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DEFENCE AND CIVIL INSTITUTE OF ENVIRONMENTAL MEDICINE

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POSITIVE FLOTATION HARNESS (PFH) FOR USE BY CANADIAN FORCES SEARCH AND RESCUE TECHNICIANS

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DEPARTMENT OF NATIONAL DEFENCE - CANADA

TABLE OF CONTENTS

ABSTRACT

At the request of Maritime Air Group Headquarters (MAGHQ), Halifax, National Defence Headquarters (NDHQ) tasked the Medical Life Support Division (MLSD) of this Institute (DCIEM) to research and develop a flotation system for the Canadian Forces Safety Restraint Harness, Rescue Specialist (Double Lift Harness). The system should provide sufficient independent buoyancy for the wearer to conduct water rescue exercises without relying on the use of a life preserver.

Utilizing unicellular foam for buoyancy, MLSD designed four prototype flotation systems over a period of four years, for operational evaluations (OPVAL) by Helicopter Squadrons 406, 423, 443 and the Diving Team of Canadian Forces Base Shearwater, Nova Scotia.

Initial test results revealed deficiencies which were rectified by MLSD, based on operator recommendations. The last prototype evaluation concluded that the tested flotation system had sufficient buoyancy to keep two persons afloat, was a suitable replacement for the Double Lift Harness/Jacket Lifesaving Combination and recommended that production models be acquired for the CH124A Helicopter fleet.

A Canadian Aerospace Company is now finalizing fabrication of 70 flotation vests with inherent buoyancy and MLSD has submitted a draft Canadian Forces Modification Instruction detailing the interface of the vest and Double Lift Harness to NDHQ.

INTRODUCTION

The Crewman's Restraint Harness, Rescue Specialist, was introduced to Maritime Air Group (MAG) CH124A Sea King helicopters in 1981 to further augment the rescue equipment carried in the aircraft. Known as the Double Lift Harness, it would facilitate the rescue by hoist of an incapacitated or unconscious survivor from the water. A crewman wearing the harness is lowered to the water and helps the survivor into a rescue sling (horse collar) and holds him, attached to the harness as the crewman and survivor are hoisted to the aircraft.

Later that year a Flight Safety incident occurred involving a helicopter crewmember wearing the inflatable life preserver, Buaer Mark II and the Crewman's Restraint Harness, Rescue Specialist. As a consequence, concerns arose as to the compatibility of the restraint harness and the life preserver (1). Canadian Forces Base (CFB) Shearwater raised an Unsatisfactory Condition Report (UCR) (2) which was staffed through Maritime Air Group Headquarters (MAGHQ) and National Defence Headquarters (NDHQ). The outcome was the recommendation that a trial be conducted on the Life Preserver, Foam Type, Maritime Orange by the Shearwater helicopter squadron to determine if it could be attached to the Crewman's Safety Restraint Harness in lieu of wearing the life preserver, Buaer Mark II. Another outcome was an NDHQ project tasking to DCIEM (3, 4) to research and develop a flotation system for the Crewman's Safety Restraint Harness which would provide sufficient independent buoyancy for the wearer to conduct rescue exercises without relying on the use of his life preserver.

CFB Shearwater Helicopter Aircrew Training and Standards Committee (HATS) conducted an Operational Evaluation (OPVAL) during the first half of 1982. This was to determine the most suitable combination of Safety Restraint Harness, Life Preserver Buaer Mk II and Life Preserver, Foam Type, Maritime Orange to afford CH124A Crewmen double lift rescue capability. The OPVAL concluded that the Life Preserver, Foam Type, Maritime Orange, worn over the Crewman's Restraint Harness provided the best combination of buoyancy, comfort and access to harness fittings. The OPVAL recommended that this type of life preserver be attached inside the Crewman's Restraint Harness and should be adopted as the CH124A helicopter standard. The OPVAL also recommended that a further trial be undertaken to construct and evaluate such a harness.

In September 1982 MAGHQ tasked CFB Shearwater to construct and evaluate a single unit, positive buoyancy Crewman's Safety Restraint Harness, and forward the prototype and test results to DCIEM. In January 1982 CFB Shearwater Safety Systems modified the harness and testing was conducted. The prototype flotation harness was passed to DCIEM representatives who were briefed on the conduct and results of the user trials at a meeting in Shearwater (April 1983). The trial report concluded that the prototype positive flotation Crewman's Safety Restraint Harness provided sufficient buoyancy to enhance the performance and confidence of the operator during double lift hoists but required further improvement by DCIEM. The report recommended that a production model based on the prototype harness be developed and evaluated by DCIEM (6).

The second MLSD prototype positive flotation harness (PFH) was

delivered to CFB Shearwater in April 1984 and was tested by 406 Maritime Operational Training Squadron, supported by CFB Shearwater (7, 8). The trial results led to the conclusion that the PFH was unsuitable for operational use as it did not have sufficient buoyancy to float a crewmember harness-man plus one other person. The trial report recommended that DCIEM develop a PFH with a minimum buoyancy of 45 pounds for further operational testing.

A third MLSD prototype PFH with increased buoyancy was completed in July 1985 (11). Further modification to provide additional increased buoyancy was completed in September 1985 (13). Testing was conducted in November 1985 at DCIEM by a MAGHQ representative. His report (14) indicated that the buoyancy requirement and operational potential had been met. A fourth MLSD prototype PFH (production model) was completed in November 1985 and forwarded to MAGHQ for user trials by HT 406 Shearwater (15).

The results contained in the MAGHQ final report (OPVAL/A 982L Operational Evaluation of the Positive Flotation Harness (PFH)) led to the conclusion that it had the buoyancy to keep two persons afloat in the water, was easier to don than the conventional double lift harness and recommended that the PFH replace the Crewman's Restraint Harness, Rescue Specialist, in the CH124A operations (16). Air Command Headquarters endorsed these recommendations (17) and 70 flotation vests that were ordered by NDHQ are now nearing completion by a Canadian Aerospace Company. The MLSD draft modification instruction to interface the vest with the harness has been forwarded to NDHQ for publication (Annex A).

OBJECTIVES

The objectives of the MLSD research and development were:

1. To design a positive flotation vest to interface with the Crewman's Safety Restraint Harness, Rescue Specialist, retaining the harness structural integrity.

2. To design a flotation vest, with sufficient adjustability to accommodate the size range of user aircrew with the various combinations of flying clothing worn in the CH124A helicopter operations.

3. To ensure that the flotation vest would perform in the water to the extent that no inflatable type life preserver would be required.

4. To design a flotation vest having improvements over the original CFB Shearwater flotation vest/harness configuration.

5. To incorporate any modifications to the flotation vest recommended by the operators subsequent to operational testing of the prototype(s).

6. To increase the buoyancy capability as recommended by test reports without the penalty of excessive bulk.

METHODS

POSITIVE FLOTATION HARNESS (PFH)

a. Description - CFB Shearwater Prototype

The prototype harness for trial was an NSN 1620-21-869-2566 Crewman's Safety Restraint Harness, Rescue Specialist, (Double Lift Harness) over which a modified NSN 4220-21-860-2985 Life Preserver Foam Type, Maritime Orange had been fitted. The life preserver was extensively altered and attached to the harness by velcro fasteners and sewing to produce the trial configuration (Figures 1 and 2 right). The life preserver modification entailed:

- removal of the collar
- cutting openings in the front flotation lobes to permit access to the harness "D" rings for attachment of the hoisting snap hooks
- cutting off the lower six inches of the back of the vest to allow unrestricted access to the two harness adjusting straps and to the large "D" ring on the lower back of the harness
- gluing a velcro fastener to the inside of the front flotation lobes.

The structural integrity of the restraint harness was maintained, the only modification being attachment of velcro fasteners to the front of the two shoulder straps to mate the fasteners on the front flotation lobes. The two pieces were interfaced by sewing the back of the flotation vest to the nylon back panel of the restraint harness. The velcro fasteners on the inside of the flotation lobes joined those on the shoulder harness straps and secured the front of the vest to the harness.

b. MLSD Prototype 1.

This prototype was basically the type described in "a." and interfaced with the restraint harness in a similar manner (no figure). The exception was that small openings were cut in the front flotation lobes to permit access to the harness "D" rings, on the premise that slightly more buoyancy would be achieved. Water tests with prototypes a. and b. showed very little increase in buoyancy for the MLSD PFH b. which was destroyed. Prototype 2. was constructed to provide better wearer flexibility and increased buoyancy.

c. MLSD Prototype 2.

The PFH consists of an NSN 1620-21-869-2566 Crewman's Safety Restraint Harness, Rescue Specialist, over which a highly modified NSN 4220-21-860-2985 Life Preserver, Foam Type, Maritime Orange has been affixed. The unit is designed to make the wearing of the Buaer MK II Life Preserver unnecessary and provides a buoyancy of 22 pounds (Figures 1 and 2 left).

The harness and life preserver are joined together by velcro fasteners and lacing through grommets in the harness and life preserver (Figure 3). The structural integrity of the harness is unaltered. The life preserver has been extensively modified by:

- replacing the collar with a compact orally inflatable collar;
- splitting the foam flotation pockets on the front of the vest into vertical ribs;
- adding extra flotation pockets to the upper back of the vest
- providing openings in the front of the vest to provide access to the hoisting "D" rings;
- replacing the toggle closures with adjustable velcro fasteners; and
- installing a pocket on each side to carry emergency signalling equipment.

The MLSD Prototype 2. PFH, tested by HT 406 Shearwater was found unsuitable for operational use due to insufficient buoyancy to float a crewmember harness man plus another person during double lift exercises. Tests also indicated that the inflatable collar appeared to be unnecessary. It was discarded in the development of Prototype 3. The trial report recommended that MLSD develop a PFH with a minimum buoyancy of 45 pounds.

d. MLSD Prototype 3.

PFH Prototype 3 was the NSN 1620-21-869-2566 Crewman's Safety Restraint Harness, Rescue Specialist, over which a positive flotation vest was fitted (Figures 4 and 5). Half inch Ensolite foam was utilized in the construction to provide maximum flexibility. Toggle closures and adjustable velcro fasteners (previous prototypes) were replaced by adjustable quick release buckles. Frontal flotation lobe foam was shaped at the neck and arm areas to reduce movement restriction for the head and arms. Smaller exit holes for the harness "D" rings still provided good access. Increased buoyancy was built into the upper back area to the extent that the finished vest provided 39.5 pounds buoyancy, without the harness. Swimming pool tests at DCIEM by a MAGHQ Sea King pilot indicated the need for more buoyancy and an adjustment capability, as the vest fitted too tightly on a 95th percentile subject (Figure 6). Side storage pouches for emergency signalling equipment were inaccessible to the wearer and had to be relocated.

e. MLSD Prototype 4.

This prototype was constructed in a similar manner to Prototype 3. However, to achieve the further buoyancy required, the frontal lobes and side panels were extended three inches downwards. An adjustment belt was fitted and storage pouches for the emergency signalling equipment (day/night flares and SDU-5A strobe light) were hung by snap hooks and "D" rings from the lower sides of the vest (Figure 7).

f. MLSD Prototype 4 - Production Model

Prototype 4. was the final configuration for the PFH. It is an NSN 1620-21-869-2566 Crewman's Safety Restraint Harness, Rescue Specialist, (Double Lift Harness) over which a positive flotation vest has been fitted. The structural integrity of the harness remains intact as no alterations other than installation of attachment points for the vest have been incorporated. The vest has several openings to allow access to all harness adjusting and attachment points and provides a positive buoyancy of approximately 43 pounds. Removable accessory pouches are clipped to each side of the lower portion of the vest. One pouch contains a light marker distress (strobe light) while the other contains two hand-held day/night flares. Reflective tape is sewn on each breast/shoulder strap and across the upper back of the PFH (Figures 8,9,10,11).

The PFH is completely compatible with existing Double Lift Harness accessories (Rescue Sling and Capewell Emergency Release Assembly).

As a consequence of OPVAL A982/L, velcro tape was sewn to the top right shoulder to accommodate the SDU-5/A strobe light and the storage pouches for the emergency signally equipment were enlarged to provide easier access.

DISCUSSION

The Flight Safety incident (1) stemmed from the inability of a helicopter crewman to inflate his life preserver under the restraint harness in the water during hoisting exercises. The remaining "survivor" on this exercise came to his rescue and managed to locate and operate the inflation devices on the life preserver, Buaer MK II. Due to inflation of the life preserver and the tightness of the restraint harness, the crewman experienced breathing difficulty and had to be rescued by crew of the safety boat nearby.

The trial of the Life Preserver, Foam Type, Maritime Orange (2) indicated that when worn over the restraint harness it provided sufficient buoyancy to keep the wearer afloat without hindering his movements in the water or restricting his vision or breathing. The trial, however, appears not to have considered the additional buoyancy required to keep two persons afloat in a sea rescue situation. Consequently, it was not until the OPVAL of MLSD Prototype 2. that the buoyancy requirement was fully recognized and DCIEM advised.

On further MLSD prototype development, it was necessary to layer the Ensolite foam in order to maintain flexibility with the increase in bulk of the flotation vest. This was achieved in Prototypes 3. and 4. to provide the stated buoyancy for the PFH (16).

It is important to note that the PFH utilizes a restraint harness that is presently used by the CF. The only additional equipment required is the flotation vest, inherenty buoyancy which attaches to the harness. This arrangement not only minimizes procurement costs, but it retains the flexibility of using the existing double lift harness, without the flotation vest during over-land rescues.

CONCLUSIONS

The Positive Flotation Harness is a viable item of Life Support Equipment for use in over-water helicopter rescue operations.

ACKNOWLEDGEMENTS

Appreciation is expressed to Captain J.R. Cottingham, formerly of HS 406 Shearwater (now SSO RW MAGHQ) whose dedicated, professional and safety conscious approach to the initial and subsequent PFH evaluation trials reflects great credit to the Canadian Forces Air environment operations.

Appreciation must also be expressed to Master Warrant Officer J.P. Legere of HT 406 Shearwater, the aircrew members of HT 406, HS 423 and HS 443 who participated in the PFH evaluation trials and the Safety Systems personnel who contributed operational support.

REFERENCES

1. Letter (3333-1) (BComd) 29 June 1982 CFB Shearwater
2. HS 443 Unsatisfactory Condition Report D0101/2825 16 Jul 82
3. Letter 14240-1 (DAS Eng 4-3-2) 14 December 1982
4. LOGCON OTTAWA DAS Eng 4399 141350Z Dec 82
5. MLSD 112 141805Z Jan 83
6. Letter MAG: 3333-1 (DComd) 08 Nov 83
7. Letter 3333-1 (BComd) 10 December 1984 CFB Shearwater
8. MAGHQ DComd 441 201215Z Dec 84
9. MLSD 323 041600Z Jan 85
10. LOGCON OTTAWA DAS Eng 4394 081630Z Jan 85
11. MLSD 107 021415Z Aug 85
12. LOGCON OTTAWA DAS Eng 4359 071430Z Oct 85
13. MLSD 137 031911Z Oct 85
14. MLSD 153 081305Z Nov 85
15. CFB Shearwater ADM 5004 091722Z Jan 86
16. Letter MAG: 3333 OPVAL/A 982 L (COMD MAG) 11 July 1986
17. Letter 3333-0086 (DCOS Ops) 28 August 1986

FIGURE CAPTIONS

POSITIVE FLOTATION HARNESS (PFH)

1. CFB Shearwater Prototype PFH (right). MLSD Prototype 2. PFH (left).
2. CFB Shearwater Prototype PFH (right). MLSD Prototype 2. PFH (left).
3. MLSD Prototype 2. Flotation Vest attachments to the restraint harness.
4. MLSD Prototype 3. PFH Fitted to a 65th Percentile Subject.
5. MLSD Prototype 3. PFH Fitted to a 95th Percentile Subject.
6. MLSD Prototype 3. PFH. Water Trials with a 95th Percentile Subject. (Note tightness of the flotation vest, neck/arm areas.)
7. MLSD Prototype 4. PFH. (Adjustable belt, extended front and side panels, storage pocket for emergency signalling equipment.)
8. Production Model PFH (front).
9. Production Model PFH (back).
10. Production Model PFH (left side).
11. Production Model PFH (right side).

Table 1. POSITIVE FLOTATION CREWMAN'S SAFETY RESTRAINT HARNESS (PFH)

This will embrace these items of Life Support Equipment:

Flotation Vest, Inherent Buoyancy, NSN 4220-21-903-2009 P/N DL 8727012-1

Crewman's Safety Restraint Harness, Rescue Specialist, NSN 1670-21-869-2566

Materiel - the following items are required for the manufacture of the flotation vest:

Item	Stock Number	Part Number	Description	Qty Per Equip	Base Acc. Code
1	4220-32-739-5101	4222/091	Ring Dee	ea 4	C
2	5325-00-291-0302	NS20230B20	Grommets	ea 24	C
3	5340-21-820-5097	M570101	Buckle	ea 2	C
4	8305-21-518-0008		Cloth, nylon, intn'l orange	metres 3	C
5	8305-21-744-5043		Webbing, nylon, 1.5", red	metres 2	C
6	8305-21-744-5044		Webbing, nylon, 1", red	metres 1	C
7	8310-21-845-9894	VT295D	Thread, size E, olive drab	as req'd	C
8	8315-21-843-7432		Velcro hook, 2", black	metres 2/3	C
9	8315-21-843-7433		Velcro pile, 2", black	metres 2/3	C
10		Fastex SN	Snap hook and retainer, black	ea 4	C
11		Fastex SR1	Buckle, side release	ea 2	C
12		VN 402C	Ensolite MLC 1/2" thick	sq ft 24	C

NOTE: Drawings were completed and forwarded to National Defence Headquarters, Directorate of Aerospace Support Engineering, for flotation vest procurement.

Table 2. Positive Flotation Capability for Crewman's Safety Restraint Harness.

Rescue Specialist (NSN 1670-21-869-2566)

Buoyancy Tests

4220-21-860-2985 Life Preserver, Foam Type, Maritime Orange	Same Life Preserver As Modified by Safety Systems Section Canadian Forces Base Shearwater	MLSD 2 Prototype Utilizing Foam from the -2985 Life Preserver
28 pounds	19 pounds	22 pounds
26 pounds (Harness -2566 attached)	17 pounds (Harness -2566 attached)	20 pounds (Harness -2566 attached)

MLSD 3rd Prototype with 1/2" Ensolite Foam, in Layers	MLSD 4th Prototype Production Model - (1/2" Ensolite Foam in increased layers)
39.5 Pounds	43 Pounds
37.5 Pounds (Harness -2566 attached)	41 Pounds (Harness -2566 attached)

Figure 1. CFB Shearwater Prototype PFH (right)
MLSD Prototype 2PFH (left)

Figure 2. CFB Shearwater Prototype PFH (right)
MLSD Prototype 2PFH (left)

Figure 3. MLSD Prototype 2 flotation vest attachments to restraint harness

Figure 4. MLSD Prototype 3 PFH fitted to a 65th percentile subject.

Figure 5. MLSD Prototype 3 PFH fitted to a 95th percentile subject.

Figure 6. MLSD Prototype 3 PFH - water trials with a 95 percentile subject Note tightness of the flotation vest, neck/arm areas.

Figure 7. MLSD Prototype 4 PFH. (Adjustable belt, extended front and side panels, storage pocket for emergency signalling equipment.)

Figure 8. Production Model PFH - front.

Figure 9. Production Model PFH - back.

Figure 10. Production Model PFH - left side.

Figure 11. Production Model PFH - right side.

CANADIAN FORCES
MODIFICATION INSTRUCTION

INSTALLATION OF ATTACHMENT TABS ON SAR RESTRAINT HARNESS
NSN 1670-21-869-2566

TO ACCOMMODATE A FLOTATION VEST, INHERENT BUOYANCY
NSN 4220-21-903-2009

Issued on the Authority of the Chief of the Defence Staff

OPI: DAS Eng (4) 1988 - 03

PURPOSE

1. The purpose of this modification is to provide a positive flotation harness (PFH) for use by SAR Techs in over-water search and rescue operations.

WHEN MODIFICATION SHALL BE EMBODIED

2. As prescribed by NDHQ/DAS Eng 4.

INSTALLATIONS AFFECTED

3. N/A

EQUIPMENT AFFECTED

4. The following equipment is affected:

   a. SAR Restraint Harness NSN 1670-21-869-2566

   b. Flotation Vest, Inherent Buoyancy, NSN 4220-21-903-2009

TRAINING AIDS AFFECTED

5. N/A

BY WHOM WORK WILL BE PERFORMED

6. Operating units.

RESOURCES REQUIRED

7. The following resources are required;

   a. Manpower - SS Tech (531) - 1.5 man hours

   b. Downtime - N/A

   c. Material - the following items are required:

ITEM	STOCK NUMBER	PART NO.	DESCRIPTION	UI	QTY PER EQPT	BA CODE
1.	4202-21-712-0003		Cord fibrous 100 lb MBS	ea	24 in	C
2.	5325-00-291-0302		Grommet	ea	6	C
3.	8305-00-268-2426		Webbing 1"		5 in	C
4.	8305-21-518-0008		Cloth nylon intn'l orange		140 sq in	C
5.	8310-21-845-9894	VT 295	Thread nylon size E OD		AR	C
6.	8315-21-897-6294		Velcro hook 3/4" OD		12 in	C
7.	83215-21-897-6295		Velcro pile 3/4" OD		12 in	C
8.	8315-21-897-6299		Velcro pile 2" OD		12 in	C

d. Tools required - nil

MATERIEL RENDERED SURPLUS

8. N/A

MODIFICATION OF SPARE ITEMS

9. Spare SAR Restraint Harness shall be modified as required, at the direction of NDHQ/DAS Eng 4.

MODIFICATION EMBODIMENT PROCEDURES

10. The following is the sequence of operations;

a. Lay out the SAR restraint harness with the outside back facing upwards, as shown in Figure 1;

b. Fabricate an upper harness patch, Figure 2:

(1) Cut the nylon cloth, item 4, to dimensions shown;
(2) Using item 5 sew webbing, item 3, in position as shown in Figure 2.
(3) With the webbing on the outside, fold the cloth in half and sew the end seams.
(4) Turn webbing inside out and sew around the perimeter.
(5) On the centre line, mark the locations for 3 grommets, item 2.

c. (1) Using item 5, sew the upper harness patch to top centre of the harness in the position shown in Figure 1.
(2) Install grommets through the harness patch and the harness cloth.

d. Fabricate a lower harness patch, Figures 3 and 4;

(1) Cut the nylon cloth item 4, to dimensions shown in step 1, Figure 3.
(2) Using item 5, sew webbing, item 3, in the position shown in Figure 3.
(3) With the webbing on the outside, fold the cloth in half and sew the end seams, step 2, Figure 4.
(4) Turn webbing inside and sew around the perimeter.
(5) On the centre line mark the location for, then install 3 grommets step 3, Figure 4.

e. Using item 5, sew the lower harness patch to the harness cloth in the location shown in Figure 1;

f. Fabricate each two front chest attachment patches Figure 5:

(1) Cut the nylon cloth, item 4, to the dimensions shown, Figure 5.
(2) Hem top and bottom edges.
(3) Turn left side seam allaowance over and tack in position with 1 row of stitching.

(4) Over this seam, sew 3/4 inch velcro pile.
(5) Turn right side seam allowance under and tack in position with one row of stitching.
(6) Over this seam sew 3/4 inch velcro hook.
(7) Sew 2 inch velcro pile in position as shown in Figure 5.

g. (1) Install the front chest attachment patches on the main lift webbing above the chest strap, right and left sides of harness with the velcro pile facing outwards, Figure 6.
(2) Ensure the chest attachment patch opening is facing inwards.

h. To attach the flotation vest, inherent buoyancy to the SAR restraint harness;

(1) Lay out the vest, inside facing up.
(2) Lay the restraint harness, folded, on the vest as shown in Figure 7 and secure with item 1, through the grommets on both vest and harness, tying off with a reef knot.
(3) Unfold the restraint harness and secure the front lobes of the vest to the harness, between the V ring and D ring, using the vest attachment webbing and item 1, tying off with a reef knot.
(4) Ensure that the main lift webbing is not tangled and align the front chest attachment patches (velcro pile) with the velcro hook sewn on the inside of the vest, Figure 8.
(5) Position the harness and vest interface on a subject and ensure that the hoisting sling attachment D rings are located in the openings provided on the vest, Figure 9.

WEIGHT, BALANCE AND STABILITY DATA

11. This modification has little effect on weight, balance and stability.

RECORDING PROCEDURES

12. Recording procedures shall be as follows:
a. Equipment - nil
b. Forms and Records - CF363

REPORTING PROCEDURES

13. TBA NDHQ

FUNCTIONAL CHARACTERISTICS OF EQUIPMENT ALTERED

14. The positive flotation harness (PFH) has the buoyancy to keep two persons afloat in a sea rescue situation; the PFH is quicker and easier to don than the conventional double lift harness.

ANNOTATION TO APPLICABLE TECHNICAL ORDERS

15. C-22-279-00/MF-000 - annotation as specified by NDHQ/DAS Eng 4.

ADDITIONAL INFORMATION

16. Nil.

REFERENCES AND OTHER DATA

17. a. Required references - Nil.
b. Background references:
- letter 3333-0086 (DCOS Ops) 28 August 1986
- LOGCON Ottawa DAS Eng 43259 121900Z Jan 88

Figure 1. Upper and Lower Harness Patch

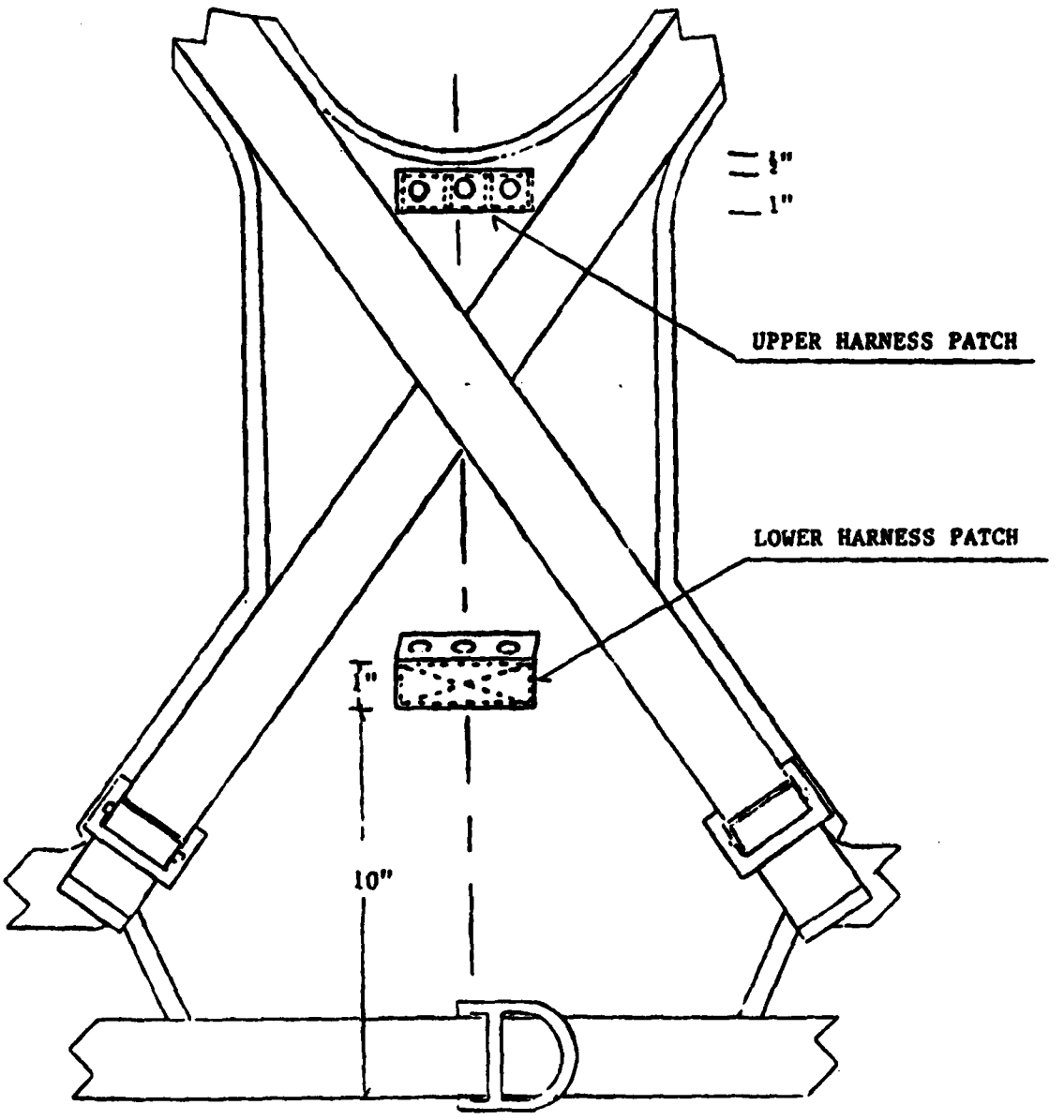


Figure 2. Upper Harness Patch

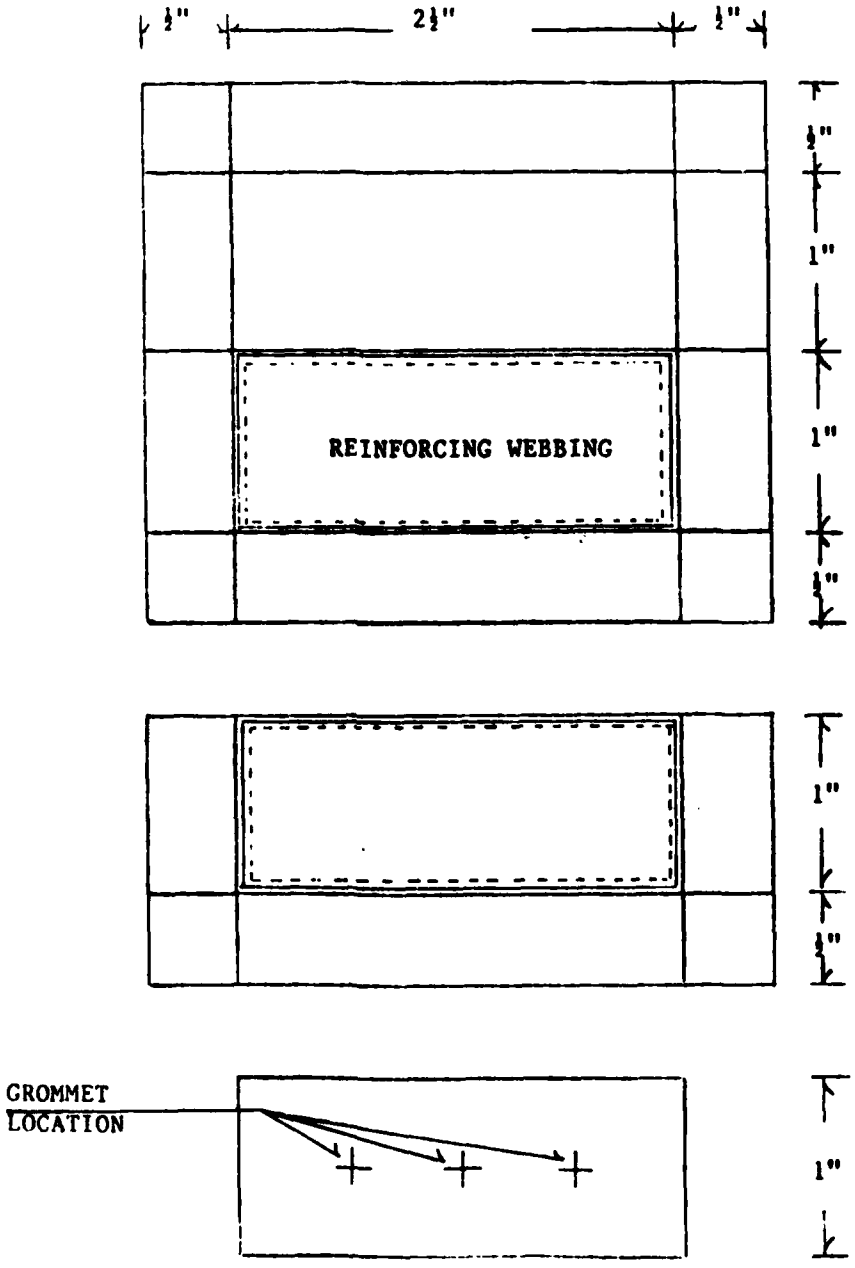
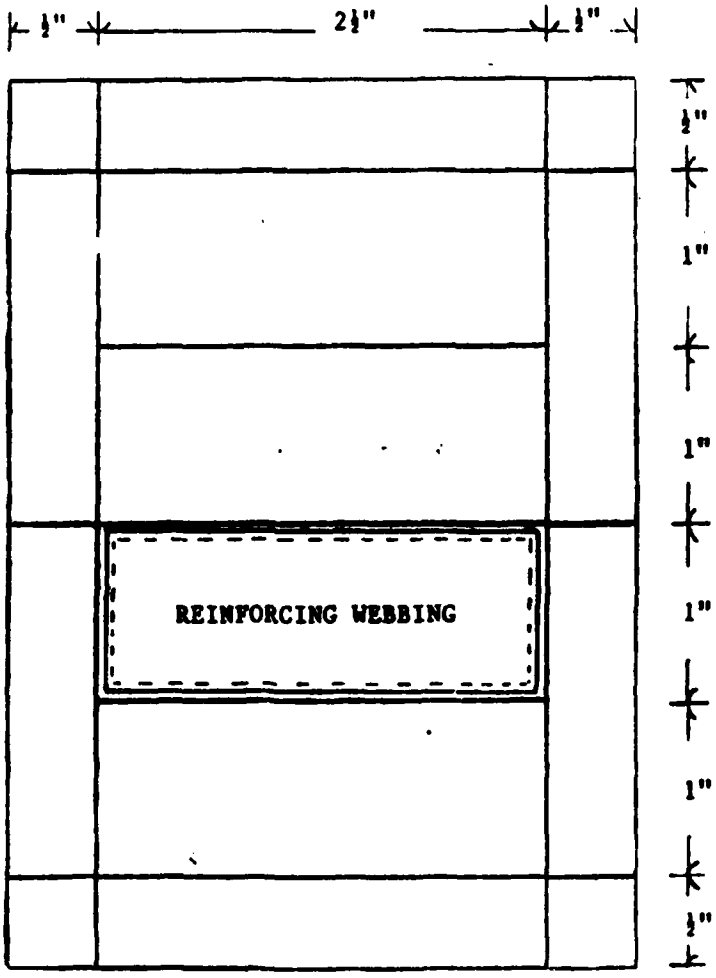
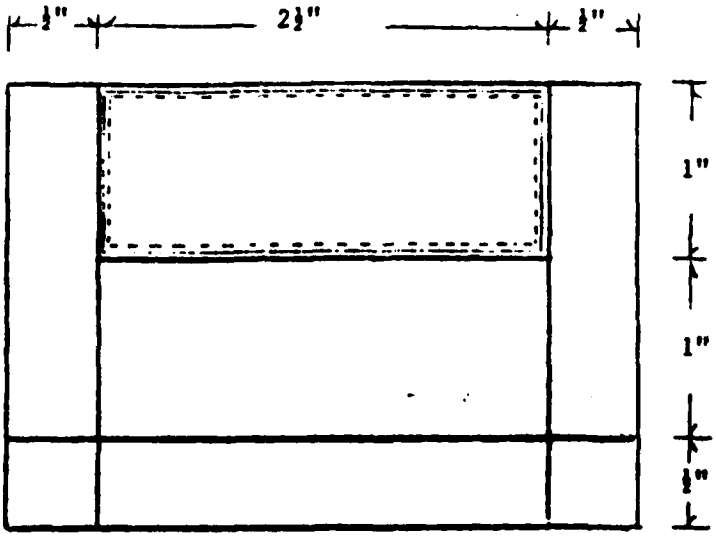


Figure 3. Lower Harness Patch - Step 1.

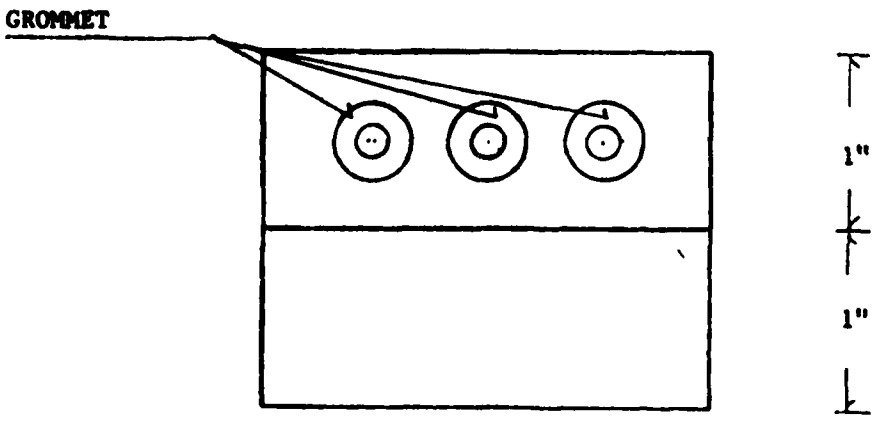


STEP 1

Figure 4. Lower Harness Patch - Steps 2. and 3.



STEP 2



STEP 3

Figure 5. Front Chest Attachment Patches

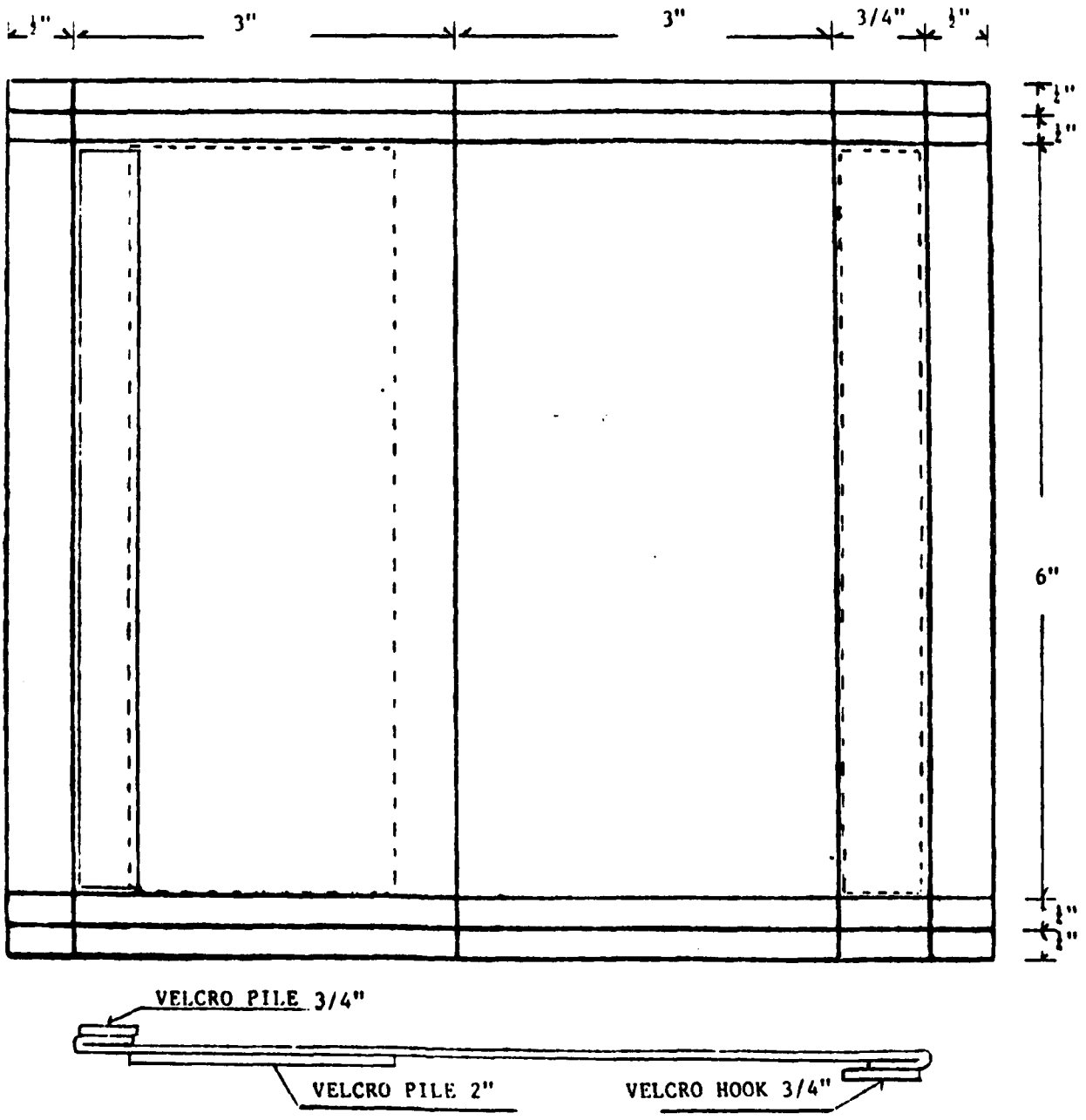


Figure 6. SAR Restraint Harness - Rear View

Figure 7. Back Attachments, SAR Restraint Harness and Flotation Vest, Inherent Buoyancy

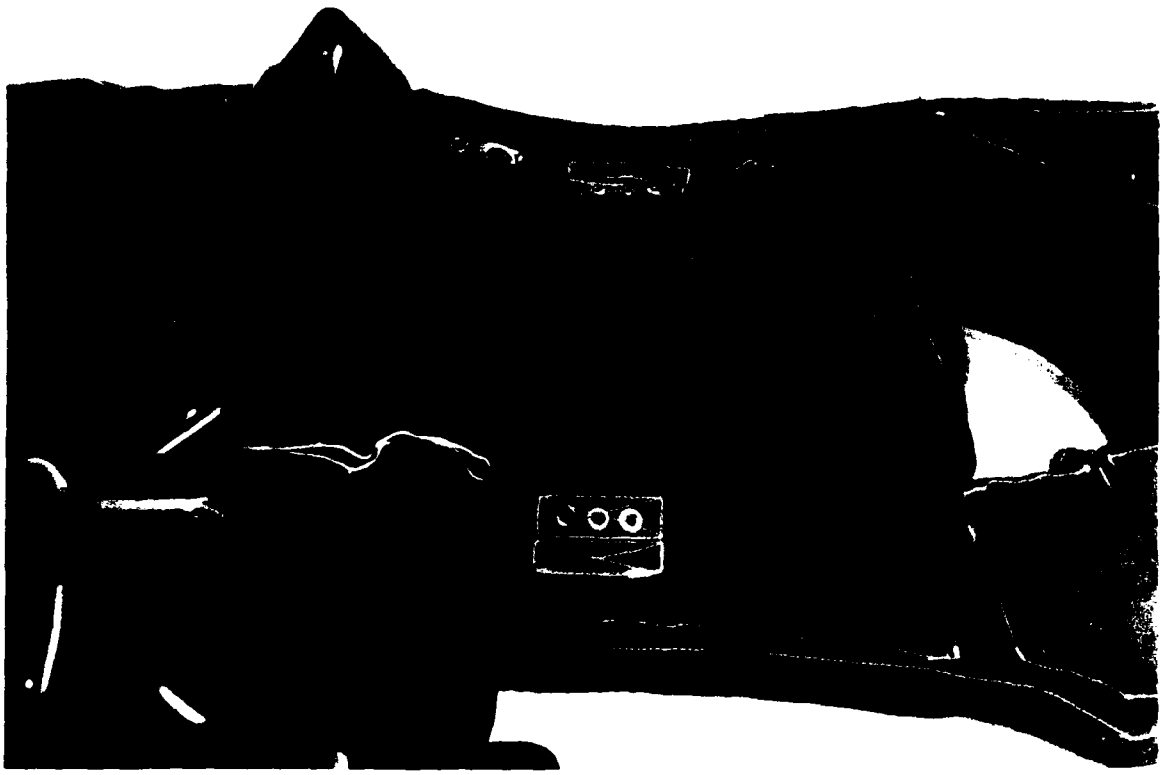


Figure 8. Front Attachments, SAR Restraint Harness and Flotation Vest, Inherent Buoyancy

Figure 9. Frontal View of SAR Restraint Harness Interfaced with Flotation Vest, Inherent Buoyancy Showing Attachment to Hoisting Sling

DOCUMENT CONTROL DATA

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At the request of Maritime Air Group Headuqarters (MAGHQ) Halifax, National Defence Headquarters (NDHQ) tasked the Medical Life Support Division (MLSD) of this Institute (DCIEM) to research and develop a flotation system for the Canadian Forces Safety Restraint Harness, Rescue Specialist (Double Lift Harness), to provide sufficient independent buoyancy for the wearer to conduct water rescue exercises without relying on the use of a life preserver.

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Double Lift Harness

Positive Flotation Harness (PFH)

Over Water Rescue