

10A ASSEMBLY OPERATIONS

09 OCT 07

17 OCT 07

Sheet 1 of 1

## List of Implemented CR(s):

Assy_OpsU976	Assy_OpsU992	Assy_OpsU1029	Assy_OpsU1033
Assy_OpsU978	Assy_OpsU998A	Assy_OpsU1030	Multi_fileU380
Assy_OpsU979	Assy_OpsU1027	Assy_OpsU1031	
Assy_OpsU981	Assy_OpsU1028	Assy_OpsU1032	

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

None

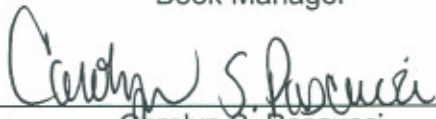
## Incorporates the following:

1. Replace cover
2. Replace iii thru x; after x, add xi and xii
3. After 16, add 16a thru 16v  
Replace 17 thru 44  
After 134, add 134a thru 134p  
After 168, add 168a thru 168af  
After 174, add 174a thru 174n  
Replace 249 thru 262  
After 320, add 320a thru 320ax

## APPROVED BY:



John J. Venditti  
Book Manager



Carolyn S. Pascucci  
Manager, Station Procedures Management



SODF Coordinator

## ACCEPTED BY:



Michael T. Hurt  
SODF Manager

**File this PCN immediately behind the front cover as a permanent record**





# International Space Station Assembly Operations

## ISS-10A

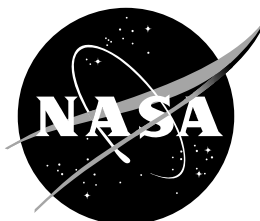
Mission Operations Directorate  
Operations Division

17 OCT 07

*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





**INTERNATIONAL SPACE STATION  
ASSEMBLY OPERATIONS  
ISS-10A**

**LIST OF EFFECTIVE PAGES**

09 OCT 07  
17 OCT 07

Sign Off .....	* 09 OCT 07	16o.....	15 OCT 07
ii.....	* 09 OCT 07	16p.....	15 OCT 07
iii.....	* 17 OCT 07	16q.....	15 OCT 07
iv.....	* 17 OCT 07	16r .....	15 OCT 07
v .....	* 17 OCT 07	16s.....	15 OCT 07
vi.....	* 17 OCT 07	16t.....	15 OCT 07
vii.....	* 17 OCT 07	16u.....	15 OCT 07
viii.....	* 17OCT 07	16v.....	TPIB
ix.....	17OCT 07	17.....	15 OCT 07
x .....	17 OCT 07	18.....	15 OCT 07
xi.....	17 OCT 07	19.....	15 OCT 07
xii.....	17 OCT 07	20.....	15 OCT 07
1 .....	09 OCT 07	21.....	15 OCT 07
2 .....	09 OCT 07	22.....	15 OCT 07
3 .....	26 APR 07	23.....	15 OCT 07
4 .....	26 APR 07	24.....	15 OCT 07
5 .....	26 APR 07	25.....	15 OCT 07
6 .....	26 APR 07	26.....	15 OCT 07
7 .....	26 APR 07	27.....	15 OCT 07
8 .....	26 APR 07	28.....	15 OCT 07
9 .....	26 APR 07	29.....	15 OCT 07
10.....	26 APR 07	30.....	15 OCT 07
11.....	10 AUG 07	31.....	15 OCT 07
12.....	10 AUG 07	32.....	15 OCT 07
13.....	10 AUG 07	33.....	15 OCT 07
14.....	10 AUG 07	34.....	15 OCT 07
15.....	10 AUG 07	35.....	15 OCT 07
16.....	TPIB	36.....	15 OCT 07
16a.....	15 OCT 07	37.....	15 OCT 07
16b.....	15 OCT 07	38.....	15 OCT 07
16c.....	15 OCT 07	39.....	15 OCT 07
16d.....	15 OCT 07	40.....	15 OCT 07
16e.....	15 OCT 07	41.....	15 OCT 07
16f.....	15 OCT 07	42.....	15 OCT 07
16g.....	15 OCT 07	43.....	15 OCT 07
16h.....	15 OCT 07	44.....	15 OCT 07
16i.....	15 OCT 07	45.....	25 SEP 07
16j.....	15 OCT 07	46.....	25 SEP 07
16k.....	15 OCT 07	47.....	25 SEP 07
16l.....	15 OCT 07	48.....	25 SEP 07
16m.....	15 OCT 07	49.....	25 SEP 07
16n.....	15 OCT 07	50.....	25 SEP 07

\* - Omit from flight book

51.....	25 SEP 07	101.....	08 AUG 07
52.....	25 SEP 07	102.....	08 AUG 07
53.....	25 SEP 07	103.....	08 AUG 07
54.....	25 SEP 07	104.....	08 AUG 07
55.....	25 SEP 07	105.....	13 SEP 07
56.....	25 SEP 07	106.....	13 SEP 07
57.....	25 SEP 07	107.....	13 SEP 07
58.....	25 SEP 07	108.....	13 SEP 07
59.....	25 SEP 07	109.....	13 SEP 07
60.....	TPIB	110.....	13 SEP 07
61.....	12 SEP 07	111.....	13 SEP 07
62.....	12 SEP 07	112.....	13 SEP 07
63.....	08 OCT 07	113.....	04 OCT 07
64.....	08 OCT 07	114.....	04 OCT 07
65.....	08 OCT 07	115.....	04 OCT 07
66.....	08 OCT 07	116.....	04 OCT 07
67.....	08 OCT 07	117.....	04 OCT 07
68.....	08 OCT 07	118.....	04 OCT 07
69.....	08 OCT 07	119.....	04 OCT 07
70.....	08 OCT 07	120.....	04 OCT 07
71.....	08 OCT 07	121.....	26 APR 07
72.....	08 OCT 07	122.....	26 APR 07
73.....	08 OCT 07	123.....	02 MAY 07
74.....	TPIB	124.....	02 MAY 07
75.....	08 OCT 07	125.....	02 MAY 07
76.....	08 OCT 07	126.....	02 MAY 07
77.....	08 OCT 07	127.....	02 MAY 07
78.....	08 OCT 07	128.....	02 MAY 07
79.....	08 OCT 07	129.....	02 MAY 07
80.....	08 OCT 07	130.....	02 MAY 07
81.....	08 OCT 07	131.....	02 MAY 07
82.....	08 OCT 07	132.....	02 MAY 07
83.....	08 OCT 07	133.....	02 MAY 07
84.....	08 OCT 07	134.....	TPIB
85.....	10 AUG 07	134a.....	15 OCT 07
86.....	10 AUG 07	134b.....	15 OCT 07
87.....	10 AUG 07	134c.....	15 OCT 07
88.....	10 AUG 07	134d.....	15 OCT 07
89.....	10 AUG 07	134e.....	15 OCT 07
90.....	10 AUG 07	134f.....	15 OCT 07
91.....	08 AUG 07	134g.....	15 OCT 07
92.....	08 AUG 07	134h.....	15 OCT 07
93.....	08 AUG 07	134i.....	25 SEP 07
94.....	08 AUG 07	134j.....	25 SEP 07
95.....	08 AUG 07	134k.....	25 SEP 07
96.....	08 AUG 07	134l.....	25 SEP 07
97.....	08 AUG 07	134m.....	25 SEP 07
98.....	08 AUG 07	134n.....	25 SEP 07
99.....	08 AUG 07	134o.....	25 SEP 07
100.....	08 AUG 07	134p.....	25 SEP 07

135	27 SEP 07	168q	16 OCT 07
136	27 SEP 07	168r	16 OCT 07
137	27 SEP 07	168s	16 OCT 07
138	27 SEP 07	168t	16 OCT 07
139	27 SEP 07	168u	16 OCT 07
140	27 SEP 07	168v	16 OCT 07
141	27 SEP 07	168w	16 OCT 07
142	27 SEP 07	168x	16 OCT 07
143	27 SEP 07	168y	16 OCT 07
144	27 SEP 07	168z	16 OCT 07
145	27 SEP 07	168aa	16 OCT 07
146	27 SEP 07	168ab	16 OCT 07
147	27 SEP 07	168ac	16 OCT 07
148	27 SEP 07	168ad	16 OCT 07
149	27 SEP 07	168ae	16 OCT 07
150	27 SEP 07	168af	16 OCT 07
151	08 OCT 07	169	08 OCT 07
152	08 OCT 07	170	08 OCT 07
153	08 OCT 07	171	08 OCT 07
154	08 OCT 07	172	08 OCT 07
155	08 OCT 07	173	08 OCT 07
156	08 OCT 07	174	08 OCT 07
157	08 OCT 07	174a	12 OCT 07
158	08 OCT 07	174b	12 OCT 07
159	08 OCT 07	174c	12 OCT 07
160	08 OCT 07	174d	12 OCT 07
161	27 SEP 07	174e	12 OCT 07
162	27 SEP 07	174f	12 OCT 07
163	27 SEP 07	174g	12 OCT 07
164	27 SEP 07	174h	12 OCT 07
165	27 SEP 07	174i	12 OCT 07
166	27 SEP 07	174j	12 OCT 07
167	27 SEP 07	174k	12 OCT 07
168	TPIB	174l	12 OCT 07
168a	15 OCT 07	174m	12 OCT 07
168b	15 OCT 07	174n	TPIB
168c	15 OCT 07	175	08 OCT 07
168d	15 OCT 07	176	08 OCT 07
168e	15 OCT 07	177	08 OCT 07
168f	15 OCT 07	178	08 OCT 07
168g	15 OCT 07	179	08 OCT 07
168h	15 OCT 07	180	08 OCT 07
168i	15 OCT 07	181	08 OCT 07
168j	15 OCT 07	182	08 OCT 07
168k	15 OCT 07	183	08 OCT 07
168l	15 OCT 07	184	08 OCT 07
168m	15 OCT 07	185	03 OCT 07
168n	15 OCT 07	186	03 OCT 07
168o	15 OCT 07	187	03 OCT 07
168p	15 OCT 07	188	03 OCT 07

189.....	03 OCT 07	239.....	27 SEP 07
190.....	TPIB	240.....	TPIB
191.....	22 SEP 07	241.....	27 SEP 07
192.....	22 SEP 07	242.....	27 SEP 07
193.....	22 SEP 07	243.....	27 SEP 07
194.....	22 SEP 07	244.....	27 SEP 07
195.....	04 SEP 07	245.....	27 SEP 07
196.....	04 SEP 07	246.....	27 SEP 07
197.....	04 SEP 07	247.....	27 SEP 07
198.....	04 SEP 07	248.....	TPIB
199.....	08 OCT 07	249.....	12 OCT 07
200.....	08 OCT 07	250.....	12 OCT 07
201.....	08 OCT 07	251.....	12 OCT 07
202.....	08 OCT 07	252.....	12 OCT 07
203.....	08 OCT 07	253.....	12 OCT 07
204.....	08 OCT 07	254.....	12 OCT 07
205.....	08 OCT 07	255.....	12 OCT 07
206.....	08 OCT 07	256.....	12 OCT 07
207.....	08 OCT 07	257.....	12 OCT 07
208.....	08 OCT 07	258.....	12 OCT 07
209.....	08 OCT 07	259.....	12 OCT 07
210.....	08 OCT 07	260.....	12 OCT 07
211.....	08 OCT 07	261.....	12 OCT 07
212.....	08 OCT 07	262.....	TPIB
213.....	08 OCT 07	263.....	04 SEP 07
214.....	08 OCT 07	264.....	04 SEP 07
215.....	08 OCT 07	265.....	04 SEP 07
216.....	08 OCT 07	266.....	04 SEP 07
217.....	08 OCT 07	267.....	04 SEP 07
218.....	08 OCT 07	268.....	04 SEP 07
219.....	21 SEP 07	269.....	04 SEP 07
220.....	21 SEP 07	270.....	04 SEP 07
221.....	21 SEP 07	271.....	04 SEP 07
222.....	21 SEP 07	272.....	04 SEP 07
223.....	21 SEP 07	273.....	04 SEP 07
224.....	TPIB	274.....	TPIB
225.....	24 SEP 07	275.....	09 OCT 07
226.....	24 SEP 07	276.....	09 OCT 07
227.....	24 SEP 07	277.....	22 MAY 07
228.....	24 SEP 07	278.....	22 MAY 07
229.....	24 SEP 07	279.....	22 MAY 07
230.....	TPIB	280.....	22 MAY 07
231.....	27 SEP 07	281.....	22 MAY 07
232.....	27 SEP 07	282.....	22 MAY 07
233.....	27 SEP 07	283.....	22 MAY 07
234.....	27 SEP 07	284.....	22 MAY 07
235.....	27 SEP 07	285.....	22 MAY 07
236.....	27 SEP 07	286.....	22 MAY 07
237.....	27 SEP 07	287.....	22 MAY 07
238.....	27 SEP 07	288.....	22 MAY 07



289	22 MAY 07	320s	27 SEP 07
290	22 MAY 07	320t	27 SEP 07
291	22 MAY 07	320u	27 SEP 07
292	22 MAY 07	320v	27 SEP 07
293	22 MAY 07	320w	27 SEP 07
294	TPIB	320x	27 SEP 07
295	08 AUG 07	320y	27 SEP 07
296	TPIB	320z	27 SEP 07
297	20 SEP 07	320aa	27 SEP 07
298	20 SEP 07	320ab	27 SEP 07
299	20 SEP 07	320ac	27 SEP 07
300	20 SEP 07	320ad	27 SEP 07
301	20 SEP 07	320ae	27 SEP 07
302	20 SEP 07	320af	27 SEP 07
303	20 SEP 07	320ag	27 SEP 07
304	20 SEP 07	320ah	27 SEP 07
305	20 SEP 07	320ai	27 SEP 07
306	20 SEP 07	320aj	27 SEP 07
307	20 SEP 07	320ak	27 SEP 07
308	20 SEP 07	320al	27 SEP 07
309	20 SEP 07	320am	27 SEP 07
310	20 SEP 07	320an	27 SEP 07
311	20 SEP 07	320ao	27 SEP 07
312	20 SEP 07	320ap	27 SEP 07
313	20 SEP 07	320aq	27 SEP 07
314	20 SEP 07	320ar	27 SEP 07
315	20 SEP 07	320as	27 SEP 07
316	20 SEP 07	320at	27 SEP 07
317	20 SEP 07	320au	27 SEP 07
318	20 SEP 07	320av	27 SEP 07
319	20 SEP 07	320aw	27 SEP 07
320	TPIB	320ax	TPIB
320a	27 SEP 07	321	27 SEP 07
320b	27 SEP 07	322	TPIB
320c	27 SEP 07	323	08 OCT 07
320d	27 SEP 07	324	TPIB
320e	27 SEP 07	325	19 SEP 07
320f	27 SEP 07	326	TPIB
320g	27 SEP 07	327	17 MAY 07
320h	27 SEP 07	328	TPIB
320i	27 SEP 07	329	17 MAY 07
320j	27 SEP 07	330	TPIB
320k	27 SEP 07	331	08 OCT 07
320l	27 SEP 07	332	08 OCT 07
320m	27 SEP 07	333	08 OCT 07
320n	27 SEP 07	334	08 OCT 07
320o	27 SEP 07	335	08 OCT 07
320p	27 SEP 07	336	08 OCT 07
320q	27 SEP 07	337	08 OCT 07
320r	27 SEP 07	338	TPIB

339.....	22 MAY 07	389.....	24 SEP 07
340.....	22 MAY 07	390.....	24 SEP 07
341.....	22 MAY 07	391.....	24 SEP 07
342.....	22 MAY 07	392.....	24 SEP 07
343.....	22 MAY 07	393.....	24 SEP 07
344.....	TPIB	394.....	24 SEP 07
345.....	05 OCT 07	395.....	24 SEP 07
346.....	TPIB	396.....	24 SEP 07
347.....	25 SEP 07	397.....	24 SEP 07
348.....	25 SEP 07	398.....	24 SEP 07
349.....	25 SEP 07	399.....	24 SEP 07
350.....	25 SEP 07	400.....	24 SEP 07
351.....	25 SEP 07	401.....	24 SEP 07
352.....	25 SEP 07	402.....	24 SEP 07
353.....	25 SEP 07	403.....	24 SEP 07
354.....	25 SEP 07	404.....	TPIB
355.....	25 SEP 07	405.....	20 SEP 07
356.....	25 SEP 07	406.....	20 SEP 07
357.....	09 OCT 07	407.....	08 AUG 07
358.....	09 OCT 07	408.....	08 AUG 07
359.....	22 MAY 07		
360.....	22 MAY 07		
361.....	22 MAY 07		
362.....	TPIB		
363.....	22 MAY 07		
364.....	22 MAY 07		
365.....	22 MAY 07		
366.....	TPIB		
367.....	08 AUG 07		
368.....	08 AUG 07		
369.....	08 AUG 07		
370.....	TPIB		
371.....	09 AUG 07		
372.....	09 AUG 07		
373.....	09 AUG 07		
374.....	TPIB		
375.....	22 MAY 07		
376.....	22 MAY 07		
377.....	21 SEP 07		
378.....	21 SEP 07		
379.....	27 SEP 07		
380.....	27 SEP 07		
381.....	09 OCT 07		
382.....	09 OCT 07		
383.....	24 SEP 07		
384.....	24 SEP 07		
385.....	24 SEP 07		
386.....	24 SEP 07		
387.....	24 SEP 07		
388.....	24 SEP 07		

CONTENTS

<b>ACTIVATION AND CHECKOUT .....</b>	<b>1</b>
<b>NODE 2</b>	
Node 2 Interim Activation .....	3
Node 2 Interim Deactivation .....	11
Node 2 Activation and Checkout Part 1 .....	16a
Node 2 Activation and Checkout Part 2 .....	17
Node 2 Ingress - Node 2 on Node 1 Port .....	45
Node 2 Ingress - Node 2 on Lab Fwd .....	61
Node 2 Port Avionics Connector Aliveness Tests .....	63
Node 2 Starboard Avionics Connector Aliveness Tests .....	75
Node2 Sample Delivery Activation and Checkout .....	85
Node2/Lab Vestibule Depressurization and Leak Check .....	91
Lab/Node 2 Vestibule Pressurization and Leak Check .....	105
Node 1/Node 2 Vestibule Pressurization and Leak Check .....	113
Node 2 Egress and Isolation .....	121
Node 1/Node 2 Vestibule Depress .....	123
<b>VESTIBULE OUTFITTING</b>	
Vestibule Config for Demate – LAB1 to PMA2 .....	134a
Vestibule Config for Ingress – NOD2 to PMA2 .....	134i
Vestibule Outfitting LAB1 to NOD2 - Part 1 .....	135
Vestibule Outfitting LAB1 to NOD2 - Part 2 .....	151
Vestibule Outfitting LAB1 to NOD2 - Part 3 .....	161
Vestibule Config for Demate NOD1 to NOD2 .....	168a
Vestibule Config for Ingress NOD1 to NOD2 .....	168q
<b>MODULE OUTFITTING</b>	
Nitrogen System QD12 Disconnect/Reconnect .....	169
Node 2 Aft NPRV Remove, Replace with IMV Valve .....	174a
Node 2 Avionics Racks Outfitting .....	175
Node 2 CCAA Anti-Vibration Module (AVM) Launch Bracket Removal .....	185
Node 2 ELPS Enable Power Sensing .....	191
Node 2 Port NPRV Inspection .....	195
Node 2 ITCS Sampling Adapter Installation .....	199
Node 2 Launch Restraint Bolts Removal .....	203
Node 2 LTL Pump Package Assembly (PPA) Launch Bracket Removal .....	219
Node 2 MTL Pump Package Assembly (PPA) Launch Bracket Removal .....	225
Node 2 Positive Pressure Relief Valve (PPRV) Cap Install .....	231
Removal of Node 2 Aft PPRV and Install MPEV .....	235
Node 2 RSR Outfitting .....	241
Node 2 Ventilation Duct Installation and Removal .....	249
Portable Fire Extinguisher and Portable Breathing Apparatus Installation .....	263

<b>NOMINAL</b> .....	275
RPCM S04B-C R&R	
RPCM S04B-C Remove and Replace (R&R) Powerdown/Powerup.....	277
RPCM S04B-C Remove and Replace Flowchart .....	295
EPS	
P6 Channels 2B and 4B Graceful Powerdown.....	297
1.3.454 P6 SAW XX Re-Deploy .....	320a
DEORBIT PREP	
Payload Deactivation.....	321
Payload Entry Switch List/Verification .....	323
Payload Reactivation.....	325
EVA PL CONFIG	
Pre-EVA Payload Configuration .....	327
Post EVA Payload Configuration.....	329
PAYLOAD	
10A Removal of CHab and Cell Culture Hab from CGBA-5.....	331
CGBA Science Insert Remove .....	339
FRTL5 Hardware Rotate .....	345
TRANSFER	
Station and Shuttle Printer Exchange .....	347
<b>MALFUNCTION</b> .....	357
COMM	
OIU Fail to Command.....	359
OIU Temp High Malfunction .....	363
Comm Malfunction Points .....	365
PL/DPS Reconfiguration .....	367
S212 OIU AD 1 NOLK/Loss of ISS or SSOR Telemetry .....	371
S62 PDI DECOM Fai.....	375
CRITICAL EQUIPMENT LOST	
Orbiter Electrical Bus Loss Matrix .....	377
Orbiter MDM Loss Impacts.....	379

<b>REFERENCE</b> .....	381
DISPLAYS	
Cargo MCDS Display Descriptions .....	383
STANDARD SWITCH PANELS	
Standard Switch Panel 1 .....	405
Standard Switch Panel 2 .....	407

This Page Intentionally Blank

# NODE 2 ACTIVATION AND CHECKOUT PART 1

(ASSY OPS/10A/FIN)

Page 1 of 21 pages

## OBJECTIVE:

To perform powerup and functional activation of Node 2 equipment tied to the MTL (ETCS Loop A) and EPS Channel 1/4.

## INITIAL CONDITIONS:

RT I/O for Node 2 power strings hardware is inhibited

DDCU Parallel SPC connectors installed

MBSU 1 RBI 11 is Open

MBSU 1 RBI 10 is Open

MBSU 4 RBI 2 is Open

MBSU 4 RBI 10 is Open

## NODE 2 DDCU N2S1B ACTIVATION

### 1. SUPPRESSING PMCU RT CAUTIONS AND WARNINGS

The following Caution and Warning messages in Table 1 should be suppressed during Node 2 activation to prevent nuisance tones.

**Table 1. Caution and Warning to be Suppressed/Inhibited**

Event Code	Class	Message Text	State
5740	C	DDCU N2D1B Loss of Comm - Node 2	SUPP
5743	C	DDCU N24B Loss of Comm - Node 2	SUPP
5731	C	DDCU N24A Loss of Comm - Node 2	SUPP
5728	C	DDCU N2S1B Loss of Comm - Node 2	SUPP
5722	C	DDCU N22A Loss of Comm - Node 2	SUPP
5725	C	DDCU N2P3A Loss of Comm - Node 2	SUPP
5734	C	DDCU N22B Loss of Comm - Node 2	SUPP
5737	C	DDCU N2O3A Loss of Comm - Node 2	SUPP

2. [INHIBITING PMCU RT FDIR, IF NECESSARY](#)

CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

**LB EPS N2 14 RT Status**

'RT [X]' where [X] = 

13	15	16	24	25	26	27
----	----	----	----	----	----	----

**cmd Inhibit FDIR Execute**

Verify RT FDIR Status – Inh

Repeat

3. [CLOSING MBSU 1 RBI 10](#)

S0: EPS: MBSU 1: RBI 10

**MBSU 1 RBI 10**

'Cmded Position'

**cmd Close – Arm**

**cmd Close – (Verify – CI)**

Verify Voltage > 145 V

4. [ENABLING RT I/O COMM FOR DDCU N2S1B](#)

To build the Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 30 – DDCU N2STB-1B

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 – Exists

Name command instance: Prim\_PMCA\_Ena\_RT\_DDCU\_N2S1B\_Arm

To build the Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 30 – DDCU N2STB-1B

sel PM\_Cmd\_Hdr: 2 – Fire

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_DDCU\_N2S1B\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2S1B\_Arm – (LADD96IM1136K)>



**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2S1B\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RTs: 9-LB EPS N2 14  
Verify 27 DDCU N2S1B Exist – Y

5. [VERIFYING INTEGRATION COUNTER DDCU N2S1B](#)

Node 2: EPS: DDCU N2S1B

**DDCU N2S1B**

Verify Integration Counter – incrementing  
Verify Input Voltage: 146 to 165 V  
Verify Converter Temp: -37.3 to 43.8 C  
Verify Power Supply Temp: -37.3 to 49.5 C  
Verify Baseplate Temp: -37.3 to 40.3 C

6. [ENABLING RT FDIR FOR DDCU N2S1B](#)

CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

**LB EPS N2 14 RT Status**

**cmd** 27 DDCU N2S1B Enable FDIR **Execute** (Verify – Ena)

7. [SETTING PARALLEL STATUS FOR DDCU N2S1B](#)

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2S1B from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 30 – DDCU N2STB-1B  
sel DDCU\_Setpt\_Cmd\_Hdr: 1 – Arm  
sel PM\_DDCUI\_Parallel: 1 – Parallel

Name command instance: DDCU\_N2S1B\_Set\_Status\_Parallel\_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2S1B from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 30 – DDCU N2STB-1B  
sel DDCU\_Setpt\_Cmd\_Hdr: 2 – Fire  
sel PM\_DDCUI\_Parallel: 1 – Parallel

Name command instance: DDCU\_N2S1B\_Set\_Status\_Parallel\_Set

**cmd** <Cmd Inv: DDCU\_N2S1B\_Set\_Status\_Parallel\_Arm – (LAPC96IM0138K)>

**cmd** <Cmd Inv: DDCU\_N2S1B\_Set\_Status\_Parallel\_Set – (LAPC96IM0138K)>

8. CLEARING DDCU N2S1B POWER ON RESET FLAG

Node 2: EPS: DDCU N2S1B: Firmware

**DDCU N2S1B Firmware**

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

sel Trip Status

**DDCU N2S1B Trip Status**

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

NODE 2 DDCU N2S4A ACTIVATION

9. CLOSING MBSU 4 RBI 2

S0: EPS: MBSU 4: RBI 2

**MBSU 4 RBI 2**

'Cmded Position'

**cmd** Close – Arm

**cmd** Close (Verify – CI)

Verify Voltage > 145 V

10. ENABLING RT I/O COMM FOR DDCU N2S4A

To build Primary PMCU Enable RT arm command template

<LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 31 – DDCU N2STB-4A

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 – Exists

Name command instance: Prim\_PMCA\_Ena\_RT\_DDCU\_N2S4A\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 31 - DDCU N2STB-4A

sel PM\_CMD\_Hdr: 2 - Fire

sel PM\_ORU\_Exist: 1 - Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_DDCU\_N2S4A\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2S4A\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2S4A\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RT: 9-LB EPS N2 14

Verify 26 DDCU N2S4A Exist – Y

11. [VERIFYING INTEGRATION COUNTER DDCU N2S4A](#)

Node 2: EPS: DDCU N2S4A

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

12. [ENABLING RT FDIR FOR DDCU N2S4A](#)

CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

**cmd** 26 DDCU N2S4A RT FDIR Status – Enable **Execute** (Verify – Ena)

13. [SETTING PARALLEL STATUS FOR DDCU N2S4A](#)

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2S4A from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 31 - DDCU N2STB-4A

sel DDCU\_Setpt\_Cmd\_Hdr: 1 - Arm

sel PM\_DDCUI\_Parallel: 1 - Parallel

Name command instance: DDCU\_N2S4A\_Set\_Status\_Parallel\_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2S4A from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 31 - DDCU N2STB-4A

sel DDCU\_Setpt\_Cmd\_Hdr: 2 - Fire

sel PM\_DDCUI\_Parallel: 1 - Parallel

Name command instance: DDCU\_N2S4A\_Set\_Status\_Parallel\_Set

**cmd** <Cmd Inv: DDCU\_N2S4A\_Set\_Status\_Parallel\_Arm – (LAPC96IM0138K)>

**cmd** <Cmd Inv: DDCU\_N2S4A\_Set\_Status\_Parallel\_Set – (LAPC96IM0138K)>

14. [CLEARING DDCU N2S4A POWER ON RESET FLAG](#)

Node 2: EPS: DDCU N2S4A: Firmware

**DDCU N2S4A Firmware**

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

sel Trip Status

**DDCU N2S4A Trip Status**

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

NODE 2 DDCU N2S1B ACTIVATION

**CAUTION**

Node 2 DDCUs will be activated without coolant flowing through the IATCS MT loop. Cooling must be established before DDCU Baseplate temperature exceeds 40.3 deg C (TBD hours).

NOTE

The DDCUs may not show proper power sharing ratios when the loads on the DDCU is small (reference SCR\_28971) DDCU OLVCS Advisory

15. POWERING ON NODE 2 DDCU N2S1B

Node 2: EPS: DDCU N2S1B: Converter

DDCU N2S1B Converter

**cmd** Converter On – Arm

**cmd** Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

NODE 2 DDCU N2S4A ACTIVATION

16. POWERING ON NODE 2 DDCU N2S4A

Node 2: EPS: DDCU N2S4A

DDCU N2S4A

sel DDCU N2S4A Converter

DDCU N2S4A Converter

**cmd** Converter On – Arm

**cmd** Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

'Power Sharing, %'

Verify DDCU N2S1B: 50

Verify DDCU N2S4A: 50

17. [ENABLING RT I/O COMM FOR RPCM N21B4A-A](#)

CDH: Primary INT MDM: LB SEPS N2 14: RT Status

LB SEPS N2 14 RT Status

**cmd** 13 RPCM N21B4A A RT Status – Enable **Execute** (Verify – Ena)

18. [ENABLING RT I/O COMM FOR RPCM N21B4A-B](#)

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 71 – RPCM N2STB-1B4A-B

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4A\_B\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 71 – RPCM N2STB-1B4A-B

sel PM\_CMD\_Hdr: 2 – Fire

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4A\_B\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4A\_B\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4A\_B\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RT: 9-LB EPS N2 14

Verify 16 RPCM N21B4A B Exist – Y

19. [ENABLING RT I/O COMM FOR RPCM N21B4A-C](#)

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 74 – RPCM N2STB-1B4A-C

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 - Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4A\_C\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 74 - RPCM N2STB-1B4A-C

sel PM\_CMD\_Hdr: 2 - Fire

sel PM\_ORU\_Exist: 1 - Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4A\_C\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4A\_C\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4A\_C\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RT: 9-LB EPS N2 14

Verify 15 RPCM N21B4A C Exist – Y **Execute** (Verify – Ena)

20. [VERIFYING INTEGRATION COUNTER RPCM N21B4A-A, B, C](#)

Node 2: EPS

Node 2: EPS

sel RPCM N21B4A [X] where [X] =

Verify Integration Counter – incrementing

Repeat

21. [ENABLING RT FDIR FOR RPCM N21B4A-A](#)

CDH: Primary INT MDM: LB SEPS N2 14: RT Status

**cmd** 13 RPCM\_N21B4A\_A Enable FDIR **Execute** (Verify – Ena)

22. [ENABLING RT FDIR FOR RPCM N21B4A-B](#)

CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

**cmd 16** RPCM\_N21B4A\_B Enable FDIR **Execute** (Verify – Ena)

23. [ENABLING RT FDIR FOR RPCM N21B4A-C](#)

CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

**cmd 15** RPCM\_N21B4A\_C Enable FDIR **Execute** (Verify – Ena)

24. [PERFORMING RPCM POWER ON RESET](#)

For RPCMs N21B4A A, B, and C

Perform [{5.420 RPCM POWER ON RESET}](#), all (SODF: GND SYSTEMS: EPS: CORRECTIVE), then:

ACTIVATING N2-1 MDM

25. [POWERING ON N2-1 MDM](#)

Node 2: EPS: RPCM N21B4A A: RPC 01

**cmd** RPC Position – Close (Verify – Cl)

Wait 5 minutes before performing the next step.

26. [ENABLING I/O TO THE N2-1 MDM](#)

CDH: Primary INT MDM: LB SYS N2 1: RT Status

**cmd 24** MDM N2-1 RT STATUS – Enable **Execute** (Verify – Ena)

27. [VERIFYING MDM N2-1 STATUS](#)

CDH: N2-1 MDM

Verify Frame Count – incrementing

Verify Processing State – Operational

√Sync Status – In Sync

28. [ENABLING RT FDIR TO THE N2-1 MDM](#)

CDH: Primary INT MDM: LB SYS N2 1: RT Status

**cmd 24** MDM N2-1 RT FDIR Status – Enable **Execute** (Verify – Ena)

ACTIVATING DDCU N2D4B



29. [CLOSING MBSU 4 RBI 10](#)

S0: EPS: MBSU 4: RBI 10

MBSU 4 RBI 10

'Cmded Position'

**cmd** Close – Arm

**cmd** Close (Verify – Cl)

Verify Voltage > 145 V

30. [ENABLING RT I/O COMM FOR DDCU N2D4B](#)

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 35 – DDCU N2NAD-4B

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 – Exists

Name command instance: Prim\_PMCA\_Ena\_RT\_DDCU\_N2D4B\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 35 – DDCU N2NAD-4B

sel PM\_CMD\_Hdr: 2 – Fire

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_DDCU\_N2D4B\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2D4B\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2D4B\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RTs: 9-LB EPS N2 14

Verify 25 DDCU N2D4B Exist – Y

31. [VERIFYING INTEGRATION COUNTER FOR DDCU N2D4B](#)

Node 2: EPS: DDCU N2D4B

DDCU N2D4B

Verify integration counter – incrementing  
 Verify Input Voltage: 146 to 165 V  
 Verify Converter Temp: -37.3 to 43.8 C  
 Verify Power Supply Temp: -37.3 to 49.5 C  
 Verify Baseplate Temp: -37.3 to 40.3 C

32. [SETTING PARALLEL STATUS FOR DDCU N2D4B](#)

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2D4B from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 35 – DDCU N2NAD-4B  
 sel DDCU\_Setpt\_Cmd\_Hdr: 1 – Arm  
 sel PM\_DDCUI\_Parallel: 1 – Parallel

Name command instance: DDCU\_N2D4B\_Set\_Status\_Parallel\_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2D4B from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 35 – DDCU N2NAD-4B  
 sel DDCU\_Setpt\_Cmd\_Hdr: 2 – Fire  
 sel PM\_DDCUI\_Parallel: 1 – Parallel

Name command instance: DDCU\_N2D4B\_Set\_Status\_Parallel\_Set

**cmd** <Cmd Inv: DDCU\_N2D4B\_Set\_Status\_Parallel\_Arm – (LAPC96IM0138K)>

**cmd** <Cmd Inv: DDCU\_N2D4B\_Set\_Status\_Parallel\_Set – (LAPC96IM0138K)>

33. [ENABLING RT FDIR FOR DDCU N2D4B](#)

CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

LB EPS N2 14 RT Status

**cmd** 25 DDCU N2D4B RT FDIR Status – Enable **Execute** (Verify – Ena)

34. [CLEARING DDCU N2D4B POWER ON RESET FLAG](#)

Node 2: EPS: DDCU N2D4B: Firmware

DDCU N2D4B Firmware

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

sel Trip Status

DDCU N2D4B Trip Status

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

NODE 2 DDCU N2D1B ACTIVATION

35. [CLOSING MBSU 1 RBI 11](#)

S0: EPS: MBSU 1: RBI 11

MBSU 1 RBI 11

'Cmded Position'

**cmd** Close – Arm

**cmd** Close (Verify – CI)

Verify Voltage > 145 V

36. [ENABLING RT I/O COMM FOR DDCU N2D1B](#)

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 34 – DDCU N2NAD-1B

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 – Exists

Name command instance: Prim\_PMCA\_Ena\_RT\_DDCU\_N2D1B\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 34 – DDCU N2NAD-1B

sel PM\_CMD\_Hdr: 2 – Fire

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_DDCU\_N2D1B\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2D1B\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2D1B\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RT: 9-LB EPS N2 14

Verify 24 DDCU N2D1B Exist – Y

37. [VERIFYING INTEGRATION COUNTER FOR DDCU N2D1B](#)

Node 2: EPS: DDCU N2D1B

**DDCU N2D1B**

Verify integration counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

38. [ENABLING RT FDIR FOR DDCU N2D1B](#)

CDH: Primary PMCU MDM: LB EPS N2 14: RT Status

**LB EPS N2 14 RT Status**

**cmd** 24 DDCU N2D1B – Enable FDIR **Execute** (Verify – Ena)

39. [SETTING PARALLEL STATUS FOR DDCU N2D1B](#)

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2D1B from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 34 – DDCU N2NAD-1B

sel DDCU\_Setpt\_Cmd\_Hdr: 1 – Arm

sel PM\_DDCUI\_Parallel: 1 – Parallel

Name command instance: DDCU\_N2D1B\_Set\_Status\_Parallel\_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2D1B from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 34 – DDCU N2NAD-1B

sel DDCU\_Setpt\_Cmd\_Hdr: 2 - Fire  
sel PM\_DDCUI\_Parallel: 1 - Parallel

Name command instance: DDCU\_N2D1B\_Set\_Status\_Parallel\_Set

**cmd** <Cmd Inv: DDCU\_N2D1B\_Set\_Status\_Parallel\_Arm – (LAPC96IM0138K)>

**cmd** <Cmd Inv: DDCU\_N2D1B\_Set\_Status\_Parallel\_Set – (LAPC96IM0138K)>

40. CLEARING DDCU N2D1B POWER ON RESET FLAG

Node 2: EPS: DDCU N2D1B: Firmware

DDCU N2D1B Firmware

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

sel Trip Status

DDCU N2D1B Trip Status

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

NODE 2 DDCU N2D4B ACTIVATION

NOTE

The DDCUS may not show proper power sharing ratios when the loads on the DDCU is small (reference SCR\_28971)

41. POWERING ON NODE 2 DDCU N2D4B

Node 2: EPS: DDCU N2D4B: Converter

DDCU N2D4B Converter

**cmd** Converter On – Arm

**cmd** Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

NODE 2 DDCU N2D1B ACTIVATION

42. [POWERING ON NODE 2 DDCU N2D1B](#)

Node 2: EPS: DCU N2D1B: Converter

DDCU N2D1B Converter

**cmd** Converter On – Arm

**cmd** Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current:  $0 \pm 3.75$  A

'Power Sharing, %'

Verify DDCU N2D1B: 50

Verify DDCU N2D4B: 50

43. [ENABLING RT I/O COMM FOR RPCM N21B4B-A](#)

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 69 – RPCM N2NAD-1B4B-A

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4B\_A\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 69 – RPCM N2NAD-1B4B-A

sel PM\_CMD\_Hdr: 2 – Fire

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4B\_A\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4B\_A\_Arm – (LADD96IM1136K)>

## NODE 2 ACTIVATION AND CHECKOUT PART 1

(ASSY OPS/10A/FIN)

Page 17 of 21 pages

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N21B4B\_A\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RT: 9-LB EPS N2 14

Verify 13 RPCM\_N21B4B\_A Exist – Y

44. [ENABLING I/O FOR RPCM N21B4B-B](#)

CDH: Primary INT MDM: LB SEPS N2 14: RT Status

LB SEPS N2 14 RT Status

**cmd** 9 RPCM N21B4B\_B RT Status Enable **Execute** (Verify – Ena)

45. [VERIFYING INTEGRATION COUNTER RPCM N21B4B-A, B](#)

Node 2: EPS

Node 2: EPS

sel RPCM N21B4B [X] where [X] =

RPCM N21B4B [X]

Verify Integration Counter – incrementing

Repeat

46. [PERFORMING RPCM POWER ON RESET](#)

For RPCMs N21B4B A and B

Perform [5.420 RPCM POWER ON RESET](#), all (SODF: GND SYSTEMS: EPS: CORRECTIVE), then:

47. [ENABLING RT FDIR FOR RPCM N21B4B-A](#)

CDH: PRIMARY PMCU MDM: LB EPS N2 14: RT Status

LB EPS N2 14 RT Status

**cmd** 13 RPCM\_N21B4B\_A RT FDIR Status – Enable **Execute** (Verify – Ena)

48. [ENABLING RT FDIR FOR RPCM N2D1B4B-B](#)

CDH: Primary INT MDM: LB SEPS N2 14: RT Status

LB SEPS N2 14 RT Status

**cmd** 9 RPCM N21B4B\_B RT FDIR Enable **Execute** (Verify – Ena)

NODE-2 IATCS MT LOOP ACTIVATION

49. VERIFYING ACCUM LEVEL

<u>NOTE</u>
Accumulator launch level is 85%

Node 2: TCS

Node 2: TCS

'PPA MTL'

Verify Avg Accum Qty > 70 %

50. APPLYING POWER TO MTL IATCS COMPONENTS

50.1 MTL Shutoff Valve (SOV) RPC

Node 2: TCS: MTL SFCA: RPCM N21B4B B RPC 01

RPCM N21B4B B RPC 01

cmd RPC Position – Close (Verify – CI)

51. MTL SFCA FLOW CONTROL VALVE (FCV) RPC

Node 2: TCS: MTL SFCA: RPCM N21B4B B RPC 16

RPCM N21B4B B RPC 16

cmd RPC Position – Close (Verify – CI)

52. MTL TWMV RPC

Node 2: TCS: MTL TWMV: RPCM N21B4A A RPC 02

RPCM N21B4A A RPC 02

cmd RPC Position – Close (Verify – CI)

53. MTL NIA ACCUMULATOR VENT VALVE (AVV) RPC

Node 2: TCS: MTL PPA: Node2 MTL NIA Commands: RPCM N21B4B B RPC 02

RPCM N21B4B B RPC 02

cmd RPC Position – Close (Verify – CI)

54. MTL NIA ISOLATION VALVE (NIV) RPC

Node 2: TCS: MTL PPA: Node2 MTL NIA Commands: RPCM N21B4B B RPC 15

cmd RPC Position – Close (Verify – CI)

55. MTL PPA RPC

Node 2: TCS: MTL PPA: RPCM N21B4A A RPC 17

RPCM N21B4A A RPC 17



cmd RPC Position – Close (Verify – CI)

ENABLING COMMUNICATIONS BETWEEN PRIMARY INT AND MTL PPA

56. ENABLING I/O TO THE MTL PPA

CDH: Primary INT MDM: LB SYS N2 1: RT Status

LB SYS N2 1 RT Status

cmd 9 PPA N2-1 RT Status Enable **Execute** (Verify – Ena)

57. LATCHING MT ACCUM VALUE

Node 2: TCS: MTL Software

Node2 MTL Software Commands

'MTL IATCS'

'Leak Recovery'

cmd Set Normal Leak Limits – Set

58. CHECKING MTL FDIR STATUS

Node 2: TCS: MTL Software

Node2 MTL Software Commands

'MTL IATCS'

√Leak Recovery Auto Shutdown – Ena

√Failure Recovery Fail Rcvy – Ena

√SFCA Overpress Protection Status – Ena

59. CHECKING MTL SFCA SOFTWARE STATUS

NOTE

In order to ensure that the MTL SFCA Mod Valve is fully opened prior to starting the pump, the MTL SFCA software must be verified to be shutdown prior to sending the MTL ITCS Activation command per SPN 25927/4495.

PCS

Node 2: TCS: MTL SFCA

Node2 MTL SFCA Commands

'Commands'

'MTL SFCA'

√SFCA Software – Shutdown

60. IATCS MTL AUTOMATED ACTIVATION

NOTE

MT loop activation is expected to occur within 75 seconds after the "startup N2 MT LOOP IATCS command has been issued. The software will automatically retry the startup process (if the first attempt fails) which can last another 75 seconds.

Node 2: TCS: MTL Software

Node2 MTL Software Commands

'MTL IATCS'

Verify the following:

IATCS Status – Idle

IATCS Activation – Not In Prog

**cmd** Startup – Startup

Verify IATCS Activation – In Prog

Wait up to 3 minutes, then

Verify IATCS Status – Oper

Node 2: TCS: MTL PPA

Node2 MTL PPA Commands

'Commands'

'MTL PPA'

Verify the following:

√Pump Software – Started

√Pump Speed – 13910 ± 1250 rpm

61. ENABLING FDIR FOR THE MTL PPA

CDH: Primary INT MDM: LB SYS N2 1: RT Status

LB SYS N2 1 RT Status

**cmd** 9 PPA N2-1 Enable FDIR **Execute** (Verify – Ena)

62. SETTING LEAK LIMIT FOR THE MTL PPA

Node 2: TCS

Node 2: TCS

'PPA'

Record MTL Avg Accum Qty: \_\_\_\_\_ %

sel MTL Software

## NODE 2 ACTIVATION AND CHECKOUT PART 1

(ASSY OPS/10A/FIN)

Page 21 of 21 pages

Node2 MTL Software Commands

'MTL IATCS'

**cmd** Set Normal Leak Limits – Set

This Page Intentionally Blank

## NODE 2 ACTIVATION AND CHECKOUT PART 2

(ASSY OPS/10A/FIN 1)

Page 1 of 28 pages

### OBJECTIVE:

To perform powerup and functional activation of Node 2 equipment tied to the LTL (ETCS Loop B) and EPS Channel 2/3.

### INITIAL CONDITIONS:

Node 2 Interim Activation complete.

DDCU SPC parallel connectors installed

MBSU 3 RBI 3 is Open

MBSU 2 RBI 3 is Open

MBSU 2 RBI 10 is Open

MBSU 3 RBI 2 is Open

### ACTIVATING 2A3A POWER SUPPLY OUTPUT

#### 1. SUPPRESSING PMCU RT CAUTIONS AND WARNINGS

The following Caution and Warning messages in Table 1 should be suppressed during Node 2 activation to prevent nuisance tones.

**Table 1. Caution and Warning to be Suppressed/Inhibited**

Event Code	Class	Message Text	State
5740	C	DDCU N2D1B Loss of Comm – Node 2	SUPP
5743	C	DDCU N24B Loss of Comm – Node 2	SUPP
5731	C	DDCU N24A Loss of Comm – Node 2	SUPP
5728	C	DDCU N2S1B Loss of Comm – Node 2	SUPP
5722	C	DDCU N22A Loss of Comm – Node 2	SUPP
5725	C	DDCU N2P3A Loss of Comm – Node 2	SUPP
5734	C	DDCU N22B Loss of Comm – Node 2	SUPP
5737	C	DDCU N2O3A Loss of Comm – Node 2	SUPP

## NODE 2 ACTIVATION AND CHECKOUT PART 2

(ASSY OPS/10A/FIN 1)

Page 2 of 28 pages

### 2. [INHIBITING PMCU RT FDIR , if necessary](#)

CDH: Primary PMCU MDM: LB EPS N2 23: RT Status

**LB EPS N2 23 RT Status**

'RT [X]' where [X] = 

11	13	16	24	25	26	27
----	----	----	----	----	----	----

**cmd Inhibit FDIR Execute**

Verify RT FDIR Status – Inh

Repeat

### 3. [CLOSING MBSU 2 RBI 3](#)

S0: EPS: MBSU 2: RBI 3

**MBSU 2 RBI 3**

'Cmdded Position'

**cmd Close – Arm**

**cmd Close (Verify – Cl)**

Verify voltage > 145 V

### 4. [ENABLING RT I/O COMM FOR DDCU N2P2A](#)

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 26 – DDCU N2PRT-2A

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 – Exists

Name command instance: Prim\_PMCA\_Ena\_RT\_DDCU\_N2P2A\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 26 – DDCU N2PRT-2A

sel PM\_CMD\_Hdr: 2 – Fire

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_DDCU\_N2P2A\_Execute

**cmd <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2P2A\_Arm – (LADD96IM1136K)>**

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2P2A\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RTs: 10-LB EPS N2 23

Verify 24 DDCU N2P2A Exist – Y

5. [VERIFYING INTEGRATION COUNTER DDCU N2P2A](#)

Node 2: EPS: DDCU N2P2A

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

6. [ENABLING RT FDIR FOR DDCU N2P2A](#)

CDH: Primary PMCU MDM: LB EPS N2 23: RT Status

**cmd** 24 DDCU N2P2A RT FDIR Enable **Execute** (Verify – Ena)

7. [SETTING PARALLEL STATUS FOR DDCU N2P2A](#)

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2P2A from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 30 – DDCU N2PRT-2A

sel DDCU\_Setpt\_Cmd\_Hdr: 1 – Arm

sel PM\_DDCUI\_Parallel: 1 – Parallel

Name command instance: DDCU\_N2P2A\_Set\_Status\_Parallel\_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2P2A from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 30 – DDCU N2PRT-2A

sel DDCU\_Setpt\_Cmd\_Hdr: 2 – Fire

sel PM\_DDCUI\_Parallel: 1 – Parallel

Name command instance: DDCU\_N2P2A\_Set\_Status\_Parallel\_Set

**cmd** <Cmd Inv: DDCU\_N2P2A\_Set\_Status\_Parallel\_Arm – (LAPC96IM0138K)>

**cmd** <Cmd Inv: DDCU\_N2P2A\_Set\_Status\_Parallel\_Set – (LAPC96IM0138K)>

8. [CLEARING DDCU N2P2A POWER ON RESET FLAG](#)

Node 2: EPS: DDCU N2P2A: Firmware

**DDCU N2P2A Firmware**

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

sel Trip Status

**DDCU N2P2A Trip Status**

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

9. [CLOSING MBSU 3 RBI 3](#)

S0: EPS: MBSU 3: RBI 3

**MBSU 3 RBI 3**

'Cmded Position'

**cmd** Close – Arm

**cmd** Close (Verify – CI)

Verify voltage > 145 V

10. [ENABLING RT I/O COMM FOR DDCU N2P3A](#)

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 27 – DDCU N2PRT-3A

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 – Exists

Name command instance: Prim\_PMCA\_Ena\_RT\_DDCU\_N2P3A\_Arm



To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 27 – DDCU N2PRT-3A

sel PM\_CMD\_Hdr: 2 – Fire

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_DDCU\_N2P3A\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2P3A\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2P3A\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RTs: 10-LB EPS N2 23

Verify 25 DDCU N2P3A Exist – Y

11. [VERIFYING INTEGRATION COUNTER DDCU N2P3A](#)

Node 2: EPS: DDCU N2P3A

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

12. [ENABLING RT FDIR FOR DDCU N2P3A](#)

CDH: Primary PMCU MDM: LB EPS N2 23: RT Status

**cmd** 25 DDCU N2P3A Enable FDIR **Execute** (Verify – Ena)

13. [SETTING PARALLEL STATUS FOR DDCU N2P3A](#)

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2P3A from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 30 – DDCU N2PRT-3A

sel DDCU\_Setpt\_Cmd\_Hdr: 1 – Arm

sel PM\_DDCUI\_Parallel: 1 – Parallel

Name command instance: DDCU\_N2P3A\_Set\_Status\_Parallel\_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2P3A from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 30 - DDCU N2PRT-3A

sel DDCU\_Setpt\_Cmd\_Hdr: 2 - Fire

sel PM\_DDCUI\_Parallel: 1 - Parallel

Name command instance: DDCU\_N2P3A\_Set\_Status\_Parallel\_Set

**cmd** <Cmd Inv: DDCU\_N2P3A\_Set\_Status\_Parallel\_Arm – (LAPC96IM0138K)>

**cmd** <Cmd Inv: DDCU\_N2P3A\_Set\_Status\_Parallel\_Set – (LAPC96IM0138K)>

14. [CLEARING DDCU N2P3A POWER ON RESET FLAG](#)

Node 2: EPS: DDCU N2P3A: Firmware

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

sel Trip Status

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

**CAUTION**

Node 2 DDCUs will be activated initially without coolant flowing through the IATCS LT LOOP. Cooling must be established before DDCU baseplate temperature exceeds 40.3 deg C (TBD hours).

ACTIVATING NODE 2 DDCU N2P2A

NOTE

The DDCUs may not show proper power sharing ratios when the loads on the DDCU is small (reference SCR\_28971)

15. [POWERING ON NODE 2 DDCU N2P2A](#)

Node 2: EPS: DDCU N2P2A

sel DDCU N2P2A Converter

cmd Converter On – Arm

cmd Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

ACTIVATING NODE 2 DDCU N2P3A

16. [POWERING ON NODE 2 DDCU N2P3A](#)

Node 2: EPS: DDCU N2P3A

sel DDCU N2P3A Converter

cmd Converter On – Arm

cmd Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

'Power Sharing, %'

Verify DDCU N2P2A: 50

Verify DDCU N2P3A: 50

17. [ENABLING RT I/O COMM FOR RPCM N22A3A-A](#)

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 70 – RPCM N2PRT-2A3A-A  
sel PM\_CMD\_Hdr: 1 – Arm  
sel PM\_ORU\_Exist: 1 – Exists

Name command instance:  
Prim\_PMCA\_Ena\_RT\_RPCM\_N22A3A\_A\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 70 – RPCM N2PRT-2A3A-A  
sel PM\_CMD\_Hdr: 2 – Fire  
sel PM\_ORU\_Exist: 1 – Exists

Name command instance:  
Prim\_PMCA\_Ena\_RT\_RPCM\_N22A3A\_A\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N22A3A\_A\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N22A3A\_A\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RTs: 10-LB EPS N2 23

Verify 13 RPCM N22A3A\_A Exist – Y

### 18. [ENABLING RT I/O COMM FOR RPCM N22A3A-C](#)

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 75 – RPCM N2PRT-2A3A-C  
sel PM\_CMD\_Hdr: 1 – Arm  
sel PM\_ORU\_Exist: 1 – Exists

Name command instance:  
Prim\_PMCA\_Ena\_RT\_RPCM\_N2P2A3A\_C\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 75 – RPCM N2PRT-2A3A-C  
sel PM\_CMD\_Hdr: 2 – Fire  
sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_RPCM\_N2P2A3A\_C\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N2P2A3A\_C\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N2P2A3A C\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RTs: 10-LB EPS N2 23

Verify 11 RPCM N22A3A\_C Exist – Y

19. [ENABLING RT I/O COMM FOR RPCM N22A3A-B](#)

CDH: Primary INT MDM: LB SEPS N2 23: RT Status

LB SEPS N2 23 RT Status

**cmd** 09 RPCM N22A3A\_B RT Status – Enable **Execute** (Verify – Ena)

20. [VERIFYING RPCM INTEGRATION COUNTERS](#)

Node 2: EPS

Node 2: EPS

sel RPCM N22A3A [X] where [X] =

RPCM N22A3A X

Verify Integration Counter – incrementing

Repeat

21. [PERFORMING RPCM POWER ON RESET](#)

For RPCMs N22A3A A, B, and C

Perform [{5.420 RPCM POWER ON RESET}](#) (SODF: GND SYSTEMS: EPS: CORRECTIVE), then:

22. [ENABLING RT FDIR FOR RPCM N22A3A-A, B, C](#)

CDH: Primary PMCU MDM: LB EPS N2 23: RT Status

LB EPS N2 23 RT Status

**cmd** 11 RPCM N22A3A\_C RT FDIR Status – Enable **Execute** (Verify – Ena)

**cmd** 13 RPCM N22A3A\_A RT FDIR Status – Enable **Execute** (Verify – Ena)

CDH: Primary INT MDM: LB SEPS N2 23: RT Status

RT Status

## NODE 2 ACTIVATION AND CHECKOUT PART 2

(ASSY OPS/10A/FIN 1)

Page 10 of 28 pages

**cmd** 09 RPCM N22A3A\_B RT FDIR Status – Enable **Execute** (Verify – Ena)

### N2-2 MDM POWER ON AND CHECKOUT

23. [POWERING ON N2-2 MDM](#)

Node 2: EPS: RPCM N22A3A B: RPC 01

**cmd** RPC Position Close (Verify – Cl)

Wait 5 minutes before performing the next step.

24. [ENABLING I/O TO THE N2-2 MDM](#)

CDH: Primary INT MDM: LB SYS N2 2: RT Status

**cmd** 24 MDM N2-2 RT Status – Enable **Execute** (Verify – Ena)

25. [VERIFYING N2-2 MDM STATUS](#)

CDH: N2-2 MDM

Verify Frame Count – incrementing

Verify Processing State – Operational

√Sync Status – In Sync

26. [POWERING N2-2 MDM SDO CARD](#)

Node 2: EPS: RPCM N22A3A B: RPC 02

**cmd** RPC Position Close (Verify – Cl)

27. [POWERING N2-2 MDM SDO CARD](#)

Node 2: EPS: RPCM N22A3A B: RPC 04

**cmd** RPC Position Close (Verify – Cl)

28. [ENABLING RT FDIR FOR THE N2-2 MDM](#)

CDH: Primary INT MDM: LB SYS N2 2: RT Status

**cmd** 24 MDM N2-2 RT FDIR Status – Enable **Execute** (Verify – Ena)

NOTE

The next 4 commands will inhibit the close command for power application to CCAA solenoid valves. This is done to preclude inadvertent commanding to the circuits.

29. EXECUTING CLOSE CMD INHIBIT TO CCAA H2O VALVES

29.1 Bypass Valve RPC Close Cmd Inh

Node 2: EPS: RPCM N22A3B C: RPC 8

RPCM N22A3B C RPC 08

**cmd** Close Cmd – Inhibit (Verify – Inh)

29.2 Bypass Valve RPC Close Cmd Inh

Node 2: EPS: RPCM N22A3B C: RPC 9

RPCM N22A3B C RPC 09

**cmd** Close Cmd – Inhibit (Verify – Inh)

29.3 Normal Valve RPC Close Cmd Inh

Node 2: EPS: RPCM N22A3B C: RPC 10

RPCM N22A3B C RPC 10

**cmd** Close Cmd – Inhibit (Verify – Inh)

29.4 Normal Valve RPC Close Cmd Inh

Node 2: EPS: RPCM N22A3B C: RPC 11

RPCM N22A3B C: RPC 11

**cmd** Close Cmd – Inhibit (Verify – Inh)

POWERING ON DDCU N2O3A

30. CLOSING MBSU 3 RBI 2

S0: EPS: MBSU 3: RBI 2

MBSU 3 RBI 2

'Cmdded Position'

**cmd** Close – Arm

**cmd** Close (Verify – Cl)

Verify voltage > 145 V

31. ENABLING RT I/O COMM FOR DDCU N2O3A

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

## NODE 2 ACTIVATION AND CHECKOUT PART 2

(ASSY OPS/10A/FIN 1)

Page 12 of 28 pages

sel PM\_ORU\_x: 33 – DDCU N2ZEN-3A  
sel PM\_CMD\_Hdr: 1 – Arm  
sel PM\_ORU\_Exist: 1 – Exists

Name command instance: Prim\_PMCA\_Ena\_RT\_DDCU\_N2O3A\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 33 – DDCU N2ZEN-3A  
sel PM\_CMD\_Hdr: 2 – Fire  
sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_DDCU\_N2O3A\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2O3A\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2O3A\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RTs: 10-LB EPS N2 23

Verify 27 DDCU N2O3A Exist – Y

### 32. [VERIFYING INTEGRATION COUNTER DDCU N2O3A](#)

Node 2: EPS: DDCU N2O3A

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V

Verify Converter Temp: -37.3 to 43.8 C

Verify Power Supply Temp: -37.3 to 49.5 C

Verify Baseplate Temp: -37.3 to 40.3 C

### 33. [ENABLING RT FDIR FOR DDCU N2O3A](#)

CDH: Primary PMCU MDM: LB EPS N2 23: RT Status

**cmd** 27 DDCU N2O3A RT FDIR Status – Enable **Execute** (Verify – Ena)

### 34. [SETTING PARALLEL STATUS FOR DDCU N2O3A](#)

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2O3A from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:



input the following values in the command template:

```
sel DDCUIP_x: 30 - DDCU N2ZEN-3A
sel DDCU_Setpt_Cmd_Hdr: 1 - Arm
sel PM_DDCUI_Parallel: 1 - Parallel
```

Name command instance: DDCU\_N2O3A\_Set\_Status\_Parallel\_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2O3A from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

```
sel DDCUIP_x: 30 - DDCU N2ZEN-3A
sel DDCU_Setpt_Cmd_Hdr: 2 - Fire
sel PM_DDCUI_Parallel: 1 - Parallel
```

Name command instance: DDCU\_N2O3A\_Set\_Status\_Parallel\_Set

**cmd** <Cmd Inv: DDCU\_N2O3A\_Set\_Status\_Parallel\_Arm – (LAPC96IM0138K)>

**cmd** <Cmd Inv: DDCU\_N2O3A\_Set\_Status\_Parallel\_Set – (LAPC96IM0138K)>

### 35. [CLEARING DDCU N2O3A POWER ON RESET FLAG](#)

Node 2: EPS: DDCU N2O3A: Firmware

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

sel Trip Status

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

POWERING ON DDCU N2O2B

36. [CLOSING MBSU 2 RBI 10](#)

S0: EPS: MBSU 2: RBI 10

MBSU 2 RBI 10

'Cmdded Position'

**cmd** Close – Arm

**cmd** Close (Verify – CI)

Verify voltage > 145 V

37. [ENABLING RT I/O COMM FOR DDCU N2O2B](#)

To build Primary PMCU Enable RT arm command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 32 – DDCU N2ZEN-2B

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 – Exists

Name command instance: Prim\_PMCA\_Ena\_RT\_DDCU\_N2O2B\_Arm

To build Primary PMCU Enable RT execute command template <LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 32 – DDCU N2ZEN-2B

sel PM\_CMD\_Hdr: 2 – Fire

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_DDCU\_N2O2B\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2O2B\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_DDCU\_N2O2B\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RTs: 10-LB EPS N2 23

Verify 26 DDCU N2O2B Exist – Y

38. [VERIFYING INTEGRATION COUNTER DDCU N2O2B](#)

Node 2: EPS: DDCU N2O2B

DDCU N2O2B

Verify Integration Counter – incrementing

Verify Input Voltage: 146 to 165 V  
 Verify Converter Temp: -37.3 to 43.8 C  
 Verify Power Supply Temp: -37.3 to 49.5 C  
 Verify Baseplate Temp: -37.3 to 40.3 C

39. [ENABLING RT FDIR FOR DDCU N2O2B](#)

CDH: Primary PMCU MDM: LB EPS N2 23: RT Status

**cmd** 26 DDCU N2O2B RT FDIR Status – Enable **Execute** (Verify – Ena)

40. [SETTING PARALLEL STATUS FOR DDCU N2O2B](#)

To build the Primary PMCU DDCU Set Status Parallel Arm Command for DDCU N2O2B from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 30 – DDCU N2ZEN-2B  
 sel DDCU\_Setpt\_Cmd\_Hdr: 1 – Arm  
 sel PM\_DDCUI\_Parallel: 1 – Parallel

Name command instance: DDCU\_N2O2B\_Set\_Status\_Parallel\_Arm

To build the Primary PMCU DDCU Set Status Parallel Set Command for DDCU N2O2B from template <LAPC96IM0138K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel DDCUIP\_x: 30 – DDCU N2ZEN-2B  
 sel DDCU\_Setpt\_Cmd\_Hdr: 2 – Fire  
 sel PM\_DDCUI\_Parallel: 1 – Parallel

Name command instance: DDCU\_N2O2B\_Set\_Status\_Parallel\_Set

**cmd** <Cmd Inv: DDCU\_N2O2B\_Set\_Status\_Parallel\_Arm – (LAPC96IM0138K)>

**cmd** <Cmd Inv: DDCU\_N2O2B\_Set\_Status\_Parallel\_Set – (LAPC96IM0138K)>

41. [CLEARING DDCU N2O2B POWER ON RESET FLAG](#)

Node 2: EPS: DDCU N2O2B: Firmware

'Clear Commands'

**cmd** Common Clear

Verify Power On Reset – blank

sel Trip Status

DDCU N2O2B Trip Status

'Parallel DDCU'

'Input Undervoltage Trip'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Trip Function – Inh

ACTIVATING NODE 2 DDCU N2O3A

NOTE

The DDCUs may not show proper power sharing ratios when the loads on the DDCU is small (reference SCR\_28971)

42. POWERING ON NODE 2 DDCU N2O3A

Node 2: EPS: DDCU N2O3A

DDCU N2O3A

sel DDCU N2O3A Converter

DDCU N2O3A Converter

**cmd** Converter On – Arm

**cmd** Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current:  $0 \pm 3.75$  A

ACTIVATING NODE 2 DDCU N2O2B

43. POWERING ON NODE 2 DDCU N2O2B

Node 2: EPS: DDCU N2O2B

DDCU N2O2B

sel Converter

DDCU N2O2B Converter

**cmd** Converter On – Arm

**cmd** Converter On – On

Verify Converter Status – On

Verify Output Voltage: 120.2 to 128.8 V

Verify Output Current: 0 ± 3.75 A

'Power Sharing, %'

Verify DDCU N2O2B: 50

Verify DDCU N2O3A: 50

44. [ENABLING RT I/O COMM FOR RPCM N22B3A-A](#)

CDH: Primary INT MDM: LB SEPS N2 23: RT Status

**cmd** 13 RPCM N22B3A\_A RT Status – Enable **Execute** (Verify – Ena)

45. [ENABLING RT I/O COMM FOR RPCM N22B3A-B](#)

To build Primary PMCU Enable RT arm command template

<LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 72 – RPCM N2ZEN-2B3A-B

sel PM\_CMD\_Hdr: 1 – Arm

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_RPCM\_N2O2B3A\_B\_Arm

To build Primary PMCU Enable RT execute command template

<LADD96IM1136K>, perform [{1.203 BUILD COMMAND FROM TEMPLATE}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

input the following values in the command template:

sel PM\_ORU\_x: 72 – RPCM N2ZEN-2B3A-B

sel PM\_CMD\_Hdr: 2 – Fire

sel PM\_ORU\_Exist: 1 – Exists

Name command instance:

Prim\_PMCA\_Ena\_RT\_RPCM\_N2O2B3A\_B\_Execute

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N2O2B3A\_B\_Arm – (LADD96IM1136K)>

**cmd** <Cmd Inv: Prim\_PMCA\_Ena\_RT\_RPCM\_N2O2B3A B\_Execute – (LADD96IM1136K)>

MSK: ODIN: Overview Displays: PWR\_RT: 10-LB EPS N2 23

Verify 16 RPCM N22B3A\_B Exist – Y

46. VERIFYING RPCM INTEGRATION COUNTERS

Node 2: EPS

Node 2: EPS

sel RPCM N22B3A [X] where [X] = AB

RPCM N22B3A [X]

Verify Integration Counter – incrementing

Repeat

47. PERFORMING RPCM POWER ON RESET

For RPCMs N22B3A A and B

Perform [{5.420 RPCM POWER ON RESET}](#) (SODF: GND SYSTEMS: EPS: CORRECTIVE), then:

48. ENABLING RT FDIR FOR RPCM N22B3A-B

CDH: Primary PMCU MDM

Primary PMCU MDM

sel LB EPS N2 23

LB EPS N2 23

sel RT Status

LB EPS N2 23 RT Status

**cmd** 16 RPCM N22B3A\_B RT FDIR Status – Enable **Execute** (Verify – Ena)

49. ENABLING RT FDIR FOR RPCM N22B3A-A

CDH: Primary INT MDM

Primary INT MDM

sel LB SEPS N2 23

LB SEPS N2 23

sel RT Status

LB SEPS N2 23 RT Status

**cmd** 13 RPCM N22B3A\_A RT FDIR Status – Enable **Execute** (Verify – Ena)

PERFORMING AUTOMATED ACTIVATION OF NODE-2 IATCS LT LOOP

50. PROCEEDING WITH NODE 2 IATCS LT LOOP ACTIVATION

<u>NOTE</u>
LTL Accumulator launch level is 85%

Node 2: TCS

Node 2: TCS

'PPA LTL'

Verify Avg Accum Qty > 70 %

51. APPLYING POWER TO LTL IATCS COMPONENTS

51.1 LTL Shutoff Valve

Node 2: TCS: LTL SFCA: RPCM N22B3A A RPC 01

RPCM N22B3A A RPC 01

**cmd** RPC Position – Close (Verify – CI)

51.2 LTL SFCA Mod Valve

Node 2: TCS: LTL SFCA: RPCM N22B3A A RPC 16

RPCM N22B3A A RPC 16

**cmd** RPC Position – Close (Verify – CI)

51.3 LTL TWMV

Node 2: TCS: LTL TWMV: RPCM N22A3A B RPC 16

RPCM N22A3A B RPC 16

**cmd** RPC Position – Close (Verify – CI)

51.4 LTL Regen TWMV

Node 2: TCS: LTL Regen TWMV: RPCM N22A3A B RPC 03

RPCM N22A3A B RPC 03

**cmd** RPC Position – Close (Verify – CI)

51.5 LTL NIA Vent Valve

Node 2: TCS: LTL PPA: Node2 LTL NIA Commands: RPCM N22B3A A RPC 02

RPCM N22B3A A RPC 02

cmd RPC Position – Close (Verify – Cl)

51.6 [LTL NIA Isol Valve](#)

Node 2: TCS: LTL PPA: Node2 LTL NIA Commands: RPCM N22B3A A RPC 15

RPCM N22B3A A RPC 15

cmd RPC Position – Close (Verify – Cl)

51.7 [LTL PPA](#)

Node 2: TCS: LTL PPA: RPCM N22A3A B RPC 17

RPCM N22A3A B RPC 17

cmd RPC Position – Close (Verify – Cl)

NOTE

LTL PPA COMM W/INTSYS must be enabled prior to LT loop activation

52. [VERIFYING CCAA H2O VALVE POSITION](#)

Node 2: TCS: IATCS Details: Node2 CCAA H2O Valve Commands

Node2 CCAA H2O Valve Commands

'Node2 CCAA H2O Valves'

Verify Normal Valve Open Posn – ✓

53. [ENABLING RT I/O COMM BETWEEN INT & LTL PPA](#)

CDH: Primary INT MDM: LB SYS N2 2: RT Status

LB SYS N2 2 RT Status

cmd 9 PPA N2-2 RT Status – Enable **Execute** (Verify – Ena)

54. [LATCHING LT ACCUM](#)

Node 2: TCS: LTL Software

Node2 LTL Software Commands

'LTL IATCS'

'Leak Recovery'

cmd Set Normal Leak Limits – Set

55. [SETTING LTL TWMV SETPOINT](#)

Node 2: TCS: LTL TWMV

Node2 LTL TWMV Commands

'Commands'

'LTL TWMV'



input Temp Setpt – 17.3deg C

**cmd** Temp Setpt – Set **Execute**

Verify Temp Setpt – 17.2 deg C

56. [VERIFYING LTL FDIR STATUS](#)

Node 2: TCS: LTL Software

**Node2 LTL Software Commands**

'LTL IATCS'

√Leak Recovery Auto Shutdown – Ena

√Failure Recovery Fail Rcvy – Ena

√SFCA Overpress Protection Status – Ena

57. [VERIFYING LTL SFCA SOFTWARE STATUS](#)

NOTE

In order to ensure that the LTL SFCA Mod valve is fully opened prior to starting the pump, the LTL SFCA software must be verified to be shutdown prior to sending the LTL ITCS activation command per SPN 25927/4495.

PCS

Node 2: TCS: LTL SFCA

**Node2 LTL SFCA Commands**

'Commands'

'LTL SFCA'

√SFCA Software – Shutdown

58. [COMMANDING LTL STARTUP](#)

NOTE

Node2 LTL loop activation is expected to occur within 75 seconds after the startup N2 LTL loop ITCS command has been issued. The software will automatically retry the startup process (if first attempt fails) which can last another 75 seconds.

Node 2: TCS: LTL Software

**Node2 LTL Software Commands**

'LTL IATCS'

Verify IATCS Status – Idle

Verify IATCS Activation – Not In Prog

**cmd** Startup – Startup

Verify IATCS Activation – In Prog

Wait up to 3 minutes, then

Verify IATCS Status – Oper

Node 2: TCS: LTL PPA

Node2 LTL PPA Commands

'Commands'

'LTL PPA'

Verify Pump Software – Started

Verify Pump Speed: 13325 ± 1250 rpm

59. [ENABLING RT FDIR FOR LTL PPA](#)

CDH: Primary INT MDM: LB SYS N2 2: RT Status

LB SYS N2 2 RT Status

'RT FDIR Status'

cmd 9 PPA N2-2 Enable FDIR **Execute** (Verify – Ena)

'Rt Comm Failed Status'

Verify 9 PPA N2-2 RT Comm Failed Status – blank

60. [SETTING LEAK LIMIT FOR THE LTL PPA](#)

Node 2: TCS

Node2: TCS

'PPA'

Record LTL Avg Accum Qty: \_\_\_\_\_ %

sel LTL Software

Node2 LTL Software Commands

'LTL IATCS'

cmd Set Normal Leak Limits – Set

ACTIVATING CCAA

If Node 1 Activation and Checkout Part 1 not complete,

| Go to step 67.

61. [ACTIVATING NODE 2 SMOKE DETECTOR 1](#)

Node 2: ECLSS: SD1: RPCM N21A4A C RPC 06

RPCM N21A4A C RPC 06

## NODE 2 ACTIVATION AND CHECKOUT PART 2

(ASSY OPS/10A/FIN 1)

Page 23 of 28 pages

**cmd** RPC Position – Close (Verify – CI)

Node 2: ECLSS: SD1

Verify Obscuration, % Contamination < 25

Verify Scatter, % Obscuration per Meter < 1

'Monitoring'

**cmd** Enable

√Status – Enabled

Wait 5 seconds.

'Active BIT'

√Failure – blank

'Passive BIT'

√Lens Status – Clean

√Failure – blank

### 62. [ACTIVATING NODE 2 SMOKE DETECTOR 2](#)

Node 2: ECLSS: SD2

sel RPCM N22A3B C RPC 01

**cmd** RPC Position – Close (Verify – CI)

Node 2: ECLSS: SD2

Verify Obscuration, % Contamination < 25

Verify Scatter, % Obscuration per Meter < 1

'Monitoring'

**cmd** Enable

√Status – Enabled

Wait 5 seconds.

'Active BIT'

√Failure – blank

'Passive BIT'

√Lens Status – Clean

√Failure – blank

63. [CONFIGURING CCAA H2O VALVE](#)

**NOTE**

1. The CCAA dryout valves should be configured in normal (flowthrough) position for CCAA activation.
2. The normal valve must be opened prior to closing the bypass valve to prevent LTL loop deadhead.

63.1 [Verifying CCAA H2O Normal Valve Open](#)

Node 2: TCS: IATCS Details: Node2 CCAA H2O Valve Commands

Node2 CCAA H2O Valve Commands

'Node2 CCAA H2O Valves'

'Normal Valve'

Verify Open Posn – √ and Close Posn – blank

Node 2: TCS: IATCS Details: Node2 CCAA H2O Valve Commands

Node2 CCAA H2O Valve Commands

'Node2 CCAA H2O Valves'

'Bypass Valve'

Verify Open Posn – blank and Close Posn – √

64. [POWERING UP CCAA](#)

Node 2: ECLSS: Node 2 CCAA: CCAA Commands

Node 2 CCAA Commands

```

sel RPCM N22A3B C RPC [X]   13 14 15 17
where [X] =
    RPCM N22A3B C RPC [X]

cmd RPC Position – Close (Verify – Cl)
Repeat
    
```

65. [INITIALIZING CCAA](#)

**Node 2 CCA Commands**

**cmd** Initialize [ $\sqrt$ State – Reset, Test, Off (< 2 minutes)]

65.1 [Inhibiting CCAA Liquid Sensor BITs](#)

sel Node 2 CCAA

**Node 2 CCAA**

sel Water Separator

**Node 2 CCAA WS**

'Liquid Sensor BIT'

'Inhibit'

**cmd** Arm ( $\sqrt$ Status – Armed)

**cmd** Inhibit ( $\sqrt$ Command Status – Sep Liquid BIT Confirm Complete)

sel Node 2 CCAA

**Node 2 CCAA**

'Heat Exchanger Liquid Sensor'

sel HX LS

**Node 2 CCAA HX LS**

'BIT'

'Inhibit'

**cmd** Arm ( $\sqrt$ Status – Armed)

**cmd** Inhibit ( $\sqrt$ Command Status – HX Liquid BIT Confirm Complete)

65.2 [Overriding CCAA Fan Speed](#)

If commanding from **MCC-H**

Verify Analog Override Parameter values with [{5.501 CCAA ANALOG PARAMETER TABLE}](#) (SODF: ECLSS: REFERENCE: THC).

**NOTE**

Changing a hazardous type override value from its current operational value will cause the override type to change from non hazardous to hazardous and will require the operator to send a hazardous ovrd confirm command.

sel CCAA Commands

Node 2 CCAA Commands

'Overrides'

input Fan Normal Speed - 4 9 2 0rpm

input Fan Lock Rotor - 4 4 2 0rpm

input Fan Overspeed - 5 4 2 0rpm

cmd Set

'Incorporate Overrides'

cmd Incorporate (√Override Type - Hazardous)

cmd Hazardous Ovrld Confirm (√Command Status - Confirm Analog Complete)

65.3 [Configuring CCAA TCCV to Full Bypass](#)

'Temperature'

input Temperature - 3 2deg C

cmd Set (√Command Status - Temp Setpoint Complete)

sel Node 2 CCAA

Node 2 CCAA

If TCCV Position < 82 deg

sel TCCV

Node 2 CCAA TCCV

'Sweep'

cmd Arm (√Status - Armed)

cmd Sweep

Wait for TCCV Position ≥ 82 deg, then

cmd Normal (√Command Status - TCCV Auto Normal Complete)

65.4 [Activating CCAA](#)

sel CCAA Commands

Node 2 CCAA Commands

cmd Operate [√State - Startup, On (< 2 minutes)]

sel Node 2 CCAA

Node 2 CCAA

'Fan'

√Speed: 4920 ± 100 rpm

√Fan dp: < 6 mmHg

65.5 [Changing CCAA Temp Setpoint](#)

sel CCAA Commands

Node 2 CCAA Commands

'Temperature'

input Temperature – 2 5deg C (or other temp per crew preference)

**cmd** Set (√Command Status – Temp Setpoint Complete)

66. [SETTING LTL TWMV SETPOINT](#)

Node 2: TCS: LTL TWMV

Node 2 LTL TWMV Commands

'Commands'

'LTL TWMV'

**cmd** CLC – Inh **Execute** (√ – Inh)

input Temp Setpt – 10.1 deg C

**cmd** Temp Setpt – Set **Execute**

Verify Temp Setpt – 10.0 deg C

**cmd** CLC – Ena **Execute** (√ – Ena)

67. [LOADING NEW DEFAULT ORU EXISTENCE PPL TO PMCU MDM](#)

If necessary:

Perform [{1.231 CCS BUILD DATA LOAD COMMAND}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL) using the following, then:

Destination Device – PMCU Primary

Storage Type – EEPROM and DRAM

File to Load – pmca\_ppl\_0003\_4\_a\_03116

Perform [{1.236 CCS DATA LOAD MANAGEMENT}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

## NODE 2 ACTIVATION AND CHECKOUT PART 2

(ASSY OPS/10A/FIN 1)

Page 28 of 28 pages

Perform [{4.413 PMCU MDM TRANSITION B: TRANSITIONING BACKUP MDM 1\(2\) FROM OFF TO WAIT WHILE MDM 2\(1\) IS OPERATIONAL}](#), all (SODF: C&DH: CORRECTIVE), then:

### MCC-H

Perform [{1.231 CCS BUILD DATA LOAD COMMAND}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), using the following:

Destination Device – PMCU Backup

Storage Type – EEPROM

File to Load – pmca\_ppl\_0003\_4\_a\_03116

Perform [{1.236 CCS DATA LOAD MANAGEMENT}](#), all (SODF: GND AVIONICS: C&DH: NOMINAL), then:

Go to [{4.414 PMCU MDM TRANSITION C: TRANSITIONING BACKUP MDM 1\(2\) FROM WAIT TO DIAGNOSTIC/OFF WHILE MDM 2\(1\) IS OPERATIONAL}](#), steps 1 to 3,6 (SODF: C&DH: CORRECTIVE: MDM STATE TRANSITIONS TIER II).



## **VESTIBULE CONFIG FOR DEMATE – LAB1 TO PMA2**

(ASSY OPS/10A/FIN)

Page 1 of 8 Pages

### OBJECTIVE:

Reconfigure the PMA2 to LAB1 vestibule in preparation for PMA2 demate and relocate to Node 2 fwd. This procedure will remove ground straps, disconnect Oxygen and Nitrogen Vestibule lines, and reinstall Hatch Thermal Cover Blanket and CBM CPAs.

### LOCATION:

Installed: PMA2, LAB1 Vestibule

Stowed: √IMS

### DURATION:

4 hours 30 minutes

### CREW:

Two

### PARTS:

Hatch Thermal Cover P/N 683-80441-2

PMA CBCS Target P/N 1F92502-503 S/N 2F262-0329-09

CBM Controller Panel Assy (two) P/N 2355260-1-1

CBM Controller Panel Assy (one) P/N 2355260-2-1

CBM Controller Panel Assy (one) P/N 2355260-3-1

EVA Hatch Window Cover Kit (P/N 683-13141-1)

Hatch Window Cover Assembly (w/ Hook Velcro Tabs)

Loop Velcro tabs (seven)

### MATERIALS:

Clean Room Gloves P/N SEG33116979-301

Dry Wipes

Zip Tie

Towel

Braycote

0.375" Gamah Seal (four) P/N S14704C

0.375" Retaining Ring (four) P/N R14104C

### TOOLS:

Vacuum Cleaner Assembly

Mini Maglite

DCS 760 Camera

Brass Picks

Fluid Fitting Torque Device (FFTD) and Gamah Seal Maintenance Kit

Fluid Fitting Torque Device (S/N 001)

0.875" Drive Gear

0.625" Reaction Gear

0.375" Retaining Ring Installation/Removal Tool

0.375" Gamah Seal Removal Tool

### ISS IVA Toolbox:

Drawer 1:

5/8" Combination Wrench

5/8" Crowfoot, 3/8" Drive

7/8" Crowfoot, 3/8" Drive

## VESTIBULE CONFIG FOR DEMATE – LAB1 TO PMA2

(ASSY OPS/10A/FIN)

Page 2 of 8 Pages

Drawer 2:

- Ratchet, 3/8" Drive
- 1/4" to 3/8" Adapter
- (40-200 in-lbs) Trq Wrench, 3/8" Drive
- (10-50 in-lbs) Trq Wrench, 1/4" Drive

Drawer 5:

- 8-1/4" Long, 2" Cut Scissors

### REFERENCE PROCEDURE(S):

- 1.100 CBM CONTROLLER PANEL ASSEMBLY INSTALLATION – GENERIC
- 1.103 ACBM TO PCBM GROUND STRAP REMOVAL
- 1.404 CBCS PMA TARGET ASSEMBLY INSTALLATION/REMOVAL
- 1.602 LAB FWD HATCH THERMAL COVER REMOVAL/INSTALLATION

### WARNING

Failure to maintain clean environment during oxygen system maintenance could result in fire hazard.

#### 1. OXYGEN SAFING STEPS

To prevent fire hazard during this procedure, minimize the time connectors and caps/plugs are open or cover them with Teflon Bags or Disposable Gloves.

If Disposable Gloves become contaminated or damaged, replace immediately with clean Disposable Gloves.

If contaminants are found

- Notify **MCC-H**
- Photo document. (DCS 760 Camera)
- Remove using the Brass Picks and retain for return to ground.

If contaminants cannot be completely removed temporarily cap connectors and hold for detailed **MCC-H** analysis.

### CAUTION

Care must be taken while working in the vicinity of Hatch Seal to avoid rubbing, scratching, or placing any type of direct pressure upon Seal. Damaging Hatch Seal could prevent Hatch from maintaining pressure when closed.

Check **MCC-H** to verify O<sub>2</sub>/N<sub>2</sub> lines are safed and at ambient pressures.

#### 2. ACCESS

- 2.1 Remove Axial Port Closeout from LAB1 to PMA2 vestibule, 1/4 Turn Fasteners (sixteen).  
Roll Closeout Panel from loose end toward attached end.  
Temporarily stow.

# VESTIBULE CONFIG FOR DEMATE – LAB1 TO PMA2

(ASSY OPS/10A/FIN)

Page 3 of 8 Pages

## 2.2 ✓ Stowage, equipment removed, from PMA2

Clean PMA2 visibly clean (Vacuum Cleaner Assembly).

### NOTE

The Deck ACBM to PCBM Ground Strap interferes with the removal of the Nitrogen Recharge Hose. The following step will remove the ACBM to PCBM Ground Straps (two).

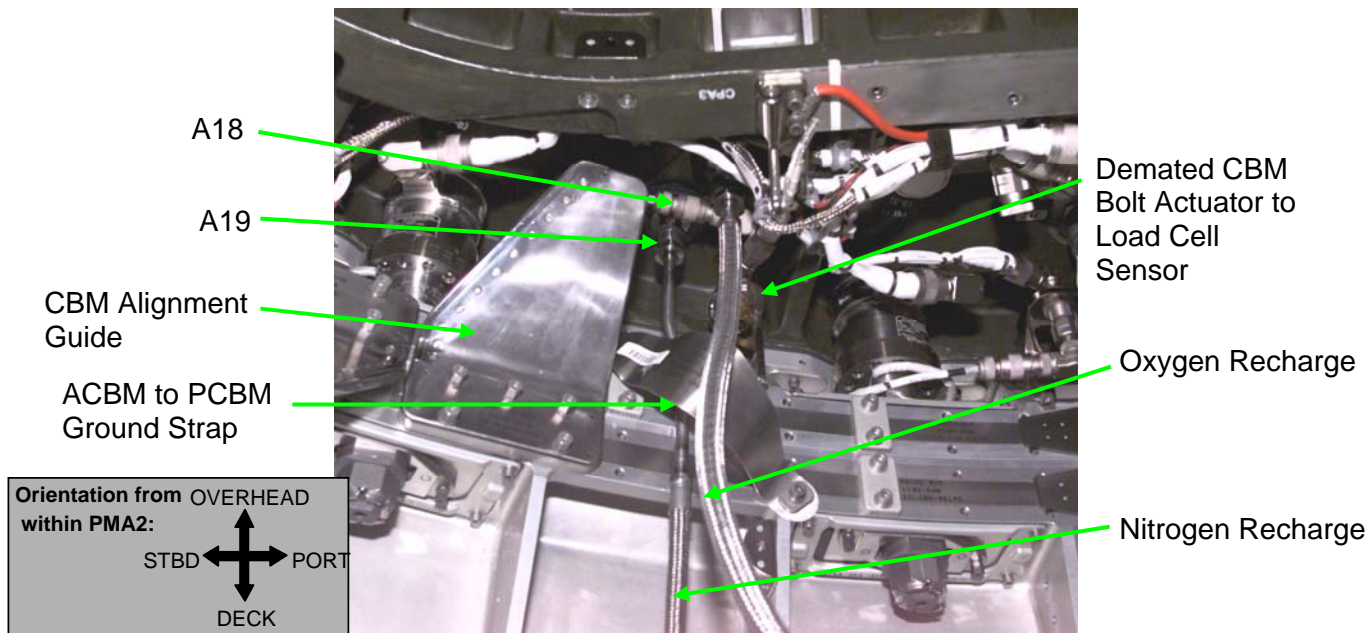


Figure 1.- Oxygen and Nitrogen Recharge hoses connected to LAB1 Fwd.

### 3. REMOVING ACBM TO PCBM GROUND STRAPS

Perform {1.103 ACBM TO PCBM GROUND STRAP REMOVAL}, all (SODF: S&M: NOMINAL: VESTIBULE), then:

Refer to Figure 1.

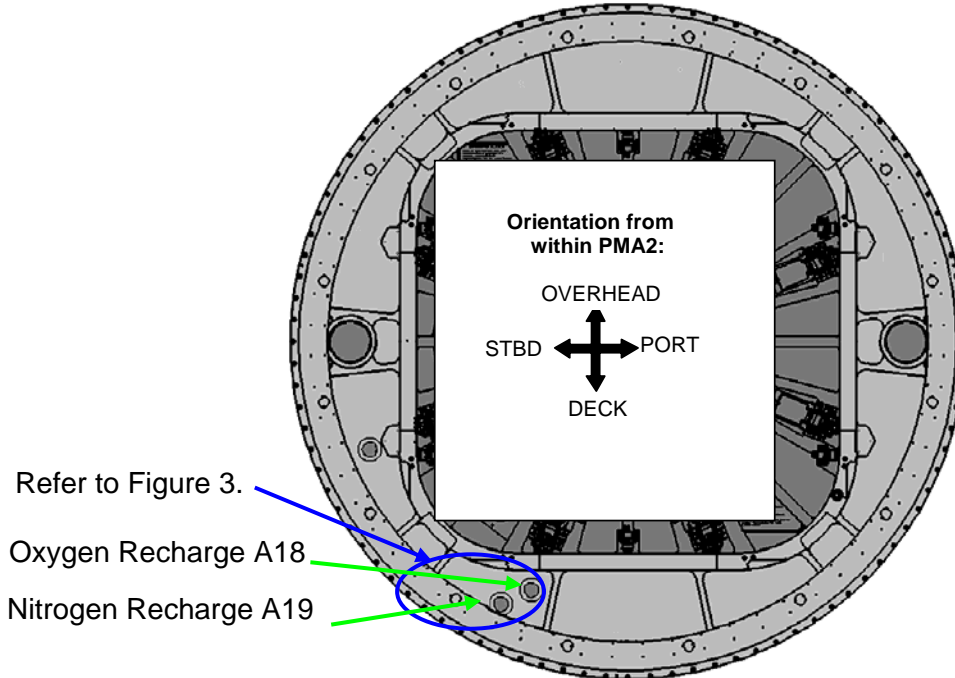


Figure 2.- LAB Fwd External Bulkhead (orientation from within PMA2 Looking Aft).

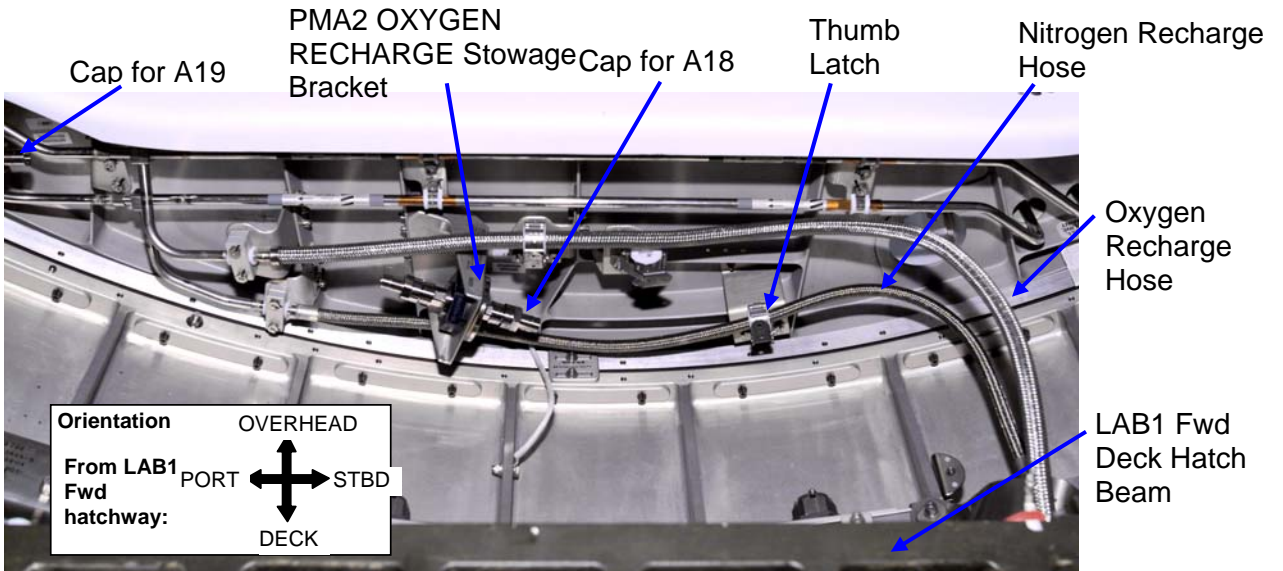


Figure 3.- Oxygen and Nitrogen Recharge Hoses in PMA2 to LAB1 Vestibule.

# VESTIBULE CONFIG FOR DEMATE – LAB1 TO PMA2

(ASSY OPS/10A/FIN)

Page 5 of 8 Pages

**NOTE**

Gamah fitting and FFTD reference information can be found in the following procedures:

- {A.2.1 FLUID FITTING TORQUE DEVICE (FFTD) ASSEMBLY AND USAGE}
- {A.2.3 MATING GAMAH FITTING USING THE FFTD}
- {A.2.13 GAMAH SEAL R&R}

(SODF: IFM: REFERENCE: APPENDIX A: ISS IVA TOOLS)

Table 1. Gamah Fitting and FFTD Torque Data

Item to be Demated	Interface	FFTD Input Torque (in-lbs)	FFTD Output Torque (in-lbs)	FFTD Head Size (in)	
				Drive Head	Reaction Head
Oxygen Recharge	Stowage Bracket	N/A	185	N/A	N/A
Nitrogen Recharge	Stowage Bracket	N/A	185	N/A	N/A
Cap	A18	38	185	0.875	0.625
Cap	A19	38	185	0.875	0.625

**WARNING**

Failure to maintain clean environment during oxygen system maintenance could result in fire hazard.

**CAUTION**

When not using the FFTD to tighten a gamah fitting, failure to maintain counter torque could result in rotation of the feedthrough and damage to feedthrough seal.

**4. RESTOWING RECHARGE HOSES ONTO PMA2 STOWAGE BRACKETS**

4.1 During disconnection of Oxygen and Nitrogen Hose:  
 Inspect both sides of each gamah fitting for damage and debris before mating.  
 Report damage and debris to **MCC-H**.  
 Inspect male threads for absence of Braycote before mating.  
 If required, apply one drop of Braycote to male threads.  
 Spread Braycote around threads using gloved hand.  
 Refer to Figures 1, 2, 3 and Table 1.

PMA2      4.2 Loosen Gamah Cap on PMA2 OXYGEN RECHARGE Stowage Bracket (Ratchet, 3/8" Drive; 7/8" Crowfoot, 3/8" Drive; 5/8" Crowfoot, 3/8" Drive; 5/8" Combination Wrench)

LAB1      4.3 Loosen Oxygen Recharge Hose on LAB1 Fwd Bulkhead A18 (FFTD; 0.875" Drive Gear; 0.625" Reaction Gear; Ratchet, 3/8" Drive).

4.4 Don Clean Room Gloves.

## VESTIBULE CONFIG FOR DEMATE – LAB1 TO PMA2

(ASSY OPS/10A/FIN)

Page 6 of 8 Pages

- Gamah Cap ←|→ PMA2 OXYGEN RECHARGE Stowage Bracket
- 4.5 Remove and replace Gamah Seal on cap (0.375" Gamah Seal Removal Tool, 0.375" Retaining Ring Removal/Installation Tool). Temporarily stow Gamah Cap for use on LAB Bulkhead A18.
  - 4.6 Oxygen Recharge Hose ←|→ LAB1 A18  
Gamah Cap →|← LAB1 A18 hand tighten
  - 4.7 Remove and replace Gamah seal on Oxygen Recharge Hose (0.375" Gamah Seal Removal Tool, 0.375" Retaining Ring Removal/Installation Tool).
- PMA2
- 4.8 OXYGEN RECHARGE Hose →|← PMA2 OXYGEN RECHARGE Stowage Bracket hand tight
  - 4.9 Tighten, torque OXYGEN RECHARGE hose to PMA2 Oxygen Recharge Stowage Bracket to 185 in-lbs [Ratchet, 3/8" Drive; (40-200 in-lbs) Trq Wrench; 7/8" Crowfoot, 3/8" Drive; 5/8" Crowfoot, 3/8" Drive]
- LAB1
- 4.10 Tighten, torque gamah cap to 38 in-lbs [input torque) [FFTD; 0.875" Drive Gear; 0.625 Reaction Gear; 1/4" to 3/8" Adapter; (10-50 in-lbs) Trq Wrench, 1/4" Drive].
  - 4.11 Doff Clean Room Gloves.
  - 4.12 Repeat for Nitrogen Recharge Hose on LAB1 Fwd Bulkhead (A19).

# VESTIBULE CONFIG FOR DEMATE – LAB1 TO PMA2

(ASSY OPS/10A/FIN)

Page 7 of 8 Pages

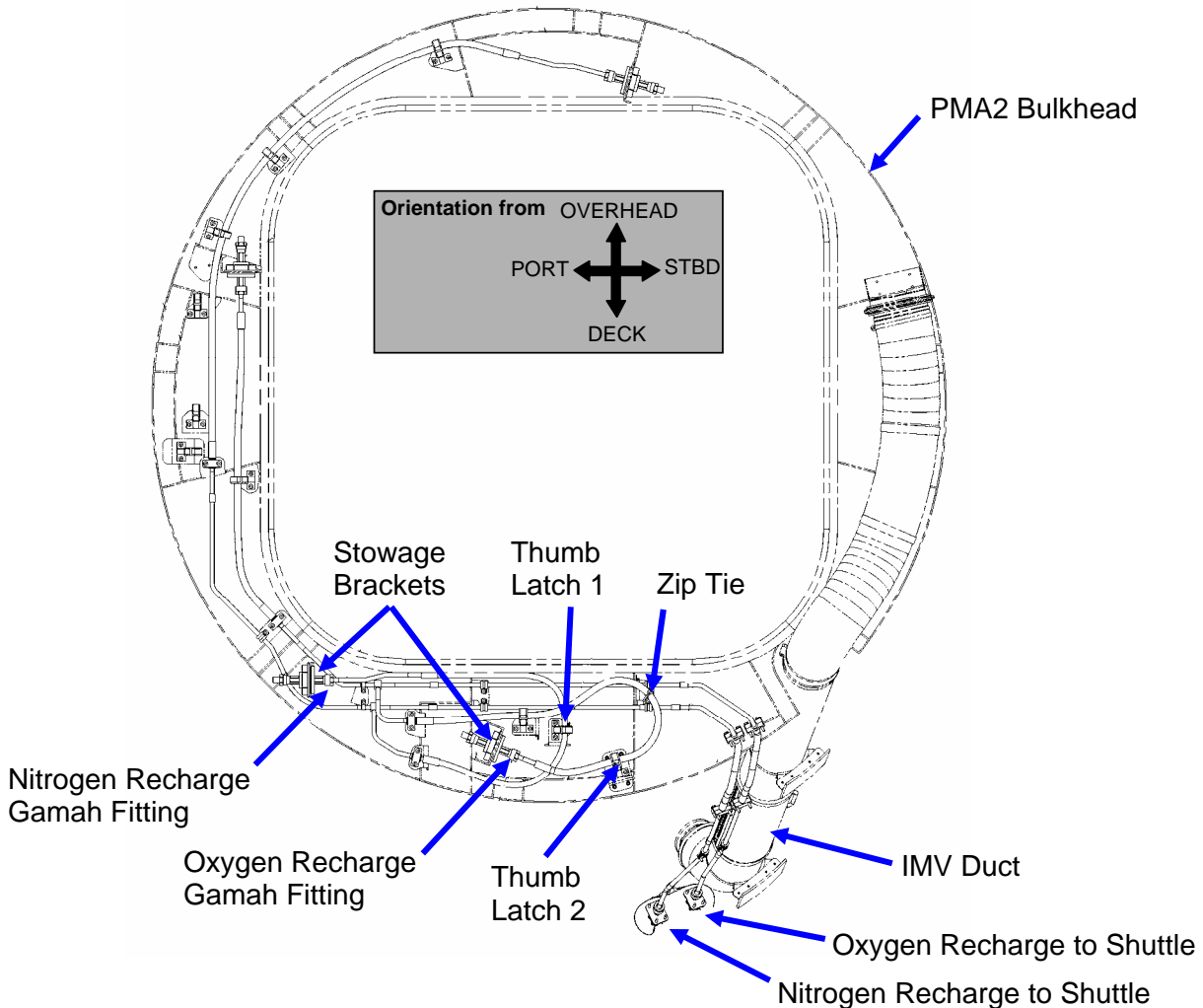


Figure 4.- PMA2 Aft Bulkhead showing final configuration of Oxygen and Nitrogen Recharge lines - View Looking Fwd in to PMA2 from LAB1.

## 5. RESTRAINING OXYGEN AND NITROGEN HOSES TO PMA2 BULKHEAD

Refer to Figure 4.

- 5.1 Latch NITROGEN RECHARGE hose to Thumb Latch 1.
- 5.2 Latch OXYGEN RECHARGE hose to Thumb Latch 2.
- 5.3 Restrain OXYGEN RECHARGE hose to structure (Zip Tie).

### NOTE

During the original installation of the Oxygen and Nitrogen Recharge Hoses, a CBM Load Cell Connector interfered with the mating of the gamah connections A18, A19. This connector was demated. It must now be remated for proper operation of the LAB1 Fwd CBM.



## VESTIBULE CONFIG FOR DEMATE – LAB1 TO PMA2

(ASSY OPS/10A/FIN)

Page 8 of 8 Pages

### 6. REMATING CBM BOLT ACTUATOR CONNECTOR

Refer to Figure 2.

6.1 Remove Kapton Tape from CBM Bolt Actuator to Load Cell Sensor J1 FNFR connector and cable 683-13497-2.

6.2 CBM Bolt Actuator to Load Cell Sensor J1 FNFR →|← 683-13497-2

### 7. INSTALLING CBM CONTROLLER PANEL ASSEMBLIES

7.1 Perform {1.100 CBM CONTROLLER PANEL ASSEMBLY INSTALLATION – GENERIC}, all (SODF: S&M: NOMINAL: VESTIBULE), then:

7.2 √All Stowage, tools, equipment removed from PMA2 and vestibule

### 8. INSTALLING CBCS TARGET

8.1 Perform {1.404 PMA TARGET ASSEMBLY INSTALL/REMOVE}, Target install steps only (SODF: S&M: NOMINAL: VESTIBULE), then:

8.2 √CBCS Target mirror cover removed and all stowage, tools, equipment removed from PMA2 and vestibule

8.3 Photo document final PMA2-to-LAB1 vestibule configuration (DCS 760 Camera).

#### NOTE

Hatch thermal cover CBCS Flap must be left open to allow the CBCS Camera to view target on oncoming element (NOD2).

### 9. INSTALLING LAB FWD HATCH THERMAL COVER

9.1 Perform {1.602 LAB FWD HATCH THERMAL COVER REMOVAL/INSTALLATION}, Installation steps only (SODF: S&M: NOMINAL: HATCH), then:

9.2 √Thermal Cover CBCS flap open

9.3 Photo document final installation of Hatch Thermal Cover (DCS 760 Camera).

### 10. POST MAINTENANCE

10.1 Check for FOD within 3' radius of worksite.

10.2 Notify **MCC-H** of task completion.

10.3 Stow equipment, tools, materials.  
Update IMS as required.



## VESTIBULE CONFIG FOR INGRESS – NOD2 TO PMA2

(ASSY OPS/10A/FIN)

Page 1 of 8 pages

### OBJECTIVE:

Remove Hatch Thermal Cover, CBCS Target and CBM CPAs, then connect Oxygen and Nitrogen Vestibule lines from PMA2 to NOD2. ACBM to PCBM Ground Straps and the Axial Port Closeout will also be installed.

### LOCATION:

Installed: PMA 2, NOD2 Vestibule

### DURATION:

4 hours

### CREW

Two

### PARTS:

Axial Port Closeout P/N 683-60461-10

CBM Ground Straps (two) P/N 683-13477-7

### MATERIALS:

Clean Room Gloves P/N SEG33116979-301

Dry Wipes

0.375" Metal Seal (four) P/N S14704C

0.375" Retaining Ring (four) P/N R14104C

Braycote

Towel

### TOOLS:

DCS 760 Camera

Mini Maglite (Use as needed)

Fluid Fitting Torque Device (FFTD) and Gamah Seal Maintenance Kit

Fluid Fitting Torque Device (S/N 001)

Brass Picks

0.875" Drive Gear

0.625" Reaction Gear

0.375" Retaining Ring Installation/Removal Tool

0.375" Gamah Seal Removal Tool

### ISS IVA Toolbox:

Drawer 1:

5/8" Combination Wrench

7/8" Crowfoot, 3/8" Drive

Drawer 2:

Ratchet, 3/8" Drive

1/4" to 3/8" Adaptor

(40-200 in-lbs) Trq Wrench, 3/8" Drive

(10-50 in-lbs) Trq Wrench, 1/4" Drive

Drawer 5:

Scissors

REFERENCE PROCEDURES

1.101 CBM CONTROLLER PANEL ASSEMBLY REMOVAL – GENERIC

1.404 PMA TARGET ASSEMBLY INSTALLATION/REMOVAL

1.102 ACBM TO PCBM GROUND STRAP INSTALLATION

1.602 LAB FWD HATCH THERMAL COVER REMOVAL/INSTALLATION

**WARNING**

Failure to maintain clean environment during oxygen system maintenance could result in fire hazard.

1. OXYGEN SAFETY STEPS

To prevent fire hazard during this procedure:

Minimize the time connectors and caps/plugs are open or cover using Teflon Bags or Disposable Gloves.

If Clean Room Gloves become contaminated or damaged, replace immediately with new Clean Room Gloves.

If contaminants are found

Notify **MCC-H**.

Photo document (DCS 760 Camera).

Remove using the Brass Picks and retain for return to ground.

If contaminants cannot be completely removed

Temporarily cap connectors and hold for detailed **MCC-H** analysis.

**CAUTION**

Care must be taken while working in the vicinity of Hatch Seal to avoid rubbing, scratching, or placing any type of direct pressure upon Seal. Damaging Hatch Seal could prevent Hatch from maintaining pressure when closed.

2. ACCESS

2.1 Open NOD2 forward Hatch per Decal.

# VESTIBULE CONFIG FOR INGRESS – NOD2 TO PMA2

(ASSY OPS/10A/FIN)

Page 3 of 8 pages

- 2.2 Perform [{1.602 LAB FWD HATCH THERMAL COVER REMOVAL/INSTALLATION}](#), Removal steps only (SODF: S&M: NOMINAL: VESTIBULE), then:
- 2.3 Perform [{1.404 PMA TARGET ASSEMBLY INSTALLATION/REMOVAL}](#), Removal steps only (SODF: S&M: NOMINAL: VESTIBULE), then:
- 2.4 Perform [{1.101 CBM CONTROLLER PANEL ASSEMBLY REMOVAL – GENERIC}](#), Removal steps only for all four CPA's (SODF: S&M: NOMINAL: VESTIBULE), then:

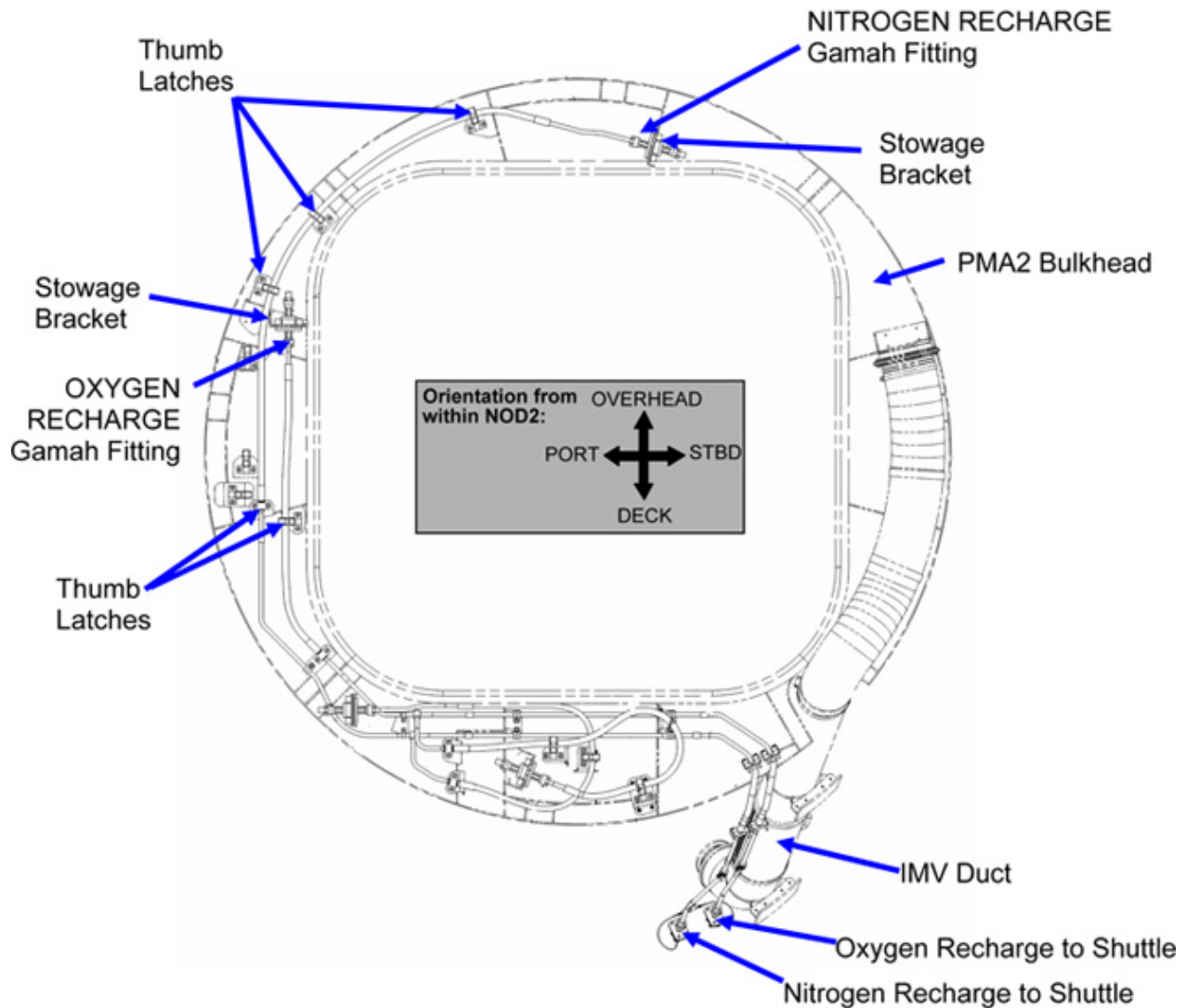


Figure 1. PMA2 Aft Bulkhead showing path of Oxygen and Nitrogen Recharge lines. View Looking Fwd in to PMA2 from NOD2.

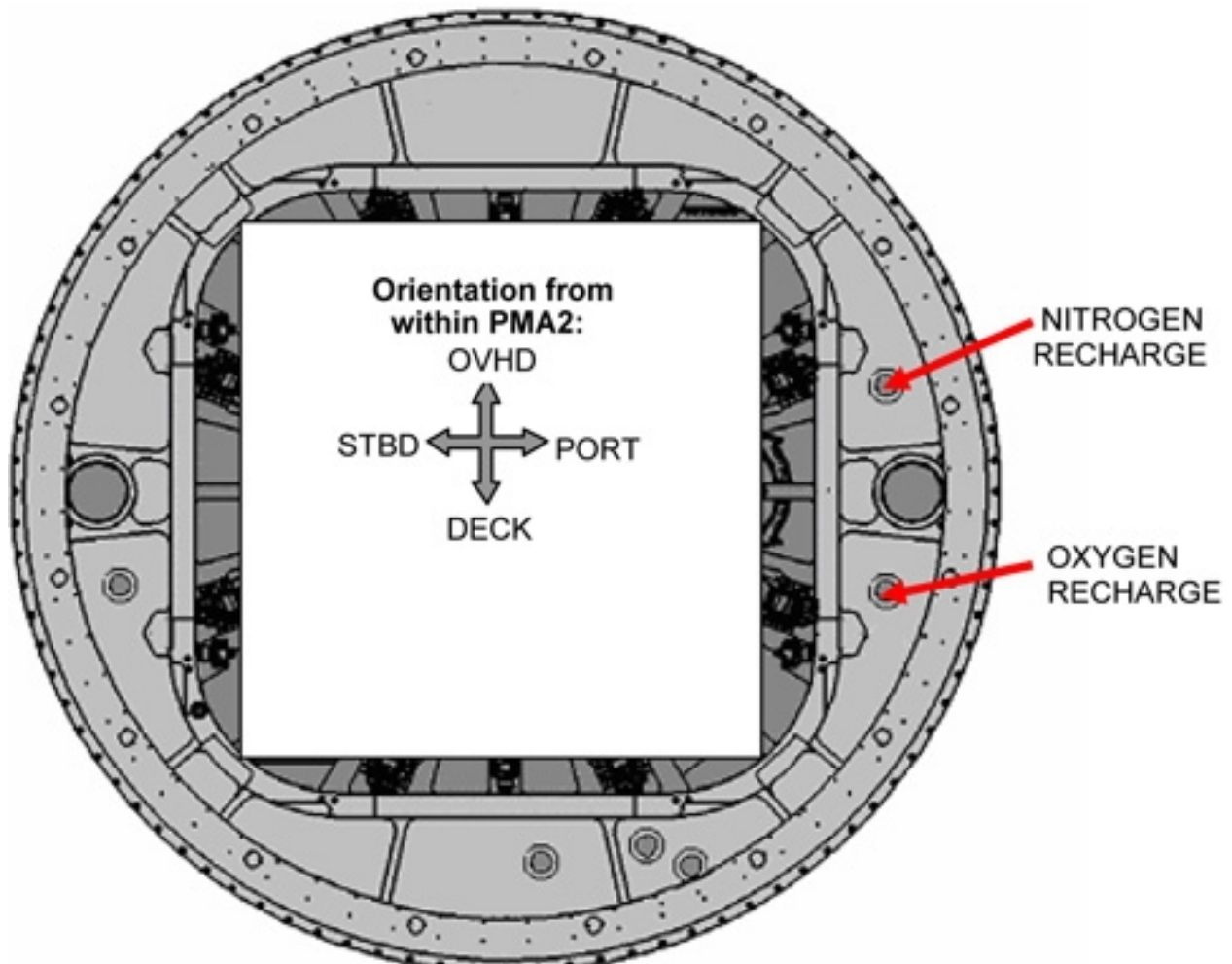


Figure 2. NOD2 Fwd External Bulkhead (orientation from within PMA2 looking Aft).

NOTE

Gamah fitting and FFTD reference information can be found in:

[{A.2.1 FLUID FITTING TORQUE DEVICE \(FTTD\) ASSEMBLY AND USAGE}](#)

[{A.2.3 MATING GAMAH FITTING USING THE FFTD}](#)

[{A.2.13 GAMAH SEAL R&R}](#) (SODF: IFM: REFERENCE: APPENDIX A: ISS IVA TOOLS)

**Table 1. Nitrogen and Oxygen Recharge line reconfiguration**

Recharge Line Name/Function	NOD2 Fwd Bulkhead Interface	Output Torque	Input Torque	FFTD Head Size (in.)	
		(in-lbs)	(in-lbs)	Drive Head	Reaction Head
NITROGEN RECHARGE	Nitrogen Rechg	185	38	0.875	0.625
OXYGEN RECHARGE	Oxygen Rechg	185	38	0.875	0.625

<b>WARNING</b>
Failure to maintain clean environment during oxygen system maintenance could result in fire hazard.

3. RECONFIGURING OXYGEN AND NITROGEN LINES

- PMA2
  - 3.1 Release NITROGEN RECHARGE line from PMA2 bulkhead as needed to reach NOD2 bulkhead (thumb latches). Close thumb latches. Refer to Figure 1.
  - 3.2 During connection of oxygen and nitrogen lines: Inspect both sides of each gamah fitting for damage, debris before mating. Report damage, debris to **MCC-H**. Inspect male threads for absence of Braycote before mating. If required, apply one drop of Braycote to male threads. Spread around threads using gloved hand. Refer to Figures 1, 2 and Table 1.
- NOD2
  - 3.3 Loosen NOD2 NITROGEN RECHRG, OXYGEN RECHRG feedthrough caps (two) (FFTD; Ratchet, 3/8" Drive). Refer to Figure 2.
- PMA2
  - 3.4 Loosen OXYGEN RECHARGE, NITROGEN RECHARGE lines from PMA2 stowage brackets (Ratchet, 3/8" Drive; 7/8" Crowfoot, 3/8" Drive; 5/8" Combination Wrench). Refer to Figure 1.
  - 3.5 Don Disposable Clean Room Gloves.

## VESTIBULE CONFIG FOR INGRESS – NOD2 TO PMA2

(ASSY OPS/10A/FIN)

Page 6 of 8 pages

- NITROGEN RECHARGE line ←|→ PMA2 NITROGEN RECHARGE Stowage bracket
- NOD2
- 3.6 Remove and replace Gamah seal on NITROGEN RECHARGE line (0.375" Gamah Seal Removal Tool, 0.375" Retaining Ring Removal/Installation Tool).
- 3.7 Gamah cap ←|→ NOD2 NITROGEN RECHRG feedthrough NITROGEN RECHARGE line →|← NOD2 NITROGEN RECHRG feedthrough per Table1
- 3.8 Remove and replace Gamah seal on NITROGEN RECHARGE Gamah cap (0.375" Gamah Seal Removal Tool, 0.375" Retaining Ring Removal/Installation Tool).
- PMA2
- 3.9 NITROGEN RECHARGE Gamah cap →|← PMA2 NITROGEN RECHARGE Stowage bracket, hand tighten Doff Latex Gloves.
- 3.10 Repeat steps 3.1 to 3.9 for NOD2 OXYGEN RECHRG connection.
- 3.11 Torque PMA NITROGEN RECHARGE and OXYGEN RECHARGE caps to 185 in-lbs (Ratchet, 3/8" Drive; (40-200 in-lbs) Trq Wrench, 3/8" Drive; 7/8" Crowfoot, 3/8" Drive, 5/8" Combination Wrench).
- NOD2
- 3.12 Torque NOD2 NITROGEN, OXYGEN RECHRG Gamah connections to 38 in-lbs (input torque) (FFTD; 1/4" to 3/8" Adaptor; (10-50 in-lbs) Trq Wrench, 1/4" Drive).
4. [INSTALLING ACBM TO PCBM GROUND STRAPS](#)
- 4.1 Perform [{1.102 ACBM TO PCBM GROUND STRAP INSTALLATION}](#), all (SODF: S&M: NOMINAL: VESTIBULE), then:
- 4.2 Photo document oxygen/nitrogen line routing and PCBM Ground Strap installation (DCS 760 Camera).
5. [INSTALLING OF AXIAL PORT CLOSEOUT](#)
- 5.1 Remove Axial Port Closeout from stowage.

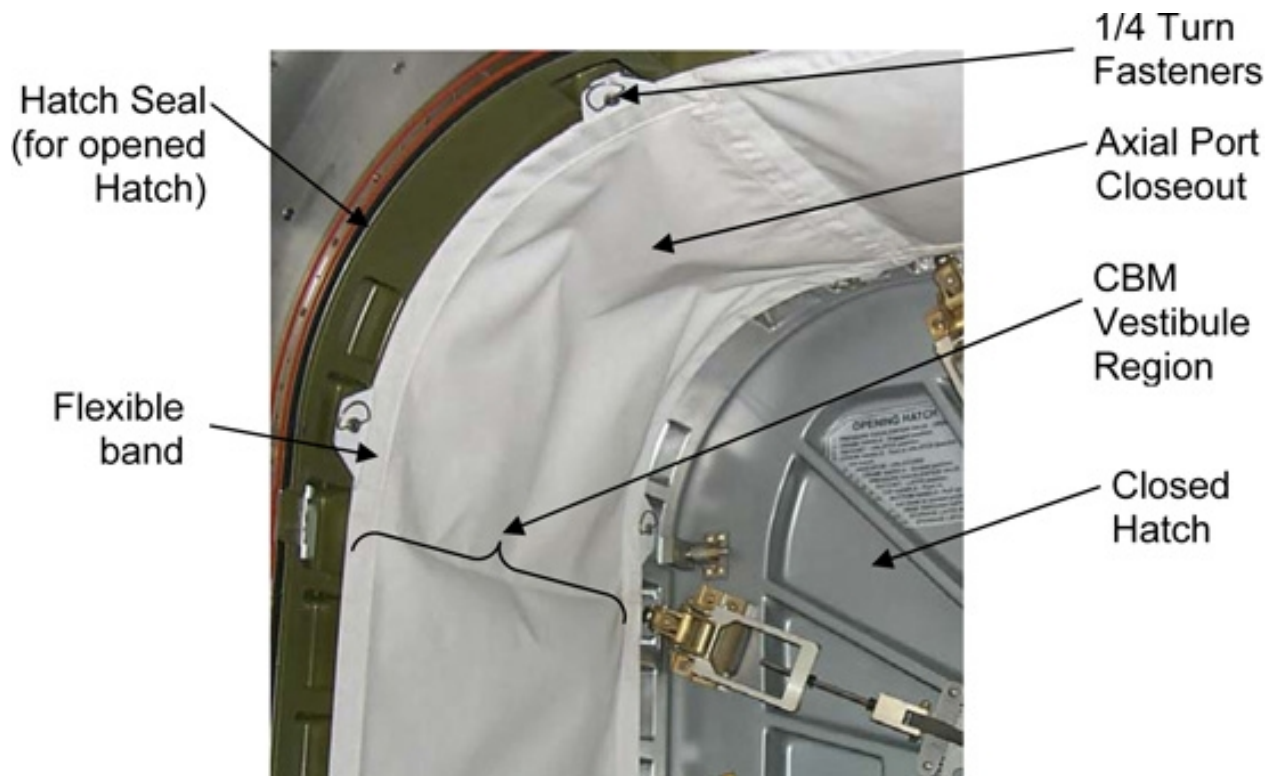


Figure 3. Installation of Axial Port Closeout.

**NOTE**  
The flexible bands in the sleeves of the Closeout are placed along the curved portion of the hatch opening.

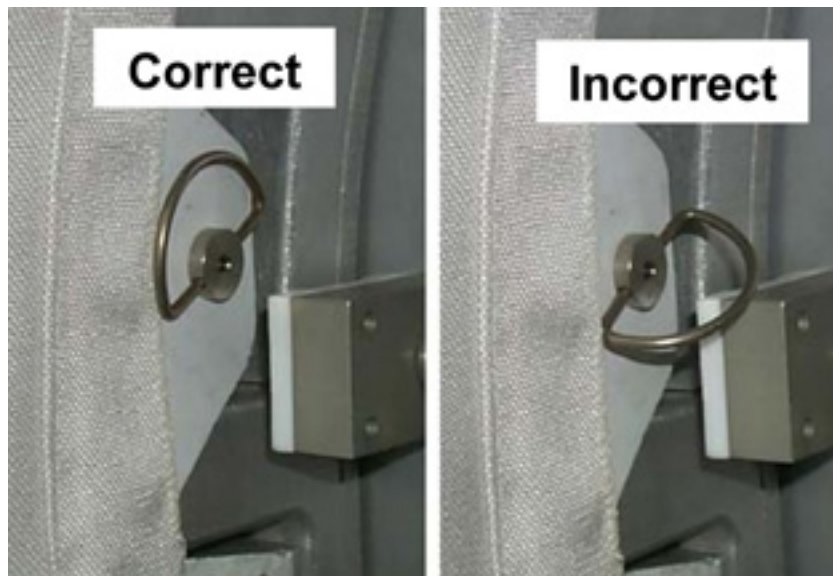


Figure 4. D-rings for Closeout.



**CAUTION**

Ensure rings for 1/4 turn fasteners are flush to prevent damage to D-rings if the hatch is closed. Refer to Figure 5.

- 5.2 Unroll Closeout while installing over CBM Vestibule.  
Engage 1/4 Turn Fasteners into mounting brackets, flattening D-rings against the Closeout.  
Refer to Figures 3, 4.

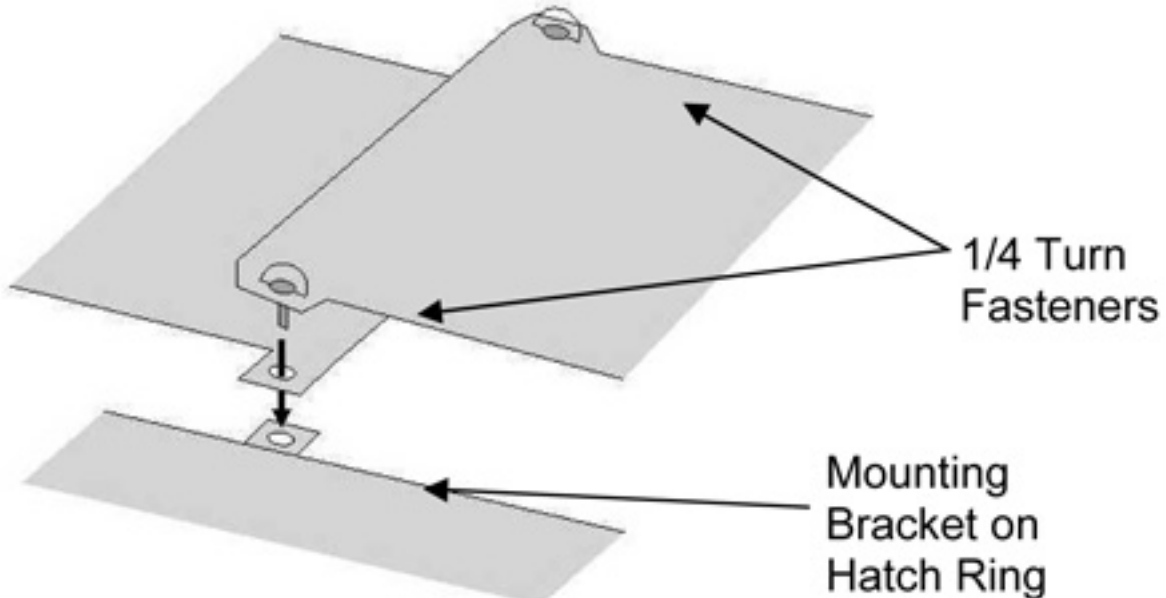


Figure 5. Overlapping Ends of Closeout for Final Attachment.

- 5.3 Overlap ends of Closeout, if necessary, detaching 1/4 Turn Fasteners at end of Closeout.  
Reattach 1/4 Turn Fasteners at end of Closeout by inserting through tabs on other end of Closeout.  
Press Velcro at Closeout ends together.  
Refer to Figure 5.
6. POST MAINTENANCE
- 6.1 Notify **MCC-H** of task completion.
- 6.2 √IMS for stowage location of materials  
Stow tools, materials.



# VESTIBULE CONFIG FOR DEMATE NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 1 of 16 pages

## Parameters 1. YY\_ZZ\_Choice

MDM	SPD Card [YY]	Bus [ZZ]
	[YY]	[ZZ]
Primary INT MDM	SPD 3	LB SEPS N2 14
Primary INT MDM	SPD 1	LB SEPS N2 23
Primary INT MDM	SPD 5	LB SYS N2 1
Primary INT MDM	SPD 0	LB SYS N2 2

### OBJECTIVE:

This procedure will deoutfit the vestibule between the NOD1 and NOD2 modules in preparation for relocating NOD2 to LAB1 forward.

### LOCATION:

NOD1-NOD2 Vestibule

### DURATION:

2 Hours

### CREW\*

Two

### PARTS:

Jumper Protective Plugs (12)

Bulkhead Connector Protective Caps (10)

IMV Caps (2) P/N 683-15016-1

IMV Caps (1) P/N 683-15016-6

Face O-Ring (3) (P/N 2-255S0604)

Bore O-Ring (3) (P/N 2-248S0604)

### MATERIALS:

Towel

Braycote

### TOOLS REQUIRED:

Mini Maglite

Portable Fan (Crew Preference)

### ISS IVA Toolbox:

Drawer 2:

Ratchet, 1/4" Drive

7/16" Deep Socket, 1/4" Drive

1/2" Deep Socket, 1/4" Drive

(10-50 in-lbs) Trq Wrench, 1/4" Drive

1/4" to 3/8" Adapter

Drawer 3:

#2 Long Torq Driver, 3/8" Drive

REFERENCED PROCEDURE(S):

1.104 CBM CENTER DISK COVER INSTALLATION

**CAUTION**

Care must be taken while working in the vicinity of hatch seal to avoid rubbing, scratching, or placing any type of direct pressure upon seal. Damaging hatch seal could prevent Hatch from maintaining pressure when closed.

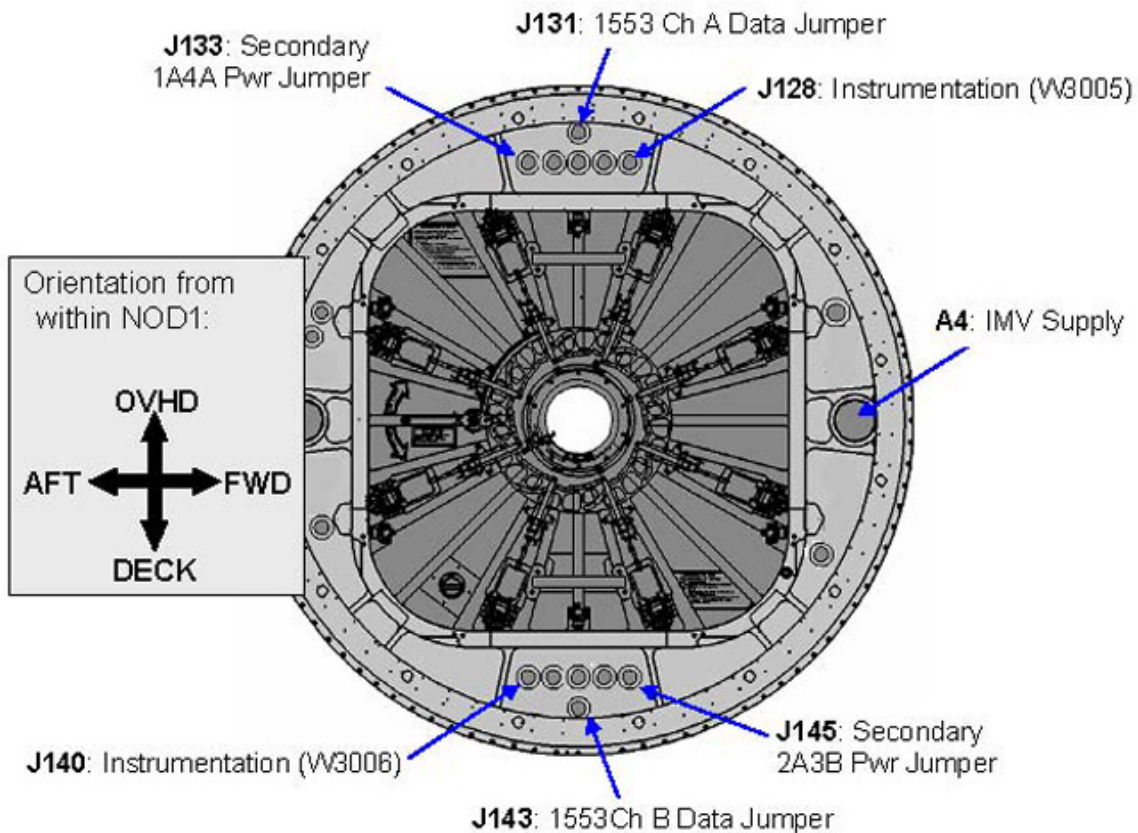


Figure 1. NOD2 Aft Bulkhead, External View Looking Port when NOD2 is mated to NOD1 Port.

1. [REMOVING SECONDARY POWER JUMPERS](#)

1.1 [Verifying ISS Power to NOD2 is safed:](#)

PCS

US Lab: EPS: LAB1P3

Lab Rack LAB1P3

sel DDCU LA1A

DDCU LA1A

'RPCM LA1A4A'

sel F

RPCM LA1A4A F

Verify Integ Counter – incrementing

sel RPC 2

RPCM LA1A4A F RPC 02

Verify RPC Position – Op

Verify Close Cmd – Inh

US Lab: EPS: LAB106

Lab Rack LAB106

sel DDCU LA3B

DDCU LA3B

'RPCM LA2A3B'

sel D

RPCM LA2A3B D

Verify Integ Counter – incrementing

sel RPC 4

RPCM LA2A3B D RPC 04

Verify RPC Position – Op

Verify Close Cmd – Inh

**Table 1. Secondary 1A4A Pwr Jumper (W3001)**

Function	P/N	Harness #	NOD1	NOD2
Secondary 1A4A Pwr	1F89713	W3001	J33	J133

- 1.2 Secondary 1A4A Pwr Jumper W3001 P33 ←|→ NOD1 J33  
Secondary 1A4A Pwr Jumper W3001 P133 ←|→ NOD2 J133  
Refer to Figure 1, Table 1.
- 1.3 Protective caps →|← NOD1 J33, NOD2 J133 feedthroughs  
Protective plugs →|← Secondary 1A4A Pwr Jumper W3001  
Stow jumper in Vestibule Outfitting Kit (VOK) CTB.

Refer to Figure 1, Table 1.

**Table 2. Secondary 2A3B Power Jumper (W3006)**

Function	P/N	Harness #	NOD1	NOD2
Secondary 2A3B Pwr	1F89715	W3002	J45	J145

1.4 Secondary 2A3B Pwr Jumper W3002 P45 ←|→ NOD1 J45  
Secondary 2A3B Pwr Jumper W3002 P145 ←|→ NOD2 J145  
Refer to Figure 1, Table 2.

1.5 Protective caps →|← NOD1J45, NOD2 J145 feedthroughs  
Protective plugs →|← Secondary 2A3B Pwr Jumper W3002  
Stow Jumper in Vestibule Outfitting Kit (VOK) CTB.  
Refer to Figure 1, Table 2.

2. REMOVING 1553 DATA JUMPERS

NOTE

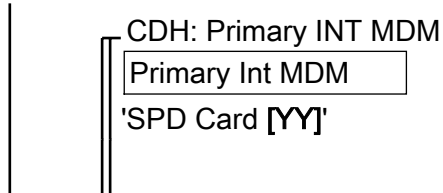
1. The following steps reconfigure the C&DH busses to remove 1553 Jumpers by verifying all busses are on bus channel A and inhibiting Auto Channel Switching.
2. Table 3 provides values for variables [YY] and [ZZ] for use in navigating to the four busses to be safed.

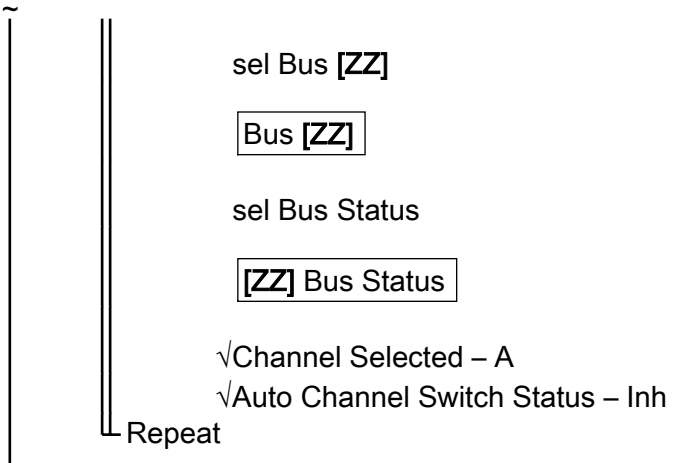
2.1 ISS ↓ **MCC-H** go for INT MDM Bus Safing.

**Table 3. 1553 Busses being safed for 1553 Jumper Removal**

MDM	SPD Card [YY]	Bus [ZZ]
Primary INT MDM	SPD 3	LB SEPS N2 14
Primary INT MDM	SPD 1	LB SEPS N2 23
Primary INT MDM	SPD 5	LB SYS N2 1
Primary INT MDM	SPD 0	LB SYS N2 2

2.2 For all busses in Table 3, where [YY] is the SPD card, [ZZ] is the Bus:





NOTE

The 1553 Jumpers are separated into four segments to allow the placement of connectors next to each hatchway the jumper passes through.

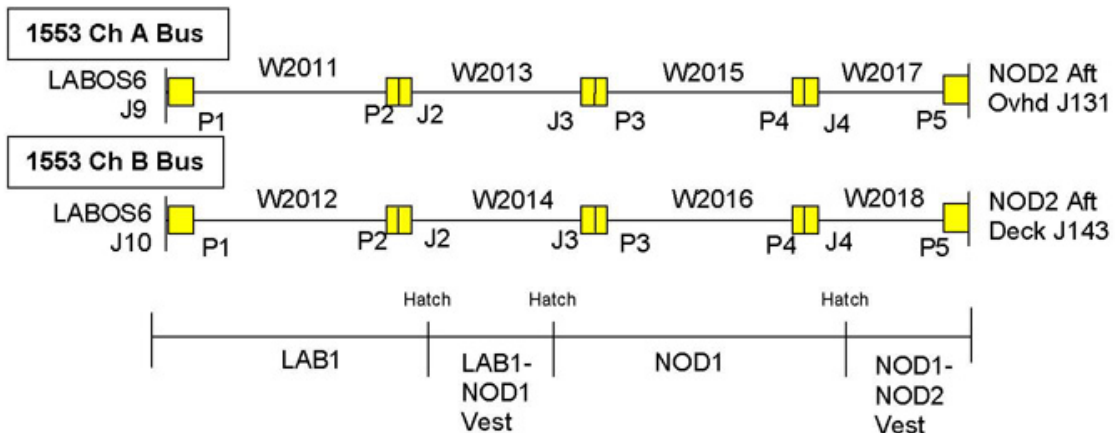


Figure 2. Temporary 1553 Data Jumper Configuration LAB1 to NOD2.

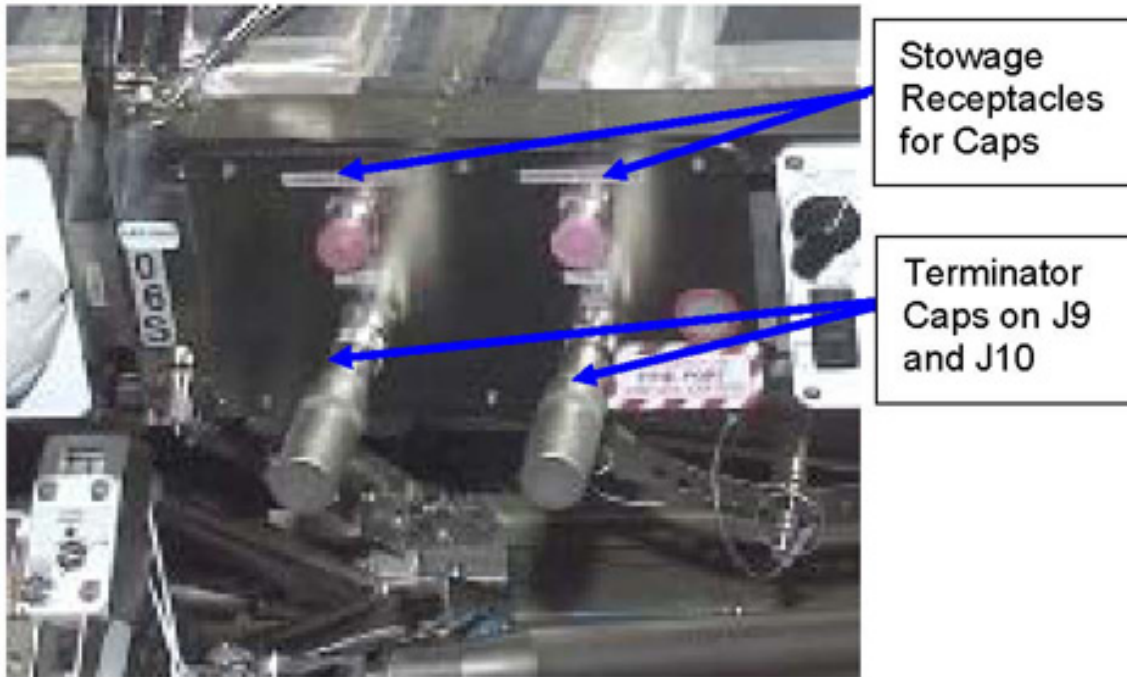


Figure 3. LAB1OS6 1553 Bus Connections.

Table 4. 1553B Data Jumper

Function	P/N	Harness #	LAB1	NOD2
1553 Ch B Data Jumper	683-22012	W2012	LABOS6	J143
	683-22014	W2014	J10	
	683-22016	W2016		
	683-22018	W2018		

2.3

Removing Ch B Data Jumper:

- 2.3.1 Install protective caps on all demated connections during removal of segmented 1553 Ch B Data Jumper.
- 2.3.2 1553 Ch B Data Jumper W2012 P1 ←|→ LABOS6 J10
- 2.3.3 Terminator Cap ←|→ LABOS6 Stowage Receptacle
- 2.3.4 LABOS6 J10 Terminator Cap →|← LABOS6 J10
- 2.3.5 1553 Ch B Data Jumper W2018 P5 ←|→ NOD2 J143
- 2.3.6 Coil cable small enough to fit in CTB.  
Stow Jumpers in Vestibule Outfitting Kit (VOK) CTB.  
Refer to Figures 1, 2, 3 and Table 4.

NOTE

1. The following steps will reconfigure the 1553 busses to allow removal of the 1553A Data jumper by switching to bus channel B.
2. Table 3 provides values for variables [YY] and [ZZ] for use in navigating to the four busses to be safed.

2.4 For all busses in Table 3:

```

CDH: Primary INT MDM
Primary Int MDM
'SPD Card [YY]'

    sel Bus [ZZ]

    Bus [ZZ]

    sel Bus Status

    [ZZ] Bus Status

    ✓Channel Selected – B
    ✓Auto Channel Switch Status – Inh
Repeat
    
```

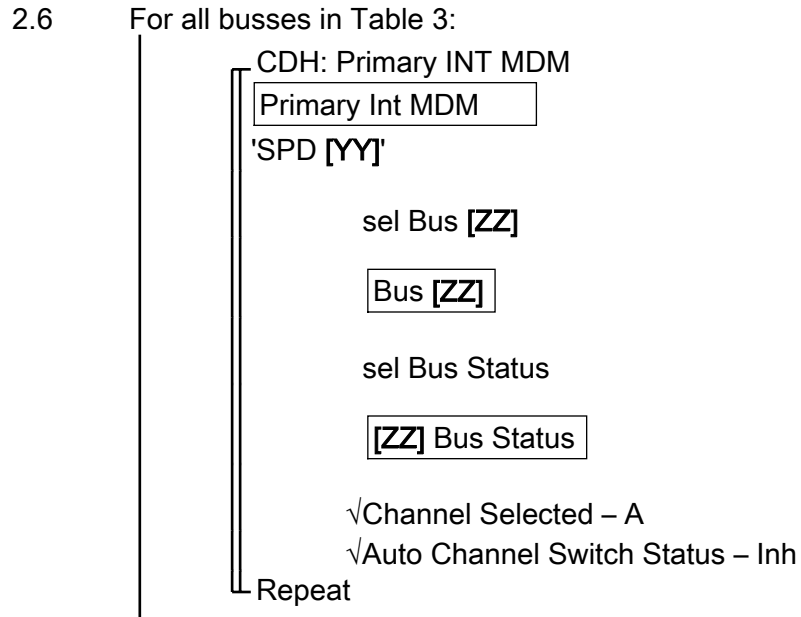
**Table 5. 1553A Data Jumper**

Function	P/N	Harness #	LAB1	NOD2
1553 Ch A Data Jumper	683-22011	W2011	LABOS6	J131
	683-22013	W2013	J9	
	683-22015	W2015		
	683-22017	W2017		

2.5 [Removing 1553 Ch A Data Jumper:](#)

- 2.5.1 Install protective caps on all demated connections during removal of segmented 1553 Ch A Data Jumper.
- 2.5.2 1553 Ch A Data Jumper (W2011 P1) ←|→ LABOS6 J9
- 2.5.3 Terminator Cap ←|→ LABOS6 Stowage Receptacle
- 2.5.4 LABOS6 J10 Terminator Plug →|← LABOS6 J9
- 2.5.5 1553 Ch A Data Jumper (W2017 P5) ←|→ NOD2 (J131)

- 2.5.6 Coil cable small enough to fit in CTB.  
Stow Jumpers in Vestibule Outfitting Kit (VOK) CTB.  
Refer to Figures 1, 2, 3 and Table 5.



- 2.7 ISS ↓ **MCC-H** complete with INT MDM bus reconfigurations, 1553 Jumper removal.

3. REMOVING INSTRUMENTATION JUMPERS

**Table 6. Instrumentation Jumpers**

Function	P/N	Harness #	NOD1	NOD2
Instrumentation (W3006)	1F89723	W3006	J40	J140
Instrumentation (W3005)	1F89721	W3005	J28	J128

- 3.1 Instrumentation Jumper W3006 P40 ↔ NOD1 J40  
Instrumentation Jumper W3006 P140 ↔ NOD2 J140  
Refer to Figure 1, Table 6.
- 3.2 Protective caps →|← NOD1 J40, NOD2 J140 feedthroughs  
Protective caps →|← Instrumentation Jumper W3006  
Stow Jumper in Vestibule Outfitting Kit (VOK) CTB.  
Refer to Figure 1, Table 6.
- 3.3 Instrumentation Jumper W3005 P28 ↔ NOD1 J28  
Instrumentation Jumper W3005 P128 ↔ NOD2 J128
- 3.4 Protective caps →|← NOD1 J28, NOD2 J128 feedthroughs



Protective caps →|← Instrumentation Jumper W3005  
Stow Jumper in Vestibule Outfitting Kit (VOK) CTB.  
Refer to Figure 1, Table 6.

4. [VERIFYING NOD1 TO NOD2 VESTIBULE READY FOR CLOSEOUT](#)

NOTE

If any of the installed CBM harness were demated during the installation of vestibule jumpers, they need to be remated now to ensure proper operation of the CBM

- 4.1 If any CBM cabling was demated during CONFIG FOR INGRESS – NOD1 TO NOD2:
- 4.1.1 Remate CBM Connectors as required.
  - 4.1.2 ISS ↓ **MCC-H** CBM connectors demated during CONFIG FOR INGRESS – NOD1 TO NOD2 have been remated

- 4.2 Inspect CPAs for damage.  
Notify **MCC-H** of any damage observed.

**Table 7. Vestibule Outfitting Kit (VOK) Closeout Checklist**

√	Item Name	Identification Number
	Secondary 1A4A Pwr Jumper	W3001
	Secondary 2A3B Pwr Jumper	W3002
	1553 Ch B Data Jumper	W2012 W2014 W2016 W2018
	1553 Ch A Data Jumper	W2011 W2013 W2015 W2017
	Instrumentation (W3005)	W3005
	Instrumentation (W3006)	W3006
	12" x 12" Ziplock Bags	528-50000-5
	Towel	

**Table 8. Vestibule Feedthrough Closeout Checklist**

√	Item Name
	NOD2 Feedthrough J133 Capped (NOD2 POWER)
	NOD1 Feedthrough J33 Capped (NOD1 POWER)
	NOD2 Feedthrough J140 Capped (NOD2 Instrumentation)
	NOD1 Feedthrough J40 Capped (NOD1 Instrumentation)
	NOD2 Feedthrough J143 Capped (1553B Data)
	LAB1OS6 J10 Capped (1553B Data)
	NOD2 Feedthrough J131 Capped (1553A Data)
	LAB1OS6 J9 Capped (1553A Data)
	NOD2 Feedthrough J145 Capped (Power)
	NOD1 Feedthrough J45 Capped (Power)
	NOD2 Feedthrough J128 Capped (Instrumentation)
	NOD1 Feedthrough J28 Capped (Instrumentation)

- 4.3 Verify NOD1 to NOD2 Vestibule ready for Closeout per checklist.  
Refer to Tables 7, 8.

5. REMOVING IMV JUMPER

CAUTION
1. Care must be taken while removing the IMV Jumper between the IMV flanges. Damaging the sealing surfaces of the IMV flanges could prevent the IMV Cap, once reinstalled, from maintaining pressure.
2. V-Band clamps may have a 7/16" or 1/2" nut. Use appropriate tool as needed. 7/16" V-Band clamps should be tightened to 35 in-lbs. 1/2" V-Band clamps should be tightened to 135 in-lbs. Over tightening or under tightening V-band may damage V-Band or prevent duct from adequately sealing.

- 5.1 √Node 1 Port Fwd IMV Valve – CLOSED

- 5.2 Loosen V-Band clamps from Node 1 (A11), Node 2 (A4) IMV flanges (Ratchet, 1/4" Drive; 7/16" Deep Socket or 1/2" Deep Socket).  
Temporarily stow V-Band clamps.
- 5.3 Remove IMV Jumper from vestibule interfaces.
- 5.4 Remove IMV Jumper O-Rings (two), one from each end of jumper.  
Stow O-Rings (two) in Ziplock Bag, stow in VOK CTB.  
Stow IMV Jumper in VOK CTB.
6. REPLACING IMV CAP O-RINGS AND INSTALLING IMV CAPS
  - 6.1 Retrieve Node 1 IMV Cap.
  - 6.2 Clean Node 1 IMV flange/grooves on IMV Cap.
  - 6.3 Sparingly apply lubricant to new bore, face IMV Cap O-Rings (Braycote - 1 or 2 drops maximum on finger).
  - 6.4 Install new bore, face O-Rings (two) on Node 1 IMV Cap.
  - 6.5 Place IMV Cap on (A11) Node 1 IMV feedthrough.
  - 6.6 Secure IMV Cap to (A11) IMV flange with V-Band clamp.  
Torque to 35 in-lbs (Ratchet, 1/4" Drive; 7/16" Deep Socket or 1/2" Deep Socket; (10-50 in-lbs) Trq Wrench).
  - 6.7 Repeat steps 6.1 to 6.6 for both Node 2 IMV ports in vestibule (IMV Caps (2) P/N 683-15016-1).

7. REINSTALLING HATCH PIP PIN

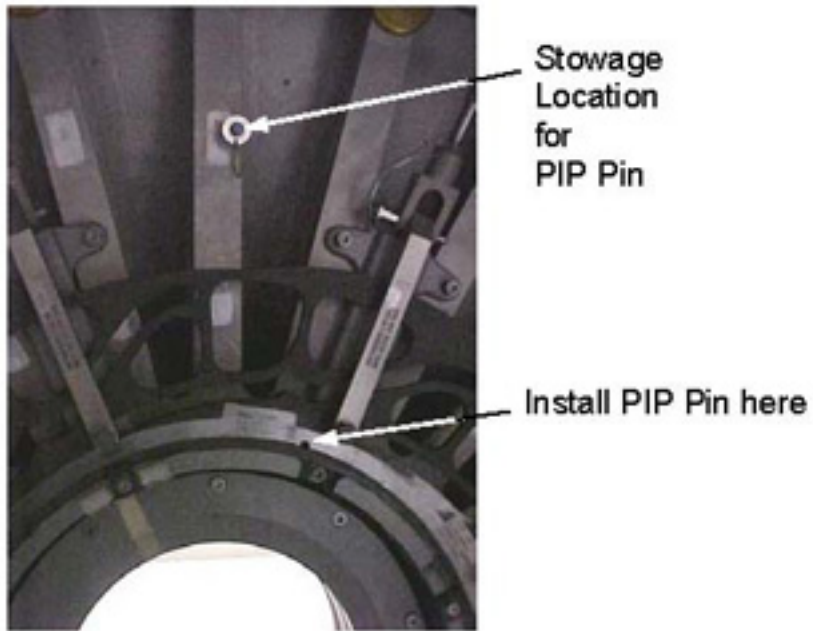


Figure 4. Reinstallation of NOD2 Hatch Launch Restraint PIP Pin.

NOD2  
Hatch

- 7.1 If present, reinstall NOD2 Hatch launch restraint PIP Pin.  
Refer to Figure 4.

8. INSTALLING NOD2 THERMAL BLANKETS

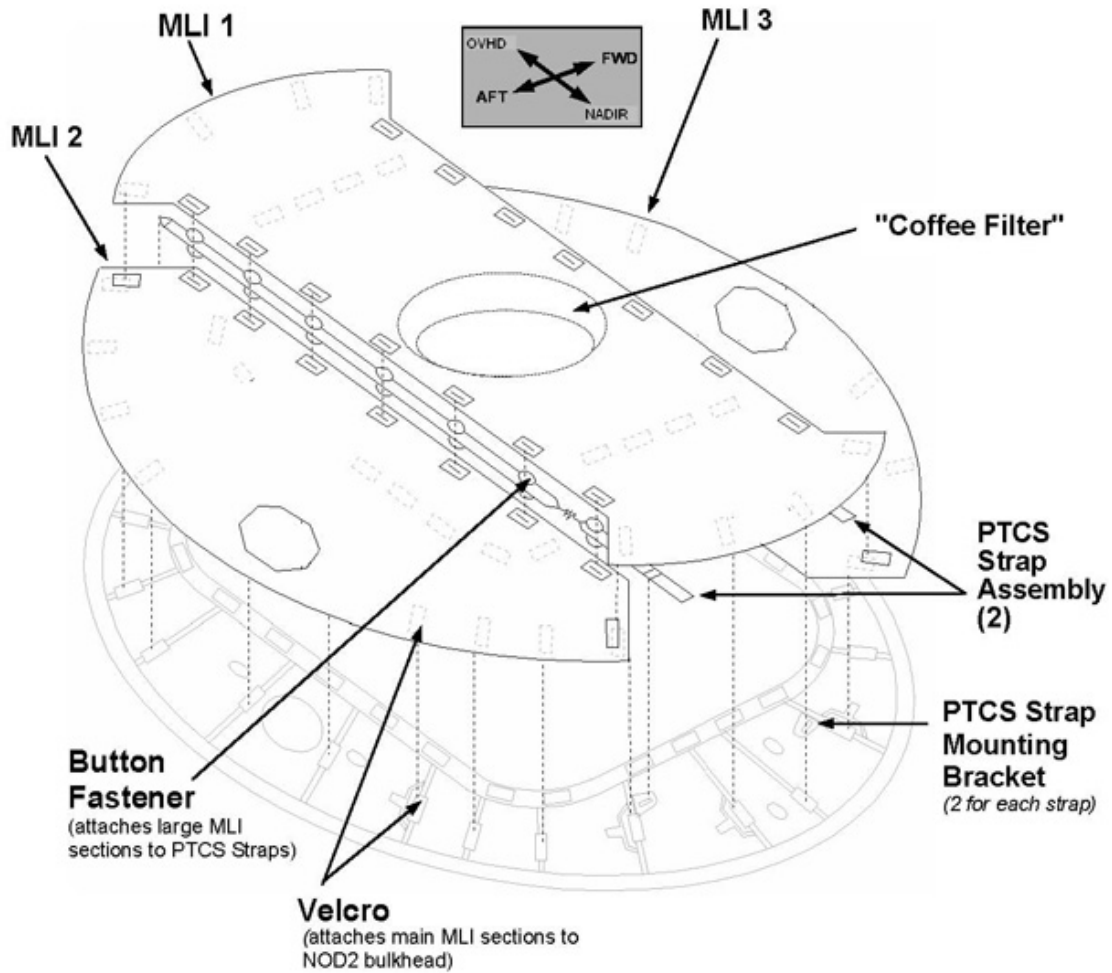


Figure 5. NOD2 Thermal MLI Blanket.

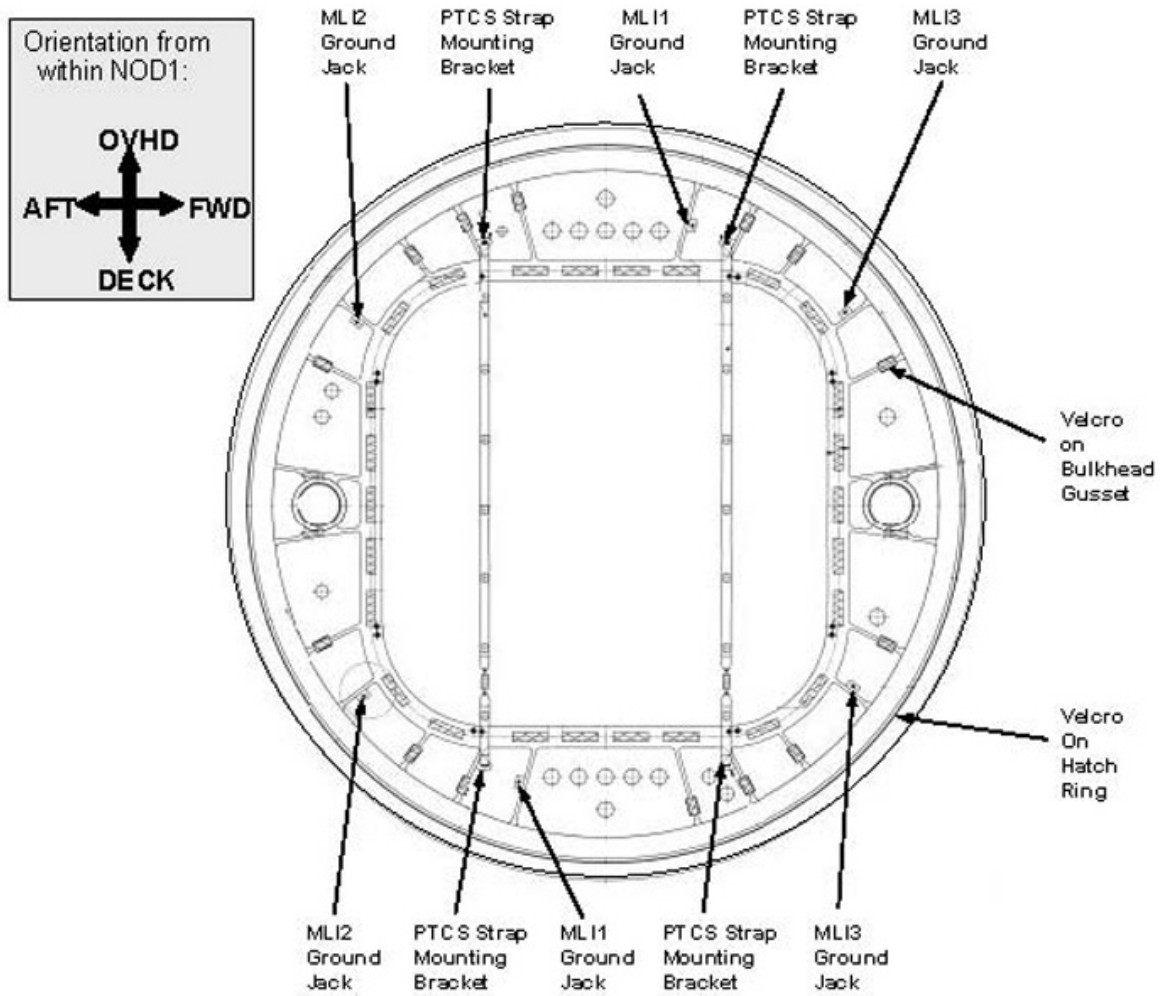


Figure 6. Bulkhead Interfaces for the NOD2 Thermal Blanket and PTCS Strap Assemblies.



Figure 7. MLI and PTCS Interfaces on NOD2 Bulkhead (MLI Removed).

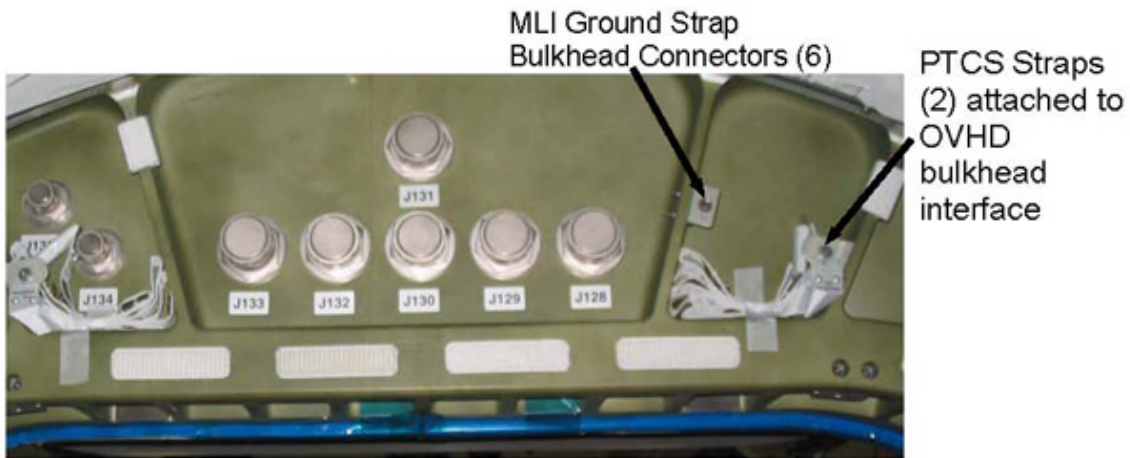


Figure 8. PTCS Strap (Stowed).

- 8.1 Attach upper PTCS Strap to mounting bracket, tighten Fasteners (one per PTCS Strap) (Ratchet, 3/8" Drive; #6 Long Trq Driver).  
Refer to Figures 5 to 8.
- 8.2 Attach NADIR end of PTCS Strap Assemblies (two places) to mounting bracket.  
Stretch spring, slip hook into slot of mounting bracket.  
Refer to Figure 7.
- 8.3 Mate MLI ground connectors by hand (six).

Refer to Figures 5 to 8.

- 8.4 Press edges of blanket (entire perimeter) around Bulkhead (Velcro) to cover ground connectors.  
Refer to Figures 5 to 8.

9. Verify NOD2 CBM latch Capture Fittings and NOD1 Capture Latch travel paths are clear of obstructions.

If NOD1 Port CBM Prep for Demate complete

- Verify CBM Capture Latches (four) are latched onto NOD2 Capture Fitting .

10. INSTALLING CBM CENTER DISK COVER

- 10.1 Perform {1.104 CBM CENTER DISK COVER INSTALLATION}, all (SODF: S&M: NOMINAL: VESTIBULE), then:

- 10.2 √Center Disk Cover Flap Closed.

- 10.3 Close NOD1 Port hatch per decal.

11. POST MAINTENANCE

- 11.1 Notify **MCC-H** of task completion.

- 11.2 √IMS for stowage location of materials, tools.



# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 1 of 16 pages

## OBJECTIVE:

This procedure will outfit the vestibule between the NOD1 and NOD2 modules to provide power to and data from the NOD2 module.

## LOCATION:

NOD1-NOD2 Vestibule

## DURATION:

1 hours 30 minutes

## CREW:

Two

## PARTS:

Table 1. NOD1 to NOD2 Vestibule Outfitting Kit (VOK)

Vestibule Jumper	P/N	Harness #
Secondary 1A4A Pwr Jumper	1F89713-1	W3001
Secondary 2A3B Pwr Jumper	1F89715-1	W3002
1553 Ch B Data Jumper	683-22012-1	W2012
	683-22014-1	W2014
	683-22016-1	W2016
	683-22018-1	W2018
1553 Ch A Data Jumper	683-22011-1	W2011
	683-22013-1	W2013
	683-22015-1	W2015
	683-22017-1	W2017
Instrumentation	1F89721-1	W3005
Instrumentation	1F89723-1	W3006
IMV Return Jumper Duct	683-13870-17	N/A

## MATERIALS:

12" x 12" Ziplock Bag (1) P/N 528-50000-5

Towel

IMV Jumper O-Ring (2) P/N 2-161S0604-70

Braycote

## TOOLS:

Mini Maglite

Portable Fan (Crew Preference)

## ISS IVA Toolbox:

Drawer 2:

7/16" Deep Socket, 1/4" Drive

1/2" Deep Socket, 1/4" Drive

Ratchet, 1/4" Drive

Ratchet, 3/8" Drive

(10-50 in-lbs) Trq Wrench, 1/4" Drive

Drawer 3:

#6 Long Torq Driver, 3/8" Drive

## REFERENCED PROCEDURE(S):

1.105 CBM CENTER DISK COVER REMOVAL

# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 2 of 16 pages

## 1. OPENING HATCH

1.1 Open NOD1 Port Hatch per Decal.

### CAUTION

Care must be taken while working in the vicinity of hatch seal to avoid rubbing, scratching, or placing any type of direct pressure upon seal. Damaging hatch seal could prevent Hatch from maintaining pressure when closed.

1.2 Inspect vestibule for condensation.

If required, wipe any condensate from vestibule (Towel).

Notify **MCC-H** of condensation.

1.3 If any CBM cables are demated due to interferences during this procedure, report connector labeling and location to **MCC-H** for tracking and remating prior to NOD2 relocate to LAB1 fwd.

## 2. REMOVAL OF CBM CENTER DISK COVER

2.1 Perform {1.105 CBM CENTER DISK COVER REMOVAL}, all (SODF: S&M: NOMINAL: VESTIBULE), then:

## 3. REMOVAL OF NODE 2 THERMAL BLANKET

### NOTE

Figures 1 to 5 are used for NOD2 Thermal Blanket removal.

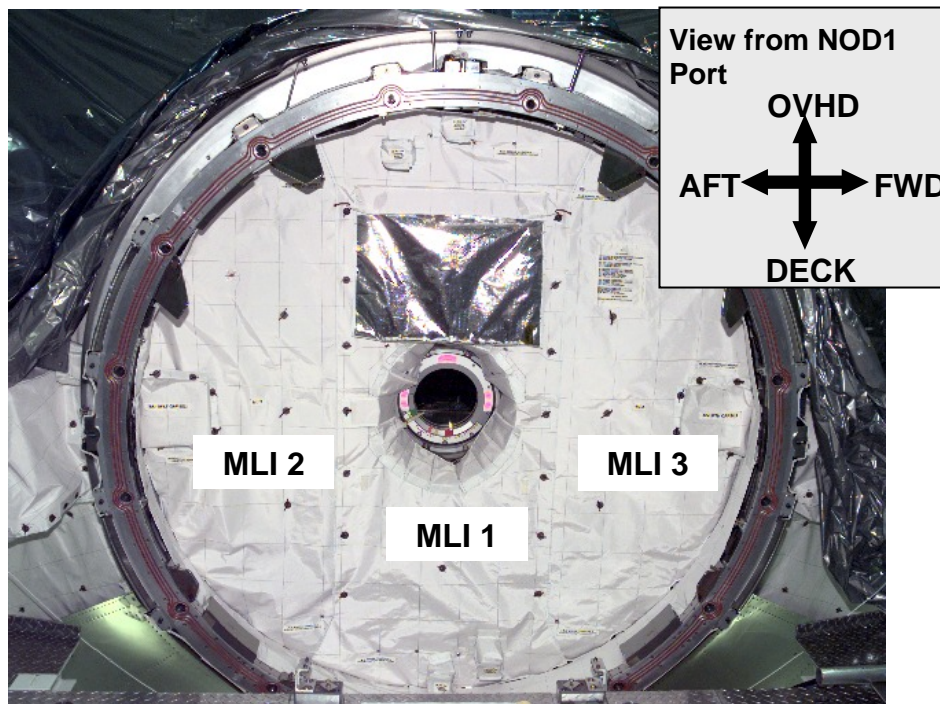


Figure 1.- MPLM Thermal Blanket Installed on MPLM Bulkhead and Hatch. (NOD2 Thermal Blanket similar, but does not have a CBCS flap or IMV MLI Caps.)

# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

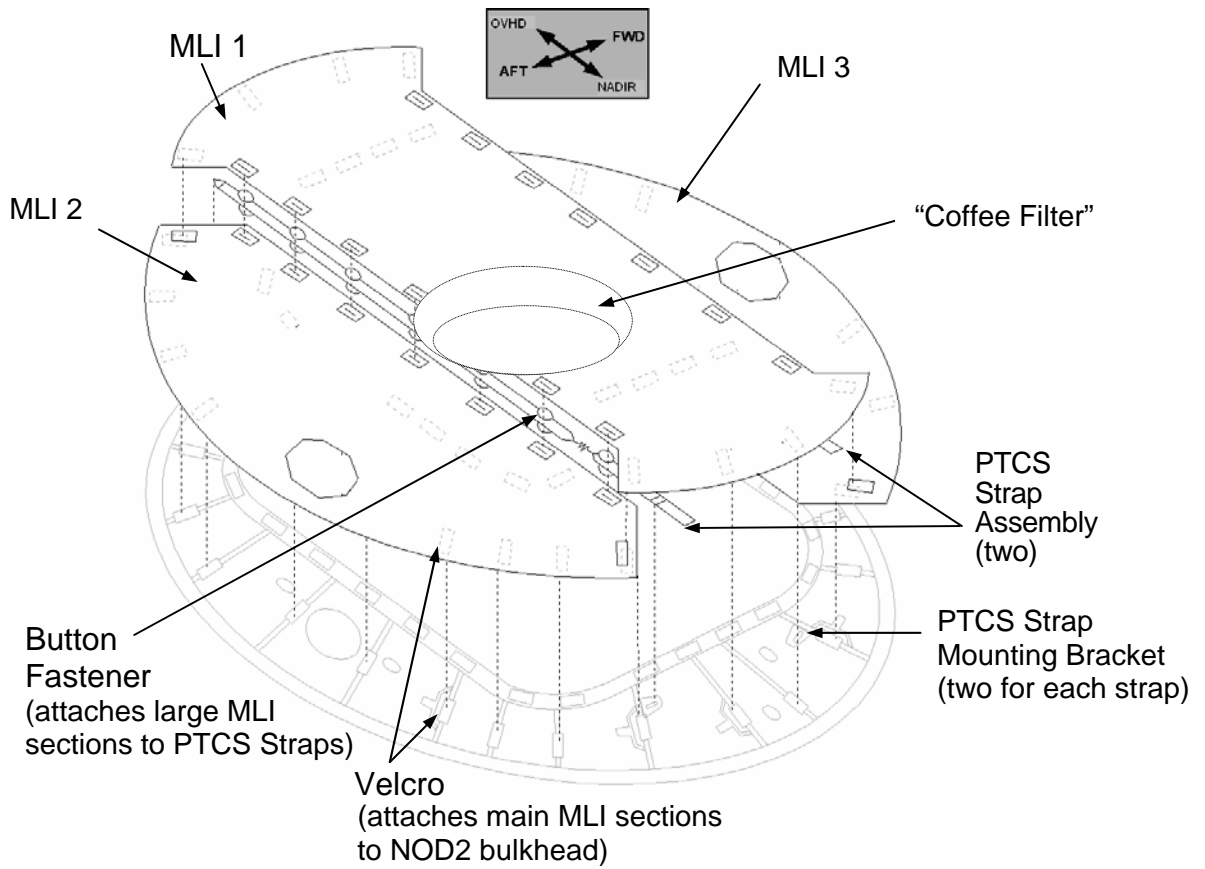


Figure 2.- NOD2 Aft Thermal MLI Blanket.

# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 4 of 16 pages

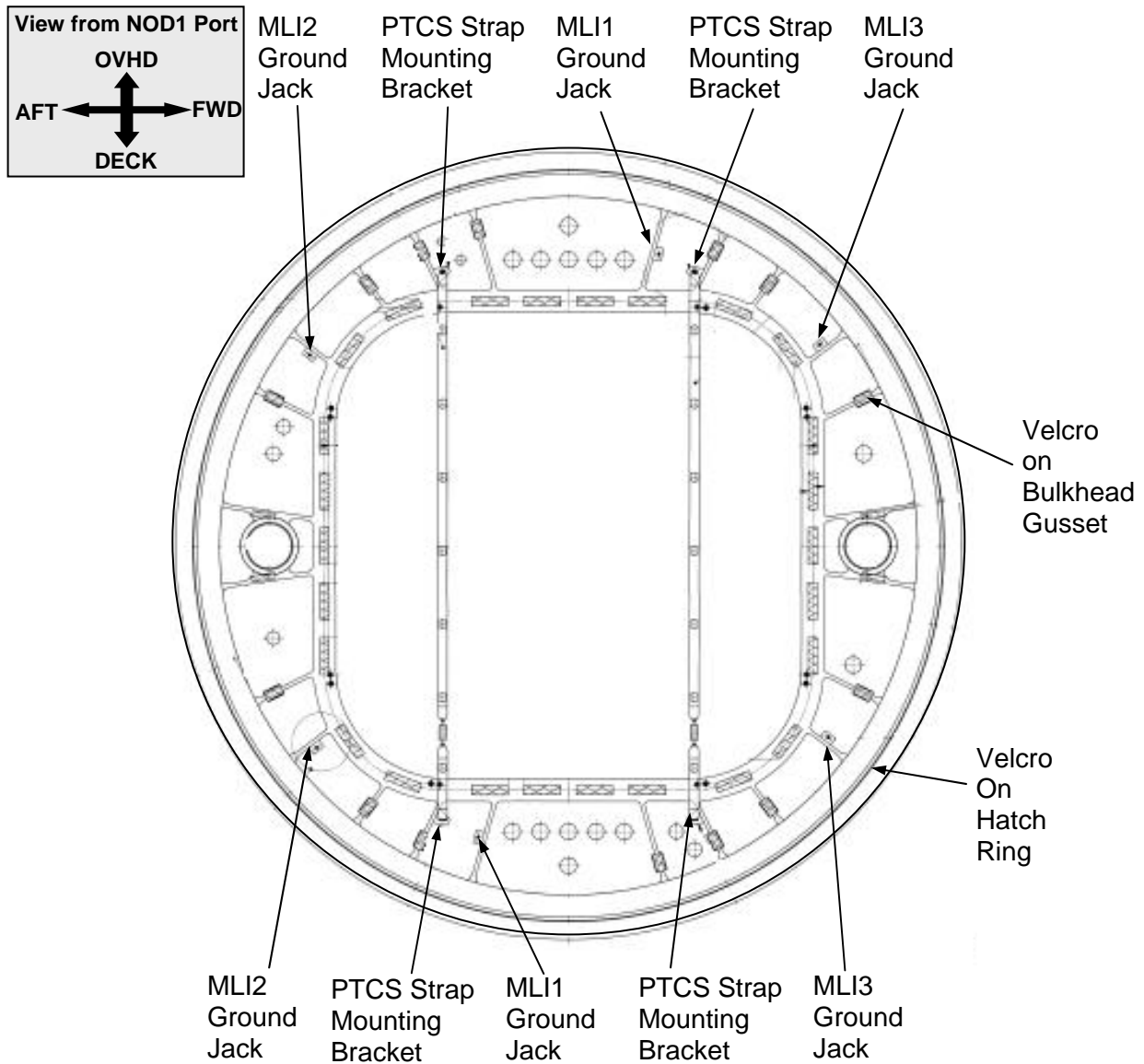


Figure 3.- Bulkhead Interfaces for the NOD2 Thermal Blanket and PTCS Strap Assemblies.

## VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 5 of 16 pages



Figure 4.- MLI Velcro and PTCS Interfaces on NOD2 Bulkhead (MLI removed).



MLI Ground  
Strap Bulkhead  
Connectors (six)

PTCS Straps  
(two) attached to  
OVHD bulkhead  
interface

Figure 5.- PTCS Strap (stowed).

### CAUTION

NODE 2 Thermal Blanket is rolled instead of folded to prevent damage to the multilayer insulation of the blanket.

### NOTE

Do not follow MLI removal instructions printed on MLI cover. Perform below steps for easier and quicker method of removal.

- 3.1 Gently pull back edges of MLI to expose ground connectors (six) on NOD2 bulkhead.  
Refer to Figures 1 to 5.
- 3.2 Demate 1/4-turn grounding connectors, by hand, two per MLI section.
- 3.3 Remove upper PTCS Strap fasteners (one per PTCS Strap) (Ratchet, 3/8" Drive; #6 Long Trq Driver, 3/8" Drive).  
Temporarily stow fasteners by installing in mounting brackets (hand tight).

# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 6 of 16 pages

- 3.4 Unhook lower end of PTCS Strap from bulkhead bracket (two places) to release blanket.
- 3.5 Pull on remaining Velcro, remove MLI blanket from vestibule, roll up. Temporarily stow.

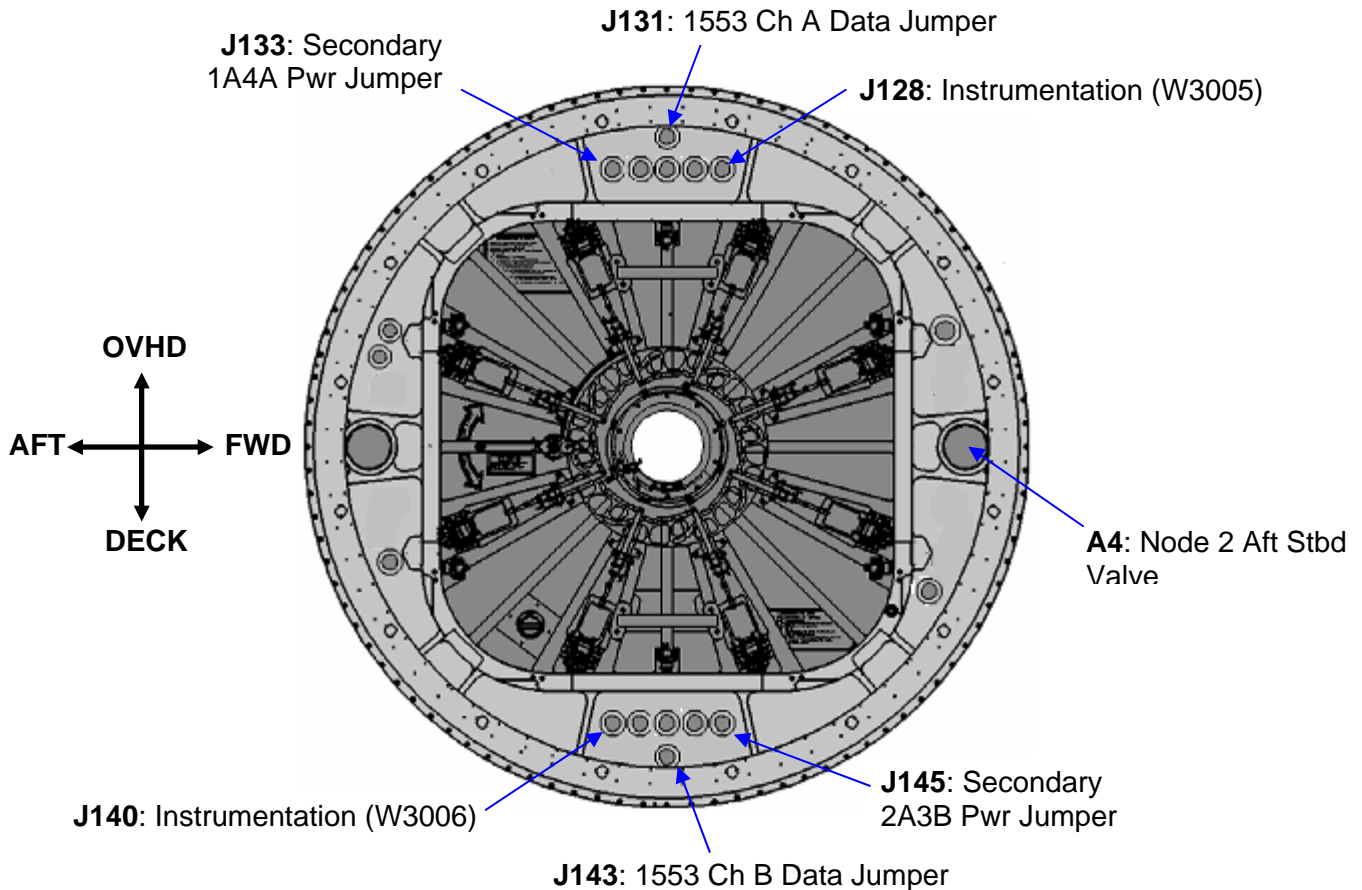


Figure 6.- NOD2 Aft Bulkhead, External View Looking Port when NOD2 is Mated to NOD1 Port. (Bolded text appears on a label on the bulkhead next to corresponding feed-through.)

## CAUTION

FOD can be generated whenever any connector with a broken EMI ring is mated or demated. Inspect all connectors for broken EMI rings. If a broken EMI ring is found, report cable part number to **MCC-H**. Remove EMI ring if it interferes with mating of the cable.

## NOTE

Jumper labels do not include the function of the jumper, only the part number, wire harness identifier and end connection data.

## VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 7 of 16 pages

### 4. INSTALLATION OF SECONDARY POWER JUMPERS

4.1 Verifying ISS Power to Node 2 is safed  
PCS      ✓ **MCC-H** for which parallel DDCUs to power down.

US Lab: EPS: LAB1P3: DDCU LA1A (LA4A)

sel Converter

**cmd** Converter - Off

Verify Output Current:  $0 \pm 3.75$  A  
Verify Power Sharing, % DDCU LA1A (LA4A) < 10

US Lab: EPS: LAB1P3

sel DDCU LA1A

'RPCM LA1A4A'

sel F

Verify Integ Counter – incrementing

sel RPC 02

Verify RPC Position – Op  
Verify Close Cmd – Inh

US Lab: EPS: LAB1O6: DDCU LA2A (LA3B)

sel Converter

**cmd** Converter - Off

Verify Output Current:  $0 \pm 3.75$  A

# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 8 of 16 pages

Verify Power Sharing, % DDCU LA1A (LA4A) < 10

US Lab: EPS: LAB1O6

LAB Rack LAB1O6

sel DDCU LA3B

DDCU LA3B

'RPCM LA2A3B'

sel D

RPCM LA2A3B D

Verify Integ Counter – incrementing

sel RPC 04

RPCM LA2A3B D RPC 04

Verify RPC Position – Op

Verify Close Cmd – Inh

Table 2. Secondary 1A4A Pwr Jumper (W3001)

Function	P/N	Harness #	NOD1	NOD2
Secondary 1A4A Power	1F89713-1	W3001	J33	J133

- 4.2 Protective caps ←|→ NOD1 J33, NOD2 J133 feedthroughs  
Protective caps ←|→ Secondary 1A4A Pwr Jumper W3001.  
Temporarily stow caps in 12"x12" Ziplock bag, stow in Vestibule  
Outfitting Kit (VOK) CTB.  
Refer to Figure 6, Table 2.

- 4.3 Secondary 1A4A Pwr Jumper W3001 P33 →|← NOD1J33  
Secondary 1A4A Pwr Jumper W3001 P133 →|← NOD2 J133

Table 3. Secondary 2A3B Power Jumper (W3006)

Function	P/N	Harness #	NOD1	NOD2
Secondary 2A3B Power	1F89715-1	W3002	J45	J145

- 4.4 Protective caps ←|→ NOD1 J45, NOD2 J145 feedthroughs  
Protective caps ←|→ Secondary 2A3B Pwr Jumper W3002.  
Temporarily stow caps in 12"x12" Ziplock bag, stow in Vestibule  
Outfitting Kit (VOK) CTB.  
Refer to Figure 6, Table 3.



# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 9 of 16 pages

## NOTE

Ground fit-checks indicated a possible interference with a CBM powered bolt connector P2 when NOD2 J45 is connected.

- 4.5 Secondary 2A3B Pwr Jumper W3002 P45 →|← NOD1 J45  
Secondary 2A3B Pwr Jumper W3002 P145 →|← NOD2 J145

Notify **MCC-H** if the CBM powered bolt connector P2 is demated to allow mating of W3002 P45 to NOD1 J45.

## 5. INSTALLATION OF 1553 DATA JUMPERS

### NOTE

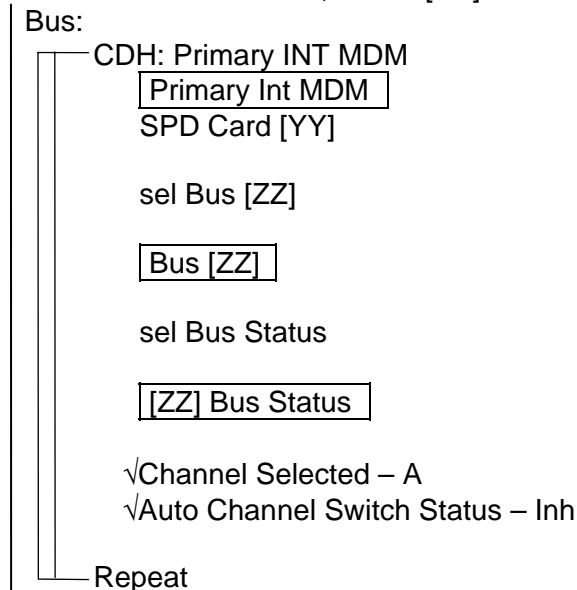
1. The following steps reconfigure the C&DH busses to install 1553 Jumpers by verifying all busses are on bus channel A and inhibiting Auto Channel Switching.
2. Table 1 provides values for variables [YY] and [ZZ] for use in navigating to the four busses to be safed.

- 5.1 Notify **MCC-H** go for INT MDM Bus Safing.

Table 4. 1553 Busses being safed for 1553B Jumper Installation

MDM	SPD Card [YY]	Bus [ZZ]
Primary INT MDM	SPD 3	LB SEPS N2-14
Primary INT MDM	SPD 1	LB SEPS N2-23
Primary INT MDM	SPD 5	LB SYS N2-1
Primary INT MDM	SPD 0	LB SYS N2-2

- 5.2 For all busses in Table 4, where [YY] is the SPD Card and [ZZ] is the



# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

### NOTE

1. The 1553 Data Jumpers are separated into four segments to allow the placement of connectors next to each hatchway the jumper passes through.
2. The 1553 Data Jumper segments were mated on the ground to save crew time on-orbit.

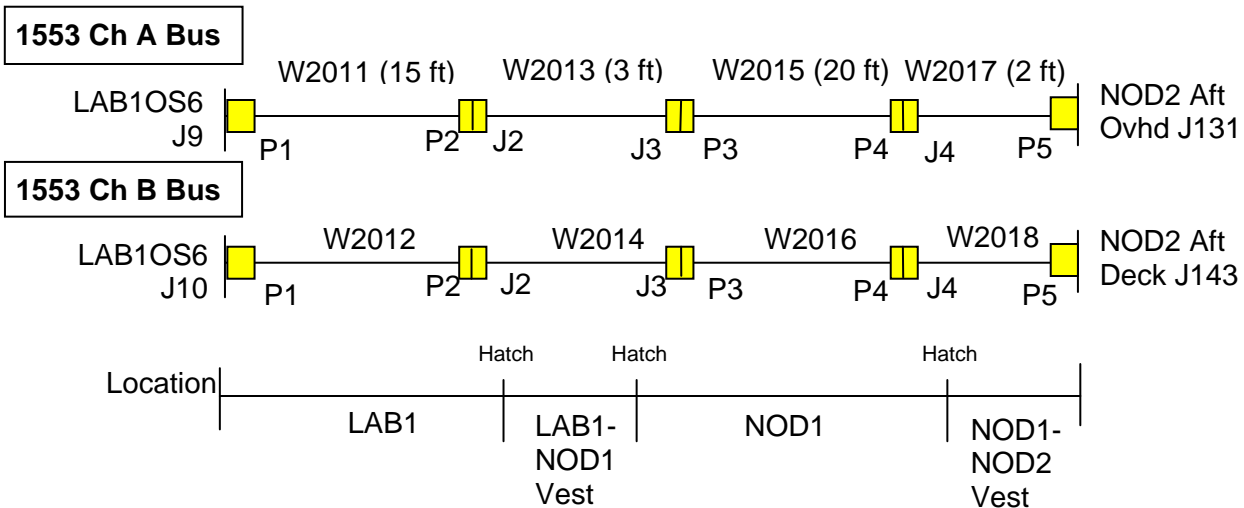


Figure 7.- Temporary 1553 Data Jumper Configuration LAB1 to NOD2.

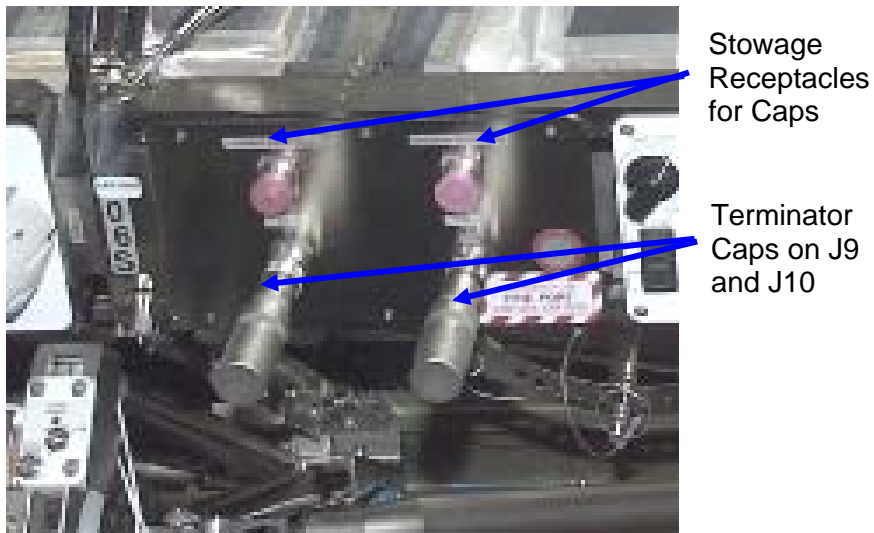


Figure 8.- LAB1OS6 1553 Bus Connections.

# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 11 of 16 pages

Table 5. 1553B Data Jumper

Function	P/N	Harness #	LAB1	NOD2
1553 Ch B Data Jumper	683-22012	W2012	LAB1OS6 J10	J143
	683-22014	W2014		
	683-22016	W2016		
	683-22018	W2018		

## 5.3 Installation of 1553 Data Jumpers

5.3.1 Remove protective caps as needed during installation of segmented 1553 Ch B Data Jumper.

5.3.2 Terminator Plug ←|→ LAB1OS6 J10  
Terminator Plug →|← Stowage Receptacle

5.3.3 1553 Ch B Data Jumper W2012 P1 →|← LABOS6 J10

5.3.4 1553 Ch B Data Jumper W2018 P5 →|← NOD2 J143

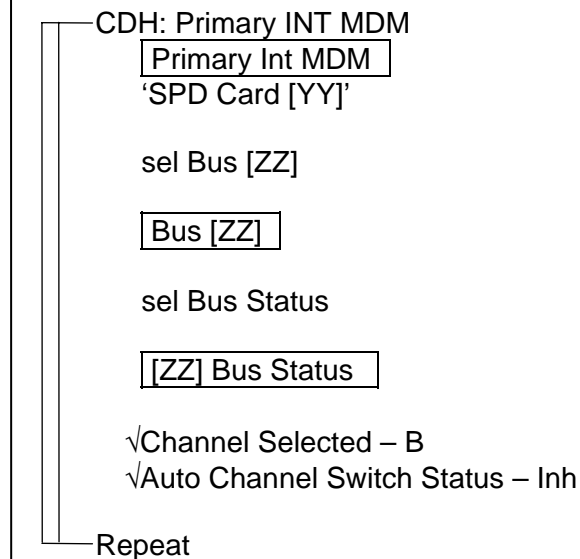
5.3.5 Restrain cables and tethered caps as required to keep out of translation path.

Refer to Figures 6, 7, 8, Table 5.

### NOTE

- The following steps will reconfigure the 1553 busses to allow installation of the 1553A Data jumper by switching to bus channel B.
- Table 4 provides values for variables [YY] and [ZZ] for use in navigating to the four busses to be safed.

5.4. For all busses in Table 4, where [YY] is the SPD Card and [ZZ] is the Bus:



# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 12 of 16 pages

Table 6. 1553A Data Jumper

Function	P/N	Harness #	LAB1	NOD2
1553 Ch A Data Jumper	683-22011	W2011	LAB1OS6 J9	J131
	683-22013	W2013		
	683-22015	W2015		
	683-22017	W2017		

## 5.5. Installation of 1553 Ch A Data Jumper

- 5.5.1 Remove protective caps as needed during installation of segmented 1553 Ch A Data Jumper.
- 5.5.2 Terminator Plug ←|→ LAB1OS6 J9  
LAB1OS6 J9 Terminator Plug →|← Stowage Receptacle
- 5.5.3 1553 Ch A Data Jumper W2011 P1 →|← LABOS6 J9
- 5.5.4 1553 Ch A Data Jumper W2017 P5 →|← NOD2 J131
- 5.5.5 Restrain cable as required to keep out of translation path.  
Stow caps as needed in 12"x12 " Ziplock Bag.  
Refer to Figures 6, 7, 8, Table 6.

### NOTE

The following steps will reconfigure the 1553 data busses to a normal configuration.

## 5.6. For all busses in Table 4, where [YY] is the SPD Card and [ZZ] is the Bus:

```

the Bus:
├── CDH: Primary INT MDM
│   ├── Primary Int MDM
│   ├── 'SPD Card [YY]'
│   ├── sel Bus [ZZ]
│   ├── Bus [ZZ]
│   ├── sel Bus Status
│   ├── [ZZ] Bus Status
│   ├── √Channel Selected – A
│   └── √Auto Channel Switch Status – Ena
└── Repeat
    
```

## 5.7. Notify **MCC-H** of completion with INT MDM bus reconfigurations, 1553 Jumper installation.

# VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 13 of 16 pages

## 6. INSTALLATION OF INSTRUMENTATION JUMPERS

Table 7. Instrumentation Jumpers

Function	P/N	Harness #	NOD1	NOD2
Instrumentation (W3006)	1F89723-1	W3006	J40	J140
Instrumentation (W3005)	1F89721-1	W3005	J28	J128

6.1 Protective caps ←|→ NOD1 J40 and NOD2 J140 feedthroughs.  
Protective caps ←|→ Instrumentation Jumper W3006.  
Temporarily stow caps in 12"x12" Ziplock bag.  
Stow in Vestibule Outfitting Kit (VOK) CTB.  
Refer to Figure 6, Table 7.

6.2 Instrumentation Jumper W3006 P40 →|← NOD1 J40  
Instrumentation Jumper W3006 P140 →|← NOD2 J140

6.3 Protective caps ←|→ NOD1 J28 and NOD2 J128 feedthroughs.  
Protective caps ←|→ Instrumentation Jumper W3005.  
Temporarily stow caps in 12"x12" Ziplock bag.  
Stow in Vestibule Outfitting Kit (VOK) CTB  
Refer to Figure 6, Table 7

6.4 Instrumentation Jumper W3005 P28 →|← NOD1 J28  
Instrumentation Jumper W3005 P128 →|← NOD2 J128

## 7. INSTALLATION OF VENTILATION JUMPER

CAUTION
1. Care must be taken while installing the IMV Duct between the IMV Flanges. Damaging the sealing surfaces of the IMV Flanges could prevent the IMV Jumper, once reinstalled, from maintaining pressure.
2. V-Band clamps may have a 7/16" or 1/2" nut. Use appropriate tool as needed. 7/16" V-Band clamps should be tightened to 35 in-lbs. 1/2" V-Band clamps should be tightened to 135 in-lbs. Over tightening or under tightening V-band may damage V-Band or prevent duct from adequately sealing.

Table 8. IMV Duct Jumper Connection Data

Function	P/N	Node 1	NOD2
IMV Return Jumper Duct	683-13870-17	A11	A4: IMV Sply to LAB

7.1 Loosen, remove V-Band Clamp on NOD1 port fwd (A11) IMV Flange (Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).

## VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 14 of 16 pages

Remove IMV Cap from NOD1 (A11) IMV Flange.  
Place IMV Cap in 12" x 12" Ziplock Bag.  
Stow in VOK CTB.  
Refer to Figure 9 and Table 8.

- 7.2 Loosen, remove V-Band Clamp on NOD2 aft stbd IMV Flange Saver  
(Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep  
Socket, 1/4" Drive).  
Remove IMV Flange Saver from NOD2 A4 IMV Flange.  
Place IMV Flange Saver in 12" x 12" Ziplock Bag.  
Stow in VOK CTB.



IMV Jumper Handling Aid

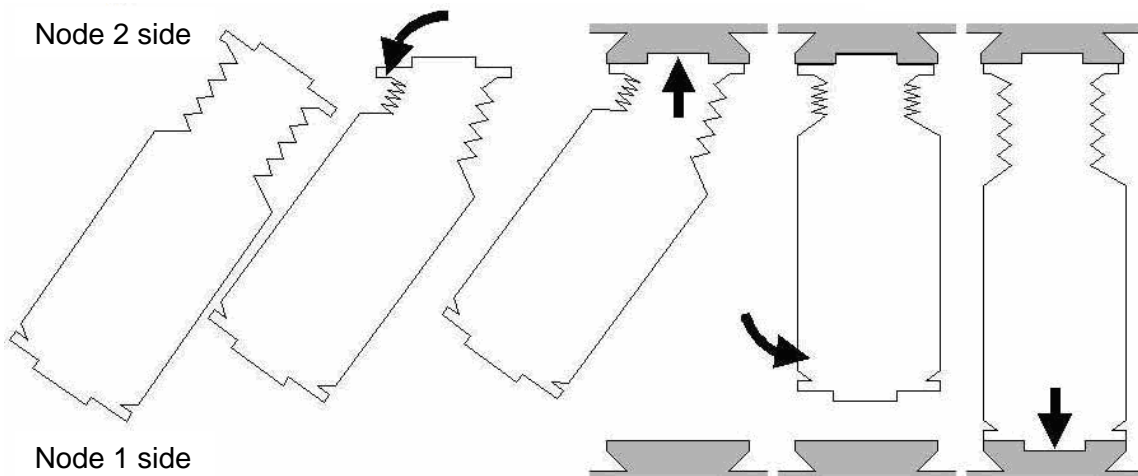


Figure 9.- Recommended Steps for IMV Duct Installation.

## VESTIBULE CONFIG FOR INGRESS NOD1 TO NOD2

(ASSY OPS/10A/FIN)

Page 15 of 16 pages

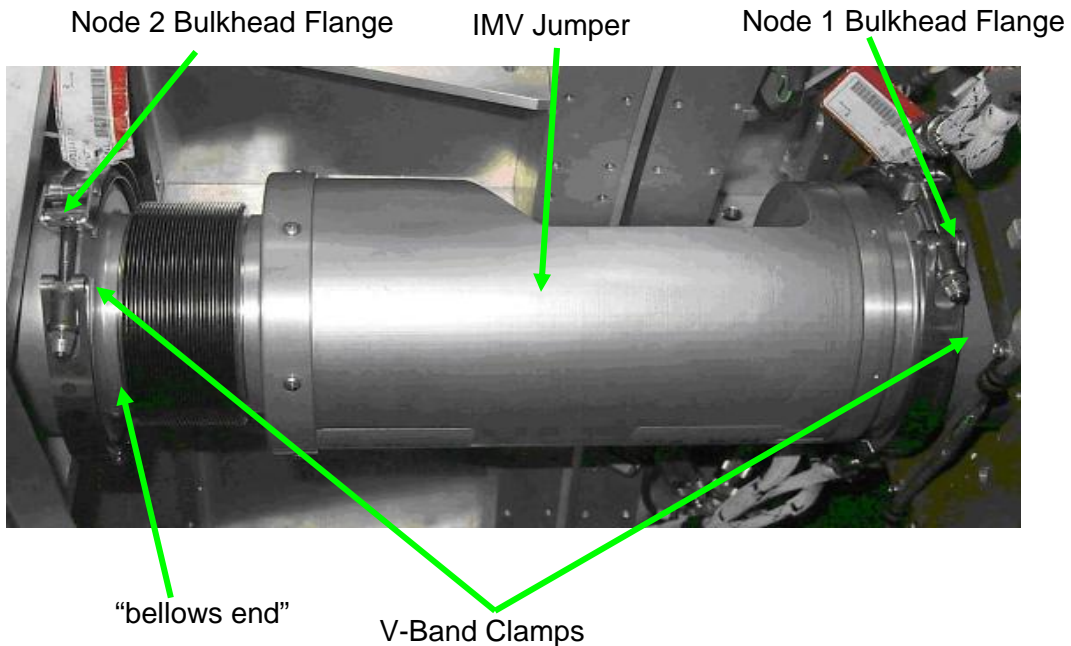


Figure 10.- IMV Jumper Installed.

- 7.3 Verify O-Ring is installed on both ends of IMV Jumper.  
If required, apply small amount of Braycote in two to three places around O-Ring grooves to prevent O-Rings from floating out.
- 7.4 Install IMV Supply Jumper using handling aid to compress bellows, sliding bellows end of jumper in first.  
Orient flat side of jumper toward the CBM rings.  
Refer to Figures 9, 10.
- 7.5 Secure jumper to NOD2 IMV Flange with V-Band Clamp  
Torque to 35 in-lbs (Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive).
- 7.6 Secure jumper to NOD1 IMV Flange with V-Band Clamp.  
Torque to 35 in-lbs (Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive).

8. HATCH LAUNCH RESTRAINT REMOVAL

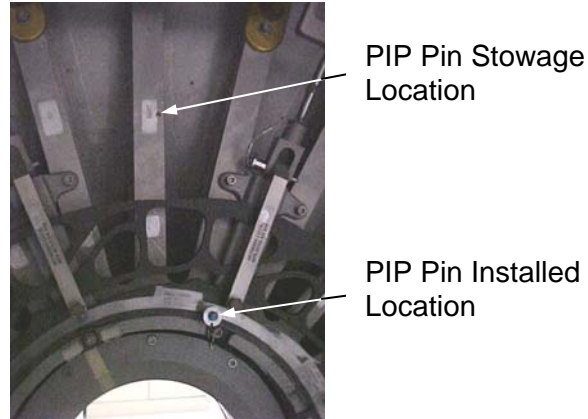


Figure 11.- Removal of NOD2 Hatch Launch Restraint PIP Pin.

- 8.1 Verify Hatch Launch Restraint PIP Pin near NOD2 Aft Hatch window has been removed.  
If required, stow PIP Pin in stowage hole on rib in upper area of Hatch.  
Refer to Figure 11.

9. POST MAINTENANCE

- 9.1 Stow 12"x12" Ziplock Bag of caps in VOK.
- 9.2 Check for FOD around work area 3' radius.
- 9.3 Notify **MCC-H** of task completion.
- 9.4 Stow materials, tools.  
Update IMS as required.



# NODE 2 AFT NPRV REMOVE, REPLACE WITH IMV VALVE

(ASSY OPS/10A/FIN)

Page 1 of 13 pages

## Parameters 1. choice1

IMV Valve Location	RPCM	RPC
[B]	[X]	[Z]
Aft Port	N22A3B C	04
Aft Stbd	N22A3B C	07

### OBJECTIVE:

Replace Node 2 Aft Port and Aft Starboard Negative Pressure Relief Valves (NPRV) with Intermodule Ventilation (IMV) Valve Assemblies and connect Remote Manual Override (RMO) Assemblies. This procedure will be executed when Node 2 is mated to Node 1 Port. There will be power and data to these valves but the final pressure check will not be executed until Node 2 is relocated to LAB Fwd. The valves to be installed will be obtained as part of this procedure from their stowed location, NOD2S3.

### LOCATION:

Installed: NOD2P6, NOD2S6

Stowed: NOD2S3 Starboard Midbay Volume

### DURATION:

1 hour 15 minutes (each valve)

### CREW:

One

### PARTS:

None

### MATERIALS:

Dry Wipes

Rubber Gloves

### TOOLS:

Drawer 2:

Ratchet, 1/4" Drive

4" Ext

6" Ext

5/32" Hex Head, 1/4" Drive

5/32" Stubby Hex Head, 1/4" Drive

7/16" Deep Socket, 1/4" Drive

1/2" Deep Socket, 1/4" Drive

1/4" Deep Socket, 1/4" Drive

(10-50 in-lbs) Trq Wrench, 1/4" Drive

Driver Handle, 1/4" Drive

Drawer 3:

Common Tip Screw Driver

Drawer 4:

12 OCT 07

174a

\_M\_18223.xml

Angled Cutters

Drawer 5:

Static Wrist Tether

REFERENCED PROCEDURE(S):

2.506 IMV Valve Reconfiguration

1. [SAFING](#)

<b>WARNING</b>
Failure to remove power can result in electrical shock hazard.

**Table 1. Node 2 Aft IMV Valve RPCM and RPC Data**

<input type="checkbox"/> [B] IMV Valve Location	<input checked="" type="checkbox"/> [x] RPCM	<input type="checkbox"/> [Z] RPC
Aft Port	N22A3B C	04
Aft Stbd	N22A3B C	07

1.1 [VERIFYING  \[B\] IMV RPC OPEN](#)

Refer to Table 1 for the following steps:

PCS

Node 2: ECLSS:  [B] Valve

Node 2  [B] Vlv

sel RPCM  [X] RPC  [Z]

RPCM  [X] RPC  [Z]

√RPC Position – Op

√Close Cmd – Inh

2. [ACCESS](#)

**Table 2. Node 2 Closeout**

IMV ORU REFDES	Closeout Panel	Fasteners
Aft Port	NOD2P6-51	10 Captive 8 Non-captive
	NOD2P6-02	4 Captive 2 Non-captive
	NOD2P6-03	10 captive 6 Non-captive
Aft Starboard	NOD2S6-51	10 Captive 8 Non-captive
	NOD2S6-02	4 Captive 2 Non-captive
IMV Valve Stowage Volume	NOD2S3-01	6 Captive 30 Non-captive

- 2.1 Remove Closeout Panels as required for each valve and IMV Valve Stowage Volume location (Ratchet, 1/4" Drive; 4" Ext, 5/32" Hex Head, 1/4" Drive).  
Temporarily stow.  
Refer to Table 2.

IMV Valve Power/Data  
(J1 and J2 stowed)

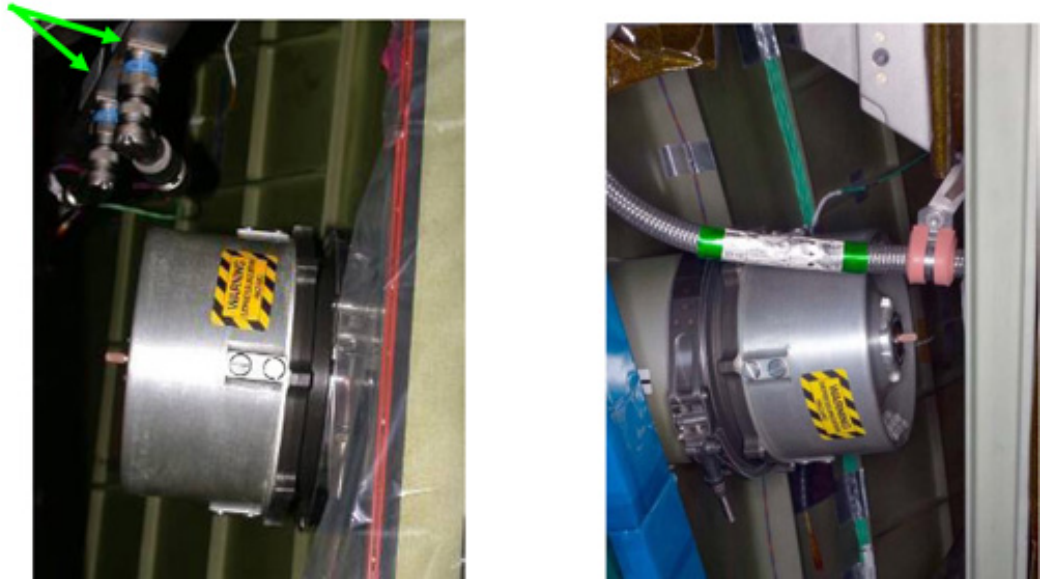


Figure 1. Node 2 Aft Starboard and Aft Port NPRVs Installed.

- 3. INSPECTION AND REMOVAL OF PORT AFT NPRV(s)



Figure 2. Deployed NPRV.

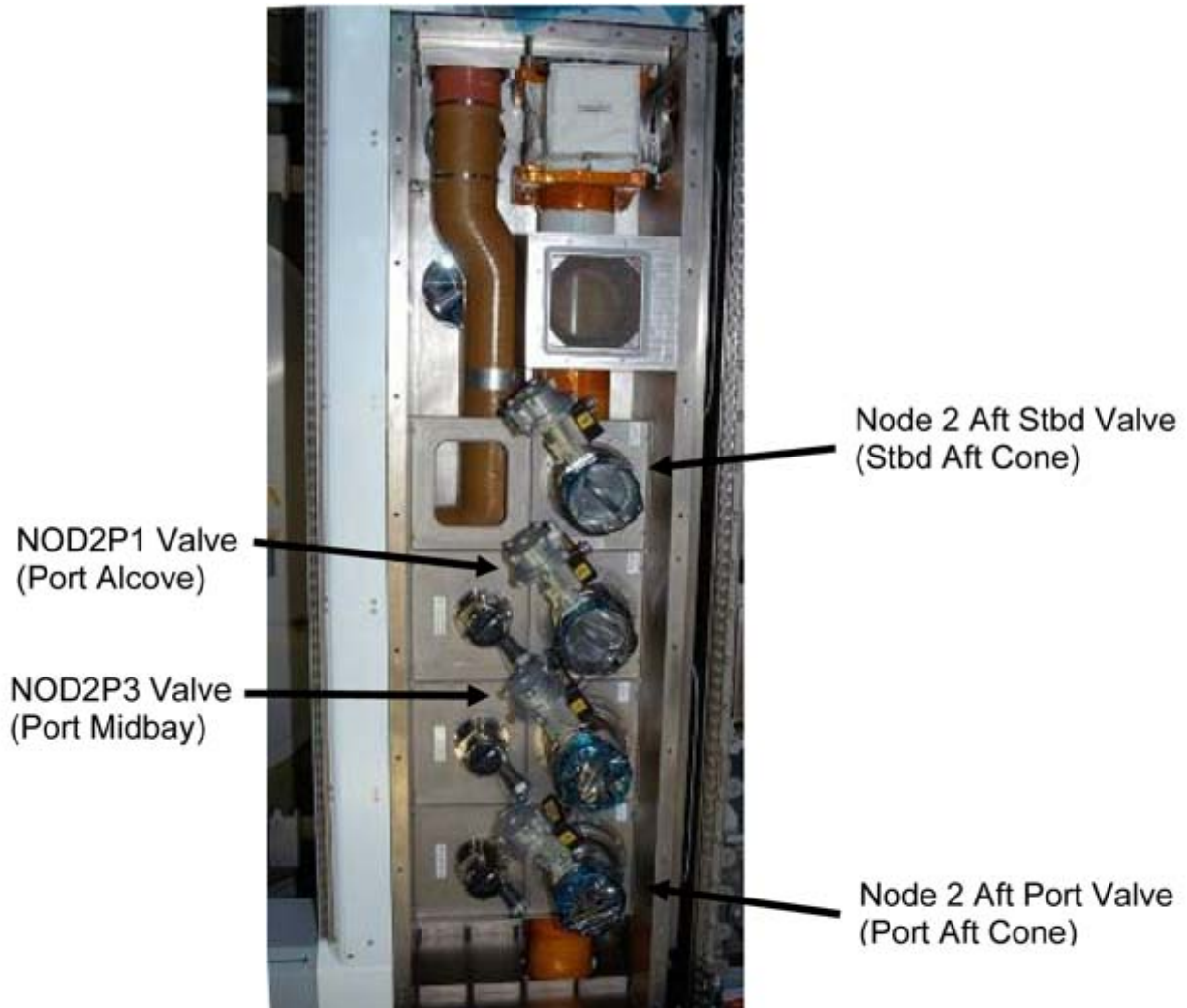


**Figure 3. Fully Seated NPRV.**

- 3.1 Verify NPRV fully seated.  
Refer to Figures 1, 2, 3.
  - 3.2 If NPRV deployed, press external cover toward bulkhead until cover snaps into place against base assembly.
  - 3.3 Loosen, remove V-Band Clamp and stow at bulkhead .  
Remove NPRV (Ratchet, 1/4" Drive; 4" Ext; 7/16" Deep Socket, 1/4" Drive).  
Temporarily stow NPRV.
4. [OBTAINING IMV VALVE FROM STOWED LOCATION](#)

**CAUTION**

None of the stowed IMV Valves in NOD2S3 have caps on the connectors. Use caution to prevent contact with connector pins without static wrist thether.



**Figure 4. Node 2 Starboard Midbay Stowage Location for IMV Valves.**

4.1 Don Static Wrist Tether.

**Table 3. IMV Valve Identification**

IMV Valve Stowage Label	P/N	S/N
IMV VLV PORT AFT CONE	P/N 2353024-4-1	D0025
IMV VLV STBD AFT CONE	P/N 2353024-2-1	D0006

4.2 Retrieve IMV Valve identified by label and replace V-Band Clamp on mock flange in stowage volume (Ratchet, 1/4" Drive; 4" Ext; 7/16" Deep Socket, 1/4" Drive). Refer to Table 3, Figure 4.

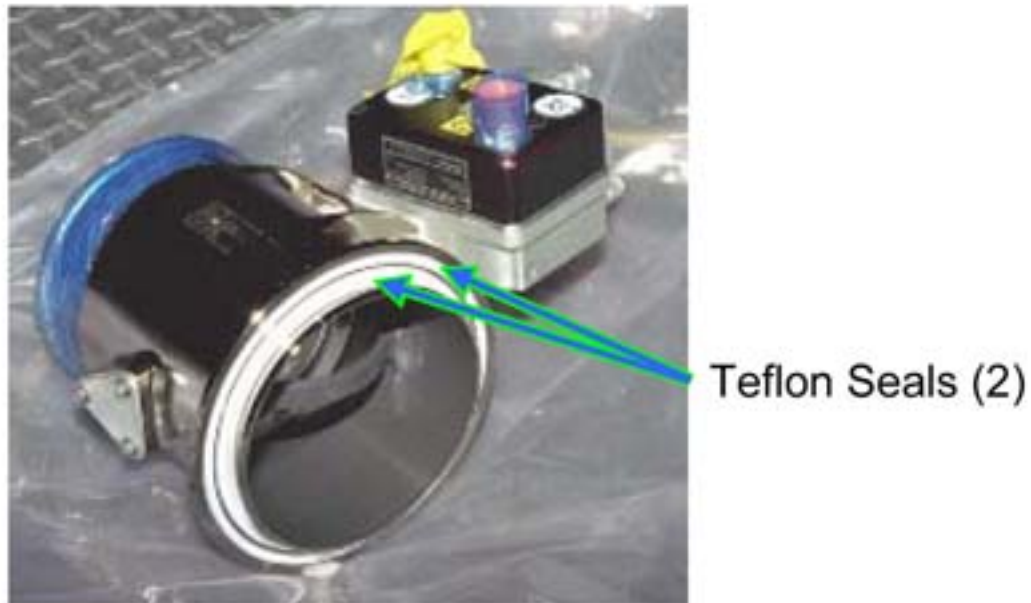


Figure 5. Typical View IMV Teflon Seals.

- 4.3 ✓ Teflon Seal (two) on mating surface of IMV Valve flange clean, free of debris  
Clean if required by wiping around circumference of seal (Dry Wipes).  
Refer to Figure 5.
- 4.4 ✓ No debris in or around valve installation location at bulkhead

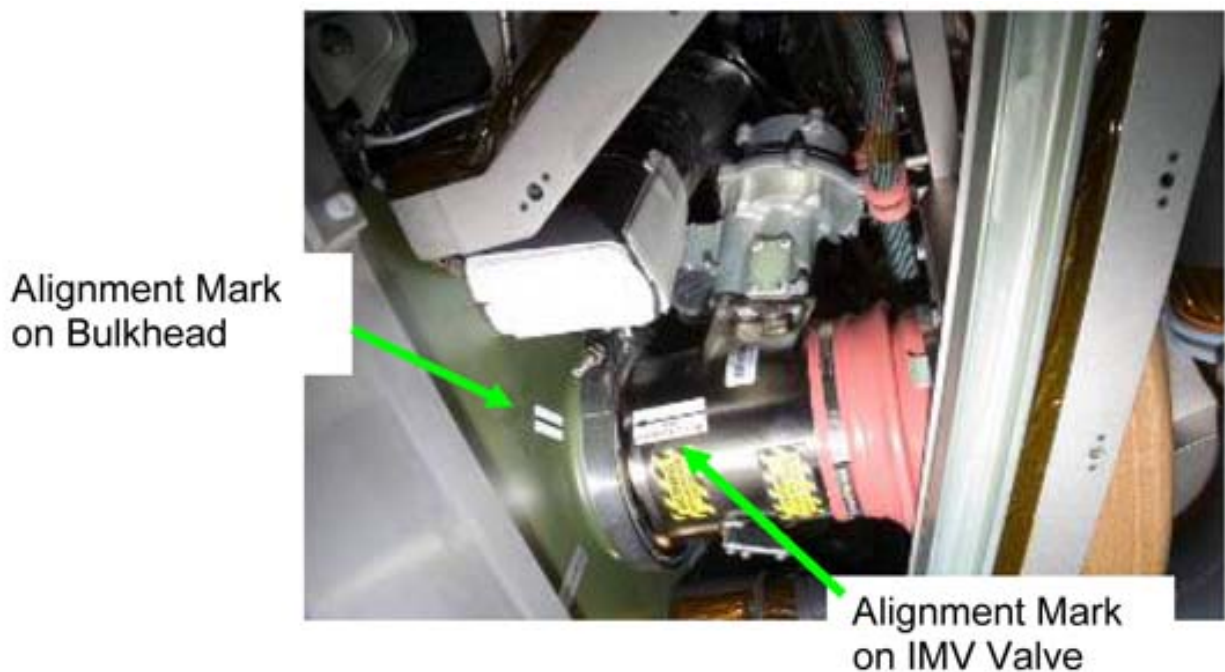


Figure 6. Typical IMV Valve With Alignment Marks.



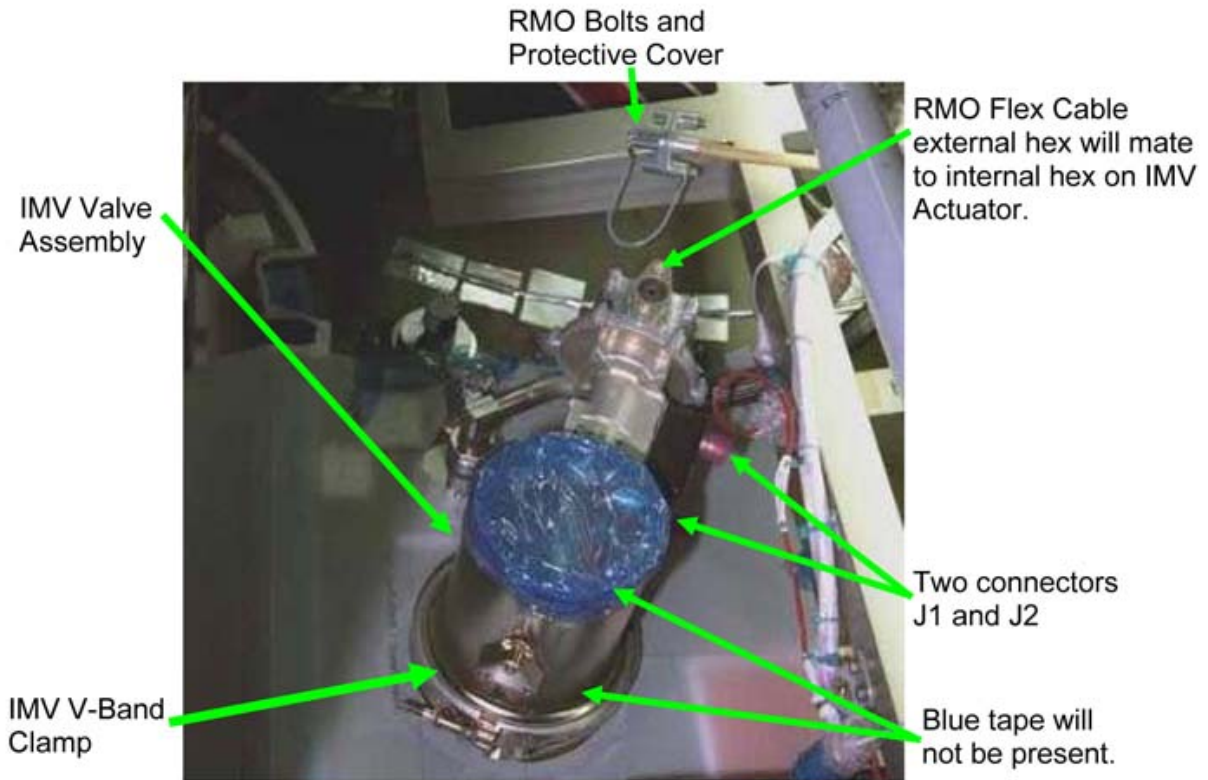


Figure 7. IMV Valve Partially Installed.

5. INSTALLATION

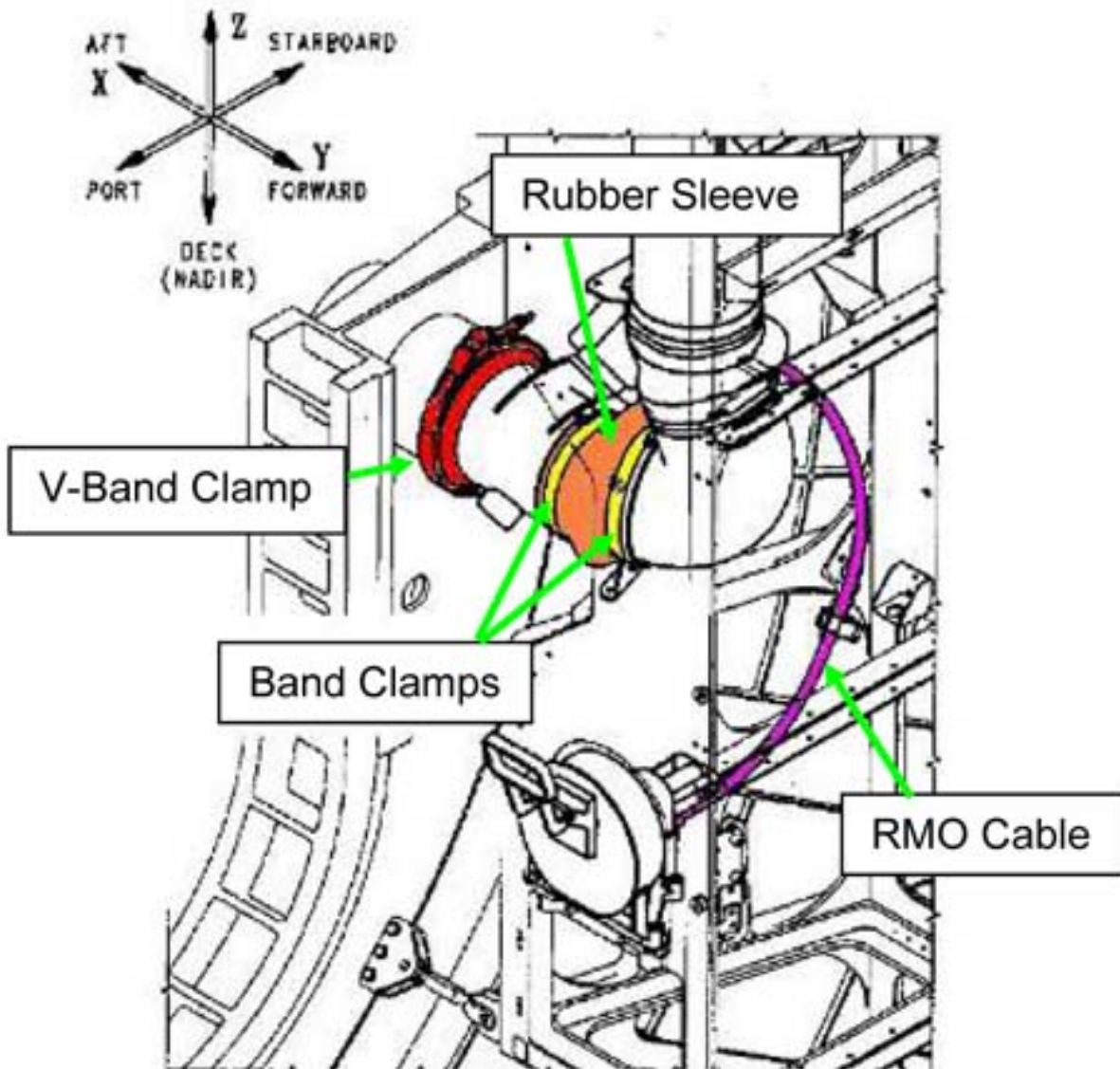


Figure 8. Aft Stbd IMV Valve with RMO Installed with Proper Bend Radius.





Figure 9. Example of Closed IMV Valve.

- 5.1 Visually verify IMV Valve is in Closed position.  
Refer to Figure 9.

**CAUTION**

RMO will not operate without optimum bend radius of flex cable. Installation of IMV Valve using alignment mark insures optimum bend radius of RMO flex cable.

- 5.2 Using reference mark, align IMV Valve to bulkhead.  
Install V-Band Clamp loosely to hold Valve in place (Ratchet, 1/4" Drive; 4" Ext; 7/16" Deep Socket, 1/4" Drive).  
Refer to Figures 5, 6, 7, 8, 9.

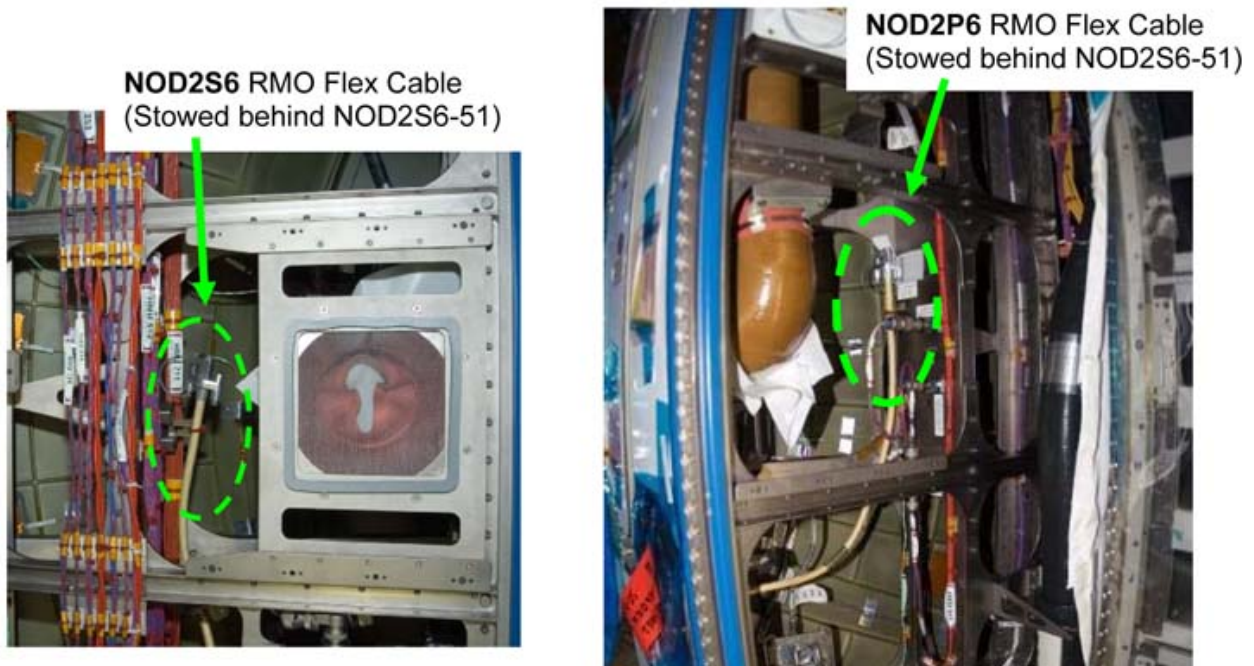


Figure 10. RMO Flex Cable Stowed Locations.

- 5.3 Release RMO flex shaft from launch location (Angled Cutters).  
Remove Tethered Cap from end of RMO flex cable (Ratchet, 1/4" Drive; 4" Ext; 5/32" Hex Head, 1/4" Drive).  
Refer to Figure 10.



Figure 11. RMO Handle.

- 5.4 Verify RMO is at the Closed position hardstop.  
Refer to Figure 11.
- 5.5 Position RMO flex cable, verify acceptable bend radius, install Fasteners (two) (Driver Handle, 1/4" Drive; 4" Ext; 5/32" Hex Head, 1/4" Drive).  
Refer to Figures 6, 7, 8.

**Table 4. Node 2 Aft IMV Valve J1 and J2 Connectors**

IMV Label	Power/Data Cable Connectors	ORU Connectors
N2-Aft_Port_IMV_VLV	P1AFT_IMVR HMU253	J1
	P2AFT_IMVR HMU612	J2
N2-Aft_Stbd_IMV_VLV	P1AFT_IMVVS HMU253	J1
	P2AFT_IMVVS HMU612	J2

5.6 Don Static Wrist Tether.  
Mate IMV Valve power and data cables stowed near installed location, to connectors J1 and J2.  
Refer to Table 4.

5.7 Doff Static Wrist Tether.

6. CHECKOUT

6.1 Notify **MCC-H**: replacement Valve installed and ready for checkout.

6.2 Close Command Enable For [B] IMV RPC  
Refer to Table 1 for below step.

PCS

Node 2: ECLSS: [B] Valve

sel RPCM [X] RPC [Z]

'Close Cmd'

cmd Ena

√Close Cmd – Ena

6.3 For Node 2 Aft Port (Stbd) IMV Valve  
Perform [{2.506 IMV VALVE RECONFIGURATION}](#), steps 1 and 2 (SODF: ECLSS: NOMINAL: THC), then:

Verify RMO Handle commanded to OPEN position hard stop.  
Refer to Figure 11.  
Notify **MCC-H** results.

- 6.4 Photo document RMO showing pointer position (DCS 760 Camera).
  - 6.5 **On MCC-H GO**, verify RMO Handle commanded to CLOSED position hard stop.  
Refer to Figure 11.  
Notify **MCC-H** results.
  - 6.6 Photo document RMO showing pointer position (DCS 760 Camera).
  - 6.7 **On MCC-H GO**, deploy RMO Handle, rotate CCW until pointer contacts RMO OPEN position hardstop.  
Allow handle to return to neutral position.  
Refer to Figure 11.
  - 6.8 Note position of pointer at neutral position.  
Determine whether pointer contact OPEN position hardstop.  
Notify **MCC-H** of results.
  - 6.9 Photo document RMO showing pointer position (DCS 760 Camera).
  - 6.10 **On MCC-H GO**, rotate RMO Handle CW until pointer contacts RMO CLOSED position hardstop.  
Allow handle to return to neutral position.  
Refer to Figure 11.
  - 6.11 Note position of pointer at neutral position.  
Determine whether pointer contact CLOSED position hardstop.  
Notify **MCC-H** of results.
  - 6.12 Photo document RMO showing pointer position (DCS 760 Camera).
7. [TORQUING IMV VALVE](#)
- 7.1 Tighten, torque RMO flex cable bolts (two) (on side of actuator) to 39 in-lbs [Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive; 4" Ext; (10-50 in-lbs) Trq Wrench, 1/4" Drive].
  - 7.2 Tighten IMV Valve V-Band Clamp nut, torque to 40 in-lbs [(10-50 in-lbs) Trq Wrench, 1/4" Drive; 4" Ext; 7/16" Deep Socket, 1/4" Drive].
8. [DUCT CONNECTION](#)

NOTE

Some IMV hose clamps may require Flat Tip Driver instead of 1/4" Deep Socket, 1/4" Drive. This is dependent on space between head of fastener and interface tolerances to band clamp.

## NODE 2 AFT NPRV REMOVE, REPLACE WITH IMV VALVE

(ASSY OPS/10A/FIN)

Page 13 of 13 pages

- 8.1 Remove cover from rubber sleeve attached to IMV duct, temporarily stow.
  - 8.2 Loosen hose clamp stowed on IMV Valve to allow rubber sleeve to slide onto end of IMV Valve (Driver Handle 1/4" Drive, 1/4" Deep Socket, 1/4" Drive).
  - 8.3 Slide rubber sleeve onto end of IMV Valve.  
Allow approximately 1 inch overlap between sleeve and duct.
  - 8.4 Slide hose clamp sleeve/valve interface so that it is at least 1/8" from end of sleeve.  
Orient clamp so that Fastener will be easily accessible from hatchway.  
Tighten V-Band Clamp Fasteners (two), torque to 17 in-lbs [Driver Handle 1/4" Drive, 1/4" Deep Socket, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive].
  - 8.5 Notify **MCC-H** Aft Port valve installed.
  - 8.6 Repeat steps 1 to 8.5 for Aft Stbd valve before Node 2 egress for relocation to LAB Fwd.
9. CLOSEOUT
- 9.1 Install Closeout Panels.  
Refer to Table 2.
10. POST MAINTENANCE
- 10.1 Notify **MCC-H** of task completion.
  - 10.2 ✓Stow NPRV(s) per Stowage Note
  - 10.3 Stow tools, materials.

This Page Intentionally Blank

## **NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL**

(ASSY OPS/10A/FIN 1) Page 1 of 13 pages

### OBJECTIVE:

Install/remove temporary ducting in Node 2 for initial outfitting while docked to Node 1 Port using a PMA IMV Flex Duct Extension as well as a new Flexible Ventilation Duct flown up on 10A inside Node 2.

### LOCATION:

Installed: Node 2 Aft-Starboard End Cone

### DURATION:

Installation: 1 hour

Removal: 1 hour

### CREW:

One

### PARTS:

PMA IMV Flex Duct Extension P/N 1F94509-1

Flexible Ventilation Duct (13 ft) P/N 683-51988-1

V-Band Clamp P/N MS27115-21R

### MATERIALS:

Gray Tape

Dry Wipes

6" x 6" Ziplock Bag labeled "NOD2S6-02"

6" x 6" Ziplock Bag labeled "NOD2S6-51"

6" x 6" Ziplock Bag labeled "NOD2S3-01"

### TOOLS:

DCS 760 Camera

Static Wrist Tether

#### ISS IVA Toolbox:

Drawer 2:

Ratchet, 1/4" Drive

5/32" Hex Head, 1/4" Drive

7/16" Deep Socket, 1/4" Drive

1/2" Deep Socket, 1/4" Drive

1/4" Socket, 1/4" Drive

Driver Handle, 1/4" Drive

4" Ext, 1/4" Drive

(10-50 in-lbs) Trq Wrench, 1/4" Drive

Drawer 5:

2" Cut Scissors

### REFERENCED PROCEDURE(S):

None

1. ACCESSING

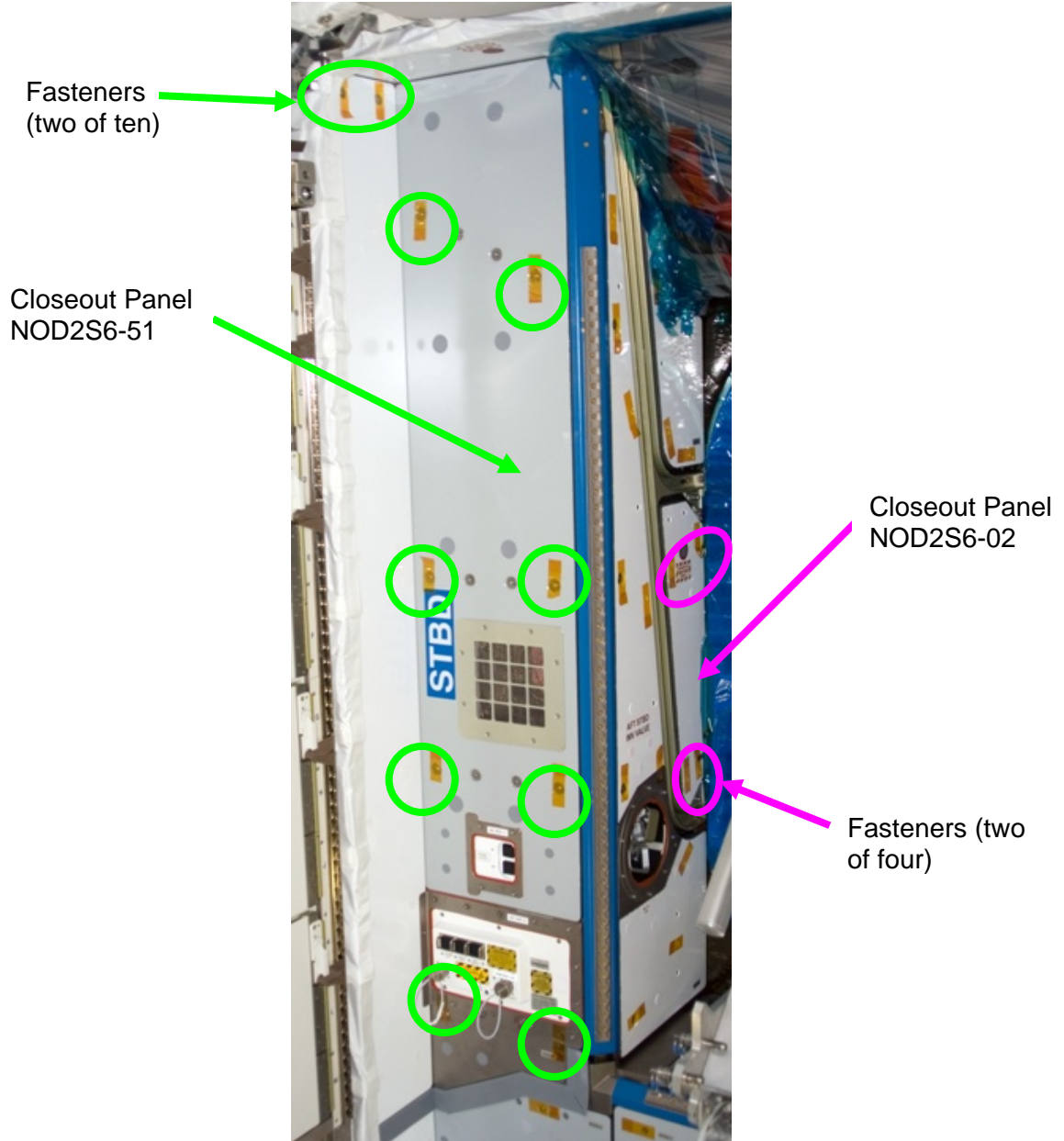


Figure 1.- Node 2 Aft Closeout Panels.

NOTE  
There is a gray dot beside each non-captive Launch Restraint Bolt.

- 1.1 Remove launch restraint bolts (two) from Closeout Panel NOD2S6-02 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Stow Bolts and Washers in labeled 6 x 6 Ziplock Bag.



## NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN 1) Page 3 of 13 pages

- 1.2 Remove Closeout Panel NOD2S6-02, Fasteners (four) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).  
Temporarily stow.  
Refer to Figure 1.
- 1.3 Remove launch restraint bolts (eight) from Closeout Panel NOD2S6-51 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).  
Stow Bolts and Washers in labled 6" x 6" Ziplock Bag.
- 1.4 Remove Closeout Panel NOD2S6-51, Beta Cloth and Fasteners (ten) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).  
Temporarily stow.  
Refer to Figure 1.

### 2. INSPECTING NEGATIVE PRESSURE RELIEF VALVE (NPRV)



Figure 2.- Deployed NPRV.



Figure 3.- Fully Seated NPRV.

- 2.1 Verify NPRV fully seated.  
Notify **MCC-H**.  
Refer to Figures 2, 3.
- 2.2 If NPRV deployed, press external cover toward bulkhead until cover snaps into place against base assembly.

3. REMOVING NPRV

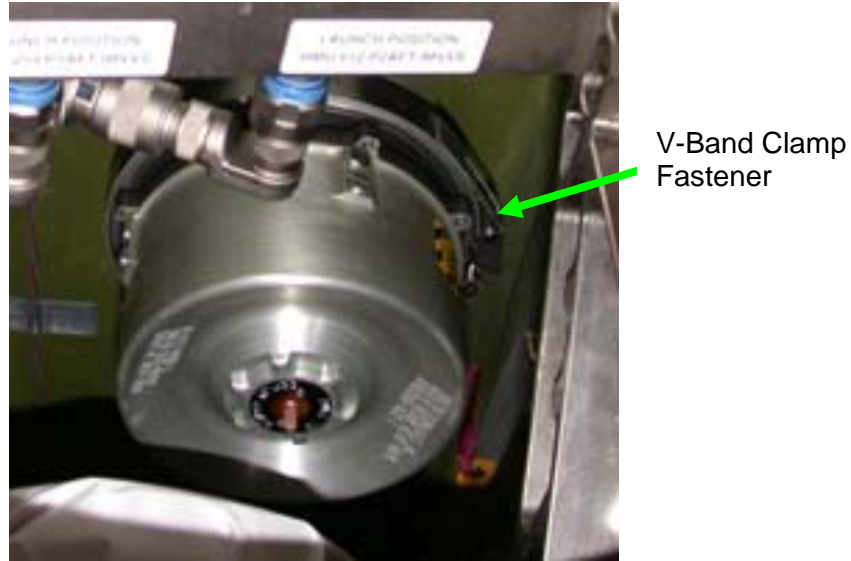


Figure 4.- Aft-Starboard Bulkhead IMV Location with NPRV Installed (looking aft).



Figure 5.- Aft-Starboard Bulkhead IMV Location with NPRV Installed (looking starboard).

- 3.1 Loosen V-Band Clamp Fastener (one) (Ratchet, 1/4" Drive; 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).  
Remove V-Band Clamp, NPRV.  
Temporarily stow NPRV and V-Band Clamp.  
Refer to Figure 4,5.

## NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN 1) Page 5 of 13 pages

### 4. INSTALLING VENTILATION DUCTING

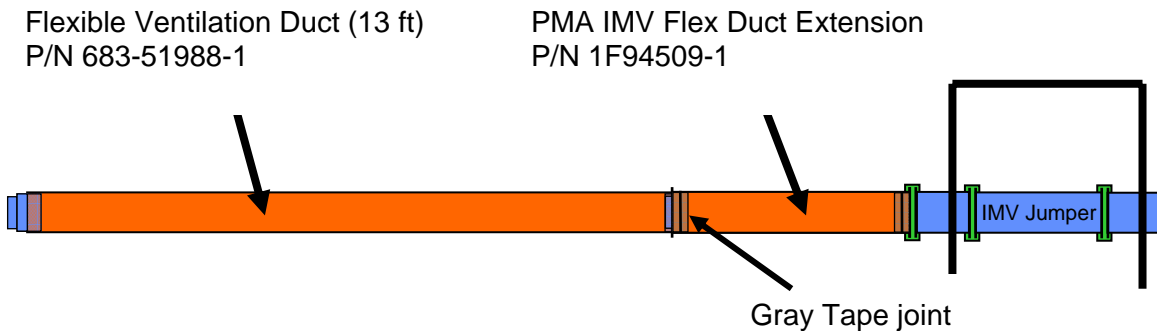


Figure 6.- Ventilation Ducting Installed Configuration.

#### NOTE

Closeout Panels will remain temporarily stowed while ducting is installed. Ducting is to be routed from the Aft-Starboard bulkhead IMV location through the NOD2S6-51 panel location and on through the module.

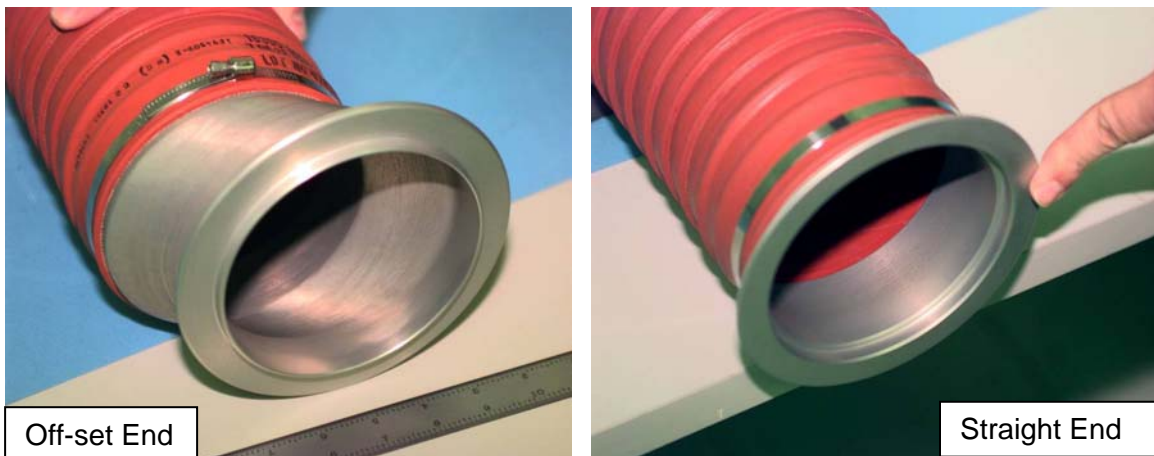


Figure 7.- Flanged ends of PMA IMV Flex Duct Extension.

- 4.1 Align Off-set end of PMA IMV Flex Duct Extension to Aft-Starboard bulkhead IMV location.  
Install V-Band Clamp, Fastener (one) (Ratchet, 1/4" Drive, 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).  
Refer to Figures 6, 7.

## NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN 1) Page 6 of 13 pages



Figure 8.- Flexible Ventilation Duct (13 ft) stowed in Node 2 (launch configuration).

- 4.2 Remove Flexible Ventilation Duct (13 ft) from stowed location in NOD2P4 (2" Cut Scissors). Refer to Figure 8.
- 4.3 Secure Non-Velcro end of Flexible Ventilation Duct (13 ft) inside straight-flanged end of PMA IMV Flex Duct Extension (Gray Tape). Refer to Figure 6,7.
- 4.4 Secure free end of Flexible Ventilation Duct (13 ft) to structure (Velcro).

### 5. REMOVING VENTILATION DUCTING

- 5.1 Remove Gray Tape securing Flexible Ventilation Duct (13 ft) to PMA IMV Flex Duct Extension (2" Cut Scissors). Temporarily stow.
- 5.2 Inspect PMA IMV Flex Duct Extension straight flange sealing surface for tape residue. If necessary, clean flange.

## NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN 1) Page 7 of 13 pages

- 5.3 Remove Off-set end of PMA IMV Flex Duct Extension from Aft-Starboard bulkhead IMV location.  
V-Band Clamp, Fastener (one) (Ratchet, 1/4" Drive, 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive).  
Temporarily stow.

### 6. INSTALLING IMV VALVE



Figure 9.- NOD2S3 Closeout.

#### NOTE

There is a gray dot beside each non-captive Launch Restraint Bolt.



## NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN 1) Page 8 of 13 pages

- 6.1 Remove launch restraint bolts (thirty) from Closeout Panel NOD2S3-01 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Stow Bolts and Washers in labled 6" x 6" Ziplock Bag. Refer to Figure 9.
- 6.2 Remove Closeout Panel NOD2S3-01, Fasteners (six) (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Temporarily stow. Refer to Figure 9.
- 6.3 Don Static Wrist Tether. Secure to unpainted, unanodized metal surface.

Table 1. IMV Valve Identification

IMV Valve Stowage Label	P/N	S/N
IMV VLV AFT STBD CONE	P/N 2353024-2-1	D0006

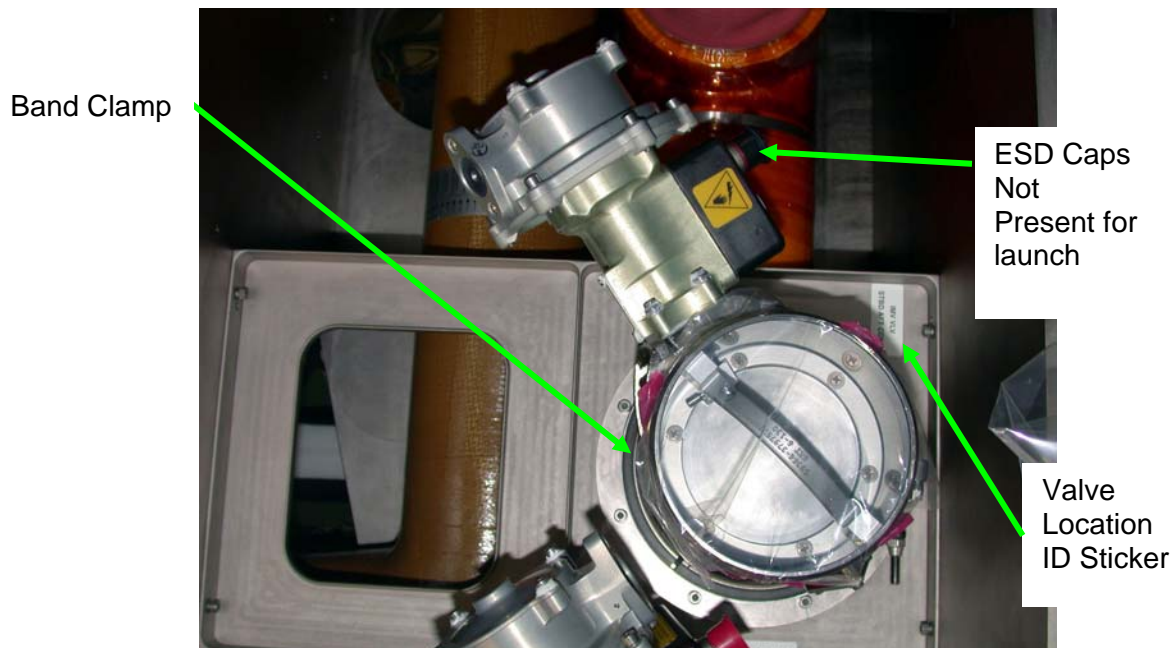


Figure 10.- IMV Valve Aft Starboard Cone Stowed Location (NOD2S3-01).

- 6.4 Remove IMV Valve and V-Band Clamp from stowed location NOD2S3-01 (Ratchet, 1/4" Drive, 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive). Refer to Table 1. Refer to Figure 10.



Figure 11.- IMV Valve.

6.5 ✓ Teflon Seals (two) on mating surface of IMV Valve Flange are present

Clean with Dry Wipes if necessary.  
Verify valve flap is in closed position.  
Refer to Figure 11.

**CAUTION**

IMV Valve should be installed in an orientation to provide optimum bend radius for RMO cable. Installation with valve and bulkhead alignment marks aligned should provide this optimal bend radius. RMO will not operate without optimum bend radius.

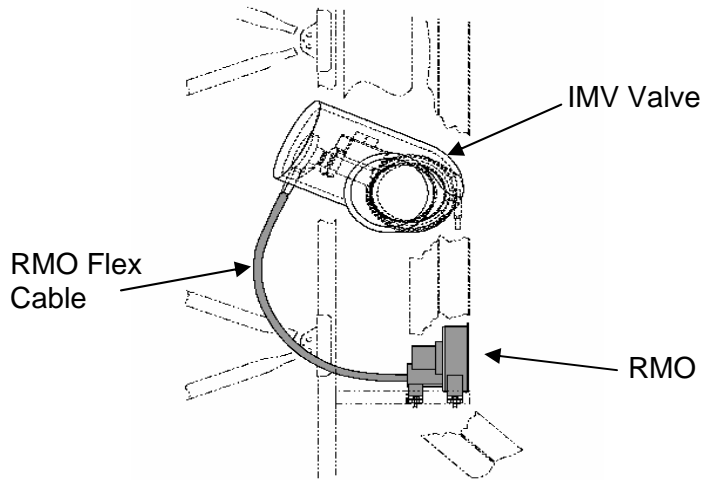


Figure 12. Aft Stbd IMV Valve with RMO Installed.

6.6 Verify RMO cable has optimum bend radius.  
Refer to Figure 12.

If optimum bend radius, proceed to step 6.9.

If not optimum bend radius, proceed to the following off-nominal situation (starred block).



## NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN 1) Page 11 of 13 pages

\*\*\*\*\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*

\*\*\*\*\*

### NOTE

1. If necessary, adjust clocking of RMO Cable interface on valve actuator. Interface can be relocated by loosening, but not removing, noncaptive actuator bolts on IMV Valve.
2. The IMV Valve actuator bolts are not captive. Loosen but do not remove.

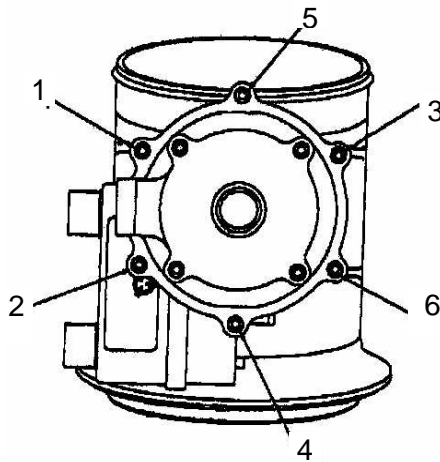


Figure 13.- IMV Actuator Bolt Tightening Pattern.

- 6.7 Loosen IMV Valve actuator noncaptive bolts (six) on top of actuator located on upper end of valve (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).  
Refer to Figure 13.
- 6.8 Carefully turn actuator clockwise or counterclockwise and relocate RMO interface connection for optimum cable bend radius.
- 6.9 Tighten actuator bolts in star pattern and torque to 23 in-lbs [Driver Handle, 1/4" Drive; 5/32" Hex Head, 1/4" Drive; (10-50 in-lbs) Trq Wrench].  
Refer to Figure 13.

## NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN 1) Page 12 of 13 pages



Figure 14.- Typical IMV Valve Reference Marks in Node 2.

- 6.10 Using reference marks, align IMV Valve to bulkhead and install V-Band Clamp, torque to 35 in-lbs [Ratchet, 1/4" Drive, 7/16" Deep Socket, 1/4" Drive or 1/2" Deep Socket, 1/4" Drive; (10-50 in-lbs) Trq Wrench, 1/4" Drive]. Refer to Figure 14.
- 6.11 Remove Tethered Cap from end of RMO flex shaft (Ratchet, 1/4" Drive; 4" Ext, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).
- 6.12 Remove RMO flex cable from launch configuration (2" Cut Scissors).
- 6.13 Install RMO flex cable. Verify acceptable bend radius, Fasteners (two) (Driver Handle, 1/4" Drive; 4" Ext, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figure 12.
- 6.14 P1AFT\_IMVVS HMU253 →|← J1  
P2AFT\_IMVVS HMU612 →|← J2



Figure 15.- Flexible Coupling Launch Configuration.

## NODE 2 VENTILATION DUCT INSTALLATION AND REMOVAL

(ASSY OPS/10A/FIN 1) Page 13 of 13 pages

- 6.15 Remove protective cloth from flexible coupling (2" Cut Scissors).  
Refer to Figure 15.
  - 6.16 Slide IMV Valve Band Clamp over flexible coupling, tighten (Ratchet,  
1/4" Drive; 4" Ext, 1/4" Drive; 1/4" Socket, 1/4" Drive).
  - 6.17 Doff Static Wrist Tether.
7. POST MAINTENANCE
- 7.1 Photo document final configuration (DCS 760 Camera).
  - 7.2 Notify **MCC-H** of task completion.
  - 7.3 Stow tools, materials, equipment.  
Update IMS with stowage locations.

This Page Intentionally Blank

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 1 of 49 pages

#### OBJECTIVE:

This procedure supports the re-deployment of a single USOS Solar Array Wing (SAW) and it is applicable to all arrays located on the main truss. Solar array re-deployment can be performed in any attitude that supports the visual verification requirements.

#### NOTE

1. Crew will be primary for performing steps 18.3, 18.7 and 18.10. **MCC-H** will be primary for performing all remaining steps.

#### Overview of Steps for SAW Deploy

- a. Unlatch Left Blanket Box (LBB) and Right Blanket Box (RBB) for high tension deploy.
  - b. Deploy 1 Bay of Mast, then stop deploy.
  - c. Latch LBB and RBB for high tension deploy.
  - d. Deploy Mast to 100 %
2. Refer to this procedure for all applicable SAWs. Refer to Table 1 for PVM power channel connectivity.

Table 1. PVM Connectivity

PVM	[XX]	[YY]
P6	2B	4B
P6	4B	2B

#### **CAUTION**

1. Steps that involve mechanical motion of the mast must be performed during insolation to support crew visual cues.
2. Steps that involve mechanical motion of the mast or latches must be performed with ISS and orbiter thrusters inhibited to avoid damage to solar array mechanisms.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 2 of 49 pages

#### 1. VERIFYING SARJ CONFIGURATION

##### CAUTION

The SARJ nearest the SAW to be re-deployed must be stopped and locked. The SARJ farthest from the SAW to be deployed can continue to be rotated. These configurations are required to minimize dynamic loading on the array and to support visual verification requirements.

PCS

P4 : EPS: Port SARJ

Port SARJ

Verify Position, deg: P6 Array Deployment Position

Verify DLA 1(2) Position – Locked

S4: EPS: Stbd SARJ

Stbd SARJ

Verify DLA 1(2) Position – Engaged(Locked) (No restrictions to SARJ rotation during SAW deploy.)

#### 2. CONFIRMING SSU [XX] SHUNTED

PVM: EPS: SSU [XX]

SSU [XX]

'SSU'

Verify Integration Counter – incrementing

Verify Shunt Current 1 (LBB), A: ~0.0

Verify Shunt Current 2 (RBB), A: ~0.0

'PVCE'

'Error Voltage'

Verify 1: -0.7 to 0.7 V

Verify 2: -0.7 to 0.7 V

Verify 3: -0.7 to 0.7 V

'Output'

Verify Error Bus Voltage, V: < 0.6

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 3 of 49 pages

```
*****
* If SSU is not shunted, then Shunt SSU at this time
* PVM: EPS: SSU [XX]
* SSU [XX]
*
* sel PVCE
*
* SSU [XX] PVCE
*
* cmd All PVCE Off – Off (single-step command –
* arm not required)
*
* √PVCE 1 Error Voltage: < 5 Volts
* √PVCE 2 Error Voltage: < 5 Volts
* √PVCE 3 Error Voltage: < 5 Volts
*****
```

#### 3. VERIFYING COMM WITH BGA CONTROLLER

PVM: EPS: BGA [XX]  
BGA [XX]  
'ECU [XX]'

Verify ECU/BGA Integ Cnt – incrementing

#### 4. VERIFYING COMM WITH SAW CONTROLLER

sel SAW [XX]

SAW [XX]  
'ECU [XX]'

Verify ECU/SAW Integ Cnt – incrementing

#### 5. REDUCING LOAD ON SUPPORTING CHANNEL PRIOR TO SAW DEPLOY OPERATIONS

##### 5.1 Verifying Which Support Channel [ZZ] is Providing Prime Power to ECU [XX]

###### NOTE

It is possible for both ECUs on a particular PVM to be powered from the same channel. This configuration will determine which channel should be powered down to support the peak power load of 580 watts.

PVM: EPS: BGA [XX]  
BGA [XX]

sel RPCM [XX] A RPC 01

RPCM [XX] A RPC 01

Verify RPC Position – Close (Verify – CI)

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 4 of 49 pages

BGA [XX]

sel RPCM [YY] A RPC 02

RPCM [YY] A RPC 02

Verify RPC Position – Close (Verify – Cl)

If ECU [XX] is receiving power from one closed RPC, use Table 2 to determine which support channel is affected.

If both RPCs, providing input power to ECU [XX], are closed, RPCM [XX] A and RPCM [YY] A input current must be used to determine which source is providing prime power to ECU [XX].

Once this is determined, use Table 2 to determine which support Channel is affected.

#### NOTE

Table 2 provides expected support channel connectivity. A support channel provides initial power to the channel being activated until the SAW is deployed and the batteries are charged (e.g., Ch 4A supports Ch 4B until Ch 4B is fully activated).

Table 2. Support Power Channel Connectivity

[XX]	[YY]	[ZZ]
2B	4B	2A
4B	2B	4A

Record the following:

RPCM [XX](YY) - A, Providing Prime Power to ECU [XX]: \_\_\_\_\_

DDCU [XX](YY) Supporting the RPCM: \_\_\_\_\_

Supporting Power Channel [ZZ]: \_\_\_\_\_

#### 5.2 Terminating All Battery Charging or Warming on Channel [XX] (Same Channel That the SAW is to be Deployed, If Required)

#### NOTE

1. Reducing load on the supporting power channel protects for a peak power load of 580 watts during SAW deployment operations. When arrays are feathered, load reduction also protects for power balance of the supporting channel.
2. BCDU/Battery caution messages are suppressed to prevent nuisance tones, during initial battery charging.

Confirm the following Caution messages are suppressed

where [Y] =  1  2  3



### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 5 of 49 pages

BCDU [XXY] Battery SOC Low Failure  
BCDU [XXY] Trip  
Batt [XXY]1(XXY2) Undervoltage Condition  
Battery [XXY]1(XXY2) Trip

If batteries are charging

PVM: EPS: Energy Storage [XX]

Energy Storage [XX]

'BCDU [XXY]'

Perform for BCDU [XXY], where [Y] =    (as required)

sel Conv

BCDU [XXY] Converter FI

'Converter'

**cmd** Converter Off – Arm

**cmd** Converter Off – Off (Verify – Off)

'Fault Isolator'

**cmd** Open – Arm

**cmd** Open – Open (Verify – Op)

Repeat

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 6 of 49 pages

If Batteries are warming,  $\sqrt{\text{MCC-H}}$  for warming status.

PVM: EPS: Energy Storage [XX]

Energy Storage [XX]

Perform for BCDU [XXY], where [Y] =    and  
[Z] =   (as required)

'BCDU [XXY]'

Verify Htr Sw A(B) – On (green icon)

sel Software Inhibits

**cmd** Batt [XXYZ] Htr Cntl Inhibit – Arm

**cmd** Batt [XXYZ] Htr Cntl Inhibit – Inhibit (Verify – Inh)

sel BCDU [XXY] SoftwareBU

**cmd** Batt [XXYZ] Htr Cntl Inhibit – Arm

**cmd** Batt [XXYZ] Htr Cntl Inhibit – Inhibit (Verify – Inh)

'Battery [XXYZ]'

sel BSCCM

**cmd** Battery [XXYZ] Heater 1,2; Off – Arm

**cmd** Battery [XXYZ] Heater 1,2; Off – Off (Verify – Off)

Repeat

#### 5.3 Powering Down ISS (If Required)

##### NOTE

When arrays are feathered, loads may be reduced to protect overall ISS energy balance.

Powerdown ISS loads so that energy balance is maintained while the array are feathered for SAW Deploy operations.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 7 of 49 pages

#### 5.4 Reducing Load on DDCU [XX](YY) Prior to SAW Deploy

##### NOTE

Power can be supplied to ECU XX from DDCU XX or DDCU YY for the solar array deploy. Therefore, it may be necessary to reduce loads on the appropriate DDCU to support a peak power load of 580 watts during array deployment.

Verify enough margin exist on DDCU [XX](YY) to support a potential peak power load of 580 watts during array deployment.  
Reduce load as necessary to meet this requirement.

#### 6. VERIFYING ECU POWER SUPPLY TEMPERATURES AND VOLTAGE STATUS

PVM: EPS: BGA [XX]

BGA [XX]

'ECU [XX]'

Verify SAW PS Temp, deg C: -33 to 51  
Verify SAW PS Voltage, V: 115 to 125  
Verify BGA PS Temp, deg C: -33 to 51  
Verify BGA PS Voltage, V: 115 to 125

#### 7. VERIFYING CHANNEL MODE AND BGA MODE

BGA [XX]

'BGA [XX]'

Verify PV Ch [XX] Mode, Primary PVCU – Non-Solar Tracking  
Verify BGA Mode, Primary PVCU – Directed Position or Null

#### 8. CONFIGURING BGA [XX] FOR SAW RE-DEPLOY

##### 8.1 Configuring BGA Position for Visual Verification

##### **CAUTION**

Prior to deploying the solar array, the BGAs must be repositioned in order to support visual verification requirements during deployment. If re-deploying a P6 array, the nearest P4 array must also be feathered to support visual requirements

##### NOTE

BGA positions assume the Port SARJ is at 90 degrees. If the SARJ is at a different position, different BGA positions may be required to support P6 array viewing during IVA operations. BGA positions for EVA support will remain the same.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 8 of 49 pages

If SAW 2B(4B) is to be re-deployed by IVA

Position BGA 2B(4B) to 200(180) degrees.

Perform {2.102 PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

Position BGA 4A(2A) to 75(110) degrees.

Perform {2.102 PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

If SAW 2B(4B) is to be re-deployed with EVA assistance

Position BGA 4A, 2A to 90 or 270 degrees and Latch BGAs on Latch 1 for EVA translation, P6 array viewing and best power generation.

Perform {2.102 PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

Perform {2.101 PVM BGA XX ENGAGE ANTIROTATION LATCH}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

If Left Blanket Box (LBB) access required, position BGA [XX] to 270 degrees and latch BGA on Latch 1.

Perform {2.102 PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

Perform {2.101 PVM BGA XX ENGAGE ANTIROTATION LATCH}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

If Right Blanket Box (RBB) access required, position BGA [XX] to 101.25 degrees and latch BGA on Latch 1.

Perform {2.102 PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

Perform {2.101 PVM BGA XX ENGAGE ANTIROTATION LATCH}, all (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

## 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 9 of 49 pages

### 8.2 Inhibiting Motor Velocity Safing to Support BGA Wiggle Technique

#### NOTE

1. SCR 19659 - If the array is parked at 0 deg, motor velocity safing may be triggered due to angle oscillations between 0 and 359. Software interprets this as a large angle movement in a short time period. Inhibit motor velocity safing to prevent the RPCs supplying the ECU from being opened.
2. SCR 28128 - The following Caution messages may also be triggered if the array is commanded to 0.  
**'BGA XX Observed vs Last Commanded State Discrepancy - PVM'**  
**'BGA XX Pointing Control Command Response Failed - PVM'**

PVM: EPS: BGA [XX]

**BGA [XX]**

sel Motor

**BGA [XX] Motor**

'Velocity Limit Safing, Primary PVCU'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Primary PVCU – Inh

'Velocity Limit Safing, Backup PVCU'

**cmd** Inhibit – Arm

**cmd** Inhibit – Inhibit

Verify Backup PVCU – Inh

## 9. VERIFYING SAW STATUS

### 9.1 Configuring for DBCL Dump of SAW Data

#### **MCC-H**

Confirm with ODIN that SAW 2B or 4B DBCL is loaded in P6 PVCUs. This DBCL corresponds to PPL 71 Version 801.

Configure for continuous data dump of SAW 2B/4B.

To build dump command, perform {[1.230 CCS BUILD DATA DUMP COMMAND](#)}, all (SODF: GND AVIONICS: C&DH: NOMINAL), then: For start location addresses, use 255D2C and for number of words use 86.

Verify initial SAW C&W flags and MDA data on SAW XX DBCL MSK displays.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 10 of 49 pages

#### 9.2 Verifying SAW Operational Ranges and Limit Switch Status

##### NOTE

Disconnects are present in the MDA Over Temp Trip FDIR. The software implements an MDA Over Temp Trip at 77.8° C. The ECU firmware implements an MDA Over Temp Trip at 140° C. These FDIR responses remove power to the MDA. Potential damage to hardware occurs at 120° C. MDA upper limit temperatures indicated in this step are conservative. At a minimum, a 30° C mast MDA temperature increase should be protected for during mast deployment.

sel SAW [XX]

SAW [XX]

'LBB'

##### NOTE

SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.

Verify SW01,02 Pin Released – Yes  
Verify SW01,02 Latched – Yes  
Verify SW01,02 Unlatched – No  
Verify MDA Slow Alert – Nominal  
Verify MDA Voltage: 000.0 ( $\pm 2.8$ )  
Verify MDA Temp, deg C: -54 to 48  
Verify MDA Over Temp Trip – blank

'MAST'

##### NOTE

SAW 2B SW 02 Deployed limit switch failed prior to the 4A mission, No is always indicated.

Verify SW01,02 Retracted – Yes  
Verify SW01,02 Deployed – No  
Verify MDA Slow Alert – Nominal  
Verify MDA Voltage: 000.0 ( $\pm 2.8$ )  
Verify MDA Temp, deg C: -54 to 48  
Verify MDA Over Temp Trip – blank

'RBB'

##### NOTE

SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.



### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 12 of 49 pages

## 10. VERIFYING SAW FDIR STATUS

### 10.1 Verifying SABB Limit Switch Override

#### NOTE

The following steps must be performed nominally if the mast will be deployed or retracted while an SABB is in an undetermined state. These steps will also verify the override of a failed Latched, Unlatched, or Pin Released limit switch.

PVM: EPS: SAW [XX]

SAW [XX]

'ECU [XX]'

sel SAW Software Inhibits

SAW [XX] Software Inhibits

'Deploy Reject'

√Deploy Reject – Inh (Allows deploy or retract commands when SABB state is undetermined)

### 10.2 Verifying Mast Limit Switch Override

#### NOTE

These steps must be performed nominally if the SABBs are latched or unlatched or if the BGA may be moved while the mast is in an undetermined (partially deployed) state. These steps will also be performed to verify the override of a failed limit switch (e.g., SAW 2B Sw 02 Deployed Limit Switch).

PVM: EPS: SAW [XX]

SAW [XX]

'ECU [XX]'

sel SAW Software Inhibits

SAW [XX] Software Inhibits

'Latch Reject'

√Latch Reject – Inh (Allows SABB unlatch or latch commands when mast state is undetermined)

### 10.3 Verifying Multi MDA On Reject

#### NOTE

These steps must be performed nominally to command 2B and 4B MDAs simultaneously.

PVM: EPS: SAW [XX]

SAW [XX]

'ECU [XX]'

sel SAW Software Inhibits



### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 13 of 49 pages

**SAW [XX] Software Inhibits**

'Multi MDA On Reject'

√Multi MDA On Reject – Inh (Allows Multiple MDAs to be powered on simultaneously)

#### 10.4 Verifying BGA Software Configuration

PVM: EPS: BGA [XX]

**BGA [XX]**

sel BGA Software Inhibits

**BGA [XX] Software Inhibits**

'SAW Deployment'

'Primary PVCU'

√SAW Deployment, Primary PVCU – Ena (Allows BGA to be operated when SAW Mast is in an undetermined state.)

'Backup PVCU'

√SAW Deployment, Backup PVCU – Ena

#### 11. VERIFYING MDA HI TEMP REJECT FUNCTION INHIBITED

PVM: EPS: SAW [XX]

**SAW [XX]**

sel SAW Software Inhibits

**SAW [XX] Software Inhibits**

sel SAW [XX] Temp Safing

**SAW [XX] Temp Safing**

'Hi Temp Reject'

√Hi Temp Reject – Inh (Allows unlatch or latch and deploy or retract commands when MDA Temp > 30° C)

#### 12. VERIFYING MDA SAFING CONFIGURATION

sel SAW Software Inhibits

**SAW [XX] Software Inhibits**

√Config Complete MDA Off Safing, Primary PVCU – Ena

√Config Complete MDA Off Safing, Backup PVCU – Ena

Turns motor off upon limit switch contact, if MDA current above limit.

√Limit Sw Turnoff Function – Ena

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 14 of 49 pages

Stops motor upon limit switch contact but does not turn motor off.

sel SAW [XX] Motor Stall Safing

SAW [XX] Motor Stall Safing

√Motor Stall Safing, Primary PVCU – Ena

√Motor Stall Safing, Backup PVCU – Ena

Turns motor off if Slow is indicated when between limit switches, and if MDA current above limit.

If deploying both arrays on a PVM the same day

Perform steps 1 to 12 for both Channels before proceeding to step 13.

#### 13. UNLATCHING LEFT BLANKET BOX (LBB)

##### 13.1 Verifying Temperatures are Within Nominal Ranges Prior to Unlatch

PVM: EPS: SAW [XX]

SAW [XX]

'ECU [XX]'

Verify SAW PS Temp, deg C: -33 to 51

Verify BGA PS Temp, deg C: -33 to 51

'LBB'

Verify MDA Temp, deg C: -54 to 48

##### 13.2 Powering On LBB Motor Drive Assembly (MDA)

###### NOTE

MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

SAW [XX]

'LBB'

sel LBB Commands

SAW [XX] LBB Commands

'MDA'

'Power'

**cmd** On – Arm

**cmd** On – On

√MDA Voltage: 120 to 125

##### 13.3 Performing Visual Verification Via Cameras

Perform a visual verification prior to, during, and at the completion of each blanket box unlatch operation.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 15 of 49 pages

There are eight latches to be unlatched for each blanket box prior to SAW retract.

Only four of eight latches are visible at a time.

Verify Camera configuration correct for solar array retraction before proceeding.

Verify latch position (four of eight) latched (tensioned).

For crew:

| If orbiter is performing mated attitude control

| | Proceed to step 13.5.

| If orbiter is not performing mated attitude control

| | Proceed to step 13.6.

| | Wait for **On MCC-H GO** for left blanket box unlatch.

#### 13.4 Verifying Initial SAW Left Blanket Box Configuration

SAW [XX] LBB Commands

Verify parameters in LATCHED column in step 13.7 before executing unlatch command.

#### 13.5 Preventing Thruster Firings

##### CAUTION

To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. Anytime the latches are not in motion, thrusters may be enabled.

**MCC-H**

If ISS is performing attitude control and ISS is in TEA (**MCC-H**)

| MCS: MCS Configuration: Manual CMG Desat

| Manual CMG Desat

| √Desat Request – Inh

| **MCC-H** ↑ ISS, orbiter, “Desats are Inhibited.”

| Go to step 13.6.

```
*****
* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
* | Perform {2.404 MODING CMG TA TO FREE DRIFT}, all (SODF:
* | MCS: NOMINAL: GNC MODING), then:
* |
* | MCC-H ↑ ISS, orbiter, "ISS is in Free Drift."
* |
* | Go to step 13.6.
*****
```

C3(A6)

```
*****
* If orbiter is performing mated attitude control
* | DAP: FREE
* |
* | Orbiter ⇒ ISS, MCC-H, "Orbiter is in Free Drift."
* |
* | Go to step 13.6.
*****
```

13.6 Unlatching SAW Left Blanket Box

<b>CAUTION</b>
Confirm no crew exercise or maximum EVA loads before proceeding.

<u>NOTE</u>
Upon successful unlatch command, the MDA current will increase (0.2 to 3.0 amps) and the Slow alert will go to Nominal during transition, then return to Slow. Once power is removed from the MDA, the Slow alert will indicate Nominal.

**MCC-H** ↑ ISS, orbiter, "We are ready to unlatch the left blanket box, please monitor Cameras."

PCS

PVM: EPS: SAW [XX]  
 SAW [XX]  
 'LBB'

sel LBB Commands

SAW [XX] LBB Commands
-----------------------

'LBB'

**cmd** Unlatch – Arm  
**cmd** Unlatch – Unlatch

13.7 Monitoring LBB Latch Parameters During Unlatch (Detension)  
 (Approximately 14 Seconds)  
 Refer to Table 3.

NOTE  
 SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.

Table 3. LBB Parameters

PARAMETER	LATCHED →	TRANSITION → Approximately 14 Seconds	UNLATCHED
LBB SW01,02 Pin Released	Yes	Yes	Yes
LBB SW01,02 Latched	Yes	No	No
LBB SW01,02 Unlatched	No	No	Yes
MDA Slow Alert	Slow	Nominal	Slow
MDA Voltage, V	120 to 125	120 to 125	120 to 125
MDA Temp, deg C	-54 to 48	-54 to 48	-54 to 48
MDA Over Temp Trip	blank	blank	blank
MDA Current, A	~0.10 (± 0.4)	0.20 to 2.00 (± 0.4)	~0.10 (± 0.4)
MDA Over Current Trip	blank	blank	blank

For crew:

- | If orbiter is performing mated attitude control
- |     | Proceed to step 13.8.
- | If orbiter is not performing mated attitude control
- |     | Proceed to step 13.9.

\*\*\*\*\*

- \* | If one Latched, Unlatched, or Pin Released limit switch fails
- \* |     | Confirm configuration visually and notify **MCC-H** before
- \* |     | proceeding.
- \* |     | SABB limit switch status that would restrict Mast commanding
- \* |     | has already been overridden in step 10.1.
- \* |     |
- \* | If two Latched, Unlatched, or Pin Released limit switches fail
- \* |     | Perform steps 13.8 and 13.9; then, notify **MCC-H** before
- \* |     | proceeding.

\*\*\*\*\*

13.8 Configuring for Nominal Attitude Control

**MCC-H**

If ISS is performing attitude control and ISS is in TEA (**MCC-H**)  
 Go to step 13.9.

```
*****
* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
* | Perform {2.405 MODING FREE DRIFT TO CMG TA} (SODF:
* | MCS: NOMINAL: GNC MODING), then:
* |
* | MCC-H ↑ ISS, orbiter, "ISS is in Attitude Control."
* |
* | Go to step 13.9.
*****
```

C3(A6)

```
*****
* If orbiter is performing mated attitude control
* | Perform DOCKED DAP REFERENCE, RATE DAMPING
* | (FDF: ORB OPS FS, REBOOST/DAP), then:
* |
* | Go to step 13.9.
*****
```

13.9 Performing Visual Verification Via Cameras  
 Verify latch position (four of eight) unlatched.

ISS ↓ **MCC-H**, "We confirm the left blanket box is unlatched."

**MCC-H** ↑ ISS, "We confirm nominal unlatch."

Crew: proceed to step 14.3.

```
*****
* If unlatch sequence is not successful, notify MCC-H before
* | proceeding.
* |
* | If MCC-H unavailable, perform {3.190 SAW XX FAILURE
* | TO UNLATCH SABB REMOTELY}, all (SODF: EPS:
* | MALFUNCTION: PRIMARY POWER SYSTEM), then:
*****
```

PCS

13.10 Power Off Left Blanket Box MDA

PVM: EPS: SAW [XX]

SAW [XX]

'LBB'

sel LBB Commands

SAW [XX] LBB Commands

'MDA'

'Power'

cmd Off – Off

√MDA Voltage < 10 (± 2.8)

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 19 of 49 pages

#### 14. UNLATCHING RIGHT BLANKET BOX (RBB)

##### 14.1 Verifying Temperatures are Within Nominal Ranges Prior to Unlatch

PVM: EPS: SAW [XX]

SAW [XX]

'ECU [XX]'

Verify SAW PS Temp, deg C: -33 to 51

Verify BGA PS Temp, deg C: -33 to 51

'RBB'

Verify MDA Temp, deg C: -54 to 48

##### 14.2 Powering On RBB Motor Drive Assembly (MDA)

###### NOTE

MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

SAW [XX]

'RBB'

sel RBB Commands

SAW [XX] RBB Commands

'MDA'

'Power'

**cmd** On – On Arm

**cmd** On – On

√MDA Voltage, V: 120 to 125

##### 14.3 Performing Visual Verification Via Cameras

Perform a visual verification prior to, during, and at the completion of each blanket box unlatch operation.

There are eight latches to be unlatched for each blanket box prior to SAW retract.

Only four of eight latches are visible at a time.

Verify Camera configuration correct for solar array retraction before proceeding.

Verify Latch Position (four of eight) – latched

For crew:

- | If orbiter is performing mated attitude control
  - | Proceed to step 14.5.
- | If orbiter is not performing mated attitude control
  - | Proceed to step 14.6.
  - | Wait for **MCC-H** right blanket box unlatch.

14.4 Verifying Initial SAW Right Blanket Box Configuration

SAW [XX] RBB Commands

Verify parameters in LATCHED column in step 14.7 before executing unlatch command.

14.5 Preventing Thruster Firings

**CAUTION**

To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. Anytime the latches are not in motion, thrusters may be enabled.

**MCC-H**

- | If ISS is performing attitude control and ISS is in TEA (**MCC-H**)
  - | MCS: MCS Configuration: Manual CMG Desat
  - | Manual CMG Desat
  - |  $\sqrt{\text{Desat Request}} - \text{Inh}$
  - | **MCC-H**  $\uparrow$  ISS, orbiter, "Desats are Inhibited."
  - | Go to step 14.6.

\*\*\*\*\*

- \* | If ISS is performing attitude control and ISS is not in TEA (**MCC-H**)
  - \* | Perform {2.404 **MODING CMG TA TO FREE DRIFT**}, all
  - \* | (SODF: MCS: NOMINAL: GNC MODING), then:
  - \* | **MCC-H**  $\uparrow$  ISS, orbiter, "ISS is in Free Drift."
  - \* | Go to step 14.6.

\*\*\*\*\*

C3(A6)

- \* | If orbiter is performing mated attitude control
    - \* | DAP: FREE
    - \* | Orbiter  $\Rightarrow$  ISS, **MCC-H**, "Orbiter is in Free Drift."
    - \* | Go to step 14.6.
- \*\*\*\*\*



### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 21 of 49 pages

#### 14.6 Unlatching SAW Right Blanket Box

##### **CAUTION**

Confirm no crew exercise or maximum EVA loads before proceeding.

##### NOTE

Upon successful unlatch commanding, the MDA current will increase (0.2 to 3.0 amps) and the Slow alert will go to Nominal during transition, then return to Slow. Once power is removed from the MDA, the Slow alert will indicate Nominal.

**MCC-H** ↑ ISS, orbiter, "We are ready to unlatch the right blanket box, please monitor Cameras."

PCS

PVM: EPS: SAW [XX]

SAW [XX]

'RBB'

sel RBB Commands

SAW [XX] RBB Commands

'RBB'

**cmd** Unlatch – Arm

**cmd** Unlatch – Unlatch

#### 14.7 Monitoring RBB Latch Parameters During Unlatch (Detension)

(Approximately 14 seconds)

Refer to Table 4.

##### NOTE

SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.

Table 4. RBB Parameters

PARAMETER	LATCHED →	TRANSITION → Approximately 14 Seconds	UNLATCHED
RBB SW01,02 Pin Released	Yes	Yes	Yes
RBB SW01,02 Latched	Yes	No	No
RBB SW01,02 Unlatched	No	No	Yes
MDA Slow Alert	Slow	Nominal	Slow
MDA Voltage, V	120 to 125	120 to 125	120 to 125
MDA Temp, deg C	-54 to 48	-54 to 48	-54 to 48
MDA Over Temp Trip	blank	blank	blank
MDA Current, A	~0.10 (± 0.4)	0.20 to 2.00 (± 0.4)	~0.10 (± 0.4)
MDA Over Current Trip	blank	blank	blank

For crew:

- | If orbiter is performing mated attitude control
- | | Proceed to step 14.8.
- | If orbiter is not performing mated attitude control
- | | Proceed to 14.9.

\*\*\*\*\*

- \* | If one Latched, Unlatched, or Pin Released limit switch fails
- \* | | Confirm configuration visually and notify **MCC-H** before
- \* | | proceeding.
- \* | |
- \* | | SABB limit switch status that would restrict Mast
- \* | | commanding has already been overridden in step 10.1.
- \* | |
- \* | If two Latched, Unlatched, or Pin Released limit switches fail
- \* | | Perform steps 14.8 and 14.9; then, notify **MCC-H** before
- \* | | proceeding.

\*\*\*\*\*

14.8 Enabling Thrusters (or Configuring for Attitude Control)

**MCC-H**

If ISS is performing attitude control and ISS is in TEA (**MCC-H**)  
 Go to step 14.9.

\*\*\*\*\*

- \* | If ISS is performing attitude control and ISS is not in TEA (**MCC-H**)
- \* | | Perform {2.405 MODING FREE DRIFT TO CMG TA}, all
- \* | | (SODF: MCS: NOMINAL: GNC MODING), then:
- \* | |
- \* | | **MCC-H** ↑ ISS, orbiter, "ISS is in Attitude Control."
- \* | |
- \* | | Go to step 14.9.

\*\*\*\*\*

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 23 of 49 pages

C3(A6)

```
*****
* If orbiter is performing mated attitude control
* | Perform DOCKED DAP REFERENCE, RATE DAMPING
* | (FDF: ORB OPS FS, REBOOST/DAP), then:
* |
* | Go to step 14.9.
*****
```

#### 14.9 Performing Visual Verification Via Cameras

Verify latch position (four of eight) unlatched (detensioned).

ISS ↓ **MCC-H**, “We confirm the right blanket box is unlatched.”

**MCC-H** ↑ ISS, “We confirm nominal unlatch.”

Crew: proceed to step 15.3 and provide Camera support as necessary.

```
*****
* If unlatch sequence is not successful, notify MCC-H before
* | proceeding.
* |
* | If MCC-H unavailable, perform {3.190 SAW XX FAILURE
* | TO UNLATCH SABB REMOTELY}, all (SODF: EPS:
* | MALFUNCTION: PRIMARY POWER SYSTEM), then:
*****
```

PCS

#### 14.10 Powering Off Right Blanket Box MDA

PVM: EPS: SAW [XX]

‘RBB’

sel RBB Commands

‘MDA’

‘Power’

**cmd** Off – Off

√MDA Voltage < 10 (± 2.8)

### 15. DEPLOYING FIRST BAY OF SOLAR ARRAY

#### **WARNING**

All SABB unlatch activities must be completed prior to performing the following steps. Verify EVA crew is clear of SAW mechanisms before proceeding.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 24 of 49 pages

#### 15.1 Verifying Temperatures are Within Nominal Ranges Prior to SAW Deploy

PVM: EPS: SAW [XX]

SAW [XX]

Verify SAW PS Temp, deg C: -33 to 51

Verify BGA PS Temp, deg C: -33 to 51

Verify Mast MDA Temp, deg C: -54 to 48

#### 15.2 Powering on Mast Motor Drive Assembly (MDA)

##### NOTE

MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

SAW [XX]

'Mast'

sel Mast Commands

SAW [XX] Mast Commands

'MDA'

'Power'

**cmd On – Arm**

**cmd On – On**

√MDA Voltage, V: 120 to 125

√MDA Current, A: ~0.10 (± 0.4)

√MDA Slow Alert – Slow

#### 15.3 Verifying Camera Configuration

ISS must be in insolation to perform this verification.

##### NOTE

Perform a visual verification prior to, during, and at the completion of the mast deploy operation. This ensures all launch restraints have been removed, minimizes the risk of potential collision hazards, and monitor for any obvious anomalies. Total number of visible Mast Bays is 31.5, 1 Bay is rigid batten to rigid batten.

Verify Camera configuration correct for solar array deployment before proceeding.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 25 of 49 pages

If orbiter is performing mated attitude control

Proceed to step 15.6.

If orbiter is not performing mated attitude control

Proceed to step 15.7.

Wait for **On MCC-H GO** for 1 Mast Bay deployment.

**MCC-H** proceed to step 15.4.

#### 15.4 Verifying Initial SAW Mast Configuration

##### NOTE

SAW 2B SW 02 Deployed limit switch failed prior to the 4A mission, No is always indicated.

SAW [XX] Mast Commands

√Mast SW01,SW02 Retracted – Yes

√Mast SW01,SW02 Deployed – No

#### 15.5 Verifying Conditions are Correct for Visual Verification

##### **CAUTION**

Steps 15.7 and 15.9 are to be performed during insolation to support crew visual cues used to determine when to abort the solar array deployment.

Verify ISS is in insolation.

#### 15.6 Preventing Thruster Firings

##### **CAUTION**

To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. At any time array deployment is stopped or aborted, thrusters may be enabled.

**MCC-H**

If ISS is performing attitude control and ISS is in TEA (**MCC-H**)

MCS: MCS Configuration: Manual CMG Desat

Manual CMG Desat

√Desat Request – Inh

**MCC-H** ↑ ISS, orbiter, “Desats are Inhibited.”

Go to step 15.7.

```
*****
* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
* | Perform {2.404 MODING CMG TA TO FREE DRIFT}, all
* | (SODF: MCS: NOMINAL: GNC MODING), then:
* |
* | MCC-H ↑ ISS, orbiter, "ISS is in Free Drift."
* |
* | Go to step 15.7.
*****
```

C3(A6)

```
*****
* If orbiter is performing mated attitude control
* | DAP: FREE
* |
* | Orbiter ⇒ ISS, MCC-H, "orbiter is in Free Drift."
* |
* | Go to step 15.7. and wait for MCC-H to deploy
* | Mast 1 Bay.
*****
```

15.7 Deploying First Bay of SAW

<b>CAUTION</b>
Confirm no crew exercise or Max EVA loads before proceeding.

<u>NOTE</u>
Upon successful deploy commanding, the MDA current will increase (0.2 to 3.0 amps) and the Slow alert will go to Nominal during transition. Once power is removed from the MDA, the Slow alert will indicate Nominal.

**MCC-H** ↑ ISS, orbiter, "Ground Deploying First Mast Bay."

PCS

```
PVM: EPS: SAW [XX]
SAW [XX]
'Mast'
```

sel Mast Commands

SAW [XX] Mast Commands
'Mast'

<u>NOTE</u>
To reduce the risk of damage to the blanket leaders, springs and hinges, the following three commands will be built and executed as time tagged commands. When the Abort command is issued, only 1/4 of the first Bay will be visible. This equates to 5 seconds between the Deploy command and the Abort command.

**cmd** Deploy – Arm  
**cmd** Deploy – Deploy

Wait approximately 5 seconds until blanket leaders and springs are just visible.

**cmd** Abort – Abort

<u>NOTE</u> The Mast – Abort command removes power from the MDA.
---

'MDA'

√Voltage < 10 (± 2.8) (MDA – Off)

IVA or EVA crew:  
Visually verify good separation between the top and bottom blanket panels, springs, and leaders.

SAW [XX] Mast Commands
------------------------

'MDA'  
'Power'

**cmd** On – Arm  
**cmd** On – On

√MDA Voltage, V: 120 to 125  
√MDA Current, A: ~0.10 (± 0.4)  
√MDA Slow Alert – Slow

SAW [XX] Mast Commands
------------------------

'Mast'

**cmd** Deploy – Arm  
**cmd** Deploy – Deploy

```
*****
* If at any time during the array deploy the blanket box
* | begins to distort
* | 'Mast'
* |
* | cmd Abort – Abort
* |
* | √MCC-H before proceeding
*****
```

Wait approximately 15 seconds (~1 Bay visible).

'Mast'

**cmd** Abort – Abort

If orbiter is performing mated attitude control  
 | Proceed to step 15.8.

If orbiter is not performing mated attitude control  
 Proceed to step 15.9.

NOTE

1. The Mast - Abort command removes power from the MDA.
2. SAW 2B SW 02 Deployed limit switch failed prior to the 4A mission, No is always indicated.

- √MDA Voltage, V: < 10 (± 2.8)
- √Mast SW01,SW02 Retracted – No
- √Mast SW01,SW02 Deployed – No

**MCC-H** proceeds to step 15.8.

**MCC-H** 15.8 Enabling Thrusters (or Configuring for Attitude Control)  
 If ISS is performing attitude control and ISS is in TEA (**MCC-H**)  
 Go to step 15.9.

```
*****
* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
* | Perform {2.405 MODING FREE DRIFT TO CMG TA}, all
* | (SODF: MCS: NOMINAL: GNC MODING), then:
* |
* | MCC-H ↑ ISS, orbiter, "ISS is in Attitude Control."
* |
* | Go to step 15.9.
*****
```

**C3(A6)**

```
*****
* If orbiter is performing mated attitude control
* | Perform DOCKED DAP REFERENCE, RATE DAMPING
* | (FDF: ORB OPS FS, REBOOST/DAP), then:
* |
* | Go to step 15.9.
*****
```

15.9 Performing Visual Verification Via Cameras  
 Verify blanket box covers clear of latch hooks (left and right SABB).  
 Verify number of visible mast bays ~1.

ISS ↓ **MCC-H**, "We confirm 1 mast bay deployed."

**MCC-H** ↑ ISS, "We confirm nominal mast deployment."



If orbiter is performing mated attitude control  
| Proceed to step 16.5.  
If orbiter is not performing mated attitude control  
| Proceed to step 16.8.  
| Wait for **MCC-H** to latch the left blanket box.

**MCC-H** proceeds to step 16.1.

\*\*\*\*\*  
\* If deploy sequence is not successful, √**MCC-H** before  
\* proceeding.  
\*  
\* If **MCC-H** unavailable, perform {3.191 SAW XX FAILURE TO  
\* | EXTEND MAST REMOTELY}, all (SODF: EPS:  
\* | MALFUNCTION: PRIMARY POWER SYSTEM), then:  
\*\*\*\*\*

16. LATCHING LEFT SOLAR ARRAY BLANKET BOX (ENGAGING HIGH TENSION MODE)

PCS

16.1 Verifying Temperatures are Within Nominal Ranges Prior to SAW

Deploy  
PVM: EPS: SAW [XX]  
SAW [XX]

Verify SAW PS Temp, deg C: -33 to 51  
Verify BGA PS Temp, deg C: -33 to 51  
Verify LBB MDA Temp, deg C: -54 to 48

16.2 Powering On LBB Motor Drive Assembly (MDA)

NOTE  
MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

SAW [XX]  
'LBB'

sel LBB Commands

SAW [XX] LBB Commands  
'MDA'  
'Power'

**cmd** On – Arm  
**cmd** On – On

√MDA Voltage, V: 120 to 125

16.3 Verifying SAW Left Blanket Box Configuration  
 Verify parameters in UNLATCHED column in step 16.7 before executing latch command.

16.4 Verifying Conditions are Correct for Visual Verification

<b>CAUTION</b>
Steps 16.6 and 16.8 are to be performed during insolation, to support crew visual cues use to determine correct SABB latch configuration.

Verify ISS is in insolation.

16.5 Preventing Thruster Firings

<b>CAUTION</b>
To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. Anytime the latches are not in motion, thrusters may be enabled.

**MCC-H**

If ISS is performing attitude control and ISS is in TEA (**MCC-H**)  
 MCS: MCS Configuration: Manual CMG Desat  

Manual CMG Desat
------------------

  
 ✓Desat Request – Inh  
**MCC-H** ↑ ISS, orbiter, “Desats are Inhibited.”  
 Go to step 16.6.

\*\*\*\*\*  
 \* If ISS is performing attitude control and ISS is not in TEA (**MCC-H**)  
 \* Perform {2.404 MODING CMG TA TO FREE DRIFT}, all  
 \* (SODF: MCS: NOMINAL: GNC MODING), then:  
 \*  
 \* **MCC-H** ↑ ISS, orbiter, “ISS is in Free Drift.”  
 \*  
 \* Go to step 16.6.  
 \*\*\*\*\*

C3(A6)

```
*****
* If orbiter is performing mated attitude control
*   DAP: FREE
*
*   Orbiter => ISS, MCC-H, "orbiter is in Free Drift."
*
*   Go to step 16.6. and wait for MCC-H to latch LBB.
*****
```

16.6 Latch SAW Left Blanket Box (Engage High Tension Mode)

<b>CAUTION</b>
Confirm no crew exercise or max EVA loads before proceeding.

<b>NOTE</b>
<ol style="list-style-type: none"> <li>Latching the blanket box engages high tension mode (75 lbs) and provides more control over stiction between blanket panels during array deployment.</li> <li>Upon successful Latch commanding, the Slow alert will go to Nominal during transition, then return to Slow. Once power is removed from the MDA, the Slow alert will indicate Nominal.</li> </ol>

**MCC-H** ↑ ISS, orbiter, "Ready to latch the left blanket box."

PCS

```
PVM: EPS: SAW [XX]
SAW [XX]
'LBB'
```

sel LBB Commands

SAW [XX] LBB Commands
-----------------------

'LBB'

**cmd** Latch – Arm  
**cmd** Latch – Latch

Be ready to visually monitor latch motion and check parameters in step 16.7 before sending this command.  
 Latch nominally takes 14 seconds to complete.

16.7 Monitoring LBB Latch Parameters During Latch  
 (Approximately 14 seconds)  
 Refer to Table 5.

**NOTE**

1. Perform a visual verification prior to, during, and at the completion of each blanket box unlatch operation. Monitor for any obvious anomalies and verify blanket box latching operation.
2. SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.

Table 5. LBB Parameters

PARAMETER	UNLATCHED →	TRANSITION → Approximately 14 seconds	LATCHED
LBB SW01,02 Pin Released	Yes	Yes	Yes
LBB SW01,02 Latched	No	No	Yes
LBB SW01,02 Unlatched	Yes	No	No
MDA Slow Alert	Slow	Nominal	Slow
MDA Voltage, V	120 to 125	120 to 125	120 to 125
MDA Temp, deg C	-54 to 48	-54 to 48	-54 to 48
MDA Over Temp Trip	blank	blank	blank
MDA Current, A	~0.10 (± 0.4)	0.20 to 3.00 (± 0.4)	~0.10 (± 0.4)
MDA Over Current Trip	blank	blank	blank

\*\*\*\*\*

\* If one Latched, Unlatched, or Pin Released limit switch fails

\* | Confirm configuration visually and √**MCC-H** before proceeding.

\* |

\* | SABB limit switch status that would restrict mast commanding

\* | has already been overridden in step 10.1.

\* |

\* If two Latched, Unlatched, or Pin Released limit switches fail

\* | Perform step 16.8 and 16.9 (if orbiter performing attitude

\* | control), then √**MCC-H** before proceeding.

\*\*\*\*\*

16.8 Performing Visual Verification Via Cameras  
 Verify latch position (four of eight) latched (tensioned position).

ISS ↓ **MCC-H**, “We confirm the left blanket box is latched.”

**MCC-H** ↑ ISS, “We confirm nominal Latch.”

If orbiter is performing mated attitude control  
 | Proceed to step 16.9.  
 If orbiter is not performing mated attitude control  
 | Proceed to step 17.8.  
 | Wait for **MCC-H** to latch the right blanket box.

**MCC-H** proceed to step 16.9.

\*\*\*\*\*  
 \* If latch sequence is not successful,  $\sqrt{\text{MCC-H}}$  before proceeding.  
 \*  
 \* If **MCC-H** unavailable, perform {3.193 SAW XX FAILURE TO  
 \* | LATCH (TENSION) SABB REMOTELY}, all (SODF: EPS:  
 \* | MALFUNCTION: PRIMARY POWER SYSTEM), then:  
 \*  
 \*\*\*\*\*

**MCC-H** 16.9 Enabling Thrusters (or Configuring for Attitude Control)  
 If ISS is performing attitude control and ISS is in TEA (**MCC-H**)  
 | Go to step 16.10.

\*\*\*\*\*  
 \* If ISS is performing attitude control and ISS is not in TEA (**MCC-H**)  
 \* | Perform {2.405 MODING FREE DRIFT TO CMG TA}, all  
 \* | (SODF: MCS: NOMINAL: GNC MODING), then:  
 \*  
 \* | **MCC-H**  $\uparrow$  ISS, orbiter, "ISS is in Attitude Control."  
 \*  
 \* | Go to step 16.10.  
 \*\*\*\*\*

**C3(A6)** \* If orbiter is performing mated attitude control  
 \* | Perform DOCKED DAP REFERENCE, RATE DAMPING  
 \* | (FDF: ORB OPS FS, REBOOST/DAP), then:  
 \*  
 \* | If orbiter continues to perform mated attitude control  
 \* | | Proceed to step 17.5.  
 \* | | Wait for **On MCC-H GO**.  
 \* | If orbiter does not continue to perform mated attitude  
 \* | | control  
 \* | | Proceed to step 17.8.  
 \* | | Wait for **MCC-H** to latch the right blanket box.  
 \*  
 \* | **On MCC-H GO** to step 16.10.  
 \*\*\*\*\*

**PCS** 16.10 Powering Off Left Blanket Box MDA  
 PVM: EPS: SAW [XX]  
 SAW [XX]  
 'LBB'

sel LBB Commands

SAW [XX] LBB Commands

'MDA'  
'Power'

cmd Off – Off

√MDA Voltage, V: < 10 (± 2.8)

17. LATCHING RIGHT SOLAR ARRAY BLANKET BOX (ENGAGING HIGH TENSION MODE)

17.1 Verifying Temperatures are Within Nominal Ranges Prior to SAW Deploy

PVM: EPS: SAW [XX]

SAW [XX]

Verify SAW PS Temp, deg C: -33 to 51  
Verify BGA PS Temp, deg C: -33 to 51  
Verify RBB MDA Temp, deg C: -54 to 48

17.2 Powering On RBB Motor Drive Assembly (MDA)

**NOTE**

MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

SAW [XX]

'RBB'

sel RBB Commands

SAW [XX] RBB Commands

'MDA'  
'Power'

cmd On – Arm

cmd On – On

√MDA Voltage, V: 120 to 125

17.3 Verifying SAW Right Blanket Box Configuration

Verify parameters in UNLATCHED column in step 17.7 before executing latch command.

17.4 Verifying Conditions are Correct for Visual Verification

**CAUTION**

Steps 17.6 and 17.8 are to be performed during insolation, to support crew visual cues use to determine correct SABB latch configuration.

Verify ISS is in insolation.

17.5 Preventing Thruster Firings

<b>CAUTION</b>
To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. Anytime the latches are not in motion, thrusters may be enabled.

**MCC-H**

If ISS is performing attitude control and ISS is in TEA (**MCC-H**)  
 MCS: MCS Configuration: Manual CMG Desat  
 Manual CMG Desat  
 ✓Desat Request – Inh  
**MCC-H** ↑ ISS, orbiter, “Desats are Inhibited.”  
 Go to step 17.6.

\*\*\*\*\*  
 \* If ISS is performing attitude control and ISS is not in TEA (**MCC-H**)  
 \* Perform {2.404 MODING CMG TA TO FREE DRIFT}, all  
 \* (SODF: MCS: NOMINAL: GNC MODING), then:  
 \*  
 \* **MCC-H** ↑ ISS, orbiter, “ISS is in Free Drift.”  
 \*  
 \* Go to step 17.6.  
 \*\*\*\*\*

C3(A6)

\*\*\*\*\*  
 \* If orbiter is performing mated attitude control  
 \* DAP: FREE  
 \*  
 \* Orbiter ⇒ ISS, **MCC-H**, “Orbiter is in Free Drift.”  
 \*  
 \* Go to step 17.8. and wait for **MCC-H** to latch RBB.  
 \*  
 \* **MCC-H** proceed to step 17.6.  
 \*\*\*\*\*

17.6 Latching SAW Right Blanket Box (Engage High Tension Mode)

<b>CAUTION</b>
Confirm no crew exercise or Max EVA loads before proceeding.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 36 of 49 pages

#### NOTE

1. Latching the blanket box engages high tension mode (75 lbs) and provides more control over stiction between blanket panels during array deployment.
2. Upon successful latch commanding, the Slow alert will go to Nominal during transition, then return to Slow. Once power is removed from the MDA, the Slow alert will indicate Nominal.

**MCC-H** ↑ ISS, orbiter, “Ready to latch the right blanket box.”

PCS

PVM: EPS: SAW [XX]

SAW [XX]

‘RBB’

sel RBB Commands

SAW [XX] RBB Commands

‘RBB’

**cmd** Latch – Arm

**cmd** Latch – Latch

Be ready to visually monitor latch motion and check parameters in step 17.7 before sending this command.

Latch nominally takes 14 seconds to complete.

#### 17.7 Monitoring RBB Latch Parameters During Latch

(Approximately 14 seconds)

Refer to Table 6.

#### NOTE

1. Perform a visual verification prior to, during, and at the completion of each blanket box unlatch operation. Monitor for any obvious anomalies and verify blanket box latching operation.
2. SABB limit switches are sensitive to thermal conditions and may indicate inaccurate values during eclipse and the first 15 minutes of insolation.



### 1.3.454 P6 SAW XX RE-DEPLOY

Table 6. RBB Parameters

PARAMETER	UNLATCHED →	TRANSITION → Approximately 14 seconds	LATCHED
RBB SW01,02 Pin Released	Yes	Yes	Yes
RBB SW01,02 Latched	No	No	Yes
RBB SW01,02 Unlatched	Yes	No	No
MDA Slow Alert	Slow	Nominal	Slow
MDA Voltage, V	120 to 125	120 to 125	120 to 125
MDA Temp, deg C	-54 to 48	-54 to 48	-54 to 48
MDA Over Temp Trip	blank	blank	blank
MDA Current, A	~0.10 (± 0.4)	0.20 to 3.00 (± 0.4)	~0.10 (± 0.4)
MDA Over Current Trip	blank	blank	blank

\*\*\*\*\*

- \* If one Latched, Unlatched, or Pin Released limit switch fails
- \* | Confirm configuration visually and √**MCC-H** before
- \* | proceeding.
- \* |
- \* | SABB limit switch status that would restrict mast commanding
- \* | has already been overridden in step 10.1.
- \* |
- \* If two Latched, Unlatched, or Pin Released limit switches fail
- \* | Perform step 17.8 and 17.9 (if orbiter performing attitude
- \* | control), then √**MCC-H** before proceeding.

\*\*\*\*\*

#### 17.8 Performing Visual Verification Via Cameras

Verify latch position (four of eight) latched (tensioned position).

ISS ↓ **MCC-H**, “We confirm the right blanket box is latched.”

**MCC-H** ↑ ISS, “We confirm nominal latch.”

If orbiter is performing mated attitude control

| Proceed to step 17.9.

If orbiter is not performing mated attitude control

Proceed to step 18.4.

**MCC-H** proceed to step 17.9.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 38 of 49 pages

```
*****
* If latch sequence is not successful, √MCC-H before proceeding.
*
* If MCC-H unavailable, perform {3.193 SAW XX FAILURE TO
* | LATCH (TENSION) SABB REMOTELY}, all (SODF: EPS:
* | MALFUNCTION: PRIMARY POWER SYSTEM), then:
*****
```

**MCC-H** 17.9 Enabling Thrusters (or Configuring for Attitude Control)  
If ISS is performing attitude control and ISS is in TEA (**MCC-H**)  
Go to step 17.10.

```
*****
* If ISS is performing attitude control and ISS is not in TEA (MCC-H)
* | Perform {2.405 MODING FREE DRIFT TO CMG TA}, all
* | (SODF: MCS: NOMINAL: GNC MODING), then:
*
* | MCC-H ↑ ISS, orbiter, "ISS is in Attitude Control."
*
* | Go to step 17.10.
*****
```

**C3(A6)** \* If orbiter is performing mated attitude control  
\* | Perform DOCKED DAP REFERENCE, (FDF: ORB OPS  
\* | FS, REBOOST/DAP), then:  
\*  
\* | Proceed to step 18.3.  
\*  
\* | **MCC-H** proceed to step 17.10.  
\*\*\*\*\*

**PCS** 17.10 Powering Off Right Blanket Box MDA  
PVM: EPS: SAW [XX]  
SAW [XX]  
'RBB'

sel RBB Commands

SAW [XX] RBB Commands  
'MDA'  
'Power'

**cmd** Off – Off

√MDA Voltage, V: < 10 (± 2.8)

If deploying both arrays on a PVM the same day  
Perform steps 13 to 17 for both Channels before proceeding to step 18.

18. COMPLETING SOLAR ARRAY DEPLOYMENT

**MCC-H** ↑ ISS, “Steps 1 to 17 of the Solar Array Re-Deploy procedure have been completed. Proceed to step 18.3 and confirm correct Camera and RWS configuration for solar array XX re-deploy.”

**WARNING**  
Verify EVA crew is clear of SAW mechanisms before proceeding.

18.1 Verifying Temperatures are Within Nominal Ranges Prior to SAW Deploy

PVM: EPS: SAW [XX]

SAW [XX]

Verify SAW PS Temp, deg C: -33 to 51  
Verify BGA PS Temp, deg C: -33 to 51  
Verify Mast MDA Temp, deg C: -54 to 48

18.2 Powering On Mast Motor Drive Assembly (MDA)

**NOTE**

1. Mast MDA temperatures may be high due to direct sunlight in deploy configuration. MDA Over Temp Trip occurs at 77.8° C. At a minimum, a 30° C mast MDA temperature increase should be protected for during mast deployment. Delay MDA activation, until just prior to deploy time to minimize temperature increase if necessary.
2. MDA Slow alert will be Nominal until MDA power is applied. Once this is done, the indication is Slow.

SAW [XX]

'Mast'

sel Mast Commands

SAW [XX] Mast Commands

'MDA'

'Power'

**cmd** On – Arm

**cmd** On – On

- √MDA Voltage, V: 120 to 125
- √MDA Current, A: ~0.10 (± 0.4)
- √MDA Slow Alert – Slow

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 40 of 49 pages

#### 18.3 Verifying Camera Configuration

ISS must be in insolation to perform this verification.

##### NOTE

Perform a visual verification prior to, during, and at the completion of the mast deploy operation to minimize the risk of potential collision hazards, monitor for any obvious anomalies, and to verify solar array deployment. Total number of visible Mast Bays is 31.5, 1 Bay is rigid batten to rigid batten.

Verify Camera configuration is correct for solar array deploy to 100 %, before proceeding.

If orbiter is performing mated attitude control

Wait for deploy time from **MCC-H**.

Proceed to step 18.6.

If orbiter is not performing mated attitude control

Proceed to step 18.7.

Wait for **On MCC-H GO** to complete Mast re-deploy.

**MCC-H** proceed to step 18.4.

#### 18.4 Verifying Initial SAW Mast Configuration

##### NOTE

SAW 2B SW 02 Deployed limit switch failed prior to the 4A mission, No is always indicated.

SAW [XX] Mast Commands

√Mast SW01,SW02 Retracted – No

√Mast SW01,SW02 Deployed – No

#### 18.5 Verifying Conditions are Correct for Visual Verification

Verify ISS is in insolation

#### 18.6 Preventing Thruster Firings

##### **CAUTION**

To minimize the potential for structural damage to hardware while the solar array mechanisms are in motion, nonpropulsive CMG control or Free Drift will be maintained. At any time array deployment is stopped or aborted, thrusters may be enabled.

**MCC-H**

If ISS is performing attitude control and ISS is in TEA (**MCC-H**)  
 MCS: MCS Configuration: Manual CMG Desat  
 Manual CMG Desat

√Desat Request – Inh

**MCC-H** ↑ ISS, orbiter, “Desats are Inhibited.”

Go to step 18.7.

\*\*\*\*\*

\* If ISS is performing attitude control and ISS is not in TEA (**MCC-H**)  
 \* Perform {2.404 MODING CMG TA TO FREE DRIFT}, all  
 \* (SODF: MCS: NOMINAL: GNC MODING), then:  
 \*  
 \* **MCC-H** ↑ ISS, orbiter, “ISS is in Free Drift.”  
 \*  
 \* Go to step 18.7.  
 \*\*\*\*\*

C3(A6)

\*\*\*\*\*

\* If orbiter is performing mated attitude control  
 \* DAP: FREE  
 \*  
 \* Orbiter ⇒ ISS, **MCC-H**, “Orbiter is in Free Drift.”  
 \*  
 \* Go to step 18.7, notify **MCC-H** before sending the  
 \* deploy command.  
 \*\*\*\*\*

18.7 Deploying 100 % of SAW (Approximately 31.5 Bays Visible)

<b>WARNING</b>
If deploying a solar array during EVA operations, confirm EV crew clear of solar array mechanisms and mast interface.

<b>CAUTION</b>
1. Confirm no crew exercise or maximum EVA loads before proceeding.
2. If the mast is in motion and the re-deploy will not be completed (100 %) before entering eclipse, the deploy must be stopped using the Mast – Abort command upon entering eclipse due to loss of visual insight. Once deploy is stopped, crew will perform step 18.9, if orbiter is performing attitude control. Otherwise, crew will hold in step 18.7 and wait for <b>MCC-H GO</b> to complete mast deploy.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 42 of 49 pages

NOTE

Upon successful deploy commanding, the MDA current will increase (0.2 to 3.0 amps) and the Slow alert will go to Nominal during transition, then return to Slow. Once power is removed from the MDA, the Slow alert will indicate Nominal.

PCS

PVM: EPS: SAW [XX]

SAW [XX]

'Mast'

sel Mast Commands

SAW [XX] Mast Commands

'Mast'

**cmd** Deploy – Arm

**cmd** Deploy – Deploy (Nominal re-deploy takes ~13 minutes.)

Monitor RBB and LBB tension bars for motion until the last Mast Bay begins to deploy.

NOTE

During deployment of the last half Mast Bay (at Mast Bay 31) the tension bars of both blankets will rise off the blanket box sill (~20 inches).

```
*****
* If either tension bar rises up more thajn 1.5" immediately abort
* the deploy.
* 'Mast'
*
* cmd Abort – Abort
*
* If either tension bar rises up excessively (> 3") from the
* blanket box sill and does not return to the sill after the abort
* is issued, then immediately
*
* 

|                        |
|------------------------|
| SAW [XX] Mast Commands |
|------------------------|


* 'MDA'
* 'Power'
*
* cmd On – Arm
* cmd On – On
*
* √MDA Voltage, V: 120 to 125
*
* 'Mast'
*
* cmd Retract – Arm
* cmd Retract – Retract
*
* Retract the mast until the tension bar reaches the sill.
*
* 'Mast'
*
* cmd Abort – Abort
*
* √MDA Voltage, V: < 10 (± 2.8)
*
* √MCC-H before proceeding
*****
```

\*\*\*\*\*

\* If guidewires become significantly hung up on panel grommets,  
\* abort the deploy.  
\* 'Mast'

\* **cmd** Abort – Abort

\* **(MCC-H only)**  
\* Perform the BGA Wiggle Technique to distribute blanket  
\* panels.

<p><b>NOTE</b> The PCS displays cannot be used to perform the BGA Wiggle technique, it must be executed by <b>MCC-H</b> utilizing a time tagged script.</p>
---

\* **P6: EPS: BGA 2B (BGA 4B)**  
\* **BGA 2B (BGA 4B)**  
\* 'BGA 2B (BGA 4B)'

\* Monitor Actual Angle, as the BGA 2B (BGA 4B) sweeps  
\* between 195 and 205 deg (175 and 185 deg).

\* If more than 24 bays remain deployed, perform the following  
\* sequence  
\* Command BGA 2B(BGA 4B) to 195 deg(175 deg) then to  
\* 205 deg(185 deg) in 26-second increments for 5 periods.  
\* Finish sequence with BGA 2B(BGA 4B) at 200 deg(180 deg).

\* If more than 14 but less than 24 bays remain deployed,  
\* perform the following sequence  
\* Command BGA 2B(BGA 4B) to 195 deg(175 deg) then to  
\* 205 deg(185 deg) in 22-second increments for 6 periods.  
\* Finish sequence with BGA 2B(BGA 4B) at 200 deg(180 deg).

\* If less than 14 bays remain deployed, perform the following  
\* sequence  
\* Command BGA 2B(BGA 4B) to 195 deg(175 deg) then to  
\* 205 deg(185 deg) in 15-second increments for 8 periods.  
\* Finish sequence with BGA 2B(BGA 4B) at 200 deg(180 deg).

\* If grommet released  
\* Perform step 18.2 and begin 18.7 again.

\* If grommet is not released  
\* Repeat BGA wiggle technique.

\*\*\*\*\*

Wait approximately 13 minutes until 100 % deployed (confirm 31.5 bays are visible).



If orbiter is performing mated attitude control  
 | Proceed to step 18.9.

If orbiter is not performing mated attitude control  
 Proceed to step 18.10.

**MCC-H** proceed to step 18.8.

18.8 Verifying Final SAW Mast Configuration

NOTE  
 SAW 2B SW 02 Deployed limit switch failed prior to the 4A mission, No is always indicated.

SAW [XX] Mast Commands

- √Mast SW01,SW02 Retracted – No
- √Mast SW01,SW02 Deployed – Yes
- √MDA Voltage, V: 120 to 125
- √MDA Current, A: ~0.10 (± 0.4)
- √MDA Slow Alert – Slow

\*\*\*\*\*

- \* If one Deployed or Retracted limit switch fails
- \* | Confirm configuration visually and √**MCC-H** before proceeding.
- \* |
- \* | Mast limit switch status that would restrict SABB and BGA commanding has already been overridden in step 10.2.
- \* |
- \* If two Deployed or Retracted limit switches fail
- \* | Perform steps 18.9 (if orbiter performing attitude control) and 18.10, then √**MCC-H** before proceeding.

\*\*\*\*\*

**MCC-H** 18.9 Enabling Thrusters (or Configuring for Attitude Control)  
 If ISS is performing attitude control and ISS is in TEA (**MCC-H**)  
 Go to step 18.10.

\*\*\*\*\*

- \* If ISS is performing attitude control and ISS is not in TEA (**MCC-H**)
- \* | Perform {2.405 **MODING FREE DRIFT TO CMG TA**}, all (SODF: MCS: NOMINAL: GNC MODING), then:
- \* |
- \* | **MCC-H** ↑ ISS, orbiter, “ISS is in Attitude Control.”
- \* |
- \* | Go to step 18.10.

\*\*\*\*\*

C3(A6)

```
*****
* If orbiter is performing mated attitude control
* | Perform DOCKED DAP REFERENCE, RATE DAMPING
* | (FDF: ORB OPS FS, REBOOST/DAP), then:
* |
* | Go to step 18.10.
*****
```

18.10 Performing Visual Verification Via Cameras

Verify mast position – Deployed  
 Verify tension bar – Pulled away from blanket box ~20"  
 (as last mast bay deploys)  
 Verify number of visible mast bays – 31.5  
 Verify solar array blanket – Flat

Verify guide rollers on final bay – Visible (final yellow flex batten)  
 or  
 Verify Last Bay barber pole decal – Visible

NOTE

Last Bay barber pole indication can be seen with the cameras only when the array is positioned at or near 180 degrees (Mast MDA side).

ISS ↓ **MCC-H**, “Solar Array XX deploy complete.”

**MCC-H** ↑ ISS, “We confirm solar array fully deployed.”

**MCC-H** proceed to 18.11.

Crew: if deploying both arrays on a PVM the same day, return to step 18.3 and reconfigure Cameras for deploy of the next array.

```
*****
* If deploy sequence is not successful, √MCC-H before
* | proceeding.
* |
* | If MCC-H unavailable, perform {3.191 SAW XX FAILURE
* | TO EXTEND MAST REMOTELY}, all (SODF: EPS:
* | MALFUNCTION: PRIMARY POWER SYSTEM), then:
*****
```

PCS

18.11 Powering Off Mast MDA

PVM: EPS: SAW [XX]

SAW [XX]

‘Mast’

sel Mast Commands

SAW [XX] Mast Commands

'MDA'  
 'Power'

**cmd** Off – Off

√MDA Voltage, V: < 10 (± 2.8)

19. FEATHERING SOLAR ARRAY TO PROTECT AGAINST ISS/ORBITER PLUME LOADS

**WARNING**

Confirm EVA, SSRMS, and SRMS, clear of solar array rotation path before unlatching and rotating BGA.

**CAUTION**

Once deployed, the solar array must be placed edge-on to ISS and orbiter thruster plume, to minimize array structural loads and contamination. The active surface of the array will be pointed toward the Sun.

PVM: EPS: BGA [XX]

BGA [XX]

'BGA [XX]'

Refer to Table 7.

sel the best power generation position for the BGA [XX] Cmd Angle

Perform {2.102 PVM CONFIGURE BGA XX TO DIRECTED POSITION MODE}, steps 5 to 8 (SODF: EPS: NOMINAL: PRIMARY POWER SYSTEM), then:

Table 7. Solar Array Feather Angles

PVM	BGA/SAW (XX)	Cmd Angle, deg
P6	2B	90 or 270
P6	4B	90 or 270

If deploying both arrays on a PVM the same day  
 Perform steps 18 to 19 for both Channels before proceeding to step 20.

20. ENABLING MOTOR VELOCITY SAFING

**NOTE**

If BGA is at 0 degrees, then delay this velocity limit safing - enable step until next time the BGA is reconfigured.

PVM: EPS: BGA [XX]  
 BGA [XX]

sel Motor

BGA [XX] Motor  
 'Velocity Limit Safing, Primary PVCU'

**cmd** Enable – Arm  
**cmd** Enable – Enable

Verify Primary PVCU – Ena

'Velocity Limit Safing, Backup PVCU'

**cmd** Enable – Arm  
**cmd** Enable – Enable

Verify Backup PVCU – Ena

**21. POST SAW DEPLOY RECONFIGURATION**

**NOTE**

1. Once this procedure is complete, SSU XX is still shunted, and the array is not yet supporting channel XX. Channel XX IEA hardware is still receiving power from a support channel.
2. Table 8 provides support channel connectivity. A support channel, provides initial power to the channel being activated until the SAW is deployed and the batteries are charged (e.g., Ch 4A supports Ch 4B until Ch 4B is fully activated).

Table 8. Support Power ChannelConnectivity

[XX]	[YY]	[ZZ]
2B	4B	2A
4B	2B	4A

**21.1 Powering Up Loads on ISS (If Necessary)**

**NOTE**

Loads previously powered down, while array were feathered may be reactivated.

Reactivate those loads previously deactivated for array deployment.

### 1.3.454 P6 SAW XX RE-DEPLOY

(EPS/10A - ALL/FIN/HC) Page 49 of 49 pages

#### 21.2 Recover Loads on DDCU [XX](YY) After SAW Deploy

NOTE

Power can be supplied to ECU XX from DDCU XX or DDCU YY for the solar array deploy. Therefore, it may have been necessary to reduce loads on the appropriate DDCU to support a peak power load of 580 watts during array deployment.

Reactivate those loads previously deactivated on DDCU [XX](YY) for array deployment.

#### 21.3 Configure for Charging Batteries from Channel XX Array (Same Channel the SAW was Deployed, If Necessary)

Go to [procedure {1.3.100 PRIMARY POWER CHANNEL ACTIVATION}](#), step 74 (SODF: EPS: ACTIVATION AND CHECKOUT: CHANNEL ACTIVATION).

This Page Intentionally Blank