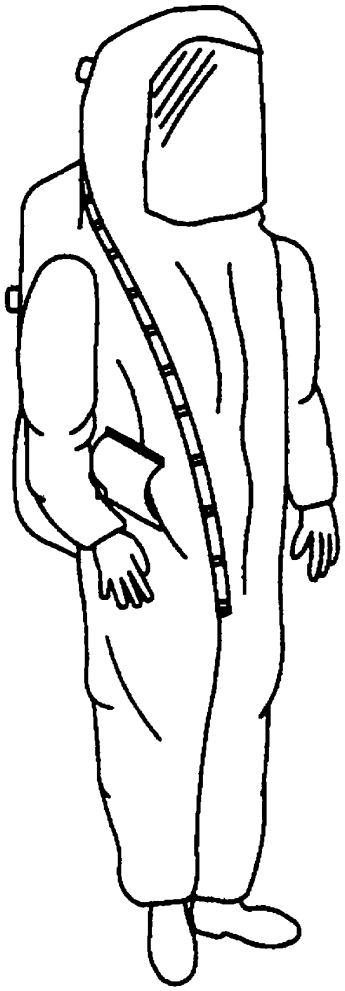
OPERATOR'S AND UNIT MAINTENANCE MANUAL

FOR
SELF-CONTAINED, TOXIC
ENVIRONMENT, PROTECTIVE
OUTFIT-INTERIM (STEPO-I)



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TM 10-8415-208-12
C3

CHANGE

NO. 3

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 16 APRIL 1995

OPERATOR'S AND UNIT MAINTENANCE MANUAL FOR

SELF-CONTAINED, TOXIC ENVIRONMENT, PROTECTIVE OUTFIT-INTERIM (STEPO-I)

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Remove pages	Insert pages
iii and iv	iii and iv
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3-69 through 3-72	3-69 through 3-72
3-75 and 3-76	3-75 and 3-76
3-79 and 3-80	3-79 and 3-80

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CHANGE

NO. 2

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WASHINGTON, D.C., 30 APRIL 1993

Operator's and Unit Maintenance Manual
for
SELF-CONTAINED, TOXIC
ENVIRONMENT, PROTECTIVE
OUTFIT-INTERIM (STEPO-I)

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1-1 and 1-2	1-1 and 1-2
2-21 through 2-24	2-21 through 2-24
2-35 and 2-36	2-35 and 2-36
3-17 through 3-26	3-17 through 3-26
----	3-26.1/(3-26.2 blank)
3-135 through 3-142	3-135 through 3-142
D-3/(D-4 blank)	D-3/(D-4 blank)

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NO. 1

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Operator's and Unit Maintenance Manual

SELF-CONTAINED, TOXIC ENVIRONMENT, PROTECTIVE OUTFIT-INTERIM (STEPO-I)

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Remove pages	Insert pages
2-7 and 2-8	2-7 and 2-8
3-71 and 3-72	3-71 and 3-72
3-135 and 3-136	3-135 and 3-136
---	Glossary-1 and Glossary-2

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WARNING

Limited air supply in the tether mode. Leave the area immediately when the EBA warning light begins to flash. A flashing warning light indicates the remote air supply has failed and 6 to 8 minutes of air at 40 liters per minute is available from the EBA. Failure to leave the area immediately and decontaminate could result in personnel death due to suffocation.

WARNING

Limited oxygen supply in the rebreather system. Leave the area immediately when the alarm whistle sounds. An audible alarm indicates the oxygen pressure has dropped to 25% or below and about 45 minutes of oxygen is available. Failure to leave the area and decontaminate immediately could result in personnel death due to suffocation.

WARNING

Fire hazard. Only use a silicone lubricant when lubricating the rebreather system preformed packing. Oil-base lubricants may ignite in the presence of high pressure oxygen causing burns to personnel.

WARNING

Compressed oxygen hazard. Replace the rebreather oxygen bottle if it is suspected to be leaking. Damaged oxygen bottles must be repaired ONLY by personnel trained and certified to accomplish such work. Tampering with damaged oxygen bottles could result in personnel injury or death due to combustion or sudden release of high pressure.

WARNING

Personnel contamination hazard. All equipment must be decontaminated in accordance with local SOP. Failure to decontaminate properly could result in personnel injury or death due to contamination.

WARNING

Heat stress hazard. The ice vest will not prevent the wearer from perspiring as heat builds up inside the encapsulating protective suit. Leave the area immediately and cool off at any sign of nausea, dizziness or difficulty in breathing. Failure to leave the area and cool off could result in personnel injury due to heat exhaustion.

WARNING

Personnel safety indicators. When operating the rebreather, specific warning signs require immediate operator attention. Leave the area immediately at any signs of nausea, dizziness, difficulty in breathing, contaminants in the face piece, or rapid pressure drop as indicated by the system pressure gauge. Failure to leave the area may result in injury or death due to suffocation.

WARNING

Personnel contamination hazard. Ensure all closures in the encapsulating protective suit are tightly secured. Openings in the encapsulating protective suit could cause sickness or death due to contamination.

WARNING

Personnel contamination hazard. Do not touch the outside of the encapsulating protective suit during doffing and always fold it outward away from the body. Failure to doff the suit properly could result in sickness or death due to contamination.

WARNING

Static electrical discharge hazard in encapsulating protective suits. All tools and equipment must be grounded in accordance with the local SOP when working near static sensitive munitions or flammable chemicals. Absence of a proper ground could result in personnel injury or death due to ignition of munitions or flammable chemicals.

WARNING

Personnel contamination hazard. Encapsulating protective suits should be thoroughly inspected for cracks in cold weather environments. Cracks are more likely to develop in cold stiff suit material. If cracks are detected, replace the encapsulating protective suit. Failure to replace a damaged suit could result in personnel injury or death due to contamination.

WARNING

Cold weather effects the EBA warning light operation. Do not use the EBA for operations in temperatures below +32°F (0°C). Below +32°F (0°C) the warning light may fail or flash inadvertently due to a decrease in battery efficiency. Operations below +32°F (0°C) could result in injury or death due to suffocation.

WARNING

Oxygen deficiency hazard in the rebreather system. Do not use the rebreather system for operations at temperatures below +1 5°F (9. 44°C). Below +15°F (9. 44°C) there may be an increase of carbon dioxide in the breathing mixture due to decreased efficiency of the C02 absorbent. Operations below +1 5°F (9. 44°C) could result in personal injury or death due to suffocation.

WARNING

Heat exhaustion hazard. Encapsulating protective suit users should be given sufficient recuperation time between operations in hot weather environments to avoid heat exhaustion. Fatigue, nausea and/or dizziness could result from extended use without proper rest and fluid replenishment.

WARNING

Do not tighten EBA fittings or connections when the system is pressurized. Close the cylinder valve and be sure nothing blocks the regulator outlet, then relieve the pressure from the system by slowly opening the regulator valve. Failure to depressurize the system prior to adjusting fittings may cause fittings to rupture, resulting in severe personal injury or death.

WARNING

Toxic adhesive hazard. Use the patching kit adhesive in a well ventilated area only and avoid skin contact. Failure to do so may result in lightheadedness or a burning sensation to the eyes and skin. In case of skin contact, wash with soap and water. If vapors become strong, leave the area and allow to ventilate.

WARNING

Personnel contamination hazard. If the EBA filter cartridge is suspected to be contaminated with chemical agent, it must be removed under engineering controls to prevent the spread of contamination. Failure to use engineering controls could result in personnel injury or death due to contamination.

WARNING

Compressed air hazard. Follow the correct procedures when removing the EBA cylinder. There may be compressed air remaining in the cylinder or pressure built-up in the system which could cause personnel injury if correct procedures are not followed.

WARNING

Personnel safety hazard. Do not lean over the EBA cylinder clamp when releasing it. The cylinder clamp is under tension and may cause personnel injury when it is released.

WARNING

Ignition hazard. Do not use oxygen or test oxygen regulators or equipment with the portable regulator tester. Oxygen could be ignited by the regulator tester motor causing personnel injury or death.

WARNING

High pressure air hazard. Always attach the regulator to its appropriate air supply source. Never attach a low pressure air line regulator to a high pressure air supply without an in line regulator to step the pressure down. Failure to follow this warning could result in severe personnel injury or death due to over-pressurization and explosion.

WARNING

Suffocation Hazard. The rebreather absorbent canister must be properly filled with C02 absorbent for the rebreather to operate properly. If the absorbent canister is not filled with fresh absorbent, C02 will not be removed from the breathing air and the user will suffocate.

WARNING

Eye safety hazard. Extra care should be taken to ensure that the rebreather system spectacle assembly is installed properly. The frame arms of the spectacle assembly have pointed ends that point towards the face of the user. Improper installation of the spectacle assembly may result in facial injury or blindness.

WARNING

Suffocation hazard. Ensure "red" hose plugs are installed in the ends of the black exhalation hose and coolant canister hose. Failure to close hose ends during storage of the rebreather will expose the CO2 absorbent to the atmosphere reducing the efficiency of CO2 removal from the breathing air in subsequent operations causing the user to suffocate.

HOW TO USE THIS MANUAL

This manual has been specially tailored to provide the information necessary to don/doff and maintain the Self-Contained, Toxic Environment, Protective Outfit-Interim (STEPO-I) at the operator and unit level. Pages are numbered consecutively within each chapter. Each page number is prefixed with a chapter number. For example, page nine of chapter three is numbered 3-9. Each chapter is divided into sections. This manual consists of the following chapters:

Chapter 1. Introduction

Chapter 2. Operating Instructions

Chapter 3. Unit Maintenance Instructions

Maintenance instructions in Chapter 3 shall be performed only by trained maintenance personnel. The operator is not authorized to perform any maintenance activities specified in Chapter 3.

Each table and appendix is preceded with an introduction explaining its format, content and use. This manual features two tables of contents and subject index.

The front cover table of contents includes topics the operator will use most often. A second table of contents, just in front of Chapter 1, is a more detailed listing of the manual.

Throughout this manual you will see "WARNING" and "CAUTION" notes. The information in them should be strictly observed. In addition to these specific items, common sense and good industrial safety practice should be followed.

WARNING

A warning is used to alert the user of hazardous operating or maintenance procedures, practices, conditions, or statements that may result in injury or death of personnel if not strictly observed.

CAUTION

A caution is used to alert the user of hazardous operating or maintenance procedures, practices, conditions, or statements that may result in damage to or destruction of equipment if not strictly observed.

An alphabetical subject index is at the back of the manual.

Illustrations are provided throughout the manual to support procedures and assist in identifying parts.

Technical Manual

No. 10-8415-208-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. 30 JUNE 1992

OPERATOR'S AND UNIT MAINTENANCE MANUAL FOR SELF-CONTAINED, TOXIC ENVIRONMENT, PROTECTIVE OUTFIT-INTERIM (STEPO-I)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished directly to you.

Distribution Statement A: Approved for public release; distribution is unlimited

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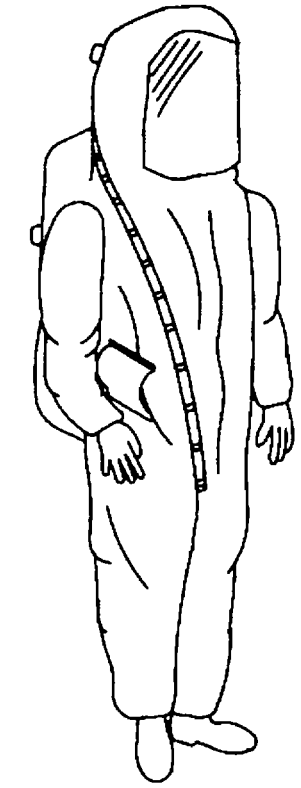
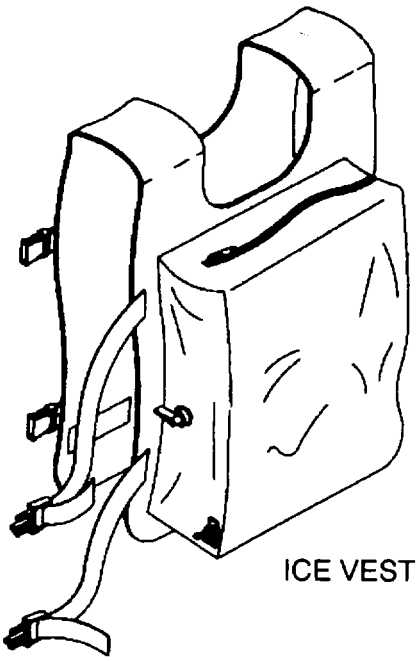
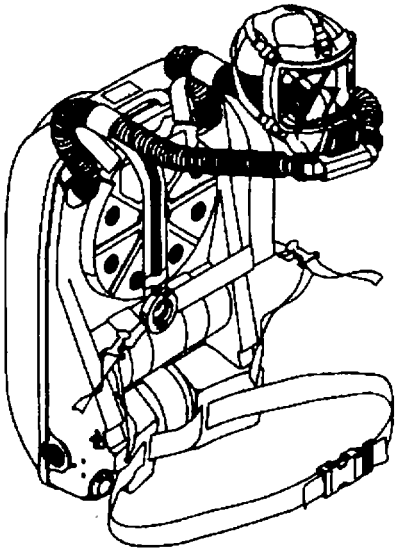


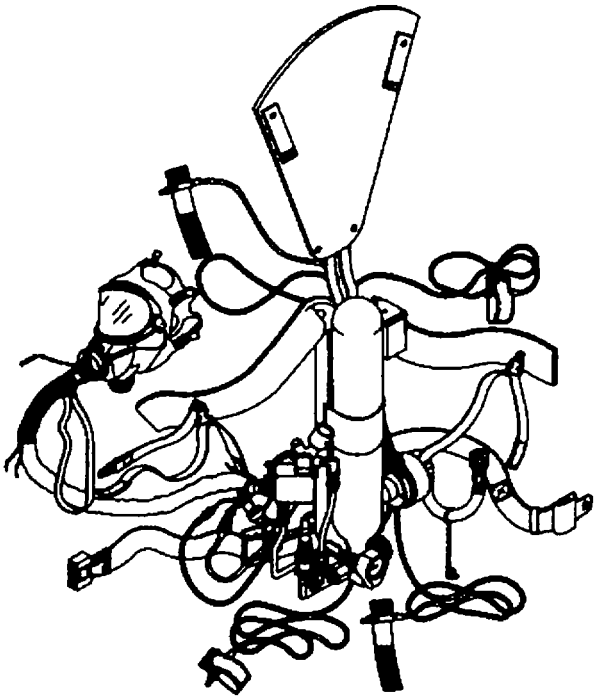
ENCAPSULATING PROTECTIVE SUIT



ICE VEST



REBREATHER SYSTEM



EMERGENCY BREATHING APPARATUS (EBA)

Figure 1-1. Self-Contained, Toxic Environment, Protective Outfit-Interim Ensemble

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE. This manual contains operating and unit maintenance instructions for the Self-Contained, Toxic Environment, Protective Outfit-Interim (STEPO-I). The STEPO-I is designed for use with a remote air source using a pass through connection in the encapsulating protective suit for a tether line (maximum of 300 feet) hook up. It may also be used independently with the rebreather system. Both modes of operation are for use in immediate danger to life and health (I DLH) concentrations of class G, H and V agent environments. The STEPO-I is not approved for use in temperatures below +32°F (0°C) in the tether mode and +15°F (-9. 44°C) in the rebreather system mode. STEPO-I authorized weartime (stay time) with cooling vest at ambient temperatures at or above 850 F (29. 44°C) is 45 minutes. Ambient temperatures below 85°F (29. 44°C) is 2 hours. Maintenance of the emergency breathing apparatus (EBA) is to be performed only by certified maintainers. All other STEPO-I components shall be maintained only by trained maintenance personnel. The operator is not authorized to perform any maintenance specified in Chapter 3 of this publication. Authorized equipment and its location is shown in paragraph 1-9, Location and Description of Major Components.

1-2. MAINTENANCE FORMS, RECORDS AND REPORTS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR's). If your Self-Contained, Toxic Environment, Protective Outfit-Interim needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF368 (Product Quality Deficiency Report). Mail it to us at:

Commander
U.S. Army Aviation and Troop Command
ATTN: AMSAT-I-MDO
4300 Goodfellow Boulevard
St. Louis, MO 63120-1798

We'll send you a reply.

1-4. WARRANTY INFORMATION. The Self-Contained Toxic Environment Protective Outfit-Interim components are warranted separately by their manufacturer. The warranty starts on the date found in block 23, DA Form 2408-9 in the logbook. Report all defects in material and workmanship to your supervisor, who will take the appropriate action.

1-5. NOMENCLATURE CROSS-REFERENCE LIST.

Table 1-1. Nomenclature Cross-Reference List

Common Name	Official Nomenclature
Blue ice	Gel packs
Face piece	Face mask
Pressure gauge	Oxygen remaining indicator
Velcro	Hook and pile fastener tape
Zipper	Slide fastener

1-6. LIST OF ABBREVIATIONS.

Table 1-2. List of Abbreviations

AT	Absorbent
BL	Bail
CAGEC	Commercial and Government Entity Code
CN	Can
CONT	Continued
EA	Each
EBA	Emergency Breathing Apparatus
EIR	Equipment Improvement Recommendations
FEP	Fluorinated Ethylene Propylene
IDLH	Immediate Danger to Life and Health
ILLUS	Illustration
IN.	Inch
LBS	Pounds
MSA	Mine Safety Appliances
PMCS	Preventive Maintenance Checks and Services
PSI	Pounds/Square Inch

Table 1-2. List of Abbreviations (Cont)

PSIG	Pounds/Square Inch Gauge
QTY RQR	Quantity Required
SCBA	Self-Contained Breathing Apparatus
RL	Roll
SOP	Standard Operating Procedure
STEPO-I	Self-Contained, Toxic Environment, Protective Outfit-interim
TAMMS	The Army Maintenance Management System
TAP	Toxicological Agents Protective
TM	Technical Manual
U/M	Unit of Measure

1-7. GLOSSARY.

Table 1-3. Glossary of Terms

Ambient	Surrounding
Chemical Agents	STEPO-I approved for Class G, H and V Agents
Diaphragm	A partition
Doffing	To remove
Donning	To put on
Encapsulating	Enclose
Ensemble	Complete outfit
Exhalation	Release
Hot Line	A boundary between contaminated and clean areas
Inhalation	To take in
Orifice	Opening
Passthrough	An opening
Tether line	Air hose
Toxic	Poisonous

Section II. EQUIPMENT DESCRIPTION

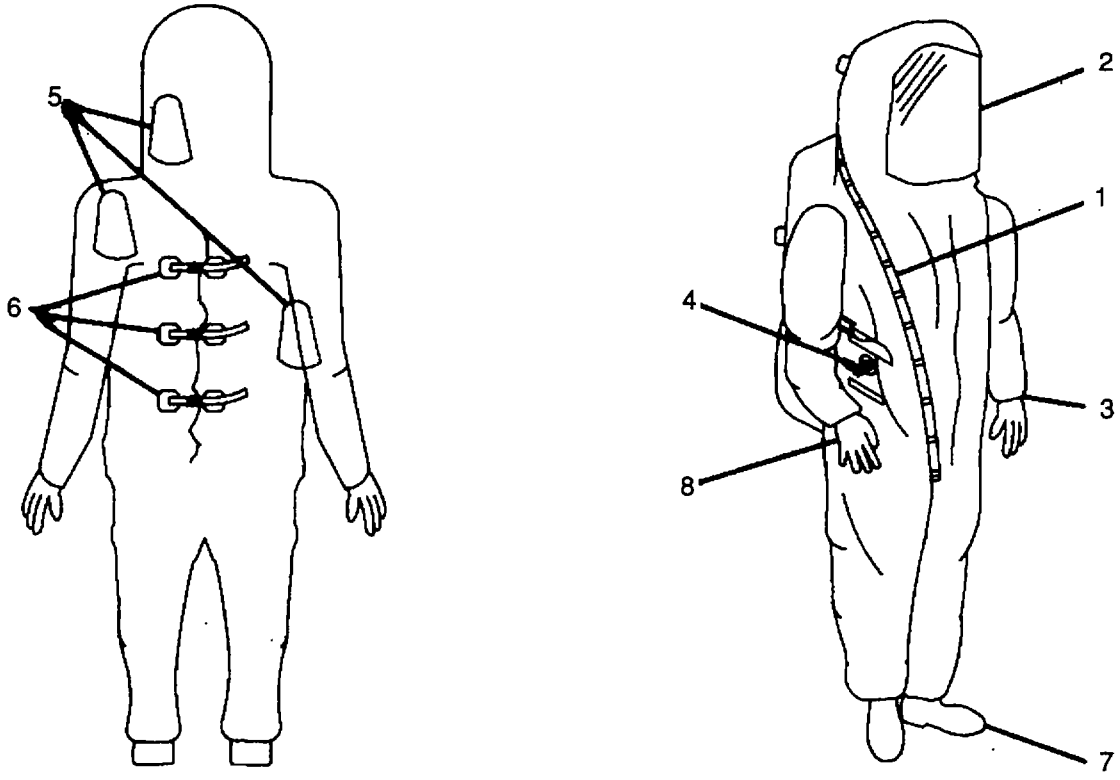
1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES. The STEPO-I is a personnel protective system for use in immediate danger to life and health (IDLH) concentrations of class G, H and V agent environments. The STEPO-I has the following capabilities and features:

Encloses the user completely
Approved for two hours of operating capability
Provides a tethered or self-contained air supply
Provides emergency air
Provides cooling capability to the user
Provide protection against class G, H and V agents

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. The STEPO-I provides personnel protection against expected chemical hazards. The STEPO-I can be operated in two separate modes. The encapsulating protective suit can be worn with the rebreather and ice vest or with the emergency breathing apparatus and tethered air line. Both modes provide the operator with a source of breathing air and a body cooling capability.

1-9.1 Encapsulating Protective Suit. The encapsulating protective suit is a one piece totally encapsulating garment with integral booties, an air tight glove cuff assembly and slide fastener closure. A polycarbonate view window is sealed into. the head area of the suit allowing the user to see out. Additional chemical protection is provided to the view window by a removable fluorinated ethylene propylene (FEP) overlay. The suit has an enlarged back area so it may be worn over a self-contained breathing apparatus. Adjustable straps on the back of the suit allow excess material to be taken-up. An air line passthrough is built into each suit so breathing air may be supplied from a remote air source through a tethered air line. The suit can be configured with exhalation valves, to prevent over inflation in the tethered air mode of operation, or with plugs when inflation of the suit is not expected.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (CONT)



Encapsulating Protective Suit

Slide Fastener, Hook and Pile Fastener Tape, Storm Flap (1).

View Window With FEP Overlay (2).

Glove Cuff Assembly (3).

Tether Line Passthrough (4).

Exhalation Valves (5).

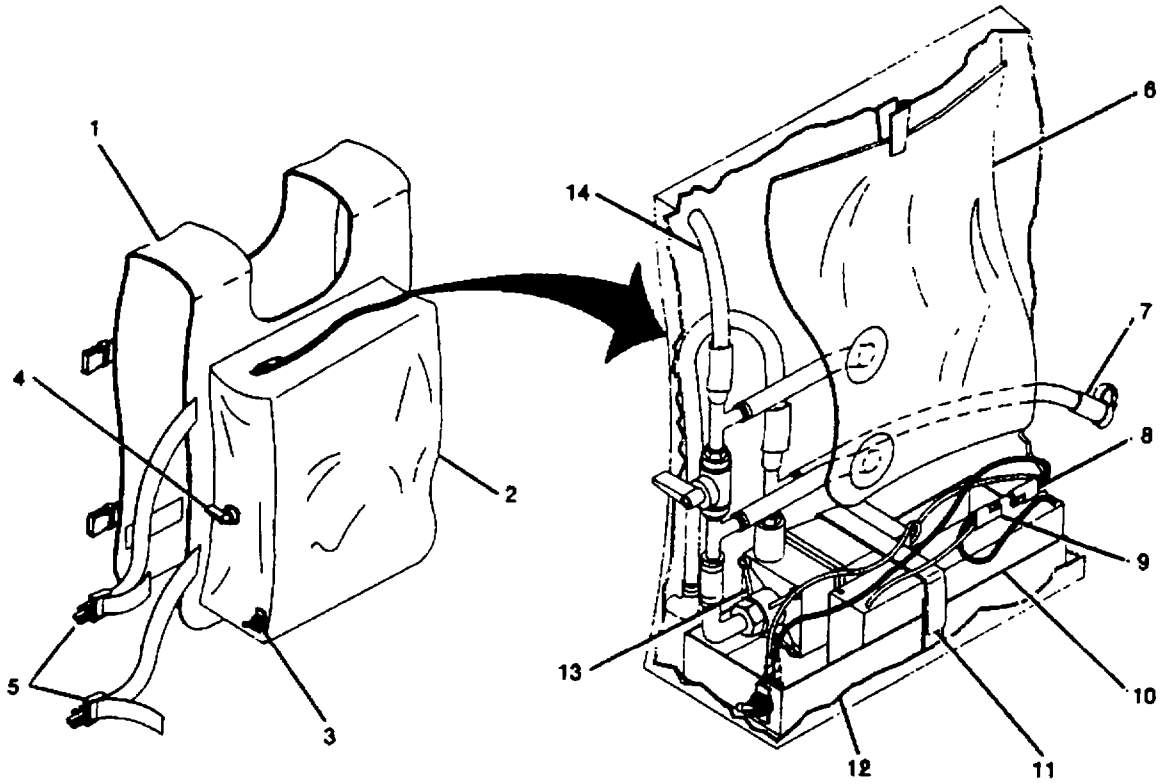
Gloves (6).

Booties (7).

External Back Take-Up Straps (8).

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (CONT)

1-9.2 Ice Vest. The ice vest is worn under the encapsulating protective suit with the rebreather system to provide cooling capabilities to the operator. Water, cooled by frozen gel packs or ice, is circulated through the ice vest by an 8-volt battery powered centrifugal pump. The pump can be manually activated by an on/off switch and cooling can be adjusted to a comfortable level by manually operating a regulating valve that controls the flow of chilled water through the vest. The ice vest has adjustable straps so a comfortable fit can be achieved by all users. A drain valve is provided to drain the ice vest after use.



Ice Vest

Vest (1).

Pouch (2).

On/Off Switch (3).

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (CONT)

Temperature Regulating Valve (4).

Adjustable Straps (5).

Coolant Bag (6).

Drain Valve (7).

Pump Connector (8).

Battery Connector (9).

Battery (10).

Hook and Pile Fastener Tape Strap (11).

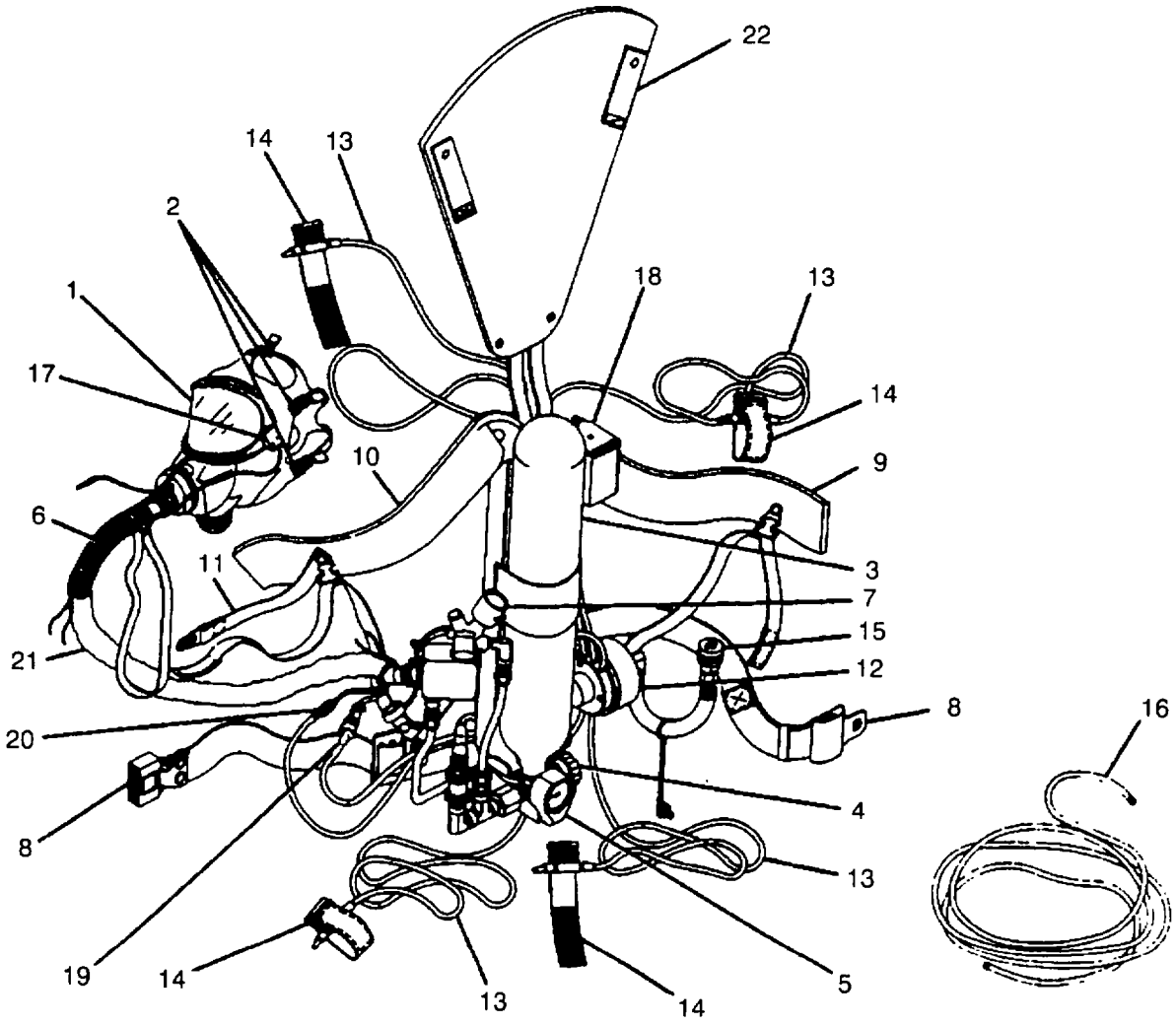
Tray (12).

Pump (13).

Shoulder Tubing (14).

1-9.3 Emergency Breathing Apparatus (EBA). The EBA is worn on the back of the operator under the encapsulating protective suit. The EBA is a combination of in-line regulator and self-contained breathing apparatus. The EBA tether line connection connects to the encapsulating protective garment passthrough assembly from which air is supplied through a tethered air line from a remote air source. The EBA has an in-line air filter and vent tubes which provide cooling air to the extremities. An in-line regulator provides breathing air "on demand" to a multi-size face piece. An air cylinder, mounted on the back of the EBA provides six to eight minutes of escape air at a rate of 40 liters/minute should the remote air supply be interrupted. A battery powered warning light is mounted on the face piece to alert the operator when the cylinder air supply is running low. A protective cushion cover is provided to protect the encapsulating protective garment from the metal components of the EBA.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (CONT)



Emergency Breathing Apparatus (EBA)

Face Piece (1).

Head Harness Straps (2).

Cylinder (3).

Cylinder Valve (4).

Pressure Gauge (5).

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (CONT)

Breathing Tube (6).

Regulator Valve (7).

Waist Strap (8).

Right Shoulder Strap (9).

Left Shoulder Strap (10).

Chest Strap (11).

Filter Housing (12).

Vent Tubes (13).

Wrist and Ankle Straps (14).

Tether Line Connection (15).

Tether Line (16).

Warning Light (17).

Battery Box (18).

Electrical Connectors (19).

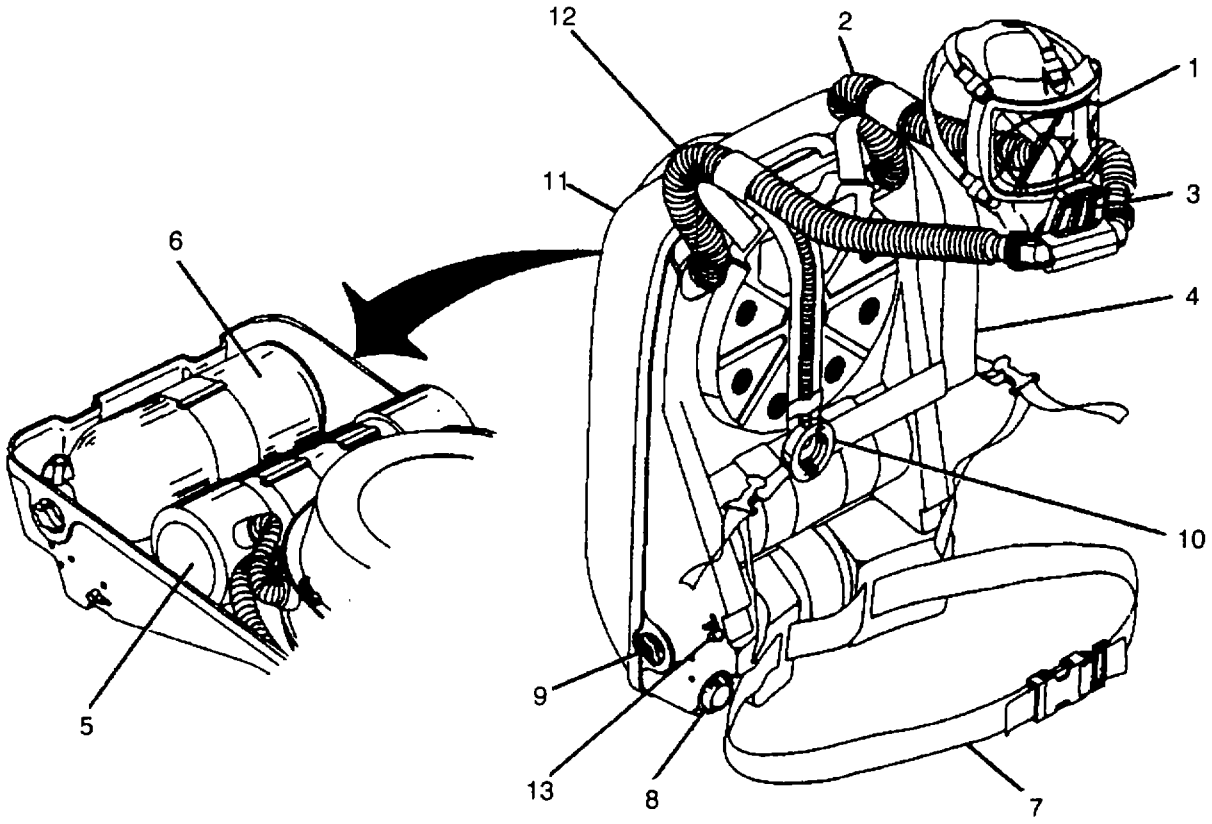
Vent Tube Connectors (20).

Breathing Tube Cover (21).

Cushion Cover (22).

1-9.4 Rebreather System. The rebreather system is a positive pressure closed circuit breathing apparatus worn with the ice vest under the encapsulating protective garment. The rebreather housing is constructed of high impact plastic with adjustable waist and shoulder straps to provide a comfortable fit. Internal components include an oxygen bottle which provides oxygen to the system; breathing chamber where oxygen is mixed with the operator's exhaled air; and a blue ice coolant canister that cools the breathing air. The inhalation breathing hose provides air to a one-size-fits-all face piece and the exhalation hose returns the operators exhaled air to the breathing chamber. The rebreather is equipped with a pressure gauge, a manual oxygen bypass valve and an audible alarm whistle to alert the operator to a low oxygen supply.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (CONT)



Rebreather System

Face Piece (1).

Breathing Hose (Inhalation) (2).

Speaking Diaphragm (3).

Shoulder and Chest Straps (4).

Coolant Canister (5).

Oxygen Bottle (6).

Waist Strap (7).

By Pass Valve (8).

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (CONT)

Oxygen Bottle Valve (9).

Pressure Gauge (10).

Housing (11).

Breathing Hose (Exhalation) (12).

Alarm Tone Stem (13).

1-10. EQUIPMENT DATA.

1-10.1 Encapsulating Protective Suit.

Fabric:	Butyl rubber coated nylon
Temperature Limits:	0°F (-17.8°C) to 100°F (+37.80C)
View Window:	12.5 in. X 14.125 in., .125 in. polycarbonate with .002 in. FEP overlay
Size:	Small, medium, large, X-large
Shipping Weight:	18 lbs
Unit Weight:	15 lbs
Storage Dimensions:	93 in. X 22 in. X 6 in.

1-10.2 Ice Vest.

Fabric:	Urethane coated nylon
Shipping Weight:	8 lbs
Unit Weight:	5.5 lbs empty
Storage Dimensions:	20 in. X 15 in. X 5 in.
Battery:	8-volt, 2.6 amp, gel-type, rechargeable

1-10.3 Emergency Breathing Apparatus (EBA).

Low Temperature Limits:	+32°F (0°C)
Emergency Air Cylinder:	2,475 PSIG, 10 minutes at 40 liters per minute of air
Face Piece Size:	Small, medium, large
Shipping Weight:	50 lbs
Unit Weight:	23 lbs
Storage Dimensions:	24 in. X 19 in. X 11 in.
Battery:	1.5-volt "D" size alkaline-manganese

1-10.4 Rebreather System.

Material:	High impact noryl
Low Temperature Limits:	+1 5°F (9.440C)
Lens:	Polycarbonate with antifogging insert
Shipping Weight:	62 lbs
Unit Weight:	39 lbs fully charged and assembled
Storage Dimensions:	24.8 in. X 15.8 in. X 7.5 in.

1-10. EQUIPMENT DATA. (CONT)

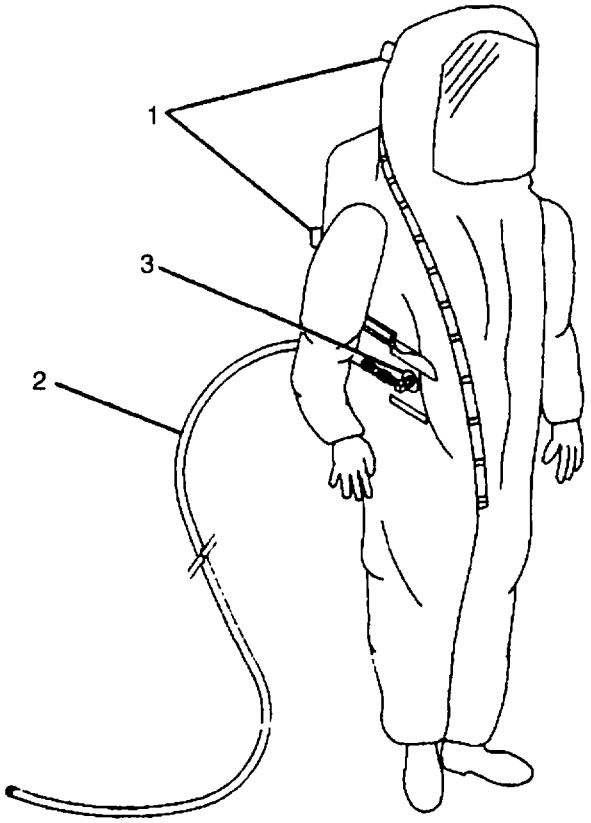
Oxygen Cylinder:	2,400 PSIG, 3 hours of breathing gas
Hoses:	Neoprene

1-10.5 Tether Line.

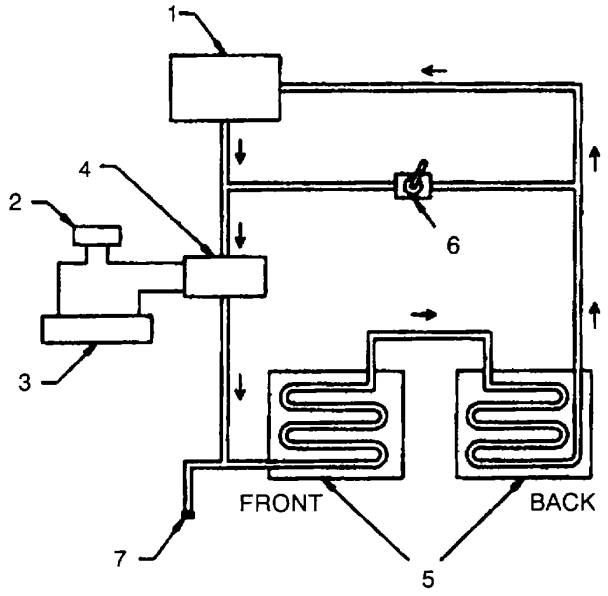
Material:	Neoprene
Length:	50 feet
Shipping Weight:	12 lbs
Unit Weight:	8 lbs
Storage Dimensions:	19 in. X 14 in. X 8 in.

Section III. TECHNICAL PRINCIPLES OF OPERATION

1-11. SELF-CONTAINED TOXIC ENVIRONMENT. PROTECTIVE OUTFIT-INTERIM (STEPO-I). The STEPO-I may be used in two modes. One is the tether mode consisting of the encapsulating protective suit, tether line and emergency breathing apparatus (EBA). The second is the rebreather system mode made up of the encapsulating protective suit, ice vest and the rebreather system. Both modes of operation are used in immediate danger of life and health (IDLH) concentrations of class G, H and V agent environments.



1-12. ENCAPSULATING PROTECTIVE SUIT. The encapsulating protective suit covers the wearer, ice vest, emergency breathing apparatus (EBA) or the rebreather system and protects against expected chemical hazards. It is equipped with exhalation valves (1) to prevent over-inflation and a tether line (2) connected to a passthrough (3) to allow air from a remote source to be used with the emergency breathing apparatus (EBA).



1-13. ICE VEST. The ice vest provides cooling capabilities to the user.

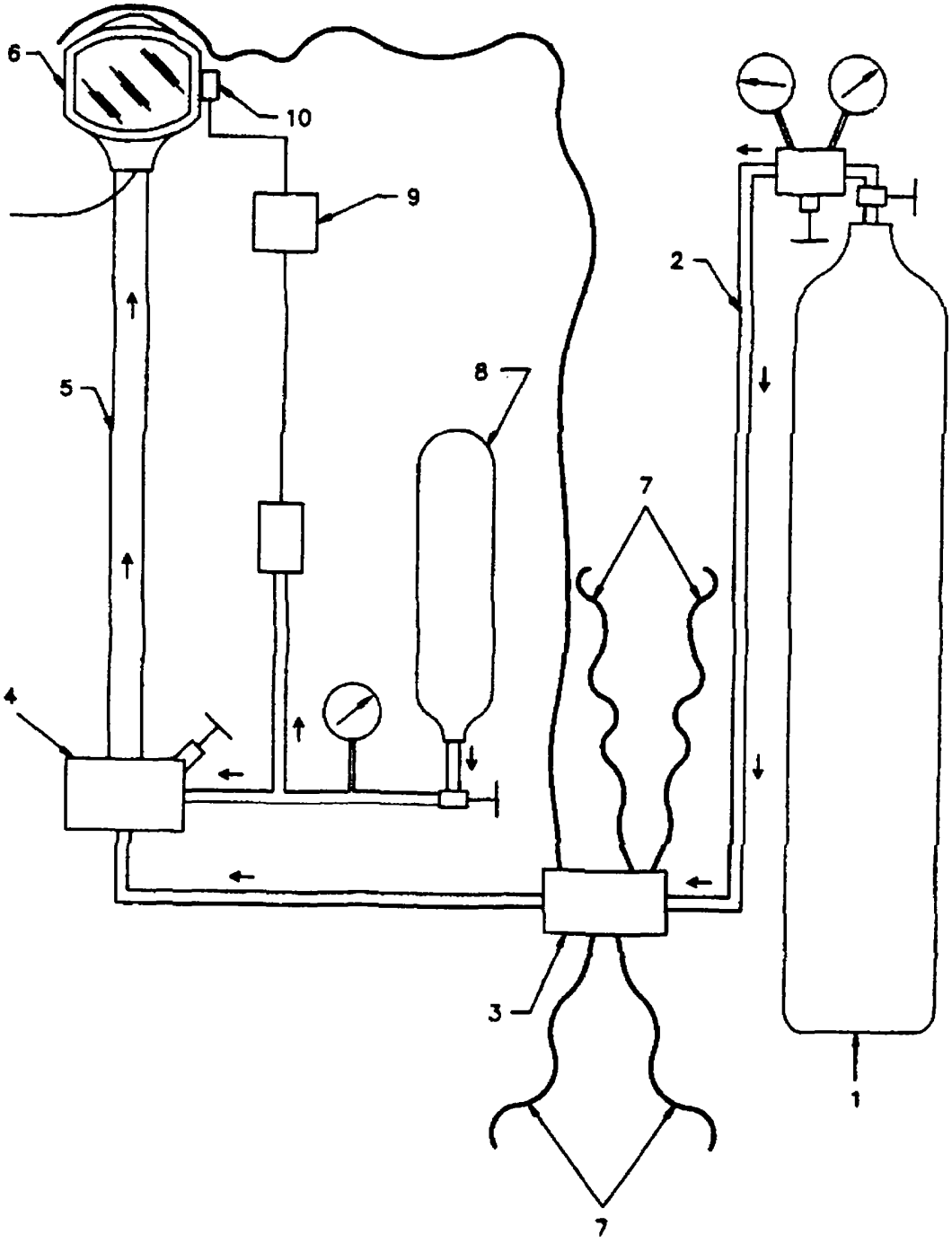
Frozen gel packs/crushed ice and water are placed in the coolant bag (1) for coolant.

The on/off switch (2) allows the user to turn on an 8-volt battery (3) powered centrifugal pump (4) to circulate the chilled water. The water is pumped through the cooling vests (5) and returned to the coolant bag (1) to be rechilled.

A manually operated regulating valve (6) controls the amount of chilled water passing through the cooling vests (5) to raise or lower the water temperature inside the ice vest.

A drain tube (7) is provided to drain water and melted ice from the ice vest.

1-14. EMERGENCY BREATHING APPARATUS (EBA). The EBA provides an "on demand" air supply from a remote source (1) through a tether line (2).



When the remote air supply (1) is connected and turned on, air is continuously supplied through a filter (3) to the regulator (4). When the user inhales, air flows from the regulator (4) through the breathing tube (5) to the face piece (6).

The EBA is equipped with vent tubes (7) which provide cool air throughout the encapsulating protective suit. The vent tubes (7) receive cooling air from the remote air (1) supply through the filter (3).

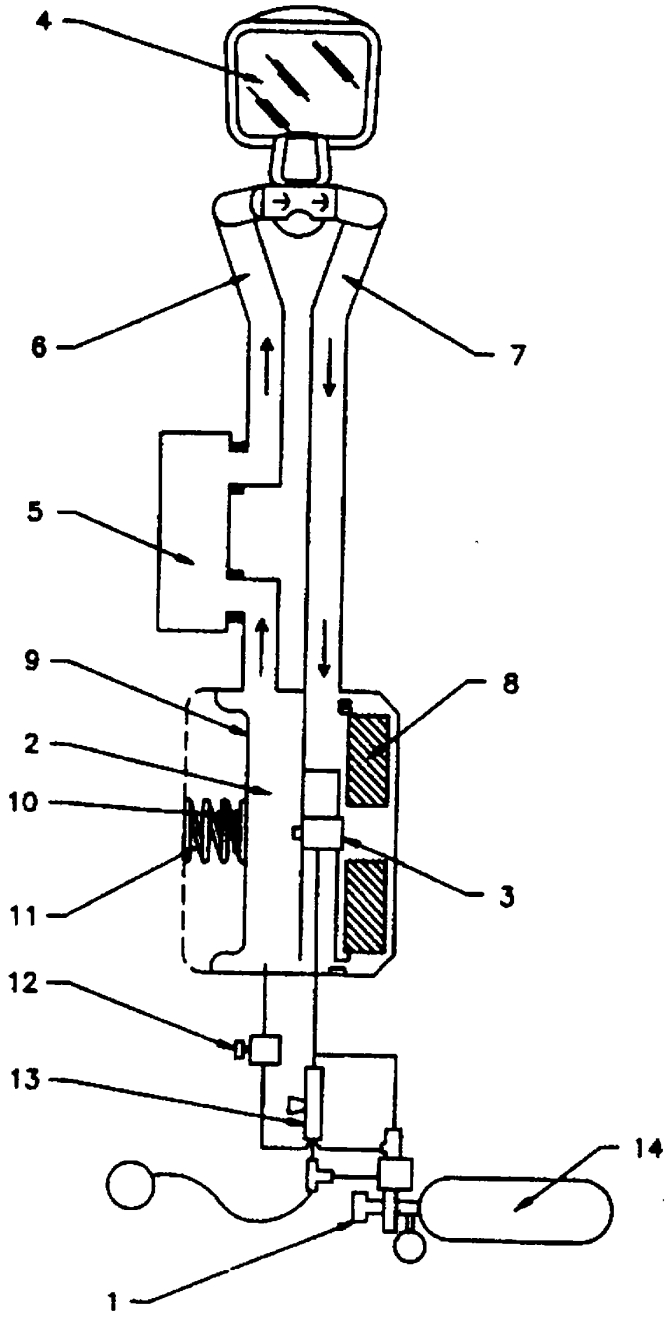
If the remote air supply (1) fails, the regulator (4) will automatically switch from the remote air supply (1) to the EBA compressed air bottle (8). The compressed air bottle (8) furnishes the user with emergency air through the regulator (4) and breathing tube (5) to the face piece (6).

WARNING

Limited air supply in the tether mode. Leave the area immediately when the EBA warning light begins to flash. A flashing warning light indicates the remote air supply has failed and less than 6 to 8 minutes of air at a rate of 40 liters/minute is available from the EBA. Failure to leave the area and decontaminate immediately could result in personnel death due to suffocation.

A battery (9) powered warning light (10) blinks when the remote air supply (1) fails and the emergency compressed air bottle (8) pressure drops below 1,950 PSIG (about 6 to 8 minutes at 40 liters per minute to decontaminate and remove the encapsulating protective suit). The warning light (10) is constantly on when the EBA is pressurized with a full compressed air bottle (8) to indicate the system is operating properly.

1-15. REBREATHER SYSTEM. The rebreather system recirculates the user's exhaled air.



When the bottle valve (1) is opened, oxygen is continuously supplied to the breathing chamber (2). Additional oxygen is automatically added by the demand/free flow valve (3) to compensate for the user's work rate or face piece (4) leakage.

When the user inhales, breathing air flows from the breathing chamber (2) through the coolant canister (5) to the inhalation hose (6) and the face piece (4). When the user exhales, the exhaled breath passes through the exhalation hose (7), through the carbon dioxide absorber (8) where carbon dioxide is removed then into the breathing chamber (2), where fresh oxygen is added.

If the user's inhalation causes the breathing diaphragm (9) to bottom, the demand/free flow valve (3) automatically supplies the additional oxygen required. In addition, if the user's exhalation causes the breathing diaphragm (9) to fully expand, any excess gas will be vented out of the breathing chamber (2) through the relief valve (10).

The breathing chamber (2) is maintained at a slight positive pressure with respect to ambient pressure by a compression spring (11) which exerts a force on the breathing diaphragm (9).

The bypass valve button (12) is for emergency use only. The valve bypasses the constant flow restrictor and it can be manually operated if the user is not getting enough breathing air.

WARNING

Limited oxygen supply in the rebreather system. Leave the area immediately when the alarm whistle sounds. An audible alarm indicates the oxygen pressure has dropped to 25% or below and about 45 minutes of oxygen is available. Failure to leave the area and decontaminate immediately could result in personnel death due to suffocation.

An audible alarm (13) sounds for approximately 20 to 45 seconds when the oxygen bottle (14) pressure drops to 25% (600 PSIG) of the operating pressure. The alarm (13) is designed with an alarm tone stem which, when covered, causes a distinct change in sound. This lets the user identify if it is his oxygen supply that is running low and must leave the area immediately. When the oxygen bottle (14) pressure drops to 25% (600 PSIG) of operating pressure, the user has about 45 minutes to decontaminate and remove the encapsulating protective suit.

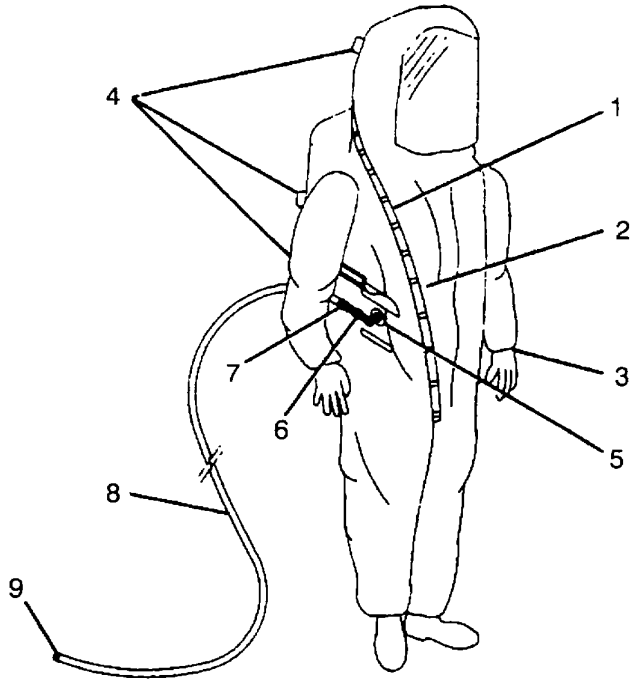
CHAPTER 2

OPERATING INSTRUCTIONS

Section I. DESCRIPTION OF CONTROLS AND INDICATORS

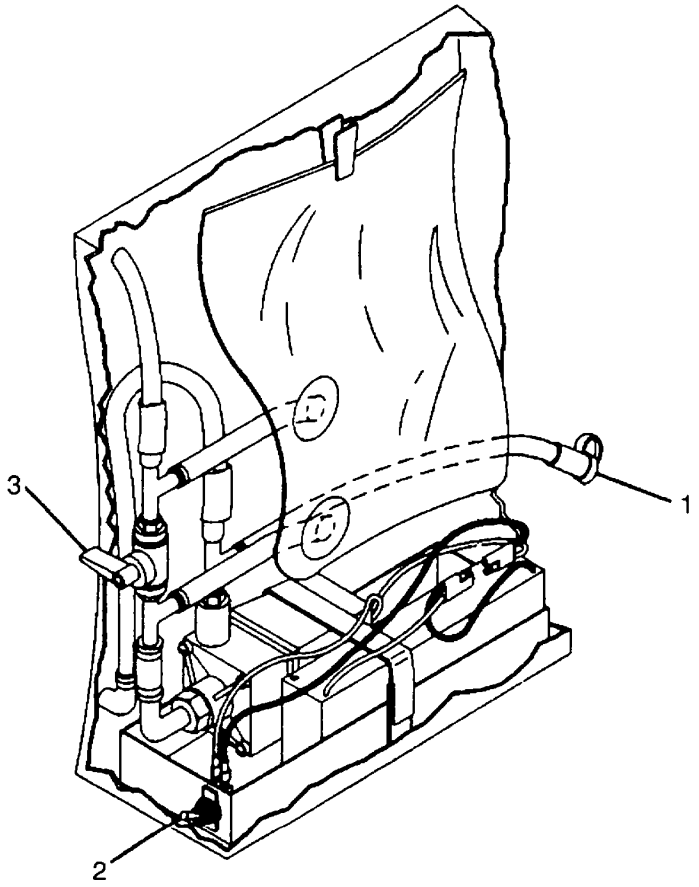
2-1. ENCAPSULATING PROTECTIVE SUIT. The fasteners and connectors needed to operate the encapsulating protective suit are located on the front, back and right side of the suit.

2-1. ENCAPSULATING PROTECTIVE SUIT. (CONT)



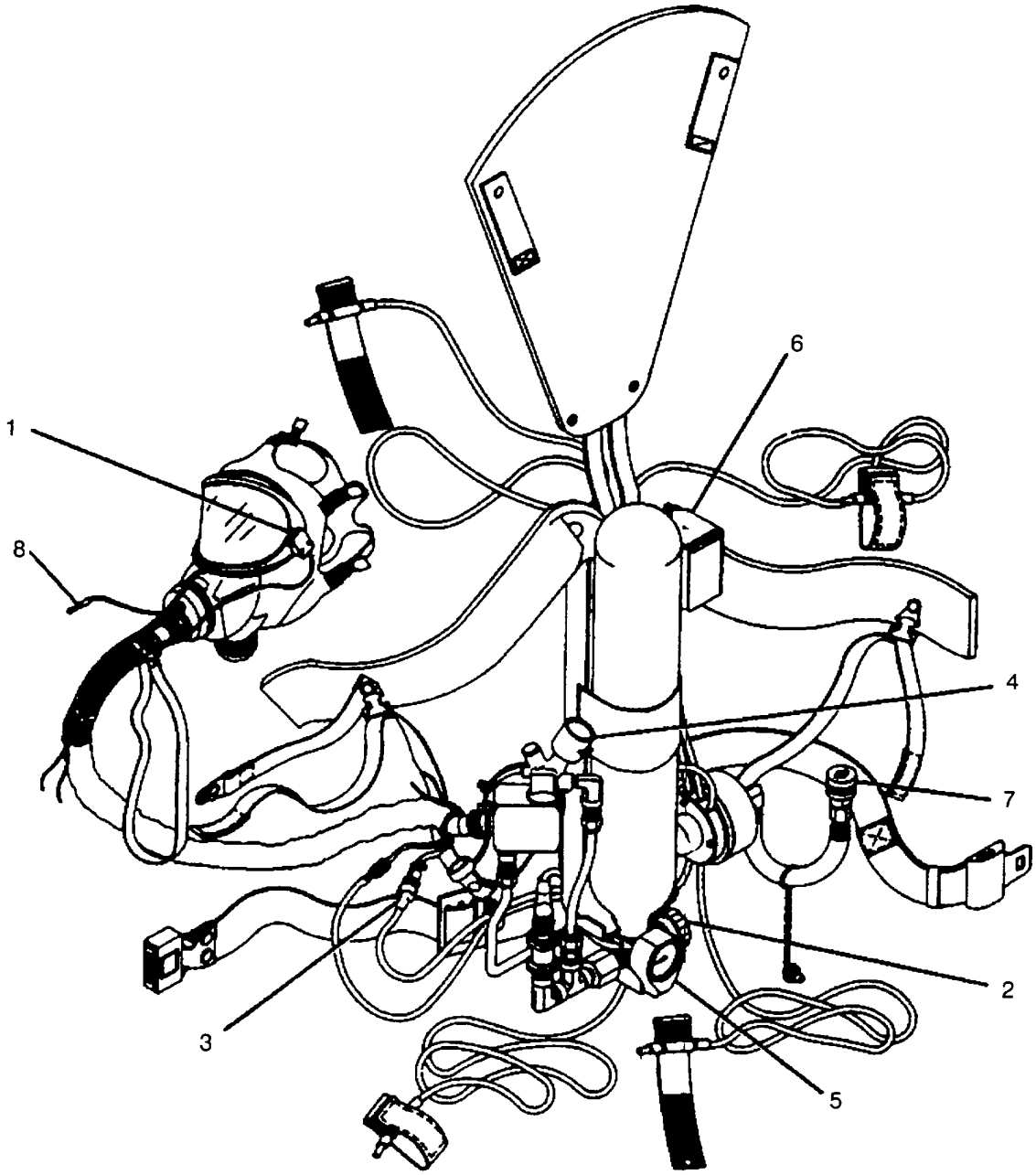
Key	Fastener or Connector	Function
1	Slide Fastener	A 48-inch neoprene slide fastener to open and close the front of the suit when donning or doffing.
2	Storm Flap	Covers the slide fastener and secures in place with a hook and pile fastener tape.
3	Glove Cuff Assembly	Provides a vapor tight seal with the rubber gloves.
4	Exhalation Valves	Prevent the suit from becoming over inflated.
5	Passthrough Assembly	Allows air from a remote source to be used with the EBA.
6	Quick Disconnect	Connects the tether line to the passthrough assembly.
7	F101 Adaptor Fitting	Connects the tether line to the quick disconnect.
8	Tether Line	Carries air from the remote air source to the suit.
9	F102 Adaptor Fitting	Connects the tether line to the remote air source.

2-2. **ICE VEST**. The controls and connections which operate the ice vest are located on the right and left sides of the vest.



Key	Control or Connection	Function
1	Drain Valve	Is used to drain melted ice water from the coolant bag.
2	On/Off Switch	Turns on or off the 8 volt battery powered pump to circulate chilled water throughout the vest.
3	Temperature Regulating Valve Control	Adjusts the water flow through the coolant bag, raising or lowering the water temperature inside the ice vest.

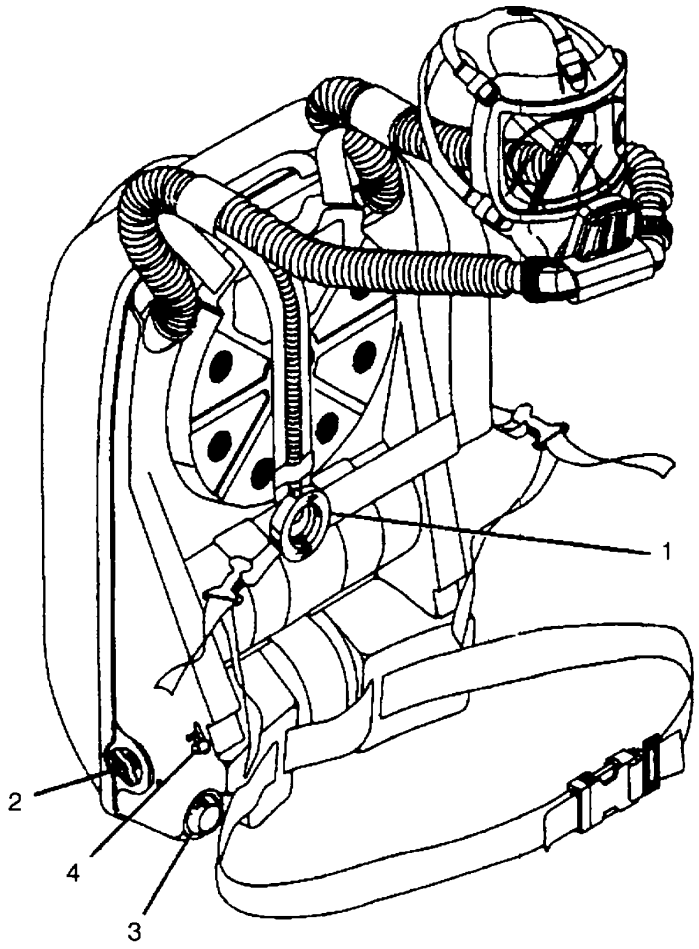
2-3. EMERGENCY BREATHING APPARATUS (EBA). The controls, indicators and connectors needed to operate the EBA are located on the exterior of the apparatus.



2-3. EMERGENCY BREATHING APPARATUS (EBA). (CONT)

Key	Fastener or Connector	Function
1	Warning Light	Light blinks when the remote air supply fails and the emergency air cylinder pressure drops below 1,950 PSIG. The warning light is constantly on when the EBA is pressurized with a full cylinder to indicate the warning system is operating properly.
2	Cylinder Valve	Allows air from the cylinder to be provided to the EBA if the tether line system fails.
3	Electrical Connector	Connects the warning light wire to the EBA battery power source.
4	Regulator Valve	Allows air pressure from the tether line or air from the cylinder into the face piece when open.
5	Pressure Gauge	Indicates the amount of air remaining in the cylinder.
6	Battery Box	Houses the battery to power the warning light.
7	Tether Line Connection	Allows air from a remote source to be used with the EBA.
8	Communication Connection	Not used.

2-4. REBREATHER SYSTEM. The controls and indicators that operate the rebreather system are located on the right side and front of the rebreather housing.



Key	Control or Indicator	Function
1	Pressure Gauge	Indicates the amount of oxygen left in the oxygen bottle.
2	Cylinder Valve	Opens the oxygen bottle to provide oxygen to the user.
3	Bypass Valve Button	Adds oxygen to the breathing chamber. Is a manual backup for the demand valve.
4	Alarm Tone Stem	Provides a method of identifying which unit is low on breathing when the alarm sounds.

Section II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-5. GENERAL. Table 2-1 (Operator PMCS table) has been provided so you can keep your Self-Contained, Toxic Environment, Protective Outfit-Interim in good operating condition and ready for its primary mission.

2-5.1 Before You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before operation (B), PMCS prior to the equipment leaving its containment area or performing its intended mission.

2-5.2 While You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during operation (D), PMCS when the equipment is being used in its intended mission.

2-5.3 If Your Equipment Fails To Operate. Turn it in to unit maintenance. Report any deficiencies using the proper forms. See DA PAM 738750.

2-6. OPERATOR PMCS PROCEDURES.

a. The Preventive Maintenance Checks and Services table lists the inspections and care of your equipment required to keep it in good operating condition.

b. Use the "Item No. " column of the PMCS table to supply the item number used in the "TM Number" column of DA Form 2404.

c. The interval column of the PMCS table tells you when to do a certain check or service.

d. Perform the before operations PMCS if:

(1) You are the assigned operator and have not operated the item since the last PMCS.

(2) You are operating the item for the first time.

e. The item to be inspected column of the PMCS table tells you the piece of equipment and the part to be inspected.

f. The procedure column of the PMCS table tells you how to do the required checks and services. Carefully follow these instructions.

g. Equipment is not ready/available if: column tells you when and why your equipment cannot be used.

h. If your equipment does not perform as required, turn it in to unit maintenance. Report any malfunctions or failures on DA Form 2404, or refer to DA PAM 738750.

Table 2-1. Operator Preventive Maintenance Checks and Services for the STEPO-I

B - Before Operation **D - During Operation**

Item No.	INTERVAL B	INTERVAL D	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
			Encapsulating Protective Suit		
1	•		Fabric	Look for holes, cuts, pits, blisters, delamination, tunnels, lumps or imbedded foreign matter, uncoated areas and scratches, abrasions, cracks, rips and tears on the inside and outside of the suit	Damaged fabric is found.
2	•		Slide Fastener	Ensure slide fastener is in good working order.	Non-working slide fastener.
3	•		Storm Rap	Inspect hook and pile fastener tape to make sure it is not coming loose. **NOTE** Damage may appear between the finger area.	Loose hook and pile fastener tape.
4	•		Glove Assembly	Inspect for a tight assembly, cuts, cracks, rips and tears.	A loose assembly or damage is found.
5	•		Seams	Ensure seam areas are not coming loose. Inspect for open seam completely through suit, strapping not cemented so it pulls off seam with little resistance, blisters, delamination, tunnels and exposed stitching.	Seams are loose. Blisters, delamination, tunnels, loose strapping, open seam or exposed stitching is found.
6	•		View Window	Inspect for a tight seal and cracks. Clean window using a dean, damp cloth to remove dust and dirt.	Loose seal or cracked window.
7	•			Ensure FEP overlay is in place.	Overlay is missing.
8	•		Passthrough Assembly	Inspect suit opening and assembly preformed packing for a proper and fight fit. **NOTE** Suit plugs are red on one end and larger than the valves.	Enlarged opening or damaged preformed packing. Loose fit.
9	•		Exhalation Valves/Plugs	Ensure valves are installed for the tether system and plugs are installed for the rebreather system.	Suit arranged for the wrong system.

Table 2-1. Operator Preventive Maintenance Checks and Services for the STEPO-I (Cont)

B - Before Operation **D - During Operation**

Item No.	INTERVAL B	INTERVAL D	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
10	•		Internal Hood Flap	Ensure all four snaps are secure. **NOTE** PMCS steps 11 through 26 are checked only when using the tether system.	Snaps are not in place.
11		•	Suit Inflation	Ensure the suit inflates in the tether mode.	Suit fails to inflate in the tether mode.
12		•		Bend over or push the suit in towards your body to ensure air leaves the suit through the exhalation valves.	Air does not exhaust through the exhalation valves.
			Tether Line (Tether Mode)		
13	•		Tether Line	Ensure tether line is available.	Tether line not available.
			EBA (Tether Mode)		
14	•		Vent Tubes	Ensure tubes are secure, not tangled, have wrist and ankle straps, clean and not cut.	Tubes are loose, missing straps, dirty or cut.
15	•			Ensure tube air holes are not covered.	Air holes covered.
16	•		Vent Tube Plugs	Ensure plugs are installed in vent tube ends.	Plugs missing.
17	•		Metal Components	Inspect for damage and tightness of connections.	Damage is found or connections are loose.
18	•		Waist and Chest Straps	Inspect webbing for rips or tears and broken buckles.	Webbing is ripped or torn or buckles broken.
19	•		Head Harness Straps	Inspect for missing or broken buckles. Ensure proper fit.	Buckles are broken or missing. Proper fit cannot be made by minor adjustments.

Table 2-1. Operator Preventive Maintenance Checks and Services for the STEPO-I (Cont)

B - Before Operation **D - During Operation**

Item No.	INTERVAL B	INTERVAL D	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
20	•		Face Piece	Inspect for cuts, holes or any other damage and ensure inlet and outlet valves are installed.	Cuts, holes or damage is found or inlet and outlet valves are missing.
21	•			Ensure lens is clean.	Dirty lens.
22	•		Breathing Tube	Inspect breathing tube for damage and ensure the cover is tied at both ends.	Damage is found or cover not tied on.
23	•		Face Piece Light	Ensure warning light lamp is installed. **CAUTION** Equipment corrosion hazard. Remove the battery from the EBA battery box when the unit is not in use. Failure to remove the battery may cause equipment damage from corrosion and require replacement of the EBA.	Lamp not installed.
24	•		Battery	Ensure "D" size battery is installed.	Battery is missing.
25	•		Cylinder	Check the pressure gauge to ensure the cylinder is charged to approximately 2500 psig.	Cylinder is charged below the full mark.
26	•		Cushion Cover	Ensure cushion cover is installed. **NOTE** PMCS steps 27 through 43 are checked only when using the rebreather system.	Cushion cover not installed.
			Rebreather System (Rebreather System Mode)		
27	•		Rebreather	Visually ensure unit is clean.	Unit is dirty.
28	•		Bypass Button	Depress the bypass button to ensure it operates properly.	The bypass button fails to operate.
29	•		Face Piece Lens	Ensure lens is clean.	Lens is dirty.

Table 2-1. Operator Preventive Maintenance Checks and Services for the STEPO-I (Cont)

B - Before Operation **D - During Operation**

Item No.	INTERVAL B	INTERVAL D	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
30	•		Face Piece	Inspect for cuts, holes or any other damage.	Cuts, holes or damage is found.
31	•		Air Hoses	Inspect hoses for cuts, holes or any other damage. **NOTE** The CO_2 absorbent will be replaced after each use or every 12 months.	Cuts, holes or damage is found.
32	•		CO_2 Absorbent	Ensure maintenance tag indicates $C0_2$ absorbent is fresh.	Maintenance tag is missing or outdated.
33	•		Coolant Canister	Ensure canister is frozen.	Canister is thawed.
34	•		Oxygen Bottle	Ensure bottle is pressurized and indicates 2,400 PSIG.	Bottle is below 2,400 PSIG.
35	•		Adjustable Straps **<u>Ice Vest</u> (Rebreather System Mode)**	Inspect webbing for rips, tears, missing or broken buckles and cleanliness.	Webbing is ripped or torn or buckles are broken or missing.
36	•		Drain Valve	Ensure valve is closed.	Valve is left open.
37	•		Battery	Ensure a battery is installed.	Battery is missing.
38	•		Coolant Bag	Inspect bag for rips, tears or holes. **NOTE** The coolant bag holds four (4) pounds of cube or crushed ice or three (3) gel packs. Gel packs require 8-10 hours to fully freeze and provide longer operating time. Approximately one (1) quart of potable water is necessary to operate the ice vest.	Bag is punctured.
39	•			Ensure the required amount of ice or gel packs and potable water are installed.	Ice, frozen gel packs or water are not installed.

Table 2-1. Operator Preventive Maintenance Checks and Services for the STEPO-I (Cont)

B - Before Operation **D - During Operation**

Item No.	INTERVAL B	INTERVAL D	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
40	•		On/Off Switch	Operate the switch to ensure it is working properly.	Pump fails to start.
41	•	•	Temperature Regulating Valve	Rotate valve to ensure it is working properly.	Valve fails to operate.
42	•		Adjustable Straps	Inspect for missing or broken buckles. Ensure proper fit.	Buckles are broken or missing. Proper fit cannot be made by minor adjustments.
43	•			Inspect webbing for rips or tears.	Webbing is ripped or torn.

Section III. OPERATION UNDER USUAL CONDITIONS

2-7. GENERAL. This section provides instructions for donning, adjusting, operating and doffing the STEPO-I ensemble using the EBA tethered system and the rebreather system under normal operating conditions.

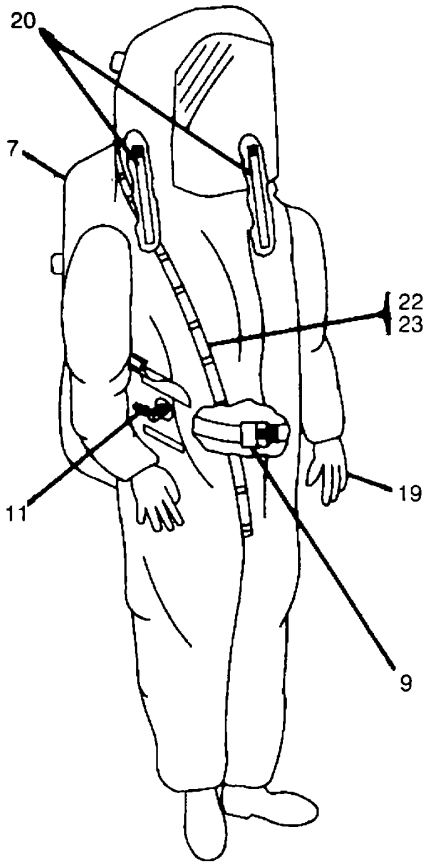
2-8. USING THE STEPO-I IN THE TETHER MODE.

2-9. DONNING THE ENCAPSULATING PROTECTIVE SUIT USING THE TETHER MODE.

a. Refer to items 1 through 12 of Table 2-1 for operator PMCS for the encapsulating protective suit.

b. Refer to item 13 of Table 2-1 for operator PMCS for the tether line.

c. Refer to items 14 through 26 of Table 2-1 for operator PMCS for the emergency breathing apparatus (EBA).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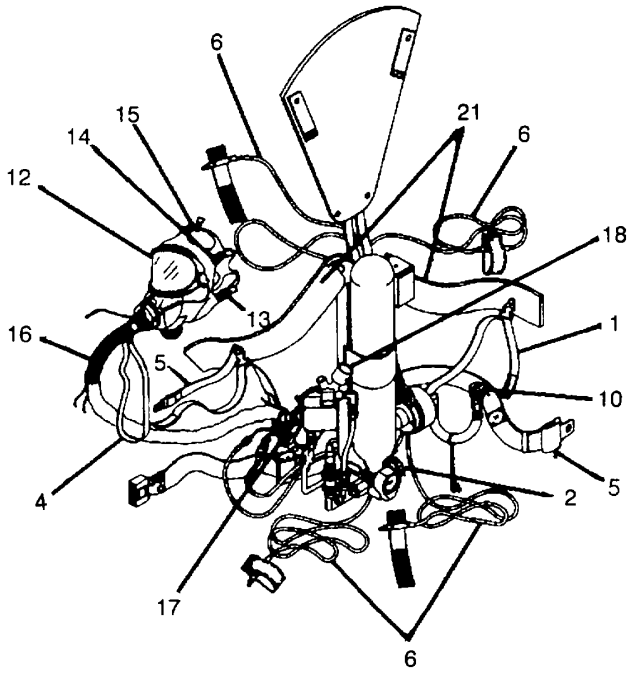
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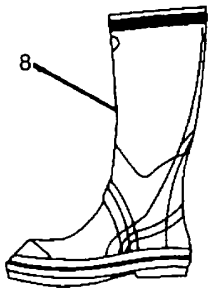
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2-9. DONNING THE ENCAPSULATING PROTECTIVE SUIT USING THE TETHER MODE. (CONT)

NOTE

Two people are required to perform the following steps.

d. User remove shoes.

e. Fully extend adjustable shoulder straps (1) on the EBA.

f. Place the EBA on your back with cylinder valve (2) down.

g. Lean forward hook chest straps (3) and adjust shoulder straps (1).

h. Place face piece neck strap (4) over head and around neck.

i. Fasten waist strap (5) and adjust waist strap (5) for comfort.

NOTE

The vent tubes at the top of the filter housing attach to the wrists and the vent tubes at the bottom attach to the ankles.

j. Attach vent tubes (6) to user's wrists and ankles.

NOTE

Use care not to tangle or pull the ankle vent tubes loose.

k. Sit down and place both feet into suit (7).

I. Roll up the outer cuffs around legs and put on boots (8).

m. Roll the outer cuffs down over boots (8).

n. Stand up and pull suit (7) up to the waist and connect waist belt (9).

o. Connect EBA tether line connection (10) to passthrough (11) connector inside of suit (7).

p. Using the quick disconnect, connect the tether line to passthrough (11).

NOTE

The maximum tether line length is 300 feet providing a pressure of 85 to 95 PSIG is maintained.

q. Connect the tether line to the remote air source.

NOTE

Breathing tube is not connected to regulator at this point.

r. Don face piece (12) as follows:

(1) Fully extend face piece (12) head harness straps (13), (14) and (15).

(2) Grip head harness straps (13), (14) and (15).

(3) Place your chin into the lower part of face piece (12).

s. Pull head harness straps (13), (14) and (15) back over your head and adjust for a tight seal as follows:

(1) Ensure all straps lie flat on the head.

(2) Tighten chin straps (13).

(3) Tighten temple straps (14).

(4) Tighten top head strap (15) to position the lens for best vision.

t. Check the seal of face piece (12) by covering the end of the breathing tube (16) with the palm of the hand and inhaling until the face piece collapses on the face.

u. Hold breath for 5 seconds, if face piece stays collapsed on face you have a good seal.

v. Connect breathing tube (16) to EBA regulator outlet (17).

NOTE

The warning light will stop blinking. and burn steady when the cylinder valve is opened.

w. Immediately turn on remote air.

x. Open cylinder valve (2).

y. Open regulator valve (18).

z. Ensure breathing and exhalation are normal.

aa. Ensure there is air flowing out of vent tubes (6).

ab. Check system for leaks.

ac. Insert both arms into suit (7) and gloves (19).

ad. Place suit (7) hook and pile fastener tape shoulder straps (20) around the EBA shoulder straps (21) and fasten.

2-9. DONNING THE ENCAPSULATING PROTECTIVE SUIT USING THE TETHER MODE. (CONT)

NOTE

Leave suit unzipped until ready to enter the contaminated area.

ae. When ready to enter the contaminated area, complete donning and close slide fastener (22) and hook and pile fastener tape storm flap (23).

af. Enter the contaminated area.

2-10. OPERATING THE EBA.

a. Breathe normally. The EBA automatically satisfies any requirements based on the physical activity, condition, experience and emotional state of the user.

WARNING

Limited air supply in the tether mode. Leave the area immediately when the EBA warning light begins to flash. A flashing warning light indicates the remote air supply has failed and less than 6 to 8 minutes at 40 liters per minute of air is available from the EBA. Failure to leave the area immediately and decontaminate could result in personnel death due to suffocation.

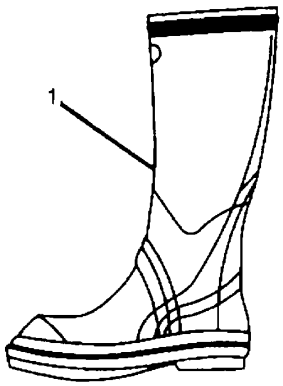
b. Should the remote air supply fail, the user automatically begins breathing from the EBA cylinder. The warning light will begin flashing when the cylinder pressure drops below 1,950 PSIG, warning the user to leave the contaminated area.

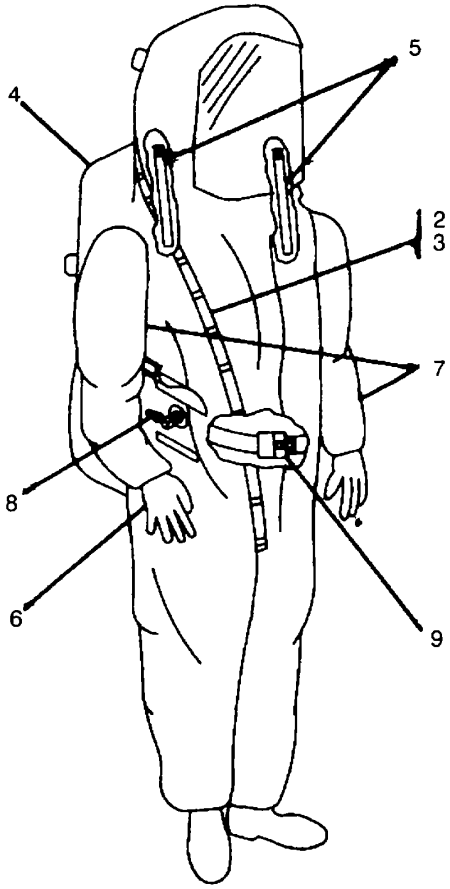
2-11. DOFFING THE ENCAPSULATING PROTECTIVE SUIT WITH THE TETHER MODE.

WARNING

Personnel contamination hazard. All equipment must be decontaminated in accordance with local SOP. Failure to decontaminate properly could result in personnel injury or death due to contamination.

a. Perform decontamination procedures in accordance with the local Standard Operating Procedures (SOP).





b. Remove boots (1).

WARNING

Personnel contamination hazard. Do not touch the outside of the encapsulating protective suit during doffing and always fold it outward away from the body. Failure to doff the suit properly could result in sickness or death due to contamination.

c. Open hook and pile fastener tape storm flap (2) and slide fastener (3).

NOTE

Two people are required to perform the following steps.

d. Remove suit (4) hook and pile fastener tape shoulder straps (5) from around the EBA shoulder straps.

2-11. DOFFING THE ENCAPSULATING PROTECTIVE SUIT WITH THE TETHER MODE. (CONT)

e. Carefully pull arms and hands out of suit (4), gloves (6) and sleeves (7).

f. Remove suit (4) down to the waist.

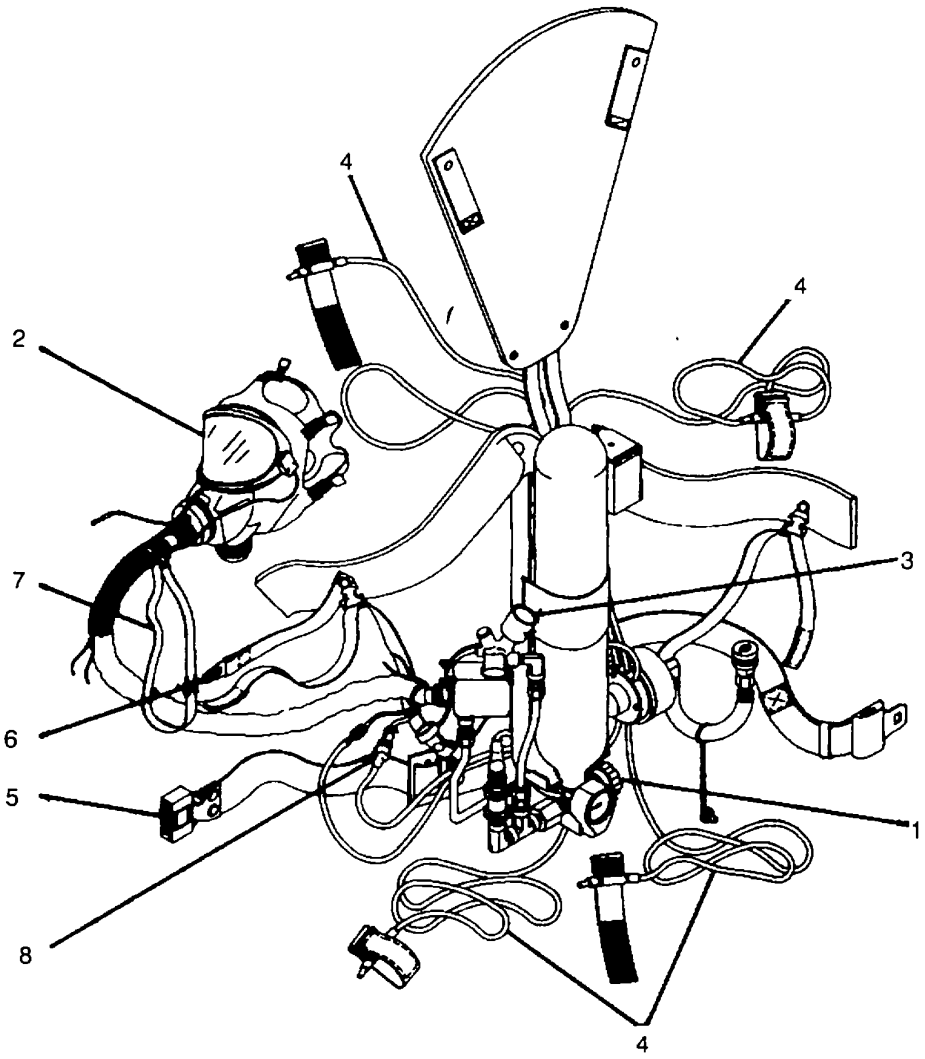
g. Disconnect the remote air tether line quick release from passthrough (8).

h. Disconnect the EBA tether line connection from passthrough (8) inside suit (4).

i. Unbuckle suit waist belt (9).

j. Step completely out of suit (4).

2-12. DOFFING THE EBA.



a. Close cylinder valve (1).

b. Remove face piece (2).

c. Unlock and close regulator valve (3) by depressing the button and turning clockwise.

d. Remove vent tubes (4) from wrists and ankles.

e. Unfasten waist strap (5) and chest strap (6).

f. Remove the EBA from body.

g. Remove face piece strap (7) from around neck.

2-13. USING THE STEPO-I IN THE REBREATHER SYSTEM MODE.

2-14. DONNING THE ENCAPSULATING PROTECTIVE SUIT USING THE REBREATHER SYSTEM.

a. Refer to items 1 through 10 of Table 2-1 for operator PMCS for the encapsulating protective suit.

b. Refer to items 27 through 35 of Table 2-1 for operator PMCS for the rebreather system.

c. Refer to items 36 through 43 of Table 2-1 for operator PMCS for the ice vest.

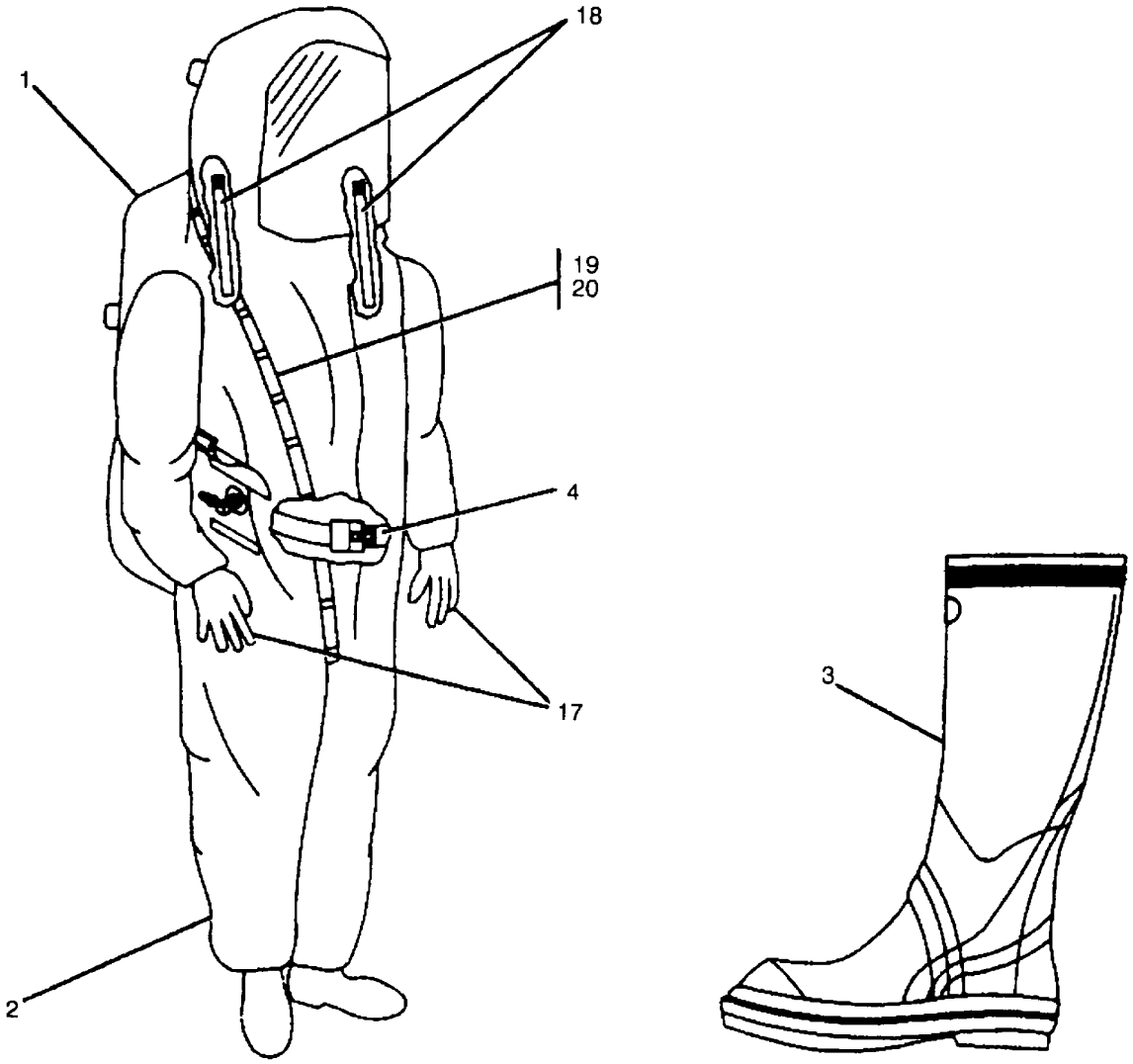
d. Remove shoes.

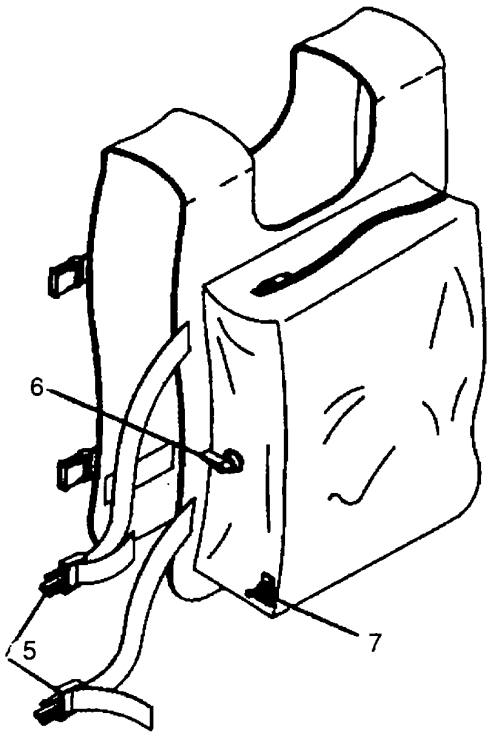
NOTE

An undershirt must be worn as a minimum.

e. Disrobe to the waist.

2-14. DONNING THE ENCAPSULATING PROTECTIVE SUIT USING THE REBREATHER SYSTEM. (CONT)

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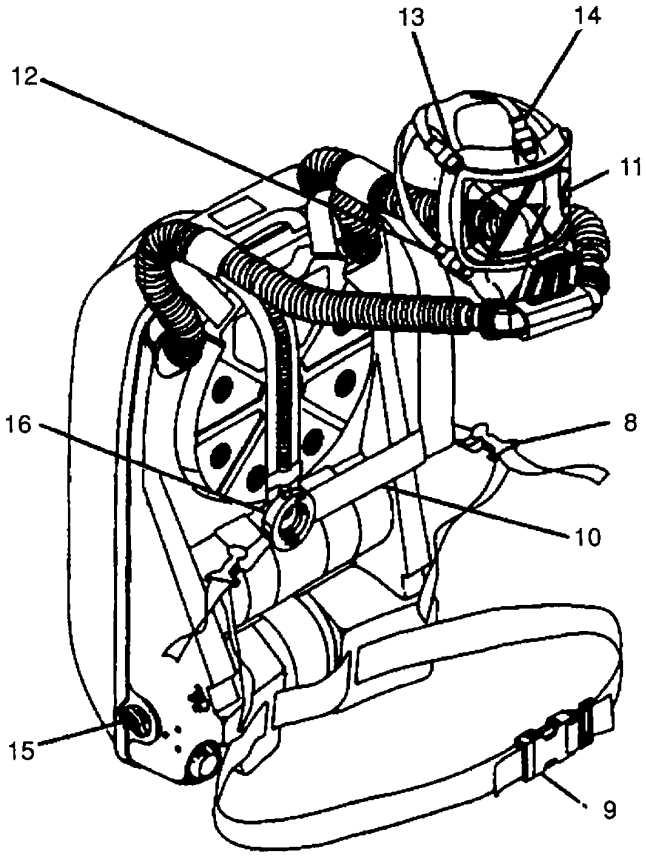
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9

2-14. DONNING THF FNCAPSUI ATING PROTFCTIVF SUIT USING THF RFBRFATHFR SYSTEM. (CONT)

f. Sit down and place both feet into suit (1).

g. Roll up outer cuffs (2) around legs and put on boots (3).

h. Roll outer cuffs (2) down over boots (3).

i. Stand up and pull suit (1) up to your waist and buckle the suit waist belt (4).

WARNING

Heat stress hazard. The ice vest will not prevent the wearer from perspiring as heat builds up inside the encapsulating protective suit. Leave the area immediately and cool off at any sign of nausea, dizziness or difficulty in breathing. Failure to leave the area and cool off could result in personnel injury due to heat exhaustion. STEPO-I authorized weartime (stay time) with cooling vest at ambient temperatures at or above 85°F (29. 44°C) is 45 minutes. Ambient temperatures below 85°F (29. 44°C) is 2 hours.

j. Disconnect the buckles on ice vest adjusting straps (5).

NOTE

The ice vest must be worn with pouch in the front.

k. Place the ice vest in position over your shoulders.

I. Connect the buckles and adjust straps (5).

NOTE

A loosely fitted vest will not produce the maximum cooling effect.

m. Ensure the ice vest is firmly secured to your body, distributing the weight evenly.

n. Turn temperature regulating valve (6) to the horizontal position (maximum cooling).

o. Turn the on/off toggle switch (7) to the on position.

NOTE

The system will take a few seconds to purge itself of trapped air before the water will start circulating.

p. Adjust temperature regulating valve (6) as needed for individual comfort.

NOTE
Two people are required to perform the following steps.

q. Lay the rebreather system face down with the top towards the user.
r. Extend shoulder straps (8).
s. Grasp the sides of the rebreather system.

NOTE
The shoulder straps should be outside the arms.

t. Raise the rebreather system over your head.
u. Bend forward and let the rebreather system slide down your back.
v. Tighten shoulder straps (8).
w. Fasten and adjust waist strap (9).

NOTE
It may be necessary to loosen the ice vest adjusting straps to perform the next step.

x. Pass chest strap (10) under the ice vest and fasten.
y. Fully extend face piece (11) head harness straps (12), (13) and (14).
z. Place chin into the lower part of face piece (11).
aa. Quickly open cylinder valve (15) and listen for a short "chirp" from the alarm whistle.
ab. Pull head harness straps (12), (13) and (14) back over your head and adjust for a tight seal as follows:

(1) Ensure all straps lie flat on the head.
(2) Tighten chin straps (12).
(3) Tighten temple straps (13).
(4) Tighten top head strap (14).

2-14. DONNING THE ENCAPSULATING PROTECTIVE SUIT USING THE REBREATHER SYSTEM. (CONT)

NOTE

The pressure gauge should read at least 2,400 PSIG within one minute

ac. Check pressure gauge (16) to ensure proper cylinder pressure

ad. Remove the maintenance tag from the rebreather system

WARNING

Personnel safety indicators. When operating the rebreather, specific warning signs require immediate operator attention. Leave the area immediately at any signs of nausea, dizziness, difficulty in breathing, contaminants in the face piece, or rapid pressure drop as indicated by the system pressure gauge. Failure to leave the area may result in injury or death due to suffocation

WARNING

Limited oxygen supply in the rebreather system. Leave the area immediately when the alarm whistle sounds. An audible alarm indicates the oxygen pressure has dropped to 25% or below and about 45 minutes of oxygen is available. Failure to leave the area and decontaminate immediately could result in personnel death due to suffocation

ae. Breathe normally. Depending on the user's activity and surrounding temperature, the breathing oxygen may seem warmer and more humid than you are used to. This condition is normal and not harmful

af. Pull suit (1) up over head and insert both arms into suit (1) and gloves (17)

ag. Place suit (1) hook and pile fastener tape straps (18) around the rebreather system shoulder straps (8) and fasten

WARNING

Personnel contamination hazard. Ensure all closures in the encapsulating protective suit are tightly secured. Openings in the encapsulating protective suit could cause sickness or death due to contamination

ah. Close slide fastener (19) and hook and pile fastener tape storm flap (20)

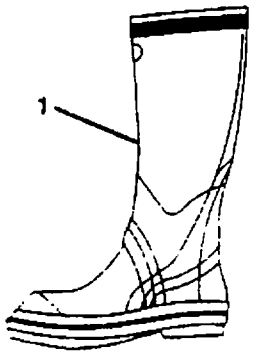
ai. Breathe normally and enter the contaminated area

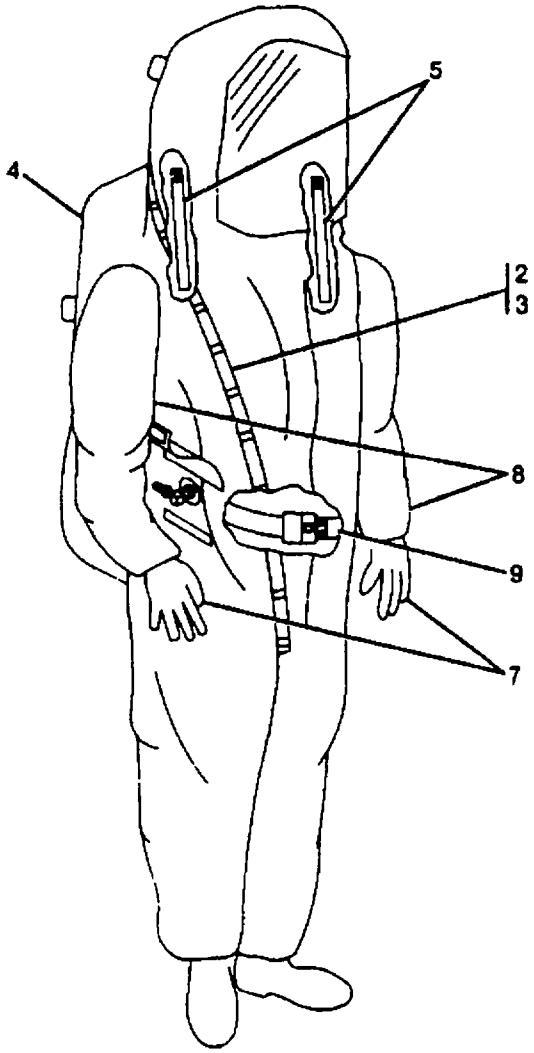
2-15. DOFFING THE ENCAPSULATING PROTECTIVE SUIT WITH THE REBREATHER SYSTEM

WARNING

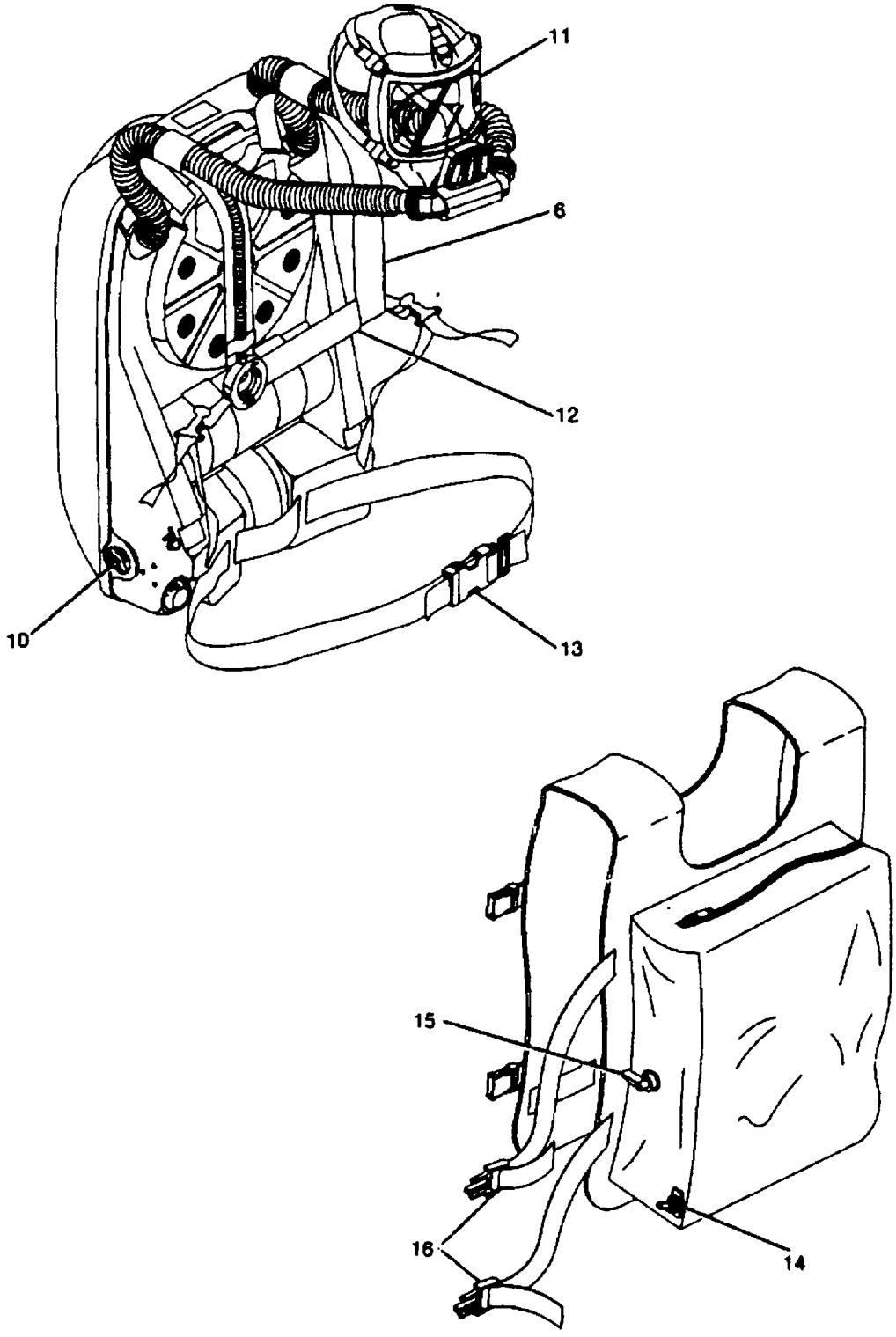
Personnel contamination hazard. All equipment must be decontaminated in accordance with local SOP. Failure to decontaminate properly could result in personnel injury or death due to contamination

a. Perform decontamination procedures in accordance with the local Standard Operating Procedures (SOP)





2-15. DOFFING THE ENCAPSULATING PROTECTIVE SUIT WITH THE REBREATHER SYSTEM. (CONT)



b. Remove boots (1)

WARNING

Personnel contamination hazard. Do not touch the outside of the encapsulating protective suit during doffing and always fold it outward away from the body. Failure to doff the suit properly could result in sickness or death due to contamination

c. Open hook and pile fastener tape storm flap (2) and slide fastener (3)

NOTE

Two people are required to perform the following steps

d. Remove suit (4) hook and pile fastener tape shoulder straps (5) from around the rebreather system shoulder straps (6)

e. Carefully pull arms and hands out of suit (4), gloves (7) and sleeves (8)

f. Remove suit (4) down to the waist

g. Unbuckle suit (4) waist belt (9)

h. Step completely out of suit (4)

i. Close the rebreather system cylinder valve (10)

j. Remove face piece (11)

k. Unfasten chest strap (12) and waist strap (13)

l Lean forward and grasp one of the shoulder straps (6). Let the other shoulder strap (6) slide off your shoulder and swing the unit in front of you

m. With both hands, gently set the unit down

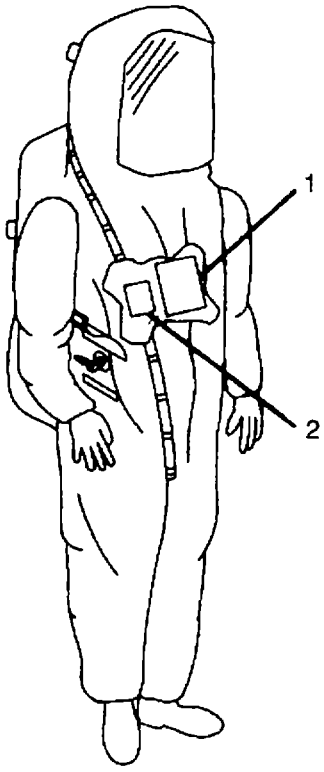
n. Turn the ice vest on/off toggle switch (14) to the off position

o. Turn the ice vest temperature regulating valve (15) to the vertical (closed) position

p. Unbuckle straps (16) and remove the ice vest

2-16. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES.

(1)



Inspection Log

Style # 12460 Serial # 60018

Date	Inspected By	Remarks	Next Inspection Date
		continued from opposite side	

TOTALLY ENCAPSULATING SUIT

Life-Guard

CARE AND USE MANUAL

PO Box 1039
Guntersville, AL 35976
1-800-323-3533
In AL 582-0011

(2)

LIFE-GUARD, INC.
GUNTERSVILLE, ALABAMA
TOTALLY ENCAPSULATING SUIT
MADE IN THE U.S.A.

STYLE 12460 MD

SIZE MEDIUM

SERIAL NUMBER _____

MATERIAL BUTYL

SEE WARNINGS
ON OPPOSITE PANEL

DO NOT REMOVE THIS LABEL

WARNINGS

There are uses and chemicals for which this garment is unsuitable. It is the responsibility of the user to verify that this suit is appropriate for the intended use and meets all health standards. It is also the responsibility of the user to read and follow all manufacturer's instructions.

Adequate breathing air must be provided inside this suit to prevent suffocation.

Do not use near flames or intense heat to prevent being burned.

If operating this suit with a noisy air system, hearing protection must be used to prevent hearing damage.

Use the buddy system. Have someone nearby who is prepared to assist the wearer in case of an emergency.

Do not use suit if damaged.

Read the user's manual before using this suit.

b. Remove boots (1)

WARNING

Personnel contamination hazard. Do not touch the outside of the encapsulating protective suit during doffing and always fold it outward away from the body. Failure to doff the suit properly could result in sickness or death due to contamination

c. Open hook and pile fastener tape storm flap (2) and slide fastener (3)

NOTE

Two people are required to perform the following steps

d. Remove suit (4) hook and pile fastener tape shoulder straps (5) from around the rebreather system shoulder straps (6)

e. Carefully pull arms and hands out of suit (4), gloves (7) and sleeves (8)

f. Remove suit (4) down to the waist

g. Unbuckle suit (4) waist belt (9)

h. Step completely out of suit (4)

i. Close the rebreather system cylinder valve (10)

j. Remove face piece (11)

k. Unfasten chest strap (12) and waist strap (13)

l. Lean forward and grasp one of the shoulder straps (6). Let the other shoulder strap (6) slide off your shoulder and swing the unit in front of you

m. With both hands, gently set the unit down

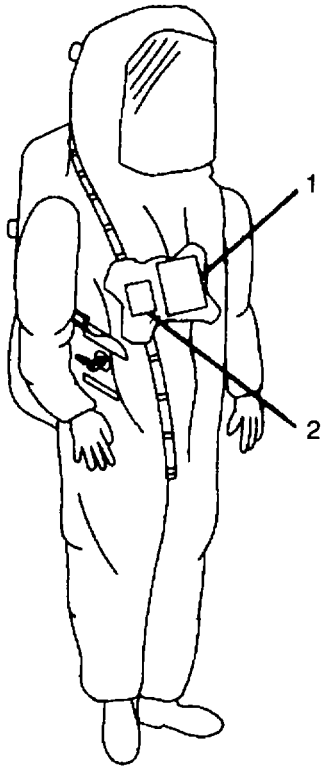
n. Turn the ice vest on/off toggle switch (14) to the off position

o. Turn the ice vest temperature regulating valve (15) to the vertical (closed) position

p. Unbuckle straps (16) and remove the ice vest

2-16. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES.

(1)



Inspection Log

Style # 12460 Serial # 60010

		(continued from opposite side)	

TOTALLY ENCAPSULATING SUIT

Life-Guard

CARE AND USE MANUAL

PO Box 1089
Guntersville, AL 35976
1-800-323-2530
In AL 582-0511

(2)

LIFE-GUARD, INC.
GUNTERSVILLE, ALABAMA
TOTALLY ENCAPSULATING SUIT
MADE IN THE U.S.A.

STYLE 12460 MD

SIZE MEDIUM

SERIAL NUMBER _____

MATERIAL BUTYL

SEE WARNINGS
ON OPPOSITE PANEL

DO NOT REMOVE THIS LABEL

WARNINGS

There are uses and chemicals for which this garment is unsuitable. It is the responsibility of the user to verify that this suit is appropriate for the intended use and meets all health standards. It is also the responsibility of the user to read and follow all manufacturer's instructions.

Adequate breathing air must be provided inside this suit to prevent suffocation.

Do not use near flames or intense heat to prevent being burned.

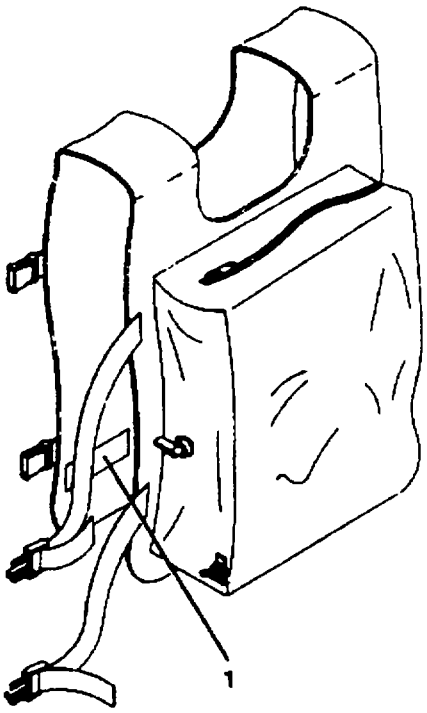
If operating this suit with a noisy air system, hearing protection must be used to prevent hearing damage.

Use the buddy system. Have someone nearby who is prepared to assist the wearer in case of an emergency.

Do not use suit if damaged.

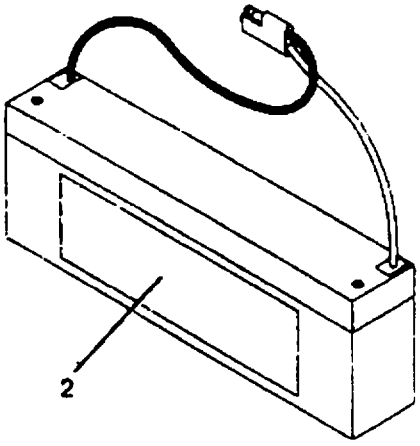
Read the user's manual before using this suit.

2-16. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES. (CONT)



(1)

ITEM COOL VEST ASSEMBLY
PART NO. 0019-19243-01
SERIAL NO. _____ SIZE N/A
CODE ID. 74897 MFG. 4/87
ILC DOVER



(2)

SEALED RECHARGEABLE
BATTERY

I. L. C. DOVER
MODEL NP2 6-8
8 VOLT 2.6 AH

2-16. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES. (CONT)

(1)

WARNING

Open-Circuit Type Self-Contained Breathing Apparatus should never have the outlet of the regulator blocked when the by-pass valve of the regulator is open and the system is pressurized. Under these conditions a high pressure can build up in the regulator, unless some component permits the pressure to be released. Generally, a part such as a diaphragm cover will be released forcibly.

A combination of the following three conditions can create the problem of pressure build-up. They are:

1. High pressure in the system, either because the cylinder valve is open or because pressure has not been drained from the system after the cylinder valve is shut-off.
2. The regulator By-Pass Valve open.
3. Outlet of regulator blocked.

The most common source of pressure build-up is the release of high pressure from the system after use of the apparatus. If this is done by opening the By-Pass valve while the regulator outlet is blocked, there will be a pressure build-up in the regulator and usually forcible ejection of the diaphragm cover. The user should shut off the cylinder valve after use and breathe down the residual air supply.

MSA MINE SAFETY APPLIANCES COMPANY
PITTSBURGH, PENNSYLVANIA, U.S.A.

(2)

MINE SAFETY APPLIANCES CO.

TO BE
FILLED WITH
COMPRESSED AIR
ONLY

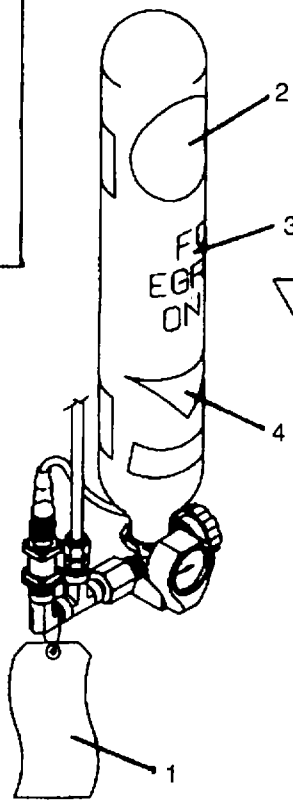
CONTENTS
Cubic Feet of Free Gas Volume
When Filled to 2475 PSIG Pressure.

WARNING: Keep away from heat or open flame. Do not use oil or grease on cylinder valve, regulator or fittings of apparatus.

CAUTION: Open cylinder valve slowly. Keep valve closed except when using.

994862 AP Rev. 2

PITTSBURGH, PA. 15208



(3)

FOR
EGRESS
ONLY

(4)

CAUTION

OPEN CYLINDER VALVE SLOWLY. KEEP VALVE CLOSED EXCEPT WHEN IN USE. IF LEAKING OCCURS AT CYLINDER AND VALVE CONNECTION, EMPTY CYLINDER AND REPLACE "O" RING

AP582 (L) Rev. 5
994868

2-16. OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES. (CONT)

(5)

WARNING

1. Use this device only after proper instruction and training in its use.

2. Use only with proper gas as specified by the manufacturer.

3. Do not enter a contaminated area unless the cylinder is filled to the full pressure approved.

4. Do not alter, modify or substitute any components, without approval of manufacturer.

5. Inspect frequently. Maintain according to manufacturer's instruction. Repair only by properly trained personnel.

APS82 (L) Rev. 6 995787

(6)

COMPRESSED AIR NON-FLAMMABLE GAS

UN1002

CAUTION: High Pressure Gas. May Accelerate Combustion

(7)

MSA Safety Precautions for MSA Self-Contained Breathing Apparatus Cylinders

Breathing apparatus cylinders should be recharged as soon as practicable after use. Cylinders should not be stored partially charged for two reasons:

1. If used without recharge, the duration of the apparatus is reduced.
2. The safety relief device is only designed to protect a fully charged cylinder from the effects of a fire.

For maximum safety the cylinders should be stored full or empty (pressure above ambient but less than 100 PSIG).

Prior to recharging, cylinders must be examined externally for evidence of high heat exposure, corrosion or other evidence of significant damage.

WARNING
CYLINDERS WHICH SHOW EVIDENCE OF EXPOSURE TO HIGH HEAT OR FLAME, e.g., PAINT TURNED TO A BROWN OR BLACK COLOR, DECALS CHARRED OR MISSING GAUGE, LENS MELTED OR ELASTOMERIC MATERIALS DISTORTED SHALL BE REMOVED FROM SERVICE AND RE-HYDROSTATIC TESTED PRIOR TO RECHARGING.

Additional information of value when performing external and internal inspections of cylinders may be found in CGA Pamphlet C6. Standards for Visual Inspection of Compressed Gas Cylinders. and/or CGA Pamphlet C6.2-1982. Visual Inspection for Fiberglass Reinforced High Pressure Cylinders available from the Compressed Gas Association, Inc., 500 Fifth Avenue, New York, New York 10036.

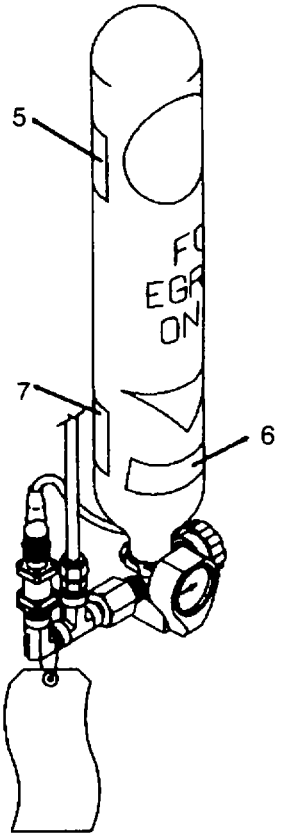
If there is any doubt about the suitability of the cylinder for recharge, it should be returned to a certified hydrostatic test facility for expert examination and retesting.

Always check to be sure the retest date is within the prescribed period and that the cylinder is properly labeled to indicate its gaseous service. New labels are restricted items which are not available except through certified hydrostatic test facilities.

Establish the service pressure of the cylinder Type 3AA cylinders that bear a plus (+) sign after the latest retest date may be recharged to a pressure 10% greater than the stamped service pressure, i.e., a cylinder stamped 3AA2015 with a plus (+) sign after the latest date may be recharged to 2216 PSIG. All other cylinders which are not type 3AA shall be filled to the designated service pressure only (as found on the DOT approval label).

Appropriately connect the cylinder to the filling recharge system and refill at a recommended rate less than 300 PSI per minute (use caution if faster recharging rates are used). Terminate the filling when the pressure reaches service pressure and allow the cylinder to cool to room temperature. If necessary top off the cylinder such that service pressure is attained with the cylinder at a temperature of 70°F. Close the valves on the cylinder and the recharge system and remove the cylinder and the valve if there is no leakage. The cylinder is now ready for reuse.

AP4811 (L) Rev. 7 465542



Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-17. OPERATION IN UNUSUAL WEATHER

2-17.1 Cold Weather

WARNING

Static electrical discharge hazard in encapsulating protective suits. All tools and equipment must be grounded in accordance with the local SOP when working near static sensitive munitions or flammable chemicals. Absence of a proper ground could result in personnel injury or death due to ignition of munitions or flammable chemicals

a. The encapsulating protective suit may give off static electrical discharges in cold and dry environments. These discharges are not dangerous except where an electrical spark could initiate a static sensitive munition (primarily rockets) or ignite a flammable chemical

b. Operations in static sensitive environments should be conducted in accordance with the local SOP. All tools and equipment must be properly grounded

WARNING

Personnel contamination hazard. Encapsulating protective suits should be thoroughly inspected for cracks in cold weather environments. Cracks are more likely to develop in cold stiff suit material. If cracks are detected, replace the encapsulating protective suit. Failure to replace a damaged suit could result in personnel injury or death due to contamination

c. The encapsulating protective suit has been approved for operations in temperatures ranging from 0°F (-17. 8°C) to 100°F (+37. 8°C). In cold weather environments the suit material may become stiff which could increase the chances of cracks forming in the material. Extra care should be taken when inspecting the suit prior to use in cold weather environments

WARNING

Cold weather effects the EBA warning light operation. Do not use the EBA for operations in temperatures below +32°F (0°C). Below +32°F (0°C) the warning light may fail or flash inadvertently due to a decrease in battery efficiency. Operations below +32°F (0°C) could result in injury or death due to suffocation

d. The emergency breathing apparatus is not approved for use in temperatures below +32°F (OC). Cold weather may effect the electrical system of the emergency breathing apparatus since battery life and efficiency is decreased in colder temperatures. If battery efficiency is decreased, the pressure switch may provide faulty readings and cause the warning light to fail or flash inadvertently. The user could potentially lose remote air and use all of the emergency air without warning.

e. Cold weather could also cause a decrease in the cylinder pressure such that the EBA would not provide the user the entire 6 to 8 minutes at 40 liters per minute of escape air.

WARNING

Oxygen deficiency hazard in the rebreather system. Do not use the rebreather system for operations at temperatures below +15°F (-9. 44°C). Below +15°F (-9. 44°C) there may be an increase of carbon dioxide in the breathing mixture due to decreased efficiency of the CO_2 absorbent. Operations below +15°F (-9. 44°C) could result in personal injury or death due to suffocation.

f. The rebreather system is not approved for use in temperatures below +1 50F (-9. 44°C). Cold 5 weather decreases the efficiency of the carbon dioxide absorbent causing an increase of carbon dioxide and a decrease of oxygen in the breathing mixture.

g. If the breathing mixture does not have enough oxygen in it, the user will initially begin gasping for air and eventually pass out.

2-17.2 Hot Weather

WARNING

Heat exhaustion hazard. Encapsulating protective suit users should be given sufficient recuperation time between operations in hot weather environments to avoid heat exhaustion. Fatigue, nausea and/or dizziness could result from extended use without proper rest and fluid replenishment. STEPO-I authorized weartime (stay time) with cooling vest at ambient temperatures at or above 85°F (29. 44°C) is 45 minutes Ambient temperatures below 85°F (29. 44°C) is 2 hours.

a. When the encapsulating protective suit is worn in hot weather environments, the user will be more prone to heat exhaustion. Fatigue, nausea and/or dizziness may result due to heat build-up inside the suit. Every effort should be made to rotate personnel in the work cycle to allow the body to recuperate.

b. As a general rule to prevent fatigue and heat exhaustion, the wearer's recuperation time should be equivalent to three times the period of time that the suit is worn; however, the final decision on the appropriate recuperating time will be determined by the local medical authority.

2-17. OPERATION IN UNUSUAL WEATHER. (CONT)

c. If the user becomes a casualty of heat stress, they should be removed from the suit immediately If the casualty is in a contaminated area, evacuate the casualty to an established hotline or an uncontaminated area upwind of the work site for decontamination and removal of the suit.

2-18. EMERGENCY PROCEDURES

CAUTION

Equipment damage. Disconnect the tether line assembly from the encapsulating protective suit before leaving the contaminated area. Failure to disconnect the tether line may cause damage to the tether line, connections and the suit pass through from excessive strain if it got caught on anything. Replacement of damaged components will be required.

a. Should the remote air supply fail when using the tether line system, the EBA emergency air cylinder will automatically provide the user with air. The warning light on the EBA face piece will e begin flashing to signal the user to leave the contaminated area immediately. The user will have 6 to 8 minutes at 40 liters per minute to decontaminate and remove the encapsulating protective suit

b. In the event the rebreather system is not supplying enough air, push the bypass valve button for about two seconds. The bypass valve allows oxygen to flow past the demand/free flow valve and constant flow restrictor directly into the breathing chamber. Repeat the use of the bypass valve button as required. If use becomes frequent, leave the contaminated area immediately

WARNING

Limited oxygen supply in the rebreather system. Leave the area immediately when the alarm whistle sounds. An audible alarm indicates the oxygen pressure has dropped to 25% or below and about 45 minutes of oxygen is available. Failure to leave the area and decontaminate immediately could result in personnel death due to suffocation

c. An alarm whistle will sound for approximately 20 to 45 seconds when the rebreather system oxygen supply reaches about 25% of operating pressure. The alarm whistle is designed with a tone stem, located on the lower right side of the rebreather system above the cylinder valve Covering the tone stem causes a distinct change in the alarm whistle sound. This provides a method of identifying which rebreather system alarm whistle has sounded when several units are in use. The user of the unit which sounded the alarm whistle must leave the contaminated area at the first sounding of the alarm whistle. It only sounds once.

2-19. DECONTAMINATION PROCEDURES.

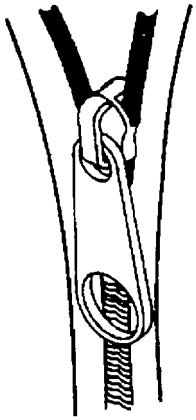
d. Decontaminate the STEPO-I ensemble in accordance with the procedures provided in your local standard operating procedures (SOP).

CHAPTER 3
UNIT MAINTENANCE INSTRUCTIONS

Paragraph

Section I. LUBRICATION INSTRUCTIONS

3-1. LUBRICATING THE ENCAPSULATING PROTECTIVE SUIT.



3-1. LUBRICATING THE ENCAPSULATING PROTECTIVE SUIT. (CONT)

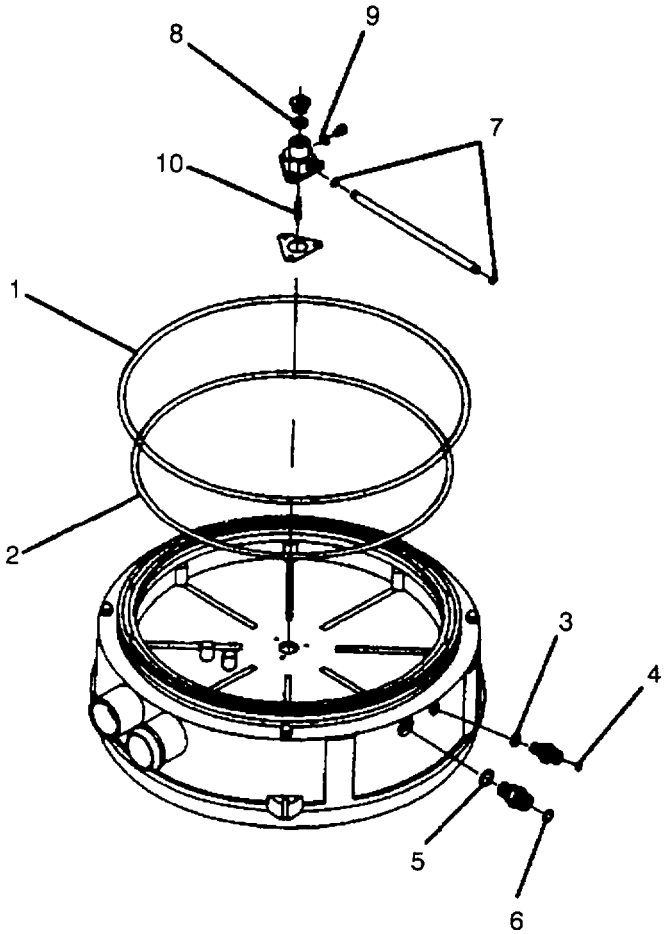
NOTE
These lubricating instructions are mandatory.

a. Lightly coat the slide fastener by rubbing it with paraffin.

b. Operate the slide fastener through its full range to ensure complete lubrication.

3-2. LUBRICATING THE REBREATHER SYSTEM.

3-2.1 Center Section.



3-2

NOTE

These lubricating instructions are mandatory.

a. Perform steps a. (1) through a. (26), paragraph 3-10. 3. 4, to remove preformed packing (1), (2), (3), (4), (5), (6), (7) and (8), gasket (9) and demand valve core (10) from the center section

b. Inspect the preformed packing and gasket for cuts or abrasions

c. Wipe the preformed packing, gasket and demand valve dry with a clean soft cloth

WARNING

Fire hazard. Only use a silicone lubricant when lubricating the rebreather system preformed packing. Oil-base lubricants may ignite in the presence of high pressure oxygen causing burns to personnel

CAUTION

Equipment damage. Only use a silicone lubricant when lubricating the rebreather system preformed packing. Use of an oil-base lubricant will damage preformed packing and cause equipment failure. Damaged preformed packing must be replaced

d. Apply a thin film of silicone lubricant to preformed packing (1), (2), (3), (4), (5), (6), (7) and (8), gasket (9) and demand valve core (10)

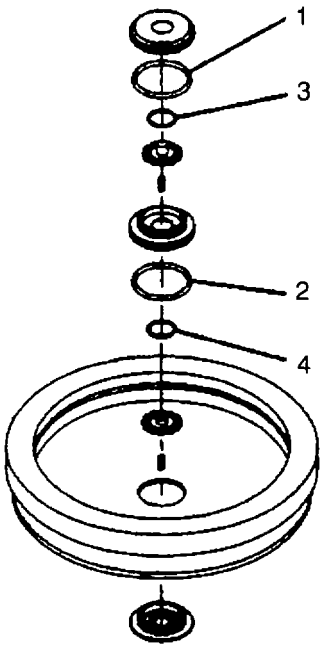
e. Perform steps b. (2) through b. (21), paragraph 3-10. 3. 4, to install preformed packing (1), (2), (3), (4), (5), (6), (7) and (8), gasket (9) and demand valve core (10)

3-2. 2 Relief Valve

NOTE

These lubricating instructions are mandatory

3-2. LUBRICATING THE REBREATHER SYSTEM. (CONT)



a. Perform steps a. (1) through a. (17), paragraph 3-10. 3. 15, to remove preformed packing (1), (2), (3) and (4) from the relief valve

b. Inspect the preformed packing for cuts or abrasions

c. Wipe the preformed packing, valve seats and valve bodies with a clean soft cloth

WARNING

Fire hazard. Only use a silicone lubricant when lubricating the rebreather system preformed packing. Oil-base lubricants may ignite in the presence of high pressure oxygen causing burns to personnel

CAUTION

Equipment damage. Only use a silicone lubricant when lubricating the rebreather system preformed packing. Use of an oil-based lubricant will damage preformed packing and cause equipment failure. Damaged preformed packing must be replaced

d. Apply a thin film of silicone lubricant to preformed packing (1), (2), (3) and (4)

e. Perform steps b. (2) through b. (20), paragraph 3-10. 3. 15, to install preformed packing (1), (2), (3) and (4)

Section II. UNIT TROUBLESHOOTING PROCEDURES

3-3. GENERAL. The table lists the common malfunctions which you may find during the operation or maintenance of the STEPO-I. You should perform the tests/inspections and corrective actions in the order listed

This manual cannot list all malfunctions that may occur, nor all the tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor

Symptom Index

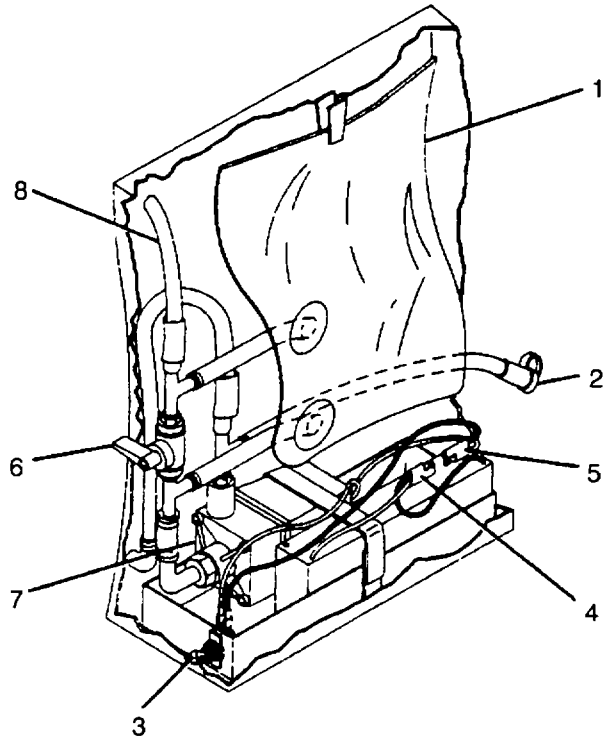
Table 3-1. Unit Troubleshooting

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
1 Tether Line Leaks		
	Step 1. Check the tether line and adapter fitting connections for tightness	Tighten all loose connections
	Step 2. Inspect male pipe thread of adapters F101 and F102 for missing or worn anti-seize tape	Apply new anti-seize tape
	Step 3. Check tether line and adapter F101 female connections for damaged or missing preformed packing	Replace the tether line or adapter Fl 01 as necessary. Refer to paragraph 3-7. 2. 1
	Step 4. Inspect the hoses for cuts, holes or punctures	Replace damaged tether line. Refer to paragraph 3-7. 2. 1
	Step 5. Tether line continues to leak	Replace the complete tether line. Refer to paragraph 3-7. 2. 1
2. Encapsulating Protective Suit Visual Defects		
	Step 1. Pressure test the suit. Refer to paragraph 3-6. 4	Patch any repairable defects or replace damaged components Refer to paragraph 3-6. 3. 1
	Step 2. Defects not repairable	Replace the suit. Notify your supervisor

Table 3-1. Unit Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

3. Ice Vest Leaks



Step 1. Ensure coolant bag (1) is closed

Close coolant bag (1)

Step 2. Check drain valve (2) to ensure it is closed

Close drain valve (2)

Step 3. Check the tubing connections for tightness

Tighten all loose connections

Step 4. Inspect coolant bag (1) for holes

Replace a damaged coolant bag. Refer to paragraph 3-8. 2. 1

Step 5. Ice vest continues to leak

Replace the ice vest. Notify your supervisor

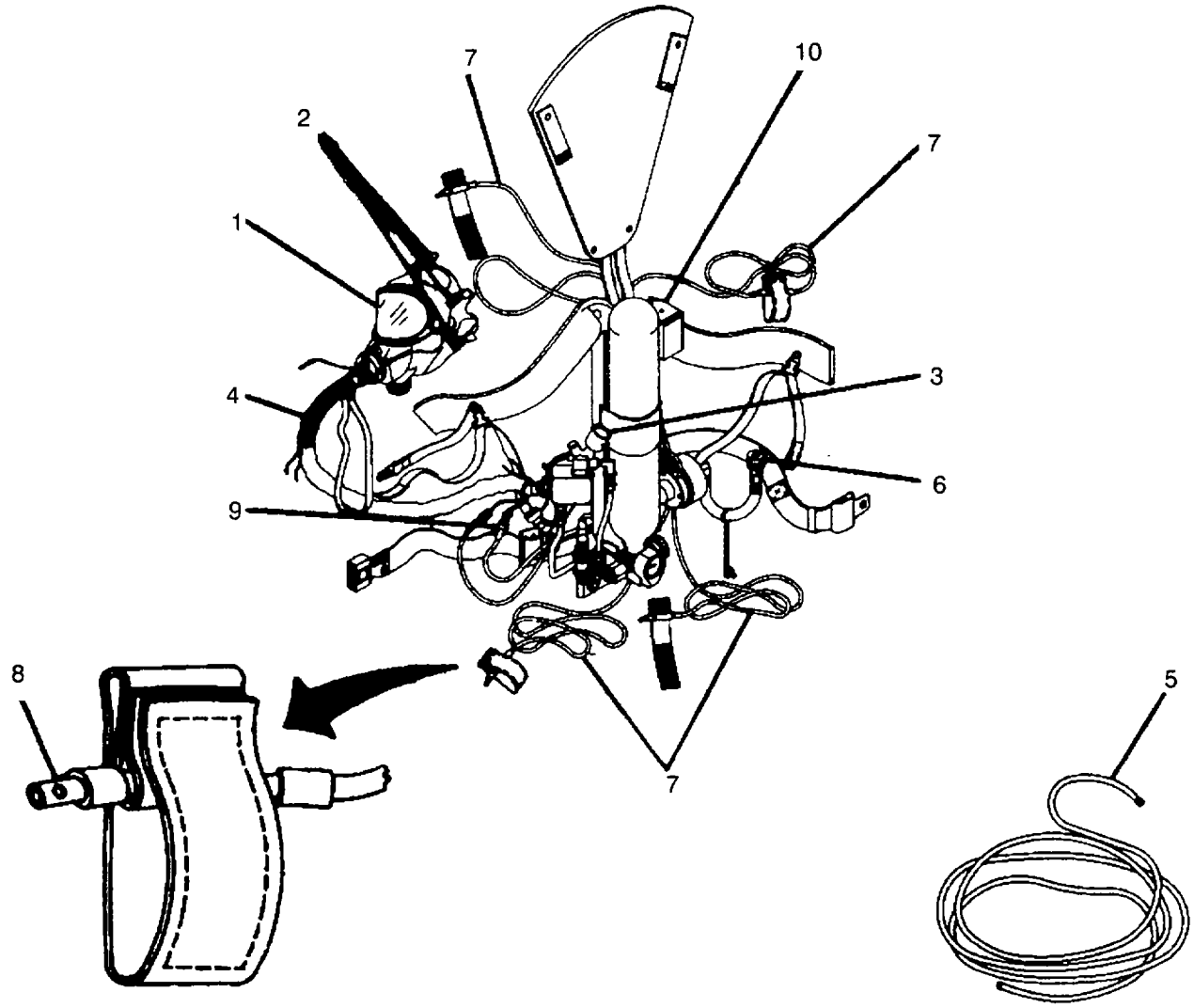
Table 3-1. Unit Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
4. Ice Vest Not Circulating Coolant	
Step 1. Check that on/off switch (3) is ON	
Turn ON on/off switch (3)	
Step 2. Check that battery connector (4) and pump connector (5) are connected	
Connect battery connector (4) and pump connector (5)	
Step 3. Check that a charged battery has been installed	
Recharge or replace the battery. Refer to paragraph 3-8. 3	
Step 4. Check that temperature regulating valve (6) is open	
Open temperature regulating valve (6)	
Step 5. Check if pump (7) is running	
If pump (7) is malfunctioning, replace the ice vest	
Step 6. Inspect coolant supply tubing (8) for blockage	
Remove blockage from tubing (8)	
Step 7. Ice vest continues to malfunction	
Replace the ice vest. Notify your supervisor	

Table 3-1. Unit Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

5. EBA Provides No Cooling Air



Step 1. Check vent tubes (1) for kinks

Work out tubing kinks

Step 2. Check vent tube (1) connections for tightness

Tighten all loose connections

Table 3-1. Unit Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
Step 3. Check that tether line (2) and tether line connection (3) are connected to the suit pass through	
	Connect tether line (2) and tether line connection (3) to the suit pass through
Step 4. Check vent tubes (1) are not clogged and air holes (4) are not blocked	
	Remove all foreign matter from the vent tubes (1) and air holes (4)
6. EBA Cylinder Gauge Low Pressure Reading	
Step 1. Ensure the cylinder (5) is not cold	
	Read cylinder gauge at room temperature (680F)
Step 2. Cylinder (5) may need recharging	
	Turn in the cylinder for recharging
Step 3. Check to see if the cylinder gauge needle is stuck	
	Tap the gauge lightly. If reading does not change and gauge operation is still doubtful, replace the air cylinder. Refer to paragraph 3-9. 2. 3
Step 4. Check the cylinder valve and neck for leaks with a soapy water solution. Refer to paragraph 3-9. 3. 3	
	If leaks are identified, replace the cylinder. Notify your supervisor
7. EBA Warning Light Flashes	
NOTE The warning light is designed to flash when the cylinder pressure drops below 1950 PSIG	
Step 1. Check that the cylinder (5) pressure is above the full mark on the cylinder pressure gauge	
	Install a fully charged cylinder. Refer to paragraph 3-9. 2. 3
Step 2. Check the electrical connection at the pressure switch (6) for tightness	
	Tighten loose connection
Step 3. Pressure switch (6) may be damaged	
	Replace pressure switch (6). Refer to paragraph 3-9. 2. 10
Step 4. Problem persists	
	Replace the EBA. Notify your supervisor

Table 3-1. Unit Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
8. EBA Warning Light Not Burning	
Step 1. Check that a battery is installed in the battery box (7)	Install or replace the battery. Refer to paragraph 3-9. 2. 1
Step 2. Check that the face piece electrical connector (8) is connected	Connect electrical connector
Step 3. Check that the lamp (9) is tight	Tighten or replace the lamp. Refer to paragraph 3-9. 2. 15
Step 4. Check warning light for signs of corrosion or loose wires	Replace the warning light and electrical connector wire. Refer to paragraph 3-9. 2. 14
Step 5. Problem persists	Replace the EBA. Notify your supervisor
9. EBA Regulator Valve is Difficult to Turn	
Step 1. Check that the regulator valve (10) locking mechanism is operating properly	Depress the locking button to close the valve
Step 2. Valve still difficult to operate	Replace the regulator (11). Refer to paragraph 3-9. 2. 6
10. EBA Cylinder Clamp is Stiff or Hard to Turn	
Step 1. Check the cylinder clamp (12) mechanism for corrosion	Apply penetrating oil to the clamp mechanism
Step 2. Check the cylinder clamp (12) mechanism for damage	Replace the support assembly. Refer to paragraph 3-9. 2. 11
11. EBA Breathing Tube Leaks	
Step 1. Check breathing tube (13) for cuts, holes and tears	Replace the breathing tube (13). Refer to paragraphs 3-9. 2. 12 and 3-9. 2. 13
Step 2. Check the threaded insert for damage	Replace the threaded insert. Refer to paragraph 3-9. 2. 13

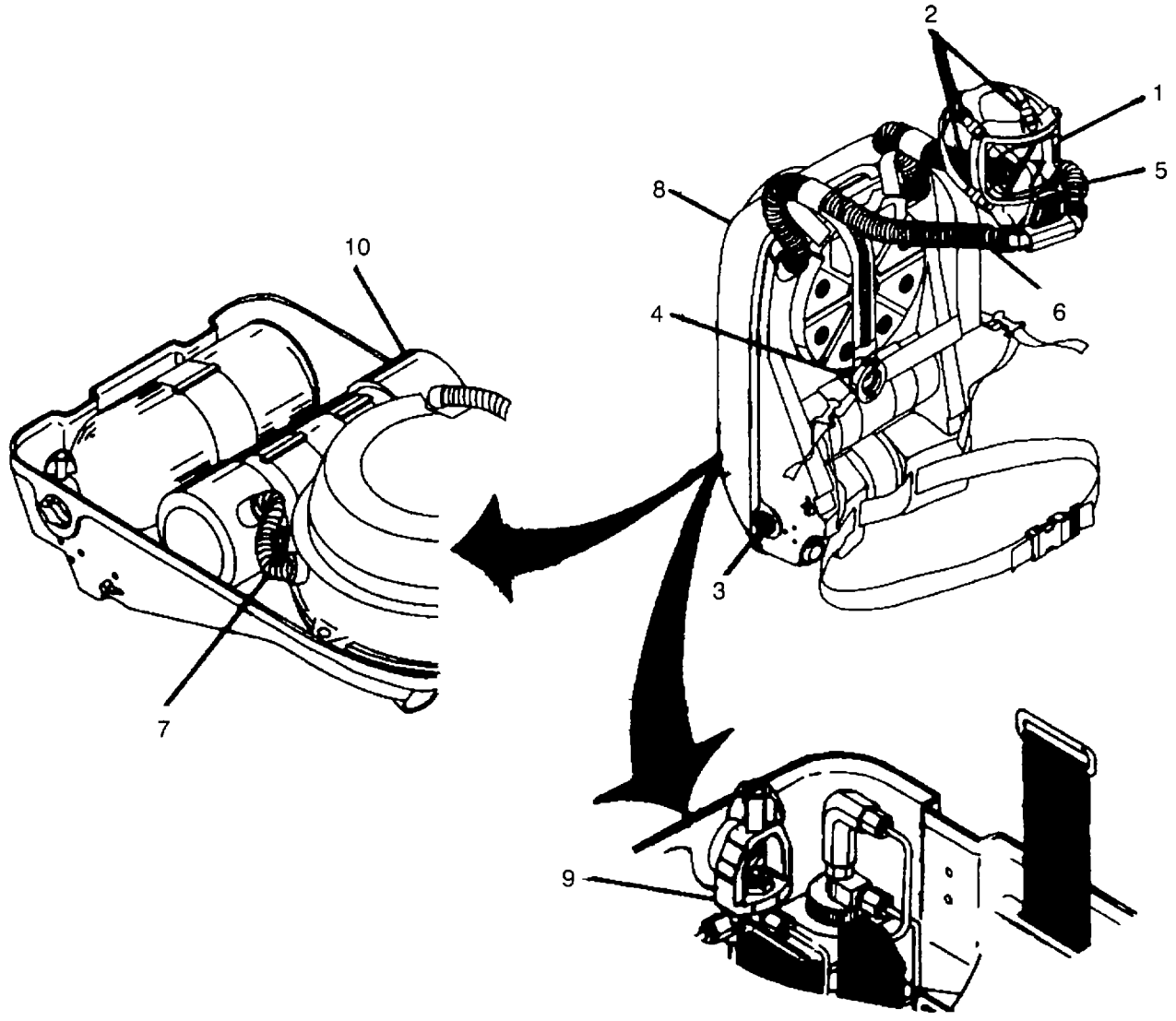
Table 3-1. Unit Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 3. Check the angle nut for damage and missing or damaged gasket.
Replace gasket or damaged angle nut. Refer to paragraph 3-9. 2. 13.
12. High Exhalation Resistance in EBA Face Piece
Step 1. Check the face piece (14) exhalation valve (15) for damage or sticking.
Replace the exhalation valve (15). Refer to paragraph 3-9. 2. 17.
Step 2. Problem persists.
Replace the face piece (14). Notify your supervisor.
13. EBA Harness System Discomfort
Step 1. Check the tension of the waist strap (16) in the support assembly.
Tighten the waist strap (16). Refer to paragraph 3-9. 2. 11.
Step 2. Check shoulder straps, adjustment straps, chest strap and waist strap for damage and signs of wear.
Replace worn or damaged straps. Refer to paragraph 3-9. 2. 11
Step 3. Check the support assembly for damage.
Replace the support assembly. Refer to paragraph 3-9. 2. 11.

Table 3-1. Unit Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	

14 Rebreather System Provides Insufficient Oxygen



Step 1. Check oxygen bottle pressure gauge.

If the bottle is not fully charged, replace the bottle. Refer to paragraph 3-10. 3. 1.

Step 2. Inspect inhalation hose (5) for cuts, holes or tears.

Replace damaged inhalation hose (5). Refer to paragraph 3-10. 3. 3.

Table 3-1. Unit Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	

Step 3. Check the face piece (1) and head harness straps (2) for damage and that a tight seal can be achieved.

Replace damaged components or entire face piece. Refer to paragraphs 3-10. 3. 10 and 3-10. 3. 11.

Step 4. Check hose connections for tightness.

Tighten all loose connections.

Step 5. Check that inhalation hose (5), exhalation hose (6) and coolant canister hose (7) are not clogged.

Remove all foreign matter from the hoses. Refer to paragraph 3-10. 3. 3.

Step 6. Remove top cover (8) and check the connection at regulating valve (9) and bottle valve (3).

Reseat the oxygen bottle. Refer to paragraph 3-10. 3. 1.

15. Rebreather System Not Cooling the Oxygen

Step 1. Check that coolant canister (10) is frozen.

Replace with a frozen coolant canister (10). Refer to paragraph 3-10. 3. 2.

Step 2. Check that coolant canister hose (7) and inhalation hose (5) connections are connected.

Connect coolant canister hose (7) and inhalation hose (5).

Step 3. Inspect coolant canister hose (7) and inhalation hose (5) for cuts, holes or tears.

Replace the damaged hose. Refer to paragraph 3-10. 3. 3.

16. Rebreather System Alarm Whistle Inoperative

Step 1. Check the pressure gauge to ensure bottle pressure is 2,400 PSIG.

If the bottle is not charged to 2,400 PSIG, replace the bottle. Refer to paragraph 3-10. 3. 1.

Step 2. Check the Stat-O-Seal for damage.

Replace a damaged or missing Stat-O-Seal. Refer to paragraph 3-10. 3. 5.

Table 3-1. Unit Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 3. Check oxygen bottle seat.

Reseat oxygen bottle. Refer to paragraph 3-10.3.1.

Step 4. Open the bottle valve and listen for a short "chirp" from the alarm whistle.

If no "chirp" is heard, replace rebreather system. Notify your supervisor.

17. High Exhalation Resistance in Face Piece

Step 1. Check the flapper valves in the face piece (1) for damage or sticking.

Release stuck valves. Replace the mask if the valves are damaged.

Step 2. Check the relief valve in the center section (11) for damage or sticking.

Clean seating surfaces and replace damaged components. Refer to paragraph 3-10.3.15.

18. Rebreather Diaphragm Bottoms Restricting Inhalation

Step 1. Perform the oxygen constant rate flow test.

Replace the restrictor, regulator or valve assembly as necessary. Refer to paragraph 3-10.4.3.

Step 2. Examine the demand/free flow valve for damage.

Replace the valve core. Refer to paragraph 3-10.3.14.

19. Rebreather Oxygen Bottle Pressure Gauge Low Pressure Reading

Step 1. Ensure the oxygen bottle (12) is not cold.

Read the pressure gauge at room temperature (680F).

Step 2. Oxygen bottle (12) may need a charge.

Turn in oxygen bottle for recharging.

Step 3. Apply a soapy water solution around the oxygen bottle (12) valve stem and valve handle and look for bubbles.

If bubbles are identified, replace the oxygen bottle. Refer to paragraph 3-10.3.1. Notify your supervisor.

20. Rebreather Breathing Hose Leaks

Step 1. Examine hoses (5), (6) and (7) for cuts, rips and tears.
Replace damaged hoses. Refer to paragraphs 3-10.3.3 and 3-10.3.9.

Table 3-1. Unit Troubleshooting (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 2. Examine hose connectors for damaged threads and missing or damaged gaskets and clamps.

Replace damaged or missing component. Refer to paragraph 3-10.3.9.

21. Rebreather System Pressure Gauge Low Pressure Reading

Step 1. Check that a fully charged oxygen bottle (12) is installed.

Install a fully charged oxygen bottle. Refer to paragraph 3-10.3.1.

Step 2. Check that the oxygen bottle valve (3) is completely open.

Open the oxygen bottle valve (3).

Step 3. Check the system for leaks.

Perform the breathing system and plumbing leak tests. Refer to paragraphs 3-10.4.1 and 3-10.4.2.

Step 4. Pressure gauge (4) operation is still doubtful.

Replace the pressure gauge (4). Refer to paragraph 3-10.3.7.

22. Rebreather Harness System Discomfort

Step 1. Examine the shoulder straps, chest strap and waist strap for damage and signs of wear.

Replace worn and damaged straps. Refer to paragraph 3-10.3.8.

Step 2. Examine rebreather body for cracks around strapping passthroughs.

Replace the rebreather. Notify your supervisor.

Section III. UNIT MAINTENANCE PROCEDURES

SECTION III. UNIT MAINTENANCE PROCEDURES (Continued)

3-4. INTRODUCTION. Maintenance of the emergency breathing apparatus (EBA) is to be performed only by certified maintainers. All other STEPO-I components shall be maintained only by trained maintenance personnel. The operator is not authorized to perform any maintenance activities specified in Chapter 3. This section contains maintenance procedures which are to be performed on the STEPO-I ensemble. The following topics are included as applicable:

a. Inspection
b. Replacement
c. Repair
d. Testing
e. Cleaning

3-5. GENERAL. All maintenance procedures in this section are to be performed by unit maintenance The operator is not authorized to perform any maintenance in this section

NOTE

Extensive repairs may require turn-in of the damaged equipment

3-6. ENCAPSULATING PROTECTIVE SUIT MAINTENANCE INSTRUCTIONS

This task covers:

a. Inspection
b. Replacement
c. Repair
d. Testing
e. Cleaning

INITIAL SETUP

Tools

Pressure Test Kit (Appendix B, Section II, item 8)
Garment Hanger (Appendix B, Section III, item 15)
Technical Manual (Appendix B, Section III, item 20)
Patching Kit (Appendix B, Section III, item 22)
Screwdriver (Appendix B, Section III, item 32)

Materials/Parts

Plugs (Appendix B, Section III, item 25)
Exhalation Valves (Appendix B, Section III, item 37)
Glove (Appendix C, Section II)
Abrasive Strip (Appendix D, Section II, item 1)
Chalk (Appendix D, Section II, item 6)
Detergent (Appendix D, Section II, item 12)
Hose Clamp (Appendix D, Section II, item 14)
Talc Powder (Appendix D, Section II, item 20)
Rags (Appendix D, Section II, item 21)
Rubber Bands (Appendix D, Section II, item 22)
Anti-Seize Tape (Appendix D, Section II, item 25)
Duct Tape (Appendix D, Section II, item 30)
Glass Syringe 10 ml (Appendix D, Section II, item 31)
Adhesive, Carboline Neoprene (Appendix D, Section II, item 32 or 33)
Laundry Soap, Powdered (Appendix D, Section II, item 34)
Laundry Soap, Powdered (Appendix D, Section II, item 35)
Laundry Soap, Flaked (Appendix D, Section II, item 36)
Soap Toilet, Liquid, Type I (Appendix D, Section II, item 37)

3-6.1 Inspection.

a. Lay the suit on a clean, smooth surface.

b. Turn the suit inside out.

c. Examine the head, sleeves, legs, front and back torso for the following defects:

3-6. ENCAPSULATING PROTECTIVE SUIT MAINTENANCE INSTRUCTIONS. (CONT)

(1) Cuts, holes or tears which extend through or expose the base fabric

(2) Abrasion mark or scratch which extends through the coating to a point where fabric yarns or fabric weave can be seen

(3) Uncoated area or cracking, crazing or brittle coating

(4) Pits, blisters, tunnels or delamination of the coating. Presence of air pockets beneath knee and elbow reinforcements is not considered a defect

(5) Lumps or imbedded foreign matter which protrudes so as to be readily abraded or easily removed from the material

(6) Creases or wrinkles resulting in adhesion of surface or delamination of coating when corrected by manual pressure

(7) Edge of patch lifting, cracking, flaking or removal of the cement or patch when subjected to flexing action between the hands

(8) Any open seam completely through coverall

d. Mark all defects with chalk.

NOTE

Interior overlap material on boot splash guard not sealed to edge is not considered a defect

e. If damage is found, refer to paragraph 3-6. 3 for repair

(1) Cuts, holes, rips or tears extending through suit fabric which do not exceed 1/4 inch in diameter or length may be repaired

(2) Cuts, holes, rips or tears extending through fabric which are greater than 1/4 inch in diameter or length will not be repaired; encapsulating suit must be replaced

(3) Defects in suit fabric which do not extend completely through fabric (i. e. expose base fabric cracking, crazing and brittle coating) may be repaired

(4) Damaged elastic cord on boot splash guard is not considered a defect; repair is not authorized. Duct tape (NSN 5640-00-103-2254) may be used to bond boot splash guard to Toxicological Agent Protective (TAP) boot

(5) For abrasions marks, scratches, uncoated areas, cracks or brittle coating, patches must extend 1/2 inch beyond the defect

(6) A maximum of 20 patches per suit and 8 patches per pattern section ONLY are authorized

f. Examine all seam strapping for proper adhesion to the fabric, i. e. loose strapping and tunnels. If strapping is missing replace suit. If loose strapping or tunnels is found repair suit. If open seam completely through suit is found replace suit

g. Examine the suit buckles, waist and shoulder straps for broken buckles, frayed, ripped or torn straps. If waist strap is ripped or torn, replace waist strap. If buckles are damaged, replace buckles. If straps on back outside of encapsulating suit are torn or ripped, replace encapsulating suit

h. Examine the internal head flap for rips, tears and damaged snap fasteners. If damaged, replace

I. internal head flap

i. Turn the suit right side out and perform steps d. through g

j. Examine the gloves for holes, cuts or tears paying close attention to the areas between the fingers. If damaged, refer to paragraph 3-6. 2. 1 to replace the gloves

k. Examine the slide fastener for broken or missing teeth, broken or missing slider, self-sealing and ease of operation. If damaged, replace the suit

l. Examine the exhalation valves for visual damage. If damaged, refer to paragraph 3-6. 2. 2 to replace exhalation valves

m. Examine the exhalation valve/plug preformed packings for damage and proper seal. If damaged, refer to paragraph 3-6. 2. 2 to replace exhalation valve/plug

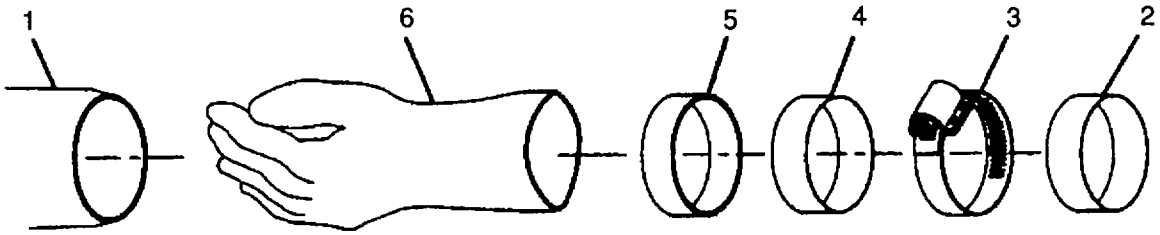
n. Examine the view window for a tight seal, holes and defects affecting field of vision, i. e. I scratches and clearness. If damaged, replace the suit.

o. Ensure the lens overlay is in place over the view window. If missing or damaged replace overlay. I

3-6.2 Replacement

3-6.2.1 Removing/Installing Glove Assembly

a. Removing



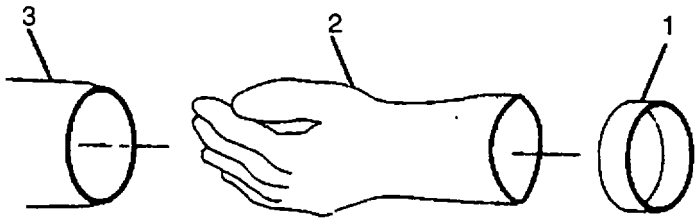
(1) Turn sleeve (1) inside out.

(2) Remove rubber band (2), hose clamp (3) and rubber band (4).

(3) Remove reinforcement collar (5) and glove (6) from sleeve (1).

(4) Remove reinforcement collar (5) from glove (6).

b. Installing.



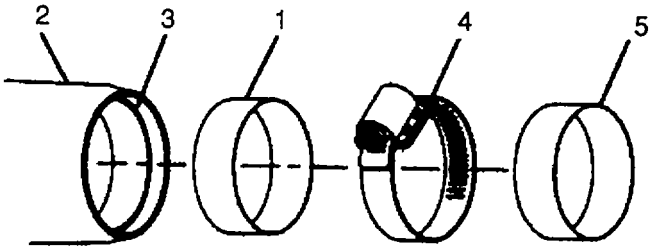
3-6. ENCAPSULATING PROTECTIVE SUIT MAINTENANCE INSTRUCTIONS. (CONT)

NOTE

Align the middle finger of the glove with the seam.

(1) Insert reinforcement collar (1) about 3 to 4 inches from the top of the cuff of new glove (2).

(2) Put new glove (2) inside sleeve (3) fingers first.



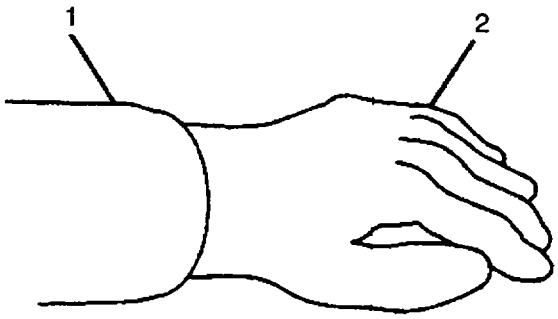
(3) Place rubber band (1) on top of sleeve (2).

(4) Center rubber band (1) over reinforcement collar (3).

(5) Place hose clamp (4) over rubber band (1) and tighten.

(6) Fold glove cuff back over hose clamp (4).

(7) Put rubber band (5) over glove assembly.

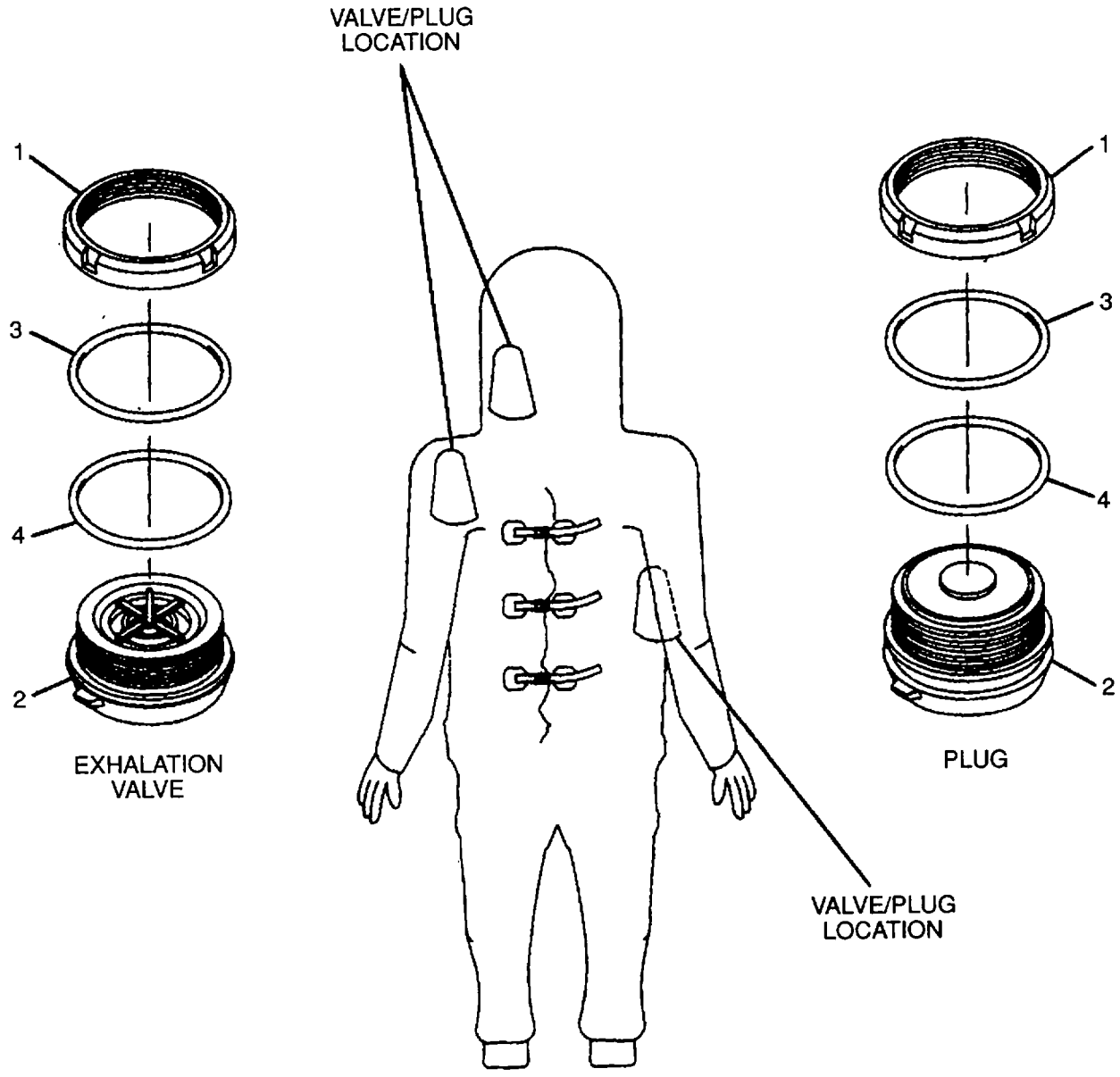


(8) Turn sleeve (1) right side out with glove (2) attached.

(9) Pressure test suit. Refer to paragraph 3-6.4.

3-6.2.2 Removing/installing Exhalation Valves/Plugs.

a. Removing.



3-6. ENCAPSULATING PROTECTIVE SUIT MAINTENANCE INSTRUCTIONS. (CONT)

NOTE

The following procedure is the same to remove a plug or an exhalation valve.

(1) Remove connector nut (1) from exhalation valve (2).

(2) Remove preformed packing (3) from exhalation valve (2).

(3) Carefully pull exhalation valve (2) and preformed packing (4) out of the suit opening.

(4) Reinstall preformed packing (3) and connector nut (1) on exhalation valve (2) to prevent damage or loss.

b. Installing.

NOTE

The following procedure is the same to install a plug or an exhalation valve.

(1) Remove connector nut (1) and preformed packing (3) from plug (2).

(2) Inspect preformed packing (3) and (4) for damage.

(3) From outside the suit, carefully push plug (2) and preformed packing (4) into the suit opening.

(4) Work preformed packing (3) onto plug (2).

(5) Screw on connector nut (1) with the bevel side out.

(6) Hand tighten connector nut (1) so preformed packing (3) and (4) make a tight, vapor-free seal.

(7) Pressure test suit if plugs are installed. Refer to paragraph 3-.4.

3-6.3 Repair.

3-6.3.1 Patching of cuts, tear. rips and holes.

a. Lay the suit on a clean smooth surface.

b. Verify encapsulating suit is repairable.

(1) Cuts, holes, rips or tears extending through suit fabric which do not exceed 1/4 inch in diameter or length may be repaired

(2) Cuts, holes, rips or tears extending through fabric which are greater than 1/4 inch it diameter or length will not be repaired; encapsulating suit must be replaced

(3) Defects in suit fabric which do not extend completely through fabric (i. e. expose base fabric cracking, crazing and brittle coating) may be repaired

(4) Damaged elastic cord on boot splash guard is not considered a defect; repair is not authorized. Duct tape (NSN 5640-00-103-2254) may be used to bond boot splash guard to Toxicological Agent Protective (TAP) boot

(5) For abrasions marks, scratches, uncoated areas, cracks or brittle coating, patches must extend 1/2 inch beyond the defect

(6) A maximum of 20 patches per suit and 8 patches per pattern section ONLY are authorized.

c. Clean and dry the damaged area on both sides with a clean cloth.

NOTE

Use maintenance kit 8415-00-889-3654 or authorized adhesive and patches cut from salvaged material when repairing encapsulating protective suit.

d. Buff the damaged area on both sides with the abrasive strip.

e. Wipe off all loose dust with a clean cloth.

WARNING

Toxic adhesive hazard. Use the patching kit adhesive in a well ventilated area only and avoid skin contact. Failure to do so may result in lightheadedness or a burning sensation to the eyes and skin. In case of skin contact, wash with soap and water. If vapors become strong, leave the area and allow to ventilate.

f. Apply a moderate coat of adhesive (in maintenance kit or per local SOP) directly to the buffed area on one side of the suit.

g. Let the adhesive dry for 5 minutes (10 minutes if the temperature is below freezing)

h. Remove the white backing from the patch

i. Center the patch over the damaged area with the newly uncovered side down and press firmly in place.

j. Allow the patch to set, then apply a protective coating of adhesive over the patch and let it harden.

k. Perform steps f. through j. to apply a patch to the other side of the damaged area of the suit.

l. Apply a light coat of talc powder to both sides of the patched area to prevent it from sticking to other portions of the suit.

m. Pressure test suit. Refer to paragraph 3-6.4.

3-6.3.2 Patching of uncoated area. abrasions. cracks. crazing and brittle coating.

a. Lay the suit on a clean smooth surface.

b. Verify that totally encapsulating suit is repairable.

(1) Defects in suit fabric which do not extend completely through fabric (i.e. expose base fabric cracking, crazing and brittle coating) may be repaired.

(2) For abrasions marks, scratches, uncoated areas, cracks or brittle coating, patches must extend 1/2 inch beyond the defect.

(3) A maximum of 20 patches per suit and 8 patches per pattern section ONLY are authorized.

c. Choose patch of sufficient size to extend at least 1/2 inch on all sides of damaged area.

d. Clean and dry patch and damaged area with a clean cloth.

e. Buff patch and damaged area with the abrasive strip found in patch kit.

f. Wipe off all buffed areas with a clean cloth.

g. Apply a moderate coat of adhesive (in patch kit or per local SOP) directly to the buffed area on the suit and the patch.

h. Let the adhesive dry for 5 minutes (10 if temperature is below freezing)

i. Center the patch over the damaged area and roll or press firmly in place

j. Allow the patch to set, then apply a protective coating of adhesive over the patch and let it harden

k. Apply a light coat of talc powder to the patched area to prevent it from sticking to other portions of the suit.

l. Pressure test the suit. Refer to paragraph 3-6.4.

3-6. ENCAPSULATING PROTECTIVE SUIT MAINTENANCE INSTRUCTIONS. (CONT)

3-6.3.3 Repair of Tunnels and Loose Strapping.

a. Lay the suit on a clean smooth surface.

b. Using a 10 ml glass syringe and blunted 18 gauge needle filled with adhesive, carefully insert needle into the tunnel or under the strapping as to not puncture the material.

c. Inject adhesive into the tunnel or under the strapping until void is filled or excess adhesive comes out around needle.

d. After 1 hour, firmly roll the strapping with a 1 to 2 inch metal roller with a 1/8 to 1/4 inch rim and a smooth or slightly knurled rolling surface.

e. Pressure test suit. Refer to paragraph 3-6. 4.

NOTE

If adhesive is too thick for injection, it may be thinned by adding small amounts of toluene to obtain proper consistency.

3-6.3.4 Laundering Procedure. Laundering of the encapsulated suit will be accomplished using the following procedures. THE SUIT SHALL NOT BE MACHINE WASHED.

a. Laundering Encapsulated Suit.

(1) Fill tank with fresh water (tank must be capable of heating water to 140°F and maintaining temperature for one hour). Heat water to 1400F.

(2) Add laundry soap (NSN 7930-00-224-7901, powdered; 7930-00-285-4303, powdered; 7930-00-634-3935, flaked; or 8520-00-228-0598, liquid, Type I) to heated water until pH reading is between 8 and 9.

(3) Place suit in heated soapy water and ensure entire suit is submerged.

(4) Soak suit for one hour without agitation.

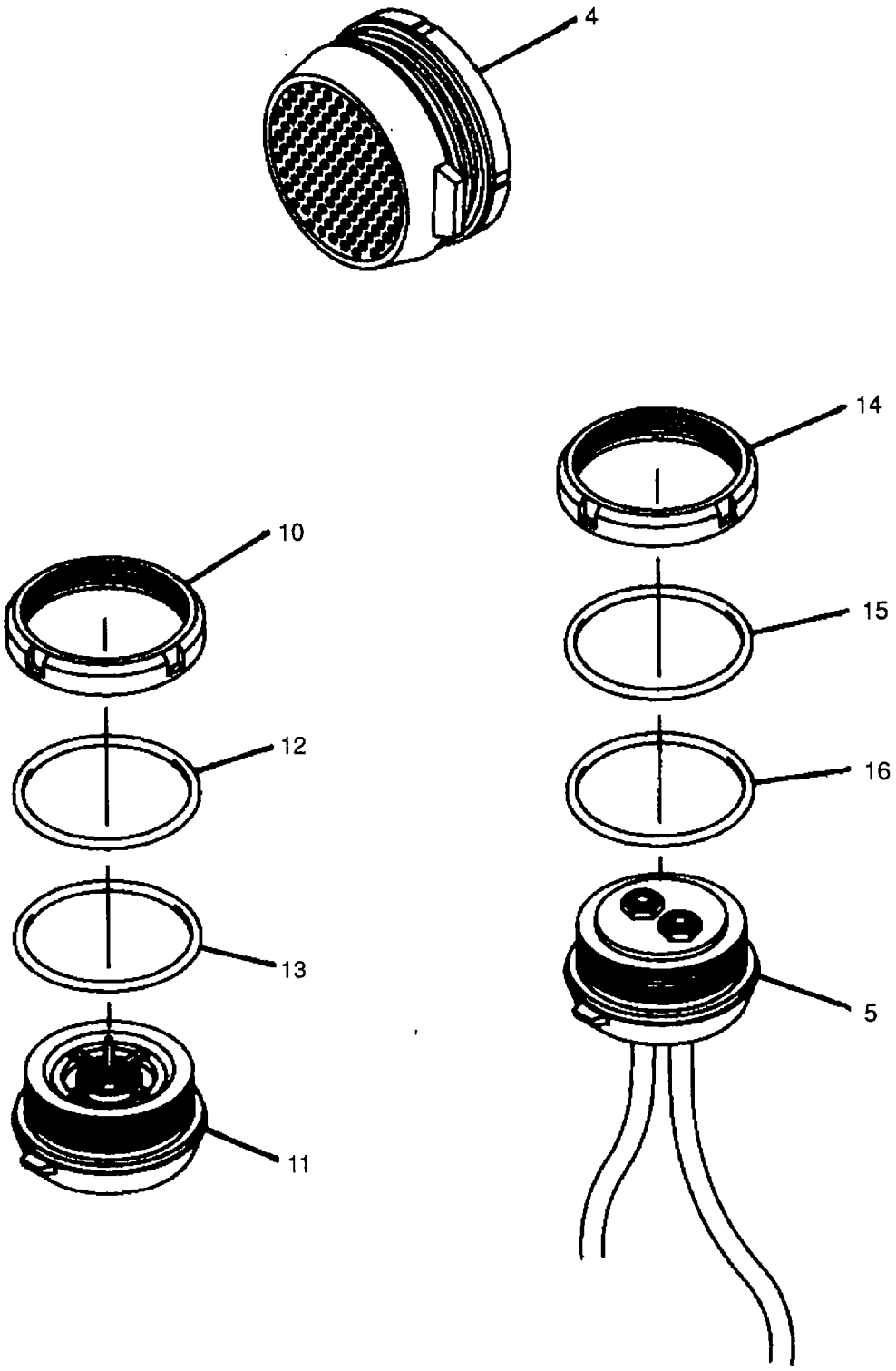
(5) Remove suit from soapy water solution and thoroughly rinse using fresh water ensuring all soap is removed.

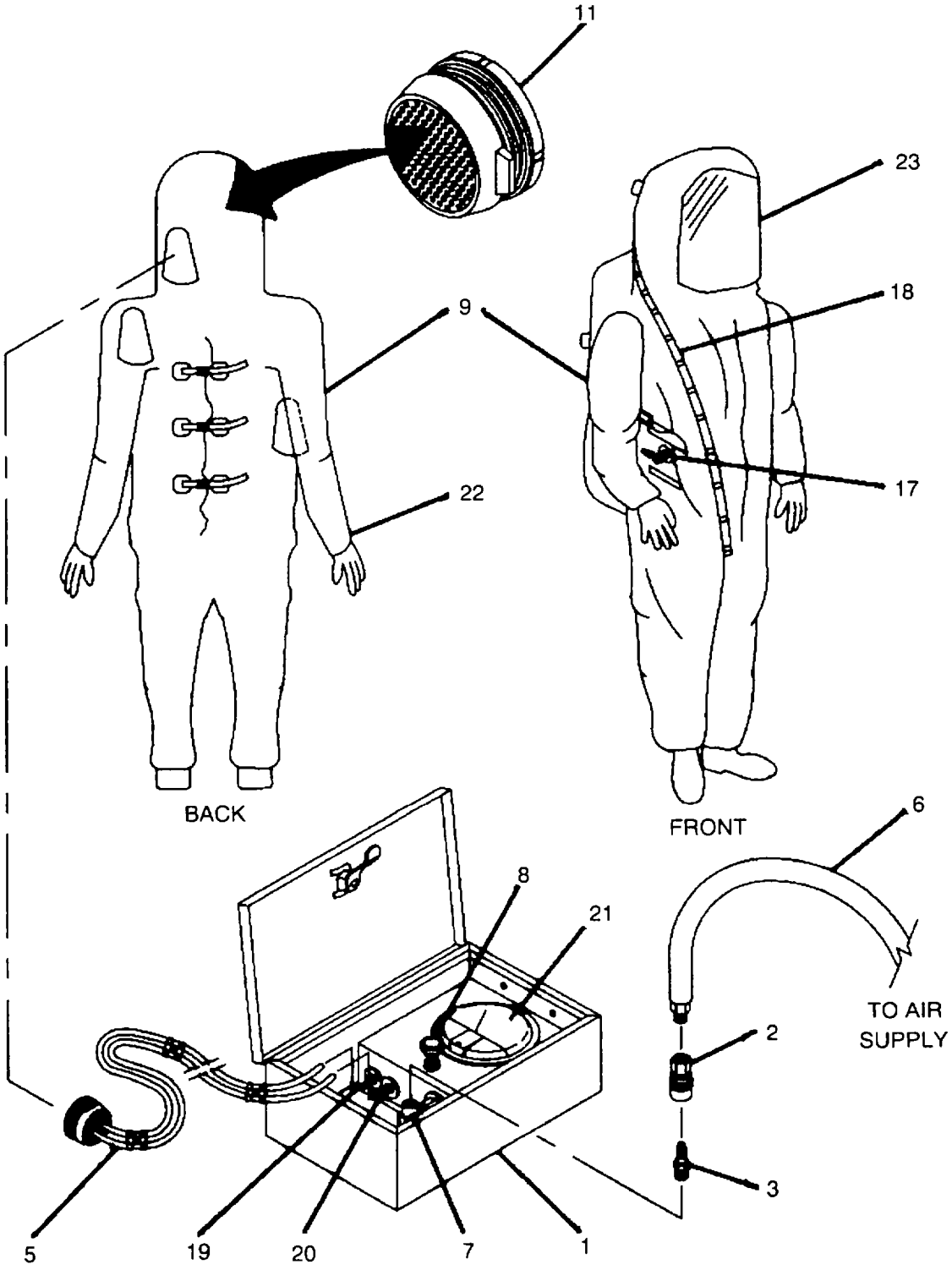
b. Drying.

(1) Hang suit by the STEPO-I garment hanger and allow to air dry (suit may require reversing to completely dry).

(2) After suit has dried, refer to paragraph 3-6. 1 to perform visual inspection and refer to paragraph 3-6. 4 to perform pressure test.

3-6.4 Pressure Test.




11
23
18
9
17
22
BACK
FRONT
6
8
21
TO AIR
SUPPLY
2
3
5
19
20
7
1

3-6. ENCAPSULATING PROTECTIVE SUIT MAINTENANCE INSTRUCTIONS. (CONT)

NOTE

The encapsulating protective suit shall be pressure tested before initial wear, monthly and when damage is suspected due to a visual inspection.

a. Open pressure test kit (1) and remove quick connect fitting (2), male connector (3), plugs (4) and test kit adaptor with hoses (5).

b. Apply anti-seize tape to the threads of air supply line (6) and attach quick connect fitting (2). Tighten using two wrenches.

c. Apply anti-seize tape to the threads of male connector (3) and attach it to pressure test kit (1) air inlet (7). Tighten using a wrench.

d. Ensure pressure test valve (8) is closed by turning it clockwise.

NOTE

The external back take-up straps should be disconnected.

e. Lay encapsulating protective suit (9) flat on a clean smooth surface.

NOTE

It may be necessary to unsnap the internal hood flap to gain access to the exhalation valve.

f. From inside suit (9), remove connector nut (10) from exhalation valve (11) located in the head area of suit (9).

g. Remove preformed packing (12) from exhalation valve (11).

h. From outside of suit (9), carefully pull exhalation valve (11) and preformed packing (13) out of suit (9) opening.

i. Remove connector nut (14) and preformed packing (15) from test kit adaptor with hoses (5).

j. From outside of suit (9), carefully push test kit adaptor with hoses (5) and preformed packing (16) into suit (9) opening.

k. From inside suit (9), work preformed packing (15) onto test kit adaptor with hoses (5).

l. Screw connector nut (14), with the bevelled side out, onto test kit adaptor with hoses (5).

m. Hand tighten connector nut (14) so preformed packings (15) and (16) make a tight, vapor-free seal.

n. Remove remaining exhalation valves (11) from suit (9) and install plugs (4). Plugs (4) are installed in the same manner as test kit adaptor with hoses (5).

o. Ensure encapsulating protective suit (9) passthrough (17) is closed. Passthrough (17) will be closed if there is no connector attached.

p. Securely close slide fastener (18) on suit (9).

NOTE

The test kit adaptor hoses may be connected to either pressure test kit fitting.

q. Connect test kit adaptor hoses (5) to pressure test kit (1) fittings (19) and (20).

r. Connect air supply line (6) with quick connect fitting (2) to male connector (3) in pressure test kit (1) air inlet (7).

s. Turn on the air supply, not to exceed 100 PSIG.

CAUTION

Over inflation hazard to encapsulating protective suits. Do not inflate the suit over four inches of water gauge when pressure testing. Over inflation can cause suit damage requiring replacement of the encapsulating protective suit.

t. Turn pressure test valve (8) counterclockwise to inflate encapsulating protective suit (9).

u. Turn pressure test valve (8) clockwise to close when the pressure reaches three inches of water gauge on pressure gauge (21).

v. Wait at least one minute to fill out the wrinkles in encapsulating protective suit (9).

w. Turn off the air supply.

x. Disconnect the air supply line by removing quick connect (2) from male connector (3).

y. Reduce the pressure to two inches of water gauge on pressure gauge (21) by slowly turning pressure test valve (8) counterclockwise to open and bleed the air off.

z. Turn pressure test valve (8) clockwise to close when the pressure reaches two inches of water gauge on pressure gauge (21) and immediately begin timing.

3-6. ENCAPSULATING PROTECTIVE SUIT MAINTENANCE INSTRUCTIONS. (CONT)

aa. After three minutes check the pressure reading on pressure gauge (21).

ab. If the pressure is 1. 6 inches of water gauge or greater, go to step ah.

ac. If the pressure is less than 1. 6 inches of water gauge, perform the following checks:

(1) Ensure slide fastener (18) is completely closed.

(2) Ensure both plugs (4) and test kit adaptor with hoses (5) have a tight, vapor-free seal.

(3) Ensure suit (9) passthrough (17) has a tight seal.

(4) Check suit (9) glove cuff assembly (22) for a tight seal.

ad. Perform the pressure test again by repeating steps q. through aa.

ae. If the pressure is still less than 1. 6 inches of water gauge, perform steps q. through s. and re-inflate suit (9) to four inches of water gauge on pressure gauge (21).

CAUTION

Over inflation hazard to encapsulating protective suits. Do not inflate the suit over four inches of water gauge when pressure testing. Over inflation can cause suit damage requiring replacement of the encapsulating protective suit.

af. Turn pressure test valve (8) clockwise to close when the pressure reaches four inches of water gauge on pressure gauge (21).

NOTE

If the pressure drops quickly, it may be necessary to inflate the suit periodically during the procedure.

ag. Check suit (9) for leaks as follows:

(1) Entirely brush suit (9), including slide fastener (18), view window (23), passthrough (17), plugs (4), test kit adaptor with hoses (5) and glove cuff assembly (22) with a mild soap and water solution.

(2) Observe suit (9) for the formation of soap bubbles which is a positive indication of a leak.

(3) Mark any leaks with chalk.

(4) Turn off the air supply.

(5) Disconnect quick connect fitting (2) from male connector (3) in pressure kit (1) air inlet (7).

ah. Open slide fastener (18) to deflate suit (9).

ai. From inside suit (9), remove connector nut (14) from test kit adaptor with hoses (5).

aj. Remove preformed packing (15) from test kit adaptor with hoses (5).

ak. From outside suit (9), carefully pull test kit adaptor with hoses (5) and preformed packing (16) from suit (9) opening.

al. Disconnect test kit adaptor hoses (5) from pressure test kit fittings (19) and (20).

am. Remove plugs (4) from suit (9). Plugs (4) are removed in the same manner as exhalation valves (11).

an. If replacement of suit (9) is not required, install exhalation valves (11) in suit (9). Exhalation valves (11) are installed in the same manner as test kit adaptor with hoses (5).

ao. Secure the internal hood flap inside suit (9) head area if it was unsnapped.

ap. If suit (9) must be patched, refer to paragraph 3-6. 3. 1 and patch suit (9).

aq. Using two wrenches, remove quick connect fitting (2) from the air supply line (6).

ar. Using a wrench, remove male connector (3) from pressure test kit (1) air inlet (7).

as. Carefully roll up test kit adaptor (5) hoses and place it, plugs (4), quick connect fitting (2) and male connector (3) in pressure test kit (1) for storage.

at. Refer to paragraph 3-11 and store the encapsulating protective suit.

3-6.5 Cleaning.

a. Hand wipe the encapsulating protective suit with a damp cloth.

b. Hang the suit up to dry.

3-7. TETHER LINE MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection

b. Replacement

3-7. TETHER LINE MAINTENANCE INSTRUCTIONS. (CONT)

INITIAL SETUP

Tools
Technical Manual (Appendix B, Section III, item 20)
Wrenches (Appendix B, Section III, item 39)

Material/Parts
Tether Line (Appendix B, Section II, item 14)
Adaptor F101 (Appendix B, Section III, item 1)
Adaptor F102 (Appendix B, Section III, item 2)
Quick Disconnect (Appendix B, Section III, item 30)
Fibrous Cord (Appendix D, Section II, item 10)
Anti-Seize Tape (Appendix D, Section II, item 25)

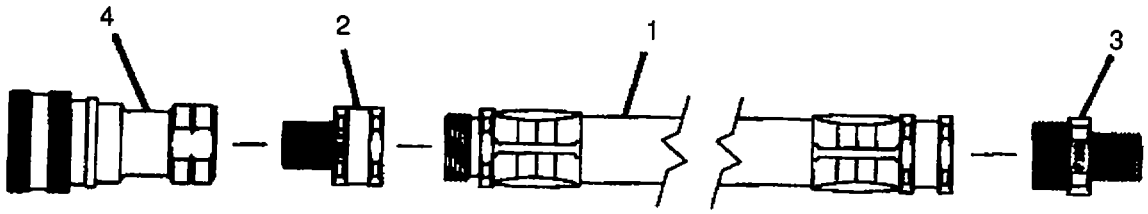
3-7.1 Inspection.

a. Visually examine the tether line for punctures, cuts, loose or damaged fittings. Replace damaged tether line. Refer to paragraph 3-7.2.1.

3-7.2 Replacement.

3-7.2.1 Removing/Installing Tether Line/Adaptors/Quick Disconnect.

a. Removing.



(1) Using two wrenches, loosen the connections holding the damaged section of tether line (1), adaptor F101 (2), adaptor F102 (3) or quick disconnect (4) in place.

(2) Remove the damaged component of the tether line assembly.

b. Installing.

NOTE

Female tether line fittings and adaptor F101 have preformed packing in them.

(1) Ensure tether line female fittings and adaptor F101 (2) have the preformed packing in place.

NOTE

New anti-seize tape is required on the threads of adaptors F101 and F102 before attaching.

(2) Attach the new component to the tether line assembly where the damaged component was removed.

(3) Using two wrenches, tighten the connections holding the new component in place.

3-8. ICE VEST MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection
b. Replacement
c. Service
d. Cleaning

INITIAL SETUP

Tools

Battery Charger (Appendix B, Section III, item 4)
Clamp Pincers (Appendix B, Section III, item 7)
Technical Manual (Appendix B, Section III, item 20)
Pliers (Appendix B, Section III, item 23)
Screwdriver (Appendix B, Section III, item 32)
Wrench (Appendix B, Section III, item 39)

Materials/Parts

Spare/Repair Kit (Appendix B, Section II, item 13)
Battery Pak (Appendix B, Section III, item 3)
Clamp (Appendix B, Section III, item 6)
Coolant Bag (Appendix B, Section III, item 8)
Coat Hanger (Appendix D, Section II, item 9)
Detergent (Appendix D, Section II, item 12)
Electrical Tape (Appendix D, Section II, item 26)

3-8.1 Inspection.

a. Visually examine the buckles and straps for broken buckles, frayed, ripped or torn straps. If damaged, replace the ice vest.

b. Check the slide fastener for proper operation. If the slide fastener does not operate properly, replace the ice vest.

c. Inspect the coolant bag and tubing for holes, cuts and punctures. If damaged, refer to paragraph 3-8. 2. 1 to replace the coolant bag.

d. Examine all tubing for damage. If damaged, replace the ice vest.

3-8. ICE VEST MAINTENANCE INSTRUCTIONS. (CONT)

e. Examine the temperature regulating valve and the on/off switch to ensure they are in good working order. Replace the ice vest if the temperature regulating valve or the on/off switch do not work properly.

f. Examine the pump connector and wiring for cuts, abrasions and corrosion damage. If damaged, replace the ice vest.

g. Examine the battery connector and wiring for cuts, abrasions and corrosion damage. If damaged, refer to paragraph 3-8. 2. 2 to replace the battery.

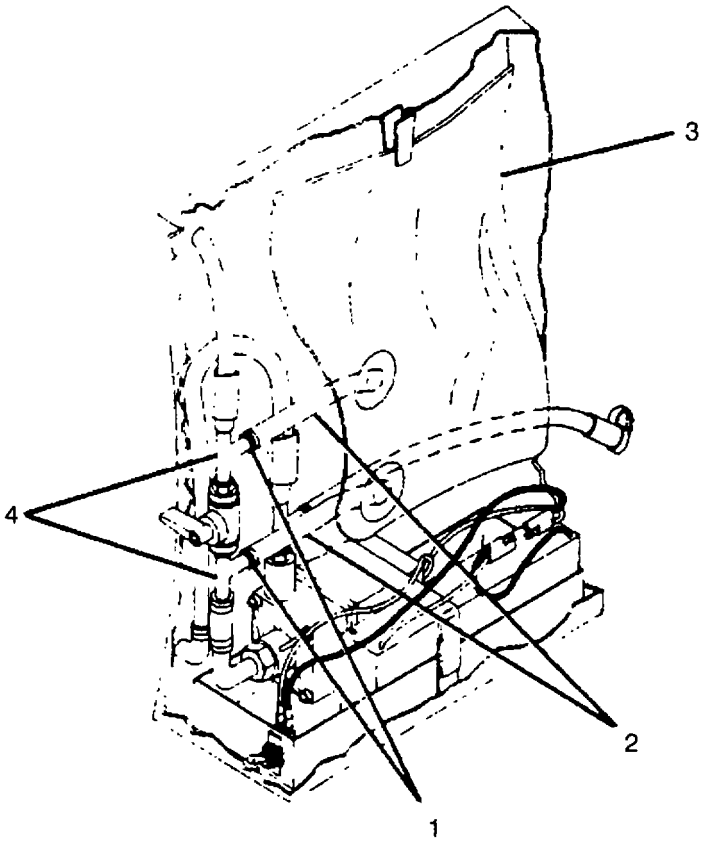
h. Inspect the battery for cracks, leaks and corrosion. If damaged, refer to paragraph 3-8. 2. 2 to replace the battery.

i. Inspect the pump housing for cracks or leaks. If damaged, replace the ice vest.

3-8.2 Replacement.

3-8.2.1 Removing/Installing Coolant Bag.

a. Removing.



(1) Compress the top of hose clamps (1) to loosen.

(2) Remove tubing (2) and coolant bag (3) from "T" fittings (4).

b. Installing.

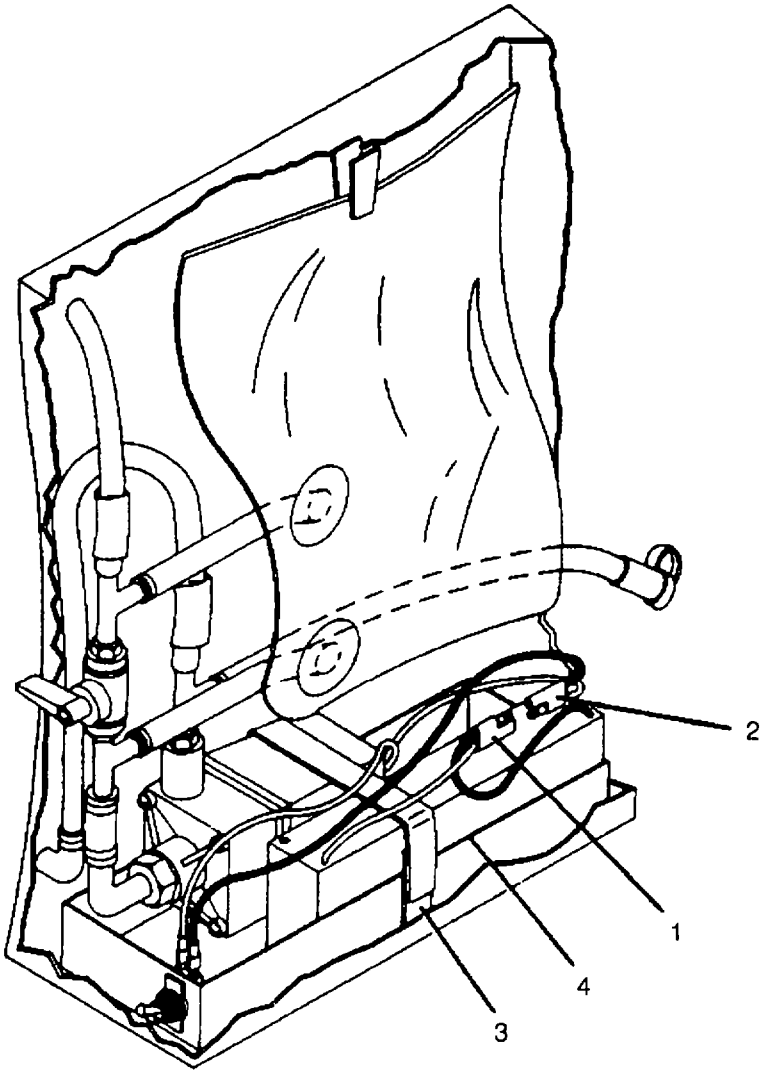
(1) Install new hose clamps (1) loosely over new tubing (2).

(2) Attach new coolant bag (3) and tubing (2) to "T" fittings (4).

(3) Position hose clamps (1) over tubing (2) and "T" fittings (4) and crimp hose clamps (1).

3-8.2.2 Removing/Installing Battery.

a. Removing.



3-8. ICE VEST MAINTENANCE INSTRUCTIONS. (CONT)

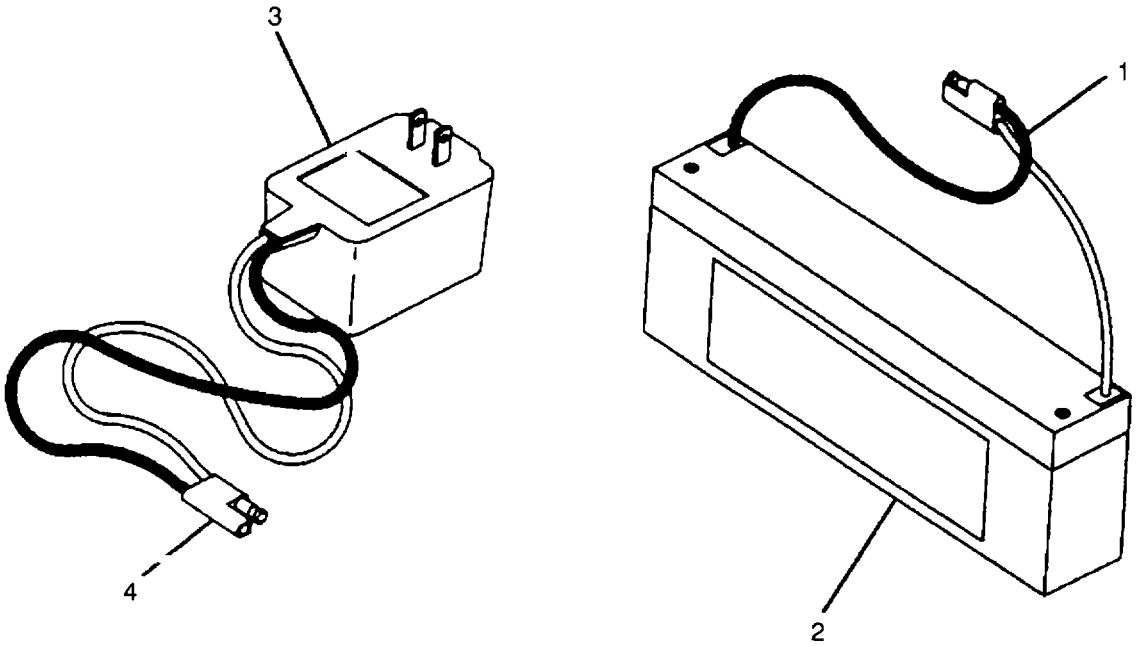
(1) Disconnect battery connector (1) from pump connector (2). Unhook hook and pile fastener tape strap (3) and remove battery (4).

b. Installing.

(1) Position new battery (4) and secure it in place using hook and pile fastener tape strap (3).

(2) Connect battery connector (1) to pump connector (2).

3-8.3 Service.



a. Disconnect battery connector (1) from pump connector. Unhook the hook and pile fastener tape strap and remove battery (2).

b. Connect battery (2) connector (1) to battery charger (3) connector (4).

c. Plug battery charger (3) into a standard electrical outlet.

NOTE

The battery requires 10-16 hours to fully charge.

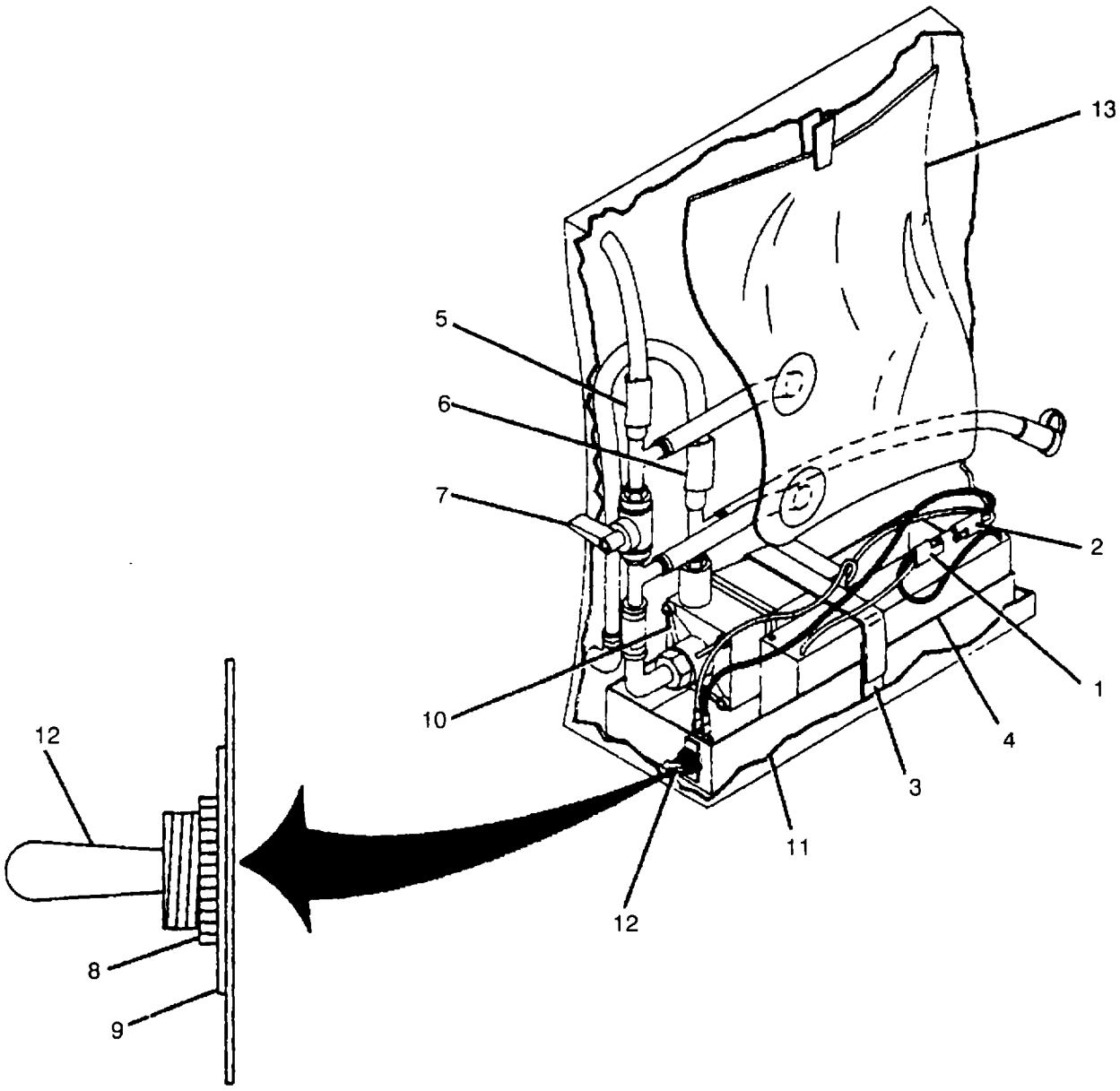
d. When charging is completed, unplug battery charger (3).

e. Unplug connectors (1) and (4).

f. Position battery (2) and secure it in place using the hook and pile fastener tape strap.

g. Connect battery connector (1) to pump connector.

3-8.4 Cleaning.



3-8. ICE VEST MAINTENANCE INSTRUCTIONS. (CONT)

a. Disconnect battery connector (1) from pump connector (2). Unhook hook and pile fastener tape strap (3) and remove battery (4).

b. Loosen hose clamps (5) and (6).

c. Release hook and pile fastener tape strap holding regulator valve (7) in position.

d. Disconnect the tubing at hose clamp (5) and (6) connections.

e. Tighten hose clamps (5) and (6) to tubing to prevent loss.

f. Remove locking nut (8) and position indicator label (9).

g. Remove pump (10), tray (11), on/off switch (12), coolant bag (13), regulating valve (7) and tubing as a complete unit from the ice vest pouch.

h. Install position indicator label (9) and locking nut (8) on the on/off switch (12) to prevent loss.

CAUTION

Equipment damage. Do not use abrasive cleanser when cleaning the ice vest. Abrasive cleansers will damage the ice vest material and require replacement of the ice vest.

i. Machine wash the ice vest in warm water using a mild detergent.

j. Rinse the ice vest thoroughly in cool water.

k. Hang the ice vest on a hanger and allow it to drip dry.

l. When the ice vest has completely dried, remove it from the hanger.

m. Remove locking nut (8) and position indicator label (9) from the on/off switch (12).

n. Place pump (10), tray (11), on/off switch (12), coolant bag (13), regulating valve (7) and the tubing inside the ice vest pouch.

o. Loosen hose clamps (5) and (6).

p. Connect the tubing and position hose clamps (5) and (6).

q. Tighten hose clamps (5) and (6).

r. Push regulating valve (7) through the opening in the ice vest material and secure it in place with the hook and pile fastener tape strap.

s. Push on/off switch (12) through the opening in the ice vest material.

t. Slide position indicator label (9) onto on/off switch (12).

u. Put locking nut (8) on the on/off switch (12) and tighten.

v. Position battery (4) and secure it in place using hook and pile fastener tape strap (3).

w. Connect battery connector (1) to pump connector (2).

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection
b. Replacement
c. Testing
d. Cleaning

INITIAL SETUP

Tools

Portable Regulator Tester (Appendix B, Section II, item 7)
MSA Special Tool (Appendix B, Section III, item 19)
Technical Manual (Appendix B, Section III, item 20)
Pliers (Appendix B, Section III, item 23)
Screwdriver (Appendix B, Section III, item 32)
Screwdriver (Appendix B, Section III, item 33)
Screwdriver (Appendix B, Section III, item 35)
Wrench (Appendix B, Section III, item 38)
Wrench (Appendix B, Section III, item 40)
Wrench (Appendix B, Section III, item 41)
Wrench (Appendix B, Section III, item 42)
Wrench (Appendix B, Section III, item 43)
Wrench (Appendix B, Section III, item 44)
Wrench (Appendix B, Section III, item 45)
Wrench (Appendix B, Section III, item 46)
Wrench (Appendix B, Section III, item 47)
Brush (Appendix D, Section II, item 5)

Materials/Parts

Spare/Repair Kit (Appendix B, Section II, item 12)
Breathing Tube (Appendix B, Section III, item 5)
Air Cylinder (Appendix B, Section III, item 10)
Filter Cartridge (Appendix B, Section III, item 13)
Preformed Packing (Appendix B, Section III, item 28)
Battery (Appendix D, Section III, item 4)
Cleaner/Sanitizer (Appendix D, Section II, item 8)
Hose Clamp (Appendix D, Section II, item 29)

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

Liquid Soap (Appendix C, Section II, item 15)
Plastic (Appendix C, Section II, item 18)
Plug, #2 Rubber (Appendix C, Section II, item 19)
Tape (Appendix C, Section II, item 26)

3-9.1 Inspection.

a. Visually examine the buckles and straps for broken buckles, frayed, ripped or torn straps. If damaged, refer to paragraph NO TAG to replace straps.

b. Examine the vent tubing connections for tightness. Refer to paragraph 3-9. 2. 9.

c. Inspect the battery box for corrosion. If damaged, replace the EBA.

d. Check the breathing tube for cuts, holes, tears and connection thread damage. If damaged, refer to paragraph 3-9. 2. 12 to replace the breathing tube.

e. Examine the regulator valve for damage. If damaged, refer to paragraph 3-9. 2. 6 to replace the regulator.

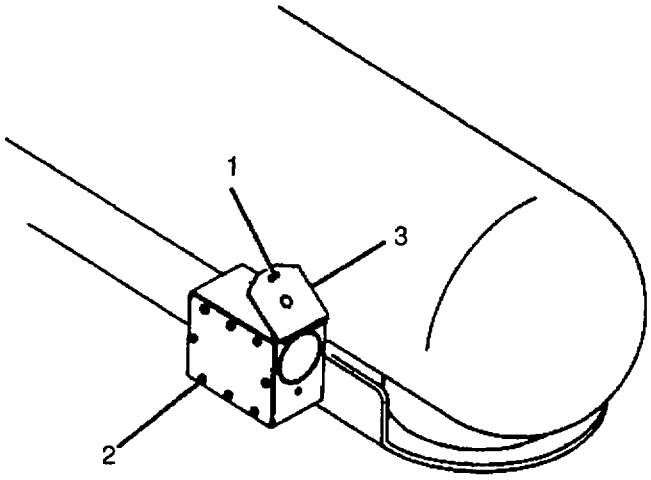
f. Examine the cylinder valve for damage and check the hydrostatic test date. If damaged or the hydrostatic test date is over 5 years old, notify your supervisor and replace the cylinder. Refer to paragraph 3-9. 2. 3.

g. Inspect the face piece for damage. Replace damaged components.

3-9.2 Replacement.

3-9.2.1 Removing/Installing Battery.

a. Removing.



(1) Turn screw (1) on battery box (2) until door (3) opens.

(2) Remove the old battery.

b. Installing.

NOTE

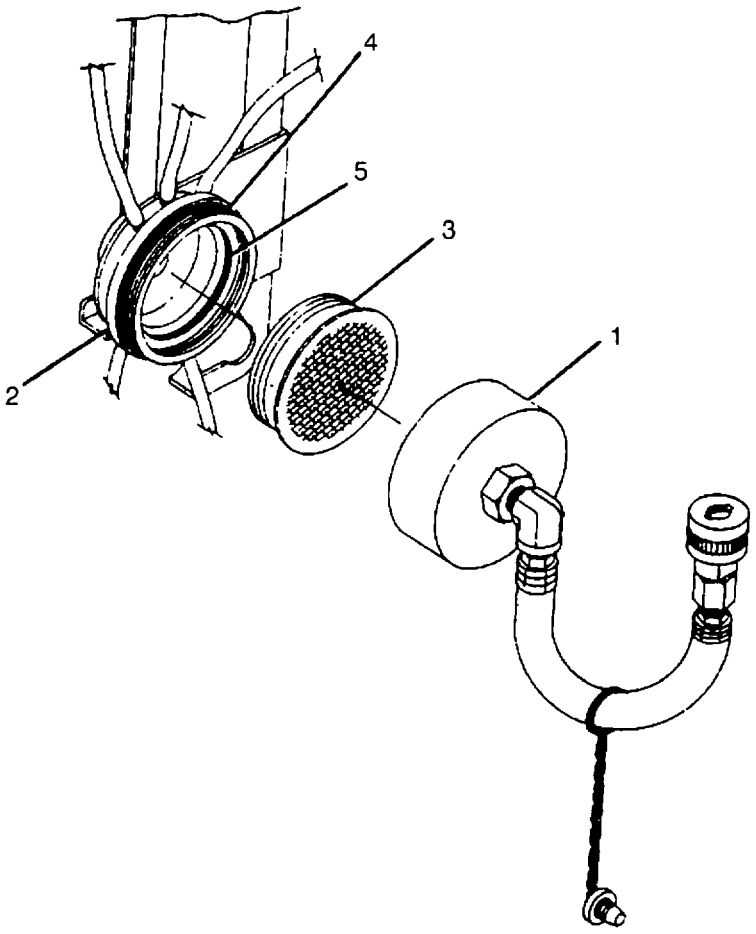
The positive (+) end of the battery points toward the battery box door.

(1) Place a new battery into battery box (2).

(2) Close door (3) and tighten screw (1) finger tight.

3-9.2.2 Removing/Installing Filter Cartridge.

a. Removing.



3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

WARNING

Personnel contamination hazard. If the EBA filter cartridge is suspected to be contaminated with chemical agent, it must be removed under engineering controls to prevent the spread of contamination. Failure to use engineering controls could result in personnel injury or death due to contamination.

(1) Unscrew air supply end (1) of filter housing (2).

NOTE

The filter cartridge will be replaced after each use or every 6 months, whichever comes first.

(2) Unscrew used filter cartridge (3).

(3) Remove preformed packing (4) and gasket (5).

NOTE

Dent the filter cartridge threads to prevent reuse.

(4) Place used filter cartridge (3), preformed packing (4) and gasket (5) into a plastic disposal bag. Twist the end closed and tape it securely for an airtight seal.

(5) Dispose of the used filter cartridge (3), preformed packing (4) and gasket (5) in accordance with local SOP.

b. Installing.

(1) Brush clean the threads of air supply end (1) and filter housing (2).

(2) Wipe the inside of air supply end (1) and filter housing (2) clean of all dirt.

(3) Install a new preformed packing (4) and gasket (5).

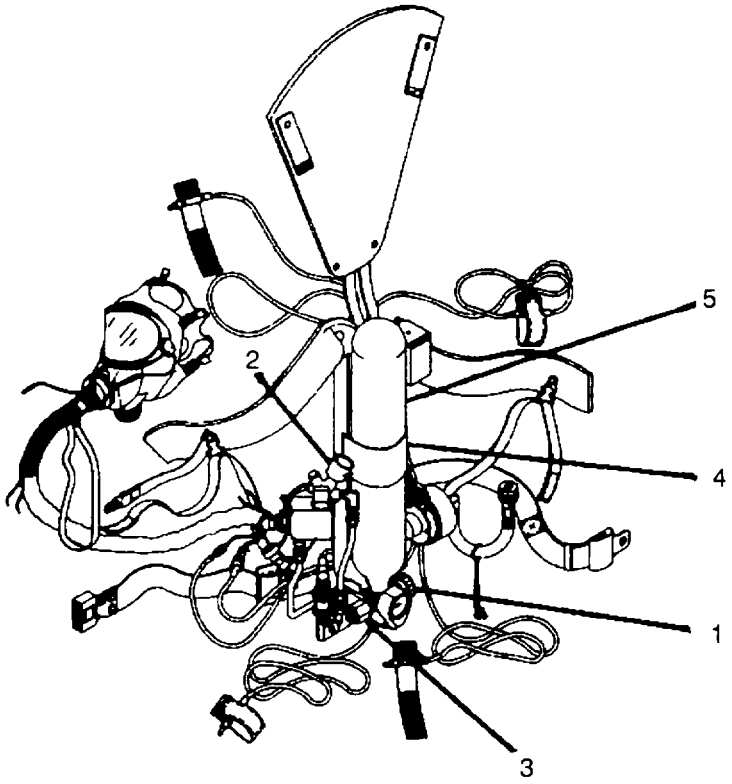
(4) Screw in a new filter cartridge (3).

(5) Screw air supply end (1) onto filter housing (2).

(6) Leak test the EBA. Refer to paragraph 3-9. 3. 3.

3-9.2.3 Removing/Installing Cylinder.

a. Removing.



WARNING

Compressed air hazard. Follow the correct procedures when removing the EBA cylinder. There may be compressed air remaining in the cylinder or pressure built-up in the system which could cause personnel injury if correct procedures are not followed.

(1) Close cylinder valve (1).

(2) Slowly open regulator valve (2) to relieve the system of pressure.

(3) Using a wrench, loosen coupling nut (3).

(4) Disconnect coupling nut (3) from cylinder valve (1).

WARNING

Personnel safety hazard. Do not lean over the EBA cylinder clamp when releasing it. The cylinder clamp is under tension and may cause personnel injury when it is released.

(5) Release cylinder clamp (4).

(6) Remove used cylinder (5) from the EBA.

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

b. Installing.

(1) Position new cylinder (5) on the EBA.

(2) Thread coupling nut (3) onto cylinder valve (1).

(3) Connect cylinder clamp (4).

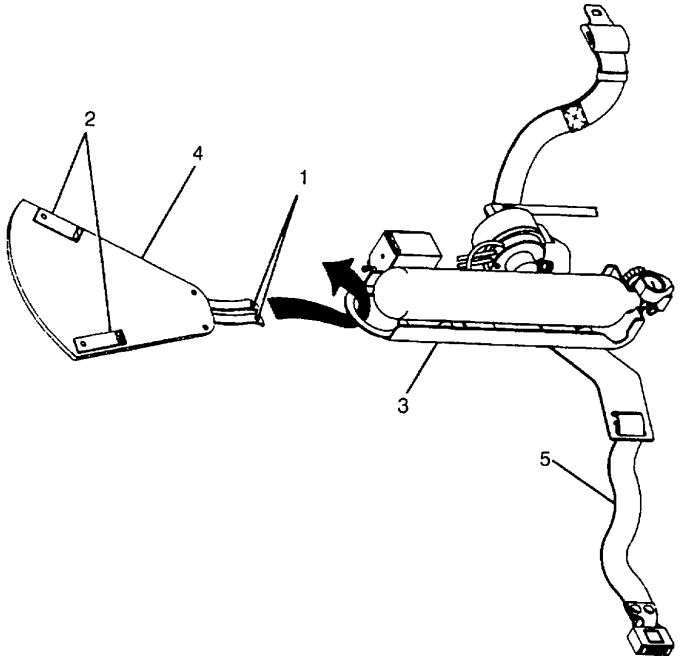
(4) Using a wrench, tighten coupling nut (3).

(5) Close the regulator valve (2).

(6) Leak test the EBA, Refer to paragraph 3-9.3.3.

3-9.2.4 Removing/Installing Cushion Cover.

a. Removing



(1) Unsnap Straps (1) and (2).

(2) Pull straps (1) out of support assembly (3).

(3) Pull cushion cover (4) clear of the EBA.

b. Installing.

(1) Lay the EBA on a flat surface, with the bottle facing up.

(2) Loop straps (1) through support assembly (3).

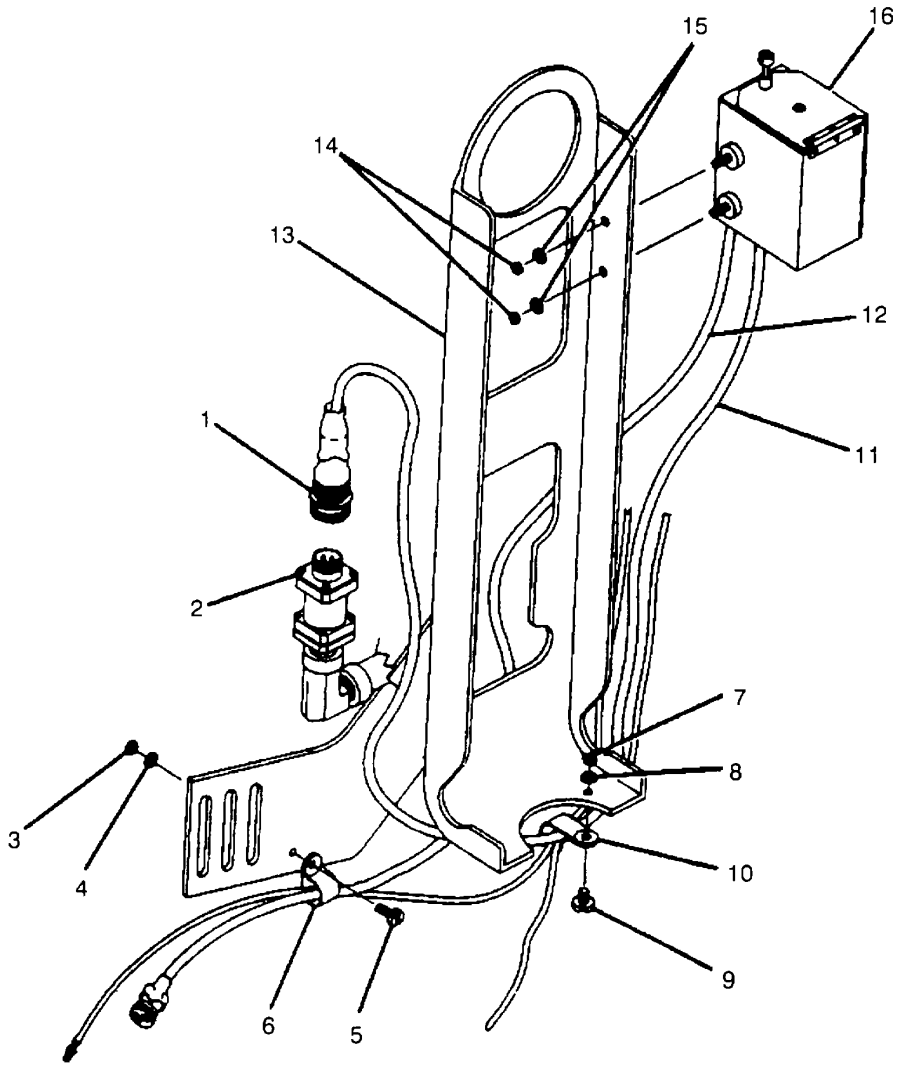
(3) Snap straps (1) to cushion cover (4).

(4) Snap straps (2) around waist strap (5), one on each side of the EBA.

3-9.2.5 Removing/Installing Battery Box/Electrical Lines.

a. Removing.

(1) Perform steps a.(1) through a.(6),paragraph 3-9.2.3, to remove the cylinder.



3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

(2) Disconnect electrical line coupling (1) from pressure switch (2).

(3) Remove nut (3), washer (4), bolt (5) and clamp (6).

(4) Remove nut (7), washer (8), bolt (9) and clamp (10).

(5) Remove cable tie and pull electrical lines (11) and (12) clear of support assembly (13).

(6) Remove nuts (14), washers (15) and battery box (16) with the electrical lines (11) and (12) from support assembly (13).

b. Installing.

(1) Install battery box (16) with electrical lines (11) and (12) to support assembly (13) using washers (15) and nuts (14).

(2) Route electrical lines (11) and (12) around support assembly (13).

(3) Put clamp (10) around electrical line (11) and vent tubes (17) and (18) and secure in place on support assembly (13) using bolt (9),washer (8) and nut (7).

(4) Put clamp (6) around electrical line (12) and vent tube (17) and secure in place on support assembly (13) using bolt (5), washer (4) and nut (3).

(5) Install new cable tie.

(6) Connect electrical line coupling (1) into pressure switch (2).

(7) Perform steps b.(1) through b.(6), paragraph 3-9.2.3, to install the cylinder.

(8) Install a battery in the battery box (16) and connect the face piece electrical connector to verify warning light operation.

3-9.2.6 Removing/installing Regulator.

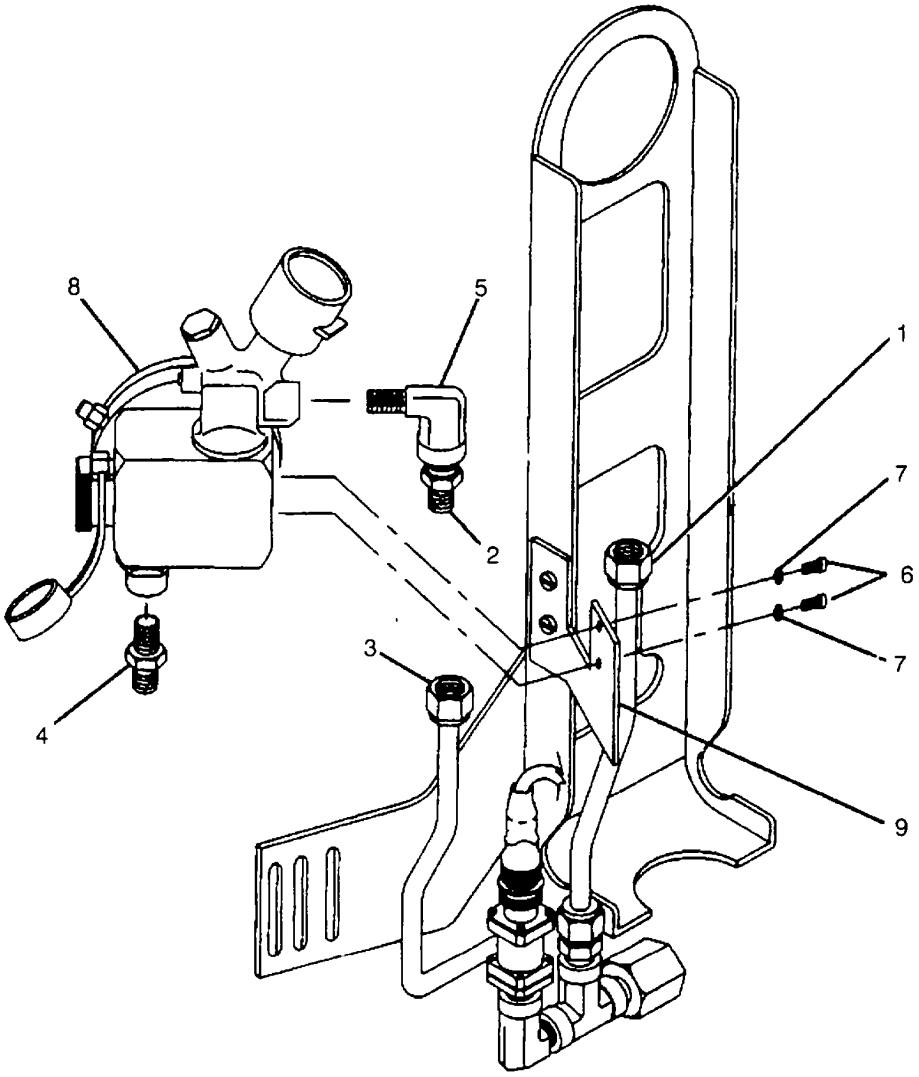
a. Removing.

(1) Perform steps a.(1) through a.(6),paragraph 3-9.2.3, to remove the cylinder.

(2) Disconnect air line coupling (1) from male connector (2).

(3) Disconnect air line coupling (3) from male connector (4).

(4) Turn elbow (5) to gain access to screws (6).



(5) Remove screws (6), washers (7) and regulator (8) from bracket (9).

(6) Remove male connector (2) from elbow (5).

(7) Remove elbow (5) from regulator (8).

(8) Remove male connector (4) from regulator (8).

b. Installing.

(1) Apply new anti-seize tape to male connector (4) threads and screw into new regulator (8).

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

(2) Apply new anti-seize tape to elbow (5) threads and screw elbow (5) into new regulator (8).

(3) Apply new anti-seize tape to male connector (2) threads and screw into elbow (5).

(4) Attach new regulator (8) to bracket (9) using washers (7) and screws (6).

(5) Connect air line coupling (3) to male connector (4).

(6) Align elbow (5) and connect air line coupling (1) to male connector (2).

(7) Perform steps b.(1) through b.(5), paragraph 3-9.2.3, to install the cylinder.

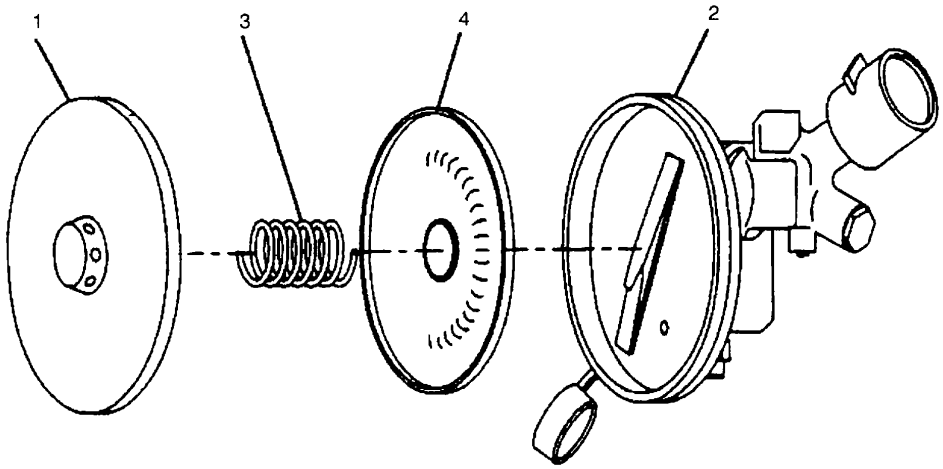
(8) Leak test the EBA and perform the Static Pressure Test and Air Flow Performance Test. Refer to paragraphs 3-9.3.1 through 3-9.3.3.

3-9.2.7 Removing/Installing Regulator Diaphragm.

a. Removing.

(1) Perform steps a.(1) through a.(6),paragraph 3-9.2.3, to remove the cylinder.

(2) Perform steps a.(2) through a.(5), paragraph 3-9.2.6, to remove the regulator.



(3) Unscrew regulator cover (1) from regulator (2).

(4) Remove diaphragm spring (3).

(5) Remove diaphragm (4) from regulator (2).

b. Installing.

(1) Install new diaphragm (4) into regulator (2) with spring seat facing out.

(2) Gently place diaphragm spring (3) on new diaphragm (4).

(3) Push and screw regulator cover (1) onto regulator (2) and hand tighten.

(4) Perform steps b.(1) through b.(6), paragraph 3-9.2.6, to install the regulator.

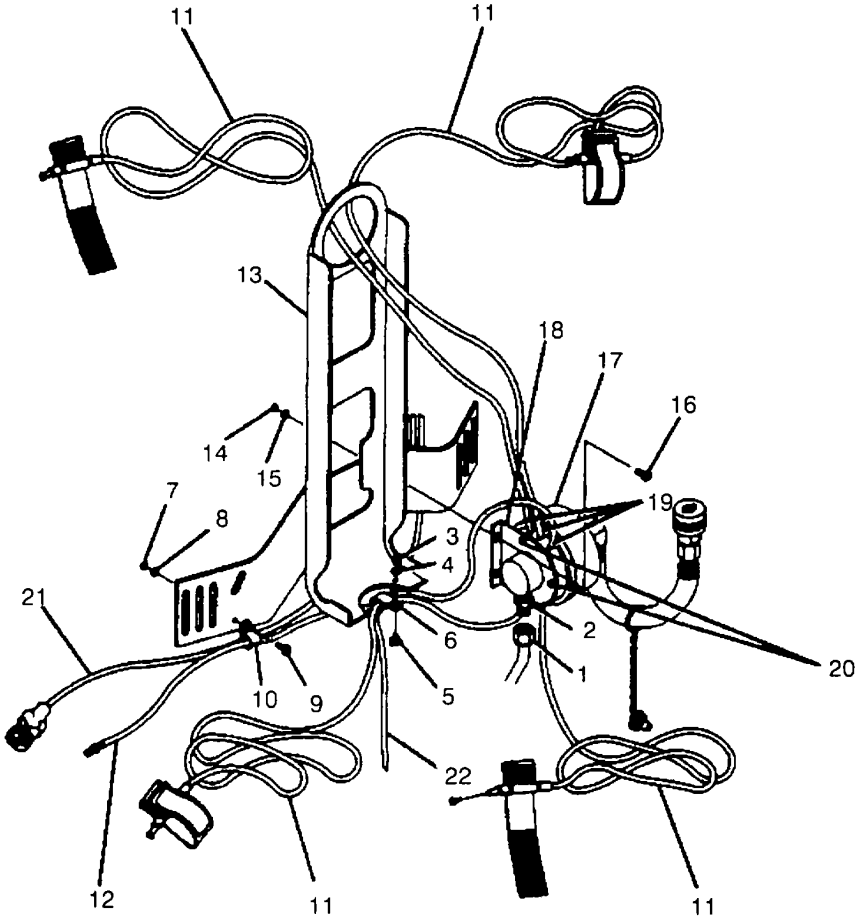
(5) Perform steps b.(1) through b.(5), paragraph 3-9.2.3, to install the cylinder.

(6) Leak test the EBA and perform the Static Pressure Test and Air Flow Performance Test. Refer to paragraphs 3-9.3.1 through 3-9.3.3.

3-9.2.8 Removing/Installing Filter Housing.

a. Removing.

(1) Perform steps a.(1) through a.(6), paragraph 3-9.2.3, to remove the cylinder.



3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

(1) Disconnect air line coupling (1) from male connector (2).

(2) Remove nut (3), washer (4), bolt (5) and clamp (6).

(3) Remove nut (7), washer (8), bolt (9) and clamp (10).

(4) Pull vent tubes (11) and (12) clear of support assembly (13).

(5) Remove nuts (14), washers (15), bolts (16) and filter housing (17) with bracket (18) from support assembly (13).

(6) Pull vent tubes (11) and (12) off of vent tube fittings (19).

(7) Remove male connector (2) from filter housing (17).

(8) Remove screws (20) and bracket (18) from filter housing (17).

b. Installing.

(1) Push vent tubes (11) and (12) onto vent tube fittings (19).

(2) Attach filter housing (17) to bracket (18) using screws (20).

(3) Apply new anti-seize tape to male connector (2) threads and screw into filter housing (17).

(4) Attach bracket (18) with filter housing (17) to support assembly (13) using bolts (16), washers (15) and nuts (14).

(5) Route vent tubes (11) and (12) around support assembly (13).

(6) Put clamp (6) around electrical wire (22) and vent tubes (11) and (12) and secure in place on support assembly (13) using bolt (5), washer (4) and nut (3).

(7) Put clamp (10) around electrical wire (21) and vent tube (12) and secure in place on support assembly (13) using bolt (9), washer (8) and nut (7).

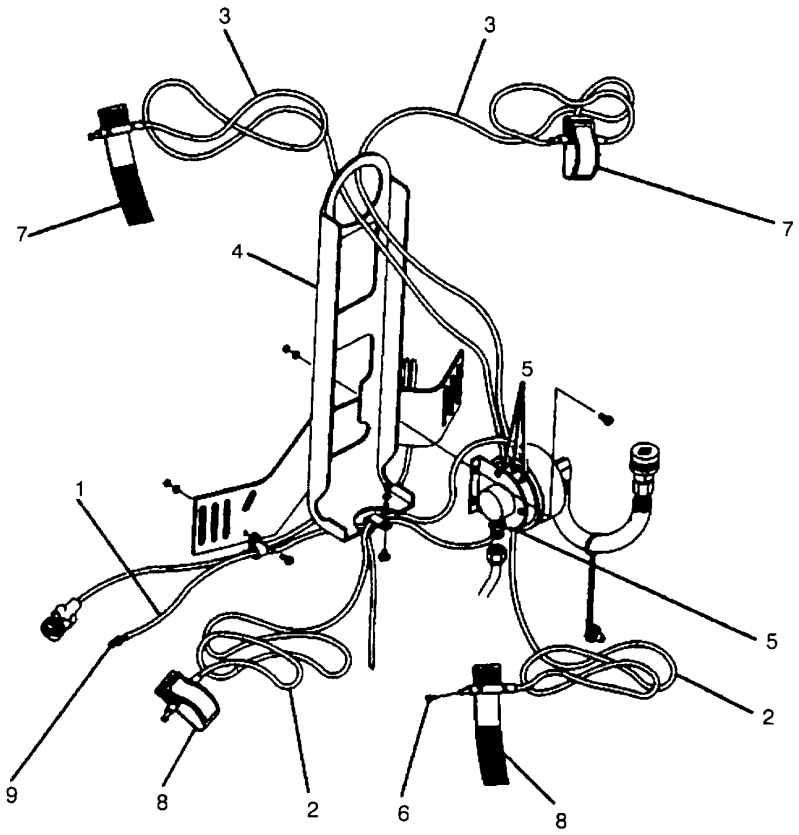
(8) Connect air line coupling (1) to male connector (2).

(9) Perform steps b.(1) through b.(5), paragraph 3-9.2.3, to install the cylinder.

(10) Leak test the EBA and perform the Static Pressure Test and Air Flow Performance Test. Refer to paragraphs 3-9.3.1 through 3-9.3.3.

3-9.2.9 Removing Installing Vent Tubes.

a. Removing.



(1) Pull damaged vent tube (1), (2) or (3) clear of support assembly (4).

(2) Pull damaged vent tube (1), (2) or (3) off of vent tube fitting (5).

(3) Remove vent tube plug (6) from damaged vent tube (2) or (3).

(4) Remove wrist strap (7) or ankle strap (8) from vent tube (2) or (3).

(5) Remove plug coupling (9) from vent tube (1).

b. Installing.

(1) Push plug coupling (9) into new vent tube (1).

(2) Slide ankle strap (8) or wrist strap (7) onto new vent tube (2) or (3).

(3) Push vent tube plug (6) into the end of new vent tube (2) or (3).

(4) Push new vent tube (1), (2) or (3) onto vent tube fitting (5).

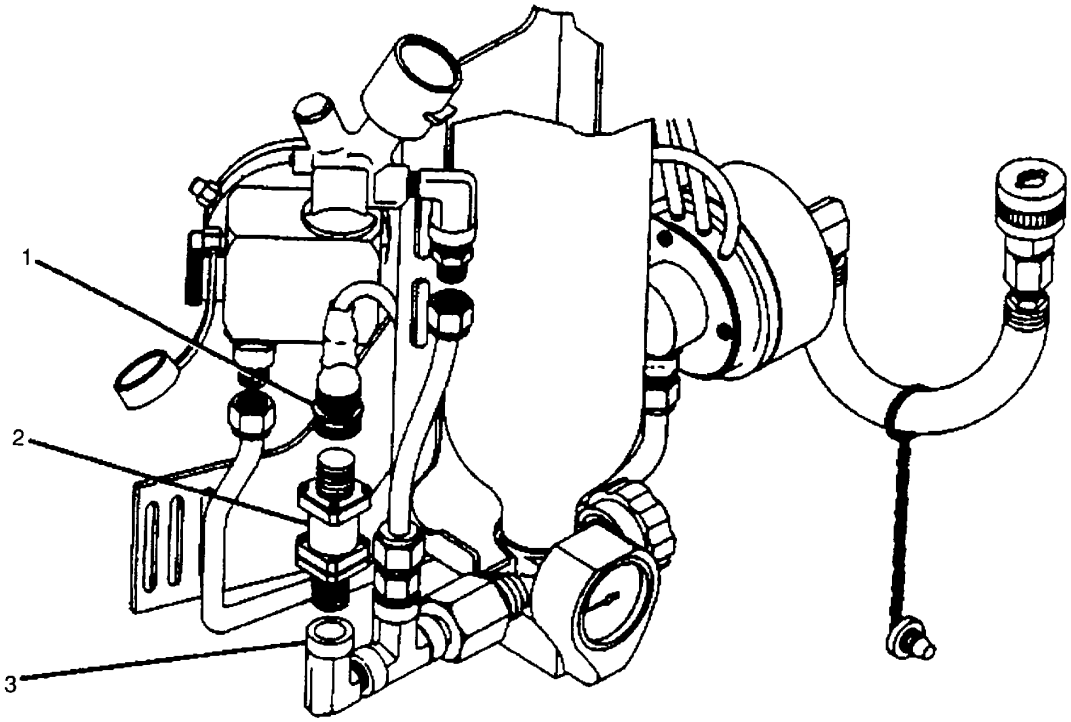
(5) Route new vent tube (1), (2) or (3) around support assembly (4).

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

3-9.2.10 Removing/Installing Pressure Switch.

a. Removing.

(1) Perform steps a.(1) through a.(6), paragraph 3-9.2.3, to remove the cylinder.



(2) Disconnect electrical line coupling (1) from pressure switch (2).

(3) Remove pressure switch (2) from air line elbow (3).

b. Installing.

(1) Apply new anti-seize tape to the threads of new pressure switch (2).

(2) Screw new pressure switch (2) into air line elbow (3).

(3) Connect electrical line coupling (1) to new pressure switch (2).

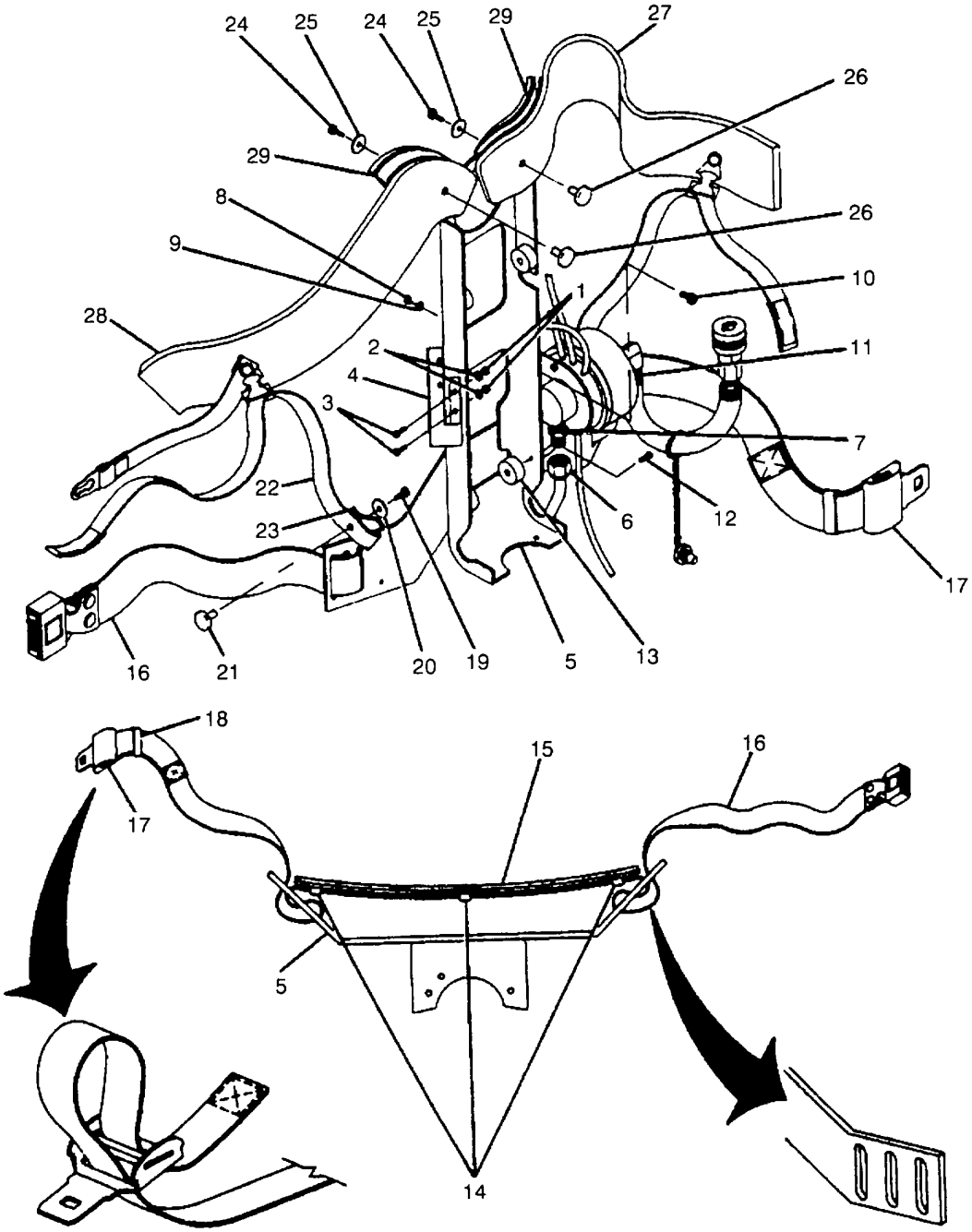
(4) Perform steps b.(1) through b.(5), paragraph 3-9.2.3, to install the cylinder.

(5) Leak test the EBA. Refer to paragraph 3-9.3.3.

(6) Verify warning light operation. Refer to steps b. through d., paragraph 3-17.

3-9.2.11 Removing/Installing Support Assembly.

a. Removing.



3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

(1) Perform steps a.(1) through a.(3), paragraph 3-9.2.4. to remove the cushion cover.

(2) Perform steps a.(1) through a.(6),paragraph 3-9.2.3, to remove the cylinder.

(3) Perform steps a.(2) through a.(6), paragraph 3-9.2.5, to remove the battery box and electrical lines.

(4) Perform steps a.(2) through a.(5), paragraph 3-9.2.6, to remove the regulator.

(5) Remove nuts (1), washers (2) and bolts (3).

6) Remove regulator bracket (4) from support assembly (5).

(7) Pull vent tubes clear of support assembly (5).

(8) Disconnect air line coupling (6) from male connector (7).

(9) Remove nuts (8), washers (9), bolts (10) and filter housing (11) with bracket from support assembly (5).

(10) Remove screws (12) and cylinder bumpers (13) from support assembly (5).

(11) Lay support assembly (5) on a flat surface cylinder side down.

(12) Unsnap retaining straps (14) and remove back pad (15) from waist strap (16).

(13) Using a screwdriver, carefully pop the plastic top off of buckle (17).

(14) Remove buckle (17) and belt loop (18) from waist strap (16).

(15) Work waist strap (16) through both sides of support assembly (5).

(16) Remove screws (19), washers (20), T-nuts (21), adjustment straps (22) and wear pads (23) from support assembly (5).

(17) Remove screws (24), washers (25), T-nuts (26), right shoulder strap (27), left shoulder strap (28) and wear pads (29) from support assembly (5).

b. Installing.

(1) Attach wear pads (29), left shoulder strap (28) and right shoulder strap (27) to support assembly (5) using T-nuts (26), washers (25) and screws (24).

(2) Attach wear pads (23) and adjustment straps (22) to support assembly (5) using T-nuts (21), washers (20) and screws (19).

(3) Thread the end of waist strap (16) through the openings on both sides of support assembly (5).

(4) Work all but about one foot of waist strap (16) through support assembly (5).

(5) Thread waist strap (16) into buckle (17) and attach belt loop (18).

(6) Carefully snap the plastic top back onto buckle (17).

(7) Position back pad (15) on waist strap (16) with the snaps toward support assembly (5).

(8) Attach back pad (15) to waist strap (16) by snapping retaining straps (14) around waist strap (16).

(9) Adjust/tighten waist strap (16).

(10) Install cylinder bumpers (13) to support assembly (5) using screws (12).

(11) Install filter housing (11) with bracket using bolts (10), washers (9) and nuts (8).

(12) Connect air line coupling (6) to male connector (7).

(13) Route vent tubes around support assembly (5).

(14) Install regulator bracket (4) using bolts (3), washers (2) and nuts (1).

(15) Perform steps b.(4) through b.(6), paragraph 3-9.2.6, to install the regulator.

(16) Perform steps b.(1) through b.(7), paragraph 3-9.2.5, to install the battery box and electrical lines.

(17) Perform steps b.(1) through b.(5), paragraph 3-9.2.3, to install the cylinder.

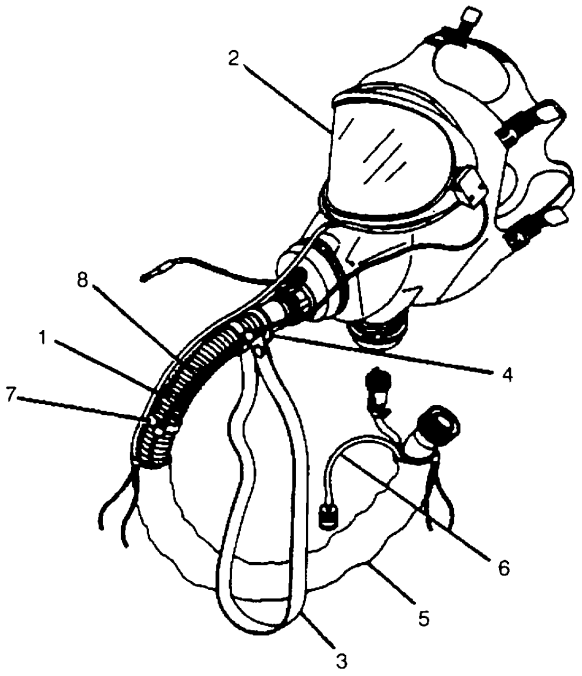
(18) Leak test the EBA and perform the Static Pressure Test and the Air Flow Performance Test. Refer to paragraphs 3-9.3.1 through 3-9.3.3.

(19) Perform steps b.(1) through b.(4), paragraph 3-9.2.4, to install the cushion cover.

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

3-9.2.12 Removing/Installing Breathing Tube Assembly.

a. Removing.



(1) Unscrew breathing tube assembly (1) from face piece (2).

(2) Remove neck strap (3) and metal ring (4).

(3) Untie and remove breathing tube cover (5).

(4) Push vent tube (6) out of the way.

(5) Remove rubber electrical connector fasteners (7) and electrical connector wire (8).

b. Installing.

(1) Work electrical connector wire (8) and electrical connector fasteners (7) onto new breathing tube (1)

(2) Slide breathing tube cover (5) over new breathing tube (1), vent tube (6) and electrical connector wire (8)

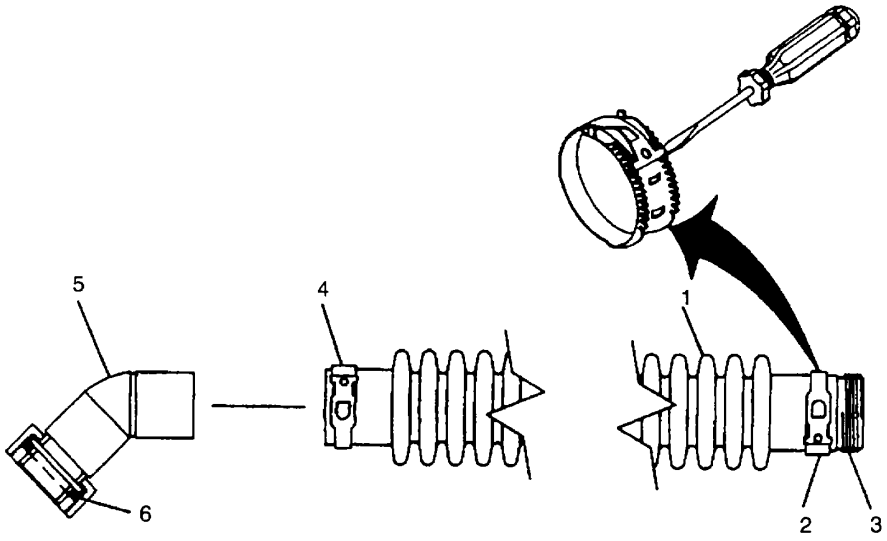
(3) Tie breathing tube cover (5) into place at both ends.

(4) Work metal ring (4) and neck strap (3) onto new breathing tube (1).

(5) Connect new breathing tube (1) to face piece (2)

3-9.2.13 Removing/Installing Breathing Tube Assembly Components.

a. Removing.



(1) Refer to paragraph 3-9.2.12 and remove breathing tube assembly (1) from the face piece.

(2) Using a screwdriver, pry clamp (2) from breathing tube assembly (1).

(3) Remove threaded insert (3) from breathing tube assembly (1).

(4) Using a screwdriver, pry clamp (4) from breathing tube assembly (1).

(5) Remove angle nut (5) from breathing tube assembly (1).

(6) Remove gasket (6) from angle nut (5).

b. Installing.

NOTE

Be sure to install new clamps.

(1) Insert gasket (6) into angle nut (5).

(2) Slide clamp (4) over breathing tube assembly (1).

(3) Insert angle nut (5) into breathing tube assembly (1).

(4) Using pliers, secure clamp (4) over angle nut (5) and breathing tube assembly (1).

(5) Slide clamp (2) over breathing tube assembly (1).

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

(6) Insert threaded insert (3) into breathing tube assembly (1).

(7) Using pliers, secure clamp (2) over threaded insert (3) and breathing tube assembly (1).

(8) Refer to paragraph 3-9.2.12 and install breathing tube assembly (1) to the face piece.

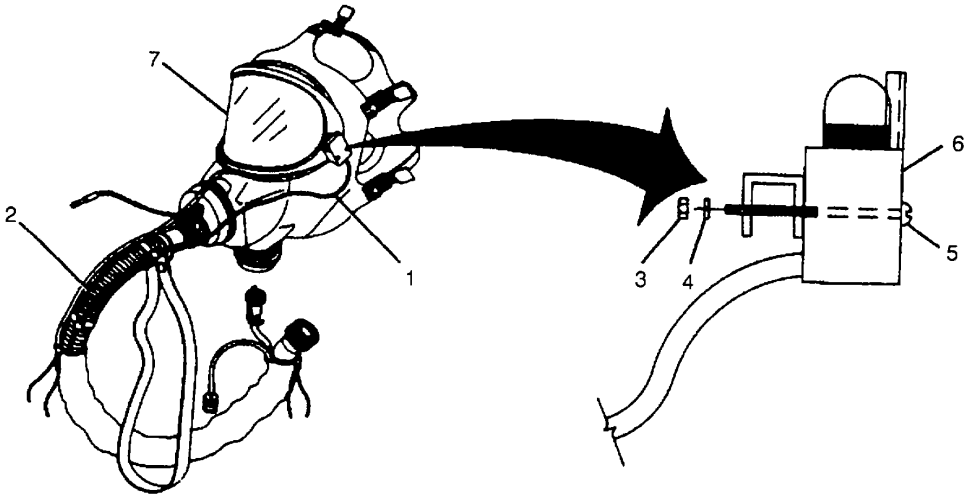
3-9.2.14 Removing/Installing Warning Light and Electrical Connector Wire.

a. Removing.

(1) Perform steps a.(1) through a.(5), paragraph 3-9.2.12, to remove electrical connector wire (1) from breathing tube assembly (2).

(2) Remove nuts (3) and washers (4).

(3) Pull bolts (5) and warning light (6) off of face piece (7).



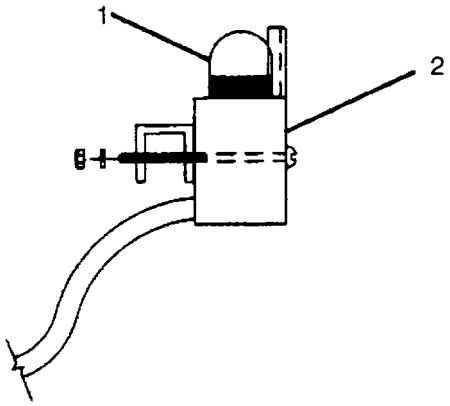
b. Installing.

(1) Push new warning light (6) and bolts (5) into place on face piece (7).

(2) Install washers (4) and nuts (3).

(3) Perform steps b.(1) through b.(5), paragraph 3-9.2.12, to install electrical connector wire (1) to breathing tube assembly (2).

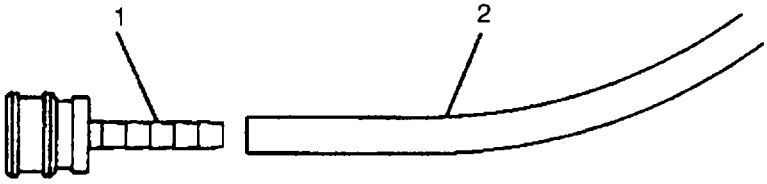
3-9.2.15 Removing/Installing Warning Light Lamp.



a. Using pliers, unscrew warning lamp (1) from bracket (2).

b. Screw new warning light lamp (1) into bracket (2) and tighten.

3-9.2.16 Removing/Installing Face Piece Vent Tube socket Coupling.



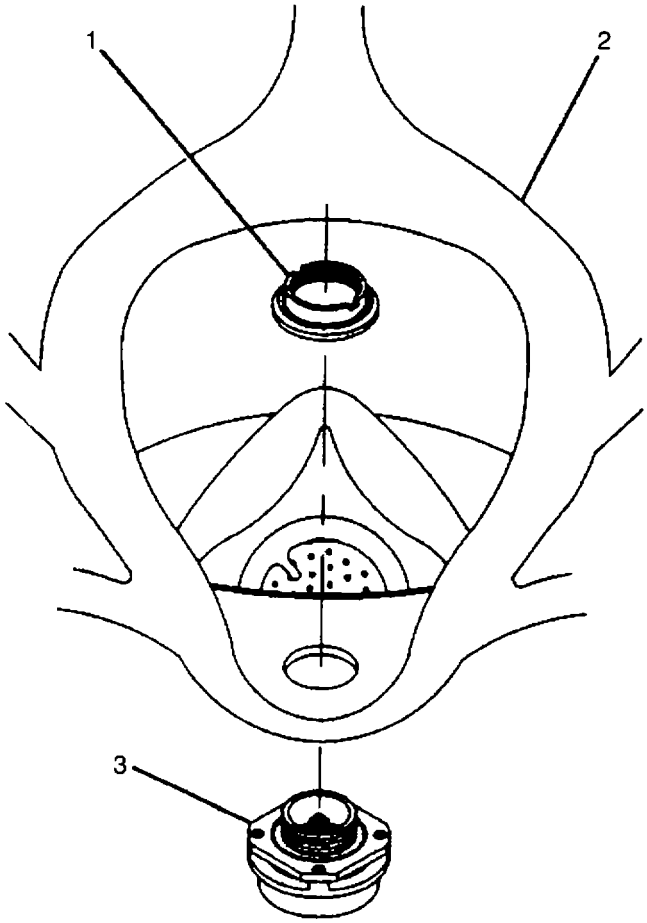
c. Remove vent tube socket coupling (1) out of the end of face piece vent tube (2).

d. Push new vent tube socket coupling (1) into the end of face piece vent tube (2).

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

3-9.2.17 Removing/Installing Exhalation Valve.

a. Removing.



(1) Using the MSA special tool, remove retaining nut (1) inside face piece (2).

(2) Pull exhalation valve (3) from the bottom of face piece (2).

b. Installing.

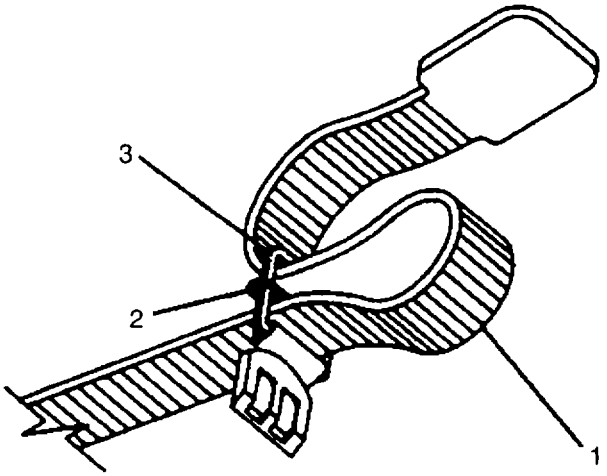
(1) Push new exhalation valve (3) through the opening in the bottom of face piece (2).

(2) Thread new retaining nut (1) onto exhalation valve (3) by turning exhalation valve (3).

(3) Using the MSA special tool, tighten retaining nut (1).

3-9.2.18 Removing/Installing Head Harness.

a. Removing.



(1) Fully extend all five head harness straps (1).

(2) With one hand, push slide retainer (2) down.

(3) Pull strap (1) end through the top of buckle (3).

(4) Push slide retainer (2) up and pull head harness strap (1) out of the bottom of buckle (3).

(5) Repeat steps (2) through (4) for the remaining head harness straps.

b. Installing.

NOTE

The ribbed side of the head strap should lay against the head.

(1) Beginning with the forehead (top) strap, raise slide retainer (2).

(2) Work the end of head harness strap (1) through the bottom of buckle (3).

(3) Push slide retainer (2) down.

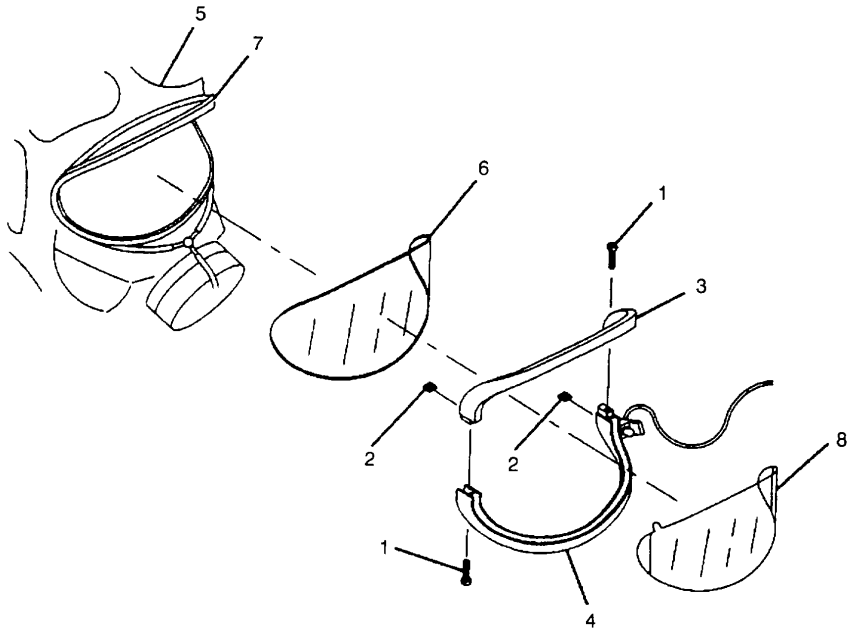
(4) Loop head harness strap (1) around slide retainer (2) and work the end of head harness strap (1) through the top of buckle (3).

(5) Repeat steps (1) through (4) for remaining head harness straps.

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

3-9.2.19 Removing/Installing Face Piece Lens.

a. Removing.



(1) Remove retaining screws (1) and nuts (2) from upper lens ring (3) and lower lens ring (4).

(2) Remove upper lens ring (3) and lower lens ring (4) from face piece (5).

(3) Remove lens (6) from face piece (5) by peeling lens seal (7) back from lens (6).

b. Installing.

NOTE

The MSA logo on the lens should be on the bottom and centered in the face piece opening.

(1) Place the bottom edge of new lens (6) into the groove of lens seal (7).

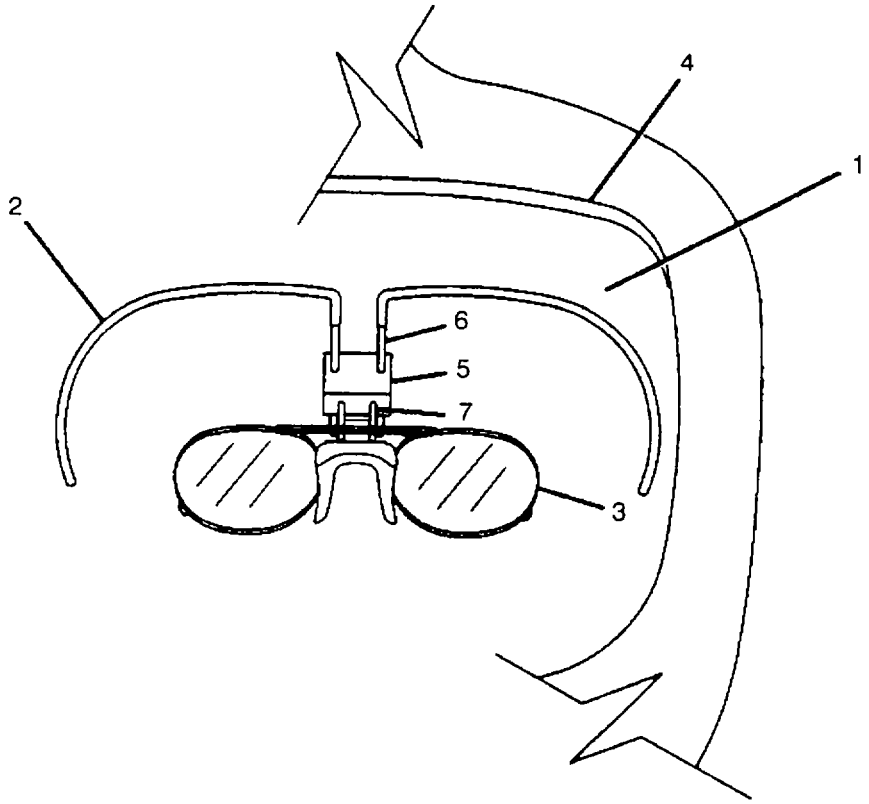
(2) Carefully work lens seal (7) around the new lens (6) edge.

(3) Attach lower lens ring (4) and upper lens ring (3) to face piece (5) using nuts (2) and retaining screws (1).

(4) Stick a new lens cover (8) over new lens (6).

3-9.2.20 Removing/Installing Spectacle Assembly.

a. Removing.



(1) Fold the head harness straps over the front of the face piece.

(2) Squeeze retaining spring (2) together and pull spectacle assembly (3) out of the face piece.

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

b. Installing.

(1) Squeeze retaining spring (2) together and position spectacle assembly (3) against face piece lens (1) and rubber face seal (4).

(2) Adjust spectacle assembly (3) as follows:

(a) Slide rubber block (5) up and down on prongs (6) for vertical adjustment.

(b) Slide spectacle prongs (7) in and out of rubber block (5) for horizontal adjustment.

(c) For additional horizontal adjustment:

(1) Repeat removal steps a.(1) and a.(2).

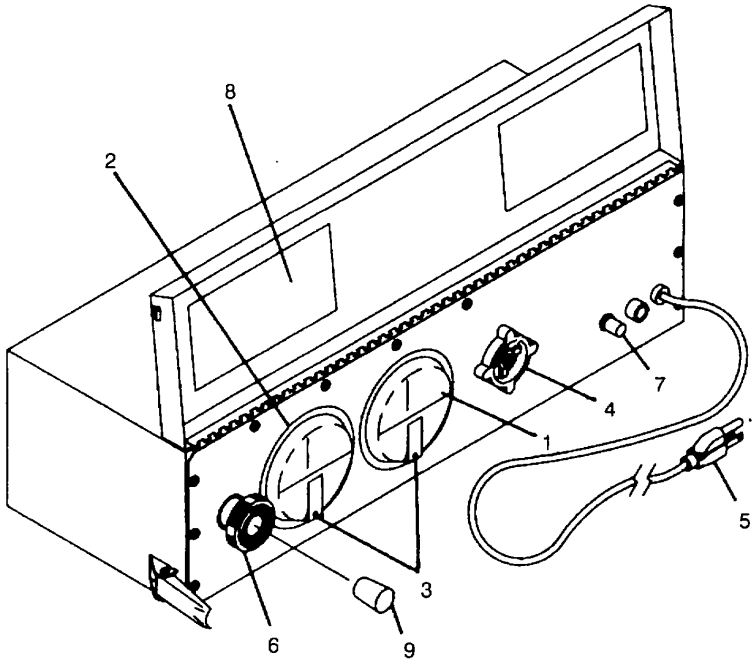
(2) Remove spectacle assembly (3) from block (5).

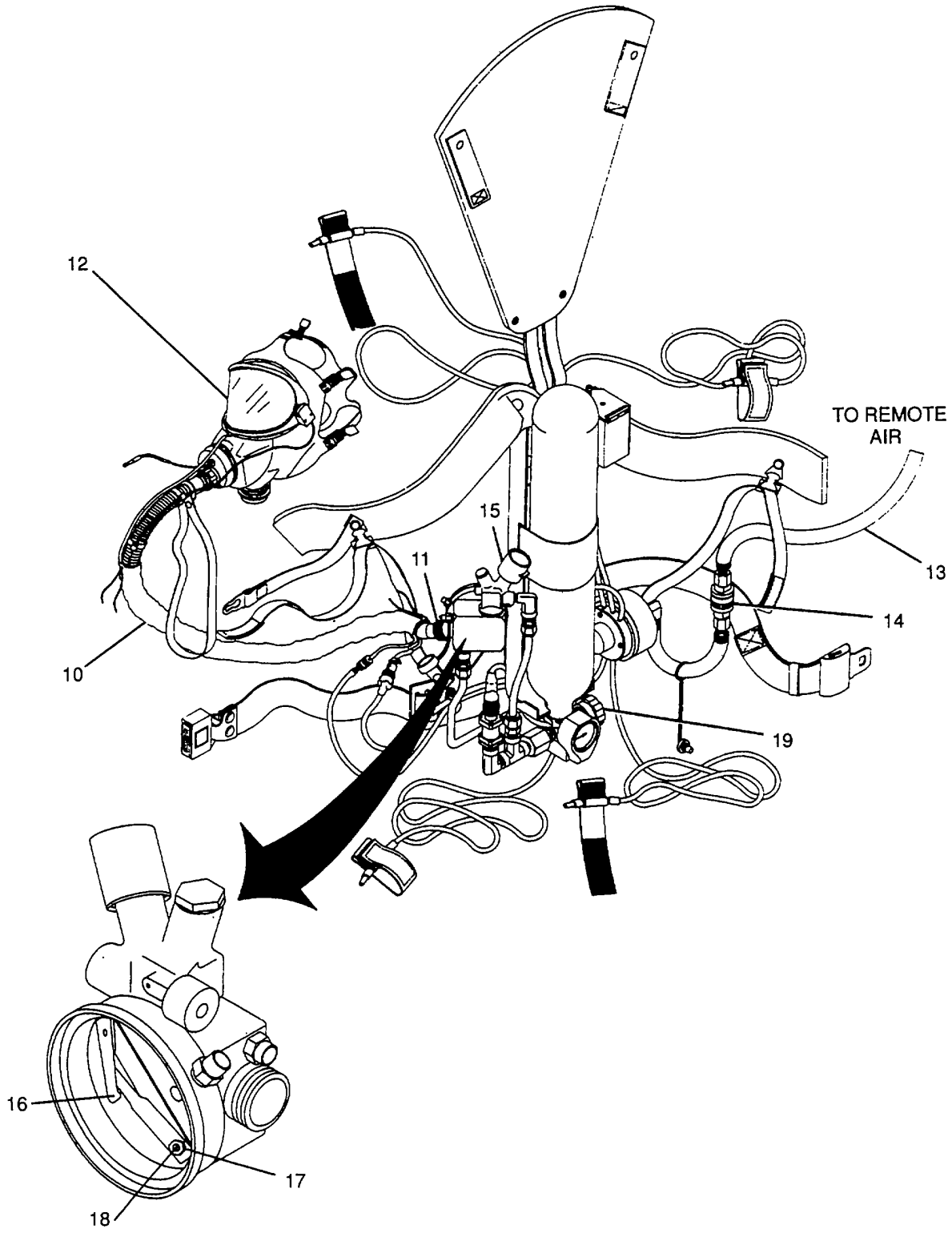
(3) Turn block (5) around and reattach to spectacle assembly (3).

(3) Repeat installing step b.(1).

3-9.3 Testing.

3-9.3.1 Static Pressure Test.




12
TO REMOTE AIR
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18

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

CAUTION

Regulator tester damage. Do not operate the regulator tester unless a test regulator is attached to the tester inlet connection. Operating the regulator tester with an open inlet connection will contaminate the flow orifice and cause the flow gauge to produce inaccurate readings. The only time the regulator tester should be operated with an open inlet connection is when the calibration is being checked and this time should be minimized

NOTE

Perform the static pressure test at the interval specified in the Unit PMCS table, after maintenance as specified, or when equipment damage is suspected

a. If necessary, zero flow gauge (1) and pressure gauge (2) by turning adjusting screws (3) at the bottom front of each gauge until the indicator needles point to zero

b. Ensure flow valve (4) is closed by turning it clockwise

CAUTION

Damage to electrical equipment. Use only a grounded 110 volt AC 60 cycle electrical power source for the regulator tester to avoid damaging internal electrical components

c. Plug electrical connection (5) into an electrical outlet

NOTE

Check the calibration of and leak test the regulator tester upon receipt and every 30 days or every 50 regulators tested, whichever comes first, or when inaccurate performance is suspected

d. Check the calibration of the regulator tester as follows:

(1) Remove any adaptors from inlet connection (6)

(2) Turn the regulator tester on by depressing on/off switch (7)

(3) Open flow valve (4) until pressure gauge (2) reading is -3 inches of water.

NOTE

The hand-written flow gauge value may differ from tester to tester

(4) Read flow gauge (1). The reading on flow gauge (1) should match the hand-written value on the reverse side of flow calibration chart (8) located on the inside front cover of the regulator tester

(5) Close flow valve (4)

(6) Turn the regulator tester off by depressing on/off switch (7)

(7) If flow gauge (1) reading was more than 10% higher than the value specified on the reverse side of flow calibration chart (8), the regulator tester should be repaired only by trained and certified maintenance personnel prior to use. If flow gauge (1) reading was lower than the specified value, continue to step e

e. Check the regulator tester for leaks as follows:

(1) Push rubber stopper (9) into inlet connection (6)

(2) Ensure flow valve (4) is closed by turning it clockwise

(3) Turn the regulator tester on by depressing on/off switch

(4) Slowly open flow valve (4) until pressure gauge (2) reading is -5 inches of water

(5) Close flow valve (4)

(6) Turn the regulator tester off by depressing on/off switch (7)

(7) Pressure gauge (2) reading should not rise above -2 inches of water in the 10 seconds interval after turning the regulator tester off

(8) If pressure gauge (2) reading does rise above -2 inches of water in 10 seconds, the regulator tester has excessive leaks and should be repaired only by trained and certified maintenance personnel prior to use

(9) Remove rubber stopper (9) from inlet connection (6).

WARNING

Ignition hazard. Do not use oxygen or test oxygen regulators or equipment with the portable regulator tester. Oxygen could be ignited by the regulator tester motor causing personnel injury or death.

f. Ensure an air cylinder charged from 1,000 to 2,475 PSIG is installed on the EBA. Refer to paragraph 3-9.2.3, steps b.(1) through b.(6), to install the cylinder.

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

g. Connect EBA breathing tube (10) to EBA regulator outlet (11).

NOTE

It is not necessary to remove the warning light electrical wire or the face piece vent tube from the breathing tube.

h. Disconnect face piece (12) from breathing tube (10) and lay face piece (12) to the side.

NOTE

The breathing tube should be kept as straight as possible to ensure the most accurate gauge readings.

i. Connect breathing tube (10) directly to inlet connection (6).

WARNING

High pressure air hazard. Always attach the regulator to its appropriate air supply source. Never attach a low pressure air line regulator to a high pressure air supply without an in line regulator to step the pressure down. Failure to follow this warning could result in severe personnel injury or death due to over-pressurization and explosion.

NOTE

The air line supply pressure to the EBA should be 85-90 PSIG.

j. Attach remote air supply line (13) to tether line connection (14).

k. Ensure flow valve (4) is closed by turning it clockwise.

l. Ensure regulator valve (15) is closed.

m. Turn on the remote air supply.

n. Completely open regulator valve (15).

NOTE

The static pressure is read from the pressure gauge when the flow valve is closed.

o. Read pressure gauge (2).

p. Open briefly and close flow valve (4) a number of times until a repeatable static pressure is read from pressure gauge (2). The static pressure should be between +1.1 and + 1.5 inches of water when flow valve (4) is closed.

q. If the static pressure is not between +1.1 and +1.5 inches of water or if a constant reading cannot be achieved, depressurize the system and perform the following checks:

(1) Remove the regulator cover and check that the diaphragm spring is properly seated in the center of the diaphragm cup. Refer to paragraph 3-9.2.7.

(2) Check the diaphragm spring for distortion. Replace damaged spring.

(3) Check the diaphragm for damage (i.e. , holes, cuts or deformation). Replace damaged diaphragm

(4) Check the height of the regulator lever assembly as follows:

(a) With the regulator cover and diaphragm removed, place a straight edge across the top of the regulator

(b) If the regulator is properly adjusted the straight edge should be flush with (just touch) the end of the short lever arm (16) without exerting pressure on the lever assembly

(c) If adjustment is required, loosen the lever assembly locknut (17)

(d) Using a fine flat blade screw driver, turn the adjusting screw (18) clockwise to raise or counterclockwise to lower the lever arms until the short lever arm (16) is flush with the straight edge

(e) Secure the adjusting screw (18) by holding it in place with the screwdriver and tightening the lever assembly locknut (17)

(5) Repeat the static pressure test. If static pressure is still low, refer to paragraph 3-9. 2. 6 to replace the regulator

(6) If the problem persists, replace the EBA. Notify your supervisor.

r. Ensure flow valve (4) is closed by turning it clockwise.

s. Turn off the remote air supply.

t. Close regulator valve (15).

u. Open cylinder valve (19) and repeat steps n. through r. to test the cylinder air supply.

v. Close cylinder valve (19) and regulator valve (15).

w. Unplug electrical connection (5) from the electrical outlet.

NOTE

Ensure the cylinder valve and the regulator valve are closed and that the system is depressurized.

x. Disconnect remote air supply line (13) from tether line connection (14).

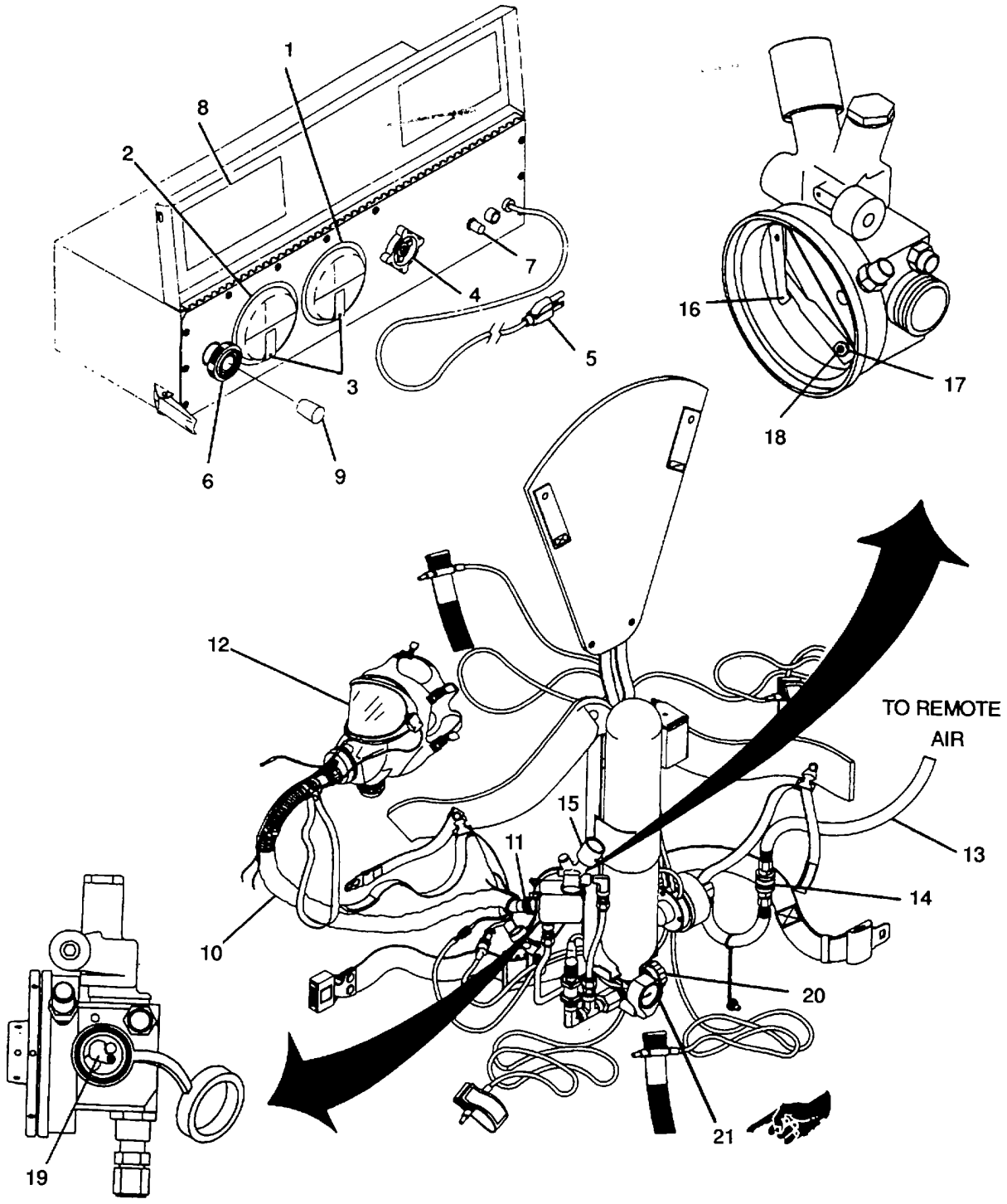
y. Remove breathing tube (10) from inlet connection (6).

z. Connect face piece (12) to breathing tube (10).

aa. Disconnect breathing tube (10) from EBA regulator outlet (11).

3-9. EMERGENCY BREATHING APPARATUS (FBA) MAINTENANCE INSTRUCTIONS. (CONT)

3-9.3.2 Air Flow Performance Test.



CAUTION

Regulator tester damage. Do not operate the regulator tester unless a test regulator is attached to the tester inlet connection. Operating the regulator tester with an open inlet connection will contaminate the flow orifice and cause the flow gauge to produce inaccurate readings. The only time the regulator tester should be operated with an open inlet connection is when the calibration is being checked and this time should be minimized

NOTE

Perform the air flow performance test at the interval specified in the Unit PMCS table, after maintenance as specified, or when equipment damage is suspected

a. If necessary, zero flow gauge (1) and pressure gauge (2) by turning adjusting screws (3) at the bottom front of each gauge until indicator needles point to zero.

b. Ensure flow valve (4) is closed by turning it clockwise.

CAUTION

Damage to electrical equipment. Use only a grounded 110 volt AC 60 cycle electrical power source for the regulator tester to avoid damaging internal electrical components

c. Plug electrical connection (5) into an electrical outlet.

NOTE

Check the calibration of and leak test the regulator tester upon receipt and every 30 days or every 50 regulators tested, whichever comes first, or when inaccurate performance is suspected

d. Check the calibration of the regulator tester as follows:

(1) Remove any adaptors from inlet connection (6).

(2) Turn the regulator tester on by depressing on/off switch (7).

(3) Open flow valve (4) until pressure gauge (2) reading is -3 inches of water.

NOTE

The hand-written flow gauge value may differ from tester to tester.

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

(4) Read flow gauge (1). The reading on flow gauge (1) should match the hand-written value on the reverse side of flow calibration chart (8) located on the inside front cover of the regulator tester

(5) Close flow valve (4)

(6) Turn the regulator tester off by depressing on/off switch (7)

(7) If flow gauge (1) reading was more than 10% higher than the value specified on the reverse side of flow calibration chart (8), the regulator tester should be repaired only by trained and certified maintenance personnel prior to use. If flow gauge (1) reading was lower than the specified values, continue to step e

e. Check the regulator tester for leaks as follows:

(1) Push rubber stopper (9) into inlet connection (6).

(2) Ensure flow valve (4) is closed by turning it clockwise.

(3) Turn the regulator tester on by depressing on/off switch (7).

(4) Slowly open flow valve (4) until pressure gauge (2) reading is -5 inches of water.

(5) Close flow valve (4).

(6) Turn the regulator tester off by depressing on/off switch (7).

(7) Pressure gauge (2) reading should rise above -2 inches of water in the 10 seconds interval after turning the regulator tester off

(8) f pressure gauge (2) reading does rise above -2 inches of water in 10 seconds, the regulator tester has excessive leaks and should be repaired only by trained and certified maintenance personnel prior to use

(9) Remove rubber stopper (9) from inlet connection (6).

WARNING

Ignition hazard. Do not use oxygen or test oxygen regulators or equipment with the portable regulator tester. Oxygen could be ignited by the regulator tester motor causing personnel injury or death

f. Ensure an air cylinder charged from 1,000 to 2,475 PSIG is installed on the EBA. Refer to paragraph 3-9.2.3, steps b.(1) through b.(6), to install the cylinder.

g. Connect EBA breathing tube (10) to EBA regulator outlet (11).

NOTE

It is not necessary to remove the warning light electrical wire or the face piece vent tube from the breathing tube

h. Disconnect face piece (12) from breathing tube (10) and lay face piece (12) to the side.

NOTE

The breathing tube should be kept as straight as possible to ensure the most accurate gauge readings

i. Connect breathing tube (10) directly to inlet connection (6).

WARNING

High pressure air hazard. Always attach the regulator to its appropriate air supply source. Never attach a low pressure air line regulator to a high pressure air supply without an in line regulator to step the pressure down Failure to follow this warning could result in severe personnel injury or death due to over-pressurization and explosion

NOTE

The air line supply pressure to the EBA should be 85-90 PSIG.

j. Attach remote air supply line (13) to tether line connection (14).
k. Ensure flow valve (4) is closed by turning it clockwise.
I. Ensure regulator valve (15) is closed
m. Turn on the remote air supply.
n. Turn the regulator tester on by depressing on/off switch (7).
o. Completely open regulator valve (15).
p. Slowly open flow valve (4) until flow gauge (1) reading matches the hand-written value for an air, flow of 200 liters/minute on flow calibration chart (8) located on the inside front cover of the regulator tester.
q. The corresponding pressure gauge (2) reading should be between 0 and +2.4 inches of water.
r. If pressure gauge (2) reading is not between 0 and +2.4 inches of water, perform the following checks:

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

(1) Check that the air supply line (13) is properly attached to the EBA tether line connection (14) and that air is being provided at 85-90 PSIG.

(2) When testing the cylinder air source, check that the cylinder valve (16) is fully open.

(3) Check that the regulator valve (15) is completely open.

(4) Check the breathing tube (10) for tight connections at the tester inlet connection (6) and regulator outlet (11).

(5) Check that the breathing tube (10) is straight.

(6) Depressurize the system and check the height of the regulator lever assembly as follows:

(a) Remove the regulator cover and diaphragm. Refer to paragraph 3-9. 2. 7.

(b) Place a straight edge across the top of the regulator.

(c) If the regulator is properly adjusted the straight edge should be flush with (ust touch) the end of the short lever arm (16) without exerting pressure on the lever assembly.

(d) If adjustment is required, loosen the lever assembly locknut (17).

(e) Using a fine flat blade screw driver, turn the adjusting screw (18) clockwise to raise or counterclockwise to lower the lever arms until the end of the short lever arm (16) is flush with the straight edge.

(f) Secure the adjusting screw (18) by holding it in place with the screwdriver and tightening the lever assembly locknut (17).

(g) Install the diaphragm and regulator cover. Refer to paragraph 3-9. 2. 7.

(7) Repeat the Air Flow Performance Test. If performance is still unacceptable, adjust the regulator control plate (19) as follows:

(a) Depressurize the system and disconnect the breathing tube (10) from the regulator outlet (11).

CAUTION

Equipment damage. Do not loosen the control plate retaining screw and only make small adjustments to the control plate (1/64" to 1/16"). The retaining screw is secured with a sealant and may break with excessive adjustment. If the screw turns during adjustment or the control plate is lose after adjustment, the control plate and screw were improperly installed and the regulator must be replaced.

(b) If the pressure gauge reading was less than 0 inches of water, use a flat blade screwdriver to rotate the control plate (19) clockwise 1/64" to 1/16".

(c) If the pressure gauge reading was greater than (+) 2. 4 inches of water, use a flat blade screw driver to rotate the control plate (19) counterclockwise 1/64" to 1/16".

(d) Connect the breathing tube (10) to the regulator outlet (11) and repeat the Airflow Performance Test.

(e) Repeat steps (a) thru (d) until an acceptable air flow is achieved or no further adjustment can be made.

(8) Repeat the air flow performance test. If performance is still low, refer to paragraph 3-9. 2. 6 and replace the regulator.

(9) If problem persists, replace the EBA. Notify your supervisor.

s. Close Flow valve (4).

t. Turn the regulator tester off by depressing on/off switch (7).

u. Turn off the remote air supply.

v. Close regulator valve (15).

w. Open cylinder valve (20) and repeat steps n. through t. to test the cylinder air supply.

x. Close cylinder valve (20) and regulator valve (15).

y. Check the regulator for internal leaks as follows:

(1) Turn regulator tester on by depressing the on/off switch (7).

(2) Turn on remote air supply (85 to 90 PSIG).

(3) Open cylinder valve (20).

(4) Open regulator valve (15).

(5) Slowly open flow valve (4) until flow gauge (1) reads 120 to 150 liters per minute in accordance with the flow calibration chart (8) located on inside cover of regulator tester.

(6) Observe cylinder pressure gauge (21) for 10 seconds. If the cylinder pressure gauge (21) drops, there are internal regulator leaks. Refer to paragraph 3-9. 2. 6 to replace the regulator.

(7) Turn regulator tester off by depressing on/off switch (7).

(8) Close cylinder valve (20) and regulator valve (15).

(9) Turn off remote air supply.

z. Unplug electrical connection (5) from the electrical outlet.

NOTE

Ensure the cylinder valve and the regulator valve are closed and that the system is depressurized.

aa. Disconnect remote air supply line (13) from tether line connection (14).

ab. Remove breathing tube (10) from inlet connection (6).

ac. Connect face piece (12) to breathing tube (10).

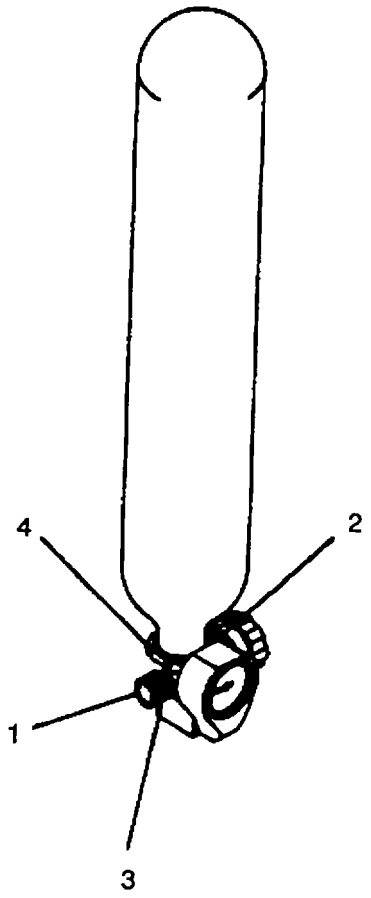
ad. Disconnect breathing tube (10) from EBA regulator outlet (11).

3-9. EMERGENCY BREATHING APPARATUS (IFBA) MAINTENANCF INSTRUCTIONS. (CONT)

3-9.3.3 Leak Test

NOTE

Perform the leak test before initial use, at the interval specified in the Unit PMCS Table, after performing maintenance as specified and when damage is suspected.

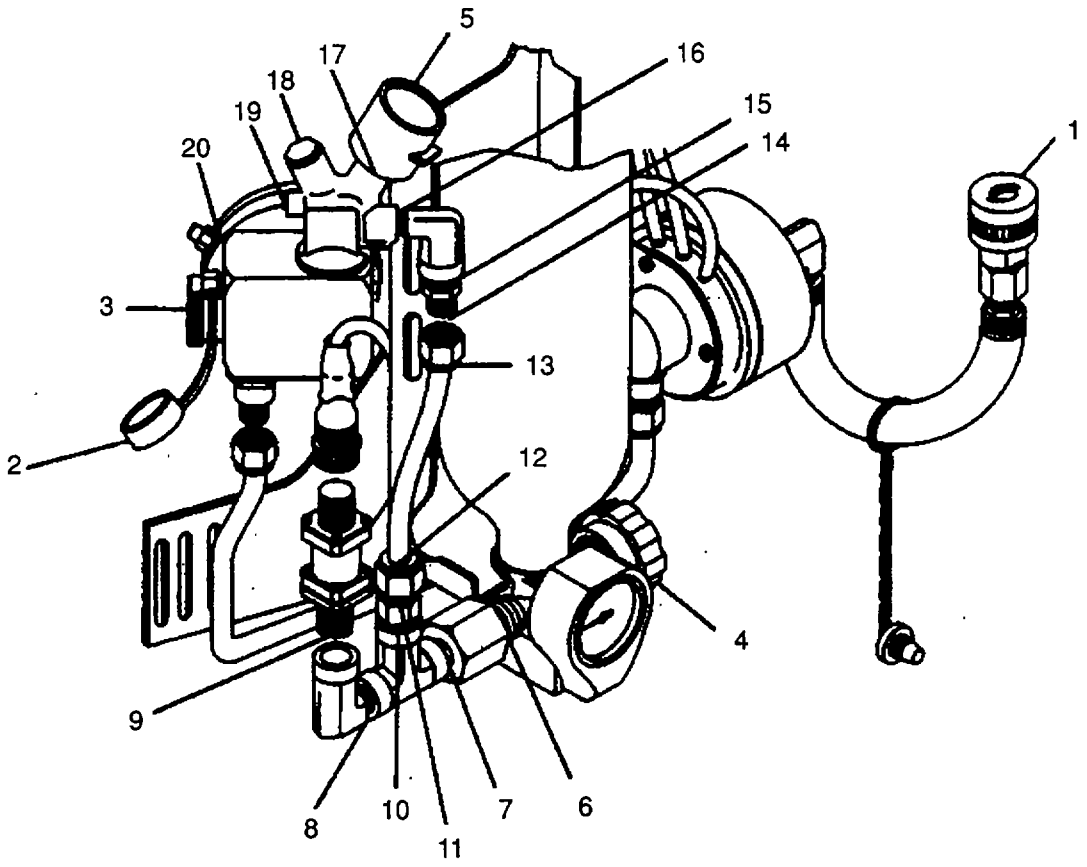


a. Check the air cylinder for leaks as follows prior to installation on the EBA.

(1) Ensure the cylinder valve is completely closed by turning clockwise.
(2) Draw a bubble of soapy water solution across the cylinder valve outlet port (1).
(3) Cover the two bleed holes on the threads with your fingers.
(4) If the bubble expands, there is an air leak through the valve. Replace the cylinder. Notify your supervisor.
(5) Apply a soapy water solution to locations (2), (3) and (4).

(6) If bubbles are observed, replace the cylinder. Notify your supervisor.

b. Perform steps b.(1) through b.(5), paragraph 3-9.2.3, to install the cylinder.

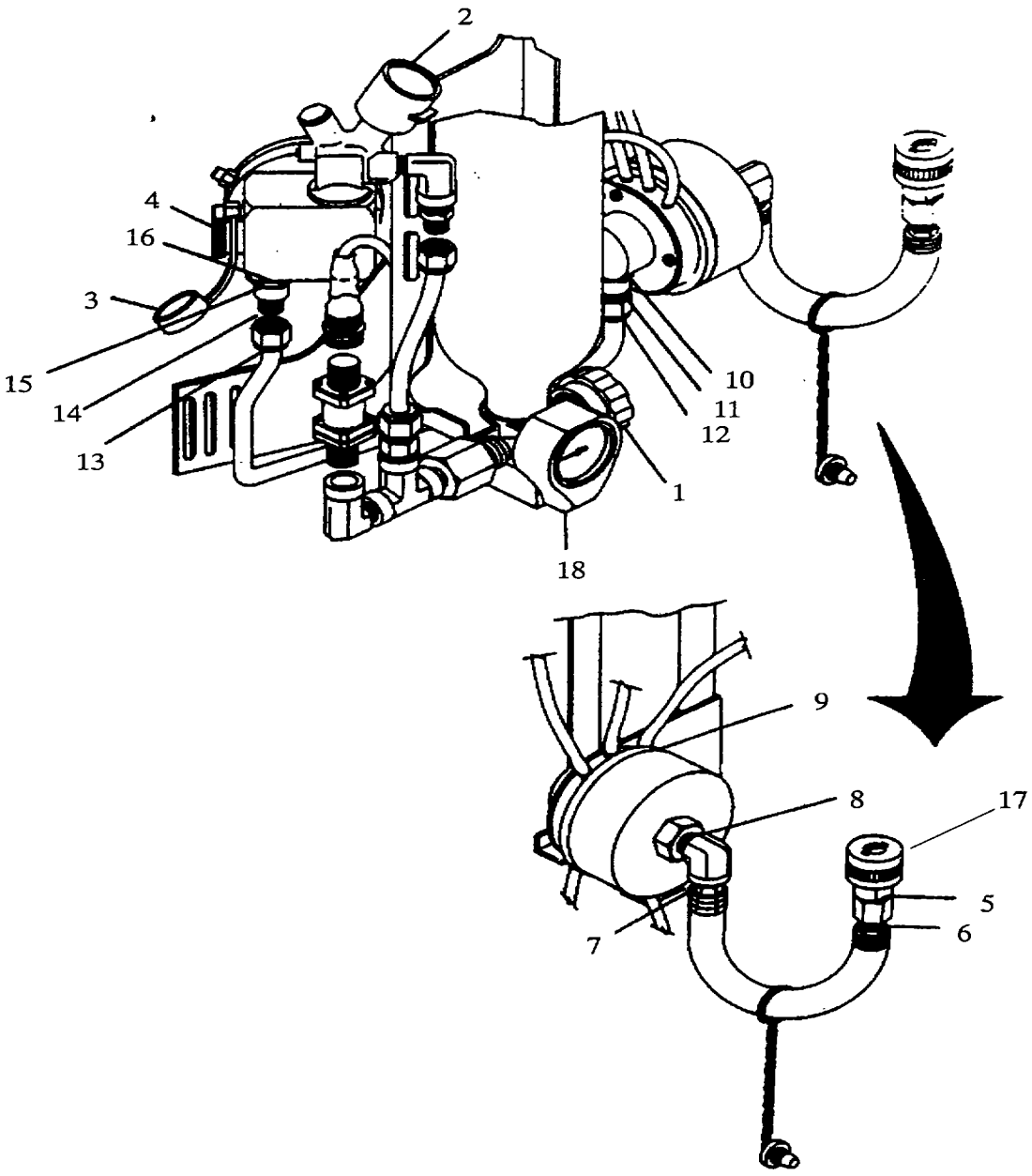


c. Attach a remote air supply line to the EBA tether line connection (1).
d. Install the dust cap (2) over the regulator outlet (3).
e. Check the high pressure system for leaks as follows:

(1) Place your hand over the dust cap (2) and regulator outlet (3).
(2) Completely open the cylinder valve (4).
(3) Completely open the regulator valve (5).
(4) Apply a soapy water solution to locations (6), (7), (8), (9), (10), (11), (12), (13), (14), (15), (16), (17), (18), (19) and (20).
(5) Bubbles are a positive indication of a leak. Refer to step g.

3-9. EMERGENCY BREATHING APPARATUS (EBA) MAINTENANCE INSTRUCTIONS. (CONT)

f. Check the tether line system for leaks as follows:



NOTE

The air supply line pressure to the EBA should be 85-90 PSIG. Insure dust cap is installed over regulator outlet.

(1) With the cylinder valve (1) and regulator valve (2) completely open and your hand over the dust cover (3) and regulator outlet (4), turn on the remote air.

(2) Apply a soapy water solution to locations (5), (6), (7), (8), (9), (10), (11), (12), (13), (14), (15) (16) and (17).

(3) Bubbles are a positive indication of a leak. Refer to step g.

g. If bubbles were observed at any locations, perform the following checks:

WARNING

Do not tighten EBA fittings or connections when the system is pressurized. Close the cylinder valve and be sure nothing blocks the regulator outlet, then relieve the pressure from the system by slowly opening the regulator valve. Failure to depressurize the system prior to adjusting fittings may cause fittings to rupture, resulting in severe personal injury or death.

(1) Check connections for tightness.

(2) Check for missing or worn out anti-seize tape at metal to metal connections.

(3) Inspect connections for thread damage. Replace the EBA if thread damage is identified. Notify your supervisor.

(4) If regulator leaks were identified, refer to paragraph 3-9. 2. 6 to replace the regulator.

(5) If filter housing leaks were identified, check the filter housing for damaged preformed packing and thread damage. Refer to paragraph 3-9. 2. 2 to replace preformed packing. Refer to paragraph 3-9. 2. 8 to replace the filter housing if threads are damaged.

(6) If leaks persists, replace the EBA. Notify your supervisor.

(h) Deleted

3-9. EMERGENCY BREATHING APPARATUS CFBA) MAINTFNANCF INSTRUCTIONS. (CONT)

i. Close the cylinder valve (1).

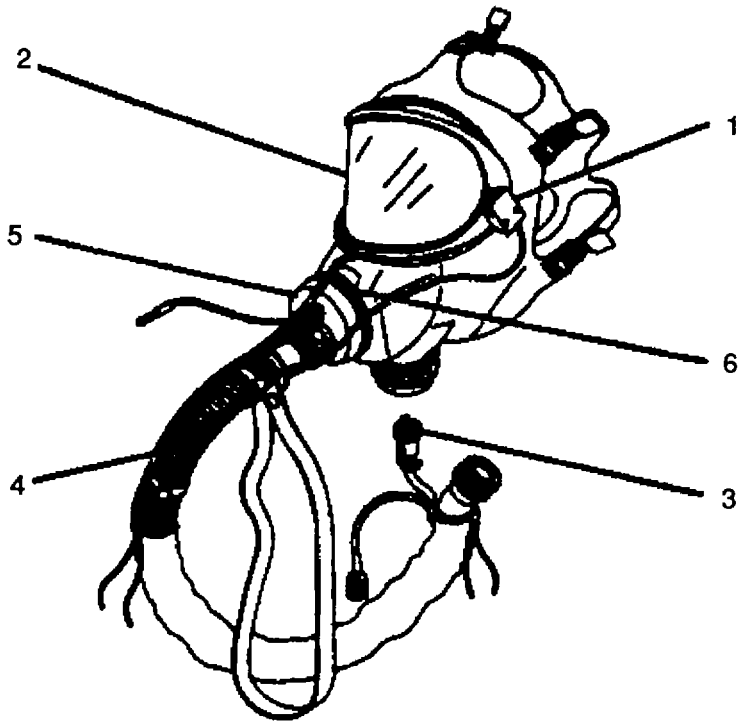
j. Turn off the remote air supply and disconnect the remote air supply line.

k. Close the regulator valve (2).

I. Slowly open, then close, the regulator valve (2) to ensure there is not pressure remaining in the system.

m. Replace the dust cover (3) over the regulator outlet (4).

3-9.4 Cleaning.



a. Using a screwdriver, remove the screws holding warning light (1) to face piece (2) and remove warning light (1).

CAUTION

Equipment corrosion hazard. Do not submerge the EBA electrical connector or warning light in water. These components will corrode and cause the warning system to fail and require replacement of the electrical connector or warning light.

b. Tape a plastic bag over electrical connector (3) and warning light (1) to keep them dry.
c. Unscrew breathing tube (4) from communication piece (5).

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d. Loosen clamp (6) and remove communication piece (5) and clamp (6) from face piece (2).

e. Immerse breathing tube (4) and face piece (2) in hot soapy water.

f. Scrub gently until clean.

g. Rinse breathing tube (4) and face piece (2) in clean water.

h. Sanitize breathing tube (4) and face piece (2) in sanitizing solution.

i. Rinse breathing tube (4) and face piece (2) in clean warm water and allow them to air dry.

j. When dry, remove the plastic bag and tape from electrical connector (3) and warning light (1).

k. Install warning light (1) to face piece (2) using the screws removed in step a.

I. Install communication piece (5) using clamp (6) and attach breathing tube (4).

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection
b. Service
c. Replacement
d. Cleaning
e. Testing

INITIAL SETUP

Tools

Hose Coupler (Appendix B, Section III, item 16)
Leak Test Fixture (Appendix B, Section III, item 18)
Technical Manual (Appendix B, Section III, item 20)
Pliers (Appendix B, Section III, item 23)
Pliers (Appendix B,. Section Ill, item 24)
Pressure Test Knob (Appendix B, Section III, item 29)
Relief Valve Tool (Appendix B, Section III, item 31)
Screwdriver (Appendix B, Section III, item 32)
Screwdriver (Appendix B, Section III, item 33)
Screwdriver (Appendix B, Section III, item 34)
Valve Core Extractor (Appendix B, Section III, item 36)
Wrench (Appendix B, Section III, item 38)
Wrench (Appendix B, Section III, item 39)
Wrench (Appendix B, Section III, item 40)
Wrench (Appendix B, Section III, item 41)
Wrench (Appendix B, Section III, item 42)
Wrench (Appendix B, Section III, item 43)
Wrench (Appendix B, Section III, item 44)
Wrench (Appendix B, Section III, item 45)
Wrench (Appendix B, Section III, item 46)
Wrench (Appendix B, Section III, item 47)
Wrench, Torque (Appendix B, Section III, item 48)
Ruler (Appendix D, Section II, item 23)

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS. (CONT)

Materials/Parts

Service Kit (Appendix B, Section II, item 10)
Spare/Repair Kit (Appendix B, Section II, item 11)
Coolant Canister (Appendix B, Section III, item 9)
Exhalation Hose (Appendix B, Section III, item 11)
Inhalation Hose (Appendix B, Section III, item 17)
Oxygen Bottle (Appendix B, Section III, item 21)
Preformed Packing (Appendix B, Section II111, item 26)
Preformed Packing (Appendix B, Section III, item 27)
Cleaner/Sanitizer (Appendix D, Section II, item 8)
Tongue Depressor (Appendix D, Section II, item 11)
Lubricant (Appendix D, Section II, item 16)
Rags (Appendix D, Section II, item 21)
Stopper (Appendix D, Section II, item 24)
Tape (Appendix D, Section II, item 26)
Vinyl Tube (Appendix D, Section II, item 27)
Copper Tubing (Appendix D, Section II, item 28)
Hose Clamp (Appendix D, Section II, item 29)

3-10.1 Inspection.

a. Visually examine the buckles and straps for broken buckles, frayed, ripped or torn straps. If damaged, refer to paragraph 3-10. 3. 8 to replace straps.

b. Remove the top cover and examine all hose connections for tightness and thread damage. Tighten loose connections. If damaged, refer to paragraph 3-10. 3. 9 to replace hose connections.

c. Check all hoses for cuts, holes or tears. If damaged, refer to paragraph 3-10. 3. 3 to replace.

d. Examine the oxygen cylinder valve for damage and check hydrostatic test date. If damaged, or the hydrostatic test date is over 3 years old, notify your supervisor and replace oxygen cylinder. Refer to paragraph 3-10. 3. 1.

e. Examine the regulating valve orifice for damage. If damaged replace the regulator assembly. Refer to paragraph 3-10. 3. 6.

f. Depress the bypass button to ensure it operates properly. If damaged, replace the rebreather system.

NOTE

CO_2 absorbent will be replaced after each use or every 12 months.

NOTE

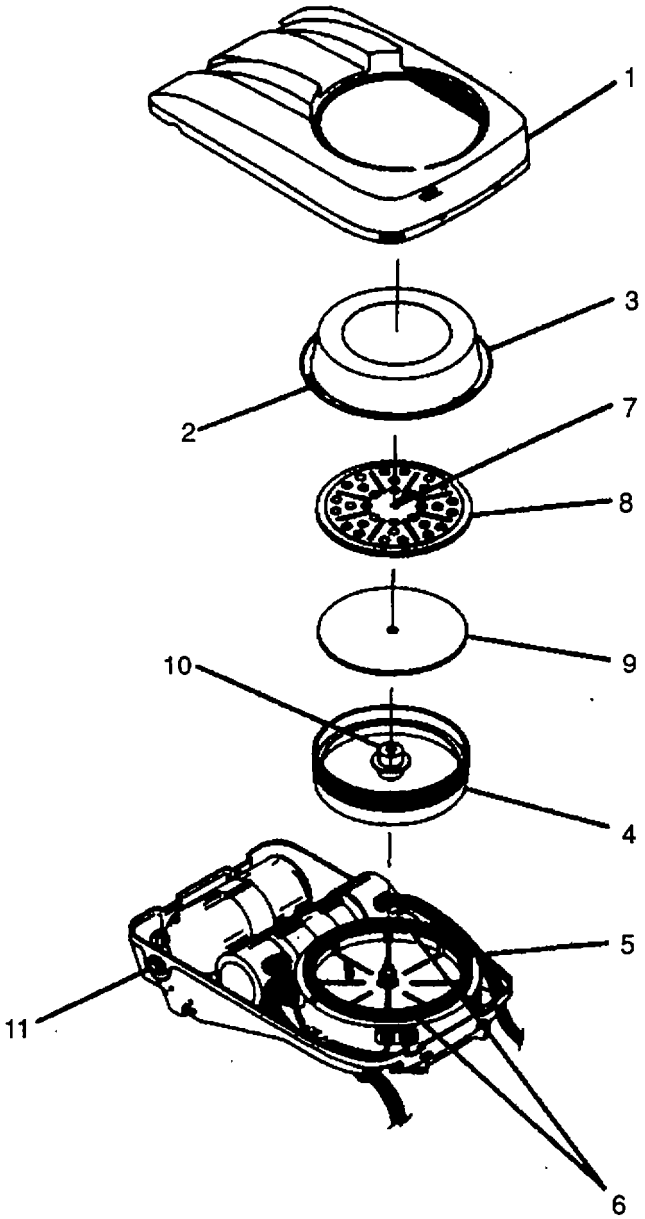
If the maintenance tag is missing or outdated, service the absorbent canister.

g. Check the maintenance tag to ensure the absorbent canister is filled with fresh absorbent. If absorbent is not fresh, refer to paragraph 3-10.2 to replace it.

3-10.2 Service.

WARNING

Suffocation Hazard. The rebreather absorbent canister must be properly filled with C02 absorbent for the rebreather to operate properly. If the absorbent, canister is not filled with fresh absorbent, C02 will not be removed from the breathing air and the user will suffocate.



3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS. (CONT)

NOTE

$C0_2$ absorbent must be replaced after each use or every 12 months for a unit in storage.

a. Lay the rebreather system on a flat surface.

b. Release the latches on the bottom of the rebreather system and remove top cover (1).

c. Slide the four snap latches (2) open and lift off center section cover (3).

d. Lift absorbent canister (4) out of center section (5).

e. Remove two preformed packing (6) and perform steps b. through d. , paragraph 3-2. 1, Lubricating the Rebreather System.

f. Install two performed packing (6) in center section (5).

g. Slide absorbent canister (4) snap latch (7) open.

h. Lift off absorbent canister cover (8).

i. Remove filter pad (9) from absorbent canister (4).

j. Remove old absorbent from absorbent canister (4).

k. Wipe absorbent canister (4) clean with a rag.

NOTE

Do not expose fresh absorbent to the atmosphere for more than one hour.

I. Refill absorbent canister (4) with new absorbent to fill line (10).

m. Lightly tap absorbent canister (4) to settle the new absorbent.

n. Add more absorbent, as necessary, to top off the absorbent canister (4) at the fill line (10).

o. Place filter pad (9) in absorbent canister (4) on top of the new absorbent.

p. Put absorbent canister cover (8) on absorbent canister (4) and slide snap latch (7) closed.

q. Push absorbent canister (4) into center section (5).

r. Set center section cover (3) in place and slide four snap latches (2) closed.

s. Attach top cover (1).

t. Secure a new maintenance tag to oxygen bottle valve (11).

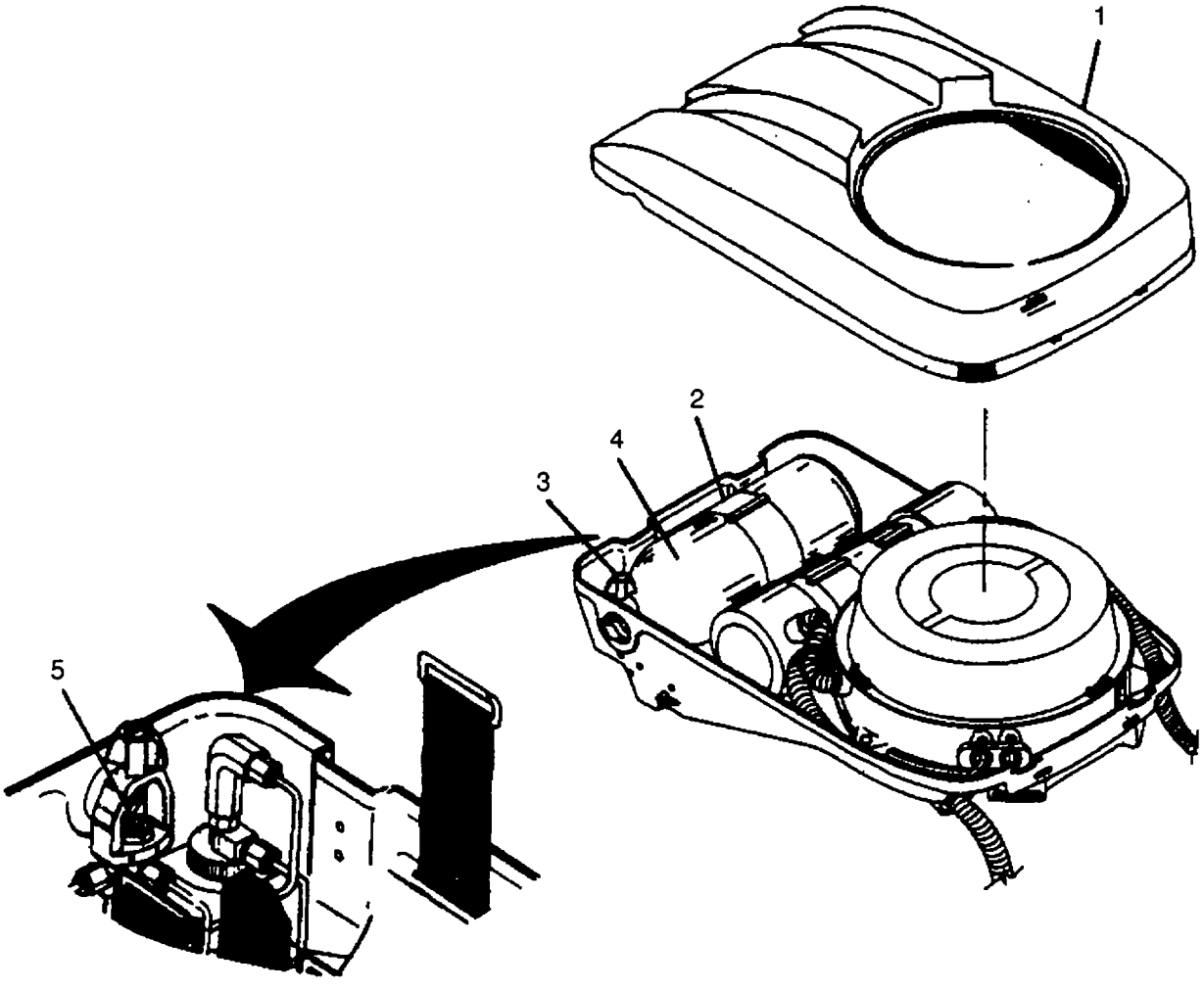
3-10.3 Replacement.

3-10.3.1 Removing/Installing Oxygen Bottle.

a. Removing.

WARNING

Compressed oxygen hazard. Replace the rebreather oxygen bottle if it is suspected to be leaking. Damaged oxygen bottles must be repaired ONLY by personnel trained and certified to accomplish such work. Tampering with damaged oxygen bottles could result in personnel injury or death due to combustion or sudden release of high pressure.



3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS. (CONT)

(1) Lay the rebreather system on a flat surface.
(2) Release the latches on the bottom of the rebreather system and remove top cover (1).
(3) Unhook hook and pile fastener tape strap (2).
(4) Loosen regulator cap (3).
(5) Remove oxygen bottle (4).

b. Installing.

(1) Inspect regulating valve orifice (5) and stat-seal for damage. If damaged, refer to paragraphs 3-10.3.5 and 3-10.3.6.

NOTE

Ensure the oxygen bottle cylinder valve is properly seated and secured.

(2) Position full oxygen bottle (4) in place ensuring that hook and pile fastener tape strap (2) is not folded under oxygen bottle (4).
(3) Tighten regulator cap (3).

(4) Secure oxygen bottle (4) in place with hook and pile fastener tape strap (2).

(5) Remove the face piece and plug the inhalation hose and exhalation hose.

(6) Open and close oxygen bottle (4) valve and listen for possible air escaping from the regulator valve seat and for a short "chirp" from the alarm whistle indicating a proper seal.

(7) Install cover (1).

3-10.3.2 Removing/Installing Coolant Canister.

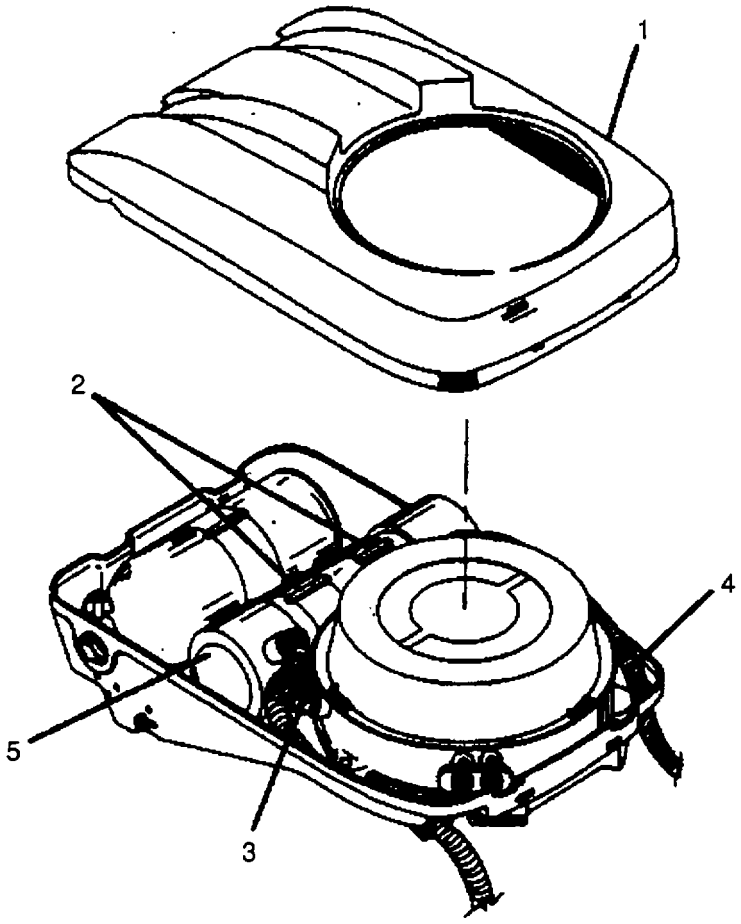
a. Removing.

(1) Lay the rebreather system on a flat surface.

(2) Release the latches on the bottom of the rebreather system and remove top cover (1).

(3) Unhook hook and pile fastener tape straps (2).

(4) Disconnect coolant canister hose (3!, and inhalation hose (4) from each end of coolant canister (5).



(5) Remove coolant canister (5).

b. Installing.

(1) Position frozen coolant canister (5) in place.

NOTE

Be careful not to crimp the hoses when connecting them to the coolant canister.

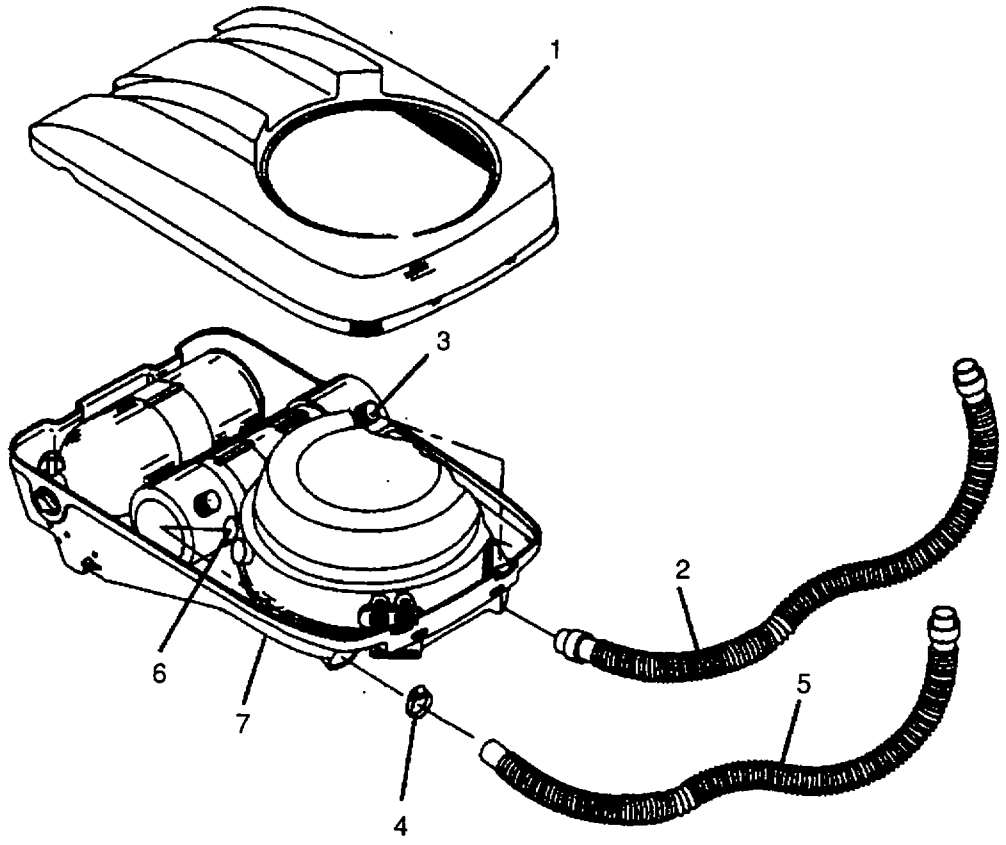
(2) Connect coolant canister hose (3) and inhalation hose (4) to each end of coolant canister (5).
(3) Secure coolant canister (5) in place with hook and pile fastener tape straps (2)
(4) Attach cover (1).

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS. (CONT)

3-10.3.3 Removing/Installing Breathing Hose Assembly.

a. Removing.

(1) Lay the rebreather system on a flat surface.



(2) Release the latches on the bottom of the rebreather system and remove top cover (1).

NOTE

Remove coolant canister if required for access.

(3) Disconnect inhalation hose (2) from coolant canister (3).

(4) Loosen hose clamp (4) on exhalation hose (5).

(5) Remove exhalation hose (5) from center section (6).

(6) Remove hose clamp (4) from exhalation hose (5).

(7) Unhook the hook and pile fastener tape straps securing exhalation hose (5) and inhalation hose (2) to the shoulder straps.

(8) Pull exhalation hose (5) and inhalation hose (2) through housing (7) openings.

b. Installing

(1) If a new breathing hose component is required, refer to paragraph 3-10. 3. 9.

(2) Carefully push exhalation hose (5) and inhalation hose (2) through housing (7) openings.

(3) Connect inhalation hose (2) to coolant canister (3).

(4) Slip hose clamp (4) over exhalation hose (5).

NOTE

Be careful not to crimp the hoses when connecting them.

(5) Attach exhalation hose (5) to center section (6).

(6) Position and tighten hose clamp (4).

(7) Secure exhalation hose (5) and inhalation hose (2) to the shoulder straps using the hook and pile fastener tape straps.

(8) Perform the Breathing System Leak Test. Refer to paragraph 3-10. 4. 2.

NOTE

Reinstall coolant canister if required.

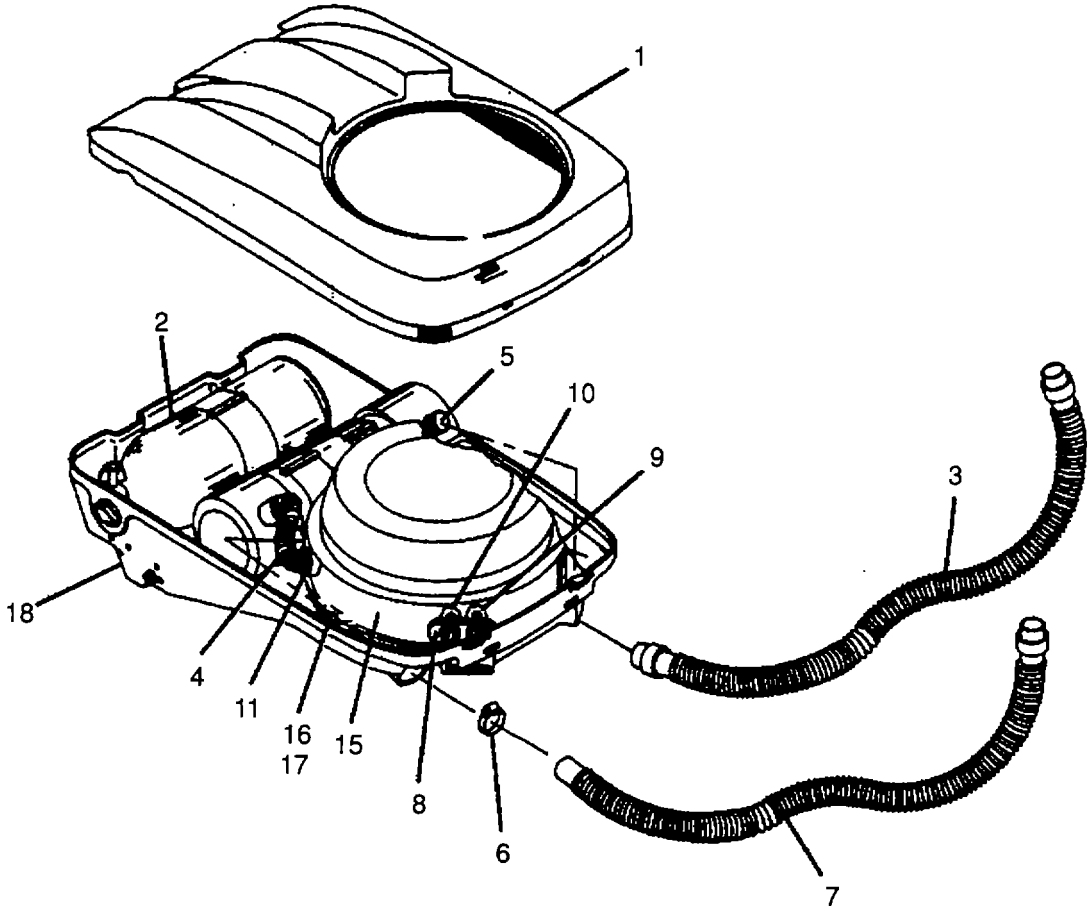
(9) Attach top cover (1).

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS. (CONT)

3-10.3.4 Removing/Installing Center Section Preformed Packing/Gaskets.

a. Removing.

(1) Place the rebreather system on a flat surface.



NOTE

Do not expose absorbent to the atmosphere for more than one hour.

(11) Lift absorbent canister (14) out of center section (15).

(12) Remove screws (16) and washers (17) from center section (15).

(13) Lift center section (15) out of lower housing (18).

(14) Remove preformed packing (19) and (20) from center section (15).

(15) Remove diaphragm clamp (21).

(16) Remove diaphragm assembly (22) from center section (15).

(17) Unscrew connectors (23) and (24) from center section (15).

(18) Remove preformed packing (25), (26), (27) and (28) from connectors (23) and (24).

(19) Pull connector tube (29) out of demand valve housing (30) and center section (15).

(20) Remove 'preformed packings (31) from connector tube (29).

(21) Unscrew restrictor (38) from demand valve housing (30) and remove preformed packing (39) from restrictor (38).

(22) Remove seal screws (32) and (33), lock nuts (34), washers (35) and valve actuator assembly (36).

(23) Lift demand valve housing (30) out of center section (15).

(24) Remove gasket (37) from demand valve housing (30).

(25) Unscrew plug screw (40) and remove gasket (41) from plug screw (40).

(26) Using the valve core extractor from the service kit, remove demand valve core (42).

b. Installing.

(1) Perform steps b. through d. , paragraph 3-2. 1, Lubricating the Rebreathing System.

(2) Install demand valve core (42) into demand valve housing (30) using the valve core extractor from the service kit.

3-10. REBREATHER SYSTEFM MAINTENANCE INSTRUCTIONS. (CONT)

(3) Install gasket (41) on plug screw (40).

(4) Screw plug screw (40) into demand valve housing (30) and tighten.

(5) Position gasket (37) and demand valve housing (30) in center section (15) ensuring connector tube (29) holes are aligned.

(6) Using seal screws (32) and (33), lock nuts (34) and washers (35), secure demand valve housing (30) and actuator assembly (36) in center section (15).

(7) Install preformed packing (39) on restrictor (38).

(8) Screw restrictor (38) into demand valve housing (30) and tighten.

(9) Install preformed packings (31) on each end of connector tube (29).

(10) Gently push connector tube (29) through center section (15) opening and into demand valve housing (30).

(11) Install preformed packing (25), (26), (27) and (28) on connectors (23) and (24).

(12) Screw connectors (23) and (24) into center section (15) and torque to 25-30 in . lbs.

(13) Position diaphragm assembly (22) on center section (15) by running a finger around the diaphragm lip to pull it over the bottom of center section (15).

(14) Position diaphragm clamp (21) with screw opposite connection (23) and (24) and tighten.

(15) Connect coolant canister hose (4) to center section (15) with hose clamp (11).

(16) Place center section (15) in lower housing (18) ensuring connectors (23) and (24) are aligned with bypass tube (9) and regulator tube (10).

(17) Install washers (17) and screws (16). Tighten screws (16) evenly.

(18) Connect bypass tube (9) and regulator tube (10) to connectors (23) and (24).

(19) Carefully push' anti-rotation collar (8) over bypass tube (9) and regulator tube (10).

(20) Connect exhalation hose (7) to center section (15) using hose clamp (6).

(21) Install preformed packing (19) and (20) in center section (15).

(22) Position absorbent canister (14) and push it down into center section (15).

(23) Position center section cover (13) on center section (15) and slide the four snap latches (12) closed.

(24) Install coolant canister (5) and connect coolant canister hose (4) and inhalation hose (3).

(25) Install oxygen bottle (2) performing steps b. (1) through b. (6), paragraph 3-10. 3. 1.

(26) Perform the Plumbing Leak Test, Breathing System Leak Test and the Oxygen Constant Flow Rate Test. Refer to paragraphs 3-10. 4. 1 through 3-10. 4. 3.

(27) Install cover (1).

3-10.3.5 Removing/Installing Stat-Seal.

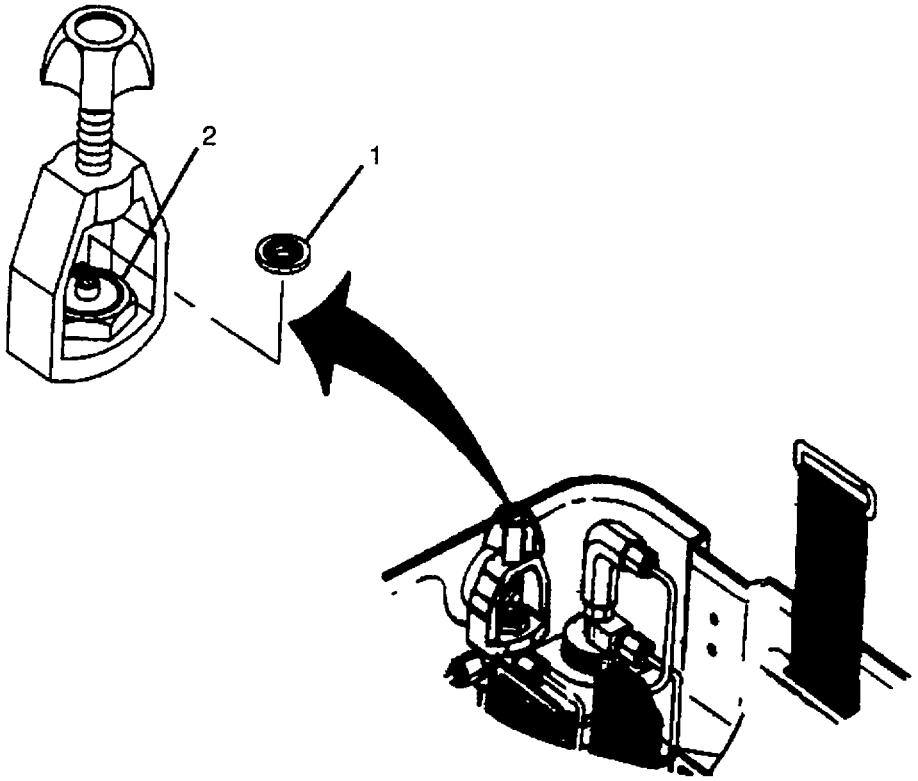
a. Removing.

NOTE

Replace the stat-seal when damage is found or suspected.

(1) Place the rebreather system on a flat surface.
(2) Release the latches on the bottom of the rebreather system and remove the top cover.
(3) Remove the oxygen bottle performing steps a.(3) through a.(5), paragraph 3-10.3.1.

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS. (CONT)



(4) Using your fingers, remove statseal (1) from regulator collar (2).

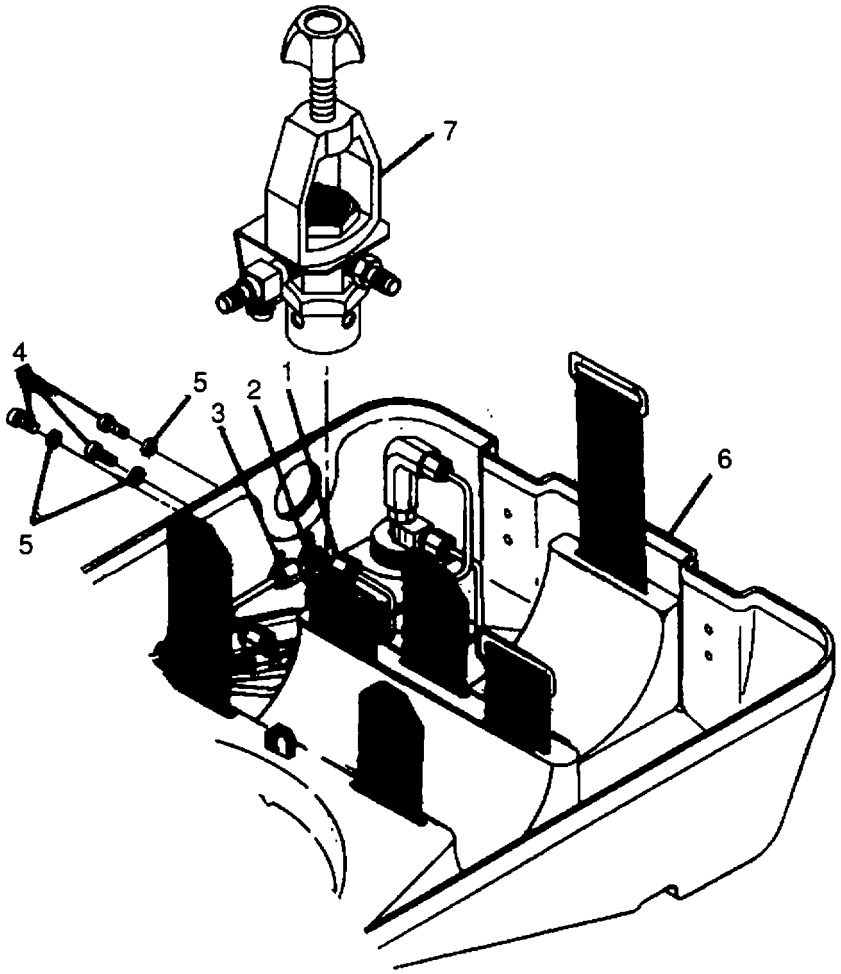
b. Installing.

(1) Carefully push new stat-seal (1) into position on regulator collar (2).
(2) Install the oxygen bottle performing steps b.(1) through b.(6), paragraph 3-10.3.1.
(3) Install the top cover.

3-10.3.6 Removing/Installing Regulator Assembly.

a. Removing.

(1) Place the rebreather system on a flat surface.
(2) Release the latches on the bottom of the rebreather system and remove the top cover.
(3) Remove the oxygen bottle performing steps a.(3) through a.(5), paragraph 3-10.3.1.



3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS. (CONT)

(4) Using a wrench, carefully loosen air line connections (1), (2) and (3).
(5) Remove pan head screws (4) and washers (5) from lower housing (6).
(6) Carefully lift regulator assembly (7) out of lower housing (6).

b. Installing.

(1) Position regulator assembly (7) in lower housing (6).
(2) Connect air line connections (1), (2) and (3) and hand tighten.

NOTE

The shorter pan head screw should be installed in the lower hole.

(3) Attach regulator assembly (7) to lower housing (6) using washers (5) and pan head screws (4).

(4) Using a wrench, tighten air line connections (1), (2) and (3).

(5) Install the oxygen bottle performing steps b. (1) through b. (6), paragraph 3-10. 3. 1.

(6) Perform the Plumbing Leak Test and Breathing System Leak Test. Refer to paragraph 3-10. 4. 1 and 3-10. 4. 2.

(7) Install the top cover.

3-10. 3. 7 Removing/Installing Pressure Gauge/Flow Restrictor.

a. Removing.

(1) Lay the rebreather system on a flat surface.

(2) Release the latches on the bottom of the rebreather system and remove the top cover.

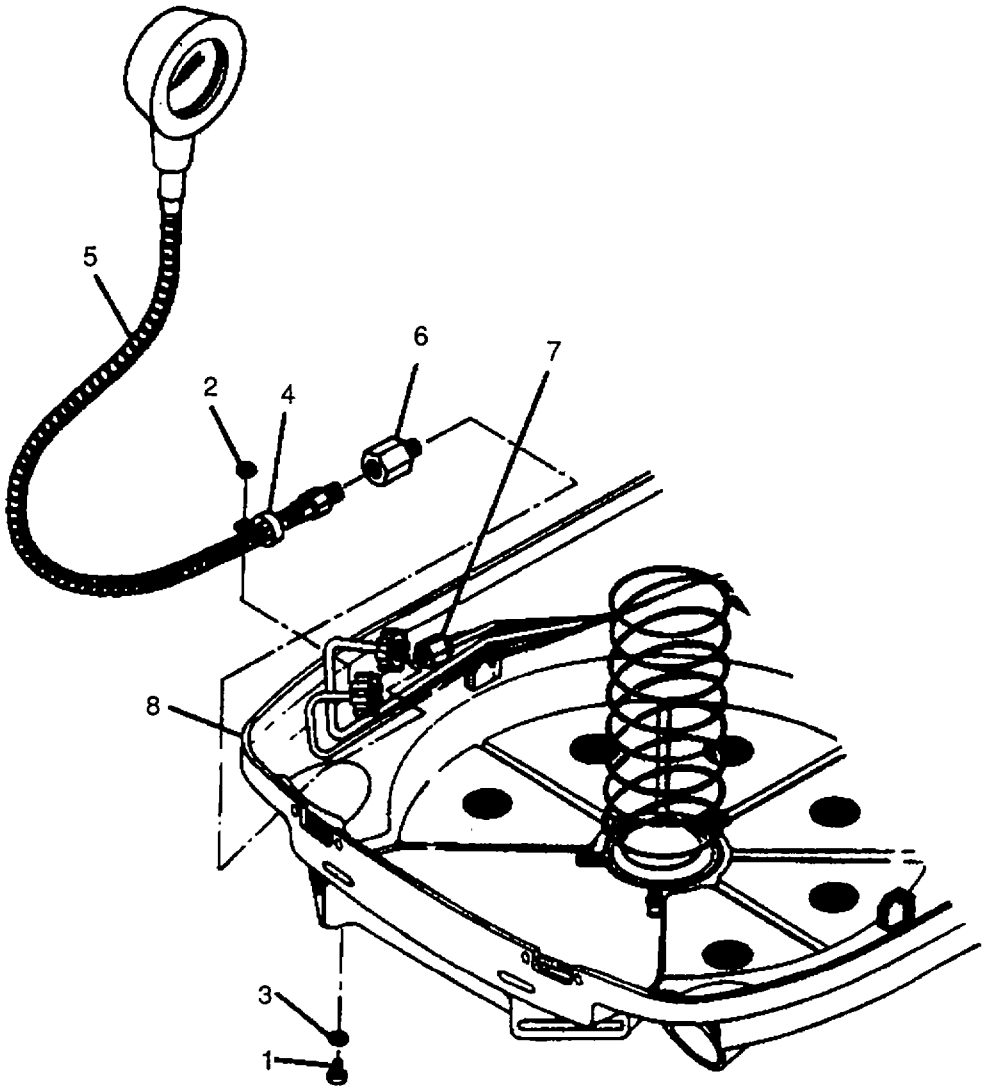
(3) Perform steps a. (4) through a. (8) and a. (1 2) and a. (1 3), paragraph 3-10. 3. 4, to remove the center section.

(4) Remove pan head screw (1), lock nut (2) and washer (3).

(5) Remove clamp (4) from pressure gauge line (5).

(6) Disconnect flow restrictor (6) from air line connection (7).

(7) Pull pressure gauge line (5) and flow restrictor (6) through lower housing (8).



(8) Disconnect flow restrictor (6) from pressure gauge line (5).

b. Installing.

(1) Apply anti-seize tape to the threads of pressure gauge line (5).
(2) Attach flow restrictor (6) to. pressure gauge line (5) and tighten.
(3) Work flow restrictor (6) and pressure gauge line (5) through lower housing (8) opening.

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS. (CONT)

(4) Connect flow restrictor (6) to air line connection (7).

(5) Place clamp (4) around pressure gauge line (5).

(6) Install washer (3), lock nut (2) and pan head screw (1).

(7) Perform steps b. (16) through b. (20) and b. (24), paragraph 3-10. 3. 4, to install the center section.

(8) Perform the Plumbing Leak Test and Breathing System Leak Test. Refer to paragraphs 3-10. 4. 1 and 3-10. 4. 2.

(9) Install the cover.

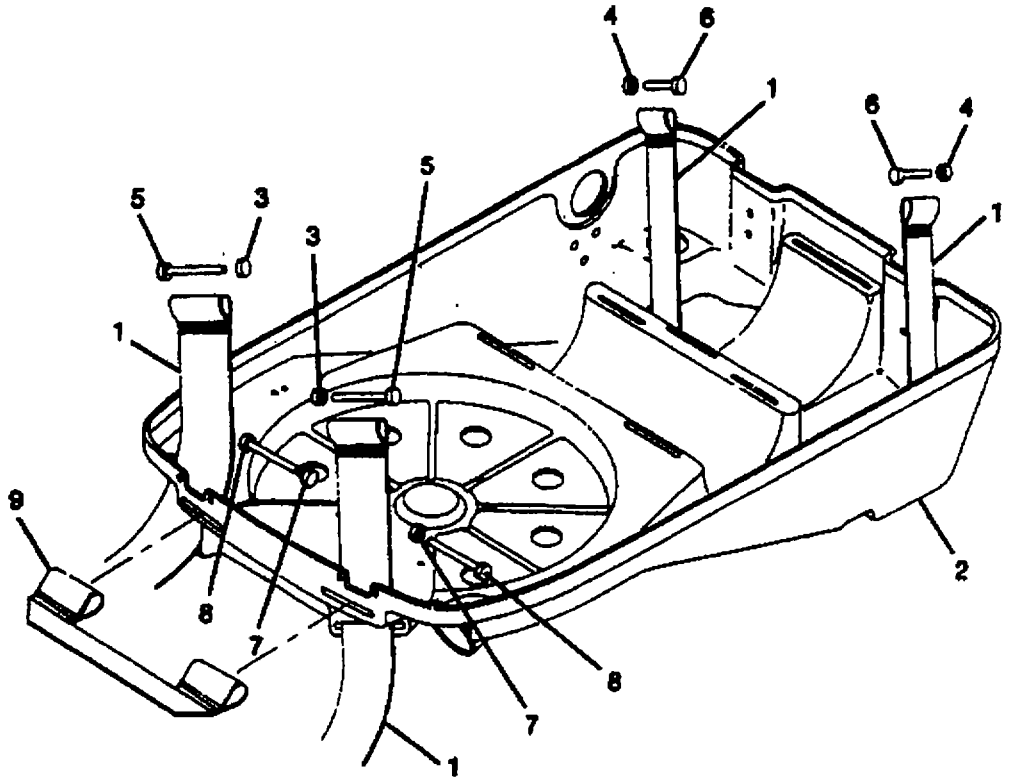
3-10. 3. 8 Removing/Installing Harness/Carrying Strap.

a. Removing.

(1) Lay the rebreather system on a flat surface.

(2) Release the latches on the bottom of the rebreather system and remove the cover.

(3) Remove the oxygen bottle by performing steps a. (3) through a. (5), paragraph 3-10. 3. 1.



(4) Perform steps a. (4) through a. (8) and a. (12) and a. (13), paragraph 3-10. 3. 4, to remove the center section.

NOTE

Use care not to damage any air line tubing when removing the harness.

(5) Carefully pull harness (1) ends out of lower housing (2) as far as possible for access.

(6) Remove caps (3) and (4) from retaining pins (5) and (6).

(7) Remove retaining pins (5) and (6) from harness (1).

(8) Carefully pull harness (1) through the openings in lower housing (2).

(9) Remove caps (7) from retaining pins (8).

(10) Remove retaining pins (8) from carrying strap (9).

(11) Pull carrying strap (9) through the openings in lower housing (2).

b. Installing.

(1) Work carrying strap (9) ends through the openings in lower housing (2).

(2) Push retaining pins (8) through the ends of carrying strap (9).

(3) Snap caps (7) onto retaining pins (8).

(4) Work new harness (1) ends through the openings in lower housing (2).

(5) Pull new harness (1) ends through the openings as far as possible for access.

(6) Push retaining pins (5) and (6) through the ends of new harness (1).

(7) Snap caps (3) and (4) onto retaining pins (5) and (6).

(8) Carefully work new harness (1) ends down into lower housing (2) so retaining pins (5) and (6) lay flat against lower housing (2).

(9) Perform steps b. (16) through b. (20) and b. (24), paragraph 3-10. 3. 4, to install the center section.

(10) Perform steps b. (1) through b. (6), paragraph 3-10. 3. 1, to install the oxygen bottle.

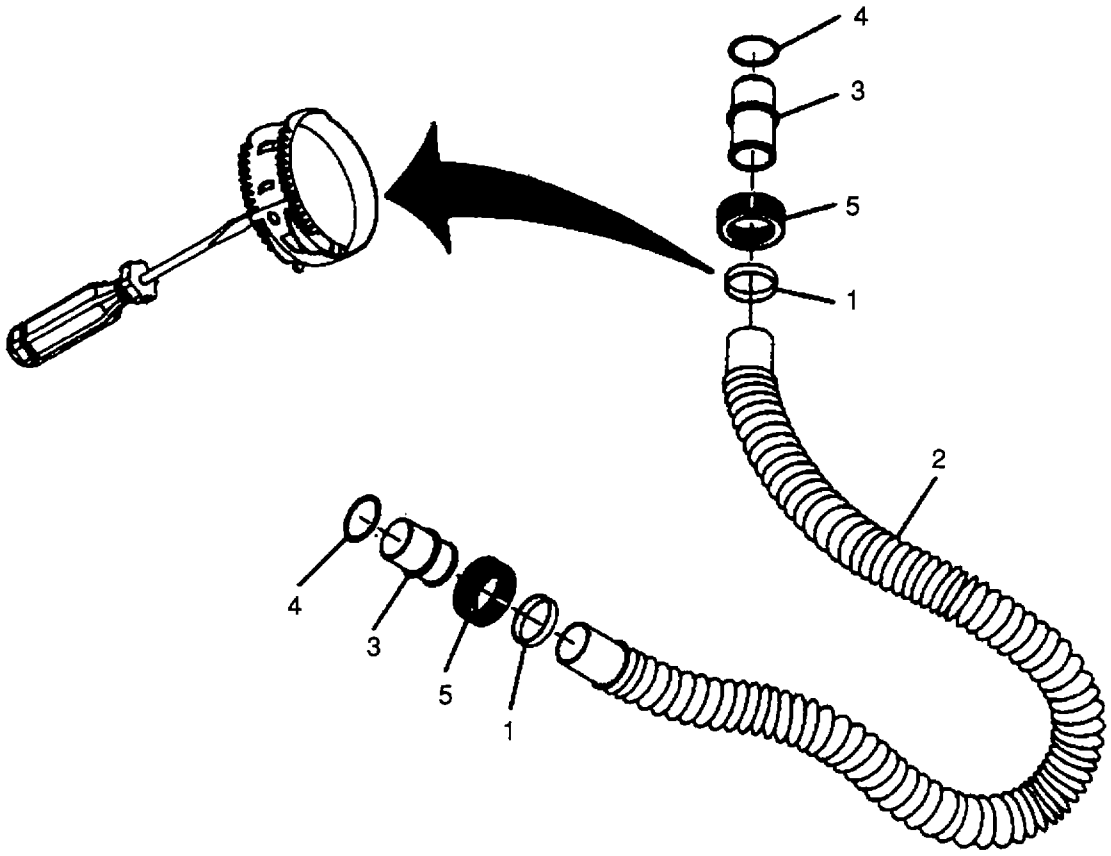
3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS. (CONT)

(11) Perform the Plumbing Leak Test and Breathing System Leak Test. Refer to paragraphs 3-10.4.1 and 3-10.4.2.

(12) Install the cover.

3-10.3.9 Removing/Installing Face Piece Hose Connector.

a. Removing.



(1) Using a screwdriver, pry hose clamp (1) loose.
(2) Remove hose clamp (1) from hose (2).
(3) Pull hose connector (3) out of hose (2).
(4) Slide hose connector gasket (4) and connector nut (5) off of hose connector (3).

b. Installing.

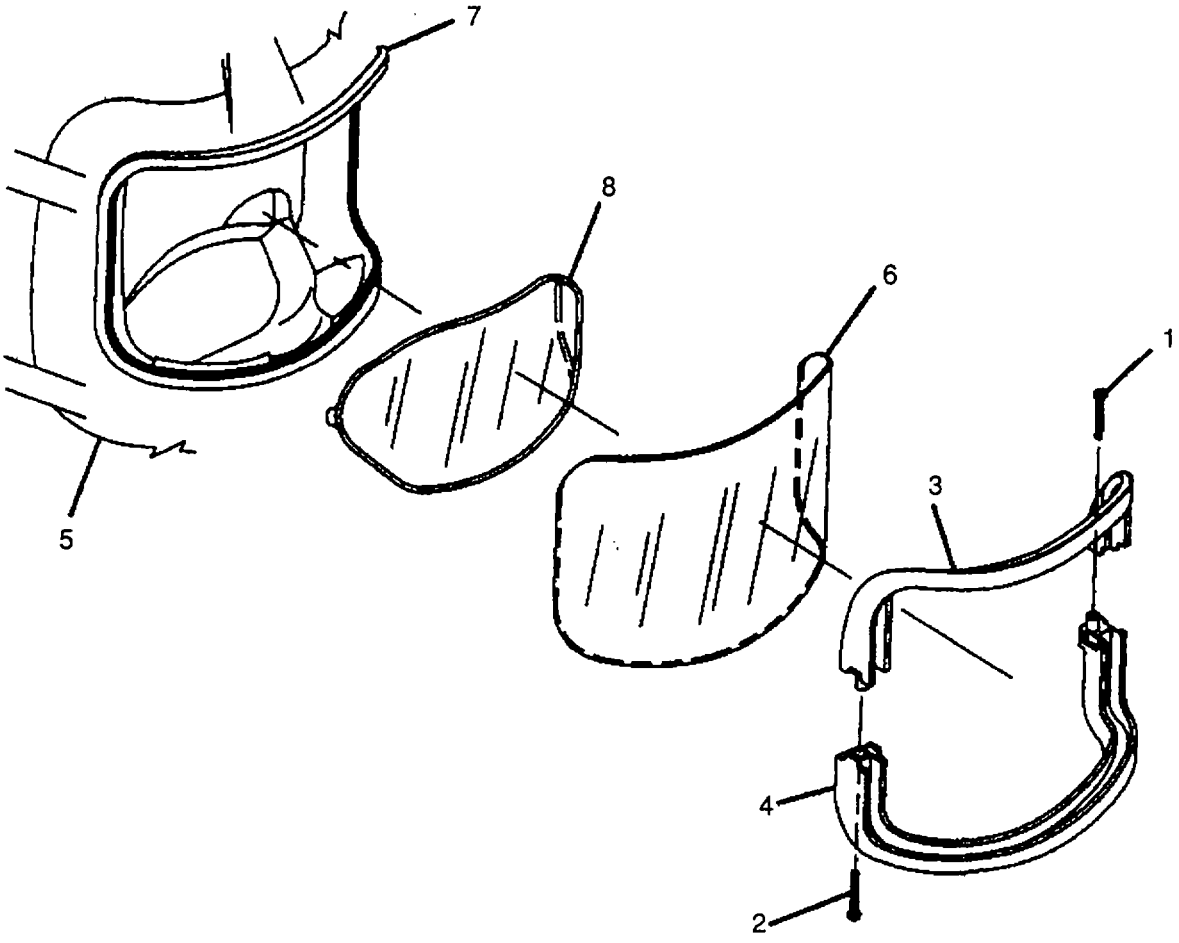
(1) Work hose connector gasket (4) onto hose connector (3).
(2) Slide connector nut (5) onto hose connector (3).

NOTE

Be sure to install a new hose clamp.

(3) Place hose clamp (1) over hose (2).
(4) Push hose connector (3) into the end of hose (2).
(5) Tighten hose clamp (1) with a pair of pliers.
(6) Connect the breathing hose to the rebreather and perform the Breathing System Leak Test. Refer to paragraph 3-10.4.2.

3-10.3.10 Removing/Installing Face Piece Lens.
a. Removing.



3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS. (CONT)

(1) Remove retaining screws (1) and (2) from upper lens ring (3) and lower lens ring (4).
(2) Remove upper lens ring (3) and lower lens ring (4) from face piece (5).
(3) Remove lens (6) from face piece (5) by peeling lens seal (7) back from lens (6).
(4) Remove therma clear lens insert (8) from lens (6).

b. Installing.

NOTE

The therma clear lens insert is equipped with an adhesive strip and may be replaced without removing the face piece lens.

(1) Attach new therma clear lens insert (8) to the inside of a new lens (6).

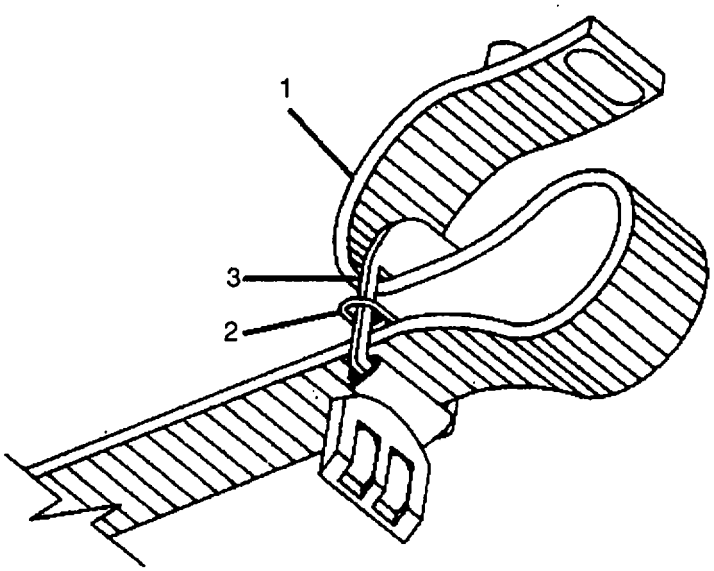
NOTE

The word "down" on the lens should be on the bottom and centered in the face piece opening.

(2) Place the bottom edge of new lens (6) into the grove of lens seal (7).
(3) Carefully work lens seal (7) around the new lens (6) edge.
(4) Attach lower ring (4) and upper ring (3) to face piece (5) using retaining screws (1) and (2).
(5) Perform the Face Piece Fit Test, paragraph 3-10.4.4.

3-10.3.11 Removing/Installing Head Harness.

a. Removing.



(1) Fully extend all five head harness straps (1).
(2) With one hand, push slide retainer (2) down.
(3) Pull strap (1) end through the top of buckle (3).
(4) Push slide retainer (2) up and pull strap (1) out of the bottom of buckle (3).
(5) Repeat steps a.(2) through a.(4) for the remaining head harness straps.

b. Installing.

NOTE

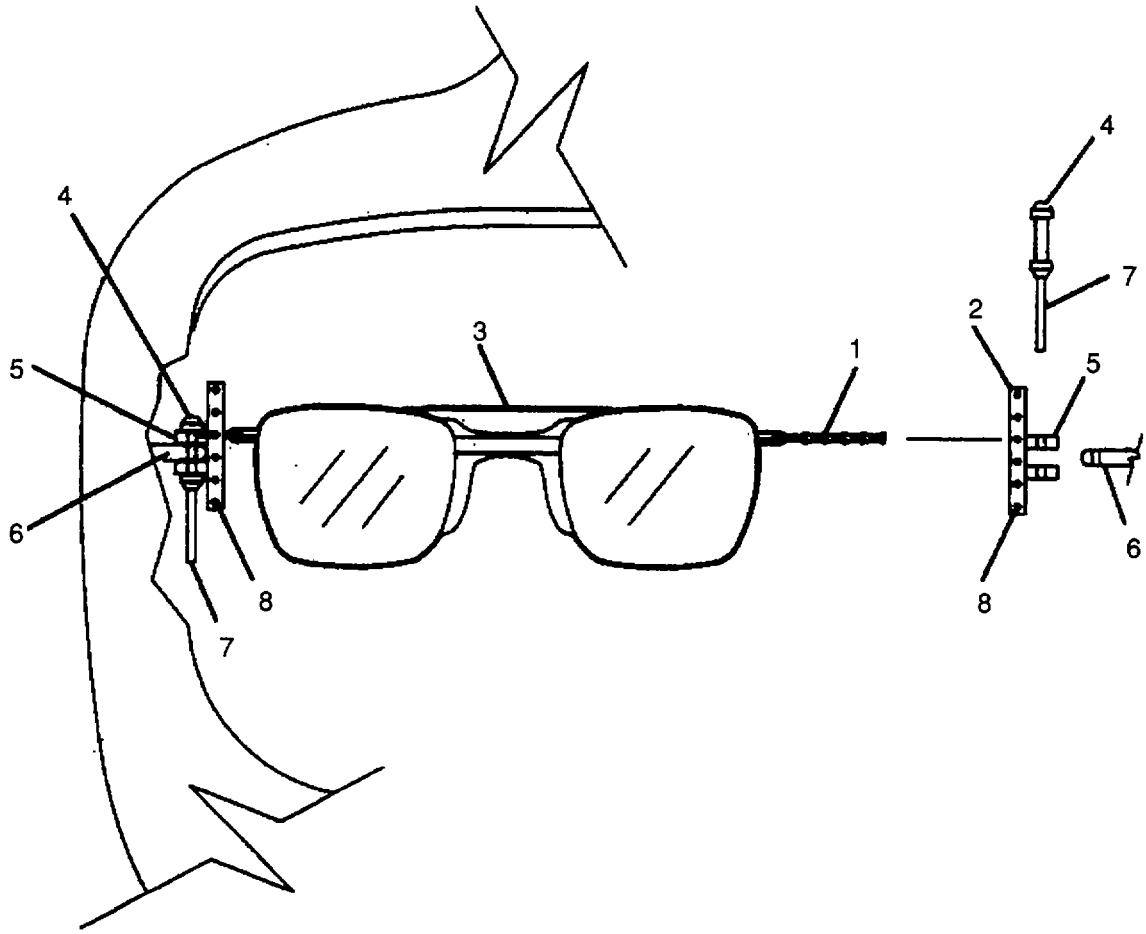
The ribbed side of the head strap should lay against the head.

(1) Beginning with the forehead (top) strap, raise slide retainer (2).
(2) Work the end of head harness strap (1) through the bottom of buckle (3).
(3) Push slide retainer (2) down.
(4) Loop new strap (1) around slide retainer (2) and work the end of head harness strap (1) through the top of buckle (3).
(5) Repeat steps b.(1) through b.(4) for the remaining head harness straps.

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

3-10.3.12 Removing/Installing Spectacle Assembly.

a. Removing.



CAUTION

Equipment damage. Temporarily cover the rebreather system face piece lens to avoid scratches when removing or installing the spectacle assembly. Damage to the face piece lens from excessive scratching will require replacement of the face piece lens.

(1) Remove spectacle frame arms (1) from spectacle holders (2).

(2) Remove spectacle frame (3) from the face piece.

(3) Using pliers, remove plugs (4) from spectacle holders (2), attachment pads (5) and face piece attachment pads (6).

(4) Remove spectacle holders (2) from the face piece.

b. Installing.

CAUTION

Equipment damage. Temporarily cover the rebreather system face piece lens to avoid scratches when removing or installing the spectacle assembly. Damage to the face piece lens from excessive scratching will require replacement of the face piece lens.

NOTE

The spectacle holders are marked (R) for right side and (L) for the left side.

(1) Position spectacle holder (2) attachment pad (5) over face piece attachment pad (6) and align the holes.

NOTE

To make installation easier, wet the plugs with water.

(2) Push plug tail (7) through attachment pads (5) and (6).
(3) Using pliers, pull on plug tail (7) and work plug (4) into position in attachment pads (5) and (6).
(4) Perform steps b.(1) through b.(3) to install the other side.

WARNING

Eye safety hazard. Extra care should be taken to ensure that the rebreather system spectacle assembly is installed properly. The frame arms of the spectacle assembly have pointed ends that point towards the face of the user. Improper installation of the spectacle assembly may result in facial injury or blindness.

(5) Insert frame arms (1) into spectacle holders (2) adjustment holes (8).

(6) Adjust the spectacle assembly as follows:

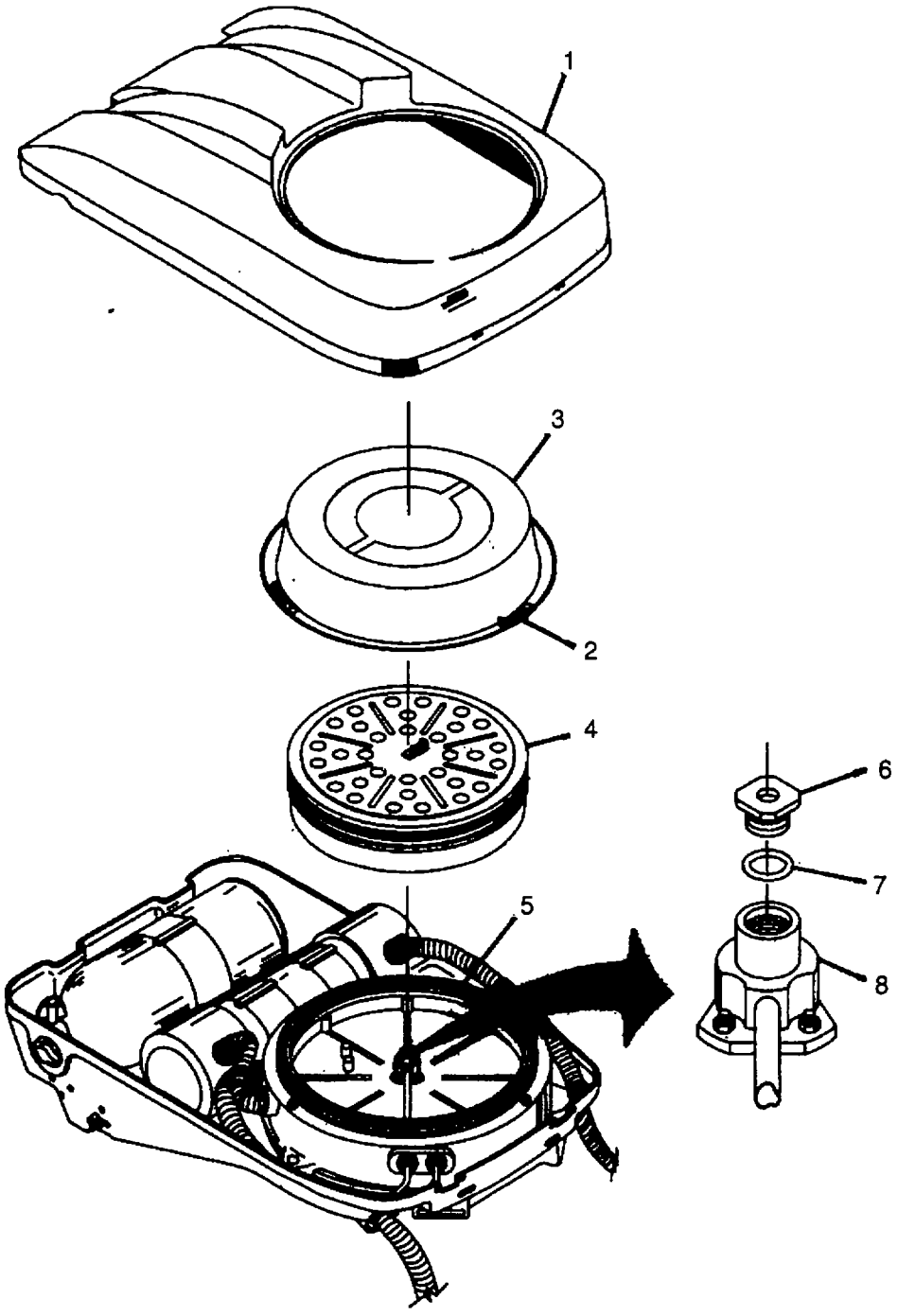
(a) Slide frame arms (1) in and out of spectacle holders (2) for distance from the user's face.

(b) Move frame arms (1) up or down to any of the spectacle holders (2) adjustment holes (8) for vertical adjustment.

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

3-10.3.13 Removing/Installing Restrictor.

a. Removing.



(1) Lay the rebreather system on a flat surface.
(2) Release the latches on the bottom of the rebreather system and remove top cover (1).
(3) Slide the four snap latches (2) open and lift off center section cover (3).

NOTE

Do not expose absorbent to the atmosphere for more than one hour.

(4) Lift absorbent canister (4) out of center section (5).
(5) Unscrew restrictor (6) with preformed packing (7) from demand housing (8).

b. Installing.

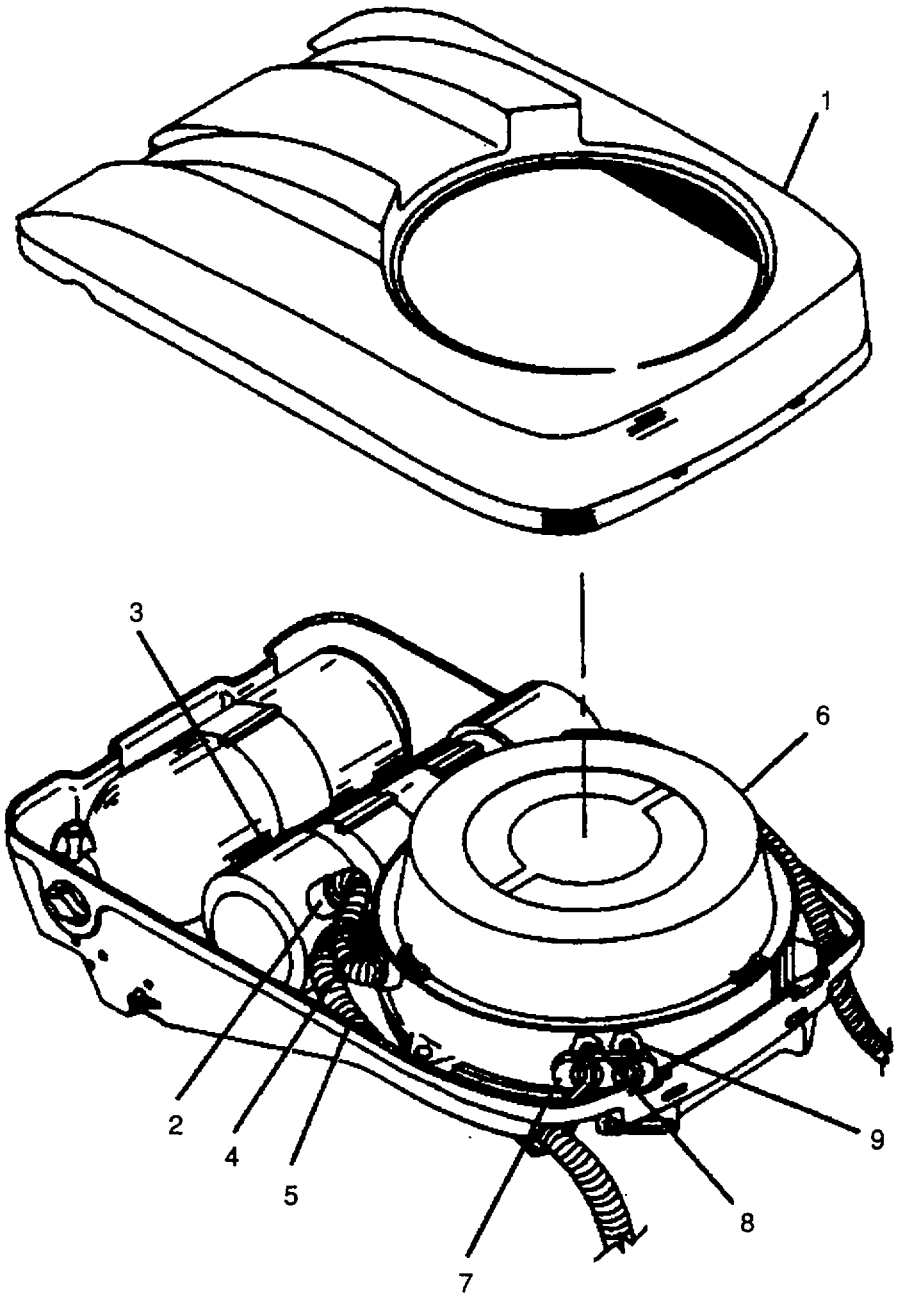
(1) Perform steps b. through d., paragraph 3-2.1, and lubricate preformed packing (7).
(2) Screw restrictor (6) with preformed packing (7) into demand valve housing (8) and tighten.
(3) Position absorbent canister (4) and push it down into center section (5).
(4) Position center section cover (3) on center section (5) and slide the four snap latches (2) closed.
(5) Perform the Oxygen Constant Flow Rate Test. Refer to paragraph 3-10.4.3.
(6) Install top cover (1).

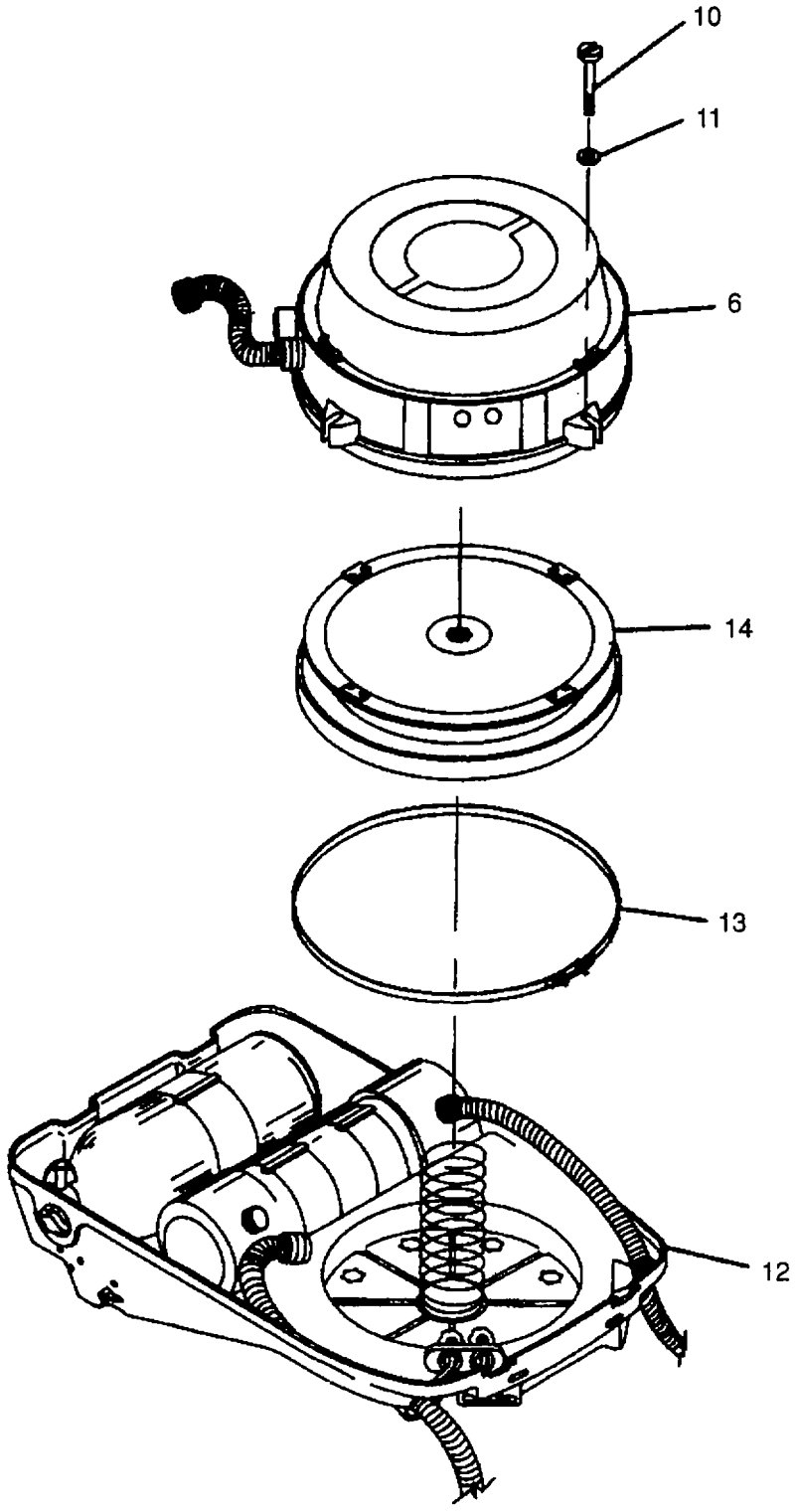
3-10.3.14 Removing/Installing Demand Valve Core.

a. Removing.

(1) Lay the rebreather system on a flat surface.
(2) Release the latches on the bottom of the rebreather system and remove the cover (1).
(3) Disconnect coolant canister hose (2) from coolant canister (3).
(4) Loosen hose clamp (4) and remove exhalation hose (5) from center section (6).

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

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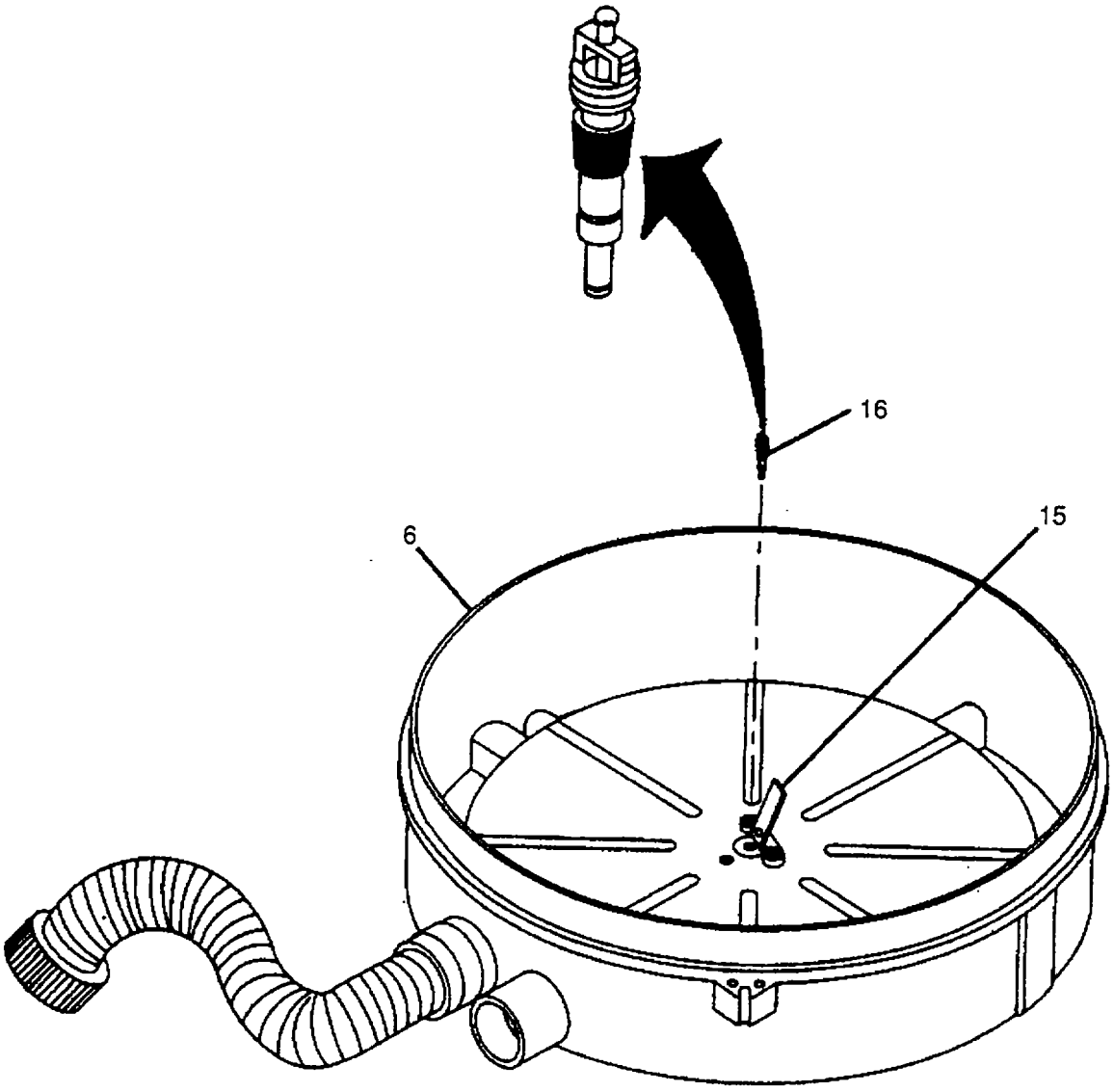
3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)



(5) Pull anti-rotation collar (7) clear of regulator tube (8) and bypass (9) connections.
(6) Disconnect regulator tube (8) and by pass tube (9) from center section (6).
(7) Remove screws (10) and washers (11) from center section (6).
(8) Lift center section (6) out of lower housing (12).
(9) Remove diaphragm clamp (13).
(10) Remove diaphragm assembly (14) from center section (6).
(11) From the underside of center section (6), hold valve actuator (15) up with a finger to gain access to demand valve core (16).
(12) Remove demand valve core (16) using the valve core extractor from the service kit.

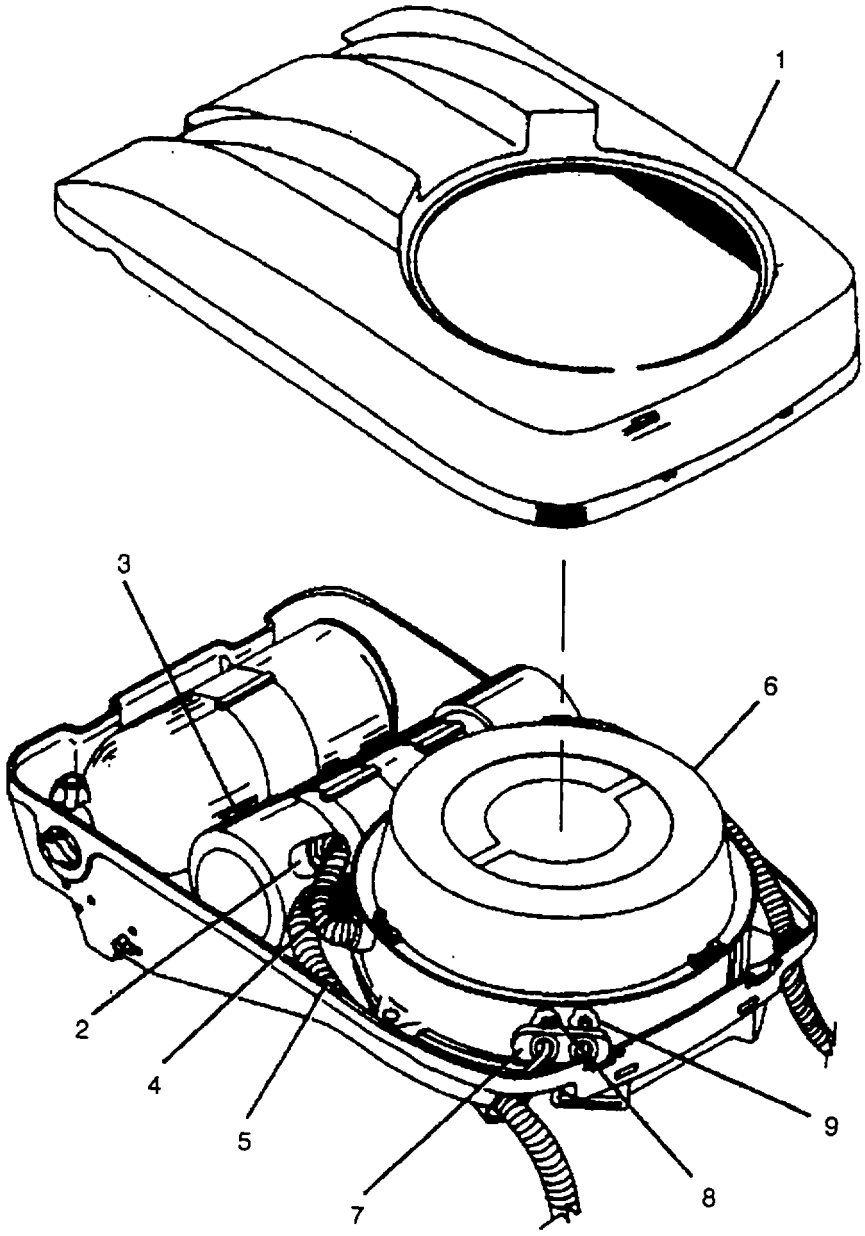
b. Installing.

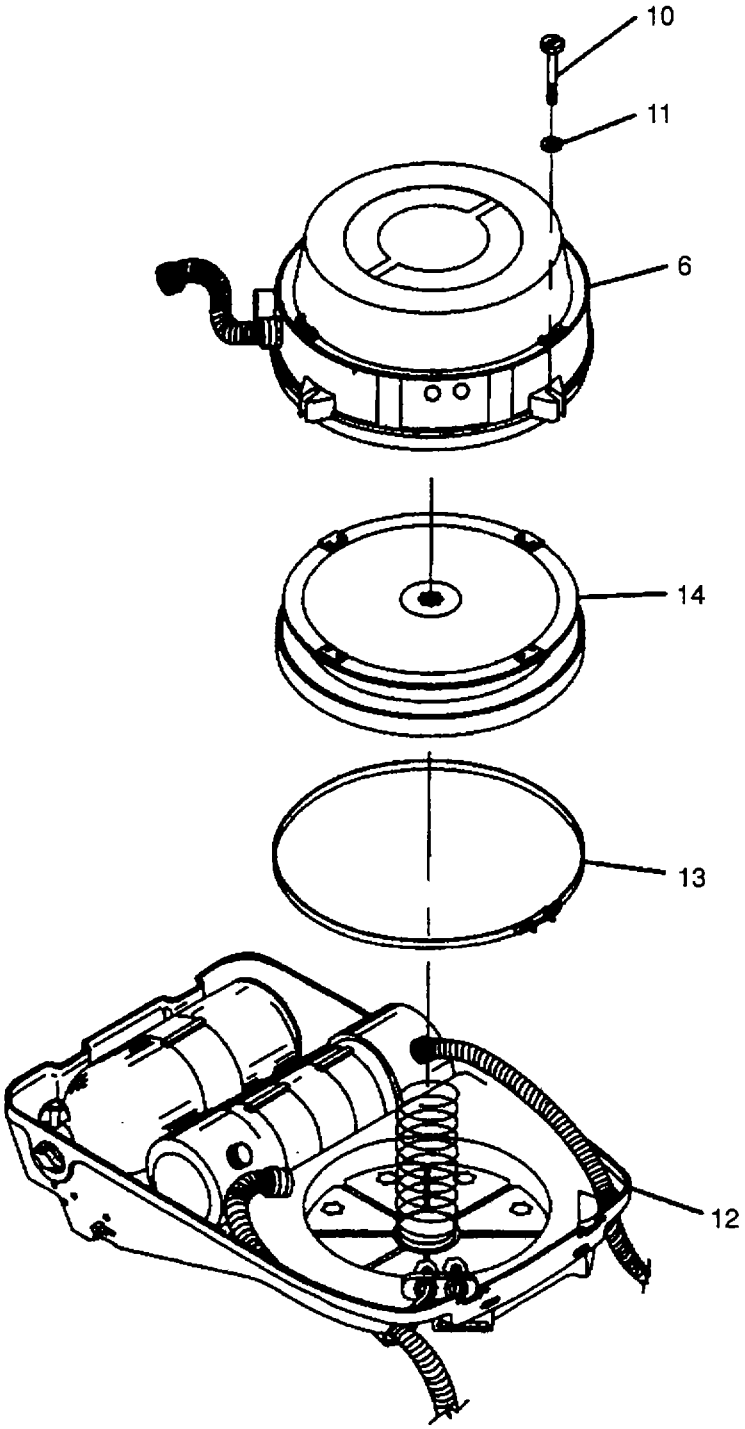
(1) Perform steps steps b. through d., paragraph 3-2.1, and lubricate demand valve core (16).
(2) From the underside of center section (6), hold valve actuator (15) up with a finger.
(3) Install demand valve core (16) using the valve core extractor from the service kit.
(4) Position diaphragm assembly (14) on center section (6) by running a finger around the diaphragm lip to pull it over the bottom of center section (6).
(5) Position diaphragm clamp (13) with the screw opposite regulator tube (8) and bypass tube (9) connections and tighten.
(6) Place center section (6) in lower housing (12) ensuring the connections for regulator tube (8) and by pass tube (9) are properly aligned.
(7) Install washers (11) and screws (10) into center section (6). Tighten screws (10) evenly.
(8) Connect regulator tube (8) and bypass tube (9) to center section (6).
(9) Carefully push anti-rotation collar (7) over regulator tube (8) and bypass tube (9) connections.
(10) Connect exhalation hose (5) to center section (6) using hose clamp (4).
(11) Connect coolant canister hose (2) to coolant canister (3).
(12) Perform the Breathing System Leak Test and the Oxygen Constant Flow Rate Test. Refer to paragraphs 3-10.4.2 and 3-10.4.3.
(13) Install top cover (1).

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

3-10.3.15 Removing/Installing Relief Valve Preformed Packing.

a. Removing.

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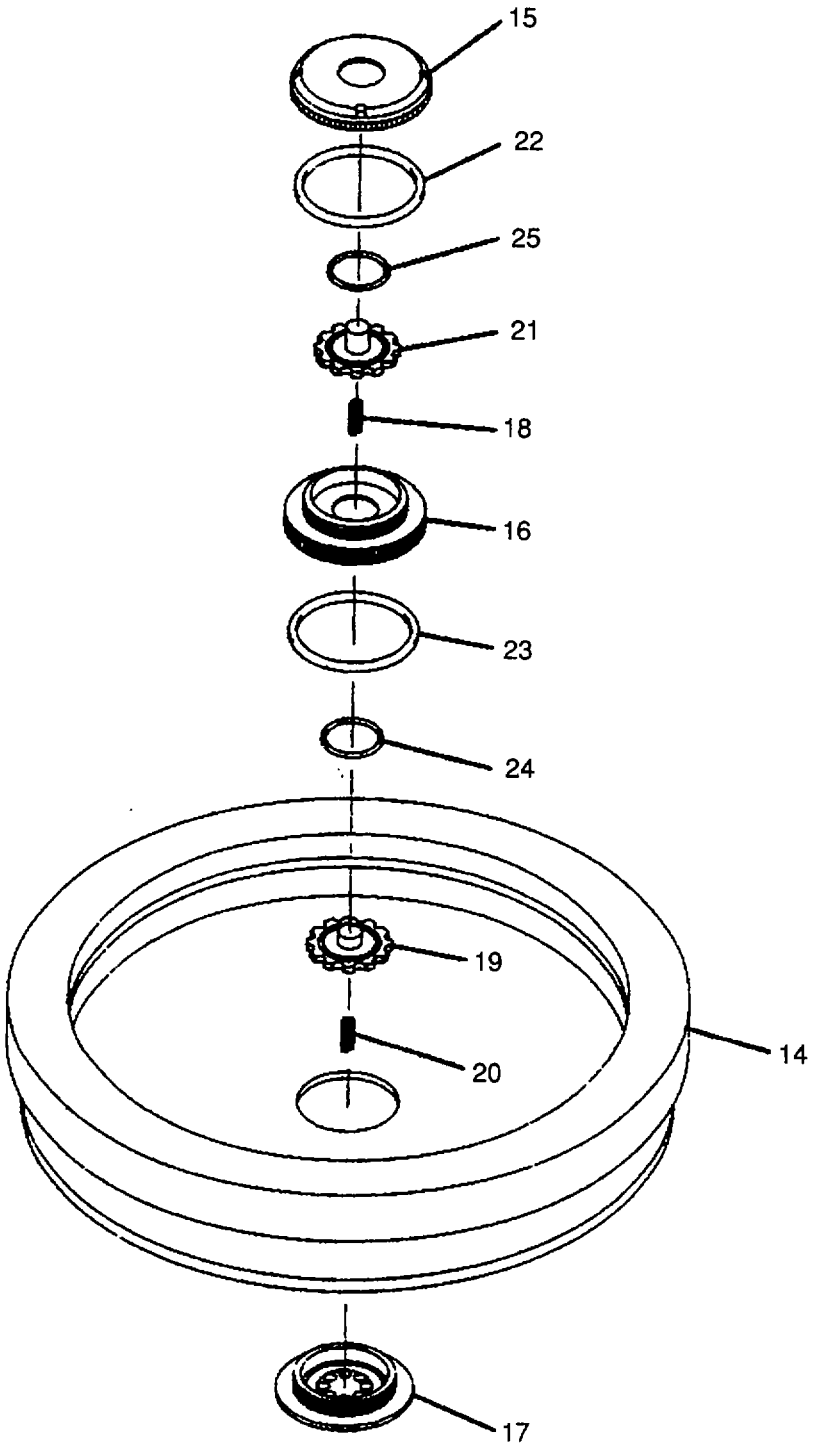
3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)



(1) Place the rebreather system on a flat surface.
(2) Release the latches on the bottom of the rebreather system and remove the cover (1).
(3) Disconnect coolant canister hose (2) from coolant canister (3).
(4) Loosen hose clamp (4) and remove exhalation hose (5) from center section (6).
(5) Pull anti-rotation collar (7) clear of regulator tube (8) and bypass tube (9) connections.
(6) Disconnect regulator tube (8) and bypass tube (9) from center section (6).
(7) Remove screws (10) and washers (11) from center section (6).
(8) Lift center section (6) out of lower housing (12).
(9) Remove diaphragm clamp (13).
(10) Remove diaphragm assembly (14) from center section (6).

NOTE

The valve body may come apart between parts (15) and (16). Slip joint pliers may aid in disassembly. If slip joint pliers are used, take precautions to prevent marring the surface of parts (15) and (16).

NOTE

Many parts are small in size. Precautions should be taken to prevent loss of parts.

(11) Unscrew valve bodies (15) and (16) from diaphragm guide (17) using the relief valve tool from the service kit.
(12) Remove silver compression spring (18), valve seat (19), and red compression spring (20) from diaphragm guide (17).
(13) Remove diaphragm guide (17) from diaphragm assembly (14).
(14) Unscrew valve body (15) from valve body (16) using slip joint pliers and relief valve tool.
(15) Remove valve seat (21) from valve body (16).
(16) Remove preformed packing (22) and (23) from valve bodies (15) and (16).
(17) Remove preformed packing (24) and (25) from valve seats (19) and (21).

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

b. Installing.

(1) Perform steps b. through d., paragraph 3-2.2, and lubricate the relief valve.
(2) Install preformed packing (24) and (25) on valve seats (19) and (21).
(3) Install preformed packing (22) and (23) on valve bodies (15) and (16).

NOTE

Valve seat (21) has a longer knob on top than valve seat (19).

(4) Set valve seat (19) into valve body (16) such that the knob comes through the hole in valve body (16).

NOTE

The silver and red compression springs do not provide the same amount of tension. Failure to install them in the proper valve seat will reduce the performance of the rebreather system.

(5) Set the red compression spring (20) into valve seat (19).
(6) Push diaphragm guide (17) through the opening in diaphragm assembly (14).
(7) Carefully screw valve body (16) with red compression spring (20) and valve seat (19) onto diaphragm guide (17) and hand tighten.
(8) Set valve seat (21) into valve body (15) such that the knob comes through the hole in valve body (15).

NOTE

The silver and red compression springs do not provide the same amount of tension. Failure to install them in the proper valve seat will reduce the performance of the rebreather system.

(9) Set silver compression spring (18) into valve seat (21).

NOTE

Silver compression spring (18) should rest on the knob of valve seat (19) when valve bodies (15) and (16) are connected.

(10) Carefully screw valve body (15) with silver compression spring (18) and valve seat (21) onto valve body (16).

(11) Tighten valve body (15) using the relief valve tool from the service kit.
(12) Position diaphragm assembly (14) on center section (6) by running a finger around the diaphragm lip to pull it over the bottom of center section (6).
(13) Position diaphragm clamp (13) with the screw opposite regulator tube (8) and bypass tube (9) connections and tighten.
(14) Place center section (6) in lower housing (12) ensuring the connections for regulator tube (8) and bypass tube (9) are properly aligned.
(15) Install washers (11) and screws (10) into center section (6). Tighten screws (10) evenly.
(16) Connect regulator tube (8) and bypass tube (9) to center section (6).
(17) Carefully push anti-rotation collar (7) over regulator tube (8) and bypass tube (9) connections.
(18) Connect exhalation hose (5) to center section (6) using hose clamp (4).
(19) Connect coolant canister hose (2) to coolant canister (3).
(20) Perform the Breathing System Leak Test. Refer to paragraph 3-10.4.2.
(21) Install top cover (1).

3-10.4 Testing.

NOTE

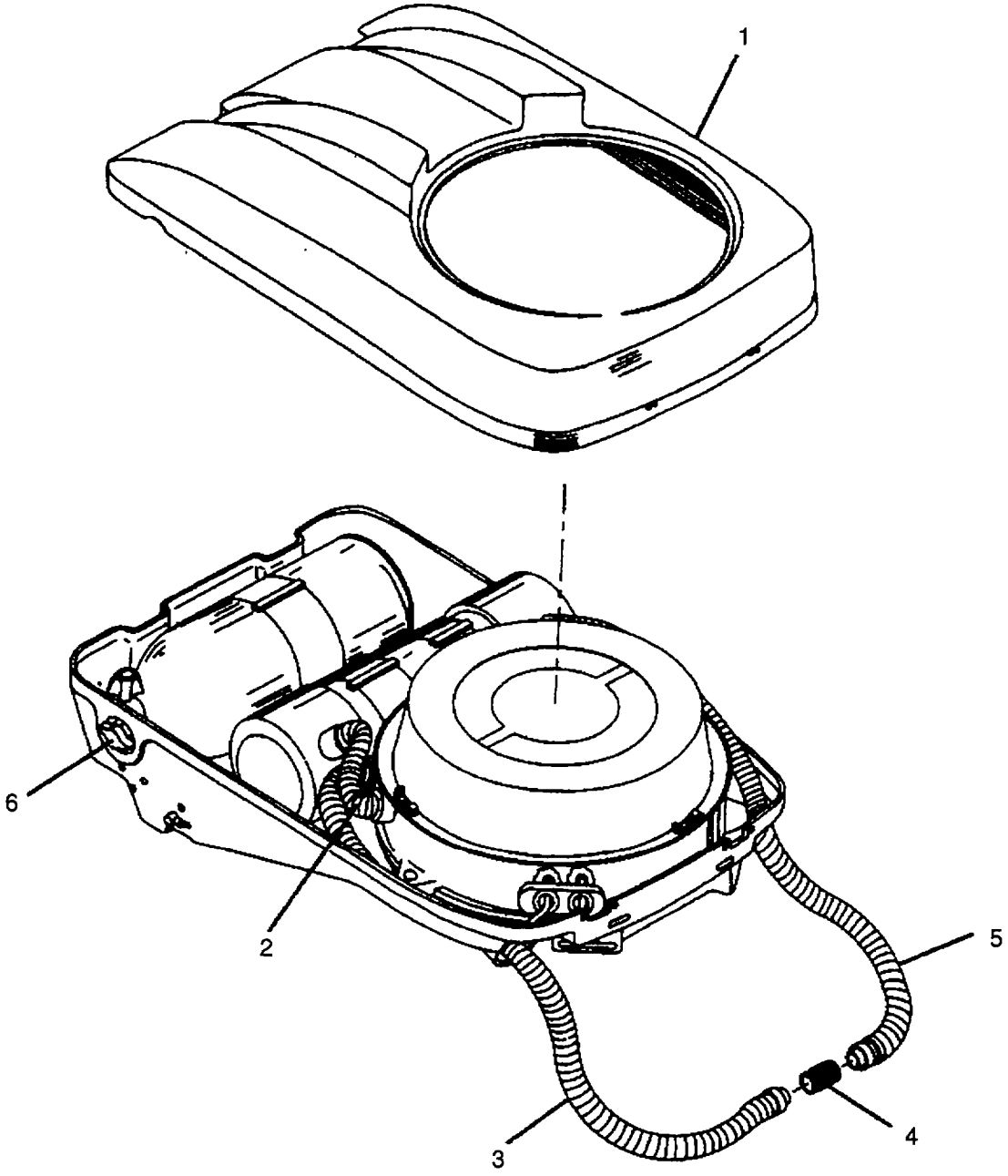
All tests shall be performed in the following order: breathing system leak test, plumbing leak test (if required) and the oxygen constant flow rate test.

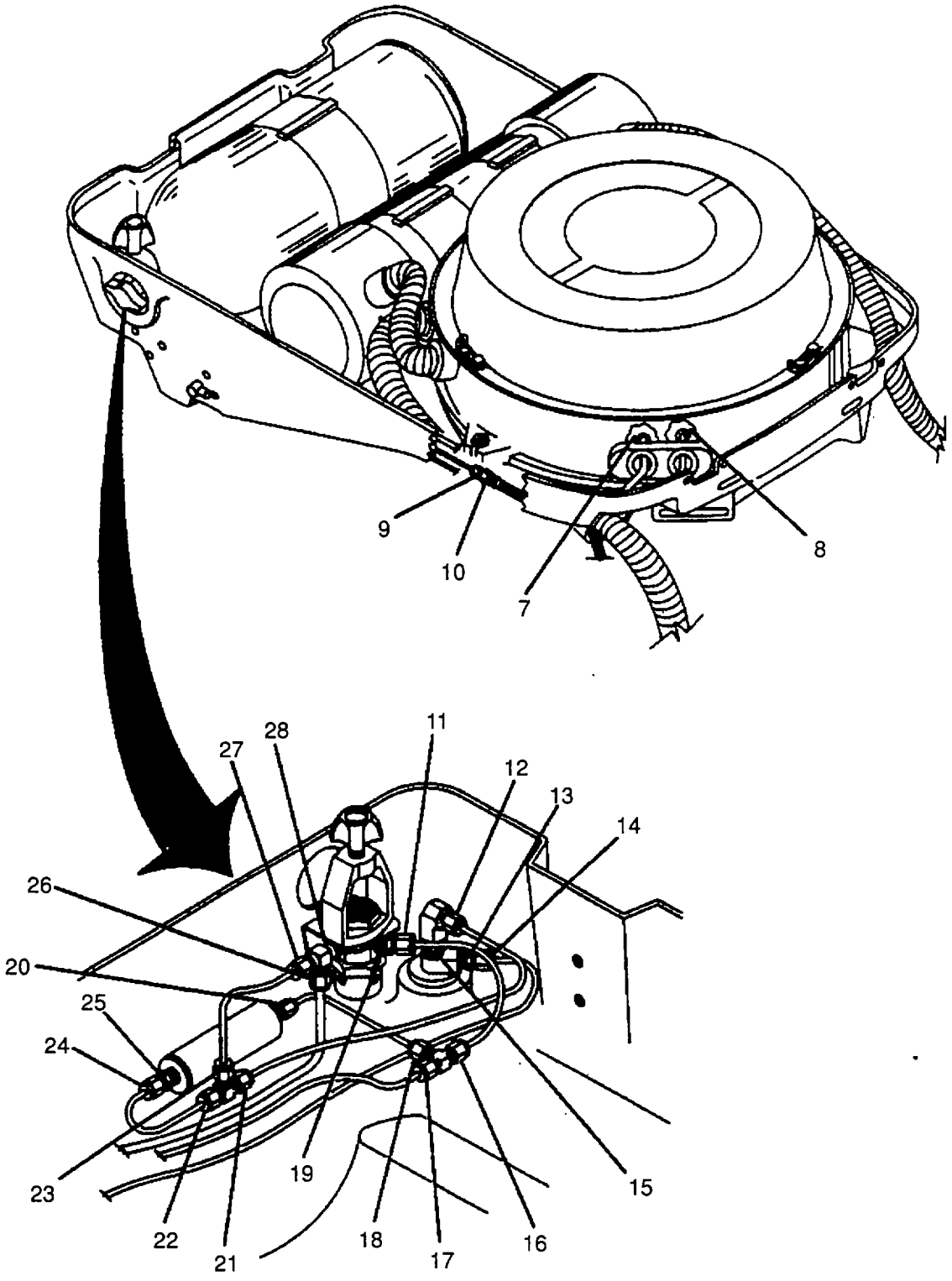
All tests shall be performed at the interval-specified in the Unit PMCS table, after maintenance as specified, or when equipment damage is suspected.

It is recommended that one oxygen bottle be designated as a "test bottle" and used to perform all required tests.

3-10. REBREATHER SYSTFM MAINTENANCE INSTRUCTIONS . (CONT)

3-10.4.1 Plumbing Leak Test.





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3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

a. Lay the rebreather system on a flat surface.
b. Release the latches on the bottom of the rebreather system and remove top cover (1).
c. If a fully charged oxygen bottle is not installed, perform steps b.(1) through b.(6), paragraph 3-10.3.1, and install a fully charged oxygen bottle.
d. Remove the red plug from coolant canister hose (2).

NOTE

The coolant canister does not have to be frozen to perform the test.

e. Perform steps b.(1) through b.(3), paragraph 3-10.3.2, and install a coolant canister.
f. Remove the red plug from exhalation hose (3).
g. Connect hose coupler (4) to exhalation hose (3) and inhalation hose (5).
h. Open oxygen bottle valve (6).

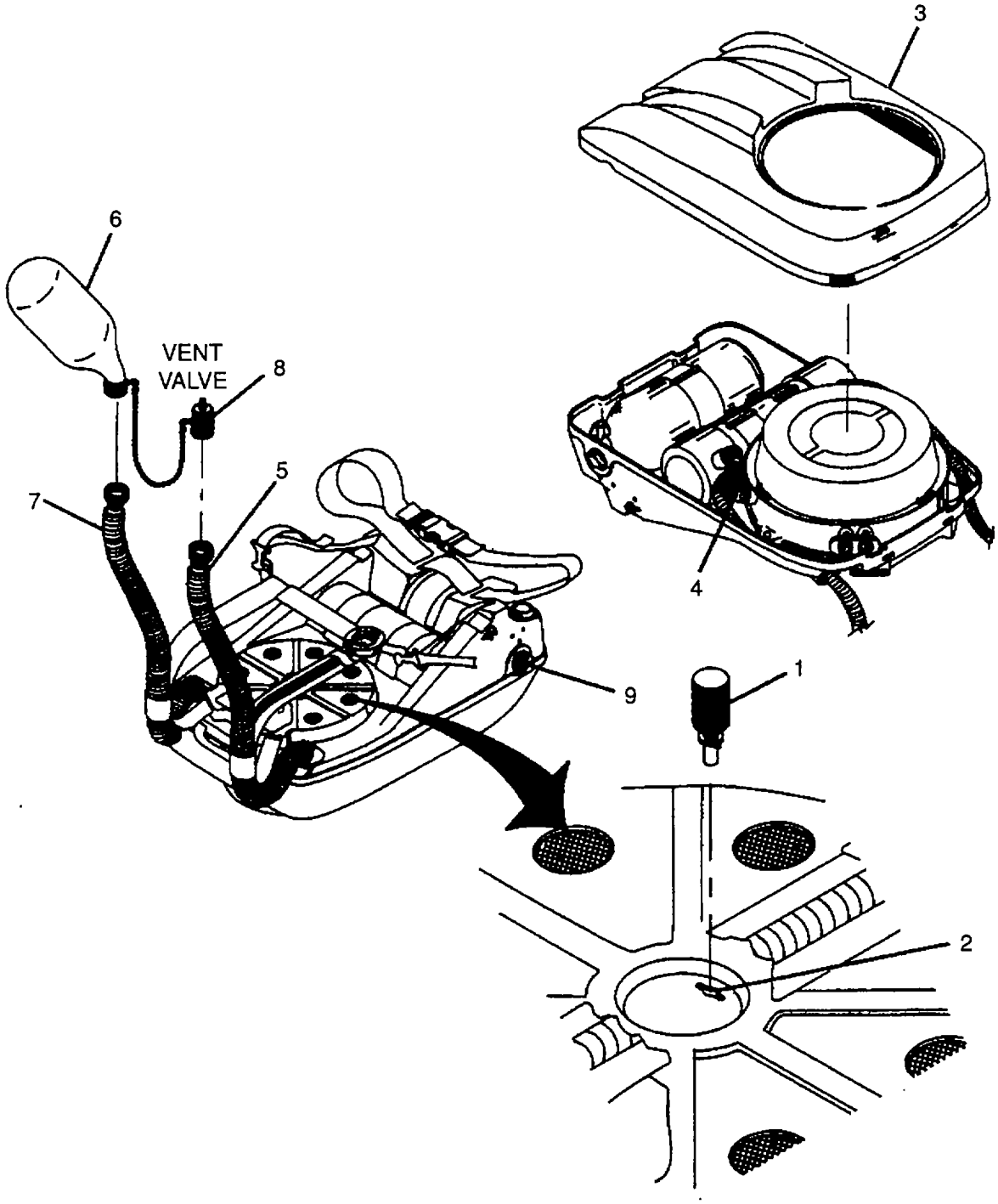
NOTE

The formation of soap bubbles is a positive sign of a leak.

i. Apply a soapy water solution to air line plumbing connections (7), (8), (9), (10), (11), (12), (13), (14), (15), (16), (17), (18), (19), (20), (21), (22), (23), (24), (25), (26), (27), and (28) and look for bubbles.
j. Close oxygen bottle valve (6) and relieve the pressure from the system by depressing the bypass valve.
k. Tighten any leaking connections and repeat steps h. through j.
l. Disconnect exhalation hose (3) and inhalation hose (5) from hose coupler (4).
m. Install the red plug in exhalation hose (3).
n. Perform steps a.(3) through a.(5), paragraph 3-10.3.2, and remove the coolant canister.
o. Install the red plug in coolant canister hose (2).
p. Perform steps a.(3) through a.(5), paragraph 3-10.3.1, and remove the oxygen bottle used for testing.
q. Wipe off excess soapy water solution.
r. Perform steps b.(1) through b.(6), paragraph 3-10.3.1, to install a fully charged oxygen bottle.

s. Install top cover (1).
t. Refer to paragraph 3-11.2.3 and store the rebreather system.

3-10.4.2 Breathing System Leak Test.



3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

a. Insert pressure test knob (1) in hole (2) in the back of the rebreather system.
b. Push and turn pressure test knob (1) 1/4 turn in either direction to lock it in position.
c. Lay the rebreather system on a flat surface.
d. Release the latches on the bottom of the rebreather system and remove top cover (3).
e. If a fully charged oxygen bottle is not installed, perform steps b.(1) through b.(6), paragraph 3-10.3.1, and install a fully charged oxygen bottle.
f. Remove the red plug from coolant canister hQse (4).

NOTE

The coolant canister does not have to be frozen to perform the test.

g. Perform steps b.(1) through b.(3), paragraph 3-10.3.2, and install a coolant canister.
h. Remove the red plug from exhalation hose (5).
i. Connect leak fixture balloon (6) to white inhalation hose (7).
j. Connect leak test fixture plug (8) to exhalation hose (5).
k. Holding inhalation hose (7) in the upright position, open oxygen bottle valve (9) to inflate leak test fixture balloon (6).

NOTE

If the leak test fixture balloon over-inflates, vent some air through the vent valve on the leak test fixture plug.

I. Close oxygen bottle valve (9) when leak test fixture balloon (6) lays at about a 450 angle to inhalation hose (7).
m. Observe leak test fixture balloon (6) for two minutes. If it does not decrease in size, continue to step r.
n. If leak test fixture balloon (6) decreases in size, perform the following checks:
   (1) Check all hose connections and fittings for a tight connection. Tighten any loose hose connections or referto paragraph 3-10.3.9 and replace any damaged hoses or connectors.
   (2) Perform plumbing leak test, paragraph 3-10.4.1.
o. Repeat steps k. through m.

p. If leak test fixture balloon (6) continues to decrease in size, perform the following checks:

(1) Refer to paragraph 3-10.3.4 and examine the preformed packing in the center section around the absorbent canister well for damage or a loose fit. Replace damaged or loose fitting preformed packing.
(2) Refer to paragraph 3-10.3.4 and examine the preformed packing in the center section connections for the regulator tube and the bypass tube for damage. Replace damaged preformed packing.

NOTE

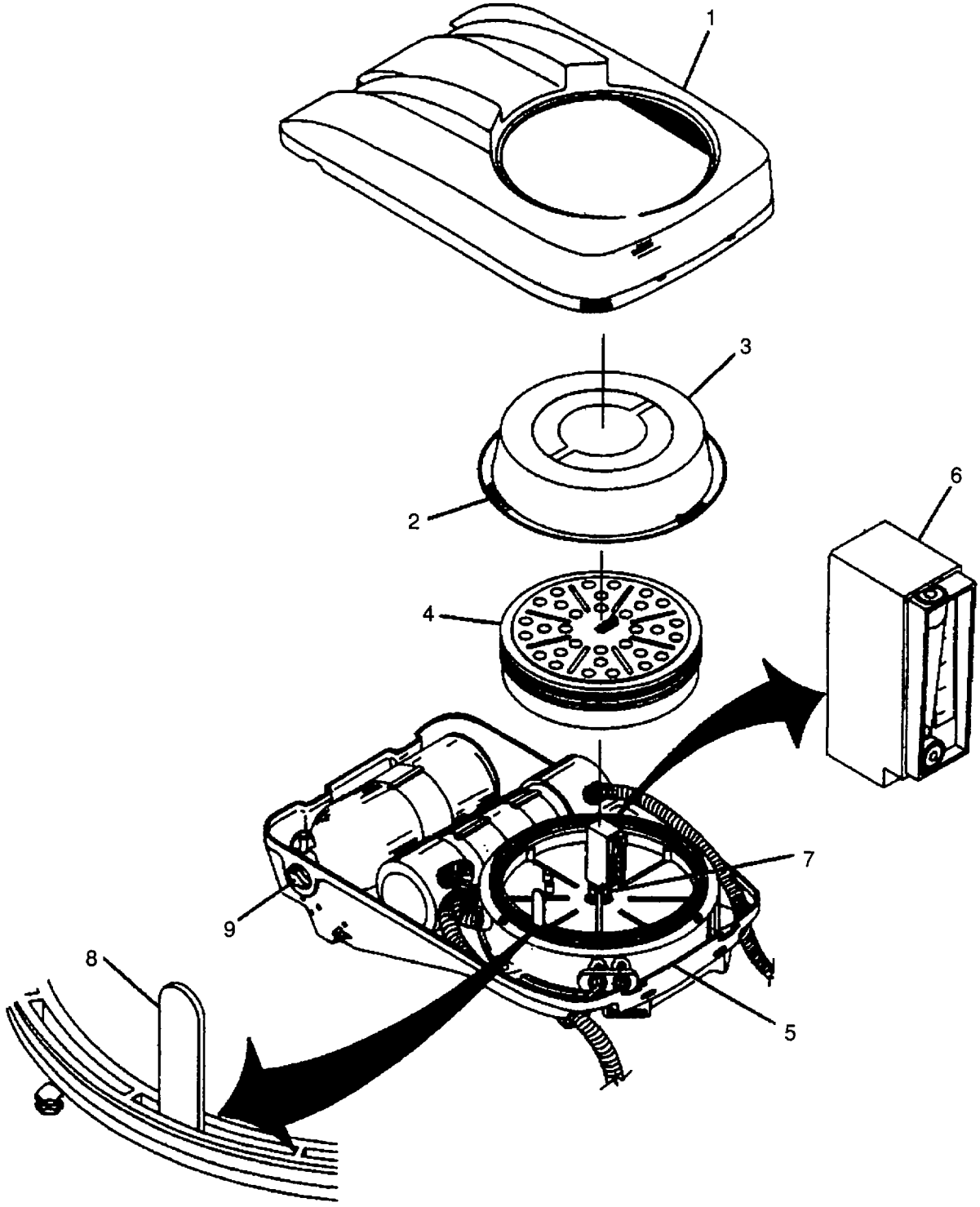
A common source of leaks is a poor seal around the diaphragm clamp.

(3) Refer to paragraph 3-10.3.15 and examine the diaphragm assembly for cracks and a tight seal around the diaphragm clamp. Reseat the diaphragm and tighten the diaphragm clamp if the seal is loose. Replace the diaphragm if damaged.
(4) Refer to paragraph 3-10.3.15 and examine the relief valve for damaged preformed packing and clean seating surfaces. Clean the seating surfaces. Replace damaged preformed packing.

q. Repeat steps k. through m. to retest the rebreather system.
r. Remove leak test fixture balloon (6) from inhalation hose (7) and leak test fixture plug (8) from exhalation hose (5).
s. Turn pressure test knob (1) 1/4 turn in either direction and pull it out of hole (2) in the back of the rebreather system.
t. Install the red plug in exhalation hose (5).
u. Perform steps a.(3) through a.(5), paragraph 3-10.3.2, and remove the coolant canister.
v. Install the red plug in coolant canister hose (4).
w. Perform steps a.(3) through a.(5), paragraph 3-10.3.1, and remove the oxygen bottle used for testing.
x. Perform steps b.(1) through b.(6), paragraph 3-10.3.1, to install a fully charged oxygen bottle.
y. Install top cover (3).
z. Refer to paragraph 3-11.2.3 and store the rebreather system.

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

3-10.4.3 Oxygen Constant Flow Rate Test.



a. Lay the rebreather system on a flat surface.
b. Release the latches on the bottom of the rebreather system and remove top cover (1).
c. Slide four snap latches (2) open and lift off center section cover (3).

NOTE

Do not expose absorbent to the atmosphere for more than one hour.

d. Lift absorbent canister (4) out of center section (5).
e. If a fully charged oxygen bottle is not installed, perform steps b. (1) through b. (6), paragraph 3-10. 3. 1, and install a fully charged oxygen bottle
f. Slip flow meter (6) over demand valve housing (7).
g. Push wooden tongue depressor (8) through one of the openings in center section (5) to hold the diaphragm away from the demand valve
h. Open oxygen bottle valve (9).

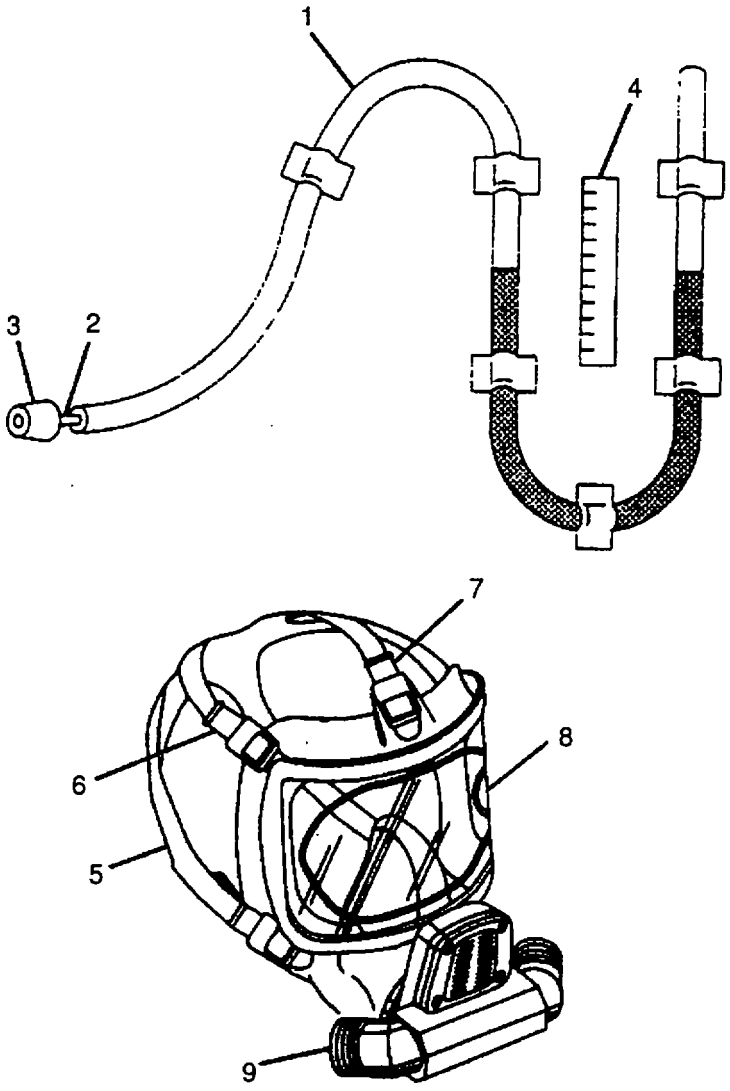
NOTE

The oxygen constant flow rate is preset to 1. 78 $\pm$ 0.13 liters per minute at sea level

i. Read flow meter (6).
j. Close oxygen bottle valve (9) and remove wooden tongue depressor (8).
k. Remove flow meter (6) from demand valve housing (7).
l. If the oxygen flow rate is 1.78 $\pm$ 0.13 liters per minute, skip to step q.
m. If the oxygen flow rate is not 1. 78 +$\pm$0. 13 liters per minute, refer to paragraph 3-10. 3. 13 and replace the restrictor
n. Repeat steps f. through k. to retest the rebreather system.
o. If the flow rate is still not 1.78 $\pm$ 0.13 liters per minute, perform the following checks:
   (1) Refer to paragraph 3-10.3.6 and replace the regulator assembly.
   (2) Refer to paragraph 3-10. 3.14 to remove and inspect the demand valve core. Replace the demand valve core if damaged
p. Repeat steps f. through k. to retest the rebreather system.
q. Position absorbent canister (4) and push it down into center section (5).
r. Position center section cover (3) on center section (5) and slide the four snap latches (2) closed.
s. Perform steps a. (3) through a. (5), paragraph 3-10. 3. 1, and remove the oxygen bottle used for testing
t. Perform steps b.(1) through b.(6), paragraph 3-10.3.1, to install a fully charged oxygen bottle.
u. Install top cover (1).
v. Refer to paragraph 3-11.2.3 and store the rebreather system.

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

3-10.4.4 Face Piece Fit Test.



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NOTE

The following procedure is an optional procedure that is not intended to replace the Army's standard face piece fit test. Face piece fitting should be conducted in accordance with local standard operating procedures (SOP)

NOTE

Perform the following procedure using the accompanying test fixture illustration

a. Construct a manometer by taping an eight foot long piece of 1/4-inch vinyl tubing (1) to a wall approximately four feet above the floor
b. Insert one end of a short piece of copper tubing (2) into a #6 one-hole rubber stopper (3).
c. Insert the other end of copper tubing (2) into the 1/4-inch vinyl tubing (1).
d. Add water to the 1/4-inch vinyl tubing (1) until both columns are about half full.
e. Tap with a finger or squeeze the 1/4-inch vinyl tubing (1) to remove any air bubbles in the water.
f. Tape a one foot ruler (4) to the wall between the two columns of water such that the six-inch mark on ruler (4) aligns with the water level in the two columns of water
g. Fully extend head harness straps (5), (6), and (7).
h. Place chin into the lower part of face piece (8).
i. Pull head harness straps (5), (6), and (7) back over the head.
j. Ensure all straps lie flat on the head.
k. Tighten chin straps (5).
l. Tighten temple straps (6).
m. Tighten top head strap (7).
n. Insert the #6 one-hole rubber stopper (3) into exhalation hose connector (9) on face piece (8).
o. Take a deep breath and slowly exhale.
p. Note the level of water in both columns of the 1/4-inch vinyl tubing (1) when leakage first occurs around face piece (8)
q. Stop exhaling and read the water level position when the water comes to rest in both columns of the 1/4-inch vinyl tubing (1) using the one foot ruler (4)
r. For a good face piece (8) fit, there should be a total displacement of at least six inches between the levels of water in the two columns of 1/4-inch vinyl tubing (1) when the water comes to rest

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

s. If the water displacement is less than six inches of water, remove the #6 one-hole stopper (3) from exhalation hose connector (9) of face piece (8) and tighten head harness straps (5), (6), and (7)

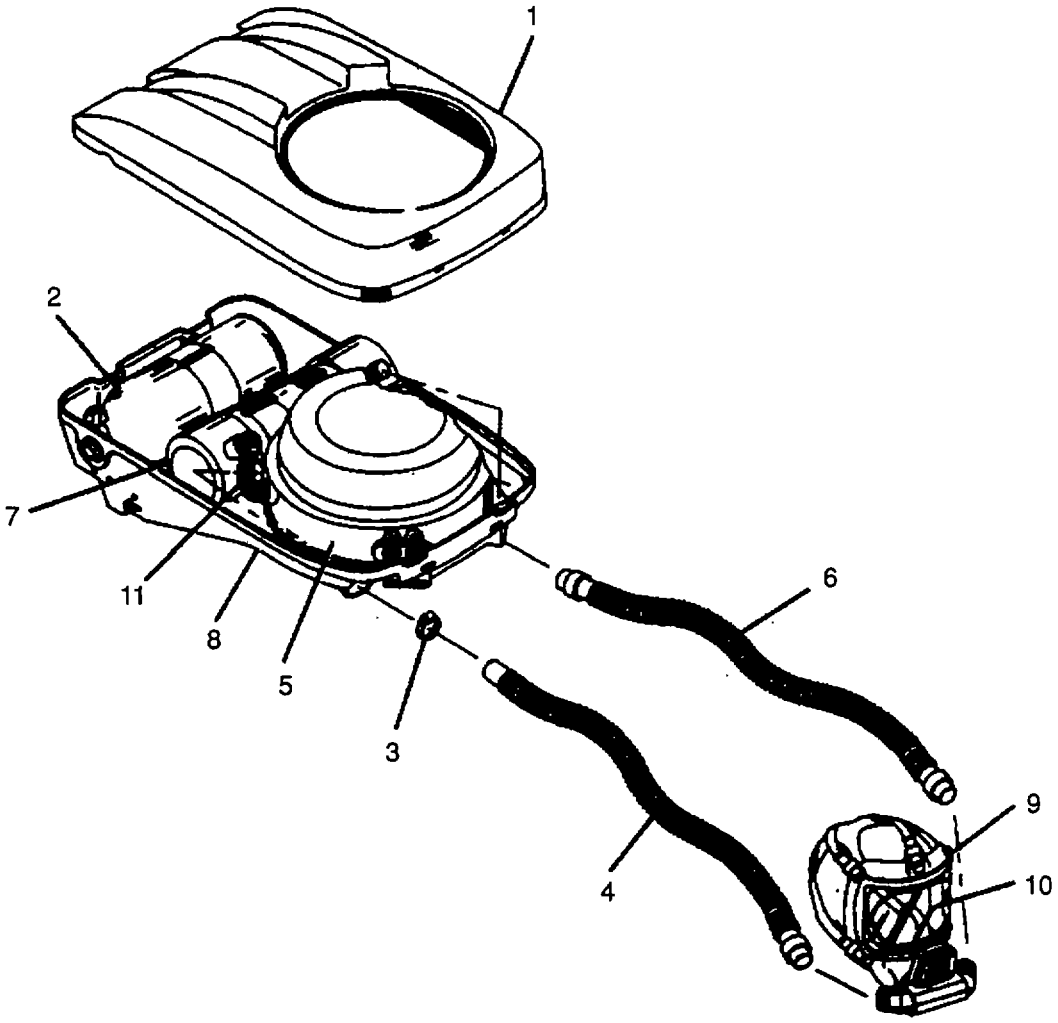
t. Reinsert the #6 one-hole stopper (3) into exhalation hose connector (9) of face piece (8) and repeat steps o. through r

u. Repeat steps s. and t. until a proper face piece (8) seal can be achieved.

v. If a proper seal cannot be achieved, replace face piece (8).

3-10.5 Cleaning.

a. Lay the rebreather system on a flat surface.



b. Release the latches on the bottom of the rebreather system and remove top cover (1).
c. Perform steps a.(3) through a.(5), paragraph 3-10.3.1, to remove the oxygen bottle (2).
d. Loosen hose clamp (3) on exhalation hose (4).
e. Remove exhalation hose (4) from center section (5).
f. Remove hose clamp (3) from exhalation hose (4).
g. Disconnect inhalation hose (6) from coolant canister (7).
h. Pull exhalation hose (4) and inhalation hose (6) through housing (8) openings.

CAUTION

Equipment damage. Do not use alcohol as a germicide when sanitizing the rebreather system. Alcohol will deteriorate the face piece lens and rubber parts and cause equipment failure. Replacement of all deteriorated parts is required.

i. Using the service kit sanitizing agent, immerse face piece (9), lens (10), exhalation hose (4) and inhalation hose (6)
j. Rinse face piece (9), lens (10), exhalation hose (4) and inhalation hose (6) several times with fresh water
k. Hang all parts up and allow them to air dry.
l. Disconnect coolant canister hose (11) from coolant canister (7) and remove coolant canister (7).
m. Empty accumulated condensate moisture through coolant canister (7) hose openings.
n. Pour about one quart of warm water and sanitizing agent into coolant canister (7) hose openings
o. Gently shake coolant canister (7) several times to agitate the solution.
p. Pour the solution out of coolant canister (7) hose openings.
q. Rinse the inside of coolant canister (7) with fresh water.
r. Allow coolant canister (7) to air dry.

3-10. REBREATHER SYSTEM MAINTENANCE INSTRUCTIONS . (CONT)

s. Remove center section cover (5) by sliding snap latches open and lifting the center section cover.
t. Remove absorbent canister from center section (5). Refer to paragraph 3-10. 2 to service the absorbent canister.
u. Pour approximately one quart of warm water containing the service kit sanitizing agent through coolant canister hose (11) and into the center section (5).
v. Gently shake the rebreather system several times to agitate the solution.
w. Pour the solution out of the center section (5) through coolant canister hose (11).
x. Rinse the inside of the center section (5) with fresh water.
y. Allow the rebreather to air dry.
z. Clean the webbing and exterior parts of the rebreather system with a mild soapy solution.
aa. Wipe the rebreather system dry with a clean cloth.

NOTE

Be careful not to crimp the hoses when connecting them.

ab. When dry, carefully push exhalation hose (4) and inhalation hose (6) through housing (8) openings.
ac. Slip hose clamp (3) over exhalation hose (4).
ad. Attach exhalation hose (4) to center section (5).
ae. Position and tighten hose clamp (3).
af. Place the "red" hose plugs in the open end of exhalation hose (4) and coolant canister hose (11) for storage.
ag. Install fully serviced absorbent canister in center section (5).
ah. Place cover on center section (5) and slide latches closed.
ai. Perform steps b.(1) through b.(6), paragraph 3-10.3.1, to install the oxygen bottle (2).
aj. Install top cover (1).

311. READY FOR USE STORAGE PROCEDURES.

3-11.1 Tether Mode Equipment.

3-11.1.1 Encapsulating Protective Suit.

a. Store the suit in a clean, dry, cool environment (50°F to 800F, 1 0°C to 22. 660C) away from direct sunlight.

b. Put the PVC hanger inside the shoulder area of the suit, ensuring the weight of the suit is evenly distributed across the hanger.

c. Close the slide fastener half way and hang the hanger by the metal hook.

3-11.1.2 Tether Line Assembly.

a. Coil the tether line assembly and tie the coil in three places. One tie at each end of the tether line assembly and one tie about half way between the other two ties.

b. Ensure adaptors F101 and F102 and the quick disconnect are with the tether line.

c. Store the tether line assembly in a clean, dry, cool environment (50°F to 800F,1 0°C to 26. 660C) close to where the emergency breathing apparatus (EBA) is stored.

3-11 1.3 Emergency. Breathing Apparatus (EBA).

a. Ensure a charged cylinder has been installed.

b. Ensure a filter cartridge has been installed in the filter housing.

c. Place the EBA inside the carrying case.

d. Roll the vent tubes up neatly to allow immediate unrolling without entanglement when the EBA is removed from the carrying case.

e. Ensure the face piece and breathing tube are placed along side of the EBA in the carrying case in such a manner that the breathing tube will not be pinched or damaged.

f. Ensure the cushion cover is in the carrying case.

g. Store the EBA inside the carrying case in a clean, dry, cool environment (50°F to 80°F, 10°C to 26. 66°C).

3-11. READY FOR USE STORAGE PROCEDURES. (CONT)

3-11.2 Rebreather System Mode Equipment.

3-11.2.1 Encapsulating Protective Suit.

a. Store the suit in a clean, dry, cool environment (50°F to 800F, 1 0°C to 26. 660C) away from direct sunlight.

b. Put the PVC hanger inside the shoulder area of the suit, ensuring the weight of the suit is evenly distributed across the hanger.

c. Close the slide fastener half way and hang the hanger by the metal hook.

3-11.2.2 Ice vest.

a. Store the ice vest in a clean, dry, cool environment (50°F to 800F, 10°C to 26.660C) away from direct sunlight.

b. Hang the ice vest on a standard coat hanger.

c. Store the battery separately from the ice vest in the charging mode, plugged into the battery charger.

d. Store the gel packs in a freezer or insure cubed or crushed ice is available.

3-11.2.3 Rebreather System.

a. Ensure a fully charged oxygen bottle has been installed.

b. Ensure fresh CO2 absorbent has been put in the absorbent canister and is filled to the full line.

WARNING

Suffocation Hazard. Ensure "red" hose plugs are installed in the ends of the black exhalation hose and the coolant canister hose. Failure to close hose ends during storage of the rebreather will expose the CO_2 absorbent to the atmosphere reducing the efficiency of CO_2 removal from the breathing air in subsequent operations causing the user to suffocate.

c. Remove the face piece and install the "red" hose plugs in the ends of the black exhalation hose and the coolant canister hose.

d. Store the coolant canister in a nearby freezer.

e. Ensure the maintenance tag is up to date and attached to the oxygen bottle valve.

f. Place the rebreather system and face piece inside the carrying case.

g. Store the rebreather system inside the carrying case in a clean, dry, cool environment (50°F to 80°F, 10°C to 26.660C).

Section IV. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

3-12. GENERAL. Table 3-2 (Unit PMCS table) has been provided so you can keep your Self-Contained, Toxic Environment, Protective Outfit-Interim in good operating condition and ready for its primary mission.

3-12.1 After You Operate. Be sure to perform your after operation (A), PMCS after the equipment has been taken out of its mission mode or returned to its containment area.

3-12.2 Quarterly Checks. Perform your Quarterly (Q) PMCS to ensure no damage has occurred during * storage and that the equipment is ready for use.

3-12.3 If Your Equipment Fails To Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA PAM 738-750.

3-13. UNIT PMCS PROCEDURES.

a. The Preventive Maintenance Checks and Services table lists the inspections and care of your equipment required to keep it in good operating condition.

b. Use the "Item No." column of the PMCS table to supply the item number used in the “TM Number" column of DA Form 2404.

c. The interval column of the PMCS table tells you when to do a certain check or service.

d. Perform the monthly PMCS if:

   (1) You are assigned to maintain the equipment and it has not been operated since the last PMCS.

   (2) Your are inspecting the equipment for the first time.

e. The item to be inspected column of the PMCS table tells you the piece of equipment and the part to be inspected.

f. The procedure column of the PMCS table tells you how to do the required checks and services. Carefully follow these instructions.

g. Equipment is not ready/available if: column tells you when and why your equipment cannot be used.

h. If your equipment does not perform as required, refer to Chapter 3 under Troubleshooting for possible problems. Report any malfunctions or failures on DA Form 2404, or refer to DA PAM B 738750.

Table 3-2. Unit Preventive Maintenance Checks and Services for the STEPO-I
A - After Operation Q - Quarterly

Item No.	INTERVAL A	INTERVAL Q	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
			Encapsulating Protective Suit		
1		•	Fabric	Lay suit flat. Look for holes, cuts, pits, blisters, delamination, tunnels, lumps or imbedded foreign matter, uncoated areas, and scratches, abrasions, cracks, rips and tears on the inside and outside of the suit. Mark with chalk. (See paragraph 3-6.1)	Damaged fabric is found.
2		•	Slide Fastener	Ensure slide fastener is in good working order.	Non-working slide fastener.
3		•		Lubricate with paraffin.	Non-working slide fastener.
4		•	Storm Flap	Inspect hook and pile fastener tape to make sure it is not coming loose. **NOTE** Damage may appear between the finger area.	Loose hook and pile fastener tape.
5		•	Glove Assembly	Inspect for a tight assembly, cuts, cracks, rips and tears.	A loose assembly or damage is found.
6		•	Seams loose.	Ensure seam areas are not coming Inspect for open seam completely through suit, strapping not cemented so it pulls off seam with little resistance, blisters, delamination, tunnels and exposed stitching.	Seams are loose. Blisters, delamination, tunnels, loose strapping, open seam or exposed stitching is found.
7		•	View Window	Inspect for a tight seal and cracks. Clean window using a clean, damp cloth, to remove dust and dirt.	Loose seal or cracked window.
8		•		Ensure view window overlay is in place.	Overlay is missing.
9		•	Passthrough Assembly	Inspect suit opening and assembly preformed packing for a proper and tight fit. **NOTE** Suit plugs are red and larger than the valves.	Enlarged opening or damaged preformed packing. Loose fit.
10		•	Exhalation Valves/Plugs	Ensure valves are installed for the tether system and plugs are installed for the rebreather system.	Suit arranged for the wrong system.

Table 3-2. Unit Preventive Maintenance Checks and Services for the STEPO-I (Cont)
A - After Operation Q - Quarterly

Item No.	INTERVAL A	INTERVAL Q	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
11		•	Internal Hood Flap	Ensure all four snaps are secure. **NOTE** The encapsulating protective suit shall be pressure tested before initial wear, after specified maintenance, monthly and when damage is suspected due to a visual inspection.	Snaps are not in place.
12		•	Complete Suit	Pressure test. (See paragraph 3-6.4.) **NOTE** PMCS steps 13 through 41 pertain to the tether mode.	Suit fails the pressure test.
			Tether Line (Tether Mode)		
13	•	•	Tether Line	Ensure tether line is available.	Tether line not available.
14	•	•		Inspect tether line female connector for thread damage and ensure preformed packing is in place.	Damage is found or preformed packing is missing.
15	•	•	Adapter Fittings	Ensure adapter F101, F102 and quick disconnect are available.	Fittings are not available.
16	•	•		Inspect adapter F102 for thread damage.	Damage is found.
17	•	•		Inspect adapter F101 for thread damage and ensure preformed packing is in place.	Damage is found or preformed packing is missing.
			EBA (Tether Mode)		
18	•	•	Vent Tubes	Ensure tubes are secure, not tangled, have wrist and ankle straps, clean and not cut.	Tubes are loose, missing straps, dirty or cut.
19	•	•		Ensure tube air holes are not covered.	Air holes covered.

Table 3-2. Unit Preventive Maintenance Checks and Services for the STEPO-I (Cont)
A - After Operation Q - Quarterly

Item No.	INTERVAL A	INTERVAL Q	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
20	•			Disconnect face piece vent tube coupling.	Coupling is connected.
21	•	•	Vent Tube Plugs	Ensure plugs are installed in vent tube ends.	Plugs missing.
22	•	•	Metal Tubing	Inspect for damage and tightness of connections.	Damage is found or connections are loose.
23	•	•	Waist and Chest Straps	Inspect webbing for rips or tears and broken buckles.	Webbing is ripped or torn or buckles broken.
24	•	•	Face Piece	Inspect for cuts, holes or any other damage.	Cuts, holes or damage is found.
25	•	•		Ensure lens is clean.	Dirty lens.
26	•			Clean, disinfect and sanitize (See paragraph 3-9.4)	Unit not clean.
27	•	•	Head Harness Straps	Inspect for missing or broken buckles. Ensure proper fit.	Buckles are broken or missing. Proper fit cannot be made by minor adjustments.
28	•	•	Breathing Tube	Inspect breathing tube for damage and ensure the cover is tied at both ends.	Damage is found or cover not tied on.
29	•			Disconnect breathing tube from regulator.	Breathing tube is attached.
30	•	•	Face Piece Light	Ensure warning light lamp is installed.	Lamp not installed.
31	•		Warning Light Cable	Disconnect face piece electrical connector **NOTE** The filter cartridge will be replaced after each use or every 6 months for a unit in storage.	Cable is connected.
32	•	•	Filter	Ensure filter has been installed in filter housing.	Filter missing.

Table 3-2. Unit Preventive Maintenance Checks and Services for the STEPO-I(Cont)

A - After Operation **Q - Quarterly**

Item No.	INTERVAL A	INTERVAL Q	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
				CAUTION Equipment corrosion hazard. Remove the battery from the EBA battery box when the unit is not in use. Failure to remove the battery may cause equipment damage from corrosion and require replacement of the EBA.	
33		•	Battery	Ensure "D" size battery is available.	Battery not available.
34	•			Remove battery from battery box.	Battery is installed.
35	•	•	Cylinder	Check the pressure gauge to ensure the cylinder is charged to approximately 2500 PSIG. **NOTE** The hydrostatic test date is stamped on the cylinder near the neck.	Cylinder is not charged approximately 2500 PSIG or date of last hydrostatic test is not current.
36		•		Check hydrostatic test date	Test date is over 5 years old.
37	•	•	Cushion Cover	Ensure cushion cover is available.	Cushion cover not available.
38	•	•		Check for cuts, rips, tears, missing or broken snaps. **NOTE** The EBA shall be tested before initial wear, after each use, monthly, after specified maintenance and when damage is suspected due to a visual inspection or poor performance.	Damage is found.
39	•	•	Leak Test	Perform leak test (See paragraph 3-9.3.3).	Fails leak test.
40	•	•	Static Pressure Test	Perform static pressure test. (See paragraph 3-9.3.1)	Fails the pressure test.
41	•	•	Air Flow Performance Test	Perform air flow performance test. (See paragraph 3-9.3.2.) **NOTE** PMCS steps 42 through 67 pertain to the rebreather system mode.	Fails the test.

Table 3-2. Unit Preventive Maintenance Checks and Services for the STEPO-I(Cont)

A - After Operation **Q - Quarterly**

Item No.	INTERVAL A	INTERVAL Q	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
			Rebreather System (Rebreather System Mode)		
42	•		Rebreather system.	Clean, disinfect and sanitize the (See paragraph 3-10.5)	Unit not clean.
43		•		Visually ensure unit is clean.	Unit is dirty.
44	•	•	Bypass Button	Depress the bypass button to ensure it operates properly.	The bypass button fails to operate.
45		•	Face Piece	Ensure lens is clean.	Lens is dirty.
46	•	•		Inspect for cuts, holes or any other damage.	Cuts holes or damage is found.
47	•	•	Air Hoses	Inspect hoses for cuts, holes or any other damage.	Cuts, holes or damage is found.
48	•			Disconnect air hoses from face piece. **NOTE** The CO_2 absorbent must be replaced if the air hose plugs are missing.	Air hoses connected.
49	•	•	Air Hose Plugs	Ensure red plugs are installed in the ends of the exhalation hose and coolant canister hose. **NOTE** The CO_2 absorbent will be replaced after each use or every 12 months for a unit in storage.	Plugs missing.
50	•	•	CO_2 Absorbent	Ensure maintenance tag indicates CO_2 absorbent is fresh.	Maintenance tag is missing or outdated.
51	•			Change the CO_2 absorbent. (See paragraph 3-10.2) maintenance tag missing.	Absorbent not changed or
52	•	•·	Absorbent Canister Well Preformed Packing	Ensure preformed packing are clean and have a thin film of silicone lubricant on them.	Preformed packing are dirty, cut or have no lubricant.
53	•	•	Coolant Canister	Ensure canister is placed in freezer.	Canister not frozen.

Table 3-2. Unit Preventive Maintenance Checks and Services for the STEPO-I(Cont)

A - After Operation **Q - Quarterly**

Item No.	INTERVAL A	INTERVAL Q	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
				WARNING Compressed oxygen hazard. Replace the rebreather oxygen bottle if it is suspected to be leaking. Damaged oxygen bottles must be repaired ONLY by personnel trained and certified to accomplish such work. Tampering with damaged oxygen bottles could result in personnel injury or death due to combustion or sudden release of high pressure.	
54	•	•	Oxygen Bottle	Ensure bottle is pressurized and indicates 2,400 PSIG and date of last hydrostatic test is current. **NOTE** The hydrostatic test date is on the label or stamped on the cylinder near the neck.	Bottle is below 2,400 PSIG or date of last hydrostatic test is not current.
55		•		Check hydrostatic test date.	Test date is over 3 years old.
56	•	•	Adjustable Straps	Inspect webbing for rips, tears, missing or broken buckles and cleanliness. **NOTE** The rebreather system shall be tested before initial wear, after each use, monthly, after specified maintenance and when damage is suspected due to a visual inspection or poor performance.	Webbing is ripped or torn or buckles are broken or missing.
57	•	•	Breathing System Leak Test	Perform leak test. (See paragraph 3-10.4.2.)	Fails the leak test.
58	•	•	Oxygen Constant Flow Rate Test **Ice Vest** (Rebreather System Mode)	Perform oxygen constant flow test. (See paragraph 3-10.4.3)	Fails the test.
59	•	•	Battery	Ensure a battery available.	Battery is not available.

Table 3-2. Unit Preventive Maintenance Checks and Services for the STEPO-I(Cont)

A - After Operation **Q - Quarterly**

Item No.	INTERVAL A	INTERVAL Q	Item To Be Inspected	Procedures Check For And Have Repaired Or Adjusted As Necessary	Equipment Is Not Ready/ Available If:
60	•			Remove and recharge battery. (See paragraphs 3-8.2.2 and 3-8.3.)	Battery is installed.
61	•	•	Coolant Bag	Inspect bag for rips, tears or holes. **NOTE** The coolant bag holds four (4) pounds of cube or crushed ice or three (3) gel packs. Gel packs require 8-10 hours to fully freeze and provide longer operating time. Approximately one (1) quart of potable water is necessary to operate the ice vest.	Bag is punctured.
62		•		Ensure the required amount of ice or gel packs and potable water are available. **CAUTION** Equipment damage. Always completely drain the coolant bag to prevent mildew inside the ice vest. Failure to drain the coolant bag may cause equipment failure from mildew and require replacement of the coolant bag or ice vest.	Ice, frozen gel packs or water are not available.
63	•			Drain the coolant bag and remove ice or gel packs.	Left full.
64		•	On/Off Switch	Operate the switch to ensure it is working properly. installation of battery.)	Pump fails to start. (Requires
65		•	Temperature Regulating Valve	Rotate valve to ensure it is working properly.	Valve fails to operate.
66	•	•	Adjustable Straps	Inspect for missing broken buckles. Ensure proper fit.	Buckles are broken or missing. Proper fit cannot be made by minor adjustments.
67	•	•		Inspect webbing for rips or tears.	Webbing is ripped or torn.

Section V. UNIT PREPARATION OF EQUIPMENT FOR USE

3-14. GENERAL. This section provides instructions for unit preparation of the STEPO-I ensemble prior to use by the operator. Preparation of the encapsulating protective suit and associated equipment for use in the tether mode and rebreather mode are presented here.

3-15. PREPARATION OF THE ENCAPSULATING PROTECTIVE SUIT FOR USE.

a. Ensure the encapsulating protective suit had been properly stored, ready for use. Refer to paragraph 3-11.1.1.

b. Ensure external back take-up straps are connected and tight for use with the EBA and tethered air system. External back take-up straps should not be connected for use with the rebreather system.

3-16. PREPARATION OF THE TETHER LINE FOR USE .

a. Ensure the tether line assembly had been properly stored, ready for use. Refer to paragraph 3-11.1.2.

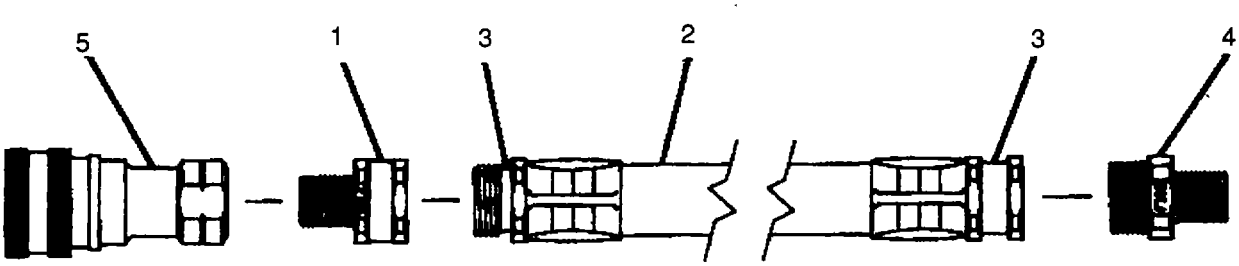
b. Remove the ties from the coiled tether line assembly and uncoil it.

NOTE

A maximum of six 50-foot lengths of tether line may be used to form a 300-foot tether line assembly.

NOTE

Female tether line fittings and adapter F101 have preformed packing in them.



c. Ensure tether line female fittings and adapter F101 (1) have the preformed packing in place.

d. Connect the required number of 50-foot lengths of tether line (2) together and tighten fittings (3) using two wrenches.

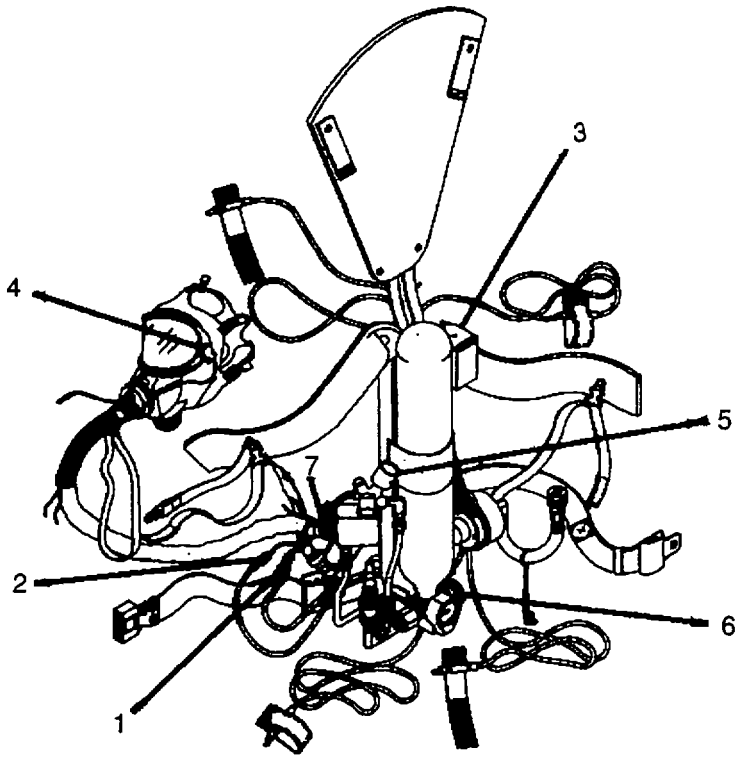
e. Apply anti-seize tape to the threads of adapter F101 (1) and adapter F102 (4).

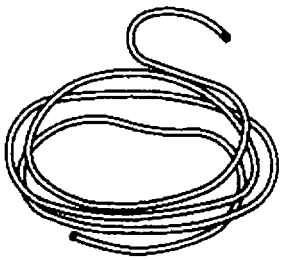
f. Attach adapter F101 (1) and adapter F102 (4) to opposite ends of the tether line and tighten using two wrenches.

g. Attach quick disconnect (5) to adapter F101 (1) and tighten using two wrenches.

3-17. PREPARATION OF THE EMERGENCY BREATHING APPARATUS (EBA) FOR USE .

a. Ensure the emergency breathing apparatus (EBA) had been properly stored, ready for use. Refer to paragraph 3-11.1.3.





b. Connect electrical connector (1) and vent tube (2).

NOTE

For all-purpose use, a 1.5 volt "D" size alkaline-manganese battery should be used.

c. Install a "D" size battery in battery box (3).

d. Perform the following checks and tests:

CAUTION

EBA regulator damage. Follow the correct procedures when preparing or operating the EBA. Opening the regulator valve and cylinder valve out of sequence may cause damage to the regulator and require regulator replacement prior to use.

(1) Test warning light (4) as follows:

(a) Depress the button and turn regulator valve (5) clockwise to close it.

(b) Open cylinder valve (6) by turning it slowly counterclockwise.

NOTE

The warning light should burn steadily.

(c) Cover regulator valve outlet (7) with your palm and open regulator valve (5) by turning it counterclockwise until it clicks.

(d) Close cylinder valve (6) by turning it clockwise.

(e) Slowly remove your palm from regulator valve outlet (7) and release the trapped air.

NOTE

The warning light should begin flashing.

(f) Close the regulator valve (5).

(2) Check the system for leaks as follows:

(a) Install the dust cap over the regulator outlet (7).

(b) Place your hand over the dust cap and regulator outlet (7).

(c) Open the cylinder valve (6).

(d) Open the regulator valve (5) and listen for leaks.

(e) If leaks are suspected, refer to paragraph 3-9.3.3 to leak test the EBA.

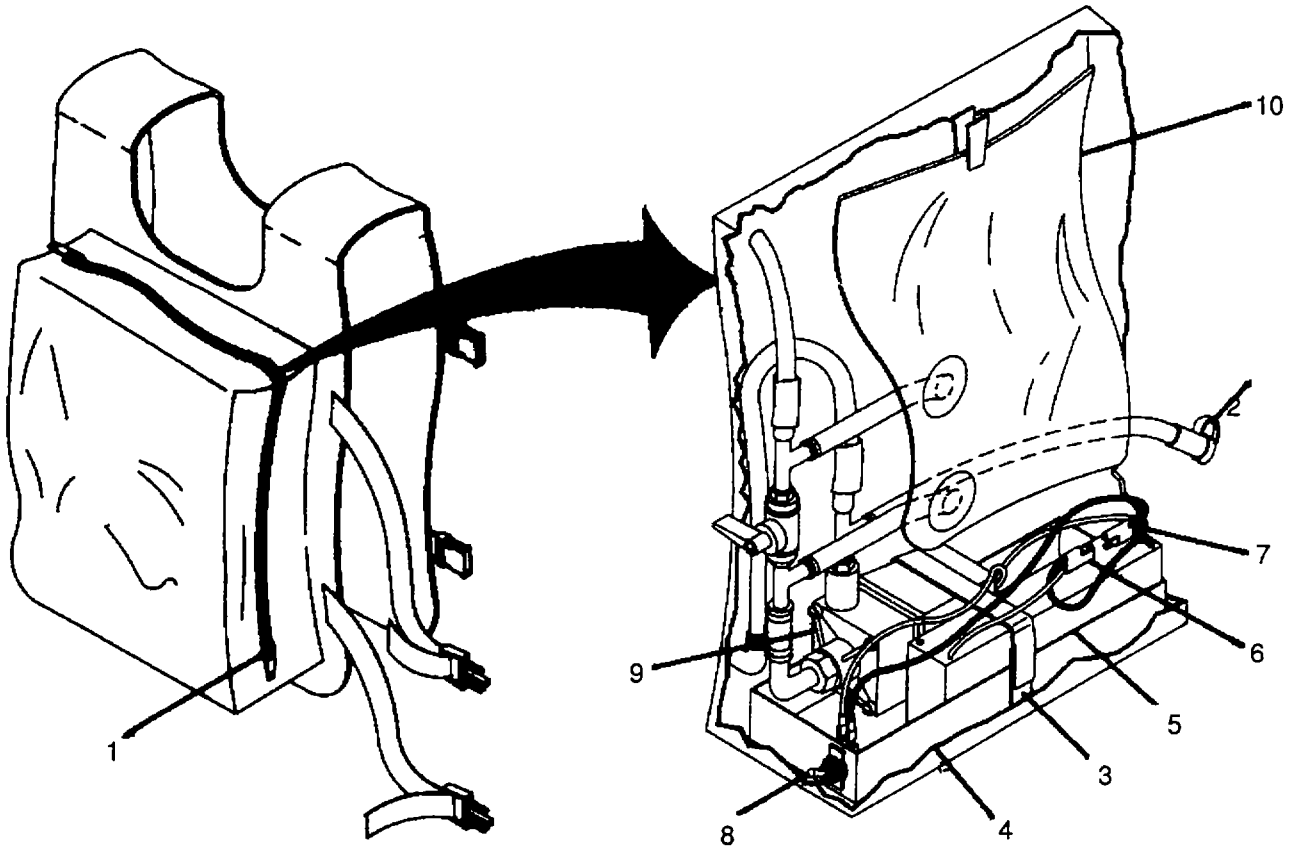
(f) Close the cylinder valve (6) and the regulator valve (5).

(g) Remove the dust cap, then slowly open, then close, the regulator valve (5) to relieve the pressure from the system.

e. Perform steps b.(1) through b.(4), paragraph 3-9.2.4, and install the cushion cover.

3-18. PREPARATION OF THE ICE VEST FOR USE .

a. Ensure the ice vest had been properly stored, ready for use. Refer to paragraph 3-11.2.2.



b. Completely open pouch slide fastener (1).

c. Verify drain valve (2) is closed.

NOTE

The ice vest holds an 8volt, 2.6 ampere hour rechargeable gel-type battery.

d. Loosen hook and pile fastener tape strap (3) around pump tray (4) and insert battery (5).

e. Plug battery connector (6) and pump connector (7) together and secure hook and pile fastener tape strap (3) in place.

f. Turn on/off switch (8) on to ensure pump (9) operates.

g. Return on/off switch (8) to the off position.

NOTE

The coolant bag holds four (4) pounds of cube or crushed ice or three (3) gel packs.

h. Open the top of coolant bag (10) and put coolant inside.

NOTE

Use approximately one (1) quart of potable water to fill coolant bag.

i. Add potable water to coolant bag (10).

j. Force excess air from coolant bag (10) by pressing on the sides while closing the top.

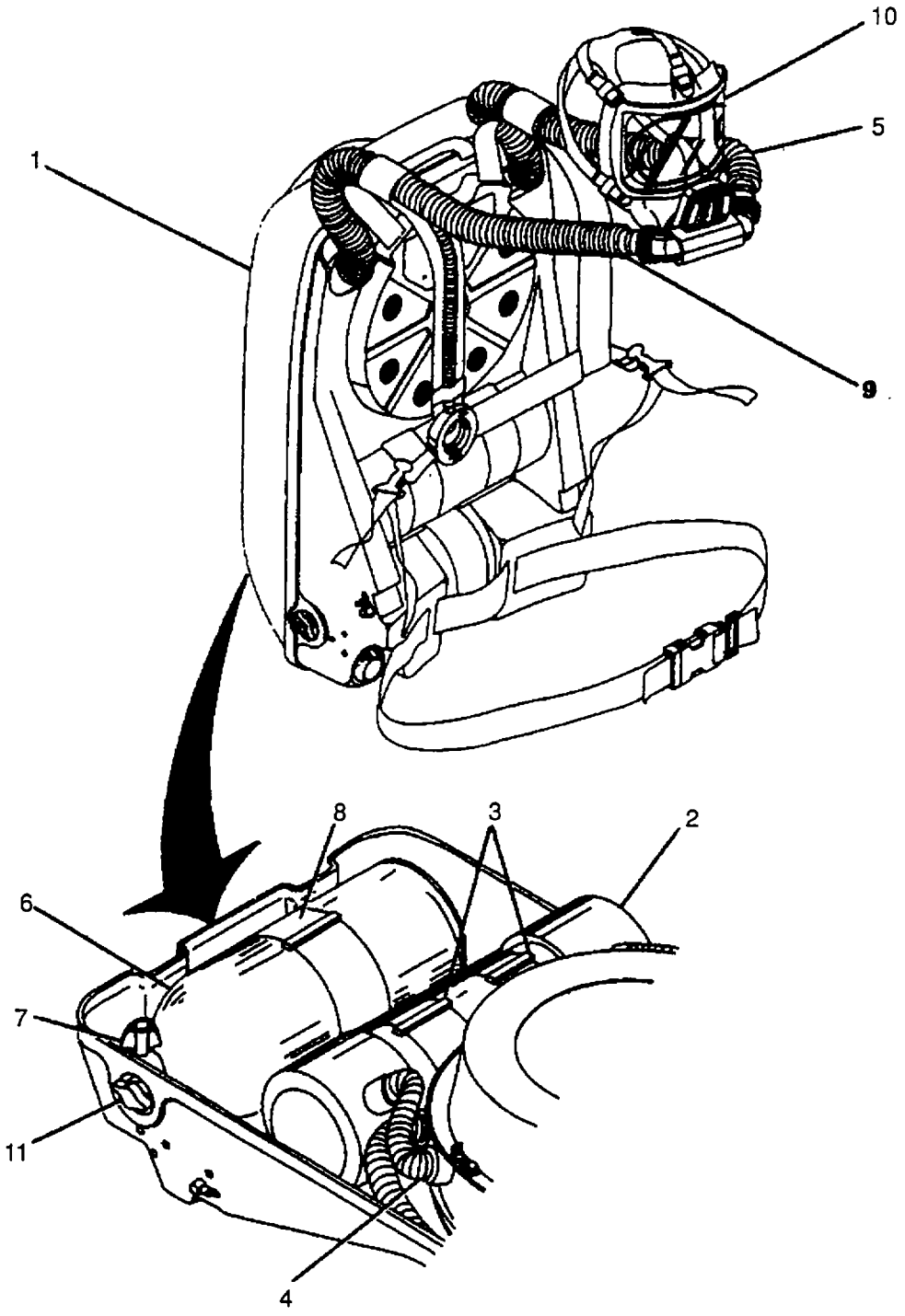
k. Verify the top of coolant bag (10) is closed.

I. Close pouch slide fastener (1).

m. Turn pump (9) on and ensure coolant is circulating throughout the ice vest, then turn pump (9) off.

3-19. PREPARATION OF THE REBREATHER SYSTEM FOR USE.

a. Ensure the rebreather system had been properly stored, ready for use. Refer to paragraph 3-11.2.3.



b. Remove top cover (1).

c. Install and secure coolant canister (2) into place with hook and pile fastener tape straps (3).

NOTE

Be careful not to crimp the hoses when connecting them to the coolant canister.

d. Remove the "red" plug from coolant canister hose (4).

e. Attach coolant canister hose (4) and white inhalation hose (5) to coolant canister (2).

NOTE

Ensure the oxygen bottle cylinder valve is properly seated and secured.

f. Install oxygen bottle (6) and tighten regulator cap (7). Secure with hook and pile fastener tape strap (8).

g. Remove the "red" plug from black exhalation hose (9).

h. Connect face piece (10) to black exhalation hose (9).

i. Place palm of hand over the end of white inhalation hose (5). Open and close oxygen bottle valve (11) and listen for a short "chirp."

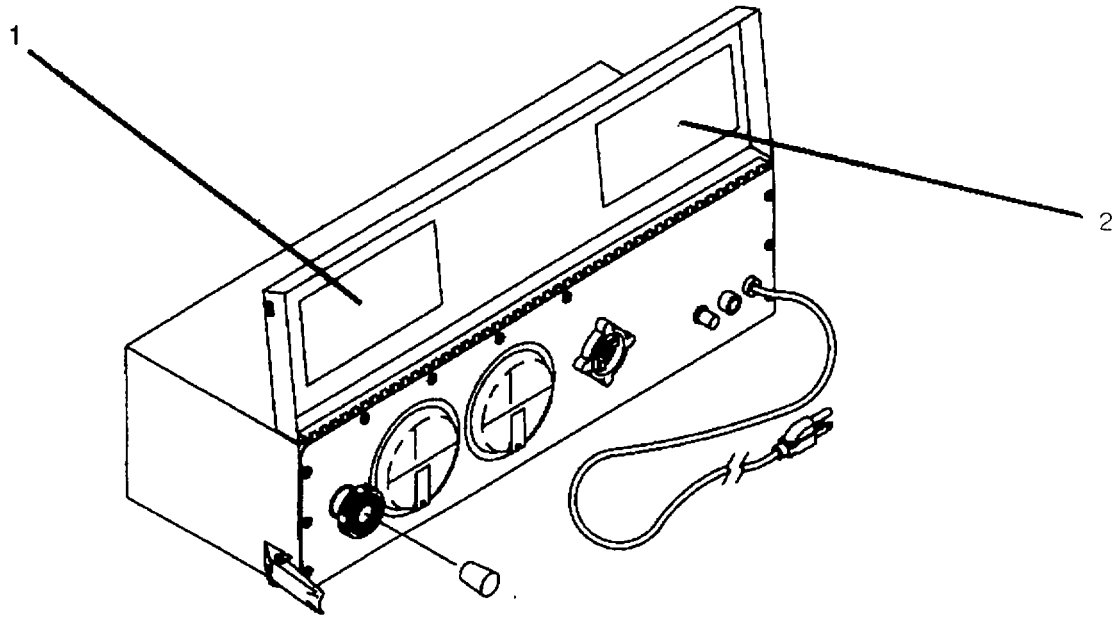
j. If no "chirp" is heard, refer to the Unit Troubleshooting Procedures, Table 3-1, item 16.

k. Connect face piece (10) to white inhalation hose (5).

l. Install top cover (1).

m. Coat face piece (11) inner lens with antifogging agent and wipe with a clean cloth.

3-20. MAINTENANCE INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES .



(1)

MSA Flow Calibration Chart

air flow liters / minute

115 125 175 200 300 350 375 450 500

Flow Gage Reading

Serial # _____

SEE OTHER SIDE FOR CALIBRATION CHECKING INSTRUCTIONS

L884 (L) Rev. 1 467371

FRONT

To Check Calibration of Instrument.

A. Make sure valve is closed.
B. Turn vacuum pump on.
C. Open valve slowly comparing the following reading on pressure gage and the flow gage. Set the pressure gage needle to the number on the following table and observe the flow gage reading.

PRESSURE GAUGE

0 5

0

FLOW GAUGE

MSA
Manufactured by

MINE SAFETY APPLIANCES COMPANY
Pittsburgh, Pennsylvania, U.S.A. 15230

BACK

(2)

WARNINGS:

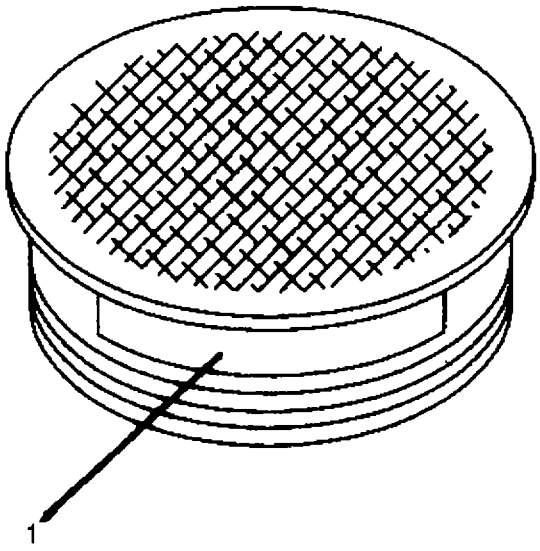
1. Read and understand instructions before operating tester.
2. DO NOT TEST OXYGEN REGULATORS OR OXYGEN EQUIPMENT ON THIS TESTER. Oxygen could ignite motor on regulator tester.
3. AIR SUPPLY SOURCE CONNECTED TO TEST REGULATOR SHALL MEET COMPRESSED GAS ASSOCIATION COMMODITY SPECIFICATION FOR AIR G-7.1 (Grade D or Higher Quality).
4. USE GROUNDED 110 VOLT AC 60 CYCLE ELECTRICAL SOURCE.
5. DO NOT REMOVE BACK PANEL OF TESTER WITH ELECTRICAL CORD PLUGGED IN.
6. DO NOT USE FUSE LARGER THAN A AMP SLOW BLOW.
7. ALWAYS ATTACH THE REGULATOR TO ITS APPROPRIATE AIR SUPPLY SOURCE. NEVER ATTACH LOW PRESSURE AIRLINE REGULATORS (MAXIMUM 125 PSIG) TO HIGH PRESSURE AIR SUPPLIES (MAXIMUM 2250 PSIG).
8. DO NOT OPERATE TESTER UNLESS A TEST REGULATOR IS ATTACHED.

Serial # _____

MSA
MINE SAFETY APPLIANCES COMPANY
Pittsburgh, Pennsylvania, U.S.A., 15208

L678 (0) Rev. 1 462218

3-20. MAINTENANCE INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES. (CONT)



(1)

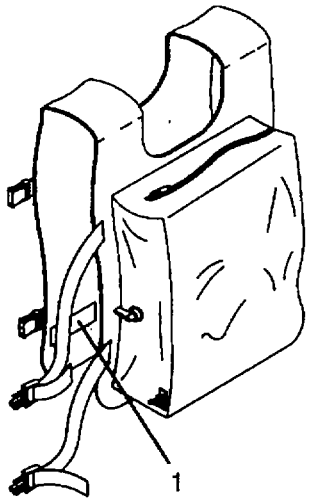
Pt. No. 459315	MSA Chemical Cartridge GMA Organic Vapors

LIMITATIONS: APPROVED ONLY FOR USE IN ATMOSPHERES CONTAINING (1) AT LEAST 19.5 PERCENT OXYGEN (2) LESS THAN 0.1 PERCENT ORGANIC VAPORS BY VOLUME.

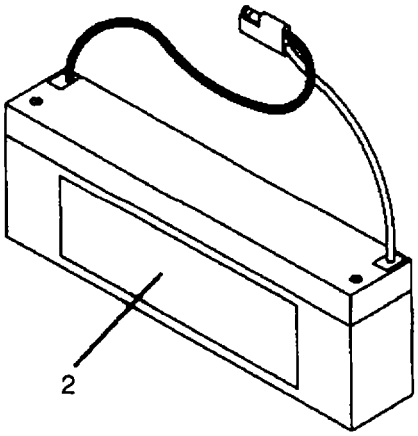
APPROVAL NO. TC–23C–40

MSHA	Issued to MINE SAFETY APPLIANCES CO. PITTSBURGH, PA, U.S.A. 15208	NIOSH

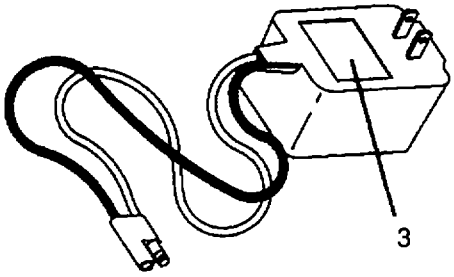
3-20. MAINTENANCE INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES . (CONT)



ITEM COOL VEST ASSEMBLY
PART NO. 0019–19243–01
SERIAL NO. _____ SIZE N/A
CODE ID. 74897 MFG. 4/87
ILC DOVER



SEALED RECHARGEABLE
BATTERY
I.L.C. DOVER
MODEL NP2 6–8
8 VOLT 2.6 AH



STRONG UL LISTED
WORLD 69J1
BATTERY CHARGER
MODEL: JW–93001–N
I/P: AC 120V 60Hz 5W
O/P: DC 9V 300mA
RED—+ 0488

APPENDIX A

REFERENCES

A-1. SCOPE. The Appendix lists all forms, field manuals, technical manuals and miscellaneous publications referenced in this manual.

A-2. FORMS.

Equipment Inspection and Maintenance Worksheet	DA Form 2402
Product Quality Deficiency Report	SF 368
Recommended Changes to Publications and Blank Forms	DA Form 2028
Recommended Changes to Equipment Technical Publications	DA Form 2028-2
Uncorrected Fault Record	DD Form 2408-9

A-3. MISCELLANEOUS PUBLICATIONS.

The Army Maintenance Management System (TAMMS)	DA PAM 738-750

Local Standard Operating Procedures

APPENDIX B

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

B-1. SCOPE. This appendix lists components of end item and basic issue items for the Self-Contained, Toxic Environment, Protective Outfit-Interim (STEPO-I) to help you inventory items required for safe and efficient operation.

B-2. GENERAL. The components of end item and basic issue lists are divided into the following sections:

B-2.1 Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacement. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

B-2.2 Section III. Basic Issue Items. These are the minimum essential items required to place the Self-Contained, Toxic Environment, Protective Outfit-Interim (STEPO-I) in operation, to operate it, and to maintain it. Although shipped separately packaged, BII must be with the Self-Contained, Toxic Environment, Protective Outfit-Interim (STEPO-I) during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

B-3. EXPLANATION OF COLUMNS. The following provides an explanation of columns found in the tabular listings:

B-3.1 Column (1) Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

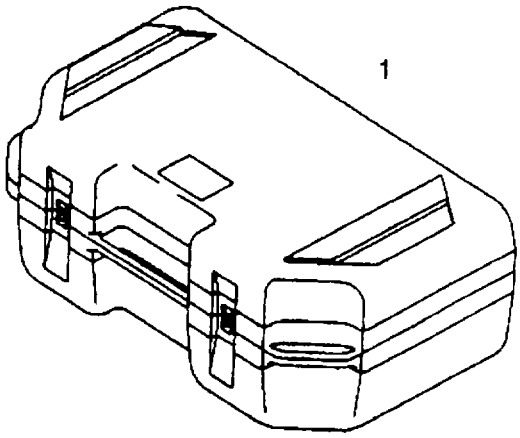
B-3.2 Column (2) National Stock Number. Indicates the national stock number assigned to the item and will be used for requisitioning purposes.

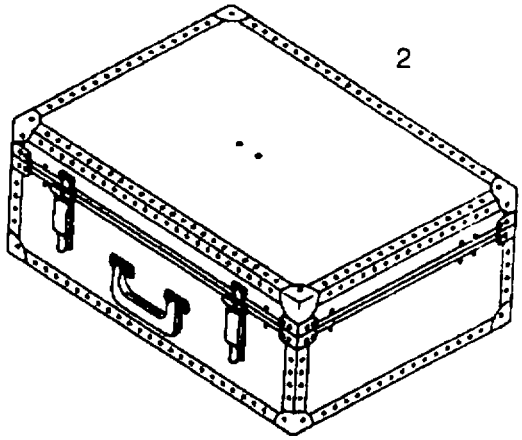
B-3.3 Column (3) Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the CAGE (in parentheses) followed by the part number.

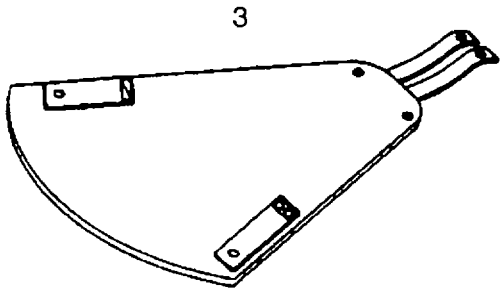
B-3.4 Column (4) Unit of Measure (U/M). Indicates the measure used in performing the actual operational maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr).

B-3.5 Column (5) Quantity Required (Qty Rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM

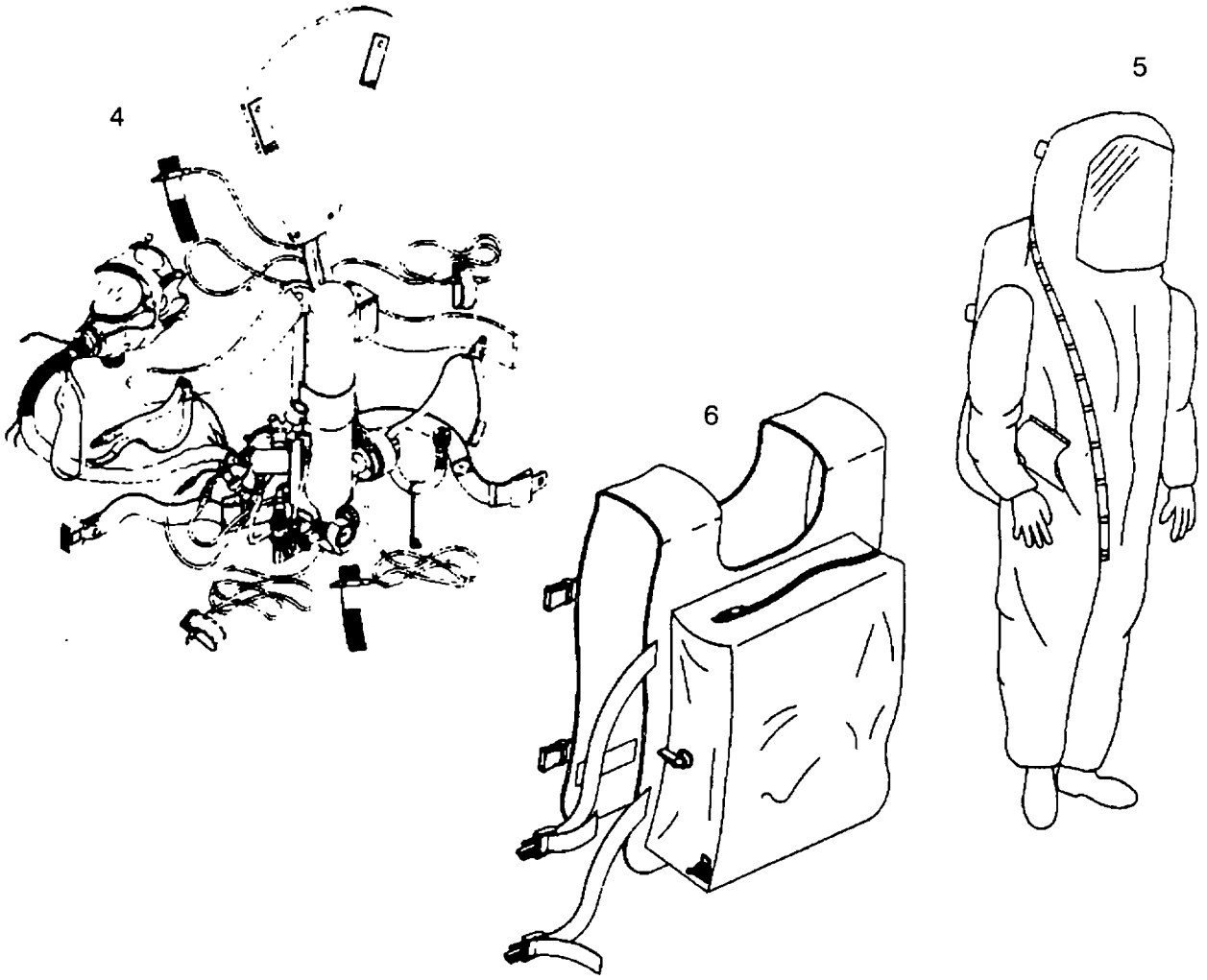






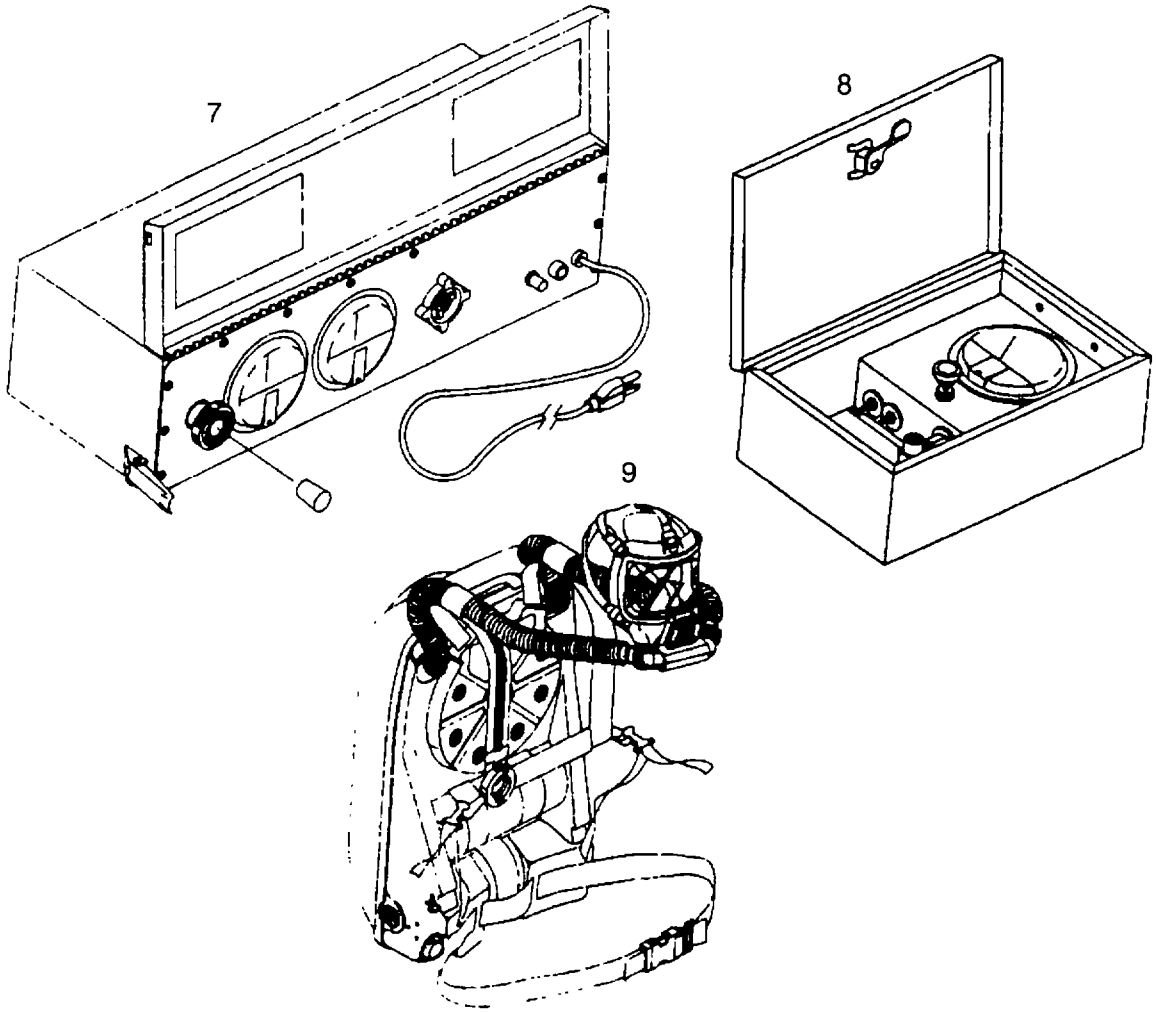
(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
1		Carrying Case, Rebreather System (52032) D17A00501	ea	1
2		Carry Case, EBA (55799) 455936	ea	1
3		Cushion Cover (55799) 304164	ea	1

Section II. COMPONENTS OF END ITEM (Cont)



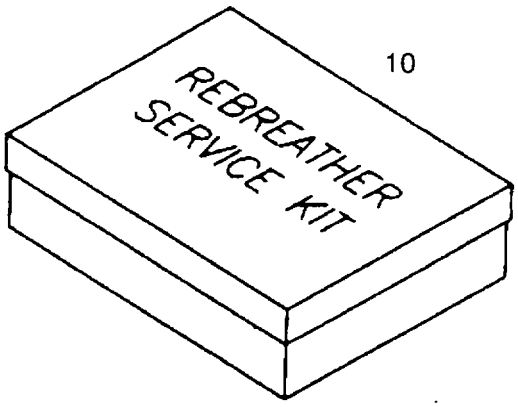
(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
4		Emergency Breathing Apparatus (EBA) (55799) small 471218, medium 457126, large 471230	ea	1
5		Encapsulating Protective Suit (0DBG0) 16460	ea	1
6		Ice Vest (74897) 0019-19243-01	ea	1

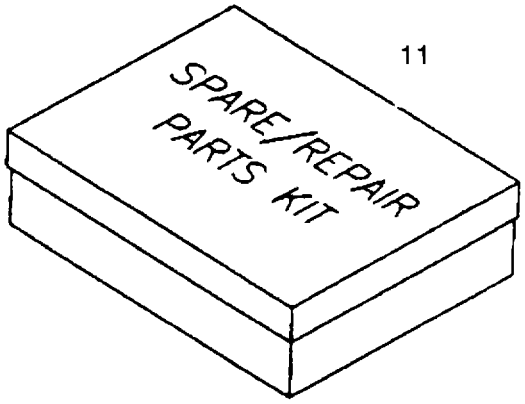
Section II. COMPONENTS OF END ITEM (Cont)

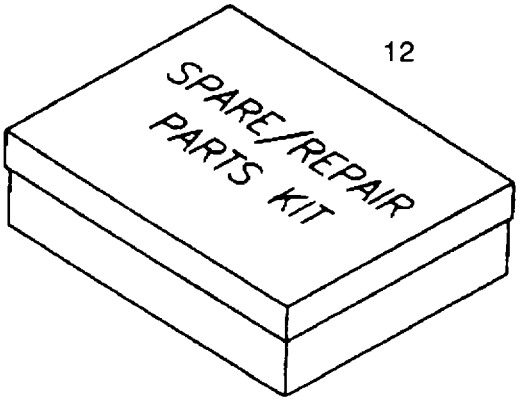


(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
7		Portable Regulator Tester (55799) 496995	ea	1
8		Pressure Test Kit (ODBG) 99970-G	ea	1
9		Rebreather System (52032) D42A00401	ea	1

Section II. COMPONENTS OF END ITEM (Cont)

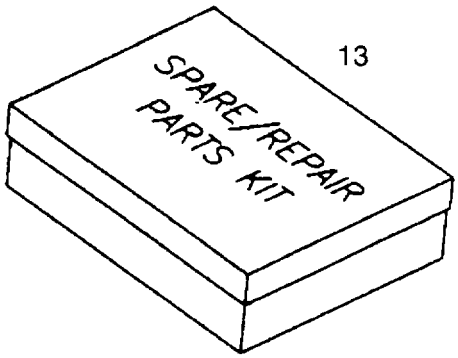


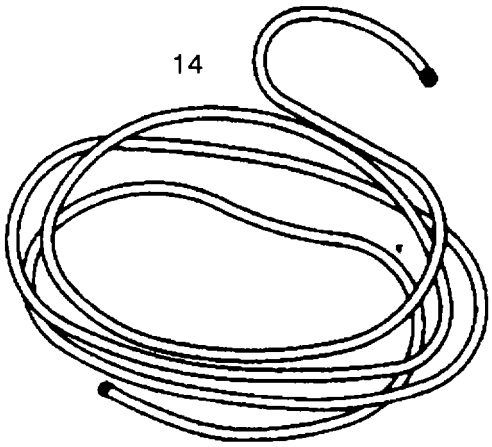




(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
10		Service Kit, Rebreather (52032) A42Y00301	ea	1
11		Spare/Repair Parts Kit, Rebreather System (52032) A42Y00201	ea	1
12		Spare/Repair Parts Kit, Emergency Breathing Apparatus (55799) small 497358, medium 497357, large 497359	ea	1

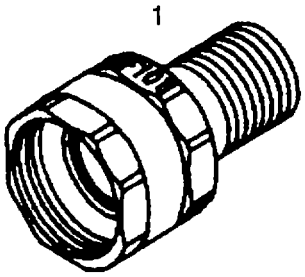
Section II. COMPONENTS OF END ITEM (Cont)

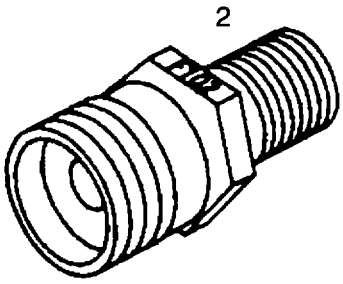


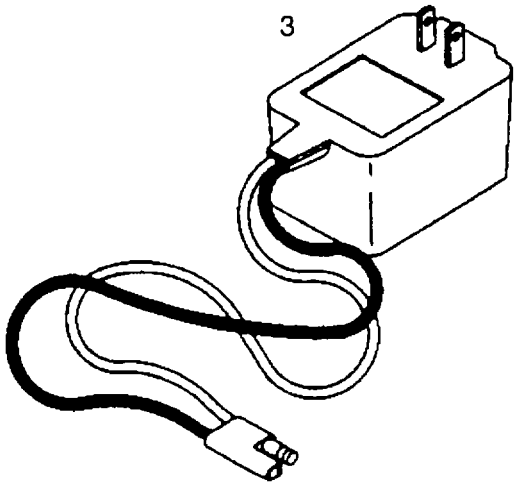


(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
13		Spare/Repair Parts Kit, Ice Vest (74897) 0019-110600-01	ea	1
14		Tether Line (55799) 455022	ea	1

Section III. BASIC ISSUE ITEMS

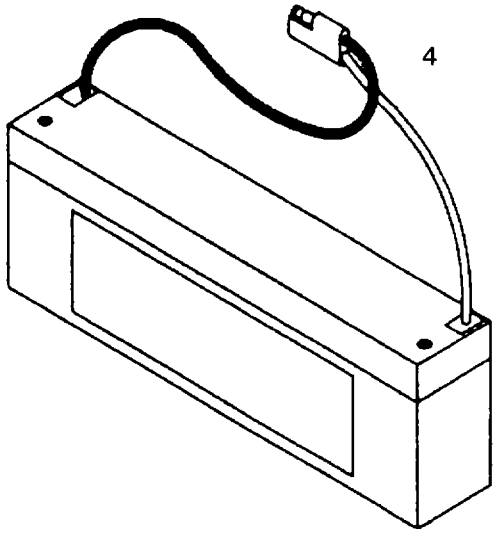


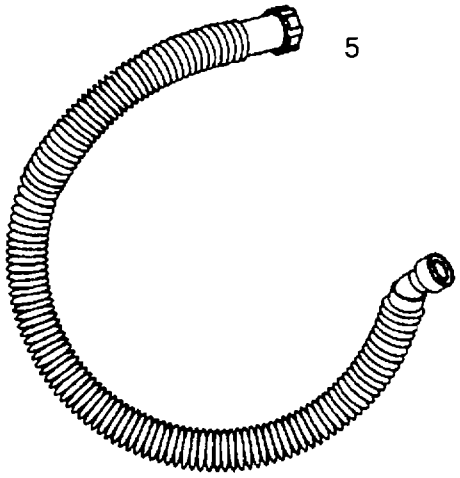


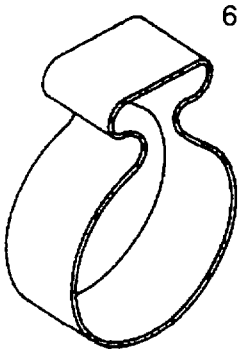


(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
1		Adapter F101 (55799) 69541	ea	1
2		Adapter F102 (55799) 69542	ea	1
3		Battery Charger (74897) CP29-0355	ea	1

Section III. BASIC ISSUE ITEMS (Cont)

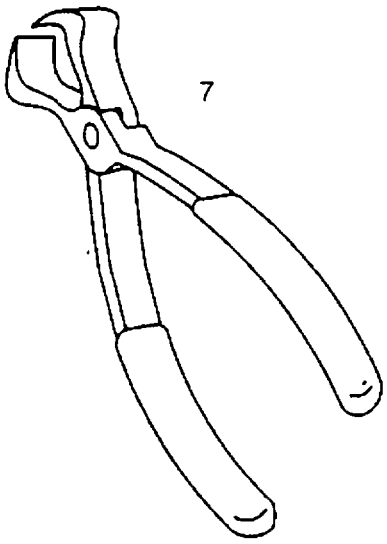


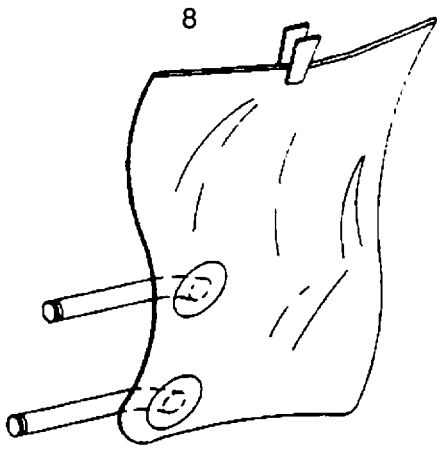


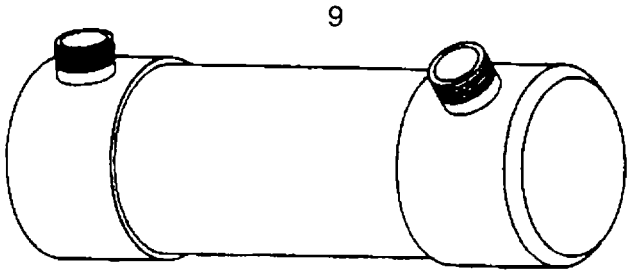


(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
4		Battery Pak (74897) CP29-0356	ea	1
5		Breathing Tube Assembly (55799) B304166	ea	1
6		Clamp (74897) CP26-0017	ea	1

Section III. BASIC ISSUE ITEMS (Cont)

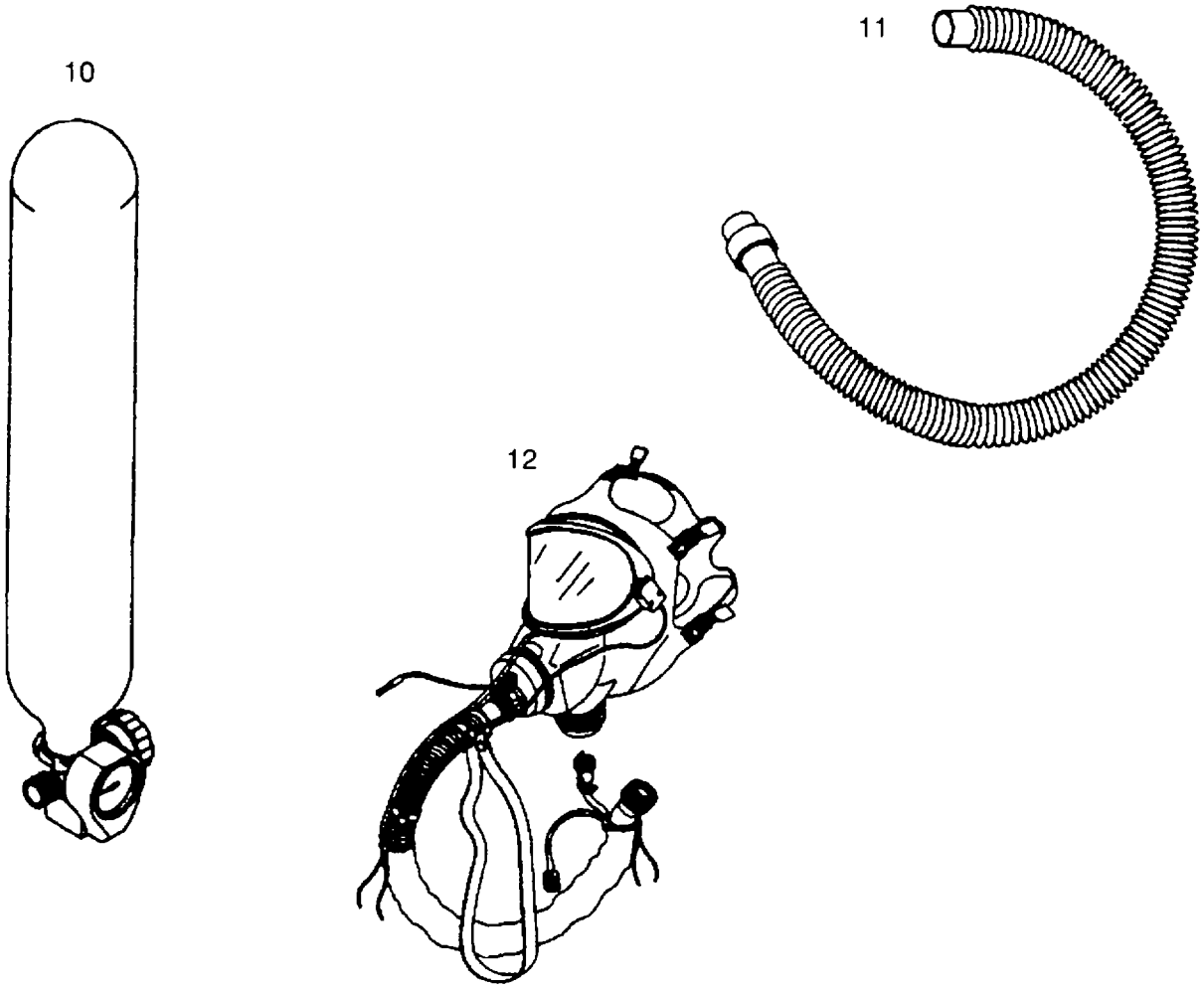






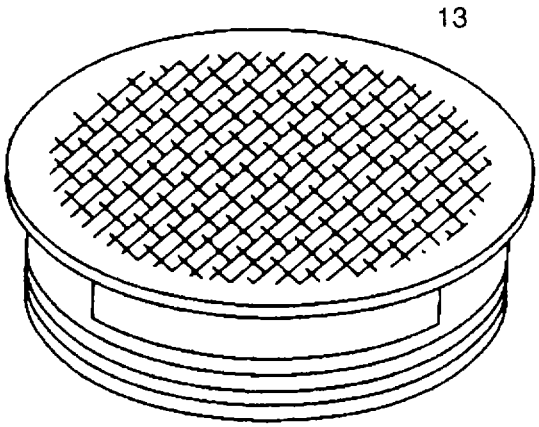
(1) Illus Number	(1) National Stock Number	(2) Description CAGEC and Part Number	(3) U/M	(4) Qty Rqr	(5)
7		Clamp Pincers (25281) 1098-1	ea	1	
8		Coolant Bag (74897) 0081-25072-01	ea	1	
9		Coolant Canister (52032) 400-558G1	ea	1	

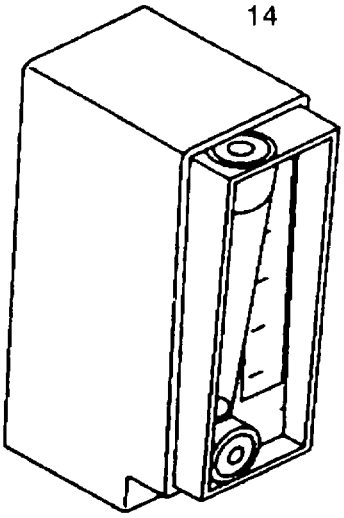
Section III. BASIC ISSUE ITEMS (Cont)

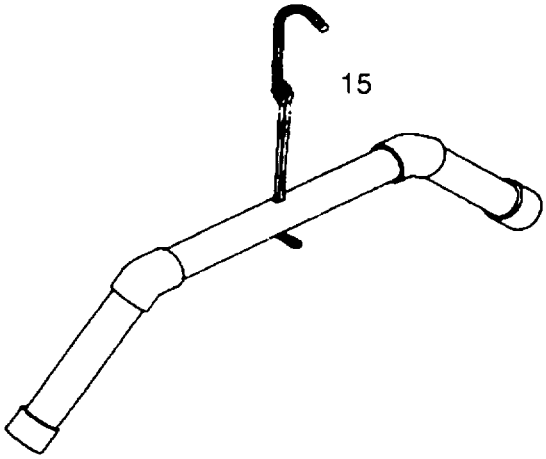


(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
10		Cylinder and Valve Assembly (55799) 476131	ea	1
11		Exhalation Hose (52032) 301-071G3	ea	1
12		Face Piece Assembly (55799) lg. 491086, med. 488348, sm. 491085	ea	1

Section III. BASIC ISSUE ITEMS (Cont)

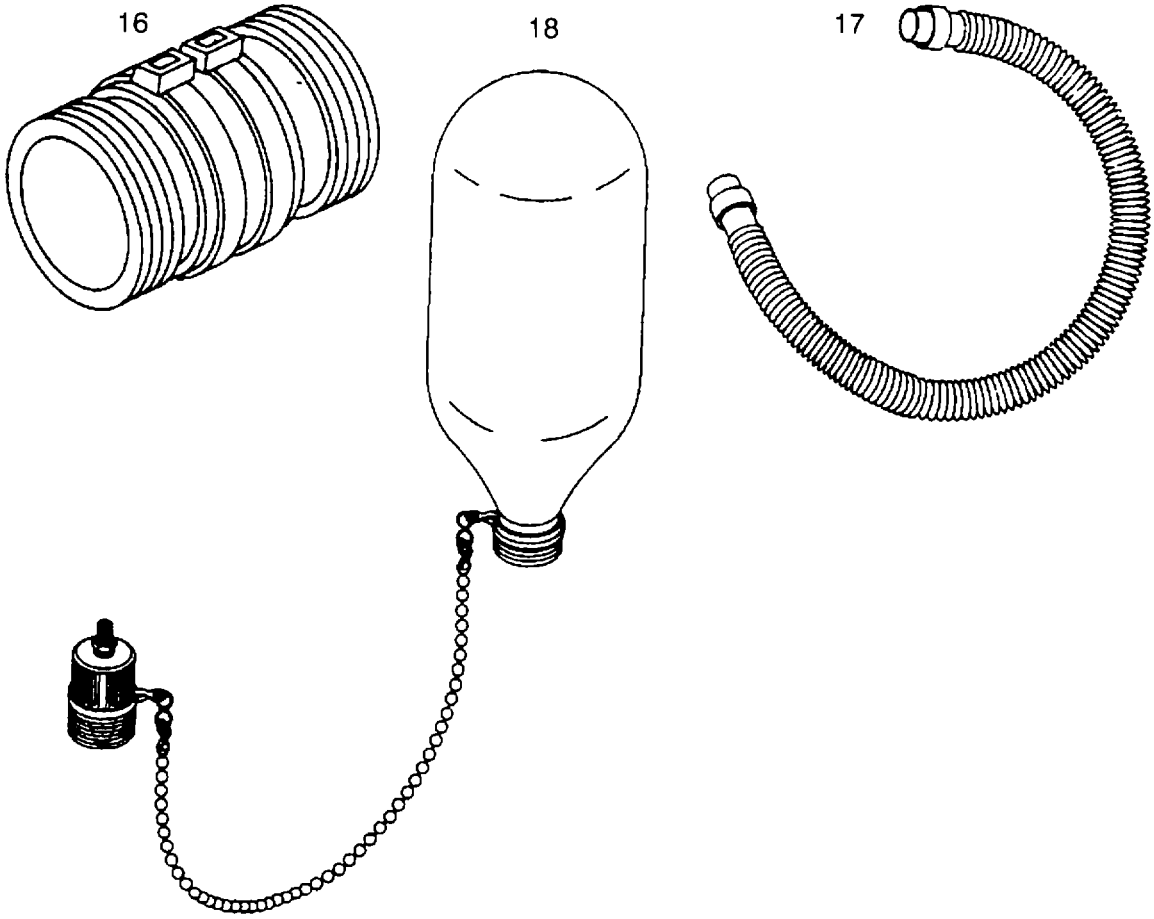






(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
13		Filter Cartridge (55799) 459315	ea	1
14		Flow Meter (52032) 201-872G1	ea	1
15		Garment Hanger (OBDGO) 20951	ea	1

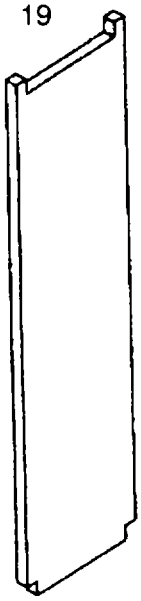
Section III. BASIC ISSUE ITEMS (Cont)



(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
16		Hose Coupler (52032) B17A00601	ea	1
17		Inhalation Hose (52032) 301-071G2	ea	1
18		Leak Test Fixture (52032) B17A00901	ea	1

Section III. BASIC ISSUE ITEMS (Cont)

19



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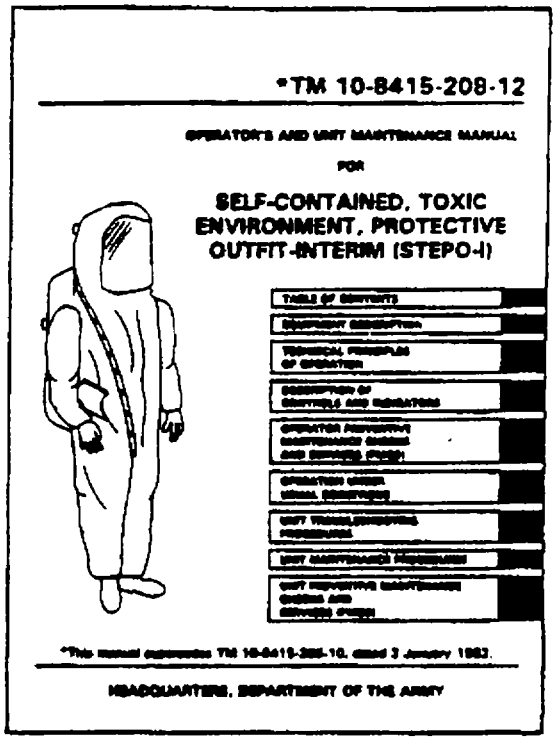

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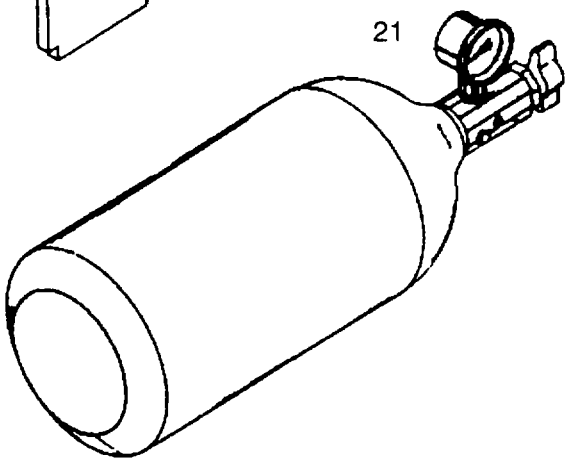
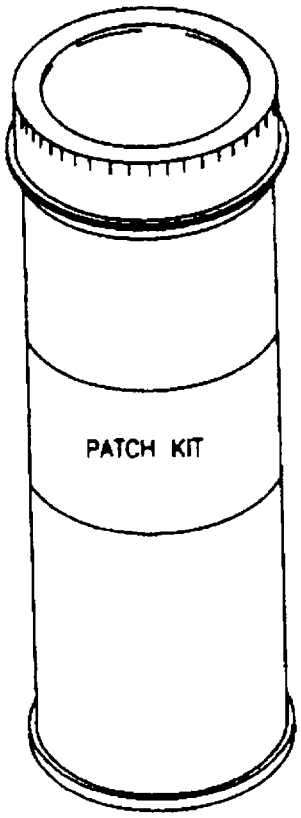


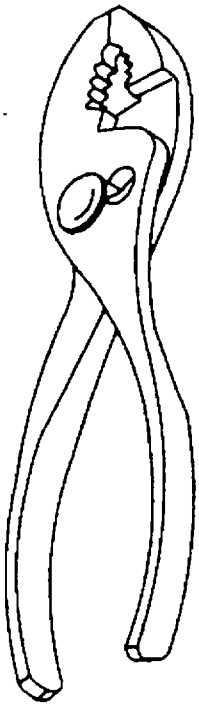
(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
19		MSA Special Tool (55799) 461828	ea	1
20	TM 10-8415-208-12	Operator's and Unit Maintenance Manual, Self-Contained, Toxic Environment Protective Outfit-Interim (STEPO-I)	ea	1
21		Oxygen Bottle (52032) 240-400	ea	1

Section III. BASIC ISSUE ITEMS (Cont)

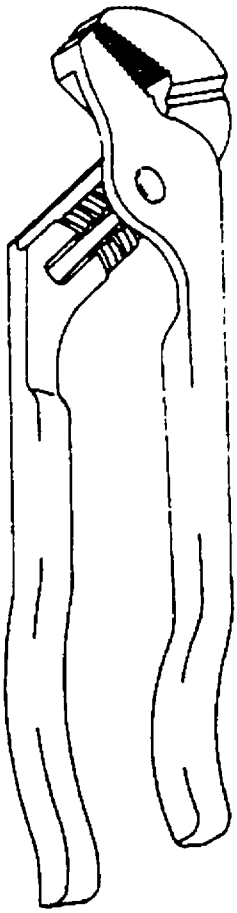
22



23

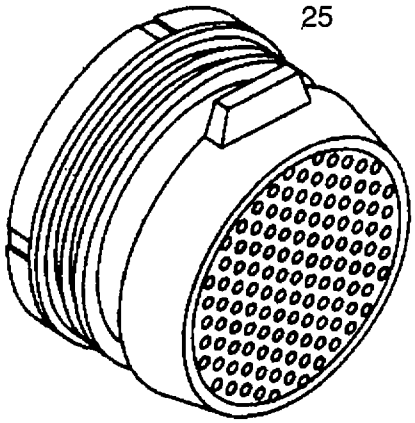


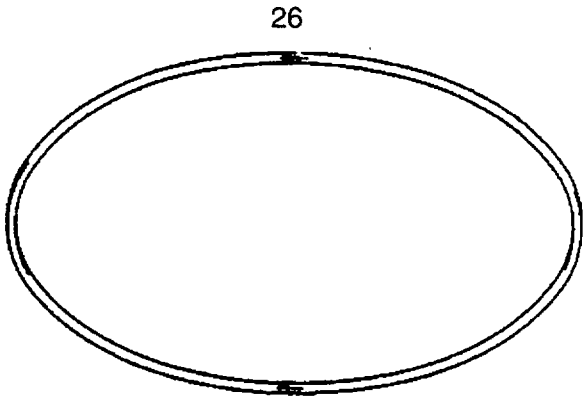
24

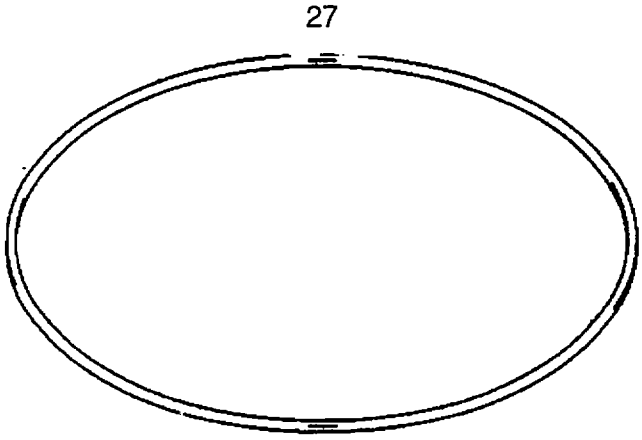


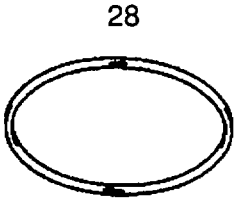
(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
22	8415-00-889-3654	Patching Kit (922835) DLA100-86-M-CA16	ea	1
23	5120-00-223-7396	Pliers, Slip-Joint (81348) GGG-P-471	ea	1
24	5120-00-278-0352	Pliers, Slip-Joint	ea	1

Section III. BASIC ISSUE ITEMS (Cont)





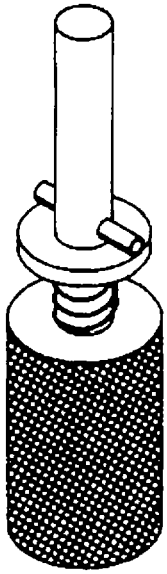




(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
25		Plugs, Exhalation Valve (ODBGO) 99198	ea	3
26		Preformed Packing (52032) 252170376	ea	1
27		Preformed Packing (52032) 252545378	ea	1
28		Preformed Packing (55799) 59740	ea	1

Section III. BASIC ISSUE ITEMS (Cont)

29



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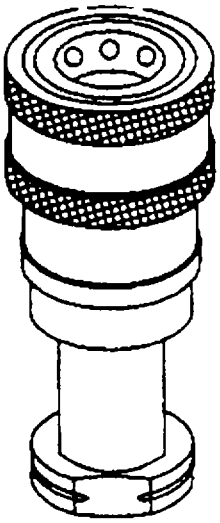
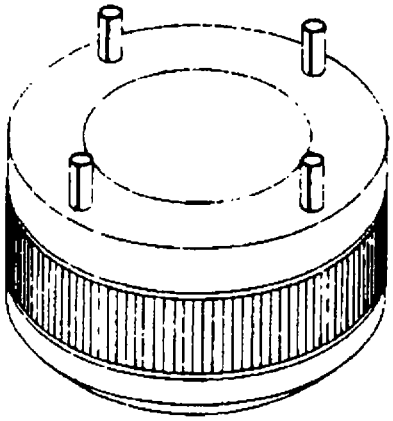
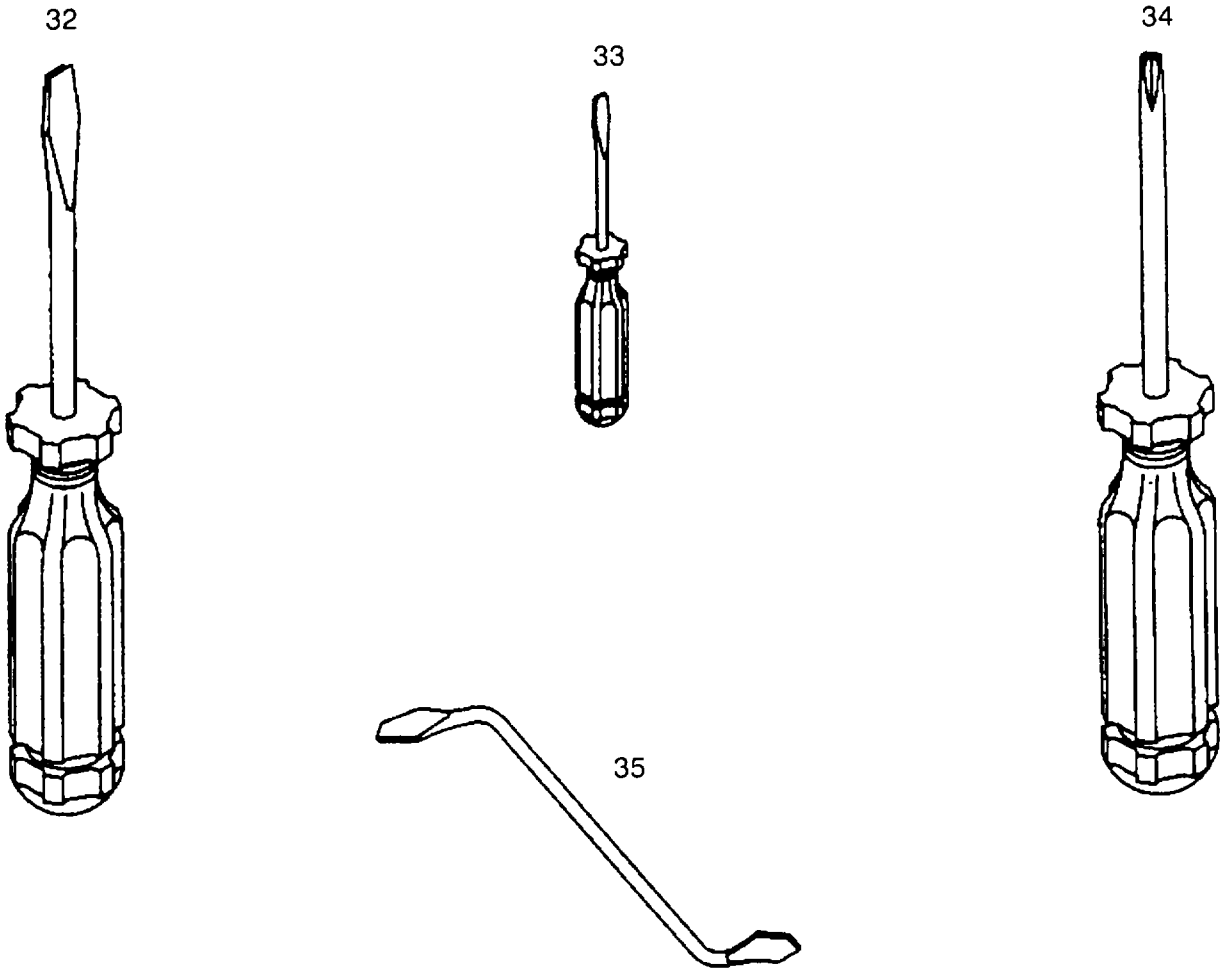


31



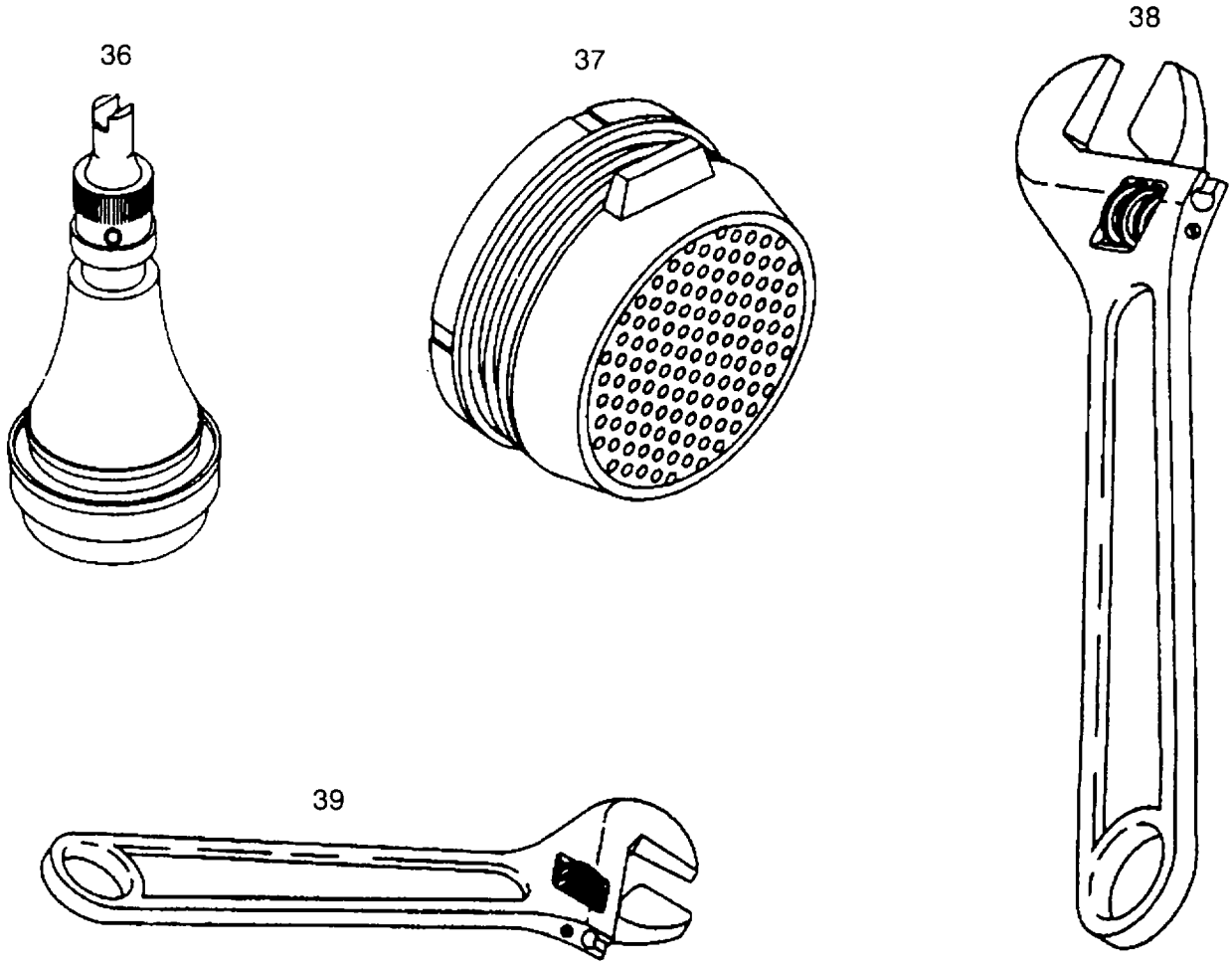
(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
29		Pressure Test Knob (52032) 200-982G1	ea	1
30		Quick Disconnect (0BDGO) SH2-62W	ea	1
31		Relief Valve Tool (52032) 201-847G1	ea	1

Section III. BASIC ISSUE ITEMS (Cont)



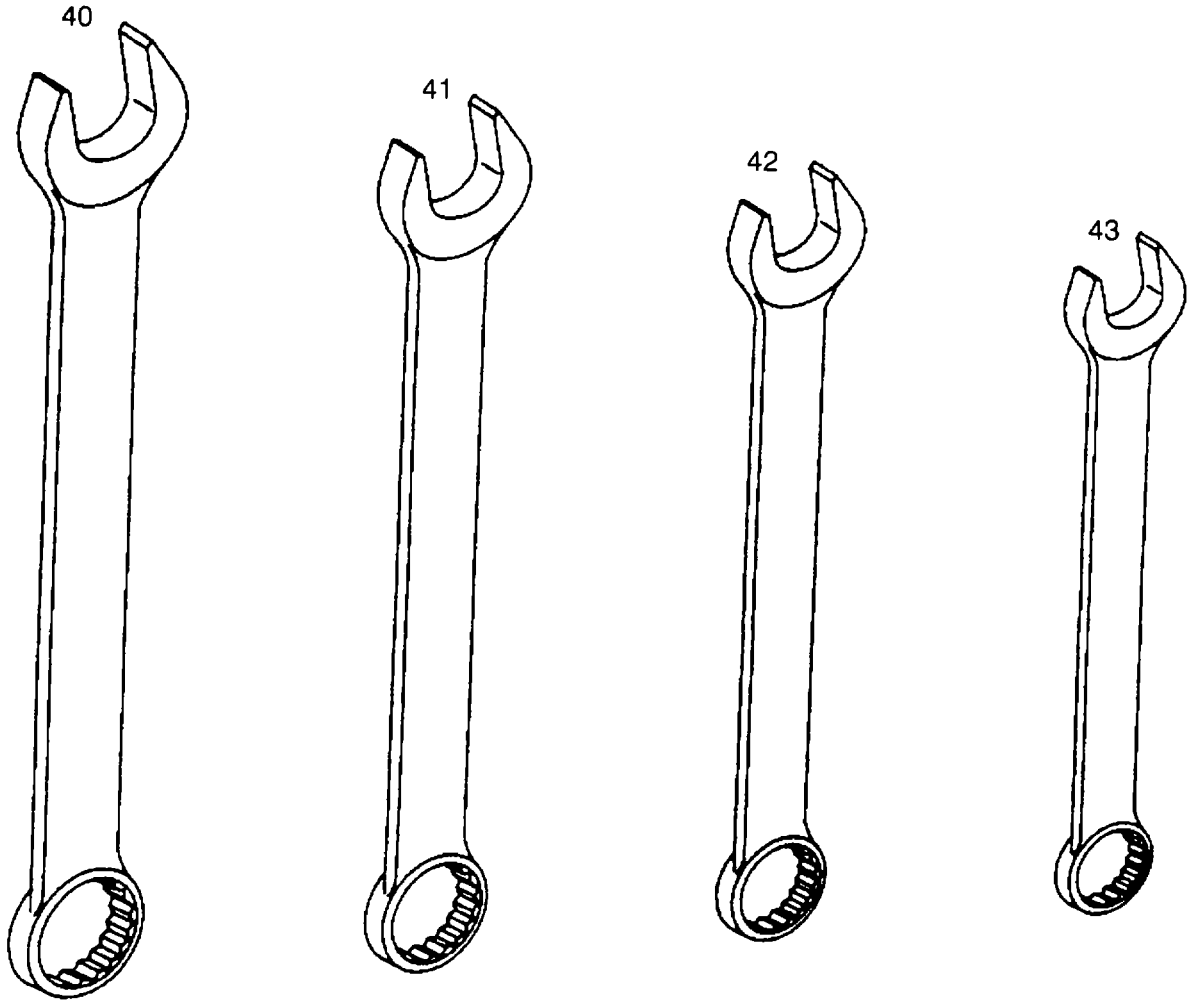
(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
32	5120-00-234-8910	Screwdriver, Flat-Tip	ea	1
33	5120-00-236-2140	Screwdriver, Flat-Tip	ea	1
34	5120-00-820-2995	Screwdriver, Philips	ea	1
35	5120-00-596-9591	Screwdriver, Off Set, 1/4 in. Flat-Tip	ea	1

Section III. BASIC ISSUE ITEMS (Cont)



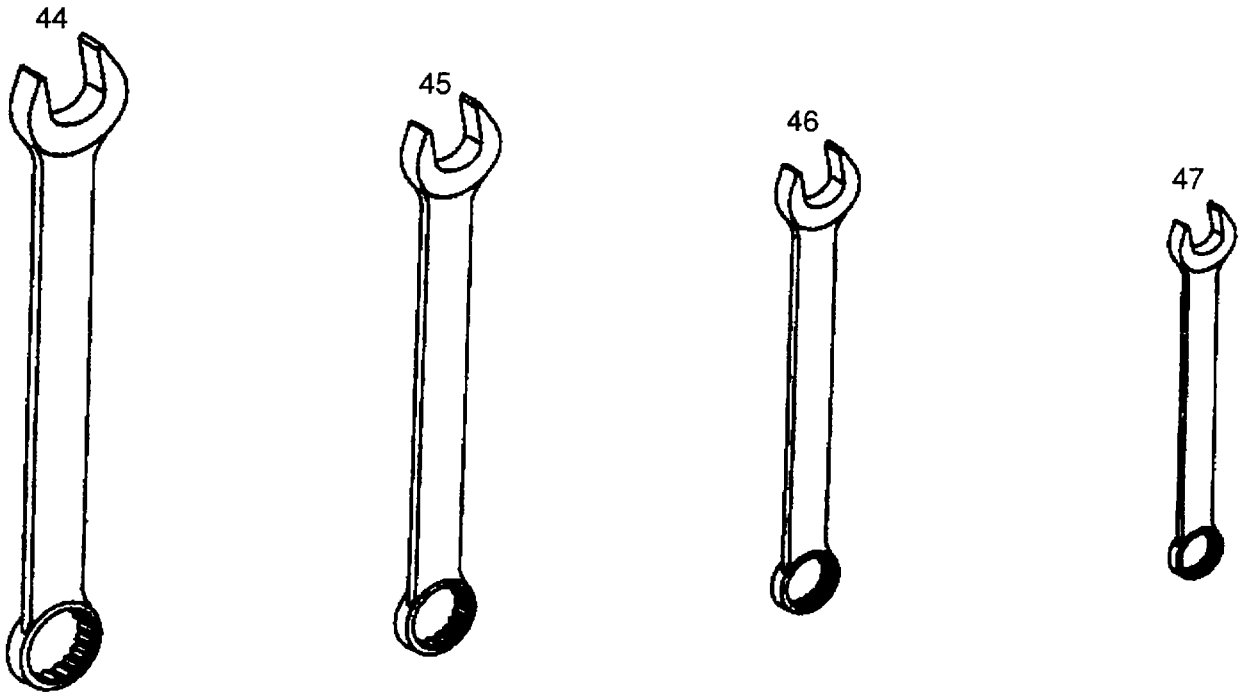
(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
36		Valve Core Extractor (52032) 201-844G1	ea	1
37		Valve, Exhalation (OBDGO) C484678	ea	3
38	5120-00-449-8083	Wrench, Adjustable, Size 10 in.	ea	1
39	5120-00-240-5328	Wrench, Adjustable, Size 8 in.	ea	2

Section III. BASIC ISSUE ITEMS (Cont)



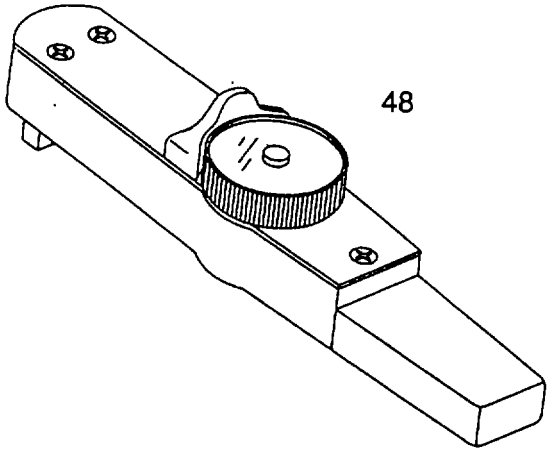
(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
40	5120-00-228-9509	Wrench, Combination, 11/16	ea	1
41	5120-00-228-9507	Wrench, Combination, 9/16	ea	1
42	5120-00-228-9505	Wrench, Combination, 7/16	ea	1
43	5120-00-228-9503	Wrench, Combination, 5/16	ea	1

Section III. BASIC ISSUE ITEMS (Cont)



(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
44	5120-00-228-9508	Wrench, Combination, 5/8	ea	1
45	5120-00-228-9504	Wrench, Combination, 3/8	ea	1
46	5120-00-228-9506	Wrench, Combination, 1/2	ea	1
47	5120-00-449-8114	Wrench, Combination, 3/16	ea	1

SECTION III. BASIC ISSUE ITEMS (CONT)



(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	(4) U/M	(5) Qty Rqr
48		Wrench, Torque, Memory Pointer Style (25281) 5718A12	ea	1

APPENDIX C

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

C-1. SCOPE. This appendix lists additional items you are authorized for the support of the Self-Contained, Toxic Environment, Protective Outfit-Interim (STEPO-I)

C-2. GENERAL. The list identifies items that do not have to accompany the Self-Contained, Toxic Environment, Protective Outfit-Interim (STEPO-I) and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA or JTA

C-3. EXPLANATION OF LISTING. National stock numbers, descriptions and quantities are provided to help you identify and request the additional items you require to support this equipment. These items are listed in alphabetical sequence by name under the type document (i.e., CTA, MTOE, TDA or JTA) which authorizes the item(s) to you

Section II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION CAGEC & PART NUMBER	(3) U/M	(4) Qty AUTH
	CTA AUTHORIZED ITEMS		
8430-00-820-6295 Series	Boots, Toxicological Agents Protective (TAP)	pr	1
8415-00-753-6551 Series	Gloves, Toxicological Agents Protective, Type II	pr	1

C-1/C-2 blank)

APPENDIX D

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. SCOPE. This appendix lists expendable supplies and materials you will need to operate and maintain the Self-Contained, Toxic Environment, Protective Outfit-Interim (STEPO-I). This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except Medical, Class V, Repair Parts and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

D-2. EXPLANATION OF COLUMNS

D-2.1. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, App. D").

D-2.2. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Unit Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

D-2.3. Column (3) National Stock Number. This is the national stock number assigned to the item; use it to request or requisition the item.

D-2.4. Column (4) Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Commercial and Government Entity Code (CAGEC) in parentheses followed by the part number.

D-2.5. Column (5)Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	O	5350-00-264-3495	Abrasive Strip	ea
2	O		Absorbent, CO2 (52032) B17A1301	bl
3	O		Anti-Fogging Agent (52032) 201-228	cl
4	C	6135-00-120-1020	Battery, Alkaline-Manganese	bx
5	O	7920-00-205-2401	Brush, Cleaning (81349) MIL-B-43871	ea
6	O	7510-00-282-6924	Chalk, Marking (58536) A-A-80	bx
7	O	8305-00-267-3015	Cheese Cloth	bl
8	O		Cleaner-Sanitizer (52032) 210-900G1	pg
9	O	7290-01-060-9069	Coat Hanger A-A-681	ea
10	O	4020-00-551-3343	Cord, Fibrous, 1/4 in. Sash Cord	rl
11	O	6715-00-324-5500	Depressor, Tongue, Wood (52032)1938-22705	bx
12	O	7930-00-985-6911	Detergent (81349) MIL-D-16791	cn
13	O		Gel Packs (74897) CP-10-0033	ea
14	O		Hose Clamp (ODGBO) 20412	ea
15	O	6505-00-926-2181	Liquid Soap	bx
16	O		Lubricant, Silicone (52032) DOW111	tb
17	O	9150-00-999-7548	Paraffin	lb

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (CONT)

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
18	O	8105-00-837-7754	Plastic, Bag, 6 in. X 6 in. 07-AB-111	bx
19	O		Plug, #2 Rubber (55799) 60379	ea
20	O	8570-00-817-0295	Powder, Talc, USP	cn
21	O	7920-00-148-9666	Rags (58536) A-A-2522	bl
22	O		Rubber Bands (OBDGO) 20410	bx
23	O	7510-00-161-6215	Ruler, Wood, 12 in.	ea
24	O		Stopper, #6 one hole (5T847) 9549K32	ea
25	O	8030-00-889-3535	Tape, Anti-Seize	rl
26	O	5970-00-284-8410	Tape, Electrical (80212) A 3016	rl
27	O		Tube, Vinyl, 1/4 in. dia., 50 ft (5T847) 5554K1 3	ft
28	O		Tubing, Copper (52032) 200862	ea
29	O		Hose Clamp (55799) 57909	ea
30	O	5640-00-103-2254	Tape, Duct	rl
31	O	6575-00-754-2834	Glass Syringe, 10 ml	ea
32	O	8040-00-058-2399	Adhesive, Carboline Neoprene, F-1 (06634)	qt
33	O	8040-00-754-2685	Adhesive, Carboline Neoprene (06634) CARBOLINE F-1 GAL	gl
33	O	7930-00-224-7901	Laundry Soap Powdered or Equal	dr
34	O	7930-00-285-4303	Laundry Soap Powdered or Equal	bx
35	O	7930-00-634-3935	Laundry Soap Flaked or Equal	dr
36	O	8520-00-228-0598	Soap Toilet, Liquid, Type I	gl

APPENDIX E

MAINTENANCE ALLOCATION CHART (MAC)

Section I. INTRODUCTION

E-1. THE ARMY MAINTENANCE SYSTEM MAC.

a. This Introduction (Section I) provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels, which are shown in the MAC in column (4) as:

Unit-includes two subcolumns, C (operator/crew) and O (unit) maintenance.
Direct Support-includes an F subcolumn.
General Support-includes an H subcolumn.
Depot-includes a D subcolumn.

c. Section III lists the tools and test equipment (both special tools and common tools sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

E-2. MAINTENANCE FUNCTIONS. Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (i. e. , by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i. e. , to clean (includes decontamination, when required), to preserve, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. Replace is authorized by the MAC and is shown as the 3rd position code of the SMR code.

i. Repair. The application of maintenance services[1] including fault location/troubleshooting[2], removal/installation, and disassembly/assembly[3] procedures, and maintenance actions[4] to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), and item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those service/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment and components.

E-3. EXPLANATION OF COLUMNS IN THE MAC, Section II.

a. Column 1-Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2-Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

---

[1] Service-Inspect, test, service, adjust, aline, calibrate, and/or replace.

[2] Fault location/troubleshooting-The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

[3] Disassembly/assembly-The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned as SMR code for the level of maintenance under consideration (i.e., identification as maintenance significant).

[4] Actions-Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

c. Column 3-Maintenance Function. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see paragraph E-2).

d. Column 4-Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C Operator or Crew
O Unit Maintenance
F Direct support Maintenance
H General Support Maintenance
D Depot Maintenance

e. Column 5-Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6-Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

E-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, Section III.

a. Column 1-Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, column 5.

b. Column 2-Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3-Nomenclature. Name or identification of the tool or test equipment.

d. Column 4-National Stock Number. The National stock number of the tool or test equipment.

e. Column 5-Tool Number. The manufacturer's part number.

E-5. EXPLANATION OF COLUMNS IN REMARKS. Section IV.

a. Column 1-Reference Code. The code recorded in column 6, Section II.

b. Column 2-Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
00	Self-Contained Toxic Environment, Protective Outfit-Interim								
01	Encapsulating Protective Suit	Inspect	.2	.3				1	A
		Service		.3					B
		Test		.6					
		Replace		.2					
		Repair		.5					
02	Tether Line	Inspect	.1	.2					A
		Replace		.2					B
		Repair		.2					
03	Ice Vest	Inspect	.1	.2				10	A, B
		Service		17.5					C
		Replace		.2					
		Repair		.5					
04	Emergency Breathing Apparatus	Inspect	.2	.2				2	A,B,
		Service		1.0				3	D
		Test		.6					
		Replace		.3					
		Repair		.5					
0401	Filter Housing	Replace		.2					E
		Repair		.3					
0402	Regulator	Replace		.4					F
		Repair		.4					
0403	Emergency Breathing Apparatus Air Mask	Replace		.2					
		Repair		.5					
05	Rebreather System	Inspect	.2	.2				4	A,B,
		Service		1.0				5	D
		Test		.6				6	
		Replace		.3				7,8,9	
		Repair		.5					
0501	Center Section	Replace		.2					
		Repair		.5					
0502	Regulator Assembly	Replace		.3					
		Repair		.1					
	Rebreather	Replace		.2					
0503	Face Piece	Repair		.3					

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Tool or Test Equipment Ref Code	(2) Maintenance Category	(3) Nomenclature	(4) NSN	(5) Tool Number
1	0	Pressure Test Kit		99970-G
2	0	Portable Regulator Tester		496995
3	0	MSA Special Tool		461828
4	0	Leak Test Fixture		B17A00901
5	0	Flow Meter		201-872G1
6	0	Pressure Test Knob		200-982G1
7	0	Relief Value Tool		201-847G1
8	0	Hose Coupler		B17A00601
9	0	Valve Core Extractor		201-844G1
10	0	Battery Charger		CP29-0355

Section IV. REMARKS

Reference Code	Remarks
A	Preventive Maintenance Checks and Services for the operator is restricted to Before and During Operations.
B	Preventive Maintenance Checks and Services for Unit Maintenance is Before, During, After and Monthly
C	The battery requires 10-16 hours to fully charge.
D	Maintenance shall only be performed by certified maintenance personnel
E	Repair is limited to Replacement of EBA Filter Cartridge
F	Repair is limited to replacement of regulator diaphragm

GLOSSARY OF TERMS

Introduction. Defect terms are arranged alphabetically. Synonymous and similar terms are cross referenced, "See...".

Definitions:

Abraded Area	An area of cloth worn away by rubbing or scraping.
Abrasion	Coating friction worn, reduced in gauge, frequently surface roughed.
Abrasion Exposing Base Cloth	Coating worn through to base cloth.
Abrasion Spot	An abraded spot.
Adhesions	See "Blocking."
Blister	Raised bubble or peak out of surface coat; raised spot or void.
Blocking	Tacky, ability to adhere to self; adhesion between touching layers of material. Cloth does not unroll readily.
Brittle Coating	Cracks when flexed.
Crack	Break in coating, usually resulting from a crease.
Cracking	Fissured surface condition.
Crater	A depression in the coating giving the opposite appearance of a blister.
Crazing	Minute (small) cracks.
Crease	Fold; pleat; doubling of surfaces that do not adhere to one another and that cannot be corrected by manual pressure.
Cut	An opening made with a sharp edged object.
Delamination	Surface coat removed, scraped, peeled or otherwise taken away from the cloth; separation of coating from base cloth; separation of one cloth; separation of one cloth from another in a piled material.
Depression	Hollow in a surface. See "Crater."
Fissure	A narrow crack.
Hole coating compound.	An opening of undetermined cause. Area not covered by base cloth and
Lump	A mass of coating compound; undiluted coating stock; Imbedded foreign material; Surface protrusion usually of the base coating material as distinguished from imbedded foreign material.
Pick-off	An area where coating is delaminated from its base and either torn off completely or remains attached as loose flap.
Pit	A spherical depression, usually small.
Rips	Cut or torn apart roughly.

GLOSSARY OF TERMS

Introduction. Defect terms are arranged alphabetically. Synonymous and similar terms are cross referenced, *See...".

Definitions:

Scratch	Marking or scraping in the material.
Tear	Split; pulled apart. See"Rip.'
Tunnel	An elongated area between coating on a multiple coating job or between the cloth and the coating.
Uncoated Area	No visible coating applied.
Wrinkle	See "Crease.'

INDEX

R

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W

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
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THE METRIC SYSTEM AND EQUIVALENTS

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3.2808.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu in.
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Square measure

1 sq. centimeter = 100 sq. millimeters =.155 sq. in.
1 sq. decimeter = 100 sq. centimeters = 15.5 inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 feet
1 sq. dekameter (are) = 100 sq. meters = 1.076.4 sq. ft.
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 hectometers = .386 sq. miles

Liquid Measure

1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons
1 liter = 10 deciliters = 33.81 fl. ounces
1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3 38 fl. ounces
1 metric ton = 10 quintals = 1.1 short tons

Approximate Conversion Factors

To change	To	Multiply by
inches	centimeters	2.540
feet	meters	.305
yards	meters	.914
miles	kilometers	1.609
sq. inches	sq. centimeters	6.451
sq. feet	sq. meters	.093
sq. yards	sq. meters	.836
sq. miles	sq. kilometers	2.590
acres	sq. hectometers	.405
cubic feet	cubic meters	.028
cubic yards	cubic meters	.765
fluid ounces	milliliters	29.573
pints	liters	.472
quarts	liters	.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	.454
short tons	metric tons	.907
pound inches	newton-meters	.11296

To change	To	Multiply by
ounce inches	newton-meters	.0070062
centimeters	inches	.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	.621
sq. centimeters	sq. inches	.155
sq. meters	sq. yards	10.764
sq. kilometers	sq. miles	1.196
sq. hectometers	acres	2.471
cubic meters	cubic feet	35.315
milliliters	fluid ounces	.034
liters	pints	2.113
liters	quarts	1.057
grams	ounces	.035
kilograms	pounds	2.205
metric tons	short tons	1.102
pound-feet	newton-meters	1.356

Temperature (Exact)

°F Fahrenheit temperature — 5/9 (after subtracting 32) — Celsius Temperature °C

PIN : 070160-003