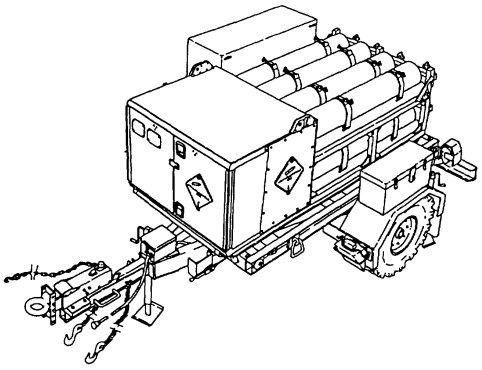
TECHNICAL MANUAL

OPERATOR'S, UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL FOR SERVICING UNIT, COMPRESSED GAS, MOBILE (NSN: 4220-01-369-7915)



HEADQUARTERS, DEPARTMENT OF THE ARMY
31 AUGUST 1994

BODY ASSEMBLY

WARNING

The storage cylinders should only be filled with compressed breathing air per BB-A-1034B, Grade A. Failure to follow this warning may result In contamination of the servicing unit and any SCUBA cylinders filled by the Servicing Unit.

WARNING

Never charge storage cylinders above the temperature compensated safe fill pressure. Failure to follow this warning may cause personnel injury, death, or equipment damage.

WARNING

Care should be taken when working around high-pressure air systems. Pressure should always be vented before hoses are connected or disconnected from the control panel. Failure to follow this warning may result in personnel Injury or death.

WARNING

COMBUSTION HAZARD. When handling end connections care should be taken not to contaminate the compressed gas system. Failure to follow this warning may result in personnel Injury, death or damage to equipment.

WARNING

Never exceed a charging rate of 200 psi/min with SCUBA cylinders out of a filling trough or 400 psi/min with cylinders In a filling trough. Failure to follow this warning may result In personnel Injury, death or damage to equipment.

WARNING

The TSP cleaning solution Is harmful to eyes and skin. Wear chemical protective apron, gloves and goggles/face shield when handling or working with the solution.

WARNING

Most ultraviolet lamps contain mercury. Extreme caution should be taken not to break the mercury vapor lamp which will contaminate the component or pipe being Inspected and may also cause human injury.

WARNING

Prior to performing maintenance procedures which require removal or disassembly of compressed gas systems, maintenance personnel should review Chapter 4, Section VII, general guidelines on removing and Installing components on life support systems. Failure to follow procedures may result in system contamination.

TRAILER ASSEMBLY

WARNING

Eye protection must be worn when bleeding brake lines. Failure to follow this warning can result In serious eye Injury or blindness.

WARNING

All personnel must stand clear of towing vehicle and Servicing Unit during coupling operation. Failure to follow this warning may result In personnel injury.

WARNING

Before moving Servicing Unit, ensure that all loose equipment Is properly stowed and that nothing will drag on the ground. Failure to follow this warning may result in Injury to personnel or damage to equipment.

WARNING

Gear oil leaking from the hub and drum assembly may soak the brakeshoe linings, making them Inoperative. If this occurs have unit maintenance replace them. Failure to follow this warning may cause brakes to malfunction, resulting In serious Injury.

WARNING

If Servicing Unit Is not coupled to towing vehicle, ensure that wheels are securely chocked, three swivel jacks are rotated downward, and leveled. Failure to do so may cause trailer to roll, resulting In Injury to personnel or damage to equipment.

WARNING

When troubleshooting an electrical malfunction, ALWAYS disconnect intervehicular electrical cable from towing vehicle. Failure to do so may result in Injury or death due to electrical shock.

WARNING

Improper cleaning methods and use of unauthorized cleaning liquids or solvents can Injure personnel and damage equipment. To prevent this, refer to TM 9-247 for further Instructions.

WARNING

Axle Is heavy and awkward to handle. Provide adequate support under trailer chassis and axle at all times. Failure to follow this warning may result In serious Injury or equipment damage.

WARNING

Do not use dry cleaning solvent P-D-680 on any Compressed Air System components. Only use the cleaning agents specified In Chapter 4, Section VII for cleaning Compressed Air System components. Use of unauthorized cleaning agents could result in personnel Injury or death.

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves, and use only In a well-ventilated area. Avoid contact with skin, eyes, and clothes, and do not breathe vapors. Do not use near open flame, excessive heat or to clean breathing air components. The solvent's flash point Is 100° F-130° F(38° C-59° C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

WARNING

Brake shoe linings contain asbestos fibers which present a serious health hazard If Inhaled. Use asbestos dust control procedures approved by local medical authority when servicing the brake assembly. Never use compressed air to clean dust from brake system components, or wipe, brush or sweep dry dust. Failure to follow proper precautions may result In exposure to dangerous concentrations of airborne asbestos fibers.

TECHNICAL MANUAL **HEADQUARTERS**
DEPARTMENT OF THE ARMY
NO. 54220-233-14 **WASHINGTON, D.C, 31 August 1994**

TECHNICAL MANUAL

OPERATOR'S, UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

FOR
SERVICING UNIT, COMPRESSED GAS, MOBILE
(NSN: 4220-01-369-7915)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

TABLE OF CONTENTS

HOW TO USE THIS MANUAL

In this manual, primary chapters and sections appear in upper case/capital letters; paragraphs are presented in numeric sequence with the chapter number listed first, e.g., 4-19., and the title is all upper case/capital letters; subordinate paragraphs are presented in alpha sequence, e.g., a., the next subordinate paragraphs are presented in numeric sequence with the number in parenthesis, e g., (1); the next paragraphs are presented in alpha sequence with the alpha presented in parenthesis, e.g. , (a). The location of additional material that must be referenced is clearly marked. Figures supporting maintenance procedures/text are located as close as possible to their references.

CHAPTER 1 - INTRODUCTION. Chapter 1 contains general information, equipment description and technical principles of operation.
CHAPTER 2 - OPERATING INSTRUCTIONS. Chapter 2 contains a description of the end item and each control and indicator is described. Operating procedures include Preventive Maintenance Checks and Services (PMCS), and operation under usual and unusual conditions.
CHAPTER 3 - OPERATORS MAINTENANCE. Chapter 3 lists lubrication instructions, troubleshooting procedures used to recognize malfunctions/symptom, probable cause and corrective action, and maintenance procedures authorized at operator level.
CHAPTER 4 - UNIT MAINTENANCE. Chapter 4 lists lubrication instructions, troubleshooting procedures used to recognize malfunctions/symptom, probable cause and corrective action, and maintenance procedures authorized at unit level.
CHAPTER 5 - DIRECT SUPPORT MAINTENANCE INSTRUCTIONS. Chapter 5 contains information for direct support maintenance on the Mobile Compressed Gas Servicing Unit.
CHAPTER 6 -GENERAL SUPPORT MAINTENANCE INSTRUCTIONS. Chapter 6 contains information for general support maintenance on the Mobile Compressed Gas Servicing Unit.
APPENDIX A- REFERENCES. This appendix lists all the publications referenced In this manual.
APPENDIX B - MAINTENANCE ALLOCATION CHART (MAC). This appendix provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.
APPENDIX C - COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEM (BII) LIST. This appendix lists components of the end item and basic issue items to help you inventory the items for safe and efficient operation of the equipment.
APPENDIX D - EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST. This appendix lists expendable/durable supplies and materials that you will need to operate and maintain the end item. This listing is for information only and is not authority to requisition the listed items.
APPENDIX E - ILLUSTRATED LIST OF MANUFACTURED ITEMS. This appendix includes complete instructions for making items authorized to be manufactured or fabricated at organizational, direct support, and general support maintenance.
APPENDIX F - TORQUE LIMITS. This appendix lists applicable torque values expressed in standard and metric values.
ALPHABETICAL INDEX. The index contains key technical manual subjects arranged in alphabetical order. If you require information on a certain subject (i.e. cleaning), but you are not sure where to look, use the index to locate the specific page.

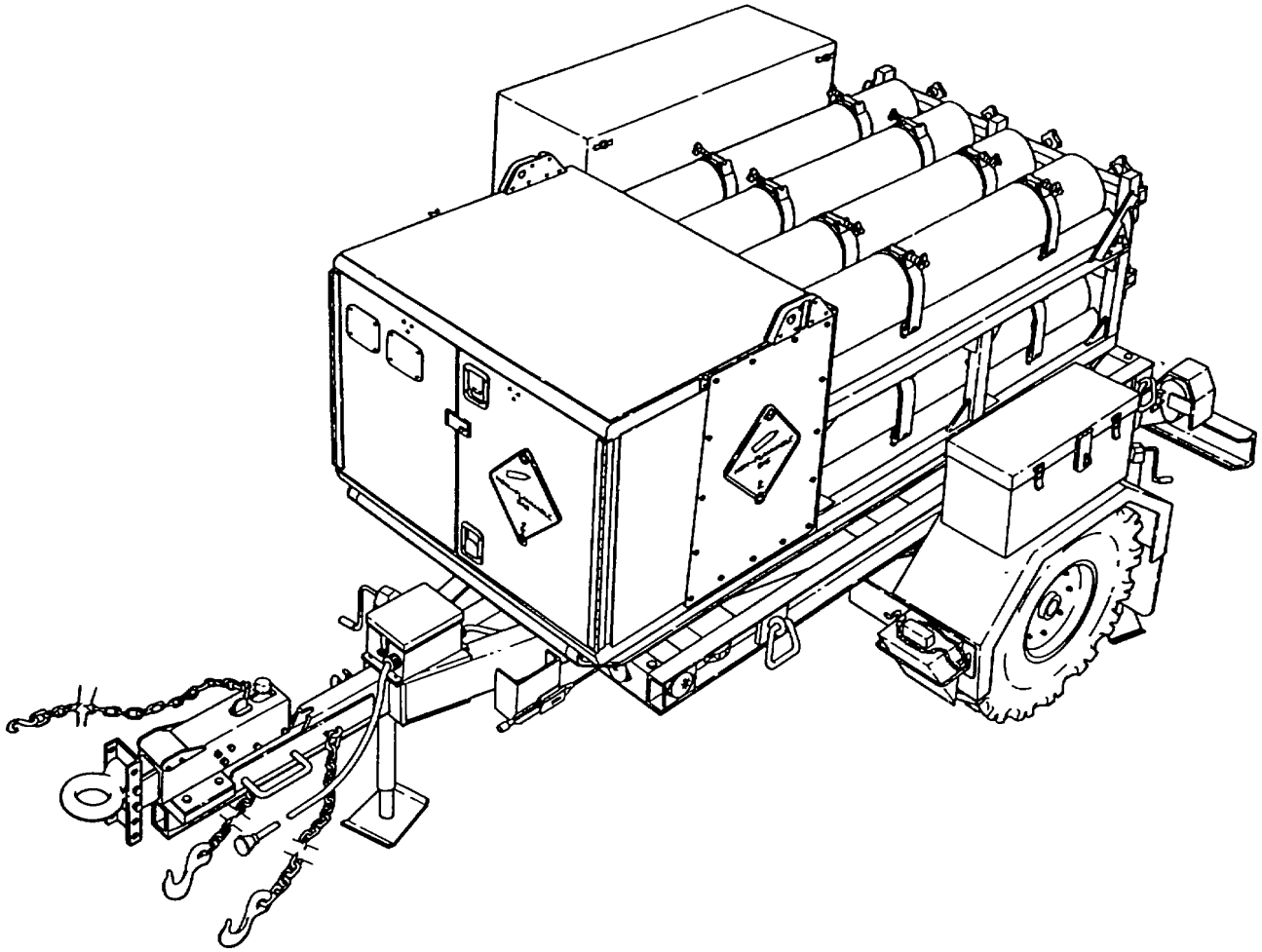


Figure 1-0. Mobile Compressed Gas Servicing Unit.

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

This manual describes the operation and Unit, Direct Support (DS), and General Support (GS) Maintenance, for the Servicing Unit, Compressed Gas, Mobile and includes operation and maintenance procedures for both the trailer and body assemblies. The National Stock Number (NSN) for the complete system is 4220-01-3697915. The Mobile Compressed Gas Servicing Unit is used to fill Self-Contained Underwater Breathing Apparatus (SCUBA) cylinders with breathing air.

1-2. MAINTENANCE FORMS AND PROCEDURES.

"Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738750 as contained in the Maintenance Management Update."

1-3. CORROSION PREVENTION AND CONTROL (CPC).

a. Corrosion Prevention and Control (CPC) 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 can be made to prevent the problem in future items.

b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

c. If a corrosion problem is identified, it can be reported using Standard Form SF 368, Product Quality Deficiency Report. Use of keywords 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 the address specified In DA PAM 738-750.

1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

References to "destruction of Army materiel to prevent enemy use" are contained in TM 750-244-6.

1-5. PREPARATION FOR STORAGE OR SHIPMENT.

Reference to the preparation of the Mobile Compressed Gas Servicing Unit for storage or shipment is contained in Chapter 4, Section VI.

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs).

"if your Mobile Compressed Gas Servicing Unit needs Improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to us at Commander, U S. Army Aviation and Troop Command (ATCOM), Attn: AMSAT-I-WTA, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798.

1-7. WARRANTY INFORMATION.

The Mobile Compressed Gas Servicing Unit does not contain warranty provisions.

1-8. OFFICIAL NOMENCLATURE AND NAME(S).

Common Name	Official Nomenclature
Servicing Unit	Servicing Unit, Compressed Gas, Mobile

1-9. ABBREVIATIONS.

ATCOM	U. S. Army Aviation and Troop Command
CAGE	Commercial and Government Entity
CBIL	Common and Bulk Items List
CGA	Compressed Gas Association
cm.	centimeter
CMRS	Calibration Measurement Requirements Summary
CPC	Corrosion Prevention and Control
DA	Department of the Army
EIR	Equipment Improvement Recommendation
F	Fahrenheit
in.	inches
Kg.	Kilogram
lbs.	pounds
MAC	Maintenance Allocation Chart
MSRA	Materiel Readiness Support Activity
MSI	Maintenance Significant Item
NSN	National Stock Number
psi	Pounds per square inch
RPSTL	Repair Parts and Special Tools List
SCF	Standard Cubic Feet
SCUBA	Self-Contained Underwater Breathing Apparatus
SMR	Source, Maintenance, and Recoverability [Code]
TM	Technical Manual
TMDE	Test, Measurement, and Diagnostics Equipment

Section II. EQUIPMENT DESCRIPTION

1-10. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES.

a. The Mobile Compressed Gas Servicing Unit consists of two major assemblies. The Body Assembly contains the Compressed Gas System and the Trailer Assembly which provides for unit mobility. The entire unit is in the 2-1/2 Ton weight class for cross country surface movement.

b. The Body assembly contains the Compressed Gas System and is used to simultaneously charge up to four twin 80 cubic foot SCUBA cylinders with breathing air at a maximum rate of 400 psi per minute. The Body Assembly is equipped with the following items:

(1) An aluminum frame weldment that provides the support for the storage cylinders, cylinder clamping system, control panel, front doors, side access panels and filling trough.

(2) Eight DOT3AA rated storage cylinders each capable of holding a maximum of 422 SCF @ 70° F (59.4° C) of breathing air at 5,000 psi (34,400 kpa). A shutoff valve is mounted at the neck of the cylinder. The shutoff valves have a CGA347 outlet connection and contain an internal safety plug that automatically vents if the pressure in the storage cylinder exceeds safe limits.

(3) A cylinder clamping system consisting of two 1-1/2 inch wide band clamps for each cylinder and a retaining bar at the rear of the cylinders that secures one row of four cylinders. The clamping allows the removal of any or all the cylinders without the use of hand tools.

(4) A control panel mounted at the front of the Body Assembly behind the front doors contains the gauges, valves, tubing, and hoses to recharge the storage cylinders, service up to four SCUBA cylinders. The inlet and outlet connections on the control panel are CGA347 high pressure air connections. Four, fifteen foot long fill hoses with yoke adapters are included to interface with "J" or "K" type connections on the SCUBA cylinders.

(5) Two hinged doors are mounted at the front of the Body Assembly to provide protection for the control panel. The roadside door contains a weather-proof toolbox dedicated for storage of tools and spare parts necessary to repair the Compressed Gas System components only.

(6) Side access panels with 1/4 turn fasteners are provided for easy access to the backside of the control panel and the storage cylinder shutoff valves.

(7) A filling trough is provided to prevent SCUBA cylinders from over-heating during the filling process. The trough is sized to allow filling of four sets of twin 80 SCUBA tanks simultaneously. When not in use, the trough Is secured to a mounting base on the curb side of the frame.

c. The Trailer Assembly is designed to provide a firm foundation for the Body Assembly during both highway and off-road travel and operational site jacking. The Trailer Assembly consists of the following.

(1) A welded steel chassis that includes an A-frame type drawbar. The chassis provides the foundation to support the Body Assembly as well as the trailer axle, suspension, brake system, electrical system and accessory components. The chassis also contains the Servicing Unit's lifting/tiedown provisions

(2) A single beam type axle assembly rated at 5,000 lbs. The axle assembly provides the foundation for the two-wheel running gear and suspension.

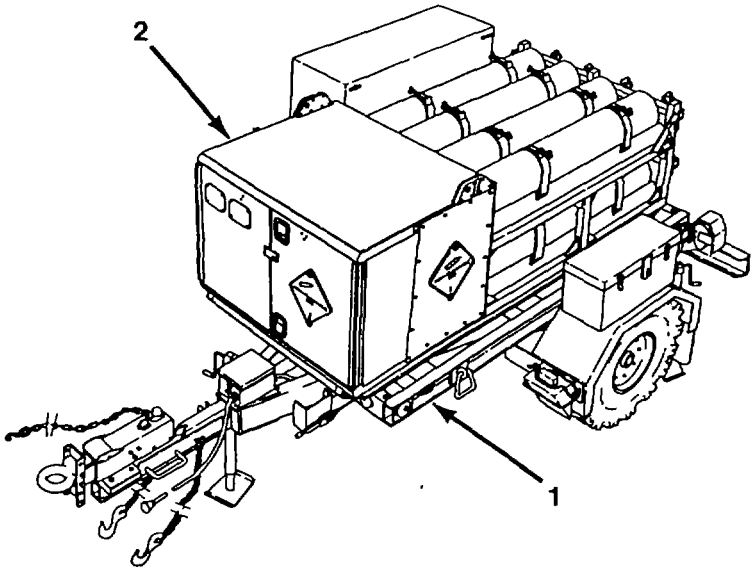
(3 A suspension system rated at 5,000 lbs. consisting of a set of leaf springs and double-acting telescopic shock absorbers.

(4) A brake system that consists of surge actuated hydraulic service brakes with interface to an operator actuated mechanical parking brake. The service brakes also provide for automatic (emergency) brake application in the event that the trailer breaks away from the towing vehicle.

(5) A front swivel jack and two rear swivel jacks, each rated at 5,000 lbs., that allow the Servicing Unit to be operated on sloped terrain. When not in use the jacks rotate up to self-stored locations under the chassis.
(6) A complete 24 V dc negative ground electrical system that includes rear tail, stop and turn lamps, front, side, and rear marker lamps. The electrical system is capable of operating under standard and blackout modes.
(7) A spare tire carrier mounted under the chassis. A winch is provided with the carrier for easy storage and removal of the spare tire.
(8) A weather proof tool box mounted on the road side fender to contain only tools used for the trailer or non-breathing air component repair.

1-11. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

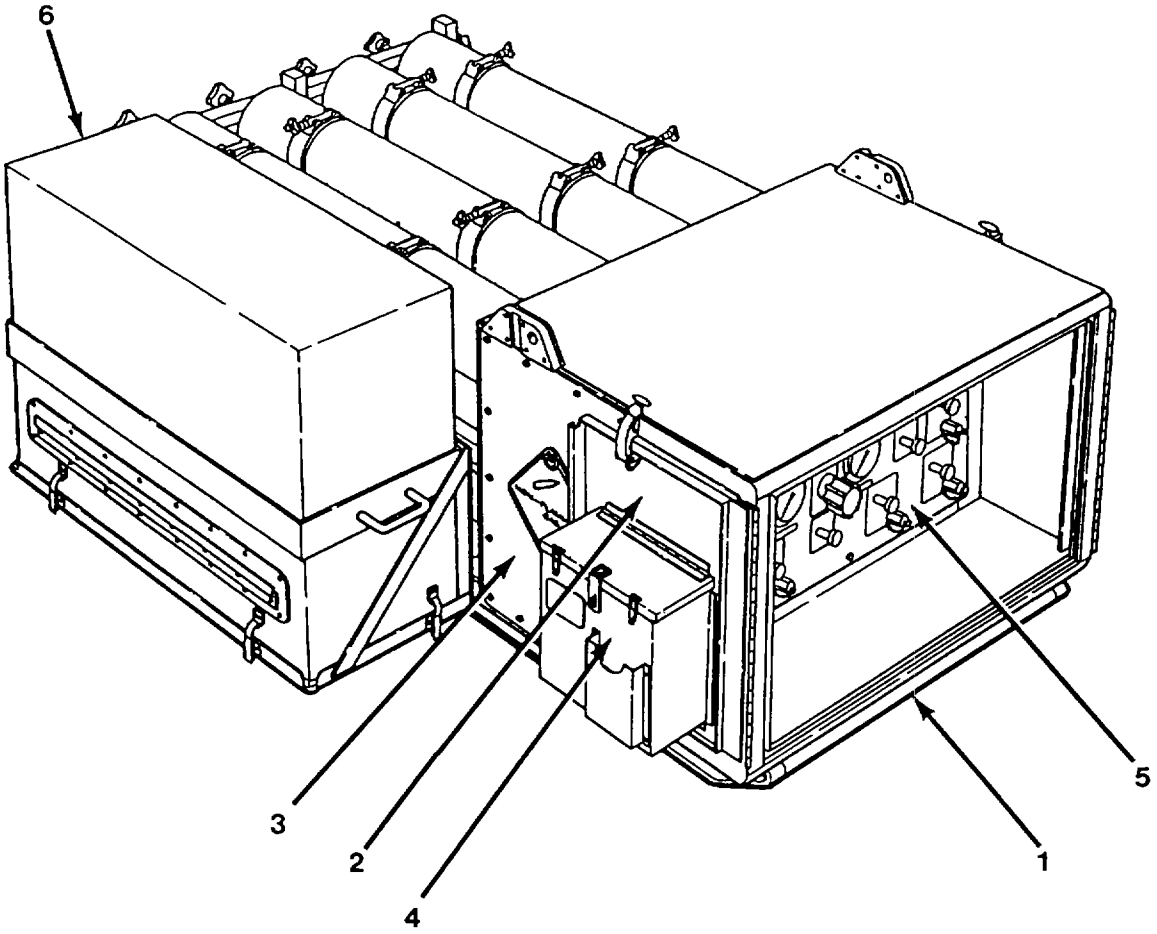
a. Mobile Compressed Gas Servicing Unit.



1 **Trailer Assembly**. A single axle, two-wheeled, pole-type trailer that provides the mobility for the Servicing Unit.
2 **Body Assembly**. A self-contained unit that provides for storage and distribution of high pressure breathing air.

Figure 1-1. Mobile Compressed Gas Servicing Unit Major Components.

b. Mobile Compressed Gas Servicing Unit Body Assembly.



1 **Frame Weldment**. Provides mounting foundation for Compressed Gas System.

2 **Curb Side Door Assembly**. Used to protect control panel Contains weather-tight tool box for storing Compressed Gas System tools and repair parts. Also contains a document holder.

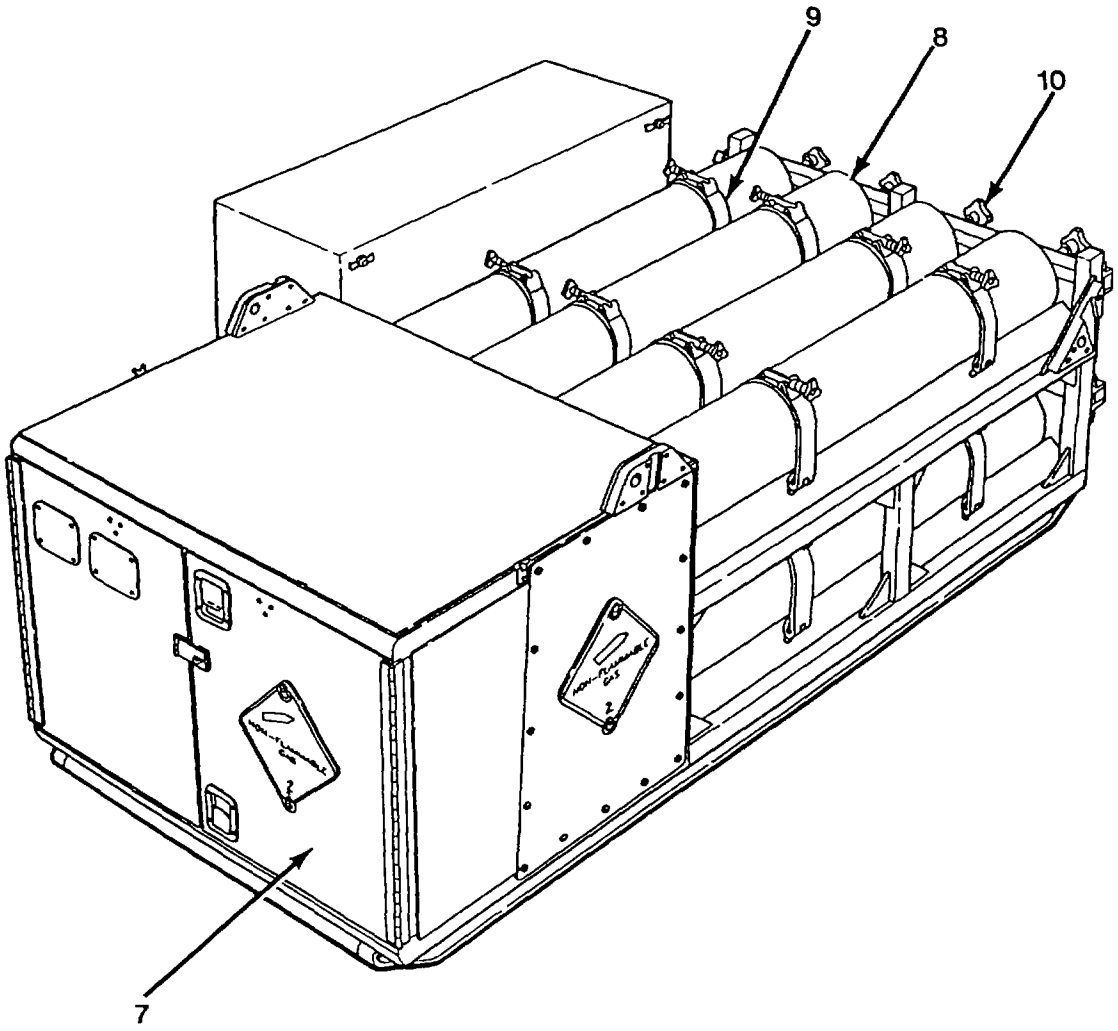
3 **Access Panel**. Used to gain access to the rear side of the control panel and storage shutoff valves.

4 **Compressed Gas System Tool Box**. Used to store Compressed Gas System tools and scuba tank fill hoses.

5 **Control Panel Assembly**. Contains gauges, valves, tubing, hoses, and an inline filter for the compressed gas system.

6 **Trough Assembly**. Used to safely fill up to four twin 80 SCUBA tanks.

Figure 1-2. Servicing Unit Body Assembly. (Sheet 1of 2)



7 **Roadside Door Assembly**. Protects the control panel and Contains two paddle latches for securing both doors.

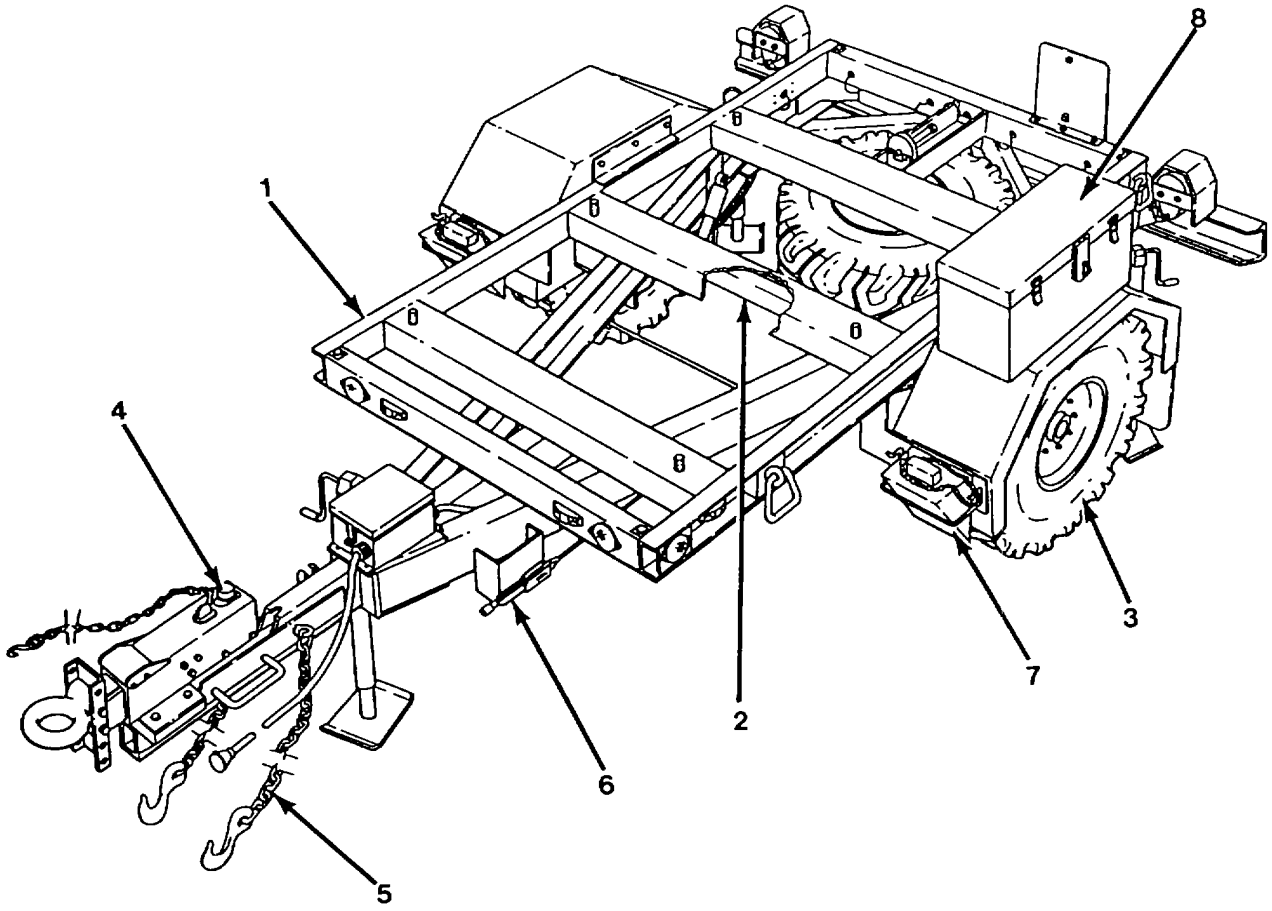
8 **Storage Cylinder**. Provides storage of high pressure breathing air. Each cylinder has a manual shutoff valve.

9 **Clamp Assembly**. Used to secure storage cylinders to frame.

10 **Hold down Bracket Assembly**. Used to secure a row of four storage cylinders to the frame. Held in place by three quick release pins.

Figure 1-2. Servicing Unit Body Assembly. (Sheet 2)

c. Mobile Compressed Gas Servicing Unit Trailer Assembly.



1 **Chassis Weldment**. Provides the foundation for the Body Assembly and trailer components and the lifting / tiedown provisions.

2 **Axle Assembly**. Provides the foundation for the running gear and suspension Contains the leaf springs, shock absorbers, hubs, and brake drums.

3 **Wheel and Tire Assembly**. Provides road and cross country mobility for the Servicing Unit. A spare tire is mounted under the chassis frame.

4 **Surge Actuator**. Contains a master cylinder and provides the actuation force to apply the trailer service brakes. Contains the lunette eye that connects to the pintle hook connection on the towing vehicle.

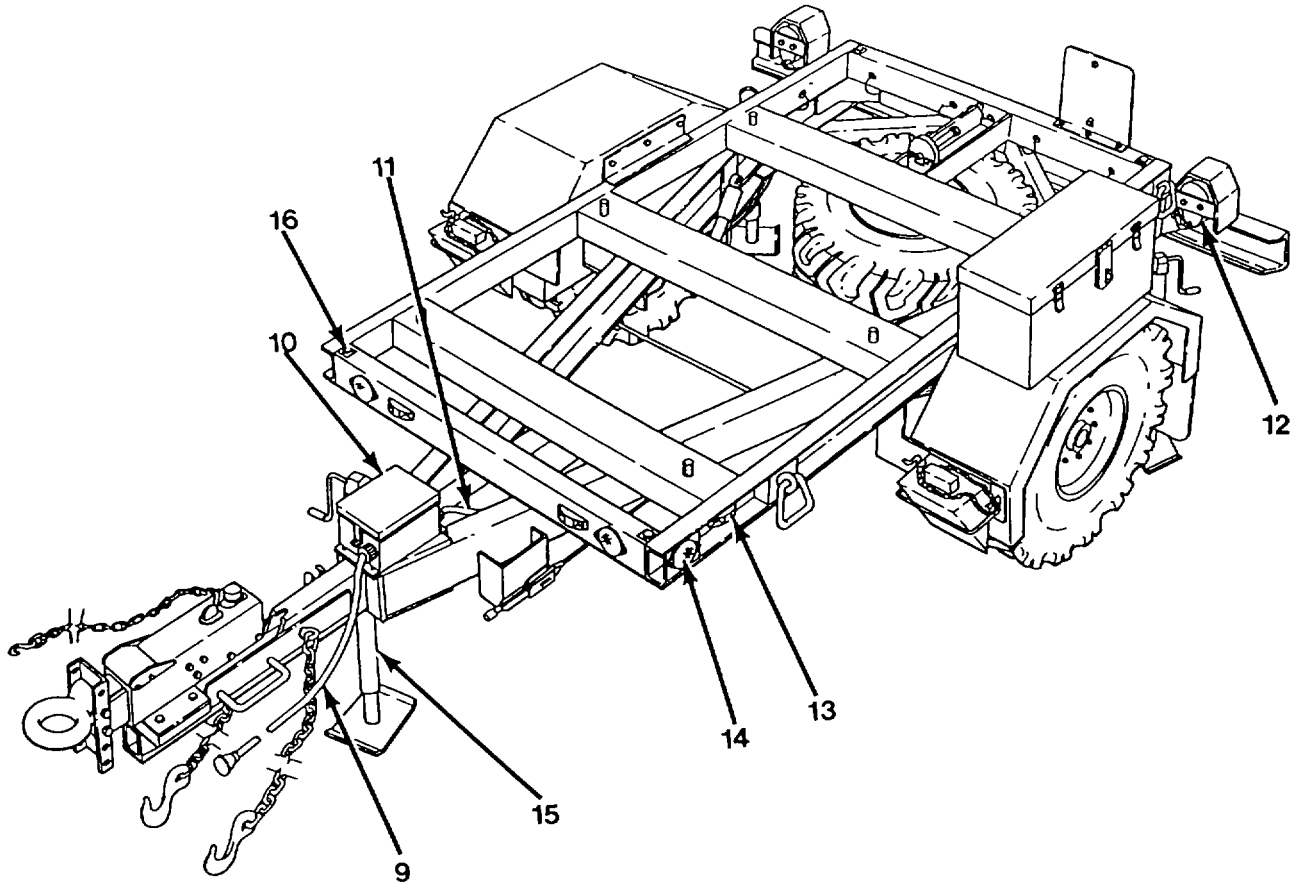
5 **Safety Chains**. Used to keep the trailer connected to towing vehicle in the event that the lunette eye to the pintle hook connection fails.

6 **Handbrake Lever**. Manually operated lever used to apply or remove the parking brake.

7 **Chock**. When placed next to the tire, prevents trailer movement on a downward slope.

8 **Trailer Tool Box**. Weather-tight box used to store trailer tools and non-breathing air parts.

Figure 1-3. Servicing Unit Trailer Assembly. (Sheet 1 of 2)



9 Intervehicular Cable. Provides the electrical interface between the towing vehicle and the trailer Equipped with a standard 12-pin connector.

10 Electrical Box. A weather-proof junction box where the trailer wire harness is connected to the Intervehicular cable.

11 Wire Harness. Distributes electrical signals to the trailer marker, tail, stop, turn and blackout lights.

12 Composite Light. Provides the rear tail, stop, turn, and blackout lights for the trailer.

13 Marker Light. Provide an outline of the trailer envelope. Red markers are mounted at the rear and rear/sides of the trailer chassis. Amber markers are mounted at the front and front/sides of the trailer chassis.

14 Reflector. Mounted at front corners and front/side corners of the trailer chassis. Reflectors are amber in color.

15 Swivel Jack. One front and two rear jacks are provided to allow the Servicing Unit to be operated on sloped terrain.

16 Circular Level. A bubble-type level that is used as a guide when operating the swivel jacks to properly level the Servicing Unit prior to operation or maintenance.

Figure 1-3. Servicing Unit Trailer Assembly. (Sheet 2)

1-12. EQUIPMENT AND TRANSPORTABILITY DATA.

Table 1-1. Servicing Unit Equipment Data.

General

Weight	4975 lbs (2,257 kg)
Length	164.5 in (418 cm)
Width	87.5 In (222 cm)
Height	69.5 in (177 cm)
Shipping	580 cu ft (16.5 cu m)
Center of Gravity Length (From Lunette Eye)	117 in (297 cm)
Center of Gravity Width	43.5 In (110.5 cm)
Center of Gravity Height (From Ground)	39 in (99 cm)

Body Assembly Specifics

Weight	3,065 lbs (1,390 kg)
Length	93 in (236 cm)
Width	64 in (162 5 cm)
Height	36 in (91.5 cm)
Sling Guides	4 each

Trailer Assembly Specifics

Weight	1,910 lbs (866 kg)
Wheel and Tire Weight (each)	110 lbs (49 kg)
Length	164.5 in (418 cm)
Width	87.5 in (222 cm)
Height	49 an (124 cm)
Tire Width	12 in (30 5 cm)
Front Overhang	110 in (279 cm)
Front Overhang Height	max = 33 In (84 cm)
	man = 26 in (66 cm)
Rear Overhang	44 in (112 cm)
Rear Overhang Height	19.5 In (49 !5 cm)
Ground Clearance	13 in (33 cm)
Tracking Width (Outside)	84 in (213 cm)
Tracking Width (Inside)	62 in (157 5 cm)
Sling Lift Points	4 each rated @ 9,400 lbs
	4.26 metric tons

Performance Design Specifics

Filling Rate with Trough (Maximum)	400 psi / minute - 2752 kpa/min
Cylinder Storage Pressure	5,000 psi - 34,400 kpa
Towing Speeds (Maximum), Primary Highway	55MPH - 87km
Unpaved Roads	30MPH - 48 km
Off- Road	20MPH - 32 km
Storage Temperature	-64° to 155° F (-54° to 68° C)
Operating Temperatures	-25° to 120° F (-32° to 49° C)

SECTION III. PRINCIPLES OF OPERATION

1-13. PRINCIPLES OF OPERATION.

NOTE

Reference desiginators are used for clarification purposes only; however, they are not Identified on the equipment

The mobile compressed gas Servicing Unit is used to fill SCUBA cylinders with breathing air. The Servicing Unit consists of a trailer assembly and a body assembly.

a. **Body Assembly**. The body assembly is bolted to the trailer and can function while mounted on the trailer or can be removed from the trailer and operated independently. The body assembly consists of an aluminum frame which provides the mounting provisions for the Compressed Gas System storage cylinders and control panel and accessory components including a trough, and a tool box/

(1) **Compressed Gas System**. The Compressed Gas System consists of eight large storage cylinders (Cylinders #1 through #8) capable of storing breathing air at 5000 psig. Figure 1-4 depicts an operational schematic of the system air flow described in the following paragraphs. Each storage cylinder has a shutoff valve (MV100 through MV107) connected to its outlet port that isolates the pressure in each cylinder from the rest of the system. Flexible hoses connect the storage cylinders to a high pressure manifold (MAN 100) mounted on the control panel. The high pressure manifold directs the flow of air to the storage cylinders when filling the Servicing Unit or to the low pressure manifold (MAN 200) when filling SCUBA tanks.

(a) Each of the eight flow paths from the storage cylinders to the high pressure manifold also contain a 1/4-turn ball valve (MV108 through 115) and a 0-6000 psig cylinder pressure gauge (Pl100 through PI107). A recharge station is connected at the Inlet to the manifold with a recharge valve (MV116) and a connection port. This station Is used when refilling the storage cylinders.

(b) At the outlet of the high pressure manifold, the manifold valve (MV117) Is provided to Isolate high and low pressure portions of the system. Down stream of this valve, air passes through a 90 micron particulate filter (F100). The air is, then, diverted to the high pressure valve (MV119) or to a pressure regulator (PR100). The pressure regulator(PR100) is used to control the fill pressure of the SCUBA cylinders. Two 0-6000 psig pressure gauges (PI108) manifold pressure gauge and (P1109) servicing pressure gauge are connected to the pressure regulator for monitoring the inlet and outlet pressure. Downstream of the pressure regulator the servicing valve, (MV118) isolates pressure to the low pressure manifold.

(c) The low pressure manifold directs pressure to four fill stations (#1 through #4). The fill stations can be used independently or simultaneously. Each fill station contains a fill station valve (MV200 through MV203) and a outlet port that connects to 15 foot long flexible fill hoses. The fill hoses have a yoke adaptor (YFA200 through YFA203) at the outlet that can be connected to SCUBA cylinders with either "J" or "K" type connections. The low pressure manifold is also connected to the bleed off valve (MV204) that is used to bleed pressure from the system once the SCUBA cylinders are filled. Each manifold contains a relief valve (RV100 and RV200). The storage cylinder valves, also, contain relief devices to vent excess pressure overboard, if the air pressure exceeds safe levels.

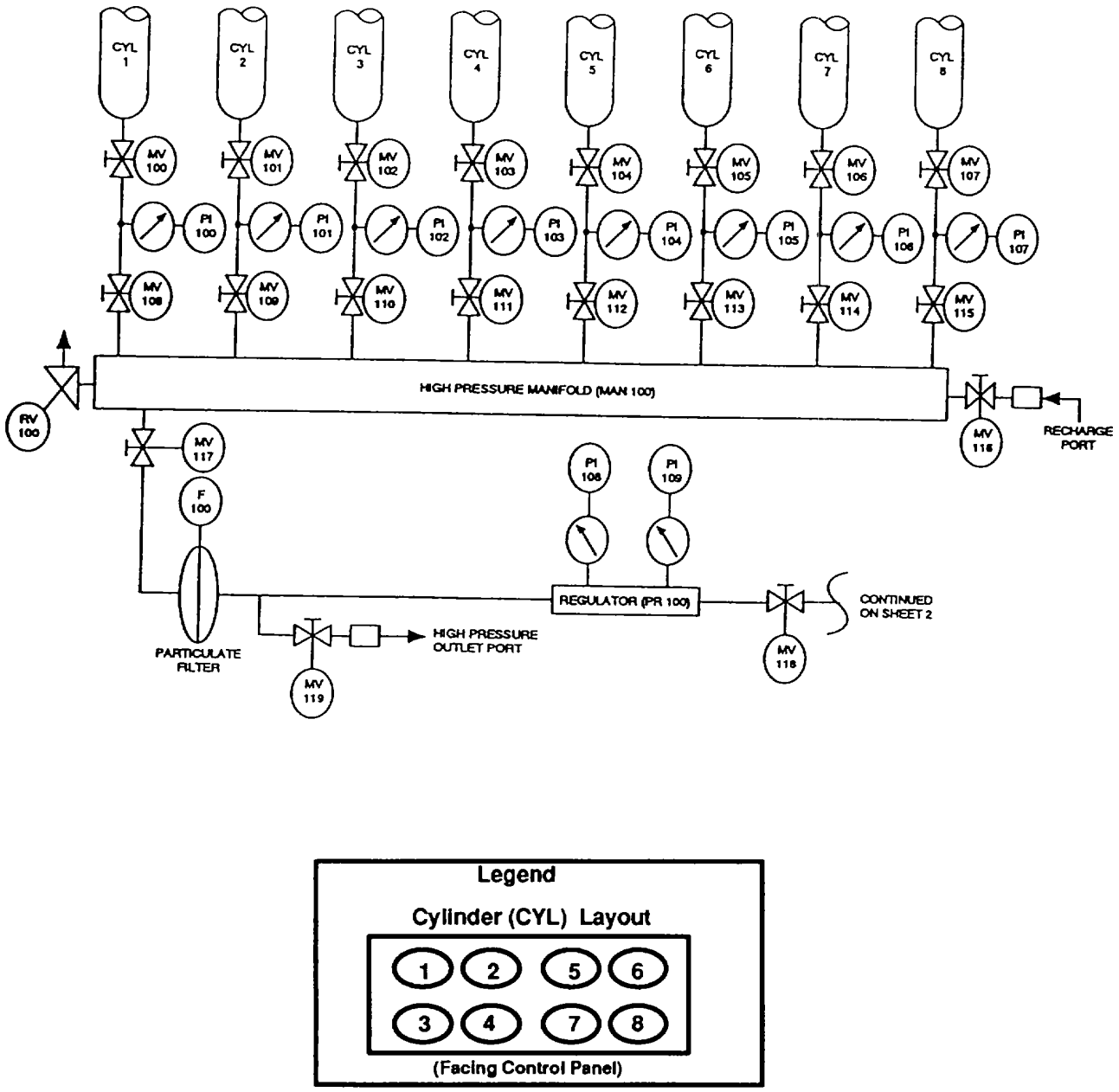


Figure 1-4. Servicing Unit Flow Schematic, Sheet 1 of 2.

(2) **Trough Assembly**. The trough is an aluminum tank capable of holding up to four twin 80 SCUBA cylinders. When filling cylinders the trough is secured to the rear bumper of the trailer and filled with water. When the SCUBA cylinders are positioned in the trough the water acts a heat sink and prevents the cylinders from overheating during the filling process. After filling operations are completed the trough is drained through two drain valves and secured to mounting provisions on the curbside of the body assembly.

(3) **Compressed Gas System.** Tool Box. A weather-tight tool box is mounted on the inside of the curbside control panel door. This tool box is used exclusively to store tools and spare parts required to maintain the Compressed Gas System in a clean manner

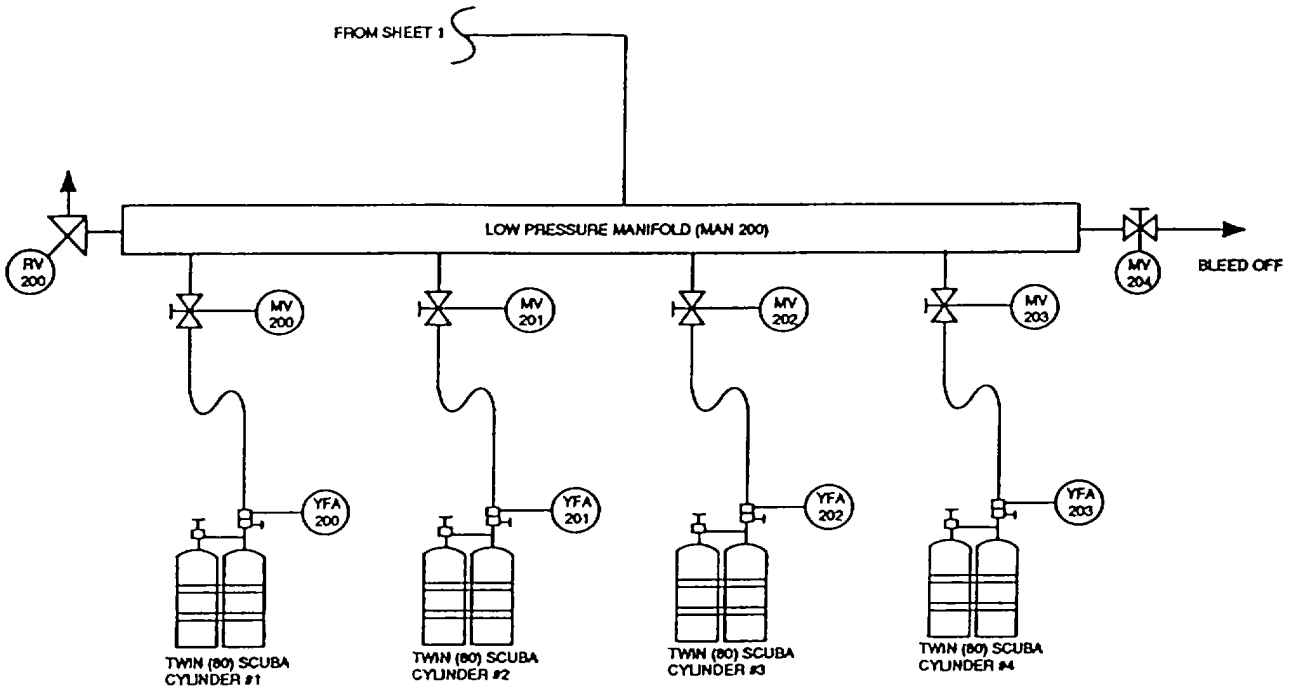


Figure 1-4. Servicing Unit Flow Schematic, Sheet 2.

b. Trailer Assembly. The trailer assembly is used to transport the body assembly to the point of usage. Major items on the trailer include a chassis frame, axle assembly, brake system, electrical system, swivel jacks, and tool box.

(1) **Chassis Frame**. The chassis frame is made of steel and contains the provisions for mounting the trailer components and the body assembly. The chassis also contains four tiedown/lifting provisions used to secure the complete Servicing Unit.

(2) **Axle Assembly**. The trailer utilizes a single axle design with leaf spring suspension. The axle is a square beam design and contains provisions for the mounting of the hub bearings, brakes, and wheel assemblies.

(3) **Brake System**. The trailer utilizes a hydraulic brake system. The system consists of a drawbar surge actuator and drum brakes on each wheel. The trailer also contains a hand actuated mechanical parking brake system that actuates the drum brakes. When the prime mover slows or stops the weight of the trailer In the forward direction applies the force necessary to actuate the surge actuator mounted on front of the trailer drawbar. The surge actuator acts as the master cylinder and provides hydraulic pressure to the brake assemblies. The surge actuator also contains the toweye provisions for connecting the trailer assembly to the prime mover.

b Trailer Assembly (Continued)

(4) **Electrical System**. The electrical system of the trailer consists of a cable assembly that connects the trailer lights to the prime mover's electrical system. The cable assembly is connected to an electrical junction box which provides a weather tight enclosure for the circuit breakers and terminal board. A wire harness is utilized to distribute the electrical signals to the trailer lights. The trailer utilizes standard military rear tail/stop/turn lights with blackout capabilities. The trailer also has four amber marker lights on the front and front/sides of the chassis and seven red marker lights on the rear and rear/sides of the chassis.

(5) **Swivel Jacks** Three swivel jacks are provided with the trailer for stabilization. One jack is mounted along the curb side of the front drawbar and two jacks are mounted at the rear comers of the chassis. The swivel jacks rotate under the chassis while the trailer is being towed. Circular (bubble-type) levels are installed at each corner of the chassis frame so that the swivel jacks can be adjusted until the Servicing Unit is properly leveled.

(6) **Trailer Tool Box**. A weather tight tool box is mounted on top of the road side fender on the trailer. This tool box is used to store tools and spare parts needed to maintain the trailer.

(7) **Spare Tire Assembly**. Attaches to the rear, bottom of the Trailer Assembly Additionally, a Hoist Assembly allows the user to raise or lower the spare tire, when required.

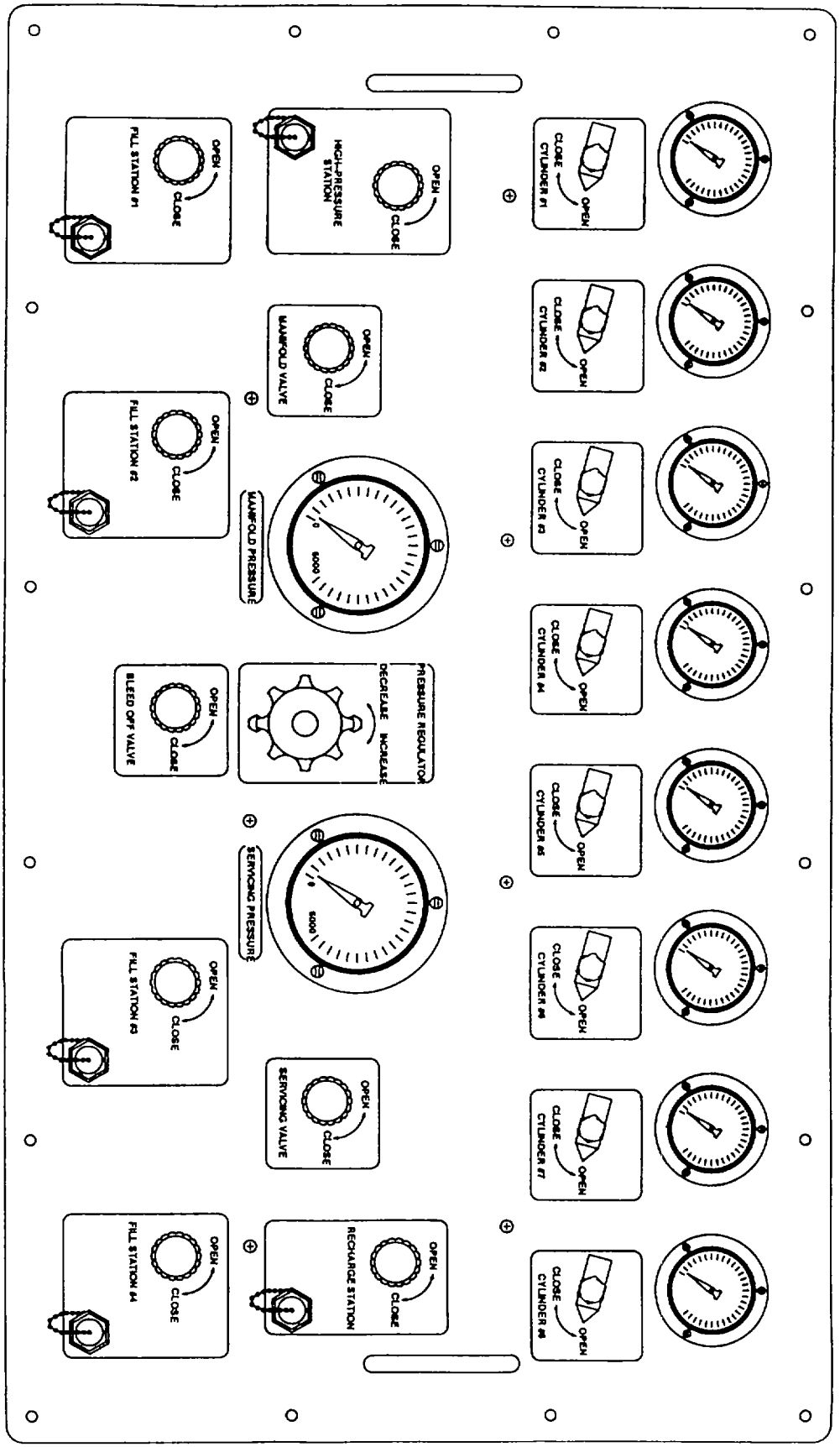


Figure 2-0. Control Panel.

CHAPTER 2

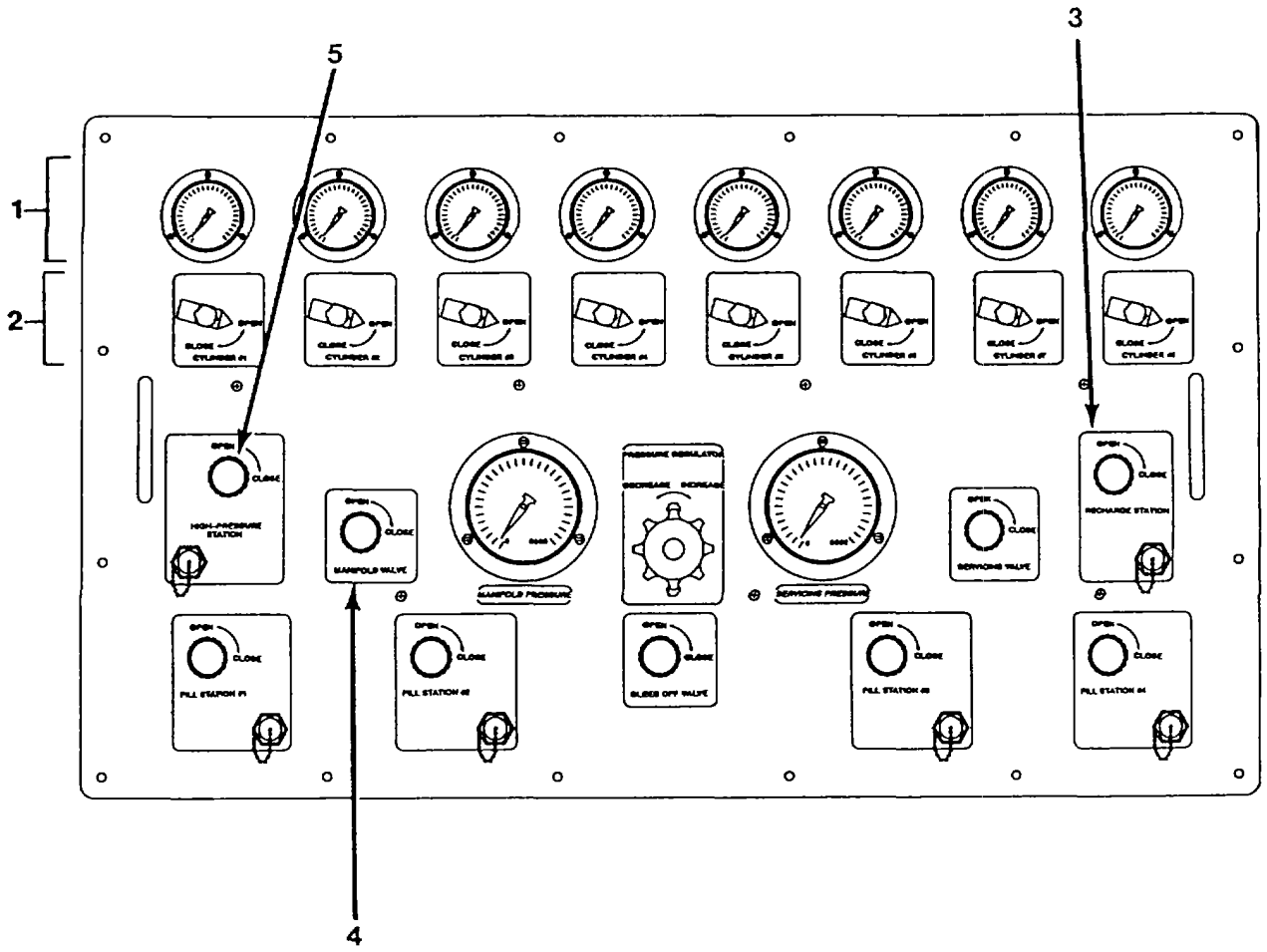
OPERATING INSTRUCTIONS

SECTION I. DESCRIPTION AND USE OF OPERATORS CONTROLS AND INDICATORS

2-1 GENERAL INFORMATION

This section shows the location and its function for all operator controls and indicators on the Mobile Compressed Gas Servicing Unit. Review this section thoroughly before operating the system. Trailer controls are described In paragraph 3-2. "Service Upon Receipt" instructions for first-time preparation and use are contained In Chapter 3, Section II.

2-2. OPERATOR'S CONTROLS AND INDICATORS.



1 Cylinder Pressure Gauge (PI100 - PI107). 0 - 6,000 psi gauges used to determine pressure inside of each storage cylinder.

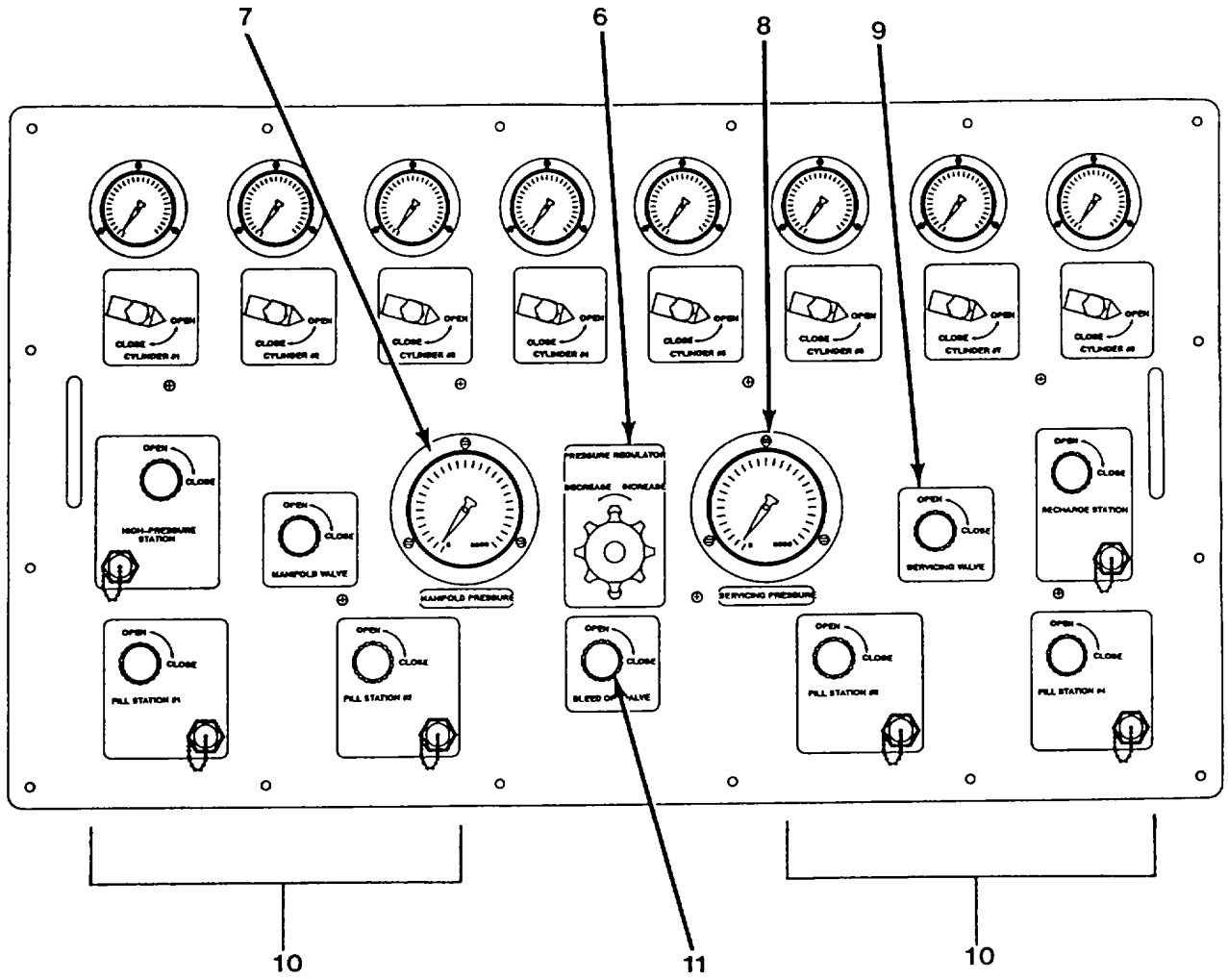
2 1/4-Turn Ball Valves (MV108-115). 1/4 - turn ball valves used to isolate air from each storage cylinder to the high pressure manifold.

3 Recharge Valve (MV116). Needle valve used to control flow of air from RECHARGE STATION to high pressure manifold.

4 Manifold Valve (MV117). Needle valve used to control flow of air from the high pressure manifold to HIGH - PRESSURE STATION or to pressure regulator (PR100).

5 High Pressure Valve (MV119). Needle valve used to control flow of air from high pressure manifold to HIGH - PRESSURE port.

Figure 2-1. Servicing Unit Control and Indicators.



6 Pressure Regulator (PR100). Used to regulate pressure of air when filling SCUBA cylinders.

7 Manifold Pressure Gauge (PI108). 0 - 6,000 psi gauge used to determine pressure at the inlet side of the pressure regulator(PR100).

8 Servicing Pressure Gauge (PI109). 0 - 6,000 psi gauge used to determine pressure at the outlet side of the pressure regulator(PR100).

9 Servicing Valve (MV118). Needle valve used to control flow of air from pressure regulator (PR100) to low -pressure manifold.

10 Fill Station Valve (4) (MV200 - MV203). Needle valves used to control flow of air from low pressure manifold to FILL STATIONS #1 through #4

11 bleed off Valve (MV204). Needle valve used to vent / depressurize the Compressed Gas System.

Figure 2-1. Servicing Unit Controls and Indicators (Continued)

SECTION II. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-3. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).

To ensure that the Servicing Unit is ready for operation at all times, it must be inspected on a regular basis so that defects may be found before they result in serious damage, equipment failure, or injury to personnel. This section contains systematic instructions on inspections, adjustments, and corrections to be performed by the operator/crew.

While performing PMCS, read and follow all safety instructions found in the Warning Summary at the front of this manual. Keep in mind all WARNINGs and CAUTIONs.

a. Perform PMCS, found in Table 2-1, at the following intervals:
   (1) Perform Before PMCS just before operating the trailer or the Compressed Gas System.
   (2) Perform During PMCS while distributing breathing air from the Compressed Gas System.
   (3) Perform After PMCS immediately after towing the Servicing Unit or after distributing breathing air from the Compressed Gas System.

b. Reporting Repairs

All defects which the operator cannot fix must be reported on a DA Form 2404, Equipment Inspection and Maintenance Worksheet, immediately after completing PMCS. If a serious problem Is found, IMMEDIATE-LY report it to your supervisor.

c. General PMCS Procedures.

WARNING

Do not use dry cleaning solvent P-D-680 on any Compressed Air System components. Only use the cleaning agents specified in Chapter 4, Section VII for cleaning Compressed Air System components. Use of unauthorized cleaning agents could result in personnel Injury or death.

Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves, and use only In a welt-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame, excessive heat or to clean breathing air components. The solvent's flash solvent, Immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

(1) Keep equipment clean. Dirt, oil, and debris may cover up a serious problem. Clean as you work and as needed. For cleaning breathing air components of the Compressed Gas System refer to Chapter 4, Section VII. DO NOT use tools from the trailer tool box or use solvent identified for the trailer components on breathing-air components. Use dry cleaning solvent (Item 15, Appendix D) on all trailer metal surfaces. Use soap and water on rubber, plastic, and painted surfaces.

(2) While performing specific PMCS procedures, inspect the following components.
   (a) Bolts, Nuts, and Screws. Ensure that they are not loose, missing, bent, or broken. Report loose or missing bolts, nuts, and screws to unit maintenance.
   (b) Welds. Inspect for gaps where parts are welded together. Check for loose or chipped, paint, rust, and cracks. Report bad welds to unit maintenance.
   (c) Electric Conduit, Wires, or Connectors. Inspect for cracked or broken conduit insulation, bare wires, and loose or broken connectors. Report loose connections, and faulty wiring to unit maintenance.
   (d) Hoses, Lines, and Fittings. Inspect for wear, damage, and leaks. Ensure that clamps and fittings are tight. Report any damage, leaks, or loose fittings and clamps to unit maintenance.

(3) Check that components are adequately lubricated in accordance with Chapter 3, Section 1.

d. Specific PMCS Procedures.
   (1). Operator/crew PMCS are provided in Table 2-1. Always perform PMCS In the order listed Once it becomes a habit, anything that is not right can be spotted in a minute.
   (2) Before performing PMCS, read all the checks required for the applicable interval and prepare all the tools needed. Have several clean rags (Item 13, Appendix D) handy Perform ALL inspections at the applicable interval

(3) If anything wrong is discovered through PMCS, perform the appropriate troubleshooting task in Chapter 3, Section III. If any component or system Is not serviceable, or if a given service does not correct the problem, notify your supervisor.

(4) The columns in Table 2-1 are defined as follows:

(a) **Item No.** Provides a logical sequence for PMCS to be performed and is used as a source of item numbers for the “TM ITEM NO" column when recording PMCS results on DA Form 2404.

(b) **Interval.** Specifies the interval at which PMCS is to be performed.

(c) **Item To Be Inspected.** Lists the system and common name of items that are to be inspected. Included in this column are specific servicing, inspection, replacement, or adjustment procedures to be followed.

(d) **Not Mission Capable If:** Explains when the Servicing Unit is non-mission capable.

e. LEAKAGE DEFINITIONS.

(1) It is Important to know how fluid leakage affects the status of the Servicing Unit. Following are types/classes of leakage an operator must know to determine whether the Servicing Unit is mission-capable.

Leakage Definitions for Crew/Operator PMCS

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enoughto form drops, but not great enough to cause drops to drip from item being Inspected.
Class III	Leakage of fluid great enough to form drops that fall from item being inspected.

CAUTION

When operating with Class I or II leaks, continue to check fluid levels more frequently than required in PMCS. Parts without fluid will stop working or may be damaged.

(2) Equipment operation is allowed with minor (Class I or II) leakage. Fluid levels in an item/system affected with such leakage must be checked more frequently than required In PMCS. Report Class III leaks IMMEDIATELY to your supervisor.

Table 2-1. Operator Preventive Maintenance Checks and Services

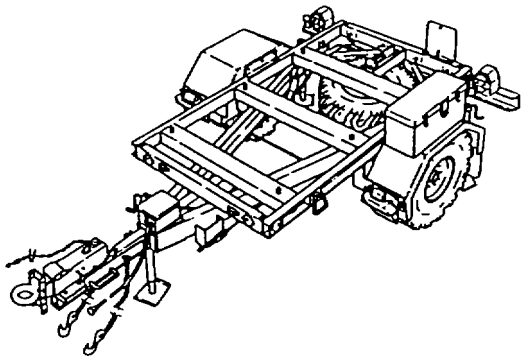
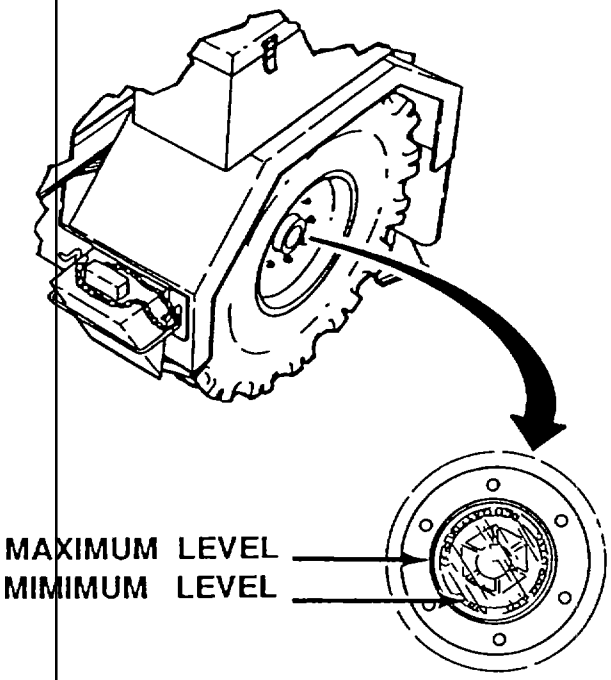
Item No.	Interval	Item to Check/Service	Procedure	Not Mission Capable if:
1	Before	Trailer Assembly	a. Check for cracks and broken welds 	Cracks or broken welds present.
2	Before	Axle Assembly	a. Check oil level on trailer wheel hub at the sight glass. Level should be halfway across sight glass	Lubricant is not coating wheel bearings within hub
			b. Check for oil leakage at hub to axle mating surface 	Class III leak Is found.

Table 2-1. Operator Preventive Maintenance Checks and Services

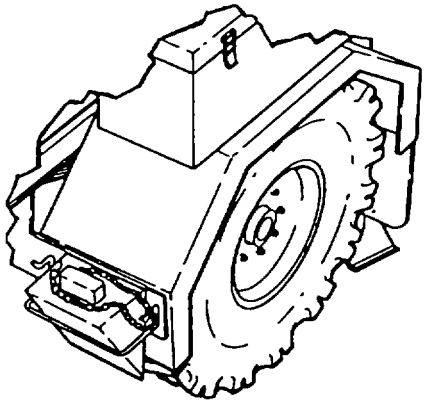
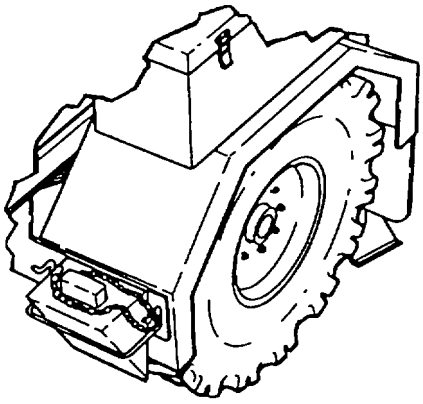
Item No.	Interval	Item to Check/Service	Procedure	Not Mission Capable if:
2	After	Axle Assembly	**WARNING** Cautiously feel each wheel hub and brakedrum. Wheel hubs or brakedrums may be hot. Failure to follow this warning may result In burns.	
			c. Check for a wheel hub or brakedrum that is hotter or cooler than the other. Overheating could indicate improperly adjusted or defective wheel bearings, or a locked-up brake A cool wheel hub and brakedrum could indicate an inoperative brake. IMMEDIATELY report any abnormal conditions to unit maintenance.	Brakedrum or hub Is excessively hot or cool,
			d Check for proper operation of brakes, when applied	Brakes do not operate properly.
				
3	Before	Wheels and Tires	a. Check lugnuts on the wheel assembly for tightness.	Lugnuts loose or not properly seated.
	After		b. Remove any glass, nails, or other debris embedded In tread	
	Before		c. Check tires for obvious damage such as cuts, bruises, bulges, and flats	Unserviceable.
			d. Check for proper tire pressure (60 psi).	Tire will not hold air pressure.
				

Table 2-1. Operator Preventive Maintenance Checks and Services

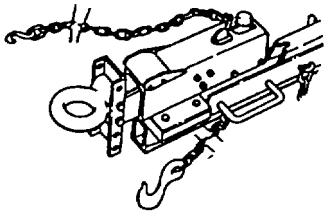
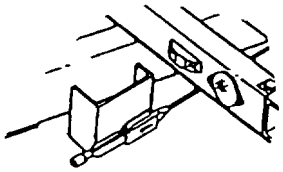
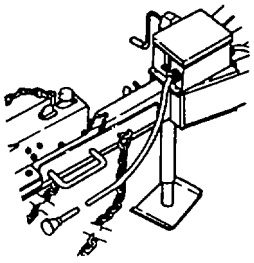
Item No.	Interval	Item to Check/Service	Procedure	Not Mission Capable if:
4	Before	Hydraulic Brake System	a. Check for brake fluid leakage from reservoir on the surge actuator, hydraulic brake lines, and fittings. b. Check brake fluid level add or remove fluid as required to be 1/2" (13mm) below opening. c. Check condition of emergency brake chain and ensure that it is attached to the towing vehicle 	Class Ill leakage is found. Level is low Chain broken or not attached to the towing vehicles.
5	Before	Parking Brake System	a. Check for proper operation of the handbrake level. b. Check for proper adjustment of handbrake lever. Handbrake lever Is properly adjusted when additional force is required to move handbrake lever beyond two-thirds distance of travel toward the applied position. 	If handbrake is inoperative or not Adjustable.
6	Before	Electrical System	a. Check general condition of Intervehicular cable and plug. 	Plug missing or cannot be mated to vehicle.

Table 2-1. Operator Preventive Maintenance Checks and Services

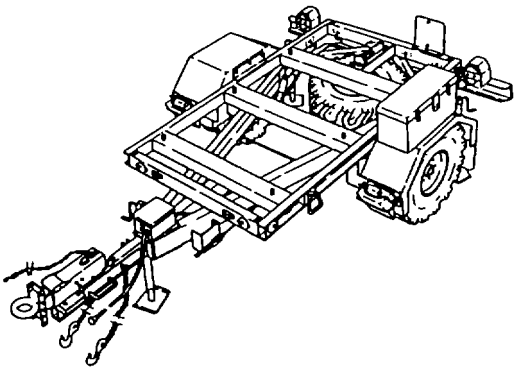
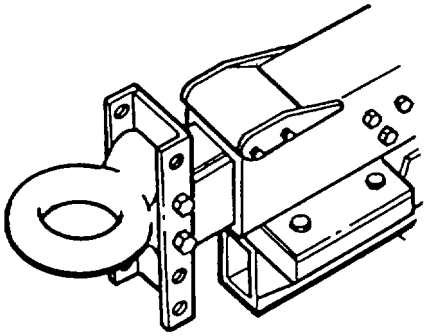
Item No.	Interval	Item to Check/Service	Procedure	Not Mission Capable if:
6	Before	Electrical System	b. Checks for obvious damage and loose lights, lenses, and reflectors. **NOTE** This procedure requires that the trailer connections are attached to the towing vehicle prior to the check. Paragraph 2-4 describes the coupling procedures. c. Check for proper operation of lights. d. Ensure that the lid on the electrical box Is clamped shut and tightly sealed. 	Lamps are inoperative for driving or braking.
7	Before	Towing and Leveling Equipment	a. Ensure that the lunette eye Is at the proper height for the towing vehicle. 	Cracks or broken welds present.

Table 2-1. Operator Preventive Maintenance Checks and Services

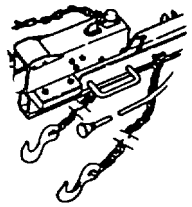
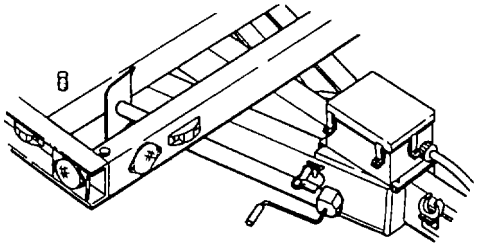
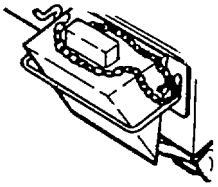
Item No.	Interval	Item to Check/Service	Procedure	Not Mission Capable if:
7	Before	Towing and Leveling Equipment	b. Check the condition of the safety chains. **NOTE** This procedure requires that the trailer connections are attached to the towing vehicle prior to the check Paragraph 2- describes coupling procedures.	Safety chains are missing or broken.
			c. Safety chains are connected to the towing vehicle. 	Safety chains are not connected to the towing vehicle.
	Before After		d. Ensure swivel jacks operate through full range of motion.	Jacks do not operate through full range
	Before After		e. Ensure swivel jacks are rotated to the UP position and the quick-release pin is installed.	
	Before After		f. Ensure that the sandshoe is tight against chassis. 	
8	Before After	Accessories	a. Ensure chocks are properly secured and chains are wrapped tight around chock holders 	Chocks are missing.

Table 2-1. Operator Preventive Maintenance Checks and Services

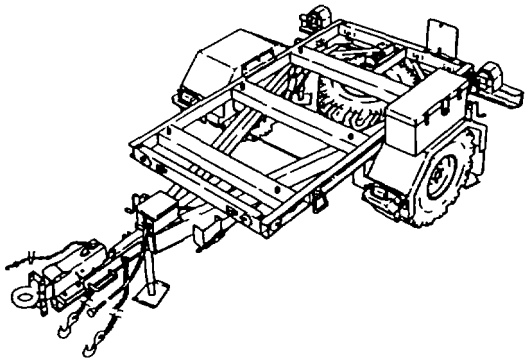
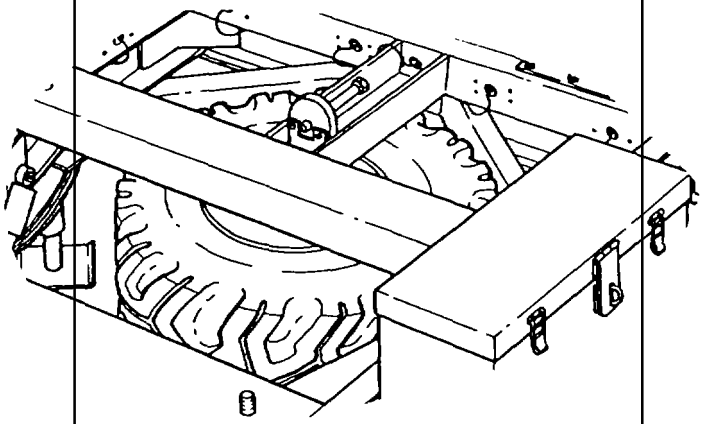
Item No.	Interval	Item to Check/Service	Procedure	Not Mission Capable if:
8	Before	Trailer Assembly	b. Tool box lid is closed and latched. c. Rear placard holder is properly attached. 	
			d. Check for a spare tire. e. Ensure that the spare tire is secured to the chassis.	Spare tire Is missing Mounting hardware missing
			f. Check the tire pressure on the spare (60 psi). 	Tire does not hold pressure

Table 2-1. Operator Preventive Maintenance Checks and Services

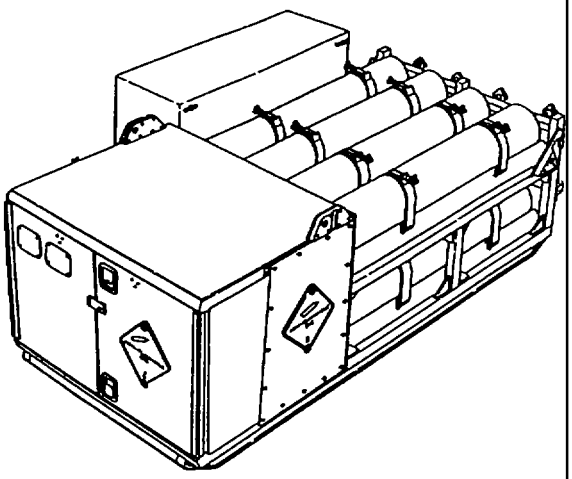
Item No.	Interval	Item to Check/Service	Procedure	Not Mission Capable if:
9	Before	Body Assembly	a. Check the frame for cracks or broken welds b. Check for six nuts that attach the body to the trailer frame.	Cracks or broken welds. Loose or missing studs/nuts.
10	Before During After	Door Assembly	a. Ensure that the front doors are closed and secured. b. Ensure that the front doors are secured open by using the rubber door holders. c. Close and secure the Compressed Gas System tool box. 	

Table 2-1. Operator Preventive Maintenance Checks and Services (PCMS) Continued

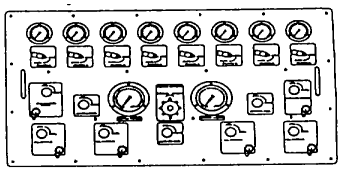
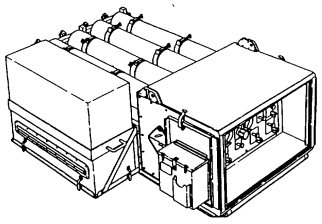
Item No.	Interval	Item to Check/Service	Procedure	Not Mission Capable if:
11	Before	Control Panel Assembly	a. Check the gauges for obvious damage.	Broken gauges.
	During		b. Check the movement and operation of the gauges during filling, recharge, or depressurization.	Gauges not operating properly
	After		c. Cover all fill station recharge and HIGH PRESSURE ports with dust caps.	
			d. Ensure all control panel valves are closed and the regulator is adjusted out. 	
12	After	Door Assembly	a. Ensure that front doors are closed and secured.	
13	Before	Cylinder Assembly	a. Fully close all cylinder valves (MV100-MV107)	
			b. Check to ensure the eight stored cylinders are tight against the control compartment bulkhead.	Missing or loose clamps.
			c. Check for sixteen cylinder clamps and securely tighten.	Missing or loose clamps.
			d. Ensure the three quick-release pins are fully engaged onthe two cylinder holddown brackets and the adjustable stops are tight against the bottom of each cylinder. 	Quick release pins missing.

Table 2-1. Operator Preventive Maintenance Checks and Services (PCMS) Continued

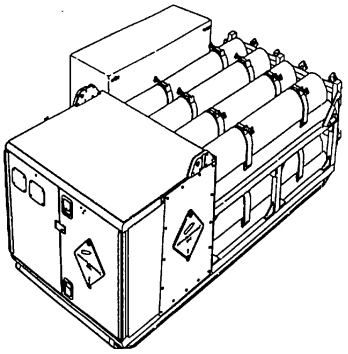
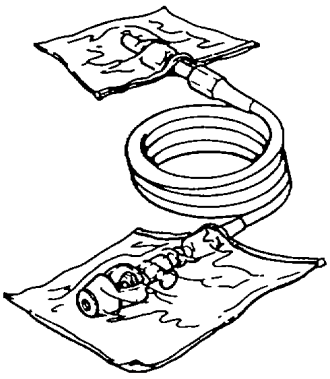
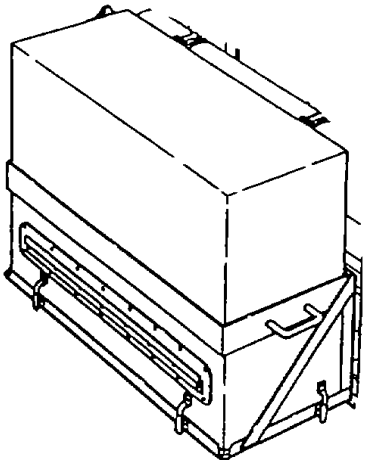
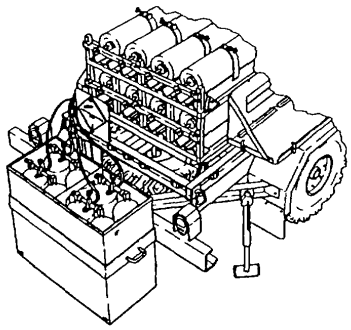
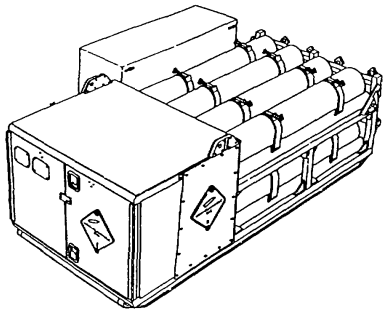
Item No.	Interval	Item to Check/Service	Procedure	Not Mission Capable if:
13	Before After	Access Panel Assembly	a. Check the access panels and lock the 1/4-turn fasteners; If required. 	
14	Before After	Fill Hose Assembly	a. Check the fill hose assemblies to ensure they are cleaned, undamaged, bagged, and stowed properly in the tool box. 	Fill hose missing dirty, damaged or relief valve missing
15	Before After	Trough Assembly	a. Ensure trough is secured to mounting base assembly 	

Table 2-1. Operator Preventive Maintenance Checks and Services (PCMS) Continued

Item No.	Interval	Item to Check/Service	Procedure	Not Mission Capable if:
15	During	Trough Assembly	**WARNING** a. If the trough is attached to the rear bumper for filling SCUBA tanks, swivel jacks must be used and leveled. The weight of the water will move the trailer and may cause equipment damage or personnel injury. b. If the trough is attached to the rear bumper ensure swivel jacks are engaged and leveled. 	
16	Before	Accessories	a. Check for one front, two side and one rear placard secured to the Body Assembly. 	

Section III. OPERATION UNDER USUAL CONDITIONS

2-4. TRAILER OPERATION

a. Assembly, Setup, and Preparation.
   (1) This section contains instructions for safely operating the Servicing Unit under usual conditions. Unusual operating conditions are defined and described in Section IV of this chapter.
   (2) Perform the Before PMCS In Table 2-1, items 1 thru 8, that do not require trailer coupling to the towing vehicle
   (3) Review all towing vehicle operating instructions to prepare for coupling and uncoupling operations.

b. Coupling Trailer to Towing Vehicle.

WARNING

All personnel must stand clear of towing vehicle and Servicing Unit during coupling operation. Failure to follow this warning may result In personnel Injury.

CAUTION

Have assistant direct you during backing operations. Damage to the equipment may result if caution is not followed.

Ensure chock blocks are in place and parking brake Is fully engaged.

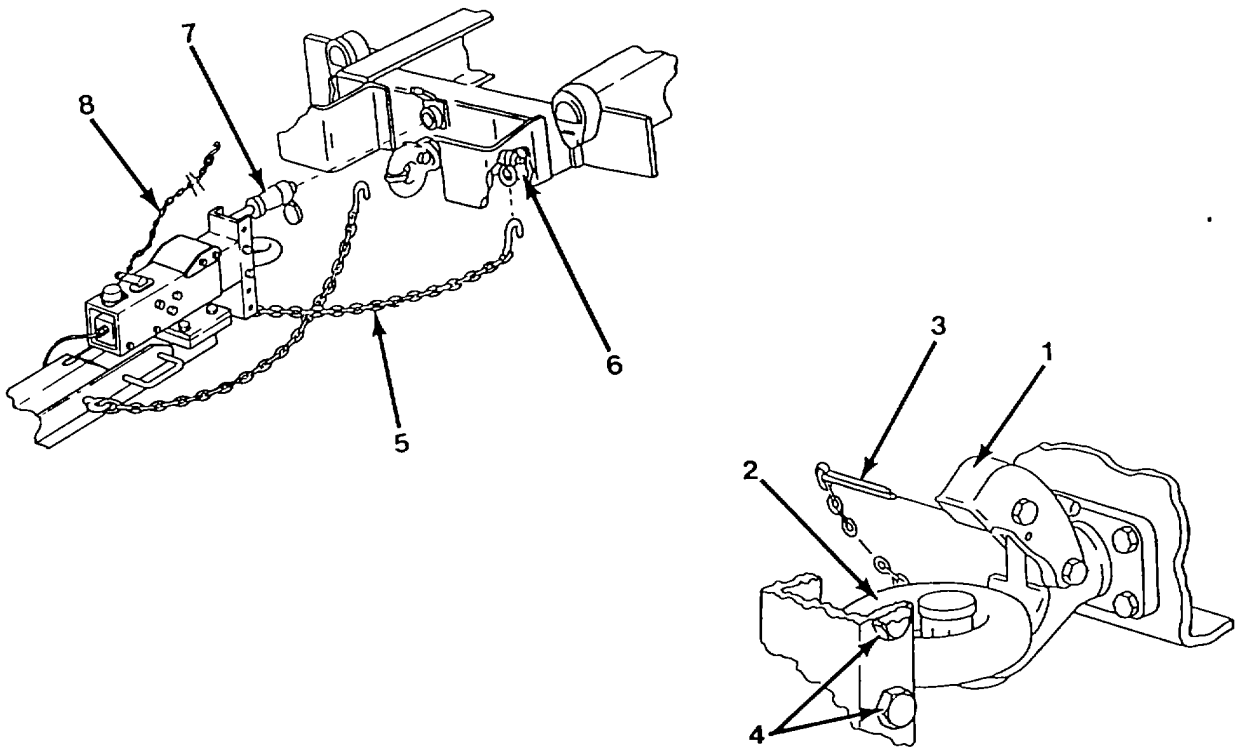


Figure 2-2. Coupling Trailer to Towing Vehicle.

(1) Align the towing vehicle with the Servicing Unit and slowly back towing vehicle until pintle (1) is adjacent to lunette eye (2)
(2) Remove pintle lockpin (3) and open pintle (1).
(3) If necessary reposition the lunette eye (2) on trailer, to position pintel and lunette eye at same level. To adjust the lunette eye, use two 15/16 wrenches, remove two locknuts and bolts(4), and relocate/tighten at the desired height.
(4) To allow engagement with the pintle, slightly raise the front swivel jack.
(5) Position towing vehicle until pintle (1) is under the lunette eye (2).
(6) Lower front swivel lack until lunette eye (2) is engaged with pintle (1)
(7) Close the pintle and install pintle lockpin (3).
(8) Cross safety chains (5) under drawbar ring and attach to towing vehicle eyebolts (6).
(9) Connect intervehicular cable (7) to towing vehicle receptacle.
(10) Attach chain (8) for emergency brake to appropriate location on towing vehicle.

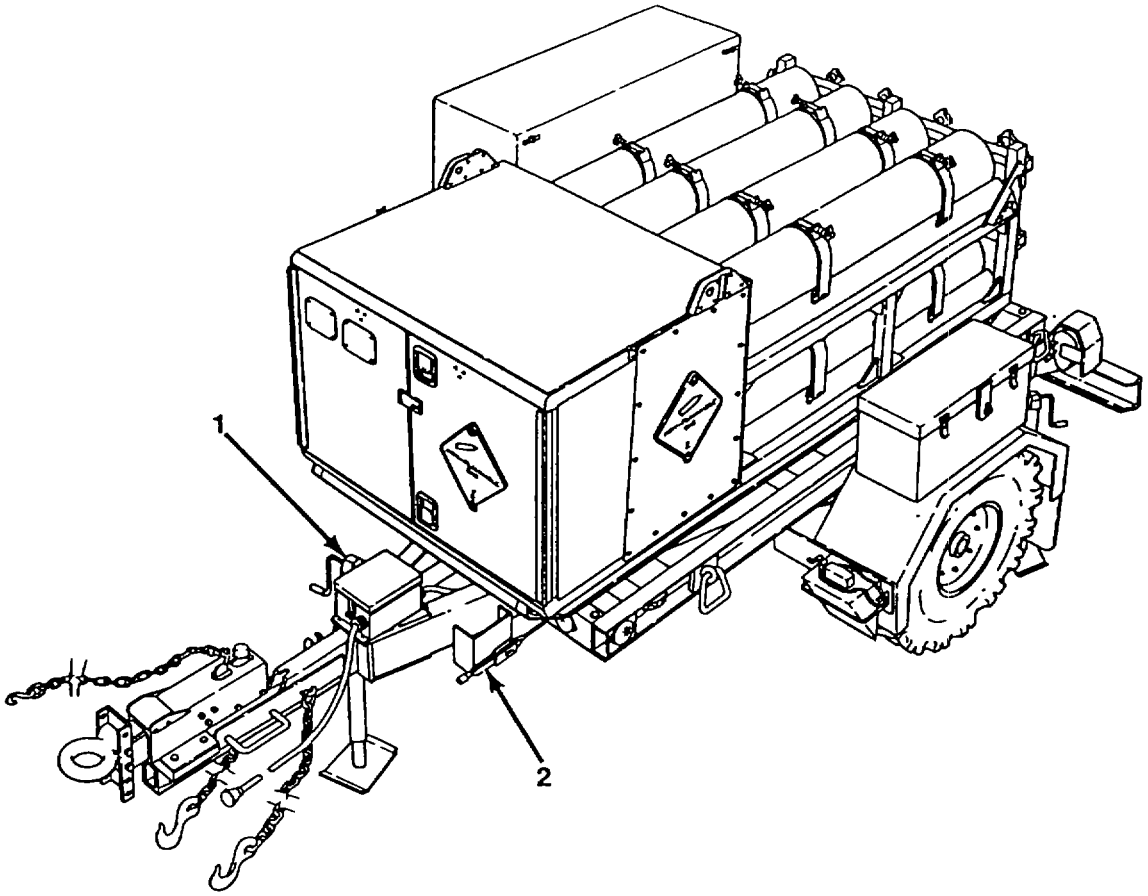


Figure 2-3. Storing Swivel Jacks.

(11) Raise sandshoes on all three swivel jacks (1) and rotate up to store under Servicing Unit.
(12) Adjust position of sandshoes on jacks, as necessary, to ensure jacks (1) are tight against chassis.
(13) Release hand brake lever (2).
(14) Perform the Before PMCS procedures Steps 6C and 8A that require the trailer to be coupled with the towing vehicle and its connections.

c. Towing Instructions.

WARNING

Before moving Servicing Unit, ensure that all loose equipment is properly stowed and that nothing will drag on the ground. Failure to follow this warning may result In Injury to personnel or damage to equipment.

NOTE

When towing the Servicing Unit, overall length of the unit must be kept In mind when passing other vehicles and when turning.

Turning and backing operations will be affected because the towing vehicle and Servicing Unit are a hinged unit.

Always tow the Servicing Unit at safe speeds and note any driving Irregularities.

When backing Servicing Unit maintain a low speed. The surge actuator will engage and the brakes will be applied, if the Servicing Unit is backed up too fast

d. Parking
   (1) When parking for extended periods, set the handbrakes on both towing vehicle and Servicing Unit.
   (2) If the towing vehicle and Servicing Unit are parked on a hill with a slope greater than 5% grade, chock wheels and lower the three swivel jacks.

e. Uncoupling Trailer from Towing Vehicle

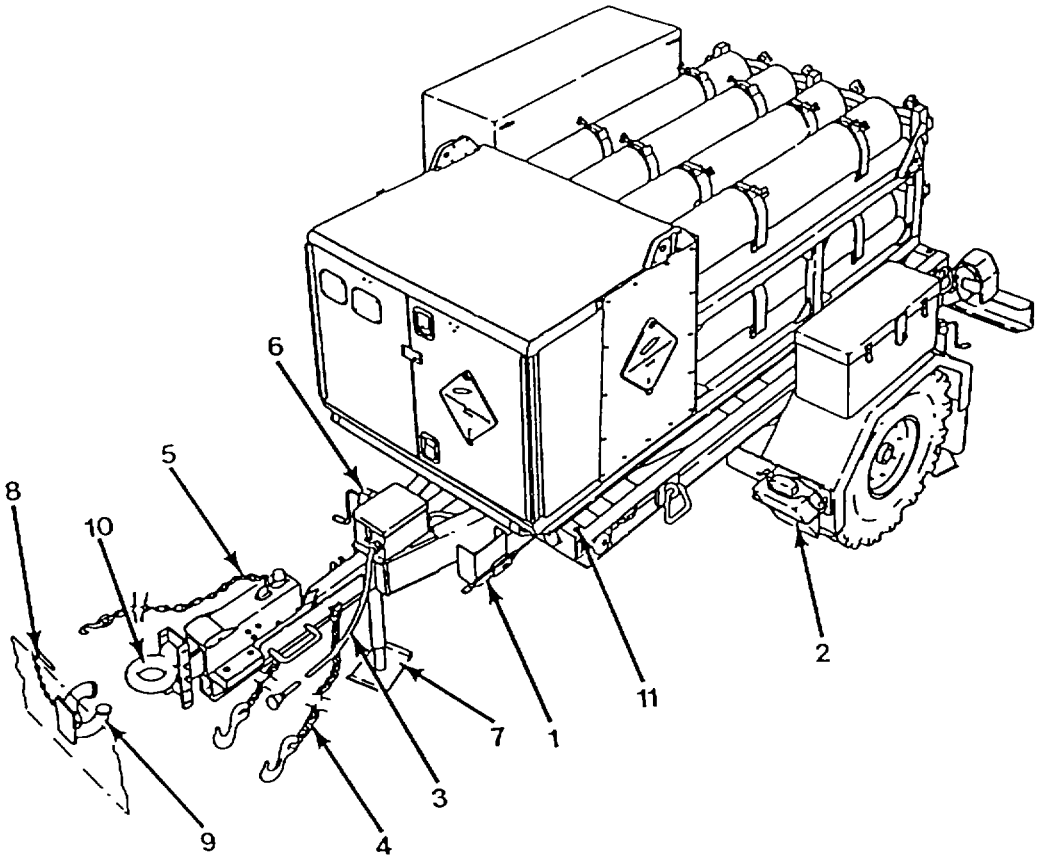


Figure 2-4. Uncoupling Trailer from Towing Vehicle.

   (1) Fully engage the handbrake (1) and place chock blocks (2) according to the slope.
   (2) Disconnect intervehicular cable (3) from towing vehicle receptacle and stow on Servicing Unit.
   (3) Disconnect safety chains (4) from towing vehicle eyebolts and stow on Servicing Unit.
   (4) Disconnect the emergency brake chain (5) from the towing vehicle and stow on Servicing Unit.
   (5) Rotate all three swivel jacks (6) downward.
   (6) Lower swivel jack sandshoes (7) until they contact ground.
   (7) Remove pintle lockpin (8) and open pintle (9), continue lowering the front swivel jack (6) until the lunette eye (10) disengages from the pintle.
   (8) Move towing vehicle a safe distance from trailer.
   (9) Using the circular levels (11) as a guide, readjust position of all three jacks (6), as necessary to level the Servicing Unit.
  (10) Perform all After PMCS in Table 2-1.

2-5. SAFETY PROCEDURES PRIOR TO OPERATION OF THE COMPRESSED GAS SYSTEM

a. Safety Precautions. The following safety precautions are necessary for the safe operation of the Servicing Unit:

(1) Only qualified operators knowledgeable in the operation of high pressure breathing air equipment and with complete knowledge of the controls and indicators on the Servicing Unit should attempt these procedures.
(2) When handling opened connections care should be taken not to contaminate control panel ports and hose end fittings. Under certain conditions contamination such as oil, grease, dirt, and sand, etc. can cause combustion when in contact with a high pressure air source.
(3) Valves should always be opened slowly. Rapid acceleration and subsequent compression of breathing air at high pressures can cause extremely high temperatures that upon contact with contaminants can cause a combustion hazard.
(4) Care should be taken when working around high pressure air systems. Pressure should always be vented before hoses are connected or disconnected from the control panel. Also, hoses should never be stretched to reach a connection.
(5) Eye protection should be worn at all times during operation or when venting breathing air from the Servicing Unit.
(6) The Servicing Unit must be attended to at all times when recharging storage cylinders or charging SCUBA cylinders
(7) Strain reliefs must be connected prior to recharging of SCUBA cylinders. Failure to do so will result in an unsafe condition.

2-6. COMPRESSED GAS SYSTEM OPERATION: RECHARGING STORAGE CYLINDERS AFTER LONG TERM STORAGE

a. Preparing Servicing Unit for Recharge

WARNING

Care should be taken when working around high pressure air systems. Pressure should always be vented before hoses are connected or disconnected from the control panel. Failure to follow this warning may result in personnel injury or death.

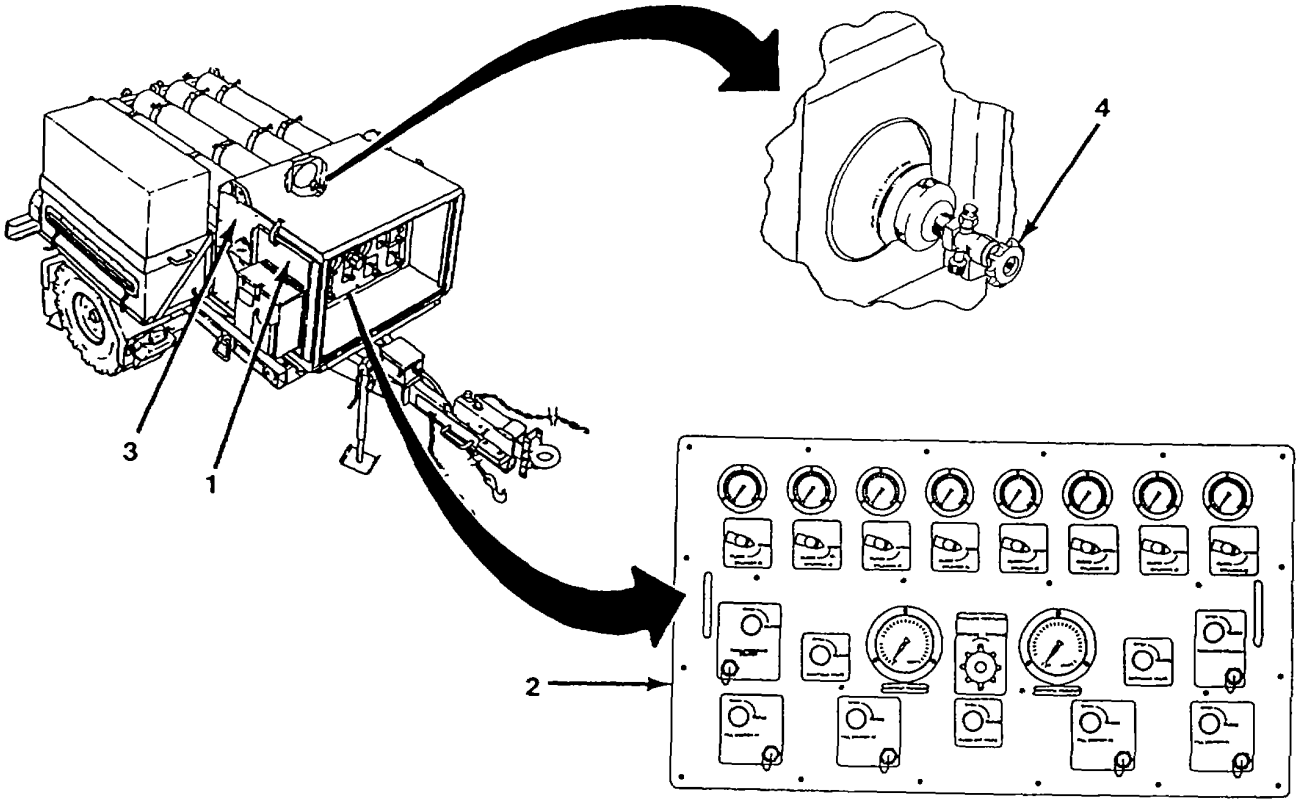


Figure 2-5. Preparing Servicing Unit for Recharge After Long Term Storage.

(1) Verify that Servicing Unit is properly set for operation per paragraph 2-4, Step e. and all Before PMCS has been completed for the Compressed Gas System (See Table 2-1, items 9 through 16).
(2) Open the front doors (1) to gain access to control panel.
(3) Verify that servicing valve, recharge valve, and all 1/4-turn ball valves on the control panel (2) are closed.
(4) Remove the side panels (3) from the Servicing Unit control compartment.
(5) Open the valve on each storage cylinder (4).

b. Recharging Storage Cylinders

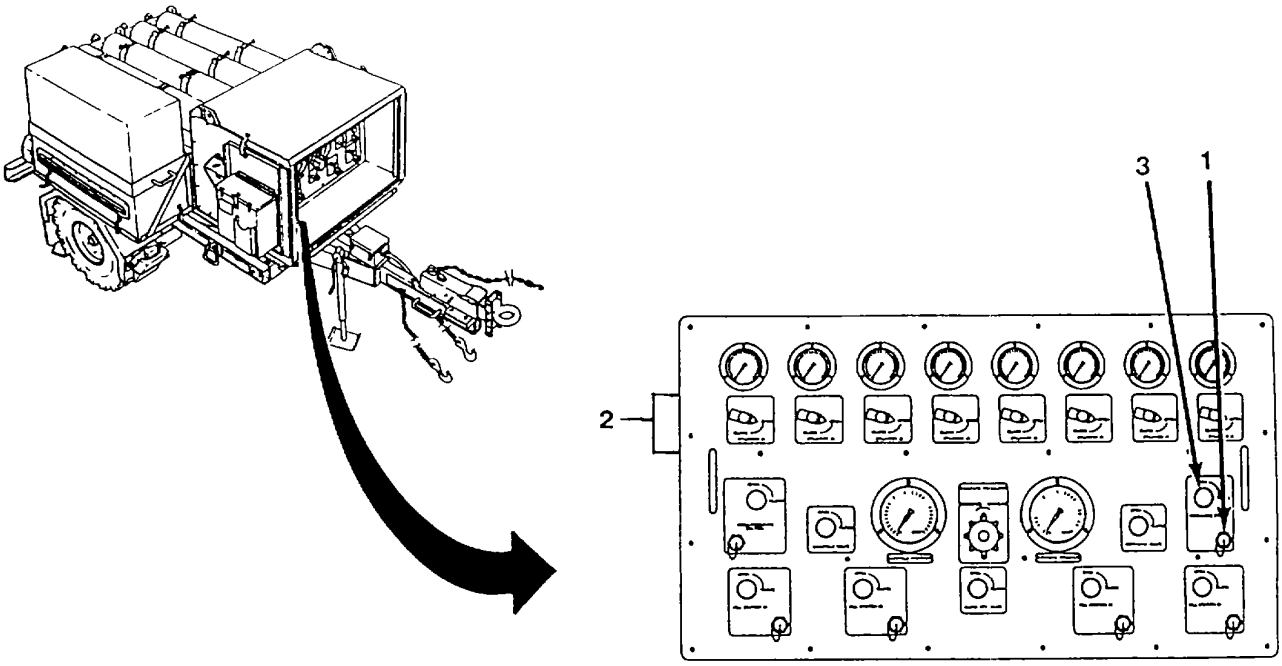


Figure 2-6. Recharging Servicing Unit After Long Term Storage

WARNING

The storage cylinders must be purged of dry nitrogen prior to filling with breathing air. Failure to follow this warning may result in an unsafe breathing media.

(1) Remove dust cap from recharge port (1).
(2) Slowly open all eight 1/4-turn ball valves (2).
(3) Open recharge valve (3) to vent dry nitrogen from storage cylinders.

WARNING

The storage cylinders should only be filled with compressed breathing air per BB-A-1034B, Grade A. Failure to follow this warning may result in contamination of the Servicing Unit and any SCUBA cylinders filled by the Servicing Unit.

(4) Using an adaptor, connect fill hose from the appropriate compressed air source to recharge port (1).
(5) Allow the cylinder to be recharged to approximately 300 psi in accordance with applicable T.M.
(6) Close recharge valve (3).
(7) Bleed pressure from the compressed air source fill hose per applicable T.M ,then disconnect the hose from the recharge port.
(8) Slowly open recharge valve to vent pressure from storage cylinders.
(9) Reconnect fill hose from the appropriate compressed air source to recharge port (1).
(10) Allow the cylinder to be recharged to approximately 300 psi in accordance with applicable T.M.
(11) When cylinder(s) have been recharged close recharge valve.
(12) Bleed pressure from the compressed air source fill hose, per applicable T.M. then disconnect the hose from recharge port.
(13) Take an air purity sample If sample is good continue to paragraph 2-7. If sample is bad Compressed Gas System may be contaminated. Notify unit maintenance.

c. Preparing Servicing Unit for Transport after Recharge.

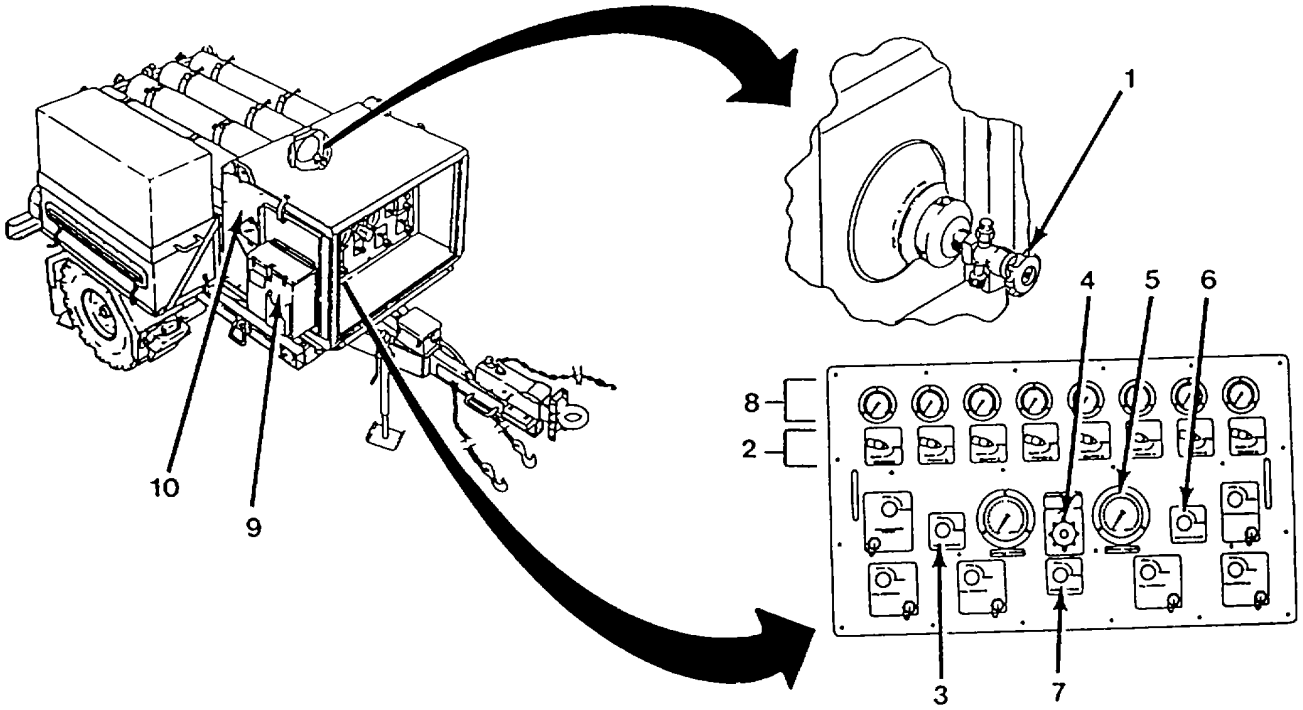


Figure 2-7. Preparing Servicing Unit for Transport

(1) Close all eight cylinder valves (1).
(2) Open all eight 1/4-turn ball valves (2).
(3) Slowly open manifold valve (3).
(4) Dial pressure regulator (4) until servicing pressure gauge (5) indicates pressure reading.
(5) Slowly open servicing valve (6).
(6) Slowly open bleed off valve (7) bleeding air from the Compressed Gas System.
(7) When air can no longer be heard venting from bleed off valve (7) and cylinder pressure gauges (8) read 0 psig close bleed off valve (7).
(8) Back off pressure regulator (4) and close all Servicing Unit control panel valves.
(9) Close control compartment front doors (9).
(10) Reinstall control compartment side panels (10).
(11) Perform After PMCS.

2-7. COMPRESSED GAS SYSTEM OPERATION: RECHARGING STORAGE CYLINDERS

a. Preparing Servicing Unit for Recharge

WARNING

Care should be taken when working around high pressure air systems. Pressure should always be vented before hoses are connected or disconnected from the control panel. Failure to follow this warning may result in personnel injury or death.

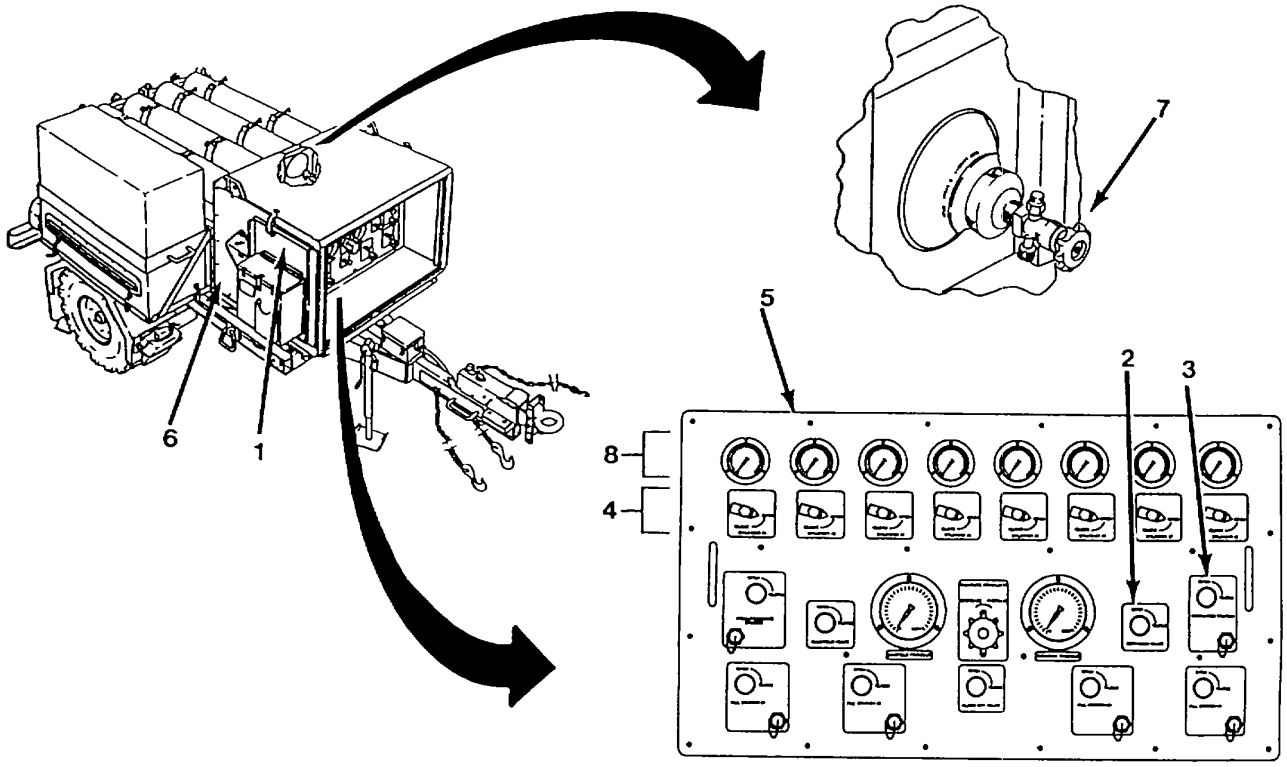


Figure 2-8. Preparing Servicing Unit for Recharge.

(1) Verify that the Servicing Unit is properly set for operation per paragraph 2-4 step e and all Before PMCS has been completed for the Compressed Gas System (See table 2-1, items 9 thru 16).
(2) Open the front doors (1) to gain access to control panel.
(3) Verify that the servicing valve (2), recharge valve (3), and all 1/4-turn ball valves (4) on the control panel (5) are closed.
(4) Remove the side panels (6) from the Servicing Unit control compartment.
(5) Slowly open the valve on each storage cylinder (7).
(6) Observe the reading on each storage cylinder pressure gauge (8) to determine which cylinders need to be recharged.
(7) Note which cylinders need recharged, then close cylinder valves (7) for all cylinders.

b. Recharging Storage Cylinders.

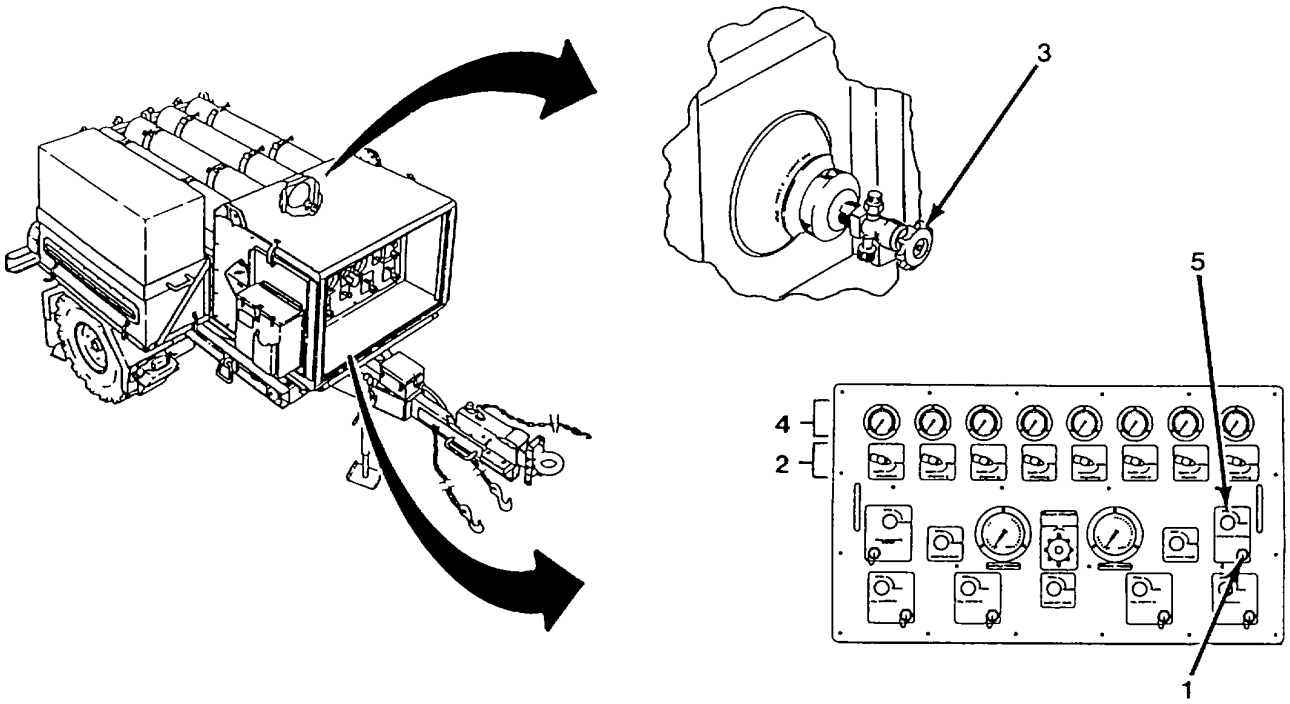


Figure 2-9. Recharging Storage Cylinders

(1) Remove dust cap from recharge port (1).

WARNING

The storage cylinders should only be filled with compressed breathing air per BB-A-1034B, Grade A. Failure to follow this warning may result in contamination of the Servicing Unit and any SCUBA cylinders filled by the Servicing Unit.

(2) Using adaptor, connect fill hose from the appropriate compressed air source to recharge port (1).

NOTE

Storage cylinders may be charged individually or together. To Individually charge cylinders only open the appropriate valves in steps 3 and 4.

(3) Slowly open all eight or the appropriate 1/4-turn ball valve(s) (2).
(4) Slowly open all eight or the appropriate cylinder valve(s) (3).
(5) If cylinders are to be charged together allow pressure in cylinders to equalize until readings on appropriate cylinder pressure gauges (4) are equal, ± 200 psi.
(6) Slowly open recharge valve (5) to allow the cylinder(s) to be recharged in accordance with applicable TM to a safe pressure (5,000 psi maximum).

WARNING

Never charge storage cylinders above the temperature compensated safe fill pressure. Failure to follow this warning may cause personnel injury, death, or equipment damage.

(7) When cylinder(s) have been recharged close recharge valve (5).
(8) If more cylinders are to be charged close cylinder valve to cylinder just charged and return to step (3) to charge the next cylinder.
(9) When all cylinders are recharged bleed pressure from the compressed air source fill hose, then disconnect the hose from recharge port (1). Remove, bag, and stow the adaptor.
(10) Install dust cap on recharge port (1).

c. Preparing Servicing Unit for Transport after Recharge.

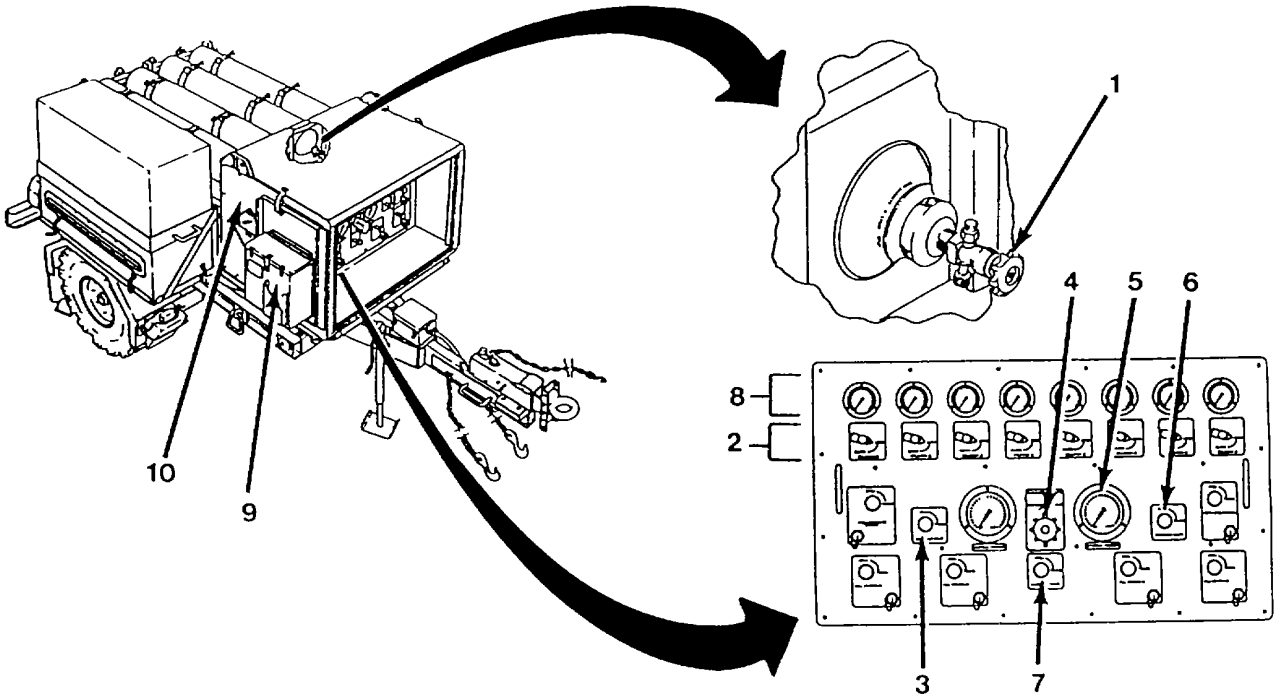


Figure 2-10. Preparing Serving Unit for Transport.

(1) Close all eight cylinder valves (1).
(2) Open all eight 1/4-turn ball valves (2).
(3) Slowly open manifold valve (3).
(4) Dial pressure regulator (4) until servicing pressure gauge (5) indicates pressure reading.
(5) Slowly open servicing valve (6).
(6) Slowly open bleed off valve (7) bleeding air from the Compressed Gas System.
(7) When air can no longer be heard venting from bleed off valve (7) and cylinder pressure gauges (8) read 0 psig close bleed off valve (7).
(8) Back off pressure regulator (4) and close all Servicing Unit control panel valves.
(9) Close control compartment front doors (9).
(10) Reinstall control compartment side panels (10).
(11) Perform After PMCS.

2-8. COMPRESSED GAS SYSTEM OPERATION: CHARGING SCUBA CYLINDERS.

a. Preparing Servicing Unit for Charging.

WARNING

Care should be taken when working around high pressure air systems. Pressure should always be vented before hoses are connected or disconnected from the control panel. Failure to follow this warning may result in personnel injury or death.

COMBUSTION HAZARD. When handling end connections care should be taken not to contaminated the Compressed Gas System. Failure to follow this warning may result in personnel injury, death or damage to equipment.

(1) Verify that the Servicing Unit is properly set for operation per paragraph 2-4, step e. and all Before PMCS has been completed for the Compressed Gas System (See table 2-1, items 9 thru 16).

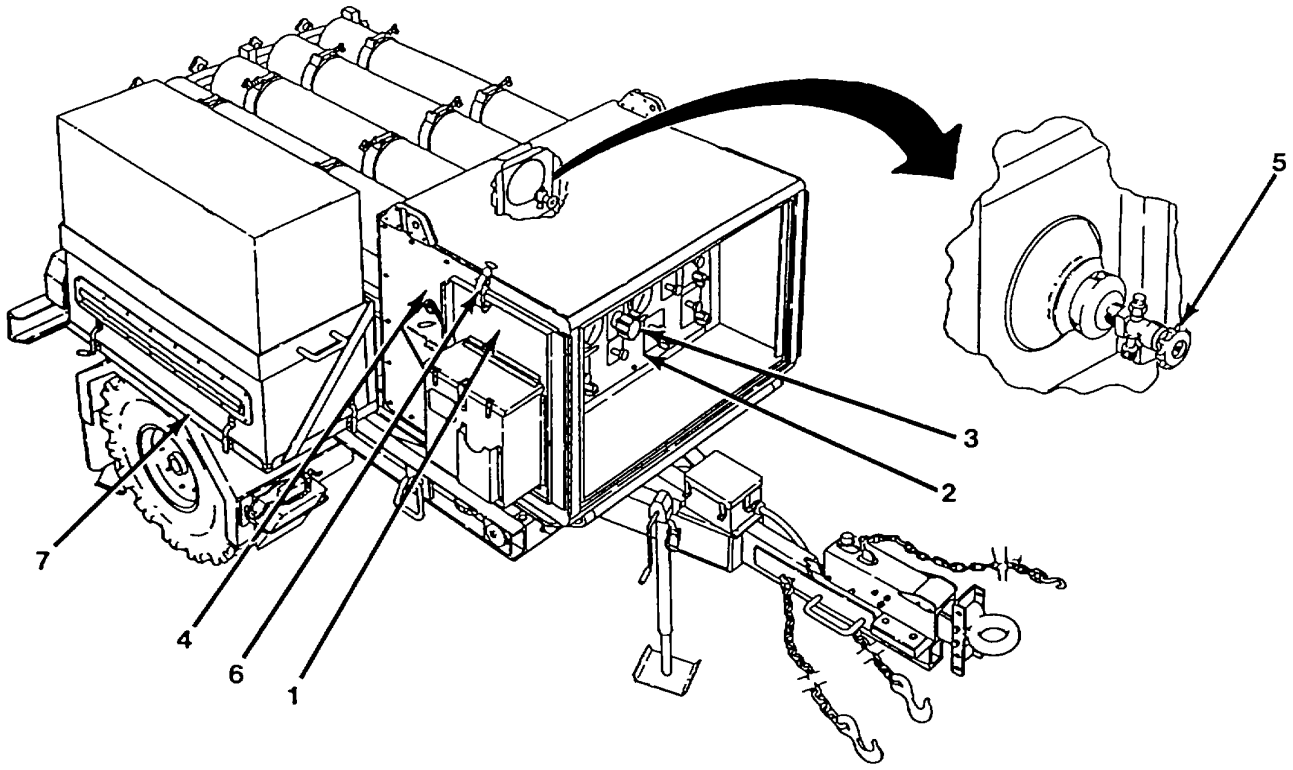


Figure 2-11. Preparing Servicing Unit for Charging.

(2) Open the front doors (1) to gain access to control panel.
(3) Verify that all valves on the control panel (2) are closed and pressure regulator (3) is completely backed off.
(4) Remove the side panels (4) from the Servicing Unit control compartment.
(5) Slowly open the cylinder valve (5) on each storage cylinder.
(6) Secure the doors to control compartment sides with the holders (6).

CAUTION

If mounting trough on trailer bumper, the rear jacks must be lowered. Failure to follow the precaution may cause equipment damage.

NOTE

The filling trough may be used to Increase the safe SCUBA cylinders charging rate. If the trough is not going to be used proceed to paragraph b., step 2.

The following procedure requires two personnel.

(7) Remove trough from it's mounting base (7) and position on the ground within 10' of control panel or on trailer back bumper.
(8) Verify drain valves on trough are closed, then fill trough with water until trough is approximately half-full.

b. Charging SCUBA Cylinders.

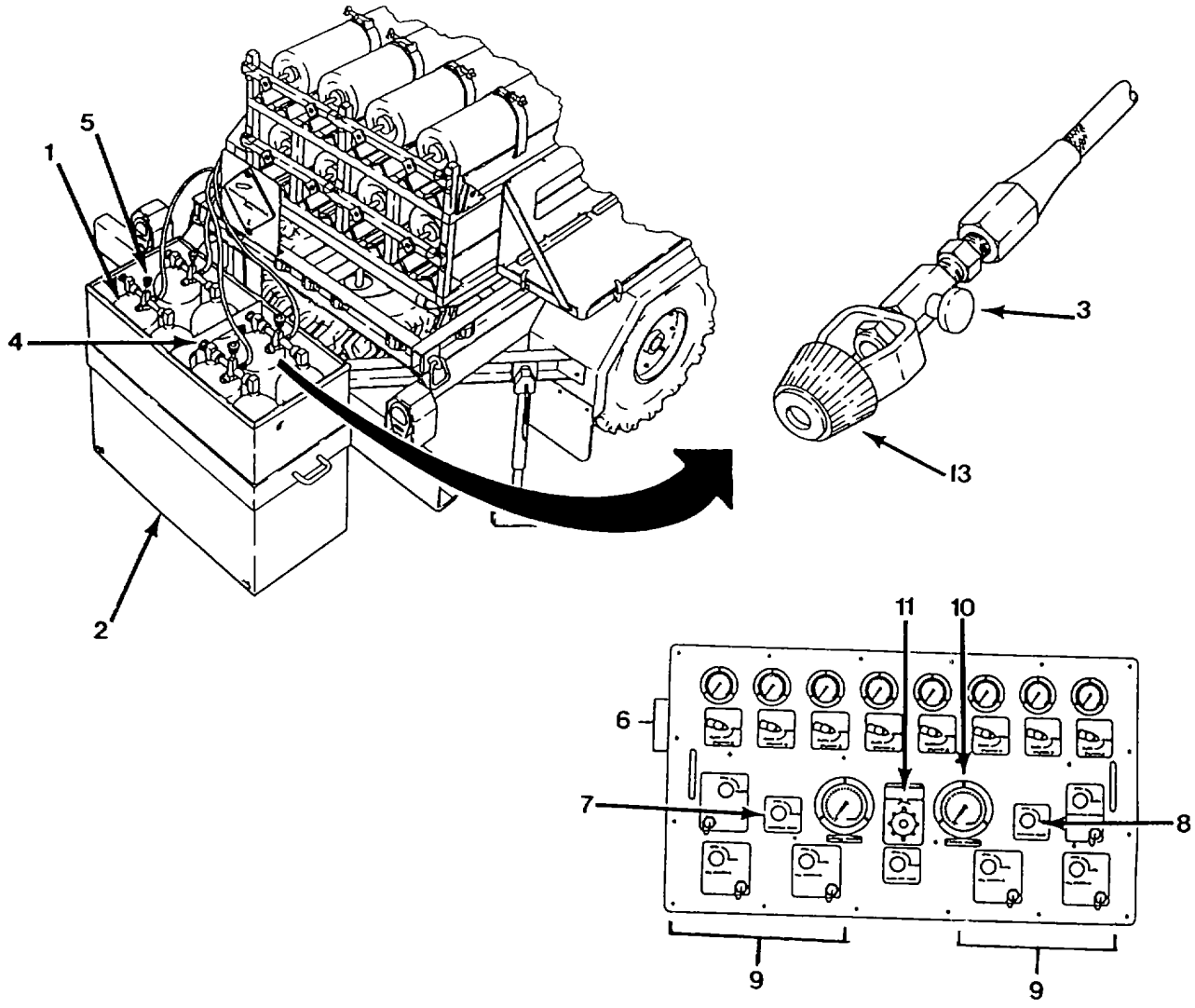


Figure 2-12. Charging SCUBA Cylinders.

(1) Position SCUBA cylinder(s) (1) to be charged in trough (2).
(2) Remove dust caps from fill stations #1 through #4 at the control panel and connect fill hose(s) and strain reliefs to stations as needed.
(3) Connect fill hose(s) and strain reliefs to SCUBA cylinder(s) (1).
(4) Ensure bleed screw (3) on each yoke adaptor is closed.
(5) Ensure reserve valve (4) on each SCUBA cylinder is in the down position.
(6) Fully open the ON/OFF valve (5) on each of SCUBA cylinder then back off on valve 1/4 turn.

NOTE

To efficiently utilize the air within each storage cylinder, a cascading mode of operation is optimal. This allows air from the cylinder with the lowest pressure reading to be used first.

(7) Slowly open 1/4-turn ball valve (6) for storage cylinder with the lowest pressure reading.
(8) Slowly open manifold valve (7).

WARNING

Never exceed a charging rate of 200 psi/min with SCUBA cylinders out of a filling trough or 400 psi/min with cylinders In a filling trough. Failure to follow this warning may result in personnel injury, death or damage to equipment.

CAUTION

When charging SCUBA cylinders with rated working pressures of less than 3000 psi special attention should be paid so as to avoid over pressurizing the SCUBA cylinders. The relief valve is set for cylinders with working pressures of 3000 psi.

(9) Open servicing valve (8) and appropriate fill station valve(s) (9).
(10) While monitoring servicing pressure gauge (10), adjust pressure regulator (11) until a safe charging rate is achieved.
(11) Continue adjusting pressure regulator(11) as necessary to maintain a safe charging rate until desired SCUBA cylinder pressure has been reached or reading of servicing pressure gauge (10) and cylinder gauge (12) are equal + or - 100 psi.
(12) Slowly close manifold valve (7).
(13) Close 1/4-tum ball valve (6) for cylinder just used for charging and slowly open 1/4-turn ball valve for cylinder with the next lowest pressure reading.
(14) Slowly open manifold valve (7).
(15) Repeat steps 10 through 14 as necessary until reading of outlet pressure gauge is equal to safe SCUBA cylinder charging pressure as determined in Navy diving manual 0927-LP-0019010.
(16) Close servicing valve (8) and fill station valves (9) opened for charging.
(17) Close ON/OFF valves (5) on charged SCUBA cylinders(1).
(18) Back off on bleed screw (3) of each yoke adaptor (13) to vent pressure from fill hose(s).
(19) Tighten bleed screw (3) when air can no longer be heard venting from hose(s), then disconnect yoke adaptor(s) (13) from SCUBA cylinder(s) (1).

NOTE

If more SCUBA cylinders are to be charged repeat steps 1 through 19. If charging operations are complete proceed to paragraph c.

c. Preparing Servicing Unit for Transport after Charging SCUBA Cylinders

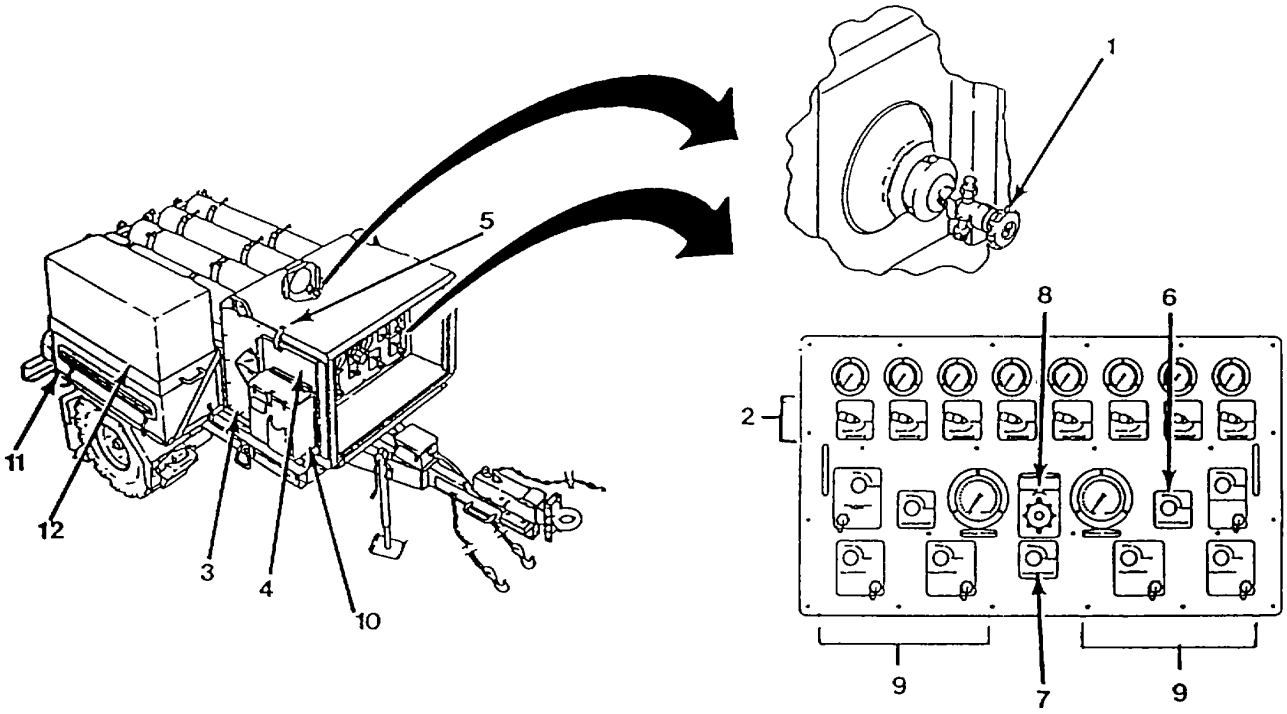


Figure 2-13. Preparing Servicing Unit for Transport.

(1) Close all eight cylinder valves (1) and slowly open all eight 1/4-tum ball valves (2).
(2) Reinstall the side panels (3) and secure the doors (4) to control compartment sides with the holders (5).
(3) Slowly open servicing valve (6) and bleed off valve (7) and allow Compressed Gas System to be vented.
(4) When air can no longer be heard venting, completely open bleed off valve (7) to ensure all air has been vented, then close bleed off valve (7).
(5) Close all valves on the control panel and back off on pressure regulator (8).
(6) Disconnect fill hose(s) from fill station(s) and install dust cap(s) on fill station(s) (9).
(7) Bag and stow fill hose(s) in gas system tool box (10).
(8) If trough (12) was used, drain the water from the trough, and secure trough to mounting base (11).
(9) Close control compartment doors.
(10) Perform after PMCS.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-9. GENERAL.

This section contains instructions for safely operating the Mobile Compressed Gas Servicing Unit under unusual conditions. In addition to normal preventive maintenance service, special care must be taken to keep the trailer operational in extreme temperatures and humidity. This section also includes references for the decontamination of the Mobile Compressed Gas Servicing Unit.

2-10. OPERATION IN EXTREME COLD.

a. Special care must be taken when operating the towed vehicle in cold weather. Refer to FM 21-305 for special instructions for all towed vehicles.

b. Refer to Chapter 3, Section I, for proper lubrication during extreme cold weather.

c. Care must be taken when handling cables. Extreme cold weather can cause insulation material on electrical wire to crack, causing short circuits. Construction materials may become hard, brittle, and easily damaged or broken.

d. When parking for any period of time in temperature below 0° F (-18º C), park in a sheltered area out of the wind and clean off any buildup of ice or snow. Place a footing of planks or brush under tires and swivel jacks to prevent them from freezing to the ground. Ensure that the tires are properly inflated. Underinflated tires will freeze, resulting in flat spots.

2-11. OPERATION IN EXTREME HEAT.

a. Refer to Chapter 3, Section I, for proper lubrication during extreme heat conditions.

b. Do not park the Servicing Unit in sunlight for long periods of time. Heat and sunlight shorten tire life. Additionally, excessive heat may increase cylinder pressure to a potentially dangerous level.

c. Shelter the Servicing Unit , when possible.

2-12. OPERATION IN SANDY OR DUSTY AREAS

a. Clean, inspect, and lubricate the Servicing Unit Trailer more often in sandy or dusty areas (Chapter 3, Section 1).

b. Maintain proper tire pressure:

(1) Reduce tire pressure to 35 psi (241 kPa) for flotation on soft sand and for operation on cross country terrain.

(2) Tire pressure must be returned to 60 psi (413 kPa) when operation resumes on hard-surface roads if tactical situation permits.

c. Take precautions to prevent breathing air connections from becoming contaminated with sand and dust. Always install dust caps on RECHARGE STATION, HIGH PRESSURE STATION, and four FILL STATION ports immediately after use.

d. Keep lid on Compressed Gas System tool box closed and drain plugs installed when not in use.

2-13. OPERATION IN SALTWATER AREAS.

a. Clean, inspect, and lubricate the Servicing Unit Trailer more often when operating in saltwater areas (Chapter 3, Section I).

2-14. OPERATION IN MUD.

a. Immediately after operation In mud, thoroughly clean, inspect, and lubricate if tactical situation permits (Chapter 3, Section I).

b. Check gear oil for contamination and level in the hub and drum assembly's sight glass (Chapter 3, Section 1).

2-15. OPERATION IN SNOW.

a. Refer to FM 21-305 for special instructions on driving hazards in snow.

b. Reduce tire pressure to 35 psi (241 kPa).

2-16. FORDING.

a. The Servicing Unit is designed and tested to ford water crossings that do not exceed the center line of the axle assembly's hub and drum. Refer to the towing vehicle operating Instructions for information on fording. Towing vehicle instructions are also applicable to the Servicing Unit.

b. Refer to TM 9-238 for fording instructions.

2-17. DECONTAMINATION PROCEDURES.

NOTE

DETAILED DECONTAMINATION AND PROTECTION PROCEDURES CAN BE FOUND IN: FM 3-4 & FM 3-5.

GENERAL:

THE FOLLOWING EMERGENCY PROCEDURES CAN BE PERFORMED UNTIL THOROUGH DECON FACILITIES ARE AVAILABLE THE COMMANDER WILL SUPERVISE, ASSIGN CREW DUTIES, AND ASSIST THE SUPPORTING NBC UNIT.

EMERGENCY PROCEDURES:

IF NBC ATTACK IS KNOWN OR SUSPECTED, MASK AT ONCE AND CLOSE ALL DOORS TO SEAL THE SERVICING UNIT. IF THE SEALED SYSTEM IS CONTAMINATED IT MAY BE EVACUATED TO A CLEAN AREA AND THE OUTER PORTION DECONTAMINATED AS AN OPERATIONAL DECON. DO NOT UNMASK UNTIL TOLD TO DO SO. IN THE EVENT BREATHING AIR COMPONENTS ARE CONTAMINATED THEY MUST BE REPLACED PRIOR TO TESTING THE SYSTEM.

NUCLEAR DECONTAMINATION:

BRUSH FALLOUT FROM SKIN, CLOTHING, AND EQUIPMENT WITH AVAILABLE BRUSHES, RAGS, AND TREE BRANCHES. WASH SKIN AND HAVE RADIATION CHECK MADE AS SOON AS TACTICAL SITUATION PERMITS. (YOU CAN FIND INSTRUCTIONS FOR THE CHECK IN FM 3-5).

BIOLOGICAL DECONTAMINATION:

BIOLOGICAL DECONTAMINATION MUST BE COMPATABLE WITH THE BIOLOGICAL AGENT. FM 3-5 MUST BE USED TO IDENTIFY SPECIFIC PROCEDURES.

CHEMICAL DETECTION AND DECONTAMINATION:

WARNING

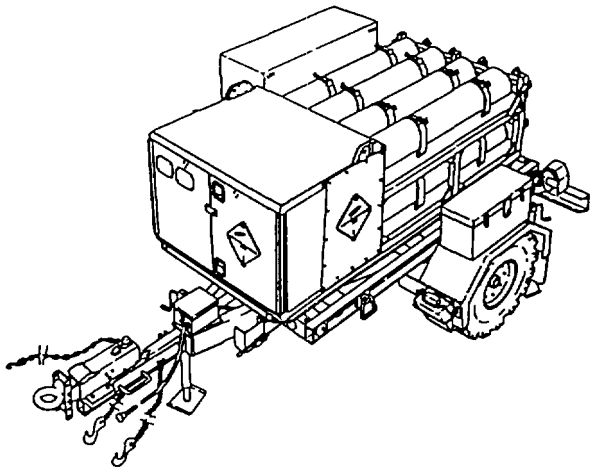
DO NOT USE DECONTAMINATION SPRAY ON PERSONNEL: IT COULD CAUSE PERSONAL INJURY.

USE THE CHEMICAL AGENT MONITOR (CAM) TO DETECT THE CHEMICAL AGENT. ALSO THE M8 PAPER FROM THE M256 CHEMICAL AGENT DETECTOR KIT OR M9 PAPER MAY BE USED TO DETERMINE IF LIQUID IS PRESENT ON THE VEHICLE SURFACE.

IF EXPOSURE TO LIQUID AGENT IS KNOWN OR SUSPECTED, CLEAN EXPOSED SKIN, CLOTHING, AND PERSONAL GEAR, IN THAT ORDER, USING M258A1 KIT. USE THE BUDDY SYSTEM. WASH EXPOSED SKIN AND THOROUGHLY DECONTAMINATE AS SOON AS TACTICAL SITUATION PERMITS.

IF THE M8 OR M9 PAPER INDICATES THAT LIQUID CHEMICAL AGENT IS PRESENT ON THE VEHICLE SURFACE USE THE M-13 DECON APPARATUS FOR OPERATIONAL DECON OF THE SERVICING UNIT. AVOID GETTING LIQUID AGENT INTO THE SEALED SYSTEM. SPRAY ONLY SURFACES THAT WILL BE TOUCHED BY THE CREW OR OPERATOR.

DECON PROCEDURES TAKE TIME. DO AS MUCH AS YOU CAN BASED ON THE TACTICAL SITUATION.



CHAPTER 3

OPERATOR MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3-1. LUBRICATION INSTRUCTIONS

a. The Servicing Unit Trailer must receive lubrication with approved lubricants at recommended intervals in order to be mission-ready at all times. These lubricants or the cleaning solvent identified in these instructions, should never be used in conjunction with the breathing air components of the Compressed Gas System. Cleaning instructions for the Compressed Gas System components are contained in Chapter 4, Section VII.

b. The lubrication chart, Table 3-1, shows lubrication points, names items to be lubricated, the required lubricant, and recommended intervals for lubrication Any special lubrication instructions required for specific components are contained in the NOTES section of the chart.

c. Recommended intervals are based on normal conditions of operation, temperature, and humidity When operating under extreme conditions, lubricants should always be changed more frequently. When in doubt, notify your supervisor.

d. Keep all lubricants in a closed container and store in a clean, dry place away from extreme heat Keep container covers clean and do not allow dust, dirt, or other foreign material to mix with lubricants. Keep all lubrication equipment clean and ready for use.

e. Maintain a record of lubrication performed and report any problems noted during lubrication. Refer to DA PAM 738-750 for maintenance forms and procedures to record and report any findings.

WARNING

Gear oil leaking from the hub and drum assembly may soak the brakeshoe linings, making them inoperative. If this occurs have unit maintenance replace them. Failure to follow this warning may cause brakes to malfunction, resulting in serious injury.

f. Keep all external parts of equipment not requiring lubrication free of lubricants. After lubrication, wipe off excess oil or grease to prevent accumulation of foreign matter.

g. Refer to FM 9-207 for lubrication instructions in cold weather.

h. Refer to TM 9-238 for lubrication instructions before and after fording operations. After fording operations have been conducted the oil level in the hub and drum assembly should be checked for contamination.

i. After operation in mud, sandy, or dusty conditions, clean and inspect all points of lubrication for fouled lubricants. Change lubricants, if required.

LUBRICATION CHART

SERVICING UNIT, COMPRESSED GAS, MOBILE

NSN: 4220-01-369-7915

FOR TRAILER ONLY

Intervals (on-condition and hard time) and related man-hour times are based on normal operation. The man-hour time specified is the time you need to do all the services prescribed for a particular interval. Decrease the intervals if your lubricants are contaminated, or if you are operating equipment under adverse conditions, including longer-than-usual operating hours. The intervals may be extended during periods of low activity. If extended, adequate preservation precautions must be taken.

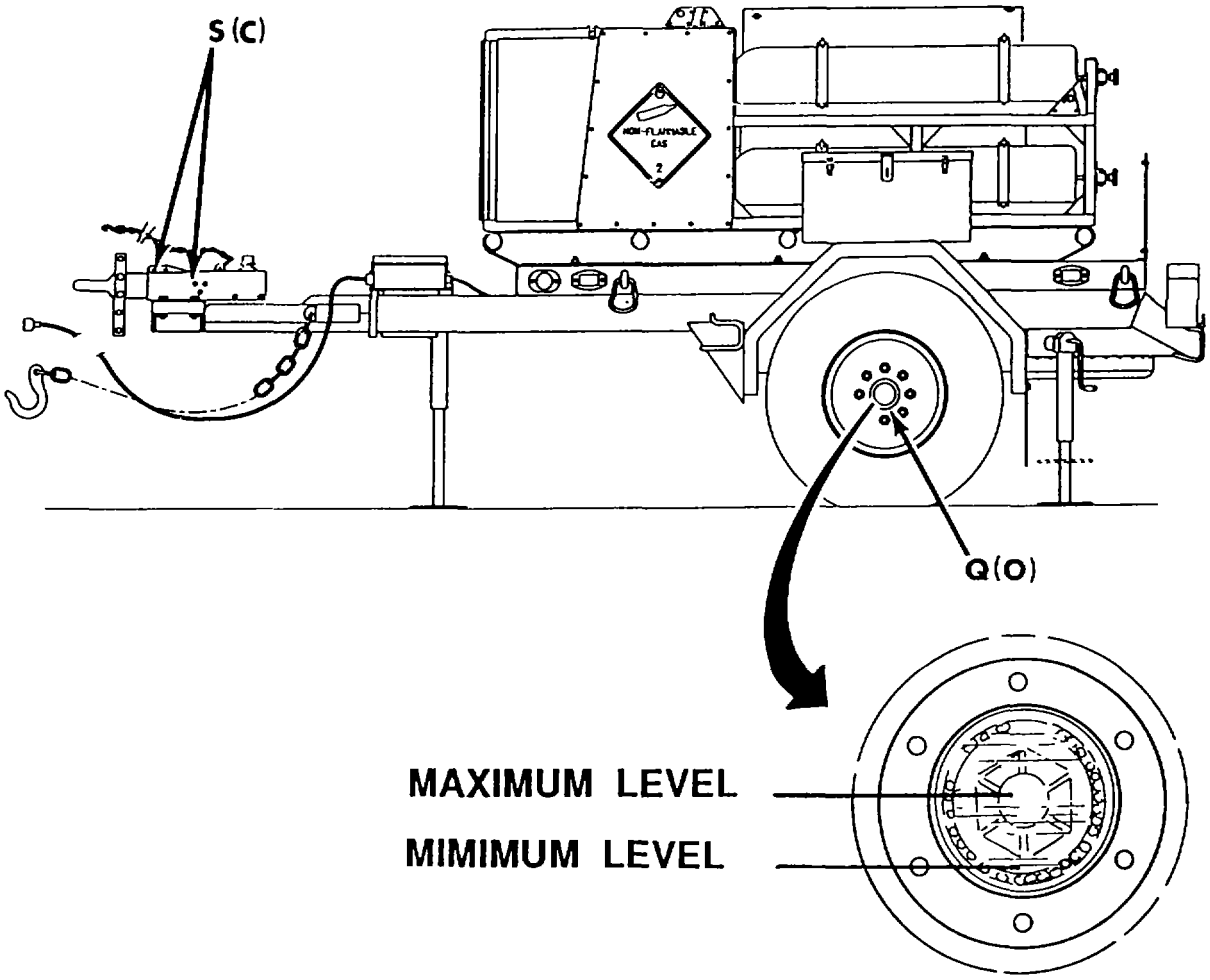
WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves, and use only in well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F 130°F (38°C 59°C). If you become dizzy while using cleaning solvent, immediately wash your eyes and obtain medical aid.

Clean all fittings and the area around lubrication points with dry cleaning solvent (Item 15, Appendix E) or equivalent before lubricating equipment. After lubrication, wipe off excess oil or grease to prevent accumulation of foreign matter.

The lowest level of maintenance authorized to lubricate a point is indicated in parentheses by one of the following: (C) Operator/Crew, or (O) for Unit Maintenance.

Table 3-1. Lubrication Instructions (Sheet 1 of 2)



TOTAL TASK-HOUR*	
INTERVAL	TASK-HOUR
Q	0.5
S	0.2

* The task-hours time specified is the time you need to do all services prescribed for a particular interval.

NOTES:

1. Gear oil (per MIL-L-2015) is changed/added at the hub and drum assembly using a hex wrench to remove the plug. Inspection of the oil level and potential contamination is a daily PMCS task. Changing the oil is scheduled on a quarterly basis.
2. There are four (4) grease points on the surge actuator. Grease must be applied every six months, per MIL-G-10924, or more frequently when severe or dusty conditions exist.

Table 3-1. Lubrication Instructions (Sheet 2)

Section II. SERVICE UPON RECEIPT

3-2. PREPARATION FOR FIRST TIME USE.

The Servicing Unit may arrive crated or unboxed on a common carrier, depending on whether the destination is stateside or overseas.

a. **Crated**. There are no special precautions necessary for uncrating if the Servicing Unit arrives in a container Disassemble the crate to the extent necessary to remove the Servicing Unit.

b. **Unboxed**. If the Servicing Unit arrives on a common carrier, safety precautions necessary to prevent injury to personnel or damage to the unit during unloading must be observed.

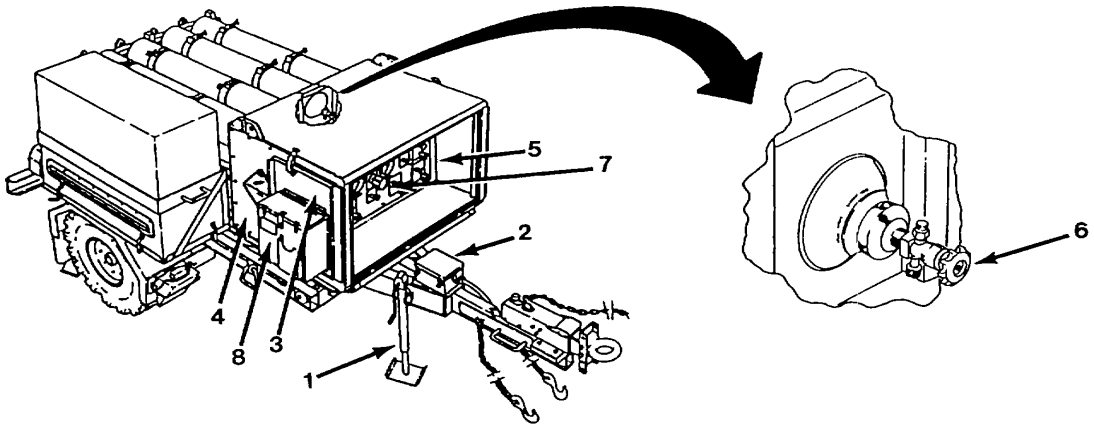


Figure 3-1. Service Upon Receipt

NOTE

The servicing pressure gauge, manifold pressure gauge, and relief valves must be calibrated.

(1) Perform a visual inspection to ensure no obvious shipping damage has occurred.
(2) Perform the "Before" PMCS as described in paragraph table 2-1.
(3) Ensure one front and two rear swivel jacks (1) operate smoothly in both directions through full range of motion.
(4) Open lid on electrical box (2) and ensure wiring and components inside box are undamaged. Then close and secure lid.
(5) Open control compartment front doors (3) and remove the side panels (4).
(6) Ensure all components mounted on control panel (5) are undamaged and securely mounted.
(7) Ensure all piping and connections of Compressed Gas System are undamaged and tightened.
(8) Ensure all eight cylinder valves (6) are closed.
(9) Check operation of all valves and pressure regulator on control panel (7) All valves and regulator should operate smoothly without binding in both directions.
(10) Open Compressed Gas System tool box (8) and ensure fill hoses are undamaged. Then close and secure tool box.
(11) Reinstall control compartment side panels (4) and close front doors (3).
(12) Check shipping/equipment log If cylinders have been charged with nitrogen for storage purposes proceed to paragraphs 2-5 and 2-6. If not, proceed to step 13.
(13) Charge eight storage cylinders on Servicing Unit per paragraphs 2-5 and 2-7, and perform a soap-solution check on the unit per Chapter 4, Section VII.

Section III. OPERATOR/CREW TROUBLESHOOTING PROCEDURES

3-3. General.

a. This section provides information for identifying and correcting malfunctions which may develop while operating your Servicing Unit.

b. Before performing troubleshooting, read and follow all safety instructions found in the Warning Summary at the front of this manual.

c. This section cannot list all malfunctions/symptoms that may occur, nor all probable causes and corrective actions. If a malfunction/symptom is not listed, or is not corrected by the listed corrective actions, notify your supervisor. There are other malfunctions/symptoms that may occur to the Servicing Unit listed in Table 4-2. These are related to topics that may be found by unit maintenance personnel.

d. When troubleshooting a malfunction/symptom:

(1) Find the troubleshooting procedure for the malfunction in question in Table 3-1. Headings at top of each page show how each troubleshooting procedure is organized: MALFUNCTION/SYMPTOM, PROBABLE CAUSE (in step number order), and TEST OR INSPECTION/CORRECTIVE ACTION.

(2) Perform in the order listed until the malfunction is corrected. DO NOT perform any maintenance task unless the troubleshooting procedure tells you to do so.

e. The columns in Table 3-1 are defined as follows:

(1)	**MALFUNCTION**.	A visual or operational indication that something is wrong with the Servicing Unit.
(2)	**PROBABLE CAUSE**	A procedure that isolates the problem in a component or assembly.
(3)	**TEST OR INSPECTION/ CORRECTIVE ACTION**	A procedure to correct the problem.

Table 3-1. Operator/Crew Troubleshooting.

MALFUNCTION/SYMPTOM PROBABLE CAUSE TEST OR INSPECTION/CORRECTIVE ACTION
ELECTRICAL SYSTEM
1. ALL LAMPS FAIL TO LIGHT .
Towing vehicle lights are turned off. Refer to towing vehicle technical manual for instructions.
Intervehicular cable does not have proper connection. Refer to towing vehicle technical manual for instructions.
Towing vehicle circuit breaker/fuse tripped. Refer to towing vehicle technical manual for instructions.

Table 3-1. Operator/Crew Troubleshooting (Continued).

MALFUNCTION/SYMPTOM PROBABLE CAUSE TEST OR INSPECTION/CORRECTIVE ACTION
2. ONE OR MORE LAMPS (BUT NOT ALL) FAIL TO LIGHT.
Loose plug connector at affected light assemblies.
Connect loose plug connector.
BRAKES
3. SERVICE BRAKES DO NOT ENGAGE WHEN SURGE ACTUATOR IS ENGAGED.
Brake fluid level is low in master cylinder at surge actuator.
Check level and fill to within 1/2 in. (13 mm.) of the top (paragraph 3-6).
4. WHEELS DO NOT ROLL WHEN SERVICING UNIT IS PUL LED FORWARD.
Parking brake hand lever is on.
Position parking brake lever to off.
Adjustment on hand lever is too tight.
Readjust hand brake lever as required (paragraph 3-4).
5. PARKING BRAKE DOES NOT ENGAGE WHEN HAND LEVER IS APPLIED.
Adjustment on hand lever is too loose.
Readjust hand brake lever as required (paragraph 3-4).
WHEEL AND TIRE ASSEMBLY
6. SERVICING UNIT HANDLES POORLY IN TOWING MODE.
Inflation of tires low or unequal.
Properly inflate tires to 60 psi.

Table 3-1. Operator/Crew Troubleshooting (Continued).

MALFUNCTION/SYMPTOM PROBABLE CAUSE TEST OR INSPECTION/CORRECTIVE ACTION
COMPRESSED GAS SYSTEM
7. EXCESSIVE TIME REQUIRED TO RECHARGE STORAGE CYLINDERS.
Manifold valve (MV117) open.
Close manifold valve.
8. CYLINDER PRESSURE GAUGE FOR ONE OR MORE (BUT NOT ALL) STORAGE CYLINDERS READS LOWER THAN RECHARGE PRESSURE.
Corresponding cylinder valve or 1/4-turn ball valve not opened.
Open valve (s).
9. SCUBA CYLINDER FILL RATE OF 400 PSI/MINUTE CANNOT BE ACHIEVED.
High pressure valve (MV119) or bleed off valve (MV204) open.
Close high pressure valve and bleed off valve.
Bleed valve on yoke adaptor(s) open.
Close bleed valve on yoke adaptor(s).

Section IV. OPERATOR MAINTENANCE

3-4. HANDBRAKE LEVER ADJUSTMENT.

WARNING

If Servicing Unit is not coupled to towing vehicle, ensure that wheels are securely checked, three swivel jacks are rotated downward, and leveled. Failure to do so may cause trailer to roll, resulting in injury to personnel or damage to equipment.

NOTE

Handbrake lever is properly adjusted when additional force is required to move handbrake lever beyond two-thirds distance of travel toward the applied position.

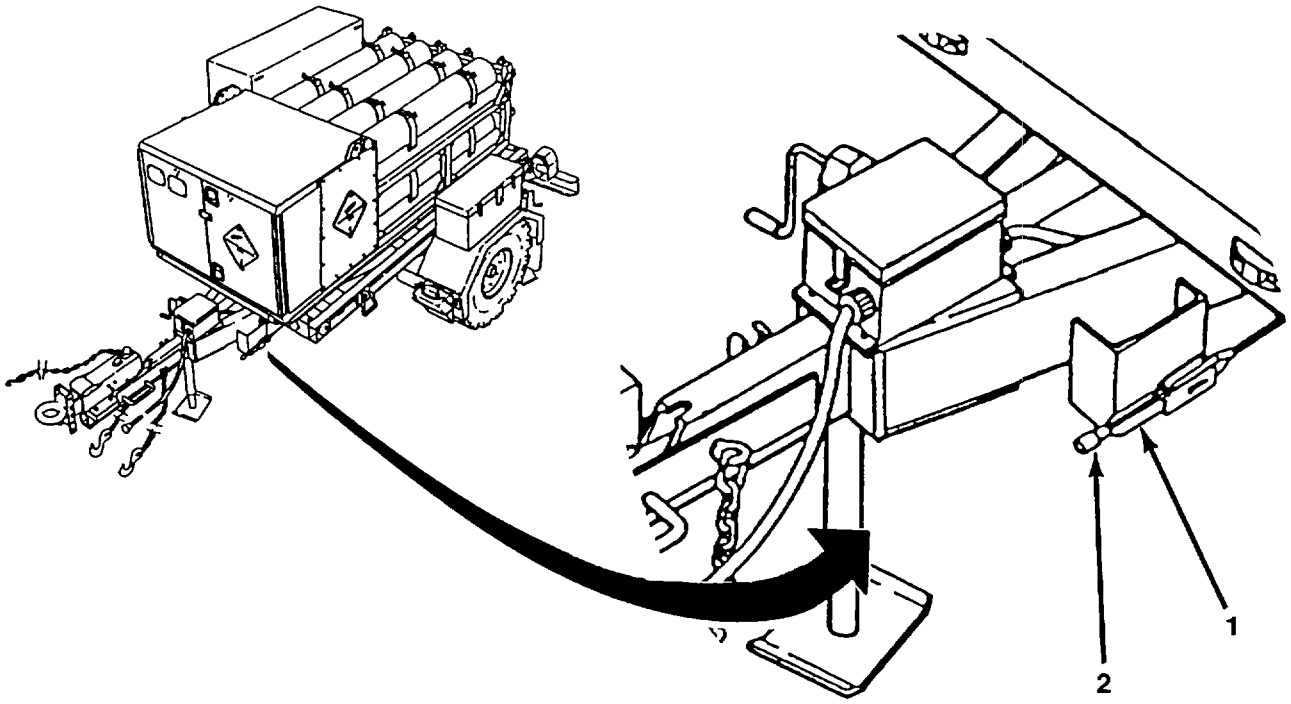


Figure 3-2. Handbrake Lever Adjustment.

(1) Release handbrake lever (1).
(2) Turn adjustment knob (2) clockwise to tighten or counterclockwise to loosen.
(3) Check adjustment. Repeat steps 1 and 2, as required.

3-5. WHEEL AND TIRE ASSEMBLY.

This task covers: **a. Removal b. Removal of Spare Tire c. Stowage of Damaged Tire d. Installation**

INITIAL SETUP:

Tools
Wrench Lug 15/16"
10" Adjustable Wrench

Materials/Parts Appendix D
Wiping Rag
Equipment Conditions
None

a. Removal.

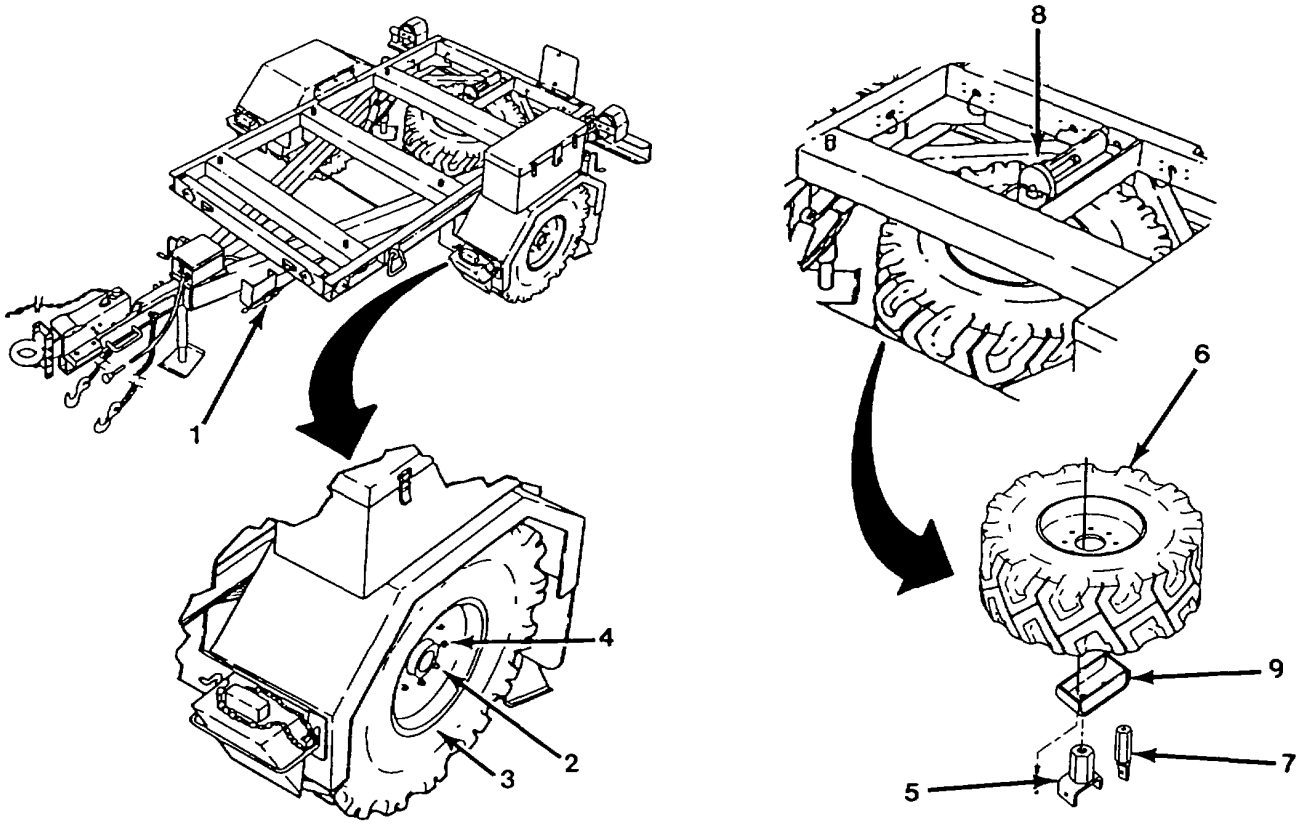


Figure 3-3. Wheel and Spare Tire Removal.

NOTE

This procedure requires two personnel

(1) Apply handbrake (1).
(2) Loosen, but do not remove eight nuts (2) from wheel (3)
(3) Position one front and two rear swivel jacks by rotating jacks downward. Raise trailer using applicable swivel jack until wheel is off ground.

(4) Remove eight nuts (2).
(5) Remove wheel from wheel studs (4).

b. Removal of Spare Tire
(1) Remove wing nut (5) from spare tire carrier.
(2) Remove wheel lock nut (7) from spare tire (6).
(3) Lower spare tire to ground using winch (8).
(4) When tire is on ground, pull holdown bracket (9) through center hole on wheel Pull tire out from under trailer.

c. Stowage of Damaged Tire
(1) Position tire under trailer and slip holdown bracket (9) through center hole on wheel.
(2) Lift tire up using winch (8) Stop lifting to adjust wheel to engage studs on carrier.
(3) Continue to lift until tire is tight against underside of chassis.
(4) Install wheel lock nut (7) and tighten.
(5) Install wing nut (5) and tighten.
(6) Back off on winch tension one full turn counter clockwise.
(7) Notify unit maintenance and exchange tires, when you return to your unit area.

d. Installation.
(1) Position wheel (1) on wheel studs (2).
(2) Install eight nuts (3) finger tight.
(3) Lower swivel jack until wheel is on ground.

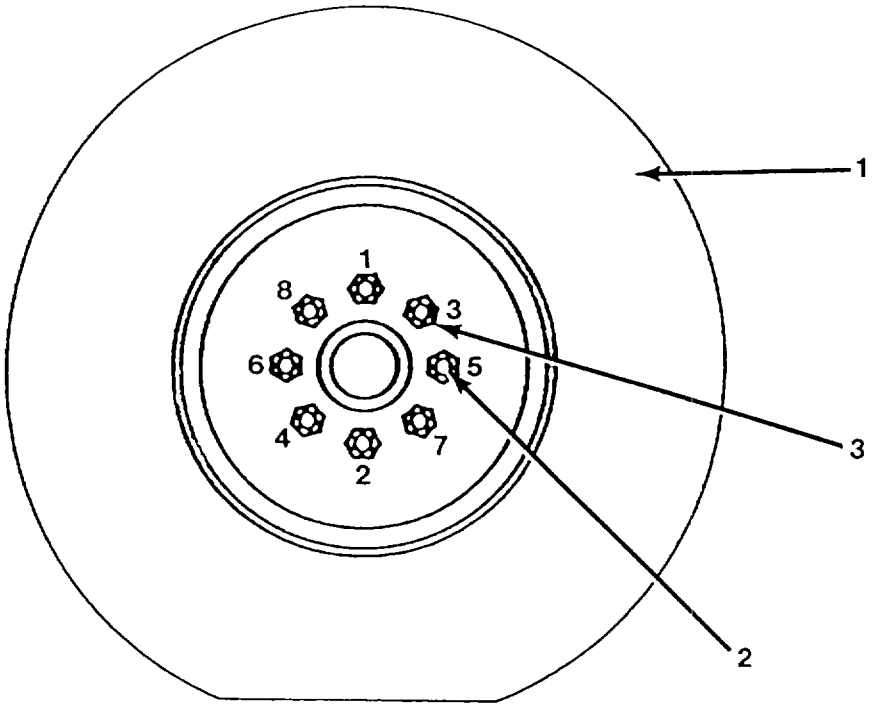


Figure 3-4. Wheel Installation

(4) Tighten eight nuts (3) using tightening sequence shown Have unit maintenance tighten nuts to 55-60 foot pounds, as soon as possible.

3-6. SERVICE SURGE ACTUATOR

This task covers: a. Filling the Master Cylinder

INITIAL SETUP:

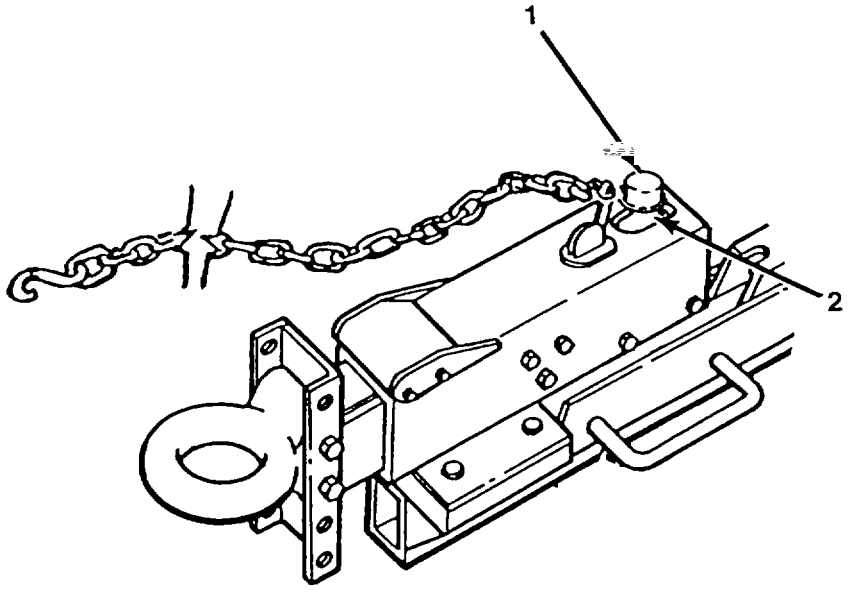
Tools
None

Materials/Parts Appendix D
Wiping Rag

Equipment Conditions
None

NOTE

This procedure covers filling the master cylinder with brake fluid. The lubrication of the surge actuator's grease points is described in paragraph 3-1



(1) Clean the area around the cap on master cylinder at surge actuator. Inspect for leakage. Refer to paragraph 2-3 for an explanation of the classes of leaks.
(2) Remove the hand tightened cap (1) on master cylinder (2). Clean thoroughly.
(3) Fill master cylinder reservoir (2) with brake fluid to within 1/2 in or 13 mm of the top.
(4) Replace cap (1) and ensure that all excess has been wiped away.

CHAPTER 4

UNIT MAINTENANCE INSTRUCTIONS

OVERVIEW

This chapter contains unit level preventive maintenance checks and services, troubleshooting, maintenance and instructions for placing the equipment into storage.

Section I. REPAIR PARTS; SPECIAL TOOLS; TEST MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); 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 your unit.

4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

Refer to Repair Parts and Special Tools List (RPSTL) TM5-4220233-24P and the Maintenance Allocation Chart pertaining to unit maintenance for the Mobile Compressed Gas Servicing Unit.

4-3. REPAIR PARTS.

Repair parts are listed and Illustrated In the RPSTL TM 5-4220-233-24P.

Section II. SERVICE UPON RECEIPT

4-4. SERVICE UPON RECEIPT.

The Mobile Compressed Gas Servicing Unit may arrive at your unit crated or unboxed on a common carrier. "Service Upon Receipt" instructions may be accomplished at the operator level Refer to Chapter 3, Section II for details. The Mobile Compressed Gas Servicing Unit requires annual calibration of the manifold pressure gauge, servicing pressure gauge, and relief valves.

Section III. UNIT LEVEL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-5. GENERAL.

To ensure that the Mobile Compressed Gas Servicing Unit is ready for operation at all times, it must be inspected on a regular basis so that defects may be found before they result in serious damage, equipment failure, or injury to personnel. This section contains systematic instructions on inspections, adjustments, and corrections to be performed by unit maintenance.

4-6. SERVICE INTERVALS.

a. Perform PMCS, found in Table 4-1, at the following intervals:
   (1) Perform Quarterly (Q) PMCS once every three months.
   (2) Perform Semiannual (S) PMCS once every six months.
   (3) Perform Annual (A) PMCS once each year.

4-7. REPORTING REPAIRS.

Report all defects and corrective actions on DA Form 2404. If a serious problem is found, report it to your supervisor immediately.

4-8. GENERAL PMCS PROCEDURES.

WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. Always wear protective goggles and gloves, and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point is 100°F-130°F(38° C-59° C). If you become dizzy while using cleaning solvent Immediately get fresh air and medical help. If solvent contacts eyes, immediately wash your eyes and get medical aid.

Do not use dry cleaning solvent P-D-680 on any Compressed Gas System components. Only use the cleaning agents specified in Chapter 4, Section VII for cleaning Compressed Gas System components. Use of unauthorized cleaning agents could result in personnel injury or death.

a. Keep equipment clean. Dirt, oil, and debris may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent (Item 15, Appendix D) on all metal surfaces. Use soap and water on rubber, plastic, and painted surfaces.
b. While performing PMCS, inspect the following components'
   (1) **Bolts, Nuts, and Screws**. Ensure that they are not loose, missing, bent, or broken. Tighten any that are loose.
   (2) **Welds**. Inspect for gaps where parts are welded together. Report bad welds to your supervisor.
   (3) **Electric Wires or Connectors**. Inspect for cracked or broken insulation, bare wires, and loose or broken connectors. Make repairs or replace as required.

(4) **Hoses, Lines, and Fittings**. Inspect for wear, damage, and leaks. Ensure that clamps and fittings are tight. If a leak originates, from a loose fitting or connector, tighten it. If a component is broken or worn, correct problem if authorized by the Maintenance Allocation Chart (MAC) (Appendix B). If not authorized, report it to your supervisor.

4-9. SPECIFIC PMCS PROCEDURES.

a. Unit level PMCS are provided in Table 4-1. Always perform PMCS in the order listed. Once it becomes a habit, anything that is not right can be spotted in a minute. If anything wrong is discovered through PMCS, perform the appropriate troubleshooting task in Section IV of this chapter. If any component or system is not serviceable, or if given service does not correct problem, notify your supervisor.

b. Before performing preventive maintenance, read all the checks required for the applicable interval and prepare tools needed to make all checks Have several clean rags (Item 13, Appendix D) handy Perform all inspections at the applicable interval.

c. The columns in Table 4-1 are defined as follows.

(1) **Item No**. Provides a logical sequence for PMCS to be performed and is used as a source of item numbers for the "TM ITEM NO' column on DA Form 2404 in recording PMCS results.

(2) **Interval**. Specifies interval at which PMCS is to be performed.

(3) **Item to be Inspected**. Lists the system and common name of items that are to be inspected. Included in this column are specific servicing, inspection, replacement, or adjustment procedures to be followed.

(4) **Procedures**. Tells you how to do the required check or service.

Table 4-1. Unit Preventive Maintenance Checks and Services (PMCS)

Q - Quarterly S - Semiannual A - Annual

Item No.	Interval Q	S	A	Item To Be Inspected	Procedures:
1				BODY FRAME	
			•		*Inspect for cracks, bent members, and broken welds.
2				STORAGE CYLINDERS	
		•			a. Check date on all eight storage cylinders If it is over 5 years since last hydrostatic testing, defer cylinder(s) to Special Repair Activity (SRA) maintenance level for new cylinder or a tested cylinder.
			•		b. Check compressed gas breathing air sample to ensure it meets BB-A-1034B, Source I, Grade A, requirements.
3				CONTROL PANEL	
		•			a. Inspect manifold pressure and servicing pressure gauges for current calibration.
			•		b. Inspect gauges for visual damage and accurate operation (paragraph 2-6).
					Note Perform operator/crew PMCS, listed in Table 2-1, prior to or along with unit PMCS.
4				INLINE FILTER	
			•		a. Inspect for cleanliness Clean or replace, and reinstall (paragraph 4-37) Filler should be checked more frequently If system is exposed to periods of operation in dusty/sandy conditions (Chapter 2, Section IV).
5				RELIEF VALVES	
		•			a. Inspect relief valves for current calibration date

Table 4-1. Unit Preventive Maintenance Checks and Services (PMCS)- Continued

Q - Quarterly S - Semiannual A - Annual

Item No.	Interval Q	S	A	Item To Be Inspected	Procedures:
6				TRAILER FRAME	
			•		a. Inspect for cracks, bent members, and broken welds.
			•		b. Check condition of lunette eye, safety chains, swivel jacks, and tool box
7				SPARE TIRE WINCH CABLE	
			•		a. Inspect spare tire winch cable for wear and fraying
8				WHEELS AND TIRES	
	•				a. Inspect wheels and tires for wear and damage Check tread depth (TM 92610-200-24).
	•				b. Tighten wheel nuts to 55-60 foot pounds
9				HUB AND BRAKE-DRUM ASSEMBLY	
		•			a. Clean, inspect, and repair or replace internal brake parts as required (paragraph 4-44).
		•			b. Adjust brakes (paragraph 4-43).
			•		c. Replace sight glass (paragraph 4-42).
10				WHEEL BEARINGS	
			•		a. Remove hubs and wheel bearings Clean, Inspect, and lubricate bearings (Table 3-1).

Table 4-1. Unit Preventive Maintenance Checks and Services (PMCS)-Continued

Q - Quarterly S - Semiannual A - Annual

Item No.	Interval Q	S	A	Item To Be Inspected	Procedures:
11				SUSPENSION	
	•				a. Inspect springs for bent or cracked leaves, loose mounting, and worn components.
	•				b. Inspect shocks for leaks and ensure they are secured to frame.
12				SURGE ACTUATOR	
	•				a. Check fluid level Fill to within 1/2 in (13 mm) from top (paragraph 3-6).
			•		b. Inspect the surge actuator and ensure it is secured to frame.
13				HANDBRAKES	
		•			Check handbrake cable adjustment. Adjust as required (paragraph 4-50).

Section IV. UNIT TROUBLESHOOTING PROCEDURES

4-10. GENERAL.

a. This section provides Information for identifying and correcting malfunctions which may develop when operating or maintaining the Servicing Unit.
b. Before performing troubleshooting, read and follow all safety instructions found in the Warning Summary at the front of this manual.
c. This section cannot list all malfunctions that may occur, nor all probable causes, and corrective actions. If a malfunction is not listed, or is not corrected by the listed corrective actions, notify your supervisor.
d. When troubleshooting a malfunction:
   (1) Question the operator to obtain any information that might help determine the cause of the problem. Before continuing, ensure that all applicable operator/crew troubleshooting (Chapter 3, Section III) was performed.
   (2) Identify the general area of the Servicing Unit where the problem has occurred. For instance, if the cylinders are not filling correctly, go to the **COMPRESSED GAS SYSTEM** listing. Then, review the malfunction/symptom description that describes your problem. Headings at the top of each page show how each troubleshooting procedure is organized: **MALFUNCTION/SYMPTOM, PROBABLE CAUSE**, and **TEST OR INSPECTION/CORRECTIVE ACTION**.
   (3) Perform each step in the order listed until the malfunction is corrected. DO NOT perform any maintenance task unless the troubleshooting procedure tells you to do so.

4-11. EXPLANATION OF COLUMNS.

a. The columns in Table 4-2 are defined as follows:

(1)	MALFUNCTION/SYMPTOM	A visual or operational indication that something is wrong with the Servicing Unit.
(2)	PROBABLE CAUSE	A procedure that isolates the problem within a component or system
(3)	TEST OR INSPECTION/ CORRECTIVE ACTION	A procedure to correct the problem

4-12. TROUBLESHOOTING PROCEDURES

Table 4-2. Unit Troubleshooting.

MALFUNCTION/SYMPTOM PROBABLE CAUSE TEST OR INSPECTION/CORRECTIVE ACTION

ELECTRICAL SYSTEM

1. ONE OR MORE (NOT ALL) LAMPS FAIL TO LIGHT

WARNING

When troubleshooting an electrical malfunction, ALWAYS disconnect intervehicular electrical cable from towing vehicle. Failure to do so may result in injury or death due to electrical shock.

NOTE

Refer to Figure 4-42, paragraph 4-51 to determine routing of electrical wires and location of electrical components

Individual lamp burnt out.

Check and replace lamp.

Individual lamp sockets damaged.

Perform continuity check and replace light as required.

Bad connection between wire harness and light.

Check connection between wire, wire harness and light, tighten or repair as required.

Damaged wire in wire harness or bad connection at junction block.

Perform continuity check between junction block and connection at light.

Damaged wire between fusible link and junction block.

Check for loose connection or damaged wire and repair as required.

Fusible link failed open.

Perform continuity check on fusible link. Replace if defective.

Damaged wire/pin on Intervehicular cable or bad connection to fusible link.

Perform continuity check between intervehicular cable and fusible link.

Table 4-2. UNIT TROUBLESHOOTING (Continued).

MALFUNCTION/SYMPTOM PROBABLE CAUSE TEST OR INSPECTION/CORRECTIVE ACTION

2. TRAILER LIGHTS ARE DIM, FLICKER OR DO NOT COME ON.

Intervehicular cable damaged.

Perform continuity check on cable and repair as required.

Ground wire #90 Inside electrical box damaged or has loose connection.

Check for damaged wire and proper connection.

Electrical box not properly grounded to chassis.

Perform continuity check between electrical box and chassis.

BRAKES

3. WHEELS DO NOT ROLL WHEN SERVICING UNIT IS PULLED FORWARD.

Brake shoes adjusted too tight.

Check brake shoe adjustment and correct as required.

Brake shoes frozen to drum (cold weather).

Heat brake drum to thaw.

Emergency lever on surge actuator is engaged.

Disengage emergency lever.

Wheel bearings are seized.

Check bearings and replace as necessary.

4. PARKING BRAKE DOES NOT ENGAGE WHEN HAND LEVER IS APPLIED.

Broken or stretched cable assembly.

Check cable(s) and replace as necessary.

5. SERVICE BRAKES DO NOT ENGAGE WHEN SURGE ACTUATOR IS ENGAGED.

Brake shoes adjusted too loose or worn.

Check brake shoe adjustment and wear, correct as required.

Table 4-2. UNIT TROUBLESHOOTING (Continued).

MALFUNCTION/SYMPTOM PROBABLE CAUSE TEST OR INSPECTION/CORRECTIVE ACTION
5. SERVICE BRAKES DO NOT ENGAGE WHEN SURGE ACTUATOR IS ENGAGED-Continued.
Air in brake system.
Bleed brake lines.
Leak in brake lines, hoses, or brake cylinders.
Inspect brake system for leaks, repair as required.
Bad master cylinder.
Replace master cylinder.
6. WHEEL HUBS BUILD UP EXCESSIVE HEAT.
Oil level in hub(s) low.
Check fluid level and service as required.
Brake shoes adjusted too tight.
Check brake shoe adjustment and correct as required.
Hub retaining nut installed too tight.
Back off on nut as required.
Wheel bearings worn.
Check wheel bearings and replace as necessary.
7. HUBS REQUIRE FREQUENT SERVICING.
Bad O-ring seal on filler cap.
Check O-ring and replace as necessary.
Sight glass cracked or gasket worn.
Check cap area for leaks and repair as required.
Hub oil seal worn.
Check rear area of hub for leaks and replace as required.

Table 4-2. UNIT TROUBLESHOOTING (Continued).

MALFUNCTION/SYMPTOM PROBABLE CAUSE	TEST OR INSPECTION/CORRECTIVE ACTION
SUSPENSION SYSTEM	
8. SERVICING UNIT HANDLES POORLY IN TOWING MODE.	
Shock absorbers worn or leaking.	Check for wear/leaks and replace as necessary.
Leaf springs worn or broken.	Check for wear and breakage, replace as necessary.
COMPRESSED GAS SYSTEM	
9. EXCESSIVE TIME REQUIRED TO RECHARGE STORAGE CYLINDERS.	
Leak in high pressure side of Compressed Gas System.	Perform soap-solution check from recharge port to manifold valve (MV117) and repair leak as required.
Relief valve (RV100) leaking.	Check for air venting from valve and replace if necessary.
Particulate filter (F100) clogged.	Check filter element and clean or replace as required.
10. PRESSURE GAUGE FOR ONE OR MORE (BUT NOT ALL) STORAGE CYLINDERS READS LOWER THAN RECHARGE PRESSURE.	
Pressure gauge bad.	Replace gauge(s) as required.
11. PRESSURE ON SCUBA CYLINDERS CREEPS UP AFTER FILLING IS COMPLETED.	
Pressure regulator has internal leakage.	Repair/Replace pressure regulator.

Table 4-2. UNIT TROUBLESHOOTING (Continued).

MALFUNCTION/SYMPTOM PROBABLE CAUSE TEST OR INSPECTION/CORRECTIVE ACTION

12. SCUBA CYLINDER FILL RATE OF 400 PSI/MINUTE CANNOT BE ACHIEVED.

Pressure regulator leaking.

Check for air venting from pressure regulator and replace if necessary.

Relief valve (RV200) leaking.

Check for air venting from valve and replace if necessary.

Particulate filter (F100) clogged.

Check filter element and clean or replace as required.

Leak In high or low pressure side of Compressed Gas System.

Perform a soap solution check on entire compressed gas and repair leak as required.

Manifold pressure gauge (Pl108) bad.

Compare reading on gauge (PI108) to reading on gauge for cylinder in use. Replace gauge if reading is not correct.

Servicing pressure gauge (P1109) bad.

Close servicing valve (MV118) and adjust pressure regulator to equalize pressure on high and low sides of system. Replace gauge if correct reading cannot be achieved.

Section V. UNIT MAINTENANCE INSTRUCTIONS

4-13. GENERAL.

a. These general maintenance instructions contain general shop practices and specific methods you must be familiar with to properly maintain your Servicing Unit. You should read and understand these practices and methods before performing any unit maintenance tasks.

NOTE

It should be understood that the portions of the Servicing Unit which comprise the Compressed System require special shop practices. These practices must be followed to maintain cleanliness of diving life support air systems. Refer to Section VII of this chapter for more detailed Information.

b. Before beginning a task, find out how much repair or replacement is needed to fix the equipment. Sometimes the reason the for equipment failure can be seen right away, and complete teardown is not necessary. Disassemble equipment only as far as necessary to repair or replace broken or damaged parts.

c. The following "Initial Setup" information applies to each procedure:
   (1) Resources are not listed unless they apply to the procedure.
   (2) Personnel are listed only if more than one technician is required to complete the task. If "Personnel Required" is not listed, one technician can complete the task.

d. All tags and forms attached to equipment must be checked to learn the reason that the equipment was removed from service. Modification Work Orders (MWOs) and Technical Bulletins (TBs) for equipment changes and updates must be applied to equipment before return to service.

4-14. WORK SAFETY.

a Observe all WARNINGs and CAUTIONs. Always use power tools carefully.
b. Protect yourself against injury. Wear eye protection and safety shoes at all times when performing maintenance. When cleaning components rubber gloves and protective clothing should be worn.
c. When lifting heavy parts, have someone help you. Ensure that lifting/jacking equipment Is working properly, is suitable for the assigned task, and is secured against slipping.
d. Keep tools and equipment used on the Compressed Gas System separated from those used to maintain other parts of the Servicing Unit.
e. Use caution when working on high pressure air systems. Pressure should always be vented before loosening connections.
f. Handle open connections on Compressed Gas System with care. Always cap or plug open ports to prevent contamination.

4-15. CLEANING INSTRUCTIONS.

These instructions do not apply to the Compressed Gas System portion of the Servicing Unit. Refer to Section VII to clean components for breathing air service.

WARNING

Improper cleaning methods and use of unauthorized cleaning liquids or solvents can Injure personnel and damage equipment. To prevent this, refer to TM 9-247 for further Instructions.

a. General. Cleaning instructions will be the same for the majority of parts and components which make up the trailer assembly and non-compressed gas portions of body assembly. The following should apply to all cleaning operations.
   (1) Clean parts before inspection, after repair, and before assembly.
   (2) Keep hands free of grease and oil which can collect dust, dirt, and grit.
   (3) After cleaning, all parts should be covered or wrapped to protect them from dust and dirt. Parts that are subject to rust should be lightly oiled before covering.

b. Steam Cleaning.
   (1) Before steam cleaning exterior or trailer assembly or body assembly, protect all portions of Compressed Gas System which could be contaminated and protect all electrical equipment which could be damaged by steam or moisture.
   (2) Place disassembled parts In a suitable container to steam clean. Parts that are subject to rust should be dried, lightly oiled, and covered after cleaning

c. Castings, Forgings, and Machined Parts.

WARNING

Dry cleaning solvent P-D-680 Is toxic and flammable. Always wear protective goggles and gloves, and use only In a well ventilated area. Avoid contact with skin, eyes, and clothes, and DO NOT breathe vapors. DO NOT use near open flame or excessive heat. The solvent's flash point Is 100°F-130° F (38° C-59° C). If you become dizzy while using cleaning solvent, Immediately get fresh air and medical help. If solvent contacts eyes, Immediately wash your eyes and get medical aid.

Brake shoe linings contain asbestos fibers which present a serious health hazard If Inhaled. Use asbestos dust control procedures approved by local medical authority when servicing the brake assembly. Never use compressed air to clean dust from brake system components, or wipe, brush or sweep dry dust. Failure to follow proper precautions may result In exposure to dangerous concentrations of airborne asbestos fibers.

(1) Clean inner and outer surfaces with dry cleaning solvent (Item 15, Appendix D).
(2) Remove grease and accumulated deposits with a stiff bristle brush (Item 3, Appendix D).

WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.) and use caution to avoid Injury to personnel.

(3) Clear all threaded holes with compressed air to remove dirt and cleaning fluids.

CAUTION

Do not wash oil seals, electrical cables, and flexible hoses with dry cleaning solvent or mineral spirits. Serious damage or destruction of material would result.

d. Electrical Cables and Flexible Hose. Wash electrical cables and flexible hose with a solution of soap and water, then wipe dry.

e. Wheel Bearings. Clean bearings in accordance with TM 9-214.

4-16. INSPECTION INSTRUCTIONS.

NOTE

All damaged areas should be marked for repair or replacement.

a. All components and parts must be carefully checked to determine if they are serviceable for use, can be repaired, or must be replaced.
b. Inspect drilled and tapped (threaded) holes for the following:
   (1) Wear, distortion, cracks, and any other damage In or around holes.
   (2) Threaded areas for distortion (stretching), and evidence of cross-threading.

c. Inspect metal lines, flexible lines (hoses), and metal fittings for the following:
   (1) Metal lines for sharp kinks, cracks, bad bends, and dents.
   (2) Flexible lines for cuts, fraying, evidence of leakage, and loose metal fittings or connectors.
   (3) Metal fittings and connectors for thread damage and worn or rounded hex heads.

d. Inspect castings, forgings, and machined metal parts for the following:
   (1) Machined surfaces for nicks, burrs, raised metal, wear, and other damage.
   (2) Inner and outer surfaces for breaks and cracks.

e. Inspect bearings in accordance with TM 9214.
f. Inspect air lines, fittings, and connectors for leaks using a leak detect or compound (Item 6, Appendix D). No leakage is permissible.

4-17. REPAIR INSTRUCTIONS.

a. Repair casting, forgings, and machined metal parts using the following instructions:
   (1) Repair minor cracked casting or forgings in accordance with TM 9-237.
   (2) Repair minor damage to machined surfaces with a fine mill file or an abrasive cloth (Item 5, Appendix D) dipped in dry cleaning solvent (Item 15, Appendix D).
   (3) Replace any deeply nicked machined surface that could affect the assembly operation.
   (4) Repair minor damage to threaded cap screw holes with thread tap of same size to prevent cutting oversize.

b. After repair, clean all parts thoroughly to prevent dirt, metal chips, or other foreign material from entering any working parts.

4-18. TAGGING WIRE, HOSES, AND TUBING.

a. As soon as first wire or hose Is disconnected, write number "1 "on two tags. Secure one tag to wire or hose and other tag to terminal, nipple, or fitting. After disconnecting second wire or hose, write number "2" on two tags. Secure one tag to wire or hose, and second tag to terminal, nipple, or fitting. Do the same for all hoses and fittings.
b. Note which numbers you used, in pencil, on art in manual. This will help you accurately re-tag, if tags are removed to perform cleaning and maintenance work.
c. Remove all tags when finished.

4-19. DEPRESSURIZING COMPRESSED GAS SYSTEM FOR MAINTENANCE.

This task covers: a. Depressurization

INITIAL SETUP:

Tools
Screwdriver, Flat -Tip

Materials/Parts Appendix D
None

Equipment Conditions
None

NOTE

This procedure should be used to depressurize the Compressed Gas System, excluding storage cylinders for maintenance To depressurize the complete Compressed Gas System, including storage cylinders, refer to paragraph 4-61.

a. Depressurization

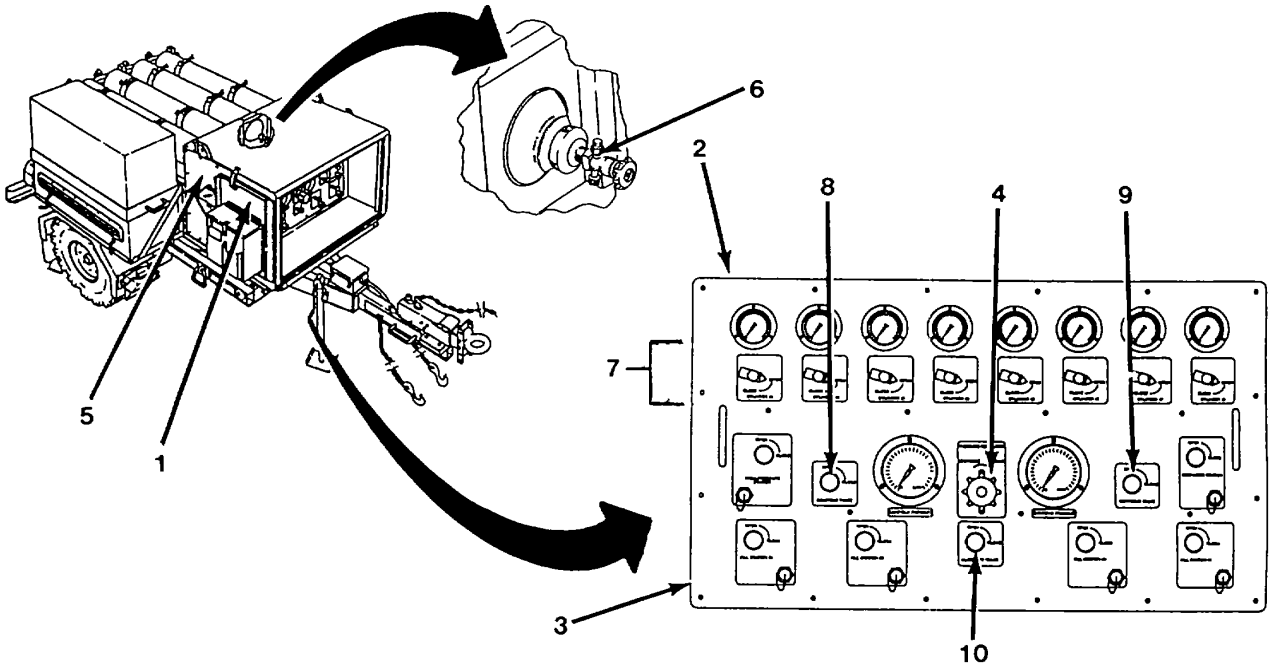


Figure 4-1. Depressurizing Compressed Gas System for Maintenance.

(1) Open the front doors (1) to gain access to control panel (2).
(2) Verify that all valves (3) on the control panel are closed and pressure regulator (4) is completely backed off.
(3) Remove side panels (5) from Servicing Unit control compartment.
(4) Verify that valve (6) on each storage cylinder is closed.
(5) Slowly open all eight 1/4-tum ball valves (7).
(6) Slowly open manifold valve (8), servicing valve (9), and bleed off valve (10).
(7) Increase setting on pressure regulator (4) to vent any remaining air through bleed off valve
(8) When air can no longer be heard venting and all pressure gauges read 0 psi, back off on regulator setting (4) and close all control panel valves. Compressed gas system is now ready for maintenance.

4-20. COMPRESSED GAS SYSTEM LEAK TEST.

This task covers: a. Testing

INITIAL SETUP:

Tools
Screwdriver, Flat -Tip

Materials/Parts Appendix D
Leak Detector (item 6)
Equipment Conditions
None

WARNING

Care should be taken when working around high pressure air systems. Pressure should always be vented before hoses are connected or disconnected from the control panel. Failure to follow this warning may result In personnel Injury or death.

COMBUSTION HAZARD. When handling end connections care should be taken not to contaminate the Compressed Gas System. Failure to follow this warning may result in personnel injury, death or damage to equipment.

Depressurize Compressed Gas System before attempting to repair a leak. Failure to follow this warning may result In personnel Injury, death, or damage to equipment.

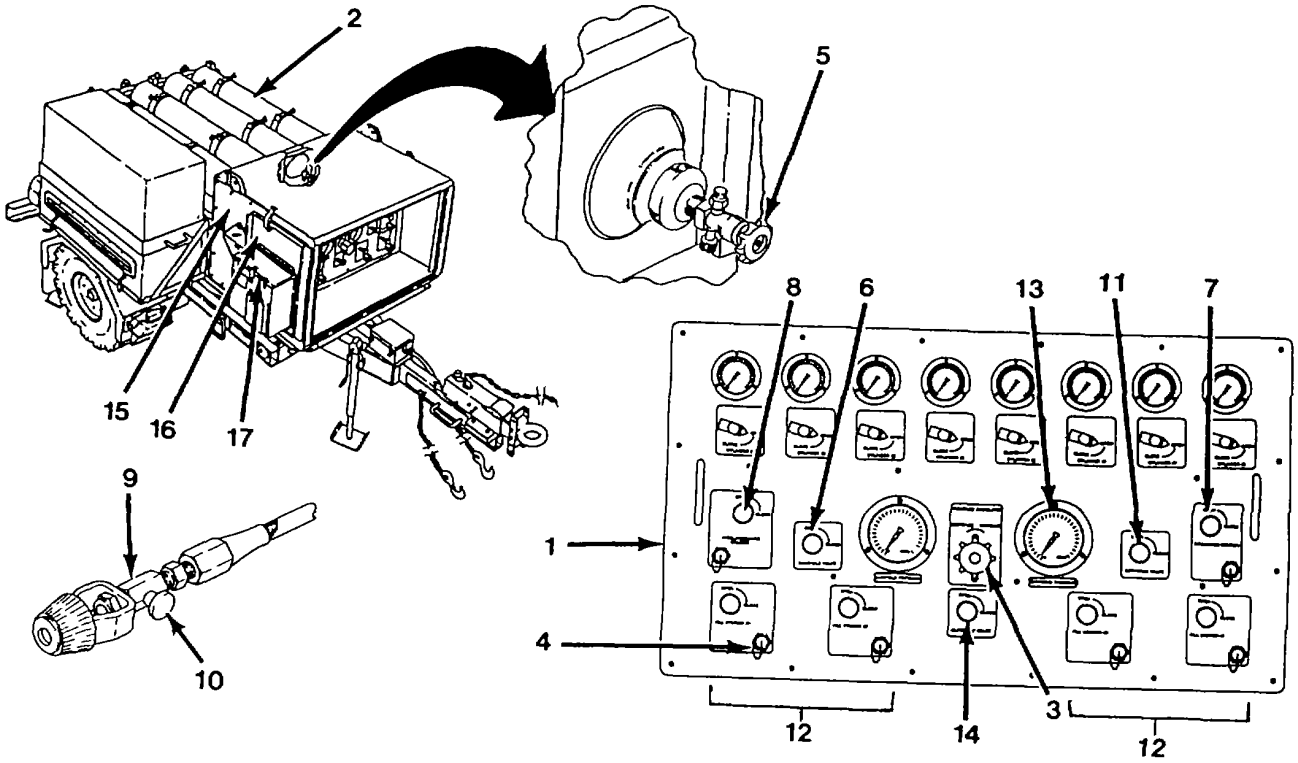


Figure 4-2. Compressed Gas System Leak Test.

a. Preparing Compressed Gas System for Leak Test.
   (1) Verify that Servicing Unit is properly set for operation per paragraph 2-7.
   (2) Verify that all valves on the control panel (1) and at each storage cylinder (2) are closed and pressure regulator (3) is completely backed off.
   (3)Verify that all dust caps (4) on control panel (1) are Installed and tightened.

b. Perform Leak Test.
   (1) Open cylinder valve (5) for cylinder with highest charge.
   (2) Slowly open MANIFOLD valve (6), RECHARGE valve (7), and HIGH PRESSURE valve (8).
   (3) Using leak detector (Item 6, Appendix D), perform leak test on high pressure portion of Compressed Gas System starting at eight cylinder valves and ending at manifold pressure gauge (Figure 1-4 sheet 1). If a leak is detected proceed to paragraph c.

NOTE

Determine if fill hose(s) were repaired. If hoses were not repaired proceed to step 6. Otherwise proceed to next step.

   (4) Remove dust cap(s) from fill stations #1 through #4 as needed and connect fill hose(s) and strain reliefs to be tested.
   (5) Connect yoke adaptor(s) (9) on fill hose(s) to scuba cylinder to prevent air leakage out of yoke adaptor(s).
   (6) Ensure bleed screw (10) on each yoke adaptor (9) is closed.
   (7) Open servicing valve (11) and all four fill station valves (12).
   (8) While monitoring servicing pressure gauge (13), slowly adjust pressure regulator (3) until a pressure of 3,000 psi is obtained.
   (9) Using leak detector (Item 6, Appendix D), perform leak test on low pressure portion of Compressed Gas System starting at servicing pressure gauge and ending at four fill station ports or fill hose yoke adaptors if connected (Figure 1-4 sheet 2). If a leak is detected proceed to paragraph c.
   (10) Close cylinder valve opened to provide test pressure.
   (11) Slowly open bleed off valve (14) and allow Compressed Gas System to be vented.
   (12) When air can no longer be heard venting completely open bleed off valve (14) to ensure all air has been vented, then close valve.
   (13) Close all valves on the control panel and back off on pressure regulator (3).
   (14) If fill hose(s) were leak tested proceed to step 15. If hose(s) were not leak tested Install the control compartment side access panels (15) and secure the front doors (16).
   (15) Disconnect yoke adaptor(s) (9) from plug(s).
   (16) Disconnect fill hose (s) from fill station (s) , install dust cap(s) on fill station(s).
   (17) Cover and stow fill hose(s) in Compressed Gas System tool box (17).
   (18) Install the control compartment side access panels (15) and secure the front doors (16).

c. Leak Repair.
   (1) Depressurize Compressed Gas System in accordance with paragraph 4-19.
   (2) Repair leak as required.
   (3) Test Compressed Gas System in accordance with paragraphs a and b.

4-21. CYLINDER ASSEMBLY

This task covers: a. Removal b. Installation

INITIAL SETUP:

Tools
Wrench, 1-1/16"

Materials/Parts Appendix D
Plastic Bags (item 2)

Equipment Conditions
Depressunze Compressed Gas System (paragraph 4-19)

NOTE

This procedure describes the steps necessary to remove one of the cylinders, but is applicable to all eight cylinders on the Servicing Unit.

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and installing components on life support systems. Failure to follow proper procedures may result In system contamination.

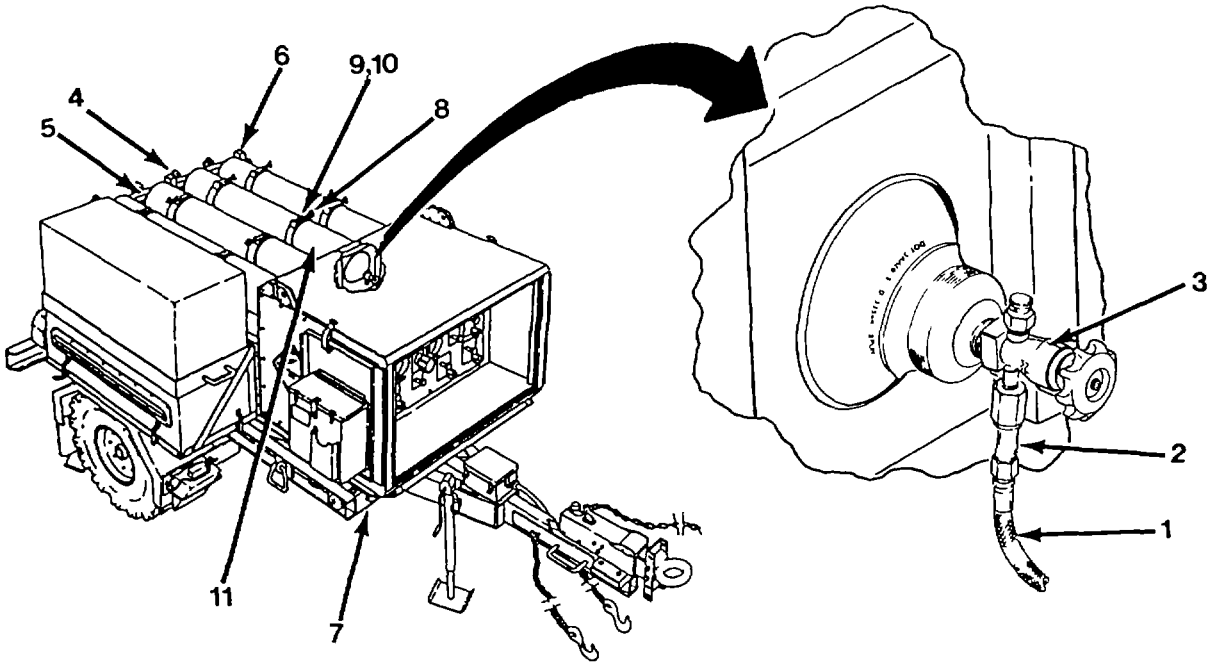


Figure 4-3. Replace Cylinder Assembly.

(1) Disconnect flexible hose (1) from CGA347 fitting (2) at cylinder valve (3) and bag hose end.
(2) Loosen four adjustable stops (4) on cylinder holddown bracket (5) securing cylinder to be replaced.
(3) Remove three quick-release pins (6) securing cylinder holddown bracket (5) to frame (7), then pull bracket off frame.
(4) Loosen wing nuts (8) on two cylinder clamps (9) until "T" bolts (10) can be disengaged to separate clamp halves.
(5) Slide cylinder (11) back on frame (7) and lower to ground.

b. Installation.

NOTE

Prior to installing cylinder ensure the following:

Documentation is available that certifies cylinder and valve have been cleaned for breathing air service.

Hydrostatic pressure test date stamped on cylinder indicates cylinder has been tested within the last five years.

Serial Number stamped on cylinder is same as certifications.

(1) Slide cylinder (11) onto frame (7) until cylinder is fully seated into gasket (12) at frame bulkhead.
(2) Rotate cylinder to position CGA347 connection on cylinder valve (3) for installation of flexible hose (1).
(3) Couple cylinder clamp (9) halves together by installing “T" bolt (10) and tightening wing nuts (8).
(4) Position cylinder holddown bracket (5) on frame and insert three quick-release pins (6) to secure bracket (5).
(5) Tighten four adjustable stops (4) on cylinder holddown bracket (5) to secure cylinders In fore and aft direction.
(6) Connect flexible hose (1) to CGA347 fitting (2) at cylinder valve (3).
(7) Perform a leak check on all connections loosened during this task as prescribed in paragraph 4-20.

4-22. CYLINDER CLAMP ASSEMBLY.

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

INITIAL SETUP:

Tools
None

Materials/Parts Appendix D
None

Equipment Conditions
Remove Cylinder Assembly
(paragraph 4-21)

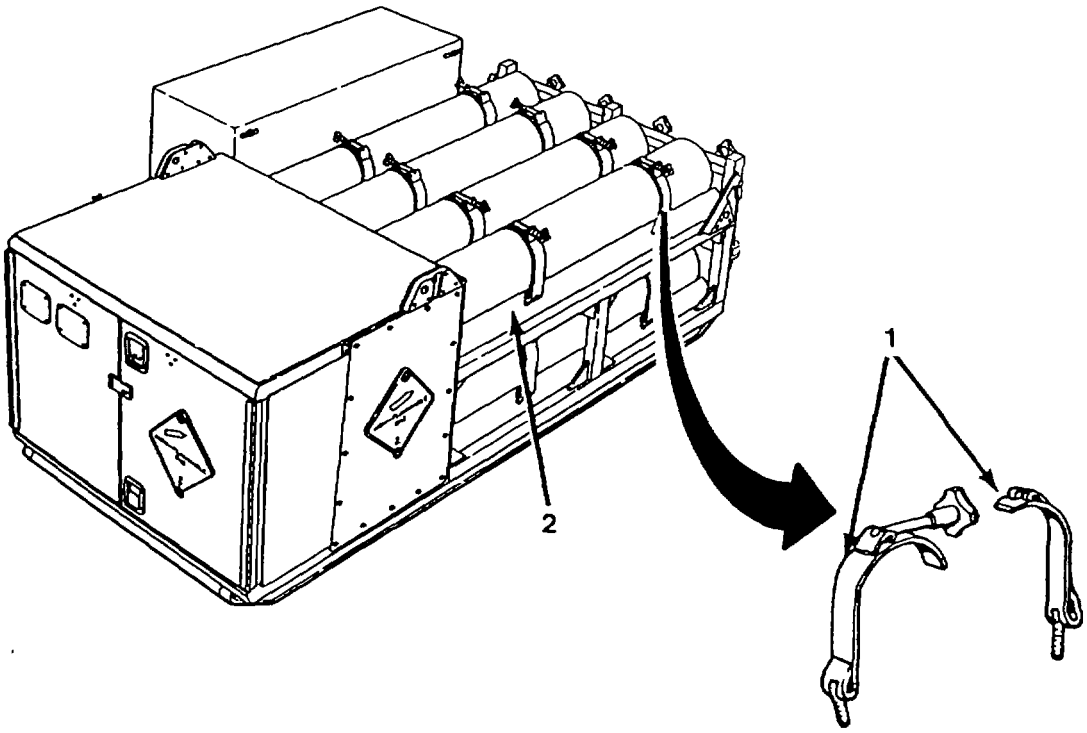


Figure 4-4. Replace Cylinder Clamp Assembly.

a. Removal.
   (1) Unscrew “T” bolts of clamp halves (1) from frame (2). Discard clamp if defective.
b. Installation.
   (1) Screw “T” bolts of clamp halves (1) into frame (2) until 1-2 threads are left exposed.
   (2) Reinstall cylinder assembly as prescribed In paragraph 4-21.

4-23. CYLINDER PRESSURE GAUGE(S).

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

INITIAL SETUP:

Tools
Socket Wrench Handle with 6" Extension
Screwdriver, Flat Tip
Socket, 5/16"
Wrench, 11/16"
Wrench, 7/8"
Wrench, 1-1/16"

Materials/Parts Appendix D
Ant-seizing Tape (Item 16)
Plastic Bags (item 2)
Equipment Conditions
depressurize Compressed Gas System
(paragraph 4-19)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII, general guidelines on removing and installing components on life support systems. Failure to follow proper procedures may result In system contamination.

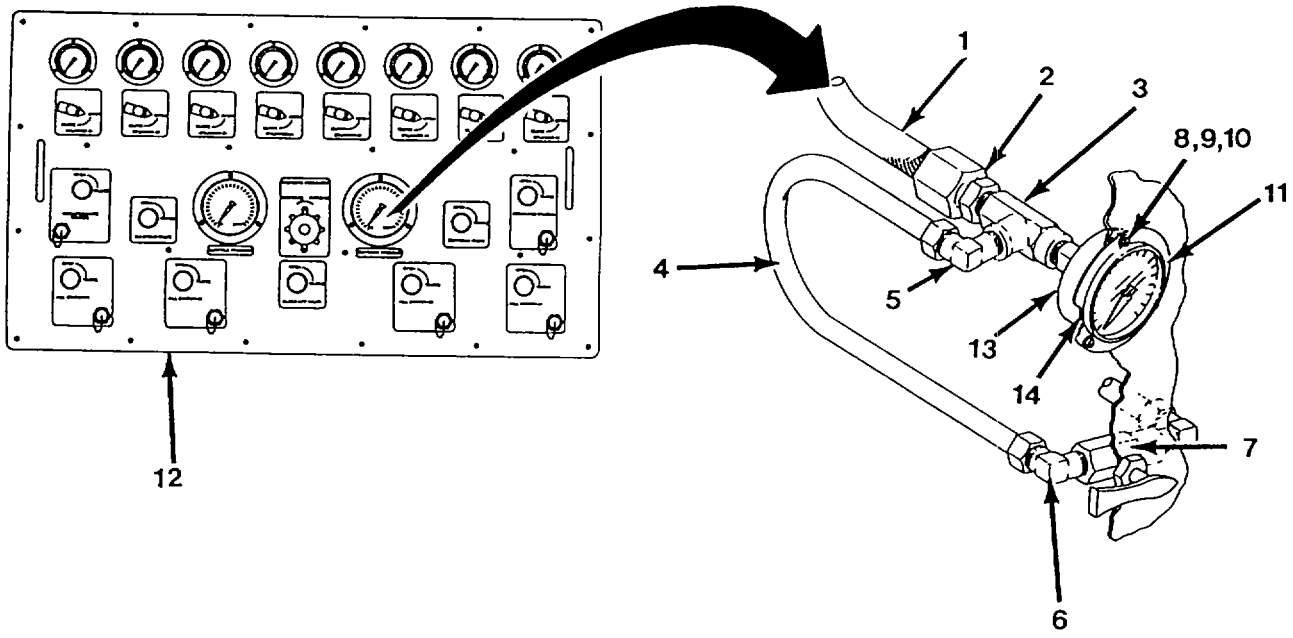


Figure 4-5. Replace Cylinder Pressure Gauge(s).

(1) Disconnect hose assembly (1) from CGA347 fitting (2) at end of pressure gauge tee fitting (3).
(2) Disconnect tube assembly (4) from elbow (5) on branch of tee fitting (3) and from elbow (6) on 1/4-turn ball valve (7).
(3) Remove three screws (8) and attaching washers (9), and nuts (10) to separate retaining ring (11) from control panel (12).

(4) Pull retaining ring (11), pressure gauge (13), gasket (14) and attached fittings out of control panel (12) Discard gasket.
(5) Note position of elbow (5) and tee fitting(3) with reference to case of pressure gauge then remove tee fitting from pressure gauge (13).

b. Cleaning of Pressure Gauge and Removed Components Refer to Section VII to clean elbow, CGA347 fitting, tee fitting, tube assembly, and replacement pressure gauge as required.

c. Installation.
(1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on pressure gauge (13).
(2) Install tee fitting (3) onto pressure gauge (13), as previously noted.
(3) Install new gasket (14) onto case of pressure gauge (13) then insert gauge into control panel (12).
(4) Install retaining ring (11) over pressure gauge then secure to control panel (12) with three screws (8), and attaching washers (9) and nuts (10).
(5) Connect tube assembly (4) to elbow (5) on tee fitting (3) and elbow (6) on 1/4-turn ball valve (7).
(6) Connect hose assembly (1) to CGA347fitting (2).
(7) Perform a leak check on all connections loosened during this task as prescribed in paragraph 4-20.

4-24. MANIFOLD AND SERVICING PRESSURE GAUGE(S).

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

INITIAL SETUP:

Tools
Socket Wrench Handle with 6" Extension
Screwdriver, Flat Tip
Screwdriver, Cross Tip
Socket, 7/16"
Wrench, 7/16"
Wrench, 9/16"
Wrench, 11/16"
Wrench, 3/4"

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System (paragraph 4-19)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and Installing components on life support systems. Failure to follow proper procedures may result In system contamination.

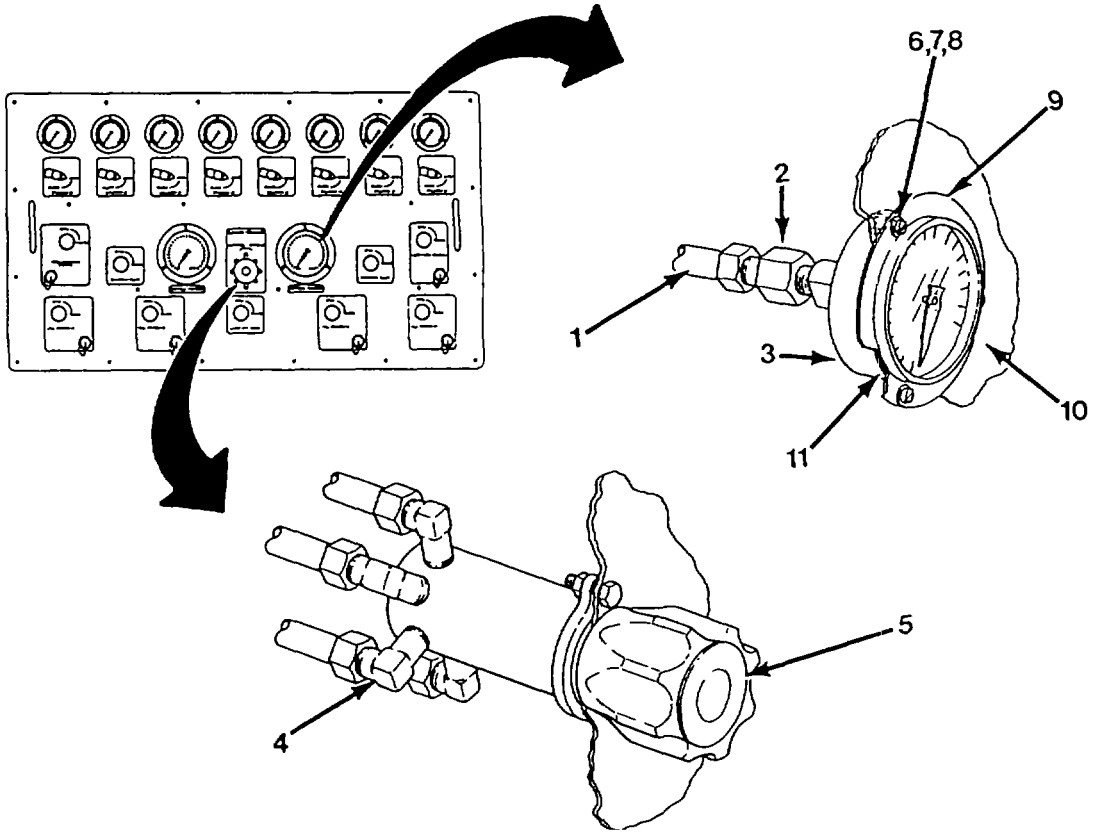


Figure 4-6. Replace Regulator Pressure Gauge(s).

(1) Disconnect tube assembly (1) from adaptor (2) on pressure gauge (3) and from elbow (4) on pressure regulator and bag.

(2) Remove three screws (6) and attaching washers (7) and nuts (8) to separate retaining ring (9) from control panel (10).
(3) Pull retaining ring (9), pressure gauge (3), gasket(11), and attached adaptor out of control panel (10). Discard gasket.
(4) Remove adaptor (2) from pressure gauge (3) and bag.

b. Cleaning of Pressure Gauge and Removed Components. Refer to Section VII to clean adaptor, tube assembly and replacement pressure gauge as required.

c. Installation.
(1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on pressure gauge (3).
(2) Install adaptor (2) onto pressure gauge (3).
(3) Install new gasket (11) onto case of pressure gauge (3) then insert gauge into control panel (10).
(4) Install retaining ring (9) over pressure gauge (3) then secure to control panel (10) with three screws (6) and attaching washers (7) and nuts (8).
(5) Connect tube assembly (1) to adaptor (2) on pressure gauge (3) and to elbow (4) on pressure regulator (5).
(6) Perform a leak check on all connections loosened during this task as prescribed in paragraph 4-20.

4-25. .1/4-TURN BALL VALVE(S).

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

INITIAL SETUP:

Tools
Screwdriver, Flat Tip
Screwdriver, Cross Tip
Wrench, 3/8"
Wrench, 9/16"
Wrench, 5/8"
Wrench, 11/16
Wrench, 3/4"

Materials/Parts Appendix D
Ant-seizing Tape (item 16)
Plastic Bags (item 2)

Equipment Conditions
Depressunze Compressed Gas System6" (paragraph 4-19)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and Installing components on life support systems. Failure to follow proper procedures may result In system contamination.

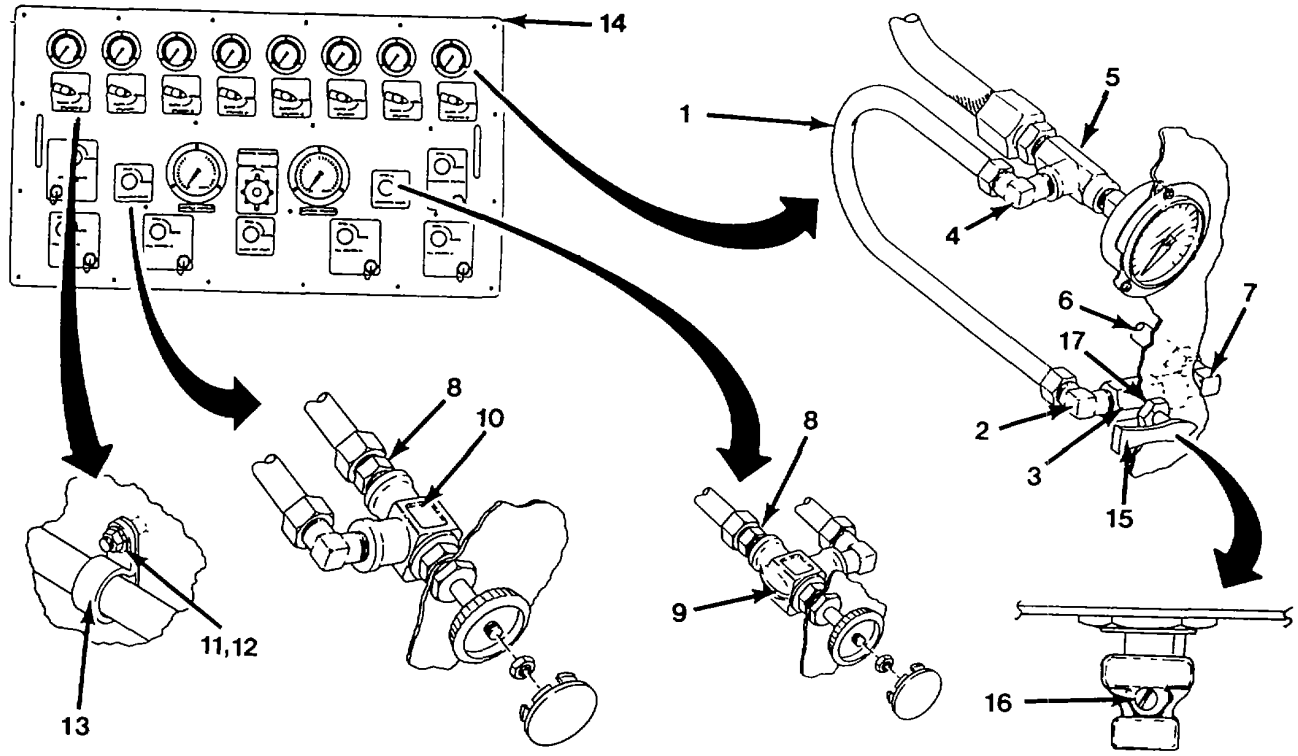


Figure 4-7. Replace 1/4-Turn Ball Valve(s).

(1) Disconnect tube assembly (1) from elbow (2) on 1/4-turn ball valve(3) and elbow (4) on cylinder pressure gauge tee fitting (5) and bag.

(2) Disconnect tubes on high pressure manifold (6) from elbows (7) on all eight 1/4-tum ball valves (3), and adaptors (8) at top of recharge valve (9) and manifold valve (10) and bag.
(3) Loosen, but do not remove, screws (11), and nuts (12) on four clamps (13) securing high pressure manifold to control panel (14).
(4) Remove handle (15) from front of 1/4-turn ball valve(3) by loosening set screw (16).
(5) Remove retaining nut (17) from 1/4-turn ball valve(3).
(6) Pull back on manifold tube (6) enough to allow 1/4-turn ball valve(3) to be removed from back of control panel (14).
(7) Note position of elbows (2 and 7) on 1/4-turn ball valve(3).
(8) Remove two elbows (2 and 7) from 1/4-turn ball valve(3) and bag.

b. Cleaning of 1/4-Turn Ball Valve and Removed Components. Refer to Section VII to clean two elbows tube assembly and replacement 1/4-turn ball valve as required.

c. Installation.
(1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on two elbows (2 and 7)
(2) Install elbows (2 and 7) onto 1/4-tum ball valve(3), as previously noted.
(3) Remove retaining nut (15) and handle (16) from 1/4-turn ball valve(3) if required.
(4) Insert 1/4-turn ball valve(3) through back of control panel (14) and temporarily secure by installing retaining nut (17) hand tight.
(5) Connect, but do not tighten, tubes from high pressure manifold (6) to elbows (7) on all eight 1/4-turn ball valves (3) and adaptors (8) on recharge valve (9) and manifold valve (10).
(6) Tighten screws (11) and nuts (12) on four clamps (13) to secure high pressure manifold (6) to control panel (14)
(7) Connect tube assembly (1) to elbow (2) on 1/4-turn ball valve(3) and to elbow (4) on pressure gauge tee fitting (5).
(8) Tighten all ten high pressure manifold tube connections.
(9) Tighten retaining nut (17)
(10) Attach handle (15) to 1/4-turn ball valve(3) with retaining screw (16)
(11) Perform a leak check on all connections loosened during this task as prescribed in paragraph 4-20

4-26. PRESSURE REGULATOR.

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

INITIAL SETUP:

Tools
Pliers, Snap Ring
Rule, Machinists
Screwdriver, Flat Tip
Screwdriver, Cross Tip
Socket Wrench handle, 1/4" Drive With 6" Extension
Socket, 7/16"
Wrench, 9/16"
Wrench, 11/16"
Wrench, Hex 3/16"

Materials/Parts Appendix D
Ant-seizing Tape (item 16)
Plastic Bags (item 2)

Equipment Conditions
Depressurize Compressed Gas System (paragraph 4-19)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and Installing components on life support systems. Failure to follow proper procedures may result in system contamination.

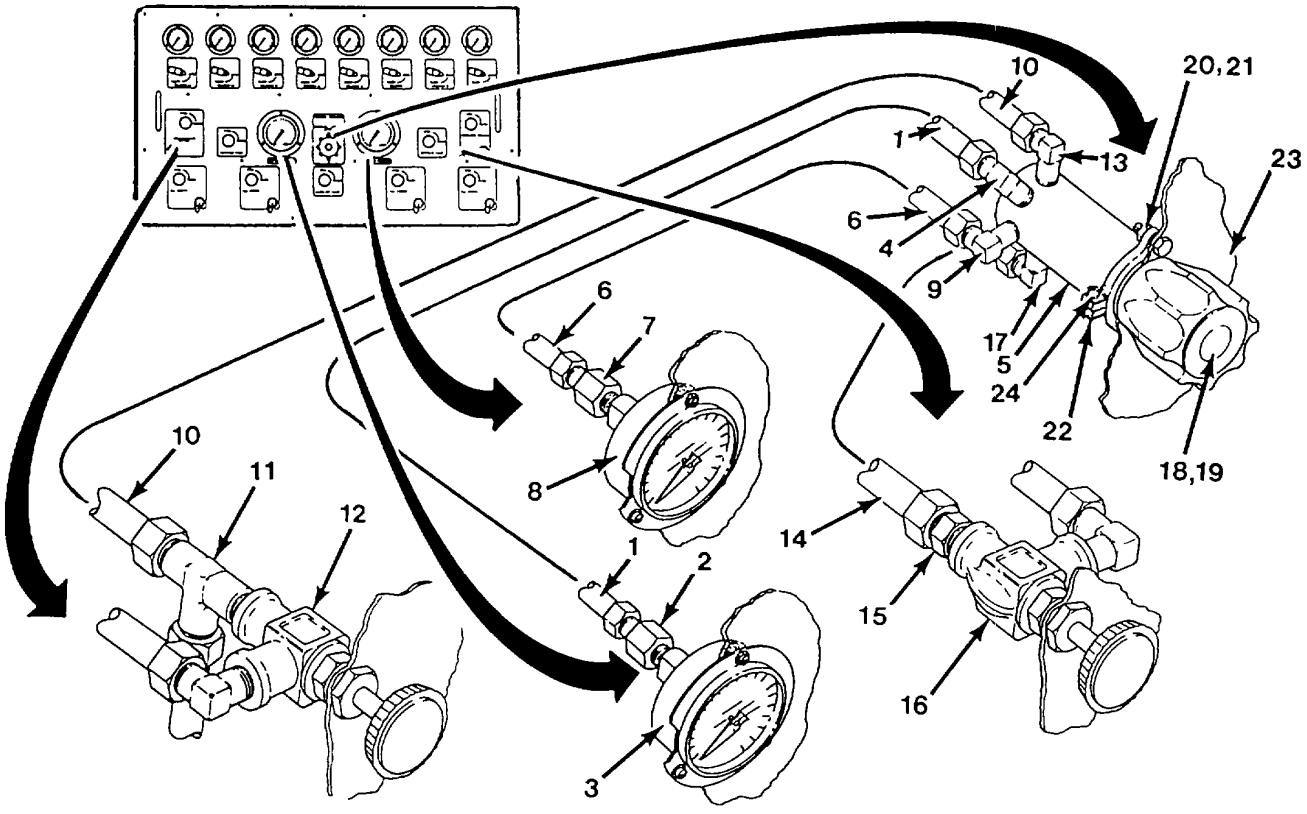


Figure 4-8. Remove Pressure Regulator.

(1) Disconnect tube assembly (1) from adaptor (2) on manifold pressure gauge (3) and from elbow (4) on inlet gauge port on regulator (5).
(2) Disconnect tube assembly (6) from adaptor (7) on servicing pressure gauge (8) and from elbow (9) on outlet gauge port on regulator (5).
(3) Disconnect tube assembly (10) from tee fitting (11) on high pressure valve (12) and from elbow (13) on inlet port on regulator (5).
(4) Disconnect tube assembly (14) from adaptor (15) on servicing valve (16) and from elbow (17) on outlet port on regulator (5).
(5) Remove button plug from top of handknob (18) on regulator (5).
(6) Remove retaining ring (19) and handknob (18) from regulator (5).
(7) Remove two screws (20) and two lockwashers (21) securing regulator mount bracket (22) and regulator (5) to control panel (23).
(8) Pull regulator (5) out back side of control panel (23).
(9) Note orientation of mount bracket (22) and distance from bottom edge of regulator (5) to mount bracket (22).
(10) Loosen two screws (24) and slide mount bracket (22) off of regulator (5).
(11) Note position of four elbows installed on regulator (5) if required.
(12) Remove four elbows from regulator.

b. Cleaning of Regulator and Removed Components. Refer to Section VII to clean elbows, tube assemblies, and replacement pressure regulator, as required.

c. Installation

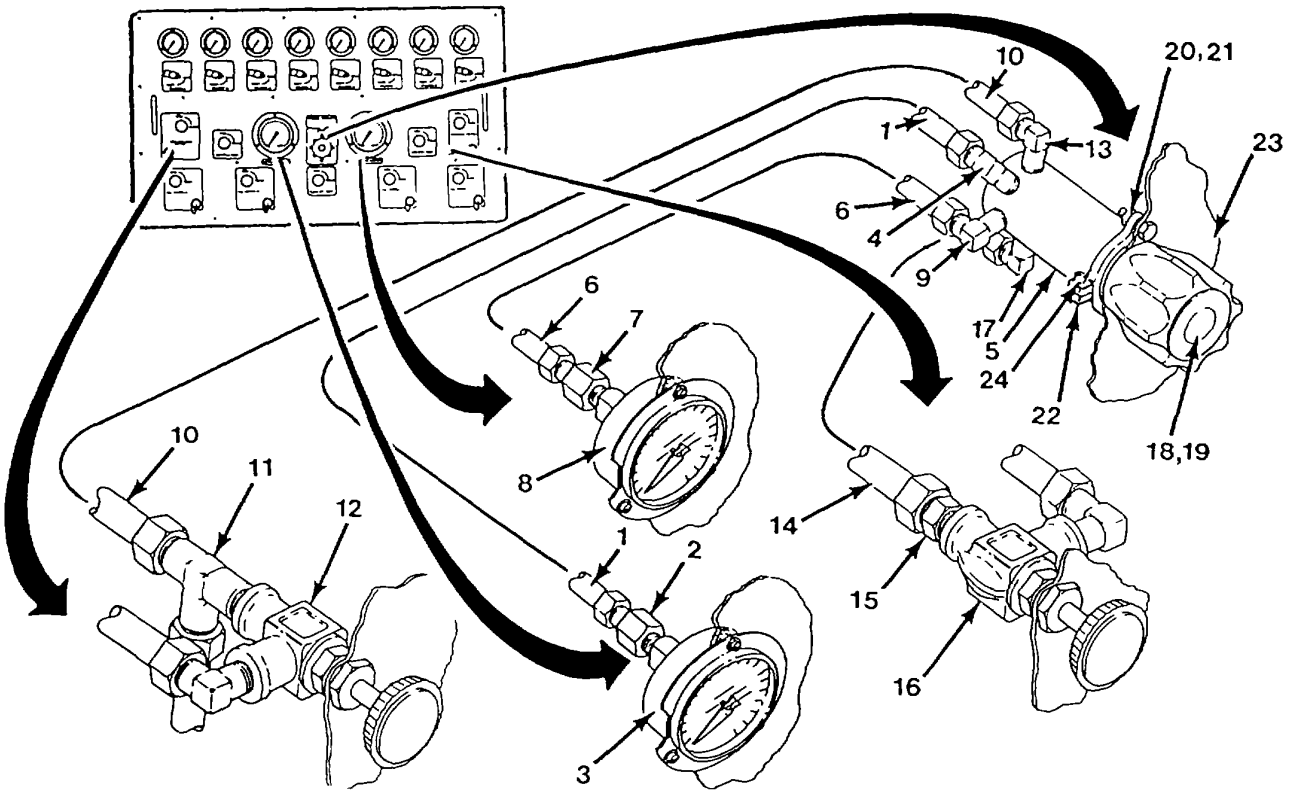


Figure 4-9. Install Pressure Regulator.

(1) Remove button plug from top of handknob (18) on regulator (5) and set aside for later Installation.
(2) Remove retaining ring (19) and handknob (18) from regulator (5) and set aside for later installation.
(3) Apply ante-seizing tape (Item 16, Appendix D) to male pipe threads on four elbows.
(4) Install four elbows onto regulator, as previously noted.

(5) Slide mount bracket (22) onto regulator (5) and secure by tightening two screws (24) in position, previously noted.
(6) Insert regulator (5) through back side of control panel (23) and secure with two screws (20) and two lockwashers (21).
(7) Connect, but do not tighten, tube assembly (14) to adaptor (15) on servicing valve (16) and elbow (17) on outlet port on regulator (5).
(8) Connect, but do not tighten, tube assembly (10) to tee fitting (11) on high pressure valve (12) and to elbow (13) on inlet port on regulator (5).
(9) Connect, but do not tighten, tube assembly (6) to adaptor (7) on servicing pressure gauge (8) and elbow (9)on outlet gauge port on regulator (5).
(10) Connect tube assembly (1) to adaptor (2) on manifold pressure gauge (3) and elbow (4) on inlet gauge port on regulator (5).
(11) Tighten remaining tube connections.
(12) Install handknob (18) on regulator (5) and secure with retaining ring (19).
(13) Insert button plug into top of handknob (18).
(14) Perform a leak check on all connections loosened during this task as prescribed in paragraph 4-20.

4-27. REPAIR PRESSURE REGULATOR.

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

INITIAL SETUP:

Tools
Crowsfoot, 1-5/8"
Pick, O-Ring
Pliers, Snap Ring
Socket Wrench Handle, 3/8" Drive With 6" Extension
Socket Wrench Handle, 1/2" Drive
Socket, 1/12" , 3/8" Drive
Socket, 1/2" , 3/8" Drive
Wrench, Torque 0-150 In/lbs
Wrench, Torque 0-50 ft/lbs
Wrench, Hex 1/8"
Pliers, Soft Grip

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item 2)
Soft Goods Knit

Equipment Conditions
Remove Pressure Regulator
(paragraph 4-26)

a. Disassembly

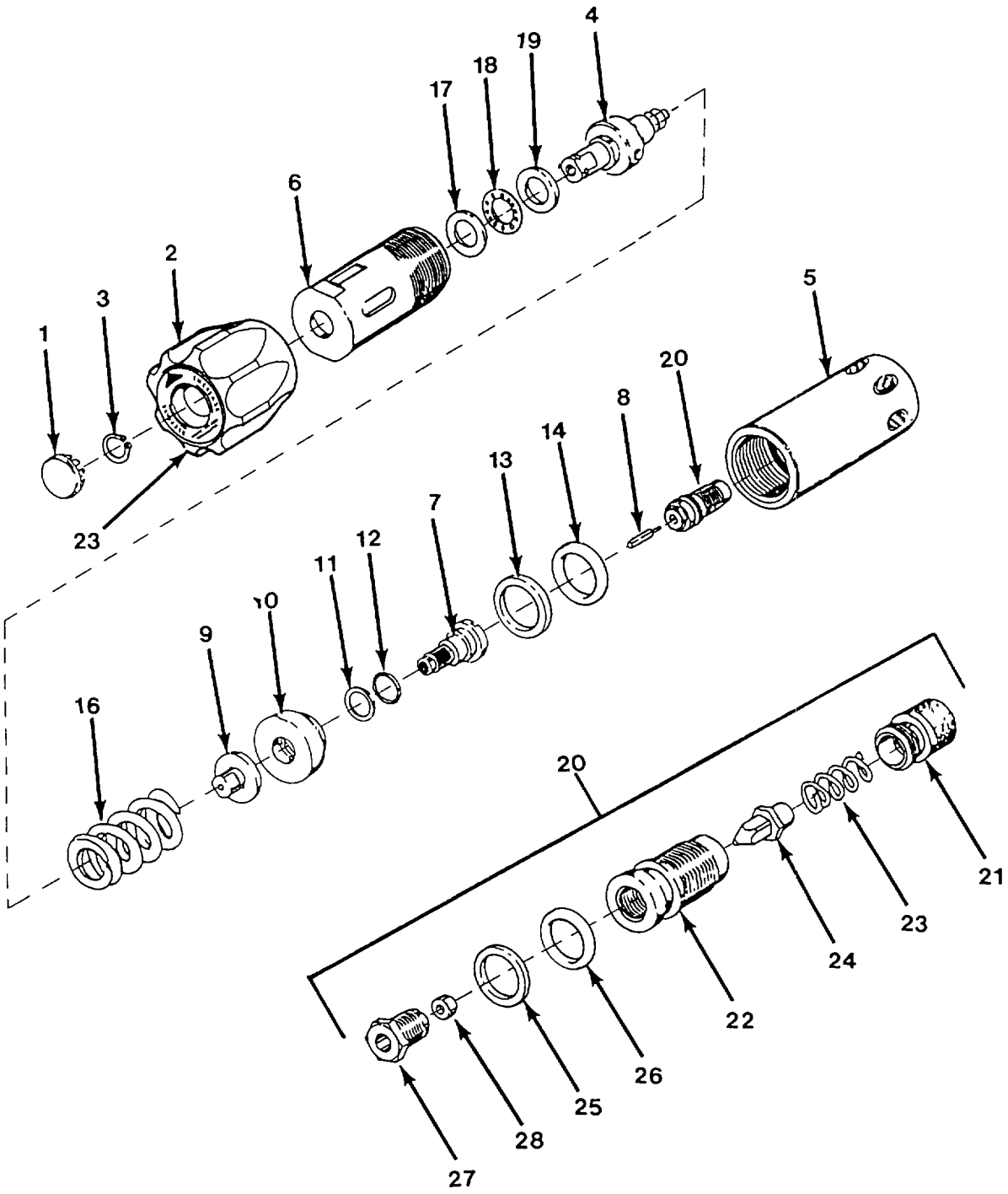


Figure 4-10. Disassemble Pressure Regulator

(1) Remove plug (1) from top of handknob (2).
(2) Remove snap ring (3) from top of adjusting screw assembly (4), then remove handknob (2).
(3) Clamp body (5) of regulator in a vise with a protector around body to prevent damage.
(4) Unscrew bonnet (6) from body (5) and tilt bonnet when removing to prevent internal parts from falling out.
(5) Lightly tap on base of body (5) until sensor (7) and connector (8) are dislodged from body.
(6) Remove spring pad (9) from tip of sensor (7).
(7) Remove sensor (7) from sensor back-up (10).
(8) Remove and discard back-up ring (11) and O-ring (12) from sensor back up (10).
(9) Remove and discard back-up ring (13) and O-ring (14) from sensor back-up (10).
(10) Remove screw (15) from slot in bonnet (6) and pull adjusting screw assembly (4) and spring (16) out of bonnet (6).
(11) Slide thrust washer (17), thrust bearing (18), and thrust washer (19) off of adjusting screw assembly (4).
(12) Unscrew main valve assembly (20) from inside of body (5).
(13) Rotate main valve assembly (20) with filter assembly (21) pointing upward then unscrew filter (21) from main valve body (22).
(14) Remove spring (23) and main valve (24) from main valve body (22).
(15) Remove an discard back-up ring (25) and O-ring (26) from main valve body (22).

NOTE

Seat retainer (27) installed In main valve body (22) has left hand threads.

(16) Unscrew seat retainer (27) remove and discard valve seat (28) from main valve body (22).

b. Cleaning of Regulator Valve Components. Refer to Chapter 4,Section VII, to clean disassembled parts of regulator and new soft goods obtained from rebuild kit and for proper lubricant to use on O-ring during re-assembly, as required

c. Assembly.

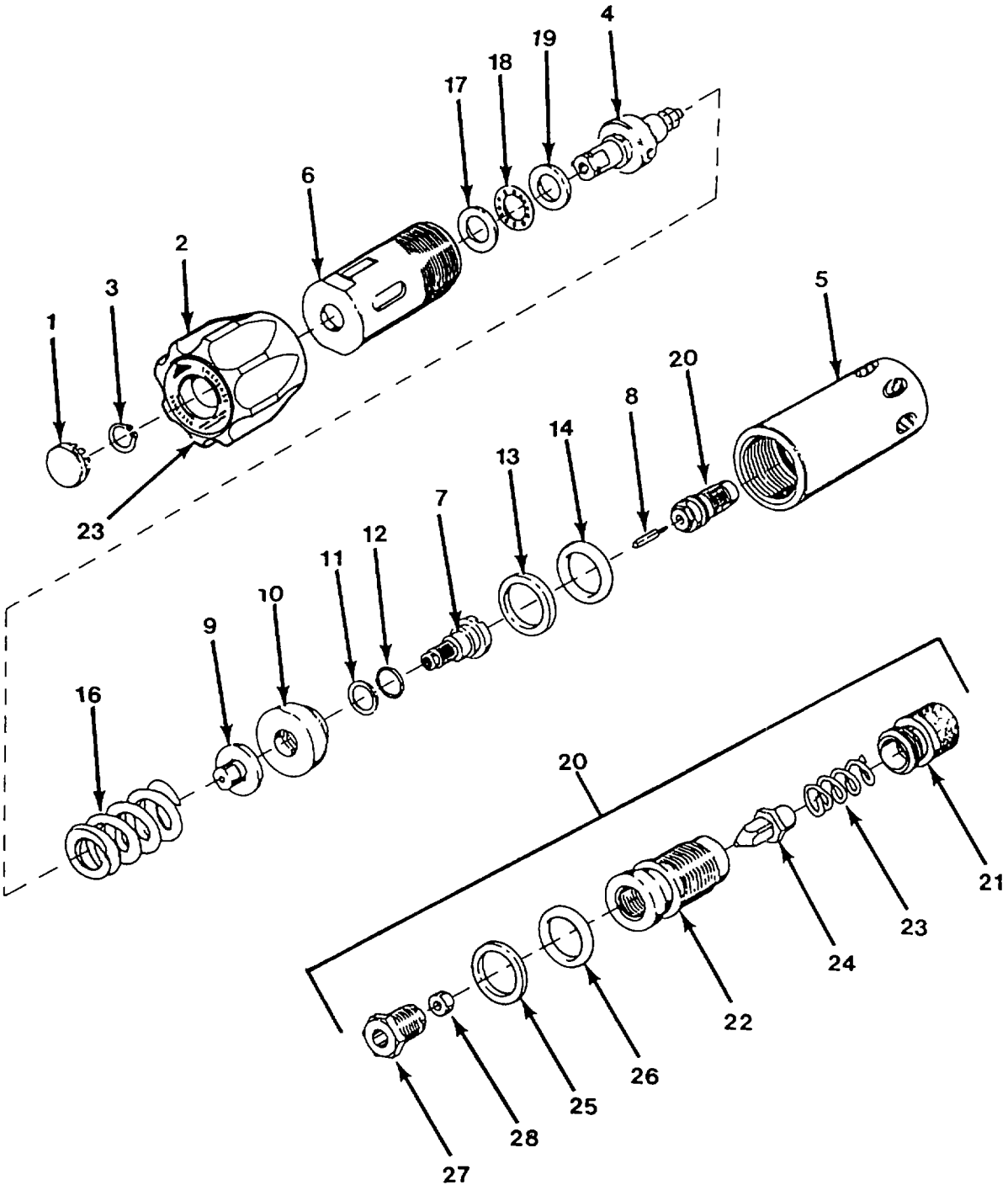


Figure 4-11. Assemble Pressure Regulator

(1) Insert new valve seat (28), with chamber side toward main valve, into main valve body (22).
(2) Thread seat retainer (27) into main valve body (22) and torque to 100-110 in/lbs.
(3) Insert main valve (24) and spring (23) into main valve body (22).
(4) Thread filter assembly (21) onto main valve body (22) hand tight.
(5) Install back-up ring (25) and O-ring (26) onto main valve body (22) to complete main valve assembly (20).
(6) Thread main valve assembly (20) into body (5) until It bottoms out in body hand tight.
(7) Slide thrust washer (19), thrust bearing (18), and thrust washer (17) onto adjusting screw assembly (4).
(8) Insert adjusting screw assembly (4), and spring (16) into bonnet (6) and secure by installing screw (15) through slot in bonnet.
(9) Install back-up ring (13) and O-ring (14) onto sensor back-up (10).
(10) Install back-up ring (11) and O-ring (12) into sensor back-up (10).
(11) Insert sensor (7) Into sensor back-up (10).
(12) Insert connector (8) into body (5).
(13) Position spring pad (9) on tip of sensor (7) and insert into body (5).
(14) Clamp body (5) of regulator in a vise with a protector around body to prevent damage.
(15) Thread bonnet (6) into body (5) and torque to 50 ft/lbs.
(16) Install handknob (2) and secure to top of adjusting screw assembly (4), with snap ring (3).
(17) Install plug (1) into top of handknob (2).

4-28. LOW PRESSURE MANIFOLD.

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

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Wrench, 3/8"
Wrench, 9/16"
Wrench, 5/8"
Wrench, 11/16"

Materials/Parts Appendix D
Anti-seizing Tape (Item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System
(paragraph 4-19)

a. Removal

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and Installing components on life support systems. Failure to follow proper procedures may result In system contamination.

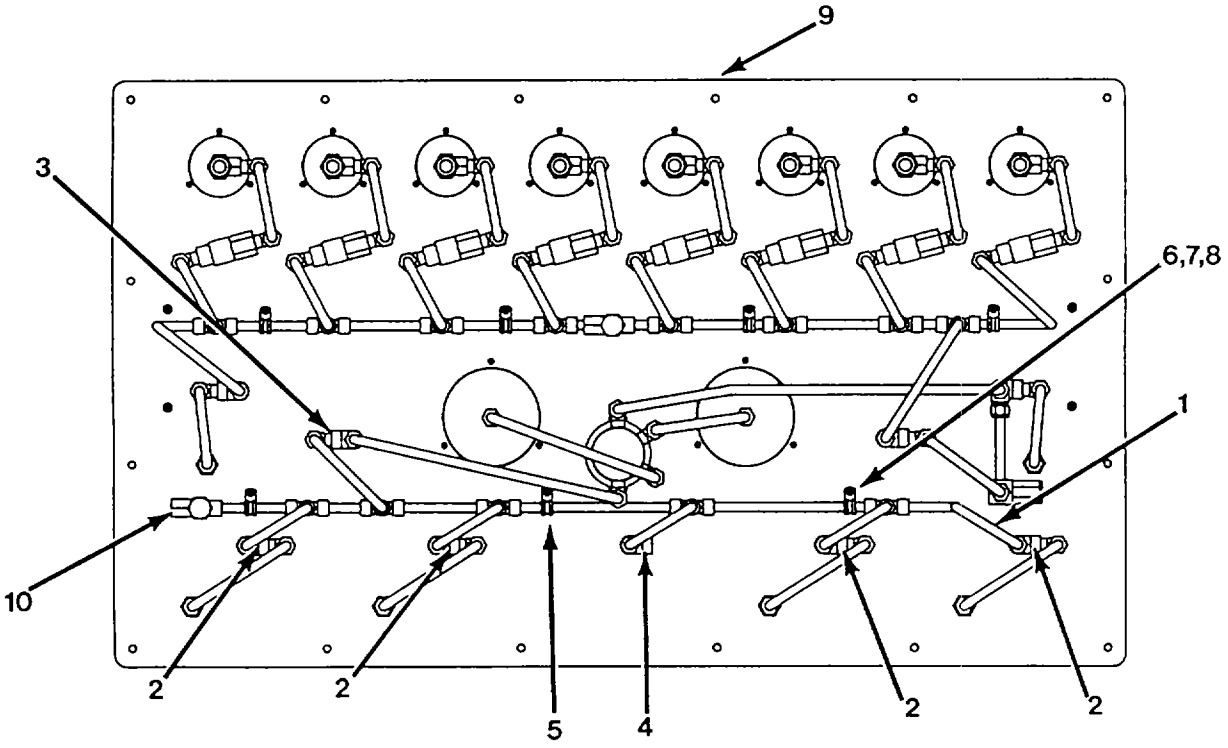


Figure 4-12. Replace Low Pressure Manifold.

(1) Disconnect tubes on manifold (1) from four fill station valves (2), servicing valve (3), and bleed off valve (4).
(2) Remove three clamps (5) attaching screws (6), washers (7), andnuts (8) securing manifold (1) to control panel (9).
(3) Pull manifold (1) off of control panel (9) and bag.
(4) Remove relief valve (10) from manifold (1) and bag.

b. Cleaning of Manifold and Removed Components. Refer to Section VII to clean end fitting on relief valve and replacement manifold as required.
c. Installation.
   (1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on relief valve (10).
   (2) Install relief valve (10) onto the manifold (1).
   (3) Position manifold (1) onto backside of control panel (9) and temporarily secure by installing three clamps (5) with attaching screws (6), washers (7), and nuts (8).
   (4) Connect, but do not tighten, connections on manifold (1) to four fill station valves (2), servicing valve (3), and bleed off valve (4).
   (5) Tighten screws (6) and nuts (8) on clamps (5) to secure manifold (1) to control panel (9).
   (6) Tighten all tube connections from manifold (1) to four fill stations (2), servicing valve (3), and bleed off valve (4).
   (7) Perform a leak check on all connections loosened during this task as prescribed In paragraph 4-20.

4-29. HIGH PRESSURE MANIFOLD.

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

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Wrench, 3/8"
Wrench, 9/16"
Wrench, 5/8"
Wrench, 11/16"
Wrench, 3/4"

Materials/Parts Appendix D
Anti-seizing Tap((Item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System
(paragraph 4-19)

a. Removal

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and Installing components on life support systems. Failure to follow proper procedures may result In system contamination.

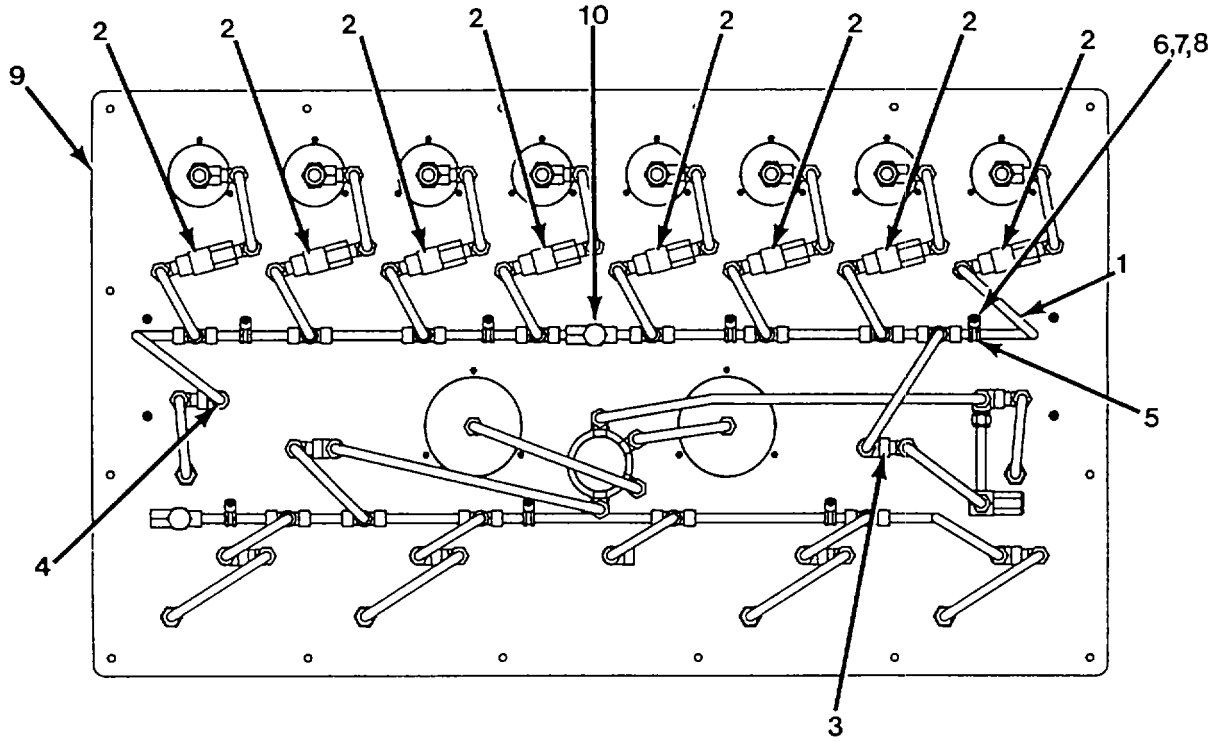


Figure 4-13. Replace High Pressure Manifold.

(1) Disconnect tubes on manifold (1) from eight 1/4 turn ball valves (2), manifold valve (3), and recharge valve (4).
(2) Remove four clamps (5) attaching screws (6), washers (7), and nuts (8) securing manifold (1) to control panel (9).
(3) Pull manifold (1) off of control panel (9) and bag.
(4) Remove relief valve (10) from manifold (1) and bag.

b. Cleaning of Manifold and Removed Components Refer to Section VII to clean end fitting on relief valve and replacement manifold as required.

c. Installation.

(1) Apply ant-seizing tape (Item 16, Appendix D) to male pipe threads on relief valve (10).
(2) Install relief valve (10) onto the manifold (1).
(3) Position manifold (1) onto backside of control panel (9) and temporarily secure by installing four clamps (5) with attaching screws (6), washers (7), and nuts (8).
(4) Connect, but do not tighten, connections on manifold (1) to eight 1/4-turn ball valves (2), manifold valve (3), and recharge valve (4).
(5) Tighten screws (6) and nuts (8) on clamps (5) to secure manifold (1) to control panel (9).
(6) Tighten all tube connections from manifold (1) to eight 1/4-turn ball valves (2), manifold valve (3), and recharge valve (4).
(7) Perform a leak check on all connections loosened during this task as prescribed In paragraph 4-20.

4-30. FILL STATION NEDDLE VALVE(S).

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

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Wrench, 3/8'
Wrench, 5/8"
Wrench, 11/16"
Wrench, 3/4"

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System
(paragraph 419)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and Installing components on life support systems. Failure to follow proper procedures may result In system contamination.

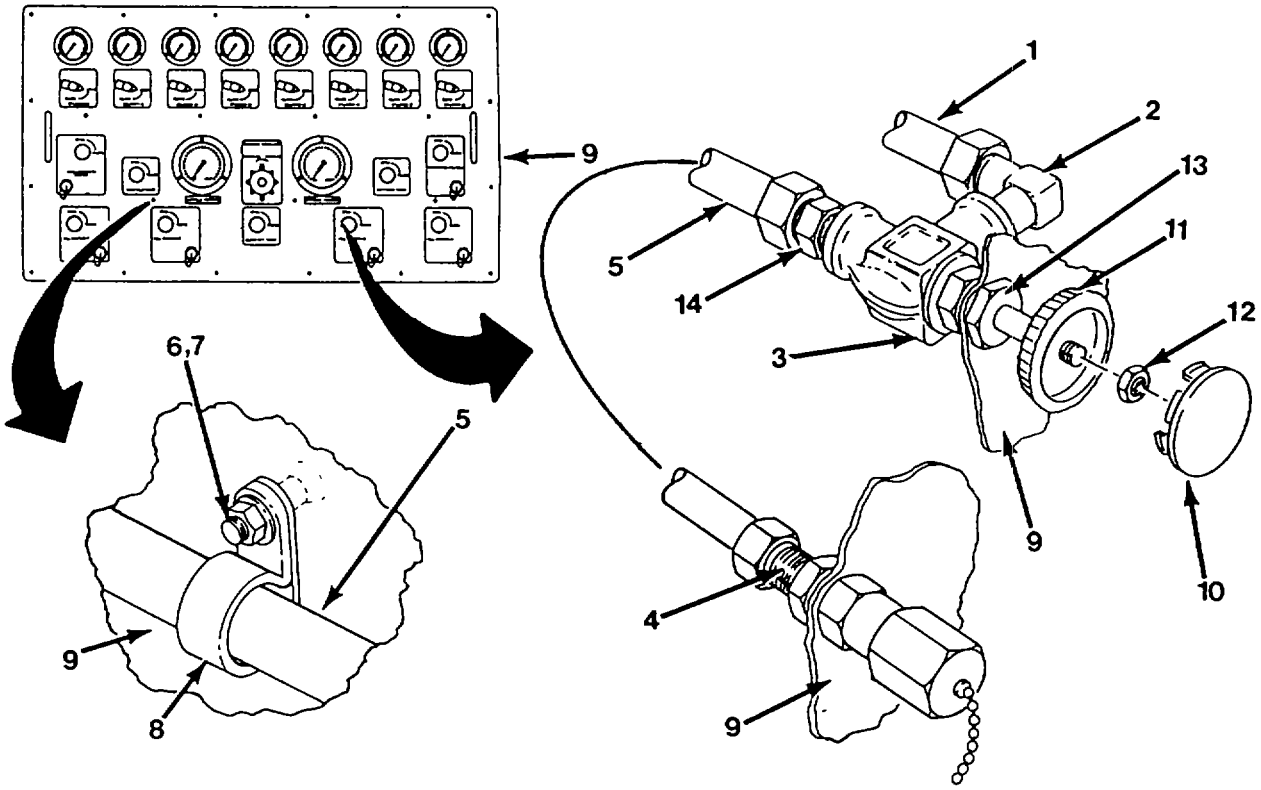


Figure 4-14. Replace Fill Station Needle Valve(s).

(1) Disconnect tube assembly (1) from elbow (2) on valve (3) and from fill station port fitting (4) and bag.
(2) Disconnect tubes on low pressure manifold (5) at all connection points.
(3) Loosen, but do not remove, screws (6) and nuts (7) on clamps (8) securing low pressure manifold (5) to control panel (9).
(4) Unsnap button plug (10) from handle (11) on valve (3) and remove nut (12) and handle (11) from valve (3).
(5) Remove retaining nut (13) from valve (3).
(6) Pull back on manifold tube (5) enough to allow valve (3) to be removed from back of control panel (9) and remove valve (3).
(7) Note position of elbow (2) on valve (3).
(8) Remove elbow (2) from side port of valve (3) and remove adaptor (14) from valve (3) and bag.

b. Cleaning of Valve and Removed Components. Refer to Section VII to clean elbow, adaptor, tube assembly, and replacement valve as required

c. Installation.
(1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on elbow (2) and adaptor (14).
(2) Install adaptor (14) on valve (3)
(3) Install elbow (2) at side port of valve (3) and position as previously noted.
(4) Remove button plug (10), nut (12), handle (11), and retaining nut (13) from new valve (3).
(5) Insert valve (3) through back of control panel (9) and temporarily secure by installing retaining nut (13) hand-tight.
(6) Connect, but do not tighten, all connections for low pressure manifold tubes.
(7) Tighten screws (6) and nuts (7) on clamps (8) to secure manifold (5) to control panel (9)
(8) Connect tube assembly (1) to elbow (2) on valve (3) and to fill station port fitting (4).
(9) Tighten all manifold tube (5) connections.
(10) Tighten retaining nut (13).
(11) Attach handle (11) to valve (3) with nut (12), then install button plug (10).
(12) Perform a leak check on all connections loosened during this task as prescribed in paragraph 4-20.

4-31. BLEED OFF NEEDLE VALVE.

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

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Wrench, 3/8"
Wrench, 5/8"
Wrench, 11/16"
Wrench, 3/4"

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item ,2)
Equipment Conditions
Depressurize Compressed Gas System
(paragraph 4-19)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and installing components on life support systems. Failure to follow proper procedures may result in system contamination.

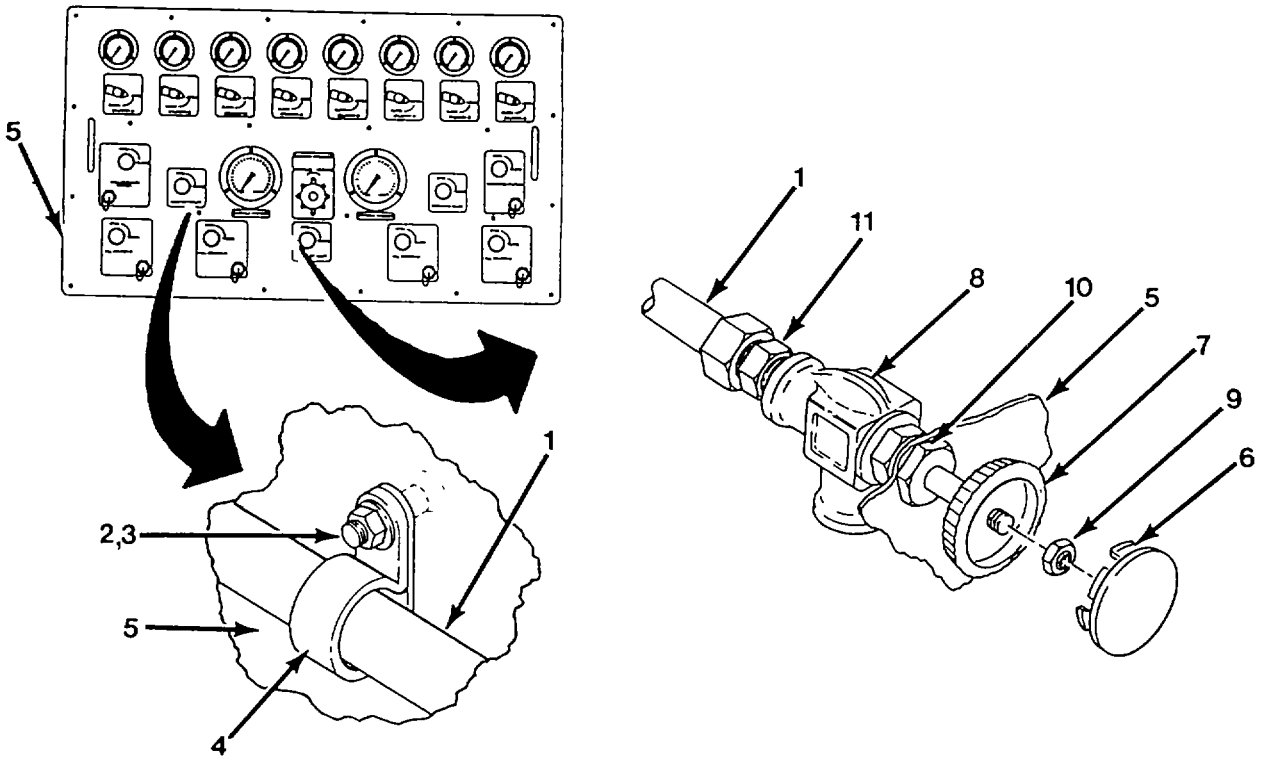


Figure 4-15. Replace Bleed Off Needle Valve.

(1) Disconnect tubes on low pressure manifold (1) at all connection points.
(2) Loosen, but do not remove, screws (2) and nuts (3) on clamps (4) securing low pressure manifold (1) to control panel (5).
(3) Unsnap button plug (6) from handle (7) on valve (8) and remove nut (9) and handle (7) from valve (8).
(4) Remove retaining nut (10) from valve (8).
(5) Pull back on manifold tube (1) enough to allow valve (8) to be removed from back of control panel (5) and remove valve (8).
(6) Remove adaptor (11) from valve (8) and bag.

b. Cleaning of Valve and Removed Components. Refer to Section VII to clean adaptor, tube assembly and replacement valve as required

c. Installation.
(1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on adaptor (11).
(2) Install adaptor (11) on valve (8).
(3) Remove button plug (6), nut (9), handle (7), and retaining nut (10) from new valve(8).
(4) Insert valve (8) through back of control panel (5) and temporarily secure by installing retaining nut (10) hand tight.
(5) Connect, but do not tighten, all connections for manifold tubes (1).
(6) Tighten screws (2) and nuts (3) on clamps (4) to secure manifold (1) to control panel (5).
(7) Tighten all manifold tube (1) connections.
(8) Tighten retaining nut (10).
(9) Attach handle (7) to valve (8) with nut (9), then Install button plug (6).
(10) Perform a leak check on all connections loosened during this task as prescribed in paragraph 4-20.

4-32. SERVICING NEEDLE VALVE

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

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Wrench, 3/8"
Wrench, 5/8"
Wrench, 11/16"
Wrench, 3/4"

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System
(paragraph 4-19)

a. Removal

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and installing components on life support systems. Failure to follow proper procedures may result In system contamination.

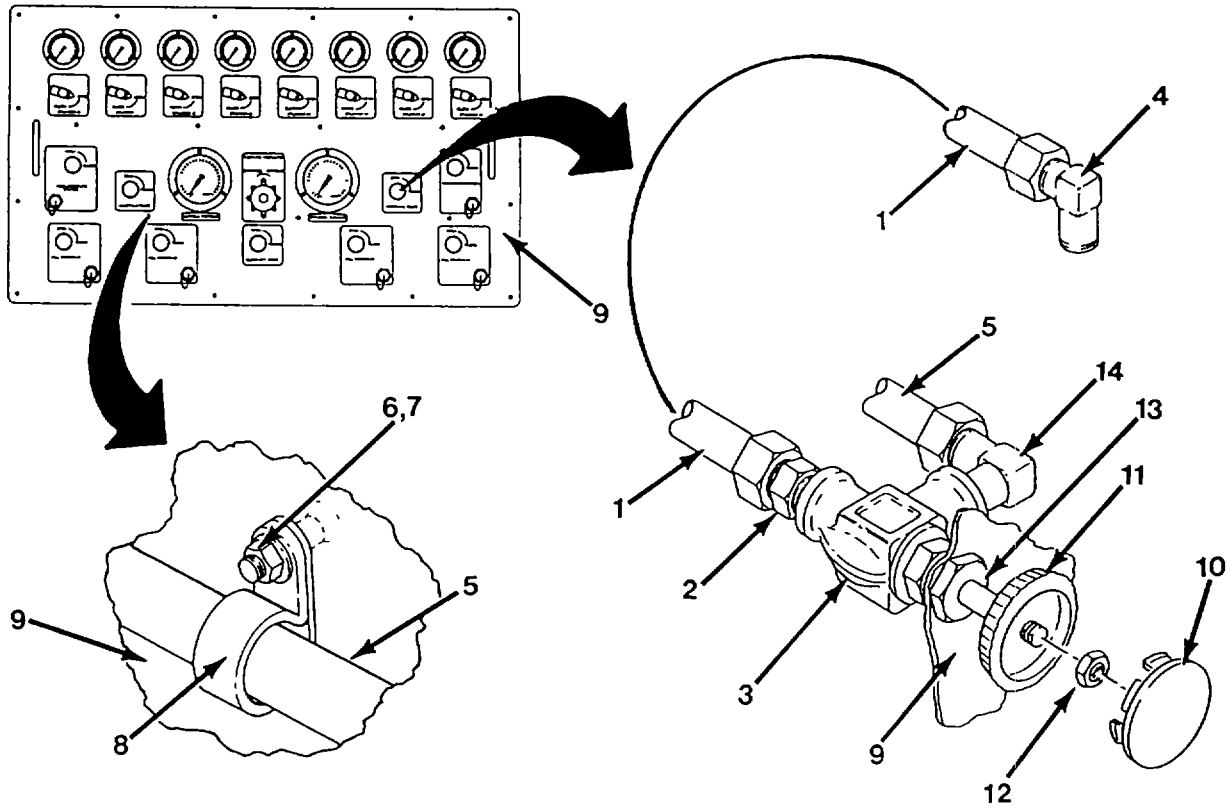


Figure 4-16. Replace Servicing Needle Valve.

(1) Disconnect tube assembly (1) from adaptor (2) on valve (3) and from elbow (4) on pressure regulator.
(2) Disconnect tubes on low pressure manifold (5) at all connection points.
(3) Loosen, but do not remove, screws (6) and nuts (7) on clamps (8) securing low pressure manifold (5) to control panel (9).
(4) Unsnap button plug (10) from handle (11) on valve (3) and remove nut (12) and handle (11) from valve (3).
(5) Remove retaining nut (13) from valve (3).
(6) Pull back on manifold tube (5) enough to allow valve (3) to be removed from back of control panel (9) and remove valve (3).
(7) Note position of elbow (14) on valve (3).
(8) Remove elbow (14) and adaptor (2) from valve (3) and bag.

b. Cleaning of Valve and Removed Components. Refer to Section VII to clean elbow, adaptor, tube assembly and replacement valve as required.

c. Installation.
(1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on elbow (14) and adaptor (2)
(2) Install adaptor (2) on valve (3).
(3) Install elbow (14) at side port of valve (3) and position elbow as previously noted.
(4) Remove button plug (10), nut (12), handle (11), and retaining nut (13) from new valve (3).
(5) Insert valve (3) through back of control panel (9) and temporarily secure by Installing retaining nut (13) hand tight.
(6) Connect, but do not tighten, all connections for manifold tubes.
(7) Tighten screws (6) and nuts (7) on clamps (8) to secure manifold (5) to control panel (9).
(8) Connect tube assembly (1) to adaptor (2) on valve (3) and to elbow (4) on pressure regulator.
(9) Tighten all manifold tube (5) connections.
(10) Tighten retaining nut (13).
(11) Attach handle (11) to valve (3) with nut (12), then Install button plug (10).
(12) Perform a leak check on all connections loosened during this task as prescribed In paragraph 4-20.

4-33. MANIFOLD NEEDLE VALVE.

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

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Wrench, 3/8"
Wrench, 5/8"
Wrench, 11/16"
Wrench, 3/4"

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System
(paragraph 4-19)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and installing components on life support systems. Failure to follow proper procedures may result In system contamination.

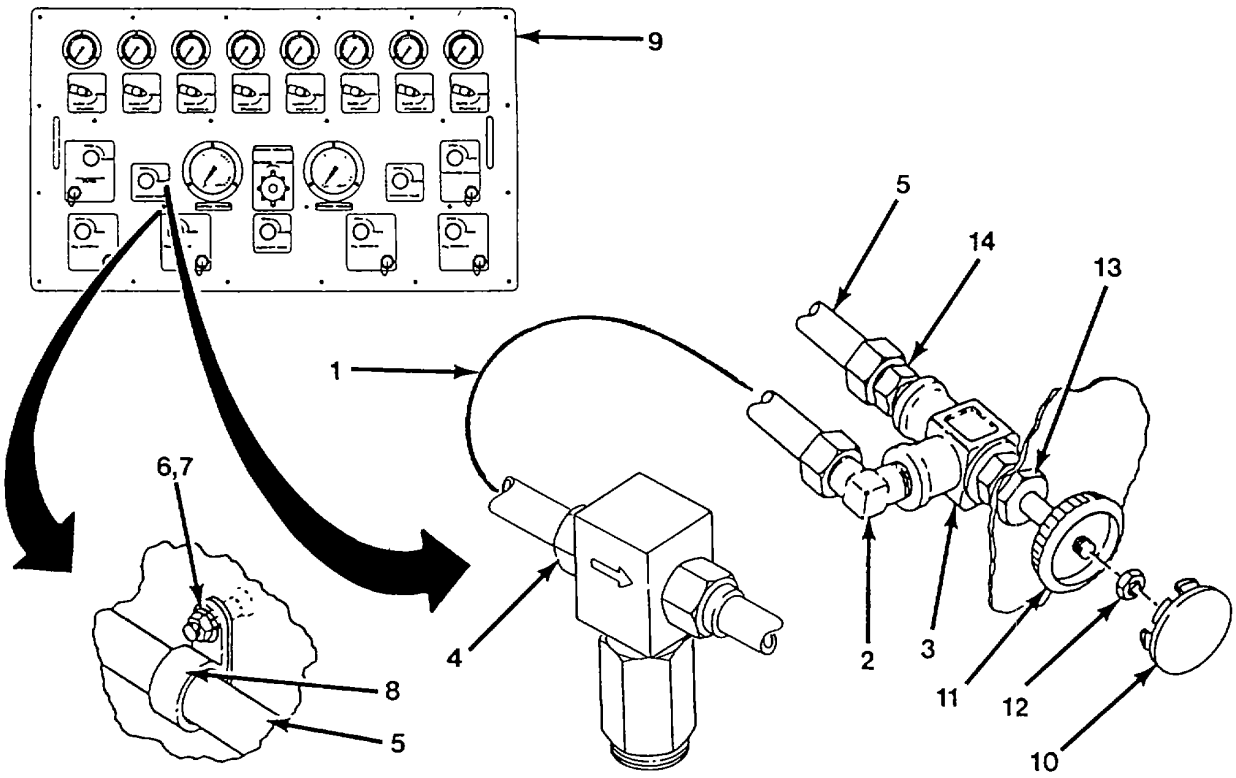


Figure 4-17. Replace Manifold needle Valve.

(1) Disconnect tube assembly (1) from elbow (2) on valve (3) and from filter fitting (4) and bag.
(2) Disconnect tubes on high pressure manifold (5) at all connection points.
(3) Loosen, but do not remove, screws (6) and nuts (7) on clamps (8) securing high pressure manifold (5) to control panel (9).
(4) Unsnap button plug (10) from handle (11) on valve (3) and remove nut (12) and handle (11) from valve (3).
(5) Remove retaining nut (13) from valve (3).
(6) Pull back on manifold tube (5) enough to allow valve (3) to be removed from back of control panel (9) and remove valve (3).
(7) Note position of elbow (2) on valve (3).
(8) Remove elbow (2) and adaptor (14) from valve (3) and bag.

b. Cleaning of Valve and Removed Components. Refer to Section VII to clean elbow, adaptor, tube assembly and replacement valve as required.

c. Installation.
(1) Apply antiseizing tape (Item 16, Appendix D) to male pipe threads on elbow (2) and adaptor (14).
(2) Install adaptor (14) on valve (3)
(3) Install elbow (2) at side port of valve (3) and position elbow as previously noted.
(4) Remove button plug (10), nut (12), handle (11), and retaining nut (13) from new valve (3).
(5) Insert valve (3) through back of control panel (9) and temporarily secure by installing retaining nut (13) hand tight.
(6) Connect, but do not tighten, all connections for high pressure manifold tubes.
(7) Tighten screws (6) and nuts (7) on clamps (8) to secure manifold (5) to control panel (9).
(8) Connect tube assembly (1) to elbow (2) on valve (3) and to filter fitting (4).
(9) Tighten all manifold tube (5) connections.
(10) Tighten retaining nut (13).
(11) Attach handle (11) to valve (3) with nut (12), then install button plug (10).
(12) Perform a leak check on all connections loosened during this task as prescribed in paragraph 4-20.

4-34. HIGH PRESSURE STATION NEEDLE VALVE.

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

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Wrench, 3/8"
Wrench, 5/8"
Wrench, 11/16"
Wrench, ¾"

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System
(paragraph 4-19)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and Installing components on life support systems. Failure to follow proper procedures may result In system contamination.

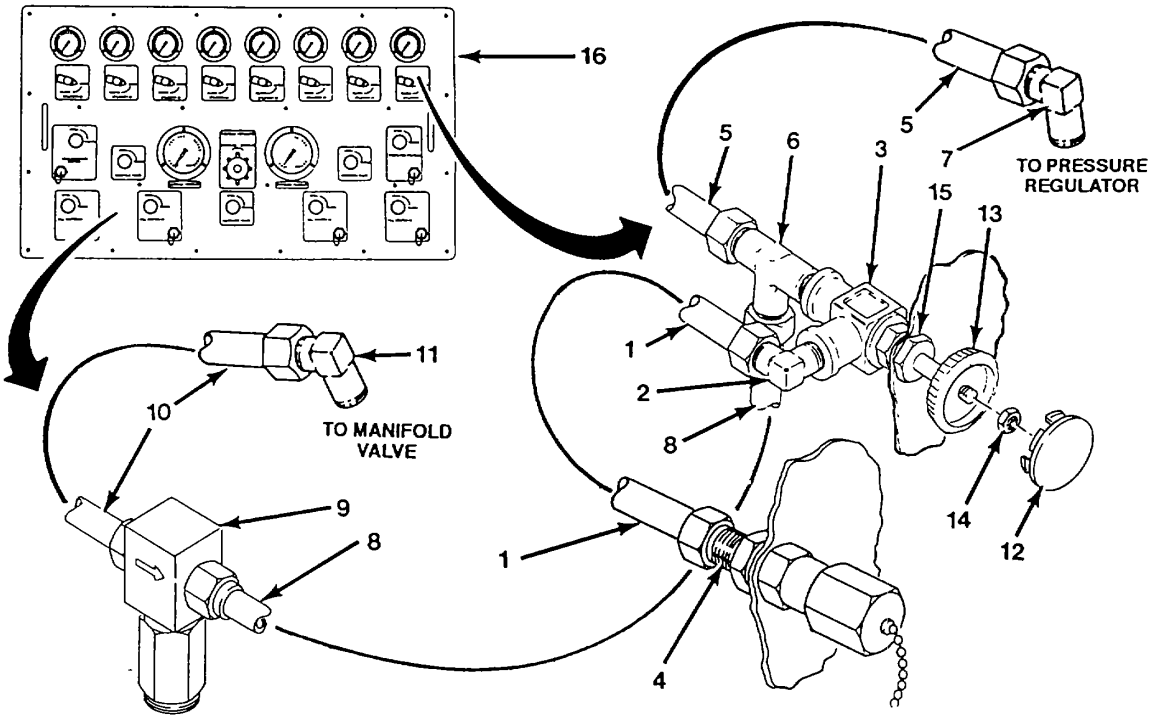


Figure 4-18. Replace High Pressure Station Needle Valve.

(1) Disconnect tube assembly (1) from elbow (2) on valve (3) and from high pressure station port fitting (4) and bag.
(2) Disconnect tube assembly (5) from tee (6) and elbow (7) on pressure regulator and bag.
(3) Disconnect tube assembly (8) from tee (6) and loosen at filter (9).
(4) Disconnect tube assembly (10) from elbow (11) on manifold valve.
(5) Remove tube assembly (10) and filter (9) together as an assembly and bag.
(6) Unsnap button plug (12) from handle (13) on valve (3) and remove nut (14) and handle (13) from valve (3).
(7) Remove retaining nut (15) from valve (3).
(8) Remove valve (3) from back of control panel (16).
(9) Note position of elbow (2) and tee fitting (6) on valve (3).
(10) Remove elbow (2) and tee fitting (6) from valve (3) and bag.

b. Cleaning of Valve and Removed Components. Refer to Section VII to clean elbow, tee fitting, tube assembly and replacement valve as required.

c. Installation.

(1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on elbow (2) and tee fitting (6).
(2) Install elbow (2) at side port of valve (3) and tee fitting (6) on valve (3) and position as previously noted.
(3) Remove button plug (12), nut (14), handle (13), and retaining nut (15) from new valve (3).
(4) Insert valve (3) through back of control panel (16) and temporarily secure by installing retaining nut (15) hand tight.
(5) Connect, but do not tighten, tube assembly (10) and filter assembly (9) to elbow (11) on manifold valve.
(6) Connect, but do not tighten, tube assembly (8) to tee (6) and filter (9).
(7) Connect tube assembly (5) to tee (6) and elbow (7) on pressure regulator.
(8) Connect tube assembly (1) to elbow (2) on valve (3) and high pressure station port fitting (4).
(9) Tighten all connections.
(10) Tighten retaining nut (15).
(11) Attach handle (13) to valve (3) with nut (14), then install button plug (12).
(12) Perform a leak check on all connections loosened during this task as prescribed in paragraph 4-20.

4-35. RECHARGE STATION NEEDLE VALVE.

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

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Wrench, 3/8'
Wrench, 5/8'
Wrench, 11/16"
Wrench, ¾"

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System
(paragraph 4-19)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and Installing components on life support systems. Failure to follow proper procedures may result in system contamination.

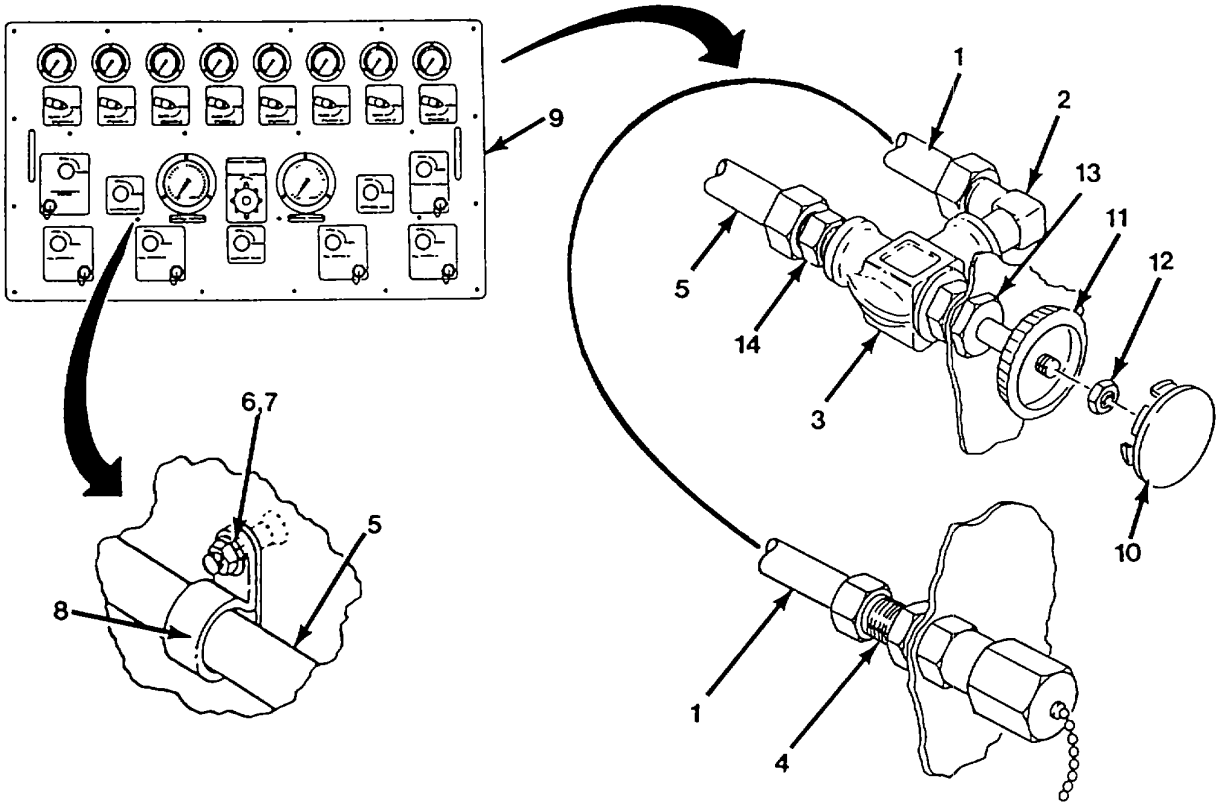


Figure 4-19. Replace Recharge Station Needle Valve.

(1) Disconnect tube assembly (1) from elbow (2) on valve (3) and from recharge station port fitting (4) and bag.
(2) Disconnect tubes on high pressure manifold (5) at all connection points.
(3) Loosen, but do not remove, screws (6) and nuts (7) on clamps (8) securing manifold (5) to control panel (9).
(4) Unsnap button plug (10) from handle (11) on valve (3) andremove nut (12) and handle (11) from valve (3).
(5) Remove retaining nut (13) from valve (3).
(6) Pull back on manifold tube (5) enough to allow valve (3) to be removed from back of control panel (9) and remove valve (3).
(7) Note position of elbow (2) on valve (3).
(8) Remove elbow (2) from side port of valve (3) and adaptor (14) from valve (3) and bag.

b. Cleaning of Valve and Removed Components. Refer to Section VII to clean elbow, adaptor, tube assembly and replacement valve as required.

c. Installation.
(1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on elbow (2) and adaptor (14).
(2) Install adaptor (14) on valve (3).
(3) Install elbow (2) at side port of valve (3) and position as previously noted.
(4) Remove button plug (10), nut (12), handle (11), and retaining nut (13) from new valve (3).
(5) Insert valve (3) through back of control panel (9) and temporarily secure by installing retaining nut (13) hand tight.
(6) Connect, but do not tighten, all connectionsfor high pressure manifold tubes.
(7) Tighten screws (6) and nuts (7) on clamps (8) to secure manifold (5) to control panel (9).
(8) Connect tube assembly (1) to elbow (2) on valve (3) and to recharge station port fitting (4).
(9) Tighten all manifold tube (5) connections.
(10) Tighten retaining nut (13).
(11) Attach handle (11) to valve (3) with nut (12), then install button plug (10).
(12) Perform a leak check on all connections loosened during this task as prescribed in paragraph 4-20.

4-36. RELIEF VALVES.

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

INITIAL SETUP:

Tools
Wrench, ¾"
Wrench, 7/8"

Materials/Parts Appendix D
Anti-seizing Tape (Item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System (paragraph 4-19)

NOTE

The relief valve set at 3,300 psi is installed on the low pressure manifold and the relief valve set at 5,500 psi is installed on the high pressure manifold The procedure to remove and replace both relief valves is the same.

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and installing components on life support systems. Failure to follow proper procedures may result In system contamination.

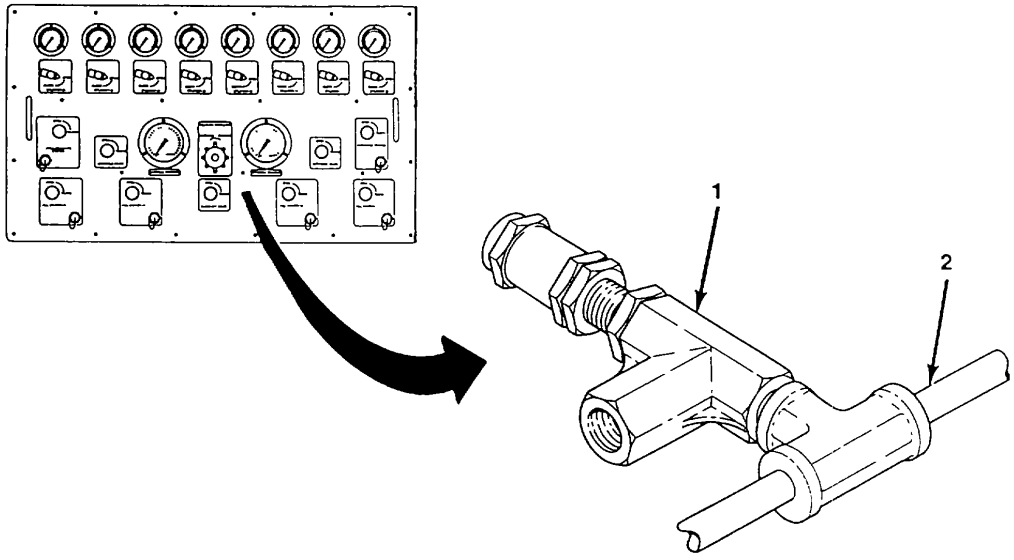


Figure 4-20. Replace Relief Valve(s).

(1) Remove relief valve (1) from high or low pressure manifold (2) and bag.

b. Cleaning of Relief Valve. Refer to Section VII to clean replacement relief valve as required.
c. Installation.
(1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on relief valve (1).
(2) Install relief valve (1) onto high or low pressure manifold (2).
(3) Perform a leak check on relief valve to manifold connection as prescribed in paragraph 4-20.

4-37. PARTICULATE FILTER.

This task covers: a. Servicing b. Removal c. Cleaning d. Installation

INITIAL SETUP:

Tools
Pliers, Slip Joint
Wrench, 1-1/8"

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System (paragraph 4-19)

a. Servicing Filter Element.

WARNING

Prior to performing either of the following tasks, maintenance personnel should review Section VII for general guidelines on removing and Installing components on life support systems. Failure to follow proper procedures may result in system contamination.

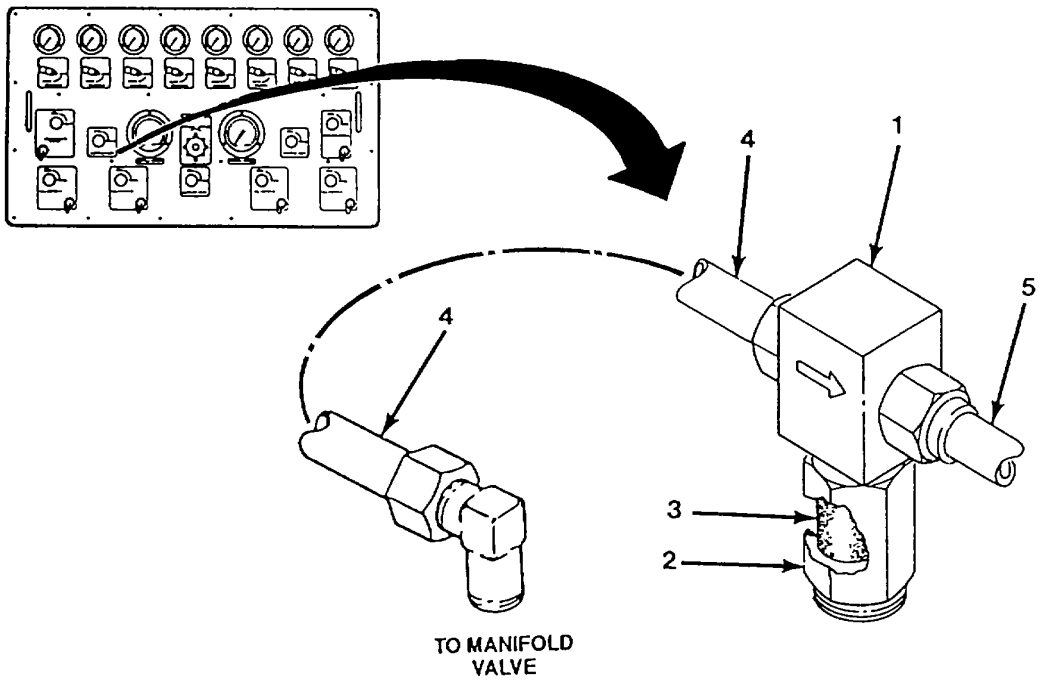


Figure 4-21. Replace or Service Particulate Filter.

(1) While supporting tubes connected to filter (1) remove cap (2) from end of filter and bag.
(2) Pull element (3) out of filter (1).
(3) Inspect element (3), if element is clean and undamaged reuse it. Otherwise, obtain a new element cleaned in accordance with Section VII.
(4) Install element (3) into filter (1).

(5) While supporting tubes connected to filter (1) install and tighten cap (2).

b. Removal.
   (1) Disconnect tube assembly (4) from Inlet port on filter (1) and manifold valve
   (2) Remove tube assembly (4) and bag.
   (3) Disconnect tube assembly (5) from outlet port on filter (1).
   (4) Note direction of flow arrow on filter (1) then pull filter out and bag.

c. Cleaning of Filter. Refer to Section VII to clean replacement filter as required.

d. Installation.

   (1) Connect tube assembly (5) to outlet port of filter (1) with flow arrow oriented as previously noted.
   (2) Connect tube assembly (4) to inlet port of filter(1) and manifold valve.
   (3) Perform a leak check on filter connections as prescribed in paragraph 4-20.

4-38. YOKE ADAPTOR.

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

INITIAL SETUP:

Tools
Wrench, 5/8”
Wrench, ¾"
Wrench, 1"

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System (paragraph 4-19)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and Installing components on life support systems. Failure to follow proper procedures may result in system contamination.

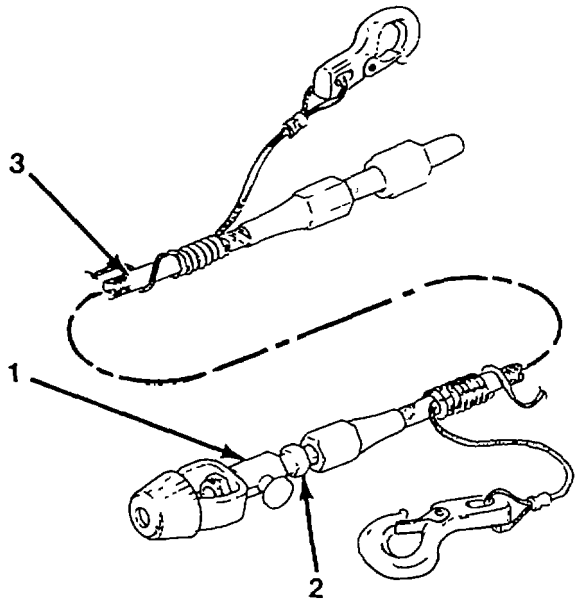


Figure 4-22. Replace Yoke Adaptor.

(1) Unscrew yoke adaptor (1) from pipe nipple (2) at end of fill hose (3) and bag.

b. Cleaning of Fill Hose, Yoke Adaptor and Nipple. Refer to Section VII to clean yoke adaptor, pipe nipple and
replacement fill hose as required.

c. Installation.
(1) Apply anti-seizing tape (Item 16, Appendix D) to male pipe threads on pipe nipple (2).
(2) Thread yoke adaptor (1) onto pipe nipple (2).
(3) Perform a leak check on fill hose connections as prescribed in paragraph 4-20.

4-39. FILL HOSE.

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

INITIAL SETUP:

Tools
Wrench, 5/8"
Wrench, ¾"
Wrench, 1"

Materials/Parts Appendix D
Anti-seizing Tape (item 16)
Plastic Bags (item 2)
Equipment Conditions
Depressurize Compressed Gas System (paragraph 4-19)

a. Removal.

WARNING

Prior to performing this task, maintenance personnel should review Section VII for general guidelines on removing and installing components on life support systems. Failure to follow proper procedures may result In system contamination.

(1) Unscrew pipe nipple (1) from end of fill hose (2) and bag.

b. Cleaning of Fill Hose, Yoke Adaptor and Nipple Refer to Section VII to clean yoke adaptor, pipe nipple and replacement fill hose as required.

c. Installation.

(1) Apply ant-seizing tape (Item 16, Appendix D) to male pipe threads on pipe nipple (1).
(2) Thread pipe nipple (1) onto fill hose (2).
(3) Perform a leak check on fill hose connections as prescribed in paragraph 4-20.

4-40. TIRE.

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

INITIAL SETUP:

Tools
None

Materials/Parts Appendix D
None

Equipment Conditions
Wheel & Tire Assembly Removed
(Paragraph 3-5)

a. Remove tire using a tire demounter. Follow normal Shop Practices.

b. Repair tire. Refer to TM 9-2610-200-24 for instructions on tire repair.

c. Replace tire using a tire demounter. Follow normal Shop Practices.

d. Refer to paragraph 3-5 to install Wheel and Tire Assembly.

4-41. WHEEL.

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

INITIAL SETUP:

Tools
None

Materials/Parts Appendix D
None

Equipment Conditions
Wheel & Tire Assembly Removed
(Paragraph 3-5)

a. Replace tire on new wheel using a tire demounter. Follow normal Shop Practices.

b. Refer to paragraph 3-5 to install Wheel and Tire Assembly.

4-42. HUB AND DRUM ASSEMBLY.

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

INITIAL SETUP:

Tools
Mallet, rubber
Pliers, Slip Joint
Pliers, Needle Nose
Puller Kit, Mechanical
Screwdriver, Flat Tip
Wrench, Hex 1/8"

Materials/Parts Appendix D
Wiping Rag (item 13)
Cleaning Solvent (item 15)
Gear Oil (item 12)
Container (item 7)
Seal
Gasket
Gasket
Cotter Pin

Equipment Conditions
Wheel & Tire Assembly Removed
(Paragraph 3-5)

WARNING

Prior to performing this task the Servicing Unit should be positioned on a hard flat surface and the swivel jacks should be lowered to provide a firm stable foundation. Failure to follow this warning may result In serious Injury or equipment damage.

NOTE

This procedure describes the removal and replacement of the hub and drum assembly, wheel bearings, and the seal for the Servicing Unit.

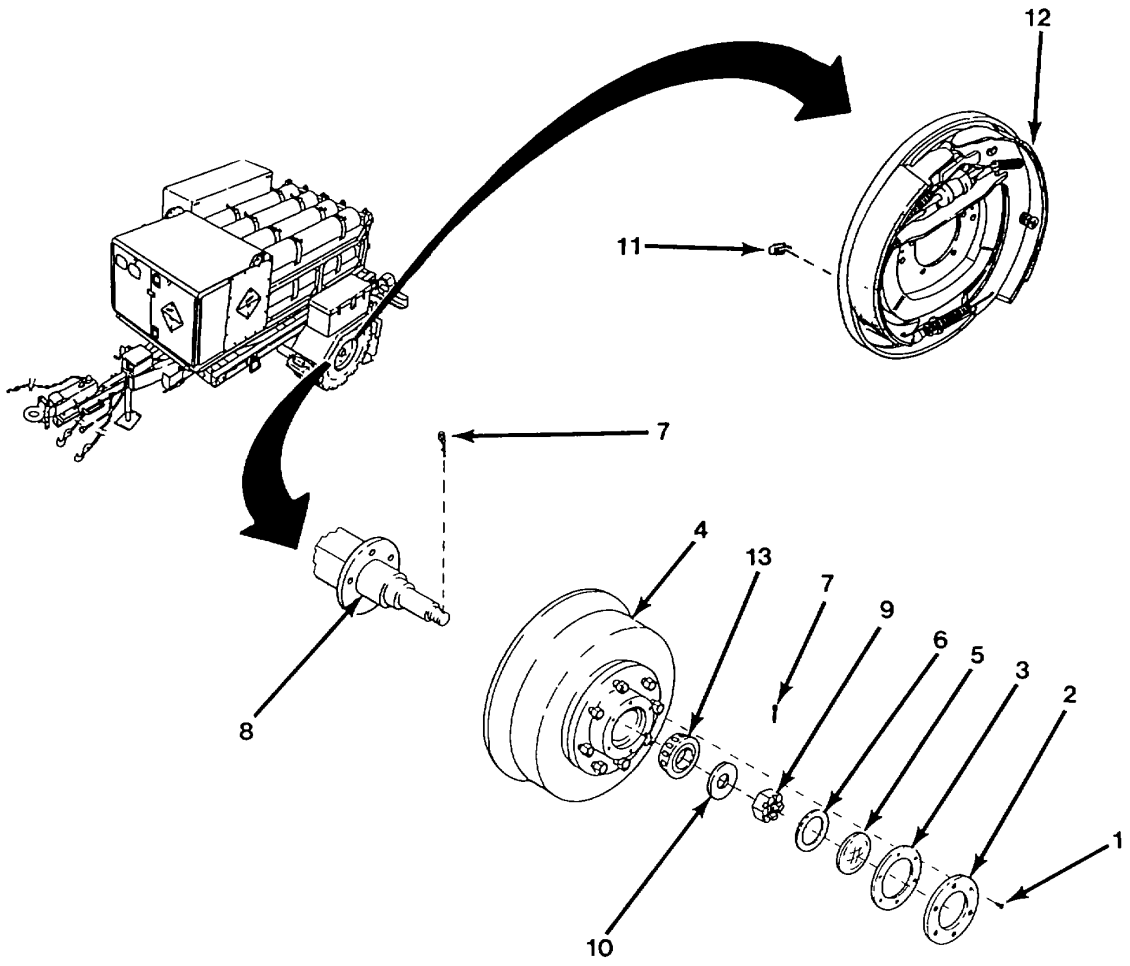


Figure 4-25. Remove Hub and Drum Assembly.

a. Removal.
   (1) Ensure handbrake is released.
   (2) Place an empty container below the hub and drum assembly to capture the oil that will drain when hub and drum assembly is removed.
   (3) Remove six screws (1) and remove mounting ring (2).
   (4) Remove mounting rings (2) and gasket (3) from front face of hub and drum assembly (4). Discard gasket.
   (5) Carefully pry cap (5) out of hub and drum assembly (4) and allow oil to drain into container.
   (6) Remove gasket (6) from seat in hub and drum assembly (4). Discard gasket.
   (7) Straighten cotter pin (7). Pull pin out of hole in spindle of axle (8). Discard cotter pin.
   (8) Unscrew spindle nut (9) from spindle of axle (8). Remove nut (9) and spindle washer (10).
   (9) Remove dust cap (11) from adjustment hole on backside of brake assembly (12).
   (10) Insert a flat tip screwdriver through hole and back off on brake adjuster assembly to release brake tension.
   (11) Carefully pull hub and drum assembly (4) from spindle of axle and catch front wheel bearing (13).

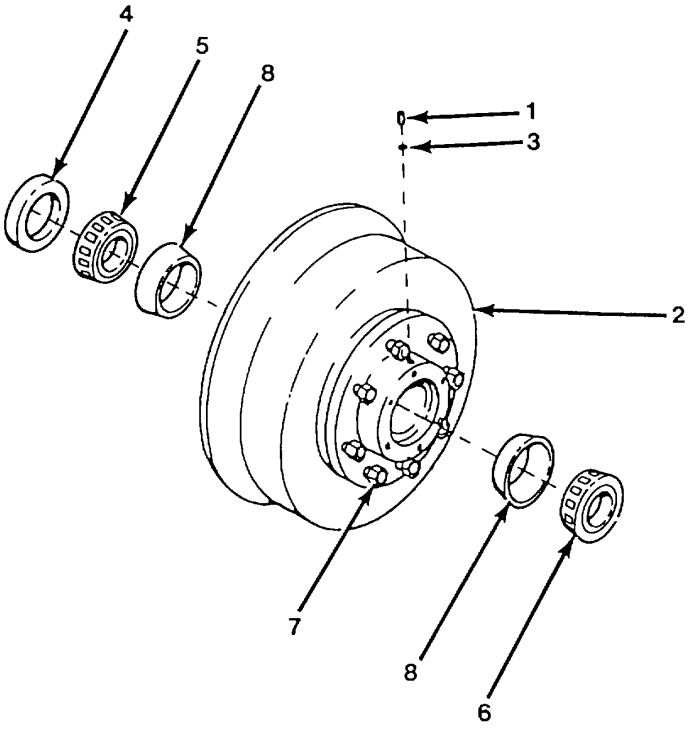


Figure 4-26. Inspect Hub and Drum Assembly.

b. Inspect.

(1) Remove plug (1) from hub (2). Remove and discard O-ring (3) from plug (1).
(2) Press seal (4) and wheel bearing (5) out of backside of hub. Discard seal.
(3) Clean and inspect wheel bearings (5 and 6) in accordance with TM 9-214. Replace if necessary.
(4) Clean and inspect assembled hub drum wheel studs (7), bearing cups (races) (8) as prescribed in paragraphs 4-15 and 4-16.

NOTE

If brake drum is worn in area where shoes ride refer to Direct Support (DS) maintenance to rework brake drum If wheel studs, hub, or bearing races are damaged refer to DS maintenance for repair.

(5) Repair, or rework, hub (2) and/or drum as necessary.
(6) After cleaning apply a liberal coat of gear oil (item 12, Appendix D) to bearing cups in hub (2) and to both wheel bearings.
(7) Insert rear wheel bearing (5) into hub (2) and press new seal (4) into hub ensuring oil seal is seated properly.
(8) Install new O-ring (3) onto plug (1) and thread plug into hub.
(9) Temporarily insert front wheel bearing into hub for later assembly.

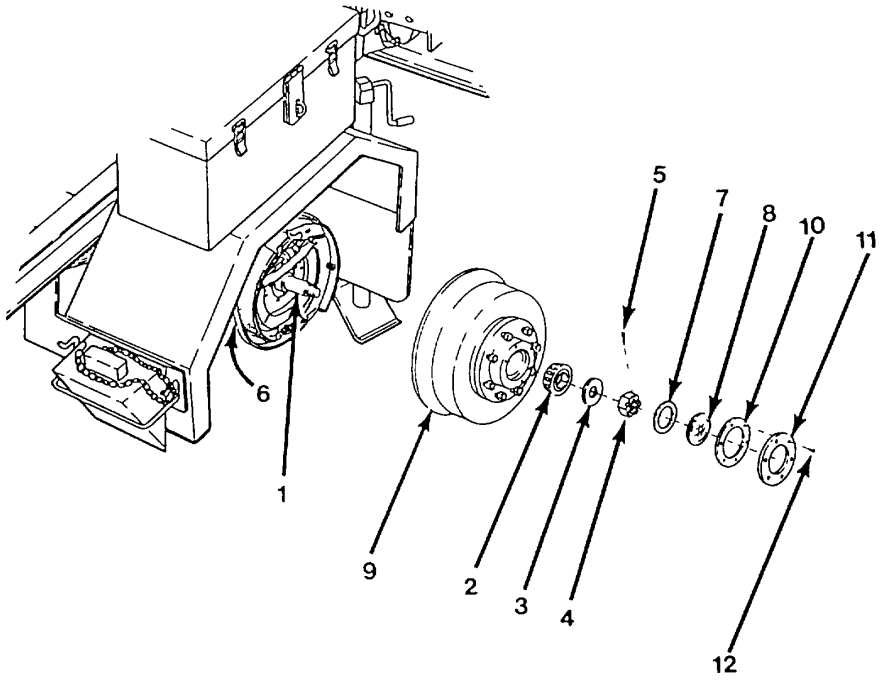


Figure 4-27. Install Hub and Drum Assembly.

c. Installation.
   (1) Inspect brake assembly for damage and wear. Refer to paragraph 4-44 if brake assembly requires repair.
   (2) Clean spindle (1) on axle as prescribed in paragraph 4-15, then apply a liberal coat of gear oil (item 12, Appendix D) to spindle.
   (3) Set aside front wheel bearing (2) and carefully mount hub and drum assembly onto spindle of axle (1).
   (4) Insert front wheel bearing (2) until bearing is mated with cup (race) on hub.
   (5) Install spindle washer (3) and thread spindle nut (4) onto spindle of axle (1) hand tight.
   (6) Align slot on spindle nut (4) with hole in spindle of axle (1). Turn nut one position (DO NOT OVER TIGHTEN) if necessary for proper alignment.
   (7) Install and open cotter pin (5) to lock spindle nut (4) position.
   (8) Perform initial adjustment of brake assembly by turning brake adjuster assembly until brake drum to brake shoe contact can be heard when hub and drum assembly is rotated.
   (9) After initial brake adjustment is made install dust cap (6) on backside of brake assembly.
   (10) Install gasket (7) and cap (8) into seat of hub and drum assembly (9).
   (11) Position gasket (10) and mounting ring (11) on front face of hub and drum assembly (9) and secure with six screws (12).
   (12) Service hub and drum assembly with gear oil as prescribed in paragraph 3-1.
   (13) Install wheel and tire assembly as prescribed in paragraph 3-5.
   (14) Make final adjustment on brake assembly as prescribed in paragraph 4-43.

4-43. BRAKES.

This task covers: a. Adjustment

INITIAL SETUP:

Tools
Screwdriver, Flat Tap

Materials/Parts Appendix D
None
Equipment Conditions
None

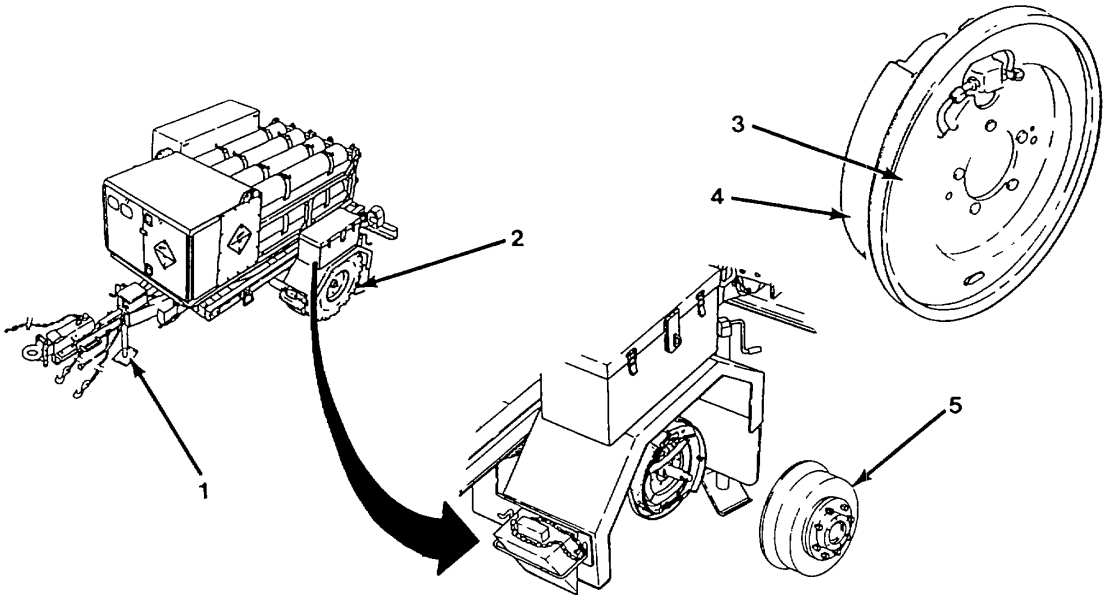


Figure 4-28. Adjust Brakes.

a. Adjustment.
   (1) Raise the Servicing Unit using the front and rear swivel jacks (1) until both tires are off the ground.
   (2) Ensure handbrake is released.
   (3) Spin each wheel (2) and verify that the wheels stop turning in ¼ to ½ revolutions. If wheels stop as specified proceed to step 6, otherwise continue to step 4.
   (4) Remove dust plug(s) on backside brake assemblies (3) and slightly turn brake adjuster(s) with a screwdriver to increase or decrease brake shoe tension as required.
   (5) Repeat step 3 and 4 until required adjustment is obtained then install dust plug(s).
   (6) Spin each wheel (2) slowly and audibly check for brake shoe (4) to drum (5) contact through 360 degrees of rotation. If contact Is not as specified continue to step 6.
   (7) Burnish brake shoes by towing the Servicing Unit approximately five miles and subjecting the unit to frequent stops.
   (8) Repeat step 3 through 6 until required brake shoe to brake drum contact is obtained for each wheel.

4-44. BRAKE SHOES.

This task covers: a. Removal b. Installation

INITIAL SETUP:

Tools
Mallet, rubber
Pliers, Slip Joint
Pliers, Needle Nose
Puller Kit, Mechanical
Screwdriver, Flat Tip
Wrench, Hex 1/8"
Brake Shoes

Materials/Parts Appendix D
Wiping Rag (item 13)
Cleaning Solvent (item 15)
Silicone Grease (item 11)
Container (item 7)
Hold down Pins
Hold down Springs

Equipment Conditions
Wheel & Tire Assembly Removed (Paragraph 3-5)
Hub and Drum Assembly Removed (Paragraph 4-42)

WARNING

Brake shoe linings contain asbestos fibers which present a serious health hazard if inhaled. Use asbestos dust control procedures approved by local medical authority when servicing the brake assembly. Never use compressed air to clean dust from brake system components, or wipe, brush or sweep dry dust. Failure to follow proper precautions may result In exposure to dangerous concentrations of airborne asbestos fibers.

a. Removal.

(1) Place an empty container below the brake assembly to capture the fluid that will drain when brake line is disconnected from brake cylinder

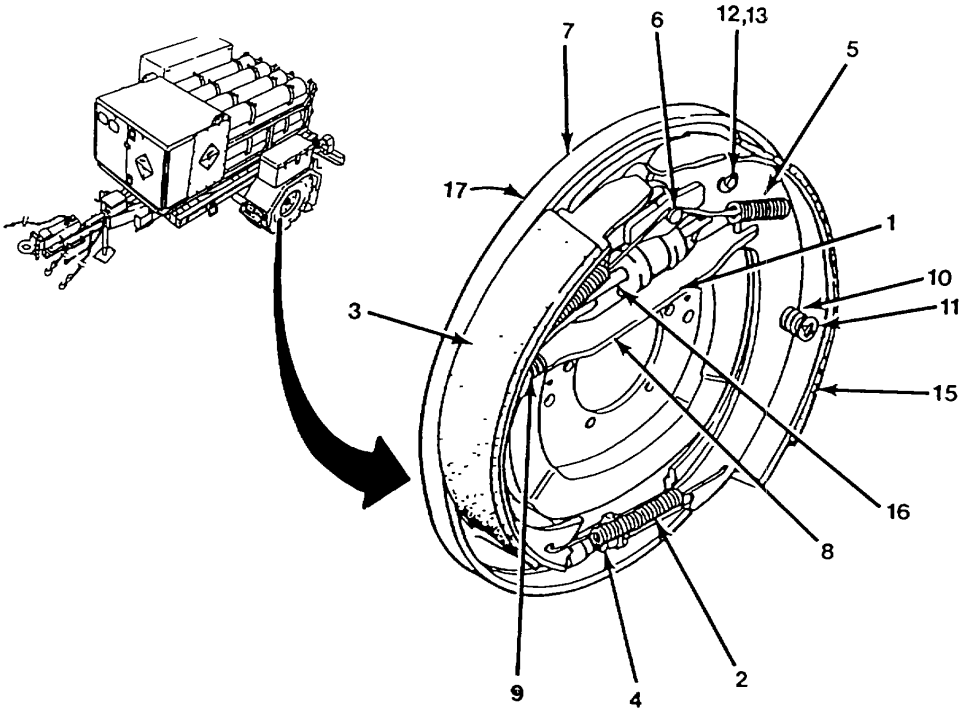


Figure 4-29. Remove Brake Shoes and Brake Cylinder.

(2) Disconnect brake line from backside of brake cylinder (1) and allow fluid to drain.
(3) Remove adjusting spring (2) from brake shoes (3 and 15).
(4) Remove adjuster assembly (4) from between brake shoes (3 and 15).
(5) Remove two retractor springs (5) from brake shoes (3 and 15) and anchor post (6) on backing plate assembly (7).
(6) Remove anchor post washer (6) from backing plate assembly (7).
(7) Remove parking brake strut (8) and spring (9) from between brake shoes (3 and 15).
(8) Remove two holddown springs (10) and pins (11) securing brake shoes (3) to backing plate assembly (7).
(9) Remove retainer (12), spring tension washer (13) and pin to release parking brake lever (14) from brake shoe (15).
(10) Remove two push rods (16) from brake cylinder (1).
(11) Discard holddown springs (10), pins (11), and brake shoes.
(12) Clean and inspect all remaining components as prescribed In paragraphs 4-15 and 4-16.
(13) Inspect parking brake cable for damage. Replace if necessary per paragraph 4-50.
(14) Inspect brake cylinder for signs of brake fluid leakage. If brake cylinder has signs of leakage or damaged continue to step 15, otherwise proceed to brake shoe installation instructions paragraph b., step 2
(15) Remove two screw and washer assemblies (17) and remove brake cylinder (1) from backing plate assembly (7).

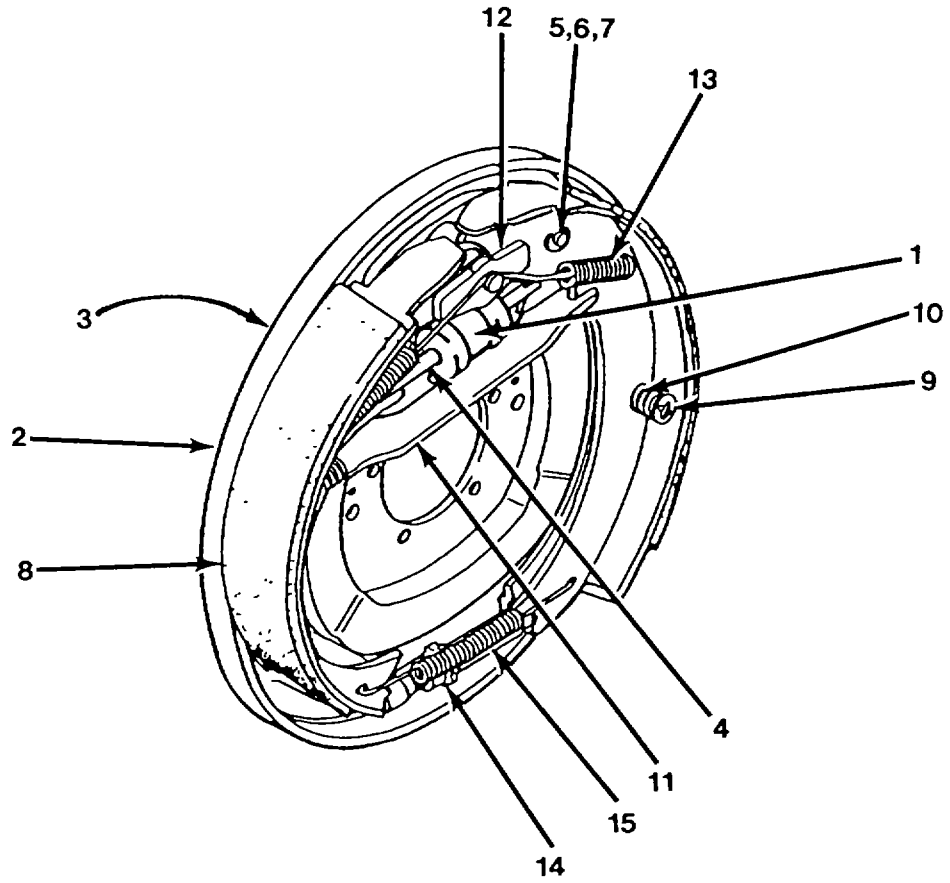


Figure 4-30. Install Brake Shoes and Brake Cylinder.

(1) Install new brake cylinder (1) onto backing plate assembly (2) and secure with two screw and washer assemblies (3).
(2) Install two push rods (4) into brake cylinder (1).
(3) Secure parking brake lever to new rear brake shoe with pin (5), spring tension washer (6) and retainer (7).
(4) Secure new brake shoes (8) to backing plate assembly (2) with two new pins (9) and holddown springs (10).
(5) Insert parking brake strut (11) and spring between brake shoes (8).
(6) Install anchor post washer (12) onto backing plate assembly (2).
(7) Install two retractor springs (13) onto brake shoes and around anchor post of backing plate assembly (2).
(8) Insert adjuster assembly (14) between brake shoes (8).
(9) Install adjuster spring (15) onto brake shoes (8).
(10) Apply a thin coat of high-temperature silicone grease (Item 11, Appendix D) to bearing surfaces of brake assembly.
(11) Connect brake line to brake cylinder (1).
(12) Install hub and drum assembly as prescribed in paragraph 4-42.
(13) Install wheel & tire assembly as prescribed in paragraph 3-5.
(14) If brake shoes on other side of trailer are to be replaced repeat this procedure, otherwise bleed and service brake system as prescribed in paragraph 4-47.
(15) Adjust brake assembly as prescribed in paragraph 4-43.

4-45. SHOCK ABSORBERS.

This task covers: a. Removal b. Installation

INITIAL SETUP:

Tools
Mallet, rubber
Socket Wrench Handle, 1/2" Drive
Socket, 3/4"

Materials/Parts Appendix D
Wiping Rag (item 13)
Cleaning Solvent (item 15)

Equipment Conditions
None

a. Removal

WARNING

Prior to performing this task the Servicing Unit should be positioned on a hard flat surface with the swivel jacks lowered, parking brakes set, and chocks installed to provide a firm stable foundation. Failure to follow this warning may result in serious personnel injury or equipment damage.

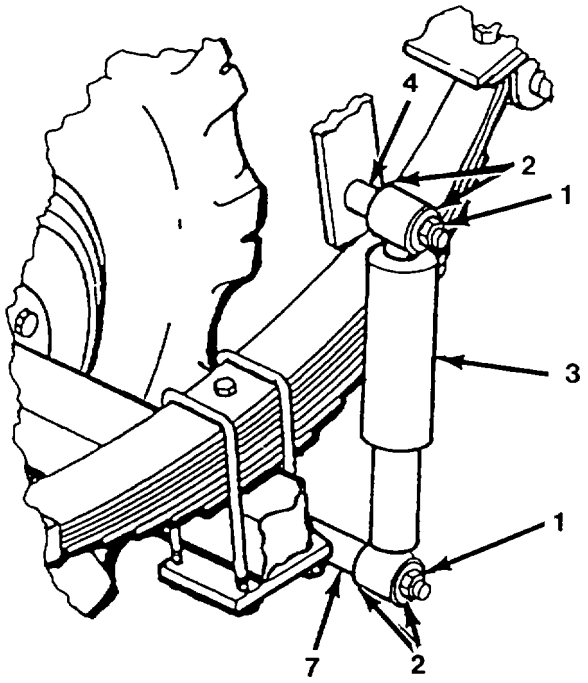


Figure 4-31. Replace Shock Absorbers.

(1) Remove nut (1) and washer (2) that secures top of shock absorber (3) to chassis mounting stud (4).
(2) Remove nut (1) and washer (2) that secures bottom of shock absorber (3) to tie plate stud (7).
(3) Pull shock absorber (3) and washers (2) off mounting studs (4) and (7).
(4) Repeat steps 1 through 3 for other shock absorber.
(5) Clean and inspect mounting stud threads as prescribed in paragraphs 4-15 and 4-16.

b. Installation.
(1) Slide washers (2) onto mounting studs (4) and (7).
(2) Adjust height on new shock absorber (3) and push onto mounting studs (4) and (7).
(3) Install washers (2) and nuts (1) to secure shock absorber.
(4) Repeat steps 1 through 3 for other shock absorber.

4-46. SPRINGS.

This task covers: a. Removal b. Installation

INITIAL SETUP:

Tools
- Mallet, rubber
- Pliers, Needle Nose
- Socket Wrench Handle, 1/2" Drive
- Socket, 5/8"
- Socket, 3/4"
- Socket, 7/8"
- Wrench, 3/4"

Materials/Parts Appendix D
- Wiping Rag (item 13)
- Cleaning Solvent (item 15)
- Rubber Bumpers
- Cotter Pins

Equipment Conditions
- Shock Absorbers Removed (Paragraph 4-45)

a. Removal

WARNING

Prior to performing this task the Servicing Unit should be positioned on a hard flat surface with the swivel jacks lowered, parking brakes set, and chocks installed to provide a firm stable foundation. Failure to follow this warning may result in serious injury or equipment damage.

Only replace one spring at a time. Removal of both springs will separate axle assembly from trailer causing an unstable foundation. Failure to follow this warning may result in serious injury or equipment damage.

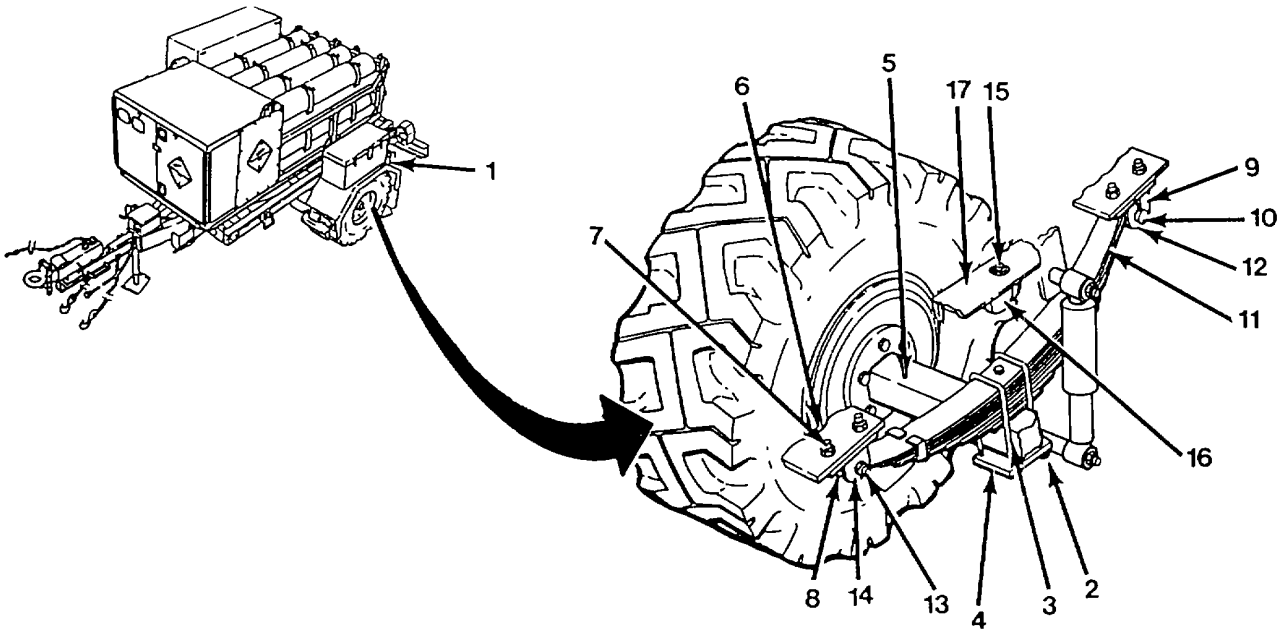


Figure 4-32. Remove Springs.

NOTE

When a spring needs replacing both springs should be replaced. In addition, both shock absorbers and rubber bumpers installed between spring and chassis should be replaced

(1) Lower sandshoes on rear swivel jacks (1) until tension is removed from springs but with tires still contacting the ground.
(2) Remove four nuts (2) and two "U" bolts (3) then remove tie plate & stud assembly (4) from bottom of axle (5).
(3) Remove two bolts (6) and two nuts (7) to separate front spring hanger (8) from chassis.
(4) Remove cotter pin (9) and clevis pin (10) to separate spring (11) from rear spring hanger (12). Discard cotter pin.
(5) Use rear swivel jack next to spring being replaced to raise trailer far enough to lift center pin on spring (11) out of axle (5).
(6) Remove bolt (13) and nut (14) then separate front spring hanger (8) from spring.
(7) Remove nut (15) and separate rubber bumper (16) from mounting bracket (17). Discard rubber bumper.
(8) Clean and inspect all removed parts as prescribed in paragraphs 4-15 and 4-16.

b. Installation.

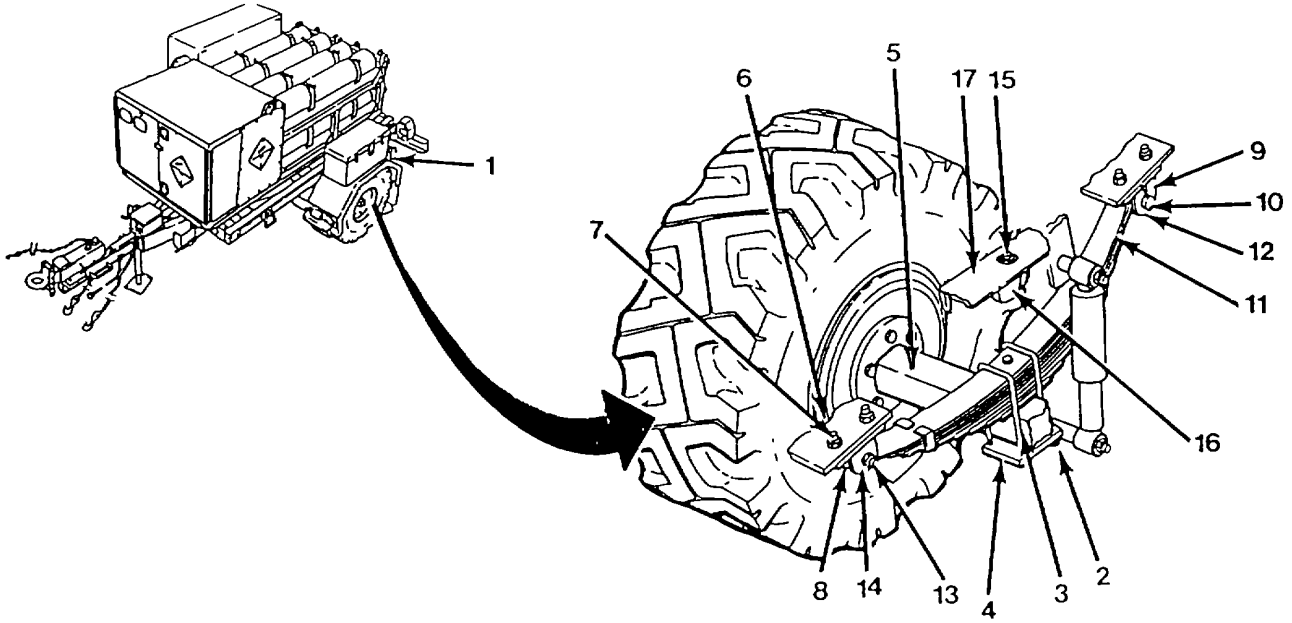


Figure 4-33. Install Springs.

(1) Install new rubber bumper (16) onto mounting bracket (17) and secure with nut (15).
(2) Install front spring hanger (8) on new spring (11) and secure with bolt (13) and nut (14).
(3) Secure spring (11) to rear hanger bracket with clevis pin (10) and cotter pin (9).
(4) Secure front spring hanger (8) to chassis with two bolts (6) and two nuts (7).
(5) Use swivel jack to lower trailer until spring (11) and axle (5) are mated with pin on spring in hole on axle (4).
(6) Position tie plate & stud assembly (4) under axle (5) and secure with two "U" bolts (3) and four nuts (2).
(7) Repeat removal and installation procedure for other spring.
(8) Install new shock absorbers as prescribed in paragraph 4-45.

4-47. BRAKE SYSTEM.

This task covers: a. Bleed & Service

INITIAL SETUP:

Tools
Brake Filler & Bleeder
Wrench, 3/8"

Materials/Parts Appendix D
Brake Fluid (item 10)
Container (item 7)
Wiping Rag (item 13)

Equipment Conditions
None

WARNING

Eye protection must be worn when bleeding brake lines. Failure to follow this warning can result in serious eye injury or blindness.

a. Bleed & Service.

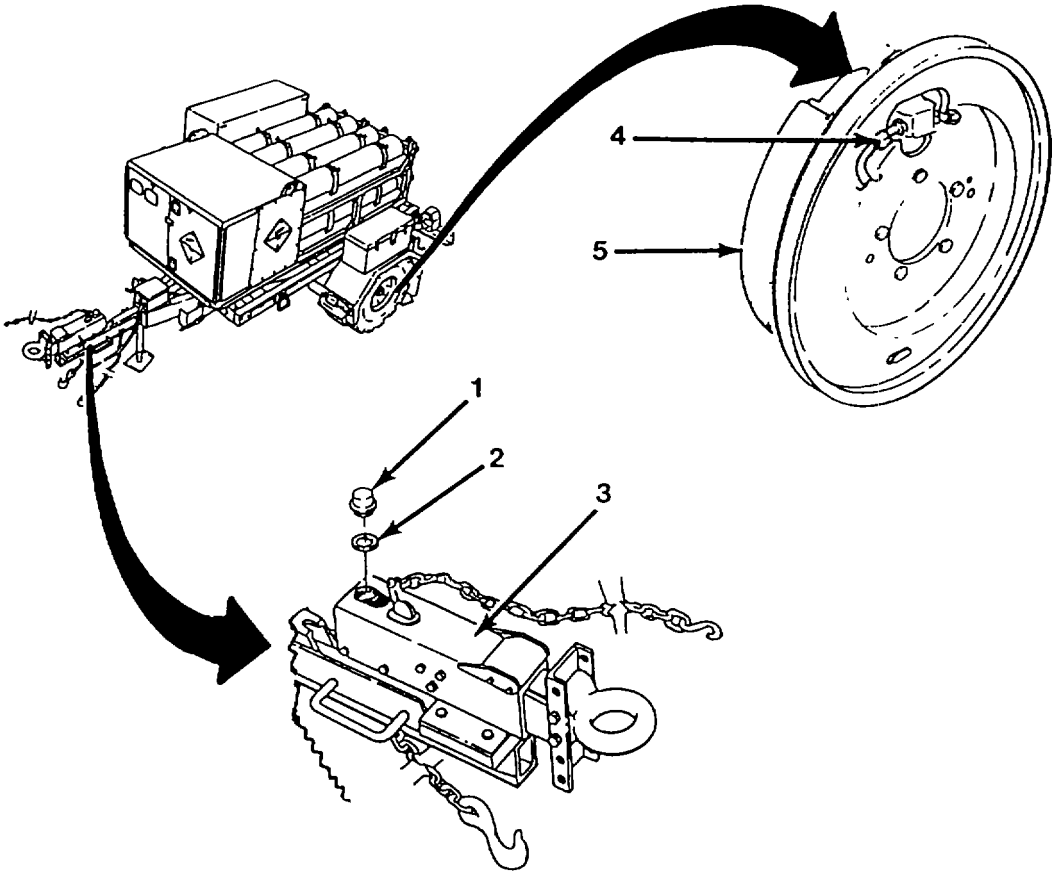


Figure 4-34. Service Hydraulic Brake System.

(1) Remove fill cap (1) and gasket (2) from surge actuator assembly (3).
(2) Connect hose from brake filler & bleeder to port on surge actuator assembly (3).

(3) Pressurize brake filler and bleeder to start flow of brake fluid into surge actuator assembly (3).
(4) Place an empty container below the bleeder fitting (4) on either brake assembly (5) to capture the fluid that will drain when brake system is bled.
(5) Slightly loosen bleeder fitting (4) on brake assembly (5) and allow air trapped in brake system to be purged.
(6) When a solid stream of fluid is flowing from bleeder fitting, tighten fitting.
(7) Reposition container under other brake assembly and repeat steps 5 and 6.
(8) Depressurize brake filler and bleeder and disconnect hose from surge actuator assembly (3).
(9) Wipe excess brake fluid that may have spilled around fill port on surge actuator with a clean cloth.
(10) Check level of brake fluid in surge actuator assembly. Add or remove fluid as necessary for fluid level to be approximately 1/2 inch (13 mm) below opening.
(11) Install gasket (2) and fill cap (1) onto surge actuator assembly (3).

4-48. SURGE ACTUATOR ASSEMBLY.

This task covers: a. Removal b. Installation

INITIAL SETUP:

Tools
Socket Wrench Handle, 1/2" Drive
Socket, 15/16"
Wrench, 9/16"
Wrench, 15/16"

Materials/Parts Appendix D
Wiping Rag (item 13)
Cleaning Solvent (item 15)
Container (item 7)

Equipment Conditions
None

a. Removal.

WARNING

Prior to performing this task the Servicing Unit should be positioned with front swivel jack lowered and chocks in place to provide a firm stable foundation. Failure to follow this warning may result in serious injury or equipment damage.

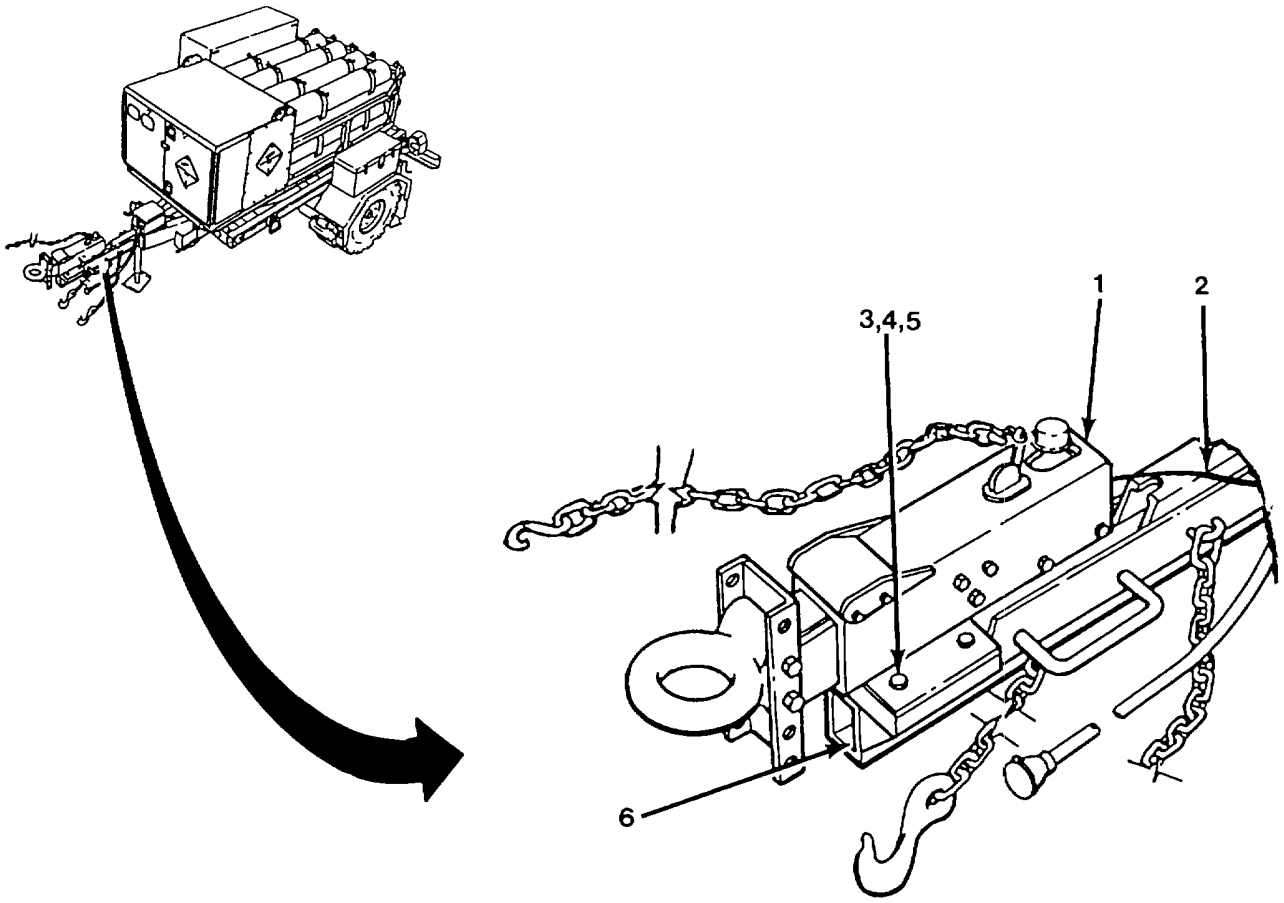


Figure 4-35. Replace Surge Actuator.

(1) Place an empty container below the surge actuator assembly (1) to capture the fluid that wIldrain when brake hose is disconnected from actuator.
(2) Disconnect brake hose assembly (2) from backside of surge actuator assembly (1) and allow fluid to drain.
(3) Remove four bolts (3), eight washers (4), four nuts (5) securing surge actuator assembly (1) to trailer drawbar (6).
(4) Remove surge actuator assembly (1) from trailer drawbar (6).
(5) Clean and inspect mounting hardware and mating surface on drawbar as prescribed in paragraphs 4-15 and 4-16. Replace hardware, as necessary.

b. Installation.
(1) Position new surge actuator assembly (1) onto trailer drawbar (6) and align mounting holes.
(2) Install four bolts (3), eight washers (4), and four nuts (5) to secure surge actuator assembly (1) to trailer drawbar(6).
(3) Connect hose assembly (2) to surge actuator assembly (1).
(4) Bleed and service brake system as prescribed In paragraph 4-47.

4-49. HANDBRAKE LEVER.

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

INITIAL SETUP:

Tools
Hammer, Ballpeen
Pliers, Needle Nose
Punch, Pin, 1/8”
Socket Wrench Handle, 3/8" Drive
Socket, 9/16"
Wrench, 9/16"

Materials/Parts Appendix D
None

Equipment Conditions
None

a. Removal.

WARNING

Prior to performing this task the Servicing Unit should be positioned on a hard flat surface with the swivel jacks lowered to provide a firm stable foundation. Failure to follow this warning may result in serious personnel Injury or equipment damage.

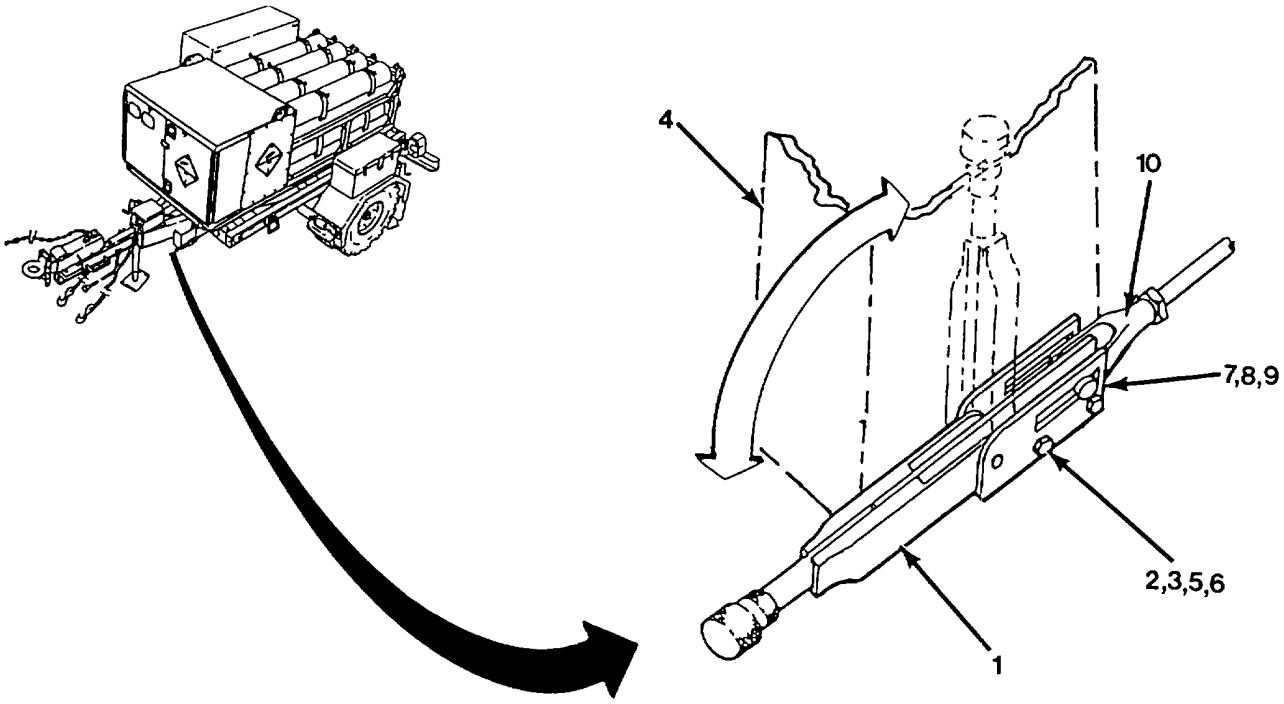


Figure 4-36. Replace Handbrake Lever.

(1) If possible release parking brake by positioning handbrake lever (1) with handle pointing up.
(2) Remove two nuts (2) and two washers (3) securing handbrake lever (1) to mounting bracket (4).
(3) Remove two screws (5), two spacers (6), four washers (3) and while holding handbrake lever (1).
(4) Remove cotter pin (7) and washer (8) and pin (9) to release handbrake lever (1) from yoke (10). Discard cotter pin.

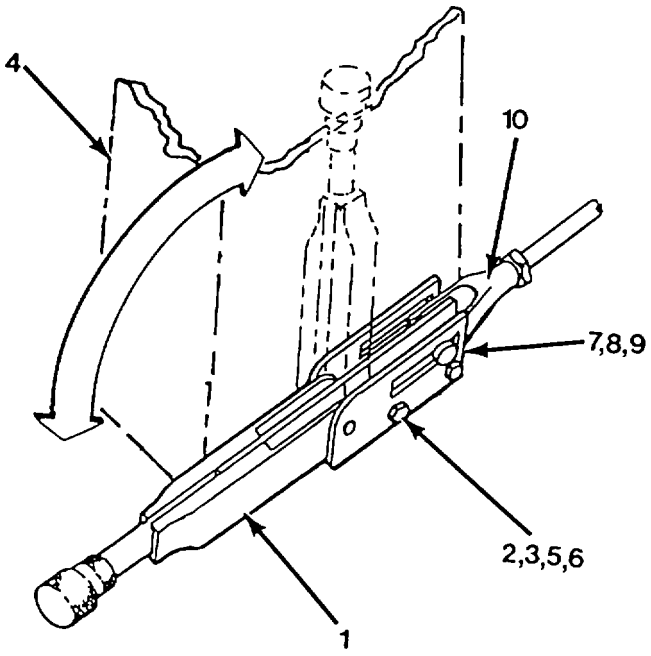


Figure 4-37. Install Handbrake Lever.

(1) Position handle of handbrake lever up so that lever forms a 90° angle.
(2) Rotate knob on handbrake lever (1) counterclockwise until knob cannot be rotated any further, then rotate adjusting knob clockwise four full turns.
(3) Insert yoke (10) into handbrake lever (1) and secure with pin (9), washer (8), and a new cotter pin (7).
(4) Install two screws (5) with two spacers (6) and four washers (3) onto handbrake lever (1) and position handbrake lever onto mounting bracket (4).
(5) Install two washers (3) and two nuts (2) to secure handbrake lever (1) to mounting bracket (4).

c. Adjustment.

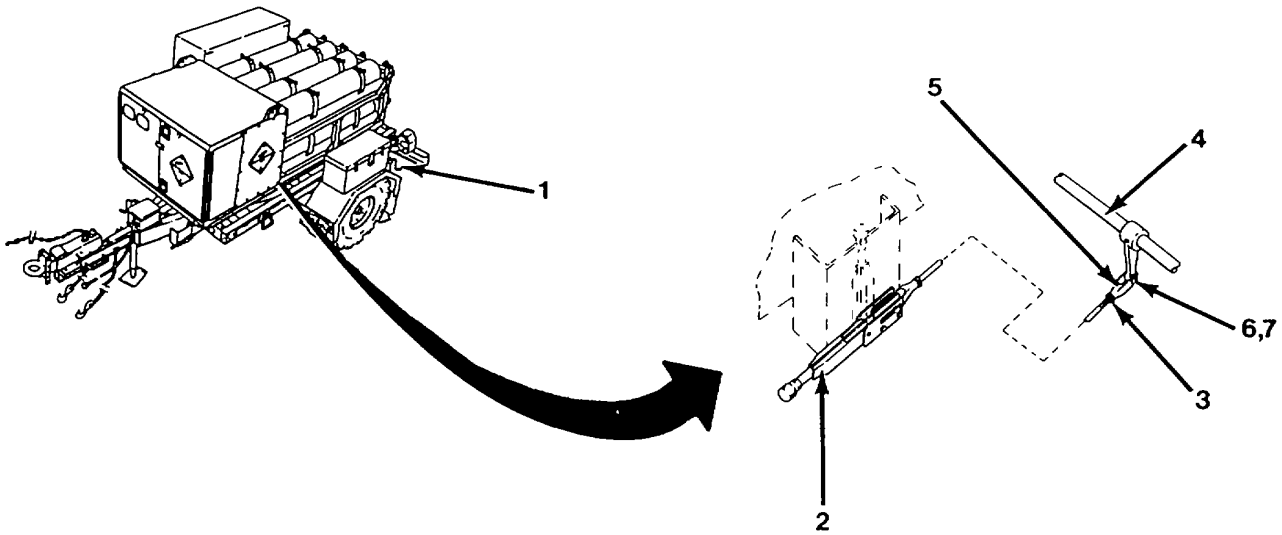


Figure 4-38. Adjust Handbrake Lever.

(1) Raise both wheels until the tires are off the ground using rear swivel jacks (1)
(2) Engage parking brakes using handbrake lever (2).
(3) Attempt to rotate both wheels. If neither wheel can be rotated proceed to step 13. If one wheel rotates and other does not, refer to paragraph 4-50 to adjust brake cable. If both wheels rotate, proceed to next step

(4) Release parking brake and ensure handbrake lever (2) is completely disengaged.
(5) Loosen jam nut (3) at back end of brake rod (4) where yoke (5) is attached.
(6) Remove cotter pin (6) and pin (7) to release yoke (5) from shaft lever.
(7) Grasp yoke (5) and rotate yoke (5) two turns to decrease distance between yokes (5).
(8) Re-attach yoke (5) to shaft lever and temporarily install pin (7).
(9) Engage parking brakes using handbrake lever (2).
(10) Attempt to rotate both wheels. If wheels cannot be rotated, proceed to next step. If wheels rotate, repeat steps 6 through 10.
(11) Install a new cotter pin (6) to secure yoke (5) to shaft lever.
(12) Tighten jam nut (3) at back end of brake rod (4).
(13) Release parking brake and ensure handbrake lever (2) is completely disengaged.
(14) Attempt to rotate both wheels, if wheels spin adjustment is complete. If wheels do not spin, rotate knob on handbrake lever clockwise one turn.
(15) Repeat step 14 until proper adjustment is obtained.

4-50. BRAKE CABLE.

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

INITIAL SETUP:

Tools
Pliers, Needle Nose
Screwdriver, Flat Tip
Wrench, 9/16"
Wrench, 7/8"

Materials/Parts Appendix D
None

Equipment Conditions
Wheel & Tire Assembly Removed (Paragraph 3-5)
Hub and Drum Removed (Paragraph 4-42)
Brake Shoes Removed (Paragraph 4-44)

a. Removal.

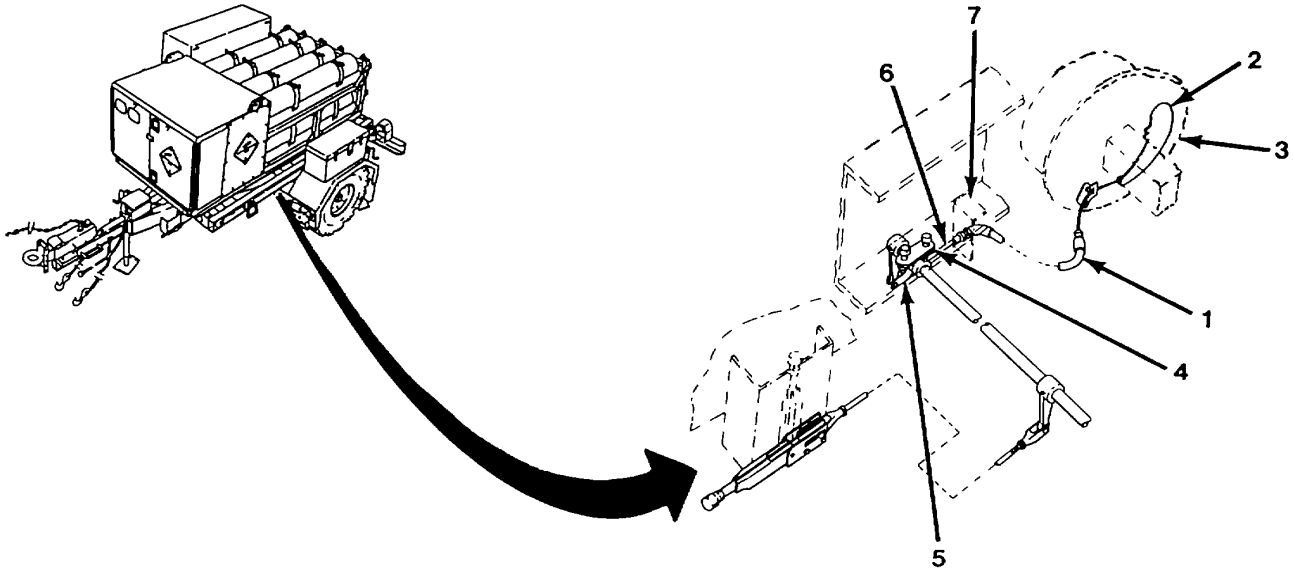


Figure 4-39. Replace Brake Cable.

(1) Pull end of brake cable (1) out of clip on parking brake lever (2).
(2) Push in on retaining clips of brake cable and pull cable outof backing plate (3).
(3) Loosen jam nut (4) where brake cable attaches to yoke (5).
(4) Loosen jam nuts on brake cable (6) where cable is secured to bracket (7).
(5) Unscrew brake cable from yoke (5).

b. Installation.
(1) Thread new brake cable into yoke (5) until four threads are left exposed on brake cable.
(2) Insert brake cable (6) into slot on bracket (7) and hand tighten jam nuts.
(3) Adjust position of jam nuts so that threaded barrel on brake cable is centered in bracket, then tighten jam nuts.

(4) Insert brake cable through hole in backing plate (3) and secure plate by bending clips on cable.
(5) Insert end of brake cable (1) into parking brake lever (2).
(6) Install brake shoes as prescribed in paragraph 4-44.

c. Adjustment.

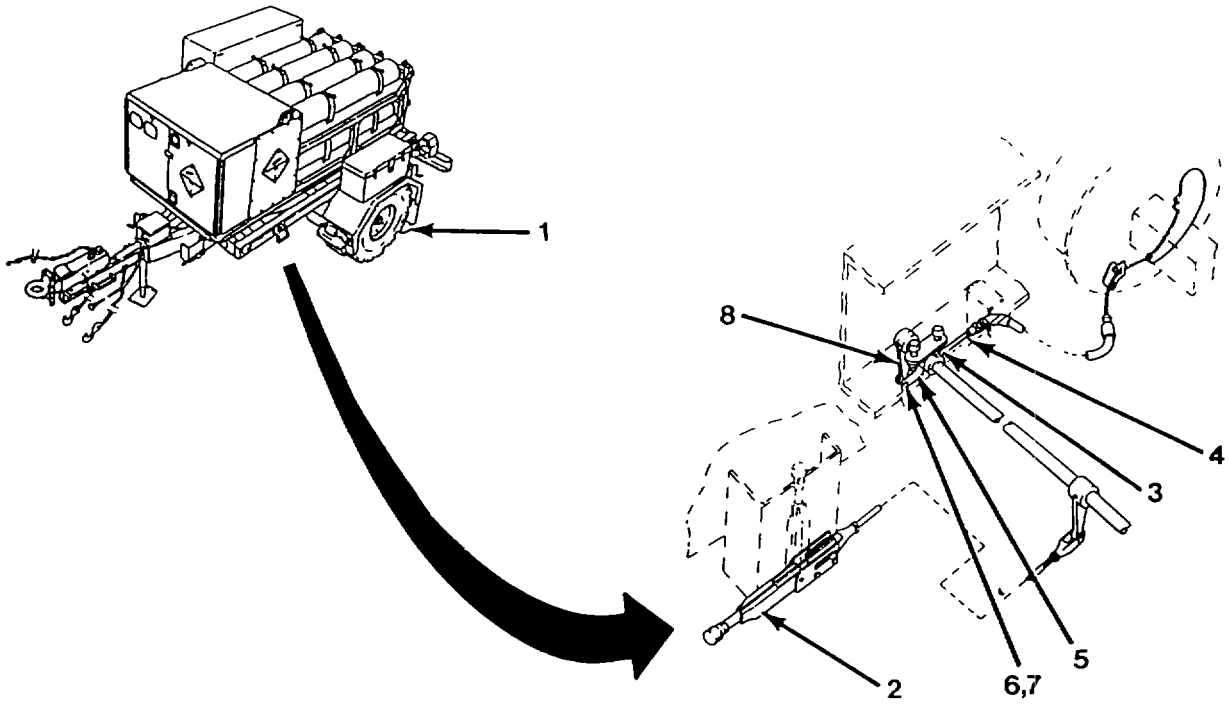


Figure 4-40. Adjust Brake Cable.

(1) Raise wheel where cable was replaced until tire is off the ground, using rear swivel-jacks (1).
(2) Engage parking brake using handbrake lever (2).
(3) Attempt to rotate wheel. If wheel can not be rotated, proceed to step 13. If wheel rotates, proceed to next step.
(4) Release parking brake and ensure handbrake lever (2) is completely disengaged.
(5) Loosen jam nut (3) where brake cable (4) attaches to yoke (5).
(6) Remove cotter pin (6) and pin (7) to release yoke (5) from shaft lever (8).
(7) Rotate yoke (5) two turns to increase brake cable tension.
(8) Re-attach yoke (5) to shaft lever (8) and temporarily install pin (7).
(9) Engage parking brake using handbrake lever (2).
(10) Attempt to rotate wheel if wheel cannot be rotated, proceed to next step. If wheel rotates, repeat steps 4 through 10.
(11) Install a new cotter pin (6) to secure yoke (5) to shaft lever (8).
(12) Tighten jam nut (3) on end of yoke.
(13) Release parking brake and ensure handbrake lever (2) is completely disengaged.
(14) Attempt to rotate wheel, if wheel spins adjustment is complete. If wheel does not spin, repeat steps 5 through 14, and decrease tension on brake cable.
(15) Repeat step 14 until proper adjustment is obtained.

4-51. INTERVEHICULAR CABLE.

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

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Screwdriver, Flat Tip
Wrench, 3/8"
Wrench, 11/32'

Materials/Parts Appendix D
Varnish, Electrical (item 18)

Equipment Conditions
None

a. Removal.

WARNING

SHOCK HAZARD. Prior to working on electrical system ensure intervehicular cable is not connected. Failure to follow this warning may result in serious injury.

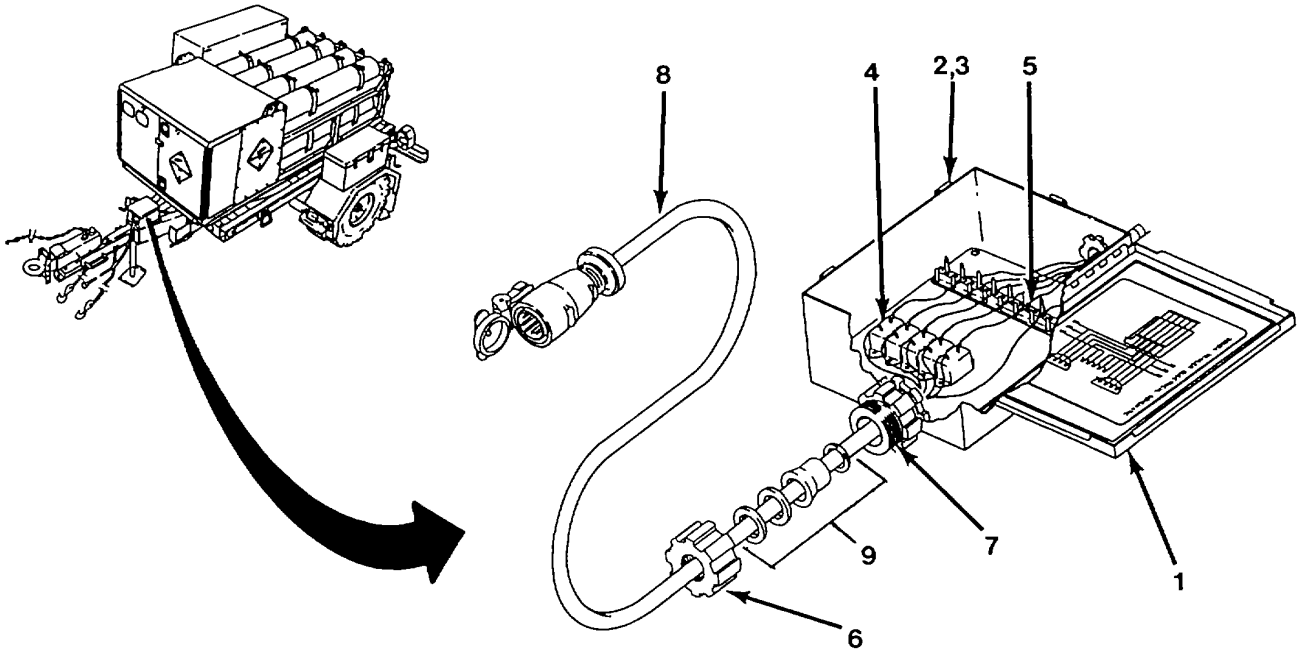


Figure 4-41. Replace Intervehicular Cable.

(1) Open lid on electrical box (1) by loosening four screws (2) and sliding clips (3) off edge of lid.
(2) Disconnect wires on intervehicular cable from five fusible links (4) and terminal board (5).
(3) Remove stuffing tube cap (6) and pull intervehicular cable out of stuffing tube body (7) and electrical box (1).
(4) Slide stuffing tube cap (6) and packing assembly (9) off of cable (8) and retain for reinstallation.

b. Installation.
(1) Slide cap (6) and packing assembly (9) onto new intervehicular cable (8).
(2) Insert cable (8) through stuffing tube body (7) into electrical box (1).

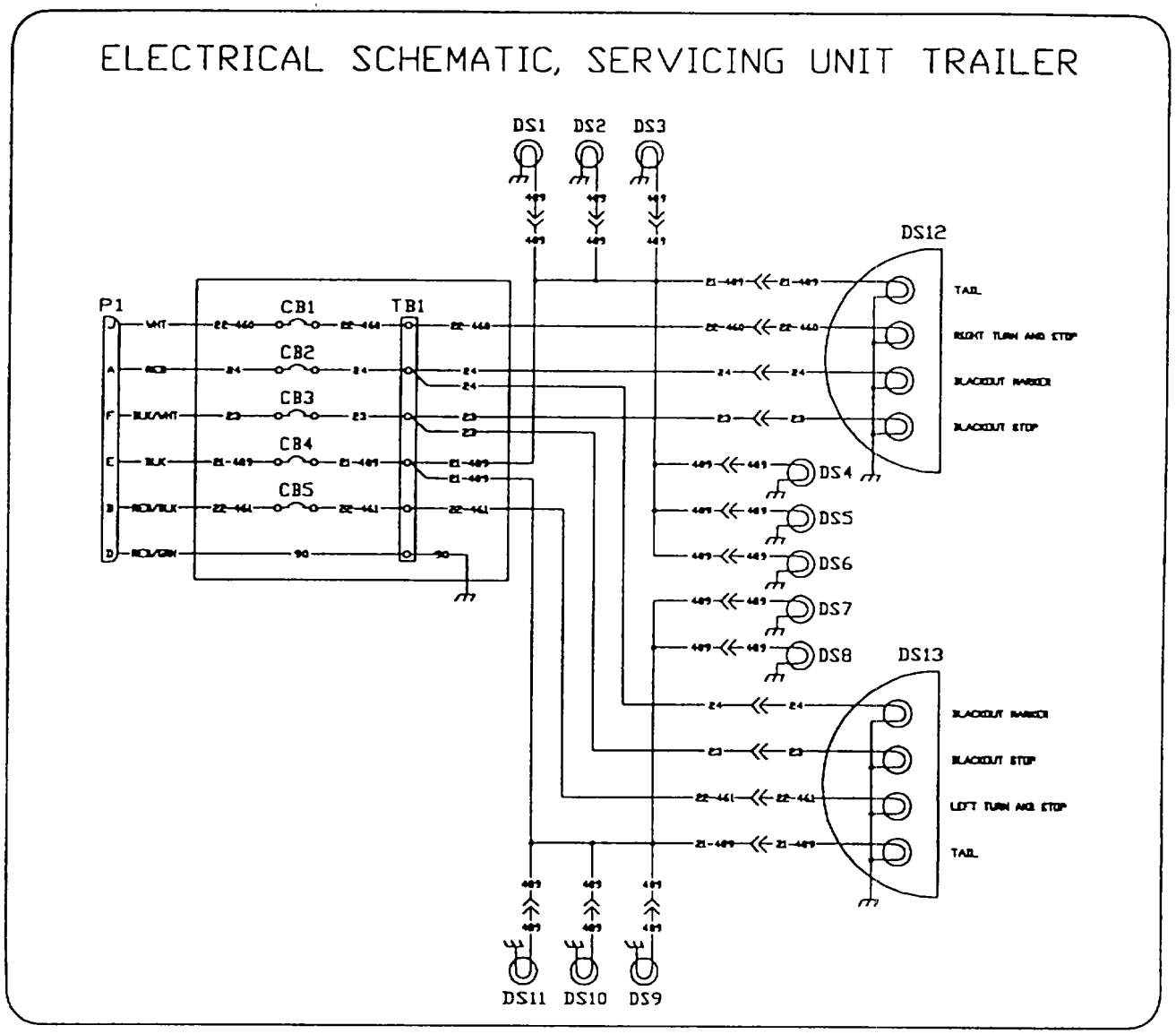


Figure 4-2. Electrical Schematic.

(3) Connect wires of cable to five fusible links (4) and terminal board (5) as shown on electrical schematic placard (See Figure 4-42).
(4) Refer to Figure 4-41 and insert packing assembly(9) into stuffing tube body (7) thread cap (6) onto body
(5) Adjust position of cable (8) so that connections in electrical box (1) are not stressed.
(6) Tighten cap (6) on body hand tight. Then, tighten cap an additional 1/2 turn.
(7) Spray a coat of electrical varnish (Item 18, Appendix D) on connections between cable, five fusible links (4), and terminal board (5).
(8) Close lid on electrical box (1) and secure by sliding four clips (3) over edge of lid and tightening four screws (2).

c. Intervehicular Cable Repair. Refer to the appropriate guidelines for general instructions on electrical repairs.

4-52. WIRE HARNESS ASSEMBLY.

This task covers: a. Removal b. Installation

INITIAL SETUP:

Tools
Socket Wrench Handle, 3/8" Drive
Screwdriver, Cross Tip
Screwdriver, Flat Tip
Socket, 7/16"
Wrench, 7/16"
Wrench, 11/32"

Materials/Parts Appendix D
Silicone Sealant (item 14)
Leak Detector (item 6)
Varnish, Electrical (item 18)

Equipment Conditions
None

a. Removal.

WARNING

SHOCK HAZARD. Prior to working on electrical system ensure intervehicular cable is not connected. Failure to follow this warning may result in serious Injury.

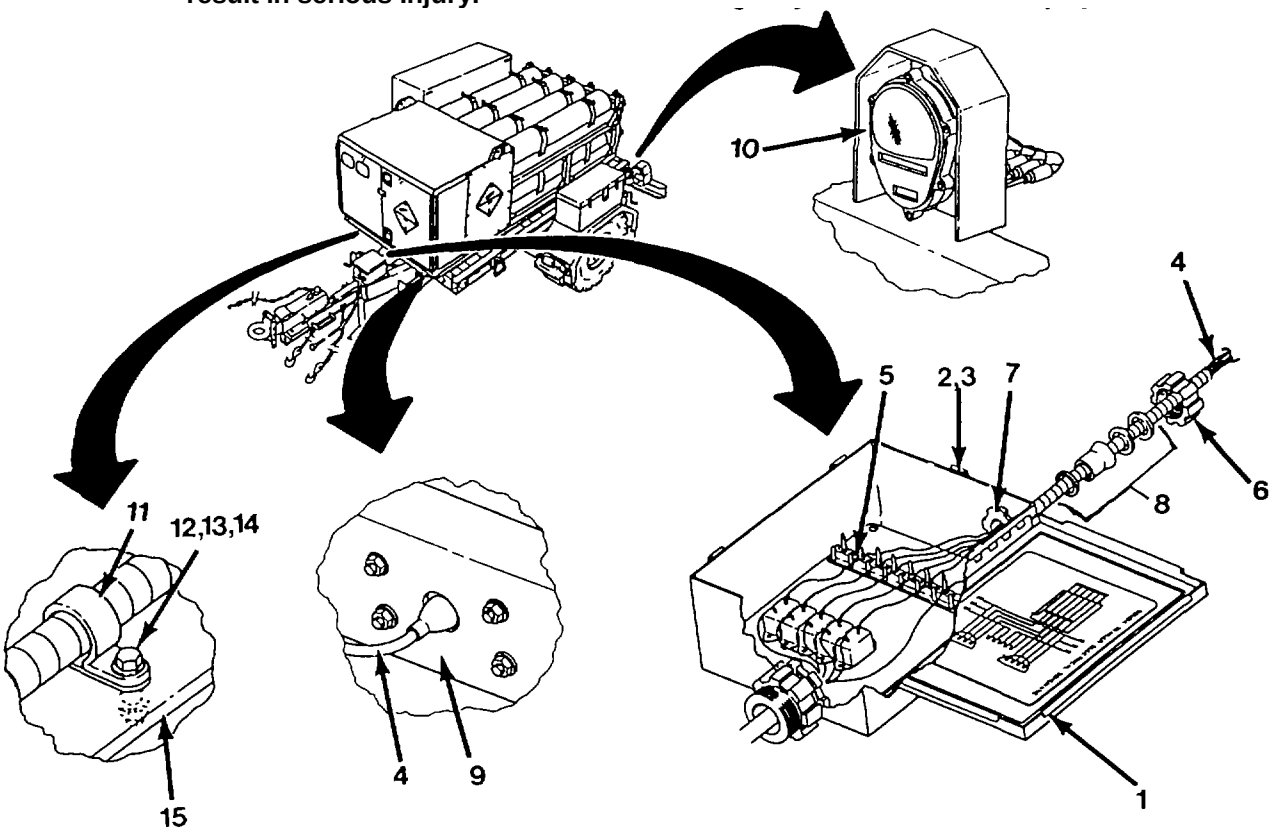


Figure 4-43. Replace Wiring Harness.

(1) Open lid on electrical box (1) by loosening four screws (2) and sliding clips (3) off edge of lid.
(2) Disconnect wire harness (4) from terminal board (5).
(3) Remove stuffing tube cap (6) and pull wire harness (4) out of stuffing tube body (7) and electrical box (1).
(4) Slide stuffing cap (6) and packing assembly (8) off of wire harness and retain for reinstallation.
(5) Disconnect wire harness (4) from eleven marker lights (9) and two composite lights (10).
(6) Remove clamp (11), attaching screw (12), nut (13), and washers (14) from twelve locations where wire harness is secured to chassis (15).

(7) Note layout of wire harness on chassis (15) then pull wire harness off of chassis.

b. Installation

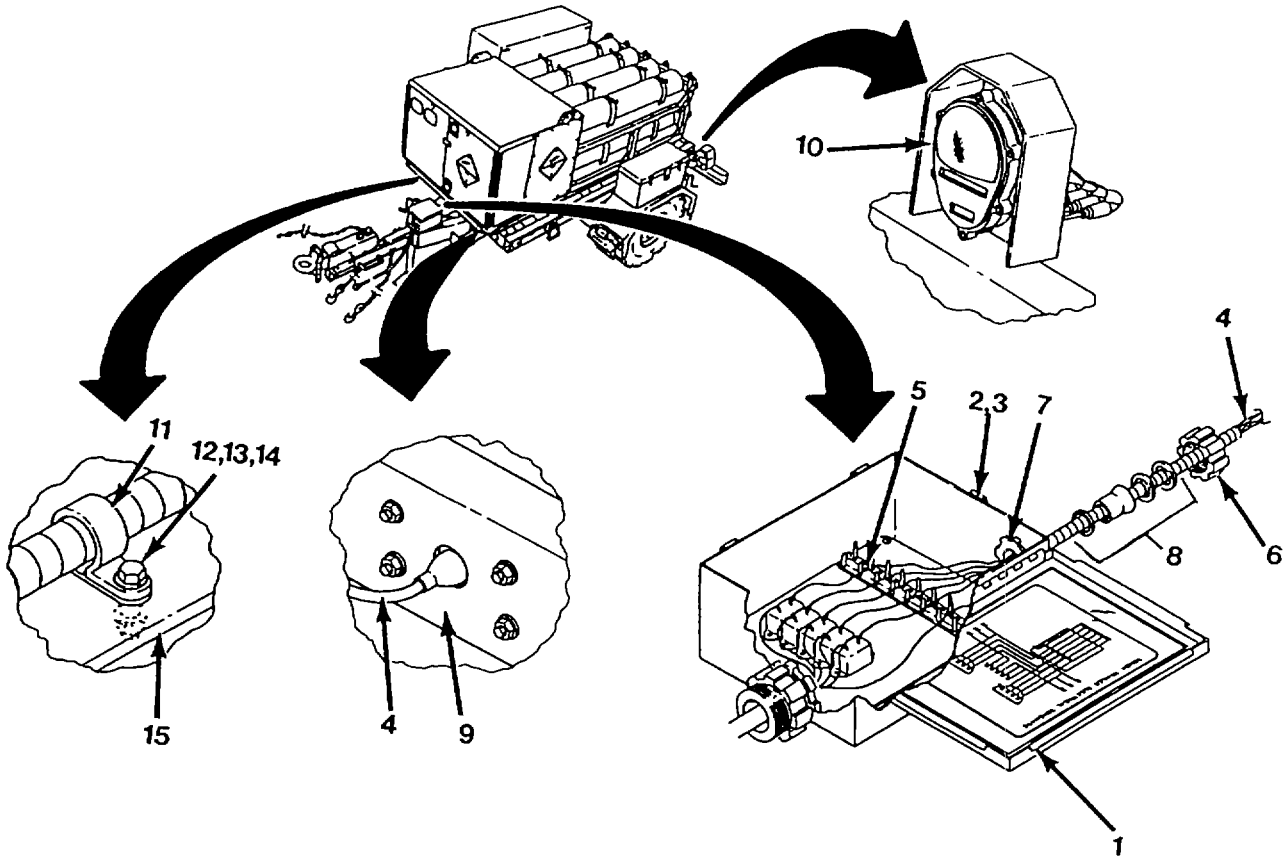


Figure 4-44. Install Wiring Harness.

(1) Route wire harness (4) on chassis (15), as previously noted.
(2) Slide cap (6) and packing assembly (8) onto new wire harness (4).
(3) Insert wire harness (4) through stuffing tube body (7) into electrical box (1).
(4) Connect wire harness (4) to terminal board (5) as shown on electrical schematic placard (Also shown in Figure 4-42).
(5) Insert packing assembly into stuffing tube body (7) thread cap onto body.
(6) Adjust position of wire harness so that connections in electrical box (1) are not stressed.
(7) Tighten cap (6) on body hand tight, then tighten cap an additional 1/2 turn.
(8) Apply a bead of sealant (Item 14, Appendix D) to prevent water from leaking into electrical box where wire harness is inserted into stuffing tube (7).
(9) Spray a coat of electrical varnish (Item 18, Appendix D) on connections between wire harness and terminal board (5).
(10) Close lid on electrical box (1) and secure by sliding four clips (3) over edge of lid and tightening four screws (2).
(11) Working back from electrical box (1) secure wire harness to chassis (15) with twelve clamps (11) and attaching screws (12), nuts (13), and washers (14).
(12) Insert connector on wire harness (4) into connector on eleven marker lights (9) and two composite lights (10).

c. Repair Refer to appropriate guidelines for general instructions on electrical repairs.

4-53. FUSIBLE LINKS.

This task covers: a. Removal b. Installation

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Screwdriver, Flat Tip
Wrench, 3/8"
Wrench, 1/4"

Materials/Parts Appendix D
Varnish, Electrical (item 18)

Equipment Conditions
None

a. Removal.

WARNING

SHOCK HAZARD. Prior to working on electrical system ensure intervehicular cable is not connected. Failure to follow this warning may result in serious injury.

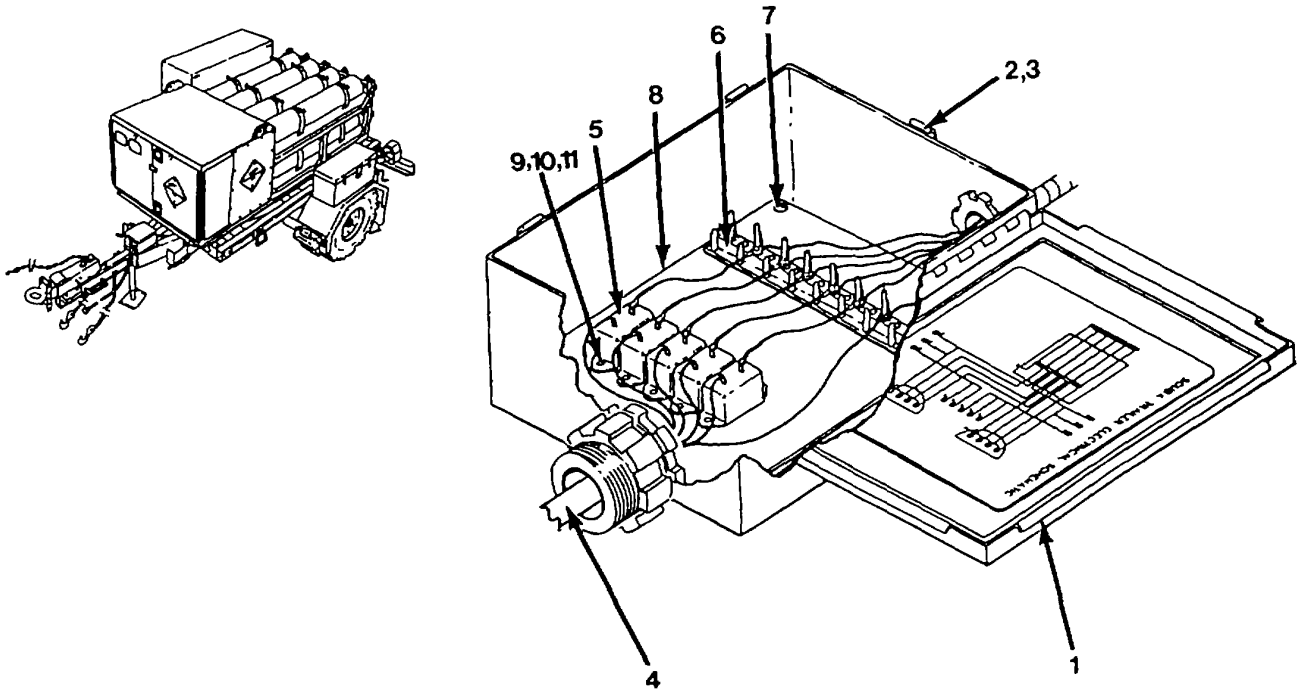


Figure 4-45. Replace fusible links.

(1) Open lid on electrical box (1) by loosening four screws (2) and sliding clips (3) off edge of lid.
(2) Disconnect wires on intervehicular cable (4) from five fusible links (5) and terminal board (6).
(3) Disconnect terminal board wire from faulty fusible link.
(4) Remove four screws (7) securing electrical panel (8) to electrical box (1).
(5) Lift up on electrical panel (8) to gain access to fusible link mounting screws (9).
(6) Remove two screws (9), attaching nuts (10), and washers (11). Then, detach fusible link from panel.

b. Installation.
(1) Secure new fusible link (5) to panel (8) with two screws (9), nuts (10), and washers (11).
(2) Secure panel (8) to electrical box (1) with four screws (7).
(3) Connect terminal block wire to new fusible link.
(4) Connect wires of intervehicular cable (4) to five fusible links (5) and terminal board (6) as shown on electrical schematic placard (Also shown in Figure 4-42).
(5) Spray a coat of electrical varnish (Item 18, Appendix D) on connections between (cable, five fusible links (5), and terminal board (6).
(6) Close lid on electrical box (1) and secure by sliding four clips (3) over edge of lid and tightening four screws (2).

4-54. COMPOSITE LIGHT AND LAMPS.

This Task Covers: **a. Replacement** **b. Removal** **c. Installation**

INITIAL SETUP:

Tools
Screwdriver, Flat Tip
Wrench, 9/16"

Materials/Parts Appendix D
None
Equipment Conditions
None

WARNING

SHOCK HAZARD. Prior to working on electrical system ensure intervehicular cable Is not connected. Failure to follow this warning may result In serious injury.

a. Lamp Replacement.

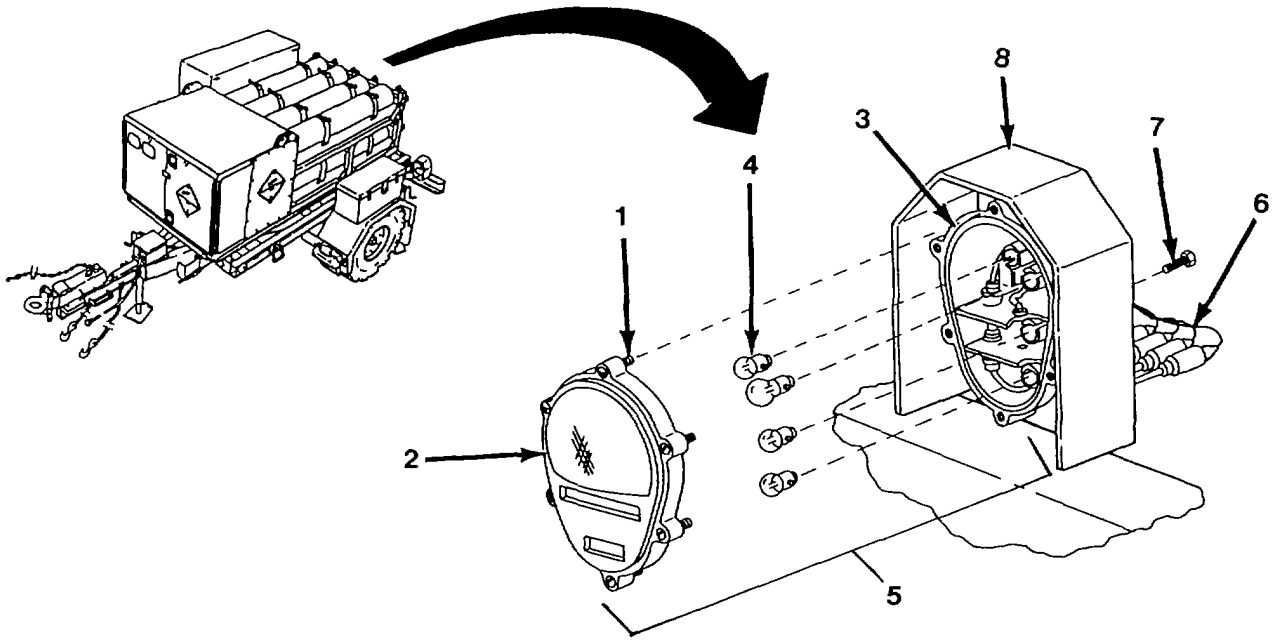


Figure 4-46. Replace Composite Lights and Lamps.

(1) Loosen six screws (1) and remove lens (2) from light housing (3).
(2) Remove suspect lamp(s) by pushing in on lamp (4) and turning counterclockwise to release from socket.

(3) Install new lamp(s) by pushing in on lamp (4) and turning clockwise to engage socket.
(4) Install lens (2) on light housing (3) and secure with six screws (1).

b. Light Removal.
(1) Tag wires for installation if marker bands at connections between light (5) and wire harness (6) are missing or not legible.
(2) Disconnect four connectors on light (5) from wire harness (6).
(3) Remove two screws (7) to detach light (5) from bracket (8).

c. Light Installation.
(1) Mount light (5) on bracket (8) and secure with two screws (7).
(2) Connect four connectors on light (5) to wire harness (6).

4-55. MARKER LIGHT AND LAMP.

This Task Covers: **a. Replacement** **b. Removal** **c. Installation**

INITIAL SETUP:

Tools
Screwdriver, Cross Tip
Screwdriver, Flat Tip
Wrench, 1/4"

Materials/Parts Appendix D
None

Equipment Conditions
None

WARNING

SHOCK HAZARD. Prior to working on electrical system ensure intervehicular cable is not connected. Failure to follow this warning may result in serious injury.

a. Lamp Replacement.

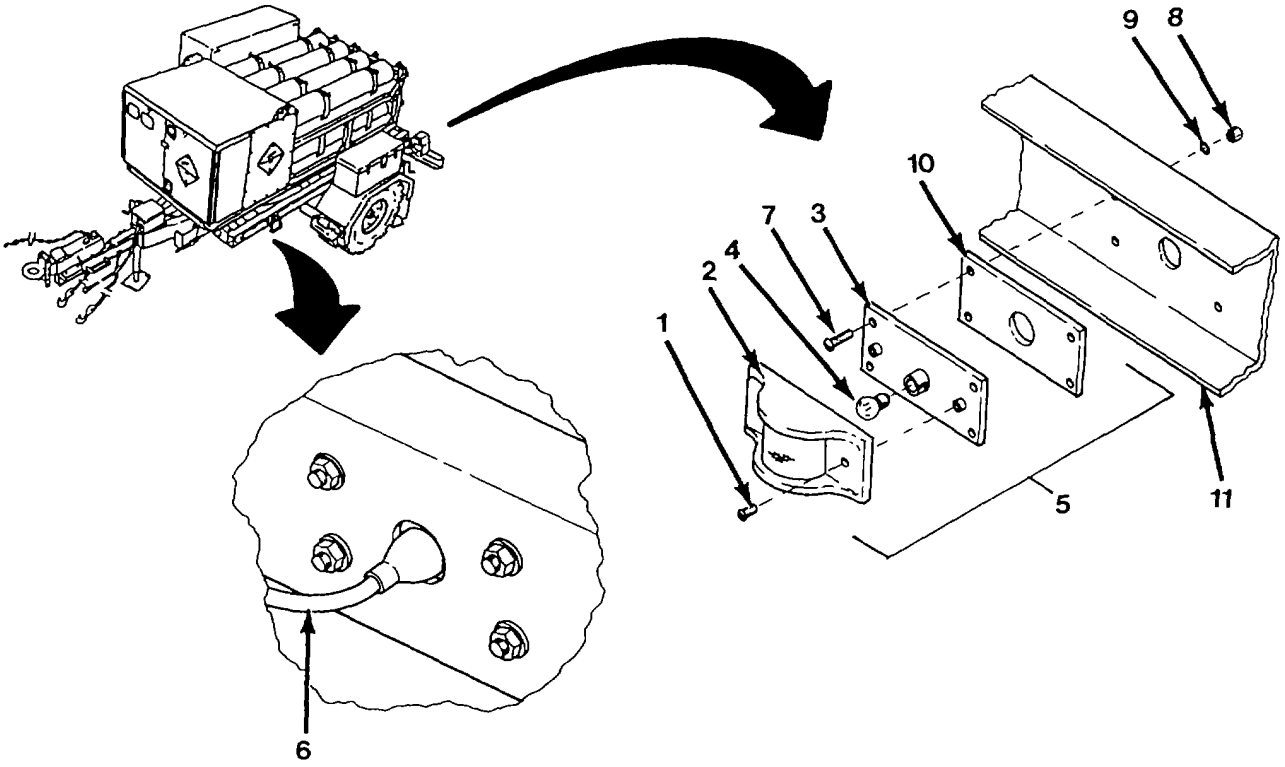


Figure 4-47. Replace Marker Lights and Lamps.

(1) Loosen two screws (1) and remove lens (2) from light housing (3).
(2) Remove lamp (4) by pushing In on lamp and turning counterclockwise to release from socket.
(3) Install new lamp (4) by pushing in on lamp and turning clockwise to engage socket.

(4) Install lens (2) on light housing (3) and secure with two screws (1).

b. Light Removal.
(1) Disconnect connector on light (5) from wire harness (6).
(2) Loosen two screws (1) and remove lens (2) from light housing (3).
(3) Remove four screws (7), nuts (8), and washers (9). Then, detach light housing and spacer plate (10) from chassis (11).

c. Light Installation.
(1) Loosen two screws (1) and remove lens (2) from light housing (3).
(2) Mount light housing (3) and spacer plate (10) on chassis (11) and secure with four screws (7), nuts (8) and washers (9).
(3) Install lens (2) on light housing (3) and secure with two screws (1).
(4) Connect connector on light (5) to wire harness (6).

4-56. SAFETY CHAIN.

This Task Covers:	**a. Replacement**	**b. Removal**	**c. Installation**

INITIAL SETUP:

Tools	Materials/Parts Appendix D
Wrench, Adjustable	None
	Equipment Conditions
	None

a. Removal.

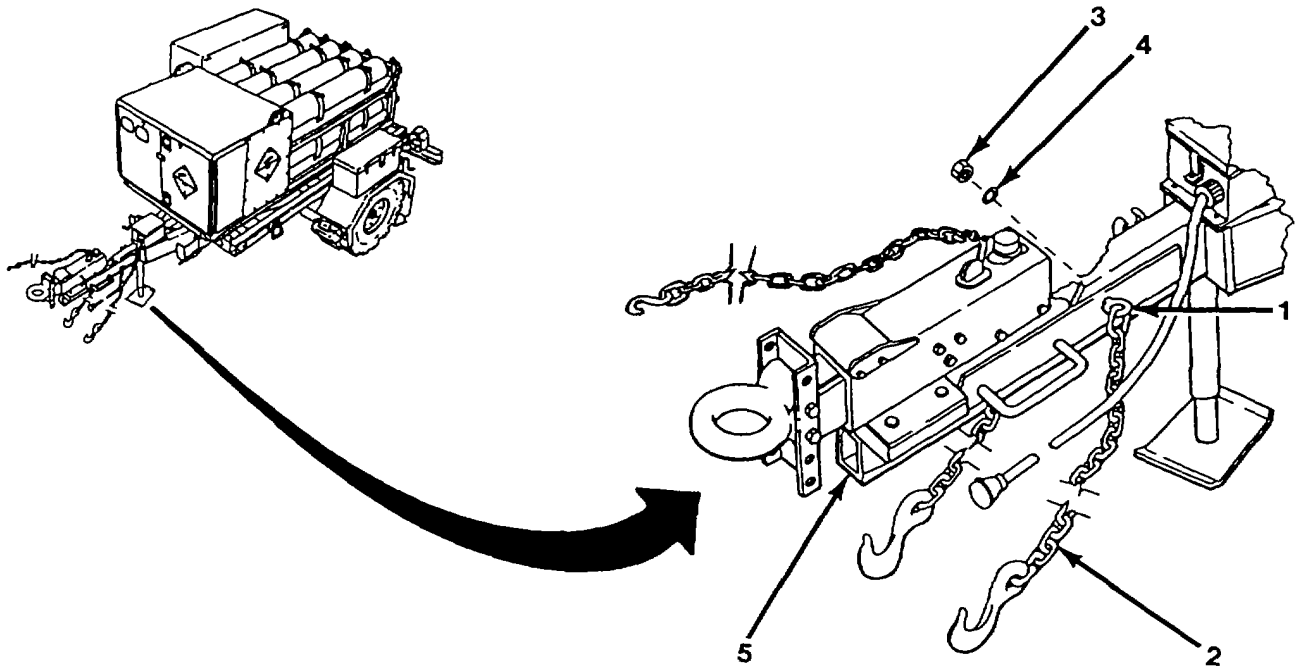


Figure 4-48. Replace Safety Chains.

(1) Unscrew eye bolt (1) on safety chain (2) from nut (3) and lock washer (4).
(2) Pull safety chain (2) out of drawbar (5).

b. Installation.

(1) Insert eye bolt (1) on safety chain (2) into hole in drawbar (5).
(2) Secure safety chain (2) with nut (3) and lock washer (4).

4-57. FRONT SWIVEL JACK.

This Task Covers: **a. Replacement** **b. Removal** **c. Installation**

INITIAL SETUP:

Tools
None

Materials/Parts Appendix D
None

Equipment Conditions
None

a. Removal.

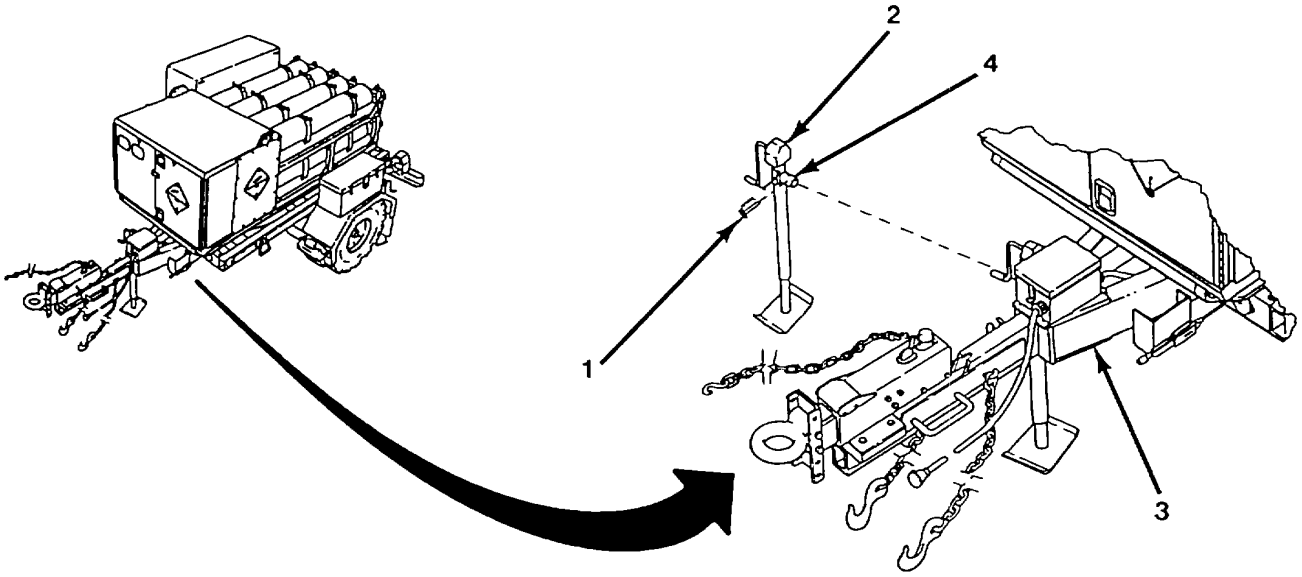


Figure 4-49. Replace Front Swivel Jack.

WARNING

Prior to performing this task the Servicing Unit should be positioned on a hard flat surface with the rear swivel jacks lowered, handbrake applied, wheels chocked, and drawbar blocked up to provide a firm stable foundation. Failure to follow this warning may result In serious personnel injury or equipment damage.

(1) Pull quick-release pin (1) out of swivel jack (2) and pull jack off of chassis (3).

b. Installation.

(1) Insert mounting tube (4) on new swivel jack (2) with over mounting tube on chassis (3). Position jack (2) with sandshoe down.
(2) Insert quick-release pin (1) to secure jack (2) to chassis (3).
(3) Lower sandshoe using handle until contact with ground is made.

4-58. REAR SWIVEL JACK

This Task Covers: **a. Replacement** **b. Removal**

INITIAL SETUP:

Tools
None

Materials/Parts Appendix D
None

Equipment Conditions
None

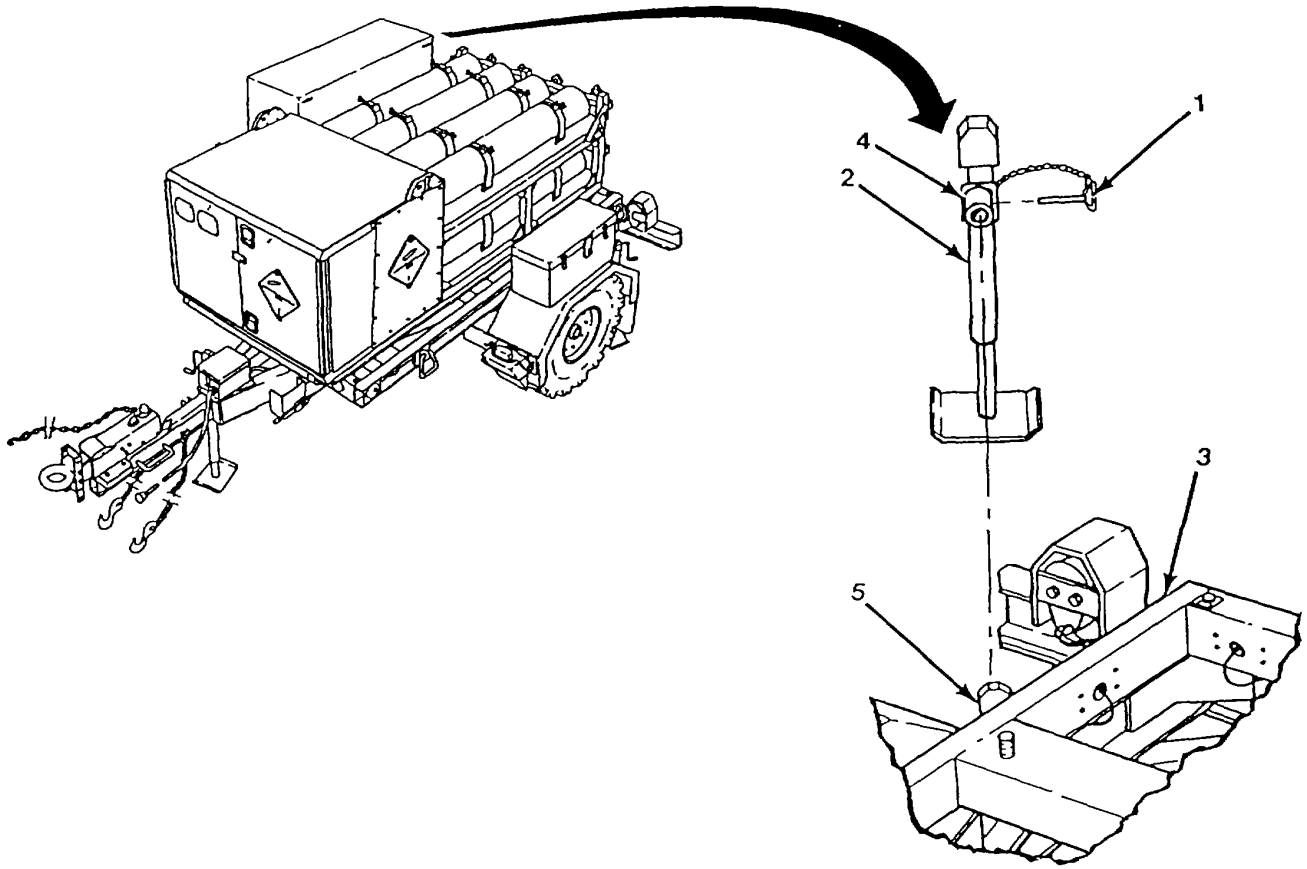


Figure 4-50. Replace Rear Swivel Jacks.

a. Removal.
(1) Pull quick-release pin (1) out of swivel lack (2) and pull jack off of chassis (3).

b. Installation
(1) Insert mounting tube (4) on new swivel jack (2) over mounting tube (5) on chassis. Insert quick-release pin (1) to secure jack (2) to chassis (3).

4-59. REFLECTOR

This Task Covers: **a. Replacement** **b. Removal**

INITIAL SETUP:

Tools
Wrench, 7/16" 2 each

Materials/Parts Appendix D
None
Equipment Conditions
None

a. Removal.

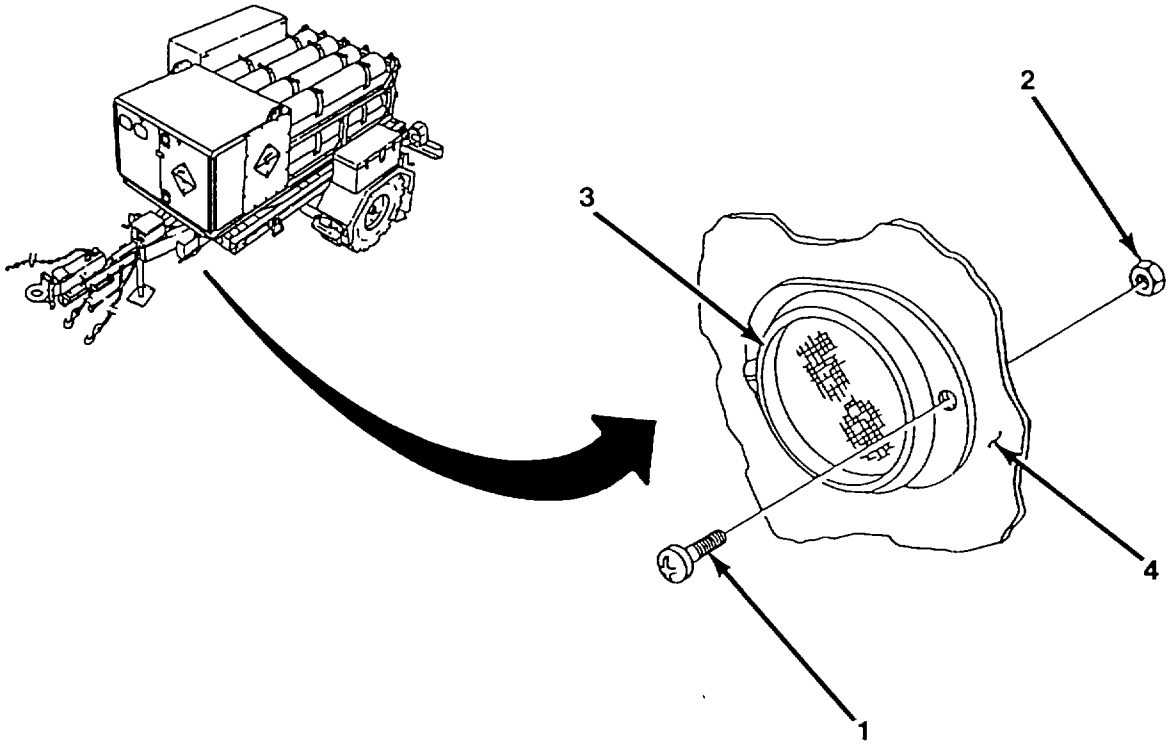


Figure 4-51. Replace Reflectors.

(1) Remove two screws (1) and two nuts (2) to detach reflector (3) from chassis (4).

b. Installation.

(1) Position new reflector (3) on chassis (4) and secure with two screws (1) and two nuts (2).

4-60. SPARE TIRE WINCH ASSEMBLY.

This Task Covers: **a. Replacement** **b. Removal**

INITIAL SETUP:

Tools
Socket Wrench Handle, 3/8" Drive
Socket, 9/16"
Socket, 9/16'
Wrench, Torque 0-150 ft/lbs
Wrench, 9/16"
Wrench, 11/16" 2 each
Wrench, 15/16"

Materials/Parts Appendix D
None

Equipment Conditions
Spare Tire Removed (Paragraph 3-5)

a. Removal.

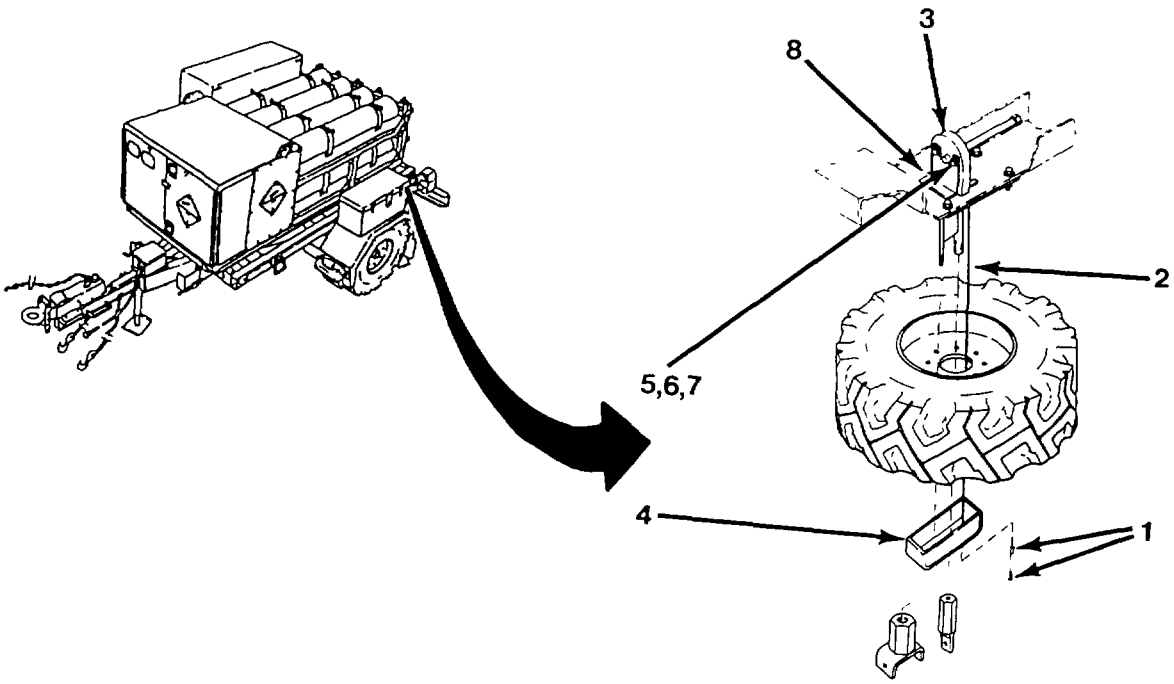


Figure 4-52. Replace Spare Tire Winch Assembly.

WARNING

Ensure safe working load of all rigging equipment Is sufficient before lifting Body Assembly from Trailer Assembly. Failure to follow this warning may result In personnel injury, death, or damage to equipment.

(1) Remove six bolts, attaching nuts, and bevel washers that secure the body to the Trailer Assembly.
(2) Lift and remove Body Assembly from Trailer Assembly.
(3) Loosen and separate cable crimping nut (1) from cable (2) on winch (3) and pull cable through holddown bracket.
(4) Remove two screws (5) and attaching nuts (6) and washers (7) securing winch assembly (3) to chassis brackets (8).
(5) Note routing of cable, then pull winch assembly(3) out from between chassis brackets (8).

b. Installation.

(1) Unwind about two feet of cable (2) from new winch assembly (3) and route cable through hole In chassis, as previously noted.
(2) Position winch assembly (3) between chassis brackets (8) and align mounting holes.
(3) Install two screws (5) and attaching nuts (6) and washers (7) to secure winch assembly (3).
(4) Insert winch cable through holddown bracket (4). Then, install cable crimping nut (1) at end of cable (2)
(5) Lift Body Assembly and place onto Trailer Assembly.
(6) Install six bolts, bevel washers, and attaching nuts to secure the Body Assembly to the Trailer Assembly.
(7) Reinstall spare tire as prescribed In paragraph 3-5.

Section VI. PREPARATION FOR STORAGE OR SHIPMENT

4-61. DEPRESSURIZING SERVICING UNIT FOR SHIPMENT.

a. Preparing the Servicing Unit for Depressurization.

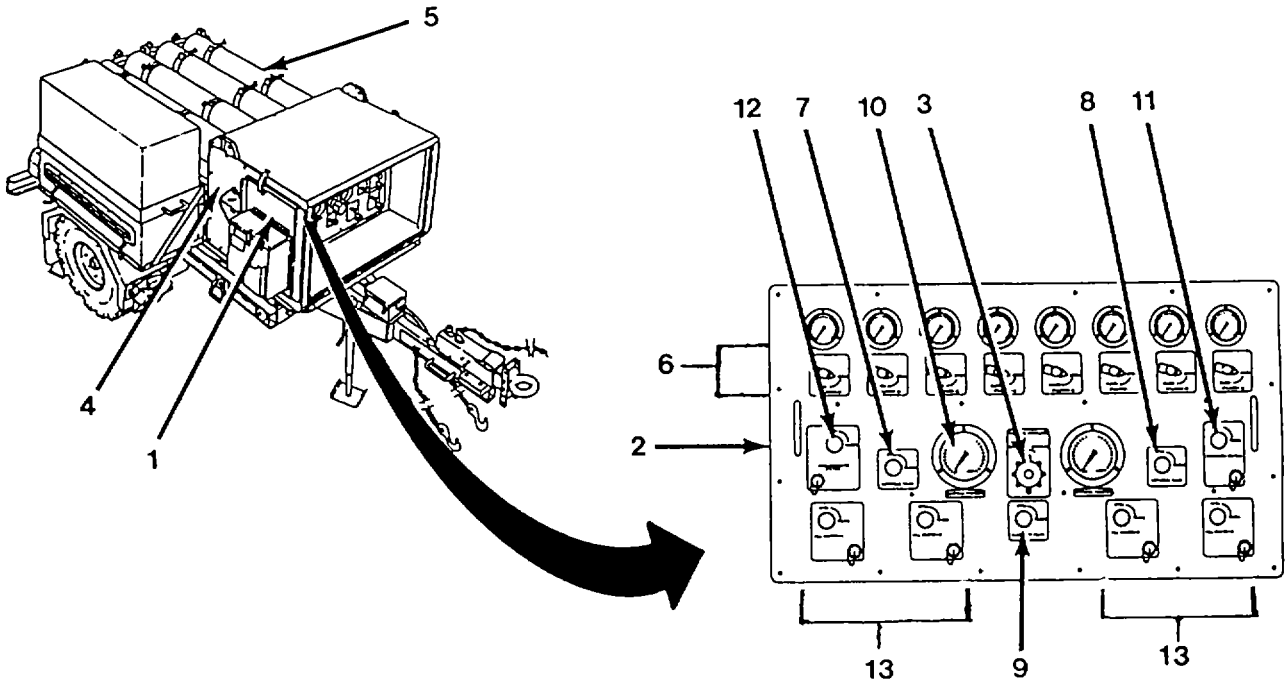


Figure 4-53. Depressurizing Servicing Unit.

(1) Open the front doors (1) to gain access to control panel (2).
(2) Verify that all valves on the control panel (2) are closed and pressure regulator (3) is completely backed off.
(3) Remove the side panels (4) from the Servicing Unit control compartment.

b. Depressurizing the Servicing Unit.
(1) Verify that the valve on each storage cylinder (5) is closed.
(2) Open all eight 1/4-tum ball valves (6).
(3) Open manifold valve (7), servicing valve (8), and bleed off valve (9).
(4) Open cylinder valve #1 and observe reading on inlet pressure gauge (10).
(5) If inlet pressure gauge reading is above 0 psi, increase setting on pressure regulator until air can be heard venting through bleed off valve.
(6) Allow pressure in cylinder #1 to vent until no air can be heard venting from the cylinder.
(7) Close cylinder valve #1 and return pressure regulator (3) to full backed-off position.
(8) Repeat steps 4 through 7 for the remaining seven storage cylinders.
(9) Ensure the entire Compressed Gas System is vented by increasing pressure regulator (3) setting to full and opening recharge valve (11), high pressure valve (12), and all four fill station valves (13).
(10) When air can no longer be heard venting from bleed off valve, back off on pressure regulator (3) setting and close all valves on the control panel.

4-62. PREPARATION FOR SHIPMENT.

a. The Servicing Unit may be shipped m either of two configurations depending on the destination.
   (1) Verify the Servicing Unit has been prepared for shipment per paragraph 456.
   (2) If Servicing Unit is to be packaged, it will be preserved and packaged in accordance with MIL-STD-2073-1, MIL-STD2073-2, and MIL-V-62038.
   (3) If Servicing Unit is shipped mobile (uncrated) it shall meet Uniform Freight Classification Rules, National Motor Freight Classification Rules or other common carriers applicable to the mode of transportation.
   (4) In either of the above shipping configurations, units and shipping containers shall be marked in accordance with MIL-STD-129.

4-63. PREPARATION FOR STORAGE.

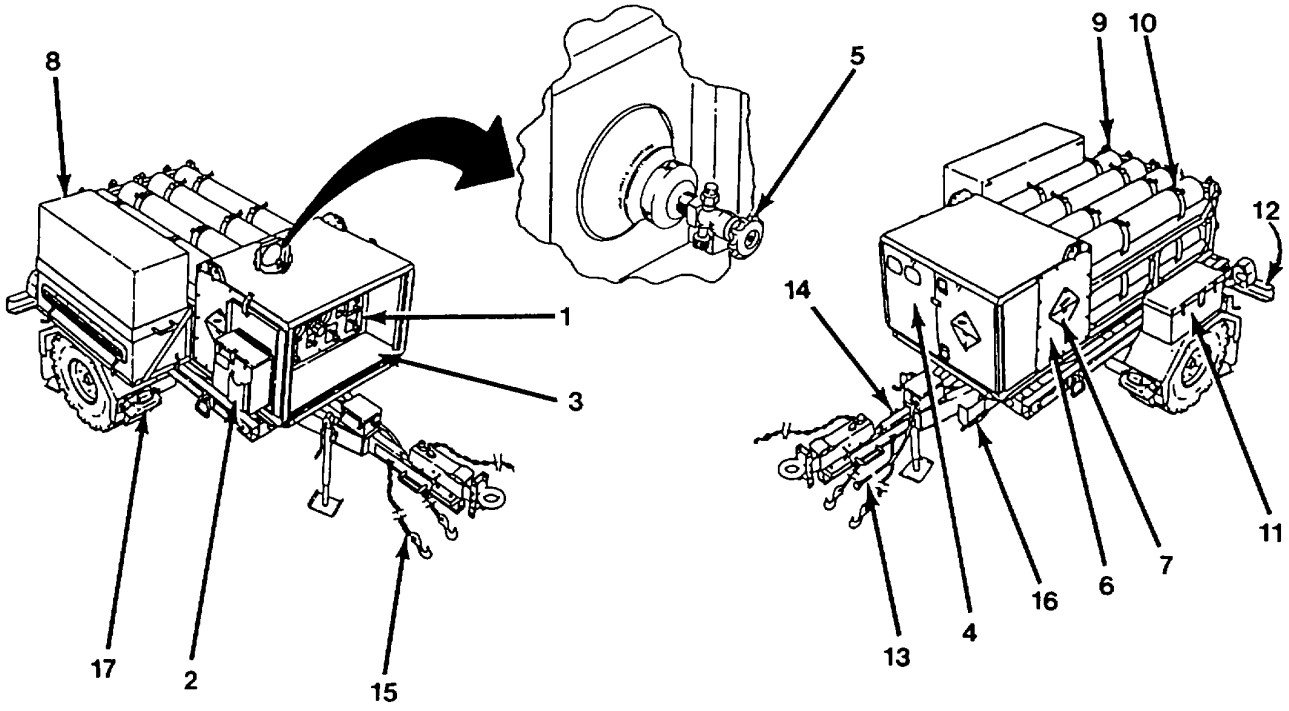


Figure 4-54. Preparation for Storage.

a. Preparing the Body Assembly for Storage.

(1) De-pressurize the Compressed Gas System, including storage cylinders, per paragraph 4-19.

CAUTION

Due to moisture content of air the Storage Cylinders must be filled with dry nitrogen for periods of storage longer than six months. Failure to follow this precaution may result In erosion Inside the cylinders and contamination of Compressed Gas System.

Determine the maximum potentially storage time for the Servicing Unit. If time period will be six months or longer prepare Servicing Unit for long-term storage per paragraph 4-64, otherwise proceed to step (2).

(2) Ensure all valves on control panel (1) are closed and regulator Is completely backed off.
(3) Ensure dust caps are Installed and secured at the recharge station, hi-pressure station, and fill stations.
(4) Ensure protective coverings Installed at both ends of four fill hoses and hoses are stowed in Compressed Gas System tool box (2).
(5) Ensure drain plugs are Installed at bottom of Compressed Gas System tool box (2) and control compartment (3).
(6) Close and secure Compressed Gas System tool box (2)
(7) Ensure the appropriate documents (breathing air certification, test date, and others are secured in document holder).
(8) Close and secure control compartment front doors (4).
(9) Ensure all eight cylinder valves (5) are closed.
(10) Install control compartment side panels (6).
(11) Ensure all four non-flammable gas placards (7) are installed and secured.
(12) Ensure trough (8) is secured to trough mounting base.

(13) Ensure two cylinder holddown brackets (9) are secured and adjustable stops on each bracket are tight against base of each cylinder.
(14) Ensure all 16 cylinder clamps (10) are properly secured.

b. Preparing the Trailer Assembly for Storage.
(1) Ensure drain plugs are Installed on trailer tool box (11).
(2) Close and secure trailer tool box (11).
(3) Ensure spare tire (12) is properly secured to underside of chassis.
(4) Ensure intervehicular cable (13) is secured to clip on drawbar (14).
(5) Ensure emergency brake chain (14) and two safety chains (15) are secured to trailer drawbar.
(6) Ensure parking brake (16) is set.
(7) Ensure two chocks and chains (17) are placed under tires or secured to chock holders as required.

4-64. PREPARATION FOR LONG-TERM STORAGE (6 MONTHS OR LONGER).

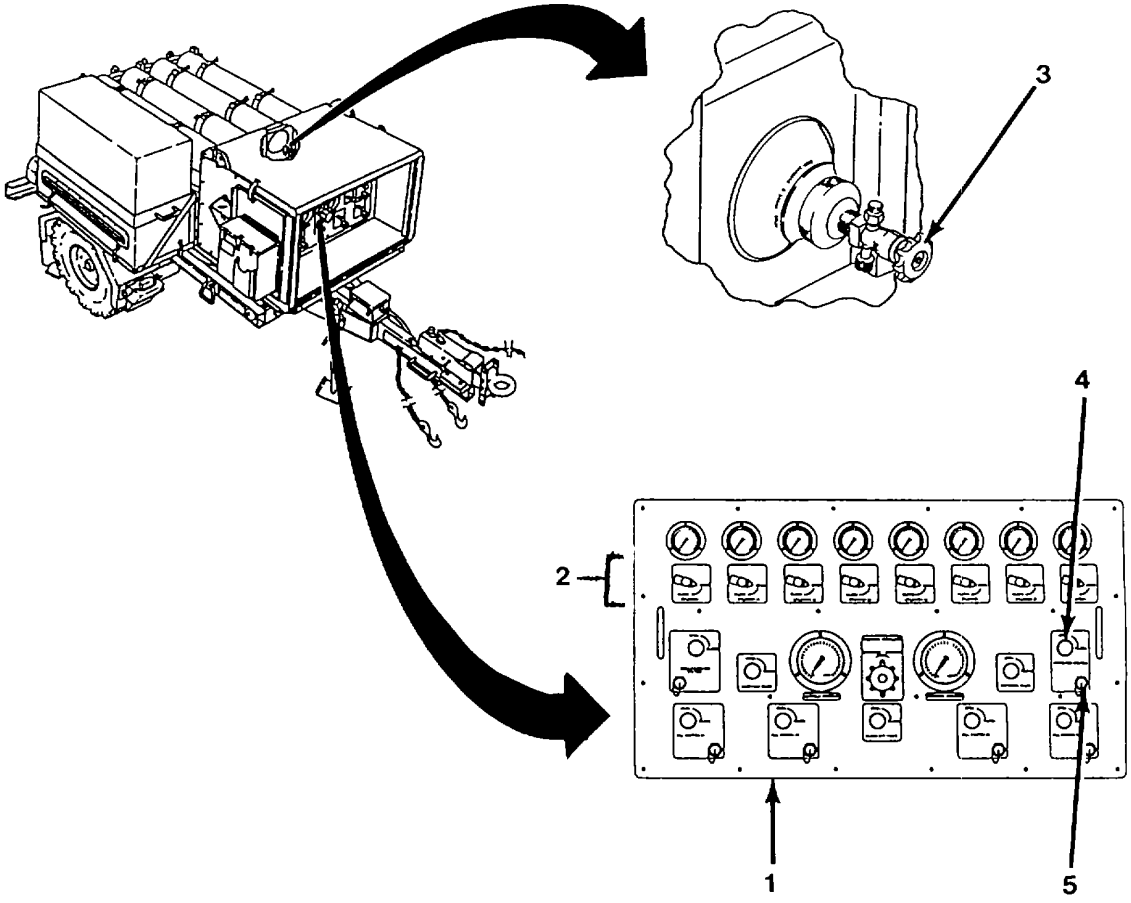


Figure 4-56. Preparation for Long-Term Storage.

a. Charging Storage Cylinders with Nitrogen.
(1) Depressurize the Compressed Gas System, including storage cylinders, per paragraph 4-56.
(2) Ensure all valves on control panel (1) are closed and regulator is completely backed off.
(3) Ensure dust caps are installed and secured at the high pressure station and fill stations.
(4) Open eight 1/4-turn ball valves (2) and eight cylinder valves (3).
(5) Open recharge valve (4).

CAUTION

The storage cylinders should only be filled with dry, oil free nitrogen per BB-N-411. Failure to follow this precaution may result In contamination of the Servicing Unit storage cylinders.

(6) Connect nitrogen pressure source to recharge port (5).
(7) Pressurize the storage cylinders with nitrogen per BB-N-411 to a pressure of 300 psi.
(8) Record pressure reading at pressure source and date, store document with recorded pressure with other documents of Servicing Unit.
(9) Close eight cylinder valves (3).
(10) Close recharge valve (4) and disconnect nitrogen pressure source from recharge port.
(11) Slowly open recharge valve (4) to allow residual pressure in Compressed Gas System to vent.
(12) Close eight 1/4-turn ball valves (2) and recharge valve (4).
(13) Install dust cap on recharge port (5).

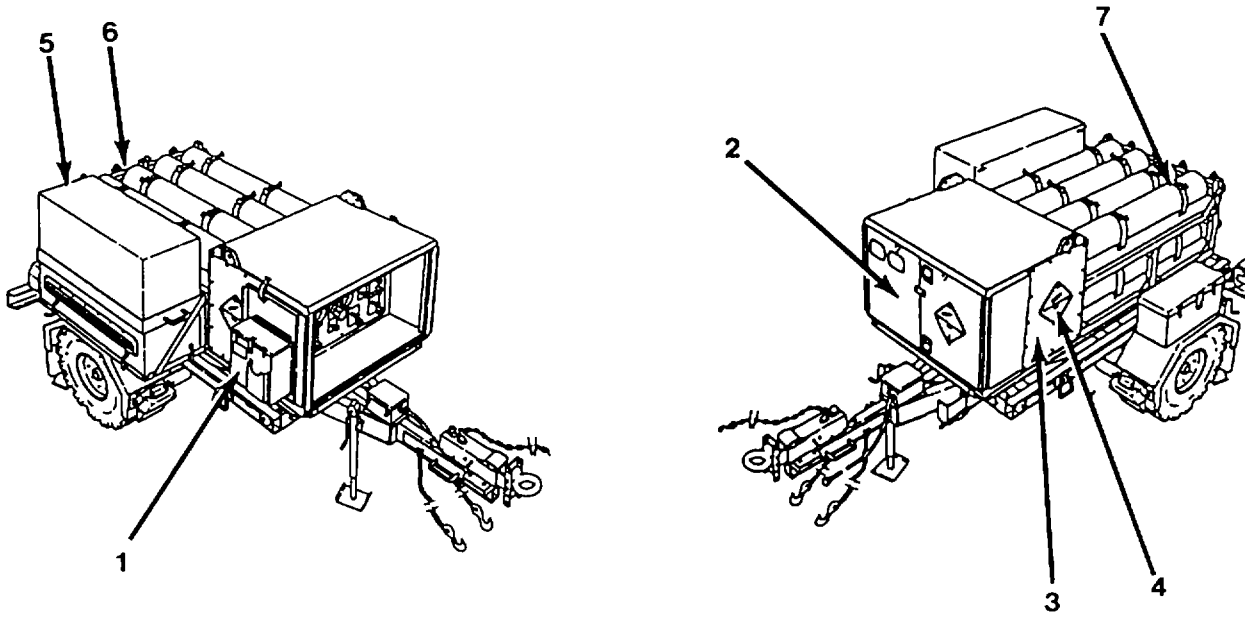


Figure 4-57. Preparation for Storage.

b. Preparing Body Assembly for Storage.
(1) Ensure protective coverings installed at both ends of fill hoses and hoses are stowed in body tool box (1).
(2) Ensure drain plugs are installed at the bottom of body tool box (1) and control compartment.
(3) Close and secure Compressed Gas System tool box (1).
(4) Ensure the appropriate documents (breathing air certification, test date, storage cylinder nitrogen pressure, etc.) are secured in document holder.
(5) Close and secure control compartment front doors (2).
(6) Install control compartment side panels (3).
(7) Ensure all four non-flammable gas placards (4) are installed and secured.
(8) Ensure trough (5) is secured to trough mounting base.
(9) Ensure two cylinder holddown brackets (6) are secured and adjustable stops on each bracket are tight against base of each cylinder.
(10) Ensure all sixteen cylinder clamps (7) are properly secured.

c. Preparing Trailer Assembly for Storage
   (1) Ensure drain plugs are installed on trailer tool box (1)
   (2) Close and secure trailer tool box.
   (3) Ensure spare tire (2) is properly secured to underside of chassis.
   (4) Ensure intervehicular cable is secured to clip on drawbar (3)
   (5) Ensure emergency brake chain (4) and two safety chains (5) are secured to trailer drawbar
   (6) Ensure parking brake (6) is set.
   (7) Ensure two chocks and chains (7) are placed under tires or secured or chock holders as required,

Section VII. UNIT LEVEL CLEANING PROCEDURES FOR DIVING LIFE SUPPORT AIR SYSTEMS

4-65. GENERAL.

The importance of maintaining a diver's air breathing system In a clean and operable condition cannot be over emphasized. This procedure provides basic steps and methods for removing and installing components and piping, and provides the simplified methods for cleaning small components, pipes and hoses for air systems, and methods for cleaning component soft goods.

4-66. DETERMINING SYSTEM CLEANLINESS.

A periodic inspection of the air system will verify system cleanliness. If a system is suspected of contamination, a hydrocarbon analysis and a particulate sample may be taken, or a gas sample may be drawn to determine the level of system cleanliness. These samples can be coordinated through the U.S. Army Aviation and Troop Command, ATTN: AMSAT-I-M, 4300 Goodfellow Blvd., St. Louis, Missouri 63120-1798.

4-67. CLEAN AREA.

All cleaning for life support air systems to be performed on components and piping shall be cleaned In a "cleaned area." This area shall be isolated from oil, grease, paper, lint particles and other airborne contaminates. It shall be as free as possible of dust and debris. Work benches shall be covered with easily cleaned surfaces such as stainless steel, synthetic rubber, vinyl linoleum Formica. Floor shall be non-dusting Walls and ceiling shall be covered with washable vinyl, latex paint or polyurethane-based paint.

4-68. REMOVING AND INSTALLING SYSTEM COMPONENTS OR PIPING .

The following steps are guidelines for the removal and Installation of piping or components from or into a clean system. In general, common sense and clean work habits must prevail at all times to maintain system cleanliness. Prior to the removal of any pipe or component, appropriate maintenance forms are to be completed and approved.

a. Removal. Extreme care shall be used in the removal of any component or pipe from a clean system to avoid introducing any contamination. To eliminate any chance of contamination, the following steps shall be adhered to:

(1) Secure the system by closing valves and controls both upstream and downstream of the component or pipe to be removed. The components shall be tagged to insure that gas is not brought on line.
(2) Removal of all debris from the intended area of assembly or disassembly such as dirt, dust, loose paint, and grease is mandatory. This includes cleaning the pipe or component which is to be removed and the adjacent components or piping.
(3) Wipe all of the external surfaces of components and piping with detergent or alcohol solvent to remove grease or dirt.
(4) All personnel shall have clean hands.
(5) All tools used in the removal must be clean and grease-free.
(6) Remove component or piping.
(7) Immediately bag or seal all exposed ends of system with plastic

b. Installation or Reinstallation .

(1) The new component or cleaned pipe shall be wrapped or double bagged. If not, the item shall be returned for cleaning.
(2) The component or piping shall be removed from bagging and shall be inspected for damage at the mating surfaces, threads, or connecting surfaces and any primary surface. Inspect for dust or minor particle contamination, and remove with lint-free rag (Item 4, Appendix D).
(3) Mating components and pipe shall have protection materials or plugs removed.
(4) Mating surfaces, O-rings and threads shall be coated lightly with an approved lubricant. Threaded surfaces must be coated to prevent galling of threads at assembly.
(5) A pressure test shall be performed to verify that there are no leaks and that the correct fittings have been installed in the system.

4-69. PRE-CLEANING OF COMPONENTS OR PIPING .
Upon receipt of new component not cleaned or components and pipe removed from the system for cleaning, the item shall be pre-cleaned. Doing this shall prepare the component for final cleaning. Pre-cleaning will be accomplished in an area separate from the clean area. The pre-cleaning will include but is not limited to the following:

a. All wrapping shall be removed.
b. Loose paint, rust, brackets, panels, tags, supports and other such items shall be removed.
c. If hydrocarbons and /or other contaminants are known to have been introduced into the component or piping, a thorough degreasing procedure shall be initiated Trisodium phosphate (TSP) (Item 17, Appendix D) or non-ionic detergent (NID) (Item 8, Appendix D) may be used.
d. Visually inspect the pre-cleaned articles under bright light to ensure that all gross contamination has been removed.
e. Bag all components and ends of pipe with plastic to await cleaning.

4-70. CLEANING METHOD - NON-IONIC DETERGENT .
This method outlines the cleaning procedures for oil-free cleaning of metallic/nonmetallic components or assemblies using non-ionic detergent. This procedure is only to be used if there is no equipment available to conduct the TSP cleaning method.

a. Cleaning Components or Assemblies (excluding hose assemblies).

CAUTION

Chemical protective gloves should be worn to prevent skin irritation from detergent and hot water.

(1) Disassemble components down to the smallest parts. Separate soft goods and clean as specified in paragraph 4-65.
(2) Clean each component by scrubbing with a non-ionic detergent (Item 8, Appendix D) solution (1/2 teaspoon 2 4 mL) detergent to 1 gallon (3 8 L) water using a nylon bristle brush (Item 3, Appendix D) and clean cloths (Item 4, Appendix D) .
(3) Rinse with distilled water at 125 degrees F (54 degrees C) until effluent shows no visible signs of detergent.
(4) Collect some of the water rinsed over the items in a flask that can be fitted with a rubber stopper. Shake the flask for a few seconds and If any bubbles form and remain on the surface of the water in the flask, continue to rinse item until no bubbles form and remain in the sample flask.
(5) Purge with dry, oil-free nitrogen until visually dry, or allow to air dry. The following dated and signed records shall be maintained:
    (a) Identification of all parts cleaned.
    (b) Results of shake test.
(6) Reassemble as outlined in specific component maintenance procedures (Chapter 4 or Chapter 5).
(7) Double bag all components in plastic (Item 2, Appendix D) and close securely.

b. Cleaning Hose Assemblies
   (1) Clean hose assemblies In accordance with the following steps using the specific materials and utilizing proper equipment. Pre-clean hose assemblies outside the clean area by rinsing externally with distilled water.
   (2) Most hose assemblies will not lend themselves to disassembly. Disassemble to maximum extent without removing fittings or clamps
   (3) The cleaning solution shall be made by adding 1/2 ounce (14.7 mL) non-ionic detergent (Item 8, Appendix D) to each 80 gallons (302.8 L) or distilled water.
   (4) Heat the cleaning solution to 120 degrees F (49 degrees C) and circulate through the hose assembly for 30 minutes at a flow rate of not less than 1 gallon (3.8 L) per minute.
   (5) Rinse the hose assembly with distilled water heated to 125 degrees F (52 degrees C) for 30 minutes at a flow rate of not less that 1 gallon (3.8 L) per minute. Do not recirculate the water.
   (6) Perform a shake test by collecting a 1000mL sample of rinse water in a flask (Item 9, Appendix D) that can be fitted with a rubber stopper. Shake the flask for a few seconds and if any bubbles form and remain on the surface of the water in the flask, continue to rinse the hose until no bubbles form and remain in the sample flask.
   (7) Purge hose assembly with clean, dry, oil-free nitrogen (preferably heated to 200 degrees F (93 degrees C)) until all visible signs of water are absent Continue drying process for 1 to 2 hours after initial purge.

NOTE

At no time shall the upstream purge pressure for all hose assemblies exceed 100 psig (6895 millibars).

   (8) After drying, cover each hose end with a clean plastic bag (Item 2, Appendix D) to maintain internal cleanliness. Secure the bag with 1 inch (2.5 cm) wide tape.
   (9) When components and systems have been assembled an air sample shall be taken to verify cleanliness.

4-71. CLEANING METHOD - TRISODIUM PHOSPHATE (TSP).

This method is the preferred method if all equipment is available. A steam/hot water cleaner that has adjustable siphon control for cleaning applications works well.

a. For components the following steps should be followed:

WARNING

The TSP cleaning solution Is harmful to eyes and skin. Wear chemical protective apron, gloves and goggles/face shield when handling or working with the solution.

   (1) Prepare a solution consisting of 2 pounds (0.9 kg) TSP (Item 17, Appendix D), 0.5 ounces (14 7 mL) non-ionic detergent and 80 gallons (302.8 L) of distilled or deionized water.
   (2) Heat solution to 165 degrees F (74 degrees C) mixing occasionally during the heating.
   (3) Disassemble components down to the smallest parts (separate and clean soft goods and aluminum parts as specified In paragraph 4-65) and soak in the solution for 10 minutes minimum, 30 minutes maximum.
   (4) After soaking, clean the parts in the ultrasonic cleaner until all visible traces of contaminate dirt or grease are gone.
   (5) For components too large for an ultrasonic cleaner, scrub the parts with a nylon bristle brush until all visible traces of contaminate dirt or grease are gone.
   (6) Rinse all parts in running hot distilled water or deionized water until all visual traces of cleaning solution are removed.
   (7) Draw 0 34 ounces (10 mL) sample Agitate or rinse water to observe for soap bubbles. if any soap bubbles are present, repeat steps 6 and 7 until no bubbles are observed.
   (8) Blow dry components with clean air, nitrogen or helium.
   (9) Reassemble components using an approved lubricant.
   (10) Bag and seal or tape closed all components and ends of pipe or hoses with plastic until ready for reinstallation.

b. For cleaning pipe or tubing the following procedures should be followed:
(1) Determine the volume of cleaning solution estimating the length of pipe or hose to be cleaned and the size of the pipe to be cleaned. look up the appropriate pipe/ube size and then the corresponding volume (in cubic inches) per one foot length in table 4-3. Multiply that volume by the estimated length to be cleaned After the total volume Is calculated, multiply the answer in cubic inches by .00433 After the total volume is calculated, multiply the answer in cubic inches by 00433 to obtain the number of gallons to fill the system. Determine applicable flow rate from table 4-4 and multiply flow rate by 30 to compute number of gallons required to pump through the system Add volume required to fill system and the volume required to pump through the system for the total volume of cleaning solution required.

Table 4-3. TSP Cleaning Solution Volume.

Pipe/Tube Size in (cm)	Volume of 1 Foot (30 cm) Length
1/4 (0 6 cm)	0 6 cubic inches (9.7 cm3)
3/8 (1 0 cm)	1 3 cubic inches (21 7 cm3)
1/2 (1 3 cm)	2 4 cubic inches (38 6 cm3)
3/4 (1 9 cm)	5 3 cubic inches (86 9 cm3)
1 (2 5 cm)	9 4 cubic Inches (154.5 cm3)
1-1/2 (3.8 cm)	21.2 cubic inches (347.6 cm3)
2 (5 1 cm)	37.7 cubic inches (617 0 cm3)

(2) Prepare a solution at a ratio of 2 pounds 90 9 kg) of TSP, 0.5 ounces (14.7 mL) non-ionic detergent for each 80 gallons (302.8 L) of distilled or deionized water as determined.
(3) Heat solution to 165 degrees F (74 degrees C) mixing occasionally during the heating.
(4) Pump the cleaning solution through the pipe/tubing for 30 minutes at a rate listed in table 4-4 using the solution pump, and maintain constant temperature at all times It may be necessary with some piping configurations to cap or plug some openings and alternate with others to maintain even flow of cleaning solution to all segments of the pipe. If you run out of cleaning solution prior to the 30 minutes listed, prepare another volume of cleaning solution.
(5) Pump hot distilled or deionized water through the system to rinse until all visible traces of cleaning solution are removed.
(6) Draw 0 34 ounces (10 mL) sample. Agitate to observe for soap bubbles if any soap bubbles are present, repeat step 5 until no bubbles are observed.
(7) Blow dry parts or components with clean, dry, oil-free nitrogen (preferably heated to 200 degrees F (93.3 degrees C)) until all visible signs of water are absent Maintain process for 1 to 2 hours after initial purge.
(8) Double bag (Item 2, Appendix C) and seal or tape closed all components and ends of pipe or hoses with plastic until ready for reinstallation.

c. Hoses shall be cleaned as specified in paragraph 465.

Table 4-4. Cleaning Solution Flow Rate.

Tube Size inches	GPM	Pipe Size inches	GPM
1/4 (0.6 cm)	1/2	1/4 (0.6 cm)	2
3/8 (1.0 cm)	2	3/8 (1.0 cm)	3
1/2 (1.3 cm)	3-3/4	1/2 (1 3 cm)	5-1/2
3/4 (1.9 cm)	6-3/4	3/4 (1.9 cm)	9-1/2
1 (2.5 cm)	12-1/2	1 (2.5 cm)	15-1/2
		1-1/4 (3.1 cm)	23
		1-1/2 (3.8 cm)	35
		2 (5.1 cm)	50

4-72. CLEANING COMPONENT SOFT GOODS

The following isopropyl alcohol method is provided for the cleaning of the soft goods and aluminum parts of system components. The method for non-ionic detergent is the same procedure as that in paragraph 4-65.

CAUTION

Ensure ventilation is adequate and avoid breathing vapors.

Personnel should wear chemical protective gloves to prevent skin irritation when contact with isopropyl alcohol is necessary.

Isopropyl alcohol shall be maintained in a covered container to preclude excess concentrations in the air for fire protection. The cover should be removed only for placement or removal of soft goods.

NOTE

Table 4-5 lists all compatible cleaning agents for general soft goods used in the Army diving systems. Only the isopropyl alcohol procedure is listed below.

a. Soak component soft goods or aluminum parts in a tray of isopropyl alcohol for 10 minutes maximum.
b. Wipe each piece of soft good individually with wipes soaked in isopropyl alcohol. Do this until all dirt and foreign matter is visually removed.
c. Rinse soft goods with fresh isopropyl alcohol.
d Blow dry with air, nitrogen, or helium.

Table 4-5. Cleaning Agents Compatible with Soft Goods.

Soft Goods	Freon PCA MIL-C-81302B	TSP O-S-642	NID MIL-D-16791	IA TI-I-735A
Adiprene C	X		X	
Adiprene L	X		X	
Buna N	X	X	X	X
Buna S	X	X	X	X
Butyl			X	X
Delrin	X	X	X	
Epoxy Resin	X		X	
Kel-f	X	X	X	X
Hypalon 40	X		X	
Kralartic	X		X	
Lexan	X		X	
Lucite	X		X	
Neoprene W	X		X	
Nylon		X		X
Polyethylene 7050	X	X	X	X
Polyethylene 9140	X	X	X	X
Polyvinyl Chloride	X	X	X	X
Surlyn A	X		X	
Teflon TFE	X	X	X	X
Teflon FEP	X	X	X	X
Thiokol FA	X		X	X
Viton A	X	X	X	X
Viton B	X	X	X	X
Zytel 101	X		X	
Ethylene Propylene	X	X	X	X

X = Solvent is compatible with soft goods Blank = Solvent is not compatible with soft goods

4-73. HYDROCARBON INSPECTION AND ANALYSIS.

a. Visual Method. By definition, visibly clean is the absence of all particulate and non-particulate matter visible to the normal, unaided (except for corrected vision) eye. Particulate is identified as matter of miniature size with observable length, width and thickness. Non-particulate is film matter without definite dimension. Examples of visual inspection are:
(1) A clean cloth placed over the discharge end may collect particulates and debris when air or nitrogen is blown through the system.
(2) A component that has been "in service" may have visible signs of grease, dirt, etc.
(3) Absorption of oil or grease on a clean filter paper from a surface wipe.

b. Ultraviolet Light Method. The ultraviolet method for detecting hydrocarbons may be employed in different ways.

WARNING

Most ultraviolet lamps contain mercury. Extreme caution should be taken not to break the mercury vapor lamp which will contaminate the component or pipe being inspected and may also cause human injury.

(1) Direct Inspection: The component may be examined directly with the ultraviolet light. By passing the component under the ultraviolet light, hydrocarbon surface contamination may exhibit fluorescence where some hydrocarbons exist.
(2) Inspection of cleaning solution when detergent is used. Used cleaning solution collected in a clean beaker when agitated will form bubbles. These bubbles, under ultraviolet light, may exhibit fluorescence.

4-74. DOCUMENTATION AND RECORD KEEPING

a. This diving system must retain certain records and documents to substantiate safety standards. The individual operating the clean area being directly involved with system maintenance should therefore be required to maintain records documenting cleaning operations in a systematic manner.

b. The purpose of this section is to set forth a guide for documentation and record keeping involved in cleaning operations and in no way intends to impose restrictions on the amount of paperwork a unit feels it requires to operate safely.

c. A sequential record should be maintained of components cleaned (i.e., regulators, pipe, and/or any component) affecting reentry into a certified system. It should include a written record of all cleaning analyses and testing accomplished as per this procedure. A data sheet should be completed for items cleaned and tested per this procedure. All other information which pertains to the cleaning and/or testing of a particular item shall be attached to or referenced on the data sheet. Such information should include, but not be limited to outside laboratory reports, vendor data, etc. The completed data sheet(s) will then be attached to the REC Report and referenced in the remarks column of the Reentry Control Log.

d. It is possible that certain data and results will apply to more than one data sheet. For example, it is possible that a sample for gaseous contaminants will be taken by sampling an entire system. This system will consist of numerous Items, each having its own data sheet. To assure complete documentation, reference the results of the gaseous contamination analysis on each affected data sheet.

e. As a minimum the data sheet should reflect the following information:
(1) Unit
(2) Date
(3) Name of Point of Contact
(4) Description of Cleaning Performed
(5) Person Performing the Cleaning
(6) Results of any Analysis
(7) Description of Item Being Cleaned
(8) Part Number/NSN
(9) Remarks

CHAPTER 5

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

OVERVIEW

This chapter contains information for direct support maintenance of the Mobile Compressed Gas Servicing Unit.

Section I. REPAIR PARTS; SPECIAL TOOLS; TEST MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE); AND SUPPORT EQUIPMENT

5-1. COMMON TOOLS AND EQUIPMENT.

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

5-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

Refer to Repair Parts and Special Tools List (RPSTL) TM-5-4220-233-24P and the Maintenance Allocation Chart pertaining to direct support maintenance for the Mobile Compressed Gas Servicing Unit.

5-3. REPAIR PARTS.

Repair parts are listed and illustrated in the Repair Parts and Special Tools List. TM 5-4220-233-24P for this equipment.

Section II. DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

5-4 REAR AXLE

This task covers: a. Removal b. Installation

Tools/Test Equipment:
Screwdriver, Flat Tip
Screwdriver, Cross Tip
Stands, Jack - 3 each
Stands, Floor -2 each
Socket, 7/8”
Socket Wrench Handle, 1/2 Drive
Wrench, 3/8"
Wrench, 1/2"

Materials/Parts (Appendix D):
Wiping Rag (Item 13)
Cleaning Solvent (Item 15)
Container (Item 7)

Equipment Conditions:
Remove Hub and Drum Assembly (paragraph 4-42)
Remove Shock Absorbers (paragraph 4-45)

a. Removal.

WARNING

Axle is heavy and awkward to handle. Provide adequate support under trailer chassis and axle at all times. Failure to follow this warning may result in serious injury or equipment damage.

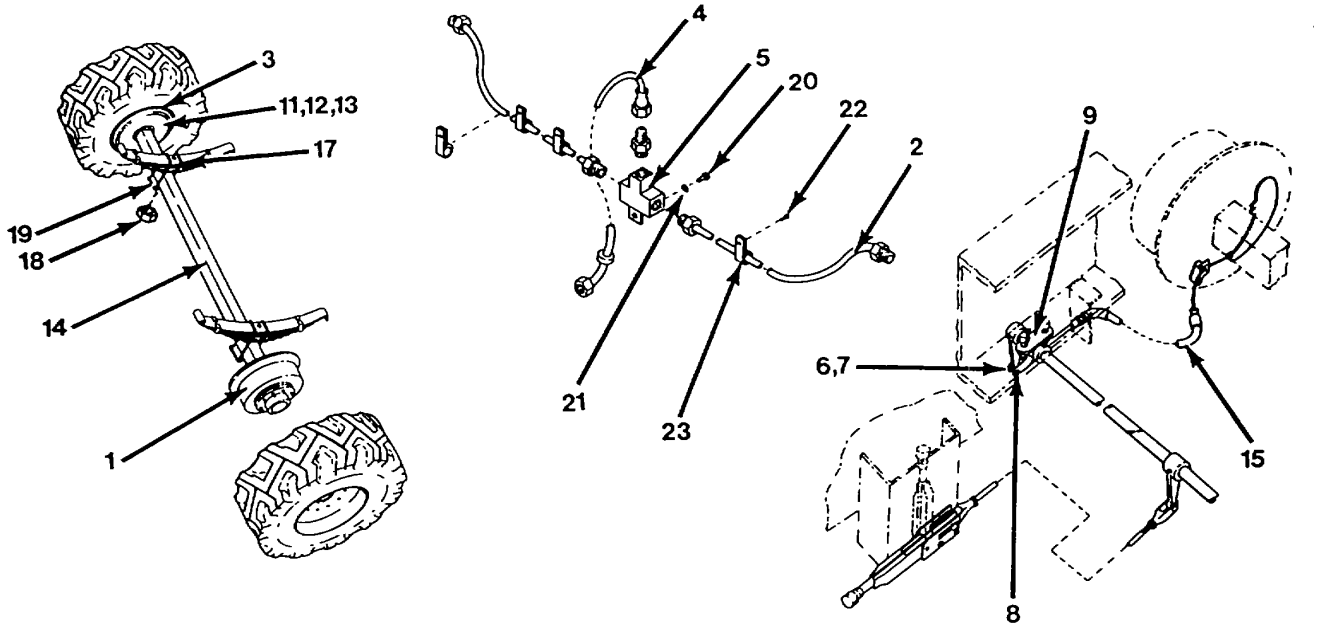


Figure 5-1. Remove Axle Assembly.

(1) Place an empty container below the brake assembly (1), then disconnect brake line (2) from backside of brake assembly (1) and allow fluid to drain.
(2) Repeat step 1 for other brake assembly (3).

(3) Place container below axle where brake hose (4) connects to "T" fitting (5) and disconnect brake hose from “T” fitting.
(4) Remove cotter pin (6) washer (7) and clevis pin (8) to release yoke (9) from shaft lever cable holder.
(5) Loosen jam nuts on cable holder (10) where cable is secured to bracket.
(6) Repeat steps 4 and 5 for other brake cable assembly.
(7) Remove five screws (11), attaching nuts (12) and washers (13) securing brake assembly (1) to axle (14),then pull brake assembly with brake cable (15) off axle and set aside.
(8) Repeat step 7 for other brake assembly (3).
(9) Position floor jacks under both ends of axle (13) just outboard of springs (15).
(10) Remove two “U” bolts (17), and four nuts (18), then remove tie plate and stud assembly (19) from bottom of axle (14).
(11) Repeat step 10 for other side of axle (14).
(12) Lower axle (14) using floor jacks and pull out from unit.
(13) Remove screw (20) and washer (21) securing T" fitting (5) to axle (14).
(14) Remove four screws (22) and clamps (23) to separate brake lines (2) from axle (14).
(15) Clean and inspect all removed parts as prescribed in paragraphs 4-15 and 4-16.

b. Installation.

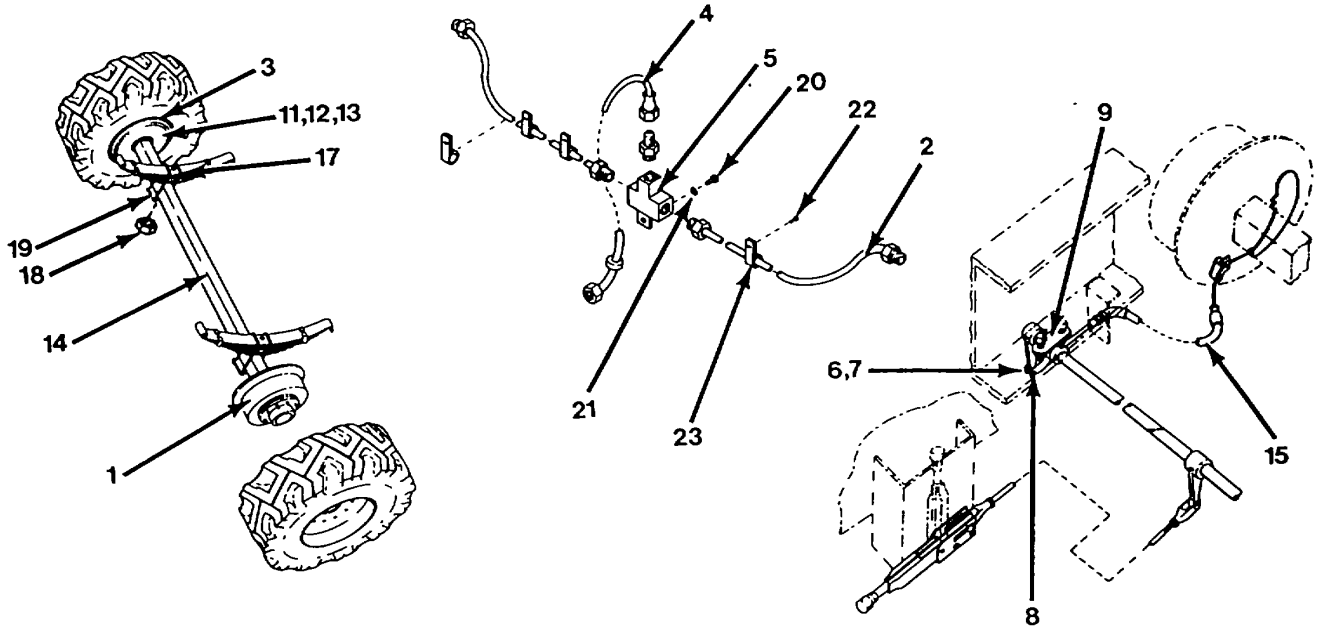


Figure 52. Install Axle Assembly.

NOTE

When an axle is replaced, both shock absorbers should also be replaced.

(1) Refer to Figure 5-2. Install brake lines (2) onto new axle (14) and secure with four clamps (23) and screws (22)
(2) Secure “T" fitting (5) to axle (14) with screw (20) and washer (21).
(3) Position axle (14) under springs (16) and raise with floor jacks until locating pins on springs are engaged with holes in top of axle.
(4) Attach axle (14) to spring (16) and plate and stud assembly (19) by installing two "U" bolts (17), and four nuts (17).
(5) Repeat step 4 for other side of axle (14).
(6) Remove floor jacks from under axle (14).
(7) Position brake assembly (1) on axle and secure with five screws (11), nuts (12) and washers (13)
(8) Repeat step 7 for other brake assembly (3).
(9) Insert brake cable onto cable holder (10) and tighten jam nuts.
(10) Install yoke (9), clevis pin (8) washer (7), and cotter pin (6) onto shaft lever.
(11) Repeat steps 9 and 10 for other brake cable assembly
(12) Connect brake hose (4) to "T” fitting (5).
(13) Connect brake line (2) to backside of brake assembly (1).
(14) Repeat step 13 for other brake assembly (3).
(15) Install new shock absorbers as prescribed in paragraph 4-45
(16) Reinstall hub and drum assemblies as prescribed in paragraph 4-42
(17) Bleed and service brake system as prescribed in paragraph 4-47.

5-5. HUB AND DRUM ASSEMBLY

This Task Covers: a. Repair and Rework

Tools/Test Equipment:
Indicator, Dial
Lathe, Brake
Micrometer, Inside, with Extension
Shop Set, Automotive
Tool Kit, General Mechanics

Materials/Parts (Appendix D):
Wiping Rag (Item 13)
Cleaning Solvent (Item 15)
Equipment Conditions:
Remove Hub and Drum Assembly (paragraph 4-42)

a. Repair/Rework.

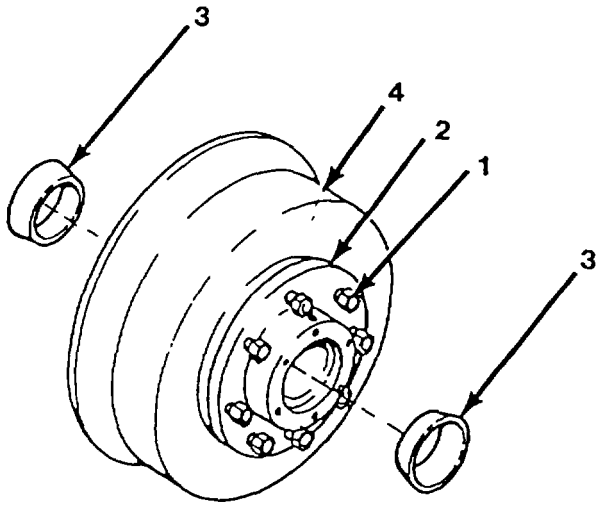


Figure 5-3. Repair Hub and Drum Assembly.

(1) Inspect drum braking surface for cracks, heat checking, and scouring. If necessary reface brake drum as prescribed in steps 5 and 6.
(2) Inspect drum braking surface for out-of-round condition at 45 degree intervals if run out exceeds 0.006 in. (0 15mm) reface brake drum as prescribed in steps 5 and 6.

(3) Inspect wheel studs (1) for damaged threads. If damaged press out damaged stud(s) and press in new stud(s).
(4) Inspect hub (2) and bearing cups (3) for damage. If either hub or cup(s) are damaged repair as prescribed in steps 7 through 9.
(5) Reface brake drum removing a maximum of 0.01 in (0.25mm) per cut until worn area is removed or out-of round condition is corrected.
(6) Measure inside diameter of brake drum after refacing is completed. If diameter exceeds 12.005 in (30 80 cm) replace brake drum as prescribed in steps 7 and 9.
(7) Press out all eight wheel studs (1) and separate brake drum (4) from hub (2). Discard wheel studs.
(8) Press new bearing cups (3) into new hub (2).
(9) Mate hub (2) to brake drum (4) and press in eight new wheel studs (1).

5-6. SURGE ACTUATOR ASSEMBLY.

This Task Covers: a. Disassembly b. Clean and Inspect c. Assembly

Tools/Test Equipment:
Mallet, Rubber
Pliers, Needle Nose
Socket Wrench Handle, 1/2" Drive
Socket, 9/16"
Socket, 15/16"
Wrench, 5/16"
Wrench, 1/2"
Wrench, 9/16"
Wrench, 5/8"
Wrench, 3/4"
Wrench, 15/16"

Materials/Parts (Appendix D):
Wiping Rag (Item 13)
Cleaning Solvent (Item 15)
Container (Item 7)
Grease (Item 11)
Replace
Lockwasher
Weather Seal
Gasket
Cotter Pins
Equipment Conditions:
Remove Surge Actuator (paragraph 4-48)

a. Disassembly.
(1) Place an empty container below the surge actuator and drain residual brake fluid out of brake line connector (1) at end of master cylinder (2).
(2) Remove two bolts (3), attaching nuts (4) and washers (5) to separate lunette eye (6) from inner slide assembly (7).
(3) Uncrimp S-hook (8) and disconnect chain (9) from brake lever assembly (10).
(4) Remove vent cap (11) from top of master cylinder assembly (2).
(5) Remove gasket (12) from vent cap (11). Discard gasket.
(6) Remove four screws (13) and lockwashers (14) securing brake lever assembly (10) to outer case (15). Discard lockwashers.
(7) Remove LH breakaway lock (16), RH breakaway lock (17), and weather seal (18) from brake lever (10). Discard weather seal.
(8) Pull brake lever assembly (10) out of outer case (15).
(9) Remove four screws (19) and four lockwashers (20) securing master cylinder (2) into outer case (15). Discard lockwashers.
(10) Pull master cylinder (2) out of outer case (15).
(11) Remove two bolts (21), attaching lockwashers (22), and nuts (23) to separate master cylinder (2) from RH and LH cylinder brackets (24) and (25). Discard lockwashers
(12) Remove connector (1) with gasket (26) from master cylinder (2). Discard gasket.
(13) Remove two front roller bolts (27), attaching lockwashers (28), and nuts (29) from outer case (15) were front cover (30) is attached. Discard lockwashers.

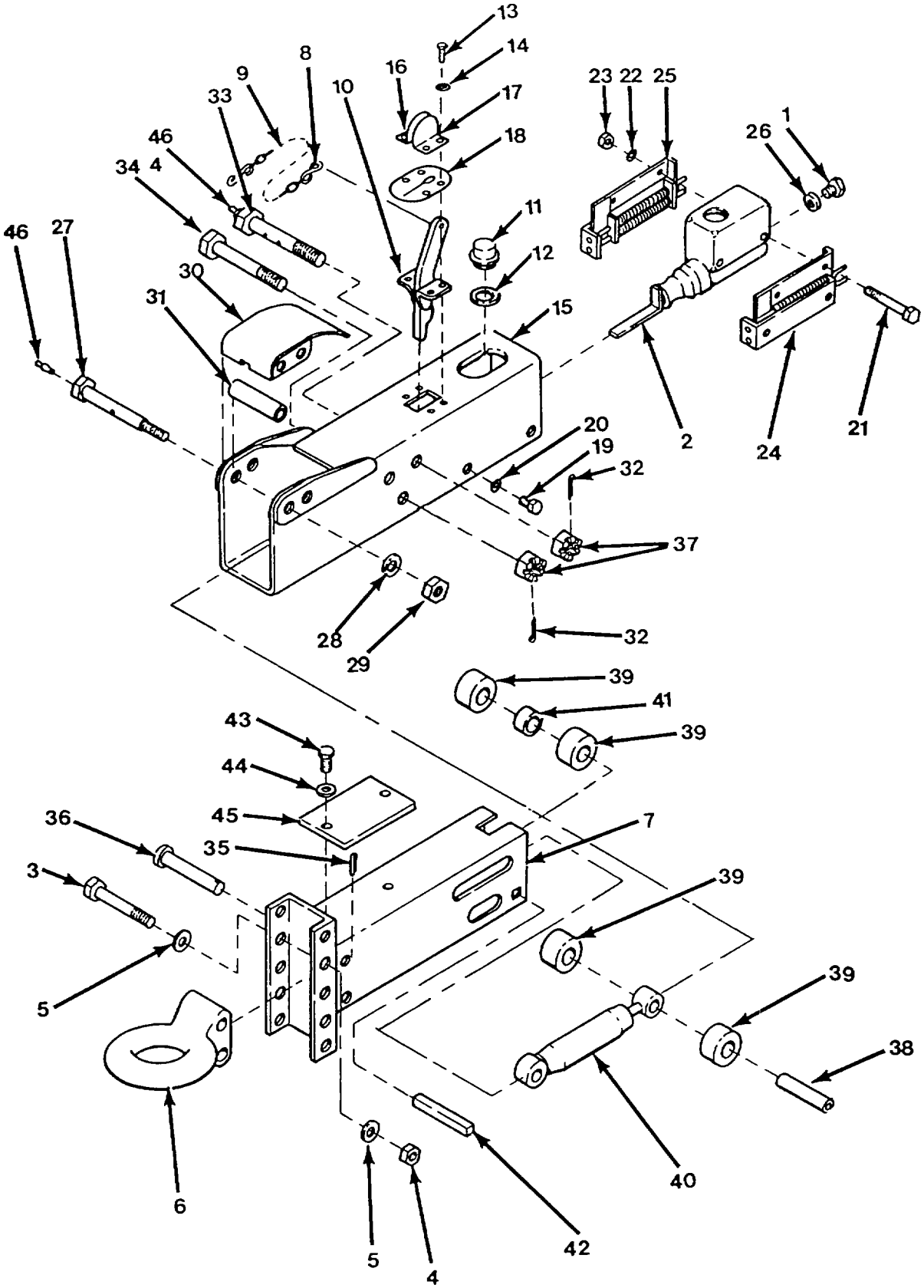


Figure 5-4. Disassemble Surge Actuator.

(14) Pull front cover (30) and two front rollers (31) off of outer case (15).
(15) Remove three cotter pins (32) from rear roller bolts (33) and (34) and two cotter pins (35) from damper bars (36). Discard cotter pins.
(16) Remove two rear roller bolts (33), one rear roller bolt (34) and attaching nuts (37) from outer case (15).
(17) Pull inner slide assembly (7) out of outer case (15).
(18) Tap two damper bars (36) out of inner slide assembly (7).
(19) Pull out three spacers (38) and remove six rear roller assemblies (39), tow dampers (40), and spacer (41) from inner slide assembly (7).
(20) Tap push rod block (42) out of inner slide assembly (7).
(21) Remove two screws (43) and two lockwashers (44) to separate centering rail (45) from Inner slide assembly (7). Discard lockwashers.
(22) Remove grease fittings (46) from front roller bolts (27) and rear roller bolts (33).

b. Clean and Inspect.
(1) Clean and inspect all components of surge actuator as prescribed in paragraphs 4-15 and 4-16, and as described below.
(2) Inspect brake lever (10) were it contacts breakaway locks (16) and (17) for signs that emergency brakes have been employed. If lever looks like ii has been used replace leverand both locks.
(3) Inspect S-hooks (8) and chain (9) for damaged or distorted links. Replace if damaged.
(4) Inspect front rollers (31) and rear rollers (39) for wear. Replace if worn.
(5) Check resistance on dampers (40) by pushing in and pulling out on rod end. Replace if dampers are easy to actuate.
(6) Inspect master cylinder assembly (2) for damage to push rod mechanism and to rubber boot. Replace if damage is found.

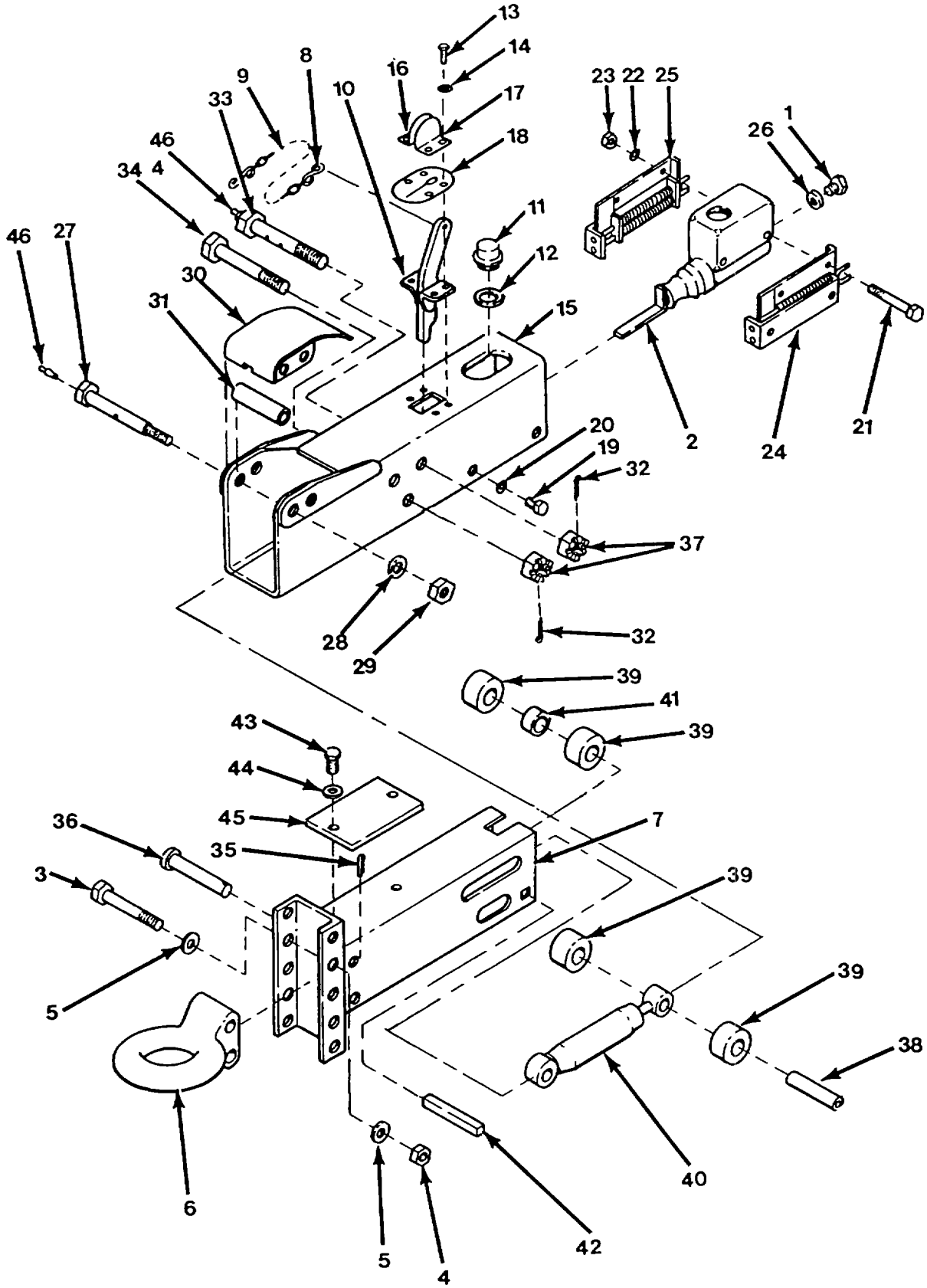


Figure 5-5. Assemble Surge Actuator.

(1) Install grease fittings (46) into front roller bolts (27) and rear roller bolts (33) and fill bolts with grease (Item 11, Appendix D).
(2) Mount centering rail (45) on top of inner slide assembly (7) and secure with two screws (43) and two new lockwashers (44).
(3) Tap push rod block (42) into inner slide assembly (7).
(4) Apply a generous coat of grease (Item 11, Appendix D)onto two front rollers (31), six roller assemblies (39), spacer (41), two spacers (38).
(5) Spread dampers (40) to their maximum length.
(6) Insert bottom set of rear roller assemblies (39) and bottom damper into inner slide assembly (7) and secure in position with spacer (38).
(7) Insert top set of rear roller assemblies (39) and top damper into inner slide assembly (7) and secure in position with spacer (38).
(8) Push rear rollers forward as far as possible and insert tow damper bars (36) to secure front of dampers (39) to inner slide assembly (7).
(9) Install new cotter pins (35) to secure both damper bars (36).
(10) Insert spacer (41) with two rear roller assemblies (39) into rear holes on inner slide assembly (7).
(11) Insert inner slide assembly (7) into outer case (15) and align mounting holes.
(12) Install two rear roller bolts (33), one rear roller bolt (34), ensuring bolt (34) is used in lower mounting hole.
(13) Secure rear roller bolts in place by installing nuts (37) hand tight, then install new cotter pins (32).
(14) Position front cover (30) and two front roller (31) onto top of outer case (15).
(15) Install two front roller bolts (27) with new lockwashers (28), and nuts (29) to secure front cover (30).
(16) Install new gasket (26) onto connector (1) and attach to master cylinder (2).
(17) Mate RH and LH cylinder brackets (24) and (25) to master cylinder (2) and secure with two screws (21), two lockwashers (22) and two nuts (23).
(18) Insert master cylinder (2) into outer case (15) and align mounting holes.
(19) Install four screws (19) and four new lockwashers (22) to secure master cylinder (14) to outer case (1).
(20) Insert brake lever assembly (10) into outer case (15) ensuring that lever is properly engaged with push rod block (41).
(21) Install weather seal (18) onto brake lever assembly (10).
(22) Position LH breakaway lock (16) and RH breakaway lock (17) on top of outer case (15) and secure with four screws (13) and new lockwashers (14).
(23) Install new gasket (12) onto vent cap (11) and thread vent cap (11) onto master cylinder assembly (2).
(24) Crimp S-hook (8) to chain (9) and brake lever assembly (10).
(25) Install lunette eye (6) on inner slide assembly (7), then secure with two screws (3) two nuts (4) and four washers (5).
(26) Bleed brakes in accordance with paragraph 4-47.

CHAPTER 6

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. GENERAL INFORMATION

Repair/test functions are to be performed by a Specialized Repair Activity (SRA). If the SRA in your geographical area does not have the capability or there is no SRA in your geographical area, utilize existing procedures for obtaining the accomplishment of the function.

APPENDIX A

REFERENCES

SCOPE

This appendix lists all Forms, Field Manuals, and Technical Manuals referenced in this manual.

FORMS

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
Product Quality Deficiency Report..... SF-368

FIELD MANUALS

Instructions for Towed Vehicles..... FM 21-305
Lubrication Instructions for Cold Weather..... FM 9-207

TECHNICAL MANUALS

Repair Parts and Special Tools List for Servicing Unit, Compressed Gas, Mobile... TM 5-4220-233-24P
Fording Instructions..... TM 9-238
Tire Repair Instructions..... TM 9-2610-200-24
Destruction of Army Material to Prevent Enemy Use..... TM 750-244-6
Welding Theory and Application..... TM 9-237
Inspection, Care and Maintenance of Anti-friction Bearings..... TM 9-214
Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Material and Related Materials Including Chemicals..... TM 9-247

MISCELLANEOUS

Navy Diving Manual..... 0927-LP-0019010
The Army Maintenance Management System (TAMMS)..... DA PAM 738-750

APPENDIX B
MAINTENANCE ALLOCATION CHART
for
SERVICING UNIT, COMPRESSED GAS, MOBILE

Section I. INTRODUCTION

B-1. GENERAL.

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

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the Identified end Item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels.

c. Section Ill lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS.

Maintenance functions will be limited to and defined as follows.

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

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontamination when required), to replace filter, to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

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

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

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used In precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the Instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of placing, seating, or fixing into position a spare, repair part, or module (component or assembly). In a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and Is shown as the third position of the SMR code.

i. Repair. The application of maintenance services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions to Identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards In appropriate technical publications (i.e., DMWR) Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II.

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be “00." The order of the equipment tasks is consistent with the Logistic Control Number (LCN) sequence.

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed In Column 2. (For a detailed explanation of these functions, refer to paragraph B-2).

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a *work time* figure In the appropriate subcolumn(s), the level of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition undertypical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized In the Maintenance Allocation Chart. The symbol designations for the various maintenance levels are as follows:

C	*Operator or Crew*
O	*Unit Maintenance*
F	*Direct Support Maintenance*
H	*General Support Maintenance*
D	*Depot Maintenance*

e. Column 5, Tools and Equipment. Tools and tool kits are listed in "item" numeric sequence in Section III. Chapters 3 through 6 identify specific tools for each procedure. National Stock Numbers for each item are, also, listed in Section III.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.

a. Column 1, Tool or test Equipment Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National NATO Stock Number. The National or NATO Stock Number (NSN) of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV.

a. Column 1, Reference Code. The code recorded in Column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated In the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART FOR SERVICING UNIT, COMPRESSED GAS, MOBILE

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT	(6) REMARKS
00	SERVICING UNIT, COMPRESSED GAS, MOBILE								
01	BODY ASSEMBLY, SERVICING UNIT	Repair	0.5					1,2,3	
	Cylinder, Breathing Air	Replace	1.0					26	C
		Repair			0.4				C, D
		Test			0.8				C, D
0101	Control Panel Assembly	Repair	0.7					7,10,11,12	C
		Test	0.5					13,14,15,16 17,18,19,20 21,22,23,24 25,26,27,28	
	Manifold Pressure Gauge	Calibrate		0.5				11,13,14,15,	C
		Repair	0.5					16,19,20,22, 23	C
	Servicing Pressure Gauge	Calibrate		0.5				11,13,14,15,	C
		Repair	0.5					16,19,20,22, 23	C
	Pressure Regulator	Test	0.5					7,9,10,14,15,	C
		Replace	0.5					16,20,22,28	
		Repair	1.0					5,6,7,11,12, 14,17,29,30 31,32	C
	Particulate Filter	Service	0.8					8,27	C
		Replace	0.5					8,27 C	
0102	Fill Hose Assembly	Test	0.5					21,23,25	
		Repair	0.5						C

Section II. MAINTENANCE ALLOCATION CHART FOR SERVICING UNIT, COMPRESSED GAS, MOBILE

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT	(6) REMARKS
02	TRAILER, SERVICING UNIT								
0201	Wheel & Tire Assembly	Repair		1.4				1,2,3 B	
0202	Axle Assembly	Repair			5.0			1,2,3,4	
	Hub & Drum Assembly	Service	0.5					1,2,3	
		Replace		1.0				1,2,3,4	
		Repair		1.3	1.5			1,2,3,4	
	Brakedrum	Replace		1.0				1,2,3,4	
		Repair			1.5			1,2,3,4	A
	Brake Assembly	Repair		1.4				1,2,3	
		Adjust		0.2				1	
0203	Brake System								
	Hydraulic Brake System	Service	0.5					1	
	Surge Actuator	Service	0.2						
		Replace		1.5				1,2,3	
		Repair			3.0			1,2,3	
0204	Parking Brake System								
	Handbrake Lever	Adjust	0.2	0.5				1,2,3	
		Replace		1.0				1,2,3	
	Handbrake Cables	Adjust		0.5				1,2,3	
		Replace		1 5				1,2,3	
0205	Electrical System	Repair		0.3				1,2,3	
		Replace		1.5				1,2,3	
0206	Towering And Leveling Equipment	Repair		0.3				1	
	Lunette Eye	Adjust	0.2					1	
		Replace	0.5					1	
0207	Accessory Items	Repair		0.6				1	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Tool or Test Equipment Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
1	O	Tool Kit, General Mechanic's Automotive	5180-00-177-7033	
2	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No 1, Less Power	4910-00-754-0654	
3	O	Shop Equipment, Automotive Maintenance and Repair: Organizational Maintenance, Common No. 2, Less Power	4910-00-754-4650	
4	F	Shop Equipment, Automotive Maintenance and Repair: Field Maintenance, Supplemental No. 1	4910-00-754-0706	
5	O	Crowfoot - 1 - 5/8" (See Section IV, C)	5120-00-181-6747	
6	O	Pick, O-ring(See Section IV, C)	5120-00-224-7446	
7	O	Pliers, Snap Rmg (See Section IV, C)	5120-00-089-0874	
8	O	Pliers, Slip Joint(See Section IV, C)	5120-00-278-0192	
9	O	Rule, Machinists(See Section IV, C	5210-00-234-5223	
10	O	Socket Wrench Handle, 1/4" Drive (See Section IV, C)	5120-00-240-1418	
11	O	Socket Wrench Handle, 3/8" Dnve (See Section IV, C)	5120-00-240-5396	
12	O	Socket Wrench Handle, 1/2" Drive (See Section IV, C)	5120-00-221-7958	
13	O	6" extension (See Section IV, C)	5120-00-243-7325	
14	O	Screwdriver, Flat Tip, 1/32" Wide Tip (See Section IV, C)	5120-00-293-3311	
15	O	Screwdriver, Cross Tip (See Section IV, C)	5120-00-714-7400	
16	O	Socket, 7/16"(See Section IV, C)	5120-00-935-7411	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Tool or Test Equipment Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
17	O	Socket, 1/2", 3/8" Drive (See Section IV, C)	5120-00-237-0977	
18	O	Wrench, 3/8"(See Section IV, C)	5120-00-228-9504	
19	O	Wrench, 7/16"(See Section IV, C)	5120-00-228-9505	
20	O	Wrench, 9/16"(See Section IV, C)	5120-00-228-9507	
21	O	Wrench, 5/8"(See Section IV, C)	5120-00-228-9508	
22	O	Wrench, 11/16"(See Section IV, C)	5120-00-228-9509	
23	O	Wrench, 3/4"(See Section IV, C)	5120-00-228-9510	
24	O	Wrench, 7/8"(See Section IV, C)	5120-00-228-9512	
25	O	Wrench,1"(See Section IV, C)	5120-00-228-9514	
26	O	Wrench, 1-1/16" (See Section IV, C)	5120-00-228-9515	
27	O	Wrench, 1-1/8"(See Section IV, C)	5120-00-228-9516	
28	O	Wrench, Hex 3/16") (See Section IV, C)	5120-00-198-5410	
29	O	Wrench, Torque 0-150 in/lbs) (See Section IV, C	5120-00-542-4489	
30	O	Wrench, Torque 0-50 ft/lbs (See Section IV, C)	5120-00-802-9436	
31	O	Pliers, Soft Curved Medium (See Section IV, C)	5120-00-624-8065	
32	O	Wrench, Hex 1/8" (See Section IV, C)	5120-00-240-5292	

Section IV. REMARKS

(1) Reference Code	(2) Remarks
A	Brakedrum repair is limited to refacing braking surface using-a brakedrum lathe.
B	Refer to TM 9-2610-200-24 for tire and tube repair.
C	Requires use of tools specifically designated for breathing air components only. Clean tools with detergent or alcohol solvent to remove grease or dirt. Do not use tools from the trailer tool box to perform maintenance. Refer to paragraph 4-65.
D	Repair/test function are to be performed by a Specialized Repair Activity (SRA). If the SRA in your geographical area does not have the capability or there is no SRA in your geographical area, utilize existing procedures for obtaining the accomplishment of the function.

APPENDIX C
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS
Section I. Introduction

C-1. Scope.

This appendix lists basic issue items for the Servicing Unit to help you inventory the items for safe and efficient operation of the equipment. There are no Components of End Item (COEI) identified for this system.

C-2. General.

The Basic Issue Items (BII) List is contained in Section III of this appendix. These essential items are required to place the Servicing Unit in operation, operate it, and to do emergency repairs. Although shipped separately, BII must be with the Servicing 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.

C-3. Explanation of Columns.

Column (1), Item Number, gives the number assigned to the entry in the listing for referencing, when required.
Column (2), National Stock Number, identifies the stock number of the item to be used for requisitioning purposes.
Column (3), Description, CAGEC and Part Number, identities the Federal item name, followed by a minimum description. The last line below the description is the Commercial Government Entity Code (CAGEC) and the part number.
Column (4), U/I (unit of issue), indicates how the item is issued for the National Stock Number shown in column two.
Column (5), Qty Rqd, indicates the quantity required.

Section II. Components of End Item

There are no Components of End Item for this system.

Section III. BASIC ISSUE ITEMS

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC and Part Number	(4) U/I	(5) QTY rqr
1		Operator's, Unit, Direct Support and General Support Maintenance Manual for Servicing Unit, Compressed Gas, Mobile (4X630), TM 5-4220-233-14.	1	1
2		Repair Parts and Special Tools List for Servicing Unit, Compressed Gas Mobile (4X630), TM 5-4220-233-24P.	1	1
3	(4X630) 833-02-225	Adaptor	1	1
4	5120-00-287-1283	Screwdriver, Flat Tip 5/16	1	1
5	5120-00-449-8083	Wrench, Adjustable 10" 250mm	1	1
6	5120-00-541-3186	Wrench, Socket 13/16	1	1
7	2540-01-052-6234	Chock, Wheel-Track	1	2

APPENDIX D
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. SCOPE.

This appendix list expendable supplies and materials you will need to operate and maintain the Manifold Service Unit. This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA50-970, Expendable/Durable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

D-2. EXPLANATION OF COLUMNS .

a. Column (1), Item Numbers

This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the materials.

b. Column (2), Level

This column identifies the lowest level of maintenance that requires the listed item.

C	*Operator or Crew*
O	*Organizational Maintenance*
F	*Direct Support Maintenance*
H	*General Support Maintenance*
D	*Depot Maintenance*

c. Column (3), National Stock Number

This is the National Stock Number assigned to the item, use it to request or requisition the item.

d. Column (4), Description

Indicates the Federal item name and if required, a description to identify the item. The last line for each item indicates the Commercial and Government Entity Code (CAGEC) in parentheses followed by the part number.

e. Column (5), Maintenance Category

Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e g, ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPEDABLE AND DURABLE ITEMS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Item Name, Description, CAGE Code, Part Number	(5) Maintenance Category
1	O	6605-00-655-8366	Alcohol: Isoproyl, (1DZ38) 3R190	pt
2	O	8105-00-837-7753	Bag: Plastic, (58536) A-A-1668	ea
3	O	7920-00-018-7052	Brush: Bristle, Nylon (17794) SX)10-18	ea
4	O	5350-00-221-0872	Cloth: Abrasive, 9'x11', Jean Cloth Backing (58536) A-A-1206	ea
5	O	7920-00-165-7195	Cloth: Lint-free (81349) MIL-C-85043	lb
6	O	6850-00-621-1819	Compound: Leak Detection (81349) MIL-L-25567	oz
7	O	7240-00-061-1163	Container: 5 Quart (81348) L-P65SZ2STA	ea
8	O	7930-00-531-9716	Detergent: Non-Ionic (81349) MIL-D-16791	cn
9	O	6640-00-264-8323	Beaker, Laboratory, Box of 8, 800 ml capacity (81348) NNNB175	ea
10	C	9150-01-102-9455	Fluid: Brake, Automatic (81349) MIL-B-46176	gl
11	C	9150-00-190-0904	Grease: Automotive (98308) MIL-C-10925	lb
12	C	9150-00-226-1409	Oil: Lubricating (81349) MIL-L-2015	qt
13	C	7920-00-205-3570	Rag: Wiping (80244) A-A-2522 GRA/WHIT	ea
14	O	8030-01-014-5869	Sealant: Silicone (81349) MIL-S-46163 TY26R	tu
15	O	6850-00-664-5685	Solvent: Dry Cleaning (81348) A-A-711 TY1	cn
16	O	8030-00-889-3534	Tape: Antiseizing (81349) MIL-L-27730	rl
17	O	6810-00-141-6078	Trisodium Phosphate (81348) 0-S-642	lb
18	O	8010-00-180-6345	Varnish: Electrical (81349) MIL-V-173	cn

APPENDIX E

ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I. Introduction

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at organizational, direct support, and general support maintenance.

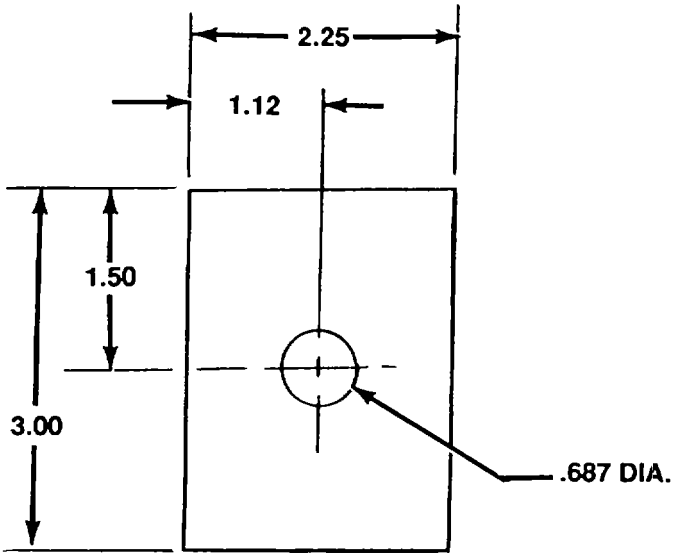
A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

Section II. Manufactured Items Part Number Index

Figure Number	Part Number	Nomenclature
1	833-00-200	Gasket, Insulating, Body Mount
2	833-01-200	Gasket, Insulating, Tool Box
3	867-8513-2	Loom, Protective
4	833-02-205	Strip, Vibration Eliminator
5	833-02-209-1	Pin, Hinge, 1/4" Dia Brass
6	833-02-204	Gasket, Handle
7	833-02-212	Cushion, Cylinder Hold-Down

Section III. Manufactured Items Illustrations



833-00-200

MATERIALS:

EPDM RUBBER ASTM D-2000

0.06 THICKNESS

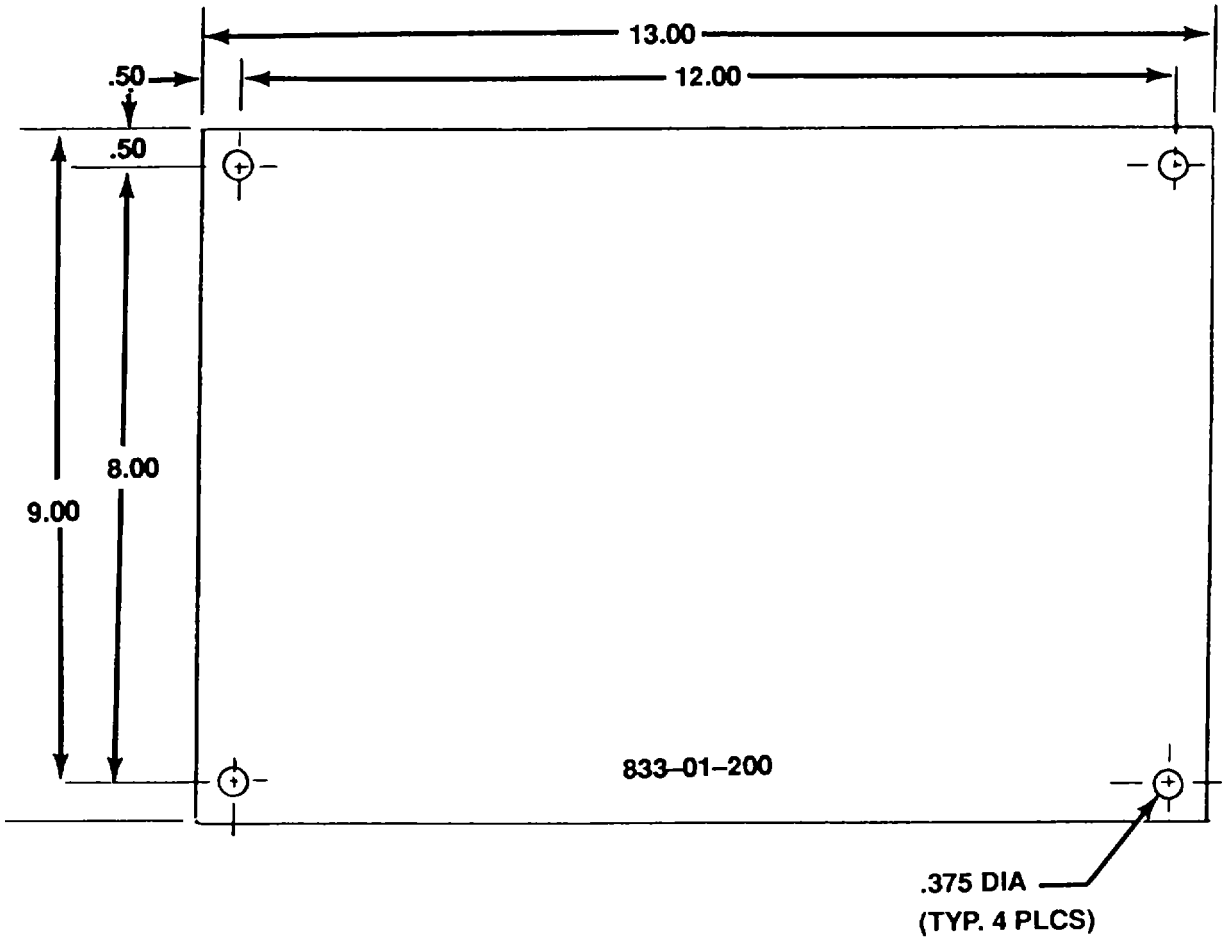
NOTES:

1. DIMENSIONS SHOWN ARE IN INCHES.

2. TOLERANCES ARE AS FOLLOWS:

DECIMALS	ANGLES
.XX ± .02	±0 30

Figure E-1.



MATERIALS:

EPDM RUBBER ASTM D-2000

0.06 THICKNESS

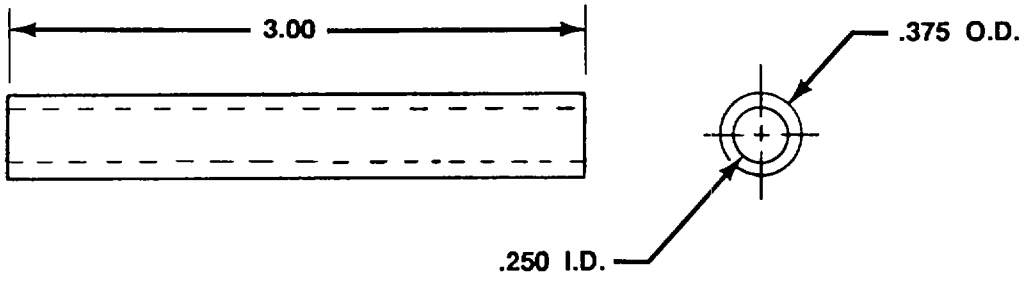
NOTES:

1. DIMENSIONS SHOWN ARE IN INCHES.

2. TOLERANCES ARE AS FOLLOWS:

DECIMALS	ANGLES
.XX ± .02	± 0-30'

Figure E-2.



867-8513-2

MATERIALS:

MAKE FROM GSX500 ASPHALT LOOM TUBE

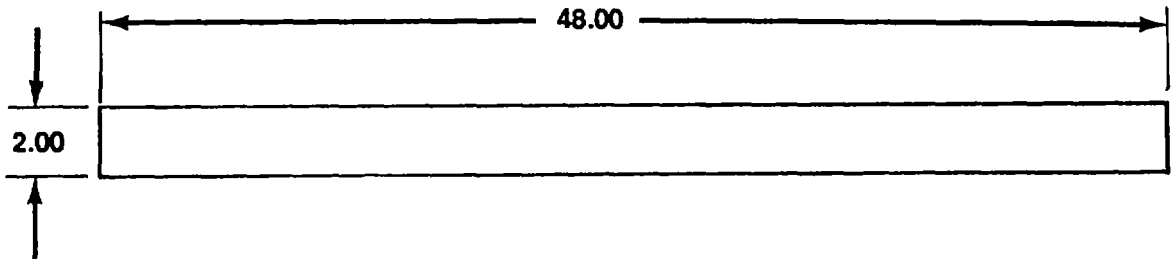
MIL-C-20079, TYPE I, CLASS 10
NOTES:

1. DIMENSIONS SHOWN ARE IN INCHES.

2. TOLERANCES ARE AS FOLLOWS:

DECIMALS	ANGLES
.XX ± .02	±0-30’

Figure E-3.



833-02-205

MATERIALS:

ULTRA-HIGH MOLECULAR WEIGHT

POLYETHELENE (UHMV)

TEMP. RANGE -300 F TO +180° F

COLOR - BLACK

ASTM-D-4020

.125 THICKNESS
NOTES:

1. DIMENSIONS SHOWN ARE IN INCHES.

2. TOLERANCES ARE AS FOLLOWS:

DECIMALS	ANGLES
.XX ± .02	±0-30'

Figure E-4.

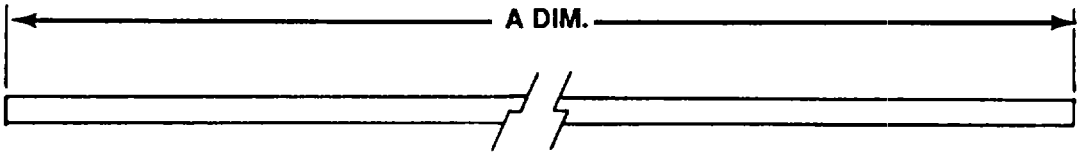


TABLE A	
DASH NO.	DIM "A"
-1	25.12
-2	17.12

MATERIALS:

.250 DIA. BRASS BAR STOCK

QQ-B-626

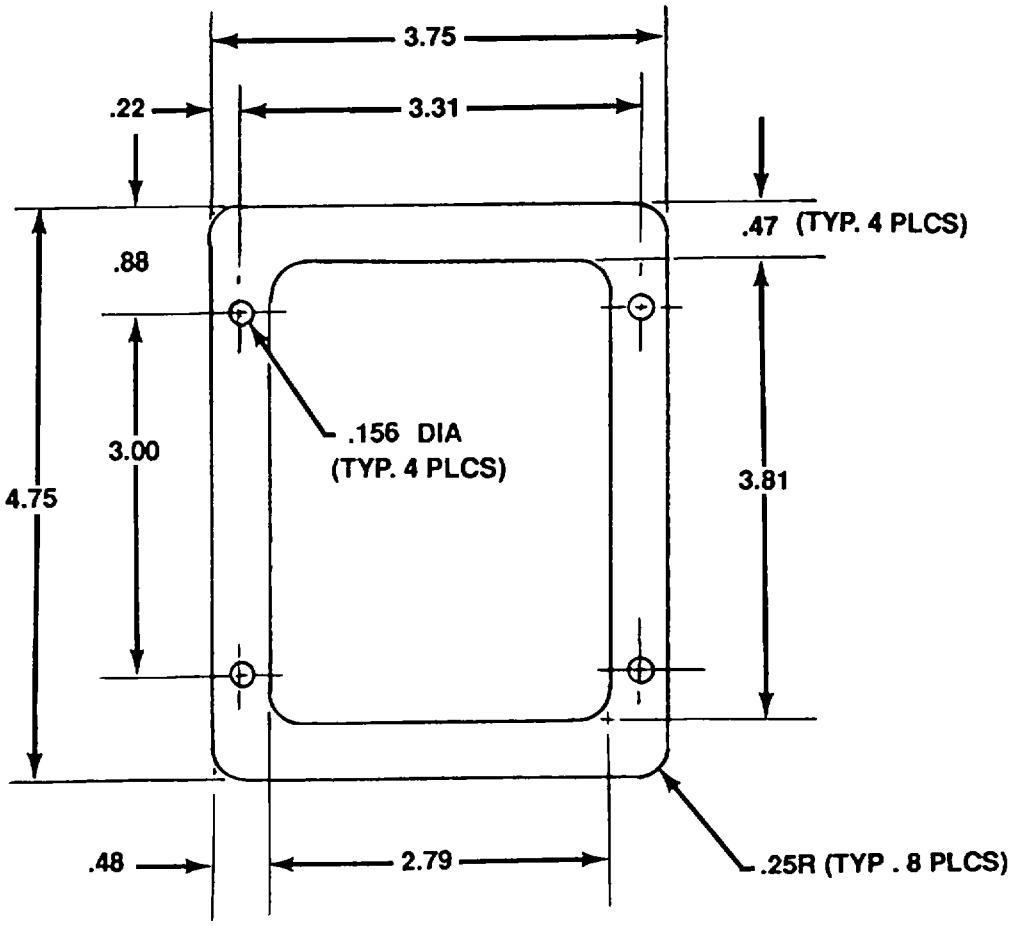
CUT TO LENGTH AS PER TABLE "A"
NOTES:

1. DIMENSIONS SHOWN ARE IN INCHES.

2. TOLERANCES ARE AS FOLLOWS:

DECIMALS	ANGLES
.XX ± .02	± -30'

Figure E-5.



833–02–204

MATERIALS:

EPDM RUBBER ASTM D-2000

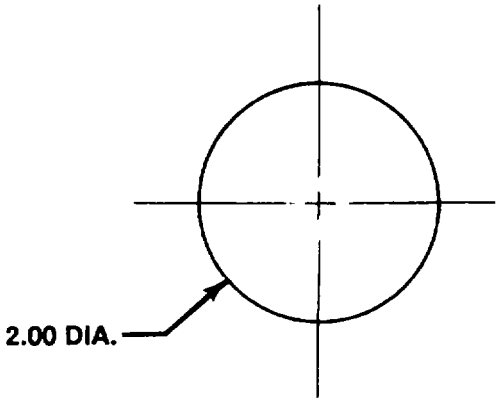
0.06 THICKNESS
NOTES:

1. DIMENSIONS SHOWN ARE IN INCHES.

2. TOLERANCES ARE AS FOLLOWS:

DECIMALS	ANGLES
.XX ± .02	± 0-30’

Figure E-6.



833–02–212

MATERIALS:
NEOPRENE RUBBER .50 THICKNESS
ASTM- D-2000-86E
TYPE BC, MIL-R-3065
NOTES:

1. DIMENSIONS SHOWN ARE IN INCHES.

2. TOLERANCES ARE AS FOLLOWS:

DECIMALS	ANGLES
.XX ± .02	± 0-30'

Figure E-7.

APPENDIX F

TORQUE LIMITS

NOTE

When torquing a fastener, select a wrench whose range fits the required torque value. A torque wrench is most accurate from 25% to 75% of its stated range. A wrench with a stated range of 0 to 100 will be most effective from 25 to 75 foot pounds. The accuracy of the reading will decrease as you approach the 0 or the 100 mark.

Surge Actuator Bolts - Torque to 95 ft/lbs (13.1 kgm).

Body to Trailer Assembly Bolts - Torque to 95 ft/lbs. (13.1 kgm).

Wheel Assembly Studs - Torque to 55-60 ft/lbs (7.6 - 8.3 kgm).

Lunette Eye Adjustment Bolts - Torque to 75 ft/lbs (10.4 kgm).

Axle U Bolts - Torque to 95 ft/lbs (13.1 kgm).

Shock Absorber Bolts - Torque to 75 ft/lbs (10.4 kgm).

INDEX

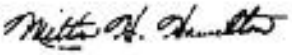
INDEX

INDEX

INDEX

By Order of the Secretary of the Army:

GORDON R SULLIVAN
General, United States Army
Chief of Staff

Official: 

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
07377

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25-E, block no. 6240, requirements for TM 5-4220-233-14.

★ U S GOVERNMENT PRINTING OFFICE 1994 555-121/00030

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 PUBLICATION

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS

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

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

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

TEAR ALONG PERFORATED LINE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

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 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .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

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
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 temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 073191-000