

## CHAPTER 22

# LPU-31/P LIFE PRESERVER, HELICOPTER CREW

### Section 22-1. Description

#### 22-1. GENERAL.

22-2. The LPU-31/P life preserver assembly is authorized for use by helicopter combatant aircrewmen using the T-65 body armor.

#### 22-3. CONFIGURATION.

22-4. The LPU-31/P life preserver assembly (see [figure 22-1](#)) weighs approximately 4 pounds and provides a minimum of 29 pounds of buoyancy. The LPU-31/P life preserver is composed of the LPP-1, -1A life preserver and a protective bladder cover.

#### NOTE

Prior to installing cover assembly on flotation assembly, remove the following items from the life preserver and retain for spare parts.

Storage Container  
Pouch  
Sea Dye Marker  
Whistle  
Survivor Locator Light



Use only Polychloroprene adhesives and Polychloroprene-coated cloth and patches on Polychloroprene-coated LPU-31/P life preserver assemblies.

22-5. The flotation assembly of the LPU-31/P is constructed of Polychloroprene-coated nylon cloth. It is equipped with an oral inflation valve, a valve stem, and an inspection record patch. See [figure 22-1](#).

22-6. The belt consists of a 53-inch piece of webbing, an adjustable buckle and clasp, a toggle assembly and a toggle assembly pocket. The belt adjusts from a waist size of 30 to 52 inches and attaches the flotation assembly to the wearer by means of the belt loop on the flotation assembly. The toggle assembly consists of a wooden toggle and line, and is used to secure survivors together while they are in the water. When not in use, the toggle line is wrapped around the wooden toggle and stowed in a pocket located on the belt.

#### 22-7. FUNCTION.

22-8. The LPU-31/P is manually inflated by pulling the inflation assembly lanyard down. In an emergency situation, the oral inflation valve should be used to top-off an inflated preserver, maintain inflation of a leaky preserver or to inflate a preserver when the inflation assembly malfunctions or fails. The oral inflation valve is also used to inflate a preserver with air during an inspection test and to deflate a preserver in preparation for packing.

#### 22-9. DONNING PROCEDURE.

22-10. The LPU-31/P is donned by wrapping the belt around the waist with the preserver in the rear and the buckle and clasp in front. After buckling, rotate the preserver to the front and insert the head through the preserver opening. The armor is then donned over the covered preserver as shown in [figure 22-2](#).

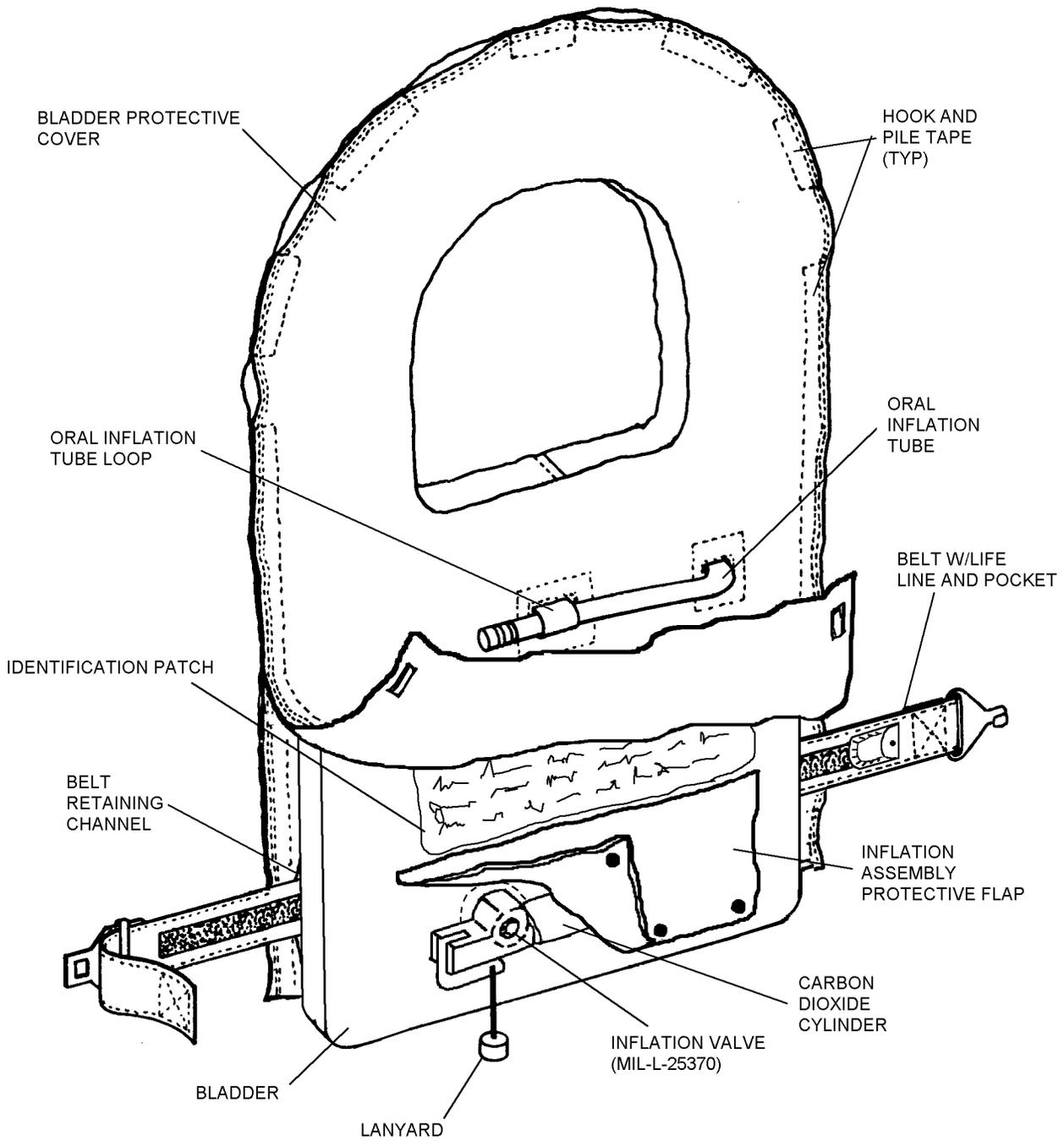
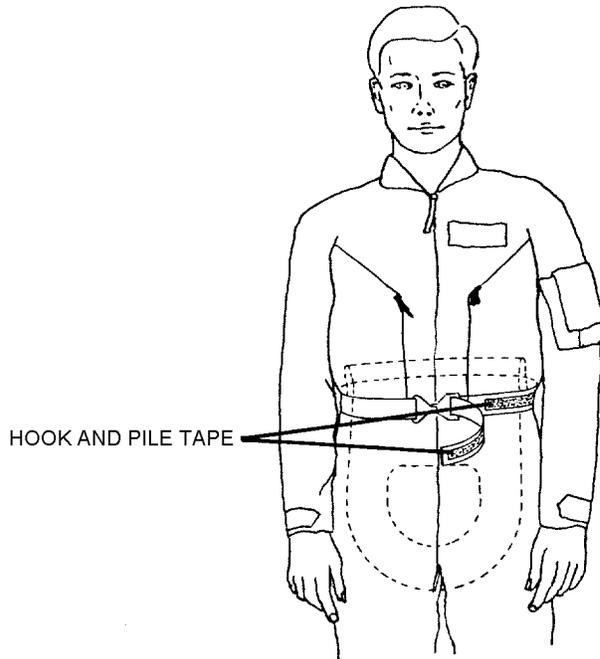
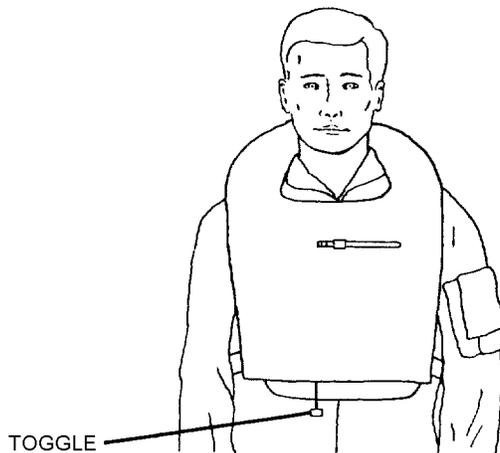


Figure 22-1. LPU-31/P Life Preserver Assembly, Parts Nomenclature

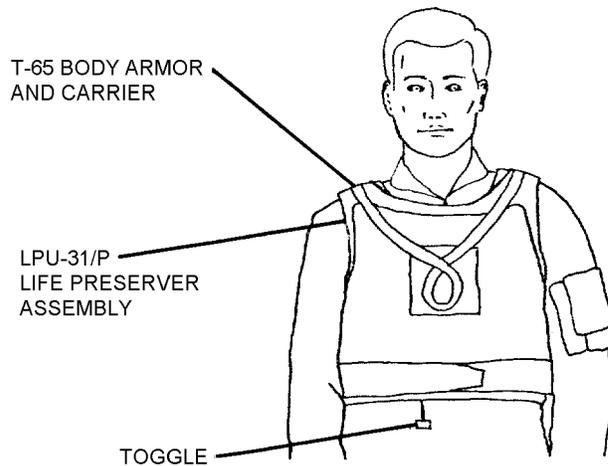
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1. DON ASSEMBLY WITH DEFLATED PRESERVER IN REAR, BUCKLE IN FRONT. ADJUST TO SIZE USING HOOK AND PILE TAPE.



2. ROTATE PRESERVER TO FRONT, AND INSERT HEAD THROUGH OPENING. READJUST BELT.



3. DON BODY ARMOR BY PLACING OVER HEAD. ADJUST TO SIZE USING WAIST BELT.

Figure 22-2. Donning Procedure

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## Section 22-2. Modifications

### 22-11. GENERAL.

22-12. There are no authorized modifications to the LPU-31/P life preservers at this time. Repairs and fabrication instructions to maintain serviceability are listed in [table 22-1](#).

**Table 22-1. LPU-31/P Common Repairs and Fabrications**

Description of Repair or Fabrication	Paragraph Number
Determination of Repairability	<a href="#">22-46</a>
Protective Cover Repair Procedures	<a href="#">22-48</a>
Cementing Life Preserver	<a href="#">22-49</a>
Patching Life Preserver	<a href="#">22-50</a>
Replacement of Oral Inflation Valve	<a href="#">22-52</a>
Recementing of Bladder Seams	<a href="#">22-53</a>
Replacement of Lanyard Cord (LPP-1 Configuration)	<a href="#">22-54</a>
Replacement of Lanyard Cord (LPP-1A Configuration)	<a href="#">22-55</a>
Replacement of Defective Plastic Snap Fastener with Metal Snap Fasteners	<a href="#">22-56</a>
Repair of Corroded CO <sub>2</sub> Inflation Valve	<a href="#">22-57</a>
Replacement of Top and Bottom Gaskets	<a href="#">22-58</a>
Replacement of Check Valve Assembly	<a href="#">22-59</a>
Fabrication of Lifeline and Toggle Assembly	<a href="#">22-60</a>
Fabrication of Protective Cover	<a href="#">22-61</a>

## Section 22-3. Maintenance

### 22-13. GENERAL.

22-14. This section contains information on inspection, disassembly, repair/replacement, testing, and re-assembly of the LPU-31/P life preserver.

### 22-15. INSPECTION.

22-16. All life preservers shall be subjected to Preflight, Special and Calendar/Phase Inspections.

22-17. The Preflight Inspection shall be performed on life preservers prior to each flight by the aircrew member to whom the life preserver is assigned. The Preflight Inspection shall be performed on life preservers installed in aircraft prior to each flight by assigned aircrewmembers.

22-18. The Special Inspection shall be performed on all aircraft installed life preservers at intervals not to exceed 30 days. The inspection shall be performed at the organizational level of maintenance by personnel assigned to the Aviator's Equipment Branch.

22-19. Upon completion of the inspection, make necessary entries on the appropriate form in accordance with OPNAVINST 4790.2 Series. The 30-Day Special Inspection may be recorded on a separate history card from the history card recording Calendar/Phase Inspections, functional checks, and modifications.

22-20. The Calendar/Phase Inspection shall be performed on all life preservers prior to placing in service. The Inspection cycle thereafter shall be as follows: personal issue life preservers shall be inspected once every 90 days. Aircraft-installed life preserver inspection shall coincide with the inspection cycle of the aircraft in which installed. See applicable Planned Maintenance System (PMS) publications for specific intervals. In no case shall the interval exceed 231 days. Unless operational requirements demand otherwise, the life preserver Calendar/Phase Inspection shall be performed by the intermediate level of maintenance or above. The functional test shall be performed prior to placing in service, every fourth inspection cycle thereafter, and whenever an inflation assembly is replaced. The leakage test shall be performed during every inspection cycle. If inspection indicates damage, complete appropriate forms

in accordance with OPNAVINST 4790.2 Series and forward entire assembly to supply. Refer to [paragraph 22-46](#) for determination of repairability.

**22-21. QUALITY ASSURANCE.** Properly detailed procedures present a logical sequence for the inspection process. The more critical procedures are underlined to designate steps which require a Quality Assurance inspection to assure performance of specific requirements. After the underlined step is performed by the Aircrew Survival Equipmentman, the procedure shall be verified before the next step is performed. This verification shall be performed by a Collateral Duty Inspector or Quality Assurance Representative (CDI, CDQAR, or QAR). Work Center supervisors are primarily responsible for quality assurance within their centers. OPNAVINST 4790.2 Series permits supervisors to nominate their more experienced personnel to serve as quality assurance inspectors. Nominated personnel shall be screened and examined by the Quality Assurance Officer prior to their designation as Quality Assurance Inspectors or Quality Assurance Representatives by the Commanding Officer. Under no circumstances shall an Aircrew Survival Equipmentman perform his own quality assurance inspection.

**22-22. PREFLIGHT/SPECIAL INSPECTION.** To perform a Preflight/Special Inspection, proceed as follows:

#### WARNING

Ensure that the inflation pull toggles are readily accessible. The pull toggles shall extend from the protective cover flap.

#### CAUTION

Do not open any sealed or safety-wired/safety tied portions of preserver for Preflight/Special Inspection.

1. Inspect exposed metal parts for corrosion and damage.
2. Inspect inflation assembly for presence of safety wire and CO<sub>2</sub> cylinders.

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3. Inspect seams and harness for wear, snags, tears and abrasions.

4. Inspect protective cover fabric for cuts, tears, abrasions, security of stitching, and other damage.

5. Inspect safety ties on locking pins.

6. Inspect hook and pile tape closure for separation; fasten as necessary.

7. Adjust and don preserver to ensure proper fit.

8. If any discrepancy is noted, the preserver shall be removed from service and repaired in accordance with procedures in this volume.

**22-23. ACCEPTANCE/CALENDAR/PHASE INSPECTION.** The Acceptance/Calendar/Phase Inspection consists of the following tasks:

1. Inflation Handle Inspection
2. Protective Cover Inspection
3. Functional Test (every fourth inspection cycle)
4. Visual Inspection
5. Life Preserver Configuration
6. General Inspection
7. Markings Inspection
8. Inflation Assembly Inspection
9. Inflation Lanyard Inspection
10. Leakage Test
11. Records Updating

**22-24. INFLATION PULL TOGGLE INSPECTION.** Inspect inflation pull toggle for the following:

1. Attachment of inflation lanyard to toggle.
2. Cuts, tears, deterioration, abrasion, stains, and general cleanliness of inflation lanyard.
3. Cracked or broken pull toggle.

**22-25. PROTECTIVE COVER INSPECTION.** To inspect protective cover, proceed as follows:

1. Inspect fabric for cuts, tears, deterioration, abrasion, stains, and general cleanliness.

2. Inspect seams for proper adhesion or stitching.

3. Inspect straps and loops for security and wear.

4. Inspect any other parts for wear, damage, and security.

5. All hardware for security of attachment, corrosion, damage, wear and, if applicable, ease of operation.

6. Inspect snap fastener assemblies for presence, security of attachment, ease of operation, corrosion, and wear.

### NOTE

All uni-directional snap fasteners shall be installed with the dot on the button of the snap fastener socket positioned on the side of the snap fastener to which lift must be applied to disengage the socket from the snap fastener stud.

7. If any discrepancies are found, the protective cover or pouch shall be repaired or removed from service as deemed appropriate by the inspection activity.

**22-26. FUNCTIONAL TEST.** To perform a functional test, proceed as follows:



Ensure area surrounding preserver is free of foreign objects.

1. Completely open preserver protective cover prior to conducting functional test. All hook and pile tape shall be separated, and unsnap protective cover of the inflation assembly.

2. Actuate inflation assembly.

3. The preserver shall fully inflate to design shape, without evidence of restriction, in less than 30 seconds.

4. If preserver does not properly inflate, determine cause. Ensure stem and valve are clean and free of foreign matter.

5. If correction is made, the preserver shall be functionally tested again.

6. Deflate preserver in accordance with paragraph 22-27 to remove all CO<sub>2</sub>.

**22-27. DEFLATION.** To deflate a life preserver, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Pump, Rotary Vacuum (or equivalent)	NIIN 00-052-5015 (90567)
As Required	Hose, 3/8- or 1/2-inch Inside Diameter, Rubber	—

1. Attach one end of rubber hose to vacuum pump.

2. Deflate through oral inflation valves. Unlock oral inflation valve, hold in open position, and hold vacuum pump hose against end of oral inflation valve. When compartment is collapsed, release oral inflation valve. Screw lock closed.

**22-28. VISUAL INSPECTION.** Prior to visually inspecting a life preserver assembly, the life preserver shall be inflated with air to 1.0 psig.



Remove all carbon dioxide cylinders prior to inflating life preserver with air.

**NOTE**

If suitable air source is not available, water-pumped nitrogen (BB-N-411) may be substituted.

**22-29. LIFE PRESERVER CONFIGURATION.** The life preserver shall be updated by comparing it to figure 22-1 and section 22-4.

**22-30. GENERAL INSPECTION.** Examine life preservers for the following:

1. Preserver fabric for cuts, tears, punctures, deterioration and abrasion. Refer to paragraph 22-48 for repair instructions.

2. Seam tapes for proper adhesion. Refer to paragraph 22-53 for repair instructions.

3. Valve inlet stems for security.

4. Oral inflation valve(s) for cracks, security, ease of operation, and corrosion.

5. Patches for proper adhesion and wear. Refer to paragraph 22-50 for repair instructions.

6. Any other parts for wear or other damage.

7. All hardware for security of attachment, corrosion, damage, wear and, if applicable, ease of operation.

8. Preservers for stains, dirt, and general cleanliness. Refer to paragraph 22-38 for cleaning instructions.

9. Cross threading and/or loose manifold nuts.

**22-31. MARKINGS INSPECTION.** To inspect and restore marking, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Ink, Marking, Laundry, Black	SPE-92 NIIN 00-161-4229
	-or-	
As Required	Ink, Drawing, Waterproof, Yellow	A-A-59291 NIIN 00-634-6583

1. Compare markings on preserver to table 22-2 as applicable.

2. Restore any faded markings.

3. Deleted.

4. Correct any markings which do not agree with the applicable table. Paint out old marking and enter new marking as close to proper position as possible.

**Table 22-2. LPU-31/P Life Preserver Markings**

Marking (Note 1)	Location	Letter Height
LIFE PRESERVER, PASSENGER, AIR TRANSPORT TYPE LPP-1 (NOTE 2) FSN [applicable number] SERIAL NO. [applicable number]	Front of flotation tube below whistle pocket	3/8 inch
LIFE PRESERVER, INFLATABLE, UTILITY TYPE, LPP-1A (NOTE 2) NSN: 1R4220-00-89-7620LX CONTRACT NO. [applicable number] MANUFACTURER [name of manufacturer] SERIAL NO. [applicable number] DATE OF MANUFACTURE [month and year]	Front of flotation tube below whistle pocket	3/8 inch
Notes: 1. Replacement markings shall be stamped or stenciled using waterproof black ink. 2. When issued for use as an LPU-31/P, the LPP-1 or the LPP-1A life preserver will be remarked as a LPU-31/P.		

**22-32. INFLATION ASSEMBLY INSPECTION.** To inspect life preserver inflation assembly, proceed as follows:

1. Remove CO<sub>2</sub> cylinder from valve assembly.
2. Examine inflation device, actuating lever and lanyard, for fraying, corrosion, stripped threads, and other damage.
3. If required, remove any sharp edges from valve with a fine file.
4. Operate actuating lever several times to ensure that lever moves freely and that piercing pin moves properly inside valve body. Inspect point of piercing pin for serviceability. If point is flat, rounded, dull, or otherwise worn or damaged, replace inflation assembly.

**NOTE**

Each time inflation assembly gaskets or inflation assembly is removed and replaced for any reason, a functional check shall be conducted. Refer to [paragraph 22-26](#). Use new gaskets when replacing device.

5. If any discrepancy is noted in device that is not repairable in accordance with [paragraph 22-57](#), remove assembly and install a new inflation device.

6. Reinstall CO<sub>2</sub> cylinder. See [paragraph 22-41](#).

**22-33. INFLATION LANYARD INSPECTION.** To inspect the inflation lanyard, proceed as follows:

1. Examine inflation lanyard for frays, ruptures, thin spots, split casing, and security of knots.
2. Replace unsatisfactory inflation lanyard. Refer to [paragraph 22-54](#) or [22-55](#).
3. Safety-wire inflation assembly as needed in accordance with [paragraph 22-42](#).

**22-34. LEAKAGE TEST.** All life preservers shall be subjected to a leakage test each Calendar/Phase Inspection. To perform a leakage test proceed in accordance with [paragraph 22-35](#).

**22-35. Test Fixture.** A suggested test fixture, consisting of a three-way valve, pressure gage, and adapters for compartments being tested, is shown in [Chapter 3](#). Test fixtures must be fabricated to meet the requirements of the schematic shown in [figure 22-3](#).

**22-36. Test Procedure.** To test life preservers, proceed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Test Fixture (or equivalent)	See <a href="#">Chapter 3</a>



Ensure test area is free of foreign objects.

1. Ensure all carbon dioxide has been removed from any preserver which has been functionally tested.



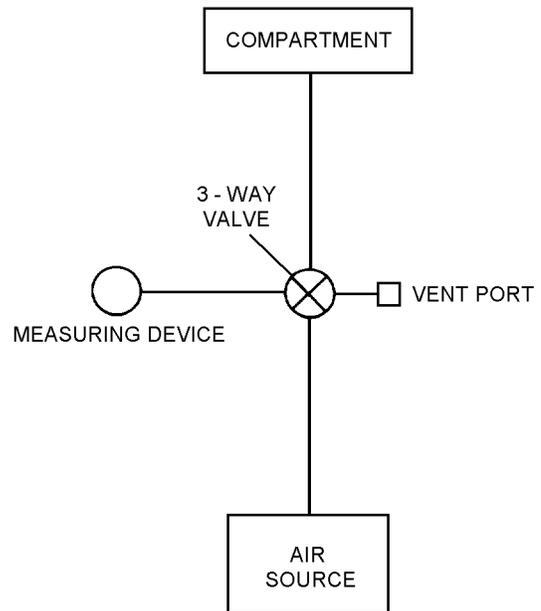
If 3-way valve is not used, measuring device valve must be closed when air feed valve is open.

Damage may occur to oral inflation valve if air supply pressure entering the life preserver exceeds ten (10) psi during this test.

**NOTE**

If a suitable air source is not available, water-pumped nitrogen (BB-N-411) may be substituted.

2. Unlock oral inflation valve and insert into rubber hose. Rotate valve to air supply position and inflate chamber. Alternately position valve between measuring device, vent and air supply until proper pressure of 2.0 psig is attained.



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**Figure 22-3. Test Fixture Schematic**

3. The air supply shall be securely shut off and after a minimum of 15 minutes, the pressure shall be readjusted, if necessary, to the leakage test pressure. Record time.
4. Disconnect air supply and check for leaks. Ensure all valves are closed.
5. Record temperature and barometric pressure.
6. After a minimum of 4 hours after completing [step 3](#), record test pressures of the single chamber. Test pressure shall not decrease to less than 1.6 psig for a life preserver chamber, from a maximum test pressure of 2.0 psig.

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7. Record temperature and barometric pressure and correct test pressure for any changes in temperature and barometric pressure. Refer to [tables 22-3 and 22-4](#).

### EXAMPLE

UNCORRECTED TEST READING 1.70 PSI

	TEMP.	BARO.
START	75° F	29.90 IN. Hg
END	70° F	29.70 IN. Hg
DIFFERENCE	- 5° F	-0.20
CORRECTION	+0.155	-0.098

TEMP. CORRECTION	+ 0.155
+ BARO. CORRECTION	- 0.098
CORRECTION	+ 0.057

UNCORRECTED READING	1.700 PSI
+ CORRECTION	+ 0.057
CORRECTED READING	1.757 PSI

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### Step 7 - Para 22-36

**Table 22-3. Temperature Conversion Chart**

Temperature Difference (°F)	Correction (psi)
1	0.031
2	0.062
3	0.093
4	0.124
5	0.155
6	0.186
7	0.217
8	0.248
9	0.279
10	0.310

Rise in temperature: subtract from gage reading.  
Fall in temperature: add to gage reading.

8. If pressure of chamber is below 1.6 psig inflate to leakage test pressure and coat with a soap solution to locate leaks. Mark leak areas. Rinse preserver with fresh water, air dry and repair in accordance with procedures in [paragraph 22-50](#).

9. Deflate preserver in accordance with [paragraph 22-27](#).

10. Ensure that inflation valve lever is cocked. Install CO<sub>2</sub> cylinder in accordance with [paragraph 22-41](#).

**22-37. RECORDS UPDATING.** Make necessary entries on appropriate form in accordance with OPNAV-INST 4790.2 Series.

### 22-38. CLEANING AND SERVICING.

22-39. Cleaning and servicing consist of cleaning the life preserver and protective cover installation of the inflation valve protective cover and CO<sub>2</sub> cylinder and, when required, safety wiring of the inflation valve actuating lever.

**22-40. CLEANING OF LIFE PRESERVER PROTECTIVE COVER/BLADDER.** To clean life preservers, machine washing is preferred on protective cover. Alternate method is by hand. Remove any survival items and other detachable items and proceed as follows:

#### Materials Required

Quantity	Description	Reference Number
As Required	Detergent, General Purpose	MIL-D-16791 NIIN 00-282-9699
As Required	Cloth, Lint-Free, Type II	MIL-C-85043 NIIN 00-044-9281
As Required	Talc, Technical	MIL-T-50036A NIIN 01-080-9589



Solvents are not to be used in cleaning life preserver.

1. Prepare solution of detergent (MIL-D-16791) consisting of 1/4 to 1/2 ounce of detergent per gallon of water.

2. Apply cleaning solution to soiled area with a spray or sponge.

3. Allow solution to remain on surface for several minutes, then agitate with a soft brush or rag.

**Table 22-4. Barometric Pressure Conversion Chart**

Press. Diff. (inHG)	Corr. (psi)								
0.01	0.005	0.16	0.078	0.31	0.152	0.46	0.225	0.61	0.299
0.02	0.010	0.17	0.083	0.32	0.157	0.47	0.230	0.62	0.304
0.03	0.015	0.18	0.088	0.33	0.162	0.48	0.235	0.63	0.309
0.04	0.020	0.19	0.093	0.34	0.167	0.49	0.240	0.64	0.314
0.05	0.025	0.20	0.098	0.35	0.172	0.50	0.245	0.65	0.319
0.06	0.030	0.21	0.103	0.36	0.176	0.51	0.250	0.66	0.323
0.07	0.035	0.22	0.108	0.37	0.181	0.52	0.254	0.67	0.328
0.08	0.040	0.23	0.113	0.38	0.186	0.53	0.260	0.68	0.333
0.09	0.045	0.24	0.118	0.39	0.191	0.54	0.265	0.69	0.338
0.10	0.049	0.25	0.123	0.40	0.196	0.55	0.270	0.70	0.343
0.11	0.054	0.26	0.127	0.41	0.201	0.56	0.275	0.71	0.348
0.12	0.060	0.27	0.132	0.42	0.206	0.57	0.279	0.72	0.353
0.13	0.064	0.28	0.137	0.43	0.211	0.58	0.284	0.73	0.358
0.14	0.069	0.29	0.142	0.44	0.216	0.59	0.289	0.74	0.363
0.15	0.073	0.30	0.147	0.45	0.221	0.60	0.294	0.75	0.368

Rise in pressure: add to gage reading.  
Fall in pressure: subtract from gage reading.

4. Rinse surface thoroughly with water; wipe with a cloth or sponge. Repeat this application until surface is free from all solution.

5. Dry protective cover before use and dry bladder with a lint-free cloth (MIL-C-85043). Apply a light coating of talc (MIL-T-50036A).

**22-41. INSTALLATION OF CO<sub>2</sub> CYLINDER.** To install CO<sub>2</sub> cylinders, proceed as follows:

**Support Equipment Required**

Quantity	Description	Reference Number
1	Scale (Gram)	A-A-52021-1 NIIN 00-514-4117 or equivalent
1	Die, Cylinder Thread Chaser	1842-008-01 (CAGE 03688) NIIN 00-069-4040

**Materials Required**

Quantity	Description	Reference Number
1	Valve Stem and Seat Seal Kit (Not E)	105AS100-5 (CAGE 30003) NIIN 00-498-6964

**Materials Required (Cont)**

Notes: 1. Seat Seal is obtained from Valve Stem and Seat Seal Kit, P/N 105AS100-5, NIIN 00-498-6964, which contains two top, two bottom, and two seat seal gaskets.

**NOTE**

Weight of charged cylinder will vary according to manufacturer.

1. Weigh a charged cylinder and compare the minimum stamped weight with the scale weight. Discard and replace cylinder if scale weight is 2 grams less than minimum stamped weight.

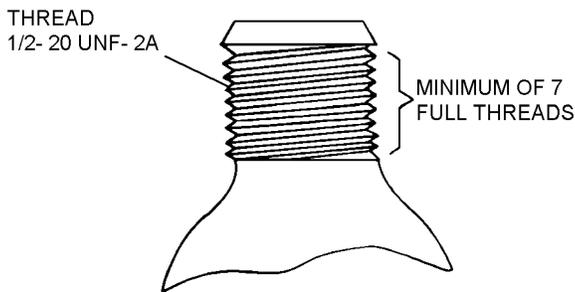
2. Refer to Figure 22-5 for proper configuration of life preserver inflation assembly.

3. Ensure that inflator lever is in closed position.

4. To assure a firm cylinder seat, conduct a cylinder thread count. Threaded portion of cylinder neck shall contain a minimum of seven full threads to assure a firm cylinder seat within valve body. Any cylinder found with less than seven full threads shall be discarded. See Figure 22-4.

Table 22-5. LPU-31/P Life Preserver Inflation Assembly

Bladder Type	Inflator	Cylinder
LPP-1	SAF-T-PAK	MIL-C-25369 (Type I) 25-28 Grams NIIN 00-372-0585
LPP-1A	MIL-L-25370 (Type II)	MIL-C-25369 (Type II) 28-31 Grams NIIN 00-543-6693



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Figure 22-4. Cylinder Thread Count



Steel threads on CO<sub>2</sub> cylinder can cause damage to aluminum threads on inflator if cylinder is not carefully threaded. If binding occurs during installation of cylinder, use thread chaser die on cylinder thread to cut free excessive plating. Reinstall cylinder. If binding still occurs, replace cylinder.

5. After performing functional test, insert a new seat seal gasket. At intermediate inspection intervals, inspect condition of gasket and replace if necessary.

6. Install CO<sub>2</sub> cylinder into inflator body as far as hand twisting will permit.

**NOTE**

When replacing CO<sub>2</sub> cylinder to inflator, ensure that CO<sub>2</sub> cylinder passes through the holding patch loop.

7. Safety-wire inflator as required in accordance with paragraph 22-42.

8. Close inflation assembly protective cover and secure with snap fasteners. See figure 22-1.

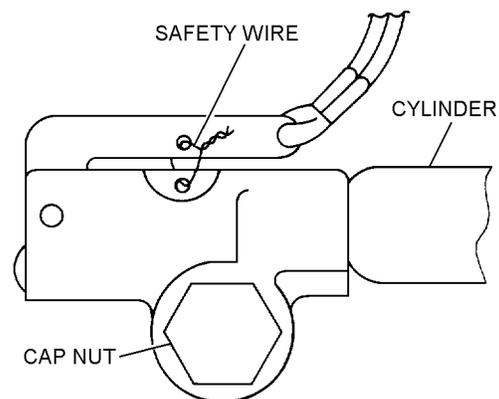
**22-42. SAFETY-WIRING.** To safety-wire the inflation assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Copper Wire, Uncoated, Type S, 0.0159-inch Diameter	QQ-W-343 NIIN 00-236-9501

1. Pass a single strand of uncoated 0.0159-inch Type S copper wire through hole in inflation assembly body and through hole in actuation lever.

2. Twist the wire a minimum of four times and trim the excess.



Step 2 - Para 22-42

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**22-43. REPAIR/REPLACEMENT.**

22-44. These instructions for the repair or fabrication of various components or subassemblies of life preservers ensure that appropriate items of equipment remain in Ready For Issue (RFI) status. Reference numbers for parts which are defective, corroded or worn and require replacement are included in the applicable paragraph. Other replacement parts, such as carrying cases and personal survival equipment, are listed in the applicable table.

22-45. Replacement of easily removed assembly components such as CO<sub>2</sub> inflation valves and survival items are authorized in addition to repair and replacement procedures documented in this section. The life preserver shall be subjected to a functional and leakage test each time CO<sub>2</sub> inflation valves are removed and replaced for any reason, and each time inflation valve gaskets are replaced.

**22-46. DETERMINATION OF REPAIRABILITY.**

Patching of holes, cuts, tears or punctures 1-inch square or less are the only repairs authorized in a life preserver bladder.

22-47. Life preserver shall be considered beyond repair for any of the following reasons:

1. Porous fabric areas on flotation bladder.
2. Leakage test failure resulting from other than repairable cut, tear or puncture.
3. Holes, cuts, tears or punctures within 1-inch of flotation bladder seams.
4. Deterioration of the polychloroprene-coated fabric caused by oil, grease, or any other foreign substance.
5. Deterioration of the polychloroprene-coated fabric caused by a heavy mildewed condition.

**22-48. PROTECTIVE COVER REPAIR PROCEDURES.** To repair the protective cover, proceed as follows:

Materials Required

Quantity	Description	Reference Number
As Required	Cloth, Duck, Nylon Type II, Sage Green	MIL-C-7219 NIIN 00-765-2863
	-or-	
As Required	Cloth, Plain Weave, Non-Melting, Type II, Olive Green	MIL-C-83429 NIIN 00-516-1998
As Required	Fastener Tape, Pile, Type II, Olive Green, 1-inch Width	MIL-F-21840 NIIN 00-106-5974
As Required	Fastener Tape, Hook, Type, Hook Type II, Olive Green, 1-inch Width	MIL-F-21840 NIIN 00-106-5973
As Required	Thread, Nylon, Type II, Size E, Sage Green	V-T-295 NIIN 00-204-3884
	-or-	
As Required	Thread, Nylon, High Temperature Resistant, Sage Green	MIL-T-83193 NIIN 00-405-2252

1. Remove bladder in areas being repaired.
2. Repair minor rips, tears, or abrasions in cover, using scrap material or equivalent.
3. Repair broken or loose stitching.

**22-49. CEMENTING LIFE PRESERVERS.** All cementing of life preservers shall be performed as follows:

Support Equipment Required

Quantity	Description	Reference Number
1	Roller, Wooden	GGG-R-00620 NIIN 00-243-9401

**NOTE**

Toluene shall be the primary solvent used in the fabrication or repair of this assembly. MEK may be used if toluene is not available. Always use solvents sparingly and wipe up excess solvents; do not allow to dry by evaporation.

Materials Required

Quantity	Description	Reference Number
1	Brush, Disposable	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
As Required	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762
As Required	Cement, Class 3, Polychloroprene	MIL-A-5540 NIIN 00-142-9913
As Required	Talc, Technical	MIL-T-50036A NIIN 01-089-9589



Do not use toluene or MEK near open flame, heat or electrical sparks. Avoid prolonged contact with skin or breathing of fumes. Use only in a well ventilated area.



Use only Polychloroprene adhesives and Polychloroprene-coated cloth patches on Polychloroprene-coated LPU-31/P flotation assembly.

**NOTE**

Toluene or MEK must be applied vigorously to life preserver material over three years old in order to reactivate the material prior to cementing. Pigment from the material coloring staining a cloth rubbed over the treated

surface will indicate the material has been reactivated. Cement shall be applied immediately after the surface has dried.

1. Clean both surfaces to be cemented with four applications of toluene or MEK. Apply toluene or MEK with back-and-forth strokes on the first and third applications, and one-way strokes on the second and fourth applications. Allow area to dry between applications.



The effective active period of adhesive mixtures composed of polychloroprene and an accelerator is eight (8) hours. Do not use mixture if older than eight hours.

2. Prepare only enough mixture for 8 hours. Dispose of any remaining mixture.
3. Using a disposable brush, apply cement to completely cover surfaces to be cemented. Use long, one direction strokes and complete each surface before cement becomes tacky as the brush may pull tacky cement from the surface. Allow to dry for 10 minutes.
4. Apply a second coat of cement as in [step 3](#). Use brush strokes perpendicular to the original direction.
5. When second coat of cement has become tacky, place pieces together. If cemented area has a cut or tear, butt edges of damage before applying patch. Roll out bubbles with a wooden roller.
6. Allow cement to cure a minimum of 48 hours.
7. Dust area with talc (MIL-T-50036A).

**22-50. PATCHING LIFE PRESERVERS.** Patching of life preservers shall be performed as follows:

**NOTE**

Life preserver is not repairable if it has holes, cuts, tears, or punctures over one-inch square.

Materials Required

Quantity	Description	Reference Number
As Required	Cloth, Life Preserver, Type I, Orange	MIL-C-19002 NIIN 00-060-9136
	-or-	
	Cloth, Life Preserver, Type I, Yellow	MIL-C-19002 NIIN 00-935-6427

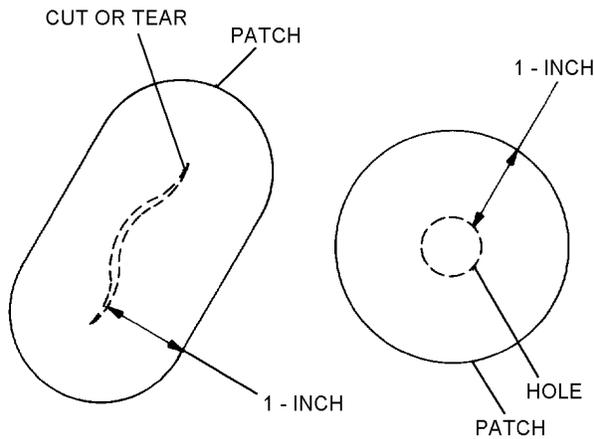


Use only Polychloroprene adhesives and Polychloroprene-coated cloth and patches on Polychloroprene-coated LPU-31/P life preserver assemblies.

**NOTE**

Select patch color as near as possible to color of life preserver being repaired.

1. Cut a rounded patch 1 inch larger than damage on all sides.



Step 1 - Para 22-50

V0050001

2. Center patch over damage and trace an outline of patch on fabric.

3. Cement patch to damaged area in accordance with paragraph 22-49.

4. Dust area with talc (MIL-T-50036A).

5. Perform a leakage test.

**22-51. INSPECTION RECORD PATCH.**

**NOTE**

The 28th In-Service Management Panel meeting for Aviation Life Support Systems rescinded the requirement for the packer to sign the Inspection Record Patch on life preservers. The requirement for all other documentation remains unchanged. The reason for this change is that most history patches are unreadable and the packer's and inspector's names are documented on Aviation Crew Systems Records.

**22-52. REPLACEMENT OF ORAL INFLATION VALVE.** To replace the oral inflation valve, proceed as follows:

Figure 22-5 Deleted.

**NOTE**

Replacement of oral inflation valves can only be obtained through salvage of BCM'ed or surveyed inflatable survival equipment.



Only toluene or MEK shall be used to clean oral inflation valve and tube. Only Polychloroprene cement (MIL-A-5540, NIIN 00-142-9913) shall be used to cement oral inflation valve to oral inflation tube.

Materials Required

Quantity	Description	Reference Number
1	Valve, Oral Inflation	—
As Required	Cement, Polychloroprene	MIL-A-5540 NIIN 00-142-9913
As Required	Brush, Disposable	NIIN 00-514-2417
As Required	Toluene	TT-T-548 NIIN 00-281-2002
	-or-	
As Required	Methyl Ethyl Ketone (MEK)	TT-M-261 NIIN 00-281-2762

1. Carefully cut through metal clamp securing oral inflation valve to oral inflation tube, and remove metal band and oral inflation valve.

2. If the tip of the oral inflation tube was damaged during removal of valve, trim off damaged section.

3. Clean both surfaces to be cemented with toluene or MEK. Allow areas to dry.

4. Using a small disposable brush, carefully apply a small amount of Polychloroprene cement to the surfaces of the tube and the valve which are to be cemented together.

5. Immediately place oral inflation valve into oral inflation tube. Oral inflation valve should be inserted up to valve shoulder. Inspect for proper application/cement.

6. Tightly wrap the cemented portion of the oral inflation tube with cord or wire and allow to cure for 48 hours before removing wrap.

7. Perform leakage test in accordance with [paragraph 22-34](#).

**22-53. RECEMENTING BLADDER SEAMS (TYPE 2, MIL-L-25370).** This repair shall be performed only if a polychloroprene flotation bladder does not leak, that is, if only outer seam around bladder is split or separating. To recement on open seam proceed as follows:

1. If seam is not leaking, recement open seam in flotation bladder in accordance with [paragraph 22-49](#).

2. Perform a leakage test in accordance with [paragraph 22-34](#).

**NOTE**

If bladder exhibits leakage from seam, bladder cell has ruptured. Dispose of life preserver after usable parts have been salvaged.

**22-54. REPLACEMENT OF LANYARD CORD.** To replace lanyard cord used with MIL-L-25370, Type 2 inflation valves, see [paragraph 22-55](#). To replace lanyard cord used with SAF-T-PAK inflation valves, proceed as follows:

**Materials Required**

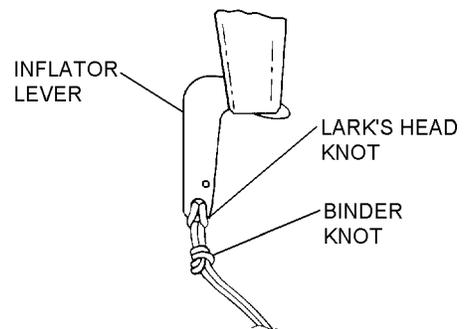
Quantity	Description	Reference Number
15 inches	Cord, Nylon, Type I (color optional)	MIL-C-5040 NIIN 00-014-6699

1. Carefully remove carbon dioxide cylinder from the inflator assembly.

2. If desired, remove nut and rubber gasket retaining the inflator and remove inflator and lanyard assembly.

3. Cut lanyard to be replaced and discard along with the two brass clips.

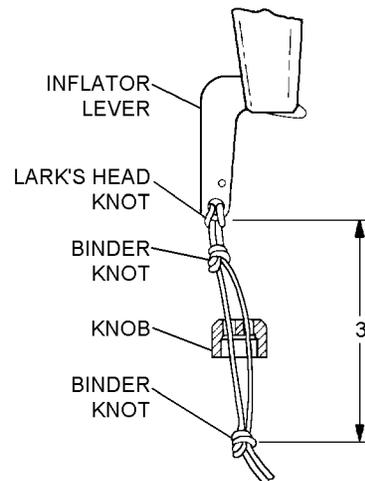
4. Fold the 15-inch length of cord in half, pass folded end through hole in end of inflator lever and tie the cord strands with a lark's head knot, followed by binder knot.



**Step 4 - Para 22-54**

V0054004

5. Thread the cord strands through the top of the knob (one strand through each hole) and tie a binder knot three inches from the lever end.



**Step 5 - Para 22-54**

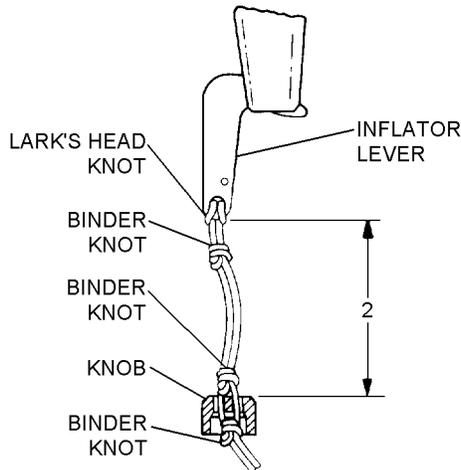
V0054005

## NAVAIR 13-1-6.1-2

6. Slide knob down to single knot and tie a binder knot on the top of the knot to secure it in position.

### NOTE

Ensure 2-inch length of lanyard exits from the end of the lever to the top of the knob.



**Step 6 - Para 22-54**

V0054006

7. Install inflator and gaskets, nut and CO<sub>2</sub> cylinders.

**22-55. REPLACEMENT OF LANYARD CORD (SAF-T-PAK).** To replace lanyard cord used with SAF-T-PAK inflation valve, see [paragraph 22-54](#). To replace lanyard cord used with MIL-L-25370, Type 2 inflation valve, proceed as follows:

### Materials Required

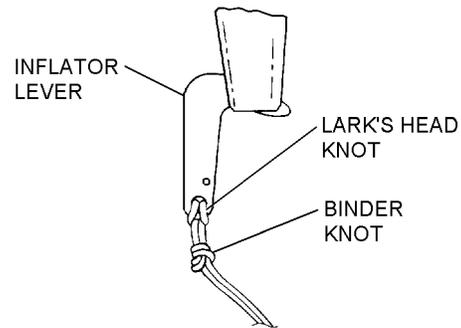
Quantity	Description	Reference Number
16 inches	Cord, Nylon, Type I (color optional)	MIL-C-5040 NIIN 00-014-6699

1. Carefully remove carbon dioxide cylinder from the inflator assembly.

2. If desired, remove nut and rubber gasket retaining the inflator and remove inflator and lanyard assembly.

3. Cut lanyard to be replaced and discard along with the two brass clips.

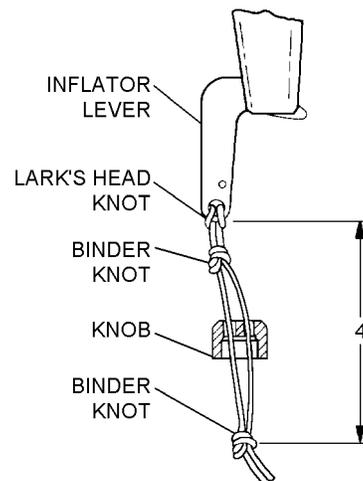
4. Fold the 16-inch length cord in half, pass folded end through hole in end of inflator lever and tie the cord strands with a lark's head knot, followed by a binder knot.



**Step 4 - Para 22-55**

V0055004

5. Thread the cord strands through the top of the knob (one strand through each hole) and tie a binder knot 4 inches from the lever end.



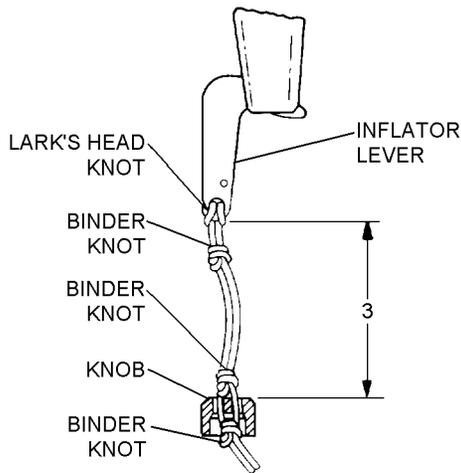
**Step 5 - Para 22-55**

V0055005

6. Slide knob down to single knot and tie a binder knot on the top of the knob to secure it in position.

**NOTE**

Ensure 3-inch length of lanyard exits from end of the lever to the top of the knob.



**Step 6 - Para 22-55**

V0055006

7. Install inflator and gaskets, nut and CO<sub>2</sub> cylinders.

**22-56. REPLACEMENT OF DEFECTIVE SNAP FASTENERS.** To replace defective snap fasteners on inflation assembly protective flap, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
1	Cap, Snap Fastener	MS27981-1B NIIN 00-276-4954
1	Socket, Snap Fastener	MS27981-3B NIIN 00-276-4966
1	Stud, Snap Fastener	MS27981-4B NIIN 00-901-9660
2	Post, Snap Fastener	MS27981-5B NIIN 00-250-6858

**NOTE**

When replacing a defective snap fastener, the mating snap fastener must also be replaced.

1. Using end cutters, remove damaged snap fastener stud and mating socket from eyelets and buttons

2. Install new snap fasteners as necessary.

**22-57. REPAIR OF CORRODED CO<sub>2</sub> INFLATION VALVE MIL-L-25370.** To repair CO<sub>2</sub> inflation valve MIL-L-25370, Type II, proceed as follows:

Materials Required		
Quantity	Description	Reference Number
As Required	Lubricant, Silicone	(CAGE 71984) NIIN 00-975-0712
1	Valve Stem and Seat Seal Kit (Note 1)	105AS100-5 (CAGE 30003) NIIN 00-498-6964
As Required	Cloth, Emery No. 240	—
1	Valve, Inflation	MIL-L-25370 Type II
As Required	Abrasive Mat	MIL-A-9962 NIIN 00-967-5093
As Required	Corrosion Preventive Compound (Amiguard) Type I	MIL-C-85054 NIIN 00-041-1596

Notes: 1. Valve Stem and Seat Seal Kit, P/N 105AS100-5, NIIN 00-498-6964, contains two top, two bottom, and two seat seal gaskets.

1. Remove CO<sub>2</sub> cylinder from valve and retain. Discard seat seal gasket.

## NAVAIR 13-1-6.1-2

2. Remove inflation valve from preserver. Discard two gaskets on valve stem.

3. Remove grooved taper pin (retaining lever) from inflation valve, using awl and mallet. See [figure 22-6](#).

4. Remove lever, spring, and piercing pin. If spring is broken or corroded, replace entire valve.

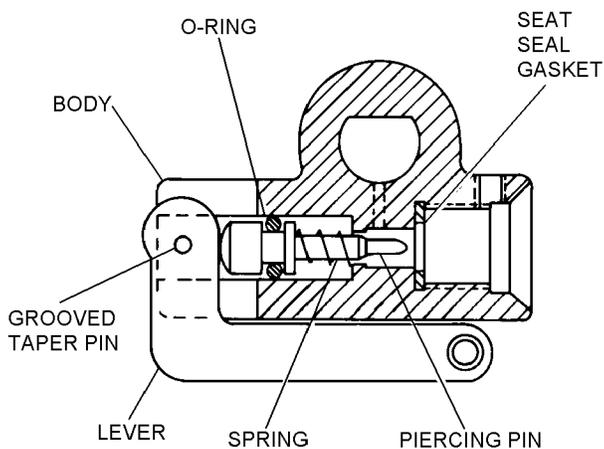
5. If piercing pin or actuating lever is corroded, remove corrosion with abrasive mat. If abrasive mat is ineffective, use 240 grit emery cloth. Do not damage O-ring on piercing pin. Wipe off any dirt or moisture from actuating lever and apply a thin coat of MIL-C-85054 and allow to dry.

6. Clean residue from actuating lever on piercing pin. Lightly coat base of piercing pin with silicone lubricant.

7. Reassemble inflation valve and operate actuating lever three or four times. Ensure that lever and piercing pin move freely.

8. If piercing pin and lever do not move freely, obtain replacement valve.

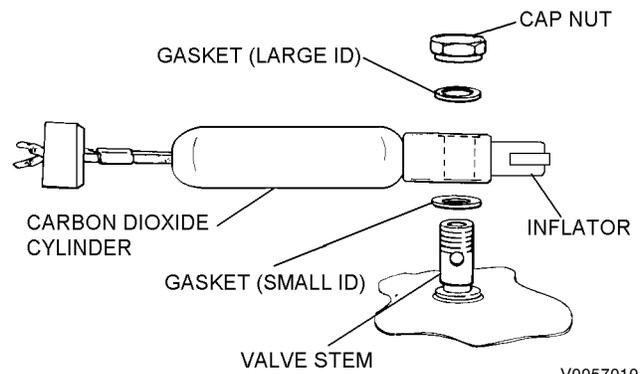
9. Reinstall inflation valve on life preserver using new gaskets.



10220006

**Figure 22-6. CO<sub>2</sub> Inflation Assembly**

10. Install cap nut onto valve stem and torque to a value of  $8 \pm 1$  in-lb.



V0057010

**Step 10 - Para 22-57**

11. Reinstall CO<sub>2</sub> cylinder using new seat seal gasket.

**22-58. REPLACEMENT OF TOP AND BOTTOM GASKETS.** To replace the top and bottom gaskets on the inflator, proceed as follows:

### Support Equipment Required

Quantity	Description	Reference Number
1	Wrench, 9/16-inch	—

### Materials Required

Quantity	Description	Reference Number
1	Valve Stem and Seat Seal Kit ( <a href="#">Note 1</a> )	105AS100-5 (CAGE 30003) NIIN 00-498-6964

Notes: 1. Valve Stem and Seat Seal Kit, P/N 105AS100-5, NIIN 00-498-6964, contains two top, two bottom, and two seat seal gaskets.

1. Remove cap nut and top gasket from inflator.

**WARNING**

Ensure that gaskets are properly positioned. The top gasket has a larger internal diameter than the bottom gasket.

2. Remove inflator and replace bottom gasket.
3. Carefully place inflator onto valve stem.
4. Install top gasket onto valve stem.
5. Tighten cap nut onto valve stem and torque to a value of  $8 \pm 1$  in-lb.
6. Perform functional and leakage tests on life preserver cell that was repaired. Refer to paragraphs 22-26 and 22-34.

**22-59. REPLACEMENT OF CHECK VALVE ASSEMBLY.** To replace a defective check valve assembly, proceed as follows:

Materials Required

Quantity	Description	Reference Number
1	Valve, Pneumatic Inflator (Check Valve Assembly) (Note 1)	Schrader-Bridgeport P/N 8457500047

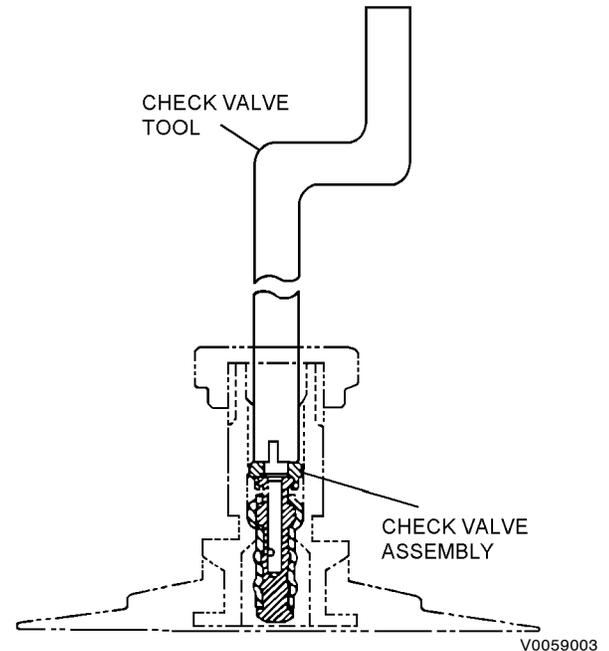
Notes: 1. Schrader-Bridgeport P/N 8457500047 must be open purchased from:  
 Schrader-Bridgeport Intl  
 205 Frazier Rd  
 P.O. Box 668  
 Altivista, VA 24517  
 Phone (804) 369-8875

Support Equipment Required

Quantity	Description	Reference Number
1	Tool, Valve Core	8769A or equivalent (CAGE 27783) NIIN 01-354-5423
1	Wrench, Torque	—

1. If not available, fabricate a valve core tool as shown in Chapter 3.
2. Remove inflator cap nut.

3. Insert valve core tool and unscrew check valve from valve stem.



Step 3 - Para 22-59

4. Insert new check valve in valve stem and tighten with valve core tool hand tight.
5. Replace cap nut and torque to a value of  $8 \pm 1$  in-lb.
6. Perform a functional and leakage test on life preserver cell that was repaired. Refer to paragraphs 22-26 and 22-34.

**22-60. REPAIR/FABRICATION OF LIFELINE AND TOGGLE ASSEMBLY.** To repair or fabricate life line and toggle assembly, proceed as follows:

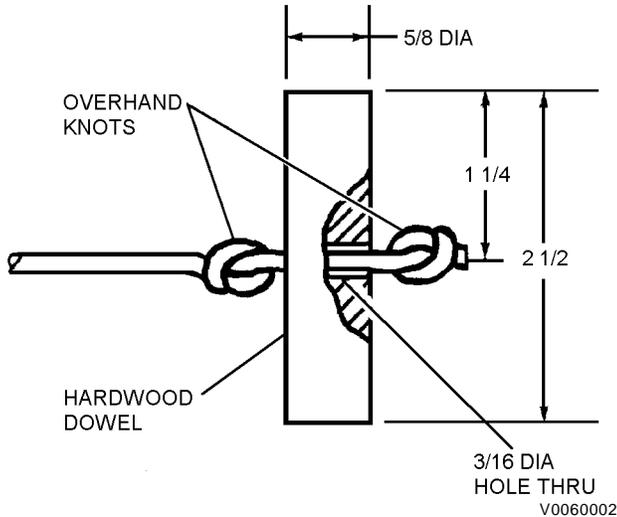
Materials Required

Quantity	Description	Reference Number
36-inch length	Cord, Nylon, Type III	MIL-C-5040 NIIN 00-240-2146
1	Dowel, hardwood 2 1/2-inch x 5/8-inch diameter	—
1	3/16-inch drill	—
As Required	Thread, Nylon Type II, Size E	V-T-295 NIIN 00-204-3884

1. Drill a 3/16-inch diameter hole in the center of a 2 1/2-inch x 5/8-inch diameter wooden dowel.

## NAVAIR 13-1-6.1-2

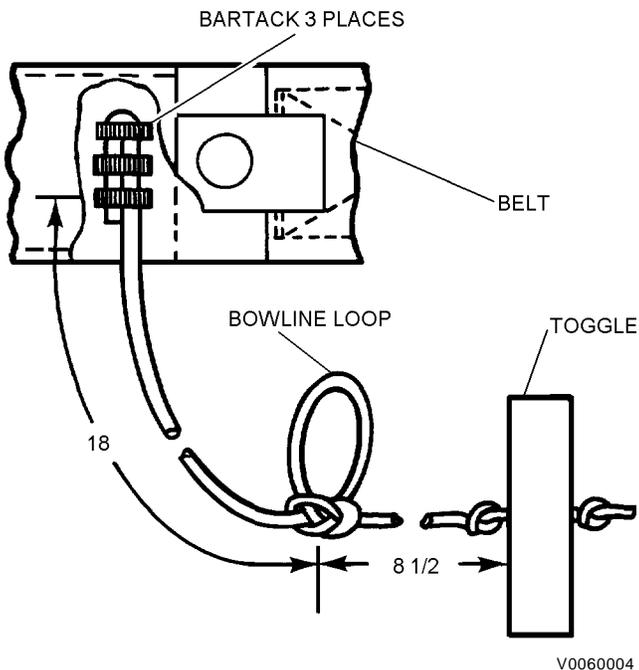
2. Pass one end of a 36-inch length of Type III nylon cord through the 3/16 inch diameter hole in center of wooden dowel. Secure cord with an overhand knot on each side of dowel.



**Steps 1 and 2 - Para 22-60**

3. Place a 1 1/4-inch diameter bowline loop in nylon cord 8 1/2 inches from center of wooden dowel.

4. Attach free end of Type III nylon cord to belt using a bartack in three places.



**Steps 3 and 4 - Para 22-60**

**22-61. FABRICATION OF LPU-31/P PROTECTIVE COVER ASSEMBLY.** To fabricate the protective cover assembly, proceed as follows:

### Materials Required

Quantity	Description	Reference Number
31 X 36 inches	Cloth, Duck, Nylon Type II, Sage Green	MIL-C-7219 NIIN 00-765-2863
	-or-	
44 inches	Cloth, Plain Weave, Non-Melting, Type II, Olive Green	MIL-C-83429 NIIN 00-516-1998
44 inches	Fastener Tape, Pile, Type II, Olive Green, 1-inch Width	MIL-F-21840 NIIN 00-106-5974
44 inches	Fastener Tape, Hook, Type II, Olive Green, 1-inch Width	MIL-F-21840 NIIN 00-106-5973
As Required	Thread, Nylon, Type II, Size E, Sage Green	V-T-295 NIIN 00-204-3884
	-or-	
	Thread, Nylon, High Temperature Resistant, Sage Green	MIL-T-83193 NIIN 00-405-2252

1. Construct patterns and assemble using figures 22-7 through 22-11.

2. Cut fabric pieces and sear all edges.

3. Cut the following pieces of 1-inch width hook and pile tape and sear ends.

- 2 pieces each 13 3/4 inches long.
- 4 pieces each 3 inches long.
- 1 piece each 2 inches long.
- 2 pieces each 1 1/4 inches long.

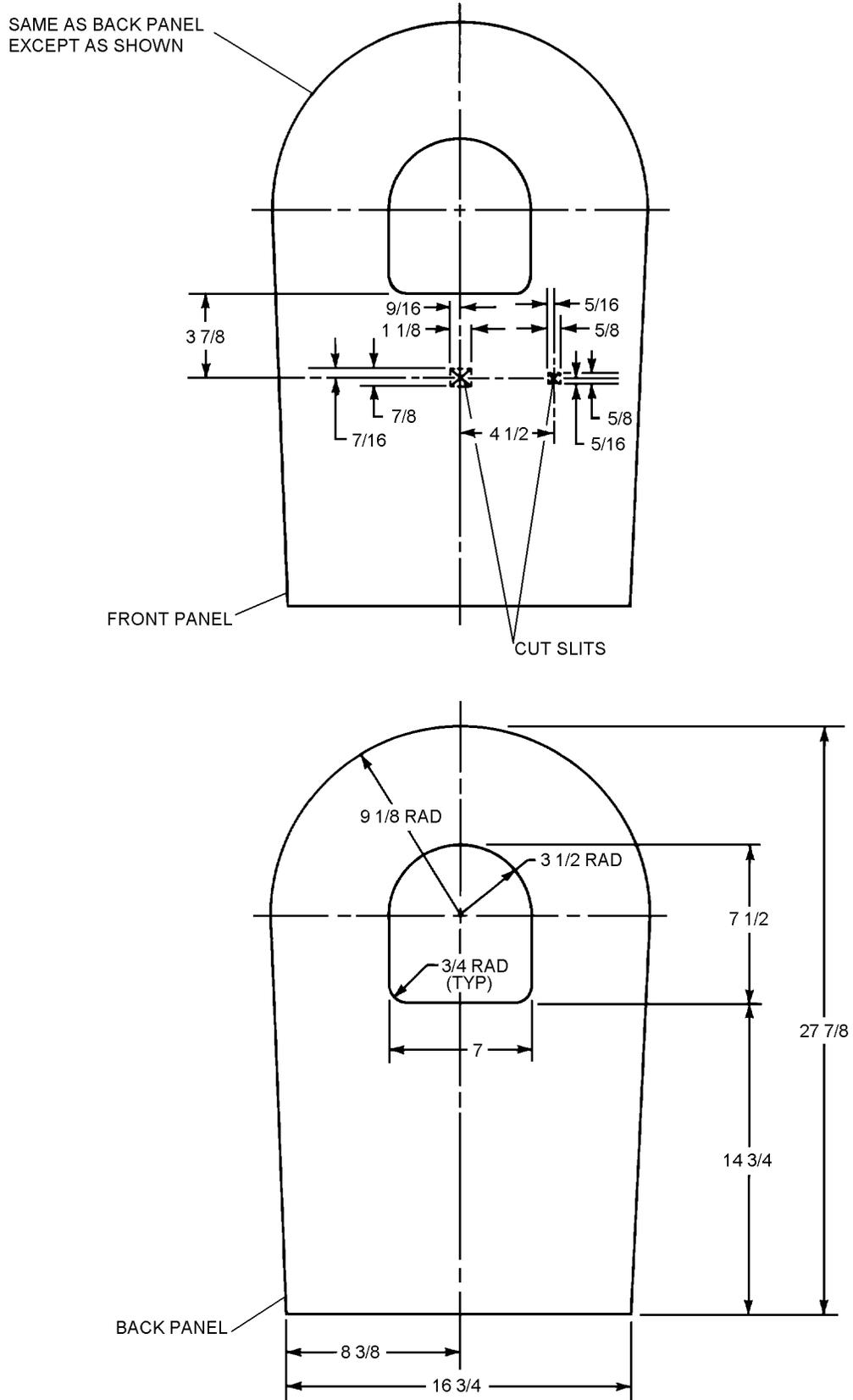


Figure 22-7. Front and Back Panels

10220007

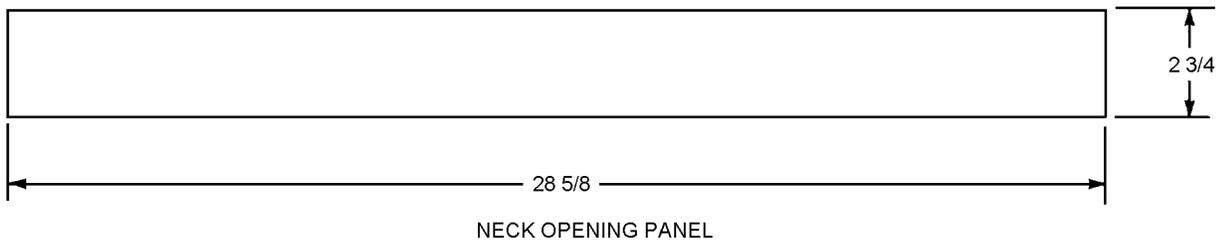
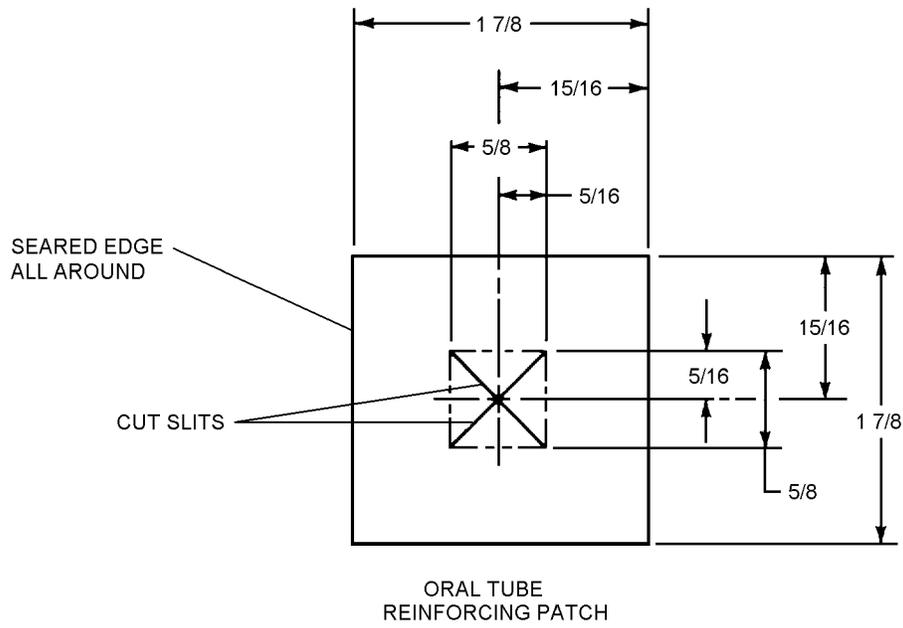
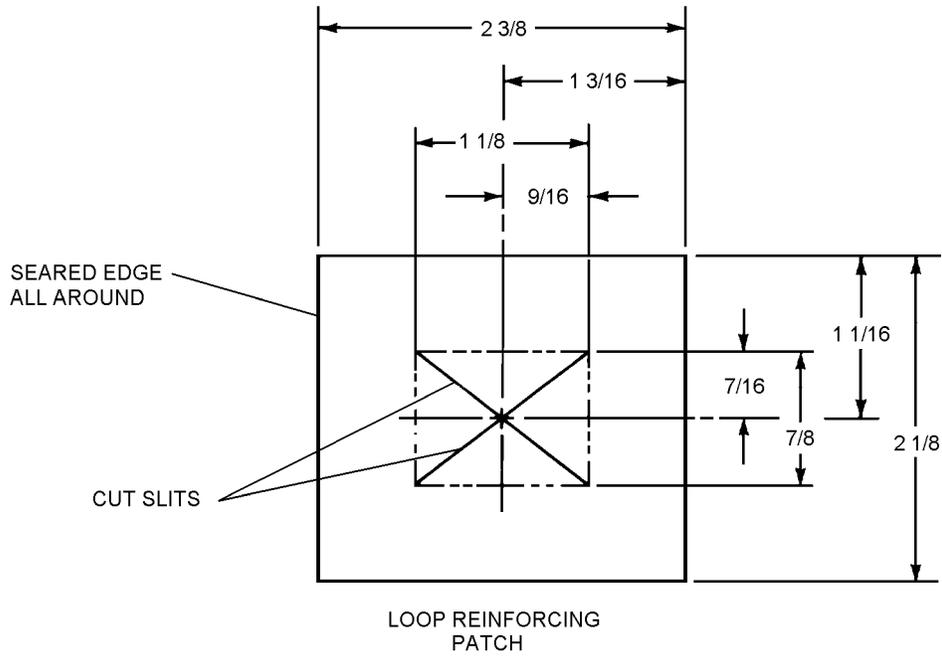
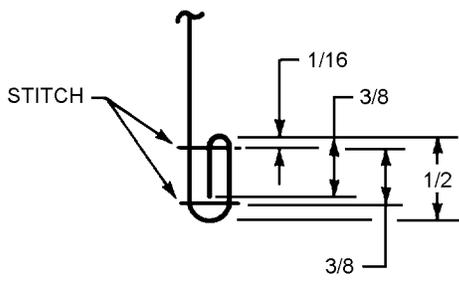
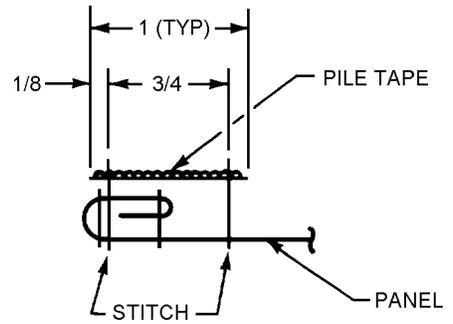


Figure 22-8. Flat Patterns

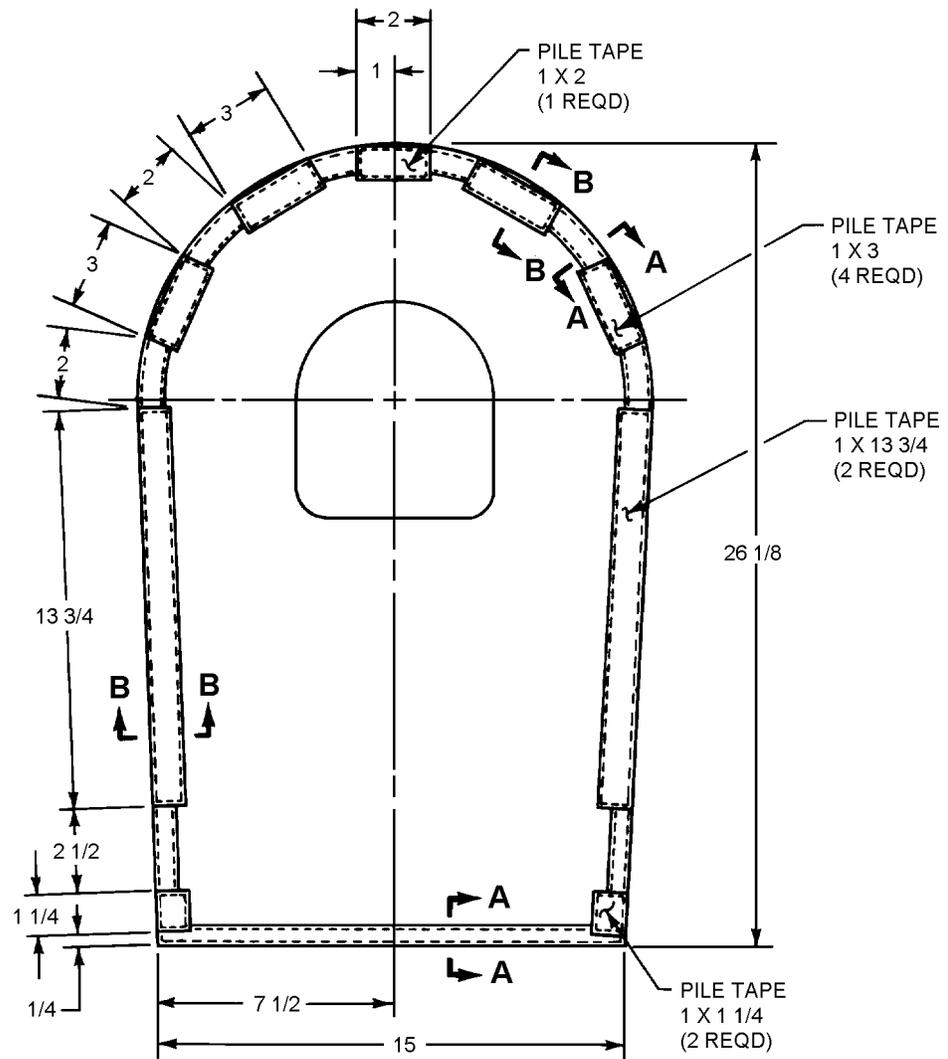
10220008



**SECTION A-A**  
TYPICAL  
(ENLARGED)



**SECTION B-B**  
TYPICAL  
(ENLARGED)



**Figure 22-9. Back Panel Assembly (Inside Shown)**

10220009

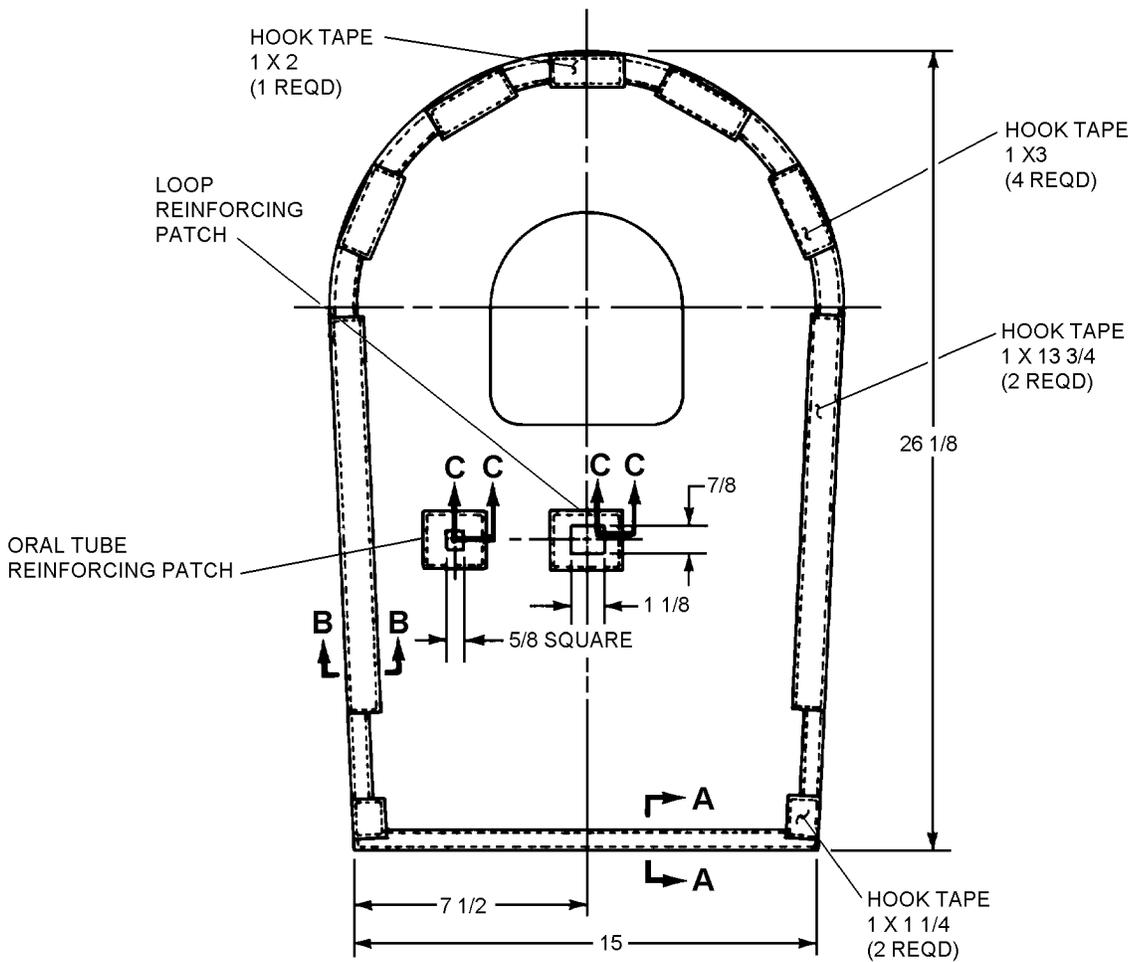
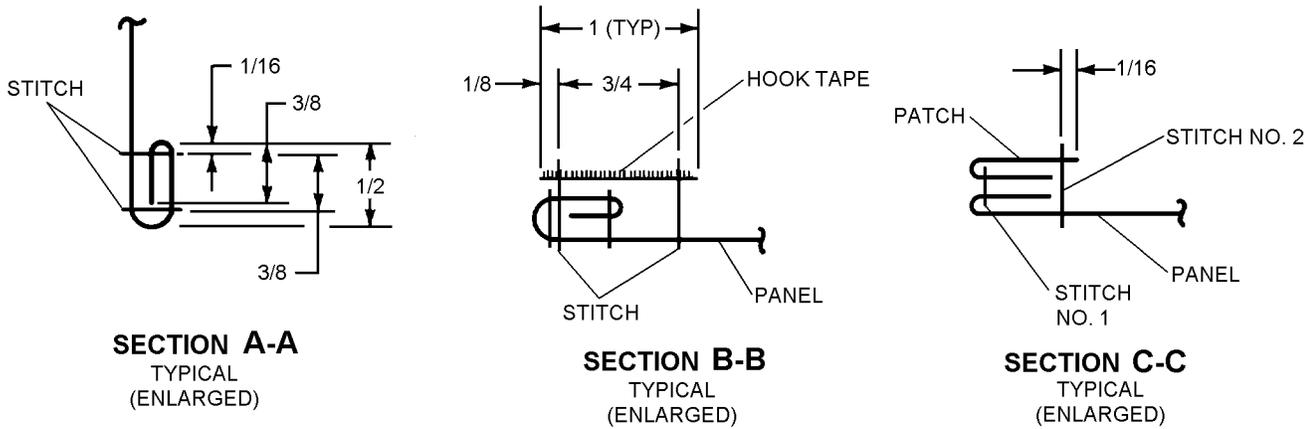


Figure 22-10. Front Panel Assembly (Inside Shown)

10220010

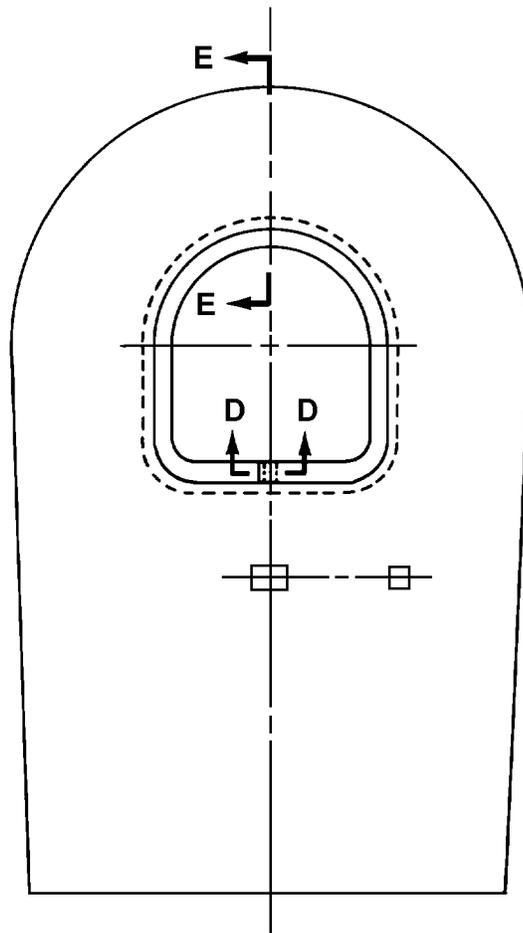
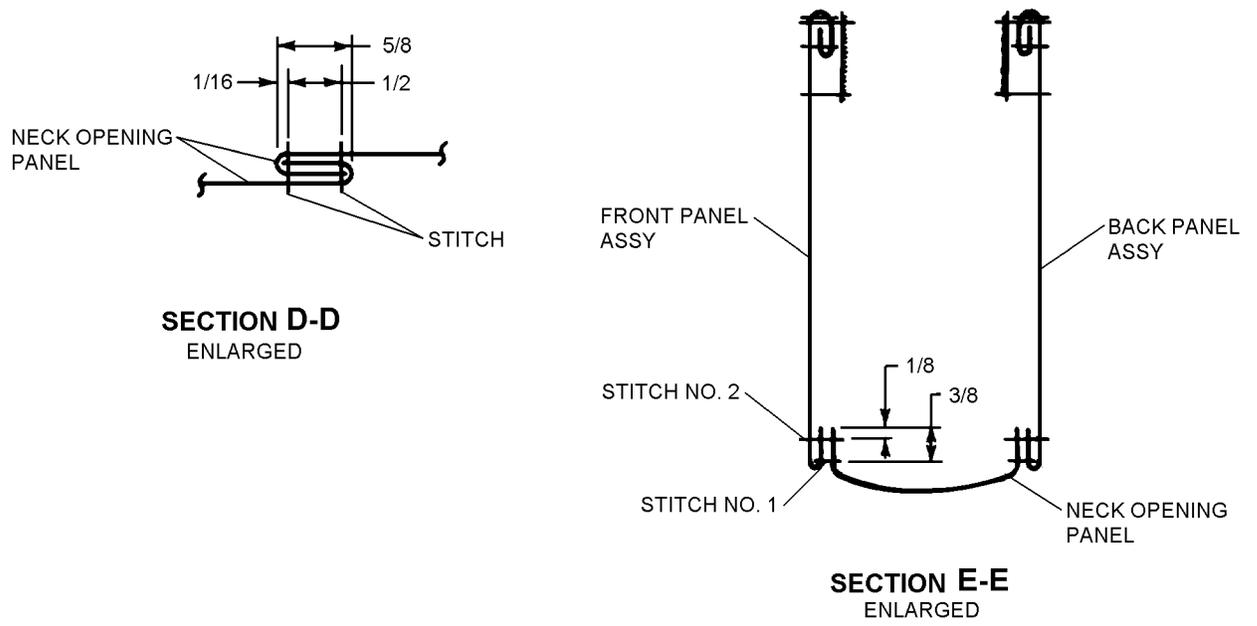


Figure 22-11. Cover Assembly

10220011

## NAVAIR 13-1-6.1-2

### NOTE

All stitching shall be performed using stitch type 301. Backstitch at least 1/2 inch on all rows of stitching.

4. Stitch outer edges of front and back panels as shown in [figure 22-9, section A-A](#), and [figure 22-10, section A-A](#).

5. Stitch pile tape to inside of back panel as shown in [figure 22-9, section B-B](#).

6. Stitch hook tape to inside front panel as shown in [figure 22-10, section B-B](#).

7. Position oral inflation tube and loop reinforcing patches on the outside of the front panel. Stitch around openings. Push patches through slits to opposite side of panel. Turn under edges and stitch close to inside and outside edges. Refer to [figure 22-10, section C-C](#).

8. Join ends of the neck opening panel as shown in [figure 22-11, section D-D](#).

9. Attach neck opening panel to front and back panels as shown in [figure 22-11, section E-E](#). Ensure that hook and pile tape sections mate properly.

### NOTE

Prior to installing cover assembly on flotation assembly, remove the following items from the life preserver and retain for spare parts.

Storage Container  
Pouch  
Sea Dye Marker  
Whistle  
Survivor Locator Light

10. Identify protective cover by adding new life preserver identification, LPU-31/P ASSY., using waterproof black ink. Identification shall be centered on the front of the protective cover, with the tops of the letters 2 inches below the opening for the oral inflation tube.

11. To install the flotation assembly in the protective cover, pull the oral inflation tube through the opening in the cover and pass the oral inflation tube through the loop. Close the container by pressing the hook and pile tapes together.

## 22-62. PACKING PROCEDURE FOR LPU-31/P LIFE PRESERVER ASSEMBLY.

22-63. The LPU-31/P Life Preserver Assembly shall be packed by qualified personnel at the lowest level of maintenance possible. For cleaning and servicing of the life preserver assembly refer to [paragraph 22-38](#).

22-64. To pack the LPU-31/P Life Preserver Assembly, proceed as follows:

1. Ensure that preserver, cover and belt have been inspected in accordance with [paragraph 22-15](#).

2. Ensure that belt is inserted through retaining channel on rear of flotation assembly.

3. Install flotation assembly in protective cover and secure hook and pile tapes.

### NOTE

Step 4 should be performed only after scheduled inspection or maintenance.

4. Make necessary entries on appropriate form in accordance with OPNAVINST 4790.2 Series.

## Section 22-4. Illustrated Parts Breakdown (IPB)

### 22-65. GENERAL.

22-66. This section lists and illustrates the assemblies and detail parts of the LPU-31/P Life Preserver.

22-67. The Illustrated Parts Breakdown should be used during maintenance when requisitioning and identifying parts.

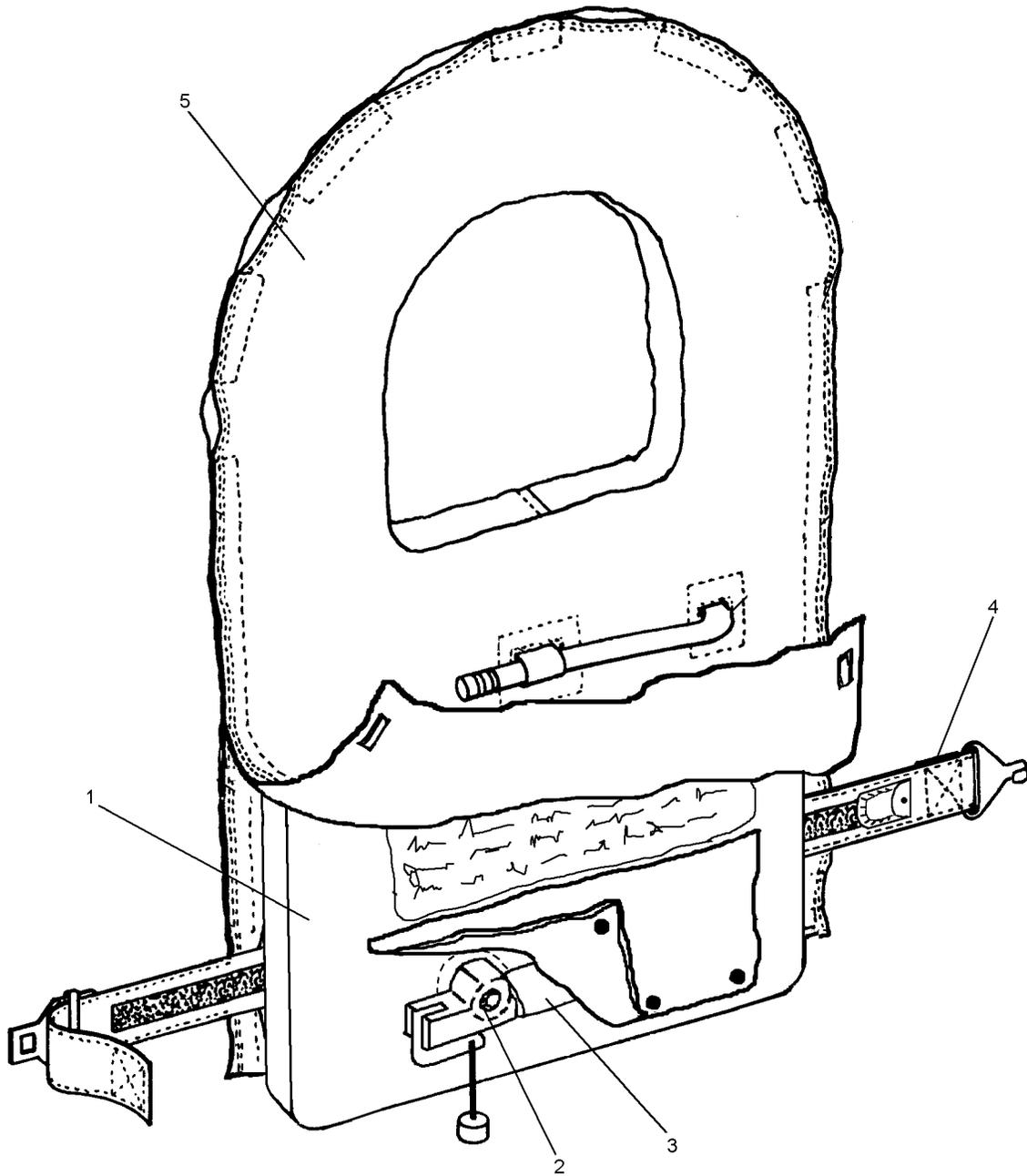


Figure 22-12. LPU-31/P Life Preserver Assembly, Illustrated Parts Breakdown

10220012

**NAVAIR 13-1-6.1-2**

Figure and Index Number	Part Number	Description	Units Per Assembly	Usable On Code
		1 2 3 4 5 6 7		
22-12	No Number	LPU-31/P LIFE PRESERVER ASSEMBLY .....	REF	
-1	36H1336-1	. LIFE PRESERVER, LPP-1, Inflatable .....	1	A
	68A94D2-1	. LIFE PRESERVER, LPP-1A, Inflatable .....	1	B
-2	SAF-T-PAK	. . INFLATION VALVE ASSEMBLY .....	1	A
		(See Note 1)		
	MIL-L-25370	. . INFLATION VALVE ASSEMBLY .....	1	B
		(Type II)		
-3	NIIN 00-372-0585	. . . CO <sub>2</sub> CYLINDER, 25-28 Grams .....	1	A
		(MIL-C-25369, Type I)		
	NIIN 00-543-6693	. . . CO <sub>2</sub> CYLINDER, 28-31 Grams .....	1	B
		(MIL-C-25369, Type II)		
-4	68A94D4-1	. . BELT ASSEMBLY .....	1	
-5	No Number	. PROTECTIVE COVER .....	1	
NOTE:		1. SAF-T-PAK inflation assembly no longer carried by supply. Use until no longer serviceable and replace with MIL-L-25370 (Type II).		

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