

2J/A ROBOTICS BOOK - FLIGHT SPECIFIC	23 MAY 09
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01 JUN 09

Sheet 1 of 1

List of Implemented CR(s):

Robotics_FSU404	Robotics_FSU406	Robotics_FSU409	Robotics_FSU413
Robotics_FSU405	Robotics_FSU407	Robotics_FSU410	Robotics_FSU414

Uplinked Messages (or Approved Flight Notes) replaced by this PCN, remove from Book:

None


Incorporates the following:

1. Replace cover
2. Replace iii thru . . . viii, after viii, add ix and x
3. Replace 3 thru 60, 73 thru 134
After 234, add 234a thru 234r
Replace 235 and 236; after 236, add 237 thru 452

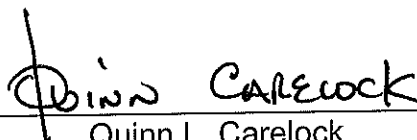
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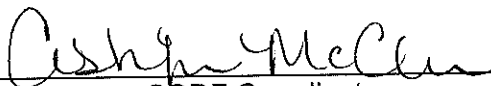
 Anthony Lou
Book Manager



 for Scott Wenger
Lead, Robotics Systems Group

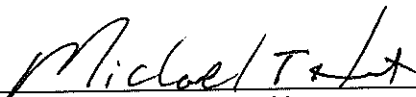


 Quinn L. Carelock
Chief, Robotics Operations Branch



 SODF Coordinator

ACCEPTED BY:



 Michael T. Hurt
SODF Manager

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JSC-48540-2J/A
APPLICABLE FOR ISS-2J/A

International Space Station Robotics Group Robotics Book - Flight Specific

ISS-2J/A

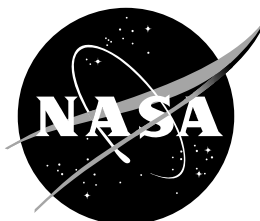
Mission Operations Directorate
Operations Division

01 JUN 09

*These procedures are available
electronically on the SODF Homepage
at <http://mod.jsc.nasa.gov/do3>*

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas



United Space Alliance

PST CODE: ROBO FSP 2J/A FIN 2

**INTERNATIONAL SPACE STATION
ROBOTICS GROUP
ROBOTICS BOOK - FLIGHT SPECIFIC
ISS-2J/A**

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1.101 JEF UNBERTH AND INSTALL

(RBT FS/2JA/FIN 1)

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<u>NOTE</u>	
1.	Verify SRMS at JEF UNBERTH CLEAR position: SY= +30.0, +65.2, -53.6, -39.4, +11.0, -121.0 =WR
2.	Verify JEMRMS at RMS Grounding tab removal position: SY = -66.0, +133.3, -99.8, -123.5, 0.0, +170.0 =WR

1. HAND CONTROLLER CALIBRATION

1.1 Translational Hand Controller (THC) Calibration

THC

- Deflect [X] Axis to positive hard stop where [X] =
- Deflect [X] Axis to negative hard stop.
- Repeat

1.2 Rotational Hand Controller (RHC) Calibration

RHC

- Deflect [X] Axis to positive hard stop where [X] =
- Deflect [X] Axis to negative hard stop.
- Repeat

2. SETUP

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
03: S1 LOOB (+60, +20)	09: P1 LOOB (+120, +25)	24: Tip Elbow (0, +5)	Camera C (0, +20)	Camera D (+10, +10)

PCS

MSS: SSRMS:

Change Loaded Parameters ► JEF ► JEF Unberth SYH
Verify 'Loaded Parameters' (two) – JEF Unberth, SY Held

Change Unloaded Parameters ► Unloaded ► LEE Tip SYH
Verify 'Unloaded Parameters' (two) – LEE Tip, SY Held

Change Display ► Orbiter ► JEF FRGF1 (Verify Orbiter>JEF FRGF1)

Change Command ► SSRMS ► Internal (Verify SSRMS>Internal)

Verify SSRMS at Docking Park position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
0.0	-180.0	-180.0	+120.0	-110.0	-180.0	-90.0
X	Y	Z	Pitch	Yaw	Roll	
-747	-373	+379	-87.6	+60.8	+178.1	
FOR	Unloaded – LEE Tip, SY Held					
Disp	Orbiter>JEF FRGF1					

1.101 JEF UNBERTH AND INSTALL

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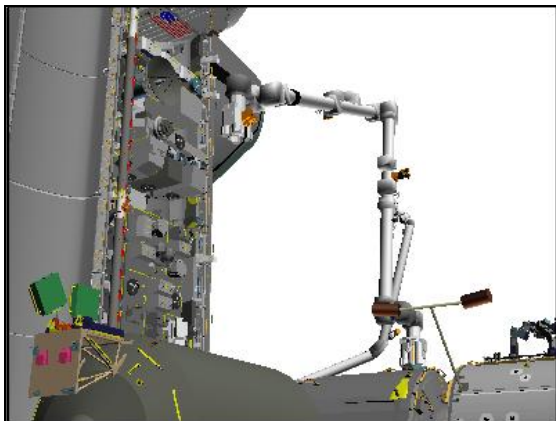


Figure 1.- Docking Park
(03: S1 Lower Outboard: +60, +20).

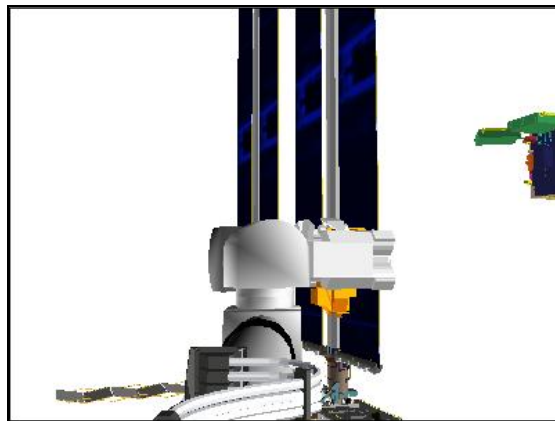


Figure 2.- Docking Park
(24: Tip Elbow: 0, +5).

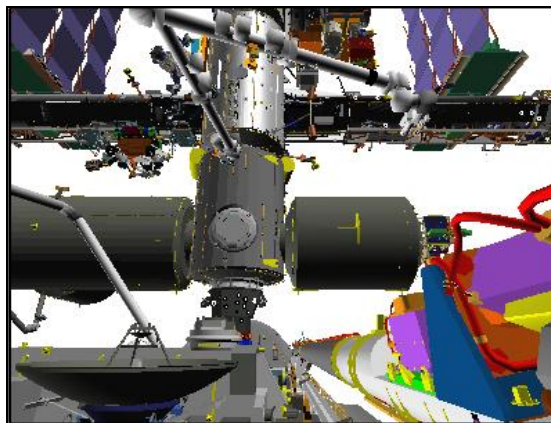


Figure 3.- Docking Park
(Camera C: 0, +20).

3. JOCAS TO JEF PRE-GRAPPLE (3 MINUTES)

NOTE

SSRMS to OBSS min clearance ~51" – Camera D

PCS

MSS: SSRMS: MSS Safing:

cmd SSRMS: Remove (Verify Not Safed)

DCP

BRAKES SSRMS → OFF (Verify OFF)

RHC

RATE → VERNIER (Verify Vernier on PCS)

PCS

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

1.101 JEF UNBERTH AND INSTALL

(RBT FS/2JA/FIN 1)

pick File ► JEF ► JEF Pre-grapple

Verify 'Joint Angles' 'Destination' for JEF Pre-Grapple position.

SR	SY	SP	EP	WP	WY	WR
-60.8	-207.7	-172.3	+133.0	-35.0	-25.0	-97.7

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	0.0	-180.0	-180.0	+120.0	-110.0	-180.0	-90.0
TGT	-60.8	-207.7	-172.3	+133.0	-35.0	-25.0	-97.7
ERR	+60.8	+27.7	-7.7	-13.0	-75.0	-155.0	+7.7

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
-60.8	-207.7	-172.3	+133.0	-35.0	-25.0	-97.7

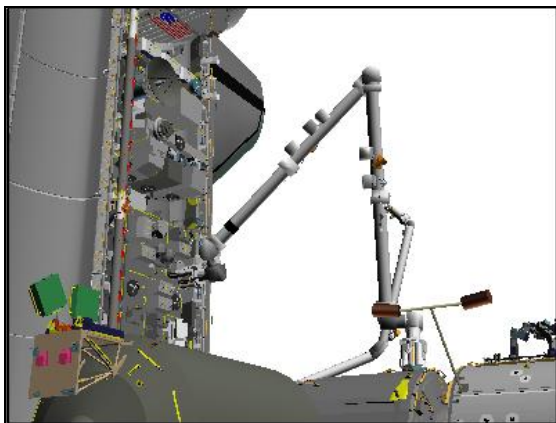


Figure 4.- JEF Pre-Grapple
(03: S1 Lower Outboard: +60, +20).

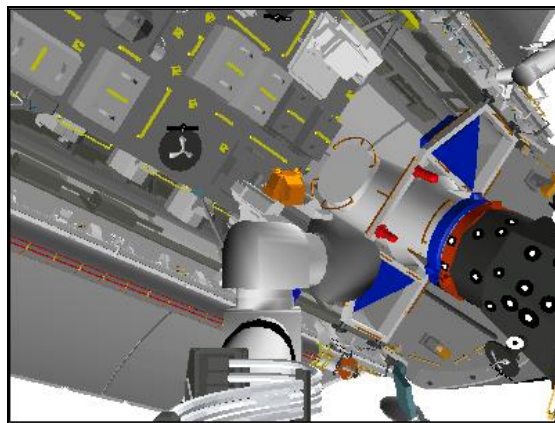


Figure 5.- JEF Pre-Grapple
(24: Tip Elbow: 0, +5).

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(RBT FS/2JA/FIN 1)

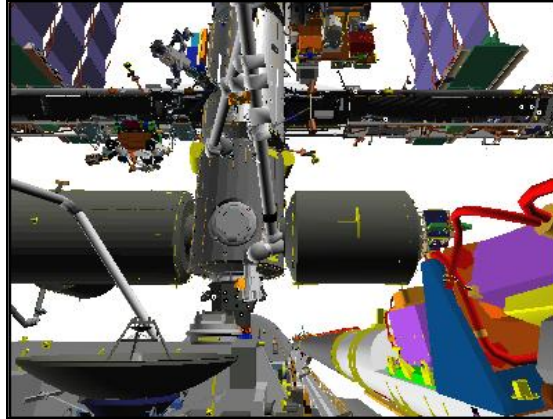


Figure 6.- JEF Pre-Grapple
(Camera C: 0, +20).

4. GRAPPLE JEF FRGF1

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
03: S1 LOOB (+60, +20)	25: Tip LEE	24: Tip Elbow (0, +5)	Camera C (0, +20)	Camera D (+10, +10)

Verify LEE camera is fully zoomed out

PCS

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: As required

NOTE

During maneuver to grapple JEF, SSRMS minimum clearance to OBSS is ~27". Monitor with Camera D.

RHC/
THC

4.1 Maneuvering to Within Grappling Envelope
Maneuver to within grapple envelope.

PCS

4.2 Slow Capture Commands
MSS: SSRMS: Tip LEE:

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

1.101 JEF UNBERTH AND INSTALL

(RBT FS/2JA/FIN 1)

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CAUTION

Due to end-to-end system latency, the RHC Trigger is hot up to 3 seconds prior to receiving a Trigger Hot icon status on the PCS.

NOTE

Once the trigger is hot, only safing or trigger commands should be sent to the Robotics equipment. If a configuration change is required, including routing MSS Cameras, safe the system to exit LEE operations (SCR 23262, 14662).

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Capture

4.3 Grapple

RHC

TRIGGER → press (momentarily)

PCS

Verify 'Snare' Close, Capture (two) – blue (12 s max)
 Verify Capture to Latch – No (SCR 19282)
 Verify 'Carriage' Tension ~5500 N (90 s max)
 Verify 'Carriage' Retract – blue
 Verify 'Carriage' Brakes – On (15s max)

4.4 Grapple Cleanup

DCP

BRAKES SSRMS → ON (Verify ON)

PCS

MSS: SSRMS:

Change Display ► ISS ► OBAS (Verify ISS>OBAS)

Change Command ► ISS ► OBAS (Verify ISS>OBAS)

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: 1.0 (Verify 1.0)

Verify SSRMS at JEF Grapple position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
-67.7	-207.7	-159.9	+116.5	-34.7	-19.0	-99.3
X	Y	Z	Pitch	Yaw	Roll	
-2181	0	-1052	0.0	0.0	0.0	
FOR	Loaded – JEF Unberth, SY Held					
Disp	ISS>OBAS					

Review {[SSRMS LEE CUE CARD](#)}, all (SODF: RBT GEN: REFERENCE).

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(RBT FS/2JA/FIN 1)



Figure 7.- JEF Grapple
(03: S1 Lower Outboard: +60, +20).

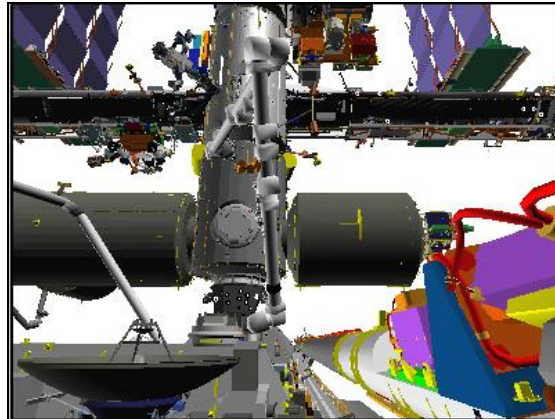


Figure 8.- JEF Grapple
(Camera C: 0, +20).

5. PRLA RELEASE

Verify with IV LTAB reconfig is complete, and EV crew, tools, and tethers are clear of JEF.

Verify with EFBM operator capture latch open is complete.

On IV and EFBM operator GO for JEF Unberth:

PCS

MSS: SSRMS: Thrusters:

Verify 'Auto Att Control Handover to RS' – Inh

Verify 'Desat Request' – Inh

*If using shuttle attitude control

* Verify in attitude, then DAP: FREE

Notify PRLA operator: Go for JEF PRLA Release.

NOTE

Steps 5.1 to 5.4 are performed by shuttle crew.

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5.1 ACTIVATING LATCHES

On SSRMS operator: Go for JEF PRLA Release.

NOTE

When MCA LOGIC switches taken OFF, KU will mode to standby.
MPM and MRL tbs – bp

MA73C:A MCA LOGIC MNC MID 2 – OFF
:B MNB MID 4 – OFF

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

R13L BAY MECH PWR SYS 1,2 (two) – ON

SM 220 JEM-EF LATCH

CRT √RDY-FOR-LAT 1,2,3,4,5 (ten) – 1
√LAT 1,2,3,4,5 (six) – 1

- * If any REL msw shows '1', *
- * expect single motor time (60 sec) *

5.2 AKA RELEASE

A6U √PL RETEN LAT 3 tb – LAT
√RDY 3 tb – gray

Note single motor times (> 30 sec)

PL RETEN LAT 3 – REL (tb-REL), 60 sec max
– OFF

5.3 PRLA RELEASE

A6U √PL RETEN LAT 1,2 (two) tb – LAT
√RDY 1,2 (two) tb – gray

Note single motor times (> 30 sec)

PL RETEN LAT 1 – REL (tb-REL), 60 sec max
– OFF
2 – REL (tb-REL), 60 sec max
– OFF

5.4 DEACTIVATE LATCHES

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

MA73C:A MCA LOGIC MNC MID 2 – ON
:B MNB MID 4 – ON

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Notify SSRMS operator: JEF PRLA released, GO for Maneuver to JEF Hover Position.

```
*****
* If 'R3Q - SSRMS LEE Uncommanded Derigidize' Caution is
*   annunciated during PRLA release:
*
*   MSS: SSRMS: Tip LEE: 
*
*   cmd 'Carriage' Rigidize ► Slow (Verify Speed – Slow)
*
*   Verify 'Confirm or Terminate' prompt.
*
*   cmd Confirm (Verify RHC Trigger Hot icon)
*
*   Verify LEE Mode – Rigidize
*
RHC *   TRIGGER → press (momentarily) (SCR 19064)
PCS *
*   Verify 'Carriage' Tension ~5500 N (90 s max)
*   Verify 'Carriage' Retract – blue
*****
```

6. JEF HOVER

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
03: S1 LOOB (+60, +20)	22: Base Elbow (+80, -15)	71: Mux D/A D(-5, 0) A(+5, 0)	Camera C (-5, +10)	SRMS Elbow (-110, -5)

On PRLA operator: JEF PRLA released, Go for Maneuver to JEF Hover position.

DCP BRAKES SSRMS → OFF (Verify OFF)

PCS MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

NOTE

- JEF to OBSS min clearance during unberth is 3.3” at Z= -1133. Monitor with Camera C.
- JEF to Node 2 min clearance ~41” – S1LOOB

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THC/
RHC

Maneuver JEF to JEF Hover position (within 5 cm/1 deg).
THC -Z Up

	Locked					
SR	SY	SP	EP	WP	WY	WR
-37.6	-207.7	-193.4	+152.7	-17.0	-43.8	-87.6
X	Y	Z	Pitch	Yaw	Roll	
-2181	0	-1540	0.0	0.0	0.0	
FOR	Loaded – JEF Unberth, SY Held					
Disp	ISS>OBAS					

Enter Mode – Standby (Verify blue)

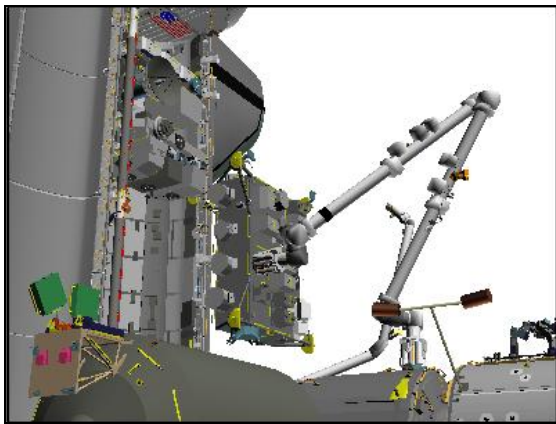


Figure 9.- JEF Hover
(03: S1 Lower Outboard: +60, +20).

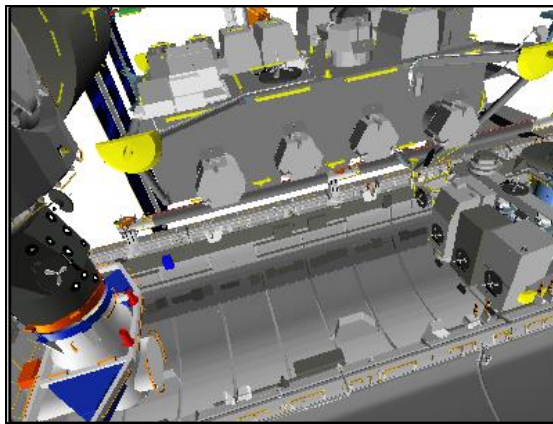


Figure 10.- JEF Hover
(72: SRMS Elbow: -110, -10).

```

*****
* If using shuttle attitude control and attitude
* | maintenance reqd
* | DAP: LVLH
* | When rates damped
* | | DAP: FREE > 2 seconds
* | | DAP: AUTO
* | | When in attitude and rates damped
* | | DAP: FREE
*****
    
```

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7. FOR OCAS TO JEF HANDOFF 1 (9 MINUTES)

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
03: S1 LOOB (+60, +20)	09: P1 LOOB (+120, +20)	71: Camera A (0, 0)	Camera C (-75, +30)	SRMS Elbow (-30, 0)
	07: P1 LOIB (+150, +40)	72: Camera B (0, +35)		

PCS MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

MSS: SSRMS: SSRMS FOR OCAS: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

pick File ► JEF ► JEF Handoff1

Verify 'FOR' 'Destination' for JEF Handoff 1 position.

X	Y	Z	Pitch	Yaw	Roll
-3013	-656	-1592	-56.0	+3.0	+11.0

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify FOR and errors are correct on FOR Position overlay.

	X	Y	Z	Pitch	Yaw	Roll
FOR	-2181	0	-1540	0.0	0.0	0.0
TGT	-3013	-656	-1592	-56.0	+3.0	+11.0
ERR	+832	+656	+52	+56.0	-3.0	-11.0

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify SSRMS at JEF Handoff 1 position (within 5 cm/1 deg).

	Locked					
SR	SY	SP	EP	WP	WY	WR
-177.3	-207.7	-211.7	+81.5	-45.1	+7.2	-35.1
X	Y	Z	Pitch	Yaw	Roll	
-3013	-656	-1592	-56.0	+3.0	+11.0	
FOR	Loaded – JEF Unberth, SY Held					
Disp	ISS>OBAS					

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DCP BRAKES SSRMS → ON (Verify ON)

PCS MSS: SSRMS: Thrusters: Thruster Controls for MSS Ops

Verify 'Auto Att Control Handover to RS' – Inh

Verify 'Desat Request' – Inh

```
*****  
* If using shuttle attitude control and attitude  
* | maintenance reqd  
* | DAP: LVLH  
* | When rates damped  
* | | DAP: FREE > 2 seconds  
* | | DAP: AUTO  
* | When in attitude and rates damped  
* | | DAP: FREE  
*****
```

Notify SRMS operator: SSRMS at JEF Handoff 1 with brakes ON, SRMS GO for JEF grapple.

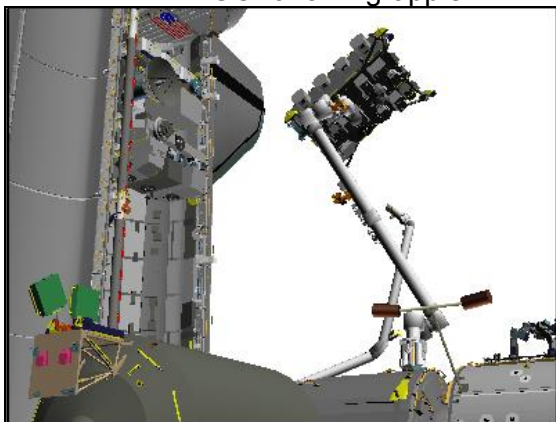


Figure 11.- JEF Handoff 1
(03: S1 Lower Outboard: +60, +20).

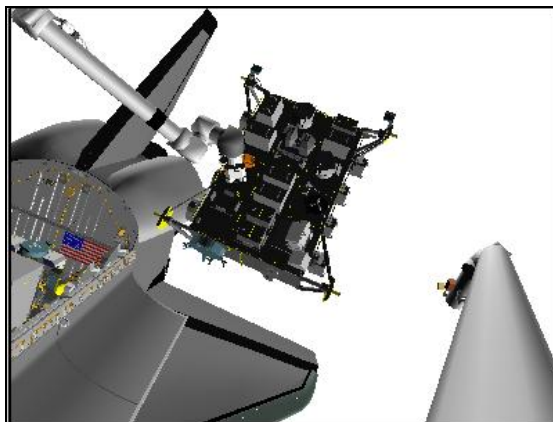


Figure 12.- JEF Handoff 1
(SRMS Elbow: -30, 0).

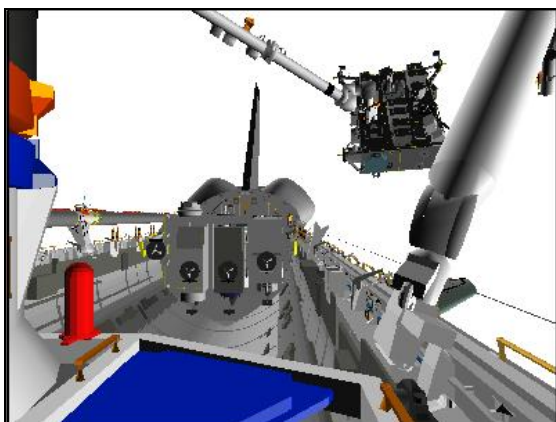


Figure 13.- JEF Handoff 1
(Camera A: 0, 0).

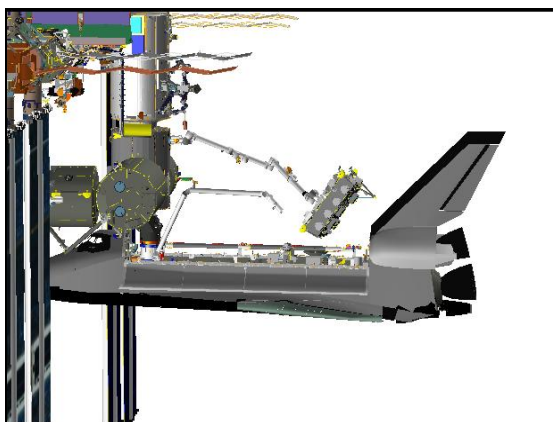


Figure 14.- JEF Handoff 1
(ISS Starboard).

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8. JEF RELEASE 1 (PUSHOFF)

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (+120, +25)	25: Tip LEE	24: Tip Elbow (0, 0)	Camera C (-60, +20)	Camera A (0, 0)

PCS MSS: SSRMS:

Change Command ► SSRMS ► Internal (Verify SSRMS>Internal)

√Vernier

PCS MSS: SSRMS: Rate:

Set 'Scale' as required

On SRMS operator: JEF grapple complete with Brakes ON, SSRMS GO for JEF ungrapple.

DCP BRAKES SSRMS → OFF (Verify OFF)

8.1 SSRMS LIMP

PCS MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

MSS: SSRMS:

Verify all joints – Limped

8.2 MODIFIED RELEASE

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Extend ► Hard Stops ► Slow, Hard Stops

Verify Speed – Slow

Verify Stops – Hard

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Extend Carriage

RHC TRIGGER → press (hold until 'Carriage' Derigidize – blue) (10 s max)

cmd Terminate (Verify 'Motors' – Inh)

cmd Release ► Automatic ► Slow (Verify Speed – Slow)

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Verify 'Confirm or Terminate' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

RHC Verify LEE Mode – Auto Release
TRIGGER → press (momentarily)

PCS Verify 'Snare' Open – blue (12 s max)
Verify 'Carriage' Extend – blue (90 s max)

9. JEF HANDOFF 1 BACKOFF

PCS MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

THC/
RHC Maneuver SSRMS to JEF Handoff 1 Backoff position (within 10 cm/2 deg)
THC – X Out

	Locked					
SR	SY	SP	EP	WP	WY	WR
-192.7	-207.7	-235.0	+129.5	-78.4	+7.3	-21.4
X	Y	Z	Pitch	Yaw	Roll	
-2601	-445	-1815	-145.5	-10.9	-117.0	
FOR	Unloaded – LEE Tip, SY Held					
Disp	ISS>OBAS					

PCS MSS: SSRMS:

Enter Mode – Standby (Verify blue)

```
*****
* If using shuttle attitude control
* | DAP: LVLH
* | When rates damped
* | | DAP: FREE > 2 seconds
* | | DAP: AUTO
*****
```

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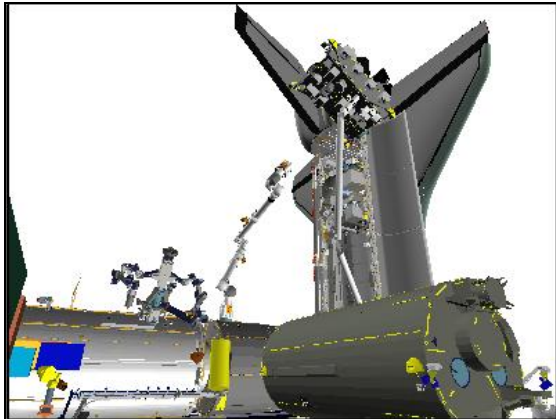


Figure 15.- JEF Handoff 1 Backoff
(09: P1 Lower Outboard: +120, +25).

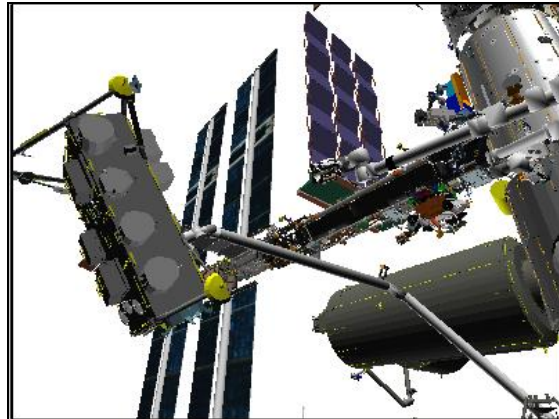


Figure 16.- JEF Handoff 1 Backoff
(Camera C: -50, +30).

10. MANEUVER TO PDGF 3 PRE-GRAPPLE

10.1 Joint OCAS to Pre-Grapple Setup (3.5 Minutes)
Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (+120, +5)	51: JEM EXT A (-170, -40)	22: Base Elbow (+145, 0)	Camera C (-20, +30)	SRMS Elbow (+120, +30)
07: P1LOIB (-180, +30)		37: MBS Mast (+110, +15)		

NOTE

1. Monitor clearance between SSRMS Tip boom and JLP using Base Elbow or JEM –EXT A Camera.
2. Monitor clearance between SSRMS base boom and SPDM using P1 LOOB Camera.

PCS

MSS: SSRMS:

Change Unloaded Parameters ► Unloaded ► LEE Tip SRH
Verify 'Unloaded Parameters' (two) – LEE Tip, SR Held

Change Loaded Parameters ► Walk Off ► MBS PDGF 3
Verify 'Loaded Parameters' (two) – MBS PDGF 3, SR Held

Change Display ► MBS ► PDGF 3 (Verify MBS>PDGF 3)

Verify Command – SSRMS>Internal

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: 1.0 (Verify 1.0)

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MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

pick File ► Walkoff ► MBS3 Pre-grapple

Verify 'Joint Angles' 'Destination' for PDGF 3 position.

SR	SY	SP	EP	WP	WY	WR
-181.4	-174.6	-81.2	+52.8	-25.5	+7.2	+46.6

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify joint angles and errors are correct on Joint Angle Position overlay (within 2 deg).

(current)
TGT
ERR

SR	SY	SP	EP	WP	WY	WR
-192.7	-207.7	-235.0	+129.5	-78.4	+7.3	-21.4
-181.4	-174.6	-81.2	+52.8	-25.5	+7.2	+46.6
-11.3	-33.1	-153.8	+76.7	-52.9	+0.1	-68.0

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
-181.4	-174.6	-81.2	+52.8	-25.5	+7.2	+46.6

Notify SRMS operator: SSRMS at PDGF 3 Pre-Grapple Setup Position, GO for SRMS maneuver to JEF HANDOFF 2.

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10.2 SINGLE JOINT WY TO PDGF 3 PRE-GRAPPLE

NOTE
Orbiter cameras are not available during SRMS maneuver to Handoff 2 position

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3
09: P1 LOOB (+120, -10)	51: JEM EXT A (-140, +45)	24: Tip Elbow (0, +15)

PCS

MSS: SSRMS:

Enter Mode – Single (Verify blue)

WARNING

The active joint must be checked on the PCS before initiating motion. Failure to do so may result in movement of the wrong joint.

DCP

JOINT SELECT → WRIST YAW (Verify WY – Selected on PCS)

THC

Perform “-” Single Joint maneuver to WY: -104.0 (THC down).

Verify SSRMS at PDGF 3 Pre-Grapple position
(within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
-181.4	-174.6	-81.2	+52.8	-25.5	-104.0	+46.6
X	Y	Z	Pitch	Yaw	Roll	
-150	0	0	0.0	0.0	0.0	
FOR	Unloaded – LEE Tip, SR Held					
Disp	MBS>PDGF 3					

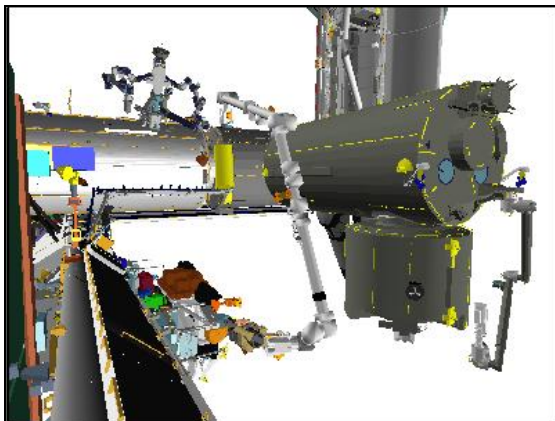


Figure 17.- PDGF 3 Pre-Grapple
(09: P1 Lower Outboard: +120, -5).



Figure 18.- PDGF 3 Pre-Grapple
(51: JEM EXT A: -140, +45).

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11. GRAPPLE PDGF 3

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3
09: P1 LOOB (+120, -5)	25: Tip LEE	24: Tip Elbow (0, +15)
		37: MBS Mast (-30, 0)

PCS

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: As required

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

RHC/
THC

11.1 Maneuvering to Within Grappling Envelope Maneuver to within grapple envelope.

PCS

11.2 Slow Capture Commands

MSS: SSRMS: Tip LEE:

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Capture

RHC

11.3 Grapple

TRIGGER → press (momentarily)

PCS

Verify 'Snare' Close, Capture (two) – blue (12 s max)

Verify Capture to Latch – Yes (SCR 19282)

Verify 'Carriage' Tension ~5500 N (90 s max)

Verify 'Carriage' Retract – blue

Verify 'Latch' Latch – blue (65 s max)

11.4 Mate Umbilicals

Verify with **MCC-H** that PDGF power is confirmed Off.

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NOTE

1. Expect '**R20 - MBS CRPCM 3P(R) Output Voltage 1 Stat Err**' Robotics Advisory message while umbilicals are mated. Message should return to norm.
2. Expect '**R3L - SSRMS Pwr Flags Fail**' Robotics Advisory message while Tip LEE is mated (SCR 19019).

MSS: SSRMS: Tip LEE:

cmd 'Umbilical' Mate (Verify '**Confirm or Terminate**' prompt)

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Mate

RHC

TRIGGER → Press (momentarily)

PCS

Verify 'Umbilical' Mate – blue (10 s max)

Verify 'Connector Continuity' Prime, Redundant (two) – Yes

11.5 Carriage Derigidization

cmd 'Carriage' Derigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Derigidize

RHC

TRIGGER → Press (momentarily) (SCR 19064)

PCS

Verify 'Carriage' Tension – 890 N (\pm 200 N)

Verify 'Carriage' Retract – grey (90 s max)

11.6 Grapple Cleanup

MSS: SSRMS:

Verify Posn Hold – orange

Verify Loaded Parameters – ✓

Verify 'Loaded Parameters' (two) – MBS PDGF 3, SR Held

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Expected PDGF 3 Grapple position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
-181.4	-185.1	-83.7	+63.0	-80.3	-101.5	-1.2
X	Y	Z	Pitch	Yaw	Roll	
0	0	0	0.0	0.0	0.0	
FOR	Loaded – MBS PDGF3, SR Held					
Disp	MBS> PDGF 3					

NOTE

Expect the following message when safing is commanded:
'R3Z - MSS OCS SSRMS Prime(Redun) ACU SRT Cat-1 Brk Stat Fail' (SCR 17495)
 This message should return to Norm.

DCP

SAFING → SAFE (Verify ON)

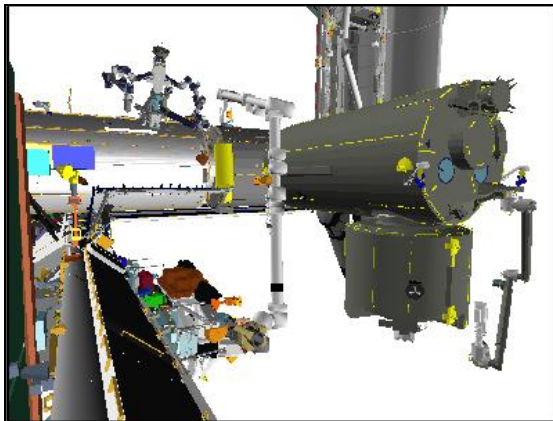


Figure 19.- PDGF 3 Grapple
(09: P1 Lower Outboard: +120, -5).

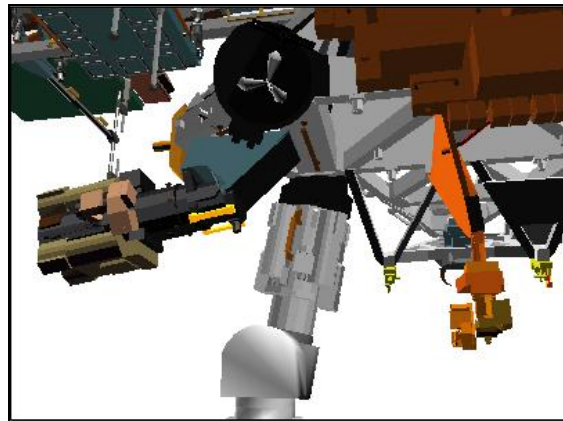


Figure 20.- PDGF 3 Grapple
(24: Tip Elbow: 0, +15).

NOTE

Steps 12 to 16 may be performed by ground.

12. SSRMS REDUNDANT (PRIME) STRING POWERDOWN TO OFF

NOTE

- Expect the following messages when Off is commanded:
'R1E - MSS OCS SSRMS Redun(Prime) ACU SRT Comm Fail' (SCR 17730)
'R1E - LAB(CUP) RWS CEU PLB ACU Cmd Resp Sync Msg Err' (SCR 31294)
 These messages should return to Norm.
- It might take up to 30 seconds for the Off status indication to appear on PCS.

PCS

MSS: SSRMS: Power: SSRMS Power

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cmd 'SSRMS' Prime – Off (Verify Off)

13. OPERATING BASE CHANGE

MSS: SSRMS: Base LEE:

cmd B

MSS: SSRMS:

Verify Base LEE – B

Verify PDGF – MBS3

14. POWERUP REDUNDANT(PRIME) STRING TO KEEP-ALIVE

NOTE

It might take up to 30 seconds for the Keep-Alive status indication to appear on PCS.

MSS: SSRMS: Power:

cmd 'SSRMS' Prime – Keep-Alive (Verify Keep-Alive)

15. POWERUP REDUNDANT(PRIME) STRING TO OPERATIONAL

NOTE

SSRMS transition from Keep-Alive to Operational will require at least 6 minutes to complete. The time is contingent on file transfer activity from the C&C MDM.

MSS: SSRMS: Power:

cmd 'SSRMS' Prime – Operational

Verify 'Systems State' – Operational

16. VIDEO COMPONENTS POWERUP

MSS: SSRMS: Base LEE VDU icon:

cmd 'SSRMS' 'Base LEE' On (Verify On)

cmd 'SSRMS' 'Base Elbow' On (Verify On)

cmd 'SSRMS' 'Tip Elbow' On (Verify On)

cmd 'SSRMS' 'Tip LEE' On (Verify On)

NOTE

The color balance and gamma setting feedback will not be available until the Camera is routed through a Camera Status Reader. The ground will route the SSRMS Cameras through the CSRs after the Camera setup in this step.

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MSS: SSRMS: Base Elbow Camera icon:

sel [X] where [X] =

cmd 'Power' On (Verify On)
cmd 'Light' On (Verify On)
cmd 'Color Bal' Metal
cmd 'Gamma' 0.45
 Repeat

17. SETUP FOR NODE2 PDGF UNGRAPPLE

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (+120, 0)	25: Tip LEE	07: P1 LOIB (-180, +30)	Camera C (-10, +30)	Camera B (-30, +20)

PCS

MSS: SSRMS:

Verify 'Loaded Parameters' (two) – Node 2 PDGF, SR Held

Verify 'Unloaded Parameters' (two) – LEE Tip, SR Held

Change Display ► Node2 ► PDGF (Verify Node2>PDGF)

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: 1.0 (Verify 1.0)

Verify SSRMS at Node2 PDGF Ungrapple position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
-1.2	+101.5	-80.3	+63.0	-83.7	+185.1	-181.4
X	Y	Z	Pitch	Yaw	Roll	
0	0	0	0.0	0.0	0.0	
FOR	Loaded – Node 2 PDGF, SR Held					
Disp	Node2>PDGF					

18. NODE2 RELEASE (PUSHOFF)

On SRMS operator: SRMS at JEF HANDOFF 2 with Brakes ON, GO for Node 2 Ungrapple and JEF Grapple.

NOTE

Expect the following suppressed caution to be annunciated when safing is removed:

'R3Q - SSRMS LEE Unocmmanded Derigidize'

Message will return to Norm after carriage is rigidized.

MSS: SSRMS: MSS Safing:

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cmd 'SSRMS' Remove (Verify Not Safed)

DCP BRAKES SSRMS → OFF (Verify OFF)

RHC RATE → VERNIER (Verify Vernier on PCS)

18.1 SSRMS Limp

PCS MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

MSS: SSRMS:

Verify all joints – Limped

18.2 Carriage Rigidization

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Rigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Rigidize

RHC TRIGGER → Press (momentarily) (SCR 19064)

PCS Verify 'Carriage' Tension ~5500 N
Verify 'Carriage' Retract – blue
Verify 'Carriage' Brakes – On (90 s max)

18.3 NODE2 PDGF Modified Release

MSS: SSRMS: Tip LEE:

cmd 'Latch' Unlatch ► Slow, Soft Stops

Verify Speed – Slow

Verify Stops – Soft

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Unlatch

RHC TRIGGER → Press (hold until 'Latch' Brakes – On) (65 s max)

PCS Verify 'Umbilical' Demate – blue (10 s max)
Verify 'Latch' Unlatch – blue

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cmd 'Carriage' Extend ► Hard Stops ► Slow, Hard Stops

Verify Speed – Slow

Verify Stops – Hard

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Extend Carriage

RHC

TRIGGER → Press (hold until 'Carriage' Derigidize – blue)
(10 s max)

cmd Terminate (Verify 'Motors' – Inh)

cmd Release ► Automatic ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Release

RHC

TRIGGER → Press (momentarily)

PCS

Verify 'Snare' Open – blue (12 s max)

Verify 'Carriage' Extend – blue (90 s max)

18.4 Backoff From NODE2 PDGF

NOTE

Monitor clearance between SSRMS tip boom and JPM using P1 LOOB Camera.

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

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THC

Maneuver SSRMS to Node2 PDGF Backoff position
(within 5 cm/1 deg).

Locked						
SR	SY	SP	EP	WP	WY	WR
-1.2	+103.2	-71.5	+29.0	-58.2	+185.4	-179.9
X	Y	Z	Pitch	Yaw	Roll	
-250	0	0	0.0	0.0	0.0	
FOR	Unloaded – LEE Tip, SR Held					
Disp	Node2>PDGF					

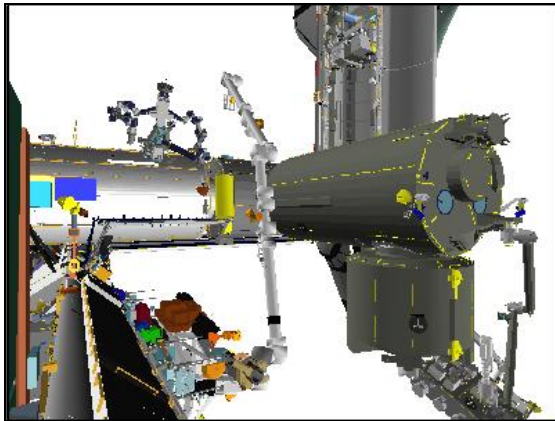


Figure 21.- Node2 PDGF Backoff
(09: P1 Lower Outboard: +120, 0).

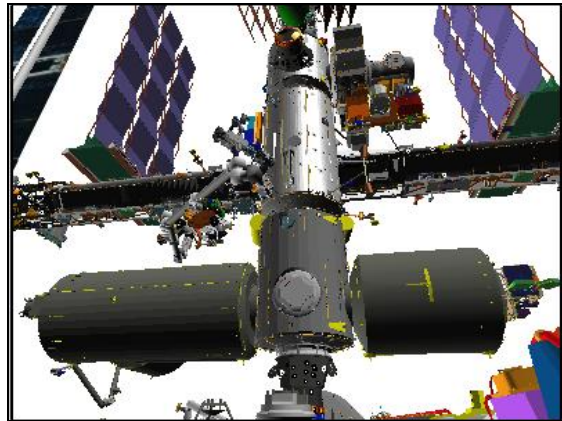


Figure 22.- Node2 PDGF Backoff
(Camera C: -10, +30).

19. SINGLE JOINT MANEUVER TO NODE2 CLEAR

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (+120, 0)	03: S1 LOOB (+70, +10)	07: P1 LOIB (-180, +30)	Camera C (-10, +30)	Camera B (-30, +20)

PCS

MSS: SSRMS:

Enter Mode – Single (Verify blue)

NOTE
Expect singularity warning for EP between -15 and +15 deg.

DCP

JOINT SELECT → ELBOW PITCH (Verify EP – Selected on PCS)

THC

Perform “-” Single Joint maneuver to EP: -100.0 (THC down).

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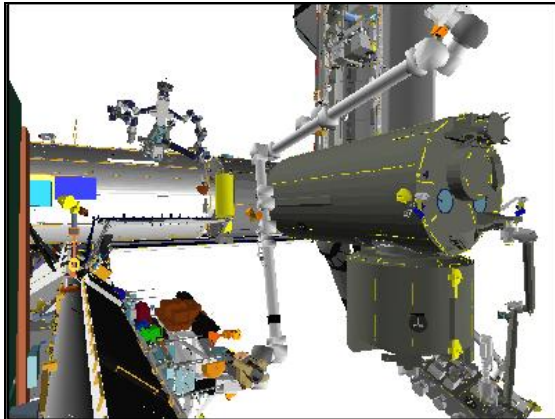


Figure 23.- Node2 Clear
(09: P1 Lower Outboard: +120, 0).

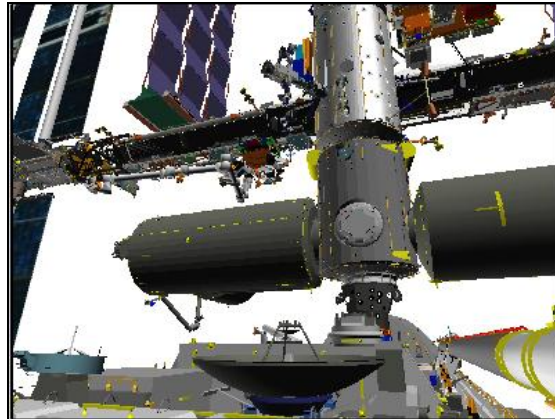


Figure 24.- Node2 Clear
(Camera C: -20, +20).

20. JOCAS TO JEF INTERMEDIATE (8 MINUTES)

√Vernier

PCS

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

pick File ► JEF ► JEF Intermediate

Verify 'Joint Angles' 'Destination' for JEF Intermediate position.

SR	SY	SP	EP	WP	WY	WR
+200.0	+145.0	-122.0	-100.0	-56.5	-110.0	-41.4

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	-1.2	+103.2	-71.5	-100.0	-58.2	+185.4	-179.9
TGT	+200.0	+145.0	-122.0	-100.0	-56.5	-110.0	-41.4
ERR	-201.2	-41.8	+50.5	0.0	-1.7	+295.4	-138.5

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS:

Verify Posn Hold – orange

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Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+200.0	+145.0	-122.0	-100.0	-56.5	-110.0	-41.4

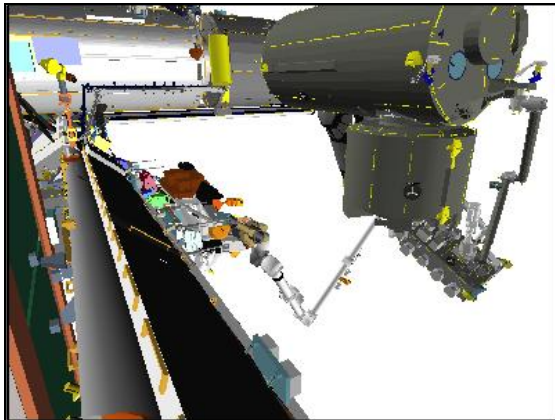


Figure 25.- JEF Intermediate
(09: P1 Lower Outboard: +120, -20).

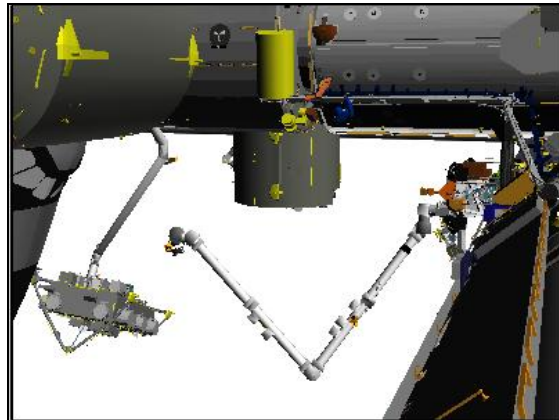


Figure 26.- JEF Intermediate
(03: S1 Lower Outboard: +70, -10).

21. JOCAS TO JEF AT HANDOFF 2 PRE-GRAPPLE (1.5 MINUTES)

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
24: Tip Elbow (+20, +10)	03: S1 LOOB (+70, -10)	52: JEM EXT F (+140, +60)	Camera C (-10, +30)	SRMS Elbow (+10, +10)

NOTE

Monitor clearance between SSRMS wrist and SRMS using S1LOOB or SRMS Elbow Cameras.

SSRMS Joint OCAS

pick File ► JEF ► JEF Handoff2

Verify 'Joint Angles' 'Destination' for Handoff2 position.

SR	SY	SP	EP	WP	WY	WR
+241.8	+169.2	-137.1	-70.8	-56.5	-146.2	-41.4

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+200.0	+145.0	-122.0	-100.0	-56.5	-110.0	-41.4
TGT	+241.8	+169.2	-137.1	-70.8	-56.5	-146.2	-41.4
ERR	-41.8	-24.2	+15.1	-29.2	0.0	+36.2	0.0

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

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PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+241.8	+169.2	-137.1	-70.8	-56.5	-146.2	-41.4

Enter Mode – Standby (Verify blue)

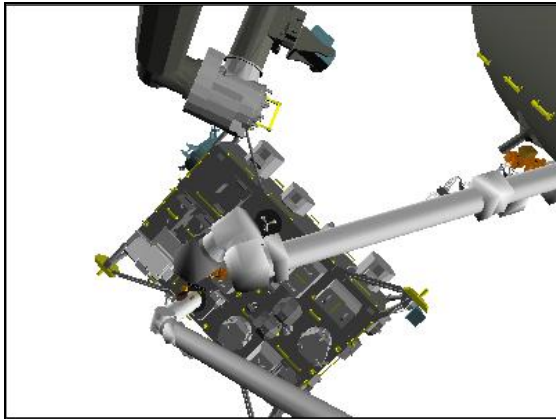


Figure 27.- JEF at Handoff 2 Pre-Grapple (52: JEM EXT F: +140, +60).

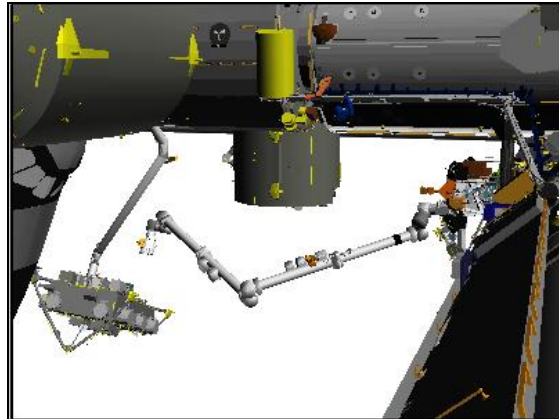


Figure 28.- JEF at Handoff 2 Pre-Grapple (03: S1 Lower Outboard: +70, -10).

22. GRAPPLE JEF AT HANDOFF 2

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1	SSC 2
03: S1 LOOB (+70, -10)	25: Tip LEE	37: MBS Mast (-85, +75)	Camera C (-10, +30)	SRMS Elbow (+10, +10)
		24: Tip Elbow (+20, +20)		

MSS: SSRMS: Thrusters:

Verify 'Desat Request' – Inh

Verify 'Auto Att Control Handover to RS' – Inh

* If using shuttle attitude control

* Verify in attitude, then DAP: FREE

MSS: SSRMS:

Change Loaded Parameters ► JEF ► JEF Install ISSACS SRH

Verify 'Loaded Parameters' (two) – JEF Install ISSACS, SR Held

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Change Display ► JPM ► JEF Install ISSACS (Verify JPM>JEF Install ISSACS)

Verify 'Command' - SSRMS>Internal

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: As required

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

22.1 Maneuvering to Within Grappling Envelope

Maneuver to within grapple envelope.

22.2 Slow Capture Commands

MSS: SSRMS: Tip LEE:

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Capture

22.3 Grapple

TRIGGER → Press (momentarily)

Verify 'Snare' Close, Capture (two) – blue (12 s max)

Verify Capture to Latch – No (SCR 19282)

Verify 'Carriage' Tension ~5500 N

Verify 'Carriage' Retract – blue

Verify 'Carriage' Brakes – On (90s max)

Verify SSRMS at JEF Handoff 2 position (within 10 cm/2 deg).

SR	SY	SP	EP	WP	WY	WR
+241.8	+174.7	-131.4	-65.1	-71.7	-145.9	-47.0
X	Y	Z	Pitch	Yaw	Roll	
+713	+332	-1353	-6.5	+7.2	-153.3	
FOR	Loaded – JEF Install ISSACS, SR Held					
Disp	JPM>JEF Install ISSACS					

DCP

BRAKES SSRMS → ON (Verify ON)

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Review {[SSRMS LEE CUE CARD](#)}, all (SODF: RBT GEN: REFERENCE).

Notify SRMS operator: SSRMS grapple complete with Brakes ON, SRMS GO for JEF ungrapple.

PCS

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: 1.0 (Verify 1.0)

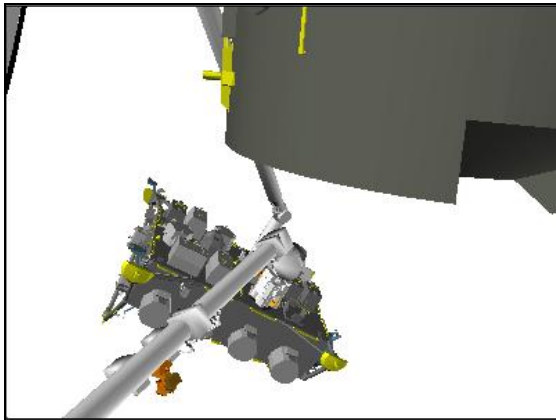


Figure 29.- JEF Handoff 2
(37: MBS Mast: -85, +75).

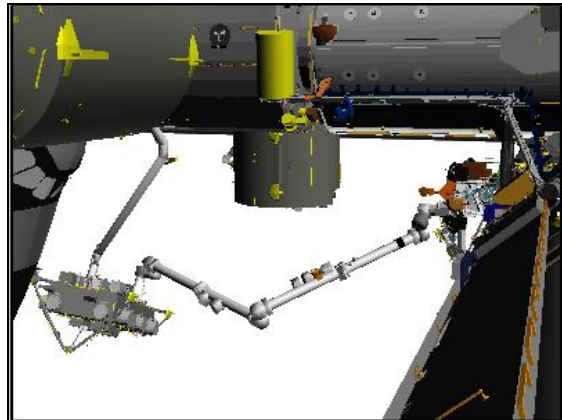


Figure 30.- JEF Handoff 2
(03: S1 Lower Outboard: +70, -10).

23. MANEUVER TO INTERMEDIATE POSITION

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1	SSC 2
03: S1 LOOB (+70, -10)	09: P1 LOOB (+120, -20)	37: MBS Mast (-90, +60)	Camera C (-30, +15)	SRMS RSC
07: P1 LOIB (-170, -20)		52: JEM EXT F (+70, +70)		

On SRMS operator: SRMS at JEF INSTALL VIEWING with Brakes ON, GO for SSRMS maneuver to JEF Pre-Install.

```
*****
* If using shuttle attitude control and attitude maintenance reqd
* | DAP: LVLH
* | When rates damped
* | | DAP: FREE > 2 seconds
* | | DAP: AUTO
* | | When in attitude and rates damped
* | | DAP: FREE
*****
```

DCP BRAKES SSRMS → OFF (Verify OFF)

RHC RATE → COARSE (Verify Coarse on PCS)

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NOTE
Monitor clearance between SSRMS Tip Boom and JEF using Tip Elbow Camera.

PCS MSS: SSRMS: SSRMS

Enter Mode – Single (Verify blue)

DCP JOINT SELECT → WRIST YAW (Verify WY – Selected on PCS)

THC Perform “+” Single Joint maneuver to WY: -120.0 (THC Up).

Verify SSRMS at Intermediate position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+241.8	+174.7	-131.4	-65.1	-71.7	-120.0	-47.0
X	Y	Z	Pitch	Yaw	Roll	
+700	+229	-1286	+0.8	+9.0	-179.2	
FOR	Loaded – JEF Install ISSACS, SR Held					
Disp	JPM>JEF Install ISSACS					

24. MANEUVER TO JEF PRE-INSTALL POSITION (20 MINUTES)

NOTE
Expect singularity warning for EP between -15 and +15 deg.

PCS MSS: SSRMS: SSRMS

Enter Mode – Joint OCAS (Verify blue)

SSRMS Joint OCAS

pick File ► JEF ► JEF Pre-Install

Verify ‘Joint Angles’ ‘Destination’ for JEF Pre-Install position.

SR	SY	SP	EP	WP	WY	WR
-23.3	+120.6	-206.0	+72.5	+24.4	+16.5	-136.7

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+241.8	+174.7	-131.4	-65.1	-71.7	-120.0	-47.0
TGT	-23.3	+120.6	-206.0	+72.5	+24.4	+16.5	-136.7
ERR	+265.1	+54.1	+74.6	-137.6	-96.1	-136.5	+89.7

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

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PCS MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS at JEF Pre-install position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
-23.3	+120.6	-206.0	+72.5	+24.4	+16.5	-136.7
X	Y	Z	Pitch	Yaw	Roll	
0	-190	0	0.0	0.0	0.0	
FOR	Loaded – JEF Install ISSACS, SR Held					
Disp	JPM>JEF Install ISSACS					

Verify JEM RMS at EF Install Viewing Position.

Notify EFBM operator: Go for EFBM Activation.

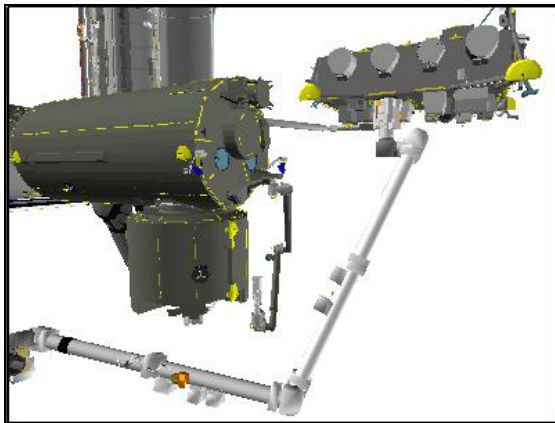


Figure 31.- JEF Pre-Install
(09: P1 Lower Outboard: +153, -7).

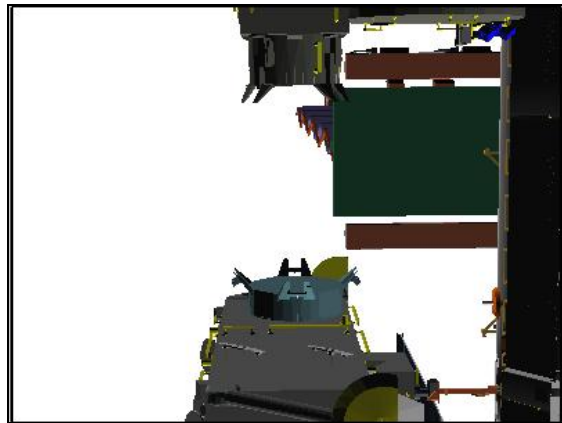


Figure 32.- JEF Pre-Install
(SRMS RSC).

25. JEF INSTALL

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (+153, -10)	52: JEMRMS MA EE (0, 0)	51: JEM EXT A (+75, -40)	Camera B (-36, +14)	SRMS RSC
07: P1 LOIB (-140, +10)	24: Tip Elbow (+25, 0)	22: Base Elbow (+85, -10)		

RHC RATE → VERNIER (Verify Vernier on PCS)

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NOTE

1. The alignment strategy during JEF install is as follows:
 - a. Perform coarse alignment at the petal overlap position (~30 cm from fully mated).
 - b. Perform final alignment at the EVA markings overlap position (~15 cm from fully mated).
 - c. Once final alignment is made, maneuver into the capture envelope until contact between the active and passive halves is observed or suspected.
2. Approach rate should be ~0.3 cm/s during the maneuver to RTL.

On EFBM operator: Go for Maneuver to Ready-to-Latch (RTL).

PCS

MSS: SSRMS: Thrusters: Thruster Controls for MSS Ops

Verify 'Desat Request' – Inh

Verify 'Auto Att Control Handover to RS' – Inh

```
*****
* If using shuttle attitude control and attitude maintenance reqd
* | DAP: LVLH
* | When rates damped
* | | DAP: FREE > 2 seconds
* | | DAP: AUTO
* | | When in attitude and rates damped
* | | DAP: FREE
*****
```

MSS: SSRMS: SSRMS

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock: Joint Lock

cmd Shoulder Roll (Verify SR – Locked)

THC/
RHC

25.1 COARSE ALIGNMENT

Maneuver to Petal Overlap Position (within 5 cm/1 deg).

THC +Y Right

Locked						
SR	SY	SP	EP	WP	WY	WR
-23.3	+123.4	-208.4	+86.5	+13.6	+17.4	-139.4
X	Y	Z	Pitch	Yaw	Roll	
0	-35	0	0.0	0.0	0.0	
FOR	Loaded – JEF Install ISSACS, SR Held					
Disp	JPM>JEF Install ISSACS					

Perform coarse alignment as required.

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25.2 FINAL ALIGNMENT

Maneuver Final alignment position (within 5 cm/1 deg).

Locked						
SR	SY	SP	EP	WP	WY	WR
-23.3	+123.7	-208.5	+88.1	+12.2	+17.5	-139.7
X	Y	Z	Pitch	Yaw	Roll	
0	-15	0	0.0	0.0	0.0	
FOR	Loaded – JEF Install ISSACS, SR Held					
Disp	JPM>JEF Install ISSACS					

Perform final alignment as required.

25.3 MANEUVER TO INSTALL

Maneuver to Install position (within 5 cm/1 deg).

Locked						
SR	SY	SP	EP	WP	WY	WR
-23.3	+123.9	-208.6	+88.8	+11.6	+17.6	-139.9
X	Y	Z	Pitch	Yaw	Roll	
0	-2	0	0.0	0.0	0.0	
FOR	Loaded – JEF Install ISSACS, SR Held					
Disp	JPM>JEF Install ISSACS					

PCS

MSS: SSRMS:

Verify Posn Hold – orange

Enter Mode – Standby (Verify blue)

25.4 SSRMS LIMP AND LEE DERIGIDIZATION

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

MSS: SSRMS:

Verify all joints – Limped

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Derigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Derigidize

RHC

TRIGGER → Press (momentarily) (SCR 19064)

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PCS

Verify 'Carriage' Tension – 890 N (\pm 200 N)

Verify 'Carriage' Retract – grey (90 s max)

Notify EFBM operator: Mvnr to RTL complete, SSRMS is Limped and LEE carriage is partially derigidized, GO for EFBM Capture Latch Closing.

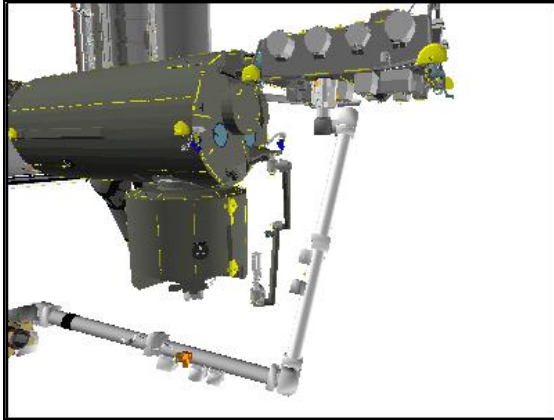


Figure 33.- JEF Install
(09: P1 Lower Outboard: +153, -10).

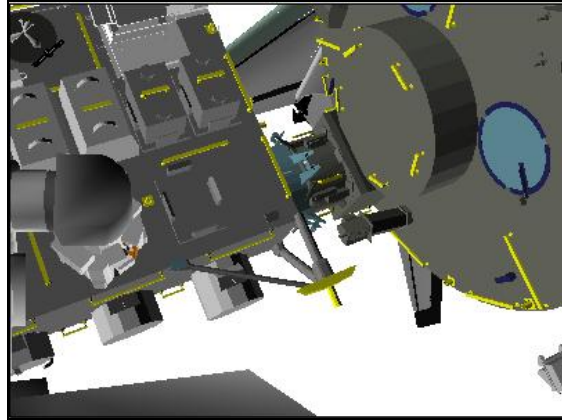


Figure 34.- JEF Install
(24: Tip Elbow: +25,0).

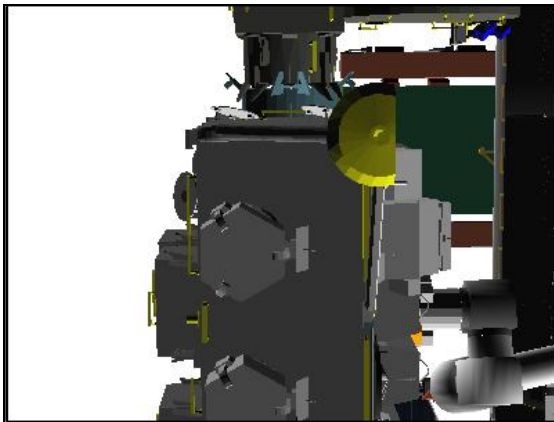


Figure 35.- JEF Install
(SRMS RSC).

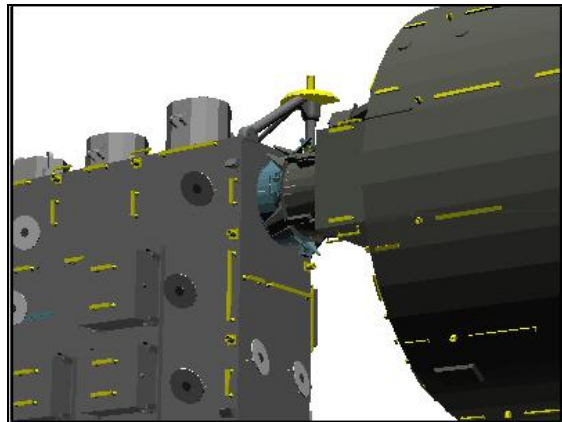


Figure 36.- JEF Install
(Camera B: -36, +14: 30 mm)

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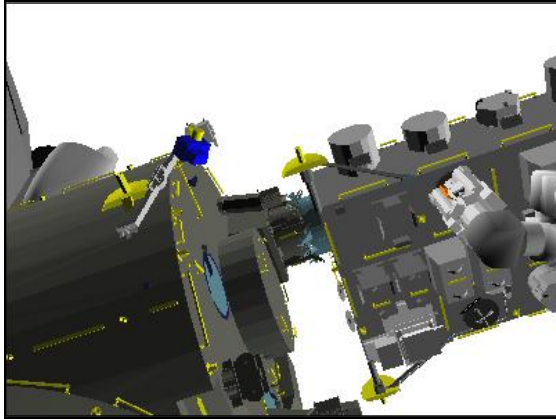


Figure 37.- JEF Install
(22: Base Elbow: +85, -10).

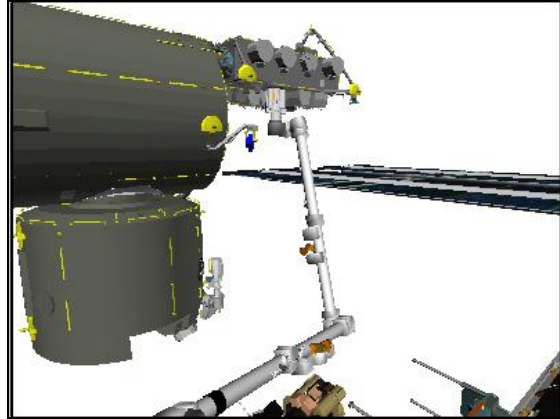


Figure 38.- JEF Install
(07: P1 Lower Inboard: -140, -10).

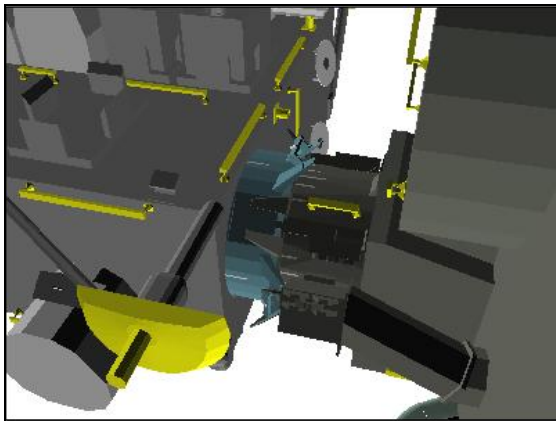


Figure 39.- JEF Install
(51: JEM EXT A: +75, -40).

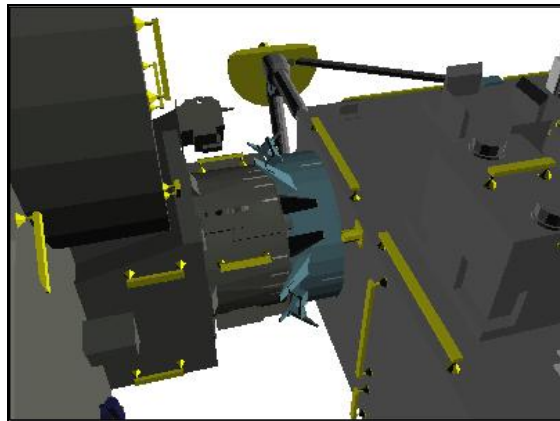


Figure 40.- JEF Install
(52: JEM EXT F: -75, -40).

26. SAFING MONITORING

On EFBM operator: Begin SSRMS Safing Monitoring.

Monitor the following indicators during EFBM second phase capture:

On RWS Monitor x: Verify SSRMS status remains Limped, and the monitor number is flashing

On the RWS DCP: Verify RWS status remains Active

If the SSRMS status transitions to Braked or Safed, the monitor number stops flashing, or the RWS status transitions to Backup
Notify EFBM operator: Stop EFBM.

27. JEF RELEASE 2

On EFBM operator: Active EFBM berth complete, SSRMS GO for JEF ungrapple.

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```
*****  
* If using shuttle attitude control  
* | DAP: LVLH  
* | When rates damped  
* | | DAP: FREE > 2 seconds  
* | | DAP: AUTO  
*****
```

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3
09: P1 LOOB (+153, -10)	25: Tip LEE	52: JEM EXT A (+35, -20)

27.1 Carriage Rigidization and Display Frame Change

PCS

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Rigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Rigidize

RHC

TRIGGER → Press (momentarily) (SCR 19064)

PCS

Verify 'Carriage' Tension ~5500 N

Verify 'Carriage' Retract – blue

Verify 'Carriage' Brakes – On (90 s max)

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Change Display ► JPM ► JEF FRGF1 (Verify JPM>JEF FRGF1)

27.2 Carriage Full Derigidization

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

MSS: SSRMS:

Verify all joints – Limped

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Extend ► Hard Stops ► Slow, Hard Stops

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Verify Speed – Slow

Verify Stops – Hard

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Extend Carriage

RHC

TRIGGER → Press (hold until 'Carriage' Derigidize – blue)
(10 s max)

cmd Terminate (Verify 'Motors' – Inh)

27.3 Auto Release

MSS: SSRMS: Tip LEE:

cmd Release ► Automatic ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Release

RHC

TRIGGER → Press (momentarily)

PCS

Verify 'Snare' Open – blue (12 s max)
Verify 'Carriage' Extend – blue (90 s max)

28. JEF INSTALLED BACKOFF

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

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THC/
RHC

Maneuver SSRMS to JEF Installed Backoff position (within 5 cm/1 deg).

Locked						
SR	SY	SP	EP	WP	WY	WR
-23.3	+128.0	-222.9	+98.0	+18.0	+18.8	-144.1
X	Y	Z	Pitch	Yaw	Roll	
-200	0	0	0.0	0.0	0.0	
FOR	Unloaded – LEE Tip, SR Held					
Disp	JPM>JEF FRGF1					

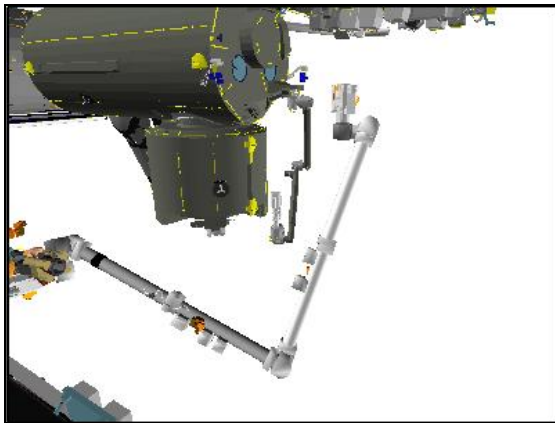


Figure 41.- JEF Installed Backoff
(09: P1 Lower Outboard: +150, -20).

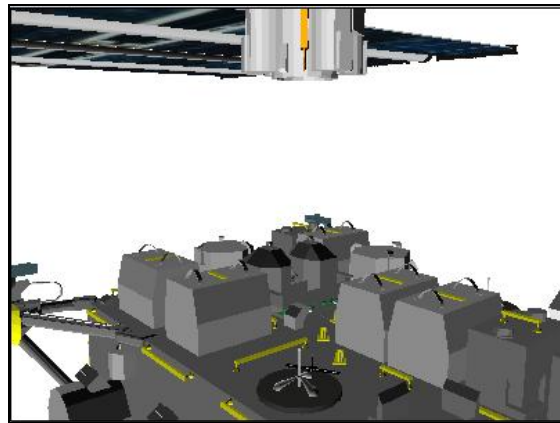


Figure 42.- JEF Installed Backoff
(51: JEM EXT A: +40, -10).

29. JOCAS TO OVERNIGHT PARK/MT TRANSLATE STOW (3 MINUTES)

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3
09: P1 LOOB (+130, -30)	07: P1 LOIB (-150, 0)	22: Base Elbow (+35, -20)
	03: S1 LOOB (+80, -10)	37: MBS Mast (+10, +30)

PCS

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

pick File ► JEF ► Overnight Park

Verify 'Joint Angles' 'Destination' for Overnight Park position.

SR	SY	SP	EP	WP	WY	WR
+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0

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cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	-23.3	+128.0	-222.9	+98.0	+18.0	+18.8	-144.1
TGT	+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0
ERR	-70.8	+25.4	+1.5	-51.9	-2.0	+18.8	-169.1

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0

NOTE

Expect the following message when safing is commanded:
'R3Z - MSS OCS SSRMS Prime(Redun) ACU SRT Cat-1 Brk Stat Fail' (SCR 17495)
 This message should return to Norm.

DCP SAFING → SAFE (Verify ON)

Notify SRMS operator: SSRMS at Overnight Park, GO for SRMS maneuver to precradle.

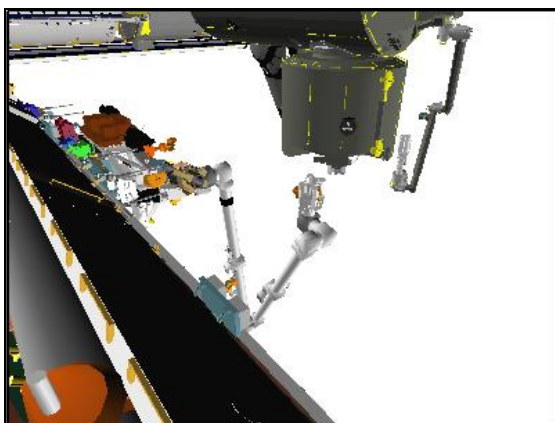


Figure 43.- Overnight Park/MT Xlate Stow (09: P1 Lower Outboard: +130, -30).

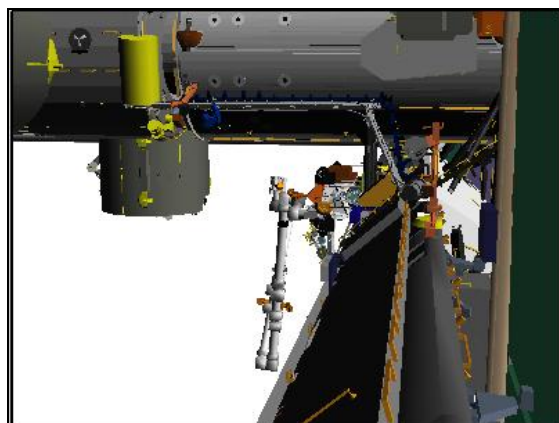


Figure 44.- Overnight Park/MT Xlate Stow (03: S1 Lower Outboard: +80, -10).

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1. HAND CONTROLLER CALIBRATION

1.1 Translational Hand Controller (THC) Calibration

THC

- Deflect [X] Axis to positive hard stop where [X] =
- Deflect [X] Axis to negative hard stop.
- Repeat

1.2 Rotational Hand Controller (RHC) Calibration

RHC

- Deflect [X] Axis to positive hard stop where [X] =
- Deflect [X] Axis to negative hard stop.
- Repeat

2. SETUP

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
13: LAB Stbd Zenith (-180, -40)	07: P1 LOIB (-130, -20)	51: JEM EXT A (-20, +40)	SRMS Elbow (+75, +10)	Camera B (-35, +10)

PCS

MSS: SSRMS:

Change Unloaded Parameters ► Unloaded ► LEE Tip SRH
Verify 'Unloaded Parameters' (two) – LEE Tip, SR Held

Change Loaded Parameters ► VCC ► VCC Stow SYH
Verify 'Loaded Parameters' (two) – VCC Stow, SY Held

Change Display ► ISS ► ISSACS (Verify ISS>ISSACS)

Change Command ► SSRMS ► Internal (Verify SSRMS>Internal)

Verify SSRMS at MT Translate Stow position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0
X	Y	Z	Pitch	Yaw	Roll	
+632	-2181	+10	-95.0	-10.5	+1111.5	
FOR	Unloaded – LEE Tip, SR Held					
Disp	ISS>ISSACS					

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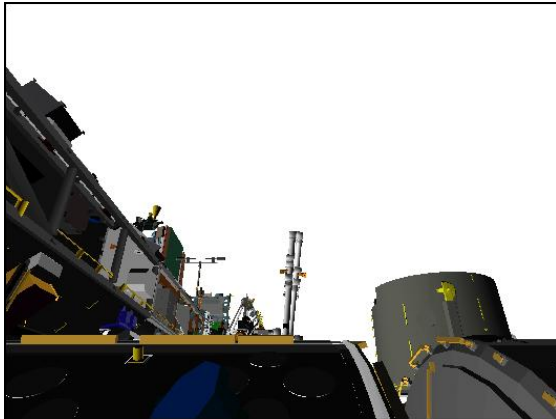


Figure 1.- MT Translate Stow
(13: LAB Stbd Zenith: -180, -40).

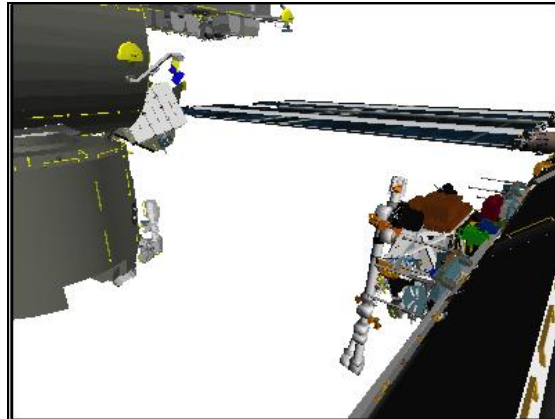


Figure 2.- MT Translate Stow
(07: P1 Lower Inboard: -130, -20).



Figure 3.- MT Translate Stow
(51: JEM EXT A: -20, +40).

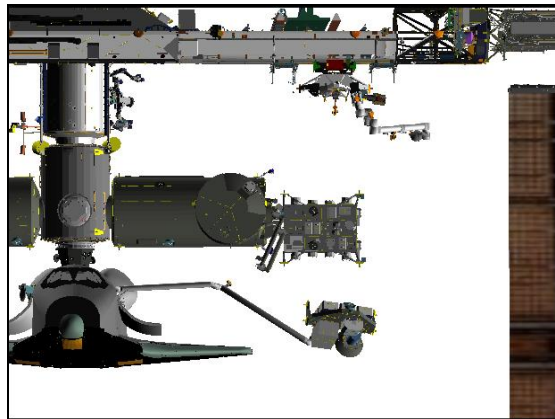


Figure 4.- MT Translate Stow
(ISS Nadir).

3. JOCAS TO START (2 MINUTES)

On SRMS operator GO: SRMS at ICC Handoff position with Brakes On
GO for ICC Grapple:

NOTE

Expect cross cluster collision warning.

RHC RATE → COARSE (Verify Coarse on PCS)

PCS MSS: SSRMS: MSS Safing:

cmd SSRMS: Remove (Verify Not Safed)

DCP BRAKES SSRMS → OFF (Verify OFF)

PCS MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

2.101 ICC STOW ON POA

(RBT FS/2JA/FIN 1)

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SSRMS Joint OCAS

pick File ► VCC ► VCC Start

Verify 'Joint Angles' 'Destination' for Start position.

SR	SY	SP	EP	WP	WY	WR
+210.0	+102.6	-136.7	+149.9	+46.3	+15.5	-97.1

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0
TGT	+210.0	+102.6	-136.7	+149.9	+46.3	+15.5	-97.1
ERR	-162.5	0.0	-87.7	0.0	-26.3	-15.5	+122.1

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+210.0	+102.6	-136.7	+149.9	+46.3	+15.5	-97.1

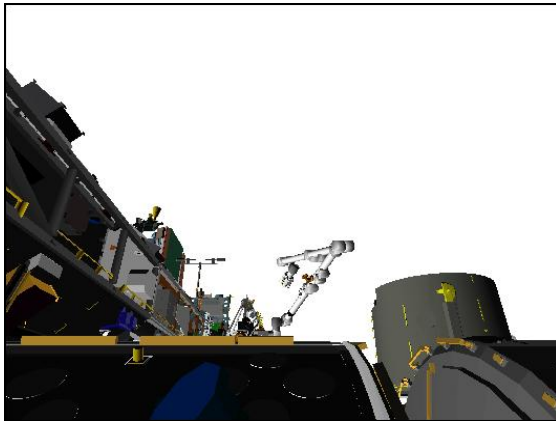


Figure 5.- Start
(13: LAB Stbd Zenith: -180, -40).

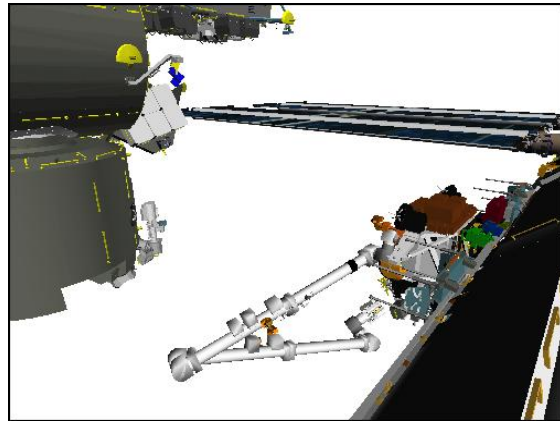


Figure 6.- Start
(07: P1 Lower Inboard: -130, -20).

2.101 ICC STOW ON POA

(RBT FS/2JA/FIN 1)

4. JOCAS TO ICC PRE-GRAPPLE (2.5 MINUTES)

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3
13: LAB Stbd Zenith (-180, -40)	07: P1 LOIB (-130, -20)	09: P1 LOOB (-180, -15)

NOTE Expect EP singularity between +15 and -15.

SSRMS Joint OCAS

pick File ► VCC ► VCC Pre-Grapple

Verify 'Joint Angles' 'Destination' for ICC Pre-Grapple position.

SR	SY	SP	EP	WP	WY	WR
+210.0	+157.4	-136.7	-106.1	+46.3	+15.5	-97.1

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+210.0	+102.6	-136.7	+149.9	+46.3	+15.5	-97.1
TGT	+210.0	+157.4	-136.7	-106.1	+46.3	+15.5	-97.1
ERR	0.0	-54.8	0.0	+256.0	0.0	0.0	0.0

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+210.0	+157.4	-136.7	-106.1	+46.3	+15.5	-97.1

2.101 ICC STOW ON POA

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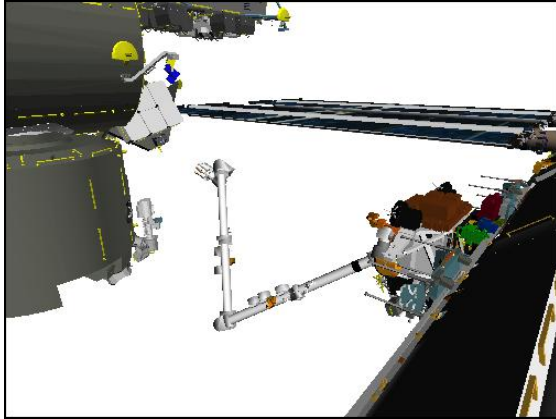


Figure 7.- ICC Pre-Grapple
(07: P1 Lower Inboard: -130, -20).

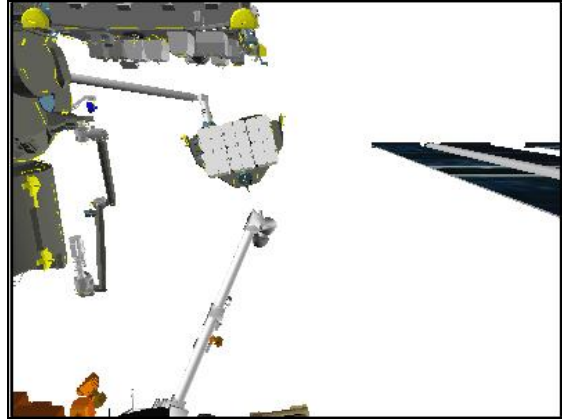


Figure 8.- ICC Pre-Grapple
(09: P1 Lower Outboard: -180, -15).

5. GRAPPLE ICC

MSS: SSRMS: Thrusters:

Verify 'Desat Request:' Inhibit
Verify 'Auto Att Control Handover to RS' – Inh

* If using shuttle attitude control
* Verify in attitude, then DAP: FREE

5.1 Setup

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
51: JEM EXT A (+60, +20)	25: Tip LEE	07: P1 LOIB (-130, -20)	SRMS Elbow (+40, 0)	Camera B (-40, 0)

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

RHC

RATE → VERNIER (Verify Vernier on PCS)

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: As required

5.2 Grapple

RHC/
THC

Maneuver to within grapple envelope.

2.101 ICC STOW ON POA

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PCS

MSS: SSRMS: Tip LEE:

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Verify 'Confirm or Terminate' prompt.

CAUTION

Due to end-to-end system latency, the RHC Trigger is hot up to 3 seconds prior to receiving a Trigger Hot icon status on the PCS.

NOTE

Once the trigger is hot, only safing or trigger commands should be sent to the Robotics equipment. If a configuration change is required, including routing MSS Cameras, safe the system to exit LEE operations (SCR 23262, 14662).

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Capture

RHC

TRIGGER → press (momentarily)

PCS

Verify 'Snare' Close, Capture (two) – blue (12 s max)

Verify Capture to Latch – Yes (SCR 19282)

Verify 'Carriage' Tension ~5500 N (90 s max)

Verify 'Carriage' Retract – blue

Verify 'Latch' Latch – blue (80 s max)

cmd 'Umbilical' Mate (Verify 'Confirm or Terminate' prompt)

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Mate

RHC

TRIGGER → Press (momentarily)

PCS

Verify 'Umbilical' Mate – blue (10 s max)

Verify 'Connector Continuity' Prime, Redundant (two) – Yes

5.3 Payload Power

MSS: SSRMS: Power:

cmd Payload Prime – ON (Verify ON)

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5.4 Grapple Cleanup

Expected ICC Grapple position (within 5 cm/1 deg).

Locked						
SR	SY	SP	EP	WP	WY	WR
+210.0	+154.0	-150.4	-81.8	+35.9	+12.3	-98.1
X	Y	Z	Pitch	Yaw	Roll	
+1840	-1568	+341	+115.6	-13.7	-161.4	
FOR	Loaded – VCC Stow, SY Held					
Disp	ISS>ISSACS					

DCP

BRAKES SSRMS → ON (Verify ON)

Notify SRMS operator: SSRMS Grappled to ICC, SRMS GO for ICC Ungrapple.

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: 1.0 (Verify 1.0)

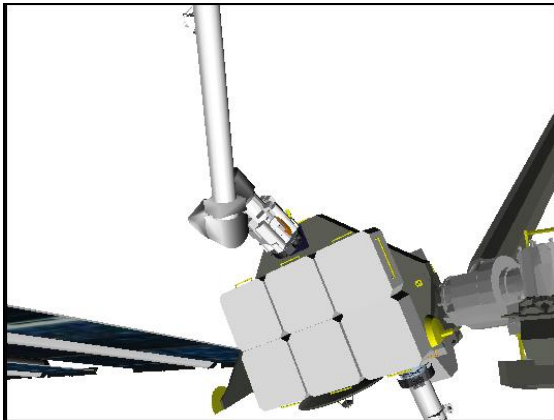


Figure 9.- ICC Grapple
(51: JEM EXT A: +60, +20).

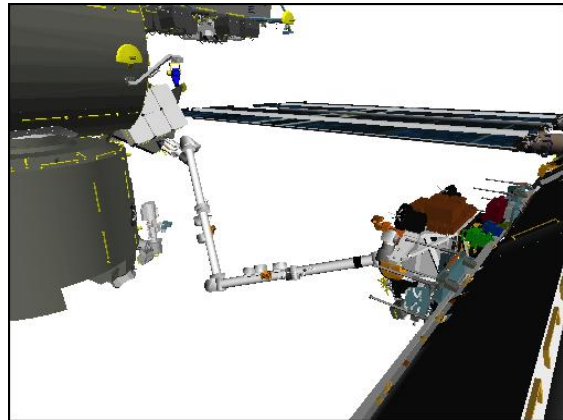


Figure 10.- ICC Grapple
(07: P1 Lower Inboard: -130, -20).

6. SINGLE JOINT TO INTERMEDIATE 1

On SRMS operator GO, SRMS is ungrappled and clear with Brakes ON, SSRMS GO to mnvr ICC.

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (-180, -15)	07: P1 LOIB (-130, -20)	51: JEM EXT A (+60, +10)	SRMS Elbow (+40, 0)	Camera B (-40, 0)

2.101 ICC STOW ON POA

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```
*****
* If using shuttle attitude control and attitude maintenance reqd
*   DAP: LVLH
*   When rates damped
*   DAP: FREE > 2 seconds
*   DAP: AUTO
*   When in attitude and rates damped
*   DAP: FREE
*****
```

BRAKES SSRMS → OFF (Verify OFF)

Change Display ► MBS ► POA (Verify MBS>POA)

PCS

MSS: SSRMS:

Enter Mode – Single (Verify blue)

WARNING
The active joint must be checked on the PCS before initiating motion. Failure to do so may result in movement of the wrong joint.

DCP

JOINT SELECT → SHOULDER YAW (Verify SY – Selected on PCS)

THC

Perform “+” Single Joint maneuver to SY: +165.0 (THC up).

Verify SSRMS at Intermediate 1 position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+210.0	+165.0	-150.4	-81.8	+35.9	+12.3	-98.1
X	Y	Z	Pitch	Yaw	Roll	
+83	+1487	+212	+85.8	-33.4	+123.1	
FOR	Loaded – VCC Stow, SY Held					
Disp	MBS>POA					



Figure 11.- Intermediate 1
(09: P1 Lower Outboard: -180, -15).

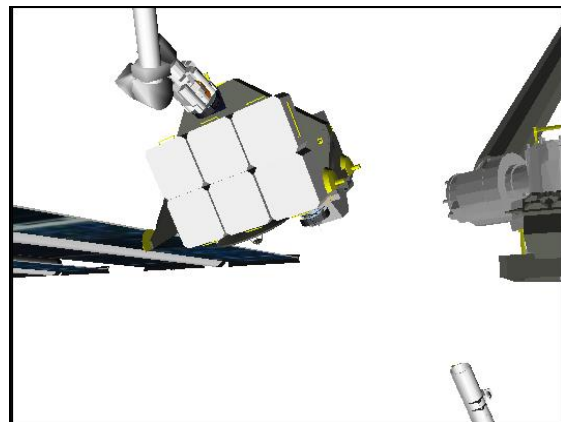


Figure 12.- Intermediate 1
(51: JEM EXT A: +60, +10).

2.101 ICC STOW ON POA

(RBT FS/2JA/FIN 1)

7. JOCAS TO INTERMEDIATE 2 (10.5 MINUTES)

RHC RATE → COARSE (Verify Coarse on PCS)

PCS MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

pick File ► VCC ► VCC Intermediate 2

Verify 'Joint Angles' 'Destination' for Intermediate 2 position.

SR	SY	SP	EP	WP	WY	WR
+210.0	+194.2	-186.2	-107.8	-131.0	-11.8	-160.6

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+210.0	+165.0	-150.4	-81.8	+35.9	+12.3	-98.1
TGT	+210.0	+194.2	-186.2	-107.8	-131.0	-11.8	-160.6
ERR	0.0	-29.2	+35.8	+26.0	+166.9	+24.1	+62.5

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+210.0	+194.2	-186.2	-107.8	-131.0	-11.8	-160.6

```
*****
* If using shuttle attitude control and attitude maintenance reqd
* | DAP: LVLH
* | When rates damped
* | | DAP: FREE > 2 seconds
* | | DAP: AUTO
* | | When in attitude and rates damped
* | | DAP: FREE
*****
```

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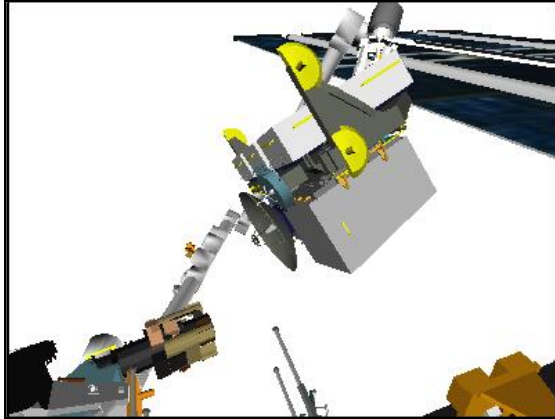


Figure 13.- Intermediate 2
(09: P1 Lower Outboard: -160, -30).



Figure 14.- Intermediate 2
(07: P1 Lower Inboard: -110, -20).

8. SINGLE JOINT TO ICC PRESTOW

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (-160, -30)	07: P1 LOIB (-110, -20)	51:JEM EXT A (-20, +30)	SRMS Elbow (+70, +20)	Camera B (-40, -20)

RHC RATE → VERNIER (Verify Vernier on PCS)

PCS MSS: SSRMS:

Enter Mode – Single (Verify blue)

DCP JOINT SELECT → SHOULDER ROLL (Verify SR – Selected on PCS)

THC Perform “+” Single Joint maneuver to SR: +237.5 (THC up).

Verify SSRMS at ICC Pre-Stow position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+237.5	+194.2	-186.2	-107.8	-131.0	-11.8	-160.6
X	Y	Z	Pitch	Yaw	Roll	
+200	0	0	0.0	0.0	0.0	
FOR	Loaded – VCC Stow, SY Held					
Disp	MBS>POA					

2.101 ICC STOW ON POA

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```
*****
* If using shuttle attitude control and attitude maintenance
* reqd
*   DAP: LVLH
*   When rates damped
*     DAP: FREE > 2 seconds
*     DAP: AUTO
*   When in attitude and rates damped
*     DAP: FREE
*****
```

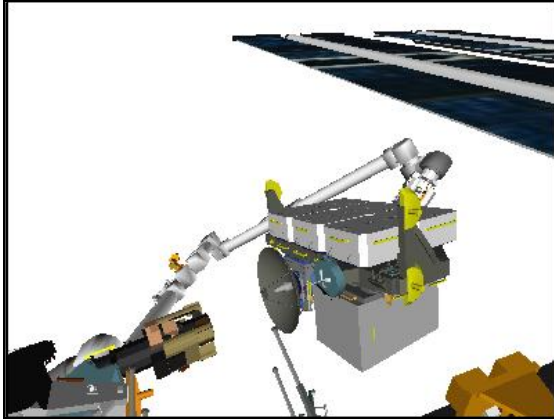


Figure 15.- ICC PreStow
(09: P1 Lower Outboard: -160, -30).

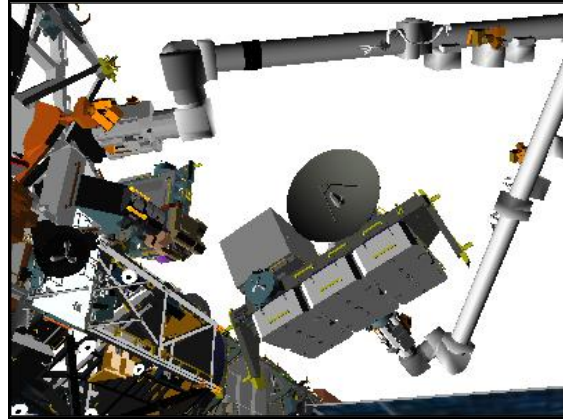


Figure 16.- ICC PreStow
(51: JEM EXT A: -20, +30).

9. INSTALLING ICC ON POA

9.1 Setup

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (-170, -40)	32: POA	22:Base Elbow (-40, 0) 51:JEM EXT A (-20, +30)	Camera B (-40, +25)	

PCS

MSS: SSRMS: MBS: MSS Safing:

cmd 'MBS' Remove (Verify Not Safed)

MSS: SSRMS: MBS:

Change POA Payload ► VCC ► VCC Grapple

Verify 'POA Payload' – VCC

MSS: SSRMS:

Verify Command – SSRMS>Internal

2.101 ICC STOW ON POA

(RBT FS/2JA/FIN 1)

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock: Joint Lock

cmd Shoulder Yaw (Verify SY – Locked)

NOTE
 SSRMS clearance to ICC increases from ~22” to 31” during maneuver to Grapple Envelope.

9.2 Attitude Control Configuration

MSS: SSRMS: Thrusters: Thruster Controls for MSS Ops

Verify ‘Desat Request:’ Inhibit

Verify ‘Auto Att Control Handover to RS’ – Inh

```
*****
* If using shuttle attitude control and attitude maintenance reqd
*   DAP: LVLH
*   When rates damped
*   DAP: FREE > 2 seconds
*   DAP: AUTO
*   When in attitude and rates damped
*   DAP: FREE
*****
```

9.3 Maneuvering to within Grapple Envelope

NOTE

1. ICC install is performed using "Fly Payload" Command frame (THC -X Pull to bring ICC into POA).
2. If CETA Brakes fully deployed:
 - a. PM to CETA Brake ~27” – JEM EXT A
 - b. ICC to CETA Brake ~13” – JEM EXT A

RHC/
THC

Maneuver ICC to within grapple envelope.

Expected ICC Install on POA position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+229.5	+194.2	-175.4	-125.3	-122.8	-5.0	-163.9
X	Y	Z	Pitch	Yaw	Roll	
+16	0	0	0.0	0.0	0.0	
FOR	Loaded – ICC Stow, SY Held					
Disp	MBS>POA					

2.101 ICC STOW ON POA

(RBT FS/2JA/FIN 1)

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Figure 17.- ICC Install on POA
(09: P1 Lower Outboard: -175, -40).

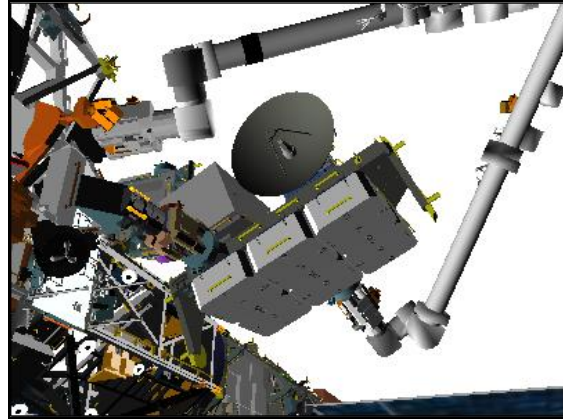


Figure 18.- ICC Install on POA
(52: JEM EXT A: -20, +30).

10. POA ICC GRAPPLE

10.1 Grapple

PCS

MSS: MBS: POA:

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Capture

RHC

TRIGGER → press (momentarily)

PCS

Verify 'Snare' Close, Capture (two) – blue (12 s max)

Verify Capture to Latch – Yes (SCR 19282)

Verify 'Carriage' Tension ~5500 N (90 s max)

Verify 'Carriage' Retract – blue

Verify 'Latch' Latch – blue (80s max)

10.2 Attitude Control Config

```
*****
* If using shuttle attitude control
* |   DAP: LVLH
* |   When rates damped
* |   |   DAP: FREE > 2 seconds
* |   |   DAP: AUTO
*****
```

10.3 Grapple Cleanup

Notify SRMS operator: SSRMS at ICC Install posn, SRMS GO for EVA2 viewing.

DCP

BRAKES SSRMS → ON (Verify ON)

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PCS

MSS: SSRMS:

Change Display ► MBS ► Stowed VCC PVGF2 (Verify
MBS>Stowed VCC PVGF2)

11. SSRMS ICC RELEASE

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (-160, -35)	25: Tip LEE	51: JEM EXT A (-10, +30)	Camera B (-40, +25)	

11.1 Removing SSRMS Payload Power

MSS: SSRMS: Power:

cmd Payload Prime – OFF (Verify OFF)

11.2 Retract SSRMS Umbilical

MSS: SSRMS: Tip LEE:

cmd 'Umbilical' Demate (Verify '**Confirm or Terminate**' prompt)

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Demate

RHC

TRIGGER → Press (momentarily)

PCS

Verify 'Umbilical' Demate – blue (10 s max)

Verify 'Connector Continuity' Prime, Redundant (two) – No

11.3 Mate POA Umbilical

MSS: MBS: POA:

cmd 'Umbilical' Mate (Verify '**Confirm or Terminate**' prompt)

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Mate

RHC

TRIGGER → Press (momentarily)

PCS

Verify 'Umbilical' Mate – blue (10 s max)

Verify 'Connector Continuity' Prime, Redundant (two) – Yes

11.4 Applying POA Payload Power

MSS: MBS: POA P/L POWER:

cmd 'Prime' – ON (Verify ON)

cmd 'Redundant' – ON (Verify ON)

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11.5 SSRMS Limp

On SRMS operator: SRMS at EVA2 viewing Position, Go for ICC Release:

DCP BRAKES SSRMS → OFF (Verify OFF)

PCS MSS: SSRMS:

Verify Command – SSRMS>Internal

√Vernier

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

MSS: SSRMS:

Verify all joints – Limped

11.6 Auto Release - Push Off

MSS: SSRMS: Tip LEE:

cmd Release ► Automatic ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Release

RHC TRIGGER → Press (momentarily)

PCS
Verify 'Latch' Unlatch – blue (65 s max)
Verify 'Carriage' Retract – blue (90 s max)
Verify 'Snare' Open – blue (12 s max)
Verify 'Carriage' Derig – blue (90s max)
Verify 'Carriage' Extend – blue (90 s max)

11.7 SSRMS Backoff

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

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MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

NOTE
SSRMS to SGANT min clearance ~22” – JEM EXT A.

THC

Back off from grapple fixture to ICC Backoff position.

Locked						
SR	SY	SP	EP	WP	WY	WR
+228.6	+192.3	-182.6	-113.1	-127.4	-3.4	-162.7
X	Y	Z	Pitch	Yaw	Roll	
-150	0	0	0.0	0.0	0.0	
FOR	Unloaded – LEE Tip, SR Held					
Disp	MBS>Stowed ICC PVGF2					

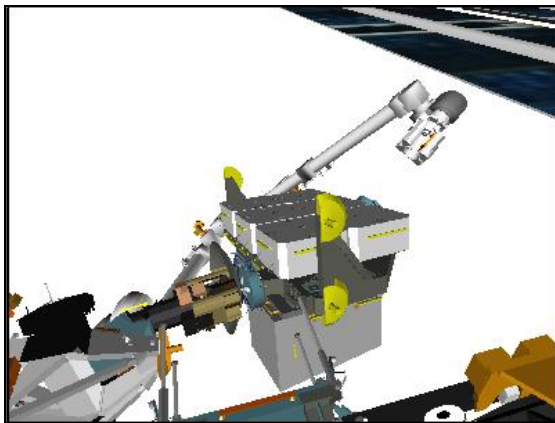


Figure 19.- ICC Backoff
(09: P1 Lower Outboard: -165, -35).

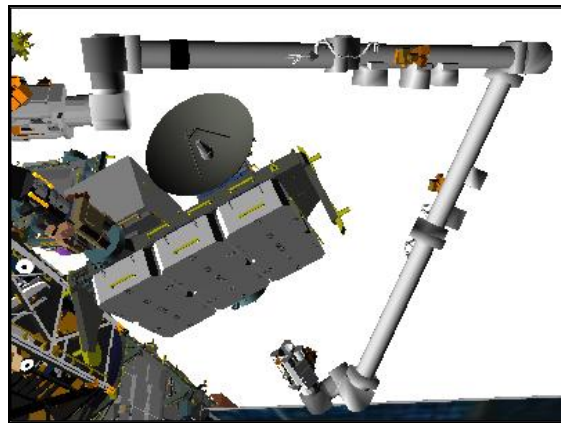


Figure 20.- ICC Backoff
(51: JEM EXT A: -10, +30).

12. JOCAS TO ICC CLEAR (1.5 MINUTES)

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
07: P1 LOIB (-120, -20)	22: Base Elbow (-35, -5)	51: JEM EXT A (-10, +30)	SRMS EE	

PCS

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

SSRMS Joint OCAS

pick File ► VCC ► VCC Clear

Verify 'Joint Angles' 'Destination' for ICC Clear position.

SR	SY	SP	EP	WP	WY	WR
+193.5	+189.4	-112.1	-117.8	-124.4	-3.7	-159.2

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cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+228.6	+192.3	-182.6	-113.1	-127.4	-3.4	-162.7
TGT	+193.5	+189.4	-112.1	-117.8	-124.4	-3.7	-159.2
ERR	+35.1	+2.9	-70.5	+4.7	-3.0	+0.3	-3.5

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+193.5	+189.4	-112.1	-117.8	-124.4	-3.7	-159.2

DCP

BRAKES SSRMS → ON (Verify ON)

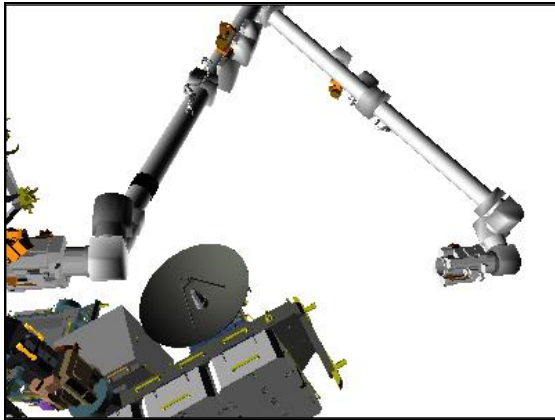


Figure 21.- ICC Clear
(51: JEM EXT A: -10, +45).

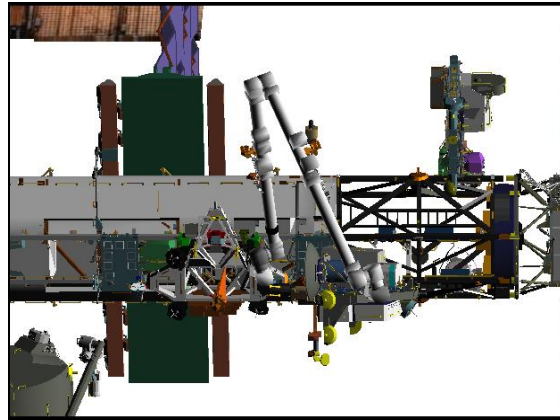


Figure 22.- ICC Clear
(ISS Aft).

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NOTE

1. Verify SRMS at EVA2 Viewing position:
SY = +130.0, +15.0, -40.4, +103.0, -7.0, -213.0 =WR

2. Verify JEMRMS at JLE Install Viewing position:
SY = -7.0, +70.0, -115.0, -40.0, 0.0, +7.0 =WR

1. HAND CONTROLLER CALIBRATION

1.1 Translational Hand Controller (THC) Calibration

THC

Deflect [X] Axis to positive hard stop where [X] =

Deflect [X] Axis to negative hard stop.

Repeat

1.2 Rotational Hand Controller (RHC) Calibration

RHC

Deflect [X] Axis to positive hard stop where [X] =

Deflect [X] Axis to negative hard stop.

Repeat

2. SETUP

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (-160, -35)	24: Tip Elbow (-20, 0)	51: JEM EXT A (-10, +30)	SRMS EE	
		07: P1 LOIB (-120, -20)		

PCS MSS: SSRMS:

Verify 'Unloaded Parameters' (two) – LEE Tip, SR Held

Change Display ► ISS ► ISSACS (Verify ISS>ISSACS)

Change Command ► ISS ► ISSACS (Verify ISS>ISSACS)

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: 1.0 (Verify 1.0).

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Verify SSRMS at ICC Clear position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+193.5	+189.4	-112.1	-117.8	-124.4	-3.7	-159.2
X	Y	Z	Pitch	Yaw	Roll	
+984	-2157	-299	-168.0	+16.2	-174.9	
FOR	Unloaded – LEE Tip, SR Held					
Disp	ISS>ISSACS					

3. JOCAS TO EVA PREP (2 MINUTES)

On SRMS operator GO, SRMS at EVA2 VIEWING, SSRMS GO for ORU Transfers.

Verify with **MCC-H** Port SARJ, arrays, and Port TRRJ are locked for EVA2 operations.

PCS MSS: SSRMS: MSS Safing:

cmd SSRMS: Remove (Verify Not Safed)

DCP BRAKES SSRMS → OFF (Verify OFF)

RHC RATE → COARSE (Verify Coarse on PCS)

PCS MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

<u>NOTE</u>
Expect singularity warning for EP between -15 and +15 deg.

pick File ► EVA2 ► EVA Prep

Verify 'Joint Angles' 'Destination' for EVA Prep position.

SR	SY	SP	EP	WP	WY	WR
+230.5	+188.8	-170.0	+50.0	-50.0	-3.4	+100.0

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+193.5	+189.4	-112.1	-117.8	-124.4	-3.7	-159.2
TGT	+230.5	+188.8	-170.0	+50.0	-50.0	-3.4	+100.0
ERR	-37.0	+0.6	+57.9	-167.8	-74.4	-0.3	-259.2

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

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PCS MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+230.5	+188.8	-170.0	+50.0	-50.0	-3.4	+100.0

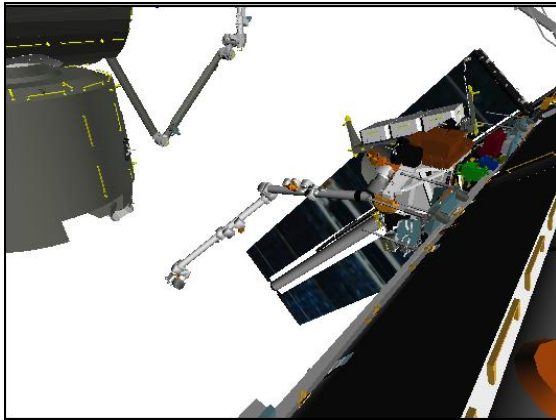


Figure 1.- EVA Prep
(07: P1 Lower Inboard: -130, -30).

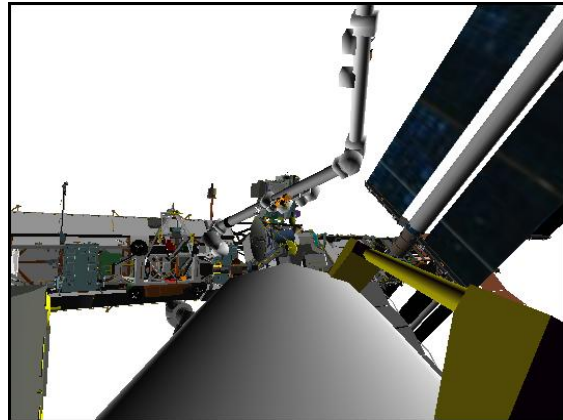


Figure 2.- EVA Prep
(SRMS EE).

4. JOCAS TO APFR PRE-INSTALL (3 MINUTES)

NOTE
SSRMS to SGANT clearance ~35" – SRMS EE.

RHC RATE → VERNIER (Verify Vernier on PCS)

SSRMS Joint OCAS

pick File ► EVA2 ► APFR Pre-install

Verify 'Joint Angles' 'Destination' for APFR Pre-install position.

SR	SY	SP	EP	WP	WY	WR
+223.1	+193.2	-123.3	+135.2	-22.6	-37.4	+159.9

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+230.5	+188.8	-170.0	+50.0	-50.0	-3.4	+100.0
TGT	+223.1	+193.2	-123.3	+135.2	-22.6	-37.4	+159.9
ERR	+7.4	-4.4	-46.7	-85.2	-27.4	+34.0	-59.9

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

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DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+223.1	+193.2	-123.3	+135.2	-22.6	-37.4	+159.9



Figure 3.- APFR PreInstall
(51: JEM EXT A: -50, +65).

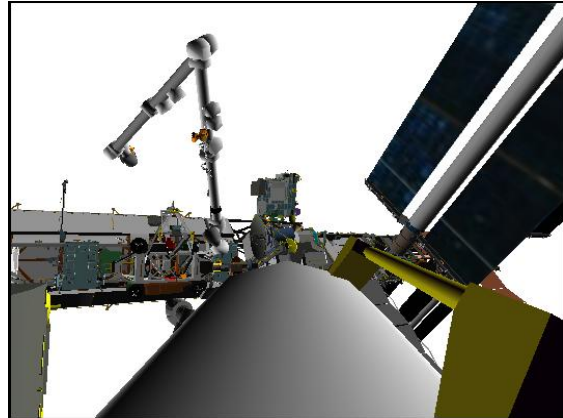


Figure 4.- APFR PreInstall
(SRMS EE).

5. MANUAL TO APFR INSTALL

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
13: LAB Stbd Zenith (-180, -40)	51: JEM EXT A (-60, +55)	24: Tip Elbow (+10, 0) 22: Base Elbow (+45, -5)	SRMS EE	

NOTE

1. Expect cross cluster collision warning while EP>142 deg.
2. SSRMS to UHF Antenna min clearance ~51” – JEM EXT A.
SSRMS Wrist Cluster to MT min clearance ~50” – SRMS EE.

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

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THC/
RHC Maneuver to APFR Install position (within 5 cm/1 deg).
THC +Z Down

Locked						
SR	SY	SP	EP	WP	WY	WR
+223.1	+213.7	-116.2	+144.8	-44.5	-57.4	+152.9
X	Y	Z	Pitch	Yaw	Roll	
+50	-1500	-300	+162.0	-0.6	+124.0	
FOR	Unloaded – LEE Tip, SR Held					
Disp	ISS>ISSACS					

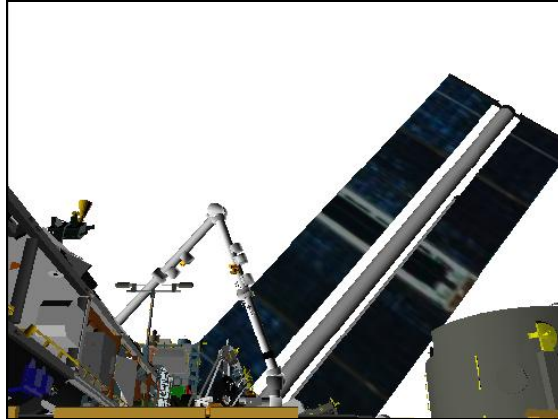


Figure 5.- APFR Install
(13: LAB Stbd Zenith: -180, -40).

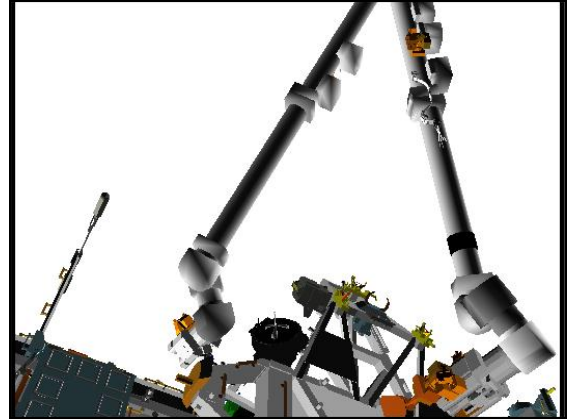


Figure 6.- APFR Install
(51: JEM EXT A: -60, +55).

6. GCA TO INSTALL APFR

NOTE APFR Settings: 12/KK/F/6.
--

THC/
RHC GCA SSRMS as necessary to perform APFR setup.

7. SINGLE AXIS MANUAL TO APFR INGRESS CLEAR

THC/
RHC Maneuver to APFR Ingress Clear position (within 20 cm/5 deg).

	Locked					
	SR	SY	SP	EP	WP	WY
	+223.1	+213.7	-116.2	+144.8	-44.5	-57.4
	X	Y	Z	Pitch	Yaw	Roll
	+50	-1500	-300	+162.0	-0.6	+124.0
APFR Install			-435			
1: Z -	+200					
2: X +	+200	-1500	-435	+162.0	-0.6	+124.0
APFR	SR	SY	SP	EP	WP	WY
Ingress Clear	+223.1	+228.5	-149.5	+146.0	-23.7	-71.3
	FOR	Unloaded – LEE Tip, SR Held				
	Disp	ISS>ISSACS				

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8. SINGLE JOINT TO APFR INGRESS

PCS MSS: SSRMS:

Enter Mode – Single (Verify blue)

WARNING
The active joint must be checked on the PCS before initiating motion. Failure to do so may result in movement of the wrong joint.

DCP JOINT SELECT → WRIST ROLL (Verify WR – Selected on PCS)

THC Perform “+” Single Joint maneuver to WR: +210.0 (THC up).

Verify SSRMS at APFR Ingress position (within 20 cm/5 deg).

SR	SY	SP	EP	WP	WY	WR
+223.1	+228.5	-149.5	+146.0	-23.7	-71.3	+210.0
X	Y	Z	Pitch	Yaw	Roll	
+200	-1500	-435	+162.0	-0.6	-166.3	
FOR	Unloaded – LEE Tip, SR Held					
Disp	ISS>ISSACS					

PCS MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

THC/
RHC GCA SSRMS as necessary to ingress APFR.

PCS MSS: SSRMS:

Enter Mode – Standby (Verify blue)

Change Unloaded Parameters ► EVA ► Chest 12/KK/F/6 SRH
 Verify ‘Unloaded Parameters’ (two) – Chest 12/KK/F/6, SR Held

Change Command ► ISS ► ISSACS/Internal (Verify
 ISS>ISSACS/Internal)

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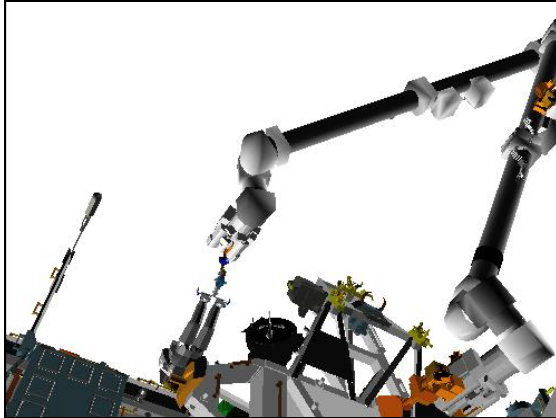


Figure 7.- APFR Ingress
 (51: JEM EXT A: -60, +55).

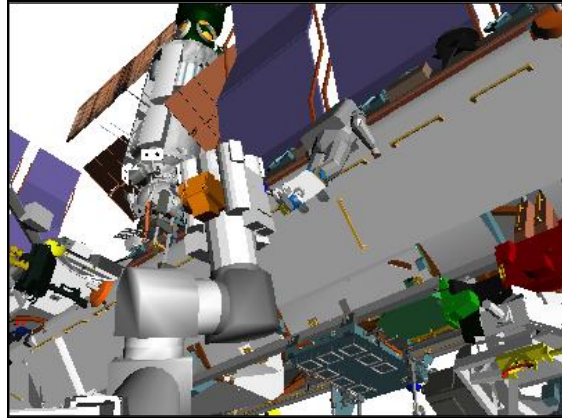


Figure 8.- APFR Ingress
 (24: Tip Elbow: +10, +10).

9. MANUAL TO EVA CLEAR

On EVA GO, EV1 Ingressed APFR, go for APFR backaway:

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

THC/
RHC

Maneuver EVA to EVA Clear position (within 20 cm/5 deg).
 THC -Z Up

Locked						
SR	SY	SP	EP	WP	WY	WR
+223.1	+200.8	-143.6	+136.5	-4.9	-44.9	+227.6
X	Y	Z	Pitch	Yaw	Roll	
+44	-1514	-400	-62.9	-1.9	-177.2	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

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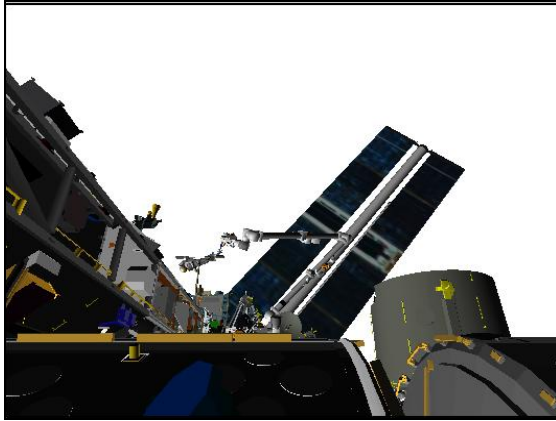


Figure 9.- EVA Clear
 (13: LAB Stbd Zenith: -180, -40).

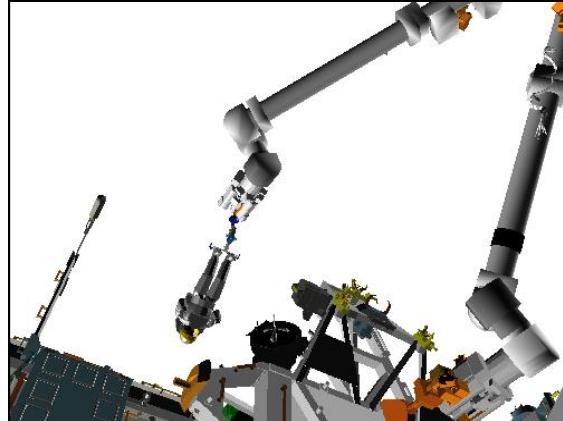


Figure 10.- EVA Clear
 (51: JEM EXT A: -60, +55).

10. JOCAS TO SGANT START (3 MINUTES)

On EV Go for mnvr to SGANT Retrieve position:

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
13: LAB Stbd Zenith (-180, -50)	51: JEM EXT A (-60, +55)	24: Tip Elbow (+30, +10)	SRMS EE	WVS
	52: JEM EXT F (-50, +35)	22: Base Elbow (+70, -30)		

NOTE
 SSRMS to SGANT min clearance ~24" – Tip Elbow.

RHC RATE → COARSE (Verify Coarse on PCS)

PCS MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

pick File ► SGANT ► SGANT Start

Verify 'Joint Angles' 'Destination' for SGANT Start position.

SR	SY	SP	EP	WP	WY	WR
+200.0	+106.0	-110.8	+132.8	-175.8	-57.3	+18.7

cmd Load (Verify Sequence Status – Confirm or Cancel)

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MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+223.1	+201.1	-143.7	+136.6	-4.9	-45.2	+227.4
TGT	+200.0	+106.0	-110.8	+132.8	-175.8	-57.3	+18.7
ERR	+23.1	+95.1	-32.9	+3.8	+170.9	+12.1	+208.7

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+200.0	+106.0	-110.8	+132.8	-175.8	-57.3	+18.7

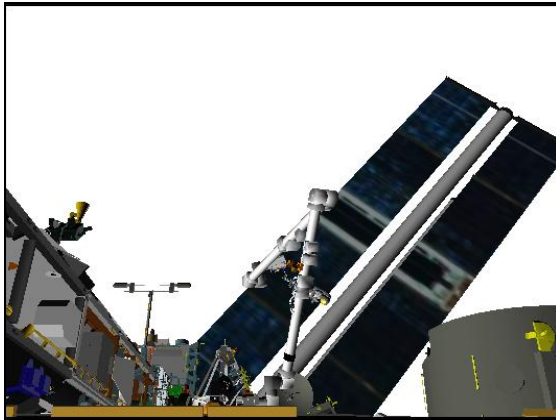


Figure 11.- SGANT Start
 (13: LAB Stbd Zenith: -180, -40: 9 mm).

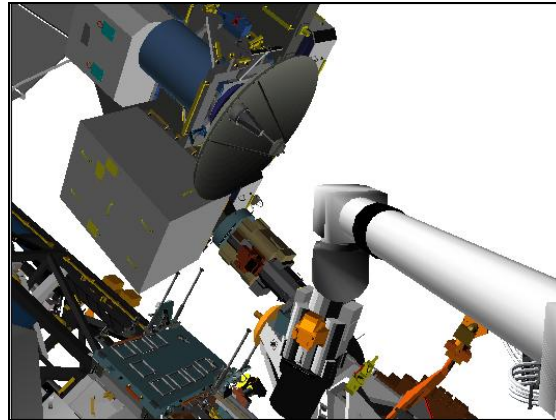


Figure 12.- SGANT Start
 (24: Tip Elbow: +60, -10).

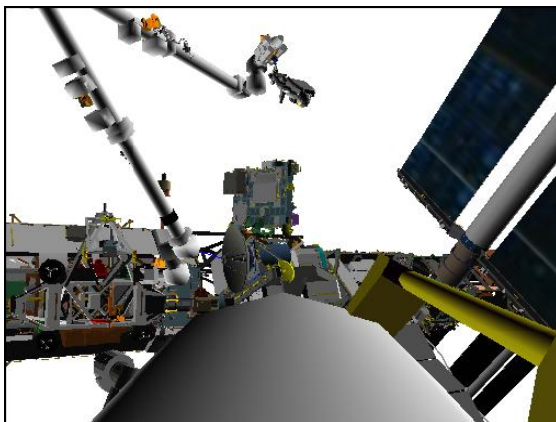


Figure 13.- SGANT Start
 (SRMS EE: 8.7 mm).

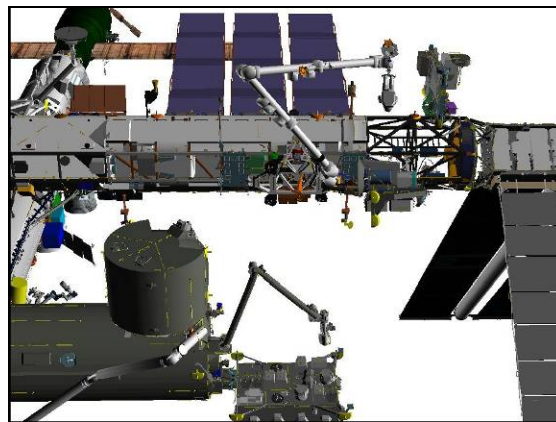


Figure 14.- SGANT Start
 (ISS Aft).

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11. MANUAL TO SGANT RETRIEVE

NOTE
 SSRMS to SGANT min clearance ~24" – SRMS EE.

RHC RATE → VERNIER (Verify Vernier on PCS)

PCS MSS: SSRMS: SSRMS

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock: Joint Lock

cmd Shoulder Roll (Verify SR – Locked)

THC/RHC Maneuver to SGANT Retrieve position (within 5 cm/1 deg).
 THC +Z Down

Locked						
SR	SY	SP	EP	WP	WY	WR
+200.0	+115.9	-92.4	+155.3	-221.8	-48.3	+12.1
X	Y	Z	Pitch	Yaw	Roll	
+695	-2039	-265	-121.7	-2.4	+5.5	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

12. GCA TO RETRIEVE SGANT

THC/RHC Maneuver SSRMS per EVA GCA to retrieve SGANT.

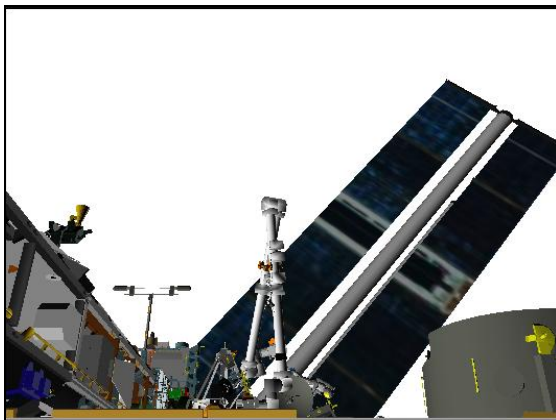


Figure 15.- SGANT Retrieve
 (13: LAB Stbd Zenith: -180, -40: 9 mm).

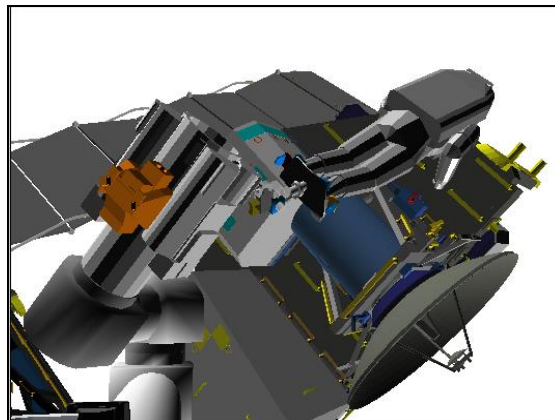


Figure 16.- SGANT Retrieve
 (24: Tip Elbow: +10, +10).

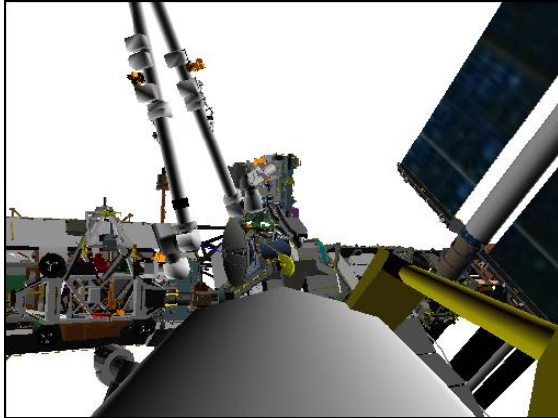


Figure 17.- SGANT Retrieve (SRMS EE).



Figure 18.- SGANT Retrieve (ISS Aft).

13. MANUAL TO SGANT HOVER

NOTE
 SSRMS to SGANT min clearance ~24" – Tip Elbow.

On EVA GO, SGANT secured for motion, SSRMS go for SGANT Hover and mnvr to SGANT Pre-INSTALL:

THC/
RHC

Maneuver to SGANT Hover position (within 20 cm/5 deg).
 THC -Z Up

Locked						
SR	SY	SP	EP	WP	WY	WR
+200.0	+105.0	-110.9	+128.9	-171.1	-58.2	+19.6
X	Y	Z	Pitch	Yaw	Roll	
+695	-2039	-650	-121.7	-2.4	+5.5	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

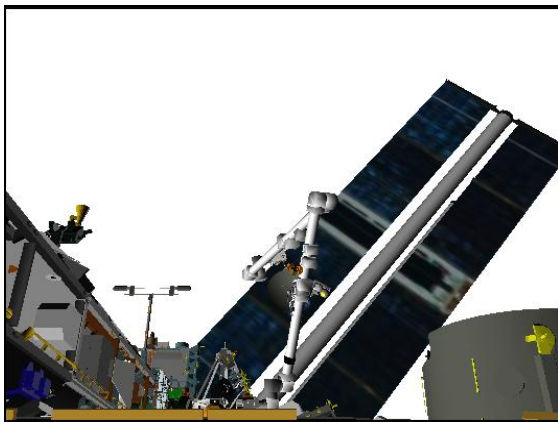


Figure 19.- SGANT Hover (13: LAB Stbd Zenith: -180, -40: 9 mm).

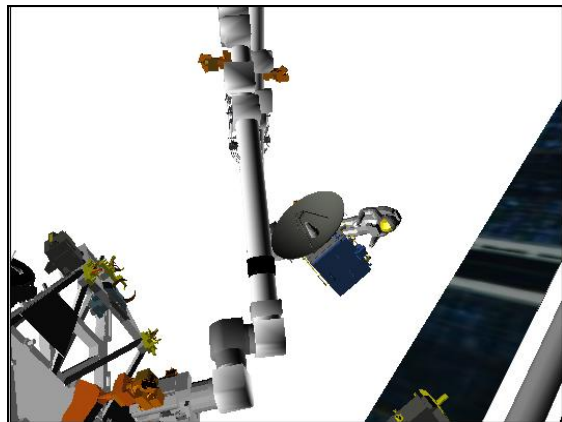


Figure 20.- SGANT Hover (51: JEM EXT A: -25, +55).

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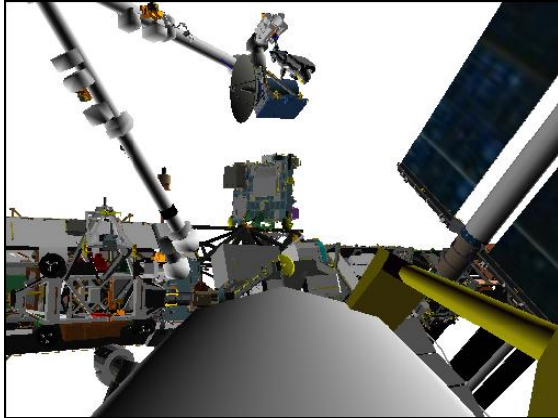


Figure 21.- SGANT Hover
(SRMS EE).

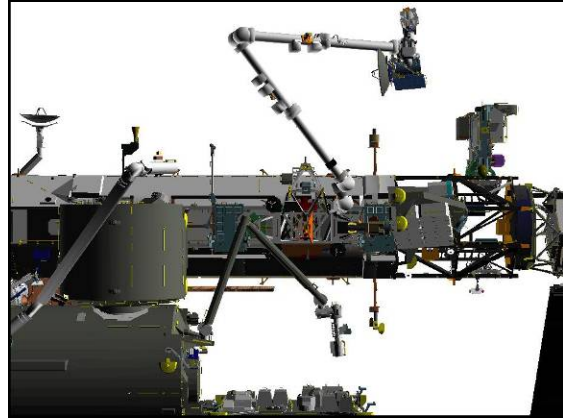


Figure 22.- SGANT Hover
(ISS Aft).

14. SINGLE JOINT TO SGANT INTERMEDIATE

RHC

RATE → COARSE (Verify Coarse on PCS)

PCS

MSS: SSRMS:

Enter Mode – Single (Verify blue)

DCP

JOINT SELECT → WRIST YAW (Verify WY – Selected on PCS)

THC

Perform “-” Single Joint maneuver to WY: -179.0 (THC DOWN).

Verify SSRMS at SGANT Intermediate position (within 20 cm/5 deg).

SR	SY	SP	EP	WP	WY	WR
+200.0	+105.0	-110.9	+128.9	-171.1	-179.0	+19.6
X	Y	Z	Pitch	Yaw	Roll	
+368	-2258	-557	-54.4	+45.2	-126.6	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					



Figure 23.- SGANT Intermediate
(13: LAB Stbd Zenith: -180, -40: 9 mm).

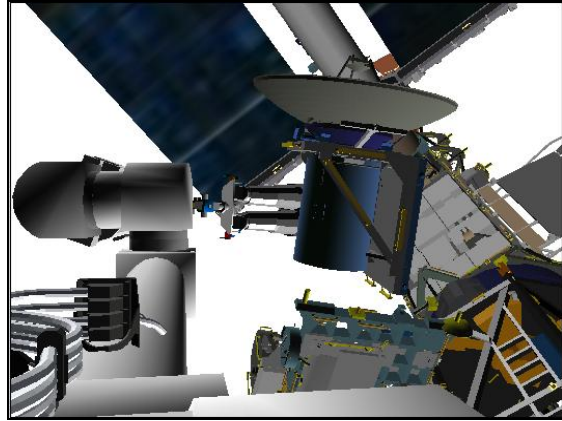


Figure 24.- SGANT Intermediate
(24: Tip Elbow: +10, 0)

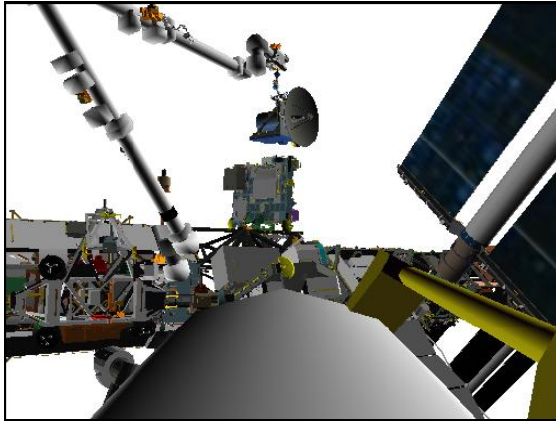


Figure 25.- SGANT Intermediate
(SRMS EE).

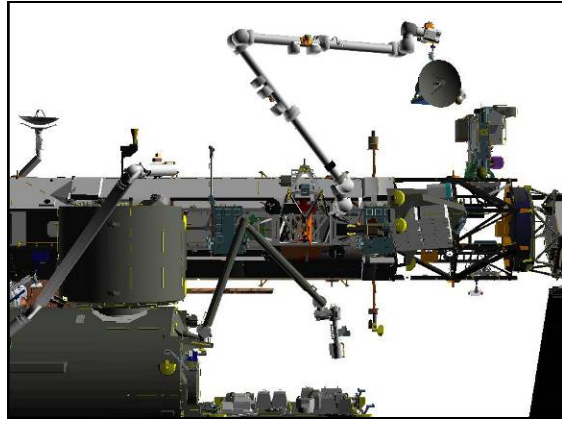


Figure 26.- SGANT Intermediate
(ISS Aft).

15. FOR OCAS TO SGANT ESP3 (3.5 MINUTES)

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
13: LAB Stbd Zenith (-180, -45)	51: JEM EXT A (-30, +45)	22: Base Elbow (+65, -15) 24: Tip Elbow (+10, +20)	SRMS EE	WVS

NOTE
EV1 to ESP3 min clearance ~33" – Base Elbow
SGANT to ESP3 min clearance ~33" – Base Elbow

RHC RATE → VERNIER (Verify Vernier on PCS)

PCS MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

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MSS: SSRMS: SSRMS FOR OCAS: Joint Lock: Joint Lock

cmd Shoulder Roll (Verify SR – Locked)

SSRMS FOR OCAS

pick File ► SGANT ► SGANT ESP3

Verify 'FOR' 'Destination' for SGANT ESP3 position.

X	Y	Z	Pitch	Yaw	Roll
-380	-2200	-540	+95.0	-37.3	-83.7

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify FOR and errors are correct on FOR Position overlay.

	X	Y	Z	Pitch	Yaw	Roll
FOR	+368	-2258	-557	-54.4	+45.2	-126.6
TGT	-380	-2200	-540	+95.0	-37.3	-83.7
ERR	+748	-58	-17	-149.4	+82.5	-42.9

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS at SGANT ESP3 position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+200.0	+154.2	-76.9	+92.6	-103.1	-191.5	-91.3
X	Y	Z	Pitch	Yaw	Roll	
-380	-2200	-540	+95.0	-37.3	-83.7	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

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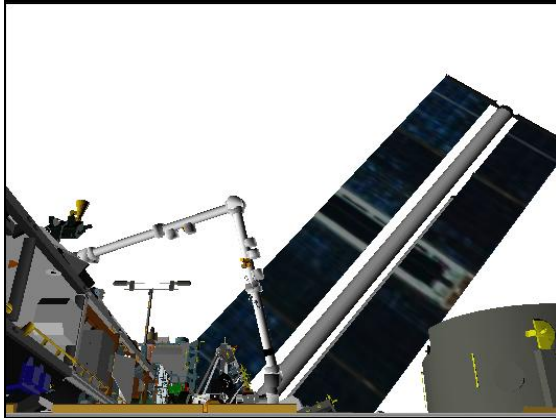


Figure 27.- SGANT ESP3
 (13: LAB Stbd Zenith: -180, -40: 9 mm).



Figure 28.- SGANT ESP3
 (22: Base Elbow: +105, -15)

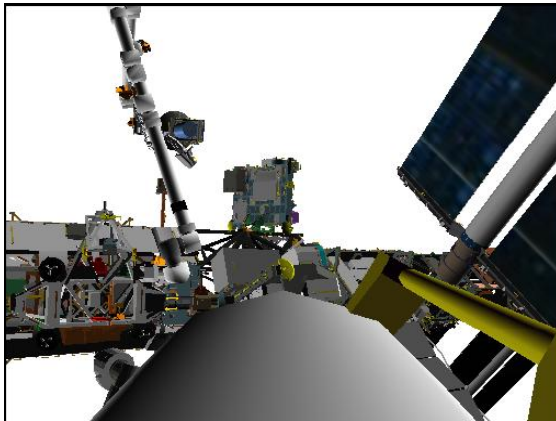


Figure 29.- SGANT ESP3
 (SRMS EE).

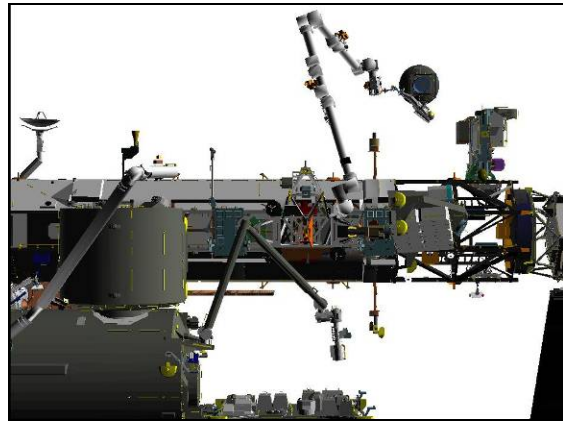


Figure 30.- SGANT ESP3
 (ISS Aft).

16. FOR OCAS TO SGANT PREINSTALL (1.5 MINUTE)

√Vernier

NOTE

1. Use Tip Elbow Camera (+10, +20) in place of Base Elbow.
2. SGANT to ESP3 min clearance ~29" – WVS 2
 EV1 to ESP3 min clearance ~33"
 SSRMS to WETA2 min clearance ~44" – LAB Stbd Zenith

SSRMS FOR OCAS

Input 'FOR' 'Destination' for SGANT PreInstall position.

X	Y	Z	Pitch	Yaw	Roll
-280	-2225	-195	+90.0	-40.0	-88.0

cmd Load (Verify Sequence Status – Confirm or Cancel)

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MON Verify FOR and errors are correct on FOR Position overlay.

	X	Y	Z	Pitch	Yaw	Roll
FOR	-380	-2200	-540	+95.0	-37.3	-83.7
TGT	-280	-2225	-195	+90.0	-40.0	-88.0
ERR	-100	+25	-345	+5.0	+2.7	+4.3

- PCS * If FOR or errors are incorrect
- * **cmd** Cancel (Verify Sequence Status – Waiting Destination)
 - *
 - * Input correct Dest FOR per table above.
 - *
 - * **cmd** Load (Verify Sequence Status – Confirm or Cancel)
 - *
- MON * Verify FOR and errors are correct on FOR Position overlay.

On EV2 GO, EV2 in position at ESP3, SSRMS GO for SGANT PreInstall.

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify SSRMS at SGANT PreInstall position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+200.0	+158.3	-71.2	+116.4	-135.0	-194.5	-83.0
X	Y	Z	Pitch	Yaw	Roll	
-280	-2225	-195	+90.0	-40.0	-88.0	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

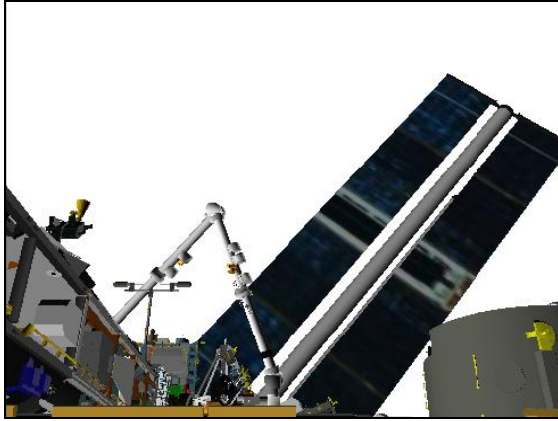


Figure 31.- SGANT Preinstall
(13: LAB Stbd Zenith: -180, -40: 9 mm).

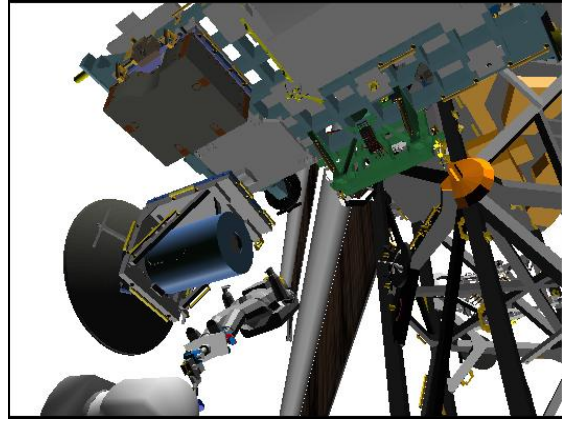


Figure 32.- SGANT Preinstall
(24: Tip Elbow: +10, +20).

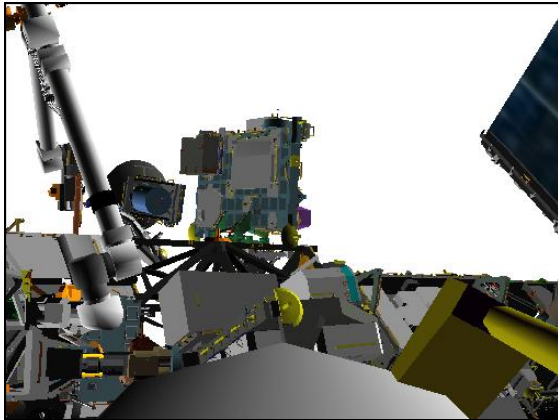


Figure 33.- SGANT Preinstall
(SRMS EE).

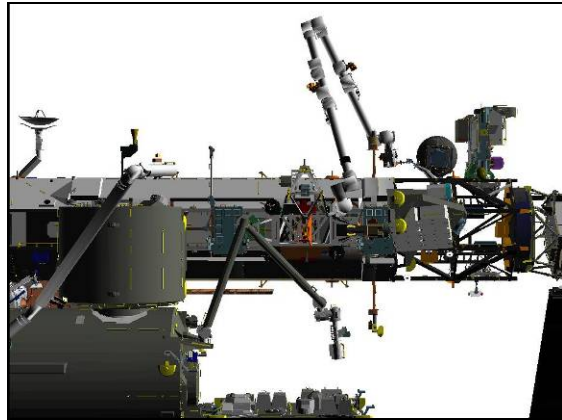


Figure 34.- SGANT Preinstall
(ISS Aft).

17. [GCA TO INSTALL SGANT](#)

NOTE
SSRMS to WETA 2 min clearance ~30" – LAB Stbd Zenith.
EV1 to ESP3 min clearance ~5".

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

THC/
RHC

Maneuver SSRMS per EVA GCA to install SGANT.

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Expected SGANT Install position.

Locked						
SR	SY	SP	EP	WP	WY	WR
+200.0	+149.4	-69.2	+117.8	-136.0	-194.2	-92.3
X	Y	Z	Pitch	Yaw	Roll	
-220	-2345	-195	+90.0	-40.0	-88.0	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

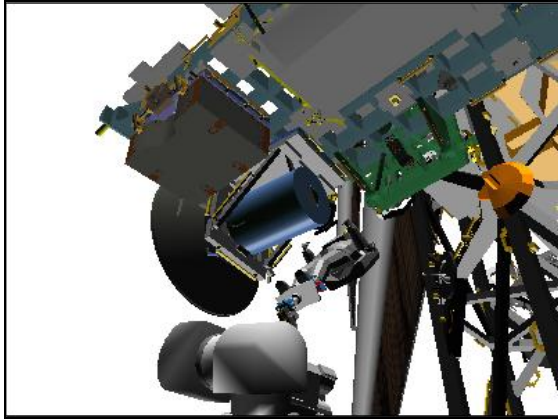


Figure 35.- SGANT Install
(24: Tip Elbow: 0, +15).

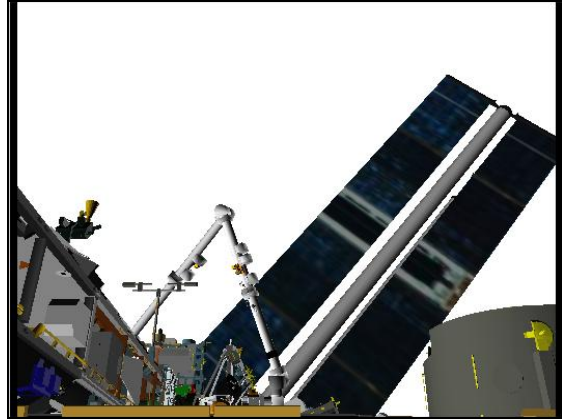


Figure 36.- SGANT Install
(13: LAB Stbd Zenith: -180, -40: 9 mm)

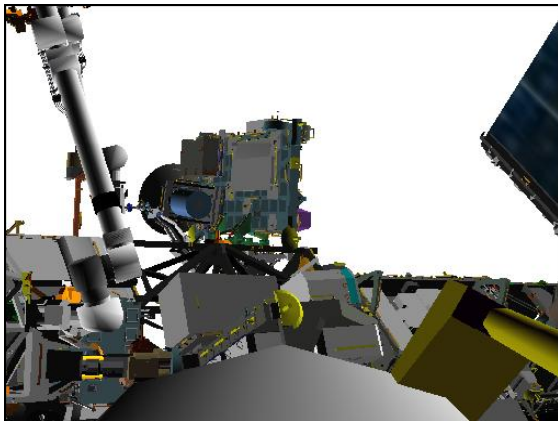


Figure 37.- SGANT Install
(SRMS EE).

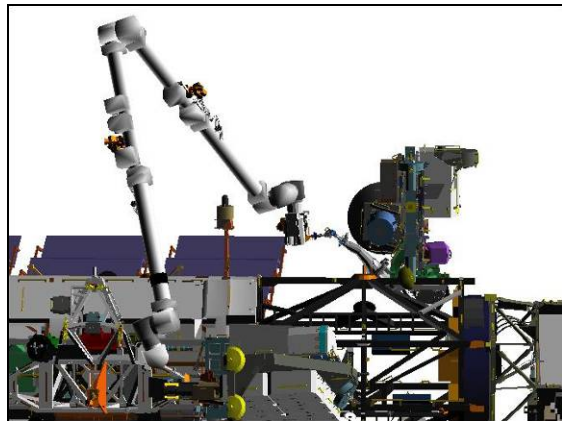


Figure 38.- SGANT Install
(ISS Aft).

18. SINGLE AXIS MANUAL TO SGANT CLEAR

On EVA GO, SGANT installed, SSRMS go for SGANT Clear.

<u>NOTE</u>	
1. During first Y maneuver:	<ul style="list-style-type: none"> a. SSRMS to P1 Truss min clearance ~49" – Tip Elbow b. SSRMS to WETA 2 min clearance ~30" – LAB Stbd Zenith c. EMU to SGANT ~16"
2. All clearances increase after the first Y maneuver.	

√Vernier

THC/
RHC

Maneuver to SGANT Clear position (within 20 cm/5 deg).

		Locked						
		SR	SY	SP	EP	WP	WY	WR
		+200.0	+149.4	-69.2	+117.8	-136.0	-194.2	-92.3
		X	Y	Z	Pitch	Yaw	Roll	
SGANT Install		-220	-2345	-195	+90.0	-40.0	-88.0	
1: Y	+		-2200					
2: X	-	-305						
3: Y	+		-2155					
4: Z	-			-635				
SGANT Clear		-305	-2155	-635	+90.0	-40.0	-88.0	
		SR	SY	SP	EP	WP	WY	WR
		+200.0	+153.2	-83.9	+91.8	-96.2	-194.3	-88.4
		FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
		Disp	ISS>ISSACS					

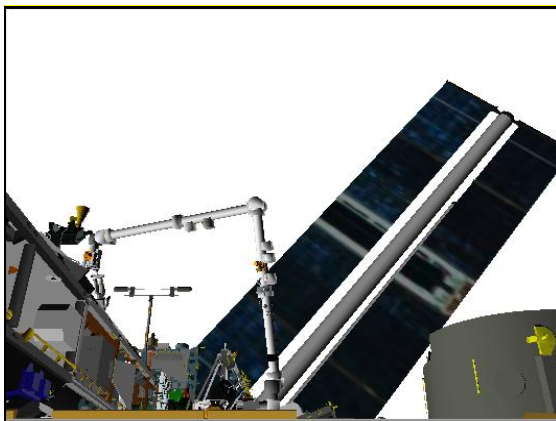


Figure 39.- SGANT Clear
(13: LAB Stbd Zenith: -180, -40: 9 mm).

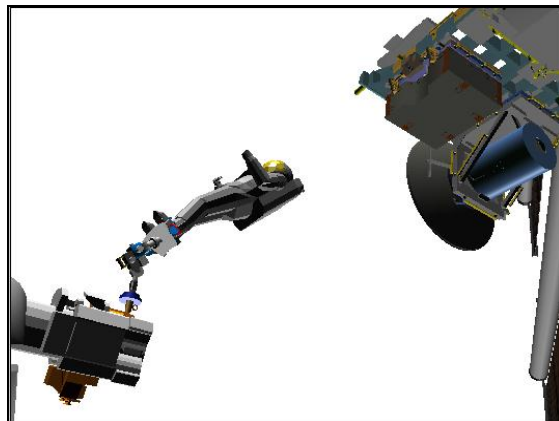


Figure 40.- SGANT Clear
(24: Tip Elbow: +25, +10).

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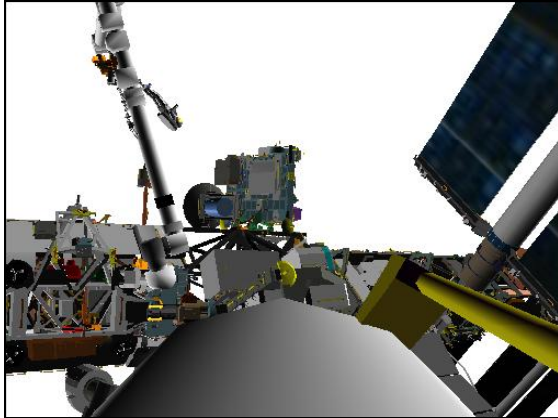


Figure 41.- SGANT Clear (SRMS EE).

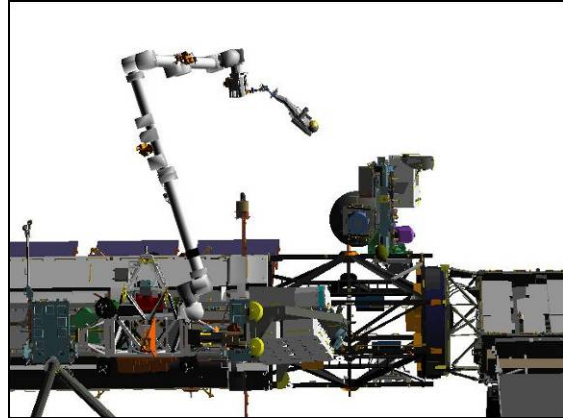


Figure 42.- SGANT Clear (ISS Aft).

19. FOR OCAS TO PUMP MODULE START (2 MINUTES)

RHC RATE → COARSE (Verify Coarse on PCS)

PCS MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

MSS: SSRMS: SSRMS FOR OCAS: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

pick File ► Pump Module ► Pump Module Start

Verify 'FOR' 'Destination' for Pump Module Start position.

X	Y	Z	Pitch	Yaw	Roll
+524	-2067	-476	-131.0	-0.7	+3.6

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify FOR and errors are correct on FOR Position overlay.

	X	Y	Z	Pitch	Yaw	Roll
FOR	-305	-2155	-635	+90.0	-40.0	-88.0
TGT	+524	-2067	-476	-131.0	-0.7	+3.6
ERR	-829	-88	-159	+221.0	-39.3	-91.6

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

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PCS MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS at Pump Module Start position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+200.0	+121.6	-105.5	+125.1	-13.7	-136.3	-180.2
X	Y	Z	Pitch	Yaw	Roll	
+524	-2067	-476	-131.0	-0.7	+3.6	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

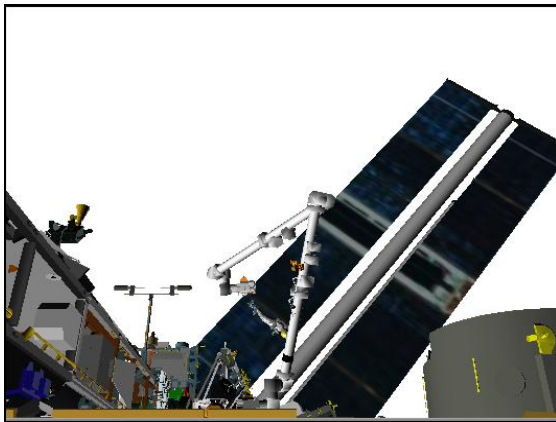


Figure 43.- Pump Module Start
 (13: LAB Stbd Zenith: -180, -40: 9 mm).

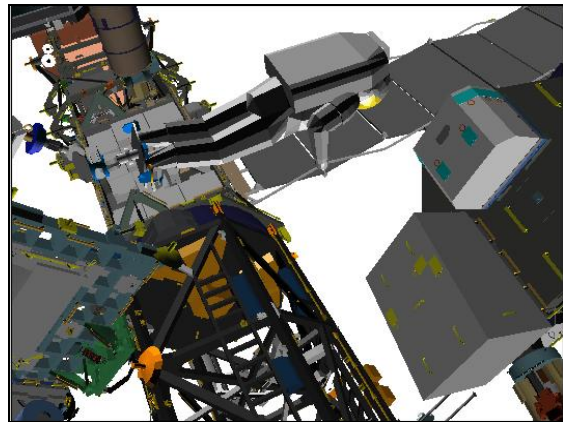


Figure 44.- Pump Module Start
 (24: Tip Elbow: +40, +5).

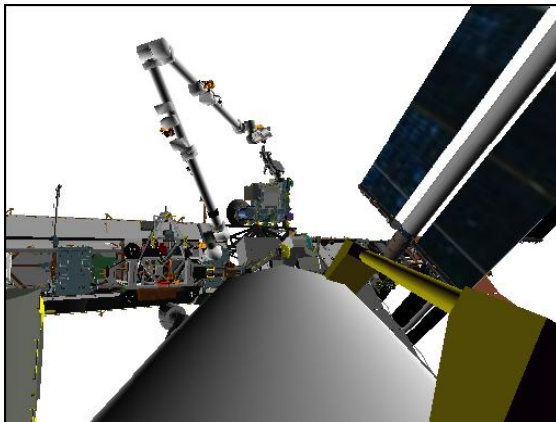


Figure 45.- Pump Module Start
 (SRMS EE).

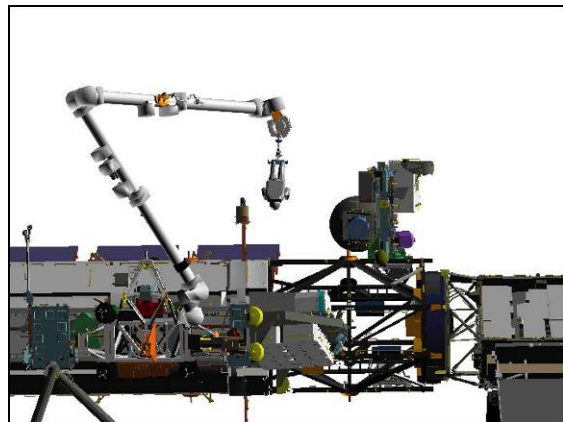


Figure 46.- Pump Module Start
 (ISS Aft).

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20. MANUAL TO PUMP MODULE RETRIEVE

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
13: LAB Stbd Zenith (-180, -40)	51: JEM EXT A (-30, +45) 52: JEM EXT F (-50, +35)	24: Tip Elbow (+40, +5) 22: Base Elbow (+35, -25)	SRMS EE	WVS

NOTE

EV1 to LDU min clearance ~23" – SRMS EE

RHC RATE → VERNIER (Verify Vernier on PCS)

PCS MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

THC/
RHC Maneuver to Pump Module Retrieve position (within 5 cm/1 deg).
THC +Z Down

Locked	SR	SY	SP	EP	WP	WY	WR
	+200.0	+129.2	-100.1	+141.5	-36.2	-143.9	-181.2
	X	Y	Z	Pitch	Yaw	Roll	
	+524	-2067	-245	-131.0	-0.7	+3.6	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held						
Disp	ISS>ISSACS						

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21. GCA TO RETRIEVE PUMP MODULE

Maneuver SSRMS per EVA GCA to retrieve Pump Module.
 THC/
 RHC

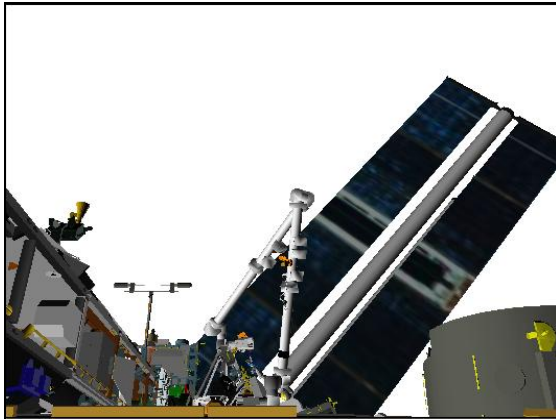


Figure 47.- Pump Module Retrieve
 (13: LAB Stbd Zenith: -180, -40: 9 mm).

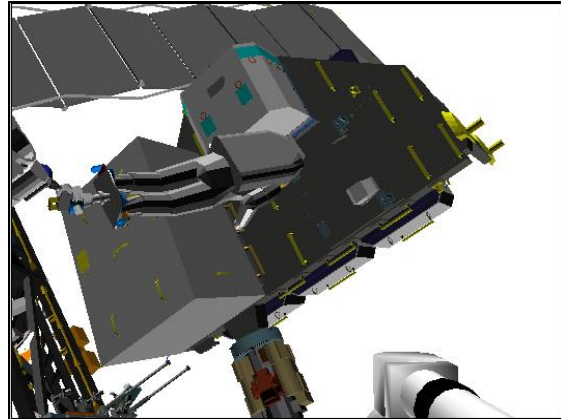


Figure 48.- Pump Module Retrieve
 (24: Tip Elbow: +40, +5).

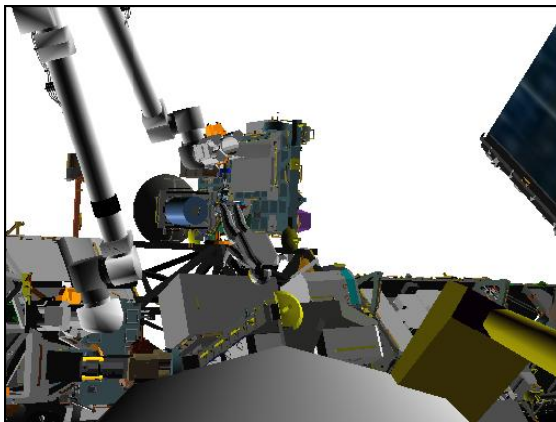


Figure 49.- Pump Module Retrieve
 (SRMS EE).

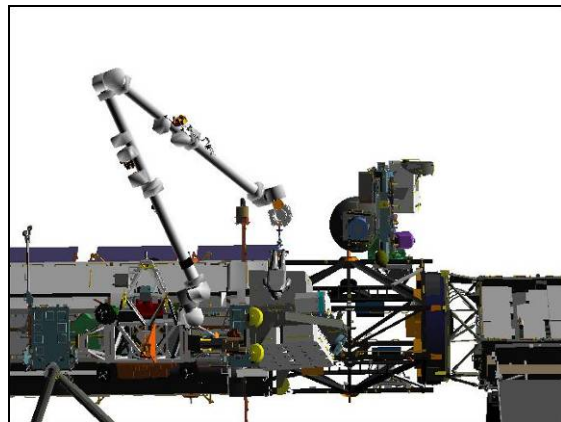


Figure 50.- Pump Module Retrieve
 (ISS Aft).

22. MANUAL TO PUMP MODULE HOVER

On EVA GO, Pump Module secured for motion, SSRMS go to mnvr to Pump Module Pre-Install:

Maneuver to Pump Module Hover position (within 20 cm/5 deg).
 THC -Z Up
 THC/
 RHC

Locked	SR	SY	SP	EP	WP	WY	WR
	+200.0	+115.8	-103.0	+105.7	+3.8	-130.6	-179.3
	X	Y	Z	Pitch	Yaw	Roll	
	+524	-2067	-700	-131.0	-0.7	+3.6	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held						
Disp	ISS>ISSACS						

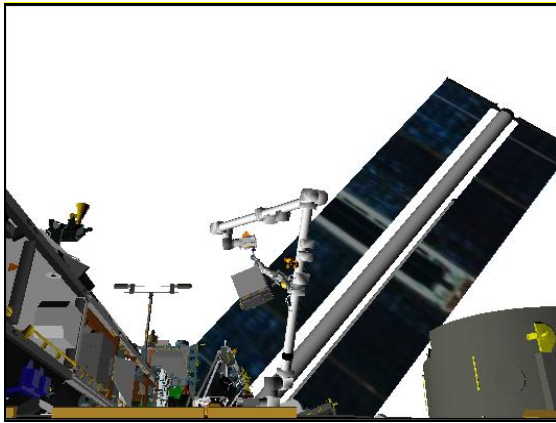


Figure 51.- Pump Module Hover
 (13: LAB Stbd Zenith: -180, -40: 9 mm).

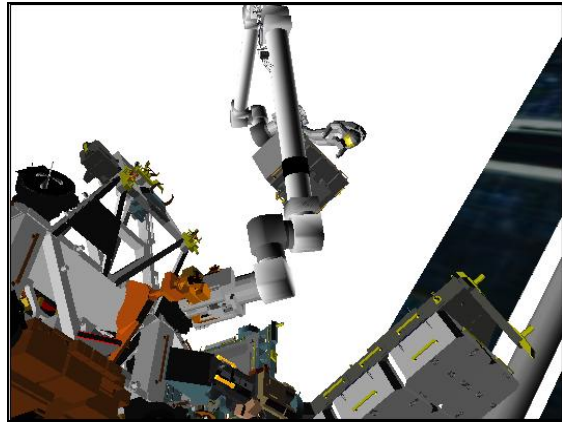


Figure 52.- Pump Module Hover
 (51: JEM EXT A: -30, +45).

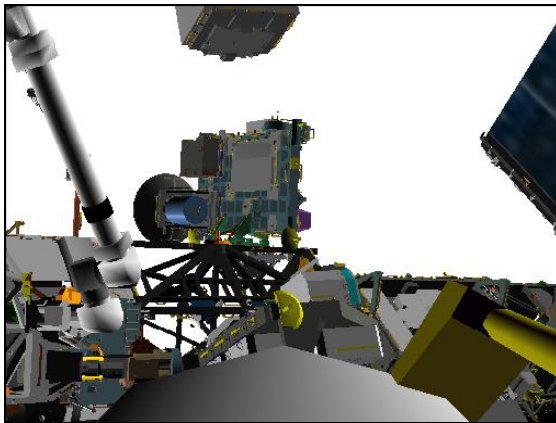


Figure 53.- Pump Module Hover
 (SRMS EE).

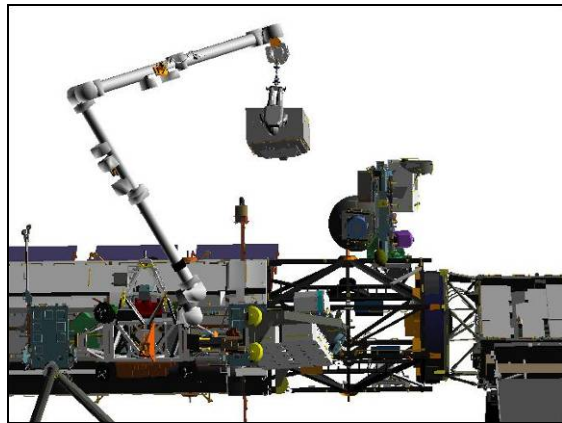


Figure 54.- Pump Module Hover
 (ISS Aft).

23. SINGLE JOINT TO PUMP MODULE INTERMEDIATE 1

PCS

MSS: SSRMS:

Enter Mode – Single (Verify blue)

DCP

JOINT SELECT → WRIST YAW (Verify WY– Selected on PCS)

RHC

RATE → COARSE (Verify Coarse on PCS)

THC

Perform “+” Single Joint maneuver to WY: -26.0 (THC up).

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Verify SSRMS at Pump Module Intermediate 1 posn (within 20 cm/5 deg).

SR	SY	SP	EP	WP	WY	WR
+200.0	+115.8	-103.0	+105.7	+3.8	-26.0	-179.3
X	Y	Z	Pitch	Yaw	Roll	
+301	-2367	-757	-62.9	+27.9	-97.5	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

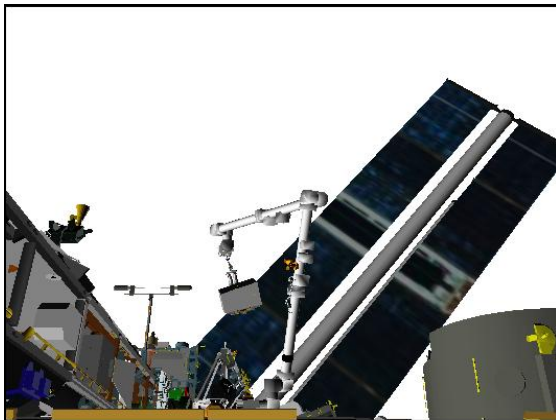


Figure 55.- Pump Module Intermediate 1
 (13: LAB Stbd Zenith: -180, -40: 9 mm).

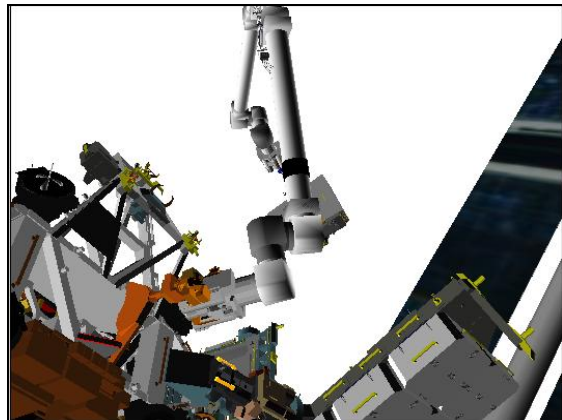


Figure 56.- Pump Module Intermediate 1
 (51: JEM EXT A: -30, +45).

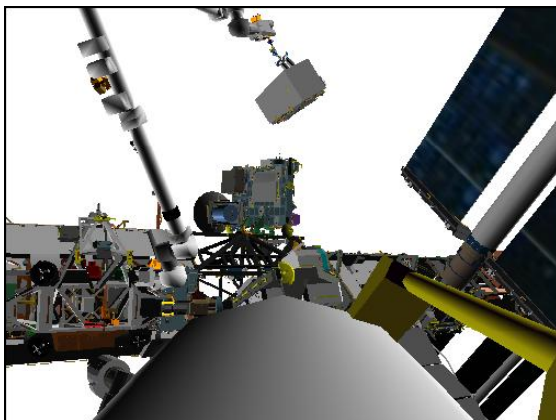


Figure 57.- Pump Module Intermediate 1
 (SRMS EE).

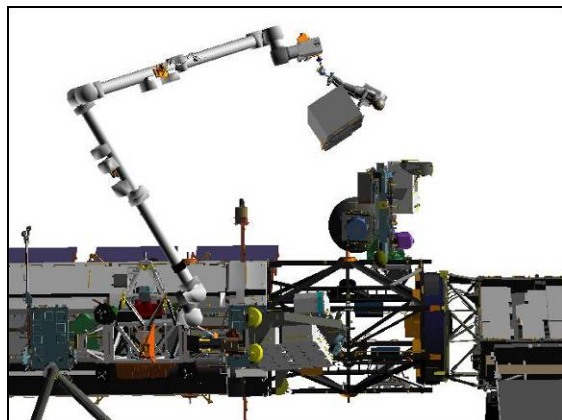


Figure 58.- Pump Module Intermediate 1
 (ISS Aft).

24. FOR OCAS TO PUMP MODULE INTERMEDIATE 2 (2.5 MINUTES)

PCS

MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

MSS: SSRMS: SSRMS FOR OCAS: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

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SSRMS FOR OCAS

pick File ► Pump Module ► Pump Module Inter 2

Verify 'FOR' 'Destination' for Pump Module Intermediate 2 position.

X	Y	Z	Pitch	Yaw	Roll
-617	-2060	-780	-70.1	-2.5	+179.7

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify FOR and errors are correct on FOR Position overlay.

	X	Y	Z	Pitch	Yaw	Roll
FOR	+301	-2367	-757	-62.9	+27.9	-97.5
TGT	-617	-2060	-780	-70.1	-2.5	+179.7
ERR	+918	-307	+23	+7.2	+30.4	-277.2

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS at Pump Module Intermediate 2 posn (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+200.0	+145.5	-74.0	+77.0	-28.6	+13.3	-137.9
X	Y	Z	Pitch	Yaw	Roll	
-617	-2060	-780	-70.1	-2.5	+179.7	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

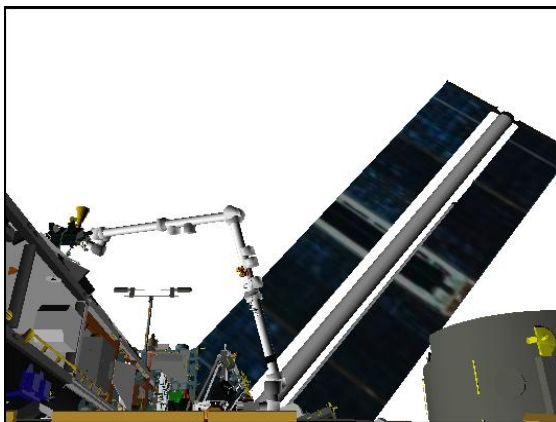


Figure 59.- Pump Module Intermediate 2
(13: LAB Stbd Zenith: -180, -40: 9 mm).

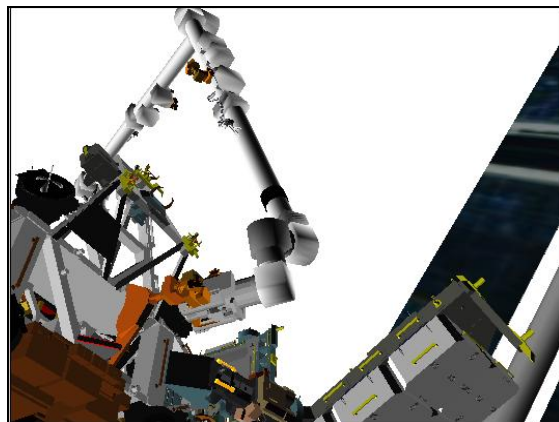


Figure 60.- Pump Module Intermediate 2
(51: JEM EXT A: -30, +45).

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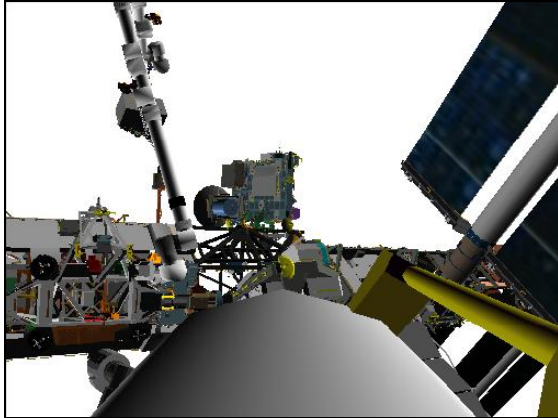


Figure 61.- Pump Module Intermediate 2 (SRMS EE).

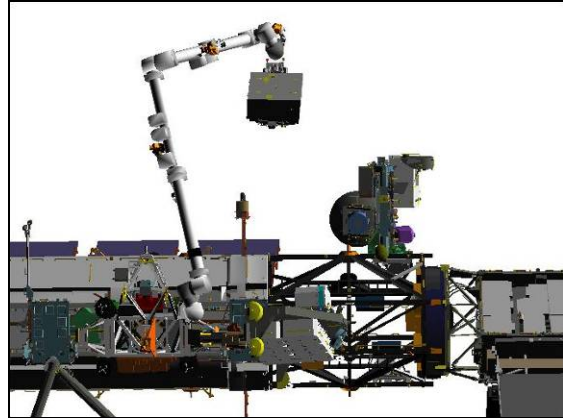


Figure 62.- Pump Module Intermediate 2 (ISS Aft).

25. FOR OCAS TO PUMP MODULE ESP3 (2 MINUTES)

RHC

RATE → VERNIER (Verify Vernier on PCS)

NOTE

Use Base Elbow Camera (+105, 0) in place of Tip Elbow.
 PM to ESP3 min clearance ~41" – Base Elbow.

SSRMS FOR OCAS

pick File ► Pump Module ► Pump Module ESP3

Verify 'FOR' 'Destination' for Pump Module ESP3 position.

X	Y	Z	Pitch	Yaw	Roll
-617	-2546	-548	-70.1	-2.5	+179.7

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify FOR and errors are correct on FOR Position overlay.

	X	Y	Z	Pitch	Yaw	Roll
FOR	-617	-2060	-780	-70.1	-2.5	+179.7
TGT	-617	-2546	-548	-70.1	-2.5	+179.7
ERR	0	+486	-232	0.0	0.0	0.0

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

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Verify SSRMS at Pump Module ESP3 position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+200.0	+127.7	-46.7	+67.5	-49.6	+29.2	-129.2
X	Y	Z	Pitch	Yaw	Roll	
-617	-2546	-548	-70.1	-2.5	+179.7	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

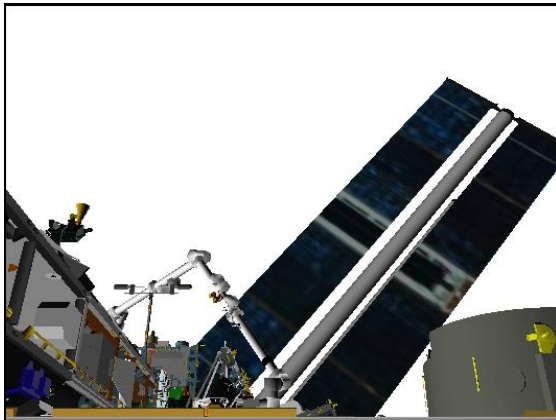


Figure 63.- Pump Module ESP3
(13: LAB Stbd Zenith: -180, -40: 9 mm).

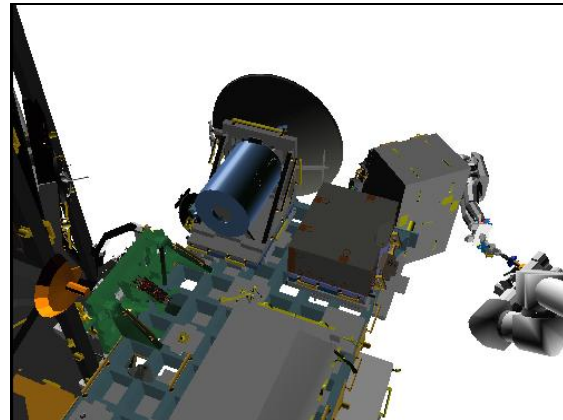


Figure 64.- Pump Module ESP3
(22: Base Elbow: +105, 0).

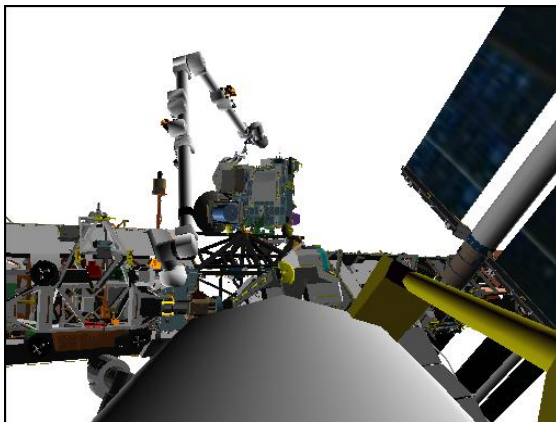


Figure 65.- Pump Module ESP3
(SRMS EE).

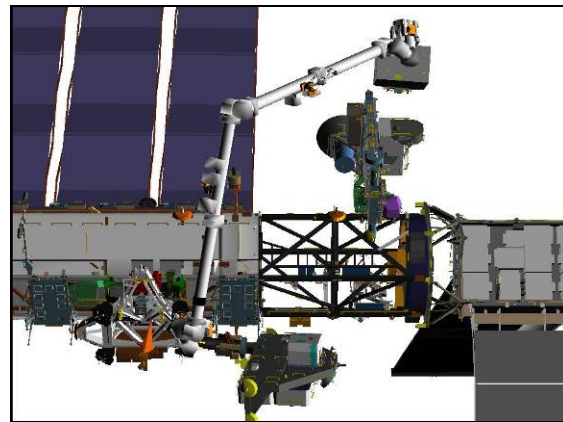


Figure 66.- Pump Module ESP3
(ISS Aft/Nadir).

26. MANUAL TO PUMP MODULE PREINSTALL

√Vernier

NOTE

1. EV1 to ESP3 min clearance ~28" – Base Elbow.
2. Pump Module to FHRC min clearance ~27" – WVS.

Verify EV1 has reoriented PM to the install configuration.

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MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

THC/
RHC

Maneuver to Pump Module PreInstall position (within 5 cm/1 deg).

Locked						
SR	SY	SP	EP	WP	WY	WR
+200.0	+117.2	-59.9	+89.9	-62.3	+38.1	-122.8
X	Y	Z	Pitch	Yaw	Roll	
-330	-2546	-548	-70.1	-2.5	+179.7	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

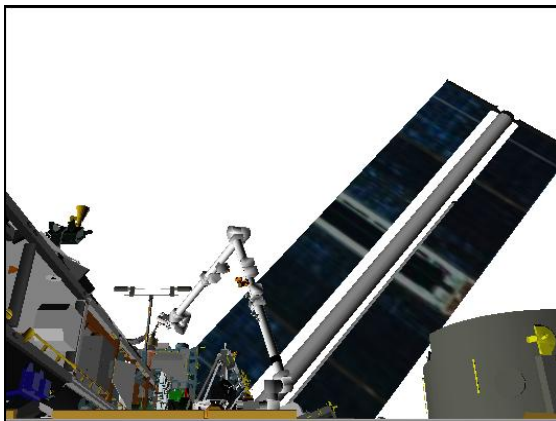


Figure 67.- Pump Module PreInstall
(13: LAB Stbd Zenith: -180, -40: 9 mm).

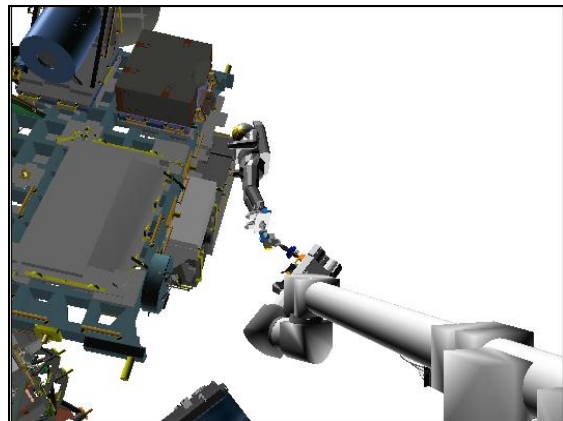


Figure 68.- Pump Module PreInstall
(22: Base Elbow: +105, 0).

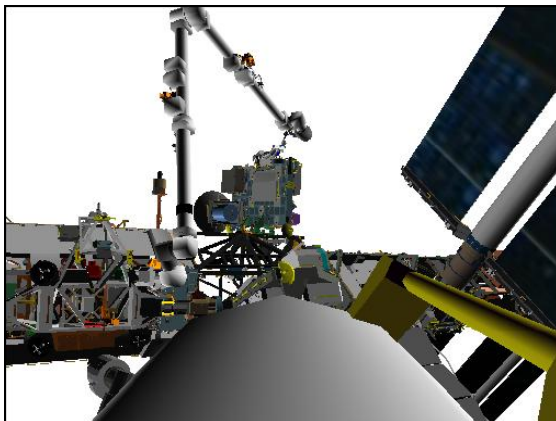


Figure 69.- Pump Module PreInstall
(SRMS EE).

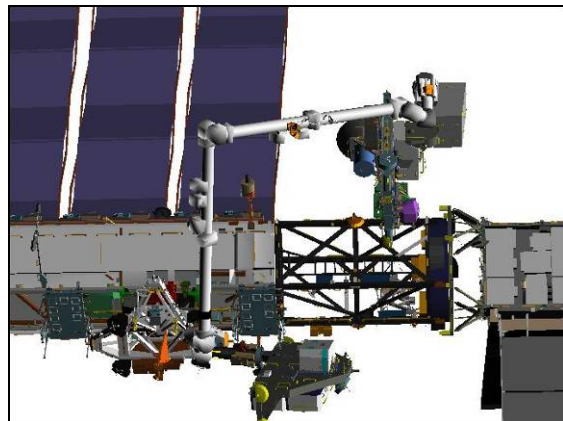


Figure 70.- Pump Module PreInstall
(ISS Aft/Nadir).

27. GCA TO INSTALL PUMP MODULE

THC/
RHC

Maneuver SSRMS per EVA GCA to install Pump Module.
THC +Y Right

Expected Pump Module Install position

Locked						
SR	SY	SP	EP	WP	WY	WR
+200.0	+119.6	-69.7	+100.8	-62.6	+36.0	-124.4
X	Y	Z	Pitch	Yaw	Roll	
-287	-2430	-548	-70.1	-2.5	+179.7	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

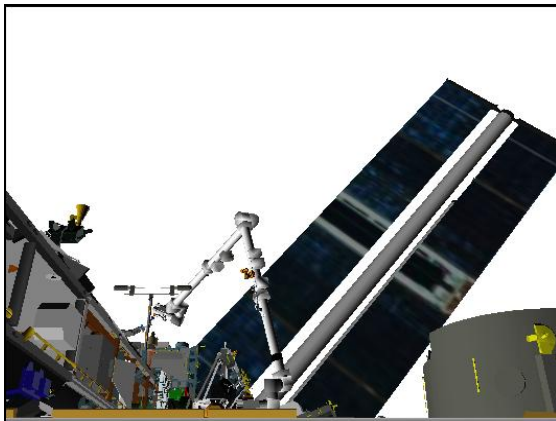


Figure 71.- Pump Module Install
(13: LAB Stbd Zenith: -180, -40: 9 mm).

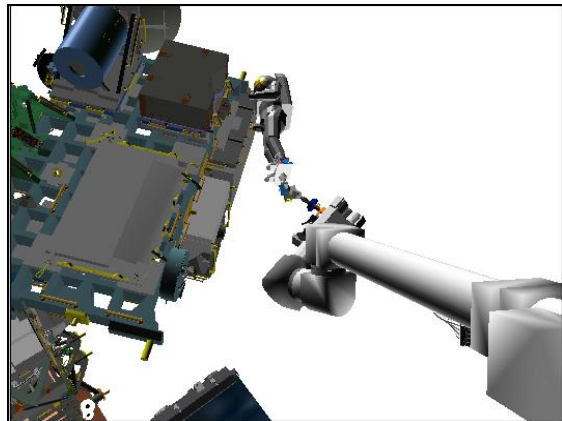


Figure 72.- Pump Module Install
(22: Base Elbow: +95, -5).

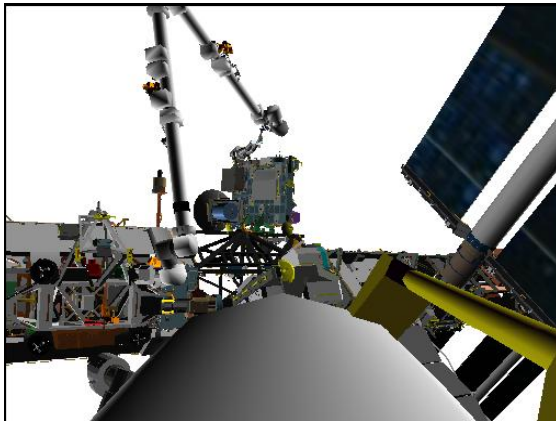


Figure 73.- Pump Module Install
(SRMS EE).

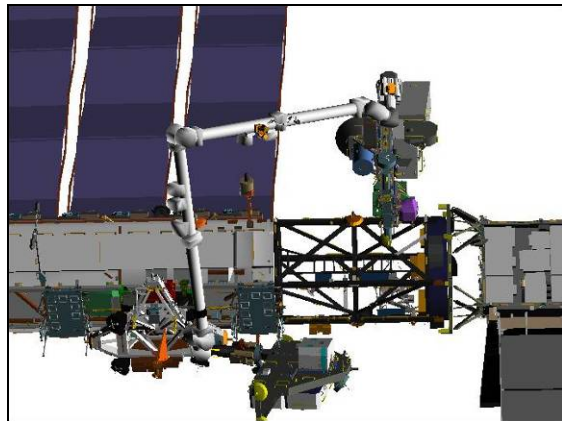


Figure 74.- Pump Module Install
(ISS Aft/Nadir).

28. MANUAL TO PUMP MODULE CLEAR

On EVA GO, Pump Module installed, SSRMS go for mnvr to LDU
Retrieve:

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THC/
RHC

Maneuver to Pump Module Clear position (within 20 cm/5 deg).

THC -Z Up

Locked						
SR	SY	SP	EP	WP	WY	WR
+200.0	+116.8	-71.6	+86.8	-47.7	+38.4	-122.5
X	Y	Z	Pitch	Yaw	Roll	
-287	-2430	-750	-70.1	-2.5	+179.7	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

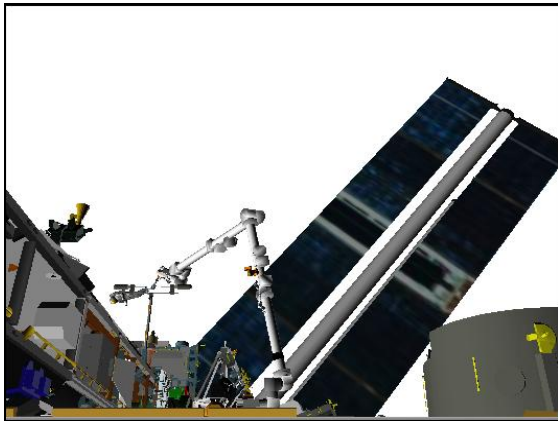


Figure 75.- Pump Module Clear
(13: LAB Stbd Zenith: -180, -40: 9 mm).

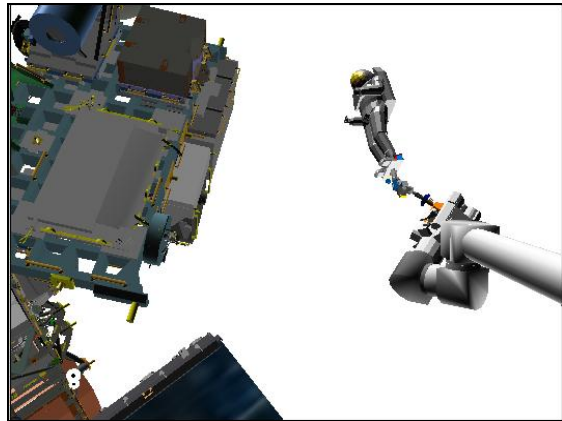


Figure 76- Pump Module Clear
(22: Base Elbow: +95, -5).

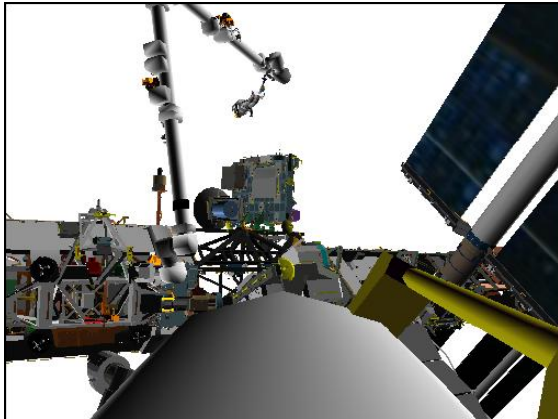


Figure 77- Pump Module Clear
(SRMS EE).

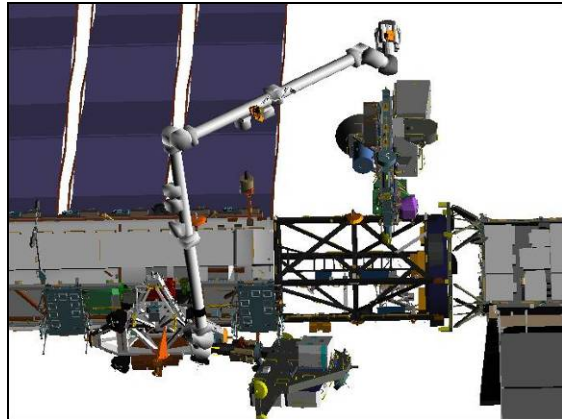


Figure 78- Pump Module Clear
(ISS Aft/Nadir).

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29. JOCAS TO LDU START (5 MINUTES)

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
13: LAB Stbd Zenith (-180, -40)	51: JEM EXT A (-30, +45) 52: JEM EXT F (-50, +35)	24: Tip Elbow (+30, 0) 22: Base Elbow (+95, -5)	SRMS EE	WVS

PCS MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

RHC RATE → COARSE (Verify Coarse on PCS)

pick File ► LDU ► LDU Start

Verify 'Joint Angles' 'Destination' for LDU Start position.

SR	SY	SP	EP	WP	WY	WR
+200.0	+95.9	-99.5	+102.1	+34.1	-26.6	+188.8

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+200.0	+116.8	-71.6	+86.8	-47.7	+38.4	-122.5
TGT	+200.0	+95.9	-99.5	+102.1	+34.1	-26.6	+188.8
ERR	0.0	+20.9	+27.9	-15.3	-81.8	+65.0	-311.3

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+200.0	+95.9	-99.5	+102.1	+34.1	-26.6	+188.8

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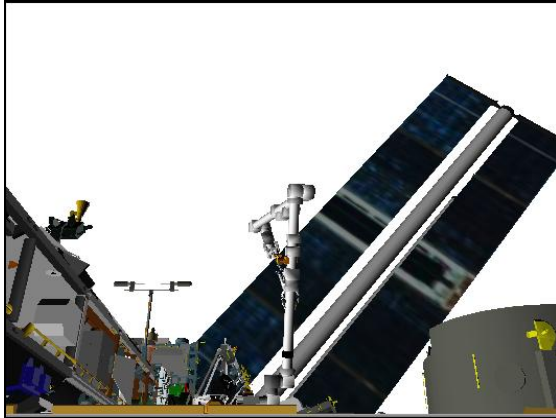


Figure 79.- LDU Start
(13: LAB Stbd Zenith: -180, -40: 9 mm).

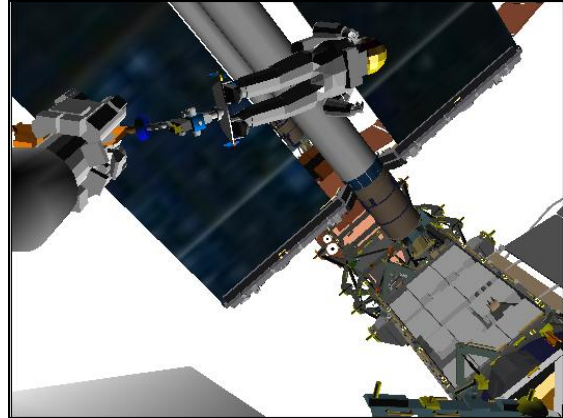


Figure 80.- LDU Start
(24: Tip Elbow: +30, 0).

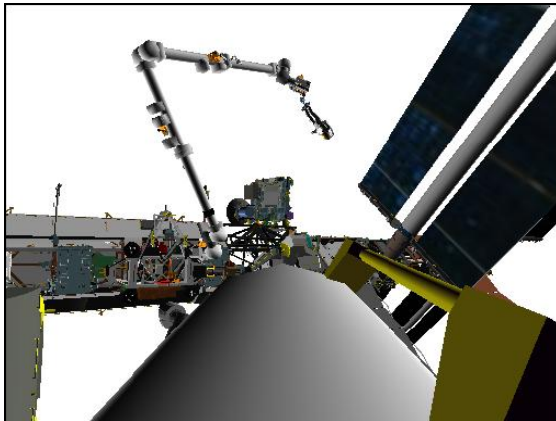


Figure 81.- LDU Start
(SRMS EE).

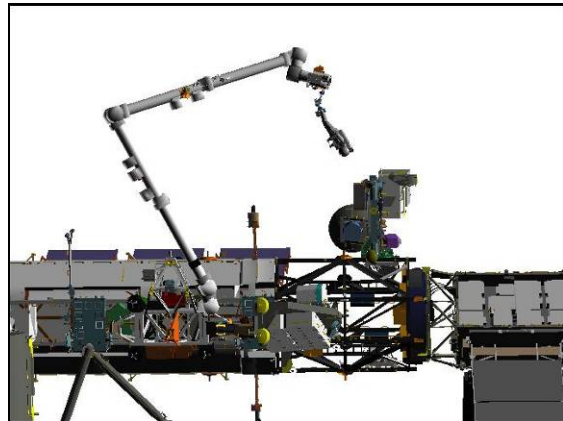


Figure 82.- LDU Start
(ISS Aft).

30. [MANUAL TO LDU RETRIEVE](#)

RHC RATE → VERNIER (Verify Vernier on PCS)

PCS MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

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THC/
RHC

Maneuver to LDU Retrieve position (within 5 cm/1 deg).
THC +Z Down

Locked						
SR	SY	SP	EP	WP	WY	WR
+200.0	+103.6	-97.8	+139.5	-2.3	-32.7	+194.3
X	Y	Z	Pitch	Yaw	Roll	
+582	-2289	-230	-78.0	+61.3	-78.3	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

31. GCA TO RETRIEVE LDU

THC/
RHC

Maneuver SSRMS per EVA GCA to retrieve LDU.

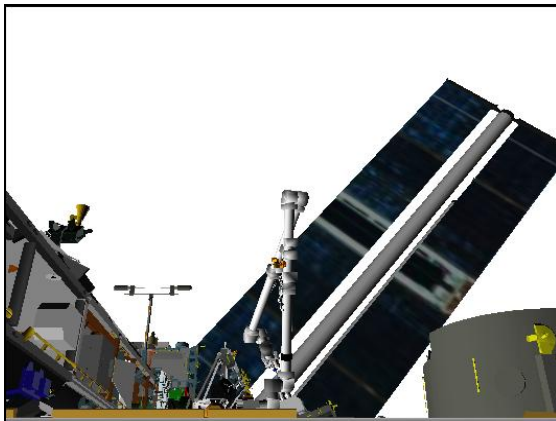


Figure 83.- LDU Retrieve
(13: LAB Stbd Zenith: -180, -40: 9 mm).

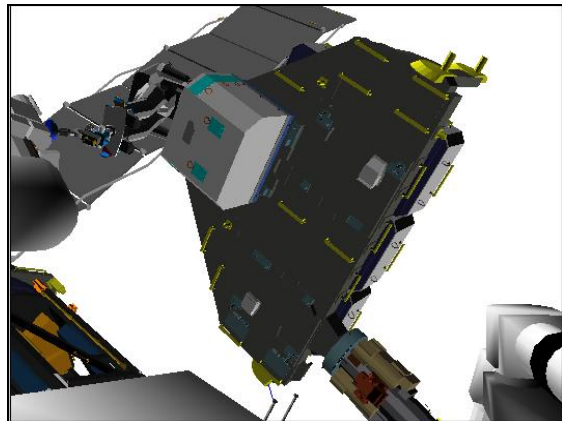


Figure 84.- LDU Retrieve
(24: Tip Elbow: +30, 0).

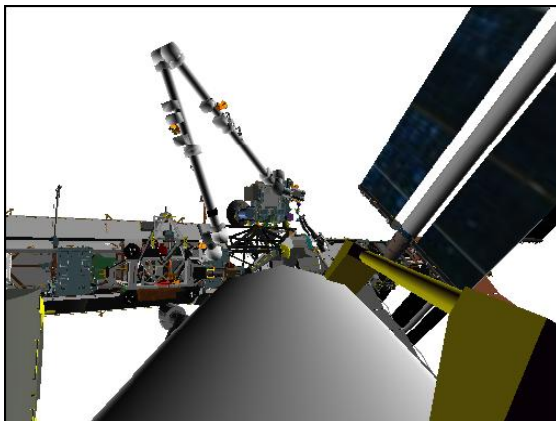


Figure 85.- LDU Retrieve
(SRMS EE).

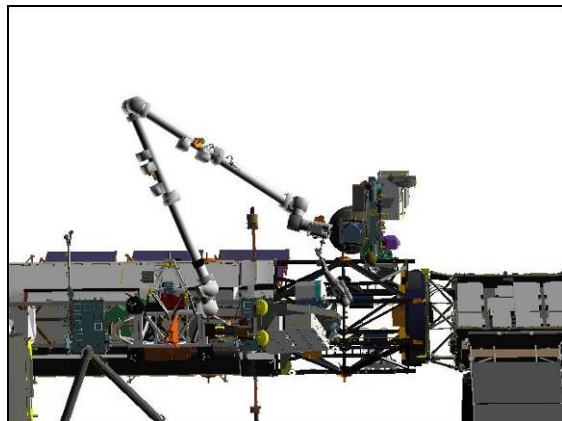


Figure 86.- LDU Retrieve
(ISS Aft).

32. MANUAL TO LDU HOVER

On EVA GO, LDU secured for motion, SSRMS go for LDU Hover and mnvr to LDU Pre-Install:

THC/
RHC

Maneuver to LDU Hover position (within 20 cm/5 deg).

THC -Z Up

Locked						
SR	SY	SP	EP	WP	WY	WR
+200.0	+95.3	-97.9	+96.3	+38.1	-26.0	+188.3
X	Y	Z	Pitch	Yaw	Roll	
+582	-2288	-750	-78.0	+61.3	-78.3	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

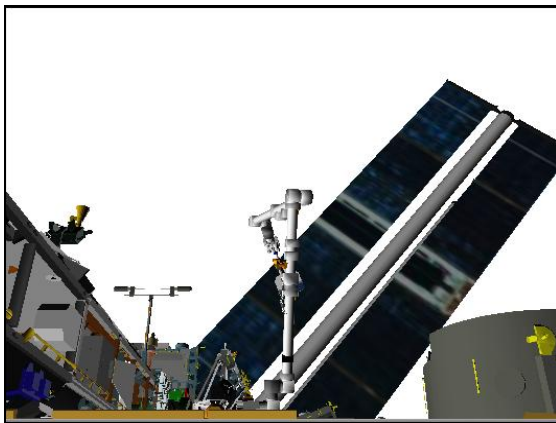


Figure 87.- LDU Hover
(13: LAB Stbd Zenith: -180, -40: 9 mm).

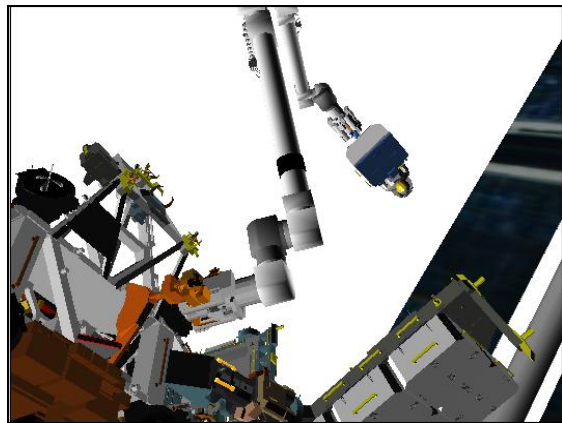


Figure 88.- LDU Hover
(51: JEM EXT A: -30, +45).

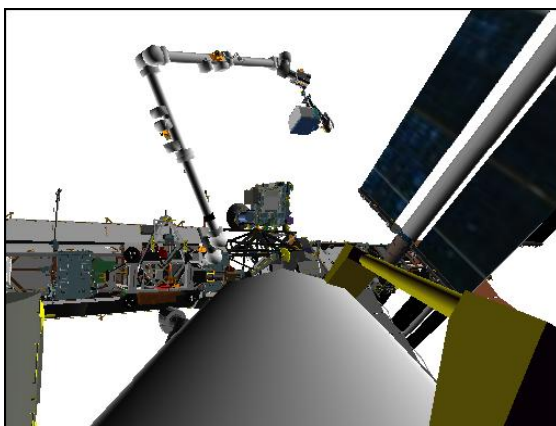


Figure 89.- LDU Hover
(SRMS EE).

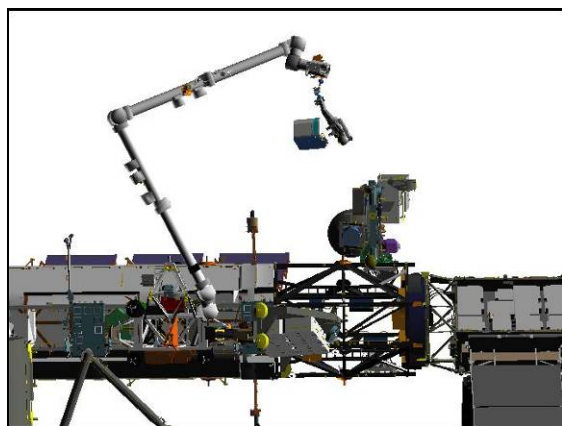


Figure 90.- LDU Hover
(ISS Aft).

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33. FOR OCAS TO LDU ESP3 (2.5 MINUTES)

RHC RATE → COARSE (Verify Coarse on PCS)

<u>NOTE</u>	
1.	SSRMS to WETA2 min clearance ~24" – LAB Stbd Zenith
2.	LDU to ESP3 min clearance ~35" – SRMS EE

PCS MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

MSS: SSRMS: SSRMS FOR OCAS: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

pick File ► LDU ► LDU ESP3

Verify 'FOR' 'Destination' for LDU ESP3 position.

X	Y	Z	Pitch	Yaw	Roll
-424	-2570	-700	-3.9	+42.9	-87.4

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify FOR and errors are correct on FOR Position overlay.

	X	Y	Z	Pitch	Yaw	Roll
FOR	+582	-2288	-750	-78.0	+61.3	-78.3
TGT	-424	-2570	-700	-3.9	+42.9	-87.4
ERR	+1006	+282	-50	-74.1	+18.4	+9.1

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify SSRMS at LDU ESP3 position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+200.0	+142.4	-26.1	+19.6	+41.1	-58.4	+140.7
X	Y	Z	Pitch	Yaw	Roll	
-424	-2570	-700	-3.9	+42.9	-87.4	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

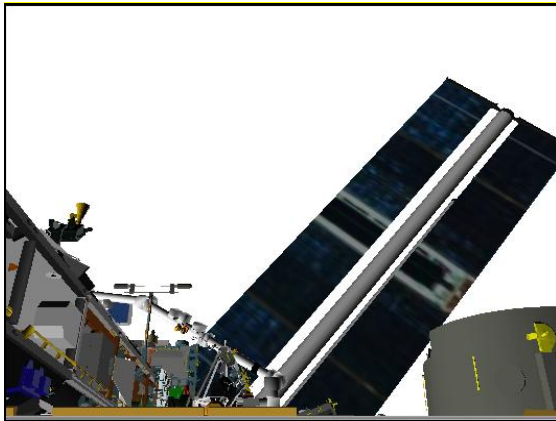


Figure 91.- LDU ESP3
 (13: LAB Stbd Zenith: -180, -40: 9 mm).

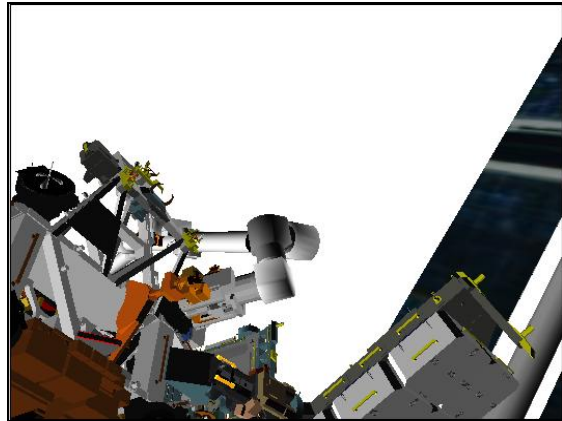


Figure 92.- LDU ESP3
 (51: JEM EXT A: -30, +45).

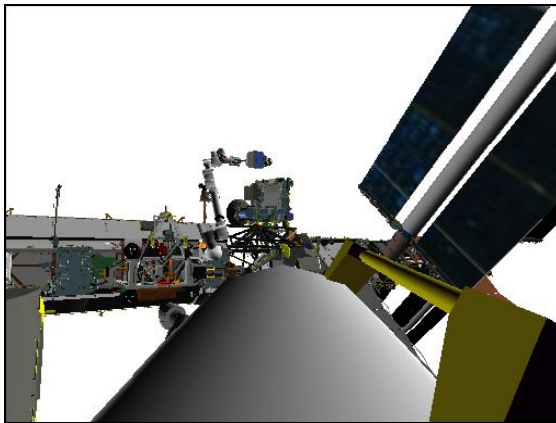


Figure 93.- LDU ESP3
 (SRMS EE: 15 mm).

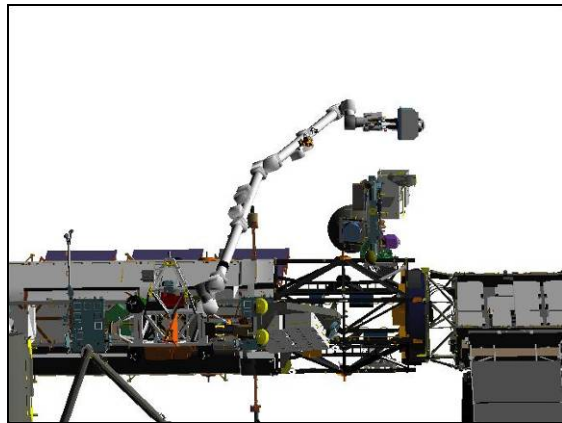


Figure 94.- LDU ESP3
 (ISS Aft).

34. SINGLE AXIS MANUAL TO LDU PREINSTALL

RHC

RATE → VERNIER (Verify Vernier on PCS)

NOTE

1. LDU to ESP3 min clearance ~20" – WVS
2. SSRMS to WETA 2 min clearance ~17" – LAB Stbd Zenith

Verify EV2 in posn to monitor clearance between LDU and PM.

Verify EV1 has oriented LDU into the install config.

PCS

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

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cmd Shoulder Roll (Verify SR – Locked)

THC/
RHC

Maneuver to LDU PreInstall position (within 5 cm/1 deg).

LDU ESP3
 1: Z +
 2: Y -
 3: X +
 4: Z +
 LDU
 PreInstall

Locked	SR	SY	SP	EP	WP	WY	WR
	+200.0	+142.4	-26.1	+19.6	+41.1	-58.4	+140.7
	X	Y	Z	Pitch	Yaw	Roll	
	-424	-2570	-700	-3.9	+42.9	-87.4	
			-635				
		-2650					
	-320						
			-320				
	-320	-2650	-320	-3.9	+42.9	-87.4	
	SR	SY	SP	EP	WP	WY	WR
	+200.0	+142.5	-30.3	+59.8	+5.3	-58.6	+141.0
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held						
Disp	ISS>ISSACS						

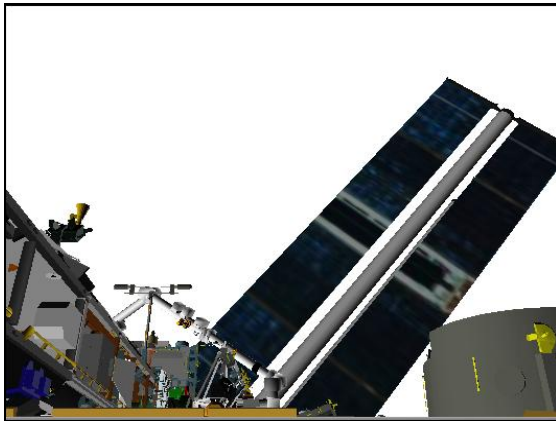


Figure 95.- LDU Pre-Install
 (13: LAB Stbd Zenith: -180, -40: 9 mm).

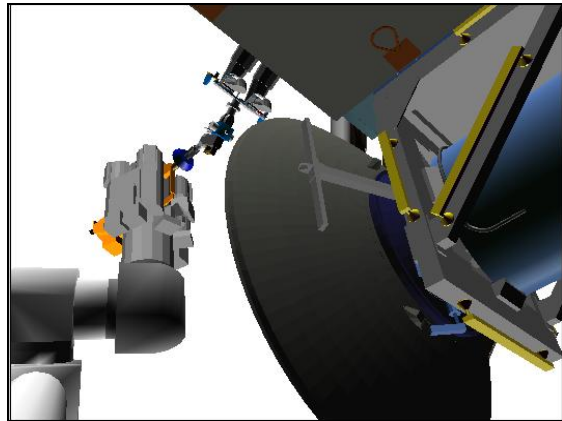


Figure 96.- LDU Pre-Install
 (24: Tip Elbow: +20, +10).

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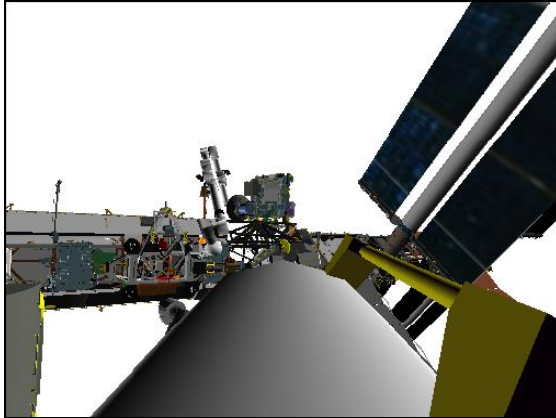


Figure 97.- LDU Pre-Install (SRMS EE).

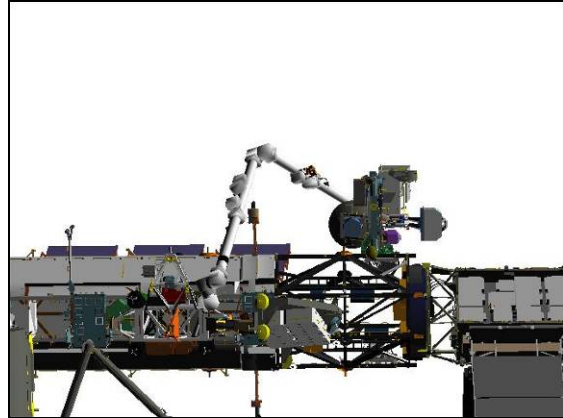


Figure 98.- LDU Pre-Install (ISS Aft).

35. GCA TO INSTALL LDU
 On EV1/EV2 GO:

<u>NOTE</u>	
1.	Expect body pitch down maneuver. RHC Pitch Negative.
2.	Monitor clearance between base boom and WETA2 in LAB Stbd Zenith.
3.	Monitor WY angle during GCA to avoid singularity. Maintain WY>-75 deg.

THC/
RHC

Maneuver SSRMS per EVA GCA to install LDU.

THC/
RHC

Expected LDU Install position.

Locked	SR	SY	SP	EP	WP	WY	WR
	+200.0	+150.2	-37.1	+70.4	+10.3	-64.6	+151.0
	X	Y	Z	Pitch	Yaw	Roll	
	-320	-2484	-300	-3.9	+42.9	-87.4	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held						
Disp	ISS>ISSACS						

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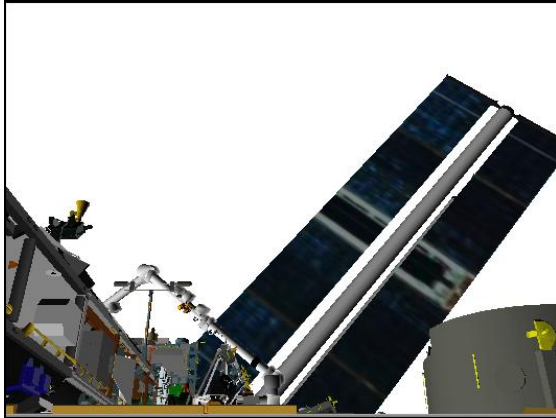


Figure 99.- LDU Install
(13: LAB Stbd Zenith: -180, -40: 9 mm).

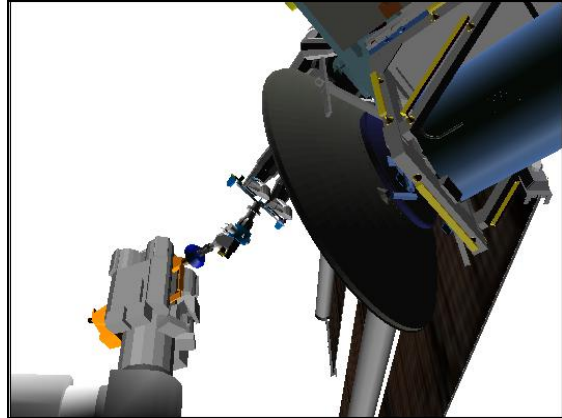


Figure 100.- LDU Install
(24: Tip Elbow: +20, +20).

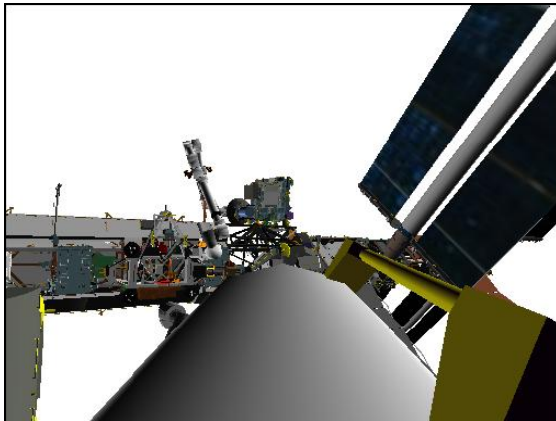


Figure 101.- LDU Install
(SRMS EE).

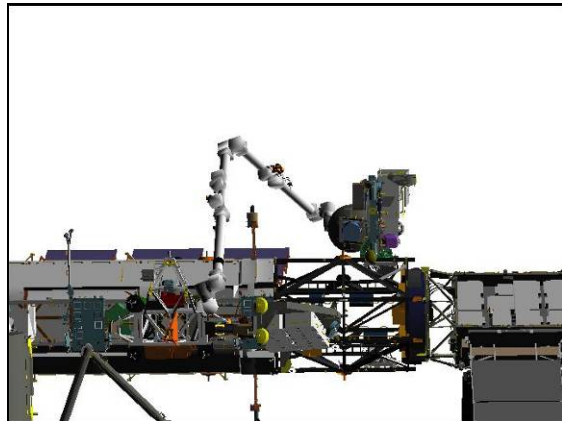


Figure 102.- LDU Install
(ISS Aft).

36. [SINGLE AXIS MANUAL TO LDU CLEAR](#)

On EVA GO, LDU install complete, SSRMS go for LDU Clear and mnvr to APFR Egress:

NOTE

1. Use Base Elbow Camera in place of Tip Elbow.
2. If significant negative body pitch (>5 degrees) was incurred on the previous GCA, RHC PITCH Positive UP before executing the following translational maneuvers.
3. During sequence #3, Z maneuver to -650, EV1 may find it necessary to lean back in APFR to improve clearances to ESP3.
4. SSRMS to WETA 2 min clearance ~26" – LAB Stbd Zenith.

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THC/
RHC Maneuver to LDU Clear position (within 20 cm/5 deg).

		Locked						
		SR	SY	SP	EP	WP	WY	WR
		+200.0	+150.2	-37.1	+70.4	+10.3	-64.6	+151.0
		X	Y	Z	Pitch	Yaw	Roll	
LDU Install		-320	-2484	-300	-3.9	+43.0	-87.3	
1: Y	-		-2605					
2: X	-	-372						
3: Z	-			-650				
LDU Clear		-372	-2605	-650	-3.9	+43.0	-87.3	
		SR	SY	SP	EP	WP	WY	WR
		+200.0	+140.7	-32.6	+36.3	+29.2	-57.2	+139.0
		FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
		Disp	ISS>ISSACS					

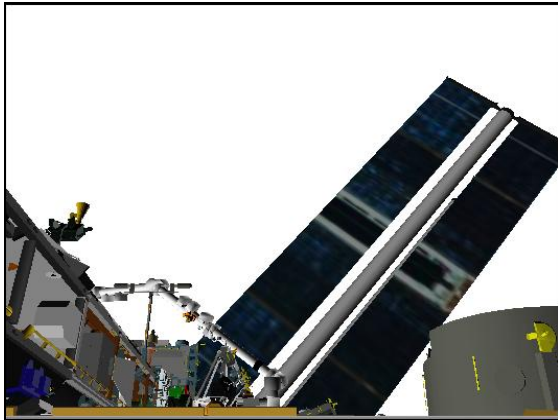


Figure 103.- LDU Clear
(13: LAB Stbd Zenith: -180, -40: 9 mm).

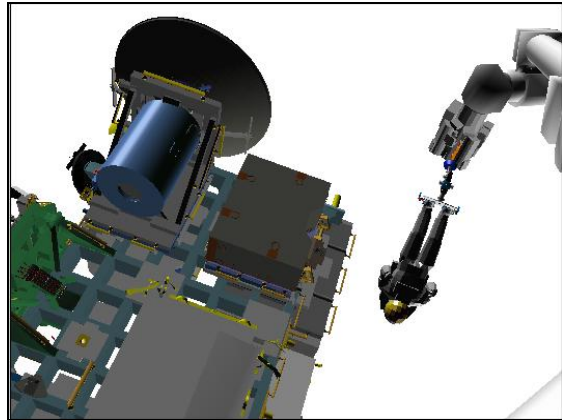


Figure 104.- LDU Clear
(22: Base Elbow: +130, -22).

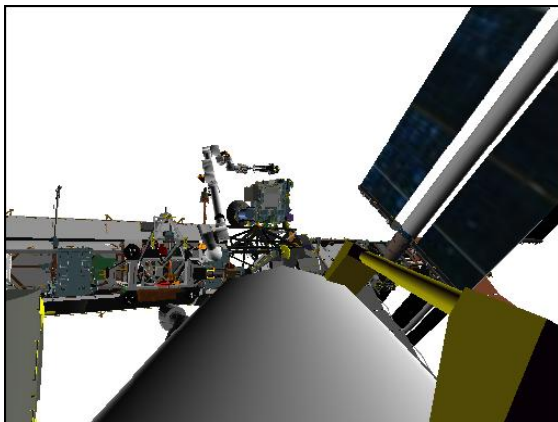


Figure 105.- LDU Clear
(SRMS EE).

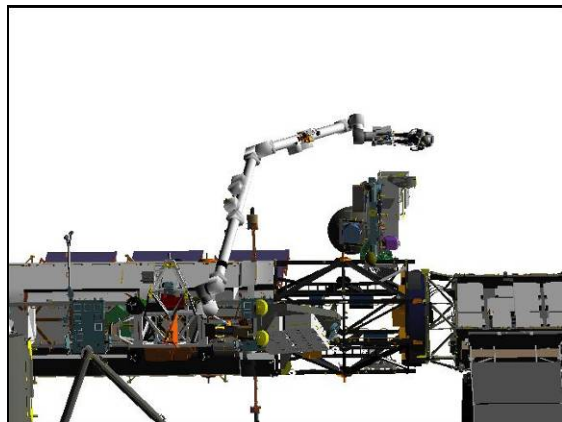


Figure 106.- LDU Clear
(ISS Aft).

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37. JOCAS TO EVA EGRESS INTERMEDIATE (2.5 MINUTES)

RHC RATE → COARSE (Verify Coarse on PCS)

PCS MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

pick File ► EVA2 ► EVA Egress Inter

Verify 'Joint Angles' 'Destination' for EVA Egress Intermediate position.

SR	SY	SP	EP	WP	WY	WR
+215.2	+193.9	-146.4	+136.4	-16.2	-34.3	+212.3

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+200.0	+140.7	-32.6	+36.3	+29.2	-57.2	+139.0
TGT	+215.2	+193.9	-146.4	+136.4	-16.2	-34.3	+212.3
ERR	-15.2	-53.2	+113.8	-100.1	+45.4	-22.9	-73.3

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+215.2	+193.9	-146.4	+136.4	-16.2	-34.3	+212.3

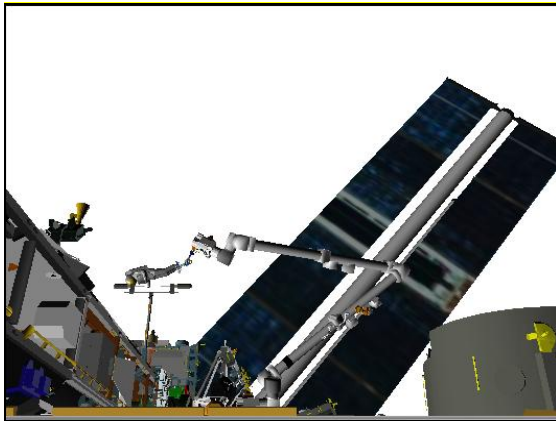


Figure 107.- EVA Egress Intermediate
 (13: LAB Stbd Zenith: -180, -40: 9 mm).

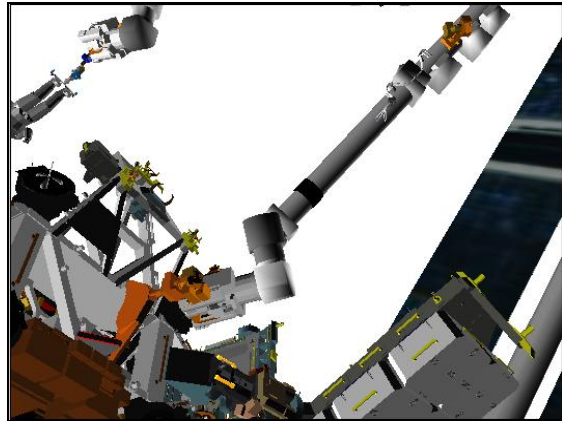


Figure 108.- EVA Egress Intermediate
 (51: JEM EXT A: -30, +45).

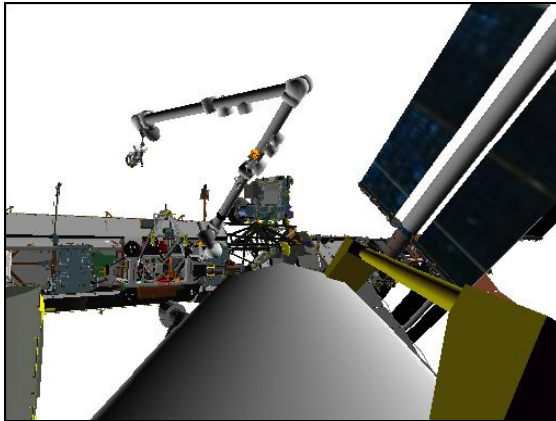


Figure 109.- EVA Egress Intermediate
 (SRMS EE).

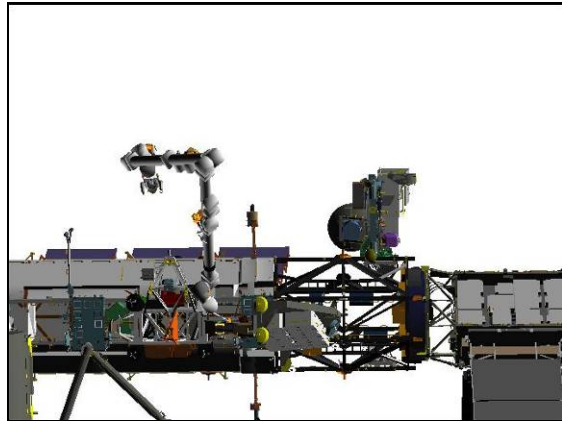


Figure 110.- EVA Egress Intermediate
 (ISS Aft).

38. MANUAL TO APFR EGRESS

RHC RATE → VERNIER (Verify Vernier on PCS)

PCS MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

NOTE
 Expect cross cluster collision warning while EP>142 deg.

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THC/
RHC Maneuver to APFR Egress position (within 5 cm/1 deg).
THC +Z Down

	Locked					
SR	SY	SP	EP	WP	WY	WR
+234.7	+193.9	-142.7	+151.5	-25.9	-41.4	+234.6
X	Y	Z	Pitch	Yaw	Roll	
+30	-1572	-285	-71.1	-6.3	+179.2	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

THC/
RHC Maneuver SSRMS per EVA GCA so EVA can Egress APFR.

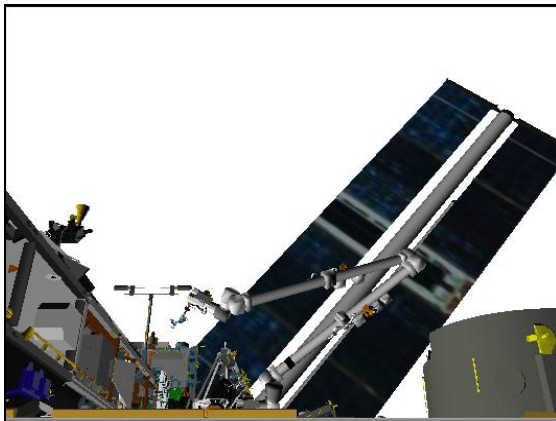


Figure 111.- APFR Egress
(13: LAB Stbd Zenith: -180, -40: 9 mm).

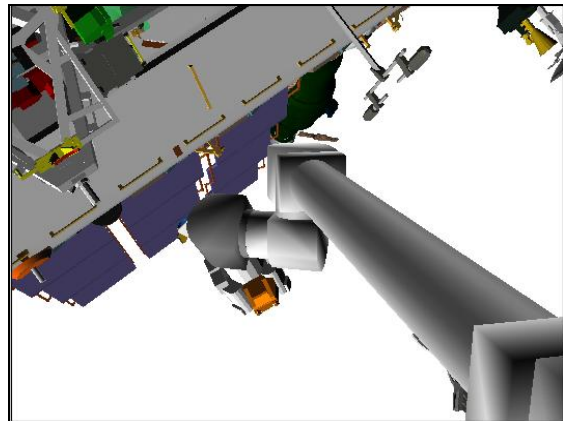


Figure 112.- APFR Egress
(22: Base Elbow: +40, -15).

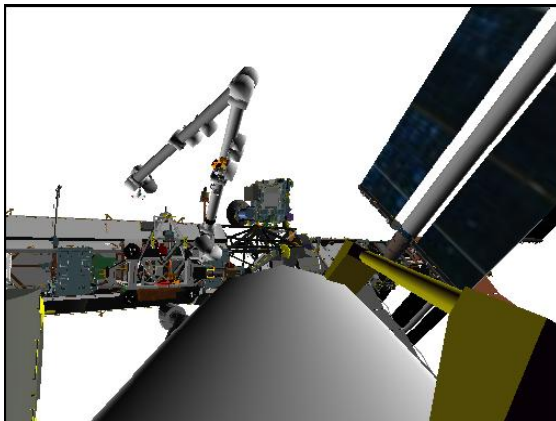


Figure 113.- APFR Egress
(SRMS EE).

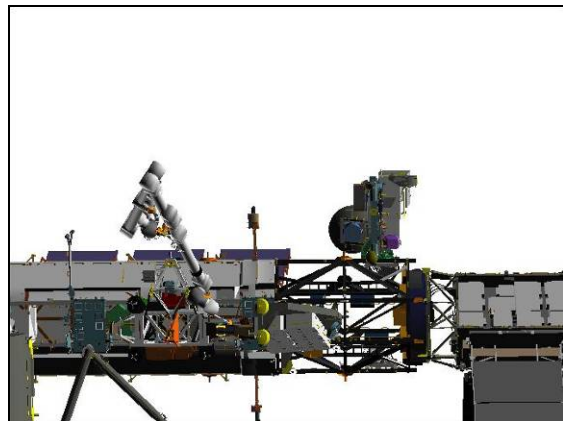


Figure 114.- APFR Egress
(ISS Aft).

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39. SINGLE JOINT TO APFR UNINSTALL

On EVA GO, EVA has egressed APFR, SSRMS go for APFR Drop Off.

PCS

MSS: SSRMS:

Enter Mode – Single (Verify blue)

DCP

JOINT SELECT → WRIST ROLL (Verify WR – Selected on PCS)

THC

Perform “-” Single Joint maneuver to WR: +165.0 (THC down).

Verify SSRMS at APFR Uninstall position (within 20 cm/5 deg).

SR	SY	SP	EP	WP	WY	WR
+234.7	+193.9	-142.7	+151.5	-25.9	-41.4	+165.0
X	Y	Z	Pitch	Yaw	Roll	
+80	-1757	-425	-43.1	-47.5	-114.6	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

40. SINGLE AXIS MANUAL TO APFR DROP OFF

PCS

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

THC/
RHC

Maneuver to APFR Drop Off position (within 20 cm/5 deg).

	Locked						
	SR	SY	SP	EP	WP	WY	WR
	+234.7	+193.9	-142.7	+151.5	-25.9	-41.4	+165.0
	X	Y	Z	Pitch	Yaw	Roll	
	+80	-1757	-425	-43.1	-47.5	-114.6	
APFR Uninstall							
1: X -	-78						
2: Y +		-1690					
3: Z +			-322				
APFR Drop Off							
	-78	-1690	-322	-43.1	-47.5	-114.6	
	SR	SY	SP	EP	WP	WY	WR
	+243.9	+193.9	-113.7	+144.4	-42.1	-43.6	+176.7
	FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
	Disp	ISS>ISSACS					

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THC/
RHC Maneuver SSRMS per EVA GCA for APFR removal

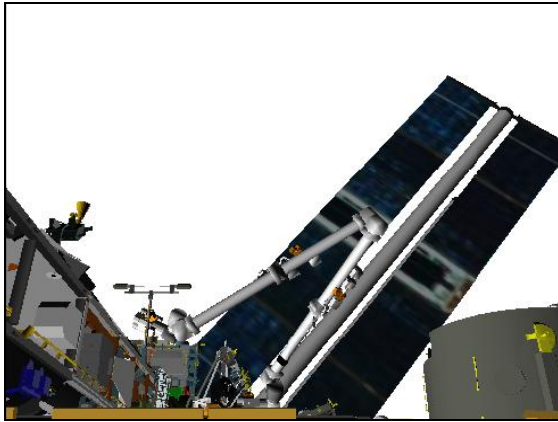


Figure 115.- APFR Drop Off
 (13: LAB Stbd Zenith: -180, -40: 9 mm).

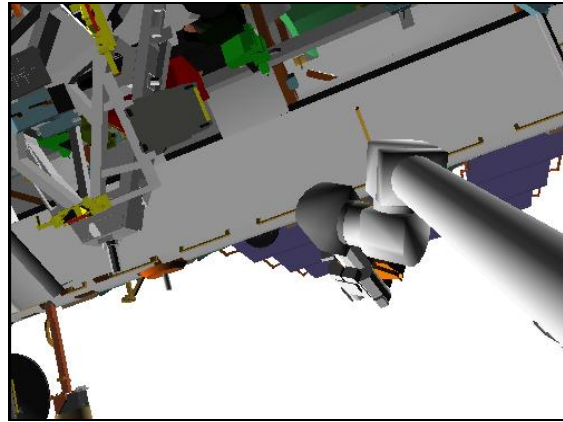


Figure 116.- APFR Drop Off
 (22: Base Elbow: +40, -15).

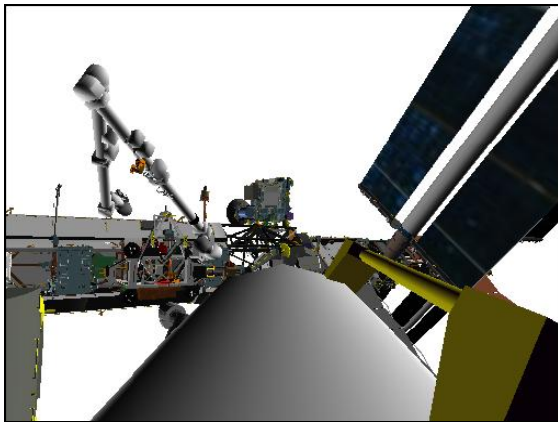


Figure.- 117 APFR Drop Off
 (SRMS EE).

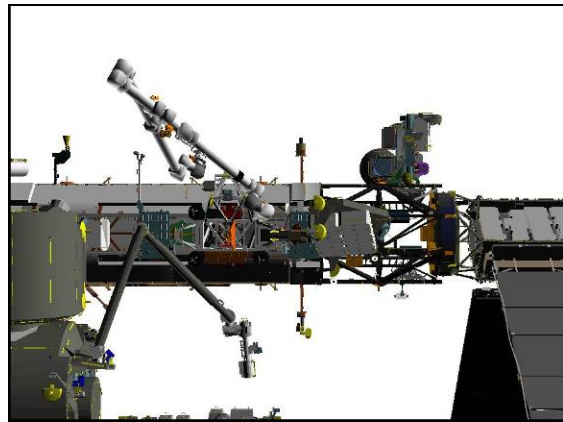


Figure 118.- APFR Drop Off
 (ISS Aft).

41. MANUAL TO APFR CLEAR

On EVA GO, EVA has deconfigured SSRMS, SSRMS go for APFR Clear.

THC/
RHC Maneuver to APFR Clear position (within 20 cm/5 deg).

	Locked					
SR	SY	SP	EP	WP	WY	WR
+231.7	+193.9	-119.3	+141.8	-41.3	-40.5	+161.3
X	Y	Z	Pitch	Yaw	Roll	
-78	-1690	-405	-43.1	-47.5	-114.6	
FOR	Unloaded – EVA, Chest 12/KK/F/6, SR Held					
Disp	ISS>ISSACS					

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42. JOCAS TO FD6 OVERNIGHT PARK (4 MINUTES)

RHC RATE → COARSE (Verify Coarse on PCS)

PCS MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

pick File ► EVA2 ► FD6 Overnight Park

Verify 'Joint Angles' 'Destination' for Overnight Park position.

SR	SY	SP	EP	WP	WY	WR
+213.7	-3.2	-101.1	+136.1	-165.1	-174.7	+140.1

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+231.7	+193.9	-119.3	+141.8	-41.3	-40.5	+161.3
TGT	+213.7	-3.2	-101.1	+136.1	-165.1	-174.7	+140.1
ERR	+18.0	+197.1	-18.2	+5.7	+123.8	+134.2	+21.2

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+213.7	-3.2	-101.1	+136.1	-165.1	-174.7	+140.1

NOTE

Expect the following message when safing is commanded:

'R3Z - MSS OCS SSRMS Prime(Redun) ACU SRT Cat-1 Brk Stat Fail' (SCR 17495)

This message should return to Norm.

DCP SAFING → SAFE (Verify ON)

Notify **MCC-H** GO for Port TRRJ, Port SARJ and arrays autotrack.

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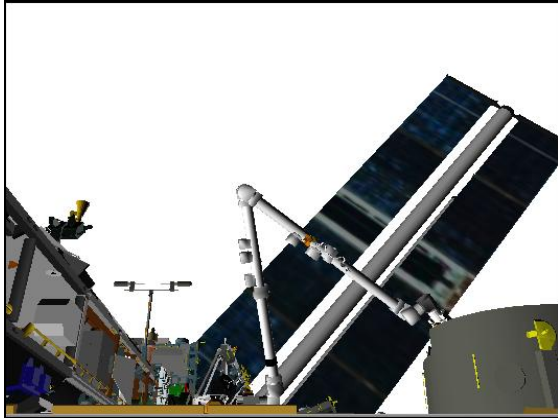


Figure 119.- Overnight Park
(13: LAB Stbd Zenith: -180, -40: 9 mm).

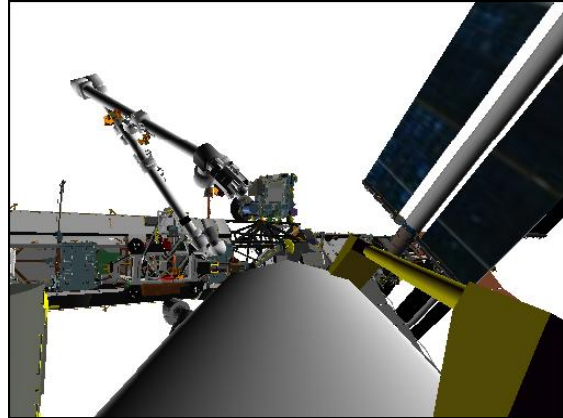


Figure 120.- Overnight Park
(SRMS EE).

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NOTE

1. Verify JEMRMS at JLE INSTALL VIEWING:
SY= -7.0, +70.0, -115.0, -40.0, 0.0, +7.0 =WR
2. Verify SRMS at JLE HANDOFF:
SY= +137.7, +23.6, -33.6, +15.4, +58.9, -235.6 =WR

1. HAND CONTROLLER CALIBRATION

1.1 Translational Hand Controller (THC) Calibration

THC

- Deflect [X] Axis to positive hard stop where [X] =
- Deflect [X] Axis to negative hard stop.
- Repeat

1.2 Rotational Hand Controller (RHC) Calibration

RHC

- Deflect [X] Axis to positive hard stop where [X] =
- Deflect [X] Axis to negative hard stop.
- Repeat

2. SETUP

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
37: MBS Mast (-145, +50)	13: LAB Stbd Zenith (-160, -40)	07: P1 LOIB (-130, -35)	SRMS Elbow (+30, -10)	Camera B (-35, +5)

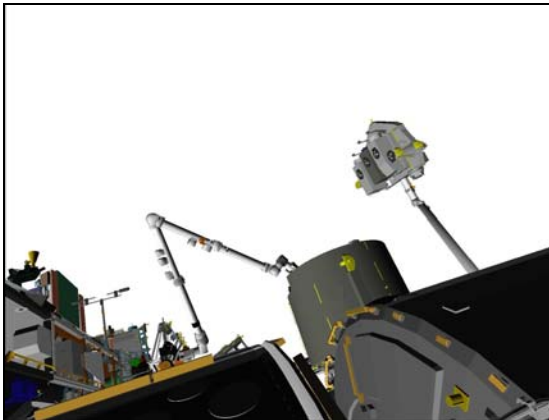


Figure 1.- Overnight Park
(13: LAB Stbd Zenith: -160, -40).

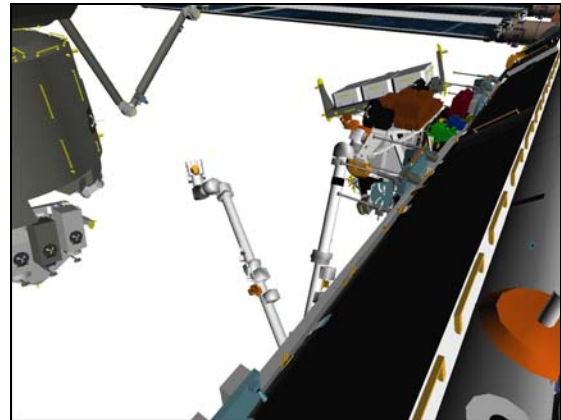


Figure 2.- Overnight Park
(07: P1 Lower Inboard: -125, -35).

PCS

MSS: SSRMS:

Change Loaded Parameters ► JLE ► JLE Install ISSACS SYH

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Verify 'Loaded Parameters' (two) – JLE Install ISSACS, SY Held

Change Unloaded Parameters ► Unloaded ► LEE Tip SYH

Verify 'Unloaded Parameters' (two) – LEE Tip, SY Held

Change Display ► JPM ► JLE Inst ISSACS EFU10 (Verify JPM>JLE Inst ISSACS EFU10)

Change Command ► SSRMS ► Internal (Verify SSRMS>Internal)

Verify SSRMS at Overnight Park position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+213.7	-3.2	-101.1	+136.1	-165.1	-174.7	+140.1
X	Y	Z	Pitch	Yaw	Roll	
+30	+246	-979	-46.9	-26.1	+154.4	
FOR	Unloaded – LEE Tip, SY Held					
Disp	JPM>JLE Inst ISSACS EFU10					

MSS: SSRMS: MSS Safing:

cmd 'SSRMS' Remove (Verify Not Safed)

3. JOCAS TO JLE PRE-GRAPPLE

On SRMS operator go: SRMS at JLE handoff posn, GO for SSRMS JLE grapple:

DCP BRAKES SSRMS → OFF (Verify OFF)

RHC RATE → VERNIER (Verify Vernier on PCS)

PCS MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

pick File ► JLE ► JLE Pre-grapple

Verify 'Joint Angles' 'Destination' for JLE Pre-Grapple position.

SR	SY	SP	EP	WP	WY	WR
+238.9	-8.8	-91.6	+76.4	-179.0	-184.8	+137.5

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+213.7	-3.2	-101.1	+136.1	-165.1	-174.7	+140.1
TGT	+238.9	-8.8	-91.6	+76.4	-179.0	-184.8	+137.5
ERR	-25.2	+5.6	-9.5	+59.7	+13.9	+10.1	+2.6

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PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+238.9	-8.8	-91.6	+76.4	-179.0	-184.8	+137.5



Figure 3.- JLE Pre-Grapple
(37: MBS Mast: -145, +45).

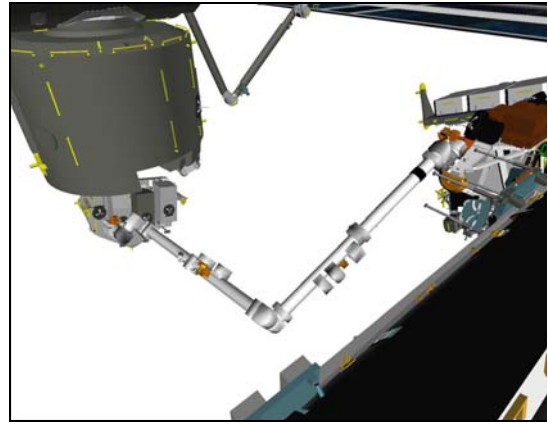


Figure 4.- JLE Pre-Grapple
(07: P1 Lower Inboard: -140, -35).

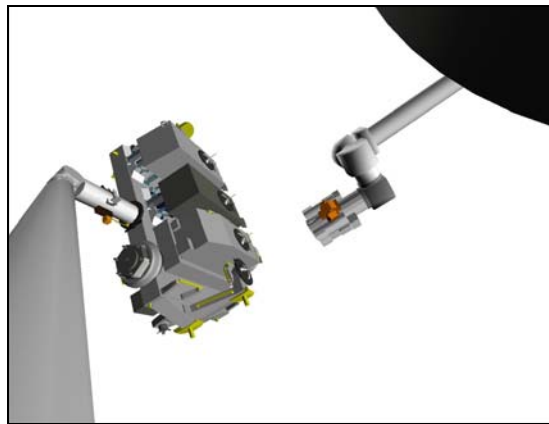


Figure 5.- JLE Pre-Grapple
(SRMS Elbow: +30, -10).

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4. GRAPPLE JLE

4.1 Setup

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
37: MBS Mast (-145, +50)	25: Tip LEE	07: P1 LOIB (-140, -35) 22: Base Elbow (+115, 0)	SRMS Elbow (+30, -10)	Camera B (-35, +5)

Verify Tip LEE camera is fully zoomed out

MSS: SSRMS: Thrusters:

Verify 'Desat Request' – Inh

Verify 'Auto Att Control Handover to RS' – Inh

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: As required

4.2 Grapple

Maneuver to within grapple envelope.

RHC/
THC

PCS

MSS: SSRMS: Tip LEE:

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

CAUTION

Due to end-to-end system latency, the RHC Trigger is hot up to 3 seconds prior to receiving a Trigger Hot icon status on the PCS.

NOTE

Once the trigger is hot, only safing or trigger commands should be sent to the Robotics equipment. If a configuration change is required, including routing MSS Cameras, safe the system to exit LEE operations (SCR 23262, 14662).

cmd Confirm (Verify RHC Trigger Hot icon)

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Verify LEE Mode – Auto Capture

RHC TRIGGER → Press (momentarily)

PCS
 Verify 'Snare' Close, Capture (two) – blue (12 s max)
 Verify Capture to Latch – No (SCR 19282)
 Verify 'Carriage' Tension ~5500 N
 Verify 'Carriage' Retract – blue
 Verify 'Carriage' Brakes – On (90 s max)

4.3 Grapple Cleanup

MSS: SSRMS:

Verify SSRMS at JLE Grapple position (within 10 cm/2 deg).

SR	SY	SP	EP	WP	WY	WR
+238.2	-8.8	-78.5	+59.4	-175.0	-184.6	+138.1
X	Y	Z	Pitch	Yaw	Roll	
+633	+820	-1123	-88.2	+75.1	-172.5	
FOR	Loaded - JLE Install ISSACS, SY Held					
Disp	JPM>JLE Inst ISSACS EFU10					

DCP BRAKES SSRMS → ON (Verify ON)

Review {SSRMS LEE CUE CARD}, all (SODF: RBT GEN: REFERENCE).

Give SRMS Operator GO for JLE ungrapple and mnvr to JLE Install Viewing posn.

PCS MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: 1.0 (Verify 1.0)



Figure 6.- JLE Grapple
(37: MBS Mast: -145, +45).

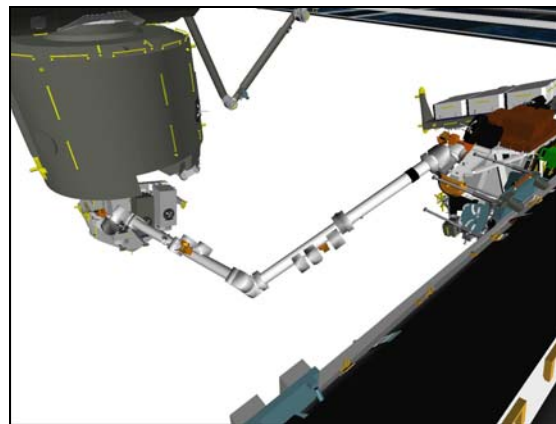


Figure 7.- JLE Grapple
(07: P1 Lower Inboard: -140, -35).

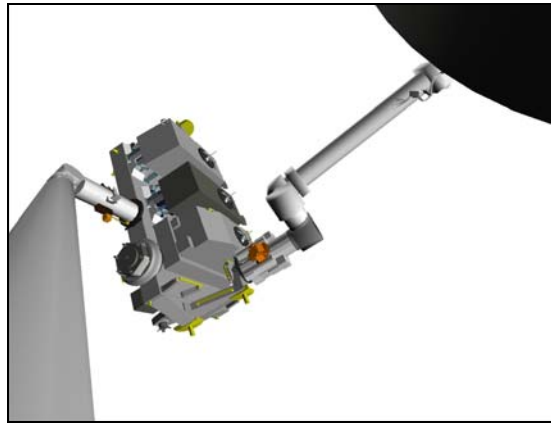


Figure 8.- JLE Grapple
 (SRMS Elbow: +30, -10).

5. SETUP FOR JLE INSTALL

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
37: MBS Mast (-135, +40)	51: JEM EXT A (+20, +85)	07: P1 LOIB (-140, -25)	SRMS EE	Camera B (-35, +5)
22: Base Elbow (+135, 0)		09: P1 LOOB (+150, -20)		

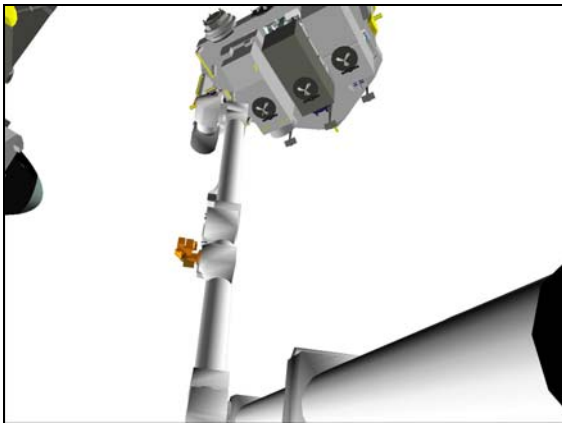


Figure 9.- JLE JOCAS Setup
 (37: MBS Mast: -135, +40).

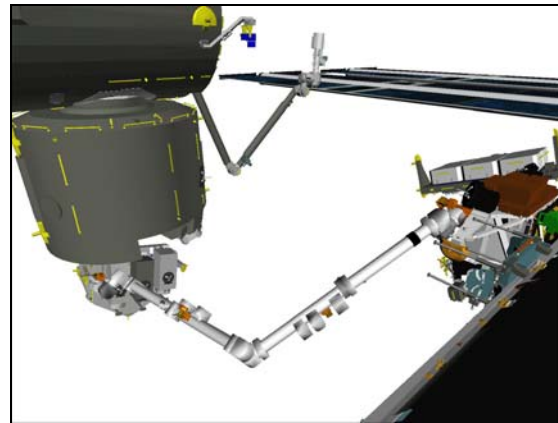


Figure 10.- JLE JOCAS Setup
 (07: P1 Lower Inboard: -140, -25).

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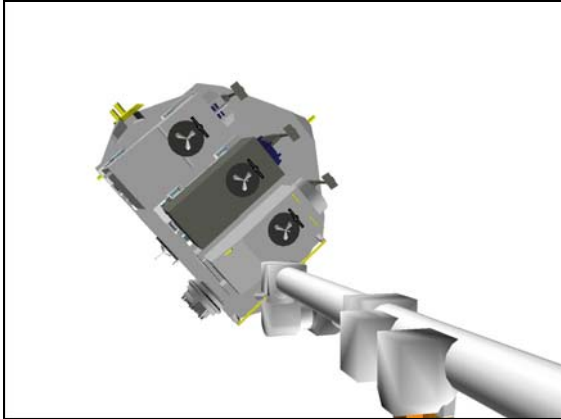


Figure 11.- JLE JOCAS Setup
(22: Base Elbow: +135, 0).

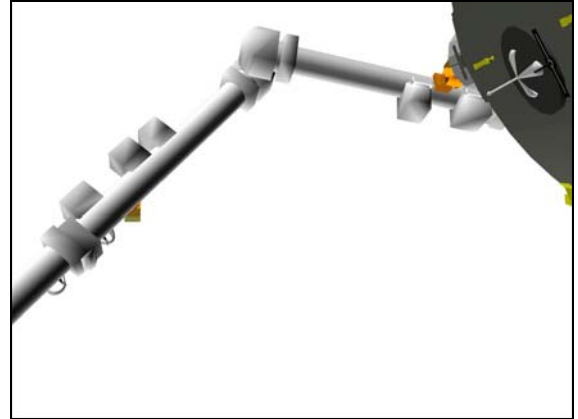


Figure 12.- JLE JOCAS Setup
(51: JEM EXT A: +20, +85).

On SRMS operator GO, SRMS at JLE Install Viewing, SSRMS GO for JLE Install:

```
*****
* If using shuttle attitude control and attitude maintenance reqd
* | DAP: LVLH
* | When rates damped
* | | DAP: FREE > 2 seconds
* | | DAP: AUTO
* | | When in attitude and rates damped
* | | DAP: FREE
*****
```

6. JOCAS TO JLE PRE-INSTALL

DCP BRAKES SSRMS → OFF (Verify OFF)

RHC RATE → COARSE (Verify Coarse on PCS)

NOTE
Monitor clearance between the SSRMS and JEMRMS using the MBS Mast or P1 LOOB Cameras.

PCS MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

pick File ► JLE ► JLE Pre-install

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Verify 'Joint Angles' 'Destination' for JLE Pre-Install position.

SR	SY	SP	EP	WP	WY	WR
+224.9	0.0	0.0	+97.3	-180.7	-136.6	+106.6

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+238.4	-8.8	-78.6	+59.4	-174.9	-184.5	+138.0
TGT	+224.9	0.0	0.0	+97.3	-180.7	-136.6	+106.6
ERR	+13.5	-8.8	-78.6	-37.9	+5.8	-47.9	+31.4

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS:

Verify Posn Hold – orange

Verify SSRMS at JLE Pre-install position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+224.9	0.0	0.0	+97.3	-180.7	-136.6	+106.6
X	Y	Z	Pitch	Yaw	Roll	
0	-300	0	0.0	0.0	0.0	
FOR	Loaded - JLE Install ISSACS, SY Held					
Disp	JPM>JLE Inst ISSACS EFU10					

Verify with EFU Operator Berthing Status Verification Complete.

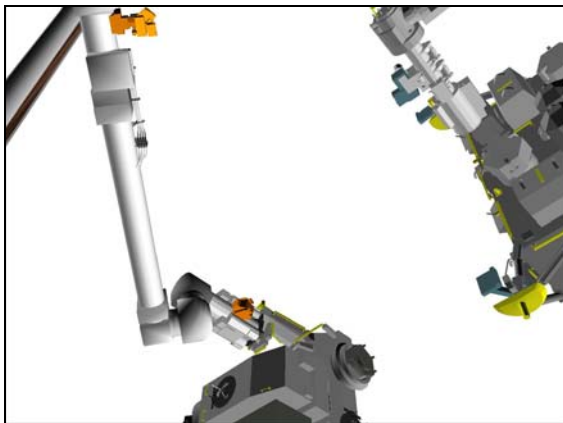


Figure 13.- JLE Pre-Install
(37: MBS Mast: +45, +50).

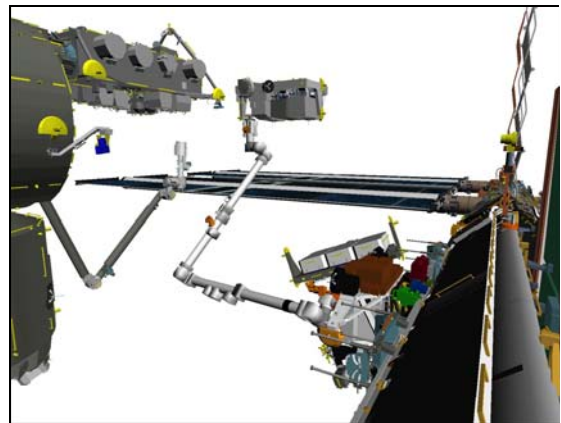


Figure 14.- JLE Pre-Install
(07: P1 Lower Inboard: -120, -10).

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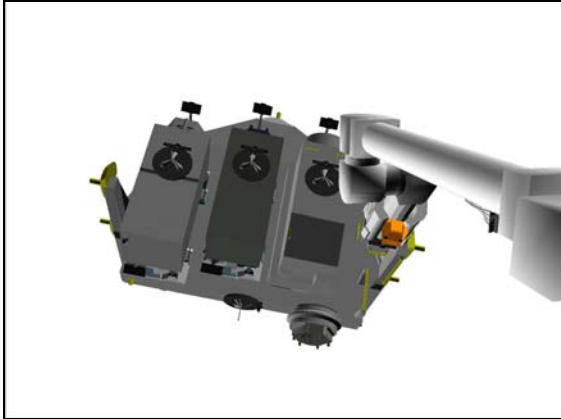


Figure 15.- JLE Pre-Install
(22: Base Elbow: +95, -15).

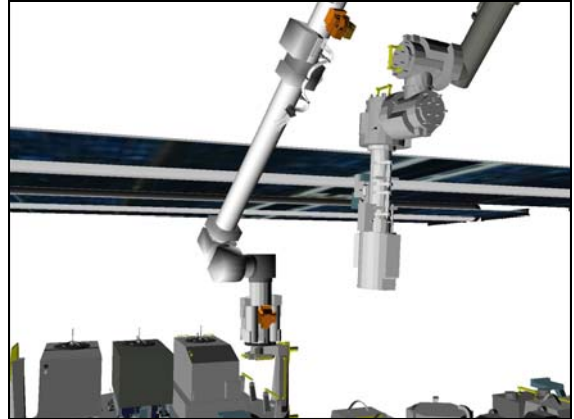


Figure 16.- JLE Pre-Install
(51: JEM EXT A: +20, +5).

7. [MANUAL TO JLE INSTALL](#)

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
24: Tip Elbow (0, +25)	52: JEM MA EE (0, 0)	09: P1 LOOB (-175, +15)	SRMS EE	Camera B (-50, +10)
51: JEM EF F (0, -25)		07: P1 LOIB (-125, -5)		

RHC RATE → VERNIER (Verify Vernier on PCS)

PCS MSS: SSRMS:

Verify Command – SSRMS>Internal

MSS: SSRMS: Thrusters:

Verify 'Desat Request' – Inh

Verify 'Auto Att Control Handover to RS' – Inh

```
*****
* If using shuttle attitude control and attitude maintenance reqd
* | DAP: LVLH
* | When rates damped
* | | DAP: FREE > 2 seconds
* | | DAP: AUTO
* | | When in attitude and rates damped
* | | DAP: FREE
*****
```

NOTE

Clearance between JLE FRGF 2 and JEF is 15 inches at mate.
Clearance between JLE ORUs and JEF Aft Camera mount is 17.5 inches at mate.

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MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

THC/
RHC

Maneuver to JLE Install position (within 5 cm/1 deg).
THC Right +Y

	Locked					
SR	SY	SP	EP	WP	WY	WR
+201.9	0.0	-6.6	+108.4	-186.7	-159.4	+103.9
X	Y	Z	Pitch	Yaw	Roll	
0	-10	0	0.0	0.0	0.0	
FOR	Loaded - JLE Install ISSACS, SY Held					
Disp	JPM>JLE Inst ISSACS EFU10					

Perform fine alignment as required

Verify JLE is within EFU capture envelope

PCS

MSS: SSRMS:

Enter Mode – Standby (Verify blue)

8. SSRMS LIMP AND CARRIAGE DERIGIDIZATION

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

MSS: SSRMS:

Verify all joints – Limped

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Derigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Derigidize

RHC

TRIGGER → Press (momentarily) (SCR 19064)

4.101 JLE INSTALL

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PCS Verify 'Carriage' Tension – 890 N (\pm 200 N)
 Verify 'Carriage' Retract – grey (90 s max)

Notify EFU operator: MnvR to RTL complete, SSRMS is Limped and LEE carriage is partially derigidized, GO for EFU 10 Capture Latch Close.

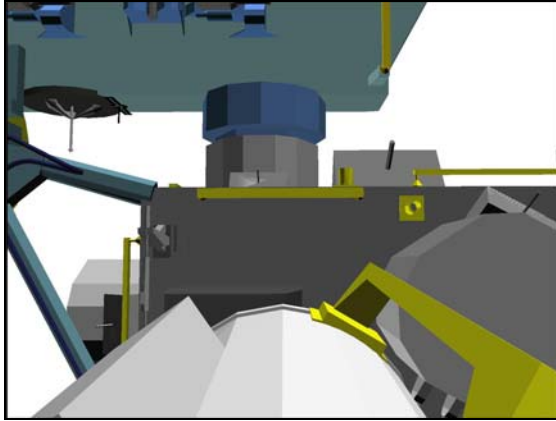


Figure 17.- JLE Install
(52: JEMRMS EE: 0, 0).

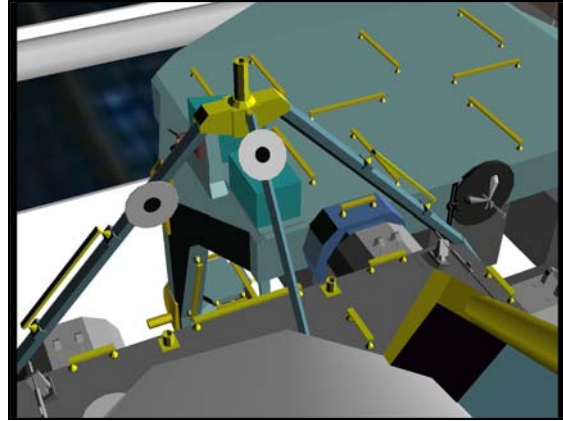


Figure 18.- JLE Install
(SRMS EE: 10 mm).

9. JLE RELEASE

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (+160, 0)	25: Tip LEE	07: P1 LOIB (-120, -10)	SRMS EE	Camera B (-50, +10)
37: MBS Mast (+65, +55)				

On **SSIPC** Go for JLE Release.

```
*****
* If using shuttle attitude control
* | DAP: LVLH
* | When rates damped
* | | DAP: FREE > 2 seconds
* | | DAP: AUTO
*****
```

9.1 Carriage Rigidization and Display Frame Change

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Rigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

4.101 JLE INSTALL

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Verify LEE Mode – Rigidize

RHC TRIGGER → Press (momentarily) (SCR 19064)

PCS Verify 'Carriage' Tension ~5500 N
Verify 'Carriage' Retract – blue
Verify 'Carriage' Brakes – On (90 s max)

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Change Display ► JPM ► Inst JLE GF EFU10 (Verify JPM>Inst JLE GF EFU10)

Verify SSRMS at JLE Mated Position (within 5cm/1deg)

SR	SY	SP	EP	WP	WY	WR
+201.0	0.0	-6.6	+108.6	-186.9	-160.3	+103.8
X	Y	Z	Pitch	Yaw	Roll	
+133	+64	-137	-27.2	-87.8*	-108.4	
FOR	Loaded – JLE Install ISSACS, SY Held					
Disp	JPM>Inst JLE GF EFU10					

*Display Singularity

9.2 SSRMS LIMP

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

Verify all joints – Limped

9.3 LEE FULL DERIGIDIZE

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Extend ► Hard Stops ► Slow, Hard Stops

Verify Speed – Slow
Verify Stops – Hard

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Extend Carriage

RHC TRIGGER → press (hold until 'Carriage' Derigidize – blue)
(10 s max)

4.101 JLE INSTALL

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PCS **cmd** Terminate (Verify 'Motors' – Inh)

9.4 AUTO RELEASE

MSS: SSRMS: Tip LEE:

cmd Release ► Automatic ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Release

RHC TRIGGER → press (momentarily)

PCS Verify 'Snare' Open – blue (12 s max)
Verify 'Carriage' Extend – blue (90 s max)

10. JLE BACKOFF

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

THC/
RHC MnvR SSRMS to JLE Backoff position (within 5 cm/1 deg).
THC Pull -X

		Locked					
SR	SY	SP	EP	WP	WY	WR	
+224.2	0.0	-36.8	+125.6	-172.3	-137.2	+106.5	
X	Y	Z	Pitch	Yaw	Roll		
-300	0	0	0.0	0.0	0.0		
FOR	Unloaded – LEE Tip, SY Held						
Disp	JPM>Inst JLE GF EFU10						

DCP BRAKES SSRMS → ON (Verify ON)

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7.101 SSRMS SAFING RECOVERY DURING EFBM OPERATIONS

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NOTE

Steps 1 and 4 are performed by the EFBM operator.

1. EFBM CAPTURE LATCH DEPLOY

1.1 EFBM ALARM RESET

On MCC-H and SSIPC GO:

BCDU Toggle ALARM RESET switch.

Verify STOP – Off

1.2 EFBM CAPTURE LATCH DEPLOY

To deploy capture latches, perform {1.102 ACTIVE EFBM OPS FOR JEF BERTHING}, steps 10.1 to 10.8 (SODF: ASSY OPS: ACTIVATION AND CHECKOUT), then:

Notify SSRMS operator: Go for SSRMS Mode to Limp.

2. SSRMS LIMPING

NOTE

1. The '**R3Q - SSRMS LEE Uncommanded Derigidize**' Caution will annunciate when SSRMS Safing is removed (SCR 38011). Caution is suppressed
2. SSRMS brakes will not be released until the override command is issued.

On EFBM operator Go for SSRMS Mode to Limp:

PCS MSS: SSRMS: MSS Safing:

cmd 'SSRMS' Remove (Verify Not Safed)

DCP BRAKES SSRMS → OFF

PCS MSS: SSRMS:

Verify Brake Override – Override or Limp or Cancel

MSS: SSRMS: Brake Override:

cmd Remove Brakes and Limping

MSS: SSRMS:

Verify Limp – Blue

Verify All Joints – Limp

7.101 SSRMS SAFING RECOVERY DURING EFBM OPERATIONS

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3. RTL VERIFICATION

Verify JEF is at Ready-to-latch position using the EFBM alignment markings (< 2cm separation between active and passive halves of EFBM).

NOTE

Steps 3.1 to 3.3 are only performed if the JEF was visually observed outside the EFBM RTL Envelope after limping in step 2.

If JEF is not at RTL

3.1 Carriage Rigidization

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Rigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Rigidize

RHC

TRIGGER → Press (momentarily) (SCR 19064)

PCS

Verify 'Carriage' Tension ~5500 N (90 s max)

Verify 'Carriage' Retract – blue

Verify 'Carriage' Brakes – On (15 s max)

3.2 Maneuvering to RTL

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

THC/
RHC

Maneuver JEF to RTL.

7.101 SSRMS SAFING RECOVERY DURING EFBM OPERATIONS

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	~3.3	<u>SSRMS Limping and Partial Derigidization</u>
PCS		MSS: SSRMS: <input type="text" value="SSRMS"/>
		Enter Mode – Standby (Verify blue)
		MSS: SSRMS: Limp: <input type="text" value="SSRMS Limp"/>
		cmd All Limp (Verify Limp – blue)
		MSS: SSRMS: <input type="text" value="SSRMS"/>
		Verify all joints – Limped
		MSS: SSRMS: Tip LEE: <input type="text" value="SSRMS Tip LEE"/>
		cmd 'Carriage' Derigidize ► Slow (Verify Speed – Slow)
		Verify ' Confirm or Terminate ' prompt.
		cmd Confirm (Verify RHC Trigger Hot icon)
		Verify LEE Mode – Derigidize
RHC		TRIGGER → Press (momentarily) (SCR 19064)
PCS		Verify 'Carriage' Retract – gray
		Verify 'Carriage' Tension – 890 N (± 200 N)
		Verify 'Carriage' Brakes – On (90 s max)

Notify EFBM operator: Maneuver to RTL complete, SSRMS is limped, and Carriage of SSRMS LEE is partially derigidized. GO for EFBM Capture Latch Closing.

4. CAPTURE LATCH CLOSING

To complete JEF berthing, go to {1.102 ACTIVE EFBM OPS FOR JEF BERTHING}, step 13 (SODF: ASSY OPS: ACTIVATION AND CHECKOUT).

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7.201 JLE RELOCATION EFU10 – EFU9

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NOTE

1. Verify JEMRMS at JLE INSTALL VIEWING:
SY= -7.0, +70.0, -115.0, -40.0, 0.0, +7.0 =WR
2. Verify SRMS at JLE Install Viewing:
SY= +63.7, +52.3, -49.2, +73.5, +53.5, -105.6=WR

1. SETUP

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
24: Tip Elbow (0, +25)	52: JEM MA EE (0, 0)	09: P1 LOOB (-175, +15)	SRMS EE	Camera B (-50, +10)
51: JEM EF F (0, -25)		07: P1 LOIB (-150, +15)		

PCS MSS: SSRMS:

Verify 'Unloaded Parameters' (two) – LEE Tip, SY Held
 Verify 'Loaded Parameters' (two) – JLE Install ISSACS, SY Held
 Verify Display - JPM>JLE Inst ISSACS EFU10
 Verify Command – SSRMS>Internal

Verify SSRMS at JLE Mated Position (within 5cm/1deg)

SR	SY	SP	EP	WP	WY	WR
+201.0	0.0	-6.6	+108.6	-186.9	-160.3	+103.8
X	Y	Z	Pitch	Yaw	Roll	
0	0	0	0.0	0.0	0.0	
FOR	Loaded – JLE Install ISSACS, SY Held					
Disp	JPM>JLE Inst ISSACS EFU10					

2. JLE DEMATE

PCS MSS: SSRMS: MSS Safing:

cmd 'SSRMS' Remove (Verify Not Safed)

DCP BRAKES SSRMS → OFF (Verify OFF)

RHC RATE → VERNIER (Verify Vernier on PCS)

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

Verify all joints – Limped

MSS: SSRMS: Thrusters:

7.201 JLE RELOCATION EFU10 – EFU9

(RBT FS/2JA/FIN) Page 2 of 7 pages

Verify 'Desat Request' – Inh
 Verify 'Auto Att Control Handover to RS' – Inh

 * If using shuttle attitude control
 * Verify in attitude, then DAP: FREE

Notify EFU operator: JLE has been grappled, SSRMS is Limped, and Carriage of LEE is partially derigidized. GO for EFU 10 Capture Latch Open.

3. MANEUVER TO JLE UNINSTALL – EFU 10

On EFU operator: GO to unberth JLE:

PCS

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

THC/
RHC

Maneuver JLE to JLE Uninstall position (within 5 cm/1 deg).
 THC Left -Y

SR	SY	SP	EP	WP	WY	WR
+210.0	0.0	-5.6	+106.0	-184.9	-151.3	+104.7
X	Y	Z	Pitch	Yaw	Roll	
0	-100	0	0.0	0.0	0.0	
FOR	Loaded - JLE Install ISSACS, SY Held					
Disp	JPM>JLE Inst ISSACS EFU10					

DCP

BRAKES SSRMS → ON (Verify ON)

Notify **SSIPC**: Go for EFU 10 deactivation and EFU 9 Activation.

Notify JEM RMS operator: Go for JEM RMS maneuver to EFU 9 JLE Install Viewing position.

PCS

MSS: SSRMS:

Change Display ► JPM ► JLE Inst ISSACS EFU9 (Verify JPM>JLE Inst EFU9)

7.201 JLE RELOCATION EFU10 – EFU9

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4. MANEUVER TO JLE PRE-INSTALL – EFU 9

On **SSIPC**, JEM RMS operator, and **MCC-H** GO:

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
24: Tip Elbow (0, +25)	22: Base Elbow (+105, -20)	09: P1 LOOB (-175, +15)	SRMS EE	Camera B (-50, +10)
	37: MBS Mast (+55, +40)	07: P1 LOIB (-150, +15)		

DCP BRAKES SSRMS → OFF (Verify OFF)

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

THC/
RHC

Maneuver JLE to JLE Pre-install EFU 9 position (within 5 cm/1 deg).
THC Push +X

SR	SY	SP	EP	WP	WY	WR
+205.3	0.0	-5.5	+89.3	-168.6	-156.0	+104.2
X	Y	Z	Pitch	Yaw	Roll	
0	-100	0	0.0	0.0	0.0	
FOR	Loaded - JLE Install ISSACS, SY Held					
Disp	JPM>JLE Inst ISSACS EFU9					

Verify with EFU operator Berthing Status Verification Complete for EFU 9.

5. MANEUVER TO JLE INSTALL - EFU 9

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
24: Tip Elbow (0, +25)	52: JEM MA EE (0, 0)	09: P1 LOOB (-175, +15)	SRMS EE	Camera B (-50, +10)
22: Base Elbow (+105, -20)	37: MBS Mast (+55, +40)	07: P1 LOIB (-150, +15)		

7.201 JLE RELOCATION EFU10 – EFU9

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THC/
RHC Maneuver to JLE Install position (within 5 cm/1 deg).
THC Right +Y

	Locked					
SR	SY	SP	EP	WP	WY	WR
+197.1	0	-6.3	+91.5	-170.3	-164.2	+103.5
X	Y	Z	Pitch	Yaw	Roll	
0	-10	0	0.0	0.0	0.0	
FOR	Loaded - JLE Install ISSACS, SY Held					
Disp	JPM>JLE Inst ISSACS EFU9					

Perform fine alignment as required.

Verify JLE is within EFU capture envelope.

PCS MSS: SSRMS:

Enter Mode – Standby (Verify blue)

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

MSS: SSRMS:

Verify all joints – Limped

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Derigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Derigidize

RHC TRIGGER → press (momentarily) (SCR 19064)

PCS Verify 'Carriage' Tension – 890 N (± 200N)
Verify 'Carriage' Retract – grey (90 s max)

Notify EFU operator: Maneuver to RTL complete, SSRMS is Limped and Carriage of LEE is partially derigidized. GO for EFU 9 Capture Latch Close.

6. JLE SETUP FOR RELEASE

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3
37: MBS Mast (+65, +50)	25: Tip LEE	09: P1 LOOB (-175, -15)

7.201 JLE RELOCATION EFU10 – EFU9

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On SSIPC Go for JLE Release:

```
*****
* If using shuttle attitude control and attitude maintenance reqd
* |   DAP: LVLH
* |   When rates damped
* |   |   DAP: FREE > 2 seconds
* |   |   DAP: AUTO
*****
```

PCS MSS: SSRMS: Tip LEE:

cmd 'Carriage' Rigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Rigidize

RHC TRIGGER → Press (momentarily) (SCR 19064)

PCS Verify 'Carriage' Tension ~5500 N (90 s max)
Verify 'Carriage' Retract – blue
Verify 'Carriage' Brakes – On (90 s max)

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Change Display ► JPM ► Inst JLE GF EFU9 (Verify JPM>Inst JLE GF EFU9)

Verify SSRMS at JLE Mated Position (within 5cm/1deg)

SR	SY	SP	EP	WP	WY	WR
+196.1	0.0	-6.3	+91.7	-170.5	-165.2	+103.4
X	Y	Z	Pitch	Yaw	Roll	
+133	+64	-138	-22.3	-89.9	-112.2	
FOR	Loaded – JLE Install ISSACS, SY Held					
Disp	JPM>Inst JLE GF EFU9					

7. JLE RELEASE WITH REDUCED DERIGIDIZATION

7.1 SSRMS LIMP

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

Verify all joints – Limped

7.201 JLE RELOCATION EFU10 – EFU9

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7.2 LEE FULL DERIGIDIZE

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

MSS: SSRMS:

Verify all joints – Limped

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Extend ► Hard Stops ► Slow, Hard Stops

Verify Speed – Slow

Verify Stops – Hard

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Extend Carriage

RHC TRIGGER → Press (hold until 'Carriage' Derigidize – blue)
(10 s max)

PCS **cmd** Terminate (Verify 'Motors' – Inh)

7.3 AUTO RELEASE

MSS: SSRMS: Tip LEE:

cmd Release ► Automatic ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Release

RHC TRIGGER → Press (momentarily)

PCS Verify 'Snare' Open – blue (12 s max)
Verify 'Carriage' Extend – blue (90 s max)

8. JLE BACKOFF

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

7.201 JLE RELOCATION EFU10 – EFU9

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Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

THC/
RHC

Maneuver to JLE Backoff position (within 5 cm/1 deg).
THC Pull -X

	Locked					
SR	SY	SP	EP	WP	WY	WR
+201.4	0.0	-18.9	+100.6	-166.6	-159.9	+103.9
X	Y	Z	Pitch	Yaw	Roll	
-150	0	0	0.0	0.0	0.0	
FOR	Unloaded – LEE Tip, SY Held					
Disp	JPM>Inst JLE GF EFU9					

PCS

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

Input 'Joint Angles' 'Destination' for JLE Back-off position (EFU10).

SR	SY	SP	EP	WP	WY	WR
+224.2	0.0	-36.8	+125.6	-172.3	-137.2	+106.5

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON

Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+201.4	0.0	-18.9	+100.6	-166.6	-159.9	+103.9
TGT	+224.2	0.0	-36.8	+125.6	-172.3	-137.2	+106.5
ERR	-22.8	0.0	+17.9	-25.0	+5.7	-22.7	-2.6

PCS

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP

AUTO SEQ → PROC

PCS

MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+224.2	0.0	-36.8	+125.6	-172.3	-137.2	+106.5

DCP

BRAKES SSRMS → ON (Verify ON)

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NOTE

1. Verify JEMRMS at Stowed Position:
 SY= 0.0, +90.0, -149.0, -31.0, 0.0, 0.0 =WY
2. Verify SRMS at Pre-Cradle:
 SY= 0.0, +25.0, -25.0, +5.0, 0.0, 0.0 =WY

1. HAND CONTROLLER CALIBRATION

1.1 Translational Hand Controller (THC) Calibration

THC

Deflect [X] Axis to positive hard stop where [X] =

Deflect [X] Axis to negative hard stop.

Repeat

1.2 Rotational Hand Controller (RHC) Calibration

RHC

Deflect [X] Axis to positive hard stop where [X] =

Deflect [X] Axis to negative hard stop.

Repeat

2. SETUP

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3
13: LAB Stbd Zenith (-170, -50)	07: P1 LOIB (-120, -15)	51: JEM EXT A (+35,+5)

Change Loaded Parameters ► JLE ► JLE Install ISSACS SYH
 Verify 'Loaded Parameters' (two) – JLE Install ISSACS, SY Held

Change Unloaded Parameters ► Unloaded ► LEE Tip SYH
 Verify 'Unloaded Parameters' (two) – LEE Tip, SY Held

Change Display ► JPM ► Inst JLE GF EFU9 (Verify JPM>Inst JLE GF EFU9)

Change Command ► SSRMS ► Internal (Verify SSRMS>Internal)

Verify SSRMS at JEMRMS CLEAR position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+20.4	+48.7	+55.0	+69.4	-247.7	-168.2	+81.8
X	Y	Z	Pitch	Yaw	Roll	
-1784	+648	+14	+150.1	-33.4	-43.3	
FOR	Unloaded – LEE Tip , SY Held					
Disp	JPM> Inst JLE GF EFU9					

3. JOCAS TO JLE PRE-GRAPPLE

PCS MSS: SSRMS: MSS Safing: MSS Safing

cmd SSRMS: Remove (Verify Not Safed)

DCP BRAKES SSRMS → OFF (Verify OFF)

RHC RATE → VERNIER (Verify Vernier on PCS)

PCS MSS: SSRMS: SSRMS

Enter Mode – Joint OCAS (Verify blue)

SSRMS Joint OCAS

Input 'Joint Angles' 'Destination' for JLE Pre-Grapple position.

SR	SY	SP	EP	WP	WY	WR
-21.9	+35.1	+15.1	-90.9	-211.9	-164.2	-116.4

NOTE
Expect singularity warning for EP between -15 and +15 deg.

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+20.4	+48.7	+55.0	+69.4	-247.7	-168.2	+81.8
TGT	-21.9	+35.1	+15.1	-90.9	-211.9	-164.2	-116.4
ERR	+42.3	+13.6	+39.9	+160.3	-35.8	-4.0	+198.2

```
*****
* If joint angles or errors are incorrect
* | cmd Cancel (Verify Sequence Status – Waiting Destination)
* |
* | Input correct Dest joint angles per table above.
* |
* | cmd Load (Verify Sequence Status – Confirm or Cancel)
* |
MON * | Verify joint angles and errors are correct on Joint Angle Position
* | overlay.
*****
```

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
-21.9	+35.1	+15.1	-90.9	-211.9	-164.2	-116.4

4. MANUAL TO JLE GRAPPLE

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3
22: Base Elbow (-105, -10)	25: Tip LEE	09: P1 LOOB (-175, -10) 07: P1 LOIB (-130, -5)

PCS

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

RHC/
THC

Maneuver to within grapple envelope.

PCS

MSS: SSRMS: Tip LEE:

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

CAUTION
Due to end-to-end system latency, the RHC Trigger is hot up to 3 seconds prior to receiving a Trigger Hot icon status on the PCS.

<u>NOTE</u>
Once the trigger is hot, only safing or trigger commands should be sent to the Robotics equipment. If a configuration change is required, including routing MSS Cameras, safe the system to exit LEE operations (SCR 23262, 14662).

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Capture

7.202 JLE RETRIEVE EFU9

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RHC TRIGGER → Press (momentarily)

PCS Verify 'Snare' Close, Capture (two) – blue (12 s max)
Verify Capture to Latch – No (SCR 19282)
Verify 'Carriage' Tension ~5500 N (90 s max)
Verify 'Carriage' Retract – blue
Verify 'Carriage' Brakes – On (15 s max)

MSS: SSRMS:

Change Display ► JPM ► JLE Inst ISSACS EFU9 (Verify JPM>JLE Inst ISSACS EFU9)

5. SETUP FOR EFU OPERATIONS

MSS: SSRMS: Thrusters:

Verify 'Desat Request' - Inh
Verify 'Auto Att Control Handover to RS' - Inh

* If using Shuttle attitude control
* | Verify in attitude, then DAP: FREE

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

Verify all joints – Limped

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Derigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Deridigize

RHC TRIGGER → press (momentarily) (SCR 19064)

PCS Verify 'Carriage' Tension – 890 N (\pm 200 N)
Verify 'Carriage' Retract – grey (90 s max)

NOTE

Expect JLE and SSRMS motion during EFU latch open as the capture latches push the JLE to the ready-to-latch position

Notify EFU operator: JLE has been grappled, SSRMS is Limped and Carriage of LEE is partially derigidized. GO for EFU 9 Capture Latch Open.

6. MANUAL TO JLE UNINSTALL

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3
22: Base Elbow (-105, -10)	37: MBS Mast (+95, +50)	09: P1 LOOB (-175, +5)
		07: P1 LOIB (-130, -5)

On EFU operator Go to unberth JLE:

MSS: SSRMS: Tip LEE: SSRMS Tip LEE

cmd 'Carriage' Rigidize ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Rigidize

RHC TRIGGER → Press (momentarily) (SCR 19064)

PCS Verify 'Carriage' Tension ~5500 N (90 s max)
 Verify 'Carriage' Retract – blue
 Verify 'Carriage' Brakes – On (15 s max)

MSS: SSRMS: Limp: SSRMS Limp

cmd None Limp (Verify Standby – blue)

MSS: SSRMS: SSRMS

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock: Joint Lock

cmd Shoulder Yaw (Verify SY – Locked)

7.202 JLE RETRIEVE EFU9
 (RBT FS/2JA/FIN) Page 6 of 6 pages

THC/ RHC Maneuver JLE to JLE Uninstall position (within 5 cm/1 deg).

		Locked					
	SR	SY	SP	EP	WP	WY	WR
	-15.7	+35.1	+3.9	-83.0	-204.8	-169.0	-114.9
	X	Y	Z	Pitch	Yaw	Roll	
JLE Grapple	0	0	0	0	0	0	
1: Y -		-150					
2: X -	-210						
3: Z -			-400				
JLE Uninstall	-210	-150	-400	0	0	0	
	SR	SY	SP	EP	WP	WY	WR
	-25.4	+35.1	+39.5	-119.9	-209.8	-161.1	-117.4
	FOR	Loaded – JLE Install ISSACS, SY Held					
	Disp	JPM>JLE Inst ISSACS EFU9					

```
*****
* If using shuttle attitude control and attitude maintenance reqd
* | DAP: LVLH
* | When rates damped
* | | DAP: FREE > 2 seconds
* | | DAP: AUTO
* | | When in attitude and rates damped
* | | DAP: FREE
*****
```

PCS MSS: SSRMS:

Enter Mode – Standby (Verify blue)

Change Display ► JPM ► JLE Inst ISSACS EFU10 (Verify JPM>JLE Inst ISSACS EFU10)

Go to {4.201 JLE RETRIEVE}, step 7 (SODF: RBT FS: JLE).

7.203 SSRMS SAFING RECOVERY DURING EFU OPERATIONS

(RBT FS/2JA/FIN 1) Page 1 of 5 pages

NOTE

Steps 2 and 3 is performed by the EFU operator.

1. SSRMS LIMPING

NOTE

1. The '**R3Q - SSRMS LEE Uncommanded Derigidize**' Caution will annunciate when SSRMS Safing is removed (SCR 38011). Caution is supressed.
2. SSRMS brakes will not be released until the override command is issued.

On MCC-H GO for SSRMS Mode to Limp:

PCS MSS: SSRMS: MSS Safing:

cmd 'SSRMS' Remove (Verify Not Safed)

DCP BRAKES SSRMS → OFF

PCS MSS: SSRMS:

Verify Brake Override – Override or Limp or Cancel

MSS: SSRMS: Brake Override:

cmd Remove Brakes and Limping

MSS: SSRMS:

Verify Limp – Blue

Verify All Joints – Limp

Notify EFU operator: GO for EFU RECOVERY operations.

2. EFU RECOVERY

On SSRMS operator: GO for EFU Recovery operations:

2.1 EDU Power Cycle For Error Reset

NOTE

Current EDU shall be used for EFU recovery operation.

Table 1. Parameters for EDUs

EDUs [Y]	EDU RPCs [Z]
EDU a	PDB a RPC3
EDU b	PDB b RPC20

7.203 SSRMS SAFING RECOVERY DURING EFU OPERATIONS

(RBT FS/2JA/FIN 1) Page 2 of 5 pages

SLT

2.1.1 EDU Deactivation

JEF: Mech: PLX: EDU

JEF Mech EDU Stat

'[Y]' (Refer to Table 1)

sel PDB RPC Posn – Cmd

JEF EPS [Z] Cmd

cmd RPC Open Execute

JEF Mech EDU Stat

'[Y]'

Verify PDB RPC Posn – Open

2.1.2 EDU Activation

JEF: Mech: PLX: EDU

JEF Mech EDU Stat

'[Y]' (Refer to Table 1)

sel PDB RPC Posn – Cmd

JEF EPS [Z] Cmd

cmd RPC Close Execute

JEF Mech EDU Stat

'[Y]'

Verify PDB RPC Posn – Closed

Verify Health Status – Normal

Verify BIT Status – Valid

Verify BIT Result – Normal

2.1.3 Selecting EFU

JEF: Mech: PLX: EFU10(9)

JEF Mech EFU10(9) Stat

sel Select – Cmd

JEF Mech EFU10(9) Select Cmd

cmd Select Execute

JEF Mech EFU10(9) Stat

Verify Health – Normal

Verify Select – Selected

7.203 SSRMS SAFING RECOVERY DURING EFU OPERATIONS

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2.2 EFU Recovery Operations

If performing JLE Berthing

NOTE

1. EFU health status-failure is expected when reaching Softdock position. The EFU power cycle is required to reset this status.
2. Close command instead of Softdock command is used for the retry because Softdock command is rejected when the latching arms are NOT at Open or Close position.

If SSRMS is safed during Open to Softdock Operation

JEF Mech EFU10(9) Stat

sel Action – Cmd

JEF Mech EFU10(9) Action Cmd

cmd Capture Execute

JEF Mech EFU10(9) Stat

Verify Full Open – Off

Verify Softdock – On

Verify Full Close – Off

Perform step 2.1 for EDU power cycle.

WARNING

1. The following conditions shall be met to ensure the successful payload mating.
 - a. Full Close – On
 - b. Capture1 – On
 - c. Capture2 – On
2. If Full Close is Off, the Full Close status on the redundant EDU shall be confirmed as an additional indication.
3. If Capture 1(2) is off, the timing of Full close-on shall be verified as an additional indication. EFU health status can be used as an alternate status for this timing confirmation because this is a summary status including Time-over error and Under-limit error of Full Close status.

7.203 SSRMS SAFING RECOVERY DURING EFU OPERATIONS

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JEF Mech EFU10(9) Stat

sel Action – Cmd

JEF Mech EFU10(9) Action Cmd

cmd Capture Execute

JEF Mech EFU10(9) Stat

Verify Full Close – On

Verify Capture1 – On

Verify Capture2 – On

* If one of Full Close, Capture1 or 2 is Off

* | If Full Close is Off

* | | If EDU a is used

* | | | Perform step 2.1.1 for EDU a deactivation, then:

* | | | Perform step 2.1.2 for EDU b activation, then:

* |

* | | If EDU b is used

* | | | Perform step 2.1.1 for EDU b deactivation, then:

* | | | Perform step 2.1.2 for EDU a activation, then:

* |

* | JEF: Mech: PLX: EFU10(9)

* | JEF Mech EFU10(9) Stat

* |

* | Verify Full Close – On

* |

* | Go to step 3.

* |

* | | If Capture1(2) is Off

* | | JEF Mech EFU10(9) Stat

* | |

* | | Verify Health – Normal

* | |

* | | Go to step 3.

Go to step 3.

If performing JLE Unberth

| Notify **SSIPC** to perform retrying EFU 10(9) Open operations.

| **On SSIPC GO**, go to step 3.

7.203 SSRMS SAFING RECOVERY DURING EFU OPERATIONS

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3. INHIBITING MECHANICAL AUTOSAFING SOFTWARE

NOTE

1. For JLE Berthing, EFU 10(9) Capture Latches have been fully closed.
2. For JLE Unberthing, EFU 10(9) Capture Latches have been fully opened.

PCS

Mechanism Autosafing

'Inhibit'

cmd Arm Execute

Verify Arm – ✓

cmd Inhibit Execute

Verify Mechanism Autosafing – Inhibited

If performing JLE Berthing:

Notify **SSIPC**, "Go for activating JLE, JLE has been berthed at EFU10(9)."

If performing JLE Unberth

Notify SSRMS operator, "Go to unberth JLE."

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7.300 CONTINGENCY - ICC STOW ON POA

(RBT FS/2JA/FIN)

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1. HAND CONTROLLER CALIBRATION

1.1 Translational Hand Controller (THC) Calibration

THC

- Deflect [X] Axis to positive hard stop where [X] =
- Deflect [X] Axis to negative hard stop.
- Repeat

1.2 Rotational Hand Controller (RHC) Calibration

RHC

- Deflect [X] Axis to positive hard stop where [X] =
- Deflect [X] Axis to negative hard stop.
- Repeat

2. SETUP

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
13: LAB Stbd Zenith (-180, -40)	07: P1 LOIB (-110, -30)	51: JEM EXT A (-40, +50)	SRMS Elbow (+75, +10)	
09: P1 LOOB (-165, -40)				

PCS

MSS: SSRMS:

Change Unloaded Parameters ► Unloaded ► LEE Tip SRH
Verify 'Unloaded Parameters' (two) – LEE Tip, SR Held

Change Loaded Parameters ► VCC ► VCC Stow SYH
Verify 'Loaded Parameters' (two) – VCC Stow, SY Held

Change Display ► MBS ► POA (Verify MBS>POA)

Change Command ► SSRMS ► Internal (Verify SSRMS>Internal)

Verify SSRMS at Park position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+207.1	+35.5	-86.7	+74.9	-8.8	-141.8	+116.1
X	Y	Z	Pitch	Yaw	Roll	
-196	+672	-663	+77.7	-5.7	+22.8	
FOR	Loaded – VCC Stow, SY Held					
Disp	MBS>POA					

7.300 CONTINGENCY - ICC STOW ON POA

(RBT FS/2JA/FIN)

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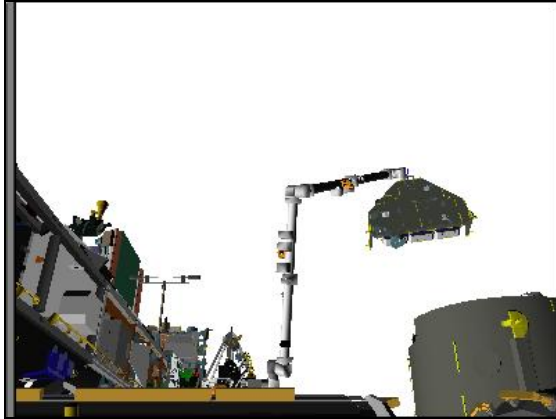


Figure 1.- Park
(13: LAB Stbd Zenith: -180, -40).

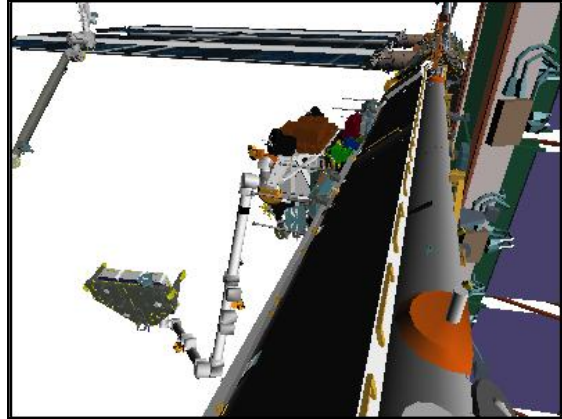


Figure 2.- Park
(07: P1 Lower Inboard: -110, -30).

3. JOCAS TO POA CLEAR (5 MINUTES)

PCS MSS: SSRMS: MSS Safing:

cmd 'SSRMS' Remove (Verify Not Safed)

DCP BRAKES SSRMS → OFF (Verify OFF)

RHC RATE → COARSE (Verify Coarse on PCS)

PCS MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

Input 'Joint Angles' 'Destination' for POA Clear position.

SR	SY	SP	EP	WP	WY	WR
+224.2	+50.0	-3.8	+111.0	-32.5	-203.5	+138.8

cmd Load (Verify Sequence Status – Confirm or Cancel)

MON Verify joint angles and errors are correct on Joint Angle Position overlay.

	SR	SY	SP	EP	WP	WY	WR
(current)	+207.1	+35.5	-86.7	+74.9	-8.8	-141.8	+116.1
TGT	+224.2	+50.0	-3.8	+111.0	-32.5	-203.5	+138.8
ERR	-17.1	-14.5	-82.9	-36.1	+23.7	+61.7	-22.7

7.300 CONTINGENCY - ICC STOW ON POA

(RBT FS/2JA/FIN)

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```

*****
* If joint angles or errors are incorrect
PCS * | cmd Cancel (Verify Sequence Status – Waiting Destination)
* |
* | Input correct Dest joint angles per table above.
* |
* | cmd Load (Verify Sequence Status – Confirm or Cancel)
* |
MON * | Verify joint angles and errors are correct on Joint Angle Position
* | overlay.
*****
  
```

PCS **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

DCP AUTO SEQ → PROC

PCS MSS: SSRMS:

Verify Posn Hold – orange

Verify Joint Angle values.

SR	SY	SP	EP	WP	WY	WR
+224.2	+50.0	-3.8	+111.0	-32.5	-203.5	+138.8

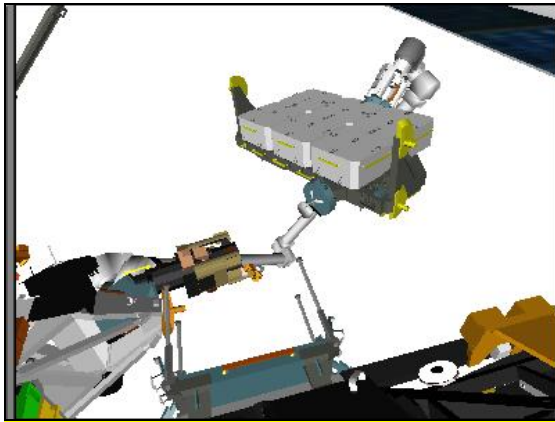


Figure 3.- POA Clear
(09: P1 Lower Outboard: -165, -40).

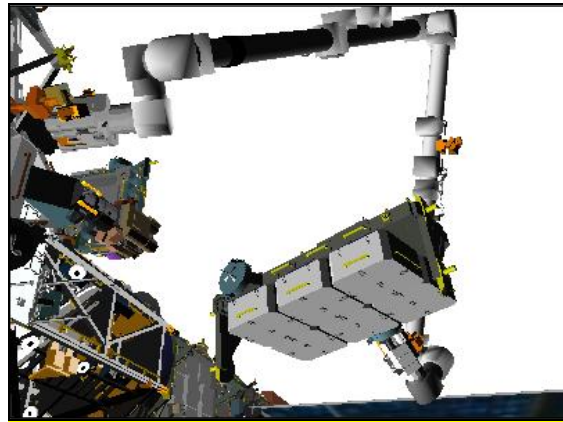


Figure 4.- POA Clear
(51: JEM EXT A: -15, +30).

```

*****
* If using shuttle attitude control and attitude
* maintenance reqd
* | DAP: LVLH
* | When rates damped
* | | DAP: FREE > 2 seconds
* | | DAP: AUTO
* | | When in attitude and rates damped
* | | DAP: FREE
*****
  
```

7.300 CONTINGENCY - ICC STOW ON POA

(RBT FS/2JA/FIN)

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4. SINGLE JOINT TO ICC PRE-STOW

RHC RATE → VERNIER (Verify Vernier on PCS)

PCS MSS: SSRMS:

Enter Mode – Single (Verify blue)

WARNING

The active joint must be checked on the PCS before initiating motion. Failure to do so may result in movement of the wrong joint.

DCP JOINT SELECT → SHOULDER YAW (Verify SY – Selected on PCS)

THC Perform “+” Single Joint maneuver to SY: +72.2 (THC up).

Verify SSRMS at ICC Pre-Stow position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+224.2	+72.2	-3.8	+111.0	-32.5	-203.5	+138.8
X	Y	Z	Pitch	Yaw	Roll	
+150	0	0	0.0	0.0	0.0	
FOR	Loaded – VCC Stow SRH					
Disp	MBS>POA					

PCS MSS: SSRMS:

Enter Mode – Standby (Verify blue)

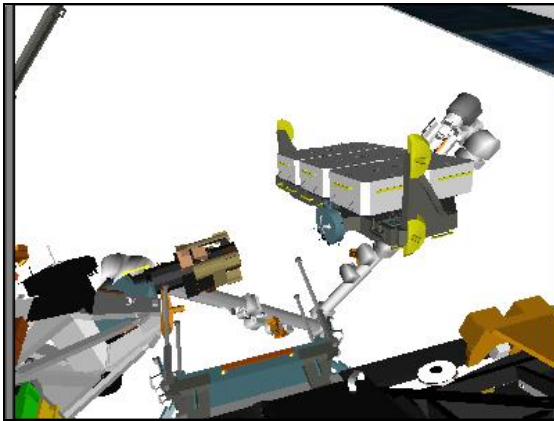


Figure 5.- ICC Pre-Stow
(09: P1 Lower Outboard: -165, -40).

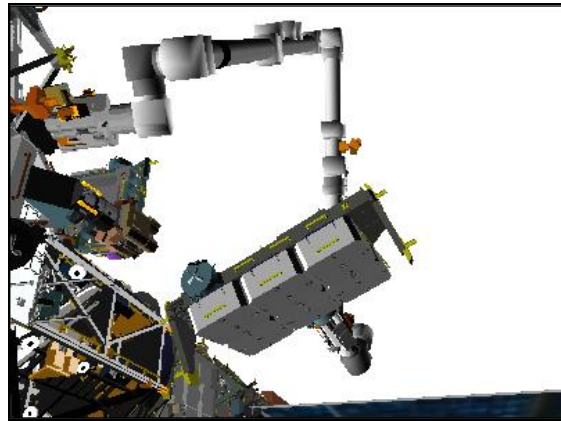


Figure 6.- ICC Pre-Stow
(51: JEM EXT A: -15, +30).

7.300 CONTINGENCY - ICC STOW ON POA

(RBT FS/2JA/FIN)

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5. INSTALLING ICC ON POA

5.1 Setup

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (-170, -40)	32: POA	22:Base Elbow (-40, 0) 51:JEM EXT A (-20, +30)	Camera B (-40, +25)	

PCS

MSS: MBS: MSS Safing:

cmd 'MBS' Remove (Verify Not Safed)

MSS: MBS:

Change POA Payload ► VCC ► VCC Grapple

Verify 'POA Payload' – VCC

MSS: SSRMS:

Verify Command – SSRMS>Internal

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

5.2 Attitude Control Configuration

PCS

MSS: SSRMS: Thrusters:

Verify 'Desat Request:' Inhibit

Verify 'Auto Att Control Handover to RS' - Inh

```

*****
* If using shuttle attitude control and attitude
* | maintenance reqd
* |   DAP: LVLH
* |   When rates damped
* |   |   DAP: FREE > 2 seconds
* |   |   DAP: AUTO
* |   When in attitude and rates damped
* |   |   DAP: FREE
*****

```


7.300 CONTINGENCY - ICC STOW ON POA

(RBT FS/2JA/FIN)

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5.3 Maneuvering to within Grapple Envelope

NOTE

1. ICC install is performed using "Fly Payload" Command frame (THC -X Pull to bring ICC into POA).
2. If CETA Brakes fully deployed:
 - a. PM to CETA Brake ~27" – JEM EXT A
 - b. ICC to CETA Brake ~13" – JEM EXT A

RHC/
THC

Maneuver ICC to within grapple envelope.

Expected ICC Install on POA position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+231.9	+72.2	-1.6	+123.4	-39.9	-205.8	+139.3
X	Y	Z	Pitch	Yaw	Roll	
+16	0	0	0.0	0.0	0.0	
FOR	Loaded – ICC Stow, SY Held					
Disp	MBS>POA					

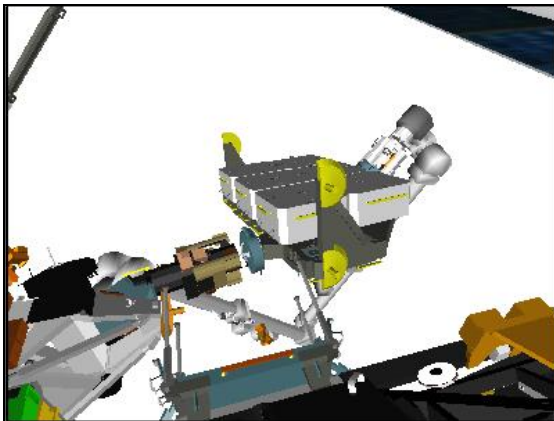


Figure 7.- ICC Install on POA
(09: P1 Lower Outboard: -165, -40).

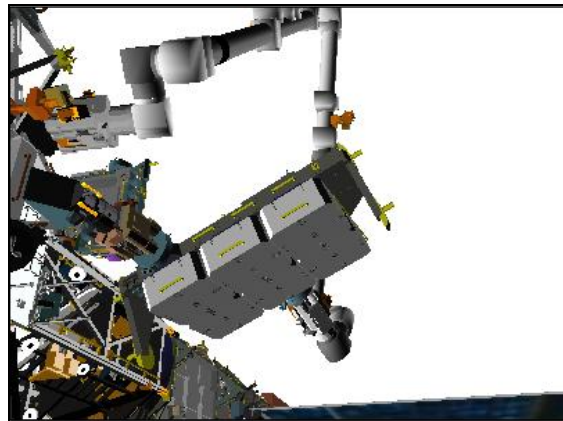


Figure 8.- ICC Install on POA
(51: JEM EXT A: -15, +30).

6. POA ICC GRAPPLE

6.1 Grapple

PCS

MSS: MBS: POA:

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Verify 'Confirm or Terminate' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Capture

RHC

TRIGGER → Press (momentarily)

27 MAY 09

7.300 CONTINGENCY - ICC STOW ON POA

(RBT FS/2JA/FIN)

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PCS Verify 'Snare' Close, Capture (two) – blue (12 s max)
Verify Capture to Latch – Yes (SCR 19282)
Verify 'Carriage' Tension ~5500 N (90 s max)
Verify 'Carriage' Retract – blue
Verify 'Latch' Latch – blue (80s max)

6.2 Attitude Control Config

```
*****  
* If using shuttle attitude control  
* | DAP: LVLH  
* | When rates damped  
* | | DAP: FREE > 2 seconds  
* | | DAP: AUTO  
*****
```

6.3 Grapple Cleanup

DCP BRAKES SSRMS → ON (Verify ON)

PCS MSS: SSRMS:

Change Display ► MBS ► Stowed VCC PVGF2 (Verify
MBS>Stowed VCC PVGF2)

7. SSRMS ICC RELEASE

Configure Cameras and overlays as required.

Monitor 1	Monitor 2	Monitor 3	SSC 1 (MON 1)	SSC 2 (DTV)
09: P1 LOOB (-165, -40)	25: Tip LEE	51: JEM EXT A (-15, +30)	Camera B (-40, +25)	

7.1 REMOVING SSRMS PAYLOAD POWER

MSS: SSRMS: Power:

cmd Payload Prime – OFF (Verify OFF)

7.2 RETRACTING SSRMS UMBILICAL

MSS: SSRMS: Tip LEE:

cmd 'Umbilical' Demate (Verify '**Confirm or Terminate**' prompt)

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Demate

RHC TRIGGER → Press (momentarily)

PCS Verify 'Umbilical' Demate – blue (10 s max)
Verify 'Connector Continuity' Prime, Redundant (two) – No

7.300 CONTINGENCY - ICC STOW ON POA

(RBT FS/2JA/FIN)

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7.3 MATE POA UMBILICAL

MSS: MBS: POA:

cmd 'Umbilical' Mate (Verify '**Confirm or Terminate**' prompt)

cmd Confirm (Verify RHC Trigger Hot icon)

RHC Verify LEE Mode – Mate
TRIGGER → Press (momentarily)

PCS Verify 'Umbilical' Mate – blue (10 s max)
Verify 'Connector Continuity' Prime, Redundant (two) – Yes

7.4 APPLYING POA PAYLOAD POWER

MSS: MBS: POA P/L POWER:

cmd 'Prime' – ON (Verify ON)

cmd 'Redundant' – ON (Verify ON)

7.5 SSRMS LIMP

DCP BRAKES SSRMS → OFF (Verify OFF)

PCS MSS: SSRMS:

Verify Command – SSRMS>Internal

√Vernier

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

MSS: SSRMS:

Verify all joints – Limped

7.6 AUTO RELEASE - PUSH OFF

MSS: SSRMS: Tip LEE:

cmd Release ► Automatic ► Slow (Verify Speed – Slow)

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Verify LEE Mode – Auto Release

7.300 CONTINGENCY - ICC STOW ON POA

(RBT FS/2JA/FIN)

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RHC TRIGGER → Press (momentarily)

PCS
 Verify 'Latch' Unlatch – blue (65 s max)
 Verify 'Carriage' Retract – blue (90 s max)
 Verify 'Snare' Open – blue (12 s max)
 Verify 'Carriage' Derig – blue (90s max)
 Verify 'Carriage' Extend – blue (90 s max)

7.7 SSRMS BACKOFF

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

MSS: SSRMS:

Enter Mode – Manual (Verify blue)

MSS: SSRMS: SSRMS Manual: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

THC Back off from grapple fixture to ICC Backoff position.

Locked						
SR	SY	SP	EP	WP	WY	WR
+233.0	+59.0	+6.0	+111.7	-40.9	-203.8	+153.7
X	Y	Z	Pitch	Yaw	Roll	
-150	0	0	0.0	0.0	0.0	
FOR	Unloaded – LEE Tip, SR Held					
Disp	MBS>Stowed ICC PVGF2					

DCP BRAKES SSRMS → ON (Verify ON)

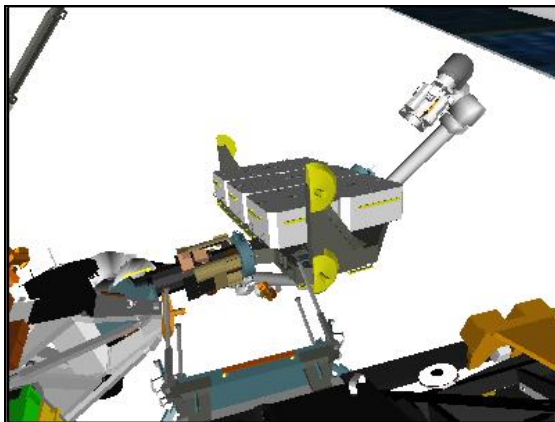


Figure 9.- ICC Backoff
 (09: P1 Lower Outboard: -165, -40).

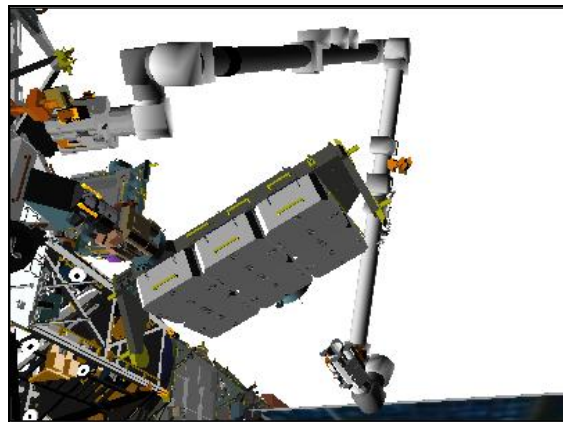


Figure 10.- ICC Backoff
 (51: JEM EXT A: -15, +30).

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7.900 SSRMS LEE SNARE CABLE CLEANUP

(RBT FS/2JA/FIN) Page 1 of 2 pages

NOTE

Items in gray are for **MCC-H** info only.

1. CANCEL SSRMS SAFING

PCS

MSS: SSRMS: MSS Safing: MSS Safing

cmd 'SSRMS' Remove (Verify SSRMS Safing – Not Safed)

2. CLOSE SNARES

MSS: SSRMS: TIP LEE: SSRMS TIP LEE

cmd 'Snare' Close ► Slow, Soft Stops

Verify Speed – Slow

Verify Stops – Soft

Ops Name	CIPUI
SSRMS_Tip_LEE_Snare_Manual_Close_Slow_Soft_Stop	CMRM96IM0102K

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Close Snares

RHC

TRIGGER → Press (Hold until 'Snare' Brakes – On)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Manual_Snare	CMRM96IM0851K:002
Cup_RWS_RHC_Trigger_Up_Manual_Snare	CMRM96IM0880K:002

PCS

Verify 'Snare' Close – blue

3. SETUP LEE FOR CAPTURE

cmd Capture ► Setup ► Slow (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Setup_For_Capture_Slow	CMRM96IM0156K

Verify '**Confirm or Terminate**' prompt.

cmd Confirm (Verify RHC Trigger Hot icon)

7.900 SSRMS LEE SNARE CABLE CLEANUP

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Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Setup for Capture

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

PCS Verify 'Snare' Open – blue
Verify Motors – Inh (340 s max)

4. SSRMS SAFING

DCP SAFING → SAFE (Verify ON)

GROUND CONTROL

GROUND CONTROL

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Configure the ISS Downlink per the following table:

1 P1 LOOB (+130, +25)	2 MBS Mast (-25, -20)
3 S1 LOOB (+75, +25)	4

Verify SSRMS is at MT Xlate-Stow position (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0

Verify SPDM Arm1 is at LAB Stow position (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
-90.0	-45.0	+80.0	+45.0	-45.0	-90.0	0.0

Verify SPDM Arm2 is at LAB Stow position (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
-90.0	-45.0	-110.0	-45.0	+45.0	-90.0	0.0

Verify SPDM BR is at LAB Stow position (within 1 deg)

BR
-50.0

Verify SRMS is at Pre-Cradle position (within 1 deg).

SY	SP	EP	WP	WY	WR
0.0	+25.0	-25.0	+5.0	0.0	0.0

Verify JEM RMS is at JEF Install Viewing position (within 1 deg).

SY	SP	EP	WP	WY	WR
-66.0	+133.3	-99.8	-123.5	0.0	+66.0

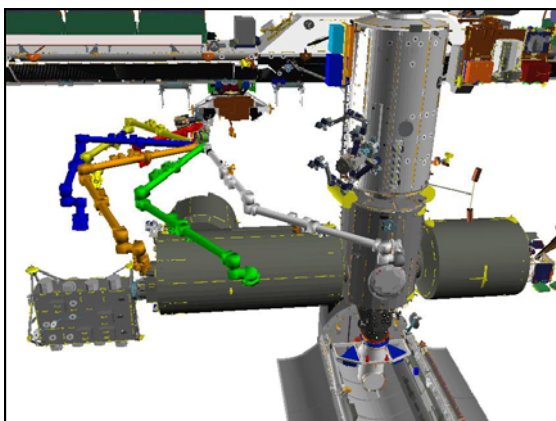


Figure 1.- Maneuver to Node 2 Grapple
 (Order of motion: Red, Yellow,
 Blue, Orange, Green, Gray).

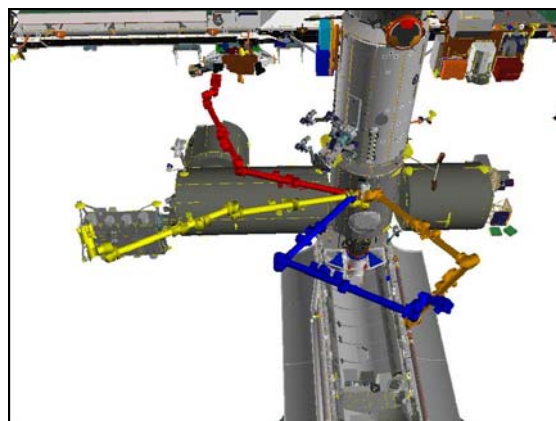


Figure 2.- Maneuver from MBS to OBSS
 Pre-Grapple
 (Order of motion: Red,
 Yellow, Blue, Orange).

1. P1 LOOB CAMERA SURVEY

Coordinate with CATO to survey the SSRMS Workspace.

	P1 LOOB	Survey Notes	Complete
Start Config	+130, +25	PLB, SPDM, Node2/JEM	
1. Tilt Down	+130, -30	MBS, Lab, JEM	
2. Pan Right	+155 , -30	Workspace Survey	
3. Tilt Up	+155, +20	JEM, JEF	

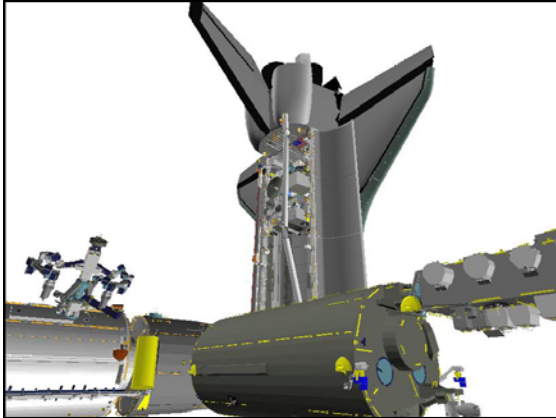


Figure 3.- P1 LOOB - Start
 (P1 Lower Outboard: +130, +25).

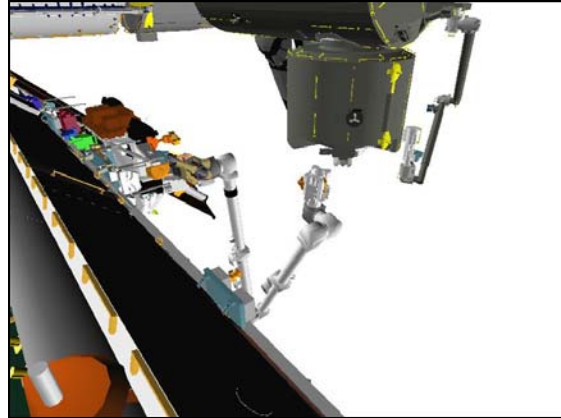


Figure 4.- P1 LOOB - Step 1
 (P1 Lower Outboard: +130, -30).

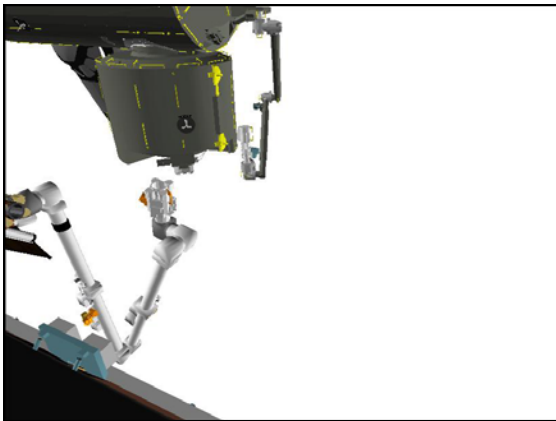


Figure 5.- P1 LOOB - Step 2
 (P1 Lower Outboard: +155, -30).

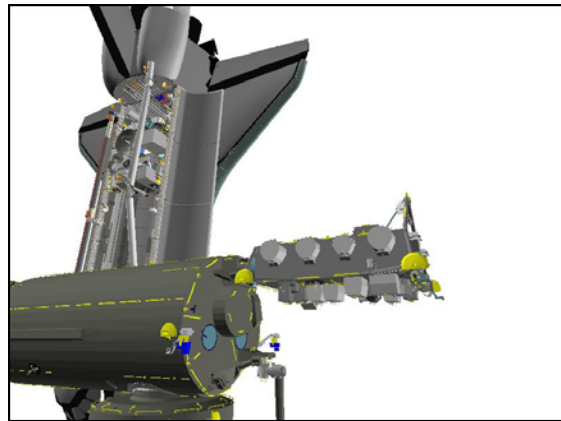


Figure 6.- P1 LOOB - Step 3
 (P1 Lower Outboard: +155, +20).

2. S1 LOOB CAMERA SURVEY

Coordinate with CATO to survey the SSRMS Workspace.

	S1 LOOB	Survey Notes	Complete
Start Config	+75, +25	Node2, PLB	

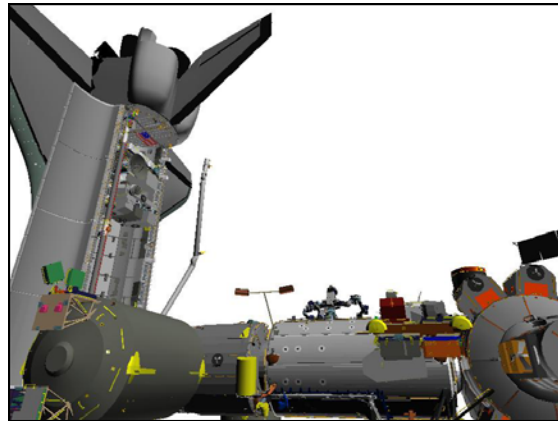


Figure 7.- S1 LOOB - Start
 (S1 Lower Outboard: +75, +25).

3. MBS MAST CAMERA SURVEY

ROBO Camera Commander

'MSS Cameras'

sel MBS Mast

cmd Activate Position (Verify Activated)

cmd Activate Commanding

Keyboard Commanding Window

Verify Current Camera: MBS Mast

	MBS Mast	Stop at	Survey Notes	Complete
Start Config	-25, -20		MBS PDGF3, POA	
1. Tilt Up	-25, +15	-25, +9	Workspace Survey	
2. Pan Right	+115 , +15	+109, +15	JEM, JEF, SPDM	

Keyboard Commanding Window

cmd Finished Commanding

Deactivate position.



Figure 8.- MBS Mast - Start
(MBS Mast: -25, -20).

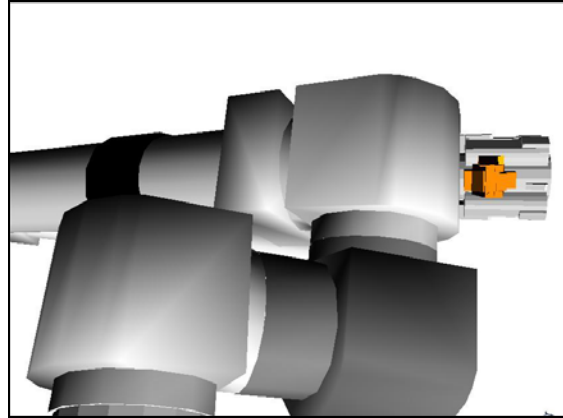


Figure 9.- MBS Mast - Step 1
(MBS Mast: -25, +15).

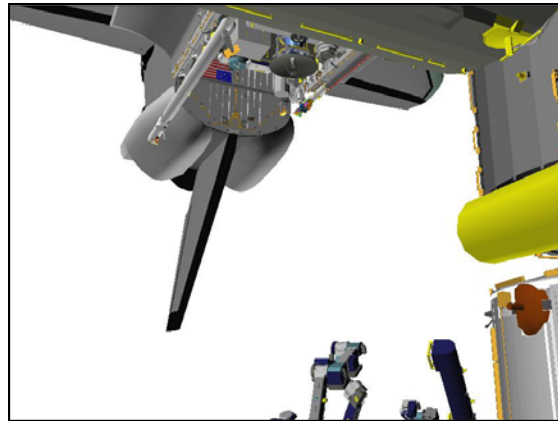


Figure 10.- MBS Mast - Step 2
(MBS Mast: +115, +15).

**8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) -
GROUND**

(RBT FS/2JA/FIN)

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NOTE

1. The procedure contains the following Safing Type A commands:
 - CMRM96IM0848K: Lab_RWS_Enable_Vernier
 - CMRM96IM0851K:001 Lab_RWS_RHC_Trigger_Up_Auto
 - CMRM96IM0854K: Lab_RWS_SSRMS_Brakes_Off
 - CMRM96IM0863K: Lab_RWS_Proceed_With_Autosequence

 - CMRM96IM0877K: Cup_RWS_Enable_Vernier
 - CMRM96IM0880K:001 Cup_RWS_RHC_Trigger_Up_Auto
 - CMRM96IM0883K: Cup_RWS_SSRMS_Brakes_Off
 - CMRM96IM0892K: Cup_RWS_Proceed_With_Autosequence
2. Motion commands outside the 5' clearance cone to structure must be executed through completion during planned S-Band AOS. During Ku LOS, SSRMS motion may only be executed along trajectories through workspace that has been surveyed and found to match RPS.
3. Motion commands inside the 5' clearance cone to structure must be executed through completion during planned S-Band and Ku-Band AOS.
4. The SSRMS_Safing command (CIPUI: CMRM96IM0454K) should be unsafed prior to starting motion.
5. After the destination angles are loaded, the autosequence can be cancelled using the SSRMS_Cancel_Manipulator_Command (CIPUI: CMRM96IM0015K).

Verify thinlayer buildscript has been executed.

1. SSRMS SETUP FOR MOTION

CDDT MSS: SSRMS: MSS Safing: MSS Safing

cmd 'SSRMS' Remove (Verify SSRMS Safing – Not Safed)

Ops Name	CIPUI
SSRMS_Cancel_Safing	CMRM96IM0801K

DCP BRAKES SSRMS → OFF (Verify OFF)

Ops Name	CIPUI
Lab_RWS_SSRMS_Brakes_Off	CMRM96IM0854K
Cup_RWS_SSRMS_Brakes_Off	CMRM96IM0883K

RHC RATE → VERNIER (Verify Vernier on PCS)

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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Ops Name	CIPUI
Lab_RWS_Enable_Vernier	CMRM96IM0848K
Cup_RWS_Enable_Vernier	CMRM96IM0877K

CDDT MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: 1.0 (Verify 1.0)

Ops Name	CIPUI
SSRMS_Change_Rate_Scale_Vern_1.0	CMRM96IM0022K:001

2. [CHANGE DISPLAY FRAME](#)

CDDT MSS: SSRMS:

Change Display ► Node2 ► PDGF (Verify Node2>PDGF)

Ops Name	CIPUI
SSRMS_Change_DYF_Node2>PDGF_POR_POS	CMRM96IM0451K:101
SSRMS_Change_DYF_Node2>PDGF_POR_ORI	CMRM96IM0451K:102
SSRMS_Change_DYF_Node2>PDGF_Trans_Vel	CMRM96IM0451K:103
SSRMS_Change_DYF_Node2>PDGF_Rot_Vel	CMRM96IM0451K:104

Frame Data	Value
Frame_ID	13

3. [CHANGE PAYLOAD FILE](#)

CDDT MSS: SSRMS:

Change Unloaded Parameters ► Ground Control ► GC Unld LEE Tip SYH

Verify 'Unloaded Parameters' (two) – GC Unld LEE Tip, SY Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_GC_Unld_LEE_Tip_SY_Held	CMRM95SM0008K:101

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Parameter	Value
File_ID	82
OCS_File_ID	81
Payload_ID	0
GF_ID	256

4. CHANGE PAYLOAD FILE

CDDT

MSS: SSRMS:

Change Loaded Parameters ► Walk Off ► Node 2 PDGF
Verify 'Loaded Parameters' (two) – Node 2 PDGF, SR Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_Node_2_PDGF_SR_Held	CMRM95SM0008K:102

Parameter	Value
File_ID	69
OCS_File_ID	67
Payload_ID	20
GF_ID	4

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0
X	Y	Z	Pitch	Yaw	Roll	
+493	+127	-1384	+178.8	+4.8	+22.4	
FOR	Unloaded - GC Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

5. CAMERA SETUP

Configure downlink views to observe expected motion:

1 P1 LOOB (+140, -20)	2 MBS Mast (+5, +15)
3 Tip Elbow (+10, +10)	4 Base Elbow (0, +10)

**8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) -
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6. ENTER JOINT OCAS MODE

CDDT

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Joint_OCAS_Mode	CMRM96IM0032K

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6.1 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+38.5	+102.4	-192.7	+127.0	+2.7	-36.0	+56.4

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_6.1	CMRM96IM0052K:1

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0
+38.5	+102.4	-192.7	+127.0	+2.7	-36.0	+56.4
+9.0	+0.2	-31.7	+22.9	+17.3	+36.0	-31.4

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+493	+127	-1384	+178.8	+4.8	+22.4
FOR	Unloaded - GC Unld LEE Tip, SY Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

DCP

AUTO SEQ → PROC

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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6.2 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+29.5	+102.1	-161.0	+104.0	-14.6	-72.0	+87.9

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_6.2	CMRM96IM0052K:2

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+38.5	+102.4	-192.7	+127.0	+2.7	-36.0	+56.4
+29.5	+102.1	-161.0	+104.0	-14.6	-72.0	+87.9
+9.0	+0.3	-31.7	+23.0	+17.3	+36.0	-31.5

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+228	+58	-1592	+177.7	-33.0	+54.3
FOR	Unloaded - GC Unld LEE Tip, SY Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
* *****
    
```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+29.5	+102.1	-161.0	+104.0	-14.6	-72.0	+87.9
X	Y	Z	Pitch	Yaw	Roll	
-144	-4	-1536	+175.5	-70.8	+83.9	
FOR	Unloaded - GC Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

Configure downlink views to observe expected motion:

1 P1 LOOB (+140, +20)	2 MBS Mast (+60, +15)
3 Tip Elbow (+10, +10)	4 Base Elbow (0, +10)

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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6.3 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+20.5	+101.9	-129.2	+81.1	-31.9	-108.0	+119.3

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_6.3	CMRM96IM0052K:3

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+29.5	+102.1	-161.0	+104.0	-14.6	-72.0	+87.9
+20.5	+101.9	-129.2	+81.1	-31.9	-108.0	+119.3
+9.0	+0.2	-31.8	+22.9	+17.3	+36.0	-31.4

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-144	-4	-1536	+175.5	-70.8	+83.9
FOR	Unloaded - GC Unld LEE Tip, SY Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) -

GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* | MSS: SSRMS: MSS Safing: MSS Safing
* |
* | cmd 'SSRMS' Apply (Verify Safed)
* |
* |
* |
* |
* |
* |
* |
* |
* |
* |
* *****

```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+20.5	+101.9	-129.2	+81.1	-31.9	-108.0	+119.3
X	Y	Z	Pitch	Yaw	Roll	
-432	-43	-1155	+2.6	-71.3	-57.4	
FOR	Unloaded - GC Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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6.4 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+13.1	+101.7	-102.8	+62.0	-46.3	-138.0	+145.5

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_6.4	CMRM96IM0052K:4

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+20.5	+101.9	-129.2	+81.1	-31.9	-108.0	+119.3
+13.1	+101.7	-102.8	+62.0	-46.3	-138.0	+145.5
+7.4	+0.2	-26.4	+19.1	+14.4	+30.0	-26.2

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-432	-43	-1155	+2.6	-71.3	-57.4
FOR	Unloaded - GC Unld LEE Tip, SY Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

**8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) -
GROUND**

(RBT FS/2JA/FIN)

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT * *****
 * If unexpected motion is observed
 * MSS: SSRMS: MSS Safing: MSS Safing
 *
 * **cmd 'SSRMS' Apply (Verify Safed)**
 *
 *

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

 * *****

CDDT MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+13.1	+101.7	-102.8	+62.0	-46.3	-138.0	+145.5
X	Y	Z	Pitch	Yaw	Roll	
-477	-46	-657	+0.6	-39.7	-33.1	
FOR	Unloaded - GC Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

Configure downlink views to observe expected motion:

1 P1 LOOB (+110, +20)	2 MBS Mast (+105, +15)
3 Tip Elbow (+10, +10)	4 Base Elbow (0, +10)

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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6.5 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+3.6	+101.5	-69.4	+37.8	-64.5	-175.9	+178.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_6.5	CMRM96IM0052K:5

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+13.1	+101.7	-102.8	+62.0	-46.3	-138.0	+145.5
+3.6	+101.5	-69.4	+37.8	-64.5	-175.9	+178.6
+9.5	+0.2	-33.4	+24.2	+18.2	+37.9	-33.1

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-477	-46	-657	+0.6	-39.7	-33.1
FOR	Unloaded - GC Unld LEE Tip, SY Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) -

GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```
* *****
* If unexpected motion is observed
*  MSS: SSRMS: MSS Safing: MSS Safing
*
*  cmd 'SSRMS' Apply (Verify Safed)
*
*  Ops Name  CIPUI
*  SSRMS_Safing  CMRM96IM0454K
* *****
```

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+3.6	+101.5	-69.4	+37.8	-64.5	-175.9	+178.6
X	Y	Z	Pitch	Yaw	Roll	
-201	0	-1	0.0	+0.1	-0.1	
FOR	Unloaded - GC Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

7. ENTER STANDBY MODE

CDDT

MSS: SSRMS: SSRMS

Enter Mode – Standby (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Standby_Mode	CMRM96IM0054K

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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8. [CHANGE PAYLOAD FILE](#)

CDDT

MSS: SSRMS:

Change Unloaded Parameters ► Ground Control ► GC Prox Unld LEE
Tip SYH

Verify 'Unloaded Parameters' (two) – GC Prox Unld LEE Tip, SY Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_GC_Prox_Unld_LEE_Tip_SY_Held	CMRM95SM0008K:103

Parameter	Value
File_ID	98
OCS_File_ID	97
Payload_ID	0
GF_ID	256

9. [CAMERA SETUP](#)

Configure downlink views to observe expected motion:

1 P1 LOOB (+120, 0)	2 MBS Mast (+105, +20)
3 Tip Elbow (+15, 0)	4 Tip LEE

10. [ENTER FOR OCAS MODE](#)

CDDT

MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_FOR_OCAS_Mode	CMRM96IM0033K

MSS: SSRMS: SSRMS FOR OCAS: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

Ops Name	CIPUI
SSRMS_Select_Base_Joint_Lock_Yaw	CMRM96IM0051K

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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10.1 FOR OCAS Maneuver

CDDT

SSRMS FOR OCAS

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-65	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_10.1	CMRM96IM0053K:1

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-201	0	-1	0.0	+0.1	-0.1
TGT	-65	0	0	0.0	0.0	0.0
ERR	-136	0	-1	0.0	+0.1	-0.1
	FOR	Unloaded - GC Prox Unld LEE Tip, SY Held				
	Disp	Node2>PDGF				

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+3.6	+101.5	-69.4	+37.8	-64.5	-175.9	+178.6

Verify SY – Locked

RPS

Verify 'SSRMS' – **Active**

Verify 'Driver' – Telemetry, **AOS**

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) -

GROUND

(RBT FS/2JA/FIN)

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
* *****

```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+0.7	+101.5	-77.1	+56.3	-78.1	-175.3	+178.5
X	Y	Z	Pitch	Yaw	Roll	
-65	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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10.2 FOR OCAS Maneuver

CDDT

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-35	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_10.2	CMRM96IM0053K:2

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-65	0	0	0.0	0.0	0.0
TGT	-35	0	0	0.0	0.0	0.0
ERR	-30	0	0	0.0	0.0	0.0
	FOR	Unloaded - GC Prox Unld LEE Tip, SY Held				
	Disp	Node2>PDGF				

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+0.7	+101.5	-77.1	+56.3	-78.1	-175.3	+178.5

Verify SY – Locked

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```
* *****
* If unexpected motion is observed
*  MSS: SSRMS: MSS Safing: MSS Safing
*
*  cmd 'SSRMS' Apply (Verify Safed)
*
*
*  Ops Name      CIPUI
*  SSRMS_Safing  CMRM96IM0454K
* *****
```

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
0.0	+101.5	-78.4	+59.5	-80.7	-175.2	+178.5
X	Y	Z	Pitch	Yaw	Roll	
-35	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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Downlink 10.3 FOR OCAS Maneuver
 Verify Downlink video is current.
 Verify LEE aligned with GF.

CDDT

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-16	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_10.3	CMRM96IM0053K:3

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-35	0	0	0.0	0.0	0.0
TGT	-16	0	0	0.0	0.0	0.0
ERR	-19	0	0	0.0	0.0	0.0
	FOR	Unloaded - GC Prox Unld LEE Tip, SY Held				
	Disp	Node2>PDGF				

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
0.0	+101.5	-78.4	+59.5	-80.7	-175.2	+178.5

Verify SY – Locked

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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11. PDGF AUTO CAPTURE

NOTE

Capture command must be executed through completion during planned S-Band and Ku-Band AOS.

Downlink Verify Downlink video is current.
Verify LEE within grapple envelope.

CDDT MSS: SSRMS: TIP LEE SSRMS TIP LEE

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Capture_Auto_Limp_Slow	CMRM96IM0092K

Verify '**Confirm or Terminate**' prompt.

NOTE

Once the trigger is hot, only safing or trigger commands should be sent to the Robotics equipment. If a configuration change is required, including routing MSS Cameras, safe the system using the SSRMS_SAFING command (CIPUI: CMRM96IM0454K) to exit LEE operations. (SCR 23262, 14662)

Verify 5 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Auto Capture

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Snare' Close, Capture (two) – blue (12 s max)
Verify Capture to Latch – Yes (SCR 19282)
Verify 'Carriage' Tension ~5500 N (90 s max)
Verify 'Carriage' Retract – blue
Verify 'Latch' Latch – blue (65 s max)
Verify Motors – Inh

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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12. UMBILICAL MATE

CDDT MSS: SSRMS: Tip LEE:

cmd 'Umbilical' Mate (Verify '**Confirm or Terminate**' prompt)

Ops Name	CIPUI
SSRMS_Tip_LEE_Umb_Auto_Mate	CMRM96IM0039K

Verify PDGF and Payload power removed.

Verify 3 minutes of S-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Mate

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Umbilical' Mate – blue (10 s max)
Verify 'Connector Continuity' Prime, Redundant (two) – Yes

13. CARRIAGE DERIGIDIZATION

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Derigidize ► Slow (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Carriage_Manual_Derigidize_Slow	CMRM95SM0002K

Verify '**Confirm or Terminate**' prompt.

Verify 3 minutes of S-Band comm coverage remaining in this pass.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Derigidize

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Carriage' Rigidize – gray
Verify 'Carriage' Brakes – On (90s max)

14. [SSRMS SAFING](#)

NOTE

Expect the following message when safing is commanded:
'R3Z - MSS OCS SSRMS Prime(Redun) ACU SRT Cat-1 Brk Stat Fail' (SCR 17495)
 This message should return to Norm.

MSS: SSRMS: SSRMS Safing:

cmd 'SSRMS' Apply (Verify Safed)

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
-0.8	+101.5	-79.8	+63.0	-83.7	-175.0	+178.5
X	Y	Z	Pitch	Yaw	Roll	
0	0	0	0.0	0.0	0.0	
FOR	Loaded - Node 2 PDGF, SR Held					
Disp	Node2>PDGF					

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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15. [SSRMS BASE CHANGE](#)

To powerdown SSRMS to OFF, perform {6.334 MSS POWERDOWN} (SODF: RBT GEN: MSS STATE TRANSITIONS), then:

To change SSRMS Base, perform {6.435 MSS OPERATING BASE CHANGE} (SODF: RBT GEN: SSRMS STATE TRANSITIONS), then:

To powerup SSRMS components, perform {6.332 MSS POWERUP} (SODF: RBT GEN: MSS STATE TRANSITIONS), then:

16. [CHANGE PAYLOAD FILE](#)

MSS: SSRMS:

Change Loaded Parameters ► Walk Off ► MBS PDGF 3
Verify 'Loaded Parameters' (two) – MBS PDGF 3, SR Held

Ops Name	CIPUI
SSRMS_Change_PId_Param_MBS_PDGF_3_SR_Held	CMRM95SM0008K:104

Parameter	Value
File_ID	69
OCS_File_ID	67
Payload_ID	20
GF_ID	11

17. [CHANGE PAYLOAD FILE](#)

MSS: SSRMS:

Change Unloaded Parameters ► Ground Control ► GC Prox Unld LEE Tip SRH

Verify 'Unloaded Parameters' (two) – GC Prox Unld LEE Tip, SR Held

Ops Name	CIPUI
SSRMS_Change_PId_Param_GC_Prox_Unld_LEE_Tip_SR_Held	CMRM95SM0008K:105

Parameter	Value
File_ID	94
OCS_File_ID	97
Payload_ID	0
GF_ID	256

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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18. CAMERA SETUP

Configure downlink views to observe expected motion:

1 P1 LOOB (+120, -10)	2 MBS Mast (-30, -15)
3 Tip Elbow (+0, +10)	4 Tip LEE

19. SSRMS CANCEL SAFING

CDDT

MSS: SSRMS: MSS Safing:

cmd 'SSRMS' Remove (Verify SSRMS Safing – Not Safed)

Ops Name	CIPUI
SSRMS_Cancel_Safing	CMRM96IM0801K

20. SSRMS BRAKES OFF

DCP

BRAKES SSRMS → OFF (Verify OFF)

Ops Name	CIPUI
Lab_RWS_SSRMS_Brakes_Off	CMRM96IM0854K
Cup_RWS_SSRMS_Brakes_Off	CMRM96IM0883K

21. CARRIAGE RIGIDIZATION

CDDT

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Rigidize ► Slow (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Carriage_Manual_Rigidize_Slow	CMRM95SM0000K

Verify '**Confirm or Terminate**' prompt.

Verify 3 minutes of S-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Rigidigize

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Carriage' Tension ~5500 N (90 s max)
Verify 'Carriage' Retract – blue
Verify 'Carriage' Brakes – On

22. [SSRMS SNAPSHOT COORDINATE SYSTEMS](#)

CDDT MSS: SSRMS: Snapshot:

cmd Snapshot (Verify SSRMS>Snapshot)

Ops Name	CIPUI
Set_Snapshot_Coordinate_Frame	CMRM96IM0457K

23. [PDGF AUTO RELEASE](#)

NOTE

Release and back-off to pre-grapple motion commands must be executed through completion during planned S-Band and Ku-Band AOS.

CDDT MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

Ops Name	CIPUI
SSRMS_Limp_Joints_All	CMRM96IM0123K

MSS: SSRMS:

Verify all joints – Limped

Downlink Verify Downlink video is current.

CDDT MSS: SSRMS: TIP LEE:

cmd Release ► Automatic ► Slow (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Release_Auto_Slow	CMRM96IM0095K

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Verify '**Confirm or Terminate**' prompt.

NOTE

Once the trigger is hot, only safing or trigger commands should be sent to the Robotics equipment. If a configuration change is required, including routing MSS Cameras, safe the system using the SSRMS_SAFING command (CIPUI: CMRM96IM0454K) to exit LEE operations. (SCR 23262, 14662)

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Auto Release

RHC

TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT

Verify 'Umbilical' Demate – blue
 Verify 'Latch' Unlatch – blue
 Verify 'Carriage' Rigidize – gray
 Verify 'Snare' Open – blue
 Verify 'Carriage' Derigidize – blue
 Verify 'Carriage' Extend – blue

MSS: SSRMS: Limp: SSRMS Limp

cmd None Limp (Verify Standby – blue)

Ops Name	CIPUI
SSRMS_Limp_Joints_None	CMRM96IM0122K

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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24. ENTER FOR OCAS MODE

CDDT

MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_FOR_OCAS_Mode	CMRM96IM0033K

MSS: SSRMS: SSRMS FOR OCAS: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

Ops Name	CIPUI
SSRMS_Select_Base_Joint_Lock_Roll	CMRM96IM0050K

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24.1 FOR OCAS Maneuver

CDDT

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-35	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_24.1	CMRM96IM0053K:4

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-2	0	0	0.0	0.0	0.0
TGT	-35	0	0	0.0	0.0	0.0
ERR	+33	0	0	0.0	0.0	0.0
	FOR	Unloaded - GC Prox Unld LEE Tip, SR Held				
	Disp	SSRMS>Snapshot				

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+175.1	-83.7	+62.9	-79.0	-101.5	-0.1

Verify SR – Locked

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

*****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
*
*****

```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+177.4	-83.7	+61.1	-65.7	-101.3	+11.6
X	Y	Z	Pitch	Yaw	Roll	
-35	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	SSRMS>Snapshot					

25. CHANGE DISPLAY FRAME

CDDT

MSS: SSRMS: SSRMS

Change Display ► MBS ► PDGF 3 (Verify MBS>PDGF 3)

Ops Name	CIPUI
SSRMS_Change_DYF_MBS>PDGF_3_POR_POS	CMRM96IM0451K:105
SSRMS_Change_DYF_MBS>PDGF_3_POR_ORI	CMRM96IM0451K:106
SSRMS_Change_DYF_MBS>PDGF_3_Trans_Vel	CMRM96IM0451K:107
SSRMS_Change_DYF_MBS>PDGF_3_Rot_Vel	CMRM96IM0451K:108

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Frame Data	Value
Frame_ID	9

CDDT 25.1 FOR OCAS Maneuver

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-150	0	0	0.0	+0.1	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_25.1	CMRM96IM0053K:5

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-35	0	0	0.0	0.0	0.0
TGT	-150	0	0	0.0	+0.1	0.0
ERR	+115	0	0	0.0	-0.1	0.0
	FOR	Unloaded - GC Prox Unld LEE Tip, SR Held				
	Disp	MBS>PDGF 3				

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+177.4	-83.7	+61.1	-65.7	-101.3	+11.6

Verify SR – Locked

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) -

GROUND

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Confirm direction of pending motion.

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
* *****

```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-81.2	+52.6	-25.1	-104.0	+47.1
X	Y	Z	Pitch	Yaw	Roll	
-150	0	0	0.0	+0.1	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

26. ENTER STANDBY MODE

CDDT

MSS: SSRMS: SSRMS

Enter Mode – Standby (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Standby_Mode	CMRM96IM0054K

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27. [CHANGE PAYLOAD FILE](#)

MSS: SSRMS:

Change Unloaded Parameters ► Ground Control ► GC Unld LEE Tip SRH
Verify 'Unloaded Parameters' (two) – GC Unld LEE Tip, SR Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_GC_Unld_LEE_Tip_SR_Held	CMRM95SM0008K:106

Parameter	Value
File_ID	79
OCS_File_ID	81
Payload_ID	0
GF_ID	256

28. [CAMERA SETUP](#)

Configure downlink views to observe expected motion:

1 P1 LOOB (+120, -10)	2 Base Elbow (+155, 0)
3 Tip Elbow (0, +10)	4 S1 LOOB (+70, +25)

29. [ENTER JOINT OCAS MODE](#)

CDDT

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Joint_OCAS_Mode	CMRM96IM0032K

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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29.1 Joint OCAS Maneuver

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-92.5	+27.4	-47.7	-112.9	+74.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_29.1	CMRM96IM0052K:6

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-81.2	+52.6	-25.1	-104.0	+47.1
+178.5	+185.5	-92.5	+27.4	-47.7	-112.9	+74.1
0.0	0.0	+11.3	+25.2	+22.6	+8.9	-27.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-150	0	0	0.0	+0.1	0.0
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
* *****
    
```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-92.5	+27.4	-47.7	-112.9	+74.1
X	Y	Z	Pitch	Yaw	Roll	
-167	+429	+345	+14.8	-13.0	+85.5	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

Configure downlink views to observe expected motion:

1 P1 LOOB (+120, +15)	2 Base Elbow (+155, 0)
3 Tip Elbow (0, +10)	4 S1 LOOB (+70, +25)

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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29.2 Joint OCAS Maneuver

CDDT

SSRMS Joint OCAS

NOTE

Expect EP singularity warning for $-15 < EP < 15$

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-103.0	+4.1	-68.7	-121.2	+99.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_29.2	CMRM96IM0052K:7

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-92.5	+27.4	-47.7	-112.9	+74.1
+178.5	+185.5	-103.0	+4.1	-68.7	-121.2	+99.1
0.0	0.0	+10.5	+23.3	+21.0	+8.3	-25.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-167	+429	+345	+14.8	-13.0	+85.5
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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29.3 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-112.7	-17.3	-88.0	-128.8	+122.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_29.3	CMRM96IM0052K:8

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-103.0	+4.1	-68.7	-121.2	+99.1
+178.5	+185.5	-112.7	-17.3	-88.0	-128.8	+122.1
0.0	0.0	+9.7	+21.4	+19.3	+7.6	-23.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-120	+646	+852	+38.7	-3.8	+163.7
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) -

GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```
* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
* *****
```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-112.7	-17.3	-88.0	-128.8	+122.1
X	Y	Z	Pitch	Yaw	Roll	
-28	+611	+1383	+48.2	+23.8	-132.7	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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29.4 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-122.4	-38.8	-107.3	-136.4	+145.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_29.4	CMRM96IM0052K:9

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-112.7	-17.3	-88.0	-128.8	+122.1
+178.5	+185.5	-122.4	-38.8	-107.3	-136.4	+145.1
0.0	0.0	+9.7	+21.5	+19.3	+7.6	-23.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-28	+611	+1383	+48.2	+23.8	-132.7
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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29.5 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-131.7	-59.3	-125.7	-143.6	+167.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_29.5	CMRM96IM0052K:10

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-122.4	-38.8	-107.3	-136.4	+145.1
+178.5	+185.5	-131.7	-59.3	-125.7	-143.6	+167.1
0.0	0.0	+9.3	+20.5	+18.4	+7.2	-22.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+94	+326	+1849	+26.6	+54.0	-57.2
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
*   MSS: SSRMS: MSS Safing: MSS Safing
*
*   cmd 'SSRMS' Apply (Verify Safed)
*
*   Ops Name      CIPUI
*   SSRMS_Safing  CMRM96IM0454K
* *****
    
```

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-131.7	-59.3	-125.7	-143.6	+167.1
X	Y	Z	Pitch	Yaw	Roll	
+206	-134	+2109	-33.9	+48.4	+45.8	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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29.6 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-141.3	-80.8	-145.0	-151.2	+190.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_29.6	CMRM96IM0052K:11

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-131.7	-59.3	-125.7	-143.6	+167.1
+178.5	+185.5	-141.3	-80.8	-145.0	-151.2	+190.1
0.0	0.0	+9.6	+21.5	+19.3	+7.6	-23.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+206	-134	+2109	-33.9	+48.4	+45.8
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) -

GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
* *****
    
```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-141.3	-80.8	-145.0	-151.2	+190.1
X	Y	Z	Pitch	Yaw	Roll	
+281	-677	+2099	-51.7	+8.4	+106.4	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

Configure downlink views to observe expected motion:

1 P1 LOOB (+120, +25)	2 Base Elbow (-115, 0)
3 MBS Mast (+104, +15)	4 S1 LOOB (+70, +25)

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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29.7 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-150.0	-100.0	-162.3	-158.0	+210.7

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_29.7	CMRM96IM0052K:12

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-141.3	-80.8	-145.0	-151.2	+190.1
+178.5	+185.5	-150.0	-100.0	-162.3	-158.0	+210.7
0.0	0.0	+8.7	+19.2	+17.3	+6.8	-20.6

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+281	-677	+2099	-51.7	+8.4	+106.4
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

*****
* If unexpected motion is observed
* |  MSS: SSRMS: MSS Safing: MSS Safing
* |
* |  cmd 'SSRMS' Apply (Verify Safed)
* |
* |  +-----+ +-----+
* |  | Ops Name | | CIPUI |
* |  +-----+ +-----+
* |  | SSRMS_Safing | | CMRM96IM0454K |
* |  +-----+ +-----+
* |
*****

```

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-150.0	-100.0	-162.3	-158.0	+210.7
X	Y	Z	Pitch	Yaw	Roll	
+288	-1067	+1856	-45.9	-32.3	+148.5	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

30. CAMERA SETUP

Configure downlink views to observe expected motion:

<p style="text-align: center;">1 P1 LOOB (+110, +25)</p>	<p style="text-align: center;">2 Base Elbow (-100, -5)</p>
<p style="text-align: center;">3 Lab Stbd Zenith (-30, -30)</p>	<p style="text-align: center;">4 S1 LOOB (+70, +25)</p>

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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30.1 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+141.5	+196.8	-153.9	-104.5	-162.3	-158.0	+210.7

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_30.1	CMRM96IM0052K:13

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-150.0	-100.0	-162.3	-158.0	+210.7
+141.5	+196.8	-153.9	-104.5	-162.3	-158.0	+210.7
+37.0	-11.3	+3.9	+4.5	0.0	0.0	0.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+288	-1067	+1856	-45.9	-32.3	+148.5
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
* *****

```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+141.5	+196.8	-153.9	-104.5	-162.3	-158.0	+210.7
X	Y	Z	Pitch	Yaw	Roll	
+103	-1371	+1749	-77.6	-60.2	+102.5	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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30.2 Joint OCAS Maneuver

rCDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+107.5	+207.2	-157.5	-108.7	-162.3	-158.0	+210.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_30.2	CMRM96IM0052K:14

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+141.5	+196.8	-153.9	-104.5	-162.3	-158.0	+210.7
+107.5	+207.2	-157.5	-108.7	-162.3	-158.0	+210.6
+34.0	-10.4	+3.6	+4.2	0.0	0.0	+0.1

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+103	-1371	+1749	-77.6	-60.2	+102.5
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
* *****
    
```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+107.5	+207.2	-157.5	-108.7	-162.3	-158.0	+210.6
X	Y	Z	Pitch	Yaw	Roll	
-281	-1490	+1613	-147.9	-54.6	+27.2	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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30.3 Joint OCAS Maneuver

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+74.6	+217.3	-161.0	-112.7	-162.3	-158.0	+210.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_30.3	CMRM96IM0052K:15

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+107.5	+207.2	-157.5	-108.7	-162.3	-158.0	+210.6
+74.6	+217.3	-161.0	-112.7	-162.3	-158.0	+210.6
+32.9	-10.1	+3.5	+4.0	0.0	0.0	0.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-281	-1490	+1613	-147.9	-54.6	+27.2
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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32. [CHANGE PAYLOAD FILE](#)

CDDT

MSS: SSRMS:

Change Loaded Parameters ► OBSS ► OBSS Mid MPM SRH
Verify 'Loaded Parameters' (two) – OBSS Mid MPM, SR Held

Ops Name	CIPUI
SSRMS_Change_PId_Param_OBSS_Mid_MPM_SR_Held	CMRM95SM0008K:107

Parameter	Value
File_ID	391
OCS_File_ID	388
Payload_ID	126
GF_ID	259

33. [CHANGE PAYLOAD FILE](#)

CDDT

MSS: SSRMS:

Change Unloaded Parameters ► unloaded ► LEE Tip SRH
Verify 'Unloaded Parameters' (two) – LEE Tip, SR Held

Ops Name	CIPUI
SSRMS_Change_PId_Param_LEE_Tip_SR_Held	CMRM95SM0008K:108

Parameter	Value
File_ID	76
OCS_File_ID	74
Payload_ID	0
GF_ID	256

8.102 SSRMS WALKOFF TO NODE2 PDGF (FOCUSED INSPECTION) - GROUND

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34. CHANGE DISPLAY FRAME

MSS: SSRMS:

Change Display ► Orbiter ► OBSS FRGF (Verify Orbiter>OBSS FRGF)

Ops Name	CIPUI
SSRMS_Change_DYF_Orbiter>OBSS_FRGF_POR_POS	CMRM96IM0451K:109
SSRMS_Change_DYF_Orbiter>OBSS_FRGF_POR_ORI	CMRM96IM0451K:110
SSRMS_Change_DYF_Orbiter>OBSS_FRGF_Trans_Vel	CMRM96IM0451K:111
SSRMS_Change_DYF_Orbiter>OBSS_FRGF_Rot_Vel	CMRM96IM0451K:112

Frame Data	Value
Frame_ID	33

Execute thinlayer commands delete script.

Configure the ISS Downlink per the following table:

1 P1 LOOB (+130, +25)	2 MBS Mast (+130, +15)
3	4 Tip Elbow (-165, +5)

Verify SSRMS is at MBS PDGF 3 Pre-Grapple position (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-81.2	+52.7	-25.3	-104.0	+46.9

Verify SPDM Arm1 is at LAB Stow position (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
-90.0	-45.0	+80.0	+45.0	-45.0	-90.0	0.0

Verify SPDM Arm2 is at LAB Stow position (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
-90.0	-45.0	-110.0	-45.0	+45.0	-90.0	0.0

Verify SPDM BR is at LAB Stow position (within 1 deg)

BR
-50.0

Verify SRMS is at ICC Handoff to SSRMS position (within 1 deg).

SY	SP	EP	WP	WY	WR
+97.0	+22.0	-35.0	+80.0	+60.0	-190.0

Verify JEM RMS is at JLE Install Viewing position (within 1 deg).

SY	SP	EP	WP	WY	WR
-7.0	+70.0	-115.0	-40.0	0.0	+7.0

NOTE
 MBS PDGF 3 Walkoff order of motion: Blue, Green, Red.

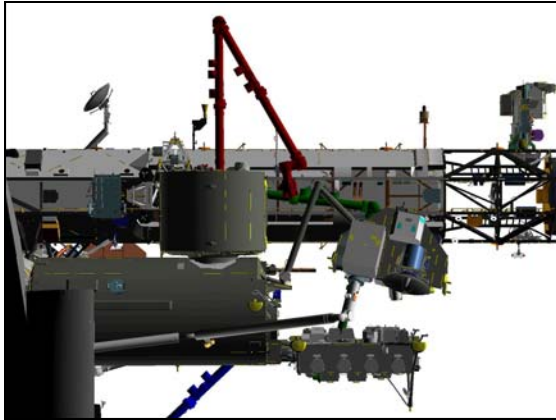


Figure 1.- MBS PDGF 3 Mnvrt MT Xlate (ISS Front).

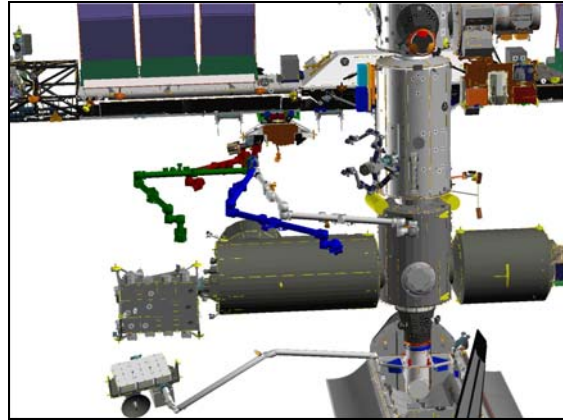


Figure 2.- MBS PDGF 3 Mnvrt MT Xlate (Bird's Eye View).

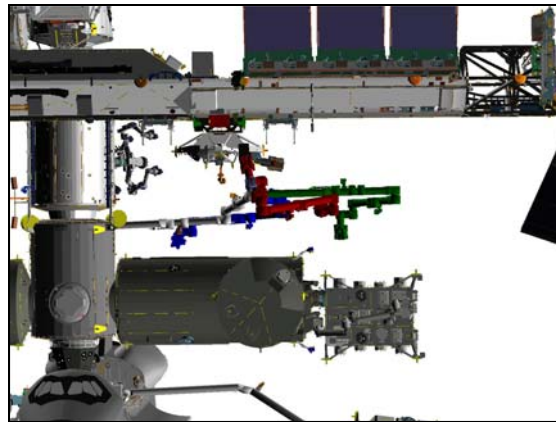


Figure 3.- MBS PDGF 3 Mnvrt MT Xlate (ISS Zenith).

1. P1 LOOB CAMERA SURVEY

Coordinate with CATO to survey the MBS PDGF 3 walkoff and mnvr to MT Translate Workspace with the S1 LOOB Camera.

	P1 LOOB	Survey Notes	Complete
Start Config	+130, +25	Workspace Survey	
1. Tilt Down	+130, -25	Workspace Survey	
2. Tilt Up	+130, -5	Workspace Survey	

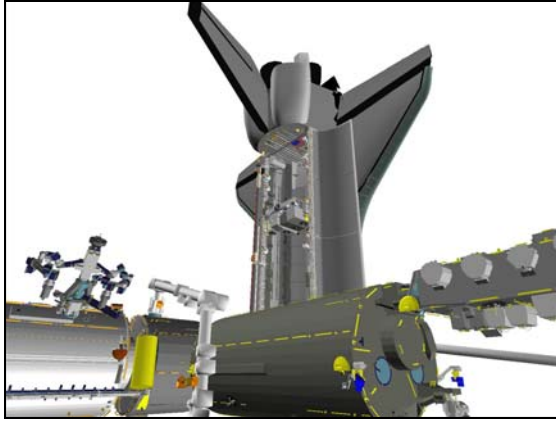


Figure 4.- P1 Lower Outboard - Start
(09: P1 Lower Outboard: +130, +25).

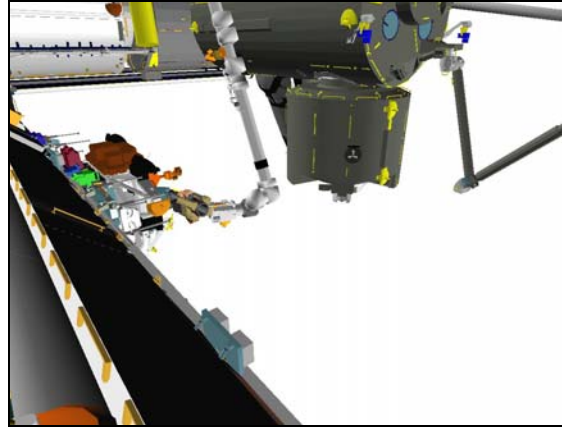


Figure 5.- P1 Lower Outboard - Step 1
(09: P1 Lower Outboard: +130, -25).

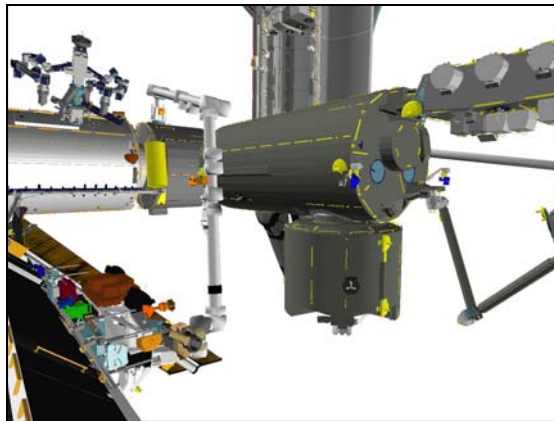


Figure 6.- P1 Lower Outboard - Step 2
(09: P1 Lower Outboard: +130, -5).

2. MBS MAST CAMERA SURVEY

ROBO Camera Commander

'MSS Cameras'

sel MBS Mast

cmd Activate Position (Verify Activated)

cmd Activate Commanding

Keyboard Commanding Window

Verify Current Camera: MBS Mast

	MBS Mast	Stop at	Survey Notes	Complete
Start Config	+130, +15		Workspace Survey	
1. Pan Left	-60, +15	-54, +15	Workspace Survey	
2. Pan Right	-40, +15	-46, +15	Workspace Survey	
3. Tilt Down	-40, -35	-40, -29	Workspace Survey	
4. Final Config (Tilt Up)	-40, -5	-40, -11	Workspace Survey	

Keyboard Commanding Window

cmd Finished Commanding

Deactivate position.

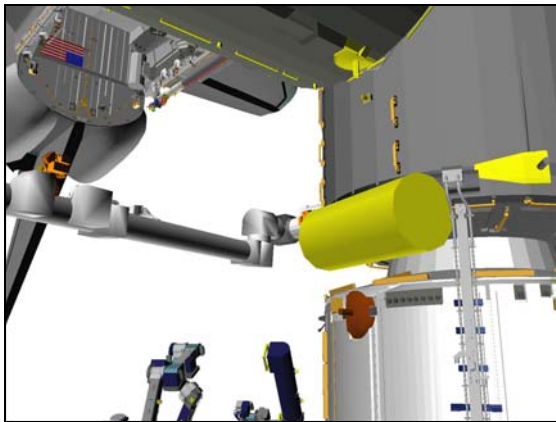


Figure 7.- MBS Mast - Start
(MBS Mast: +130, +15).

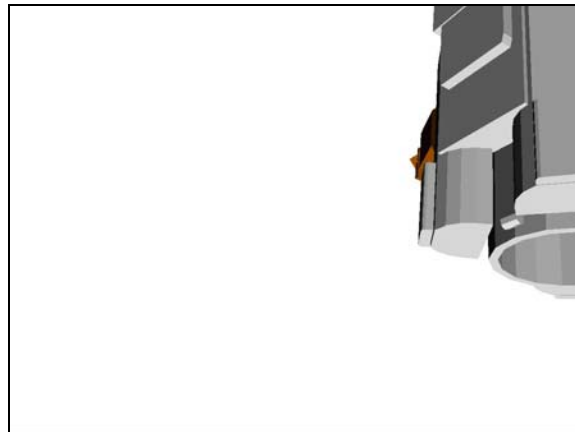


Figure 8.- MBS Mast - Step 1
(MBS Mast: -60, +15).

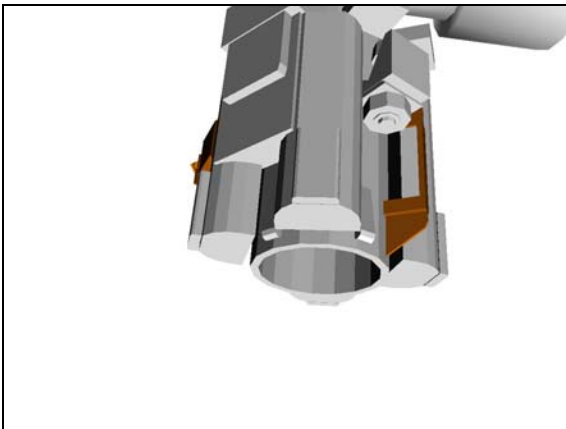


Figure 9.- MBS Mast - Step 2
(MBS Mast: -40, +15).

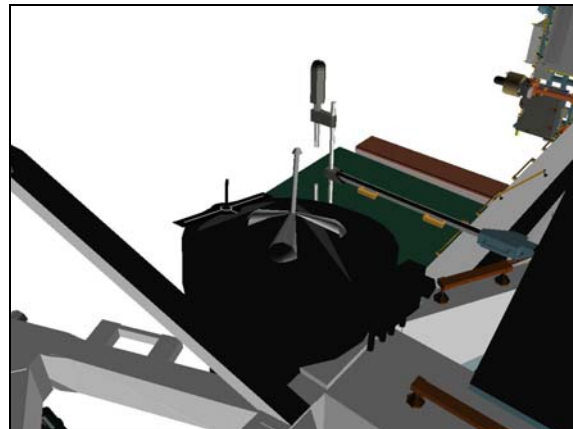


Figure 10.- MBS Mast Step - 3
(MBS Mast: -40, -35).

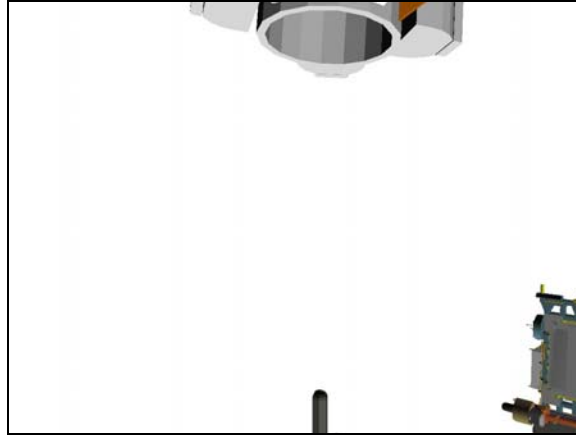


Figure 11.- MBS Mast - Step 4
(MBS Mast: -40, -5).

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8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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NOTE

1. The procedure contains the following Safing Type A commands:
 - CMRM96IM0848K: Lab_RWS_Enable_Vernier
 - CMRM96IM0851K:001 Lab_RWS_RHC_Trigger_Up_Auto
 - CMRM96IM0854K: Lab_RWS_SSRMS_Brakes_Off
 - CMRM96IM0863K: Lab_RWS_Proceed_With_Autosequence

 - CMRM96IM0877K: Cup_RWS_Enable_Vernier
 - CMRM96IM0880K:001 Cup_RWS_RHC_Trigger_Up_Auto
 - CMRM96IM0883K: Cup_RWS_SSRMS_Brakes_Off
 - CMRM96IM0892K: Cup_RWS_Proceed_With_Autosequence
2. Motion commands outside the 5' clearance cone to structure must be executed through completion during planned S-Band AOS. During Ku LOS, SSRMS motion may only be executed along trajectories through workspace that has been surveyed and found to match RPS.
3. Motion commands inside the 5' clearance cone to structure must be executed through completion during planned S-Band and Ku-Band AOS.
4. The SSRMS_Safing command (CIPUI: CMRM96IM0454K) should be unsafed prior to starting motion.
5. After the destination angles are loaded, the autosequence can be canceled using the SSRMS_Cancel_Manipulator_Command (CIPUI: CMRM96IM0015K).

Verify Thinlayer commands build script has been executed.

1. CHANGE PAYLOAD FILE

CDDT

MSS: SSRMS:

Change Unloaded Parameters ► Ground Control ► GC Prox Unld LEE Tip SRH

Verify 'Unloaded Parameters' (two) – GC Prox Unld LEE Tip, SR Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_GC_Prox_Unld_LEE_Tip_SR_Held	CMRM95SM0008K:101

Parameter	Value
File_ID	94
OCS_File_ID	97
Payload_ID	0
GF_ID	256

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8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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2. CHANGE PAYLOAD FILE

CDDT

MSS: SSRMS:

Change Loaded Parameters ► Walk Off ► MBS PDGF 3
Verify 'Loaded Parameters' (two) – MBS PDGF 3, SR Held

Ops Name	CIPUI
SSRMS_Change_PId_Param_MBS_PDGF_3_SR_Held	CMRM95SM0008K:102

Parameter	Value
File_ID	69
OCS_File_ID	67
Payload_ID	20
GF_ID	11

3. CHANGE DISPLAY FRAME

CDDT

MSS: SSRMS:

Change Display ► MBS ► PDGF 3 (Verify MBS>PDGF 3)

Ops Name	CIPUI
SSRMS_Change_DYF_MBS>PDGF_3_POR_POS	CMRM96IM0451K:101
SSRMS_Change_DYF_MBS>PDGF_3_POR_ORI	CMRM96IM0451K:102
SSRMS_Change_DYF_MBS>PDGF_3_Trans_Vel	CMRM96IM0451K:103
SSRMS_Change_DYF_MBS>PDGF_3_Rot_Vel	CMRM96IM0451K:104

Frame Data	Value
Frame_ID	9

Verify SSRMS at PDGF3 Pre-grapple position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-81.2	+52.7	-25.3	-104.0	+46.9
X	Y	Z	Pitch	Yaw	Roll	
-150	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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4. CAMERA SETUP

Configure downlink views to observe expected motion:

1 P1 LOOB (+120, -5)	2 MBS Mast (-40, -5)
3 Tip LEE	4 Tip Elbow (+5, +20)

5. SSRMS SETUP FOR MOTION

CDDT

MSS: SSRMS: MSS Safing:

cmd 'SSRMS' Remove (Verify SSRMS Safing – Not Safed)

Ops Name	CIPUI
SSRMS_Cancel_Safing	CMRM96IM0801K

DCP

BRAKES SSRMS → OFF (Verify OFF)

Ops Name	CIPUI
Lab_RWS_SSRMS_Brakes_Off	CMRM96IM0854K
Cup_RWS_SSRMS_Brakes_Off	CMRM96IM0883K

RHC

RATE → VERNIER (Verify Vernier on PCS)

Ops Name	CIPUI
Lab_RWS_Enable_Vernier	CMRM96IM0848K
Cup_RWS_Enable_Vernier	CMRM96IM0877K

CDDT

MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: 1.0 (Verify 1.0)

Ops Name	CIPUI
SSRMS_Change_Rate_Scale_Vern_1.0	CMRM96IM0022K:001

**8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) -
GROUND**

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6. ENTER FOR OCAS MODE

CDDT

MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_FOR_OCAS_Mode	CMRM96IM0033K

MSS: SSRMS: SSRMS FOR OCAS: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

Ops Name	CIPUI
SSRMS_Select_Base_Joint_Lock_Roll	CMRM96IM0050K

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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6.1 FOR OCAS Maneuver

CDDT

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-65	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_6.1	CMRM96IM0053K:1

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-150	0	0	0.0	0.0	0.0
TGT	-65	0	0	0.0	0.0	0.0
ERR	-85	0	0	0.0	0.0	0.0
	FOR	Unloaded - GC Prox Unld LEE Tip, SR Held				
	Disp	MBS>PDGF 3				

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+185.5	-81.2	+52.7	-25.3	-104.0	+46.9

Verify SR – Locked

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

*****
*If unexpected motion is observed
*  MSS: SSRMS: MSS Safing: MSS Safing
*
*  cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*****

```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+179.5	-83.3	+59.0	-53.7	-101.5	+22.2
X	Y	Z	Pitch	Yaw	Roll	
-65	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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6.2 FOR OCAS Maneuver

Configure downlink views to observe expected motion:

1 P1 LOOB (+120, -5)	2 MBS Mast (-40, -25)
3 Tip LEE	4 Tip Elbow (+5, +20)

CDDT

SSRMS FOR OCAS

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-35	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_6.2	CMRM96IM0053K:2

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-65	0	0	0.0	0.0	0.0
TGT	-35	0	0	0.0	0.0	0.0
ERR	-30	0	0	0.0	0.0	0.0
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+179.5	-83.3	+59.1	-53.7	-101.5	+22.2

Verify SR – Locked

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

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8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) -

GROUND

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Confirm direction of pending motion.

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
* 

| Ops Name     | CIPUI         |
|--------------|---------------|
| SSRMS_Safing | CMRM96IM0454K |


*
* *****
    
```

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+177.4	-83.7	+61.1	-65.7	-101.3	+11.6
X	Y	Z	Pitch	Yaw	Roll	
-35	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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Downlink 6.3 FOR OCAS Maneuver
 Verify Downlink video is current.
 Verify LEE aligned with grapple fixture.

CDDT

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-16	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_6.3	CMRM96IM0053K:3

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-35	0	0	0.0	0.0	0.0
TGT	-16	0	0	0.0	0.0	0.0
ERR	-19	0	0	0.0	0.0	0.0
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+177.4	-83.7	+61.1	-65.7	-101.3	+11.6

Verify SR – Locked

RPS Verify 'SSRMS' –
 Verify 'Driver' – Telemetry,
 Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
* *****

```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+176.1	-83.8	+62.2	-73.4	-101.3	+4.9
X	Y	Z	Pitch	Yaw	Roll	
-16	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

7. PDGF AUTO CAPTURE

NOTE
Capture command must be executed through completion during planned S-Band and Ku-Band AOS.

Downlink

Verify Downlink video is current.
Verify LEE within grapple envelope.

CDDT

MSS: SSRMS: TIP LEE: SSRMS TIP LEE

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Capture_Auto_Limp_Slow	CMRM96IM0092K

Verify 'Confirm or Terminate' prompt.

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8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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NOTE

Once the trigger is hot, only safing or trigger commands should be sent to the Robotics equipment. If a configuration change is required, including routing MSS Cameras, safe the system using the SSRMS_SAFING command (CIPUI: CMRM96IM0454K) to exit LEE operations. (SCR 23262, 14662)

Verify 5 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Auto Capture

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Snare' Close, Capture (two) – blue (12 s max)
Verify Capture to Latch – Yes (SCR 19282)
Verify 'Carriage' Tension ~5500 N (90 s max)
Verify 'Carriage' Retract – blue
Verify 'Latch' Latch – blue (65 s max)
Verify Motors – Inh

8. UMBILICAL MATE

CDDT MSS: SSRMS: Tip LEE:

cmd 'Umbilical' Mate (Verify 'Confirm or Terminate' prompt)

Ops Name	CIPUI
SSRMS_Tip_LEE_Umb_Auto_Mate	CMRM96IM0039K

Verify PDGF and Payload power removed.

Verify 3 minutes of S-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

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Verify LEE Mode – Mate

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Umbilical' Mate – blue (10 s max)
Verify 'Connector Continuity' Prime, Redundant (two) – Yes

9. CARRIAGE DERIGIDIZATION

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Derigidize ► Slow (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Carriage_Manual_Derigidize_Slow	CMRM95SM0002K

Verify '**Confirm or Terminate**' prompt.

Verify 3 minutes of S-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Derigidize

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Carriage' Rigidize – gray
Verify 'Carriage' Brakes – On (90s max)

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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10. SSRMS SAFING

NOTE

Expect the following message when safing is commanded:
'R3Z - MSS OCS SSRMS Prime(Redun) ACU SRT Cat-1 Brk Stat Fail' (SCR 17495)
 This message should return to Norm.

MSS: SSRMS: SSRMS Safing: MSS Safing

cmd 'SSRMS' Apply (Verify Safed)

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+178.5	+175.0	-83.7	+63.0	-79.7	-101.5	-0.7
X	Y	Z	Pitch	Yaw	Roll	
0	0	0	0.0	0.0	0.0	
FOR	Loaded - MBS PDGF 3, SR Held					
Disp	MBS>PDGF 3					

11. SSRMS BASE CHANGE

To powerdown SSRMS to OFF, perform {6.334 MSS POWERDOWN} (SODF: RBT GEN: MSS STATE TRANSITIONS), then:

To change SSRMS Base, perform {6.435 MSS OPERATING BASE CHANGE} (SODF: RBT GEN: SSRMS STATE TRANSITIONS), then:

To powerup SSRMS components, perform {6.332 MSS POWERUP} (SODF: RBT GEN: MSS STATE TRANSITIONS), then:

12. CHANGE PAYLOAD FILE

CDDT

MSS: SSRMS: SSRMS

Change Unloaded Parameters ► Ground Control ► GC Prox Unld LEE Tip SYH

Verify 'Unloaded Parameters' (two) – GC Prox Unld LEE Tip, SY Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_GC_Prox_Unld_LEE_Tip_SY_Held	CMRM95SM0008K:103

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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Parameter	Value
File_ID	98
OCS_File_ID	97
Payload_ID	0
GF_ID	256

13. CHANGE PAYLOAD FILE

CDDT

MSS: SSRMS:

Change Loaded Parameters ► Walk Off ► Node 2 PDGF
Verify 'Loaded Parameters' (two) – Node 2 PDGF, SR Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_Node_2_PDGF_SR_Held	CMRM95SM0008K:104

Parameter	Value
File_ID	69
OCS_File_ID	67
Payload_ID	20
GF_ID	4

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
-0.7	+101.5	-79.7	+63.0	-83.7	-175.0	+178.5
X	Y	Z	Pitch	Yaw	Roll	
-838	-1910	+1188	+166.0	+66.2	+96.9	
FOR	Loaded - Node 2 PDGF, SR Held					
Disp	MBS>PDGF 3					

14. CAMERA SETUP

Configure downlink views to observe expected motion:

1 P1 LOOB (+130, -5)	2 MBS Mast (+110, +15)
3 Tip LEE	4 Tip Elbow (+10, 0)

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CDDT 15. [SSRMS CANCEL SAFING](#)
MSS: SSRMS: MSS Safing:

cmd 'SSRMS' Remove (Verify SSRMS Safing – Not Safed)

Ops Name	CIPUI
SSRMS_Cancel_Safing	CMRM96IM0801K

DCP 16. [SSRMS BRAKES OFF](#)
BRAKES SSRMS → OFF (Verify OFF)

Ops Name	CIPUI
Lab_RWS_SSRMS_Brakes_Off	CMRM96IM0854K
Cup_RWS_SSRMS_Brakes_Off	CMRM96IM0883K

CDDT 17. [CARRIAGE RIGIDIZATION](#)
MSS: SSRMS: Tip LEE:

cmd 'Carriage' Rigidize ► Slow (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Carriage_Manual_Rigidize_Slow	CMRM95SM0000K

Verify '**Confirm or Terminate**' prompt.

Verify 3 minutes of S-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Rigidigize

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Carriage' Tension ~5500 N (90 s max)
Verify 'Carriage' Retract – blue
Verify 'Carriage' Brakes – On

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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18. SSRMS SNAPSHOT COORDINATE SYSTEMS

MSS: SSRMS: Snapshot:

cmd Snapshot (Verify SSRMS>Snapshot)

Ops Name	CIPUI
Set_Snapshot_Coordinate_Frame	CMRM96IM0457K

19. PDGF AUTO RELEASE

NOTE

Release and back-off to pre-grapple motion commands must be executed through completion during planned S-Band and Ku-Band AOS.

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

Ops Name	CIPUI
SSRMS_Limp_Joints_All	CMRM96IM0123K

MSS: SSRMS:

Verify all joints – Limped

Downlink Verify downlink video is current.

CDDT MSS: SSRMS: TIP LEE:

cmd Release ► Automatic ► Slow (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Release_Auto_Slow	CMRM96IM0095K

Verify '**Confirm or Terminate**' prompt.

NOTE

Once the trigger is hot, only safing or trigger commands should be sent to the Robotics equipment. If a configuration change is required, including routing MSS Cameras, safe the system using the SSRMS_SAFING command (CIPUI: CMRM96IM0454K) to exit LEE operations. (SCR 23262, 14662)

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Auto Release

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT
Verify 'Umbilical' Demate – blue
Verify 'Latch' Unlatch – blue
Verify 'Carriage' Rigidize – gray
Verify 'Snare' Open – blue
Verify 'Carriage' Extend – blue

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

Ops Name	CIPUI
SSRMS_Limp_Joints_None	CMRM96IM0122K

20. [ENTER FOR OCAS MODE](#)

CDDT MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_FOR_OCAS_Mode	CMRM96IM0033K

MSS: SSRMS: SSRMS FOR OCAS: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

Ops Name	CIPUI
SSRMS_Select_Base_Joint_Lock_Yaw	CMRM96IM0051K

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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20.1 FOR OCAS Maneuver

CDDT

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-35	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_20.1	CMRM96IM0053K:4

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-2	0	0	0.0	0.0	0.0
TGT	-35	0	0	0.0	0.0	0.0
ERR	+33	0	0	0.0	0.0	0.0
	FOR	Unloaded - GC Prox Unld LEE Tip, SY Held				
	Disp	SSRMS>Snapshot				

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
-0.6	+101.4	-79.5	+62.8	-83.5	-175.0	+178.5

Verify SY – Locked

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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Frame Data	Value
Frame_ID	13

CDDT 21.1 FOR OCAS Maneuver

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-150	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_21.1	CMRM96IM0053K:5

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-35	0	0	0.0	0.0	0.0
TGT	-150	0	0	0.0	0.0	0.0
ERR	+115	0	0	0.0	0.0	0.0
	FOR	Unloaded - GC Prox Unld LEE Tip, SY Held				
	Disp	Node2>PDGF				

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+0.2	+101.4	-78.3	+59.5	-80.7	-175.2	+178.5

Verify SY – Locked

RPS Verify 'SSRMS' –
 Verify 'Driver' – Telemetry,
 Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
*
* *****

```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+2.9	+101.4	-72.4	+45.6	-70.1	-175.7	+178.6
X	Y	Z	Pitch	Yaw	Roll	
-150	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

22. **ENTER STANDBY MODE**

CDDT

MSS: SSRMS: SSRMS

Enter Mode – Standby (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Standby_Mode	CMRM96IM0054K

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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23. [CHANGE PAYLOAD FILE](#)

CDDT

MSS: SSRMS:

Change Unloaded Parameters ► Ground Control ► GC Unld LEE Tip SRH

Verify 'Unloaded Parameters' (two) – GC Unld LEE Tip, SR Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_GC_Unld_LEE_Tip_SR_Held	CMRM95SM0008K:105

Parameter	Value
File_ID	79
OCS_File_ID	81
Payload_ID	0
GF_ID	256

24. [CAMERA SETUP](#)

Configure downlink views to observe expected motion:

1 P1 LOOB (+130, +5)	2 MBS Mast (+105, +15)
3 Base Elbow (0, 0)	4 Tip Elbow (0, +10)

25. [ENTER JOINT OCAS MODE](#)

CDDT

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Joint_OCAS_Mode	CMRM96IM0032K

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

25.1 Joint OCAS Maneuver

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+9.5	+101.6	-94.9	+61.1	-56.7	-149.7	+155.9

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_25.1	CMRM96IM0052K:1

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+2.9	+101.4	-72.4	+45.6	-70.1	-175.7	+178.6
+9.5	+101.6	-94.9	+61.1	-56.7	-149.7	+155.9
-6.6	-0.2	+22.5	-15.4	-13.3	-26.0	+22.7

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-150	0	0	0.0	0.0	0.0
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```
* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
* *****
```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+9.5	+101.6	-94.9	+61.1	-56.7	-149.7	+155.9
X	Y	Z	Pitch	Yaw	Roll	
-382	-38	-433	+0.4	-27.3	-22.8	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	Node2>PDGF					

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

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25.2 Joint OCAS Maneuver

Configure downlink views to observe expected motion:

1 P1 LOOB (+130, +5)	2 MBS Mast (+55, +15)
3 Base Elbow (0, 0)	4 Tip Elbow (0, +10)

CDDT

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+16.6	+101.8	-119.1	+77.7	-42.4	-121.7	+131.4

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_25.2	CMRM96IM0052K:2

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

	SR	SY	SP	EP	WP	WY	WR
Current	+9.5	+101.6	-94.9	+61.1	-56.7	-149.7	+155.9
Dest	+16.6	+101.8	-119.1	+77.7	-42.4	-121.7	+131.4
Error	-7.1	-0.2	+24.2	-16.6	-14.3	-28.0	+24.5

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-382	-38	-433	+0.4	-27.3	-22.8
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

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25.3 Joint OCAS Maneuver

Configure downlink views to observe expected motion:

1 P1 LOOB (+130, -15)	2 MBS Mast (+25, +15)
3 Base Elbow (0, 0)	4 Tip Elbow (0, +10)

CDDT

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+25.2	+102.0	-148.5	+97.9	-25.0	-87.7	+101.7

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_25.3	CMRM96IM0052K:3

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

	SR	SY	SP	EP	WP	WY	WR
Current	+16.6	+101.8	-119.1	+77.7	-42.4	-121.7	+131.4
Dest	+25.2	+102.0	-148.5	+97.9	-25.0	-87.7	+101.7
Error	-8.6	-0.2	+29.4	-20.2	-17.4	-34.0	+29.7

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-438	-50	-918	+1.2	-56.8	-46.6
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

Confirm direction of pending motion.

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
*  MSS: SSRMS: MSS Safing: MSS Safing
*
*  cmd 'SSRMS' Apply (Verify Safed)
*
*  Ops Name      CIPUI
*  SSRMS_Safing CMRM96IM0454K
* *****
    
```

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+25.2	+102.0	-148.5	+97.9	-25.0	-87.7	+101.7
X	Y	Z	Pitch	Yaw	Roll	
-266	-27	-1379	+154.6	-87.2	+76.9	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	Node2>PDGF					

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

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25.4 Joint OCAS Maneuver

Configure downlink views to observe expected motion:

1 P1 LOOB (+130, -35)	2 MBS Mast (+25, +15)
3 Base Elbow (0, 0)	4 Tip Elbow (0, +10)

CDDT

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+34.4	+102.3	-179.7	+119.2	-6.5	-51.7	+70.2

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_25.4	CMRM96IM0052K:4

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+25.2	+102.0	-148.5	+97.9	-25.0	-87.7	+101.7
+34.4	+102.3	-179.7	+119.2	-6.5	-51.7	+70.2
-9.2	-0.3	+31.2	-21.3	-18.5	-36.0	+31.5

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-266	-27	-1379	+154.6	-87.2	+76.9
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) -

GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
* *****
    
```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+34.4	+102.3	-179.7	+119.2	-6.5	-51.7	+70.2
X	Y	Z	Pitch	Yaw	Roll	
+78	+28	-1584	+177.2	-49.5	+67.8	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	Node2>PDGF					

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

(RBT FS/2JA/FIN)

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25.5 Joint OCAS Maneuver

Configure downlink views to observe expected motion:

1 P1 LOOB (+130, -35)	2 MBS Mast (-60, +15)
3 Base Elbow (0, 0)	4 Tip Elbow (0, +10)

CDDT

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_25.5	CMRM96IM0052K:5

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

	SR	SY	SP	EP	WP	WY	WR
Current	+34.4	+102.3	-179.7	+119.2	-6.5	-51.7	+70.2
Dest	+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0
Error	-13.1	-0.3	+44.7	-30.7	-26.5	-51.7	+45.2

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+78	+28	-1584	+177.2	-49.5	+67.8
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

28 MAY 09

8.202 SSRMS WALKOFF TO MBS PDGF 3 (FOCUSED INSPECTION) - GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
*   MSS: SSRMS: MSS Safing: MSS Safing
*
*   cmd 'SSRMS' Apply (Verify Safed)
*
*   Ops Name      CIPUI
*   SSRMS_Safing  CMRM96IM0454K
* *****

```

CDDT

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0
X	Y	Z	Pitch	Yaw	Roll	
+493	+127	-1384	+178.8	+4.8	+22.4	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	Node2>PDGF					

26. SSRMS SAFING

NOTE

Expect the following message when safing is commanded:
'R3Z - MSS OCS SSRMS Prime(Redun) ACU SRT Cat-1 Brk Stat Fail' (SCR 17495)
 This message should return to Norm.

MSS: SSRMS: SSRMS Safing: MSS Safing

cmd 'SSRMS' Apply (Verify Safed)

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

Execute Thinlayer commands delete script.

8.301 PRE-MOTION SURVEY: WALKOFF N2 PDGF (WS4)

(RBT FS/2JA/FIN)

Configure the ISS Downlink per the following table:

1 P1 LOOB (+110, +25)	2 MBS Mast (-25, -20)
3 S1 LOOB (+75, +25)	4

Verify SSRMS is at MT Xlate-Stow position (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+130.0	+80.0	-210.0	+130.0	-40.0	-175.0	+170.0

Verify SPDM Arm1 is at Lab Stow position (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
-90.0	-45.0	+80.0	+45.0	-45.0	-90.0	0.0

Verify SPDM Arm2 is at Lab Stow position (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
-90.0	-45.0	-110.0	-45.0	+45.0	-90.0	0.0

Verify SPDM BR is at Lab Stow position (within 1 deg)

BR
-50.0

Verify SRMS is at Pre-Cradle position (within 1 deg).

SY	SP	EP	WP	WY	WR
0.0	+25.0	-25.0	+5.0	0.0	0.0

Verify JEM RMS is at Stow position (within 1 deg).

SY	SP	EP	WP	WY	WR
0.0	+90	-149	-31	0.0	0.0

NOTE

Order of SSRMS motion to N2 PDGF Grapple is as follows:

- a. Natural (current position)
- b. Yellow
- c. Orange
- d. Green
- e. Blue
- f. Magenta

8.301 PRE-MOTION SURVEY: WALKOFF N2 PDGF (WS4)

(RBT FS/2JA/FIN)

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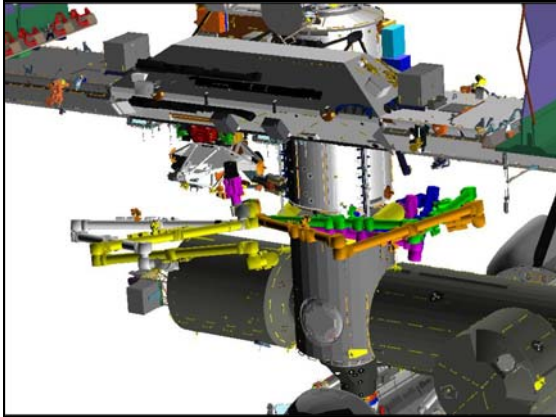


Figure 1.- SSRMS Motion Overview
(Bird's Eye View).

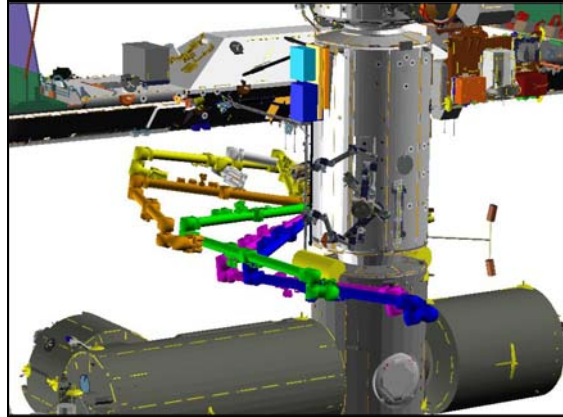


Figure 2.- SSRMS Motion Overview
(Bird's Eye View).

NOTE

Order of SSRMS motion to OBSS Pre-Grapple is as follows:

- a. Magenta
- b. Red
- c. Brown
- d. Gray
- e. Beige
- f. Aquamarine
- g. Black

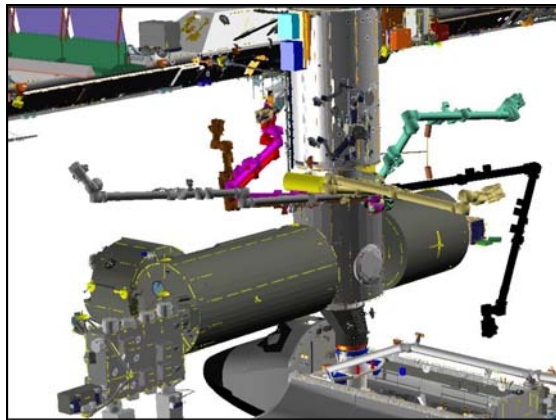


Figure 3.- SSRMS Motion Overview
(Bird's Eye View).

8.301 PRE-MOTION SURVEY: WALKOFF N2 PDGF (WS4)

(RBT FS/2JA/FIN)

Page 3 of 5 pages

1. P1 LOOB CAMERA SURVEY

Coordinate with CATO to survey the SSRMS Workspace.

	P1 LOOB	Survey Notes	Complete
Start Config	(+110, +25)	PLB, SPDM, Node2/JEM	
1. Tilt Down	(+110, -20)	MBS, Lab, JEM	
2. Pan Right	(+130 , -20)	MBS, Lab, JEM	

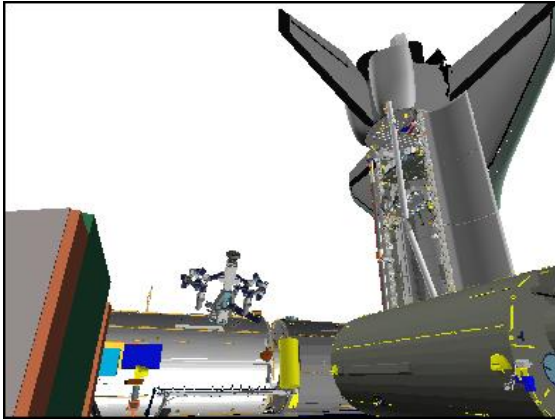


Figure 4.- P1 Lower Outboard - Start
(09: P1 Lower Outboard: +110, +25).

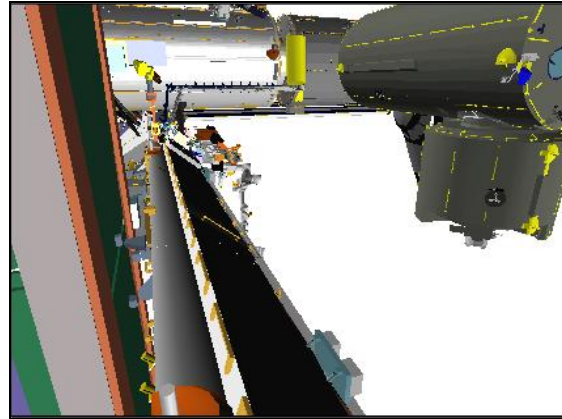


Figure 5.- P1 Lower Outboard - Step 1
(09: P1 Lower Outboard: +110, -20).

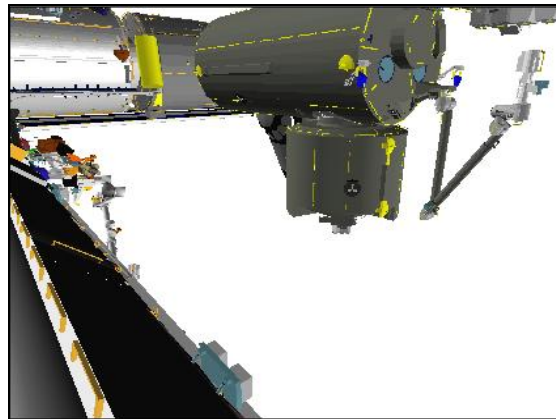


Figure 6.- P1 Lower Outboard - Step 2
(09: P1 Lower Outboard: +130, -20).

8.301 PRE-MOTION SURVEY: WALKOFF N2 PDGF (WS4)

(RBT FS/2JA/FIN)

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2. S1 LOOB CAMERA SURVEY

Coordinate with CATO to survey the SSRMS Workspace.

	S1 LOOB	Survey Notes	Complete
Start Config	(+75, +25)	Node2, PLB	

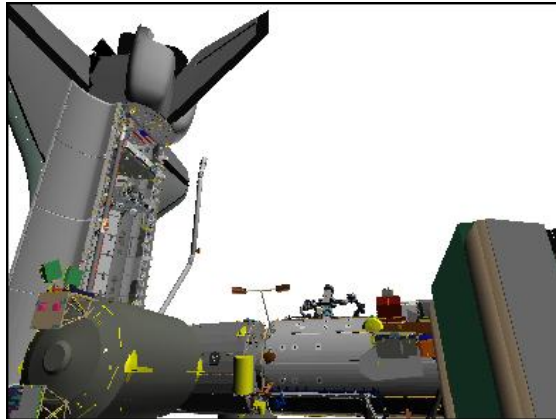


Figure 7.- S1 Lower Outboard - Start
(03: S1 Lower Outboard: +75, +25).

3. MBS MAST CAMERA SURVEY

ROBO Camera Commander

'MSS Cameras'

sel MBS Mast

cmd Activate Position (Verify Activated)

cmd Activate Commanding

Keyboard Commanding Window

Verify Current Camera: MBS Mast

	MBS Mast	Stop at	Survey Notes	Complete
Start Config	(-25, -20)		MBS PDGF3, POA	
1. Tilt Up	(-25, +15)	(-25, +9)	Workspace Survey	
2. Pan Right	(+10 , +15)	(+4 , +15)	JEM, JLP	

Keyboard Commanding Window

cmd Finished Commanding

Deactivate position.

8.301 PRE-MOTION SURVEY: WALKOFF N2 PDGF (WS4)

(RBT FS/2JA/FIN)



Figure 8.- MBS Mast - Start
(37: MBS Mast: -25, -20).

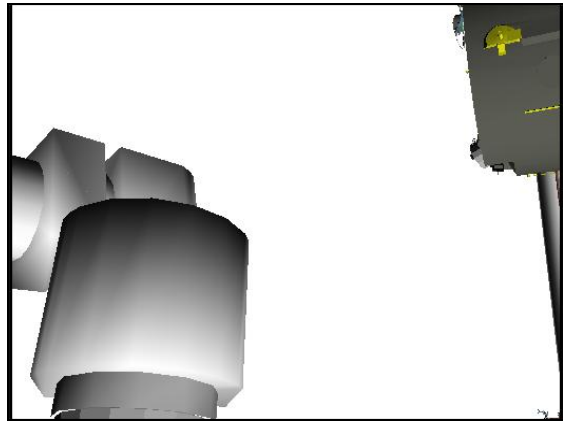


Figure 9.- MBS Mast - Step 1
(37: MBS Mast: -25, +15).

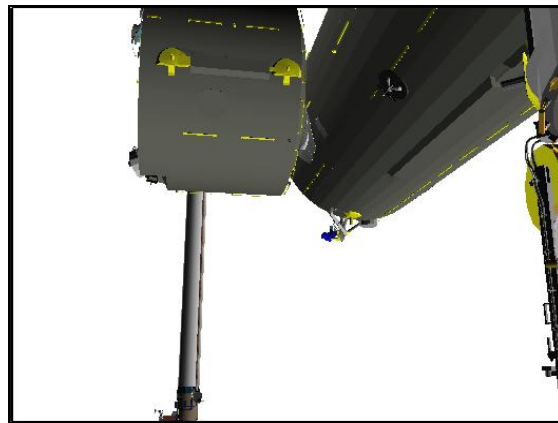


Figure 10.- MBS Mast - Step 2
(37: MBS Mast: +10, +15).

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8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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NOTE

1. The procedure contains the following Safing Type A commands:
CMRM96IM0848K: Lab_RWS_Enable_Vernier
CMRM96IM0851K:001 Lab_RWS_RHC_Trigger_Up_Auto
CMRM96IM0854K: Lab_RWS_SSRMS_Brakes_Off
CMRM96IM0863K: Lab_RWS_Proceed_With_Autosequence

CMRM96IM0877K: Cup_RWS_Enable_Vernier
CMRM96IM0880K:001 Cup_RWS_RHC_Trigger_Up_Auto
CMRM96IM0883K: Cup_RWS_SSRMS_Brakes_Off
CMRM96IM0892K: Cup_RWS_Proceed_With_Autosequence
2. Motion commands outside the 5' clearance cone to structure must be executed through completion during planned S-Band AOS. During Ku LOS, SSRMS motion may only be executed along trajectories through workspace that has been surveyed and found to match RPS.
3. Motion commands inside the 5' clearance cone to structure must be executed through completion during planned S-Band and Ku-Band AOS.
4. The SSRMS_Safing command (CIPUI: CMRM96IM0454K) should be unsafed prior to starting motion.
5. After the destination angles are loaded, the autosequence can be canceled using the SSRMS_Cancel_Manipulator_Command (CIPUI: CMRM96IM0015K).000000

Verify Thinlayer commands build script has been executed.

1. [SSRMS SETUP FOR MOTION](#)

CDDT

MSS: SSRMS: MSS Safing:

cmd 'SSRMS' Remove (Verify SSRMS Safing – Not Safed)

Ops Name	CIPUI
SSRMS_Cancel_Safing	CMRM96IM0801K

DCP

BRAKES SSRMS → OFF (Verify OFF)

Ops Name	CIPUI
Lab_RWS_SSRMS_Brakes_Off	CMRM96IM0854K
Cup_RWS_SSRMS_Brakes_Off	CMRM96IM0883K

RHC

RATE → VERNIER (Verify Vernier on PCS)

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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Ops Name	CIPUI
Lab_RWS_Enable_Vernier	CMRM96IM0848K
Cup_RWS_Enable_Vernier	CMRM96IM0877K

CDDT MSS: SSRMS: Rate:

Set 'Scale' 'Vernier' Rate Scale: 1.0 (Verify 1.0)

Ops Name	CIPUI
SSRMS_Change_Rate_Scale_Vern_1.0	CMRM96IM0022K:001

2. CHANGE DISPLAY FRAME

MSS: SSRMS:

Change Display ► Node2 ► PDGF (Verify Node2>PDGF)

Ops Name	CIPUI
SSRMS_Change_DYF_Node2>PDGF_POR_POS	CMRM96IM0451K:101
SSRMS_Change_DYF_Node2>PDGF_POR_ORI	CMRM96IM0451K:102
SSRMS_Change_DYF_Node2>PDGF_Trans_Vel	CMRM96IM0451K:103
SSRMS_Change_DYF_Node2>PDGF_Rot_Vel	CMRM96IM0451K:104

Frame Data	Value
Frame_ID	13

3. CHANGE PAYLOAD FILE

MSS: SSRMS:

Change Unloaded Parameters ► Ground Control ► GC Unld LEE Tip SYH
Verify 'Unloaded Parameters' (two) – GC Unld LEE Tip, SY Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_GC_Unld_LEE_Tip_SY_Held	CMRM95SM0008K:101

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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Parameter	Value
File_ID	82
OCS_File_ID	81
Payload_ID	0
GF_ID	256

4. CHANGE PAYLOAD FILE

MSS: SSRMS:

Change Loaded Parameters ► Walk Off ► Node 2 PDGF
Verify 'Loaded Parameters' (two) – Node 2 PDGF, SR Held

Ops Name	CIPUI
SSRMS_Change_PId_Param_Node_2_PDGF_SR_Held	CMRM95SM0008K:102

Parameter	Value
File_ID	69
OCS_File_ID	67
Payload_ID	20
GF_ID	4

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+130.0	+80.0	-210.0	+130.0	-40.0	-175.0	+170.0
X	Y	Z	Pitch	Yaw	Roll	
+1341	+200	-81	-151.2	-18.8	-11.2	
FOR	Unloaded - GC Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

5. CAMERA SETUP

Configure downlink views to observe expected motion:

1 Lab Stbd Zenith (-180, +10)	2 JEM EXT A (-155, +30)
3 P1 LOIB (+140, -25)	4 P1 LOOB (+75, -15)

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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6. ENTER JOINT OCAS MODE

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Joint_OCAS_Mode	CMRM96IM0032K

6.1 Joint OCAS Maneuver

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+100.0	+85.2	-195.7	+119.6	-40.0	-175.1	+172.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_6.1	CMRM96IM0052K:1

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+130.0	+80.0	-210.0	+130.0	-40.0	-175.0	+170.0
+100.0	+85.2	-195.7	+119.6	-40.0	-175.1	+172.6
+30.0	-5.2	-14.3	+10.4	0.0	+0.1	-2.6

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+1341	+200	-81	-151.2	-18.8	-11.2
FOR	Unloaded - GC Unld LEE Tip, SY Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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6.2 Joint OCAS Maneuver

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+71.0	+90.3	-181.8	+109.5	-40.0	-175.2	+175.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_6.2	CMRM96IM0052K:2

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+100.0	+85.2	-195.7	+119.6	-40.0	-175.1	+172.6
+71.0	+90.3	-181.8	+109.5	-40.0	-175.2	+175.1
+29.0	-5.1	-13.9	+10.1	0.0	+0.1	-2.5

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+1241	+248	-463	-116.2	-19.7	-6.1
FOR	Unloaded - GC Unld LEE Tip, SY Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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6.3 Joint OCAS Maneuver

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+42.0	+95.3	-167.9	+99.4	-40.0	-175.3	+177.7

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_6.3	CMRM96IM0052K:3

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+71.0	+90.3	-181.8	+109.5	-40.0	-175.2	+175.1
+42.0	+95.3	-167.9	+99.4	-40.0	-175.3	+177.7
+29.0	-5.0	-13.9	+10.1	0.0	+0.1	-2.5

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+864	+251	-719	-82.4	-17.0	-0.6
FOR	Unloaded - GC Unld LEE Tip, SY Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```
* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*   Ops Name      CIPUI
*   -----
*   SSRMS_Safing  CMRM96IM0454K
*
* *****
```

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+42.0	+95.3	-167.9	+99.4	-40.0	-175.3	+177.7
X	Y	Z	Pitch	Yaw	Roll	
+346	+186	-669	-49.5	-11.0	+3.1	
FOR	Unloaded - GC Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

Configure downlink views to observe expected motion:

<p>1 Lab Stbd Zenith (-180, -30)</p>	<p>2 JEM EXT A (-155, +5)</p>
<p>3 P1 LOIB (+160, -5)</p>	<p>4 P1 LOOB (+120, 0)</p>

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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6.4 Joint OCAS Maneuver

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+15.0	+100.0	-155.0	+90.0	-40.0	-175.4	+180.0

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_6.4	CMRM96IM0052K:4

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+42.0	+95.3	-167.9	+99.4	-40.0	-175.3	+177.7
+15.0	+100.0	-155.0	+90.0	-40.0	-175.4	+180.0
+27.0	-4.7	-12.9	+9.4	0.0	+0.1	-2.3

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+346	+186	-669	-49.5	-11.0	+3.1
FOR	Unloaded - GC Unld LEE Tip, SY Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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8. CHANGE PAYLOAD FILE

MSS: SSRMS:

Change Unloaded Parameters ► Ground Control ► GC Prox Unld LEE Tip SYH

Verify 'Unloaded Parameters' (two) – GC Prox Unld LEE Tip, SY Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_GC_Prox_Unld_LEE_Tip_SY_Held	CMRM95SM0008K:103

Parameter	Value
File_ID	98
OCS_File_ID	97
Payload_ID	0
GF_ID	256

9. CAMERA SETUP

Configure downlink views to observe expected motion:

1 Lab Stbd Zenith (-180, -30)	2 JEM EXT A (-170, -10)
3 P1 LOIB (+145, +10)	4 P1 LOOB (+120, 0)

10. ENTER JOINT OCAS MODE

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Joint_OCAS_Mode	CMRM96IM0032K

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10.1 Joint OCAS Maneuver

<u>NOTE</u>	
1.	Tip Elbow Camera to JEM min clearance ~40” – JEM EXT A
2.	Tip Boom to Cable Envelope min clearance ~16” – P1 LOIB
3.	Continue monitoring these clearances thru step 16 where the closest clearance for Tip Elbow Camera to JEM is 34” and for Tip Boom to Cable Envelope is 9”.

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+4.5	+109.6	-142.8	+81.6	-33.4	-175.4	+186.8

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_10.1	CMRM96IM0052K:5

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+15.0	+100.0	-155.0	+90.0	-40.0	-175.4	+180.0
+4.5	+109.6	-142.8	+81.6	-33.4	-175.4	+186.8
+10.5	-9.6	-12.2	+8.4	-6.6	0.0	-6.8

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-37	+71	-296	-19.8	-3.7	+3.3
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held				
Disp	Node2>PDGF				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

Confirm direction of pending motion.

DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: 
*
* cmd 'SSRMS' Apply (Verify Safed)
*
* 

| Ops Name     | CIPUI         |
|--------------|---------------|
| SSRMS_Safing | CMRM96IM0454K |


* *****

```

MSS: SSRMS:

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+4.5	+109.6	-142.8	+81.6	-33.4	-175.4	+186.8
X	Y	Z	Pitch	Yaw	Roll	
-150	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

11. CAMERA SETUP

Configure downlink views to observe expected motion:

1 Tip LEE	2 JEM EXT A (-170, -10)
3 P1 LOIB (+145, +10)	4 P1 LOOB (+120, 0)

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12. ENTER FOR OCAS MODE

MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_FOR_OCAS_Mode	CMRM96IM0033K

MSS: SSRMS: SSRMS FOR OCAS: Joint Lock:

cmd Shoulder Yaw (Verify SY – Locked)

Ops Name	CIPUI
SSRMS_Select_Base_Joint_Lock_Yaw	CMRM96IM0051K

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12.1 FOR OCAS Maneuver

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-65	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_12.1	CMRM96IM0053K:1

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-150	0	0	0.0	0.0	0.0
TGT	-65	0	0	0.0	0.0	0.0
ERR	-85	0	0	0.0	0.0	0.0
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+4.5	+109.6	-142.8	+81.6	-33.4	-175.4	+186.8

Verify SY – Locked

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

*****
* If unexpected motion is observed
*  MSS: SSRMS: MSS Safing: MSS Safing
*  |
*  | cmd 'SSRMS' Apply (Verify Safed)
*  |
*  |
*  |
*  |
*  |
*  |
*  |
*  |
*****
  
```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+3.4	+109.6	-149.4	+91.4	-37.6	-175.0	+186.8
X	Y	Z	Pitch	Yaw	Roll	
-65	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

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12.2 FOR OCAS Maneuver

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-35	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_12.2	CMRM96IM0053K:2

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-65	0	0	0.0	0.0	0.0
TGT	-35	0	0	0.0	0.0	0.0
ERR	-30	0	0	0.0	0.0	0.0
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+3.4	+109.6	-149.4	+91.4	-37.6	-175.0	+186.8

Verify SY – Locked

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
*   MSS: SSRMS: MSS Safing: MSS Safing
*
*   cmd 'SSRMS' Apply (Verify Safed)
*
*   Ops Name      CIPUI
*   SSRMS_Safing  CMRM96IM0454K
* *****

```

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+3.0	+109.6	-151.7	+94.6	-38.9	-174.9	+186.7
X	Y	Z	Pitch	Yaw	Roll	
-35	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

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Downlink 12.3 FOR OCAS Maneuver
 Verify Downlink video is current.
 Verify LEE aligned with GF.

CDDT

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-16	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_12.3	CMRM96IM0053K:3

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-35	0	0	0.0	0.0	0.0
TGT	-16	0	0	0.0	0.0	0.0
ERR	-19	0	0	0.0	0.0	0.0
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+3.0	+109.6	-151.7	+94.6	-38.9	-174.9	+186.7

Verify SY – Locked

RPS Verify 'SSRMS' –
 Verify 'Driver' – Telemetry,
 Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT **cmd** Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*   Ops Name      CIPUI
*   SSRMS_Safing  CMRM96IM0454K
*
* *****
    
```

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+2.7	+109.6	-153.2	+96.6	-39.7	-174.8	+186.7
X	Y	Z	Pitch	Yaw	Roll	
-16	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SY Held					
Disp	Node2>PDGF					

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13. PDGF AUTO CAPTURE

NOTE

Capture command must be executed through completion during planned S-Band and Ku-Band AOS.

Downlink Verify Downlink video is current.
Verify LEE within grapple envelope.

CDDT MSS: SSRMS: TIP LEE: SSRMS TIP LEE

cmd Capture ► Automatic ► Slow, Limp (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Capture_Auto_Limp_Slow	CMRM96IM0092K

Verify '**Confirm or Terminate**' prompt.

NOTE

Once the trigger is hot, only safing or trigger commands should be sent to the Robotics equipment. If a configuration change is required, including routing MSS Cameras, safe the system using the SSRMS_SAFING command (CIPUI: CMRM96IM0454K) to exit LEE operations. (SCR 23262, 14662)

Verify 5 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Auto Capture

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Snare' Close, Capture (two) – blue (12 s max)
Verify Capture to Latch – Yes (SCR 19282)
Verify 'Carriage' Tension ~5500 N (90 s max)
Verify 'Carriage' Retract – blue
Verify 'Latch' Latch – blue (65 s max)
Verify Motors – Inh

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14. UMBILICAL MATE

MSS: SSRMS: Tip LEE:

cmd 'Umbilical' Mate (Verify '**Confirm or Terminate**' prompt)

Ops Name	CIPUI
SSRMS_Tip_LEE_Umb_Auto_Mate	CMRM96IM0039K

Verify PDGF and Payload power removed.

Verify 3 minutes of S-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Mate

RHC

TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT

Verify 'Umbilical' Mate – blue (10 s max)

Verify 'Connector Continuity' Prime, Redundant (two) – Yes

15. CARRIAGE DERIGIDIZATION

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Derigidize ► Slow (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Carriage_Manual_Derigidize_Slow	CMRM95SM0002K

Verify '**Confirm or Terminate**' prompt.

Verify 3 minutes of S-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

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Verify LEE Mode – Derigidize

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Carriage' Rigidize – gray
Verify 'Carriage' Brakes – On (90s max)

16. [SSRMS SAFING](#)

NOTE

Expect the following message when safing is commanded:
'R3Z - MSS OCS SSRMS Prime(Redun) ACU SRT Cat-1 Brk Stat Fail' (SCR 17495)
This message should return to Norm.

MSS: SSRMS: SSRMS Safing:

cmd 'SSRMS' Apply (Verify Safed)

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+2.4	+109.6	-154.4	+98.2	-40.4	-174.7	+186.7
X	Y	Z	Pitch	Yaw	Roll	
0	0	0	0.0	0.0	0.0	
FOR	Loaded - Node 2 PDGF, SR Held					
Disp	Node2>PDGF					

17. [SSRMS BASE CHANGE](#)

To powerdown SSRMS to OFF, perform {6.334 MSS POWERDOWN}
(SODF: RBT GEN: MSS STATE TRANSITIONS), then:

To change SSRMS Base, perform {6.435 MSS OPERATING BASE
CHANGE} (SODF: RBT GEN: SSRMS STATE TRANSITIONS), then:

To powerup SSRMS components, perform {6.332 MSS POWERUP}
(SODF: RBT GEN: MSS STATE TRANSITIONS), then:

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18. [CHANGE PAYLOAD FILE](#)

MSS: SSRMS:

Change Loaded Parameters ► Walk Off ► MBS PDGF 3
Verify 'Loaded Parameters' (two) – MBS PDGF 3, SR Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_MBS_PDGF_3_SR_Held	CMRM95SM0008K:104

Parameter	Value
File_ID	69
OCS_File_ID	67
Payload_ID	20
GF_ID	11

19. [CHANGE PAYLOAD FILE](#)

MSS: SSRMS:

Change Unloaded Parameters ► Ground Control ► GC Prox Unld LEE Tip SRH
Verify 'Unloaded Parameters' (two) – GC Prox Unld LEE Tip, SR Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_GC_Prox_Unld_LEE_Tip_SR_Held	CMRM95SM0008K:105

Parameter	Value
File_ID	94
OCS_File_ID	97
Payload_ID	0
GF_ID	256

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+186.7	+174.7	-40.4	+98.2	-154.4	-109.6	+2.4
X	Y	Z	Pitch	Yaw	Roll	
+828	+390	+63	-102.4	+76.9	+22.5	
FOR	Loaded - MBS PDGF 3, SR Held					
Disp	Node2>PDGF					

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20. [CAMERA SETUP](#)

Configure downlink views to observe expected motion:

1 Tip LEE	2 JEM EXT A (-170, +5)
3 P1 LOIB (+145, -5)	4 P1 LOOB (+120, -5)

21. [SSRMS CANCEL SAFING](#)

MSS: SSRMS: MSS Safing:

cmd 'SSRMS' Remove (Verify SSRMS Safing – Not Safed)

Ops Name	CIPUI
SSRMS_Cancel_Safing	CMRM96IM0801K

22. [SSRMS BRAKES OFF](#)

DCP

BRAKES SSRMS → OFF (Verify OFF)

Ops Name	CIPUI
Lab_RWS_SSRMS_Brakes_Off	CMRM96IM0854K
Cup_RWS_SSRMS_Brakes_Off	CMRM96IM0883K

23. [CARRIAGE RIGIDIZATION](#)

CDDT

MSS: SSRMS: Tip LEE:

cmd 'Carriage' Rigidize ► Slow (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Carriage_Manual_Rigidize_Slow	CMRM95SM0000K

Verify '**Confirm or Terminate**' prompt.

Verify 3 minutes of S-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Rigidigize

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RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT Verify 'Carriage' Tension ~5500 N (90 s max)
Verify 'Carriage' Retract – blue
Verify 'Carriage' Brakes – On

24. SSRMS SNAPSHOT COORDINATE SYSTEMS

MSS: SSRMS: Snapshot

cmd Snapshot (Verify SSRMS>Snapshot)

Ops Name	CIPUI
Set_Snapshot_Coordinate_Frame	CMRM96IM0457K

25. PDGF AUTO RELEASE

NOTE

Release and back-off to pre-grapple motion commands must be executed through completion during planned S-Band and Ku-Band AOS.

MSS: SSRMS: Limp:

cmd All Limp (Verify Limp – blue)

Ops Name	CIPUI
SSRMS_Limp_Joints_All	CMRM96IM0123K

MSS: SSRMS:

Verify all joints – Limped

Downlink Verify downlink video is current.

CDDT MSS: SSRMS: TIP LEE:

cmd Release ► Automatic ► Slow (Verify Speed – Slow)

Ops Name	CIPUI
SSRMS_Tip_LEE_Release_Auto_Slow	CMRM96IM0095K

Verify '**Confirm or Terminate**' prompt.

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NOTE

Once the trigger is hot, only safing or trigger commands should be sent to the Robotics equipment. If a configuration change is required, including routing MSS Cameras, safe the system using the SSRMS_SAFING command (CIPUI: CMRM96IM0454K) to exit LEE operations. (SCR 23262, 14662)

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

cmd Confirm (Verify RHC Trigger Hot icon)

Ops Name	CIPUI
SSRMS_Tip_LEE_Confirm_Effector	CMRM96IM0729K

Verify LEE Mode – Auto Release

RHC TRIGGER → Press (momentarily)

Ops Name	CIPUI
Lab_RWS_RHC_Trigger_Up_Auto	CMRM96IM0851K:001
Cup_RWS_RHC_Trigger_Up_Auto	CMRM96IM0880K:001

CDDT
Verify 'Umbilical' Demate – blue
Verify 'Latch' Unlatch – blue
Verify 'Carriage' Rigidize – gray
Verify 'Snare' Open – blue
Verify 'Carriage' Derigidize – blue
Verify 'Carriage' Extend – blue

MSS: SSRMS: Limp:

cmd None Limp (Verify Standby – blue)

Ops Name	CIPUI
SSRMS_Limp_Joints_None	CMRM96IM0122K

26. [ENTER FOR OCAS MODE](#)

MSS: SSRMS:

Enter Mode – FOR OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_FOR_OCAS_Mode	CMRM96IM0033K

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MSS: SSRMS: SSRMS FOR OCAS: Joint Lock:

cmd Shoulder Roll (Verify SR – Locked)

Ops Name	CIPUI
SSRMS_Select_Base_Joint_Lock_Roll	CMRM96IM0050K

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26.1 FOR OCAS Maneuver

NOTE

1. Base Elbow Camera to JEM min clearance ~29" – JEM EXT A
2. Base Boom to Cable Envelope min clearance ~12" – P1 LOIB

SSRMS FOR OCAS

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-35	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_26.1	CMRM96IM0053K:4

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-2	0	0	0.0	0.0	0.0
TGT	-35	0	0	0.0	0.0	0.0
ERR	+33	0	0	0.0	0.0	0.0
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	SSRMS>Snapshot					

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+186.7	+174.8	-40.5	+98.3	-154.1	-109.6	+2.8

Verify SR – Locked

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* ****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
*
*
*
*
*
*

```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+186.7	+176.6	-42.0	+99.2	-148.5	-109.5	+8.1
X	Y	Z	Pitch	Yaw	Roll	
-35	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	SSRMS>Snapshot					

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27. CHANGE DISPLAY FRAME

MSS: SSRMS:

Change Display ► MBS ► PDGF 3 (Verify MBS>PDGF 3)

Ops Name	CIPUI
SSRMS_Change_DYF_MBS>PDGF_3_POR_POS	CMRM96IM0451K:105
SSRMS_Change_DYF_MBS>PDGF_3_POR_ORI	CMRM96IM0451K:106
SSRMS_Change_DYF_MBS>PDGF_3_Trans_Vel	CMRM96IM0451K:107
SSRMS_Change_DYF_MBS>PDGF_3_Rot_Vel	CMRM96IM0451K:108

Frame Data	Value
Frame_ID	9

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27.1 FOR OCAS Maneuver

NOTE

1. Base Elbow Camera to JEM min clearance ~25" – JEM EXT A
2. Base Boom to Cable Envelope min clearance ~15" – P1 LOIB

SSRMS FOR OCAS

Load the following FOR OCAS Destination.

X	Y	Z	Pitch	Yaw	Roll
-65	0	0	0.0	0.0	0.0

Ops Name	CIPUI
SSRMS_Set_FOR_OCAS_Dest_Step_27.1	CMRM96IM0053K:5

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 5 cm/1 deg).

	X	Y	Z	Pitch	Yaw	Roll
FOR	-35	0	0	0.0	0.0	0.0
TGT	-65	0	0	0.0	0.0	0.0
ERR	+30	0	0	0.0	0.0	0.0
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

Verify current SSRMS Joint angles (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+186.7	+176.6	-42.0	+99.2	-148.5	-109.5	+8.1

Verify SR – Locked

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
*   MSS: SSRMS: MSS Safing: MSS Safing
*
*   cmd 'SSRMS' Apply (Verify Safed)
*
*   Ops Name      CIPUI
*   SSRMS_Safing  CMRM96IM0454K
* *****
    
```

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+186.7	+178.2	-43.2	+99.9	-143.3	-109.5	+13.0
X	Y	Z	Pitch	Yaw	Roll	
-65	0	0	0.0	0.0	0.0	
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

28. CAMERA SETUP

Configure downlink views to observe expected motion:

1 Lab Stbd Zenith (-180, -30)	2 JEM EXT A (-170, +5)
3 P1 LOIB (+145, -5)	4 P1 LOOB (+120, -5)

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29. ENTER JOINT OCAS MODE

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Joint_OCAS_Mode	CMRM96IM0032K

29.1 JOINT OCAS Maneuver

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+186.7	+178.2	-43.3	+80.0	-143.2	-109.6	+13.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_29.1	CMRM96IM0052K:6

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+186.7	+178.2	-43.2	+99.9	-143.3	-109.5	+13.0
+186.7	+178.2	-43.3	+80.0	-143.2	-109.6	+13.1
0.0	0.0	+0.1	+19.9	-0.1	+0.1	-0.1

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-65	0	0	0.0	0.0	0.0
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band and Ku-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* | MSS: SSRMS: MSS Safing: 
* |
* | cmd 'SSRMS' Apply (Verify Safed)
* |
* | 

||
||
||


* *****
    
```

MSS: SSRMS:

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+186.7	+178.2	-43.3	+80.0	-143.2	-109.6	+13.1
X	Y	Z	Pitch	Yaw	Roll	
-134	+149	-219	+6.6	-0.5	+18.9	
FOR	Unloaded - GC Prox Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

30. ENTER STANDBY MODE

MSS: SSRMS:

Enter Mode – Standby (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Standby_Mode	CMRM96IM0054K

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31. CHANGE PAYLOAD FILE

CDDT

MSS: SSRMS:

Change Unloaded Parameters ► Ground Control ► GC Unld LEE Tip
SRH

Verify 'Unloaded Parameters' (two) – GC Unld LEE Tip, SR Held

Ops Name	CIPUI
SSRMS_Change_Pld_Param_GC_Unld_LEE_Tip_SR_Held	CMRM95SM0008K:106

Parameter	Value
File_ID	79
OCS_File_ID	81
Payload_ID	0
GF_ID	256

32. CAMERA SETUP

Configure downlink views to observe expected motion:

1 LAB Stbd Zenith (-180, -30)	2 JEM EXT A (-170, +5)
3 P1 LOIB (-180, -5)	4 P1 LOOB (+120, -5)

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33. ENTER JOINT OCAS MODE

MSS: SSRMS:

Enter Mode – Joint OCAS (Verify blue)

Ops Name	CIPUI
SSRMS_Enter_Joint_OCAS_Mode	CMRM96IM0032K

33.1 Joint OCAS Maneuver

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+183.1	+178.2	-56.1	+54.1	-146.4	-117.7	+46.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_33.1	CMRM96IM0052K:7

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+186.7	+178.2	-43.3	+80.0	-143.2	-109.6	+13.1
+183.1	+178.2	-56.1	+54.1	-146.4	-117.7	+46.1
+3.6	0.0	+12.8	+25.9	+3.2	+8.1	-33.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-134	+149	-219	+6.6	-0.5	+18.9
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
* *****
    
```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+183.1	+178.2	-56.1	+54.1	-146.4	-117.7	+46.1
X	Y	Z	Pitch	Yaw	Roll	
-293	+696	-342	+24.2	-3.7	+92.1	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

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33.2 Joint OCAS Maneuver

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+179.8	+178.2	-67.8	+30.6	-149.3	-125.0	+76.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_33.2	CMRM96IM0052K:8

Verify Sequence Status – Confirm or Cancel

GND

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+183.1	+178.2	-56.1	+54.1	-146.4	-117.7	+46.1
+179.8	+178.2	-67.8	+30.6	-149.3	-125.0	+76.1
+3.3	0.0	+11.7	+23.5	+2.9	+7.3	-30.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-293	+696	-342	+24.2	-3.7	+92.1
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' –

Verify 'Driver' – Telemetry,

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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33.3 Joint OCAS Maneuver

NOTE

Expect singularity warning for EP between -15 and +15 deg through step 33.4.

CDDT

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+176.7	+178.2	-78.6	+8.6	-152.0	-131.9	+104.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_33.3	CMRM96IM0052K:9

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+179.8	+178.2	-67.8	+30.6	-149.3	-125.0	+76.1
+176.7	+178.2	-78.6	+8.6	-152.0	-131.9	+104.1
+3.1	0.0	+10.9	+22.0	+2.7	+6.9	-28.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-367	+1242	-141	+38.6	+7.8	+156.0
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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33.4 Joint OCAS Maneuver

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+173.7	+178.2	-89.1	-12.6	-154.6	-138.5	+131.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_33.4	CMRM96IM0052K:10

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+176.7	+178.2	-78.6	+8.6	-152.0	-131.9	+104.1
+173.7	+178.2	-89.1	-12.6	-154.6	-138.5	+131.1
+3.0	0.0	+10.5	+21.2	+2.6	+6.6	-27.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-350	+1628	+298	+42.6	+27.8	-147.4
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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33.5 Joint OCAS Maneuver

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+170.8	+178.2	-99.6	-33.8	-157.2	-145.1	+158.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_33.5	CMRM96IM0052K:11

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+173.7	+178.2	-89.1	-12.6	-154.6	-138.5	+131.1
+170.8	+178.2	-99.6	-33.8	-157.2	-145.1	+158.1
+3.0	0.0	+10.5	+21.2	+2.6	+6.6	-27.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-275	+1769	+858	+29.7	+48.8	-86.7
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

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33.6 Joint OCAS Maneuver

NOTE
SSRMS to SPDM min clearance ~43” – JEM EXT A.

CDDT

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+167.7	+178.2	-110.5	-55.8	-159.9	-152.0	+186.1

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_33.6	CMRM96IM0052K:12

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+170.8	+178.2	-99.6	-33.8	-157.2	-145.1	+158.1
+167.7	+178.2	-110.5	-55.8	-159.9	-152.0	+186.1
+3.1	0.0	+10.9	+22.0	+2.7	+6.9	-28.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-180	+1637	+1421	-14.0	+57.0	-2.8
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
*   MSS: SSRMS: MSS Safing: MSS Safing
*
*   cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*   Ops Name      CIPUI
*   SSRMS_Safing  CMRM96IM0454K
*
* *****
    
```

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+167.7	+178.2	-110.5	-55.8	-159.9	-152.0	+186.1
X	Y	Z	Pitch	Yaw	Roll	
-110	+1247	+1861	-52.5	+38.2	+71.8	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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33.7 Joint OCAS Maneuver

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+165.0	+178.2	-120.0	-75.0	-162.3	-158.0	+210.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_33.7	CMRM96IM0052K:13

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+167.7	+178.2	-110.5	-55.8	-159.9	-152.0	+186.1
+165.0	+178.2	-120.0	-75.0	-162.3	-158.0	+210.6
+2.7	0.0	+9.5	+19.2	+2.4	+6.0	-24.5

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-110	+1247	+1861	-52.5	+38.2	+71.8
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```
* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*   Ops Name      CIPUI
*   SSRMS_Safing  CMRM96IM0454K
*
* *****
```

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+165.0	+178.2	-120.0	-75.0	-162.3	-158.0	+210.6
X	Y	Z	Pitch	Yaw	Roll	
-96	+787	+2040	-66.4	+11.3	+113.4	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

34. CAMERA SETUP

Configure downlink views to observe expected motion:

1 S1 LOOB (+75, +15)	2 JEM EXT A (-170, -30)
3 CAM C (-20, +35)	4 P1 LOOB (+120, +35)

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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34.1 Joint OCAS Maneuver

CDDT

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+168.3	+190.6	-133.0	-87.0	-162.3	-158.0	+210.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_34.1	CMRM96IM0052K:14

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+165.0	+178.2	-120.0	-75.0	-162.3	-158.0	+210.6
+168.3	+190.6	-133.0	-87.0	-162.3	-158.0	+210.6
-3.3	-12.4	+13.0	+12.0	0.0	0.0	0.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-96	+787	+2040	-66.4	+11.3	+113.4
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

```

* *****
* If unexpected motion is observed
* MSS: SSRMS: MSS Safing: MSS Safing
*
* cmd 'SSRMS' Apply (Verify Safed)
*
*
*
*
*
*
*
*
*
*
* *****
  
```

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

MSS: SSRMS: SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+168.3	+190.6	-133.0	-87.0	-162.3	-158.0	+210.6
X	Y	Z	Pitch	Yaw	Roll	
+120	+369	+1988	-54.4	-11.5	+123.9	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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34.2 Joint OCAS Maneuver

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+171.9	+204.0	-147.0	-99.8	-162.3	-158.0	+210.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_34.2	CMRM96IM0052K:15

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+168.3	+190.6	-133.0	-87.0	-162.3	-158.0	+210.6
+171.9	+204.0	-147.0	-99.8	-162.3	-158.0	+210.6
-3.6	-13.4	+14.0	+12.9	0.0	0.0	0.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+120	+369	+1988	-54.4	-11.5	+123.9
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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DCP

AUTO SEQ → PROC

Ops Name	CIPUI
Lab_RWS_Proceed_With_Autosequence	CMRM96IM0863K
Cup_RWS_Proceed_With_Autosequence	CMRM96IM0892K

Verify SSRMS motion as expected.

CDDT

* *****

* If unexpected motion is observed

* | MSS: SSRMS: MSS Safing:

MSS Safing

* |

* | **cmd 'SSRMS' Apply (Verify Safed)**

* |

Ops Name	CIPUI
SSRMS_Safing	CMRM96IM0454K

* |

* *****

MSS: SSRMS:

SSRMS

Verify Posn Hold – orange

Verify SSRMS position (within 5 cm/1 deg).

SR	SY	SP	EP	WP	WY	WR
+171.9	+204.0	-147.0	-99.8	-162.3	-158.0	+210.6
X	Y	Z	Pitch	Yaw	Roll	
+277	-4	+1722	-35.9	-34.9	+136.4	
FOR	Unloaded - GC Unld LEE Tip, SR Held					
Disp	MBS>PDGF 3					

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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34.3 Joint OCAS Maneuver

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+175.5	+217.4	-161.0	-112.7	-162.3	-158.0	+210.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_34.3	CMRM96IM0052K:16

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+171.9	+204.0	-147.0	-99.8	-162.3	-158.0	+210.6
+175.5	+217.4	-161.0	-112.7	-162.3	-158.0	+210.6
-3.6	-13.4	+14.0	+12.9	0.0	0.0	0.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+277	-4	+1722	-35.9	-34.9	+136.4
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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35.1 Joint OCAS Maneuver

CDDT

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+141.5	+217.4	-161.0	-112.7	-162.3	-158.0	+210.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_35.1	CMRM96IM0052K:17

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+175.5	+217.4	-161.0	-112.7	-162.3	-158.0	+210.6
+141.5	+217.4	-161.0	-112.7	-162.3	-158.0	+210.6
+34.0	0.0	0.0	0.0	0.0	0.0	0.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
+269	-249	+1358	-7.6	-55.9	+156.6
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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35.2 Joint OCAS Maneuver

CDDT

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+107.5	+217.3	-161.0	-112.7	-162.3	-158.0	+210.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_35.2	CMRM96IM0052K:18

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+141.5	+217.4	-161.0	-112.7	-162.3	-158.0	+210.6
+107.5	+217.3	-161.0	-112.7	-162.3	-158.0	+210.6
+34.0	0.0	0.0	0.0	0.0	0.0	0.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-94	-497	+1422	-90.8	-82.4	+77.5
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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35.3 Joint OCAS Maneuver

SSRMS Joint OCAS

Load the following Joint OCAS Destination.

SR	SY	SP	EP	WP	WY	WR
+74.6	+217.3	-161.0	-112.7	-162.3	-158.0	+210.6

Ops Name	CIPUI
SSRMS_Set_Joint_OCAS_Dest_Step_35.3	CMRM96IM0052K:19

Verify Sequence Status – Confirm or Cancel

GND

SSRMS

Verify current position and OCAS Target position (within 1 deg).

Current
Dest
Error

SR	SY	SP	EP	WP	WY	WR
+107.5	+217.3	-161.0	-112.7	-162.3	-158.0	+210.6
+74.6	+217.3	-161.0	-112.7	-162.3	-158.0	+210.6
+32.9	0.0	0.0	0.0	0.0	0.0	0.0

Verify current FOR position (within 5 cm/1 deg).

X	Y	Z	Pitch	Yaw	Roll
-537	-502	+1446	-167.0	-54.9	+5.4
FOR	Unloaded - GC Unld LEE Tip, SR Held				
Disp	MBS>PDGF 3				

RPS

Verify 'SSRMS' – Active

Verify 'Driver' – Telemetry, AOS

Verify 'GMT' – incrementing

Verify 7 minutes of S-Band comm coverage remaining in this pass.

CDDT

cmd Confirm (Verify Sequence Status – Auto Seq sw - Hot)

Ops Name	CIPUI
SSRMS_Confirm_Manipulator_Autoseq	CMRM96IM0025K

Confirm direction of pending motion.

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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37. [CHANGE PAYLOAD FILE](#)

MSS: SSRMS:

Change Loaded Parameters ► OBSS ► OBSS Mid MPM SRH
Verify 'Loaded Parameters' (two) – OBSS Mid MPM, SR Held

Ops Name	CIPUI
SSRMS_Change_PId_Param_OBSS_Mid_MPM_SR_Held	CMRM95SM0008K:107

Parameter	Value
File_ID	391
OCS_File_ID	388
Payload_ID	126
GF_ID	259

38. [CHANGE PAYLOAD FILE](#)

MSS: SSRMS:

Change Unloaded Parameters ► Unloaded ► LEE Tip SRH
Verify 'Unloaded Parameters' (two) – LEE Tip, SR Held

Ops Name	CIPUI
SSRMS_Change_PId_Param_LEE_Tip_SR_Held	CMRM95SM0008K:108

Parameter	Value
File_ID	76
OCS_File_ID	74
Payload_ID	0
GF_ID	256

8.302 SSRMS WALK-OFF TO NODE2 PDGF (WS4) – GROUND

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39. CHANGE DISPLAY FRAME

MSS: SSRMS:

Change Display ► Orbiter ► OBSS FRGF (Verify Orbiter>OBSS FRGF)

Ops Name	CIPUI
SSRMS_Change_DYF_Orbiter>OBSS_FRGF_POR_POS	CMRM96IM0451K:109
SSRMS_Change_DYF_Orbiter>OBSS_FRGF_POR_ORI	CMRM96IM0451K:110
SSRMS_Change_DYF_Orbiter>OBSS_FRGF_Trans_Vel	CMRM96IM0451K:111
SSRMS_Change_DYF_Orbiter>OBSS_FRGF_Rot_Vel	CMRM96IM0451K:112

Frame Data	Value
Frame_ID	33

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8.401 MT PRE-TRANSLATION SURVEY - WS 6 TO WS 7

(RBT FS/2JA/FIN)

Page 1 of 3 pages

Configure the ISS Downlink per the following table:

1	2
JEM EXT A (-110, +30) FL = 115 mm	Base Elbow (+20, +30) FL = 9 mm

Verify SSRMS at MT Translate Stow (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+47.5	+102.6	-224.4	+149.9	+20.0	0.0	+25.0

1. JEM EXTERNAL AFT CAMERA SURVEY

Coordinate with CATO to survey the MT translation path with the JEM External Aft Camera.

	JEM EXT A	Survey Notes	Done
Start Config	(-110, +30) FL = 115 mm	MT Translation Path	
1: Pan Right	(-60, +30)	MT Translation Path	
2: Tilt Down	(-60, +25)	MT Translation Path	
3: Pan Right	(-45, +25)	MT Translation Path	

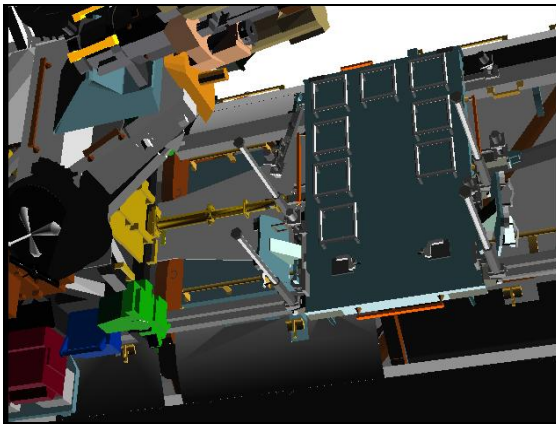


Figure 1.- JEM EXT A - Start
(JEM EXT A: -110, +30).

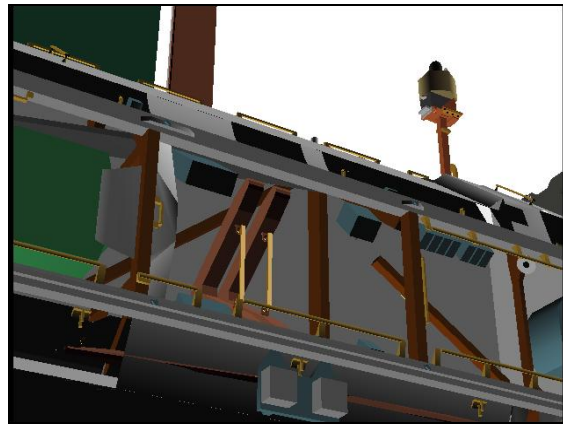


Figure 2.- JEM EXT A - Step 1
(JEM EXT A: -60, +30).

8.401 MT PRE-TRANSLATION SURVEY - WS 6 TO WS 7

(RBT FS/2JA/FIN)

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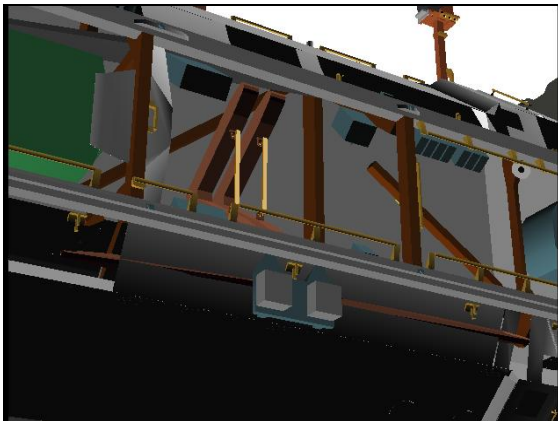


Figure 3.- JEM EXT A - Step 2
(JEM EXT A: -60, +25).

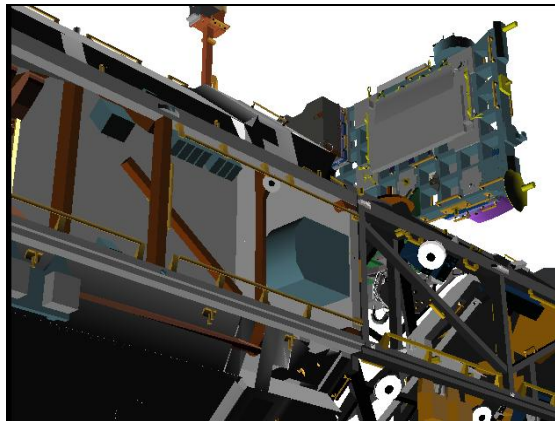


Figure 4.- JEM EXT A - Step 3
(JEM EXT A: -45, +25).

2. BASE ELBOW SURVEY

NOTE

1. **“PTU not following commands”** error messages may be generated when MSS Cameras are powered.
2. Due to MCCST command latency, the pan/tilt stop command should be issued 6 deg before the destination is reached.

MCCST

ROBO Camera Commander
'MSS Cameras'

sel SSRMS Base Elb

cmd Activate Commanding

Keyboard Commanding Window

Verify Current Camera: SSRMS Base Elb

	Base Elbow	Stop at	Survey Notes	Done
Start Config	(+20, +30) FL = 9 mm	-	MT Translation Path	
1: Pan Right	(+40, +30)	(+34, +30)	MT Translation Path	
2: Tilt Down	(+40, +20)	(+40, +26)	MT Translation Path	
3. Zoom In	FL = 20 mm			
4: Pan Right	(+60, +20)	(+54, +20)	MT Translation Path	
5: Tilt Down	(+60, +13)	(+60, +19)	MT Translation Path	

Keyboard Commanding Window

cmd Finished Commanding

MSS Camera Command Tool

cmd Activate Position (Verify Active Position - none)

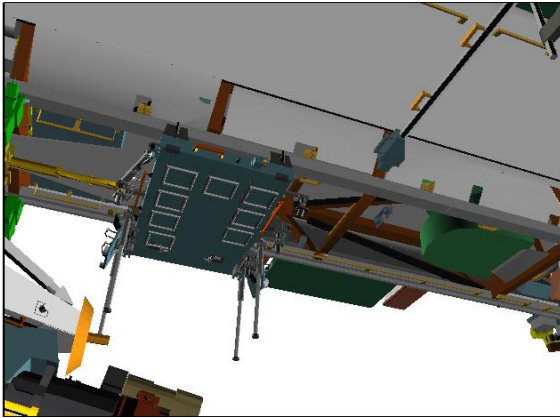


Figure 5.- Base Elbow - Start
(Base Elbow: +20, +30, FL = 9).

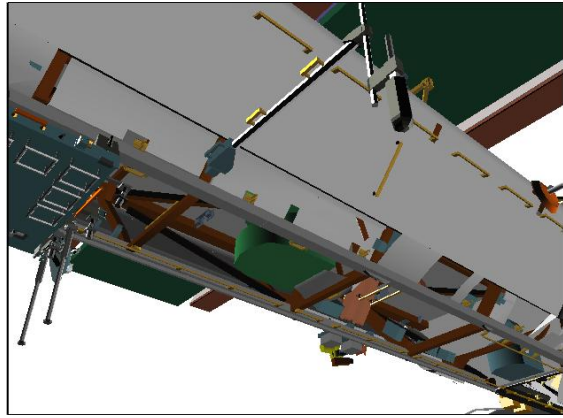


Figure 6.- Base Elbow - Step 1
(Base Elbow: +40, +30, FL = 9).

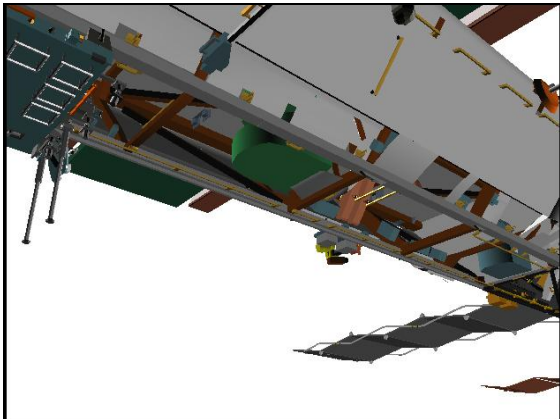


Figure 7.- Base Elbow - Step 2
(Base Elbow: +40 +20, FL = 9).

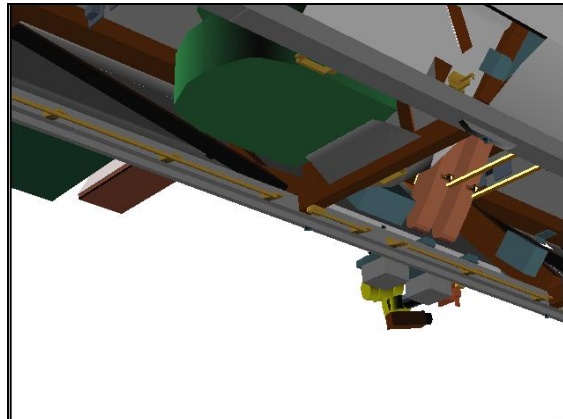


Figure 8.- Base Elbow - Step 3
(Base Elbow: +40 +20, FL = 20).

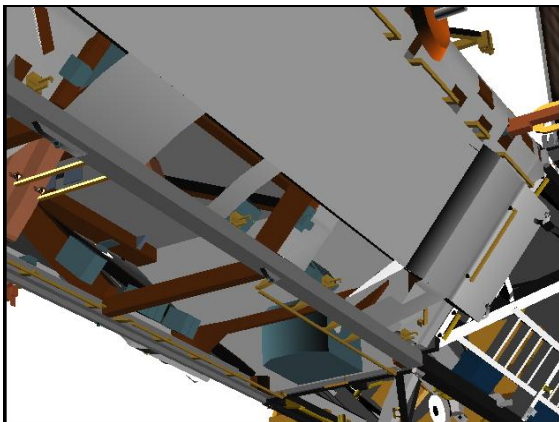


Figure 9.- Base Elbow - Step 4
(Base Elbow: +60, +20, FL = 20).

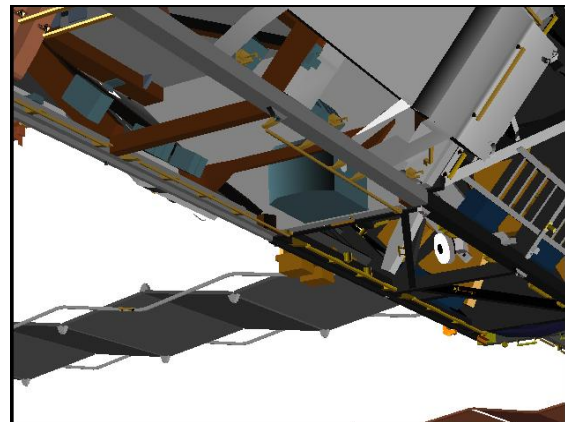


Figure 10.- Base Elbow - Step 5
(Base Elbow: +60, +13, FL = 20).

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8.501 MT PRE-TRANSLATION SURVEY - WS 7 TO WS 8

(RBT FS/2JA/FIN)

Page 1 of 2 pages

Configure the ISS Downlink per the following table:

1	2
JEM EXT A (-35, +20) FL = 150 mm	Base Elbow (-25, +10) FL = 16 mm

Verify SSRMS at FD6 Overnight Park (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+213.7	-3.2	-101.1	+136.1	-165.1	-174.7	+140.1

1. JEM EXTERNAL AFT CAMERA SURVEY

Coordinate with CATO to survey the MT translation path with the JEM External Aft Camera.

	JEM EXT A	Survey Notes	Done
Start Config	(-35, +20) FL = 150 mm	MT Translation Path	

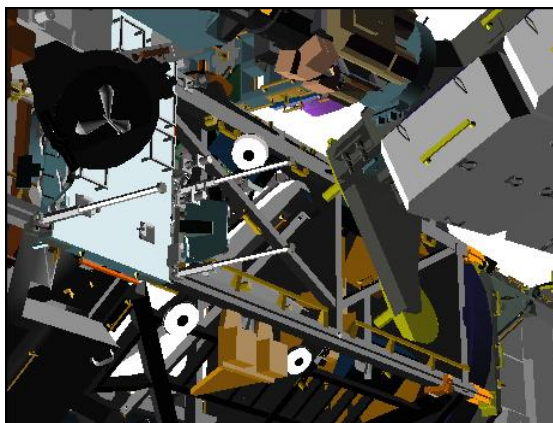


Figure 1.- JEM EXT A - Start
(JEM EXT A: -35, +20).

2. BASE ELBOW SURVEY

NOTE
1. 'PTU not following commands' error messages may be generated when MSS Cameras are powered.
2. Due to MCCST command latency, the pan/tilt stop command should be issued 6 deg before the destination is reached.

MCCST

ROBO Camera Commander
'MSS Cameras'

sel SSRMS Base Elb

8.501 MT PRE-TRANSLATION SURVEY - WS 7 TO WS 8

(RBT FS/2JA/FIN)

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cmd Activate Commanding

Keyboard Commanding Window

Verify Current Camera: SSRMS Base Elb

	Base Elbow	Stop at	Survey Notes	Done
Start Config	(-25, +10) FL = 16 mm	-	MT Translation Path	
1: Tilt Up	(-25, +35)	(-25, +29)	MT Translation Path	

Keyboard Commanding Window

cmd Finished Commanding

MSS Camera Command Tool

cmd Activate Position (Verify Active Position – none)

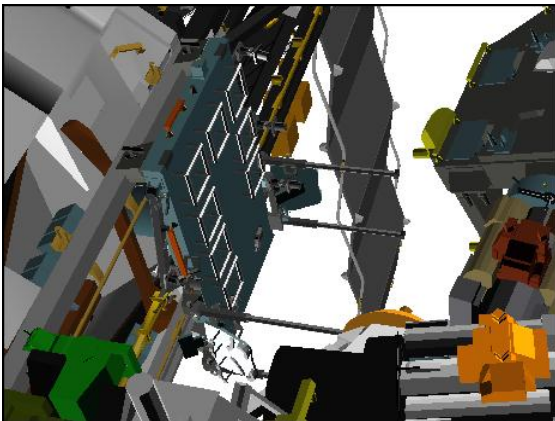


Figure 2.- Base Elbow - Start
(Base Elbow: -25, +10).

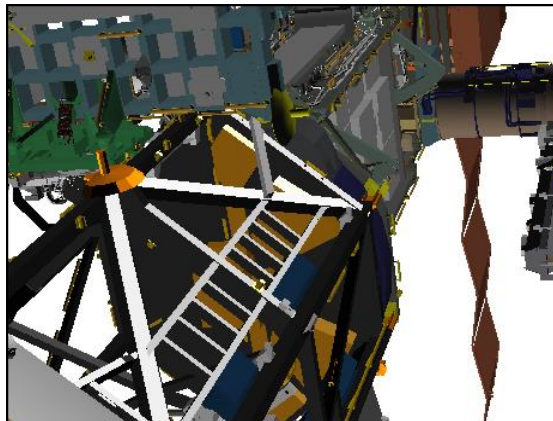


Figure 3.- Base Elbow - Step 1
(Base Elbow: -25, +35).

Configure the ISS Downlink per the following table:

1	2
JEM EXT A (-45, +25) FL = 130 mm	Base Elbow (-110, +90)

Verify SSRMS at JEM RMS Clear Posn (within 1 deg).

SR	SY	SP	EP	WP	WY	WR
+20.4	+48.7	+55.0	+69.4	-247.7	-168.2	+81.8

1. JEM EXTERNAL AFT CAMERA SURVEY

Coordinate with CATO to survey the MT translation path with the JEM External Aft Camera.

	JEM EXT A	Survey Notes	Done
Start Config	(-45, +25) FL = 130 mm	MT Translation Path	
1. Pan Left	(-65, +25)	MT Translation Path	
2. Tilt Up	(-65, +30)	MT Translation Path	
3. Pan Left	(-125, +30)	MT Translation Path	
4. Tilt Down	(-125, +20)	MT Translation Path	
5. Pan Left	(-155, +20)	MT Translation Path	
6. Tilt Down	(-155, +15)	MT Translation Path	

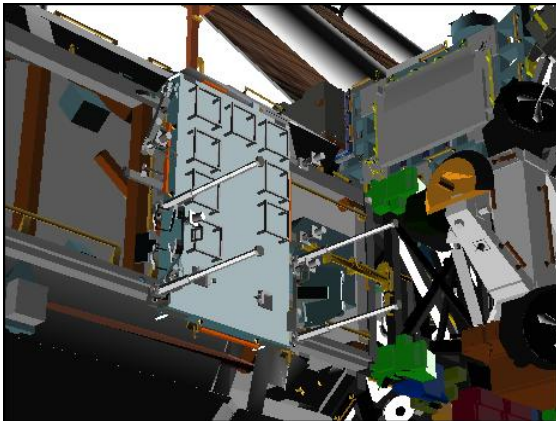


Figure 1.- JEM EXT A - Start
(JEM EXT A: -45, +25).

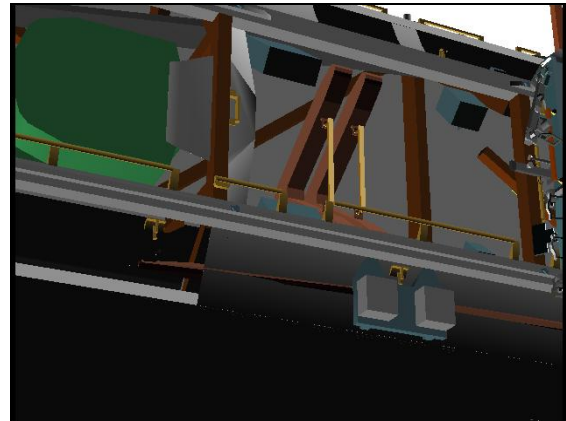


Figure 2.- JEM EXT A - Step 1
(JEM EXT A: -65, +25).

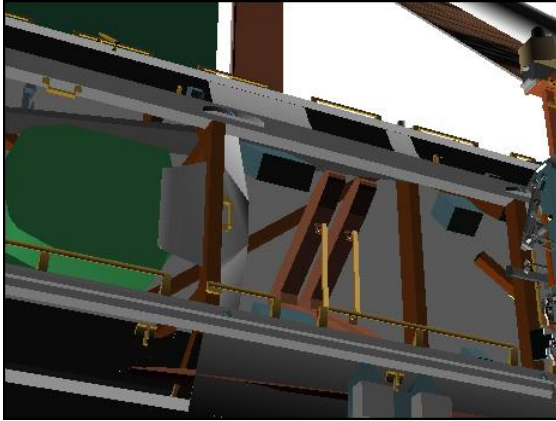


Figure 3.- JEM EXT A - Step 2
(JEM EXT A: -65, +30).

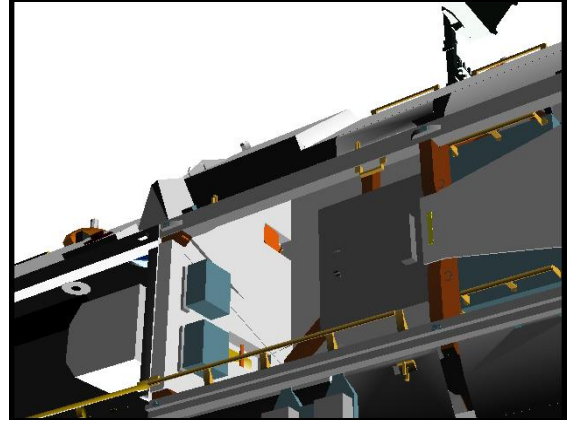


Figure 4.- JEM EXT A - Step 3
(JEM EXT A: -125, +30).

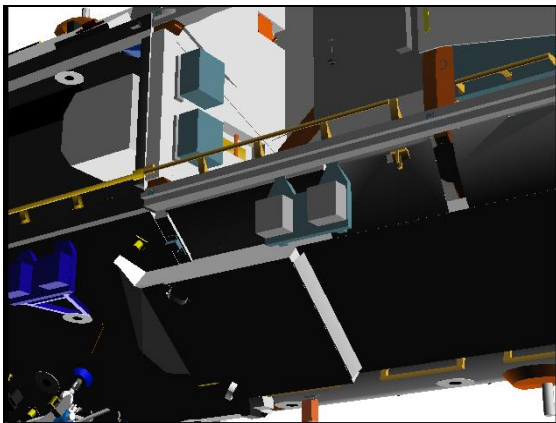


Figure 5.- JEM EXT A - Step 4
(JEM EXT A: -125, +20).



Figure 6.- JEM EXT A - Step 5
(JEM EXT A: -155, +20).



Figure 7.- JEM EXT A - Step 5
(JEM EXT A: -155, +15).

2. BASE ELBOW SURVEY

NOTE

1. **'PTU not following commands'** error messages may be generated when MSS Cameras are powered.
2. Due to MCCST command latency, the pan/tilt stop command should be issued 6 deg before the destination is reached.

MCCST

ROBO Camera Commander
 'MSS Cameras'

sel SSRMS Base Elb

cmd Activate Commanding

Keyboard Commanding Window

Verify Current Camera: SSRMS Base Elb

	Base Elbow	Stop at	Survey Notes	Done
Start Config	(-110, +90)	-	MT Translation Path	
1: Pan Left	(-150, +90)	(-144, +90)	MT Translation Path	
2: Zoom In	FL = 25mm		Configure Camera	
3: Tilt Down	(-150, +75)	(-140, +81)	MT Translation Path	
4: Zoom In	FL = 50 mm		Configure Camera	
5: Tilt Down	(-150, +63)	(-140, +69)	MT Translation Path	

Keyboard Commanding Window

cmd Finished Commanding

MSS Camera Command Tool

cmd Activate Position (Verify Active Position – none)

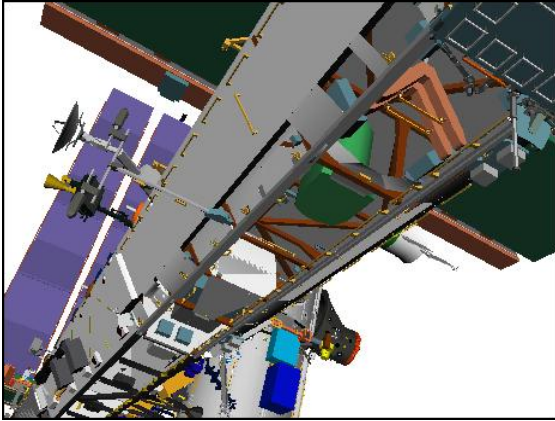


Figure 8.- Base Elbow - Start
(Base Elbow: -110, +90).

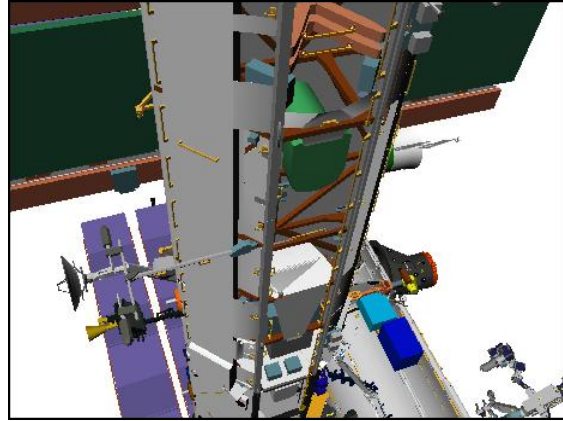


Figure 9.- Base Elbow - Step 1
(Base Elbow: -150, +90).

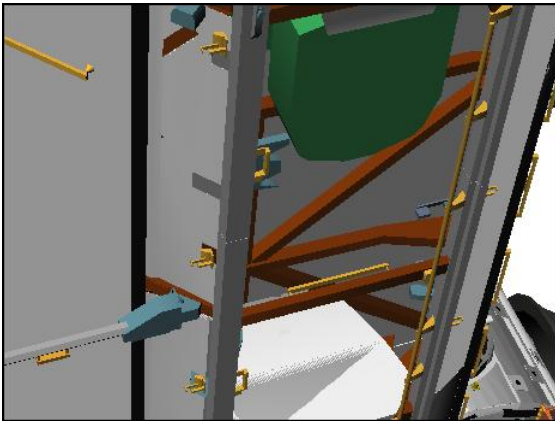


Figure 10.- Base Elbow - Step 2
(Base Elbow: FL = 25mm).



Figure 11.- Base Elbow - Step 3
(Base Elbow: -150, +75).

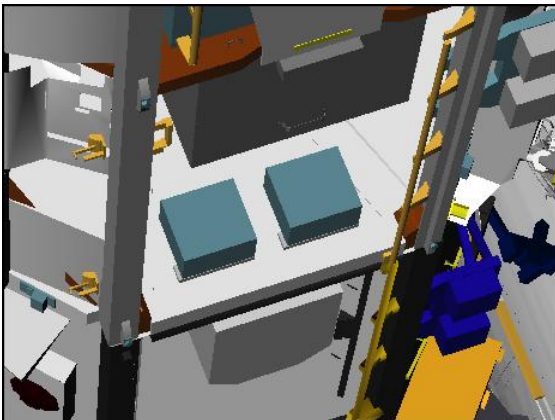


Figure 12.- Base Elbow - Step 4
(Base Elbow: FL = 50mm).

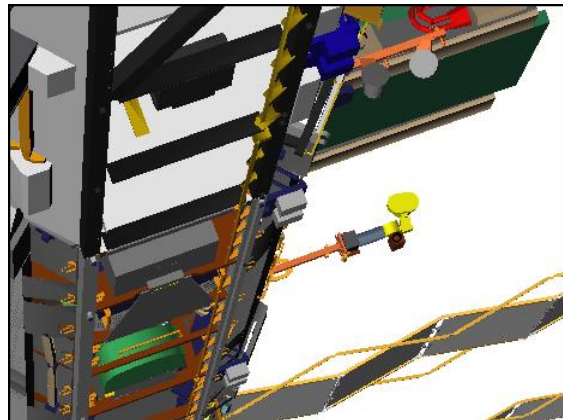


Figure 13.- Base Elbow - Step 5
(Base Elbow: -150, +63).

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Page 1 of 16 pages

1. JEF INSTALL RELATED CS AND FOR

1.1 JEF Grapple DPF

Description: Used to grapple JEF FRGF1 when JEF is in the Payload Bay.

GUI Name: Orbiter> JEF FRGF1

Type: DPF

Reference Frame: ISSACS

Definition:

Location: DPF is located at JEF FRGF1 origin when JEF is berthed in Orbiter Cargo Bay.

Orientation: Aligned such that it matches EEOCS when SSRMS TIP LEE is grappled at JEF FRGF.

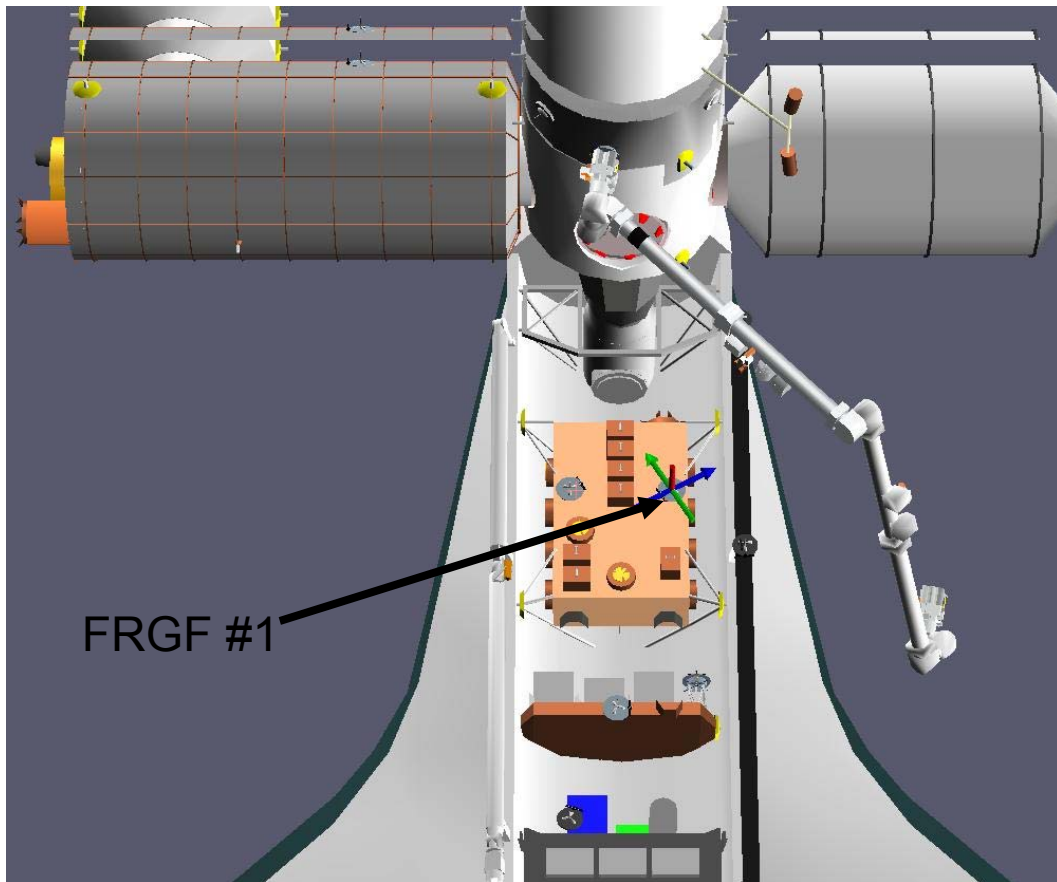


Figure 1-1. JEF STBD FRGF in Payload Bay DPF.

1.2 JEF Unberth DPF

Description: Used to unberth JEF from the Payload Bay when grappled to JEF FRGF1. Frame is attached to the orbiter, not to the payload.

GUI Name: Orbiter> JEF Unberth

Type: DPF

Reference Frame: ISSACS

Definition:

Location: FOR is located at the geometric center of the 4 port and starboard trunnion pin ends.

Orientation: Aligned with OBAS when JEF is fully berthed.

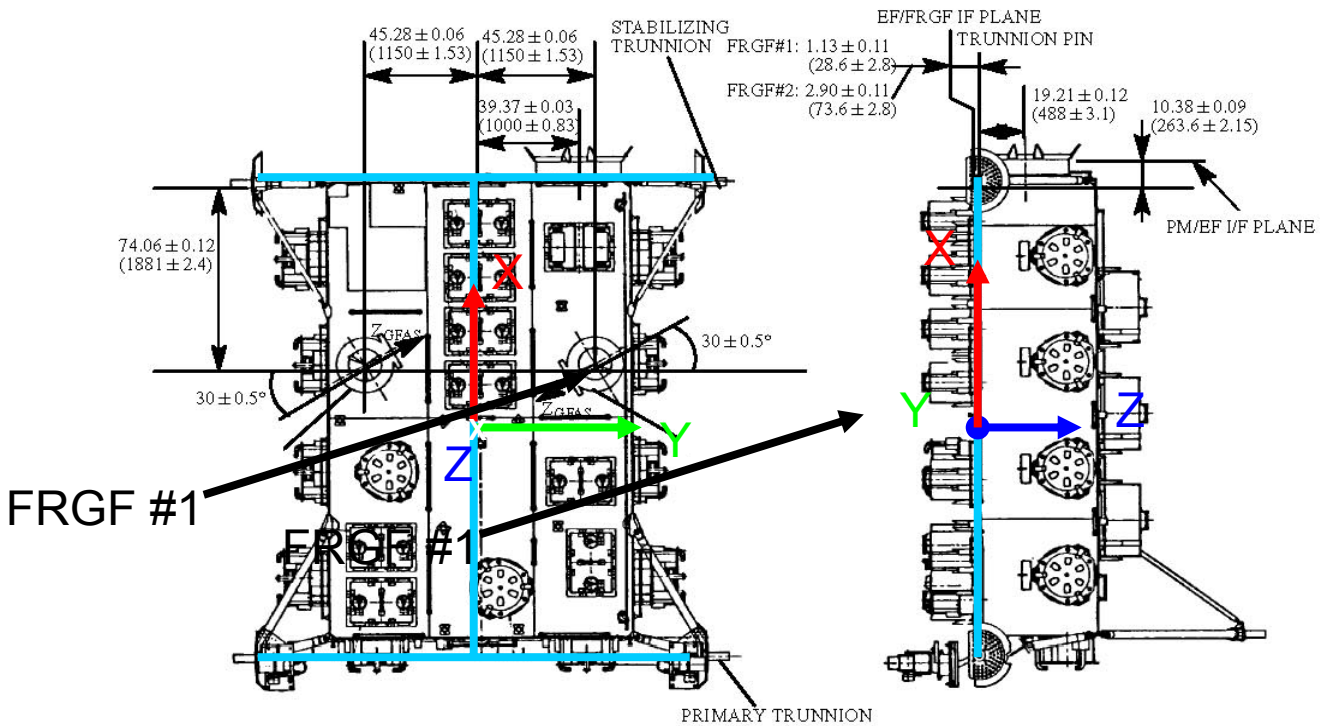


Figure 1-2. JEF Unberth DPF.

1.3 JEF Unberth FOR

Description: Used to unberth JEF from the Orbiter using JEM EF FRGF1.

GUI Name: JEF>JEF Unberth

Type: FOR

GF Used: FRGF1

Definition:

Location: FOR is located at the geometric centre of the 4 port and starboard trunnion pin ends.

Orientation: Aligned with OBAS when JEF is fully berthed.

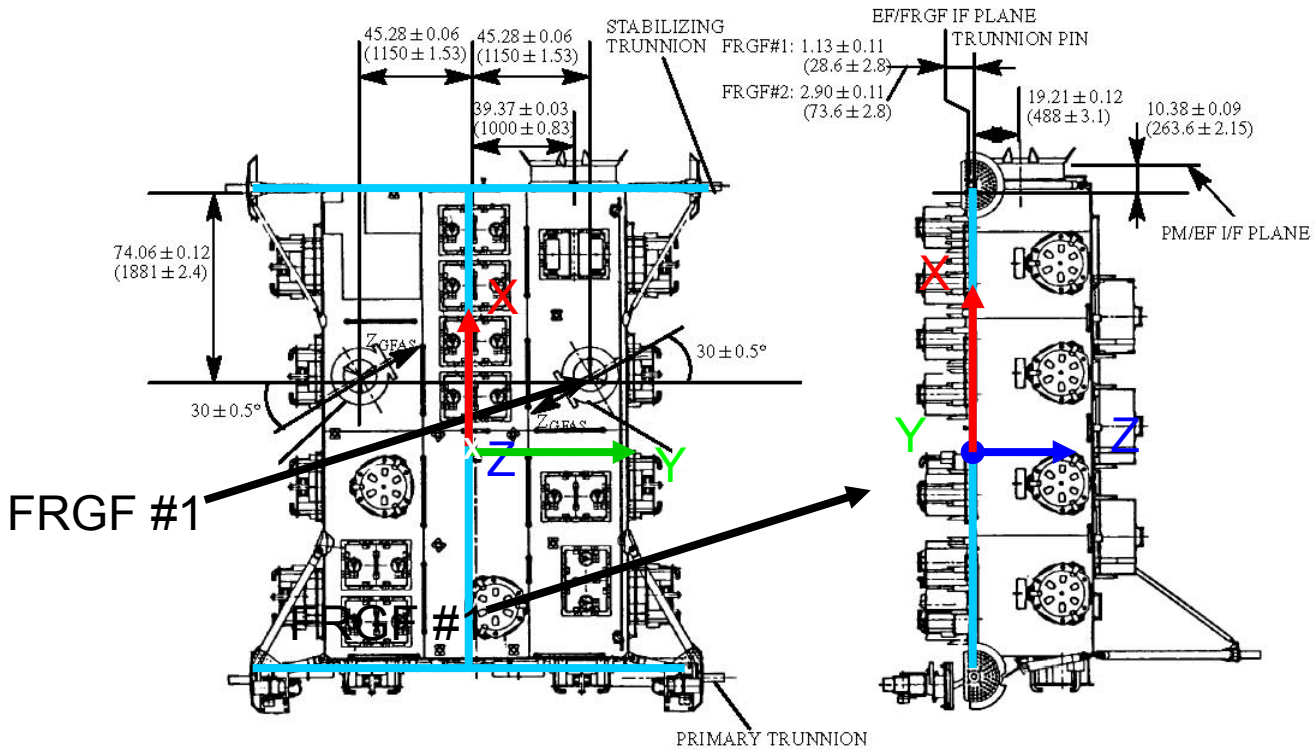


Figure 1-3. JEF Unberth FOR.

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1.4 JEF Install ISSACS FOR

Description: Used to install and release JEF Passive EFBM from JEM Active EFBM using JEF GF#1, ISSACS orientation.

GUI Name: JEF>JEF Install ISSACS

Type: FOR

GF Used: FRGF1

Definition:

Location: FOR is located on the mating plane of the Passive Half of the EFBM, centered on the geometric center of the four latches when JEF is fully mated to the JEM Active EFBM.

Orientation: Aligned so that when JEF is fully mated JEM Active EFBM:

+X = +X ISSACS,

+Y = +Y ISSACS,

+Z = +Z ISSACS.

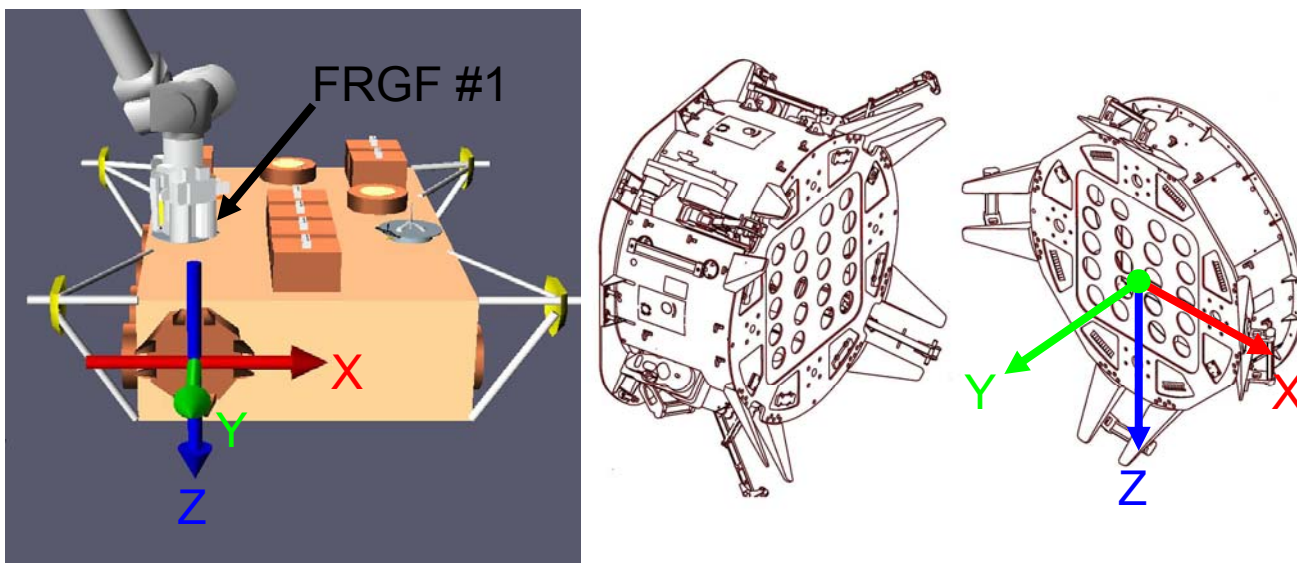


Figure 1-4. JEF Install ISSACS FOR.

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1.5 JEF Install ISSACS DPF

Description: Used to install and release JEF Passive EFBM on JEM Active EFBM, ISSACS orientation.

GUI Name: JPM>JEF Install ISSACS

Type: DPF

Reference Frame: ISSACS

Definition:

Location: DPF is located on the mating plane of the Active Half of the EFBM, centered on the geometric center of the four latches when JEF is fully mated to JEM Active EFBM.

Orientation: Aligned so that when JEF is fully mated JPM Active EFBM:

+X = +X ISSACS,

+Y = +Y ISSACS,

+Z = +Z ISSACS.

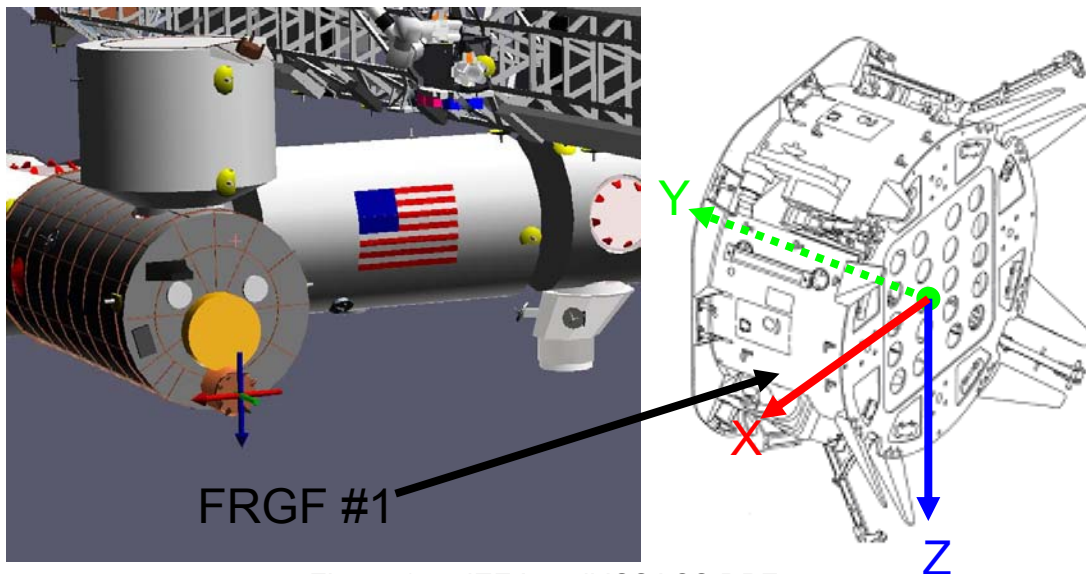


Figure 1-5. JEF Install ISSACS DPF.

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1.6 JEF Release DPF

Description: Used to release JEF FRGF #1 once JEF is mated/installed on the JEM PM.

GUI Name: JPM> JEF FRGF1

Type: DPF

Reference Frame: ISSACS

Definition:

Location: DPF is located at JEF FRGF1 origin when JEF is mated to the JEM PM.

Orientation: Aligned so that it matches EEOCS when SSRMS TIP LEE is grappled at JEF FRGF.

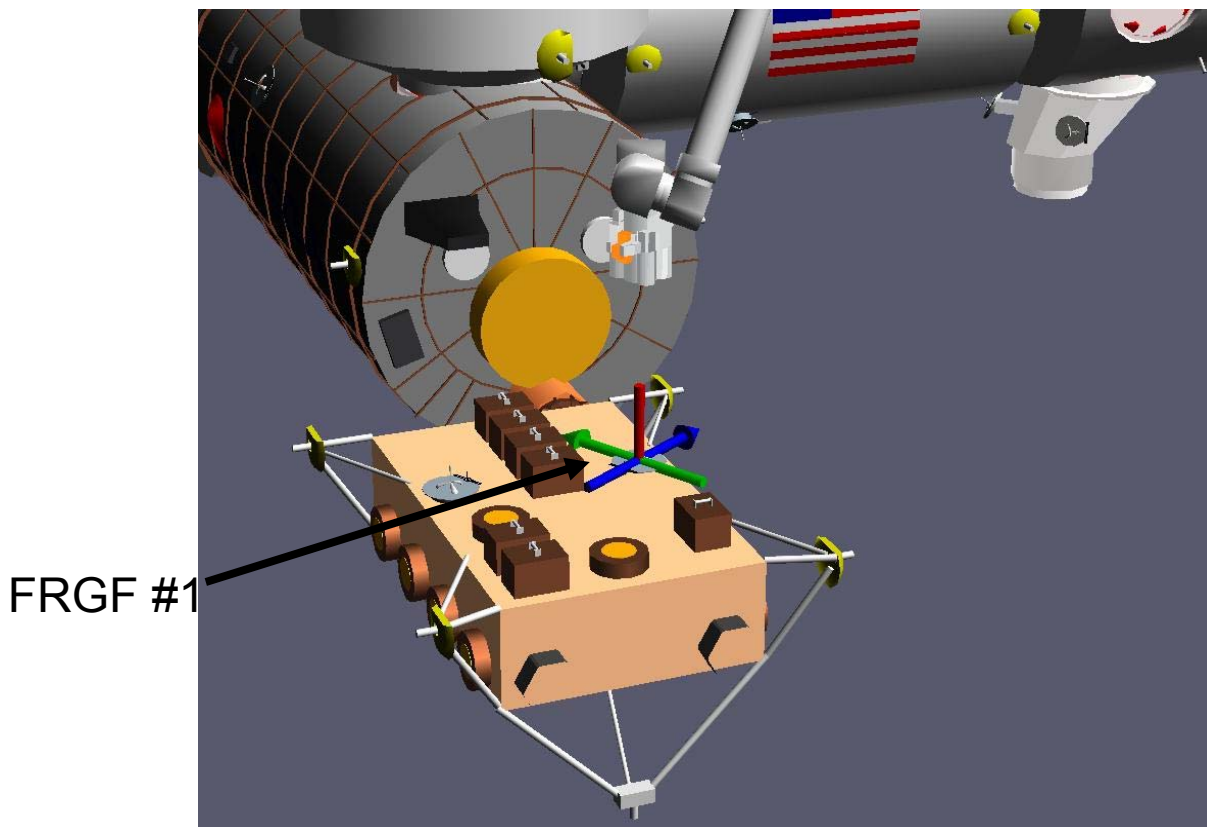


Figure 1-6. JEF Release DPF.

2. JLE INSTALL RELATED CS AND FOR

2.1 JLE Install ISSACS FOR

Description: Used to install JLE PIU at JEF EEU, ISSACS orientation.

GUI Name: JLE>JLE Install ISSACS

Type: FOR

GF Used: FRGF1

Definition:

Location: FOR is located on the mating plane of the PIU of the JLE, centered on the geometric center of the three latches of the JEF EEU when JLE is fully mated.

Orientation: Aligned so that when JLE is fully mated JEF EFU:

+X = +X ISSACS,

+Y = +Y ISSACS,

+Z = +Z ISSACS.

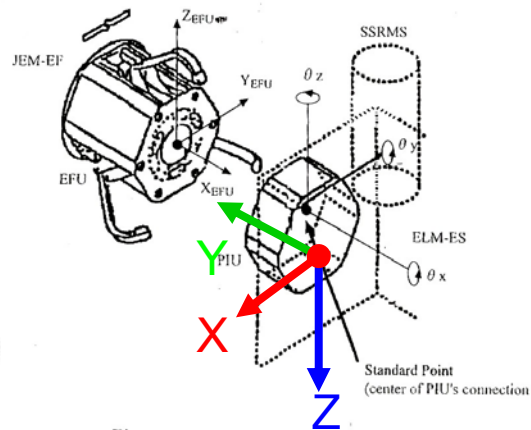
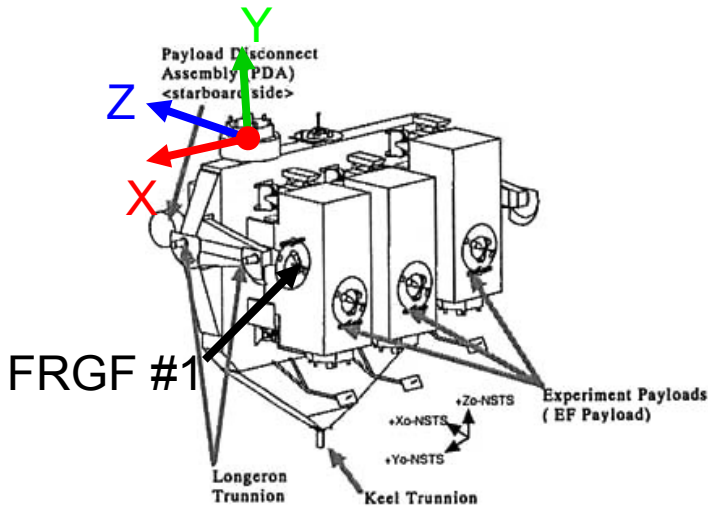


Figure-5. Definition of coordinate system

Figure 2-1. JLE Install ISSACS FOR.

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2.2 JLE Install ISSACS EFU10 DPF

Description: Used to install JLE PIU at JEF EEU using EFU #10, ISSACS orientation.

GUI Name: JPM>JLE Install ISSACS EFU10

Type: DPF

Reference Frame: ISSACS

Definition:

Location: DPF is located on the mating plane of EFU#10 of the JEF, centered on the geometric center of the three latches of the JEF EEU when JLE is fully mated.

Orientation: Aligned so that when JLE is fully mated JEF EFU #10.

+X = +X ISSACS,

+Y = +Y ISSACS,

+Z = +Z ISSACS.

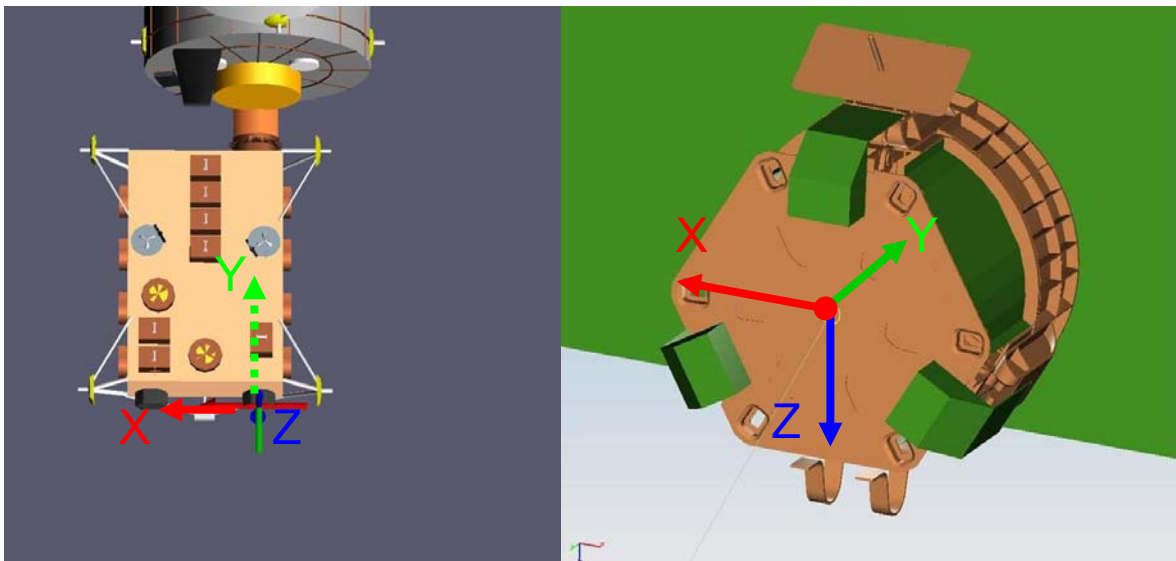


Figure 2-2. JLE Install ISSACS EFU10 DPF.

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2.3 JLE Release EFU10 DPF

Description: Used to release JLE FRGF#1 when JLE is mated to JEF EFU #10.

GUI Name: JPM>Inst JLE GF EFU10

Type: DPF

Reference Frame: ISSACS

Definition:

Location: DPF is located at JLE FRGF1 origin when JEF is mated to JEF EFU#10.

Orientation: Aligned so that it matches EEOCS when SSRMS TIP LEE is grappled to JEF FRGF.

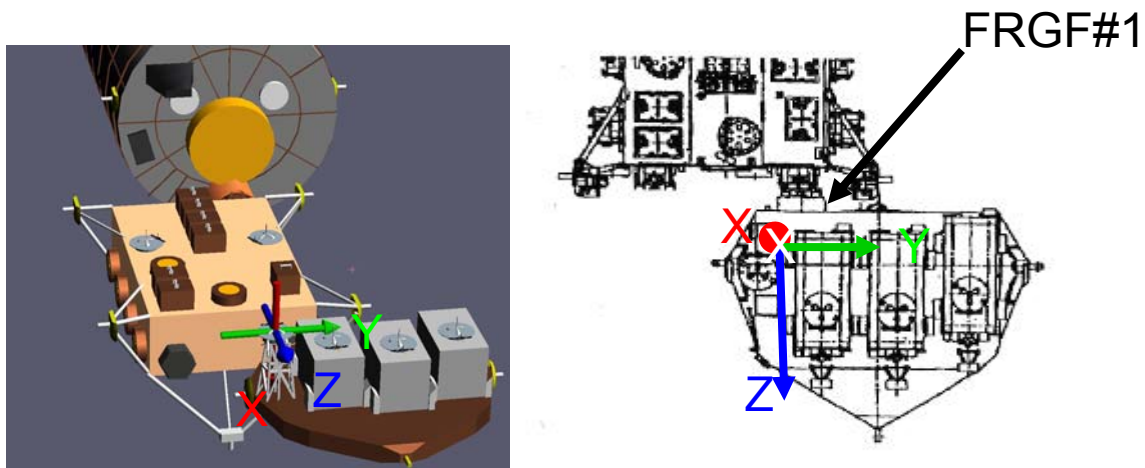


Figure 2-3. JLE Release EFU10 DPF.

3. VCC OPERATIONS CS AND FOR

3.1 VCC Stow FOR

Description: Used to stow VCC on MBS POA when SSRMS is grappled to VCC PVGF2.

GUI Name: VCC> VCC Stow

POA Payload File GUI Name: VCC>VCC Grapple

Type: FOR

GF Used: VCC PVGF2

Definition:

Location: FOR is located at VCC PVGF1.

Orientation: Aligned so that it matches MBS POA EEOCS when MBS POA is grappled to VCC PVGF1.

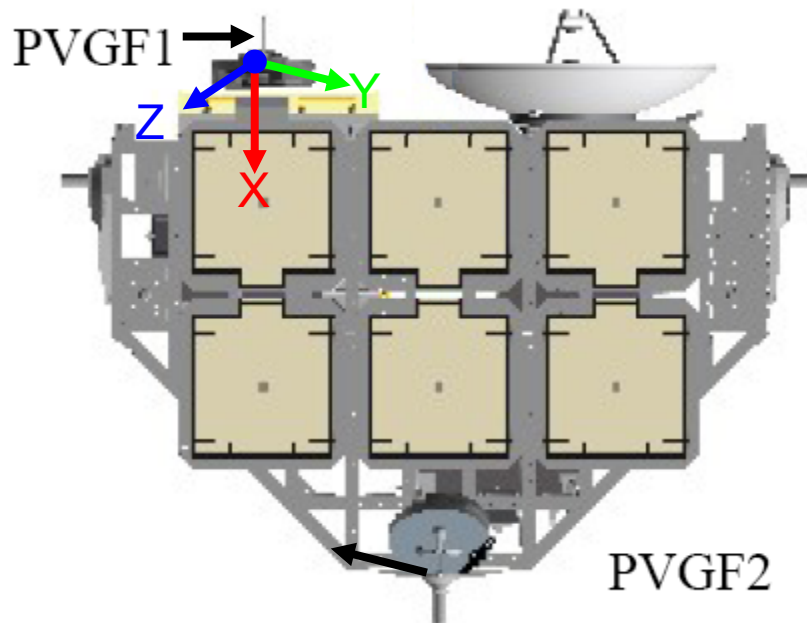


Figure 3-1. SSRMS VCC Stow FOR.

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3.2 VCC Release DPF

Description: Used to ungrapple stowed VCC on MBS POA when SSRMS is grappled to VCC PVGF2.

GUI Name: MBS>Stowed VCC PVGF2

Type: DPF

Reference Frame: MOCS

Definition:

Location: DPF is located at VCC PVGF2 origin.

Orientation: Aligned so that it matches SSRMS EEOCS when SSRMS TIP LEE is grappled to VCC PVGF2.

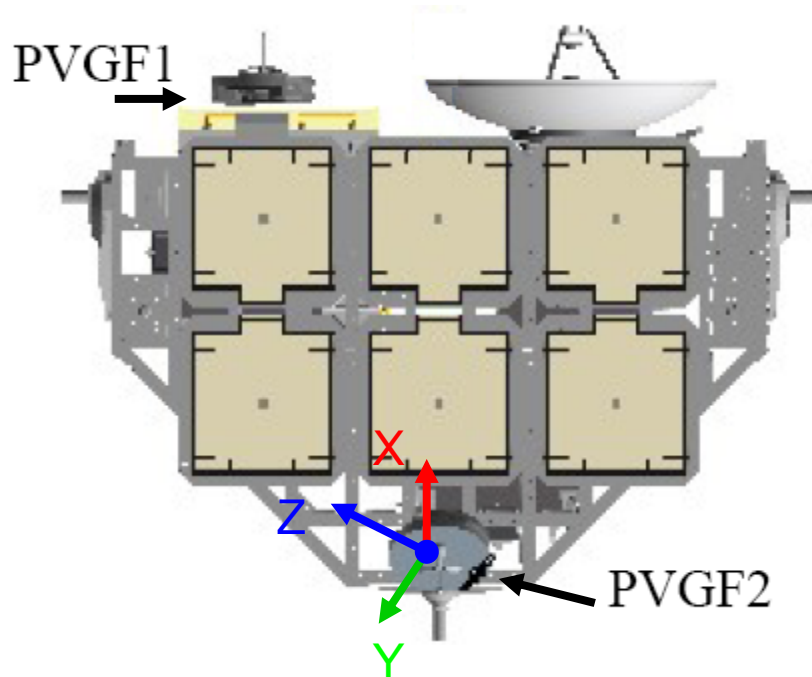


Figure 3-2. VCC Release DPF.

REFERENCE DATA

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3.3 VCC MNVR FOR

Description: Used to maneuver VCC (SSRMS grappled to PVGF #2).

GUI Name: VCC>VCC Mnvr

Type: FOR

GF Used: VCC PVGF2

Definition:

Location: FOR is located at exposed plane of Batteries, at the geometric center of all six Batteries, between Batteries B and E.

Orientation: Aligned so that the following occurs:

- +X points towards the VCC Base plate
- +Y points away from the keel pin
- +Z points toward the STBD trunnion pin

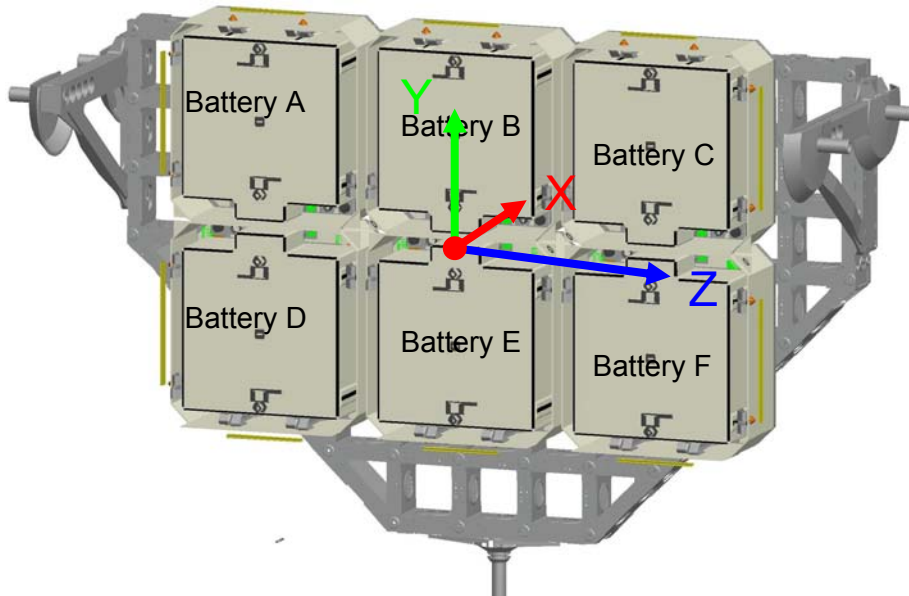


Figure 3-3. VCC MNVR FOR.

4. EVA RELATED CS AND FOR

4.1 EVA>Chest 12/KK/F/6

Description: Maneuvering EVA with SSRMS

GUI Name: EVA>Chest 12/KK/F/6

Type: FOR

GF Used: No GF (WIF)

Definition:

Location: FOR is located at the EVA Chest, on the EMU sternum location.

Orientation:

X points forward towards the front of the EVA

Y points towards the right arm of the EVA

Z points towards the foot restraint of the APFR

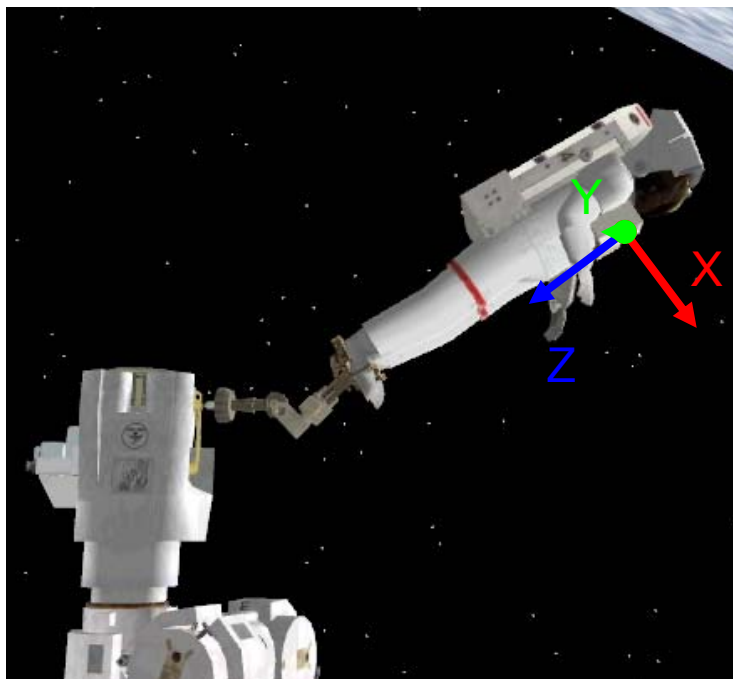


Figure 4-1. EVA>Chest 12/KK/F/6 FOR.

5. PAYLOAD GRAPPLE FIXTURES
5.1 JEF Grapple Fixtures

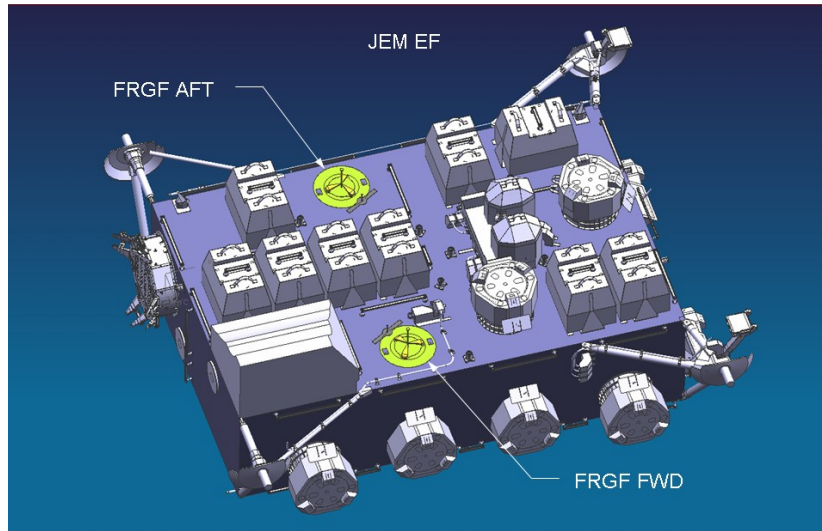


Figure 5-1. JEF Grapple Fixtures Labeling.

Labeling convention used:

Boeing CAD Team:
DPA JEM-EF Measurement Data Model - April 24, 2008

JEM EF FRGF AFT	FRGF1
JEM EF FRGF FWD	FRGF2

5.2 JLE Grapple Fixtures

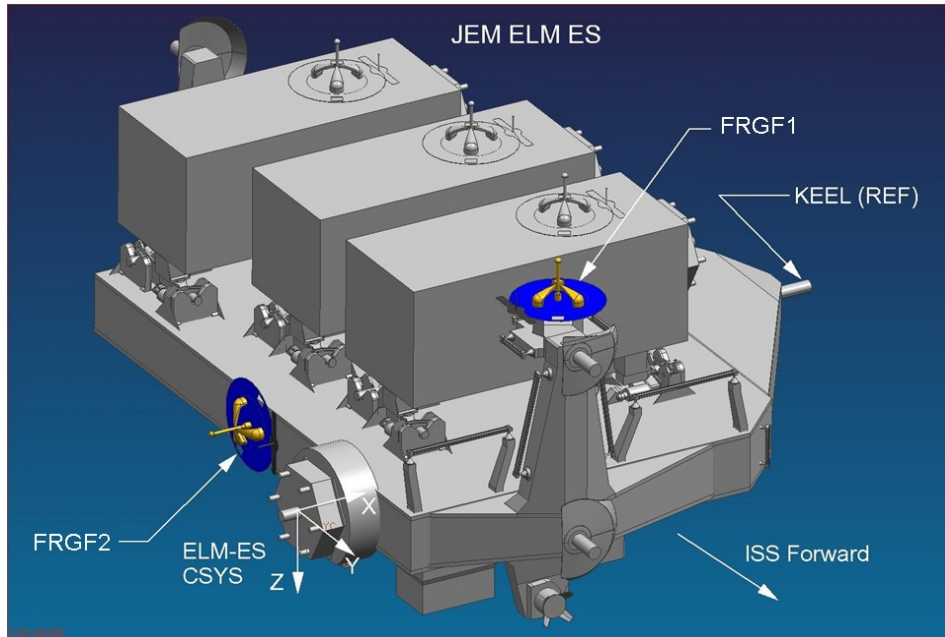


Figure 5-2. JLE Grapple Fixtures Labeling.

Labeling convention used:

Boeing CAD Team:
DPA JEM-ES Measurement Data Model - June 05, 2008

JEM-ELM-ES FRGF1
JEM-ELM-ES FRGF2

5.3 VCC Grapple Fixtures

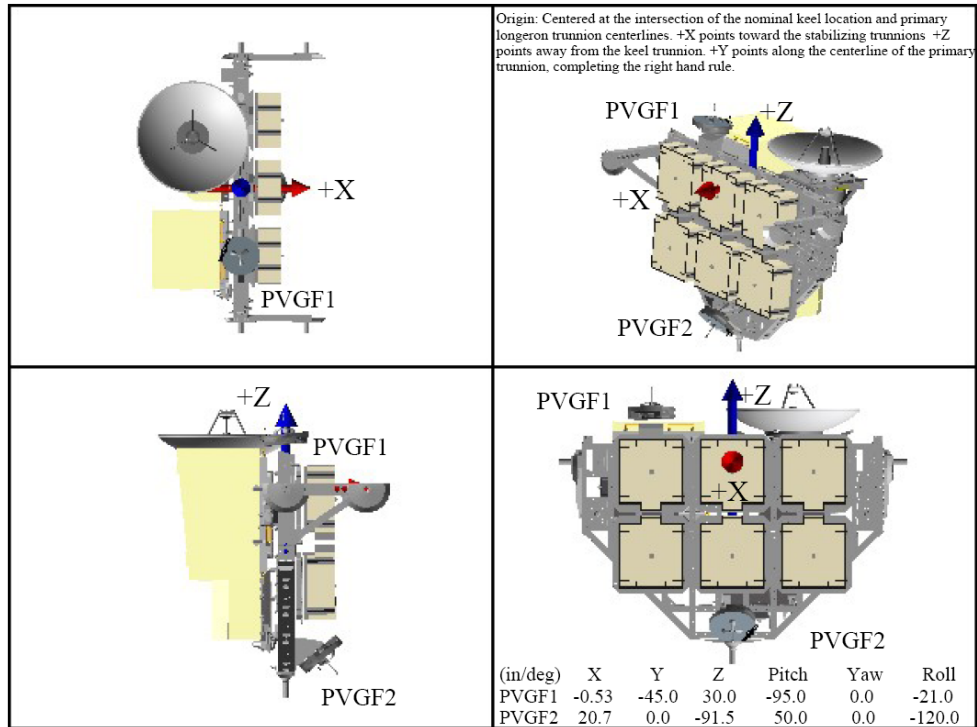


Figure 5-3. VCC Grapple Fixtures Labeling.

Labeling convention used:

Boeing Houston EVR:
EID684-12 - July 25, 2008

ICC-VLD PVGF1
ICC-VLD-PVGF2