

**TECHNICAL MANUAL  
OPERATOR'S, UNIT, AND DIRECT  
SUPPORT  
MAINTENANCE MANUAL  
INCLUDING REPAIR PARTS AND  
SPECIAL TOOLS LIST**

**FOR**

**RECOVERY / RECHARGER UNIT  
FIRE EXTINGUISHER,  
MONOBROMOTRIFLUOROMETHANE  
SKID MOUNTED,  
PNEUMATIC MOTOR DRIVEN  
MODEL RHA-101-M1  
NSN 4210-01 -430-5340**

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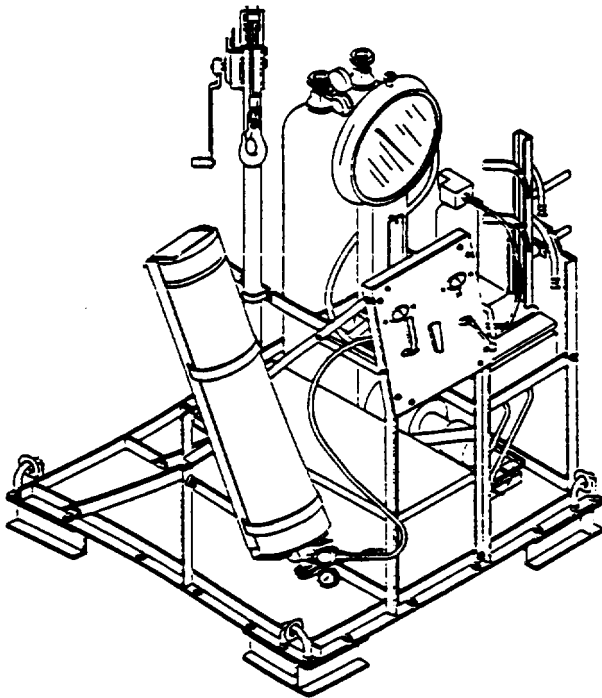
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\*This Technical Manual Supersedes TM 54210-218-13&P, dated 13 June 1986, including all changes, and TM 5-4320-349-30&P, dated 30 August 1995.

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**31 OCTOBER 1996**

**WARNING**

Death or serious injury may result if personnel fail to observe the following safety precautions. High pressure gas or air can be dangerous if improperly handled.

Personnel must check to ensure that the recovery bottle is a high pressure 2,265 psi bottle. Failure to use the correct bottle can result in an explosion and death.

Perform operating procedures in a well ventilated area. Presume that all installations will eventually leak due to vibration, wear or accident.

Sudden release of compressed gases may cause severe injury to personnel. Do not deviate from approved procedures. Wear safety goggles or face shield, gloves and hearing protection when working with pressurized gases.

The fire extinguisher is under pressure. Caution should be taken when making connections to the fire extinguisher cylinder fill/charge valve.

When opening or closing the fill/charge valve, be certain the entire valve is not being loosened from the fire extinguisher cylinder.

Be certain you have an understanding of the entire system before operating. Procedural errors may cause catastrophic equipment failure and personnel injury or death.

Do not use the HALON transfer unit for any gas other than HALON / nitrogen. Serious injury or death may result.

Inspect all connections for contaminants before tightening. Remove any foreign materials. Follow specific special inspection and cleaning procedures to ensure removal of any hydrocarbon contamination.

Open all valves slowly to prevent pressure surge that might rupture a hose and cause injury or death to personnel.

Safety pins and antirecoil caps must be installed before handling or transporting of M-1 or Schrader valve fire extinguisher.

Do not refill any fire extinguisher that is out of hydrostatic test date.

Treat all fire extinguishers as filled extinguishers.

Inhalation of monobromotrifluoromethane gas (Halon 1301) at concentrations of 5% to 6% for more than 4 or 5 minutes may result in serious cardiac or central nervous system effects. Operate the Recovery / Recharger Unit only in well ventilated areas.

Liquid Halon 1301 (including the spray in the immediate vicinity of discharge) may freeze the skin (frostbite) on contact. Wear protective clothing and eye protection to avoid such contact. In the event of frostbite, warm the affected area quickly to body temperature.

Immerse hands in warm water or place hands in armpits. Get medical attention promptly.

Do not use compressed air for cleaning, except where reduced to less than 30 psi (207 kPag). When using compressed air, wear safety goggles or glasses and ensure air blast is not directed at another person. Do not direct compressed air against the skin.

For artificial respiration, refer to FM 21-11.

**b**

Operator's, Unit and Direct Support  
Maintenance Manual including  
Repair Parts and Special Tools List  
for  
**Recovery/Recharger Unit, Fire Extinguisher, Monobromotrifluoromethane,  
Skid Mounted, Pneumatic Motor Driven  
Model RHA-101-MI  
NSN 4210-01-30340**

**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 the procedures, please let us know. Mail your letter, 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. You may also submit your recommended changes by E-mail directly to <mpmt%avma28@st-louis-emh7.army.mil>. A reply will be furnished directly to you. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

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\*This Technical Manual Supersedes TM 5-4210-218-13&P, dated 13 June 1986, including all changes, and TM 5-4320-349-30&P, dated 30 August 1995.

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## HOW TO USE THIS MANUAL

This technical manual contains operation and maintenance instructions for the Recovery / Recharger Unit, Fire Extinguisher Maintenance instructions are divided into Operator, Unit and Direct Support levels. You must familiarize yourself with all operation and applicable maintenance procedures before operation of the equipment or performance of maintenance tasks. Important features of this manual are as follows:

Title Page Index. On the right side of the cover page, you will find a listing of frequently used manual sections or entries. The boxes contain the title of the section or entry and the page number of the first page of the referenced section or entry. Page numbers are located on the outer lower corner of each page.

Warning Pages. On the reverse side of the title page, you will find a summary of critical warnings. Death or serious injury may result if these warnings are not explicitly followed. Carefully read all warnings prior to performance of any operation or maintenance task.

Chapter and Section Divisions. This manual is divided into chapters that provide coverage of general information, operation instructions, and three levels of maintenance instructions. Each chapter begins on a right-hand page. The chapters are further divided into sections containing major topics of interest. The Table of Contents, just after the warning pages, has a complete listing of chapters, sections and major paragraphs.

Alphabetical Index. An index, arranged in alphabetical order, of controls, procedures, indicators, and common names is contained at the back of this manual (after all appendices). To use the index, first locate the heading of interest and note the page number indicated, turn to that page and locate the specific paragraph or step that is in question.

Repair Parts and Special Tools List. A listing of exploded figures and connected parts identification is contained just after the Maintenance Allocation Chart. Explicit instructions on its content and use are contained at the start of the listing and are not repeated here.

Reporting Errors and Recommending Improvements. If you find mistakes, or you feel that the procedures in this manual can be improved, complete the form DA-2028-2 included at the back of this manual (following the alphabetical index). A completed sample is included as a guide. Remove the blank form by tearing along the perforation, complete the form and mail to the address on the reverse side. You may also submit your changes via E-mail. The format for this type of submission is also provided immediately following the alphabetical index. A reply will be furnished you.

## CHAPTER 1

### INTRODUCTION

#### SECTION I. GENERAL INFORMATION

##### 1-1 SCOPE.

1-1.1 Type of Manual. Operator's, Unit, and Direct Support Maintenance Manual including Repair Parts and Special Tools List.

1-1.2 Model Number and Equipment Name. RHA-1O1-M1, Recovery / Recharger Unit, Fire Extinguisher, Monobromotrifluoromethane ICBF<sub>3</sub> or Halon 1301). The system hereafter will be referred to as the Recovery / Recharger Unit.

1-1.3 Purpose of Equipment. The Recovery / Recharger Unit (Figure 1-1) provides all necessary hardware to field recover residual Halon / nitrogen from 5 or 7 lb. (2.3 Kg or 3.2 Kg) capacity fire extinguishers and to recharge the same extinguisher when completely evacuated.

##### 1-2 MAINTENANCE FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 738-750 (Functional Users Manual for The Army Maintenance Management System (TAMMS)), or AR 700-138 (Army Logistics Readiness and Sustainability).

##### 1-3 DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Refer to TM 750-244-3 for information and procedures on destruction to prevent enemy use.

##### 1-4 PREPARATION FOR STORAGE OR SHIPMENT.

Procedures to accomplish storage or shipment of the Recovery / Recharger Unit are contained in Section VI of Chapter 4, Unit Maintenance.

##### 1-5 OFFICIAL NOMENCLATURE, NAMES AND DESIGNATIONS.

The nomenclature is; Recovery / Recharger Unit, Fire Extinguisher, Monobromotrifluoromethane

##### 1-6 EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your Recovery / Recharger Unit needs improvement, let us know. Send us a SF 368 (Product Quality Deficiency Report). 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. Mail the SF 368 to Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

## 1-7 WARRANTY INFORMATION.

The pump unit of the Recovery / Recharger Unit is covered by a limited warranty for a period of one year from the date of shipment from the manufacturer's plant. To determine when the shipping date was, the serial number of the pump will have to be reported to the pump manufacturer. Report all, defects to your supervisor, who will take appropriate action.

1-8 SAFETY, CARE, AND HANDLING.**WARNING**

**In accordance with Environmental Protection Agency rules Halon is not to be vented into the atmosphere. At no time will open venting of Halon be allowed. Extreme care must be exercised when charging an extinguisher or when evacuating a partially filled or full extinguisher to prevent Halon escape.**

1-9 CORROSION PREVENTION AND CONTROL (CPC).

- a. Corrosion Prevention and Control of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements made to prevent the problem in future items.
- b. While corrosion is typically associated with rusting of metal products, it can also include deterioration of other materials, such as rubber or plastic. Unusual cracking, softening, swelling or breaking of the materials may be a corrosion problem.
- c. If a corrosion problem is identified, it can be reported using Standard Form 368 (Product Quality Deficiency Report). Using key words such as 'corrosion', 'rust', 'deterioration' or 'cracking' will ensure that the information is identified as a CPC problem..
- d. The form should be submitted to Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MDO, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

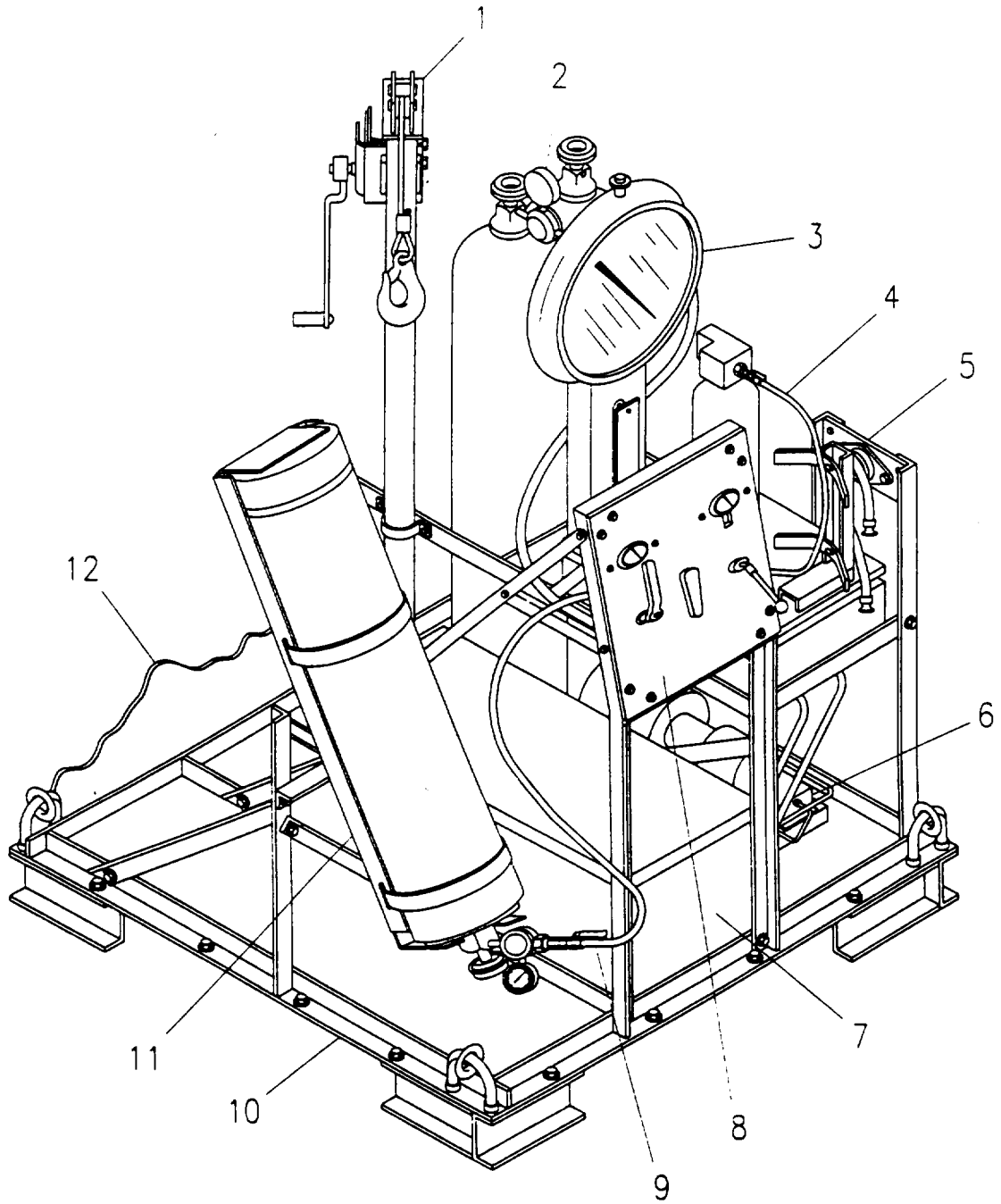


Figure 1-1. Recovery I Recharger Unit, Major Components

## SECTION II. EQUIPMENT DESCRIPTION AND DATA

### 1-10 EQUIPMENT CHARACTERISTICS, CAPABILITIES. AND FEATURES.

#### 1-10.1 Characteristics.

- PORTABLE Used in the field or an indoor area with proper ventilation.
- OPERATES OVER WIDE TEMPERATURE RANGE Operating range from + 20°F to + 100°F (-7°C to +38°C).
- COMPLETE Requires only Halon supply, nitrogen supply, a recovery cylinder and a continuous compressed air supply for operation.

#### 1-10.2 Capabilities and Features.

- Recovers Halon and nitrogen from fully or partially charged extinguishers and transfers it to a recovery cylinder.
- Charges a typical 5 lb. or 7 lb. (2.3 Kg or 3.2 Kg) capacity fire extinguisher in 10 minutes or less when the ambient air temperature is between +20°F and + 100°F (-7°C and +38°C).
- Provides a tilt rack to invert the Halon supply cylinder.
- Provides a hoist capable of lifting 600 lb. (272 Kg).
- Provides a platform type scale with scale range to 100 lb. (45 Kg) in 4 oz (0.11 Kg) increments for accurate weighing of fire extinguishers.
- Provides a temperature gage with scale range from -20°F to + 120°F (-29°C to +49°C) for accurate nitrogen pressurization of extinguishers over the operating temperature range.

### 1-11 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

Major components of the recharger are illustrated in Figure 1-1 and described below. Reference numbers listed below are keyed to the appropriate assembly illustration in Figure 1-1.

1-11.1 Hoist Winch Assembly (1). Provides a crank operated winch for lifting and placing the Halon cylinder on the tilt rack assembly (11) and the nitrogen cylinder on the base assembly (10).

1-11.2 Nitrogen Regulator and Hose (2). Controls the discharge pressure from the nitrogen cylinder and directs the flow of nitrogen to the appropriate valves on the control panel (8).

1-11.3 Scale Assembly (3). Consists of an indicator dial, column, temperature gauge, leveling device and scale platform. The dial indicates the weight of the fire extinguisher being filled. The dial may be set to zero, using the tare knob on top of dial, when the empty fire extinguisher is placed on the scale. The leveling device is used to position the scale as level as possible in the scale frame (5).

1-11.4 Extinguisher Hose Assembly (4). Connects the control panel to the extinguisher to allow transfer of Halon and nitrogen from and to the extinguisher. Has valve to allow isolation of the extinguisher

1-11.5 Scale Frame Assembly (5). Consists of an aluminum frame which supports the scale assembly (3), and adjustable (high-low position) fire extinguisher agitator bracket, and provides a frame to support the hoist winch assembly (1) and nitrogen and recovery cylinders. The agitator bracket consists of a base for

mounting extinguisher adapter, an upright mounting two cylinder supports and two adjustable straps, used to hold the extinguisher securely during recovery operations, charging operations and manual agitation following nitrogen pressurization.

1-11.6 Transfer Pump Unit (6). Consists of an air motor driven pump unit for the transfer of liquids or vapors in particular Halon and nitrogen. Requires air supply not to exceed 175 psi. Nominal pump output at 100 psi / 50 cfm air drive and two stage operation is 2 gpm.

1-11.7 Tool Box (7). Provides for convenient storage of tools, expendable materials, and accessories. The tool box lid is hinged and provided with wing turn latches for secure closure. The tool box is not attached to the base assembly (10).

1-11.8 Control Panel (8). Provides mounting for the control valves and gauges necessary to operate the pump and control and direct the flow of Halon and nitrogen in the recovery and charging process.

1-11.9 Halon Hose Assembly (9). Connects the Halon cylinder to appropriate valve on the control panel (8) for the transfer of Halon to the extinguisher during charging operations. Also used to connect to recovery cylinder during recovery operations. Has valve to allow isolation of either the Halon or recovery cylinder and an adapter, with gauge to monitor input pressure to the recovery cylinder.

1-11.10 Base Assembly (10). Provides a portable mounting surface for the recharger. The base is raised from the floor by support channels to facilitate lifting by forklift. Rings are provided at each corner for attachment of chains, cables, etc.

1-11.11 Tilt Rack Assembly (11). Consists of a channel, bar, bearing, and frame. The Halon cylinder is initially placed upright and secured by straps on the channel, then inverted by rotation of the channel around a bearing mounted bar. The Halon bottle must be inverted for liquid to be pumped to the fire extinguisher.

1-11.12 Cover (12). Provides limited access plus protection from the environment when the recharger is not in use. Two adjustable straps are provided to secure the cover.

1-12 EQUIPMENT DATA.

Performance data and dimensions for each major Recovery / Recharger Unit component are listed below. Reference the manual Table of Contents to locate an illustrated parts list for each assembly.

a. Hoist Winch Assembly.

|                    |   |
|--------------------|---|
| Rated Lift         | 600 lb. (272 Kg)                            |
| Drum Cable Storage | 60 ft (18 m) maximum; 5 ft (1.5 m) supplied |
| Brake Type         | Single disc, automatic                      |

b. Scale Assembly.

|             |  |
|-------------|--|
| Scale Type  | Platform   |
| Scale Range | 100 lb. (45 Kg) in 0.25 lb. (0.11 Kg) increments |

c. Scale Frame Assembly.

|        |                    |
|--------|--------------------|
| Length | 43.0 in (109.2 cm) |
| Width  | 16.0 in (40.6 cm)  |
| Height | 40.6 in (103.1 cm) |

- d. Transfer Pump Unit.
  - Length (maximum) 29 in (74 cm)
  - Width (maximum) 17 in (43 cm)
  - Height (maximum) 11.5 in (29 cm)
  - Pump Assembly Nominal output (two stage); 2 gpm @100 psi / 50 cfm
- e. Nitrogen Pressure Regulator Gauge Range 0 to 1500 psi (0-10300 kPa)
- f. Base Assembly.
  - Length 47 in (119 cm)
  - Width 47 in (119 cm)
  - Height (maximum) 6.5 in (16.5 cm)
- g. Tool Box.
  - Length 30.3 in (77.0 cm)
  - Width 12.0 in (30.5 cm)
  - Height 12.0 in (30.5 cm)
- h. Control Panel.
  - Hose Material Fiber-reinforced rubber
  - Pump Inlet Pressure Gauge Range -20 psi + 600 psi (-138 to + 4137 kPa)
  - Pump Outlet Pressure Gauge Range 0 to 2000 psi (0 to 13789 kPa)
  - Adapter Gauge Range (Attaches to Halon hose) 0 to 1000 psi (0 to 6895 kPa)
  - Nitrogen Monitor Gauge (Attaches to extinguisher hose) 0 to 1500 psi (0 - 10300 kPa)
- i. Tilt Rack Assembly.
  - Length (of channel) 47.8 in (121.4 cm)
  - Width 13.6 in (34.5 cm)
  - Height (maximum) 71.3 in (181.1 cm)
- j. Cover.
  - Length 156 in (396.2 cm)
  - Width 156 in (396.2 cm)
  - Weight 26 lb. (11.8 kg)
  - Material Water resistant canvas, poly web reinforced hem
- k. Halon 1301 Fluid.
  - Odor and Detection Faint ether odor
  - Flammability Nonflammable
  - Toxicity Group 6 (underwriter's Laboratories classification for the least 11 toxic of all extinguishing agents)

I. Recovery / Recharger Unit, Fire Extinguisher.

|                   |                     |
|-------------------|---------------------|
| Length            | 47.0 in (119.4 cm)  |
| Width             | 47.0 in (119.4 cm)  |
| Height            | 74.25 in (118.6 cm) |
| Weight (shipping) | 518 lb. (235.0 kg)  |

1-13 SAFETY, CARE, AND HANDLING.

Before you operate the Recovery / Recharger Unit or perform maintenance, read and fully understand the WARNINGS located on the inside front cover.

**SECTION III. TECHNICAL PRINCIPLES OF OPERATION**

1-14 LOADING AND INVERTING THE HALON CYLINDER.

The Halon cylinder is lifted and placed on the tilt rack assembly (11, figure 1-1) using the hoist winch assembly (1). The hoist winch assembly cable is attached to the D-rings of the cylinder lifting harness using the spring hook provided. The winch is then operated by turning a handle clockwise to lift the cylinder. The winch is provided with an automatic brake to hold the load and prevent the handle from freewheeling. The tilt rack assembly provides a balanced mounting surface for the Halon Cylinder to simplify inversion of the cylinder. The Halon cylinder is inverted so that Halon liquid, rather than vapor, is available for pumping to the fire extinguisher.

1-15 EXTINGUISHER RECOVERY AND CHARGING.

1-15.1 General. The Recovery / Recharger Unit as shown in Figure 1-1 may be used to remove Halon and nitrogen from an extinguisher cylinder by creating a minus psi reading at the cylinder valve and placing the extracted material in a recovery cylinder. Or it may be used to pump Halon into empty extinguisher cylinders by pumping Halon from a Halon cylinder and creating a positive pressure at the cylinder valve. All necessary valves, hoses, and gauges come as part of the Recovery / Recharger Unit. The Halon cylinder, nitrogen cylinder and the recovery cylinder are not part of the recharging unit. Detailed procedural steps are in Chapter 2.

1-15.2 Recovery. The recovery of Halon and nitrogen from an extinguisher is accomplished by pumping the extinguisher contents from the extinguisher to a recovery cylinder. The Halon hose is connected to the recovery cylinder and the extinguisher hose to the extinguisher. The UNIT OPERATION valve is placed in the RECOVERY position, the HALON/NITROGEN valve in the HALON position and the pump started (given that all appropriate valves are open) and the process continues until a minus 5 psi reading is observed on the INLET PRESSURE gauge. At that time all valves are closed, the PUMP control placed in the OFF position, and all other controls in the OFF position.

1-15.3 Charging. To charge an extinguisher the Halon hose is connected to the Halon cylinder and the nitrogen hose to the nitrogen regulator which is connected to the nitrogen cylinder. The extinguisher hose, with nitrogen monitor adapter and fire extinguisher adapter, is connected to the extinguisher, which is secured in the agitator bracket. The HALON/NITROGEN valve is placed in the HALON position and the UNIT OPERATION valve in the CHARGE position. When all appropriate valves have been opened the PUMP control is placed in the ON position and Halon pumped into the extinguisher until the correct weight is reached. All valves are closed or placed in the OFF position. The HALON/NITROGEN valve is placed in the NITROGEN position, the UNIT OPERATION valve in the CHARGE position, and the nitrogen regulator set to the pressure specified for the ambient temperature. When the nitrogen monitor pressure gauge reaches the pressure according to the ambient temperature (same as nitrogen regulator pressure setting) the procedure is halted. The extinguisher is shaken and if the pressure reading drops the nitrogen pressure



process is repeated until a stable pressure reading is observed. At the conclusion of all charging operations make sure all valves are closed or OFF and place the cover over the Recovery / Recharger Unit.

CHAPTER 2

OPERATING INSTRUCTIONS'

SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1 RECOVERY / RECHARGER UNIT CONTROLS AND INDICATORS.

The controls and indicators you need to operate the Recovery / Recharger Unit are located on the control panel, the nitrogen pressure regulator, the Halon cylinder adapter and hose, the extinguisher hose and the air filter/regulator.

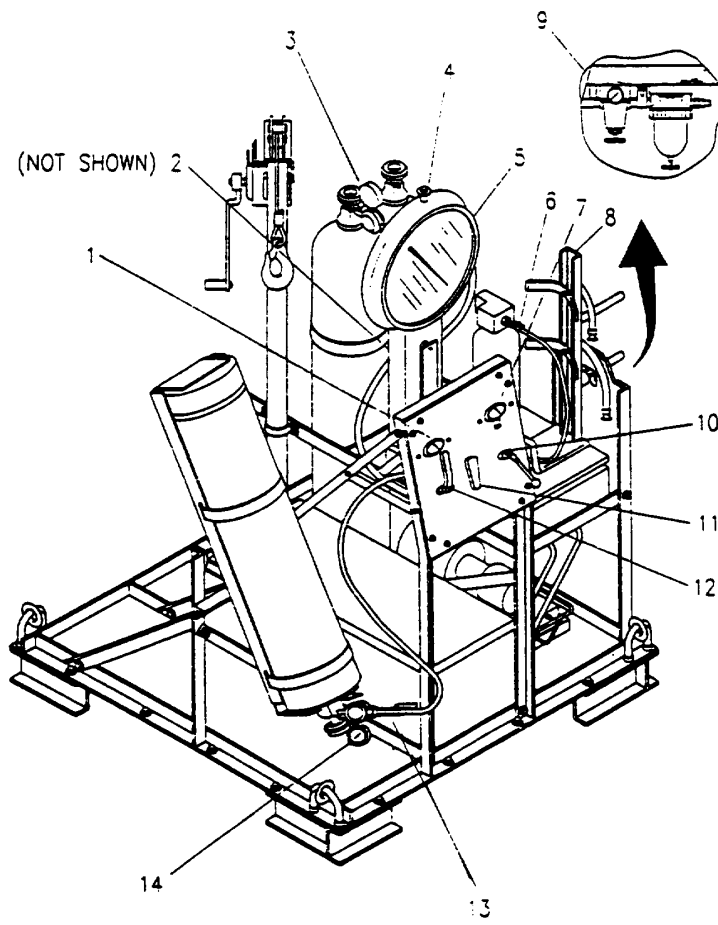


Figure 2-1. Operators Controls, Gauges and Valves.

1. INLET PRESSURE gauge. Indicates the pump inlet pressure from minus 20 psi (minus 138 kPa) to plus 600 psi (4137 kPa).
2. THERMOMETER. Used to determine ambient temperature for nitrogen pressurization. Mounted on rear of scale column.
3. NITROGEN REGULATOR. Used to set correct nitrogen pressure according to ambient temperature.
4. TARE KNOB. Used to zero scale dial prior to filling extinguisher cylinder with Halon.
5. SCALE. Shows weight of Halon placed in extinguisher cylinder to avoid overflow.
6. EXTINGUISHER HOSE valve. Position allows or stops flow to or from the extinguisher cylinder.
7. OUTLET PRESSURE gauge. Indicates pump outlet pressure from 0 to 2000 psi (0-13789 kPa).
8. AGITATOR BRACKET. Provides mounting for extinguisher cylinder adapters. Secures extinguisher cylinder during recovery and charging operations. Used to shake extinguisher after nitrogen pressurization to achieve a stabilized extinguisher pressure reading.
9. AIR FILTER / REGULATOR. Connection point for external compressed air source needed to drive transfer unit pump air motor. Regulator controls air pressure to air motor and filter removes water or other contaminants that could damage motor.
10. UNIT OPERATION valve. Position determines unit function in either recovery or recharge of extinguisher cylinder.
11. HALON / NITROGEN valve. Position determines if flow is through the pump. HALON position also used to direct flow to the recovery cylinder.
12. PUMP valve. Position determines if pump is ON or OFF.
13. HALON HOSE valve. Position allows or stops flow from the Halon cylinder or to the recovery cylinder.
14. HALON CYLINDER ADAPTER WITH GAUGE (0 to 1000 psi) (0-6895 kPa). Acts as interface between the cylinders and hoses and when on the recovery cylinder indicates pump pressure required to force Halon/nitrogen mix into the recovery cylinder.

## **SECTION II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

### 2-2 GENERAL

- a. Operator Preventive Maintenance Checks and Services (PMCS) are performed to be sure the Recovery / Recharger Unit is ready for use at all times. These checks and services help you find and fix defects before the Recovery / Recharger Unit is damaged or fails.
- b. If minor defects are found while the Recovery / Recharger Unit is operating, take notes on the cause and effect of each defect. Fix or have each defect fixed after you have stopped operating the Recovery / Recharger Unit.
- c. Record all defects and steps taken to fix them as soon as possible. See DA PAM 738-750.

2-3 . OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES PROCEDURES.

- a. The PMCS procedures contained in table 2-1 will help you find and fix defects before the Recovery / Recharger Unit is damaged or fails. Each procedure is keyed to an illustration which shows the location and details of the component(s) being checked or serviced. These item numbers are contained in the ITEM NUMBER column of table 2-1.
- b. The INTERVAL column of table 2-1 indicates the service interval of the PMCS procedure: Before, During and After operation of the Recovery / Recharger Unit.
- c. The EQUIPMENT IS NOT READY/AVAILABLE IF column of table lists conditions which prevent operation of the Recovery / Recharger Unit. These conditions must be corrected prior to operation of the Recovery / Recharger Unit.
- d. Leakage definitions used in the PMCS are classified as follows:
  - (1) Leakage of Halon is not allowed.

INITIAL SETUP

Tools

None identified

Materials/Parts

None identified

Personnel Required

2 each 52C Utility Equipment Repairer

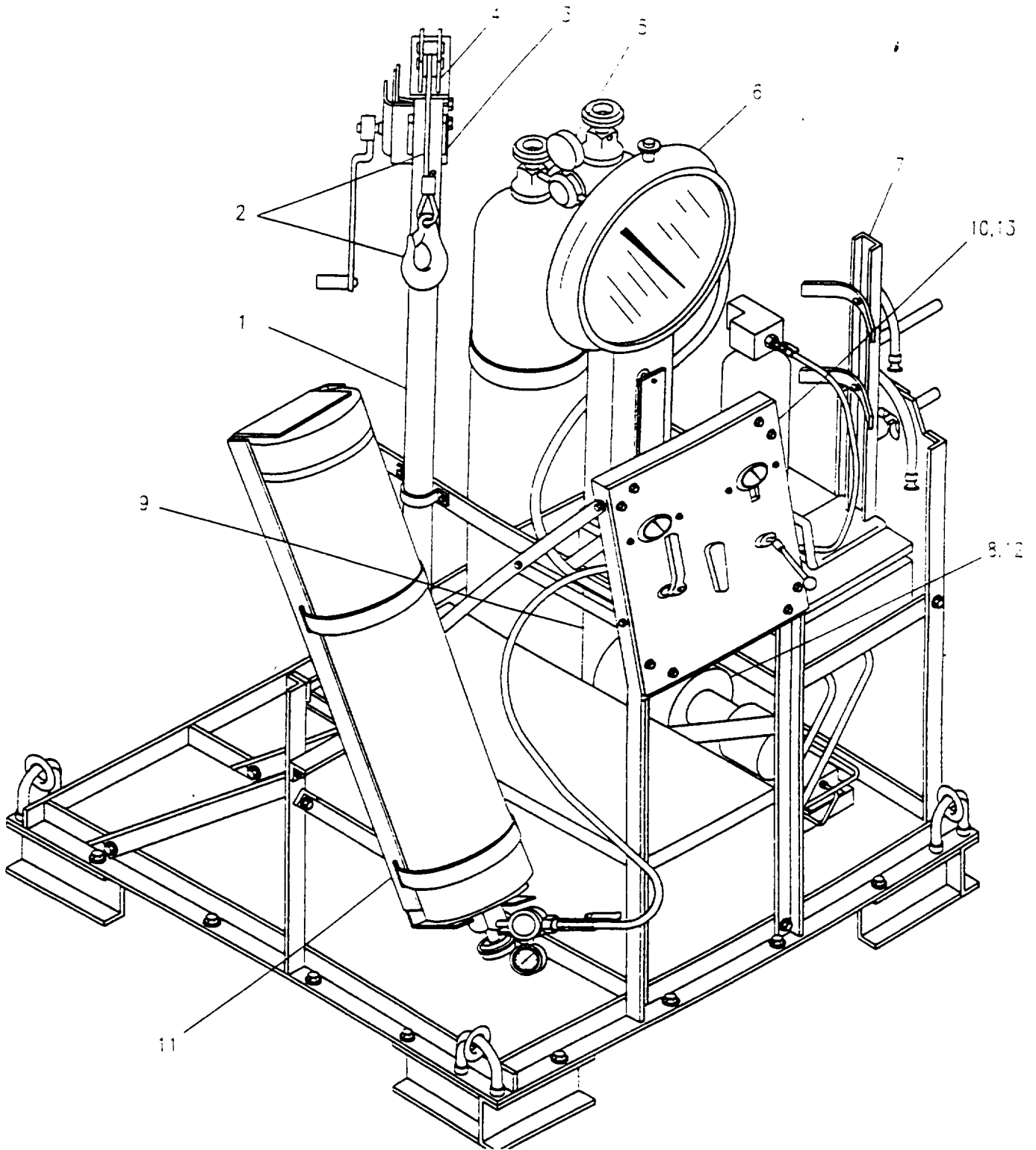
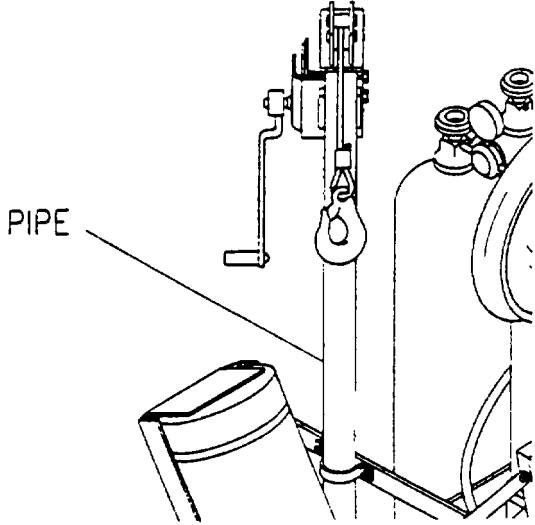
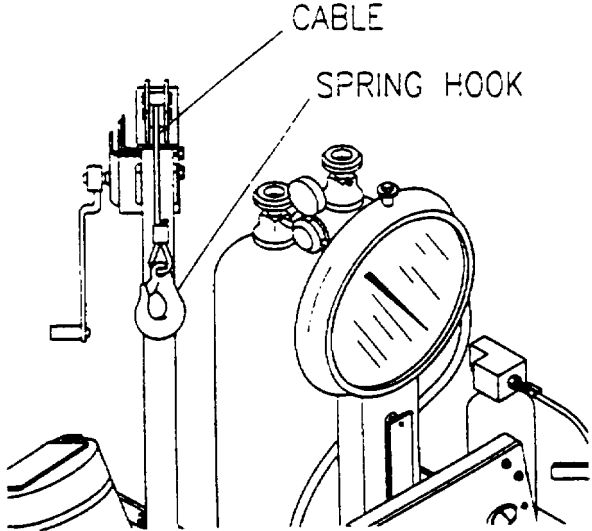
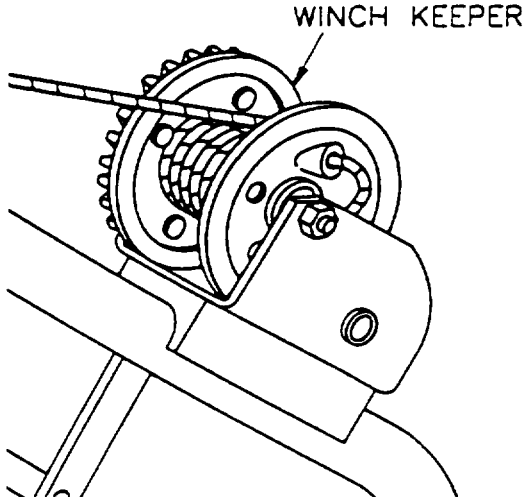
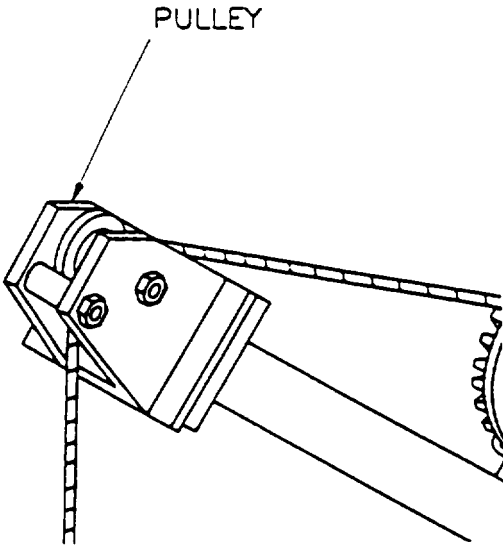


Figure 2-2. Preventive Maintenance Checks and Services Locator

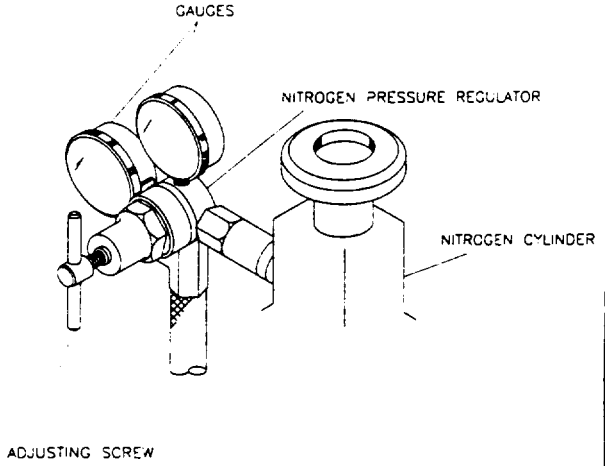
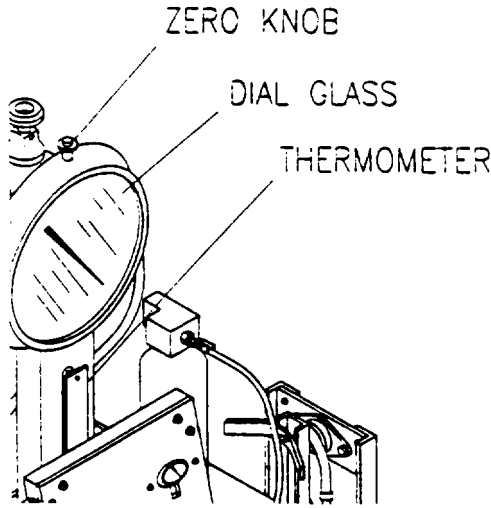
Table 2-1. Operator Preventive Maintenance Checks and Services for Recovery / Recharger Unit

| Item No. | Interval | Location                         | Procedure   | Not Fully Mission Capable If:  |
|----------|----------|----------------------------------|---|--|
|          |          | Item To Check/ Service           |   |  |
| 1        | Before   | Rear Hoist Pipe                  | Inspect pipe for bending or cracking. Report defects to supervisor.                           | Pipe bent or cracked.  |
|          |          |                                  |            |  |
| 2        | Before   | Hoist Pipe Cable and Spring Hook | Inspect cable for breaks and kinks and spring hook for closure. Report defects to supervisor. | More than 5 strands broken or kinked in cable or spring hook will not close. |
|          |          |                                  |           |  |

**Table 2-1. Operator Preventive Maintenance Checks and Services for Recovery / Recharger Unit  
(Continued)**

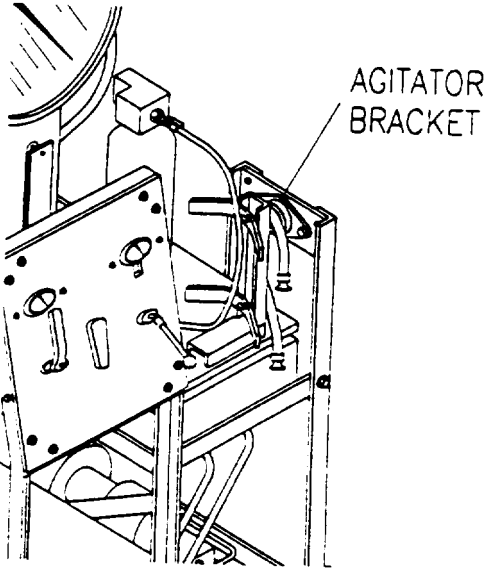
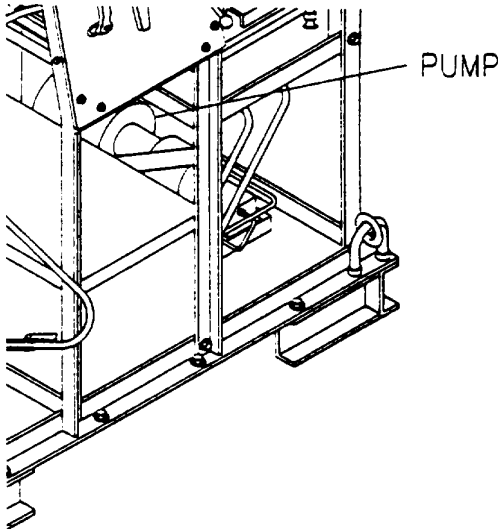
| Item No. | Interval | Location               | Procedure  | Not Fully Mission Capable If: |
|----------|----------|------------------------|--|-------------------------------|
|          |          | Item To Check/ Service |  |                               |
| 3        | Before   | Winch Keeper           | <p>Inspect two bolts holding keeper for tightness.</p>  | Keeper loose or missing.      |
| 4        | Before   | Hoist Pipe Pulley      | <p>Inspect pulley for free movement.</p>               | Pulley does not move freely.  |

**Table 2-1. Operator Preventive Maintenance Checks and Services for Recovery / Recharger Unit  
(Continued)**

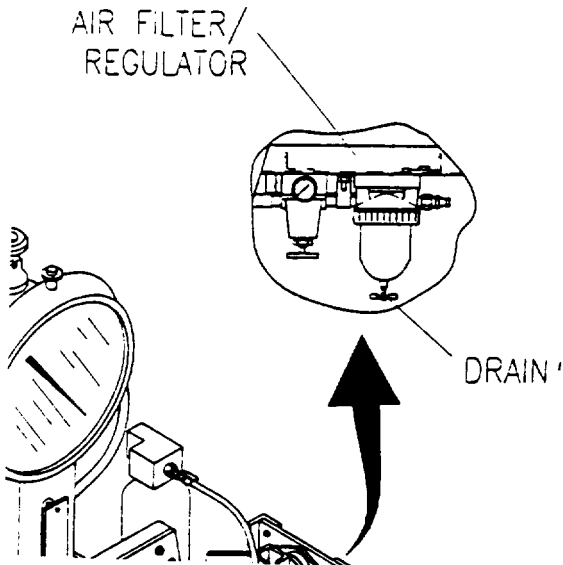
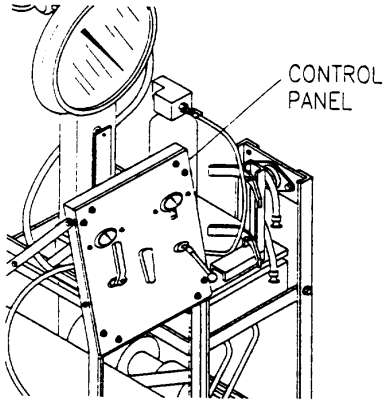
| Item No. | Interval | Location                  | Procedure   | Not Fully Mission Capable If:                                  |
|----------|----------|---------------------------|---|--|
|          |          | Item To Check/ Service    |   |  |
| 5        | Before   | Nitrogen Bottle Regulator | <p>Inspect gauges for broken glass and pressure adjusting screw for free movement.</p>  <p>The diagram shows a nitrogen bottle regulator assembly. It includes two gauges labeled 'GAUGES', a nitrogen pressure regulator labeled 'NITROGEN PRESSURE REGULATOR', and a nitrogen cylinder labeled 'NITROGEN CYLINDER'. An adjusting screw is also indicated with the label 'ADJUSTING SCREW'.</p> | Gauge glass broken or pressure adjusting screw frozen.         |
| 6        | Before   | Scale Frame Scale         | <p>Inspect scale for broken dial glass, broken thermometer and zero knob adjustment.</p>  <p>The diagram shows a scale frame scale assembly. It includes a zero knob labeled 'ZERO KNOB', a dial glass labeled 'DIAL GLASS', and a thermometer labeled 'THERMOMETER'.</p>   | Dial glass broken, thermometer broken, or scale will not zero. |



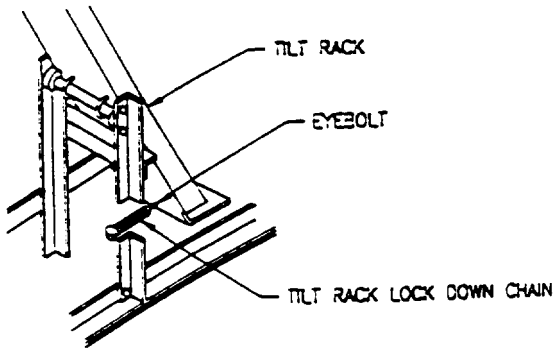
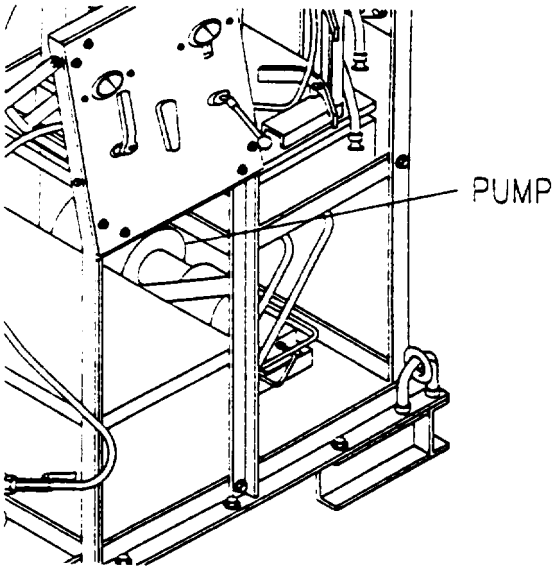
**Table 2-1. Operator Preventive Maintenance Checks and Services for Recovery / Recharger Unit  
(Continued)**

| Item No. | Interval | Location                              | Procedure  | Not Fully Mission Capable If:   |
|----------|----------|---------------------------------------|--|---|
|          |          | Item To Check/ Service                |  |   |
| 7        | Before   | Scale<br>Frame<br>Agitator<br>Bracket | Inspect for a broken bracket, for high-low adjustment. Inspect straps for completeness and if extinguisher bottle can be held. | Bracket will not adjust or straps are defective or will not secure extinguisher bottle. |
|          |          |                                       |   |   |
| 8        | Before   | Base<br>Transfer<br>Pump Unit         | Inspect pump inlet and outlet connection for indications of leakage. Use leak detector.  | Evidence of leakage found.  |
|          |          |                                       |    |   |

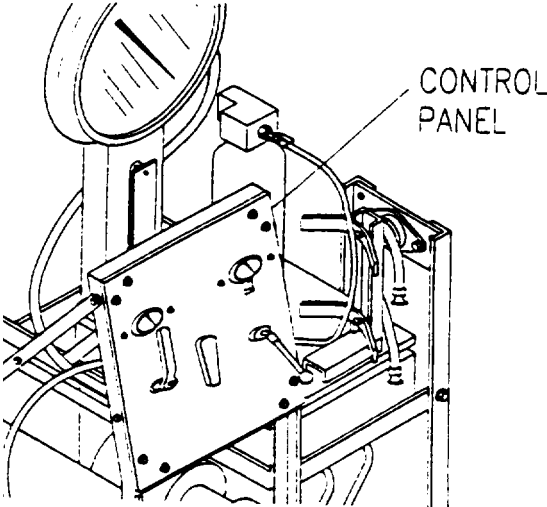
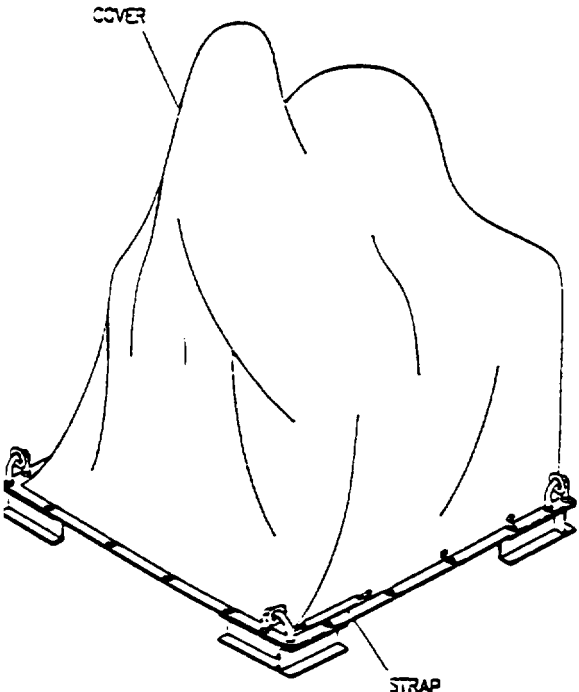
**Table 2-1. Operator Preventive Maintenance Checks and Services for Recovery / Recharger Unit  
(Continued)**

| Item No. | Interval | Location  | Procedure  | Not Fully Mission Capable If:   |
|----------|----------|---|--|---|
|          |          | Item To Check/ Service  |  |   |
| 9        | Before   | Back of Control Panel<br>Air Filter                           | <p>Inspect air filter by opening petcock in bottom of bowl.</p>   | Other than clear water drains from bowl.  |
| 10       | Before   | Control Panel<br>Gauges<br>Valves, and<br>Hose<br>Connections | <p>Inspect gauges for broken glass, valves for smooth operation and hose connections for leakage. Use leak detector.</p>  | Gauge glass broken, valves do not operate or operate hard or evidence of leakage found. |

**Table 2-1. Operator Preventive Maintenance Checks and Services for Recovery / Recharger Unit  
(Continued)**

| Item No. | Interval | Location                        | Procedure  | Not Fully Mission Capable If:  |
|----------|----------|---------------------------------|--|--|
|          |          | Item To Check/ Service          |  |  |
| 11       | Before   | Tilt Rack<br>Tilt Rack Assembly | Inspect tie down bolt and chain and check rack for ease of operation.<br><br> <p>The diagram shows a perspective view of a metal structure. A horizontal bar is attached to a vertical post. A chain is connected to the end of this bar. Labels with leader lines point to the 'TILT RACK' (the vertical post), an 'EYEBOLT' (a bolt on the horizontal bar), and the 'TILT RACK LOCK DOWN CHAIN'.</p> | Tie down will not secure rack in inverted position or rack binds and is difficult to invert.                   |
| 12       | During   | Base Transfer Pump Unit         | Observe pump operation for time to fill and indication of Halon leakage. Use leak detector.<br><br> <p>The diagram shows a complex mechanical assembly with various pipes, valves, and structural supports. A label 'PUMP' with a leader line points to a specific component within the assembly.</p>  | With full Halon cylinder, pump takes over 15 minutes to fill extinguisher or detector indicates Halon leakage. |

**Table 2-1. Operator Preventive Maintenance Checks and Services for Recovery / Recharger Unit  
(Continued)**

| Item No. | Interval | Location                           | Procedure   | Not Fully Mission Capable If:  |
|----------|----------|------------------------------------|---|--|
|          |          | Item To Check/ Service             |   |  |
| 13       | During   | Control Panel<br>Gauges,<br>Valves | Observe gauges for indication of nonresponse to changing conditions and valves for difficult operation. | Gauges do not respond to changing conditions or valves become very difficult to operate. |
|          |          |                                    |                      |  |
| 14       | After    | Cover<br>Cover                     | Inspect cover for tears or broken strap.  |  |
|          |          |                                    |                     |  |

**SECTION III. OPERATION UNDER USUAL CONDITIONS.**

2-4 GENERAL.

The instructions in this section are for personnel who operate the Recovery / Recharger Unit. These instructions describe how the Recovery / Recharger Unit is prepared for use, operated, and prepared for movement. Normal operation conditions are defined as ambient temperatures between + 20°F and +10°F (-7°C and +38°C).

2-5 ASSEMBLY AND PREPARATION FOR USE.

Service upon receipt functions, including unloading, unpacking, inspection, and installation of the Recovery / Recharger Unit, are to be accomplished by unit level maintenance personnel. Refer to unit maintenance instructions contained in Chapter 4, Section II of this manual.

2-6 INITIAL ADJUSTMENTS AND DAILY CHECKS.

2-6.1 Cover. Loosen two adjustable straps and remove cover from equipment. Store cover in a dry location. Store adjustable straps in the tool box.

2-6.2 Before PMCS. Before operating the Recovery / Recharger Unit, perform your before PMCS specified in table 2-1. Always keep in mind the WARNINGS located on the inside front cover.

**NOTE**

**A ball valve is open when the valve handle is aligned parallel with the valve body.  
Turn the handle 90° in either direction to close the valve.**

2-6.3 Installation of Nitrogen and Halon Supply Cylinders.

**WARNING**

**Always wear safety glasses or goggles around compressed gas.**

**NOTE**

**The Recovery / Recharger Unit requires the following cylinders for operation.**

| <u>NSN</u>  | <u>Description</u>      | <u>Quantity</u> |
|---|-------------------------|-----------------|
| 6830-00-292-0732                                      | Nitrogen cylinder       | 1               |
| 6830-00-543-6623                                      | Halon cylinder          | 1               |
| 8120-01-371-0533<br>(for recovery only<br>Halon 1301) | Compressed Gas Cylinder | varies          |

- a. To pull cable from the winch for connection to the cylinder, simultaneously pull on cable (gloves are recommended) and slowly turn winch handle counterclockwise.

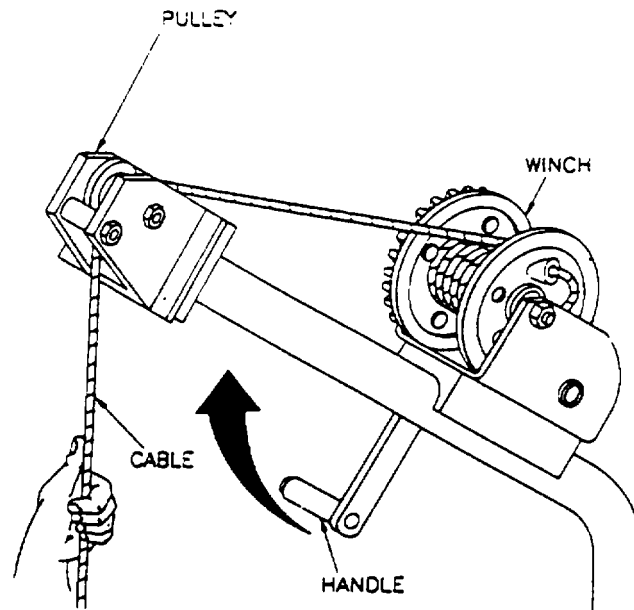


Figure 2-3. Winch Cable

- b. Securely hook the spring hook to the O-rings on the lifting harness. Use item 7, Appendix D, to lift Halon cylinder and item 8, Appendix D, to lift nitrogen cylinder.

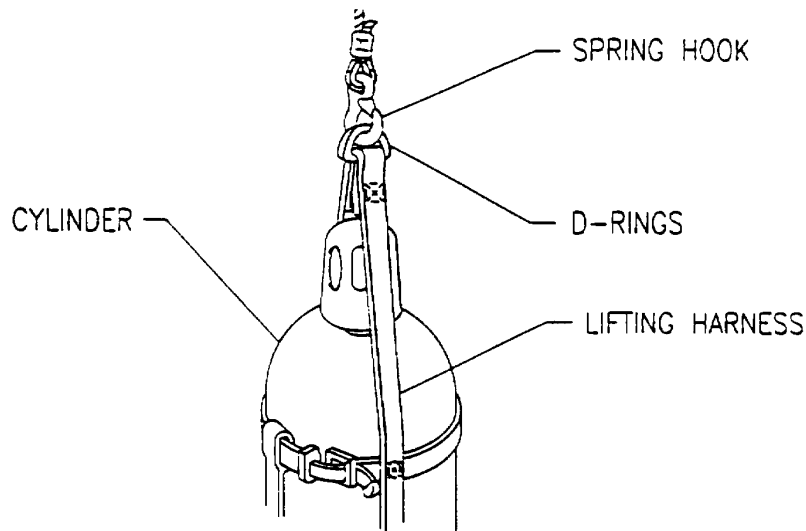


Figure 2-4. Lifting Halon or Nitrogen Cylinder

**WARNING**

- The winch is not designed to lift humans and should not be operated when there are persons positioned on the load being moved.
- Do not lift loads in excess of 600 lb. (272 Kg). Equipment failure and serious injury to personnel may result.
- Do not guide the cable with your hands when operating the winch. Serious injury may result.

- Do not leave the winch unattended with a suspended load. Equipment failure and serious injury to personnel may result.

**CAUTION**

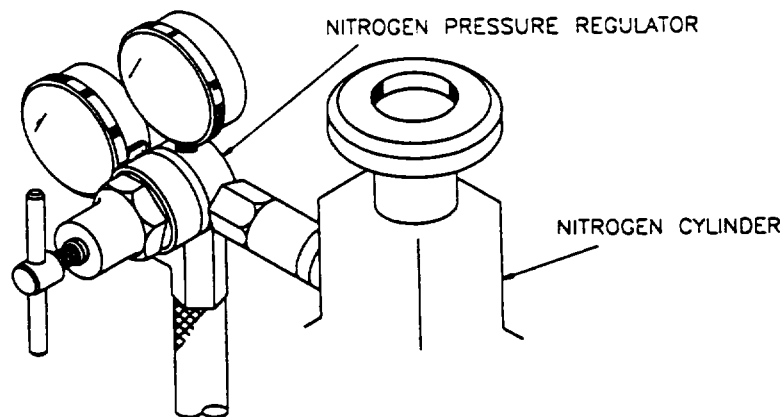
The 'clicking' sound audible when lifting loads indicates that the brake is functioning properly. If the clicking sound stops while the handle is being turned clockwise, slowly lower the cylinder by turning the handle counterclockwise. Do not operate the winch until the ratchet has been repaired or replaced.

- c. Turn the handle clockwise to lift the cylinder. If you release the handle, the brake will hold the load.

**NOTE**

To disengage the brake, turn the handle clockwise far enough to hear two 'clicks'. The brake will engage only when the handle is turned rapidly in the counterclockwise direction.

- d. Lower the Halon cylinder with valve upright onto the tilt rack assembly (or lower the nitrogen cylinder onto the designated position on the base assembly) by slowly turning the winch handle counterclockwise while guiding the cylinder into the desired position.
- e. Disengage the spring hook from the lifting harness D-rings.
- f. Secure the Halon cylinder to the tilt rack assembly using the tie down straps attached to the tilt rack. Secure the nitrogen cylinder to the scale frame assembly using the straps attached to the nitrogen bottle support.
- g. Remove the safety caps from the cylinders. Store the safety caps in the tool box.
- h. Connect the nitrogen pressure regulator to the nitrogen cylinder.



*Figure 2-5. Nitrogen Pressure Regulator Installation.*

- i. Use the tilt rack to invert the Halon cylinder. Connect the snap end of the tilt rack lock down chain to the eyebolt to hold the tilt rack in the inverted position.

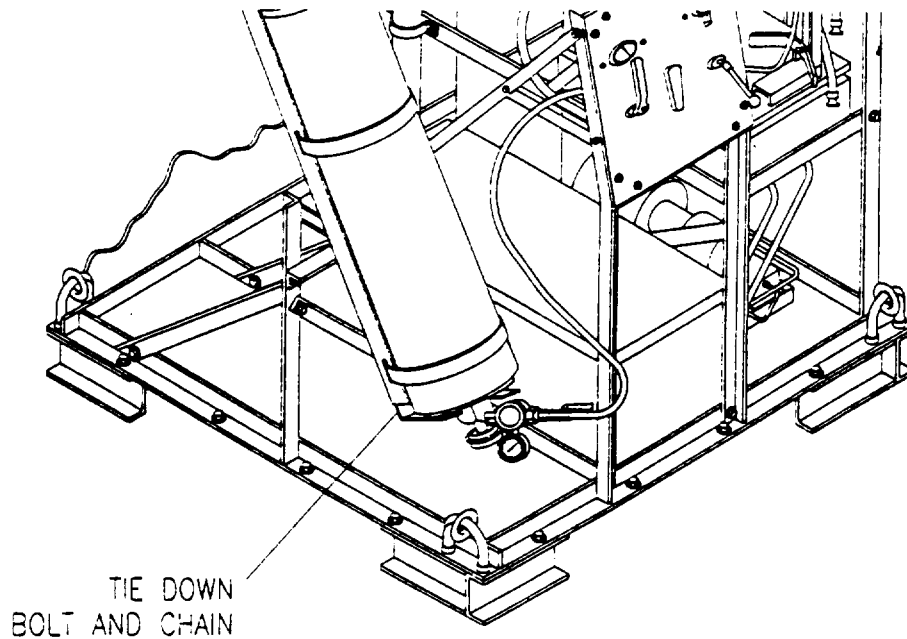


Figure 2-6. Halon Cylinder Inversion.

## 2-7. SYSTEM LEAK TEST.

- a. Insure that all valves are in the closed or OFF position.
- b. Disconnect the nitrogen hose from the elbow on the HALON / nitrogen valve.
- c. Attach nitrogen hose to the test adapter. The test adapter is located in the tool box and consists of a quick disconnect plug and a reducing connector to fit the nitrogen hose.
- d. Connect the test adapter to the Halon hose.
- e. Set the outlet pressure gauge on the nitrogen pressure regulator to 400 psi by turning the adjustment screw counterclockwise.
- f. Open the nitrogen supply cylinder valve.

### CAUTION

If inlet pressure gauge on the control panel reading exceeds 500 psi. close nitrogen supply cylinder valve, release pressure from the system by opening the extinguisher hose ball valve and readjust the nitrogen pressure regulator outlet pressure gauge. Repeat step f.



- g. Slowly open the ball valve on the Halon hose.
- h. Place the UNIT OPERATION valve in the RECOVER position for approximately 5 seconds. Then move it to the CHARGE position. Do not allow the inlet pressure gauge to exceed 500 psi.
- i. Place HALON / NITROGEN valve in the HALON position.
- j. Close the nitrogen supply cylinder valve.
- k. Monitor the inlet pressure gauge on the control panel for 20 to 30 minutes for any loss of pressure. If no pressure loss is detected skip steps l and m.
- l. If pressure loss is detected open the nitrogen supply cylinder valve to reestablish pressure.
- m. Using leak detection compound (item 9, Section II, Appendix F) check all connections for leaks. Correct any leaks found.
- n. Close nitrogen supply cylinder valve.
- o. Slowly open ball valve on extinguisher hose to release pressure in the system.
- p. Disconnect the test adapter from the Halon hose.
- q. Disconnect the nitrogen hose from the test adapter and store the test adapter in the tool box.
- r. Connect the nitrogen hose to the elbow on the HALON / NITROGEN valve.
- s. Place all valves in the closed or OFF position

## 2-8 PREPARATION FOR RECOVERY.

### NOTE

The following instructions apply *only* to the recovery of Halon and nitrogen from fire extinguisher cylinders that are partially or fully charged. In accordance with EPA environmental law, do not vent Halon into the atmosphere.

Inlet pressure gauge on the control panel reads minus 20 psi (minus 138 kPa) (vacuum) to plus 600 psi (4137 kPa). Outlet pressure gauge on the control panel reads 0-2000 psi (0-13789 kPa).

### WARNING

**Check to ensure that the recovery cylinder is a high pressure 2265 psi (15617 kPa) cylinder. Failure to use the correct cylinder can result in explosion and death.**

- a. Place recovery cylinder on the floor next to nitrogen cylinder and secure with straps attached to the nitrogen cylinder support.
- b. Connect the Halon cylinder adapter assembly, with gauge, to the recovery cylinder. Then connect Halon hose to the adapter assembly. Tighten all connections.
- c. Connect the air compressor to the quick-disconnect fitting on the filter, located below and to the left rear of the control panel. Adapt the supplied female quick-disconnect fitting to the air hose as required. Compressor must supply a minimum of 15 CFM at 150 to 175 psi (1034 to 1206 kPa).

- d. Verify that the shift valve located on top of the pump is open (two stage position).
- e. Verify that all valves on the control panel are in the OFF position.
- f. Verify that all other valves and ports on the hoses, fire extinguisher and recovery cylinder are closed.

**CAUTION**

**The safety pin and antirecoil cap must be in place before handling M-1 or Schrader valve fire extinguisher. If not on fire extinguisher, place it aside until a safety pin and antirecoil cap can be installed.**

**CAUTION**

**Do not handle any fire extinguisher that has not been hydrotested within the last five years. The date should be stamped on fire extinguisher. If not, have using unit verify date.**

**2-9 HALON / NITROGEN RECOVERY PROCEDURES.**

**2-9.1 For M-1 Tank Extinguisher Cylinder or any Cylinder With Schrader Valve.**

**WARNING**

**Sudden release of compressed gases may cause severe injury to personnel. Do not deviate from approved procedures. Wear safety goggles or face shield, gloves and hearing protection when working with pressurized equipment.**

**Perform operating procedures in a well ventilated area. Accidental Halon leaks remove oxygen from the air. Suffocation can occur.**

- a. Connect the Schrader valve adapter, located in the tool box, to the extinguisher hose. The Schrader valve adapter has a 37° bend at one end.
- b. Install extinguisher support bracket, P/N 12463588 (item 6, Appendix D) on agitator bracket.
- c. Start the air compressor. Adjust air inlet regulator on the Recovery / Recharger Unit to 150 psi (1034 kPa).

**WARNING**

**The fire extinguisher is under pressure. Caution should be taken when making connections to the fire extinguisher fill valve to prevent Halon escape. Serious injury or death could result.**

- d. Place the fire extinguisher on the support bracket, valve down, and secure with straps on agitator bracket.
- e. Remove the cap from the fill valve on the fire extinguisher and connect the extinguisher hose to the fill valve.
- f. Open the valve on the recovery cylinder and the ball valve on the Halon hose.
- g. Place the HALON/NITROGEN valve in the HALON position.

- h. Place the UNIT OPERATION valve in the RECOVER position.

**WARNING**

**When opening or closing the extinguisher fill valve, be certain that the entire valve is not being loosened from the fire extinguisher. Halon could escape and cause injury or death.**

- i. Open the fill valve on the fire extinguisher by rotating the small hex nut counterclockwise.
- j. Slowly open the ball valve on the extinguisher hose. Listen for the flow of Halon/nitrogen from the fire extinguisher through the pump to the recovery cylinder.

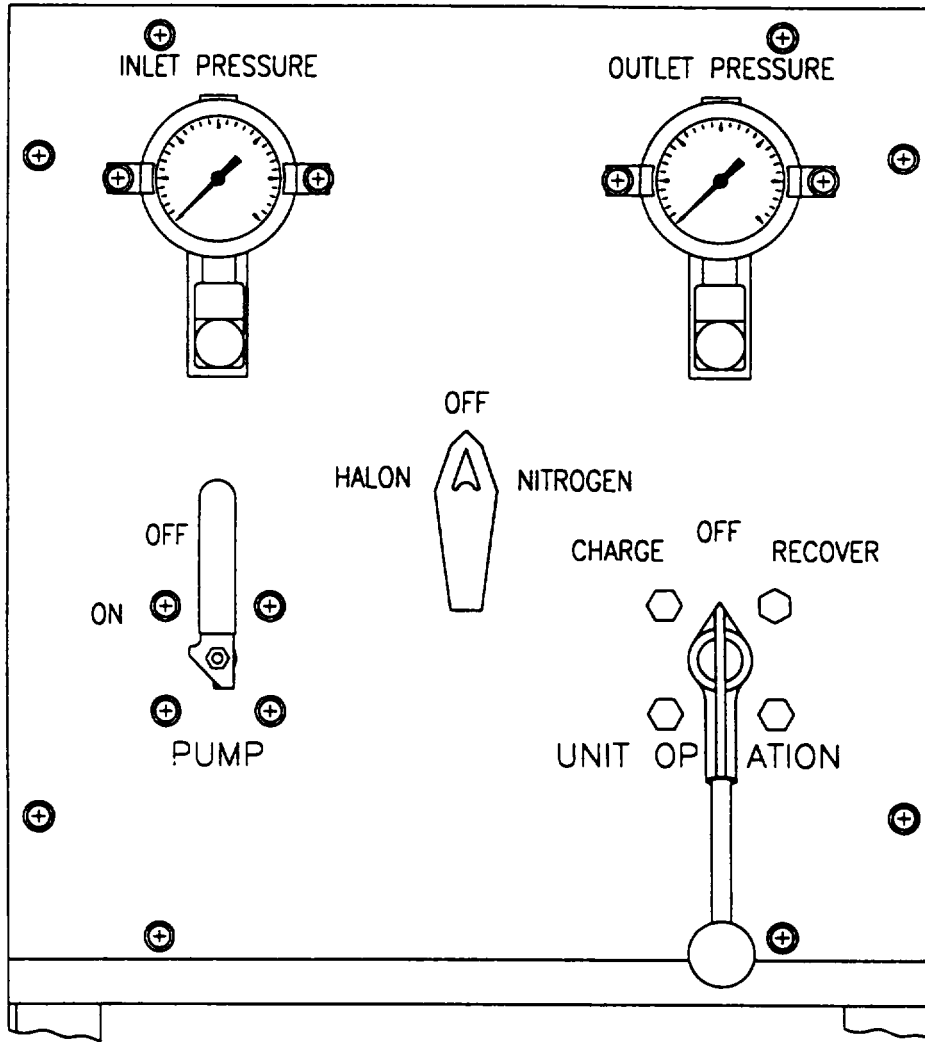


Figure 2-7. Control Panel Layout.

**CAUTION**

The Halon transfer pump is not to be operated where the working pressure exceeds 1000 psi. The adapter gauge will be damaged.

- k. When the flow of Halon/nitrogen stops, start the pump by rotating the PUMP valve 90 degrees counterclockwise to the ON position.

**NOTE**

When a recovery cylinder pressure reaches 900 psi (6205 kPa) and must be changed, it should be set aside for a minimum of 24 hours. This will allow contents to settle and allow input of additional Halon nitrogen mix. This process may be repeated a maximum of three times or the 900 psi (6205 kPa) pressure is maintained, whichever occurs first. The recovery cylinder should be marked as to time and date of last change.

- l. When the inlet pressure gauge on the control panel shows a minus 5 psi (minus 34 kPa) (vacuum) or the gauge on the Halon hose adapter exceeds 900 psi (6205 kPa) close the ball valve on the extinguisher hose. A reading of 900 psi (6205 kPa) requires recovery cylinder change.
- m. Move UNIT OPERATION valve from RECOVER to OFF.
- n. Place the HALON/NITROGEN valve in the OFF position.
- o. Close the ball valve on Halon hose at recovery cylinder.
- p. Turn off the pump by rotating the PUMP valve 90 degrees clockwise to the OFF position.

**WARNING**

When opening or closing the fill valve, be certain that the entire valve is not being loosened from the fire extinguisher. Halon could escape and cause injury or death.

- q. Close the fill valve on the fire extinguisher by rotating the small hex nut clockwise until securely closed.
- r. Disconnect the extinguisher hose adapter from the fill valve on the fire extinguisher and remove empty extinguisher from agitator bracket.
- s. After all fire extinguishers are processed, place all valves on the hoses, control panel and the recovery cylinder in the closed or OFF position.
- t. Stop the compressor.
- u. Remove extinguisher adapter from extinguisher hose and place in tool box.
- v. Disconnect Halon hose from recovery cylinder and air compressor hose from air filter.
- w. Remove extinguisher support bracket from agitator bracket and place in tool box.
- x. Stow hoses in approved manner.

**2-9.2 For the Bradley Infantry Fighting Vehicle (engine compartment). (Refer to Figure 2-7).****WARNING**

**Sudden release of compressed gases may cause severe injury to personnel. Do not deviate from approved procedures. Wear safety goggles or face shield, gloves and hearing protection when working with pressurized equipment. Perform operating procedures in a well ventilated area.**

- a. Connect the Bradley adapter, located in tool box, to the extinguisher hose. The Bradley adapter is a straight adapter with a swivel fitting at one end.
- b. Install extinguisher support base, P/N 12463589 (item 6, Appendix D) on agitator bracket.
- c. Start the compressor. Adjust the air inlet regulator on the Recovery / Recharger Unit to 150 psi (1034 kPa).

**NOTE**

**This fire extinguisher contains a dip tube attached to the fill/discharge valve assembly and must be kept upright (valve on top) during the recovery process.**

- d. Place the fire extinguisher on the agitator bracket and secure with straps on agitator bracket. The cylinder shall be in an upright position (valve on top).

**WARNING**

**The fire extinguisher must have a safety control valve (item 2, Appendix D) attached.**

**The fire extinguisher is under pressure. Caution should be taken when making connections to the fire extinguisher cylinder fill/discharge valve, otherwise injury or death could occur. Verify that the safety control valve located in tool box, is in the SET position and attach it to the 3/818 NPSM fill/discharge valve on the fire extinguisher.**

- f. Connect the extinguisher hose to the safety control valve on the fire extinguisher.
- g. Open the valve on the recovery cylinder and the ball valve on Halon hose.
- h. Place the HALON/NITROGEN valve in the HALON position.
- i. Place the UNIT OPERATION valve in the RECOVER position.
- j. Open the valve on the fire extinguisher by slowly rotating the safety control valve counterclockwise.
- k. Slowly open the ball valve on the extinguisher hose. Listen for the flow of Halon/nitrogen from the fire extinguisher through the pump to the recovery cylinder.

**CAUTION**

**The Halon transfer pump is not to be operated where the working pressure exceeds 1000 psi (6895 kPa). The adapter gauge will be damaged.**

- k. When the flow of Halon/nitrogen stops, start the pump by rotating the PUMP valve 90 degrees counterclockwise to the ON position.

**NOTE**

**When a recovery cylinder pressure reaches 900 psi (6205 kPa) and must be changed, it should be set aside for a minimum of 24 hours. This will allow contents to settle and allow input of additional Halon nitrogen mix. This process may be repeated a maximum of three times or the 900 psi (6205 kPa) pressure is maintained, whichever occurs first. The recovery cylinder should be marked as to time and date of last change.**

- l. When the INLET PRESSURE gauge on the control panel shows a minus 5 psi (vacuum), or the gauge on the Halon hose adapter exceeds 900 psi (6205 kPa), close the ball valve on the extinguisher hose. A reading of 900 psi (6205 kPa) requires recovery cylinder change.
- m. Move UNIT OPERAATION valve from RECOVER to OFF.
- n. Place the HALON/NITROGEN valve in the OFF position.
- o. Turn off the pump by rotating the PUMP valve 90 degrees clockwise to the OFF position.
- p. Close the fill valve on the fire extinguisher by slowly rotating the safety control valve clockwise to SET.
- q. Disconnect the extinguisher hose from the fill valve on the fire extinguisher cylinder.
- r. Remove empty fire extinguisher from the agitator bracket.
- s. After all fire extinguishers are processed, place all valves on the hoses, control panel, and recovery cylinder in the closed or OFF position.
- t. Stop the air compressor.
- u. Remove extinguisher hose adapter from extinguisher hose and place in tool box.
- v. Disconnect Halon hose from recovery cylinder and air compressor hose from air filter.
- w. Stow hoses in approved manner.
- x. If used, remove extinguisher support base from agitator bracket and place in tool box.

**2-10 PREPARATION FOR CHARGING.****NOTE**

The following instructions apply *only* to the charging of Halon and nitrogen into fire extinguisher cylinders that have been evacuated in accordance with paragraph 2-9 of this manual.

In accordance with EPA environmental law, *do not* vent Halon into the atmosphere.

Inlet pressure gauge on the control panel reads minus 20 psi (minus 138 kPa) (vacuum) to plus 600 psi (4137 kPa). Outlet pressure gauge on the control panel reads 0-2,000 psi (0-13789 kPa).

- a. Connect the Halon tank adapter assembly with gauge (1000 psi) located in tool box, to the Halon supply cylinder. Then connect Halon hose to the adapter assembly.
- b. Connect the air compressor to the quick-disconnect fitting on the air filter, below and to the left rear of the control panel. Adapt the supplied female quick-disconnect fitting to the air hose as required. Compressor must supply a minimum of 15 cfm of air at 150-175 psi (1034 to 1206 kPa).
- c. Verify that the shift valve located on top of on the pump is open (two stage position).
- d. Verify that all valves on the control panel are in the OFF position.
- e. Verify that all other valves and ports on the hoses, fire extinguisher and Halon cylinder are closed.
- f. Connect nitrogen monitor adapter assembly with gauge (1500 psi), located in tool box, to the extinguisher hose using the quick disconnect fitting.

**2-10.1 For the M1 Tank or any Cylinder with a Schrader Valve. (Refer to Figure 2-7.).****WARNING**

Sudden release of compressed gases may cause severe injury to personnel. Do not deviate from approved procedures. Wear safety goggles or face shield, gloves and hearing protection when working with pressurized equipment. Perform operating procedures in a well ventilated area. Accidental Halon leaks remove oxygen from the air. Suffocation can occur.

**WARNING**

Before starting the charging procedure on any M-1 or Schrader valve fire extinguisher cylinder, make certain the safety pin and antirecoil cap are in place and the cylinder has a hydrostatic test date not more than 5 years old. Reject any cylinder that does not satisfy both criteria. Serious injury could result from doing otherwise.

- a. Connect the Schrader valve adapter, located in tool box, to the nitrogen monitor adapter assembly. The Schrader valve adapter has a 370 bend at one end.
- b. Start the compressor. Adjust the air inlet regulator on the Recovery / Recharger Unit to 140 psi (965 kPa).

- c. Attach extinguisher support base, P/N 12463589 (item 6, Appendix D) to agitator bracket.
- d. Carefully place empty fire extinguisher upright onto agitator bracket, secure with straps. Lower agitator bracket to rest on scale platform.
- e. Remove the cap from the fill valve on the fire extinguisher and connect the Schrader valve adapter to the fill valve on the fire extinguisher.
- f. Check the maximum pounds capacity of the fire extinguisher being charged, capacity should be marked on cylinder. Subtract 0.5 pound. The result is the amount of Halon to be put into the cylinder.
- g. Open the fill valve on the fire extinguisher cylinder by rotating the small hex nut counterclockwise.
- h. Open the valve on the Halon cylinder.

Table 2-2.. Nitrogen Pressure Regulator Temperature vs. Pressure Corrections

| Temperature °F (°C) | Pressure PSI (KPa) | Temperature °F (°C) | Pressure PSI (KPa) | Temperature °F (°C) | Pressure PSI (KPa) |
|---------------------|--------------------|---------------------|--------------------|---------------------|--------------------|
| + 20(-7)            | 575 (3965)         | + 60(+ 16)          | 725 (5000)         | + 100(+ 38)         | 900 (6205)         |
| +30(-1)             | 600 (4140)         | +70(+21)            | 750 (5170)         | +110(+43)           | 940 (6481)         |
| +40(+4)             | 650(4480)          | +80(+27)            | 800(5520)          | +120(+49)           | 1015 (6998)        |
| + 50(+ 10)          | 675 (4650)         | + 90(+ 32)          | 850(5860)          | + 130(+ 54)         | 1100 (7585)        |
|                     |                    |                     |                    | +140(+60)           | 1200(8274)         |

- i. Open the ball valve on the Halon hose.
- j. Adjust the scale to 0 lb. using the tare knob located on top of the scale dial.
- k. Open the ball valve on the extinguisher hose.
- l. Place the UNIT OPERATION valve in the CHARGE position.
- m. Place HALON/NITROGEN valve in the HALON position.

**NOTE**

**With a fully charged Halon cylinder the extinguisher capacity may be reached without pumping. Watch scale carefully when allowing free flow of Halon.**

- n. Check scale for pounds of Halon flowing into fire extinguisher. Fill extinguisher with the amount of Halon calculated in step f. The remaining Halon will be forced out of the hose into the extinguisher with nitrogen pressurization.

**NOTE**

**For the next step you will be stopping the pump after each stroke to read the scale. Keep your hand on the PUMP control valve for quick stopping to avoid overcharge.**



**NOTE**

**Do not exceed the maximum pounds calculated in step f. Different cylinders have different capacities.**

- o. When the flow of Halon stops, start the pump by rotating the PUMP control valve 90 degrees counterclockwise. Stop the pump after each stroke and watch scale carefully to ensure that the Halon weight is 0.5 pound less than the extinguisher rated capacity (for example, 5 pound capacity; fill to 4.5 pounds) The remaining Halon will be forced from the hose to the extinguisher with nitrogen pressurization.
- p. When the extinguisher contains the appropriate number of pounds of Halon, close the ball valve on the extinguisher hose.
- q. Move HALON/NITROGEN valve to the OFF position.
- r. Raise agitator bracket, with extinguisher attached, so it no longer rests on scale platform.
- s. Read the thermometer on the scale column and adjust the nitrogen regulator gauge to the required pressure according to the ambient temperature as indicated in table 2-2.
- t. Open the valve on nitrogen supply cylinder.
- u. Open the ball valve on extinguisher hose.
- v. Place the HALON/NITROGEN valve in the NITROGEN position and pressurize extinguisher.
- w. When correct pressure as read in the nitrogen monitor adapter assembly gauge is reached, close ball valve on extinguisher hose.
- x. Agitate fire extinguisher cylinder in bracket to reduce pressure. If pressure is under that determined in step s, repeat steps t through w.

**NOTE**

**Repeat paragraph 2-10.1, steps t. through w. until pressure in fire extinguisher cylinder is stabilized at required pressure.**

**WARNING**

**When opening or closing the fill valve, be certain that the entire valve is not being loosened from the extinguisher. Halon could escape and cause injury or death.**

- y. Close the fill valve on the fire extinguisher by rotating the small hex nut clockwise.
- z. Place the HALON/NITROGEN valve in the OFF position.
- aa. Disconnect the extinguisher hose from the fire extinguisher fill valve and install cap.

**NOTE**

**Place the filled fire extinguisher aside for 24 hours. The time and date of setting aside should be marked on the fire extinguisher. At the end of 24 hours repeat paragraph 210.1 steps r through aa.**

**NOTE**

**The steps that follow are to recapture the Halon leftover in the pump and hoses back into the Halon supply cylinder.**

- ab. After all fire extinguishers are processed, verify that the valve on the Halon hose is closed.
- ac. Close ball valve on nitrogen supply cylinder. Loosen nitrogen pressure regulator from nitrogen cylinder and bleed off nitrogen.
- ad. Place the tilt rack in the upright position.
- ae. Place the unit operation valve in the recover position.
- af. Open the valve on the Halon hose.
- ag. Place the HALON/NITROGEN valve in the HALON position.
- ah. Start the pump by rotating the pump control valve 90 degrees counterclockwise to the ON position. Operate the pump until the INLET PRESSURE gauge reads minus 5 psi vacuum.
- ai. Close valve on the Halon hose, stop the pump and close valves on Halon supply cylinder.
- aj. Return the UNIT OPERATION valve to the OFF position.
- ak. Return the HALON/NITROGEN valve to the OFF position.
  - al. Stop the compressor.
- am. Remove the adapters from extinguisher hose and place adapters in tool box.
  - an. Disconnect Halon hose from Halon cylinder and air compressor hose from air filter.
  - ao. Stow hoses in approved manner.
  - ap. If used, remove extinguisher support base from agitator bracket and place in tool box.

**2-10.2 For the Bradley Infantry Fighting Vehicle (engine compartment). (Refer to Figure 2-7)**

**WARNING**

**Sudden release of compressed gases may cause severe injury to personnel. Do not deviate from approved procedures. Wear safety goggles or face shield, gloves and hearing protection when working with pressurized equipment. Perform operating procedures in a well ventilated area.**

- a. Connect the Bradley adapter, stored in tool box, to the nitrogen monitor adapter assembly. The Bradley adapter is straight with a swivel fitting at one end.
- b. Start the air compressor. Adjust the air inlet regulator on the Recovery / Recharger Unit to 140 psi (965 kPa).
- c. Attach extinguisher support base, P/N 12463589 (item 6, Appendix D) to agitator bracket.

- d. Carefully place empty fire extinguisher cylinder upright onto the agitator bracket, secure with straps. Lower agitator bracket to rest on scale platform.

**WARNING**

**The fire extinguisher must have a safety control valve attached.**

- e. Verify that the safety control valve (item 2, Appendix D) is in the SET position and attach it to the 3/8-18 NPSM fill/discharge valve on the fire extinguisher cylinder.
- f. Connect the Bradley adapter to the safety control valve on the fire extinguisher cylinder.

**NOTE**

**If fire extinguisher is not marked with the maximum capacity, it is the responsibility of the user to obtain the information relating to their extinguisher.**

- g. Check the maximum pounds capacity of the fire extinguisher cylinder being charged. Capacities should be marked on cylinder. Subtract 0.5 pound. The result is the amount of Halon to be put in the cylinder.
- h. Open the valve on the fire extinguisher cylinder by slowly rotating the safety control valve counterclockwise and place agitator bracket in lower position, resting on scale platform.
- i. Open the valve on the Halon cylinder.
- j. Open the ball valve on the Halon hose.
- k. Adjust the scale to 0 lb. using tare knob on top of scale dial.
- l. Open the ball valve on the extinguisher hose.

**NOTE**

**Do not exceed the maximum pounds capacity for the fire extinguisher cylinder. Different cylinders have different capacities.**

- m. Place the UNIT OPERATION valve in the CHARGE position.
- n. Place HALON/NITROGEN valve in the HALON position.

**NOTE**

**With a fully charged Halon cylinder the extinguisher cylinder capacity may be reached without pumping. Watch scale carefully when allowing free flow of Halon.**

- o. Check scale for pounds of Halon flowing into fire extinguisher cylinder. Fill extinguisher with the amount of Halon calculated in step g. The remaining Halon will be forced from the hose to the extinguisher with nitrogen pressurization.

**NOTE**

**For the next step you will be stopping the pump after each stroke to read the scale. Keep your hand on the PUMP control valve for quick stopping to avoid overcharge.**

- p. When the flow of Halon stops, start the pump by rotating the PUMP control valve 90 degrees counterclockwise. Stop the pump after each stroke and watch scale carefully to ensure that the Halon weight is 0.5 pound less than the extinguisher rated capacity (for example, 5 pound capacity; fill to 4.5 pounds) The remaining Halon will be forced from the hose to the extinguisher with nitrogen pressurization.
- q. When the extinguisher contains the appropriate number of pounds of Halon, close the ball valve on the extinguisher hose.
- r. Place HALON/NITROGEN valve in the OFF position.
- s. Raise agitator bracket, with extinguisher attached, so it no longer rests on scale platform.
- t. Read the thermometer on scale column and adjust the nitrogen regulator gauge to the pressure according to the ambient temperature as indicated in Table 2-2.
- u. Open ball valve on nitrogen supply cylinder.
- v. Open ball valve on extinguisher hose.
- w. Place the HALON/NITROGEN valve in the NITROGEN position and pressurize the extinguisher.
- x. When correct pressure as read on the nitrogen monitor adapter assembly gauge is reached, close ball valve on extinguisher hose.
- y. Agitate fire extinguisher in bracket to reduce pressure. If pressure is under that required, repeat steps t through y.

**NOTE**

**Repeat paragraph 2-10.2 steps t. through y. until pressure in fire extinguisher is stabilized at required pressure.**

- z. Close the fill valve on the fire extinguisher cylinder by slowly rotating the safety control valve clockwise to the SET position.
- aa. Place the HALON/NITROGEN valve to the OFF position.
- ab. Disconnect the Bradley adapter from the fire extinguisher fill valve and install cap.

**NOTE**

**Place the filled fire extinguisher aside for 24 hours. The time and date of setting aside should be marked on the fire extinguisher. At the end of 24 hours repeat paragraph 2-10.2 steps w through y.**

**NOTE**

**The steps that follow are to recapture the Halon left in the pump and hoses back into the Halon supply cylinder.**

- ac. After all fire extinguisher are processed, verify that the valve on the Halon hose is closed.
- ad. Close ball valve on nitrogen supply cylinder. Loosen nitrogen pressure regulator to nitrogen cylinder connection and bleed off nitrogen.

- ae. Place the tilt rack in the upright position.
- af. Place the UNIT OPERATION valve in the RECOVER position.
- ag. Open the valve on the Halon hose.
- ah. Place the HALON/NITROGEN valve in the HALON position.
- ai. Start the pump by rotating the PUMP control valve 90 degrees counterclockwise to the ON position. Operate the pump until the inlet pressure gauge reads minus 5 psi (vacuum).
- aj. Close valve on the Halon hose, stop the pump and close valve on Halon supply cylinder.
- ak. Return the UNIT OPERATION valve to the OFF position.
- al. Return the HALON/NITROGEN valve in the OFF position.
- am. Stop the compressor.
- an. Remove adapters from extinguisher hose and place adapter in tool box.
- ao. Disconnect Halon hose from Halon cylinder and air compressor hose from air filter.
- ap. Stow hoses in approved manner.
- aq. If used, remove extinguisher support base from agitator bracket and place in tool box.

**2-11 PREPARATION FOR MOVEMENT.**

**WARNING**

**When performing the following procedures, wear glasses or goggles.**

- a. Remove Halon and nitrogen cylinders from the unit to be handled separately as pressurized containers.
- b. Secure the tilt rack assembly in the inverted position using the tilt rack lock down chain.
- c. Secure the nitrogen regulator to the agitator bracket frame with two U-bolts.
- d. Hook the spring hook to the frame and tighten cable by turning winch handle.
- e. Strap scale to tool box lid using two adjustable straps from tool box.
- f. Install cover per after PMCS.
- g. Unit may be moved by fork lift or by sling load (make certain slings do not crush anything).

**SECTION IV. OPERATION UNDER UNUSUAL CONDITIONS**

**2-12 OPERATION IN UNUSUAL WEATHER.**

To insure that the fire extinguisher is recharged to the correct pressure do not operate the Recovery /Recharger Unit with an ambient temperature lower than +20 ° F (-7°C) or higher than + 100°F (+38°C).

**2-29(2-30 BLANK)**

## CHAPTER 3

## OPERATOR MAINTENANCE INSTRUCTIONS

## SECTION I. LUBRICATION INSTRUCTIONS

**3-1 LUBRICATION OF OTHER MOVING COMPONENTS.**

**3-1.1 Tool Box Hinges.** Lubricate hinges on tool box with general purpose oil (item 7, Section II, Appendix F) every six months.

**3-1.2 Tilt Rack Bearings.** Lubricate bearings on tilt rack with general purpose oil (item 7, Section II, Appendix F) every six months.

**Section II. TROUBLESHOOTING PROCEDURES****3-2 GENERAL.**

- a. Table 3-1 lists common malfunctions which may be found during operation or maintenance of the Recovery / Recharger Unit. You should perform the tests/inspections and corrective actions in the order listed.
- b. This manual cannot list all malfunctions that may occur, nor all tests/inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**WARNING**

**Wear safety glasses or goggles while performing the following procedures.**

**NOTE**

**Before you use this table, perform all operation checks listed in the Operator PMCS (table 2-2).**

Table 3-1. Operator Troubleshooting Procedures

| MALFUNCTION   | TEST OR INSPECTION  | CORRECTIVE ACTION                                  |
|---|---|--|
| 1. SYSTEM FAILS TO MAINTAIN PRESSURE  |   |  |
|   | Step 1. Verify that all valves are in the closed or OFF position.                                     | Close all valves.                                  |
|   | Step 2. Apply leak detection fluid (item 9, Appendix F) to all piping connections; watch for bubbles. | Tighten or replace any leaking components.         |
|   | Step 3. Notify supervisor.  |  |
| 2. LOW PRESSURE (Less than 1000 psi or 6895 kPa) INDICATION ON NITROGEN INLET PRESSURE GAGE |   |  |
|   | Step 1. Verify that nitrogen cylinder valve is fully open.  | Open nitrogen cylinder valve.                      |
|   | Step 2. Nitrogen supply depleted or low.  | Replace nitrogen cylinder.                         |
|   | Step 3. Notify supervisor.  |  |
| 3. SLOW HALON CHARGE RATE (Extinguisher Fill Time Exceeds 15 Minutes)                       |   |  |
|   | Step 1. Verify that Halon cylinder valve is fully open.   | Open Halon cylinder valve.                         |
|   | Step 2. Verify that air pressure regulator is set for 140 psi.  | Adjust air pressure regulator to correct pressure. |
|   | Step 3. Notify supervisor.  |  |

**Section III. MAINTENANCE PROCEDURES**

**3-3 INTRODUCTION.**

This section contains operator maintenance procedures. Operator maintenance is limited to cleaning exterior surfaces of the Recovery / Recharger Unit.



**3-3.1 Cleaning System Components.**

**WARNING**

**Do not use compressed air for cleaning except where reduced to less than 30 psi (206.9 kPa). When using compressed air wear safety goggles or glasses and ensure air blast is not directed at another person. Do not direct compressed air against the skin.**

- a. Remove loose dirt and other particles from the exterior of the Recovery / Recharger Unit using compressed air not exceeding 30 psi (207 kPa).
- b. Clean Recovery / Recharger Unit components with an approved solvent (item 8, Appendix F.)

**3-3(3-4 BLANK)**

**CHAPTER 4****UNIT MAINTENANCE INSTRUCTIONS****SECTION I. REPAIR PARTS, SPECIAL TOOLS, AND SUPPORT EQUIPMENT****4-1 COMMON TOOLS AND EQUIPMENT.**

For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to the unit authorized to have the Recovery / Recharger Unit.

**4-2 SPECIAL TOOLS AND SUPPORT EQUIPMENT.**

Special tools required for maintenance of the Recovery / Recharger Unit are listed in Appendix B. No support equipment is required for maintenance of the Recovery / Recharger Unit.

**4-3 REPAIR PARTS.**

Repair parts are listed and illustrated in Appendix C to this manual.

**SECTION II. SERVICE UPON RECEIPT****4-4 EQUIPMENT UNPACKING AND INSTALLATION.**

**4-4.1 Packaging Data.** The Recovery / Recharger Unit is shipped partially assembled in a large shipping container. This container may be moved using a forklift. The Recovery / Recharger Unit is shipped in the following condition.

- a. All components are assembled and mounted on the base with the exception of the hoist winch assembly, and the scale assembly. The hoist winch assembly is placed across the top of the equipment during shipment. The scale assembly is strapped to the lid of the tool box.
- b. The tilt rack assembly is secured in the non-inverted position with the tilt rack lock down chain.
- c. The nitrogen pressure regulator is attached securely to the shaker bracket with two U-bolts.
- d. All tools and loose hardware are stored in the tool box.

**4-4.2 Site and Shelter Requirements.**

- a. The Recovery / Recharger Unit does not have particular site requirements but must be positioned close to a compressed air source with a capability to provide air at a maximum of 175 psi at 15 CFM.

- b. The ambient temperature of the operational site must be maintained between + 20 ° F and + 100°F (-7°C and +38°C) while the Recovery / Recharger Unit is being operated.

**4-4.3 Unpacking the Equipment.**

- a. Transport the shipping container to the operational site using a fork lift.
- b. Snip the bands and disassemble the shipping container. Store reusable packing materials for possible reshipment of equipment.

**4-4.4 Inspecting the Equipment.**

- a. Visually inspect Recovery / Recharger Unit components for any damage which may have occurred during shipment.
- b. Verify that Recovery / Recharger Unit is complete as listed on the packing slip. Report all discrepancies in accordance with DA PAM 738-750.

**4-4.5 Tools Required for Installation.** Tools required to install the Recovery / Recharger Unit are stored in the tool box.

**4-4.6 Scale Assembly Installation.** Refer to paragraph 4-12.

**4-4.7 Hoist Winch Assembly Installation.** The hoist winch assembly is placed across the top of the equipment during shipment. Unpack the assembly and refer to paragraph 4-8 for installation instructions.

**4-4.8 Fire Extinguisher and Cylinder Hose Installation.** Hoses will be attached to the appropriate valves and gauges except for the nitrogen hose which will be in the tool box. All adapters will also be found in the tool box.

**NOTE**

**Regulator secured to scale frame at agitator bracket location by two U-bolts**

**4-4.9 Nitrogen Pressure Regulator Installation.**

- a. Remove four nuts and washers from U-bolts.
- b. Remove U-bolts and regulator.
- c. Reinstall washers and nuts on U-bolts and store in tool box.
- d. Remove nitrogen hose from tool box and install on regulator.
- e. Store assembly in tool box pending use 4-4.10 Operational Test. Perform the procedures specified in Section III of Chapter 2 to determine if the Recovery / Recharger Unit is ready for operation.

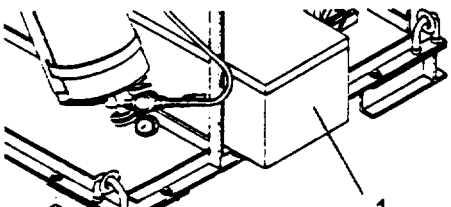
**SECTION III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

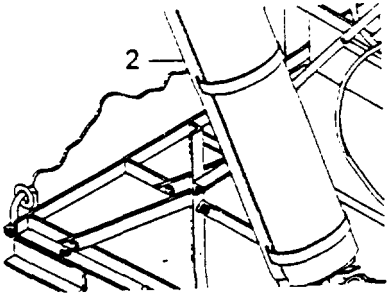
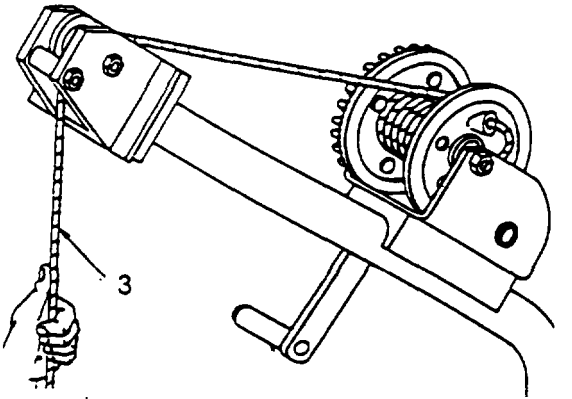
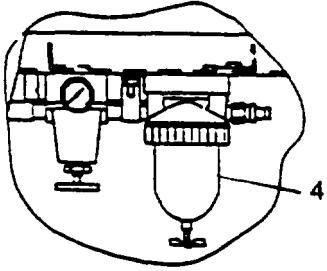
**4-5 GENERAL.**

- a. This section contains preventive maintenance checks and services (PMCS) for unit maintenance personnel to maintain the Recovery / Recharger Unit in a constant state of readiness.
- b. PMCS which must be performed by unit maintenance personnel are contained in table 4-1.
  - (1) ITEM NUMBER Column. The item numbers indicate the sequence in which the unit level PMCS are to be performed. In addition, the item number is used in the 'TM Number' column on DA Form 2404, Equipment inspection and maintenance worksheet, in recording results of PMCS.
  - (2) ITEM TO BE INSPECTED Column. A general description of the item to be inspected. Used by maintenance personnel for orientation.
  - (3) PROCEDURE Column. Procedure to be performed by maintenance personnel.
  - (4) Leakage definitions used in the PMCS are classified as follows:

No Halon leakage is allowed

*Table 4-1. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR RECOVERY / RECHARGER UNIT*

| Item No. | Interval       | Location               | Procedure   | Not Fully Mission Capable If: |
|----------|----------------|------------------------|---|-------------------------------|
|          |                | Item To Check/ Service |   |                               |
| 1.       | Semi- annually | Tool Box (1)           | <p>Check for proper closure, cracked or broken hinges and defective latches. Replace tool box if hinges are broken or latches will not secure lid.</p>  |                               |

| Item No. | Interval      | Location               | Procedure  | Not Fully Mission Capable If:                     |
|----------|---------------|------------------------|--|---|
|          |               | Item To Check/ Service |  |   |
| 2.       | Semi-annually | Tilt Rack (2)          | <p>Check for smooth operation and oil tilt rack bearings. Use item 7, Section II, Appendix F as a lubricant.</p>  |   |
| 3        | Semi-annually | Winch Cable (3)        | <p>Inspect for broken strands or kinks.</p>   | Cable is kinked or at least 5 strands are broken. |
| 4.       | Semi-annually | Air Filter (4)         | <p>Remove sediment bowl and filter. Clean and reinstall</p>   |   |

**SECTION IV. TROUBLESHOOTING**

**4-6 GENERAL.**

This section provides information useful to unit maintenance personnel in diagnosing and correcting unsatisfactory operation or failure of the Recovery / Recharger Unit. Refer to table 4-2 for a listing of possible malfunctions that may occur in the Recovery / Recharger Unit.

**WARNING**

**Wear safety glasses or goggles while performing the following procedures.**

**NOTE**

**Before you use this table, perform all checks listed in the Unit PMCS (table 4-1).**

*Table 4-2. Unit Troubleshooting Procedures*

| <b>MALFUNCTION</b>   | <b>TEST OR INSPECTION</b>                          | <b>CORRECTIVE ACTION</b>      |
|--|--|-------------------------------|
| <b>1. SYSTEM FAILS TO MAINTAIN PRESSURE</b>                                  |  |                               |
|  | Step 1. Inspect for leakage at fittings and hoses. | Replace defective hoses.      |
|  | Step 2. Defective ball valve.                      | Replace ball valve.           |
|  | Step 3. Defective pressure regulator.              | Replace pressure regulator.   |
| <b>2. SLOW HALON CHARGE RATE (Extinguisher fill time exceeds 15 minutes)</b> |  |                               |
|  | Step 1. Inspect for blockage or kinks in hoses.    | Replace hose remove blockage. |
|  | Step 2. Notify supervisor.                         |                               |

**SECTION V. MAINTENANCE PROCEDURES**

**4-7 REMOVAL AND REPLACEMENT OF PRINCIPAL ASSEMBLIES.**

The following procedures contain instructions to remove and replace principal assemblies of the Recovery / Recharger Unit. Disassembly, cleaning, inspection, repair, and assembly instructions for direct support maintenance are specified in Chapter 5.

**4-8 HOIST WINCH ASSEMBLY INSTALLATION. (Refer to Figure 4-1)**

**This task covers:**

**a. Installation**

**INITIAL SETUP:**

**Equipment Conditions**

**Tools**

Reference

Tool Kit, General Mechanics  
(Item 1, Section III Appendix B)

Newly received Recovery / Recharger  
Unit; paragraph 4-4.

**Materials/Parts**

None

**4-8.1 Preparation**

- a. Remove hoist winch assembly from shipping position.
- b. Loosen two self-locking nuts (1) on each hoist strap (2) located on scale frame. Do not remove nuts.

**4-8.2 Installation**

- a. Position hoist bearing (4) on floor of base (bearing in tool box).
- b. Slide hoist pipe (3) under both hoist straps (2) and rest on bearing.
- c. Tighten two self-locking nuts (1) on each hoist strap (2).
- d. Check freedom of swing for assembly and proper winch operation (clicking sound when cable being wound).

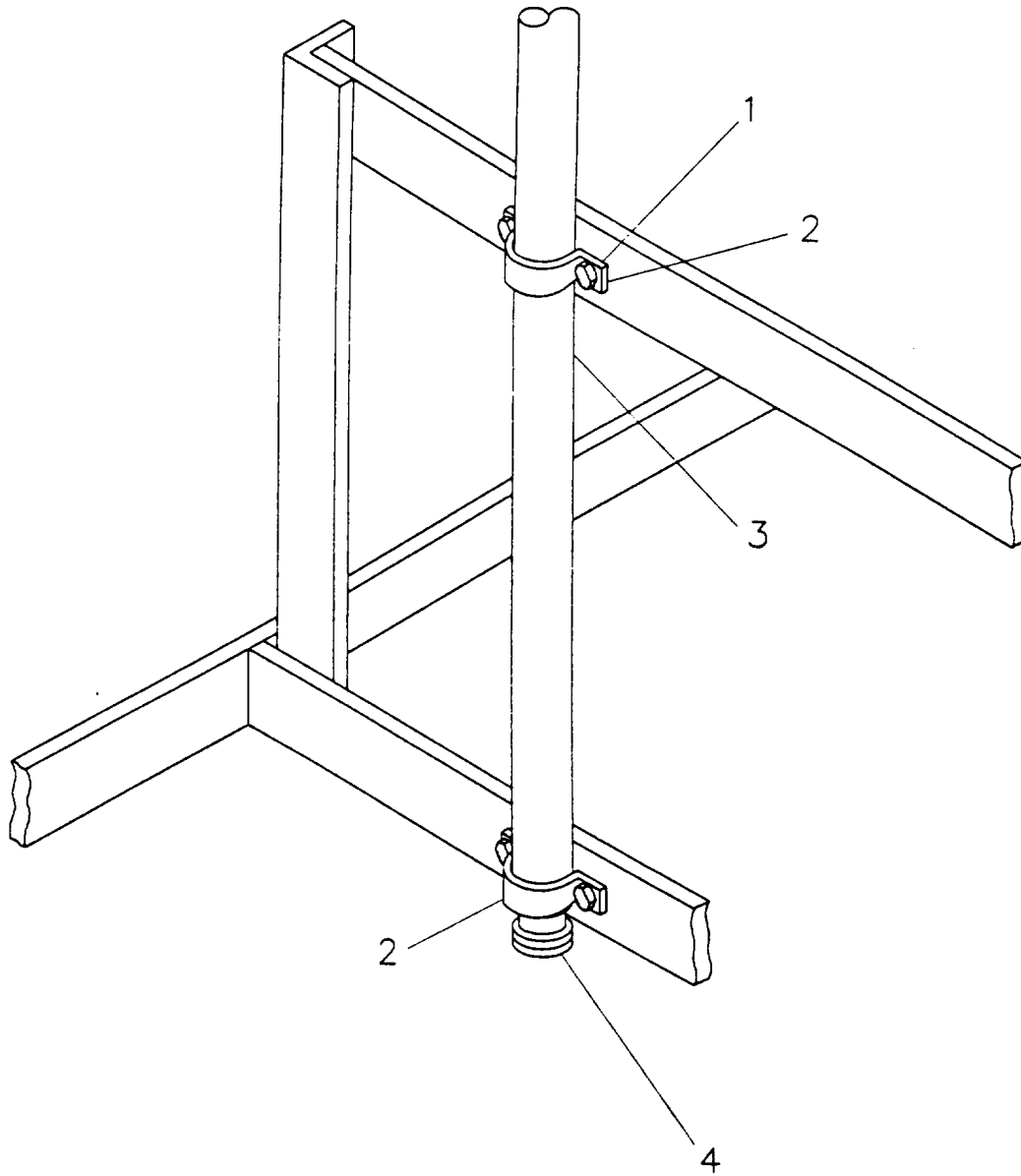


Figure 4-1. Hoist Winch Assembly Installation



**4-9 HOIST WINCH ASSEMBLY REPLACEMENT. (Refer to Figure 4-1)**

**This task covers:**

- a. Removal**
- b. Installation**

**INITIAL SETUP:**

**Equipment Conditions**

**Tools**

Reference

Tool Kit, General Mechanics

Recovery / Recharger Unit cover removed; paragraph 2-6.1

Recovery / Recharger Unit disconnected from air supply; paragraph 2-7.

**Materials/Parts**

Hoist Winch Assembly

**4-9.1 Removal.**

- a. Loosen two self-locking nuts (1) on each hoist strap (2). Do not remove nuts.
- b. Slide hoist pipe (3) out of both hoist straps (2).
- c. Remove hoist bearing (4).

**4-9.2 Installation.**

- a. Position hoist bearing (4) on floor of base.
- b. Slide hoist pipe (3) under both hoist straps (2) and rest on bearing.
- c. Tighten two self-locking nuts (1) on each hoist strap (2).
- d. Check freedom of swing for assembly and proper winch operation (clicking sound when cable being wound).

**4-10 WINCH ASSEMBLY REPLACEMENT.** (Refer to Figure 4-2)

This task covers:

- a. Removal
- b. Installation

**INITIAL SETUP:**

**Equipment Conditions**

**Tools**

General Mechanics Tool Box, Item 1, Section III, Appendix B

Reference

Cover removed from Recovery / Recharger Unit; paragraph 2-6.1

**Materials/Parts**

Self-locking nuts  
Winch assembly

Air supply disconnected, paragraph 2-7

**4-10.1 Removal.**

**NOTE**

**Make note of how cable is threaded for use at reinstallation**

- a. Strip cable (1) by loosening two nuts (2) securing cable clamp to winch drum. Retain cable for reuse.
- b. Remove two bolts (3) and washers (4) and lift winch assembly (5) off hoist column mounting block.

**4-10.2 Installation.**

- a. Position winch assembly (5) on hoist column mounting block and secure with two washers (4) and bolts (3).
- b. Position cable (1) on winch drum, thread according to notes made at removal and secure by tightening two nuts (2) and wind cable until about two feet extend beyond pulley assembly.

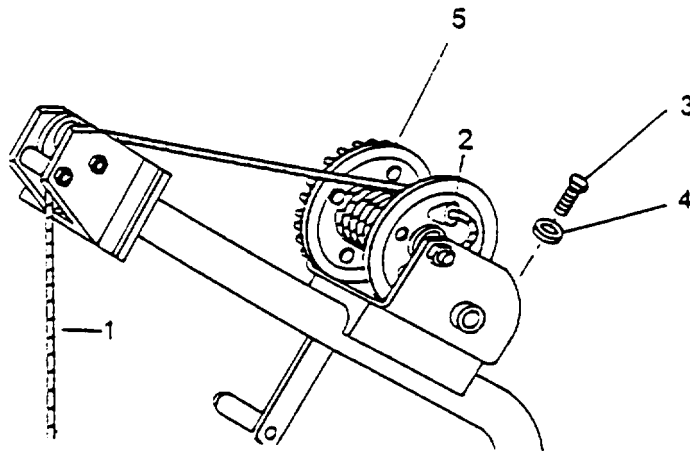


Figure 4-2. Winch Assembly Replacement

**4-11 PULLEY ASSEMBLY REPLACEMENT (Refer to Figure 4-3)**

This task covers:

- a. Removal      b. Installation

**INITIAL SETUP:****Equipment Conditions****Tools**

Reference

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Cover removed from Recovery / Recharger Unit; paragraph 2-6.1

**Materials/Parts**

Self-locking nuts  
Pulley assembly

Air supply disconnected, paragraph 2-7

**4-11.1 Removal.**

- a. Remove nut (1), bolt (2) and spacer (3) at front of pulley assembly (4). Retain nut, bolt and spacer for reuse.
- b. Lift cable out of pulley groove and position out of way for installation.
- c. Remove four nuts (5), washers (6), and bolts (7) securing pulley assembly (4) to hoist column mounting block. Remove pulley assembly. Retain bolts, washers, and nuts for reuse.

**4-11.2 Installation.**

- a. Position new pulley assembly (4) on hoist column mounting block and secure with four bolts (7), washers (6), and nuts (5).
- b. Place winch cable in pulley groove.
- c. Install spacer (3) bolt (2) and nut (1) at front of pulley assembly (4).

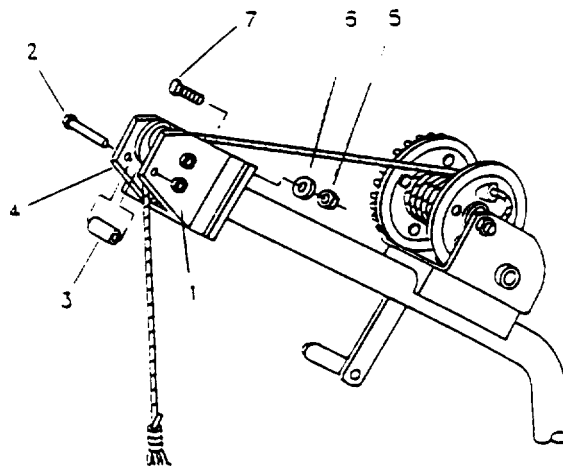


Figure 4-3. Pulley Assembly Replacement

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## 4-12 SCALE INSTALLATION.

---

This task covers:   a. Assembly                   b. Installation

---

### INITIAL SETUP

### Equipment Condition

#### Tools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

#### Reference

Cover removed from Recovery / Recharger Unit; paragraph 2-6.1

#### Materials/Parts

New Recovery / Recharger Unit

Air supply disconnected, paragraph 2-7

---

### 4-12.1 Assembly. (Refer to Figure 4-4)

#### **CAUTION**

**Every scale is a relatively delicate, precision mechanism which gives best results when handled with care.**

#### **NOTE**

**A new scale will be shipped with the column unattached. The initial replacement steps involve scale assembly. Each Bench Dial Scale is packed in two separate boxes, one for the dial head mechanism and the other for the base mechanism. Open the box containing the dial head mechanism and carefully remove the contents.**

- a. As shown in Figure 4-4.a, remove two screws (1), washers (2) and shipping bracket (3) at the low end of the column assembly. Discard the bracket but retain the two fastening bolts
- b. Open the box containing the base and lever mechanism and carefully remove the contents.
- c. Lift the platform off the base and set it aside.
- d. Turn the base assembly upside down and loosen the locking nut (6) on each of the four adjustable feet.
- e. As shown in Figure 4-4,b place the dial head mechanism and base assembly on their sides. Be sure that the dial chart is facing the lever mechanism.
- f. Line up the holes in the bottom of the column assembly with the corresponding holes in the base assembly.
- g. As shown in Figure 4-4,c insert two washers (2) and screws (1) (from para a) through the bottom of the base assembly and into the column assembly. Tighten screws as much as possible.
- h. Using a set of pliers, grasp the end of the steelyard assembly (4) but use caution not to scratch or damage the 'V' bearing hook. Hook the 'V' bearing hook under the tooled steel pivot (5) as shown in Figure 4-4.d

- i. Turn the scale to its operating position and remove shipping wires wrapped around the center of the lever system. Then, reinstall the platform removed in para c, above.
- j. Set the scale in place on scale frame and level. (Refer to Figure 4-4e )
  - (1) Turn the four adjustable feet (7) until the scale is resting firmly at each corner on the supporting surface.
  - (2) Verify the scale is level by observing the leveling device attached to the side of the column assembly. The plum rod should be centered as closely as possible for the best results.
  - (3) Using the lock nuts loosened in para d, above, lock each adjustable foot in position.
- k. Adjust the zero balance device (3, Figure 4-5) to obtain a zero reading. Turning the zero balance clockwise causes the indicator assembly to move clockwise. Turing the zero balance device counterclockwise causes the indicator assembly to move counterclockwise.

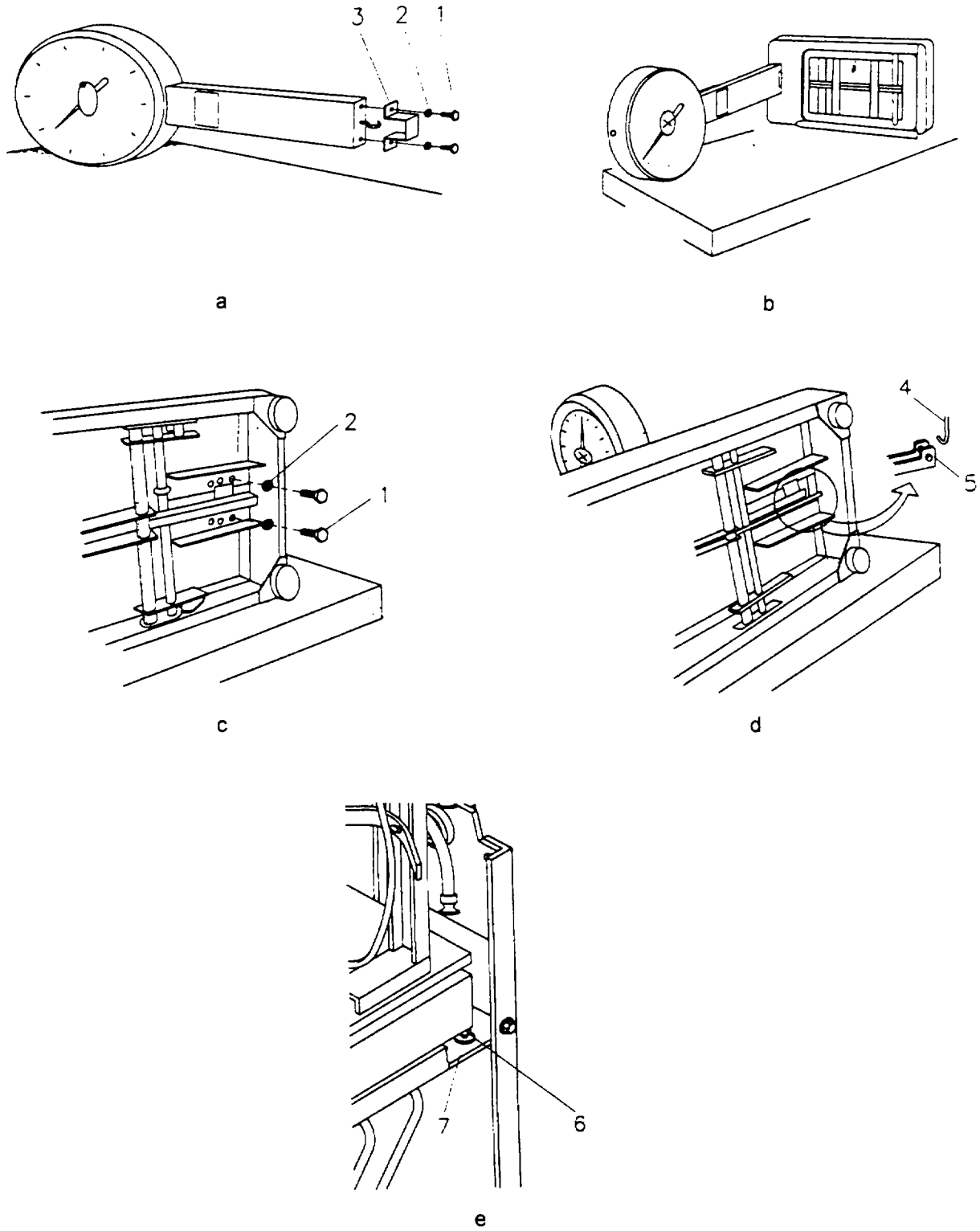


Figure 4-4. Scale Installation

**4-13 SCALE REPLACEMENT. (Refer to Figure 4-5)**

**This task covers:**    a. Removal                    b. Installation

**INITIAL SETUP**

Equipment Condition

Tools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Materials/Parts

Self-locking nuts  
Scale

Air supply disconnected, paragraph 2-7

**4-13.1 Removal.**

- a. Install two adjustable straps (1) from tool box to secure platform.
- b. Lift scale (2) from its position on scale frame assembly and set aside.

**4-13.2 Installation.**

**CAUTION**

**Every scale is a relatively delicate, precision mechanism which gives best results when handled with care.**

**NOTE**

**A new scale will be shipped with the column unattached. The initial replacement steps involve scale assembly. Each Bench Dial Scale is packed in two separate boxes, one for the dial head mechanism and the other for the base mechanism. Open the box containing the dial head mechanism and carefully remove the contents.**

- a. Refer to paragraph 4-12 and follow all steps.

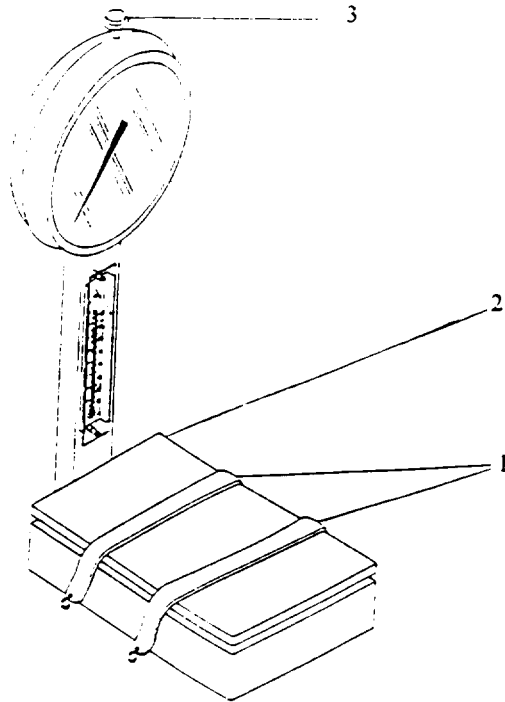


Figure 4-5. Scale Replacement

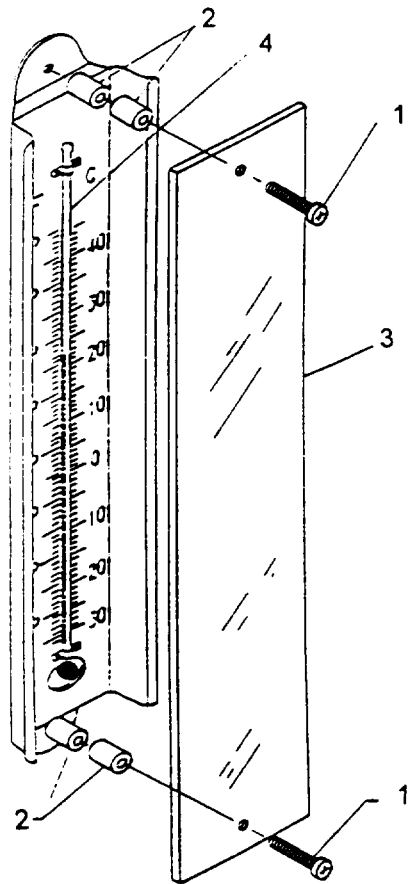


Figure 4-6. Temperature Gauge Replacement



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**4-14. TEMPERATURE GAUGE REPLACEMENT. (Refer to Figure 4-6)**


---

This task covers:    a. Removal            b. Installation

---

**INITIAL SETUP**Equipment ConditionTools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Materials/Parts

Temperature gauge  
Appendix C

Air supply disconnected, paragraph 2-7

---

**4-14.1. Removal.**

- a. Remove two screws (1) securing temperature gauge to scale column.
- b. Retain four standoffs (2), plastic cover (3) and two screws (1) for reuse. Discard temperature gauge (4).

**4-14. Installation.**

- a. Place plastic cover (3) and two standoffs (2) on one screw (1).
- b. Hold new temperature gauge (4) in place and install top screw with standoffs and plastic cover but do not tighten.
- c. Pass remaining screw (1) through plastic cover (3) and two standoffs.
- d. Holding temperature gauge (4) in place, install screw through temperature gauge mounting hole.

---

**4-15 AGITATOR BRACKET REPLACEMENT. (Refer to Figure 4-7)**


---

This task covers:    a. Removal                    b. Installation

---

**INITIAL SETUP**Equipment ConditionTools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Materials/Parts

Self-locking nuts  
Agitator bracket

Air supply disconnected, paragraph 2-7

---

**4-15.1 Removal.**

- a. Loosen setscrew (1) in collar (2).
- b. Pull bracket (3) out of collar (2). Retain collar for reuse.
- c. Loosen setscrew (4) in collar (5) and slide collar off shaft.
- d. Remove two nuts (6), washers (7) and bolts (8), two straps (9), and two guides (10) from bracket. Discard nuts (6).
- e. Dispose of bracket (3).

**4-15.2 Installation.**

- a. Using replacement bracket, install two straps (9) on bolts (8) and locate in holder in bracket.
- b. Install two guides (10), washers (7), and nuts (6) and secure all items to bracket.
- c. Install one collar (5) and setscrew (4) on shaft. Do not tighten setscrew.
- d. Install assembly shaft through bearing and place collar (2) and setscrew (1) on shaft end.
- e. Adjust bracket for proper position on scale and secure by tightening both collar setscrews.

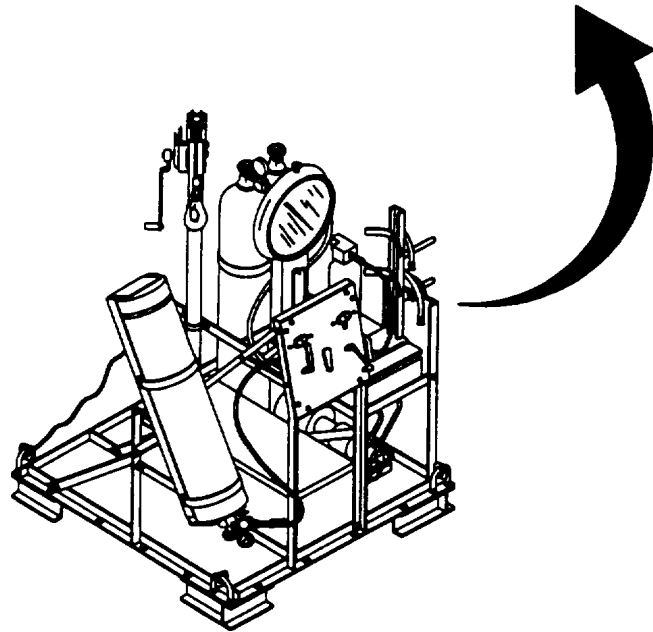
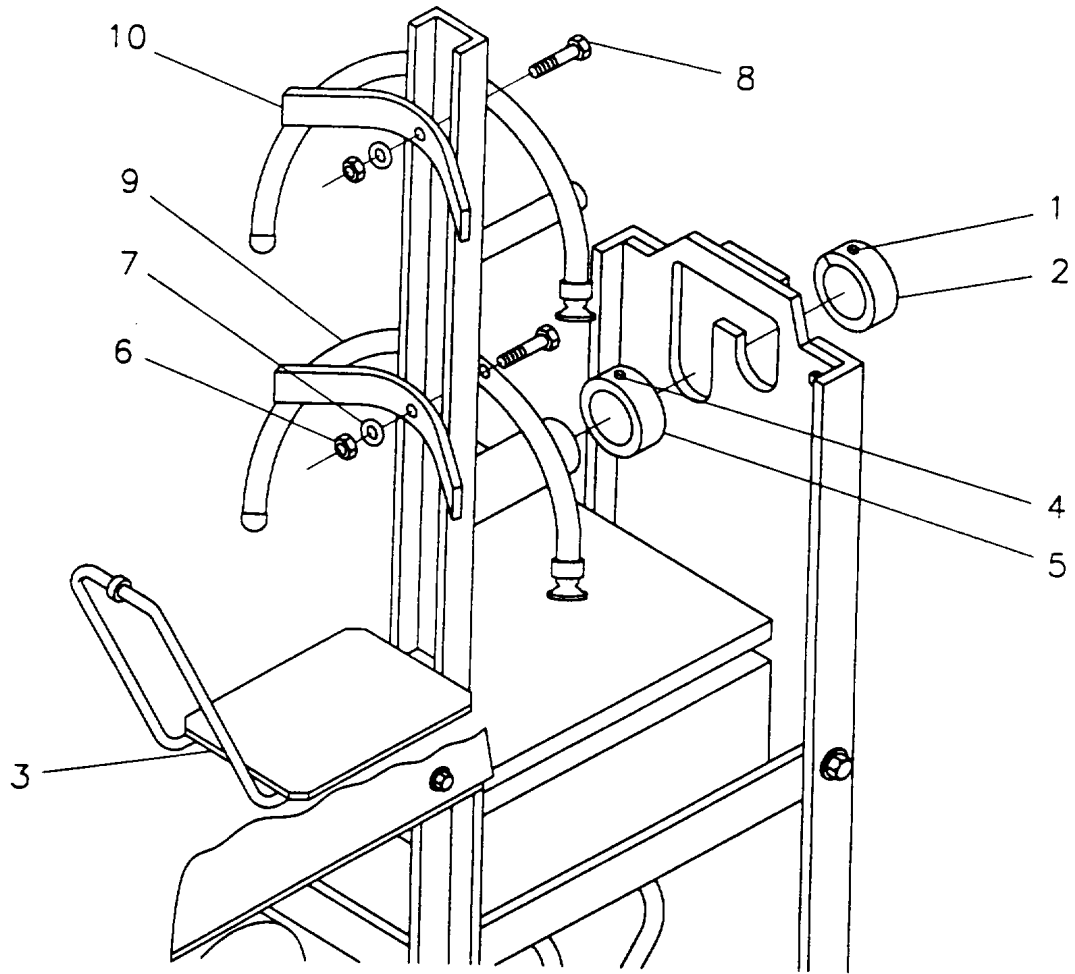


Figure 4-7. Agitator Bracket Replacement

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**4-16. TILT RACK ASSEMBLY REPLACEMENT (Refer to Figure 4-8)**


---

**This task covers:**    **a. Removal**                      **b. Installation**

---

**INITIAL SETUP**Equipment ConditionTools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Materials/Parts

Self-locking nuts  
As required

Air supply disconnected, paragraph 2-7

---

**4-16.1 Removal.**

- a. Place assembly in upright position.
- b. Attach hoist cable to assembly at upper end and take all slack out of cable.

**NOTE**

**As last screw is removed, assembly will become free. Steady unit to prevent drop or swing.**

- c. Remove four nuts (1), washers (2), and bolts (3) holding the flanged bearings (4) to legs.
- d. Using hoist to assist, move assembly aside for component removal.
- e. Remove two nuts (5), washers (6), bolts (7, 8) and washers (9) holding angle (10) to channel (11). Discard nuts (5).
- f. Remove two nuts (12), washers (13), bolts (14, 16) and washers (15) holding angle and plate (17) to channel (11). Discard nuts (12).
- g. Remove four nuts (18), washers (19), holding two U-bolts (20) and shaft (21) and bearings (4) to the channel (11). Discard nuts (1 8).

**4-16.2 Installation.****NOTE**

**Make sure shaft extends equal distance on each side of channel**

- a. Install two U-bolts (20), around shaft (21) and through channel (11) and secure with four washers (19) and nuts (18).
- b. Install angle and plate (17) on channel (11) and secure with two washers (15), bolts (16 & 14), washers (13) and nuts (12).

- c. Install angle (10) on channel (11) and secure with two washers (9), bolts (8, 7), washers (6) and nuts (5).
- d. Move new assembly to position where hoist cable may be attached to upper end.
- e. Using hoist to assist, lift assembly into position for fitting between upright legs.
- f. Position flanged bearings (4) on shaft (21) ends and fit assembly between upright legs.
- g. Align holes in flanged bearings and legs and install four bolts (3), washers (2) and nuts (1) but do not tighten.
- h. Remove hoist cable and tighten bolts (3) alternately.
- i. Check assembly for smooth operation.

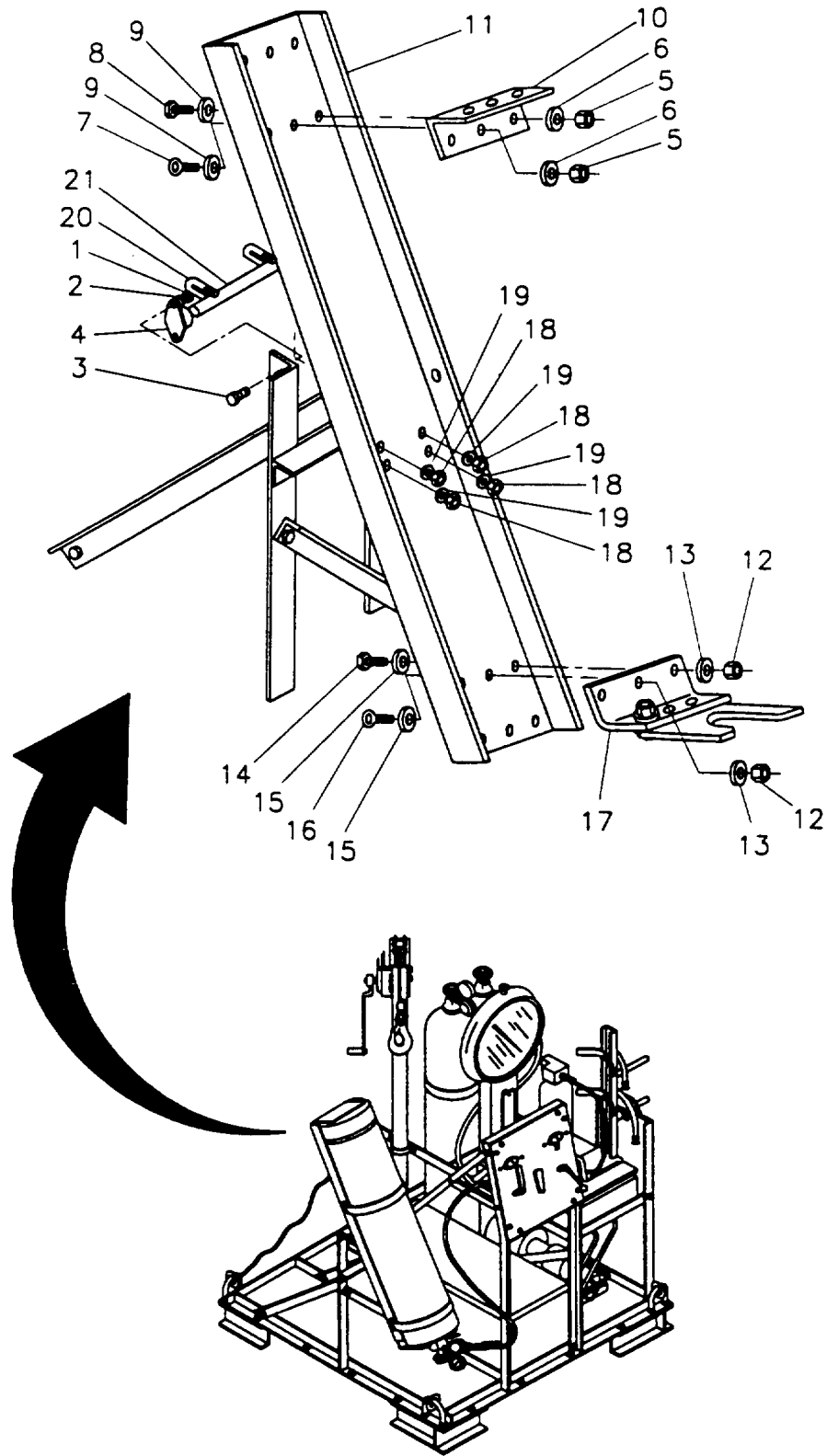


Figure 4-8. Tilt Rack Replacement

**4-17. TIEDOWN ASSEMBLY REPLACEMENT. (Refer to Figure 4-9)**

**This task covers:**    a. Removal                    b. Installation

**INITIAL SETUP**

Tools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Materials/Parts

Self-locking nuts  
As required

Equipment Condition

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Air supply disconnected, paragraph 2-7

**4-17.1 Removal.**

- a. Remove nut (1), washer (2), and bolt (3). Retain for use.
- b. Remove chain (5) and snap and discard, but leave washer (4) on bolt (3).

**4-17.2 Installation.**

- a. Place bolt (3) with washer (4) through last link of new chain (5).
- b. Position bolt (3) through hole in base floor.
- c. Install washer (2) and nut (1) and tighten.
- d. Invert rack and hook into position to verify proper installation.

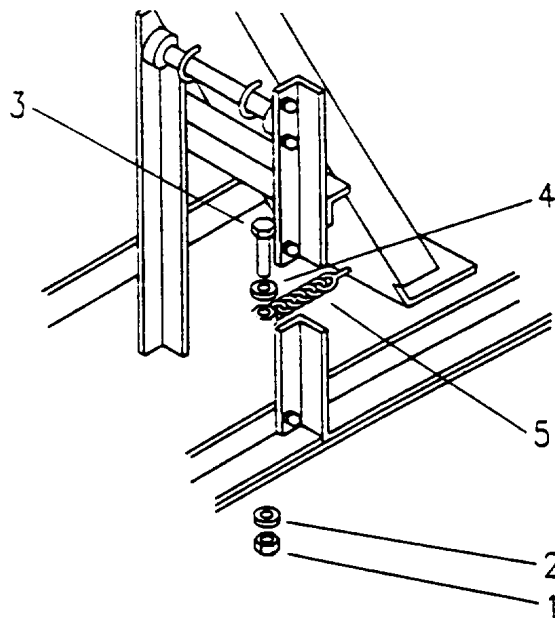


Figure 4-9. Tie Down Replacement

**4-18. HALON CYLINDER ADAPTER ASSEMBLY W/GAUGE. REPAIR. (Refer to Figure 4-10)**

This task covers:    a. Removal                    b. Installation

**INITIAL SETUP**

Tools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Materials/Parts

As required  
Antiseize tape (item 3, Section II, Appendix F)

Equipment Condition

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Adapter disconnected from Halon cylinder

Air supply disconnected, paragraph 2-7

**NOTE**

The Halon cylinder adapter assembly (1) is composed of five individual elements.

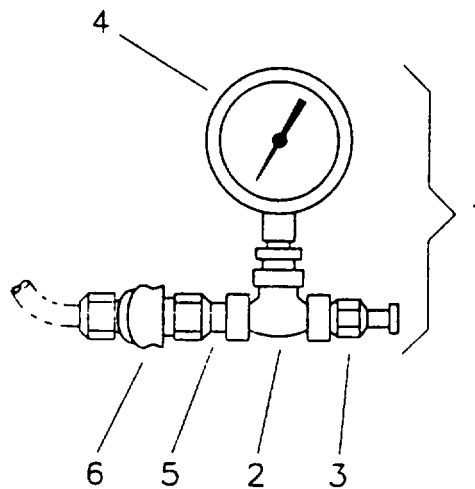


Figure 4-10. Halon Cylinder Adapter Assembly Repair

**4-18.1 Halon Cylinder Adapter Replacement.**

**4-18.1.1 Removal.**

- a. Disconnect Halon cylinder adapter assembly (1) from Halon hose using the quick disconnect fitting (6).
- b. Holding pipe tee (2) securely, unscrew Halon cylinder adapter (3) and discard.



**4-18.1.2 Installation.**

- a. Check new Halon cylinder adapter (3) for defects.
- b. Wrap Halon cylinder adapter with one layer of antiseize tape (item 3, Section II, Appendix F).
- c. Holding pipe tee (2) securely, screw new Halon cylinder adapter into pipe tee and tighten securely.
- d. Connect assembly to Halon hose, install on Halon cylinder valve and test for leaks using leak detector (Appendix E).

**4-18.2 Gauge Replacement.****4-18.2.1 Removal.**

- a. Holding pipe tee (2) securely, unscrew gauge (4) from pipe tee and discard.
- b. Make certain pipe tee threads are cleaned of any remaining antiseize tape.

**4-18.2.2 Installation.**

- a. Check new gauge (4) for defects.
- b. Wrap gauge threads with one layer of antiseize tape (item 3, Section II, Appendix F).
- c. Holding pipe tee (2) securely, screw gauge (4) into pipe tee (2) and tighten securely.
- d. Install assembly and check for leaks using leak detector (Appendix E).

**4-18.3 Quick Disconnect Plug Replacement.****4-18.3.1 Removal.**

- a. Hold pipe nipple (5) securely, unscrew plug (6) from nipple and discard.
- b. Clean any remaining antiseize tape from nipple threads.

**4-18.3.2 Installation.**

- a. Check new plug (6) for defects.
- b. Wrap plug threads with one layer of antiseize tape (item 3, Section II, Appendix F).
- c. Screw plug (6) onto pipe tee (2) and tighten securely.
- d. Install adapter on Halon cylinder and test for leaks using leak detector (Appendix E).

**4-18.4 Pipe Tee Replacement.****4-18.4.1 Removal.**

- a. Perform step a of procedure 4-18.2.1.
- b. Perform step b of procedure 4-18.1.1.
- c. Holding nipple securely, unscrew pipe tee (2) and lay aside for disposal.

- d. Clean any remaining antiseize tape from nipple, Halon cylinder adapter, and gauge thread.

**4-18.4.2 Installation.**

- a. Check new pipe tee (2) for defects.
- b. Wrap one layer of antiseize tape (item 3, Section II, Appendix F) around nipple, Halon cylinder adapter, and gauge threads.
- c. Holding nipple, screw pipe tee (2) onto nipple and tighten securely.
- d. Holding pipe tee (2) securely, screw Halon cylinder adapter into pipe tee and tighten.
- e. Holding pipe tee (2) securely, screw gauge into pipe tee and tighten.
- f. Install Halon cylinder adapter assembly on Halon cylinder and test for leaks using leak detector (Appendix E).

---

**4-19 FIRE EXTINGUISHER ADAPTER ASSEMBLIES REPAIR (Refer to Figure 4-11 and 4-12)**

---

**This task covers:**    a. Removal                      b. Installation

---

**INITIAL SETUP**

Equipment Condition

Tools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Materials/Parts

As required  
Antiseize tape (item 3, Section II, Appendix F)

Air supply disconnected, paragraph 2-7

---

**4-19.1 M-1 Extinguisher or Schrader Valve Adapter. (Refer to Figure 4-11)**

**4-19.1.1 High Pressure Connector replacement.**

**4-19.1.1.1 Removal.**

- a. Holding nipple (1) securely, unscrew high pressure connector (2) and place aside for disposal.
- b. Clean any remaining antiseize tape from nipple threads.

**4-19.1.1.2 Installation.**

- a. Check new connection for defects.
- b. Wrap nipple (1) threads with one layer of antiseize tape (item 3, Section II, Appendix F).
- c. Holding nipple (1) securely, screw new high pressure connector (1) on nipple and tighten securely.
- d. Install adapter and refer to paragraph 2-10 of operating instruction to pressurize to test for leaks using leak detector (Appendix E).

**4-19.1.2 Quick Disconnect Plug Replacement.**

**4-19.1.2.1 Removal.**

- a. Holding nipple (1) securely, unscrew quick disconnect plug (3) and discard.
- b. Clean any remaining antiseize tape from nipple threads.

**4-19.1.2.2 Installation.**

- a. Check new plug for defects.
- b. Wrap nipple threads with one layer of antiseize tape (item 3, Section II, Appendix F).
- c. Holding nipple (1) securely, screw new quick disconnect plug (3) on nipple and tighten.

- d. Install adapter and refer to paragraph 2-9 of operating instruction to pressurize to test for leaks using leak detector (Appendix E).

**4-19.2 Bradley Engine Compartment Extinguisher Adapter Repair. (Refer to Figure 4-12)**

**4-19.2.1 Flare Swivel Adapter Replacement.**

**4-19.2.1.1 Removal.**

- a. Holding nipple (1) securely, unscrew swivel adapter (2) from nipple and set aside for disposal.
- b. Clean any remaining antiseize tape from nipple threads.

**4-19.2.1.2 Installation.**

- a. Check new swivel adapter for defects.
- b. Wrap nipple (1) threads with one layer of antiseize tape (item 3, Section II, Appendix F).
- c. Holding nipple securely, screw new swivel adapter on nipple and tighten securely.
- d. Install adapter and refer to paragraph 2-9 of operating instructions test for leaks using leak detector (Appendix E).

**4-19.3 Quick Disconnect Plug Replacement.**

**4-19.3.1 Removal.**

- a. Holding nipple (1) securely, unscrew quick disconnect plug (3) from nipple and discard.
- b. Clean any remaining antiseize tape from nipple threads.

**4-19.3.2 Installation.**

- a. Check new quick disconnect plug (3) for defects.
- b. Wrap nipple (1) threads with one layer of antiseize tape (item 3, Section II, Appendix F).
- c. Holding nipple securely, screw new quick disconnect plug (3) on nipple and tighten securely.
- d. Install adapter and refer to paragraph 2-9 of operating instructions to check for leaks using leak detector (Appendix E).

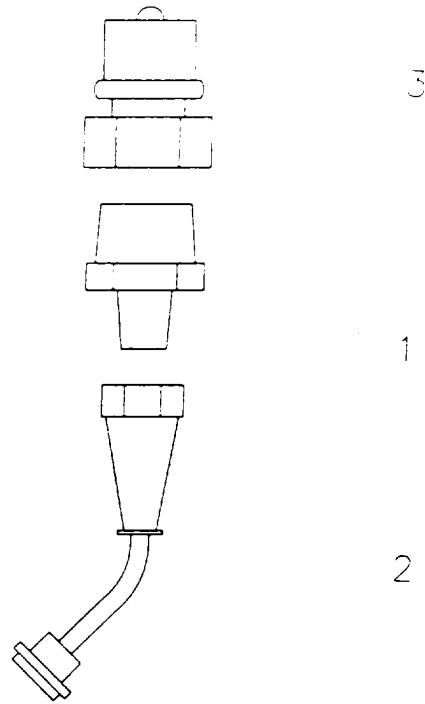


Figure 4-11. M-1 Extinguisher or Schrader Valve Adapter Repair

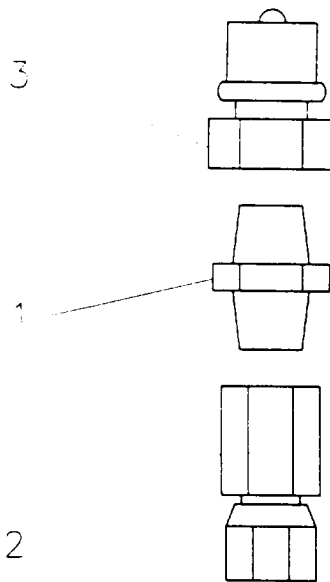


Figure 4-12. Bradley Engine Compartment Extinguisher Adapter Repair

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**4-18. HALON CYLINDER ADAPTER ASSEMBLY W/GAUGE. REPAIR. (Refer to Figure 4-10)**


---

This task covers:    a. Removal                      b. Installation

---

**INITIAL SETUP**Equipment ConditionTools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Materials/Parts

Self-locking nuts  
Hose

Air supply disconnected, paragraph 2-7

---

**4-20.1 Removal.****NOTE**

**Make certain that all Halon has been recovered from the hose before breaking any connection.**

- a. Disconnect the hose swivel couplings (1) at each end of hose.
- b. Remove hose (2).

**4-20.2 Installation.**

- a. Remove any remaining antiseize tape from the hose connection points.
- b. Wrap male connecting threads with one layer of antiseize tape (item 3, Section II, Appendix F)
- c. Connect hose swivel couplings (1) to correct connection points and tighten.

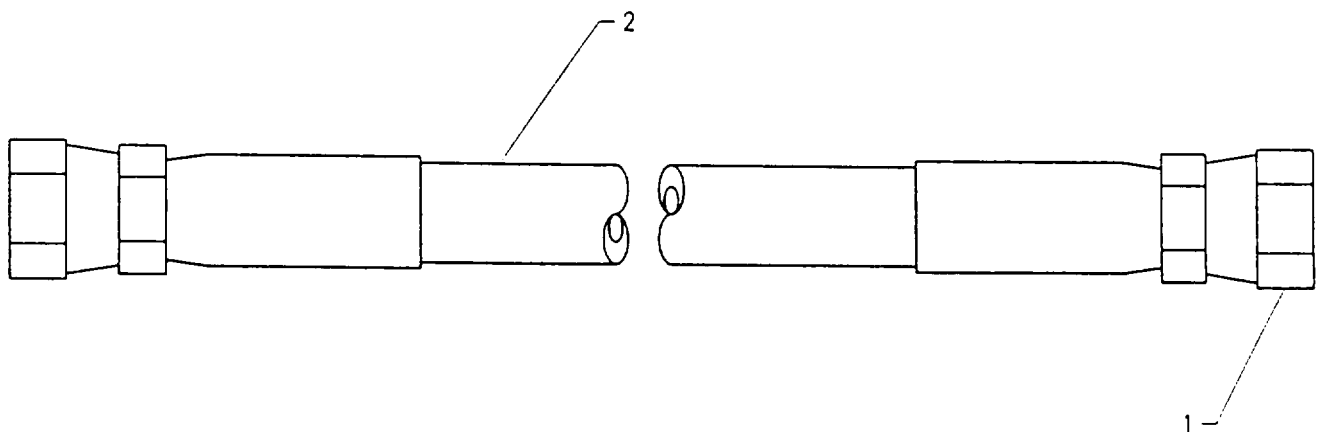


Figure 4-13. Hose Replacement

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**4-21 PRESSURE REGULATOR ASSEMBLY REPLACEMENT. (Refer to Figure 4-14)**


---

This task covers:    **a. Removal**                      **b. Installation**

---

**INITIAL SETUP**Equipment ConditionTools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Materials/Parts

Pressure Regulator

Air supply disconnected, paragraph 2-7

---

**4-21.1 Removal.**

- a. Close the ball valve (1) on the nitrogen bottle.
- b. Close adjusting screw (2) by turning clockwise as far as it will go.
- c. Crack the regulator to hose connection (3) to bleed off any remaining pressure. After pressure is relieved, disconnect the hose.
- d. Unscrew regulator (4) from cylinder by turning nut (5) counterclockwise.

**4-21.2 Installation.**

- a. Attach new regulator to cylinder by tightening nut (5) finger tight.
- b. Adjust regulator until gauges are upright and readable.
- c. Tighten regulator to cylinder connection making sure gauges stay upright.
- d. Install hose connection (3) to regulator (4) outlet and tighten hose connection while holding regulator outlet fitting.
- e. Turn cylinder ball valve (1) on and check for leaks and pressure indication on one gauge.
- f. Turn adjusting screw (2) counterclockwise to check outlet pressure gauge (6).
- g. Check for leaks by sound and leak detection compound (item 9, Section II, Appendix F).
- h. If system will not be used immediately, close cylinder ball valve.

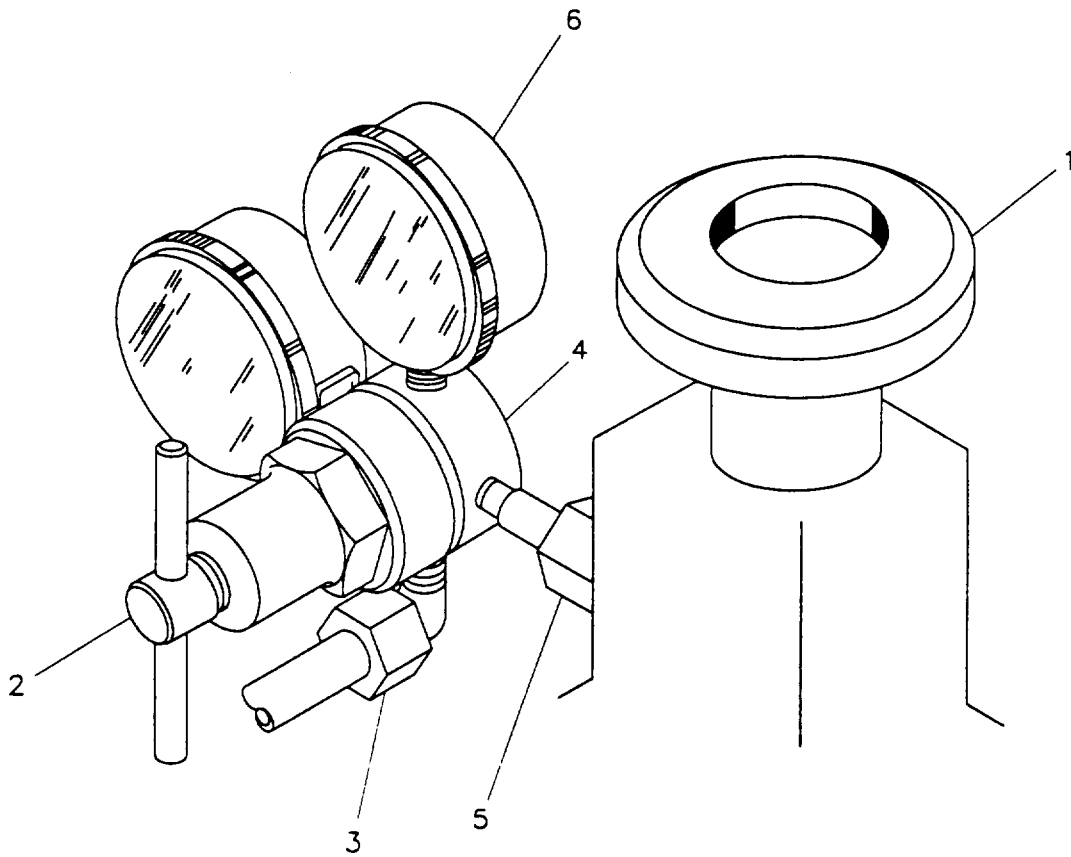


Figure 4-14. Pressure Regulator Assembly Replacement



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**4-22 AIR FILTER SERVICE. (Refer to Figure 4-15)**

---

**This task covers:    a. Disassembly        b. Service                    c. Assembly**

---

**INITIAL SETUP****Equipment Condition****Tools****Reference**

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Cover removed from Recovery / Recharger paragraph 2-6.1

Wrench, Pipe, Item 6, Section II, Appendix B

Air supply disconnected, paragraph 2-7

**Materials/Parts**Solvent Item 8, Section II, Appendix F

---

**4-22.1 Disassembly.**

- a. Unscrew bowl retaining ring (1).
- b. Remove bowl (2) and empty any water. O-ring may come off with bowl. Retain for reuse. (If other than water in bowl, have air supply checked for contamination.)
- c. Remove screw (3) holding lower baffle (4), gasket (5), filter element (6), upper gasket (7) positioning cone (8) and upper baffle (9).
- d. Separate all components removed above.

**4-22.2 Service.**

- a. Wash filter element in cleaning solvent (item 8, Section II, Appendix F).
- b. Dry filter element thoroughly. (Do not use compressed air.)

**4-22.3 Assembly.**

- a. Install lower baffle (4) and gasket (5), filter element (6), upper gasket (7), positioning cone (8) and upper baffle (9) on screw (3).
- b. Position above assembly and secure in place by tightening screw (3) (finger tight).
- c. Position O-ring (10) (if loose), install bowl (2) and secure with bowl retaining ring (1).
- d. Pressurize system and check for leaks by sound and leak detection compound (item 9, Section II, Appendix F).

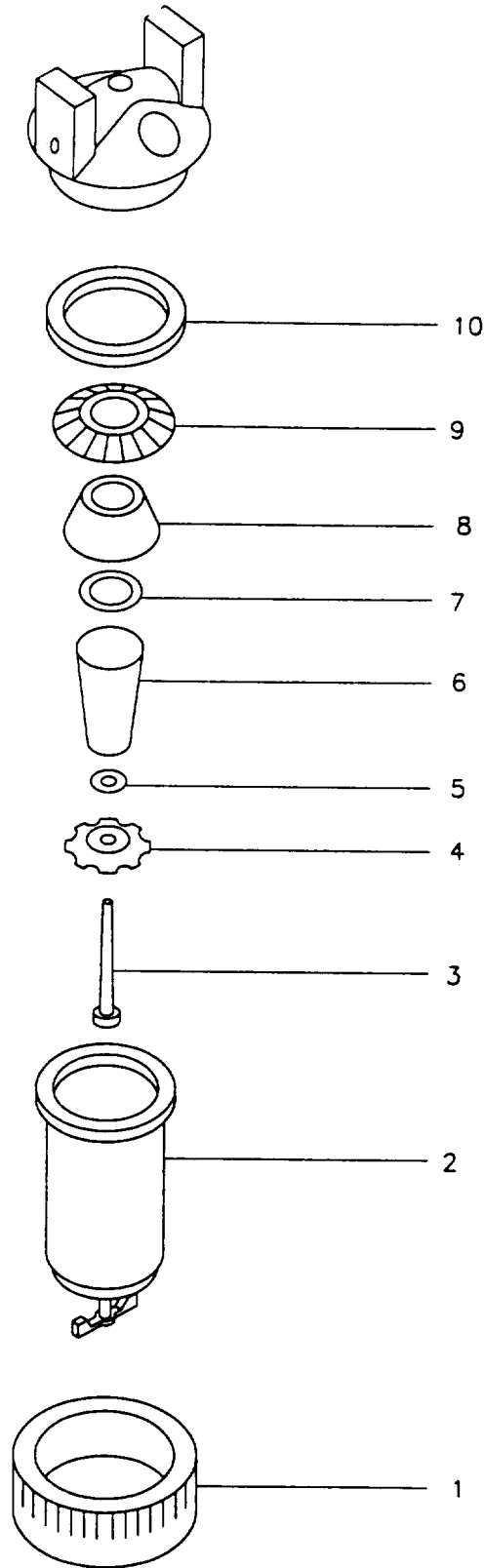


Figure 4-15. Air Filter Service

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**4-23 AIR FILTER / REGULATOR ,ASSEMBLY REPLACEMENT. (Refer to Figure 4-16)**


---

This task covers:    a. Removal                      b. Installation

---

**INITIAL SETUP**Equipment ConditionTools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Reference

Cover removed from Recovery / Recharger Unit; paragraph 2-6.1

Materials/Parts

Self-locking nuts  
Air Filter / Regulator

Air supply disconnected, paragraph 2-7

---

**NOTE**

**Assembly comes loose with next step.**

**4-23.1 Removal.**

- a. Remove two nuts (1), washers (2), and one clamp (3). Discard nuts.
- b. Remove two bolts (4) and washers (5).
- c. Disconnect air outlet hose (6).
- d. Remove air inlet hose connection (7). Retain for reuse.

**4-23.2 Installation.**

- a. Install air inlet hose connection (7).
- b. Position new assembly and install two washers (5), bolts (4), one clamp (3), two washers (2) and nuts (1).
- c. Reconnect air outlet hose (6).

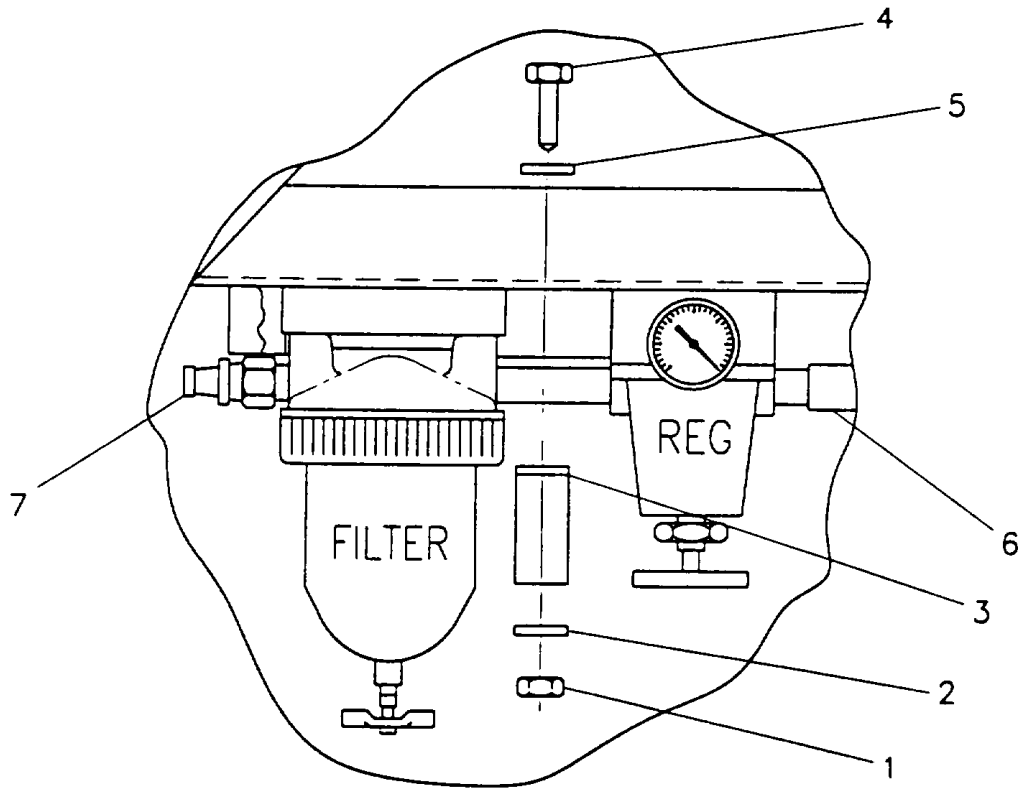


Figure 4-16. Air Filter and Regulator Replacement

---

**4-24 TOOL BOX REPLACEMENT. (Refer to Figure 4-17)**


---

This task covers:    **a. Removal**                      **b. Installation**

---

**INITIAL SETUP**Equipment ConditionToolsReference

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Cover removed from Recovery / Recharger paragraph 2-6.1

Materials/Parts

Air supply disconnected, paragraph 2-7

Tool box

---

**4-24.1 Removal.**

- a. Empty tool box (1) of all contents and set aside for discard.

**NOTE**

**Tool box is not secured.**

- b. Lift tool box (1) from its location on base (2) and remove.

**4-24.2 Installation.**

- a. Check new tool box (1) to assure that hinges and latches work properly.
- b. Position new tool box (1) in location on base.
- c. Place all items taken from old tool box in new tool box.

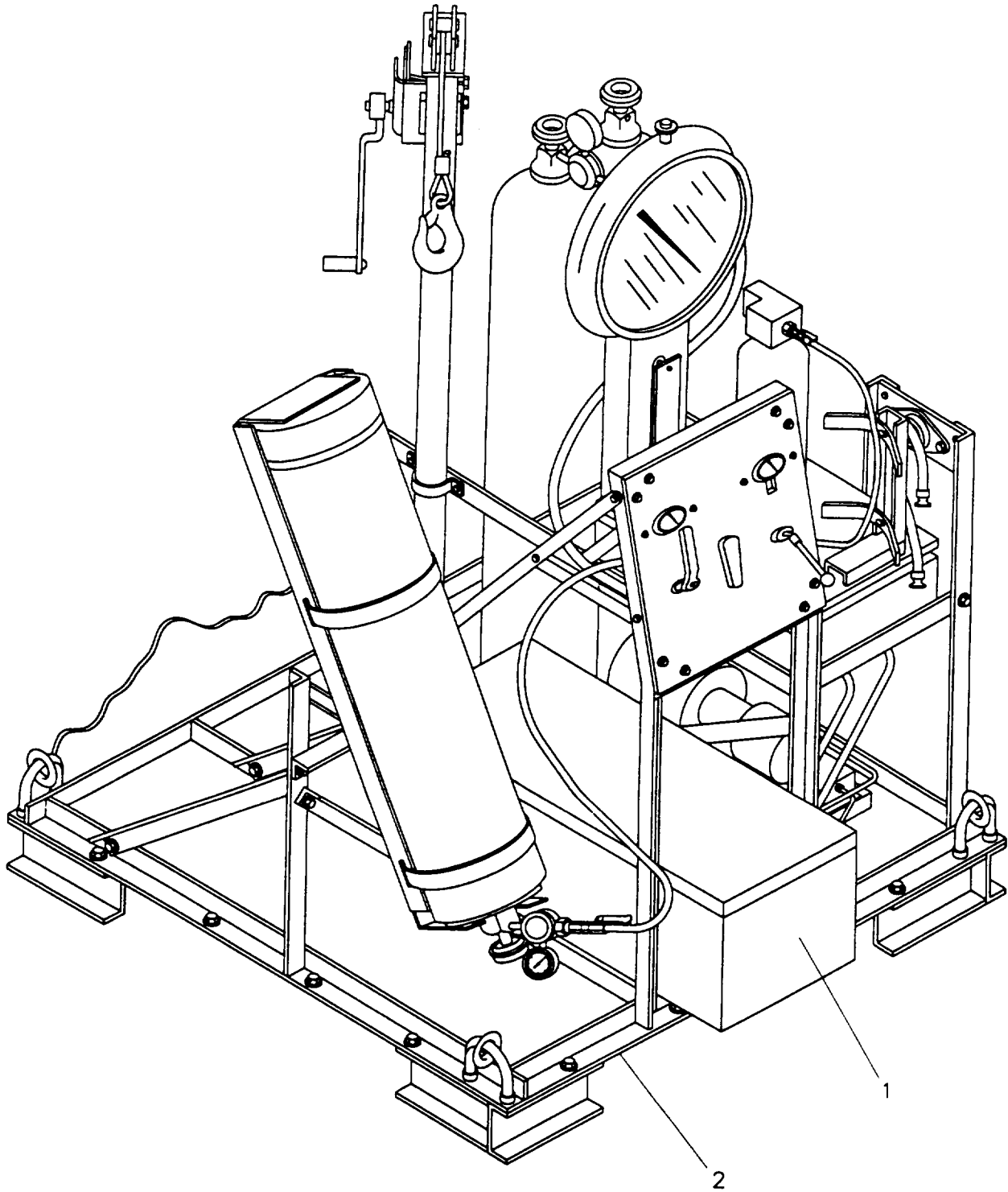


Figure 4-17. Tool Box Replacement

---

**4-25 U-BOLT REPLACEMENT. (Refer to Figure 4-18)**


---

This task covers:    **a. Removal**                      **b. Installation**

---

**INITIAL SETUP**Equipment ConditionTools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Materials/Parts

Self-locking nuts  
U-bolt

Air supply disconnected, paragraph 2-7

---

**4-25.1 Removal.**

- a. Remove two nuts (1) and washers (2) holding U-bolt (3) to base and discard nuts.
- b. Remove U-bolt (3) and slip sling connecting ring (4) off U-bolt and retain ring for reuse.
- c. Remove two stop nuts (5) from U-bolt and discard nuts

**4-25.2 Installation.**

- a. Check new U-bolt (3) for defects.
- b. Install stop nuts (5) on U-bolt as far as threads will allow.
- c. Slip sling connecting ring (4) on U-bolt.
- d. Fit U-bolt and ring assembly through appropriate holes in base.
- e. Install two washers (2) and nuts (1) and tighten.

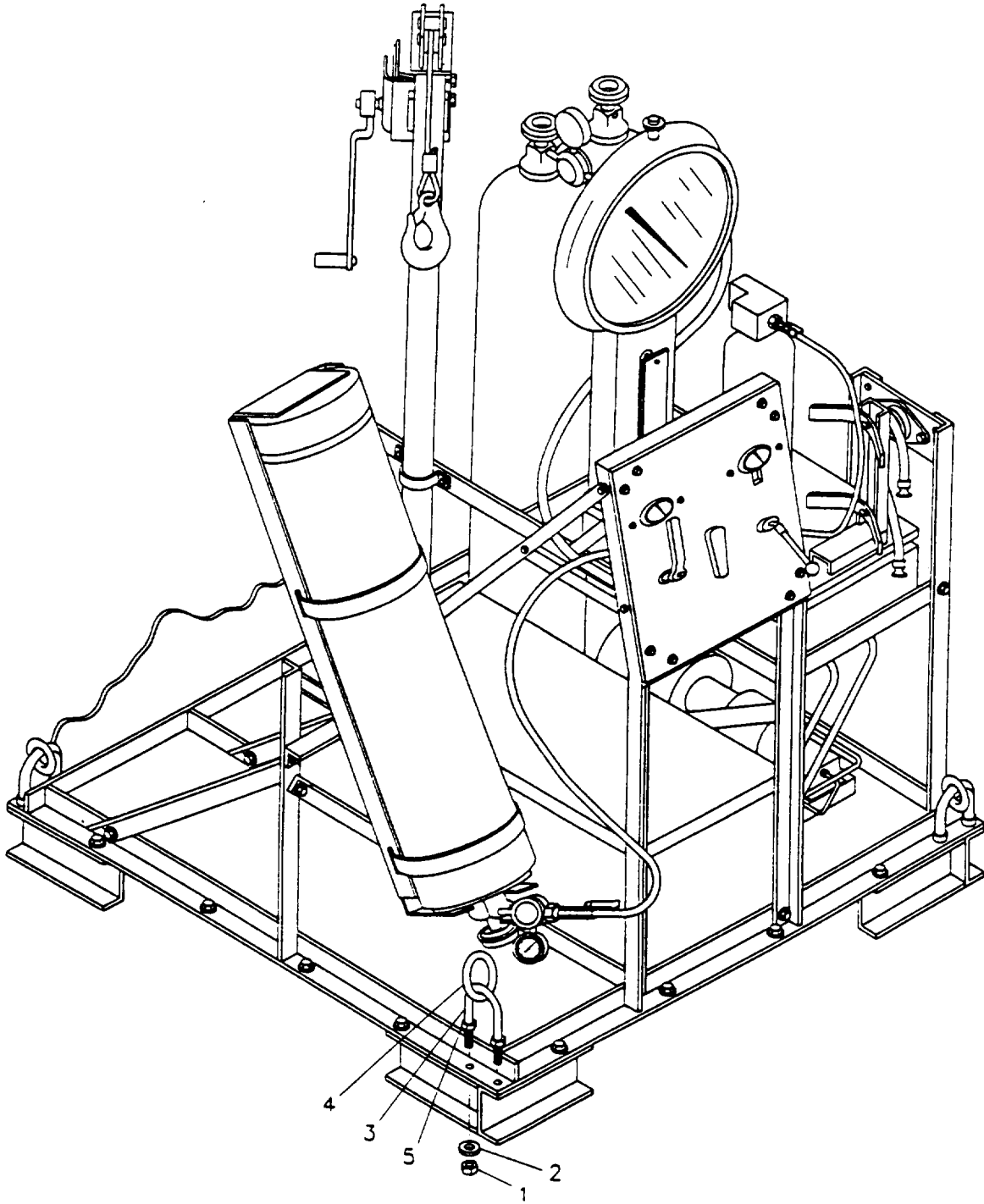


Figure 4-18. U-bolt Replacement



**4-26 SLING CONNECTING RING REPLACEMENT. (Refer to Figure 4-18)**

**This task covers:**    **a. Removal**                      **b. Installation**

**INITIAL SETUP**

Equipment Condition

Tools

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Reference

Cover removed from Recovery / Recharger paragraph 2-6.1

Materials/Parts

Self-locking nuts  
Sling Connecting Ring

Air supply disconnected, paragraph 2-7

**4-26.1 Removal.**

- a. Refer to procedure 4-25.1 U-Bolt Replacement and perform steps a and b..
- b. Discard old sling connecting ring (4).

**4-26.2 Installation.**

- a. Check new sling connecting ring (4) for defects.
- b. Slip sling connecting ring (4) on U-bolt.
- c. Refer to procedure 4-25.2 U-Bolt Replacement and perform steps d and e.

---

4-27. COVER REPLACEMENT. (Refer to figure 4-19)

---

This task covers:      a. Removal                      b. Installation

---

**INITIAL SETUP**

|  | Equipment Condition                    |
|--|--|
| Tools  | Reference                              |
| General Mechanics Tool Box, Item 1, Section III, Appendix B. | Air supply disconnected, paragraph 2-7 |
| Materials/Parts  |  |
| Cover  |  |

---

4-27.1. Removal.

- a Loosen adjustable straps (1).
- b Remove cover (2).

4-27.2. Installation.

- a Place cover (2) over unit.
- b Tighten adjustable straps (1).

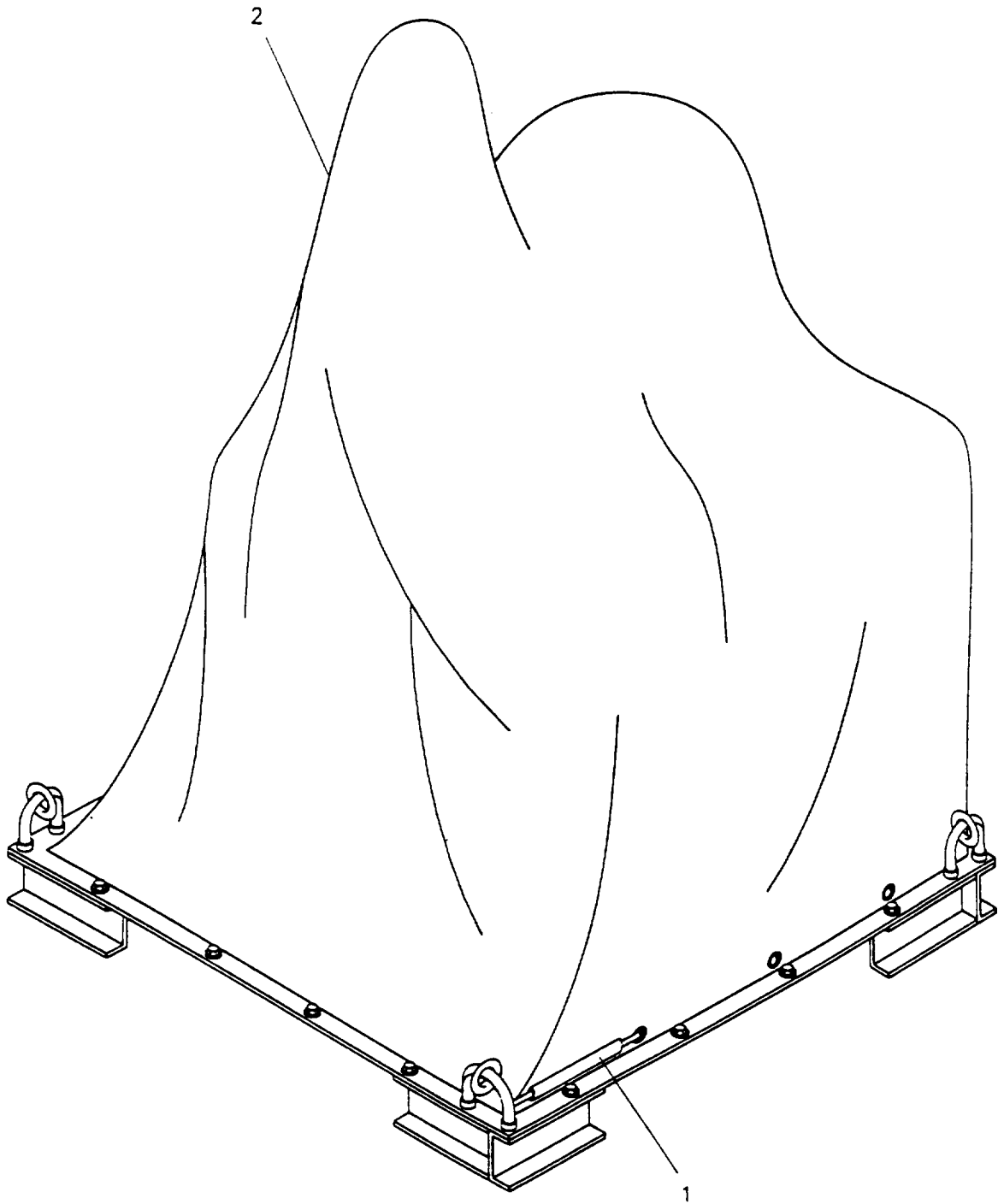


Figure 4-19. Cover Replacement

**SECTION VI. PREPARATION FOR STORAGE OR SHIPMENT**4-28. PREPARATION FOR STORAGE.

- a. Clean system components.

**CAUTION**

**Do not invert scale assembly. Inversion will disconnect the column assembly indicator from the base assembly.**

- b. Using a fork lift, move the Recovery / Recharger Unit to the storage location. The storage location should be level and well drained.
- c. Install cover

4-29. PREPARATION FOR SHIPMENT.**WARNING**

**Wear safety glasses or goggles while performing the following procedures.**

- a. Securely attach the nitrogen pressure regulator to the shaker bracket with two U-bolts and four nuts and washers. U-bolts stored in tool box.
- b. Using the hoist winch assembly, lift (para. 2-6.3) the Halon cylinder and nitrogen cylinder off the base assembly and set aside for separate transport.

**NOTE**

**The adjustable straps are stored in the tool box.**

- c. Remove the scale assembly (para. 4-13.1). Secure the scale assembly to the top surface of the tool box using two adjustable straps.
- d. Remove the hoist winch assembly (para. 4-8.1). Place the hoist winch assembly in a secure position across the top of the unit.
- e. Install the equipment cover (para 4-27.2).
- f. Enclose the Recovery / Recharger Unit in the original shipping container. If not available consult transportation authorities for the required packaging.
- g. Transport the shipping container using a fork lift.

CHAPTER 5

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

SECTION I. GENERAL

5-1. GENERAL

This chapter contains disassembly, cleaning, inspection, replacement, and assembly instructions for the Recovery / Recharger Unit assemblies. Except for the transfer pump unit and the control panel the assemblies will have been replaced at unit level.

SECTION II. MAINTENANCE INSTRUCTIONS

---

5-2. WINCH ASSEMBLY REPAIR. (Refer to Figure 5-1)

---

This task covers:      a. Disassembly      b. Cleaning      c. Inspection      d. Assembly

---

INITIAL SET UP

Equipment Conditions

Tools

Reference

Tool Kit, General Mechanics  
(Item 1, Section III Appendix B)

Winch Assembly Removed, reference  
paragraph 4-9

Materials/Parts

As required  
Solvent (item 7, Section II, Appendix F)

---

5-2.1. Disassembly.

- a. Remove locknut (1) and slide cap screw (2) from core of drum (3).
- b. Remove drum (3) and frame spacer (4).
- c. Remove retaining ring (5), spring (6) and unscrew handle (7) from pinion shaft (8).
- d. Remove handle disc (9) and retaining ring (10).

**NOTE**

**The next step will allow parts to fall free. Be prepared to catch and retain all parts that are on the pinion shaft.**

- e. Remove pinion shaft (8) by driving on handle end and then pulling it out by opposite end.
- f. Ratchet gear assembly(11), friction disc (12) and pinion gear assembly(13) will drop free as pinion shaft (8) is removed.
- g. Remove bushings (14) and (15).

**NOTE**

**Do not perform the next step unless it is clearly evident that some part of the pawl assembly requires replacement.**

- h. Remove locknut (16), ratchet bolt (17), ratchet spring (18), ratchet spacer (19) and ratchet pawl (20).

5-2.2. Cleaning.

- a. Clean components of all visible grease, oil or dirt with cleaning solvent (Item 7, Section II, Appendix F).
- b. Maintain clean conditions during reassembly.

5-2.3. Inspection.

- a. Measure friction disc (12) for wear. If thickness is less than 1/16 inch replace friction disc and handle disc.
- b. Inspect all metallic parts for cracks, chips or signs of wear. Replace winch assembly if any parts are cracked or chipped.

5-2.4. Assembly.

- a. Coat ratchet pawl (20) with oil (item 8, Section II, Appendix F).
- b. Install ratchet bolt (17) through ratchet pawl (20), ratchet spacer (19), ratchet spring (18) and frame (21).
- c. Install locknut (16) on ratchet bolt (17).
- d. Coat pinion shaft (8) and two bushings (14) and (15) with oil (item 8, Sect II, Appx F).
- e. Insert pinion shaft (8) through bushing (15) and place pinion gear assembly (13), friction disc (12) and ratchet gear assembly (11) on pinion shaft as it is inserted.
- f. Seat pinion shaft (8) and install retaining ring (10).
- g. Install handle disc (9), handle (7), spring (6) and retaining ring (5).
- h. Install frame spacer (4) in drum (3) core.
- i. Install cap screw (2) through frame (21), drum (3) and frame.
- j. Install locknut (1) on cap screw (2).
- k. Operate assembly and listen for clicking sound to verify correct assembly.

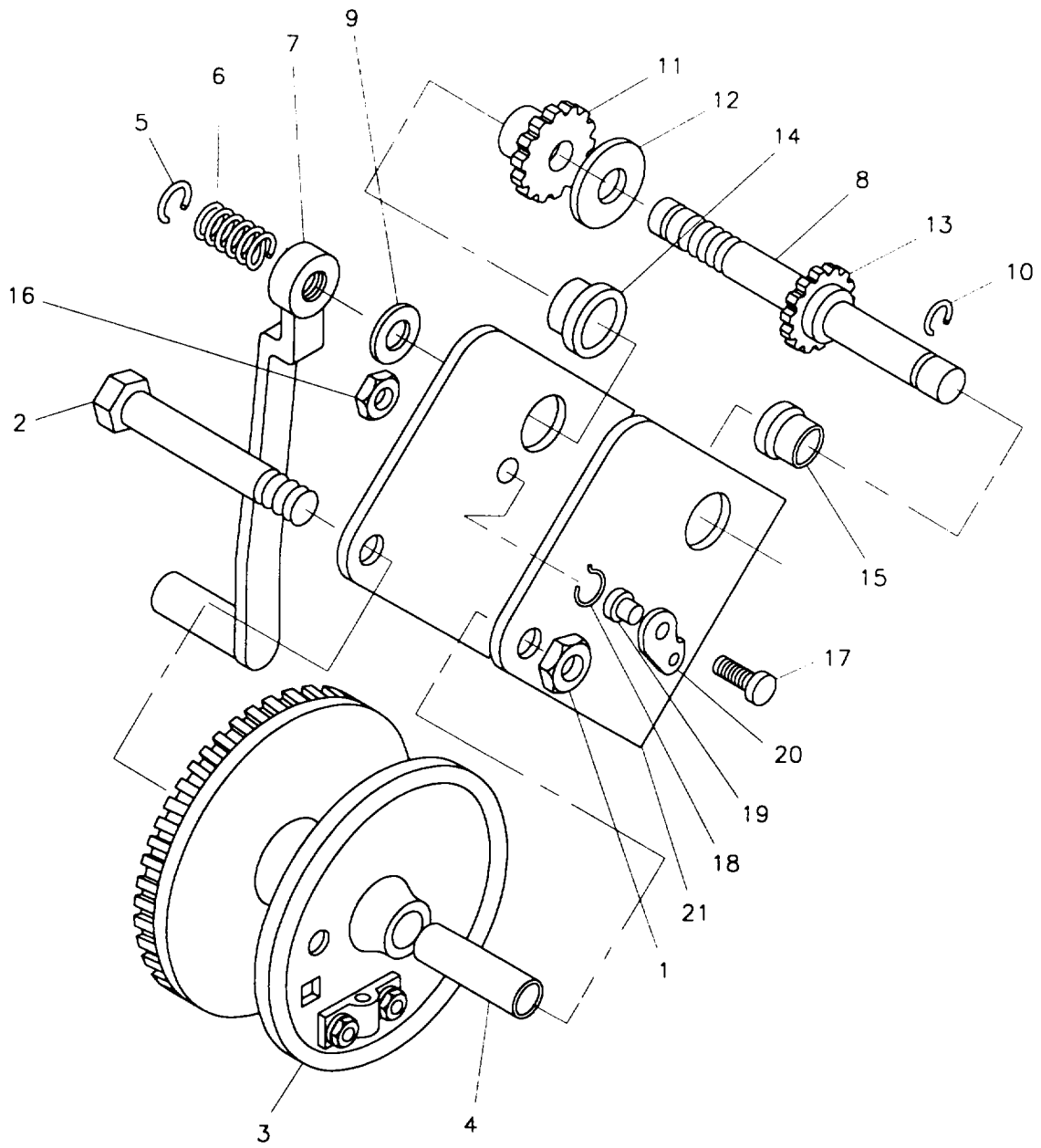


Figure 5-1. Winch Assembly Repair

---

### 5-3. SCALE FRAME REPAIR (Refer to Figure 5-2)

---

This task covers:      a. Removal                      b. Installation

---

#### INITIAL SETUP

#### Equipment Condition

#### Tools

#### Reference

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Scale removed from Recovery / Recharger Unit; paragraph 4-13.1

#### Materials/Parts

Self-locking nuts

---

#### NOTE

**The scale frame consists of angle pieces drilled and bolted. Repair is unlikely but, if required, would consist of replacement of one or more of the angles.**

#### 5-3.1. Removal. (typical)

- a. Remove two nuts (1), washers (2), bolts (3) and washers (4) holding each end of piece to be removed.
- b. Remove damaged piece.

#### 5-3.2. Installation. (typical)

- a. Install new piece.
- b. Position and secure with two washers (4), bolts (3), washers (2), and nuts (1) on each end.



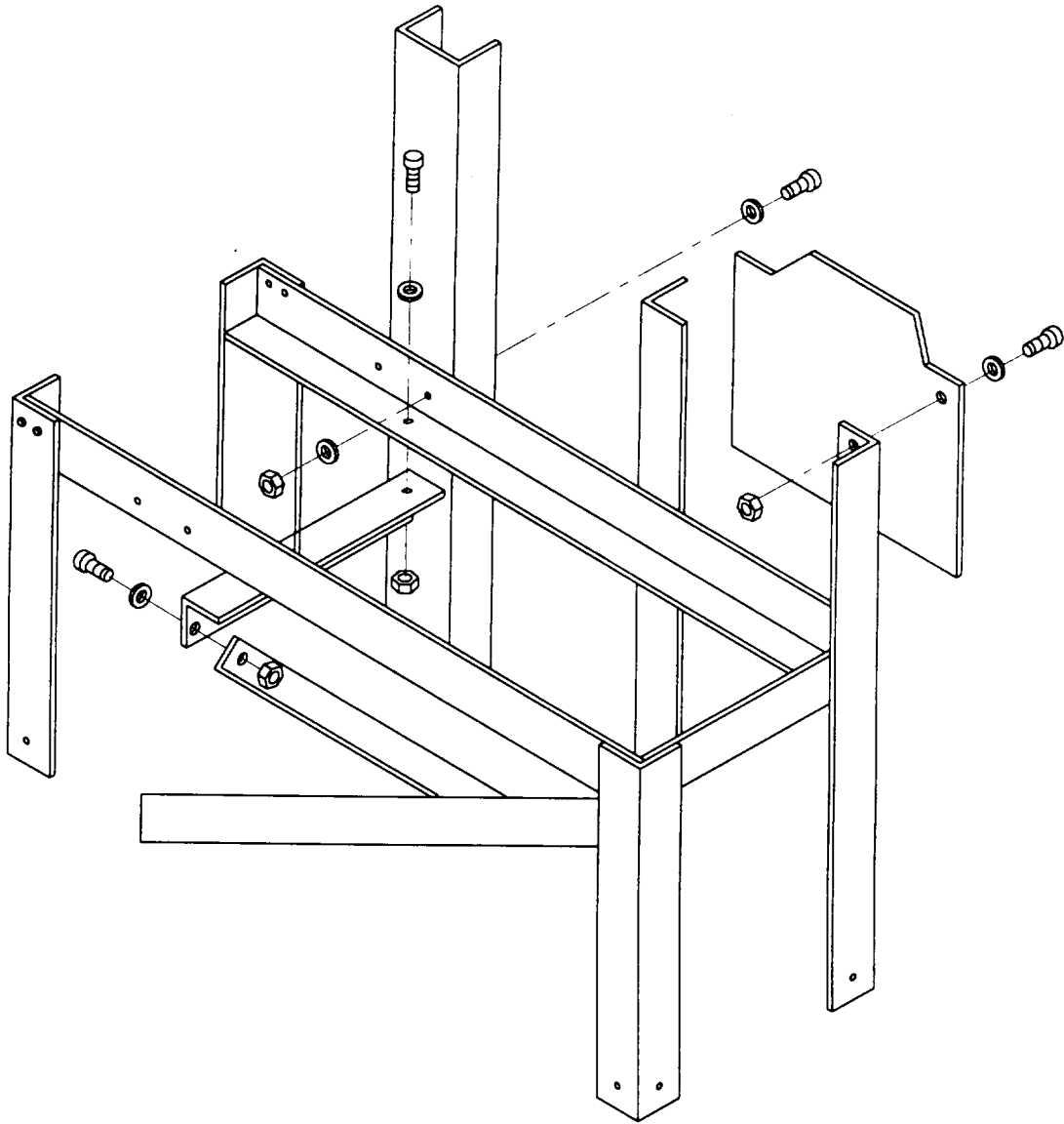


Figure 5-2. Scale Frame Repair

---

**5-4. TILT RACK ASSEMBLY REPAIR.** (Refer to Figure 5-3)

---

This task covers:      a. Removal                      b. Installation

---

**INITIAL SETUP****Equipment Condition****Tools****Reference**

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Cover removed from Recovery / Recharger Unit; paragraph 2-6.1

**Materials/Parts**

Self-locking nuts

---

**NOTE**

**The tilt rack assembly consists of angles, channel, plate drilled and bolted plus rod and bearings. Refer to paragraph 4-16 for removal instructions for angles, channel, and plate, plus rod and bearings. The remaining angle is addressed here.**

**5-4.1. Removal.** (typical)

- a. Remove two nuts (1), washers (2), bolts (3) and washers (4) holding each end of piece to be replaced.
- b. Remove damaged piece.

**5-4.2. Installation.** (typical)

- a. Install new piece.
- b. Position and secure with two washers (4) bolts (3), washers (2), and nuts (1) on each end.

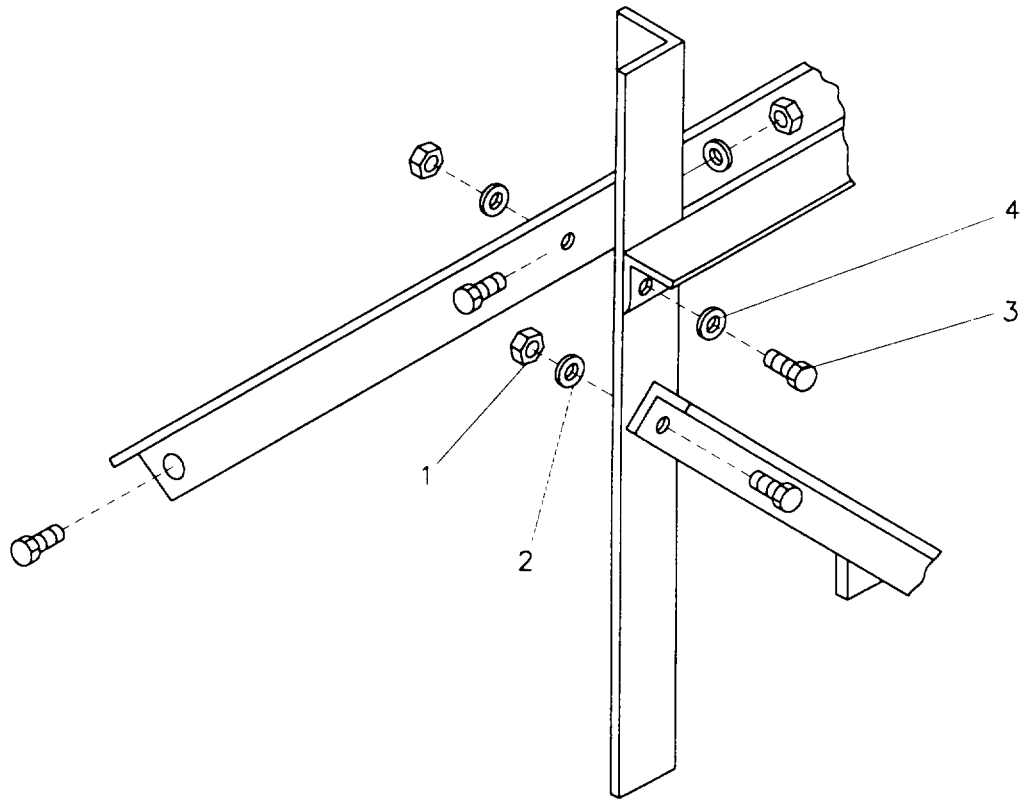


Figure 5-3. Tilt Rack Assembly Repair

---

 5-5. CONTROL PANEL REPAIR. (Refer to Figure 5-4)
 

---

 This task covers:      a. Removal                      b. Installation
 

---

INITIAL SETUPEquipment ConditionTools

## Reference

General Mechanics Tool Box,  
Item 1, Section III, Appendix B.

Cover removed from Recovery / Recharger  
Unit; paragraph 2-6.1

Materials/Parts

Self-locking nuts

---

**NOTE**

**Control panel repair consists of gauge or valve replacement.**

**NOTE**

**If your Recovery / Recharger Unit control panel has gauges secured with clips, continue. If your Recovery / Recharger Unit has gauges that are held in place by screws, go to paragraph 5-5.5 for replacement instructions.**

5-5.1. Outlet or Inlet Pressure Gauge Replacement.5-5.1.1. Removal.

- a. Remove two nuts (1), washers (2), screws (3), washers (4) and clips (5) holding inlet or outlet gauge (6) in place. Discard nuts.
- b. Reach behind control panel and tilt the hose connection assembly so that gauge (6) moves away from control panel.
- c. Hold the elbow (7) connection to the gauge securely and unscrew gauge (6) from elbow. Discard gauge.

5-5.1.2. Installation.

- a. Check replacement gauge visually for defects. Do not use if defective.
- b. Position hose connection assembly as for removal and hold elbow (7) securely.
- c. Wrap male threads with one layer of antiseize tape (item 3, Section II, Appendix F) and screw replacement gauge (6) into elbow making certain gauge dial faces away from control panel when tight.
- d. Position gauge assembly in control panel.
- e. Install two clips (5), washers (4) screws (3), washers (2), and nuts (1) to secure gauge assembly.
- f. Pressurize system and check for leaks using leak detector.

5-5.2. Unit Operation Valve Replacement.5-5.2.1. Removal.

- a. Tag or mark all hoses to allow correct reconnection and disconnect all hoses leading to or away from valve (refer to paragraph 4-13).
- b. Loosen two setscrews (8) located in sides of valve handle (9) and remove handle.

**NOTE**

**Mark valve top in some manner.**

- c. Remove four cap screws (10) securing valve (11) to control panel. As last screw is removed, hold valve to prevent falling. Discard nuts.

**NOTE**

**Note the location of all hardware items in relation to valve top for reinstallation.**

- d. Hold removed valve securely and remove all elbows (12). Discard nuts.
- e. Discard valve.

5-5.2.2. Installation.

- a. Check replacement valve visually for defects. Do not use if defective.

**NOTE**

**Valve should come with handle pointing to OFF position. Mark valve body before removing handle so valve will be installed with mark at top.**

- b. Loosen the setscrews (8) located in sides of valve handle (9) and remove handle. Discard nuts.
- c. Wrap male threads with one layer of antiseize tape (item 3, Section II, Appendix F) and install elbows (12) removed in d., above on valve (1 1), in same relative position as removed. Use mark indicating valve top as guide.
- d. From rear side of control panel, pass valve (11) control shaft through opening for unit operation valve. Make certain mark is at top.
- e. Align one panel valve mounting cap screw hole with a matching relative position hole in valve body. Keep mark at top.
- f. Install one cap screw (10) through control panel into valve (11) body. Do not tighten.
- g. Install three remaining cap screws (10) and tighten all four.
- h. In accordance with tagging or marking scheme used at disconnect, reconnect all hoses leading to or away from valve.
- i. Install valve handle (9) with pointer indicating OFF and tighten two setscrews (8).

5-5.3. Product Selection Valve Replacement.5-5.3.1. Removal.**NOTE**

**Mark top of valve body in some manner before removing.**

- a. Loosen setscrew (13) in side of valve handle (14) and remove handle.
- b. Loosen and remove valve retaining nut (15).

**NOTE**

**To assist in reconnection, tag or mark all hoses in relation to valve top.**

- c. Remove valve (16) from control panel and holding connection points securely, disconnect all hoses leading to or away from valve (16).
- d. Holding valve (16) body securely, remove all elbows (17) noting position in relation to valve top.
- e. Discard valve.

5-5.3.2. Installation.**NOTE**

**Valve should come with pointer indicating no flow position. Mark top of valve to assist in installation.**

- a. Check replacement valve visually for defects. Do not use if defective.
- b. Loosen setscrew (13) in valve handle (14) and remove handle. Discard nuts.
- c. Remove valve retaining nut (15). Retain for reuse.
- d. Wrap male threads with one layer of antiseize tape (item 3, Section II, Appendix F) and holding valve (16) body securely, install elbows (17) removed in d. above, in relation to valve top.
- e. Holding each connection point securely, reconnect hoses as tagged or marked leading to or away from valve.
- f. Position valve with mark on top and secure with valve retaining nut (15).
- g. Install valve handle (14) with pointer indicating OFF and secure by tightening setscrew (13) in valve handle side.

5-5.4. Pump Control Valve Replacement.5-5.4.1. Removal.**NOTE**

**This valve is a ball valve with only open or closed positions. If not already so position valve handle in OFF position.**

- a. Holding valve handle securely, remove nut (18) securing handle (19) and remove handle.

**NOTE**

**For ease of reconnection, tag or mark hoses in relation to valve in OFF position before disconnection.**

- b. Holding connection points securely, disconnect hoses leading to or away from valve(20).
- c. Remove four nuts (21), washers (22), screws (23), washers (24) and two brackets (25) holding valve.
- d. Holding valve (20) securely, remove two elbows (26). Retain for reuse.
- e. Discard valve.

5-5.4.2. Installation.

- a. Inspect replacement valve visually for defects. Do not use if defective.
- b. If not so, position valve handle (19) at right angle to valve body. Position valve with handle up and mark valve top in some manner.
- c. Holding valve handle securely, remove nut (18) and remove valve handle (19).
- d. Wrap male threads with one layer of antiseize tape (item 3, Section II, Appendix F) and install elbows (26) removed in d., above.

**NOTE**

**Mark on valve should be at top.**

- e. Position valve with shaft through panel opening and mark on top.
- f. For each side of valve, install bracket (25) two screws (23) (through control panel and bracket), and secure with washer (22) and nut (21). Do not tighten until both brackets have been installed.
- g. Reconnect hoses leading to or away from valve. Follow marking scheme used in disconnection.
- h. Install valve handle (19) with long portion up and secure with nut (18).

**NOTE**

**The following procedure to be used only for control panel gauges secured with screws.**

5-5.5. Outlet or Inlet Pressure Gauge Replacement. (Refer to Figure 5-4, sheet 2)

5-5.5.1. Removal.

- a. Remove three screws (27) holding gauge flange to control panel. Retain for reuse.
- b. Pull gauge (28) from mounting hole and holding elbow (29) unscrew gauge.

5-5.5.2. Installation.

- a. Inspect replacement gauge for defects. If defective, do not use.
- b. Clean any remaining antiseize tape from mounting stem (29). Wrap thread with one layer of antiseize tape (item 3, Section II, Appendix F).
- c. Screw gauge (28) stem into elbow (29) making sure gauge will face outward.
- d. Position gauge in mounting hole on control panel, align mounting holes and install three screws (27).



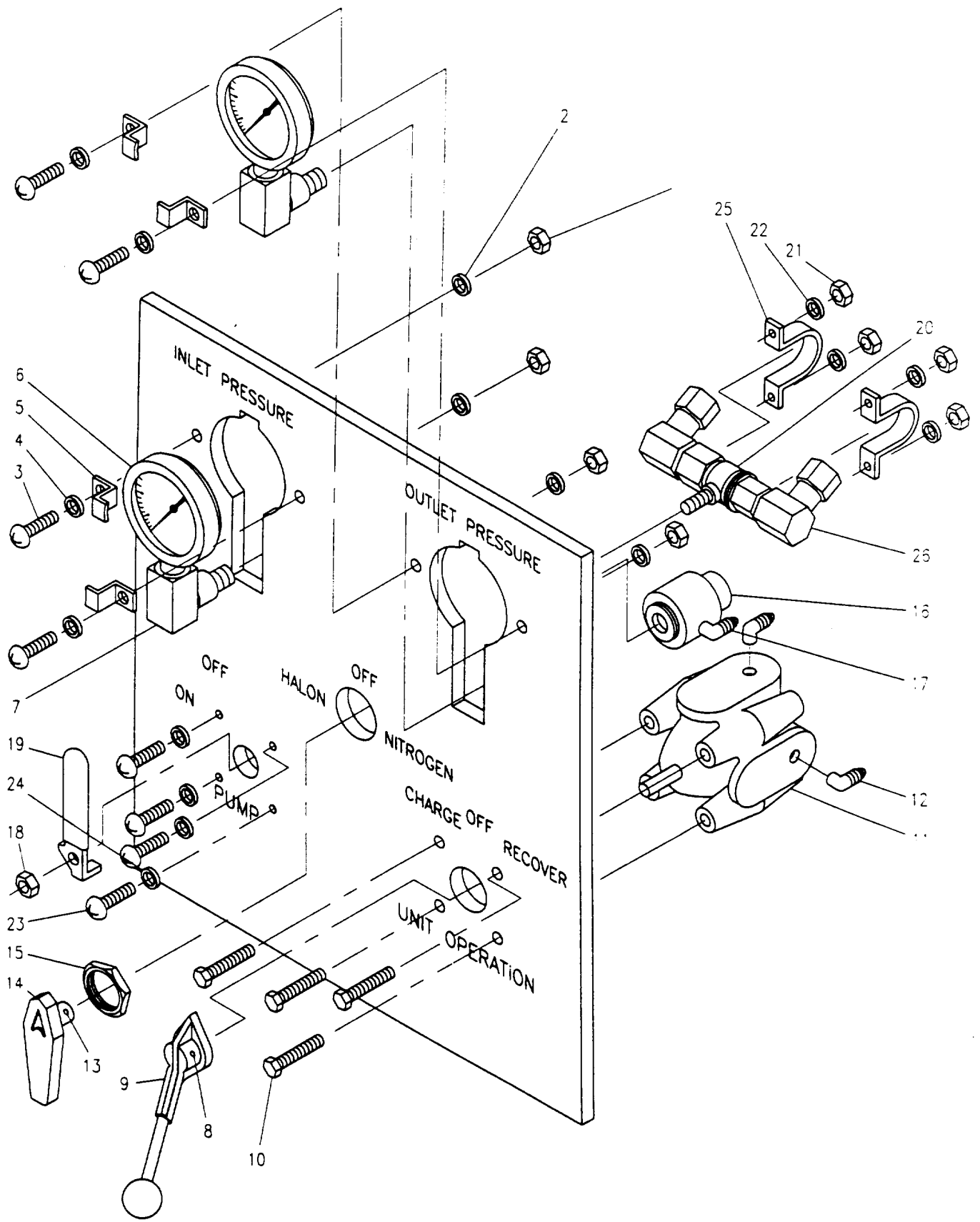


Figure 5-4. Control Panel Repair (Sheet 1)

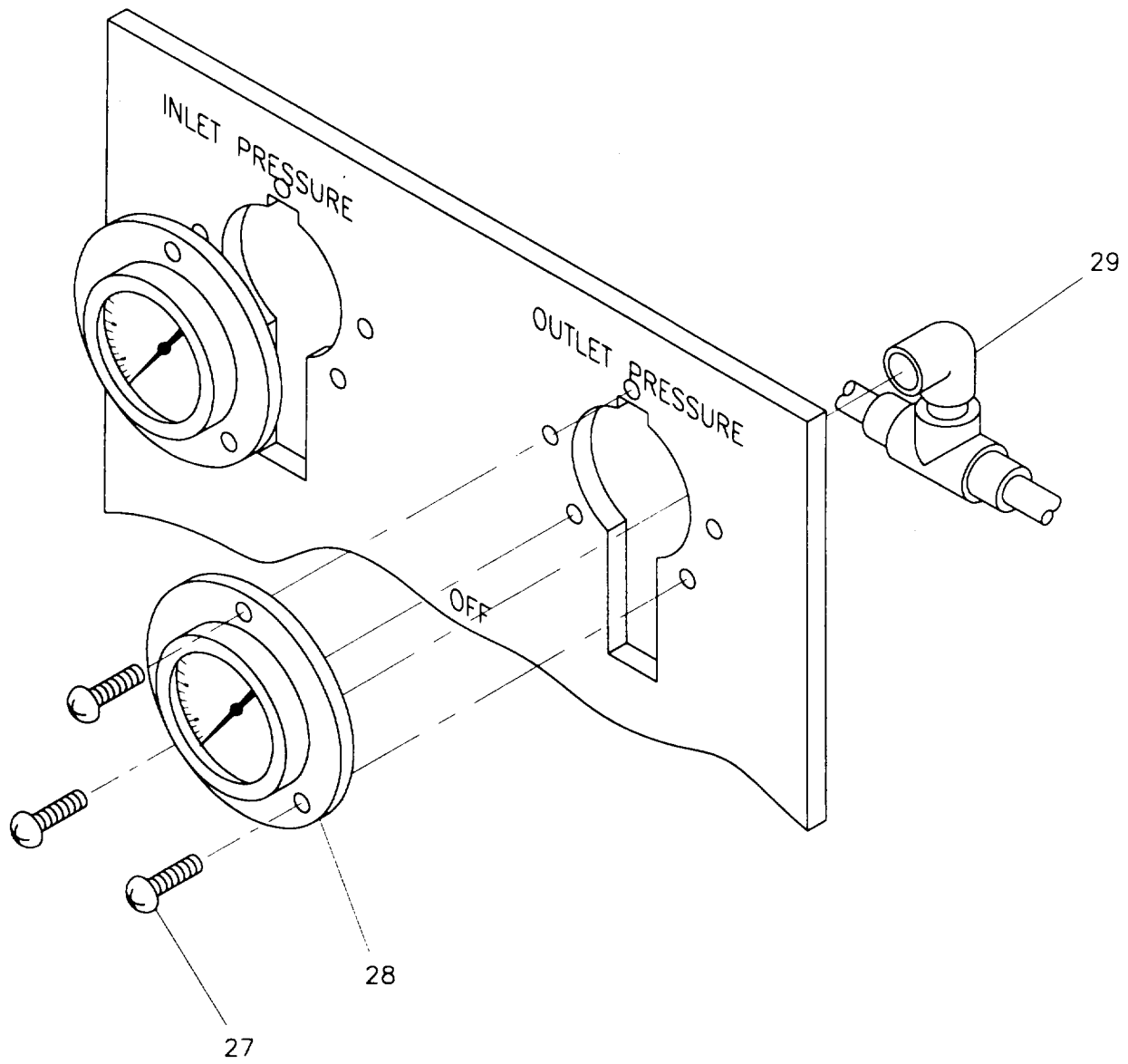


Figure 5-4 Control Panel Repair (Sheet 2)

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5-6. CONTROL PANEL ASSEMBLY REPLACEMENT. (Refer to Figure 5-5)

---

This task covers:      a. Removal                      b. Installation

---

INITIAL SETUP

Equipment Condition

Tools

Reference

General Mechanics Tool Box, Item 1, Section III, Appendix B.

Cover removed from Recovery / Recharger Unit; paragraph 2-6.1

Materials/Parts

Self-locking nuts

---

**NOTE**

**Refer to paragraph 5-5 for instructions on Control panel component removal and installation.**

5-6.1. Control Panel Removal.

- a. Following instructions in paragraph 5-5, release all gauges and valves from control panel. Hoses will have to be disconnected from gauges but not valves.

**NOTE**

**Exercise caution when removing last two screws. Control panel may swing and/or drop.**

- b. When all gauges and valves have been freed from control panel, remove eight screws (1) and washers (2) holding control panel (3) to frame.
- c. Set panel aside for disposal.

5-6.2. Control Panel Installation.

- a. Check replacement panel visually for defects. Do not use if defective.
- b. Position control panel (3) and install washer (2) and screw (1) through control panel (3) and into two upper mounting holes. Do not tighten.
- c. Install remaining six washers (2) and screws (1) and tighten all eight.
- d. Following installation instructions in paragraph 5-5, reinstall and reconnect all gauges and valves.

5-6.3. Support Frame Removal.

**NOTE**

**If support frame and panel are both to be replaced, follow procedures in paragraph 5-6.1 .a. If only frame is to be removed, follow steps a and b.**

- a. Remove three nuts (4), washers (5), and bolts (6) in face of support frame. Discard nuts.
- b. Remove two nuts (7), washers (8), and bolts (9) securing top of support frame to angle braces (one brace each side). Discard nuts.
- c. Approximately one-third up on the angled portion of the support frame, remove two nuts (10), washers (11), and bolts (12) that secure brace to support frame (one brace each side).
- d. Remove support frame (13) and set aside.

5-6.4. Support Frame Installation.

- a. Check replacement frame visually for defects. Do not use if defective.
- b. Position frame (13) making certain angle braces fit on outside of frame at top and braces fit on inside of frame and bottom of frame is on outside of base assembly.
- c. Install two bolts (6), washers (5), and nuts (4) in support frame and base frame connection and one bolt (6), washer (5), and nut (4) in support frame and scale frame connection.
- d. Install two bolts (9), washers (8), and nuts (7) to secure top of support frame to angle braces (one brace each side).
- e. Install two bolts (12), washers (11), and nuts (10) to secure the braces running from the angle braces to the support frame (one brace each side).
- f. If panel was installed as part of frame, follow component installation instructions in paragraph 5-5.
- g. If panel to be installed, follow instructions in paragraph 5-6.2.
- h. Check system for leaks when installation complete.

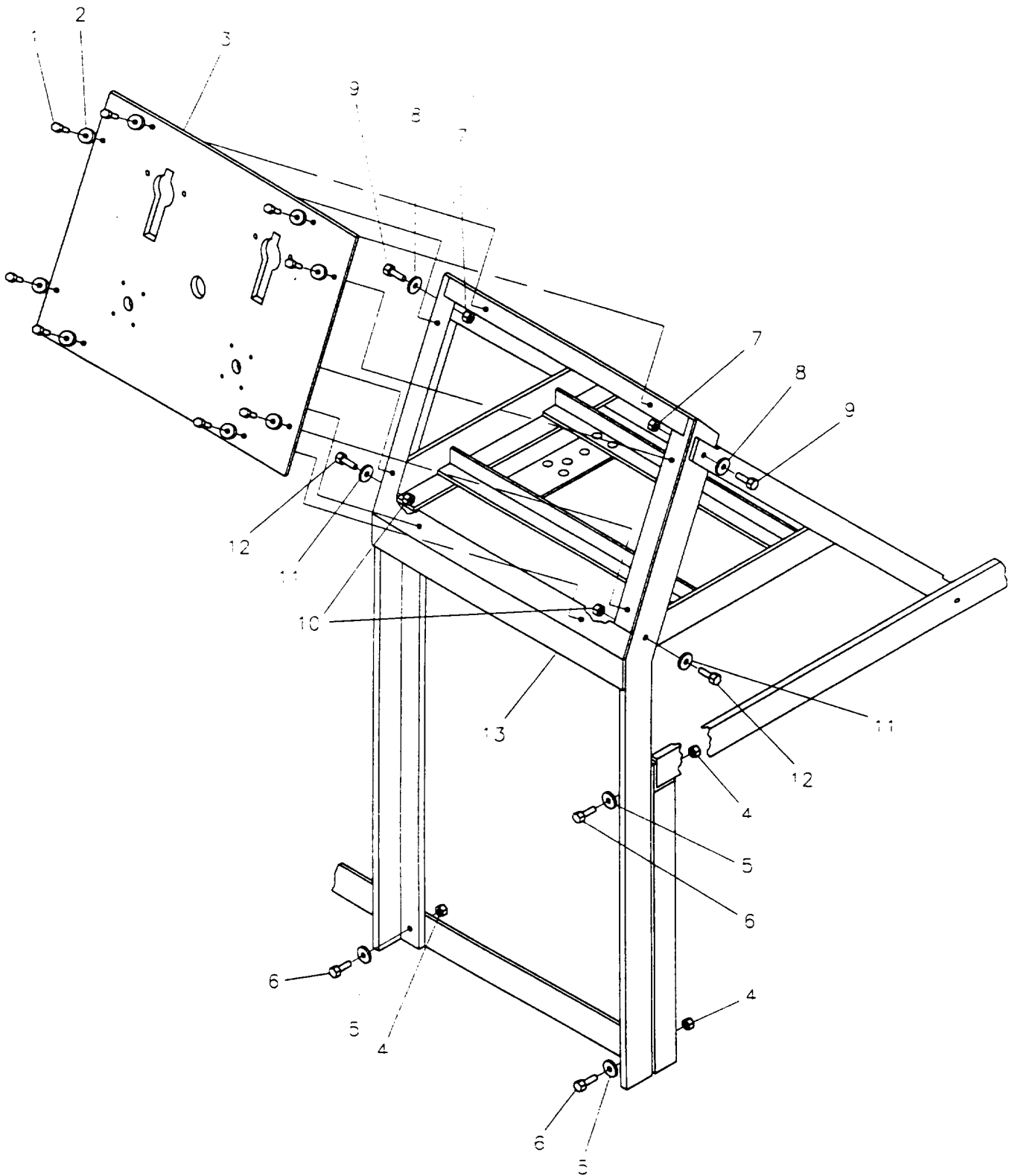


Figure 5-5. Control Panel Assembly Replacement

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5-7. NITROGEN PRESSURE REGULATOR REPAIR. (Refer to Figure 5-6)

---

This task covers:      a. Removal                      b. Installation

---

INITIAL SETUP

Equipment Condition

Tools

Reference

General Mechanics Tool Box,  
Item 1, Section III, Appendix B.

Cover removed from Recovery / Recharger  
Unit; paragraph 2-6.1

Materials/Parts

Self-locking nuts

---

**NOTE**

**Pressure regulator repair is limited to selected items as noted.**

5-7.1. Inlet or Outlet Pressure Gauge Replacement.

5-7.1.1. Removal.

- a. Hold regulator body (1) securely and unscrew inlet pressure gauge (2) or outlet pressure gauge (3) from body. Inlet pressure gauge (3) will have a screen (4) in mounting hole. Remove screen and check for contamination.
- b. If contaminated wash out with solvent (item 8, Section II, Appendix F) and dry thoroughly.
- c. Discard damaged gauge.

5-7.1.2. Installation

- a. Check replacement gauge visually for defects. Do not use if defective.
- b. Check mounting hole in body for clean threads. Clean as necessary
- c. For inlet pressure gauge (2) install screen (4) in hole and install inlet pressure gauge (2). (When tight make sure gauge face is toward adjusting screw).
- d. For outlet pressure gauge (3) install and tighten. (When tight make sure gauge face is toward adjusting screw).

5-7.2. Retaining Ring, Inlet Nut or Inlet Stem Assembly Replacement.

5-7.2.1. Removal.

- a. Unscrew stem (5), nut (6) and retaining ring (7 ) from body (1).
- b. Remove retaining ring (7) from stem (5).
- c. Slide nut (6) off stem (5).

- d. Discard part to be replaced.

5-7.2.2. Installation.

- a. Inspect replacement part visually for defects. Do not use if defective.
- b. Place nut (6) on stem (5) with threads toward rounded end of stem
- c. Place retaining ring (7) on stem.
- d. Screw assembly into body (1) and tighten being careful not to mar the stem area where nut slides over.

5-7.3. Outlet Hose Connection Replacement.

5-7.3.1. Removal.

- a. Hold body (1) securely and unscrew connecting elbow (10) from tee (9).
- b. Remove any remaining antiseize tape from tee.

5-7.3.2. Installation.

- a. Inspect replacement nipple visually for defects. Do not use if defective.
- b. Wrap male threads with one layer of antiseize tape (item 3, Section II, Appendix F), install elbow (10) in mounting hole and tighten.

5-7.4. Safety Relief Valve.

5-7.4.1. Removal.

- a. Hold tee (8) securely and unscrew safety relief valve (9).
- b. Clean mounting hole at any remaining antiseize tape.

5-7.4.2. Installation.

- a. Inspect new safety relief valve for defects. Do not use if defective.
- b. Wrap male threads with one layer of antiseize tape (item 3, Section II, Appendix F), install safety relief valve and tighten.

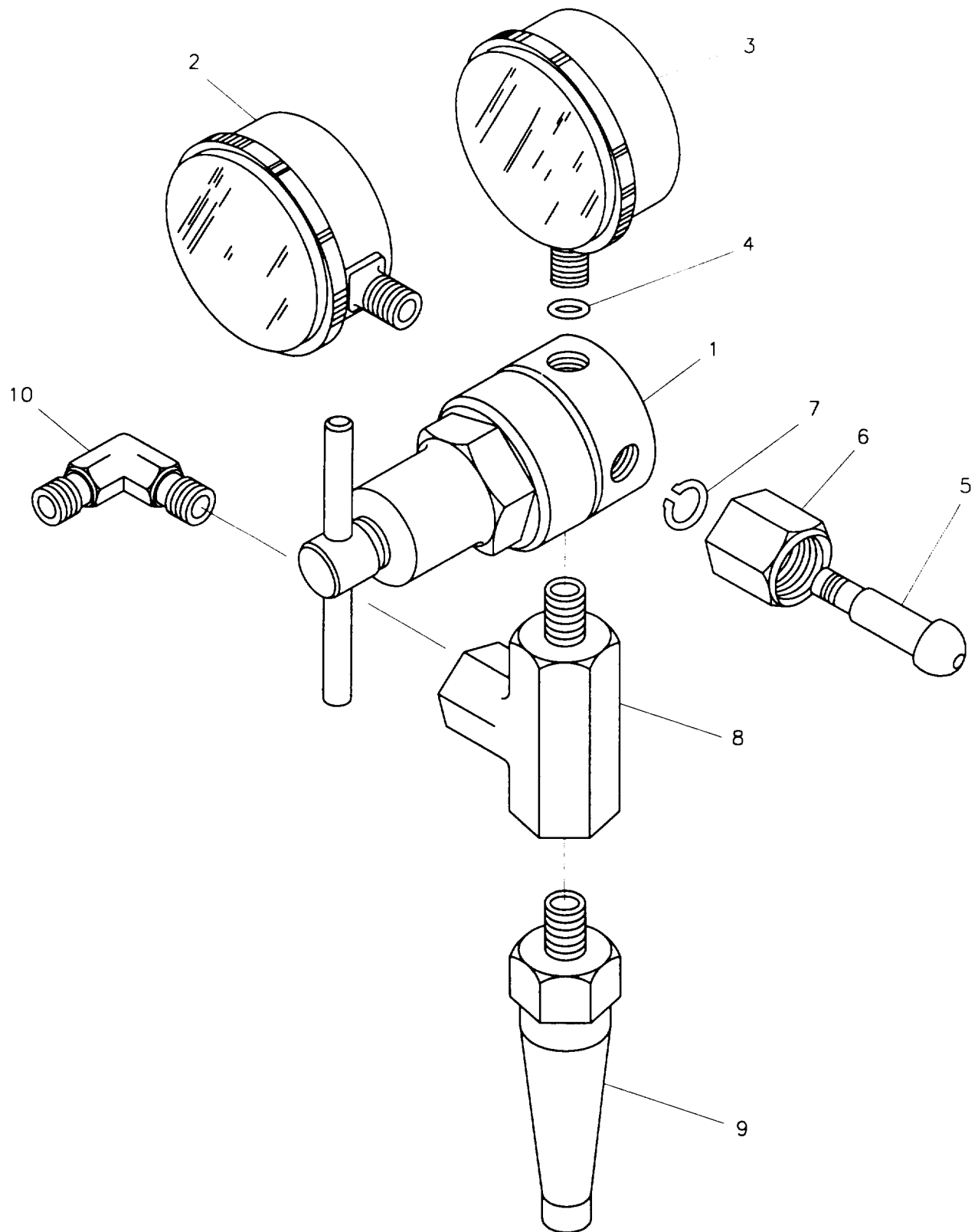


Figure 5-6. Pressure Regulator Repair



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5-8. TRANSFER PUMP UNIT REPLACEMENT (Refer to Figure 5-7)

---

This task covers:      a. Removal                      b. Installation

---

INITIAL SET UP

Equipment Conditions

Tools

Reference

Transfer Pump Unit

Recovery / Recharger Unit cover removed; paragraph 2-6.1

Recovery / Recharger Unit disconnected from air supply; paragraph 2-7.

Materials/Parts

Transfer Pump Unit

---

5-8.1. Removal.

**NOTE**

**For ease of installation, tag or mark hoses before disconnection. Refer to Figure 5-7, sheet 1 for steps a through d.**

- a. Disconnect transfer pump unit inlet (1) and outlet (2) hoses.
- b. Disconnect air motor air inlet hose (3).
- c. Remove 4 nuts (4), washers (5), bolts (6) and washers (7) securing mounting bracket (8) to base. Retain for reuse.
- d. Lift assembly out of base assembly and place for mounting bracket removal.
- e. Remove six nuts (9), bolts (10), and washers (11) securing transfer pump unit assembly to mounting bracket (8).
- f. Lift transfer pump unit assembly off mounting bracket (8) and place for further disassembly.

**NOTE**

**For ease of installation, make note of plumbing configuration before removal.**

- g. Remove all plumbing from transfer pump unit by first removing all tubing (12); second remove stage valve elbow (13); third remove stage valve (14); and fourth all remaining elbows and tees (15) (assemblies may be unscrewed at pump inlet and outlet check valves). Retain for reuse.
- h. Remove air motor air inlet fitting (16). Retain for reuse.

5-8.2. Installation.

- a. Check replacement pump visually for defects. Do not use if defective.

**NOTE**

**Refer to notes on plumbing configuration made during removal.**

- b. Install plumbing for unit by first installing all elbow and tee assemblies (15); second installing stage valve (14); third installing stage valve elbow (13); and fourth connecting all tubing (12).
- c. Install air inlet fitting (16).
- d. Position pump on mounting bracket (8) and align mounting holes.
- e. Install and tighten six washers (11), bolts (10), and nuts (9) to secure transfer pump unit to mounting bracket.
- f. Install pump mounting bracket assembly in position with air motor at rear and align mounting holes.
- g. Install four washers (7), bolts (6), washers (5), and nuts (4) and tighten.

**NOTE**

**Refer to hose tagging or marking for correct reconnection.**

**NOTE**

**When connecting transfer pump unit inlet/outlet hoses and motor air inlet hose, insure threads are clean of any old antiseize tape.**

- h. Wrap one layer of antiseize tape (item 3, Section II, Appendix F) around male threads of inlet and outlet hose adaptors. Also wrap one layer around male threads of air inlet hose adapter.
- i. Connect transfer pump unit inlet (1) and outlet (2) hoses.
- j. Connect air motor air inlet hose (3).

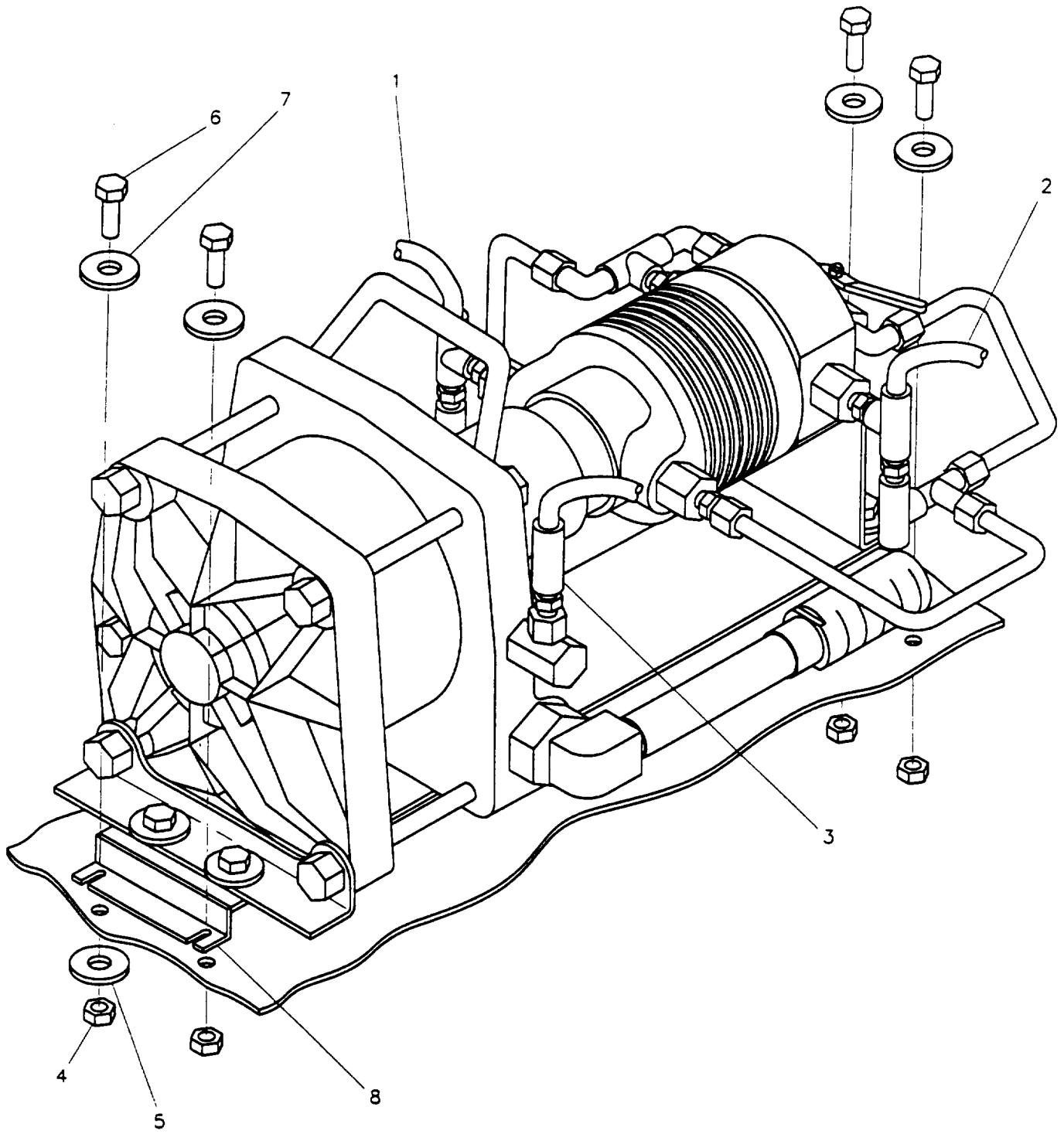


Figure 5-7. Transfer Pump Unit Replacement (Sheet 1)

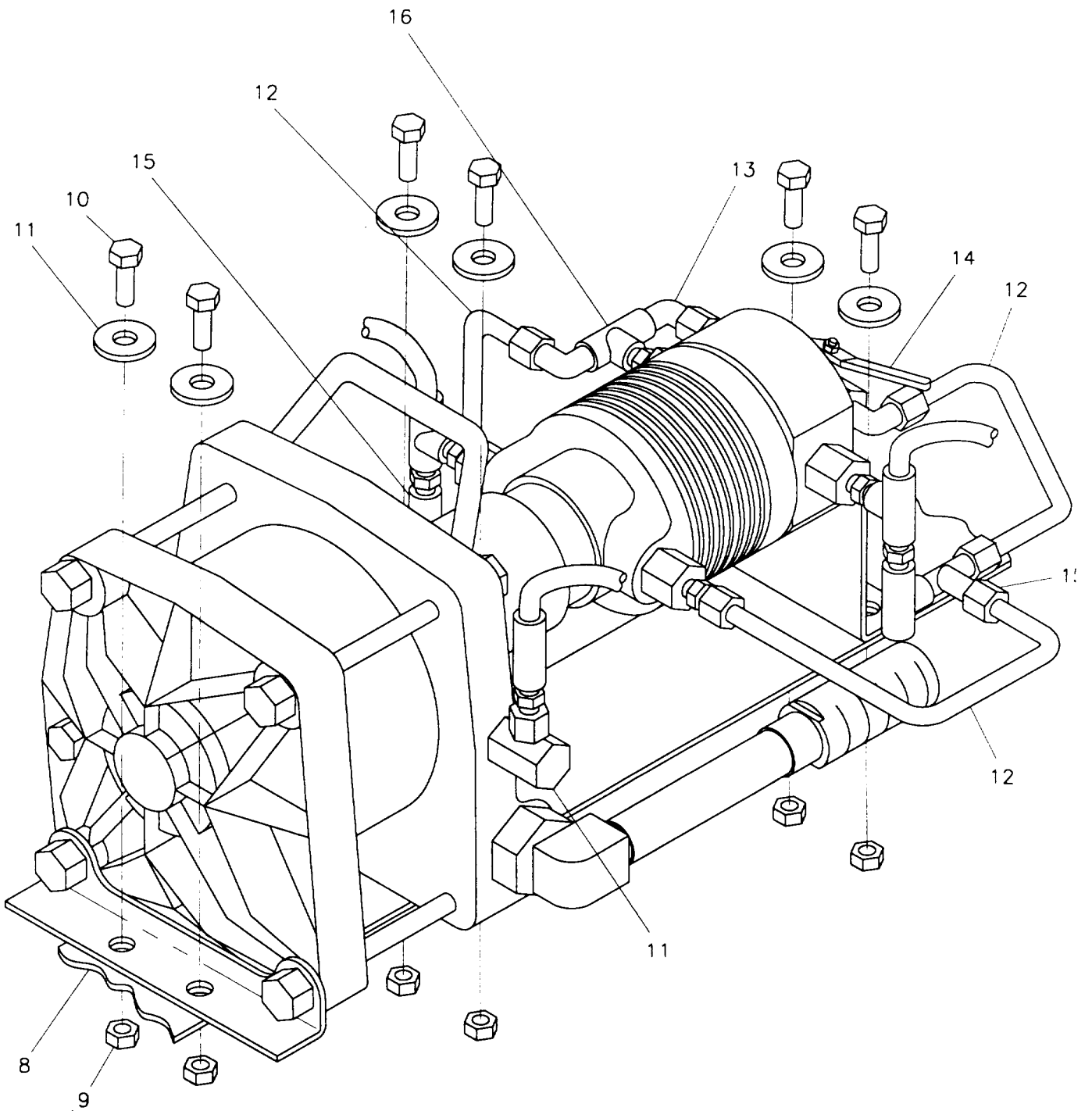


Figure 5-7 Transfer Pump Unit Replacement (Sheet 2)

---

5-9. TRANSFER PUMP UNIT REPAIR. (Refer to Figure 5-8)

---

This task covers:      a. Test                              b. Removal                              c. Installation

---

INITIAL SETUP

Equipment Condition

Tools

Reference

Tool Kit, General Mechanics  
(Item 1, Section III, Appendix B)

Transfer pump unit removed from the  
Recovery / Recharger Unit; paragraph 5-8.1

Materials/Parts

Antiseize tape (item 3, Section II, Appendix F)  
Self-locking nuts  
Seal kit

---

5-9.1. Test.

- a. Remove 1/8' pipe plug (1) in upper end cap (2).
- b. Install 0-160 psi pressure gauge where pipe plug was removed.
- c. Apply air pressure to air drive by turning pump control valve handle on control panel clockwise to ON position.
- d. Gauge will immediately rise from zero and stabilize at drive pressure for correct pilot valve operation.
- e. Zero gauge reading indicates lower pilot valve (16) has not been actuated.
- f. Full gauge reading indicates upper pilot valve (15) has not been actuated.
- g. A slow rise in pressure indicates leakage in lower pilot valve or o-ring on inside end of spool (6) or o-ring on inside end of sleeve (8)
- h. A slow decrease in pressure indicates upper pilot valve (15) is faulty and repair is necessary.
- i. Upon completion of test, turn pump control valve handle on control panel counterclockwise to OFF position and disconnect air inlet line.
- j. Upon completion of test remove gauge, wrap pipe plug (1) with one layer of antiseize tape (item 3, Section II, Appendix F) and install in upper end cap (2).

5-9.2. Air Valve Repair. (Refer to Figure 5-8)

5-9.2.1. Removal.

- a. Unscrew muffler and pipe assembly (3) from elbow and retainer nut assembly (4).
- b. Unscrew elbow and retainer nut assembly (4) from body (5).
- c. Insert special tool P/N 28584 (item 4, Section III, Appendix B) into first row of holes in spool (6).

- d. Pull spool straight out.
- e. Remove and replace eight o-rings (7) on spool exterior.
- f. Insert special tool P/N 28584 (item 4, Section III, Appendix B) in second row of holes in sleeve (8).
- g. Pull sleeve straight out. (Use screwdriver to pry if necessary).
- h. Insert special tool P/N 28584 (item 4, Section III, Appendix B) bumper hook through bumper (9) and pulls straight out.
- i. Remove and replace four o-rings (10) on sleeve (8) exterior and one o-ring (10) on retainer nut and elbow assembly (4) exterior. Retainer nut o-ring same as sleeve o-rings.
- j. Replace bumper (9).

5-9.2.2. Installation.

- a. Lubricate o-rings lightly with Haskel silicon lubricant (part of seals kit).
- b. Apply liberal coating of lubricant to rubber side of bumper (9) and stick to end of sleeve (8).
- c. Push bumper-sleeve unit all the way into bore in one smooth quick movement.
- d. Install spool (6)
- e. Install retainer and elbow assembly (4).
- f. Install muffler and pipe assembly (3).

5-9.3. Pilot System Repair.

**NOTE**

**The following steps check the pilot system portion of the air drive.**

- a. Remove hexagonal o-ring sealed plug (11).
- b. Remove spring (12) and using special tool, P/N 28584 (item 4, Section III, Appendix B) remove pilot stem (13). Slant tool into hole after spring removed and pull up.
- c. Inspect pilot stem and seat for foreign material. Replace stem if bent or scratched or molded seat is damaged.

**NOTE**

**Unless excessive leakage occurs, it is not advisable to replace the o-ring seal from the shank of the stem. This requires disassembly of the air section.**

- d. If removed stem satisfactory, reuse. If not, obtain new stem.
- e. Install by inserting stem (1 3) carefully in a centered and vertical position to pass through o-ring in upper cap.
- f. Install spring (12).
- g. Replace o-ring (14) (P/N 568906-9, part of seals kit P/N 16772) and install plug (11).

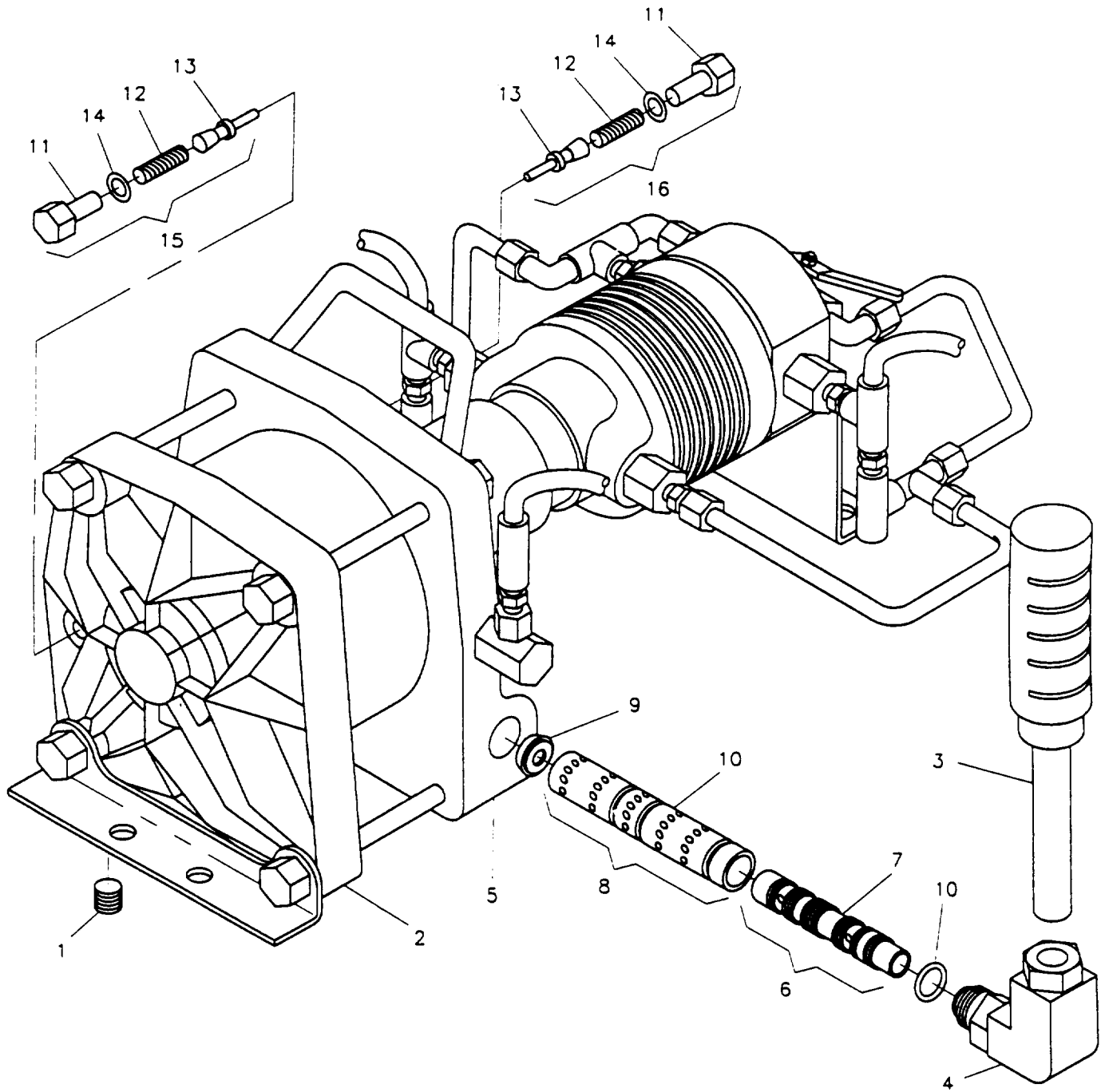


Figure 5-8. Transfer Pump Unit Repair



**5-10. BASE ASSEMBLY REPAIR. (Refer to Figure 5-8)**

This task covers: a. Removal b. Installation

INITIAL SET UP

Equipment Conditions

Tools

Tool Kit, General Mechanics  
(Item 1, Section III Appendix B)

Reference

Recovery / Recharger Unit cover removed; paragraph 2-6.1

Recovery / Recharger Unit disconnected from air supply; paragraph 2-7.

Scale frame assembly removed, paragraph 5-3

Tilt rack assembly removed, paragraph 4-16

Control panel removed, paragraph 5-6

Tool box removed, paragraph 4-24

Hoist assembly removed, paragraph 4-9

Transfer pump unit removed, paragraph 5-8

Materials/Parts

As required

5-10.1 Removal.

**NOTE**

**Repair of the base assembly is limited to welding of cracks and replacement of angle components.**

- a. To repair by welding, the decision requiring piece part removal or welding in place will have to be made at the time of repair.
- b. Normal process of drilling a hole at end of crack to stop propagation and then welding will be followed.

**NOTE**

**The following steps are typical for removal and replacement of angle pieces.**

- c. Remove nuts (1), washers (2), bolts (3) and washers (4) securing the angle piece to be replaced.
- d. Remove angle piece and replace defective angle piece..

5-10.2 Installation.

**NOTE**

**The following steps assume that replacement angle identified previously has been obtained.**

- a. Position replacement angle and match drill mounting/securing holes.
- b. Install and tighten previously removed washers (4), bolts (3), washers (2), and nuts (1).

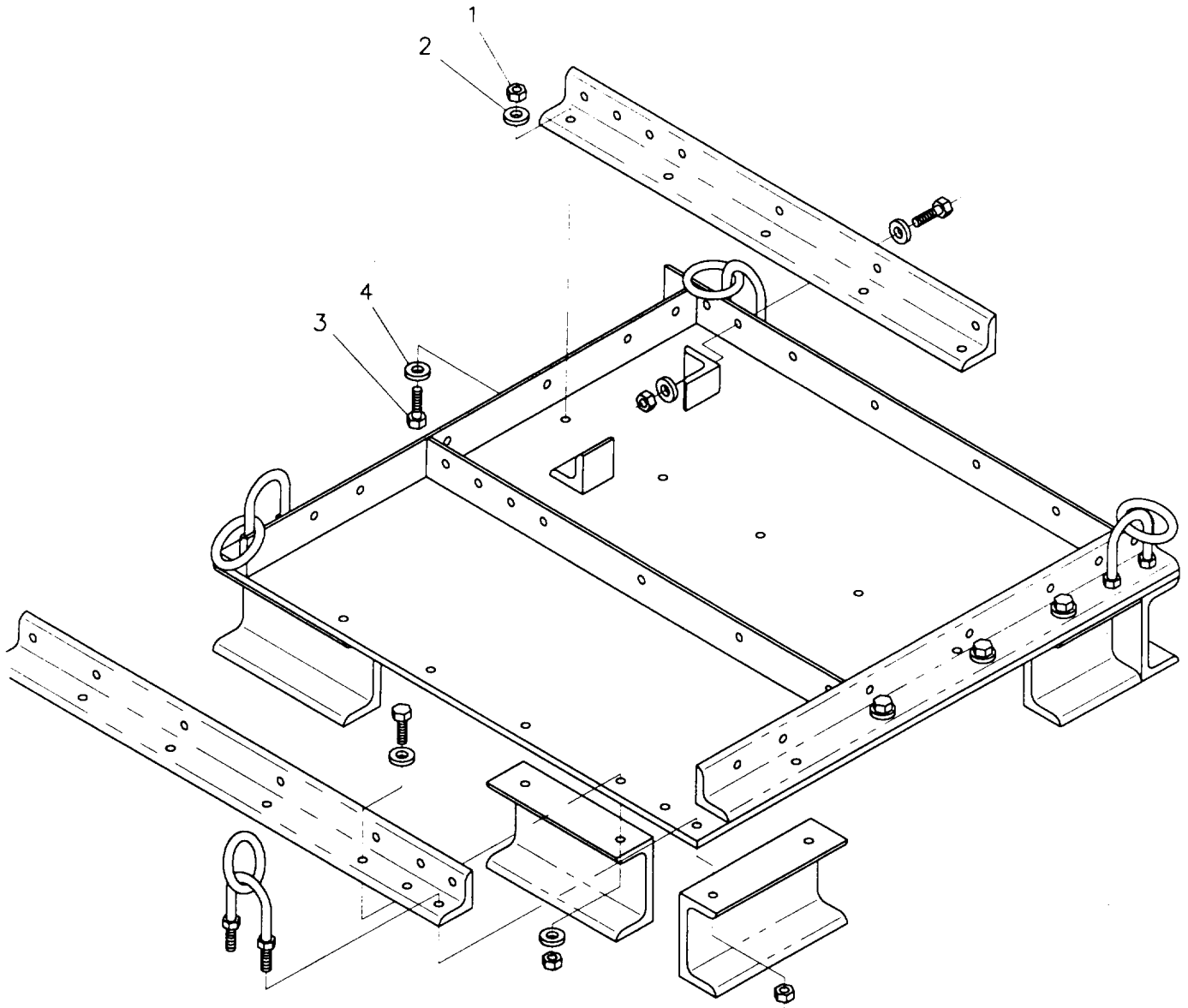


Figure 5-9. Base Assembly Repair

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 5-11 SCALE ASSEMBLY REPAIR. (Refer to Figure 5-10)
 

---

 This task covers:      a. Removal                      b. Installation
 

---

INITIAL SETUPEquipment ConditionToolsReference

Tool Kit, General Mechanics  
(Item 1, Section III Appendix B)

Scale removed from Recovery / Recharger  
Unit; paragraph 4-13.1

Materials/Parts

As required

---

5-11.1 Dial Chart Cover Replacement.5-11.1.1 Removal.**NOTE**

**Before beginning this procedure, be sure there is no load on platform and scale is zeroed.**

- a. Remove three screws ( 1 ) from scroll ( 2 ).
- b. Gently pry scroll loose and remove both scroll and dial chart cover ( 3 ).
- c. Discard cover.

5-11.1.2 Installation.

- a. Inspect replacement cover visually for defects. Do not use if defective.
- b. Insert cover into scroll (2)
- c. Mount assembly to dial housing assembly being sure to align screw hole in scroll and housing assembly.
- d. Install and tighten three screws ( 1 ) to secure scroll to housing assembly.

5-11.2 Tare Device Assembly Replacement.5-11.2.1 Removal.**NOTE**

**Before beginning this procedure, be sure there is no load on platform and scale is zeroed.**

- a. Remove three screws (4) from dial housing back plate ( 5 ).
- b. Unscrew tare knob (6) and remove.

**NOTE**

**Keep slight tension on springs (7) until installation is complete to avoid having them unhook inside the scale column assembly**

- c. Unhook two springs (7) from tare device (8) assembly arms.
- d. Discard tare device assembly.

**5-11.2.2 Installation.**

- a. Inspect replacement components visually for defects. Do not use if defective.
- b. Unscrew tare knob (6) but leave spring on threaded rod.
- c. Hook springs (7) to tare assembly device arms (fingers to back of scale).
- d. Holding tare assembly device by center, position threaded rod with spring through hole in housing and install tare knob (6) to secure.
- e. Adjust tare knob (6) until scale zeros.
- f. Install back plate and secure with three screws (4).

**5-11.3 Leveling Device Replacement.****5-11.3.1 Removal.**

- a. Remove two screws (9) holding leveling device ( 10) to column.
- b. Discard leveling device.

**5-11.3.2 Installation.**

- a. Inspect replacement leveling device visually for defects. Do not use if defective.
- b. Position leveling device (10) on column and secure with two screws (9).

**5-11.4 Dial Indicator Assembly Replacement.****5-11.4.1 Removal.**

- a. Refer to paragraph 5-11.1.1 and perform steps a and b.
- b. Grasp bottom of indicator assembly (11 ) to prevent movement and loosen and remove indicator assembly lock nut (12).
- c. Grasp indicator assembly (11) near center and pull gently until indicator assembly slips off mounting pinion (13)
- d. Discard indicator assembly.

5-11.4.2 Installation.

- a. Inspect replacement item visually for defects. Do not use if defective.
- b. Grasp new indicator assembly (11) near center and place on mounting pinion (13) making sure indicator points at zero mark.
- c. Grasp indicator assembly (11) at the bottom and install and tighten the indicator locking nut (12).
- d. Refer to paragraph 5-11.1.2 and perform steps b, c and d.

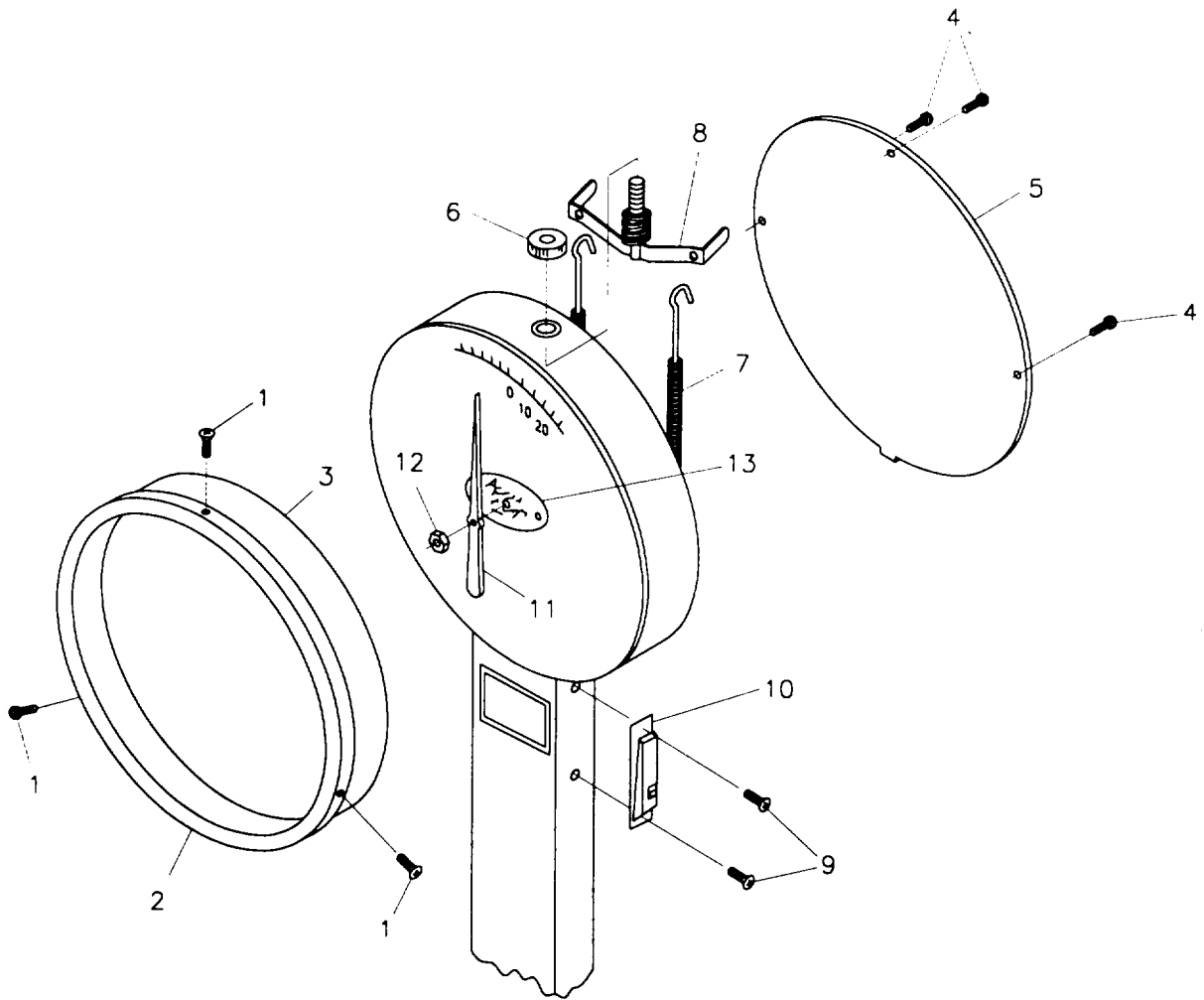


Figure 5-10. Scale Assembly Repair

5-35/(5-36 BLANK)

APPENDIX A

REFERENCES

A.1 SCOPE.

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A.2 FORMS AND RECORDS.

|   |                |
|---|----------------|
| Recommended Changes to Publications and Blank Forms .....     | DA Form 2028   |
| Recommended Changes to Equipment Technical Publications ..... | DA Form 2028-2 |
| Equipment Inspection and Maintenance Worksheet .....          | DA Form 2404   |
| The Army Maintenance Management System (TAMMS) .....          | DA Pam 738-750 |
| Report of Deficiency .....                                    | SF 364         |
| Product Quality Deficiency Report .....                       | SF 368         |

A.3 FIELD MANUALS.

|                              |          |
|------------------------------|----------|
| First Aid for Soldiers ..... | FM 21-11 |
|------------------------------|----------|

A.4 TECHNICAL MANUALS AND BULLETINS.

|   |                    |
|---|--------------------|
| Recovery / Recharger Unit, Fire Extinguisher Monobromotrifluoromethane .....  | TM 5-4210-218-13&P |
| Preservation, Packaging, and Packing of Military Supplies and Equipment ..... | TM 38-230-1        |
| Administrative Storage .....  | TM 740-90-1        |
| Destruction of Army Materiel to Prevent Enemy Use .....                       | TM 750-244-3       |

A.5 MILITARY STANDARDS.

|  |                |
|--|----------------|
| Abbreviations for Use on Drawings, Standards, Specifications & Technical Documents ..... | MIL-STD-12     |
| Marking for Shipment and Storage .....   | MIL-STD-129    |
| DOD Materiel Procedures for Development & Application of Packaging Requirements .....    | MIL-STD-2073-1 |
| Packaging Requirement Codes .....  | MIL-STD-2073-2 |

A.6 MISCELLANEOUS.

|   |             |
|---|-------------|
| Army Logistics Readiness & Sustainability .....   | AR 700-138  |
| Army Materiel Maintenance Policy and Retail Maintenance Operations .....                      | AR 750-1    |
| Expendable/Durable Items (Except Medical, Class V, Repair Parts, and<br>Heraldic items) ..... | CTA 50-970  |
| Compressors, Reciprocating and Rotary Gasoline Engine .....                                   | MIL-C-52980 |
| Tape, Anti-seize .....  | MIL-T-27730 |
| Cylinder, Compressed Gas .....  | RR-C-901/1  |



**APPENDIX B****MAINTENANCE ALLOCATION CHART****SECTION I. INTRODUCTION****B-1 THE ARMY MAINTENANCE SYSTEM MAC.**

B. 1.1 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-1.2 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 on the MAC in column (4) as:

Unit - includes two subcolumns, C (operator/crew) and O (unit) maintenance.

Direct Support - includes an F subcolumn.

B-1.3 Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

B-1.4 Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

**B-2 Maintenance Functions.** Maintenance functions are limited to and defined as follows:

B-2.1 **Inspect.** To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

B-2.2 **Test.** To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item/end item and comparing those characteristics with prescribed standards.

B-2.3 **Service.** Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component and the work measurement time required to perform the functions by the designated maintenance level. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

- c. Section III lists the special tools and test equipment required for each maintenance function.

## B-2. EXPLANATION OF COLUMN IN SECTION II.

a. Column (1). Group Number. A number is assigned to each group in a top down breakdown sequence. The applicable groups are listed on the MAC in disassembly sequence beginning with the first group removed.

b. Column (2). Component Assembly. This column contains a brief description of the components of each numerical group.

c. Column (3). Maintenance Function. This column lists the various maintenance functions (A through K). The lowest maintenance level authorized to perform these functions is indicated by a symbol in the appropriate column. Work measurement time standards (the active repair time required to perform the maintenance function) are shown directly below the symbol identifying the maintenance level. The symbol designations for the various maintenance levels are as follows:

- C - Operator or crew
- O - Organizational maintenance
- F - Direct support maintenance

The maintenance functions are defined as follows:

(1) Inspect. To determine serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

(2) Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

(3) Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

(4) Adjust. To maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

(5) Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

(6) 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.

(7) Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

(8) Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

(9) Repair. The application of maintenance services or other maintenance actions to 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.

(10) Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in

appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return to like new condition.

(11) **Rebuild.** Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

B-3. EXPLANATION OF COLUMNS IN SECTION III.

a. Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Maintenance Category. This column shows the lowest level of maintenance authorized to use the special tools or test equipment.

c. Nomenclature. This column lists the manufacturer's code and part number, or Federal Stock Number (FSN) of tools and test equipment.

B-4. EXPLANATION OF COLUMNS IN SECTION IV.

a. Reference Code. The code recorded in the MAC, Section II, Column 6.

b. Remarks. This column lists information pertinent to the maintenance authorized to use the special tools or test equipment.

c. Nomenclature. This column lists the name or identification of the tools or test equipment.

d. Tool Number. This column lists the manufacturer's code and part number, or Federal Stock Number (FSN) of tools and test equipment.

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT ASSEMBLY                       | (3)<br>MAINTENANCE<br>FUNCTION                       | (4)<br>MAINTENANCE LEVEL |            |            |   |   | (5)<br>TOOLS AND<br>EQUIPMENT | (6)<br>REMARKS |
|------------------------|---|--|--------------------------|------------|------------|---|---|-------------------------------|----------------|
|                        |   |  | C                        | O          | F          | H | D |                               |                |
| 00                     | Recovery / Recharger<br>Unit, Fire Extinguisher |  |                          |            |            |   |   |                               |                |
| 01                     | Hoist Winch Assembly                            | Inspect<br>Install<br>Replace<br>Repair              | 0.2                      | 0.5<br>0.5 | 0.4        |   |   | A<br>C                        |                |
| 0101                   | Winch Assembly<br>Repair                        | Replace  |                          | 0.6<br>0.5 |            |   |   |                               |                |
| 0102                   | Pulley Assembly<br>Repair                       | Replace  |                          | 0.5<br>0.4 |            |   |   |                               |                |
| 02                     | Scale Assembly                                  | Inspect<br>Install<br>Replace<br>Repair<br>Calibrate | 0.2                      | 0.3<br>0.3 | 0.5<br>x   |   |   | A<br>C<br><br>F               |                |
| 0201                   | Temperature Gauge                               | Replace  |                          | 0.2        |            |   |   |                               |                |
| 03                     | Scale Frame Assembly                            | Inspect<br>Repair                                    | 0.1                      |            | 0.5        |   |   | A                             |                |
| 0301                   | Agitator Bracket                                | Inspect<br>Replace                                   | 0.1                      | 0.5        |            |   |   | A                             |                |
| 04                     | Tilt Rack Assembly                              | Inspect<br>Replace<br>Repair                         | 0.1                      | 0.4<br>0.5 |            |   |   | A                             |                |
| 0401                   | Tie Down  | Inspect<br>Replace                                   | 0.1                      | 0.2        |            |   |   | A                             |                |
| 05                     | Control Panel Assembly                          | Inspect<br>Replace<br>Repair                         | 0.2                      |            | 0.5<br>0.5 |   |   | A                             |                |
| 0501                   | Valve Assemblies                                | Replace  |                          |            | 0.5        |   |   |                               |                |
| 0502                   | Gauges  | Replace<br>Calibrate                                 |                          |            | 0.5<br>x   |   |   | F                             |                |
| 0503                   | Halon Hose Adapter<br>Assembly w/Gauge          | Inspect<br>Repair                                    | 0.1                      | 0.5        |            |   |   | A                             |                |
| 0504                   | Extinguisher Hose Adapter<br>Assemblies         | Inspect<br>Repair                                    | 0.1                      | 0.5        |            |   |   | A                             |                |
| <b>B-4</b>             |   |  |                          |            |            |   |   |                               |                |

| (1)<br>GROUP<br>NUMBER | (2)<br>COMPONENT ASSEMBLY                                      | (3)<br>MAINTENANCE<br>FUNCTION            | (4)<br>MAINTENANCE LEVEL |            |                   |   |   | (5)<br>TOOLS AND<br>EQUIPMENT        | (6)<br>REMARKS |
|------------------------|--|---|--------------------------|------------|-------------------|---|---|--------------------------------------|----------------|
|                        |  |   | C                        | O          | F                 | H | D |                                      |                |
| 0505                   | Hose Assemblies  | Inspect<br>Replace                        | 0.1                      | 0.5        |                   |   |   |                                      | A              |
| 0506                   | Nitrogen Pressure<br>Regulator Assembly                        | Inspect<br>Replace<br>Repair<br>Calibrate | 0.1                      | 0.4        | 1.5<br>x          |   |   | 2<br>1,2                             | A<br><br>F     |
| 06                     | Transfer Pump Unit   | Inspect<br>Test<br>Replace<br>Repair      | 0.1                      |            | 0.5<br>2.0<br>1.5 |   |   | 1,2,7,8<br>1,2,3<br>1,2,3,4<br>5,7,8 | A              |
| 0601                   | Air Regulator and Filter                                       | Inspect<br>Service<br>Replace             | 0.1                      | 0.2<br>0.4 |                   |   |   | 1,6<br>1,2                           | A              |
| 07                     | Tool Box   | Inspect<br>Replace                        | 0.1                      | 0.3        |                   |   |   | 1,2                                  | A              |
| 08                     | Base Assembly  | Inspect<br>Repair                         | 0.1                      |            | 0.4               |   |   | 1,2,3                                | A              |
| 0801                   | U-Bolts  | Replace                                   |                          | 0.2        |                   |   |   | 1                                    |                |
| 0802                   | Ring Sling   | Replace                                   |                          | 0.2        |                   |   |   | 1                                    |                |
| 09                     | Cover  | Inspect<br>Replace                        | 0.1<br>0.2               |            |                   |   |   | 1                                    |                |
| 10                     | Cylinder, Compressed<br>Gas; (Halon, Nitrogen and<br>Recovery) | Inspect<br>Replace                        | 0.1<br>0.5               |            |                   |   |   | 2,3                                  |                |
|                        |  | <b>B-5</b>                                |                          |            |                   |   |   |                                      |                |

**SECTION III. TOOLS AND TEST EQUIPMENT  
FOR  
RECOVERY / RECHARGER UNIT, FIRE EXTINGUISHER  
MONOBROMOTRIFLUOROMETHANE**

| TOOL OR TEST EQUIPMENT REF CODE | MAINTENANCE CATEGORY | NOMENCLATURE                 | NATIONAL/NATO STOCK NUMBER | TOOL NUMBER              |
|---------------------------------|----------------------|------------------------------|----------------------------|--------------------------|
| 1                               | O,F                  | TOOL KIT, GENERAL MECHANIC'S | 5180-00-177-7033           | SC5180-90-CL-N26 (50980) |
| 2                               | C,O,F                | WRENCH, ADJUSTABLE 8W        | 5120-00-449-8083           | (15073) 5385A 14         |
| 3                               | C,O,F                | WRENCH ADJUSTABLE 12'        | 5120-00-423-6728           | (72368) AC115            |
| 4                               | F                    | TOOL, SPOOL                  |                            | (81400) 28584            |
| 5                               | F                    | WRENCH, TORQUE               | 5120-00-242-3264           | (58506) A-A-241 1        |
| 6                               | O                    | WRENCH, PIPE                 | 5120-00-262-8491           | (19207) 5576345          |
| 7                               | F                    | KEY SET, SOCKET HEAD         | 5120-00-595-9244           | (55719) AWIIK            |
| 8                               | F                    | GAUGE, 0-160 PSI             |                            | (56198) 2016-208F        |

**SECTION IV. REMARKS**

| REFERENCE CODE | REMARKS   |
|----------------|---|
| A              | PERFORMED AS PART OF OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) |
| B              | PERFORMED AS PART OF PREPERATION FOR OPERATION PROCEDURE                        |
| C              | PERFORMED AS PART OF SERVICE UPON RECEIPT                                       |
| D              | PERFORMED AS PART OF UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)     |
| E              | GAS CYLINDERS ARE ADDITIONAL AUTHORIZED ITEMS                                   |
| F              | CALIBRATED BY CALIBRATION LABORATORY  |

**B-7/(B-8 BLANK)**

## APPENDIX C

UNIT AND DIRECT SUPPORT  
REPAIR PARTS AND SPECIAL TOOLS LIST

## SECTION I. INTRODUCTION

C-1. SCOPE.

This RPSTL lists and authorizes spares and repair parts; special tools; Test, Measurement, and Diagnostic Equipment (TMDE); and other special support equipment required for performance of organizational, direct support, and general support maintenance of the Recovery / Recharger Unit. It authorizes the requisitioning, issue, and disposition of spares, repair parts and special tools as indicated by the Source, Maintenance and Recoverability (SMR) codes.

C-2. GENERAL.

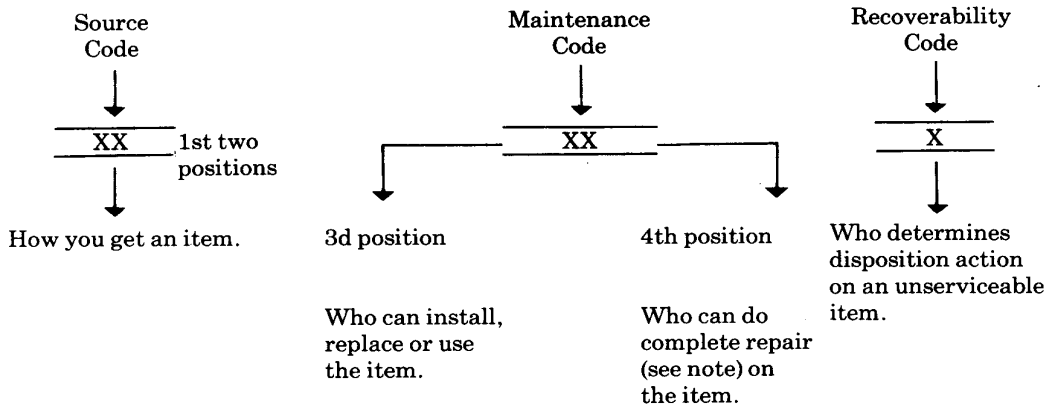
In addition to Section I, Introduction, this Repair Parts and Special Tools List is divided into the following sections:

- a. Section II - Repair Parts List. A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. The lists also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed by item name in FIG BULK at the end of the section. Repair parts kits or sets are listed separately in their own functional group within Section II. Repair parts for repairable special tools are also listed in the section.
- b. Section III - Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in DESCRIPTION AND USABLE ON CODE (UOC) column) for the performance of maintenance.
- c. Section IV - Cross-reference Indexes. A list, in National Item Identification Number (NIIN) sequence, of all national stock numbered items appearing in the listings, followed by a list of alphanumeric sequence of all part numbers appearing in the listing. National stock numbers and part numbers are cross-referenced for each illustration figure and item number appearance. The figure and item number index lists figure and item number in alphanumeric sequence and cross-references NSN, CAGEC and part number.

C-3. EXPLANATION OF COLUMNS (SECTIONS II AND III).

- a. ITEM NO. (Column (2)). The Source, Maintenance, and Recoverability (SMR) code is a 5-position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instruction, as shown in the following breakout:





\*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

(1) Source Code. The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follows:

| Code  | Explanation  |
|---|--|
| <ul style="list-style-type: none"> <li>PA</li> <li>PB</li> <li>PC **</li> <li>PD</li> <li>PE</li> <li>PF</li> <li>PG</li> </ul>   | <p>Stocked items; use the applicable NSN to request/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3d position of the SMR code.</p> <p>**NOTE: Items coded PC are subject to deterioration.</p>   |
| <ul style="list-style-type: none"> <li>KD</li> <li>KF</li> <li>KB</li> </ul>  | <p>Items with these codes are not be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance category indicated in the 3d position of the SMR code. The complete kit must be requisitioned and applied.</p>  |
| <ul style="list-style-type: none"> <li>MO—Made at org/<br/>AVUM category</li> <li>MF—Made at DS/<br/>AVUM category</li> <li>MH—Made at GS<br/>category</li> <li>ML—Made at<br/>Specialized<br/>Repair Activity<br/>(SRA)</li> <li>MD—Made at Depot</li> </ul> | <p>Items with these codes are not to be requested/requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the Bulk Material group of the repair parts list in this RPSTL. If the item is authorized to you by the 3d position code of the SMR code, but the source code indicates it is made t a higher level, order the item from the higher level of maintenance.</p> |

| Code  | Explanation   |
|---|---|
| <ul style="list-style-type: none"> <li>AO —Assembled by<br/>org/AVUM<br/>category</li> <li>AF —Assembled by<br/>DS/AVUM<br/>category</li> <li>AH —Assembled by<br/>GS category</li> <li>AL —Assembled by<br/>SRA</li> <li>AD —Assembled by<br/>Depot</li> </ul> | <p>Items with these codes are not to be requested/requisitioned individually. The parts that makeup the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3d position code of the SMR code authorizes you to replace the item, but the source code indicates the items is assembled at a higher level, order the item from the higher level of maintenance.</p> |

- XA - Do not requisition an "XA"-coded item. Order its next higher assembly. (Also, refer to the NOTE below.)
- XB - If an "XB" item is not available from salvage, order it using the CAGEC and part number given.
- XC - Installation drawing, diagram, instruction sheet, field service channels using the CAGEC and part number given. If no NSN is available.

NOTE: Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted by requirements of AR 700-42.

(2) Maintenance Code. Maintenance codes tells you the level(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the SMR Code as follows:

(a) The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to one of the following levels of maintenance.

| Code | Application/Explanation  |
|------|--|
| C    | -Crew or operator maintenance done within organizational or aviation unit maintenance. |
| O    | -Organizational or aviation unit category can remove, replace, and use the item.       |
| F    | -Direct support or aviation intermediate level can remove, replace, and use the item.  |
| H    | -General support level can remove, replace, and use the item.                          |
| L    | -Specialized repair activity can remove, replace, and use the item.                    |
| D    | -Depot level can remove, replace, and use the item.                                    |

(b) The maintenance code entered in the fourth position tells whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (i.e., perform all authorized repair functions.) (NOTE: Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.) This position will contain one of the following maintenance codes.

| Code | Application/Explanation   |
|------|---|
| O    | -Organizational or (aviation unit) is the lowest level that can do complete repair of the item.                                       |
| F    | -Direct support or aviation intermediate is the lowest level that can do complete repair of the item.                                 |
| H    | -General support is the lowest level that can do complete repair of the item.   |
| L    | -Specialized repair activity (designate the specialized repair activity) is the lowest level that can do complete repair of the item. |

- D -Depot is the lowest level that can do complete repair of the item.
- Z -Nonreparable. No repair is authorized.
- B -No repair is authorized. (No parts or special tools are authorized for the maintenance of a "B" - coded item). However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

(3) Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the SMR Code as follows:

| Recoverability Codes | Application/Explanation   |
|----------------------|---|
| Z                    | -Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3d position of SMR Code. |
| O                    | -Reparable item. When uneconomically repairable, condemn and dispose of the item at organizational or aviation unit level.            |

| Recoverability Codes | Application/Explanation  |
|----------------------|--|
| F                    | -Reparable item. When uneconomically repairable, condemn and dispose of the item at the direct support or aviation intermediate level.   |
| H                    | -Reparable item. When uneconomically repairable, condemn and dispose of the item at the general support level.   |
| D                    | -Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.   |
| L                    | -Reparable item. Condemnation and disposal not authorized below specialized repair activity (SRA).   |
| A                    | -Item requires special handling or condemnation procedures because of specific reasons (e.g., precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions. |

- b. CAGEC (Column (3)). The Commercial and Government Entity Code (CAGEC) is a 5-digit numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.
- c. PART NUMBER (Column 4). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

**NOTE**

**When you use a NSN to requisition an item, the item you receive may have a different part number from the part ordered.**

- d. DESCRIPTION AND USABLE ON CODE (UOC) (Column 5). This column includes the following information:
    - (1) The Federal item name, and when required, a minimum description to identify the item.
    - (2) The physical security classification of the item is indicated by the parenthetical entry (insert applicable physical security classification abbreviation, e.g., Phy Sec C1 (C) -Confidential, Phy Sec CI (S) -Secret, Phy Sec C1 (T) Top Secret).
    - (3) Items that are included in kits and sets are listed below the name of the kit or set.
    - (4) Spare/repair parts that make up an assembled item are listed immediately following the assembly item line entry.
    - (5) Part numbers for bulk materials are referenced in this column in the line item entry for the item to be manufactured/fabricated.
    - (6) When the item is not used with all serial numbers of the same model, the effective serial numbers are shown on the last line(s) of the description (before UOC).
    - (7) The usable on code, when applicable (see paragraph 5, Special Information).
    - (8) In the Special Tools List section, the Basis of Issue (BOI) appears as the last line(s) in the entry for each special tool, special TMDE, and other special support equipment. When density of equipment supported exceeds density spread indicated in the basis of issue, the total authorization is increased proportionately.
    - (9) The statement 'END OF FIGURE' appears just below the last item description in column 5 for a given figure in both Section II and Section III.
  - e. QTY (Column (6)). The OTY (quantity per figure column) indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that the quantity is variable and the quantity may vary from application to application.
- C-4. Explanation of Columns (Section IV).
- a. NATIONAL STOCK NUMBER (NSN) INDEX.

- (1) STOCK NUMBER column. This column lists the NSN by National Item Identification Number (NIIN) sequence. The NSN consists of the last nine digits of the NSN (i.e., NSN . When using this column to locate an item, ignore the first 4 digits of the 5305-01-674-1467 NIIN NSN. However, the complete NSN should be used when ordering item's by stock number.
- (2) FIG. column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in Section II and Section III.
- (3) ITEM column. This item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

b. PART NUMBER INDEX. Part numbers in this index are listed by part number in ascending alphanumeric sequence (i.e., vertical arrangement of letter and number combination which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order.

- (1) CAGEC column. The Commercial and Government Entity Code (CAGEC) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.
- (2) PART NUMBER column. Indicates the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the items by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.
- (3) STOCK NUMBER column. This column lists the NSN for the associated part number and manufacturer identified in the PART NUMBER and CAGEC columns to the left.
- (4) FIG. column. This column lists the number of the figure where the item is identified/located in Section II
- (5) ITEM column. This item number is that number assigned to the item as appears in the figure referenced in the adjacent figure number column.

c. FIGURE AND ITEM NUMBER INDEX.

- (1) FIG. column. This column lists the number of the figure where the item is identified/located in Section II and Section III.
- (2) ITEM column. This item number is that number assigned to the item as appears in the figure referenced in the adjacent figure number column.
- (3) STOCK NUMBER column. This column lists the NSN for the item.
- (4) CAGEC column. The Commercial and Government Entity Code (CAGEC) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.
- (5) PART NUMBER column. Indicates the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the items by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

C-5. Special Information. Use the following subparagraphs as applicable:

a. USABLE ON CODE. The usable on code appears in the lower left corner of the description column heading. Usable on codes are shown as "UOC: ..." in the Description column (justified left) on the first line applicable item description/nomenclature. Uncoded items are applicable to all models. Identification of the usable on codes used in the RPSTL are:

| <u>Code</u> | <u>Used On</u>                    |
|-------------|-----------------------------------|
| PAA         | Model M114 (These codes and model |
| PAB         | Model M114A numbers are examples  |
| PAC         | Model M114B only.)                |

b. FABRICATION INSTRUCTIONS. Bulk materials required to manufacture items are listed in the Bulk Material Functional Group of this RPSTL. Part numbers for bulk materials are also referenced in the description column of the line item entry for the item to be manufactured/fabricated.

c. ASSEMBLY INSTRUCTION. Items that make up the assembly are listed immediately following the assembly item entry or reference is made to an applicable figure.

d. KITS. Line item entries for repair parts kits appear in a group in Section III (see table of contents).

e. INDEX NUMBERS. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the National Stock Number/Part Number Index and the bulk material list in Section II.

f. ILLUSTRATIONS - LISTING. The illustrations in this RPSTL are identical to those published in (enter the higher levels of maintenance manual(s), e.g., -34P, -40P). Only those parts codes 'C' or 'O' in the third position of the SMR Code are listed in the tabular listing; therefore, there may be a break in the item number sequence. Only illustrations containing organizational or aviation unit authorized items appear in this RPSTL.

**NOTE**

**The above statements shall appear in organizational or aviation unit level RPSTL's only.**

C-6. How to Locate Repair Parts.

a. When National Stock Number or Part Number is Not Known.

(1) First. Using the table of contents, determine the assembly group or subassembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and listings are divided into the same groups.

(2) Second. Find the figure covering the assembly group or subassembly group to which the item belongs.

(3) Third. Identify the item on the figure and use the Figure and Item Number Index to find the NSN.

- b. When National Stock Number or Part Number is known:
- (1) First. Using the National Stock Number of the Part Number Index, find the pertinent National Stock Number or Part Number. The NSN index is the National Item Identification Number (NIIN) sequence (see 4.1(1)). The part numbers in the Part Number index are listed in ascending alphanumeric sequence (see 4.b). Both indexes cross-reference you to the illustration/figure and item number of the item you are looking for.
  - (2) Second. Turn to the figure and item number, verify that the item is the one you're looking for, then locate the item number in the repair parts list for the figure.

## APPENDIX D

COMPONENTS OF END ITEM (COEI)  
AND  
BASIC ISSUE ITEMS (BII) LISTS

## SECTION I. INTRODUCTION

D-1. SCOPE.

This appendix lists components of the end item and basic issue items for the Recovery / Recharger Unit to help you inventory the items for safe and efficient operation of the equipment.

D-2. GENERAL.

The Components of End Item (COEI) and Basic Issue Items (BII) Lists are divided into the following sections:

D-2.1 Section II. Components of End Item. This listing is for information purposes only, and is not authority to requisition replacements. These items are part of the Recovery / Recharger Unit. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

D-2.2 Section III. Basic Issue Items. These essential items are required to place the Recovery / Recharger Unit in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the Recovery / Recharger Unit during operation and when it is transferred between property accounts. This list is your authority to request / requisition them for replacement based on authorization of the end item by the TOE / MTOE. Illustrations are furnished to help you find and identify the items.

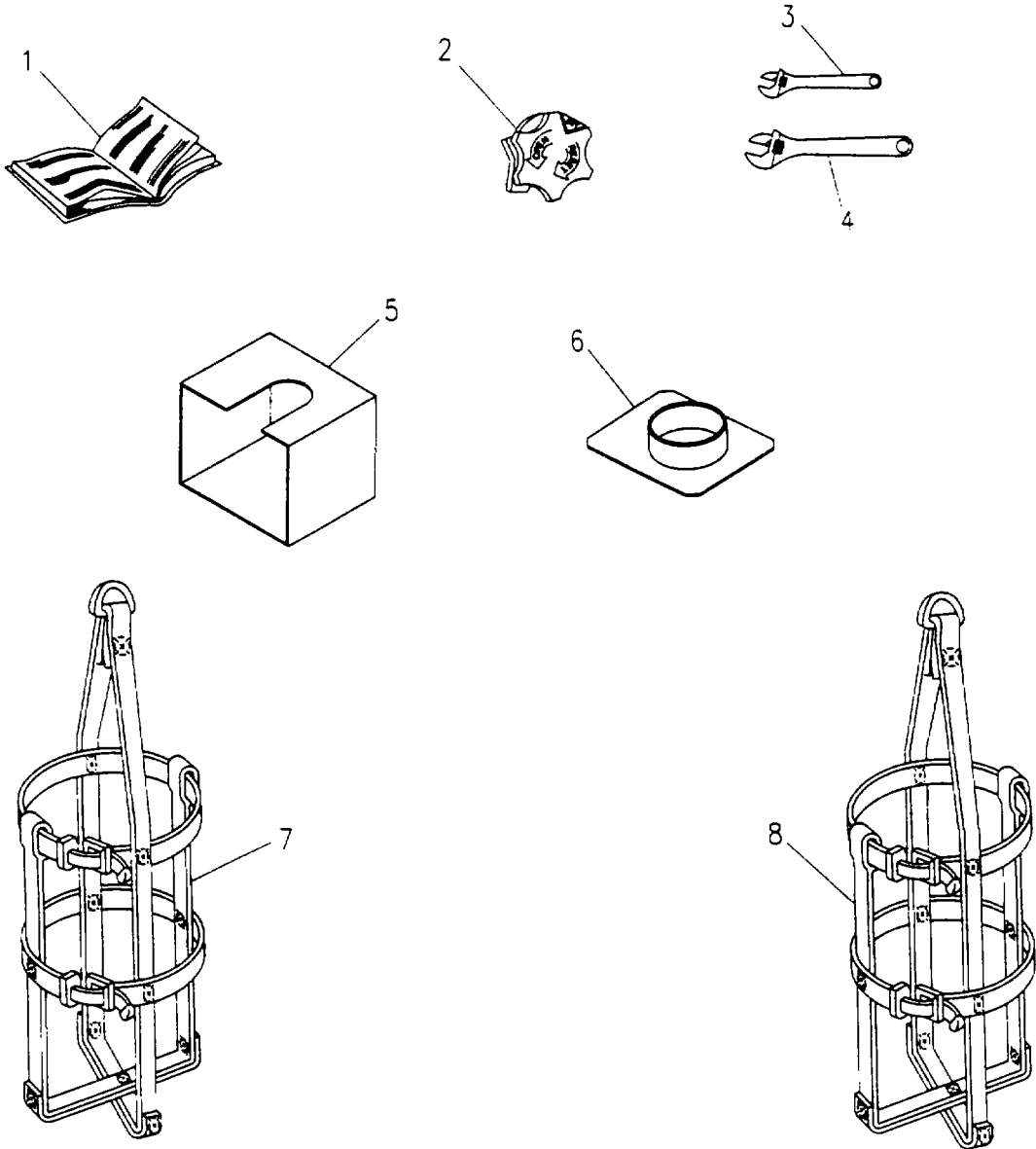
D-2.3 Explanation of Columns. The columns contain data to assist in identifying the items for the two lists as follows:

- a. Column (1), Illustration Number gives you the number of the item illustrated.
- b. Column (2), National Stock Number, identifies the stock number of the item to be used for requisitioning purposes.
- c. Column (3), Description and Usable On Code, identifies the federal item name followed by a minimum description when needed. The last line below the description is the Commercial and Government Entity Code (CAGEC) and the part number.



SECTION II. COMPONENTS OF END ITEM

NO COMPONENTS OF END ITEM ARE IDENTIFIED



## SECTION III. BASIC ISSUE ITEMS

| (1)<br>ILLUS<br>NUMBER | (2)<br>NATIONAL<br>STOCK<br>NUMBER | (3)<br>DESCRIPTION,<br>CAGEC and Part Number   | (4)<br>Usable<br>On Code<br>U/M | (5)<br>QTY<br>Req'd |
|------------------------|------------------------------------|--|---------------------------------|---------------------|
| 1                      |                                    | TM 5-4210-218-13&P   | EA                              | 1                   |
| 2                      | 4210-01-125-4294                   | Valve, Fire Extinguisher<br>(Safety Control Valve)<br>(19207)12307556                      | EA                              | 1                   |
| 3                      | 5120-00-449-8083                   | Wrench, Adjustable 8' EA 1<br>(81348) A-A-2344   |                                 |                     |
| 4                      | 5120-00-423-6728                   | Wrench, adjustable 12' EA 1<br>(81348) A-A-2344  |                                 |                     |
| 5                      |                                    | Bracket, Extinguisher Support<br>(19207)12463588   | EA                              | 1                   |
| 6                      |                                    | Base, Extinguisher Support<br>(19207)12463589  | EA                              | 1                   |
| 7                      |                                    | Sling, Lifting Cylinder<br>Compressed Gas, 12.28"<br>Nominal Diameter<br>(97403)13229E6725 | EA                              | 1                   |
| 8                      |                                    | Sling, Lifting Cylinder<br>Compressed Gas, 9.12"<br>Nominal Diameter<br>(97403)13229E6726  | EA                              | 1                   |
| <b>D-3(D4 BLANK)</b>   |                                    |  |                                 |                     |

**APPENDIX E**

**ADDITIONAL AUTHORIZATION LIST**

**SECTION 1. INTRODUCTION**

E-1. SCOPE.

This appendix lists additional items you are authorized for the support of the Recovery / Recharger, Fire Extinguisher.

E-2. GENERAL.

This list identifies items that do not have to accompany the Recovery / Recharger, Fire Extinguisher and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

E-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 his equipment.

SECTION II. ADDITIONAL AUTHORIZATION LIST

| (1)<br>National Stock<br>Number | (2)<br>Description<br>CAGEC And Part Number Usable On Code | (3)<br>U/M | (4)<br>QTY<br>AUTH |
|---------------------------------|--|------------|--------------------|
| 6830-01-122-2652                | Cylinder, Nitrogen   | EA         | 1                  |
| 6830-00-104-2654                | Cylinder, Halon (Monobromotrifluoron)                      | EA         | 1                  |
| 4940-01-014-6037                | Detector, Leak, (16734) TIF 5000                           | EA         | 1                  |
| 8120-01-371-0533                | Cylinder, Compressed Gas (For Recovery)                    | EA         | 1                  |
| 4240-00-542-2048                | Face Shield (81348) A-A-1770                               | EA         | 1                  |
|                                 | Compressor, Air 15 CFM at 175 PSI (81349) MIL-C-52980      | EA         | 1                  |
|                                 | E-2  |            |                    |

## APPENDIX F

## EXPENDABLE AND DURABLE ITEMS LIST

## SECTION I. INTRODUCTION

F.1 SCOPE.

This appendix lists expendable and durable items you will need to maintain the M1 tank hull. 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 items (except Medical, Class V, Repair Parts, and Heraldic Items).

F.2 EXPLANATION OF COLUMNS.

F.2.1 Column (1) - Item number. This number is assigned to the entry in the listing for referencing when required.

F.2.2 Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew  
0 - Unit Maintenance  
F - Direct Support Maintenance  
H - General Support Maintenance

F.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.

F.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) parentheses followed by the part number.

F.2.5 Column (5) Unit of Measure (UM)/Unit of Issue (UI). 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 as shown in the Army Master Data File (AMDF) requisition the lowest unit of issue that will satisfy your requirements.

**SECTION II. EXPENDABLE/DURABLE SUPPLIES AND REQUIREMENTS LIST**

| (1)<br>ITEM<br>NUMBER | (2)<br>LEVEL | (3)<br>NATIONAL STOCK<br>NUMBER | (4)<br>ITEM NAME, DESCRIPTION<br>CAGEC, PART NUMBER | (5)<br>UM/UI |
|-----------------------|--------------|---------------------------------|---|--------------|
| 1                     | C            | 6615-00-137-6345                | EAR PLUGS   | EA           |
| 2                     | C            | 8415-00-634-4658                | GLOVES<br>(81348) JJ-G-451                          | EA           |
| 3                     | F            | 8030-00-889-3535                | TAPE, ANTISEIZE (TEFLON)                            | RL           |
| 4                     | C            |                                 | WASHER, NIPPLE SEALING<br>(16166) 665               | EA           |
| 5                     | F            |                                 | LUBRICANT<br>(81400) 28442                          | EA           |
| 6                     | C            | 7930-00-531-9715                | DETERGENT, OIL SOLUBLE<br>(81349) MIL-D-16791       | EA           |
| 7                     | O            | 9150-00-111-0201                | LUBRICATING OIL, ENGINE<br>(81349) MIL-L-21260      | PT           |
| 8                     | F            | 6850-00-597-9765                | CLEANING COMPOUND, SOLVENT GL<br>(81349) O-C-1889   |              |
| 9                     | O            | 6850-00-621-1820                | LEAK DETECTION COMPOUND<br>(81349) MIL-L-25567      | BT           |

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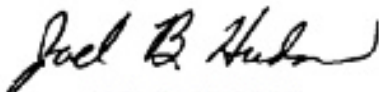
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TM 54210-218-13&P

By Order of the Secretary of the Army:



JOEL B. HUDSON  
Administrative Assistant to the  
Secretary of the Army  
03096

DENNIS J. REIMER  
Official: General, United States Army  
Chief of Staff

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TM 5-4210-218-13&P.

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The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whoever" <whoever@avma27.army.mil>

To: mpmtovma28@st-louis-emh7.army.mil

Subject: DA Form 2028

1. From: Joe Smith
2. Unit: home
3. Address:4300 Park
4. City: Hometown
5. St: MO
6. Zip: 77777
7. Date Sent: 19-OCT-93
8. Pub no: 55-2840-229-23
9. Pub Title: TM
10. Publication Date: 04-JUL-85
11. Change Number: 7
12. Submitter Rank: MSG
13. Submitter FName: Joe
14. Submitter MName: T
15. Submitter LName: Smith
16. Submitter Phone: 123-123-1234
17. Problem: 1
18. Page: 2
19. Paragraph: 3
20. Line: 4
21. NSN: 5
22. Reference: 6
23. Figure: 7
24. Table: 8
25. Item: 9
26. Total: 123
27. Text:

This is the text for the problem below line 27.

## 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 = 3,280.8 feet

### *Weights*

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigrams = .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

### *Liquid Measure*

1 centiliter = 10 milliliters = .34 fl. ounce  
 1 deciliter = 10 centiliters = 3.38 fl. ounces  
 1 liter = 10 deciliters = 33.81 fl. ounces  
 1 dekaliter = 10 liters = 2.64 gallons  
 1 hectoliter = 10 dekaliters = 26.42 gallons  
 1 kiloliter = 10 hectoliters = 264.18 gallons

### *Square Measure*

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch  
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches  
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet  
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet  
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres  
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

### *Cubic Measure*

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch  
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches  
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

## Approximate Conversion Factors

| <i>To change</i> | <i>To</i>          | <i>Multiply by</i> | <i>To change</i>   | <i>To</i>     | <i>Multiply by</i> |
|------------------|--------------------|--------------------|--------------------|---------------|--------------------|
| inches           | centimeters        | 2.540              | ounce-inches       | newton-meters | .007062            |
| feet             | meters             | .305               | centimeters        | inches        | .394               |
| yards            | meters             | .914               | meters             | feet          | 3.280              |
| miles            | kilometers         | 1.609              | meters             | yards         | 1.094              |
| square inches    | square centimeters | 6.451              | kilometers         | miles         | .621               |
| square feet      | square meters      | .093               | square centimeters | square inches | .155               |
| square yards     | square meters      | .836               | square meters      | square feet   | 10.764             |
| square miles     | square kilometers  | 2.590              | square meters      | square yards  | 1.196              |
| acres            | square hectometers | .405               | square kilometers  | square miles  | .386               |
| cubic feet       | cubic meters       | .028               | square hectometers | acres         | 2.471              |
| cubic yards      | cubic meters       | .765               | cubic meters       | cubic feet    | 35.315             |
| fluid ounces     | milliliters        | 29.573             | cubic meters       | cubic yards   | 1.308              |
| pints            | liters             | .473               | milliliters        | fluid ounces  | .034               |
| quarts           | liters             | .946               | liters             | pints         | 2.113              |
| gallons          | liters             | 3.785              | liters             | quarts        | 1.057              |
| ounces           | grams              | 28.349             | liters             | gallons       | .264               |
| pounds           | kilograms          | .454               | grams              | ounces        | .035               |
| short tons       | metric tons        | .907               | kilograms          | pounds        | 2.205              |
| pound-feet       | newton-meters      | 1.356              | metric tons        | short tons    | 1.102              |
| pound-inches     | newton-meters      | .11296             |                    |               |                    |

## Temperature (Exact)

|    |                           |                               |                        |    |
|----|---------------------------|-------------------------------|------------------------|----|
| °F | Fahrenheit<br>temperature | 5/9 (after<br>subtracting 32) | Celsius<br>temperature | °C |
|----|---------------------------|-------------------------------|------------------------|----|

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

**SOMETHING WRONG WITH THIS PUBLICATION?**

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER

PUBLICATION DATE

PUBLICATION TITLE

BE EXACT... PIN-POINT WHERE IT IS

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

| PAGE NO. | PARA-GRAPH | FIGURE NO. | TABLE NO. |
|----------|------------|------------|-----------|
|----------|------------|------------|-----------|

TEAR ALONG PERFORATED LINE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 2028-2 JUL 79

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**PIN: 059968-000**