

22 JUN 05

Sheet 1 of 1

List of Implemented CR(s):

ISS\_EVA\_SYSU323 ISS\_EVA\_SYSU324 ISS\_EVA\_SYSU325 ISS\_EVA\_SYSU326

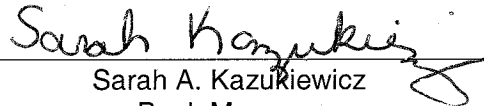
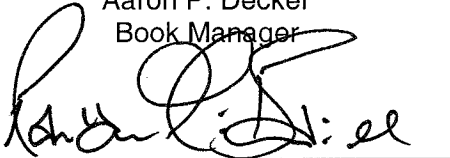
Uplinked Messages (or Approved Flight Notes) replaced by this PCN, remove from Book:

None

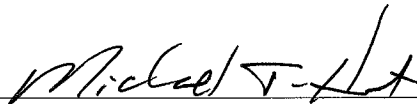
Incorporates the following:

1. Replace cover
2. Replace iii thru x
3. Replace 17 thru 68, 71 thru 78, 85 thru 88, 103 and 104, 169 thru 176, 185 thru 188, 195 thru 198, 211 thru 214, 277 and 278, 283 thru 288, 293 and 294, 299 thru 304, 307 thru 320, 323 thru 336, 355 thru 370, 459 thru 464, 471 thru 482, 493 thru 554, 557 thru 590, 597 thru 616

APPROVED BY:

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Lead, EVA Task GroupDricia K. Mack  
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SODF Coordinator

ACCEPTED BY:

Michael T. Hurt  
SODF Manager**File this PCN immediately behind the front cover as a permanent record**





# International Space Station ISS EVA Systems Checklist

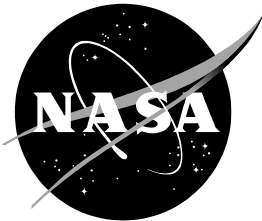
**Mission Operations Directorate  
Operations Division**

**22 JUN 05**

*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  
ISS EVA SYSTEMS CHECKLIST**

**LIST OF EFFECTIVE PAGES**

26 APR 05  
22 JUN 05

Sign Off.....*	26 APR 05	30 .....	08 JUN 05
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8 .....	03 MAR 05	51 .....	16 MAY 05
9 .....	12 APR 05	52 .....	16 MAY 05
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11 .....	12 APR 05	54 .....	16 MAY 05
12 .....	12 APR 05	55 .....	16 MAY 05
13 .....	12 APR 05	56 .....	16 MAY 05
14 .....	12 APR 05	57 .....	16 MAY 05
15 .....	26 APR 05	58 .....	16 MAY 05
16 .....	26 APR 05	59 .....	16 MAY 05
17 .....	16 MAY 05	60 .....	16 MAY 05
18 .....	16 MAY 05	61 .....	16 MAY 05
19 .....	08 JUN 05	62 .....	16 MAY 05
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73.....	08 JUN 05	123 .....	19 APR 05
74.....	08 JUN 05	124 .....	19 APR 05
75.....	08 JUN 05	125 .....	19 APR 05
76.....	08 JUN 05	126 .....	19 APR 05
77.....	16 MAY 05	127 .....	19 APR 05
78.....	16 MAY 05	128 .....	19 APR 05
79.....	26 APR 04	129 .....	19 APR 05
80.....	26 APR 05	130 .....	19 APR 05
81.....	28 APR 04	131 .....	19 APR 05
82.....	28 APR 04	132 .....	19 APR 05
83.....	29 JUN 04	133 .....	19 APR 05
84.....	29 JUN 04	134 .....	19 APR 05
85.....	16 MAY 05	135 .....	19 APR 05
86.....	16 MAY 05	136 .....	19 APR 05
87.....	16 MAY 05	137 .....	19 APR 05
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89.....	03 JUN 04	139 .....	12 MAR 04
90.....	03 JUN 04	140 .....	26 APR 05
91.....	03 JUN 04	141 .....	19 APR 05
92.....	03 JUN 04	142 .....	19 APR 05
93.....	27 APR 04	143 .....	19 APR 05
94.....	27 APR 04	144 .....	19 APR 05
95.....	26 APR 05	145 .....	19 APR 05
96.....	26 APR 05	146 .....	19 APR 05
97.....	09 MAR 05	147 .....	19 APR 05
98.....	09 MAR 05	148 .....	19 APR 05
99.....	09 MAR 05	149 .....	19 APR 05
100.....	09 MAR 05	150 .....	26 APR 05
101.....	09 MAR 05	151 .....	08 JUN 04
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103.....	19 MAY 05	153 .....	23 JUN 04
104.....	19 MAY 05	154 .....	23 JUN 04
105.....	19 APR 05	155 .....	23 JUN 04
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173.....	16 MAY 05	223 .....	19 APR 05
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322.....	26 APR 05	372 .....	26 APR 05

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373.....	31 MAR 05	423 .....	31 MAR 05
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375.....	31 MAR 05	425 .....	31 MAR 05
376.....	31 MAR 05	426 .....	31 MAR 05
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378.....	26 APR 05	428 .....	26 APR 05
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473.....	13 JUN 05	523 .....	16 MAY 05
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521.....	16 MAY 05	571 .....	13 JUN 05
522.....	22 JUN 05	572 .....	13 JUN 05

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573.....	13 JUN 05	623 .....	21 APR 05
574.....	22 JUN 05	624 .....	26 APR 05
575.....	16 MAY 05	625 .....	24 MAR 05
576.....	16 MAY 05	626 .....	26 APR 05
577.....	16 MAY 05		
578.....	16 MAY 05		
579.....	16 MAY 05		
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616.....	13 JUN 05		
617.....	26 APR 05		
618.....	26 APR 05		
619.....	21 APR 05		
620.....	21 APR 05		
621.....	21 APR 05		
622.....	21 APR 05		

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x

ISS EVA SYS

(10 Minutes for PHA Setup)  
(5 Minutes for LEH Configuration)

**OBJECTIVE:**

This procedure will allow the EVA crewmembers to perform their 80-minute mask prebreathe using shuttle O2. Shuttle LEH O2 is used for the exercise portion, while shuttle O2 from the E-Lk PBA ports is used for nonexercise periods. PHA SETUP steps may be performed the night before an EVA. LEH CONFIGURATION steps must be performed immediately prior to EVA PREP.

**PHA SETUP**

- C-Lk 1. Unstow PHA bags (two 60-ft Bags, one 90-ft Bag).
- E-Lk 2. Verify all three PHA Bags configured per Figure 1, connect all components.



Figure 1.- PHA Bag Configuration.

**1.205 SHUTTLE LEH CONFIGURATION FOR EVA PREBREATHE ON ISS**  
(ISS EVA SYS/UF2 - ALL/FIN 2/Paper on ISS) Page 2 of 2 pages

3. Temporarily store both 60-ft PHA bags in E-Lk near A/L PBA port.
4. Transfer 90-ft PHA Bag to orbiter middeck.  
Temporarily stow Bag.

LEH CONFIGURATION

5. √**MCC-H** to ensure O2 cryo config will support EVA Prebreathe
- L2      6. √O2 XOVR SYS 1,2 – OP
- MO32M    7. Relief Valve of 90-ft PHA Bag →|← LEH O2 5
8. LEH O2 5 vlv → OP
  9. Route 90-ft PHA from orbiter middeck to CEVIS.  
Use Velcro ties to tend hose, as required.
- Lab      10. Secure loose end of 90-ft hose to CEVIS using Velcro ties.

## 1.210 EVA PREP USING SHUTTLE O2

(ISS EVA SYS/UF2 - ALL/FIN 5/SPN/HC/Paper on ISS)

Page 1 of 13 pages

(170 Minutes)

### OBJECTIVE:

Prepare for EVA using exercise prebreathe protocol. During exercise, a 90-foot PHA hose is plumbed into a middeck LEH port. Shuttle oxygen is utilized for the entire prebreathe.

1. EVA COMM AND AIRLOCK ENVIRONMENT CONFIG
  - MCC-H/IV 1.1 Perform {2.701 UHF 1 ORU ACTIVATION}, all (SODF: C&T: NOMINAL: UHF), then:
  - 1.2 Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL: AUDIO), then:
  - 1.3 Prior to beginning step 7, perform {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION}, steps 1 to 7 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:
  - IV 1.4 Perform shuttle EVA COMM CONFIG, all (FDF: EVA: EVA PREP), then:

### EXERCISE PREBREATHE/PREP FOR DONNING (110 MINUTES)

2. VERIFYING AIRLOCK EQUIPMENT
  - 2.1 ✓PFE located in PFE locker
    - ✓Pressure gauge needle is in green zone (800 to 900 psig)
  - 2.2 ✓Three PHA Quick Don Masks available to support EVA Prep
  - 2.3 ✓PBA Bottles and Quick Don Masks located in Airlock for every isolated crewmember
    - ✓PBA Bottles →|← Quick Don Masks for each non-EVA crewmember in Airlock
    - ✓Oxygen Bottle pressure gauge needle ≥ 3000 psig for each Bottle
  - 2.4 ✓Two CSA-CPs located in Airlock
    - ✓Battery power for both CSA-CPs
  - AL10A1 2.5 ✓Flexible Vent Duct attached to the Conditioned Air Supply connection
  - 2.6 Set up and activate one PCS in Airlock.
    - ✓SSC located in Airlock
3. ACTIVATING AIRLOCK CO2 REMOVAL
  - 3.1 Unstow new Metox Canisters (two). Report barcodes to **MCC-H**.

## 1.210 EVA PREP USING SHUTTLE O2

(ISS EVA SYS/UF2 - ALL/FIN 5/SPN/HC/Paper on ISS)

Page 2 of 13 pages

- 3.2 Remove Metox Canister caps.  
Stow in EMU Equipment Bag.
- A/L1A1 3.3 Open CO2 Removal Receptacle door.
- 3.4 √CO2 VALVE – REMOVAL
- 3.5 Install Metox Canisters in CO2 Removal Receptacle per label on closeout.
- 3.6 Close and latch CO2 Removal Receptacle door.
- 4. MASK PREBREATHE PREP
- EV1,2 4.1 Relief Valve of 60-ft PHA Bags 1,2 →|← A/L PBA port  
Route one 60-ft hose from PBA port to CEVIS (secure bag to handrail).
- 4.2 Position Heart Rate Watch on CEVIS.  
Install EV1 PCMCIA card in CEVIS.
- 4.3 Verify prime and backup bungees are configured (blue or black only).
- ISS IV 4.4 Perform {2.2.050 CEVIS - ON LINE MODE OPERATIONS}, step 3 (SODF: MED OPS: NOMINAL: CMS), then:
- EV1,2 4.5 Don Ergometer/CEVIS shoes.  
Don other over-the-head garments.  
Don TCU top.
- 4.6 Take one aspirin tablet (325 mg).
- 5. CONFIGURING FOR PHA COMMUNICATION (IF REQUIRED)
- 5.1 EACP Y-Cable ←|→ ATU 4,5
- 5.2 PHA Comm Cables →|← Headset Control Unit (HCU)  
√HCU →|← HCU Extension Cable
- 5.3 HCU Extension Cable →|← ATU (near activity)
- 5.4 HCU → PTT (to alleviate noise)
- ATU 5.5 pb PTT → Press  
pb 1 → Press (Big Loop)  
pb 5 → Press (Airlock)

## 1.210 EVA PREP USING SHUTTLE O2

(ISS EVA SYS/UF2 - ALL/FIN 5/SPN/HC/Paper on ISS)

Page 3 of 13 pages

- √Display – '1G, 5T' and other loops, as required
- √Display – 'PTT'

### INITIATING MASK PREBREATHE

#### **WARNING**

Positive mask O2 pressure and fit are necessary to ensure adequate prebreathe.

- EV1,2            6. Verify black plates in top of Quick Don Mask are seated in silicon.
7. Don Quick Don Mask.

- PHA            8. Quick Don Mask O2 control → EMERGENCY
9. Momentarily pull Mask away from face.

√O2 flow

- IV              Record mask prebreathe initiation GMT in block A on EVA  
                  PREBREATHE CUE CARD, start timer, **P/B PET = 0:00**

- EV              10. √Comm, as required

#### NOTE

Steps 11 to 13 should be performed in parallel.

- EV-1,IV        11. Perform exercise per EVA EXERCISE PRESCRIPTION  
                  steps 1 to 14 on EVA PREBREATHE CUE CARD.

### EV-2            12. EMU POWERUP (BOTH EMUs)

- UIA            12.1 √sw UIA PWR EV-1,2 (two) – OFF  
                  √UIA PWR EV-1,2 LEDs (four) – Off  
                  √EMU O2 SUPPLY PRESS gauge: 850 to 950

- C-Lk wall      12.2 Remove SCU from stowage straps and pouches.  
                  Transfer SCU to E-Lk.

- DCM            12.3 Open DCM Cover.  
                  Affix cover to DCM with Velcro.

- 12.4 SCU →|← DCM

√SCU locked

- EV2    DCM        12.5 sw POWER → BATT

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### CAUTION

EMU must be on BATT power when UIA suit power is turned on.

PSA 12.6 √sw SUIT SELECT (two) – OFF  
√sw EMU MODE EMU1,2 (two) – PWR

12.7 sw MAIN POWER → ON

√MAIN POWER LED – On

12.8 sw SUIT SELECT (two) → EMU 1,2

√EMU 1,2 LEDs (two) – On

√EMU 1,2 Volts: 18.0 to 19.0

UIA 12.9 sw PWR EV-1,2 (two) → ON

√PWR EV-1,2 EMU LEDs (two) – On

DCM 12.10 sw POWER → SCU

12.11 √STATUS: BATT VDC ≥ 20.3

UIA 13. OXYGEN EMU 1,2 vlv (two) → OPEN

### NOTE

Steps 14 to 18 should be performed in parallel.

When EV1 Exercise complete

EV2,IV

14. Perform exercise per EVA EXERCISE PRESCRIPTION steps 1 to 14 on EVA PREBREATHE CUE CARD.

EV1 Both EMUs

15. Waist ring ←|→ HUT

Temporarily stow LTA.

16. Helmet ←|→ HUT

Temporarily stow helmet.

17. Gloves ←|→ EMU

Temporarily stow gloves.

18. Remove Dosimeter from in-flight garments.  
Insert Dosimeter in LCVG left leg pocket.

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IV	EV1/EV2
<p>19. On the shuttle middeck MO32M Relief Valve of 90-ft PHA ← → LEH O2 5 Port</p> <p>20. LEH O2 5 vlv → CL</p> <p>23. Stow hose in 90-ft PHA Bag.</p> <p>24. Stow the following in E-Lk 90-ft PHA Bag EVA PREBREATHE CUE CARD Food and drink for EV crew, if desired.</p>	<p>21. If necessary, apply Medical Kit items. Refer to {5.110 APPROVED NON-EMU HARDWARE}, all (SODF: ISS EVA SYS: REFERENCE), as required.</p> <p>22. Don MAG, TCU bottom, LCVG, biomed.</p> <div style="text-align: center;"> <p style="font-size: small;">j_48023_001</p> </div> <p>Figure 1.- Nondisposable Biomed Configuration.</p>

IV

**25. CLOSING NODE 1 STBD HATCH**

**NOTE**

Be prepared to initiate depress within 5 minutes of closing the Node 1 Stbd Hatch to prevent high O2 concentrations in the Airlock.

When P/B PET = 50 minutes and 15 minutes post second EV crew exercise

- 25.1 ✓ **MCC-H** for Go to continue
- 25.2 ✓ Node 1 Stbd Hatch MPEV – CLOSED and uncapped
- 25.3 Check hatch seal and close Node 1 Stbd Hatch per decal (omit last step of decal).

**WARNING**

Do not initiate depress until 50 minutes of mask prebreathe and 15 minutes post second EV crew exercise are complete. The depress time from 760 mmHg (14.7 psia) to 527 mmHg (10.2 psia) must be greater than 20 minutes.

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**26. DEPRESSING TO 10.2 PSIA**

EV1,2 26.1 Momentarily pull Mask away from face to verify positive O2 flow

\*\*\*\*\*  
\* If no positive O2 flow, contact **MCC-H**.  
\*\*\*\*\*

<u>NOTE</u>
1. EV crew should perform steps 26.2 to 26.8 while IV is depressing Airlock to 10.2 psia (527 mmHg) in steps 26.9 to 26.23
2. EMU displays <span style="border: 1px solid black; padding: 2px;">O2 IS OFF</span> message during Airlock depress, sw DISP → PRO, as required.

DCM 26.2 √STATUS: SOP P: > 5410 (compare with gauge)

26.3 √Waist ring – open

26.4 Don LTA (attach donning handles as required).

If boot bladder manipulation required

26.5 Boot ←|→ Leg (sizing ring)

26.6 Pull up excess boot bladder around full circumference of boot disconnect.

<b>WARNING</b>
Keep bladder material clear of threads during reconnection of boot.

26.7 Boot →|← Leg (sizing ring)

26.8 Lock 1 → LOCK

√All locks (three per boot) are engaged

IV    UIA    26.9 √DEPRESS PUMP ENABLE LED – On

UIA    26.10 sw DEPRESS PUMP PWR → ON  
Wait 10 seconds.

C-Lk   26.11 DEPRESS PUMP MAN ISOV → OPEN

√Cab Press – Decreasing (use Vacuum Manometer or PCS)

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PCS

Airlock: ECLSS

Airlock: ECLSS

'Equipment Lock'

- 26.12 Start depress PET clock.  
Record start time in Block C of Prebreathe Cue Card.

When Cab Press < 14.1 psia (729 mmHg)

- 26.13 Turn Hatch handle in the UNLATCH direction approximately 1.5 turns to place the Hatch in the equalize position (orange stripe).

- 26.14 Crank Handle – Stowed position

### NOTE

1. CSA-CP % O2 will read approximately 1 % lower than actual during depress. Stable Airlock pressure is needed to obtain an accurate reading.
2. Per SPN 2563 (12A to 20A), each MCA partial pressure reading of the Airlock will be 86 seconds old before the depress begins, and will increase up to 99 seconds old at 10.2 psia.

- 26.15 Monitor O2 using CSA-CP during depress.  
Refer to Figure 2.

C-Lk

When Airlock is at 11.8 (610 mmHg)

- 26.16 DEPRESS PUMP MAN ISOV → CLOSED

- 26.17 Wait for depress PET = 15 minutes and O2 > 24.5 %

- 26.18 ✓ **MCC-H** for Go to continue

- 26.19 DEPRESS PUMP MAN ISOV → OPEN

- 26.20 Continue DEPRESS to 10.2 psia (527 mmHg).  
Refer to Figure 2.

- 26.21 DEPRESS PUMP MAN ISOV → CLOSED

- 26.22 Verify O2 is between 23.5 and 28.8 %.

UIA

- 26.23 sw DEPRESS PUMP PWR → OFF

**MCC-H/IV**

- 26.24 Perform {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION}, step 8 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:

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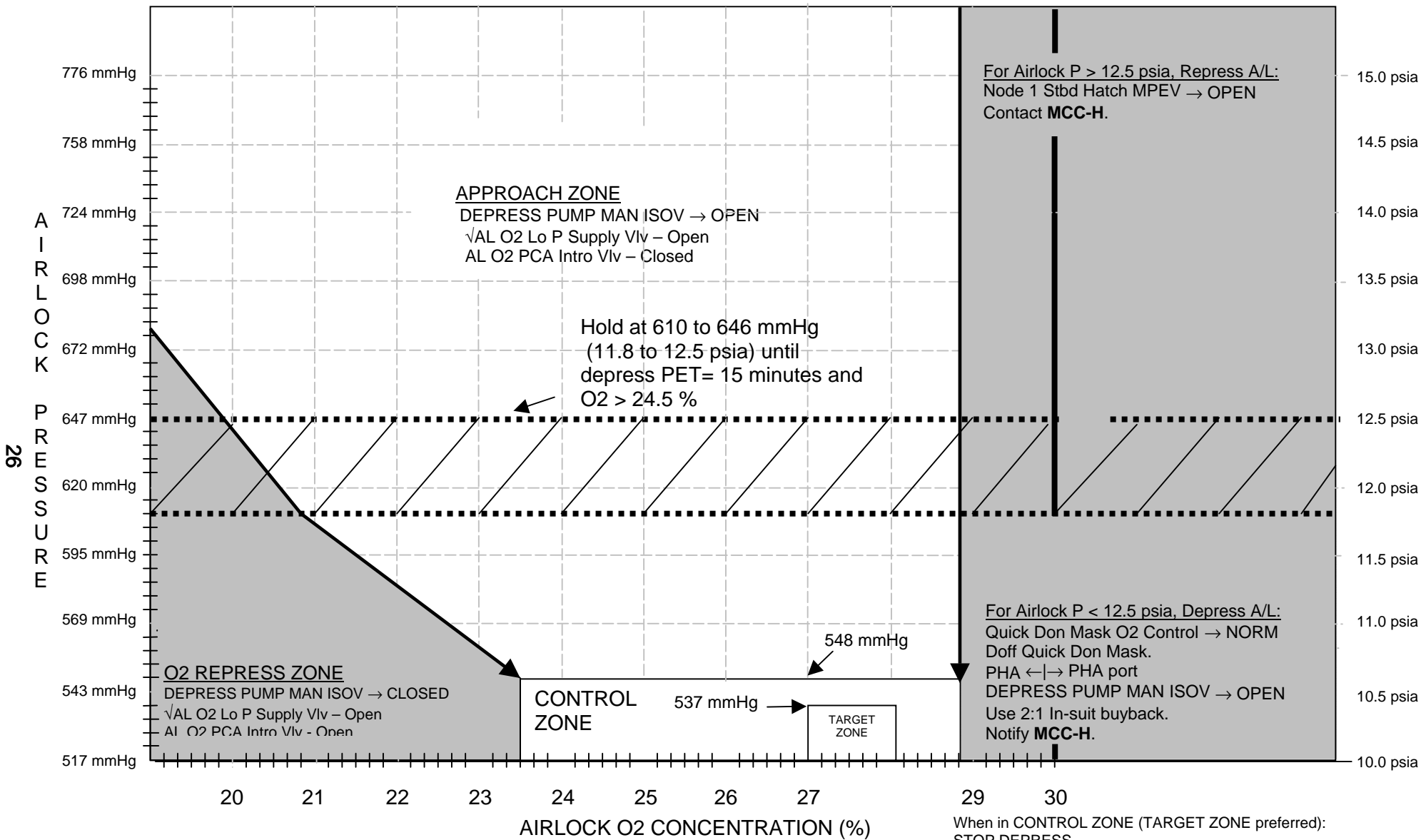


Figure 2.- 10.2 Airlock Depress Graph.

**1.210 EVA PREP USING SHUTTLE O2**

<b>WARNING</b>
<p>Do not terminate mask prebreathe until:</p> <ul style="list-style-type: none"> <li>• Airlock at 10.2 psia (527 mmHg)</li> <li>• P/B PET &gt; 1:20</li> <li>• 0:45 since finishing EV2 exercise</li> <li>• Airlock O2 between 23.5 and 28.8 %</li> </ul>

When mask prebreathe complete

- 27. Momentarily pull Mask away from face to verify positive O2 flow.

\*\*\*\*\*  
 \* If no positive O2 flow, contact **MCC-H**.  
 \*\*\*\*\*

- PHA  28. Quick Don Mask O2 control → NORMAL

Record Mask Prebreathe Terminate P/B PET in block D on EVA PREBREATHE CUE CARD.

- 29. Doff Quick Don Mask.

- A/L1D2  30. Relief Valve of 60-ft PHA ←|→ A/L PBA port  
Install cap on A/L PBA port.  
Close A/L PBA door.

- 31. Unstow biomed pigtail from EMU Servicing Kit.

Biomed pigtail →|← signal conditioner  
 Biomed pigtail →|← electrical harness

- 32. Don comm cap.

<u><b>NOTE</b></u>
Due to an RF interference issue between the hand-held mics and the EMU radios, the hand-held mic should not be used in the vicinity of powered EMU radios.

- DCM  33. sw COMM mode → PRI (hot mic to **MCC-H**)

- 34. √sw Comm FREQ – LOW

- 35. Verify biomed, EMU data, RF comm with **MCC-H**.

- 36. sw COMM mode → HL

- 37. Doff comm cap.

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38. Biomed pigtail ←|→ electrical harness

ATU4,5  39. √EACP Y-Cable →|← ATUs

EACP  40. √EACP Y-Cable →|← EACP

sw PWR → ON

√EMU1,2 mode sel (two) – DUAL

ATU4,5,6  41. pb PTT → Press

pb 1 → Press (Big Loop)

pb 3 → Press (Shuttle/ISS ICOM)

pb 5 → Press (Airlock)

√Display – '1G, 3, 5T' other comm. loops as required

√Display – 'DUAL'

### EMU DONNING (55 MINUTES)

#### NOTE

May be performed by EV1 and EV2 simultaneously.

42. √EDDA latched

43. If not taken previously, take one aspirin tablet (325 mg).

44. √Suit arms aligned

45. √Gloves ←|→ EMU

√Wrist disconnects – op

46. Stow IV glasses as required.

47. Don thumb loops.

48. √Drink vlv position

49. √Biomed connector is outside of HUT

50. Don HUT.

51. Release thumb loops.

52. √Suit arms aligned

53. Don EV glasses as required.  
Don comm cap.

54. √Comm

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55. Biomed pigtail →|← electrical harness

56. LCVG →|← Multiple Water Connector

√Multiple Water Connector locked

57. √Thermal cover clear of waist ring

58. Waist ring → engage position

59. Waist ring →|← HUT

√Waist ring locked

60. Remove donning handles.  
Stow donning handles in EMU Equipment Bag.

61. Cover waist ring.

### CAUTION

Pulling on blue bite valve to adjust position  
can cause valve to release from stem.

62. √Drink vlv position

63. √Mic boom position

64. Don comfort gloves, wristlets.

65. Wrist rings → engage position

66. Don EV gloves.

√EV gloves locked

67. Tighten palm restraint straps.

68. √sw Glove heater (two) – OFF

69. √sw REBA – OFF (pull tab toward left arm of suit)

70. Lower arm power harness cables →|← Gloves

Stow slack under arm TMG.

71. √Cuff C/L position

√Wrist mirrors installed

**1.210 EVA PREP USING SHUTTLE O2**

<b>CAUTION</b>
Flexible Ventilation Duct must be removed from Crewlock prior to taking EMU Fan to ON to avoid ice formation on UIA water lines.

72. Rotate Flexible Ventilation Duct out of C-Lk.

<b>CAUTION</b>
Minimize fan operation with O2 ACT – OFF (~2 minutes).

DCM  73. sw FAN → ON

74. √Electrical harness clear of neck ring

75. Don helmet.

√Helmet locked

DCM  76. O2 ACT → IV

77. √Helmet purge vlv – cl, locked

DCM  78. PURGE vlv → cl (dn)

If EMU TV capability

79. Unstow EMU TV power cable.

80. EMU TV power cable ←|→ Ground plug

81. EMU TV power cable →|← EMU TV

EV2  82. Repeat steps 42 to 81 if donning performed serially.

EMU CHECK (5 MINUTES)

Both  83. √Cooling

\*\*\*\*\*

\* If cooling insufficient

\* | Slowly cycle Temp control vlv between 7 and Max C

\* | while IV depresses and holds pump priming valve

\* | on back of EMU (30 seconds minimum).

\*\*\*\*\*

DCM  84. Temp control vlv → as required

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- |                          |                          |                          |                          |     |                   |                                |
|--------------------------|--------------------------|--------------------------|--------------------------|-----|-------------------|--------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 85. | √Wrist rings      | – covered                      |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |     | √Waist rings      | – covered                      |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |     | √sw WATER         | – OFF (switch guard installed) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |     | √sw POWER         | – SCU                          |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |     | √sw FAN           | – ON                           |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |     | √sw Comm FREQ     | – LOW                          |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |     | √Helmet lights    | – Operational                  |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |     | √Helmet purge vlv | – cl, locked                   |
| DCM                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |     | √PURGE vlv        | – cl (dn)                      |

### NOTE

During leak check, when **SET O2 IV** message is displayed, wait 30 seconds and √SUIT P gauge stable (4.2 to 4.4) before moving O2 ACT → IV.

86. sw DISP → STATUS until **LEAK CHECK?** displayed  
sw DISP → YES

Follow displayed instructions.

```
*****
* If LEAKAGE HI SUIT P X.X
* | Perform {2.115 FAILED LEAK CHECK (14.7/10.2
* | PSIA)}, all (SODF: ISS EVA SYS: EMU
* | CONTINGENCY), then:
*****
```

87. Go to {1.220 EMU PURGE}, all (SODF: ISS EVA SYS: EVA PREP/POST).

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## 1.215 EVA PREP USING ISS O2

(ISS EVA SYS/7A - ALL/FIN 6/SPN/HC/Paper on ISS)

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(170 Minutes)

### OBJECTIVE:

Prepare for EVA using exercise prebreathe protocol. All of the oxygen required to support prebreathe is supplied from ISS high pressure oxygen tank.

- MCC-H/IV**
1. EVA COMM AND AIRLOCK ENVIRONMENT CONFIG
    - 1.1 Perform {2.701 UHF 1 ORU ACTIVATION}, all (SODF: C&T: NOMINAL: UHF), then:
      - 1.2 Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL: AUDIO).
      - 1.3 Prior to beginning step 7, perform {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION}, steps 1 to 7 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:  
  
If orbiter docked
- IV**
- 1.4 Perform shuttle EVA COMM CONFIG, all (FDF: EVA: EVA PREP), then:

### EXERCISE PREBREATHE/PREP FOR DONNING (110 MINUTES)

- IV**
2. VERIFYING AIRLOCK EQUIPMENT
    - 2.1 ✓PFE located in PFE locker
      - ✓Pressure gauge needle is in green zone (800 to 900 psig)
    - 2.2 ✓Three PHA Quick Don Masks available to support EVA Prep
    - 2.3 ✓PBA Bottles and Quick Don Masks located in Airlock for every isolated crewmember
      - ✓PBA Bottles →|← Quick Don Masks for each non-EVA crewmember in Airlock
      - ✓Oxygen Bottle pressure gauge needle  $\geq$  3000 psig for each Bottle
    - 2.4 ✓Two CSA-CPs located in Airlock
      - ✓Battery power for both CSA-CPs
- AL10A1**
- 2.5 ✓Flexible Vent Duct attached to the Conditioned Air Supply connection
  - 2.6 Set up and activate one PCS in Airlock.
    - ✓SSC located in Airlock
3. ACTIVATING AIRLOCK CO2 REMOVAL
    - 3.1 Unstow new Metox Canisters (two). Report barcodes to **MCC-H**.
    - 3.2 Remove Metox Canister caps. Stow in EMU Equipment Bag.

## 1.215 EVA PREP USING ISS O2

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A/L1A1 3.3 Open CO2 Removal Receptacle door.

3.4 √CO2 VALVE – REMOVAL

3.5 Install Metox Canisters in CO2 Removal Receptacle per label on closeout.

3.6 Close and latch CO2 Removal Receptacle door.

### 4. MASK PREBREATHE PREP

EV1,2 4.1 Relief Valve of 120-ft PHA Bags 1,2 →|← PHA port  
Route EV1 hose from PHA port to CEVIS (secure bag to handrail).

4.2 Tether hose for strain relief.

4.3 Position Heart Rate Watch on CEVIS.  
Install EV1 PCMCIA card in CEVIS.

4.4 Verify prime and backup bungees are configured (blue or black only).

4.5 Perform {2.2.050 CEVIS - ON LINE MODE OPERATIONS}, step 3 (SODF: MED OPS: NOMINAL: CMS), then:

4.6 Don Ergometer/CEVIS shoes.  
Don other over-the-head garments.  
Don TCU top.

4.7 Take one aspirin tablet (325 mg).

### 5. CONFIGURING FOR ONBOARD PHA COMM (IF REQUIRED)

5.1 EACP Y-Cable ←|→ ATU 4,5

5.2 PHA Comm Cables →|← Headset Control Unit (HCU)

√HCU →|← HCU Extension Cable

5.3 HCU Extension Cable →|← ATU (near activity)

5.4 HCU – PTT (to alleviate noise)

ATU 5.5 pb PTT → Press  
pb 1 → Press (Big Loop)  
pb 5 → Press (Airlock)

5.6 √Display – ‘1G, 5T’ and other loops, as required  
√Display – ‘PTT’

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### INITIATING QUICK DON MASK PREBREATHE

#### **WARNING**

Positive mask O2 pressure and fit are necessary to ensure adequate prebreathe.

- EV1,2 PHA
6. Verify black plates in top of Quick Don Mask are seated in silicon.
  7. Don Quick Don Mask.
  8. Quick Don Mask O2 control → EMERGENCY
  9. Momentarily pull Quick Don Mask away from face.

√O2 flow

Record Quick Don Mask prebreathe initiation GMT in block A on the EVA PREBREATHE CUE CARD, start timer, **P/B PET = 0:00**

10. √Comm, as required

#### NOTE

Steps 11 to 13 should be performed in parallel.

- EV-1,IV
11. Perform exercise per EVA EXERCISE PRESCRIPTION steps 1 to 2 and 6 to 12 on EVA PREBREATHE CUE CARD, then:

EV2

12. EMU POWERUP (BOTH EMUs)

UIA

- 12.1 √sw PWR EV-1,2 (two) – OFF
- √PWR EV-1,2 LEDs (four) – Off
- √EMU O2 SUPPLY PRESS gauge: 850 to 950

C-Lk  
wall

- 12.2 Remove SCU from stowage straps and pouches.  
Transfer SCU to E-Lk.

DCM

- 12.3 Open DCM Cover  
Attach Cover to DCM with Velcro.

- 12.4 SCU →|← DCM

√SCU locked

- 12.5 sw POWER → BATT

#### **CAUTION**

EMU must be on BATT power when UIA suit power is turned on.

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- PSA            12.6 √sw SUIT SELECT (two) – OFF  
                  √sw EMU MODE EMU1,2 (two) – PWR
- 12.7 sw MAIN POWER → ON
- √MAIN POWER LED – On
- 12.8 sw SUIT SELECT (two) → EMU 1,2
- √EMU 1,2 LEDs (two) – On  
                  √EMU 1,2 Volts: 18.0 to 19.0
- UIA            12.9 sw PWR EV-1,2 (two) → ON
- √PWR EV-1,2 EMU LEDs (two) – On
- DCM           12.10 sw POWER → SCU
- 12.11 √STATUS: BATT VDC ≥ 20.3
- UIA            13. OXYGEN EMU 1,2 vlv (two) → OPEN

**NOTE**

Steps 14 to 18 should be performed in parallel.

- When EV1 Exercise complete
- EV2,IV        14. Perform exercise per EVA EXERCISE PRESCRIPTION steps  
                  1 to 2 and 6 to 12 on EVA PREBREATHE CUE CARD, then:
- EV1    Both        15. Waist ring ←|→ HUT  
      EMUs        Temporarily stow LTA.
16. Helmet ←|→ HUT  
                  Temporarily stow helmet.
17. Gloves ←|→ EMU  
                  Temporarily stow gloves.
18. Remove Dosimeter from in-flight garments.  
                  Insert Dosimeter in LCVG left leg pocket.
- IV            19. Stow the following in E-Lk  
                  EVA PREBREATHE Cue Card.  
                  Food and drink for EV crew, if desired.

## 1.215 EVA PREP USING ISS O2

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- EV1,2
20. If necessary, apply Medical Kit items.  
Refer to {5.110 APPROVED NON-EMU HARDWARE}, all (SODF: ISS EVA SYS: REFERENCE), as required.
  21. Don MAG, TCU bottom, LCVG, biomed.  
Refer to Figure 1.

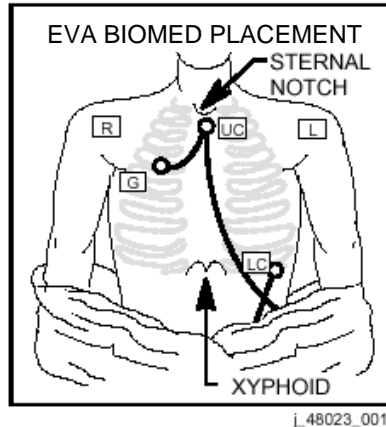


Figure 1.- Nondisposable Biomed Configuration.

### IV 22. CLOSING NODE 1 STBD HATCH

#### NOTE

Be prepared to initiate depress within 5 minutes of closing the Node 1 Stbd Hatch to prevent high O2 concentrations in the Airlock.

When P/B PET = 50 minutes and 15 minutes post second EV crew exercise

- 22.1 ✓ **MCC-H** for Go to continue
- 22.2 ✓ Node 1 Stbd Hatch MPEV – CLOSED and uncapped
- 22.3 Check hatch seal and close Node 1 Stbd Hatch per decal (omit last step of decal).

#### **WARNING**

Do not initiate depress until 50 minutes of mask prebreathe and 15 minutes post second EV crew exercise are complete. The depress time from 760 mmHg (14.7 psia) to 527 mmHg (10.2 psia) must be greater than 20 minutes.

## 1.215 EVA PREP USING ISS O2

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### 23. DEPRESSING TO 10.2 PSIA

EV1,2 23.1 Momentarily pull Quick Don Mask away from face to verify positive O2 flow

\*\*\*\*\*

\* If no positive O2 flow, contact **MCC-H**.

\*\*\*\*\*

#### NOTE

1. EV crew should perform steps 23.2 to 23.8 while IV is depressing Airlock to 10.2 psia (527 mmHg) in steps 23.9 to 23.23.
2. EMU displays **O2 IS OFF** message during Airlock depress, sw DISP → PRO, as required.

DCM 23.2 √STATUS **SOP P**: > 5410 (compare with gauge)

23.3 √Waist ring – open

23.4 Don LTA (attach donning handles as required).

If boot bladder manipulation required

23.5 Boot ←|→ Leg (sizing ring)

23.6 Pull up excess boot bladder around full circumference of boot disconnect.

#### **WARNING**

Keep bladder material clear of threads during reconnection of boot.

23.7 Boot →|← Leg (sizing ring)

23.8 Lock 1 → LOCK

√All locks (three per boot) are engaged

IV UIA 23.9 √DEPRESS PUMP ENABLE LED – On

UIA 23.10 sw DEPRESS PUMP PWR → ON

Wait 10 seconds.

C-Lk 23.11 DEPRESS PUMP MAN ISOV → OPEN

√Cab Press – Decreasing (use Vacuum Manometer or PCS)

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PCS            Airlock: ECLSS  
                  Airlock: ECLSS  
                  'Equipment Lock'

- 23.12 Start depress PET clock.  
Record start time in Block C of EVA PREBREATHE CUE CARD.

When Cab Press < 14.1 psia (729 mmHg)

- 23.13 Turn Hatch handle in the UNLATCH direction approximately 1.5 turns to place the Hatch in the equalize position (orange stripe).

- 23.14 Crank Handle – Stowed position

### NOTE

1. CSA-CP % O2 will read approximately 1 % lower than actual during depress. Stable Airlock pressure is needed to obtain an accurate reading.
2. Per SPN 2563 (12A to 20A), each MCA partial pressure reading of the Airlock will be 86 seconds old before the depress begins, and will increase up to 99 seconds old at 10.2 psia.

- 23.15 Monitor O2 using CSA-CP during depress.  
Refer to Figure 2.

When Airlock is at 11.8 (610 mmHg)

- C-Lk | 23.16 DEPRESS PUMP MAN ISOV → CLOSED  
      | 23.17 Wait for depress PET = 15 minutes and O2 > 24.5 %

- 23.18  **MCC-H** for Go to continue

- 23.19 DEPRESS PUMP MAN ISOV → OPEN

- 23.20 Continue DEPRESS to 10.2 psia (527 mmHg).  
Refer to Figure 2.

- 23.21 DEPRESS PUMP MAN ISOV → CLOSED

- 23.22 Verify O2 is between 23.5 and 28.8 %.

- UIA 23.23 sw DEPRESS PUMP PWR → OFF

- MCC-H/IV** 23.24 Perform {[1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION](#)}, step 8 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:

# 1.215 EVA PREP USING ISS O2

(ISS EVA SYS/7A - ALL/FIN 6/SPN/HC/Paper on ISS)

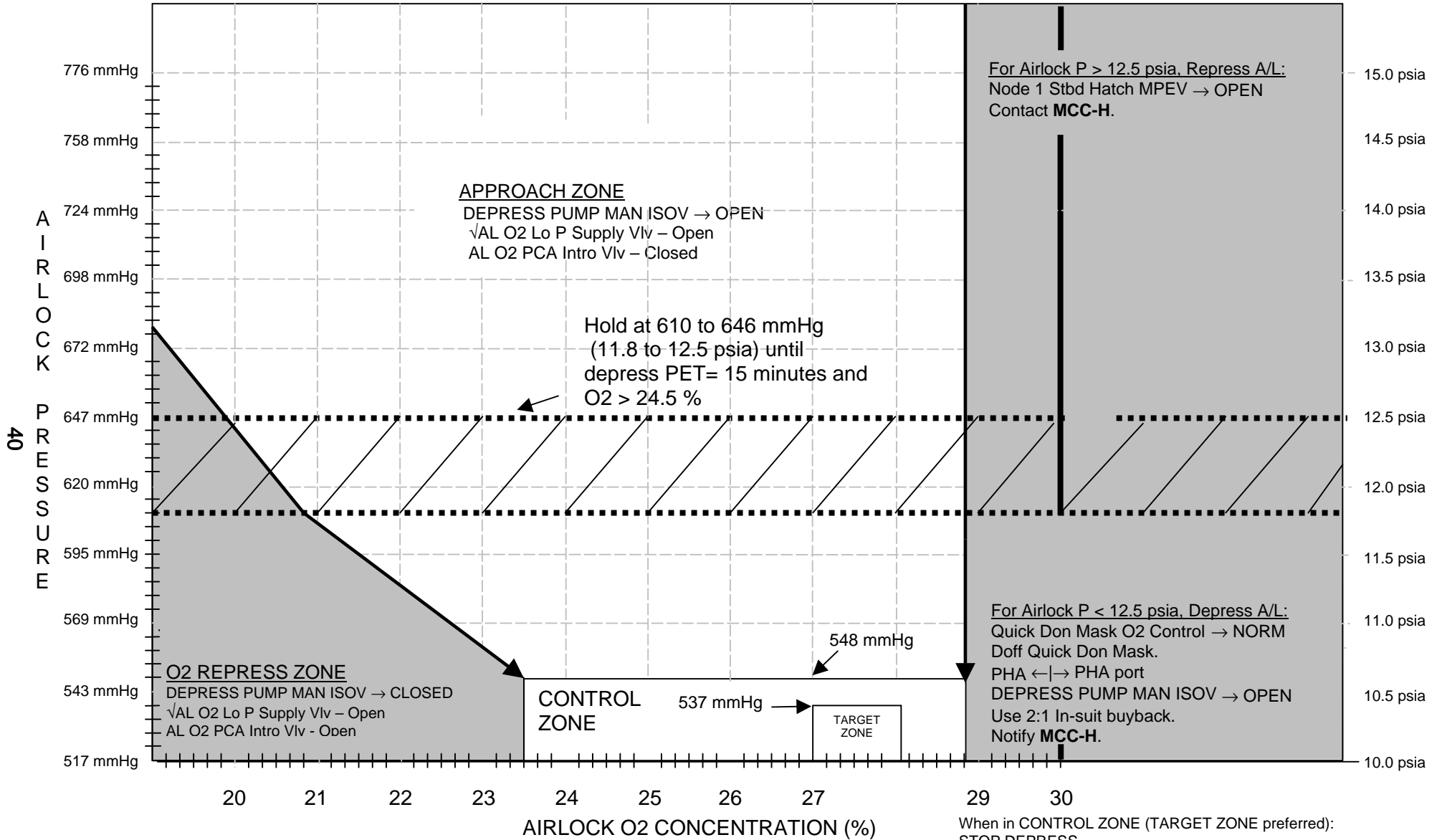


Figure 2.- 10.2 Airlock Depress Graph.

## 1.215 EVA PREP USING ISS O2

(ISS EVA SYS/7A - ALL/FIN 6/SPN/HC/Paper on ISS)

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### WARNING

Do not terminate Quick Don Mask prebreathe until:

- Airlock at 10.2 psia (527 mmHg)
- P/B PET > 1:20
- 0:45 since finishing EV2 exercise
- Airlock O2 between 23.5 and 28.8 %

PHA

When Quick Don Mask prebreathe complete

24. Momentarily pull Quick Don Mask away from face to verify positive O2 flow.

\*\*\*\*\*

\* If no positive O2 flow, contact **MCC-H**.

\*\*\*\*\*

25. Quick Don Mask O2 control → NORMAL

Record Mask Prebreathe Terminate P/B PET in block D on EVA PREBREATHE CUE CARD.

26. Doff Quick Don Mask.

- AL1D2  27. Relief Valve of PHAs ←|→ PHA port

Install cap on PHA port.

28. Unstow biomed pigtail from EMU Servicing Kit.

Biomed pigtail →|← signal conditioner

Biomed pigtail →|← electrical harness

29. Don comm cap.

### NOTE

Due to an RF interference issue between the hand-held mics and the EMU radios, the hand-held mic should not be used in the vicinity of powered EMU radios.

- DCM  30. sw COMM mode → PRI (hot mic to **MCC-H**)

31. √sw Comm FREQ – LOW

32. Verify biomed, EMU data, RF comm with **MCC-H**.

33. sw COMM mode → HL

## 1.215 EVA PREP USING ISS O2

(ISS EVA SYS/7A - ALL/FIN 6/SPN/HC/Paper on ISS)

Page 10 of 13 pages

34. Doff comm cap.
35. Biomed pigtail ←|→ electrical harness
- ATU4,5  36. √EACP Y-Cable →|← ATUs
- EACP  37. √EACP Y-Cable →|← EACP
- sw PWR → ON
- √EMU1,2 mode sel (two) – DUAL
- ATU4,5,6  38. pb PTT → Press  
pb 1 → Press (Big Loop)  
pb 3 → Press (Shuttle/ISS ICOM)  
pb 5 → Press (Airlock)
- √Display – ‘**1G, 3, 5T**’ other comm. loops as required  
√Display – ‘**DUAL**’

### EMU DONNING (55 MINUTES)

#### NOTE

May be performed by EV1 and EV2 simultaneously.

39. √EDDA latched
40. Take one aspirin tablet (325 mg), if not taken previously.
41. √Suit arms aligned
42. √Gloves ←|→ EMU  
√Wrist disconnects – op
43. Stow IV glasses as required.
44. Don thumb loops.
45. √Drink vlv position
46. √Biomed connector is outside of HUT
47. Don HUT.
48. Release thumb loops.
49. √Suit arms aligned
50. Don EV glasses as required.  
Don comm cap.

## 1.215 EVA PREP USING ISS O2

(ISS EVA SYS/7A - ALL/FIN 6/SPN/HC/Paper on ISS)

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- 51. √Comm
- 52. Biomed pigtail →|← electrical harness
- 53. LCVG →|← Multiple Water Connector  
√Multiple Water Connector locked
- 54. √Thermal cover clear of waist ring
- 55. Waist ring → engage position
- 56. Waist ring →|← HUT  
√Waist ring locked
- 57. Remove donning handles.  
Stow donning handles in EMU Equipment Bag.
- 58. Cover waist ring.

### CAUTION

Pulling on blue bite valve to adjust position can cause valve to release from stem.

- 59. √Drink vlv position
- 60. √Mic boom position
- 61. Don comfort gloves, wristlets.
- 62. Wrist rings → engage position
- 63. Don EV gloves.  
√EV gloves locked
- 64. Tighten palm restraint straps.
- 65. √sw Glove heater (two) – OFF
- 66. √sw REBA – OFF (pull tab toward left arm of suit)
- 67. Lower arm power harness cables →|← Gloves  
Stow slack under arm TMG.
- 68. √Cuff C/L position  
√Wrist mirrors installed

## 1.215 EVA PREP USING ISS O2

(ISS EVA SYS/7A - ALL/FIN 6/SPN/HC/Paper on ISS)

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### CAUTION

Flexible Ventilation Duct must be removed from Crewlock prior to taking EMU Fan to ON to avoid ice formation on UIA water lines.

69. Rotate Flexible Ventilation Duct out of C-Lk.

### CAUTION

Minimize fan operation with O2 ACT – OFF (~ 2 minutes).

- DCM  70. sw FAN → ON

71. √Electrical harness clear of neck ring

72. Don helmet.

√Helmet locked

- DCM  73. O2 ACT → IV

74. √Helmet purge vlv – cl, locked

- DCM  75. PURGE vlv → cl (dn)

If EMU TV capability

76. Unstow EMU TV power cable.

77. EMU TV power cable ←|→ Ground plug

78. EMU TV power cable →|← EMU TV

- EV2  79. Repeat steps 39 to 78 if donning performed serially.

### EMU CHECK (5 MINUTES)

- Both  80. √Cooling

\*\*\*\*\*

\* If cooling insufficient

\* | Slowly cycle Temp control vlv between 7 and Max C  
\* | while IV depresses and holds pump priming valve  
\* | on back of EMU (30 seconds minimum).

\*\*\*\*\*

- DCM  81. Temp control vlv → as required

82. √Wrist rings – covered

- √Waist rings – covered

- DCM  √sw WATER – OFF (switch guard installed)

## 1.215 EVA PREP USING ISS O2

(ISS EVA SYS/7A - ALL/FIN 6/SPN/HC/Paper on ISS)

Page 13 of 13 pages

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	√sw POWER	– SCU
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	√sw FAN	– ON
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	√sw Comm FREQ	– LOW
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	√Helmet lights	– Operational
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	√Helmet purge vlv	– cl, locked
DCM	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	√PURGE vlv	– cl (dn)

### NOTE

During leak check, when **SET O2 IV** message is displayed, wait 30 seconds and √SUIT P gauge stable (4.2 to 4.4) before moving O2 ACT → IV.

83. sw DISP → STATUS until **LEAK CHECK?** displayed  
sw DISP → YES, follow displayed instructions.

```
*****  
* If LEAKAGE HI SUIT P X.X  
* | Perform {2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)},  
* | all (SODF: ISS EVA SYS: EMU CONTINGENCY), then:  
*****
```

84. Go to {1.220 EMU PURGE}, all (SODF: ISS EVA SYS: EVA PREP/POST).

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## 1.220 EMU PURGE

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 1 of 2 pages

I

### OBJECTIVE:

Purge cabin air from the EMU prior to in-suit prebreathe.

#### NOTE

Flex arms and legs periodically and avoid overcooling during purge/prebreathe.

BOTH DCM

1. O2 ACT → PRESS
2. Verify no EMU fit issues.
3. PURGE vlv → op (up), begin 12-minute purge clock

For exercise protocol, record GMT purge start time in block E of EVA PREBREATHE CUE CARD, inform **MCC-H**.

For campout protocol, record GMT purge start time here.

GMT (PURGE INIT:) \_\_\_\_/\_\_\_\_:\_\_\_\_ \_\_\_\_

MCC-H/IV

4. INHIBITING ISS RAPID DEPRESS RESPONSE AND ALARM
  - 4.1 Perform {1.110 ISS AIRLOCK 10.2 PSIA OPERATIONS TERMINATION}, step 1 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:
    - 4.2 Verify Russian Segment Rapid Depress Response inhibited

#### **WARNING**

To ensure sufficiently low PPN2 levels in the EMU, do not repress Equipment Lock until 5 minutes of purge is complete.

When 5 minutes of purge complete

#### NOTE

1. If shuttle docked, airlock repress may cause shuttle dP/dT alarm.
2. Airlock repress will take approximately 7 minutes with the Node Stbd Hatch MPEV open.

IV

5. Inform shuttle crew of airlock repress initiation, as required.
6. Verify with **MCC-H** step 4 complete and **GO** for repress. Node 1 Stbd Hatch MPEV → throttled Open to Close (as required)
7. Open Node 1 Stbd Hatch per decal.

## 1.220 EMU PURGE

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 2 of 2 pages

- BOTH DCM
- When 12-minute purge complete
8. PURGE vlv → cl (dn)
  9. O2 ACT → IV
  10. For Exercise protocol, record GMT of in-suit prebreathe start time on block F of EVA PREBREATHE CUE CARD.  
  
For Campout protocol, record GMT of in-suit prebreath start time here.  
  

GMT (IN-SUIT P/B INIT:) ____/____:____ ____
---
- MCC-H/IV
11. [ENABLING ISS RAPID DEPRESS RESPONSE AND ALARM](#)  
Perform {1.110 ISS AIRLOCK 10.2 PSIA OPERATIONS TERMINATION}, step 2 to 7 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:
  12. Go to {1.225 EMU PREBREATHE} (SODF: ISS EVA SYS: EVA PREP/POST).

## 1.225 EMU PREBREATHE

(ISS EVA SYS/7A - ALL/FIN 6/HC/Paper on ISS)

Page 1 of 4 pages

I

### OBJECTIVE:

To perform the required in-suit prebreathe prior to an EVA.

1. Monitor prebreathe clock.

Protocol	Prebreathe Duration
Exercise	01:00
Campout	00:40
14.7 psi	04:00

If 14.7 psi protocol

2.  $\checkmark$  **MCC-H** for additional EMU water dump requirements

PHA

3. Depress Quick Don Mask O2 control to bleed down line.  
Install caps on PHA fittings.
4. Use spare Quick Don Mask to bleed down 90-ft PHA (if using shuttle O2)  
Spare Quick Don Mask  $\leftarrow$  |  $\rightarrow$  90-ft PHA
5. Stow PHA Quick Don Masks in PHA Bags.
6. Return additional PBAs retrieved from other modules to original stowage lockers.  
Inform **MCC-H** PBAs are restowed.
7. Install miniworkstation, tools, waist tethers, BRTs as required on EMUs.
8. Egress EDDA.  
Stow EDDA handles.

### SAFER DONNING (30 MINUTES)

IV

9. Remove SAFER from Stowage Bag.  
Remove Stowage Straps (two) from thruster towers.  
Stow Stowage Straps in EMU Equipment Bag.  
Unfold thruster towers.
10. Inspect:  
Thruster tower hinges  
Tower latches  
  
 $\checkmark$  TMG not blocking thrusters
11.  $\checkmark$  TMG clear from SAFER striker plate on EMU PLSS
12. Remove Inhibitor.  
Close, fasten port cover.  
Stow Inhibitor in EMU Equipment Bag.

## 1.225 EMU PREBREATHE

(ISS EVA SYS/7A - ALL/FIN 6/HC/Paper on ISS)

Page 2 of 4 pages

13. MAN ISOL vlv → OP (dn)
14. Latch → PRELOAD
15. Latch ↶ to recess butterfly in housing.

### CAUTION

Latch ↶ past softstop can bind latch.

16. Latch ↶ to softstop.

If required

17. Latch ↶ to align latch collar with square bolt head.
18. Latch → ENG
19. PLSS →|← thruster towers
20. Push latch in and ↷ (~90°).

\*\*\*\*\*

- \* If latch will not engage
- \* | Latch → PRELOAD
- \* | Latch ↶
- \* | Return to step 16.

\*\*\*\*\*

21. Latch → PRELOAD
22. Latch ↶ until ratcheting.

### CAUTION

Latch ↶ may disengage SAFER.

23. Continue ratcheting until lock marking on latch and tower aligned.
24. Latch → LCK
25. √Access to HCM deploy lever  
√TMG not blocking thrusters
26. Repeat steps 9 to 25 for SAFER 2.

A/L1A1

27. DEACTIVATING CO2 REMOVAL
  - 27.1 Rotate EDDA open.

27.2 Open CO2 Removal Receptacle door.

27.3 Remove Metox canisters from CO2 Removal Receptacle.

## 1.225 EMU PREBREATHE

(ISS EVA SYS/7A - ALL/FIN 6/HC/Paper on ISS)

Page 3 of 4 pages

- 27.4 Unstow Metox canister caps from EMU Equipment Bag.
- 27.5 Install caps on Metox canisters.
- 27.6 Report canister barcode to **MCC-H** as comm permits.
- 27.7 Temporarily stow Metox canisters for future regeneration or use.
- 27.8 Close and latch CO2 Removal Receptacle door.
- 27.9 Rotate EDDA closed.

### PREPARING FOR DEPRESS (10 MINUTES)

IV

28. Remove loose equipment from C-Lk.

√EVA tools and ORUs installed in C-Lk as required for EVA

29. sw REBA → ON, pull tab toward right arm of suit

If EMU TV capability

30. pb EMU TV power → Press

√Green LED – On

EV

31. Ingress C-Lk.

C-Lk

32. √DEPRESS PUMP MAN ISOV – CLOSED

IV

DCM

33. Remove water switch guard (two).  
Stow water switch guard in EMU Equipment Bag.

IV

34. Egress C-Lk.

#### **CAUTION**

Verify EV crew is clear of hatch mechanism.

35. IV Hatch → CLOSE, lock

36. √IV Hatch equalization valve – OFF (√cap remains removed)

37. √EMERGENCY MPEV – CLOSED

## 1.225 EMU PREBREATHE

(ISS EVA SYS/7A - ALL/FIN 6/HC/Paper on ISS)

Page 4 of 4 pages

- When in-suit prebreathe time complete
- |           |  |
|-----------|--|
| PCS       | <p>38. Airlock: ECLSS: PCA: VRIV<br/><span style="border: 1px solid black; padding: 2px;">AL PCA VRIV</span><br/>'Open'</p> <p><b>cmd</b> Arm (√Status – Armed)<br/><b>cmd</b> Open (√Position – Open)</p>   |
| EV    UIA | <p>39. √sw DEPRESS PUMP PWR – OFF<br/>√DEPRESS PUMP ENABLE LED – On</p> <p><b>On MCC-H GO</b>, go to CREWLOCK DEPRESS portion of<br/><span style="color: blue;">{CREWLOCK DEPRESS/REPRESS CUE CARD}</span><br/>(SODF: ISS EVA SYS: EVA PREP/POST).</p> |

HOOK  
VELCRO

HOOK  
VELCRO

**CREWLOCK DEPRESS/REPRESS CUE CARD**

(ISS EVA SYS/7A - ALL/FIN 6/HC/Paper on ISS)

Page 1 of 2 pages

CREWLOCK DEPRESS (30 MINUTES) (45 MINUTES FOR EXERCISE PROTOCOL)

- When prebreathe complete
- DCM 1. √sw Comm FREQ – LOW
  - UIA 2. sw COMM mode → PRI
  - UIA 3. sw DEPRESS PUMP PWR → ON  
(wait 10 seconds for complete startup)
  - C-Lk 4. DEPRESS PUMP MAN ISOV → OPEN, (EV expect alert tone)  
Start Depress PET clock.  
Monitor Suit P gauge < 5.5.  
\*\*\*\*\*  
\* If gauge > 5.5  
\* | Stop depress, √**MCC-H**.  
\*\*\*\*\*
  - DCM 5. C-Lk at 6.0, (EV expect alert tone)
- When C-Lk at 5.0 psia (259 mm Hg)
- C-Lk 6. DEPRESS PUMP MAN ISOV → CLOSED, (EV expect alert tone)
  - DCM 7. sw DISP → STATUS until **LEAK CHECK?** displayed  
sw DISP → YES, follow displayed instructions  
\*\*\*\*\*  
\* If **LEAKAGE HI | SUIT P X.X**  
\* | Perform {2.110 FAILED LEAK CHECK (5 PSIA)}  
\* | (SODF: ISS EVA SYS: EMU CONTINGENCY), then:  
\*\*\*\*\*
  - 8. √O2 ACT – EVA
- For Exercise Protocol, hold at 5.0 psia until Depress PET = 00:25, then:
- C-Lk 9. DEPRESS PUMP MAN ISOV → OPEN, (EV expect alert tone)
  - IV A/L1A2 10. Emergency MPEV → Open  
Monitor SUIT P gauge < 5.5.  
\*\*\*\*\*  
\* If gauge > 5.5  
\* | Stop depress, √**MCC-H**.  
\*\*\*\*\*
- When C-Lk at 2.0 psia (103 mm Hg)
- C-Lk 11. DEPRESS PUMP MAN ISOV → CLOSED
  - UIA 12. sw DEPRESS PUMP PWR → OFF
  - C-Lk 13. Attach waist tethers to C-Lk D-ring for egress.
  - DCM When C-Lk dP/dT ~ 0, (EV expect alert tone)
- When EV Hatch ΔP < 0.5 psi (26 mm Hg)
- C-Lk 14. EV Hatch → open, stow
  - IV A/L1A2 15. Emergency MPEV → Closed

POST DEPRESS (5 MINUTES)

- DCM 1. sw POWER → BATT (stagger switch throws), expect warning tone  
(IV record GMT \_\_\_\_/\_\_\_\_:\_\_\_\_) EVA PET = 00:00
- UIA 2. sw PWR EV-1,2 (two) → OFF  
√PWR EV-1,2 LEDs (four) – Off
- DCM 3. SCU ←|→ DCM
- 4. Install DCM cover.
- 5. Stow SCU in pouch.
- C-Lk 6. √DEPRESS PUMP MAN ISOV – CLOSED
- DCM 7. Temp control vlv → Max H
- 8. sw WATER → ON
- 9. √DCM blank, BITE – off
- 10. Temp control vlv → 3 to Max C
- 11. √STATUS, Compare to Cuff Checklist page 1 (IV record)
- 12. Visors as required.
- IV PCS 13. Airlock: ECLSS: PCA: VRIV  
**cmd** Close (√Position – Closed)
- 14. Go to {CREWLOCK EGRESS} (SODF: ISS EVA SYS: CUFF  
CHECKLIST) page 34 or EVA specific timeline.

EVA-1a/7A - ALL/F

HOOK  
VELCRO

HOOK  
VELCRO

**CREWLOCK DEPRESS/REPRESS CUE CARD**

(ISS EVA SYS/7A - ALL/FIN 6/Paper on ISS) Page 2 of 2 pages

PRE REPRESS (5 MINUTES)

- DCM 1. √SCU →|← DCM
- DCM 2. √sw WATER – OFF for 2 minutes
- 3. √EV Hatch closed, locked
- 4. Waist tethers ←|→ C-Lk D-ring, attach to EMUs
- UIA 5. √OXYGEN EMU1,2 vlv (two) – OPEN
- 6. sw PWR EV-1,2 (two) → ON
- √PWR EV-1,2 EMU LEDs (two) – On
- √PWR EV-1,2 VOLTS = 18.0 to 19.0
- DCM 7. sw POWER → SCU, (EV expect warning tone)

CREWLOCK REPRESS (10 MINUTES)

**WARNING**  
If on SOP, leave O2 ACT – EVA thru C-Lk repress.

- DCM 1. O2 ACT → PRESS
  - 2. sw COMM mode → HL
  - C-Lk 3. √EV Hatch MPEV – CLOSED
  - 4. Notify shuttle crew of possible -dP/dT alarm during repress.  
IV Hatch equalization vlv → throttle OFF to NORM (as required),  
(EV expect alert tone)  
(IV record GMT \_\_\_\_\_/\_\_\_\_\_:\_\_\_\_\_)
  - DCM 5. C-Lk at 4.0, (EV expect alert tone)  
When C-Lk at 5.0 (259 mm Hg)
  - C-Lk 6. IV Hatch equalization valve → OFF, (EV expect alert tone)  
Wait 2 minutes for C-Lk pressure to stabilize, then:
  - IV PCS 7. Airlock: ECLSS  
Record Crew Lock Press: \_\_\_\_\_mmHg (P1)  
Wait 1 minute, then record again: \_\_\_\_\_mmHg (P2)
- \*\*\*\*\*
- \* If  $\Delta P \geq 9$  mmHg (where  $\Delta P = P1-P2$ )
  - \* | Go to {4.150 CREWLOCK LARGE LEAK
  - \* | RESPONSE} (SODF: ISS EVA SYS:
  - \* | EMERGENCY).
  - \* |
  - \* If  $\Delta P > 2$  mmHg (where  $\Delta P = P1-P2$ )
  - \* | Go to {2.205 CREWLOCK SMALL LEAK
  - \* | RESPONSE} (SODF: ISS EVA SYS: AIRLOCK
  - \* | CONTINGENCY).
- \*\*\*\*\*
- 8. √sw Gloves heaters – OFF, gloves clean

**WARNING**  
1. If CUFF 1 symptoms resolving upon repress, report as CUFF 2.  
2. If any DCS, leave O2 ACT – PRESS.

- DCM 9. O2 ACT → IV
- C-Lk 10. IV Hatch equalization vlv → NORM, (EV expect alert tone)
- DCM When C-Lk dP/dT ~ 0, (EV expect alert tone)
- 11. Go to {1.240 POST EVA} (SODF: ISS EVA SYS: EVA PREP/POST).

### 1.235 EMU STATUS

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

Page 1 of 6 pages

I

#### EMU STATUS

	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2
TIME EV												
TIME LF												
% PWR												
% O2												
SUIT P			Report status to MCC when: <ul style="list-style-type: none"> <li>Any parameter outside normal range</li> <li>TIME LF ≤ required</li> <li>Limiting consumable changes (PWR↔O2)</li> <li>ΔTIME LF between EV1 and EV2 ≥ 1 hour</li> </ul>									
O2 P												
SOP P												
SUBLM P												
BAT VDC												
BAT AMP												
RPM												
CO2												
H2O TEMP												
H2O GP												
H2O WP			<u>NORMAL STATUS</u> EVA HR:MIN left since PWR-BATT HR:MIN remaining at present use rate Displayed if not limiting consumable 4.2 to 4.4 psid 150 to 950 psid 5410 to 6800 psia 2.0 to 4.2 psia ≥ 16.7 3.0 to 4.0 18.0 to 20.0 k 0.2 to 2.0 mmHg 32 to 75 degF 14.0 to 16.0 psid									
GAUGE												
			TIME EV									
			TIME LF									
			% PWR									
			% O2									
			TIME EV									
			TIME LF									
			% PWR									
			% O2									

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### 1.235 EMU STATUS

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

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#### EMU STATUS

	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2
TIME EV												
TIME LF												
% PWR												
% O2												
SUIT P			Report status to MCC when:									
O2 P			<ul style="list-style-type: none"> <li>Any parameter outside normal range</li> </ul>									
SOP P			<ul style="list-style-type: none"> <li>TIME LF ≤ required</li> </ul>									
SUBLM P			<ul style="list-style-type: none"> <li>Limiting consumable changes (PWR↔O2)</li> </ul>									
BAT VDC			<ul style="list-style-type: none"> <li>ΔTIME LF between EV1 and EV2 ≥ 1 hour</li> </ul>									
BAT AMP			<u>NORMAL STATUS</u>									
RPM			<ul style="list-style-type: none"> <li>O2 POS</li> </ul>		EVA							
CO2			<ul style="list-style-type: none"> <li>TIME EV</li> </ul>		HR:MIN left since PWR-BATT							
H2O TEMP			<ul style="list-style-type: none"> <li>TIME LF/limiting consum</li> </ul>		HR:MIN remaining at present use rate							
H2O GP			% O2(PWR) LF		Displayed if not limiting consumable							
H2O WP			SUIT P		4.2 to 4.4 psid		TIME EV					
GAUGE			O2 P		150 to 950 psid		TIME LF					
			SOP P		5410 to 6800 psia		% PWR					
			SUBLM P		2.0 to 4.2 psia		% O2					
			BAT VDC		≥ 16.7							
			BAT AMP		3.0 to 4.0							
			RPM		18.0 to 20.0 k		TIME EV					
			CO2		0.2 to 2.0 mmHg		TIME LF					
			H2O TEMP		32 to 75 degF		% PWR					
			H2O GP/WP		14.0 to 16.0 psid		% O2					

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### 1.235 EMU STATUS

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

Page 3 of 6 pages

#### EMU STATUS

	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2			
TIME EV															
TIME LF															
% PWR															
% O2															
SUIT P			Report status to MCC when:												
O2 P			<ul style="list-style-type: none"> <li>Any parameter outside normal range</li> </ul>												
SOP P			<ul style="list-style-type: none"> <li>TIME LF ≤ required</li> </ul>												
SUBLM P			<ul style="list-style-type: none"> <li>Limiting consumable changes (PWR↔O2)</li> </ul>												
BAT VDC			<ul style="list-style-type: none"> <li>ΔTIME LF between EV1 and EV2 ≥ 1 hour</li> </ul>												
BAT AMP															
RPM															
CO2															
H2O TEMP															
H2O GP															
H2O WP															
GAUGE															
			<u>NORMAL STATUS</u>												
			EVA												
			HR:MIN left since PWR-BATT												
			HR:MIN remaining at present use rate												
			Displayed if not limiting consumable												
			4.2 to 4.4 psid												
			O2 P					150 to 950 psid					TIME EV		
			SOP P					5410 to 6800 psia					TIME LF		
			SUBLM P					2.0 to 4.2 psia					% PWR		
			BAT VDC					≥ 16.7					% O2		
			BAT AMP					3.0 to 4.0							
			RPM					18.0 to 20.0 k					TIME EV		
			CO2					0.2 to 2.0 mmHg					TIME LF		
			H2O TEMP					32 to 75 degF					% PWR		
			H2O GP/WP					14.0 to 16.0 psid					% O2		

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### 1.235 EMU STATUS

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

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#### EMU STATUS

	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2		
TIME EV														
TIME LF														
% PWR														
% O2														
SUIT P			Report status to MCC when: <ul style="list-style-type: none"> <li>Any parameter outside normal range</li> <li>TIME LF ≤ required</li> <li>Limiting consumable changes (PWR↔O2)</li> <li>ΔTIME LF between EV1 and EV2 ≥1 hour</li> </ul>											
O2 P														
SOP P														
SUBLM P														
BAT VDC														
BAT AMP														
RPM														
CO2														
H2O TEMP														
H2O GP														
H2O WP			NORMAL STATUS											
GAUGE			EVA HR:MIN left since PWR-BATT HR:MIN remaining at present use rate Displayed if not limiting consumable											
			• O2 POS • TIME EV • TIME LF/limiting consum											
			% O2(PWR) LF SUIT P O2 P SOP P SUBLM P BAT VDC BAT AMP RPM CO2 H2O TEMP H2O GP/WP											
			4.2 to 4.4 psid 150 to 950 psid 5410 to 6800 psia 2.0 to 4.2 psia ≥ 16.7 3.0 to 4.0 18.0 to 20.0 k 0.2 to 2.0 mmHg 32 to 75 degF 14.0 to 16.0 psid											
			TIME EV TIME LF % PWR % O2											
			TIME EV TIME LF % PWR % O2											

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### 1.235 EMU STATUS

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#### EMU STATUS

	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2					
TIME EV																	
TIME LF																	
% PWR																	
% O2																	
SUIT P			Report status to MCC when:														
O2 P			<ul style="list-style-type: none"> <li>Any parameter outside normal range</li> </ul>														
SOP P			<ul style="list-style-type: none"> <li>TIME LF ≤ required</li> </ul>														
SUBLM P			<ul style="list-style-type: none"> <li>Limiting consumable changes (PWR↔O2)</li> </ul>														
BAT VDC			<ul style="list-style-type: none"> <li>ΔTIME LF between EV1 and EV2 ≥ 1 hour</li> </ul>														
BAT AMP			<u>NORMAL STATUS</u>														
RPM			• O2 POS					EVA									
CO2			• TIME EV					HR:MIN left since PWR-BATT									
H2O TEMP			• TIME LF/limiting consum					HR:MIN remaining at present use rate									
H2O GP			% O2(PWR) LF					Displayed if not limiting consumable									
H2O WP			SUIT P					4.2 to 4.4 psid									
GAUGE			O2 P					150 to 950 psid		TIME EV							
			SOP P					5410 to 6800 psia		TIME LF							
			SUBLM P					2.0 to 4.2 psia		% PWR							
			BAT VDC					≥ 16.7		% O2							
			BAT AMP					3.0 to 4.0									
			RPM					18.0 to 20.0 k		TIME EV							
			CO2					0.2 to 2.0 mmHg		TIME LF							
			H2O TEMP					32 to 75 degF		% PWR							
			H2O GP/WP					14.0 to 16.0 psid		% O2							

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### 1.235 EMU STATUS

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#### EMU STATUS

	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2			
TIME EV															
TIME LF															
% PWR															
% O2															
SUIT P			Report status to MCC when:												
O2 P			<ul style="list-style-type: none"> <li>Any parameter outside normal range</li> </ul>												
SOP P			<ul style="list-style-type: none"> <li>TIME LF ≤ required</li> </ul>												
SUBLM P			<ul style="list-style-type: none"> <li>Limiting consumable changes (PWR↔O2)</li> </ul>												
BAT VDC			<ul style="list-style-type: none"> <li>ΔTIME LF between EV1 and EV2 ≥ 1 hour</li> </ul>												
BAT AMP			<u>NORMAL STATUS</u>												
RPM			<ul style="list-style-type: none"> <li>O2 POS</li> </ul>					EVA							
CO2			<ul style="list-style-type: none"> <li>TIME EV</li> </ul>					HR:MIN left since PWR-BATT							
H2O TEMP			<ul style="list-style-type: none"> <li>TIME LF/limiting consum</li> </ul>					HR:MIN remaining at present use rate							
H2O GP			% O2(PWR) LF					Displayed if not limiting consumable							
H2O WP			SUIT P					4.2 to 4.4 psid							
GAUGE			O2 P					150 to 950 psid		TIME EV					
			SOP P					5410 to 6800 psia		TIME LF					
			SUBLM P					2.0 to 4.2 psia		% PWR					
			BAT VDC					≥ 16.7		% O2					
			BAT AMP					3.0 to 4.0							
			RPM					18.0 to 20.0 k		TIME EV					
			CO2					0.2 to 2.0 mmHg		TIME LF					
			H2O TEMP					32 to 75 degF		% PWR					
			H2O GP/WP					14.0 to 16.0 psid		% O2					

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(80 Minutes)

OBJECTIVE:

Doff EMUs after an EVA and perform required maintenance activities.

<b>CAUTION</b>
Verify EV crew is clear of hatch mechanism.

IV

When equalization complete

- 1. Open IV Hatch per decal.

IV Hatch equalization valve → OFF

\*\*\*\*\*

\* If required, IV use damp towel to clean gloves.

\*\*\*\*\*

SAFER DOFFING (5 MINUTES)

IV

SAFER

- 2. Latch → ENG
- 3. Latch ↶ until release (~90 deg).
- 4. PLSS ←|→ Thruster Towers
- 5. Install Inhibitor (not required if SAFER has been used).
- 6. Temporarily stow SAFER in C-Lk.
- 7. Repeat steps 2 to 6 for SAFER 2.

SUIT DOFFING (25 MINUTES)

- 8. Engage EMU in EDDA.
- 9. Remove tools, as required.

<b>WARNING</b>
Do not doff EMU if DCS symptoms resolved during REPRESS. √MCC-H via PMC

BOTH DCM

- 10. O2 ACT → OFF
- 11. PURGE vlv → op (up)

IV

- 12. Install WATER switch guards (two).

If EMU TV capability

- 13. pb EMU TV power → OFF

√EMU TV POWER LED (green) – Off

## 1.240 POST EVA

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PLSS  14. sw REBA → OFF (toward left arm of suit)

If EMU TV capability

15. EMU TV Power Cable ←|→ EMU TV  
EMU TV Power Cable →|← Ground Plug

16. Lower Arm Cables ←|→ Gloves

Stow lower arm and glove cable connectors under TMG.

DCM  17. √STATUS: SUIT P < 0.4 (compare with gauge)

Gloves ←|→ EMU

Stow gloves in EMU Equipment Bag.

18. Helmet ←|→ EMU

Temporarily stow helmet.

19. sw COMM mode → OFF

20. Doff comm cap.  
Doff EV glasses.

DCM  21. sw FAN → OFF

22. Waist Ring ←|→ HUT

23. LCVG ←|→ Multiple Water Connector

24. Biomed Pigtail ←|→ Electrical Harness

25. √Wrist disconnects – op

EV  26. Doff HUT.

27. Doff LTA.  
Temporarily stow LTA.

28. Doff biomed, LCVG, TCUs.

29. Doff MAG.  
Seal MAG in Ziplock Bag and dispose.

30. Remove dosimeter from LCVG.

31. Biomed Pigtail ←|→ Signal Conditioner

Stow biomed pigtail in EMU Servicing Kit.

## 1.240 POST EVA

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IV ATU 4,5  32. pb HANG UP → Press  
pb 1(2,3,4,5) → Press

EACP  33. sw PWR → OFF

A/L1A  34. Rotate Flexible Ventilation Duct into C-Lk.  
Secure duct with Velcro strap.

### EVA COMM AND AIRLOCK ENVIRONMENT DECONFIG

35. Perform shuttle EVA COMM DECONFIG, (FDF: EVA:  
EVA PREP) if required, then:

**MCC-H/IV**  36. Perform {2.210 AUDIO SUBSYSTEM  
DECONFIGURATION FROM UHF OPS}, all (SODF:  
C&T: NOMINAL: AUDIO), then:

37. Perform {2.702 UHF 1 ORU DEACTIVATION}, all  
(SODF: C&T: NOMINAL: UHF), then:

### WATER RECHARGE/METOX REGEN INIT (15 MINUTES)

If EMU Water Recharge required per timeline

IV  38. Perform {1.505 EMU WATER RECHARGE},  
Initiate steps, (SODF: ISS EVA SYS: EMU  
MAINTENANCE), then:

If Metox regeneration required per timeline

39. Remove Metox from EMUs.  
Install EMU Vent Port Plugs on CCC ports.

40. Perform {1.510 METOX REGENERATION}, all  
(SODF: ISS EVA SYS: EMU MAINTENANCE),  
then:

41. √PLSS thermal cover on back of EMU – closed

### OXYGEN RECHARGE VERIFICATION (5 MINUTES)

DCM  42. STATUS:

43. Continue charge until O2 P > 850 psi.  
Record O2 P.  
Report to **MCC-H** as comm permits.

EMU	O2 P

UIA  44. OXYGEN EMU 1,2 vlv (two) → CLOSE

## 1.240 POST EVA

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- PCS       45. [RECONFIGURING O2 SYSTEM](#)
- 45.1 C&W Summ  
  
'Event Code Tools'
- sel Inhibit
- 
- input Event Code – 6 6 0 3 (O2 UIA Supply Pressure Low-A/L)
- cmd Arm**  
**cmd Execute**
- 45.2 sel Suppress
- 
- input Event Code – 5 0 1 3 (Primary INT MDM Fail-LAB)
- cmd Arm**  
**cmd Execute**
- 45.3 Airlock: ECLSS: O2 Hi Pressure Supply Valve
- cmd Close** (√Actual Position – Closed)
- [SAFER STOW \(5 MINUTES\)](#)
- SAFER  46. Latch → PRELOAD
47. Latch ↻ until lock markings on latch and tower recess aligned.
48. Push in latch.
- Latch → LCK
49. Fold thruster towers, install stowage straps (two).
50. MAN ISOL vlv → CL (up)
51. Stow SAFER in SAFER stowage bag in C-Lk.
- [WATER RECHARGE TERM \(5 MINUTES\)](#)
- If EMU Water Recharge required per timeline
52. Perform {1.505 EMU WATER RECHARGE},  
Terminate steps, (SODF: ISS EVA SYS: EMU MAINTENANCE), then:

## 1.240 POST EVA

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### 53. POWERING DOWN EMUs

#### NOTE

When performing EMU powerdown, SCUs may remain connected to the EMUs if additional EMU operations are planned.

- UIA
- 53.1 sw PWR EV-1,2 (two) → OFF
- √PWR EV-1,2 LEDs (four) – Off  
√PWR EV-1,2 VOLTS: ~00.0
- 53.2 √OXYGEN EMU 1,2 vlv (two) – CLOSE
- PSA
- 53.3 sw SUIT SELECT (two) → OFF
- √SUIT SELECT LEDs (four) – Off
- 53.4 sw MAIN POWER → OFF
- √MAIN POWER LED – Off
- DCM
- 53.5 SCU ←|→ DCM
- 53.6 Install DCM cover.
- C-Lk wall
- 53.7 Insert SCU in stowage pouch.

### SUIT DRYING/SEAL WIPE (10 MINUTES)

54. Wipe with drying towel:
- LTA, legs, boots
  - HUT, suit arms
  - Gloves

#### **WARNING**

Avoid stericide contact with eyes. Wash hands thoroughly after application.

55. Wipe LTA crotch with stericide (in EMU Servicing Kit).
56. Lightly wipe seals on LTA waist ring, arm wrist rings, HUT neck ring, helmet interior with lint-free wipe (in EMU Servicing Kit).

## 1.240 POST EVA

(ISS EVA SYS/7A - ALL/FIN 5/HC/Paper on ISS)

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- 57. Install Multiple Water Connector cover.
- 58. Clean, refurbish biomed.
- 59. Remove drink bags from EMU.  
Dispose in shuttle wet trash (if available).

√Drink bag restraint bag installed in HUT

- 60. Remove helmet light batteries; stow
- 61. Clean PHA Quick Don Masks with dry wipes from EMU Servicing Kit.

### EMU OVERNIGHT STOW (10 MINUTES)

#### NOTE

When shuttle present, minimum EMU hardware (helmet, HUT, LTA, LCVG, and battery only) should be located together to provide easy access for potential return to shuttle during an expedited undock.

- 62. Stow comm cap in right arm of EMU.
- 63. Helmet →|← HUT  
  
Install helmet cover.
- 64. Tether LTA to EDDA.
- 65. Hang LCVGs, TCUs, other EMU accessories for drying.

#### NOTE

Do not perform step 66 if Metox regeneration is in progress.

**MCC-H/IV**  
PCS

### 66. CONFIGURING AIRLOCK CCAA

Airlock: ECLSS: AL1A1 CCAA: CCAA Commands

AL CCAA Commands

'Temperature'

input Temperature Setpoint – 2 5 deg C

**cmd** Set

√Command Status – Temp Setpoint Complete

HOOK  
VELCRO

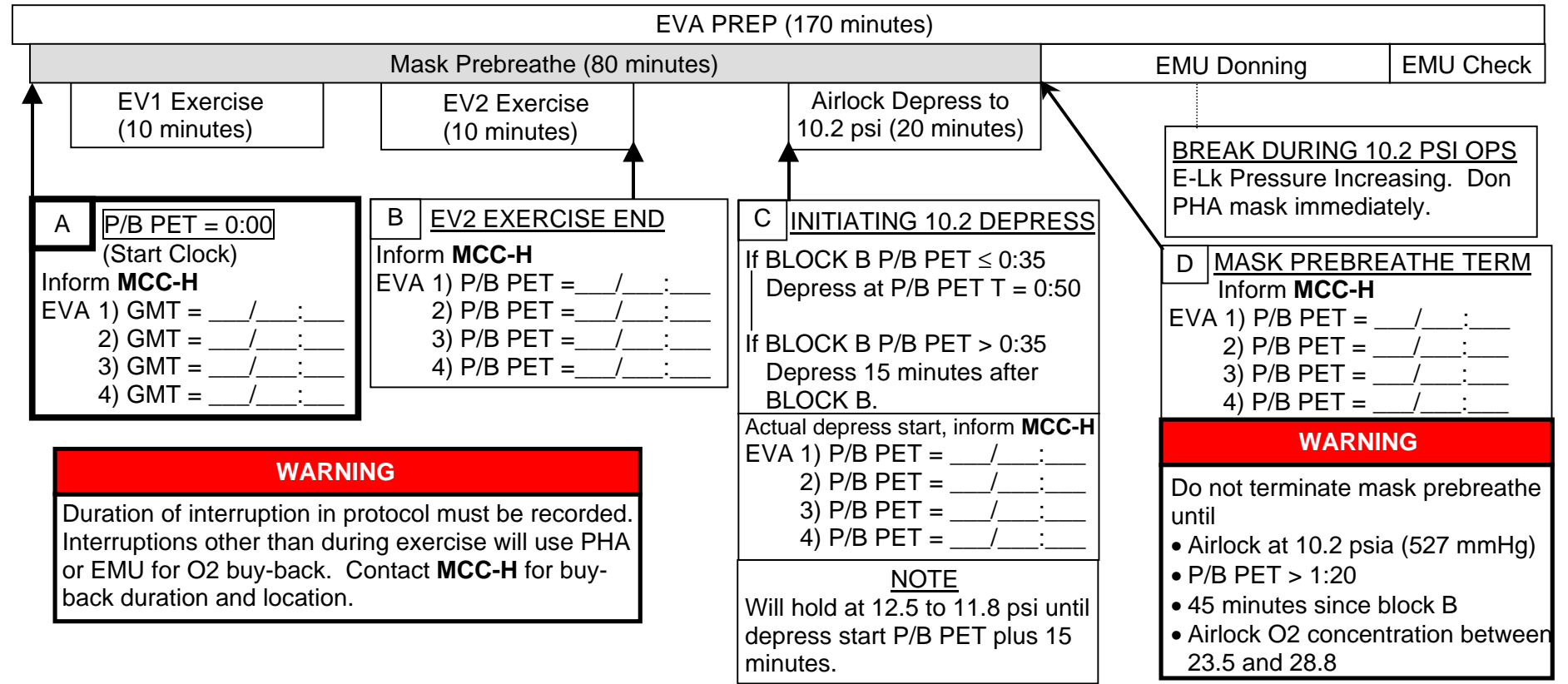
**EVA PREBREATHE CUE CARD**

(ISS EVA SYS/8A - ALL/FIN 1/Paper on ISS)

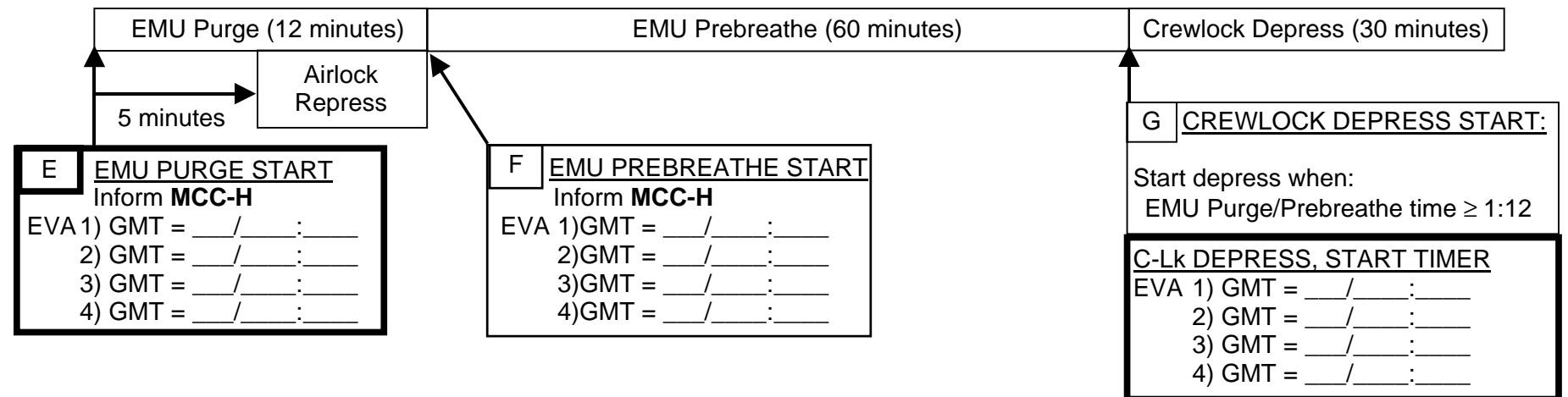
Page 1 of 2 pages

ISS EVA-2a/ALL/E

EVA PREBREATHE EVENTS



67



HOOK  
VELCRO

**EVA PREBREATHE CUE CARD**

(ISS EVA SYS/8A - ALL/FIN 1/Paper on ISS)

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ISS EVA-2b/ALL/E

EVA EXERCISE PRESCRIPTION

Start Exercise Protocol	When Exercise Complete
<p><b>DON EXERCISE EQUIPMENT:</b></p> <ol style="list-style-type: none"> <li>Don Heart Rate Monitor chest strap and synchronize start of exercise with Heart Rate Watch and CEVIS Refer to {<a href="#">CEVIS ON LINE MODE OPERATIONS</a>}, steps 2 and 4.2 to 4.4 (SODF: MED OPS: NOMINAL: CM), then:</li> <li>Configure bungees on CEVIS.</li> </ol> <p><b>IF USING SHUTTLE O2, RECONFIGURE PHA TO 90 FT HOSE:</b></p> <ol style="list-style-type: none"> <li>90-ft hose from shuttle LEH Port → ← Special Tee Assembly</li> <li>60-ft hose from PBA port ← → Special Tee Assembly</li> <li>Temporarily stow 60-ft hose for use after CEVIS ops.</li> </ol> <p><b>INITIATE EXERCISE</b></p> <ol style="list-style-type: none"> <li>Perform exercise per prescription below. Synchronize start of Heart Rate Watch with exercise.</li> </ol>	<p><b>TERMINATE EXERCISE</b></p> <ol style="list-style-type: none"> <li>Press STOP on CEVIS display and stop heart rate watch.</li> <li>Record Exercise End PET (For EV2 record in Block B of Prebreathe Events).</li> <li>Momentarily pull mask away from face to verify positive O2 flow. If no O2 flow, contact <b>MCC-H</b>.</li> <li>If all EV crew have completed exercise Cycle ergometer Power Switch → OFF Remove PCMCIA card from CEVIS. Temporarily stow PCMCIA card.</li> </ol> <p><b>DOFF EXERCISE EQUIPMENT</b></p> <ol style="list-style-type: none"> <li>Doff Heart Rate Monitor chest strap. Clean with alcohol wipes (EMU Servicing Kit) avoiding electrodes.</li> <li>Doff Ergometer/CEVIS shoes</li> </ol> <p><b>IF USING SHUTTLE O2, RECONFIGURE PHA TO 60 FT HOSE</b></p> <p>When 5 minutes have elapsed after exercise completion</p> <ol style="list-style-type: none"> <li>60-ft hose from PBA port → ← Special Tee Assembly</li> <li>90-ft hose from Shuttle LEH Port ← → Special Tee Assembly</li> </ol>

**NOTE**

- Maintain > 60 rpm and match arm/leg cadence (pedaling effort at < 60 rpm becomes noticeably more difficult). Use table values for workload and record heart rate. If heart rate exceeds the maximum indicated at the top of the table, decrease workload by 25-watt increments until heart rate falls below the maximum.
- CEVIS timer will not increase while arrows remain displayed. Workload will change as soon as arrows are pressed.
- If an interruption of either exercise or mask prebreathe < 2 minutes occurs during the 10-minute exercise, extend the 75 % max VO2 portion of the table for a duration equal to the interruption.

EXERCISE PRESCRIPTION		EV 1			EV 2			EV 3			EV 4					
Time	Max VO2	Workload (watts)	Heart Rate (bpm) (Not to exceed = ____)			Workload (watts)	Heart Rate (bpm) (Not to exceed = ____)			Workload (watts)	Heart Rate (bpm) (Not to exceed = ____)					
			EVA#1	EVA#2	EVA#3		EVA#1	EVA#2	EVA#3		EVA#1	EVA#2	EVA#3	EVA#1	EVA#2	EVA#3
1 min	37.5 %															
1 min	50 %															
1 min	62.5 %															
7 min	75 %															
1 min	Cooldown															
Exercise End PET			:	:	:		:	:	:		:	:	:		:	:

## 1.305 EQUIPMENT LOCK PREP

(ISS EVA SYS/7A - ALL/FIN 5/HC/Paper on ISS) Page 1 of 6 pages

(45 Minutes)

### OBJECTIVE:

Prepare Equipment Lock, EMUs, and ancillary hardware to support EVA Prep activities.

### DRINK BAG FILL (15 MINUTES)

#### NOTE

1. Drink bag filling and degassing may take longer than 15 minutes.
2. Drink bag should not be filled over 32 oz. and is only certified to hold noniodinated water for a maximum of 24 hours.

BOTH

1. Fill drink bag (DIDB) from SM or shuttle galley using angled fill tool.  
Remove gas from drink bag.
2. Stow fill tool in trash.
3. Temporarily stow drink bag in EMU Equipment Bag.

### PREPARING EMU AND BIOMED EQUIPMENT (15 MINUTES)

If loose equipment is stowed in HUT

4. Waist ring ←|→ HUT
5. Remove loose equipment from HUT.
6. Waist ring →|← HUT
7. Stage crew preference items in EMU Equipment Bag as required.
8. Helmet ←|→ HUT
9. Unstow Comm Cap and inspect MBEDs (two) for damage.  
Replace MBEDs as required (EMU Servicing Kit).
10. Remove DIDB restraint bag from HUT.
11. Insert drink bag into restraint bag.  
Install restraint bag in HUT.
12. Install fresnel lenses, valsalva devices, as required.
13. Apply antifog (EMU Servicing Kit) to the following:  
Helmet (not Fresnel lens)  
EV Glasses  
Thoroughly wipe off antifog.
14. Helmet →|← HUT

### 1.305 EQUIPMENT LOCK PREP

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15. ✓Helmet lights installed on helmet

BSA 16. ✓CHARGE IN PROGRESS LED – Off

Unstow four helmet light batteries.  
Install batteries in helmet lights.

17. ✓Helmet light ops

18. ✓EMU TV installed on helmet as required

If required

19. Unstow biomed sternal harness and signal conditioner from EMU Servicing Kit.

20. Install sternal harness in LCVG.

21. Install signal conditioner in LCVG pocket.

22. Sternal harness →|←signal conditioner

23. Reposition EDDA for EMU donning as required.

24. Cuff Checklist →|← EMU

#### PREPARING PREBREATHE EQUIPMENT (10 MINUTES)

If using Exercise Prebreathe Protocol

EV1, EV2

25. ✓CEVIS configuration in Node/Lab

26. Install prime and backup tubing (blue or black only) on CEVIS.

27. Unstow PCMCIA cards (two), Heart Rate Monitor, and Velcro straps.

E-Lk

Stow PCMCIA cards (two) and Heart Rate Monitor in side pocket of PHA Bag.

28. ✓PHA configuration per Figure 1 or Figure 2 as required

### 1.305 EQUIPMENT LOCK PREP

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Figure 1.- Prebreathe Hose Assembly (PHA) ISS O2 Use Configuration.

### 1.305 EQUIPMENT LOCK PREP

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Figure 2.- Prebreathe Hose Assemblies (PHA) Shuttle O2 Use Configuration.

- 29. Visually inspect three PHAs, PHA Quick Don Masks for any damage.
- BOTH 30. Stow Quick Don Masks and 15 feet of hose in large side pocket of PHA Bags.
- A/L10A1 31. ✓Flexible Ventilation Duct attached to Conditioned Air Supply connection

### 1.305 EQUIPMENT LOCK PREP

(ISS EVA SYS/7A - ALL/FIN 5/HC/Paper on ISS) Page 5 of 6 pages

#### VERIFYING EQUIPMENT IN AIRLOCK (5 MINUTES)

32. Confirm the following equipment is located in the Airlock:

- PFE located in PFE locker
  - √Pressure gauge needle in green zone (800 to 900 psig)
  
- PBA Quick Don Masks and bottles for every isolated crewmember
  - √PBA Bottles →|← Quick Don Masks for each non-EVA crewmember in the airlock
  - √Oxygen bottle pressure  $\geq$  3000 psig for each bottle
  
- CSA-CPs (two for exercise prebreathe and overnight campout)
  - √Good battery power on both CSA-CPs
  
- Two spare regenerated METOX canisters

All required EMU components:

- HUTS
  
- LTAs
  
- Gloves
  
- Helmets
  
- LCVGs (with biomed)
  
- Comm Caps
  
- Crew preference items
  
- Dosimeter
  
- EMU Servicing Kit
  
- Flashlight
  
- Jeweler's Screwdriver (optional)
  
- Airlock Tool kit
  
- Earplugs
  
- Towel
  
- Aspirin

### 1.305 EQUIPMENT LOCK PREP

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#### WARNING

EV crewmembers should minimize application of hygiene and hydrocarbon-based products prior to EVA day to avoid introduction of irritants and combustibles into the EMU. For acceptable items in EMU, refer to {5.110 APPROVED NON-EMU HARDWARE}, all (SODF: ISS EVA SYS: REFERENCE), as required.

- Personal Hygiene Items
- Egg Timers
- Vacuum Manometer (optional, √**MCC- M** for VM number)

## 1.307 REBA INSTALLATION/REMOVAL

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS)

Page 1 of 2 pages

I

(10 Minutes for Installation)  
(10 Minutes for Removal)

### OBJECTIVE:

Install/remove Rechargeable EVA Battery Assembly (REBA) to/from the back of EMU  
PLSS.

#### NOTE

1. Take care when mating/demating EMU Power Harness to avoid damaging pins.
2. Refer to figures below for procedure.

#### INSTALLATION (10 MINUTES)

1. Unstow REBA, note barcode (serial number).
2. As required, rotate EDDA to access back of EMU.
3. Unzip TMG to access REBA pouch and EMU Power Harness.
4. Remove REBA J1 fabric cover.
5. Install REBA on EMU.
6. Configure REBA pull tabs through slots in TMG.
7. √sw (pulltab) REBA – OFF, toward left arm of suit
8. EMU Power Harness (P1) →|← REBA (J1)
9. Report REBA barcode (serial number) to **MCC-H** as comm permits.
10. Zip TMG closed.
11. Rotate EDDA closed as required.

#### REMOVAL (10 MINUTES)

12. As required, rotate EDDA to access back of EMU.
13. √sw (pulltab) REBA – OFF
14. EMU Power Harness (P1) ←|→ REBA (J1)
15. Remove REBA from EMU.
16. Install REBA J1 fabric cover.
17. Report REBA barcode (serial number) to **MCC-H** as comm permits.  
Stow REBA.
18. Rotate EDDA closed as required.

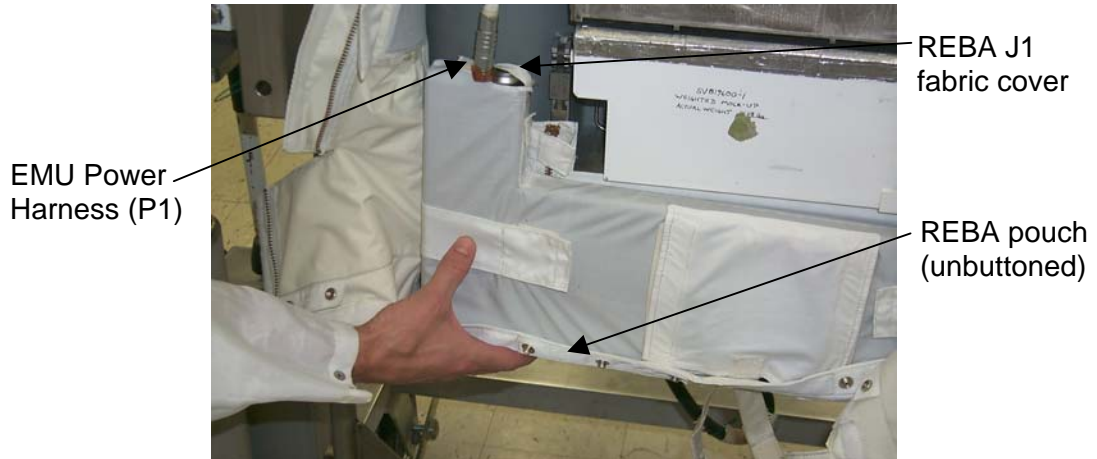


Figure 1.- REBA Installation on PLSS.



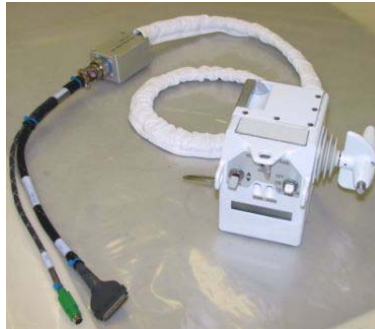
Figure 2.- REBA Pulltabs Routed Through TMG Slot.

(30 Minutes for Setup)  
 (30 to 60 Minutes for Training)

**OBJECTIVE:**

Set up SAFER On-Board Trainer and practice SAFER checkout and rescue operations.

<b>CAUTION</b>
Due to PCMCIA card touch temp concerns, do not use trainer at 527 mmHg (10.2 psia).



**HARDWARE UNSTOW**

1. Unstow the following:

ITEM	QTY	P/N (S/N)	Location
Ethernet Terminators	2	SED39129319-801	NOD1S4_B2
Ethernet T-connectors	2	SED39129318-801	NOD1S4_B2
3COM PCMCIA Etherlink Network PC Cards with Dongles	2	SDZ39129269-301	Various
Ethernet 10base2 Cable 3 feet (coax)	1	SED39129316-301	Various
SAFER Simulation (Quickflex) PCMCIA card	1	QQ1-030A064V4	CD Library, Vol 1A
SAFER training hand controller (HCM) with Adapter cable	1	SEG33114457-301	AL1D1 CTB 1172
Windows SSC (graphics PC)	1		Various
Linux SSC with RedHat (ROBOT/SAFER) hard drive (sim PC)	1	SDZ39129266-301 (6057)	Hard drive in CD Library, Vol 1A

\*\*\*\*\*  
 \* If no SSC configured as a Sim PC  
 \* | Perform {2.403 THINKPAD HARD DRIVE CHANGEOUT}  
 \* | (SODF: POC: NOMINAL) inserting ROBOT/SAFER hard drive  
 \* | into sim PC, then:  
 \*\*\*\*\*

2. √3COM PCMCIA Etherlink Network PC cards installed in both SSCs in bottom slot

SSC CONFIGURATION

**NOTE**  
For proper network connectivity, SSC CONFIGURATION must be complete prior to powering up SSCs.

3. Configure SSCs as illustrated in Figure 1.

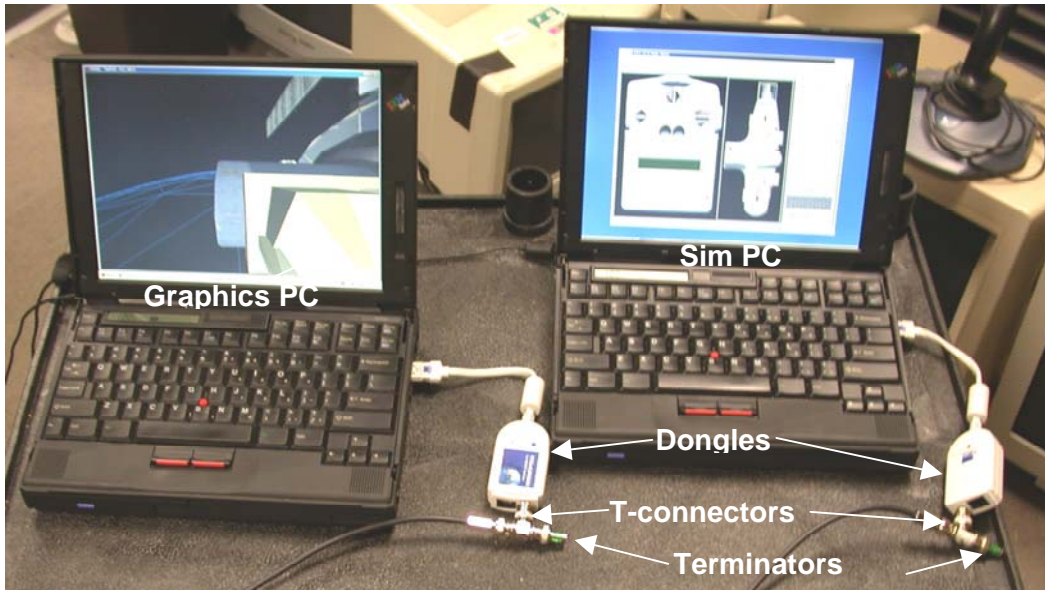
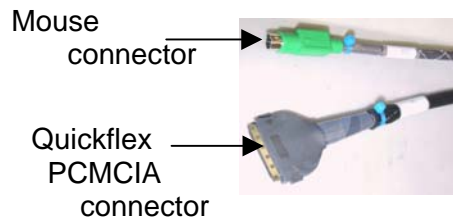


Figure 1.- SSC Configuration.

HCM CONNECTION

- Sim PC
4. Insert SAFER Simulation (Quickflex) PCMCIA card.
  5. √Adapter Cable →|← HCM
  6. SAFER training hand controller →|← Quickflex PCMCIA card and mouse port



DOUG STARTUP

7. Power up SSCs, if required.

### 1.335 SAFER ON-BOARD TRAINING

(ISS EVA SYS/8A - ALL/FIN 3/Paper on ISS)

Page 3 of 4 pages

Graphics PC 8. From desktop, sel Station Apps folder icon.

9. sel DOUG application icon (Doug.exe)

#### 10. SELECTING VISUAL LOAD

Load Select Dialog

sel desired flight load  
sel OK

#### 11. SELECTING DISPLAY CONTENT

Select Display Dlg

sel SAFER  
sel OK

While DOUG is loading

12. Verify dongle LED (green) – Blinking

When Graphics PC loading complete

Sim PC 13. Log in using SAFER user name and password listed on desktop banner.

14. Verify dongle LED (green) – On, (indicates high network activity)

#### SELF-RESCUE SIMULATION

15. sel desired scenario  
sel separation rate  
sel Day or Night

##### NOTE

1. Only SIM PC SAFER power switch is functional.
2. Any input on the HCM except for power switch throws will make it the active controller for the rest of the run.

HCM 16. √sw MODE – ROT

17. √sw PWR – OFF

SIM PC 18. sel START

When 30 second countdown complete

19. PWR → ON

When rescue complete

20. sel STOP

21. Repeat steps 15 to 20 as required for more training.

SAFER CHECKOUT PRACTICE

Sim PC 22. √PWR – OFF

23. sel START

24. PWR → TST/ON  
PWR → ON  
PWR → TST/ON

25. Follow instructions displayed on SIM PC SAFER display.

26. PWR → OFF

HARDWARE STOW

When SAFER training complete

- AL1D1
- 27. HCM ←|→ Sim PC (if applicable)  
Stow HCM in CTB 1172 (keep adapter cable attached).
  - 28. Power down SSCs.
  - 29. Remove PCMCIA cards and stow network hardware.
  - 30. Go to {2.403 THINKPAD HARD DRIVE CHANGEOUT}  
(SODF: POC: NOMINAL) to remove ROBOT/SAFER hard drive from sim PC.

**1.403 REBA POWERED HARDWARE CHECKOUT**  
(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 1 of 2 pages

(15 Minutes)

**OBJECTIVE:**

Verify the EMU glove heaters are functional and the EMU TV is receiving power from the Rechargeable EVA Battery Assembly (REBA) prior to EVA.

- EMUs 1. ✓ REBA installed on PLSS  
✓ sw REBA (pulltab) – OFF

If EMU TV capability

2. Install EMU TV on helmet lights; note camera addresses and serial numbers.  
Refer to Figure 1.
3. Record camera addresses and serial numbers for each EMU.

	Camera Addresses	Serial Numbers
EMU 1		
EMU 2		
EMU 3		
EMU 4		

4. Unstow EMU TV power cable.
5. EMU TV power cable ←|→ Ground Plug
6. EMU TV power cable →|← EMU TV

If no EMU TV capability

7. ✓ EMU TV power cable →|← Ground Plug
8. ✓ Upper arm connection, Lower Arm Power Harness →|← SEMU cable
9. ✓ sw Glove heater (one per glove) – OFF
10. Lower Arm Power Harness →|← Gloves

**NOTE**

To avoid excessive battery consumption and heat buildup, deactivate heaters once heat detected at fingertips.

11. sw REBA (1 per EMU) → ON, pull tab toward right arm of suit
12. sw Glove heater (two per EMU) → ON

When heat detected on all outside fingertips

13. sw Glove heater (two per EMU) → OFF

**1.403 REBA POWERED HARDWARE CHECKOUT**  
(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 2 of 2 pages

If EMU TV capability

- 14. pb EMU TV power → Press
  - √Green LED – On
- 15. pb EMU TV power → Press
  - √Green LED – Off
- 16. sw REBA (1 per EMU) → OFF, pull tab toward left arm of suit
- 17. Lower Arm Power Harness ←|→ Gloves
- 18. Stow lower arm and glove pwr harness connectors under TMG.
- 19. EMU TV Power Cable ←|→ EMU TV
- 20. EMU TV Power Cable →|← Ground Plug
- 21. Stow EMU TV Power Cable.

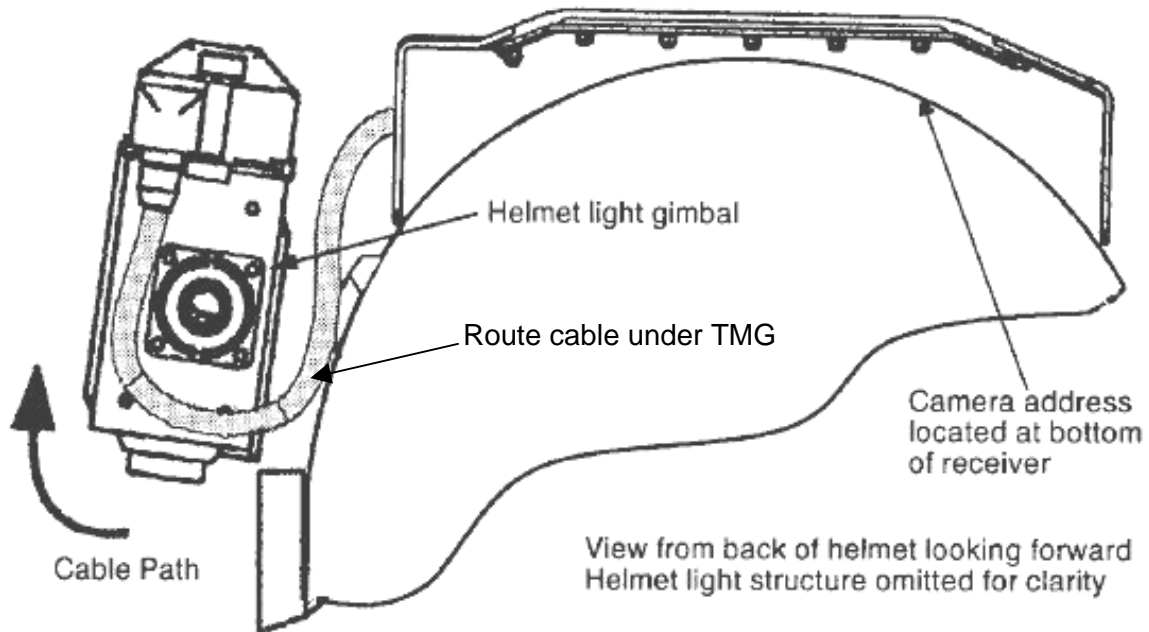


Figure 1.- REBA Connection for EMU TV.

## 1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS)

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I

(25 Minutes)

(45 Minutes if setting up CWC)

### OBJECTIVE:

Recharge EMU feedwater tanks with iodinated water from EMU Water Recharge Bag Payload Water Reservoir (PWR). A small quantity is then dumped from the feedwater tanks to provide ullage for condensate collection during the next EMU prebreathe.

### INITIATE (15 MINUTES)

- E-Lk 1. Unstow designated EMU Water Recharge Bag (PWR) from floor bin.

#### CAUTION

PWRs should be inspected for gas bubbles prior to connecting them to the IRU to avoid introducing gas into the EMU feedwater tanks. If a significant quantity of gas is observed, a PWR de-gas may be required.

- PWR 2. Unzip restraint bag to access bladder.  
Report approximate visual quantity of H<sub>2</sub>O and gas bubbles to **MCC-H** as comm permits.  
Zip restraint bag closed.

- A/L1F2 3. Attach bag to wall below IRU.

- IRU 4. EMU Water Recharge Bag →|← H<sub>2</sub>O IN Port

5. √H<sub>2</sub>O outlet vlv (rotary) – CLOSED

If EMUs not powered

### 6. POWERING UP EMUS

- UIA 6.1 √sw PWR EV-1,2 (two) – OFF  
√PWR EV-1,2 LEDs (four) – Off  
√EMU O<sub>2</sub> SUPPLY PRESS gauge: < 950
- C-Lk wall 6.2 Remove SCU from stowage straps and pouches.  
Transfer SCU to E-Lk.
- DCM 6.3 Remove DCM cover.  
Attach with Velcro to DCM.
- 6.4 SCU →|← DCM
- √SCU locked
- 6.5 sw POWER → BATT

## 1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS)

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### CAUTION

EMU must be on BATT power when UIA suit power is turned on.

PSA

- 6.6 √sw SUIT SELECT (two) – OFF  
√sw EMU MODE EMU1,2 (two) – PWR

- 6.7 sw MAIN POWER → ON

√MAIN POWER LED – On

- 6.8 sw SUIT SELECT (two) → EMU 1,2

√EMU 1,2 LEDs (two) – On

√EMU 1,2 Volts: 18.0 to 19.0

UIA

- 6.9 sw PWR EV-1,2 (two) → ON

√PWR EV-1,2 EMU LEDs (two) – On

DCM

- 6.10 sw POWER → SCU

UIA

7. √WATER EV-1,2 REG vlv (two) – SUPPLY

8. WATER EV-1,2 SUPPLY vlv (two) → OPEN

If PSA Utility Outlet power being used for other applications

9. Contact **MCC-H** for verification of PSA Utility Outlet power loading.

PSA

10. sw IRU/UTILITY POWER → ON

√IRU/UTILITY POWER LED – On

√IRU Volts: 27.0 to 29.0

### NOTE

1. The following step powers on the IRU.
2. Be prepared to verify the POWER, PRESS, and TEMP LEDs briefly illuminate when IRU POWER is taken ON. As required, notify **MCC-H** of any missing pixels on QUANTITY display.

IRU

11. sw POWER → ON

√POWER, PRESS, TEMP LEDs (three) –On (at startup)

# 1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS)

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When 2.5-second LED and pixel check complete

- 12. ✓POWER LED remains – On
- 13. H2O outlet vlv (rotary) ↻ EMU SUPPLY.
- 14. sw PUMP → ON

✓PUMP LED – On (green)  
 ✓QUANTITY display – ↑

\*\*\*\*\*  
 \* If TEMP LED or PRESSURE LED – On (yellow)  
 \* | sw PUMP → OFF  
 \* |  
 \* | Contact **MCC-H**.  
 \*\*\*\*\*

## TERMINATE (10 MINUTES)

DCM

- 15. ✓STATUS: H2O WP

IRU

If H2O WP ≤ 12.0 psi and Quantity display not ↑ (bag empty)

- 15.1 sw PUMP → OFF
- 15.2 H2O outlet vlv (rotary) ↻ CLOSED
- 15.3 Record value from IRU Quantity display in Table 1.  
 Report bag serial number, Quantity, and empty status to **MCC-H** as comm permits.

Table 1. Payload Water Reservoir Content

Date	Bag Serial Number	IRU Quantity	Approx. H2O/Gas Content	
			H2O (L)	Gas (mL)

- 15.4 EMU Water Recharge Bag ←|→ H2O IN Port

Stow in E-1k Floor Bin.

E-1k

- 15.5 Unstow new designated EMU Water Recharge Bag.

## 1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS)

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- IRU
- 15.6 Unzip restraint bag to access bladder.  
Report approximate visual quantity of H2O and gas bubbles to **MCC-H** as comm permits.  
Zip restraint bag closed.
  - 15.7 EMU Water Recharge Bag →|← H2O IN Port
  - 15.8 Go to step 13.
- When H2O WP > 12.0 psi, stable for ~30 seconds (charging complete)
- UIA
16. WATER EV-1,2 SUPPLY vlv (two) → CLOSE
- IRU
17. sw PUMP → OFF  
√PUMP LED – Off
  18. H2O outlet vlv (rotary) ↻ CLOSED.
  19. Record value from Quantity display on Table 1.
20. sw POWER → OFF  
√POWER LED – Off
  21. EMU Water Recharge Bag ←|→ H2O IN Port  
Unzip restraint and inspect bag for water and gas content.  
Record on Table 1.  
Zip restraint bag closed.
  22. Report bag serial number, IRU Quantity, and approximate visual H2O/gas content to **MCC-H** as comm permits.
- A/L1D1
23. Stow bag in floor bin.  
Report new stowage location to **MCC-H** as comm permits.
- PSA
- If PSA Utility Outlet power not being used for other applications
24. sw IRU/UTILITY POWER → OFF  
√IRU/UTILITY POWER LED – Off

## 1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS)

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Alternate method to dump to a CWC per **MCC-H**.

### 25. SETTING UP EMU WASTEWATER COLLECTION BAG (20 minutes)

25.1 Unstow the following:

- CWC s/n \_\_\_\_ with orange label

#### ISS IVA Toolbox:

- Ratchet, 3/8" Drive
- 6" Extension
- 5/16" Socket, 3/8" Drive

UJA

25.3 Unfasten captive screws (four) on filter access door using ratchet and 5/16" socket with 6" extension.

#### **CAUTION**

UJA Filter access door was not designed to handle kickloads while open. Use caution when translating near it.

25.4 Open filter access door.

#### NOTE

1. As required, use a towel to clean up any residual water.
2. Refer to Figure 1 for UJA Waste biocide filter location and attachment configuration.

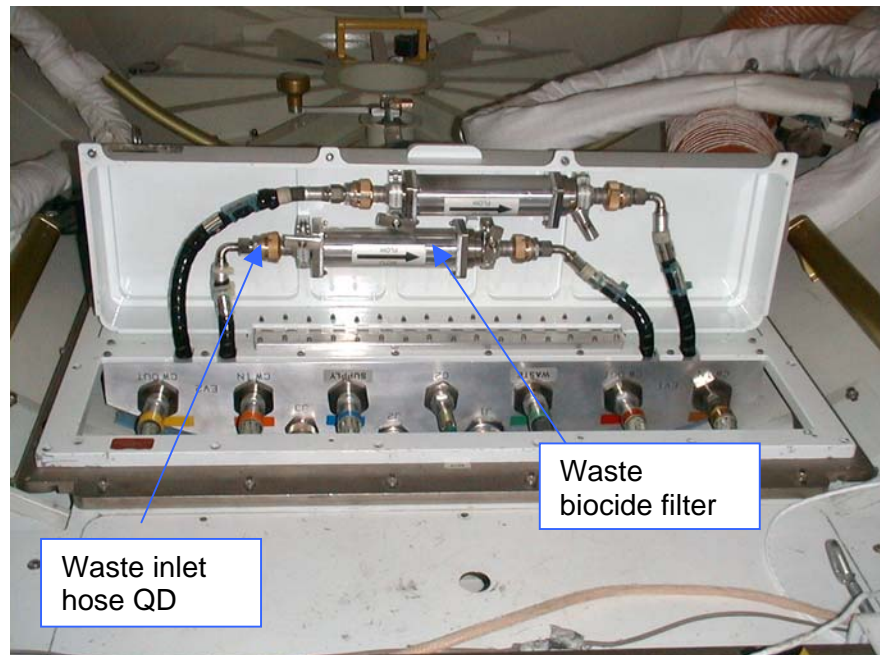


Figure 1.- UJA Filters and Hoses.

## 1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS)

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UIA

25.5 WASTE inlet hose QD ←|→ WASTE biocide filter

25.6 CWC →|← WASTE inlet hose QD

25.7 Perform steps 27 to 33.

25.8 CWC ←|→ WASTE inlet hose QD

25.9 WASTE inlet hose QD →|← WASTE biocide filter

25.10 Close UIA filter access door.

25.11 Fasten captive screws (four) on filter access door using ratchet and 5/16" socket.

25.12 Restow CWC and tools.  
Go to step 35.

PCS

### 26. VERIFYING CONDENSATE TANK CONFIGURATION

Lab: ECLSS: H2O Vent

Lab Water Vent

√Water Vent System Status – Inhibited

If Water Vent System Status – Enabled

√**MCC-H**

√Condensate Tank Qty 1(2) < 42.5 kg

If Condensate Tank Qty 1(2) > 42.5 kg

√**MCC-H**

EMU

27. √Helmet ←|→ HUT

Install SCOF

√SCOF locked

DCM

28. O2 ACT → IV

UIA

29. √WATER EV-1(2) SUPPLY vlv – CLOSE

#### NOTE

Steps 30 and 31 should be performed serially for EMU 1 and EMU 2.

30. WATER EV-1(2) REG vlv → WASTE

Wait 30 seconds.

## 1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS)

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31. WATER EV-1(2) REG vlv → SUPPLY
32. Repeat steps 30 and 31 for other EMU.
- DCM 33. O2 ACT → OFF
34. Verify with **MCC-H** that 0.5 to 1.0 lbm (0.23 to 0.45 kg) per EMU was dumped to condensate tank.
35. Remove SCOF.  
Stow SCOF in EMU Equipment Bag.
36. As required per timeline, go to {1.240 POST EVA} (SODF: ISS EVA SYS: EVA PREP/POST).  
  
or  
  
Go to {1.525 LCVG WATER FILL} (SODF: ISS EVA SYS: EMU MAINTENANCE).  
  
or  
  
Go to step 37.
- DCM 37. POWERING DOWN EMUS (AS REQUIRED)
  - 37.1 √sw POWER – SCU
  - UIA 37.2 sw PWR EV-1,2 (two) → OFF  
  
√PWR EV-1,2 LEDs (four) – Off  
√PWR EV-1,2 VOLTS: ~ 00.0
  - 37.3 OXYGEN EMU 1,2 vlv (two) → CLOSE
  - PSA 37.4 sw SUIT SELECT (two) → OFF  
  
√SUIT SELECT LEDs (four) – Off
  - 37.5 sw MAIN POWER → OFF  
  
√MAIN POWER LED – Off
  - DCM 37.6 SCU ←|→ DCM
  - 37.7 Install DCM cover.
  - C-lk wall 37.8 Insert SCU in stowage pouch.

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## 1.510 METOX REGENERATION

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 1 of 4 pages

### OBJECTIVE:

Regenerate Metal Oxide (Metox) Canisters by baking out CO<sub>2</sub> in Metox Regenerator Oven.

(10 Minutes for Initiate)

(10 Minutes for Terminate)

(14 Hour Total Regeneration Time)

### CAUTION

If air quality anomaly or unusual smell is present, Metox regeneration should not be performed.

### 1. INITIATE (10 MINUTES)

MCC-H

#### 1.1 Configuring LTL and Airlock CCAA to Support METOX REGEN

1.1.1 To set the desired LTL temperature setpoint to 7.7° C or less as required (8.3° C desired minus 0.6° C measurement error), perform {2.201 LAB IATCS SETPOINT CHANGE}, all (SODF: TCS: NOMINAL: IATCS), then:

1.1.2 For the Airlock CCAA, perform {2.503 CCAA FAN SPEED CHANGE}, steps 1.3 to 1.5 (SODF: ECLSS: NOMINAL: THC), then:

In step 1.4, set the fan speed to 5500 rpm.

In step 1.5, set the temperature to 18° C.

When TCCV position < 13 deg, proceed.

1.1.3 To set the Airlock CCAA fan speed to 3400 rpm, perform {2.503 CCAA FAN SPEED CHANGE}, step 2 (SODF: ECLSS: NOMINAL: THC), then:

#### 1.1.4 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Enable

Enable an Event

input Event Code – 6 7 0 3 (AL1A1 CCAA INOPERATIVE-A/L)

**cmd Execute**

#### 1.2 Open CO<sub>2</sub> Removal Receptacle Door.

CO<sub>2</sub> VALVE → REGEN

CO<sub>2</sub>

Removal

Receptacle

## 1.510 METOX REGENERATION

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 2 of 4 pages

Metox  
Regen

1.3 √sw POWER – OFF

√ON LED – Off

1.4 Open regenerator door > 90°.

√No Metox Canisters stowed in regenerator

If regenerating single Metox Canister

1.5 Install shutoff caps over ports in upper berth (pull out and twist).

1.6 Report Metox Canister barcode and new location to **MCC-H** as comm permits.

Install expended Metox Canister in lower berth per label on Canister.

Go to step 1.8.

1.7 Report Metox Canister barcode and new location to **MCC-H** as comm permits.

Install expended Metox Canisters per label on Canister.

### NOTE

The CYCLE switch must be set to START within 15 minutes of closing the regenerator door to avoid resetting the regenerator to the cooldown mode.

1.8 Close regenerator door.

Lock regenerator door handle.

1.9 sw POWER → ON/RESET

Verify all LEDs (19) – On (during startup)

Verify TIME REMAINING display – ↓ (hexidecimally from 'F:FF' to '0:00') and no LCD characters missing

When display countdown and LED check complete

- 1.10 √ON LED – On
- √sw MODE – REGENERATE
- √sw FAULT OVERRIDE – OFF
- √FAULT OVERRIDE ON LED – Off
- √TIME REMAINING display: '0:00'
- √POWER INTERRUPT LED – Off

### NOTE

A faint heater-like smell is expected during regeneration.

1.11 sw CYCLE → START

## 1.510 METOX REGENERATION

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 3 of 4 pages

\*\*\*\*\*

- \* If unusual smell or air quality anomaly during regeneration
- \* | sw CYCLE → SHUTDOWN
- \* |
- \* | Contact **MCC-H**.

\*\*\*\*\*

### NOTE

During single Canister regeneration, the UPPER CAN FAULT INDICATOR LED will be illuminated.

#### 1.12 ✓ FAULT INDICATOR LEDs (eight) – Off

If VALVE/DOOR FAULT INDICATOR LED (yellow) – On and TIME REMAINING display: '**E:02**'

1.13 Open regenerator door > 90°.

1.14 Close regenerator door.  
Lock regenerator door handle.

1.15 Return to step 1.11.

#### 1.16 ✓ REGENERATE HEATING LED – On

✓ TIME REMAINING display: '**14:00**'

✓ TIME REMAINING display – ↓ (1-minute increments)

1.17 If any unexpected errors or faults occur during regeneration, refer to {[2.235 METOX REGENERATOR TROUBLESHOOTING](#)} (SODF: ISS EVA SYS: AIRLOCK CONTINGENCY) and contact **MCC-H**.

## 2. TERMINATE (10 MINUTES)

When 14 hour regeneration cycle complete or per **MCC-H** instruction:

### CAUTION

Metox Canisters should not be left in oven after regeneration.

Metox  
Regen

#### 2.1 ✓ REGENERATE COOLING LED – Off

✓ REGENERATE COMPLETE LED – On

✓ TIME REMAINING display: '**0:00**' and no error codes present

✓ OVEN HOT LED – Off

✓ FAULT INDICATOR LEDs (eight) – Off

2.2 Open regenerator door.

2.3 Remove Metox Canister(s).

## 1.510 METOX REGENERATION

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 4 of 4 pages

### NOTE

The regenerator has a known failure mode in which the Metox state indicator may not reset to "R". **MCC** tracks canister status.

- 2.4 Close regenerator door.
- 2.5 sw POWER → OFF
- 2.6 Unstow Metox Canister caps from EMU Equipment Bag.  
Install caps on regenerated Canisters.  
Stow regenerated Canisters.
- 2.7 Report Metox Canister barcode and new stowage location to **MCC-H**, as communication permits.

CO2  
Removal  
Receptacle

- 2.8 Open CO2 Removal Receptacle Door.

CO2 VALVE → REMOVAL

**MCC-H**  
IV PCS

- 2.9 Configuring LTL and Airlock CCAA for Nominal Operations  
To set the LTL Temperature Setpoint to 11.1°C or less as required, perform {2.201 LAB IATCS SETPOINT CHANGE}, all (SODF: TCS: NOMINAL: IATCS), then:

For the Airlock CCAA to set the Temperature Setpoint to 25°C (or per crew preference), go to {2.501 CABIN TEMPERATURE CONTROL}, all (SODF: ECLSS: NOMINAL: THC).

- 2.10 Returning C&W to Nominal Configuration  
C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Suppress

Suppress an Event

input Event Code – 6 7 0 3 (AL1A1 CCAA INOPERATIVE-A/L)

**cmd** Arm

**cmd** Execute

## 1.525 LCVG WATER FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 1 of 3 pages

(40 Minutes)

### OBJECTIVE:

Fill empty LCVGs with water for EMU crewmember cooling.

#### 1. POWERING UP EMUs

If EMUs not powered

- |  |      |   |                |  |
|--|------|---|----------------|--|
| UIA  | 1.1  | √sw PWR EV-1,2 (two) – OFF<br>√PWR EV-1,2 LEDs (four) – Off<br>√EMU O2 SUPPLY PRESS gauge: < 950  |                |  |
| C-Lk wall  | 1.2  | Remove SCU from stowage straps and pouches.<br>Transfer SCU to E-Lk.  |                |  |
| DCM  | 1.3  | Remove DCM cover.<br>Velcro to DCM.   |                |  |
|  | 1.4  | SCU → ← DCM<br><br>√SCU locked  |                |  |
|  | 1.5  | sw POWER → BATT   |                |  |
|  |      | <table border="1"><tr><td style="background-color: yellow;"><b>CAUTION</b></td></tr><tr><td>EMU must be on BATT power when<br/>UIA suit power is turned on.</td></tr></table> | <b>CAUTION</b> | EMU must be on BATT power when<br>UIA suit power is turned on. |
| <b>CAUTION</b>   |      |   |                |  |
| EMU must be on BATT power when<br>UIA suit power is turned on. |      |   |                |  |
| PSA  | 1.6  | √sw SUIT SELECT (two) – OFF<br>√sw EMU MODE EMU1,2 (two) – PWR  |                |  |
|  | 1.7  | sw MAIN POWER → ON<br><br>√MAIN POWER LED – On  |                |  |
|  | 1.8  | sw SUIT SELECT (two) → EMU 1,2<br><br>√EMU 1,2 LEDs (two) – On<br>√EMU 1,2 Volts: 18.0 to 19.0  |                |  |
| UIA  | 1.9  | sw PWR EV-1,2 (two) → ON<br><br>√PWR EV-1,2 EMU LEDs (two) – On   |                |  |
| DCM  | 1.10 | sw POWER → SCU  |                |  |

#### FILLING LCVG WITH EMU FEEDWATER (15 MINUTES)

2. Waist Ring ←|→ HUT  
Temporarily stow LTA.  
Remove Multiple Water Connector cover.

### 1.525 LCVG WATER FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 2 of 3 pages

3. Dry LCVG →|← Multiple Water Connector

√Multiple Water Connector locked

4. Helmet ←|→ HUT  
Temporarily stow helmet.

5. Install SCOF.

DCM

6. Temp control vlv → 7

7. √STATUS: H2O TEMP = ambient

Record H2O TEMP.

EMU	H2O TEMP

8. sw FAN → ON

9. O2 ACT → IV, (expect NO VENT FLOW message, sw DISP → PRO)

10. Wait 30 seconds, then:

10.1 Depress and hold pump priming valve on back of EMU (30 seconds minimum).

10.2 Slowly cycle Temp Control Valve through full range, returning to 7 position.

**NOTE**

A decrease in H2O TEMP may not be seen if EMU cooling loop was circulating prior to this procedure.

DCM

11. √STATUS: H2O TEMP decrease from step 7

Record H2O TEMP.

EMU	H2O TEMP

12. Verify air bubbles visible and mobile in LCVG lines.  
Verify no unusual fan noise present.

## 1.525 LCVG WATER FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 3 of 3 pages

If no H2O TEMP decrease or no H2O flow detected in LCVG or if an unusual fan noise is present

13. Slowly cycle Temp Control Valve through full range, returning to 7 position.
14. Depress and hold pump priming valve on back of EMU (30 seconds minimum).
15. Repeat steps 13 and 14 during fill as required.

When no air bubbles visible in LCVG lines

- DCM
16. sw FAN → OFF
  17. O2 ACT → OFF

### REFILLING EMU FEEDWATER (25 MINUTES)

18. Perform {1.505 EMU WATER RECHARGE}, all (SODF: ISS EVA SYS: EMU MAINTENANCE), then:

HUT 19. √SCOF removed

Install helmet.

20. LCVG ←|→ Multiple Water Connector  
Stow LCVG in HUT.  
Install Multiple Water Connector cover.

21. Waist Ring →|← HUT

### 22. POWERING DOWN EMUs

When EMU power no longer desired

- DCM 22.1 √sw POWER – SCU
- UIA 22.2 sw PWR EV-1,2 (two) → OFF
- √PWR EV-1,2 LEDs (four) – Off
- √PWR EV-1,2 VOLTS: ~ 00.0
- 22.3 OXYGEN EMU 1,2 vlv (two) → CLOSE
- PSA 22.4 sw SUIT SELECT (two) → OFF
- √SUIT SELECT LEDs (four) – Off
- 22.5 sw MAIN POWER → OFF
- √MAIN POWER LED – Off
- DCM 22.6 SCU ←|→ DCM
- 22.7 Install DCM cover.
- C-1k wall 22.8 Insert SCU in stowage pouch.

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(20 Minutes for Initiate)  
(10 Minutes for Terminate)

OBJECTIVE:

Recharge EMU, REBA, Helmet Light (HL), and/or PGT batteries in the Battery Stowage Assembly via the Battery Charger Assembly.

<b>CAUTION</b>
Verify that the GSE protective tape has been removed from the battery connectors before installation in BSA. If found, tape should be discarded.

INITIATE (20 MINUTES)

- |        |   |
|--------|---|
| BSA    | 1. Open BSA door.<br>As required, install or remove EMU, HL, and/or PGT batteries per <b>MCC-H</b> direction. |
|        | 2. Close BSA door.  |
|        | If charging REBA(s)   |
| E-Lk   | 3. Unstow REBA/BSA cable from M0-2 Bag.   |
| BSA    | 4. REBA/BSA Cable → ← AUX CHARGE PORT   |
| EMU1,2 | 5. Deploy and demate REBA Jumper Cables.  |
|        | 6. REBA Jumper Cables (one per REBA) → ← REBA/BSA Cable   |
| BCA    | 7. sw MAIN POWER (up to four) → ON<br><br>√MAIN POWER LEDs (up to four) – On                                  |
|        | 8. Wait 20 seconds until pixel test is complete.<br><br>√Display readable and CHARGE column reads:            |

CH: -- V: ---- A: ----
------------------------------

<u>NOTE</u>
1. Do not activate BC switches when hourglass is displayed.
2. MODE (middle) and DATA (right) switches are not labeled on each BC.

## 1.605 BSA BATTERY RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS)

Page 2 of 4 pages

9. sw MODE (up to four) → STOP

```
*****
* If display garbled/blank or 'Look At' message on
* | any display
* |   On affected BC, sw MAIN POWER → OFF
* |
* |   Repeat steps 7 to 9 on affected BC.
*****
```

BCA If charging EMU batteries (BC3 Ch4 and BC4 Ch4)  
10. Report voltage(s) to **MCC-H**.

### 11. VERIFYING INITIAL CHANNEL PROFILE

If PCS available

PCS 11.1 Airlock: EVA: Airlock Systems: Battery Charger Assembly

(BCA)

BCA

11.2 √Status – No History (for all channels)

If PCS not available

BCA 11.3 Toggling sw DATA → HISTORY (six channels per BC)

11.4 Verify '**No History**' displayed for each channel.

BCA 12. sw MODE (up to four) → CHARGE

#### NOTE

1. BCs will start charging on first populated channel.
2. During EMU battery charge initiation (BC3 Ch4 and BC4 Ch4) voltage values in CHARGE column will read 0.0 for the first 2 to 6 minutes.

13. √Display CHARGE column indicates charging (voltage and amperage values displayed)

BSA 14. √CHARGE IN PROGRESS LED – On

#### NOTE

Opening the BSA door will stop all battery charging. Interruption of EMU battery charging will reduce the charged capacity.

### TERMINATE (10 MINUTES)

When batteries have completed charge or per **MCC-H** instruction

BCA 15. √Display toggling – '**Charged**' and '**Look At**'

# 1.605 BSA BATTERY RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS)

Page 3 of 4 pages

Record channels listed in 'Look At' section on table below.

	BC1	BC2	BC3	BC4
Channels				

NOTE  
Do not actuate BC switches when hourglass is displayed.

16. sw MODE (up to four) → STOP

BSA 17. √CHARGE IN PROGRESS LED – Off

BCA 18. √Display CHARGE column reads

CH: --  
V: ----  
A: ----

19. Verify channels listed as 'Look at' were expected per **MCC-H**.

NOTE  
Battery chargers may display the following messages for an empty slot:  
**'Batt circuit open'**  
**'Short circuit error'**  
**'Time-out error'**

```

*****
* If any unexpected 'Look at' channels
* |
* |   If PCS available
* |   PCS   Airlock: EVA: Airlock Systems: Battery Charger
* |         Assembly (BCA)
* |         BCA
* |
* |         √Status – Task Complete (for all channels with
* |         batteries installed)
* |
* |         Report unexpected channel status to MCC-H.
* |
* |   If PCS not available
* |   BCA   Toggling sw DATA → HISTORY (all six channels
* |         per BC)
* |
* |         √Display – 'Task Completed - OK' for each
* |         channel charged
* |
* |         Report unexpected messages to MCC-H.
*****

```

# 1.605 BSA BATTERY RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS)

Page 4 of 4 pages

If EMU batteries charged (BC3 Ch4 and BC4 Ch4)  
 20. Report voltage(s) to **MCC-H**.

BCA 21. sw MAIN POWER (up to four) → OFF

√MAIN POWER LEDs (up to four) – Off

If REBAs were charged

EMU1,2 22. REBA/BSA Cables (two) ←|→ REBA Jumper Cables

23. Mate and stow REBA Jumper Cables.

BSA 24. REBA/BSA Cable ←|→ AUX CHARGE PORT

Stow REBA/BSA Cable in M-02 Bag.

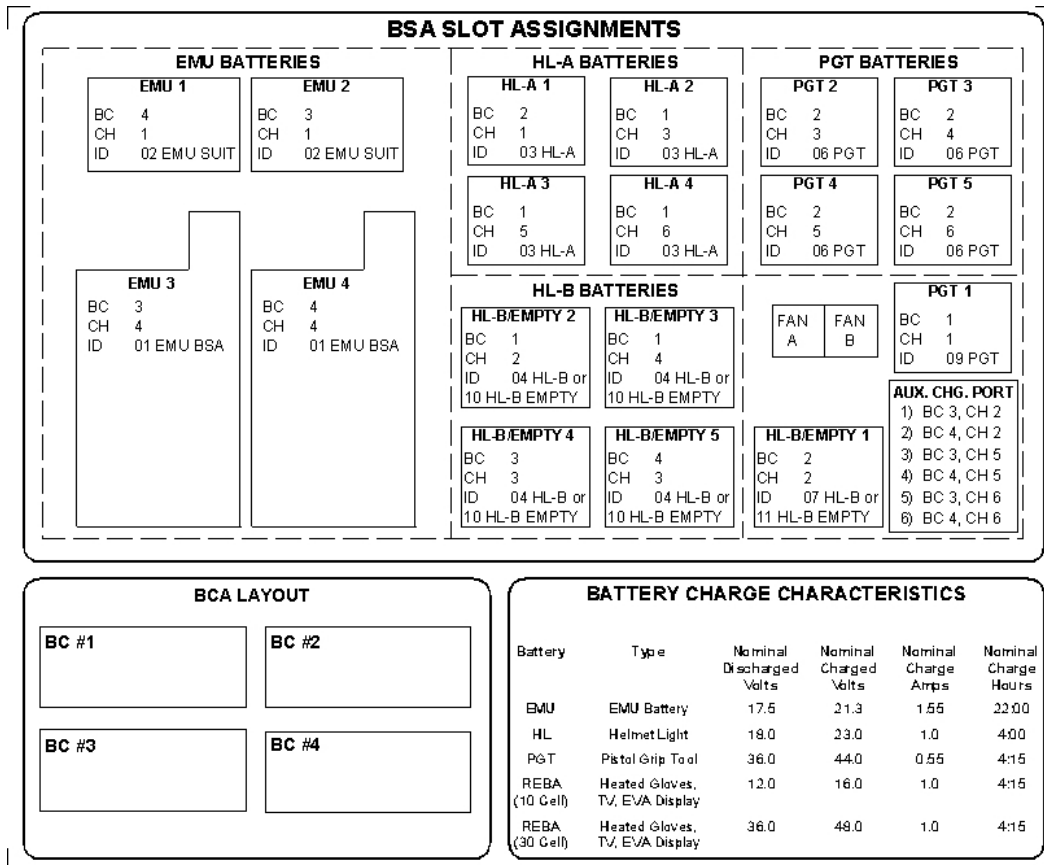


Figure 1.- BSA Door Display (for reference only).

**2.105 DISPLAY LOSS DURING POWER TRANSFER (WARM RESTART)** I  
(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 1 of 1 page

(5 Minutes)

OBJECTIVE:

This procedure cycles EMU power while saving nonvolatile RAM in order to reset a locked up DCM display.

UIA If EMU on BATT power and SCU →|← DCM  
1. √sw PWR EV-1(2) – OFF  
√PWR EV-1(2) EMU LED – Off

DCM If EMU on SCU power  
2. sw POWER → BATT

UIA 3. sw PWR EV-1(2) → OFF  
√PWR EV-1(2) EMU LED – Off

**WARNING**

Fan will be off from steps 4 to 10 during which time CO2 buildup is a concern.

NOTE

Affected EMU will be without comm after step 6. Steps 6 and 7 should be read together before performing step 6.

DCM 4. sw FAN → OFF (expect **FAN SW OFF** message, sw DISP → PRO)

IV 5. Inform affected EV crewmember of impending comm loss.

DCM 6. sw POWER → SCU

Wait 7 seconds

DCM 7. sw POWER → BATT

When 5-second Power Restart complete

8. √Display – **O2 POS – XX**  
9. sw FAN → ON (as required)

If display blank or locked up

10. Contact **MCC-H**.

UIA If SCU power desired  
11. √SCU →|← DCM

sw PWR EV-1(2) → ON

√PWR EV-1(2) EMU LED – On

√PWR EV-1(2) VOLTS: 18.0 to 19.0

DCM 12. sw POWER → SCU

13. √Display – **O2 POS – XX**

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## 2.120 METOX/LIOH REPLACEMENT (MANNED)

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS)

Page 1 of 2 pages

I

(15 Minutes)

### OBJECTIVE:

Remove and replace Lithium Hydroxide (LiOH) or Metal Oxide (Metox) Canister from EMU during manned operations.

- IV 1. Unstow new Metox or LiOH Canister.
- PLSS 2. Unzip thermal cover.  
Affix thermal cover with Velcro to top of EMU.

### WARNING

- 1. Fan will be off during changeout. Perform changeout as quickly as possible.
- 2. Vent loop is pressurized. Restrain Metox or LiOH canister to avoid injury.

- DCM 3.  $\sqrt{O_2}$  ACT – IV
- 4. Helmet purge vlv → op
- DCM 5. sw FAN → OFF
- IV PLSS 6. Remove expended Metox or LiOH Canister.

If installing LiOH

Holding new Canister with silver plate label facing self

- 7. Remove caps from new LiOH Canister (left first).
- 8. Install Canister in EMU (attach Velcro strap).  
Latch Canister in place.

If installing Metox

- 9. Remove caps from new Metox Canister.
- 10. Install Metox using label on Canister for proper orientation.  
Latch Canister in place.

### NOTE

EMU may issue CO2 HIGH or MONITOR CO2 message.

- DCM 11. sw FAN → ON
- 12. Helmet purge vlv → cl, locked
- DCM 13. O2 ACT → PRESS

## 2.120 METOX/LIOH REPLACEMENT (MANNED)

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS)

Page 2 of 2 pages

14. PURGE vlv → op (up)
15. Begin timing 2-minute purge.
- IV PLSS 16. Close thermal cover zipper.
17. Place caps on expended Metox or LiOH Canister.  
Temporarily stow Canister.
18. Report Metox and/or LiOH Canister barcodes and new stowage location to **MCC-H** as comm permits.

When purge time = 2 minutes

DCM

19. √STATUS: CO2 < 3.0 mmHg, then:

PURGE vlv → cl (dn)

20. O2 ACT → IV

**NOTE**

A minimum of 40 minutes of prebreathe is required to condition Metox and LiOH Canisters.

21. Go to {1.225 EMU PREBREATHE}, all (SODF: ISS EVA SYS: EVA PREP/POST) with a minimum of 40-minute prebreathe.

## 2.125 BATTERY REPLACEMENT (MANNED)

(ISS EVA SYS/7A - ALL/FIN 2/Paper on ISS) Page 1 of 3 pages

(15 Minutes)

### OBJECTIVE:

Remove and replace a failed or degraded EMU battery during manned operations.

- IV 1. Unstow new EMU battery.
- PLSS 2. Unzip thermal cover.  
Velcro thermal cover to top of EMU.

#### **WARNING**

1. POWER switch must be in SCU during battery changeout.
2. Fan will be off during changeout. Perform changeout as quickly as possible.

- EV DCM
- If no SCU power available
3.  $\sqrt{O_2}$  ACT – IV
  4. Helmet purge vlv → op
  5. sw FAN → OFF

#### NOTE

EMU will be without comm after step 6 until battery power is restored at step 15.

- EV DCM
- If SCU power available
7.  $\sqrt{sw}$  POWER – SCU
  8.  $\sqrt{O_2}$  ACT – IV
  9. Helmet purge vlv → op
- DCM
10. sw FAN → OFF

#### **WARNING**

Vent loop is pressurized. Restrain Metox or LiOH during battery changeout to avoid injury and to prevent breaking of vent loop seal.

- IV PLSS 11. Unlatch Metox or LiOH canister and rotate it outward.
12. Unlatch and remove used battery.

## 2.125 BATTERY REPLACEMENT (MANNED)

(ISS EVA SYS/7A - ALL/FIN 2/Paper on ISS) Page 2 of 3 pages

13. Install new battery (✓connector alignment).  
Engage latch.
14. ✓Metox or LiOH canister seated in vent ports.  
  
Rotate downward until latch pins engage.  
Latch canister in place.

- If no SCU power available
- |      |     |   |
|------|-----|---|
| EV   | DCM | 15. sw POWER → BATT   |
| EV   |     | 16. sw FAN → ON   |
|      |     | 17. Helmet purge vlv → cl, locked   |
|      | DCM | 18. ✓STATUS: <span style="border: 1px solid black; padding: 2px;">BATT VDC</span>   |
| IV   |     | 19. Report the following to <b>MCC-H</b> as comm permits:<br>Old battery barcode and stowage location<br>New battery barcode and BATT VDC reading |
| PLSS |     | 20. Close thermal cover zipper.   |

<p><u>NOTE</u> The EMU calculated TIME EV and TIME LF do not reset despite the battery changeout. A cold restart is required to reset those parameters.</p>
---

If required per **MCC-H**

21. [COLD RESTART OF EMU CWS](#)

<p><b>WARNING</b></p>
-----------------------

<p>Fan and O2 will be OFF during restart. Perform as quickly as possible.</p>
---

- |  |     |  |  |
|--|-----|--|--|
| EV   | DCM | 21.1 sw FAN → OFF  |  |
|  |     | 21.2 O2 ACT → OFF  |  |
|  |     | <table border="1"><tr><td style="text-align: center;"><p><u>NOTE</u><br/>If SCU power not available, EMU will be without comm between steps 21.3 and 21.4.</p></td></tr></table> | <p><u>NOTE</u><br/>If SCU power not available, EMU will be without comm between steps 21.3 and 21.4.</p> |
| <p><u>NOTE</u><br/>If SCU power not available, EMU will be without comm between steps 21.3 and 21.4.</p> |     |  |  |
|  |     | 21.3 sw POWER → BATT(SCU), wait 2 seconds.   |  |
|  |     | 21.4 sw POWER → SCU(BATT)  |  |
|  |     | 21.5 sw FAN → ON   |  |
|  |     | 21.6 O2 ACT → IV   |  |

## 2.125 BATTERY REPLACEMENT (MANNED)

(ISS EVA SYS/7A - ALL/FIN 2/Paper on ISS) Page 3 of 3 pages

- |    |     |  |
|----|-----|--|
| EV | DCM | If Metox or LiOH canister seal was broken during changeout           |
|    |     | 22. O2 ACT → PRESS   |
|    |     | 23. PURGE vlv → op (up)  |
|    |     | 24. Begin 2-minute purge.  |
|    |     | When purge time = 2 minutes  |
|    |     | 25. PURGE vlv → cl (dn)  |
|    |     | 26. O2 ACT → IV  |
|    |     | 27. Go to {1.225 EMU PREBREATHE} (SODF: ISS EVA SYS: EVA PREP/POST). |

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## 2.140 EMU COLD RESTART (MANNED)

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

Page 1 of 1 page

I

(5 Minutes)

### OBJECTIVE:

Reset EMU caution and warning system by clearing nonvolatile RAM.

#### **WARNING**

This procedure should be used only at airlock pressures of 8.0 psia and higher. Fan and O2 will be off during restart. Perform restart as quickly as possible.

- DCM
1. sw FAN → OFF
  2. O2 ACT → OFF
- If POWER – SCU
3. sw POWER → BATT
- Wait 2 seconds.
4. sw POWER → SCU
- If POWER – BATT
5. sw POWER → SCU
- Wait 2 seconds.
6. sw POWER → BATT
7. O2 ACT → IV
  8. sw FAN → ON

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## 2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 1 of 6 pages

I

(75 Minutes with Hatch inspection)  
(55 Minutes without Hatch inspection)

### OBJECTIVE:

This procedure provides the crew with the necessary steps to safe the Airlock in the event that the Crewlock fails its 5 psi leak check upon Repress. A small leak is defined as one that can be supported by consumables to allow for EV crew to ingress the Equipment Lock and perform safing activities at a habitable pressure.

### NOTE

Steps 1 to 20 depress the Crewlock to vacuum and have the EV crew reopen the EV Hatch to check if there is debris that was caught in the hatch when it was closed. Steps 1 to 20 can be performed only if time and consumables permit.

1. √**MCC-H** that time and consumables permit Steps 1 to 20 to be performed

### DEPRESS CREWLOCK AND INSPECT EV HATCH SEALS (20 MINUTES)

DCM

2. √SCU →|← DCM

3. √STATUS: SUIT P 4.2 to 4.4

Compare with gauge.

4. O2 ACT → EVA (expect SET O2 PRESS msg)  
sw DISP → PRO

IV PCS

5. Airlock: ECLSS: PCA: VRIV  
AL PCA VRIV  
'Open'

**cmd** Arm (√Status – Armed)  
**cmd** Open (√Position – Open)

IV A/L1A2

6. Emergency MPEV → Open

Monitor Suit P gauge < 5.5.

\*\*\*\*\*

\* If gauge ≥ 5.5, stop depress, √**MCC-H**.

\*\*\*\*\*

7. ACTIVATING DEPRESS PUMP

**MCC-H/IV**  
PCS

- 7.1 Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01  
RPCM AL1A4A A RPC 01

√Close Cmd – Ena

**cmd** RPC Position – Close (√Position – Closed)

**2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA**  
 (ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 2 of 6 pages

- EV    UIA            7.2 √DEPRESS PUMP ENABLE LED – On
- sw DEPRESS PUMP PWR → ON
- Wait 10 seconds for startup.
- C-lk            7.3 DEPRESS PUMP MAN ISOV → OPEN
- When C-Lk at 2.0 psia (103 mmHg)
8. DEPRESS PUMP MAN ISOV → CLOSED
9. sw DEPRESS PUMP PWR → OFF
- EV    DCM        10. When C-Lk dP/dT ~0, EV expect alert tone
- EV    C-Lk        When EV Hatch ΔP < 0.5 psi (26 mm Hg)
11. EV Hatch → open
- Inspect EV Hatch Seals.  
Remove any debris that is present.
- IV    A/L1A2      12. Emergency MPEV → Closed
- PCS        13. Airlock: ECLSS: PCA: VRIV
- AL PCA VRIV
- ‘Close’
- cmd** Close (√Position – Closed)
- [REPRESSING CREWLOCK \(10 MINUTES\)](#)
- EV    C-Lk        14. √Thermal cover – closed
- EV Hatch → close, lock
- DCM        15. O2 ACT → PRESS
- IV    E-Lk        16. IV Hatch equalization valve → throttle OFF to NORM (as required,  
EV expect alert tone)
- BOTH DCM        17. C-Lk at 4.0, EV expect alert tone
- IV    C-Lk        When C-Lk at 5.0 (259 mm Hg)
18. IV Hatch equalization valve → OFF (EV expect alert tone)
- Wait 30 seconds for pressure stabilization.
19. √C-Lk pressure integrity (2 minutes, ΔP ≤ 0.1 psi)

**2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA**  
(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 3 of 6 pages

If leak check passed

- 20. Go to CREWLOCK REPRESS {CREWLOCK DEPRESS/REPRESS CUE CARD}, steps 8 to 11 (SODF: ISS EVA SYS: EVA PREP/POST).

- C-Lk 21. IV Hatch equalization vlv → throttle OFF to NORM (EMER) (as required, EV expect alert tone)

<b>WARNING</b>
1. If Cuff 1 symptoms resolving upon repress, report as Cuff 2.
2. If any DCS, leave O2 ACT – PRESS.

When C-Lk P > 5.0 psia

BOTH DCM

- 22. O2 ACT → IV
- 23. When C-Lk dP/dT ~0 (EV expect alert tone)

<b>CAUTION</b>
Verify EV crew is clear of Hatch mechanism.

EV CREW SAFING (15 MINUTES)

IV PCS

- 24. Airlock: ECLSS:  

Airlock: ECLSS
----------------

  
'Equipment Lock'

Monitor dP/dT

When dP/dT < 0.10 mmHg/min

IV

- 25. Open IV Hatch per decal.
- 26. IV Hatch equalization valve → OFF

BOTH

- 27. EV crew ingress E-Lk.

DCM

- 28. O2 ACT → OFF
- 29. PURGE vlv → op (up)
- 30. √sw COMM mode – HL

IV

- 31. Install WATER sw guards (two).
- 32. √Glove heater switch (two) – OFF

**2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA**  
(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 4 of 6 pages

If EMU TV capability

33. pb EMU TV power → OFF

√EMU TV POWER LED (green) – Off

PLSS 34. sw REBA → OFF (toward left arm of suit)

35. Lower arm cables ←|→ gloves

Stow lower arm and glove cable connectors under TMG.

If EMU TV capability

36. EMU TV power cable ←|→ EMU TV

EMU TV power cable →|← ground plug

DCM 37. √STATUS: SUIT P < 0.4 (compare with gauge)

Gloves ←|→ EMU

Stow gloves in EMU Equipment Bag.

38. Helmet ←|→ EMU

Temporarily stow helmet.

39. Doff Comm Cap, disconnect from electrical harness.  
Stow in EMU Equipment Bag.

**NOTE**

EV crew will be without SCU cooling while  
IV performs SCU removal steps.

DCM 40. sw FAN → OFF

UIA 41. sw PWR EV-1,2 (two) → OFF

√PWR EV-1,2 LEDs (four) – Off

PSA 42. sw SUIT SELECT (two) → OFF

√SUIT SELECT LEDs (four) – Off

43. sw MAIN POWER → OFF

√MAIN POWER LED – Off

EACP 44. sw PWR → OFF

**2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA**  
 (ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 5 of 6 pages

BOTH DCM 45. SCU ←|→ DCM

Install DCM Cover.

REMOVING SCU AND TOOLS FROM CREWLOCK (30 MINUTES)

IV C-Lk 46. Unstow from C-Lk IV Bag:  
 7/16" Socket with 6" extension (in socket caddy)  
 EVA Ratchet

UIA 47. √WATER SUPPLY EV-1, 2 vlv (two) – CLOSE  
 √OSCA – O2 CLOSED (O2 3AKP)

PCS 48. CLOSING AIRLOCK O2 HI PRESSURE SUPPLY VALVE  
 Airlock: ECLSS: O2 Hi P Supply Vlv  
AL O2 Hi Pressure Supply Valve

cmd Close (√Actual Position – Closed)

**NOTE**

Removal of ОРЛАН caps is technique sensitive. For removal instructions, the cap is pushed inward and rotate clockwise (opposite the displayed arrow) 1/8 turn; then, the cap is pulled outward. Refer to Figure 1.



Figure 1.- OSCA and ОРЛАН Caps.

UIA 49. ОРЛАН-I (II) cap 2 ←|→ OSCA  
 ОРЛАН-I (II) cap 3 ←|→ OSCA

OSCA ↻ PRESS (НАДДУВ)

**2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA**  
 (ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 6 of 6 pages

50. √OXYGEN EMU 1,2 vlv (two) – OPEN

NOTE  
 The next step will depressurize the SCU and UIA supply lines via the OSCA prior to removal of the SCU.

51. OXYGEN ORLAN vlv → OPEN

When purge no longer audible

52. √EMU O2 SUPPLY PRESS gauge ≅ 0  
 √ORLAN O2 SUPPLY PRESS gauge ≅ 0

53. OSCA ↻ O2 CLOSED (O2 3AKP)

ОРЛАН-I (II) cap 2 → | ← OSCA  
 ОРЛАН-I (II) cap 3 → | ← OSCA

54. OXYGEN EMU 1,2 vlv (two) → CLOSE

55. OXYGEN ORLAN vlv → CLOSE

C-Lk 56. Remove SCU from stowage straps on C-Lk wall.

UIA 57. SCU ←|→ UIA (by turning SCU Mating bolts (two) ↻ using Ratchet with 7/16" Socket (~15 turns each))

58. Strain relief hooks (two) ←|→ tether points (two) on C-Lk wall

59. √DEPRESS PUMP MAN ISOV – CLOSED

60. Remove stowage pouches from C-Lk restraint straps (leave DCM connectors inside pouches).

61. Transfer to E-Lk from C-Lk  
 SCUs (with pouches)  
 Crewlock EVA Bags (four)  
 IV Bag  
 Staging Bag  
 All additional EVA tools

E-Lk 62. Close IV Hatch per decal.  
 √IV Hatch equalization valve – OFF

63. Install IV Hatch equalization valve cap.

ALL 64. Go to {1.240 POST EVA}, all (SODF: ISS EVA SYS: EVA PREP/POST).

√MCC-H for deltas

OBJECTIVE:

Depress the Airlock to 10.2 psia in order to resolve an EMU configuration problem and avoid an unrecoverable break in prebreathe protocol.

NOTE  
**MCC-H** will perform steps 1 to 6 from the ground.

- PCS 1. CONFIGURING MCA FOR AIRLOCK SAMPLING  
1.1 US Lab: ECLSS: AR Rack: MCA: Nominal Cmds  
Lab MCA Nominal Commands

√State – Operate (Standby)

If State not Operate (Standby)  
Go to step 2.

- 1.2 'Rapid Sampling'

**cmd** Airlock

√State – Standby, Operate

NOTE  
Once the MCA is rapid sampling, it will take approximately 6 minutes to purge the lines. Airlock constituent data is not accurate until this purge is complete.

- 1.3 US Lab: ECLSS: AR Rack: MCA  
LAB MCA  
'(ORU 2) Mass Spectrometer Assembly'

√Sample Time – updating 10 seconds

√Sample Location – Airlock

- 1.4 C&W Summ  
Caution & Warning Summary  
'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 4 6 1 (MCA ppO2 Approaching Limits)

**cmd** Arm

**cmd** Execute

## 2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

(ISS EVA SYS/9A - ALL/FIN 2/SPN/Paper on ISS) Page 2 of 12 pages

### 2. VERIFYING OXYGEN AND NITROGEN SYSTEM

PCS

#### 2.1 Airlock: ECLSS: Oxygen System

AL Oxygen System

'O2 Hi Pressure Supply Valve'

√Actual Position – Open

'High Pressure'

√UIA Supply Press: 5343 to 6308 kPa (775 to 915 psia)

#### 2.2 'O2 Low Pressure Supply Valve'

√Actual Position – Open

'Low Pressure'

√PCA O2 Line Press: 689 to 930 kPa (100 to 135 psia)

#### 2.3 Airlock: ECLSS: Nitrogen System

AL Nitrogen System

'N2 Supply Valve'

√Actual Position – Open

√PCA N2 Line Press: 689 to 930 kPa (100 to 135 psia)

### 3. CONFIGURING C&W FOR ACS CAMPOUT MODE

PCS

#### 3.1 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 3 5 6 (Cabin Pressure Above Normal-E/L)

**cmd Arm**

**cmd Execute**

input Event Code – 6 5 7 6 (Rapid Depress-A/L)

**cmd Arm**

**cmd Execute**

#### 3.2 sel Enable

Enable an Event

input Event Code – 5 9 1 2 (Cabin SD Fail-A/L)

## 2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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### cmd Execute

input Event Code – 6 5 3 7 (Cabin SD Lens Contamination-A/L)

### cmd Execute

input Event Code – 6 5 3 9 (Cabin SD Active BIT Fail-A/L)

### cmd Execute

#### NOTE

Upon IMV Fan deactivation, rpm sensor registers 0 volts. MDM conversion translates 0 volts (0 counts) to  $7164 \pm 50$  rpm.

- PCS
4. [TERMINATING AIRLOCK IMV](#)
    - 4.1 Node 1: ECLSS: IMV Stbd Aft Fan  
Node 1 IMV Stbd Aft Fan  
'Off'  
  
**cmd** Arm ( $\surd$ Status – Armed)  
**cmd** Off ( $\surd$ State – Off)  
  
 $\surd$ Speed, rpm:  $\sim 7164 \pm 50$
    - 4.2 Node 1: ECLSS: IMV Stbd Aft Valve  
Node 1 IMV Stbd Aft Vlv  
  
 $\surd$ State – Enabled  
  
'Close'  
  
**cmd** Arm ( $\surd$ Status – Armed)  
**cmd** Close  
  
Wait 15 seconds.  
  
 $\surd$ Position – Closed
    - 4.3 Node 1: ECLSS: IMV Stbd Fwd Valve  
Node 1 IMV Stbd Fwd Vlv  
  
 $\surd$ State – Enabled

## 2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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If Position – Open  
| 'Close'  
  
| **cmd** Arm (√Status – Armed)  
| **cmd** Close  
  
| Wait 15 seconds.  
  
| √Position – Closed

### 4.4 Airlock: ECLSS: Duct SD

**AL Duct Smoke Detector**

'Monitoring'

**cmd** Inhibit

√Status – Inhibited

## 5. INITIATING ACS CAMPOUT (10.2 psia) MODE

PCS

### 5.1 Airlock: ECLSS: PCA: Global ACS Commands

**Global ACS Commands**

'LAB ACS'

√Auto Pressure/Composition Control – Monitor

'Airlock ACS'

√Auto Pressure/Composition Control – Monitor

'Campout'

**cmd** Initiate

#### NOTE

The Airlock PCA NIV may open when Campout is initiated due to a change in the gas introduction limits. It will close when the Airlock Auto Pressure/Composition Control is inhibited.

### 5.2 'ACS Primary PCA'

√Primary PCA – LAB/Airlock

'Airlock ACS'

If Auto Pressure/Composition Control – Comp Control

**cmd** Inhibit (√ – Monitor)

'LAB ACS'

If Auto Pressure/Composition Control – Comp Control

**cmd** Inhibit (√ – Monitor)

## 2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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### 5.3 Airlock: ECLSS: PCA

AL ACS

√ACS Campout Status – Campout

sel N2 Intro Valve

AL PCA N2 Intro Valve

√Position – Closed

## 6. INHIBITING AIRLOCK RAPID DEPRESS RESPONSE

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'Airlock Depress Response – INT MDM'

**cmd** Inhibit – Arm (√Status – Armed)

**cmd** Inhibit

√Airlock Depress Response-INT MDM Status – Inhibited

## 7. VERIFYING AIRLOCK EQUIPMENT

7.1 Verify PBA Bottles and Masks located in Airlock for every isolated crewmember.

Verify PBA Bottles →|← Masks for each non-EVA crewmember in the Airlock.

Verify Oxygen Bottle pressure gauge needle  $\geq 3000$  psig for each Bottle.

7.2 Verify two CSA-CPs located in Airlock.

Verify Battery power for both CSA-CPs.

## 8. ACTIVATING AIRLOCK CO2 REMOVAL (as required)

8.1 Unstow Metox Canisters (two) used previously.

8.2 Remove caps from Metox Canisters.

8.3 Stow caps in EMU Equipment Bag.

A/L1A1 8.4 Rotate EDDA open.

8.5 Report Metox Canister barcodes to **MCC-H**.

8.6 Open CO2 Removal Receptacle door.

8.7 √CO2 VALVE – REMOVAL

8.8 Install Metox Canisters in CO2 Removal Receptacle per label on closeout.

8.9 Close and latch CO2 Removal Receptacle door.

8.10 Rotate EDDA closed.

## 2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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### 9. CLOSING NODE 1 STBD HATCH

#### NOTE

Be prepared to initiate depress within 5 minutes of closing the Node 1 Stbd Hatch to prevent high O2 concentrations in the Airlock.

9.1 ✓ **MCC-H** for Go to continue

9.2 ✓ Node 1 Stbd Hatch MPEV – CLOSED and uncapped

9.3 Check Hatch seal and close Node 1 Stbd Hatch per decal (omit last step of decal).

### 10. DEPRESSING TO 10.2 PSIA

UIA

10.1 ✓ DEPRESS PUMP ENABLE LED – On

10.2 sw DEPRESS PUMP PWR → ON

Wait 10 seconds.

C-Lk

DEPRESS PUMP MAN ISOV → OPEN

PCS

Airlock: ECLSS

Airlock: ECLSS

'Equipment Lock'

10.3 ✓ Cab Press – decreasing

When Cab Press < 14.1 psia (729 mmHg) or **On MCC-H GO**

10.4 Turn Hatch handle in the UNLATCH direction approximately 1.5 turns to place the Hatch in the equalize position (orange stripe).

10.5 Crank Handle – Stowed Position

#### NOTE

1. CSA-CP % O2 will read approximately 1 % lower than actual during depress. Stable Airlock pressure is needed to obtain an accurate reading.
2. Per SPN 2563 (12A to 20A), each MCA partial pressure reading of the Airlock will be 86 seconds old before the depress begins, and will increase up to 99 seconds old at 10.2 psia.

10.6 Continue depress to 12.5 psia (646 mmHg). Refer to Figure 1. Monitor using CSA-CP during depress.

## 2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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- When Airlock is at 12.5 psia (646 mmHg)
- C-Lk 10.7 DEPRESS PUMP MAN ISOV → CLOSED
- 10.8 Verify O2 is greater than 24.5 %
- If O2 < 24.5 %
- DCM 10.9 PURGE vlv → op (up) until O2 > 24.5 %, then:
- 10.10 PURGE vlv → cl (dn)
- C-Lk 10.11 DEPRESS PUMP MAN ISOV → OPEN
- 10.12 Continue depress to 10.2 psia (527 mmHg).  
Refer to Figure 1.
- C-Lk 10.13 DEPRESS PUMP MAN ISOV → CLOSED
- 10.14 Verify O2 is between 23.5 % and 28.8 %.
- UIA 10.15 sw DEPRESS PUMP PWR → OFF

### NOTE

**MCC-H** will perform step 11 from the ground.

## 11. ENABLING AIRLOCK RAPID DEPRESS RESPONSE AND ALARM

- PCS 11.1 Airlock: ECLSS  
Airlock: ECLSS  
'Equipment Lock'
- Wait until  $|dP/dT| < 0.04$  mmHg/min.
- 11.2 Rapid Depress: Rapid Depress Response Software Control  
US Rapid Depress Response Software Control  
'Airlock Depress Response – INT MDM'
- cmd Enable**
- √Airlock Depress Response – INT MDM Status – Enabled
- 11.3 C&W Summ  
Caution & Warning Summary  
'Event Code Tools'
- sel Enable
- Enable an Event
- input Event Code – 6 5 7 6 (Rapid Depress-A/L)
- cmd Execute**

## 2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

(ISS EVA SYS/9A - ALL/FIN 2/SPN/Paper on ISS) Page 8 of 12 pages

- DCM      **12. DEPRESSURIZING AFFECTED EMU**
- 12.1 O2 ACT → OFF
- 12.2 PURGE vlv → op (up)
- 12.3 sw REBA → OFF (toward left arm of suit)
- If EMU TV already configured
- PLSS      12.4 pb EMU TV power → OFF
- √EMU TV POWER LED (green) – Off
- 12.5 EMU TV power cable ←|→ EMU TV  
            EMU TV power cable →|← ground plug
- 12.6 Lower arm cables ←|→ gloves  
            Stow lower arm and glove cable connectors under TMG.
- DCM      12.7 √STATUS: SUIT P < 0.4 (compare with gauge)
- Gloves ←|→ EMU  
            Stow gloves in EMU Equipment Bag.
- 12.8 Helmet ←|→ EMU  
            Temporarily stow helmet.
- DCM      12.9 sw FAN → OFF
- 12.10 Doff other EMU components as needed.
- 13. MAINTAINING SUFFICIENT PPO2**
- If O2 concentration drops below 24 %, on unaffected EMU
- DCM      13.1 PURGE vlv → op (up)
- When O2 concentration approximately 24.5 %
- DCM      13.2 PURGE vlv → cl (dn)
- 14. RECONFIGURING AFFECTED EMU**
- When EMU problem resolved, perform the following as required
- 14.1 √Suit arms aligned
- 14.2 √Gloves ←|→ EMU  
            √Wrist disconnects – op
- 14.3 Don thumb loops.
- 14.4 √Drink vlv position
- 14.5 √Biomed connector is outside of HUT.
- 14.6 Don HUT.

## 2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

(ISS EVA SYS/9A - ALL/FIN 2/SPN/Paper on ISS) Page 9 of 12 pages

- 14.7 Release thumb loops.
- 14.8 √Suit arms aligned
- 14.9 Don EV glasses as required.  
Don comm cap.
- 14.10 √Comm
- 14.11 Biomed pigtail →|← electrical harness
- 14.12 LCVG →|← Multiple Water Connector  
√Multiple Water Connector locked
- 14.13 √Thermal cover clear of waist ring
- 14.14 Waist ring → engage position
- 14.15 Waist ring →|← HUT  
√Waist ring locked
- 14.16 Remove donning handles.  
Stow donning handles in EMU Equipment Bag.
- 14.17 Cover waist ring.
- 14.18 √Drink vlv position
- 14.19 √Mic boom position
- 14.20 Don comfort gloves, wristlets.
- 14.21 Wrist rings → engage position
- 14.22 Don EV gloves.  
√EV gloves locked
- 14.23 Tighten palm restraint straps.
- 14.24 √sw Glove heater (two) – OFF
- 14.25 √sw REBA – OFF (toward left arm of suit)
- 14.26 Lower arm power harness cables →|← Gloves  
Stow slack under arm TMG.

## 2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

(ISS EVA SYS/9A - ALL/FIN 2/SPN/Paper on ISS) Page 10 of 12 pages

- 14.27 ✓Cuff C/L position  
✓Wrist mirrors installed
- DCM 14.28 sw FAN → ON
- 14.29 ✓Electrical harness clear of neck ring
- 14.30 Don helmet.  
✓Helmet locked
- DCM 14.31 O2 ACT → IV
- 14.32 ✓Helmet purge vlv – cl, locked
- DCM 14.33 PURGE vlv → cl (dn)

**CAUTION**  
Minimize fan operation with O2 ACT – OFF (~2 minutes).

If EMU TV capability

- 14.34 Unstow EMU TV power cable.
- 14.35 EMU TV power cable ←|→ Ground plug
- 14.36 EMU TV power cable →|← EMU TV

### EMU CHECK (5 MINUTES) FOR AFFECTED EMU

#### 15. ✓Cooling

\*\*\*\*\*  
\* If cooling insufficient  
\* | Slowly cycle Temp control vlv between 7 and Max C  
\* | while IV depress and hold pump priming valve on  
\* | back of EMU (30 seconds minimum).  
\*\*\*\*\*

- DCM 16. Temp control vlv → as required
17. ✓Wrist rings – covered  
✓Waist rings – covered  
✓sw WATER – OFF  
✓sw POWER – SCU  
✓sw FAN – ON  
✓sw Comm FREQ – LOW  
✓Helmet purge vlv – cl, locked
- DCM ✓PURGE vlv – cl (dn)

## 2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

(ISS EVA SYS/9A - ALL/FIN 2/SPN/Paper on ISS) Page 11 of 12 pages

### NOTE

During leak check, when **SET O2 IV** message is displayed, wait 30 seconds and  $\sqrt{\text{SUIT P}}$  gauge stable (4.2 to 4.4) before moving O2 ACT → IV.

18. sw DISP → STATUS, until **LEAK CHECK?** displayed  
sw DISP → YES (Follow displayed instructions).
19. Contact **MCC-H** to obtain total EMU Prebreathe time.
20. For affected EMU, go to {1.220 EMU PURGE} (SODF: ISS EVA SYS: EVA PREP/POST).

**2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA**  
 (ISS EVA SYS/9A - ALL/FIN 2/SPN/Paper on ISS) Page 12 of 12 pages

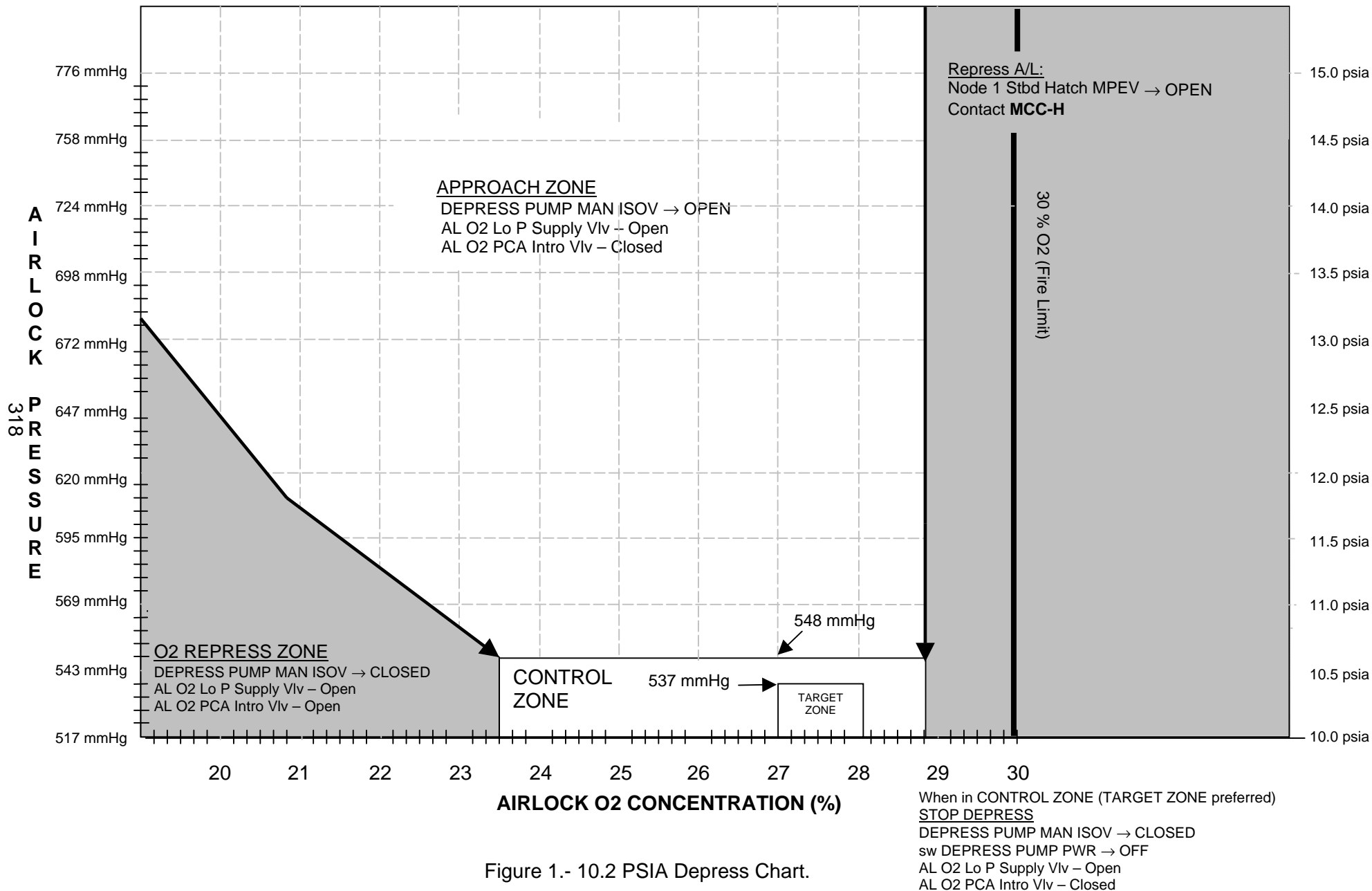


Figure 1.- 10.2 PSIA Depress Chart.

## 2.220 CONTINGENCY AIRLOCK DEPRESS USING VAJ

(ISS EVA SYS/8A - ALL/FIN 1/Paper on ISS)

Page 1 of 2 pages

### OBJECTIVE:

Depress Joint Airlock in the event of a failed Depress Pump by using the VAJ connected to the Airlock VRIV.

#### NOTE

This procedure should be performed in conjunction with  
1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION.

- PCS
1. VERIFYING AIRLOCK CONFIGURATION PRIOR TO DEPRESS
    - 1.1 Node 1: ECLSS: IMV Stbd Aft Fan  
Node 1 IMV Stbd Aft Fan  
  
√State – Off  
√Speed, rpm: ~7164 ± 50
    - 1.2 Node 1: ECLSS: IMV Stbd Aft Valve  
Node 1 IMV Stbd Aft Vlv  
  
√Position – Closed
    - 1.3 Node 1: ECLSS: IMV Stbd Fwd Valve  
Node 1 IMV Stbd Fwd Vlv  
  
√Position – Closed
- Node 1  
Stbd  
Hatch
- 1.4 √Node Stbd Hatch MPEV – CLOSED and uncapped
  - 1.5 √Node 1 Stbd Hatch in the equalize position (orange stripe)
- PCS
2. VERIFYING AIRLOCK RAPID DEPRESS RESPONSE STATUS  
Rapid Depress: Rapid Depress Response Software Control  
US Rapid Depress Response Software Control  
'Airlock Depress Response - INT MDM'  
  
√Status – Inhibited
- PCS
3. OPENING AIRLOCK VRIV  
Airlock: ECLSS: PCA: VRIV  
AL PCA VRIV  
'Open'  
  
**cmd** Arm (√Status – Armed)  
**cmd** Open (√Position – Open)

## 2.220 CONTINGENCY AIRLOCK DEPRESS USING VAJ

(ISS EVA SYS/8A - ALL/FIN 1/Paper on ISS)

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### 4. INITIATING AIRLOCK DEPRESS

√**MCC-H** for Target Pressure: \_\_\_\_\_ mmHg

#### **WARNING**

Opening the Emergency MPEV will vent the Airlock to space and may cause a loud hissing noise. Crew in the vicinity should don earplugs.

PCS

Airlock: ECLSS

Airlock: ECLSS

'Equipment Lock'

Monitor Cab Press.

A/L1A2

Emergency MPEV → Open

When Equipment Lock Cab Press = Target Pressure

Emergency MPEV → Closed

PCS

### 5. CLOSING AIRLOCK VRIV

Airlock: ECLSS: PCA: VRIV

AL PCA VRIV

'Close'

**cmd** Close (√Position – Closed)

## 2.235 METOX REGENERATOR TROUBLESHOOTING

(ISS EVA SYS/7A - ALL/FIN 3) Page 1 of 14 pages

### OBJECTIVE:

Given a fault or error on the Metox Regenerator this procedure provides troubleshooting steps for the crew to perform.

#### NOTE

1. For error codes that direct crew to contact **MCC-H**, report error code and time indicated on display.
2. If multiple errors present, error codes will be listed sequentially. Contact **MCC-H** prior to taking action.

DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
(none)	Power source interruption of < 5 seconds	Abort Condition (Cooling mode not initiated)	POWER INTERRUPT LED – Blinking	If initiating new regen sw CYCLE → START  If terminating previous regen Contact <b>MCC-H</b> to determine additional regen time. sw CYCLE → START
<b>E:02</b>	Attempted to start regeneration in cooling mode	No Start Condition	VALVE/DOOR LED – Blinking	Cycle Oven Door > 90°  sw CYCLE → START
<b>E:03</b>	Attempted to start regeneration with sw MODE – STANDBY	No Start Condition	STANDBY LOCAL LED – Blinking	sw MODE → REGENERATE  sw CYCLE → START
<b>E:04</b>	Attempted to start regeneration with erroneous REMOTE STANDBY discrete active	No Start Condition	STANDBY REMOTE LED – Blinking	sw MODE → STANDBY  sw MODE → REGENERATE  sw CYCLE → START  Contact <b>MCC-H</b>
<b>E:05</b>	Attempted to start regeneration with sw FAULT OVERRIDE – ON	No Start Condition	FAULT OVERRIDE ON LED – Blinking	sw FAULT OVERRIDE → OFF  sw CYCLE → START

## 2.235 METOX REGENERATOR TROUBLESHOOTING

(ISS EVA SYS/7A - ALL/FIN 3) Page 2 of 14 pages

DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:06</b>	Regenerator left in STANDBY > 6 hours when activated during heating cycle	Abort Condition (4-hour cooling mode initiated)	CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	sw POWER → OFF  When ready to resume, Perform {1.510 METOX REGENERATION} (SODF: ISS EVA SYS: EMU MAINTENANCE)
<b>E:07</b>	Erroneous boot discrete present without test discrete	Overridable Condition	CTRL LED – On	Contact <b>MCC-H</b> (Controller suspect)
<b>E:08</b>	RAM test failure	Dead Condition	CTRL LED – On	Cycle sw POWER  If error no longer present, continue with use  Contact <b>MCC-H</b>
<b>E:09</b>	ROM test failure	Dead Condition	CTRL LED – On	Cycle sw POWER  If error no longer present, continue with use  Contact <b>MCC-H</b>
<b>E:10</b>	Upper Cannister Solenoid overcurrent (> 2.1 to 4.4 amps)	Dead Condition	CTRL LED – On	Contact <b>MCC-H</b>
<b>E:11</b>	Lower Cannister Solenoid overcurrent (> 2.1 to 4.4 amps)	Dead Condition	CTRL LED – On	Contact <b>MCC-H</b>
<b>E:12</b>	Door Unlock Solenoid overcurrent	Dead Condition	CTRL LED – On VALVE/DOOR LED – On	Contact <b>MCC-H</b>
<b>E:13</b>	Door Lock Solenoid overcurrent (> 2.1 to 4.4 amps)	Dead Condition	CTRL LED – On VALVE/DOOR LED – On	Contact <b>MCC-H</b>
<b>E:14</b>	Valve Solenoid overcurrent (> 2.1 to 4.4 amps)	Dead Condition	CTRL LED – On VALVE/DOOR LED – On	Contact <b>MCC-H</b>
<b>E:15</b>	120 V Supply overcurrent (7.0 to 14.6 amps)	Dead Condition	CTRL LED – On	Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:17</b>	V1 reference is too high (> 6.0 volts)	Dead Condition	CTRL LED – On	Contact <b>MCC-H</b>
<b>E:18</b>	V2 reference is too high (> 6.0 volts)	Overridable Condition	CTRL LED – On	Contact <b>MCC-H</b>
<b>E:19</b>	V1 reference is too low (< 4.0 volts)	Dead Condition	CTRL LED – On	Contact <b>MCC-H</b>
<b>E:20</b>	V2 reference is too low (< 4.0 volts)	Overridable Condition	CTRL LED – On	Contact <b>MCC-H</b>
<b>E:21</b>	Zero 1 reference is too high (> 1.0 volts)	Dead Condition	CTRL LED – On	Contact <b>MCC-H</b>
<b>E:22</b>	Zero 2 reference is too high (> 1.0 volts)	Overridable Condition	CTRL LED – On	Contact <b>MCC-H</b>
<b>E:23</b>	Zero 1 reference is too low (< -1.0 volts)	Dead Condition	CTRL LED – On	Contact <b>MCC-H</b>
<b>E:24</b>	Zero 2 reference is too low (< -1.0 volts)	Overridable Condition	CTRL LED – On	Contact <b>MCC-H</b>
<b>E:25</b>	+12 V too high (> 14.0 volts)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:26</b>	-12 V too high (> -10.0 volts)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:27</b>	+12 V too low (< 10.0 volts)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:28</b>	-12 V too low (< -14.0 volts)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:29</b>	Upper Canister Indicator Solenoid voltage high (Solenoid feedback indicates it is on prior to completion of regeneration)	Dead Condition	CTRL LED – On	Contact <b>MCC-H</b> (Controller suspect)
<b>E:30</b>	Upper Canister Indicator Solenoid voltage low (Solenoid commanded on, but feedback indicates off)	Status Condition	CTRL LED – On	If no other errors present, no action. When regeneration complete, Canister state indicator will require manual actuation to the R position
<b>E:31</b>	Lower Canister Indicator Solenoid voltage high (Solenoid feedback indicates it is on prior to completion of regeneration)	Dead Condition	CTRL LED – On	Contact <b>MCC-H</b> (Controller suspect)
<b>E:32</b>	Lower Canister Indicator Solenoid voltage low (Solenoid commanded on, but feedback indicates off)	Status Condition	CTRL LED – On	If no other errors present, no action. When regeneration complete, Canister state indicator will require manual actuation to the R position
<b>E:33</b>	Watchdog never ready	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:34</b>	Watchdog reset too wide	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:35</b>	Fan RPM < 30,000 (15 seconds after start)	Dead Condition	CTRL LED – On FAN LED – On	Cycle sw POWER  If error no longer present, continue with use  Contact <b>MCC-H</b>
<b>E:36</b>	Fan RPM > 30,000 < 40,000 (for 60 seconds)	Overridable Condition	CTRL LED – On FAN LED – On	Cycle sw POWER  If error no longer present, continue with use  Contact <b>MCC-H</b>
<b>E:37</b>	Fan RPM > 60,000 (15 seconds after start)	Dead Condition	CTRL LED – On FAN LED – On	Cycle sw POWER  If error no longer present, continue with use  Contact <b>MCC-H</b>
<b>E:38</b>	Fan > 60000 RPM (for 60 seconds)	Overridable Condition	CTRL LED – On FAN LED – On	Cycle sw POWER  If error no longer present, continue with use  Contact <b>MCC-H</b>
<b>E:39</b>	Fan did not turn off when commanded  <u>NOTE</u> Fan is not nominally commanded off during a regeneration cycle. Abort only occurs if Regenerator was taken to STANDBY.	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On and FAN LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:40</b>	Heater overcurrent (> 6.2 to 12.8 amps)	Abort Condition (4-hour cooling mode initiated)	HEATER LED – On, CYCLE ABORT INITIATED LED – On, and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:41</b>	Heater undervoltage when on (< 94.5)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On and HEATER LED – Blinking with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:42</b>	Heater overvoltage when off (> 25 volts with Server On) (> 10 volts with Server Off)	Dead Condition	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:43</b>	Heater on after power server is off (> 25 volts with Server on) (> 10 volts with Server off)	Abort Condition (4-hour cooling mode initiated)	HEATER LED – Blinking with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>  If no comm with <b>MCC-H</b> , sw POWER → OFF
<b>E:44</b>	Heater too slow (failed to bring temp up to set value after Standby mode within 6 hours)	Overridable Condition	HEATER LED – On	Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:45</b>	Door not indicating latched while regenerating	Overridable Condition	VALVE/DOOR LED – On	√Oven door closed and latched  sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:46</b>	Diverter Valve not in Cooling position when commanded	Overridable Condition	VALVE/DOOR LED – On	Contact <b>MCC-H</b>
<b>E:47</b>	Diverter Valve not in Heating position when commanded	Overridable Condition	VALVE/DOOR LED – On	Contact <b>MCC-H</b>
<b>E:48</b>	Diverter Valve position not at Limit default	Overridable Condition	VALVE/DOOR LED – On	Contact <b>MCC-H</b>
<b>E:49</b>	Diverter Valve indicates both Heating and Cooling position	Overridable Condition	VALVE/DOOR LED – On	Contact <b>MCC-H</b>
<b>E:50</b>	Internal Heater Temp Sensor invalid low (T1 < -30° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:51</b>	Internal Heater Temp Sensor invalid low (T2 < -30° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:52</b>	Internal Heater Temp Sensor invalid high (T1 > 600° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:53</b>	Internal Heater Temp Sensor invalid high (T2 > 600° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:54</b>	Internal Heater Temp Sensors invalid (T1 and T2 > 600° F or < -30° F)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On and HEATER LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:55</b>	Internal Heater Temp Sensor overtemp (T1 > 475° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:56</b>	Internal Heater Temp Sensor overtemp (T2 > 475° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:57</b>	Internal Heater Temp Sensors overtemp (T1 and T2 > 475° F)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On and HEATER LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:58</b>	Internal Heater Temp Sensor undertemp (T1 < 225° F after 2 hours heating)	Overridable Condition	HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:59</b>	Internal Heater Temp Sensor undertemp (T2 < 225° F after 2 hours heating)	Overridable Condition	HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:60</b>	Internal Heater Temp Sensors undertemp (T1 and T2 < 225° F after 2 hours heating)	Overridable Condition	HEATER LED – On	Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:61</b>	Internal Heater Temp Sensor undertemp (T1 < 290° F after 9.5 hours heating)	Overridable Condition	HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:62</b>	Internal Heater Temp Sensor undertemp (T2 < 290° F after 9.5 hours heating)	Overridable Condition	HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:63</b>	Internal Heater Temp Sensors undertemp (T1 and T2 < 290° F after 9.5 hours heating)	Overridable Condition	HEATER LED – On	Contact <b>MCC-H</b>
<b>E:64</b>	Internal Heater Temp Sensor delta out of range (T1 and T2 differ by > 16° to 27° F)	Overridable Condition	HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:65</b>	Oven Temp Sensor invalid low (T8 < -30° F)	Overridable Condition	CTRL LED – On OVEN HOT LED – On	FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:66</b>	Oven Temp Sensor invalid high (T8 > 440° F)	Overridable Condition	CTRL LED – On OVEN HOT LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:67</b>	Upper and Lower Can Temp Sensors undertemp (T4 and T6 < 250° F after 4 hours heating, indicating low flow)	Overridable Condition	FLOW LED – On UPPER CAN LED - On LOWER CAN LED - On	√CO2 REMOVAL RECEPTACLE CO2 VALVE – REGEN  √Airlock CCAA On  Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:68</b>	Controller Watchdog failed (lost sync)	Abort Condition	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:69</b>	Controller Watchdog failed (out of sync)	Abort Condition	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:70</b>	External Heater Temp Sensor overtemp (T3 > 525° F)	Abort Condition	CTRL LED – On and HEATER LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:71</b>	External Heater Temp Sensor invalid low (T3 < -30° F)	Abort Condition	CTRL LED – On and HEATER LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>
<b>E:72</b>	External Heater Temp Sensor invalid high (T3 > 570° F)	Abort Condition	CTRL LED – On and HEATER LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:73</b>	Upper Canister Outlet Temp Sensor invalid low (T4 < -30° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:74</b>	Upper Canister Outlet Temp Sensor invalid low (T5 < -30° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:75</b>	Upper Canister Outlet Temp Sensor invalid high (T4 > 570° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:76</b>	Upper Canister Outlet Temp Sensor invalid high (T5 > 570° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:77</b>	Upper Canister Outlet Temp Sensors invalid (T4 and T5 > 570° F or <-30°F)	Overridable Condition	TEMP LED – On	Contact <b>MCC-H</b>
<b>E:78</b>	Upper Canister Outlet Temp Sensor undertemp (T4 < 250° F between 4 to 10 hours heating)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact <b>MCC-H</b>
<b>E:79</b>	Upper Canister Outlet Temp Sensor undertemp (T5 < 250° F between 4 to 10 hours heating)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact <b>MCC-H</b>
<b>E:80</b>	Upper Canister Outlet Temp Sensors undertemp (T4 and T5 < 250° F between 4 to 10 hours heating)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:81</b>	Upper Canister Outlet Temp Sensor no heat spike (T4 < 300° F after 10 hours heating)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact <b>MCC-H</b>
<b>E:82</b>	Upper Canister Outlet Temp Sensor no heat spike (T5 < 300° F after 10 hours heating)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact <b>MCC-H</b>
<b>E:83</b>	Upper Canister Outlet Temp Sensors no heat spike (T4 and T5)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact <b>MCC-H</b>
<b>E:84</b>	Upper Canister too slow (failed to bring temp up to set value after standby mode within 6 hours)	Overridable Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact <b>MCC-H</b>
<b>E:85</b>	Lower Canister Outlet Temp Sensor invalid low (T6 < -30° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:86</b>	Lower Canister Outlet Temp Sensor invalid low (T7 < -30° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:87</b>	Lower Canister Outlet Temp Sensor invalid high (T6 > 570° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>
<b>E:88</b>	Lower Canister Outlet Temp Sensor invalid high (T7 > 570° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
<b>E:89</b>	Lower Canister Outlet Temp Sensors invalid high (T6 and T7 > 570° F or < -30° F)	Overridable Condition	TEMP LED – On	Contact <b>MCC-H</b>
<b>E:90</b>	Lower Canister Outlet Temp Sensor undertemp (T6 < 250° F between 4 to 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact <b>MCC-H</b>
<b>E:91</b>	Lower Canister Outlet Temp Sensor undertemp (T7 < 250° F between 4 to 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact <b>MCC-H</b>
<b>E:92</b>	Lower Canister Outlet Temp Sensors undertemp (T6 and T7 < 250° F between 4 to 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact <b>MCC-H</b>
<b>E:93</b>	Lower Canister Outlet Temp Sensor no heat spike (T6 < 300° F after 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact <b>MCC-H</b>
<b>E:94</b>	Lower Canister Outlet Temp Sensor no heat spike (T7 < 300° F after 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact <b>MCC-H</b>
<b>E:95</b>	Lower Canister Outlet Temp Sensors no heat spike (T6 and T7 < 300° F after 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact <b>MCC-H</b>

## 2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION		
<b>E:96</b>	Lower Canister too slow (failed to bring temp up to set value after Standby mode within 6 hours)	Overridable Condition	LOWER CAN LED – On	Contact <b>MCC-H</b>		
<b>E:97</b>	Upper Canister Outlet Temp Sensor delta out of range (T4 and T5 differ by > 17° to 27° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>		
<b>E:98</b>	Lower Canister Outlet Temp Sensor delta out of range (T6 and T7 differ by > 17° to 27° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On  Contact <b>MCC-H</b>		
<b>E:99</b>	Oven Temp Sensor indicates hot at end of cooling cycle (T8 > 105° F)	Overridable Condition	FLOW LED – On OVEN HOT LED – On	<table border="1" style="width: 100%;"> <tr> <td style="background-color: yellow; text-align: center;"><b>CAUTION</b></td> </tr> <tr> <td style="text-align: center;">Canisters may be hot.</td> </tr> </table> Open Oven door using MANUAL OVERRIDE. Check for excess heat in oven  Contact <b>MCC-H</b>	<b>CAUTION</b>	Canisters may be hot.
<b>CAUTION</b>						
Canisters may be hot.						

## 2.315 HYGIENE BREAK

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(70 Minutes)

### OBJECTIVE:

This procedure allows the campout crewmembers to repress the airlock for required hygiene activities and to allow additional crewmembers in the airlock. The EV crew cannot initiate repress until at least 8:40 have been spent at 10.2 psi and then must spend 70 minutes on PHA Quick Don Masks.

### NOTE

**MCC-H** will nominally perform steps 1 to 4 from the ground prior to repressing the Airlock to 14.7 psia. Steps 1 and 3 do not need to be performed if manual pressure composition control is being used.

**MCC-H/IV**  
PCS

### 1. INHIBITING AIRLOCK PRESSURE COMPOSITION CONTROL

Airlock: ECLSS: PCA: PCA Commands

AL PCA Commands

'Press Composition Control'

**cmd** Inhibit

√Airlock ACS State – Monitor

PCS

### 2. INHIBITING AIRLOCK ALARMS

C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 3 5 6 (Cabin Pressure Above Normal-E/L)

**cmd** Arm

**cmd** Execute

input Event Code – 6 4 6 1 (MCA ppO2 Approaching Limits)

**cmd** Arm

**cmd** Execute

input Event Code – 6 5 7 5 (RAPID DEPRESS -LAB)

**cmd** Arm

**cmd** Execute

## 2.315 HYGIENE BREAK

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### NOTE

Per SPN 2562, the PCS rapid sample commands will not work (12A to 15A). The rapid sample commands must be built by the ground.

### 3. MCA CONFIGURATION

3.1 Perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND: C&DH: NOMINAL) to build Rapid Sample Template <LAEA96IM0472K>, then:

input Sequence Item 1 – 6 (Airlock)

**cmd** <Cmd Inv: LAB\_MCA\_Rpd\_Smpl\_Tmpl - (LAEA96IM0472K)>

PCS

3.2 US Lab: ECLSS: AR Rack: MCA

LAB MCA

'(ORU 2) Mass Spectrometer Assembly'

√Sample Time – updating every 2 seconds onboard or every 10 seconds on the ground

√Sample Location – Airlock

PCS

### 4. INHIBITING ISS RAPID DEPRESS RESPONSE AND ALARM

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'INT MDM Rapid Depress Response'

**cmd** Inhibit Arm (√ – Armed)

**cmd** Inhibit (√Status – Inhibited)

'CC MDM Rapid Depress Response'

**cmd** Inhibit Arm (√ – Armed)

**cmd** Inhibit (√Status – Inhibited)

4.1 Inhibiting CCS Low Pressure Safing Response

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'CC MDM Low Cabin P Response'

'Inhibit'

**cmd** Arm (√Arm Status – Armed)

**cmd** Inhibit (√Status – Inhibited)

4.2 √**MCC** to verify Russian Segment Rapid Depress Response inhibited

## 2.315 HYGIENE BREAK

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### MASK PREBREATHE INITIATION

EV1,2 A/L1D2 5. Relief Valve of PHA →|← PHA port

#### **WARNING**

Positive mask O2 pressure and fit are necessary to ensure adequate prebreathe.

6. Verify black plates in top of Quick Don Mask are seated in silicon.

7. Don Quick Don Mask.

PHA 8. Quick Don Mask O2 control → EMERGENCY

9. Momentarily pull mask away from face.

√O2 flow

10. Record mask P/B initiate time and continue mask prebreathe for 70 minutes.

GMT (MASK P/B INIT: HYGIENE) \_\_\_\_/\_\_\_\_:\_\_\_\_ \_\_\_\_

#### **WARNING**

1. Do not initiate airlock repress until 8:40 at 10.2 psi.
2. Do not terminate prebreathe until airlock pressure is back at 10.2 psia (527 mmHg) and 70 minutes of hygiene prebreathe completed.

### REPRESSING AIRLOCK TO 14.7 PSIA

11. Node 1 Stbd Hatch MPEV → Open  
Expect airlock repress to take approximately 7 minutes.

12. Open Node 1 Stbd Hatch per decal.

### 13. ENABLING ISS RAPID DEPRESS RESPONSE AND ALARM

MCC-H,IV

US Lab: ECLSS

Lab: ECLSS

Wait until  $|dP/dT| < 0.04$  mmHg/min, then:

13.1 Rapid Depress: Rapid Depress Response Software Control  
US Rapid Depress Response Software Control  
'INT MDM Rapid Depress Response'

**cmd** Enable (√Status – Enabled)

'CC MDM Rapid Depress Response'

## 2.315 HYGIENE BREAK

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**cmd** Enable (√Status – Enabled)

### 13.2 C&W Summ

'Event Code Tools'

sel Enable

input Event Code – 6 5 7 5 (RAPID DEPRESS – LAB)

**cmd** Execute

### 13.3 Enabling CCS Low Pressure Safing Response

Rapid Depress: Rapid Depress Response Software Control

'CC MDM Low Cabin P Response'

'Enable'

**cmd** Enable (√Status – Enabled)

MCC-H,IV

## 14. INHIBITING A/L RAPID DEPRESS RESPONSE AND ALARM

Rapid Depress: Rapid Depress Response Software Control

'Airlock Rapid Depress Response – INT MDM'

**cmd** Inhibit – Arm (√Status – Armed)

**cmd** Inhibit

√Airlock Depress Response–INT MDM Status – Inhibited

### C&W Summ

'Event Code Tools'

sel Inhibit

input Event Code – 6 5 7 6 (Rapid Depress-A/L)

**cmd** Arm

**cmd** Execute

PCS

## 15. CONFIGURING THE DEPRESS PUMP

Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01

√Close Cmd – Ena

## 2.315 HYGIENE BREAK

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cmd RPC Position – Close (Verify – CI)

### WARNING

When dragging PHA hoses through hatches, ensure QDs are within 3 feet of each Hatch.

### NOTE

During the period that airlock is at 14.7 psi, IV crew can perform PREP FOR DRESSING steps in {2.320 10.2 PSIA CAMPOUT EVA PREP} (SODF: ISS EVA SYS: OVERNIGHT CAMPOUT) in advance.

- EV1,2            16. Perform necessary hygiene activities.  
17. Retrieve breakfast.

- IV, EV1, EV2    18. Ingress Airlock.

- IV                19. CLOSING NODE 1 STBD HATCH

### NOTE

Be prepared to initiate depress within 5 minutes of closing the Node 1 Stbd Hatch to prevent high O2 concentrations in the Airlock.

- 19.1 √MCC-H for Go to continue

- 19.2 √Node 1 Stbd Hatch MPEV – CLOSED and uncapped

- 19.3 Check hatch seal and close Node 1 Stbd Hatch per decal (omit last step of decal).

20. DEPRESSING TO 10.2 PSIA

- 20.1 Momentarily pull mask away from face to verify positive O2 flow.

\*\*\*\*\*  
\* If no positive O2 flow, contact MCC-H.  
\*\*\*\*\*

- UIA                20.2 √DEPRESS PUMP ENABLE LED – On

- UIA                20.3 sw DEPRESS PUMP PWR → ON

Wait 10 seconds.

- C-Lk                20.4 DEPRESS PUMP MAN ISOV → OPEN

√Cab Press – Decreasing (use vacuum manometer or PCS)

## 2.315 HYGIENE BREAK

(ISS EVA SYS/7A - ALL/FIN 5/SPN) Page 6 of 8 pages

PCS

Airlock: ECLSS

Airlock: ECLSS

'Equipment Lock'

When Cab Press <14.1 psia (729 mmHg)

20.5 Turn Hatch handle in the UNLATCH direction approximately 1.5 turns to place the Hatch in the equalize position (orange stripe).

20.6 Crank Handle – Stowed Position

### NOTE

1. CSA-CP % O<sub>2</sub> will read approximately 1 % lower than actual during depress. Stable Airlock pressure is needed to obtain an accurate reading.
2. Per SPN 2563 (12A to 20A), each MCA partial pressure reading of the Airlock will be 86 seconds old before the depress begins, and will increase up to 99 seconds old at 10.2 psia.

20.7 Monitor O<sub>2</sub> using CSA-CP during depress.  
Refer to Figure 1.

# 2.315 HYGIENE BREAK

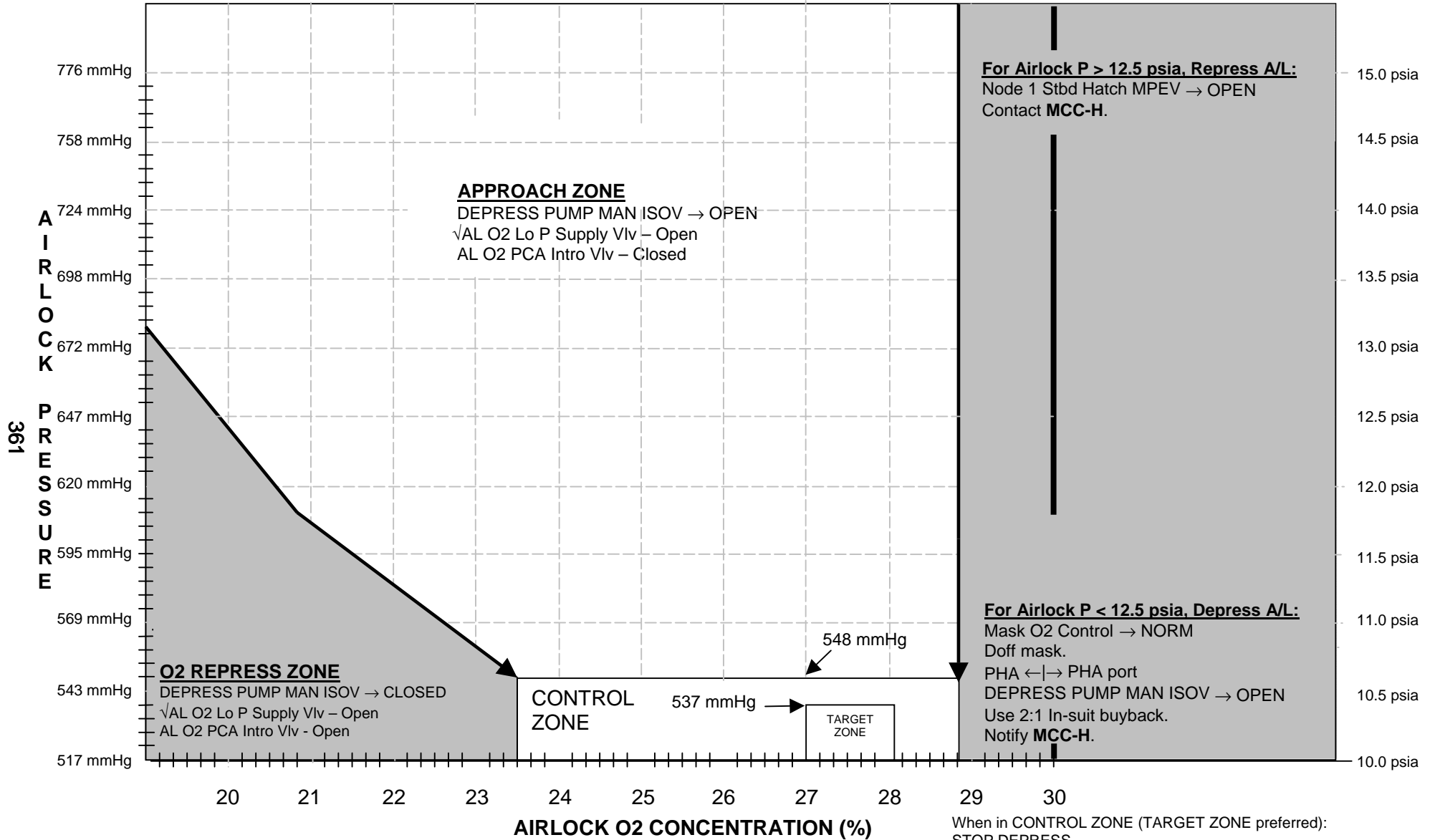


Figure 1.- 10.2 PSIA Depress Chart.

## 2.315 HYGIENE BREAK

(ISS EVA SYS/7A - ALL/FIN 5/SPN) Page 8 of 8 pages

- When Airlock is at 10.2 psia (527 mmHg)
- C-Lk | 20.8 DEPRESS PUMP MAN ISOV → CLOSED
- 20.9 Verify O2 is between 23.5 % and 28.8 %.
- UIA | 20.10 sw DEPRESS PUMP PWR → OFF
- MCC-H/IV** | 21. Perform {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION}, step 8 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:

### WARNING

Do not terminate prebreathe until Airlock pressure at 10.2 psia (527 mmHg) and 70 minutes hygiene prebreathe completed.

When 70 minutes of hygiene prebreathe complete and Airlock at 10.2 psia (527 mmHg)

22. Record Mask P/B terminate time
- GMT (MASK P/B TERM: HYGIENE) \_\_\_\_ / \_\_\_\_ : \_\_\_\_ \_\_\_\_
- PHA | 23. Quick Don Mask O2 control → NORMAL
24. Doff Quick Don Mask.
- A/L1D2 | 25. Relief Valve of PHA ←|→ PHA port
- Install cap on PHA port, Relief Valve.
- PHA | 26. Stow PHA Quick Don Mask in PHA Bag.

(90 Minutes)

OBJECTIVE:

This procedure is performed after 2.315 Hygiene Break to power up and don the EMUs. It assumes that the campout prebreathe protocol is used.

PREP FOR DONNING (30 MINUTES)

1. EVA COMM CONFIG

- MCC-H/IV**
- 1.1 Perform {2.701 UHF 1 ORU ACTIVATION}, all (SODF: C&T: NOMINAL: UHF), then:
  - 1.2 Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL: AUDIO), then:

If orbiter docked

- STS IV**
- 1.3 Perform shuttle EVA COMM CONFIG, all (FDF: EVA: EVA PREP), then:

2. EMU POWERUP

- EV-1,2**
- UIA**
- 2.1 √sw UIA PWR EV-1,2 (two) – OFF  
√UIA PWR EV-1,2 LEDs (four) – Off  
√EMU O2 SUPPLY PRESS gauge: 850 to 950
- C-Lk wall**
- 2.2 Remove SCU from stowage straps and pouches. Transfer SCU to E-Lk.
- DCM**
- 2.3 Open DCM Cover.  
Affix cover with Velcro to DCM.
  - 2.4 SCU →|← DCM  
  
√SCU locked
- DCM**
- 2.5 sw POWER → BATT

**CAUTION**

EMU must be on BATT power when UIA suit power is turned on.

- PSA**
- 2.6 √sw SUIT SELECT (two) – OFF  
√sw EMU MODE EMU1,2 (two) – PWR
  - 2.7 sw MAIN POWER → ON  
  
√MAIN POWER LED – On

2.8 sw SUIT SELECT (two) → EMU 1,2

- √EMU 1,2 LEDs (two) – On
- √EMU 1,2 Volts: 18.0 to 19.0

UIA 2.9 sw PWR EV-1,2 (two) → ON

- √PWR EV-1,2 EMU LEDs (two) – On

DCM 2.10 sw POWER → SCU

2.11 √STATUS: BATT VDC ≥ 20.3

UIA 3. OXYGEN EMU1,2 vlv (two) → OPEN

4. Waist ring ←|→ HUT

Temporarily stow LTA.  
 Remove Multiple Water Connector cover.

5. Helmet ←|→ HUT  
 Temporarily stow helmet.

6. Remove Dosimeter from inflight garments.  
 Insert Dosimeter in LCVG left leg pocket.

7. If necessary, apply Medical Kit items. As required, refer to {5.110 APPROVED NON-EMU HARDWARE}, all (SODF: ISS EVA SYS: REFERENCE).

8. Don MAG, TCU, LCVG, biomed.

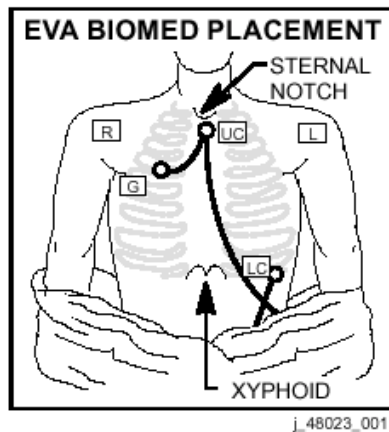


Figure 1.- Nondisposable Biomed Configuration.

9. Unstow biomed pigtail from EMU Servicing Kit.

Biomed pigtail →|← signal conditioner  
 Biomed pigtail →|← electrical harness

## 2.320 10.2 PSIA CAMPOUT EVA PREP

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 3 of 7 pages

10. Don comm cap.

### NOTE

Due to an RF interference issue between the hand-held mics and the EMU radios, the hand-held mic should not be used in the vicinity of powered EMU radios.

- DCM  11. sw COMM mode → PRI

12. √sw Comm FREQ – LOW

13. Verify biomed, EMU data, RF comm with **MCC-H**.

- EV1,2 DCM  14. sw COMM mode → HL

15. Doff comm cap.

16. Biomed pigtail ←|→ electrical harness

- ATU  17. √EACP y-cable →|← ATUs  
4,5

- EACP  18. √EACP y-cable →|← EACP

sw PWR → ON

√EMU 1,2 mode sel (two) – DUAL

- ATU  19. pb PTT → Press  
4,5,6 pb 1 → Press (Big Loop)  
pb 3 → Press (Shuttle/ISS ICOM)  
pb 5 → Press (Airlock)

√Display – ‘**1G, 3, 5T**’ and other loops, as required

√Display – ‘**DUAL**’

### EMU DONNING (55 MINUTES)

#### NOTE

May be performed by EV1 and EV2 simultaneously.

20. √EDDA latched

- EV1,2  21. Take one aspirin tablet (325 mg), if not taken previously.

- EV1 DCM  22. √STATUS: SOP P: 5410 to 6800 (compare with gauge)

23. √Waist ring – open

24. Don LTA (attach donning handles as required).

## 2.320 10.2 PSIA CAMPOUT EVA PREP

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 4 of 7 pages

If boot bladder manipulation required

25.1 Boot ←|→ Leg (sizing ring)

25.2 Pull up excess boot bladder around full circumference of boot disconnect.

**WARNING**

Keep bladder material clear of threads during reconnection of boot.

25.3 Boot →|← Leg (sizing ring)

25.4 Lock 1 → LOCK

√All locks (three per boot) are engaged

- 26. √Suit arms aligned
- 27. √Gloves ←|→ EMU  
√Wrist disconnects – open
- 28. Stow IV glasses as required.
- 29. Don thumb loops.
- 30. √Drink vlv position
- 31. √Biomed connector is outside of HUT
- 32. Don HUT.
- 33. Release thumb loops.
- 34. √Suit arms aligned
- 35. Don EV glasses as required.  
Don comm cap.
- 36. √Comm
- 37. Biomed pigtail →|← electrical harness
- 38. LCVG →|← Multiple Water Connector  
√Multiple Water Connector locked
- 39. √Thermal cover clear of waist ring

## 2.320 10.2 PSIA CAMPOUT EVA PREP

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 5 of 7 pages

40. Waist ring → engage position

41. Waist ring →|← HUT

√Waist ring locked

42. Remove donning handles.  
Stow donning handles in EMU Equipment Bag.  
Cover waist ring.

### CAUTION

Pulling on blue bite valve to adjust position  
can cause valve to release from stem.

43. √Drink vlv position

44. √Mic boom position

45. Don comfort gloves, wristlets.

46. Wrist rings → engage position

47. Don EV gloves.

√EV gloves locked

48. Tighten palm restraint straps.

49. √sw Glove heater (two) – OFF

50. √sw REBA – OFF (toward left arm of suit)

51. Lower arm power harness cables →|← Gloves

Stow slack under arm TMG.

52. √Cuff C/L position

√Wrist mirrors installed

### CAUTION

Flexible Ventilation Duct must be removed from  
Crewlock prior to taking EMU fan to ON to avoid  
ice formation on UIA water lines.

53. Rotate Flexible Ventilation Duct out of C-Lk.

### CAUTION

Minimize fan operation with O2 ACT – OFF (~2 minutes).



**2.320 10.2 PSIA CAMPOUT EVA PREP**

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 7 of 7 pages

- 67. sw DISP → STATUS until LEAK CHECK? displayed  
sw DISP → YES

Follow displayed instructions.

```
*****  
* If LEAKAGE HI / SUIT P X.X  
* | Go to {2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)},  
* | all (SODF: ISS EVA SYS: EMU CONTINGENCY).  
*****
```

- 68. Go to {1.220 EMU PURGE}, all (SODF: ISS EVA SYS: EVA PREP/POST).

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## 2.515 EMU PREBREATHE WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 1 of 4 pages

### OBJECTIVE:

Complete 4-hour in-suit prebreathe, install tools, and make final preparations for Crewlock depressurization.

1. **MCC-H** will monitor prebreathe clock.

Protocol	Prebreathe Duration
In-suit	04:00

- EV1,2
2. sw REBA → ON (pull tab toward right arm of suit)

3. DONNING SAFER (15 MINUTES)

When comm permits, **MCC-H** will read the remaining steps of this procedure to the EV crew.

- EV1 EV2s  
SAFER
- 3.1 PLSS →|← thruster towers

- 3.2 Push latch in and ↻ (~90°)

\*\*\*\*\*

\* If latch will not engage  
\* | Latch → PRELOAD  
\* | Latch ↻  
\* | Latch → ENGAGE  
\* | Return to step 3.1

\*\*\*\*\*

- 3.3 Latch → PRELOAD

- 3.4 Latch ↻ until ratcheting

### CAUTION

Latch ↻ may disengage SAFER.

- 3.5 Continue ratcheting until lock marking on latch and tower aligned.

- 3.6 Latch → LCK

- 3.7 ✓ Access to HCM deploy lever  
✓ TMG not blocking thruster

- EV2
- 3.8 Repeat steps 3.1 to 3.7 for EV1s SAFER.

- EV1,2
4. Install miniworkstation, tools, waist tethers, BRTs as required on EMUs.

## 2.515 EMU PREBREATHE WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 2 of 4 pages

EV2 Do not proceed until **MCC-H** reports 1 hour of prebreathe remains.  
5. Unstow new Metox canister.

EV1s  
PLSS 6. Unzip thermal cover.  
Affix thermal cover with Velcro to top of EMU.

### WARNING

Fan will be off during changeout. Perform changeout as quickly as possible to avoid CO2 buildup.

### CAUTION

Vent loop is pressurized. Restrain Metox canister.

EV1 DCM 7.  $\sqrt{O_2}$  ACT – IV  
8. Helmet purge vlv → op  
9. sw FAN → OFF

EV2 EV1s  
PLSS 10. Remove expended Metox canister.  
11. Remove caps from new Metox canister.  
12. Install Metox using label on canister for proper orientation.  
Latch canister in place.

### NOTE

EMU may issue **CO2 HIGH** or **MONITOR CO2** message because Metox canister not conditioned yet.

EV1 DCM 13. sw FAN → ON  
14. Helmet purge vlv → cl, locked

DCM 15. O2 ACT → PRESS  
16. PURGE vlv → op (up)  
17. Begin timing 2-minute purge.

EV2 EV1s  
PLSS 18. Close thermal cover zipper.  
19. Place caps on expended Metox.  
Temporarily stow canister.  
20. Report Metox canister barcodes and new stowage location to **MCC-H** as comm permits.

## 2.515 EMU PREBREATHE WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 3 of 4 pages

- EV1 DCM
- When purge time = 2 minutes
21. √STATUS: CO2 < 3.0 mmHg, then:  
  
PURGE vlv → cl (dn)
  22. O2 ACT → IV

### NOTE

A minimum of 40 minutes of prebreathe is required to condition Metox canisters.

- EV1,2 23. Repeat steps 5 to 22 for EV2.

- EV1,2 24. pb EMU TV power → Press

√Green LED – On

- MCC-H PCS** 25. [CONFIGURING THE DEPRESS PUMP](#)  
Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01  
RPCM AL1A4A A RPC 01

√Close Cmd – Ena

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

26. [OPENING NODE 1 STBD FWD IMV VALVE](#)

Node 1: ECLSS: IMV Stbd Fwd Valve

Node 1 IMV Stbd Fwd Vlv

sel RPCM N14B A RPC 16

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

'Enable'

**cmd** Arm (√Status – Armed)

**cmd** Enable (√Status – Enabled)

'Open'

**cmd** Arm (√Status – Armed)

**cmd** Open (Wait 15 seconds, √Position – Open)

- EV1,2 Node 1 Stbd Hatch 27. √Ribbed side (EVA side) Hatch Handle in properly stowed position (Handle should be engaged on Handle Stowage Retaining Key, pointing up towards UNLATCH direction.)

28. √Latch Ratchet – LATCH

## 2.515 EMU PREBREATHE WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 4 of 4 pages

29. √Node 1 Stbd Hatch MPEV – CLOSED (√cap remains removed)

30. Close Node 1 Stbd Hatch per decal.

Eq-Lk 31. √IV Hatch equalization valve – OFF (√cap remains removed)

32. EMERGENCY MPEV → OPEN

33. Ingress C-Lk.

C-Lk 34. √DEPRESS PUMP MAN ISOV – CLOSED

### CAUTION

Hatch mechanism is a pinch point. Keep all suit components clear of mechanism.

35. IV Hatch → CLOSE, lock

When in-suit prebreathe time complete

UIA

36. √sw DEPRESS PUMP PWR – OFF

√DEPRESS PUMP ENABLE LED – On

**On MCC-H GO**, go {CREWLOCK DEPRESS/REPRESS  
WITHOUT IV CUE CARD} CREWLOCK DEPRESS (SODF:  
ISS EVA SYS: NO IV EVA).

HOOK  
VELCROHOOK  
VELCRO**CREWLOCK DEPRESS/REPRESS WITHOUT IV CUE CARD**

(ISS EVA SYS/E6 - ALL/FIN/Paper on ISS) Page 1 of 2 pages

CREWLOCK DEPRESS (30 MINUTES)

- When prebreathe complete
- DCM 1. √sw Comm FREQ – LOW
- UIA 2. √sw COMM mode → PRI
- UIA 3. sw DEPRESS PUMP PWR → ON  
(wait 10 seconds for complete startup)
- C-Lk 4. DEPRESS PUMP MAN ISOV → OPEN, (expect alert tone)  
Monitor Suit P gauge < 5.5.
- \*\*\*\*\*
- \* If gauge > 5.5
- \* | Stop depress, √**MCC-H**
- \*\*\*\*\*
- DCM 5. C-Lk at 6.0, (expect alert tone)
- When C-Lk at 5.0 psia (259 mmHg)
- C-Lk 6. DEPRESS PUMP MAN ISOV → CLOSED, (expect alert tone)
- DCM 7. sw DISP → STATUS until **LEAK CHECK?** displayed  
sw DISP → YES, follow displayed instructions
- \*\*\*\*\*
- \* If **LEAKAGE HI | SUIT P X.X**
- \* | Perform {2.110 FAILED LEAK CHECK (5 PSIA)}
- \* | (SODF: ISS EVA SYS: EMU CONTINGENCY), then:
- \*\*\*\*\*
8. √O2 ACT – EVA
9. √STATUS, compare with Cuff Checklist page 1
10. DEPRESS PUMP MAN ISOV → OPEN, (expect alert tone)  
Monitor SUIT P gauge < 5.5.
- MCC-H** 11. Airlock: ECLSS: PCA: VRIV  
'Open'  
**cmd** Arm (√Status – Armed)  
**cmd** Open (√Position – Open)
- \*\*\*\*\*
- \* If gauge > 5.5
- \* | DEPRESS PUMP MAN ISOV → CLOSED
- \* | ↓**MCC-H**: 'Stop depress'
- \* | **MCC-H** perform step 16.
- \*\*\*\*\*
- When C-Lk at 2.0 psia (103 mmHg)
- C-Lk 12. DEPRESS PUMP MAN ISOV → CLOSED
- UIA 13. sw DEPRESS PUMP PWR → OFF
- C-Lk 14. Attach waist tethers to C-Lk D-ring for egress.
- DCM When C-Lk dP/dT ~ 0, expect alert tone
- When EV Hatch ΔP < 0.5 psi (26 mmHg)
- C-Lk 15. EV Hatch → open, stow
- MCC-H** 16. Airlock: ECLSS: PCA: VRIV  
'Close'  
**cmd** Close (√Position – Closed)

POST DEPRESS (5 MINUTES)

- DCM 1. sw POWER → BATT (stagger switch throws), expect warning tone  
(**MCC-H** record GMT \_\_\_\_/\_\_\_\_:\_\_\_\_) **EVA PET = 00:00**
- UIA 2. sw PWR EV-1,2 (two) → OFF  
√PWR EV-1,2 LEDs (four) – Off
- DCM 3. SCU ←|→ DCM
4. Install DCM cover.
5. Stow SCU in pouch.
- C-Lk 6. √DEPRESS PUMP MAN ISOV – CLOSED
- DCM 7. Temp control vlv → Max H
8. sw WATER → ON
9. √DCM blank, BITE – off
10. Temp control vlv → 3 to Max C
11. √STATUS, compare to Cuff Checklist page 1 (**MCC-H** record)
12. Visors as required.
13. Go to {**CREWLOCK EGRESS**} (SODF: ISS EVA SYS: CUFF  
CHECKLIST) page 34 or EVA specific timeline.

EVA-1a/E6 - ALL/C

HOOK  
VELCRO

HOOK  
VELCRO

**CREWLOCK DEPRESS/REPRESS WITHOUT IV**

(ISS EVA SYS/E6 - ALL/FIN/Paper on ISS) Page 2 of 2 pages

PRE REPRESS (5 MINUTES)

- 1. √SCU →|← DCM
- DCM 2. √sw WATER – OFF (for at least 2 minutes before proceeding)
- 3. √EV Hatch closed, locked
- 4. Waist tethers ←|→ C-Lk D-ring, attach to EMUs
- UIA 5. √OXYGEN EMU1,2 vlv (two) – OPEN
- 6. sw PWR EV-1,2 (two) → ON
- √PWR EV-1,2 EMU LEDs (two) – On
- √PWR EV-1,2 VOLTS = 18.0 to 19.0
- DCM 7. sw POWER → SCU, (expect warning tone)

CREWLOCK REPRESS (10 MINUTES)

**WARNING**

If on SOP, leave O2 ACT – EVA thru C-Lk repress.

- DCM 1. O2 ACT → PRESS
- 2. sw COMM mode → HL
- C-Lk 3. √EV Hatch MPEV – CLOSED
- 4. IV Hatch equalization valve → throttle OFF to NORM (as required),  
(expect alert tone)  
**(MCC-H record GMT\_\_\_\_\_/:\_\_\_\_\_)**
- DCM 5. C-Lk at 4.0, (expect alert tone)
- When C-Lk at 5.0 (259 mmHg)
- C-Lk 6. IV Hatch equalization valve → OFF, (expect alert tone)
- Wait 2 minutes for C-Lk pressure to stabilize, then:
- MCC-H** 7. Airlock: ECLSS
- Record Crew Lock Press: \_\_\_\_\_mmHg (P1)
- Wait 1 minute, then record again: \_\_\_\_\_mmHg (P2)
- \*\*\*\*\*
- \* If  $\Delta P \geq 9$  mmHg (where  $\Delta P = P1-P2$ )
- \* | Go to {2.530 CREWLOCK LARGE LEAK
- \* | RESPONSE WITHOUT IV} (SODF: ISS EVA
- \* | SYS: NO IV EVA).
- \*
- \* If  $\Delta P > 2$  mmHg (where  $\Delta P = P1-P2$ )
- \* | Go to {2.525 CREWLOCK SMALL LEAK
- \* | RESPONSE WITHOUT IV} (SODF: ISS EVA
- \* | SYS: NO IV EVA).
- \*\*\*\*\*
- 8. √Gloves heaters – OFF, gloves clean

**WARNING**

1. If CUFF 1 symptoms resolving upon repress, report as CUFF 2.

2. If any DCS, leave O2 ACT – PRESS.

- DCM 9. O2 ACT → IV
- C-Lk 10. IV Hatch equalization vlv → throttle OFF to NORM, (expect alert tone)
- DCM When C-Lk dP/dT ~ 0, (expect alert tone)
- 11. Go to {2.520 POST EVA WITHOUT IV} (SODF: ISS EVA SYS: NO IV EVA).

**2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV**  
(ISS EVA SYS/INC 9 - ALL/FIN/HC/Paper on ISS) Page 1 of 5 pages

(90 Minutes with Hatch inspection)  
(65 Minutes without Hatch inspection)

OBJECTIVE:

This procedure provides the crew with the necessary steps to safe the Airlock in the event that the Crewlock fails its 5 psi leak check upon Repress. A small leak is defined as one which can be supported by consumables to allow for EV crew to ingress the Equipment Lock and perform safing activities at a habitable pressure. This procedure assumes two EVA crewmembers and no IV crew.

CONFIGURING EMU

EV DCM 1. √sw Comm FREQ – LOW

sw COMM mode → PRI

NOTE

Steps 3 to 13 depress the Crewlock to vacuum and have the EV crew reopen the EV Hatch to check if there is debris that was caught in the hatch when it was closed. Steps 3 to 13 can be performed only if Time and Consumables permit.

**MCC-H** 2. Inform EV crew whether or not consumables permit performing steps 3 to 13.

DEPRESS CREWLOCK AND INSPECT EV HATCH SEALS  
(25 MINUTES)

EV DCM 3. √SCU →|← DCM

4. √STATUS: SUIT P 4.2 to 4.4, compare with gauge

5. O2 ACT → EVA (expect SET O2 PRESS msg, sw DISP → PRO)

**MCC-H** 6. Airlock: ECLSS: PCA: VRCV  
PCS AL PCA VRCV

√Status – Operational

√Position – Closed

Airlock: ECLSS: PCA: VRIV

AL PCA VRIV

'Open'

**cmd** Arm (√Status – Armed)

**cmd** Open (√Position – Open)

EV DCM 7. Monitor Suit P gauge < 5.5.

\*\*\*\*\*

\* If Suit P gauge ≥ 5.5 psid

\* | Stop depress.

\* | Contact **MCC-H**.

\*\*\*\*\*

**2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV**  
 (ISS EVA SYS/INC 9 - ALL/FIN/HC/Paper on ISS) Page 2 of 5 pages

**8. ACTIVATING DEPRESS PUMP**

- |  |      |   |
|--|------|---|
| <b>MCC-H</b>                                   | PCS  | 8.1 Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01<br><u>RPCM AL1A4A A RPC 01</u><br><br>√Close Cmd – Ena<br><br><b>cmd</b> RPC Position – Close (√Position – Cl) |
| EV   | UIA  | 8.2 √DEPRESS PUMP ENABLE LED – On<br><br>sw DEPRESS PUMP PWR → ON<br>(wait 10 seconds for startup)  |
|  | C-lk | 8.3 DEPRESS PUMP MAN ISOV → OPEN<br><br>When C-Lk at 2.0 psia (103 mmHg)  |
|  | UIA  | 9. DEPRESS PUMP MAN ISOV → CLOSED<br><br>10. sw DEPRESS PUMP PWR → OFF  |
|  | DCM  | 11. When C-Lk dP/dT ~0, EV expect alert tone<br><br>When EV Hatch ΔP < 0.5 psi (26 mm Hg)   |
| EV   | C-Lk | 12. EV Hatch → open<br><br>Inspect EV Hatch seals and remove any debris that is present.  |
| <b>MCC-H</b>                                   | PCS  | 13. Airlock: ECLSS: PCA: VRIV<br><u>AL PCA VRIV</u><br>'Close'<br><br><b>cmd</b> Close (√Position – Closed)   |
| <b><u>REPRESSING CREWLOCK (10 MINUTES)</u></b> |      |   |
| EV   | C-Lk | 14. √Thermal cover – closed<br>√EV Hatch MPEV – CLOSED<br><br>EV Hatch → close, lock  |
|  | DCM  | 15. O2 ACT → PRESS  |
|  | C-Lk | 16. IV Hatch equalization valve → throttle OFF to NORM (as required, expect alert tone)   |
|  | DCM  | 17. C-Lk at 4.0, expect alert tone.<br><br>When C-Lk at 5.0 (259 mm Hg)   |
|  | C-Lk | 18. IV Hatch equalization valve → OFF (expect alert tone)   |

**2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV**  
(ISS EVA SYS/INC 9 - ALL/FIN/HC/Paper on ISS) Page 3 of 5 pages

Wait 30 seconds for pressure stabilization, then proceed  
19.  $\checkmark$ C-Lk pressure integrity (2 minutes,  $\Delta P \leq 0.1$  psi)

If leak check passed

20. Go to CREWLOCK REPRESS {CREWLOCK  
DEPRESS/REPRESS WITHOUT IV CUE CARD}  
steps 8 to 11 (SODF: ISS EVA SYS: NO IV EVA).

- C-Lk 21. IV Hatch equalization vlv  $\rightarrow$  throttle OFF to NORM (EMER) (as required, EV expect alert tone)

**WARNING**

1. If Cuff 1 symptoms resolving upon repress, report as Cuff 2.  
2. If any DCS, leave O2 ACT – PRESS.

When C-Lk P > 5.0 psia

- DCM 22. O2 ACT  $\rightarrow$  IV  
23. When C-Lk dP/dT  $\sim$ 0, (EV expect alert tone)

**CAUTION**

Verify EV crew is clear of hatch mechanism.

DOFFING EMU AND POWERDOWN (25 MINUTES)

- EV 24. To doff EMUs, perform {2.520 POST EVA WITHOUT IV} steps 1 to 25 and 28 (SODF: ISS EVA SYS: NO IV EVA), then:
- UIA 25. sw PWR EV-1,2 (two)  $\rightarrow$  OFF  
 $\checkmark$ PWR EV-1,2 LEDs (four) – Off
- PSA 26. sw SUIT SELECT (two)  $\rightarrow$  OFF  
 $\checkmark$ SUIT SELECT LEDs (four) – Off
27. sw MAIN POWER  $\rightarrow$  OFF  
 $\checkmark$ MAIN POWER LED – Off
- EACP 28. sw PWR  $\rightarrow$  OFF
- DCM 29. SCU  $\leftarrow$  |  $\rightarrow$  DCM  
Install DCM Cover.
30. Insert SCU in stowage pouch.

**2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV**  
 (ISS EVA SYS/INC 9 - ALL/FIN/HC/Paper on ISS) Page 4 of 5 pages

REMOVING SCU AND TOOLS FROM CREWLOCK (30 MINUTES)

- C-Lk 31. Unstow from C-Lk IV Bag:  
 7/16" Socket with 6" extension (in socket caddy)  
 EVA Ratchet
  
- UIA 32. √WATER SUPPLY EV-1, 2 vlv (two) – CLOSE  
 √WATER REGULATOR EV-1,2 vlv (two) – CLOSE  
 √OSCA – O2 CLOSED (O2 3AKP)
  
- MCC-H/EV  
 PCS 33. CLOSING AIRLOCK O2 HI PRESSURE SUPPLY VALVE  
 Airlock: ECLSS: O2 Hi Pressure Supply Valve  
 AL O2 Hi Pressure Supply Valve

**cmd** Close (Verify Actual Position – Closed)

NOTE

Removal of ОРЛАН caps is technique sensitive. For removal instructions, push cap inward and rotate clockwise (opposite the displayed arrow), 1/8 turn; then pull outward. Refer to Figure 1.



Figure 1.- OSCA and ОРЛАН Caps.

- EV    UIA    34. ОРЛАН-I (II) cap 2 ←|→ OSCA  
 ОРЛАН-I (II) cap 3 ←|→ OSCA  
  
 OSCA ↻ PRESS (НАДДУВ)

**2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV**  
 (ISS EVA SYS/INC 9 - ALL/FIN/HC/Paper on ISS) Page 5 of 5 pages

35. √OXYGEN EMU 1, 2 vlv (two) – OPEN

NOTE  
 The next step will depressurize the SCU and UIA supply lines via the OSCA prior to removal of the SCU.

36. OXYGEN ORLAN vlv → OPEN

When purge no longer audible

- |      |  |  |
|------|--|--|
|      |  | 37. √EMU O2 SUPPLY PRESS gauge $\cong$ 0<br>√ORLAN O2 SUPPLY PRESS gauge $\cong$ 0   |
|      |  | 38. OSCA ↻ O2 CLOSED (O2 3AKP)<br><br>ОРЛАН-I (II) cap 2 →   ← OSCA<br>ОРЛАН-I (II) cap 3 →   ← OSCA                                   |
|      |  | 39. OXYGEN EMU 1,2 vlv (two) → CLOSE   |
|      |  | 55. OXYGEN ORLAN vlv → CLOSE   |
| C-Lk |  | 40. Remove SCU from stowage straps on C-Lk wall.   |
| UIA  |  | 41. SCU ←   → UIA (by turning SCU Mating bolts (two) ↻ using ratchet with 7/16" Socket ( $\cong$ 15 turns each)).                      |
|      |  | 42. Strain relief hooks (two) ←   → tether points (two) on C-Lk wall   |
|      |  | 43. √DEPRESS PUMP MAN ISOV – CLOSED  |
|      |  | 44. Remove stowage pouches from C-Lk restraint straps (leave DCM connectors inside pouches).   |
|      |  | 45. Transfer to E-Lk from C-Lk<br>SCUs (with pouches)<br>Crewlock EVA Bags (four)<br>IV Bag<br>Staging Bag<br>All additional EVA tools |
| E-Lk |  | 46. Close IV Hatch per decal.<br><br>√IV Hatch equalization valve – OFF  |
|      |  | 47. Install IV Hatch equalization valve cap.   |
|      |  | 48. Perform {2.520 POST EVA WITHOUT IV} (SODF: ISS EVA SYS: NO IV EVA), then:<br><br>√ <b>MCC-H</b> for deltas                         |

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## 2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN/Paper on ISS)

Page 1 of 6 pages

(105 Minutes without second repress attempt)

### OBJECTIVE:

Given a large Crewlock leak that cannot be supported during Crewlock repress, this procedure depresses the Equipment Lock to vacuum for EV crew ingress and repress.

#### NOTE

1. No IV crew is available for this procedure.
2. The VRIV and VRCV are assumed to be fully operational.

#### DEPRESSING CREWLOCK (25 MINUTES)

- |              |      |  |
|--------------|------|--|
| EV           | DCM  | 1. $\sqrt$ sw Comm FREQ – LOW  |
|              |      | 2. sw COMM mode → PRI  |
|              | C-Lk | 3. $\sqrt$ IV Hatch equalization valve – OFF   |
|              | DCM  | 4. O2 ACT → EVA  |
| <b>MCC-H</b> | PCS  | 5. Airlock: ECLSS: PCA: VRCV<br><u>AL PCA VRCV</u><br><br>$\sqrt$ Status – Operational<br>$\sqrt$ Position – Closed<br><br>Airlock: ECLSS: PCA: VRIV<br><u>AL PCA VRIV</u><br>'Open'<br><br><b>cmd</b> Arm ( $\sqrt$ Status – Armed)<br><b>cmd</b> Open ( $\sqrt$ Position – Open) |
| EV           | DCM  | 6. Monitor SUIT P gauge < 5.5.<br><br>*****<br>* If gauge > 5.5, stop depress, $\sqrt$ <b>MCC-H</b> .<br>*****   |
| EV           | C-Lk | If EV Hatch MPEV is usable per <b>MCC-H</b><br>7. EV Hatch MPEV → OPEN<br><br>8. Attach waist tethers to C-Lk (UIA) D-ring.<br><br>9. When C-Lk dP/dT ~ 0, (EV expect alert tone)  |

**2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV**

(ISS EVA SYS/INC 9 - ALL/FIN/Paper on ISS)

Page 2 of 6 pages

When EV Hatch ΔP < 26 mmHg (0.5 psi)

- 10. EV Hatch → open, stow
- 11. EV Hatch MPEV → CLOSED
- 12. Inspect EV Hatch seals for damage and debris.
- 13. Remove debris as required.

**MCC-H**

- 14. ✓EMU consumables

EV

If second repress attempt desired and > 90 minutes of EMU consumables remain

- 15. ✓Thermal cover – closed
- 16. EV Hatch → close and lock
- 17. Go to CREWLOCK REPRESS {CREWLOCK DEPRESS/REPRESS WITHOUT IV CUE CARD} steps 3 to 11 (SODF: ISS EVA SYS: NO IV EVA).

If < 80 minutes of EMU Metox (LiOH) remain

- 18. Helmet Purge vlv → open

PREPARING EQUIPMENT LOCK FOR VACUUM (20 MINUTES)

MCC-H	EV
19. Perform {2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV} steps 1 to 6 (SODF: ISS EVA SYS: NO IV EVA), then:	C-Lk 20. Begin removing every other Velcro strap from SCU.  C-Lk IVA Bag: 21. Retrieve EVA Ratchet and 7/16" X 6" wobble socket.  DCM 22. Cold soak as time allows.  Temp control vlv → increase toward Max C (slightly colder than comfortable)

EQUIPMENT LOCK DEPRESS (15 MINUTES)

**MCC-H**

- 23. Give a go for Equipment Lock depress.

EV C-Lk

- 24. ✓EV Hatch – open and stowed
- 25. IV Hatch equalization valve → EMER

## 2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN/Paper on ISS)

Page 3 of 6 pages

- MCC-H**            26. Airlock: ECLSS: PCA: VRCV  
    **PCS**            AL PCA VRCV  
                      'Open'

**cmd** Arm (√Status – Armed)  
**cmd** Open (√Position – Open)

### WARNING

Hatch latch mechanism is a pinch hazard.  
Verify EV crew is clear of it.

- MCC-H**            27. Give EV crew a go to open IV Hatch  
                      When E-Lk pressure ~ 0.0 psia (expect ~ 10 to 15 minutes)

- EV**    **C-Lk**        28. Open IV Hatch per decal.  
                      29. IV Hatch equalization valve → OFF  
                      30. EV Hatch Thermal Cover → Close  
                      31. Partially close EV Hatch. Leave small gap for water sublimation.  
                      32. Waist Tethers ←|→ C-Lk D-ring; attach to EMUs

### CONFIGURING FOR SCU REMOVAL (5 MINUTES)

33. Transfer the following to Equipment Lock and secure:  
    IV Bag  
    Staging Bag  
    Crewlock EVA Bags (four)  
    All ORUs

If Helmet Purge vlv open (per step 18, to conserve Metox/LiOH)

34. Helmet Purge vlv → close and lock  
**DCM**        35. √STATUS: O2 P > 850

### WARNING

EV crew will be without SCU O2 supply for approximately 45 minutes. If Metox (LiOH) canister expended, open/close helmet purge valve as required to maintain safe ppCO2 levels. The SOP may be required to complete the procedure.

## 2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN/Paper on ISS)

Page 4 of 6 pages

### MCC-H

PCS

#### 36. CLOSING AIRLOCK O2 HI PRESSURE SUPPLY VALVE

Airlock: ECLSS: O2 Hi Pressure Supply Valve

AL O2 Hi Pressure Supply Valve

**cmd** Close (Verify Actual Position – Closed)

EV

DCM

37. sw POWER → BATT, (expect warning tone)

UIA

38. sw PWR EV-1,2 (two) → OFF

√PWR EV-1,2 LEDs (four) – Off

DCM

39. SCU ←|→ DCM

Install DCM cover.

C-Ik

40. Stow SCU in pouch.

DCM

41. Temp control vlv → Max H

42. sw WATER → ON

43. √DCM blank, BITE – off

44. Temp control vlv → between 3 and Max C (slightly colder than comfortable)

### MCC-H

PCS

#### 45. DISABLING THE POWER SUPPLY ASSEMBLY

Airlock: EPS: RPCM AL2A3B B

sel RPC 18

RPCM AL2A3B B RPC 18

**cmd** Open Cmd – Enable (√Open Cmd – Ena)

**cmd** RPC Position – Op (√RPC Position – Op)

### MCC-H

46. Give EV crew a go for SCU removal.

#### REMOVING SCU FROM UIA (20 MINUTES)

MCC-H	EV
<p>47. Perform {2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV} steps 7 and 8 (SODF: ISS EVA SYS: AIRLOCK CONTINGENCY), then:</p>	<div style="border: 2px solid black; padding: 5px; text-align: center; background-color: yellow; margin-bottom: 10px;"> <p><b>CAUTION</b></p> </div> <p>ОРЛАН caps on UIA are not tethered. Be prepared to catch them during removal.</p> <p>48. Perform {SCU REMOVAL FROM UIA (AT VACUUM)} pages 32 and 33 (SODF: ISS EVA SYS: CUFF CHECKLIST), then:</p>

## 2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN/Paper on ISS)

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### EQUIPMENT LOCK INGRESS (5 MINUTES)

EV DCM 49. Begin maximum cold soak.

Temp control vlv → Max C

50. Transfer SCUs to E-Lk and secure.

51. √All items removed from C-Lk.

#### NOTE

EV crew will be without cooling after the next step.

DCM 52. sw WATER → OFF

53. EV Hatch → fully close, lock

54. Ingress E-Lk.

55. Close IV Hatch per decal, lock.

√IV Hatch equalization valve – OFF

A/L1A2 56. EMERGENCY MPEV → CLOSED

### EQUIPMENT LOCK REPRESS (15 MINUTES)

#### **WARNING**

The VRIV and VRCV must be closed in order to repress the Equipment Lock.

#### NOTE

EV crew disregard SET O2 PRESS message during repress.

MCC-H 57. Give a go for Equipment Lock Repress

EV 58. Node 1 Stbd Hatch MPEV → throttle CLOSED to OPEN (as required), EV expect alert tone

**2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV**

(ISS EVA SYS/INC 9 - ALL/FIN/Paper on ISS)

Page 6 of 6 pages

If EV crew consumables/condition permit

**MCC-H**

- 59. When E-Lk at 1.0 psi, perform IV Hatch leak check
  - 59.1 Node 1 Stbd Hatch MPEV → CLOSED (EV expect alert tone)
  - 59.2 Wait 30 seconds for pressure stabilization.
  - 59.3 √E-Lk pressure integrity (2 minutes, ΔP < 1.5 mmHg)
  - 59.4 Node 1 Stbd Hatch MPEV → throttle CLOSED to OPEN (as required), EV expect alert tone

EV

- 60. E-Lk at 4.0 psi, EV expect alert tone

<b>WARNING</b>
1. If Cuff 1 symptoms resolving upon repress, report as Cuff 2.
2. If any DCS, O2 ACT → PRESS instead of IV in the next step.

DCM

- When E-Lk at 5.0 psi
- 61. O2 ACT → IV

<b>WARNING</b>
Verify EV crew is clear of hatch latch mechanism.

- When E-Lk dP/dT ~0 (EV expect alert tone)
- 62. Open Node 1 Stbd Hatch per decal.

- 63. √Node 1 Stbd Hatch MPEV – CLOSED

EV

- 64. Install IV Hatch equalization valve cap.

<b>MCC-H</b>	<b>EV</b>
65. Go to {4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE} (SODF: ISS EVA SYS: AIRLOCK CONTINGENCY).	66. Perform {2.520 POST EVA WITHOUT IV} (SODF: ISS EVA SYS: NO IV EVA), then:  √ <b>MCC-H</b> for deltas

# NORMAL EVA STATUS

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## NORMAL EVA STATUS

O2 POS	EVA
TIME EV	HH:MM since PWR-BATT
TIME LF/ Limit consum	HH:MM remaining at present use rate
% O2 (PWR) LF	Nonlimiting consumable will be displayed
SUIT P	4.2 to 4.4 psid
O2 P	150 to 950 psia
SOP P	5410 to 6800 psia
SUBLM P	2.0 to 4.2 psia
BAT VDC	≥ 16.7
BAT AMP	3.0 to 4.0
RPM	18.0 to 20.0 K
CO2	0.2 to 2.0 mm
H2O TEMP	32 to 75° F
H2O GP/WP	14.0 to 16.0 psid
GAUGE	4.2 to 4.4 psid

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DCM  
CONFIG  
MAL  
INDEX

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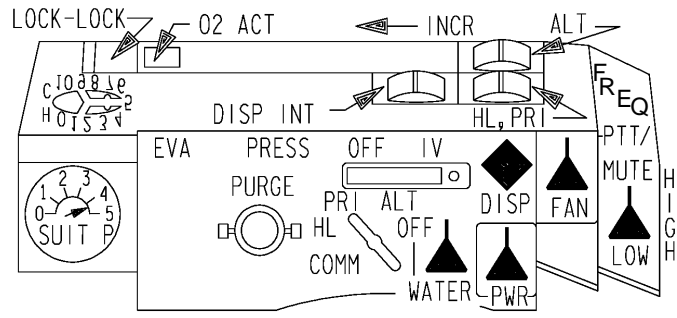
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**DCM CONFIG**

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NORM  
EVA  
STAT

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**EVA COMM FREQUENCIES**

LOW=414.2 MHz

HIGH=417.1 MHz

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# EMU MALFUNCTION INDEX

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## EMU MALFUNCTION INDEX

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ABORT EVA	6	O2 USE HIGH	14
AIR FLOW CONT	21	PWR LF (%)	24
BATT AMPS HI	9	RESRV H2O ON	17
BATT VDC LOW	10	RLF V FAIL	23
BITE light	23	SET H2O OFF	24
COMM FAIL	20	SET O2 EVA	24
CO2 HIGH	19	SET O2 PRESS	24
DCS	4	SET PWR SCU	24
FAN SW OFF	24	SOP O2 ON	8
H2O GP LOW	16	SOP P LOW	13
H2O IS OFF	24	SUBLM P	15
LIMITS BAD	23	SUIT P EMERG	23
LOSS OF COOLING	22	SUIT P HIGH	12
MONITOR CO2	19	SUIT P LOW	11
NO VENT FLOW	18	TERMINATE EVA	7
O2 IS OFF	24	TIME LF: XX	24
O2 LF (%)	24	VENT SW FAIL	23

DCS

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# DECOMPRESSION SICKNESS (DCS)

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## DECOMPRESSION SICKNESS (DCS)

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### Class 1

Symptoms: Mild pain (single/multiple sites) and/or single extremity numbness/tingling. Difficult to discern from suit pressure points. Symptoms do not interfere with performance.

DCM  
CONFIG  
MAL  
INDEX

DCS Action: Report in POST EVA PMC.

### Class 2

Symptoms: Moderate Class 1 symptoms that interfere with performance or symptoms that resolve upon repress.

Action: Perform worksite cleanup, minimize activity of affected crewmember, TERM EVA; REPRESS

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# DECOMPRESSION SICKNESS (DCS)

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## DECOMPRESSION SICKNESS (DCS) (CONT)

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### Class 3

Symptoms: Severe Class 1 symptom or migratory, trunkal/multiple site numbness/tingling, unusual headache.

Action: Assist affected crewmember to C-Lk, safe worksite, TERM EVA; REPRESS.

### Class 4

Symptoms: Serious symptom – central neurological, cardiopulmonary

Action: ABORT EVA.  
Assisted return of affected crewmember to C-Lk, repress affected crewmember solo. Unaffected crewmember safe worksite, TERM EVA; REPRESS.

ABORT  
EVA  

---

TERM  
EVA

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**ABORT EVA**

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**ABORT EVA**

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**BOTH:** Ingress C-Lk.  
Unhook from reel.  
Outer (EV) Hatch – close and lock  
Go to EMERGENCY CREWLOCK REPRESS  
decal (airlock hatches).

DCS

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# TERMINATE EVA

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## TERMINATE EVA

1. Ingress C-Lk.
2. Connect SCU.

### WARNING

If terminating due to BATT AMPS HIGH (system short), do not perform step 3.

- UIA
3. sw PWR EV-1(2) → ON
  4. √OXYGEN EMU1(2) vlv – OPEN

### NOTE

If fan stops during power transfer  
Cycle FAN switch – OFF,ON

- DCM
5. PWR → SCU (fwd)
  6. WATER → OFF (fwd)
  7. √SUIT P ≥ 3.3 and stable
  8. Monitor EMU status.
  9. Coordinate Ingress with EV1(2).

SOP  
ON  
BATT  
AMPS

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**SOP O2 ON**

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**SOP O2 ON**

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SOP O2 ON | TIME LF HH'MM

1. Go to ABORT EVA, 6. >>

<p><u>NOTE</u>          Message triggered when:          SUIT P &lt; 4.05 <u>and</u>          SOP RATE &gt; 36.0 psi/min.</p>
---

ABORT  
 EVA  
 -----  
 TERM  
 EVA

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# BATT AMPS HIGH

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## BATT AMPS HIGH

BATT AMPS HI	BAT AMPS X.X	BAT VDC XX.X
--------------	--------------	--------------

1. Helmet purge vlv → op
2. sw FAN → OFF

If BAT AMP without fan > 1.3 (system short)

3. sw WATER → OFF
4. Notify IV/EV of impending communication loss.
5. sw POWER → SCU, do not take UIA EV-1(2) PWR → ON
6. Go to TERM EVA, 7.

If BAT AMP without fan 0.7 to 1.3 (fan short)

7. Go to TERM EVA, 7.

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BATT  
VDC  
-----  
SUIT  
P LOW

### NOTE

Message triggered when amps > 5.0.  
Normal BATT AMP: 3.0 to 4.0.  
Normal BATT AMP without fan: 0.7 to 1.3.

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# BATT VDC LOW

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## BATT VDC LOW

SOP  
ON

BATT VDC LOW | BAT VDC XX.X

BATT  
AMPS

If fan RPMS degraded and/or communication lost

| 1. Go to TERM EVA, 7.

If communication and fan normal (sensor fail)

| 2. Continue EVA.

### NOTE

Message triggered when VOLTS < 15.7.

Normal BATT VDC ≥ 16.7.

Normal Fan RPM: 18.0 to 20.0K.

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**SUIT P LOW**

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**SUIT P LOW**



SUIT P LOW | SUIT P X.X

- If 'O2 USE HIGH' message present
  - 1. Go to ABORT EVA, 6. >>
- If 'O2 USE HIGH' message not present
  - 2. Continue EVA, monitor SUIT P, SOP P, and gauge.
    - If gauge < 4.0 and SOP P decreasing
  - 3. Go to TERM EVA, 7. >>

SUIT  
P HI  
SOP P  
LOW

NOTE  
Message triggered when SUIT P < 4.05.



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# SUIT P HIGH

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## SUIT P HIGH

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SUIT P HIGH	O2 RATE XX.X	SOP RATE XXX
-------------	--------------	--------------

If O2 RATE > 7.0 or SOP RATE > 8

| 1. Go to TERM EVA, 7. >>

If O2 RATE < 7.0 and SOP RATE ≤ 8

| 2. Monitor SUIT P, SOP P, and gauge.

| 3. Continue EVA.

BATT  
VDC

SUIT  
P LOW

### NOTE

Message triggered when SUIT P > 4.55. Normal O2 RATE ~1.7 psi/min.
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# SOP P LOW

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## SOP P LOW

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SOP P LOW	SOP P XXX0	SOP RATE XXX
-----------	------------	--------------

1. Go to TERM EVA, 7. >>

### NOTE

Message triggered when SOP P < init SOP P – 600  
(SOP P initialized at EMU powerup).

O2  
USE  
SUBLM  
PRESS

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## O2 USE HIGH

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### O2 USE HIGH

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O2 USE HIGH	O2 RATE XX.X
-------------	--------------

If **SUIT P LOW** message present

| 1. Go to ABORT EVA, 6.

If O2 P erratic or ~ 0

| 2. Continue EVA.

| 3. Recharge O2 periodically.

If O2 RATE > 7.0

| 4. Go to TERM EVA, 7.

If O2 RATE ≤ 7.0

| 5. Recharge O2 as required.

| 6. Continue EVA.

SUIT  
P HI  
SOP P  
LOW

#### NOTE

Message triggered when  
O2 RATE > 10.2 psi/min or  
O2 P < 150 and TIME EV < 5 hr.  
Normal O2 RATE ≈ 1.7 psi/min.

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# SUBLM PRESS

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## SUBLM PRESS

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SUBLM P XX.X SET H2O OFF

1. √WATER – OFF (fwd)

If SUBLM P < 1.0 and stable

When cooling desired, then:

2. Temp control vlv – Max H
3. WATER – ON (aft)
4. Temp control vlv – as required

If cooling insufficient

5. Go to LOSS OF COOLING, 22, step 2.

If cooling sufficient

6. Continue EVA, monitor SUBLM P and cooling. >>

If SUBLM P ≥ 1.0 and stable (sensor fail)

7. Perform steps 2 to 4, continue EVA, monitor H2O GP/WP and cooling.

### NOTE

Message triggered when SUBLM P < 1.5 or > 5.3.  
Normal SUBLM P: 2.0 to 4.2.

H2O  
GP LO  
RESRV  
H2O

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# H2O GP LOW

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## H2O GP LOW

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### H2O GP LOW

If H2O WP < 13.5 (H2O reg fail)

| If cooling insufficient

| | 1. Go to LOSS OF COOLING, 22.

| If cooling sufficient

| | 2. Monitor cooling.

| | 3. Continue EVA. >>

If H2O WP ≥ 13.5 (xdcr fail)

| 4. Monitor H2O WP.

| | If H2O WP drops to < 12.0

| | | 5. Go to TERM EVA, 7.

### NOTE

Message triggered when H2O GP < 13.5.

Normal H2O TEMP: 32° to 75° F.

Normal H2O WP: 14.0 to 16.0.

O2  
USE  
SUBLM  
PRESS

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**RESRV H2O ON**

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**RESRV H2O ON**

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RESRV H2O ON | TIME LF 'MM

NO  
VENT  
CO2

H2O GP	H2O WP	ACTION
≈15	≈0	1. Monitor SUBLM P and H2O TEMP (WP xdcr fail).
> 17.0	≈15	2. Monitor H2O WP and H2O TEMP (GP xdcr fail). If H2O WP drops to < 12.0   3. Go to TERM EVA, 7.
≈15	< 12.0	4. Go to TERM EVA, 7 (reserve H2O on).

**NOTE**

Message triggered when GP minus WP > 2.1 psi.  
Normal SUBLM P: 2.0 to 4.2 psia.  
Normal H2O TEMP: 32° to 75° F.  
Normal H2O GP/WP: 14.0 to 16.0.

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# NO VENT FLOW

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H2O  
GP LO

## NO VENT FLOW

RESRV  
H2O

If fan is not running

1. Cycle FAN sw → OFF,ON  
If fan restarts  
| 2. Continue EVA. >>
- If fan does not start  
| 3. Helmet purge vlv → op  
| 4. Go to TERM EVA, 7. >>

If fan is running

- If RPM < 19.0K  
| 5. Helmet purge vlv → op  
| 6. Go to TERM EVA, 7. >>
- If RPM ≥ 19.0K  
| 7. Assess helmet CO2 level.  
| 8. Go to CO2 HIGH, 19, step 3.

### NOTE

Message triggered when flow < 3.7 cfm.  
Normal vent flow: 6 to 8 cfm.

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**CO2**



**CO2**



**CO2 XX.X MM | MONITOR CO2** – PPCO2 > 3.0 MM

- 1. Minimize physical activity.
- 2. Assess physical condition then go to step 3 below.

**CO2 HIGH | OPEN PURGE V** – PPCO2 > 8.0 MM

- 1. √DCM PURGE vlv – cl, √Helmet purge vlv – op
- If symptoms noted prior to opening purge vlv

- | 2. Go to TERM EVA, 7. >>

If no symptoms noted (or inconclusive)

- | 3. Close/open helmet purge vlv as required to assess physical condition for high CO2.

If symptoms noted

- | 4. Helmet purge vlv → op
- | 5. Go to TERM EVA, 7. >>

If no symptoms noted

- | 6. Helmet purge vlv → cl, locked
- | 7. Monitor physical condition and PPCO2.
- | 8. Continue EVA.

COMM  
FAIL  
AIR  
CONTM

**NOTE**  
Normal PPCO2: 0.2 to 2.0 mm



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# COMMUNICATION FAILURE

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## COMMUNICATION FAILURE

NO  
VENT  
CO2

- ALL 1. ✓Proper config, EMU and ISS (Mode, Volume, Freq)  
Perform following sequence until communication restored:
- BOTH If EV crewmember hears intermittent sidetones/  
communication or no sidetones
2. Clear structure to recover communication (signal blockage).
- If unresolved
3. Affected crewmember select ALT(PRI)(notify **MCC-H**).
- ISS IV If IV does not have communication with EV1 and EV2
- PCS 4. If UHF 1 active
- | 4.1 C&T: UHF 1: RPCM LAD52B A RPC 08
- If UHF 2 active
- | 4.2 C&T: UHF 2: RPCM LA1B H RPC 04
- 4.3 **cmd** RPC Position – Open (✓Position – Op)
- 4.4 Contact **MCC-H** for clean up steps
- STS IV If IV does not have communication with EV1 and EV2
- O6 | 5. sw EVA STRING → 2(1).
- ALL If unresolved
- | 6. Perform coordinated frequency change.
- If unable to restore minimum of relay communication
- | 7. Go to TERM EVA, 7.

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# AIR FLOW CONTAMINATION

(ISS EVA SYS/7A - ALL/FIN 1/Paper on ISS) Page 1 of 1 page

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## AIR FLOW CONTAMINATION

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If flow exiting helmet vent contaminated by

Caustic water or LiOH particles

1. Helmet purge vlv → op
2. sw FAN → OFF
3. sw WATER → OFF

If contamination still present

4. Go to ABORT EVA, 6.

If contamination no longer present

5. Go to TERM EVA, 7.

If excessive water in vent loop or helmet

6. Contact **MCC-H**.

### NOTE

EMU water tanks hold ~ 1 gallon H2O.

LOSS  
COOL  
MISC 1

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# LOSS OF COOLING

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## LOSS OF COOLING

1. Temp Control vlv → cycle 3 to Max C; leave in Max C

If cooling restored, continue EVA >>

2. Begin translation to Airlock for TERMINATE EVA.

If SCU cannot be connected prior to overheating

DCM

3. Helmet purge vlv → Open, lock

4. If vent flow excessively hot  
sw FAN → OFF

If helmet purge flow insufficient for cooling

5. Helmet purge vlv → Closed, lock

6. DCM purge vlv → Open

7. SCU →|← DCM

8. √sw FAN – ON

COMM UIA 9. √OXYGEN EMU 1(2) vlv – OPEN

FAIL

If cooling sufficient

AIR

10. √Helmet purge vlv – Closed, locked

CNTM

11. √DCM purge vlv – Closed, locked

If cooling insufficient

12. Perform steps 3 to 6

13. Go to TERM EVA, 7



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# MISCELLANEOUS MESSAGES

(ISS EVA SYS/7A - ALL/FIN 1/Paper on ISS)

Page 1 of 2 pages

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## MISCELLANEOUS MESSAGES 1

**SUIT P EMERG** | **CLOSE PURG V** – SUIT P < 3.1

**RLF V FAIL** | **STOP DEPRESS** – Stop DEPRESS,  
Contact **MCC-H**,  
SUIT P > 5.7.

**VENT SW FAIL** – Vent flow sensor unreliable.

### Built-In Tests

BITE light illuminated – CWS unreliable, contact **MCC-H**.

**LIMITS BAD** – Warnings unreliable, monitor status  
list, continue EVA.

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TIME  
LF  
—  
IV  
HATCH

# MISCELLANEOUS MESSAGES

(ISS EVA SYS/7A - ALL/FIN 1/Paper on ISS)

Page 2 of 2 pages

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## MISCELLANEOUS (Cont)/TIME LF

SET O2 EVA
SET O2 PRESS
SET H2O OFF
FAN SW OFF
SET PWR SCU
O2 IS OFF
H2O IS OFF

Verify proper configuration.

### Consumables

XX% O2 LF	TIME LF 'MM
XX% PWR LF	TIME LF 'MM

Triggered with 30 minutes of calculated time remaining for limiting consumable.

1. Contact **MCC-H** to confirm calculation.

-----

If no communications with **MCC-H**  
| Go to TERM EVA, 7.

-----

LOSS  
COOL  
MISC 1

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## IV HATCH LATCH DISCONNECT

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### IV HATCH LATCH DISCONNECT

IV BAG – EVA RATCHET, 1/2" SOCKET 8" EXT

1. Inspect latches for debris/damage.
2. Turn crank handle.  
If no rotation:
  3. Remove PIP pin from all eight tension rods.
  4. Cycle disengaged latch using tension rod for leverage.
  5. If latch does not cycle, remove latch by releasing four captive latch bolts. Secure latch after removal.
  6. If latch does cycle, cycle latch to open position.
7. Hatch → Open

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EV  
HATCH

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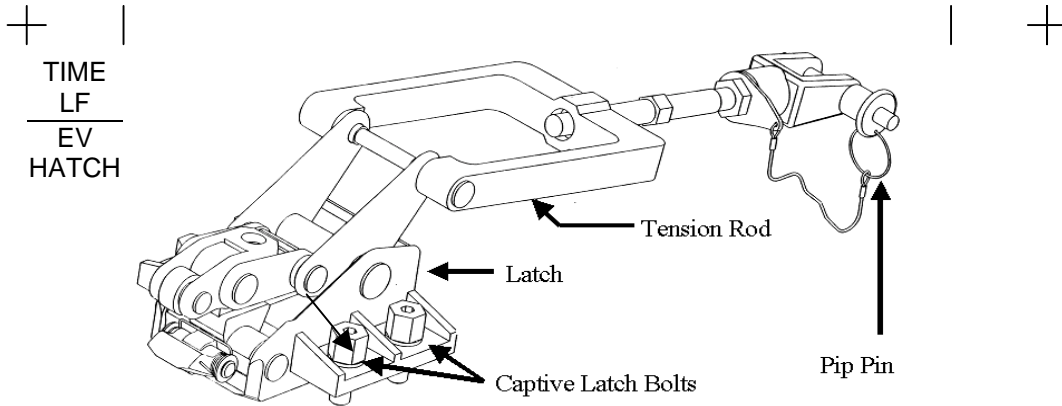


Figure 1.- Tension Rod/Latch Assembly.

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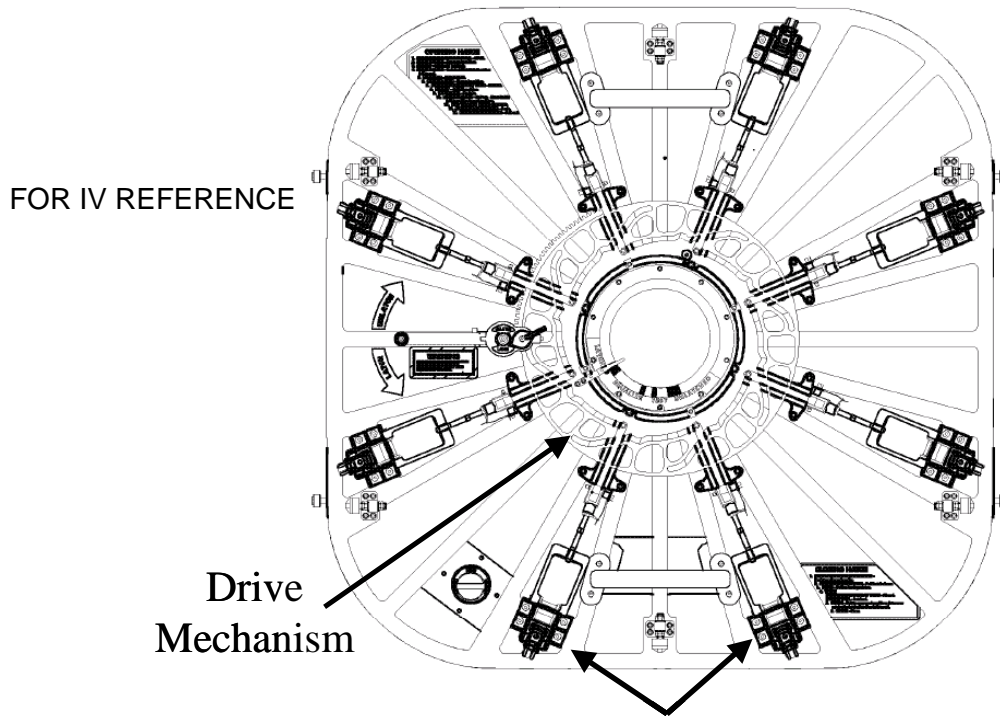


Figure 2.- Tension Rod/Latch Assembly (eight).

# EV HATCH LATCH DISCONNECT

(ISS EVA SYS/7A - ALL/FIN 1/Paper on ISS)

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## EV HATCH LATCH DISCONNECT

A/L TOOL BOX – EVA RATCHET, 7/16" SOCKET 6" EXT, ADJ  
WRENCH

CETA TOOL BOX – SM TRASH BAG

1. Remove bolt A, stow in trash bag.
2. Rotate actuator handle.

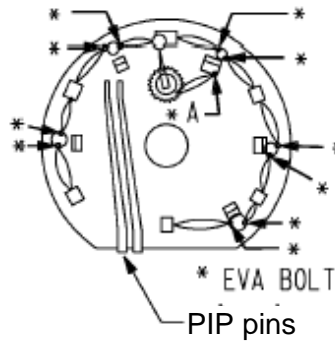
If no rotation – jammed actuator

3. Force latches open.
4. Seal hatch with repress and secure.

If free rotation – jammed latch

5. Locate and remove jam.
6. Reconnect actuator.

EV  
HATCH  
SSRMS  
FRGF



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# EV HATCH HINGE DISCONNECT

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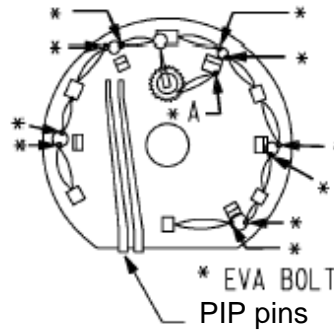
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## EV HATCH HINGE DISCONNECT

1. Remove hinge PIP pins, as required.
2. Restrain hinge arm(s) and PIP pins clear of opening.
3. Ingress airlock, position hatch for closing.
4. Hatch → close, lock

EV  
HATCH  
LATCH



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# SSRMS FRGF RELEASE

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## SSRMS FRGF RELEASE

CETA TOOL BOX – EVA RATCHET, 1/2" SOCKET 8" EXT, SM TRASH BAG

1. White release rod ↻ (32 strokes of 90 degrees).
2. Black release rod ↻ (32 strokes of 90 degrees – shaft will release from grapple fixture).
3. Clear worksite for SSRMS powerdown.
4. Stow slug in small trash bag.

SSRMS  
PDGF  
SSRMS  
LEE  
LATCH

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# SSRMS PDGF RELEASE

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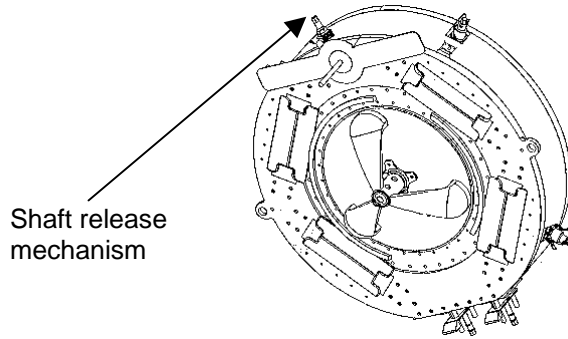
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## SSRMS PDGF RELEASE

CETA TOOL BOX – EVA RATCHET, 7/16" SOCKET 6" EXT

1. Rotate shaft release mechanism to hard stop (shaft will release from grapple fixture).
2. Clear worksite for SSRMS powerdown.

EV  
HATCH  
HINGE  
SSRMS  
FRGF



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# SSRMS LEE LATCH CONTINGENCY

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## SSRMS LEE LATCH CONTINGENCY

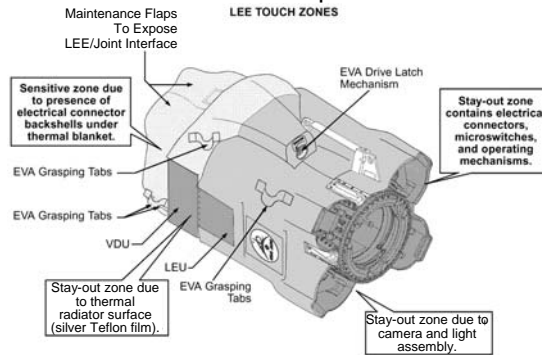
PGT, Right Angle Drive, 7/16" Socket 2" Extension, 6.6 ft-lbs, 30 rpm, 10.5 or

EVA Ratchet, 7/16" Socket 2" Extension

### CAUTION

Do not exceed 10.5 ft-lbs against hard stop.

1. To Release LEE Latch  
Rotate LEE Latch EVA Drive bolt CCW up to 59.5 turns to hard stop
2. To Engage LEE Latch  
Rotate LEE Latch EVA Drive bolt CW up to 59.5 turns to hard stop
3. Clear worksite



SCU  
RMVL

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# SCU REMOVAL FROM UIA (AT VACUUM)

(ISS EVA SYS/7A - ALL/FIN 1/Paper on ISS) Page 1 of 2 pages



## SCU REMOVAL FROM UIA (AT VACUUM)

C-Lk IV BAG – EVA Ratchet, 7/16" Socket 6" EXT

- UIA
1. √PWR EV-1,2 switch (two) – OFF  
√PWR EV-1,2 LEDs (four) – Off  
√WATER SUPPLY EV-1,2 vlv (two) – CLOSE  
√OSCA – O2 CLOSED (O2 3AKP)
  2. √**MCC-H** that power and O2 inhibits in place

### NOTE

Removal of ОРЛАН caps is technique sensitive. For removal instructions, the cap is pushed inward and rotated clockwise (opposite the displayed arrow) 1/8 turn; then, the cap is pulled outward.

3. ОРЛАН-I (II) cap 2 ←|→ OSCA  
ОРЛАН-I (II) cap 3 ←|→ OSCA
4. OSCA ↻ PRESS (НАДДУВ)
5. √OXYGEN EMU 1,2 vlv (two) – OPEN
6. OXYGEN ORLAN vlv → OPEN
7. √EMU O2 SUPPLY PRESS gauge ≅ 0  
√ORLAN O2 SUPPLY PRESS gauge ≅ 0

SSRMS  
PDGF  
SSRMS  
LEE  
LATCH

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## SCU REMOVAL FROM UIA (AT VACUUM)

(ISS EVA SYS/7A - ALL/FIN 1/Paper on ISS) Page 2 of 2 pages

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### SCU REMOVAL FROM UIA (AT VACUUM, CONT'D)

8. OSCA ↺ O2 CLOSED (O2 3AKP)
9. ОРЛАН-I (II) cap 2 → | ← OSCA  
ОРЛАН-I (II) cap 3 → | ← OSCA
10. OXYGEN EMU 1,2 vlv (two) → CLOSE
11. OXYGEN ORLAN vlv → CLOSE
12. Mating bolts (two) ↺ using ratchet with 7/16" socket  
(≅15 turns each).
13. Strain relief hooks (two) ← | → tether points (two) on  
C-Lk wall
14. Remove SCU from stowage straps on C-Lk wall.
15. Remove stowage pouches from C-Lk restraint straps  
(leave DCM connectors inside pouches).
16. Stow 7/16" socket with 6" extension (in socket caddy)  
and EVA ratchet in C-Lk IV Bag.

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C-LK  
EGRSS  
C-LK  
INGRS

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# CREWLOCK EGRESS

(ISS EVA SYS/7A - ALL/FIN 1/Paper on ISS) Page 1 of 1 page

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## CREWLOCK EGRESS

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SCU  
RMVL

EV1

1. Thermal cover → open
2. Egress Crewlock.
3. Verify hook locks installed in safety tether hooks on external D-rings.
4. Safety tether short strap →|← EMU D-ring or extender, double tether to reel, unlock reel
5. Waist tether ←|→ internal Crewlock D-ring, stow on EMU or clear of hatch opening

EV2

6. Repeat steps 1 to 5
7. Thermal cover → close

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# CREWLOCK INGRESS

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 1 of 1 page

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## CREWLOCK INGRESS

- BOTH 1. Complete Tool Inventory.
- 2. ✓Tool Boxes closed, latched
- EV2 3. Waist tether →|← internal Crewlock D-ring
- 4. Safety tether short strap ←|→ EMU  
Safety tether short strap →|← external hatch handrail
- 5. ✓Reel unlocked, retract cable slack
- 6. Ingress Crewlock.
- 7. Retrieve SCU, remove DCM cover.  
SCU →|← DCM, ✓Locked
- EV1 8. Repeat steps 3 to 7.
- BOTH 9. sw WATER → OFF (fwd)
- 10. Thermal cover → close  
Attach Velcro strap.

### CAUTION

Do not close hatch until EMU  
WATER – OFF for 2 minutes.

- 11. ✓EV hatch clear of FOD and obstructions.
- 12. EV hatch → close and lock
- 13. Go to PRE REPRESS portion of {CREWLOCK  
DEPRESS/REPRESS CUE CARD} (SODF: ISS EVA  
SYS: EVA PREP/POST).

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#### 4.105 EMERGENCY CREWLOCK REPRESS

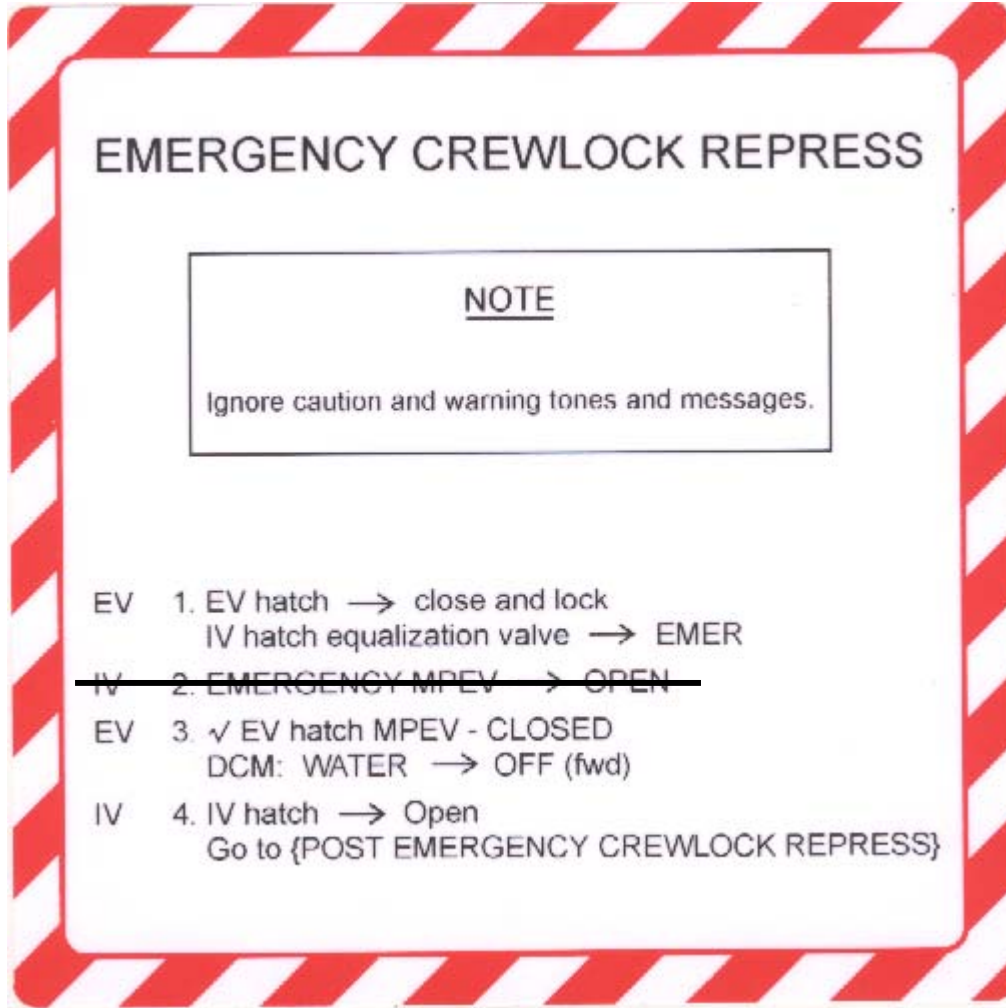
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Page 1 of 1 page

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##### OBJECTIVE:

In an emergency, these steps need to be performed for a rapid Emergency Crewlock Repress. This decal is posted on the inside of the EV hatch and on both sides of the IV hatch.



Go to {4.110 POST EMERGENCY CREWLOCK REPRESS} (SODF: ISS EVA SYS: EMERGENCY).

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## 4.110 POST EMERGENCY CREWLOCK REPRESS

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

Page 1 of 1 page

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(10 Minutes)

### OBJECTIVE:

Following an Emergency Crewlock Repress, this procedure safely configures both EV crewmembers in their suits. Different steps are taken for the affected crewmember and the unaffected crewmember.

### WARNING

This procedure should not be performed following a Cuff 4 DCS incident. If a Cuff 4 DCS incident, go to {4.120 DCS TREATMENT}, all (SODF: ISS EVA SYS: EMERGENCY).

### AFFECTED CREWMEMBER

- DCM 1. PURGE vlv → op (up)
2. O2 ACT → OFF
3. √STATUS: SUIT P < 0.4 (compare with guage)
4. Gloves ←|→ EMU
5. Helmet ←|→ HUT
- DCM 6. SCU →|← DCM
- UIA 7. sw PWR EV-1(2) → ON
- √PWR EV-1(2) EMU LED – On  
√PWR EV-1(2) VOLTS: 18.0 to 19.0
- DCM 8. sw POWER → SCU
- If single crewmember aborting EVA
- IV 9. √**MCC-H** for further steps >>

### UNAFFECTED CREWMEMBER

- DCM 10. O2 ACT → IV
11. SCU →|← DCM
- UIA 12. sw PWR EV-1(2) → ON
- √PWR EV-1(2) EMU LED – On  
√PWR EV-1(2) VOLTS: 18.0 to 19.0
- DCM 13. sw POWER → SCU
14. √**MCC-H** for further steps

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#### 4.115 EXPEDITED SUIT DOFFING

(ISS EVA SYS/7A - ALL/FIN 2/Paper on ISS) Page 1 of 2 pages

(20 Minutes)

#### OBJECTIVE:

Do off the EMU in a fast, yet safe manner. Performed in case of an emergency.

**CAUTION**  
Verify EV crew is clear of hatch mechanism.

IV

When equalization complete

1. Open IV Hatch per decal.

IV Hatch equalization valve → OFF

\*\*\*\*\*  
\* If required, IV use damp towel to clean gloves.  
\*\*\*\*\*

SAFER  
IV

#### SAFER DOFFING (5 MINUTES)

2. Latch → ENG
3. Latch ↶ until release (~ 90 deg)
4. PLSS ←|→ Thruster Towers

DCM

#### SUIT DOFFING (10 MINUTES)

5. O2 ACT → OFF
6. PURGE vlv → op (up)
7. Engage EMU in EDDA.

PLSS

If EMU TV capability

8. EMU TV Power Cable ←|→ EMU TV

DCM

9. √STATUS: SUIT P < 0.4 (compare with gauge)

Gloves ←|→ EMU

10. Helmet ←|→ EMU

DCM

11. sw FAN → OFF
12. Waist Ring ←|→ HUT
13. LCVG ←|→ Multiple Water Connector
14. Biomed Pigtail ←|→ Electrical Harness
15. Do off comm cap.

#### 4.115 EXPEDITED SUIT DOFFING

(ISS EVA SYS/7A - ALL/FIN 2/Paper on ISS) Page 2 of 2 pages

16. Doff HUT.

17. Doff LTA.

If taking EMUs to shuttle

- 18. Waist ring →|← HUT
- 19. Gloves →|← EMU
- UIA 20. sw PWR EV-1,2 (two) → OFF
  - √PWR EV-1,2 LEDs (four) – Off
- 21. Remove Metox from EMUs (not required if LiOH is installed).
- 22. PLSS thermal cover on back of EMU → close
- DCM 23. SCU ←|→ DCM
- 24. Install helmet and helmet cover.
- 25. Transfer EMU to shuttle.

#### EMU/AIRLOCK CONFIGURATION

When time permits

- 26. IV Hatch equalization valve → OFF
- DCM 27. Install WATER switch guards (two).
- 28. √sw Glove heater (two) – OFF
- 29. Stow lower arm and glove cable connectors under TMG.

If EMU TV capability

- 30. EMU TV Power Cable →|← Ground Plug
- 31. Go to {1.240 POST EVA}, step 28 (SODF: ISS EVA SYS: EVA PREP/POST).

DCS Signs and Symptoms Associated with Each Cuff Class Defined in Cuff Checklist

1

- Determine Cuff Class

Cuff Class 1

Cuff Class 2 or 3 (Report to MCC-H)

Cuff Class 4 (Report to MCC-H)

4

**NOTE**  
DO NOT perform 4.110 POST EMERGENCY CREWLOCK REPRESS.

- Abort EVA (Cuff Checklist page 6) with ingress assist from unaffected crewmember.
- Unaffected crewmember perform ISS safing.
- Unstow Respiratory Support Pack (RSP).
- Refer to {[ACLS ALGORITHM](#)} (SODF: ISS MED: ACLS), then:

Crewmember conscious?

No → 7

Yes → 6

6

Can crewmember speak in full sentences without respiratory distress?

No → 4

Yes → 19

7

- Perform {[1.240 POST EVA](#)} (SODF: ISS EVA SYS: EVA PREP/POST), then:
- Proceed to US Lab, in close proximity of CHeCS Rack (LAB1D4), and treat affected crewmember per {[CARDIOPULMONARY RESUSCITATION: CPR](#)} (SODF: ISS MED: BASIC LIFE SUPPORT), then:
- √MCC-H for further action for incapacitated crewmember

3

- Terminate EVA (Cuff Checklist page 7).
- Unaffected crewmember stow safety tether, perform worksite cleanup and/or ISS safing.
- √MCC-H for ISS config
- Perform [INGRESS](#) (Cuff Checklist page 35).

If terminating for Cuff Class 3

- PMC on GND2
- COMM Mode → HL

ATU4(5)

- IV dial GND2

5

- Perform PRE-REPRESS portion of {[CREWLOCK DEPRESS/REPRESS CUE CARD](#)} (SODF: ISS EVA SYS: EVA PREP/POST).
- Perform REPRESS portion of {[CREWLOCK DEPRESS/REPRESS CUE CARD](#)} (SODF: ISS EVA SYS: EVA PREP/POST).
- Remain on SCU.
- Unaffected crewmember perform {[1.240 POST EVA](#)} (SODF: ISS EVA SYS: EVA PREP/POST) per FLIGHT PLAN; do not perform [EVA COMM AND AIRLOCK ENVIRONMENT DECONFIG](#).
- Perform DCS In-suit Exam {[BENDS - DECOMPRESSION SICKNESS: DCS](#)} (SODF: ISS MED: A THROUGH B).
- PMC (expect GND2 private).

Does MCC-H require Metox canister changeout?

Yes → 8

No → 9

2

- Continue EVA.
- If Symptoms resolve upon REPRESS go to Cuff Class 2, block 5
- Report to Surgeon next PMC.

8

- Perform {[2.120 METOX/LIOH REPLACEMENT \(MANNED\)](#)} (SODF: ISS EVA SYS: EMU CONTINGENCY), then:

→ 9

1  
EVA terminated to prevent progression to Cuff Class 4. If Cuff 2, affected crewmember will assist other EV with minor worksite cleanup, if possible, to expedite cleanup and then terminate EVA.

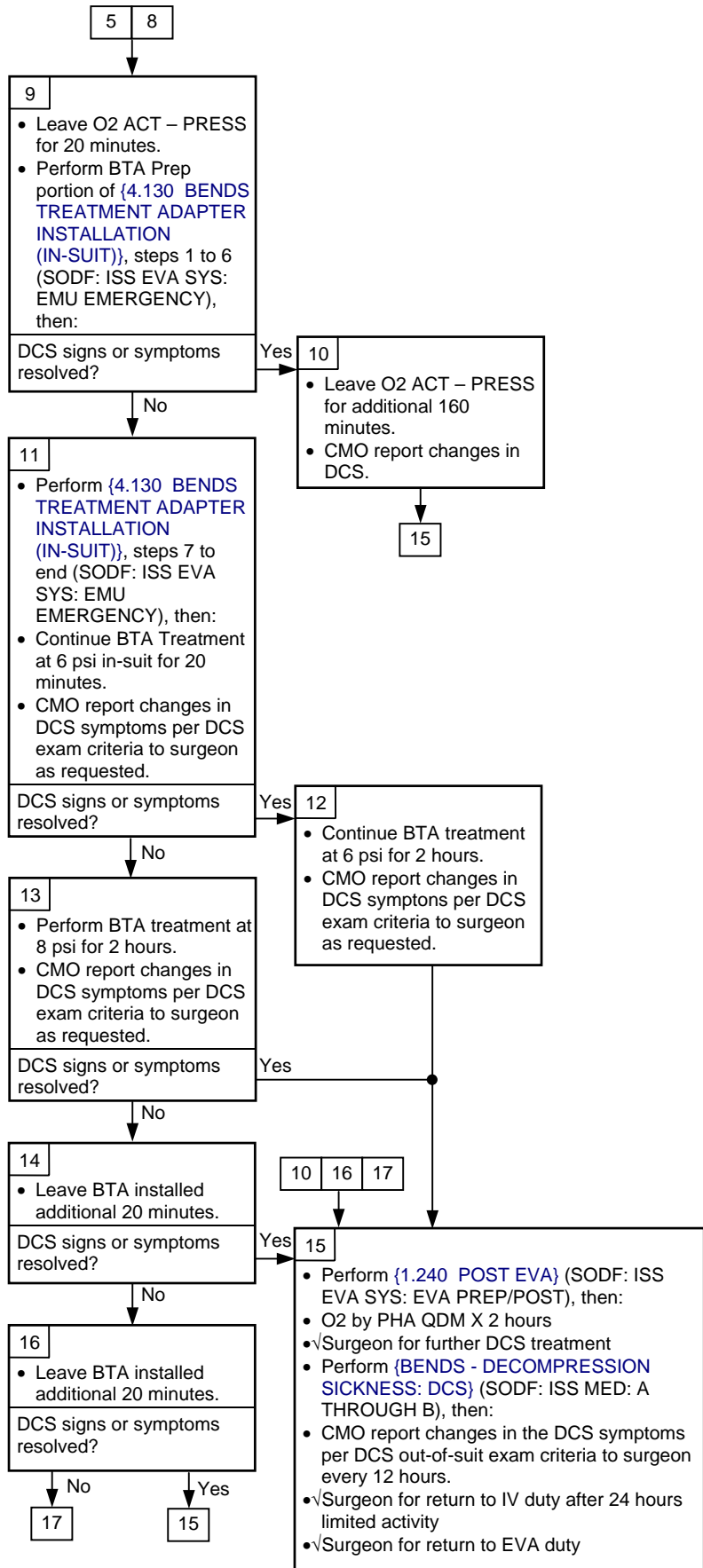
2  
If estimated time reqd for DCS treatment exceeds Metox canister consumables, a changeout should be performed. If 10 or 12 required, minimum treatment is ~3 hours.

3  
For Cuff Class 3 only, affected crewmember waiting in Crewlock needs to be in contact with surgeon via PMC due to severity and potential progression of symptoms.

4  
Cuff Class 4 symptoms may be secondary to Type 2 DCS which is a medical emergency. Unstowing the resuscitator enables IV crew to be prepared to administer CPR, if required. Because it is critical to repress a Class 4 quickly, this may result in a one crewmember repress.

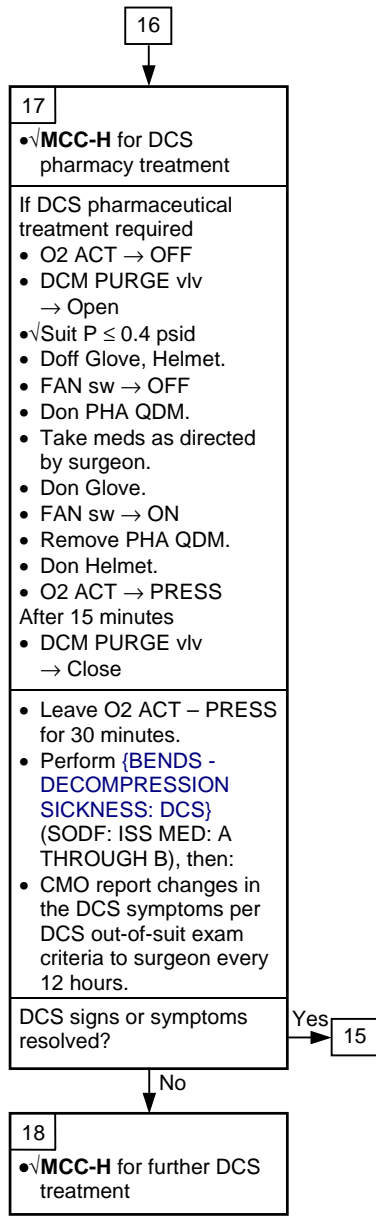
**4.120 DCS TREATMENT**

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)



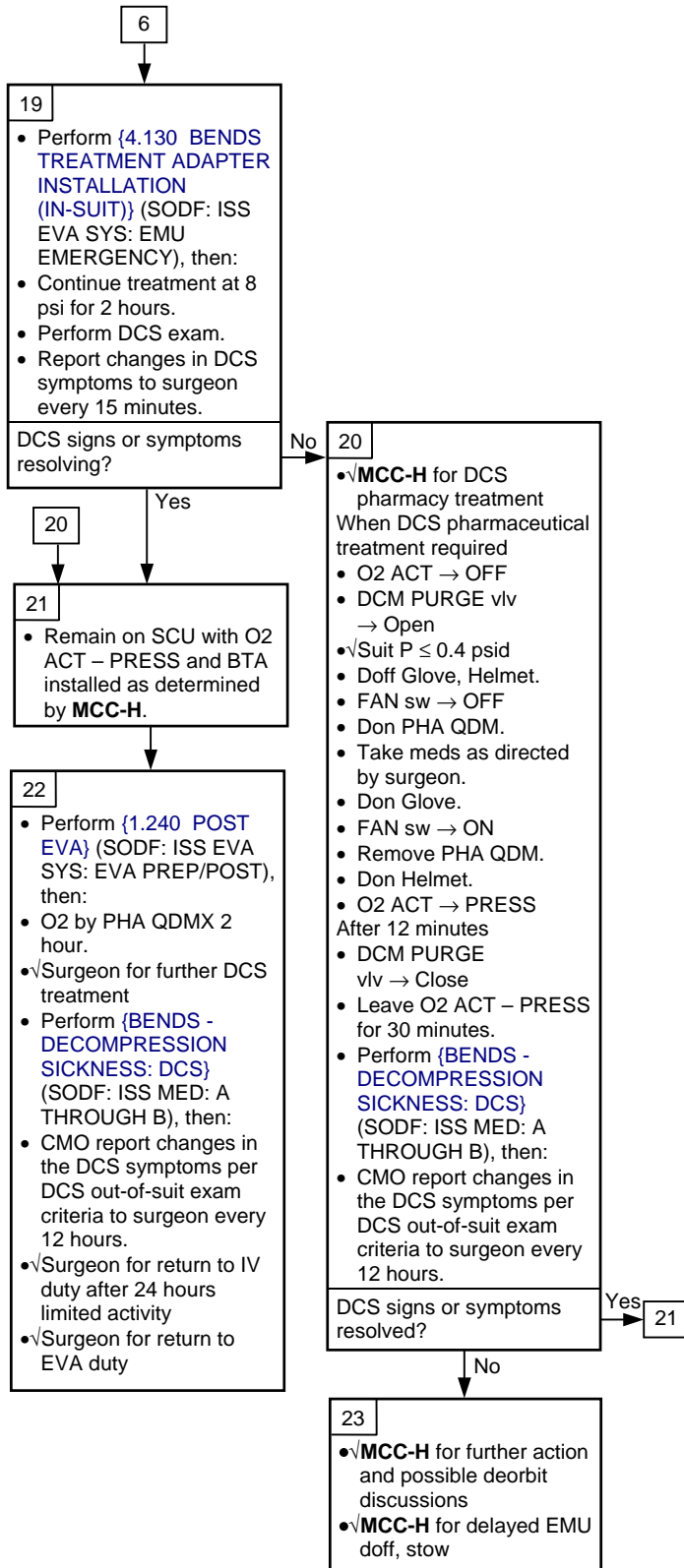
**4.120 DCS TREATMENT**

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)



4.120 DCS TREATMENT

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)



## 4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

Page 1 of 7 pages

(60 Minutes)

### OBJECTIVE:

To install the Bends Treatment Adaptor (BTA) for Decompression Sickness (DCS) treatment. Performed if symptoms confirmed post suit doffing.

### BTA PREP (10 MINUTES)

1. Unstow BTA and 3/8" Wrench.
  - PLSS 2. Cut/break TMG tacks.  
Refer to Figure 1.
  3. Unzip PLSS TMG (avoid pulling on antenna cable).
  4. Remove Impact Shield.  
Disconnect hatch marked cable P3 (cut cable if required).  
Refer to Figure 1.
  5. Remove Test Port F Plug on SOP using 3/8" end of BTA Wrench  
(4 to 6 turns ↺).  
Refer to Figure 2.
  - BTA 6. Stow Test Port F Plug on BTA.  
Refer to Figure 1.
- If Metox (LiOH) canister replacement required by **MCC-H**
7. Unstow new Metox (LiOH) canister.
  8. Remove used Metox (LiOH) canister.
  9. Install new Metox (LiOH) canister using label on canister for proper orientation.  
Report Metox canister barcode to **MCC-H** as comm permits.
  10. Install caps on used Metox (LiOH) canister.  
Temporarily stow canister for future regeneration.  
Tape an 'X' on the used LiOH canister and stow.

### BTA TREATMENT (50 MINUTES)

11. √SCU →|← DCM
- BTA 12. Unstow Poppet Keeper Screw from BTA.
- PLSS 13. Open Positive Pressure Relief Valve (PPRV) using BTA poppet keeper  
(thread ↻, pull, tighten nut).  
Refer to Figure 1.
14. Align BTA Engage mark with PPRV Mark.  
  
BTA →|← PPRV (rotate BTA ↻ to Lock)  
  
√BTA Locked

#### 4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

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15. Don MAG, LCVG, biomed.
16. Fill Drink Bag, remove gas.  
Insert bag in Restraint Bag.  
Install Drink Bag, Restraint Bag in HUT.  
Dispose of fill tool in EMU Equipment Bag trash.

UIA 17. √OXYGEN EMU 1(2) vlv – OPEN

DCM 18. sw POWER → BATT

<b>CAUTION</b>
EMU must be on BATT power when UIA suit power is turned on.

PSA 19. √sw SUIT SELECT – OFF  
√sw EMU MODE EMU1(2) – PWR

20. sw MAIN POWER → ON

√MAIN POWER LED – On

21. sw SUIT SELECT → EMU 1(2)

√EMU 1(2) LED – On

√EMU 1(2) Volts: 18.0 to 19.0

UIA 22. sw PWR EV-1(2) → ON

√PWR EV-1(2) EMU LED – On

DCM 23. sw POWER → SCU

24. √Waist ring – op

25. Don LTA (attach donning handles as required).

26. √Suit arms aligned

√Wrist disconnects – op

27. Don thumb loops.

28. √Biomed connector outside of HUT

29. Don HUT.

Release thumb loops.

## 4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

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30. √Suit arms aligned
31. Don comm cap.
32. √sw COMM mode – HL (vol as required)

If biomed downlink desired

MCC-H/IV  
PCS

### 33. CONFIGURING FOR EMU COMM

33.1 Powering Up UHF 1 for EVA Operations on 414.2 MHz  
Perform {2.701 UHF 1 ORU ACTIVATION}, steps 1 to 16  
(SODF: C&T: NOMINAL: UHF), then:

33.2 Configuring Audio Subsystem for EVA Operations  
Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION  
FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL:  
AUDIO), then:

DCM

34. sw COMM mode → PRI
35. sw Comm FREQ → LOW
36. Biomed pigtail →|← electrical harness
37. LCVG →|← Multiple Water Connector  
√Multiple Water Connector locked
38. √Thermal cover clear of waist ring
39. Waist ring → engage position  
Waist ring →|← HUT  
√Waist ring locked
40. Wrist ring → engage position
41. Don EV gloves.  
√EV gloves locked
42. √Mic boom position
- DCM 43. sw FAN → ON
44. √Electrical harness clear of neck ring
45. Don helmet.  
√Helmet locked
46. √Helmet purge vlv – Closed, locked

#### 4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

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DCM 47. ✓PURGE vlv – Op (up)

48. O2 ACT → PRESS, begin purge clock (12 minutes)

Record start of purge clock.

GMT (PURGE START) \_\_\_\_/\_\_\_\_:\_\_\_\_ \_\_\_\_

PCS 49. Verifying Condensate Tank Configuration

Lab: ECLSS: H2O Vent

Lab Water Vent

✓Water Vent System Status – Inhibited

If Water Vent System Status – Enabled

✓**MCC-H**

✓Condensate Tank Qty 1(2) < 42.5 kg

If Condensate Tank Qty 1(2) > 42.5 kg

✓**MCC-H**

UIA 50. ✓WATER EV-1(2) SUPPLY vlv – CLOSE

51. WATER EV-1(2) REG vlv → WASTE

When 12-minute purge complete and H2O WP < 7 and stable for ~ 1 minute

52. WATER EV-1(2) REG vlv → SUPPLY

GMT (PURGE END) \_\_\_\_/\_\_\_\_:\_\_\_\_ \_\_\_\_

DCM 53. PURGE vlv → CI (dn)

54. ✓STATUS: **SUIT P**: 4.2 to 4.4

**NOTE**

Suit P will increase about ~ 0.5 psi each time the O2 Act → OFF.

55. O2 ACT → OFF (until Suit P stabilizes)

56. O2 ACT → PRESS (for 15 seconds)

57. Repeat steps 55,56 until Suit P = 6.0 psig on BTA gauge.

**NOTE**

BTA relief valve relieves at 8.04 to 8.45 psig.

#### 4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

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58. Repeat steps 55,56 as required to maintain SUIT P = 6.0 psig.

NOTE

Initial treatment will be at 6 psid for Cuffs 2 and 3 and will be increased to 8 psid if symptoms do not resolve. Initial treatment for Cuff 4 will be 8 psid.

59. Contact Surgeon (**MCC-H**) for treatment length and changes in treatment pressure.

# 4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

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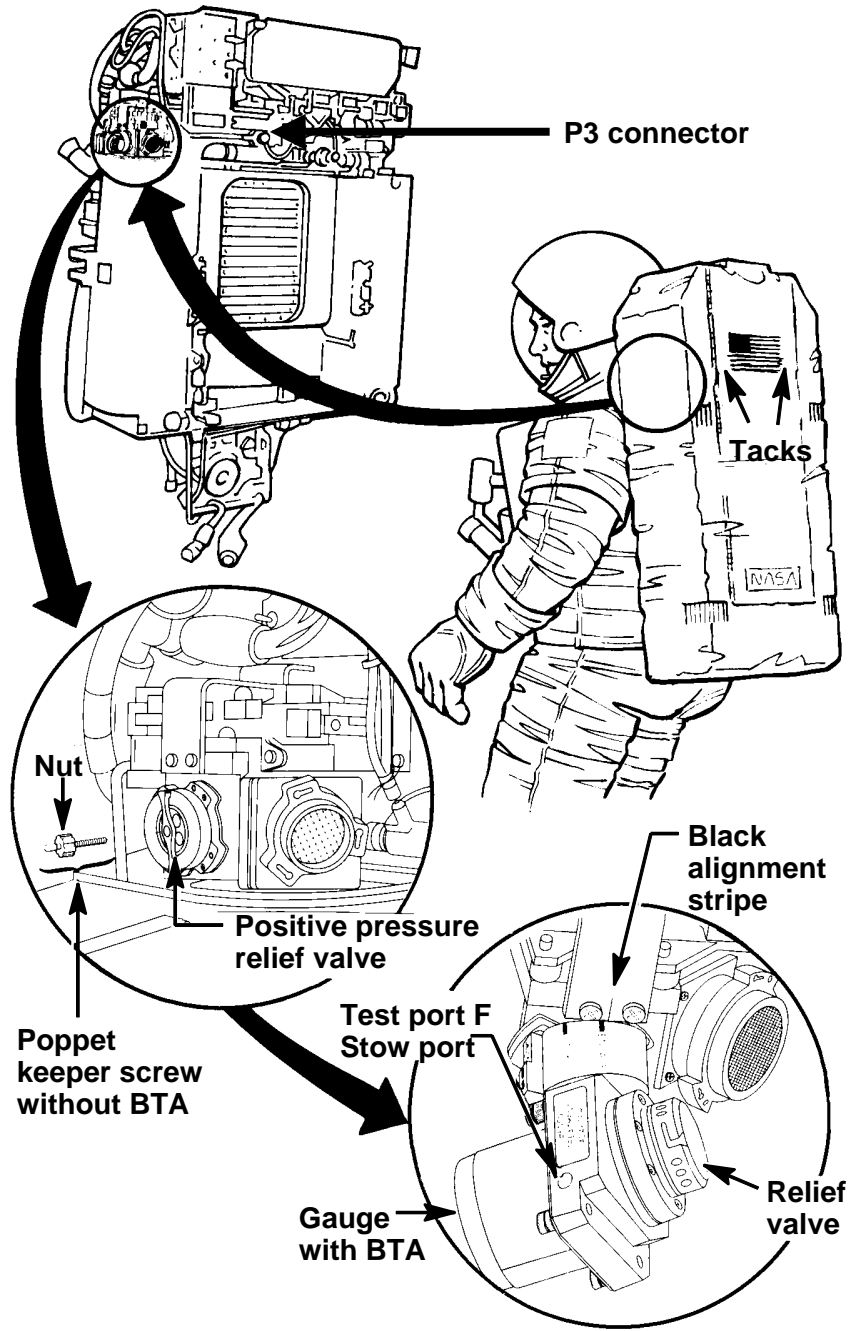


Figure 1.- BTA Location on EMU.

**4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)**

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS)

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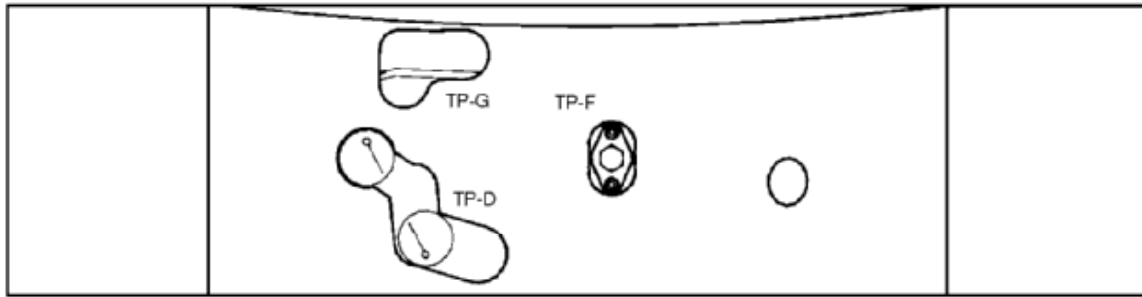


Figure 2.- Secondary Oxygen Package.

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## 4.130 BENDS TREATMENT ADAPTER INSTALLATION (IN-SUIT)

I

(ISS EVA SYS/7A - ALL/FIN 2/Paper on ISS) Page 1 of 4 pages

(70 Minutes)

### OBJECTIVE:

To install the bends treatment adapter (BTA) for BTA operations. Performed while the crewmember remains pressurized in the suit.

### BTA PREP (10 MINUTES)

1. Unstow BTA and 3/8" Wrench.
2. Cut/break TMG tacks.  
Refer to Figure 1.
3. Unzip PLSS TMG (avoid pulling on antenna cable).
4. Remove Impact Shield.  
Disconnect hatch marked cable P3 (cut cable if required).  
Refer to Figure 1.

### NOTE

It may be necessary to extend the legs forward to access the test port in a pressurized EMU.

5. Remove Test Port F Plug on SOP using 3/8" end of BTA Wrench (4 to 6 turns ↺).  
Refer to Figure 2.
6. Stow Test Port F Plug on BTA.  
Unstow poppet keeper screw from BTA, stow in EMU Servicing Kit.  
Refer to Figure 1.

### BTA TREATMENT (60 MINUTES)

7. √SCU →|← DCM
8. Align BTA Engage mark with PPRV Mark.  
BTA →|← PPRV (rotate BTA ↻ to Lock)  
  
√BTA locked
9. √OXYGEN EMU 1(2) vlv – OPEN
10. √sw POWER – SCU
11. √sw FAN – ON
12. √sw COMM mode – HL (vol as required)

#### 4.130 BENDS TREATMENT ADAPTER INSTALLATION (IN-SUIT)

(ISS EVA SYS/7A - ALL/FIN 2/Paper on ISS) Page 2 of 4 pages

- If biomed downlink desired
- MCC-H/IV  
PCS
13. CONFIGURING FOR EMU COMM
- 13.1 Powering Up UHF 1 for EVA Operations on 414.2 MHz  
Perform {2.701 UHF 1 ORU ACTIVATION}, steps 1 to 16  
(SODF: C&T: NOMINAL: UHF), then:
- 13.2 Configuring Audio Subsystem for EVA Operations  
Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION  
FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL:  
AUDIO), then:
- DCM
14. sw COMM mode → PRI
15. sw Comm FREQ → LOW
- PCS
16. Verifying Condensate Tank Configuration  
Lab: ECLSS: H2O Vent  
Lab Water Vent
- √Water Vent System Status – Inhibited
- If Water Vent System Status – Enabled  
√MCC-H
- √Condensate Tank Qty 1(2) < 42.5 kg
- If Condensate Tank Qty 1(2) > 42.5 kg  
√MCC-H
- UIA
17. √WATER EV-1(2) SUPPLY vlv – CLOSE
18. WATER EV-1(2) REG vlv → WASTE
- DCM
- When H2O WP < 7 and stable for ~ 1 minute
- UIA
19. WATER EV-1(2) REG vlv → SUPPLY
- DCM
20. √STATUS: SUIT P: 4.2 to 4.4
21. O2 ACT → OFF (until SUIT P stabilizes)

#### NOTE

Suit pressure will nominally increase when the O2 actuator is taken to OFF. SUIT P = H2O GP when the O2 ACT – OFF. For actual SUIT P > 5.9 psi, SUIT P can be directly read only as the H2O GP; actual SUIT P = 4.7 to 5.5 psi above BTA gauge pressure.

#### 4.130 BENDS TREATMENT ADAPTER INSTALLATION (IN-SUIT)

(ISS EVA SYS/7A - ALL/FIN 2/Paper on ISS) Page 3 of 4 pages

##### CAUTION

If BTA gauge pressure increases while O2 ACT – PRESS, set O2 ACT – OFF immediately to prevent a hazardous condition; contact **MCC-H**.

22. O2 ACT → PRESS (for 15 seconds), monitor BTA gauge not increasing
23. O2 ACT → OFF (until H2O GP stable)
24. Repeat steps 22 and 23 until H2O GP = 6.0 psid on DCM display with O2 ACT – OFF.
25. Repeat steps 22 and 23 as required to maintain H2O GP = 6.0 psid.

##### NOTE

Initial treatment will be at 6 psid for Cuffs 2 and 3 and will be increased to 8 psid if symptoms do not resolve. Initial treatment for Cuff 4 will be 8 psid.

26. Contact Surgeon (**MCC-H**) for treatment length and changes in treatment pressure.

# 4.130 BENDS TREATMENT ADAPTER INSTALLATION (IN-SUIT)

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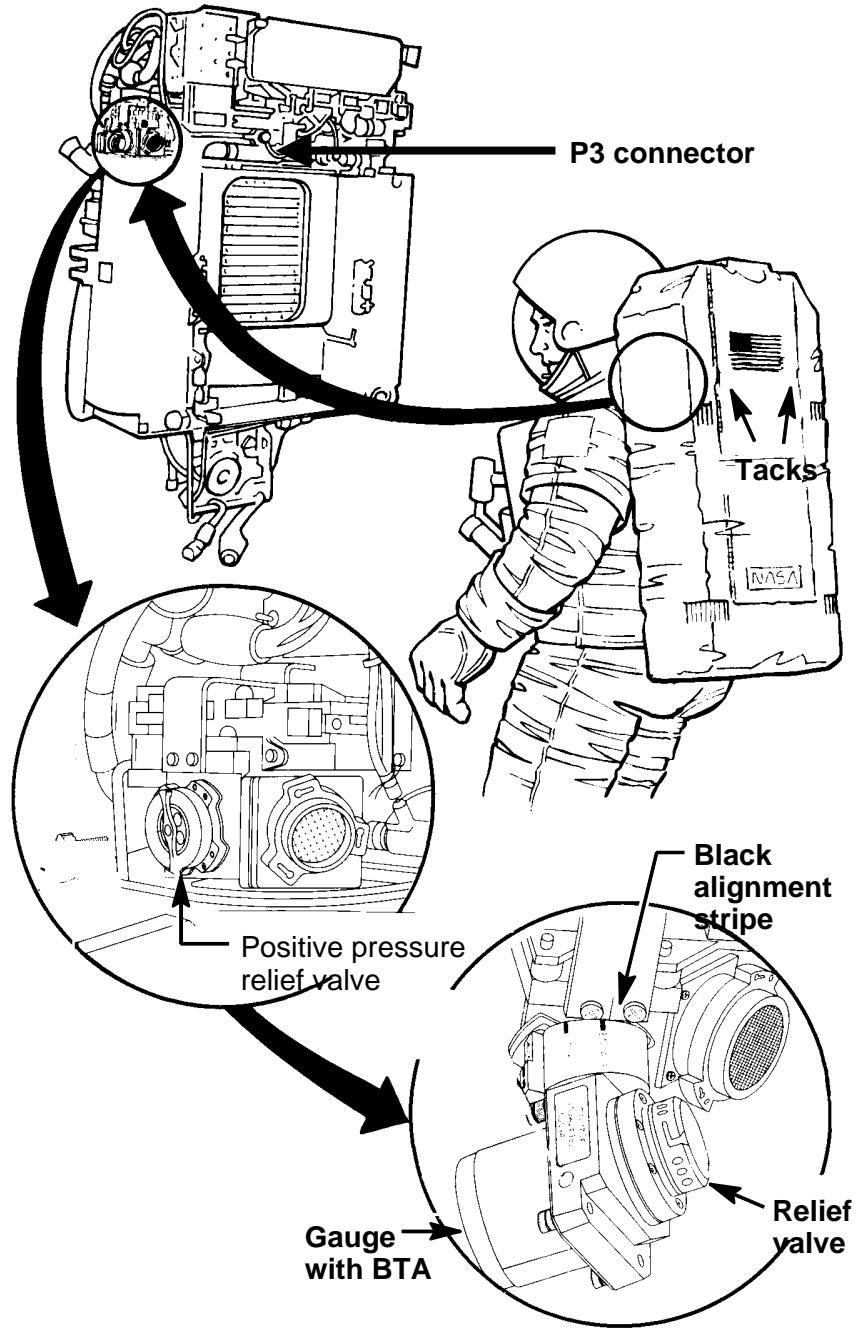


Figure 1.- BTA Location on EMU.

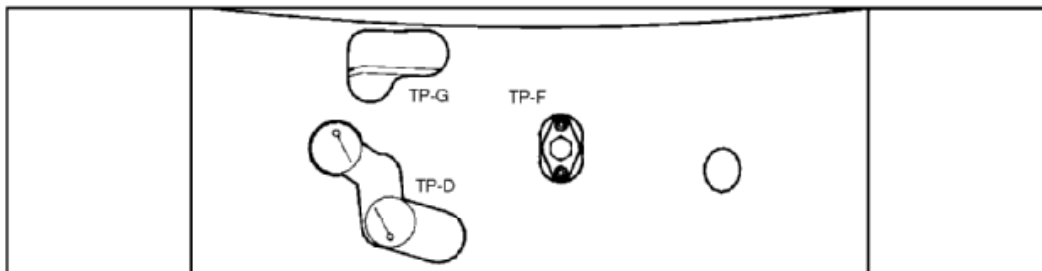


Figure 2.- Secondary Oxygen Package.

## 4.135 SAFER RESCUE

(ISS EVA SYS/7A - ALL/FIN 2/Paper on ISS)

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### OBJECTIVE:

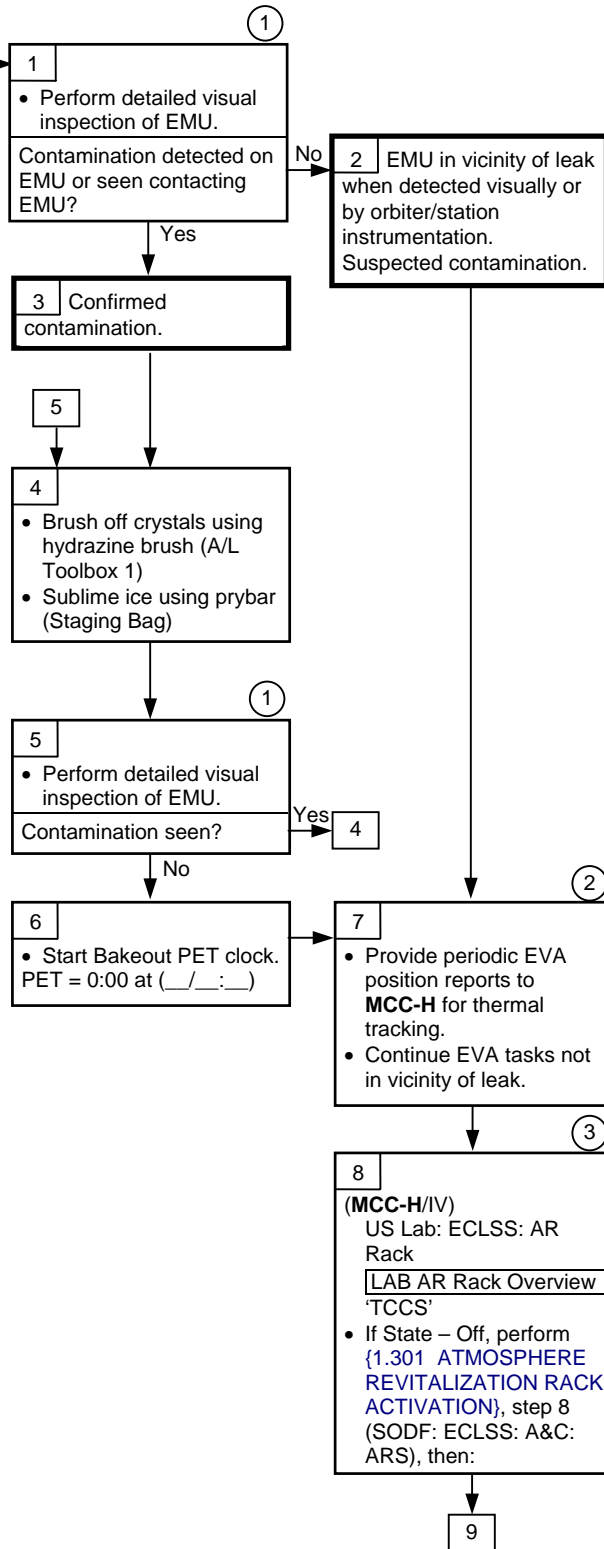
To return a separated EV crewmember back to the vehicle using the Simplified Aid For EVA Rescue (SAFER). The IV crewmember will be reading the steps to the separated EV crewmember.

1. Deploy SAFER HCM.
- HCM 2. sw PWR → ON
3. Fly to vehicle.  
Monitor GN2 % and PWR %.  
  
\*\*\*\*\*  
\* If no gas flow  
\* √MAN ISOL vlv – OP (dn)  
\*\*\*\*\*
- IV/  
other EV 4. Provide GCA
- IV 4.1 Provide range and range rate using Laser Range Finder, as required.
- 4.2 Configure WVS and ISS external cameras to assist separated EV crew.
- 4.3 Turn on external vehicle lights, as required.
- EV 5. Tether to nearest structure.  
  
√Connection
6. Tether to available safety tether or other EV crewmember.  
  
√Connection
- HCM 7. sw PWR → OFF
8. MAN ISOL vlv → CL (up)
9. √**MCC-H**

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Crew Visually Detects Plume, Leaking QD, White Crystals, or "Snow" Coming from Orbiter/Station During EVA

Orbiter/Station Chemical System Leak Suspected Due to Steady (not Step Function) Decrease in Pressure or Temperature



① Ammonia visual inspection should be performed in night or shaded ambient light with helmet spot lights used to illuminate TMG. Use of sun visor during inspection should be avoided. View TMG from an oblique angle. The following are indications of ice on the EMU:

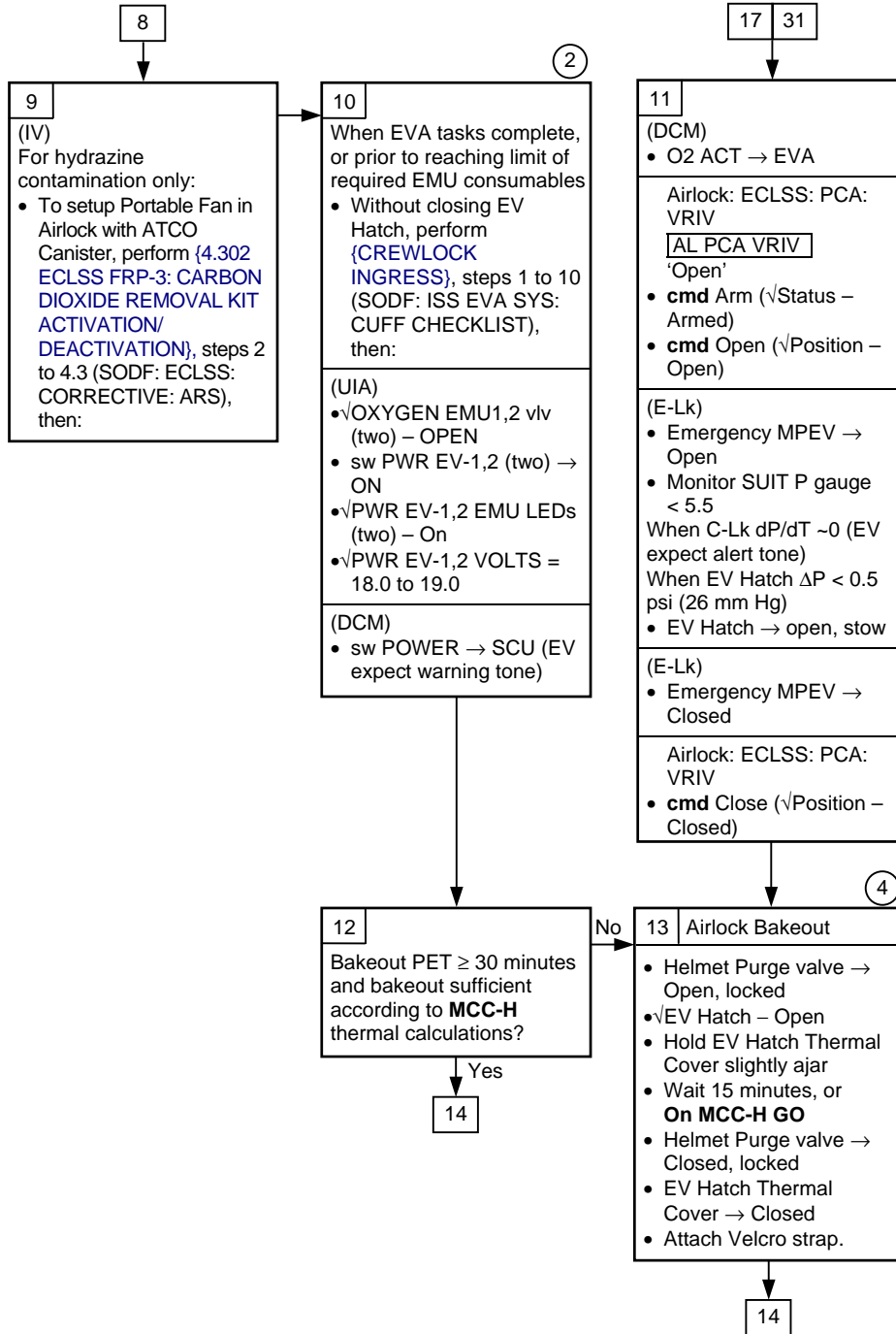
- Loss of TMG thread pattern.
- Waxy gloss or hard pack snow appearance.
- Unusual contours.

② For confirmed contamination 2:00 (2:15 if from ISS thruster) of EMU consumables must be available to support activities from ingress through EMU doffing. For suspected contamination 0:55 (1:10 if from ISS thruster) of consumables required. EVA tasks must be deferred to protect these consumables. Bakeout on SCU does not consume Metox/LiOH if Helmet Purge valve is open.

③ All displays in this procedure are on the PCS, unless otherwise noted.

**4.140 ISS EVA DECONTAMINATION**

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 2 of 9 pages

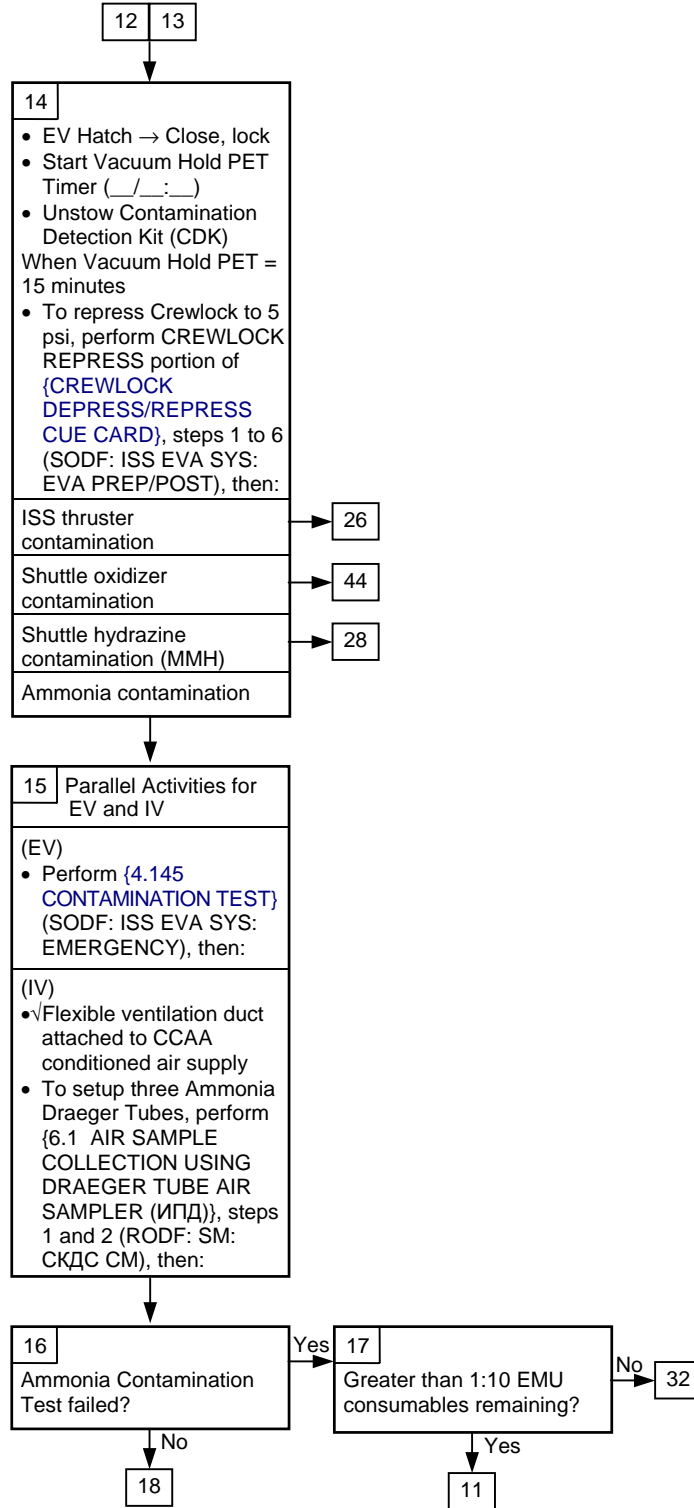


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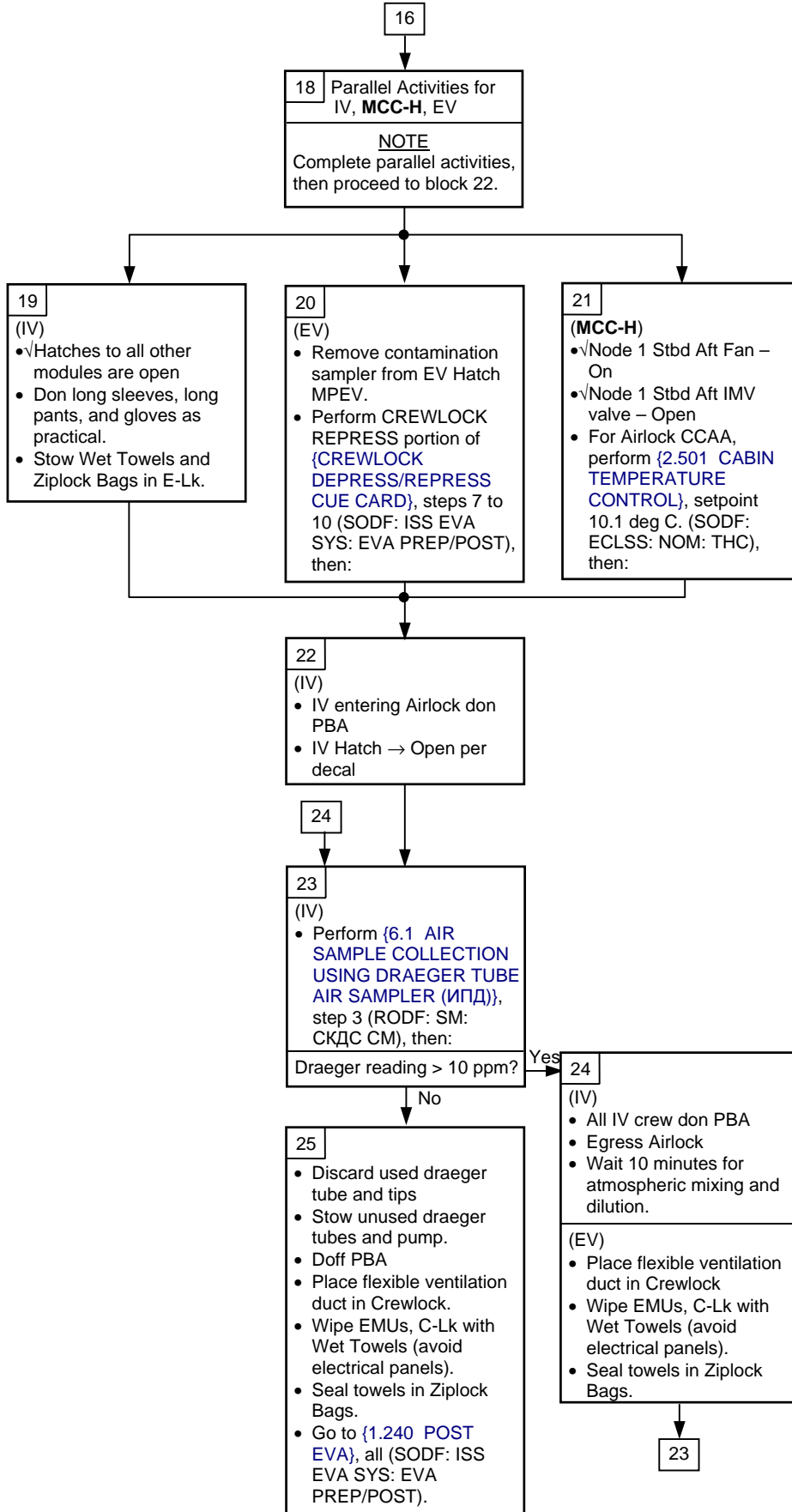
④ Crew should remain in Crewlock throughout Airlock Bakeout. However, if temporary egress is required, SCU strain relief hook must be connected to EMU D-Ring.

**4.140 ISS EVA DECONTAMINATION**

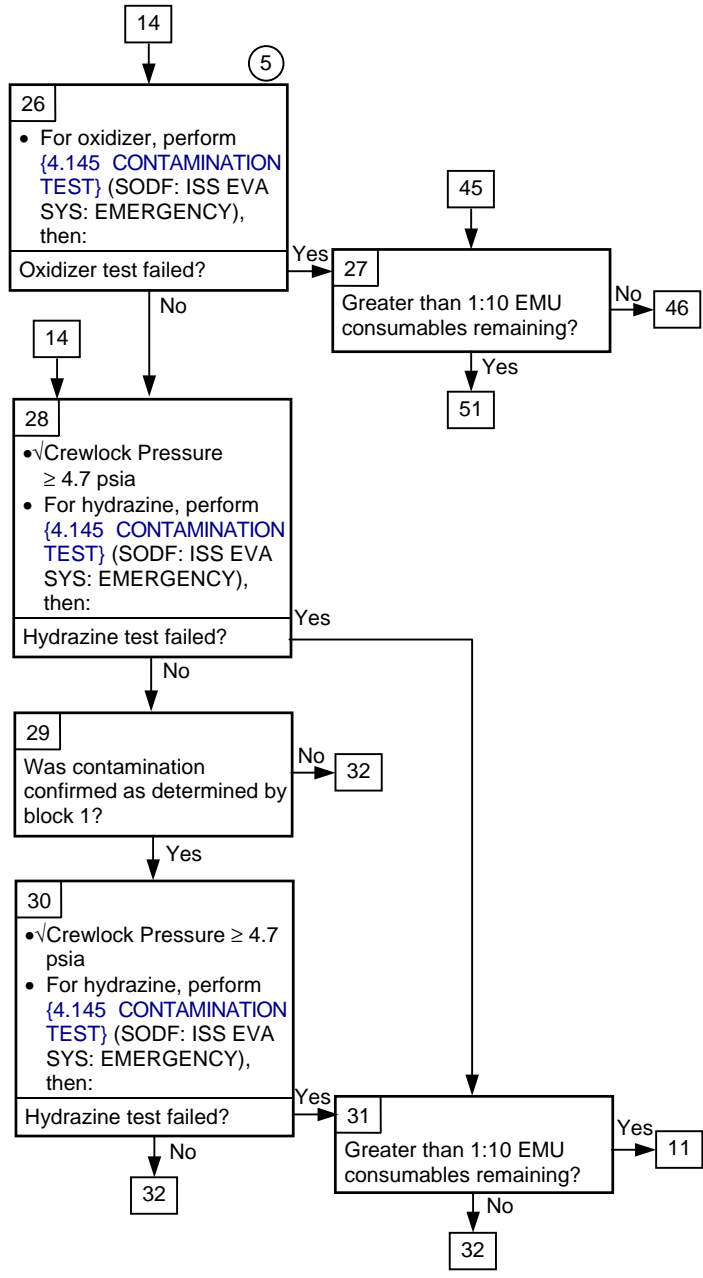
(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 3 of 9 pages



**4.140 ISS EVA DECONTAMINATION**



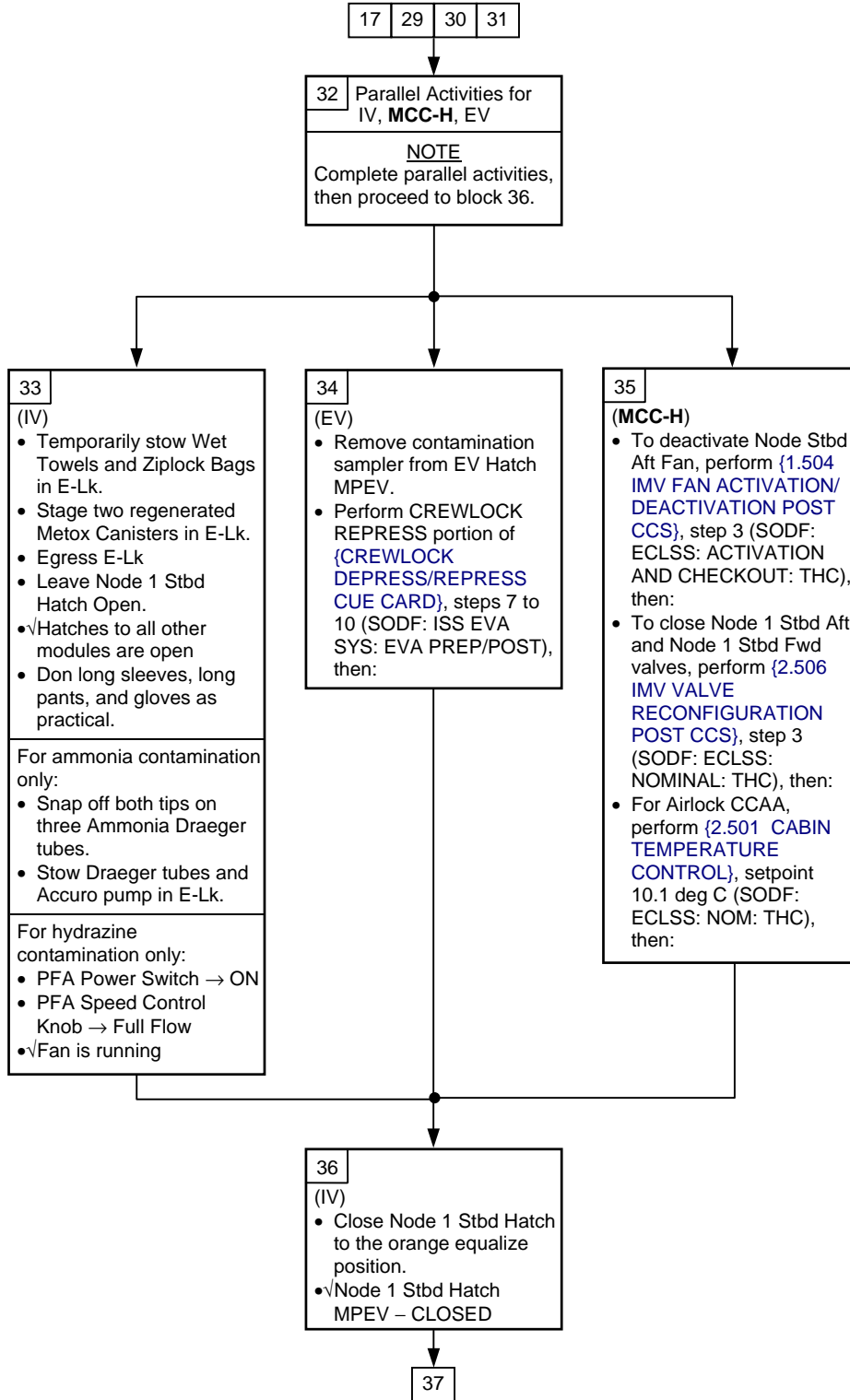
**4.140 ISS EVA DECONTAMINATION**



⑤  
On ISS, it is impossible to determine if a propulsion leak was fuel or oxidizer. Therefore tests must be performed for both oxidizer and UDMH.

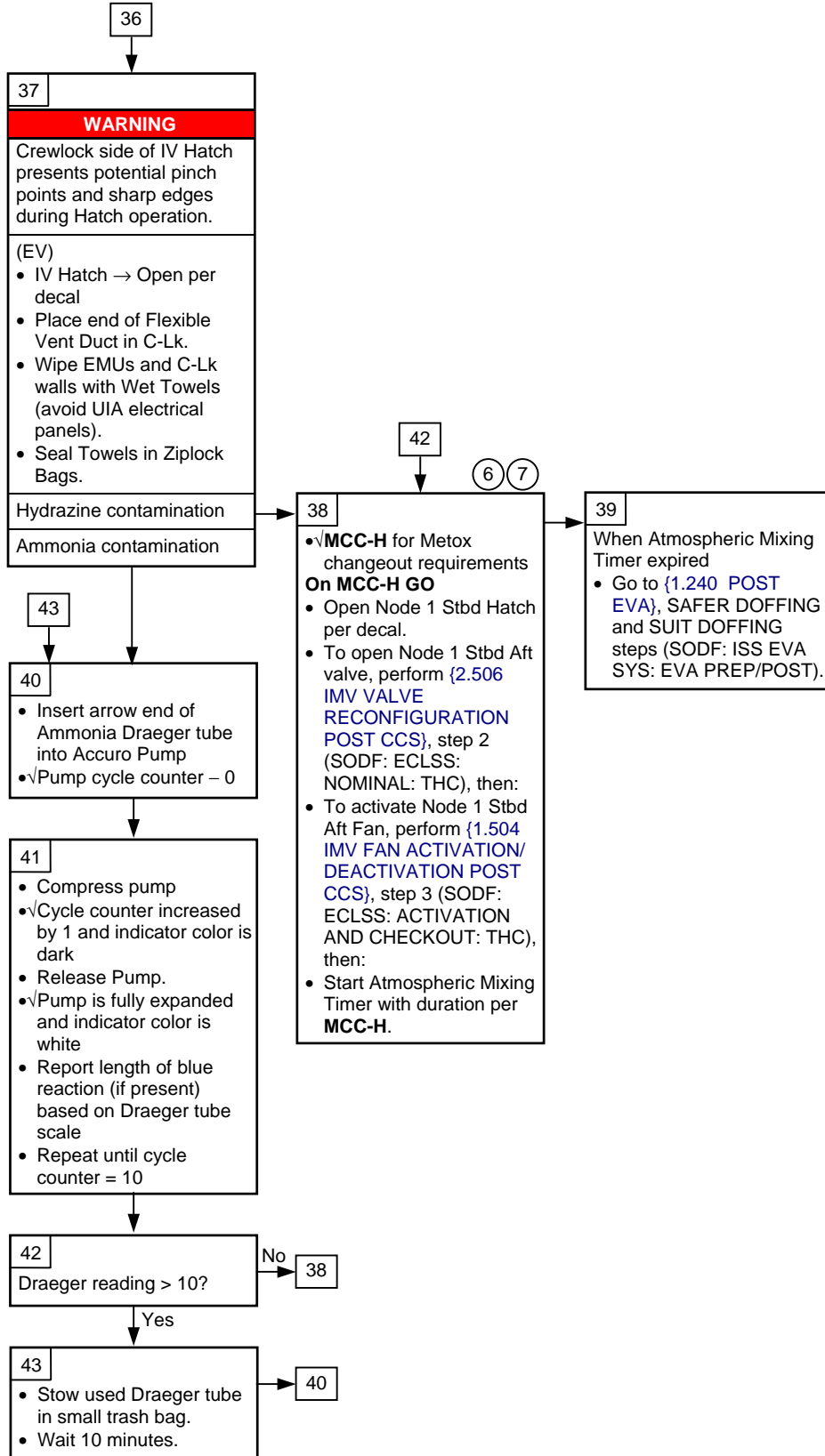
**4.140 ISS EVA DECONTAMINATION**

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 6 of 9 pages



**4.140 ISS EVA DECONTAMINATION**

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 7 of 9 pages

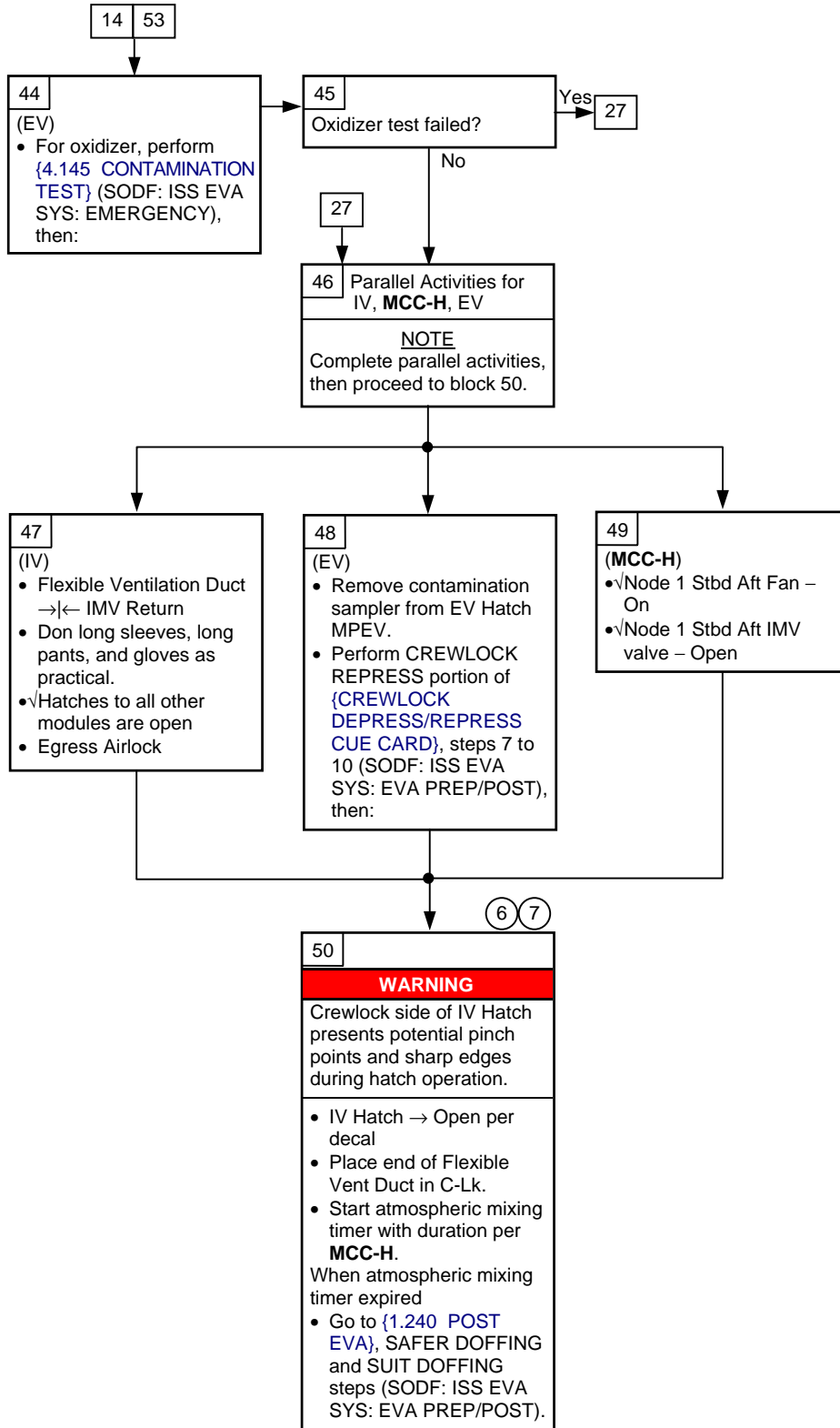


⑥ Atmospheric mixing will dilute Airlock atmosphere by 50 % every 6 minutes. Mixing will be 99 % complete after 42 minutes. Maximum dilution is approximately 14:1 with shuttle present and 12:1 without shuttle. Minimum mixing time assuming Contamination Test passed at 5 psi is 5 minutes for MMH and 10 minutes for UDMH.

⑦ IV crewmembers must remain outside of Airlock during atmospheric mixing time to avoid localized regions of elevated concentration. If IV must enter Airlock before mixing complete to assist EV crew, don PBA.

**4.140 ISS EVA DECONTAMINATION**

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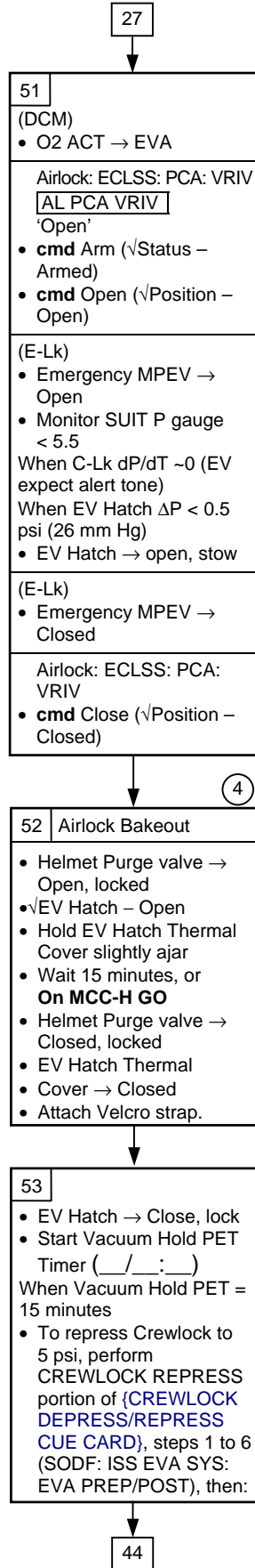


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⑦ IV crewmembers must remain outside of Airlock during atmospheric mixing time to avoid localized regions of elevated concentration. If IV must enter Airlock before mixing complete to assist EV crew, don PBA.

**4.140 ISS EVA DECONTAMINATION**

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 9 of 9 pages



④ Crew should remain in Crewlock throughout Airlock Bakeout. However, if temporary egress is required, SCU strain relief hook must be connected to EMU D-Ring.

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#### 4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS)

Page 1 of 6 pages

(100 Minutes without second repress attempt)

#### OBJECTIVE:

Given a large Crewlock leak that cannot be supported during Crewlock repress, this procedure depresses the Equipment Lock to vacuum for EV crew ingress and repress.

#### DEPRESSING CREWLOCK (20 MINUTES)

EV DCM 1. √sw Comm FREQ – LOW

sw COMM mode → PRI

#### NOTE

Steps 21 to 24 should be performed in parallel as quickly as possible to save EV crew consumables.

IV2 If more than one IV crewmember available  
2. Perform steps 21 to 24 immediately, then assist IV1 as available.

IV C-Lk 3. √IV Hatch equalization valve – OFF

EV DCM 4. O2 ACT → EVA

IV PCS 5. Airlock: ECLSS: PCA: VRIV

AL PCA VRIV

'Open'

**cmd** Arm (√Status – Armed)

**cmd** Open (√Position – Open)

IV 6. Emergency MPEV → OPEN (EV expect alert tone)  
EV Monitor SUIT P gauge < 5.5.

\*\*\*\*\*

\* If gauge > 5.5, stop depress, √**MCC-H**.

\*\*\*\*\*

EV C-Lk If EV Hatch MPEV is usable per **MCC-H**

7. EV Hatch MPEV → OPEN

8. Attach waist tethers to C-Lk (UIA) D-ring.

9. When C-Lk dP/dT ~ 0, (EV expect alert tone)

When EV Hatch ΔP < 26 mmHg (0.5 psi)

10. EV Hatch → open, stow

11. EV Hatch MPEV → CLOSED

12. Inspect EV Hatch seals for damage and debris.  
Remove debris as required.

#### 4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 2 of 6 pages

IV 13. Emergency MPEV → CLOSED

PCS 14. Airlock: ECLSS: PCA: VRIV  
AL PCA VRIV  
 'Close'

**cmd** Close (√Position – Closed)

15. √**MCC-H** for EMU consumables

EV If second repress attempt desired and > 90 minutes of EMU consumables

16. √Thermal cover – closed

17. EV Hatch → close and lock

18. Go to CREWLOCK REPRESS {CREWLOCK DEPRESS/REPRESS CUE CARD} (SODF: ISS EVA SYS: EVA PREP/POST) steps 3 to 11.

EV If < 80 minutes of EMU Metox (LiOH) remain

19. Helmet Purge vlv → open

#### PREPARING EQUIPMENT LOCK FOR VACUUM (20 MINUTES)

MCC-H/IV	IV	EV
PCS: 20. Perform {4.152 EQUIPMENT LOCK CONFIG FOR VACUUM}, steps 1 to 12. (SODF: ISS EVA SYS: EMERGENCY), then:	Metx. 21. √sw POWER – OFF Regen. √ON LED – Off  BCA 22. √sw MAIN POWER (four) – OFF √LEDs (four) – Off  EACP 23. √sw PWR – OFF  24. Remove from E-lk: All bags All laptops (PCS, SSC) spare EMU(s) All PHAs All PBAs PFE EMU Equip Bag EMU Serv Kit All floor bin-stowed items  25. Egress E-Lk  26. Close Node1 Stbd Hatch per decal.  27. √Node 1 Stbd Hatch MPEV – CLOSED and uncapped	C-Lk 28. Begin removing every other Velcro strap from SCU.  C-Lk IVA Bag: 29. Retrieve EVA Ratchet and 7/16" X 6" wobble socket  30. Cold soak as time allows. Temp control vlv → increase toward Max C (slightly colder than comfortable)

#### 4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 3 of 6 pages

##### EQUIPMENT LOCK DEPRESS (15 MINUTES)

MCC-H, IV 31. Give a go for Equipment Lock depress.

EV C-Lk 32. √EV Hatch – Open and stowed

33. IV Hatch equalization valve → EMER

#### WARNING

Hatch latch mechanism is a pinch hazard.  
Verify EV crew is clear of it.

MCC-H/IV

PCS

34. Airlock: ECLSS:  
'Equipment Lock'  
Monitor 'Cab Press'

EV C-Lk

When 'Cab Press' ~ 0 mmHg (10 to 15 minutes)

35. Open IV Hatch per decal.

36. IV Hatch equalization valve → OFF

37. EV Hatch Thermal Cover → Close

38. Partially close EV Hatch. Leave small gap for water sublimation.

39. Waist Tethers ←|→ C-Lk D-ring; attach to EMUs

##### CONFIGURING FOR SCU REMOVAL (5 MINUTES)

40. Transfer the following to Equipment Lock and secure:

IV Bag  
Staging Bag  
Crewlock EVA Bags (four)  
All ORUs

If Helmet Purge vlv – open (per step 19, to conserve Metox/LiOH)

41. Helmet Purge vlv → close and lock

DCM 42. √STATUS: O2 P > 850

#### WARNING

EV crew will be without SCU O2 supply for approximately 40 minutes. If Metox (LiOH) canister expended, open/close helmet purge valve as required to maintain safe ppCO2 levels. The SOP may be required to complete the procedure.

MCC-H/

IV PCS

43. CLOSING AIRLOCK O2 HI PRESSURE SUPPLY VALVE

Airlock: ECLSS: O2 Hi Pressure Supply Vlv  
AL O2 Hi Pressure Supply Valve

**cmd** Close (Verify Actual Position – Closed)

## 4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 4 of 6 pages

- EV DCM 44. sw POWER → BATT, (expect warning tone)
- UIA 45. sw PWR EV-1,2 (two) → OFF  
√PWR EV-1,2 LEDs (four) – Off
- DCM 46. SCU ←|→ DCM  
Install DCM cover.
- C-1k 47. Stow SCU in pouch.
- DCM 48. Temp control vlv → Max H
49. sw WATER → ON  
√DCM display – blank, BITE – off
50. Temp control vlv → 3 to Max C (slightly colder than comfortable)

**MCC-H/IV**  
PCS

51. DISABLING THE POWER SUPPLY ASSEMBLY  
Airlock: EPS: RPCM AL2A3B B

sel RPC 18

RPCM AL2A3B B RPC 18

**cmd** Open Cmd – Enable (√Open Cmd – Ena)

**cmd** RPC Position – Op (√RPC Position – Op)

**MCC-H**

52. Give EV crew a go for SCU Removal.

### REMOVING SCU FROM UIA (20 MINUTES)

MCC-H/IV	EV
<p>53. Perform {4.152 EQUIPMENT LOCK CONFIG FOR VACUUM}, step 13 (SODF: ISS EVA SYS: EMERGENCY), then:</p>	<div style="border: 2px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; background-color: yellow; margin: 0;"><b>CAUTION</b></p> <p style="margin: 0;">ОРЛАН caps on UIA are not tethered. Be prepared to catch them during removal.</p> </div> <p>54. Perform {SCU REMOVAL FROM UIA (AT VACUUM)}, pages 32 and 33 (SODF: ISS EVA SYS: CUFF CHECKLIST), then:</p>

### EQUIPMENT LOCK INGRESS (5 MINUTES)

- DCM 55. Begin maximum cold soak.  
Temp control vlv → Max C

#### 4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS)

Page 5 of 6 pages

56. Transfer SCUs to E-Lk and secure

57. ✓All items removed from C-Lk

**NOTE**

EV crew will be without cooling after the next step.

58. sw WATER → OFF

59. EV Hatch → fully close, lock

✓EV Hatch MPEV – CLOSED

60. Ingress E-Lk.

✓IV Hatch clear of debris.

EV

61. Close IV Hatch per decal, lock.

✓IV Hatch equalization valve – OFF

**EQUIPMENT LOCK REPRESS (15 MINUTES)**

**NOTE**

EV crew disregard **SET O2 PRESS** message during repress.

**MCC-H**

62. Give a go for Equipment Lock Repress

EV/IV

63. Node 1 Stbd Hatch MPEV → throttle CLOSED to OPEN (as required), EV expect alert tone

EV DCM

64. E-Lk at 4.0, EV expect alert tone.

**WARNING**

1. If Cuff 1 symptoms resolving upon repress, report as Cuff 2.
2. If any DCS, O2 ACT → PRESS instead of IV in the next step.

DCM

When AIRLK P > 5.0 psia

65. O2 ACT → IV

**WARNING**

Verify EV crew is clear of hatch latch mechanism.

When E-Lk dP/dT ~ 0 (EV expect alert tone)

66. Open Node 1 Stbd Hatch per decal.

#### 4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS)

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67. √Node 1 Stbd Hatch MPEV – CLOSED

IV

68. Install IV Hatch equalization valve cap.

<b>MCC-H</b>	IV and EV
69. Go to {4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE} (SODF: ISS EVA SYS: EMERGENCY).	70. Perform {4.115 EXPEDITED SUIT DOFFING}, all (SODF: ISS EVA SYS: EMERGENCY), then:  √ <b>MCC-H</b> for deltas

## 4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS)

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I

(20 minutes)

### OBJECTIVE:

Command ISS hardware to a configuration safe for Equipment Lock Depress and Repress.

#### NOTE

This procedure should normally be performed by **MCC-H**.

**MCC-H/IV**

PCS

1. Rapid Depress: ISS IMV Isolation

ISS IMV Isolation

'Airlock IMV Isolation'

**cmd** Arm (√Arm Status – Armed)

**cmd** Isolate

√Status – Isolated

2. Node 1: ECLSS: IMV Stbd Aft Vlv

Node 1 IMV Stbd Aft Valve

'Inhibit'

**cmd** Arm (√Arm Status – Armed)

**cmd** Inhibit (√State – Inhibited)

sel RPCM N14B C RPC 13

**cmd** RPC Position – Open (Verify – Op)

3. Node 1: ECLSS: IMV Stbd Fwd Vlv

Node 1 IMV Stbd Fwd Valve

'Inhibit'

**cmd** Arm (√Arm Status – Armed)

**cmd** Inhibit (√State – Inhibited)

sel RPCM N14B A RPC 16

**cmd** RPC Position – Open (Verify – Op)

4. US Lab: ECLSS: AR Rack

LAB AR Rack Overview

'CDRA'

If CDRA State – Operate

'Stop'

#### NOTE

Per SPN 1903 (5A-AC), the Disarm command should be sent after the Stop command because it does not automatically disarm itself.

#### 4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

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┌  
└ **cmd** Arm (√Status – Armed)  
└ **cmd** Stop  
└ **cmd** Disarm (√Status – Disarmed)  
└ √CDRA Status – Stop Complete

PCS

##### 5. US Lab: TCS

**LAB:IATCS Overview**

'Status'

If Mode – Sngl LT or Sngl MT  
Go to step 6.

US Lab: TCS: IATCS Details: LAB Act TCS RPC Commands

**LAB Act TCS RPC Commands**

Verify positions of all RPCs (17) – CI

US Lab: TCS: IATCS Details

**IATCS Details**

Verify LTL PPA RT Status – Ena

Verify MTL PPA RT Status – Ena

US Lab: TCS: Software

**Software Commands**

'IATCS'

'Mode'

**cmd** Sngl LT – Arm (√Arm Status – Sngl LT Armed)

**cmd** Sngl LT – Sngl LT

Expect Caution message '**Lab LTL SFCA Uncontrolled DP - LAB**'

Expect Caution message '**Lab MTL SFCA Uncontrolled DP - LAB**'

##### NOTE

Multiple LAB1XX Rack Temp and Flow Cautions can be expected.

Wait up to 3 minutes.

US Lab: TCS

**Lab:IATCS Overview**

'Status'

'IATCS'

#### 4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

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Verify Status – Oper  
Verify Mode – Sngl LT

##### NOTE

Lowering the LTL SFCA Mod Vlv dP prior to commanding LCA Vlv 2 to Dual is necessary due to the expected large pressure transient. At the nominal setpoint, the pressure spike may trigger the SFCA Overpress FDIR, resulting in auto reduction of LTL Pump Speed.

US Lab: TCS: LTL SFCA

LTL SFCA Commands

'LTL SFCA'

'Mod Vlv dP Setpt'

input New Setpoint – 20.7 kPa

**cmd** Set – Set ( $\sqrt{\text{Mod Vlv dP Setpt: 20.7 kPa}}$ )

US Lab: TCS

Lab: IATCS Overview

'SFCA'

$\sqrt{\text{LTL Mod Vlv dP: } 20.7 \pm 7 \text{ kPa}}$

##### Configuring LCA Valve 2 to Dual Position

US Lab: TCS: LCA Icon

LCA Commands

'LCA'

$\sqrt{\text{Vlv1 Posn – Sngl}}$

If Vlv2 Posn – Sngl then

**cmd** Vlv2 Posn – Dual **Execute**

$\sqrt{\text{Vlv2 Posn – Dual}}$

US Lab: TCS: LTL SFCA

LTL SFCA Commands

'LTL SFCA'

'Mod Vlv dP Setpt'

input New Setpoint – 75.8 kPa

**cmd** Set – Set ( $\sqrt{\text{Mod Vlv dP Setpt: 75.8 kPa}}$ )

## 4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

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### NOTE

LT Setpoint is raised to prevent localized freezing of water on the AL CCAA HX surfaces. While the LT setpoint is elevated, LAB CCAs are not providing any latent cooling.

PCS

### 6. RAISING LT SETPOINT

P6: TCS: Loop A(B) Details: PPL Ver ID

PPL\_Ver\_ID

'P6 PVCA EETCS'

'Setpt PPL Ver ID'

√Prime: 106

√Bkup: 106

If Ver ID ≠ 106, √**MCC-H**

P6: TCS: Loop A(B) Line Heater Icon

Loop A(B) Line Heater Commands

'EETCS LoopA(B) PFCS'

√Line Htr Cntl – Ena

If Line Htr Cntl – Inh

√Inhibited Line Htr ≠ Both

Repeat step for both EETCS Loop A and Loop B.

LAB: TCS: LTLTWMV Icon

LTL TWMV Commands

'LTL TWMV'

'Temp Setpt'

input – 2 1

**cmd Set Execute**

√Temp Setpt – 21.0° C

If after several minutes, LTL TWMV Out Temp < 21.0° C

Raise the MTL TWMV Temp Setpoint to increase temperature of water entering LT IFHX.

LAB: TCS: MTL TWMV Icon

MTL TWMV Commands

'MTL TWMV'

'Temp Setpt'

input – 1 5

#### 4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

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**cmd Set Execute**

√Temp Setpt – 15.0° C

**cmd CLC – Ena (Verify – Ena)**

Raise MTL TWMV Temp Setpoint in 2-degree increments as required until LTL TWMV Out Temp  $-21.0 \pm 0.6^{\circ}$  C.

#### 7. Fire Summ: Airlock

**AL Fire Display**

'Fire Isolation'

'Cabin Air Assembly'

**cmd Stop** (√State – EIB Off)

sel AL CCAA

**AL CCAA: CCAA Commands**

**AL CCAA Commands**

sel RPCM AL2A3B B RPC [X] where [X] = **3** **5** **6** **17**

**cmd RPC Position – Open** (√ – Op)

Repeat

#### 8. Fire Summ: Airlock

**AL Fire Display**

'Airlock Smoke Detectors'

sel Cabin

**AL Cabin Smoke Detector**

'Monitoring'

**cmd Inhibit** (√Status – Inhibited)

sel RPCM AL2A3B A RPC 08

**RPCM AL2A3B A RPC 08**

**cmd RPC Position – Open** (Verify – Op)

**AL Fire Display**

'Airlock Smoke Detectors'

sel Duct

#### 4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

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AL Duct Smoke Detector

'Monitoring'

**cmd** Inhibit (√Status – Inhibited)

sel RPCM AL2A3B B RPC 07

RPCM AL2A3B B RPC 07

**cmd** RPC Position – Open (Verify – Op)

**MCC-H**

#### 9. Configuring MCA for Sampling LAB/NODE

AL Fire Display

'LAB MCA'

√State – Operate

If State not Operate  
Go to step 10.

sel LAB MCA

LAB MCA

sel Nominal Cmds

LAB MCA Nominal Commands

#### NOTE

Per SPN 3572 (5A - x2 INTR3), the MCA can get out of sync with the INT SYS after an autosequence command. To prevent this, a Standby Immediate command should be issued first.

'Standby'

**cmd** Immediate

√State – Standby

'Auto Sequencing'

**cmd** LAB/Node1

√State – Operate

LAB MCA

sel Additional TIm

LAB MCA Additional TIm

√Invalid Sequence – blank

#### 4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS)

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##### 10. C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 3 6 8 (Cabin Pressure Low-E/L)

**cmd Arm**  
**cmd Execute**

input Event Code – 6 5 7 6 (Rapid Depress-A/L)

**cmd Arm**  
**cmd Execute**

input Event Code – 6 3 5 6 (Cabin Pressure Above Normal-E/L)

**cmd Arm**  
**cmd Execute**

input Event Code – 5 9 1 0 (Cabin Pressure Below Normal-E/L)

**cmd Arm**  
**cmd Execute**

##### 11. Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'Airlock Depress Response – INT MDM'

'Inhibit'

**cmd Inhibit – Arm** ( $\sqrt{\text{Status}}$  – Armed)  
**cmd Inhibit** ( $\sqrt{\text{Status}}$  – Inhibited)

'CC MDM Rapid Depress Response'  
'Inhibit'

**cmd Arm** ( $\sqrt{\text{Status}}$  – Armed)  
**cmd Inhibit** ( $\sqrt{\text{Status}}$  – Inhibited)

##### 12. DEACTIVATING AIRLOCK ATUS, CVIU, AND UOP

Airlock: EPS: RPCM AL2A3B A

sel RPC [X] where [X] = 1 3 14 17

**cmd RPC Position – Open** ( $\sqrt{\text{Op}}$  – Op)

Repeat

## 4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS)

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Airlock: EPS: RPCM AL2A3B B: RPC 01

RPCM AL2A3B B RPC 01

'RPC Position'

**cmd** RPC Position – Open ( $\sqrt{\quad}$  – Op)

Prior to Equipment Lock Repress

### 13. INHIBITING ISS RAPID DEPRESS RESPONSE AND C&W

**MCC-H/IV**  
PCS

#### 13.1 Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'INT MDM Rapid Depress Response'

'Inhibit'

**cmd** Inhibit Arm ( $\sqrt{\text{Status}}$  – Armed)

**cmd** Inhibit ( $\sqrt{\text{Status}}$  – Inhibited)

C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 5 7 5 (Rapid Depress – LAB)

**cmd** Arm

**cmd** Execute

#### 13.2 Inhibiting CCS Low Pressure Safing Response

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'CC MDM Low Cabin P Response'

'Inhibit'

**cmd** Arm ( $\sqrt{\text{Status}}$  – Armed)

**cmd** Inhibit ( $\sqrt{\text{Status}}$  – Inhibited)

## 4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3) Page 1 of 6 pages

### OBJECTIVE:

Reconfigure ISS systems back to normal following execution of procedure {4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA} (SODF: ISS EVA SYS: EMERGENCY). This procedure is nominally performed by **MCC-H**.

**MCC-H/IV**  
PCS

### 1. RECONFIGURING IATCS

- 1.1 US Lab: TCS: LTL TWMV Icon  
LTL TWMV Commands  
'Commands'  
'LTL TWMV'

**cmd** CLC – Ena **Execute** ( $\sqrt{\text{CLC – Ena}}$ )

#### NOTE

If LTL or MTL TWMV setpoints were previously changed in response to Crewlock leak, then setpoints must be reset to the original values.

- 1.2 For LTL TWMV and MTL TWMV as necessary, perform {2.201 LAB IATCS SETPOINT CHANGE}, all (SODF: TCS: NOMINAL: IATCS), then:

PCS

### 2. ENABLING RAPID DEPRESS RESPONSE

Rapid Depress  
ISS Depress  
'LAB'

Wait until  $|dP/dT| < 0.04$  mmHg/min.

- 2.1 Enabling Rapid Depress Response  
sel Rapid Depress Response Software Control

US Rapid Depress Response Software Control  
'Airlock Depress Response – INT MDM'  
'Enable'

**cmd** Enable ( $\sqrt{\text{Status – Enabled}}$ )

'INT MDM Rapid Depress Response'  
'Enable'

**cmd** Enable ( $\sqrt{\text{Status – Enabled}}$ )

'CC MDM Rapid Depress Response'  
'Enable'

**cmd** Enable ( $\sqrt{\text{Status – Enabled}}$ )

## 4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

Page 2 of 6 pages

- 2.2 Enabling CCS Low Pressure Safing Response  
'CC MDM Low Cabin P Response'  
'Enable'

**cmd** Enable (√Status – Enabled)

### 3. ENABLING ALARMS

C&W Summ

'Event Code Tools'

sel Enable

input Event Code: [X] where [X] =

Cabin Pressure Low-E/L

Cabin Pressure Below Normal-E/L

Cabin Pressure Above Normal-E/L

RAPID DEPRESS-A/L

RAPID DEPRESS-LAB

**cmd** Execute

Repeat

### 4. ACTIVATING AIRLOCK ATUS, CVIU, AND UOP

Airlock: EPS: RPCM AL2A3B A

sel RPC [X] where [X] =

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

Repeat

Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 9 to 12 (SODF: C&T: NOMINAL: AUDIO), then:

## 4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

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### 5. RELEASING IMV ISOLATION

Rapid Depress: Isolation Status

ISS IMV Isolation

'Airlock IMV Isolation'

**cmd** Release (√Airlock IMV Isolation Status – Released)

### 6. ACTIVATING AIRLOCK SMOKE DETECTORS

6.1 Fire Summ: Airlock

AL Fire Display

'Airlock Smoke Detectors'

sel Cabin

sel RPCM AL2A3B A RPC 08

RPCM AL2A3B A RPC 08

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

AL Cabin Smoke Detector

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

6.2 Fire Summ: Airlock

AL Fire Display

'Airlock Smoke Detectors'

sel Duct

sel RPCM AL2A3B B RPC 07

RPCM AL2A3B B RPC 07

## 4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

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

**AL Duct Smoke Detector**

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

## 7. REESTABLISHING INTERMODULE VENTILATION

### 7.1 Node 1: ECLSS: IMV Stbd Aft Valve

**Node 1 IMV Stbd Aft Vlv**

sel RPCM N14B C RPC 13

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

'Enable'

**cmd** Arm (√Arm State – Armed)

**cmd** Enable (√State – Enabled)

'Open'

**cmd** Arm (√Arm Status – Armed)

**cmd** Open

√Position – In Transit

Wait 25 seconds.

√Position – Open

## 4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

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### 7.2 Node 1: ECLSS: IMV Stbd Aft Fan

**Node 1 IMV Stbd Aft Fan**

'On'

**cmd** On

√State – In Transit

Wait 15 seconds.

√State – On

√Speed: 7745 to 9278 rpm

### 7.3 Node 1: ECLSS: IMV Stbd Fwd Valve

**Node 1 IMV Stbd Fwd Vlv**

sel RPCM N14B A RPC 16

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

**Node 1 IMV Stbd Fwd Vlv**

'Enable'

**cmd** Arm (√Arm Status – Armed)

**cmd** Enable (√State – Enabled)

## 8. [ACTIVATING AIRLOCK CCAA](#)

To activate Airlock CCAA, perform {[1.509 AIRLOCK CCAA ACTIVATION](#)}, steps 3 to 9 (SODF: ECLSS: ACTIVATION AND CHECKOUT: THC), then:

## 9. [RECONFIGURING MCA AUTOSEQUENCE LIST](#)

### **NOTE**

The nominal autosequence list will include Node, Airlock, and Lab modules when MPLM is not available.

## 4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

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If desired autosequence list is LAB/Node1/Airlock, LAB/Node1, or LAB/Node1/Airlock/MPLM

### NOTE

Per SPN 3572 (5A - x2 INTR3), the MCA can get out of sync with the INT SYS after an autosequence command. To prevent this, a Standby Immediate command should be issued first.

US Lab: ECLSS: AR Rack

LAB AR Rack Overview

'Standby Immediate'

**cmd** Standby Immediate

√State – Standby

'MCA'

'Auto Sequence'

**cmd** LAB/Node1/Airlock (LAB/Node1)  
(LAB/Node1/Airlock/MPLM)

√State – Operate

US Lab: ECLSS: AR Rack: MCA: Additional TIm

LAB MCA Additional TIm

√Invalid Sequence – blank

If another autosequence list is desired, perform {2.301 MCA AUTO SEQUENCE LIST CHANGE}, all (SODF: ECLSS: NOMINAL: ARS), then:

### 10. ACTIVATING CDRA

If required, to activate CDRA, go to {1.301 ATMOSPHERE REVITALIZATION RACK ACTIVATION}, step 10 (SODF: ECLSS: ACTIVATION AND CHECKOUT: ARS).