MUSTANG SURVIVAL
MHSS 02 HELICOPTER PASSENGER TRANSPORTATION SUIT SYSTEM
MUSTANG MODEL MS2000-2 AND MD1128A-2

DESCRIPTION AND MAINTENANCE INSTRUCTIONS
MANUAL NO. MHSS 02/MR002/A/F
MARCH 01, 2010, REV: 1.4

Mustang Survival Canada
3810 Jacombs Road
Richmond, BC, V6V 1Y6
Tel: (604) 270-8631 Fax: (604) 270-0489
E-mail: mustang@mustangsurvival.com
WEB: www.mustangsurvival.com

Mustang Survival-USA
3870 Mustang Way
Bellingham, WA
USA 98226
Tel: (360) 676-1782 Fax: (360) 676-5014
E-mail: mustangusa@mustangsurvival.com

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1.0 INTRODUCTION

1.1 GENERAL

1.1.1 This manual is organized into nine sections. Sections 1.0 – 6.0 detail the Mustang Flight Commander model MS2000-2. Section 7.0 is dedicated to the Life Preserver model MD1128A-2 and section 9.0 shows parts lists, for both garments.

1.1.2 The Mustang Helicopter Suit System (MHSS) consists of the MS2000-2 Flight Commander suit and MD1128A-2 Life Preserver.

1.1.3 Mustang immersion suits are items of primary survival equipment, and as such, every precaution shall be taken to assure proper storage, maintenance, and handling. The life of the wearer may very well depend on the condition of the immersion suit and the security of its attachments and equipment. This publication provides the information required to inspect, test, and maintain the Flight Commander suit Mustang Survival Model MS2000-2 and Life Preserver model MD1128A-2.

1.1.4 The Mustang Survival Helicopter Passenger Transportation Suit System is a one-piece immersion suit, combined with an inflatable buoyancy element, designed to provide flotation in case of accidental immersion in water, and to minimize the risk of drowning. These components make up the Mustang Helicopter Passenger Suit System (MHSS02), which has been issued a Type Certificate by Transport Canada. The immersion suit and life preserver are to be worn together only. The system is also designed to reduce thermal shock upon entry into cold water and delaying the onset of hypothermia.

1.1.5 The MS2000-2 Flight Commander is a one-piece coverall fitted with wrist and neck seals.

1.1.6 The suit also incorporates fitted, CSA (Canadian Standards Association) Grade 1 approved polyurethane non-slip, steel toe boots, a waterproof front closure zipper, a neoprene hood with splash guard, inflatable mitts, and retro-reflective tape.

1.1.7 This manual provides information on the hazards of cold-water immersion, the function and features of the MS2000-2. Also included is test, maintenance and repair instructions to assist Life Support Equipment Technicians that have been trained by Mustang Survival or Mustang Survival approved trainers. Training must be completed every three years to maintain qualifications.

1.1.8 Read this manual thoroughly to become familiar with the operation of the zippers, pockets and seals. The lives of crewmembers may depend on the condition of the MS2000-2. Keep the manual in a convenient location for easy reference in the event that the suit requires inspection, repair or cleaning.

1.2 CONTACT

1.2.1 For further information concerning this manual or the suit, contact:

Mustang Survival Corp.

3810 Jacombs Road

Richmond, BC

V6V 1Y6

Tel. (604) 270-8631

Fax (604) 270-0489

E-mail: mustang@mustangsurvival.com

WEB: www.mustangsurvival.com

1.3 RIGHTS RESERVED

1.3.1 Velcro™ is a trademark of American Velcro™ Inc.

1.3.2 Seam Grip™ is a trademark of McNett Corporation.

1.4 REQUIREMENTS

1.4.1 The individual to whom the suit is issued or assigned, following internal training, are encouraged to conduct pre and post use inspections and for returning the suit 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 MS2000-2 users in the following:

a. Fitting of the immersion suit.

b. Purpose, use and operation of all accessories.

c. Importance and method of visual pre and post use inspections.

1.4.3 The Life Support Equipment shop is responsible for:

a. Inspection upon first issue from the dealer, supply depot or contractor.

b. Ensuring the suit is complete and serviceable prior to issue.

c. Periodic inspection and testing of the suit (see section 6.4).

d. Maintenance, cleaning and repair when required.

e. Requisitioning and maintaining stocks of spare parts.

f. Maintenance of inspection records for all Mustang Survival MS2000-2 units.

1.5 DESCRIPTION

1.5.1 The MS2000-2 is a coverall type garment, fitted with a removable Thermal Liner, wrist and face seals, and boots. The outer shell provides waterproofness, while the Thermal Liner provides buoyancy and hypothermia protection.

1.5.2 The integrated boots are CSA approved, with non-skid sole and steel toes and are designed for use in an industrial environment.

1.5.3 Shell

1.5.3.1 The outer shell is constructed of 210-denier polyurethane coated nylon fabric. All seams are sewn and taped inside using hot air sealing tape to maintain watertightness. The shell provides waterproof coverage from the feet to neck and wrists.

1.5.4 Thermal Liner

1.5.4.1 The Thermal Liner is constructed using three layers of material. The interlining and inner lining are gold coloured 100% nylon. These two fabrics enclose the 5.0 mm PVC foam flotation material. The Thermal Liner is designed to be removable, and is equipped with plastic fix-locks to fasten it into the legs of the suit, and wrists and fabric loops at the neck. There are two zippers located along the front entry of the Thermal Liner, which form the primary attachment to the shell.

NOTE: Appropriate thermal undergarments (such as polypropylene underwear) should be worn to enhance the protection afforded by the MS2000-2 and assist in wicking moisture away from the body.

1.5.5 Fit

1.5.5.1 The MS2000-2 is constructed in seven standard sizes, ranging from 2XS to 2XL. Custom sizes are available on special order from the manufacturer.

MS2000-2 Size Chart					
Size	Height (in)	Weight (lb)	Height (cm)	Weight (kg)	Boot Size U.S. Men' s
2XS	64 - 68	108 – 156	163 - 173	49.0 – 70.7	7
XS	68 - 70	126 – 183	173 - 178	57.1 – 83.0	8
S	70 - 72	135 – 196	178 - 183	61.2 – 88.9	8
M	72 – 74	144 – 209	183 – 188	65.3 – 94.8	9
L	74 - 76	153 – 222	188 - 193	69.4 – 100.7	10
XL	76 - 80	180 – 249	193 - 203	81.6 – 112.9	11 / 12
2XL	80 -84	198 – 275	203 -213	89.8 – 124.7	11 / 12

2.0 IMMERSION AND ANTI-EXPOSURE CLOTHING

2.1 HAZARDS

2.1.1 Cold-water immersion is a life-threatening situation, and your survival depends on the clothing you wear. Cold, shock, hypothermia, loss of dexterity and mental sharpness and drowning are your primary concerns. Many strong swimmers drown within yards of safety in cold water. This suggests that many drown as a result of the rapid shock of immersion, causing immediate hyperventilation, water ingestion, and often heart failure, which may occur in water below 59°F (15°C).

2.1.2 Without adequate buoyancy and insulation, individuals rely on swimming ability and endurance for survival. Your strength and endurance are seriously diminished in colder water, reducing your ability to overcome waves, currents, spray, etc.

2.1.3 Hypothermia results when your body loses heat faster than it can be replaced, and can occur in any environment below 98.6°F (37°C), our normal body core temperature. Water conducts heat away from our body 25-30 times faster than air, presenting a high risk.

2.1.4 Shivering is the body's way of generating heat to replace the heat that is lost. The smallest blood vessels constrict close to the skin, reducing the blood circulation to your hands and feet. Circulation to the body core is also restricted, where it is needed most, resulting in a loss of dexterity. As the effect of cold increases, muscles weaken and stiffen, leading to the loss of feeling and reduced co-ordination. Your decision-making and thinking processes slow down.

2.1.5 Proper clothing reduces many of these hazards, improving your chances of survival. Clothing should provide insulation from the cold and should not hinder mobility. Ensure buoyancy is provided either inherently in your outfit, or with an additional life preserver, preferably both.

2.2 HYPOTHERMIA PROTECTION

2.2.1 Immersion in cold water is a danger for anyone working on or near the water. The length of time a person can survive in cold water largely depends on both the water's temperature and the thermal protection of their protective clothing.

2.2.2 To create the most effective protection against hypothermia, Mustang Survival begins by evaluating the clothing's immersed Clo value, which depicts the level of thermal insulation a garment provides. Clo is a measurement of insulation, much like the 'R' values assigned to fibreglass house insulation. We determine the rate at which heat is lost from the body, as well as the difference in temperature between the skin and the water.

2.2.3 When tested on a thermally insulated manikin, the MS2000-2 exceeds 0.75 Immersed Clo in turbulent water.

2.2.4 Generally, there are two types of immersion protective clothing:

a. Wet suits

b. Dry suits

2.3 WET SUITS

2.3.1 Wet suits allow some water in, but restrict water movement into and out of the suit. Your body heats up the water that becomes, more or less, trapped in the suit. If the openings of the suit become restricted, the warmed water stays inside the suit longer, reducing heat loss. If a wet suit is damaged or torn, the level of protection is reduced.

2.4 DRY SUITS

2.4.1 Dry suits (MS2000-2) protect you during cold-water immersion by using, in conjunction with garments worn under the suit, the trapped air as an insulation layer from the cold water. Most dry suits utilize seals at the wrists, neck (or face) and ankles, unless incorporating gloves and boots. These seals are made from waterproof materials, insulated or non-insulated.

3.0 MS2000-2 FLIGHT COMMANDER FEATURES

3.1 GENERAL

3.1.1 Familiarize yourself with all the features of the suit to maximize its effectiveness. Illustrations are provided as an additional reference.

3.1.2 The suit is made of watertight fabric and has neoprene wrist seals and an adjustable neck seal, a waterproof main entry zipper. The suit is reasonably watertight and is intended to keep the wearer dry in the event of immersion.

3.2 TESTING

3.2.1 All garments are tested to ensure the highest level of reliability and performance. Mustang Survival offers superior quality under rigid ISO-9001 standards.

3.3 ASSEMBLED MS2000-2 AND MD1128A-2

Figure 1. Component Locations

3.4 OTHER FEATURES

- International Yellow Outer Shell colour that meets Canadian standard CAN/CGSB-65.17-99
- Does not exceed 32 lbs of buoyancy, suitable for egression from an inverted helicopter

- Watertight zippers and seams
- SOLAS approved high visibility reflective tape
- Highly visible Outer Shell
- Exhaust valves (3) to vent excess air during egress

3.4.1 **Wrist and Face Seals**

3.4.1.1 Wrist seals are incorporated in the module.

3.4.1.2 The hood forms the face seal.

3.4.2 **Main Entry Zipper**

3.4.2.1 The front entry zipper, located on the Outer Shell (see figure 1), is a waterproof design. It is sewn onto the shell, and seam sealed to watertight integrity. The zipper, a heavy-duty zipper with nickel-silver teeth providing a watertight seal when closed, has been designed for ease of replacement (see section 6.5.12).

3.4.2.2 A thong is attached to the zipper slider, assists the wearer in opening and closing the zipper.

CAUTION: Avoid snagging your clothing in the zipper, as this may break the zipper's seal.

3.4.3 **Hood**

3.4.3.1 The integral neoprene thermal hood protects against water and wind exposure.

3.4.4 **Boots**

3.4.4.1 The boots are CSA (Canadian Standards Association) approved waterproof steel-toed work boots, permanently attached to the suit's legs. They are fitted with non-skid soles for traction.

3.4.5 **Buddy Line**

3.4.5.1 The buddy line attaches to other people in the water to maintain close contact (see section 4.2.6).

4.0 ASSEMBLY

4.1 GENERAL

WARNING: The MS2000-2 should be worn with the Outer Shell and Thermal Liner assembled. The modules are not to be worn independently. A loss of protection and wear resistance will result if worn improperly.

4.2 ASSEMBLING THE MS2000-2

4.2.1 Layout the Thermal Liner and Outer Shell

a. Lay out the Thermal Liner and the Outer Shell side by side in the same orientation as worn.

NOTE: Ensure the Thermal Liner seams are facing out before insertion into the Outer Shell.

b. Ensure the Outer Shell's waterproof zipper is fully opened.

4.2.2 Connect the Thermal Liner/Outer Shell at the Ankle

a. Keeping the bottom flat and straight, insert each Thermal Liner leg down into each Outer Shell leg until it reaches the plastic snaps above the ankle.

NOTE: Ensure the legs do not twist, maintaining a matching orientation during insertion.

b. Attach the two ankle snaps. Apply the same procedure to the other leg.

4.2.3 Wrist Connection

a. After laying the Outer Shell out flat, push the left arm of the Thermal Liner down to the end of the left arm of the Outer Shell.

NOTE: Ensure that the arms do not twist. Maintain a matching orientation during insertion.

b. Repeat this procedure with the right arm.

c. To join these layers, fasten the wrist connectors on each arm.

4.2.4 Interconnection Zipper

d. Complete the connection of the Outer Shell to the Thermal Liner by connecting the end of the interconnection zipper (located at the bottom of the Thermal Liner opening).

e. Close the length of the upper Outer Shell/Thermal Liner interconnection zipper.

4.2.5 Neck Connection

a. Align and fasten the three Outer Shell neck sewing straps through the Thermal Liner neck loops.

4.2.6 Buddy Line

4.2.6.1 The buddy line must be attached properly for the Helicopter Passenger suit to be certified.

a. Place the buddy line around the left sleeve of the Immersion suit. Pass the snap hook through the black loop at end of the buddy line. Ensure the buddy line is not twisted and the loop is pointed towards the outside edge of the arm.

Figure 2. Step a. Buddy Line Assembly

b. Neatly fold the remaining buddy line webbing back and forth, with the snap hook attaching to the Velcro tab as shown. Do not wrap excess webbing around sleeve.

Figure 3. Step b. Buddy Line Assembly

c. Close the buddy line tunnel by fastening the Velcro strips. Ensure the snap hook is exposed.

Figure 4. Step c. Buddy Line Assembly

5.0 DONNING\DOFFING INSTRUCTIONS

5.1 DONNING PROCEDURE

NOTE: The MS2000-2 may be donned without assistance.

WARNING: The MS2000-2 must be worn with the Outer Shell and Thermal Liner assembled. The modules are not to be worn separately. A loss of protection and wear resistance will result if worn improperly.

a. Lay the suit face up on a large flat clean surface, ensuring that the legs and arms are not tangled or twisted.

b. Open the leg zippers for ease of entry.

c. Open the front entry zipper and check that the liner is fastened into the suit.

CAUTION: Use extreme caution when donning the MS2000-2. Prior to donning, remove any rings, watches, earrings, necklaces and eyeglasses that will cause damage to wrist and neck seals. Also, remove all footwear.

d. Don the suit as you would a pair of coveralls. For ease of donning, the suit may be folded down over its legs and boots in the fire suit 'bunker' position.

e. Place your legs into the suit and draw it up and on, putting hands through the wrist seals and donning the hood.

WARNING: Failure to completely close the waterproof entry zipper will result in leakage of water inside the suit and reduction of in-water survival time.

f. Secure the front zipper.

g. The wrist seals should be tightened on the forearms just above the wrists to the point of discomfort prior to water entry. Once floating in a stable position with the life preserver inflated, the seals may be loosened for comfort.

5.2 DOFFING PROCEDURE

a. Wash down the MS2000-2 while wearing it, paying particular attention to the entry zipper. Remove all traces of salt. See section 6.3 for additional instructions.

b. Unzip the front zipper.

c. Remove the hood and release the wrist adjustment straps.

CAUTION: Failure to completely open the waterproof entry zipper may result in damage to the suit when it is doffed.

d. Insert two fingers under wrist seal and gently pull seal outward. Cup the hand, fingertips and thumb together, and gently pull your hand from seal. Repeat for other hand.

e. Remove your legs from the suit.

f. Hang to dry in a well-ventilated area, which is free from direct sunlight. The suit should be hung from its boots to allow water to drain. Ensure the Outer Shell and Thermal Liner are completely dry before reassembling.

6.0 MAINTENANCE AND CARE

6.1 GENERAL

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

6.1.2 Refer to section 6.2 for cleaning instructions.

6.1.3 **Service Life**

6.1.3.1 The suit's service life is determined on condition rather than age. Suits will have a longer service life if; frequently inspected, tested and properly maintained.

6.1.4 **Work Area**

The work area where inspection and maintenance of the suit is performed should be smooth and flat, where the suit will not snag, tear or otherwise be punctured or damaged and should also be cleared of all non-essential equipment and materials. The working surface should be free of harmful contaminants such as oil, grease, acids or solvents. Work areas, which are subjected to wide temperature variations, should be avoided.

6.2 CLEANING

6.2.1 Refer to section 6.3.5 for metal zipper cleaning guidelines.

6.2.2 **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.

6.2.2.1 Separate layers and wash in warm water (100°F) using mild laundry detergent and hang to dry.

6.2.2.2 Ensure all pockets are emptied and layers have been separated. Unzip all interconnection zippers before laundering.

6.2.2.3 Hand wash or sponge down the fabric in warm soapy tap water, and rinse with clean water. If machine washing use the gentle cycle with a mild detergent or soap.

6.2.2.4 Hang to dry in a well-ventilated area, which is free from direct sunlight. The suit should be hung from its boots to allow water to drain. Ensure the Outer Shell and Thermal Liner are completely dry before reassembling.

6.2.2.5 To avoid premature aging of the nylon fabric and stitching, the suit should not be hung in direct sunlight for extended periods of time. To avoid mildew, hang dry the suit after every use, and be sure not to roll up the product or stow it away while damp. If it has been exposed to salt spray, the suit must be rinsed off with fresh water and allowed to dry prior to storage.

6.3 TREATMENT AFTER IMMERSION

6.3.1 Whenever a suit has been immersed in water, it must be treated as specified below and then inspected in accordance with the current authorized servicing schedule.

6.3.2 Fresh Water Immersion

6.3.2.1 Allow the suit to dry naturally, preferably in the open air. If the insides of the boots are waterlogged, drying may be hastened by blowing with oil-free compressed air at room temperature.

6.3.3 Salt Water Immersion

6.3.3.1 Disassemble the layers and rinse thoroughly with clean, fresh water. Allow the suit modules to dry naturally, preferably in the open air.

6.3.4 Chlorinated Water Immersion

6.3.4.1 Immersion of the suit in chlorinated water (such as a swimming pool) is not recommended. If the suit is immersed in chlorinated water, use the same washing procedure as for salt water immediately following immersion.

6.3.5 Metal Zipper Care

6.3.5.1 Zipper cleaning is the first step to zipper longevity. Clean the zipper of any mud, sand, salt or foreign elements. Use warm soapy water to remove any heavy deposits.

6.3.5.2 The zippers should always be left in the open position while the suit is stored. See section 6.3.5 for zipper care procedures and for recommended zipper cleaners and lubricants.

6.3.5.3 For the metal entry zipper, use one of the zipper manufacturers' recommended cleaning fluids listed in figure 5. Every few uses, apply a recommended wax after cleaning (see figure 5) for zipper lubrication. For example a daily use suit requires wax once a week.

Figure 5. Recommended Zipper Cleaning Fluids and Waxes

CARE PRODUCT	PRODUCT NAME	SUPPLIER
Cleaning Fluid	Zippy Cool	YKK USA
	Zip Care	McNett
	BDM Fluid	BDM UK
Lubricating Wax	Zippy Cool	YKK USA
	Zip Wax	McNett
	BDM Wax	BDM UK

6.4 MS2000-2 FLIGHT COMMANDER INSPECTION PROCEDURES

6.4.1 Inspection Intervals

6.4.1.1 This section describes the various inspection procedures and their intervals for the MS2000-2 Flight Commander. Please note the MD1128A-2 Life Preserver has its own inspection procedures and intervals (see section 7.7).

6.4.1.2 A close visual inspection of the MS2000-2 (see section 6.4.2) should be performed prior to issue, by the issuer. It is suggested that the suit user also perform visual inspections.

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

6.4.1.3 The suit should have a close visual inspection (see section 6.4.2):

a. On receipt from the dealer, supply depot or contractor.

b. Before and after use by the individual issued the suit or at least once every twelve months.

c. Whenever the integrity of the suit is in doubt.

d. If out of service (on the shelf).

6.4.2 **Close Visual Inspection**

6.4.2.1 To perform a close visual inspection separate the two layers and lay them on a clean, flat surface and ensure:

a. The suit is dry inside and out.

b. There is no excessive wear or damage to the material, particularly stiffness, discoloration, burns, tears and frayed edges.

c. There is no separation of the seams, broken or missing stitches.

d. All metal components are intact and free from damage or corrosion.

e. The zippers are intact and operating smoothly.

f. All wrist adjustment straps are adjusting freely and smoothly.

g. Pockets and pocket closures are intact.

h. Face, wrist seals and boots have not deteriorated: cuts, tears, detachment.

i. Check retro reflective tape for condition and adhesion. Replace if necessary.

6.4.2.2 Lubricate the front entry zipper after inspection (see section 6.3.5).

6.4.3 **Suit Leakage Test**

6.4.3.1 Have a qualified approved technician test for leaks periodically, at least every six months, and when a visual inspection raises any doubt about the integrity of the life preserver.

6.4.3.2 To perform the suit leakage test on the Outer Shell only:

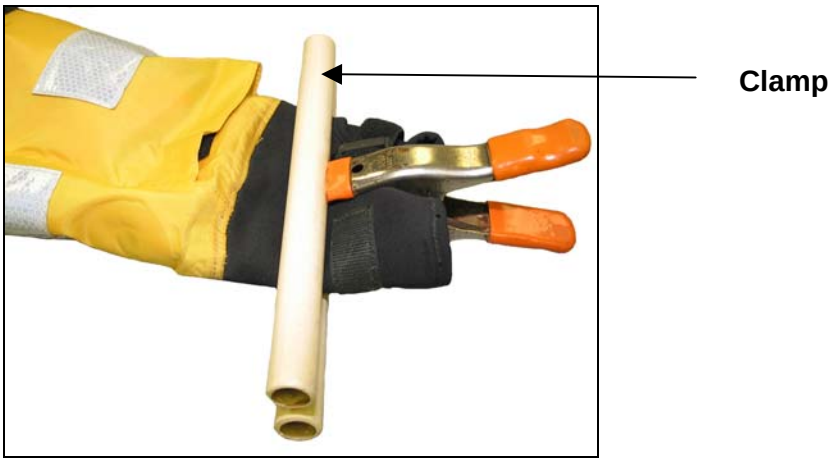
a. Remove the Thermal Liner.

b. Lay the suit flat on the test bed, and insert the air line.

c. Close the main entry zipper, and make certain that the ball fits into the neck seal. Tighten the ratchets if necessary.

d. Seal the wrists using clamps, as shown in figure 6.

Figure 6. Component Locations



e. Inflate the suit to twelve inches water column. Adjust the air pressure by releasing part of one wrist seal until it is steady at twelve inches.

f. Spray the entire suit with a soap and water mixture consisting of 0.5% liquid soap by weight to detect leaks.

g. The presence of bubbles indicates a leak, indicating a failure that requires repair.

h. Mark any leaks with a chinagraph type pencil for later sealing.

i. When finished spraying, rinse the suit with fresh water, deflate, and hang by the boots to dry.

6.5 REPAIRS

6.5.1 The protection provided by this dry suit relies very much on its watertight characteristics. It is extremely important that damaged suits are handled in accordance with the following repair requirements.

6.5.2 Life Support Equipment Technicians that have been trained by Mustang Survival or Mustang Survival approved trainers can normally perform the repairs listed in this manual, with adequate facilities. The manufacturer should do all major repairs, not listed in this manual, unless otherwise authorized by Mustang Survival Corp. This section provides some information to assist with minor or emergency repairs to the suit and related components. Each module may be repaired, to a degree, or replaced individually.

6.5.3 The proper work area is defined in section 6.1.4 of this document.

6.5.4 **Stitching**

6.5.4.1 All repairs involving sewing shall be done with thread that corresponds to the colour of the material being sewn. The thread to be used is outlined in section 9.0.

6.5.4.2 Seam repairs, and stitching shall be done using a single needle lockstitch, eight to ten stitches per inch. Securely backstitch all ends of stitching, including breaks in thread, not less than 12 mm ($^1/_2$ inch).

6.5.5 **Limits of Repair**

6.5.5.1 It is recommended that the following guidelines be used in determining potential for repair of the Outer Shell and Thermal Liner.

a. Replace defective zippers (see section 6.5.12).

b. Use recommended replacement parts (see section 9.0) whenever possible.

c. Do not patch the hood, wrist seals or boots.

d. Patch small tears, no more than 51 mm (2 inches) in diameter.

e. Replace boots (see section 6.5.9).

6.5.6 **Repair Materials**

6.5.6.1 The full description and part numbers of the materials required for repairs are detailed in section 9.0 of this manual.

NOTE: Use only Mustang Survival approved materials listed in section 9.0.

6.5.7 **Shell Fabric Repair**

a. To repair a tear in the shell fabric, first trim the edges of the tear.

b. Cut a patch large enough to cover the tear, leaving a 25 mm (1 inch) border.

c. Place the patch on the inside of the suit with its coated side facing the coating on the suit. Tape it temporarily in place.

d. Using a bar welder, weld a bar down each side of the tear.

e. Weld around the perimeter of the patch to keep it in place. Be sure to get a watertight seal around the whole perimeter of the patch.

f. Alternative method if the torn area is difficult to place into the welder:

Place the patch over the tear on the outside of the suit, and sew around the perimeter.

Turn the suit inside out, and tape along the stitching and edge of the patch, to restore water-tightness.

g. Perform a leak test to ensure the suit is watertight (see section 6.4.3).

6.5.8 **Thermal Liner Fabric Patching**

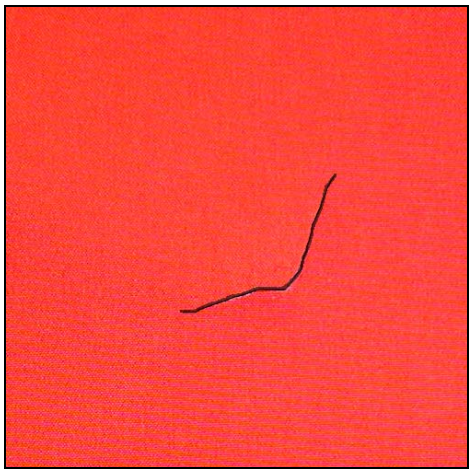
NOTE: The Outer Shell should not be patched with this method. Use the Shell Fabric repair procedure (see section 6.5.7) or return any damaged Outer Shells to Mustang Survival for damage appraisal and repair.

6.5.8.1 The fabric colour in the following example does not reflect the actual MS2000-2 Outer Shell fabric colour.

6.5.8.2 Patching of minor tears and holes on the Thermal Liner shell fabric should follow:

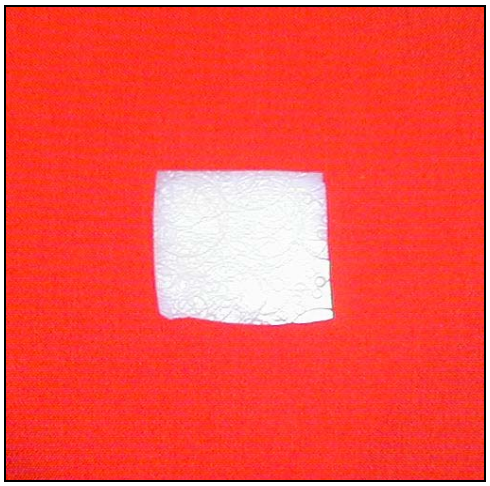
a. Clean the area around the tear of loose and foreign material (see figure 7).

Figure 7. Step a. Patching



b. Cut a square, or rectangle, in the damaged fabric slightly larger than the hole (see figure 8).

Figure 8. Step b. Patching

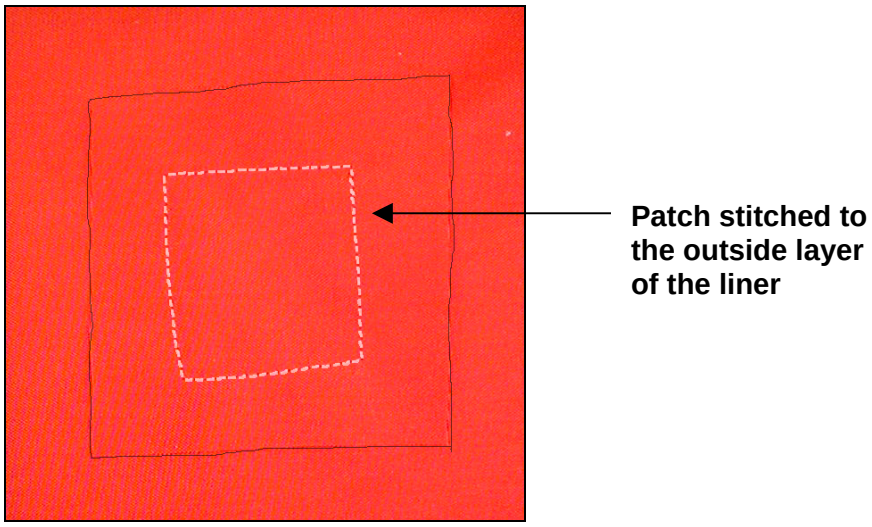


c. Cut a patch of the original material being repaired, exceeding the hole in size by not less than 37 mm (1 ½ inch).

d. Apply the fabric patch to the outside layer of the Thermal Liner.

e. Single-stitch the patch to the fabric 6 mm (¼ inch) from the edge of the hole (see figure 9).

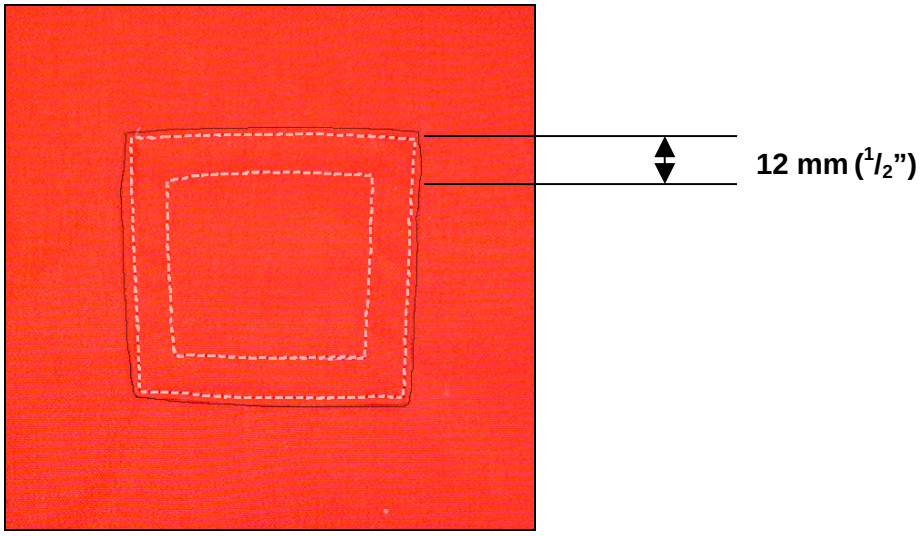
Figure 9. Steps c., d. and e. Patching



f. Roll an edge of the patch under itself and single-stitch approximately 12 mm (½ inch) from the original stitch.

g. Repeat this for each edge of the patch, until it is secured (see figure10).

Figure 10. Steps f. and g. Patching



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

i. If the damage extends across a seam, the patch may also extend across the seam.

j. Fit and glue a piece of foam into the hole to keep it in place. Don't overlap the foam.

k. Repeat the Thermal Liner shell fabric patch procedure for the inside layer if required.

6.5.9 Boot Replacement

NOTE: The boots and cuffs of this garment are left or right handed. Ensure that the proper replacement is chosen.

NOTE: There are different sized boots that are matched with different sized suits. Size 7, 8, 8, 9, 10, 11 and 11 boots are matched with size 2XS, XS, S, M, L, XL and 2XL suits, respectively.

a. To remove the worn boot, apply Methyl Ethyl Ketone (MEK) to the inside or outside of the boot where it attaches to the suit. This can be done using a pointed flat stick or screwdriver to get the opening started. Once an opening has been established, apply the MEK with a small paintbrush and slowly work your way around the outside of the boot.

Figure 11. Step a. Boot Replacement

b. Continue to separate the layers until the boot is removed.

Figure 12. Step b. Boot Replacement

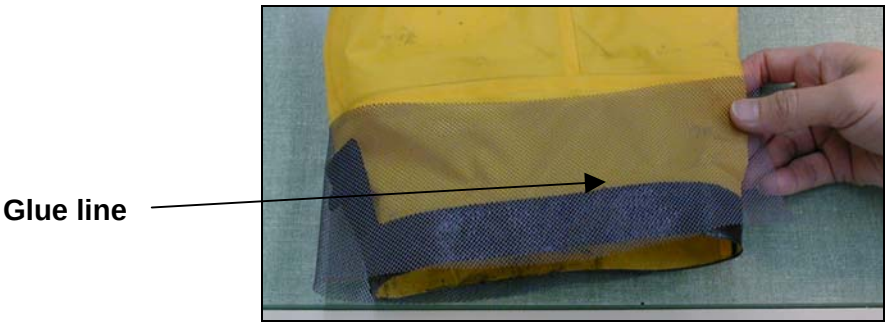
c. Cut the bottom of the mesh off the suit using scissors. Cut up to the start of the yellow fabric on the inside of the suit.

Figure 13. Step c. Boot Replacement

d. Cut and prepare the new boot for attachment. Use the old boot as a guide for cutting the new boot. Sand the outside surface of the boot, the top 63 mm (2 ½ inches), to allow the glue to bond.

e. Prepare a new piece of mesh to be sewn onto the bottom of the leg. First, cut a rectangular piece of mesh on the bias (45%) to 76 x 445 mm (3 x 17 ½ inches). Wrap the mesh around the leg, aligning it to the cut edge.

Figure 14. Step e. Boot Replacement



f. Sew the mesh onto the shell fabric, .16 cm ($^{1}/_{16}$”) **above** the glue line (see figure 15) completely around the leg, using a single needle stitch.

NOTE: Do not sew below the glue line.

Figure 15. Step f. Boot Replacement

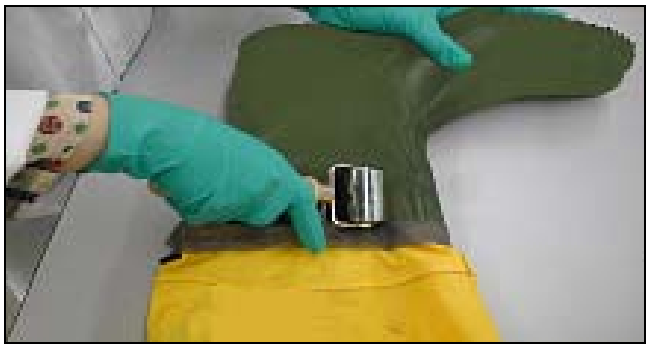
g. Heat tape the stitch line, with a 25 mm (1 inch) overlap, on the inside of the leg with TA1079 (see section 9.0) using a hot air tape machine.

h. Apply two layers of Uniroyal glue (see section 9.0) to the top 25 mm (1 inch) of the boot and inside of the leg fabric. Allow fifteen minutes to dry for each coat of glue.

Figure 16. Step h. Boot Replacement

i. Fold back the mesh to the stitch line, uncovering the boot. Carefully align and join the glued portions of the suit leg and the appropriate boot. Use a roller to remove all air pockets between the boot and the leg fabric. A flat solid object inside the leg will help to maintain even pressure with the roller.

Figure 17. Step i. Boot Replacement

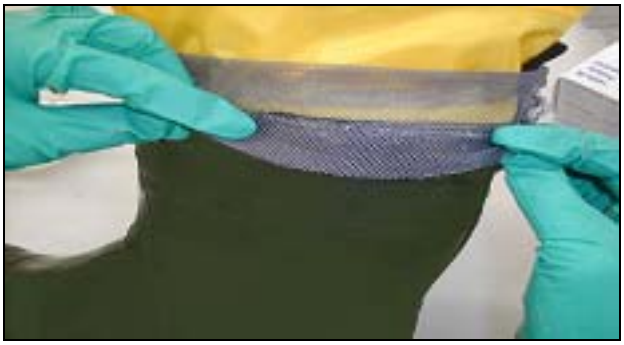


j. Apply two coats of Helmitin glue (see section 9.0) to the top 25 mm (1 inch) of the boot, each time allowing it to be become tacky.

Figure 18. Step j. Boot Replacement

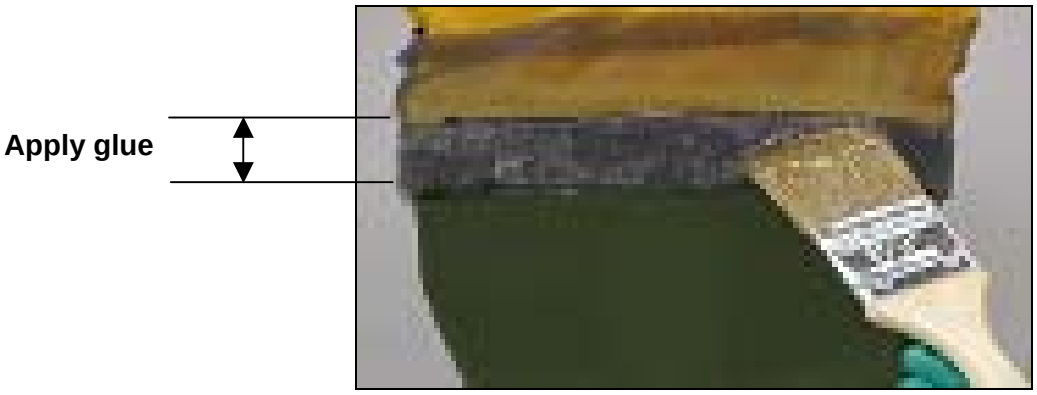
k. Place the leg over the boot and fold the bottom layer of mesh down and roll to attach glue.

Figure 19. Step k. Boot Replacement



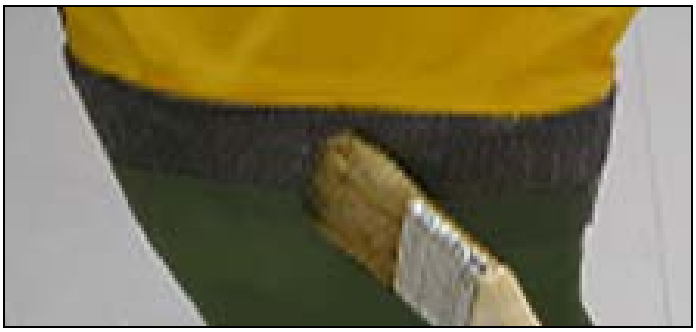
l. Apply two layers of glue to the bottom of the boot mesh. Allow fifteen minutes between applications for the glue to dry.

Figure 20. Step l. Boot Replacement



m. Fold the remainder of the mesh down and apply three layers of glue the remainder of the mesh until it is completely filled in. Allow fifteen minutes between applications for the glue to dry.

Figure 21. Step m. Boot Replacement



n. Apply one coat of Helmitin glue (or until the mesh is completely covered).

Figure 22. Step n. Boot Replacement

o. Use Uniroyal glue (see section 9.0) on the inside of the boot around the seam, where the boot meets the suit, to complete the seal.

p. Perform a leak test to ensure the suit is watertight (see section 6.4.3).

6.5.10 Cuff Replacement

NOTE: The boots and cuffs of this garment are either left or right handed. Ensure that the proper replacement is chosen.

NOTE: There are different sized cuffs that are matched with different sized suits. Size small cuffs are used on size 2XS suits only, while all remaining sizes (XS – 2XL) use size large cuffs.

a. Turn the sleeve inside out and cut along the bottom edge of the sealing tape.

b. Peel the cuff back and pick out the stitching holding it to the sleeve.

c. Obtain a replacement cuff from the manufacturer or supplier.

d. Sew the replacement cuff onto the sleeve.

e. Heat tape over the stitching to restore water-tightness.

f. Perform a leak test to ensure the suit is watertight (see section 6.4.3).

6.5.11 Liner Attachment Snap-Clip Replacement

NOTE: The replacement for clips on liner and shell are similar. The shell is used for example, as waterproof integrity of the suit shell is imperative.

a. Turn the sleeve inside out and use a seam ripper or razor to remove the ribbon (webbing) and 3/4“ buckle assembly from the circular mounting patch.

b. Obtain a replacement assembly or materials from the manufacturer or supplier.

c. Using repair material and hardware, sew and replace the assembly with a new buckle, re-attached to a new length of ribbon, attached to a new circular patch.

d. Apply two layers of Uniroyal glue (see section 9.0) to the patch on the suit and inside of the new replacement patch. Allow fifteen minutes to dry for each coat of glue.

e. Perform a leak test to ensure the suit is watertight (see section 6.4.3).

6.5.12 Waterproof Zipper Replacement

a. Turn the suit inside out, and lay it flat.

b. Cut along the edge of the sealing tape, being careful not to cut through the Outer Shell.

c. Peel the zipper tape back, and pick out the stitches holding it in place. At the neck seal, peel the neoprene comfort flap carefully off the zipper. Solvent may aid in peeling up the glue. Pick out the remaining stitches.

d. Pull the zipper off the suit.

e. Set a new zipper (obtained from the manufacturer or supplier) in place, and sew it into the suit.

f. Heat tape along the stitching to restore water-tightness.

g. At the collar, fold the comfort flap down, and glue it into position.

h. If the comfort flap is irreparably damaged while removing the old zipper:

Cut it off level with the top of the collar.

Retain it for use as a pattern.

Cut a new flap, allowing for 10 mm ($^4/_{10}$ inch) overlap onto the front of the collar.

Glue the new flap into place

Fold the flap over the top of the zipper tape, and glue it onto the original neoprene collar.

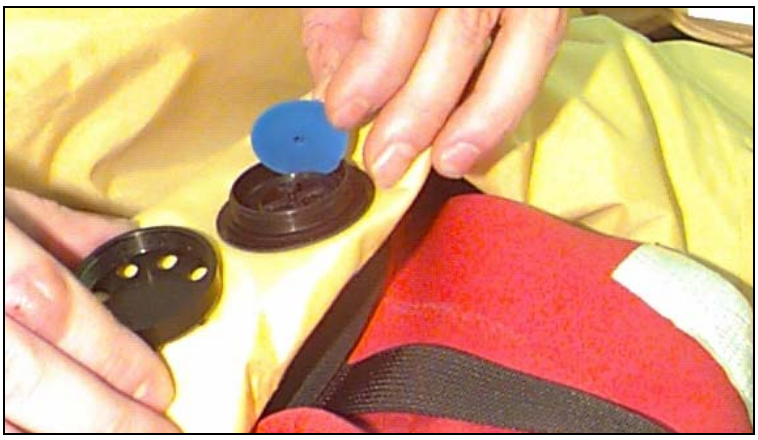
i. Perform a leak test to ensure the suit is watertight (see section 6.4.3).

6.5.13 Exhaust Valve Replacement

6.5.13.1 The exhaust valves are designed to be easily replaceable. They may be unscrewed and removed with little difficulty. Use the following procedure:

a. Unscrew the top of the valve housing and remove the blue silicone valve flapper.

Figure 23. Step a. Exhaust Valve Replacement



b. Place the valve removal tool (special tool # 7MlVTOlO) in the four open quadrants that are revealed.

Figure 24. Step b. Exhaust Valve Replacement

c. Unscrew the valve body from its core and remove it from the suit.

Figure 25. Step c. Exhaust Valve Replacement

d. Remove the rubber washers; set all valve parts aside.

e. Place a new valve into the hole, and screw it together. Ensure that replacement washers are included in the replacement valve. Hand-tighten only (Reverse the sequence of removal).

f. Perform a leak test to ensure the suit is watertight.

6.5.13.2 If the valve has been torn from the suit:

a. Patch over the tear (see section 6.5.7).

b. Punch a hole 24 mm (.95 inch) in diameter in the position the valve is to be placed.

c. Set the valve into place as above.

d. Perform a leak test to ensure the suit is watertight (see section 6.4.3).

6.5.14 Buddy Line Replacement

a. Remove the old buddy line.

b. Cut a new line, using another as a pattern (if available).

c. Set all loops, Velcro™ pieces and snap hook in place on the new line.

d. Attach the new line, in place, on the suit.

6.5.15 Reflective Tape Replacement

a. Pick out the stitching holding the original tape to the suit.

b. Cut a piece of reflective tape the same size as the original.

c. Sew the new tape to the suit.

d. Turn the suit inside out and heat tape around the stitching to restore water-tightness.

e. Perform a leak test to ensure the suit is watertight (see section 6.4.3).

6.5.16 Mitt Replacement

a. Obtain a replacement mitt from the manufacturer or supplier.

NOTE: Make certain that the correct hand is chosen.

b. Pick the stitching while holding the old mitt from its fabric lanyard, and discard.

c. Sew the replacement suit mitt to the fabric lanyard.

6.5.17 Mitt Snap Replacement

6.5.17.1 The MS2000-2 Mitt snap replacement procedure is similar to the MD1128A-2 Spray Hood snap replacement procedure with the exception of the parts and dies used. Refer to section 7.9.9 for instructions for the **Spray Hood** replacement instructions.

6.5.17.2 The components required to replace MD1128-2 hood snaps are the Dome cap (HD7806), Spring (HD7808), Rivet or Post (HD7809) and Socket (HD7807).

a. Using a pair of cutting pliers, work the cutting edge underneath the Socket (HD-7807) while stretching the foam away from the socket base with your fingers. Cut off Socket (HD-7807) while being careful not to cut into the foam.

Figure 26. Step a. Mitt Snap Replacement

b. Load hand pliers with the dies shown.

Figure 27. Step b. Mitt Snap Replacement

c. Set the new Dome Cap (HD-7806) with the pin facing up into the bottom die. Set the new Socket (HD-7807) in to the upper die.

Figure 28. Step c. Mitt Snap Replacement

d. Align pin of Dome Cap over hole in foam liner ensemble. Make sure the Cap and Socket are on the proper sides of the foam liner. Press the snap together.

e. The new snap is installed. If the snap rotates not enough force was applied.

f. Using a pair of cutting pliers, work the cutting edge underneath the Post (HD-7809).

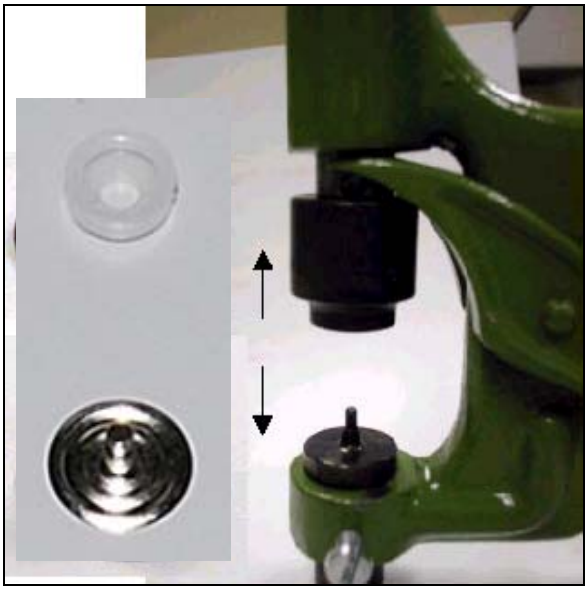
Figure 29. Step e. Mitt Snap Replacement

g. Cut off Post (HD-7809) while being careful not to cut into the fabric.

h. Load hand pliers with the appropriate dies.

i. Set the new Stud (HD-7808) with the stud facing up into the top die. Set the new Post (HD-7809) into the lower die.

Figure 30. Step h. Mitt Snap Replacement



j. Align Post over hole in fabric. Ensure the Stud and Post are on the proper sides of the fabric.

k. Press the snap together.

l. The new snap is installed. If the snap rotates not enough force was applied.

6.6 STORAGE INSTRUCTIONS

6.6.1 The suit should be stored hanging by its boots in a dry, well ventilated area. An area without excessive sunlight, and ultra violet rays, and is free of petroleum products, acids and other damaging contaminants, where normal room temperature may be maintained. If it cannot be hung upside down, it may be hung from a strong wide coat hanger.

NOTE: Avoid thin wire hangars, as they will damage the foam.

6.6.2 If the suit cannot be hung, then it may be stored folded on a flat shelf.

6.6.3 To fold the MS2000-2 for storage:

a. Lay the boots down first.

Figure 31. Step a. Folding Instructions

b. Bring the arms in across the chest.

Figure 32. Step b. Folding Instructions

c. Fold the suit at the shins.

Figure 33. Step c. Folding Instructions

d. Fold the suit at the knees.

Figure 34. Step d. Folding Instructions

e. Fold again at the waist so that the suit lies with its back uppermost. The zipper should be facing outward to minimize abrasion.

Figure 35. Step e. Folding Instructions

f. Tuck the hood into the fold to protect it.

Figure 36. Step f. Folding Instructions

g. Store away from extreme heat and direct sunlight.

CAUTION: Never store the suit wet.

7.0 MD1128A-2 LIFE PRESERVER

Figure 37. MD1128A-2 Life Preserver

7.1 GENERAL

7.1.1 The Mustang Survival Helicopter Suit System is a one-piece immersion suit, combined with an inflatable buoyancy element, designed to provide flotation in case of accidental immersion in water, and to minimize the risk of drowning. The system is also designed to reduce thermal shock upon entry into cold water and delay the onset of hypothermia.

7.1.2 The inflated MD1128A-2 Life Preserver (Fig. 37) is styled as a torso ring fitted around the vest, positioned below the arms, front lower chest and around the upper back. It is designed to be used only while attached to the Flight Commander Helicopter Passenger Transportation suit, as part of the Mustang Helicopter Suit System (MHSS-02), and should **never** be used alone. When inflated, the cell supports the head and keeps the upper torso out of the water enhancing protection against hypothermia, and lessens the negative effect on core temperature. When deflated, the Life Preserver is contained within a vest, which is semi-permanently attached to the suit.

7.1.3 The life preserver is inflated by using two separately operated carbon dioxide gas auto-inflation systems. It is a common characteristic that all inflatable life preservers will gradually permeate CO_2 gas through their cell material with time, and a softening of the cell will be observed over extended periods. In the MD1128A-2, this is overcome by providing oral inflation systems to top up the pressure in the cell. The oral inflation system may also provide added pressure to the bladders in cold temperature conditions, since under these conditions the CO_2 gas will not expand as greatly as in warmer temperatures. Finally, in the event that one CO_2 inflation system fails to operate, the oral inflation system may be used as a backup system to fully inflate the life preserver.

7.2 DESCRIPTION

7.2.1 Design and Construction

7.2.1.1 The MD1128A-2 has a single chamber inflatable cell activated by two 60-gram CO_2 cylinder inflator systems. The life preserver is styled as a torso ring fitted around the vest, positioned below the arms, front lower chest and around the lower back. The vest is constructed from a highly durable 210-denier polyurethane (PU) coated nylon. The outer shell of the MD1128A-2 vest is not integral with the inflation cell, but acts as a cell enclosure secured by Velcro™ and snap fasteners. The inflation cell and cover are folded and placed back into the vest cell enclosure as instructed in Section 9.0.

7.2.1.2 The MD1128A-2 has one small pocket located on the inside of the front cover that houses a sea-dye marker pack. A safety whistle and sea light are supplied with the life preserver and are attached to the top left front lobe of the bladder. The bladder has emergency jettison and deflation systems fitted. The emergency jettison comprises a double grab rod system located at the front vest shoulder straps. The bladder is located at three points and on removal of the rods the bladder is free to drop away from the vest. The system was devised to allow a trapped passenger in a submerged ditched helicopter, with an inflated cell, to jettison it aiding a better escape. A dump valve is fitted to the front right lobe of the inflatable cell. This dump valve was incorporated to aid ingress into a life raft and in emergency egress situations.

7.2.1.3 The safety whistle and sea light may be used in emergency egress situations.

7.2.1.4 The inflatable cell is larger in the front and rear than its side lobes. The deflation system allows the wearer to deflate the cell in order to facilitate raft boarding.

7.2.2 Inflation System

7.2.2.1 The MD1128A-2 single chamber inflatable cell design incorporates two CO_2 inflation systems and an oral inflation system. In case the inflation cell fails to inflate, the life preserver may be inflated orally. The oral inflation system consists of an oral tube and oral valve. Each oral valve is normally closed, and is opened by blowing into the oral tube.

7.2.3 Inflation Cell

7.2.3.1 The polyurethane coated nylon single chamber inflation cell is not integral with the outer shell of the life preserver, but is contained within a polyurethane cell cover which is attached at three points to the vest and is totally contained within the outer shell of the vest. The single chamber cell is in the form of an inflatable ring located around the upper torso. The cell is fully inflated with two 60-gram cylinder of compressed CO_2 gas.

7.2.4 Air Breathing Device

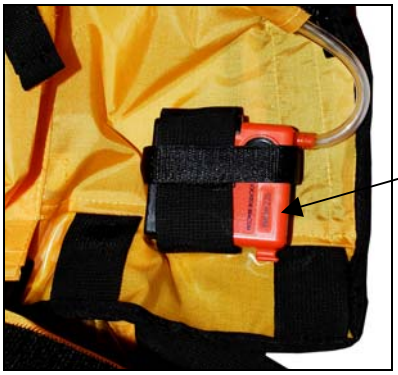
7.2.4.1 The MD1128A-2 also has pair of pockets that house a survival egress air breathing device. The compressed air cylinder is held in a pocket located on the outer left side of the inner cover. The mouthpiece of the device is held in a pocket located on the left side of the outer cover (Fig. 38). The breathing system pockets are designed for an Aqua Lung SEA Model LV-2.

Figure 38. Air Breathing Device

7.2.1 **PLB Retainer**

7.2.1.1 The MD1128A-2 has webbing straps on the outer left side of the inner cover, which houses a personal locator beacon (PLB) (Fig. 39). A fabric tunnel, which extends around the perimeter of the vest neckline, houses the personal locator beacon's antenna. The MD1128A-2 was designed to house a Sea Marshall SMRS8.

Figure 39. PLB Retainer



7.2.2 **Spray Hood**

7.2.2.1 The MA7638 spray hood is attached to vest cover behind the users head. The spray hood is stowed rolled up behind the wearer's head. Deployed quickly by the wearer pulling it overtop of the head, it is intended to reduce the splashing of water onto the airways (Fig. 40).

Figure 40. Spray Hood

7.2.3 **Fasteners**

7.2.3.1 The MD1128A-2 has easy-to-use, Velcro™ hook and loop, and snap fasteners on the torso cover. This allows the life preserver to expand when inflated, and easily be folded when deflated. When inflating, the Velcro™ and snap fasteners burst open allowing the inflation cell to expand out of the cell enclosure.

7.2.3.2 A durable nylon waist belt is attached to the life preserver vest. This belt is fastened and fitted using a quick-release buckle and waist belt adjuster. To tighten the belt, pull the extra webbing from the waist belt adjuster. After adjusting the fit, the excess webbing is led through a belt loop to keep it out of the way. A strap is fitted to the vest to prevent ride-up when the wearer enters the water. To ensure proper function, it is important to ensure that this strap is adjusted to fit the wearer before water entry.

7.2.4 **Markings**

7.2.4.1 The life preserver is marked with indelible stencil. The life preserver is marked with suit fitting instructions, which are located on the inside of the vest cover. The fitting instructions are printed clearly enough to be read even in dimly lit surroundings.

7.2.5 **Fit**

7.2.5.1 The MD1128A-2 is a Universal sized life preserver that is fitted to all thirteen standard sizes of the MS2000-2.

7.3 OPERATING INSTRUCTIONS

7.3.1 **Manual Inflation**

7.3.1.1 Inflation with CO_2 gas is accomplished quickly and simply by pulling down sharply on the beaded pull cords located at the lower front center of the life preserver vest. This action releases gas into the buoyancy cell, which then fully inflates within five seconds.

7.3.2 **Oral Inflation**

7.3.2.1 In the event that a CO_2 gas cylinder fails to inflate, or if the cell needs to be topped up during use, your inflatable life preserver can be inflated by mouth through the inflation tube.

7.3.3 **Fit Adjustments**

7.3.3.1 Normally there are no adjustments required once the system is inflated. All adjustments should be carried out prior to use (i.e. when donning). If it is necessary to adjust after inflation, the cell may be partially deflated by pulling the dump valve cord to permit access to the waist belt buckle. The cell may then be re-inflated orally.

7.4 FITTING AND DONNING INSTRUCTIONS

7.4.1 **Fitting Instructions**

7.4.1.1 The MD1128A-2 is a constant wear device that can **only** be worn with the MS2000-2 Flight Commander suit.

a. Lay the MD1128A-2 life jacket on its back on a clean flat surface; ensure the waist strap is unbuckled.

b. Lay the MS2000-2 suit torso portion on top of the MD1128A-2 in the same orientation. Insert the arms of the MS2000-2 through the armholes of the MD1128A-2 vest and fold the front portion of the vest over the front portion of the suit.

c. Engage both life jacket attachment zippers on the front of the suit with the respective teeth on the edge of the vest. Zip closed.

d. Turn the suit and vest combination over and place it face down on the table. The male half of the side release buckle attached to the suit, and the female half on the vest, should now be exposed. Mate the two halves.

7.4.2 Donning Instructions

7.4.2.1 The following instructions outline the procedures for donning the MD1128A-2 life preserver when fitted to the MS2000-2 Flight Commander suit. Proceed as follows:

a. Don the suit system as described in section 5.0 of this manual.

b. Fasten the waist buckle and cinch the adjustable strap until fit is tight and secure.

c. Secure cell strap buckle.

7.4.3 Activating Inflation System

7.4.3.1 Grasp the beaded handles positioned at the front centre of the vest and pull down and away from the body.

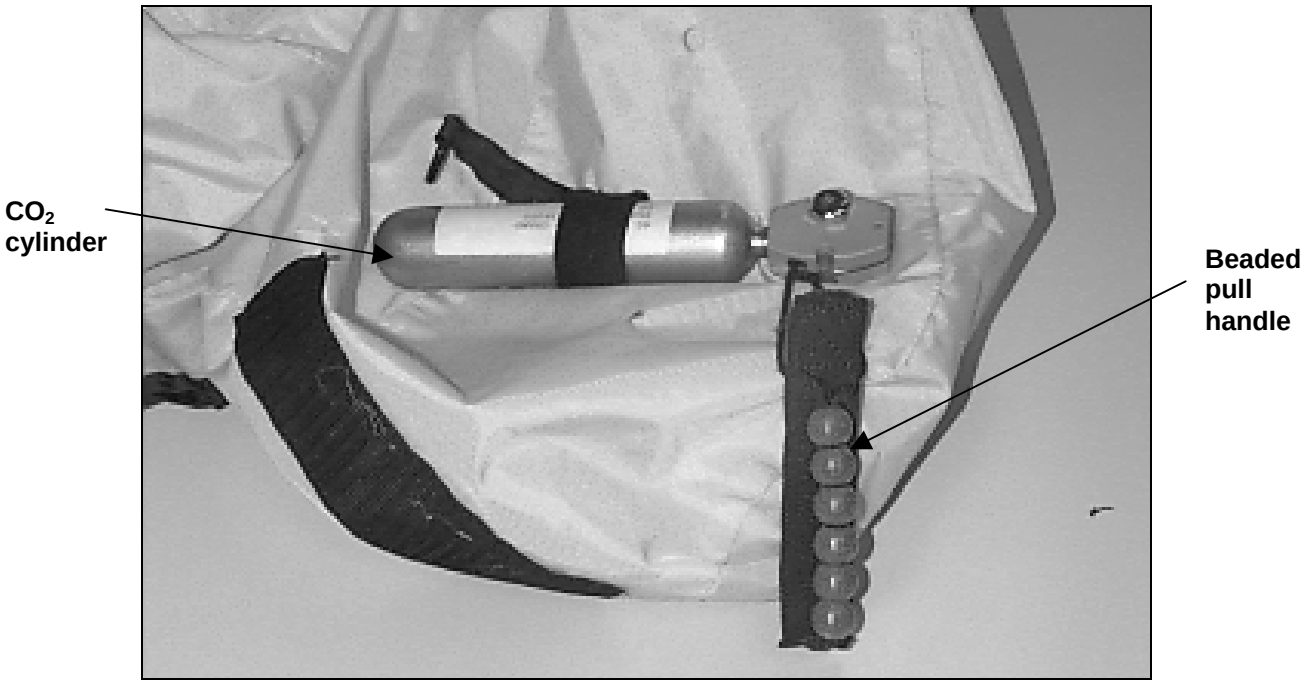
NOTE: If required, the life preserver oral inflation valve is located on the fop front cover of the right hand lobe of the cell.

7.5 FOLDING AND PACKING PROCEDURES

a. Lay the life preserver flat with the back of the vest face up, and completely deflate the chamber by using a vacuum source on the oral tube, or by rolling the cell toward the dump valve. When rolling the chamber, first release the dump valve and evacuate the cell. Start from the opposite end and roll towards the dump valve, while holding it open. When completely rolled, first release the valve, and then unroll the life preserver. The life preserver should now be thoroughly evacuated. If necessary, it may be rolled again to completely expel any remaining air.

b. Ensure that the CO_2 cylinders are not pierced, and are secured in place and should not weigh five grams less than their stamped weight. Replace underweight cylinders. The inflators are to have their safety clips in place.

Figure 41. Fully Charged and Fitted CO_2 Cylinder



c. Ensure the light and battery are secured in place.

d. Loosen waist belt to its maximum adjustment.

e. Starting from the center of the cell container fold the Velcro™ pile on the cell to match the Velcro™ hook on the container housing above and below the cell container.

f. Gather the cell to the right of center and fold with a vertical crease, match both the Velcro™ hook and pile on the cell cover. Repeat for the left side of centre.

g. Move to the right lobe area of the cell. Fold the cell Velcro™ pile to the container Velcro™ hook at the top and bottom container/vest, both Velcro™ piles are positioned either side of the oral tube. Repeat for left lobe.

h. Place right inflator beaded handle on Velcro™ strip at edge of vest, ensuring inflator pull cord is placed at the bottom right corner of vest cover. Position the CO_2 cylinder parallel with vertical edge of vest, inflator lower most.

i. Place the oral inflation tube diagonally so that the oral valve lays next to the CO_2 cylinder.

j. Position cell cover securing strap at the top right of the container cover at the seam junction of cover and vest. The buckle is to be positioned outside the container cover.

k. Fold the cell cover from the right and position over the oral inflation tube; hold in place.

l. Fold up the lower part of the lobe ensuring the dump valve pull cord is free and will not be trapped in the fold.

m. Hold down folds and fit container cover, ensuring Velcro™ and snap fasteners are secured all the way to the centre vest position.

n. To pack the left lobe follow the instruction as stated in steps g. to m. ensuring all operations are for the left side and not the right.

o. Position cell cover securing strap at the top left of the container cover at the seam junction of cover and vest. The buckle is to be positioned outside the container cover.

p. Fold the cell cover from the left and hold in place.

q. Fold the cell cover from the bottom upwards and hold in place.

r. Hold down folds and fit container cover, ensuring Velcro™ and snap fasteners are secured all the way to the centre vest position.

s. With the cell completely encased in its cover, ensure the two halves of the side release buckle are exposed at the container/vest seam junctions on the respective sides. Ensure the beaded handles are positioned correctly with the pull cords free at the container corners.

7.6 INSPECTION PROCEDURES

7.6.1 Inspection Intervals

7.6.1.1 A close visual inspection should be performed prior to issue, by the issuer and the user.

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

7.6.1.2 The life preserver should have a close visual inspection (see section 7.6.2):

a. On receipt from the dealer, supply depot or contractor.

b. Before and after use by the individual issued the life preserver or at least once every twelve months.

c. Whenever the integrity of the suit is in doubt.

d. If out of service (on the shelf).

7.6.2 Close Visual Inspection

7.6.2.1 Lay the life preserver flat on a clean, dry, smooth surface.

7.6.2.2 Visually examine the life preserver for signs of damage or missing components. Visually inspect for the following by opening the cell container cover:

a. Punctures, abrasions, or holes to the protective container, cell cover, or the inflatable cell

b. Broken or missing fasteners and hardware

c. Loose, damaged, or missing thread

d. Corrosion to metal fittings

e. Condition of the CO_2 inflator and dump valve pull cords

f. Ensure warning label is attached to the lining back panel and that all safety markings are readable. See section 7.9.11 for marking repair guidelines.

7.6.2.3 Test the mechanical and/or the oral inflator mechanism, where applicable, by performing the CO_2 Inflation Mechanism Test (see section 7.7.7) and/or the Oral Inflation Valve Test (see section 7.7.6).

7.6.3 Perform the Inflatable Cell (see section 7.7.5) and Dump Valve (see section 7.7.9) Tests.

7.6.3.1 Check the inflators before use. As a safety precaution, it is recommended that you check that the inflators are complete, armed, and ready for use. To do this, follow these simple instructions:

a. Ensure the cell container is open. Unscrew and remove the CO_2 gas cylinder from the inflator and inspect the small end of the CO_2 gas cylinder. If the end is pierced, the CO_2 gas cylinder is empty and must be replaced.

b. Make sure the lever on the inflator is in the up or "ready" position with the red safety indicator clip in place. If the lever is in the down or "fired" position, it must be reset into the "ready" position and the new red safety clip installed before inserting the CO_2 gas cylinder.

CAUTION: Moving the lever into the up or "ready" position after the CO_2 gas cylinder is in place will cause the CO_2 cylinder to discharge into the buoyancy cell.

c. Verify that the "O" ring is present in the bottom of the inflator. Insert the CO_2 gas cylinder, small end down, and screw into the threaded hole on the inflator; repeat for the other inflator.

7.6.3.2 Check the Sea Light system expiry date marked on the light. If the system has expired remove it from the suit, and follow the instructions in line (f) below, otherwise proceed as follows. Check the:

a. Light dome for cracks

b. Battery pack casing for cracks and damage

c. Power cord and plug for damage and corrosion

d. Cell for deterioration, i.e. Swelling

e. Operation of the circuit and bulb, by applying 1.5 volts across the leads. The bulb should light under these conditions; if it does not light, renew the bulb or the entire unit.

f. Fitting of the rescue light. If the existing rescue light is to be replaced follow these procedures for fitting the new light:

i.) Remove the existing light.

ii.) Test the new circuit and bulb by procedure (e) above.

iii.) Ensure plugs are secure in battery.

iv.) Wrap the extra lead around the battery, and push the battery into the neoprene pocket, and the lamp housing into the neoprene holder, of the life preserver.

7.6.4 **Inspect the Whistle**

7.6.4.1 Inspect the whistle at least once every twelve months.

a. For cracks or signs of wear or damage to the casing

b. Check the operation of the whistle by blowing the whistle several times; the sound should be clear and not muffled.

c. If either the whistle shows signs of damage, or the sound is unsatisfactory the whistle is to be replaced, and a new whistle tested.

7.6.4.2 To obtain the maximum benefit from your life preserver it is recommended that you become familiar with its flotation characteristics, Test it by standing in water chin deep and inflating the buoyancy cell. Lift your feet off the bottom and note how you float in various positions and water conditions.

NOTE: The MD1128A-2 life jacket is to be worn attached to an MS2000-2 personal immersion suit during this test.

7.7 MD1128A-2 LIFE PRESERVER TESTING PROCEDURES

7.7.1 Inspection Intervals

7.7.2 This section describes the various inspection procedures and their intervals for the MD1128A-2 Life Preserver. Please note the MS2000-2 Flight Commander has its own inspection procedures and intervals (see section 6.4).

7.7.3 Your life preserver should be inspected and tested annually to maintain all components of the life preserver, and its associated equipment (including whistle) in a serviceable condition, and to ensure that the inflatable cell will withstand the specified pressure. For life preserver that is in use, a more frequent interval is required.

7.7.4 Have a technician test for leaks periodically, at least every twelve months, and when a visual inspection raises any doubt about the integrity of the life preserver.

7.7.5 Inflatable Cell Test

7.7.5.1 Record the barometric pressure and temperature twice; when the cell is inflated, and when the time interval of the test has passed.

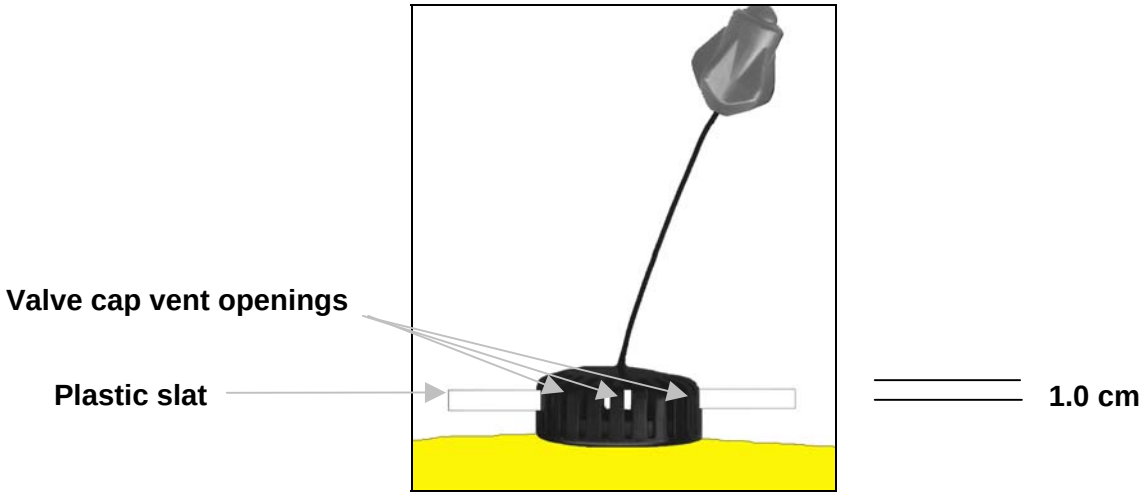
7.7.5.2 The cell pressure shall be corrected for barometric pressure and temperature changes that have occurred during the test using the following correction factors:

7.7.5.3 Perform the leakage test as follows:

a. Remove the CO_2 cylinders from the inflators.

b. Carefully block the dump valve passages with plastic slats that pass through the valve cap vent openings close to the spring. The slats must be wide enough to fully suppress the spring, so no air travels through the valves.

Figure 42. Blocking the Dump Valve Passages



c. Inflate the cell through the oral tubes to 1.56 psi from a regulated air supply using a standard lever activated air nozzle with a rubber tip. Ensure the dump valve is sealed to prevent leaks (see step b.).

d. Wait 5 minutes for the dump valve to reseat, then check with a dial pressure gauge with a rubber tip that is pressed to the oral inflate tube opening;

Pass/Fail criteria is that the cell will pass the test if the following conditions are met:

i. At the end of 1 hour, pressure is 1.25 psi or greater

ii. At the end of 2 hours, pressure is 1.0 psi or greater

7.7.5.4 The test will be considered a failure if the pressure drops below these values before the time has elapsed. If a cell fails, it must be set aside and examined to determine the cause of failure.

7.7.6 **Oral Inflation Valve Test**

7.7.6.1 To test the oral inflator:

a. Visually inspect the tube and ensure there are no cuts or tears.
b. Remove the CO_2 cylinders from the inflators.
c. Inflate the cell through the oral tube.
d. Hold the inflator under water, bubbles from the tube or valve indicate a leak and repair or replacement is required.

7.7.7 **CO_2 Inflation Mechanism Test**

7.7.7.1 To test the CO_2 inflator, operate the manual lever several times. Ensure the lever moves fully and that the piercing pin travels far enough to puncture the sealing disk. Visually check to see that the piercing pin is in place, and protrudes sufficiently. Ensure the piercing pin is centered, and does not bend to one side.

7.7.8 After the test, the cell shall be deflated, and the CO_2 cylinders re-attached.

7.7.9 **Dump Valve Test**

7.7.9.1 The dump valve should easily operate by pulling the cord attached to the center of the valve. This movement should be under tension as the valve diaphragm is kept in place by a compression spring. In order to test this spring inflate the cell until the dump valve starts to vent automatically, this will start to happen when the cell is fully inflated and the pressure gauge is at approximately 2.0 psi. Once the valve has stopped auto-venting, pull on the cord to operate the dump valve. The valve should vent easily. On release of the cord, the valve should close and no air should escape. This operation should be carried out 3-4 times to fully test the system.

7.7.9.2 Determination of the need of repair of overhaul.

7.7.9.3 The following table provides a guideline for determination of the service required to return the life preserver to operational condition:

Figure 43. MD1128A-2 Service Guidelines

ITEM	CONDITION	DETERMINATION
Fabric	Puncture, abrasion, chafing	Repair. Not repairable if the damage is to the inflatable cell
	Soiling	Clean
	Porosity	Not repairable

ITEM	CONDITION	DETERMINATION
	Contamination, oil, grease, etc.	Clean or not repairable, depending on severity
Stitching	Loose, ripped, cut	Repair
Webbing	Ripped, cut, contaminated	Replace
Snaps	Bent, broken, corroded, inoperative	Replace
Oral Tube	Cut, split	Not repairable
Oral Valve	Leaks, inoperative	Replace
Inflatable Cell	Leaks, punctured	Not repairable
Lamp	Broken, inoperative	Replace
Wire	Broken, corroded	Replace
Battery	Swollen, affected	Replace
Pull Ring	Broken, missing	Replace
CO_2 Cylinder	Wrong type, corroded, discharged, underweight	Replace
CO_2 Inflator	Leaks, damage, corroded, actuator arm bent or inoperative	Replace
Inflation Handle	Missing, broken	Replace
Manifold Valve	Leaks	Replace core if it still leaks, not repairable

7.8 LAUNDERING PROCEDURES

7.8.1 Wash in fresh water using mild laundry detergent and hang to dry.

NOTE: Do not dry clean.

Do not use chlorine bleach.

Do not iron.

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

Do not store in a wet condition.

7.8.1 Laundering the Inflatable

a. Remove the CO_2 gas cylinders. Use a $^{9}/_{16}$"AF wrench to remove the inflators. Discard the top and bottom o-rings.

b. Unscrew the dump valve caps and remove.

c. Remove the quick release rods.

d. Remove the bladder from the cover. Use this opportunity to visually inspect the bladder.

e. Hand wash or sponge down the fabric in warm fresh soapy water, then rinse with clean water. If machine washing use the gentle cycle with a mild detergent or soap.

f. Hang to dry in a well-ventilated area, which is free from direct sunlight. A plastic coat hanger is preferable to clothesline clips, so that the life preserver material is not wrinkled or damaged when wet. Do not tumble dry.

g. To avoid premature aging of the nylon buoyancy cell and stitching, the life preserver should not be hung in direct sunlight for extended periods of time. To avoid mildew, hang dry the life preserver after every use, and be sure not to roll up the product or stow it away while damp. If it has been exposed to salt spray, the salt must be rinsed off with fresh water and the life preserver allowed to dry prior to storage.

h. Be sure to replace the CO_2 gas cylinder, if necessary, and check that the lever on the inflator is in the up or "ready" position with the safety clip in place. Remember to follow the instructions and observe the cautions given below. Replace the inflator o-rings, top and bottom.

i. When dry, store the life preserver unfolded, or on a coat hanger in a dry, cool, well ventilated environment.

7.9 REPAIR PROCEDURES

7.9.1 Cover Fabric Patching

a. Trim the ragged edges of the tear before patching.

Figure 44. Step a. Cover Fabric Patching

b. Cut a patch large enough to overlap the damaged area by 25 mm (1 inch) on all sides. The patch must be placed with its coated side facing the coating on the shell.

c. Weld around the perimeter.

d. Do not attempt to patch the inflatable cell.

7.9.2 The vest fabric must be sewn.

7.9.3 Patching the Vest

a. Trim the edges of the tear.

b. Cut a patch, of vest fabric (see section 9.0), large enough to overlap the damaged area by 25 mm (1 inch) on all sides.

c. Tack sew the edges to the patch, and then sew around the perimeter using a 5 mm ($^3/_{16}$ inch) seam allowance.

7.9.4 Oral Inflation Valve Replacement

7.9.4.1 The valve may be replaced if it is faulty (see figure 45). The valve is Mustang part number HD7647.

7.9.4.2 To replace this valve:

a. Place the end of the oral tube in a vice just below the valve. Alternatively, gently place the valve in vice grips. Protect the valve from marking by covering the vice grip teeth.

NOTE: If the valve breaks, ensure all debris is cleared from the tube.

b. Squeeze slowly to force the valve out of the end of the tube, being careful not to mark the tube surface.

c. Once the valve has been removed, place the replacement valve into the tube end. A small amount of liquid soap will ease the valve into the tube.

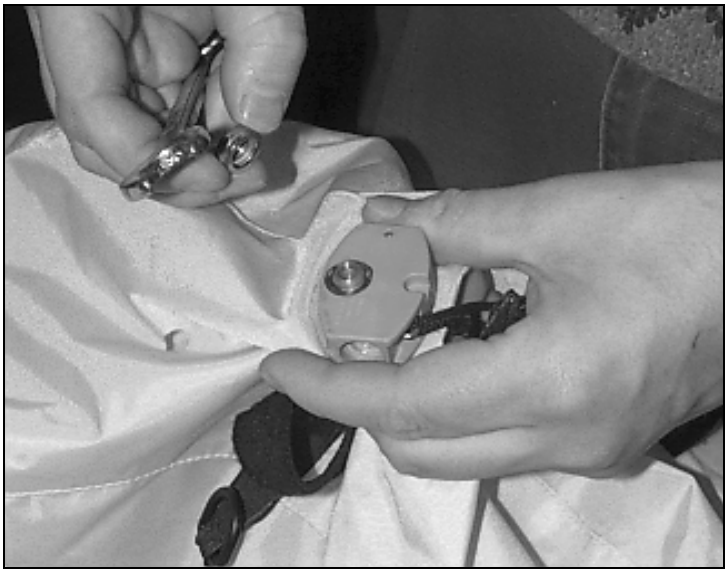
Figure 45. Step c. Oral Inflation Valve Replacement

7.9.5 **Inflator Replacement**

7.9.5.1 To replace the inflator (Mustang part no. HD77189):

a. Remove the inflator nut, and top gasket; set aside.

Figure 46. Step a. Inflator Replacement



b. Pull the inflator off the manifold valve.

c. Set the new inflator onto the manifold valve.

d. Replace the top gasket and nut; tighten to 20 in. lb using a torque wrench.

7.9.6 Webbing Repair/Replacement

a. Pick out the stitches and remove the damaged piece.

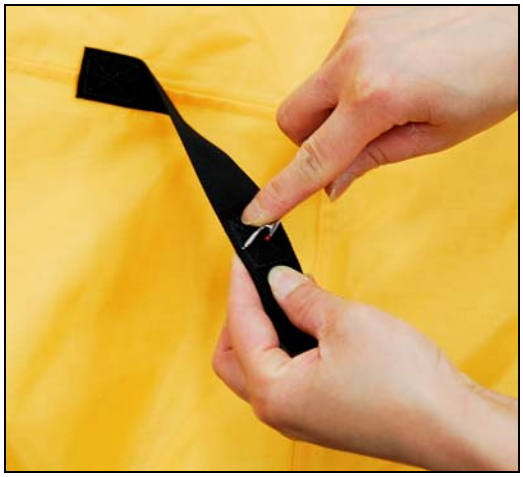
b. Cut a new piece using the original, if possible, as a pattern.

c. Set the new piece in place using the same stitching as the original webbing.

7.9.7 Buckle Replacement

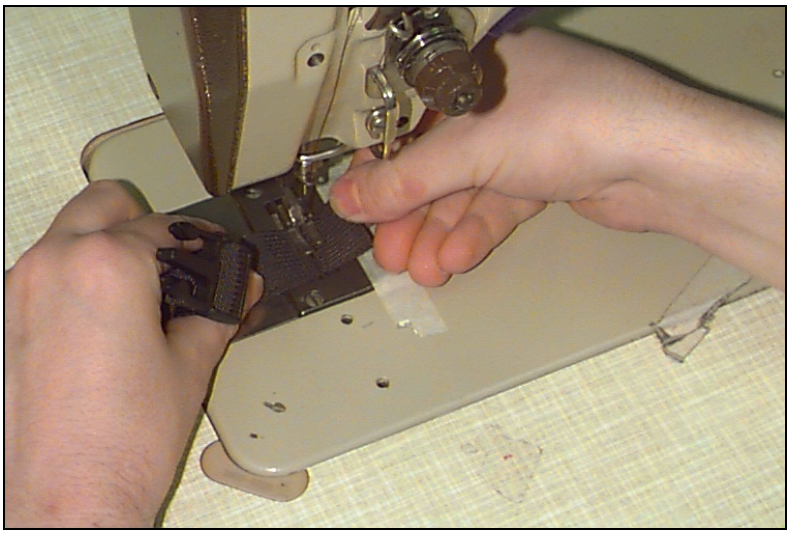
a. Pick out the stitching and remove the old buckle.

Figure 47. Step a. Buckle Replacement



b. Set a new buckle in its place using the same stitching as the original buckle.

Figure 48. Step b. Buckle Replacement



7.9.8 Dump Valve Replacement

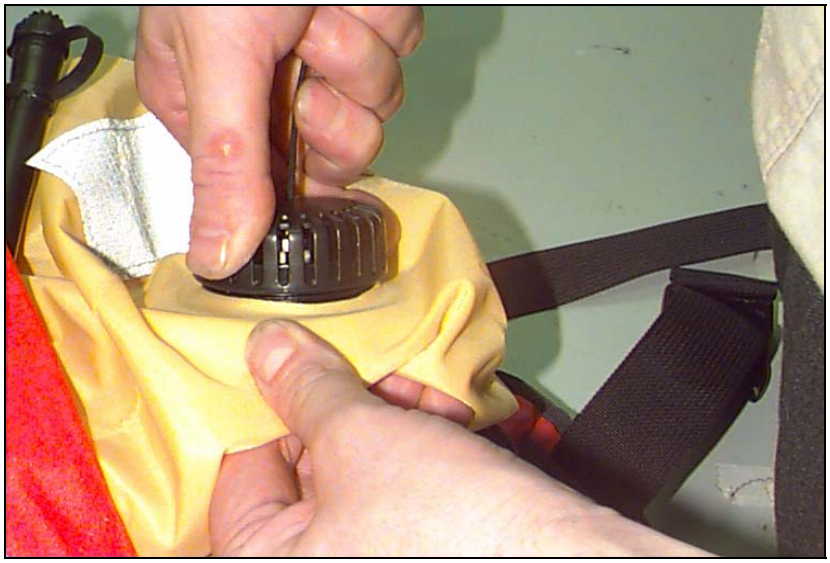
7.9.8.1 The dump valve cover and valve assembly may be replaced as a unit. If the base is damaged, the cell must be replaced.

7.9.8.2 To replace the cover:

a. Unscrew the cover and remove it.

b. Replace the cover with a new one. Hold the lanyard back against the spring to keep the valve diaphragm off its seat while screwing the cover on (this will prevent premature wear of the rubber, make the job easier).

Figure 49. Step b. Dump Valve Cover Replacement



7.9.9 Spray Hood Snap Replacement

7.9.9.1 The MD1128A-2 snap replacement procedure is similar to the MS2000-2 Mitt snap replacement procedure with the exception of the parts and dies used. Refer to section 6.5.17 for instructions for the **Mitt snap** replacement instructions.

7.9.9.2 The components required to replace MD1128-2 hood snaps are the Dome cap (HD7770), Stud (HD7780), Post (HD7185-13) and Socket (HD7785).

a. Using a pair of cutting pliers, work the cutting edge underneath the Socket (HD-7785) while stretching the foam away from the socket base with your fingers. Cut off Socket (HD-7785) while being careful not to cut into the foam.

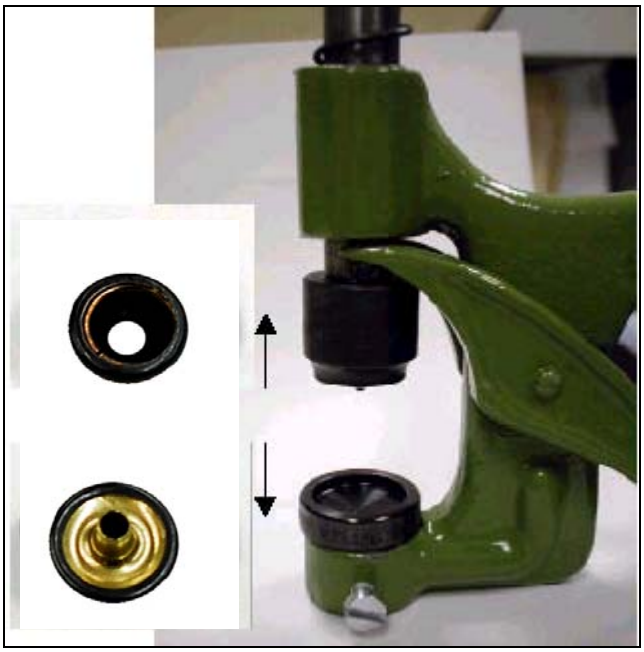
Figure 50. Step a. Spray Hood Snap Replacement

b. Load hand pliers with the dies shown.

Figure 51. Step c. Spray Hood Snap Replacement

c. Set the new Dome Cap (HD-7770) with the pin facing up into the bottom die. Set the new Socket (HD-7785) in to the upper die.

Figure 52. Step c. Spray Hood Snap Replacement



d. Align pin of Dome Cap over hole in foam liner ensemble. Make sure the Cap and Socket are on the proper sides of the foam liner. Press the snap together.

Figure 53. Step f. Spray Hood Snap Replacement

e. The new snap is installed. If the snap rotates not enough force was applied.

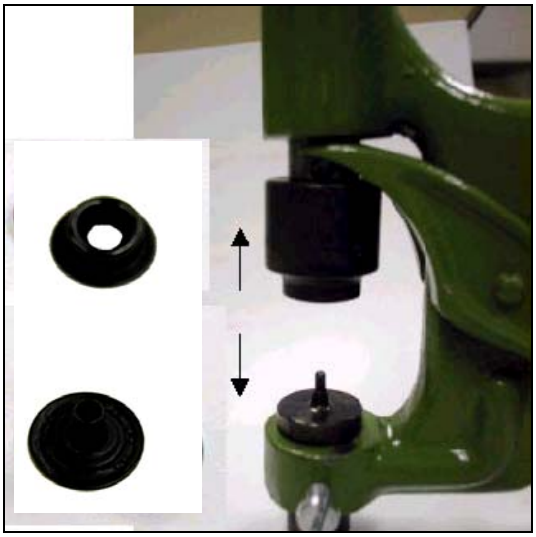
f. Using a pair of cutting pliers, work the cutting edge underneath the Post (HD-7185-13). Cut off Post (HD-7185-13) while being careful not to cut into the fabric.

Figure 54. Step f. Spray Hood Snap Replacement

g. Load hand pliers with the appropriate dies.

h. Set the new Stud (HD-7780) with the stud facing up into the top die. Set the new Post (HD-7185-13) into the lower die.

Figure 55. Step h. Spray Hood Snap Replacement



i. Align Post over hole in fabric. Ensure the Stud and Post are on the proper sides of the fabric.

Figure 56. Step i. Spray Hood Snap Replacement

j. Press the snap together.

Figure 57. Step j. Spray Hood Snap Replacement

k. The new snap is installed. If the snap rotates not enough force was applied.

Figure 58. Step k. Spray Hood Snap Replacement

7.9.10 **Baby Dot Snap Replacement**

7.9.10.1 The MD1128A-2 Baby Dot snap replacement procedure is similar to the Mitt snap replacement procedure. Refer to section 6.5.17 for instructions for the **Mitt snap** replacement instructions.

7.9.11 **Markings Repairs**

7.9.11.1 Markings may be repaired if worn, damaged or missing, or unreadable in any way. The markings being referred to are any alphanumeric data or images on the suit that refer to its proper operation, safe maintenance or emergency functionality, fit or form.

7.9.11.2 Worn labels may be marked with permanent marker or replaced with manufacturer-supplied labels as necessary.

7.9.11.3 Damaged, missing or unreadable labels should be replaced with manufacturer-supplied labels.

8.0 SUMMARY

8.1 The Mustang Survival Helicopter Passenger Transportation Suit System, MS2000-2 is a constant wear dry suit that protects helicopter crewmembers and passengers in harsh marine environments with cold-water immersion features. The MS2000-2 and MD1128A-2 comprise a suit system. The suit is easily donned, maintained and stored. Qualified approved technicians, with proper equipment, or Mustang Survival Corp. may make suit repairs. A well-maintained suit means survival in emergency situations for which normal clothes were not designed.

9.0 PARTS LIST

This section identifies the materials used in the manufacturing of the Mustang Survival MS2000-2 and MD1128A-2. These materials are highly recommended for repairs and replacements. 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 products may not be exactly as shown below.

Figure 59. MS2000-2 Outer Shell (shown without MD1128A-2)

Figure 60. Replacement Sub-Assembly List for the MS2000-2

PART NUMBER	NOMENCLATURE	FUNCTION/USE
MA4000 02	Flight Commander Replacement Liner	Liner, Size 5 Liner, Size 6 Liner, Size 7 Liner, Size 8 Liner, Size 9 Liner, Size 10 Liner, Size 11
MA2003 02	Flight Commander Replacement Suit Storage Bag	Storage Bag, Size 5 Storage Bag, Size 6 Storage Bag, Size 7 Storage Bag, Size 8 Storage Bag, Size 9 Storage Bag, Size 10 Storage Bag, Size 11
MA2501 02	Flight Commander Suit Patch Kit	Repair Sub-Assembly
MA2502 02	Flight Commander Replacement Inflatable Mitt (Pair)	Universal Size
MA2503 02	Flight Commander Replacement Radio Pocket	Universal Size
MA2504 02	Flight Commander Replacement Buddy Line	Universal Size
MA2505 02	Flight Commander Replacement Wrist Seals (Pair)	Cuffs, Size S Cuffs, Size L
MA2506 02	Flight Commander Replacement Boots (Pair)	Boots, Size 7 Boots, Size 8 Boots, Size 9 Boots, Size 10 Boots, Size 11
MA2507 02	Flight Commander Replacement Entry Zipper	Repair Sub-Assembly
MA2508 02	Flight Commander Replacement Suit Exhaust Valve	Repair Sub-Assembly

Figure 61. Replacement Parts List for the MS2000-2

PART NUMBER	NOMENCLATURE	FUNCTION/USE
EL-1004-13	Black elastic	Whistle holder
FA-1023-6	Lining gold	Liner lining (both surfaces)
FA-1043	Mosquito netting	Boot reinforcement
FA-1073-13	Gore-tex BD650	Flange for hanger loop
FA-1167-6	210x210 d nylon	Shell fabric (suit, mitts, hose)
FA-1241	Polyester mesh	Drainage mesh @ wrists & ankles
FD-1404-13	Black foam	Mitt insulation
FD-2303	3mm FR neoprene	Flap & trim on hood & light holder
FD-2304	5mm FR neoprene	Wrist seals and hood
FL-3000-10	5mm Airsoft PVC foam	Liner insulation/floatation
GL-1001 or GL-1006	Adhesive, Bostick 1125A or Adhesive, Rainbow RH149	New neoprene cuff
GL-1007-13	Rainbow black	Bonding boot
GL-1011	Uniroyal 6571 adhesive	Bonding
HD-7017	Kwik Vent exhaust	Neckline exhaust valve
HD-7100-13	TSR-100 buckle black	MD1128A-2 rear attachment
HD-7161-13	1” looploc black	Mitt & new cuff straps
HD-7178-13	¾” CR buckles	Liner-Shell attachments
HD-7565-13	Black aluminum eyelet	Vents in liner @ neck & shoulders
HD-7625-13	4 3/8” 727ACUS oral tube	Head pillow & mitt inflation tubes
HD-7686-13	3/8”x12”corrugated hose	Head pillow
HD-7201-10	Nylon connector (white)	Head pillow hose
HD-7630	Oral valve 800 RO/TL	Head pillow & mitt inflation valve
HD-7422	Snap hook 316SS	End of buddy line
HD-7640	Brass crimp rings	Head pillow hose connectors
HD-7806	Baby Dot Dome	Mitt pocket
HD-7807	Baby Dot Socket	Mitt pocket
HD-7808	Baby Dot Spring	Mitt pocket
HD-7809	Baby Dot Rivet	Mitt pocket
HT-1050	Warning card	Instructions
IN-1000-10	Plastisol (white)	Winged Logo
IN-1000-13	Plastisol (black)	Winged Logo and name
LA-4525-9	MS logo	MS Logo

PART NUMBER	NOMENCLATURE	FUNCTION/USE
LA-4132	2” nylon	Labels
LA-4133	5” nylon	Labels
LA-4135	2” black nylon	Labels
LA-4128	5” black nylon	Labels
LC-1001-13	Black lanyard lace cord	Whistle attachment
MI-5119-6 to MI-5119-13	Dunlop Purofort Thermo Plus	Boots
MI-5719	ACR L8 sea light	Light
MI-5751	SOLAS whistle	Whistle
TA-1019	2” SOLAS tape adhesive	Hood
TA-1025-13	1.5” slit tackle black	Liner binding / hanger loops
TA-1093	2” SOLAS tape	Wrists
TA-1085-14	1” Gore-tex seam tape	Secures hanger loop flange
TA-1079	7/8” ether tape	Seam sealing of shell
TA-1024-13	¾” gros grain	Ankle/wrist liner-shell connectors
TA-1054-13	7/8” Melco tape	New wrist cuff
TA-1027-13	1” gros grain	New wrist cuff strap
TA-4000-13	Melco tape	Inside wrist seal and hood
TH-8850-6	Yellow Thread CSB33	Serging of liner
TH-8866-4	CSB 69 red thread	Hood sewing
TH-8866-10	CSB 69 white thread	Sewing, label to shell
TH-8866-13	CSB 69 black thread	Sewing
TH-8866-9	CSB 69 grey thread	Sewing badge to shell
TH-8866-41	CSB 69 yellow thread	Sewing
VE-5000-13	¾” hook black	Buddy line cover flap
VE-5010-13	¾” loop black	Buddy line cover flap
VE-5100-13	1” hook black	New cuff strap
VE-9110-13	1” loop black	New cuff and mitt straps
VE-5200-13	38mm hook black	Mitt strap
VE-5300-13	2” hook black	Hood flap
VE-5310-13	2” hook black	Hood flap
WE-7000-13	½” nylon tubular webbing	New wrist cuff
WE-8500-13	1” nylon webbing black	Buddy line & heel pull tabs

PART NUMBER	NOMENCLATURE	FUNCTION/USE
ZI-8003-13 (2XS) ZI-8003-13 (XS) ZI-8004-13 (S) ZI-8004-13 (M) ZI-8004-13 (L) ZI-8005-13 (XL) ZI-8005-13 (2XL)	VFO 56 23” black VFO 56 23” black VFO 56 24” black VFO 56 24” black VFO 56 24” black VFO 56 25” black VFO 56 25” black	Liner – shell zipper attachment
ZI-8015-13 or ZI-8015-4	VFO 56 9.5” black or red	MD1128A-2 attachment (front)
ZI-9225	33.5” PU waterproof zipper	Main entry 2XL
ZI-9227	30.5” PU waterproof zipper	Main entry 2XS-S
ZI-9228	31.5” PU waterproof zipper	Main entry M, L
ZI-9229	32.5” PU waterproof zipper	Main entry XL

Figure 62. MD1128A-2 Not Inflated

Figure 63. MD1128A-2 Inflated View

Figure 64. Replacement Sub-Assembly List for the MD1128A-2

PART NUMBER	NOMENCLATURE	FUNCTION/USE
MA1128 02	Flight Commander Replacement Life Preserver Bladder	Repair Sub-Assembly
MA2500 02	Flight Commander Life Preserver Re-Arm Kit	Service Accessory Kit
MA2509 02	Flight Commander Replacement Life Preserver Dump Valve	Repair Sub-Assembly

Figure 65. Replacement Parts List for the MD1128A-2

PART NUMBER	NOMENCLATURE	FUNCTION/USE
EL-1004-13	Blk elastic	Holds end of CO2 cylinders
FA-1167-6	210x210 d nylon	Vest shell, restraint layer, bladder, pockets
FD-2303	3mm FR neoprene	Light holder
HD-7043-13	730 ROLS 66BK tube black	Oral inflation tube
HD-7365	Tecnojacket valve	Exhaust valve and manifold
HD-7100-13	TSR-100 buckle black	Rear attachment for LPU to suit & chest buckle
HD-7125-13	TSR-150 buckle black	Front waist buckle

PART NUMBER	NOMENCLATURE	FUNCTION/USE
HD-7190-13	D ring	Secures bladder to vest
HD-7610	Manifold with nut & core	Manifold for inflator mechanisms
HD-7647	730 ROA oral valve	Oral inflation valve
HD-7648	CAP (736ACU/4) for 730	Oral tube valve cap
HD-7714-4	Inflator handle beads, red	Inflator handle beads
HD-7716	Inflator locking clip	Inflator locking clip
HD-7718-9	840 AMLS Inflator	Inflator mechanisms
HD-7806	Baby dot dome	Snaps along rear of vest
HD-7807	Baby dot socket	Snaps along rear of vest
HD-7808	Baby dot spring	Snaps along rear of vest
HD-7809	Baby dot rivet	Snaps along rear of vest
IN-1000-13	Plastisol (black)	Winged Logo and instructions
LA-4133	5” nylon	Label
LA-4135	5.12” black nylon	Label
LA-4525-9	MS logo (grey)	MS logo
LC-1001-13	Black lanyard lace cord	Inflator lanyards
MI-5020	¼” Delrin rod (white)	Bladder release mechanisms
MI-5702	60g CO2	Compressed gas cylinders
MI-5719	ACR L8 sea light	Light
MI-5720	Sea marker FSA907-3	Sea dye
MI-5992	FS donning instruction	Instructions
TA-1024-13	¾” gross grain	Vest binding and D ring attachment on bladder
TA-1027-13	1” gros grain	Emergency release flap tab(s), HEEDS regulator pocket tab
TA-1093	2” SOLAS tape	Retro-reflective tape
TH-8866-9	CSB 69 grey thread	Sewing logo
TH-8866-10	CSB 69 white thread	Sewing labels & retro tape
TH-8866-13	CSB 69 black thread	Sewing Velcro, binding, webbing
TH-8866-41	CSB 69 yellow thread	Sewing
VE-5000-13	¾” hook black 0199	PLB strap
VE-9000-6	¾” hook lemon 0199	Restraint layer bladder folds, closes bottom of vest along breakout region, HEEDS regulator pocket
VE-5010-13	¾” loop black 0199	Personal Locator Beacon (PLB) strap
VE-9010-6	¾” loop lemon 0199	Restraint layer bladder folds (rear lobe), closes bottom of vest along breakout region, secures beaded handles, HEEDS regulator pocket
VE-9100-6	1” hook lemon 0199	Restraint layer - secures bladder folds near underarm

PART NUMBER	NOMENCLATURE	FUNCTION/USE
VE-5100-13	1” hook black 0199	HEEDS bottle strap end
VE-9110-6	1” loop lemon 0199	HEEDS bottle pocket, restraint layer bladder folds (underarms)
VE-9110-13	1” loop black 0199	On beaded handles
VE-5300-13	2” H88 hook black 0199	Front lobes of bladder
VE-5310-13	2” L1000 loop black 0199	Front lobes of bladder
WE-8500-13	1” nylon webbing black	Front lobe connector, HEEDS strap, rear attachment strap, beaded handles, keepers for Delrin rods
WE-8501-13	1.5” nylon webbing black	Waist belt, belt keepers, PLB holder, reinforcement along length of Delrin rods
ZI-2000-13	VFC 56 #580 10” black	MD1128A-2 bladder access zipper on restraint layer
ZI-8015-13 OR ZI-8015-4	VFO 56 #580 9.5” black or red	MD1128A-2 zippers (front) attachment LPU to suit

Figure 66. MA7638 Spray Hood

Figure 67. Replacement Parts List for the MA7638 Spray Hood

PART NUMBER	NOMENCLATURE	FUNCTION/USE
EL-1014-13	3/8 INCH BLACK ELASTIC, PT. NO. P-38	Side darts
FA-1167-6	56 IN. 210 X 210 DENIER NYLON 6,6 BRIGHT, SPANISH YELLOW, 6.3-7.5 OZ/YD2	Shell material
HD-7156-13	3/4 IN. SNAPHOOK & RETAINER SN-3/4, PT. 106-0000-5614, & PT. 108-0075-5614	Shell front
HD-7185-30	SNAP FASTENER MS-27983-4 & MS-27980-8B EYELET	Attach straps

PART NUMBER	NOMENCLATURE	FUNCTION/USE
HD-7770	DOME CAP K5500, X210128-2B, MS-27980-1B	Attach straps
HD-7780	STUD, K5500 BS10370 2CMS-27980-7B	Attach straps
HD-7785	SOCKET, K5500 XX 10224, MS-27980-6B	Attach straps
LA-4132	2" NYLON LABEL STOCK	Label
LA-4134	BLACK NYLON RESIN RIBBON	Label
MI-5039	0.016" x 54" FR Vinyl Film - 3S DPC CPAI CFM UV Undusted	Window
TA-1093	2” SOLAS TAPE	Peak of hood
TA-1024-13	3/4 IN. GROS GRAIN RIBBON TAPE, MIL-T-5038H TYPE 3, BLACK, PAT. 4462 (72 YDS/ROLL)	packing straps, perimeter binding, side dart elastic tunnels
TH-8866-13	CSB 69 BONDED NYLON THREAD - BLACK	Stitching
TH-8866-6	CSB 69 BONDED NYLON THREAD GOLD #6	Stitching
VE-5000-13	3/4" BLACK H88 0199 HOOK FASTENER 330/BLK PT #155086 (C OF C TO AA55126A, TYPE 2, CLASS 1)- 50 YDS / ROLL	dart/strap attach
VE-5310-13	2 INCH L1000 BLACK 0199 MIL-A LOOP FASTENER 330/BLK PT.#154991 (C OF C TO: AA55126A, TYPE 2, CLASS 1)	strap attach
WE-8500-13	1 IN. NYLON BLACK WEBBING, MIL-W-17337F, PAT. 6703, CLASS I, TSO-C-13F, (100 YDS/ROLL AVERAGE)	hood/LP attachment straps
PA-7000	8 IN. X 11 IN. ZIPLOC POLYBAG	packaging
SS-6020	#3 SHIPPING CARTONS (24-7/8 x 13 x 10-15/16) 32ECT	packaging