td></td> <td>3 (N)</td> <td>Ratchet</td> <td>2-in ext</td> </tr> </tbody> </table>	Hose Box				✓	P-Clamp	Tool	Socket		1 (Z)	PGT	6-in ext		2 (Z)	PGT	6-in ext		3 (Z)	Ratchet	2-in ext		1 (N)	PGT	6-in ext		2 (N)	PGT	6-in ext		3 (N)	Ratchet	2-in ext	<p>FHRC HOSE BOX P-CLAMP RELEASE (OUTBD) (00:40)</p> <ol style="list-style-type: none"> 9. Translate to P1 FHRC Hose Box 10. Perform tether swap at S0 HR 3416 11. ✓Spare 85-ft Safety Tether <ul style="list-style-type: none"> <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel unlocked 12. ✓Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Lg hook closed and locked on ERCM 13. Stow A/L Safety Tether on HR ____ 	<p>FHRC STINGER P-CLAMP RELEASE (INBD) (01:00)</p> <ol style="list-style-type: none"> 1. Stow VSC Bag on A/L HR 0559 (aft of hatch) 2. Retrieve P-Clamp Crewlock Bag (w/spare safety tether); stow on BRT 3. Perform Glove Inspection 4. Translate to P1 FHRC Stinger 5. Perform tether swap at S0 HR 3417 6. ✓Spare 85-ft Safety Tether <ul style="list-style-type: none"> <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel unlocked 7. ✓Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Lg hook closed and locked on ERCM 8. Stow A/L Safety Tether on HR ____ 9. Translate to P1 Bay 12 (face 1) 10. Temp stow P-Clamp Crewlock Bag on Nadir FHRC HR
Hose Box																																		
✓	P-Clamp	Tool	Socket																															
	1 (Z)	PGT	6-in ext																															
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<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="4">Stinger</th> </tr> <tr> <th>✓</th> <th>P-Clamp</th> <th>Tool</th> <th>Socket</th> </tr> </thead> <tbody> <tr> <td></td> <td>1</td> <td>PGT</td> <td>6 or 12-in ext</td> </tr> <tr> <td></td> <td>2</td> <td>PGT</td> <td>6 or 12-in ext</td> </tr> <tr> <td></td> <td>3</td> <td>PGT</td> <td>6 or 12-in ext</td> </tr> <tr> <td></td> <td>4</td> <td>PGT</td> <td>6 or 12-in ext</td> </tr> <tr> <td></td> <td>5</td> <td>PGT</td> <td>12-in ext</td> </tr> <tr> <td></td> <td>6</td> <td>PGT</td> <td>6 or 12-in ext</td> </tr> </tbody> </table>	Stinger				✓	P-Clamp	Tool	Socket		1	PGT	6 or 12-in ext		2	PGT	6 or 12-in ext		3	PGT	6 or 12-in ext		4	PGT	6 or 12-in ext		5	PGT	12-in ext		6	PGT	6 or 12-in ext	<ol style="list-style-type: none"> 14. Retrieve Ratchet w/2-in ext from P-Clamp Crewlock Bag 15. Translate to P1 Bay 14 (face 1) 16. Release Hose Box P-clamps (6), start at end furthest from QD <p>[A7, CCW2, 30.5], ~7-12.5 turns</p> <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in Socket 6-in ext <input type="checkbox"/> (9.2 ft-lb, 30 RPM) <p>Ratchet: CCW – 7/16-2-in ext</p> 17. <input type="checkbox"/> WVS Survey of P-clamps 18. Check SAFER handles 19. Stow ratchet w/2-in ext in P-Clamp Crewlock Bag 20. Perform P-Clamp Crewlock Bag inventory 21. Stow P-Clamp Crewlock Bag on BRT 	<ol style="list-style-type: none"> 11. Stow 6-in ext from PGT on MWS RET w/PIP pin 12. Retrieve 12-in ext from P-Clamp Crewlock Bag; install on PGT 13. Release Stinger P-clamps (6), any order <p>[A7, CCW2, 30.5], ~7-12.5 turns</p> <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in Socket 12-in ext <input type="checkbox"/> (9.2 ft-lb, 30 RPM) 14. <input type="checkbox"/> WVS Survey of P-clamps 15. Check SAFER handles 16. Stow 12-in ext in P-Clamp Crewlock Bag 17. Install 6-in ext on PGT
Stinger																																		
✓	P-Clamp	Tool	Socket																															
	1	PGT	6 or 12-in ext																															
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	6	PGT	6 or 12-in ext																															

EVA 3 GET-AHEAD FHRC P-CLAMP RELEASE/NODE 2 ZENITH CBCS FLAP (01:00) (Cont)

FHRC P-clamps – Hose Box (Outboard)

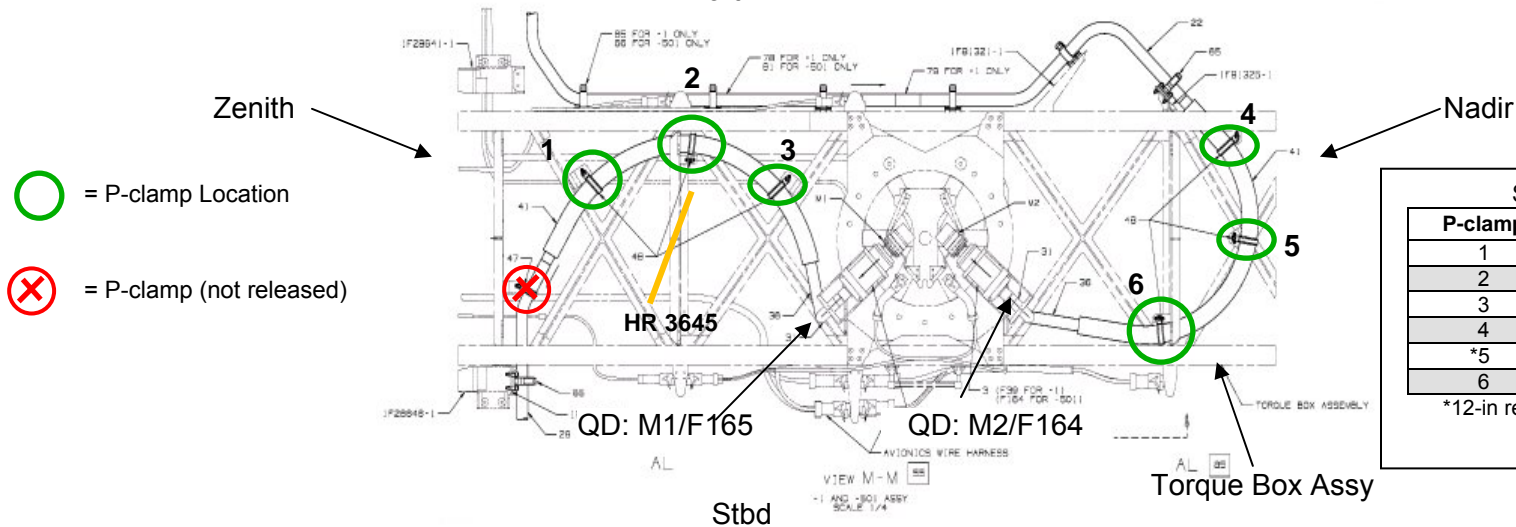
Aft



Hose Box P1 Bay 14		
P-clamp	Tool	Socket
1 (Z)	PGT	6-in ext
2 (Z)	PGT	6-in ext
3 (Z)	Ratchet	2-in ext
1 (N)	PGT	6-in ext
2 (N)	PGT	6-in ext
3 (N)	Ratchet	2-in ext

FHRC P-clamps – Stinger (Inboard)

Port



Stinger P1 Bay 12		
P-clamp	Tool	Socket
1	PGT	6 or 12-in ext
2	PGT	6 or 12-in ext
3	PGT	6 or 12-in ext
4	PGT	6 or 12-in ext
*5	PGT	12-in ext
6	PGT	6 or 12-in ext

*12-in required for this bolt

EVA 3 CLEANUP/INGRESS (00:25) (Cont)

IV	EV1 (Be)	EV2 (Pk)
	<p><u>CLEANUP</u> (00:10)</p> <ol style="list-style-type: none"> 1. Perform Tool Inventory 2. If Get-Ahead P-clamp task performed: <ol style="list-style-type: none"> a. Perform tether swap to A/L tether at S0 HR 3416 b. √A/L Safety Tether <ul style="list-style-type: none"> <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel unlocked c. √Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Lg hook closed and locked on ERCM d. Stow spare 85-ft Safety Tether on MWS 3. Translate to A/L 	<p><u>CLEANUP</u> (00:10)</p> <ol style="list-style-type: none"> 1. Perform Tool Inventory 2. If Get-Ahead P-clamp task performed: <ol style="list-style-type: none"> a. Perform tether swap to A/L tether at S0 HR 3417 b. √A/L Safety Tether <ul style="list-style-type: none"> <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel unlocked c. √Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Lg hook closed and locked on ERCM d. Stow spare 85-ft Safety Tether on MWS 3. Translate to A/L
	<p><u>INGRESS</u> (00:15)</p> <ol style="list-style-type: none"> 4. Open thermal cover 5. Ingress A/L 6. Attach Waist Tether to fwd UIA D-ring 7. √Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Hook closed and locked 8. Stow P-Clamp Crewlock Bag and spare 85-ft Safety Tether in A/L 	<p><u>INGRESS</u> (00:15)</p>
	<ol style="list-style-type: none"> 9. Receive MLI/OIH Bag from EV2; stow in A/L 	<ol style="list-style-type: none"> 4. Retrieve MLI/OIH Bag from A/L HR 0555 (fwd hatch); transfer to EV1
	<ol style="list-style-type: none"> 10. Receive VSC Bag from EV2; stow in A/L 11. Give EV2 GO to relocate EV1 Safety Tether 	<ol style="list-style-type: none"> 5. Retrieve VSC Bag from A/L HR 0559 (aft hatch); transfer to EV1 6. On EV1 GO relocate EV1 Safety Tether anchor point from fwd A/L D-ring to A/L D-ring Ext 7. Attach Waist Tether to A/L D-ring Ext 8. √Waist Tether (R) <ul style="list-style-type: none"> <input type="checkbox"/> Hook closed and locked 9. Release EV2 Safety Tether from aft A/L D-ring; attach to MWS
	<ol style="list-style-type: none"> 12. Give EV2 GO to ingress 	<ol style="list-style-type: none"> 10. On EV1 GO, ingress A/L 11. Close thermal cover (Velcro tab)
<ol style="list-style-type: none"> 1. Perform WVS PWR DWN (PHOTO/TV, <u>WVS Cue Card</u>) 	<ol style="list-style-type: none"> 13. Remove SCU from stowage pouch 14. Remove DCM cover 15. Connect SCU to DCM, √locked 	<ol style="list-style-type: none"> 12. Remove SCU from stowage pouch 13. Remove DCM cover 14. Connect SCU to DCM, √locked

EVA 3 CLEANUP/INGRESS (00:25) (Cont)

IV	EV1 (Be)	EV2 (Pk)
	<p style="text-align: center;"><u>NOTE</u> A TCV setting 8 – Max C minimizes time for SCU cooling</p>	
	<p>16. Water – OFF (fwd); expect 'H2O IS OFF' msg</p>	<p>15. Water – OFF (fwd); expect 'H2O IS OFF' msg</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;"><u>CAUTION</u> Do not close hatch until EMU water off for 2 min</p> </div> <p>16. Verify no hardware blocking the hatch 17. EV Hatch Handle – verify position per hatch decal 18. EV Hatch – close and lock 19. Go to PRE-REPRESS (<u>DEPRESS/REPRESS</u> Cue Card)</p>

EVA 3 TASK DATA – OPEN LOOP B QDs

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:30
Two EV Crew	N/A	N/A

Tools:

EV1
N/A

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
M3 and M4	683-99525		M3, M4
QD booties	683-63447-2 (right) 683-63447-3 (left)		F#/M#

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
QD booties	0.2	10 x 16 x 0.1

EVA Connectors:

Harness	From	To	Clamps (#)	Conn Size	Function
M3/M4 Jumpers	LAB M3/M4	NOD3 M3/M4	None	1"	NOD3 Primary Cooling

Inhibits:

ORU/Task	Location	Inhibit
M3/M4 jumper mate	Prior to opening LAB QD	ETCS Loop B shutdown per 2.510 ETCS Loop B Pump Module Shutdown (SODF: TCS: Nominal: ETCS)

Notes:

1. Initial assessment shows it takes about 20 lb per line to move the jumper once pressurized

Timeline Considerations:

1. QDs may be opened in any order

EVA 3 TASK DATA – NODE 3 LTA CABLE DISCONNECT

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:15
Two EV Crew	N/A	N/A

Tools:

EV2
Wire Ties (integral to HRs and LTA cables)

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
P612 MLI Cap	3123ND920-401		
P612 Dust Cap	NZGL-PPC-N-21-R		

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
P612 MLI Cap	0.1323	5.9 x 3.0 x 1.6
P612 Dust Cap	0.454	3.2 x 1.9 x 1.9

EVA Connectors:

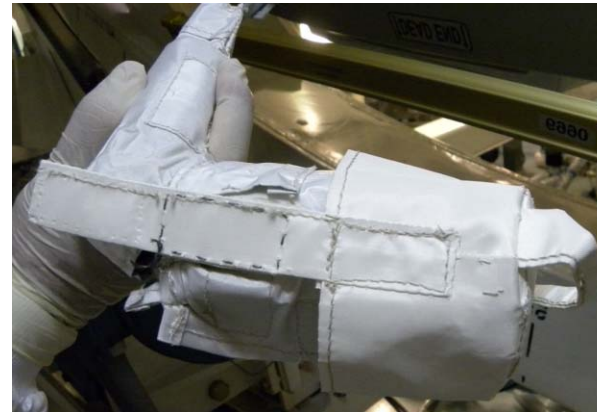
Harness	From	To	Clamps (#)	Conn Size	Function
P612	NODE 3	P1 Connector	0	21	NOD3 heater power
P1	Y-cable	P612	0	21	NOD3/Airlock heater power

Inhibits:

ORU/Task	Location	Inhibit
P612	Prior to demating P1 from NOD1 J612	612 Demate/mate – RPCM N1 – RS1-B – RPCs 1,2,15,16 RPC – Open and Close Command Inhibited

Notes:

- No FPP (floating connector) bootie is required for J602/P602 because P602 is built with a grounding cable within the MLI sheath



EVA 3 TASK DATA – PMA3 CABLE INSTALL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	01:00
Two EV Crew	N/A	N/A

Tools:

EV2
Wire Ties
PGT w/7/16 (wobble) Socket-6 ext

EVA Fasteners:

Fastener Name	Label	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
PMA3 Umbilical Launch Restraint Bolts	F2 F3 F4 F5	7/16	4	N/A	24.0	27.2	10.5-14	30
Handle bracket bolt	F6	7/16	1	N/A	24.0	166	18-19	30

EVA Connectors:

Harness	From	To	Clamps (#)	Conn Size	Function
PMA3	PMA3	NODE 3	6	601 = 17 602 = 21	PMA3 heater power

Notes:

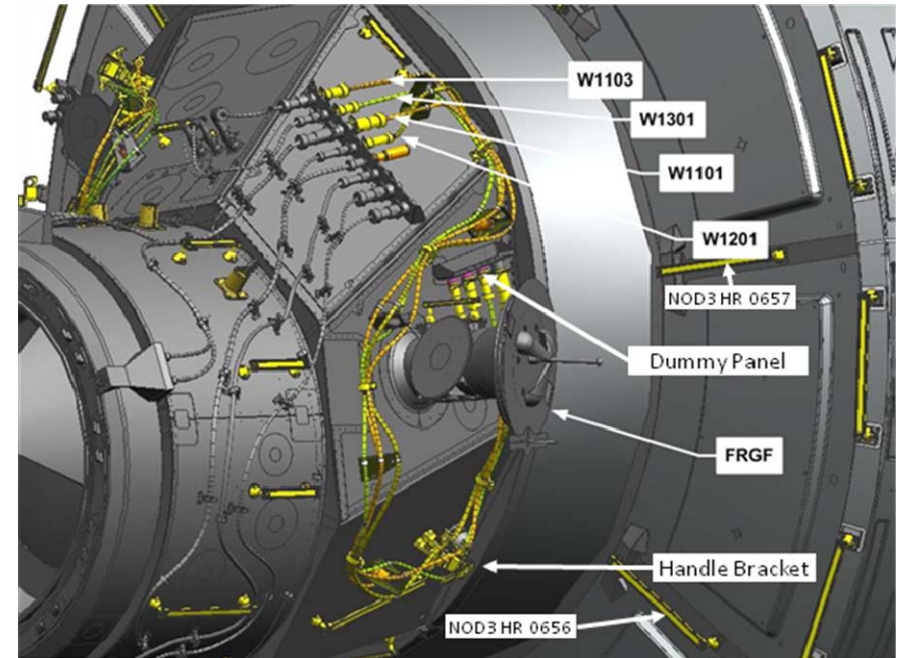
- J103 is data and J106 is power

Inhibits:

ORU/Task	Location	Inhibit
PMA3 Cable Install	Prior to cable disconnect from PMA3	Port TRRJ √DLA (1) – LOCKED (0 degrees)

Timeline Considerations:

- This task can be shortened if EV1 assists EV2:



EVA 3 TASK DATA – CUPOLA MLI REMOVAL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	02:00
Two EV Crew	N/A	01:10

Tools:

EV1
PGT w/7/16 (wobble) Socket-6 ext
Large ORU Bag

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
Cupola MLI	0000CN005-801		

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
Cupola MLI (A)	11	145 x 78 x 1
Cupola MLI (B)	11	145 x 78 x 1

EVA Fasteners:

Fastener Name	Label	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
MLI fasteners	1,2	7/16	2/flap	N/A	7.4	17.6	12	30

Inhibits:

ORU/Task	Location	Inhibit
Cupola Window Shutters	When crew < 10 ft from window	IV coordinate shutter opening/closing with EV crew, minimize time shutter is open

EVA 3 TASK DATA – CUPOLA LAUNCH LOCK RELEASE

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:40
Two EV Crew	N/A	00:30

Tools:

EV1
PGT w/7/16 (wobble) Socket-6 ext

EVA Fasteners:

Fastener Name	Label	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
Window shutter launch locks	1,2,3	7/16	21	3.8	5.2	7.89	12	30

EVA 3 TASK DATA – OI WIF INSTALL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:15
Two EV Crew	N/A	N/A

Tools:

EV1
N/A

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
OIWIF	SEG33106861-301		

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
OIWIF	1.15	5 x 5 x 3.8

EVA 3 TASK DATA – OIH INSTALL

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:45

Tools:

EV1
PGT w/7/16 (wobble) Socket-6 ext

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
OIH (24")	SEG33106351-301		631
OIH (12")	SEG33106351-305		612, 624, 638, 639, 644

Mass & Dimensions:

ORU	Mass (lb)	Dimensions (in)
OIH (24")	1.95	2.4 x 2 x 31.5
OIH (12")	1.6	17 x 3.2 x 2.2

EVA Fasteners:

Fastener Name	Label	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
OIH Bolts	N/A	7/16	2/OIH	1.5-5.5	5.5	21.3	8-9.5	30

Notes:

1. Safety tethering to on-orbit installed OIHs, specifically those installed with a PGT setting of 'A2,' is acceptable

EVA 3 TASK DATA – VSC VIDEO CABLE ROUTING

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	N/A
Two EV Crew	N/A	01:10

Tools:

EV2
Wire Ties

ORU Identification:

ORU	Part Number	Serial Number	EVA Label
S0 Caps	NZGL- RPC-N-15-0-M5		
VSC Cable	1F75196		

Mass & Dimensions:

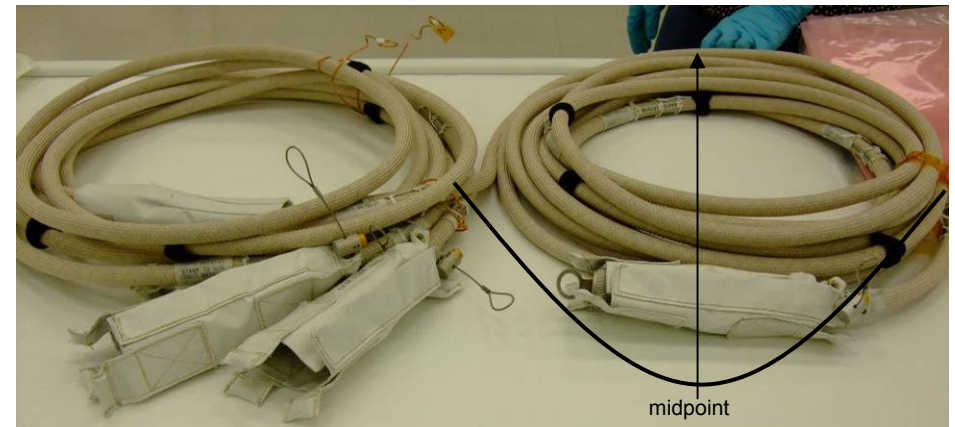
ORU	Mass (lb)	Dimensions (in)
S0 Caps	0.25	1.95 x 1.4 x 1.4
VSC Cable	12.0	851 x 3.0 x 3.0

Notes:

1. Wire tie #1 (small) holds S0 connectors (3) together
2. Wire tie #2 (long) holds S0 bundle together, every twist has 2 loops
3. Wire tie #3 (long) holds FGB bundle together, every twist has 2 loops
4. Wire tie #2 also is twisted 1 more time around FGB bundle to hold both bundles to get; once this first twist is release, there should be about 2 ft of slack between the bundles
5. Wire ties #2 and #3 need to be replaced so they are anchored near the ends of the connectors, so that untwisting can be done as the cables are routed away from the midpoint

Timeline Considerations:

1. This task can be shortened if EV1 assists EV2



EVA 3 TASK DATA – NOD2 ZENITH CBCS FLAP CLOSURE

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	00:05

Notes:

1. Zenith port used for PMA3 till relocation prior to EVA 3

EVA 3 TASK DATA – FHRC P-CLAMPS

Estimated Task Duration:

	With RMS	Without RMS
One EV Crew	N/A	N/A
Two EV Crew	N/A	01:00

Tools:

EV1	EV2
PGT w/7/16 (wobble) Socket-6 ext	PGT w/7/16 Socket-12 in ext
Ratchet wrench w/7/16-2 in ext	

EVA Fasteners:

Fastener Name	Label	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
Hosebox P-Clamp bolts	1,2,3	7/16	6	N/A	6.0	12.6	6-12.5	30
Stinger P-Clamp bolts	Arrow	7/16	6	N/A	6.0	12.6	7-12.5	30

Inhibits:

ORU/Task	Location	Inhibit
P1 P-Clamps	Prior to translation to P1	Port TRRJ √DLA (1) – LOCKED (0 degrees)

EVA 3 TASK DATA – FHRC P-CLAMPS (Cont)



Figure 1.- Hose box P-clamps have labels with bolt numbers.

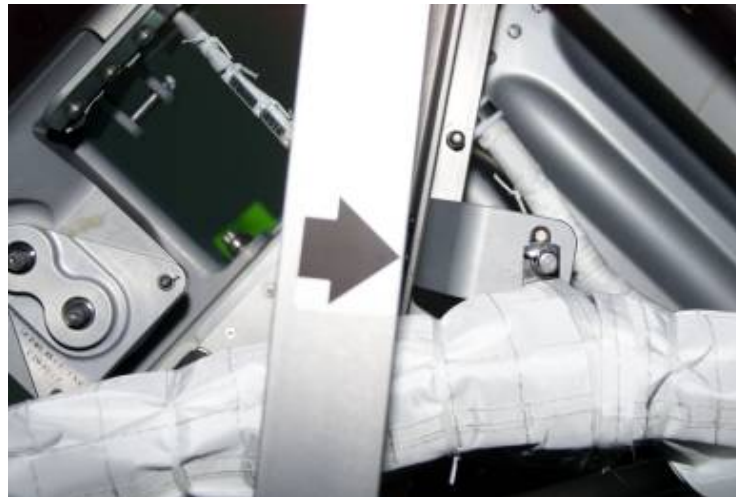


Figure 2.- Torque box P-clamps have arrow labels for bolts.

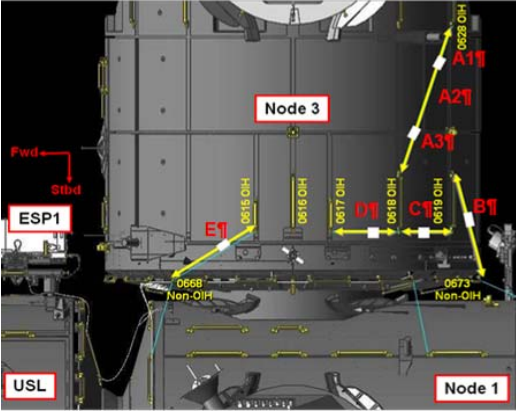
STS-130/20A EVA GET-AHEADS

Task (in priority order)	EV – Time (hr:mn) Required	EVA Applicable
NH3 Jumper Bag Relocate	1 EV – 00:20	1
NH3 MLI Layout	2 EV – 00:20 (gap spanners = 00:10)	1
NODE 3 Gap Spanner Cleanup	1 EV – 00:20	1
OI WIF and Secondary OIH Install	1 EV – 01:30	2
VSC Cable Wire-tie Install (ref <u>EVA 3</u> , FS 7-103)	1 EV – 00:30	2
P1 RBVM Thermal Bootie F151 Closure	1 EV – 00:45	1, 2, 3
TS Relocate/APFR #4 Heat Shield Removal	1 EV – 00:45	1, 2
APFR #4 w/o Heat Shield Install	1 EV – 00:15	2, 3
S1 FHRC P-Clamp Release	1 EV – 00:45	3
ESP-2 to LAB Gap Spanner Install	1 EV – 00:10	3

GET-AHEAD – NH3 MLI LAYOUT (00:20)

IV					EV1 (Be)	EV2 (Pk)
√	G-S	1st HR	2nd HR	SN	<p><u>NH3 MLI LAYOUT</u> (00:20)</p> <ol style="list-style-type: none"> Translate to receive Gap Spanners Install Gap Spanners (ϵ, δ, γ) to 1st HR per table <hr/> <ol style="list-style-type: none"> Receive NOD3 side NH3 MLI Attach NOD3 side NH3 MLI to NOD3 HR 0669 (fwd) and 0670 (aft), using Adj Equip Tethers (2) (D and E) <hr/> <ol style="list-style-type: none"> Route Gap Spanner γ from NOD1 HR 0112 (port) → 0142 (stbd) 	<p><u>NH3 MLI LAYOUT</u> (00:20)</p> <ol style="list-style-type: none"> Open NH3 MLI Bag, secure lid Install Gap Spanners (β, α) to 1st HR per table Release Adj Equip Tether restraining 1st half MLI in Bag <hr/> <ol style="list-style-type: none"> Deploy NOD3 side NH3 MLI to EV1 Release Adj Equip Tether restraining 2nd half MLI in Bag, tend MLI till EV1 has NOD3 end attached and MLI configured on NOD1 <hr/> <ol style="list-style-type: none"> Attach Lab side NH3 MLI to LAB HR 0218 (stbd) and 0219 (port), using Adj Equip Tethers (2) (A and B) Route Gap Spanner α from NOD2 HR 0219 (port) → 0232 (aft)
	α	0219 (port)	0232 (aft)	-305		
	β	0220 (port)	0220 (stbd)	-303		
	γ	0112 (port)	0142 (stbd)	-303		
	δ	0128 (fwd)	0111 (fwd)	-303		
	ϵ	0111 (aft)	0110 (fwd)	-301		

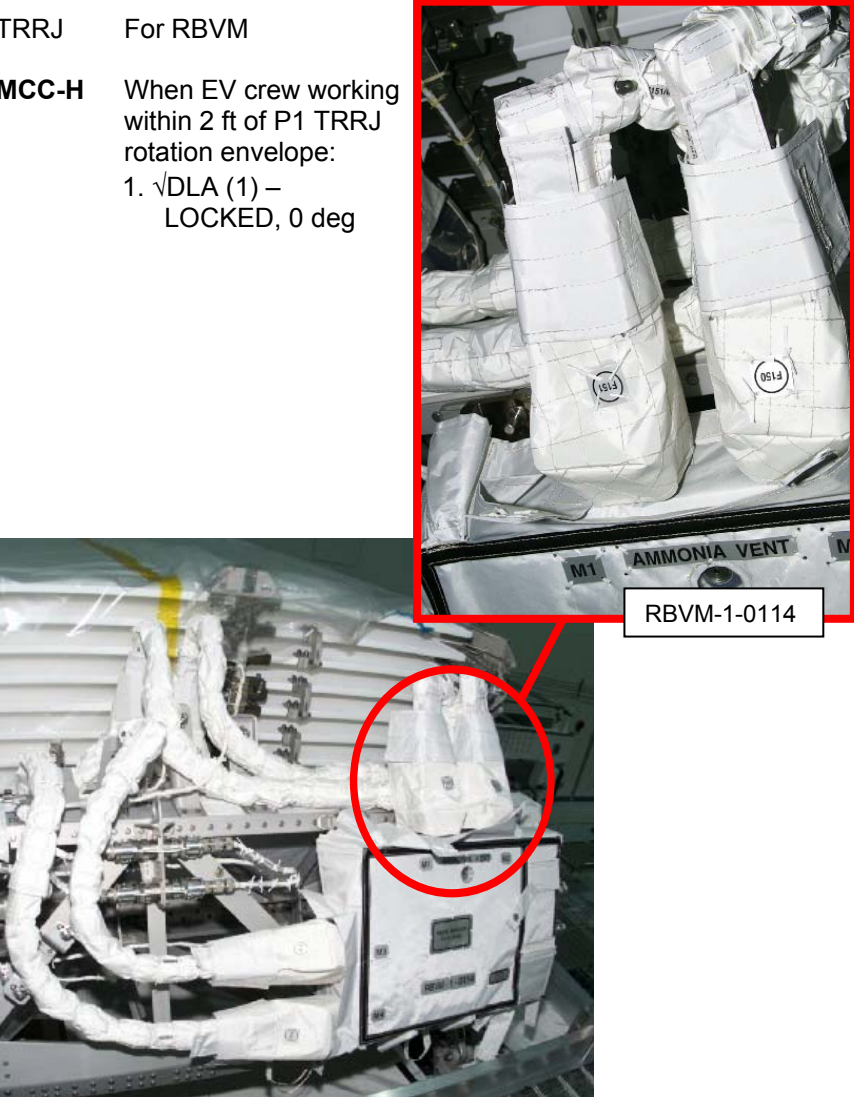
GET-AHEAD – NH3 MLI LAYOUT (00:20) (Cont)

IV/SSRMS	EV1				
	<p><u>CLEAN UP NOD3 GAP SPANNERS</u> (00:15)</p>				
<p>1. Remove tape on gap spanner per table below; stow in Small Trash Bag</p>					
<p><u>Tape #</u></p>	<p><u>HR (standoff)</u></p>		<p><u>HR (standoff)</u></p>	<p>√ <u>Removed</u></p>	<p>√ <u>Turn Test</u></p>
<p>A1 A2 A3</p>	<p>NOD3 0618 (port)</p>		<p>NOD3 0628 (stbd)</p>	<p>(3 pieces)</p>	
<p>B</p>	<p>NOD3 0673 (zenith)</p>		<p>NOD3 0619 (port)</p>		
<p>C</p>	<p>NOD3 0619 (stbd)</p>		<p>NOD3 0618 (stbd)</p>		
<p>D</p>	<p>NOD3 0618 (stbd)</p>		<p>NOD3 0617 (stbd)</p>		
<p>E</p>	<p>NOD3 0615 (stbd)</p>	<p>→</p>	<p>NOD3 0668 (fwd)</p>		


GET-AHEAD – OI WIF AND SECONDARY OIH INSTALL (01:30)

IV/SSRMS						EV1	
<p>Block G – OI WIF Install</p> <ol style="list-style-type: none"> Retrieve OI WIF from Crewlock Bag Slide OI WIF onto dovetail fitting √Both spring plungers are down Perform pull test 						<p>EV1</p> <p><u>NODE 3 OI WIF INSTALL</u> (00:45)</p> <ol style="list-style-type: none"> Translate to A/L Open thermal cover and retrieve OIH Get-ahead Bag; stow on BRT Close thermal cover Translate to NOD3 HR 0600 (stbd endcone fwd/zenith) via fwd route Perform Glove Inspection Install OI WIFs in the following order per Block G – OI WIF Install: <ul style="list-style-type: none"> <input type="checkbox"/> 01 <input type="checkbox"/> 02 Install OIH 0612 per Block D – OIH Install: <ul style="list-style-type: none"> <input type="checkbox"/> 0612 Install OI WIF per Block G – OI WIF Install: <ul style="list-style-type: none"> <input type="checkbox"/> 06 	
√	OIH	Bolt 1		Bolt 2			
		Torque (ft-lb)	Turns	Torque (ft-lb)	Turns		
	0612						
	0638						
	0631						
	0624						
	0639						
	0644						
<p>Block D – OIH Install</p> <ol style="list-style-type: none"> Install OIH (soft dock armed) √OIH label # and orientation matches mount # √Fully seated Drive OIH bolts (2) [A2,CW2,30.5] ~8 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket- 6-in ext <input type="checkbox"/> (3.8 ft-lb, 30 RPM) √Fully seated 						<p><u>NODE 3 OIH INSTALL</u> (00:45)</p> <ol style="list-style-type: none"> Translate to NOD3 port endcone Retrieve and Install OIHs in the following order per Block D – OIH Install: <ul style="list-style-type: none"> <input type="checkbox"/> 0638 <input type="checkbox"/> 0631 <input type="checkbox"/> 0624 Translate to port/fwd trunnion (cover #4) Install OIH 0639 per Block D – OIH Install: <ul style="list-style-type: none"> <input type="checkbox"/> 0639 Translate to port/aft trunnion (cover #3) Install OIH 0644 per Block D – OIH Install: <ul style="list-style-type: none"> <input type="checkbox"/> 0644 	

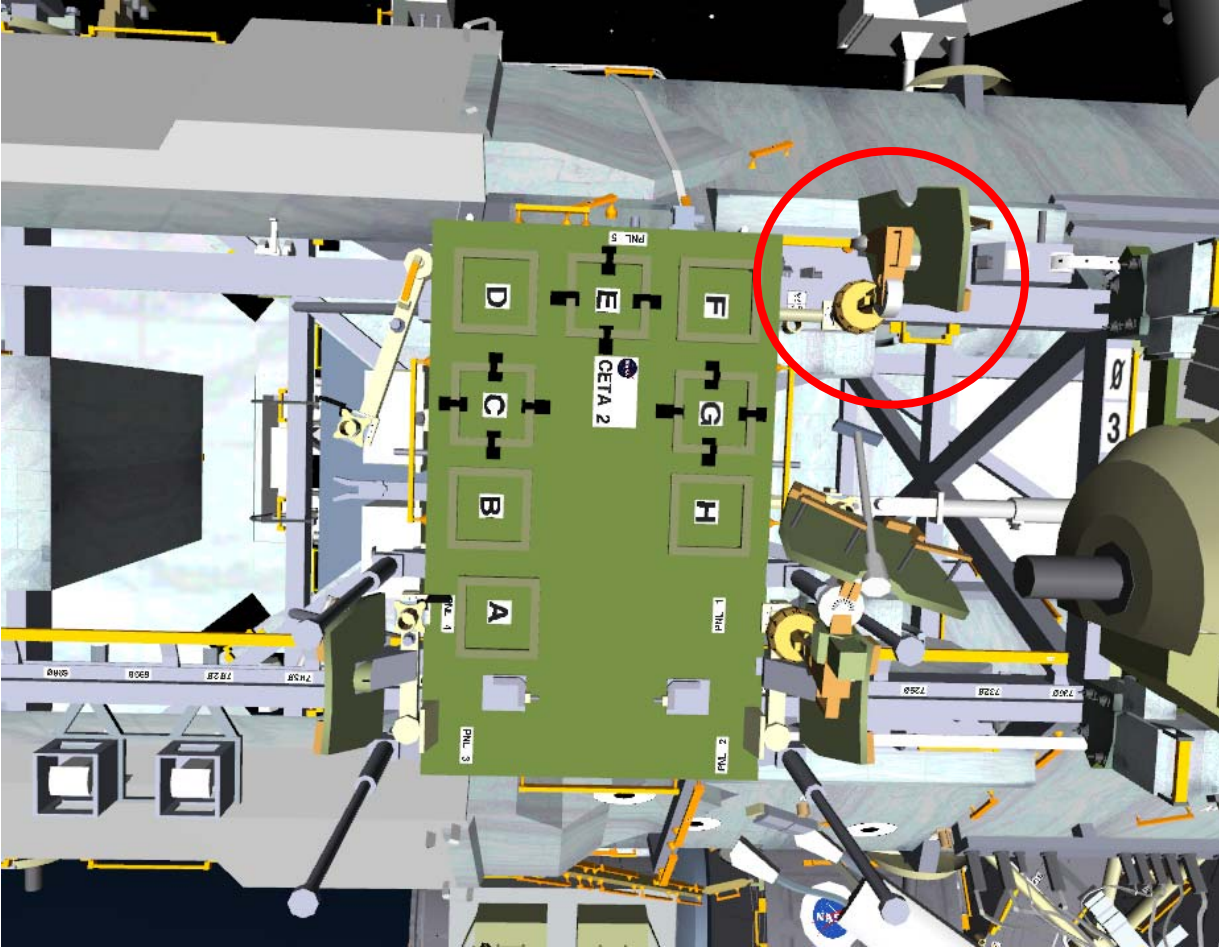
GET-AHEAD – P1 RBVM THERMAL BOOTIE CLOSURE (00:45)

IV/SSRMS	EV1
<p>TRRJ For RBVM</p> <p>MCC-H When EV crew working within 2 ft of P1 TRRJ rotation envelope:</p> <ol style="list-style-type: none"> √DLA (1) – LOCKED, 0 deg 	<p style="text-align: center;"><u>NOTE</u></p> <p>One Wire Tie required for task</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;"><u>CAUTION</u></p> <p>Avoid inadvertent contact with ETCS radiator flexhoses and panels [S1,P1]</p> <p>Avoid kicking S1/P1 radiator beam. If any of these occur, wait 2 to 5 min to allow structural response to dissipate</p> </div> <ol style="list-style-type: none"> Retrieve spare 85-ft safety tether Translate port on S0; perform tether swap at S0 HR 3530 (nadir of Bay 04 marker) √Spare Safety Tether <ul style="list-style-type: none"> <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel unlocked √Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Lg hook closed and locked on ERCM Stow A/L Safety Tether on HR ____ Translate to P1 FHRC (Bay 14 marker) Translate to zenith-most translation path at the top of P1 Translate to port-most RBVM, labeled RBVM-1-0114 Secure bootie F-151 (mated to M1) in place over QD, use wire ties as required Perform tether swap to A/L tether at S0 HR 3530 √A/L Safety Tether <ul style="list-style-type: none"> <input type="checkbox"/> Anchor hook closed and locked <input type="checkbox"/> Reel unlocked √Waist Tether <ul style="list-style-type: none"> <input type="checkbox"/> Lg hook closed and locked on ERCM Stow spare Safety Tether on MWS

GET-AHEAD – TS RELOCATE/APFR #4 HEAT SHIELD REMOVAL (00:45)

IV/SSRMS	EV1
 <p>Tool Stanchion in A/L WIF 09</p>	<p><u>RELOCATE TOOL STANCHION</u> (00:25) – EVA 1, 2</p> <ol style="list-style-type: none">1. Translate to Z1 WIF 102. RET, retrieve Tool Stanchion; stow on BRT3. Translate to A/L WIF 09 (between zenith gas tanks)4. Install Tool Stanchion on APFR with low-profile settings close to structure: Tool Stanchion aft of APFR (probe points ISS fwd) Tool Head facing stbd/port <input type="checkbox"/> Pull test <p><u>RETRIEVE APFR</u> (00:20) – EVA 1 OR 2 ONLY</p> <ol style="list-style-type: none">5. Translate to Z1 WIF 106. RET, retrieve APFR; stow on BRT7. Translate to A/L8. Stow APFR in A/L; configure low profile for ingress

GET-AHEAD – APFR #4 W/O HEAT SHIELD INSTALL (00:15)

IV/SSRMS	EV1
	<p>INSTALL APFR (00:15)</p> <ol style="list-style-type: none">1. Translate A/L2. Retrieve APFR, stow on BRT3. Translate to stbd CETA WIF 44. Install APFR [3,YY,B,6]<ul style="list-style-type: none"><input type="checkbox"/> Black on Black<input type="checkbox"/> Pull test

GET-AHEAD – S1 FHRC P-CLAMP RELEASE (00:55)

IV/SSRMS	EV1																																																								
<p>S1 FHRC P-clamps: Bay 11 Stinger (6) – diagram on next page Bay 13 Hose Box (4) – diagram on next page</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>TRRJ For S1 FHRC P-clamps: MCC-H While EV crew working within 2 ft of S1 TRRJ rotation envelope 1. √DLA (1) – LOCKED (locked at 0 deg for FHRC P-clamps)</p> </div> <p style="text-align: center;">Stinger</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>P-clamp</th> <th>Tool</th> <th>Socket</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/></td> <td>1</td> <td>PGT</td> <td>6- or 12-in ext</td> </tr> <tr> <td><input type="checkbox"/></td> <td>2</td> <td>PGT</td> <td>6- or 12-in ext</td> </tr> <tr> <td><input type="checkbox"/></td> <td>3</td> <td>PGT</td> <td>6- or 12-in ext</td> </tr> <tr> <td><input type="checkbox"/></td> <td>4</td> <td>PGT</td> <td>6- or 12-in ext</td> </tr> <tr> <td><input type="checkbox"/></td> <td>*5</td> <td>PGT</td> <td>12-in ext</td> </tr> <tr> <td><input type="checkbox"/></td> <td>6</td> <td>PGT</td> <td>6- or 12-in ext</td> </tr> </tbody> </table> <p>*12-in required for this bolt</p> <p style="text-align: center;">Hose Box</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>P-clamp</th> <th>Tool</th> <th>Socket</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/></td> <td>1 (N)</td> <td>PGT</td> <td>6-in ext</td> </tr> <tr> <td><input type="checkbox"/></td> <td>2 (N)</td> <td>PGT</td> <td>6-in ext</td> </tr> <tr> <td><input type="checkbox"/></td> <td>3 (N)</td> <td>Ratchet</td> <td>2-in ext</td> </tr> <tr> <td><input type="checkbox"/></td> <td>1 (Z)</td> <td>PGT</td> <td>6-in ext</td> </tr> <tr> <td>√</td> <td>2 (Z)</td> <td>PGT</td> <td>6-in ext</td> </tr> <tr> <td>√</td> <td>3 (Z)</td> <td>Ratchet</td> <td>2-in ext</td> </tr> </tbody> </table>		P-clamp	Tool	Socket	<input type="checkbox"/>	1	PGT	6- or 12-in ext	<input type="checkbox"/>	2	PGT	6- or 12-in ext	<input type="checkbox"/>	3	PGT	6- or 12-in ext	<input type="checkbox"/>	4	PGT	6- or 12-in ext	<input type="checkbox"/>	*5	PGT	12-in ext	<input type="checkbox"/>	6	PGT	6- or 12-in ext		P-clamp	Tool	Socket	<input type="checkbox"/>	1 (N)	PGT	6-in ext	<input type="checkbox"/>	2 (N)	PGT	6-in ext	<input type="checkbox"/>	3 (N)	Ratchet	2-in ext	<input type="checkbox"/>	1 (Z)	PGT	6-in ext	√	2 (Z)	PGT	6-in ext	√	3 (Z)	Ratchet	2-in ext	<p><u>RELEASE FHRC P-CLAMPS [Stinger (Inboard)] (00:30)</u></p> <ol style="list-style-type: none"> 1. Retrieve P-Clamp Crewlock Bag from Airlock; close thermal cover 2. Translate to S1 Bay 11 (face 1) 3. Temp stow P-Clamp Crewlock Bag on Nadir FHRC HR 4. Stow 6-in ext from PGT on MWS RET w/PIP pin 5. Retrieve 12-in ext from P-Clamp Crewlock Bag; install on PGT 6. Release P-clamps (6) [A7, CCW2, 30.5] ~7-12.5 turns, any order <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket- 12-in ext <input type="checkbox"/> (9.2 ft-lb, 30 RPM) 7. <input type="checkbox"/> WVS Survey of P-clamps 8. Check SAFER handles 9. Stow 7/16-12-in ext in P-Clamp Crewlock Bag 10. Install 6-in ext on PGT <p><u>RELEASE FHRC P-CLAMPS [Hose Box (Outboard)] (00:25)</u></p> <ol style="list-style-type: none"> 11. Retrieve ratchet w/2-in from P-Clamp Crewlock Bag 12. Translate to S1 Bay 13 (face 1) 13. Release P-clamps (4) [A7, CCW2, 30.5] ~7-12.5 turns, start at end furthest from QD <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket- 6-in ext <input type="checkbox"/> (9.2 ft-lb, 30 RPM) 14. <input type="checkbox"/> WVS Survey of P-clamps 15. Check SAFER handles 16. Stow ratchet w/2-in from P-Clamp Crewlock Bag 17. Perform tool inventory 18. Stow P-Clamp Crewlock Bag on BRT
	P-clamp	Tool	Socket																																																						
<input type="checkbox"/>	1	PGT	6- or 12-in ext																																																						
<input type="checkbox"/>	2	PGT	6- or 12-in ext																																																						
<input type="checkbox"/>	3	PGT	6- or 12-in ext																																																						
<input type="checkbox"/>	4	PGT	6- or 12-in ext																																																						
<input type="checkbox"/>	*5	PGT	12-in ext																																																						
<input type="checkbox"/>	6	PGT	6- or 12-in ext																																																						
	P-clamp	Tool	Socket																																																						
<input type="checkbox"/>	1 (N)	PGT	6-in ext																																																						
<input type="checkbox"/>	2 (N)	PGT	6-in ext																																																						
<input type="checkbox"/>	3 (N)	Ratchet	2-in ext																																																						
<input type="checkbox"/>	1 (Z)	PGT	6-in ext																																																						
√	2 (Z)	PGT	6-in ext																																																						
√	3 (Z)	Ratchet	2-in ext																																																						

GET-AHEAD – S1 FHRC P-CLAMP RELEASE (00:55) (Cont)

FHRC P-clamps – Hose Box (Outboard)

Legend:
 ○ = P-clamp Location
 ⊗ = TA-clamp (not released)

Hose Box S1 Bay 13

	P-clamp	Tool	Socket
<input type="checkbox"/>	1 (N)	PGT	6-in ext
<input type="checkbox"/>	2 (N)	PGT	6-in ext
<input type="checkbox"/>	3 (N)	Ratchet	2-in ext
<input type="checkbox"/>	1 (Z)	PGT	6-in ext
<input checked="" type="checkbox"/>	2 (Z)	PGT	6-in ext
<input checked="" type="checkbox"/>	3 (Z)	Ratchet	2-in ext

Additional Labels: Nadir, Aft, Zenith Tray, TA, HR 3230, HR 3229, 1N, 2N, 3N, 1Z, 2Z, 3Z, QD: M3/F40, QD: M4/F41, QD: M5/F42, QD: M6/F43, Forward, SCALE NONE.

FHRC P-clamps – Stinger (Inboard)

Legend:
 ○ = P-clamp Location
 ⊗ = P-clamp (not released)

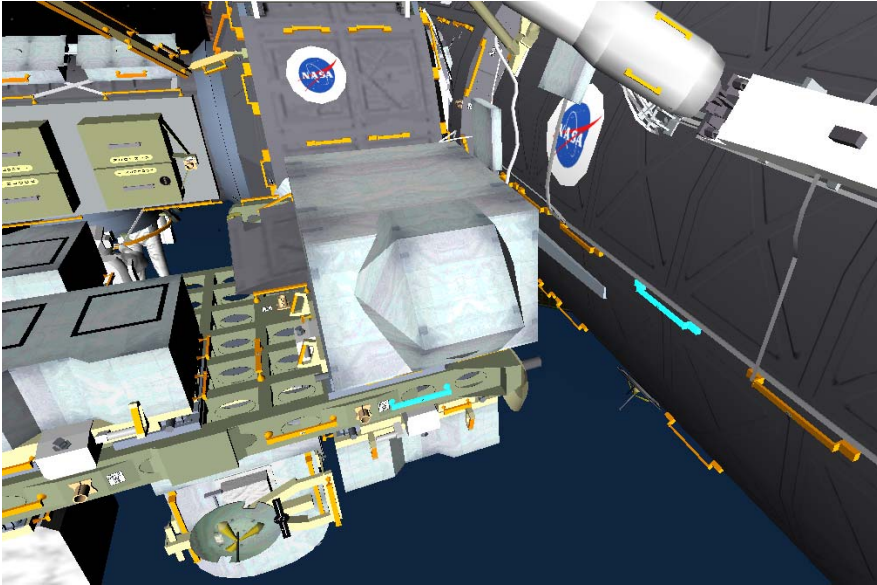
Stinger S1 Bay 11

	P-clamp	Tool	Socket
<input type="checkbox"/>	1	PGT	6- or 12-in ext
<input type="checkbox"/>	2	PGT	6- or 12-in ext
<input type="checkbox"/>	3	PGT	6- or 12-in ext
<input type="checkbox"/>	4	PGT	6- or 12-in ext
<input type="checkbox"/>	*5	PGT	12-in ext
<input type="checkbox"/>	6	PGT	6- or 12-in ext

Additional Labels: Nadir, Zenith Tray, Torque Box Assy, QD: M1, QD: M2, AVIONICS WIRE HARNESS, VIEW M-M, SCALE 1/4.

GET-AHEAD – ESP-2 TO LAB GAP SPANNER INSTALL

IV



EV

ESP-2 TO LAB GAP SPANNER INSTALL (00:15)

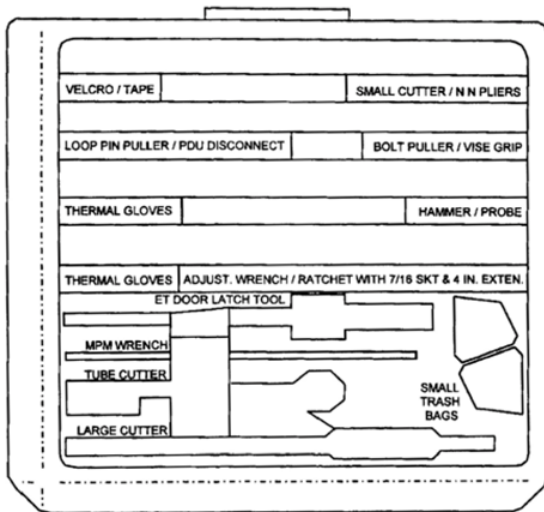
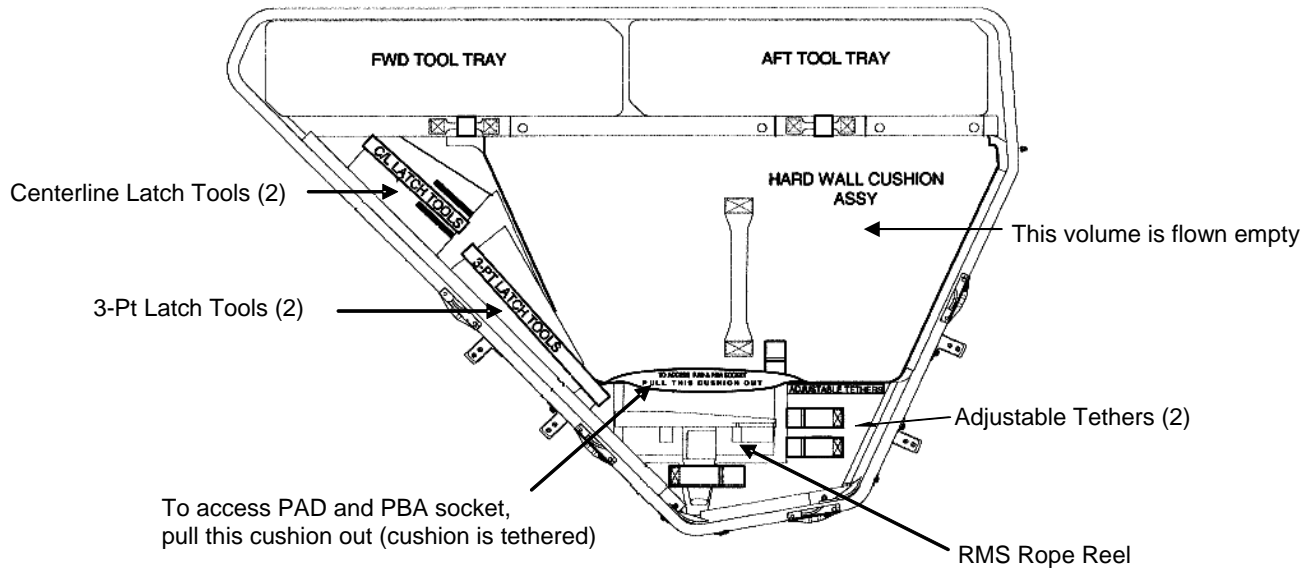
1. Retrieve -307 Gap Spanner from P-Clamp/Contingency Crewlock Bag
2. From A/L, take stbd translation path around ESP-2 to fwd LAB/ESP-2 interface
3. Install -307 Gap Spanner (ESP-2 HR 8013 (port) → LAB HR 0293 (aft))

TOOLS AND STOWAGE

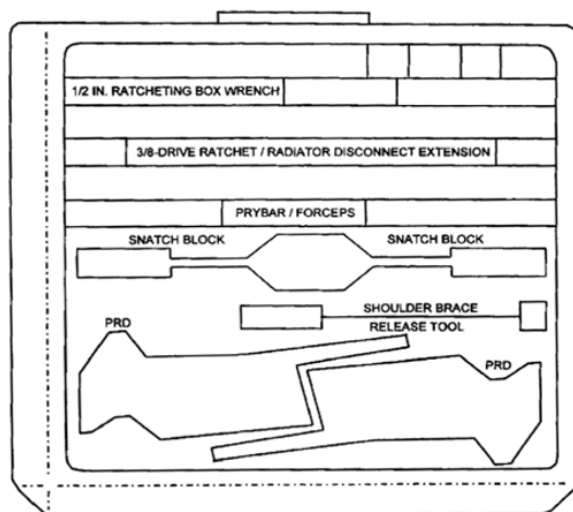
PORT LIGHTWEIGHT TOOL STOWAGE ASSEMBLY (TSA)	TEMP FS 8-2
PGT CHECKOUT	8-3
PGSC-PGT CONNECTION (A31P AND 760XD)	8-4
PROGRAM PGT SETTINGS	8-5
DOWNLOAD/ERASE EVENT LOG	8-5
PGT CONTINGENCIES.....	8-6
PGT STANDARD SETTINGS.....	8-7
APFR MANAGEMENT – STS-130 (20A).....	FS 8-9
55-FT SAFETY TETHERS – STS-130 (20A).....	FS 8-10
85-FT SAFETY TETHERS – STS-130 (20A).....	FS 8-11
TOOLBOX STOWAGE – STS-130 (20A)	FS 8-12
FLUID QD BAG #1 – STS-130 (20A).....	FS 8-13
FLUID QD BAG #2 – STS-130 (20A).....	FS 8-14
FLUID QD ON-ORBIT TRAINER – STS-130 (20A).....	FS 8-15
CREW TETHER INSPECTIONS – STS-130 (20A)	FS 8-16
BRT INSPECTION – STS-130 (20A).....	FS 8-22
NPV MANUAL VALVE OPEN – STS-130 (20A).....	FS 8-24
APFR THERMAL SHIELD REMOVAL.....	FS 8-25

TOOLS AND
STOWAGE

PORT LIGHTWEIGHT TOOL STORAGE ASSEMBLY (TSA)



Forward Tray Layout and Labels



Aft Tray Layout and Labels



When closing TSA doors, ensure locking tabs on latches are closed "Arrow to Arrow"

TOOLS AND STOWAGE

APFR MANAGEMENT – STS-130 (20A)

APFR DESIGNATOR	APFR 1 s/n 1004 (8A, 13A.1 Pitch knob problem)	APFR 2 s/n 1006 (TS, US EVA 9 Pitch knob problem, 10A sticky locking collar)	APFR 3 s/n 1005 (Inc12 suspected sharp edge on locking collar and possible sticky locking collar)	APFR 4 s/n 1002 (TS, old ORU tether, heat shield)	APFR 5 s/n 1003 (TS, old ORU tether, heat shield removed on ULF3)	APFR 6 s/n 1007 (heat shield removed on 12A.1 stage)	APFR 7 s/n 1008	IAPFR 1	IAPFR 2	CRANE (old ORU tether)	TS (APFR 2)	TS	ORU stanchion/ TERA headless	OTSD
Post STS-129	P6 WIF 22 [12,QQ,C,1] Yaw & Roll Settings are Approximate	P1 WIF 3 [6,PP,F,11] TS zenith pointed stbd	Lab WIF 4 [1,RR,F,12] Ingress Aid toward LAB (not against boot plate)	Z1 WIF 10 [3,LL,B,6] TS aft pointed zenith	A/L WIF 9 [12,PP,F,12]	Stbd CETA cart WIF 1 [12,GG] [6,OO,E,6] Ingress Aid	P6 WIF 10 [12,GG,E,6] Ingress Aid	Z1 WIF 5 [12,PP,F,12]	Z1 WIF 3 [6,PP,F,12]	PMA1 WIF 5	P1 WIF 3, hex pointed ISS zenith, tool headpointed stbd and oriented zenith/nadir)	S0 port wedge face	S0 port wedge face	S0 WIF 7 CL=7
Post EVA 1	P6 WIF 22 [12,QQ,C,1] Yaw & Roll Settings are Approximate	P1 WIF 3 [6,PP,F,11] TS zenith pointed stbd	Lab WIF 4 [1,RR,F,12] Ingress Aid toward LAB (not against boot plate)	Z1 WIF 10 [3,LL,B,6] TS aft pointed zenith	A/L WIF 9 [12,PP,F,12]	Stbd CETA cart WIF 1 [12,GG] [6,OO,E,6] Ingress Aid	P6 WIF 10 [12,GG,E,6] Ingress Aid	Z1 WIF 5 [12,PP,F,12]	Z1 WIF 3 [6,PP,F,12]	PMA1 WIF 5	P1 WIF 3, hex pointed ISS zenith, tool headpointed stbd and oriented zenith/nadir)	S0 port wedge face	S0 port wedge face	S0 WIF 7 CL=7
Post EVA 2	P6 WIF 22 [12,QQ,C,1] Yaw & Roll Settings are Approximate	P1 WIF 3 [6,PP,F,11] TS zenith pointed stbd	Lab WIF 4 [1,RR,F,12] Ingress Aid toward LAB (not against boot plate)	Z1 WIF 10 [3,LL,B,6] TS aft pointed zenith	A/L WIF 9 [12,PP,F,12]	Stbd CETA cart WIF 1 [12,GG] [6,OO,E,6] Ingress Aid	P6 WIF 10 [12,GG,E,6] Ingress Aid	Z1 WIF 5 [12,PP,F,12]	Z1 WIF 3 [6,PP,F,12]	PMA1 WIF 5	P1 WIF 3, hex pointed ISS zenith, tool headpointed stbd and oriented zenith/nadir)	S0 port wedge face	S0 port wedge face	S0 WIF 7 CL=7
Post EVA 3	P6 WIF 22 [12,QQ,C,1] Yaw & Roll Settings are Approximate	P1 WIF 3 [6,PP,F,11] TS zenith pointed stbd	Stbd A/L Tool Box [9,RR,F,12] Ingress Aid	Z1 WIF 10 [3,LL,B,6] TS aft pointed zenith	A/L WIF 9 [12,PP,F,12]	Stbd CETA cart WIF 1 [12,GG] [6,OO,E,6] Ingress Aid	P6 WIF 10 [12,GG,E,6] Ingress Aid	Z1 WIF 5 [12,PP,F,12]	Z1 WIF 3 [6,PP,F,12]	PMA1 WIF 5	P1 WIF 3, hex pointed ISS zenith, tool headpointed stbd and oriented zenith/nadir)	S0 port wedge face	S0 port wedge face	S0 WIF 7 CL=7

55-FT SAFETY TETHERS – STS-130 (20A)

	#67 s/n 1017 Lg-sm	#68 s/n 1018 Lg-sm	#69 s/n 1019 Lg-sm	#72 s/n 1022 Lg-sm	#71 s/n 1021 Lg-sm (has retracting issues – AR written-2J/A) (2J/A saw kink in braided cable)	#73 s/n 1023 has retracting issues – ARs 1J, 2J/A) (2J/A saw kink in braided cable & noted brown smudges on the LAT)	#60 s/n 1008 Lg-sm (has retracting issues) (2J/A – LATs are pretty brown & may need inspection before use)	#70 s/n 1020 Lg-sm (2J/A – LATs are pretty brown & may need inspection before use)	#66 s/n 1016 Sm-sm 2J/A noted brown smudges on the LAT-GO for EVA
ULF3 Stage	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	RETURNED: STS-128/17A	RETURNED: STS-128/17A	RETURNED: STS-128/17A	RETURNED: STS-128/17A	RETURNED: STS-128/17A
Post EVA 1	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area					
Post EVA 2	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area					
Post EVA 3	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area					

85-FT SAFETY TETHERS – STS-130 (20A)

	#22 s/n 1002 Lg-sm (2 J/A – retracting issue)	#21 s/n 1001 Lg-sm	#24 s/n 1004 Lg-sm	#29 s/n 1009 Lg-sm (Up on ULF3)	#25 s/n 1005 Lg-sm	#27 s/n 1007 Lg-sm	#28 s/n 1008 Lg-sm
ULF3 Stage	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	STS-130/20A Middeck	STS-130/20A Middeck	RETURNED: STS-129/ULF3
Post EVA 1	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	STS-130/20A Middeck	STS-130/20A Middeck	
Post EVA 2	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	STS-130/20A Middeck	STS-130/20A Middeck	
Post EVA 3	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	INSIDE: Tether staging area	STS-130/20A Middeck	STS-130/20A Middeck	

TOOLBOX STOWAGE – STS-130 (20A)

	Z1 PORT TOOLBOX (MMOD Damage – potential sharp edges) {all slots have sliders}	Z1 STBD TOOLBOX (MMOD Damage – potential sharp edges) {all slots have sliders}	A/L TOOLBOX 1 (STBD)	A/L TOOLBOX 2 (PORT)
SLOT # 1	SQUARE TM BOARD {stbd door} SQ TORQUE MULTIPLIER 7/16-in FLUSH SQ SOCKET 7/16-in PROUD SQ SOCKET 7/16-in RECESSED SQ SOCKET	SQUARE TM BOARD {stbd door} 7/16-in FLUSH SQ SOCKET 7/16-in PROUD SQ SOCKET	HAMMER BOARD {nadir door}	CABLE CUTTER BOARD COMPOUND CUTTERS (SM) SCISSORS {zenith door}
SLOT # 2		QD BAIL TOOL BOARD {stbd door} BMRRM LATCH TOOL QD BAIL DRIVE TOOL (1-in)	PLIERS BOARD {nadir door} NEEDLE NOSE PLIERS	
SLOT # 3	RATCHET BOARD {middle} 7/16-in X 12-in WOBBLE SOCKET 7/16-in X 2-in RIGID SOCKET	RATCHET BOARD {middle} 7/16-in X 6-in WOBBLE SOCKET	{only slot with slider}	{only slot with slider}
SLOT # 4				
SLOT # 5	ROUND TM BOARD {port door} RND TORQUE MULTIPLIER 5/8-in PROUD RND SOCKET 7/16-in FLUSH RND SOCKET 7/16-in PROUD RND SOCKET		ADJ WRENCH BOARD FORCEPS WRENCH, ADJ {zenith door}	T-HANDLE TOOL BOARD 1-8-in T-TOOLS {nadir door}
SLOT # 6	TRASH BAG BOARD {stbd door} SMALL TRASH BAG	TRASH BAG BOARD {stbd door}	HYDRAZINE BRUSH BOARD HYDRAZINE BRUSH {nadir door}	
SLOT # 7	SOCKET BOARD {port door} 5/32-in BALL END ALLEN DR 1/2-in X 8-in WOBBLE SOCKET 5/16-in X 7-in RIGID SOCKET	SOCKET BOARD {port door} 5/32-in BALL END ALLEN DR 1/2-in X 8-in WOBBLE SOCKET 5/16-in X 7-in RIGID SOCKET	PRD (Toolboard) {zenith door} PRD	PRD (Toolboard) {nadir door} PRD
PANEL # 8	CHEATER BAR PANEL {stbd door}	CHEATER BAR PANEL {stbd door} CHEATER BAR ADJ EQUIP TETHER	TOOL CADDY PANEL {nadir door}	
PANEL # 9	18-in SOCKET PANEL {port door} 7/16-in X 18-in WOBBLE SOCKET	18-in SOCKET PANEL {port door}	BOLT PULLER PANEL BOLT PULLER MECHANICAL FINGER {zenith door}	LARGE CUTTER PANEL {nadir door} Large Cutters (-303)
EXTERNAL	1 ROUND SCOOP w/D-HANDLE (on zenith micro) (D-handle taped over repaired MMOD damage) D-HANDLE on port side of toolbox	<u>NOTE</u> D-Handle will not stow on the side of this toolbox due to an interference with the CMG MLI		

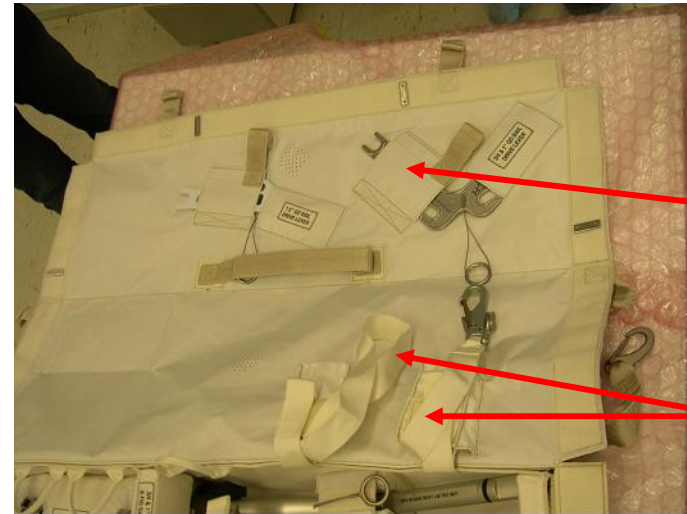
FLUID QD BAG #1 – STS-130 (20A)

QD TOOL BAG #1 (SEG33114667-301/1001)			
#	TOOL	PART#/SERIAL #	LOCATION IN BAG
1.	1/4" CAP TOOL	GD2043725/TBD	<input type="checkbox"/> 1/4" CAP TOOL POCKET
2.	1/2" CAP TOOL	GD2043730/TBD	<input type="checkbox"/> 1/2" CAP TOOL POCKET
3.	1" CAP TOOL	GD2043325/TBD	<input type="checkbox"/> 1" CAP TOOL POCKET
4.	3/4" & 1' QD BAIL DRIVE LEVER	SDG33113838-703/TBD	<input type="checkbox"/> 3/4" & 1' QD BAIL DRIVE LEVER POUCH ON LID
5.	1.5" QD BAIL DRIVE LEVER	SDG33113837-701/TBD	<input type="checkbox"/> 1.5" QD BAIL DRIVE LEVER POUCH ON LID
6.	1.5" NH3/N2 VENT TOOL – F	1F9859-1/01	<input type="checkbox"/> 1.5" NH3/N2 VENT TOOL – F POCKET
7.	1" H20/N2 VENT TOOL – F	1F98593-1/01	<input type="checkbox"/> 1" H20/N2 VENT TOOL – F POCKET
8.	3/4" NH3/N2 VENT TOOL – F	1F98597-1/01	<input type="checkbox"/> 3/4" NH3/N2 VENT TOOL – F POCKET
9.	1" NH3/N2 VENT TOOL – F	1F98589-1/TBD	<input type="checkbox"/> 1" NH3/N2 VENT TOOL – F POCKET
10.	1" NH3/N2 VENT TOOL – M	1F98596-1/01	<input type="checkbox"/> 1" NH3/N2 VENT TOOL – M POCKET
11.	1/4" NH3/N2 VENT TOOL – F	1F98592-1/01	<input type="checkbox"/> 1/4" NH3/N2 VENT TOOL – F POCKET
12.	1.5" QRT & FID GAUGE	SEG33114617-701/TBD	<input type="checkbox"/> 1.5" QRT & FID GAUGE POCKET
13.	3/4" & 1" QRT & FID GAUGE	SEG33114616-701/TBD	<input type="checkbox"/> 3/4" & 1" QRT & FID GAUGE POCKET

- Ensure cap tools (3) are friction fitted

- Close all QRT tool flaps (2)

- Close all vent tool flaps (6)



- Close bail drive lever flaps (2)

- Internal bag straps (2) should be stowed in pouches

FLUID QD BAG #2 – STS-130 (20A)

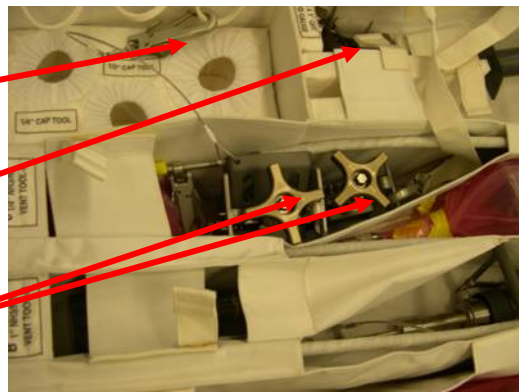
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QD TOOL BAG #2 (SEG33114667-301/1002)			
#	TOOL	PART #/SERIAL #	LOCATION IN BAG
1.	1/4" CAP TOOL	GD2043725/TBD	<input type="checkbox"/> 1/4" CAP TOOL POCKET
2.	1/2" CAP TOOL	GD2043730/TBD	<input type="checkbox"/> 1/2" CAP TOOL POCKET
3.	1" CAP TOOL	GD2043325/TBD	<input type="checkbox"/> 1" CAP TOOL POCKET
4.	1.5" NH3/N2 VENT TOOL – F	1F9859-1/02	<input type="checkbox"/> 1.5" NH3/N2 VENT TOOL – F POCKET
5.	1" H20/N2 VENT TOOL – F	1F98593-1/02	<input type="checkbox"/> STILL IN RAT'S NEST (EXTERNAL FROM 5A)
6.	3/4" NH3/N2 VENT TOOL – F	1F98597-1/02	<input type="checkbox"/> 3/4" NH3/N2 VENT TOOL – F POCKET
7.	1" NH3/N2 VENT TOOL – F	1F98589-1/TBD	<input type="checkbox"/> 1" NH3/N2 VENT TOOL – F POCKET
8.	1" NH3/N2 VENT TOOL – M	1F98596-1/TBD	<input type="checkbox"/> 1" NH3/N2 VENT TOOL – M POCKET
9.	1/4" NH3/N2 VENT TOOL – F	1F98592-1/02	<input type="checkbox"/> 1/4" NH3/N2 VENT TOOL – F POCKET
10.	1/4" BDT	SEG33114984-301/001	<input type="checkbox"/> STOWED ON TOP OF 1/4" VENT TOOL <input type="checkbox"/> MUST BE TETHERED TO INSIDE OF BAG USING 1 ADJ
11.	3/4" BDT	SEG33114986-301/001	<input type="checkbox"/> STOWED ON TOP OF 1/4" VENT TOOL, TETHERS TO BAG INTERNAL LOOPS USING BDT INTEGRAL TETHER
12.	3/4" AKT	SEG33114983-301/1001	<input type="checkbox"/> STOWED WITH VENT TOOL ADAPTERS IN QRT & FID POUCHES <input type="checkbox"/> MUST BE TETHERED TO INSIDE OF BAG USING 1 ADJ
13.	VENT TOOL ADAPTERS (2)		<input type="checkbox"/> ONE VTA IN THE 3/4" & 1" QRT & FID GAUGE POUCH; THE OTHER IN THE 1.5" QRT & FID GAUGE POUCH <input type="checkbox"/> EACH VTA MUST BE TETHERED INSIDE THE BAG USING 1 ADJ TETHER FOR EACH

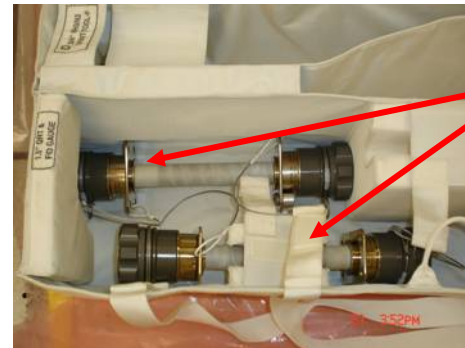
3/4" BDT is tethered to internal bag loop using integral tool tether

3/4" AKT stowed with VTAs in QRT/FID pouch

1/4" and 3/4" BDTs are stowed on top of 1/4" vent tool



BDT AND AKT STOWAGE



VENT TOOL ADAPTER STOWAGE

Vent Tool Adapters (2) are stowed in QRT/FID gauge pockets and need adj tethers

FLUID QD ON-ORBIT TRAINER – STS-130 (20A)

1. ISS Fluid QD Trainer Assembly:

- a. All hardware marked “IVA Training Unit Only” except Shunt Jumper
- b. 3 Male QDs (1.5", 1.0", 0.75")
- c. 2 Female QDs (1.5", 0.75")
- d. Use NOD2 Shunt Jumper for 1.0"
- e. 2 SPDs (1.5", 1.0")
- f. Panel Cover
- g. 2" x 2" squares of pile fasteners are attached to the panel front at 2" intervals
- h. The panel attaches to the seat track on either side of a rack front with the aid of four (4) Standoff Assemblies

2. Locations:

- a. A/L100_Behind Closeout
- b. CTB 1258 – “QD Trainer”

3. STS-130 (20A) Required Tools for IVA Training:

- a. NOD2 Shunt Jumper
- b. Panel Cover



CREW TETHER INSPECTIONS – STS-130 (20A)

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OBJECTIVE:

Inspect Load Alleviating Strap (LAS) on Safety Tethers, Waist Tethers and soft strap on D-ring extenders

Prior to each set of EVAs (Shuttle or ISS) all on-board tethers are to be inspected
Between each EVA, only those tethers used during the previous EVA require inspection

DURATION:

1 hr 30 min to perform Parts 1 and 2 on 6 waist tethers, 6 D-ring extenders, and 8 safety tethers
Additional 30 min required to perform Part 3 on 2 tethers

NOTE: Standard tool config prep times only protect for performing Part 1 between EVAs on tethers used during the previous EVA

ITEMS REQUIRED FOR PART 2 OR 3

MATERIALS

Sharpie
Ziplock Bag

TOOLS

Camera
ISS IVA Toolbox

Drawer 5:
Tape measure

Tape Pantry
“EVA Tape” (P/N P213, 1" Permacel glass cloth tape)

PART 1: PRIOR TO EACH EVA

1. Prior to EVA use, soft goods on each safety tether (LAS), waist tether (LAS) and D-ring extender (strap) for that EVA must be inspected
 - a. MMOD inspection: Inspect the soft goods (load alleviating strap) of the Waist Tether and ERCM/Safety Tether and soft strap of the D-ring extender for MMOD damage and discoloration, manipulating the sheath as needed to inspect between folds. The damage may appear as small or large holes in the load alleviating strap or as a tear/rip in the sheath. The MMOD damage may also appear in small concentrated areas of excessive fraying (as would be expected to be found in the vicinity of a hole). Soft goods should be white to yellow or tan in appearance. Soft goods showing a burnt brown or black discoloration should not be used (see figures 1a-c)
 - b. D-ring extender: Inspect the soft strap of the D-ring extender for MMOD damage, excessive wear and fraying (see figures 1a-c)

CREW TETHER INSPECTIONS – STS-130 (20A) (Cont)

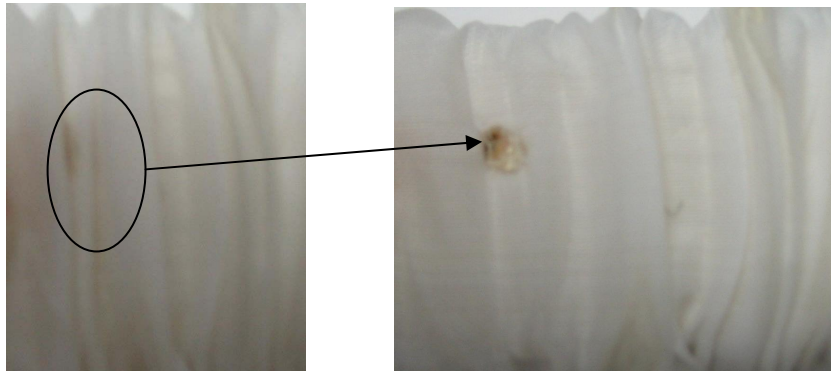


Figure 1a.- Damage masked by folds in LAS sheath exposed when unbunched.
NOTE: Photo of ground created damage

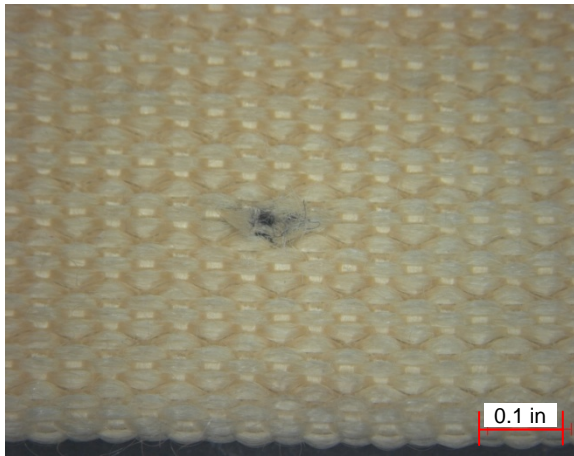


Figure 1b.- Picture showing MMOD damage found in flight AET.



Figure 1c.- Frayed D-ring extender; NO GO for use.

- c. LAS base inspection: Inspect base of LAS where strap attaches to ERCM D-ring for any damage (see figure 1d)
- Smudging, as shown in figure 1d, is acceptable
 - If safety tether anchor hook is taped, inspect tape for wear or damage



Figure 1d.- LAS attachment to ERCM D-ring.

- d. Tack stitching inspection: Verify 2 surface and 2 through tack stitches still present on each LAS (waist tether and safety tether)
- Verify through stitches still intact by gently moving sheath away from hook to expose threads through Nomex (see figures 2a-c). Once verified, gently replace sheath over red indicator
 - Visually verify surface stitches on non-seam side of tether

CREW TETHER INSPECTIONS – STS-130 (20A) (Cont)

- e. Red indicator inspection: If red showing and all tack stitches present:
 - i. Gently pull the sheath back to cover red indicator. Due to tolerances, some red may still show. (Tether is GO as long as tack stitching still present)
 - ii. Note width of any remaining red showing
 - iii. Report s/n to **MCC-H** of any tethers with red still showing

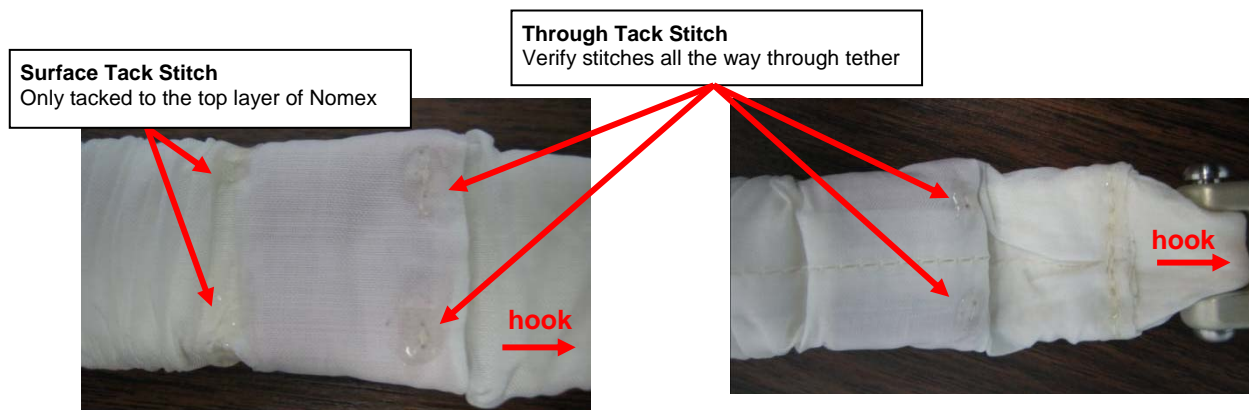


Figure 2a.- Top View (non seam side).

Figure 2b.- Bottom View (seam side).

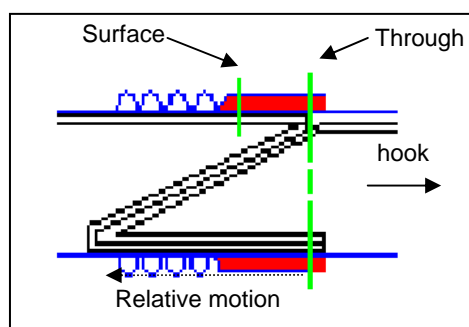


Figure 2c.- Cross-section of tack stitching.

2. Report serial numbers to **MCC-H** with inspection results
3. For any tethers with MMOD/other damage, fraying or missing tack stitching, proceed to part 2
4. Restow remaining tethers

PART 2: MMOD DAMAGE/MISSING TACK STITCHING EVALUATION

1. Retrieve camera and Ziplock(s)
2. If MMOD damage is found on LAS
 - a. Smooth out the sheath at the damage location and take detailed photos of damage (with serial number in photo if possible, see figure 3.) Note if any damage to the underlying Nomex strap is visible
 - b. Remove tether from usable inventory. Place tether in Ziplock bag labeled “NO GO for use”. Report location and s/n to **MCC-H**
 - c. Report results to **MCC-H**

CREW TETHER INSPECTIONS – STS-130 (20A) (Cont)



Reference figure 3b for correct label location
For Waist Tethers, ensure label says Waist Tether Assy

Figure 3a.- Photo of partial red indicator showing with serial number.

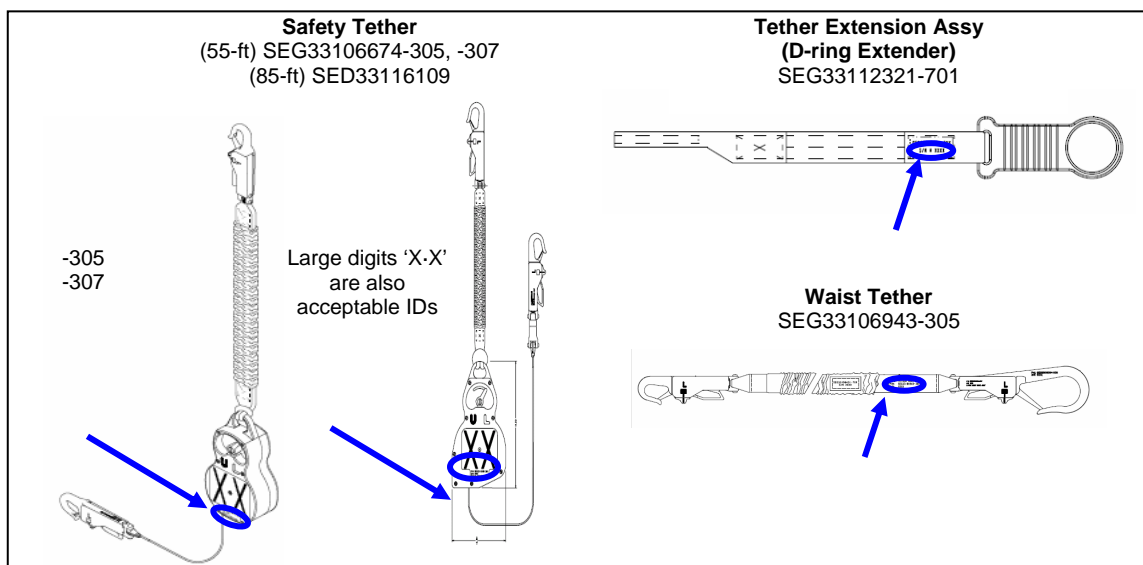


Figure 3b.- Serial Number Reference.

3. If tack stitches are broken
 - a. Take detailed photos of tack stitches (with serial number in photo, reference figure 4) for further engineering evaluation
 - b. Stow tethers per Table 1

TABLE 1: TETHER GO/NO GO CRITERIA

Broken stitch	Action
1 or both surface stitches broken	Gently smooth sheath away from hook so only a single layer covers the red indicator area Return tether to usable inventory
1 through stitch broken, 1 through stitch intact and 0-2 surface tack stitches intact	Return tether to usable inventory
2 through stitches broken	Remove tether from usable inventory. Place tether in Ziplock bag labeled "NO GO for use Report location to MCC-H

- c. Report results to **MCC-H**

CREW TETHER INSPECTIONS – STS-130 (20A) (Cont)

4. If fraying or MMOD damage is found on D-ring extender
 - a. Take detailed photos of damage showing s/n of extender (if possible). See figure 4
 - b. Remove tether from usable inventory. Place tether in Ziplock bag labeled “NO GO for use”. Report location and s/n to **MCC-H**
 - c. Report results to **MCC-H**



Figure 4.- D-ring extender showing s/n.

5. If damage found on LAS base
 - a. Take detailed photos of damage with at least one photo showing tether number
 - b. Swap tether for spare
 - c. Remove tether from usable inventory. Place tether in Ziplock bag labeled “NO GO for use”. Report location and s/n to **MCC-H**
 - d. If tape damaged/worn on anchor hook, take detailed photos. Replace tape as necessary using EVA tape
 - e. Report results to **MCC-H**

PART 3: MEASURE LAS LENGTH (on **MCC-H GO**)

1. Retrieve quarantined tethers, tape measure, sharpie and camera
2. Mark the desired length on a stable surface. Reference figures 5a and 5b for required lengths
3. Measure quarantined tether against markings. Photograph results
4. Report finding by s/n to **MCC-H**
5. Stow tethers per **MCC-H** direction

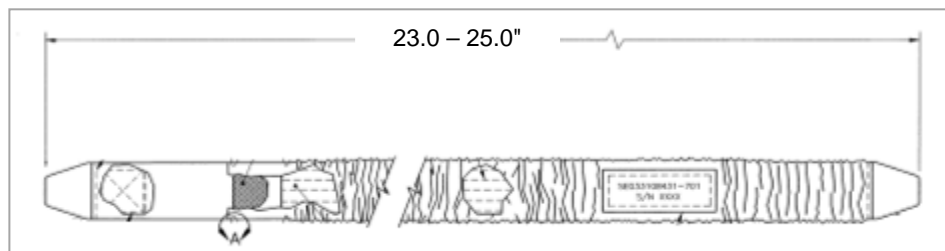


Figure 5a.- Waist Tether.

BRT INSPECTION – STS-130 (20A)

OBJECTIVE:

Inspect all BRT units for loose Base Mount Screws and tighten as needed. This inspection is required prior to each series of EVAs

DURATION:

30 min assuming three BRTs

TOOLS:

BRT(s) SEG33110400

ITEMS TO UNSTOW (IF PART 2 REQUIRED):

TOOLS:

Permacel Glass Cloth Tape

ISS IVA Toolbox:

Drawer 2:

Ratchet, 1/4" Drive

1/4" to 3/8" Adapter

(5-35 in-lb) Torq Driver, 1/4" Drive

Drawer 3:

4-1/32" Long, #2 Phillips, 3/8" Drive

PART 1: BASE MOUNT SCREWS – GUIDELINES AND INSPECTION INSTRUCTIONS

NOTE

This inspection is not required prior to the first use of a new BRT

1. Prior to EVA use, each BRT must be inspected for loose fittings (screws) in two locations at the base mount assembly
Refer to figure 1

Inspection of the Base Mount locations involves grasping both sides of the fitting, applying opposing torsional/bending loads, and watching/feeling for any looseness in the fitting or in the three screws at each location. The fitting should be solid and stiff. The screws should not move within their countersink

2. If loose screws or fittings are observed during any of the above inspections:

Notify **MCC** of s/n and proceed to part 2

If all BRTs pass inspection:

Notify **MCC**

BRT INSPECTION – STS-130 (20A) (Cont)

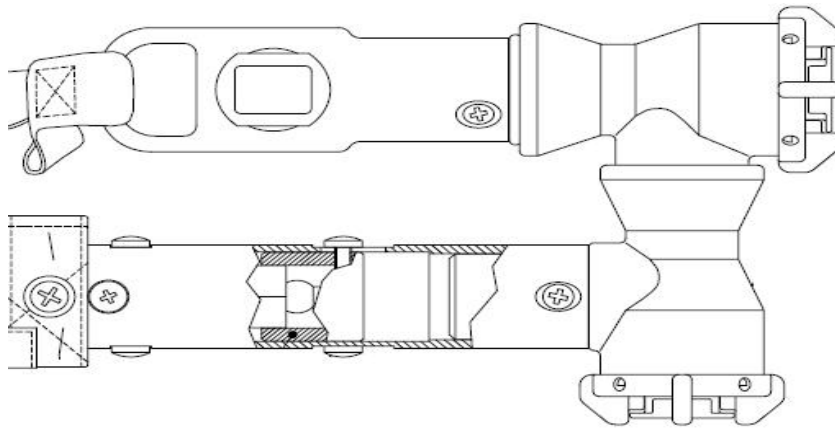


Figure 1.- Base mount screws (three, 120° apart) – two locations.

PART 2: BASE MOUNT SCREWS – TIGHTENING INSTRUCTIONS (IF REQUIRED)

3. Tighten, torque base mount fitting screws (six) to 12 in-lb [(5-35 in-lb) Torq Driver, 1/4" Drive; 1/4" to 3/8" Adapter; 4-1/32" long, #2 Phillips, 3/8" Drive]
4. Cover fastener heads by wrapping Permacel Glass Cloth Tape around BRT, ensuring tape location does not hinder BRT function
5. Notify **MCC-H** of task completion

NPV MANUAL VALVE OPEN – STS-130 (20A)

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Prior to completing Tool Config on EVA 2

1. Retrieve the following from NOD3_D5_D2
 - a. NPV (ACS)
 - b. NPV MLI
 - c. NPV Base MLI
2. Verify NPV Valve is in open position (see figure 1)

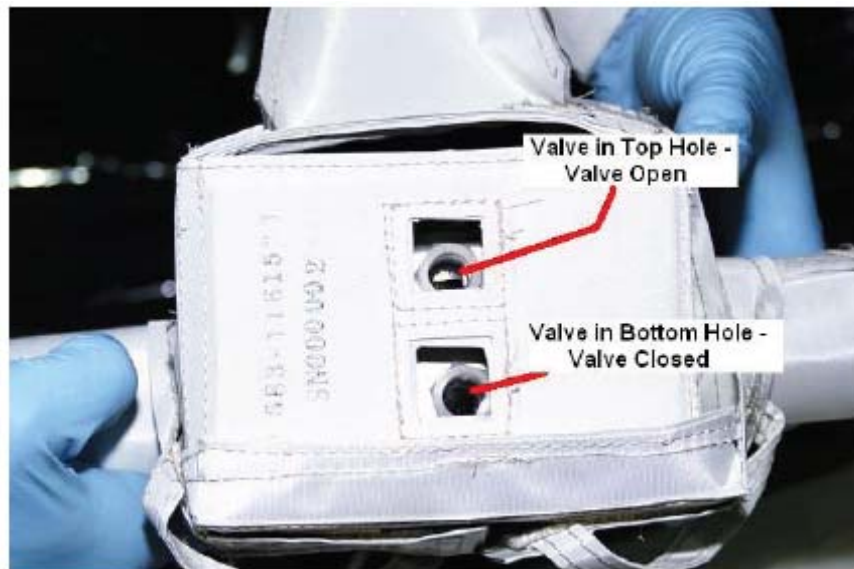


Figure 1.- NPV Valve Indicator.

3. If the NPV Valve is not in open position, complete the following:
 - Drive NPV top bolt (1) **[A2,CCW2,30.5]** ~22 turns, to hard stop
 - 7/16-in (wobble) Socket-6-in ext
 - (3.8 ft-lb, 30 RPM)

APFR THERMAL SHIELD REMOVAL

I

1. Retrieve the following:
 - APFR
 - Dry Wipes
 - Ziplock Bag
 - Sharpie
 - Driver Handle, 3/8-in Drive – Drawer 2
 - #8 Long Torq Driver, 3/8-in Drive – Drawer 3

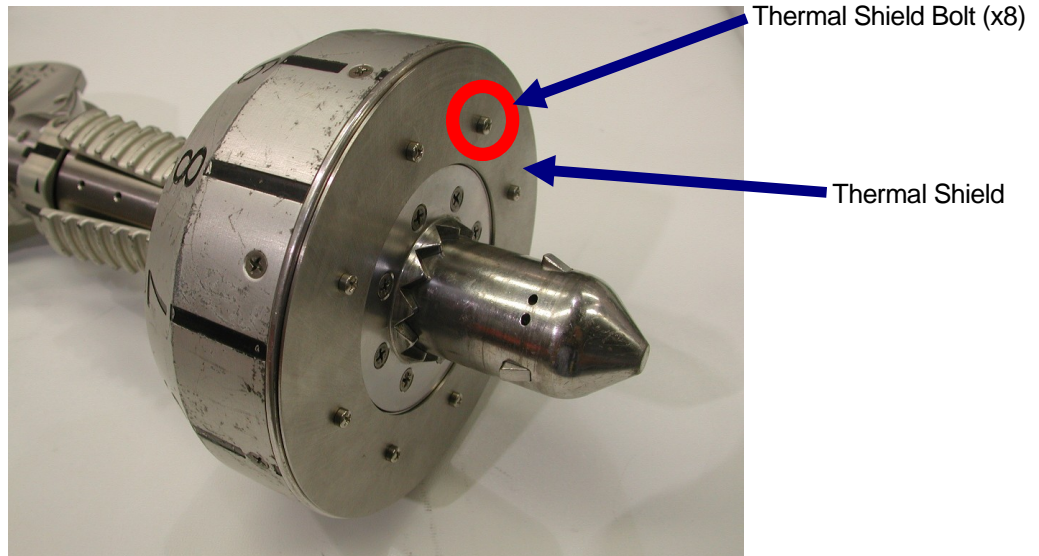


Figure 1.- Thermal Shield Location on APFR.

2. Remove APFR thermal shield non-captive screws (eight) (Driver, Handle, 3/8-in Drive; #8 Long Torq Driver, 3/8-in Drive). Expect a breaking torque of 10-30 in-lb
Refer to figure 1
Stow screws in Ziplock Bag

CAUTION

Do not pry Thermal Shield off, damage could occur

3. Remove Thermal Shield; light tapping applied from side of Thermal Shield may be required (Driver Handle, 3/8-in Drive, blunt end)
Temp stow thermal shield in Ziplock Bag
4. Inspect bottom of APFR Load Limiter for sharp edges
5. Wipe off Vibratite from bottom of Load Limiter (Dry Wipes). Vibratite may not come completely off; it is not essential to remove all residue
6. Label Ziplock Bag "20A APFR Thermal Shield, GMT 2010/XXX" and stow (Sharpie)

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EMU MAINT/RECHARGE

WATER RECHARGE.....	TEMP FS 10-2
EMU POWERUP.....	TEMP FS 10-2
WATER FILL.....	TEMP FS 10-2
WATER FILL VERIFICATION.....	TEMP FS 10-2
EMU LiOH CHANGEOUT.....	10-4
MIDDECK EMU BATTERY RECHARGE (STAND-ALONE).....	10-4a
MIDDECK EMU BATTERY RECHARGE/LiOH REPLACEMENT.....	10-5
INITIATE.....	10-5
TERMINATE.....	10-6
IN-SUIT EMU BATTERY RECHARGE/CHARGE VERIFICATION.....	10-7
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HELMET LIGHT/PGT BATTERY RECHARGE.....	10-8
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REBA BATTERY INSTALLATION.....	10-9
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STS-130 CONSUMABLES TRACKING CUE CARD.....	FS CC 10-15
STS-130 BATTERY RECHARGE CUE CARD.....	FS CC 10-16

WATER RECHARGE

IF EMU NOT ALREADY POWERED UP:

EMU POWERUP

- BOTH DCM 1. Retrieve, position SCUs; remove DCM covers
 2. Connect SCUs to DCM, √locked
 3. PWR – BATT

CAUTION

EMU must be on BATT pwr when
 airlock pwr supply is turned on

- AW18H 4. PWR/BATT CHGR EMU 1,2 MODE (two) – PWR
 BUS SEL (two) – MNA(MNB)
 MD(flir) 5. √EMU O2 ISOL VLV – OP
 AW82B 6. EV1,2 O2 vlv (two) – OP
 DCM 7. PWR – SCU

WATER FILL

- MO13Q 8. √ARLK H2O S/O VLV – OPEN (tb-OP)
 R11L 9. √SPLY H2O TKA OUTLET – CL (tb-CL)

SM 60 TABLE MAINT

- CRT 10. Use TKB quantity:
 PARAM ID – ITEM 1 +0 6 2 0 4 2 0 EXEC
 11. Log value before recharge

Recharge #	H2O TKB %
1	
2	
3	
4	
5	

- AW82D 12. √EMU 1,2 H2O WASTE tb (two) – CL
 SPLY (two) – OP (tb-OP)
 13. √H2O TKB quantity decreasing

NOTE

Full charge requires ~15 min

WATER FILL VERIFICATION

- DCM 14. √STATUS: H2O WP 8-15 psi and stable for ~30 sec (indicates charging complete)

SM 60 TABLE MAINT

- CRT 15. Use TKB quantity:
 PARAM ID – ITEM 1 +0 6 2 0 4 2 0 EXEC
 16. Log value after recharge

Recharge #	H2O TKB %
1	
2	
3	
4	
5	

EMU MAINT/
 RECHARGE

Cont next page

TEMP FS 10-2

130

EVA/ALL/FIN A

TOP

HOOK
VELCRO

STS-130 CONSUMABLES TRACKING CUE CARD

METOX for Campout & 10.2 Ops	Serial Numbers	EVA 1 05 & 07	EVA 2 11 & 13	EVA 3 15 & 16

PWR Usage: Use 1005, 1023, 1025 in that order until drained

Dump CWC: 1059 for all EVAs

	EV	EMU	LiOH (s/n)	Metox (s/n)	EMU Batt (s/n)	REBA (s/n)	EHIP Batts (s/n)	ERCA (address)	SAFER (s/n)	PGT Batt (s/n)	PGT Batt Spare (s/n)
EVA 1 (FD 5)	EV1 Be	3004	2004 ~launched in EV2 suit	N/A	2086 ~launched in suit	1006	1025 1026	16	1004	1004	1008
	EV2 Pk	3005	2003 ~launched in EV1 suit	N/A	2087 ~launched in suit	1008	1028 1029	18	1006	1005	1009
EVA 2 (FD 7)	EV1 Be	3004	2014	N/A	2084	1006	1025 1026	16	1004	1004	1008
	EV2 Pk	3005	2002	N/A	2088	1008	1028 1029	18	1006	1005	1009
EVA 3 (FD 9)	EV1 Be	3004	2016	N/A	2086	1006	1025 1026	16	1004	1004	1008
	EV2 Pk	3005	N/A	20	2087	1008	1028 1029	18	1006	1005	1009
Return Config	EV1 Be	3004	2003	N/A	2083	N/A	N/A	N/A	N/A	N/A	N/A
	EV4 Pk	3018	2004	N/A	2085	N/A	N/A	N/A	N/A	N/A	N/A

NOTE: Shuttle contingency LiOH = 2026, 2028, 2022, 2021: DO NOT OPEN BAG

EVA-5a/130/O/B

(reduced copy)

FS CC 10-15

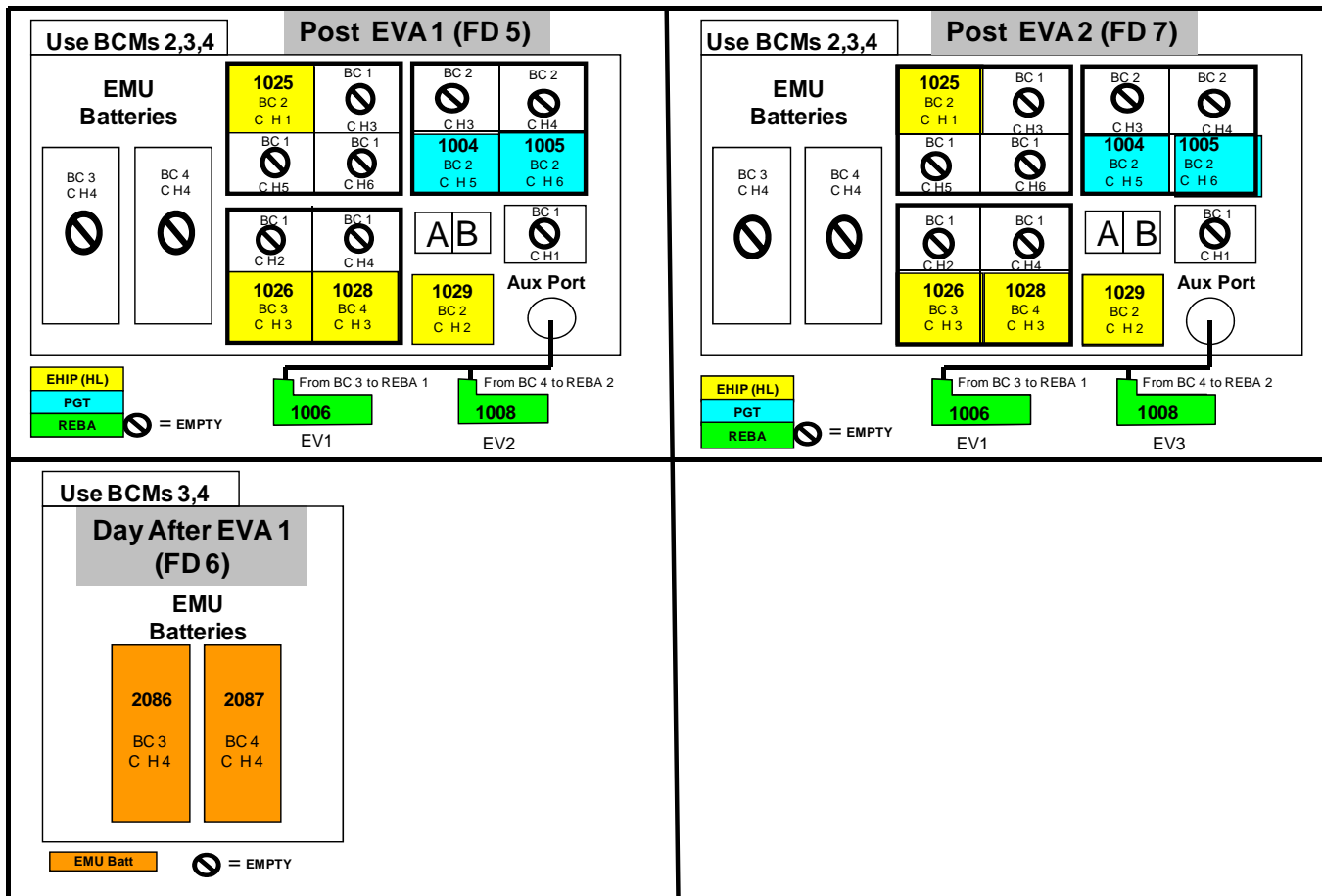
P & I

EVA/130/FIN A

TOP
BACK OF 'STS-130 CONSUMABLES TRACKING CUE CARD'

HOOK
VELCRO

STS-130 BATTERY RECHARGE CUE CARD



EVA-5b/130/O/B |

(reduced copy)

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TOP

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EMERGENCY UNDOCKING EVA TRANSFER

Critical

- EMUs (Be & Pk)
- CCAs (Be & Pk)
- Gloves (Be & Pk)
- LCVG (Be & Pk)
- EMU Batteries (2), (s/n 2083 & 2084 preferred)
- BTA 1008
- 3/8 Drive Ratchet w/7/16 (rigid) socket

Desired

- ECOKS (Be, Pk)
- EMU Servicing Kit
- Adj Eq Tethers (6)
- Remove the following items from EMUs and leave on ISS
 - Helmet Lights, TV, REBA, METOX
 - ISS Tethers and Tools

EVA-6a/130/O/B

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EXPEDITED SUIT DOFFING CUE CARD

CAUTION

Verify EV crew is clear of hatch mechanism

- IV When equalization complete:
1. Open IV Hatch per decal
- DCM SUIT DOFFING
2. O2 ACT → OFF
3. PURGE vlv → op (up)
4. sw REBA → OFF (toward left arm of suit)
5. EMU TV Power Cable ←|→ EMU TV
6. √STATUS: **SUIT P** < 0.4 (compare with gauge)
7. Glove ←|→ EMU (leave donned, disconnected)
8. Helmet ←|→ EMU
- DCM 9. sw FAN → OFF
- SAFER SAFER DOFFING
10. Latch → ENG
11. Latch ↷ until release (~90 deg)
12. PLSS ←|→ Thruster Towers
- PLSS SUIT DOFFING (Cont)
13. Engage EMU in EDDA
14. Lower Arm Cables ←|→ Gloves
15. Gloves ←|→ EMU
16. Comm Mode → OFF
17. Doff EMU
- UIA If taking EMUs to shuttle:
18. sw PWR EV-1,2 (two) → OFF
 √PWR EV-1,2 LEDs (four) – Off
- DCM 19. SCU ←|→ DCM
20. LTA →|← HUT
21. Gloves →|← EMU
22. Helmet →|← EMU
23. Go to **EMERGENCY UNDOCKING
EVA TRANSFER** on reverse side

EVA-6b/130/O/A

EMU CONTINGENCY RESIZE MATRIX (STS-130/20A)

FOR LOSS OF:	EV1 – Behnken	EV2 – Patrick
HUT/PLSS	Use EMU 3018, XL 1. Remove glove/arm assys 2. Use primary arms, gloves 3. √Arm red connects to right, √locks, √cams 4. Use primary LTA 5. Swap EMU PLSS identifier stripes, national flag 6. Swap helmet, comm cap, LiOH/Metox, EMU battery, REBA	Use EMU 3018, XL 1. Remove ring/glove/arm assys 2. Use primary ring, arms, gloves 3. √Arm red connects to right, √locks, √cams 4. Use primary LTA 5. Swap EMU PLSS identifier stripes, national flag 6. Swap helmet, comm cap, LiOH/Metox, EMU battery, REBA
CCA	Use size 04/321 s/n 1213/1068 Location: ECOK (Be)	Use size 06/321 CCA s/n 1192/1045 Location: ECOK (Pk)
Lower Arm Segment	Use size 02 arm s/n 331/332 from ISS. Cams S/S (red = right, blue = left) 1. √Locks, √cams	Use size 02 arm s/n 331/332 from ISS. Cams L/L (red = right, blue = left) 1. √Locks, √cams
Gloves	Back-up: Use 6BB gloves s/n 6219 Location: ECOK (Be) Swap Arm Cams to S/L	Back-up: Use 6C3 gloves s/n 6263 Location: ECOK (Pk) Swap Arm Cams to S/L
Waist Brief	Use size 01 waist brief s/n 2076 (045) from ISS. Cams S/S 1. Use prime legs, leg rings, and boots 2. √Locks, √cams 3. Swap EMU brief identifier stripes	Use size 01 waist brief s/n 2076 (045) from ISS. Cams S/S 1. Use prime legs and boots 2. √Locks, √cams 3. Swap EMU brief identifier stripes
Leg Segment	Use size 03 leg from ISS s/n 233/234. Cams S/L 1. √Locks, √cams	Use size 02 leg from ISS s/n 215/216. Cams S/L 1. √Locks, √cams
Boot	Use size 02 boots s/n 214 from ISS 1. √NO BSI or Toe Cap 2. √Locks	Use size 02 boots s/n 219 from ISS 1. √NO BSI or Toe Cap 2. √Locks
Sizing Rings	<ul style="list-style-type: none"> 0.5" Thigh: Use s/n 127/128 from ISS M-O2 Bag 1.5" Leg: Use s/n 125/126 from ISS M-O2 Bag 0.5" Arm: Use s/n 145/146 	<ul style="list-style-type: none"> 1.0" Leg: Use s/n 117/118 from ISS M-O2 Bag
LCVG	(05/05) 1. Use s/n 3167 Location: Bag "E" I 2. Transfer biomed and dosimeter	(05/05) 1. Use s/n 3167 Location: Bag "E" I 2. Transfer biomed and dosimeter

Sizing notes

If Back-up gloves are used:

BE – final lower arm adjustment should be SHT/LNG

PK – final lower arm adjustment should be SHT/LNG

Both CMs: If overall LTA length is too snug due to zero-G spinal growth:

Toggle lower waist cam to the LNG position by pulling the restraint pin, and releasing the restraint line.

This adds an additional 1.0" (approx) of length to your overall suit length. If you feel any foot instep contact due to this change, keep the waist adjustment the same, and shorten the legs by ½" by toggling the lower leg cam to the SHT position. Final leg position for CMs would be SHT/SHT

PK notes

- After EVA #1, if CM-Patrick notices that he cannot maintain a desired fingertip/finger crotch contact (hands falling out of gloves), install elbow padding into elbow pad sleeve of LCVG. These pads are located in CM-Patrick's ECOK (PK EVA #2 bag) if needed
- If B/U gloves size 6C3 s/n 6263 are used, use modified comfort gloves size SR1 s/n 033, which are located in CM-Patrick's ECOK (PK EVA #3 bag) if needed

BE notes

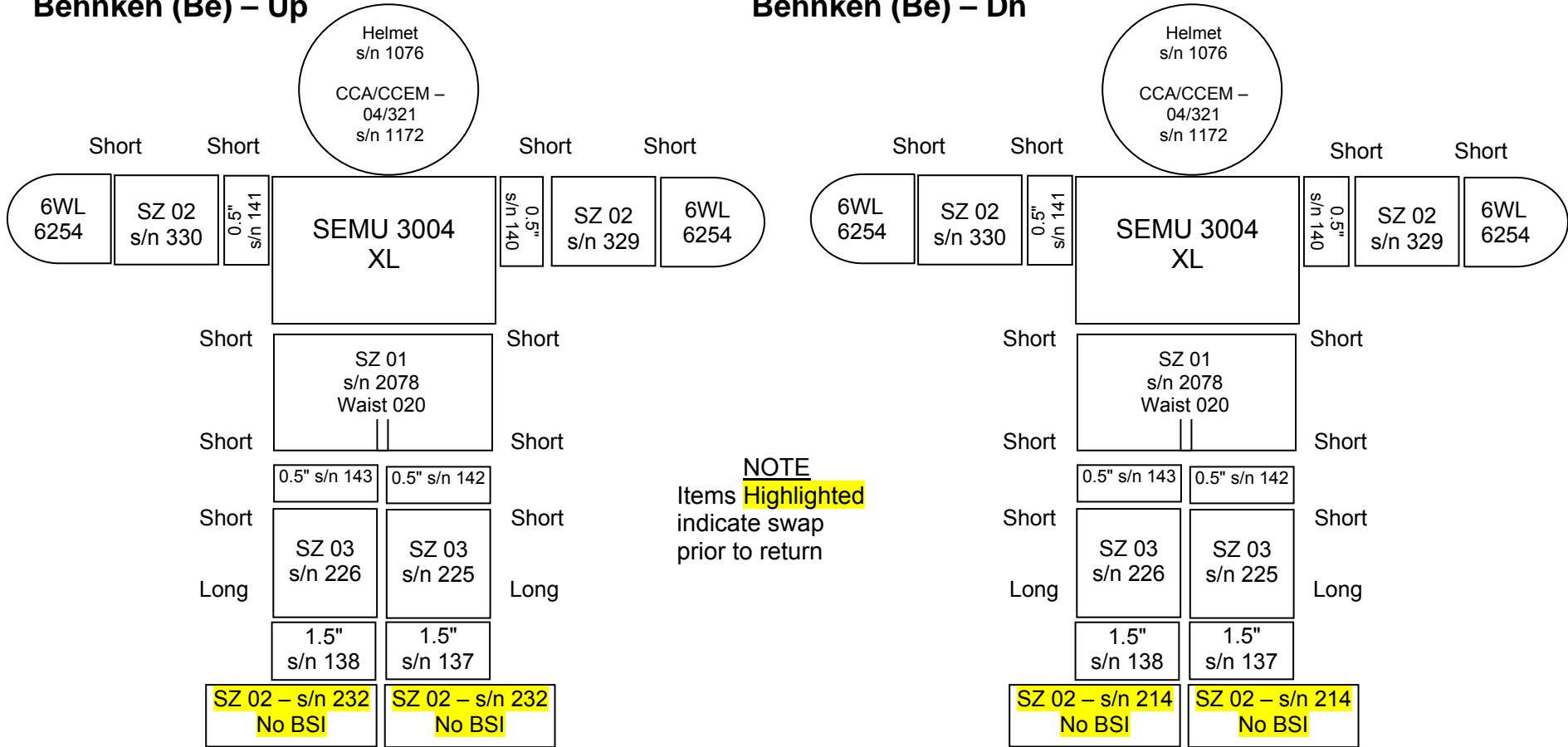
If Cm-Behnken experiences any index metacarpal knuckle swelling, use moleskin-mosite comfort patch and thinner spectra comfort gloves within his ECOK zip lip bags for subsequent EVAs

P & I

STS-130 NOMINAL EMU SIZING

Behnken (Be) – Up

Behnken (Be) – Dn

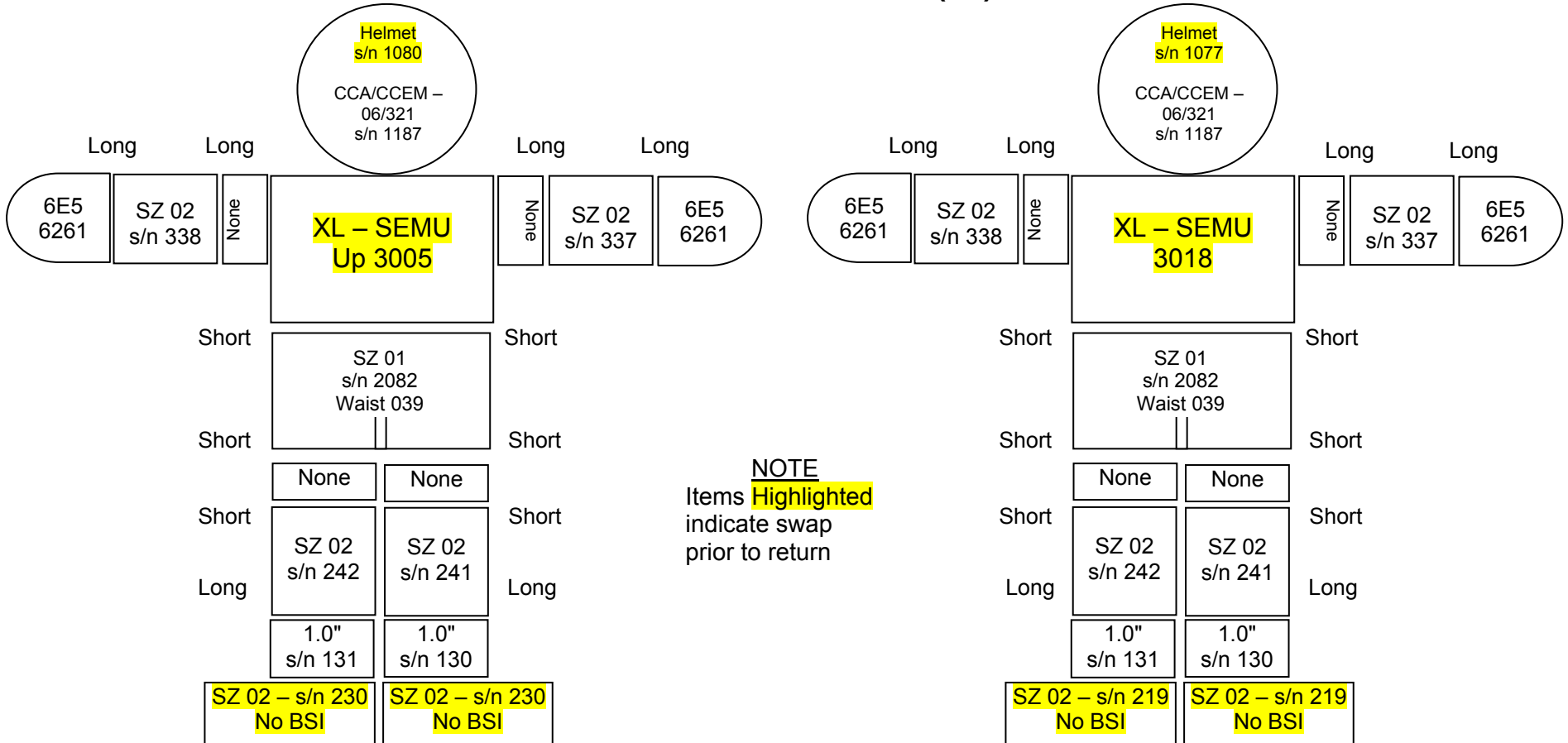


	Croakie	Fresnel	Valsalva	LCVG/BLVD	MAG	TCU Top	TCU Bottom	Comfort Gloves	Socks
Be	None	None	Mod -308	04/05	709	L	L	-10 & .06	Thermax Sock Liner

STS-130 NOMINAL EMU SIZING (Cont)

Patrick (Pk) – Up

Patrick (Pk) – Dn



	Croakie	Fresnel	Valsalva	LCVG/BLVD	MAG	TCU Top	TCU Bottom	Comfort Gloves	Socks
PK	1	None	-309	05/05	709	L	M	Custom	Tube

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TPS REPAIR

The TPS Repair procedures listed below are not published in the hardcopy EVA Flight Supplement. These procedures will be uplinked realtime if they are required.

A PDF and a WORD version of the procedures can be found at:
<http://mod.jsc.nasa.gov/do3/FDF/FDFBooks/Status%20Sheets/index.html>.

Select the "As Flown" Status sheet for STS-130 and the link to the procedures can be found with the link to the EVA FS. The procedures can also be found on the FDF Books CD provided to the FAO console

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STS-130/20A WORKAROUND CRIBSHEET

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UNSCH/CONT
EVA TASKS

STS-130/20A WORKAROUND CRIBSHEET

EVA 1 CONTINGENCIES

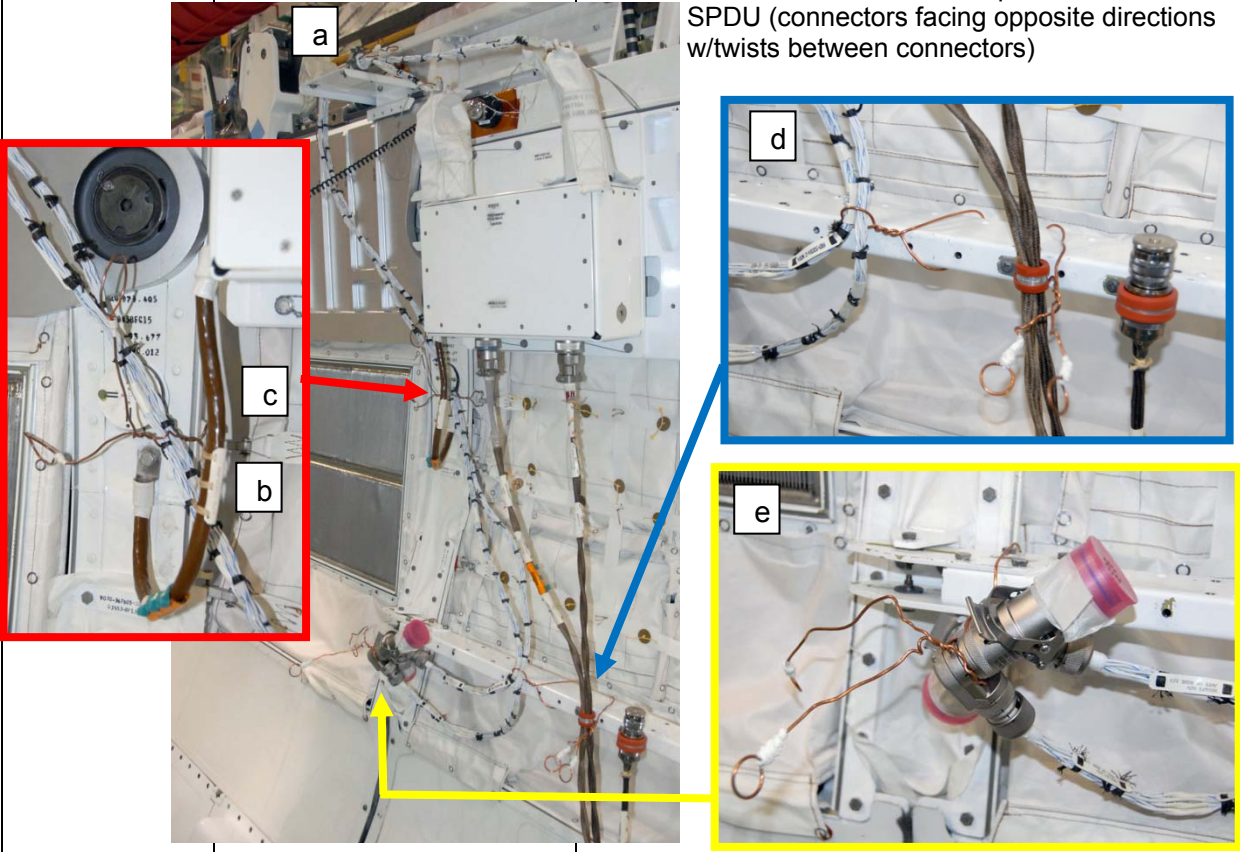
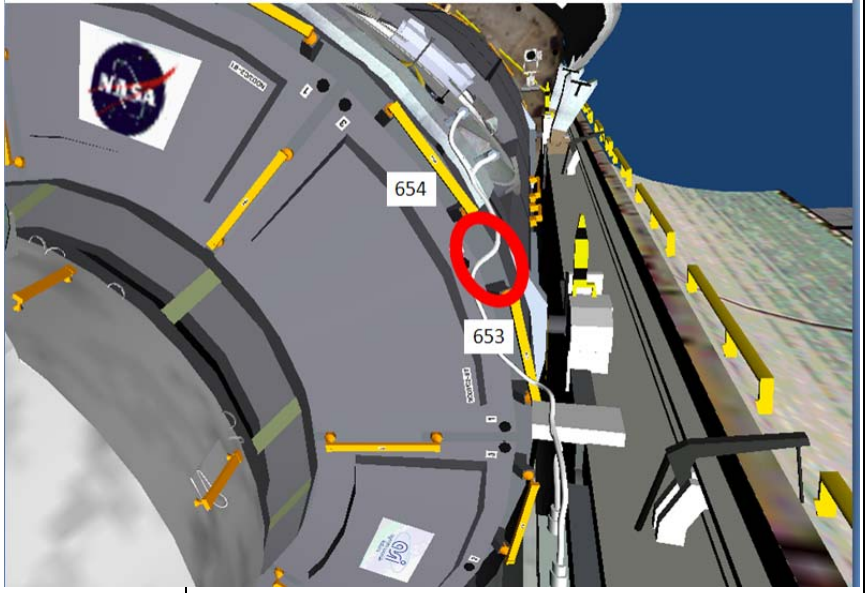
TASK	FAILURE	ACTION
Egress		
Hatch	A. Hatch fails to open	If lever does not rotate Check for FOD
Gap Spanner #1 Install		
Gap Spanner	B. Gap Spanner will not install on HR	1. Check Gap Spanner fully extended 2. Route to alternate HR per MCC direction
NOD1 Port CBCS Flap Open		
CBCS Flap	C. Flap unable to be secured open	Use Wire Ties to restrain flap open to center disk cover turn buckle. Verify Wire Ties clear of mating interfaces
1553 BUS Terminator Install		
Clover Leaf Dust Cap	D. Connector Cap (Twist) will not release	1. Increase force 2. Use tether hook for additional leverage 3. On MCC-H GO : Attach Adj Equip Tether hook to cap tether point and pull strap of adj tether to release cap
Terminator	E. Connector fails to soft dock	1. Verify correct plug and jack 2. Verify bail fully aft 3. Verify backshell fully aft and remains fully aft. If backshell not fully aft, pull and hold in fully aft position while attempting to soft dock connector 4. Inspect the following: – O-ring seal – FOD – Bend radius – Soft dock springs – Connector keying feature 5. Verify alignment (avoid excessive rolling or rocking the plug as this could unseat soft dock springs) – Connector should snap into soft dock with little force once half shells are aligned
	F. Bail bar fails to slide over-center	1. Inspect bail for FOD 2. Inspect bail linkage for damage and report to MCC-H 3. Check alignment and sideloads 4. Verify sufficient TA clamps are open 5. Increase force on bail 6. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 7. On MCC-H GO : Retrieve vise grips to help increase force on bail
	G. Connector fails to mate	1. Verify half-shells are fully seated on both sides 2. Verify cable and backshell free to move (no clamps) 3. Push forward on connector backshell while actuating bail 4. Detach from soft dock and inspect: – Pins – FOD – EMI band – Bend radius – TA clamps – P clamps – Bail linkages and rivets – Soft dock springs – O-ring seal and main joint gasket – Connector keying feature 5. Cycle bail while disconnected (push forward on connector backshell for additional leverage)

UNSC/CONT
EVA TASKS

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
Orbiter LTA Cable Remove/Stow		
TA Clamp	H. TA clamp fails to release	<ol style="list-style-type: none"> 1. With handle up, press down on top of rounded clamp 2. With handle up, use tether hook to pry drawhook from capture pin
LTA Connector	I. Bail bar fails to slide over-center	<ol style="list-style-type: none"> 1. Inspect bail for FOD 2. Inspect bail linkage for damage and report to MCC-H 3. Check alignment and sideloads 4. Verify sufficient TA clamps are open 5. Increase force on bail 6. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 7. On MCC-H GO: Retrieve Vise Grips to help increase force on bail
	J. Backshell fails to slide (after over-center mechanism has been overcome)	<ol style="list-style-type: none"> 1. Verify sufficient TA clamps are open 2. Check for cable harness and hardware interference 3. Check alignment and sideloads 4. Inspect bail and connector for FOD 5. Inspect bail linkage for damage and report to MCC-H 6. Wiggle/jiggle connector while pushing or pulling on backshell 7. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 8. On MCC-H GO: Retrieve Vise Grips to help increase force on bail
	K. Connector fails to release from soft dock	<ol style="list-style-type: none"> 1. Verify bail fully thrown, undamaged, and backshell fully aft 2. If backshell springs forward, pull and hold in fully aft position (will have to overcome spring force, approx 5-10 lb) while attempting to demate connector 3. Verify sufficient TA clamps are open 4. Check for cable harness and hardware interference 5. Check alignment and sideloads 6. Relieve compression on connector interface due to cable loads by pulling backshell away from jack 7. Push the plug towards the jack to compress the soft dock 8. Wiggle/jiggle connector. (Use slight rolling motion)

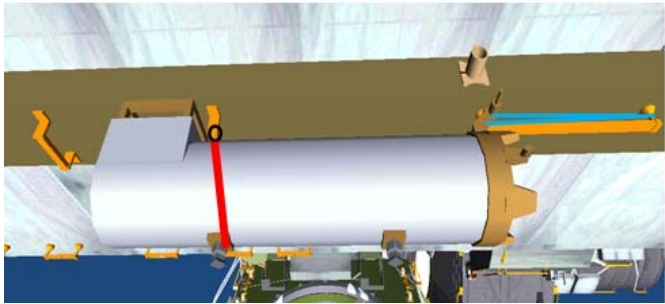
STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	<p>L. Connector(s) cannot be removed from SPDU</p> 	<p>Tie-down to orbiter. Route cables as follows:</p> <ul style="list-style-type: none"> a. In sill TA clamp b. Under grounding wire c. Wire Tie (small) to orbiter strap bracket d. Wire Tie (long) to center of strut below SPDU (use harness bracket to restrain cables forward) e. Wire Tie connectors to aft part of strut under SPDU (connectors facing opposite directions w/twists between connectors)
	<p>M. Connector(s) cannot be removed from NOD3</p>	<p>Coil and Wire Tie between NOD3 HRs 0653 & 0654</p> 

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
Clover Leaf Dust Cap	N. Connector cap (Twist) will not install	<ol style="list-style-type: none"> 1. Check for FOD 2. Increase force 3. Use tether hook for additional leverage
TSA	O. Latch fails to open	<ol style="list-style-type: none"> 1. Release 7/16 EVA bolt on latch bracket [A2 CCW2, 30.5], ~1-2 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (3.8 ft-lb, 30 RPM) 2. Rotate bracket clear of latch 3. OR stow cable in Avionics C/Lk bag and close remaining latches
	P. Latch fails to close	Close remaining latches (3 of 4 required for landing)
OTP Removal/Stow		
EDFs	Q. EDF does not release with recommended torque	<ol style="list-style-type: none"> 1. Use manual Ratchet Mode on PGT (CCW, 30.5) for 1 turn only, continue releasing at nominal torque 2. Use Ratchet Wrench (ccw) 3. Remove EDF with Prybar (only if head not free spinning) 4. 3 of 4 EDFs required for OTP-SPDM interface
	R. EDF cannot be removed from lug/clevis after untorqued	<ol style="list-style-type: none"> 1. Twist outer washer (lanyard washer) back and forth while pulling outward 2. Verify lanyard not snagged 3. Drive EDF [B7,CCW2,30.5], ~2 turns (start EDF by hand when re-installing) <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (25.5 ft-lb, 30 RPM) 4. Gently tap along EDF major axis with back of equipment hook or Prybar (EDF head must not be free spinning), and pull outward with lanyards 5. Use equipment hook over EDF bolt head to remove (EDF head must not be free spinning) 6. EVA Prybar (EDF head must not be free spinning)
	S. Cannot softdock EDF into lug/clevis interface	<ol style="list-style-type: none"> 1. Verify lug/clevis free of FOD 2. Twist EDF bolt head by hand to seat on tip hex head, retry insertion; verify head not free spinning 3. Drive EDF [B7,CCW2,30.5], ~2 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (25.5 ft-lb, 30 RPM) 4. Retry insertion; verify head not free spinning 5. Remove EDF and verify collets not expanded
Hinge Pin	T. Hinge pin does not release with recommended trq	<ol style="list-style-type: none"> 1. Use manual Ratchet Mode on PGT (CCW, 30.5) for 1 turn only, continue releasing at nominal torque 2. Use Ratchet Wrench (ccw)
	U. Hinge pin cannot be removed	<ol style="list-style-type: none"> 1. Use Prybar to remove hinge pin 2. Re-engage 3 of 4 EDFs (B7, CW2, 30.5)
Tie-down	V. OTP hinge pin stalls/jams when installing onto HAB tray	Drive EDF [B7,CCW2,30.5] , ~10 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (25.5 ft-lb, 30 RPM)

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	W. OTP hinge pin cannot be secured to HAB tray horizontal HR	Use LDTD Tether to secure OTP hinge pin bracket (bar parallel to hinge pin) against HAB tray horizontal HR Port standoff. LDTD Tether should be wrapped around OTP hinge pin bracket, with both hooks to stbd HR standoff. Note that each leg of tether routing is on opposite sides of the port HR standoff 
	X. OTP cannot be secured to HAB tray with LDTD tether	Secure to HAB tray HH with 2 Adj Equip Tethers in series (same routing as LDTD Tether)
NODE 3 LTA Cable Install/NODE 3 Avionics Install		
TA Clamp	Y. TA clamp fails to release	<ol style="list-style-type: none"> 1. With handle up, press down on top of rounded clamp 2. With handle up, use tether hook to pry drawhook from capture pin
Connectors	Z. Bail bar fails to slide over-center	<ol style="list-style-type: none"> 1. Inspect bail for FOD 2. Inspect bail linkage for damage and report to MCC-H 3. Check alignment and sideloads 4. Verify sufficient TA clamps are open 5. Increase force on bail 6. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 7. On MCC-H GO: Retrieve Vise Grips to help increase force on bail
	AA. Backshell fails to slide (after over-center mechanism has been overcome)	<ol style="list-style-type: none"> 1. Verify sufficient TA clamps are open 2. Check for cable harness and hardware interference 3. Check alignment and sideloads 4. Inspect bail and connector for FOD 5. Inspect bail linkage for damage and report to MCC-H 6. Wiggle/jiggle connector while pushing or pulling on backshell 7. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 8. On MCC-H GO: Retrieve Vise Grips to help increase force on bail
	BB. Connector fails to release from soft dock	<ol style="list-style-type: none"> 1. Verify bail fully thrown, undamaged, and backshell fully aft 2. If backshell springs forward, pull and hold in fully aft position (will have to overcome spring force, approx 5-10 lb) while attempting to demate connector 3. Verify sufficient TA clamps are open 4. Check for cable harness and hardware interference 5. Check alignment and sideloads

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
		<ol style="list-style-type: none"> 6. Relieve compression on connector interface due to cable loads by pulling backshell away from jack 7. Push the plug towards the jack to compress the soft dock 8. Wiggle/jiggle connector. (Use slight rolling motion)
	CC. Connector fails to soft dock	<ol style="list-style-type: none"> 1. Verify correct plug and jack 2. Verify bail fully aft 3. Verify backshell fully aft and remains fully aft. If backshell not fully aft, pull and hold in fully aft position while attempting to soft dock connector 4. Inspect the following: <ul style="list-style-type: none"> - O-ring seal - FOD - Bend radius - Soft dock springs - Connector keying feature 5. Verify alignment (avoid excessive rolling or rocking the plug as this could unseat soft dock springs) <ul style="list-style-type: none"> - Connector should snap into soft dock with little force once half shells are aligned
	DD. Connector fails to mate	<ol style="list-style-type: none"> 1. Verify half-shells are fully seated on both sides 2. Verify cable and backshell free to move (no clamps) 3. Push forward on connector backshell while actuating bail 4. Detach from soft dock and inspect: <ul style="list-style-type: none"> - Pins - FOD - EMI band - Bend radius - TA clamps - P clamps - Bail linkages and rivets - Soft dock springs - O-ring seal and main joint gasket - Connector keying feature 5. Cycle bail while disconnected (push forward on connector backshell for additional leverage)
Clover Leaf Dust Cap	EE. Connector cap (Twist) will not release	<ol style="list-style-type: none"> 1. Increase force 2. Use tether hook for additional leverage 3. On MCC-H GO: Attach Adj Equip Tether hook to cap tether point and use strap of adj tether to release cap
Gap Spanner #2 Install		
Gap Spanner	FF. Gap spanner will not install on HR	<ol style="list-style-type: none"> 1. Check gap spanner fully extended 2. Route to alternate HR per MCC direction
Ingress		
Hatch	GG. Hatch fails to close	<ol style="list-style-type: none"> 1. Check hatch seated and no FOD on sealing surface 2. If lever does not rotate: <ul style="list-style-type: none"> Check for FOD

STS-130/20A WORKAROUND CRIBSHEET (Cont)

EVA 2 CONTINGENCIES

TASK	FAILURE	ACTION
Egress		
Hatch	A. Hatch fails to open	If lever does not rotate: Check for FOD
NODE 3 FQD Jumpers		
<p><u>NOTE</u></p> <p>If troubleshooting requires the crew to leave the worksite, verify that female QDs are covered to prevent exposure to direct sunlight</p>		
Mating Ops	B. Female QD Cap/Plug fails to remove	<ol style="list-style-type: none"> 1. Verify release ring is fully retracted while attempting to demate 2. Verify detent button is up (locking collar can be rotated under button) 3. Apply greater force to release ring and female QD cap; use EV2 as reqd 4. Notify MCC-H
	C. Cap will not demate	<ol style="list-style-type: none"> 1. Verify pulling out on cap before rotating to ensure locking tab is disengaged 2. Wait for day pass if possible and reattempt cap removal (thermal cycle) 3. If force is too great for hand actuation or crystals visible around the QD, male may be leaking; notify MCC-H <ol style="list-style-type: none"> a. Retrieve QD Cap Tool from QD bag on A/L b. Drive QD Cap Tool [A4, CCW1, 30.5], ~2 turns <ul style="list-style-type: none"> <input type="checkbox"/> Perform last turn CCW by hand <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (6.3 ft-lb, 10 RPM) c. If force too great for hand actuation, allow time for thermal cycling and venting
	D. Female and Male physically too far apart	<ol style="list-style-type: none"> 1. Assess Gap Spanner routing 2. If Loop A lines too short notify MCC-H; prepare to activate Loop B only (30 min)
	E. Female cannot be angled directly with the Male	<ol style="list-style-type: none"> 1. Assess and counteract side loads as necessary 2. Manipulate hose to make alignment, release gap spanners as required 3. Note force required to manipulate hose, counter force will be required during valve ops
	F. QD fails to mate	<ol style="list-style-type: none"> 1. Check for debris, damage, or crystals 2. Verify release ring is retracted. (Fwd white band is not visible); perform snap back test 3. Check alignment and verify no side loads
	G. Release ring snap back test fails	<ol style="list-style-type: none"> 1. Push release ring forward while pushing QD forward. (Release ring will not slide fwd if QD is in FID); verify fwd whit band visible and repeat snap back test 2. QD is in FID; demate QD, verify fwd white band not visible, and remate QD
	H. Pull test fails	Demate QD, verify fwd white band not visible, and remate QD
	I. Gap check fails (visual or FID gauge)	Retract release ring, demate QD, verify fwd white band not visible, and remate QD

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
Valve Ops	J. Detent button is partially unthreaded	Rethread detent button <ol style="list-style-type: none"> Load bail handle (button will free spin if not loaded) <ul style="list-style-type: none"> If valve is open, pull bail handle aft If valve is closed, push bail handle fwd Rotate button cw (8 turns max)
	K. Detent button is missing NOTE Detent button is only required for BDT ops and 1 in SPD ops	<ol style="list-style-type: none"> Use equipment hook to depress detent button shaft Use tether strap around gloved finger to depress detent button shaft Retrieve and use Beta Gimbal Antirotation Latch Tool to depress detent button shaft (Z1 stbd toolbox)
	L. Bail fails to travel fwd (open)	<ol style="list-style-type: none"> Check for debris, damage, or crystals Check side loads; re-attempt Retrieve and use QD bail drive lever; notify MCC-H
	M. Bail fails to travel to full fwd (valve open) position (button does not pop up)	<ol style="list-style-type: none"> Neutralize sideloads Apply greater opening force to QD bail handle Retrieve and use QD bail drive lever; notify MCC-H
	N. Detent button fails to depress during valve closing <div style="border: 2px solid black; padding: 5px; width: fit-content;">WARNING Bail may kick back and contact crew when button is depressed if a leaking primary seal allowed pressure build-up in spring cavity</div>	<ol style="list-style-type: none"> Verify locking collar fully rotated Push and hold bail handle fwd (to open) with significant force to relieve load on button while simultaneously depressing the detent button. <ol style="list-style-type: none"> If button depresses, vent by pulling bail aft until release ring covers aft white band Push bail fwd to valve open and check button depresses Retrieve QD bail drive lever and repeat step 2; notify MCC-H Contact MCC-H to reduce NH3 temperature if possible On MCC-H GO: Retrieve and install QD button depress tool (BDT → QD Bag) and AKT (Contingency Crewlock Bag)
O. Bail fails to travel to full aft (valve closed) position (button does not pop up)	<ol style="list-style-type: none"> Inspect QD for retaining wire protrusion Neutralize possible side loading Depress button and increase force on bail Retrieve and use QD bail drive lever; notify MCC-H 	
Demating Ops	P. Female QD fails to demate	<ol style="list-style-type: none"> Verify release ring is fully retracted while attempting to demate Verify detent button is up (locking collar can be rotated under button) Neutralize sideloads or manipulate flexhose to relieve mating forces on female QD Apply greater force to release ring and female QD Retrieve and use QD release tool (QRT) to apply greater force; notify MCC-H
Leaks	Q. Male QD leaks after cap removal <div style="border: 1px solid black; padding: 5px; width: fit-content;">CAUTION Avoid twisting of QD jumpers and clocking of QDs once valves are open Avoid significant crushing of NH3 MLI</div>	<ol style="list-style-type: none"> If crystals are minimal and dissipating, continue If continuous and significant leak, re-install QD cap <ol style="list-style-type: none"> Notify MCC-H; press with EVA When ready to open QD valves, remove cap and prepare for quick QD mate on MCC-H GO If unable to reinstall cap, mate both LAB and NOD3 sides of QD jumper <ol style="list-style-type: none"> Stay clear of leak until loop shutdown complete Ensure at least 2 gap spanners routed over lines Open LAB QD per BLOCK C Open NOD3 QD per BLOCK C Verify jumpers can be manipulated; notify MCC-H if decrease in pressure required

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	R. Female mated QD leaks in valve open position (bail fwd)	<ol style="list-style-type: none"> 1. Close valve (bail aft) [BLOCK A step 11] 2. Re-attempt QD opening per BLOCK C 3. If no joy, perform steps 11 thru 14 BLOCK A 4. On MCC-H GO, perform BLOCK B and BLOCK C 5. If no joy, close valve (bail aft) [BLOCK A step 11] and press with EVA 6. On MCC-H GO, prepare for Loop B activation (1 hr)
	S. QD leaks after closing valve	Open valve per BLOCK C
	T. Female QD leaks after demate	Mate to male
	U. Male QD leaks after demate (male sleeve may be visibly stuck open)	<ol style="list-style-type: none"> 1. Remate female QD and open valve (bail fwd) [BLOCK B and C] <ol style="list-style-type: none"> a. Depress button and use significant force to push bail forward; release button b. With QD in open position (bail fwd) apply significant force to aft end of the female QD in back and forth, up and down directions c. Attempt to close valve (bail aft) d. Demate QD and inspect 2. If no joy, remate QD and open valve [BLOCK B and C] 3. If QD still leaking contact MCC-H 4. Repeat step 1a thru 1d and install cap
	V. Leak detected by MCC-H after valve ops (possible male sleeve stuck open)	<ol style="list-style-type: none"> 1. Cycle QD to open position (bail fwd) <ol style="list-style-type: none"> a. Depress button and use significant force to push bail forward; release button b. With QD in valve open (bail fwd) position apply significant force to aft end of the female QD in back and forth, up and down directions c. Attempt to close valve (bail aft) d. Demate QD and inspect 2. If applicable, close valve of appropriate QD in flowpath, verify detent button is up, and fwd white line is visible
	W. Frozen NH3 present on Female and male QD mated	On MCC-H GO : Open QDs
Bootie Ops	X. Thermal bootie fails to remain securely closed	<ol style="list-style-type: none"> 1. Install wire tie around bootie to keep QD fully covered 2. Check with MCC-H
NODE 3 FQD MLI		
MLI Install	Y. MLI will not mate/fit	<ol style="list-style-type: none"> 1. Check MLI oriented correctly 2. Secure MLI using Wire Ties
Gap Spanner Install		
Gap Spanner	Z. Gap spanner will not install on HR	<ol style="list-style-type: none"> 1. Check gap spanner fully extended 2. Route to alternate HR per MCC direction 3. Retrieve alternate Gap Spanner per MCC direction
	AA. Additional Gap Spanners needed for restraints	Use the following <ul style="list-style-type: none"> - 303 (#2): NOD1 HR 0106 → NOD3 HR 0673 - 305: NOD1 HR 0112 (stbd) → LAB HR 0220 (port) - 307 (#1): LAB HR 0231 → 0232
Keel Pin Cover Install		
Keel Pin Cover	BB. Keel Pin cover grounding fastener will not install	<ol style="list-style-type: none"> 1. Check MLI oriented correctly 2. Wire Tie tether loops together

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
NODE 3 Nadir CBM		
CBCS Flap	CC. Flap unable to be secured open	Use Wire Ties to restrain flap open to center disk cover turn buckle. Verify Wire Ties clear of mating interfaces
Petals	DD. CBM petal will not release	<ol style="list-style-type: none"> 1. Wrap Adj Equip Tether strap or equipment hook around latch to aid in release 2. If no joy, can be release via IV bolt-driving command
Trunnion Cover Install		
Trunnion Cover	EE. Trunnion cover grounding fastener will not install	<ol style="list-style-type: none"> 1. If 1 of 2 fasteners installed successfully, no action – press with next task 2. If both fasteners will not install, ensure Velcro mated (6 Velcro tabs)
OIH Install		
OIH	FF. HR will not install in seat track or fails to soft dock	<ol style="list-style-type: none"> 1. Verify HR installed in correct direction per arrow on underside of HR 2. Verify HR shoes are completely released and soft dock armed 3. Check for FOD on HR and seat track 4. Verify HR bolt completely released: <ul style="list-style-type: none"> Drive OIH bolt [A1,CCW2,30.5], ~8 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (2.5 ft-lb, 30 RPM) 5. If HR in seat track but soft dock will not engage, attempt to drive HR bolts 6. On MCC-H GO: Depending on HR priority, attempt to install 180 out or a different HR at this location
	GG. HR bolt fails to fully seat	<ol style="list-style-type: none"> 1. Increase PGT setting, drive OIH bolt [A3,CW2,30.5], ~8 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (4.8 ft-lb, 30 RPM) 2. If torqued, remove HR: <ol style="list-style-type: none"> a. Drive OIH bolt [A2,CCW2,30.5], ~1 turn <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (3.8 ft-lb, 30 RPM) – To break torque b. Drive OIH bolt [A1,CCW2,30.5], ~7 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (2.5 ft-lb, 30 RPM) – Check for FOD on HR and seat track and reinstall using original torque 3. Increase PGT setting, drive OIH bolt [A3,CW2,30.5], ~8 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (4.8 ft-lb, 30 RPM) 4. On MCC-H GO: Depending on HR priority, attempt to install 180 out or a different HR at this location 5. Remove HR and stow in OIH Bag
	HH. HR bolt jammed and can be neither installed nor removed	<div style="border: 3px double black; padding: 5px; text-align: center;"> <p>WARNING Do not use failed OIH for any translation, BRT, etc</p> </div> <ol style="list-style-type: none"> 1. Install other bolt 2. If 1 of 2 bolts is installed, no action is required but do not use the OIH 3. If both bolts failed, tie down the OIH to adjacent HR

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
NPV Install		
	II. Unable to release vent plate bolt	1. Apply higher torque for one turn; drive bolt [A7,CCW2,30.5] , 1 turn <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (9.2 ft-lb, 30 RPM) 2. NPV plate good with 1 of 4 bolts
	JJ. NPV cannot be installed on alignment pins	On MCC GO , install vent using one alignment pin, rotate vent, and position vent such that surface is in contact with mounting plate surface. Wire tie vent to mounting plate and allow 30 minutes for thermal equilibrium
	KK. NPV bolt does not engage	Secure NPV with at least 2 more bolts (2 of 4 fully torque bolts required)
	LL. NPV bolt jams on install	Secure NPV with at least 2 more bolts (2 of 4 fully torque bolts required)
Gap Spanner #3 Install		
Gap Spanner	MM. Gap spanner will not install on HR	1. Check gap spanner fully extended 2. Route to alternate HR per MCC direction
Ingress		
Hatch	NN. Hatch fails to close	1. Check hatch seated and no FOD on sealing surface 2. If lever does not rotate: Check for FOD

STS-130/20A WORKAROUND CRIBSHEET (Cont)

EVA 3 CONTINGENCIES

TASK	FAILURE	ACTION
Egress		
Hatch	A. Hatch fails to open	If lever does not rotate: Check for FOD
NODE 3 FQD Jumpers		
<p><u>NOTE</u> If troubleshooting requires the crew to leave the worksite, verify that female QDs are covered to prevent exposure to direct sunlight</p>		
Valve Ops	B. Detent button is partially unthreaded	Rethread detent button a. Load bail handle (button will free spin if not loaded) – If valve is open, pull bail handle aft – If valve is closed, push bail handle fwd b. Rotate button cw (8 turns max)
	C. Detent button is missing <u>NOTE</u> Detent button is only required for BDT ops and 1 in SPD ops	1. Use equipment hook to depress detent button shaft 2. Use tether strap around gloved finger to depress detent button shaft 3. Retrieve and use Beta Gimbal Antirotation Latch Tool to depress detent button shaft (Z1 stbd toolbox)
	D. Bail fails to travel fwd (open)	1. Check for debris, damage, or crystals 2. Check side loads; re-attempt 3. Retrieve and use QD bail drive lever; notify MCC-H
	E. Bail fails to travel to full fwd (valve open) position (button does not pop up)	1. Neutralize sideloads 2. Apply greater opening force to QD bail handle 3. Retrieve and use QD bail drive lever; notify MCC-H
	F. Detent button fails to depress during valve closing <div style="border: 2px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p style="text-align: center;">WARNING Bail may kick back and contact crew when button is depressed if a leaking primary seal allowed pressure build-up in spring cavity</p> </div>	1. Verify locking collar fully rotated 2. Push and hold bail handle fwd (to open) with significant force to relieve load on button while simultaneously depressing the detent button a. If button depresses, vent by pulling bail aft until release ring covers aft white band b. Push bail fwd to valve open and check button depresses 3. Retrieve QD bail drive lever and repeat step 2; notify MCC-H 4. Contact MCC-H to reduce NH3 temperature if possible 5. On MCC-H GO : Retrieve and install QD button depress tool (BDT → QD Bag) and AKT (Contingency Crewlock Bag)
	G. Bail fails to travel to full aft (valve closed) position (button does not pop up)	1. Inspect QD for retaining wire protrusion 2. Neutralize possible side loading 3. Depress button and increase force on bail 4. Retrieve and use QD bail drive lever; notify MCC-H
	H. Detent button is partially unthreaded	Rethread detent button a. Load bail handle (button will free spin if not loaded) – If valve is open, pull bail handle aft – If valve is closed, push bail handle fwd b. Rotate button cw (8 turns max)

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
Leaks	I. Male QD leaks after cap removal <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p style="text-align: center;">CAUTION</p> <p>Avoid twisting of QD jumpers and clocking of QDs once valves are open</p> <p>Avoid significant crushing of NH3 MLI</p> </div>	<ol style="list-style-type: none"> 1. If crystals are minimal and dissipating, continue 2. If continuous and significant leak, re-install QD cap <ol style="list-style-type: none"> a. Notify MCC-H; press with EVA b. When ready to open QD valves, remove cap and prepare for quick QD mate on MCC-H GO 3. If unable to reinstall cap, mate both LAB and NOD3 sides of QD jumper <ol style="list-style-type: none"> a. Stay clear of leak until loop shutdown complete b. Ensure at least 2 gap spanners routed over lines c. Open LAB QD per BLOCK C d. Open NOD3 QD per BLOCK C e. Verify jumpers can be manipulated; notify MCC-H if decrease in pressure required
	J. Female mated QD leaks in valve open position (bail fwd)	<ol style="list-style-type: none"> 1. Close valve (bail aft) [BLOCK A step 11] 2. Re-attempt QD opening per BLOCK C 3. If no joy, perform steps 11 thru 14 BLOCK A 4. On MCC-H GO, perform BLOCK B and BLOCK C 5. If no joy, close valve (bail aft) [BLOCK A step 11] and press with EVA
	K. QD leaks after closing valve	Open valve per BLOCK C
	L. Female QD leaks after demate	Mate to male
	M. Male QD leaks after demate (male sleeve may be visibly stuck open)	<ol style="list-style-type: none"> 1. Remate female QD and open valve (bail fwd) [BLOCK B and C] <ol style="list-style-type: none"> a. Depress button and use significant force to push bail forward; release button b. With QD in open position (bail fwd) apply significant force to aft end of the female QD in back and forth, up and down directions c. Attempt to close valve (bail aft) d. Demate QD and inspect 2. If no joy, remate QD and open valve [BLOCK B and C] 3. If QD still leaking contact MCC-H 4. Repeat step 1a thru 1d and install cap
	N. Leak detected by MCC-H after valve ops (possible male sleeve stuck open)	<ol style="list-style-type: none"> 1. Cycle QD to open position (bail fwd) <ol style="list-style-type: none"> a. Depress button and use significant force to push bail forward; release button b. With QD in valve open (bail fwd) position apply significant force to aft end of the female QD in back and forth, up and down directions c. Attempt to close valve (bail aft) d. Demate QD and inspect 2. If applicable, close valve of appropriate QD in flowpath, verify detent button is up, and fwd white line is visible
	O. Frozen NH3 present on Female and male QD mated	On MCC-H GO : Open QDs
Bootie Ops	P. Thermal bootie fails to remain securely closed	<ol style="list-style-type: none"> 1. Install wire tie around bootie to keep QD fully covered 2. Check with MCC-H
NODE 3 FQD MLI		
MLI Install	Q. MLI will not mate/fit	<ol style="list-style-type: none"> 1. Check MLI oriented correctly 2. Secure MLI using Wire Ties

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
Gap Spanner Install		
Gap Spanner	R. Gap spanner will not install on HR	<ol style="list-style-type: none"> 1. Check gap spanner fully extended 2. Route to alternate HR per MCC direction 3. Retrieve alternate Gap Spanner per MCC direction
NODE 3 LTA Connector Demate		
Connectors	S. Bail bar fails to slide over-center	<ol style="list-style-type: none"> 1. Inspect bail for FOD 2. Inspect bail linkage for damage and report to MCC-H 3. Check alignment and sideloads 4. Verify sufficient TA clamps are open 5. Increase force on bail 6. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 7. On MCC-H GO: Retrieve Vise Grips to help increase force on bail
	T. Backshell fails to slide (after over-center mechanism has been overcome)	<ol style="list-style-type: none"> 1. Verify sufficient TA clamps are open 2. Check for cable harness and hardware interference 3. Check alignment and sideloads 4. Inspect bail and connector for FOD 5. Inspect bail linkage for damage and report to MCC-H 6. Wiggle/jiggle connector while pushing or pulling on backshell 7. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 8. On MCC-H GO: Retrieve Vise Grips to help increase force on bail
	U. Connector fails to release from soft dock	<ol style="list-style-type: none"> 1. Verify bail fully thrown, undamaged, and backshell fully aft 2. If backshell springs forward, pull and hold in fully aft position (will have to overcome spring force, approx 5-10 lb) while attempting to demate connector 3. Verify sufficient TA clamps are open 4. Check for cable harness and hardware interference 5. Check alignment and sideloads 6. Relieve compression on connector interface due to cable loads by pulling backshell away from jack 7. Push the plug towards the jack to compress the soft dock 8. Wiggle/jiggle connector. (Use slight rolling motion)
	V. Connector fails to soft dock	<ol style="list-style-type: none"> 1. Verify correct plug and jack 2. Verify bail fully aft 3. Verify backshell fully aft and remains fully aft. If backshell not fully aft, pull and hold in fully aft position while attempting to soft dock connector 4. Inspect the following: <ul style="list-style-type: none"> – O-ring seal – FOD – Bend radius – Soft dock springs – Connector keying feature 5. Verify alignment (avoid excessive rolling or rocking the plug as this could unseat soft dock springs) <ul style="list-style-type: none"> – Connector should snap into soft dock with little force once half shells are aligned

STS-130/20A WORKAROUND CRIBSHEET (Cont)

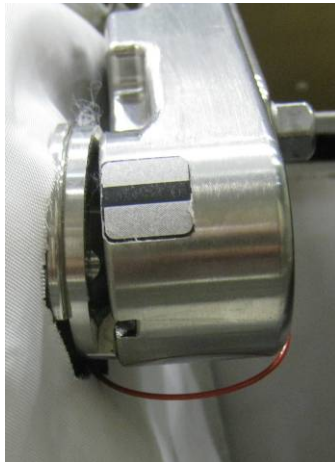
TASK	FAILURE	ACTION
	W. Connector fails to mate	<ol style="list-style-type: none"> 1. Verify half-shells are fully seated on both sides 2. Verify cable and backshell free to move (no clamps) 3. Push forward on connector backshell while actuating bail 4. Detach from soft dock and inspect: <ul style="list-style-type: none"> - Pins - FOD - EMI band - Bend radius - TA clamps - P clamps - Bail linkages and rivets - Soft dock springs - O-ring seal and main joint gasket - Connector keying feature 5. Cycle bail while disconnected (push forward on connector backshell for additional leverage)
PMA3 Heater Cable Mate		
Release stanchion bolts	X. Stanchion bolt will not release	Increase torque on PGT, release bolt [B7,CCW2,30.5] , 1 turn <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (25.5 ft-lb, 30 RPM)
	Y. Handle Bracket bolt will not release	<ol style="list-style-type: none"> 1. Increase torque on PGT, release bolt [B7,CCW2,30.5], 1 turn <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (25.5 ft-lb, 30 RPM) 2. Use manual Ratchet Mode on PGT (CCW, 30.5) for 1 turn only, continue releasing at nominal torque
TA Clamp	Z. TA clamp fails to release	<ol style="list-style-type: none"> 1. With handle up, press down on top of rounded clamp 2. With handle up, use tether hook to pry drawhook from capture pin
	AA. TA Clamp fails to close	Use Wire Tie to route cable
Connectors	BB. Bail bar fails to slide over-center	<ol style="list-style-type: none"> 1. Inspect bail for FOD 2. Inspect bail linkage for damage and report to MCC-H 3. Check alignment and sideloads 4. Verify sufficient TA clamps are open 5. Increase force on bail 6. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 7. On MCC-H GO: Retrieve Vise Grips to help increase force on bail
	CC. Backshell fails to slide (after over-center mechanism has been overcome)	<ol style="list-style-type: none"> 1. Verify sufficient TA clamps are open 2. Check for cable harness and hardware interference 3. Check alignment and sideloads 4. Inspect bail and connector for FOD 5. Inspect bail linkage for damage and report to MCC-H 6. Wiggle/jiggle connector while pushing or pulling on backshell 7. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 8. On MCC-H GO: Retrieve Vise Grips to help increase force on bail

STS-130/20A WORKAROUND CRIBSHEET (Cont)


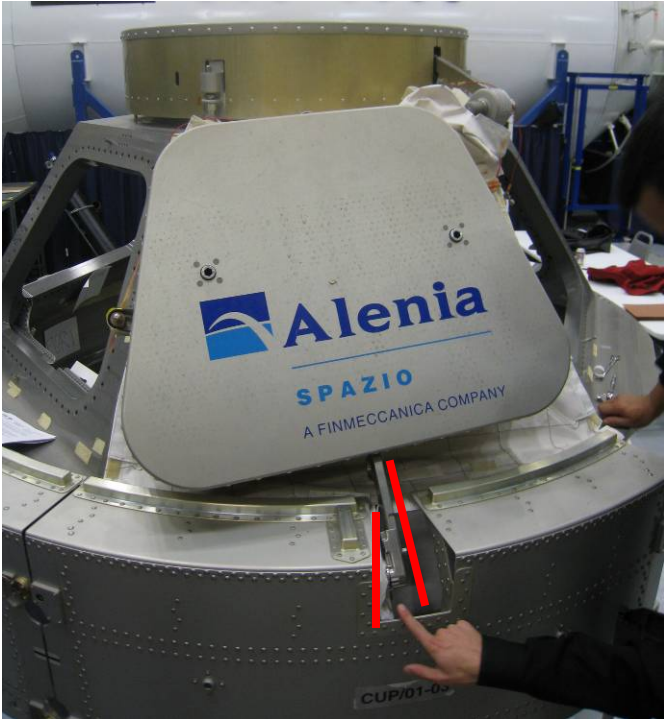

TASK	FAILURE	ACTION
	DD. Connector fails to release from soft dock	<ol style="list-style-type: none"> 1. Verify bail fully thrown, undamaged, and backshell fully aft 2. If backshell springs forward, pull and hold in fully aft position (will have to overcome spring force, approx 5-10 lb) while attempting to demate connector 3. Verify sufficient TA clamps are open 4. Check for cable harness and hardware interference 5. Check alignment and sideloads 6. Relieve compression on connector interface due to cable loads by pulling backshell away from jack 7. Push the plug towards the jack to compress the soft dock 8. Wiggle/jiggle connector. (Use slight rolling motion)
	EE. Connector fails to soft dock	<ol style="list-style-type: none"> 1. Verify correct plug and jack 2. Verify bail fully aft 3. Verify backshell fully aft and remains fully aft. If backshell not fully aft, pull and hold in fully aft position while attempting to soft dock connector 4. Inspect the following: <ul style="list-style-type: none"> - O-ring seal - FOD - Bend radius - Soft dock springs - Connector keying feature 5. Verify alignment (avoid excessive rolling or rocking the plug as this could unseat soft dock springs) <ul style="list-style-type: none"> - Connector should snap into soft dock with little force once half shells are aligned
	FF. Connector fails to mate	<ol style="list-style-type: none"> 1. Verify half-shells are fully seated on both sides 2. Verify cable and backshell free to move (no clamps) 3. Push forward on connector backshell while actuating bail 4. Detach from soft dock and inspect: <ul style="list-style-type: none"> - Pins - FOD - EMI band - Bend radius - TA clamps - P clamps - Bail linkages and rivets - Soft dock springs - O-ring seal and main joint gasket - Connector keying feature 5. Cycle bail while disconnected (push forward on connector backshell for additional leverage)
Clover Leaf Dust Cap	GG. Connector cap (Twist) will not release	<ol style="list-style-type: none"> 1. Increase force 2. Use tether hook for additional leverage 3. On MCC-H GO: Attach Adj Equip Tether hook to cap tether point and use strap of adj tether to release cap

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
Cupola MLI		
Grounding Fastener	HH. Fasteners will not release	<ol style="list-style-type: none"> Apply higher torque for one turn: Release bolt [B2,CCW2,30.5], 1 turn <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (16.0 ft-lb, 30 RPM) Apply higher torque for one turn: Release bolt [B7,CCW2,30.5], 1 turn <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (25.5 ft-lb, 30 RPM) <input type="checkbox"/> expect bolt to shear Use Manual Ratchet (30.5, CCW) for 1 turn, return to nominal settings, expect bolt to shear On MCC GO, cut MLI around bolt w/EMU scissors or compound cutters On MCC GO, use Prybar, expect bolt to shear
Cupola Launch Locks		
Launch Lock	II. Bolt will not release	<ol style="list-style-type: none"> Apply higher torque for one turn: Release bolt [A7,CCW2,30.5], 1 turn <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (9.2 ft-lb, 30 RPM) Apply higher torque for one turn: Release bolt [B7,CCW2,30.5], 1 turn <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (25.5 ft-lb, 30 RPM) <input type="checkbox"/> expect bolt to shear Use Manual Ratchet (30.5, CCW) for 1 turn, return to nominal settings, expect bolt to shear On MCC GO, use Prybar, expect bolt to shear
Cupola Shutters Checkout		
Cupola Shutter	JJ. Shutter fails open	<ol style="list-style-type: none"> Rotate shutter and arm (less than 8 degrees) towards gearbox against spring force to hard stop (torque required is less than 35 ft-lb) Hold against spring force while moving shutter to closed position <ol style="list-style-type: none"> Force against spring can be released once tooth is out of notch on drive shaft (~10 degrees) Torque required to rotate shield closed is less than 18 ft-lb When fully closed, align shutter with launch bolts; arm will remain offset 8 degrees Re-engage launch lock bolt to right of shutter arm [A7,CW2,30.5], ~8 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (9.2 ft-lb, 30 RPM)



STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
		
OI WIF Install		
OI WIF	KK. WIF fails to soft dock	<ol style="list-style-type: none"> 1. Check for FOD and structural interference, cycle soft dock pins; reattempt installation 2. Verify WIF is co-planar 3. Install a different WIF at this location 4. On MCC-H GO: Attempt installation of WIF in a different location 5. Return WIF inside
	LL. WIF tabs do not release	Use Prybar to release tabs

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
OIH Install		
OIH	MM. HR will not install in seat track or fails to soft dock	<ol style="list-style-type: none"> 1. Verify HR installed in correct direction per arrow on underside of HR 2. Verify HR shoes are completely released and soft dock armed 3. Check for FOD on HR and seat track 4. Verify HR bolt completely released: Drive OIH bolt [A1,CCW2,30.5], ~8 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (2.5 ft-lb, 30 RPM) 5. If HR in seat track but soft dock will not engage, attempt to drive HR bolts 6. On MCC-H GO: Depending on HR priority, attempt to install 180 out or a different HR at this location
	NN. HR bolt fails to fully seat	<ol style="list-style-type: none"> 1. Increase PGT setting, drive OIH bolt [A3,CW2,30.5], ~8 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (4.8 ft-lb, 30 RPM) 2. If torqued, remove HR: <ol style="list-style-type: none"> a. Drive OIH bolt [A2,CCW2,30.5], ~1 turn <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (3.8 ft-lb, 30 RPM) - To break torque b. Drive OIH bolt [A1,CCW2,30.5], ~7 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (2.5 ft-lb, 30 RPM) - Check for FOD on HR and seat track and reinstall using original torque 3. Increase PGT setting, drive OIH bolt [A3,CW2,30.5], ~8 turns <ul style="list-style-type: none"> <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (4.8 ft-lb, 30 RPM) 4. On MCC-H GO: Depending on HR priority, attempt to install 180 out or a different HR at this location 5. Remove HR and stow in OIH Bag
	OO. HR bolt jammed and can be neither installed nor removed	<div style="border: 3px double black; padding: 5px; text-align: center;"> <p>WARNING</p> <p>Do not use failed OIH for any translation, BRT, etc</p> </div> <p>Install other bolt</p> <ol style="list-style-type: none"> 1. If 1 of 2 bolts is installed, no action is required but do not use the OIH 2. If both bolts failed, tie down the OIH to adjacent HR
VSC Video Cable Install		
Cable	PP. Cable length too short	Release Wire Ties to pull slack direction needed
Clover Leaf Dust Cap	QQ. Connector cap (Twist) will not release	<ol style="list-style-type: none"> 1. Increase force 2. Use tether hook for additional leverage 3. On MCC-H GO: Attach Adj Equip Tether hook to cap tether point and use strap of adj tether to release cap
Connectors	RR. Bail bar fails to slide over-center	<ol style="list-style-type: none"> 1. Inspect bail for FOD 2. Inspect bail linkage for damage and report to MCC-H 3. Check alignment and sideloads 4. Verify sufficient TA clamps are open 5. Increase force on bail 6. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 7. On MCC-H GO: Retrieve Vise Grips to help increase force on bail

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	SS. Backshell fails to slide (after over-center mechanism has been overcome)	<ol style="list-style-type: none"> 1. Verify sufficient TA clamps are open 2. Check for cable harness and hardware interference 3. Check alignment and sideloads 4. Inspect bail and connector for FOD 5. Inspect bail linkage for damage and report to MCC-H 6. Wiggle/jiggle connector while pushing or pulling on backshell 7. Attach 2 hooks from Adj Equip Tether to connector bail and use adj strap to pull bail into demated position 8. On MCC-H GO: Retrieve Vise Grips to help increase force on bail
	TT. Connector fails to release from soft dock	<ol style="list-style-type: none"> 1. Verify bail fully thrown, undamaged, and backshell fully aft 2. If backshell springs forward, pull and hold in fully aft position (will have to overcome spring force, approx 5-10 lb) while attempting to demate connector 3. Verify sufficient TA clamps are open 4. Check for cable harness and hardware interference 5. Check alignment and sideloads 6. Relieve compression on connector interface due to cable loads by pulling backshell away from jack 7. Push the plug towards the jack to compress the soft dock 8. Wiggle/jiggle connector. (Use slight rolling motion)
	UU. Connector fails to soft dock	<ol style="list-style-type: none"> 1. Verify correct plug and jack 2. Verify bail fully aft 3. Verify backshell fully aft and remains fully aft. If backshell not fully aft, pull and hold in fully aft position while attempting to soft dock connector 4. Inspect the following: <ul style="list-style-type: none"> – O-ring seal – FOD – Bend radius – Soft dock springs – Connector keying feature 5. Verify alignment (avoid excessive rolling or rocking the plug as this could unseat soft dock springs) <ul style="list-style-type: none"> – Connector should snap into soft dock with little force once half shells are aligned
	VV. Connector fails to mate	<ol style="list-style-type: none"> 1. Verify half-shells are fully seated on both sides 2. Verify cable and backshell free to move (no clamps) 3. Push forward on connector backshell while actuating bail 4. Detach from soft dock and inspect: <ul style="list-style-type: none"> – Pins – FOD – EMI band – Bend radius – TA clamps – P clamps – Bail linkages and rivets – Soft dock springs – O-ring seal and main joint gasket – Connector keying feature 5. Cycle bail while disconnected (push forward on connector backshell for additional leverage)

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
FHRC P-Clamp		
	WW. P-Clamp does not release	Increase torque PGT [B1,CCW2,30.5] , drive OIH bolt 1 turn <input type="checkbox"/> 7/16-in (wobble) Socket-6-in ext <input type="checkbox"/> (12.0 ft-lb, 30 RPM) <input type="checkbox"/> return to original setting
NODE 2 Zenith CBM		
CBCS Flap	XX. Flap unable to be secured closed	Use Wire Ties to restrain flap closed to center disk cover flaps tether point. Verify Wire Ties clear of mating interfaces
Ingress		
Hatch	YY. Hatch fails to close	1. Check hatch seated and no FOD on sealing surface 2. If lever does not rotate: Check for FOD

STS-130/20A WORKAROUND CRIBSHEET (Cont)

GENERIC CONTINGENCIES

TASK	FAILURE	ACTION
I. Generic	APFR/IAPFR	
	A. APFR/IAPFR fails to install into WIF	<ol style="list-style-type: none"> 1. Verify APFR collar in install position (black-on-black) 2. Check for FOD in WIF or structural interference 3. Attempt APFR install in alternate clocking 4. If no joy, attempt APFR install in alternate WIF 5. If no joy, APFR failure – Use another APFR
	B. Joint fails to actuate	<ol style="list-style-type: none"> 1. Verify no load is applied to joint and/or jiggle APFR joint while actuating knob – For pitch joint, push knob in during rotation (Class I pitch joints known to be stiff) 2. Increase force applied in order to free joint
	C. Boot becomes stuck in APFR boot plate	<ol style="list-style-type: none"> 1. Have other EV crewmember assist with getting boot out 2. Loosen 7/16-in EVA bolts (3) on heel clip using EVA ratchet or PGT: PGT: [B1 (12.0), CCW2, 30.5], 7/16 - 6-ext 3. Remove 7/16-in EVA bolts (3 – captive) on heel clip (non captive) using EVA ratchet or PGT: PGT: [B1 (12.0), CCW2, 30.5], 7/16 - 6-ext 5 turns
	D. Boot becomes stuck in IAPFR boot plate	<ol style="list-style-type: none"> 1. Have other EV crewmember assist with getting boot out 2. If wearing Small EMU boot, have other EV crewmember adjust boot sizing to Large 3. Loosen 7/16-in EVA bolts (2) on heel clip using EVA ratchet or PGT: PGT: [B2 (16.0), CCW2, 30.5], 7/16 - 6-ext 4. Remove 7/16-in EVA bolts (2) on heel clip using EVA ratchet or PGT: PGT: [B2 (16.0), CCW2, 30.5], 7/16 - 6-ext 4 turns
	Ballstack	
	E. ECOM fails to release from ISS Structure	On MCC-H GO : Tether ballstack to handrail and leave outside
	F. ECOM fails to release from MUT EE	Leave together and return inside
	G. Ballstack fails to rigidize	On MCC-H GO : Use secondary tethers to assist in restraining payload
	BRT	
	H. BRT jaws fail to release	<ol style="list-style-type: none"> 1. Loosen rigidizing collar to relieve sideloads 2. Shake BRT while depressing paddles to alleviate sideloads from handrail 3. Detach BRT from suit and tether to structure
	Cannon Connector	
	I. Connector fails to release	<ol style="list-style-type: none"> 1. Check for FOD, damage or misalignment 2. Verify cable routing is not impeding connector rotation. (Release TA-clamps as required) 3. Use cannon connector tool for more leverage
J. Connector/Cap fails to softdock	<ol style="list-style-type: none"> 1. Verify collar unlocked. (White on connector shell tip should align with white on receptacle backplate) 2. Check for FOD or damage 	

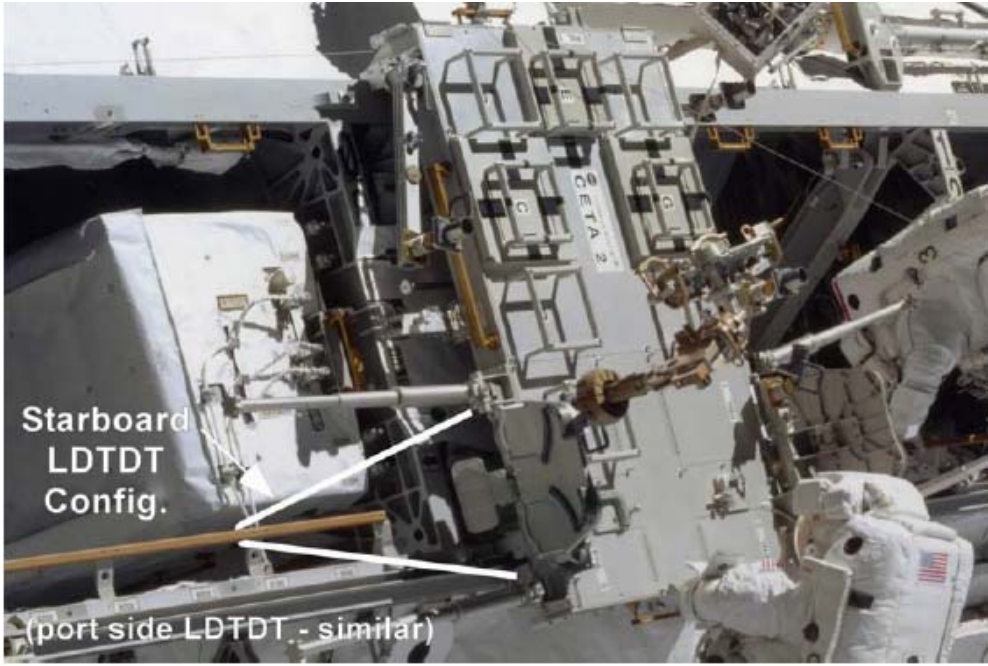


STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	K. Connector/Cap fails to lock	<ol style="list-style-type: none"> 1. Remove connector/cap; check for FOD or damage 2. Check alignment, remate, rock connector back and forth as required. (Once locked, white on connector shell tip should align with black on receptacle backplate) 3. Use cannon connector tool for more leverage
	L. High cable stiffness prevents mating	<ol style="list-style-type: none"> 1. Verify all TA-clamps are released 2. Use second crewmember 3. Use APFR
	M. Connector/Jack pin bent	<ol style="list-style-type: none"> 1. Describe pin location and condition <ul style="list-style-type: none"> – Obtain WVS view of interface if possible 2. On MCC-H GO: For 16, 20, or 22 gauge pins only, retrieve pin straightener and attempt pin repair 3. On MCC-H GO: Retrieve needle nose pliers and attempt pin repair <ul style="list-style-type: none"> – MCC-H will verify pin size prior to retrieving tools
	N. Connector/Jack FOD	On MCC-H GO : Obtain connector cleaner tool to remove FOD
	O. Connector EMI band bent	On MCC-H GO : Obtain needle nose pliers or forceps to remove band
CETA Cart		
	P. Wheel bogie fails to release from truss	<ol style="list-style-type: none"> 1. Verify brakes are fully released 2. Ensure trigger is being depressed while attempting to rotate handle 3. On MCC-H GO: Perform {6.100.125 CETA Cart Wheel Bogie R&R} <ul style="list-style-type: none"> – There is no spare wheel bogie on-orbit, so after the CETA cart is relocated, the failed wheel bogie will be reinstalled
	Q. Wheel bogie fails to install on truss	There is no spare wheel bogie on-orbit. 4 of 4 bogies are required. Real time call on whether MT couple or CETA cart tie-down required. For tie-down see BLOCK G
	R. Parking brake fails to engage	<ol style="list-style-type: none"> 1. Use parking brake handle on other side of CETA cart 2. Couple CETA cart to MT and utilize other WIF if possible
	S. Parking brake fails to disengage	<ol style="list-style-type: none"> 1. Hold pedal down for brake release 2. Use pedal on other side of CETA cart to release parking brake
	T. Dynamic brake fails to engage	Limit translation rates to allow manual stopping
	U. CETA active coupler fails to capture or lock	<ol style="list-style-type: none"> 1. Cycle active coupler 2. If at least 1 CETA cart is stbd of the MT, swap active couplers 3. On MCC-H GO: Tie down CETA cart. See BLOCK G

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	V. CETA cart tie-down	On MCC-H GO : Perform the following tie-down procedure (see figure 1) <ol style="list-style-type: none"> a. Translate CETA cart to TBD location (not over truss segment joint) b. Engage parking brake c. Retrieve 2 Long Duration Tie-Down (LDTD) tethers from P6 AUX Bag (fwd face of Z1) d. Route 1 LDTD tether on stbd side of CETA cart as follows: <ol style="list-style-type: none"> 1. Attach 1 hook to zenith brake handle support tether point 2. Loop tether strap around CETA rail HR standoff 3. Attach second hook to nadir brake handle support tether point 4. Lightly cinch tether and close buckle 5. Close MLI flap over buckle and any excess strap e. Repeat on port side of CETA cart
	W. Coupler knob fails to unlock	<ol style="list-style-type: none"> 1. On MCC-H GO: Release active coupler by removing wire ties (2) (reinstall of wire ties not required) and PIP pins (2) 2. On MCC-H GO: Release passive coupler via EVA bolt: PGT: [B7 (25.5), CCW2, 30.5], 7/16 - 6-ext 9 turns – Bolt is attached by lanyard
	X. Swing arm fails to deploy	Use alternate swing arm or WIF
	Y. Swing arm fails to stow	On MCC-H GO : Remove swing arm via EVA bolts (4) (Captive Bolts): PGT: [B7 (25.5), CCW2, 30.5], 7/16 - 6-ext
	Z. Swing arm fails to lock	Restrain in stowed position with wire ties

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	 <p>Starboard LDTDT Config. (port side LDTDT - similar)</p>  	<p style="text-align: center; border: 1px solid black; padding: 5px;">Figure 1.- CETA Cart Tie-down.</p>
	<p>EVA Wrench (Torque & Ratchet)</p>	
	<p>AA. Ratchet teeth slip</p>	<p>Ratchet to new set of teeth and reapply torque</p>
	<p>BB. Wrench does not ratchet</p>	<p>Hold the ratchet selector and socket in opposite hands and rotate in opposite directions</p>

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
Fluid QD Ops		
<p style="text-align: center;"><u>NOTE</u></p> <p>Troubleshooting steps outlined in this cribsheet are a generic starting point. Flight specific situations may require different actions.</p> <p>If troubleshooting requires the crew to leave the worksite, verify that female QDs are covered to prevent exposure to direct sunlight. For thermal clocks, refer to Flight Rules</p>		
Mating Ops		
CC. QD fails to mate		<ol style="list-style-type: none"> 1. Check for debris, damage, or crystals 2. Verify release ring is retracted. (Fwd white band is not visible) 3. Check alignment and verify no side loads
DD. Release ring snap back test fails		<ol style="list-style-type: none"> 1. Push release ring forward. (Release ring will not slide fwd if QD is in FID) 2. QD is in FID; demate QD, verify fwd white band not visible, and remate QD
EE. Gap check fails (visual or FID gauge)		Retract release ring, demate QD, verify fwd white band not visible, and remate QD
Valve Ops		
FF. Detent button is partially unthreaded		<p>Rethread detent button</p> <ol style="list-style-type: none"> a. Load bail handle (button will free spin if not loaded) <ul style="list-style-type: none"> – If valve is open, pull bail handle aft – If valve is closed, push bail handle fwd b. Rotate button cw (8 turns max)
GG. Detent button is missing <p style="text-align: center;"><u>NOTE</u></p> <p>Detent button is only required for BDT ops and 1 in SPD ops</p>		<ol style="list-style-type: none"> 1. Use equipment hook to depress detent button shaft 2. Use tether strap around gloved finger to depress detent button shaft 3. Retrieve and use Beta Gimbal Antirotation Latch Tool to depress detent button shaft 4. On MCC-H GO: Install spare detent button. (Buttons are stowed IVA and must be configured prior to EVA use)
HH. Bail fails to travel fwd		<ol style="list-style-type: none"> 1. Check for debris, damage, or crystals 2. Retrieve and use QD bail drive lever (3/4-, 1-, & 1 1/2-in only); notify MCC-H
II. Bail fails to travel to full fwd (valve open) position (button does not pop up)		<ol style="list-style-type: none"> 1. Neutralize sideloads 2. Apply greater opening force to QD bail handle 3. Retrieve and use QD bail drive lever (3/4-, 1-, & 1 1/2-in only); notify MCC-H 4. If applicable, retrieve and install SPD; notify MCC-H

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	JJ. Detent button fails to depress during valve closing <div style="border: 2px solid black; padding: 5px; width: fit-content;"> <p style="text-align: center; margin: 0;">WARNING</p> <p style="margin: 0;">Bail may kick back and contact crew when button is depressed if a leaking primary seal allowed pressure build-up in spring cavity</p> </div>	<ol style="list-style-type: none"> 1. Verify locking collar fully rotated (1/2-, 3/4-, & 1-in only) 2. Push and hold bail handle fwd (to open) with significant force to relieve load on button while simultaneously depressing the detent button. <ul style="list-style-type: none"> – If button depresses, vent by pulling bail aft until release ring covers aft white band – Push bail fwd to valve open and check button depresses 3. Retrieve QD bail drive lever and repeat step 2 (3/4-, 1-, & 1 1/2-in only); notify MCC-H 4. Contact MCC to reduce NH3 temperature if possible 5. On MCC-H GO: Retrieve and install QD Button Depress Tool (BDT) (1/4-, 3/4-, & 1-in only)
	KK. Bail fails to travel to full aft (valve closed) position (button does not pop up)	<ol style="list-style-type: none"> 1. Inspect QD for retaining wire protrusion 2. Neutralize possible side loading 3. Depress button and increase force on bail 4. Retrieve and use QD bail drive lever (3/4-, 1-, & 1 1/2-in only); notify MCC-H
Demating Ops		
	LL. Female QD fails to demate	<ol style="list-style-type: none"> 1. Verify release ring is fully retracted while attempting to demate 2. Verify TA- or P-clamps are released 3. Verify detent button is up (locking collar can be rotated under button) 4. Verify trigger linkage is still attached to release ring (1 1/2-in only) 5. Neutralize sideloads or manipulate flexhose to relieve mating forces on female QD 6. Apply greater force to release ring and female QD 7. Retrieve and use QD Release Tool (QRT) to apply greater force; notify MCC-H
	MM. Thermal bootie fails to remain securely closed	Install wire tie around bootie to keep QD fully covered
	NN. Cap will not demate	<ol style="list-style-type: none"> 1. Verify pulling out on cap before rotating to ensure locking tab is disengaged 2. Wait for day pass if possible and reattempt cap removal 3. If force is too great for hand actuation or crystals visible around the QD, male may be leaking; notify MCC-H <ul style="list-style-type: none"> – Prepare for quick mate on MCC-H GO 4. Retrieve QD cap tool (1/4-, 1/2-, & 1-in only) <ul style="list-style-type: none"> – Use QD cap tool to turn stuck cap a maximum of 2 turns (cap vents at ~ 2 turns). Finish removal of cap by hand (~ 1 additional turn)
Leaks		
	OO. Mated QD leaks in valve open position (bail fwd)	<ol style="list-style-type: none"> 1. Remove SPD and fully open valve (bail fwd) 2. If leak continues, close valve (bail aft)
	PP. Male QD leaks after cap removal	Reinstall cap; notify MCC-H – Prepare for quick QD mate on MCC-H GO

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	QQ. Female QD leaks during or after bail actuation to fwd position (valve open)	1. Return bail to aft position (valve closed) 2. Perform release ring snap back test – If FID is observed, demate and remate QD – If no FID, neutralize sideloads and cycle bail to fwd position (valve open)
	RR. Leaking QD after SPD install	1. Remove SPD, open valve fully (bail fwd), verify detent button is up, and aft white line is visible – If leak stops rotate locking collar to lock 2. Close valve (bail aft), verify detent button is up, fwd white line is visible, and rotate locking collar to lock 3. If applicable, close valve of appropriate QD in flowpath, verify detent button is up, and fwd white line is visible
	SS. Female QD leaks after demate	Fully mate to destination male as quickly as possible
	TT. Male QD leaks after demate (male sleeve may be visibly stuck open)	1. Remate female QD and open valve (bail fwd) a. Depress button and use significant force to push bail forward; release button b. With QD in open position (bail fwd) apply significant force to aft end of the female QD in back and forth, up and down directions c. Attempt to close valve (bail aft) d. Demate QD and inspect 2. If applicable, close valve of appropriate QD in flowpath, verify detent button is up, and fwd white line is visible 3. Install cap (1/4-, 1/2-, & 1-in only)
	UU. Leak detected by MCC-H after valve ops (possible male sleeve stuck open)	1. Cycle QD to open position (bail fwd) a. Depress button and use significant force to push bail forward; release button b. With QD in valve open (bail fwd) position apply significant force to aft end of the female QD in back and forth, up and down directions c. Attempt to close valve (bail aft) d. Demate QD and inspect 2. If applicable, close valve of appropriate QD in flowpath, verify detent button is up, and fwd white line is visible
	VV. Frozen NH3 present on female or male QD	1. Leave QD exposed to vacuum; wait maximum of 5 min for sublimation (check periodically) 2. On MCC-H GO : Continue QD ops

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	<p>QD Blocks</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p><u>MATE QD</u></p> <ol style="list-style-type: none"> 1. Remove QD caps as required 2. Inspect male and female QD for debris or damage 3. Verify female QD ready to mate <ul style="list-style-type: none"> √Detent button – up √Locking collar – locked position √Fwd white band – not visible 4. Assess side load potential prior to mate 5. Mate QD <ul style="list-style-type: none"> √Fwd white band – visible 6. Perform snapback test <ul style="list-style-type: none"> √Fwd white band visible 7. Perform pull test. (Stay clear of button and release ring) 8. Perform visual gap test <ul style="list-style-type: none"> √For FID </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p><u>Open Valve</u></p> <ol style="list-style-type: none"> 1. Assess side loads 2. Rotate locking collar to unlocked position 3. Depress detent button 4. Push bail to forward position 5. √Aft white band visible 6. √Detent button – up 7. Rotate locking collar to locked position </div> <div style="border: 1px solid black; padding: 5px;"> <p><u>Close Valve, Demate QD</u></p> <ol style="list-style-type: none"> 1. √Aft white band visible 2. √Detent button fully installed 3. √Detent button up 4. Rotate locking collar to unlocked position 5. √Detent button can be depressed 6. Assess side loads prior to bail movement 7. Push bail toward open position with significant force while depressing detent button (unstick male sleeve seals) 8. Depress detent button, move bail aft (close valve) 9. √Fwd white band visible 10. √Detent button up 11. Rotate locking collar to locked position 12. Assess side loads prior to demate 13. Pull back on release ring and demate QD 14. √Release ring – retracted (FWD white band not visible) 15. Inspect male and female QD for debris, damage, or anomalous conditions (ammonia crystals) 16. Install QD caps as required; verify lock tab engaged </div>


STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	FRAM	
	A. Primary FRAM bolt fails to release	<ol style="list-style-type: none"> 1. Confirm socket fully engaged to release anti-rotation mechanism 2. Increase PGT setting: PGT: [B2 (16.0), CCW2, 30.5], 7/16 - 6-ext 3. On MCC-H GO: Increase PGT setting: PGT: [B4 (19.4), CCW2, 30.5], 7/16 - 6-ext
	B. Active FRAM fails to seat on passive FRAM	<ol style="list-style-type: none"> 1. Check for FOD in mechanism 2. Check alignment (engage 2 forward shear pins first to ensure connector door is not jamming)
	C. Primary FRAM bolt fails to engage	<ol style="list-style-type: none"> 1. Verify FRAM seated 2. Check for FOD 3. Back out primary bolt fully 4. Reattempt engagement 5. Increase PGT setting: PGT: [B2 (12.0), CW2, 30.5], 7/16 - 6-ext 6. On MCC-H GO: Increase PGT setting: PGT: [B4 (16.0), CW2, 30.5], 7/16 - 6-ext 7. Consider hold for thermal stabilization between active and passive FRAM 8. Engage contingency pins: <ul style="list-style-type: none"> – Front pins (all FRAMs) PGT: [A4 (6.3), CW2, 30.5], 7/16 - 6-ext 14.11 – (1.25 * Turns on Primary Bolt) turns – If less than 6.5 turns on primary bolt: Aft pins for LWAPA, SAPA, CEPA, and ExPA <ul style="list-style-type: none"> – Remove bolt from STOW location and engage in INSTALL location – Manually turn bolt as far as possible – PGT: [B1 (12.0), CW2, 30.5], 7/16 - 6-ext ~3.5 turns – Aft pins for MAPA and LAPA PGT: [A4 (6.3), CW2, 30.5], 7/16 - 6-ext 16.858 – (1.25 * Turns on Primary Bolt) turns – Aft pins for LMC FRAM <ul style="list-style-type: none"> – Prep CPK by disengaging J-hook on locking mechanism; ensure J-hook fully seated in unlock position – Slide T-handle until contingency pin contacts primary FRAM pin (# on locking mechanism counter = # of turns on primary FRAM bolt) – Disengage J-hook from unlock position. J-hook is spring loaded and will “pop” into place if not precisely aligned with numbered slot. Fully seat J-hook in lock position
	D. Latch dogs fail to retract during FRAM removal from Square Grid Interface	<ol style="list-style-type: none"> 1. Lift FRAM so that latch dogs contact square grid 2. Cycle primary drive bolt
	E. Latch dogs not retracted prior to installation onto Square Grid Interface	Push latch dogs to retracted position with tool or tether hook

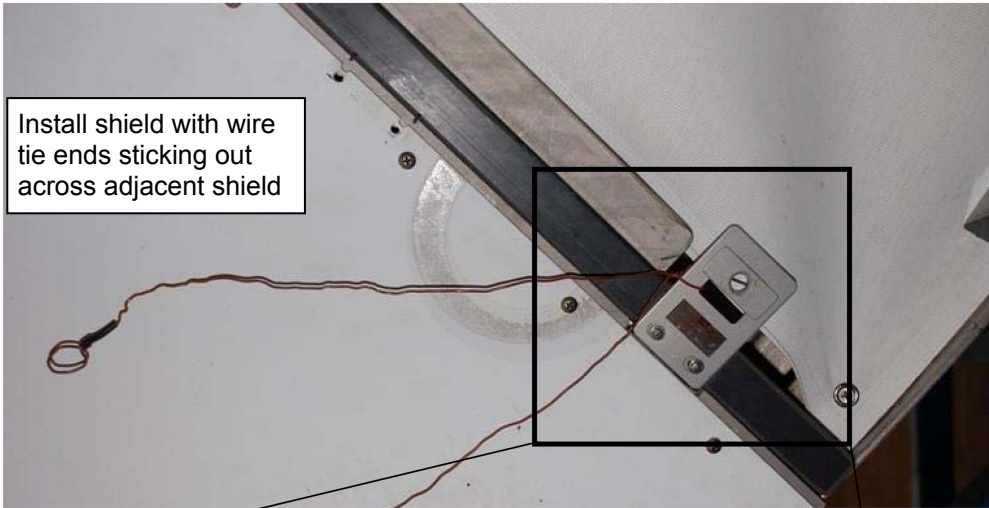
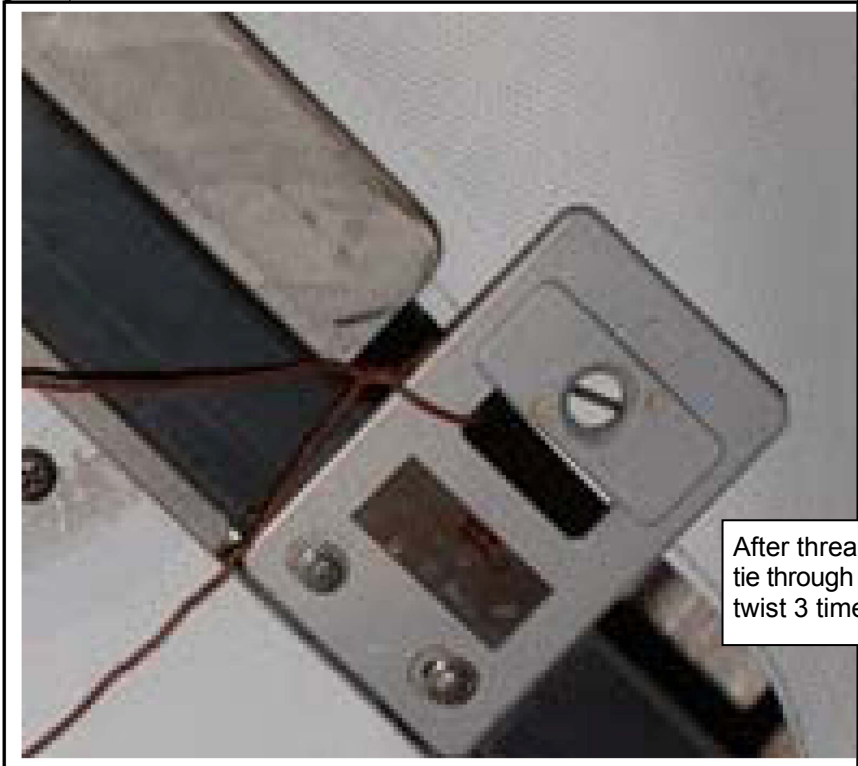
STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	<p>MMOD Shield</p> <p>F. MMOD shield Dzus fastener fails to release</p> <div style="border: 2px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">WARNING</p> <p>Do not touch back side of MMOD shield or handle fastener fragments due to sharp edges</p> <p>Fastener and shield/tool interface must be covered to avoid potential projectiles</p> </div>	<ol style="list-style-type: none"> 1. On MCC-H GO: Retrieve pry bar and emptied med ORU bag 2. Release other Dzus fasteners 3. Assess clearance between MMOD shield and tools 4. If possible, rotate fastener to position tangs off of tools 5. Place med ORU bag over failed fastener 6. Insert pry bar under MMOD shield by failed fastener and pry shield away from structure
	<p>G. MMOD shield Dzus fastener fails to engage</p>	<ol style="list-style-type: none"> 1. Verify center fastener is engaged first 2. Check Dzus fastener aligned with bracket (floating receptacles on endcones) 3. Verify fastener clocking correct per alignment mark 4. Push firmly and rotate 5. Engage other fasteners: 2 out of 3 required 6. If 2 of 3 not achieved: <ul style="list-style-type: none"> – Option 1 (Wire Tie) (See figures 2-4): 1 properly secured wire tie = 1 Dzus fastener; using a long wire tie, squish the loop on one end, feed it through the bracket on structure (may need to push floating receptacle inboard to get it out of way), secure wire tie w/3 twists. Feed one end of wire tie around Dzus head (on outside of shield) and secure with 3 twists. If HR nearby can also secure wire tie to HR. (Goal is for the wire tie to push shield in toward body of structure and toward center if endcone shield) – Option 2 (LDTDT): Use 1 adj (attach to tether point on T tool and to structure HR) and 1 LDTDT across shield to hold shield in position
	<p>H. T-handle tool fails to engage shield</p>	<p>Remove adjacent fasteners and attempt reinstallation</p>
	<p>I. MLI grounding strap Dzus fails to release</p>	<p>On MCC-H GO: Cut ground wire near Dzus fastener</p>

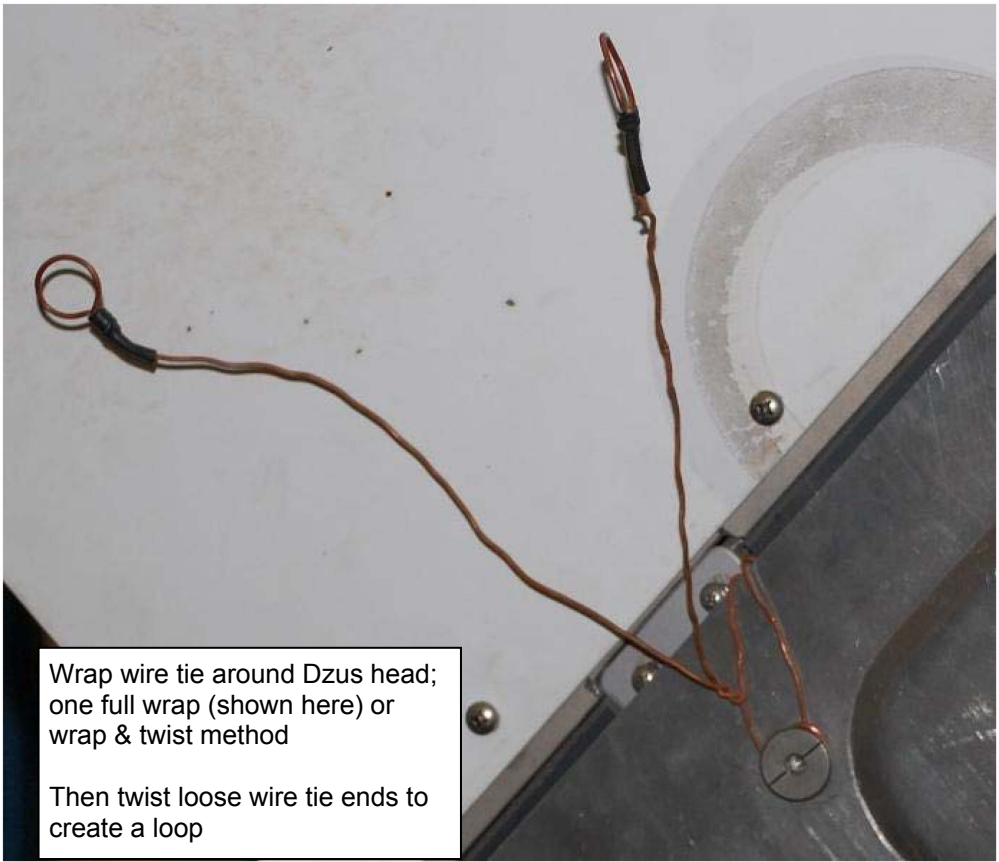
STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
		 <p>Will "squish" loop together a little Pre-EVA for easier access through nutplate</p> <p>Floating receptacle shifted towards center of Shield</p> <p>Wire Tie Inserted Thru "Window" on receptacle bracket</p> <p>Figure 2.- MMOD Shield Wire Tie Option.</p>

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	 <p>Install shield with wire tie ends sticking out across adjacent shield</p>	 <p>After threading wire tie through nutplate, twist 3 times</p> <p>Figure 3.- MMOD Shield Wire Tie Option. (Cont)</p>

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
		 <p>Wrap wire tie around Dzus head; one full wrap (shown here) or wrap & twist method Then twist loose wire tie ends to create a loop</p> <p>Figure 4.- MMOD Shield Wire Tie Option. (Cont)</p>

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	MUT EE	
J.	MUT EE jaws fail to release	<ol style="list-style-type: none"> 1. Verify locking collar fully released 2. Shake MUT EE while depressing paddles to alleviate sideloads from handrail 3. Release MUT EE ECOM socket and tether MUT EE to structure
	MWS	
K.	MWS EE is sticky	Known problem. Report degree of stickiness to MCC-H and any noted correlation with thermal environment. Post EVA, report s/n of affected unit (s/n located on "stem" of T-bar)
L.	MWS EE cord fails to retract	<ol style="list-style-type: none"> 1. Verify MWS EE tether lock in unlock position 2. Cycle MWS EE tether lock 3. Check tether reel opening for FOD 4. Pull out small amount of tether and allow reel to retract while holding light tension on the tether
M.	MWS T-bar fails to pivot	<ol style="list-style-type: none"> 1. Check sideloads on T-bar while depressing button 2. Slip T-bar clutch (40-60 lb force required)
	NZGL Connectors	
N.	Bail bar fails to slide over-center	<ol style="list-style-type: none"> 1. Inspect bail for FOD 2. Inspect bail linkage for damage and report to MCC-H 3. Check alignment and sideloads 4. Verify sufficient TA-clamps are open 5. Increase force on bail 6. Attach 2 hooks from adj tether to connector bail and use adj strap to pull bail into demated position 7. On MCC-H GO: Retrieve vise grips to help increase force on bail
O.	Backshell fails to slide (after over-center mechanism has been overcome)	<ol style="list-style-type: none"> 1. Verify sufficient TA-clamps are open 2. Check for cable harness and hardware interference 3. Check alignment and sideloads 4. Inspect bail and connector for FOD 5. Inspect bail linkage for damage and report to MCC-H 6. Wiggle/jiggle connector while pushing or pulling on backshell 7. Attach 2 hooks from adj tether to connector bail and use adj strap to pull bail into demated position 8. On MCC-H GO: Retrieve vise grips to help increase force on bail

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	<p>P. Connector fails to release from soft dock</p>	<ol style="list-style-type: none"> 1. Verify bail fully thrown, undamaged, and backshell fully aft 2. If backshell springs forward, pull and hold in fully aft position (will have to overcome spring force, approx 5-10 lb) while attempting to demate connector 3. Verify sufficient TA-clamps are open 4. Check for cable harness and hardware interference 5. Check alignment and sideloads 6. Relieve compression on connector interface due to cable loads by pulling backshell away from jack 7. Push the plug towards the jack to compress the soft dock 8. Wiggle/jiggle connector. (Use slight rolling motion)
	<p>Q. Connector fails to soft dock</p>	<ol style="list-style-type: none"> 1. Verify correct plug and jack 2. Verify bail fully aft 3. Verify backshell fully aft and remains fully aft. If backshell not fully aft, pull and hold in fully aft position while attempting to soft dock connector 4. Inspect the following: <ul style="list-style-type: none"> - O-ring seal - FOD - Bend radius - Soft dock springs - Connector keying feature 5. Verify alignment (avoid excessive rolling or rocking the plug as this could unseat soft dock springs) <ul style="list-style-type: none"> - Connector should snap into soft dock with little force once half-shells are aligned
	<p>R. Connector fails to mate</p>	<ol style="list-style-type: none"> 1. Verify half-shells are fully seated on both sides 2. Verify cable and backshell free to move (no clamps) 3. Push forward on connector backshell while actuating bail 4. Detach from soft dock and inspect: <ul style="list-style-type: none"> - Pins - FOD - EMI band - Bend radius - TA-clamps - P clamps - Bail linkages and rivets - Soft dock springs - O-ring seal and main joint gasket - Connector keying feature 5. Cycle bail while disconnected (push forward on connector backshell for additional leverage)

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	S. Connector pin bent	<ol style="list-style-type: none"> 1. Rotate connector to bail up position and describe pin location and condition <ul style="list-style-type: none"> – Obtain WVS view of interface if possible 2. On MCC-H GO: For 16, 20, or 22 gauge pins only, retrieve pin straightener and attempt pin repair 3. On MCC-H GO: Retrieve needle nose pliers and attempt pin repair <ul style="list-style-type: none"> – MCC-H will verify pin size prior to retrieving tools 4. Inspect plug and jack prior to re-mating
	T. Connector FOD	<ol style="list-style-type: none"> 1. On MCC-H GO: Retrieve connector cleaner tool <p style="text-align: center;"><u>NOTE</u></p> <p>One N2 cartridge is already captured in the tool (the other is lanyarded inside the caddy). In order to puncture the cartridge, it must be threaded into the tool until the indicator line passes out of sight under the collar of the tool.</p> <p>Puncture connector cleaner cartridge only when ready to perform actual cleaning.</p> <p>Use entire N2 cartridge prior to reentering airlock</p> 2. Attempt cleaning
	U. Connector EMI band bent	<p>On MCC-H GO: Retrieve needle nose pliers or forceps to remove band</p> <ul style="list-style-type: none"> – Bail may need to be pushed forward while demated to expose EMI band for removal
	V. Connector bail linkage failure	<ol style="list-style-type: none"> 1. On MCC-H GO: Re-attempt connector mate/demate with broken bail <ul style="list-style-type: none"> – Impart load through undamaged side of bail linkage – Assist bail motion with hand on backshell once bail linkage has passed over-center – May take multiple pushes on the bail to mate/demate connector 2. Tether hook or vise grips may be used for additional leverage
	W. Connector soft dock spring bent	<p>On MCC-H GO: Retrieve needle nose pliers and remove bent spring</p>
	X. Connector O-ring or main joint gasket seal loose (seal and O-ring required in 1-G only)	<ol style="list-style-type: none"> 1. Remove seal with tether hook 2. On MCC-H GO: Retrieve additional tools to remove seal (Ex., wire tie, needle nose pliers, probe, loop pin puller)
	Y. Connector cap (Twist) will not release	<ol style="list-style-type: none"> 1. Increase force 2. Use tether hook for additional leverage 3. On MCC-H GO: Attach equip hook to cap tether point and use strap of adj tether to release cap

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	On-Orbit Installed HR	
	A. HR will not install in seat track or fails to soft dock	<ol style="list-style-type: none"> 1. Verify HR installed in correct direction per arrow on underside of HR 2. Verify HR shoes are completely released and soft dock armed 3. Check for FOD on HR and seat track 4. Verify HR bolt completely released: PGT [A1 (2.5), CCW2, 30.5], 7/16 - 6-ext 5. If HR in seat track but soft dock will not engage, attempt to drive HR bolts 6. On MCC-H GO: Depending on HR priority, attempt to install 180 out or a different HR at this location
	B. HR bolt fails to fully engage	<ol style="list-style-type: none"> 1. If torqued, remove HR: PGT [A2 (3.8), CCW2, 30.5], 7/16 - 6-ext – To break torque PGT [A1 (2.5), CCW2, 30.5], 7/16 - 6-ext – For removal – Check for FOD on HR and seat track and reinstall using original torque 2. Increase PGT setting: PGT [A3 (4.8), CW2, 30.5], 7/16 - 6-ext 3. On MCC-H GO: Depending on HR priority, attempt to install 180 out or a different HR at this location
	On-Orbit Installed WIF	
	C. WIF fails to soft dock	<ol style="list-style-type: none"> 1. Check for FOD and structural interference, cycle soft dock pins; reattempt installation 2. Verify WIF is co-planar 3. Install a different WIF at this location 4. On MCC-H GO: Attempt installation of WIF in a different location 5. Return WIF inside
	PAD	
	D. Release knob fails to rotate open	<ol style="list-style-type: none"> 1. Verify knob in release position (J-hook not locked) 2. Attempt to rotate knob using ratchet on knob's 7/16 in hex stud 3. Release contingency release bar captive bolts (2) PGT [A6 (8.3), CCW2, 30.5], 7/16 - 6 ext 5 turns (Verify hook released from striker bar)
	PGT	
	E. No LEDs	<ol style="list-style-type: none"> 1. Perform LED test 2. Use display torque
	F. LEDs and torque messages do not agree	Use torque message and notify MCC-H
	G. Mode switch breaks	Retrieve spare PGT

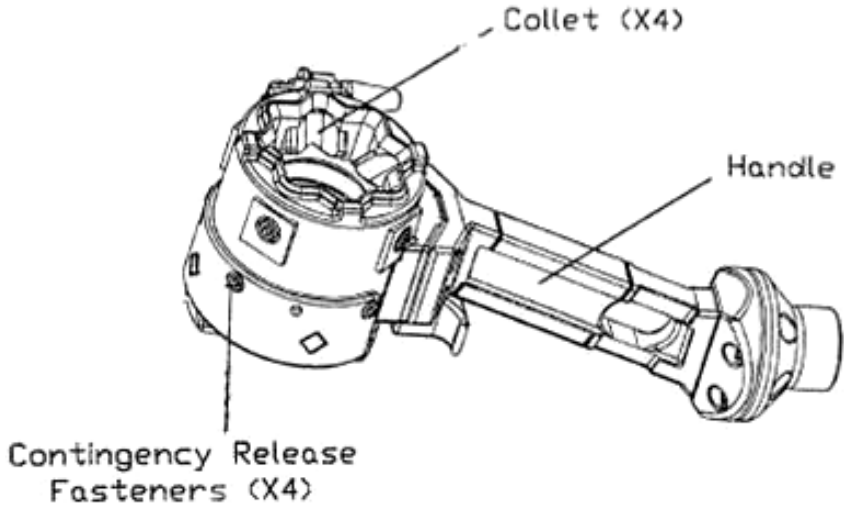
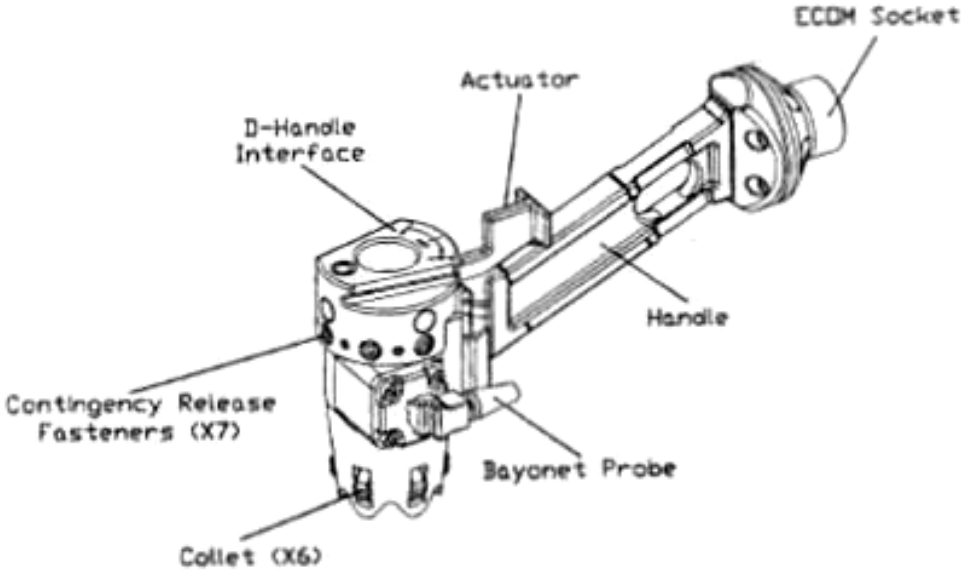
STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	LCD Messages	
	H. BATTERY HITEMP	<ol style="list-style-type: none"> 1. Power off PGT 2. If alternate battery available; change battery 3. Retrieve spare PGT 4. Switch to ratchet mode
	I. BATTERY LOTEMP (blinking)	<ol style="list-style-type: none"> 1. Drive tool with no load to increase battery temperature 2. If alternate battery available; power off and change battery 3. Retrieve spare PGT 4. Power off and switch to ratchet mode
	J. BATTERY LOVOLT (blinking)	<ol style="list-style-type: none"> 1. Continue using tool until unable to deliver sufficient torque 2. Retrieve spare PGT 3. Power off and switch to ratchet mode
	K. CAL FAILED	<ol style="list-style-type: none"> 1. Press, release trigger to repeat calibration 2. Power cycle and calibrate 3. Retrieve spare PGT 4. Power off and switch to ratchet mode
	L. COLLAR ERROR	<ol style="list-style-type: none"> 1. Cycle torque and speed collars to clear error 2. Power cycle and calibrate 3. Retrieve spare PGT 4. Power off and switch to ratchet mode
	M. COMPAR ERROR	<ol style="list-style-type: none"> 1. Cycle torque collar and A/B mode switch 2. Power cycle and calibrate 3. Retrieve spare PGT 4. Power off and switch to ratchet mode
	N. EEPROM WR ERR (blinking) HYBRID HITEMP OVER CURR SLFTST FAIL X	<ol style="list-style-type: none"> 1. Power cycle and calibrate 2. Retrieve spare PGT 3. Power off and switch to ratchet mode
	O. HI TORQ	<ol style="list-style-type: none"> 1. Contact MCC-H and report torque. (Real time engineering assessment required) 2. On MCC-H GO: Power cycle and calibrate 3. Retrieve spare PGT 4. Power off and switch to ratchet mode
	P. HICURR	<ol style="list-style-type: none"> 1. Reattempt operation – Can be caused by excessive rotation of the PGT body while torquing 2. Power cycle and calibrate 3. Retrieve spare PGT 4. Power off and switch to ratchet mode
	Q. LO TORQ (expected during bolt release)	<ol style="list-style-type: none"> 1. Reattempt operation until desired torque is reached 2. Power cycle and calibrate 3. Retrieve spare PGT 4. Power off and switch to ratchet mode
	R. LOCURR	<ol style="list-style-type: none"> 1. Reattempt operation 2. Power cycle and calibrate 3. Retrieve spare PGT 4. Power off and switch to ratchet mode
	S. LOG IS FULL (blinking)	<ol style="list-style-type: none"> 1. Cycle torque and speed collars to clear message 2. Continue operation
	T. MOTOR HITEMP	<ol style="list-style-type: none"> 1. Power off PGT 2. Retrieve spare PGT 3. Switch to ratchet mode

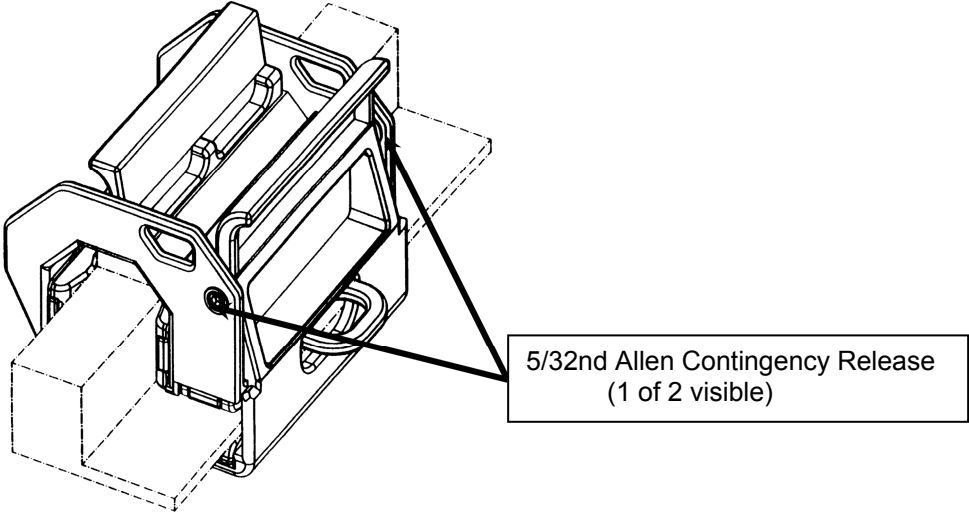
STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	<p>Safety Tether</p> <p>U. Safety tether fails to retract/tend</p>	<ol style="list-style-type: none"> 1. Verify reel is unlocked 2. Verify tether reel and/or cable guide (for 85-ft tethers) is clear of FOD 3. Pull out small amount of cable and allow reel to retract while holding light tension on the cable 4. Tap side of reel housing during retraction 5. Report ID # of faulty tether to MCC-H and use alternate safety tether 6. Coil safety tether to bring inside 7. For 85-ft tether. On MCC-H GO: If coiling tether is not practical, release level wind mechanism bypass on back of safety tether. (Red indicator will show around edge of bypass once released) <p style="text-align: center;"><u>NOTE</u></p> <p>Once level wind has been released cable guide will likely be frozen in place. This will limit the amount of tether that can be successfully retracted into the tether housing and may require coiling of excess tether.</p> <p>Level wind release will require safety tether be returned for ground servicing.</p> <p>If tether fails to retract due to thermal issue, normal tether function may return after tether brought IVA</p>
	<p>V. Safety tether red stripe showing (any length)</p>	<p>Safety tether cannot be used</p> <ul style="list-style-type: none"> – Report ID # of faulty tether to MCC-H – Use alternate safety tether
	<p>W. Crew hook fails</p>	<ol style="list-style-type: none"> 1. On load alleviating end: Use waist tether to replace alleviating strap <ul style="list-style-type: none"> – Report ID # of faulty tether to MCC-H – Retrieve replacement safety tether 2. On anchor end: Report ID # of faulty tether to MCC-H and use an alternate safety tether
	<p>Scoops</p> <p>A. Scoop will not release from fitting</p>	<ol style="list-style-type: none"> 1. If actuator will not pull back while in locked position, tap actuator with tool to release 2. On MCC-H GO: Leave scoop in place 3. On MCC-H GO: Remove non-captive contingency screws; 5 turns. Stow in trash bag PGT [A1 (2.5), CCW2, 30.5], 5/32 allen drive <ul style="list-style-type: none"> – Square Scoop: 4 screws (figure 5) – Round Scoop: 7 screws (figure 6)

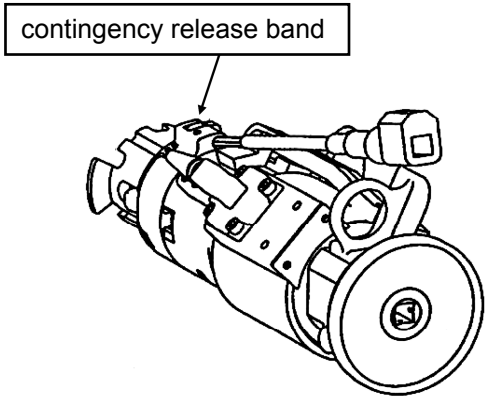
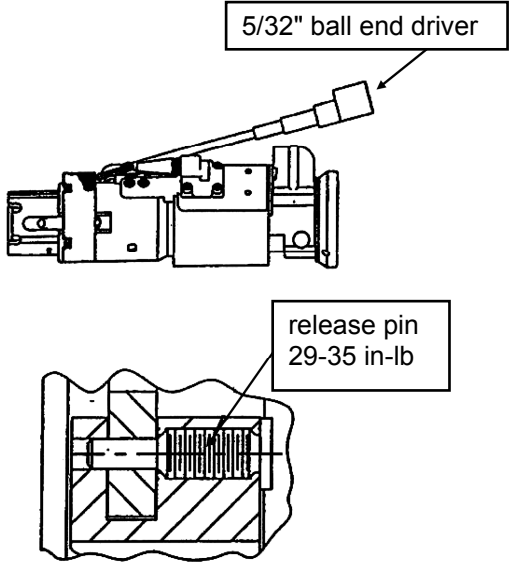
STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
		 <p>Figure 5.- Square Scoop.</p>
		 <p>Figure 6.- Round Scoop.</p>

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
Socket Caddy		
B.	Socket fails to release from socket caddy	<ol style="list-style-type: none"> 1. Verify PIP pin fully inserted into drop proof tether interface on socket 2. Reattempt using a different PIP pin
TA-Clamp		
C.	TA-clamp fails to release	<ol style="list-style-type: none"> 1. With handle up, press down on top of rounded clamp 2. With handle up, use tether hook to pry drawhook from capture pin
Tether Shuttle		
D.	Tether shuttle will not release from CET/MT rail	<ol style="list-style-type: none"> 1. Verify slider in unlock and no obstructions to paddle actuation 2. Verify safety tethered to structure and safety tether removed from tether shuttle anchor point 3. On MCC-H GO: Remove non-captive screws (2) at hingeline to release nadir section with slide lock (not captive) (figure 7). TBD turns. Stow screws in trash bag PGT [A1 (2.5), CCW1, 30.5], 5/32 allen drive
<div style="text-align: center;">  <p>Figure 7.- Tether Shuttle.</p> </div>		
Torque Multiplier		
E.	TM will not release from fitting	<ol style="list-style-type: none"> 1. Place TM anti-backlash in neutral, if unable: PGT [RCW, 30.5] – Apply cw torque while pushing anti-backlash button to neutral. Reattempt removal 2. If able to lift TM off of bolt, attempt to rock off of fitting (Square TM only) 3. On MCC-H GO: Release TM contingency release band pin 20 turns (do not exceed 28 turns) (figure 8): PGT [A1 (2.5), CCW2, 30.5], 5/32 ball end driver – When band springs open remove TM

STS-130/20A WORKAROUND CRIBSHEET (Cont)

TASK	FAILURE	ACTION
	 <p>contingency release band</p>	 <p>5/32" ball end driver</p> <p>release pin 29-35 in-lb</p> <p>Figure 8.- Torque Multiplier.</p>
TSA		
	F. Latch fails to open	Release 7/16 EVA bolt on latch bracket; rotate bracket clear of latch PGT [A2 (3.8), CCW2, 30.5], 7/16 - 6 ext 1-2 turns
	G. Latch fails to close	Close remaining latches (3 of 4 required for landing)

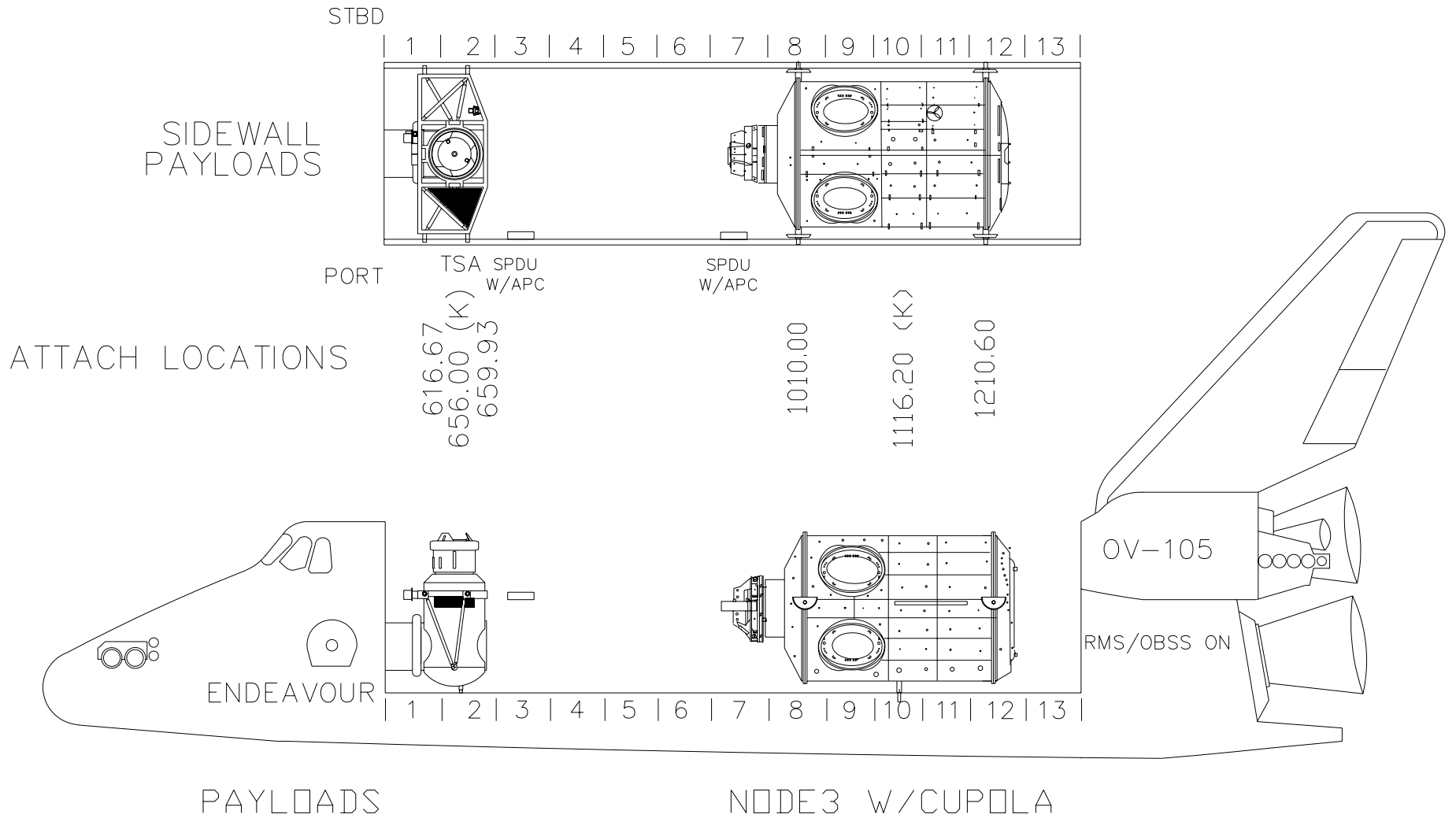
FLIGHT SPECIFIC EVA REFERENCE

PAYLOAD BAY LAYOUT FS 18-3
EVA TRANSFER FS 18-4
EVA 1
 NODE 1 PORT CBM..... FS 18-5
 PLB INTERFACES (SPDU) FS 18-6
 PLB INTERFACES (PRLA)..... FS 18-7
 TSA FS 18-8
 NODE 3 LTA CONNECTORS..... FS 18-10
 CUPOLA MATED TO NODE 3..... FS 18-12
 PCBM COVER STOWAGE (LARGE TRASH BAG) FS 18-13
 NH3 JUMPER BAG..... FS 18-14
 NH3 MLI BAG (LARGE ORU TRANSFER BAG)..... FS 18-15
 SPECIAL PURPOSE DEXTEROUS MANIPULATOR (SPDM) FS 18-16
 OTP TIE-DOWN PLAN FS 18-19
 S0 HAB TRAY FS 18-21
 OTSD FS 18-23
 NODE 1 NADIR (STS-129 FLYAROUND) FS 18-26
 NODE 3 612 LTA CABLE..... FS 18-27
 NODE 3 602 LTA CABLE..... FS 18-28
 LTA CONNECTOR MLI..... FS 18-29
 P612 CONNECTOR MLI..... FS 18-30
 NODE 3 CONNECTORS FS 18-32
EVA 2
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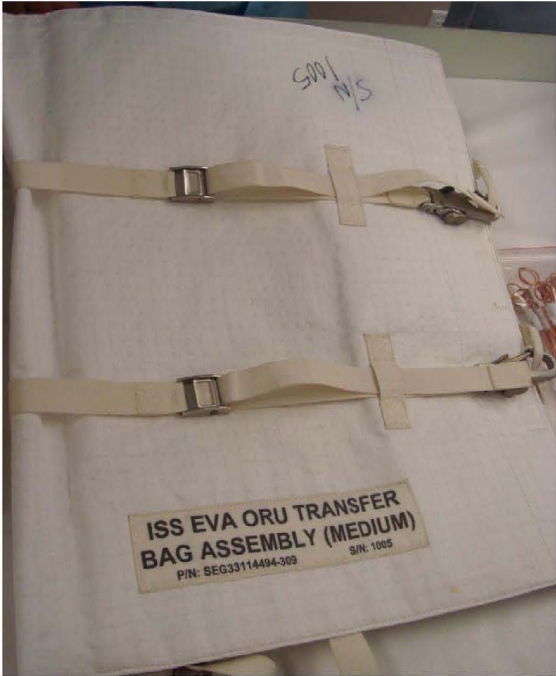
FLIGHT SPECIFIC
EVA REFERENCE

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PAYLOAD BAY LAYOUT



EVA TRANSFER



NODE 1 PORT CBM

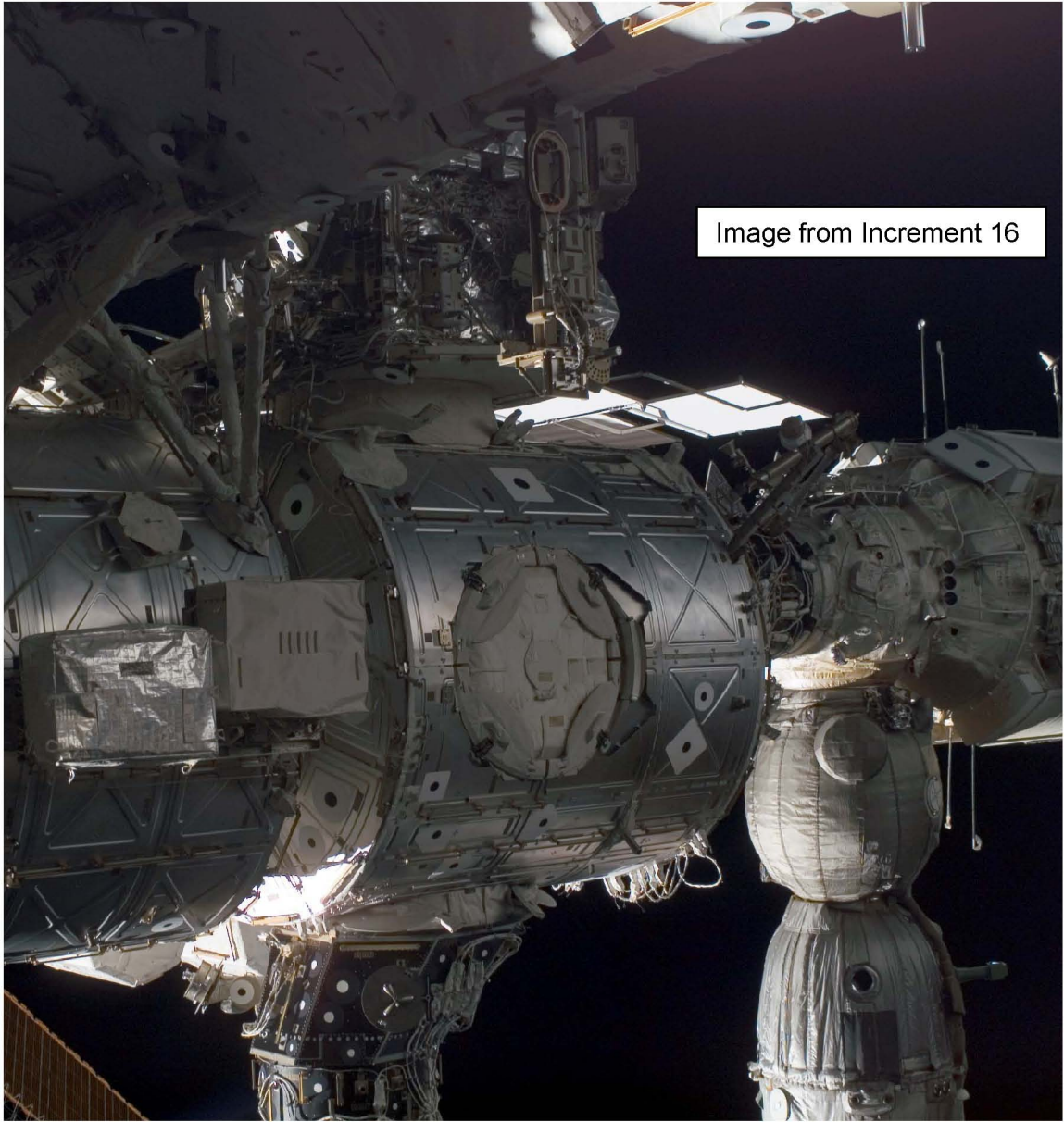


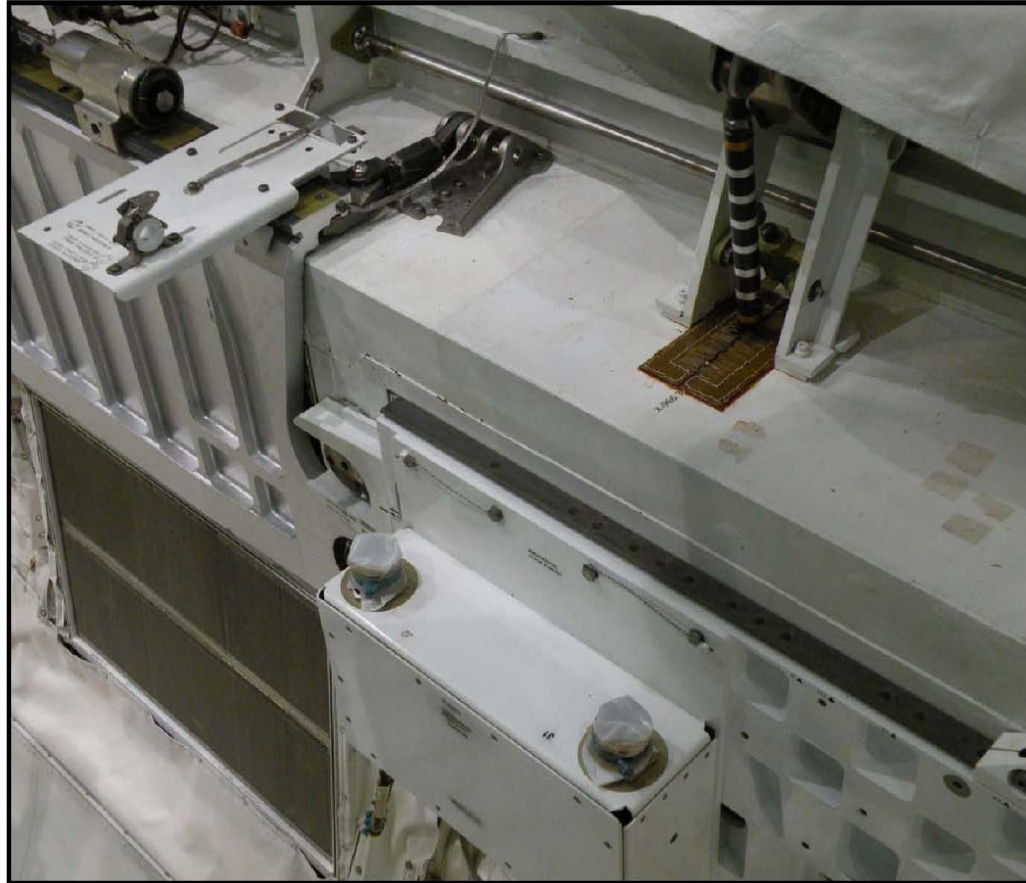
Image from Increment 16

FS 18-5

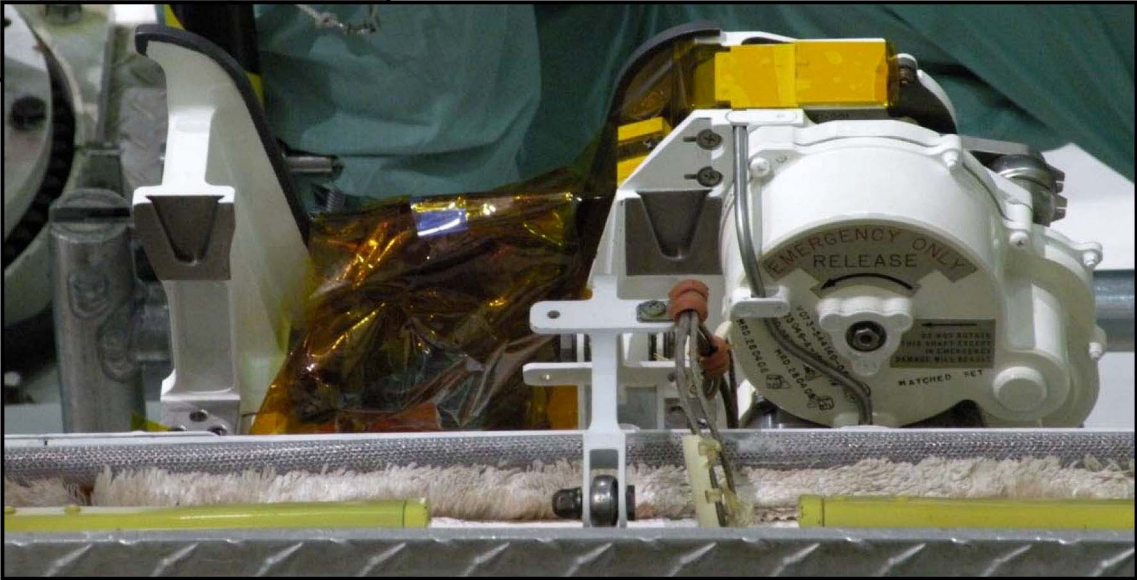
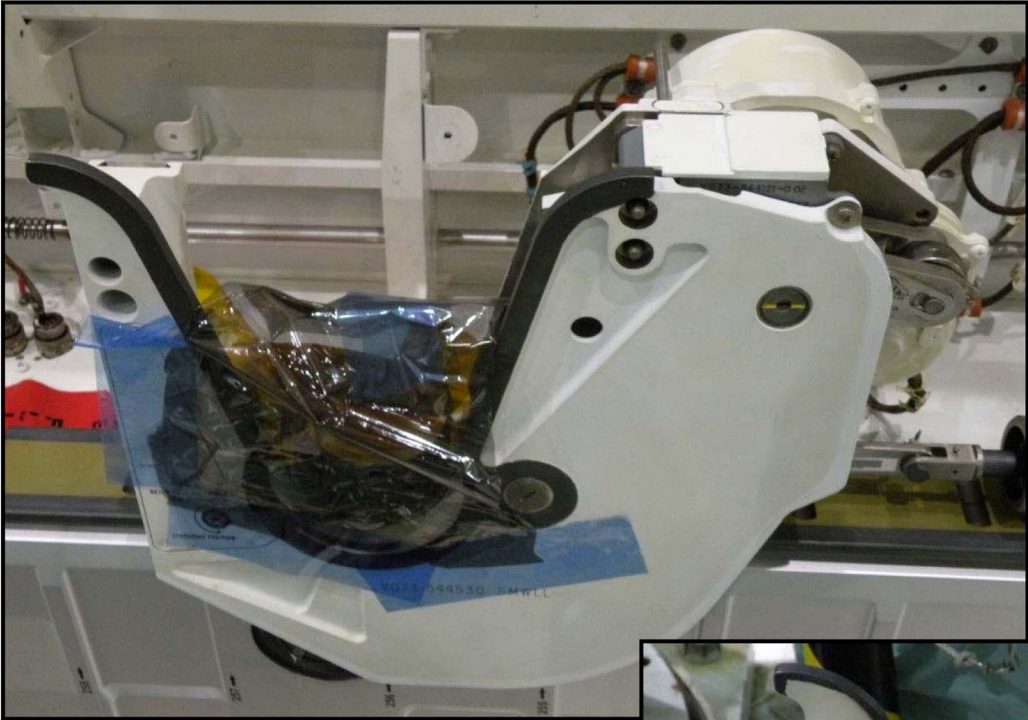
EVA/130/FIN A

EVA 1

PLB INTERFACES (SPDU)



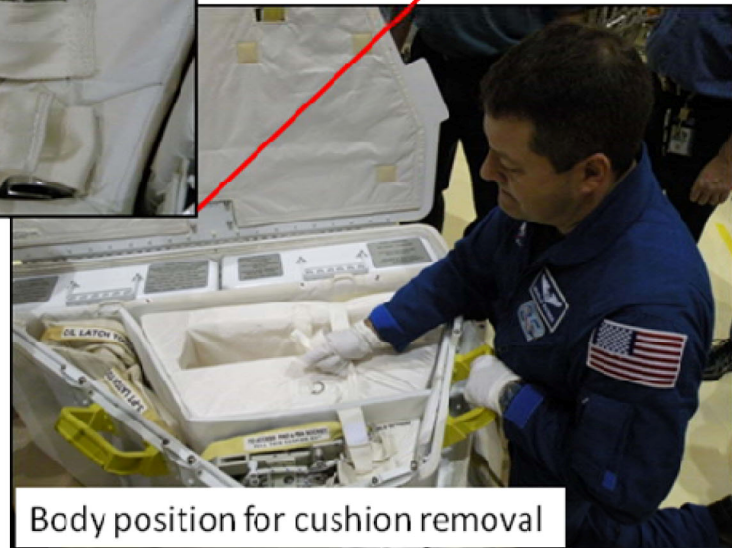
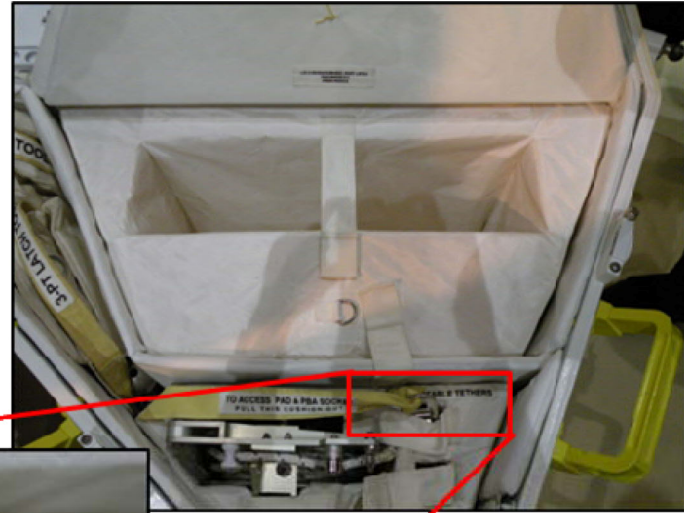
PLB INTERFACES (PRLA)



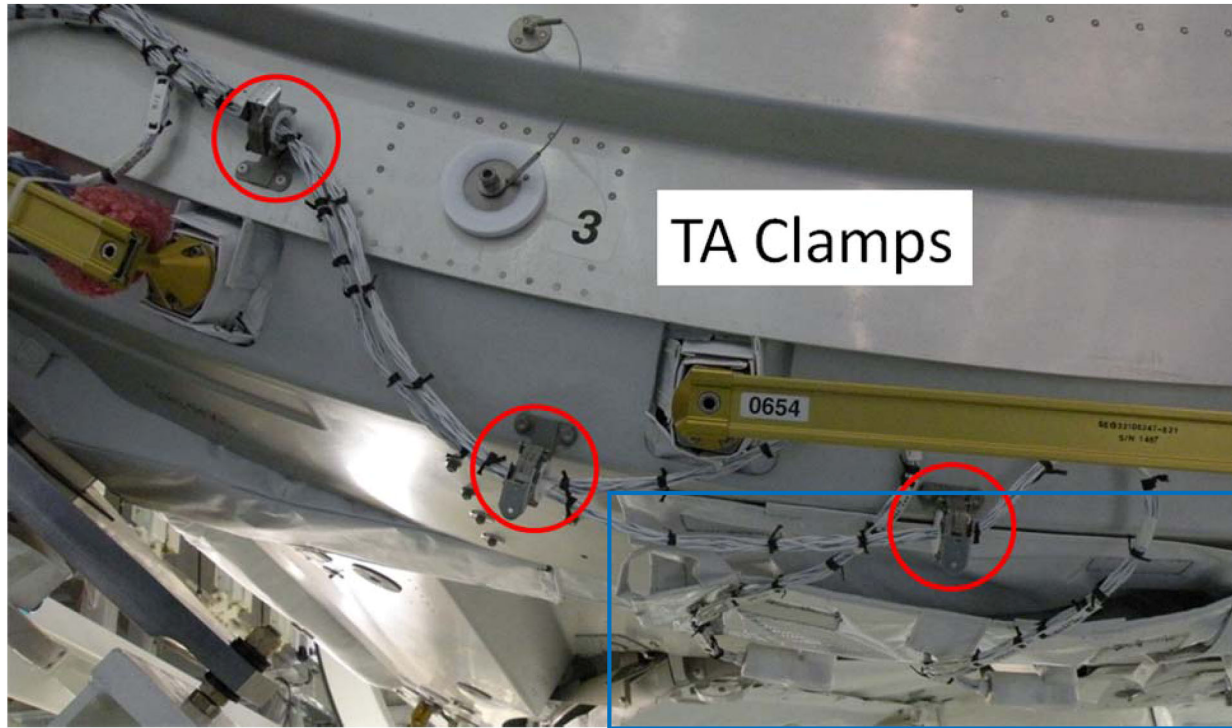
TSA



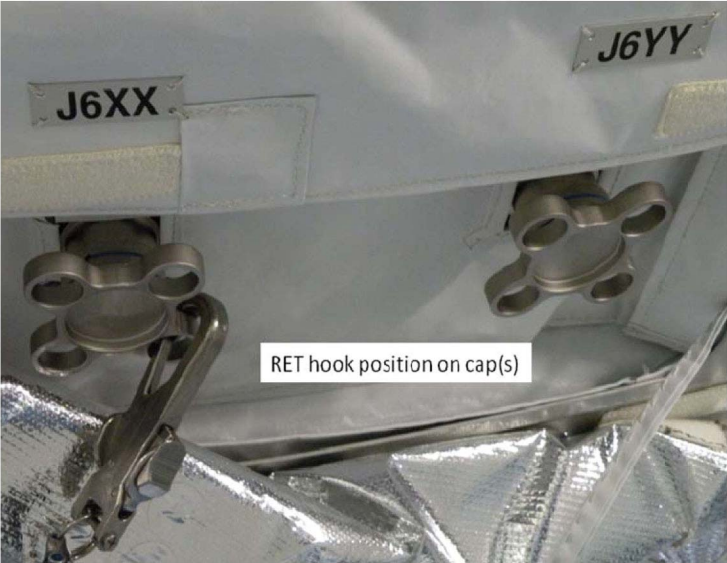
TSA (Cont)



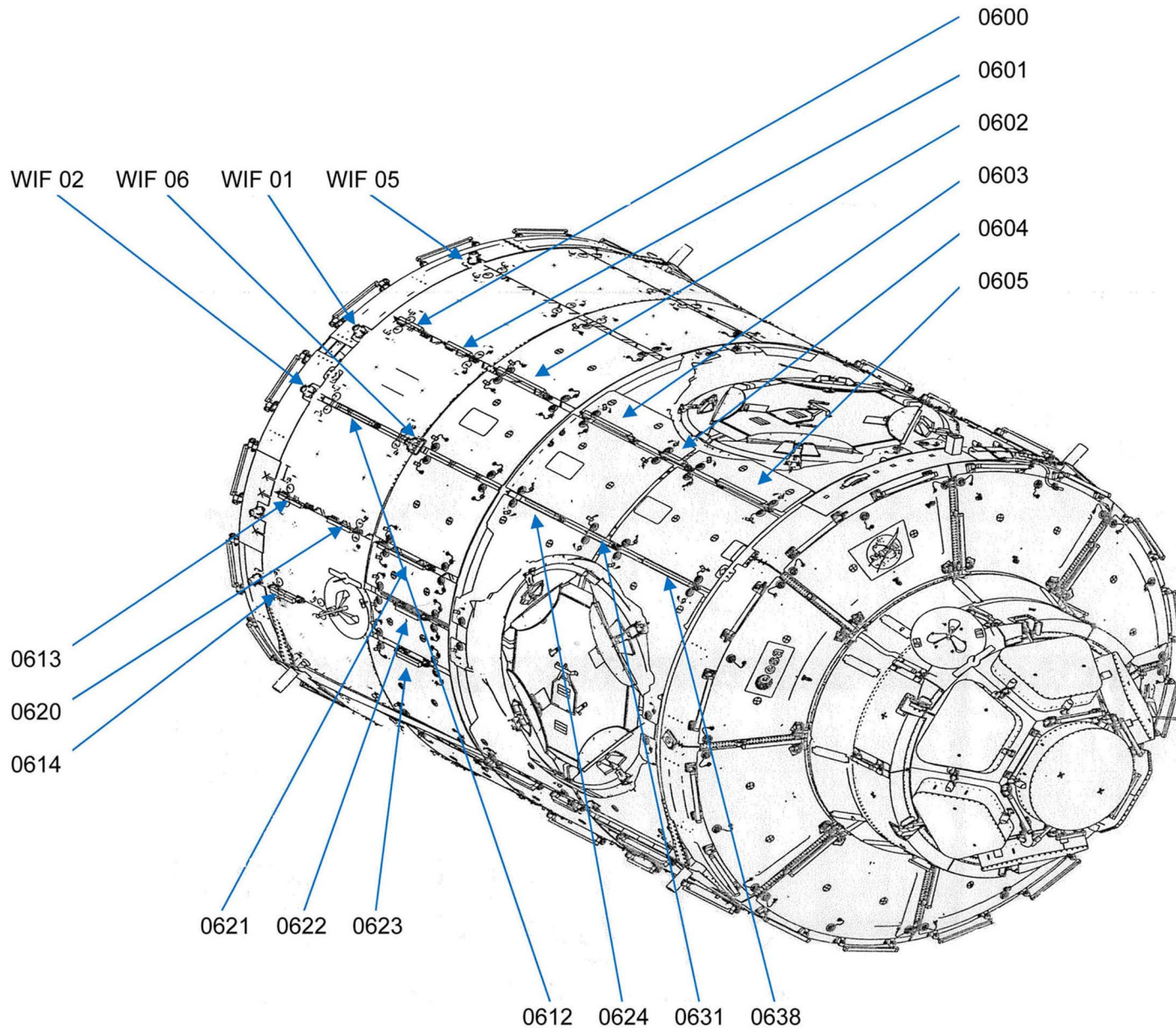
NODE 3 LTA CONNECTORS



NODE 3 LTA CONNECTORS (Cont)



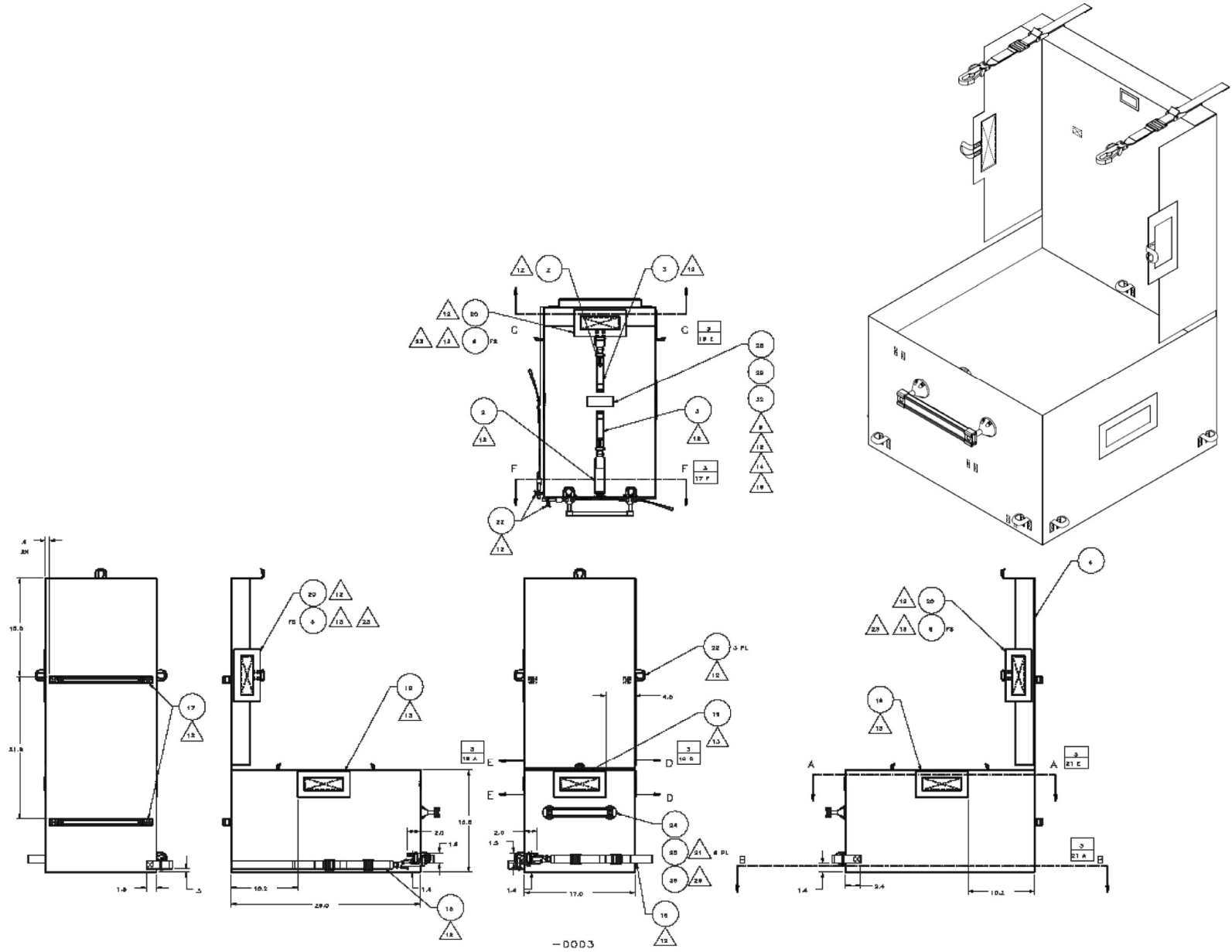
CUPOLA MATED TO NODE 3



PCBM COVER STOWAGE (LARGE TRASH BAG)



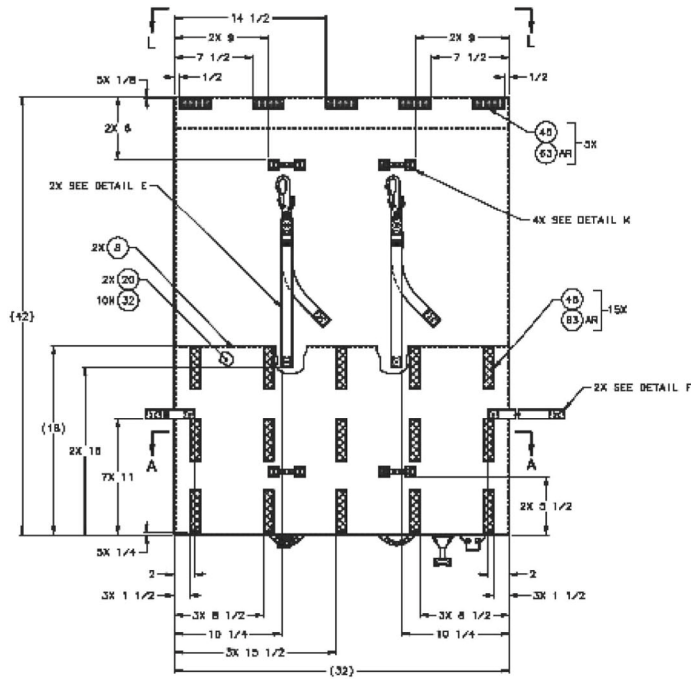
NH3 JUMPER BAG



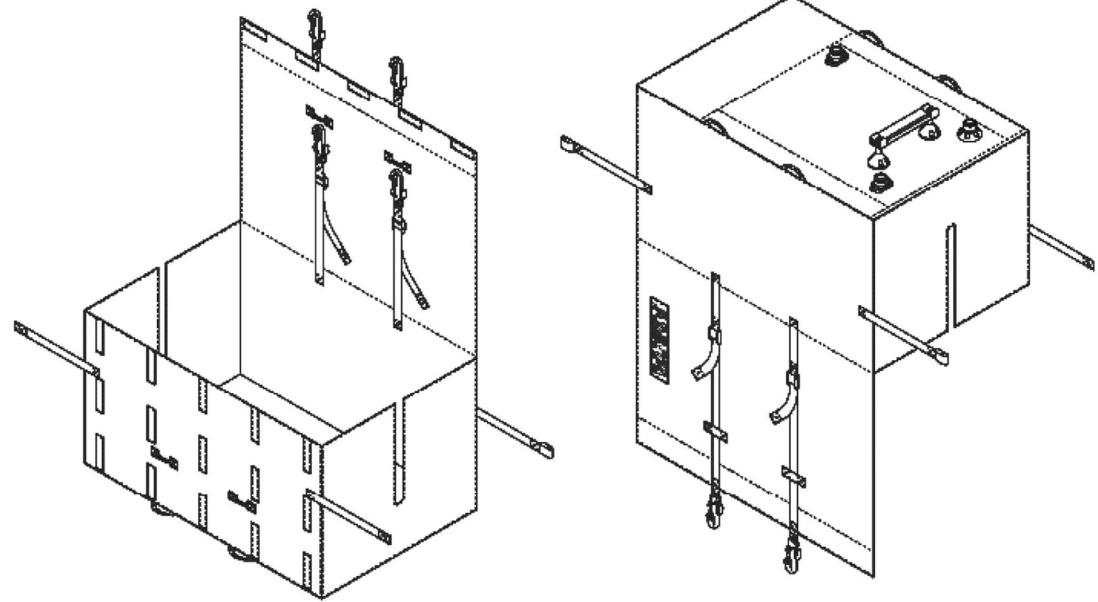
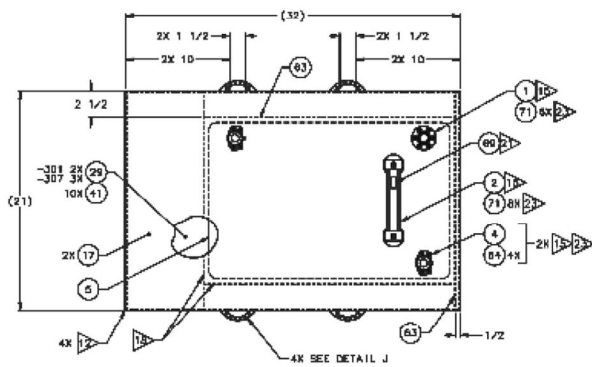
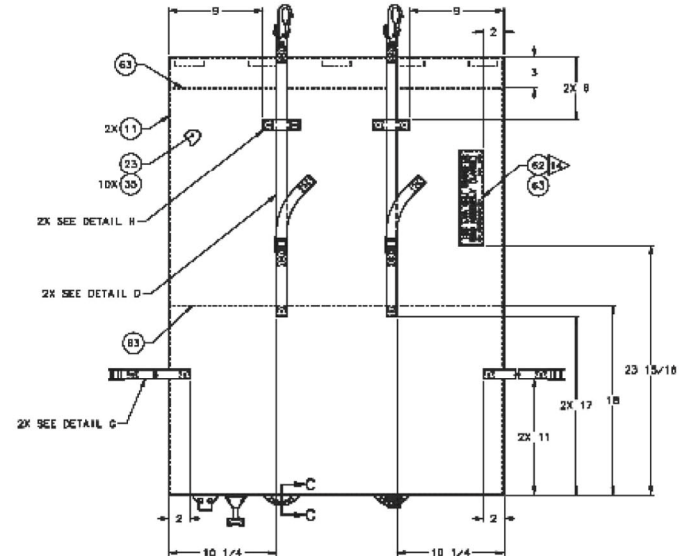
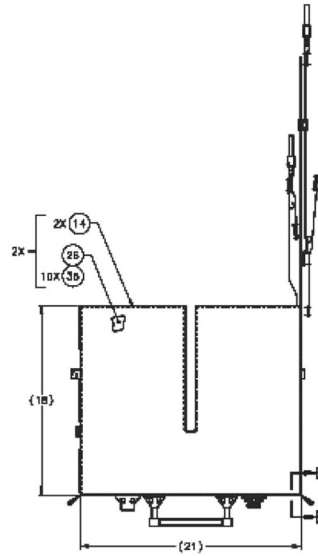
FS 18-14

EVA/130/FIN A

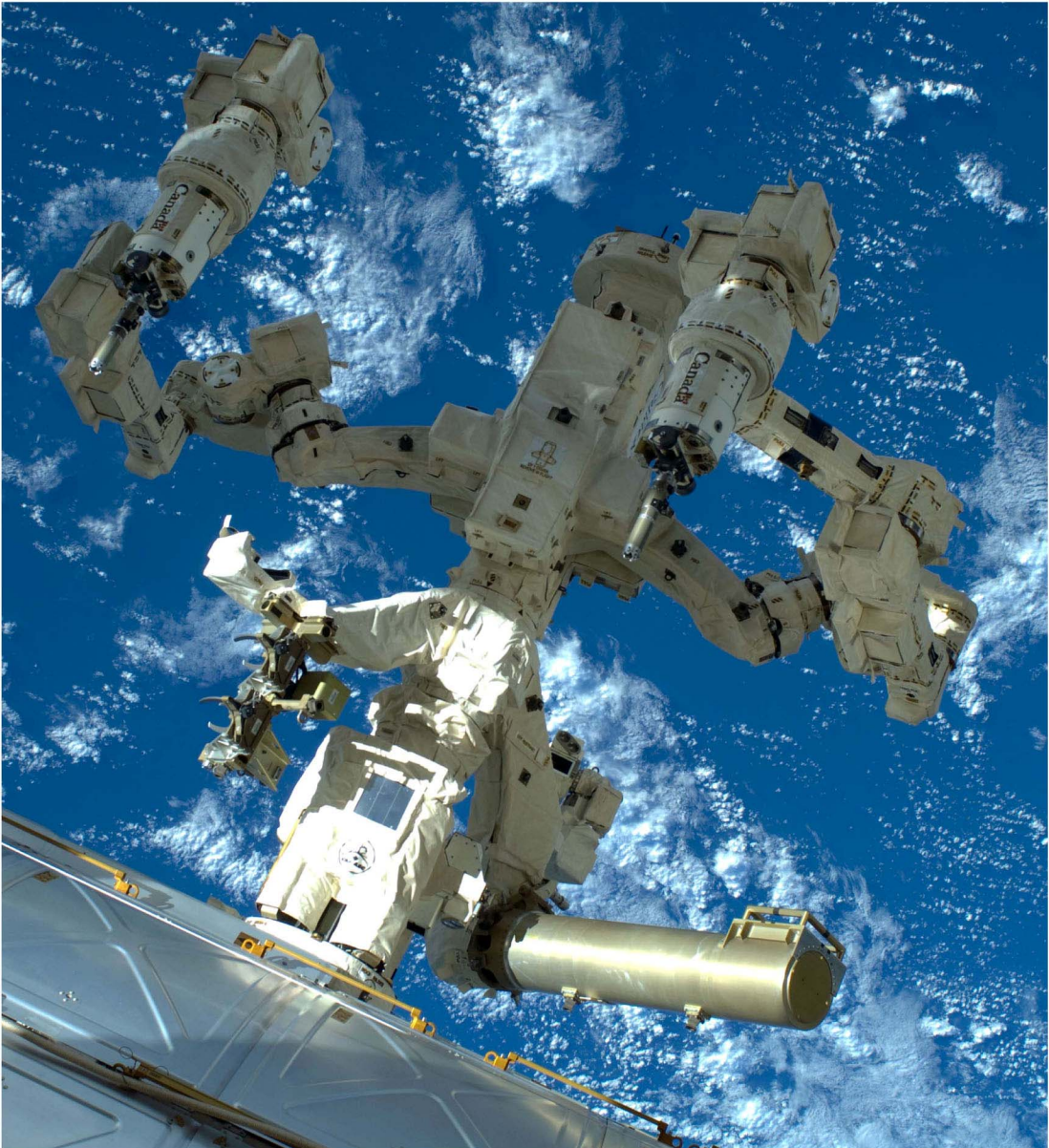
NH3 MLI BAG (LARGE ORU TRANSFER BAG)



-301 & -307
SCALE: 1/4

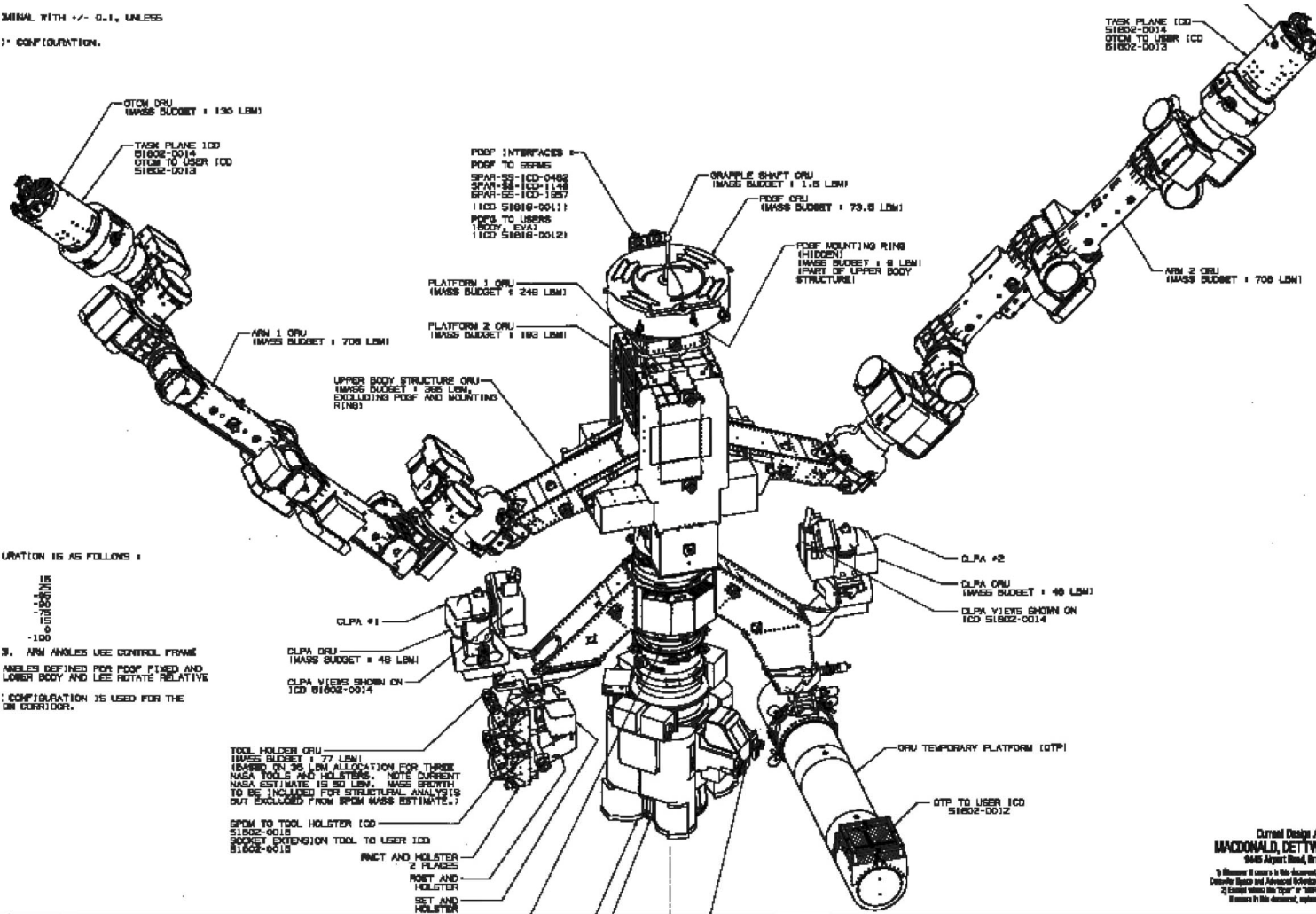


SPECIAL PURPOSE DEXTEROUS MANIPULATOR (SPDM)



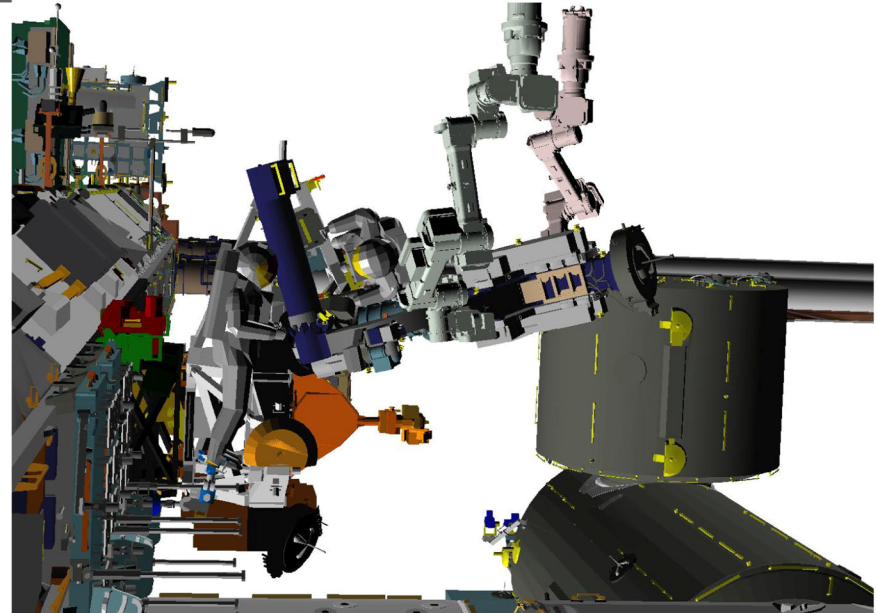
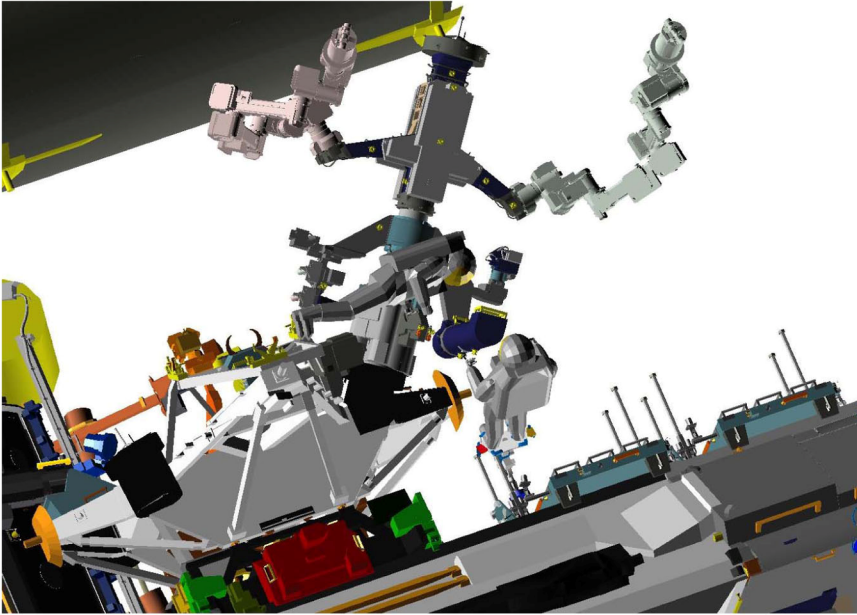
SPECIAL PURPOSE DEXTEROUS MANIPULATOR (SPDM) (Cont)

MINIMAL WITH +/- 0.1%, UNLESS
 1) CONFIGURATION.

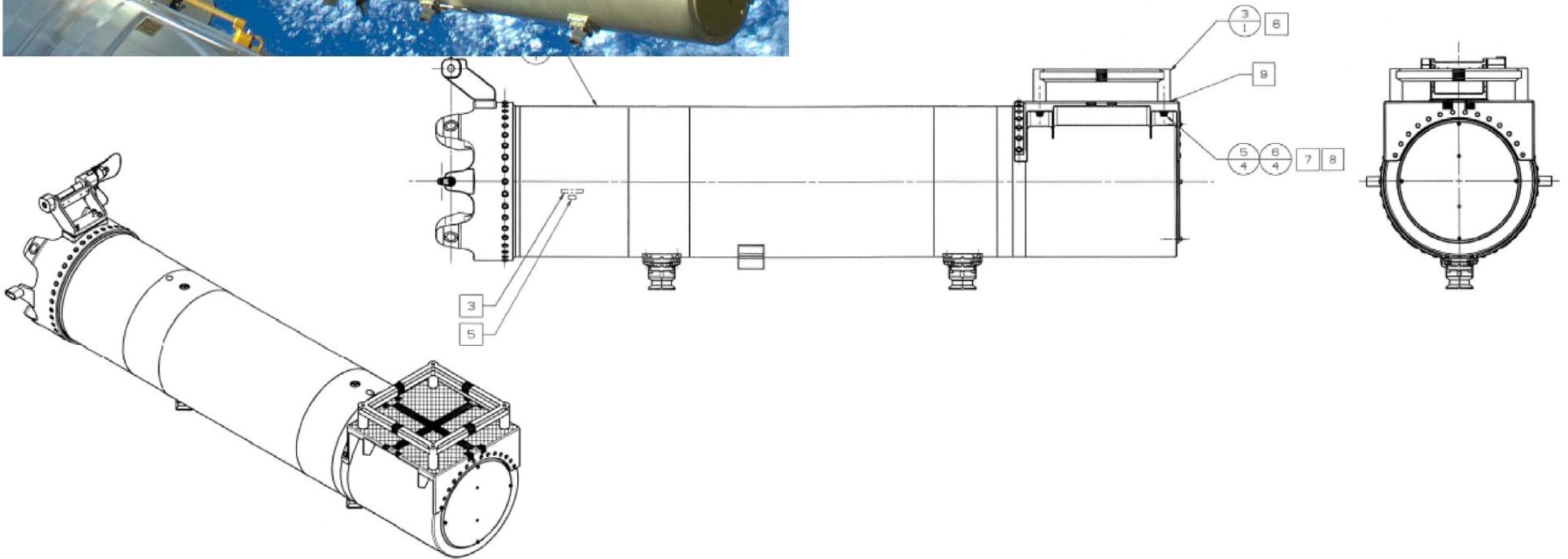
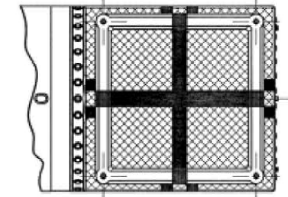
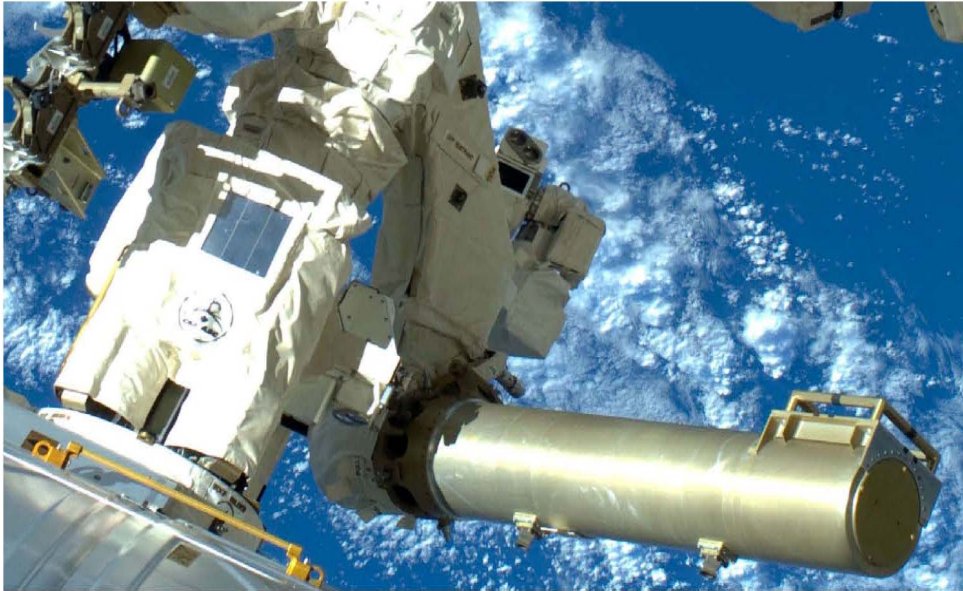


Current Design Act/8
 MACDONALD, DETTWILER
 9645 Airport Blvd, Memphis,
 TN 38115
 * If dimension is shown in this document, unless
 otherwise noted and Advanced Technical Staff will
 * Consult before the "Top" or "Left" views if
 it occurs in this document, unless "Top"

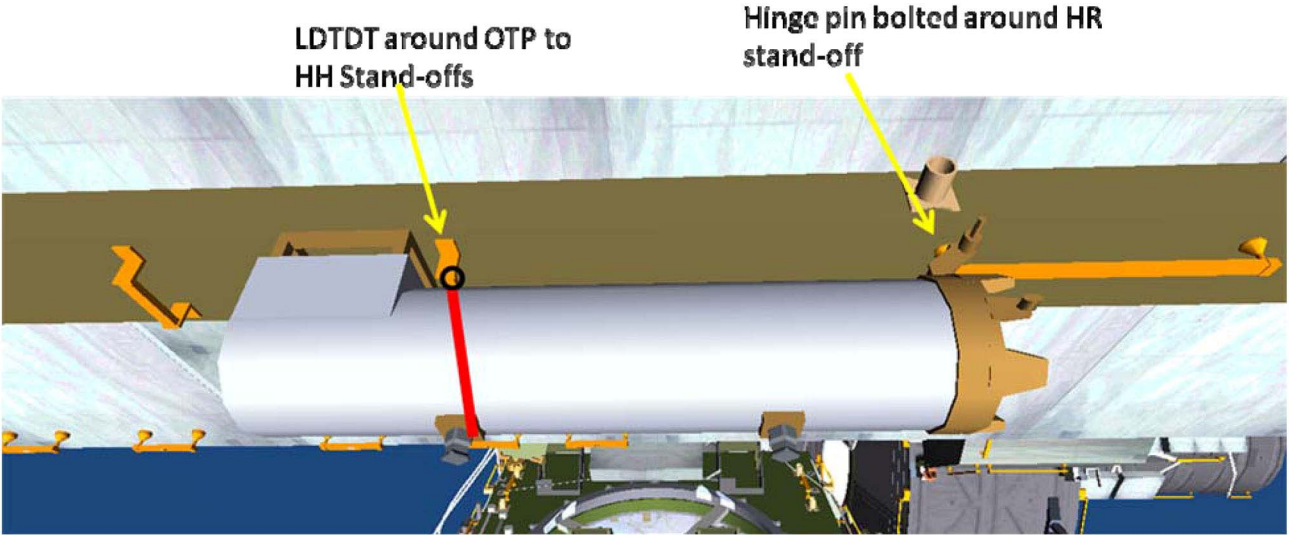
SPECIAL PURPOSE DEXTEROUS MANIPULATOR (SPDM) (Cont)



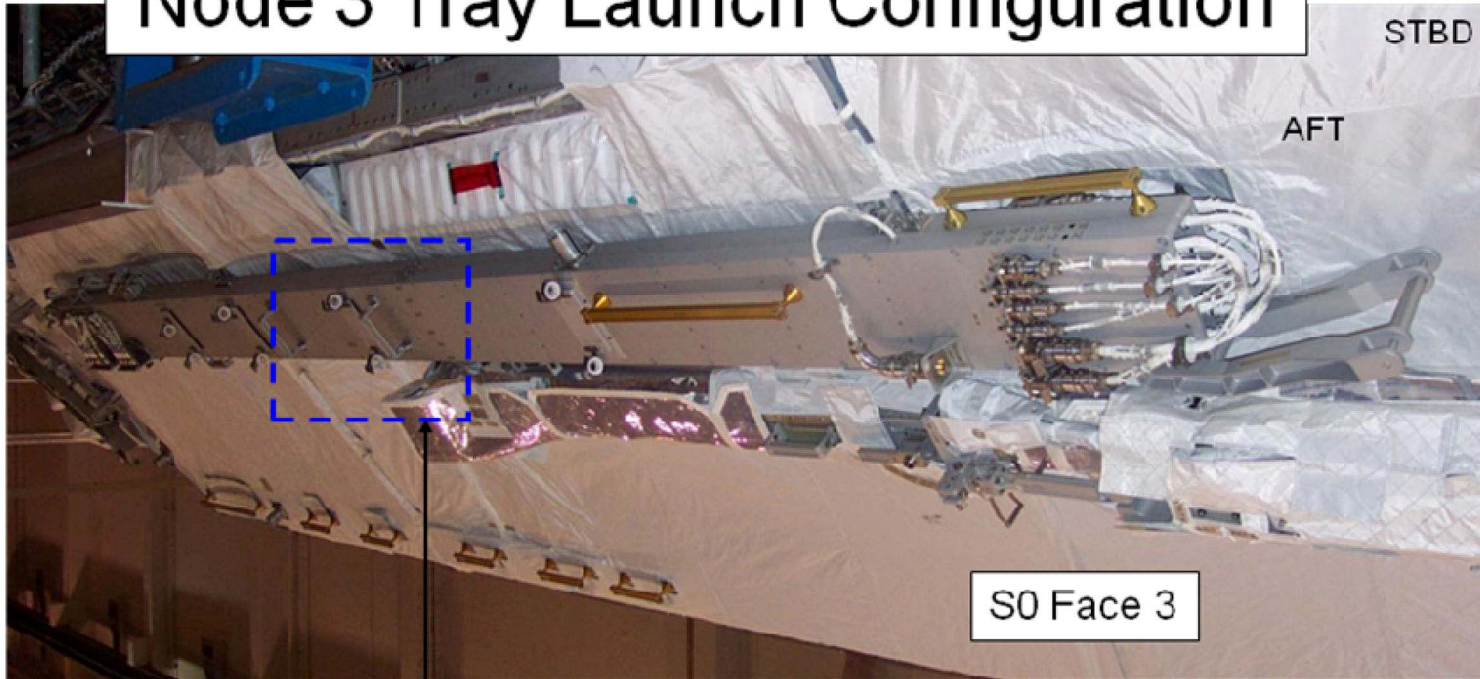
OTP TIE-DOWN PLAN



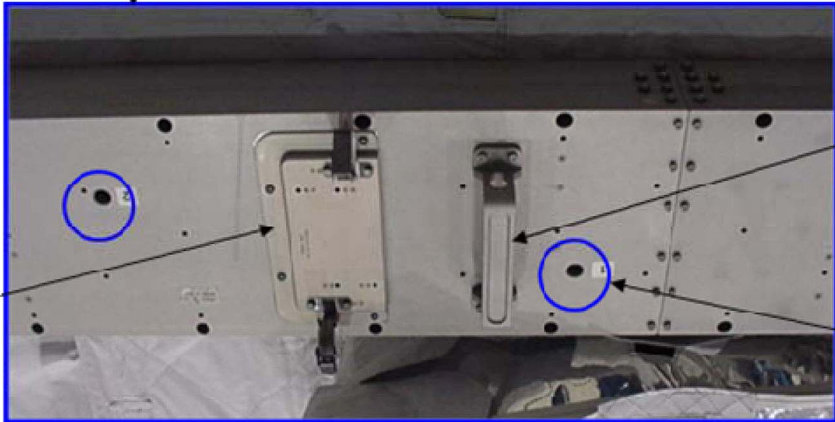
OTP TIE-DOWN PLAN (Cont)



Node 3 Tray Launch Configuration



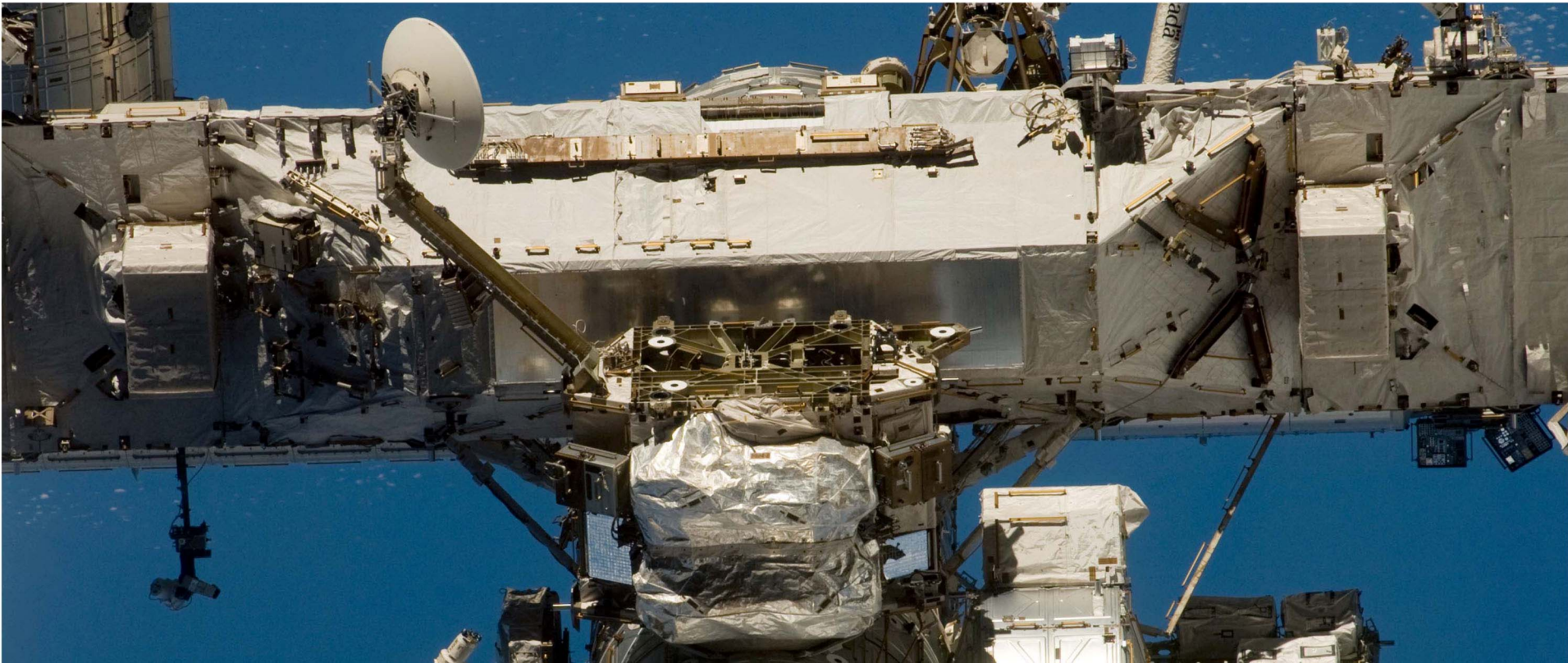
1F77671
Bracket, Cable, Drag On

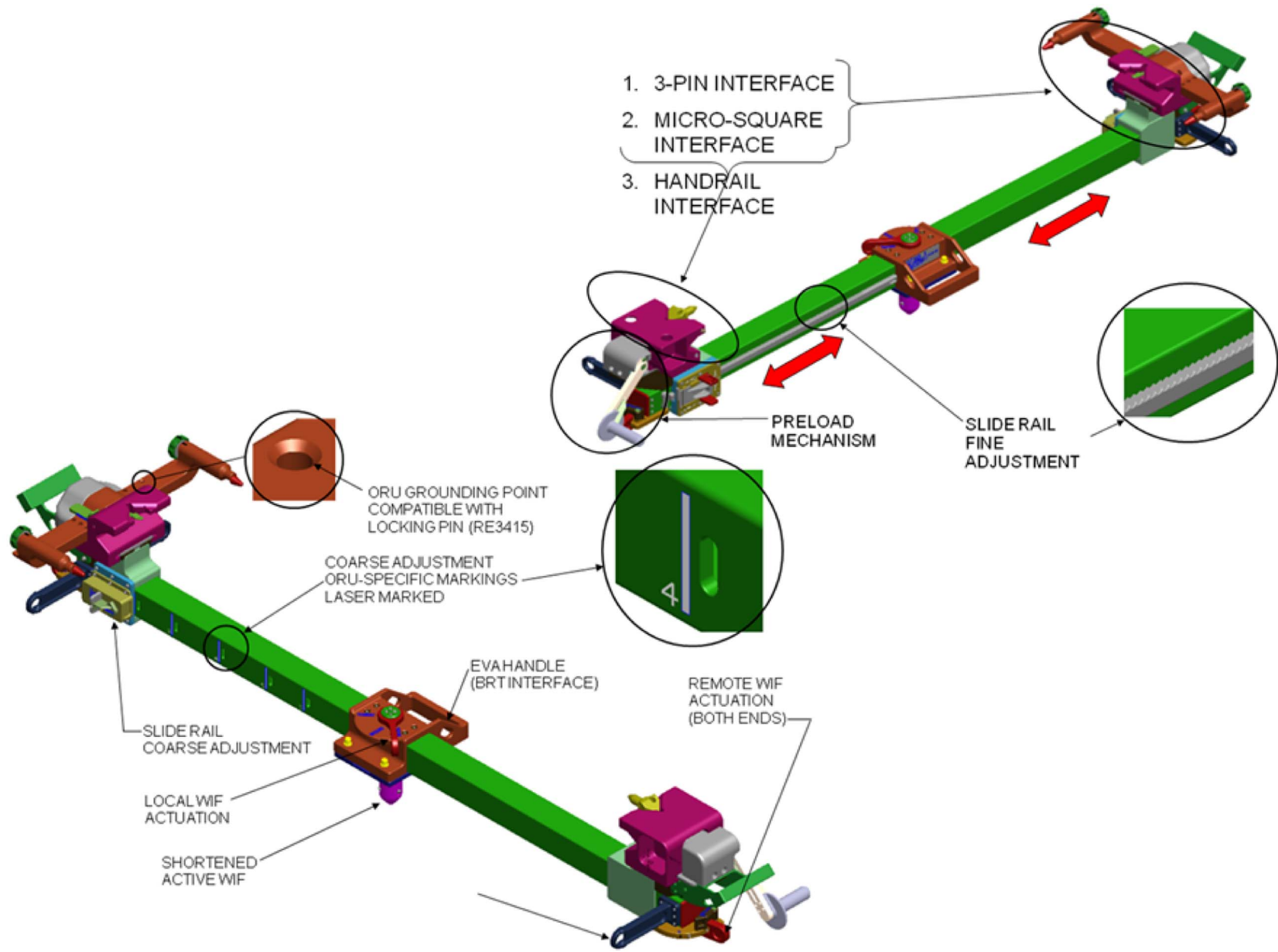


1F76152
EVA Handle

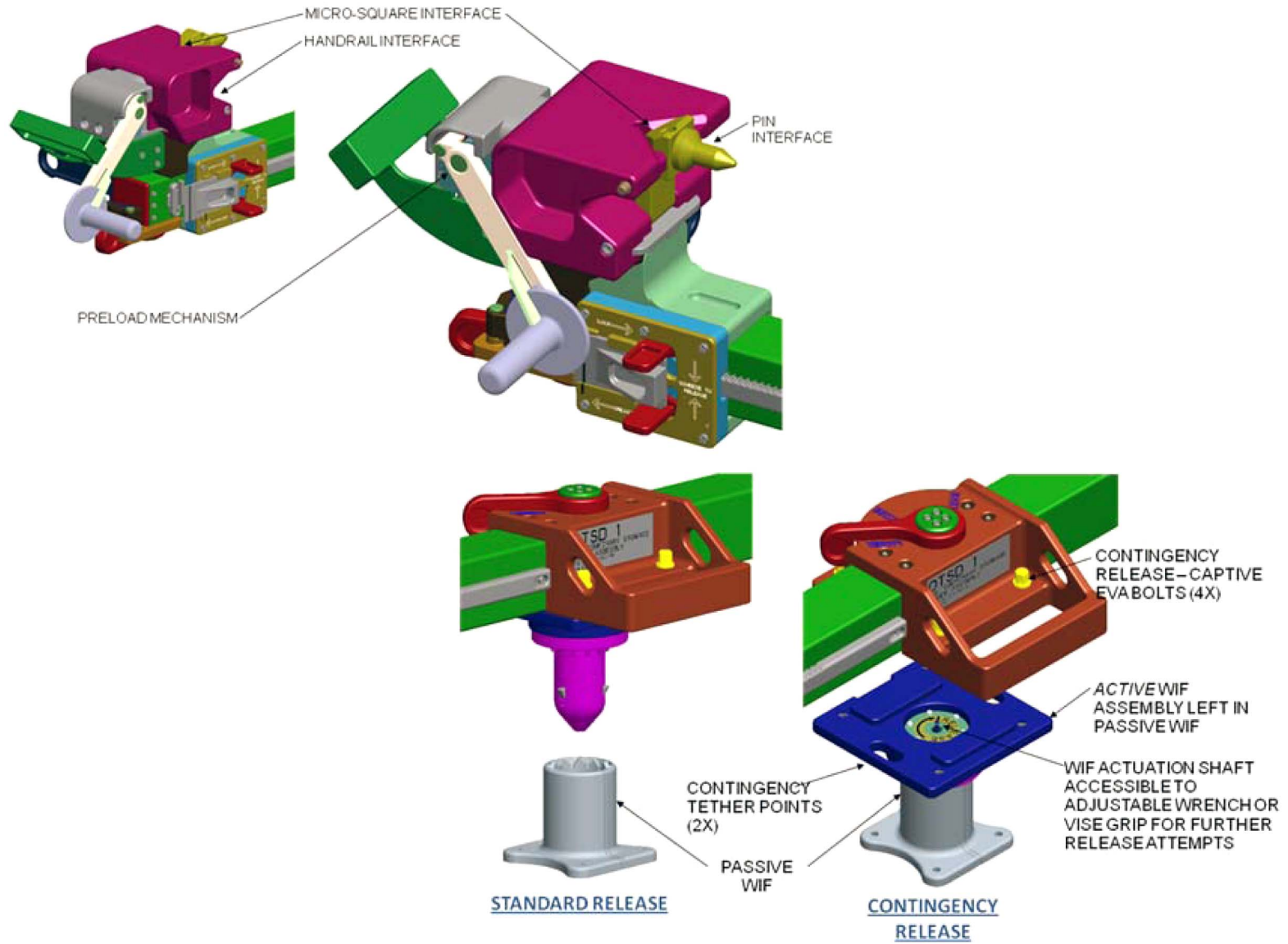
N3 Tray
Launch Restraint Bolts
(2 Places)

S0 HAB TRAY (Cont)

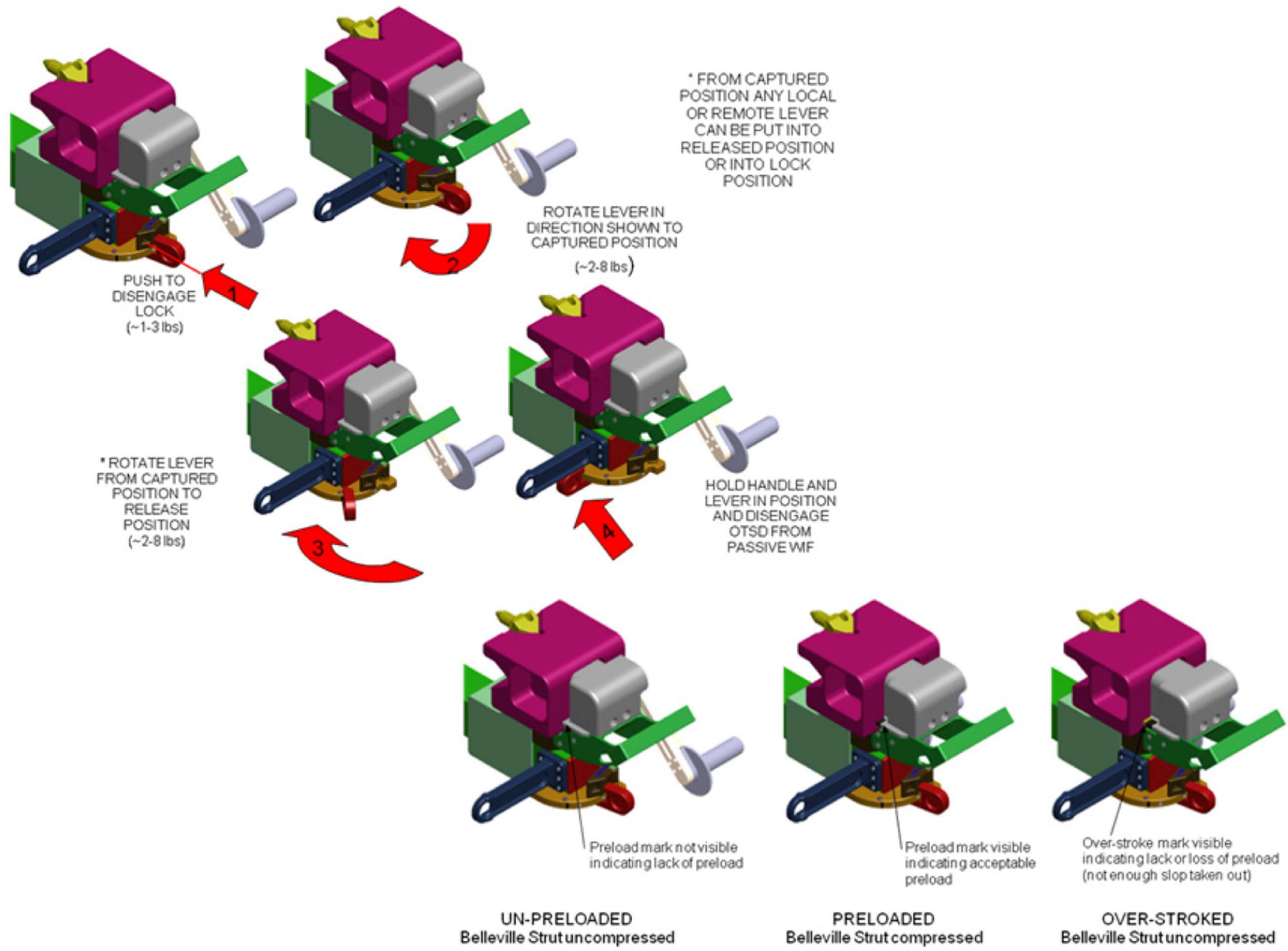




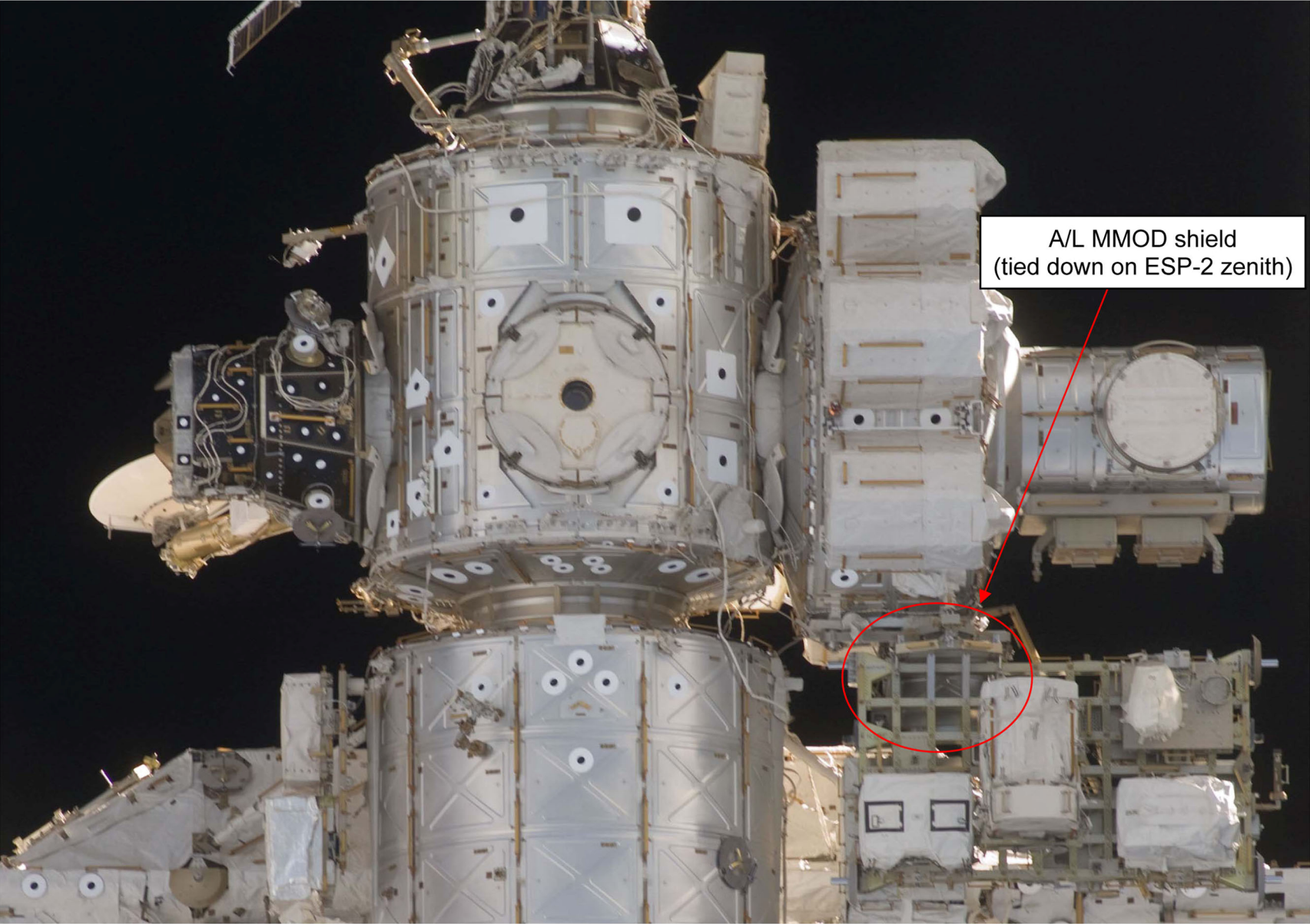
OTSD (Cont)



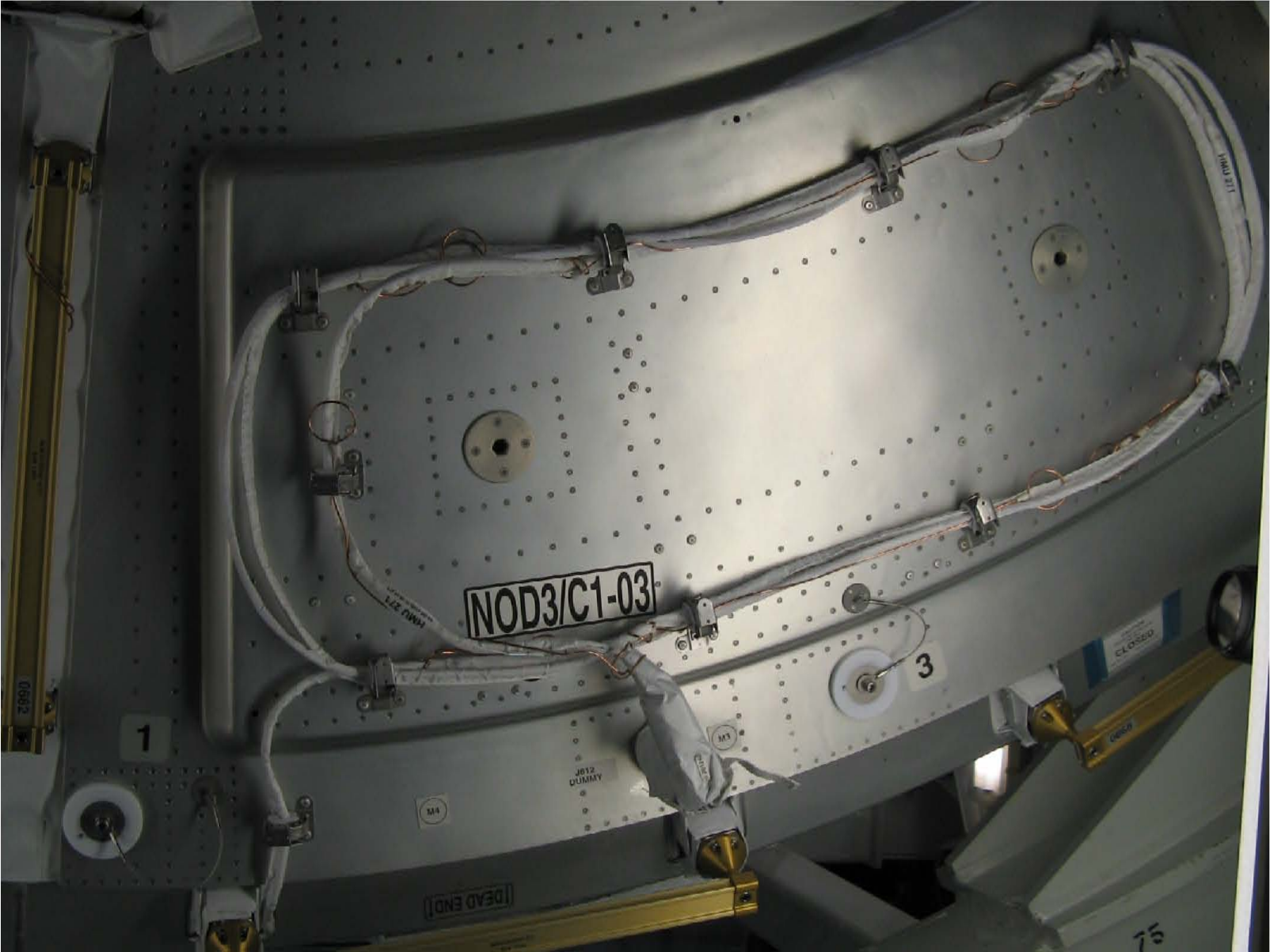
OTSD (Cont)



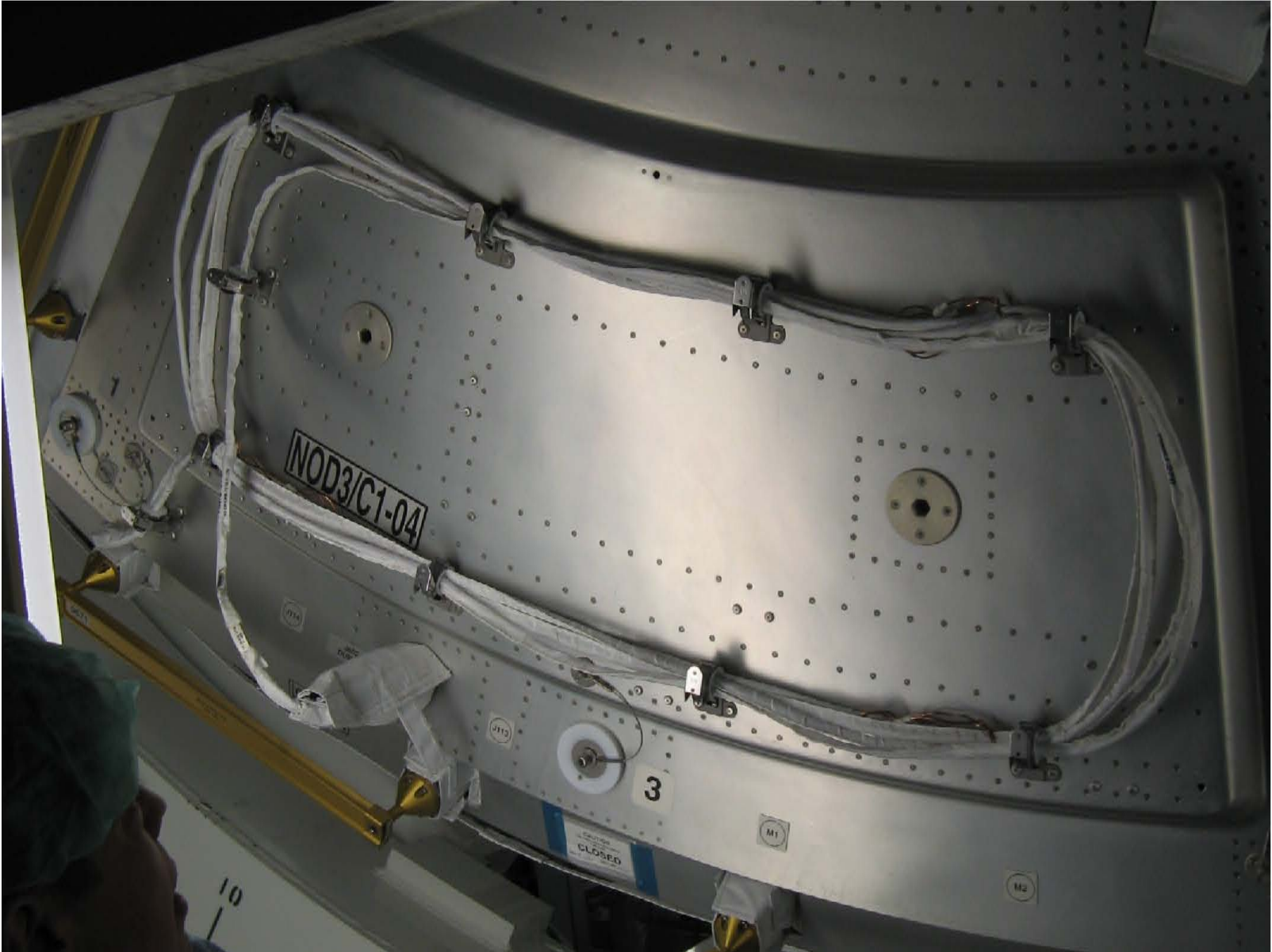
NODE 1 NADIR (STS-129 FLYAROUND)



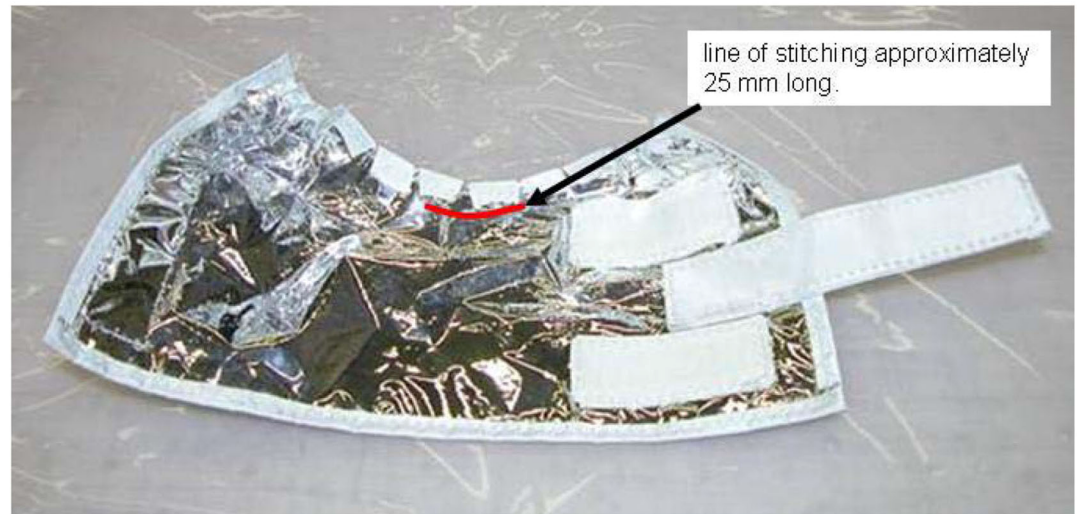
NODE 3 612 LTA CABLE



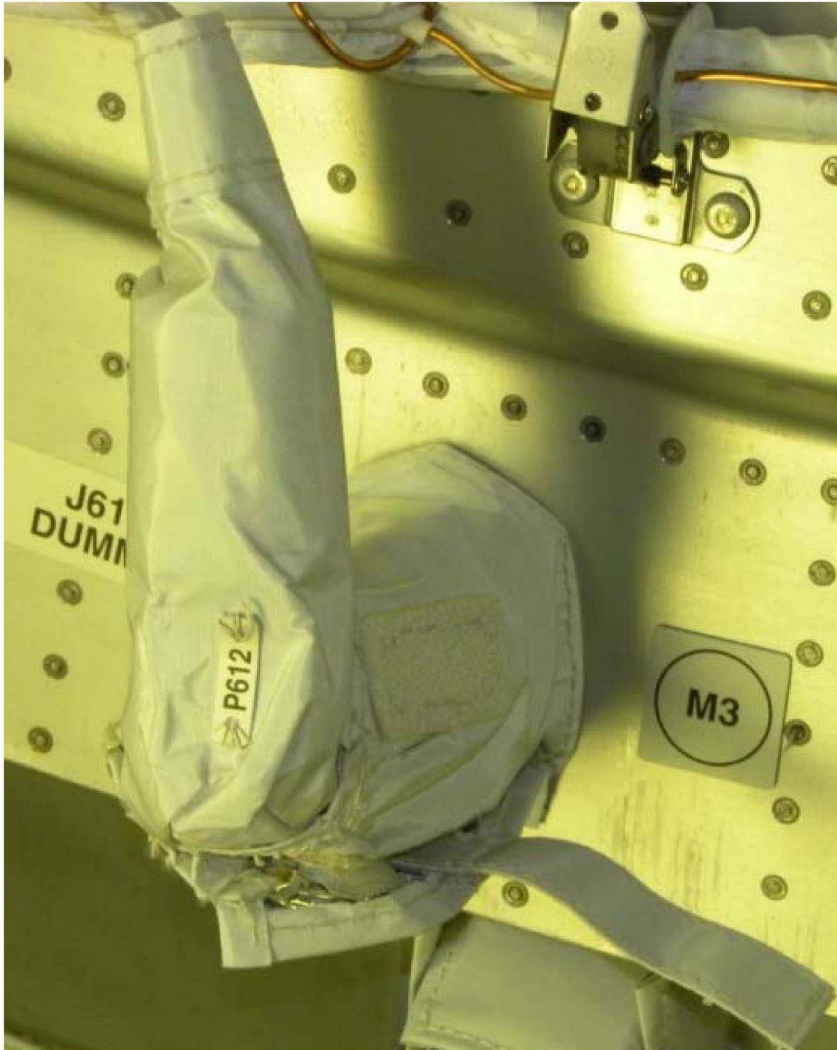
NODE 3 602 LTA CABLE



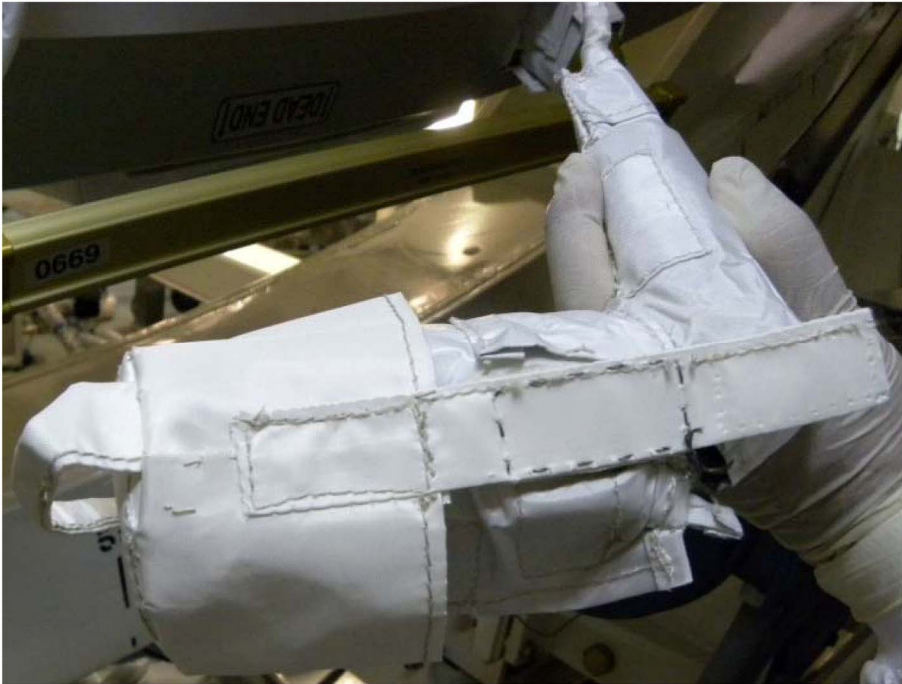
LTA CONNECTOR MLI



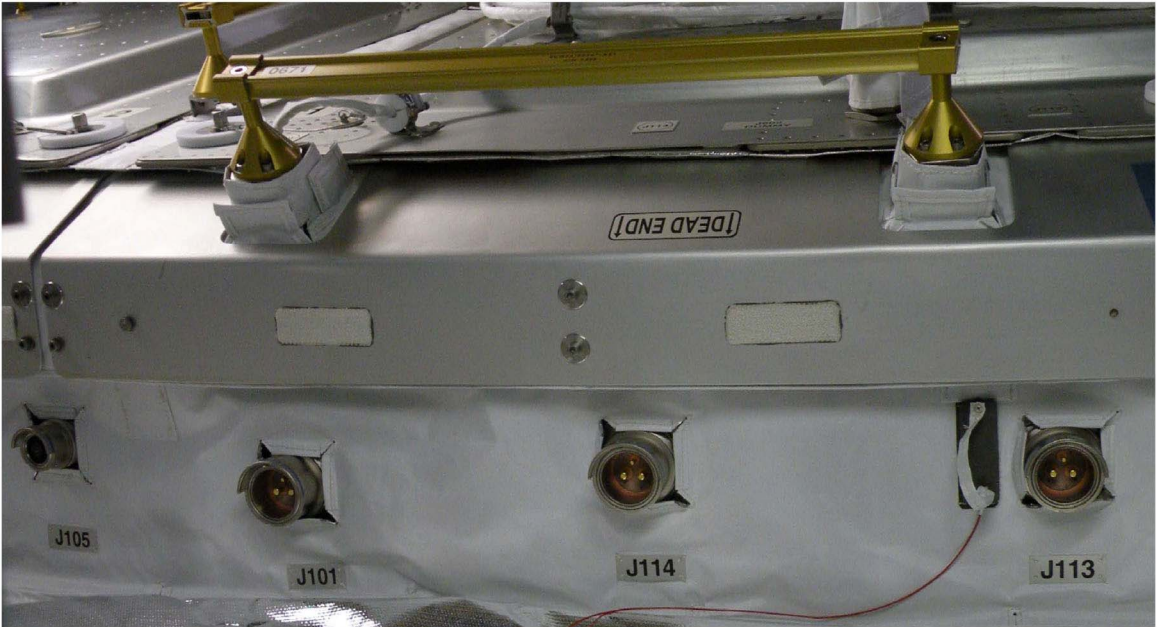
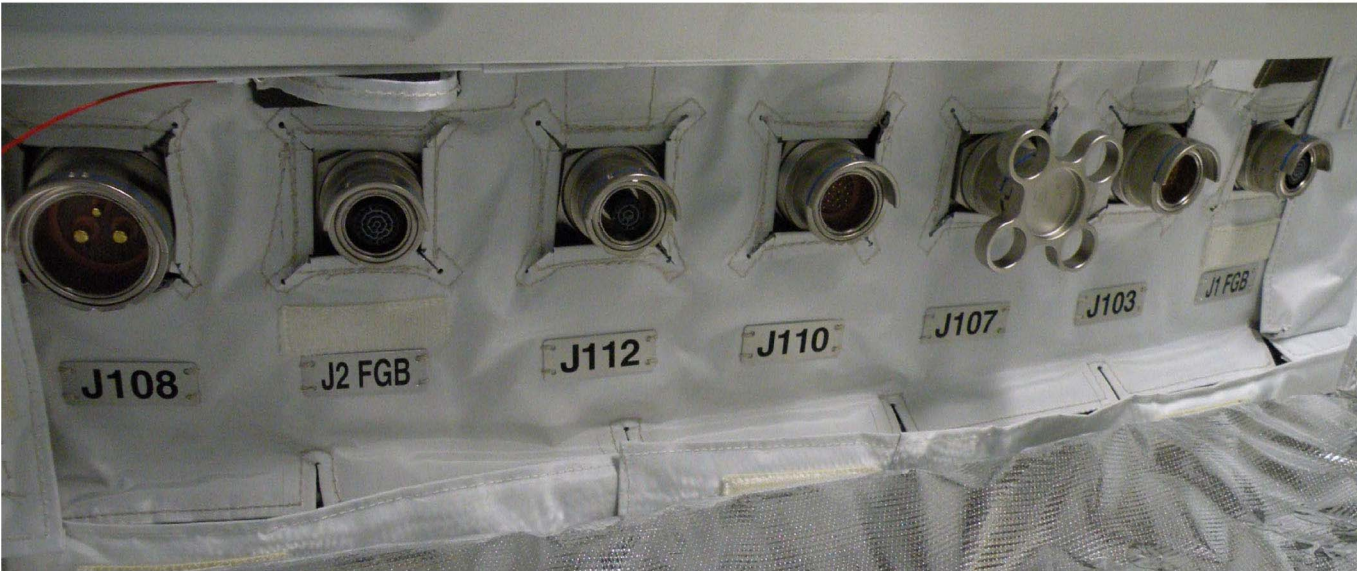
P612 CONNECTOR MLI



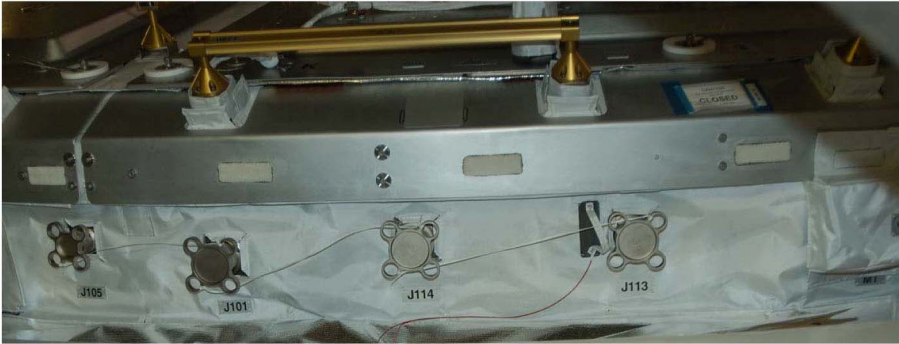
P612 CONNECTOR MLI (Cont)



NODE 3 CONNECTORS



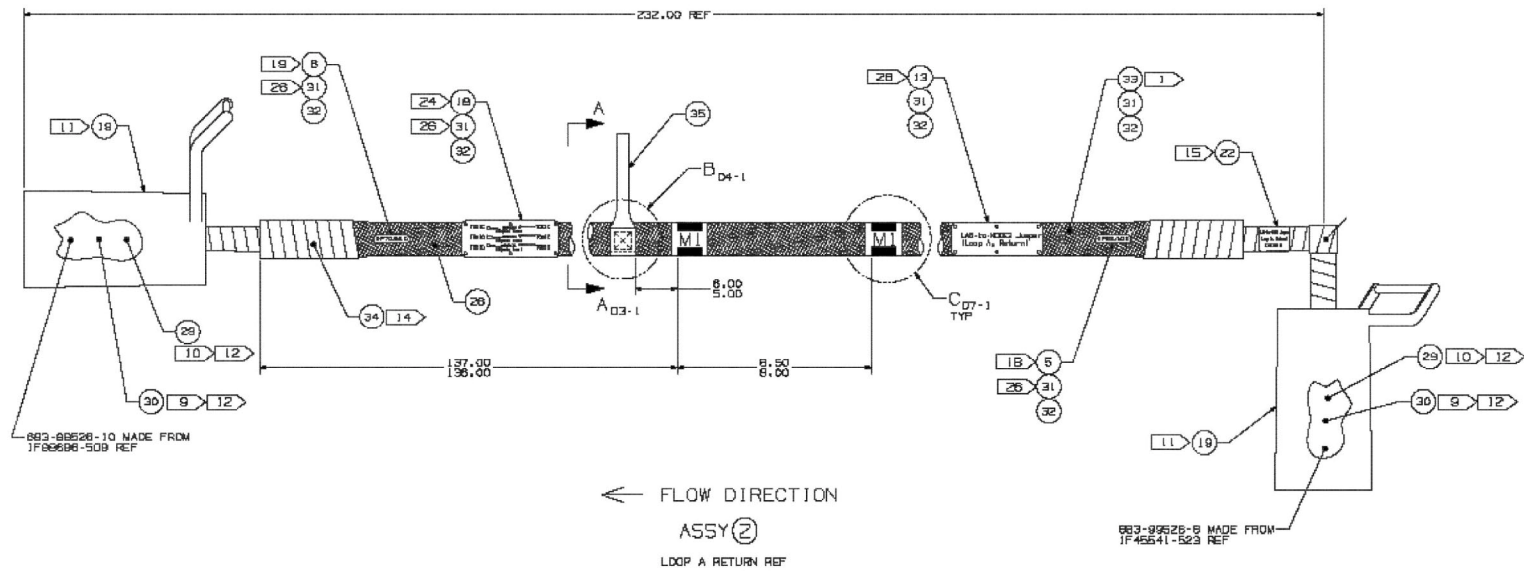
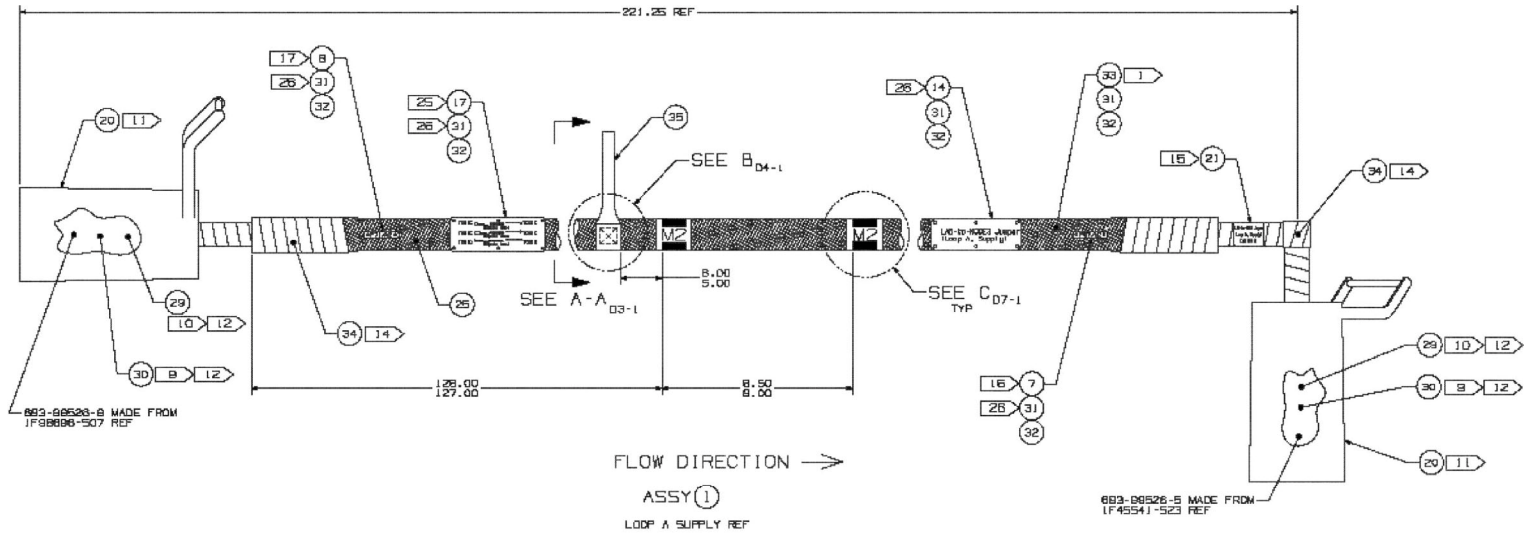
NODE 3 CONNECTORS (Cont)



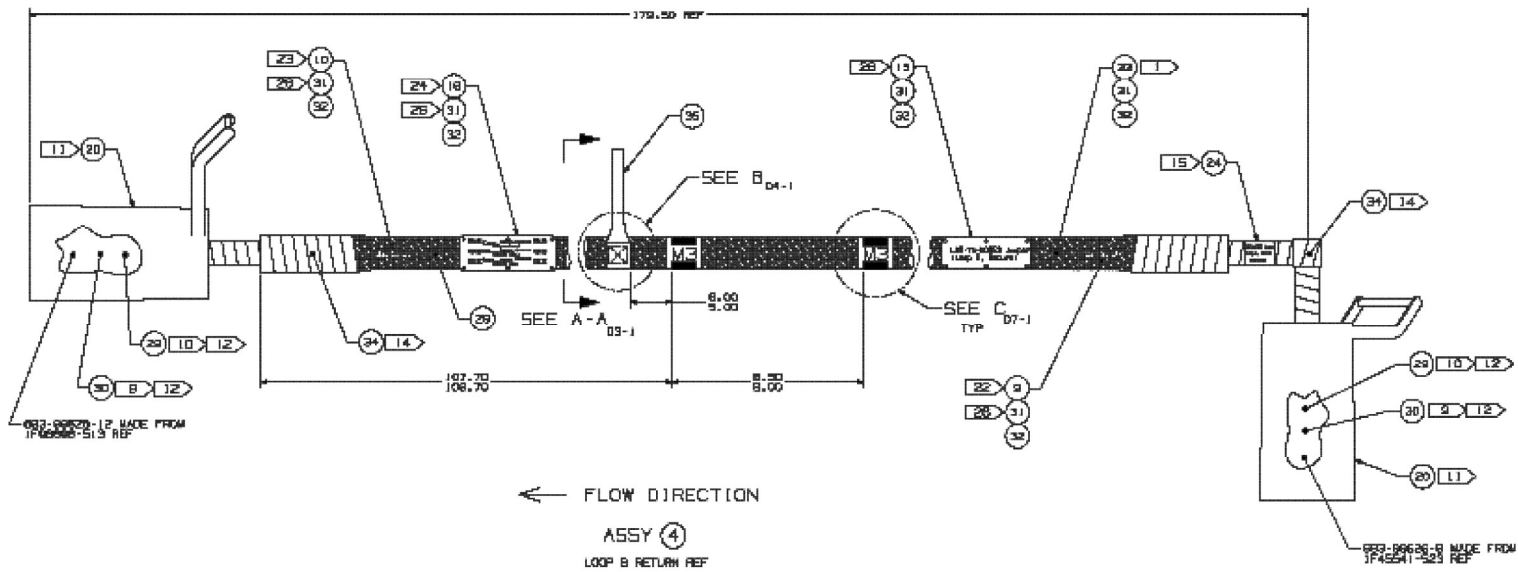
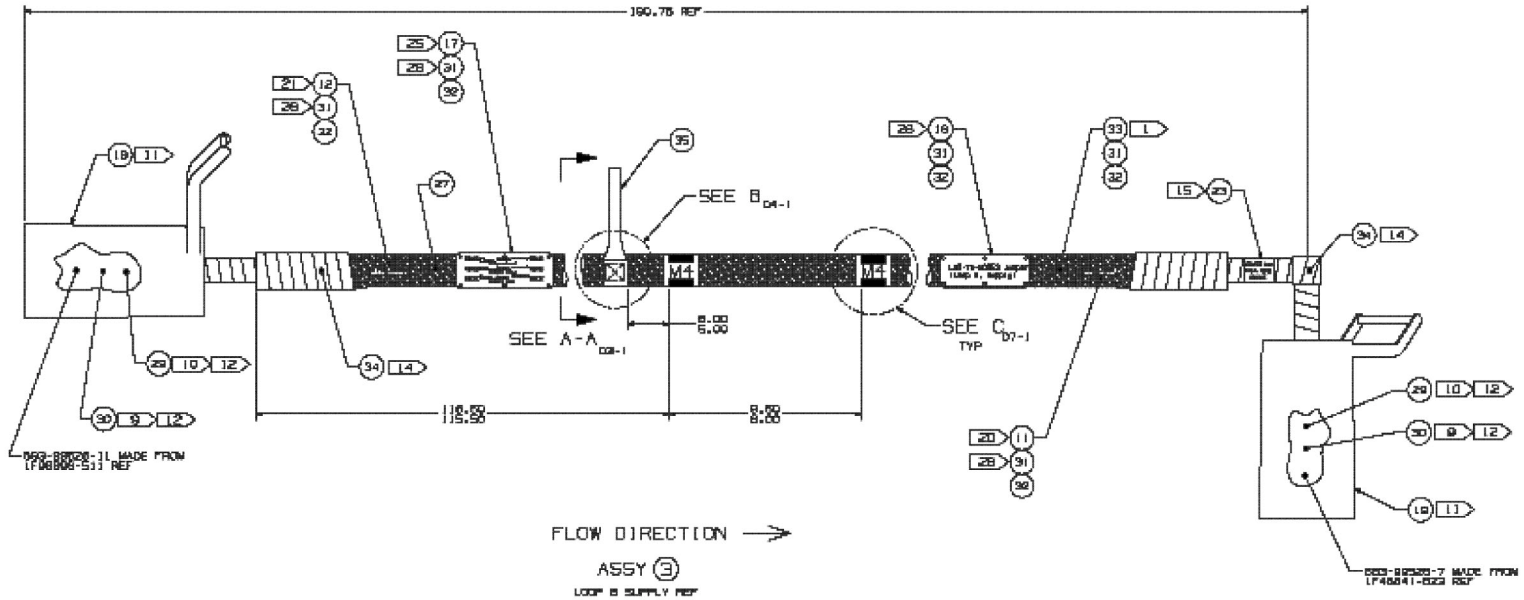
NODE 3 CONNECTORS (Cont)



NODE 3 AMMONIA LINES



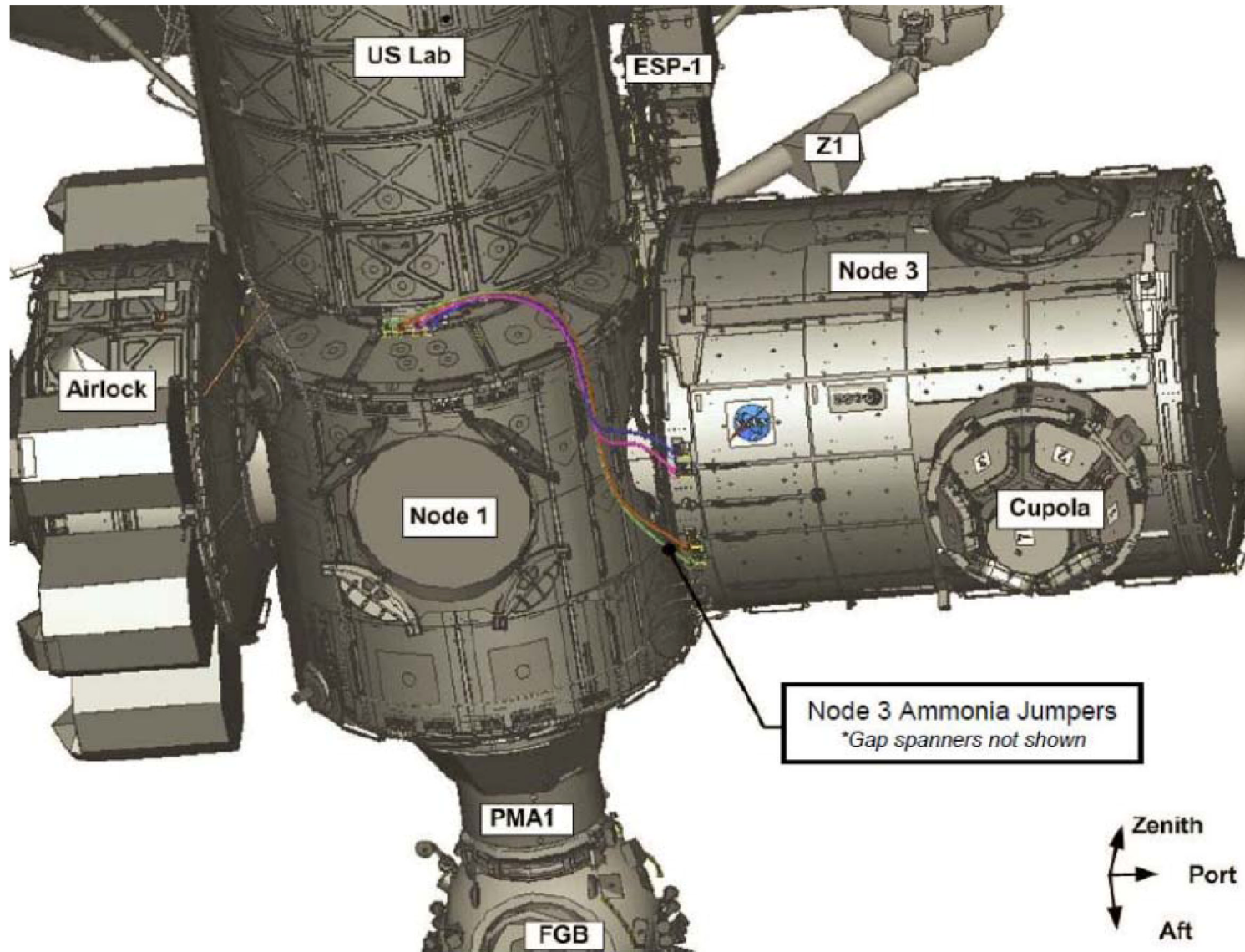
NODE 3 AMMONIA LINES (Cont)



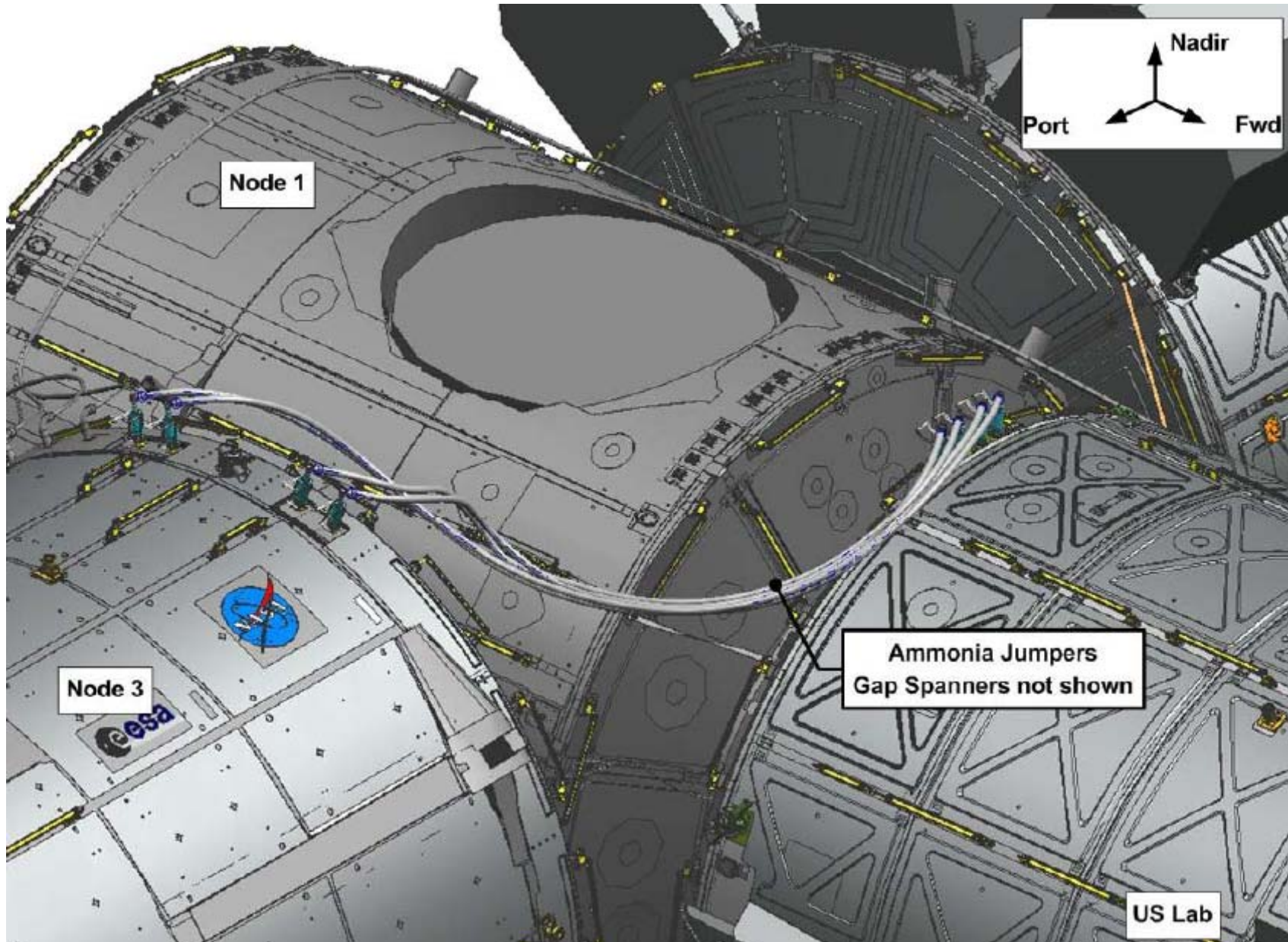
NODE 3 AMMONIA LINES – MLI LABEL, ELBOW



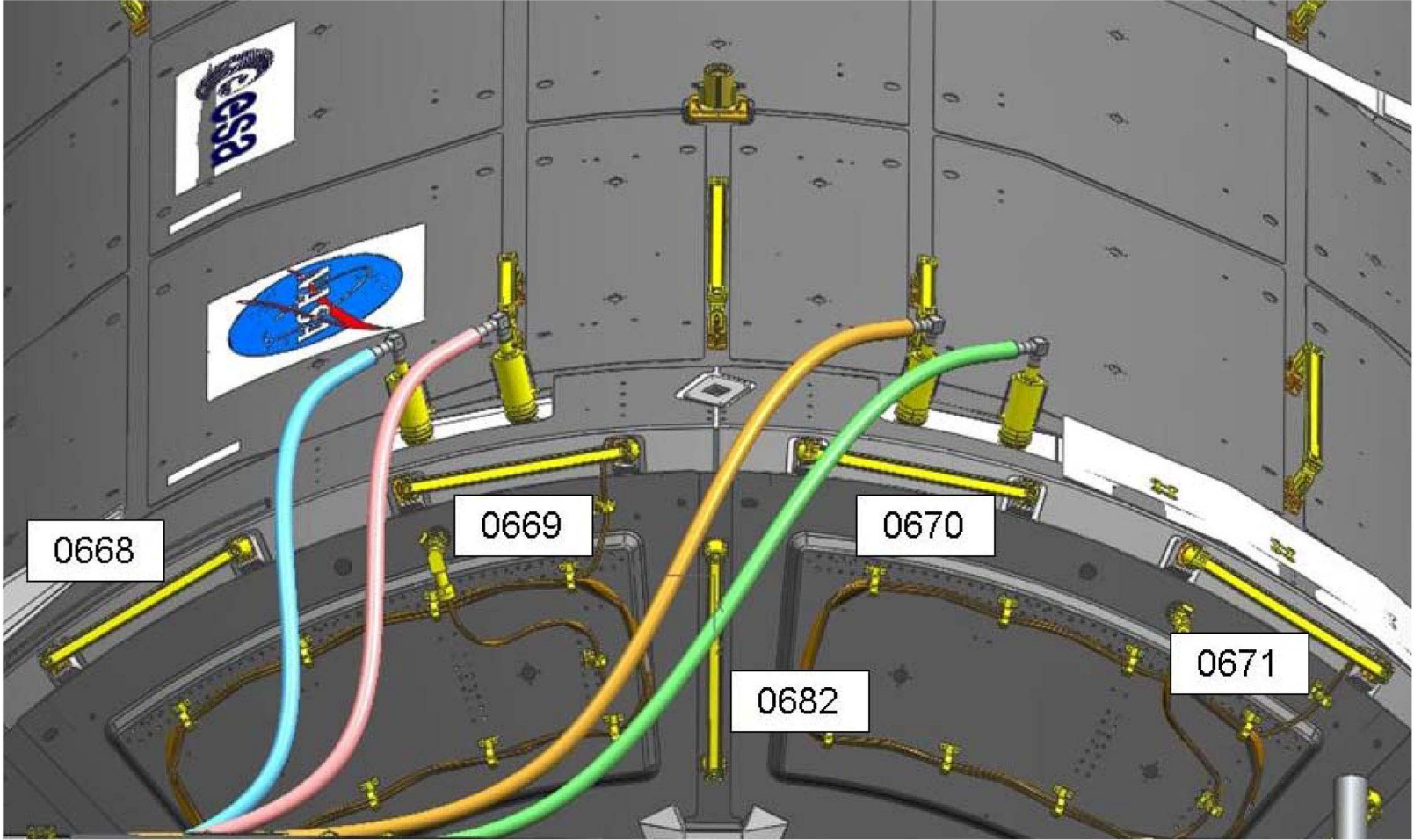
AMMONIA LINE ROUTING



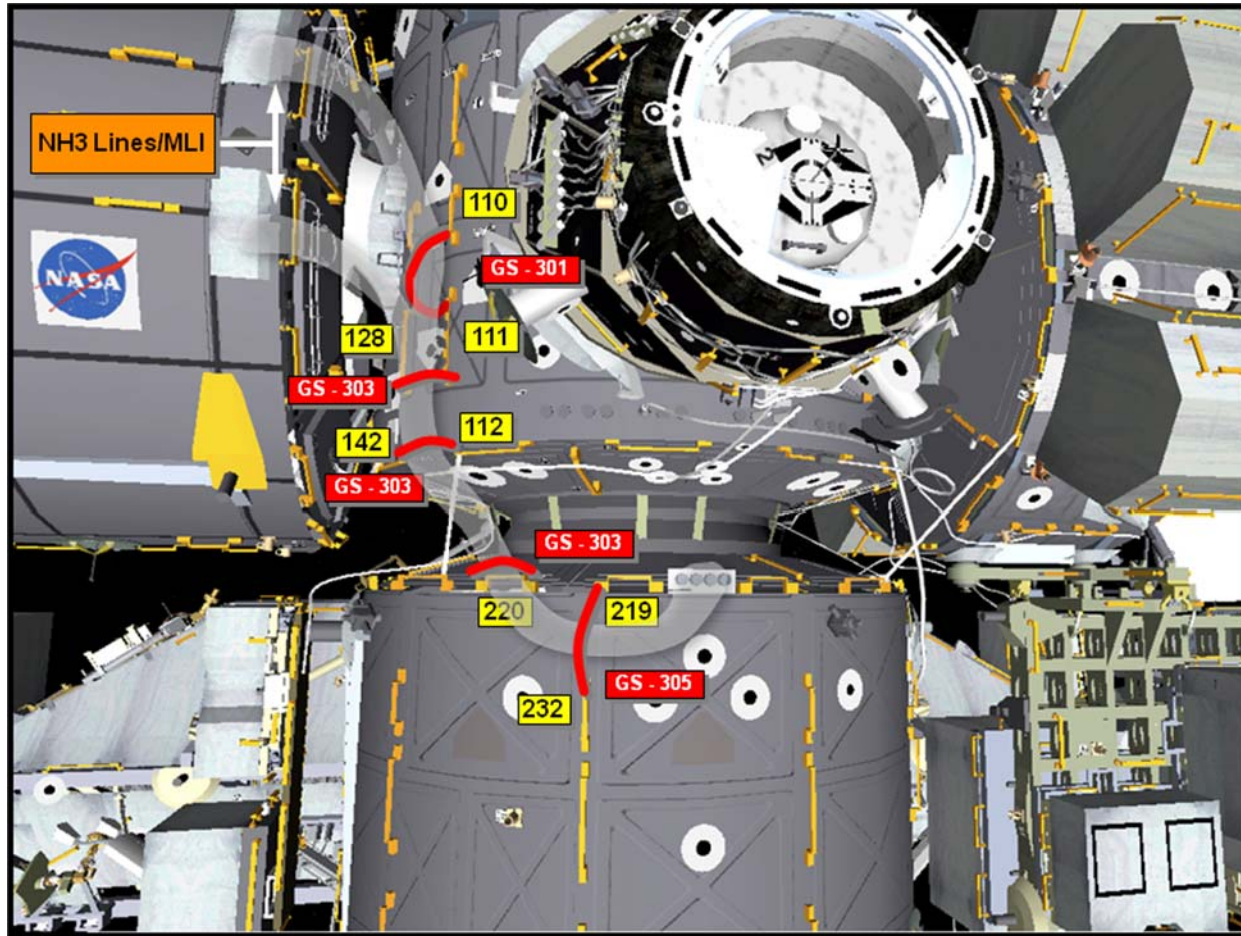
AMMONIA LINE ROUTING (Cont)



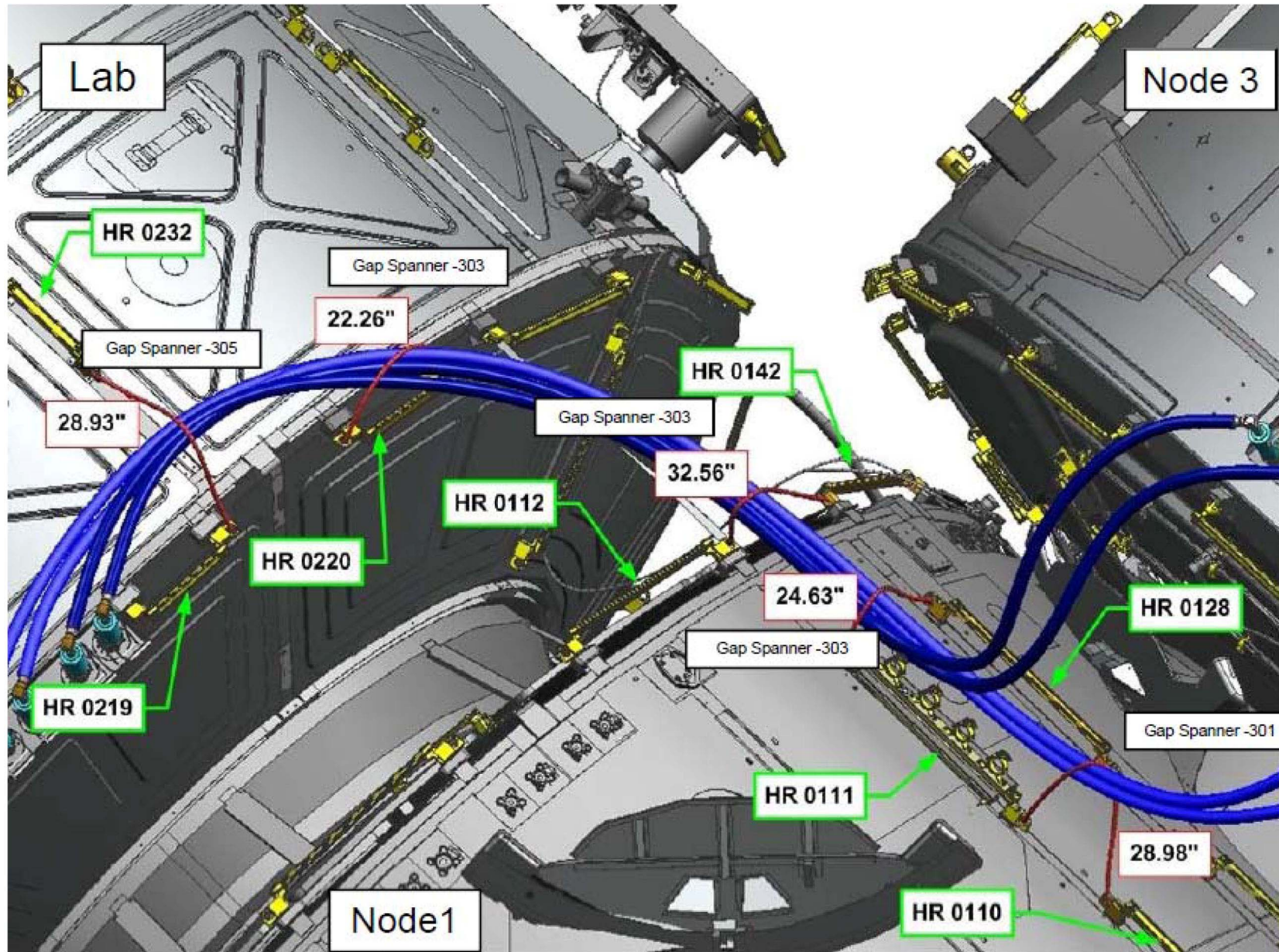
AMMONIA LINE ROUTING (Cont)



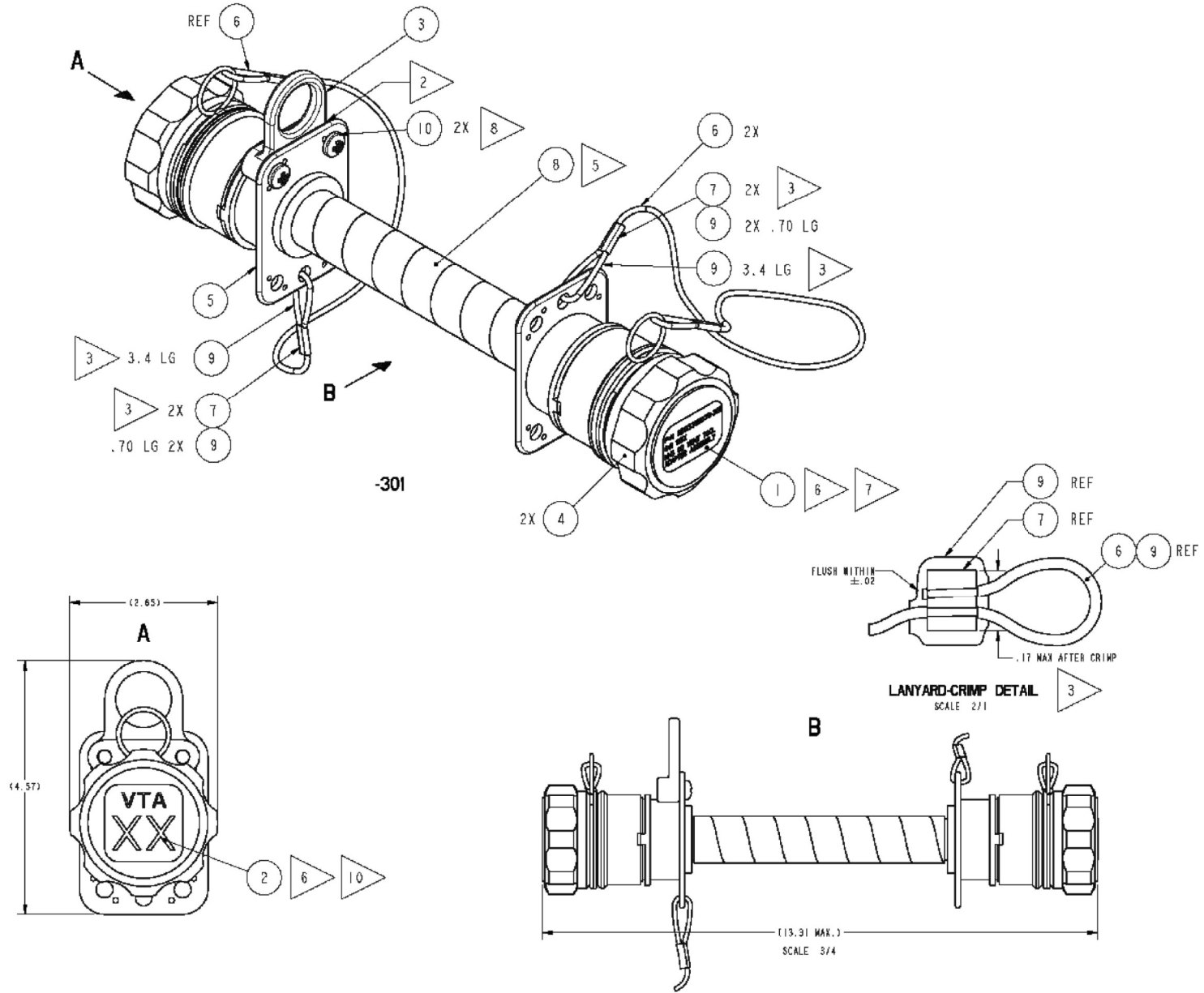
AMMONIA LINE GAP SPANNER ROUTING



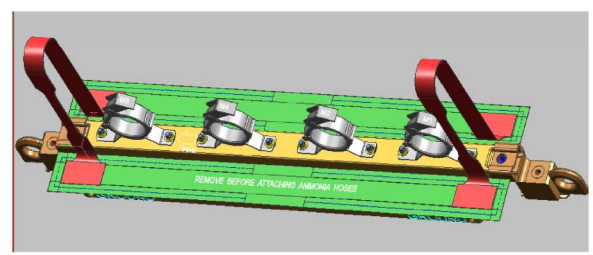
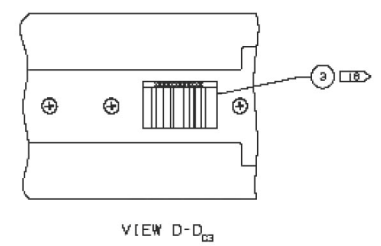
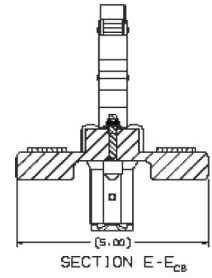
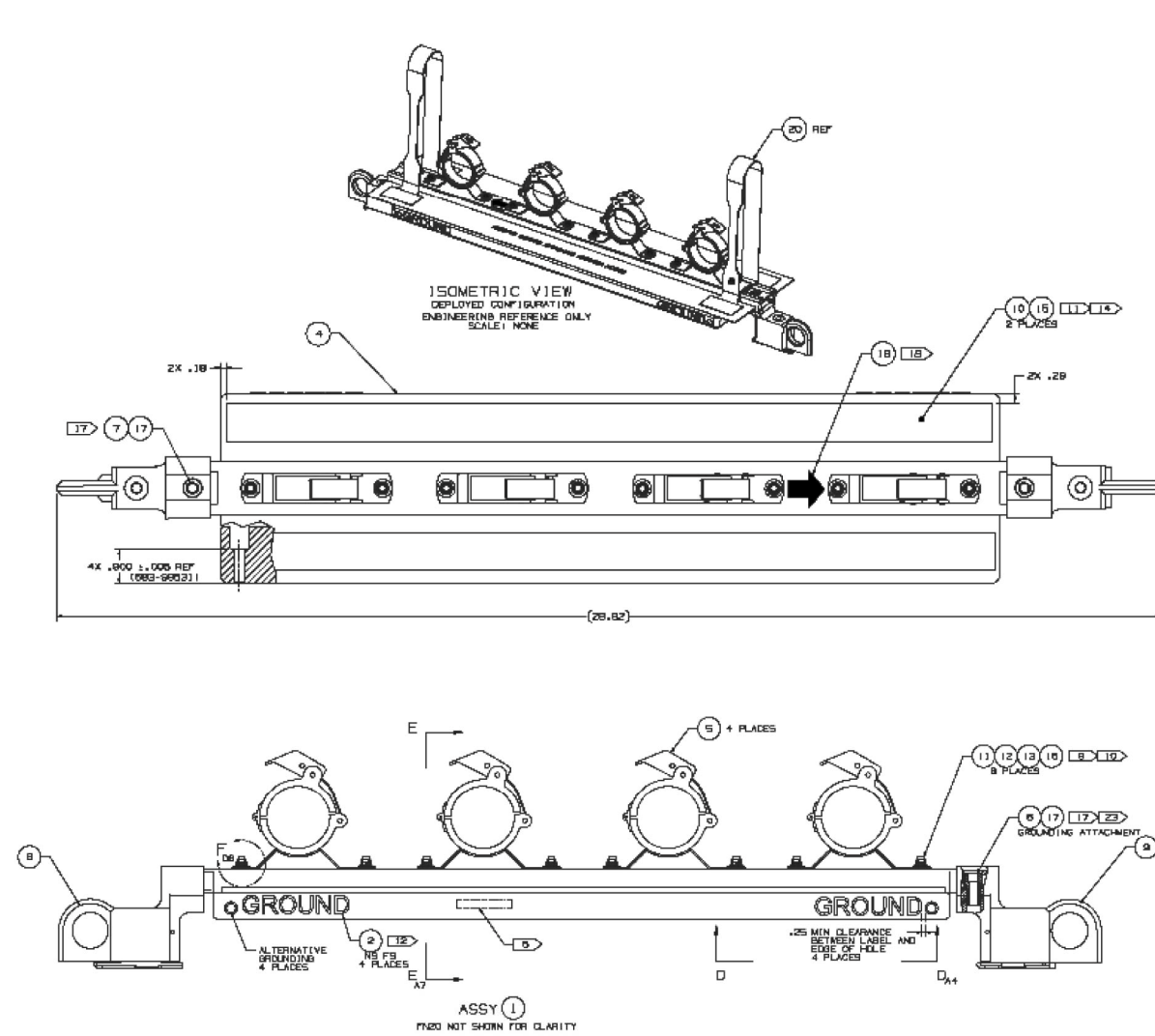
AMMONIA LINE GAP SPANNER ROUTING (Cont)



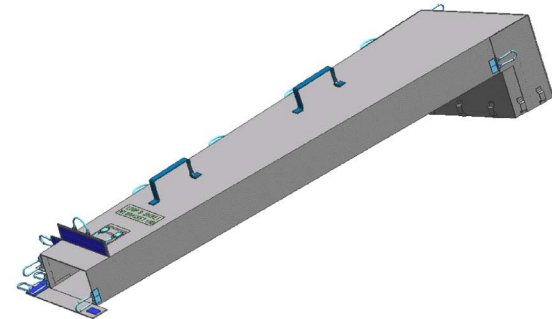
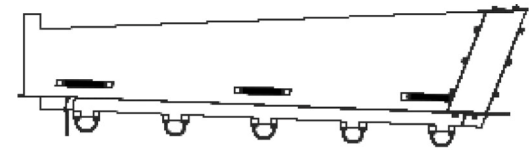
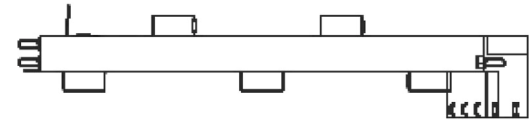
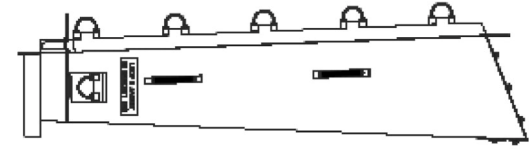
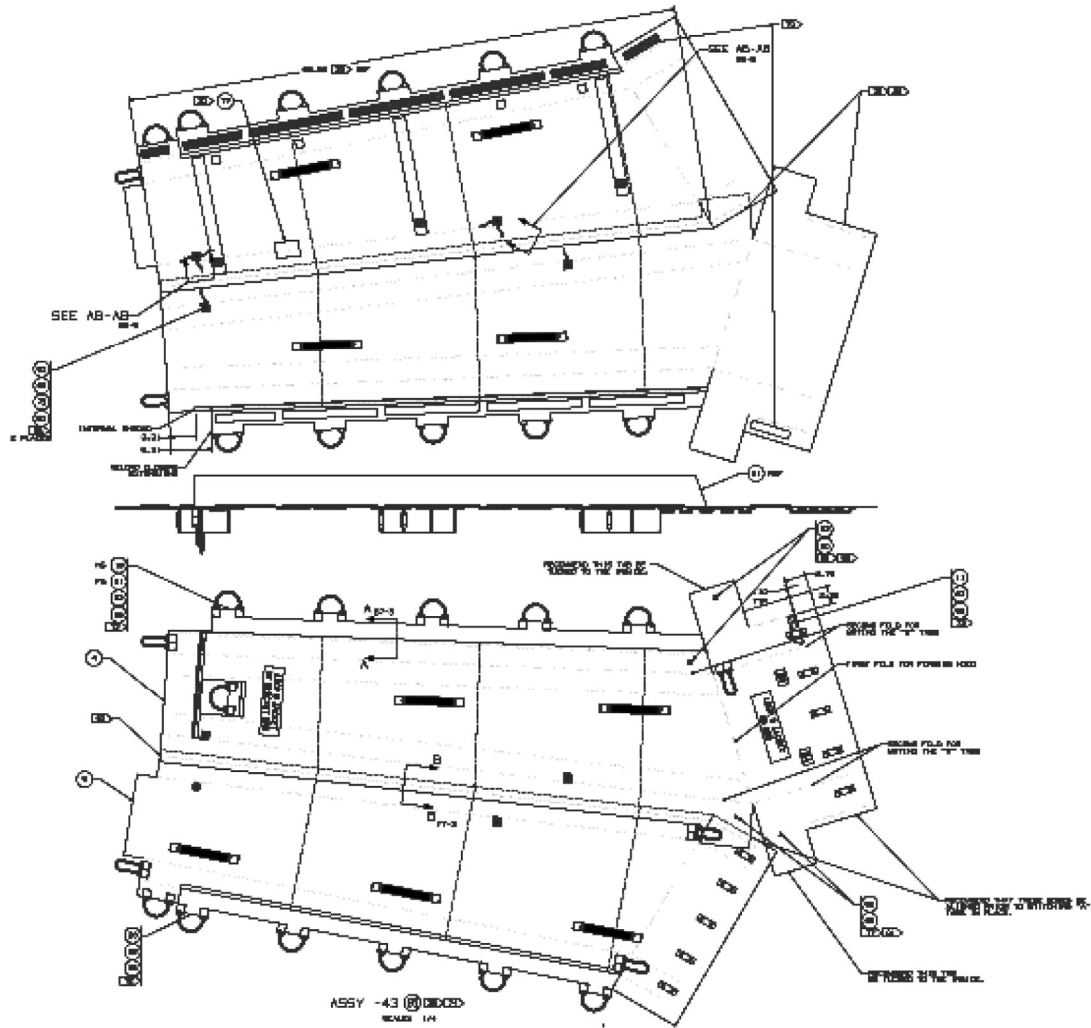
AMMONIA (NH3) VENT TOOL



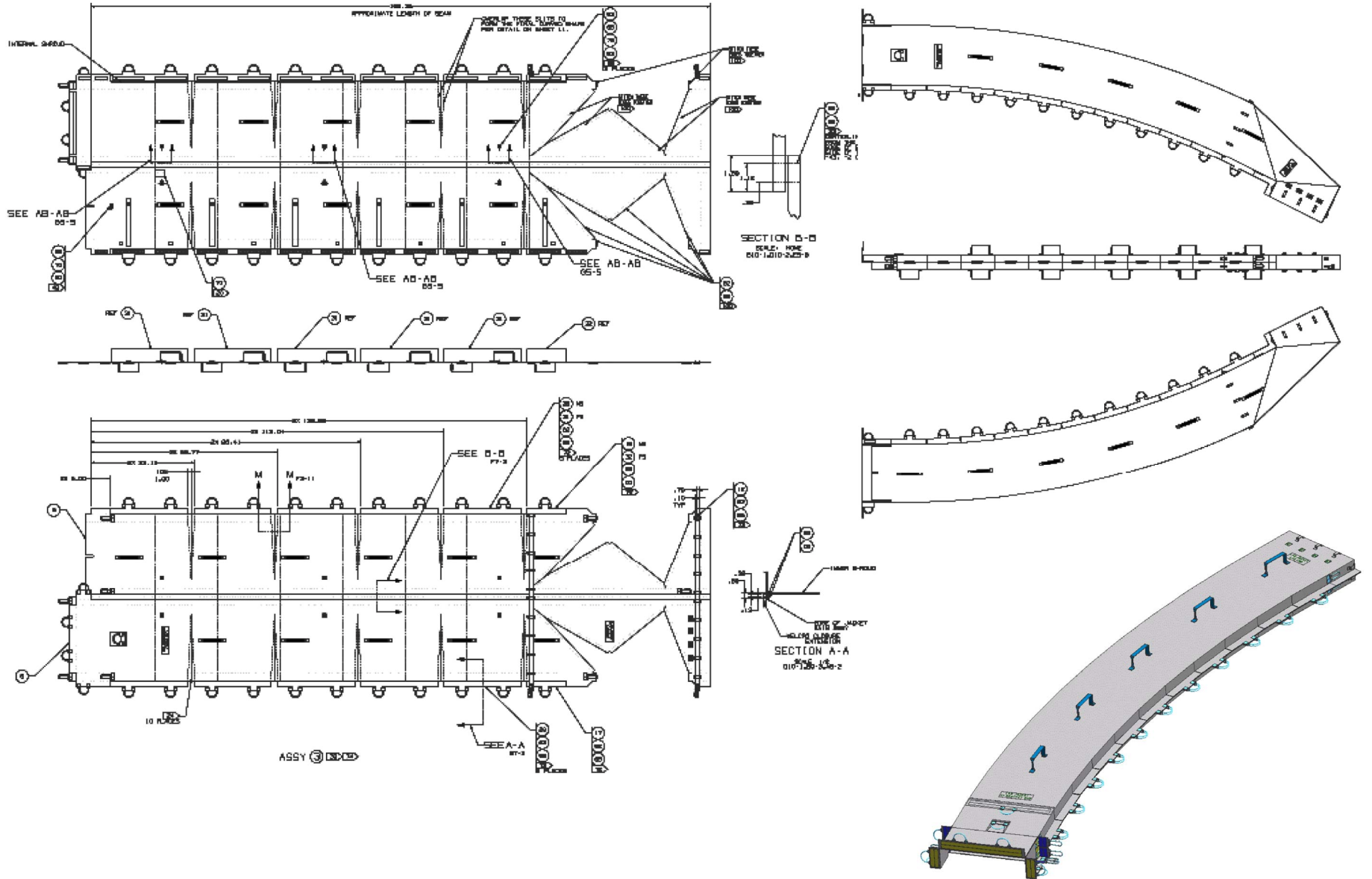
NH3 HANDRAIL BRACKET



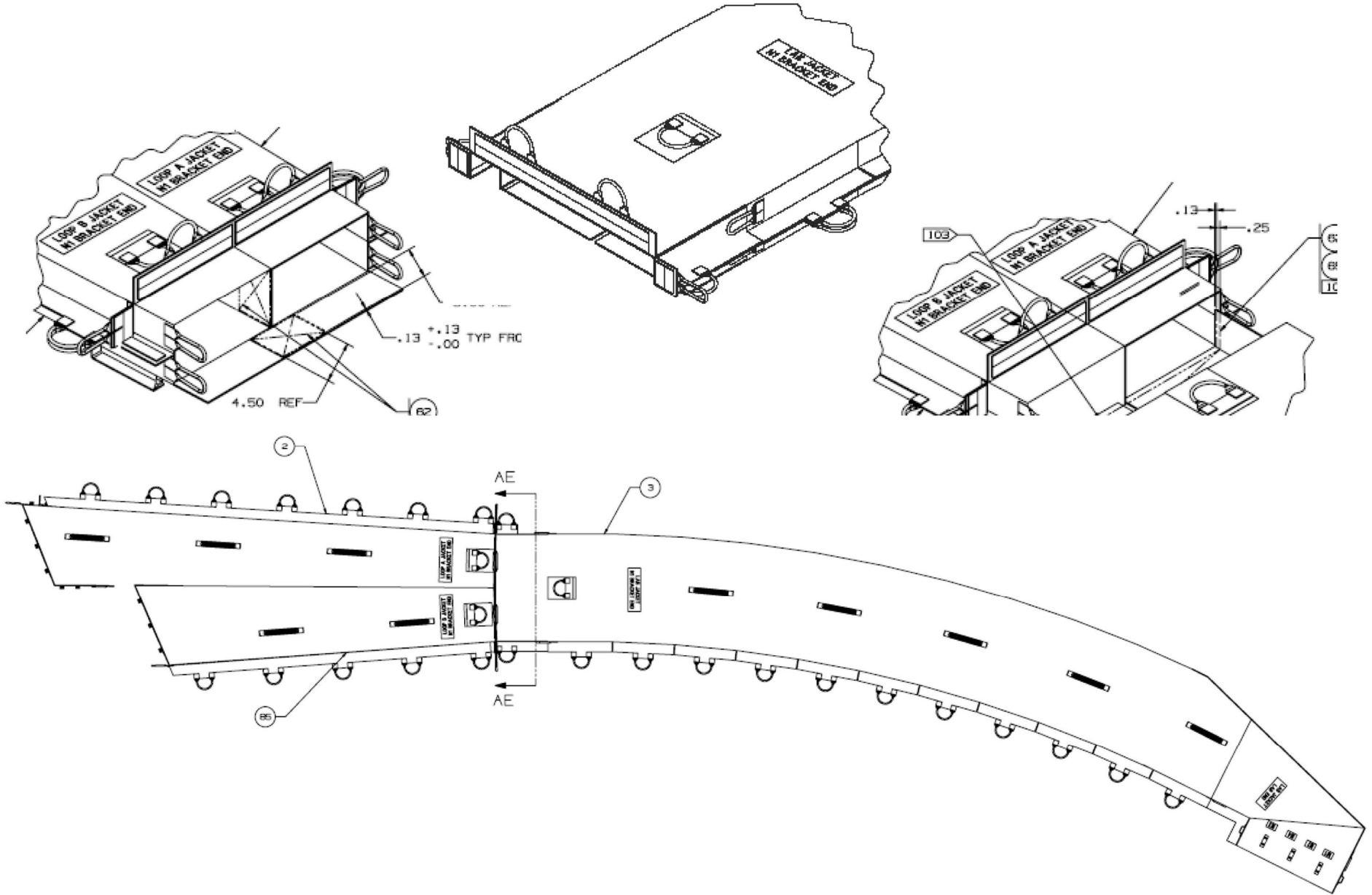
NH3 MLI – LOOP B JACKET



NH3 MLI – LAB JACKET



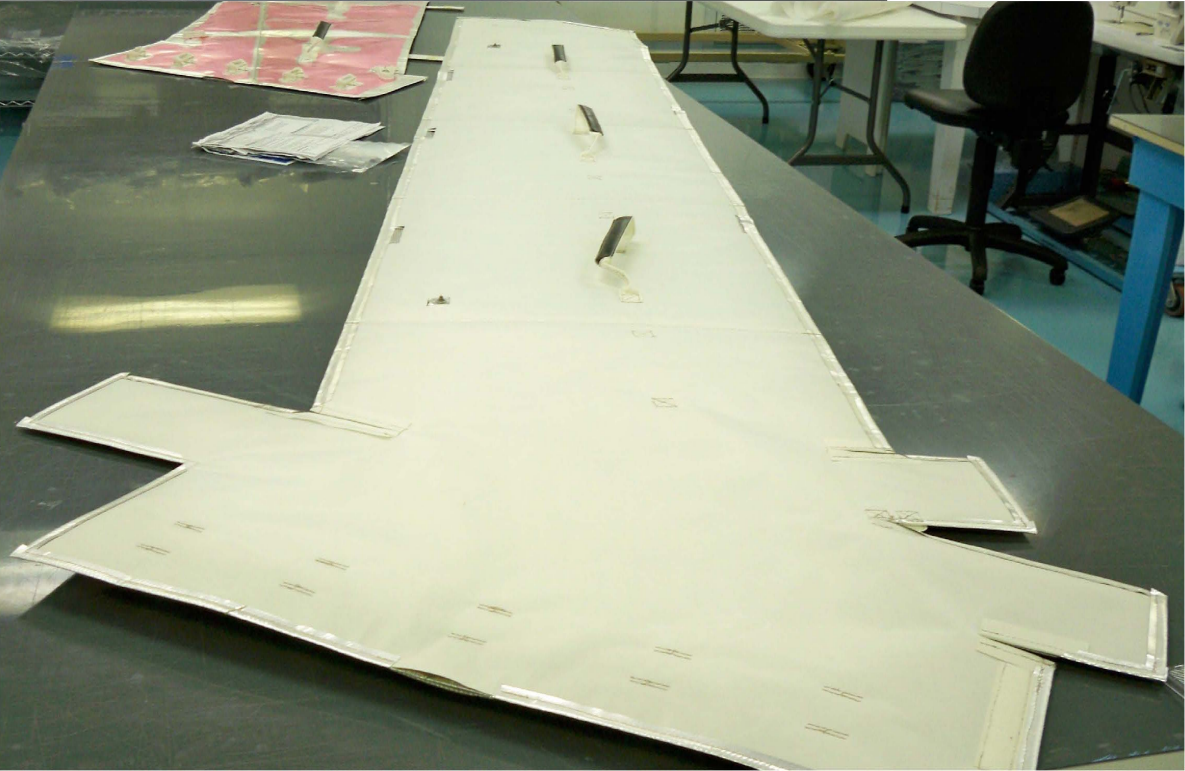
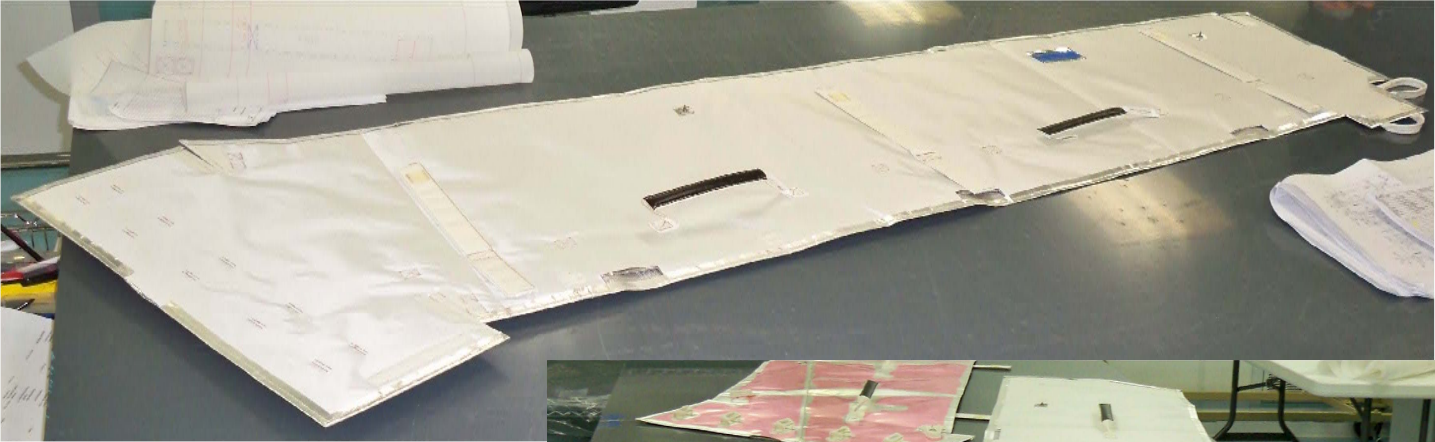
NH3 MLI AND ROUTING



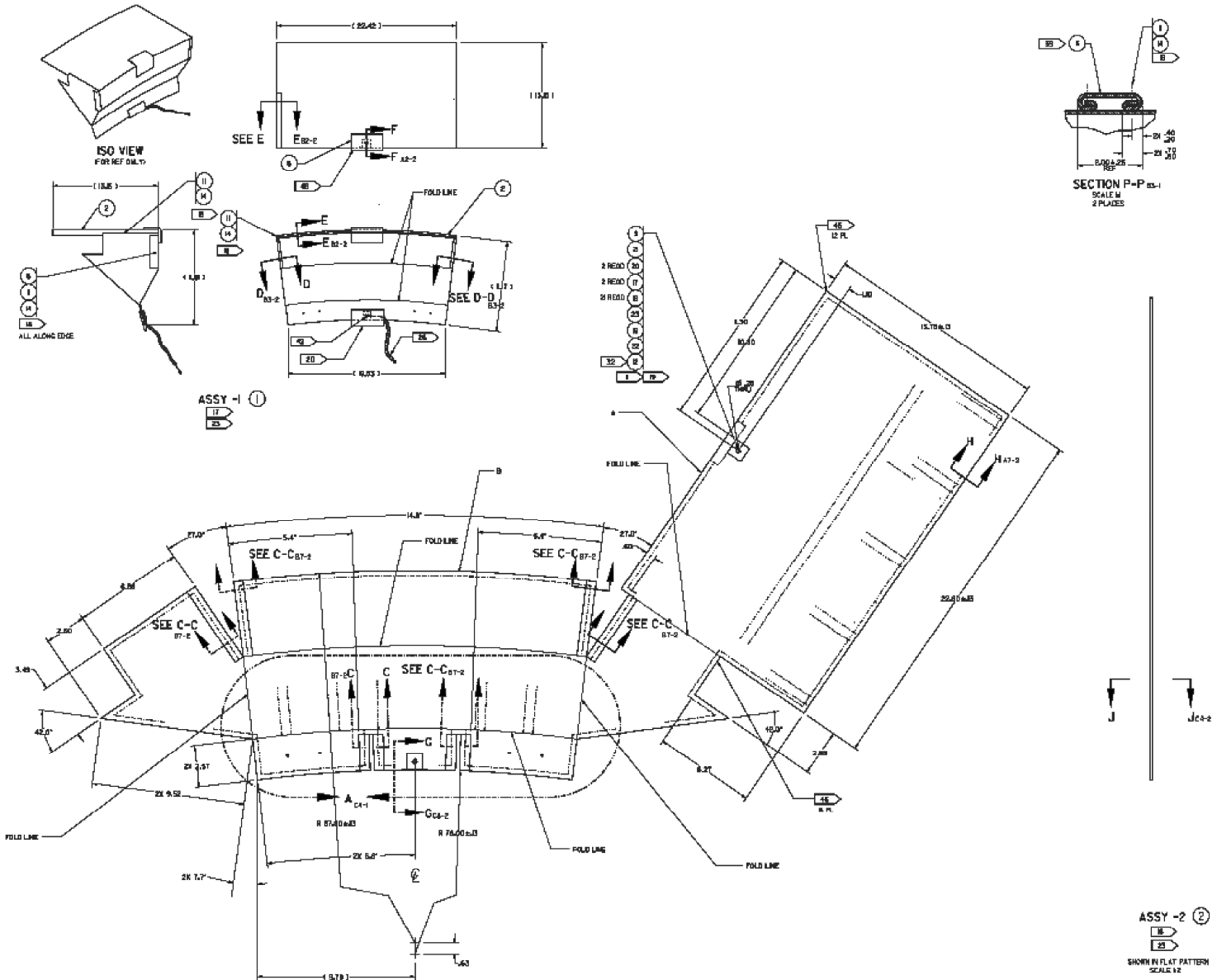
NH3 MLI AND ROUTING (Cont)



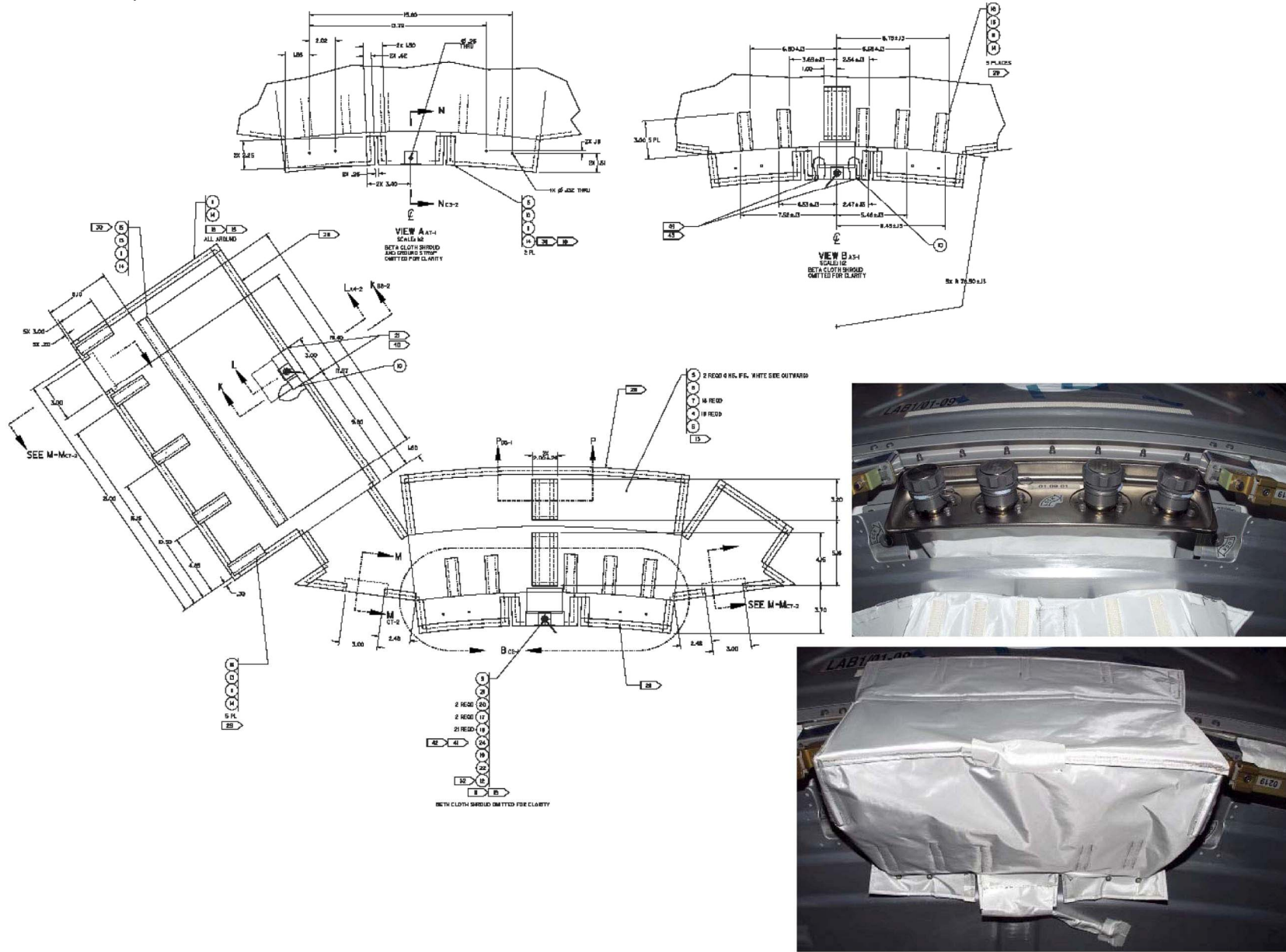
NH3 MLI AND ROUTING (Cont)



LAB COZY



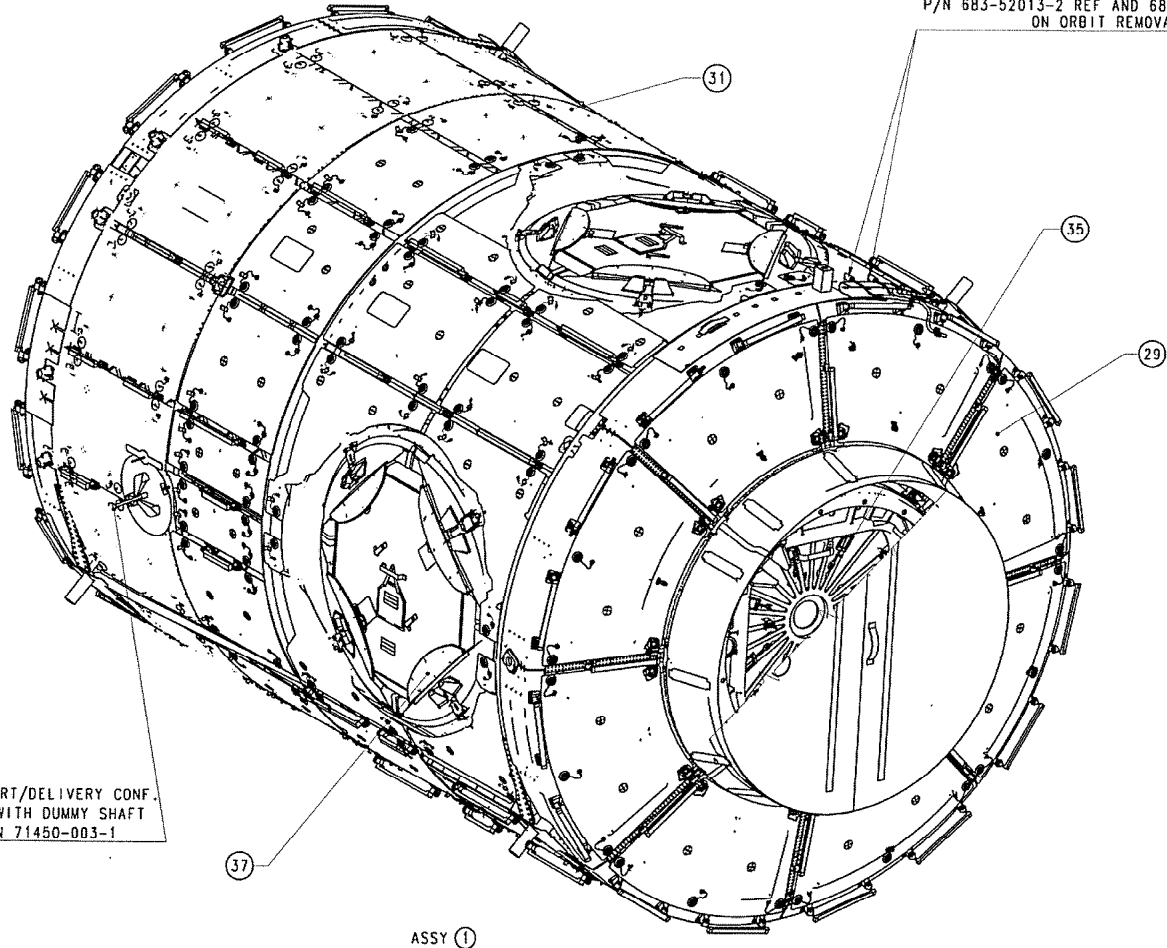
LAB COZY (Cont)



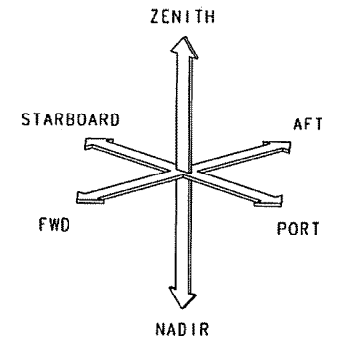
NODE 3

L009

SPDU HARNESS
P/N 683-52013-2 REF AND 683-52014-2 REF
ON ORBIT REMOVAL

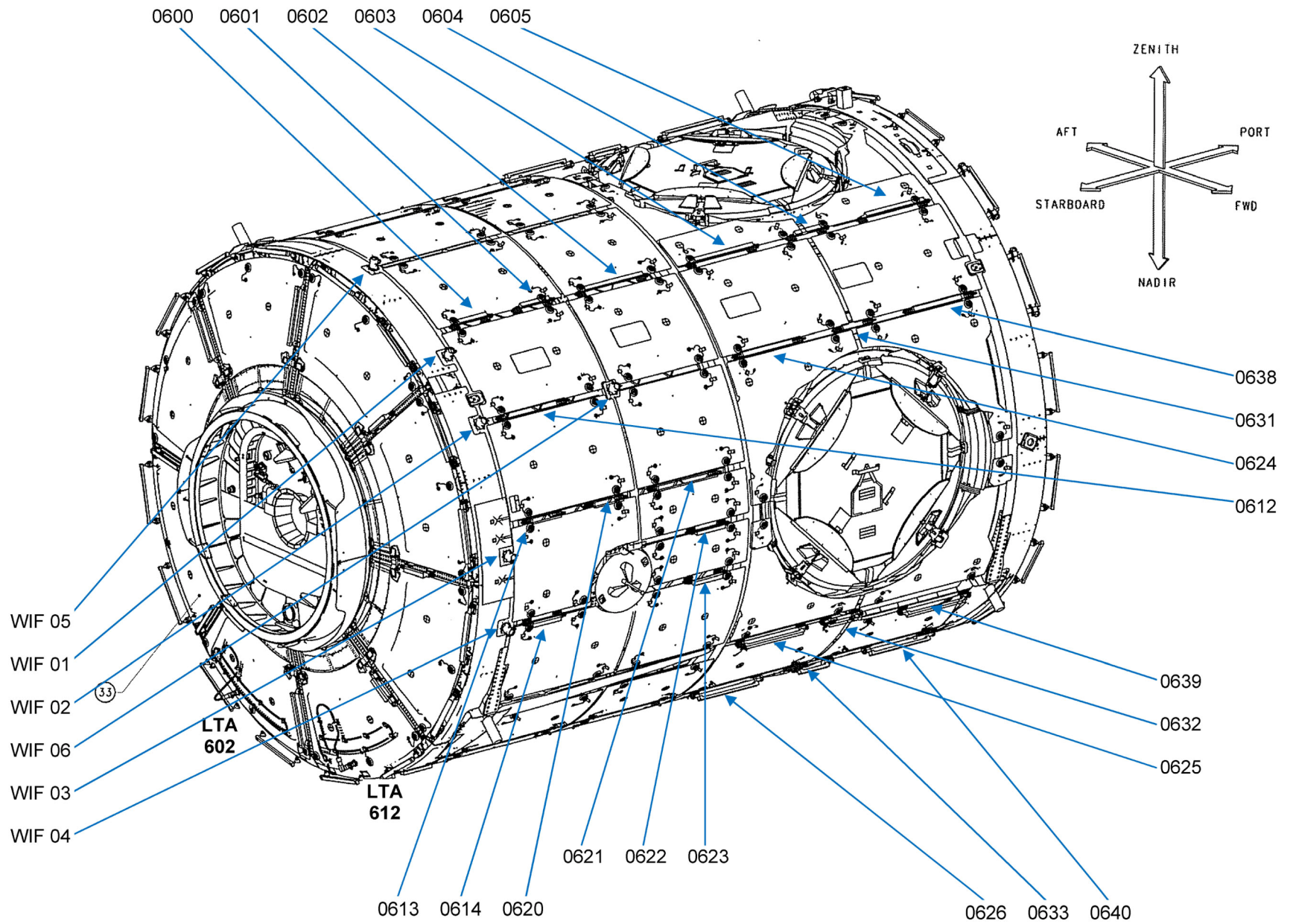


FOR TRANSPORT/DELIVERY CONF.
REPLACED WITH DUMMY SHAFT
ASSY PN 71450-003-1

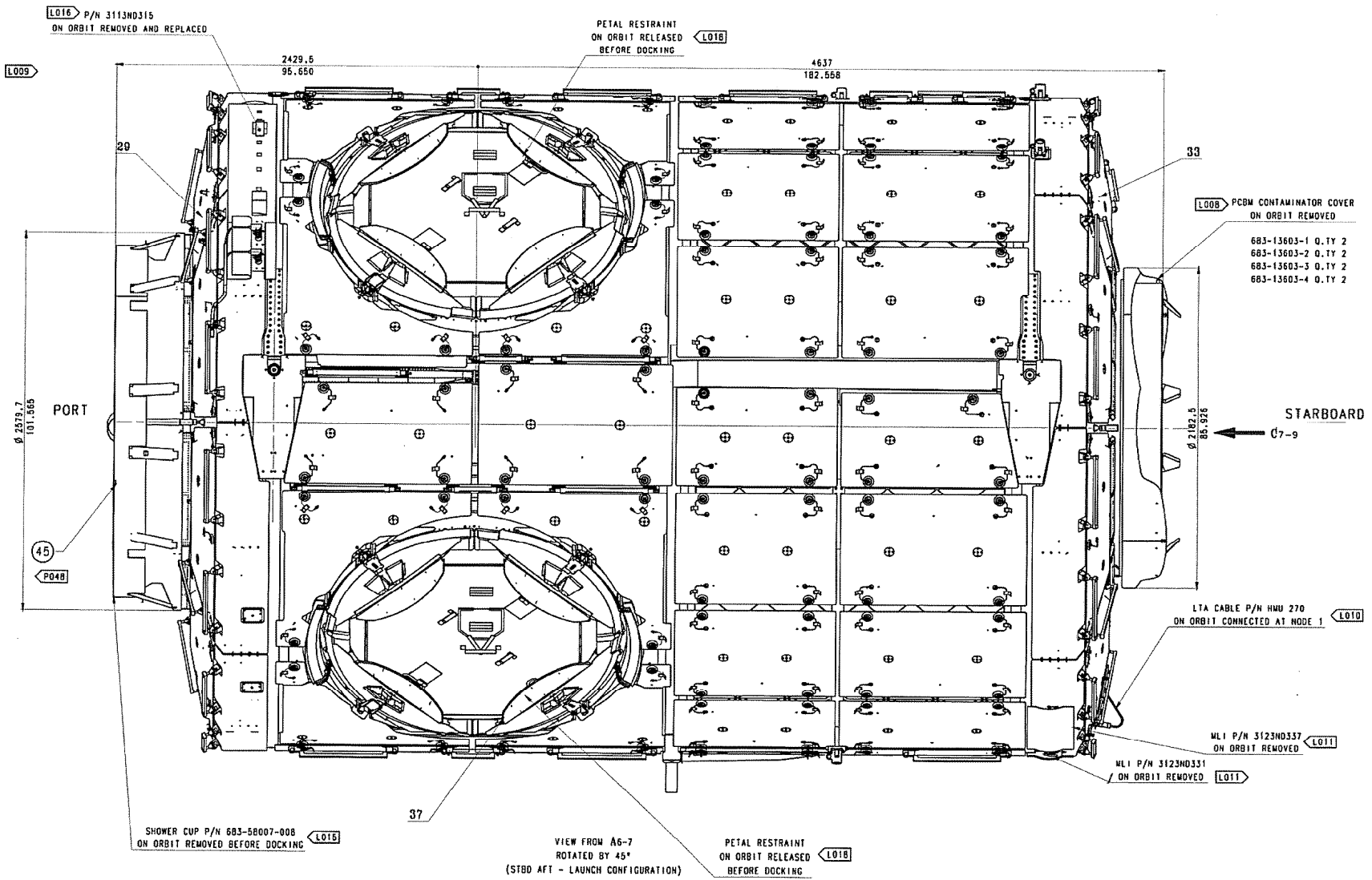


P081
P080

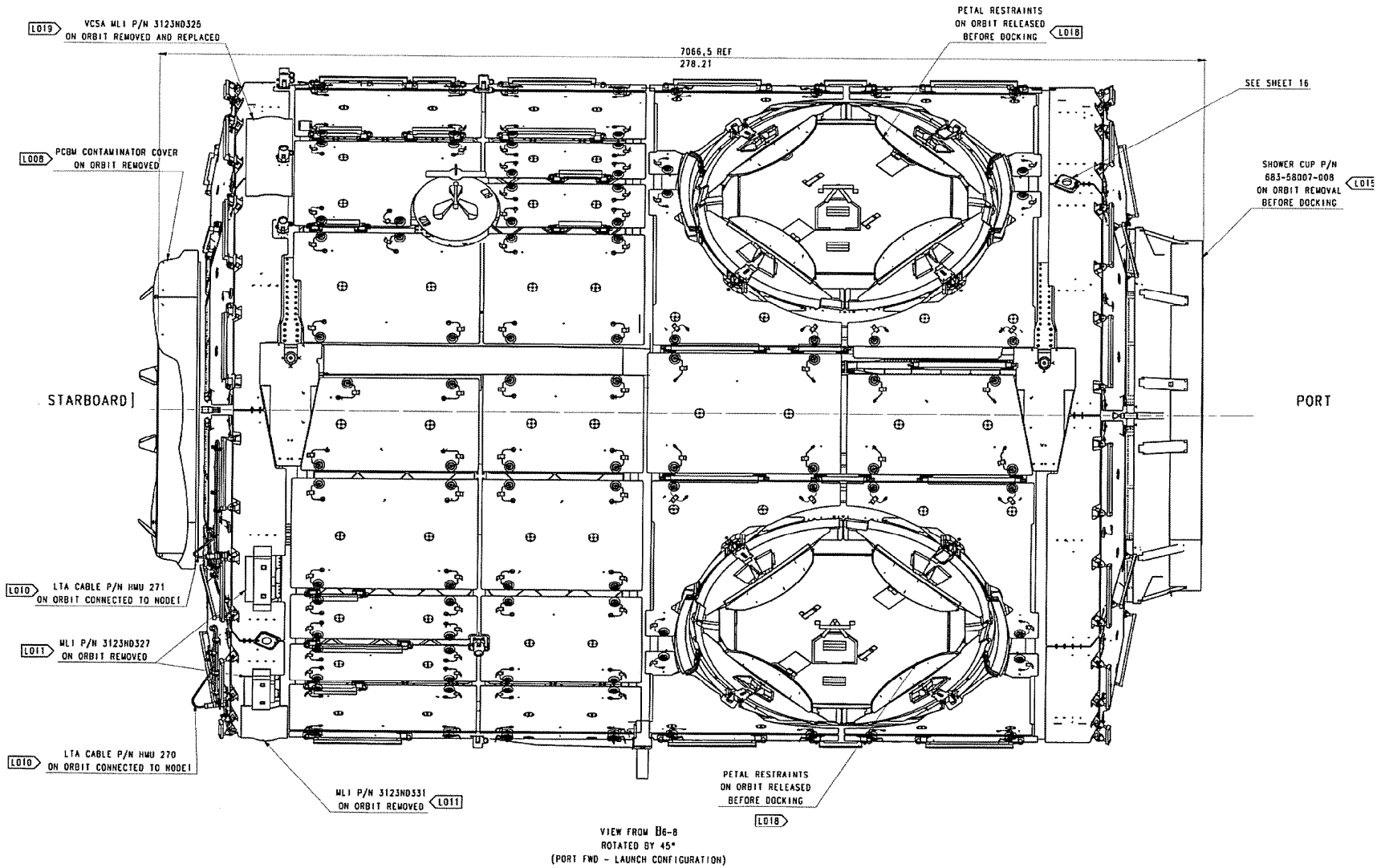
NODE 3 (Cont)



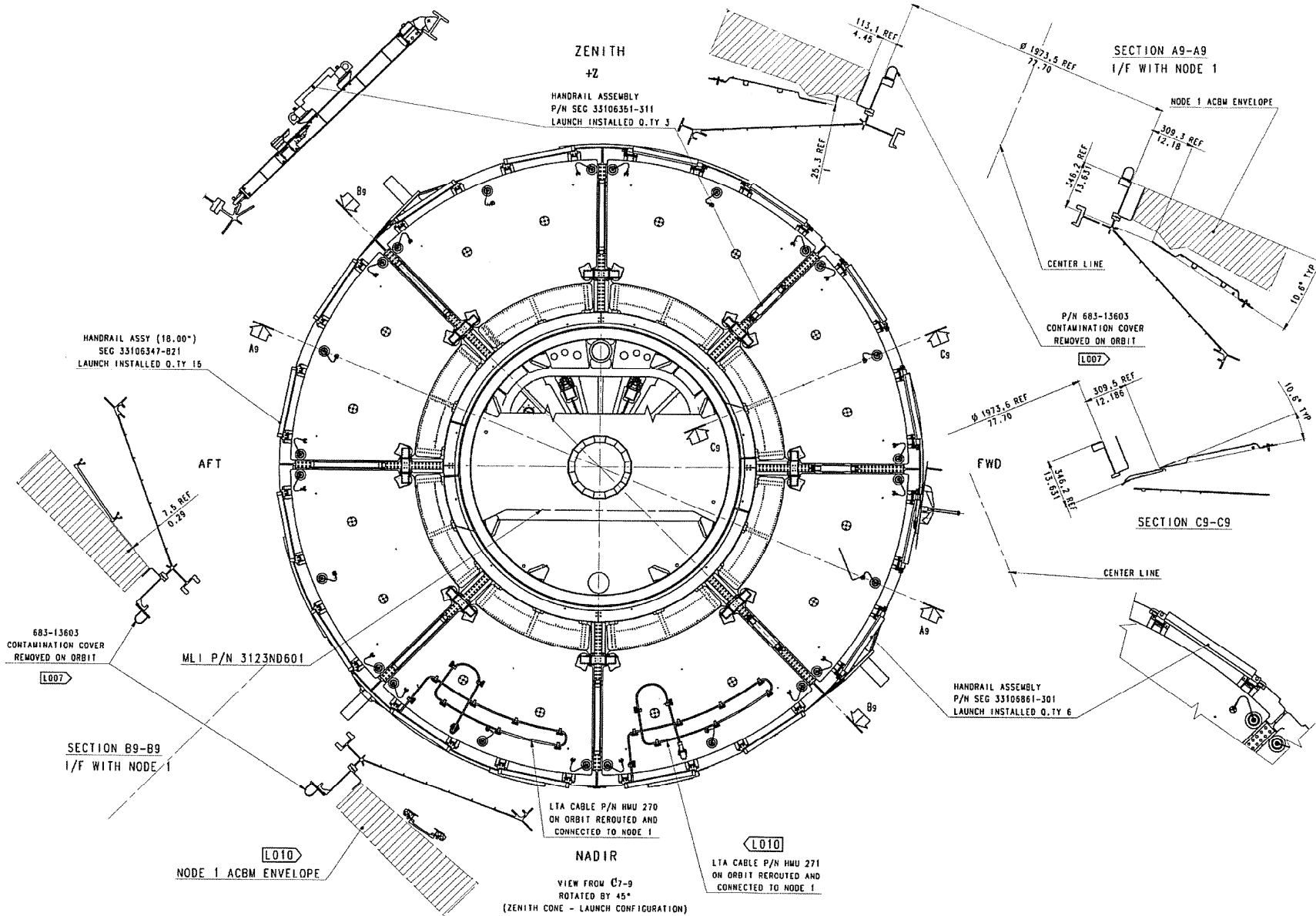
NODE 3 (ZENITH AFT VIEW)



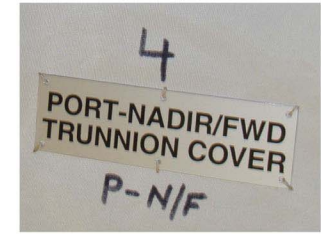
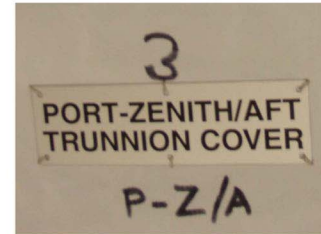
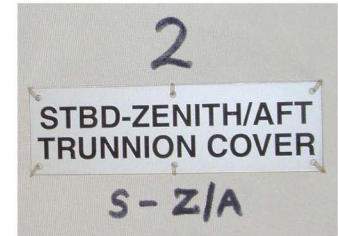
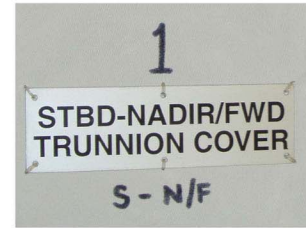
NODE 3 (FWD NADIR VIEW)



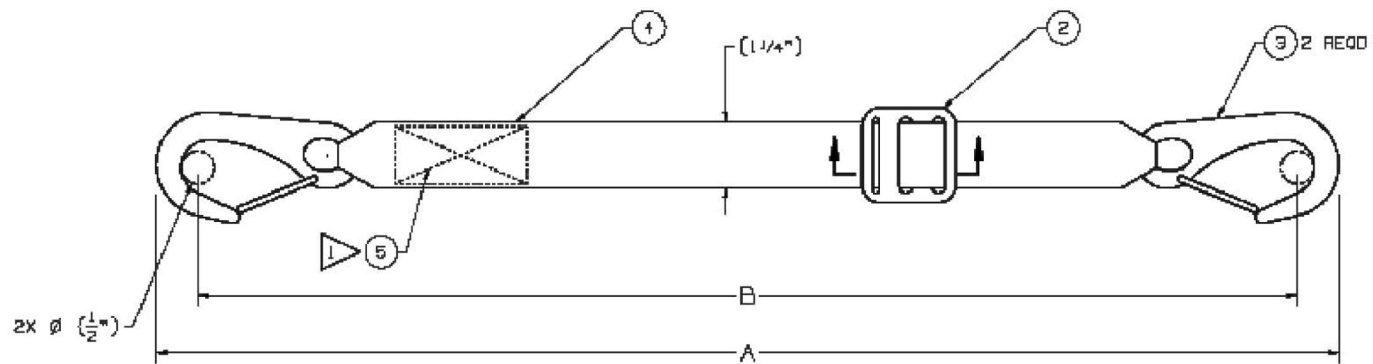
NODE 3 (PORT VIEW)



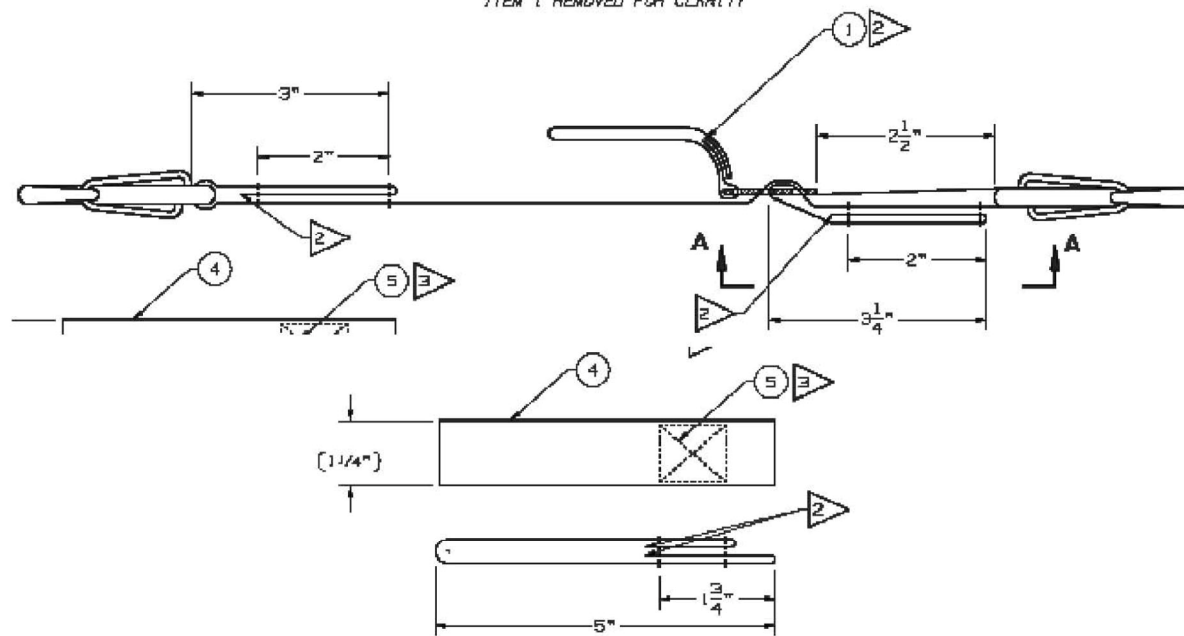
TRUNNION/KEEL PIN COVERS



NODE 3 GAP SPANNERS



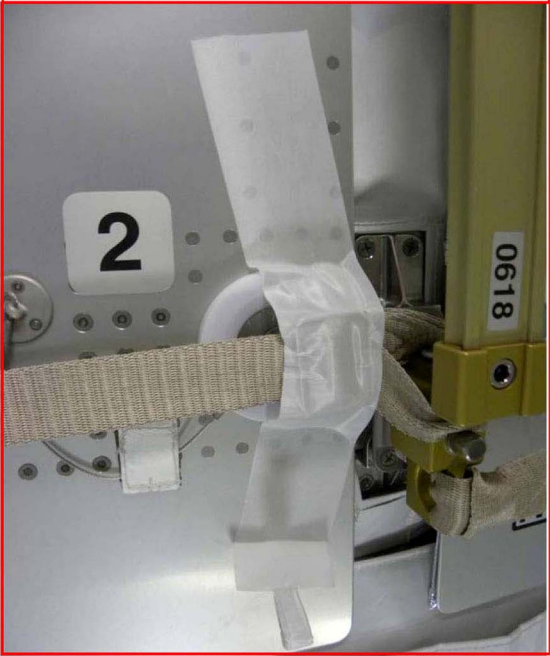
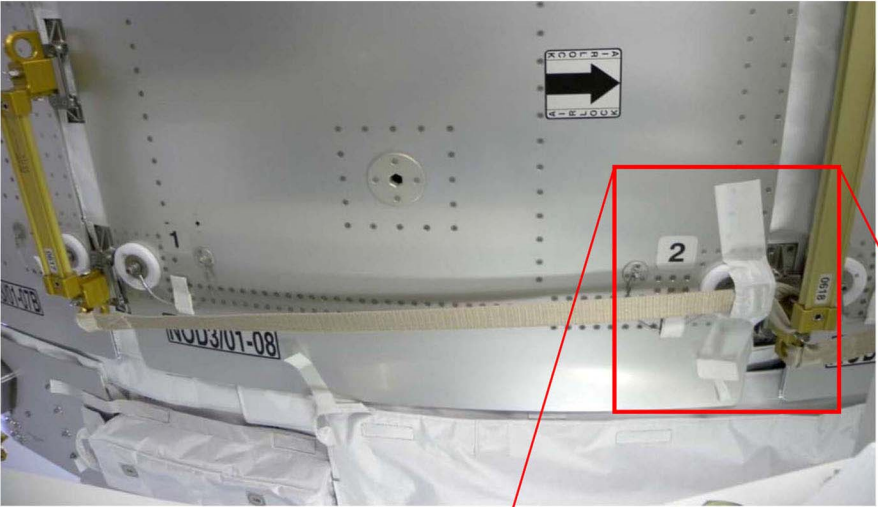
ITEM 1 REMOVED FOR CLARITY



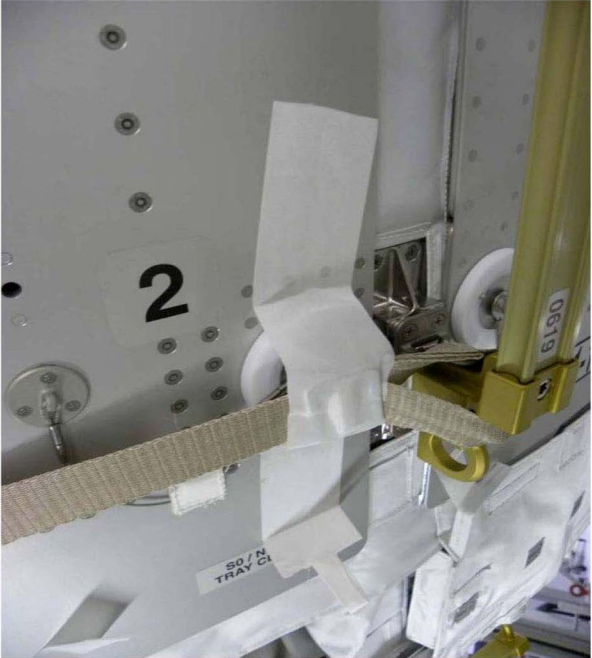
-001

TABULATION BLOCK		
DASH NO.	DIM (A)	MINIMUM ADJUSTABLE RANGE "B"
-301	(22-1/2)	18"-21"
-303	(31-3/4)	21"-30"
-305	(46-1/2)	30"-45"
-307	(74)	45"-72"

NODE 3 GAP SPANNERS (Cont)

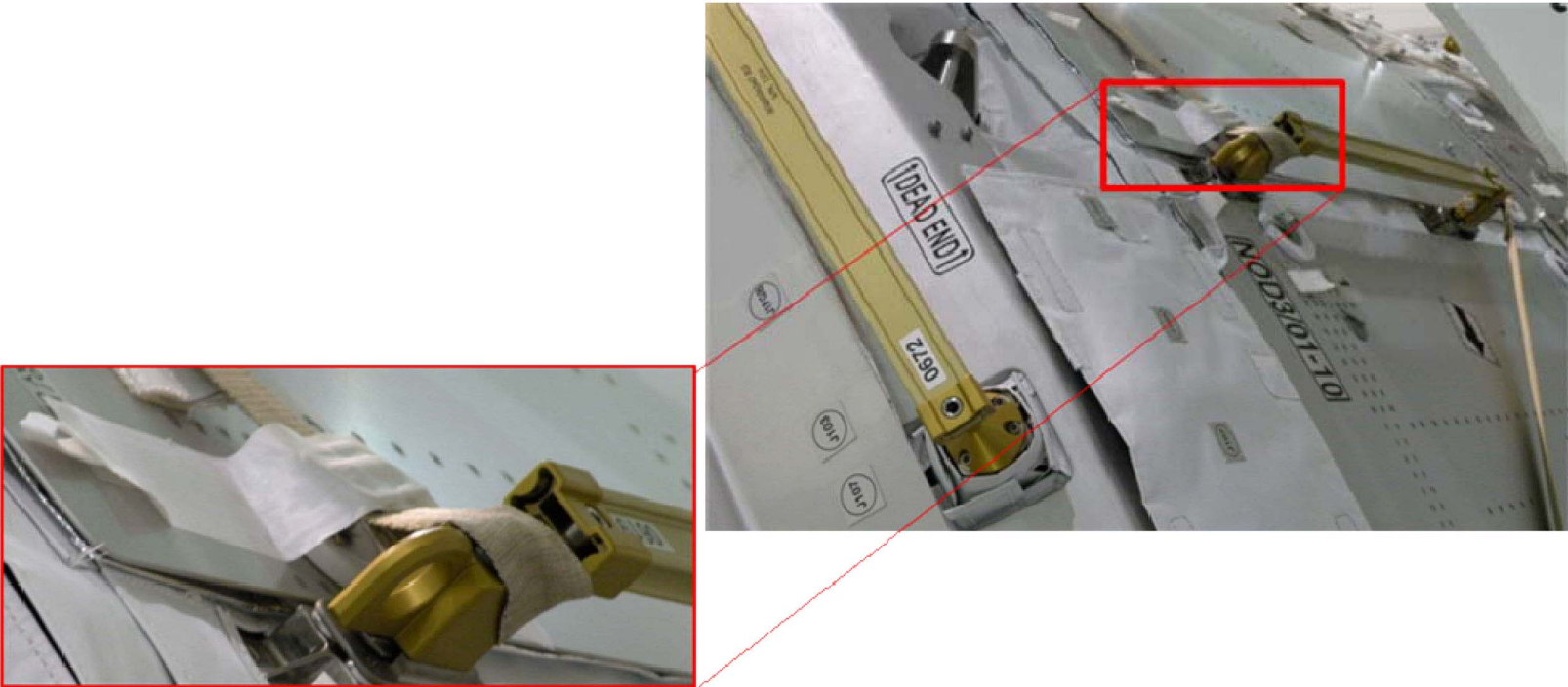


FS 18-60

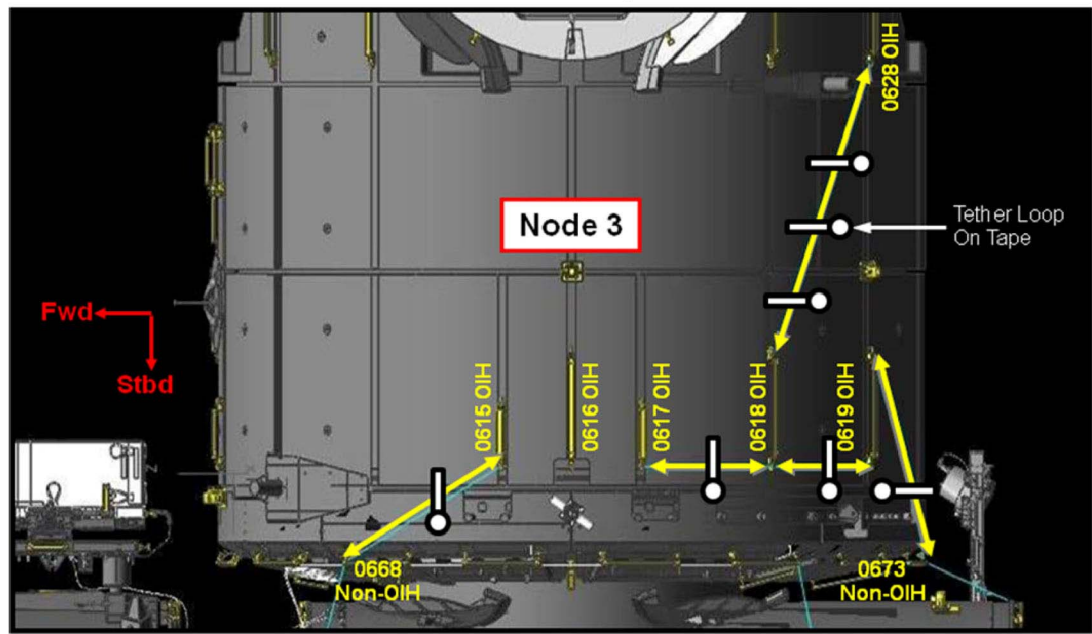
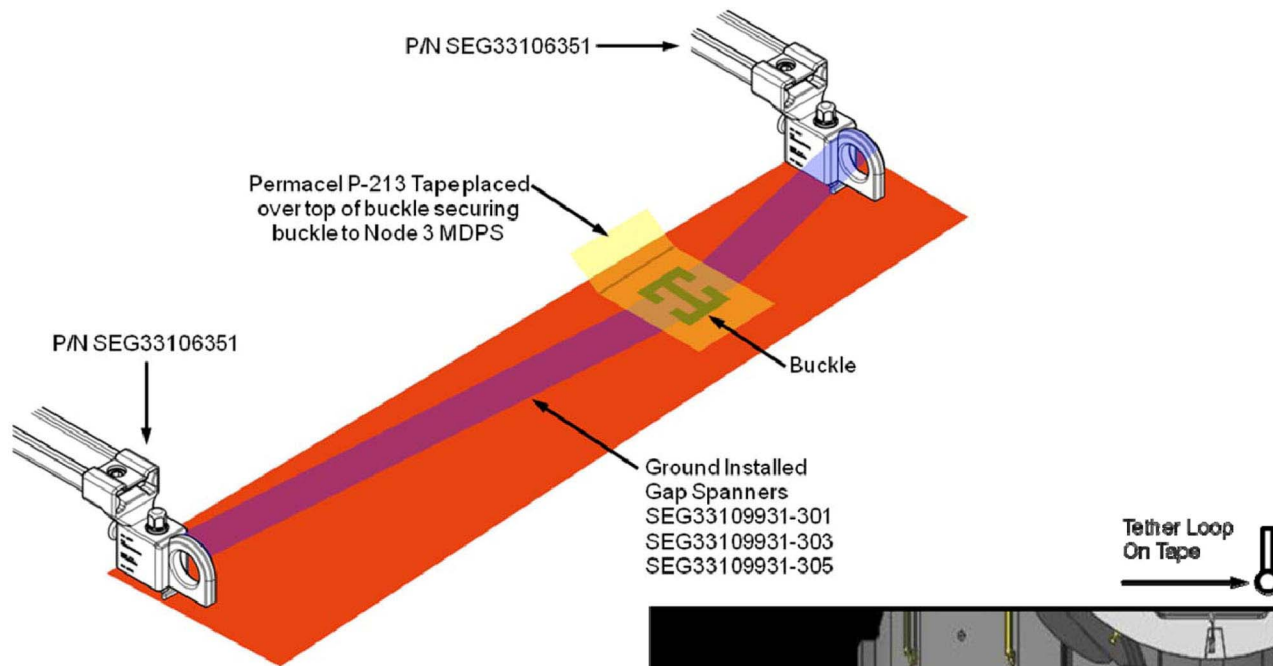


EVA/130/FIN A

NODE 3 GAP SPANNERS (Cont)



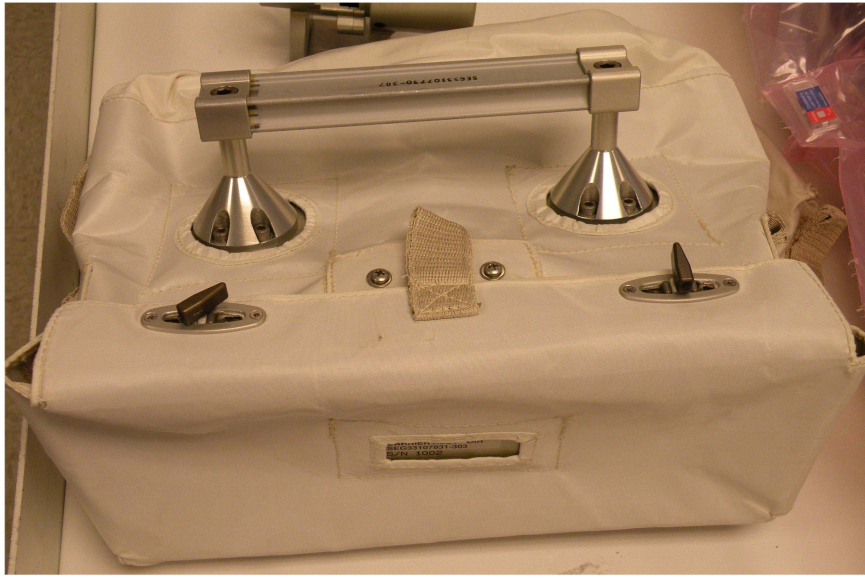
NODE 3 GAP SPANNER TAPING



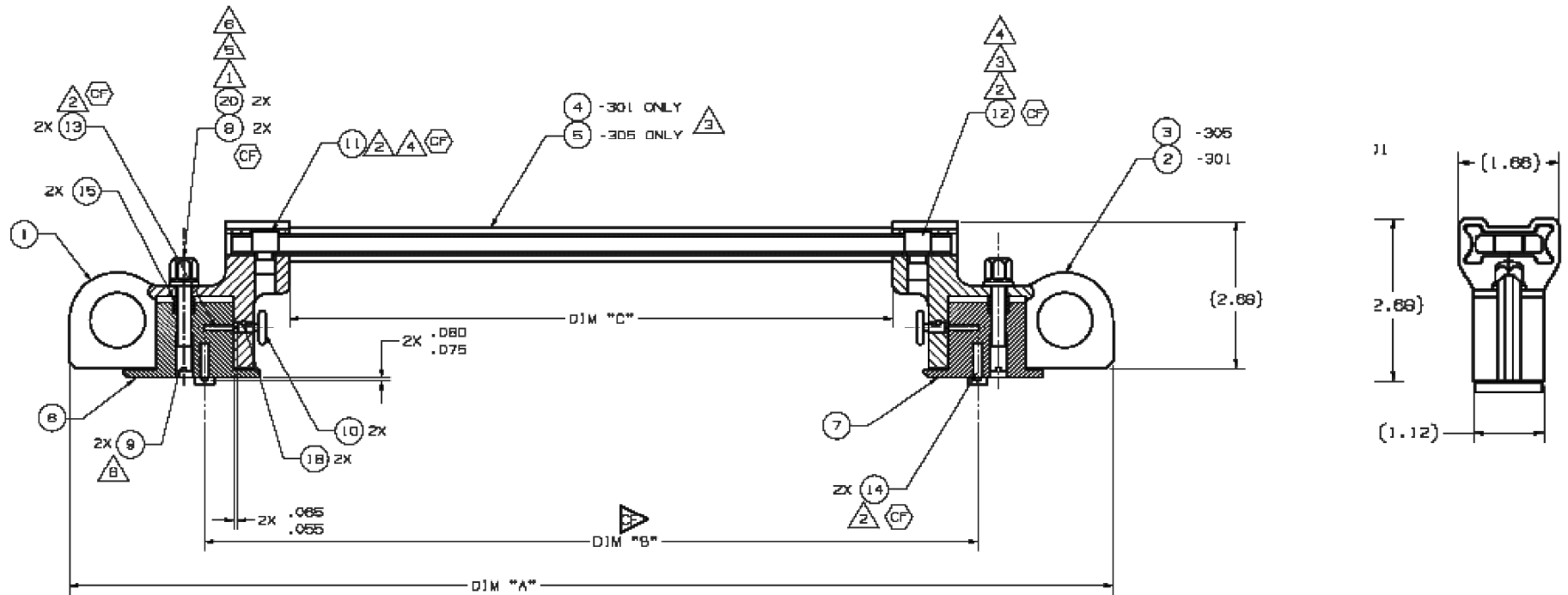
ORBIT-INSTALLED HANDRAIL (OIH) BAG



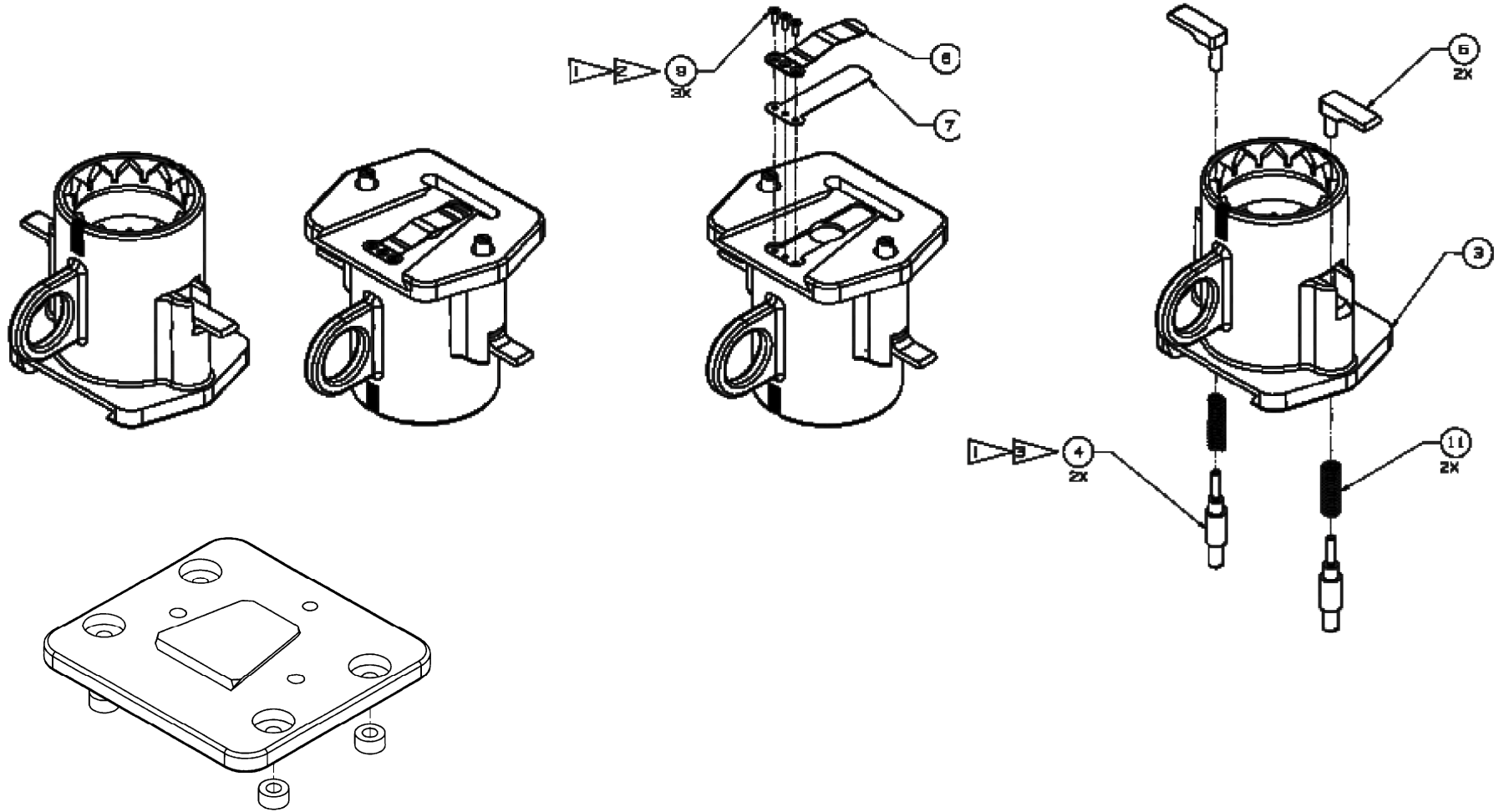
ORBIT-INSTALLED HANDRAIL (OIH) BAG (Cont)



NODE 3 ORBIT-INSTALLED HANDRAILS (OIH)

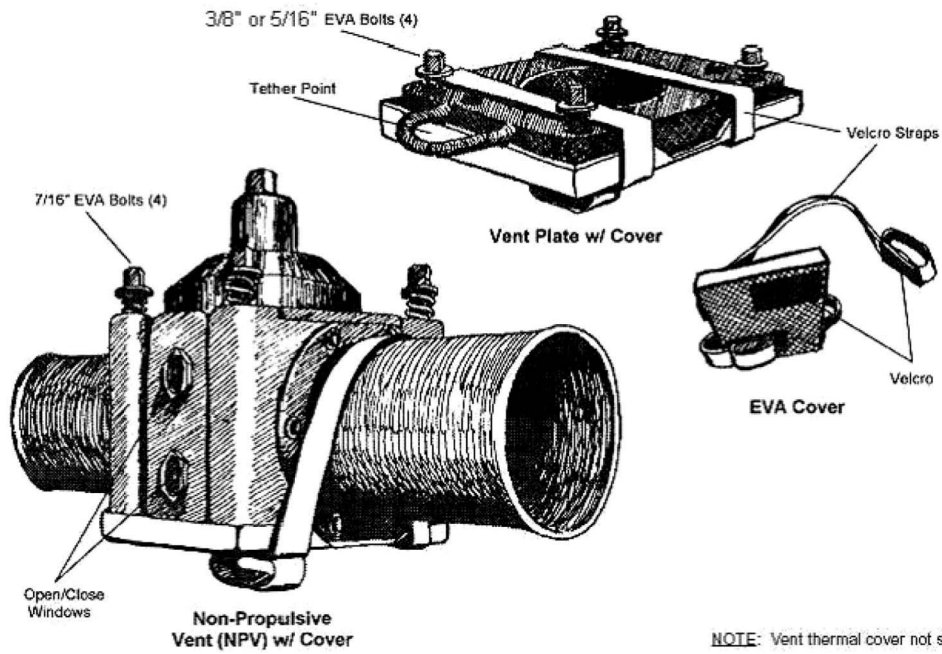


NODE 3 ORBIT-INSTALLED WIFs

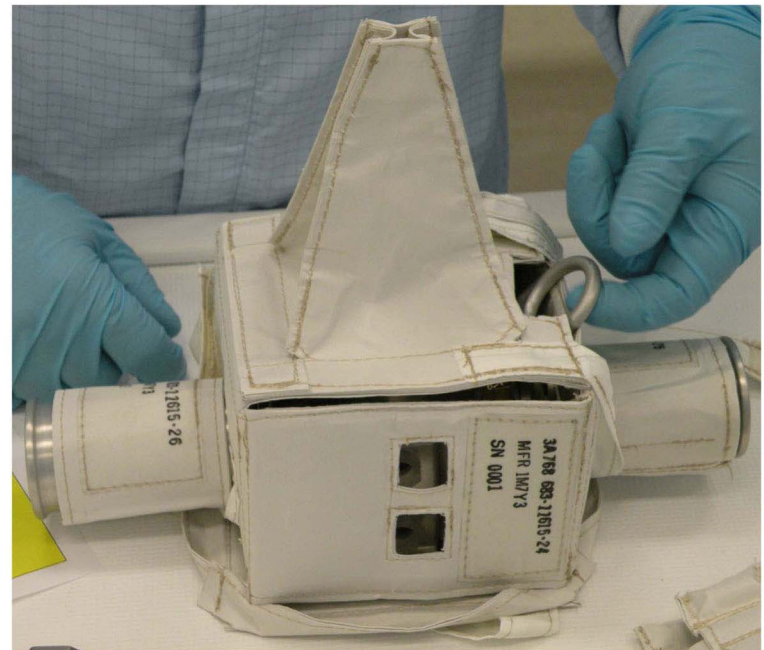
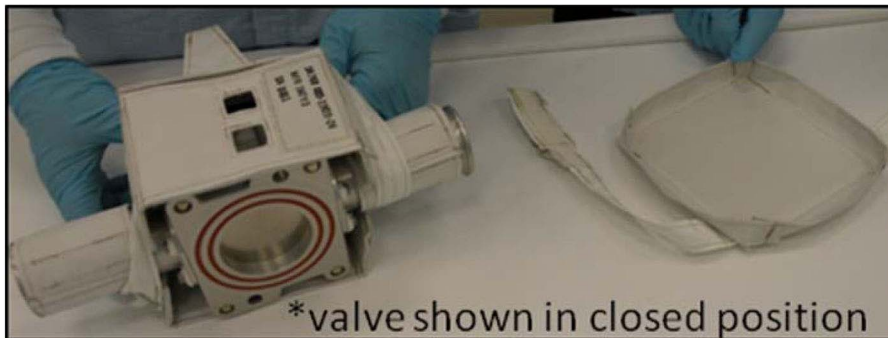
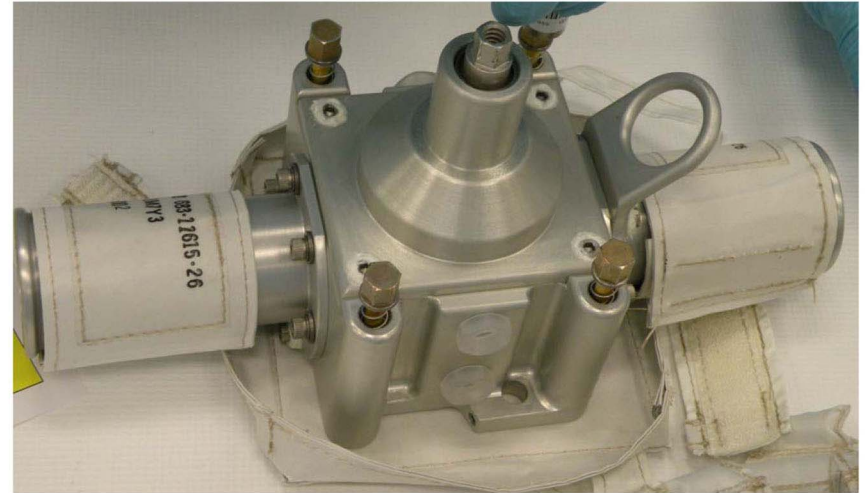


NODE 3 NON-PROPULSIVE VENT (NPV)

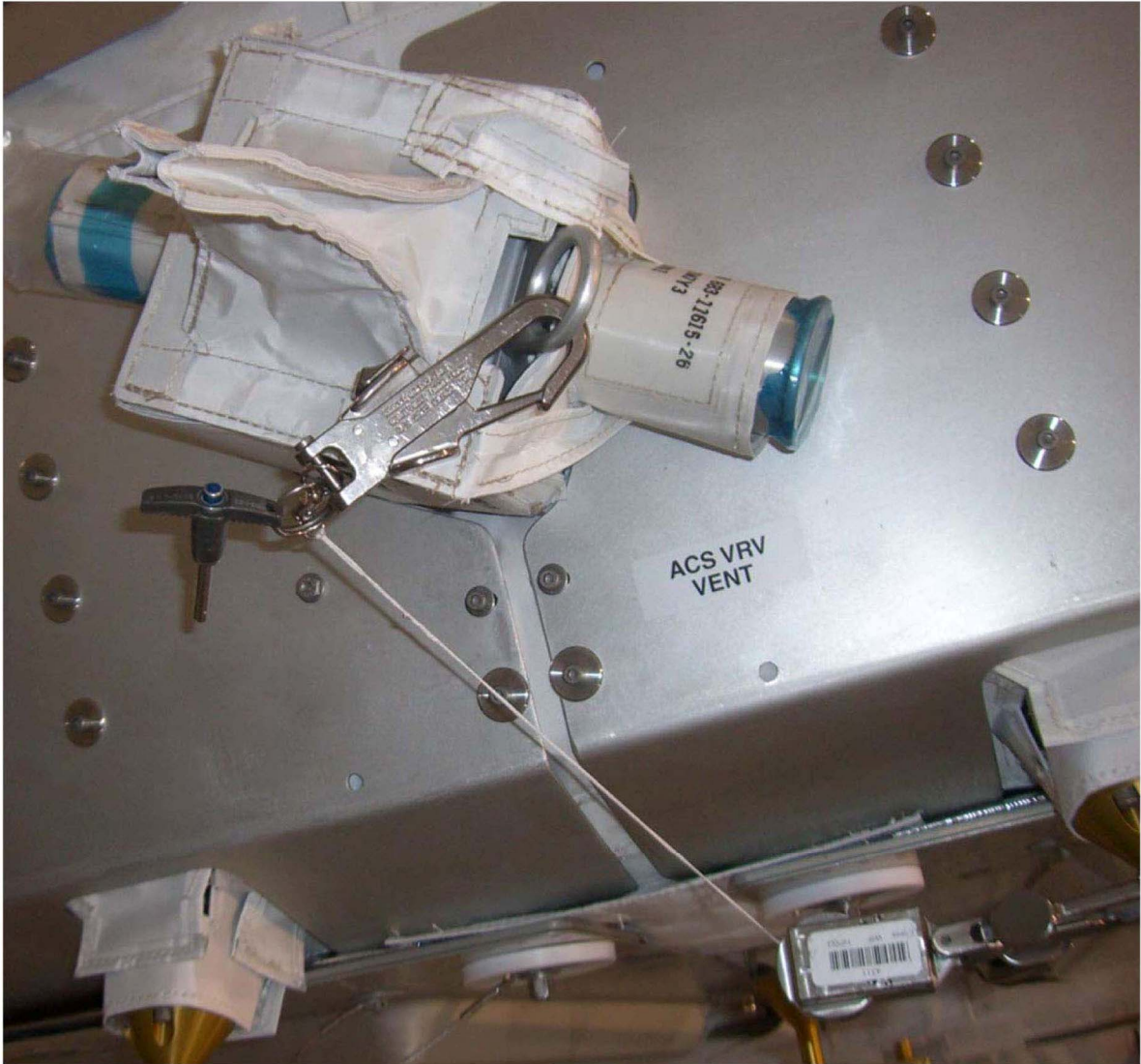
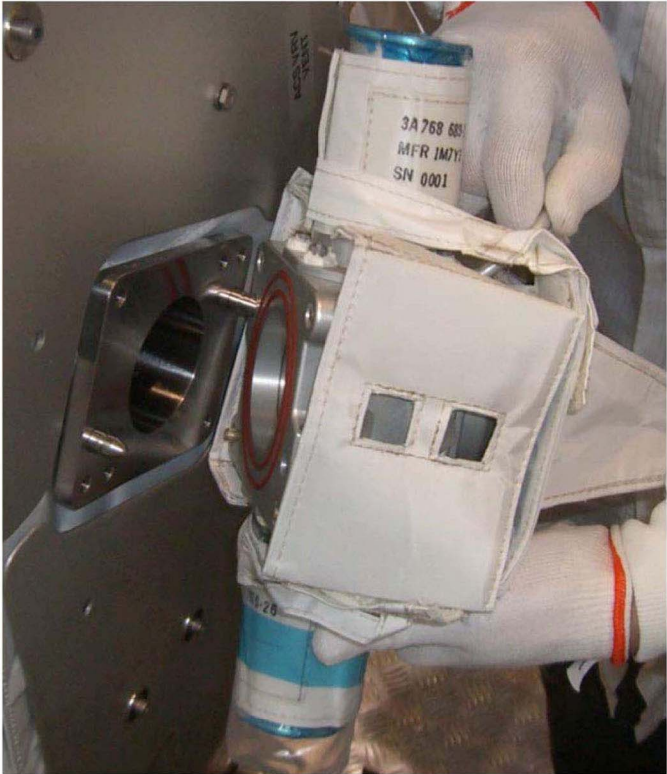
NON-PROPULSIVE VENT (NPV), VENT PLATE, AND EVA COVER



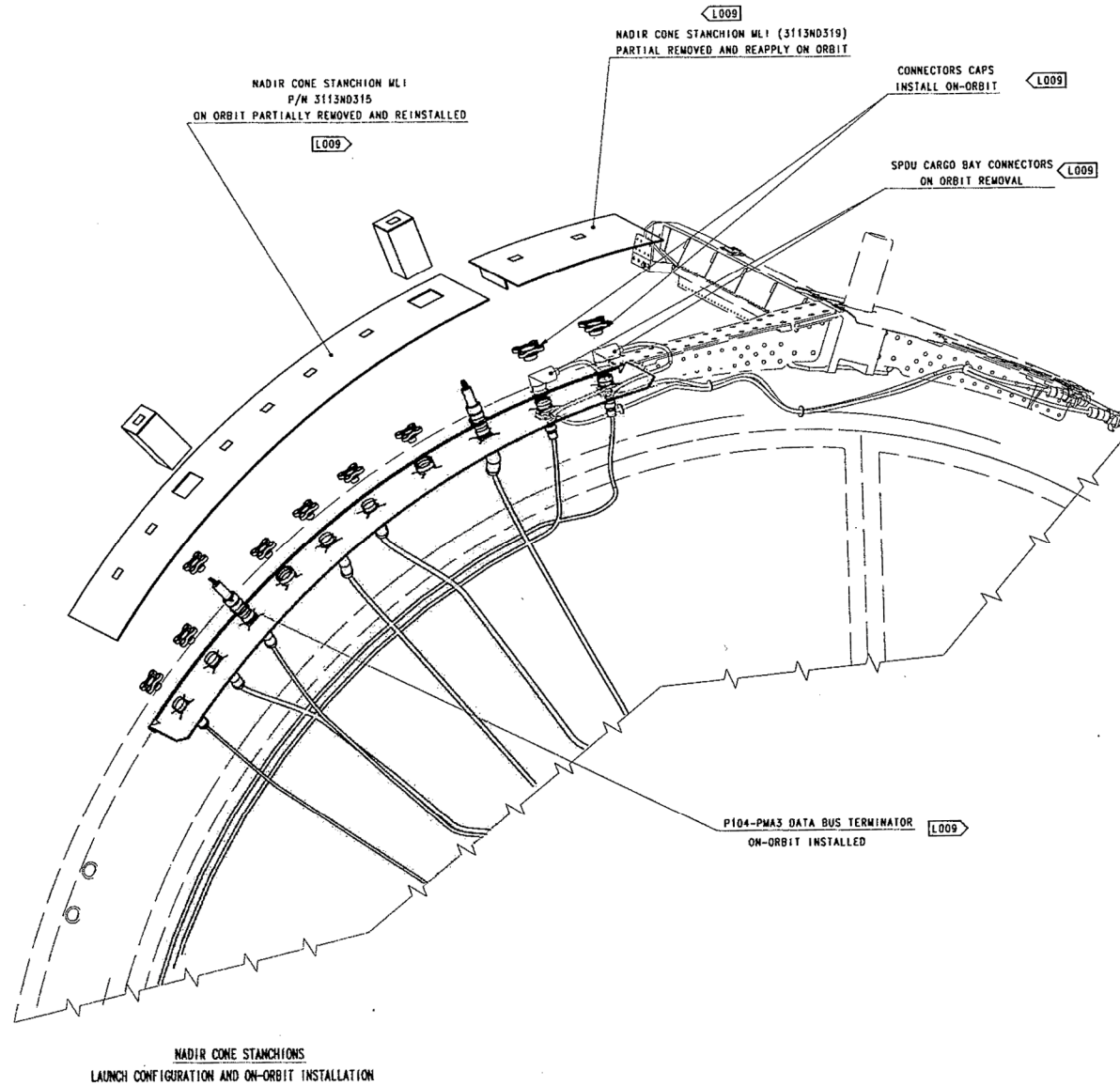
NOTE: Vent thermal cover not shown



NODE 3 NON-PROPULSIVE VENT (NPV) (Cont)



NOD3/PMA3 CONNECTORS



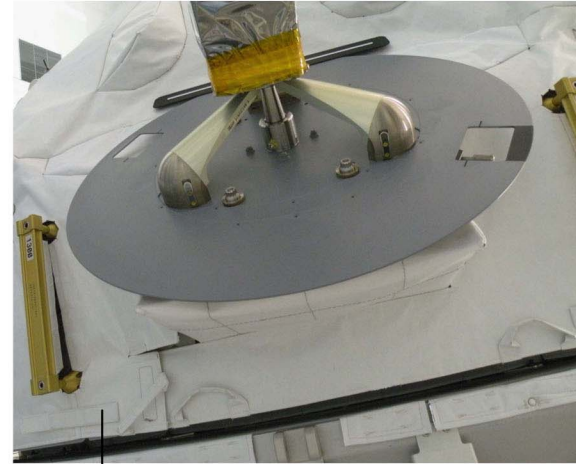
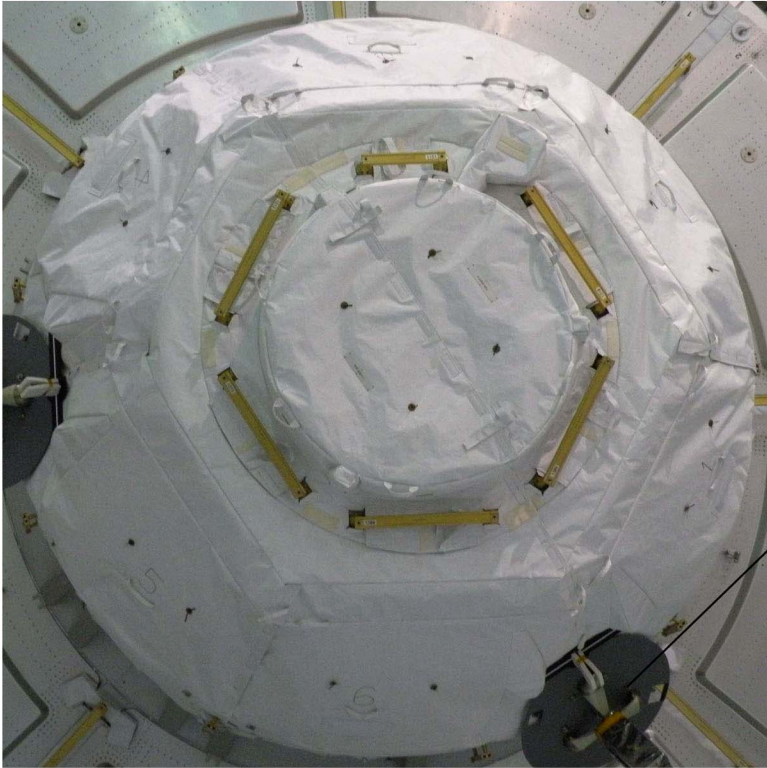
PMA3 HEATER CABLE CAPS



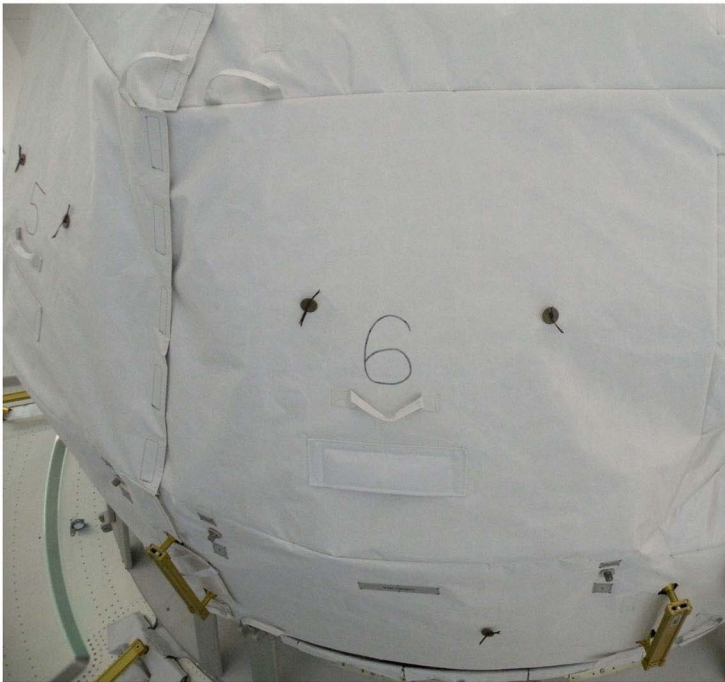
PMA3 Heater Cable Connector Caps

(NOTE: These caps need to be wire tied together with a long wire tie prior to stowage in the PMA3 crewlock bag for EVA 3)

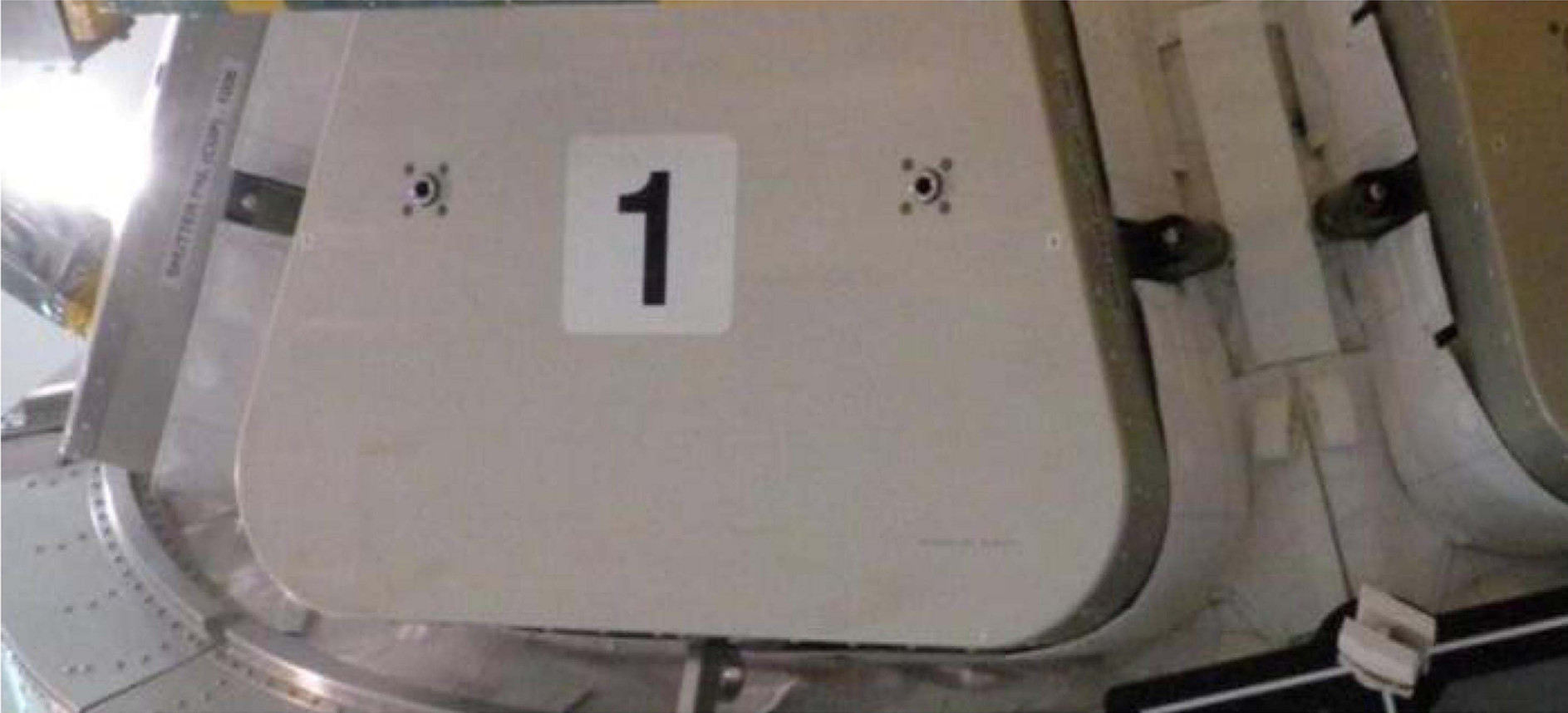
CUPOLA MLI



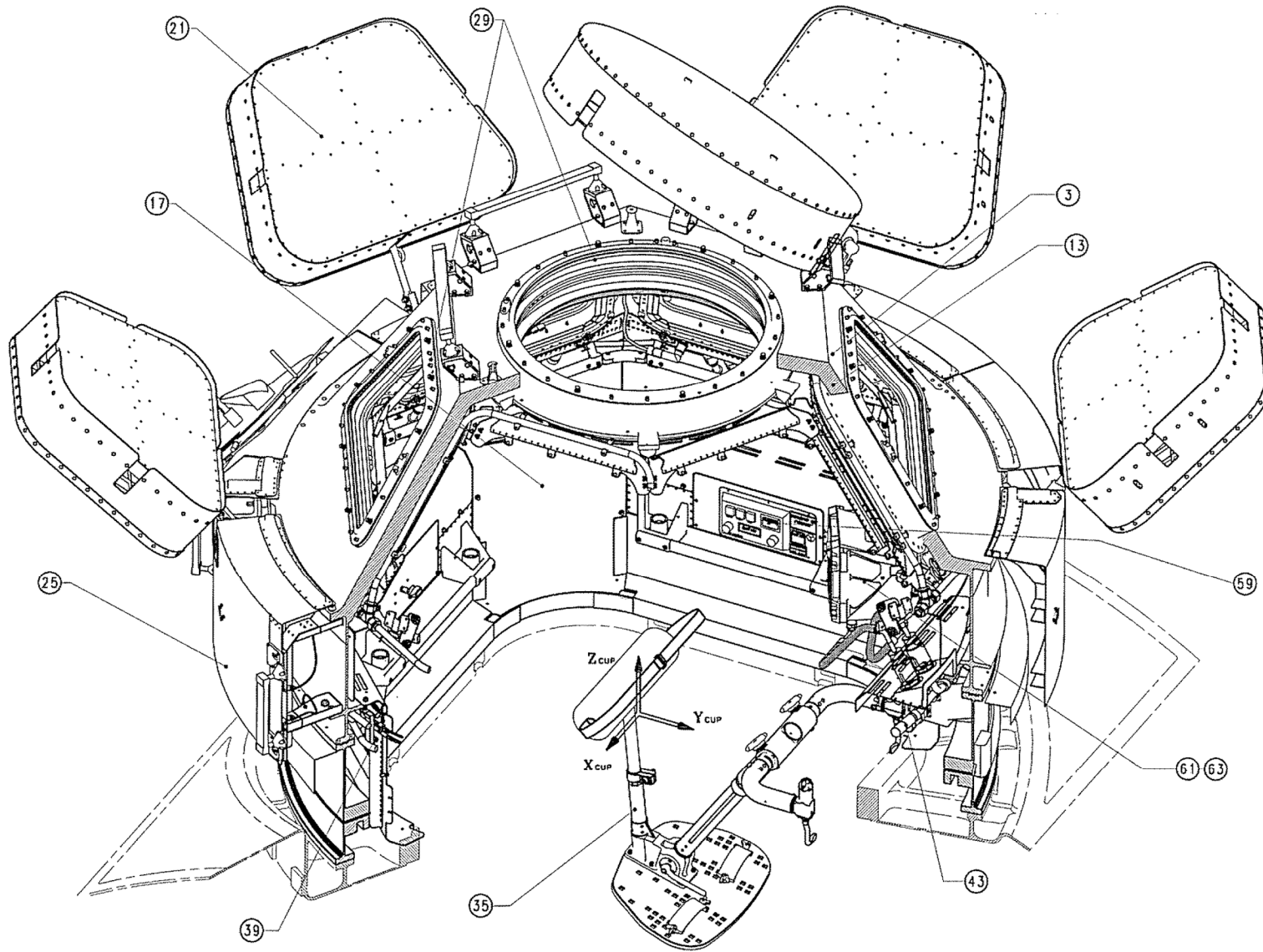
CUPOLA MLI (Cont)



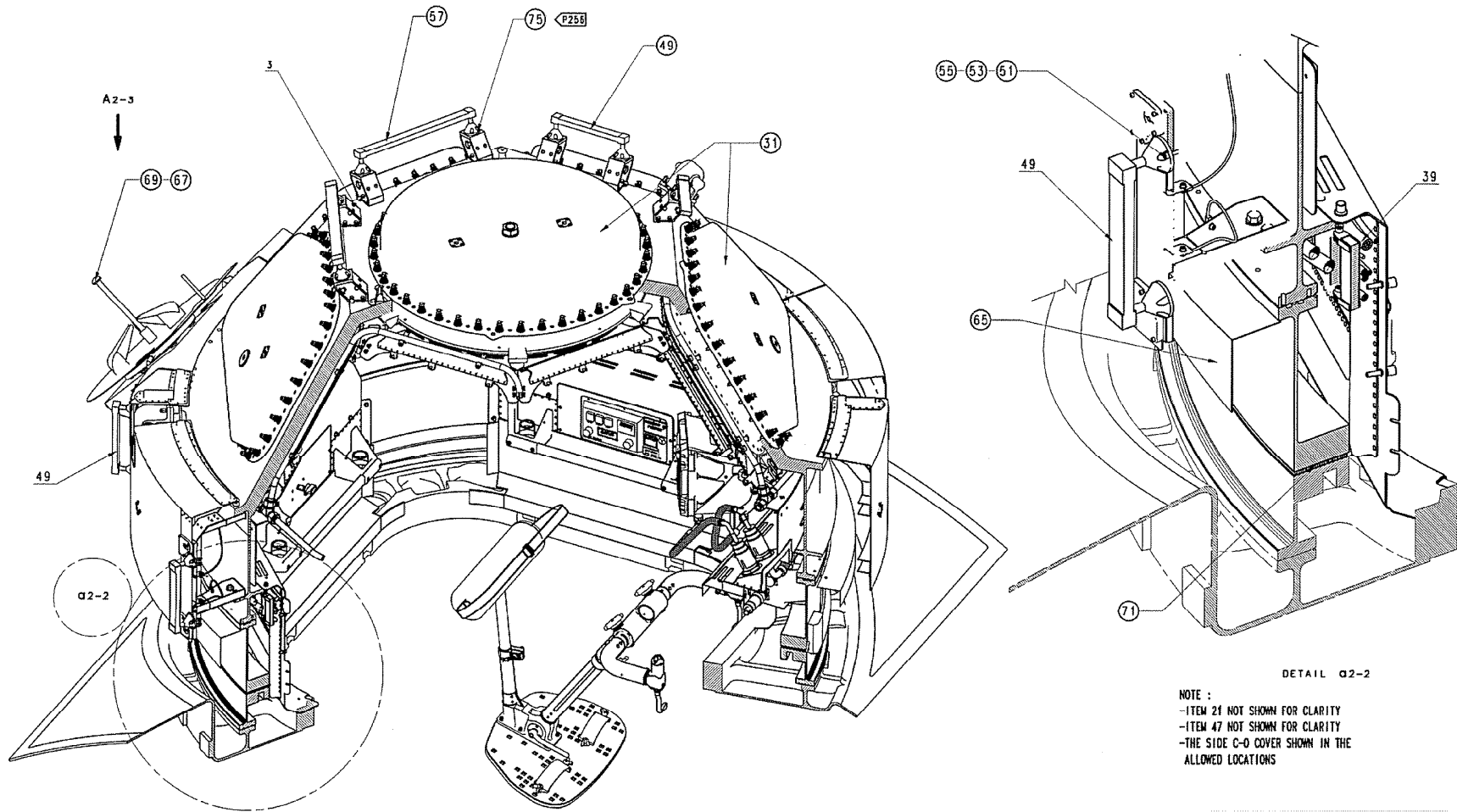
CUPOLA LAUNCH LOCKS



CUPOLA



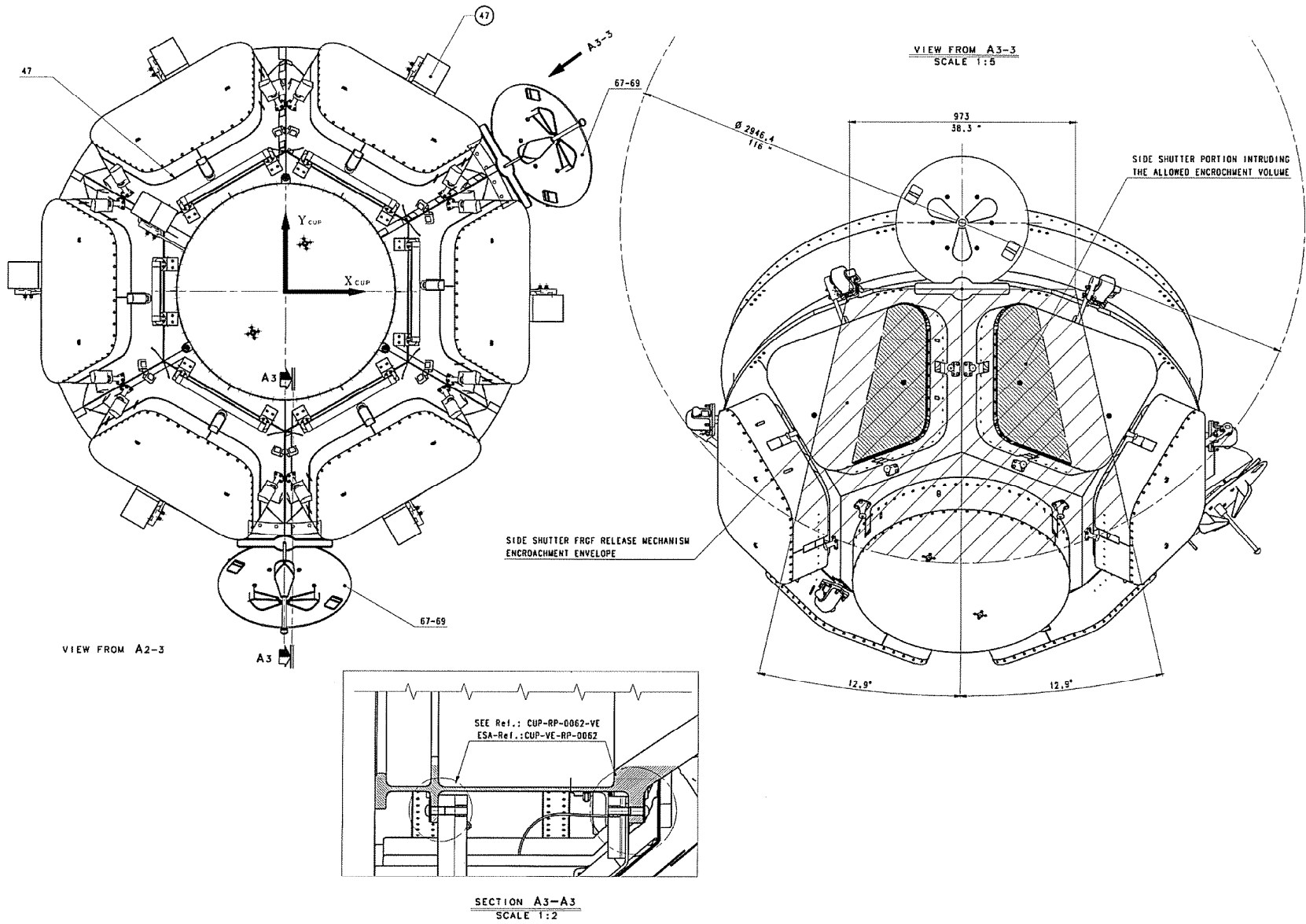
CUPOLA (Cont)



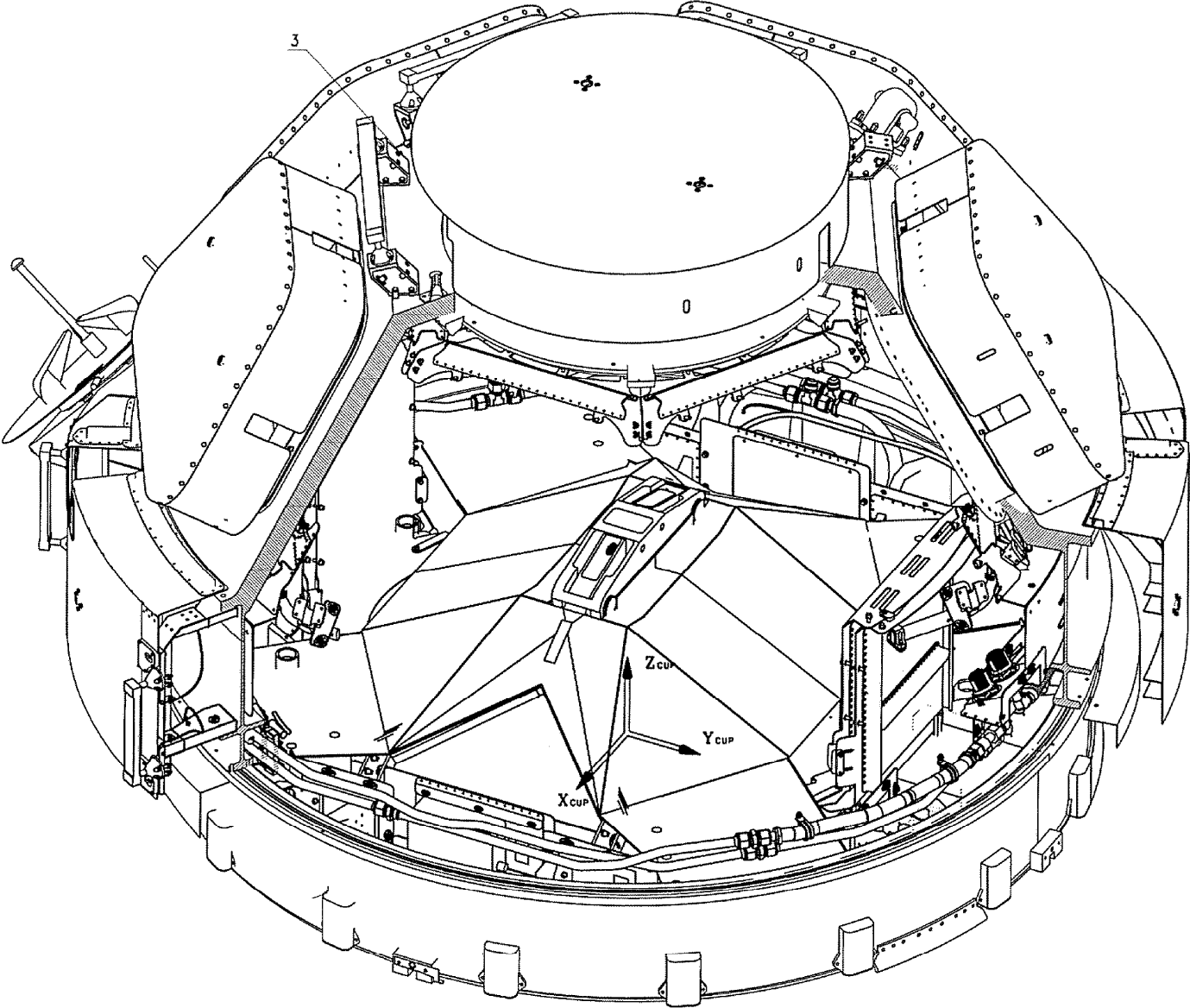
DETAIL Q2-2

NOTE :
 -ITEM 21 NOT SHOWN FOR CLARITY
 -ITEM 47 NOT SHOWN FOR CLARITY
 -THE SIDE C-O COVER SHOWN IN THE ALLOWED LOCATIONS

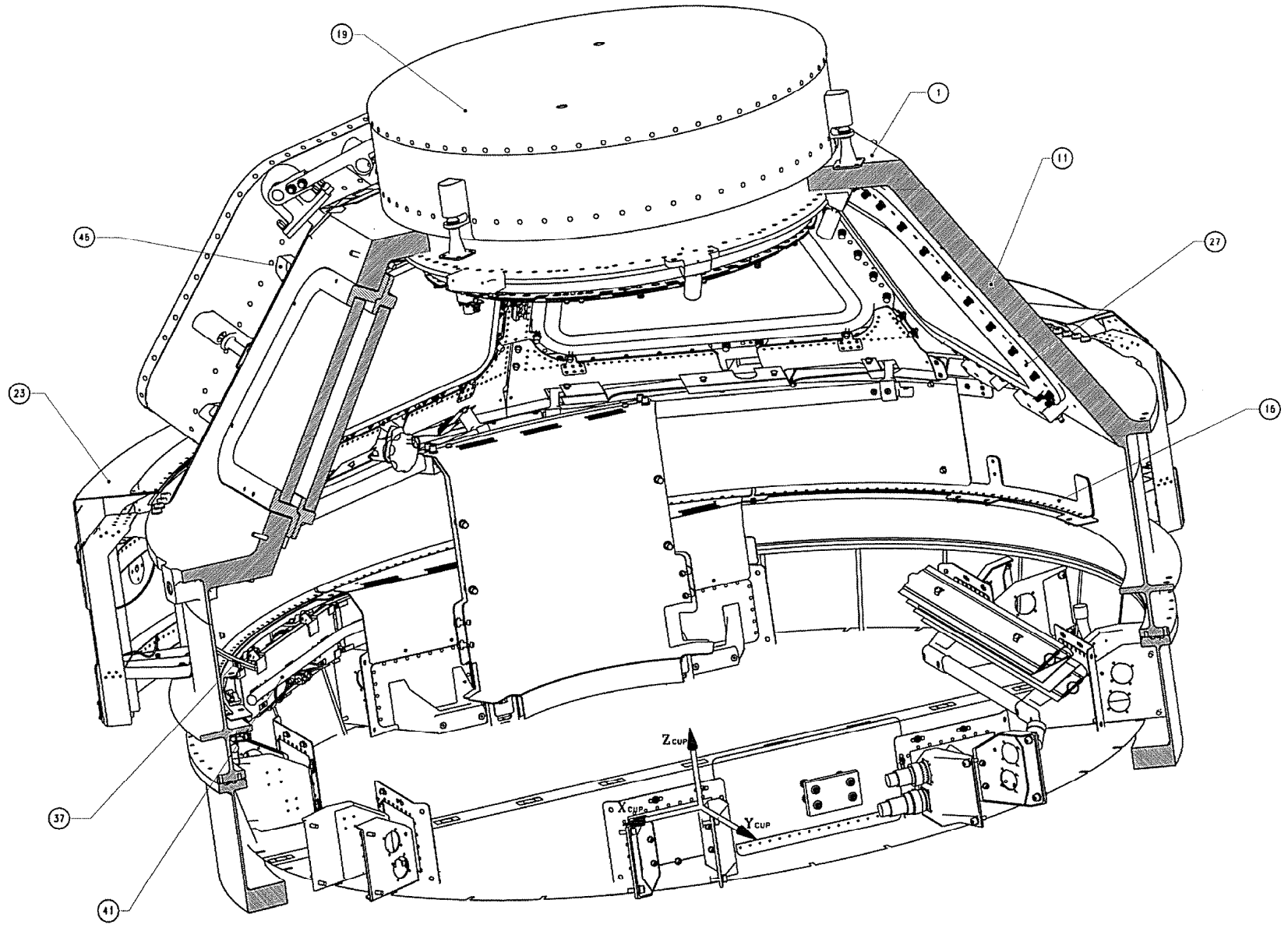
CUPOLA (Cont)



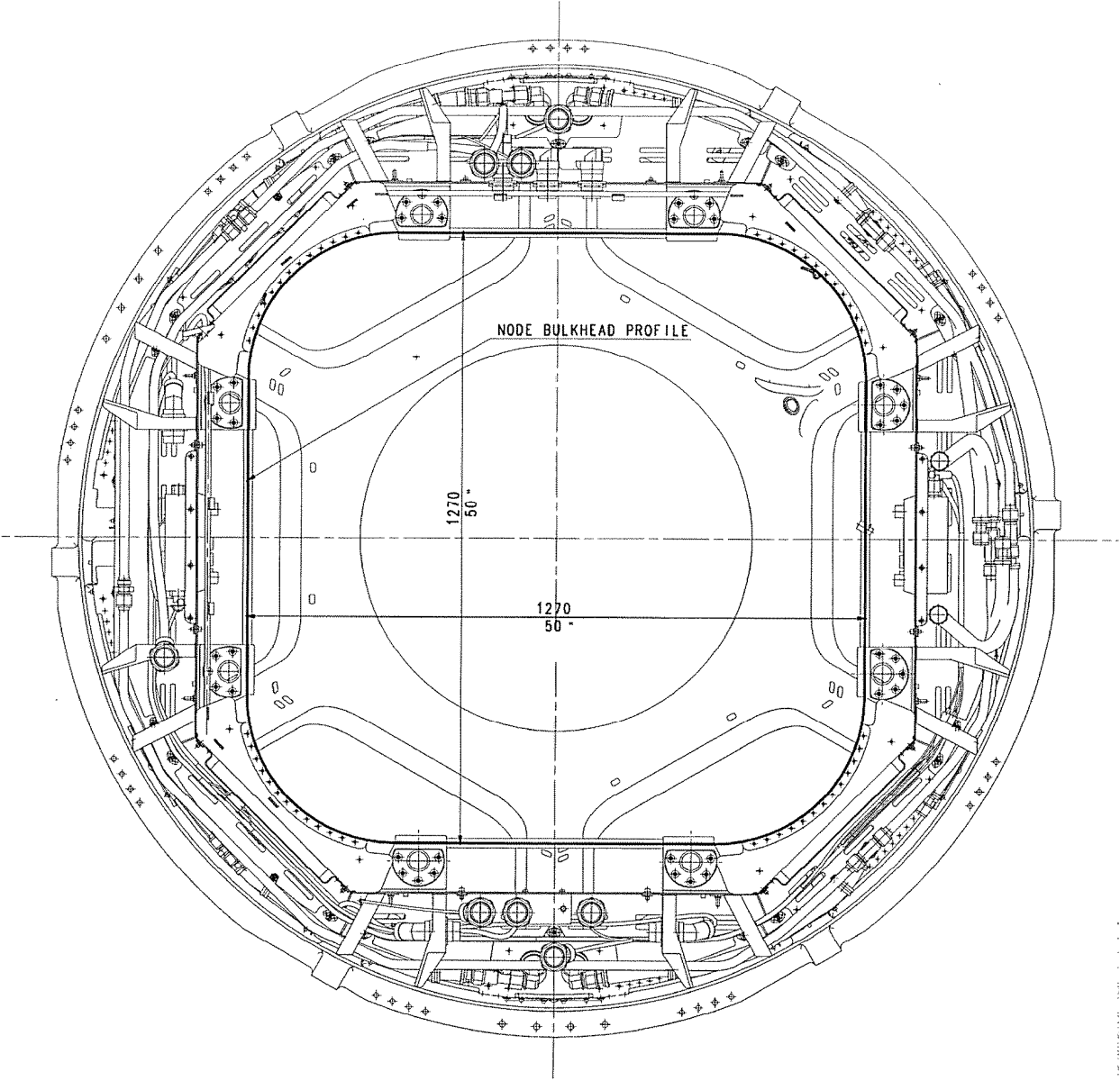
CUPOLA (Cont)



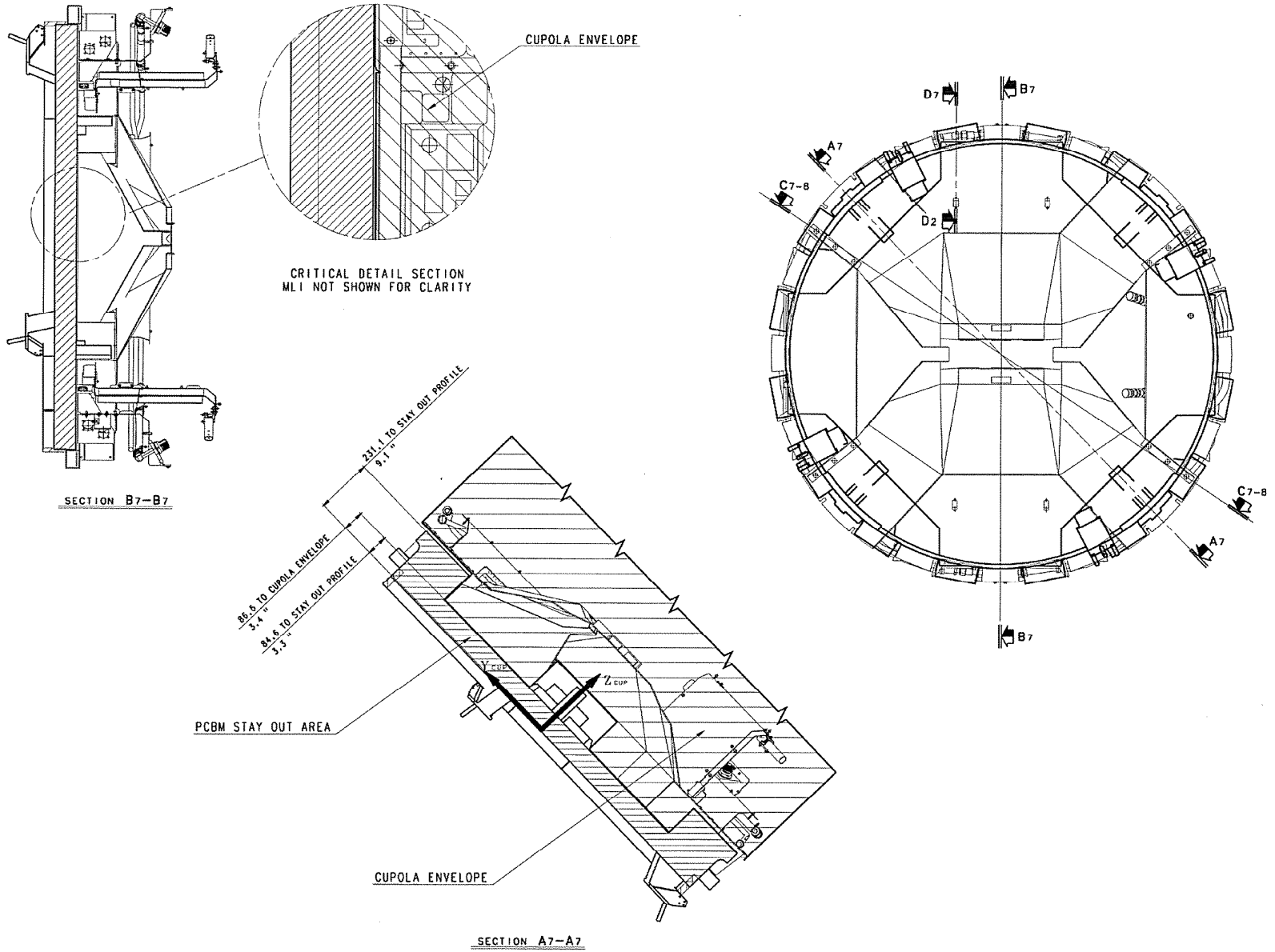
CUPOLA (Cont)



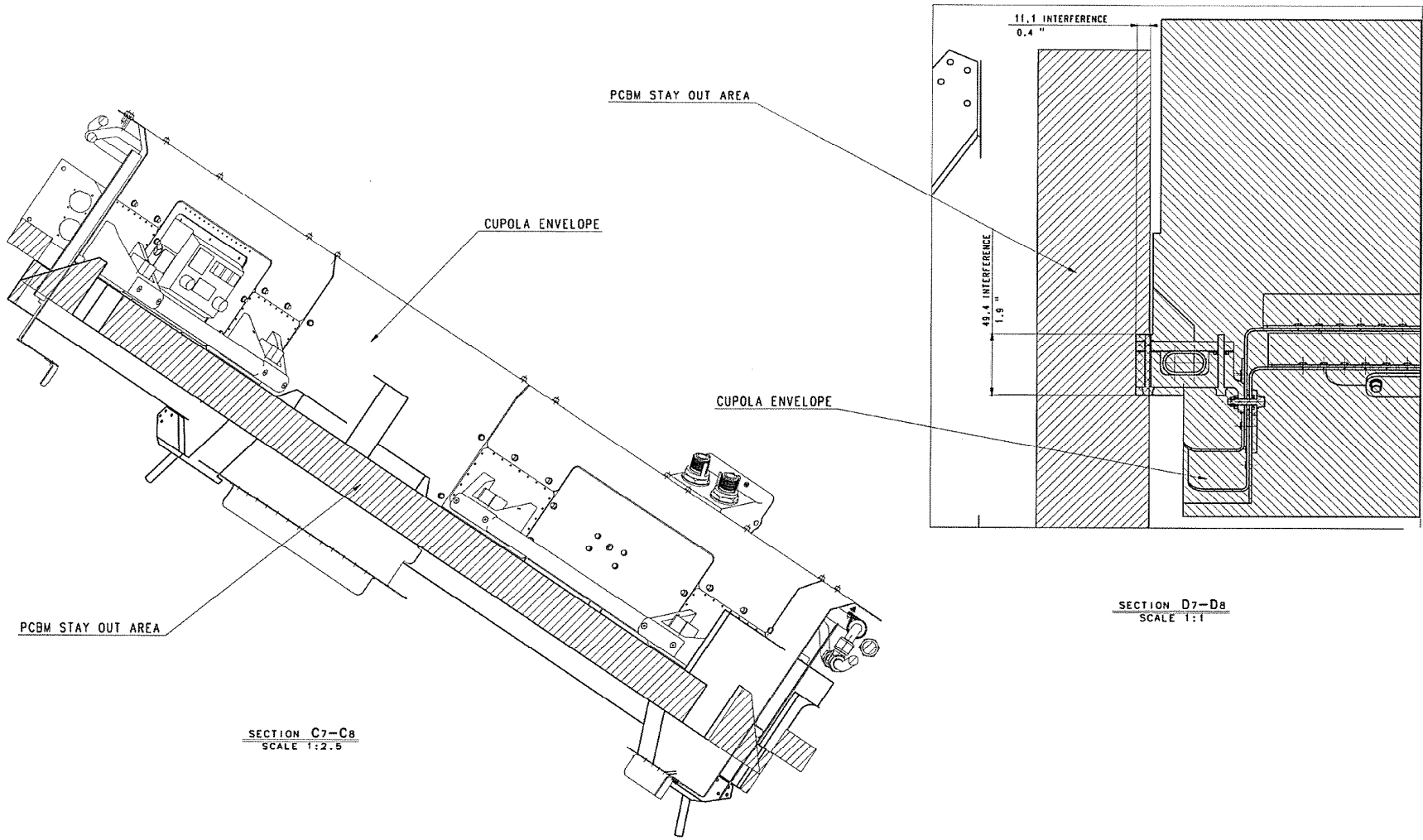
CUPOLA (Cont)



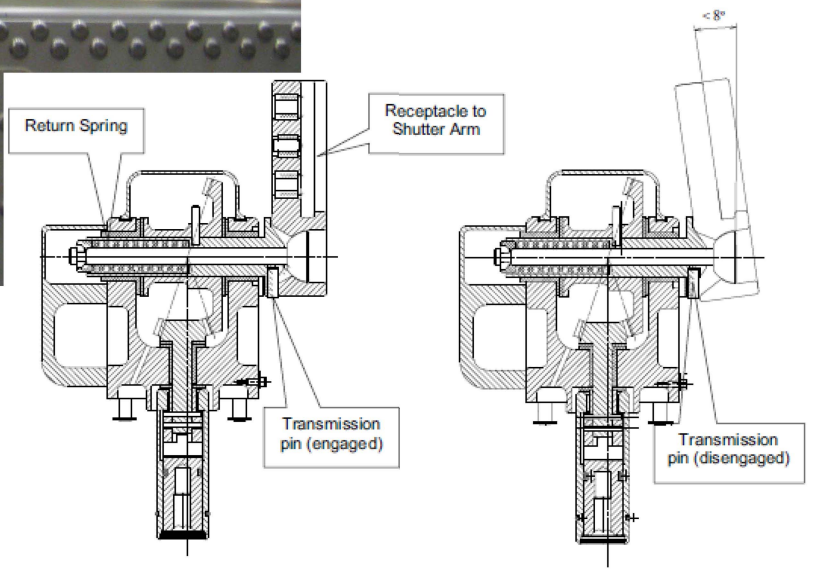
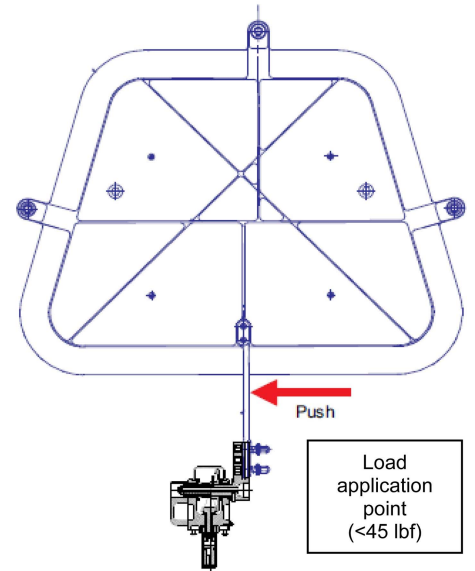
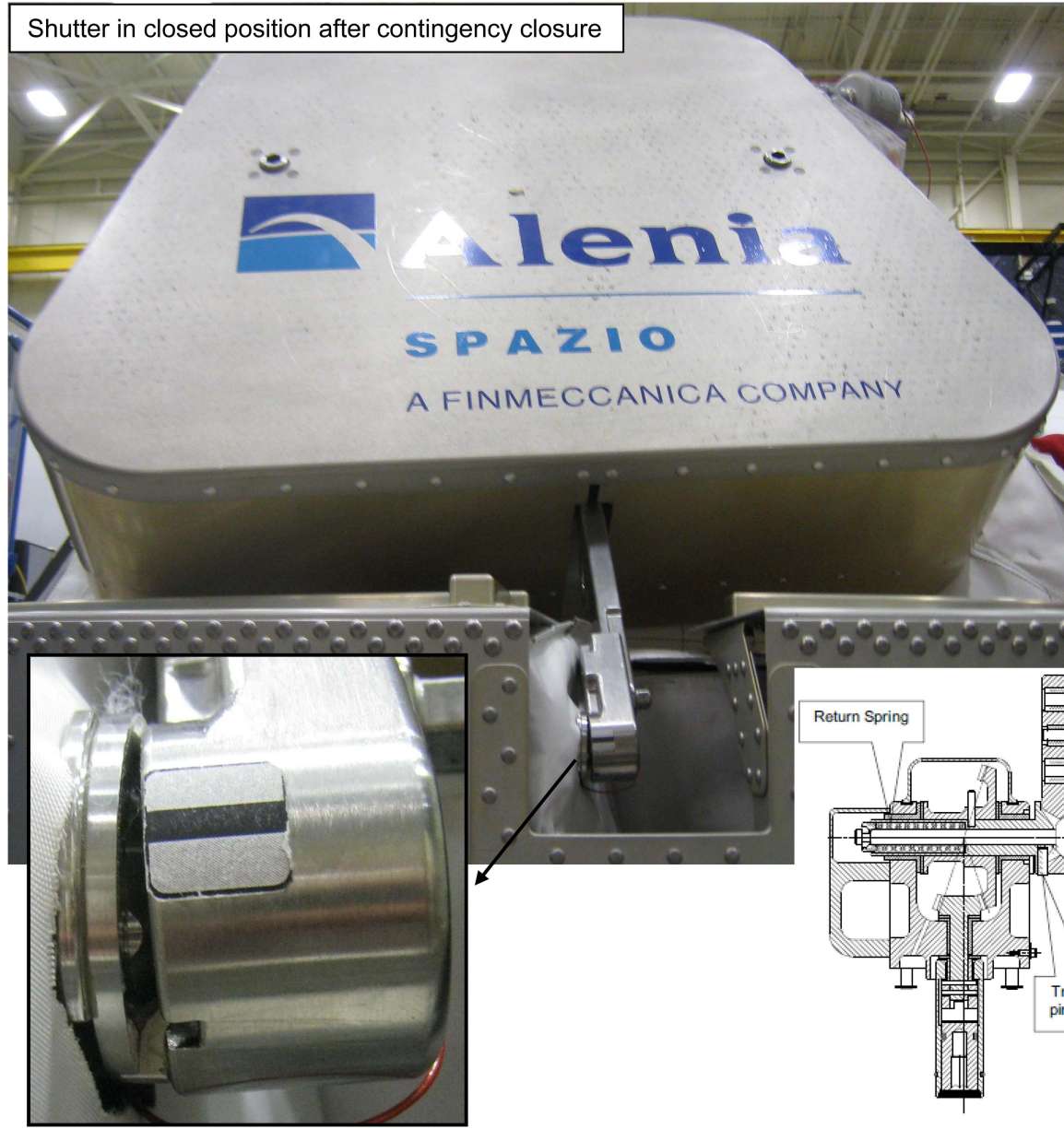
CUPOLA (Cont)



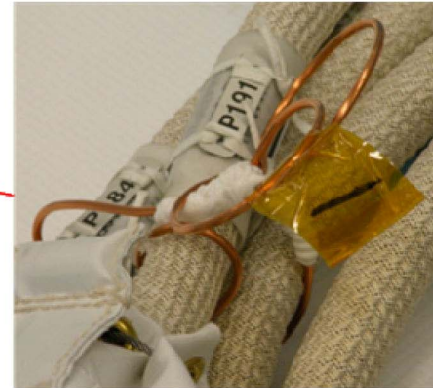
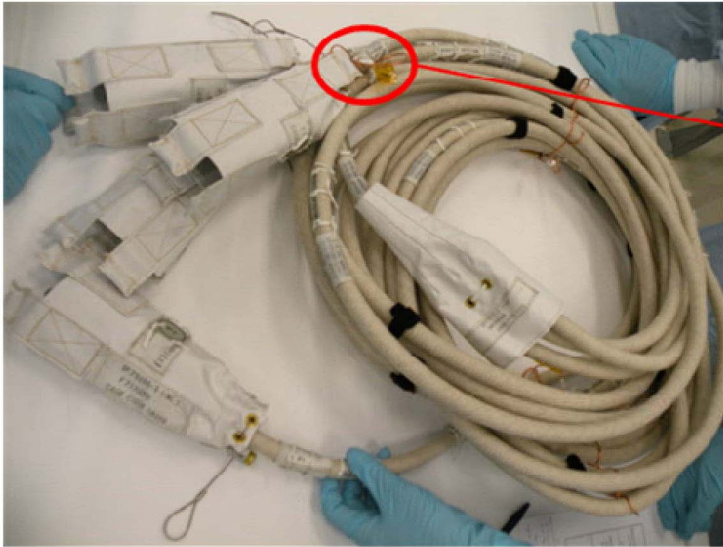
CUPOLA (Cont)



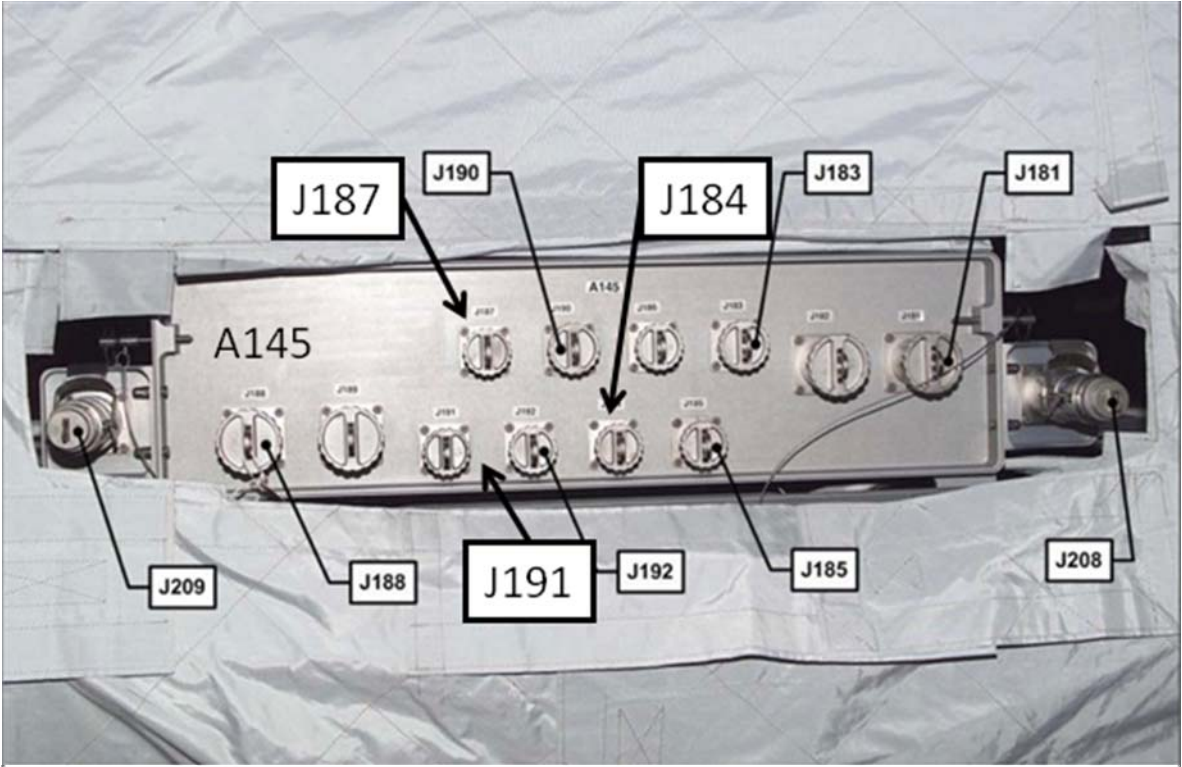
CUPOLA SHUTTER CONTINGENCY



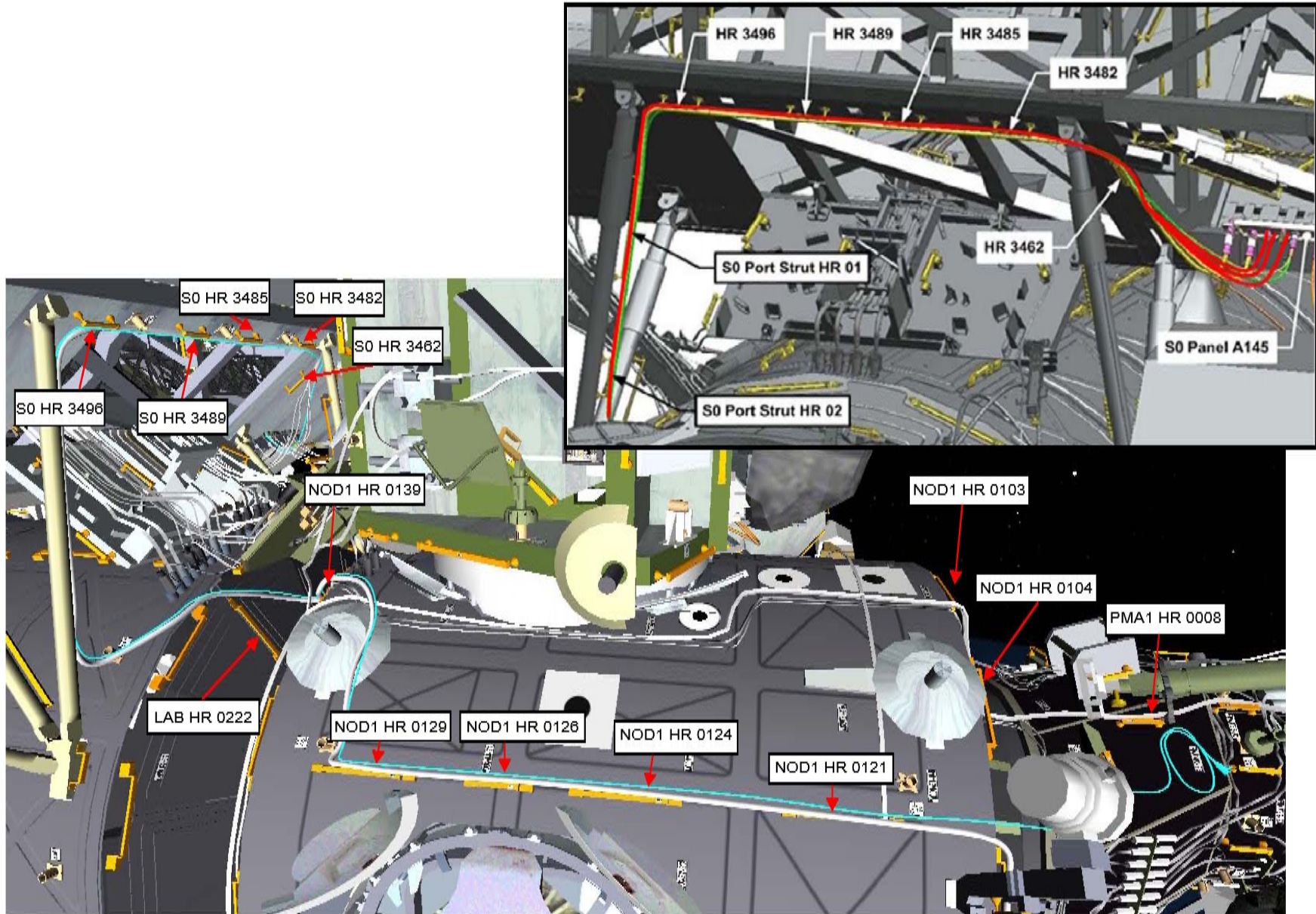
VSC VIDEO CABLE



VSC VIDEO CABLE (Cont)



VSC VIDEO CABLE ROUTING



RBVM



RBVM (Cont)



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EVA CHECKLIST

STS 130