

## SECTION VII

## DONNING PROCEDURES

## 7-1 GENERAL

The A7L contract end items have been designed so that trained personnel may don this equipment without assistance. The aid of a technician or fellow crew member, however, can expedite donning. Technicians and crewmen must be familiar with the procedures outlined in this section before donning any portion of the CEI's. The procedures are amplified in nature, and suggest the steps required to properly don A7L contract end items; they do not, however, distinguish between ground or in-flight (zero G) situations nor do they differentiate between specific areas for task accomplishment. Interface data is limited, and references to stowage practices are not included.

## NOTE

Techniques in donning may vary within an individual step but the sequence of the steps outlined in each donning task should not be changed.

## 7-2 IV CONFIGURATION DONNING PROCEDURES

## 7-3 DONNING FCS

## NOTE

The ointment must be applied prior to preflight donning of the FCS.

- a. Apply protective ointment over both buttocks and entire perineal area of the body. Duplicate applications shall be made to all anal fissure tissues. Approximately one-third of the contents of the ointment tube shall be utilized for each application.

## NOTE

For proper function, ensure a snug fit without sag in the crotch portion of the FCS.

- b. Don the FCS in the same manner as conventional underwear shorts and place genitals through front-opening.
- c. Position FCS around waist and thighs to ensure a seal.

## 7-4 DONNING CWG

## NOTE

The CWG is worn during intravehicular activity only.

- a. Lay out CWG with front entry buttons unfastened.
- b. Don CWG in the same manner as conventional long underwear.
- c. Adjust feet into integrated socks.
- d. Insert bio-instrumentation leads through slot provided on chest area of CWG.
- e. Engage buttons to secure front opening.

7-5

## DONNING LCG.

## NOTE

The LCG replaces the CWG for extravehicular activity. The LCG may, however, be worn during periods of intravehicular activity.

- a. Open front-entry slide fastener of LCG.

## CAUTION

Care must be exercised during donning of the LCG to prevent possible damage to components.

- b. Don the LCG in the same manner as conventional long underwear.
- c. Adjust feet into integrated socks.
- d. Insert bio-instrumentation leads through holes provided on front of LCG.

## CAUTION

Adjust LCG manifold assembly within the belt loops so that the vertical tubing will lie along the front center line of the suited subject.

- e. Close front-entry slide fastener.
- f. Insure that the LCG is adjusted over the knee, elbow, shoulder and medical injection disc areas so that the rerouted tubing in these areas is comfortably oriented to these areas.

7-6

## DONNING BIO-MEDICAL BELT

## NOTE

The bio-medical belt when snapped in place is positioned under the manifold assembly.

- a. Position bio-medical belt on front of CWG or LCG and engage snap-fasteners.
- b. Secure bio-instrumentation leads to respective units on bio-medical belt.

## 7-7 DONNING BIO-MEDICAL HARNESS

- a. Position bio-medical harness onto bio-medical belt; pull flap of bio-medical belt up and over the bio-harness and engage snap-fasteners.
- b. Connect the leads of the bio-harness to respective units of bio-medical belt and tighten captive nuts until finger-tight.

## 7-8 DONNING UCTA.

- a. Remove the cuff half of the UCTA flange by depressing the projecting release levers and twisting the cuff-half of the flange slightly while lifting it from the UCTA.

## NOTE

Ensure that the UCTA roll-on cuff is sized properly for the crewman. The size is designated by the dash number of the cuff part number. (-4, 7/8 inch; -5, 1 inch; -6, 1 1/8 inch.)

- b. Place the rolled bead of the larger diameter end of the UCTA roll-on cuff in the groove provided on the metal cuff-half of the UCTA flange so as not to obstruct the six air bleed slots around the bottom of the flange.
- c. If the UCTA has been previously worn, it will be stowed in the PGA with a UCTA clamp on the cuff. Remove and stow the UCTA and proceed with the following steps.
- d. Roll the cuff down toward the cuff flange as far as possible.
- e. Place penis in the cuff and roll the cuff onto penis.
- f. Attach the cuff-half of the UCTA flange to the UCTA by depressing the flange release levers and twisting the cuff-half of the flange slightly while pushing the two halves of the flange together. Release the flange levers.
- g. Attach the waistband blue velcro patch to the blue velcro patch on the UCTA.
- h. Holding the UCTA in place, attach the waistband white velcro patch to the white velcro patch on the UCTA.

## NOTE

The waistband of the UCTA elastic harness should be placed across the "small-of-the-back".

- i. Attach the velcro strip of the harness crotch strap to the velcro tab on the UCTA.
- j. Adjust the straps to ensure a proper fit by clamping the velcro

attachment points as necessary.

- k. Evacuate as much gas as possible from the UCTA before connecting the drain hose.

7-9

DONNING TLSA.

## NOTE

The procedures outlined below are written for donning of both IV and EV configured PGA's and differences in donning are explained in the individual steps.

- a. Remove protective covers, gas connector caps, etc., from TLSA as required. Do not remove wrist disconnect covers at this time.
- b. Remove ITMG connector cover from chest area of TLSA.
- c. Open shoulder cable disconnect access flap, pull out and rotate shoulder cable disconnect knob, and disengage shoulder cable ends, (on suits equipped with shoulder cable disconnect).
- d. Loosen torso strap.
- e. Remove donning straps from stowed position in bio-medical injection access flap or utility pocket.
- f. Open slide fastener cover flap.

## CAUTION

During the donning sequence the crewman must not sit on the pressure closure seal unless the slide fastener is closed, and the pressure closure seal must not be permitted to come in contact with objects or surfaces which could cause rips, cuts, snags or other damage.

- g. Fully open both the restraint and pressure sealing slide fastener closures.
- h. Insert the red colored suit donning lanyard through the pull tab of the restraint slide fastener slider and the blue colored suit donning lanyard through the pull tab of the pressure sealing slide fastener slider.

## CAUTION

On suits equipped with arm bearing, insure that the lower sections of both arms are rotated or positioned so as to orient the pressure relief valve and pressure gage to the inner side of the wrists before the suit is donned.

- i. Grasp TLSA and, while assuming a sitting attitude, place TLSA on lap with rear-entry area open.

## CAUTION

Exercise care in handling of PGA to preclude the possibility of damage to components.

- j. With one hand, grasp TLSA by the helmet attaching ring and with the other hand, grasp the suit donning assist strap located on the left knee area.

## CAUTION

Care must be exercised at all times to ensure that boot soles

precautions are ignored.

- k. Carefully place left foot into TLSA and manipulate foot to enable easy insertion into boot.
- l. Release hold on suit donning assist straps; grasp tab on upper rear of boot and carefully maneuver foot until it becomes fully positioned into boot.
- m. Repeat steps j. through l. for right foot.
- n. Pull upwards on suit until proper positioning over legs is achieved, and ensure that suit is situated well up into crotch.
- o. Connect the UCTA in line connector.

#### CAUTION

The connectors must be properly aligned before engagement or damage to the pins and seal will result.

- p. Connect bio-medical harness electrical branch to suit electrical harness.
- q. Remove water connector plug and connect the LCG water connector to the TLSA multiple water connector receptacle. (Disregard if LCG is not worn).
- r. Remove wrist disconnect protective covers.

#### NOTE

This procedure has proven satisfactory for a majority of test subjects. Alternate methods such as full insertion of head through neck ring, or insertion of one arm, then the combined insertion of second arm and head is acceptable provided the load on the TLSA, and/or the slide fastener assembly is not increased.

- s. Insert hands into shoulder convolutes, lower and position head into neck ring while simultaneously slipping hands fully into arms and through wrist disconnects.
- t. Assume an erect attitude to permit TLSA to settle over torso and limbs.
- u. Grasp back of neck ring and top of CWG or LCG with one hand and with other hand, grasp the red donning lanyard, pull out and down to position restraint slide fastener slider toward middle of the back.
- v. Pull red donning lanyard over buttocks while running fingers ahead of slider to prevent snagging of the CWG of LCG.

- w. Grasp tab of restraint slider from the front and fully close restraint slide fastener.
- x. Remove suit donning lanyard; tuck slider tab up into TLSA, and stow lanyard in pocket.
- y. Grasp back of neck ring with one hand and with other hand grasp the blue donning lanyard; pull lanyard out and down to situate pressure sealing slide fastener slider to mid-back.
- z. Change grasp and continue to close slider down over buttocks.
- aa. Grasp pressure sealing slider tab from front of TLSA and fully close pressure sealing slide fastener.
- ab. Remove and stow blue suit donning lanyard.
- ac. Engage snap fastener of slider tab to receptacle on TLSA.
- ad. Position lock assembly over slider and push lock button to the LOCK position.
- ae. Close cover flap over slide fastener and engage fasteners.

## CAUTION

To effect proper electrical connector engagement, position the halves of the connector to insure pin alignment and then gently slide the two halves together until the locks become engaged. Under no circumstances shall electrical connectors be forcibly engaged.

- af. Don communications carrier; connect electrical lead to upper branch of electrical harness; connect electrical umbilical to TLSA and test system.

## CAUTION

Gas umbilicals must be inserted straight into the gas connectors to prevent excessive side loading and subsequent damage to gas connector "O" ring seals.

- ag. Connect gas outlet umbilical to exhaust gas connector.

## CAUTION

To prevent an inadvertant overpressure, always connect the outlet umbilical first.

- ah. Connect gas inlet umbilical to inlet gas connector.
- ai. Connect shoulder cable ends to shoulder cable disconnect, rotate knob and ensure that lock engages (as applicable).

- aj. Close cover flap over shoulder cable disconnect (as applicable).
- ak. Provide ventilation flow.

7-10

DONNING PHA

## CAUTION

Red anodized helmet neck ring components must not be used with blue anodized neck rings or vice versa. Serious interruptions to ventilation flow can result.

- a. Decrease gas flow (when applicable).
- b. Place helmet attaching ring lock subassembly in the ENGAGE position.

## NOTE

Index marks and printed labels on the helmet neck ring of enlarged helmets identify the ENGAGE and LOCKED positions of the helmet attaching ring to insure proper alignment and engagement. A solid index mark is provided on the inside front center surface of the helmet neck ring to provide a visual reference and assurance of helmet neck ring to attaching ring alignment during helmet donning operations by the astronaut.

- c. Place PHA on helmet attaching ring; ensure proper alignment and press down on helmet.
- d. Position lock subassembly to the LOCK position.
- e. Increase gas flow as required.

7-11

DONNING PGA GLOVE.

- a. Decrease gas flow (when applicable).
- b. Place suit wrist disconnects in ENGAGE position.
- c. Ensure that glove palm restraint is loosened, then place hand into glove.
- d. Align glove wrist disconnect with that of suit wrist disconnect and engage both units.
- e. Ensure that glove may be easily rotated and place the suit wrist disconnect in the LOCK position.
- f. Adjust glove palm restraint as desired.
- g. Don other glove in a similar manner.

- h. Increase gas flow as required.

## NOTE

This step may be accomplished at an earlier interval.

- i. Activate liquid cooling system as required.

7-12

## EV CONFIGURATION DONNING PROCEDURES.

The following procedures are written assuming a fully suited, IV configured crewman is wearing a CWG.



- 7-13 DOFF PGA GLOVES per instructions in paragraph 8-16.
- 7-14 DOFF PHA per instructions in paragraph 8-5.
- 7-15 DOFF TLSA per instructions in paragraph 8-9.
- 7-16 DOFF UCTA per instructions in paragraph 8-10.
- 7-17 DOFF BIO-MEDICAL HARNESS per instructions in paragraph 8-11.
- 7-18 DOFF BIO-MEDICAL BELT per instructions in paragraph 8-12.
- 7-19 DOFF CWG per instructions in paragraph 8-22.
- 7-20 DON LCG per instructions in paragraph 7-5.
- 7-21 DON BIO-MEDICAL BELT per instructions in paragraph 7-6.
- 7-22 DON BIO-MEDICAL HARNESS per instructions in paragraph 7-7.
- 7-23 DON UCTA per instructions in paragraph 7-8.
- 7-24 DON TLSA per instructions in paragraph 7-9.
- 7-25 DONNING LUNAR BOOT.
- a. Insert the PGA boot into the enlarged upper portion of the lunar boot and pull up on the donning strap assembly to facilitate positioning the PGA boot.
  - b. Fold the surplus material at the upper edges to overlap the tongue area and then engage the snap fasteners and retaining strap attached to each fold.
  - c. Wrap the strap assemblies securely across the instep and engage the latch mechanism.
- 7-26 DON PLSS per applicable manufacturer's or interface procedures.
- 7-27 DONNING PURGE VALVE
- a. Insert the purge valve in the lower RH exhaust connector.
- NOTE
- After inserting the purge valve into the gas connector, it may be necessary to rotate the valve slightly to effect a complete engagement with the gas connector locking ring.
- 7-28 DONNING CONNECTOR COVER
- a. Position connector cover over chest area of TLSA and engage fasteners.
- 7-29 DON PHA per instructions contained in paragraph 7-10.
- 7-30 DONNING EV GLOVE
- a. Roll glove gauntlet back to provide access to wrist disconnect.
  - b. Place suit wrist disconnect in ENGAGE position.

- c. Decrease gas flow.
- d. Ensure that glove palm restraint is loosened, then place hand into glove.
- e. Align glove wrist disconnect with that of suit wrist disconnect and engage both units.
- f. Ensure that glove rotates easily and place the suit wrist disconnect to the LOCK position.
- g. Roll glove gauntlet back over TLSA arm.
- h. Adjust palm restraint as desired; close cover flap and engage fasteners.
- i. Don other glove in a similar manner.

7-31

## DONNING EVVA

## CAUTION

Extreme caution shall be exercised to prevent damage to equipment.

- a. Insure that visors are in the up position.
- b. Open EVVA collar to provide access to latching mechanism.
- c. Disengage latching mechanism.

## NOTE

Alignment during donning is accomplished by use of the projecting feed port as a guide for proper positioning.

- d. Lower EVVA onto helmet attaching ring and engage latching mechanism.
- e. Attach the collar around the EVVA/ITMG interface area.

7-32

## DONNING LEVA

## CAUTION

The visors and eyeshades shall not be operated unless properly attached to a pressure helmet or specially designed fixture. When handling the LEVA, the assembly shall not be twisted or carelessly handled for any reason nor shall the visor be touched with the bare hands.

- a. Insure that the visors and both eyeshades are in the up position.
- b. Open LEVA collar to provide access to the latching mechanism.

- c. Disengage the latching mechanism and spread LEVA shell assembly, then carefully lower the LEVA over the PHA.
- d. Align the LEVA separation point with the PHA index marks so as to permit maximum range of vision and to align with the feed port cover.
- e. Engage the latching mechanism and fasten the collar flap in place.

7-33

## DONNING NECK DAM.

- a. After removing the helmet assembly and prior to water egress, pull the neck dam over the head and position it comfortably around the neck.
- b. Engage the neck dam ring with the PGA helmet attaching ring.

## SECTION VIII

## A7L DOFFING PROCEDURES

## 8-1 GENERAL

The A7L contract end items have been designed so that a trained subject can doff this equipment without assistance. The aid of a suit technician or fellow crewman, however, can expedite doffing. Technicians and crewmen must be familiar with the procedures outlined in this section before doffing any portion of the CEI's.

## 8-2 DOFFING FROM EV CONFIGURATION.

## NOTE

A pressurized environment is assumed prior to doffing and the EMU is assumed to be in the same configuration as at the end of EV donning procedures.

## 8-3 DOFFING EVVA.

## CAUTION

Use adequate care to prevent damage to either the EVVA or PHA.

- a. Disengage fastener tapes which secure EVVA collar to TLSA.
- b. Ensure that both visors are locked in the full OPEN position and disengage latching mechanism.
- c. Ease the EVVA up and off PHA.

## 8-3A DOFFING LEVA

## CAUTION

The visors and eyeshades shall not be operated unless the LEVA is properly attached to a pressure helmet or specially designed fixture. When handling the LEVA, the assembly shall not be twisted or carelessly handled for any reason nor shall the visors be touched with the bare hands.

- a. Ensure that the eyeshades and visors are in the full up position.
- b. Disengage the fastener tape which holds the LEVA collar in place and then disengage the latching mechanism.
- c. Ease the LEVA up and off the PHA.

## 8-4 DOFFING EV GLOVE.

- a. Decrease pressure to ventilation flow of 0.75 psig.

- b. Roll glove gauntlet back to provide access to wrist disconnect.
- c. Position wrist disconnect to OPEN position and doff EV glove.
- d. Doff other glove in a similar manner.

8-5

DOFFING PHA.

- a. Place helmet attaching ring latching mechanism to OPEN position.
- b. Ease the PHA up and out of helmet attaching ring.
- c. Remove and stow helmet.

## 8-6 DOFFING CONNECTOR COVER

- a. Disengage snap fasteners and remove connector cover.

## 8-7 DOFF PLSS per applicable manufacturer's or interface instructions.

## 8-8 DOFFING LUNAR BOOT.

- a. Release the instep strap latch mechanism and disengage the strap assembly.
- b. Loosen the retaining strap and snaps at the overlapping folds, and unfold the overlapping material.
- c. Remove and stow the boot.

## 8-9 DOFFING TLSA.

- a. Unlock shoulder cable disconnect and disconnect shoulder cable ends. (On suits equipped with shoulder cable disconnect).
- b. Open slide fastener cover flap.
- c. Remove blue suit donning lanyard from lanyard pocket; unlock pressure sealing slide fastener lock assembly; release slider tab snap fastener and position suit donning lanyard into slider tab.
- d. Grasp blue suit donning lanyard and pull until the pressure sealing slider tab is in the full OPEN position and remove suit donning lanyard.
- e. Remove red suit donning lanyard from lanyard pocket; release restraint slider tab from its stowed position and insert lanyard into slider tab.
- f. Grasp the red suit donning lanyard; pull until the restraint slider is in the full OPEN position and remove the suit donning lanyard.
- g. Disconnect gas inlet and outlet umbilicals.
- h. Remove purge valve.
- i. Grasp the TLSA at rear entry area and separate the slide fasteners; slip the TLSA from around the back and buttocks.
- j. Disconnect communications carrier electrical lead.
- k. Grasp the helmet attaching ring, slip head out, and pull both arms away from TLSA.
- l. Disconnect LCG multiple water connector.
- m. Disconnect urine connector.
- n. Remove legs from TLSA.

## 8-10 DOFFING UCTA

## NOTE

The UCTA should be completely drained before doffing.

- a. Disconnect the UCTA drain hose quick disconnect from the mating disconnect of the suit-mounted UCTA transfer hose assembly.
- b. After completing doff of the PGA, hold the UCTA in place and detach the waistband velcro patches.
- c. Remove the cuff-half of the UCTA flange by depressing the release levers and twisting the cuff-half of the flange slightly while pulling the flange away from the UCTA.
- d. Roll the cuff from penis.
- e. Fold the cuff in half and clamp it closed with the UCTA clamp.
- f. Reconnect the cuff-half of the flange to the UCTA.
- g. Stow the UCTA.

## 8-11 DOFFING BIO-MEDICAL HARNESS

- a. Disconnect electrical leads of bio-medical harness from bio-medical belt.
- b. Disengage snap fasteners which secure bio-medical harness and remove it from bio-medical belt.

## 8-12 DOFFING BIO-MEDICAL BELT

- a. Disconnect bio-instrumentation leads from bio-medical belt.
- b. Disengage snap fastener and remove bio-medical belt from LCG.

## 8-13 DOFFING LCG.

- a. Open front-entry slide fastener.
- b. Pull bio-instrumentation leads out through holes provided on front of LCG.
- c. Slip out of LCG.

## 8-14 DOFFING FCS

- a. Doff FCS in the same manner as conventional underwear shorts.

- 8-15 DOFFING FROM IV CONFIGURATION.
- 8-16 DOFFING PGA GLOVE
- a. Decrease gas flow to 0.75 psig (when applicable).
  - b. Loosen palm restraint.
  - c. Place wrist disconnect in OPEN position and remove glove.
  - d. Doff other glove in the same manner.
- 8-17 DOFF PHA per instructions in paragraph 8-5.
- 8-18 DOFF TLSA per instructions in paragraph 8-9.
- 8-19 DOFF UCTA per instructions in paragraph 8-10.
- 8-20 DOFF BIO-MEDICAL HARNESS per instructions in paragraph 8-11.
- 8-21 DOFF BIO-MEDICAL BELT per instructions in paragraph 8-12.
- 8-22 DOFFING CWG.
- a. Disengage buttons on front opening.
  - b. Disengage the two tabs and remove CWG electrical harness.
  - c. Pass bio-instrumentation leads through slot on chest area of CWG.
  - d. Remove CWG in the same manner as conventional long underwear.
- 8-23 DOFF FCS per instructions in paragraph 8-14.
- 8-24 DOFFING NECK DAM.
- a. Unlock helmet attaching ring and separate neck dam from the helmet attaching ring.
  - b. Pull neck dam over the head.

## NOTE

To fold the flexible ring neck dam, grip the metal ring with both hands, (placed 180 degrees apart) then twist the hands in opposite directions to form a figure eight and simultaneously push the assembly in itself to form a spiral-shaped compact unit.

- c. Fold neck dam for stowage (flexible ring type only).