EVA Checklist

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

Generic, Rev G
July 28, 2000

NOTE
For STS–106 and subsequent (chronological) flights per current schedule.

Verify this is the correct version for the pending operation (training, simulation or flight). Electronic copies of FDF books are available. URL: http://fltproc.jsc.nasa.gov/fdf
List of Implemented Change Requests (482s):

EVA-1437    EVA-1447
EVA-1440    EVA-1448
EVA-1441

Incorporate the following:

1. Replace iii thru vi
2. Replace 1-7 & 1-8
3. Replace 3-1 thru 3-4, 3-7 & 3-8
4. Replace 4-5 thru 4-8
5. Replace 9-1 & 9-2, 9-5 & 9-6
6. After 11-2, add 11-3 & 11-4

Prepared by: Paul S. Baker
Book Manager

Approved by: Mary A. Ficarra
Lead, EVA Systems Group

James V. Thornton
Chief, EVA and Crew Systems Operations Branch

Encl: 22 pages

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REV G 07/28/00  
PCN–1 12/15/00  
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Δ – Replace with page from Flight Supplement, if applicable.  
Otherwise, not flown
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10.2 PSI CABIN

MASK PREBREATHE INITIATE ........................................... 1–2
PREP FOR 10.2 PSI CABIN ........................................... 1–3
CABIN DEPRESS TO 10.2 PSI ........................................ 1–4
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MASK PREBREATHE TERMINATE ..................................... 1–6
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CABIN REPRESS TO 14.7 PSI ....................................... 1–8
14.7 PSI CABIN CONFIG ............................................. 1–9
MASK PREBREATHE INITIATE

1. Take one aspirin tablet (325 mg) if not taken previously
2. Configure Quick Don Mask, HIU, and 14 ft comm/O2 Umbilicals (two)
3. \( \checkmark \) LEH O2 SPLY 1,2 vlv (two) – OP
4. O2 XOVR SYS 2 – CL
5. LEH O2 4(5,6,7) outlet – connect O2 hose
6. MIDDECK COMM CCU PWR – OFF
   outlet – connect comm cable
   CCU PWR – ON
7. Decrease HIU volume control
8. LEH O2 4(5,6,7) vlv – OP
9. Don mask

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

10. Set mask O2 control to EMERGENCY
11. Momentarily pull mask away from face and verify O2 flow
12. \( \checkmark \) Comm
13. Configure ATU for PTT/PTT as reqd to alleviate comm noise

**WARNING**
Do not terminate prebreathe until cabin pressure at 10.2 psia and 1 hr prebreathe completed

14. Note time and continue mask prebreathe at least 1 hr
PREP FOR 10.2 PSI CABIN

PRESS/CYRO SYS CONFIG
L2 1. √O2 SYS 1,2 SPLY (two) – ctr (tb–OP)
   √XOVR SYS 1 – OP
   2 – CL
2. √N2 SYS 1,2 SPLY (two) – ctr (tb–OP)
   √REG INLET (two) – ctr (tb–OP)
3. O2/N2 CNTLR VLV SYS 1 – OP (N2)
   2 – CL (O2)

   SM 88 APU/ENVIRON THERM

4. If FLASH EVAP CNTLR PRI A,B – OFF:
   If FREON LOOP 1,2 EVAP OUT T between 41–47 degF:
   RAD CNTLR OUT TEMP – HI
   When FREON EVAP OUT TEMP > 50 degF, RAD CNTLR OUT TEMP – NORM (then immediately)
   FLASH EVAP CNTLR PRI A(B) – ON
   After ~1 min
   √FREON EVAP OUT TEMP ~39 degF
   If FREON LOOP 1,2 EVAP OUT T not between 41–47 degF:
   FLASH EVAP CNTLR PRI A(B) – ON

   L1
5. If FLASH EVAP CNTLR PRI A(B) – ON,
   continue:

AIRLOCK/MIDDECK PREP

MO10W 5. √O2 REG INLET SYS 1 vlv – CL
   2 vlv – OP
6. √N2 XOVER vlv – CL
   If internal airlock:

ML31C 7. √VAC VENT ISOL VLV BUS SEL – MNA
   √CNTL – ctr (tb–OP)
   √NOZ HTR – ON
8. If CO2 RMVL SYS flown: Perform CO2 RMVL SYS DEACT, 4–8

AW18A 9. LTG FLOOD (four) – ON

DCM 10. √PURGE vlv – op (up)
11. Remove LTA restraint bag (1 ea EMU)

AW82B 12. AIRLK DEPRESS vlv cap – vent, remove

RESET FDA & C/W LIMITS

X: SM 60 SM TABLE MAINT

13. Contact MCC for uplink of B/U C/W and SM ALERT TMBU (if desired)
   Changes enclosed in

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CABIN DEPRESS TO 10.2 PSI

WARNING
Do not initiate depress until EV1 and EV2 have completed 45 min of mask prebreathe

Do not terminate prebreathe until cabin pressure at 10.2 psia and 1 hr mask prebreathe completed

1. Plot initial CABIN P vs PPO2 on 10.2 PSIA DEPRESS CHART using SM SYS SUMM 1

WARNING
Cabin O2 concentration (SM SYS SUMM 1) must be maintained below 28.5% to protect against increased flammability risk

Terminate all WCS activity while flowing N2 thru 14.7 CAB REG INLET SYS 1

NOTE
Expect klaxon each time airlock depress valve opened

AW82B, MO10W

2. START DEPRESS
Config vlvs per DEPRESS CHART

3. Continue plotting CABIN P vs PPO2 every 60 sec using SM SYS SUMM 1. Reconfig vlvs when plot transitions into different zone

4. STOP DEPRESS
When CABIN P and PPO2 are in CONTROL ZONE (TARGET ZONE preferred), stop depress by configuring as listed at lower left of 10.2 PSIA DEPRESS CHART

WARNING
Do not initiate depress until EV1 and EV2 have completed 45 min of mask prebreathe

Do not terminate prebreathe until cabin pressure at 10.2 psia and 1 hr mask prebreathe completed
When in **CONTROL ZONE** (TARGET ZONE preferred):

**STOP DEPRESS**
Airlk DEPRESS vlv – CL
Install Airlk DEPRESS vlv Cap
14.7 CAB REG INLET SYS 1 – CL
SYS 2 – CL

**NOTE**
Trend of plot should closely parallel slope of lines in each zone. If it does not, verify valve config.
10.2 PSI CABIN CONFIG

R13

1. Reset FDA & C/W limits:
   Changes enclosed in ________

2. Contact MCC for uplink of B/U C/W and SM ALERT TMBU (if desired)

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### Mask Prebreathe Terminate

**WARNING**
Do not terminate prebreathe until cabin pressure at 10.2 psia and 1 hr prebreathe completed

1. Set mask O2 control to NORMAL
2. Doff mask
3. LEH O2 4(5,6,7) vlv – CL
   C6, MO32M, MO69M
4. MIDDECK COMM CCU PWR – OFF
   – Disconnect comm cable
   – CCU PWR – ON
5. Depress Mask O2 control
6. LEH O2 4(5,6,7) outlet – Disconnect hose
   C6, MO32M, MO69M
7. Stow mask, HIU, and 14 ft comm/O2 umbilical

If internal airlock and CO2 RMVL SYS flown:

4. Perform CO2 RMVL SYS ACT (EVA PREP)

L2

5. O2 XOVR SYS 2 – OP

6. If O2 bleed orifice not installed:
   ✓ LEH O2 vlv 8 – CL
   Unstow and insert O2 bleed orifice in O2 QD
   LEH O2 vlv 8 – OP

7. Stow mask, HIU, and 14 ft comm/O2 umbilical

---

1–6

EVA/ALL/GEN G,3
10.2 PSI MAINTENANCE

WARNING
Cabin O2 concentration (SM SYS SUMM 1) must be maintained below 28.5%. See chart this page.
Terminate all WCS activity while flowing N2 thru 14.7 CAB REG INLET SYS 1.

CAUTION
Do not perform 10.2 PSI MAINTENANCE in parallel with EMU purge.

X: SM SYS SUMM 1

NOTE
Perform 10.2 PSI MAINTENANCE procedure post airlock repress and post sleep while 10.2 psi operations desired. Perform pre–sleep maintenance, if reqd, using target area in control zone.

1. If PPO2 < 2.70 psia:
   If pre–sleep:
   OCAC
   Perform OCAC filter cleaning as reqd
   OCAC PWR – OFF

2. When PPO2 ~2.70 psia or when CABIN PRESS ~10.4 psia:
   DIRECT O2 – OP
   If pre–sleep:
   OCAC
   OCAC PWR – ON

3. If CABIN PRESS < 10.40 psia:
   MO10W
   14.7 CAB REG INLET SYS 1 vlv – OP (N2)
   When CABIN PRESS ~10.40 psia:
   14.7 CAB REG INLET SYS 1 vlv – CL

CABIN LEAK MONITORING

4. Log 10.2 PSI MAINTENANCE times (MET)
   1. _______  5. _______
   2. _______  6. _______
   3. _______  7. _______
   4. _______  8. _______

NOTE
If MCC requests maintenance, then log time and use that time to compare to next maintenance.

5. If successive maintenance reqd because CABIN PRESS decreased from 10.40 to 10.00 psia:
   For Δt < 40 min, perform O2(N2) FLOW HIGH/CAB P LOW/dP/dT (ORB PKT, ECLS)
   For 40 min < Δt < 10 hr, perform MAL, ECLS SSR–8, SMALL CABIN–LEAK ISOL
**CABIN REPRESS TO 14.7 PSI**

**WARNING**
Termite all WCS activity during repress to 14.7 psia

**SETUP**

**NOTE**
Verify outer hatch(es) closed

X: SM 60 SM TABLE MAINT

R13

1. Reset C/W and FDA limits
2. Contact MCC for uplink of B/U C/W and SM ALERT TMBU (if desired)

Changes enclosed in [ ]

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**REPRESS**

X: SM 66 ENVIRONMENT

MO10W

3. 14.7 CAB REG INLET SYS 1,2 vlv (two) – OP

L2

4. √O2/N2 CNTLR VLV SYS 1 – OP
   2 – AUTO

5. Contact MCC to determine if FES should remain ON

6. If FES operation not reqd:
   L1 FLASH EVAP CNTLR PRI A(B) – OFF
14.7 PSI CABIN CONFIG

ORBITER PCS 1(2) CONFIG

MO10W 1. O2 REG INLET SYS 1(2) vlv – OP
2(1) vlv – CL
2. H2O TK N2 REG INLET SYS 1(2) vlv – OP
2(1) vlv – CL
3. √H2O TK N2 ISOL SYS 1.2 vlv (two) – OP
4. If prior to shuttle airlock repress:
   14.7 CAB REG INLET SYS 1.2 vlv
   (two) – CL
   If after shuttle airlock repress:
   14.7 CAB REG INLET SYS 1(2) vlv
   2(1) vlv – OP
L2 5. O2/N2 CNTLR VLV SYS 1(2) – AUTO
   2(1) – CL(O2)

RESET C/W AND FDA LIMITS

R13U 6. Contact MCC for uplink of B/U C/W and
   SM ALERT TMBU (if desired)
   Changes enclosed in □□□□

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</tbody>
</table>

7. Go to SM CHECKPOINT INITIATE (ORB OPS, DPS)
AIRLOCK CONFIG

AIRLOCK PREP .................................................................................................................. 2–2
EMU SWAP ........................................................................................................................ 2–3
BOOSTER FAN DEACTIVATION/REMOVAL ................................................................. 2–4
  INSTALLATION/ACTIVATION ...................................................................................... 2–4
EVA TOOL TRANSFER ..................................................................................................... 2–4
EMU REMOVAL ................................................................................................................ 2–4
  INSTALLATION ............................................................................................................. 2–4
CHECKOUT PREP ........................................................................................................... 2–5
LTA RERAINT STRAP REMOVAL .................................................................................... 2–6
  INSTALLATION ............................................................................................................. 2–6
AIRLOCK PREP (50 min)

Retrieve or unstow following equipment:
- MF28G 3/8–in breaker bar, 4–in ext w/3/8–in drive
- IFM Tool Kit 1/2–in socket w/3/8–in drive
- Vol H EMU Equipment Bag – attach to middeck lockers/wall
- Cooling Loop Jumper – stow in EMU Equipment Bag
- EMU Servicing Kit – temp stow
- Helmet Lights – remove covers
- EVA Bag
- FDF Locker Cuff Checklists (2) – stow in EMU Equipment Bag
- DEPRESS/REPRESS Cue Card

1. ✓ Inner hatch Equal vlv (two) – OFF
2. AW18A LTG FLOOD (four) – ON
3. Remove from airlock, as reqd:
   - Airlock Stowage Bag
   - Airlock Floor Pallet using 3/8–in breaker bar, 4–in ext w/3/8–in drive,
     and 1/2–in socket w/3/8–in drive

   **CAUTION**
   - Do not stow EMU lights in locker with batteries installed

4. Stow Vol H Bags in Vol H
5. Transfer to airlock:
   - EVA Bag – install on airlock wall
   - DEPRESS/REPRESS Cue Card
   - Helmet Lights
6. Install IVA foot restraint, as reqd
7. Unbuckle SCU straps, Velcro SCU to wall
8. Install EMU lights on helmets (EMU 1,EMU 2)
9. Disconnect all helmets, temp stow
10. Remove comm caps from LTA restraint bags and connect to electrical
     harnesses
11. Remove LTA restraint bags
12. Disconnect waist rings; remove and stow any equipment stowed in
     HUT/LTA
13. Remove Drink Bag restraint bags – stow in EV1,EV2 mesh bags
14. Stow LTA restraint bags on AAPs
15. ✓ Thermal cover clear of waist ring
16. Waist ring – engage posn
17. Connect LTA to HUT, lock
18. ✓ Tether hook operation
19. Remove 20–g Crash Bag from middeck EMU, as reqd
EMU SWAP (30 min)

NOTE
EMU X is to be removed and EMU Y is to be installed

EMU X
1. Install gloves

AW18H
2. √ PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF
   √ MODE (two) – OFF

DCM
3. Disconnect SCU; install DCM cover
4. Stow SCU on AAP, Velcro to wall
5. Connect LTA to HUT; lock (if reqd)
6. Disconnect helmet, stow
7. Release EMU from AAP, transfer EMU to middeck
8. Install helmet
9. Remove 20–g Crash Bag on middeck EMUs (if flown)

EMU Y
10. √ Helmet disconnected, stowed
11. Remove comm cap from LTA restraint bag and connect to electrical harness (if reqd)
12. Remove LTA restraint bag
13. Release EMU from middeck AAP, transfer to airlock
14. Mount EMU on AAP
15. Disconnect waist ring; remove and stow any equipment stowed in HUT/LTA
16. Waist ring – engage posn
17. Connect LTA to HUT, lock
18. √ Tether hook operation

NOTE
O2 vlv for SCU connected to EMU Y must be closed prior to checkout of EMU Y

AW82B
19. If performing EMU CHECKOUT of EMU Y:
   EV–1(EV–2) O2 vlv – CL

EMU X
20. Attach EMU to middeck AAP
21. Attach LTA restraint bag
BOOSTER FAN DEACTIVATION/REMOVAL (15 min)

MO13Q 1. ARLK FAN A,B (two) – OFF
MA73C:G 2. cb AC1,2 ARLK TNL FAN A,B (six) – op
EXT A/L 3. Disconnect flex duct from booster fan muffler inlet, direct airflow into airlock, temp secure
4. Disconnect vent duct from booster fan outlet and external airlock duct inlet, temp stow in middeck
If booster fan to be removed:
5. Disconnect flex duct from booster fan inlet, rotate and stow in launch bracket
6. Demate booster fan electrical connectors from J1,J2 (two) on tunnel extension wall, loosen cable harnesses (two) from Velcro strips (four)
7. Stow electrical connectors (two) on booster fan dummy fittings, secure cable harnesses with Velcro strips
8. Loosen booster fan fasteners (four)
9. Remove booster fan assy, temp stow in middeck

BOOSTER FAN INSTALLATION/ACTIVATION (15 min)

If booster fan to be installed:
MA73C:G 1. √ cb AC1,2 ARLK TNL FAN A,B (six) – op
MO13Q 2. √ ARLK FAN A,B (two) – OFF
EXT A/L 3. Install booster fan assy, secure fasteners (four)
4. Demate electrical connectors (two) from booster fan dummy fittings and Velcro strips
5. Mate booster fan electrical connectors J1,J2 (two) on tunnel extension wall, secure cable harnesses (two) with Velcro strips (four)
6. Unstow/connect flex duct from launch bracket to booster fan inlet
7. Unstow/connect vent duct to external airlock duct inlet and booster fan outlet
8. Unstow/connect flex duct from middeck to fan muffler inlet
MA73C:G 9. cb AC1,2 ARLK TNL FAN A,B (six) – cl
MO13Q 10. ARLK FAN A(B) – ON
11. Check for airflow at top of external airlock halo

EVA TOOL TRANSFER (30 min)

1. Remove tools from Spacehab/ODS per EVA Equipment Stowage List (EVA FS, TOOLS/TIMELINES)
2. As reqd, stow in middeck, airlock, or tunnel adapter

EMU REMOVAL (30 min)

1. As reqd, install gloves
2. Perform LTA RESTRAINT STRAP INSTALLATION (AIRLOCK CONFIG)
3. Relocate LTA spring hooks (four) from AAP rings to SAFER mount brackets
4. Disconnect EMUs from AAPs, stow in middeck

EMU INSTALLATION (30 min)

1. Transfer EMUs to A/L, connect to AAPs
2. As reqd for EVA, perform LTA RESTRAINT STRAP REMOVAL (AIRLOCK CONFIG)
3. Relocate LTA spring hooks (four) from SAFER mount brackets to AAP rings
EMU CHECKOUT PREP (30 min)

AW18A
1. LTG FLOOD (four) – ON
2. Remove Airlock Stowage Bag from airlock (if flown)

Vol H
3. Unstow:
   - EMU Equipment Bag – attach to middeck lockers/wall
   - EMU Servicing Kit – mark with Gray Tape; label “Shuttle”; temp stow
   - Drink Bags for later use (stow on top of Vol H bags)
4. Stow Vol H bags in Vol H
5. Unbuckle SCU straps, Velcro SCU to wall
6. Remove 20–g Crash Bag from middeck EMU (if flown)
7. Disconnect all helmets, temp stow
8. Remove comm caps from LTA restraint bags and connect to electrical harnesses in EMU
9. Remove LTA restraint bags
10. Disconnect waist rings; remove and temp stow any equipment stowed in HUT/LTA
11. Stow LTA restraint bags on AAP
12. ✔Thermal cover clear of waist rings
13. ✔Waist ring – engage position
14. Connect LTA to HUT, lock
15. ✔Tether hook operation
16. Install helmet, lock (not reqd if proceeding directly to EMU Checkout)
**LTA RESTRAINT STRAP REMOVAL** (15 min)

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

1. Disconnect all attachments (six) from SAFER mount brackets (two)
2. Loosen cinch strap mechanism, remove SAFER mount brackets
3. Remove strap from PLSS
4. Stow strap in LTA restraint bag pouch with D-rings (three) connected
5. Engage EMU in AAP
6. Stow LTA restraint bag/strap

**LTA RESTRAINT STRAP INSTALLATION** (15 min)

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

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

**LTA RESTRAINT STRAP APPLICATION**

**EMU LAUNCH AND LANDING CONFIGURATION**

(LTA Restraint Strap installed)

NOTE: French hooks should be attached to SAFER mount brackets for launch and landing
## CHECKOUTS

<table>
<thead>
<tr>
<th>CHECKOUT</th>
<th>Page</th>
</tr>
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<tbody>
<tr>
<td>EMU CHECKOUT</td>
<td>3-2</td>
</tr>
<tr>
<td>EMU POWERUP</td>
<td>3-2</td>
</tr>
<tr>
<td>COMM CHECK</td>
<td>3-2</td>
</tr>
<tr>
<td>PRIMARY REGULATOR/FAN/PUMP CHECK</td>
<td>3-3</td>
</tr>
<tr>
<td>SOP CHECK</td>
<td>3-5</td>
</tr>
<tr>
<td>BATTERY CHARGE CHECK INIT</td>
<td>3-5</td>
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<tr>
<td>BATTERY CHARGE CHECK TERM</td>
<td>3-5</td>
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<tr>
<td>EMU SWAP DURING CHECKOUT</td>
<td>3-6</td>
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<tr>
<td>POST EMU C/O RECONFIG</td>
<td>3-7</td>
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<td>SAFER CHECKOUT</td>
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<tr>
<td>SELF TEST SEQUENCE</td>
<td>3-8</td>
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<td>SAFER CHECKOUT RESULTS</td>
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<td>SAFER CHECKOUT RESULTS</td>
<td>3-9</td>
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<td>STATUS TROUBLESHOOTING</td>
<td>CC</td>
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<tr>
<td>REBA POWERED HARDWARE CHECKOUT</td>
<td>3-11</td>
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</table>
EMU CHECKOUT

NOTE
Procedures are written for simultaneous c/o of EMUs #_____ (stbd) and #_____ (port) in airlock. An additional c/o of EMU(s) #_____ uses same procedure after performing EMU SWAP during c/o.

If external airlock:

[ ] X: SM 60 SM TABLE MAINT

☐ 1. Contact MCC for uplink of SM ALERT TMBU (if desired)

Changes enclosed in [ ].

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<th>Param Name</th>
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EMU POWERUP (2 min)

NOTES
If procedure is being repeated for 3rd EMU #_____ only, other previously checked EMU #_____ is reqd in airlock to perform EMU POWERUP and COMM CHECK procedures to verify EMU–to–EMU comm.

‘PWR RESTART’ msg occurs and BITE light is illuminated whenever EMU power is cycled.

Perform all DCM PWR sw throws with firm, deliberate action.

BOTH DCM
[ ] 2. Retrieve, position SCUs; remove DCM covers
[ ] 3. Connect SCUs to DCM, locked
[ ] 4. PWR – BATT

CAUTION
EMU must be on BATT pwr when airlock power supply is turned on.

AW18H
[ ] 5. PWR/BATT CHGR EMU 1,2 MODE (two) – PWR BUS SEL (two) – MNA(MNB)
[ ] 6. √ EMU INPUT 1,2 volts = 18.0–20.0

DCM
[ ] 7. PWR – SCU

COMM CHECK (13 min)
EV
[ ] 8. √ AIRLK AUD PWR – OFF
IV1
[ ] 9. √ AUD CTR UHF A/G 1,2 (two) – OFF
[ ] A/A – T/R
IVA ATU □ □ 10. □AUD PWR – AUD/TONE
   A/G 1,2 (two) – OFF
   A/A – T/R
   ICOM A,B (two) – OFF (as reqd)
R14:C □ □ 11. □ cb MNA UHF EVA – cl
   □ MNC UHF EVA – cl
O6 □ □ 12. □UHF SPLX/EVA PWR AMP – OFF
   MODE – EVA

BOTH □ □ 13. Helmets disconnected
□ □ 14. Don comm caps
□ □ 15. Perform onboard A/A comm check per table

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<tr>
<th>EMUs</th>
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<td>PRI</td>
<td>HIGH</td>
</tr>
<tr>
<td>PRI</td>
<td>LOW</td>
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</tbody>
</table>

A1R □ □ 16. AUD CTR UHF A/A – OFF
IV1 □ □ 17. Perform EVA COMM CONFIG, steps 4 thru 6 and 8 (EVA PREP)

BOTH □ □ 18. Verify RF comm with MCC
□ □ 19. Doff comm caps
IV1 □ □ 20. AUD CTR UHF A/G 1 – OFF

If procedure is being repeated for 3rd EMU #_____ only, then on other,
previously checked EMU #_____:
□ 21. Install helmet, lock
□ 22. COMM mode – HL
□ 23. PWR/BATT CHGR EMU 1(2) BUS SEL – OFF

PRIMARY REGULATOR/FAN/PUMP CHECK (40 min)
If external airlock:
MD(flr) □ □ 24. EMU O2 ISOL VLV – OP
DCM □ □ 25. STATUS: □ O2 P = 850–950

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<td>O2 P</td>
</tr>
</tbody>
</table>

AW82B □ □ 26. EV–1, EV–2 O2 vlv (two) – OP
□ □ 27. Install helmet, lock
□ □ 28. □ Suit arms aligned
□ □ 29. □ Gloves locked
□ □ 30. □ Helmet purge vlv – cl, locked
DCM □ □ 31. PURGE vlv – cl (dn)
□ □ 32. O2 ACT – IV
□ □ 33. STATUS: □ SUIT P = 0.4–1.4 and stable (compare w/gauge)

<table>
<thead>
<tr>
<th>EMU</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>33.</td>
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<td>SUIT P (IV)</td>
</tr>
</tbody>
</table>
34. O2 ACT – PRESS

35. STATUS:  
- SUIT P = 4.2–4.4 and stable (compare w/gauge)
- H2O TEMP = ambient
- H2O GP/WP = 14.0–16.0

<table>
<thead>
<tr>
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<th>3</th>
<th>4</th>
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</thead>
</table>
| 35. SUIT P (PRESS)  
H2O TEMP  
H2O GP  
H2O WP | | | | |

36. O2 ACT – IV, start timing manual leak check  
(2 min, SUIT ΔP ≤ 0.3 psi)

<table>
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<td>36. ΔP</td>
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</tbody>
</table>

* If ΔP > 0.3 psi, go to FAILED LEAK CHECK *

* (14.7/10.2 PSI) Cue Card, CC 6–4 *

DCM

37. O2 ACT – OFF

38. PURGE vlv – op (up)

39. STATUS:  
- SUIT P < 0.4 (compare w/gauge)

40. Disconnect gloves, temp stow in airlock

41. Disconnect helmet, temp stow

42. Disconnect waist ring – secure LTA to outer hatch handrail

43. Connect LCVG, ✓ locked

DCM

44. ✓ Temp control vlv – Max C

CAUTION
Minimize fan operation with O2 ACT – OFF (~2 min)

AW18H

45. FAN – ON (PWR RESTART may occur)

46. ✓ EMU INPUT amps = 1.5–4.7 (1.5–5.0 at 14.7)

<table>
<thead>
<tr>
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<th>1</th>
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<tr>
<td>46. INPUT AMPS</td>
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</tbody>
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DCM

47. Install SCOF, lock

48. O2 ACT – IV, ‘NO VENT FLOW’ msg, PROC

49. STATUS:  
- H2O TEMP decrease from step 35

<table>
<thead>
<tr>
<th>EMU</th>
<th>1</th>
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<tr>
<td>49. H2O TEMP</td>
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AW18H

50. ✓ EMU INPUT amps = 1.5–3.6 (1.5–4.0 at 14.7)  
✓ EMU INPUT amps decrease from step 46

<table>
<thead>
<tr>
<th>EMU</th>
<th>1</th>
<th>2</th>
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<tbody>
<tr>
<td>50. INPUT AMPS</td>
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</tbody>
</table>
DCM □ □ 51. PWR – BATT
□ □ 52. STATUS: √BAT VDC ≥ 16.5
√BAT AMPS = 2.3–3.7 (2.4–4.0 at 14.7)
√RPM = 19.0–20.0 K

<table>
<thead>
<tr>
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<th>1</th>
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<th>4</th>
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<tr>
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<tr>
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<tr>
<td>RPM</td>
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</tbody>
</table>

□ □ 53. √Fan noise steady
□ □ 54. O2 ACT – OFF
□ □ 55. FAN – OFF
□ □ 56. PWR – SCU

SOP CHECK (5 min)
DCM □ □ 57. STATUS: √SOP P = 5800–6800, cycle to SUIT P

<table>
<thead>
<tr>
<th>EMU</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tr>
<td>SOP P</td>
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</tbody>
</table>

SOP □ □ 58. √SOP gauge 5800–6800, note SOP interstage gauge

<table>
<thead>
<tr>
<th>EMU</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tr>
<td>58.</td>
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<tr>
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<tr>
<td>INT GAUGE</td>
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</tbody>
</table>

□ □ 59. Depress SOP manual override (50 sec max):
√SOP interstage gauge < 600
DCM

<table>
<thead>
<tr>
<th>EMU</th>
<th>1</th>
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</table>

□ □ 60. Remove SCOF, stow
If EMU to be used for EVA:
□ □ 61. Stow LCVG in HUT
Else:
□ □ 62. Disconnect LCVG, stow
□ □ 63. Install helmet, LTA, gloves
DCM □ □ 64. COMM mode – HL

BATTERY CHARGE CHECK INIT (15 min)
AW18H □ □ 65. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF
MODE (two) – CHARGE
BUS SEL (two) – MNA(MNB)

□ □ 66. Continue charge 15 min, minimum
□ □ 67. Perform REBA BATTERY RECHARGE TERMINATE (EMU
MAINT/RECHARGE), as reqd

EMU ___ □ □ 68. Perform REBA BATTERY INSTALLATION (EMU
& ____ MAINT/RECHARGE), as reqd

Cont next page
**BATTERY CHARGE CHECK TERM**

When PWR/BATT CHGR EMU INPUT AMPS < 1 and 15 min minimum charge complete:

- 69. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF
- MODE (two) – OFF

**EMU SWAP DURING CHECKOUT** (30 min) (If reqd)

**NOTE**

EMU(s) #____ to be removed from airlock.
EMU(s) #____ to be installed in airlock.
Procedure written for swap of one or two EMUs

EMU __
- 70. Gloves installed

DCM
- 71. Disconnect SCU; install DCM cover
- 72. Stow SCU on AAP, Velcro to wall
- 73. Disconnect helmet, stow
- 74. Release EMU from AAP, transfer EMU to middeck
- 75. Install helmet

EMU __
- 76. Disconnect helmet, stow
- 77. Remove comm cap from LTA restraint bag and connect to electrical harness
- 78. Remove LTA restraint bag
- 79. Release EMU from middeck AAP, transfer to airlock
- 80. Install EMU on AAP
- 81. Disconnect waist ring; remove and stow any equipment stowed in HUT/LTA
- 82. Waist ring – engage posn
- 83. Connect LTA to HUT, lock
- 84. Tether hook operation

**NOTE**

O2 vlv for SCU connected to EMU(s) #____ must be closed prior to checkout of EMU

AW82B
- 85. EV–____ O2 vlv – CL

EMU __
- 86. Install EMU on middeck AAP
- 87. Attach LTA restraint bag, as reqd
- 88. Go to EMU POWERUP, 3–2
POST EMU C/O RECONFIG (5 min)

When EMU C/O for all EMUs complete:

IV O6  □ 89. UHF MODE – OFF
  √SPLX/EVA XMIT FREQ – 259.7/414.2
  √PWR AMP – OFF
  √SPLX SQUELCH – ON

R10  □ 90. BIOMED CH 1,2 (two) – as reqd

If external airlock and EMU C/O for all EMUs complete:

AW82B  □ 91. EV–1, EV–2 O2 vlv (two) – CL

BOTH DCM  □ 92. Remove SCUs; install DCM covers
  □ 93. Stow SCU on AAP, Velcro to wall

IV ML86B:C  □ 94. cb MNC EXT ARLK HTR LINE ZN 1,2 (two) – cl

SAFER CHECKOUT (30 min if first checkout of SAFER unit, 20 min for subsequent checks)

NOTE
Procedures written for simultaneous c/o of SAFER 1&2

BOTH  1. Remove SAFER and SAFER CHECKOUT RESULTS Cue Card from Stowage Bag/FDF Locker

PM  2. √Inhibitor installed, properly engaged

If first SAFER CHECKOUT:

HCM  3. Remove power switch guard
  4. Stow HCM
  5. Remove Stowage Straps from thruster towers, unfold towers
  6. Inspect:
     Thruster tower hinges
     Tower latches
     √TMG not blocking thrusters
  7. Fold thruster towers
  8. Install Stowage Straps

PM  9. MAN ISOL vlv – OP (dn)
  10. Deploy HCM; √proper deployment

CAUTION
Minimize time with SAFER powered (~1 min)

NOTE
Have SAFER CHECKOUT RESULTS Cue Card w/proper serial number ready to record status.

From power on to entry into Test Mode, the SAFER will be in Automatic Attitude Hold (AAH) (Green LED on). Changes in SAFER attitude may result in AAH–induced thruster firings

Cont next page
11. As reqd, review SELF TEST SEQUENCE (refer to box below)
12. Perform Self Test:

   HCM
   Start timer
   PWR – TST/ON
   Wait until [GN2 XX% PWR XX%] displayed
   ✓ AAH LED on
   PWR – ON
   PWR – TST/ON
   Follow displayed instructions on HCM:
   ✓ [SELF TEST – WAIT] displayed; if able, count thruster clicks (twenty four)

   * If [NSI CIRCUIT OPEN] or ‘FAIL: ...’ msg *
   * displayed or non–responsive display: *
   * Note failure msg *
   * Press DISP sw to resume test *
   * If [HC TO DETENT] msg displayed: *
   * Note msg *
   * ✓ HC grip springs to center position *

When [RATE CHECK] displayed, rotate SAFER at least + and – 3 deg/sec sequentially in each rotational axis

13. ✓ [GO FOR EVA] or [FAILED TEST] displayed
14. PWR – ON
15. DISP: Record GN2%, PWR%, BATT V (SAFER CHECKOUT
    RESULTS Cue Card)
16. PWR – OFF
17. Stop timer, record ‘ON Time’ (∼1 min desired)
18. ✓ GN2% ≥ 87
    ✓ PWR% ≥ 45
    ✓ BATT V ≥ 35
19. Report status and SAFER serial number to MCC
20. MODE – ROT

   NOTE
   When stowing HCM, verify that umbilical will not
   snag on deploy mechanism when HCM deployed

21. Stow HCM
22. Stow SAFER and Cue Card in Stowage Bag
23. ✓ Inhibitor installed
24. MAN ISOL vlv – CL (up)

**SELF TEST SEQUENCE** (for reference only; do not perform)

HCM
1. NSI circuit test
2. [SELF TEST – WAIT]; ✓ Twenty–four thruster clicks and THR
   LED flashing
3. DEPRESS AAH
4. [MODE – ROT] (if in TRAN)
5. MODE – TRAN
6. HC +X (fwd), (∼X, +Y (rt), −Y, +Z (dn), −Z, +P (twist up), −P)
7. RATE CHECK]; rotate SAFER at least + and – 3 deg/sec sequentially in each rotational axis
# SAFER CHECKOUT RESULTS

<table>
<thead>
<tr>
<th>SAFER SERIAL #</th>
<th>GMT</th>
<th>ON Time</th>
<th>GN2%</th>
<th>PWR%</th>
<th>BATT V</th>
<th>GMT</th>
<th>ON Time</th>
<th>GN2%</th>
<th>PWR%</th>
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**NOTE**
SAFER battery expected to last for 52 1-min checkouts and have at least 45% PWR remaining.

## BATTERY CHANGEOUT

<table>
<thead>
<tr>
<th>GMT</th>
<th>OLD BATT SERIAL #</th>
<th>NEW BATT SERIAL #</th>
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(reduced copy)
### SAFER STATUS TROUBLESHOOTING

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<th>GMT:</th>
<th>NOMINAL STATUS</th>
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<tr>
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<td>GMT:</td>
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<table>
<thead>
<tr>
<th>GN2%</th>
<th>87–99%</th>
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<tr>
<td>PWR%</td>
<td>45–99%</td>
</tr>
<tr>
<td>TANK P</td>
<td>&gt; 6575 psia</td>
</tr>
<tr>
<td>TANK T</td>
<td>–40 to 140 degF</td>
</tr>
<tr>
<td>RATE R</td>
<td>±30 deg/s</td>
</tr>
<tr>
<td>RATE P</td>
<td>±30 deg/s</td>
</tr>
<tr>
<td>RATE Y</td>
<td>±30 deg/s</td>
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<td>DISPL R</td>
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</tr>
<tr>
<td>DISPL P</td>
<td>±99.9 deg</td>
</tr>
<tr>
<td>DISPL Y</td>
<td>±99.9 deg</td>
</tr>
<tr>
<td>BATT V</td>
<td>≥35.0 V</td>
</tr>
<tr>
<td>BATT T</td>
<td>50 to 90 degF</td>
</tr>
<tr>
<td>Leak</td>
<td>NO LEAK</td>
</tr>
</tbody>
</table>

### SAFER JET NOMENCLATURE

- [Diagram of SAFER jet](image)

---

CC 3–10  EVA/ALL/GEN G,1
**REBA POWERED HARDWARE CHECKOUT (15 min)**

**NOTE**
Procedure written for simultaneous c/o of 12 volt HDW on all EMUs

1. Perform REBA BATTERY INSTALL (EMU MAINT/RECHARGE), as reqd
2. REBA sw (1 per EMU) – OFF
3. Install EMU TV on helmets 1,2; note camera addresses EV1 ___, EV2 ___ (see figure below)
4. Unstow EMU TV power cable, disconnect from ground plug
5. Mate EMU TV power cable to EMU TV
6. EMU TV power cable mated to ground plug
7. Upper arm connections mated
8. Connect lower arm pwr harness to Gloves
9. REBA sw (1 per EMU) – ON, pull tab toward right arm of suit
10. Glove heater sw (two per EMU) – ON
11. Glove heater sw (two per EMU) – OFF
12. EMU TV power pb – press, Green LED illuminated
13. EMU TV power pb – press, Green LED not illuminated
14. REBA sw (1 per EMU) – OFF, pull tab toward left arm of suit
15. Disconnect lower arm pwr harness from Gloves
16. Stow lower arm and glove pwr harness connectors under TMG
17. Attach LTA restraint bag, as reqd

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

---

**Diagram:** View from back of helmet looking forward. Helmet light structure omitted for clarity.
<table>
<thead>
<tr>
<th>Task</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>MIDDECK PREP</td>
<td>4–2</td>
</tr>
<tr>
<td>EVA PREP</td>
<td>4–2</td>
</tr>
<tr>
<td>PREP FOR DONNING</td>
<td>4–2</td>
</tr>
<tr>
<td>EMU DONNING CHECK</td>
<td>4–5</td>
</tr>
<tr>
<td>EMU PURGE</td>
<td>4–6</td>
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<tr>
<td>EMU PREBREATHE</td>
<td>4–6</td>
</tr>
<tr>
<td>SAFER DONNING</td>
<td>4–6</td>
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<tr>
<td>EVA COMM CONFIG DECONFIG</td>
<td>4–8</td>
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<tr>
<td>CO2 RMVL SYS DEACT</td>
<td>4–9</td>
</tr>
<tr>
<td>ACT</td>
<td>4–9</td>
</tr>
</tbody>
</table>
**WARNING**
Payload bay floods exceed EMU thermal limits during operation. If EVA crew will be operating in vicinity of PLB floods, floods must be turned off now.Cooldown time may be as long as 6 hr.

**MIDDECK PREP (30 min)**

AW18A 1. LTG FLOOD (four) – ON
2. √EVA Bag installed in airlock
3. √REBA sw – OFF
   If EMU TV:
4. Demate EMU TV power cable; connect ground plug
5. Disconnect helmets; Velcro to lockers

HUT 6. Remove Drink Bag restraint bag
7. Fill Drink Bag from galley, remove gas and insert Drink Bag in restraint bag
8. Install Drink Bag restraint bag in HUT and dispose of fill tool in wet trash
9. Apply anti–fog (EMU Servicing Kit), wipe off:
   Helmets (not Fresnel lens)
   EV glasses, attach to comm cap
10. Stow EMU Servicing Kit
11. Install Helmets; lock
12. Attach Cuff C/L to EMUs

**EVA PREP (90 min)**

### PREP FOR DONNING (30 min)

If internal airlock:
ML31C 1. √VAC VENT ISOL VLV CNTL tb – OP
   √NOZ HTR – ON
If external airlock:

BOTH DCM 2. Retrieve, position SCU; remove DCM cover
3. Connect SCU to DCM, √locked

AW82B 4. EV–1, EV–2 O2 vlv (two) – op

MO13Q 5. √ARLK H2O S/O VLV – OP (tb–OP)

MD(tlr) 6. √EMU O2 ISOL VLV – OP

ML86B:C 7. √cb MNC EXT ARLK HTR PN 1,2 (two) – op

L2 8. √O2 XOVR SYS 1,2 (two) – OP

BOTH DCM 9. PWR – BATT

### CAUTION
EMU must be on BATT pwr when airlock power supply turned on

AW18H 10. PWR/BATT CHGR EMU 1,2 MODE (two) – PWR
   BUS SEL (two) – MNA(MNB)

DCM 11. PWR – SCU
12. Verify panels as shown next page
EMU DONNING (55 min)

NOTE
May be performed by EV1 & EV2 simultaneously

Both

28. Take one aspirin tablet (325 mg)
29. STATUS: √SOP P = 5800–6800 (compare w/gauge)

Ev1

30. √Waist ring – op
31. Don LTA, attach donning handles as reqd
32. Ingress airlock
33. √Suit arms aligned
34. Disconnect gloves, √wrist disconnects – op
35. Stow IV glasses
36. Don thumb loops
37. √Biomed connector is outside of HUT

Plss

38. √REBA sw – OFF
39. Don HUT
40. Release thumb loops
41. √Suit arms aligned
42. Don EV glasses as reqd
43. Don comm cap

Dcm

44. √COMM mode – HL, vol as reqd
45. √Comm
46. Connect biomed to elec harness
47. Connect LCVG, IV1 √locked
48. √Thermal cover clear of waist ring
49. Waist ring – engage posn
50. Connect waist ring, IV1 √locked
51. Remove donning handles, stow in EMU Equipment Bag, cover waist ring
52. √ELEC harness clear of neck ring
53. √Drink vlv posn
54. √Mike boom posn
55. Don comfort gloves, wristlets
56. Wrist rings – engage posn
57. Don EV gloves, IV1 √locked
58. Tighten palm restraint straps
If REBA battery:

- IV1
  - Glove heater sw (two) – OFF
  - Connect lower arm pwr harness to gloves
  - Stow slack under arm TMG
  - Cuff C/L posn

**CAUTION**

Minimize fan operation with O2 ACT – OFF (—2 min)

<table>
<thead>
<tr>
<th>EV1</th>
<th>DCM</th>
<th>IV1</th>
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<tbody>
<tr>
<td>DCM</td>
<td>EV1</td>
<td>DCM</td>
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</tbody>
</table>

- EV1
  - FAN – ON (PWR RESTART may occur)
  - Don helmet, IV1 locked

- DCM
  - O2 ACT – IV
  - Helmet purge vlv – cl, locked

- If EMU TV:
  - Unstow EMU TV power cable; disconnect from ground plug
  - Mate EMU TV power cable to EMU TV

<table>
<thead>
<tr>
<th>EV2</th>
<th>DCM</th>
<th>BOTH</th>
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</table>

- EV2
  - Repeat steps 29–69

- BOTH
  - Cooling
    * If cooling insufficient, IV1 depress
    * and hold pump priming vlv on
    * back of EMU (30 sec min)

- DCM
  - Temp control vlv – as reqd
  - Wrist rings – covered
  - Waist rings – covered

- DCM
  - COMM mode – HL
  - WATER – OFF
  - PWR – SCU
  - FAN – ON
  - Comm FREQ – LOW
  - Helmet purge vlv – cl, locked

- DCM
  - PURGE vlv – cl (dn)

**NOTE**

During LEAK CHECK procedure, when ‘SET O2 IV’ msg displayed, wait 30 sec and SUIT P gauge stable (4.2–4.4) before moving O2 ACT–IV

<table>
<thead>
<tr>
<th>DCM</th>
<th>BOTH</th>
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- BOTH
  - STATUS: LEAK CHECK?, PROC follow displayed instructions
    * If LEAKAGE HI SUIT P X.X, go to FAILED LEAK CHECK (14.7/10.2 PSI)
    * CC 6–4 (Cue Card)
EMU PURGE

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

BOTH DCM

1. O2 ACT – PRESS
2. PURGE vlv – op (up), begin purge clock
3. When N2 purge complete (per table):
   PURGE vlv – cl (dn)
   O2 ACT – IV

EMU PREBREATHE

IV1 R1
4. Begin prebreathe clock
5. O2 TK3 HTR A(B) – as reqd
6. Egress AAP, stow handles

IV1 AW82B
7. AIRLK DEPRESS vlv cap – vent, remove, stow
8. Remove loose equipment
9. If reqd, stow REBA jumper cable

SAFER DONNING

(If reqd)

IV1
10. Remove SAFER from Stowage Bag
11. Remove Stowage Straps from thruster towers; stow in EMU Equipment Bag; unfold towers
12. Inspect:
    Thruster tower hinges
    Tower latches
    √TMG not blocking thrusters
13. √TMG clear from SAFER striker plate on EMU PLSS
14. Remove Inhibitor; close, fasten port cover
15. MAN ISOL vlv – OP (dn)
16. Latch – PRELOAD
17. Rotate latch to recess butterfly in housing

CAUTION
Rotating ccw past softstop can bind latch

18. Rotate latch ccw to softstop
19. Latch – ENGAGE
20. Mate PLSS to thruster towers
21. Push latch in and rotate cw until stop (~90°)
   * If latch will not engage: *
   * Latch – PRELOAD *
   * Rotate latch ccw until stop *
   * Return to step 19 *

22. Latch – PRELOAD
23. Rotate latch cw until ratcheting

CAUTION
Rotating ccw may disengage SAFER

24. Continue ratcheting until lock marking on latch, tower aligned
25. Latch – LOCK
26. √Access to HCM deploy lever
27. √TMG not blocking thruster
28. Repeat for SAFER 2
29. Install MWS and BRTs (as reqd)
30. EVA tools installed in airlock
31. As reqd, perform BOOSTER FAN DEACTIVATION/REMOVAL (AIRLOCK CONFIG)
32. Remove, stow appropriate vent ducts to allow hatch closure
33. As reqd, disconnect vent duct from middeck floor fitting, stow
34. As reqd, unstow, install diffuser cap on middeck floor fitting
35. Loose middeck—stowed items clear of inner hatch and middeck diffuser cap air flow
36. Remove WATER switch guard (two), stow in EMU Equipment Bag
37. REBA sw – ON
If EMU TV:
38. EMU TV power pb – press, Green LED illuminated
If external airlock with aft hatch:
39. Deploy floor hatch supports
40. Egress airlock
41. Inner hatch – close, lock
42. Inner hatch Equal vlv caps (two) – removed
43. Inner hatch Equal vlv (two) – OFF
If internal airlock:
44. If flown: Perform CO2 RMVL SYS DEACT
45. When prebreathe time complete, MCC for go to DEPRESS/REPRESS (Cue Card)
EVA COMM CONFIG

O6  1. √UHF SPLX/EVA XMIT FREQ  –  259.7/414.2
   √PWR AMP  –  OFF
   √EVA STRING  –  1
   MODE  –  EVA

If docked with ISS and EVA comm on A/G 1:

   NOTE
   In step 2, A/G 1 docked hardline is disabled.
   UHF will become A/G 1 Shuttle to ISS link

   2. √MCC and ISS that UHF configured and in
      Public Call

A1R  SPACELAB A/G 1  –  OFF

3. √AUD CTR VOICE RCD SEL CH 1  –  A/G 1(2)
   2  –  ICOM A

4. √AUD CTR UHF A/G 1(2)  –  T/R
   √2(1)  –  OFF
   √A/A  –  OFF

IVA ATU  5. √AUD A/G 1(2)  –  T/R

R10  6. BIOMED CH 1  –  EVA 1
   2  –  EVA 2

DCM  7. Comm FREQ  –  LOW
   COMM mode  –  PRI

Perform as reqd for IV volume control:

8. On ATUs in use by IV, adjust VOL A/G 1(2)
   tw for comfortable EVA volume; then
   adjust VOL A/G 2(1) tw for comfortable MCC
   volume. (MCC uplinks on both A/G 1 and
   A/G 2.) Record ATU tw settings

EVA COMM DECONFIG

O6  1. UHF MODE  –  OFF
   √SPLX/EVA XMIT FREQ  –  259.7/414.2
   √PWR AMP  –  OFF
   √SPLX SQUELCH  –  ON

If docked with ISS and EVA comm on A/G 1:

A1R  2. SPACELAB A/G 1  –  ON

3. √AUD CTR UHF A/G 1(2)  –  OFF
   √2(1)  –  OFF
   √A/A  –  OFF
   VOICE RCD SEL CH 1  –  OFF
   2  –  OFF

R10  4. BIOMED CH 1,2 (two)  –  as reqd
### CO2 RMVL SYS DEACT

<table>
<thead>
<tr>
<th>MO51F</th>
<th>CO2 RMVL SYS CNTLR 1(2) MODE – STBY (hold 3 sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wait 6 sec</td>
</tr>
<tr>
<td></td>
<td>✓CO2 RMVL SYS CNTLR 1(2) OPER lt – off</td>
</tr>
<tr>
<td></td>
<td>✓FAIL lt – on</td>
</tr>
</tbody>
</table>

### CO2 RMVL SYS ACT

<table>
<thead>
<tr>
<th>MO51F</th>
<th>CO2 RMVL SYS AC1(3) – OFF (hold 3 sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MNA(C) – OFF</td>
</tr>
<tr>
<td>✓CNTLR 1(2) FAIL lt – off</td>
<td></td>
</tr>
<tr>
<td>AC1(3) – ON (hold 3 sec)</td>
<td></td>
</tr>
<tr>
<td>MNA(C) – ON</td>
<td></td>
</tr>
<tr>
<td>CNTLR 1(2) MODE – OPER (hold 3 sec)</td>
<td></td>
</tr>
</tbody>
</table>

| Wait 6 sec |
| ✓CO2 RMVL SYS CNTLR 1(2) OPER lt – on |
EMU STATUS
## EMU STATUS

### NORMAL STATUS

- **O2 POS**
  - TIME EV: HR:MIN since PWR–BATT
  - TIME LF: HR:MIN remaining at present use rate
  - % O2 (PWR) LF: Displayed if not limiting consumable

- **SUIT P**
  - 4.2–4.4 psid

- **O2 P**
  - 60–900 psid

- **SOP P**
  - 5800–6800 psia

- **SUBLM P**
  - 2.0–4.2 psia

- **BAT VDC**
  - 16.3–17.0

- **BAT AMP**
  - 3.0–4.0

- **RPM**
  - 19.0–20.0 k

- **CO2**
  - 0.2–0.5 mmH

- **H2O TEMP**
  - 32–75 degF

- **H2O GP/WP**
  - 14.0–16.0 psid

---

**Report status to MCC when:**
- Any parameter outside normal range
- TIME LF ≤ reqd
- Limiting Consumable changes (PWR ↔ O2)
- ΔTIME LF between EV1 and EV2 ≥ 1 hr

---

**Airlock Egress**

**Airlock Ingress**
DEPRESS/REPRESS
### DEPRESS (10 MIN)

When prebreathe complete:
- **AW82B**
  1. AIRLK DEPRESS vlv – 5, ALERT TONE, monitor suit P gauge < 5.5
  2. Airlock at 6.0, ALERT TONE
  3. When airlock at 5.0, AIRLK DEPRESS vlv – CL, ALERT TONE

**BOTH DCM**
- 4. STATUS: [LEAK CHECK?], PROC, follow displayed instructions
  - If [LEAKAGE HI] [SUIT P X], go to FAILED
  - If [LEAK CHECK (5 PSI)], reverse side
- 5. O2 ACT – EVA
- 6. STATUS, Cuff C/L, 1

**AW82B**
- 7. AIRLK DEPRESS vlv – 0, ALERT TONE, monitor suit P gauge < 5.5
  - If gauge > 5.5, stop depress, *MCC*
- 8. Attach waist tether(s) to A/L D–ring for egress
- 9. Airlock dP/dT < 0.5, outer hatch – open, stow
- 10. When outer hatch dP < 0.5, outer hatch – closed, stow

### POST DEPRESS (5 MIN)

**BOTH DCM**
- 1. PWR – BATT, WARN TONE
  - (IV1 record MET _ _ _)
- 2. Temp control vlv – Max H
- 3. WATER – ON
- 4. Temp control vlv – as reqd
- 5. STATUS, Cuff C/L, 1 (IV1 Record)
- 6. Visors as reqd
- 7. Go to AIRLOCK EGRESS, Cuff C/L, 42, or Flight Specific Timeline

**IV1**
- 8. cb MNC EXT ARLK HTR LINE ZN 1,2 (two) – cl

### PRE REPRESS (5 MIN)

If external airlock:
- **IV1**
  1. cb MNC EXT ARLK HTR LINE ZN 1,2 (two) – op
- **MD(flr)**
  2. cb EMU O2 ISOL vlv – OP
- **BOTH**
  3. cb Outer hatch closed and locked
- **DCM**
  4. cb WATER – OFF
- 5. Disc waist tethers, attach to EMU
- 6. Retrieve, position SCUs; remove DCM covers
- 7. Connect SCUs to DCM, *locked*

**AW82B**
- 8. cb EV–1, EV–2 O2 vlv (two) – OP

**AW18H**
- 9. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – MNA(MNB)

**DCM**
- 10. PWR – SCU, WARN TONE

**NOTE**

IV1 expect dP/dT alarm during repress.

### REPRESS (10 MIN)

**BOTH DCM**
- 1. O2 ACT – PRESS
- 2. COMM mode – HL

**AW82B**
- 3. O2 ACT – CL

**DCM**
- 4. Inner hatch Equal vlv (one) – throttle OFF to NORM (as reqd), ALERT TONE
- 5. Airlock at 4.0, ALERT TONE
- 6. When airlock at 5.0, Equal vlv – OFF, ALERT TONE

**NOTE**

If any DCS, leave O2 ACT – PRESS

If CUFF 1 symp resolve upon repress, report as CUFF 2

**WARNING**

If on SOP, leave O2 ACT – EVA thru airlock repress

If external airlock and CO2 RMVL SYS flown:
- 12. Perform CO2 RMVL SYS ACT (EVA PREP)

If external airlock:
- **ML86B:C**
  13. cb MNC EXT ARLK HTR LINE ZN 1,2 (two) – cl
DEPRESS/REPRESS

TNL ADAPTER

B6–1  EVA/TNL/GEN G
### Depress/Repress (25 Min)

When prebreathe complete:

- AW82B 1. Airlk DEPRESS vlv – 5, ALERT TONE, monitor suit P gauge < 5.5
  
- 2. Airlk at 6.0, ALERT TONE
  
- 3. When airlk at 5.0, Airlk DEPRESS vlv – CL, ALERT TONE

#### BOTH DCM

4. STATUS: LEAK CHECK?, PROC, follow displayed instructions
   
   * If LEAKAGE HI (SUIT P X.X), go to FAILED *

5. O2 ACT – EVA

6. STATUS, Cuff C/L, 1

7. MCC for aft module pressure integrity

8. Airlk dP/dT ∼ 0, ALERT TONE

9. Configure UHF, EVA COMM CONFIG (EVA PREP)

### Post Depress (15 Min)

#### BOTH DCM

1. PWR – BATT, WARN TONE

2. Disc SCUs; install DCM covers

3. Stow SCUs on AAP, Velcro to wall

4. Airlk DEPRESS vlv – CL

5. Attach waist tether(s) to A/L D–ring for egress

6. EVA hatch – open, stow

7. Temp control vlv – Max H

8. WATER – ON

9. DCM blank, BITE off

10. Temp control vlv – as reqd

11. STATUS, Cuff C/L, 1 (IV1 Record)

12. Go to AIRLOCK EGRESS, Cuff C/L, 42, or Flight Specific Timeline

13. Perform CO2 RMVL SYS ACT (EVA PREP)

14. If airlk and CO2 RMVL SYS flown:

15. Go to POST EVA

16. If external airlk:

#### IV1

17. cb MNC EXT ARLK HTR LINE ZN 1,2 (two) – cl

### Pre Repress (5 Min)

If external airlk:

1. ML86B:C 1. cb MNC EXT ARLK HTR LINE ZN 1,2 (two) – op

2. MD(fr) 2. EMU O2 02 vlv – OP

3. BOTH 3. EVA hatch closed, locked

4. DCM 4. WATER – OFF

5. Disc waist tethers, attach to EMU

6. Retrieve, position SCUs; remove DCM covers

7. Connect SCU to DCM, locked

8. AW82B 8. EV–1, EV–2 O2 vlv (two) – OP

9. AW18H 9. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – MNA(MNB)

10. DCM 10. PWR – SCU, WARN TONE

### Repress (20 Min)

#### BOTH DCM

1. O2 ACT – PRESS

2. COMM mode – HL

#### IV1

3. Expect dP/dT alarm during repress

4. Inner hatch Equal vlv (one) – throttle OFF to NORM (as reqd), ALERT TONE

5. Airlk at 4.0, ALERT TONE

6. When airlk at 5.0, Equal vlv (two) – OFF, ALERT TONE

7. Airlk pressure integrity (4 min, ΔP ≤ 0.1 psi)

### Warning

If on SOP, leave O2 ACT – EVA thru airlk repress

If CUFF 1 symp resolve upon repress, report as CUFF 2

If any DCS, leave O2 ACT – PRESS
FAILED LEAK CHECK
## FAILED LEAK CHECK (14.7/10.2 PSI)

1. Leaking EMU: O2 ACT – PRESS
2. Rotate lower arm assemblies one rev
3. Suit arms aligned
4. Sizing rings locked
5. Swivel hips from side to side
6. Repeat leak check as follows:
   - DCM
     - PURGE vlv – cl (dn)
     - O2 ACT – PRESS until SUIT P = 4.2–4.4 and stable (compare w/gauge)
     - O2 ACT – IV, start timing, 1 min (during EMU CHECKOUT, 2 min)
     - Max \(\Delta P = 0.3\) psi
7. If leak check passed, go to step 11
   If leak check failed:
     - PURGE vlv – op (up), O2 ACT – OFF
     - FAN – OFF (if EVA PREP)
     - Cycle/inspect suit disconnects as follows:
       - Helmet (leave off), Gloves
       - LTA
       - FAN – ON (if EVA PREP)
8. Install Helmet, repeat leak check step 6, then:
9. If leak check passed, go to step 11
   If leak check failed:
     - PURGE vlv – op (up), O2 ACT – OFF
     - FAN – OFF (if EVA PREP)
     - Cycle/inspect suit disconnects as follows:
       - Helmet (leave off), Gloves
       - Helmet purge vlv, Sizing rings
       - LiOH cartridge (O–rings)
       - FAN – ON (if EVA PREP)
10. Install Helmet, repeat leak check step 6, then:
11. If leak check passed:
    - Waist ring, wrist rings covered
    - Continue EMU CHECKOUT or EVA PREP >>
12. If leak check failed (EMU lost):
    - PURGE vlv – op (up)
    - Contact MCC, go to POST EVA, 9–2

## FAILED LEAK CHECK (5 PSI)

1. Leaking EMU: Repeat leak check on watch and gauge as follows:
   - O2 ACT – PRESS until P > 4.2
     - IV
     - (1 min, Max \(\Delta P = 0.3\) psi)
2. If leak check passed:
   - Return to DEPRESS/REPRESS Cue Card, DEPRESS, step 5 (suit pressure sensor unreliable) >>
3. O2 ACT – IV
4. Equal vlv (one) – NORM
5. Repeat leak check as follows:
   - DCM
     - PURGE vlv – cl (dn)
     - O2 ACT – PRESS, until P > 4.2
     - IV, start timing
     - (1 min, Max \(\Delta P = 0.3\) psi)
6. Contact MCC

---

**EVA–1b/O/I**

**EVA–2b/O/I**

---

**TOP – BACK OF ‘DEPRESS/REPRESS’**
FLIGHT SPECIFIC TIMELINES
TOOLS AND STOWAGE

PSA STOWAGE ................................................................. 8–2
PGT CHECKOUT ............................................................... 8–3
760XD PGSC–PGT CONNECTION ......................................... 8–4
PROGRAM PGT SETTINGS ............................................... 8–4
DOWNLOAD/ERASE EVENT LOG ...................................... 8–5
PGT CONTINGENCIES ..................................................... 8–6
TOOLS AND STOWAGE

- INBOARD -

PSA STOWAGE

RADIATOR DISCONNECT/
3/8-IN DRIVE RATCHET

GSE LATCH PINS*

SNATCH BLOCK

SNATCH BLOCK

VELCRO/TAPE

MINI-WORK STATION (2)

1/2-IN BOX RATCHET

ADJUSTABLE WRENCH/
3/8-IN DRIVE RATCHET

RMS MPM WRENCH

SHOULDER BRACE
RELEASE TOOL

3 POINT LATCH TOOLS (2)

PAYLOAD RETENTION
DEVICES (2)

*

TUBE CUTTER

EVA TRASH BAG

ET UMBILICAL DOOR
LATCH TOOL

CENTERLINE LATCH TOOLS (2)

*FLIGHT SPECIFIC ITEM OR EMPTY COMPARTMENT

SMALL

173250400, ART, 4

8-2

EVA/ALL/GEN G
PGT CHECKOUT

1. Unstow PGT
2. √PWR – OFF
3. √Battery connector covering removed
4. Install battery
5. Ratchet collar – not MTR
6. Cycle MTL settings
7. Cycle bayonette fittings
8. Speed collar – CAL
9. PWR – ON
10. √‘TRIG TO CAL’ on display
11. Press, release trigger to calibrate
12. √‘CAL PASSED’ on display
13. Ratchet collar – MTR
14. √Illumination of all LEDs and ‘LED TEST’ displayed
15. Press trigger and hold
   √BATT VDC ≥ 36.0
16. Speed collar – cw
17. Press trigger and √drive rotates cw
18. Speed collar – ccw
19. Press trigger and √drive rotates ccw
20. To verify programmed settings, cycle MODE/torque collar/speed collar and compare with PGT SETTINGS TABLE
21. PWR – OFF
760XD PGSC–PGT CONNECTION

1. ✓ PGSC equipped with RS422 PCMCIA card and adapters (two)
2. ✓ PGT PWR – OFF
3. ✓ PGT battery installed
4. Ratchet collar – not MTR

**CAUTION**
Do not over–torque cover screw

5. Open PGT serial port cover using 3/32–in Allen Wrench attached to PGT–RS422 cable
6. Connect PGT–RS422 cable to PGT Remote Programming port
7. Connect other end of PGT–RS422 cable to COM 2 or COM 4 adapter box, as desired
8. PGT PWR – ON
9. If PGSC is not powered, PGSC pwr – on
10. Select SHUTTLE APPS icon on PGSC Windows desktop
11. Select PGT icon that corresponds to COM port selected in step 7
12. ✓ Tool Communications Check dialog box appears
13. ✓ Serial Connection Verified
14. ✓ Intool software version 2.2
15. Select CONTINUE

PROGRAM PGT SETTINGS

1. Perform 760XD PGSC–PGT CONNECTION
If loading settings from a set file in C:\SPOCAPPS\PGT32\SETTINGS:
   2. Select FILE, OPEN ...
   3. Select desired settings file, OPEN
4. Select TORQUE/REVOLUTIONS SETTINGS tab in Pistol Grip Tool Remote Software window
5. Enter changes to table as necessary
6. Select SPEED & POWER MANAGEMENT SETTINGS tab
7. Enter changes to table as necessary
8. ✓ Ratchet collar – not MTR
9. Select TOOL, SEND DATA TO TOOL
10. Select desired tables for upload
11. ✓ All sent settings – black on gray (programmed successfully)
If saving new settings to a file:
   12. Select FILE, SAVE AS ...
   13. Type in new file name, SAVE
14. Verify programmed settings on PGT by cycling MODE/torque collar/speed collar; compare displayed values to expected values
DOWNLOAD/ERASE EVENT LOG

1. Perform 760XD PGSC–PGT CONNECTION
2. ✓ Ratchet collar – not MTR
3. Select EVENT LOG tab
4. Select TOOL, GET DATA FROM TOOL...
5. Select TOOL EVENT LOG DATA (READ–ONLY)
6. ✓ DOWNLOAD PGT EVENT LOG dialog box appears
7. Select YES to download data
8. ✓ SAVE EVENT LOG DATA TO FILE dialog box appears
9. Enter name for file
10. Select SAVE
11. ✓ Event Log data displayed in viewer
12. If erasing Event Log data from PGT, select OK in ERASE EVENT LOG dialog box
<table>
<thead>
<tr>
<th>MESSAGE</th>
<th>CORRECTIVE ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BATTERY HITEMP</td>
<td>If alternate battery avail: power off, change battery. Other- wise, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>BATTERY LOTEMP</td>
<td>Drive tool with no load to increase battery temperature. If no joy and alternate battery avail: power off, change battery. Otherwise, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>(blinking) BATTERY LOVOLT</td>
<td>Continue using until tool is unable to deliver sufficient torque. If no joy and alternate battery avail: Power off, change battery. Otherwise, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>CAL FAILED</td>
<td>Press, release trigger to repeat calibration. If no joy, power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>COLLAR ERROR</td>
<td>Cycle Torque and Speed collars to clear error. If no joy, power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>COMPAR ERROR</td>
<td>Cycle Torque collar and A/B mode switch. If no joy, power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>EEPROM WR ERR</td>
<td>Power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>(blinking)</td>
<td></td>
</tr>
<tr>
<td>HI TORQ</td>
<td>If fault occurs during engagement and MTL did not slip, ignore message. Otherwise: power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>HICURR</td>
<td>Reattempt operation. If no joy, power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>HYBRID HITEMP</td>
<td>Power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>LO TORQ</td>
<td>Reattempt operation until desired torque is reached. If no joy, power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>LOCURR</td>
<td>Reattempt operation. If no joy, power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>LOG IS FULL (blinking)</td>
<td>Continue operation.</td>
</tr>
<tr>
<td>MOTOR HITEMP</td>
<td>Power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>OVER CURR</td>
<td>Power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
<tr>
<td>SLFTST FAIL X</td>
<td>Power cycle, calibrate. If no joy, power off, switch to Ratchet mode.</td>
</tr>
</tbody>
</table>
## POST EVA

<table>
<thead>
<tr>
<th>Task</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>POST EVA</td>
<td>9–2</td>
</tr>
<tr>
<td>SUIT DOFFING</td>
<td>9–2</td>
</tr>
<tr>
<td>SAFER DOFFING</td>
<td>9–2</td>
</tr>
<tr>
<td>EMU WATER RECHARGE</td>
<td>9–3</td>
</tr>
<tr>
<td>SAFER STOW</td>
<td>9–4</td>
</tr>
<tr>
<td>SUIT DRYING/SEAL WIPE</td>
<td>9–4</td>
</tr>
<tr>
<td>OXYGEN RECHARGE VERIFICATION</td>
<td>9–4</td>
</tr>
<tr>
<td>WATER FILL VERIFICATION</td>
<td>9–4</td>
</tr>
<tr>
<td>EMU POWERDOWN</td>
<td>9–5</td>
</tr>
</tbody>
</table>
POST EVA (00:45 if NOT performing ‘If reqd’ proc blocks)
(01:25 if performing all ‘If reqd’ proc blocks)

SUIT DOFFING

WARNING
Do not doff EMU if DCS symptoms resolved during REPRESS. ✶MCC via PMC

CAUTION
Hold hatch away from airlock to avoid damaging vent duct (N/A for tunnel adapter, ext A/L)

IV1
☐☐☐ 1. When ΔP < 0.5, open hatch
☐☐☐ 2. As reqd, remove diffuser cap at middeck floor, stow
☐☐☐ 3. As reqd, unstow airlock vent duct, connect end to middeck floor fitting
☐☐☐ 4. Configure appropriate vent ducts for airflow into airlock
☐☐☐ 5. As reqd, perform BOOSTER FAN INSTALLATION/ACTIVATION (AIRLOCK CONFIG)

EV
☐☐☐ 6. ✶Gloves clean

* If reqd, IV use damp towel to clean gloves *

IV1
☐☐☐ 7. Perform EVA COMM DECONFIG (EVA PREP)

BOTH DCM
☐☐☐ 8. O2 ACT – OFF
☐☐☐ 9. PURGE vlv – op (up)
☐☐☐ 10. ✶COMM mode – HL

IV1
☐☐☐ 11. Install WATER sw guards (two)
If EMU TV:
☐☐☐ 12. EMU TV power pb – press, ✶Green LED not illuminated
If REBA battery:
☐☐☐ 13. ✶Glove heaters sw (two) – OFF
☐☐☐ 14. REBA sw – OFF
☐☐☐ 15. Disconnect lower arm pwr harness from gloves
☐☐☐ 16. Stow lower arm and glove pwr harness connectors under TMG

PLSS
☐☐☐ 17. Demate EMU TV power cable, mate to ground plug
☐☐☐ 18. STATUS: ✶SUIT P < 0.4 (compare w/gauge); disconnect gloves, stow
☐☐☐ 19. Disconnect helmet, stow

AW82B
☐☐☐ 20. AIRLK DEPRESS vlv – install cap

SAFER DOFFING (10 min) (If reqd)

IV
☐☐☐ 21. Latch – ENGAGE
☐☐☐ 22. Rotate latch ccw until release (~90 deg)
☐☐☐ 23. Demate PLSS from thruster towers
☐☐☐ 24. Latch – PRELOAD
☐☐☐ 25. Rotate latch cw until lock markings on latch and tower recess aligned
☐☐☐ 26. Push in latch, latch – LOCK
☐☐☐ 27. Fold thruster towers
☐☐☐ 28. Transfer to middeck
☐☐☐ 29. Install inhibitor

BOTH PM
☐☐☐ 30. MAN ISOL vlv – CL (up)
☐☐☐ 31. Temp stow SAFER
☐☐☐ 32. Repeat for SAFER 2

Cont next page
If reqd, unstow REBA jumper cable

AAP release handles to 90°

Engage HUT in AAP (IV1 assist as reqd)

AAP release handles to lock

Disconnect waist ring, LCVG, biomed

Doff comm cap

Wrist disconnects – op

Doff EV glasses

Doff HUT

Doff LTA, secure to handrail

Remove dosimeter from LCVG; insert in inflight garment

Doff: Biomed (disc pigtail, stow in EMU Servicing Kit) LCVG (secure to HUT)

MAG (UCD, clamp), stow in wet trash

Stow HUT Multiple Water Connector in left arm

Remove EVA Bag and tools as reqd

O2 TK3 HTR A(B) – as reqd

If external airlock:

ML86B:C cb MNC EXT ARLK HTR LINE ZN 1,2 (two) – cl

EMU WATER RECHARGE (5 min) (If reqd) (√MCC for config, if reqd)

If external airlock:

MO13Q √ARLK H2O S/O VLV – OP (tb–OP)

R11L If SPLY H2O XOVR VLV closed (tb–CL or bp) (water transfer config):

- √SPLY H2O TKA OUTLET – CL (tb–CL)

- SM 60 TABLE MAINT

PARAM ID – ITEM 1 +0 6 2 0 4 2 0 EXEC

R11L If SPLY H2O XOVR VLV open (tb–OP) (nominal config):

- √SPLY H2O TKA OUTLET – CL (tb–CL)

- SPLY H2O TKD OUTLET – CL (tb–CL)

- SPLY H2O TKC OUTLET – OP (tb–OP)

- SPLY H2O TKB INLET – CL (tb–CL)

- SM 60 TABLE MAINT

PARAM ID – ITEM 1 +0 6 2 0 5 4 8 EXEC

Log value before recharge

<table>
<thead>
<tr>
<th>Recharge #</th>
<th>H2O TKB(C) %</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

AW82D √EMU 1,2 H2O WASTE tb (two) – CL

SPLY (two) – OP (tb–OP)

CRT √H2O TKB(C) quantity decreasing
SAFER STOW (10 min) (If reqd)
PM
☐☐☐61. Inhibitor installed
☐☐☐62. Thruster towers folded
☐☐☐63. Unstow stowage straps from EMU Equipment Bag; install
☐☐☐64. MAN ISOL vlv – CL (up)
☐☐☐65. Stow SAFER in Stowage Bag

SUIT DRYING/SEAL WIPE
☐☐☐66. Wipe with drying towel:
    LTA, legs, boots
    HUT, suit arms
    Gloves

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

☐☐☐67. Wipe crotch with stericide (in EMU Servicing Kit)
☐☐☐68. Lightly wipe seals on LTA waist ring, arm wrist rings, HUT neck ring with lint-free wipe (in Servicing Kit)
☐☐☐69. Clean, refurbish biomed
☐☐☐70. Remove drink bag from HUT and dispose in wet trash

OXYGEN RECHARGE VERIFICATION
DCM ☐☐☐71. STATUS: [O2 P XXX]
☐☐☐72. Continue charge until O2 P ∼850

WATER FILL VERIFICATION (10 min) (If reqd)
DCM ☐☐☐73. STATUS: √H2O WP 8–15 psi and stable for ∼30 sec
(indicates charging complete)

SM 60 TABLE MAINT
R11L If SPLY H2O XOVR VLV closed (tb–CL or bp) (water transfer config):
CRT ☐☐☐74. Use TKB quantity:
    PARAM ID – ITEM 1 +0 6 2 0 4 2 0 EXEC
R11L If SPLY H2O XOVR VLV open (tb–OP) (nominal config):
CRT ☐☐☐75. Use TKC quantity:
    PARAM ID – ITEM 1 +0 6 2 0 5 4 8 EXEC
☐☐☐76. Log value after recharge

<table>
<thead>
<tr>
<th>Recharge #</th>
<th>H2O TKB(C) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
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<td>5</td>
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</tbody>
</table>

NOTE
Full charge = ∼6%/EMU

R11L If SPLY H2O XOVR VLV closed (tb–CL or bp) (water transfer config):
☐☐☐77. SPLY H2O TKA OUTLET – OP (tb–OP)
If SPLY H2O XOVR VLV open (tb–OP) (nominal config):
☐☐☐78. SPLY H2O TKC OUTLET – CL (tb–CL)
    TKB OUTLET – OP (tb–OP)
ML31C ☐☐☐79. SPLY H2O TKD OUTLET – OP (tb–OP)
☐☐☐80. If FES reqd, perform TOPPING FES STARTUP
      (ORB OPS, ECLS)

Cont next page
If WCS:

- WCS 81. FAN SEP same as HOSE BLOCK
- 82. MODE – COMMODE/MANUAL/EMU, posn guard over sw

(WCS ON) (airflow, WCS ON)

If EDO WCS:

- EDO WCS 83. URINAL SEL sw same as URN DIV VLV
- 84. Unstow urinal hose; posn guard strap over hose yoke

(WCS ON lt on)

If EDO WCS:

- EDO WCS 83. FAN SEP same as HOSE BLOCK
- 82. MODE – COMMODE/MANUAL/EMU, posn guard over sw

(WCS ON lt on)

AW82D 85. EMU 1,2 H2O SPLY (two) – CL (tb–CL)
- 86. Install SCOFS, lock

AW82H 88. EMU 1,2 H2O WASTE reg (two) – MAN OP

AW82D 89. EMU 1(2) H2O WASTE (one) – OP (tb–OP) (1 min), then
- 87. Install SCOFS, lock

AW82H 90. EMU 1,2 H2O WASTE reg (two) – REGULATING

If WCS:

- WCS 93. MODE – AUTO (WCS ON lt off)

If EDO WCS:

- 94. Stow urinal hose

EMU POWERDOWN

- 95. Install helmets

AW18D 96. AIRLK AUD PWR – OFF

AW18H 97. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF

(W) MODE (two) – OFF

AW82D 98. EMU 1,2 H2O WASTE, SPLY (four) – CL

If external airlock:

- 99. EV–1, EV–2 O2 vlv (two) – CL

If not performing in-suit EMU battery recharge:

BOTH DCM 100. Remove SCU; install DCM cover

- 101. Stow SCU on AAP, Velcro to wall

If last EVA completed:

- SM 60 SM TABLE MAINT

- 102. Contact MCC for uplink of SM ALERT TMBU (if desired)

Changes enclosed in [ ]

<table>
<thead>
<tr>
<th>Param Name</th>
<th>Param ID</th>
<th>Lower Limit</th>
<th>Upper Limit</th>
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<tr>
<td>EXT A/L H2O LINE T 1 SPLY ZN 1 T</td>
<td>0640181</td>
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<tr>
<td>EXT A/L H2O LINE T 2 LCG 2 SPLY ZN 2 T</td>
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<td>45</td>
<td>145</td>
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<tr>
<td>EXT A/L O2 LN T SPLY ZN 2 T</td>
<td>0640186</td>
<td>OSL</td>
<td>OSL</td>
</tr>
</tbody>
</table>

9–5 EVA/ALL/GEN G, 6
EMU MAINT/RECHARGE

WATER RECHARGE .................................................. 10–2
EMU POWERUP ....................................................... 10–2
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OXYGEN RECHARGE VERIFICATION ........................... 10–3
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  TERMINATE .................................................... 10–6
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WATER RECHARGE

IF EMU NOT ALREADY POWERED UP:

EMU POWERUP

If external airlock:

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

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

AW18H 4. PWR/BATT CHGR EMU 1,2 MODE (two) – PWR
BUS SEL (two) – MNA(MNB)

If external airlock:

MD (flr) 5. √EMU O2 ISOL VLV – OP
AW82B 6. EV1,2 O2 vlv (two) – OP
DCM 7. PWR – SCU

WATER FILL (√MCC for config, if reqd)

If external airlock:

R11L If SPLY H2O XOVR VLV closed (tb–CL or bp) (water transfer config):
9. √SPLY H2O TKA OUTLET – CL (tb–CL)

SM 60 TABLE MAINT

CRT 10. Use TKB quantity:
PARAM ID – ITEM 1+0 6 2 0 4 2 0 EXEC
R11L If SPLY H2O XOVR VLV open (tb–OP) (nominal config):
L1 11. √RAD CNTLR OUT TEMP – NORM
12. √FLASH EVAP CNTLR PRI A,B (two) – OFF
ML31C 13. SPLY H2O TKD OUTLET – CL (tb–CL)
TKB OUTLET – CL (tb–CL)
TKC OUTLET – OP (tb–OP)
√INLET – CL (tb–CL)

SM 60 TABLE MAINT

CRT 15. Use TKC quantity:
PARAM ID – ITEM 1+0 6 2 0 5 4 8 EXEC
16. Log value before recharge

<table>
<thead>
<tr>
<th>Recharge #</th>
<th>H2O TKB(C) %</th>
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</thead>
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</table>

AW82D 17. √EMU 1,2 H2O WASTE tb (two) – CL
SPLY (two) – OP (tb–OP)

CRT 18. √H2O TKB(C) quantity decreasing

NOTE
Full charge requires ~15 min

Cont next page
OXYGEN RECHARGE VERIFICATION
DCM 19. STATUS: [O2 P XXX]
20. Continue charge until O2 P –850

WATER FILL VERIFICATION
DCM 21. STATUS: √H2O WP 8–15 psi and stable for ~30 sec (indicates charging complete)

SM 60 TABLE MAINT
R11L If SPLY H2O XOVR VLV closed (tb–CL or bp) (water transfer config):
CRT 22. Use TKB quantity:
   PARAM ID – ITEM 1 +0 6 2 0 4 2 0 EXEC
R11L If SPLY H2O XOVR VLV open (tb–OP) (nominal config):
CRT 23. Use TKC quantity:
   PARAM ID – ITEM 1 +0 6 2 0 5 4 8 EXEC
24. Log value after recharge

<table>
<thead>
<tr>
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</table>

NOTE
Full charge = ~6%/EMU

R11L If SPLY H2O XOVR VLV closed (tb–CL or bp) (water transfer config):
25. SPLY H2O TKA OUTLET – OP (tb–OP)
If SPLY H2O XOVR VLV open (tb–OP) (nominal config):
26. SPLY H2O TKC OUTLET – CL (tb–CL)
   TKB OUTLET – OP (tb–OP)
ML31C 27. SPLY H2O TKD OUTLET – OP (tb–OP)
28. If FES reqd, perform TOPPING FES STARTUP (ORB OPS, ECLS)
If WCS:
WCS 29. √FAN SEP same as HOSE BLOCK
30. MODE – COMMODE/MANUAL/EMU, posn guard over sw (√airflow, WCS ON lt on)
If EDO WCS:
EDO WCS 31. √URINAL SEL sw same as URN DIV VLV
32. Unstow urinal hose; posn guard strap over hose yoke (√airflow)
AW82D 33. EMU 1,2 H2O SPLY (two) – CL (tb–CL)
34. Install SCOFS, lock
DCM 35. O2 ACT – IV
AW82H 36. EMU 1,2 H2O WASTE reg (two) – MAN OP
AW82D 37. EMU 1(2) H2O WASTE (one) – OP (tb–OP) (1 min), then
   – CL (tb–CL)
   – Repeat for other EMU
AW82H 38. EMU 1,2 H2O WASTE reg (two) – REGULATING
DCM 39. O2 ACT – OFF
40. Remove SCOFS, stow
If WCS:
WCS 41. MODE – AUTO (√WCS ON lt off)
If EDO WCS:
42. Stow urinal hose
43. If EMU powerup performed, go to EMU POWERDOWN
EMU LiOH CHANGEOUT (20 min)

CAUTION
If 10.2 cabin used, possible ΔP across LiOH cartridge caps. Direct ports away from face.

1. Transfer new cartridges to airlock
2. Transfer new batteries, as reqd, to airlock
3. Release EMU from AAP, posn as reqd
4. Unzip thermal cover, Velcro to top of EMU
5. Record used LiOH serial numbers

<table>
<thead>
<tr>
<th>EVA #</th>
<th>EV 1</th>
<th>EV 2</th>
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<tbody>
<tr>
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</table>

6. Remove, mark used LiOH cartridge

IF EMU BATTERY TO BE REPLACED:

7. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF
8. V/PWR – SCU

CAUTION
Do not allow battery to impact airlock wall

9. Remove used battery
10. Install new battery (√connector alignment), latch

11. Holding new LiOH cartridge with aluminum plate serial number facing self, remove caps (left first), install LiOH (attach Velcro retainer strap)
12. Close thermal cover zipper
13. Reinstall EMU in AAP
14. Place caps on used LiOH cartridge
15. Stow used batteries, LiOH in middeck lockers
MIDDECK EMU BATTERY RECHARGE/LiOH REPLACEMENT

INITIATE (30 min)

NOTE
Refer to REF DATA for specific plug–in location

1. Unstow new LiOH cartridges
2. Unzip thermal cover, Velcro to top of EMU
3. Record used LiOH serial numbers

<table>
<thead>
<tr>
<th>EVA #</th>
<th>EV 1</th>
<th>EV 2</th>
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<tbody>
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</table>

4. Remove, mark, stow used LiOH cartridge
5. ✔ PWR – SCU
6. Remove, stow used battery
7. Holding new LiOH cartridge with aluminum plate serial number facing, remove caps (left first), install LiOH (attach Velcro retainer strap)
8. Close thermal cover zipper, stow EMU in middeck
9. Unstow middeck battery charger

10. ✔ DC UTIL PWR – OFF
11. Configure battery(s), charger, and straps for charge
12. Connect charger cable(s) to battery(s)
13. Stow battery(s)/charger for charge
14. Connect power cable to utility outlet

15. DC UTIL PWR – ON

16. ✔ Charge light(s) – RED
    ✔ Ready light(s) – GREEN (mom), OFF

TERMINATE (15 min)

17. When charge complete:
    ✔ Charge light(s) – OFF
    ✔ Ready light(s) – GREEN
    DC UTIL PWR – OFF
    Disc cable(s) from battery(s)

18. Unzip thermal cover, Velcro to top of EMU
19. Remove LiOH cartridge
20. Open battery latch
21. Install charged battery (✔ connector alignment), latch
22. Reinstall LiOH (attach Velcro retainer strap)
23. Close thermal cover zipper
IN–SUIT EMU BATTERY RECHARGE/CHARGE VERIFICATION

INITIATE
If external airlock:
1. Retrieve, position SCUs; remove DCM covers
2. Connect SCUs to DCM, √locked

AW18H 3. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF
   MODE (two) – CHARGE
   BUS SEL (two) – MNA(MNB)

4. Continue charge as reqd:
   Verification: 15 min, minimum
   Full Charge: Up to 20 hr

TERMINATE
AW18H 5. √PWR/BATT CHGR EMU INPUT AMPS < 1 for both EMUs

6. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF
   MODE (two) – OFF

If external airlock:
7. Remove SCU; install DCM cover
8. Stow SCU on AAP, Velcro to wall

EMU POWERDOWN
AW18D 1. AIRLK AUD PWR – OFF

AW18H 2. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF
   MODE (two) – OFF

AW82D 3. √EMU 1,2 H2O WASTE,SPLY tb (four) – CL

If external airlock:
4. Remove SCU; install DCM cover
5. Stow SCU on AAP, Velcro to wall
HELMET LIGHT/PGT BATTERY RECHARGE

INITIATE (10 min)

NOTE
Refer to REF DATA for specific plug–in location

1. Unstow, as reqd: EHIP Battery Charger
   Y–pwr cable
   EHIP–PGT Adapter cable (charger to battery) (2)
   PGT Batteries (2)
   Helmet Light Batteries (4)

2. DC UTIL PWR – OFF
3. Plug Y–pwr cable into charger, then into orbiter pwr supply
4. DC UTIL PWR – ON
   Blue LEDs illuminated
   * If blue LEDs not illuminated: *
   * DC UTIL PWR – ON *
   * If blue LEDs still not illuminated: *
   * DC UTIL PWR – OFF *
   * Unplug Y–pwr cable from charger *

   IFM Pin Kit
   * Change fuse (7.5A) *
   * Plug Y–pwr cable into charger *
   * DC UTIL PWR – ON *

If charging helmet light batteries:
5. Install batteries (four) into charger
If charging PGT batteries, perform for each battery:
6. Install PGT battery adapter into charger
7. Release captive screw on PGT battery door using screwdriver
8. Pry open PGT battery door, rotate away from cavity
9. Remove battery jumper, temp stow
10. Remove cap from adapter cable, plug into battery
11. Yellow LED illuminated; start timer (MET / : : ); temp stow charger
   * If yellow LED not illuminated, see chart below *

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green and red LED illuminated</td>
<td>Cold batt (≤ 50 degF)</td>
<td>Leave batt installed in charger (Batt will warm up and change LED to yellow automatically)</td>
</tr>
<tr>
<td>Red LED illuminated</td>
<td>Hot batt (≥ 113 degF)</td>
<td>Remove batt, let cool to room temp; reinstall batt after cooling and Yellow LED illuminated</td>
</tr>
</tbody>
</table>

12. Wait 15 min and check LEDs
   If yellow LEDs illuminated:
   13. Continue charging
   If green LED(s) illuminated:
   14. Remove battery or EHIP–PGT Adapter cable from affected stations(s)
   15. Wait for blue LED(s) illuminated
   16. Re–install battery or EHIP–PGT Adapter cable
   17. Yellow LED(s) illuminated
   18. Continue charging

TERMINATE (10 min)

NOTE
Refer to REF DATA for specific plug–in location

1. When green LED illuminated, remove batteries

Cont next page
If helmet light batteries charged:
2. Install batteries in lights
3. \(\checkmark\) EMU light ops
   Velcro to lockers

**CAUTION**

Do not stow EMU lights in locker with batteries installed

If PGT batteries charged, perform for each battery:
4. Unplug battery from PGT battery adapter; reinstall cap on cable

**NOTE**
PGT battery will not function if jumper is not installed
5. Re-install battery jumper
6. Rotate battery door into place, tighten screw using screwdriver
7. Mark batteries “charged”, stow in locker
8. Remove PGT battery adapter from charger
9. DC UTIL PWR – OFF
10. Stow:
    Battery Pack Charger
    Y-pwr cable
    PGT Battery Adapters (2)
    PGT Batteries (2)

**REBA BATTERY INSTALLATION**

1. Unstow REBA from locker or charger
2. Remove EMU from AAP
3. \(\checkmark\) Glove heater sw (two) – OFF
4. Remove REBA J1 connector cover
5. Install REBAs on EMUs
6. Route REBA sw pull tabs thru TMG loops
7. \(\checkmark\) REBA sw (one per EMU) – OFF
8. Connect EMU power harness to REBA (P1/J1)
9. Install EMU on AAP

**EMU BATTERY REMOVAL/INSTALL (5 min)**

**CAUTION**

Do not allow battery to impact airlock wall

**WARNING**
EMU pwr switch must be in SCU position with airlock pwr OFF during battery changeout

<table>
<thead>
<tr>
<th>DCM</th>
<th>1. (\checkmark) PWR – SCU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>If SCU connected to DCM:</td>
</tr>
<tr>
<td>AW18H</td>
<td>2. (\checkmark) PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF</td>
</tr>
<tr>
<td>PLSS</td>
<td>3. Release EMU from AAP as reqd</td>
</tr>
<tr>
<td></td>
<td>4. Unzip thermal cover, Velcro to top of EMU</td>
</tr>
<tr>
<td></td>
<td>5. Open LiOH(Metox) latches</td>
</tr>
<tr>
<td></td>
<td>6. Rotate LiOH(Metox) canister outward until softstop or remove canister</td>
</tr>
<tr>
<td></td>
<td>7. Open battery latches</td>
</tr>
<tr>
<td></td>
<td>8. Remove/install EMU battery as reqd ((\checkmark) connector alignment)</td>
</tr>
<tr>
<td></td>
<td>9. Close battery latches</td>
</tr>
<tr>
<td></td>
<td>10. Reinstall LiOH(Metox), latch</td>
</tr>
<tr>
<td></td>
<td>11. Close thermal cover</td>
</tr>
<tr>
<td></td>
<td>12. Reinstall EMU in AAP as reqd</td>
</tr>
<tr>
<td></td>
<td>13. Stow or charge batteries as reqd</td>
</tr>
</tbody>
</table>

---

**EVA/ALL/GEN G,5**
HELMET LIGHT BULB CHANGEOUT (15 min)

NOTE
Light assembly has several loose pieces which may be spring loaded. Be prepared to capture them during changeout.

CAUTION
Handle bulbs with care. Do not touch bulbs with bare hands (could degrade bulb life span).

1. Remove battery from affected side of lights
2. Obtain, don Comfort Glove
3. Depress Faceplate; open Faceplate Sliders (two) on affected side of lights
4. Remove Faceplate
5. Remove Reflector Housing by pulling straight out
6. Remove affected bulbs as reqd; replace
7. Mark, stow used bulbs

NOTE
Contacts on Spot Bulb may be difficult to reseat fully into socket.

8. Install Reflector Housing; seat Spot Bulb
9. Install Faceplate; lock Sliders (two)
10. Install battery; EMU light ops
REBA BATTERY RECHARGE

INITIATE (10 min)

NOTE
Refer to REF DATA for specific plug–in plan location

1. Unstow: REBA Charger
   Y–pwr cable
   REBA Charger extension cable (if reqd)
2. \( \surd \) DC UTIL PWR – OFF
   If in–suit recharge:
   3. Plug Y–pwr cable into charger, REBA Charger extension cable into Y–pwr cable, REBA Charger extension cable into orbiter power supply
   Else:
   4. Plug Y–pwr cable into charger and orbiter power supply
5. DC UTIL PWR – ON
   \( \surd \) Blue LEDs (two) illuminated
   * If blue LED not illuminated: *
   * \( \surd \) DC UTIL PWR – ON *
   * \( \surd \) cb – cl *
   * \( \surd \) Cable connections mated *
   * If blue LED still not illuminated: *
   * DC UTIL PWR – OFF *
   * Unplug Y–pwr cable from charger *
   * Change fuse (4.0 Amps) *
   * Plug Y–pwr cable into charger *
   * DC UTIL PWR – ON *

REBA Charger

6. \( \surd \) REBA sw (two) – OFF
7. Demate REBA jumper cables (two)
8. Mate Charge cables (two) to REBA jumper cables
REBA Charger

9. \( \surd \) Yellow LEDs (two) illuminated; temp stow charger on wall

* If yellow LED not illuminated, see chart below *

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green and red LED illuminated</td>
<td>Cold batt ( \leq 50 ) degF</td>
<td>Leave REBA connected to charger (REBA will warm up and change LED to yellow automatically)</td>
</tr>
<tr>
<td>Red LED illuminated</td>
<td>Hot batt ( \geq 113 ) degF</td>
<td>Leave REBA connected to charger (REBA will cool and LED will change to yellow automatically)</td>
</tr>
</tbody>
</table>

TERMINATE (10 min)

NOTE
Refer to REF DATA for specific plug–in plan location

1. When green LEDs (two) illuminated, disconnect REBAs from Charger
2. Mate REBA jumper cables
3. DC UTIL PWR – OFF
4. Stow:  REBA Charger
          Y–pwr cable
          REBA Charger extension cable (if reqd)
POST EVA ENTRY PREP (45 min if SAFER not flown)  
(55 min if SAFER flown)

AW18D  1.  AIRLK AUD PWR – OFF
AW18H  2.  PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF
       MODE (two) – OFF

      If external airlock:
MD(flr)  3.  EMU O2 ISOL VLV – CL
AW82B  4.  EV–1,EV–2 O2 vlv (two) – CL
AW82D  5.  EMU 1,2 H2O WASTE,SPLY tb (four) – CL
       Stow in FDF locker: DEPRESS/REPRESS (Cue Card)
       Cuff C/L (two)
       Stow in EMU Equipment Bag: Comm caps (two)
       Stow LCVG in HUT (do not mate to Multiple Water Connector)
       Connect LTA to HUT
       Install gloves
      If heated gloves:
       11.  Remove REBA batteries from all EMUs; stow
If EMU TV:
       12.  Remove EMU TVs from helmet lights; stow
       13.  Transfer EMU lights to middeck
       14.  Install helmets (SCOFs), lock
       15.  Remove SCU; install DCM cover
       DCM     16.  Stow SCU on AAP; re buckle straps
       17.  PURGE vlvs – op (up)
       18.  Perform LTA RESTRAINT STRAP INSTALLATION (AIRLOCK
            CONFIG) as reqd
       19.  Attach LTA restraint bags over LTA, suit arms; tighten straps
       20.  Install and loosely secure Airlock Floor Pallet using 1/4–in drive
            ratchet, 4–in ext w/1/4–in drive, and 1/2–in socket w/1/4–in drive.
            Torque to 200 in–lb using torque wrench

SAFER ENTRY STOW (10 min) (If reqd)
       21.  Deploy HCM
       22.  Install pwr sw guard
       23.  Stow HCM in foam outside of SAFER
       24.  Stow SAFER in Stowage Bag

       25.  Install additional EMU(s)/Airlock Stowage Bag(s) in airlock;  
            bag, strap installed
       26.  Install 20–g crash bag on middeck EMUs (if flown)
       27.  Remove, mark batteries from lights; stow in lockers

CAUTION
To prevent possible equipment damage, do not stow EMU lights
in locker with batts installed

Vol H  28.  Stow EMU lights, EMU Equipment Bag, EVA Bag in middeck

Inner Hatch  29.  Equal vlv (two) – NORM, install caps

       * If outer hatch leaking or integrity suspect: *
       *   Equal vlv (two) – OFF, install caps   *

30.  Inform MCC, Post EVA Entry Prep complete
POST ISS EVA ENTRY PREP (45 min if SAFER not flown)
(55 min if SAFER flown)

If external airlock:
1. MD(flr) EMU O2 ISOL VLV – CL
2. AW18D AIRLK AUD PWR – OFF
3. AW18H PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF
   MODE (two) – OFF
4. AW82B EV–1, EV–2 O2 vlv (two) – CL
5. AW82D EMU 1,2 H2O WASTE, SPLY tb (four) – CL
6. Remove helmets, temp stow
7. Disconnect Comm Caps from EMU electrical harness, temp stow
8. Only LCVG and EV Crew Options Kit in HUT (do not mate
   LCVG to Multiple Water Connector)
9. Connect LTA to HUT if not already connected
10. Gloves installed, locked
11. Install helmets, lock
12. Install helmet covers if not already installed
13. SCU stowed on AAP; straps buckled
14. PURGE vlv – op (up)
15. No loose items temp stowed in Vol H (waist tethers, etc). Install as
   reqd
16. Attach LTA restraint bags over LTA, suit arms, tethers;
   tighten straps
17. Stow Comm Caps in LTA Restraint Bag pocket
If airlock floor pallet removed:
18. Install and loosely secure Airlock Floor Pallet using 1/4–in drive
   ratchet, 4–in ext w/1/4–in drive, and 1/2–in socket w/1/4–in
   drive. Torque to 200 in–lb using torque wrench
19. Install floor Airlock Stowage Bag in airlock; vlv, strap installed

SAFER ENTRY STOW (10 min) (If SAFER returning)
20. Deploy HCM
21. Install power switch guard (‘PWR’ over PWR switch)
22. Stow HCM in foam outside of SAFER
23. Stow SAFER in Stowage Bag

Inner Hatch
24. Equal vlv (two) – NORM, install caps

* If outer hatch leaking or integrity suspect: *
   * Equal vlv (two) – OFF, install caps *

25. Inform MCC, Post ISS EVA Entry Prep complete
26. Stow in FDF/ODF locker (if reqd): FDF EVA Checklist, used
   EVA Prebreathe Cue Card, ISS EVA Checklist
OFF–NOMINAL PROCEDURES
EMU CONTINGENCY PROCS

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DISPLAY LOSS DURING POWER TRANSFER (WARM RESTART)

DCM
1. FAN – OFF
   If PWR – SCU:
AW18H
2. PWR/BATT CHGR EMU 1(2) BUS SEL – OFF (7 sec)
DCM
3. PWR – BATT
AW18H
4. ✓DISPLAY – ‘O2 POS – XX’
DCM
5. PWR/BATT CHGR EMU 1(2) MODE – PWR
AW18H
6. ✓EMU INPUT 1(2) volts = 18.0–20.0
DCM
7. PWR – SCU
AW18H
8. ✓DISPLAY – ‘O2 POS – XX’
   If PWR – BATT:
DCM
9. PWR – SCU
AW18H
10. PWR/BATT CHGR EMU 1(2) BUS SEL – OFF (7 sec)
DCM
11. PWR – BATT
AW18H
12. ✓DISPLAY – ‘O2 POS – XX’
   If reqd, FAN – ON
VACUUM H2O RECHARGE (MANNED)

WARNING
Procedure should be used only if performing a contingency EVA

EV
1. Perform AIRLOCK INGRESS, Cuff C/L, 43 (Close hatch, partially engage latches)
2. ✓Helmet purge vlv – cl, locked
DCM
3. ✓PURGE vlv – cl (dn)
4. ✓WATER – OFF
   If external airlock:
IV
5. ✓ARLK H2O S/O VLV – OP (tb–OP)
MD(flfr)
6. ✓EMU O2 ISOL VLV – OP
ML86B:C
7. ✓cb MNC EXT ARLK HTR LINE ZN 1,2 (two) – op
EV
8. Remove DCM cover
9. Connect SCU to DCM
10. COMM mode – HL
AW82B
11. ✓EV–1(EV–2) O2 vlv – OP
AW18H
12. PWR/BATT CHGR EMU 1(2) BUS SEL – MNA(MNB)
DCM
13. PWR – SCU (fwd), WARN TONE
R11L
If SPLY H2O XOVR VLV closed (tb–CL or bp) (water transfer config):
   14. SPLY H2O TKA OUTLET – CL (tb–CL)
If SPLY H2O XOVR VLV open (tb–OP) (nominal config):
IV
L1
15. ✓RAD CNTLR OUT TEMP – NORM
16. ✓FLASH EVAP CNTLR PRI A,B (two) – OFF
ML86B:C
17. SPLY H2O TKD OUTLET – CL (tb–CL)
R11L
18. SPLY H2O TKB OUTLET – CL (tb–CL)
AW82D
19. ✓EMU 1(2) H2O WASTE – CL (tb–CL)
   SPLY – OP (tb–OP)

WARNING
O2 will be off. IV1 stand by inner hatch
Equal vlvs for emergency repress

EV
DCM
20. O2 ACT – OFF, monitor SUIT P (√SUIT P > 3.6)
   * When SUIT P ≤ 3.6:
   * O2 ACT – PRESS until SUIT P = 4.2–4.4
   * – OFF
21. STATUS: ✓H2O WP – 8–15 psi and stable for ~30 sec (indicates charging complete), then:
   O2 ACT – PRESS until SUIT P = 4.2–4.4
   – EVA
If SPLY H2O XOVR VLV closed (tb–CL or bp) (water transfer config):

22. SPLY H2O TKA OUTLET – OP (tb–OP)

If SPLY H2O XOVR VLV open (tb–OP) (nominal config):

23. SPLY H2O TKC OUTLET – CL (tb–CL)
   TKB OUTLET – OP (tb–OP)

24. SPLY H2O TKD OUTLET – OP (tb–OP)

25. If FES reqd, perform TOPPING FES STARTUP (ORB OPS, ECLS)

26. EMU 1(2) H2O SPLY – CL (tb–CL)

27. COMM mode – PRI(ALT)

28. ✓ COMM freq – LOW(HIGH)

NOTE
Disregard fault msgs until CWS updated with: O2 ACT – EVA, WATER – ON, and H2O TEMP < 60

29. Go to DEPRESS/REPRESS Cue Card, DEPRESS (POST DEPRESS, step 1, if tunnel adapter)

**LiOH REPLACEMENT (MANNE**

**CAUTION**
If 10.2 cabin used, possible ∆P across LiOH cartridge caps. Direct ports away from face

**WARNING**
Fan will be off during changeout. Perform changeout as quickly as possible

**CAUTION**
Vent loop is pressurized. Restrain LiOH cartridge

1. Unstow new LiOH cartridge with aluminum plate serial number facing, remove caps (left first)

2. Unzip EMU thermal cover, fold back, Velcro to top of EMU

3. ✓ O2 ACT – IV

4. Helmet purge vlv – op

5. FAN – OFF

6. Remove used cartridge

7. Holding new LiOH cartridge with aluminum plate serial number facing, install LiOH (attach Velcro retainer strap)

8. FAN – ON (PWR RESTART may occur)

9. Helmet purge vlv – cl, locked

10. O2 ACT – PRESS

11. PURGE vlv – op (up)

12. Begin timing 2–min purge

13. Close EMU thermal cover zipper

14. Place caps on used LiOH cartridge

15. Mark used cartridge, stow in middeck

When purge time = 2 min:

16. PURGE vlv – cl (dn)

17. O2 ACT – IV

NOTE
A minimum of 40 min of prebreathe reqd to condition LiOH cartridge

18. Continue EVA PREP or EMU PREBREATHE with minimum of 40 min prebreathe
BATTERY REPLACEMENT (MANNED)

1. Unstow new battery

**CAUTION**
Do not allow battery to impact airlock wall

2. Unzip EMU thermal cover, fold back, Velcro to top of EMU

**WARNING**
Power switch must be in SCU during battery changeout

Fan will be off during changeout. Perform changeout as quickly as possible

If no SCU power available:
3. √O2 ACT – IV
4. Helmet purge vlv – op
5. FAN – OFF
6. PWR – SCU

If degraded/dead battery:

DCM
7. √PWR – SCU
8. √O2 ACT – IV
9. Helmet purge vlv – op
10. FAN – OFF (fwd)
11. Open battery latch
12. Open LiOH cartridge latches

**CAUTION**
Vent loop is pressurized. Hold LiOH cartridge in place

13. Rotate LiOH cartridge outward until limited by Velcro retainer strap
14. Remove used battery
15. Install new battery (√connector alignment), latch
16. √LiOH cartridge seated, rotate downward until latch pins engage
17. Close LiOH cartridge latches

If no SCU power available:
18. PWR – BATT

DCM
19. FAN – ON (aft) (PWR RESTART may occur)
20. Helmet purge vlv – cl, locked
21. Close EMU thermal cover zipper
22. Perform EMU COLD RESTART (EMU CONT PROCS)
23. Continue EVA Prep

* If LiOH cartridge seal broken, purge EMU, *
* LiOH REPLACEMENT (EMU CONT PROCS), *
* begin at step 10 *
WATER DUMP

1. Connect SCUs to DCM, locked
2. PWR – BATT

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

3. PWR/BATT CHGR EMU 1,2 MODE (two) – PWR
   BUS SEL (two) – MNA(MNB)

4. PWR – SCU
   If WCS:
   5. FAN SEP same as HOSE BLOCK
   6. MODE – COMMODE/MANUAL/EMU; posn guard over sw
      (√ airflow, WCS ON lt on)

If EDO WCS:
7. URINAL SEL sw same as URN DIV VLV
   8. Unstow urinal hose; posn guard strap over hose yoke (√ airflow)

9. EMU 1,2 H2O SPLY (two) – CL (tb–CL)
10. Remove Helmets, stow
11. Install SCOFs, lock

12. O2 ACT – IV
13. EMU 1,2 H2O WASTE reg (two) – MAN OP
14. EMU 1(2) H2O WASTE (one) – CL (tb–CL)
    – OP (tb–OP) (until H2O WP < 7 and stable for ~1 min)
    – Repeat for other EMU

15. EMU 1,2 H2O WASTE reg (two) – REGULATING

16. O2 ACT – OFF
   If WCS:
   17. MODE – AUTO (√ WCS ON lt off)

   If EDO WCS:
18. Stow urinal hose
**SCU SWAP (UNMANNED)**

**BOTH DCM**
1. ✓ FAN – OFF
2. ✓ O2 ACT – OFF
3. ✓ COMM mode – HL

**AW18H**
4. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF

**DCM**
5. Swap SCUs
6. PWR – BATT

**AW18H**
7. ✓ PWR/BATT CHGR EMU 1,2 MODE (two) – PWR
8. ✓ BUS SEL (two) – MNA(MNB)
9. ✓ EMU INPUT 1,2 volts = 18.0–20.0

**SCU SWAP (MANNED)**

**BOTH DCM**
1. Temp control vlv – Max C
2. Perform EVA COMM CONFIG (EVA PREP), steps 1,4,5,7
3. PWR – BATT

**AW18H**
4. PWR/BATT CHGR EMU 1,2 BUS SEL (two) – OFF

**DCM**
5. Swap SCUs

**AW18H**
6. ✓ PWR/BATT CHGR EMU 1,2 MODE (two) – PWR
7. ✓ BUS SEL (two) – MNA(MNB)
8. ✓ EMU INPUT 1,2 volts = 18.0–20.0

**DCM**
9. PWR – SCU
10. COMM mode – HL
11. Temp control vlv – as reqd

**EMU COLD RESTART (MANNED)**

---

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

---

**DCM**
1. FAN – OFF
2. O2 ACT – OFF

If PWR – SCU:
3. PWR – BATT (2 sec)
4. PWR – SCU

If PWR – BATT:
5. PWR – SCU (2 sec)
6. PWR – BATT

7. O2 ACT – IV
8. FAN – ON
If contamination is only suspected, MCC may direct crew to bypass blocks 6,8,9,10. For vapor only leaks, blocks 18 thru 21 are reqd only if contamination test fails.

During orbit night, the EMU should be in the airlock which is a warm environment. This raises the surface temperature of the EMU which increases the rate of contaminant sublimation.

Because detection equipment is available for hydrazine and oxidizer, only one bakeout needs to be performed prior to airlock repress and contamination test.

**During EVA**
- If crew visually detects plume, white crystals, or “snow” coming from payload/vehicle
- OR
- If payload/vehicle chemical system leak suspected due to steady (not step function) decrease in pressure or temperature

**12.1 CHEMICAL CHECK/DECONTAMINATION**

1. **Contamination visually detected on EMU or plume/crystals seen contacting EMU?**
   - NO
   - YES

2. **EMU in vicinity of leak detected visually or by payload/vehicle instrumentation**
   - Suspect contamination
   - Confirmed contamination

3. **Notify MCC**

4. **Brush off crystals (Use hyd brush; leave in Node Bag)**

5. **Continue EVA tasks not in vicinity of leak**
   - As soon as practical, perform following block

6. **Bakeout ≥ 30 min?**
   - YES
   - NO

7. **MCC for repeating blocks 8 and 9 based upon EMU consumables**

8. **Additional bakeout?**
   - YES
   - NO

9. **Shuttle Thrusters**
   - 12

10. **ISS Thruster**
    - 14

11. **Ammonia**
    - 18

**On MCC call:**
- If ≥ 10 min orbit night left:
  - Perform TERMINATE EVA
    (Cuff C/L, 7)
- 10 min prior to orbit day:
  - Perform POST DEPRESS
    (Cue Card, DEPRESS/REPRESS)
  - Perform EGRESS
    (Cuff C/L, 42)

**Perform INGRESS** (Cuff C/L, 43)
**Perform PRE REPRESS** (Cue Card, DEPRESS/REPRESS)
**Perform REPRESS, steps 1 thru 6 only**
**Determine contamination type:**
When $t = 2$ hr or cabin PPCO$_2 = 7–10$ mmHg, replace one ATCO can with one LiOH canister.

If contamination is from ISS thrusters and contamination tests are inconclusive, perform block 19.
12.1 (Cont)

5. IV crew must remain on QDMs and EV crew must remain in EMU for as long as cabin PPO2 and EMU PPCO2 levels will allow. The minimum time breathing O2 should be 20 min following booster fan activation to allow for the two atmospheres to mix and to allow any localized pockets of contaminants to dissipate.

20

(L1)
- CAB TEMP CNTLR – OFF

(MD44F)
- Pin cab temp cntl act link – FULL COOL

21

(WCS)
- MODE – COMM MODE/MANUAL/EMU
- COMM MODE CNTL – PULL UP (wait 15 sec)
- COMM MODE CNTL – PUSH FWD

22

- Continue REPRESS, steps 7 thru 10 (DEPRESS/REPRESS Cue Card)
- IV crewmembers don ‘Quick Don’ Masks
- When \( \Delta P < 0.5 \), open hatch

If hydrazine or ammonia contamination:
- IV crew pass wet towels and Ziploc bags to EV crew
- Close hatch
- EV crew wipe EMUs and airlock with towels (avoid electrical panels)
- Seal towels in bags
- Open hatch
- Perform BOOSTER FAN INSTALLATION/ACTIVATION (AIRLOCK CONFIG); start timer

Ammonia contamination?

- YES 23
  - When atmosphere mixing time complete:
    - IV crewmembers remove QDMs attempt to detect ammonia odor
    - Notify MCC

- NO

24

On MCC call:
- Perform POST EVA

(L1)
- H2O PUMP LOOP 1 – GPC
- H2O LOOP 2 BYP MODE – AUTO

(MD44F)
- Pin cab temp cntl act link – PRI(SEC) ACT

(L1)
- CAB TEMP CNTLR – 1(2)
- CAB TEMP sel – adj rotary as desired

(WCS)
- COMM MODE CNTL – OFF (BACK/ON)
- MODE – AUTO

(AW82A)
- Remove detector if reqd; stow in EVA Bag
CONTAMINATION TEST

To be performed after airlock ingress and partial airlock repress following suspected hydrazine or oxidizer contamination

EV
1. ✓ Inner hatch Equal vlv (two) – OFF
2. Attach hydrazine detector cap over depress valve
3. ✓ Helmet lights – OFF

AW82B
4. ✓ LTG FLOOD (four) – ON

AW18A
For suspected oxidizer contamination:
5. Tear open Dräger pouch
   ✓ Initial tube color pale green
   * Use new tube if not proper color *
6. Insert arrow end of Dräger tube into detector holder

For suspected hydrazine contamination:
7. Tear open Gold Salt pouch
   ✓ Initial coupon color white
   * Use new coupon if not proper color *
8. Insert indicator into detector holder

NOTE
Test performed at 5 psi. For oxidizer, depress for 1.5 min. For MMH and UDMH, depress for 10 min

9. AIRLK DEPRESS vlv – 5 (ALERT TONE may occur)
10. Wave detector near EMUs
11. After specified depress time, AIRLK DEPRESS vlv – CL (ALERT TONE may occur)
12. ✓ Detector for color change. Determine if test failed based upon following criteria and inform MCC:
   Oxidizer – any gray/blue reacted crystals
   MMH – > 25 ppb
   UDMH – > 50 ppb
13. Continue 12.1 CHEMICAL CHECK/DECONTAMINATION
SAFER BATTERY CHANGEOUT (15 min)

PM  1. Install Inhibitor
    2. MAN ISOL vlv – CL (up)
HCM  3. PWR – OFF
PM  4. Loosen screws (eight) using 9/64–in Hex Wrench
     5. Remove battery; disconnect battery umbilical connector
     6. Mark, stow used battery
     7. Obtain new battery
     8. Record new battery serial number (SAFER CHECKOUT RESULTS
        Cue Card)
     9. Connect battery umbilical connector; install battery
    10. Tighten screws (eight)
    11. Go to SAFER CHECKOUT
BENDS TREATMENT ADAPTER (BTA) INSTALLATION (IN–SUIT)

**BTA PREP**

1. Unstow BTA with 3/8–in Wrench
2. Cut/break TMG tacks (see 12–16)
3. Unzip PLSS TMG (avoid pulling on antenna cable)
4. Remove Impact Shield
5. Disconnect hatch marked cable P3 (see 12–16); cut cable if reqd

**NOTE**

It may be necessary to extend the legs forward to access the test port in a pressurized EMU

6. Remove Test Port F Plug on SOP using 3/8–in end of BTA Wrench (4–6 turns ccw) (see SECONDARY OXYGEN PACKAGE below)

**SECONDARY OXYGEN PACKAGE**

7. Stow Test Port F Plug (see 12–16) on BTA
8. Unstow poppet keeper screw from BTA, temp stow (in EMU Servicing Kit)

**BTA TREATMENT**

9. ✓SCU connected to DCM
10. Connect BTA to PPRV (cw), ✓locked
11. ✓EV–1(EV–2) O2 vlv – OP
12. If external airlock: ✓EMU O2 ISOL vlv – OP
13. ✓PWR – SCU
14. ✓FAN – ON
15. ✓COMM MODE – HL, vol as reqd (for biomed downlink, COMM MODE – PRI(ALT))

If WCS:

16. ✓FAN SEP same as HOSE BLOCK
17. MODE – COMMODE/MANUAL/EMU, posn guard over sw (√airflow, WCS ON it on)

If EDO WCS:

18. ✓URINAL SEL sw same as URN DIV VLV
19. Unstow urinal hose; posn guard strap over hose yoke (√airflow)

20. ✓EMU 1(2) H2O SPLY – CL (tb–CL)
21. WASTE reg – MAN OP
22. EMU 1(2) H2O WASTE – OP (tb–OP) (until H2O WP < 7 and stable for ~ 1 min)
23. EMU 1(2) H2O WASTE – CL (tb–CL)
24. SPLY WASTE reg – REGULATING

If WCS:

25. MODE – AUTO (√WCS ON it off)

If EDO WCS:

26. Stow urinal hose
27. $\sqrt{\text{SUIT P}} = 4.2 - 4.4$
28. O2 ACT – OFF (until SUIT P stabilizes)

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>If BTA gauge pressure increases while O2 ACT – PRESS, set O2 ACT – OFF immediately to prevent a hazardous condition; contact MCC. Note that the BTA gauge increases nominally when O2 ACT – OFF. Actual Suit P = 4.7–5.5 psi above BTA gauge pressure.</td>
</tr>
</tbody>
</table>

29. O2 ACT – PRESS (for 15 sec), $\sqrt{\text{BTA gauge not increasing when O2 ACT – PRESS}}$
30. O2 ACT – OFF, status to H2O GP, $\sqrt{\text{stable}}$
31. Repeat steps 29,30 until H2O GP = 6.0 psid and stable on DCM display with O2 ACT – OFF

As reqd to maintain H2O GP = 6.0 psid:
32. Repeat steps 29,30

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
</tr>
</tbody>
</table>

33. Contact Surgeon for treatment length and changes in treatment pressure
BENDS TREATMENT ADAPTER (BTA) INSTALLATION (POST SUIT DOFFING)

BTA PREP
1. Unstow BTA with 3/8–in Wrench
2. Cut/break TMG tacks (see 12–16)
3. Unzip PLSS TMG (avoid pulling on antenna cable)
4. Remove Impact Shield
5. Disconnect or cut hatch marked cable P3 (see 12–16)
6. Remove Test Port F Plug on SOP using 3/8–in end of BTA Wrench (4–6 turns ccw) (see SECONDARY OXYGEN PACKAGE below)

SECONDARY OXYGEN PACKAGE

BTA 7. Stow Test Port F Plug (see 12–16) on BTA

If LiOH replacement reqd by MCC:
8. Unstow new LiOH cartridge
9. Remove, mark used LiOH cartridge
10. Holding new LiOH cartridge w/aluminum plate serial number facing self, remove caps (left first), install LiOH (attach Velcro retainer strap)
11. Install caps on used cartridge

BTA TREATMENT
12. ✓ SCU connected to DCM
13. Unstow Poppet Keeper Screw from BTA
14. Open Positive Pressure Relief Valve (PPRV) using BTA poppet keeper (thread cw to hard stop, pull, tighten nut) (see 12–16)
15. Connect BTA to PPRV (cw), ✓ locked
16. Don MAG, LCVG, biomed
17. Fill drink bag from galley, remove gas and insert drink bag in restraint bag
18. Install drink bag restraint bag in HUT and dispose of fill tool in wet trash

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

AW82B 19. ✓ EV–1(EV–2) O2 vlv – OP
MD (flr) 20. If external airlock: ✓ EMU O2 ISOL vlv – OP
DCM 21. PWR – BATT

AW18H 22. PWR/BATT CHGR EMU 1(2) MODE – PWR
23. BUS SEL – MNA(MNB)
DCM 24. PWR – SCU
25. ✓ Waist ring – op
26. Don lower torso; as reqd, attach donning handles
27. ✓ Suit arms aligned
28. ✓ Wrist disconnects – op
29. Remove cooling garment connector jumper
30. Don thumb loops
31. ✓ Biomed connector outside of HUT
32. Don upper torso
33. Release thumb loops
34. ✓ Suit arms aligned
35. Don comm cap
36. ✓COMM MODE – HL, vol as reqd (for biomed downlink, perform EVA COMM CONFIG (EVA PREP))
37. Connect biomed to elec harness
38. Connect cooling garment, ✓locked
39. ✓Thermal cover clear of waist ring
40. Waist ring – engage posn
41. Connect waist ring, ✓locked
42. Wrist rings – engage posn
43. Don EV Gloves, ✓locked
44. ✓Elec harness clear of neck ring
45. ✓Mike boom posn

DCM
46. FAN – ON
47. Don helmet, ✓locked
48. ✓Helmet purge vlv – cl, locked
49. ✓PURGE vlv – op
50. O2 ACT – PRESS, begin purge clock (12 min)

If WCS:
51. ✓FAN SEP same as HOSE BLOCK
52. MODE – COMMODE/MANUAL/EMU, posn guard over sw (✓airflow, WCS ON lt on)

If EDO WCS:
53. ✓URINAL SEL sw same as URN DIV VLV
54. Unstow urinal hose; posn guard strap over hose yoke (✓airflow)

AW82D 55. ✓EMU 1(2) H2O SPLY – CL (tb–CL)
AW82H 56. ✓WASTE reg – MAN OP
AW82D 57. ✓WASTE – OP (tb–OP)

When N2 purge time = 12 min:
58. EMU 1(2) H2O WASTE – CL (tb–CL)

AW82H 59. ✓SPLY WASTE reg – REGULATING

If WCS:
50. MODE – AUTO (✓WCS ON lt off)

If EDO WCS:
61. Stow urinal hose

DCM 62. PURGE vlv – cl (dn)
63. ✓Suit P = 4.2–4.4
64. O2 ACT – OFF (until Suit P incr stabilizes)
65. – PRESS (for 15 sec)
66. Repeat steps 64,65 until Suit P = 6.0 psig on BTA gauge

NOTE
BTA relief valve relieves at 8.04–8.45 psig

As reqd to maintain Suit P = 6.0 psig:
67. Repeat steps 64,65
68. Contact Surgeon for treatment length and changes in treatment pressure
BTA LOCATION ON EMU

- Positive pressure relief valve
- Poppet keeper screw w/o BTA (install in PPRV for POST SUIT DOFFING proc only)
- Gauge w/BTA
- Test port F plug stow port
- Black alignment stripe
- Relief valve
- P3 connector

Nut

Tacks
EMU Resize (30 min)

NOTE
Procedures written for arm, thigh, and boot disconnects. Arm, thigh, and boot sizing rings are not interchangeable and cannot be stacked. See figures on 12–18 as reference during procedure.

1. Identify component(s) to be installed per appropriate resize matrix

Old component(s)/EMU
2. Peel back TMG from disconnect

If replacing arm components
3. \[\square\text{REBA sw} \rightarrow \text{OFF}\]
4. Disconnect lower arm power harness from gloves and upper arm
5. Lock 1 – OPEN (on arm, lock may reengage due to bladder)
6. Lock 2 – hold OPEN while turning ring to engage lock 2 OPEN against disconnect
7. Lock 3 – hold OPEN while turning ring in OPEN direction
8. Demate segment/ring
9. Install protective caps on ends of components; place rings in protective pouches
10. Repeat steps 2–9 as reqd

New component(s)/EMU
11. \[\checkmark\text{Proper size located on bladder by disconnect}\]
12. \[\checkmark\text{All seals, threads and wipe with lint–free wipe (Prep Kit)}\]
13. Lock 1 – OPEN (on arm, lock may reengage due to bladder)
14. Align new component yellow hash marks with yellow bar on disconnect
15. Turn rings in LOCK direction
16. \[\checkmark\text{Lock 2,3} \rightarrow \text{locked}\]
17. Lock 1 – LOCK
18. \[\checkmark\text{Cam adjustments (4 per segment)}\] per appropriate resize matrix
19. If Lower arm replaced, connect lower arm power harness to upper arm
20. Remate TMG covering disconnect
21. Repeat steps 11–20 as reqd

Old component(s)/EMU
22. Stow replaced component(s)

![Disconnected EMU Components Diagram](image)

(Cont on next page)
EMU RESIZE (Cont)

ARM CAM ADJUSTMENT
(0.25–in per cam)

**NOTES**
Cam Adjuster only rotates in one direction.

Cam Adjuster should click and lock in the full SHORT and full LONG positions.

Cam positions/arms must be symmetric; likely minimum of four (4) cams to be adjusted

WAIST CAM ADJUSTMENT
(1.0–in per cam)

**NOTES**
After adjusting, verify that restraint is routed around proper pin, that material is not damaged, twisted or pinched, and that movable pin is fully inserted.

With restraint in LONG position, the darkened area on Resizing Pull Tab should NOT be easily visible.

With restraint in SHORT position, the darkened area on Resizing Pull Tab should be easily visible.

Cam positions must be symmetric; minimum of two (2) cams to be adjusted

LEG CAM ADJUSTMENT
(0.5–in per cam)

**NOTE**
After adjusting, verify that restraint is routed around the oval cam, that material is not damaged, twisted or pinched, and that Movable Pin is fully inserted.

Cam positions/legs must be symmetric; likely minimum of four (4) cams to be adjusted

**CAUTION**
In SHORT position, the Movable Pin must be inserted thru oval cam, not just thru the restraint loop

In LONG position, the restraint must NOT be around the Movable Pin; verify that oval cam and restraint are down
DAP/EVA RESCUE/RETRIEVE

EVA ORBITER CONFIGURATION ...................................................... 13–2
RESCUE/RETRIEVE ................................................................. 13–4
EVA ORBITER CONFIGURATION

1. GENERIC ORBITER CONFIGURATION
   A6U  SENSE – as reqd
   FLT CNTLR PWR – OFF
   DAP TRANS: PULSE/PULSE/PULSE

   O14, cb MNA,C DDU AFT (two) – cl
   O15, Pri RJD LOGIC, DRIVER (sixteen) – ON
   O16

   GNC 20 DAP CONFIG
   CRT
   √ PRI TRAN PLS – ITEM 17 +0.1 0
   √ ITEM 37 +0.0 5

   A1U  √ KU CNTL – CMD
       PWR – STBY

   Unstow, review EVA RESCUE procedure
2. **REGION–SPECIFIC ORBITER CONFIGURATION**
   Using region charts, determine region(s) in which EVA crewmembers will be located.
   Working in order top of table to bottom using the most restrictive region, configure orbiter systems per following table, performing any Initial Configuration Actions which contain a ‘✓’.
   Items which do not have a ‘✓’ may be configured as desired to meet mission–specific requirements.

   ![WARNING]
   Deviating from orbiter systems configuration called out in following table may put EVA crewmembers at risk of being plumed by RCS jets.

   **NOTE**
   The following table should be used for initial configuration. It should not be used during the EVA (e.g., for EVA RESCUE).
   If VERNS not available, use ALT instead. All other configuration actions remain unchanged.

<table>
<thead>
<tr>
<th>INITIAL CONFIGURATION ACTIONS</th>
<th>In Bay</th>
<th>Above Bay</th>
<th>Above Alt OMS Pods</th>
<th>Below Tail/Midbody</th>
<th>Below Nose</th>
<th>Beside Bay</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VERN</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>ALT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LOW Z</strong></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>No LOW Z</strong></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>SPEC 20</strong></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>P/Y/JET OPTION (PRI &amp; ALT, DAP A &amp; B) – ALL</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>OVRD L/R MANFs 1,2,4 (six) – CL</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>L3L,R3R (two) – DES</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>SPEC 23</strong></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>OVRD L/R MANFs 2,3,4 (six) – CL</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>L1L,R1R (two) – DES</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>O14, O15, O16</strong></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>RJDA L1/R1 (L2/R2, L4/R4) DRIVER (three) – OFF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>RJDA L2/R2 (L3/R3, L4/R4) DRIVER (three) – OFF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>RJD MANF L5/F5/R5 DRIVER – OFF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>RJDF F1(F2,F3,F4) MANF DRIVER – OFF (four)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>MISC</strong></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>FLT CNTLR PWR (three) – OFF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

3. **POST–EVA RECONFIGURATION**
   Return orbiter to desired/required systems configs.
EVA RESCUE/RETRIEVE

NOTE
Assumes that EVA ORBITER CONFIGURATION procedure has already been performed

1. CONFIGURATION

A6U
DAP: FREE(INRTL)

✓ SENSE SWITCH as desired
O14:F, ✓ Pri RJD LOGIC, DRIVER (sixteen) – ON
O15:F,
O16:F
O16:F ✓ RJD MANF L5/F5/R5 DRIVER – ON

GNC 23 RCS
OVRD L/R MANF – OP (if OVRD CLOSED earlier)

A1U
KU CNTL – PNL

2. OPERATIONS

NOTE
When EVA crewmember clear of RCS jets,
FLT CNTLR PWR ON and DAP INRTL

If TRANSLATION:
DAP: LO Z, as reqd (DAP A has larger TRANS PULSE size)
If ROTATION:
DAP: VERN(PRI), as reqd

NOTE
Translate, then rotate, as reqd to center crewmember over bay.

Null translational rates, then establish closing(opening) rate as reqd to crewmember in bay.

Use RMS and/or other EVA crewmember to assist if possible
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payload Bay EVA Nomenclature</td>
<td>14–2</td>
</tr>
<tr>
<td>RMS/PRLA Contingency EVA</td>
<td>14–3</td>
</tr>
<tr>
<td>96 Bolt Pre–EVA Tool Config</td>
<td>14–13</td>
</tr>
<tr>
<td>EVA Timeline</td>
<td>14–14</td>
</tr>
<tr>
<td>Capture Latch Manual Release (ODS/PMA)</td>
<td>14–19</td>
</tr>
<tr>
<td>96 Bolt EVA Layout</td>
<td>14–21</td>
</tr>
</tbody>
</table>
### RMS/PRLA CONTINGENCY EVA

**FOR RMS/PRLA FAILURES:**

<table>
<thead>
<tr>
<th>PRE EVA RMS CONFIG</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV</strong></td>
<td></td>
</tr>
<tr>
<td><strong>A8L</strong></td>
<td></td>
</tr>
<tr>
<td>IF MRL fails to latch:</td>
<td></td>
</tr>
<tr>
<td>✓RMS R–F–L tb (three) – gray</td>
<td></td>
</tr>
<tr>
<td>✓RMS tb – STO</td>
<td></td>
</tr>
<tr>
<td>Go to RMS TIEDOWN</td>
<td>4</td>
</tr>
<tr>
<td>IF MPM fails to stow(deploy):</td>
<td></td>
</tr>
<tr>
<td>✓RMS RETEN LAT – LAT (tb–LAT)</td>
<td></td>
</tr>
<tr>
<td>✓MPMs stowed(deployed) as far as possible</td>
<td></td>
</tr>
<tr>
<td>Go to MPM STOW/DEPLOY</td>
<td>5</td>
</tr>
<tr>
<td>IF Joint fails:</td>
<td></td>
</tr>
<tr>
<td>Position RMS for easy striker bar access</td>
<td></td>
</tr>
<tr>
<td>Go to RMS JOINT ALIGN</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRE EVA EE/GF CONFIG</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV</strong></td>
<td></td>
</tr>
<tr>
<td><strong>A8U</strong></td>
<td></td>
</tr>
<tr>
<td>BRAKES – ON (tb–ON)</td>
<td></td>
</tr>
<tr>
<td>EE MODE – OFF</td>
<td></td>
</tr>
<tr>
<td><strong>A8L</strong></td>
<td></td>
</tr>
<tr>
<td>RMS SEL – OFF</td>
<td></td>
</tr>
<tr>
<td>Go to RMS FLIGHT RELEASABLE GRAPPLE FIXTURE RELEASE</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PRE EVA PRLA CONFIG</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IV</strong></td>
<td></td>
</tr>
<tr>
<td><strong>MA73C:C</strong></td>
<td></td>
</tr>
<tr>
<td>cb MCA PWR AC1 3Φ MID 1 – op</td>
<td></td>
</tr>
<tr>
<td>AC2 3Φ MID 3 – op</td>
<td></td>
</tr>
<tr>
<td><strong>R13L</strong></td>
<td></td>
</tr>
<tr>
<td>PL BAY MECH PWR 1,2 (two) – OFF</td>
<td></td>
</tr>
<tr>
<td><strong>A6U</strong></td>
<td></td>
</tr>
<tr>
<td>PL RETEN LOGIC PWR SYS 1,2 (two) – OFF</td>
<td></td>
</tr>
<tr>
<td>LAT (five) – OFF</td>
<td></td>
</tr>
<tr>
<td>Go to PRLA OPEN/CLOSE</td>
<td>9</td>
</tr>
</tbody>
</table>
RMS/PRLA CONTINGENCY EVA (Cont)

FOR RMS/PRLA FAILURES (Cont):

<table>
<thead>
<tr>
<th>RMS TIEDOWN</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>If MRL fail to latch – monitor EV1 and EV2</td>
</tr>
</tbody>
</table>

Refer to RMS TIEDOWN figure, following page, as reqd

RMS TIEDOWN

TOOL BOX – PRDs (2), EVA TRASH BAG
IFM – 9/64-in ALLEN WRENCH (AW)
ELBOW – PRD aft of MPM, peel blanket (fwd of MPM) toward EE; feed hook under cable harness (if reqd, remove cable harness clamp bolt with AW, bend clamp out of way), adjust strap as far fwd as possible
WRIST – PRD aft of MPM, strap rests just fwd of pitch joint opening
END EFFECTOR – PRD fwd of PM, peel blankets aft and fwd, strap rests aft–most on yaw joint (at roll/yaw I/F), adjust strap under bolt studs
1. Figure eight the strap
2. Pull minimum 6–in slack in strap
3. Ratchet PRD snug (14 full strokes reqd)
4. Strap in correct arm location, ratchet tight
5. Reattach blankets

MPM STOW/DEPLOY[5]

IV1 If MPM fail to stow/deploy, monitor EV1 and EV2, then:

MPM STOW/DEPLOY

TOOL BOX – MPM WRENCH

1. Rotate torque shaft (8 revs) until MPMs are stowed/deployed, $X_0=693$

![Diagram of MPM STOW/DEPLOY](image)

EVA CUFF C/L 35 10/29/93

IV When MPMs in stow(deploy) position:

- $\sqrt{RMS \ tb} \rightarrow \ STO(DPY)$
- or
- 4: SM 94 PDRS CONTROL
- $\sqrt{RMS \ STO(DPY)}$
- 11 00 (00 11)
RMS/PRLA CONTINGENCY EVA (Cont)

RMS TIEDOWN

NOTE: DO NOT REMOVE BLANKET AT THIS JOINT

9467. ART; 3
### RMS/PRLA CONTINGENCY EVA (Cont)

**FOR RMS/PRLA FAILURES (Cont):**

<table>
<thead>
<tr>
<th>RMS JOINT ALIGN</th>
<th>6</th>
</tr>
</thead>
</table>
| **IV**          | If Joint Fail – reposition RMS as reqd for RMS rope attachment  
|                 | – monitor EV1 and EV2 |

#### RMS JOINT ALIGN

- **TOOL BOX – ADJ TETHERs, SNATCH BLOCKs (2), RMS ROPE REEL**

  1. Attach RMS rope around end effector under handrail. Translate to avoid wrapping rope around RMS
  2. Attach snatch block(s) to handrail(s) and route rope as reqd
  3. Reposition RMS as required for cradling
  4. Pull RMS down into MPMs
  5. Perform final positioning by hand to allow MRLs to latch

| EVA CUFF C/L   | 34 | 10/29/93 |

- **When RMS ready to latch:**
  - **R13L** PL BAY MECH PWR SYS (two) – ON
  - **A8L** RMS RETEN LAT – LAT (tb–LAT 18 sec max) – OFF

- If MPMs deployed:
  - **Elbow Camr in aligned posn:**
    - Pan 90° from X–AXIS
    - Tilt per DECAL
  - **A8L** RMS – STO (tb–STO, 68 sec max) – OFF
  - **A8U** BRAKES – ON (tb–ON)
  - **R13L** PL BAY MECH PWR SYS (two) – OFF

- **RMS SHOULDER BRACE RELEASE**

  - **IV** A8 ✓ RMS SELECT – OFF

**RMS SHOULDER BRACE RELEASE**

- **TOOL BOX – RMS SHOULDER BRACE RELEASE TOOL**

  1. Fold aside rub strip and thermal blankets
  2. Insert tool and move handle down
  3. Remove tool and reconfigure blankets

| EVA CUFF C/L | 34 | 10/29/93 |

---

EVA/ALL/GEN G
RMS/PRLA CONTINGENCY EVA (Cont)

FOR RMS/PRLA FAILURES (Cont):

RMS FLIGHT RELEASABLE GRAPPLE FIXTURE RELEASE

| EV | 1. Rotate white release rod ccw to hard stop (32 strokes of 90 deg) |
| EV | 2. Rotate black release rod cw to hard stop (32 strokes of 90 deg – shaft will release from grapple fixture) |
| A8 | 3. Clear worksite for RMS powerdown: RMS SEL – PORT Perform RMS POWERDOWN (PDRS OPS) |
| V  | 4. Tape end of shaft to restrain slug within shaft |
| ~  | 5. Cover end effector with jettison stowage bag to restrain grapple shaft |

EVA CUFF C/L  37  09/30/96

VISUAL AID
RELEASE ROD
POSITIONING LINES

WHITE
RELEASE ROD

10 O’CLOCK POSITION

WRENCH
ACCESS
CUTOUT
(TYP)

4 O’CLOCK POSITION

COLOR DARK GRAY

BLACK
RELEASE
ROD

88054139, ART 3
RMS/PRLA CONTINGENCY EVA (Cont)

EFGF GRAPPLE SHAFT RELEASE

1. Perform visual inspection of EE/GF interface to determine possible cause of failure
2. Remove tee pull (−10 lb)
3. Rotate release rod cw (break out < 20 ft−lb, running < 11 ft−lb) to hard stop (−90 strokes of 70 deg)

WARNING
If payload not restrained, rotation of release rod after grapple shaft release may impart movements to payload

4. √ Electrical connector disconnected
5. If electrical connector not disconnected, insert probe into connector release port ~5.25 in for full release

6. Clear worksite for RMS cradle
7. Perform RMS POWERDOWN (PDRS OPS)
8. Cover end effector with jettison stowage bag to restrain grapple shaft

SPARE SHAFT REPLACEMENT (If reqd)

9. Rotate release rod cw to hardstop then rotate ccw five strokes of ~70 deg (at least one full rev reqd). This will insure that grapple shaft can be released for future failures
10. Insert spare shaft (~5 lb to overcome ball detent) using alignment pin and guide
11. Rotate release rod ccw to hardstop (~90 strokes of ~70 deg), apply slight axial pressure to grapple shaft for initial rotations. This is required to aid in engagement of Acme threads

   If grapple shaft not engaged after four revs of release rod, repeat steps 9–11
12. Verify no gap between grapple shaft shoulder and grapple fixture cone. If gap is visible, release shaft and repeat insertion procedures
13. Replace tee pull

Tools Req’d:
1/2–in Box Ratchet, EVA Probe (PSA), Jettison Stowage Bag (Airlock), Spare Grapple Shaft w/Transfer Bag (if reqd, Airlock)
ELECTRICAL FLIGHT GRAPPLE FIXTURE
RMS/PRLA CONTINGENCY EVA (Cont)

FOR RMS/PRLA FAILURES (Cont):

PRLA OPEN/CLOSE

Refer to EVA RELEASABLE PAYLOAD RETENTION LATCHES figures, 14–11, 14–12, as reqd

PRLA OPEN/CLOSE

AIRLOCK–RATCHET WITH 7/16 SOCKET

IV ✓ PRLA PWR OFF

EV 1. Rotate ratchet in release direction (as marked above EVA drive) to shear pin

2. View yellow indicator as applicable

3. Continue to rotate drive 4–1/2 revs to disc gear train from drive shaft

To open latch:

4. Continue rotation in release direction (as marked above EVA drive) until latch open against stop

To close latch:

5. Rotate EVA drive in opposite direction of release (as marked above EVA drive) until latch closed against hardstop and over center

IV ✓ PRLA tb LAT

Cont next page

EVA CUFF C/L 38 07/20/00

PRLA OPEN/CLOSE (CONT)

EV 6. Apply PRLA locking feature if applicable

To lock:

7. Rotate each bolt (2) cw 1/2 turn

For subsequent PRLA ops, release locking feature before operating EVA drive (2 bolts ccw 1/2 turn); relock after operation

EVA CUFF C/L 39 07/20/00

IV MA73C:C cb MCA PWR AC1 3Φ MID 1 – cl

:D AC2 3Φ MID 3 – cl

To verify PL Latches op/cl:

A6U ✓ PL RETEN LAT 1(2,3,4,5) tb – LAT(REL)
In–board end of shaft has yellow marks. Not aligned indicates motor disengaged.

LWLL/MWLL/SMWLL

LIGHTWEIGHT LONGERON LATCH/
MIDDLEWEIGHT LONGERON LATCH/
SUPER MIDDLEWEIGHT LONGERON LATCH

MMWL

MODIFIED MIDDLEWEIGHT LATCH

EVA RELEASABLE PAYLOAD RETENTION LATCHES

14–11
In-board end of shaft extends to show yellow stripe when motor disengaged.
96 BOLT PRE–EVA TOOL CONFIG

STOWAGE LOCATIONS AT LAUNCH
Flight specific Middeck stowage and PFR configuration will be uplinked

EMUs:
- MWS Baseplates (2)
- Retractable Tethers (2)
- Adj Equip Tethers (2)
- Waist Tethers (4)

Middeck:
- MWS T–bars (2)
- MWS Swing Arms (3)
- BRT (2)
- Waist Tethers Ext (2) (If flown)
- General Purpose (GP) Caddies (2)
- Adj Equip Tethers (2)
- Retractable Tethers (2)
- Crewlock Bag
- Right Angle Drive (RAD)
- Socket Caddy
- 6–in Exts (2)
- PGTs (2)
- PGT Batteries (3)
- Adj Fuse Tether
- Jettison Stowage Bag

Node Bag:
96 Bolt Bag:
- 7/16–in Box End Wrenches (2)
- ODS Clamps (2)
- ODS Clamp Handles (2)
- PB Articulating Socket
- Bridge Rail Clamp
- RAD w/7/16–in Sockets (2)

TSA (Port):
- Large Cutter
- PRDs (2)
- Sm EVA Trash Bags (2)

Fwd Bulhead:
- PFR

Port PLB (Bay 2):
- Bridge Rail Clamp
- PB Articulating Socket

Configure Crewlock EVA Bag:
- PGT Spare Battery
- Socket Caddies w/6–in Exts (2), RAD (Spare)

Configure Adj Fuse Tether with one of following:
- GP Caddies (2)
- PGTs w/Batteries (2)

Stow Adj Fuse Tether, Crewlock Bag, Jettison Stowage Bag in Airlock pre–EVA

Remove ODS Centerline Camera pre–EVA
# 96 BOLT EVA TIMELINE

<table>
<thead>
<tr>
<th>Time</th>
<th>PET</th>
<th>IV/RMS</th>
<th>EV1</th>
<th>EV2</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>00:00</td>
<td></td>
<td></td>
<td>3. Perform POST DEPRESS (DEPRESS/REPRESS)</td>
<td>4. Perform POST DEPRESS (DEPRESS/REPRESS)</td>
</tr>
<tr>
<td>00:15</td>
<td></td>
<td></td>
<td>5. Perform AIRLOCK EGRESS (CUFF C/L, 42) Add the following steps to AIRLOCK EGRESS:</td>
<td>6. Perform AIRLOCK EGRESS (CUFF C/L, 42) Add the following steps to AIRLOCK EGRESS:</td>
</tr>
<tr>
<td>00:30</td>
<td></td>
<td></td>
<td>6a. Translate to GO2 ISOLATION VALVE on outside of airlock (aft port side) &lt;br&gt;6b. Open thermal cover; remove pip pin &lt;br&gt;6c. GO2 XFER ISO VLV – CL AW64L(E) &lt;br&gt;6d. Re–install pip pin; close thermal cover</td>
<td></td>
</tr>
</tbody>
</table>

AW64L(E) <br>GN2 XFER PANEL <br>GO2 XFER PANEL
<table>
<thead>
<tr>
<th>PET</th>
<th>IV/RMS</th>
<th>EV1</th>
<th>EV2</th>
</tr>
</thead>
<tbody>
<tr>
<td>01:00</td>
<td></td>
<td><strong>PAYLOAD BAY SETUP</strong></td>
<td><strong>PAYLOAD BAY SETUP</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Retrieve 96 Bolt Bag from Node Bag</td>
<td>1. Retrieve following items from port TSA:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Attach 96 Bolt Bag to Ext A/L Truss near port TSA</td>
<td>PRDs (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Remove thermal blanket covering ODS bolts; temp stow in A/L with Adj Equip Tether</td>
<td>Large Cutter</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Retrieve GP Caddy from Adj Fuse Tether; attach to MWS</td>
<td>2. Close and latch TSA door</td>
</tr>
<tr>
<td>01:20</td>
<td></td>
<td><strong>TOOL CONFIG</strong></td>
<td>3. Temp stow PRDs (two) on Truss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Retrieve following items from port TSA:</td>
<td>4. Temp stow Large Cutter on stbd ODS using Adj Equip Tether</td>
</tr>
<tr>
<td></td>
<td>01:20</td>
<td>PRDs (2)</td>
<td>5. Retrieve Adj Fuse Tether from A/L; temp stow on Truss</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Large Cutter</td>
<td>6. Remove thermal blanket covering ODS bolts; temp stow in A/L with Adj Equip Tether</td>
</tr>
<tr>
<td></td>
<td>01:45</td>
<td>2. Retrieve ODS Clamp and Handle from 96 Bolt Bag; install handle in clamp, √ locked; hand off to EV2</td>
<td>7. Retrieve GP Caddy from Adj Fuse Tether; attach to MWS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Retrieve ODS Clamp and Handle from 96 Bolt Bag; install handle in clamp, √ locked; attach Waist Tether from EMU to ODS Clamp</td>
<td><strong>INSTALL CLAMP – STBD</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Retrieve 7/16–in Box End Wrench from 96 Bolt Bag; attach to GP Caddy</td>
<td>1. Tether ODS Clamp to handrail at worksite</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CAUTION</strong></td>
<td>2. Release bolts 35 to 38 (four); pull to lock up</td>
</tr>
<tr>
<td></td>
<td>PGT: 25.5 ft–lb, CCW2,30.5</td>
<td>During clamp installation, do not apply any sideload on ODS gusset (may puncture A/L)</td>
<td>3. Retract Clamp pip pin</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>INSTALL CLAMP – PORT</strong></td>
<td>4. Install clamp between bolts 36,37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Tether ODS Clamp to handrail at worksite</td>
<td>5. Set clamp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Release bolts 83 to 86 (four); pull to lock up</td>
<td>Turn bolt at top of clamp until upper jaws contact vestibule ring, then add l/4 turn; insert pip pin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Retract Clamp pip pin</td>
<td>6. √ Clamp Handle locked</td>
</tr>
<tr>
<td></td>
<td>01:45</td>
<td>4. Install clamp between bolts 84,85</td>
<td><strong>CAUTION</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Set clamp</td>
<td>During clamp installation, do not apply any sideload on ODS gusset (may puncture A/L)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Turn bolt at top of clamp until upper jaws contact vestibule ring, then add l/4 turn; insert pip pin</td>
<td><strong>INSTALL CLAMP – PORT</strong></td>
</tr>
<tr>
<td></td>
<td>01:45</td>
<td>6. √ Clamp Handle locked</td>
<td>1. Tether ODS Clamp to handrail at worksite</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>CAUTION</strong></td>
<td>2. Release bolts 83 to 86 (four); pull to lock up</td>
</tr>
<tr>
<td></td>
<td>PGT: 25.5 ft–lb, CCW2,30.5</td>
<td>During clamp installation, do not apply any sideload on ODS gusset (may puncture A/L)</td>
<td>3. Retract Clamp pip pin</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>INSTALL CLAMP – STBD</strong></td>
<td>4. Install clamp between bolts 36,37</td>
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<tr>
<td></td>
<td></td>
<td>1. Tether ODS Clamp to handrail at worksite</td>
<td>5. Set clamp</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Release bolts 35 to 38 (four); pull to lock up</td>
<td>Turn bolt at top of clamp until upper jaws contact vestibule ring, then add l/4 turn; insert pip pin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Retract Clamp pip pin</td>
<td>6. √ Clamp Handle locked</td>
</tr>
</tbody>
</table>
### 96 BOLT EVA TIMELINE (Cont)

<table>
<thead>
<tr>
<th>PET</th>
<th>IV/RMS</th>
<th>EV1</th>
<th>EV2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IF PFR REQUIRED:</td>
<td>IF PFR REQUIRED:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Retrieve Art Socket and Bridge Rail Clamp from 96 Bolt Bag</td>
<td>Port Bridge Rail Camp and Art Socket launched in second to fwd–most available half–hole</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Install bridge rail clamp and art socket on stbd bridge rail in aft–most available half–hole, knob inboard</td>
<td>1. Move clamp assy to fwd–most available half–hole, knob inboard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Retrieve PFR from port side</td>
<td>2. Retrieve fwd bulkhead PFR and install</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PFR SETUP FOR CLAMP INSTALL</strong></td>
<td><strong>PFR SETUP FOR CLAMP INSTALL</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Art Socket: (P = 2, Y = 6)</td>
<td>1. Art Socket: (P = 1, Y = 6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. PFR: (P = 10, R = A, Y = 8)</td>
<td>2. PFR: (P = 10.5, R = A, Y = 3)</td>
</tr>
<tr>
<td>02:05</td>
<td>Record Cables cut at following locations:</td>
<td><strong>WARNING</strong></td>
<td><strong>WARNING</strong></td>
</tr>
<tr>
<td></td>
<td>Bolt 32 – 1 cable</td>
<td>Cut ends of O2 and N2 lines present sharp edge hazard</td>
<td>Cut ends of O2 and N2 lines present sharp edge hazard</td>
</tr>
<tr>
<td></td>
<td>Bolt 24 – 7 cables</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bolt 21 – 1 cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bolt 19 – 1 cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bolt 1 – 1 cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bolt 95 – 2 cables</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bolt 74 – 2 cables</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bolt 69 – 3 cables</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Line 69 – 1 line N2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Line 66 – 1 line O2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bolt 51 – 1 cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bolt 47 – 2 cables</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PGT: 25.5 ft–lb, CCW2, 30.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>03:15</td>
<td>USE BRT FOR BOLT RELEASE</td>
<td>USE BRT FOR BOLT RELEASE</td>
<td>SURVEY VESTIBULE</td>
</tr>
<tr>
<td></td>
<td>1. Release bolts 1–33, 40–48 and grounding strap between bolts 9 and 10</td>
<td>1. Release bolts 49–81, 88–96</td>
<td>1. All bolts except 34,39,82,87 locked up</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. All cables cut (21), all gas lines cut (two), and ground strap removed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. All tools, tethers removed from vestibule</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Separation plane clear of all cables and lines</td>
</tr>
</tbody>
</table>

**CUT CABLES AND LINES**
1. Use Large Cutter to cut all cables at 96 bolt interface
2. Bend cables w/cutter to verify cables separated
3. Stow Large Cutter on available handrail

**SURVEY VESTIBULE**
1. All bolts except 34,39,82,87 locked up
2. All cables cut (21), all gas lines cut (two), and ground strap removed
3. All tools, tethers removed from vestibule
4. Separation plane clear of all cables and lines
<table>
<thead>
<tr>
<th>PET</th>
<th>IV/RMS</th>
<th>EV1</th>
<th>EV2</th>
</tr>
</thead>
</table>
| 03:25 | ✔ FREE DRIFT  
PGT: 25.5 ft-lb, CCW2, 30.5 | PREP FOR RELEASE  
1. Receive PRD from temp stow on Truss  
2. Attach PRD fixed end to handrail, retractable end to Clamp Handle  
3. Before releasing last two bolts, ✔ FREE DRIFT  
4. Release bolts 34,39; pull to lock up  
5. Notify IV, GO for Clamp Release | PREP FOR RELEASE  
1. Receive PRD from temp stow on Truss  
2. Attach PRD fixed end to handrail, retractable end to Clamp Handle  
3. Before releasing last two bolts, ✔ FREE DRIFT  
4. Release bolts 82,87; pull to lock up  
5. Notify IV, GO for Clamp Release |
| 03:50 | Give EV GO for Clamp Release | CLAMP RELEASE  
1. Retract Clamp Handle pip pin; ✔ green stripe visible  
2. Coordinate with IV and give EV2 short count for simo release  
3. Simo with EV2, pull on PRD strap to open clamp  
4. After clamp open, inform IV, “Clamp open and EV1 clear” | CLAMP RELEASE  
1. Retract Clamp Handle pip pin; ✔ green stripe visible  
2. Simo with EV1, pull on PRD strap to open clamp  
3. After clamp open, inform IV, “Clamp open and EV2 clear” |
| 04:00 | SEPARATION BURN | CLEANUP  
1. Translate to TSA w/96 Bolt Bag  
Remove Right Angle Drives (two) from PGTs (two) using pip pin on 96 Bolt Bag; stow in 96 Bolt Bag  
2. Remove ODS Clamp and Handle from ODS gusset; stow Clamp, Handle, 7/16–in Box End Wrench in 96 Bolt Bag  
3. Stow Waist Tether on EMU  
4. Remove and stow 96 Bolt Bag in airlock  
5. Stow PRD, Trash Bag in Port TSA  
IF USED:  
6. Configure stbd PFR assy for landing:  
Bridge Rail Clamp: second to aft–most available half-hole; ✔ knob locked  
7. Art Socket: P = 11.5, Y = 3; ✔ locked  
8. PFR to EV2 port side | CLEANUP  
1. Translate to TSA  
2. Stow PGTs (two) on Adj Fuse Tether  
3. Stow Adj Fuse Tethers in airlock  
4. Remove ODS Clamp and Handle from ODS gusset; stow Clamp, Handle, 7/16–in Box End Wrench in 96 Bolt Bag  
5. Stow Waist Tether on EMU  
6. Stow Large Cutter, Trash Bag, PRD in Port TSA  
7. Close TSA door, close all latches  
IF USED:  
8. Configure port PFR socket assy for landing:  
Bridge Rail Clamp: second to fwd–most available half-hole; ✔ knob locked  
9. Art Socket: P = 11.5, Y = 3; ✔ locked  
10. PFR: P = 10, R = A, Y = 6; ✔ locked |

**CAUTION**  
Posn body below separation plane for clamp release  
During clamp release, do not apply any sideload on ODS gusset (may puncture A/L)
<table>
<thead>
<tr>
<th>PET</th>
<th>IV/RMS</th>
<th>EV1</th>
<th>EV2</th>
</tr>
</thead>
</table>
| 04:40 | VERIFY 96 BOLT BAG STOWAGE  
ODS Clamps (2)  
ODS Clamp Handles (2)  
Right Angle Drives with 7/16–in Socket (2)  
7/16–in Box End Wrenches (2) | | VERIFY AIRLOCK STOWAGE  
Adj Fuse Tethers  
PGTs w/batteries (2)  
GP Caddies (2)  
ODS Thermal Blankets with Adj Equip Tethers (2)  
96 Bolt Bag  
Crewlock Bag:  
  PGT spare battery  
  Socket Caddy w/6–in Exts (2), RAD |
| 05:15 | PERFORM AIRLOCK INGRESS, CUFF C/L, 43  
✓ EMU equipment:  
  MWS w/swing arm  
  BRT  
  Retractable Tethers (2)  
  Adj Equip Tethers (2)  
  Waist Tethers (2) | | PERFORM AIRLOCK INGRESS, CUFF C/L, 43  
✓ EMU equipment:  
  MWS w/swing arm  
  BRT  
  Retractable Tethers (2)  
  Adj Equip Tethers (2)  
  Waist Tethers (2) |
| 05:30 | | | |
If APDS powered:

A7 pb PWR OFF – push
✓ STATUS It (eighteen) – off
Perform DOCKING MECHANISM POWERDOWN (RNDZ, APDS)

TOOLS REQD
Jettison Stowage Bag
Russian Capture Latch Tool (if reqd, in Node Bag)

BOTH
1. Configure Waist Tethers as safety line inside ODS

EV1
Attach at ODS Hatch D–ring nearest capture latches

EV2
Attach at A/L D–ring behind EV1

EV2
2. Open outer hatch to improve EMU sublimator performance

EV1
3. ODS/PMA interface:
   Open ODS hatch
   Remove docking lights (two):
   Release elec connector (one) at each light pip pin (one) on each light boom
   Stow lights and booms in bag

   NOTE
   EV2 restrain/aid EV1 as reqd

EV1
4. Remove Cross–Hair assembly
   Stow in bag

5. ✓ IV GO for release

6. Release capture latch
<table>
<thead>
<tr>
<th>IV</th>
<th>EV</th>
</tr>
</thead>
</table>
| | **NOTE**
| | If reqd, EV2 retrieve Russian Capture Latch Tool from Node Bag (requires safety tether reel ops)
| | 7. Notify IV when capture latch released
| | 8. Close hatch at capture latch interface
| EV2 | 9. If used, temp stow Russian Capture Tool in A/L and perform **AIRLOCK INGRESS** (CUFF C/L, 43)
| | 10. Close outer hatch
| BOTH | 11. Go to A/L REPRESS |
**EVA CUFF CHECKLIST**

<table>
<thead>
<tr>
<th>Normal EVA Status</th>
<th>15–2</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVA COMM FREQUENCIES</td>
<td>15–2</td>
</tr>
<tr>
<td>EMU MAL INDEX</td>
<td>15–2</td>
</tr>
<tr>
<td>DECOMPRESSION SICKNESS (DCS)</td>
<td>15–3</td>
</tr>
<tr>
<td>ABORT EVA</td>
<td>15–3</td>
</tr>
<tr>
<td>TERMINATE EVA</td>
<td>15–3</td>
</tr>
<tr>
<td>EVA COMM FREQUENCIES</td>
<td>15–2</td>
</tr>
<tr>
<td>EMU MAL INDEX</td>
<td>15–2</td>
</tr>
<tr>
<td>DECOMPRESSION SICKNESS (DCS)</td>
<td>15–3</td>
</tr>
<tr>
<td>ABORT EVA</td>
<td>15–3</td>
</tr>
<tr>
<td>TERMINATE EVA</td>
<td>15–3</td>
</tr>
<tr>
<td>SOP O2 ON</td>
<td>15–4</td>
</tr>
<tr>
<td>BATT AMPS HIGH</td>
<td>15–4</td>
</tr>
<tr>
<td>VDC LOW</td>
<td>15–4</td>
</tr>
<tr>
<td>SUIT P LOW</td>
<td>15–4</td>
</tr>
<tr>
<td>HIGH</td>
<td>15–4</td>
</tr>
<tr>
<td>SOP P LOW</td>
<td>15–5</td>
</tr>
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<th>Value</th>
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<tr>
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<td>HR:MIN since PWR-BATT</td>
</tr>
<tr>
<td>Time LF/ Limit Consum</td>
<td>HR:MIN remaining at present use rate</td>
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<tr>
<td>% O2 (PWR) LF</td>
<td>Displayed if not limiting consumable</td>
</tr>
<tr>
<td>Suit P</td>
<td>4.2–4.4 psid</td>
</tr>
<tr>
<td>O2 P</td>
<td>60–900 psia</td>
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<td>RPM</td>
<td>19.0–20.0 K</td>
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<td>CO2</td>
<td>0.2–0.5 mm</td>
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<td>H2O Temp</td>
<td>32–75 degF</td>
</tr>
<tr>
<td>H2O GP/WP</td>
<td>14.0–16.0 psid</td>
</tr>
<tr>
<td>Gauge</td>
<td>4.2–4.4 psid</td>
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### EVA COMM FREQUENCIES

- Low = 414.2 MHz
- High = 417.1 MHz

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<td>O2 IS Off</td>
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<td>O2 LF (%)</td>
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<tr>
<td>O2 Use High</td>
<td>14</td>
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<td>Note: BOLDFACE ind detailed proc</td>
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### DCM CONFIG

- Lock-Lock
- O2 Act
- Incr
- Alt

### DCS

- Resrv H2O On
- RLF V Fail
- Set H2O Off
- Set O2 Eva
- Set O2 Press
- Set PWR SCU
- SOP O2 On
- SOP P Low
- Subl P
- Suit P Emerg
- Suit P High
- Suit P Low
- Terminate Eva
- Time LF:XX
- Vent SW Fail

### Note: 07/20/00

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<td>3</td>
<td>07/25/00</td>
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15–2 EVA/ALL/GEN G
DECOMPRESSION SICKNESS (DCS)

Class 1
Symp: Mild pain (single/multiple sites) and/or single extremity numbness/tingling. Difficult to discern from suit P points. Symp do not interfere with performance.
Action: Report in POST EVA PMC

Class 2
Symp: Moderate Class 1 symp that interfere with performance or symp that resolve upon repress.
Action: Perform worksite cleanup, minimize activity of affected crewmember. TERM EVA; REPRESS

Class 3
Symp: Severe Class 1 symp or migratory, trunkal/multiple site numbness/tingling, unusual headache
Action: Assist affected crewmember to A/L, safe PLB. TERM EVA; REPRESS

Class 4
Symp: Serious symp - central neurological, cardiopulmonary
Action: ABORT EVA. Assisted return of affected crewmember to A/L, repress affected crewmember solo. Unaffected crewmember safe PLB, TERM EVA; REPRESS

ABORT EVA

WARNING
If terminating due to Batt AMPS HIGH (system short), do not perform step 3

1. Ingress airlock
2. Connect SCU

AW18H 3. PWR/ Batt CHGR EMU 1(2) BUS SEL - MNA (MNB) IV 4. IF EXT A/L; EMU 02 ISOL VLV - OP
AW82B 5. EV-1(EV-2) 02 VLV - OP

NOTE
If fan stops during power transfer:
Cycle FAN sw - OFF, ON

DCM 5. Power - SCU (fwd)
6. WATER - OFF (fwd)
7. SUIT P > 3.3 and stable
8. Monitor EMU status
9. Coordinate ingress with EV(2) SOP

TERMINATE EVA

ABORT EVA
TERM EVA

6 07/20/97

7 04/01/99
SOP 02 ON

**SOP 02 ON TIME LF XX:XX**

1. Go to ABORT EVA, 6 >>

**NOTE**

Msg triggered when:
- SUIT P < 4.05 and
- SOP RATE > 36.0 psi/min

---

BATT AMPS HIGH

**BAT AMPS HI BAT AMPS X.X BAT VDC XX.X**

BATT

If BAT VDC < 16.3:
1. Helmet purge vlw - op
2. FAN - OFF
3. WATER - OFF
   - If BAT AMP w/o fan 0,7-1.3 (fan short):
     - 4. Go to TERM EVA, 7 >>
   - If BAT AMP w/o fan > 1.3 (system short):
     - 5. Notify IV/IV of impending COMM loss
     - 6. PWR - SCU, do not activate airlock power
     - 7. Go to TERM EVA, 7 >>
If BAT VDC > 16.3 (amp sensor fail):
8. FAN RPM 19.0-20.0 K
9. Continue EVA, monitor BAT VDC, RPM

**NOTE:**

Msg triggered when AMPS > 5.0
Normal BAT AMP = 3.0-4.0
Normal BAT AMP w/o fan = 0.7-1.3

---

BATT VDC LOW

**BATT VDC LOW BAT VDC XX.X**

BATT

If fan RPMs degraded and/or comm lost:
1. Go to TERM EVA, 7 >>
If comm and fan normal (sensor fail):
2. Continue EVA

**NOTE**

Msg triggered when VOLTS < 15.7
Normal BAT VDC = 16.3-17.0
Normal Fan RPM = 19.0-20.0 K

---

SUIT P LOW

**SUIT P LOW SUIT P X.X**

SUIT P

If 02 USE HIGH msg present:
1. Go to ABORT EVA, 6 >>
If 02 USE HIGH msg not present:
2. Continue EVA, monitor SUIT P, SOP P, SUIT P

**NOTE**

Gauge < 4.0 and SOP P decreasing:
3. Go to TERM EVA, 7 >>

Msg triggered when SUIT P < 4.05
### SUIT P HIGH

**SUITE P HIGH | 02 RATE XX.X | SOP RATE XXX**

If 02 RATE > 7.0 or SOP RATE > 8:
1. Go to TERM EVA, 7
If 02 RATE < 7.0 and SOP RATE ≤ 8:
2. Monitor SUIT P, SOP P, and gauge
3. Continue EVA

**NOTE**
Msg triggered when SUIT P > 4.55
Normal 02 RATE = 1.7 psi/min

---

### SOP P LOW

**SOP P LOW | SOP P XXXQ | SOP RATE XXX**

1. Go to TERM EVA, 7

**NOTE**
Msg triggered when SOP P < INIT SOP P - 600
(SOP P initialized at EMU powerup)

---

### SUIT P LOW

**SUITE P LOW | 02 RATE XX.X | SUITE P LOW**

If SUIT P LOW msg present:
1. Go to ABORT EVA, 6
If 02 P erratic or ~0:
2. Continue EVA
3. Recharge 02 periodically
4. Go to TERM EVA, 7

**NOTE**
Msg triggered when 02 RATE < 1.0
Normal 02 RATE = 0.7 psi/min

---

### O2 USE HIGH

**O2 USE HIGH | 02 RATE XX.X**

If SUIT P LOW msg present:
1. Go to ABORT EVA, 6
If 02 P erratic or ~0:
2. Continue EVA
3. Recharge 02 periodically
4. Go to TERM EVA, 7

**NOTE**
Msg triggered when:
02 RATE > 10.2 psi/min or
02 P < 150 and TIME EV < 5 hr
Normal 02 RATE = 1.7 psi/min

---

### SOP L LOW

**SOP L LOW | SOP L XXXQ | SOP RATE XXX**

1. Go to TERM EVA, 7

**NOTE**
Msg triggered when SOP L < INIT SOP L - 600
(SOP L initialized at EMU powerup)

---

### SUBLM PRESS

**SUBLM PRESS | 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 reqd
   if cooling Insufficient:
   5. Go to TERM EVA, 7
   if cooling sufficient:
   6. Continue EVA, monitor SUBLM P and cooling

If SUBLM P > 1.0 and stable (sensor fail):
7. Perform steps 2-4, continue EVA, monitor H2O GP/WP and cooling

**NOTE**
Msg triggered when SUBLM P < 1.5 or > 5.3
Normal SUBLM P = 2.0-4.2

---

15-5
**H2O GP LOW**

If H2O WP < 13.5 (H2O reg fail):
- If cooling insufficient:
  1. Go to TERM EVA, 7 >>
- If cooling sufficient:
  2. Monitor cooling
  3. Continue EVA >>
If H2O WP ≥ 13.5 (xdr fail):
- Monitor H2O WP
  1. If H2O WP drops to < 12.0:
  2. Go to TERM EVA, 7

**NOTE:**
Msg triggered when H2O GP < 13.5
Normal H2O TEMP = 32-75 degF
WP = 14.0-16.0

**NO VENT FLOW**

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 < 19.0 Ks:
  5. Helmet purge vlv - op
  6. Go to TERM EVA, 7 >>
- If RPM > 19.0 Ks:
  7. Assess helmet CO2 level
  8. Go to CO2 HIGH, 19, step 3

**NOTE:**
Msg triggered when flow < 3.7 cfm
Normal vent flow = 6-8 cfm

**RESERV H2O ON**

**RESERV H2O ON TIME LF: XX**

<table>
<thead>
<tr>
<th>H2O GP</th>
<th>H2O WP</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>~15</td>
<td>~15</td>
<td>1. Monitor SUBLM P and H2O TEMP (WP xdr fail)</td>
</tr>
<tr>
<td>&gt;17.0</td>
<td>~15</td>
<td>2. Monitor H2O WP and H2O TEMP (GP xdr fail)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If H2O WP drops to &lt; 12.0:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Go to TERM EVA, 7</td>
</tr>
<tr>
<td>~15</td>
<td>&lt;12.0</td>
<td>4. Go to TERM EVA, 7</td>
</tr>
</tbody>
</table>

**NOTE:**
Msg triggered when GP minus WP > 2.1 psi
Normal SUBLM P = 2.0-4.2 psi
H2O TEMP = 32-75 degF
GP/WP = 14.0-16.0

**CO2**

**CO2 XX, X MM  MONITOR CO2** - PPCO2 > 3.0 MM
1. Minimize physical activity
2. Assess phys 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 reqd to assess phys 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 phys condition & PPCO2
          8. Continue EVA

**NOTE:**
Normal PPCO2 = 0.2-0.5 MM

**NO VENT**

**CO2**
COMM FAILURE

ALL
1. Proper config, EMU & orbiter (Mode, Vol, Freq)
   Perform following sequence until comm restored
   2. Clear structure to recover comm
      (signal blockage)
      If unresolved:
      3. Aff cm select ALT(PRI)(notify MCC)
      4. IV select STRING 2(1)
      5. Perform coordinated freq change
      6. Go to TERM EVA, 7

20 04/23/99

MISC MSGS

SUITE P EMERG CLOSE PURGE V1 - SUIT P < 3.1
RLF V FAI STOP DEPRESS - stop DEPRESS, contact MCC,
SUIT P > 5.7

Built-in tests

BITE light illuminated - CWS unreliable, contact MCC
LIMITS BAD - Warnings unreliable, monitor status
   list, continue EVA
VENT SW FAIL - Vent flow sensor unreliable

MISC MSGS (CONT)

Consumables
XXX O2 LF TIME LF : XX
XXX PWR LF TIME LF : XX
Triggered w/ 30 min remaining

SET O2 EVA
SET O2 PRESS
SET H2O OFF
FAN SW OFF
SET PWR SCU
O2 IS OFF
H2O IS OFF

Verify proper config

MISC

AIR CONT

22 07/30/84

AIR FLOW CONTAMINATION

If flow exiting helmet vent contaminated by
caustic water or L1OH dust:
1. Helmet purge vill - op
2. FAN - OFF
3. WATER - OFF
   If contamination still present:
   4. Go to ABORT EVA, 6 >>
   Otherwise:
   5. Go to TERM EVA, 7 >>

If excessive water in vent loop or helmet:
6. Contact MCC

NOTE
EMU water tanks hold =1 gal H2O

23 10/10/96
PLBD DRIVE CUT

TWO BOX - TUBE CUTTER, VELCRO/TAPE

IV1 \Pwr off

CUT *1, stow antenna if stbd side, perform WINCH OPS 29, steps 1 & 2, then cut *6 thru *2 and perform WINCH OPS 30, steps 3 thru 7

BANDS VISIBLE CORRECTIVE ACTION

| 1-6 | Cut upper rod in middle \& restrain (27) |
| 7-10 | Cut lower rod between 2nd \& 3rd bands from top and restrain (27) |

DOOR DRIVE RESTRAINT

TWO BOX - TAPE

Tape Here (*2-6)

Tape Here - Forward-most Linkage Only

Tape Here (Forward, Inboard Corner)
DOOR DRIVE DISCONNECT

TOOL BOX - PDU DISC TOOL, TRASH BAG

IV1 Pwr off
1. Perform WINCH OPS, 29, steps 1, 2
2. Remove fabric cover(s)
3. Insert Disc Tool in Door Drive PDU
Xo - 79B, port OR stdb
4. Rotate tool cw to stop (60 deg) and leave tool in PDU
5. Rotate torque shaft at least 3 turns
   (see below)
6. Perform WINCH OPS, 30, steps 3-7
7. If reqd for other door, rotate tool ccw
   60 deg and remove from PDU

SILL

Looking Outboard 5 3 Turns

28 09/30/96

WINCH OPERATIONS

IV1 Pwr off
1. Winch
   CONTROL - REEL OUT
   Handle ratchet - blue (center)
   Attach rope to wrist tether
   Rope: Fwd - in clip & over rollers
   Aft - rope guide, under handrail, & over rollers
   Winch hook - under #4 latch bellcrank
   CONTROL - IN
   Handle ratchet - green (cw)
2. Ratchet in rope slack only

Cont next pg

29 09/11/96

WINCH OPERATIONS (CONT)

IV1 Pwr off
3. PLBD(s) - close with winch
   If aft not READY TO LATCH, repeat steps 1 & 3
   at aft winch

IV1 Pwr on

IV1 Latches - close
4. Winch hook - remove from PLBD
5. Rope - reel in excess
6. Handle - stow
7. Repeat steps 5-7 for aft winch, if reqd

3-PT TOOL INSTALLATION

TOOL BOX - 3-PT TOOLS, ADJUSTABLE TETHERS

IV1 Pwr off
1. Position installation handles as reqd
2. Tools - Install in sequence
   Fwd-2, 4
   Aft-2, 3
   Fwd-1, 2, 3, 4
   Aft-1, 2, 3
3. Ratchet select lever - green
4. Handle - ratchet to hard stop
   - stow handle or restrain with Adj tether

TOOL RESET
1. Ratchet - red
2. Handle - ratchet to stop
3. Tool - compress to latch handles

30 10/06/870

31 09/11/96

EVA/ALL/GEN G
**CL LATCH TOOL**

**TOOL BOX - CL LATCH TOOL**

**IVI**
1. Tools - install
   1st gang - 1, 3
   2nd gang - 6, 8
   3rd gang - 9, 11
   4th gang - 14, 16
2. Trigger - safety off
   - depress
3. Ratchet select lever - green
4. Handle - ratchet to hard stop
   - stow

**TOOL RESET**
1. Ratchet - red
2. Handle - ratchet to stop
3. Tool - compress to latch

---

**AIRLOCK LATCH DISCONNECT**

**TOOL BOX/ A/L - ADJ WRENCH, RATCHET WITH 7/16 SOCKET**

**TOOL BOX - EVA TRASH BAG, ADJ TETHERS**

1. Remove bolt A, stow in trash bag
2. Rotate actuator handle
   If no rotation - jammed actuator
3. Force latches open
4. Seal hatch w/ repress & secure for ldg (IV)
   If free rotation - jammed latch
5. Locate & remove jam
6. Reconnect actuator

**HINGE DISCONNECT**

**TOOL BOX - ADJ TETHERS, VELCRO/TAPE**

1. Remove hinge pin pins, as reqd
2. Restrained hinge arm(s)
   & pin pins clear of opening, ingress airlock,
   posn hatch for closing
3. Close, lock hatch

---

**RMS JOINT ALIGN**

**TOOL BOX - ADJ TETHERS, SNATCH BLOCKS (2), RMS ROPE REEL**

1. Attach RMS rope around end effector under
   handrail, Translate to avoid wrapping rope
   around RMS
2. Attach snatch block(s) to handrail(s) and
   route rope as reqd
3. Reposition RMS as required for cradling
4. Pull RMS down into MPMs
5. Perform final positioning by hand to allow
   MRLs to latch

**RMS SHOULDER BRACE RELEASE**

**TOOL BOX - RMS SHOULDER BRACE RELEASE TOOL**

1. Fold aside rub strip and thermal blankets
2. Insert tool and move handle down
3. Remove tool and reconfigure blankets

---

**MPM STOW/DEPLOY**

**TOOL BOX - MPM WRENCH**

1. Rotate torque shaft (8 revs) until MPMs
   are stowed/deployed, X0=693

---

**RMS TIEDN**

**RMS REL**

**Deploy**

**3 in.**

**PDU**

**Torque Shaft**

**Drive Point**

**Looking Outboard**

**RMS**

**Shoulder**

---

**15–10 EVA/ALL/GEN G**
**RMS TIEDOWN**

TOOL BOX - PRDs (2), EVA TRASH BAG
FM - 9/64-in ALLEN WRENCH (AW)
ELBOW - PRD aft of MPM, peel blanket (fwd of MPM) toward EE, feed hook under cable harness (if reqd, remove cable harness clamp bolt with AW, bend clamp out of way), adjust strap as far fwd as possible
WRIST - PRD aft of MPM, strap rests just fwd of pitch joint opening
END EFFECTOR - PRD fwd of MPM, peel blankets aft and fwd, strap rests aft-most on yaw joint (at roll/yaw I/F), adjust strap under bolt studs
1. Figure eight the strap
2. Pull minimum 6-in slack in strap
3. Ratchet PRD snug, (14 full strokes reqd)
4. Strap in correct arm location, ratchet tight
5. Reattach blankets

**RMS FLIGHT RELEASABLE GRAPPLE FIXTURE RELEASE**

AIRLOCK - JETTISON STOWAGE BAG
TOOL BOX - 1/2-in BOX RATCHET, VELCRO/TAPE

**EV**

1. Rotate white release rod ccw to hard stop (32 strokes of 90 deg)
2. Rotate black release rod cw to hard stop (32 strokes of 90 deg - shaft will release from grapple fixture)
3. Clear worksite for RMS powerdown
4. Tape end of shaft to restrain slug within shaft
5. Cover end effector with jettison stowage bag to restrain grapple shaft

**PRLA OPEN/CLOSE**

AIRLOCK - RATCHET WITH 7/16 SOCKET

**IV**  √ PRLA pwr off

**EV**

1. Rotate ratchet in release direction (as marked above EVA drive) to shear pin
2. View yellow indicator as applicable
3. Continue to rotate drive 4 1/2 revs to disc gear train from drive shaft
4. Continue rotation in release direction (as marked above EVA drive) until latch open against stop
5. Rotate EVA drive in opposite direction of release (as marked above EVA drive) until latch closed against hardstop and over center

**PRLA TO CLOSE LATCH**

6. Apply PRLA locking feature if applicable
   To lock:
   7. Rotate each bolt (2) cw 1/2 turn

For subsequent PRLA ops, release locking feature before operating EVA drive (2 bolts ccw 1/2 turn); relock after operation

**Cont next pg**

09/30/96

**PRLA OPEN/CLOSE (CONT)**

**EV**

6. Apply PRLA locking feature if applicable
   To lock:
   7. Rotate each bolt (2) cw 1/2 turn

For subsequent PRLA ops, release locking feature before operating EVA drive (2 bolts ccw 1/2 turn); relock after operation

**PRLA TO OPEN LATCH**

**IV**  √ PRLA to LAT

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**KU ANTENNA STOW**

1. Secure tether reel clear of antenna dish with wrist tether

   **CAUTION**
   Antenna dish is very fragile. Avoid contact with gold thermal blankets & black painted surfaces

2. Align α (dish roll) and β (dish pitch) gimbals for pin engagement

3. Give IV GO to drive pins in short pulses

   **NOTE**
   Top lockarm (by wide beam horn and gold foil) drives fully before bottom lockarm (by silver gyro box)

---

**AIRLOCK EGRESS**

- **EV1**
  1. Thermal cover - open
  2. Egress airlock
  3. EV1's reel - remove from container, attach to EMU D-ring, unlock
  4. EV2's reel - remove from container, transfer to EV2

- **EV2**
  5. Attach reel to EMU D-ring, unlock

- **BOTH**
  6. Waist tethers - attach to self, stow extra in A/L clear of hatch
  7. Egress airlock
  8. If external A/L, close thermal cover

- **EV2**
  9. Tether line - unsnap strap (1)
      - remove from Velcro straps
      - release fastener on slidewire cover (1), hook guard

---

**AIRLOCK INGRESS**

- **BOTH**
  1. TOOL BOX - closed, latched

- **EV2**
  2. Secure Velcro on slidewire cover
  3. Secure tether line thru Velcro straps:
      - ODS Routing - sill, FWD truss, reel box
      - BHD Routing - slidewire link, cabin
      - attach fitting

  4. Ingress airlock, attach waist tether(s) to A/L D-ring
  5. Attach EV1's waist tether(s) to A/L D-ring
  6. Lock tether reel, transfer to EV1

- **EV1**
  7. Reels (both) - retract cable slack, stow in container, locked
  8. Ingress airlock

- **BOTH**
  9. WATER - OFF (fwd)
  10. Thermal cover - close
  11. Outer (EVA) hatch - close and lock
  12. Go to PRE REPRESS
      (DEPRESS/REPRESS Cue Card)

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This Page Intentionally Blank
UNSCHEDULED/CONTINGENCY EVA TASKS
Replace this page with page(s) from Flight Supplement
EMERGENCY PROCEDURES

EMERGENCY AIRLOCK REPRESS ........................................... 19–3
EMERGENCY AIRLOCK REPRESS ........................................... 19–4
POST EMERGENCY AIRLOCK REPRESS ................................. 19–4
SAFER RESCUE .................................................................. 19–5
SAFER RESCUE .................................................................. 19–6
19.1 DCS TREATMENT ......................................................... 19–7
EMERGENCY AIRLOCK REPRESS
EMERGENCY AIRLOCK REPRESS

NOTE: Ignore CWS functions

Outer (EVA) hatch – close and lock

Inner hatch Equal vlv (two) – EMER

AW82B: √AIRLK DEPRESS vlv – CL

DCM: WATER – OFF (fwd)

Open inner hatch

Go to POST EMERGENCY AIRLOCK REPRESS

POST EMERGENCY AIRLOCK REPRESS

For affected crewmember:
DCM  1. PURGE vlv – op (up)
    2. O2 ACT – OFF, FAN – OFF
    3. √Suit P < 0.4; disconnect gloves, helmet
    4. Connect SCU to DCM
AW18H  5. PWR/BATT CHGR EMU 1(2) BUS SEL – MNA(MNB)
DCM  6. PWR – SCU

For unaffected crewmember:
DCM  7. O2 ACT – IV
    8. Connect SCU to DCM
AW18H  9. PWR/BATT CHGR EMU 1(2) BUS SEL – MNA(MNB)
DCM  10. PWR – SCU

If single crewmember aborting EVA:
    11. Outer (EVA) hatch Equal vlv caps (two) – remove, stow
    12. √MCC
SAFER RESCUE
SAFER RESCUE

1. Deploy SAFER HCM
2. PWR – ON
3. Fly back
   Monitor GN2% and PWR%
   IV/other EV GCA as reqd

   * If no gas flow:
   * √MAN ISOL vlv – OP (dn)

4. Tether to nearest structure; √connection
5. PWR – OFF
6. MAN ISOL vlv – CL (up)
7. Tether to available safety tether or other EV crewmember; √connection
8. √MCC
19.1 DCS TREATMENT

1. Determine Cuff Class
   - Cuff Class 1
   - Cuff Class 2 or 3 (Report to MCC)
   - Cuff Class 4 (Report to MCC)

2. Continue EVA
   - If symptoms resolve upon REPRESS, go to Cuff Class 2, block [5]
   - Report to Surgeon next PMC

3. Terminate EVA (Cuff C/L, 7)
   - Unaffected crewmember stow safety tether, perform worksite cleanup and/or PLB safing
   - MCC requests PLB config
   - Perform INGRESS (Cuff C/L, 43)

4. If terminating for Cuff Class 3:
   - PMC on A/G 1
   - COMM Mode – HL (A1R)
   - AUD CTR UHF A/G 2 – T/R
   - AUD CTR UHF A/G 1 – OFF

5. Does MCC require EMU LiOH changeout?
   - YES
   - O2/N2 CNTLR VLV SYS 1,2 (two) – OP
   - Perform PRE–REPRESS (DEPRESS/REPRESS Cue Card)
   - Perform REPRESS (DEPRESS/REPRESS Cue Card)
   - Remain on SCU
   - If CAB P ≤ 10.2, perform 10.2 PSI MAINTENANCE (10.2 PSI CABIN)
   - Unaffected crewmember perform POST EVA per FLIGHT PLAN, omitting steps 7–9
   - Perform DCS exam (MED C/L)
   - PMC (expect A/G 1–private, A/G 2–open)

6. Perform LiOH REPLACEMENT (MANNED) (EMU CONT PROCs), omitting steps 3, 17, 18
   - Cab P ≤ 11.0?
   - YES
   - Leave O2 ACT – PRESS for 20 min (20 min check starts at 10.2 psi)
   - Perform BTA PREP, BENDS TREATMENT ADAPTER (BTA) INSTALLATION (IN–SUIT) (EMU CONT PROCs)
   - DCS signs or symptoms resolved?
   - YES
   - Leave O2 ACT – PRESS for add’l 160 min
   - CMO report changes in DCS symptoms per DCS exam criteria to Surgeon as requested
   - NO
   - Can crewmember speak in full sentences w/o respiratory distress?
   - YES
   - NO
   - 20
   - CMO report changes in DCS symptoms per DCS exam criteria to Surgeon as requested

7. Cab P ≤ 11.0?
   - YES
   - Leave O2 ACT – PRESS for 20 min (20 min check starts at 10.2 psi)
   - Perform BTA PREP, BENDS TREATMENT ADAPTER (BTA) INSTALLATION (IN–SUIT) (EMU CONT PROCs)
   - DCS signs or symptoms resolved?
   - YES
   - Leave O2 ACT – PRESS for add’l 160 min
   - CMO report changes in DCS symptoms per DCS exam criteria to Surgeon as requested
   - NO
   - Can crewmember speak in full sentences w/o respiratory distress?
   - YES
   - NO
   - 20
   - CMO report changes in DCS symptoms per DCS exam criteria to Surgeon as requested

8. Leave O2 ACT – PRESS for add’l 160 min
   - CMO report changes in DCS symptoms per DCS exam criteria to Surgeon as requested

9. Can crewmember speak in full sentences w/o respiratory distress?
   - YES
   - NO
   - 19
   - CMO report changes in DCS symptoms per DCS exam criteria to Surgeon as requested

10. Leave O2 ACT – PRESS for add’l 160 min
    - CMO report changes in DCS symptoms per DCS exam criteria to Surgeon as requested
11. If reqd, perform CABIN REPRESS TO
14.7 PSI (10.2 PSI CABIN) with
following change to step 4:
'\( (L2) \)
O2/N2 CNTL VLV SYS 1,2 (two) –
OP
- Perform BENDS TREATMENT
ADAPTER (BTA) INSTALLATION
(IN–SUIT) (EMU CONT PROCS)
- Continue BTA treatment at 6 psi
in–suit for 20 min

DCS signs or symptoms resolved?

12. Incr CAB PRESS 15.56 psia
max as follows:
(C5)
- DIRECT O2 – OP
When CAB PRESS = 15.56 psia,
- DIRECT O2 – CL
- Perform BTA treatment at 8 psi for 2 hr
- CMO report changes in DCS
symptoms per DCS exam criteria
to Surgeon as requested

DCS signs or symptoms resolved?

13. Leave BTA installed add'l 20 min

DCS signs or symptoms resolved?

14. Continue at 6 psi for 2 hr
- CMO report changes in symp
to Surgeon as requested

15. Leave BTA installed add'l 20 min

DCS signs or symptoms resolved?

16. MCC for DCS pharmacy treatment

If DCS pharm treatment reqd,
- O2 ACT – OFF
- DCM PURGE vlv – op
- Suit P ≤ 0.4 psid
- Doff Glove, Helmet
- FAN – OFF
- Don QDM
- Take meds as directed by Surgeon
- Don Glove
- FAN – ON
- Remove QDM, don Helmet
- O2 ACT – PRESS
After 12 min,
- DCM PURGE vlv – cl
- Leave O2 ACT – PRESS for 30 min
- CMO report changes in DCS symptoms per
DCS exam criteria to Surgeon as requested

DCS signs or symptoms resolved?

17. Perform POST EVA
- O2 by QDM X 2 hr
- Surgeon for further DCS treatment
- CMO report changes in DCS symptoms per
DCS exam criteria to Surgeon every 12 hr
- Surgeon for return to IV duty after 24 hr
limited activity
- Surgeon for return to EVA duty
- Go to DCS AFTERCARE (MED C/L)

18. MCC for further DCS treatment
19.1 (Cont)

9

• Perform CABIN REPRESS TO 14.7 PSI (10.2 PSI CABIN) with following change to step 4:
  'L2' • O2/N2 CNTLR VLV 1,2 (two) – OP'

When 14.7 REPRESS complete,
• Incr CAB PRESS to 15.56 psi max as follows:
  (C5)
• DIRECT O2 – OP
When CAB PRESS = 15.56 psi,
• DIRECT O2 – CL

DCS signs or symptoms resolving?

21

• Perform BENDS TREATMENT ADAPTER (BTA) INSTALLATION (IN–SUIT) (EMU CONT PROC)
• Perform BTA treatment at 8 psi for 2 hr
• Perform DCS EXAM (MED C/L) and report changes in DCS symptoms to Surgeon every 15 min

20

• Perform POST EVA
• Treat affected crewmember per CPR STATION (MED, CPR STATION)
• MCC for deorbit of incapacitated crewmember
If CAB P < 15.56 psi,
• Perform CABIN REPRESS TO 14.7 PSI (10.2 PSI CABIN) with following change to step 4:
  'L2' • O2/N2 CNTLR VLV SYS 1,2 (two) – OP'

When 14.7 REPRESS complete,
• Incr CAB PRESS to 15.56 psi max as follows:
  (C5)
• DIRECT O2 – OP
When CAB PRESS = 15.56 psi,
• DIRECT O2 – CL

23

YES

• MCC for DCS pharmacy treatment
  If DCS pharmacy treatment reqd,
  • O2 ACT – OFF
  • DCM PURGE vlv – op
  • Suit P ≤ 0.4 psid
  • Doff Glove, Helmet
  • FAN – OFF
  • Don QDM
  • Take meds as directed by Surgeon
  • Don Glove
  • FAN – ON
  • Remove QDM, don Helmet
  • O2 ACT – PRESS
  After 12 min,
  • DCM PURGE VLV – CL
  • Leave O2 ACT – PRESS for 30 min
  • CMO report changes in DCS symptoms per DCS exam criteria to Surgeon as requested

DCS signs or symptoms resolved?

22

NO

• MCC for delayed EMU doff, stow

25

• Perform POST EVA
• O2 by QDM X 2 hr
  • Surgeon for further DCS treatment
  • CMO report changes in DCS symptoms per DCS exam criteria to Surgeon every 12 hr
  • Surgeon for return to IV duty after 24 hr limited activity
  • Surgeon for return to EVA duty
  • Go to DCS AFTERCARE (MED C/L)

6

Max pressure should be used to treat Cuff Class 4 DCS (type 2 DCS)

7

Incapacitated crewmember needs hyperbaric treatment on Earth as soon as possible. If airlock not available due to single crewmember abort, perform POST EVA in middeck on battery power. EVA FCT should be prepared to modify procedure for single crewmember abort

8

MCC will determine allowable cumulative O2 time based on O2 toxicity limit. O2 time will vary based on EVA time and pressure profile

9

Because DCS symptoms unresolved, deorbit to site with hyperbaric facility reqd for add’l treatment. Affected crewmember should remain in pressurized EMU as long as possible

08/15/01
CUE CARD CONFIGURATION
Refer to the following pages for cue cards and decals in this document:

CC 3–9  SAFER CHECKOUT RESULTS Cue Card
CC 3–10 SAFER STATUS TROUBLESHOOTING Cue Card
CC A6–2 DEPRESS/REPRESS Cue Card (Nominal Config)
CC B6–2 DEPRESS/REPRESS Cue Card (Tunnel Adapter)
CC 6–4 FAILED LEAK CHECK Cue Card
19–4 EMERGENCY AIRLOCK REPRESS Decal