

**MUSTANG SURVIVAL INTEGRATED AIRCREW LIFE  
PRESERVER AND SURVIVAL VEST,  
MUSTANG MODEL MSV971**

**DESCRIPTION AND MAINTENANCE INSTRUCTIONS  
JUNE 9, 2004, REV: 1.0**



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## 1.0 INTRODUCTION

### 1.1 GENERAL

- 1.1.1 The MSV971 LP/SV comprises of an aircrew life preserver fully integrated with a survival vest.
- 1.1.2 The life preserver is universal in size and fit. The survival vest is designed in four sizes, in order to be close fitting and adaptable to each individual user.

**Figure 1. Vest Sizes**

SIZE	CHEST SIZE RANGE
SMALL	36 - 40 inches / 91 - 102 cm
MEDIUM	40 - 44 inches / 102 - 112 cm
LARGE	44 - 48 inches / 112 - 122 cm
EXTRA LARGE	48 - 52 inches / 122 - 132 cm

### 1.2 CONTACT

- 1.2.1 For further information concerning this manual or the LP/SV, contact:

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### 1.3 RIGHTS RESERVED

- 1.3.1 GORE-TEX® is a registered trademark of W.L. Gore and Associates.
- 1.3.2 Velcro™ is a trademark of American Velcro™ Inc.
- 1.3.3 Nomex® is a registered trademark of DuPont.

### 1.4 RESPONSIBILITIES

- 1.4.1 The individual to whom the LP/SV is issued or assigned, following internal training, assumes responsibility for pre and post use inspections and for returning the LP/SV to the Life Support Equipment shop for periodic inspection and testing on required dates.
- 1.4.2 Each operational organization is responsible for the instruction and survival training of all MSV971 users in the following:
  - a. Fitting and operation of the LP/SV.



- b. Purpose, use and operation of all LP/SV furnished equipment accessories.
- c. Importance and method of visual pre and post use inspections.

1.4.3 The Aviation Life Support Equipment shop is responsible for:

- a. Periodic inspection and testing of the LP/SV.

**NOTE: The inspection interval should not exceed 180 days (see section 5.0).**

- b. Inspection when first issued from a Supply Depot or contractor and prior to issue for service.
- c. Maintenance, cleaning, and repair if and when required.
- d. Ensuring that a fully charged carbon dioxide (CO<sub>2</sub>) cylinder and functional CO<sub>2</sub> inflation device are properly installed prior to issue.
- e. Requisitioning and maintaining stocks of spare parts.
- f. Maintenance of inspection records of all MSV971 units.

#### 1.4.4 Testing

1.4.4.1 All LP/SV's are tested to ensure the highest level of reliability and performance. Mustang Survival offers superior quality under rigid QA standards which are certified to ISO-9001.

#### 1.4.5 Fit

1.4.5.1 When an MSV971 unit is initially issued to aircrew personnel, assigned to an aircraft passenger, or seasonal environments dictate the changing of personnel flight clothing it is to be individually fitted to the wearer. The wearer is to be fully instructed in the donning and adjustment procedures.



## 2.0 FEATURES

### 2.1 DESIGN AND CONSTRUCTION

#### 2.1.1 General

2.1.1.1 Mustang Survival personal LP/SV's are designed to provide flotation in case of accidental immersion in water, minimizing the risk of drowning.

2.1.2 Familiarize yourself with all the features of the LP/SV to maximize its effectiveness. Illustrations are provided to support the text.

**NOTE: All location reference points in this section are based from the perspective of the person wearing the LP/SV.**

### 2.2 ASSEMBLED LP/SV

Figure 2. Component Locations (front view)





Figure 3. Component Locations (rear view)



## 2.3 LIFE PRESERVER

2.3.1 The life preserver cover (see figure 29) is attached directly to the survival vest with an interlocking (Dutch style) speed lacing loop system (see figure 4) and is easily removable. The life preserver consists of two major components:

- a. Inflatable Cell
- b. Protective Container

2.3.2 The inflatable cell is attached to the Survival Vest at three points; one directly to the protective container by means of a short speed lacing loop system at the rear. The other two direct attachment points are where the webbing straps attach to the front lobes. The free end of the Survival Vest anchor strap passes through the slots on the back side the protective cover and through the inflatable cell grommets (1.0 inch (25 mm) plastic grommets RF bonded in place), located at the lower points of the cell lobes. A 'lift the dot' snap is used to secure them in place. The inflatable cell, when folded, is contained within the protective container by means of a perimeter zipper closure system and a Velcro™ patch located at the rear at the zipper ends.

## 2.4 INFLATABLE CELL

2.4.1 The inflatable cell is made from polyurethane coated nylon fabric and is yellow in colour. The perimeter of the cell is sealed using radio frequency (RF) bonding.

**NOTE: All location reference points in this section are based from the perspective of the person wearing the LP/SV.**

2.4.2 The inflatable cell comprises two independent chambers, front and rear, which are created by the provision of a separate ply of unsupported polyurethane film between the outer panels of

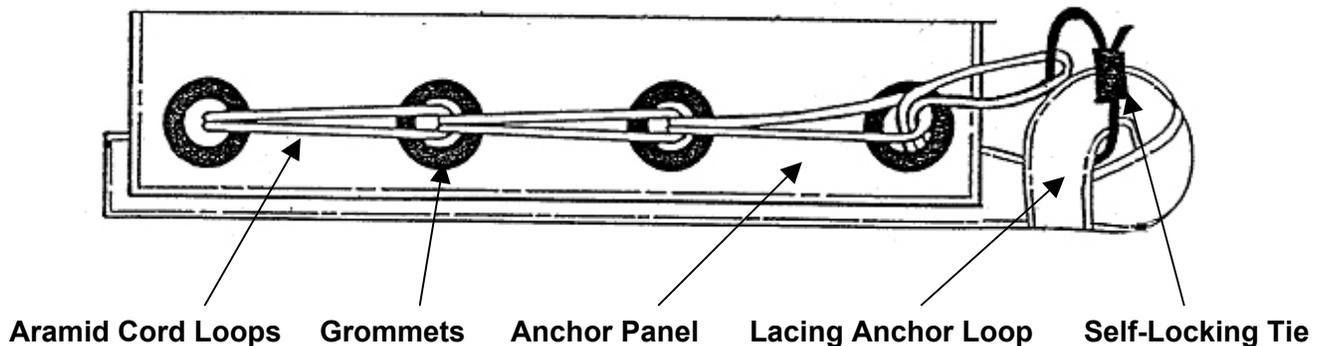


the cell. This ply forms a floating baffle, which is free to move between the front and rear panels depending on the gas volume in each chamber.

**WARNING: The MSV971 is configured with a manual inflation system and will not automatically inflate when immersed in water.**

- 2.4.3 Normal manual inflation by carbon dioxide gas (CO<sub>2</sub>), fully inflates the rear chamber. The front chamber may be inflated by mouth only, and provides for redundancy in an event where the rear chamber becomes damaged or requires topping up.
- 2.4.4 When inflated, the cell forms a yoke around the back of the user's neck, extending into two lobes down the user's chest.
- 2.4.5 A cell anchor strip is permanently attached to the rear panel of the inflatable cell to permit attachment of the cell to the protective container by means of an interlocking (Dutch style) speed lacing loop system.

**Figure 4. Speed Lacing Loop System**



- 2.4.6 The inflatable cell is designed to provide a minimum buoyant force of 15.9 kg (35 lb), when fully inflated with 34-37 grams of carbon dioxide (CO<sub>2</sub>) gas in ambient temperatures above 0° C (32° F).



## 2.5 MANUAL CO<sub>2</sub> INFLATION DEVICE

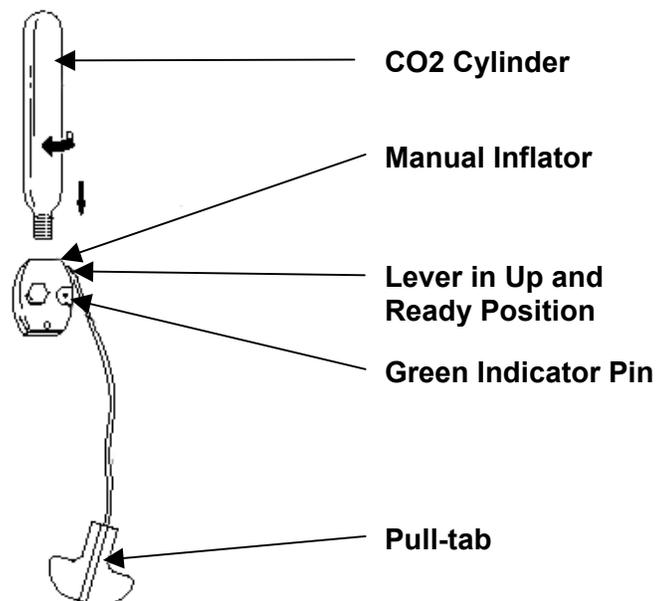
The MSV971 is an appropriate platform for a wide variety of customized LP/SV units to address user requirements that include:

- use in ejection seat fitted aircraft
- use with an automation inflation device
- stowage of unique pieces/combinations of survival equipment

Contact Mustang Survival for further details.

2.5.1 Life preservers, which are intended for use in non-ejection seat, equipped aircraft incorporate a manually operated inflation device. The operating components of the manual inflation device (Halkey-Roberts HD77189 840 AMLS INFLATOR) are shown in figure 5.

**Figure 5. Manual CO<sub>2</sub> Inflation Device – Non-Operated/Ready Position**



2.5.2 The manual inflation device is located on the rear left lobe of the inflatable cell. The inflation device is secured with a cap nut to the manifold valve, which in turn is RF bonded to the inflatable cell. A 34-37 gram carbon dioxide (CO<sub>2</sub>) cylinder is threaded into the top of the inflation device, and is secured against the cell with a looped nylon elastic retaining strap. The beaded inflation handle is attached with a lanyard to the operating lever of the inflation device, which in turn is safety tied by inserting and tying a red cotton witness thread through the hole in the operating lever and through the hole in the body of the inflation device.

## 2.6 BEADED CO<sub>2</sub> INFLATION HANDLE

2.6.1 The beaded inflation handle is constructed of six plastic beads threaded onto a loop of nylon webbing. The handle is attached with a lanyard to the operating lever of the CO<sub>2</sub> inflation device and is fixed with Velcro™ to the back side of the left lobe of the protective container.



The beaded handle is designed to provide a positive grip for inflation of the preserver with cold, wet or gloved hands.

## 2.7 ORAL INFLATOR

2.7.1 Two oral inflator valve assemblies are attached to the inflatable cell. Each oral inflator valve assembly consists of an oral inflation valve mounted in an oral inflation tube, which in turn is RF bonded to the inflatable cell. Both oral inflators are secured against the cell with a Velcro™ retaining strap. Each oral inflator accesses a separate chamber.

2.7.2 The oral inflator located on the front left lobe of the inflatable cell inflates/deflates the front chamber. This inflator is used in the event that the rear inflatable chamber becomes damaged or if the other chamber fails to inflate. When the inflatable cell is stored (packed), this inflator valve is locked in the open position for use as back-up in an emergency.

2.7.3 The oral inflator located on the rear right lobe of the inflatable cell inflates/deflates the rear inflatable chamber. This inflator provides an alternate means of inflation in the unlikely event that the manual or automatic inflation device malfunctions. When the inflatable cell is stored (packed), this inflator valve is locked in the closed position to prevent venting during inflation.

2.7.4 Both inflators also provide a means of "topping up" the cell to compensate for normal leakage or under-inflation due to excessively cold temperatures. As well, these oral inflators provide a means for cell deflation.

## 2.8 PROTECTIVE CONTAINER

2.8.1 The protective container is constructed of flame retardant aramid Nomex® cloth, sage green in color. It is attached directly to the survival vest with a speed lacing loop system. The container houses the inflatable cell, providing a compact, flame resistant protective enclosure.

2.8.2 The un-inflated cell is attached directly to the inside of the protective container with a speed lacing loop system. The cell is neatly folded and packed within the container, which in turn is secured in the closed position with a system of slide fasteners, and a Velcro™ tab. The tail ends of the slide fastener tapes are protected by 'tucking' the tails into the lower openings of the secured container to prevent premature opening.

2.8.3 The container's slide fastener closure is closed with separate sliders, which are stowed and secured with a lanyard inside the pockets located on the inside of the survival vest.

2.8.4 The inflation handle lanyard passes through the upper reinforced opening at the rear left of the container and Velcro™ attaches the beaded inflation handle to the underside of the protective container. The anchor straps for the lobes of the inflatable cell pass through the lower reinforced openings in the protective container.

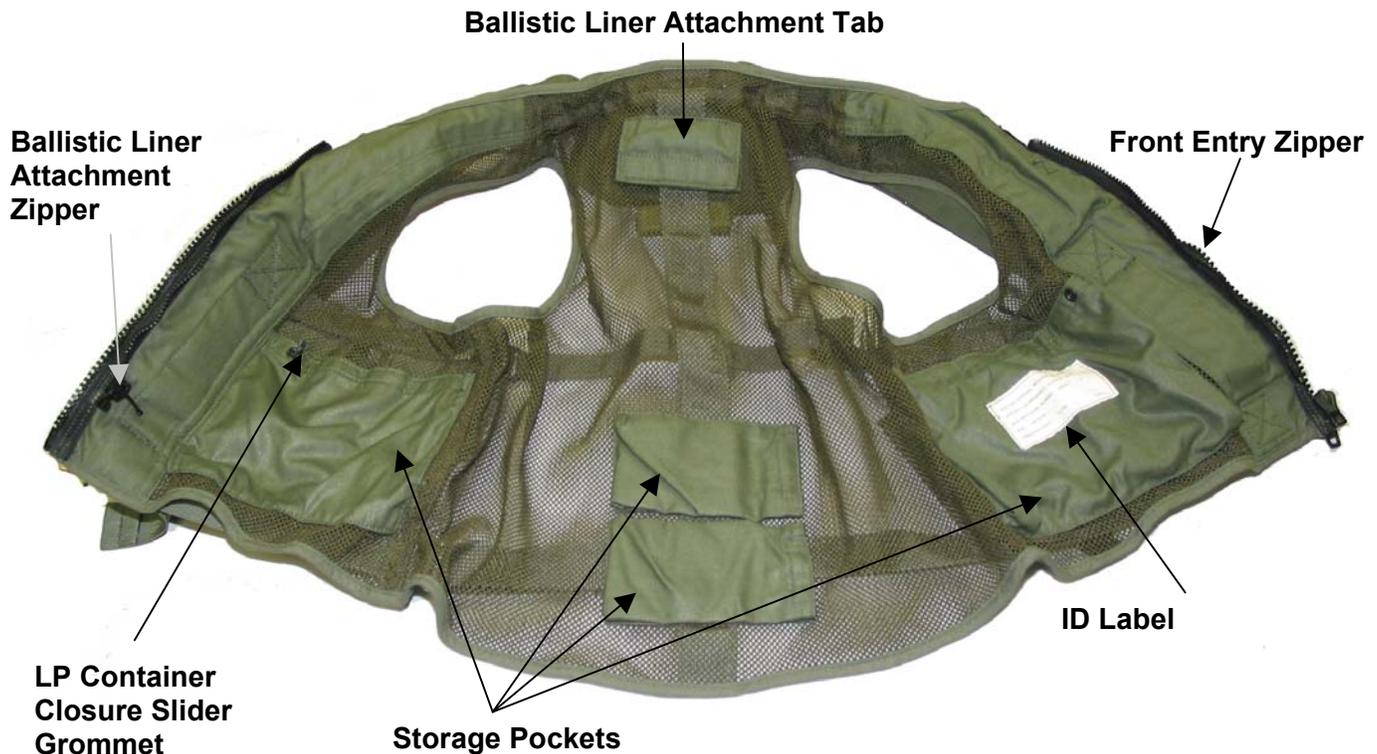
2.8.5 Inflation of the life preserver, forces the fasteners around the periphery of the container to separate, allowing the cell to reach its fully inflated shape.



## 2.9 SURVIVAL VEST

- 2.9.1 The Survival Vest is designed for use in fixed seat equipped aircraft, providing a mounting platform for the life preserver equipped with a manual inflation device.

**Figure 6. Inside View of the LP/SV**



- 2.9.2 The survival vest is a waistcoat style vest constructed of sage green, flame retardant, Nomex<sup>®</sup> cloth and mesh. The vest incorporates six outside pockets and four inside pockets, for the storage of personal survival equipment. Customers may contact Mustang Survival to select different pocket configurations.

- 2.9.3 Also provided are two rings located on the front of the vest, between the lobes of the protective container. These rings are meant to provide a suitable attachment point for reducing the hanging weight of mask/helmet-mounted equipment (i.e. chemical protective canisters) relieving stress to the neck.

- 2.9.4 The vest is donned and secured at the front with a large black nylon entry zipper and a waist buckle. A snap tab is provided at the top, to retain the zipper slider tab and, to ensure that the zipper remains secured in windblasts. The waist belt and side adjustment straps provide adjustment.

- 2.9.5 A series of life preserver attachment loops, constructed of loops of sage green, fire retardant Nomex<sup>®</sup> cord, are sewn into a folded nylon tape strip, which is secured down the front left and front right chest area, and across the upper back, below the neck. These loops provide a means for attachment of the life preserver protective container.



## 2.10 RESCUE HARNESS SYSTEM

- 2.10.1 The vest incorporates a rescue harness system, consisting of a left side and right side harness handle loop. The harnesses are sewn directly to the outside of the vest, and are constructed of sage green nylon webbing, folded and stitched over a stainless steel reinforcement cable which is used only to maintain the loop shape of the harness. Both sides should be used simultaneously during lifting.
- 2.10.2 The side adjustment straps are located on the left and right sides of the survival vest, just below the arm openings. The side adjustment straps provide both preliminary and final wearer adjustment for use, both prior to and after water entry.
- 2.10.3 The harness handle loops are fed through the upper reinforced slot opening in the protective container and stored underneath the folded cell. Velcro™ deployment lines attach the top of each handle loop that attaches to the inflatable cell so that the lines are readily accessible after inflation.

***WARNING: Failure to do this will cause the harness system to be inoperative and could only be used after the inflatable cell has been deflated.***

- 2.10.4 Each harness has a strip of reflective tape stitched to the top of it for low-light rescues..
- 2.10.5 The (user's) right hand harness has an attached buddy-line and whistle. These items are stored in two looped nylon retaining straps fixed mid-way up the harness.

## 2.11 ADJUSTABLE WAIST BELT

- 2.11.1 The waist belt is constructed of 1 1/2 inch (38 mm) wide sage green nylon webbing. The belt is secured at the front of the vest with a two-piece steel buckle. The belt provides both preliminary wearer adjustment upon donning the LP/SV and a final adjustment just before or after water entry.
- 2.11.2 The waist belt is stitched directly to the vest at the front left and at the right side, effectively separating the belt into two adjustment areas.
- 2.11.3 Preliminary fit by adjusting the belt sliders, located at the rear of the vest, until the vest feels comfortably snug.
- 2.11.4 Final/ongoing adjustment is accomplished by adjusting the buckle on the front of the belt after donning. This adjustment is intended to ensure that the LP/SV remains well secured to the wearer, reducing the potential for the vest to 'ride-up' on the wearer upon inflation of the life preserver in water. Final adjustments are possible both prior to and after water entry.

## 2.12 SIDE ADJUSTMENT STRAPS

- 2.12.1 The side adjustment straps are constructed of one inch (25 mm) wide sage green acetyl nylon webbing. One length of webbing forms the rear fixed ends, by looping through black nylon belt adjusters, and sewing both free ends directly to the side of the vest.
- 2.12.2 Two lengths of webbing form the adjustment ends; with one end sewn to the front of the vest and the free end passed through a nylon belt loop and looped through the belt adjuster, then is folded and sewn into a T-tab for webbing retention.
- 2.12.3 Adjust by pulling on the T-tab. Loosen by lifting at the front of the nylon adjuster and pushing the adjuster rearwards.



## 2.13 BALLISTIC LINER ATTACHMENT POINTS

- 2.13.1 The MSV971 has built-in provisions for adding an optional ballistic liner accessory to the inside of the survival vest. The vest has two zippers running along the inside of the main opening and a Velcro™ tab at the inner neck that secure the ballistic liner.

**NOTE: Depending on the thickness of the liner used, switching to a larger sized survival vest may be necessary when worn with a ballistic liner.**

## 2.14 OPERATION

**CAUTION: Over-pressurization will over-stress the inflatable cell. Both chambers of the cell must be completely evacuated of any residual air or carbon dioxide gas prior to CO<sub>2</sub> inflation.**

- 2.14.1 Manual operation of the life preserver is accomplished by grasping the beaded inflation handle located on the lower left side of the protective container. Jerking sharply downwards rotates the operating lever of the CO<sub>2</sub> inflation device, which in turn forces the piercing pin to puncture the neck of the CO<sub>2</sub> cylinder and allow the compressed gas to flow into the inflatable cell.

The MSV971 is an appropriate platform for a wide variety of customized LP/SV units to address user requirements that include:

- use in ejection seat fitted aircraft
- use with an automation inflation device
- stowage of unique pieces/combinations of survival equipment

Contact Mustang Survival for further details.



2.14.2 The pressure of the expanding gas forces the fasteners around the periphery of the protective container to separate, automatically opening the protective container and allowing the cell to reach its fully inflated shape.

**NOTE: Carbon dioxide gas does not remain in the life preserver indefinitely. Either of the oral inflator valves can be used as a means of compensating for normal cell leakage. The oral inflators are also provided as an emergency back up in the unlikely event that the CO<sub>2</sub> inflation device fails.**

**Figure 7. Component Locations – Inflated Cell**





## 3.0 DONNING AND PACKING INSTRUCTIONS

### 3.1 GENERAL

**WARNING:** *The MSV971 must be worn fully assembled. The modules are not to be worn separately. A loss of protection and wear resistance may result if worn improperly.*

### 3.2 FOLDING AND PACKING INSTRUCTIONS

#### 3.2.1 To fold and pack the MSV971:

**NOTE:** *Points of reference (in this section) for folding and packing are based from the perspective of person facing the front of an LP/SV.*

- a. Remove the zipper closing sliders from inside the inner front pockets of the survival vest.

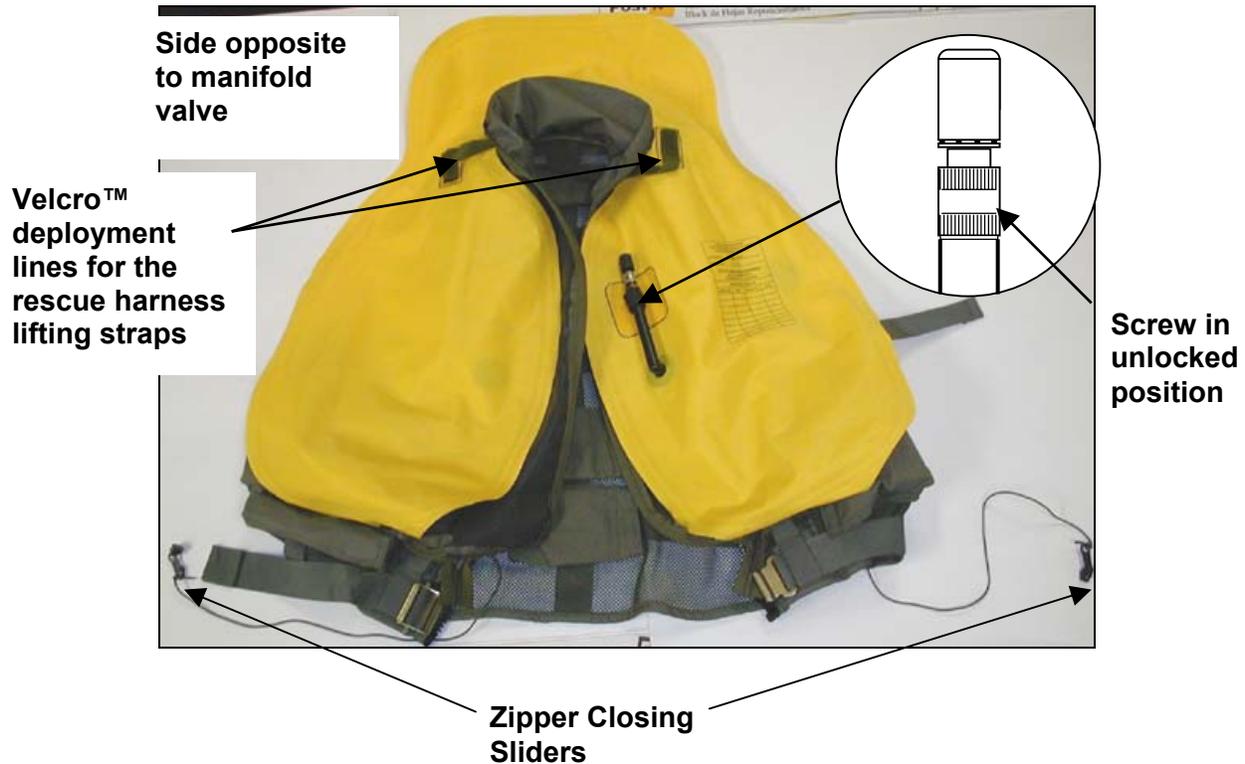
**Figure 8. Step a. Folding and Packing Instructions**





- b. Lay the LP/SV unit out on a flat, clean surface so that the completely deflated cell is fully extended.
- c. Ensure that the rescue harness loops are fed through the upper openings in the protective container and laying flat underneath the cell. Check that the Velcro™ deployment lines are routed through the centre of the collar and connected the top of the harness loops with the patch on the cell and also check that the buddy-line and whistle are secured in place.
- d. **SIDE OPPOSITE TO MANIFOLD VALVE** Screw shall be turned fully in the **LOWER** (not locked) position. This would allow the user to, if needed, manually inflate the cell without having to fumble with the lock.
- e. **MANIFOLD VALVE SIDE** Screw shall be turned fully in the **UPPER** (locked) position. Otherwise, as the cell is folded and packed and the inflator actuated, it is possible that the cell itself may depress the valve as it inflates, permitting the escape of gas.

**Figure 9. Steps b. to e. Folding and Packing Instructions**





- f. Ensure that the rescue harness lifting loops are fed through the upper openings in the protective container and laying flat underneath the cell. Ensure that the buddy-line and whistle are in place.

**Figure 10. Step f. Folding and Packing Instructions**



- g. Attach a slider onto one side of the container-closing zipper at the bottom, and carefully mate with the other zipper tail. Repeat for the other side.
- h. Fold up the lower portion of the right side cell lobe so that the lower edge of the lobe is within the protective container and fold in the sides of the cell lobe.

**Figure 11. Step h. Folding and Packing Instructions**



- i. Ensuring the zipper does not snag the inflatable cell; ease the slider along the zipper, progressively closing the container over the cell. Tuck the zipper tail inside the opening at the lower edge of the protective container.

**CAUTION: Ensure the lanyard is not wrapped around the inflator, or any other component, that would prevent the operation of the inflator lever.**



- j. Ensure (right side only) that the lanyard of the beaded handle passes through the reinforced opening of the container.

**NOTE: The inflator should be on top of the folded cell before closing to ensure proper activation of the cylinder when the lanyard is pulled.**

**Figure 12. Step j. Folding and Packing Instructions**



- k. Repeat steps f. to i. for the left side of the inflatable cell.
- l. Fold the cell into the top portion of the container, and continue to ease the slider along up to the top centre where the zipper ends while keeping the cell in the container. Don't remove the slider yet.

**Figure 13. Step l. Folding and Packing Instructions**





- m. Secure the beaded inflation handle to the Velcro™ located on the underside of the protective container, at the lower right.
- n. Carefully remove the sliders from the zipper ends, and pinch together the Velcro™ tabs. Re-stow the sliders in the vest pockets.
- o. Secure the beaded inflation handle to the Velcro™ located on the underside of the protective container.

**Figure 14. Step o. Folding and Packing Instructions**



- p. Flatten the top portion of the life preserver and mate the Velcro™ tab to the patch on the back of the Survival Vest.

**Figure 15. Step o. Folding and Packing Instructions**





## 4.0 MAINTENANCE AND CARE

### 4.1 GENERAL

- 4.1.1 After immersion in water (other than fresh clean water), the LP/SV modules should be either washed or rinsed separately. To increase the life of the garment, it is recommended to wash the LP/SV only when required.

### 4.2 CLEANING

#### 4.2.1 Laundering Procedures

**NOTE: Do not dry clean.**

***Do not use bleach or other chlorine products.***

***Do not use fabric softeners.***

***Do not tumble dry.***

***Do not iron.***

***Do not dry in front of a radiator or other source of direct heat.***

***Do not store in a wet condition.***

- a. Separate layers (Life Preserver and Survival Vest).
  - b. Ensure all pockets are emptied.
  - c. Hand wash or sponge down an area of the Life Preserver/Inflatable Cell fabric in warm (100°F) soapy (using mild laundry detergent) fresh water, then rinse with clean water. Do not completely immerse the Life Preserver/Inflatable Cell. If machine washing the Survival Vest, use the gentle cycle with a mild detergent or soap.
  - d. Hang to dry the layers in a well-ventilated area, which is free from direct sunlight. Ensure the Life Preserver and Survival Vest are completely dry before reassembling.
  - e. Reassemble the LP/SV.
- 4.2.1.1 To avoid mildew, hang dry the LP/SV after every use, and be sure not to stow the product away while damp.

### 4.3 TREATMENT AFTER IMMERSION

- 4.3.1 Whenever a LP/SV has been immersed in water, it must be treated as specified below and then inspected in accordance with the current authorized servicing schedule.

#### 4.3.2 Fresh Water Immersion

- 4.3.2.1 Allow the LP/SV to dry naturally, preferably in the open air.

#### 4.3.3 Salt Water Immersion

- 4.3.3.1 Disassemble the layers (Life Preserver and Survival Vest) and rinse thoroughly with clean, fresh water. Allow the LP/SV modules to dry naturally, preferably in the open air.



#### 4.3.4 Chlorinated Water Immersion

4.3.5 Immersion of the LP/SV in chlorinated water is not recommended. If the LP/SV is immersed in chlorinated water, use the same washing procedure as for salt water immediately following immersion.

#### 4.4 SERVICE LIFE

4.4.1 The LP/SV's service life is determined on condition rather than age. LP/SV's may remain in service if properly maintained and all test and inspection results are satisfactory.

#### 4.5 WORK AREA

4.5.1 The work area where inspection and maintenance of the LP/SV is performed should be smooth and flat, where the LP/SV will not snag, tear or otherwise be punctured or damaged and should also be cleared of all non-essential equipment and materials.

4.5.2 The working surface should be free of harmful contaminants such as oil, grease, acids or solvents. Work areas, subject to wide temperature variations, should be avoided.

#### 4.6 STORAGE

4.6.1 The life preservers should be stored in the following manner:

- a. They are to be stored in a cool, dry area where an even temperature can be maintained.
- b. They are not to be exposed to sunlight, ozone gas, or ultra violet rays, and must be kept free from petroleum products, acids or other damaging contaminants.

#### 4.7 EQUIPMENT REQUIRED

4.7.1 Specialty/non-standard items required for maintenance are listed in figure 16.

**Figure 16. Equipment Required**

DESCRIPTION	PART NUMBER	NSN
Oral valve crimp ring tool	MA7614 or T809CP	5120-21-252-2023

#### 4.8 MAINTENANCE REPORTING

4.8.1 Maintenance performed on the LP/SV system can be reported as follows:

- a. The Safety Systems personnel should update the service/inspection record label located on the front of the inflatable cell.
- b. Appropriate entries should be recorded in accordance with the owner's particular organizational requirements.



## 5.0 INSPECTION AND TESTING

### 5.1 REQUIREMENTS

5.1.1 The MSV971 LP/SV should be inspected at the following times, as deemed appropriate by the user's Safety Systems Section:

- a. Maintenance inspection on receipt from the supply depot.
- b. Visual inspection before issue and upon return of the LP/SV to the Safety Systems Section.
- c. Periodic maintenance inspection every 60-180 days, depending on usage. Relatively frequent use requires more frequent maintenance inspections.
- d. Visual inspection after every CO<sub>2</sub> or oral inflation.
- e. Maintenance inspection whenever the integrity of the LP/SV is in doubt.

***NOTE: Proper care of this garment is extremely important for best results and extended service.***

### 5.2 PRE-FLIGHT AND POST-FLIGHT INSPECTION

5.2.1 The individual to whom the LP/SV is issued or assigned should carry out a visual inspection of the survival vest and outer life preserver protective container prior to, and after, each flight. The inspection should consist of the steps outlined in section 5.3 only.

### 5.3 VISUAL INSPECTION

5.3.1 A visual inspection of the LP/SV should consist of the following two procedures, describing the inspection of the inflatable cell and the inspection of the survival vest and protective container.

#### 5.3.2 Visual Inspection of the Survival Vest and Protective Container

5.3.3 A visual inspection of the survival vest and protective container should consist of the following:

- a. Ensure it is dry inside and out.
- b. Check for the presence of all components.
- c. Check for excessive wear or damage to the material, particularly stiffness, discoloration, burns, tears, abrasions, and frayed or separating edges.
- d. Check for separation of seams and broken or missing stitching.
- e. Ensure all metal components are intact and free from damage or corrosion.
- f. Ensure front entry zipper is intact and operating freely and smoothly.
- g. Ensure all adjustment straps can be adjusted freely and smoothly.
- h. Ensure all pockets and pocket closures are intact.
- i. Ensure the beaded CO<sub>2</sub> inflation handle is intact and properly secured to the protective container.
- j. Ensure the life preserver protective container is properly secured to the survival vest, with self-locking tie intact, and that the closure zippers and Velcro™ tab are secure.



### 5.3.4 Visual Inspection of the Inflatable Cell

5.3.4.1 A visual inspection of the inflatable cell should consist of the following:

- a. Open the protective cover by separating the Velcro™ tab at the rear and pulling the zipper halves apart.
- b. Ensure the life preserver inflatable cell is properly secured to the protective container, with self-locking tie intact.
- c. Check the cell for physical damage and excessive wear, e.g., abrasion, holes, cuts, tears or checking. If any damage is found, the cell must be replaced.
- d. Check for condition of all Radio Frequency (RF) seams and bonding. If any damage is found (i.e. bubbling or burns in fabric, breaks, cuts or tears on weld), the cell must be replaced.
- e. Check for security of both oral inflators and that the back oral inflation valve is in the locked closed position and the front oral inflation valve is in the locked open position.
- f. Check for security of all grommets, anchor patch assemblies, and retaining patch assemblies. If any damage is found, the cell must be replaced.
- g. Remove the CO<sub>2</sub> cylinder and ensure the cylinder has not been fired or cylinder pierced.
- h. Check for security and correct installation of the CO<sub>2</sub> inflation device.
- i. Check for damage to the internal CO<sub>2</sub> cylinder mating threads. If any damage is found, the device must be replaced.
- j. Ensure the beaded CO<sub>2</sub> inflation handle is properly attached to the operating lever of the CO<sub>2</sub> inflation device. Note any fraying at the attachment point and replace it if necessary.
- k. Ensuring that the cylinder seat-sealing gasket is correctly positioned, replace the cylinder and ensure that the witness thread or wire on the CO<sub>2</sub> inflation device is intact.
- l. Ensure both rescue harnesses are intact and properly stored within the life preserver protective container and that the buddy-line and whistle are intact and properly stored on the right harness. Ensure the rescue harnesses is properly routed.
- m. Refold the inflatable cell and secure it within the protective container (see section 3.2 – Folding and Packing).

## 5.4 MAINTENANCE INSPECTION

5.4.1 Have qualified safety systems personnel perform the maintenance inspection, an in-depth inspection, in accordance with this manual.

5.4.2 Perform the following tests and inspections, forming the overall maintenance inspection, in this order:

- a. Remove the inflatable cell from the protective container.
- b. Perform the inflation manifold valve test as per section 5.5.
- c. Perform the oral inflator valve test as per section 5.6.
- d. Perform the inflatable cell test as per section 5.7.



- e. Perform the CO<sub>2</sub> inflation device test as per section 5.8.
- f. Perform the CO<sub>2</sub> cylinder weight test as per section 5.9.
- g. Reassemble the LP/SV unit and perform the visual inspections as per section 5.3 above.

## 5.5 INFLATION MANIFOLD VALVE TEST

### 5.5.1 Test the core of the inflation manifold valve:

- a. Remove the cap nut and the inflation device.
- b. Ensure that the core of the valve is properly seated, and then inflate the cell to 2.0 psi gauge or until the cell feels hard to the touch.
- c. Place a small amount of soap & water solution over the valve opening. Bubbles in the solution indicate leakage; replace the core. Alternatively, submerge the cell in fresh clean cool water and look for bubbles.

## 5.6 ORAL INFLATOR VALVE TEST

### 5.6.1 Test both oral inflator valves for leaks:

- a. With the opposite chamber evacuated completely, inflate the appropriate inflatable cell chamber to a gauge pressure of 2.0 psi or until the cell feels hard to the touch.
- b. Place a small amount of soap & water solution on the stem opening. Use care to prevent the entry of water into the valve. A bubbling of the soap solution will indicate leakage.
- c. To check the oral inflation valve for blockage; lower the pressure in the inflatable cell chamber to 0.5 - 1.0 psig. Open the air passage by pushing the valve inwards and then blow by mouth through the oral inflator valve. The effort required to inflate the chamber should not be excessive and the valve must close tightly when the oral inflation is halted.
- d. Consider the valve non-serviceable if it fails either test and replace it.

## 5.7 INFLATABLE CELL TEST

5.7.1 The inflatable cell consists of two independent inflatable chambers, both of which must be tested. Prior to any inflatable cell chamber test, it is imperative that the opposite chamber is first evacuated of all residual gas or air. The rear chamber can be accessed through the rear oral inflator assembly and the CO<sub>2</sub> inflation valve. The front chamber can be accessed through the front oral inflator assembly only.

### 5.7.2 To test each chamber of the inflatable cell:

- a. Remove the CO<sub>2</sub> cylinder to prevent accidental double inflation.
- b. Slowly inflate one of the cell chambers, through the oral inflation valve, using an oil free pressurized airline. Inflate to a gauge pressure of 2.0 psi (140 cm/55 inches of water).

**NOTE: If the cell being tested is a new item from stock, inflate the rear chamber of the cell through the CO<sub>2</sub> inflation device, rather than the oral inflation valve, to ensure free airflow through the inflation device and manifold.**

- c. Allow ten minutes for pressure stabilization, then (if necessary) adjust the pressure back to 2.0 psi gauge.



- d. Hang the inflatable cell for six hours in an area where the ambient temperature can be maintained at a constant 22°C (72°F).
- e. The cell chamber is serviceable if, after the six-hour period, the internal pressure in either chamber did not drop below 1.5 psi (corrected for temperature, if necessary). Otherwise the cell is condemned and non-repairable.

**NOTE: Both chambers must be serviceable before the inflatable cell is to be considered usable.**

- f. Evacuate the tested cell chamber completely of all residual air and repeat steps (a) through (e) for the other cell chamber
- g. If there is evidence of leakage in any of the valves, replace the suspect valve and repeat steps (b) through (f).

## 5.8 CO<sub>2</sub> INFLATION DEVICE TEST

5.8.1 To test the inflation device, and perform the following:

- a. Remove the CO<sub>2</sub> cylinder.
- b. Ensure the cylinder seat-sealing gasket is in place.
- c. Pull the beaded inflation handle and rotate the operating lever several times to ensure a smooth, free operation.
- d. Check that there is a minimum of a 3.0 mm protrusion of the piercing pin. This is required to ensure that the piercing pin will pierce the CO<sub>2</sub> cylinder-sealing disc when the inflator valve is in the operated/activated position. If the protrusion is less than 3 mm, the device must be replaced.
- e. Return the operating lever to the non-operated "ready" position.
- h. Replace the CO<sub>2</sub> cylinder.

## 5.9 CO<sub>2</sub> CYLINDER INSPECTION AND WEIGHT TEST

5.9.1 All carbon dioxide (CO<sub>2</sub>) cylinders should be weighed and inspected regardless of whether they are new, or previously fitted cylinders that appear to be serviceable.

5.9.2 To inspect the cylinder, perform the following:

- a. Weigh the cylinder with a scale, which is accurate to 0.1 gram. The measured weight should not be lower than the gross weight stencilled on the cylinder. Cylinders not meeting the gross weight specifications should be retained only for training or test purposes and must be clearly marked "NOT FOR SERVICE USE".
- b. Inspect the cylinder threads for damage, the cylinder surface for nicks, dents or ballooning and the cylinder neck-sealing disc for scratches or punctures. Cylinders showing any damage should have the gas released under control and then are disposed of as scrap.



## **6.0 REPAIRS**

### **6.1 GENERAL**

- 6.1.1 It is extremely important that damaged LP/SV's are handled in accordance with the following repair requirements.
- 6.1.2 Qualified repair personnel can perform some repairs, with adequate facilities. The manufacturer should do all major repairs, unless otherwise authorized by Mustang Survival Corp. This section provides some information to assist with minor or emergency repairs to the LP/SV and related components. The inflatable cell is not repairable and should be slashed and disposed of if damaged.
- 6.1.3 The proper work area is defined in section 4.5 of this document.
- 6.1.4 Qualified personnel should only perform repair and overhaul of the MSV971 LP/SV.
- 6.1.5 The special tools requirements are contained in section 4.7.
- 6.1.6 The reporting procedures may be found in section 4.8

### **6.2 IDENTIFICATION OF DEFECTS**

- 6.2.1 Defects should be identified in accordance with the inspection and testing procedures detailed in section 5.0.

### **6.3 SURVIVAL VEST OR PROTECTIVE CONTAINER**

- 6.3.1 Any survival vest or protective container failing inspection should be repaired using the following guidelines.
  - a. Replace missing parts or components from stock.
  - b. Clean heavily soiled areas using mild soap and water and a soft, non-abrasive nylon or synthetic bristle brush. Other cleaning agents or solvents must not be used.
  - c. Re-sew worn, broken or missing stitching.
  - d. Replace damaged fasteners.
  - e. Replace corroded or damaged metal parts.
  - f. Damaged or underweight CO<sub>2</sub> cylinders must be disposed of and replaced.
  - g. Replace components with damaged fabric.

- 6.3.2 Those repairs requiring sewing shall be done in accordance with section 6.4.

### **6.4 SEWING**

- 6.4.1 All repairs involving sewing should be done with sage green aramid thread, A-A-50195. Do seam repairs, stitching, and joining using a single needle lockstitch, 8 to 10 stitches per inch (25 mm).
- 6.4.2 Securely backstitch all ends of stitching, including breaks in thread, not less than 0.5 inch (12 mm). Any raw edges of aramid fabric, which become exposed as a result of repairs, must be surged using a four-thread serger, 10 to 12 stitches per inch (25 mm), to prevent unravelling.



The construction of all LP/SV units use  $\frac{5}{16} \pm \frac{1}{16}$  inch seam allowances. There shall be no sewing repairs to the inflatable cell.

### 6.4.3 Damage Treatment

- 6.4.3.1 Cut away and patch singed, burnt or worn areas of the protective container. See section 6.4.5 for Protective container fabric patching procedure.

**NOTE: Cut away material no more than 50 mm (2 inches) in diameter.**

### 6.4.4 Repair Materials

- 6.4.4.1 The full description and part numbers of the materials required for repairs are detailed in section 8.0 of this manual.

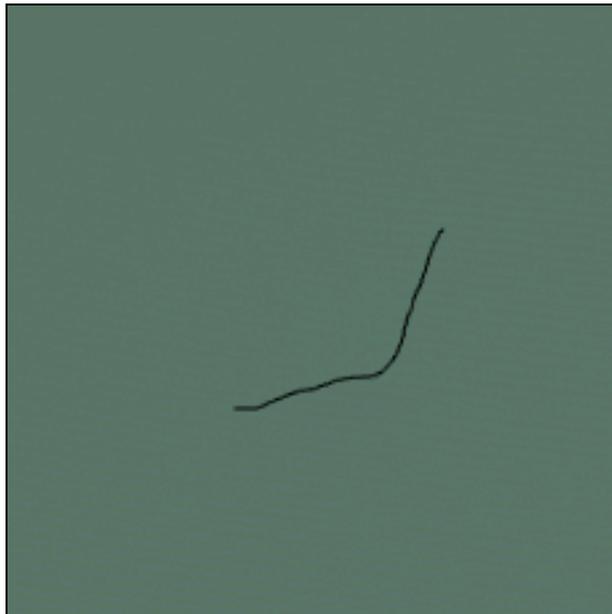
### 6.4.5 Protective Container Fabric Patching

- 6.4.5.1 The fabric colour in the following example does not reflect the actual MSV971 protective container fabric colour.

- 6.4.5.2 To patch minor tears and holes on the protective container fabric:

- a. Clean the area around the tear of foreign material (see figure 17).

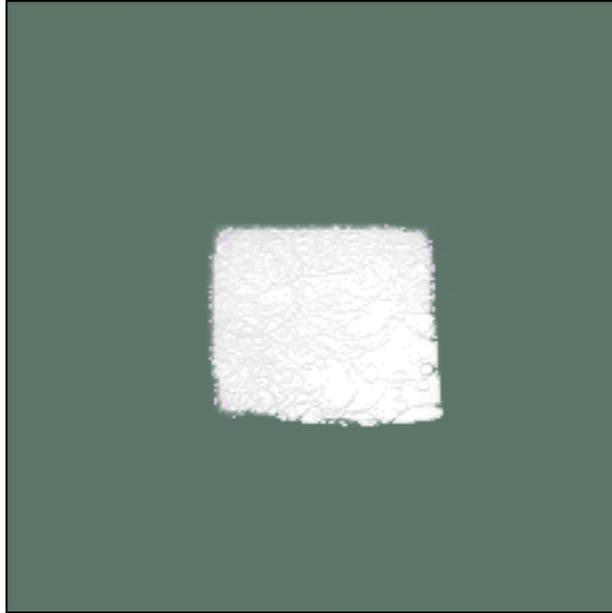
**Figure 17. Step a. Patching**





- 
- b. Cut a square, or rectangle, in the damaged fabric slightly larger than the hole (see figure 18).

**Figure 18. Step b. Patching**

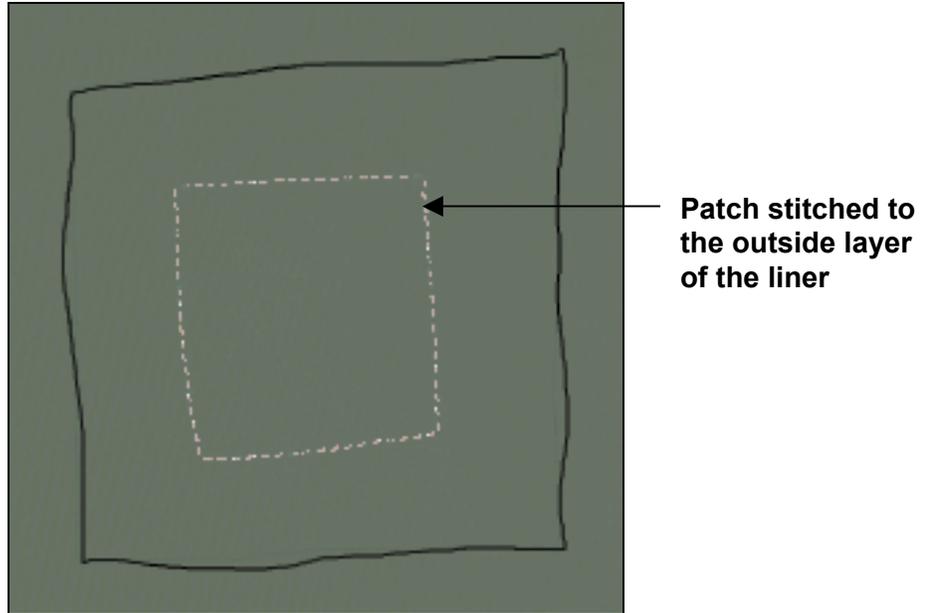


- c. Cut a patch of the original material being repaired, exceeding the hole in size by not less than 37 mm (1 ½ inch).
- d. Apply the fabric patch to the outside layer of the protective container and ensure that the weave corresponds to that of the material surrounding the repair area.



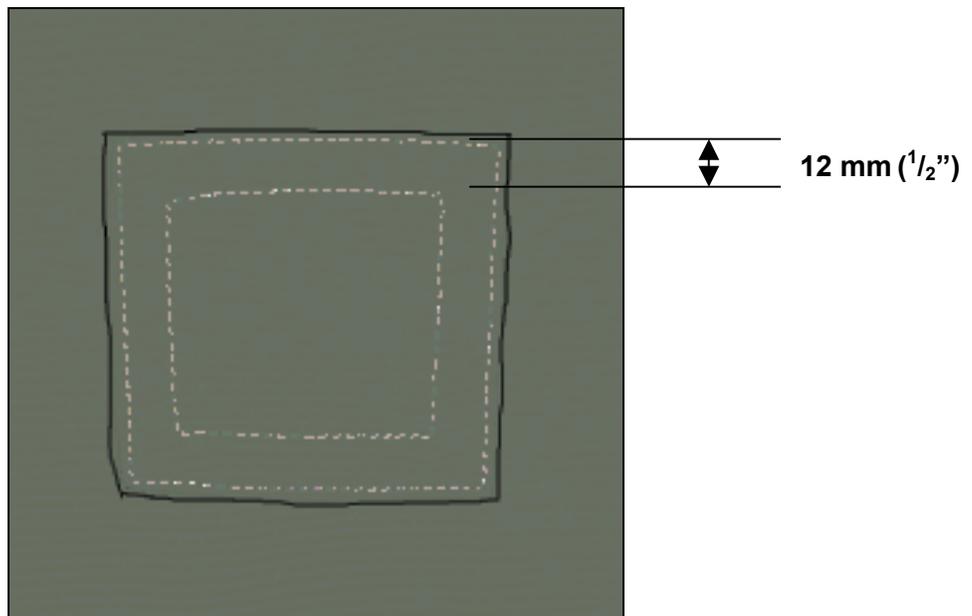
- e. Single-stitch the patch to the fabric 6 mm ( $\frac{1}{4}$  inch) from the edge of the hole (see figure 19).

**Figure 19. Steps c., d. and e. Patching**



- f. Roll an edge of the patch under itself and single-stitch approximately 12 mm ( $\frac{1}{2}$  inch) from the original stitch.
- g. Repeat this for each edge of the patch, until it is secured (see figure 20).

**Figure 20. Steps f. and g. Patching**



- h. Repair closely grouped small holes or tears with one large patch, rather than several small ones.



## 6.5 ORAL INFLATOR VALVE

6.5.1 The oral inflator valve is not repairable and should be replaced when it is proven defective. To replace the valve, perform the following:

- a. Remove the crimp ring. Grab the crimp ring with the tip of a side cutter tool and cut.
- b. Immerse the end of the oral tube in hot water long enough for the tube to soften.
- c. Ease the valve out by applying pressure to the tube just below the valve.
- d. Install a new valve (the tube may have to be softened again in hot water).

**CAUTION: DO NOT allow water to enter the inflatable cell.**

- e. Install a new crimp ring using the oral valve crimp ring tool.
- f. Perform the Oral Inflator Valve Test as detailed in section 5.6.

**NOTE: If either oral inflation tube is cracked or leaking, the inflatable cell must be scrapped.**

## 6.6 CO<sub>2</sub> INFLATION DEVICE

6.6.1 The CO<sub>2</sub> inflation device is not repairable and replace it when proven defective. To replace either the manual CO<sub>2</sub> inflation device:

- a. Remove the  $\frac{9}{16}$  inch (14 mm) cap nut and discard the upper sealing gasket.
- b. Remove the CO<sub>2</sub> inflation device by lifting it off the inflation manifold valve.
- c. Remove and discard the lower and upper sealing gaskets.
- d. Remove and replace the core valve, if necessary.
- e. Install a new lower sealing gasket.
- f. Install a new CO<sub>2</sub> inflation device.
- g. Install a new upper sealing gasket.
- h. Install a cap nut and tighten to a torque of 8.0 inch-pounds using a calibrated torque wrench.
- i. Perform the CO<sub>2</sub> Inflation Device Test outlined in section 5.8.

## 6.7 INFLATABLE CELL

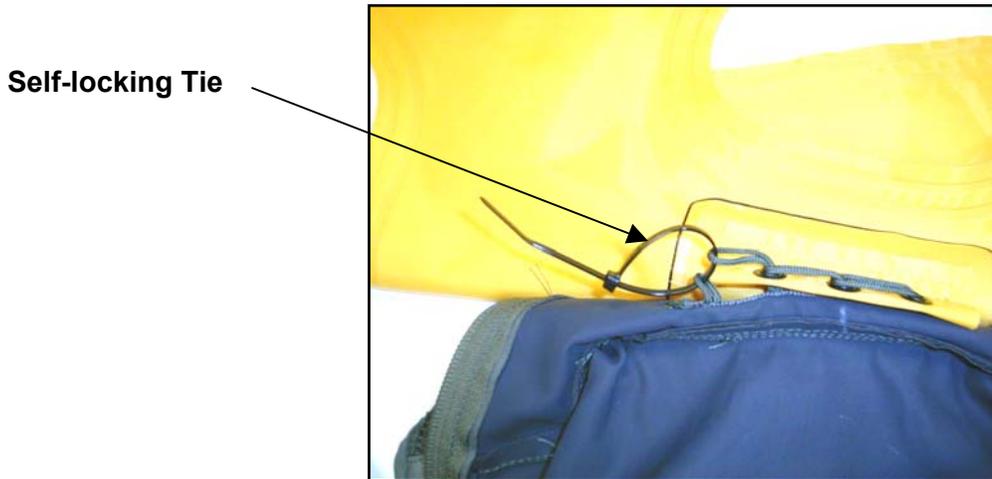
**NOTE: There shall be no repairs to the inflatable cell.**

6.7.1 To replace the inflatable cell:

- a. Remove the inflatable cell from the protective container by carefully cutting the self-locking plastic tie away from the lacing anchor loops and discarding. Unsnap the survival vest anchor straps from the grommets at the bottom of each cell lobe and remove the Velcro™ lifting strap. The cell can now be easily separated from the container.



**Figure 21. Step a. Replace Inflatable Cell**



- b. Remove the oral inflator valves and CO<sub>2</sub> inflation device from the cell.
- c. Reinstall the components removed from the non-serviceable cell onto the replacement cell.
- d. Perform the Inflatable Cell Test detailed in Section 5.7.
- e. Re-attach the serviceable cell to the protective container with the cell anchor strip. Referring to figures 4 and 22 and starting at the right side, thread the aramid cord loops of the protective container through the grommets of the cell anchor strips. Pass the first cord loop over the top of the second loop and so forth, forming an interlocking arrangement as shown.

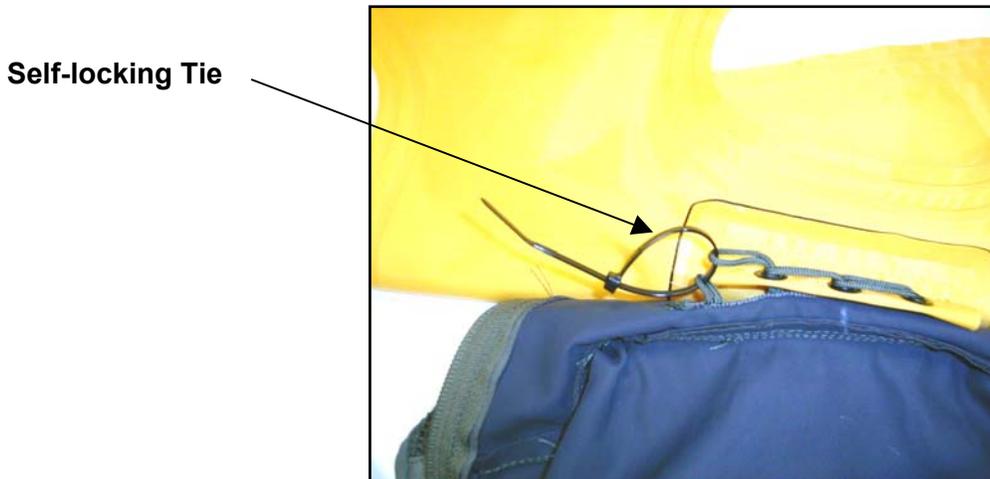
**Figure 22. Step f. Replace Inflatable Cell**





- f. Secure the last cord loop to the lacing anchor loop, by passing a new plastic self-locking tie through both loops, and cinching tightly. Carefully trim the excess tie ends.

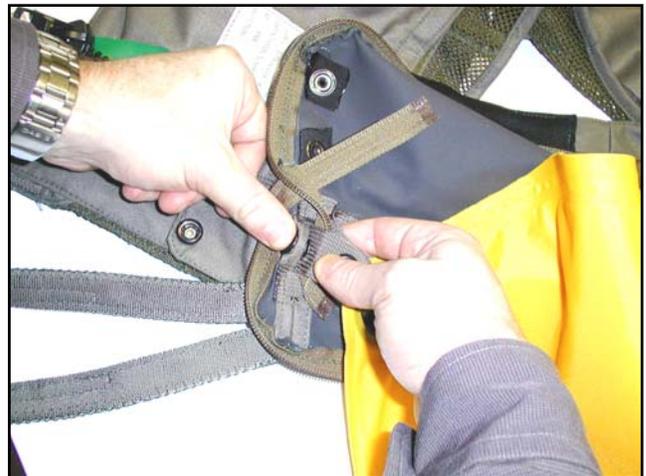
**Figure 23. Step g. Replace Inflatable Cell**



**NOTE: Ensure that the plastic self-locking tie ends do not form a sharp point, which may puncture or abrade the inflatable cell.**

- g. Re-attach the survival vest anchor straps to the bottom of the cell lobes, ensuring that they pass through the lower opening in the protective container.

**Figure 24. Step h. Replace Inflatable Cell**



- h. Re-pack the life preserver as detailed in section 3.2.

## 6.8 CO<sub>2</sub> CYLINDER

- 6.8.1 The carbon dioxide (CO<sub>2</sub>) cylinder must be replaced when it fails the weight test as detailed in section 2.5, or when there is damage to the cylinder neck sealing disc, threads, or the surface of the cylinder.



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## **7.0 SUMMARY**

- 7.1 The Mustang Survival MSV971 is an emergency use LP/SV that protects over-water aircrew in harsh marine environments by providing flotation and maintaining the individual in a face-up position. These LP/SV's are easily donned, maintained and stored. Qualified approved technicians, with proper equipment, or Mustang Survival Corp. may make LP/SV repairs. A well-maintained LP/SV means survival in emergency situations for which normal clothes were not designed.

## **8.0 PARTS LIST**

- 8.1 This section identifies the materials used in the construction of the Mustang Survival MSV971. Qualified repair personnel can perform some repairs, with adequate facilities. The manufacturer should do all major repairs, unless otherwise authorized by Mustang Survival Corp. Item order quantity is based on their availability. The actual product may not be exactly as shown below.



Figure 25. MSV971 Survival Vest and Index Numbers





**Figure 26. Parts List for the MSV971 Survival Vest**

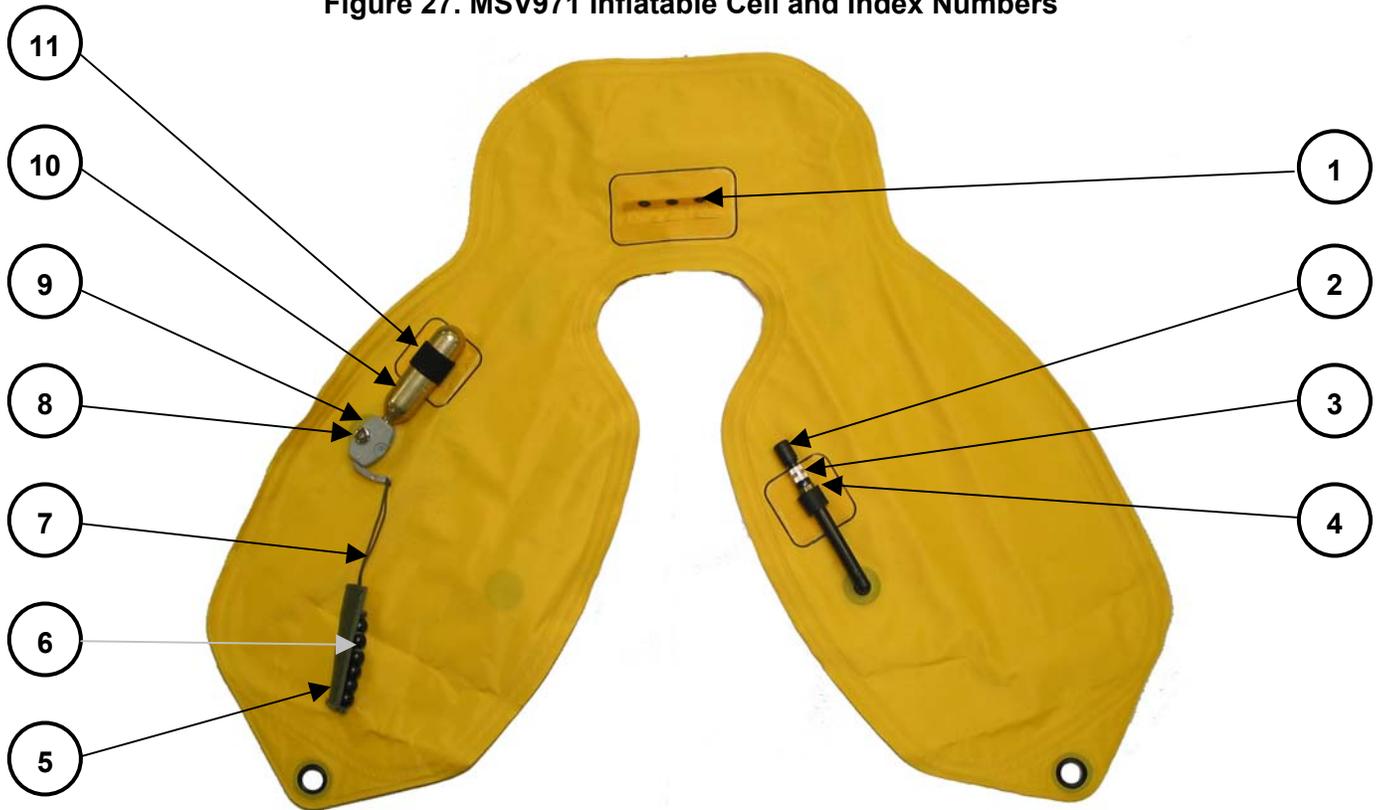
INDEX NUMBER	PART NUMBER	NOMENCLATURE	MIN ORDER QUANTITY
1	TA106927	1 <sup>5</sup> / <sub>8</sub> INCH BIAS TAPE, CALENDARED	1 ROLL
2	HD718230	SNAP FASTENER CAP	20 EA
3	HD718330	SNAP FASTENER SOCK	20 EA
4	HD718430	SNAP FASTENER STUD	20 EA
5	HD718530	SNAP FASTENER EYELET	20 EA
6	HD743013	1 IN. (25 MM) STAINLESS STEEL D-RING, BLACK	20 EA
7	HD7807	BABY DOT SOCKET	50 EA
8	HD7809	BABY DOT RIVET	50 EA
9	FA112527	CALENDARED NOMEX <sup>®</sup> 6 OZ.	20 MTR
10	ZI600413	15 IN. (381 MM) ZIPPER BLACK SIZE SMALL	10 EA
N/A	ZI601213	15.5 IN. (394 MM) ZIPPER BLACK SIZE MEDIUM	10 EA
N/A	ZI600613	16 IN. (406 MM) ZIPPER BLACK SIZE LARGE	10 EA
N/A	ZI600713	16 <sup>1</sup> / <sub>2</sub> IN. (419 MM) ZIPPER BLACK SIZE EXTRA LARGE	10 EA
11	WE850327	1 <sup>23</sup> / <sub>32</sub> IN. (44 MM) NYLON WEBBING	1 ROLL (100 YDS)
12	HD7042	DAVIS AIRCRAFT CLASP	10 EA
13	HD7044	DAVIS AIRCRAFT SLIDE	10 EA
14	WE850027	1 IN. (25 MM) NYLON SAGE GREEN	1 ROLL (100 YDS)
15	WE850127	1 <sup>1</sup> / <sub>2</sub> IN. (38 MM) NYLON SAGE GREEN WEBBING	1 ROLL (100 YDS)
16	TA100027	1 <sup>1</sup> / <sub>2</sub> IN. (38 MM) SLIT BIAS TAPE SAGE	1 ROLL (100 YDS)
17	HD7740	1 <sup>1</sup> / <sub>2</sub> IN. (38 MM) SLIDE ADJUSTER	20 EA
18	TA102927	<sup>3</sup> / <sub>4</sub> IN. (19 MM) GROS GRAIN RIBBON TAPE	1 ROLL
19	HD7710	2 <sup>1</sup> / <sub>2</sub> IN. (64 MM) POLYPROPYLENE TOGGLE	50 EA
N/A	MI5755	ELASTIC BAND	100 EA
20	WE700013	<sup>1</sup> / <sub>2</sub> IN. (12 MM) NYLON TUBULAR WEBBING	1 ROLL
21	FA125427	NOMEX <sup>®</sup> MESH	1 MTR
N/A	HD715013	1 IN. (25 MM) LADDERLOC, BLACK	50 EA
N/A	HD7633	<sup>1</sup> / <sub>16</sub> IN. (1.6 MM) COPPER FERRULE	EA
N/A	MI5630	<sup>1</sup> / <sub>16</sub> IN. (1.6 MM) STAINLESS STEEL WIRE	FT
22	EL100413	1 IN. (25 MM) BLACK ELASTIC GABARDINE	1 ROLL (72 YDS)
23	LC102427	NOMEX <sup>®</sup> LACE CORD	YD
24	MI5751	SOLAS APPROVED WHISTLE, ORANGE	20 EA



<b>INDEX NUMBER</b>	<b>PART NUMBER</b>	<b>NOMENCLATURE</b>	<b>MIN ORDER QUANTITY</b>
25	TA1017	1 IN. (25 MM) SOLAS REFLECTIVE TAPE	1 ROLL (50 MTR)
N/A	HD719413	NO.5 SLIDER PULLS BLACK 5 CNT	20 EA
N/A	HD7695	5 1/2 IN. (140 MM) BLACK CABLE TIES (PROTECTIVE COVER ATTACHMENT)	50 EA
N/A	TH886027	BONDED NOMEX <sup>®</sup> THREAD SAGE, GREEN	1 CONE
N/A	VE90837	19 MM LOOP FASTENER	1 ROLL (50 MTRS)
N/A	VE91827	25 MM HOOK FASTENER	1 ROLL (50 MTRS)
N/A	VE93107	50 MM LOOP FASTENER	1 ROLL (50 YDS)
N/A	ZI800113	12 IN. (305 MM) ZIPPER BLACK (FOR BALLISTIC INSERT)	10 EA



**Figure 27. MSV971 Inflatable Cell and Index Numbers**



**Figure 28. Parts List for the MSV971 Inflatable Cell**

INDEX NUMBER	PART NUMBER	NOMENCLATURE	MIN ORDER QUANTITY
1	HD7580	BRASS CHEMICAL GROMMET, DULL BLACK	50 EA
2	HD7634	ORAL VALVE 800 ROL NON-LOCK	10 EA
3	HD7716	INFLATOR LOCKING CLIP	20 EA
4	HD7640	BRASS CRIMPING RING 809 RT	20 EA
5	VE901013	19 MM BLACK LOOP FASTENER	1 ROLL (50 MTRS)
6	HD771413	INFLATOR HANDLE BEADS, BLACK	50 EA
7	LC102427	NOMEX® LACE CORD	YD
8	HD7610	MANIFOLD VALVE W/NUT & CORE	20 EA
9	HD77189	840 AMLS INFLATOR	20 EA
10	MI5707	CO2 CYLINDER 34-37 GRMS	10 EA
11	EL100413	1 IN. (25 MM) BLACK ELASTIC GABARDINE	1 ROLL (72 YDS)
N/A	VE900013	19 MM BLACK HOOK FASTENER	1 ROLL (50 YDS)
N/A	GL1011	UNIROYAL ADHESIVE	1 CAN (5.28 gallons US)



**Figure 29. MSV971 Protective Cover and Index Numbers**



**Figure 30. Parts List for the MSV971 Protective Cover**

INDEX NUMBER	PART NUMBER	NOMENCLATURE	MIN ORDER QUANTITY
1	HD7580	BRASS CHEMICAL GROMMET, DULL BLACK	50 EA
2	FA112527	CALENDARED NOMEX <sup>®</sup> 6 OZ.	20 MTR
3	FA116927	3-LAYER LAMINATED NOMEX 4.5 OZ SAGE GREEN	MTR
4	VE90827	19 MM HOOK FASTENER	1 ROLL (50 MTRS)
5	ZC100327	5 CNF 5/8 GAP & CUT 1/2 IN. (12 MM) SAGE GREEN	EA
6	VE91837	25 MM LOOP FASTENER	1 ROLL (50 MTRS)