US EVA 10 (ALPHA) SUMMARY TIMELINE

PET HR : MIN	IV	US EVA 10 (ALPHA) EV1 – Wt	EV2 – Mk	PET HR : MIN
00:00		POST DEPRESS (00:05)	POST DEPRESS (00:05)	00:00
	IV: Orbiter S-band inhibits √MCC-H GO for SSPTS cable demate	EVA 5 EGRESS/SETUP (00:35)	EVA 5 EGRESS/SETUP (00:35)	
		SSPTS CABLE STOW (00:20)	SSPTS CABLE STOW (00:20)	
01:00	√MCC-H GO for PMA2/Lab umbilical demate	PMA2/LAB UMBIL STOW (00:40)	PMA2/LAB UMBIL STOW (01:00)	01:00
	√MCC-H GO for Lab CETA light remove	LAB CETA LIGHT (00:45)		
02:00			TEMP STOW N2 PORT TRAY AVIONICS (01:10)	02:00
		TEMP STOW N2 STBD TRAY AVIONICS (00:45)		
03:00		NODE 2 PDGF HORSESHOE CONNECTOR (00:30)	RPCM S0 4B-C R&R (00:30)	03:00
		REMOVE AND STOW ACBM COVER, CBM SURVEY (00:50)	REMOVE AND STOW ACBM COVER, CBM SURVEY (00:50)	
04:00	√MCC-H GO for Russian power reconfig			04:00
		MATE S0/N1 SM POWER CABLE (00:40)	CONFIGURE PMA1/FGB H-JUMPERS (00:50)	
05:00		BSP RETRIEVE (01:00)		05:00
			VTE BAG RELOCATE (00:25)	
			NODE 2 HANDRAIL INSTALL (00:25)	
06:00				06:00
		EVA 5 CLEANUP/INGRESS (00:20)	EVA 5 CLEANUP/INGRESS (00:20)	
	EVA = 6:35	PRE-REPRESS (00:05)	PRE-REPRESS (00:05)	

PRE US EVA 10 (ALPHA) TOOL CONFIG

EV1

EMU D-rings
- ☒ 2 – Tether Extender
- ☒ 2 – Waist Tethers
- ☒ 1 – 85-ft Safety Tether on Left D-ring ext

MWS
- ☒ Small trash bag [right inside w/wire tie]
- ☒ 1 – Adj tether [left]
- ☒ 1 – RET (with PIP pin) [left]
- ☒ 2 – RET (sm-sm) [right]
- ☒ 2 – Wire ties
- ~~☒ Socket caddy [left inside]~~
- ☒ Swing Arm [right side]
  - ☒ PGT S/N __1___
    (B1, CW2, 30.5)
    - ☒ 7/16-6 in ext
    - ☒ 1 – RET (sm-sm)
  - ☒ Wire Tie Caddy
    - ❑ 1 – long wire tie
    - ☒ 1 – RET (sm-sm)
- ☒ BRT [left side]
  - ☒ 2 – long wire ties tied together
  - ☒ 2 – short wire ties
  - ☒ 1 – RET (sm-sm)

☒ SAFER

☒ 1 - Pair of over-gloves
- ☒GP caddy

Items remain in the A/L

Prior to EVA, inspect: RET cord for damage Small trash bag bristles for damage or deformation Safety & waist tether load alleviating straps: no red

Total RETs sm-sm used – 14 Total RETs with PIP pin – 3 Total RETs Lg-sm – 4 Total Adj tethers – 2 (+1 on trash bag)

EV2

EMU D-rings
- ☒ 2 – Tether Extender
- ☒ 2 – Waist Tethers
- ☒ 1 – 85-ft Safety Tether on Left D-ring ext

MWS
- ☒ Small trash bag [right inside w/wire tie]
- ☒ 1 – RET(with PIP pin) [left]
- ☒ 2 – RET (sm-sm) [right]
- ☒ 2 – Wire ties
- ☒ Swing Arm [right side]
  - ☒ PGT S/N __5___
    (B1, CCW1, 30.5)
    - ☒ 7/16-6 in ext
    - ☒ 1 – RET (sm-sm)
  - ☒ Wire Tie Caddy
    - ☒ 1 – RET (sm-sm)
- ☒ BRT [left side]
  - ☒ 2 – long wire ties tied together
  - ☒ 2 – short wire ties
  - ☒ 1 – RET (sm-sm)

☒ SAFER

☒ 1 - Pair of over-gloves
- ☒ GP caddy

CREWLOCK

☒ 1 - RET (Lg-sm)
- ☒ C/L bag #4
  - ☒ Adj tether on outside
  - ❑ EVA Camera and Bracket
  - ☒ Fish stringer (w/free hook outside door on soft handle, on int)
    - ☒ Lab Caps (8) – J101 (15), J102 (15), J103 (17), J104 (15), J105 (15), J106 (21), J115 (25), J117 (25)
  - ☒ MMOD T-tool (int)
  - ☒ Int hook outside door for H-jumper
  - ☒ Round Scoop (on RET)
    - ☒ 1 – RET (sm-sm)

☒ 1 - RET (Lg-sm) – used later for ACBM cover
- ☒ APFR 8 (w/ ingress aid)

~~❑ 1 - RET (Type - crew preference)~~
- ~~❑ APFR 5 (no ingress aid) - if volume allows~~

CREWLOCK (cont)

☒ Staging Bag
- ☒ Fuse Tether (1)
  - ☒ Connector Cleaner Tool Kit
  - ~~❑ Wire Tie Caddy (w/ 9 wire ties)~~
  - ☒ PGT (spare) S/N __8___
    - ☒ PGT Battery S/N __8___
  - ☒Connector Pin Straightener
  - ☒ Probe
  - ☒ Velcro/Tape Caddy
  - ☒ Pry Bar
  - ☒ Vise Grips
  - ☒ 3" scraper {from solar array cont C/L bag}

☒ IV Bag
- ☒ Contamination Detection Kit
  - ☒ Gold Salt Coupon (6)
  - ☒ Color Chart (2)
  - ☒ ISS Contamination Sampler (2)
  - ☒ Ammonia Draeger Tube (11)
- ☒ DCM Plug (2) - SAFER Hard Mount
- ☒ GP Caddy (2)
  - ☒ Thermal Mittens (2 pr)
- ☒ EVA Ratchet
- ☒ Socket Caddy
  - ☒ 1/2 x 8-in socket (IV Hatch)
  - ☒ 7/16 x 6-in socket (backup)

☒ Small ORU Bag
- ☒ Wire tie (2) sm ORU bag to C/L bag #4
- ☒ Adj tether to secure sm ORU bag to C/L bag #4
- ☒ RPCM (verify protective caps removed)
  - ☒ RET (sm-sm) (gate pointed away from RPCM)
  - ☒ RET (sm-sm)

PRE US EVA 10 (ALPHA) TOOL CONFIG

CREWLOCK (cont)

☒ 1 - RET (Lg-sm)

- ☒ 6B Box Cover (BSP)
  - ☒ 1 – Adj tether
  - ☒ Dummy box
  - ☒ 1 – RET (sm-sm)

☒ 1 – RET (Lg-sm)

- ~~☒ Med ORU Bag (for CETA Light once removed)~~
  - ~~☒ 1 – RET (with PIP pin)~~

☒ 1 – RET (Lg-sm) (for Node 2 Shower Cap)

☒ 1 – Lg-sm RET

- ☒ Node 2 Handrail 0371

US EVA 10 (ALPHA) PRE BRIEF

EVA PREP:

* Follow procedures carefully
* PBA and SCU are pure O2
* Do not force connections

A/L CONFIG and TOOLS:

* Crew lock bag for contingencies stays in the A/L
* ORU bag for CETA light stow will stay in the A/L

EGRESS PLAN:

* EV2 to A/L D-ring extender; EV1 R waist to EV2 safety tether
* EV1 egresses and attaches own safety tether to A/L, EV2 attached to base of CETA spur handrail
* EV2 hands out APFRs; attaches crew lock bag wire-tied to sm ORU bag to self, (Large-small RETs stay in the A/L attached to tether extender)
* EV2 closes thermal cover
* Both check SAFER handles down and down

TRANSLATION:

* EV1 fairleads stbd of EV2 CETA rail or CETA cart translation path
* Watch presence of MT and CETA carts now at WS 4
* Check tethers often
* Check each other's tethers, when possible
* Awareness of sensitive hardware in your work area (bend radii on cables, SHUTTLE)
* Review translation paths (DOUG/photos and MSG 16-0236)

TETHERS and TOOLS:

* Follow good tethering protocol on all tools – "Good RET"
* Pull test everything (PGT sockets, APFRs, etc)

GLOVE CHECKS:

* Before/after pre-determined tasks, day/night cycles
* Especially careful inspection of thumb/forefinger

SSPTS and PMA Cables:

* Monitor cable bend radii
* Make sure FRGF and stovepipe/PMA interface clear when complete
* Report connector status after de-mating
* Minimize translation on the stovepipe
* Reference MSG 16-0257 pg 11

Avionics Tray Cable Stowage:

* Monitor cable bend radii
* Report connector status after de-mating
* Review MSG 16-0034

Gap Spanners:

* Ensure cables clear
* "Skid" 180 deg to loosen

CETA Light:

* Remove/stow in A/L ORU bag

ACBM Cover Removal and Stow:

*Good comm to ensure that we have appropriate control

* Reference MSG 15-1453 & 16-0257 pg 12 & 13

Horseshoe Connectors:

* EV1 slide receptacles out, retrieve connectors, slide on; drive bolt
* Horseshoe connectors only on via micro-square soft capture
* Reference PDGF data package sent up (MSG 16-0235 & 16-0257 pg 6 - 10)

H-jumper:

* Description of de-mates (review labeling)
* No longer need to move bail back on PMA side
* Review briefing package (MSG 16-0034 & 16-0257 pg 14)

RPCM:

* Standard R&R – ensure hook is on correctly (check IV)
* Check type and serial number of RPCM before removing

BSP Remove:

* Don't stow hardware near radiator behind BSP
* Ensure forward lip of BSP interfaces with cover

VTE Bag Relocate:

* Grab outboard bag

Node 2 Handrail Install:

* Verify pre-install config, and follow installation direction arrow

COMM PROTOCOL:

* Give IV status during work and when complete
* Give IV status on location during translation

SUIT MAL PROTOCOL:

Challenge-response led by IV or nominal suit

CONNECTORS:

* Check pin straightness
* No FOD in receptacle
* Good EMI band
* Proper bend radius

PGT OPS:

* Check settings with IV
* Pull test on all socket installs
* Report Turn count
* Report lights and actual torque from PGT display

Red light – Low torque, green light – in torque window, Both – Hi torque
Cal Procedure – Ratchet Collar – Not motor, Speed Collar – Cal, Pull trigger

DAY/NIGHT TRANSITIONS: (IV will call)

* Lights, visor, glove heaters, check all tools secure, adjust suit temp if desired

INGRESS PLAN:

EV2 in first, then tether to D-ring extender
EV1 disconnect EV2 safety tether, connect it to right waist tether
EV1 disconnect own safety tether
EV1 in feet first with an EV2 assist
Check hatch seal clear before closing

US EVA 10 (ALPHA) EVA INHIBIT PAD

Ground

All EVAs

Ground Radar
MCC-H 1. √TOPO console, ground radar restrictions in place for EVA

USOS (1)

ALL EVAs

PCU

NOTE
PCUs may require up to 1 hr warm-up period before they are operational

MCC-H 1. √PCUs (two) operational in discharge mode and one of the following:
a. CCS PCU EVA hazard control enabled
b. No more than two arrays unshunted
c. No more than two arrays pointed < 90º from velocity vector

OR

2. One or no PCUs operational in discharge mode and one of the following:
a. No more than two arrays unshunted
b. No more than two arrays pointed < 90º from velocity vector

LOCATION DEPENDENT INHIBITS

Lab Window
{EVA crew expected to be in this area during translation on Lab}
IV 1. Close window shutter

KU-BAND (SGANT) Antenna
{On call, EV crew not expected to be in this area}
MCC-H If EV crew < 3.3 ft from KU-BAND antenna
1. Park KU-BAND:
1.1 Pointing Mode – Inhibit
1.2 PLC – Reset
1.3 Autotrack Continuous Retry – Inhibit

USOS (2)

LOCATION DEPENDENT INHIBITS

S-BAND (SASA) ANTENNAS
{On call, EV crew not expected to be in this area}
MCC-H If EV crew < 3.6 ft from S1 SASA [P1 SASA]
1. P1 SASA [S1 SASA] – Active
2. S1 SASA [P1 SASA] – Powered down

SARJ
{On call, EV crew not expected to be in this area}
MCC-H If EV crew working within 2 ft or outboard of SARJ:
1. √DLA (1) – LOCKED
2. All motor setpoints set to zero
3. All motors deselected

OR

4. Both DLAs – LOCKED

EVA 5 SPECIFIC INHIBITS

SSPTS CABLE DEMATE
{Expect inhibits in place prior to egress}
MCC-H
1. RPCM Z13B A RPC 2 – Open, Close Cmh Inh
2. RPCM Z14B A RPC 2 – Open, Close Cmh Inh
3. RPCM LA2A3B D RPC 1 – Open, Close Cmh Inh
4. RPCM LA1A4A D RPC 3 – Open, Close Cmh Inh
5. DDCU LA1A OR LA4A CONVERTER – Off
6. DDCU LA2A OR LA3B CONVERTER – Off

PMA2 TO LAB UMBILICAL DISCONNECT
{Expect inhibits in place prior to egress}
MCC-H 1. RPCM LA1B C RPC 1 – 14 – Open, Close Cmd Inh

US EVA 10 (ALPHA) EVA INHIBIT PAD

USOS (3)

EVA 5 SPECIFIC INHIBITS

LAB CETA LIGHT REMOVE
{Expect inhibits in place just prior to task (starts 01:15 thermal clock}
MCC-H
1. RPCM S01A C RPC 15 – Open, Close Cmd Inh
2. RPCM S02B C RPC 15 – Open, Close Cmd Inh

LAB TRAY AVIONICS RELEASE
{Expect inhibits in place prior to egress}
MCC-H
1. MBSU 1 RBI 10 & 11 – Open, Close Cmd Inhibit
2. MBSU 2 RBI 3 & 10 – Open, Close Cmd Inhibit
3. MBSU 3 RBI 2 & 3 – Open, Close Cmd Inhibit
4. MBSU 4 RBI 2 & 10 – Open, Close Cmd Inhibit
5. RPCM S01A_D RPC 2, 4 & 5 – Open, Close Cmd Inhibit
6. RPCM S02B_D RPC 2, 4 & 5 – Open, Close Cmd Inhibit
7. RPCM S03A_C RPC 1 & 2 – Open, Close Cmd Inhibit
8. RPCM S04B_C RPC 3 & 4 – Open, Close Cmd Inhibit

BSP REMOVAL
{Expect inhibits in place just prior to task}
MCC-H
1. RPCM Z14B B RPC 4 – Open, Close Cmd Inh
2. RPCM Z13B B RPC 4 – Open, Close Cmd Inh

S0/N1 SM POWER CABLE INSTALL/H-JUMPER REMOVAL
{Expect inhibits in place just prior to task}
MCC-H
1. RPCM Z14B A RPC 1 – Open, Close Cmd Inh
2. RPCM Z14B A RPC 3 – Open, Close Cmd Inh
3. MBSU 2 RBI 5 – Open, Close Cmd Inh
4. MBSU 3 RBI 5 – Open, Close Cmd Inh
5. MBSU 4 RBI 5 – Open, Close Cmd Inh

RPCM REMOVE AND REPLACE
{Expect inhibits in place during EVA, once SSRMS ready}
MCC-H
1. DDCU S14B Converter – OFF

RSOS (1)

ALL EVAs

SM Antennas
IV
1. GTS – Deactivate
2. ARISS – Deactivate or VHF (144-146 MHz) TX only

FGB Antennas
MCC-M
1. ARISS – Deactivate
2. √FGB KURS P [КУРС P] – Deactivate

Soyuz Antennas
MCC-M
1. √Soyuz KURS A [КУРС A] – Deactivate

FGB Thrusters
MCC-M
1. √FGB MCS unpowered
2. √All FGB Attitude Control Thruster Valves (80) – closed
3. √FGB Attitude Control Manifold Valves – closedКШК1, КШК2, КШК4, КШК5, КШК9, ОКО3, ОКГ3, ОКО6, ОКГ6, ОКО7, ОКГ 7, ОКО8, ОКГ8

Soyuz Thrusters
MCC-M
1. √Soyuz manifolds (4) – closed ЭКО1, ЭКО2, ЭКГ1, ЭКГ2
2. √Soyuz MCS unpowered
3. √Soyuz Attitude Control Thruster Valves (52) – closed
4. √Soyuz Main Engine Valves (K1,K2,K3,K4,K5,K6) – closed

US EVA 10 (ALPHA) NOTES, CAUTIONS, AND WARNINGS

NOTE

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. MLI handholds are not rated for crewmember transition loads

CAUTION

ISS Constraints

A. Avoid inadvertent contact with
   1. Grapple fixture shafts (drylube)
   2. PIP pins
   3. EVA Crane [PMA1]
   4. TCS Reflectors [PMA2,PMA3]
   5. APAS hardware [PMA2,PMA3]
   6. CETA Lights (Z-93 paint) [LAB,S1,Node 1]
   7. Passive UMAs
   8. MBS VDU, MCU, CRPCMs, and Cameras (taped radiative surfaces, silver Teflon)
   9. Deployed TUS cable
   10. S0 aft face Radiator
   11. GPS Antennas (S13 paint) [S0]
   12. UHF Antennas [LAB,P1]
   13. ETCS Radiators [S1,P1]
   14. EETCS/PV Radiator bellows and panels [P6,P4,S4]
   15. SASA RF Group [S1,P1]
   16. Heat pipe radiators [Z1]
   17. PCU cathode and HCA ports [Z1]
   18. Ku-Band Antenna (SGANT) dish [Z1]
   19. CMG cover/shells [Z1]
   20. SSRMS Cameras
   21. Open CBM petal covers and LAB window shutte

CAUTION (Cont)

ISS Constraints (Cont)

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 < 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
   2. Avoid bend radii < 14 in for hoses with a diameter ≥ 1 in
   3. Additional care should be taken to not exceed bend radii when applying loads at the flexible hose to rigid tube stub interfaces
   4. Ensure fluid QD booties are fully closed prior to leaving worksite; wire tie if reqd

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

CAUTION (Cont)

ISS Constraints (Cont)

F. Other

1. ITT Cannon connector: On demated connectors, do not rotate collar or manipulate cable/connector using collar or connector tool
2. WIS Antennas: do not use as handholds [Node 1,P6,Z1]
3. Lubricant from Ku-Band SGANT gimbals [Z1], CMGs [Z1], and RTAS Ground Strap fasteners [P6,P4,S4] can contaminate EMU
4. MLI handholds are not rated for crewmember translation loads
5. CBM petal covers may not be used as handholds unless both launch restraint pins are engaged

WARNING

ISS Constraints

A. Avoid inadvertent contact with
1. Grapple fixture targets and target pins
2. SSU, ECU, beta gimbal platform, mast canister, SAW blanket boxes unless the beta gimbal is locked and the motor is turned off
3. Stay inboard of SARJ when active
4. Stay 2 ft from S1/P1 radiator beam rotational envelope when beam is free to rotate
5. Stay 5 ft from moving MT on face 1

B. Handrails
1. Handrails previously used for MISSE attachment may not be used as a safety tether point [A/L endcone 564 & 566, A/L Tank 2 nad/fwd & port/fwd, P6 5389]

C. Pinch
1. NZGL connector linkage. Use caution when mating/locking
2. ITT Cannon Connector rotating housing
3. EV side of IV Hatch during Hatch operation (also snag hazard) [A/L]
4. LAB window shutter and CBM petal cover linkages during operation

D. 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 config

WARNING (Cont)

ISS Constraints (Cont)

E. 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]

F. Sharp Edges
1. Inner edges of WIF sockets
2. Mating surfaces of EVA connectors. Avoid side loads during connector mating
3. Back side of MMOD shield fasteners
4. Spring loaded captive EVA fasteners (e.g., 6B-boxes, BMRRM); the end of the spring may protrude
5. PMA umbilical launch restraints-exposed bolt threads
6. Adjustable Fuse Tether (Fish Stringer) buckles stowed in Node Bag
7. Nickel coated braided copper Ground Straps may contain frayed wires [P6,P4,S4,S6]
8. Z1 handrail 6061 by the Ku-Band boom launch restraint [Z1]
9. Solar Array Blanket Box [P4,S4,P6]
10. Keep hands away from SSRMS LEE opening, and snares
11. Fastener threads on back of Z1 U-jumper male FQD panel, if nutplate cap missing

WARNING (Cont)

ISS Constraints (Cont)

G. Thermal
1. EVA connectors with booties may become hot if left uncovered. Handling may need to be limited
2. PMA handrails may be hot. Handling may need to be limited
3. Turn off glove heaters when comfortable temp reached to prevent bladder damage. Do not pull fingers out of gloves when heaters are on
4. Uncovered trunnion pins may be hot
5. SSRMS/MBS operating Cameras and lights may radiate large amounts of heat
6. Stay 1 ft away from PMAs and MMOD shields > 270 degF if EMU sun visor up
7. Stay at least 1 ft away for no more than 15 min from PMAs and MMOD shields > 300 degF if EMU sun visor up
8. Stay 0.5 ft away from PMA and MMOD shields > 325 degF
9. Do not touch EMU protective visor if temp has been < -134 for > 15 min
10. No EMU TMG contact of PMAs and MMOD shields when temp > 320 degF
11. No EMU boot contact with foot restraint when temp < -120 degF or > 200 degF

H. Electrical Shock Hazard
1. Stay ≥ 2 ft from following ungrounded floating connectors if not inhibited: SSPTS on Lab fwd and stbd Node 1, H-jumper on FGB, MT cables, and S0 Bay 00, 02, and 03

US EVA 10 (ALPHA)

US EVA 10 (ALPHA) A/L EGRESS AND SETUP (00:35)

IV	EV1 – Wt (FF)	EV2 – Mk (FF)
1. Post crew egress: WVS Software: Select page – RF Camera sel 'Advanced controls' S-Band level (two) – max	INITIAL CONFIG 1. Verify: ☐ Left waist tether connected to EV2's 85-ft safety tether ☐ hook locked ☐ Over-gloves donned EGRESS/INITIAL SET-UP 1. Open hatch thermal cover 2. Egress crewlock 3. Attach own 85-ft safety tether to fwd A/L D-ring ☐ √Gate closed ☐ √Hook locked ☐ √Reel unlocked ~~4. Receive APFR 5 w/o ingress aid from EV2~~ ~~5. Stow APFR onto stbd airlock toolbox (6, XX, F, 12)~~ 6. Receive APFR 8 w/ ingress aid; stow on BRT 7. Translate to CETA spur HR 3401 (base of CETA spur) 8. Attach EV2's 85-ft safety tether to HR 3401 ☐ √Gate closed ☐ √Hook locked ☐ √Reel unlocked 9. Give EV2 GO to release waist tether 10. Assist EV2 as reqd 11. Verify SAFER config ☐ √L Handle down (MAN ISO Vlv – Open) ☐ √R Handle down (HCM – Closed)	INITIAL CONFIG 1. Verify: ☐ Right waist tether to A/L D-ring Extender; √hook locked ☐ 85-ft safety tether to EV1's left waist tether ☐ Over-gloves donned EGRESS/INITIAL SET-UP ~~1. If present, transfer APFR 5 w/o ingress aid to EV1~~ 2. Transfer APFR 8 w/ ingress aid to EV1 3. Attach Lg-sm RET from APFR to A/L D-ring for ACBM cover 4. Egress crewlock 5. Retrieve sm ORU bag and crewlock bag combo from A/L 6. Stow bags on BRT 7. Attach Lg-sm RET from crewlock bag to A/L D-ring ext 8. On EV1 GO, release right waist tether, stow on self 9. Close hatch thermal cover 10. Verify SAFER config ☐ √L Handle down (MAN ISO Vlv – Open) ☐ √R Handle down (HCM – Closed)

US EVA 10 (ALPHA) A/L EGRESS AND SETUP (00:35)

IV	EV1 – Wt (FF)	EV2 – Mk (FF)
	12. Translate to Lab stbd SSPTS bag/Lab WIF via CETA spur, face 1 CETA rail, then stbd Lab strut path - Fairlead up CETA spur then stbd of CETA rail (~1/2 bay) or onto CETA carts if poor access 13. Install APFR w/ ingress aid into Lab WIF 12 at 11, QQ, L, 12 - Verify locking collar black-on-black - Perform pull test 14. Continue translation to SSPTS bag ~~15. Remove over-gloves; stow into sm trash bag **(TBR)**~~ 16. Perform glove inspection	11. Translate to Lab zenith SSPTS bag via CETA spur, then port Lab strut WARNING 2' Keep Out Zone for floating cables between MT and MBS. Stay on UMA handrails during translation underneath MT ~~12. Remove over-gloves; stow into sm trash bag **(TBR)**~~ 13. Perform glove inspection

US EVA 10 (ALPHA)

SSPTS CABLE STOW (00:20)

IV	EV1 – Wt (FF)	EV2 – Mk (FF)
{SSPTS CABLE DEMATE INHIBITS RPCM Z13B A RPC 2 – Open, Close Cmh Inh RPCM Z14B A RPC 2 – Open, Close Cmh Inh RPCM LA2A3B D RPC 1 – Open, Close Cmh Inh RPCM LA1A4A D RPC 3 – Open, Close Cmh Inh DDCU LA1A OR LA4A CONVERTER – Off DDCU LA2A OR LA3B CONVERTER – Off}	TEMP STOW SSPTS BAG W9303 (STBD) 1. Translate to Lab stbd SSPTS bag	TEMP STOW SSTPS BAG W9302 (ZENITH/PORT) 1. Translate to zenith port SSPTS bag 2. Temp stow crewlock bag near PMA2/Lab umbilical worksite using adjustable tether (HR 0263)
	WARNING Avoid unnecessary contact with Lab stovepipe. May present sharp edge hazard	
	CAUTION Avoid with inadvertent contact with partially installed Lab MMOD shield (zenith/stbd, with NASA meatball)	
	2. Disconnect straps 1 and 2, wrapped around stove pipe bracket and connected to bag D-ring 3. Flip W9303 bag so that side A is up	3. Disconnect straps 1 and 2, wrapped around stove pipe bracket and connected to bag D-ring 4. Flip W9302 bag so that side A is up
	NOTE Ensure safety tethers are not underneath SSPTS bag when flipped	
☐ √With MCC all inhibits in place for SSPTS cable demate 2. Give EV GO for SSPTS cable demate	4. Secure straps 1 and 2 to Lab HR 0296 fwd standoff 5. Move strap 4 from nadir end of HR 0274 to zenith 6. On IV GO, demate J16A from P16 7. Stow PMA cable with wire tie; verify bootie covering cable 8. Open side A of W9303 9. Stow cable in side A of W9303 (do no mate to cap) 10. Close side A of W9303 11. Perform glove inspection 12. Translate to PMA2/Lab umbilicals	5. Secure strap 1 to Lab HR 0264 aft standoff 6. Secure strap 2 to Lab HR 0263 fwd standoff 7. On IV GO, demate J3A from P3 8. Stow PMA cable in TA clamp (use wire tie if reqd); verify bootie covering cable 9. Open side A of W9302 10. Stow cable in side A of W9302 (do no mate to cap) 11. Close side A of W9302 12. Perform glove inspection 13. Translate to PMA2/Lab umbilicals

US EVA 10 (ALPHA)

SSPTS CABLE STOW – TASK DATA

Tools: None

EVA Fasteners: None

EVA Connectors:

Harness	From	To	Clamps (qty)	Conn Size	Function
J3A	P3	A side of W9302	N/A	25	Power – CH 1/4 to OPCU-2
J16A	P16	A side of W9303	N/A	25	Power – CH 2/3 to OPCU-1

Foot Restraints: None

Timeline Considerations:

Notes: None

Cautions: None

Warnings:

1. Minimize translational use of stove pipe brackets

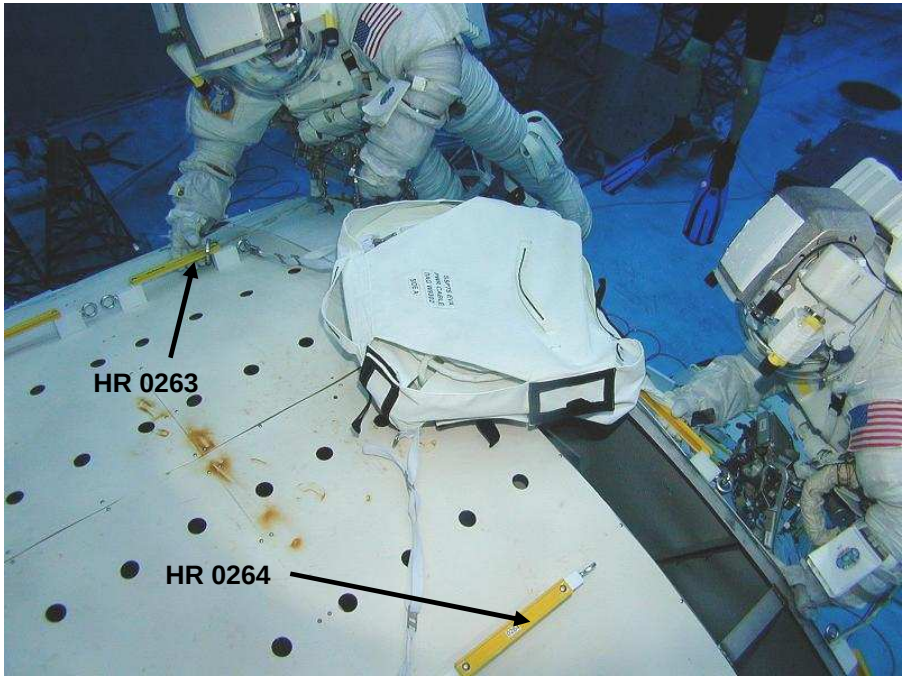


Figure 2. SSPTS bag W9302 (zenith/port) temp stowed

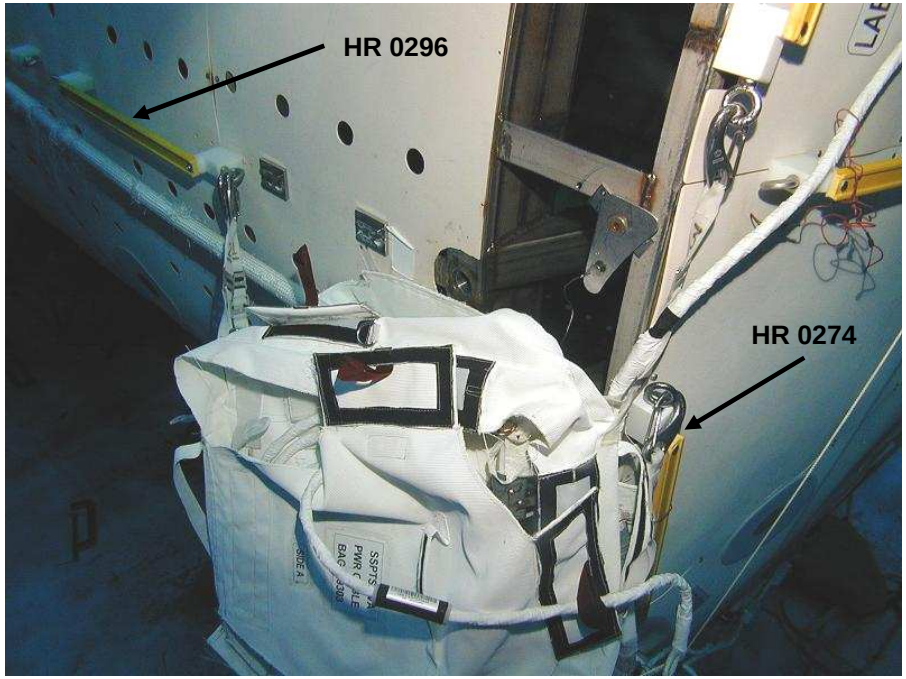


Figure 1. SSPTS bag W9303 (stbd) temp

SSPTS CABLE STOW – TASK DATA (Cont)

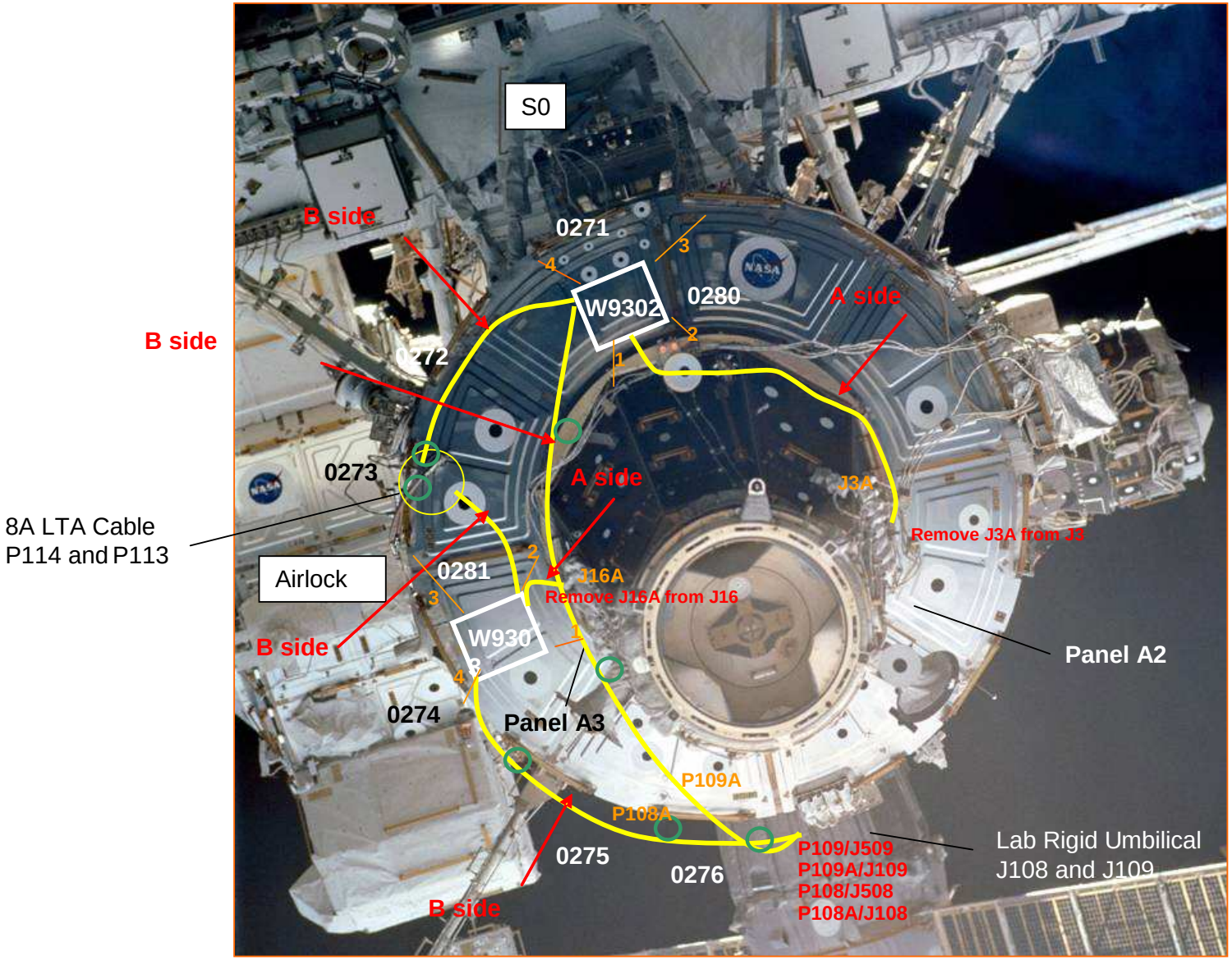


Figure 3. SSPTS Cable Routing When Connected to PMA2

PMA2/LAB UMBILICAL STOW (01:00)

IV	EV1 – Wt (FF)	EV2 – Mk (FF)
{PMA2/LAB UMBILICAL DEMATE INHIBITS RPCM LA1B C RPC 1-14 – Open, Close Cmd Inh	RELEASE PMA2 REDUNDANT UMBILICALS	RELEASE PMA2 REDUNDANT UMBILICALS
	NOTE √Connectors for straight pins, no FOD, EMI band intact, and good bend radius Connector P613 has a missing rivet on the bail	
	CAUTION Avoid bend radii < 10 times cable diameter; Avoid pulling on cable during mate/demate	
	1. Translate to PMA2	1. Translate to PMA2
		2. Release wire ties as necessary, expect: ☐ Lab HR 0269 ☐ Lab HR 0268
	2. Slide booties off all 8 connectors at Lab panel 3. Wire tie into primary and redundant bundles if not already done	3. Translate to crewlock bag 4. Tether to and remove fish stringer with caps 5. Temp stow fish stringer near umbilical worksite (suggest Lab HR 0269)
☐ √With MCC all inhibits in place for PMA2/Lab umbilical demate 1. Give EV GO for PMA2/Lab umbilical demate	4. On IV GO, release primary connectors from Lab panel: ☐ P611/J103 – primary (size 17) ☐ P613/J105 – primary* (NOTE: missing rivet) (15) ☐ P612/J106 – primary (21) ☐ P610/J117 – primary (25) 5. Transfer primary umbilicals to EV5	6. Receive umbilicals from ~~EV4~~ EV1
	6. Release redundant connectors from Lab panel: ☐ P616/J101 – redundant (15) ☐ P615/J102 – redundant (15) ☐ P614/J 104 – redundant (15) ☐ P609/J115 – redundant (25)	
	7. Verify tether clear of cables	

PMA2/LAB UMBILICAL STOW (01:00) (Cont)

IV	EV1 – Wt (FF)	EV2 – Mk (FF)
	STOW PMA2 REDUNDANT UMBILICALS 1. Route redundant umbilical assy for temp stow on PMA2 (stbd/zenith side) 2. Secure cables in clamps, as necessary ☐ C13 Clamp ☐ C12 Clamp ☐ C11 Clamp ☐ C10 Clamp ☐ C09 Clamp ☐ C08 Clamp	STOW PMA2 PRIMARY UMBILICALS 1. Route primary umbilical assy for temp stow on PMA2 (nadir/port side) 2. Secure cables in clamps, as necessary ☐ C06 Clamp ☐ C05 Clamp ☐ C04 Clamp ☐ C03 Clamp ☐ C02 Clamp ☐ C01 Clamp
	NOTE Do not wire-tie umbilicals to stovepipe	
	3. As necessary: use wire ties for additional restraint ☐ Recommend HR 0415 (zenith/stbd) ☐ Recommend HR 0416 (nadir/stbd) ☐ Recommend HR 0418 (stbd) 4. Verify harness clear of PMA2 CBM mating surface and grapple fixture; verify booties covering cables 5. Perform glove inspection 6. Translate to crewlock bag 7. Retrieve round scoop from crewlock bag; stow on MWS 8. Translate to Lab stbd avionics tray CETA light	3. As necessary: use wire ties for additional restraint ☐ Recommend HR 0411 (nadir/port) ☐ Recommend HR 0412 (nadir/port) ☐ Recommend HR 0408 (zenith/port) ☐ Recommend HR 0403 (port) 4. Verify harness clear of PMA2 CBM mating surface and grapple fixture; verify booties covering cables 5. Perform glove inspection 6. Translate to fish stringer with caps 7. Install caps (8) on Lab jacks: J101 (size 15) to J117 (size 25) Zenith-most: ☐ J101 (15) ☐ J102 (15) ☐ J103 (17) ☐ J104 (15) ☐ J105 (15) ☐ J106 (21) ☐ J115 (25) ☐ J117:Nadir-most (25) 8. Tether to and restow fish stringer in crewlock bag INSTALL PORT FLUID TRAY GAP SPANNERS (PORT/FWD) 9. Receive small trash bag with gap spanners from EV1 10. On IV GO, demate P664, P665 in preparation for gap spanner installation 11. Retrieve 2 – gap spanners from trash bag 12. Install gap spanners from aft standoff of HR 0288, through avionics tray handrail to fwd standoff of HR 0259 13. Translate to Lab port avionics tray
☐ √With MCC all inhibits in place for disconnecting Lab avionics cables 2. Give EV GO for disconnecting Lab avionics cables		

US EVA 10 (ALPHA)

PMA2/LAB UMBILICAL STOW – TASK DATA

Tools:

EV1 (FF)	EV2 (FF)
Wire ties	Wire ties

EVA Fasteners: None

EVA Connectors:

Harness	From	To	Clamps	Size	Function
P609	J115	Temp stow		25	None
P610	J117	Temp stow		25	None
P611	J103	Temp stow		17	Data – RTDs, GNC Moding
P612	J106	Temp stow		21	Shell Heaters
P613	J105	Temp stow		15	Data – 1553 A, Video
P614	J104	Temp stow		15	Data – 1553 B, Video
P615	J102	Temp stow		15	None
P616	J101	Temp stow		15	Data – Audio

Foot Restraints:

Task	WIF	APFR Setting

Timeline Considerations:

Note:

1. Verify pin and EMI band integrity
2. Verify connector free of FOD
3. Do not wire-tie umbilicals to stovepipe

Cautions:

1. Avoid bend radii < 10 times cable diameter
2. Avoid pulling on cable during mate/demate

Warnings:

PMA2/LAB UMBILICAL STOW – TASK DATA (Cont)

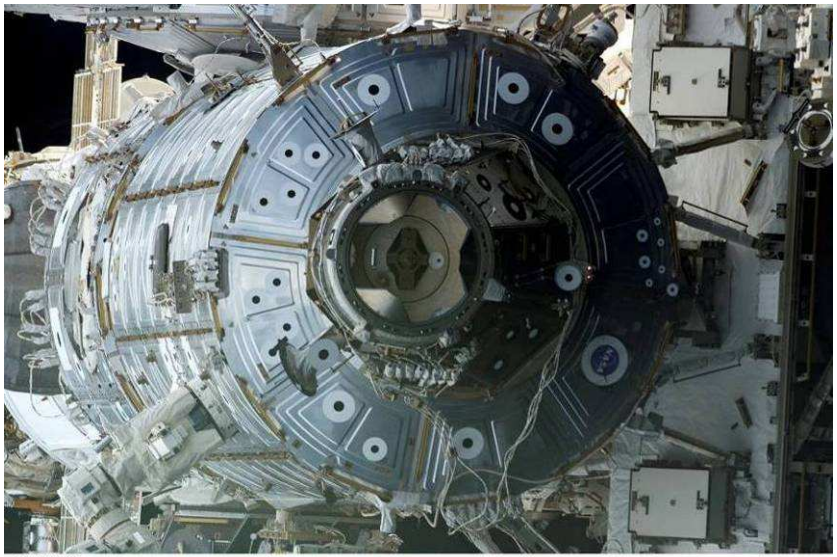


Figure 4. PMA2 umbilicals on STS-114

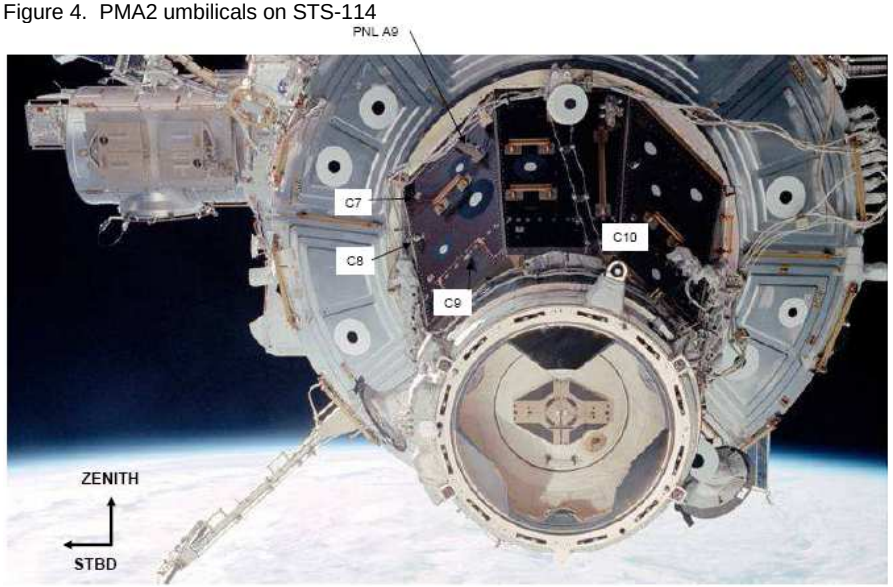


Figure 6. PMA2 umbilical routing to Lab

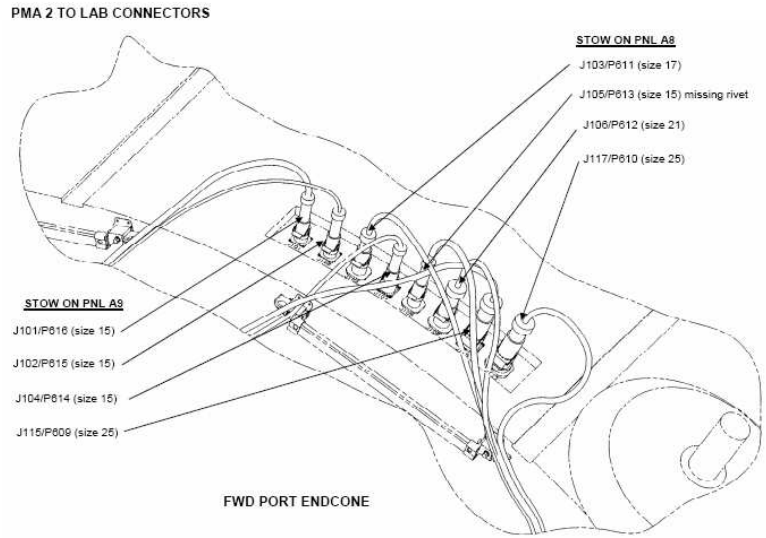


Figure 5. PMA2-to-Lab connectors on Lab panel

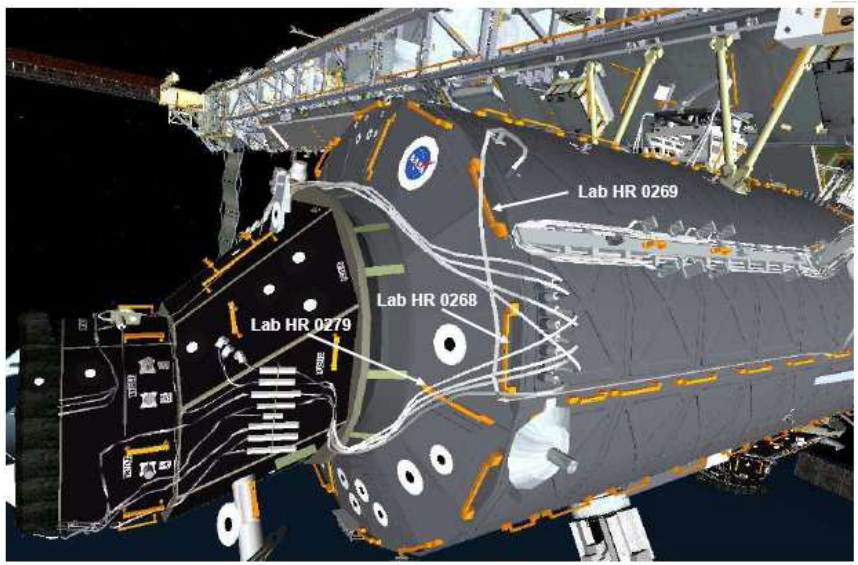


Figure 7. Handrails for PMA2 Umbilical disconnect from Lab

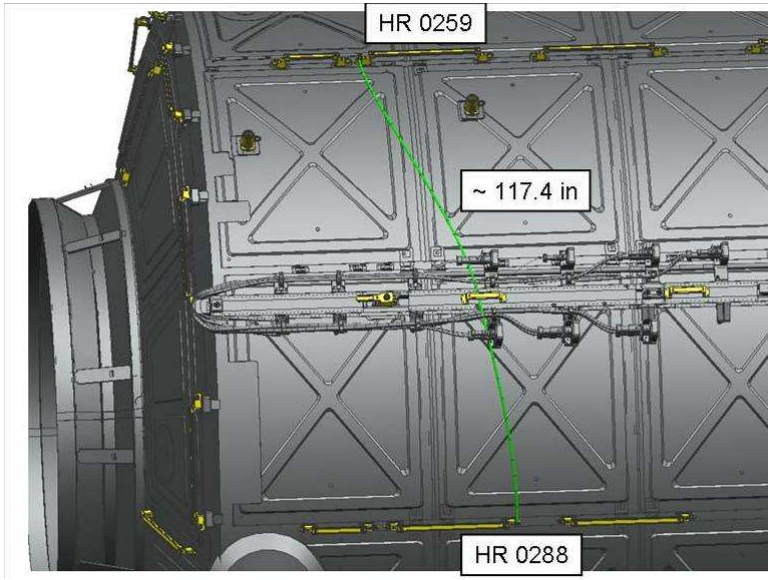


Figure 8. Port Fluid Tray Gap Spanners

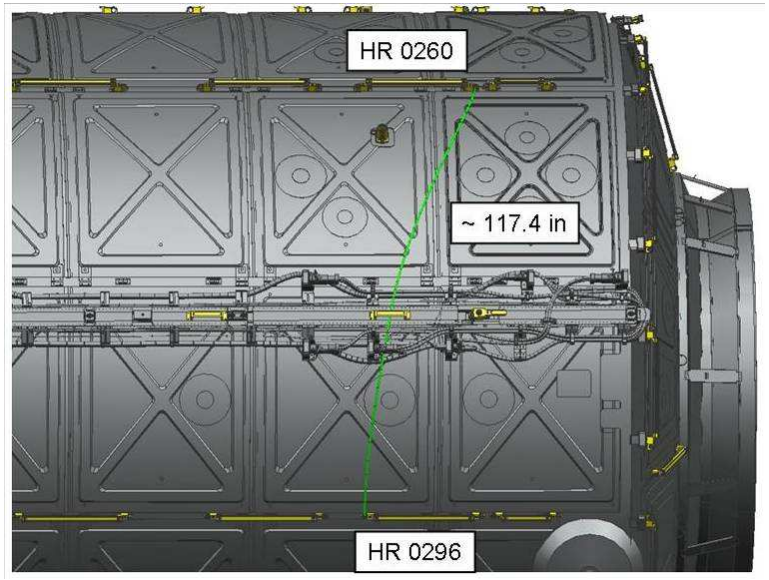


Figure 9. Stbd Fluid Tray Gap Spanners

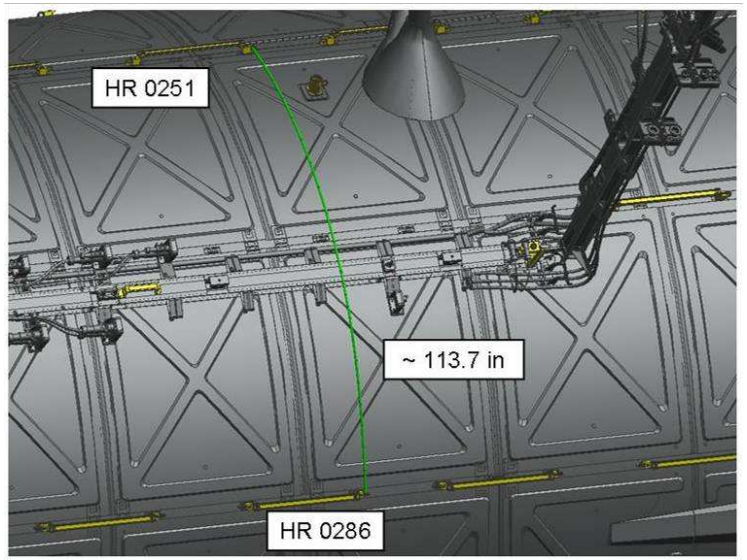


Figure 10. Port/aft Gap Spanner

LAB CETA LIGHT RETRIEVE (00:45)

<table>
<tr><th>IV</th><th>EV1 – Wt (FF)</th></tr>
<tr><td>{LAB CETA LIGHT REMOVE INHIBITS
RPCM S01A C RPC 15 – Open, Close Cmd Inh
RPCM S02B C RPC 15 – Open, Close Cmd Inh}
☐ √With MCC all inhibits in place for disconnecting Lab avionics cables
1. Give EV GO for disconnecting Lab avionics cables

☐ √With MCC all inhibits in place for CETA light remove
2. Give EV GO for Lab CETA light connector demate</td><td>INSTALL STBD FLUID TRAY GAP SPANNERS (STBD/FWD)

1. Translate to Lab CETA light

2. On IV GO, demate connectors P670, P671 in preparation for gap spanner install; temp stow
3. Translate to small trash bag with gap spanners (HR 0296)
4. Retrieve 2 – gap spanners from small trash bag
5. Install gap spanners from aft standoff of HR 0296, through avionics tray handrail to fwd standoff of HR 0260
6. Retrieve & transfer small trash bag with gap spanners to EV 2

LAB CETA LIGHT RETRIEVE

CAUTION
CETA Light paint is sensitive. Avoid unnecessary contact

7. Attach round scoop to CETA light
8. On IV GO, demate the following connectors (temp stow for later mate):
<table><tr><th colspan="4">CETA Light Stanchion Panel A2 – Demate</th></tr><tr><td>P101</td><td>←|→</td><td>J101</td><td></td></tr><tr><td>P102</td><td>←|→</td><td>J102</td><td></td></tr></table>
9. BRT to avionics tray handrail
10. Verify tethered to CETA light via round scoop or tether point
11. Release Stanchion Bolt
PGT, 7/16-6 in ext: B7, CCW2; ~18-19.5 turns
12. Remove CETA light; stow on BRT

13. Translate to Airlock
14. Ingress Airlock; temp stow CETA light/round scoop ~~inside Med ORU bag~~
15. Close Airlock hatch thermal cover
16. Verify SAFER config
☐ √L Handle down (MAN ISO Vlv – Open)
☐ √R Handle down (HCM – Closed)

17. Translate to Lab stbd avionics tray</td></tr>
</table>

LAB CETA LIGHT RETRIEVE – TASK DATA

Tools:

EV1 (FF)	EV2 (FF)
PGT	
7/16-6 in ext	
Round Scoop	

EVA Fasteners:

Fastener Name	Label	Head Size	Qty	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
CETA Light Stanchion Bolt	N/A	7/16	1	25.5 (max-34.7, due to thermal)	165.9	18-19.5	30

EVA Connectors:

Harness	From	To	Clamps	Size	Function
P101 (W9101)	CETA Light J101	Lab Tray J261	N/A	15	Sec Pwr 2B/1A
P102 (W9102)	CETA Light J252	Lab Tray J262	N/A	15	Sec Pwr 2B/1A

Foot Restraints: None

Lab CETA Light Thermal Clock: With no MLI bag, 1.25 hr from removal of heater power until transfer to airlock
With MLI bag, 1.5 hr from removal of heater power until placement in bag, and 8 hr from placement in bag until transfer to airlock

Timeline Considerations:

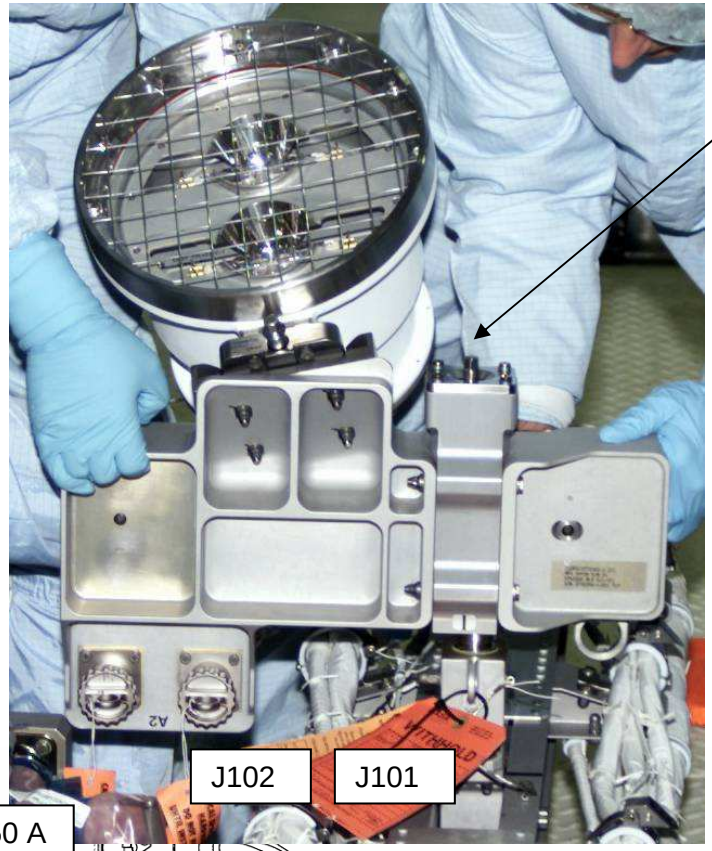
Note:

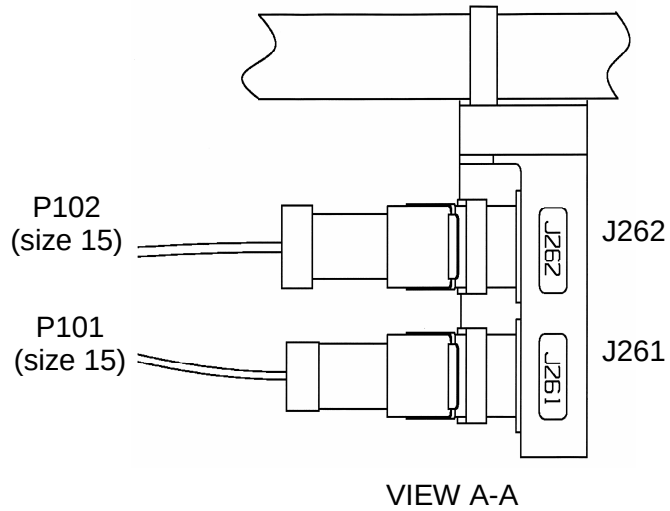
Cautions:

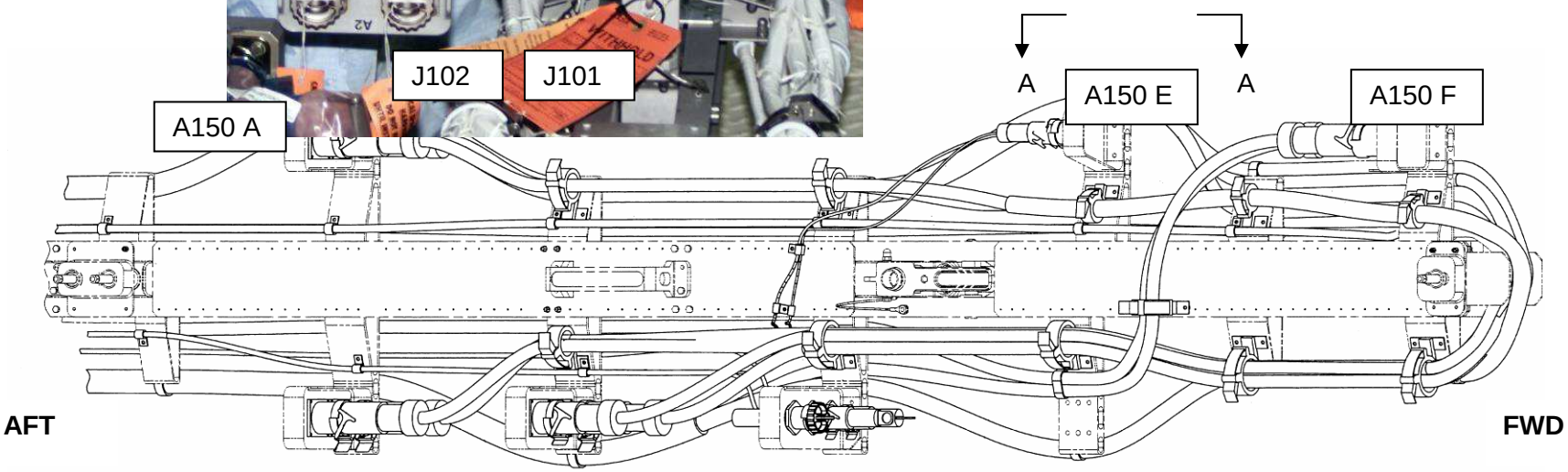
1. CETA Light paint is sensitive. Avoid unnecessary contact

Warnings:

LAB CETA LIGHT RETRIEVE – TASK DATA (Cont)







TEMP STOW N2 TRAY AVIONICS UMBILICALS (01:10)

<table>
<tr><th>IV</th><th>EV1 – Wt (FF)</th><th>EV2 – Mk (FF)</th></tr>
<tr>
<td>
<u>{LAB TRAY AVIONICS RELEASE INHIBITS</u>
MBSU 1 RBI 10 & 11 – Open, Close Cmd Inh
MBSU 2 RBI 3 & 10 – Open, Close Cmd Inh
MBSU 3 RBI 2 & 3 – Open, Close Cmd Inh
MBSU 4 RBI 2 & 10 – Open, Close Cmd Inh
RPCM S01A_D RPC 2, 4 & 5 – Op, Cl Cmd Inh
RPCM S02B_D RPC 2, 4 & 5 – Op, Cl Cmd Inh
RPCM S03A_C RPC 1 & 2 – Open, C Cmd Inh
RPCM S04B_C RPC 3 & 4 – Open, Cl Cmd Inh}

☐ √With MCC all inhibits in place for disconnecting Lab avionics cables
1. Give EV GO for disconnecting Lab avionics cables
</td>
<td>
<u>TEMP STOW STBD AVIONICS UMBILICALS</u>
1. Translate to Lab stbd avionics tray
2. Perform glove inspection

3. On IV GO, release avionics umbilicals from dummy panels on stbd tray:
☐ P670 from J251 (zenith)
☐ P671 from J252 (zenith)
4. Complete Lab CETA light umbilical mate:
<table>
<tr><th colspan="4">Lab Avionics Tray Panel A150 E – Mate</th></tr>
<tr><td>P101</td><td>→|←</td><td>J261</td><td></td></tr>
<tr><td>P102</td><td>→|←</td><td>J262</td><td></td></tr>
</table>
5. Continue release of avionics umbilicals from dummy panels on stbd tray:
☐ P672 from J256 (nadir)
☐ P673 from J255 (nadir)
☐ P674 from J257 (nadir)
6. Release TA-clamps where necessary; close after umbilical released
7. Wire tie umbilicals together
8. Wire tie zenith bundle to Lab HR 0273; nadir bundle to Lab HR 0274

9. Verify all umbilicals clear for Node 2 mating and fluid tray installation

10. Perform glove inspection
11. Cinch down stbd gap spanner (verify 180 deg rotation)
12. Translate to Node 2 PDGF
</td>
<td>
<u>TEMP STOW PORT AVIONICS UMBILICALS</u>
1. Translate to Lab port avionics tray
2. On IV GO, release avionics umbilicals from dummy panels on zenith side of port tray:
☐ P103 from J648 (zenith)
☐ P102 from J646 (zenith)
☐ P105 from J649 (zenith)
☐ P104 from J647 (zenith)
☐ P101 from J654 (zenith)
3. Wire tie umbilicals together
4. Wire tie bundle to Lab HR 0288, 0287
5. Release avionics umbilicals from dummy panels on nadir side of port tray:
☐ P662 from J652 (nadir)
☐ P663 from J653 (nadir)
☐ P660 from J650 (nadir)
☐ P661 from J651 (nadir)
☐ P665 from J656 (nadir)
☐ P664 from J655 (nadir)
6. Wire tie umbilicals together
7. Wire tie bundles to Lab HR 0288, 0287, and 0286
8. Verify all umbilicals clear for Node 2 mating and fluid tray installation
9. Cinch down fwd/port gap spanner (verify 180 deg rotation)
10. Retrieve final 2 – gap spanners from small trash bag
11. Stow small trash bag in crewlock bag
~~12. Retrieve MMOD T-tool from crewlock bag; stow in own trash bag~~
13. Retrieve crewlock bag; stow on BRT

<u>INSTALL GAP SPANNERS (INC 16 OFF-RAMP)</u>
14. Translate to current Hwy 110, install gap spanners onto aft standoff of HR 0286 to aft standoff of HR 0251; cinch down (verify 180 deg rotation)

15. Perform glove inspection
16. Translate to S0 RPCM via port Lab strut, then Face 1
</td>
</tr>
</table>

US EVA 10 (ALPHA)

TEMP STOW N2 TRAY AVIONICS UMBILICALS – TASK DATA SHEET

Tools:

EV1 (FF)	EV2 (FF)
Wire Ties	Wire Ties

EVA Fasteners: None

EVA Connectors:

Harness	From	To	Clamps	Size	Function
P670	J251	Temp Stow		25	Power to DDCU N2P2A
P671	J252	Temp Stow		25	Power to DDCU N202B
P672	J256	Temp Stow		25	Power to DDCU N2P3A
P673	J255	Temp Stow		25	Power to DDCU N203A
P674	J257	Temp Stow		25	Power to S0-1 MDM SDO card 6A Power to S0-2 MDM SDO card 8A Power to S0-2 MDM SDO card 8B
P101	J648	Temp Stow		15	Data Node 2 PDGF video 1
P102	J646	Temp Stow		25	Node 2 PDGF power 1
P103	J649	Temp Stow		15	Data Node 2 PDGF video 3
P104	J647	Temp Stow		25	Node 2 PDGF power 2
P105	J654	Temp Stow		15	Data Node 2 PDGF video 2
P662	J652	Temp Stow		25	Power to DDCU N2S4A
P663	J653	Temp Stow		25	Power to DDCU N2D4B
P660	J650	Temp Stow		25	Power to DDCU N2S1B
P661	J651	Temp Stow		25	Power to DDCU N2D1B
P665	J656	Temp Stow		13	Data Node 2 Port VSCA video
P664	J655	Temp Stow		25	Power to S0-2 MDM SDO card 6A Power to S0-1 MDM SDO card 8A Power to S0-1 MDM SDO card 8B

Foot Restraints:

Timeline Considerations:

Note:

Cautions:

Warnings:

TEMP STOW N2 AVIONICS UMBILICALS – TASK DATA SHEET (Cont)

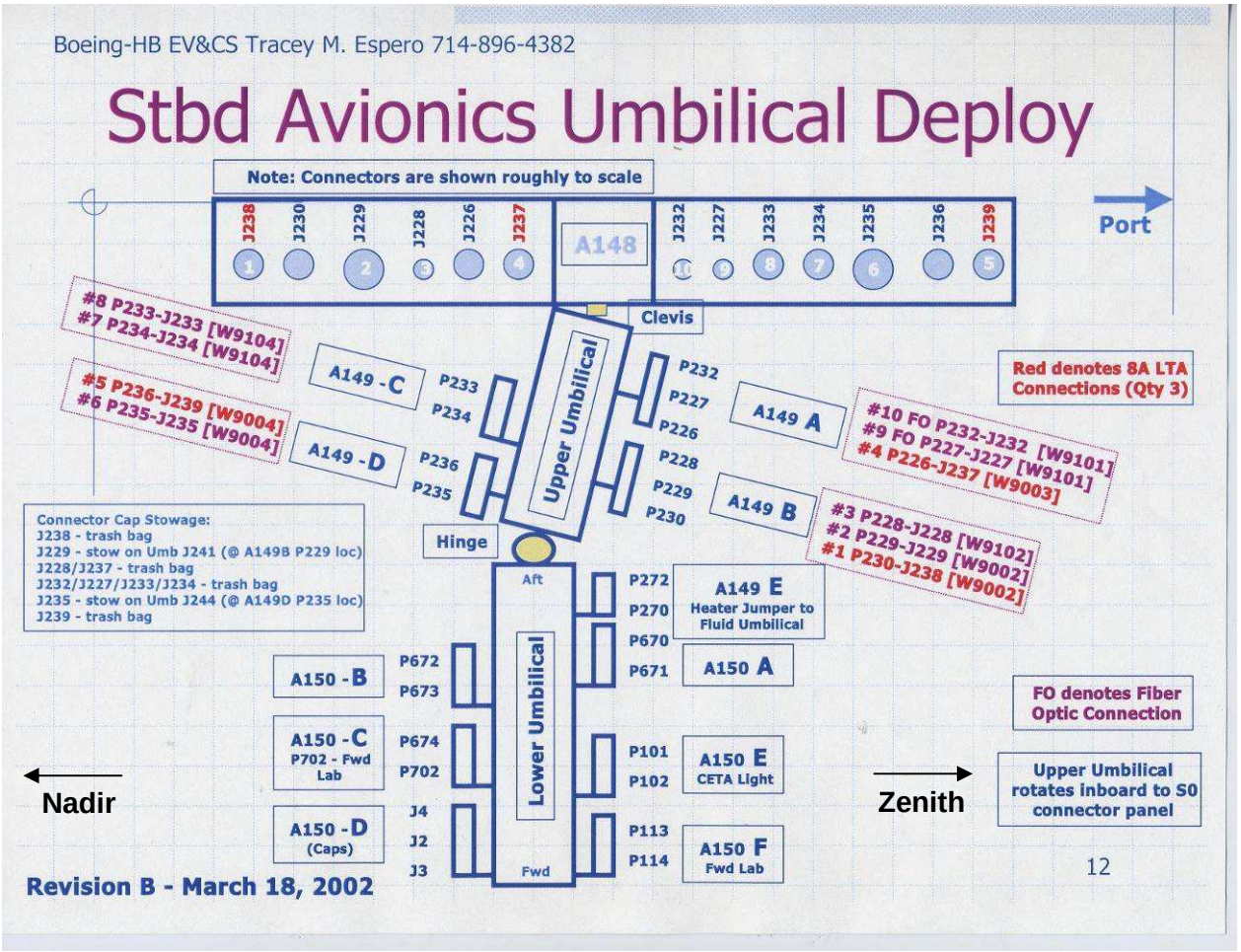


Figure 12. Stbd Avionics Umbilical Connectors

TEMP STOW N2 AVIONICS UMBILICALS – TASK DATA SHEET (Cont)

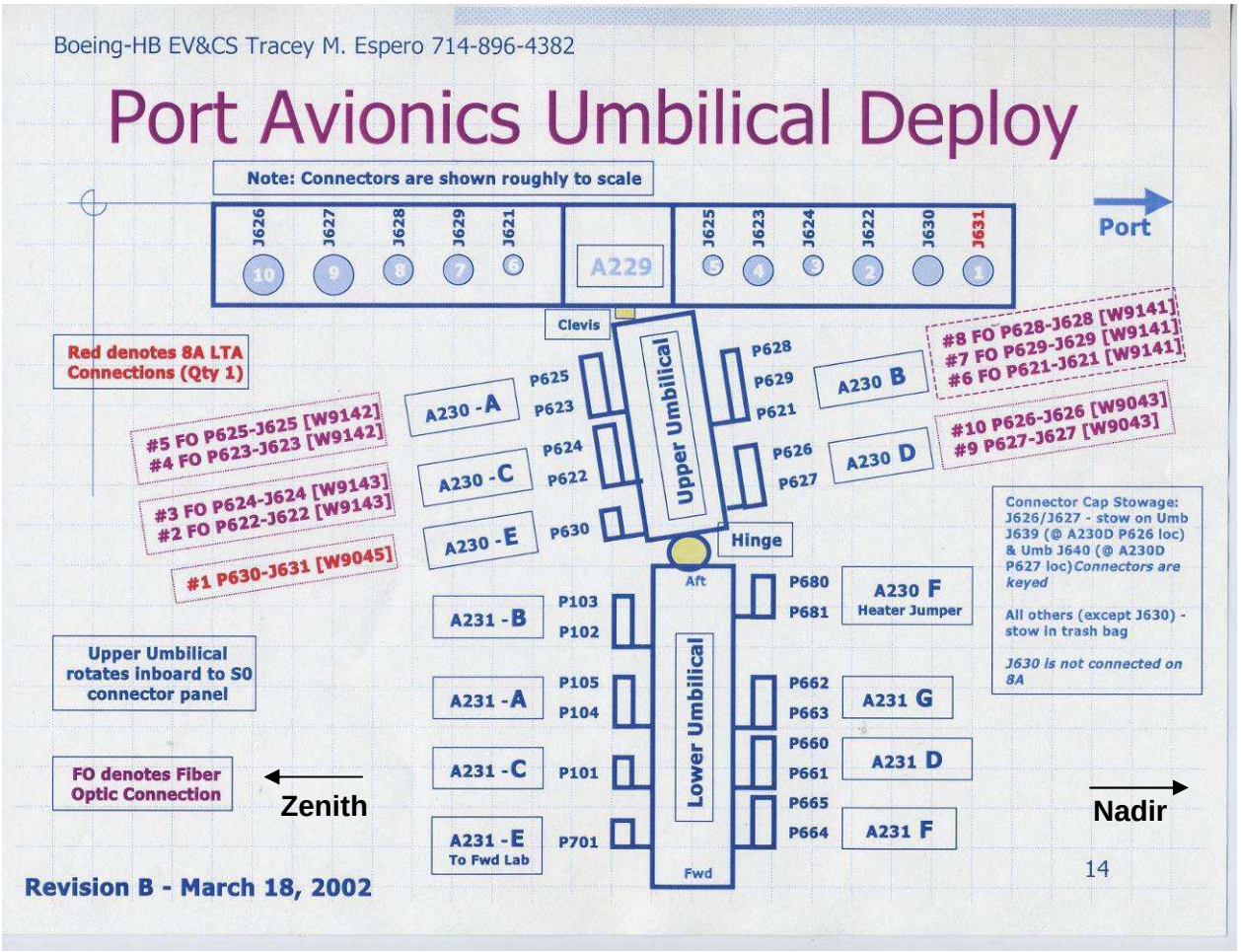


Figure 13. Port Avionics Umbilical Connectors

TEMP STOW N2 AVIONICS UMBILICALS – TASK DATA SHEET (Cont)

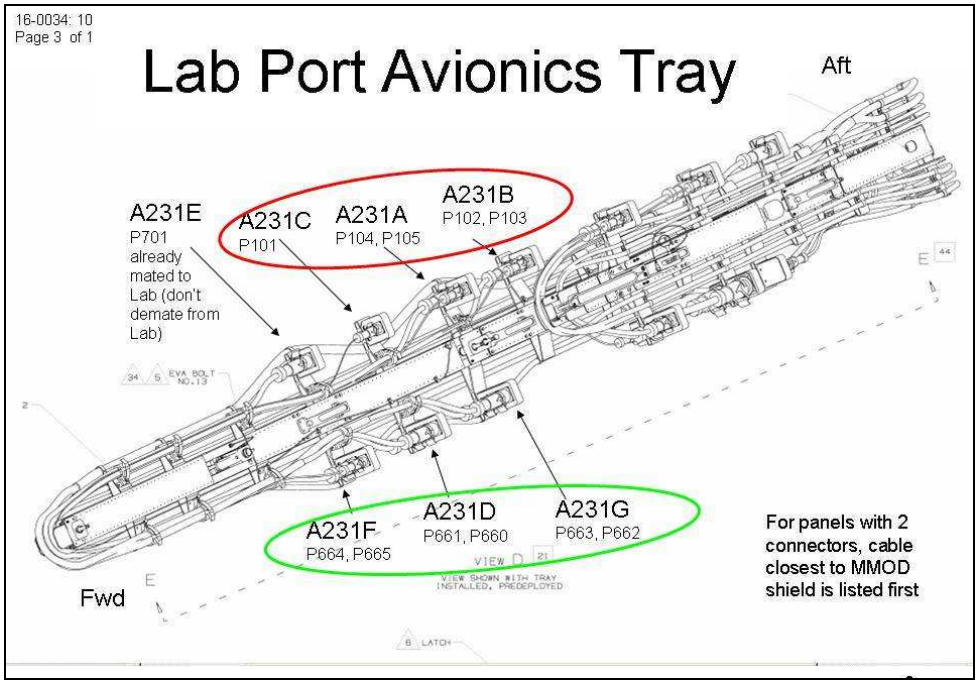


Figure 14. Port Avionics Tray

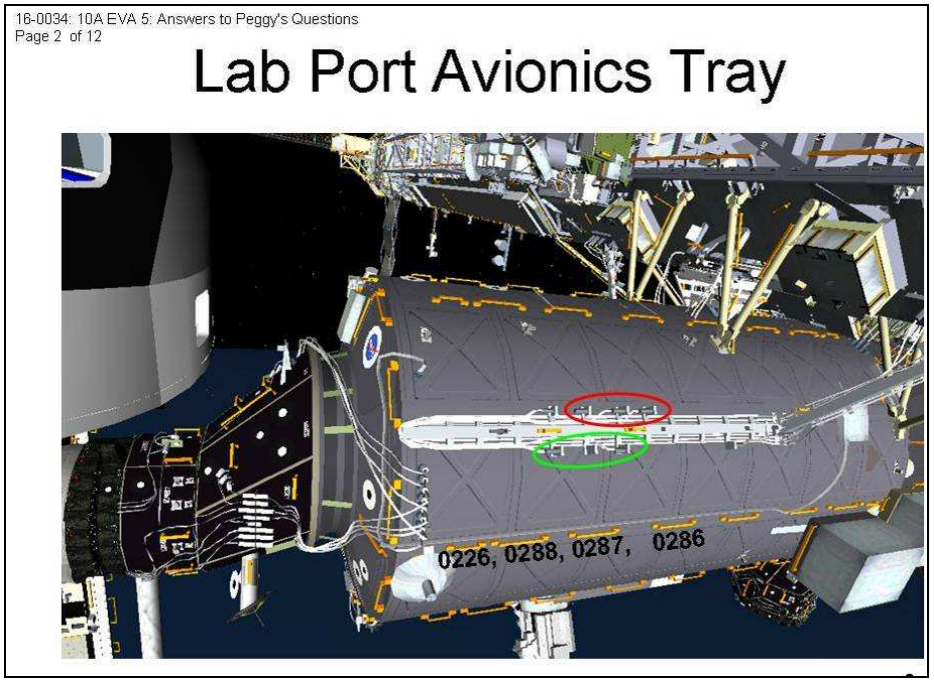
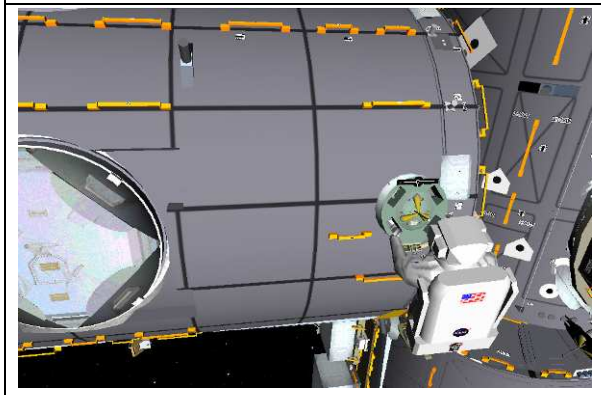


Figure 15. Handrails for Port Avionics Tray

NODE 2 PDGF HORSESHOE CONNECTORS (00:30)

IV



☐ Note: No inhibits required for Horseshoe connectors

1. Give EV1 GO for horseshoe connector demate

HORSESHOE CONNECTOR		
Connector	Turns	Torque
P6/P8 (inboard)		
P7/P5 (outboard)		

EV1 – Wt (FF)

HORSESHOE CONNECTOR MATES

1. Translate to Node 2 PDGF via Z1 fwd face (NOTE: EV2's safety tether also routed along this path)
   - ☐ Release fairlead at CETA rail
   - ☐ Fairlead self at Z1 HR 6025 only

> WARNING
> Avoid touching curvic coupling due to potential sharp edges

> CAUTION
> Avoid touching grapple pin and target

2. Release horseshoe connector receptacle MLI cover
3. Release **horseshoe connector receptacle engagement bolt (two)**
   PGT, 7/16-6 in ext: A6, CCW2; 19 turns (~~to hardstop~~ free spinning)

☐ √Yellow band visible on both receptacles

4. Translate to horseshoe connector launch bracket
5. Release TA clamps as reqd (expecting 3)
6. Open MLI cover
7. On IV GO, rotate sq microfixtures (two) 60 deg ccw
8. Remove horseshoe connectors (P6/P8 first due to cable interference)

9. Install horseshoe connector onto PDGF
10. P6/P8 → J6/J8 (inboard)
11. Rotate square microfixture – LOCK, 60 deg cw
12. P7/P5 → J7/J5 (outboard)
13. Rotate square microfixture – LOCK, 60 deg cw
14. Drive **horseshoe connector receptacle engagement bolt (two)**
    PGT, 7/16-6 in ext: A6, CW2; 15-19 turns (to hardstop)

15. Route cable through prepositioned wire-tie on HR 0335
16. Reinstall MLI cover, feeding horseshoe connector cables through opening created by flap in cover
17. Reinstall MLI cover over launch bracket
18. Install cable into empty TA clamps as reqd for appropriate cable length

19. Close any remaining open TA clamps
20. Translate to Node 2 fwd endcone (ACBM thermal cover)

PDGF INSTALL ON NODE 2 – TASK DATA

EVA Tools:

EV1 (FF)	EV2 (FF)
PGT	MMOD T-tool
7/16-6 in ext	PGT
	7/16-6 in ext

EVA Fasteners:

Fastener	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
PDGF EDF	7/16”	4	9.2 – initial 25.5 – final	25	100	Release: 5 turns at bolt Install: 4-6 total turns at bolt	10
PDGF Horseshoe Connector	7/16”	2		7.0-11.25	14.5	15-17 until yellow line visible 20 to hard stop	30

EVA Connectors:

Task	From	To	Clamps (Qty)	Conn Size	Function
P8/P6	Node 2	PDGF	2	---	Data/Power
P5/P7	Node 2	PDGF	2	----	Power/Data

Foot Restraints:

Task	WIF	APFR Setting
PDGF Install	Node2-08	2,QQ,C,12
PDGF Install – Backup	Node2-06	10, RR, H, 12

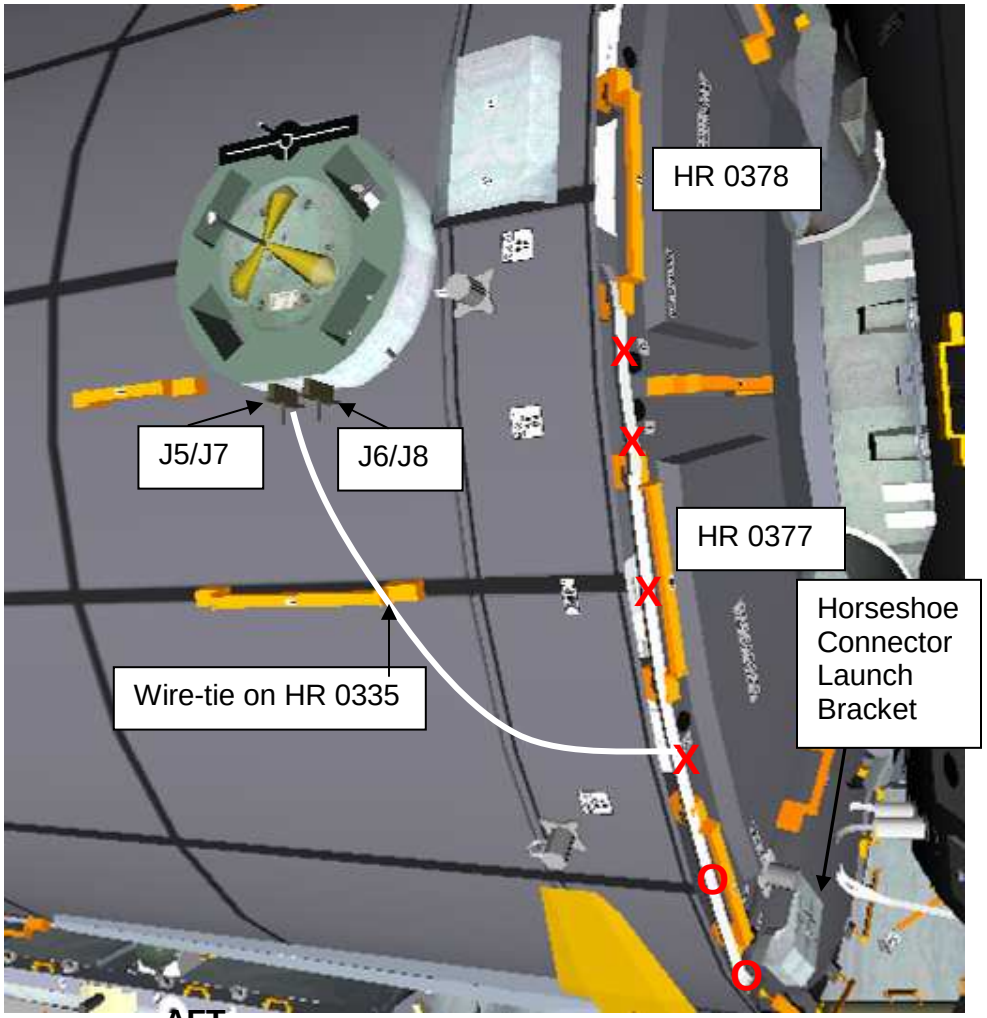
Cautions:

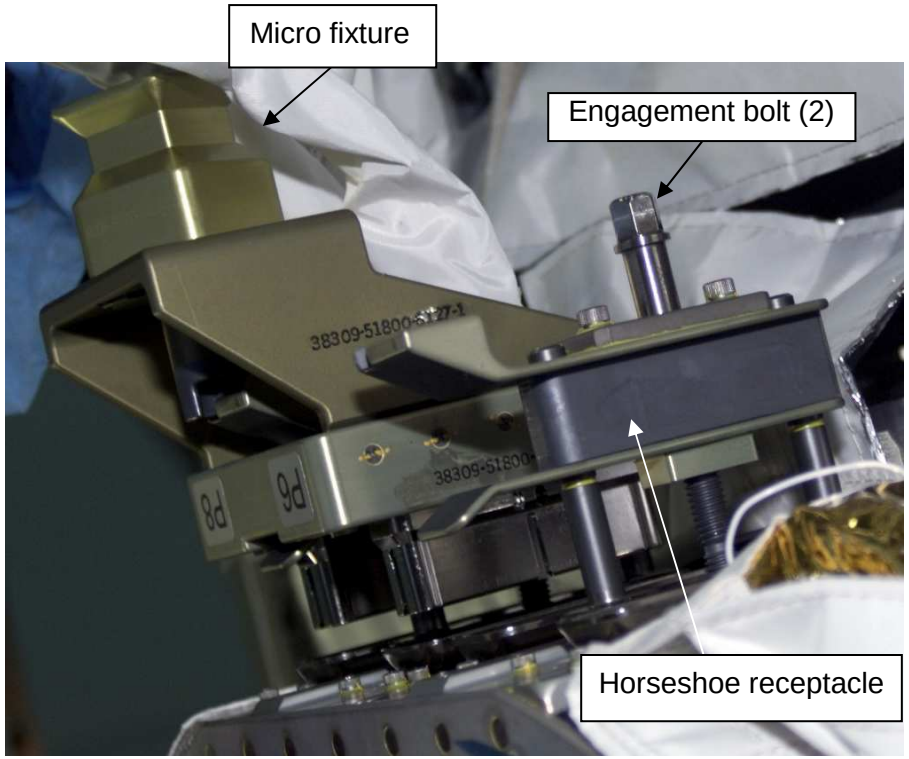
- Avoid touching grapple pin, connector area, underside of PDGF, target

Warning:

- Avoid touching curvic coupling due to potential sharp edges

PDGF INSTALL ON NODE 2 – TASK DATA (Cont)





O – Cable Removed from TA Clamp

X – Cable Installed in TA Clamp

Figure 17. Node 2 PDGF Horseshoe Connectors Installed

AFT

PORT

PDGF OVERVIEW

US EVA 10 (ALPHA)

RPCM S04B-C R&R (00:30)

IV	EV2 – Mk (FF)
{RPCM S04B-C R&R INHIBITS DDCU S14B Converter – OFF} ☐ √MCC-H all inhibits are in place for RPCM R&R 1. Give EV2 GO for RPCM R&R RPCM Install data Bolt | Turns | Torque Drive Screw | | 2. Notify MCC-H new RPCM installed (GO for RPCM power up and Checkout) 8. Retrieve Node 2 handrail from temp stow 9. Egress Airlock, close hatch thermal cover 10. Verify SAFER config:	1. Translate to RPCM S04B-C (CETA marker 8100, S0 Bay 2) 2. Perform glove inspection WARNING Edges of RPCM housing may be sharp, use caution while handling 3. Verify correct RPCM: Map on truss “S0 4B-C”, RPCM Label S/N “9000” (3rd from outboard) 4. Tether to failed RPCM with ORU bag RET (gate pointed away from RPCM) 5. On IV GO, release **RPCM Drive Screw** PGT, 7/16-6 in ext: A7, CCW2; ~8 turns, push while turning ☐ √Status indicator – UNLOCK 6. Remove failed RPCM, temp stow 7. Inspect guide rail for debris/damage 8. Remove new RPCM from ORU bag 9. Inspect RPCM connector interface for debris/damage 10. Install RPCM on guide rail and slide into softdock, √gate away from RPCM (s/n 9938177) ☐ √Status indicator – not below UNLOCK 11. Install **RPCM Drive Screw** PGT, 7/16-6 in ext: A2, CW2; 6-7 turns to HS, push while turning ☐ √Status Indicator – LOCK 12. Stow failed RPCM in sm ORU bag; stow sm ORU bag on BRT 13. √MT translation path outboard is clear of EVA hardware WARNING 2’ Keep Out Zone for floating cables between MT and MBS. Stay on UMA handrails during translation underneath MT 14. Translate to airlock; stow crewlock bag on HR 0547 15. Retrieve MMOD T-tool from crewlock bag; stow in trash bag 16. On MCC Go: Ingress airlock; retrieve Node 2 handrail 17. Egress airlock, close hatch thermal cover 18. Verify SAFER config: ☐ √L Handle down (MAN ISO Vlv – Open) ☐ √R Handle down (HCM – Closed) 19. Translate to Node 2 endcone

US EVA 10 (ALPHA)

RPCM S04B-C R&R – TASK DATA

Tools:

EV1 (FF)	EV2 (FF)
	PGT
	7/16-6 in ext

EVA Fasteners:

Fastener Name	Head Size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns
RPCM Drive Screw	7/16	1	5.5 grnd 3.8 orbit	4.5	18.6 remv 8.5 install	8 rmv 6-7 install

EVA Connectors: None

Foot Restraints: None

ORU Identification:

	Serial Number
Spare RPCM	9938177
Failed RPCM	9000

RPCM Tether Orientation

Note:

1. Installation of tether on RPCM tether point must be oriented such that the hook gate is facing the body of the RPCM. Otherwise interference between the SPDA frame and the RPCM will not allow hook removal

Caution:

1. Failure to use wobble socket, or socket with equivalent outer diameter, to release lock springs can result in damage to the RPCM Drive Screw Assembly
2. Do not operate drive screw with scoop attached to microconical. The wobble socket feature will not extend thru the round scoop
3. Failure to align and fully seat socket until lock springs have released can result in damage to RPCM Drive Screw Assembly
4. Combined linear an rotational motion on the socket while inserting, can result in damage to RPCM Drive Screw Assembly

Warning:

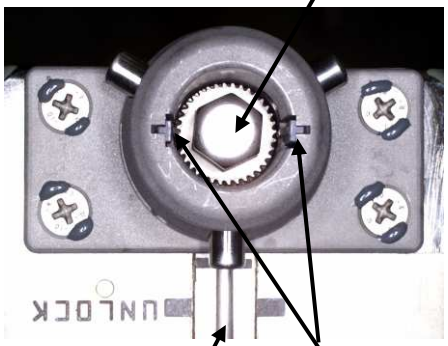
1. RPCM may have sharp edges, use caution while handling

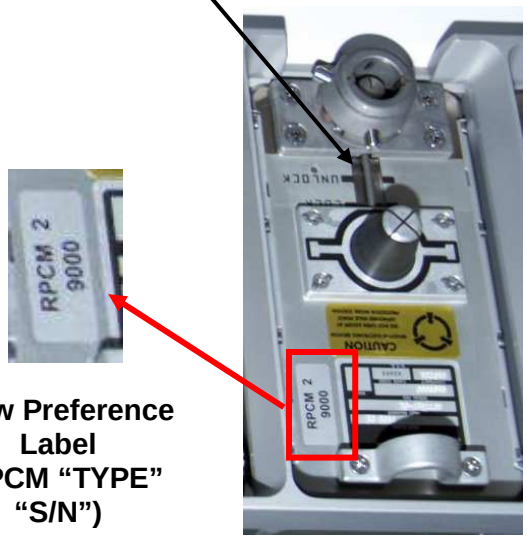
Thermal Clocks:

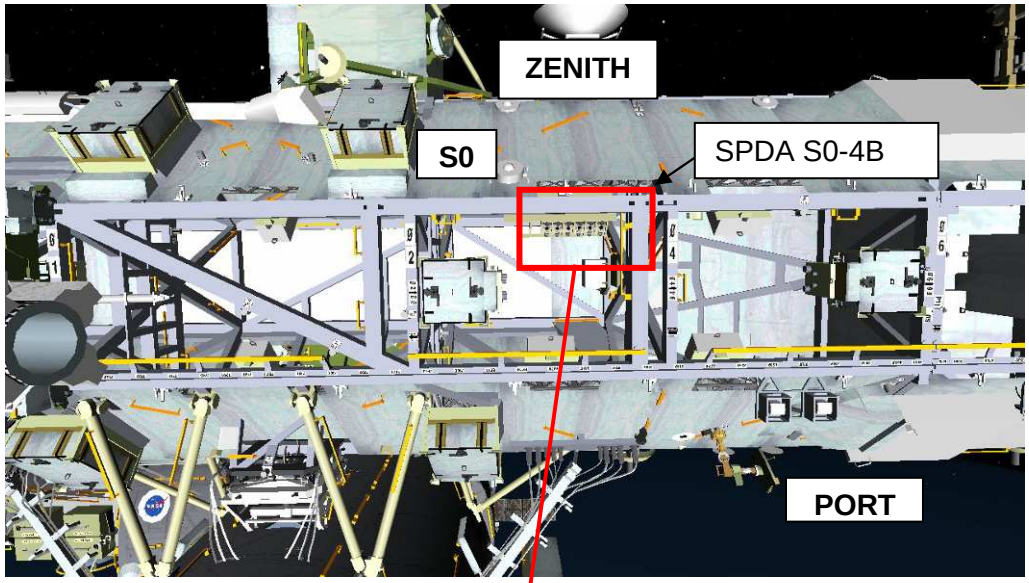
New RPCM in MLI bag – 6-hr transfer clock from removal from airlock to removal from bag
2-hr activation clock from removal from bag to physically installed

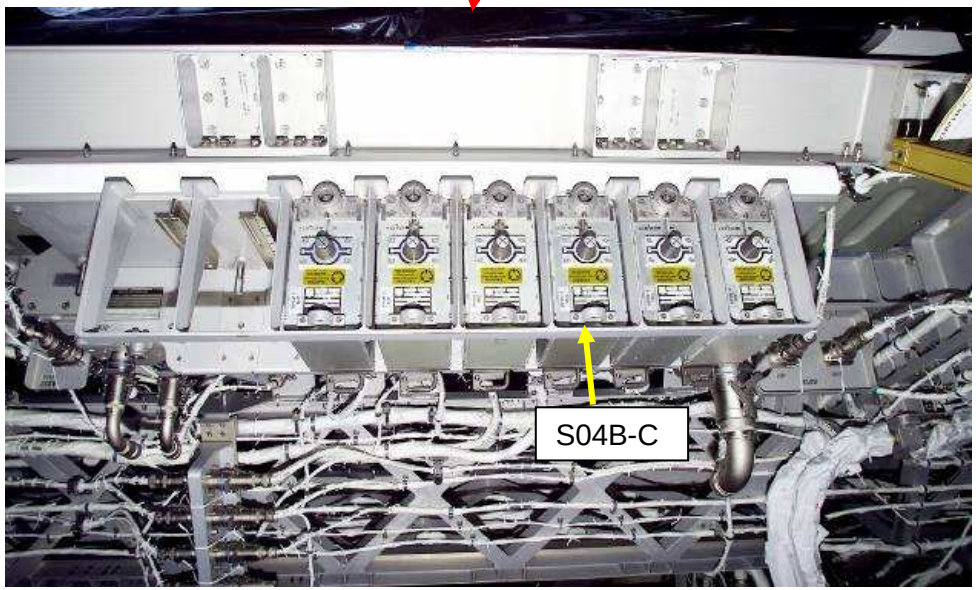
Old RPCM in MLI bag – 1.5-hr removal clock from physically removed to placement in MLI bag
8-hr transfer clock from placement in bag to placement in airlock

RPCM S04B-C R&R – TASK DATA (Cont)









US EVA 10 (ALPHA)

REMOVE ACBM COVER, CBM SURVEY (00:50)

IV	EV1 – Wt (FF)	EV2 – Mk (FF)
IV: Ref. Pg 41 for Node 2 Handrail install	REMOVE NODE 2 ACBM THERMAL COVER 1. Translate to shower cap on ISS port end along zenith gap spanner 2. Perform glove inspection 3. Doff over glove; temp stow on self 4. With EV2, fold shower cap in half 5. With EV2, fold shower cap in half twice more; attaching wire ties as necessary 6. Tether to shower cap 7. Secure shower cap into final bundle; temp stow 8. Visually inspect the Node 2 CBM to ensure that it is clear for PMA2 berthing 9. Perform glove inspection 10. If feasible, donn over gloves 11. Translate to airlock w/ shower cap 12. Stow shower cap inside airlock 13. Close airlock hatch thermal cover 14. Verify SAFER config ☐ √L Handle down (MAN ISO Vlv – Open) ☐ √R Handle down (HCM – Closed) 15. Translate to Node 1 fwd stbd/zenith endcone	REMOVE NODE 2 ACBM THERMAL COVER 1. Translate to Node 2 endcone/shower cap via zenith crewlock, zenith/aft Node 1 and primary nadir/aft Node 2 handrail path NOTE Watch for CETA light on Node 1 port while translating 2. Perform glove inspection 3. Doff over glove; temp stow on self 4. Release thermal cover Velcro strap in order to loosen from ACBM stove pipe 5. Assist EV1; attaching wire ties as necessary 6. Release thermal cover Dzus fasteners (at 3:00) using MMOD T-tool 7. Secure shower cap into final bundle 8. Visually inspect the Node 2 CBM to ensure that it is clear for PMA2 berthing 9. Perform glove inspection 10. Donn over gloves 11. Assist EV1 with shower cap stow in airlock as required (if assisting, will need to unwind safety tether on way back) 12. Translate to PMA1/FGB zenith face via aft/zenith Node 1

REMOVE ACBM COVER, CBM SURVEY – TASK DATA

Tools:

EV1 (FF)	EV2 (FF)
Wire Ties	Wire Ties
	MMOD T-tool

EVA Fasteners: None

EVA Connectors: None

Connector Inhibits: None

Foot Restraints: None

<u>Timeline Considerations</u>:

<u>Note:</u>

<u>Cautions:</u>

<u>Warnings:</u>

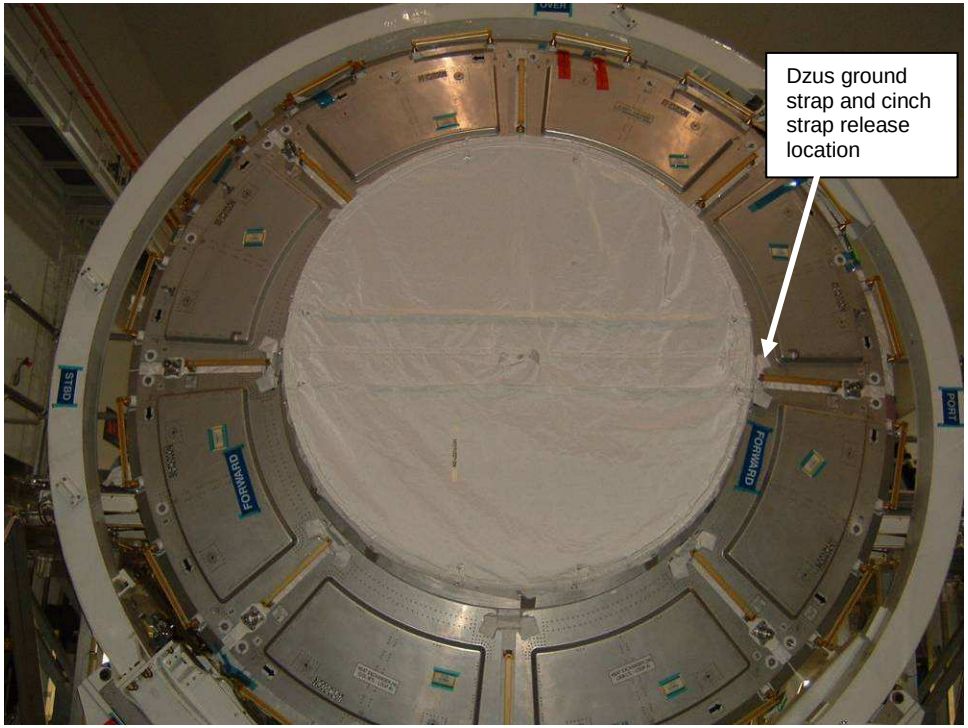


Figure 16. Node 2 ACBM Thermal Cover (Shower Cap)

S0/N1 POWER CABLE/H-JUMPER HARNESS REMOVAL (00:50)

IV	EV1 – Wt (FF)	EV2 – Mk (FF)
{S0/N1 POWER CABLE/H-JUMPER REMOVE INHIBITS RPCM Z14B A RPC 03 – Open, Close Cmd Inh RPCM Z14B A RPC 01 – Open, Close Cmd Inh MBSU 2 RBI 5 – Open, Close Cmd Inh MBSU 3 RBI 5 – Open, Close Cmd Inh MBSU 4 RBI 5 – Open, Close Cmd Inh}	MATE S0/N1 SM POWER CABLE/H-JUMPER REMOVE 1. Translate to Node 1 fwd stbd/zenith endcode 2. Perform glove inspection 3. If not already performed, doff over gloves	PORT H-JUMBER REMOVAL (CHANNEL 1/4) 1. Translate to PMA1/FGB zenith face via aft Node 1 2. Perform glove inspection 3. BRT to PMA HR 0004
	NOTE √Connectors for straight pins, no FOD, EMI band intact, and good bend radius	
	4. Demate: ☐ Z1 P150 (W36C) from Node 1 J650 ☐ S0 P651 (W4014) from Node 1 J651 5. Demate: ☐ S0 P650 (W4012) from J871 on S0 swing arm 6. Inspect and mate: ☐ S0 P651 (W4014) onto J872 on S0 swing arm 7. Un-wire tie S0/N1 SM Power Cable (W4020) from HR 1003L (S0 Tray H1) on S0 tray 8. Route SM cable and S0 P650 to Node 1 J651/J650 9. Remove cap from S0/N1 SM Power Cable P651A; stow in trash bag 10. Inspect and mate: ☐ S0 P650 (W4012) onto Node 1 J650 ☐ SM Power Cable P651A to Node 1 J651 11. Cleanup cable as necessary	4. Slide back thermal booties to expose connectors from: ☐ H-Jumper: P16A, P17A ☐ FGB P16 ☐ FGB P17 5. Attach RET to H-jumper 6. Demate connector: ☐ Jumper J17A from FGB P17 ☐ Jumper J16A from FGB P16 ☐ Jumper P17A from PMA1 J17 ☐ Jumper P16A from PMA1 J16 7. Remove H-Jumper; stow on self via attached wire tie 8. Inspect and mate: ☐ FGB P17 to PMA1 J17 ☐ FGB P16 to PMA1 J16
1. Once EV1 step 9 complete, notify MCC-H: SM Power cable install complete (GO to close MBSU 4 RBI 5)	12. Translate to Z1 stbd/nadir face (aft corner, nadir of WIF 02) 13. Inspect and mate: ☐ Z1 P150 (W36C) onto Z1 J650 (inboard) 14. Install in TA clamps as reqd (3 or 4) 15. Clean up cable slack as required 16. Perform WVS photo closeout of connectors 17. Perform glove inspection 18. Donn over gloves 19. Translate to Airlock	9. Perform WVS photo closeout of connectors 10. Re-install thermal booties 11. Perform glove inspection 12. Translate to temp stowed crewlock bag on Airlock via zenith/aft Node 1 path 13. Temp stow H-jumper on crewlock bag using exposed equipment hook 14. Translate to Airlock

S0/N1 POWER CABLE/H-JUMPER HARNESS REMOVAL – TASK DATA

Tools:

EV1 (FF)	EV2 (FF)

EVA Fasteners: N/A

EVA Connectors:

Harness	From	To	Size	Function	Inhibit
Z1 P150 (W36C?)	N1 J650	Z1 J650	25	Secondary Power to CHT 22	RPCM Z14B A 03 – Open, Close Cmd Inh
S0 P651 (W4014)	N1 J651	S0 swing arm J872	25	MBSU 2 Power to CHT 23 and 24	MBSU 3 RBI 5 – Open, Close Cmd Inh
S0 P650 (W40XX)	S0 swing arm J87??	N1 J650	25	Primary Power to CHTs 21 and 22	MBSU 2 RBI 5 – Open, Close Cmd Inh
S0/N1 Jumper P651A	Temp Stow	N1 J651	25	MBSU 4 Power to CHT 23 and 24	MBSU 4 RBI 5 – Open, Close Cmd Inh
H-Jumper J17A	FGB P17		25	Secondary Power to ARCUs 53 and 54	RPCM Z14B A 01 – Open, Close Cmd Inh
H-Jumper J16A	FGB P16		25	Secondary Power to CHT 21 Secondary Power to CHT 22	RPCM Z14B A 01 – Open, Close Cmd Inh RPCM Z14B A 03 – Open, Close Cmd Inh
H-Jumper P17A	PMA1 J17		25	Secondary Power to ARCUs 53 and 54, CHT 21	RPCM Z14B A 01 – Open, Close Cmd Inh
H-Jumper P16A	PMA1 J16		25	Secondary Power to CHT 22	RPCM Z14B A 03 – Open, Close Cmd Inh
FGB P17		PMA1 J17	25	Secondary Power to ARCUs 53 and 54	RPCM Z14B A 01 – Open, Close Cmd Inh
FGB P16		PMA1 J16	25	Primary Power to CHTs 21 and 22	MBSU 2 RBI 5 – Open, Close Cmd Inh

Foot Restraints: None

Timeline Considerations:

1. EV1 step 2 first box (demate Z1P150 from Node 1 J650), step 4 (demate S0 P650 from swing arm), step 8 first box (mate S0 P650 to Node 1 J650), and steps 10-14 (mate of Z1 P150 to Z1 J650) are part of the H-jumper removal task. The remainder of EV1 steps are the SM power cable install. These tasks are intermingled for time lining efficiency

Note:

2. Verify pin and EMI band integrity
3. Verify connector free of FOD

Cautions:

Warnings:

S0/N1 POWER CABLE/H-JUMPER HARNESS REMOVAL – TASK DATA (Cont)

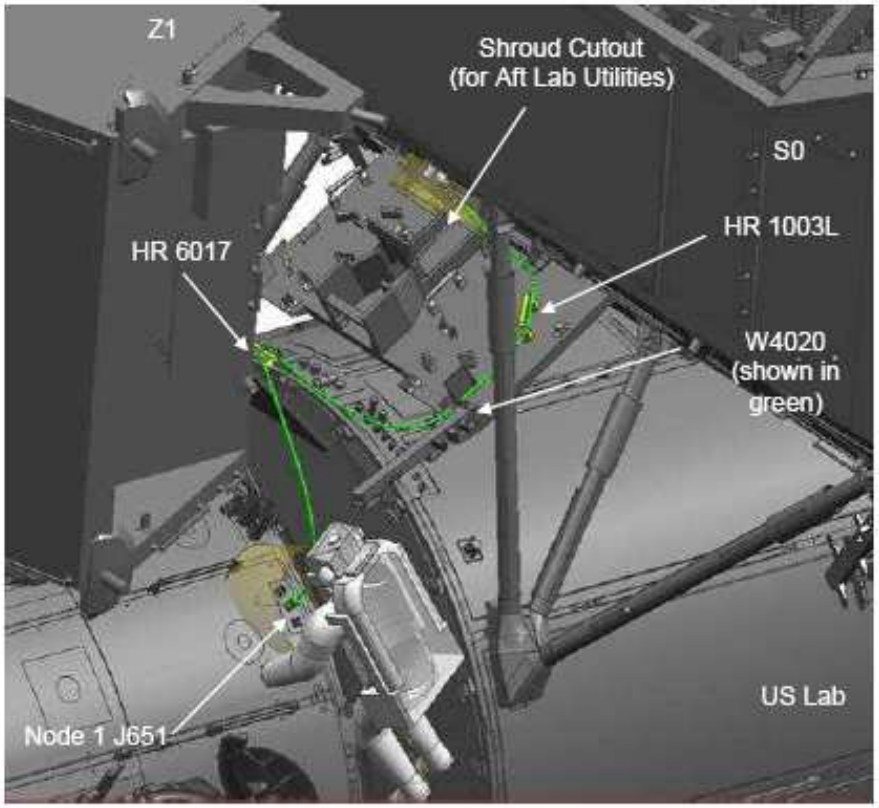


Figure 18. Installing Node 1 end of S0/N1 SM Power Cable into Node 1 J651

Figure 19: S0/N1 SM Power Cable

Figure 20. Node 1 J651

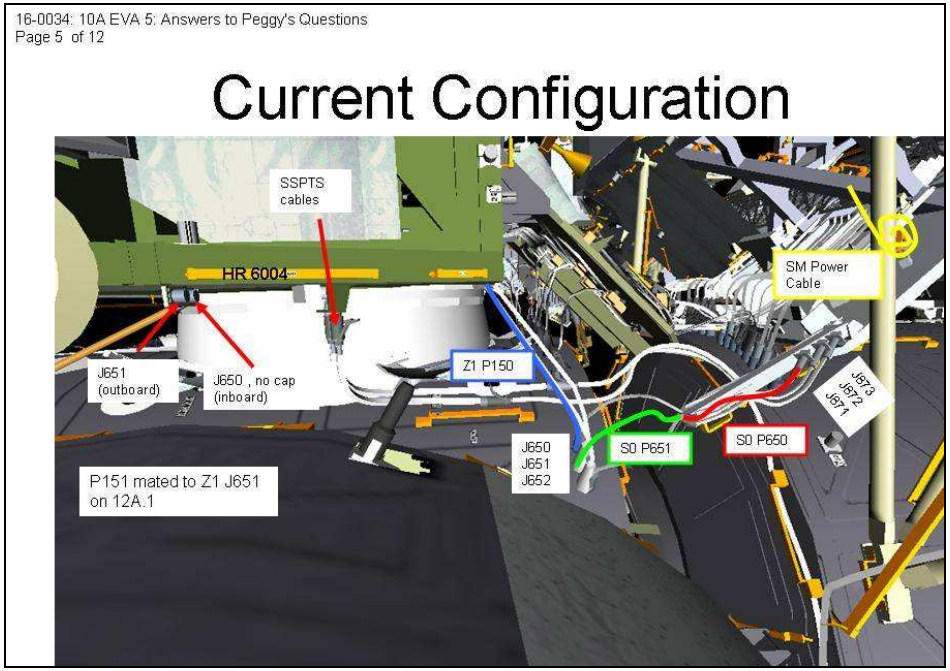


Figure 21. Current configuration of S0/N1 SM Power Cable

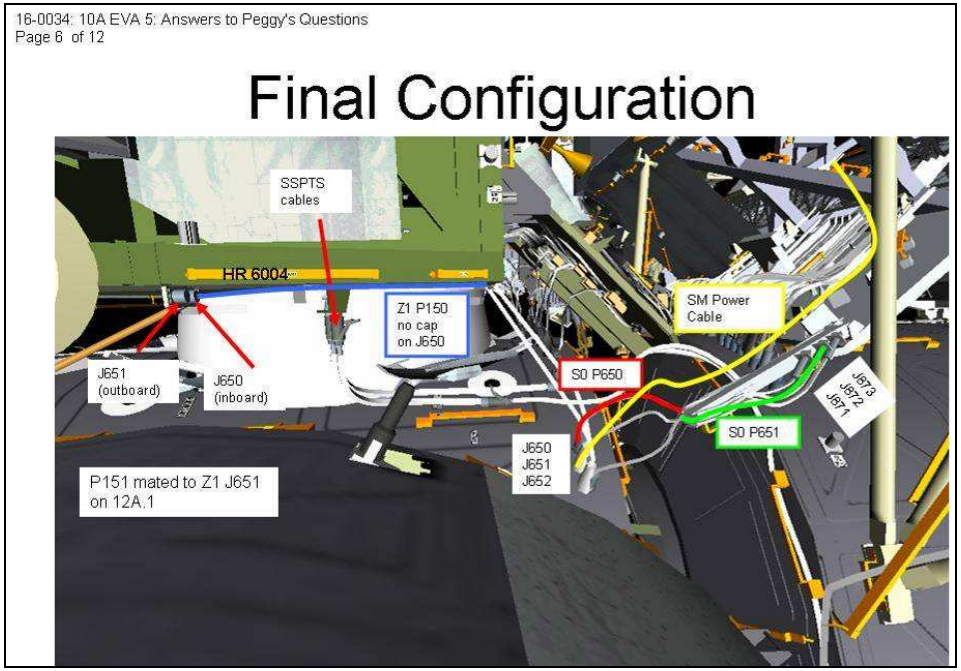
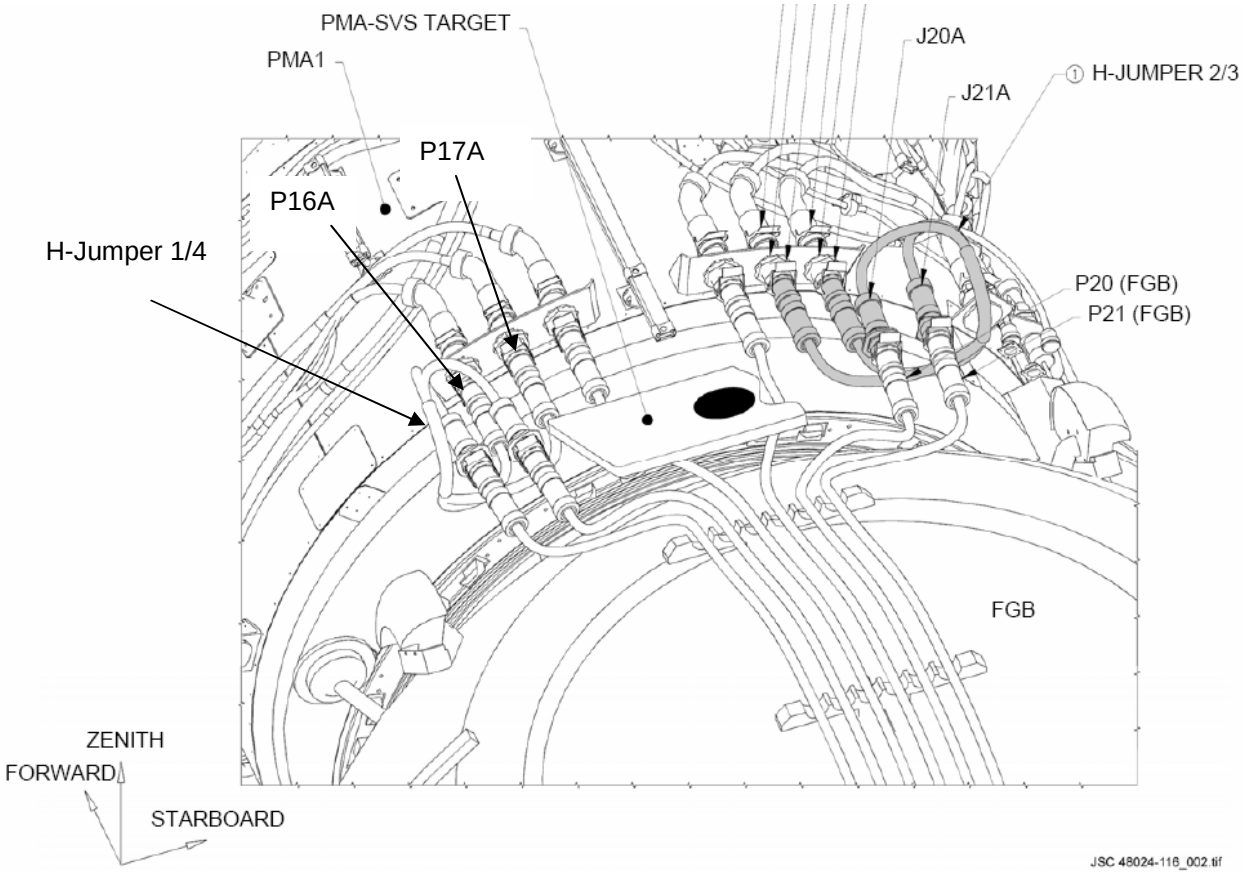


Figure 22. Final configuration of S0/N1 SM Power Cable

S0/N1 POWER CABLE/H-JUMPER HARNESS REMOVAL – TASK DATA (Cont)



BSP RETRIEVE / VTE BAG RELOCATE / NODE 2 HANDRAIL (01:00)

IV

{BSP RETRIEVE INHIBITS
RPCM Z14B B RPC 4 – Open, Close Cmd Inh
RPCM Z13B B RPC 4 – Open, Close Cmd Inh}

☐ √MCC-H GO to remove BSP

1. Give EV GO for BSP remove

Dummy Box Bolt Data

Bolt	Turns	Torque
Center Jack		
Outer Fastener (Nadir)		
Outer Fastener (Zenith)		

	Bolt 1 (left)		Bolt 2 (right)	
HR	Turns	Torque	Turns	Torque
0371				

EV1 – Wt (FF)

BSP REMOVAL

1. Retrieve 6B box cover with dummy box from A/L
2. Attach Lg-sm RET from cover to A/L D-ring ext
3. Translate to Z1 BSP (stbd)
4. Remove dummy box from 6B box cover; temp stow (suggest A/L HR 0522)
5. Open BSP thermal cover (“garage door”)
6. Tether to BSP tether point
7. BRT to HR 6001
8. On IV GO, release **BSP outer fasteners** (2)
   PGT, 7/16-6 in ext; A7, CCW2; 15 turns
9. Release **BSP center jack bolt**
   PGT, 7/16-6 in ext; A7, CCW2; 33 turns
10. Release BSP by sliding it along guide pins
11. Inspect BSP cotherm for damage
12. Inspect Z1 cold plate for cotherm debris
13. Stow BSP on 6B box cover; wrap with MLI cover

BSP DUMMY BOX INSTALL

14. Retrieve dummy box, install on Z1
15. Drive **BSP center jack bolt**
    PGT, 7/16-6 in ext; A7, CW2; ~25-30 turns to HS
16. Drive **BSP outer fasteners** (2)
    PGT, 7/16-6 in ext; A7, CW2; ~7-12 turns to HS
17. Close BSP thermal cover
18. Retrieve 6B box cover/BSP
19. Translate to Airlock

EV2 – Mk (FF)

VTE BAG RELOCATE

1. Translate to zenith face of crewlock
2. Perform glove inspection
2. Tether to and remove VTE bag (outboard)
4. Translate to S0 face 3
5. Stow VTE bag on handrails 3425 (inboard standoff) and 3430 (2 straps to outboard standoff) (leave 4th strap free)

NODE 2 HANDRAIL INSTALL

6. Translate to Airlock
7. On MCC Go: Ingress Airlock
8. Retrieve Node 2 handrail from temp stow
9. Egress Airlock, close hatch thermal cover
10. Verify SAFER config:
    ☐ √L Handle down (MAN ISO Vlv – Open)
    ☐ √R Handle down (HCM – Closed)
11. √Handrail soft dock armed (push both buttons)
12. Install and soft dock handrail (arrow on bottom, align HR# to structure #, push in to soft dock)
13. Tighten **handrail bolts** (two)
    PGT, 7/16-6 in ext: A2, CW2; ~8 turns
14. Report turns and torque
    ☐☐ HR 0371 inbrd end cone near WIF 07

US EVA 10 (ALPHA)

BSP RETRIEVE – TASK DATA

Tools:

EV1 (FF)	EV2 (FF)
PGT	
7/16-6 in	
6B Box Cover	
Dummy Box	

EVA Fasteners:

Fastener	Label	Head size	Qty	Install Torque (ft-lb)	Release Torque (ft-lb)	Failure Torque (ft-lb)	Turns	RPM
BSP Outer Fasteners	N/A	7/16”	2	N/A	12.3	14.8	15	30
BSP Center Jacking	N/A	7/16”	1	N/A	12.3	14.8	33	30
Dummy Box Center Jacking	N/A	7/16”	1	9.2	N/A	13.2	24.5-29.5	30
Dummy Box Outer Fasteners	N/A	7/16”	2	9.2	N/A	13.2	7-12	30

EVA Connectors: None

Mass and Dimensions:

Item	Mass (lb)	Dimensions (in)

Foot Restraints: None

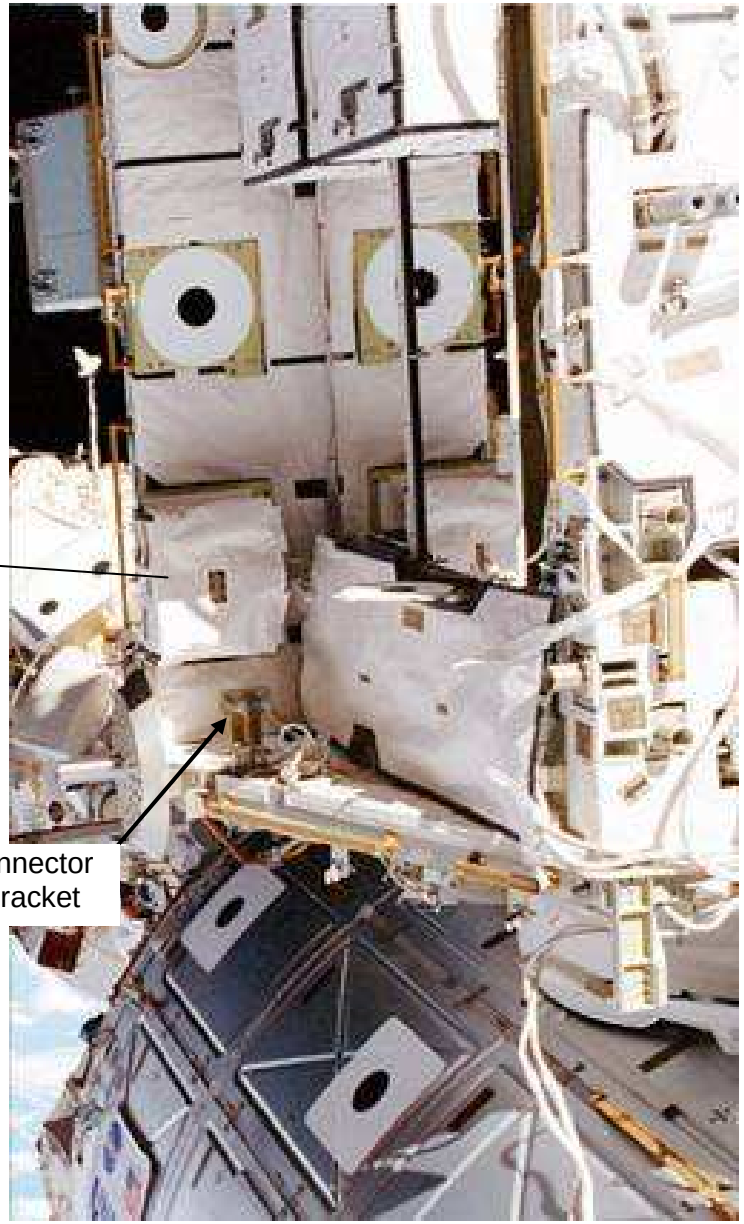
BPS Thermal Clock: 2 hr from removal of heater power until transfer to Airlock

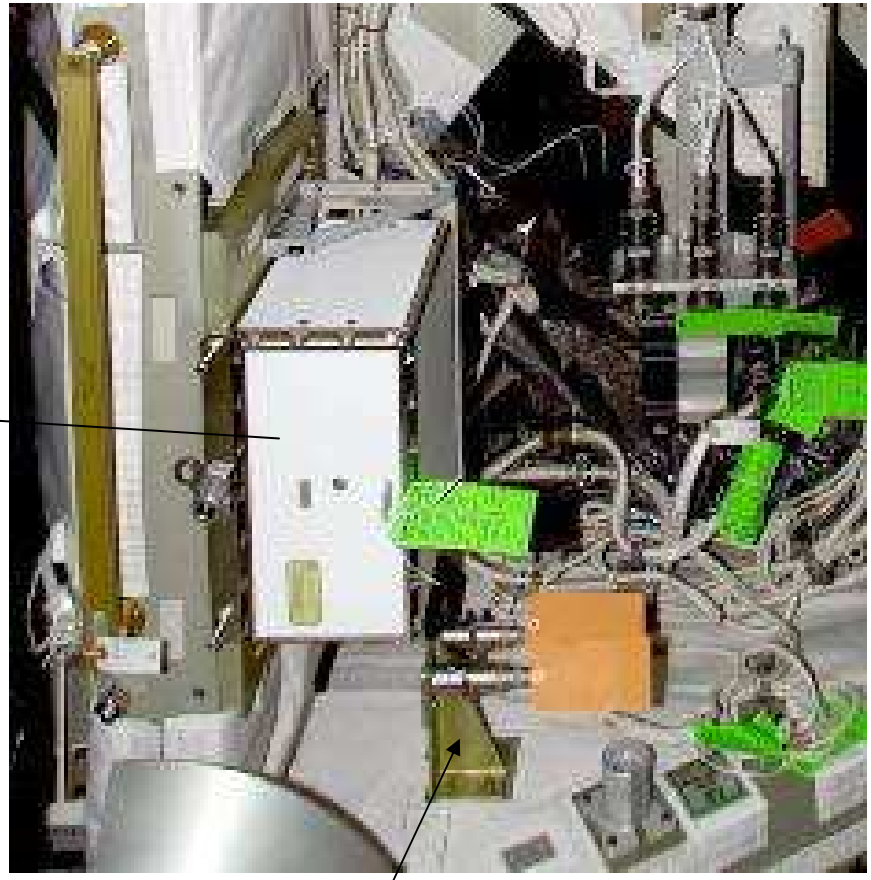
Note:

Cautions:

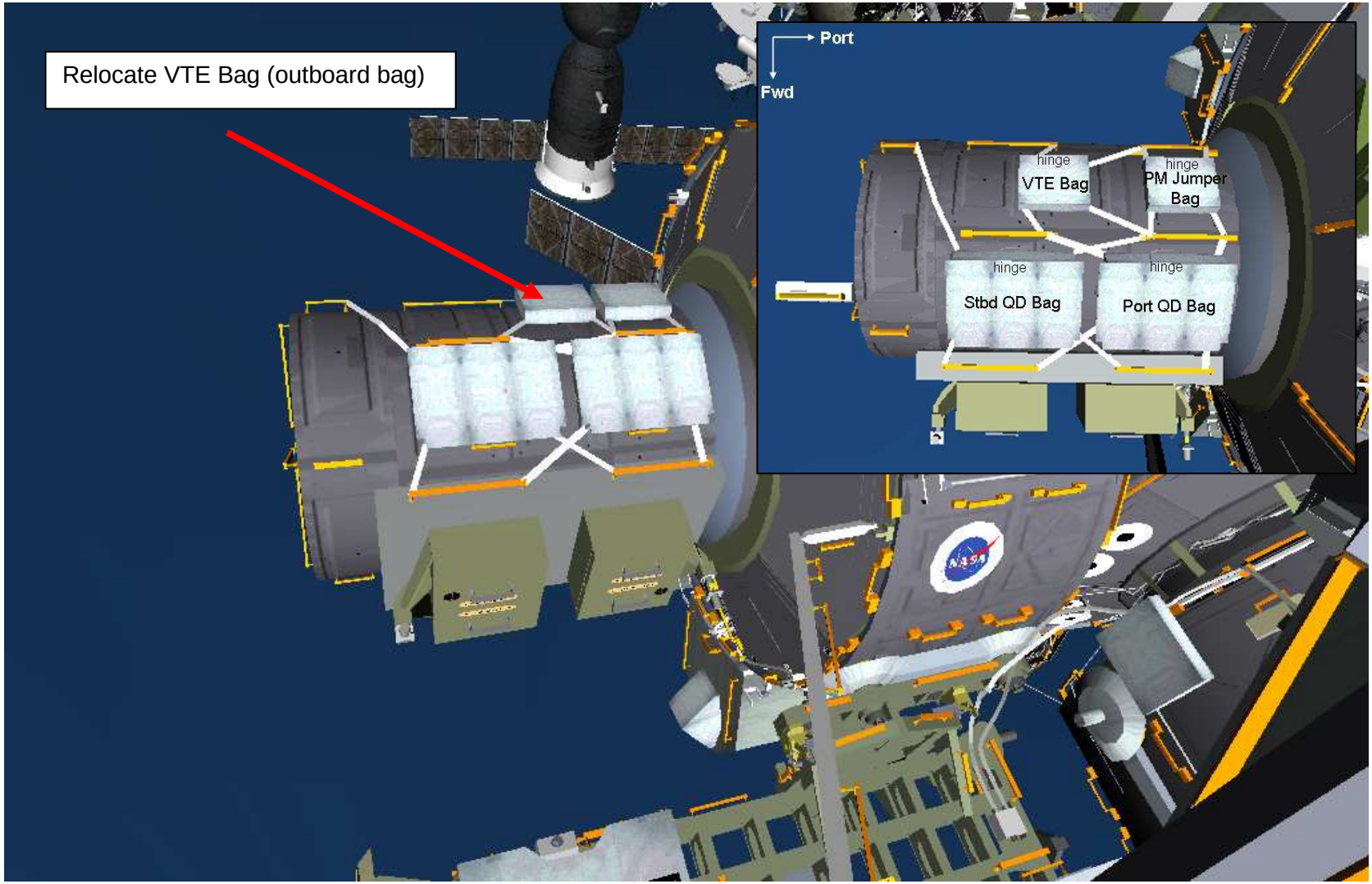
Warnings:

BASE BAND SIGNAL PROCESSOR (BSP)



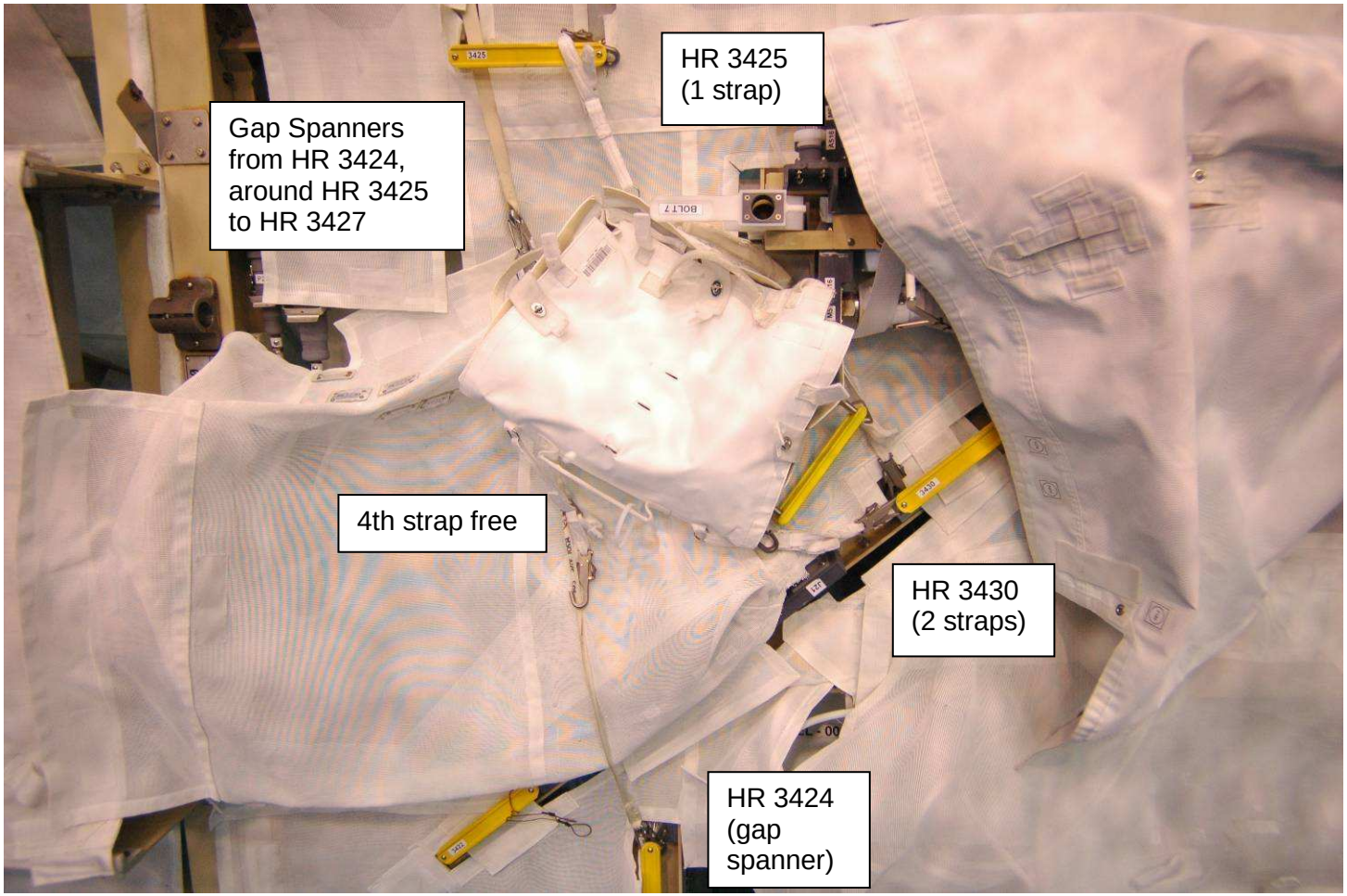


US EVA 10 (ALPHA)



US EVA 10 (ALPHA)

VENT TOOL EXTENDER BAG RELOCATE



Vent Tool Extender Bag Temp Stow – S0 Face 02

US EVA 10 (ALPHA)

US EVA 10 (ALPHA) CLEANUP AND INGRESS (00:20)

IV	EV1 – Wt (FF)	EV2 – Mk (FF)
	1. Translate to airlock 2. Perform glove inspection 3. Perform tool inventory	1. Translate to airlock 2. Perform glove inspection 3. Retrieve crewlock bag from zenith side of toolbox 4. Perform tool inventory 5. Ingress airlock; stow crewlock bag
1. Perform prior to ingress: WVS PWRDN (P/TV, <u>WVS CUE CARD</u>)	4. Transfer BSP to EV2 6. Translate to CETA spur HR 3401	6. Receive BSP from EV1; stow on Lg-Sm RET in airlock 7. Connect right waist tether to UIA D-ring ☐ √Hook locked 8. Give EV1 GO to disconnect EV2 safety tether
	7. On EV2 GO, disconnect EV2's safety tether; attach to own left waist tether ☐ √Hooks locked (2) 8. Translate to airlock 9. Disconnect EV2's A/L safety tether from A/L; temp stow on self 10. Ingress airlock	
	DCM 11. Retrieve SCU, remove DCM cover 12. Connect SCU to DCM, √Locked 13. Water – OFF 14. Hatch thermal cover – close 15. Secure thermal cover Velcro strap	DCM 9. Retrieve SCU, remove DCM cover 10. Connect SCU to DCM, √Locked 11. Water – OFF
	<u>CAUTION</u> Do not close hatch until EMU water – OFF for 2 min	
	16. √EV Hatch clear of FOD and obstructions 17. EV Hatch – verify handle position per hatch decal; close and lock 18. Go to PRE REPRESS portion of {CREWLOCK DEPRESS/REPRESS CUE CARD} (SODF: ISS EVA SYS: EVA PREP/POST)	12. Go to PRE REPRESS portion of {CREWLOCK DEPRESS/REPRESS CUE CARD} (SODF: ISS EVA SYS: EVA PREP/POST)

US EVA 10 (ALPHA)

POST US EVA 10 (ALPHA) TOOL CONFIG

EV1

EMU D-rings
- ❑ 2 – Tether Extenders
- ❑ 2 – Waist Tethers
- ❑ 1 – 85-ft Safety Tether

MWS
- ❑ Small trash bag [right inside]
- ❑ 1 – Adj tether [right]
- ❑ 1 – RET (with PIP pin) [left]
- ❑ 2 – RET (sm-sm) [right]
- ❑ 2 – Wire ties
- ~~☒ Socket caddy~~
- ❑ Swing Arm [right side]
  - ❑ PGT w/7/16-6 in ext
    - ❑ 1 – RET (sm-sm)
  - ❑ Wire Tie Caddy
    - ❑ 1 – RET (sm-sm)
- ❑ BRT [left side]
  - ❑ 2 – long wire ties tied together
  - ❑ 2 – short wire ties
  - ❑ 1 – RET (sm-sm)

❑ SAFER

❑ 1 - Pair of over-gloves

❑ GP caddy

Total RETs sm-sm used – 14
Total RETs with PIP pin – 3
Total RETs Lg-sm – 4
Total Adj tethers – 3

EV2

EMU D-rings
- ❑ 2 – Tether Extenders
- ❑ 2 – Waist Tethers
- ❑ 1 – 85-ft Safety Tether

MWS
- ❑ Small trash bag [right inside]
  - ❑ MMOD T-tool
- ❑ 1 – RET(with PIP pin) [left]
- ❑ 2 – RET (sm-sm) [right]
- ❑ 2 – Wire ties
- ❑ Swing Arm [right side]
  - ❑ PGT w/ 7/16-6 in ext
    - ❑ 1 – RET (sm-sm)
  - ❑ Wire Tie Caddy
    - ❑ 1 – RET (sm-sm)
- ❑ BRT [left side]
  - ❑ 2 – long wire ties tied together
  - ❑ 2 – short wire ties
  - ❑ 1 – RET (sm-sm)

❑ SAFER

❑ 1 - Pair of over-gloves

❑ GP caddy

ADDITIONAL ITEMS RETURNED TO A/L
- BSP (cap connectors w/ caps in ziplock bag)
- H-Jumper
- Lab CETA Light
- Node 2 Shower Cap

❑ 1 - RET (Lg-sm)
- ❑ C/L bag #4
  - ❑ H-jumper
  - ❑ Fish stringer (from caps)
  - ❑ EVA Camera and Bracket
  - ❑ Small trash bag (from gap spanners)
  - ❑ Adj tether (2)
  - ❑ RET (sm-sm) - previously on round scoop

CREWLOCK

❑ Staging Bag
- ❑ 3" Scraper

❑ IV Bag
- ❑ Contamination Detection Kit
  - ❑ Gold Salt Coupon (6)
  - ❑ Color Chart (2)
  - ❑ ISS Contamination Sampler (2)
  - ❑ Ammonia Draeger Tube (11)
- ❑ DCM Plug (2) - SAFER Hard Mount
- ❑ GP Caddy (2)
  - ❑ Thermal Mittens (2 pr)
- ❑ EVA Ratchet
- ❑ Socket Caddy
  - ❑ 1/2 x 8-in socket (IV Hatch)
  - ❑ 7/16 x 6-in socket (backup)

❑ Small ORU Bag
- ❑ Wire-tied (2) to C/L bag #4
- ❑ Adj tether to secure sm ORU bag to C/L bag #4
- ❑ RPCM (failed)
  - ❑ 2 - RET (sm-sm)

❑ Lg-sm RET
- ❑ 6B box cover (BSP)
  - ❑ 1 – Adj tether
  - ❑ 1 – RET (sm-sm)
  - ❑ BSP

❑ 1 – RET (Lg-sm) (previously holding APFR)
- ❑ Node 2 Shower Cap

❑ 1 - RET (Lg-sm)
- ~~❑ Med ORU Bag~~
  - ~~❑ 1 – RET (with PIP pin)~~
  - ❑ Lab CETA Light (exposed jacks need to be taped once inside)
  - ❑ Round scoop

❑ Lg-sm RET (previously holding Node 2 handrail)