TECHNICAL MANUAL

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

TRAILER MOUNTED TYPE I

MANIFOLD SERVICING UNIT

(NSN 4220-01-005-0704) AND

TRAILER MOUNTED TYPE II

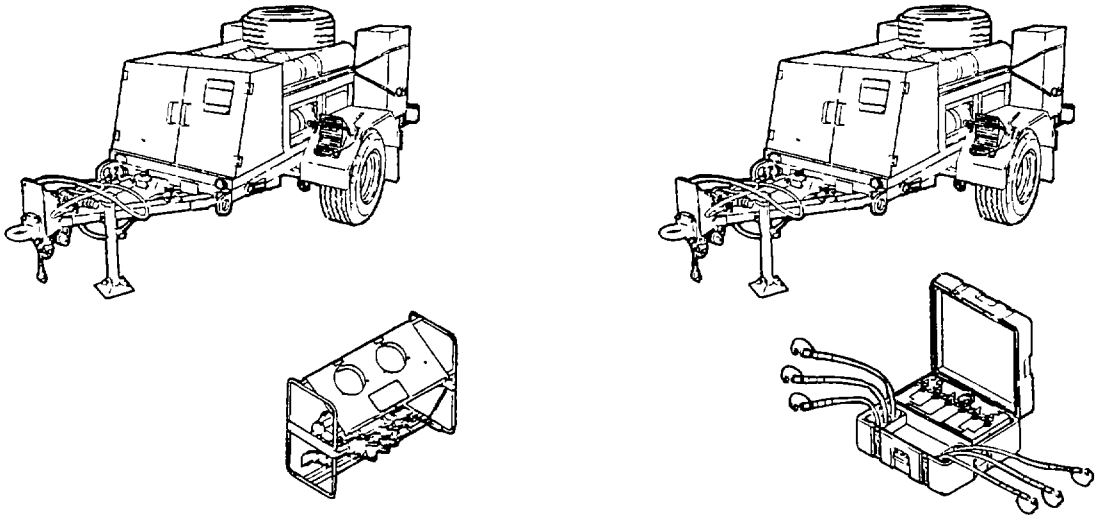
MANIFOLD SERVICING UNIT

(NSN 4220-01-005-3276) AND

OXYGEN BOOSTER PUMP

(NSN 3655-01-042-3633)

CHARGING STATION



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HEADQUARTERS, DEPARTMENT OF THE ARMY

12 AUGUST 1992

WARNING

Dry cleaning solvent, PD-680 used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame or excessive heat Wear eye protection and protective clothing. Flash point of solvent is 100°F-138°F (38°C-60°C).

WARNING

The breathing air hose connections should be thoroughly inspected prior to servicing and any trace of oil, grease, or foreign material carefully removed. Use only those air hoses supplied and designed for this equipment. All air system openings, hoses, fittings, etc, must be taped shut or double bagged with polyurethane to prevent contamination from foreign materials.

Permit only qualified personnel to use this equipment. Complete familiarity is a basic prerequisite to safe operation techniques. The operator must always be in attendance when the equipment Is in use.

WARNING

Wear faceshield and clear immediate area of personnel when using low pressure air for maintenance procedures.

WARNING

Repair or replace worn or damaged parts Immediately with authorized parts. Failure of a component during equipment usage could result in injury or death to the operator.

WARNING

Do not attempt to disassemble diving system components while pressurized. Failure to observe this warning may result in injury or death to personnel.

WARNING

Cleanliness is imperative in maintaining and handling diving air system components, All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted. Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

WARNING

Do not work on trailer mounted equipment unless the trailer is properly stabilized. The trailer could shift or fall resulting in injury or death to personnel.

WARNING

Do not use trichloroethylene or methyl chloroform in cleaning operations associated with any diving system. Use of either chemical, or similar contaminates, can result in death when operator's/divers are exposed to these contaminates under pressure. The contaminates are not water soluble. If contamination or suspected contamination occurs, immediately discontinue all equipment/diving operations and notify the Army diving safety office, AUTOVON 927-1329/Commercial (804) 878-1329. The only acceptable cleaning agents are tribasic sodium phosphate (tsp) and nonionic soaps.

WARNING

If in doubt about the serviceability of part, repair or replace it immediately. Use only approved replacement parts. Failure of a component part during a dive may result in injury or death

WARNING

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death.

NOTE

This manual is not intended to dictate safe diving operation or procedures. Diving supervisors are ultimately responsible for conducting safe diving operations in accordance with FM 20-11, Military Diving Manual and all other applicable military diving safety and operational references

WARNING

Trisodium Phosphate (TSP) is severely irritating to body tissues and must be handled with extreme care. It is most harmful if swallowed or inhaled, but may also cause chemical burns to skin. Avoid breathing dust and avoid contact with skin or eyes. Use with adequate ventilation. Wear eye protection, rubber or vinyl gloves, and protective clothing. Wash skin thoroughly if contact occurs. Keep in tightly closed container.

TECHNICAL MANUAL

NO. 5-4220-228-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C, 12 AUGUST 1992

Operator, Unit, Direct Support, and General Support Maintenance Manual for TRAILER MOUNTED TYPE I MANIFOLD SERVICING UNIT (NSN 4220-01-005-0704) AND TRAILER MOUNTED TYPE II MANIFOLD SERVICING UNIT (NSN 4220-01-005-3276) AND OXYGEN BOOSTER PUMP (NSN 3655-01-042-3633) CHARGING STATION

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

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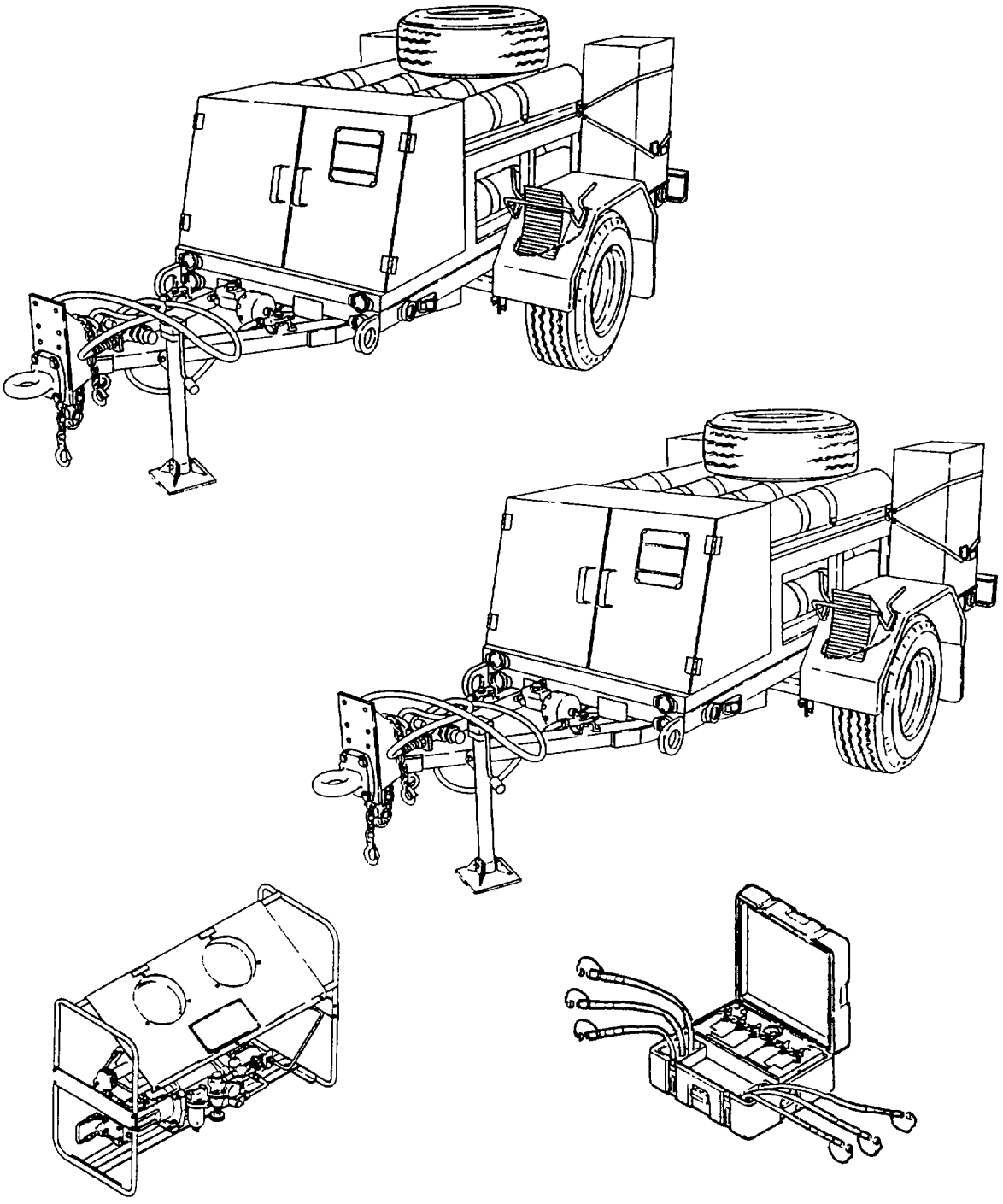

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Figure 1-1 Type I and Type II Manifold Servicing Units, Oxygen Booster Pump, and Oxygen Charging Station.

CHAPTER 1
INTRODUCTION

OVERVIEW

This chapter contains general information pertaining to Type I and Type II Manifold Servicing Units, Oxygen Booster Pump and Oxygen Charging Station, and their components

Section I. GENERAL INFORMATION

1-1 **Scope**. This manual contains Operator's, Unit, Direct Support and General Support maintenance for the Trailer Mounted Type I Air Manifold Service Unit, Type II Air/Oxygen Manifold Service Unit, Oxygen Booster Pump, and Oxygen Charging Station. The purpose of this equipment is to support Self Contained Underwater Breathing Apparatus (SCUBA) and Underwater Breathing Apparatus (UBA), and closed-circuit Oxygen Diving Operations. The Type I Air Manifold Service Unit provides air and is used only with SCUBA Diving, while the Type II Air/Oxygen Manifold Service Unit provides air and oxygen to support SCUBA and/or UBA closed-circuit diving operations.

1-2 **Maintenance Forms and Records**. Department of the Army forms and procedures used for equipment maintenance will be those prescribed in DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3 **Destruction of Army Materiel to Prevent Enemy Use**. Refer to TM 750-244-1-2 Destruction of Army Materiel to Prevent Enemy Use and TM 750-244-3 Destruction of Army Materiel to Prevent Enemy Use for instructions covering the Destruction of Army Materiel to Prevent Enemy Use.

1-4 **Preparation for Storage or Shipment**. Refer to Chapter 4, Section VI, and TM 38-230 for procedures to place the equipment into storage and prepare equipment for shipment.

1-5. **Reporting Equipment Improvement Recommendations (EIR's)**. If your Trailer Mounted Type I Air Manifold Service Unit, Trailer Mounted Type II Air/Oxygen Manifold Service Unit, Oxygen Booster Pump, or Oxygen Charging Station 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 Troop Support Command, ATTN: AMSTR-MOF, 4300 Goodfellow Boulevard, St. Louis, Missouri 63120-1798.
We will send you a reply

1-6. **List of Abbreviations.**

FSW	feet of sea water
NEDU	Navy Experimental Diving Unit
PSI	pounds per square inch
SCFM	standard cubic feet per minute
TFE	Teflon
TSP	trisodium phosphate

Section II. EQUIPMENT DESCRIPTION AND DATA

1-7. **Equipment Characteristics, Capabilities, and Features**. The Type I and Type II Manifold Servicing Units are mounted on a CT-1 Commercial 3/4 ton, 2-wheel chassis trailer and are used to transfer gas, from eight high pressure supply cylinders for up to four SCUBA cylinders at the same time The Oxygen Booster Pump enables transfer of oxygen from a partially oxygen filled cylinder to top-off a high pressure oxygen cylinder The Oxygen Charging Station allows the refilling of up to six SCUBA and/or UBA oxygen cylinders from a single oxygen cylinder

1-8. **Location and Description of Major Components.**

a. Type I and Type II Manifold Servicing Units. (figure 1-2)

HOUSING GROUP (1). The housing group consists of a hinged top cover, side covers, left and right hinged doors, an undershield and a tool box The housing components are attached to the welded frame and provides protection for the control panel group and cylinder valves

COMPRESSED GAS CYLINDERS (2) These cylinders are used to either store breathable air on the Type I Air Manifold Servicing Unit, or a combination of breathable air and oxygen on the Type II Air/Oxygen Manifold Servicing Unit.

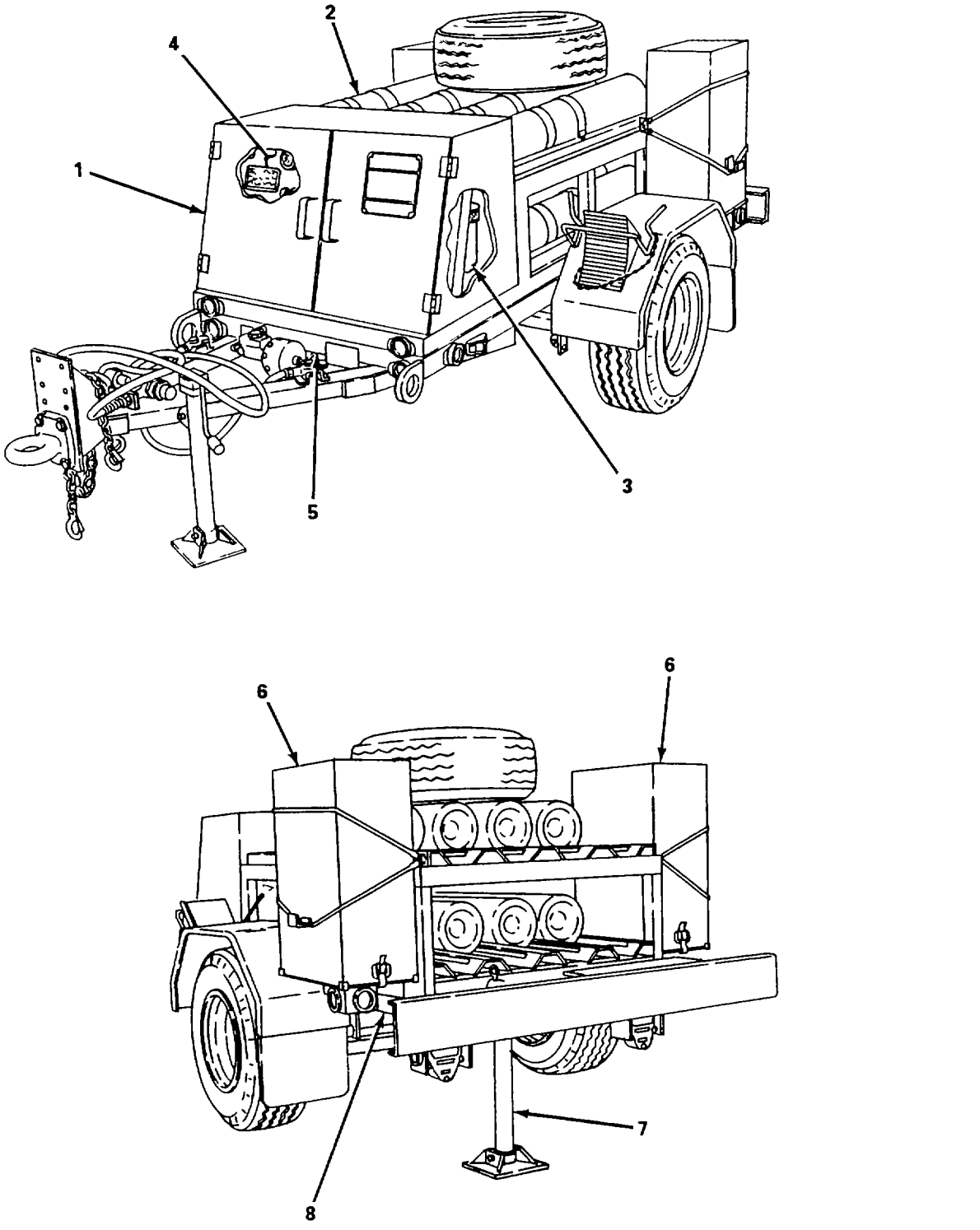

Figure 1-2. Type I and Type II Manifold Servicing Units Major Components.

AIR PURIFICATION CYLINDER (3). The purification cylinders are located within the Housing Group for the Type I Air and Type II Air/Oxygen Manifold Servicing Units. The purification cylinders provide final filtering of the air and oxygen before entering the SCUBA cylinders. Access to the purification cylinders is through the hinged top cover of the Housing Group.

CONTROL PANEL ASSEMBLIES (4). The control panel is located behind the doors of the Housing Group. There are two control panels, one for the Type I Air Manifold Servicing Unit and one for the Type II Air/Oxygen Manifold Servicing Unit Each control panel Is configured to allow charging of one to four SCUBA cylinders. The control panels are attached to the welded frame assembly.

WELDED FRAME ASSEMBLY (5) The welded frame provides the mounting base for all the components of the Manifold Servicing Unit, Type I or Type II.

SERVICE TROUGHS (6) Used to cool compressed gas cylinders being charged

STABILIZING JACKS (7) Used to level and steady manifold servicing units during operation.

b. Oxygen Booster Pump. (figure 1-3)

GAUGES, OXYGEN (1). Right hand gauge displays the input oxygen pressure, scaled 0-3500 psi. Left hand gauge displays the output oxygen pressure, scaled 0-6000 psi.

PILOT AIR SWITCH (2). Senses input oxygen pressure. When the input pressure drops to 150 psi, the switch closes shutting out the air drive supply to the pilot air valve (switch) stopping the pump.

FILTER (INPUT/OUTPUT) (3). Five micron particle filters located at the input and output oxygen connections to filter the oxygen.

GAS BARREL W/CHECK VALVES (4). One barrel on either side of the air pump provides two levels of compression. Gas is drawn in on one barrel while compressed gas Is expelled out the second barrel. Each barrel has a set of check valves used to direct gas flow.

AIR DRIVE ASSEMBLY (5). Consists of a low pressure (150 psi max) input connection, water separator, air pressure regulator w/pressure gauge and control (speed) valve used to drive the air pump which in turn drives the balanced opposed gas barrels.

RESULT REGULATOR (6). Regulates the oxygen pressure to which the output oxygen cylinder is to be charged. When the desired pressure is reached the air drive to the air pump is shut off stopping the pump.

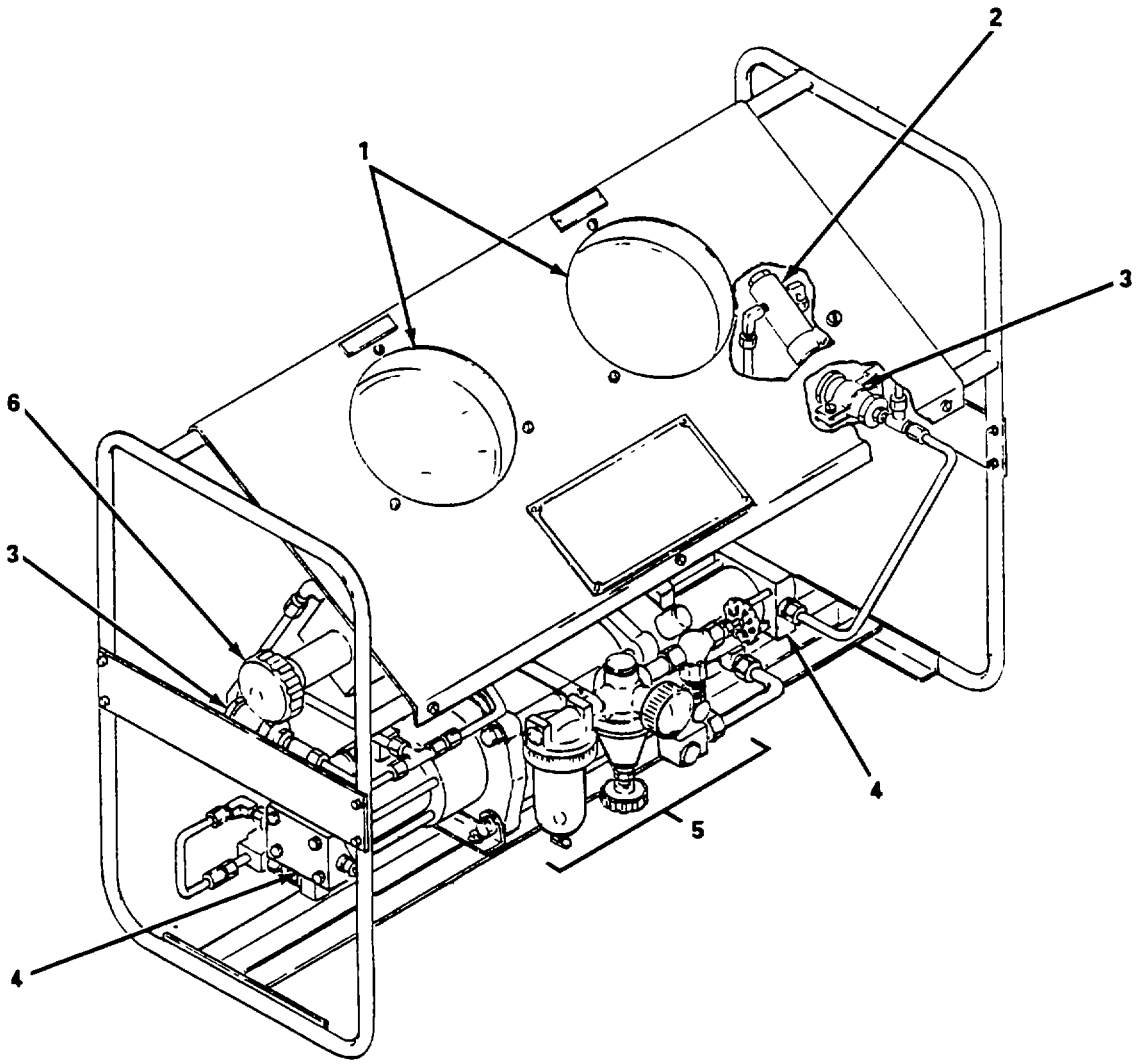

Figure 1-3. Oxygen Booster Pump Major Components.

c. Oxygen Charging Station. (figure 1-4)

VENT VALVE (1). Allows the charging station to be vented of high pressure oxygen.

PRESSURE GAGE. (2) Indicates the pressure of the connected UBA cylinders.

CONTROL VALVES (3). Six color coded valves used to turn on and off the flow of oxygen to associated charging whips.

CHARGING WHIPS (4). Six color coded, 48 in (1219 mm) whips with connectors to mate with SCUBA and/or UBA oxygen cylinders

CHARGING WHIP (5) Used to connect external oxygen supply to oxygen charging station.

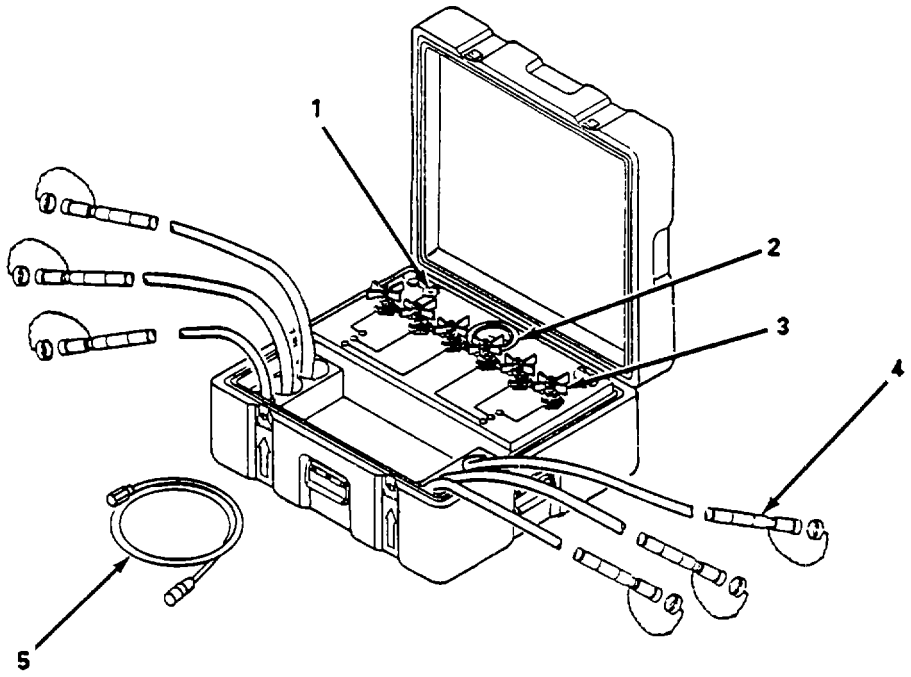

Figure 1-4. Oxygen Charging Station Major Components.

1-9. **Difference Between Models**. The Type I Air Manifold Service Unit has a single control panel to transfer breathable air from eight storage cylinders to one of four SCUBA cylinders. The Type II Air/Oxygen Manifold Servicing Unit has a spilt control panel to transfer breathable air and oxygen from eight storage cylinders (four for air and four for oxygen) to four outlet connections (two for air and two for oxygen).

1-10. Equipment Data.

a. Manifold Servicing Units.

Type I (Air)	Military Specification MIL-S-52881 (ME)
Type II (Air/Oxygen)	Military Specification MIL-S-52881 (ME)
Operating Temperature Range	-25° to 1 20°F (-32° to 48°C)
Mounting	Welded, Frame, Mechanically Fastened to CT-1 Trailer
Length	157 in. (3987 mm)
Width	73 in.(1854 mm)
Height	66 in. (1676 mm)
Volume	405 cu. Ft. (11.46 m^3)
Shipping Weight (dry) .	3280 lbs (1478 Kg)
Highway Speed	55 mph
OFF Road Speed	15 mph
Cylinder, Compressed Gas, Air, ICC 3AA, 3500 psi (Type I	Military Specification RR-C-901
Cylinder, Compressed Gas, Oxygen, DOT 3AA, 2265 psi (Type II)	Military Specification RR-C-901
Trailer, CT-1 Commercial (Government Furnished)	MS 53028

b. Oxygen Booster Pump.

Booster Pump	Air Driven, balanced opposed Piston Type, Two Stage.
High Pressure Sections, Tubing and Fittings	Stainless steel, 5000 psi maximum oxygen working pressure
Filters	Inlet and outlet gas 5 microns, all stainless steel.
Gauges	Stainless steel tube, solid front 4-1/2 inch dial size.

Port Size ..... Inlet and outlet gas 1/4 NPT female; air drive 1/2 inch NPT female.

Control Range ..... Inlet minimum: 150 to 850 psi cutout
Out maximum: 800 to 5000 psi cutout
Safety Relief (outlet): 800 to 5000 psi

Noise ..... 80 db range pulses depending on working pressure. (Measured at 30 inches from Booster.)

Length ..... 32 inches

Width ..... 14 inches

Height ..... 24 inches

Weight ..... 115 pounds

c. Oxygen Charging Station.

Length ..... 25 in (635 mm)

Width ..... 19 in (483 mm)

Height ..... 14 5 in (368 mm)

Weight ..... 70 lbs (31 8 Kg)

Working Pressure ..... 4500 psi (31028 Kpa)

Pressure Gage ..... 0-10000 psi (0-700 bar)

Charging Whips

Length ..... 48 in (1219 mm)

Working Pressure ..... 6000 psi (423 bar)

Supply Whip

Length ..... 120 in. (3048 mm)

Working Pressure ..... 6000 psi (423 bar)

1-11. **Safety, Care, and Handling**. When operating or doing maintenance on the Type I Manifold Servicing Unit, Type II Manifold Servicing Unit, or the Oxygen Booster Pump, take all necessary precautions to ensure the safety of others as well as yourself. Avoid careless operating or maintenance habits which cause accidents to personnel and damage to the equipment. Observe all WARNINGS, CAUTIONS, and NOTES in this manual. This equipment can be extremely dangerous if these instructions are not followed. When working with

compressed gas cylinder, be extremely careful. The enormous amount of potential energy in the cylinder can cause serious injury and death to personnel and destruction of equipment. When working on oxygen systems, be extremely careful. The oxygen systems must be kept as clean as possible. The slightest bit of contamination could cause serious injury or death to the divers, and damage to the equipment. Use only approved cleaning agents on air and oxygen systems.

Section III. PRINCIPLES OF OPERATION

1-12. **Theory of Operation**. The following describes the theory of operation of the Type I and Type II Manifold Servicing Units, the Booster Pump System, and the Charging Station.

a. Type I and Type II Manifold Servicing Units. Each Manifold Servicing Unit contains eight high pressure storage cylinders, front panel control valves, pressure gauges and pressure regulators to control and monitor the transfer of high pressure air and oxygen from the storage cylinders to one to four SCUBA cylinders. The Type I Air Manifold Servicing Unit only provides breathable air. The Type II Air/Oxygen Manifold Servicing Unit has a split control panel and provides breathable air, from four high pressure storage cylinders, and oxygen from the remaining four high pressure oxygen storage cylinders. Each half of the control panel has control valves, pressure gages and pressure regulators to transfer air and oxygen to the SCUBA/UBA cylinders. Operating procedures allow the SCUBA cylinders to be charged by cascading storage cylinders through a manifold, purifier, and regulator to charge the cylinders to the desired pressure. The storage cylinders may be replaced or recharged through a front panel recharge connection and control valve.

b. Oxygen Booster Pump. The oxygen booster pump consists of a large reciprocating air drive piston directly coupled to two small oxygen gas barrel pistons. Each oxygen piston operates in a high pressure oxygen barrel section The oxygen barrel section end caps contain high pressure inlet and outlet check valves. The air drive section includes a cycling spool and pilot valves that provide continuous reciprocating action when the air drive (maximum 150 psi) is supplied to the air drive inlet. Each oxygen high pressure barrel section will draw oxygen into the inlet check valve, compress the oxygen and force the oxygen out the outlet check valve. The outlet check valve is connected to the second oxygen barrel's inlet check valve. With this interconnection, the inlet oxygen supply pressure acts directly through the opposed piston construction to assist the air drive during the compression stroke. The result regulator and pilot air switch determines when the booster pump will stop operation. When the supply (inlet) oxygen cylinder pressure drops to 150 psi the pilot air switch will close stopping the pump. When outlet (receiving) cylinder pressure reaches the desired pressure, that which the result regulator is set, the result regulator will close, stopping the pump.

c. Oxygen Charging Station. The Oxygen Charging Station provides the means of safely transferring high pressure oxygen from an external source (booster pump or cylinder) to any one of six UBA cylinders. A single supply line is connected to a piping manifold which supplies six different charging whips. Six corresponding valves control which charging whip is supplied. The pressure gage indicates pressure in cylinders being charged.

CHAPTER 2
OPERATING INSTRUCTIONS

OVERVIEW

This chapter provides information and procedures required by the operator to operate the Type I and Type II Manifold Servicing Units, Oxygen Booster Pump, and Oxygen Charging Station safely and efficiently.

Section I. DESCRIPTION OF OPERATOR CONTROLS AND INDICATORS

2-1. **General**. This section contains a list of the operator's controls and indicators and a description of their function

2-2. **Type I Manifold Servicing Unit**. (figure 2-1)

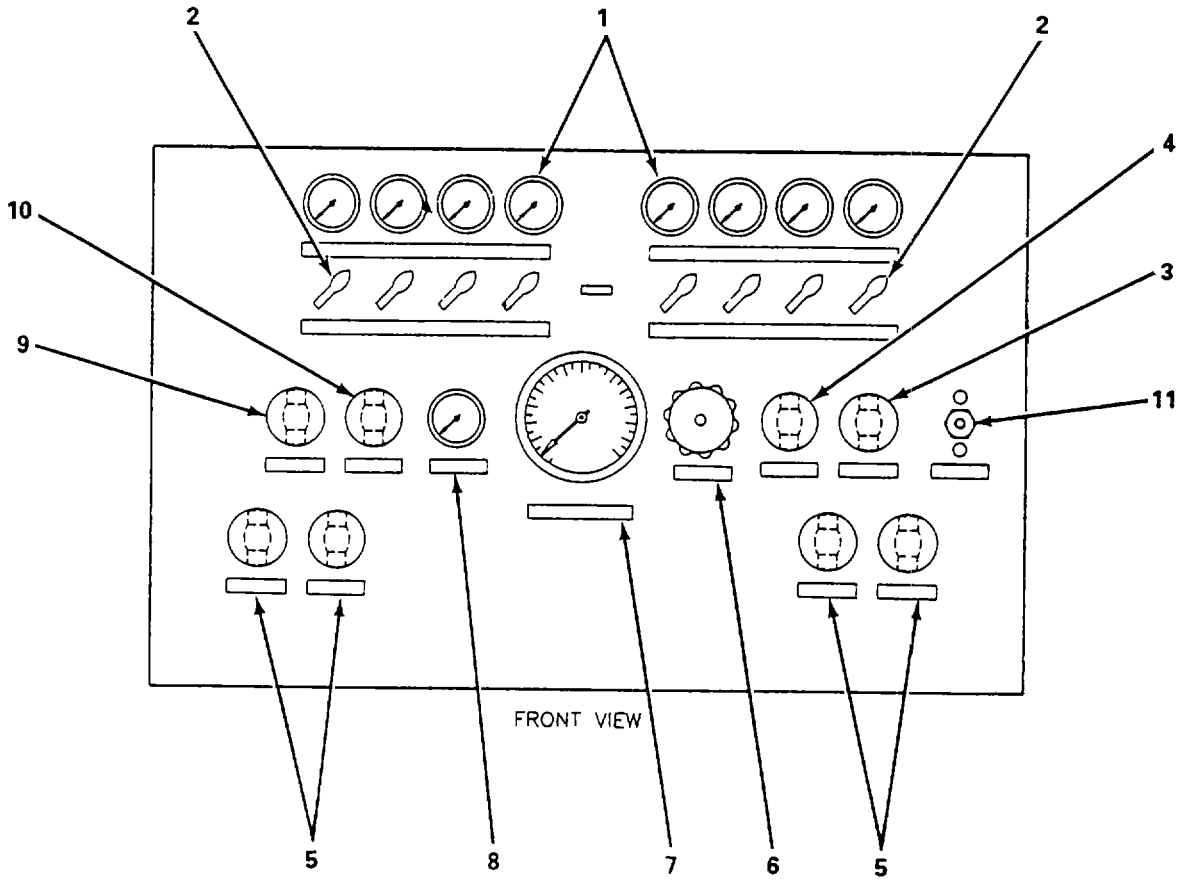

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Figure 2-1. Type I Manifold Servicing Unit Controls and Indicators.

Key	Control or Indicator	Function or Use
1	Cylinder Pressure Gage	Eight front panel pressure gages show the pressure (PSIG) of the eight air cylinders on the manifold servicing unit
2	Control Valve, Quarter-Turn On-Off (Quarter Turn Valve)	Eight front panel valves control the flow of air pressure from the eight air cylinders to the supply manifold
3	Re-charge Valve, Hand (Hand Valve)	Control valve for re-charging of the breathable air cylinders from an external connected high pressure air source Valve is set in the closed position except when the air cylinders are being recharged.
4	Servicing Valve (Hand Valve)	Control valve to open or close the flow of air pressure to the SCUBA Manifold
5	Charging Valves (Hand Valve)	Control valve to one of four connected SCUBA cylinders, opened when charging the cylinders.
6	Pressure Regulator	Control used to set and regulate the air pressure of the air entering the SCUBA cylinders.
7	Gage, Pressure Regulator	Gage shows the pressure level set by the pressure regulator valve.;
8	SCUBA Manifold Pressure Gage	Gage shows the pressure of the air in the manifold that feeds the SCUBA cylinders
9	Manifold Shut-Off Valve (Hand Valve)	The supply manifold shut off valve is used to isolate the supply manifold from the purifier and SCUBA manifold.
10	Bleed-Off Valve (Hand Valve)	The bleed valve Is used when necessary to bleed off sections of the air supply system or the total system.
11	System Recharge Connection	Connection point where external supply cylinder is connected when re-charging cylinders on servicing unit.

2-3. **Type II Manifold Servicing Unit.** (figure 2-2)

NOTE

The Type II front panel is split in half. The right half is used for the oxygen servicing function and the left half is used for the breathable air servicing. The control and indicator descriptions for the two halves are identical.

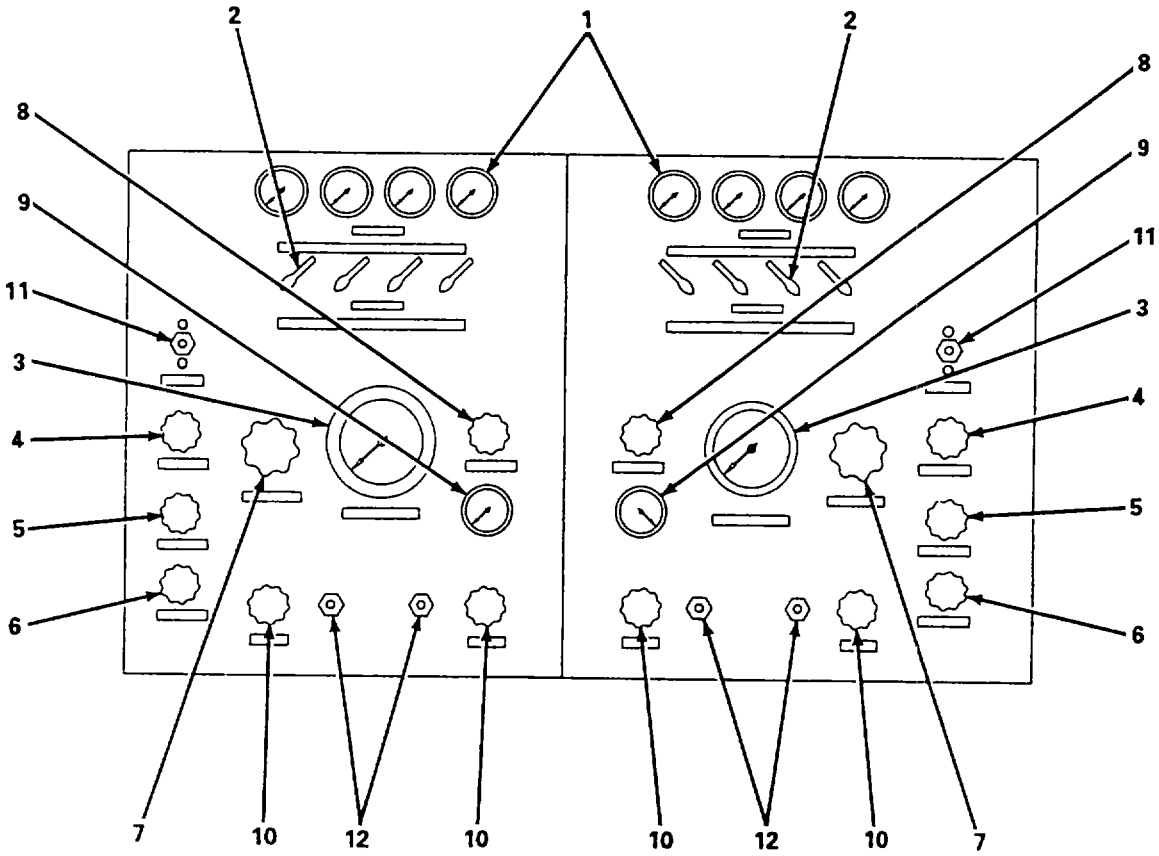


Figure 2-2. Type II Manifold Servicing Unit Controls and Indicators.

Key	Control or Indicator	Function or Use
1	Cylinder Pressure Gage	Four pressure gages show the pressure of each (Air/ Oxygen) cylinder group on the manifold servicing unit.
2	Control Valve, Quarter-Turn On-Off (Quarter-Turn Valve)	Four front panel valves control the flow of air/oxygen from four cylinders to their respective supply manifold.
3	Gage, Pressure Regulator	Gages shows the pressure level set by the pressure regulator valve.
4	Recharging Valves (Hand Valve)	Control valve for recharging the air and/or oxygen cylinders from an external connected high pressure air/ oxygen source Valve is set in the closed position except when the air/oxygen cylinders are being recharged.
5	Manifold Shut-off Valve (Hand Valve)	Control valve that is used to shut off or isolate the supply manifold from the purifier and cylinders.
6	Bleed-off Valve (Hand Valve)	The bleed-off valve is used when necessary to bleed off sections of the air/oxygen supply system, or total system.
7	Pressure Regulator	Control used to regulate the air/oxygen pressure entering the cylinders.
8	Servicing Valve (Hand Valve)	Control valve used to open or close the flow of air/oxygen pressure to the manifold.
9	Manifold Gage	Shows the pressure of the air/oxygen in the manifold that feeds the cylinders.
10	Charging Valve (Hand Valve)	Control valve used to turn on or off the pressure flow to connected cylinders.
11	System Recharge Connection	Connection point where external supply cylinder is connected when recharging cylinders on servicing unit.
12	Charging Valve Connection	Connection point where charging whip Is connected when charging compressed gas cylinders.

2-4. **Oxygen Booster Pump.** (figure 2-3)

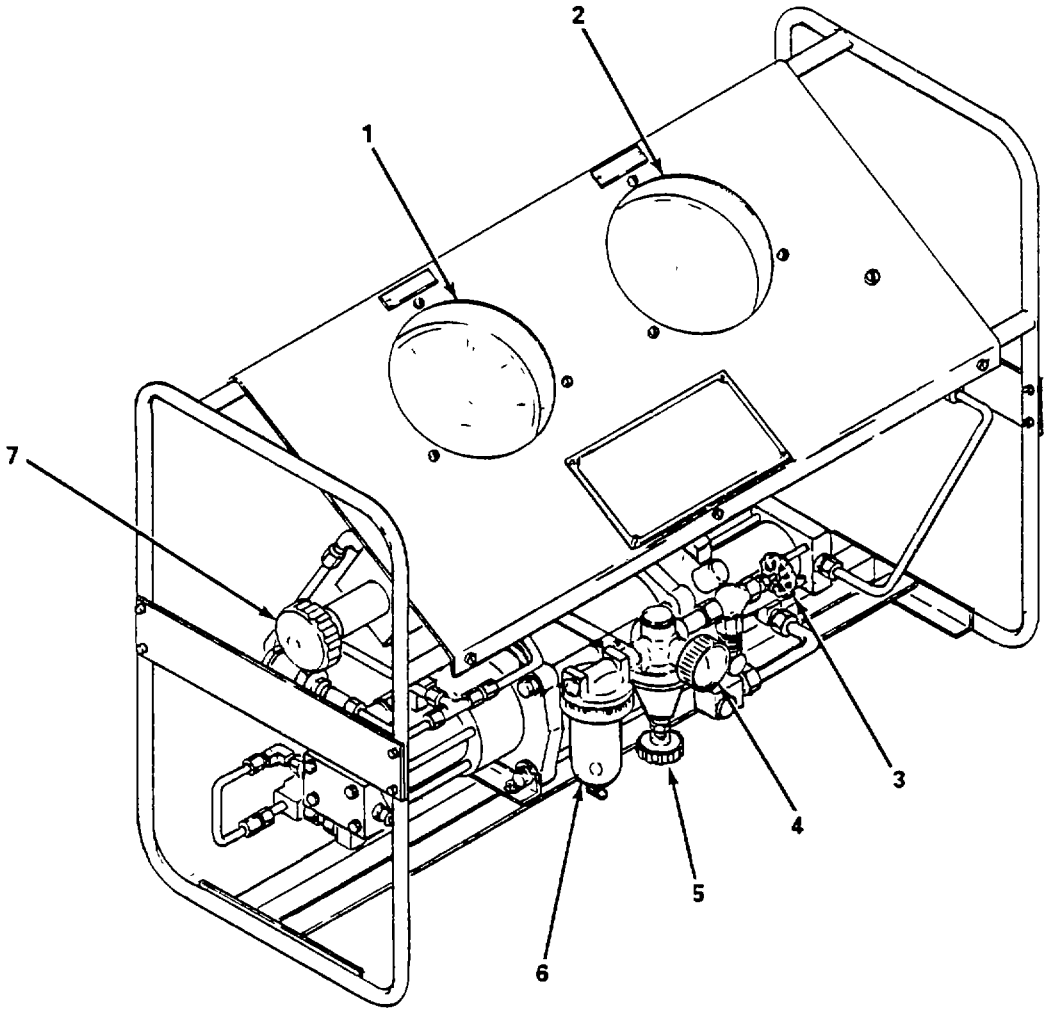


Figure 2-3. Oxygen Booster Pump Controls and Indicators.

Key	Control or Indicator	Function or Use
1	Gage, Outlet (0-6000 PSI)	Gage shows the pressure of the cylinder being charged with oxygen.
2	Gage, Inlet (0-3500 PSI)	Gage shows the pressure of the oxygen being withdrawn from an external cylinder.
3	Control Valve, Air Speed	Valve, hand, used to control the air drive input to the oxygen pump and controls the speed of the pump operation.
4	Gage, Air (0-160 PSI)	The air gage shows the pressure of the air drive set by the air drive regulator.
5	Valve, Regulator Control	Controls the regulator setting of the air drive pressure, maximum setting Is 150 psi.
6	Filter/Water Separator	Water Is extracted and accumulated from the air drive source.
7	Result Regulator	Control adjustment set to desired oxygen pressure of cylinder under charge.

2-5. **Oxygen Charging Station**. (figure 2-4)

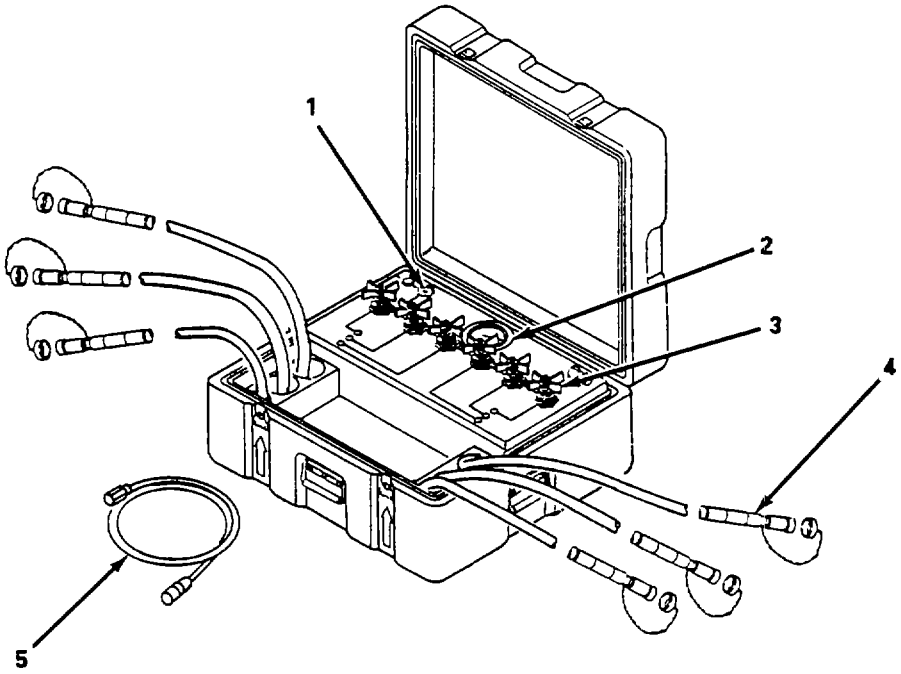


Figure 2-4. Oxygen Charging Station Controls and Indicators.

Key	Control or Indicator	Function or Use
1	Vent Valve	Vents charging station of high pressure oxygen when charging operations are completed.
2	Pressure Gage	Indicates pressure in oxygen tanks being charged.
3	Control Valves	Controls the rate of charge for each cylinder being charged. Color coded to match charging whips.
4	Charging Whips	Used to connect oxygen tanks being charged to charging station.
5	Supply Whip	Connects external oxygen supply to oxygen charging station.

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

2-6. **General**. Operator PMCS are performed to ensure that the Type I and Type II Manifold Servicing Units and Oxygen Booster Pump are ready for operation at all times. Perform the checks and services at the specified intervals

a. *Before you Operate*. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS prior to the equipment leaving its containment area or performing its intended mission.

b. *While you Operate*. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS when the equipment is being used in its intended mission.

c. *After you Operate*. Be sure to perform your after (A) PMCS after the equipment has been taken out of its mission mode or returned to its containment area.

d. *If your Equipment Fails to Operate*. Troubleshoot with proper equipment. Report any deficiencies using the proper forms See DA Pam 738-750.

2-7. **Purpose of PMCS Table**. The purpose of the PMCS table is to provide a systematic method of inspecting and servicing the equipment in this way, small defects can be detected early before they become a major problem causing the equipment to fail to complete its mission. The PMCS table is arranged with the individual PMCS procedures listed in sequence under assigned intervals. The most logical time (before, during, or after operation) to perform each procedure determines the interval to which it is assigned. Make a habit of doing the checks in the same order each time and anything wrong will be seen quickly. See paragraphs 2-8 and 2-9 for an explanation of the columns in table 2-1.

2-8. **Explanation of Columns.** The following is a list of the PMCS table column headings with a description of the information found in each column

a. *Item No.* This column shows the sequence in which the checks and services are to be performed, and is used to identify the equipment area on the Equipment Inspection and Maintenance Worksheet, DA Form 2404.

b. *Interval.* This column shows a dot (•) when each check is to be done.

c. *Item to be Inspected/Procedures.* This column identifies the general area or specific part where the check or service Is to be done, and explains how to do them.

d. *Equipment is Not Ready/Available If.* See paragraph 2-10.

2-9. **Reporting Deficiencies.** If your equipment does not perform as required, refer to Chapter 3 under Troubleshooting for possible problems. Report any malfunctions or failures on DA Form 2404, or refer to DA Pam 738-750.

2-10. **Equipment is Not Ready/Available If Column**. This column lists conditions that make the equipment unavailable for use because it is unable to perform its mission, or because it would represent a safety hazard. Do not accept or operate equipment with a condition in the "Equipment is Not Ready If" column.

NOTE

The terms ready/available and mission capable refer to the same status. Equipment Is on hand and is able to perform its combat mission Refer to DA Pam 738-750.

2-11**. Special Instructions**. Preventive maintenance is not limited to performing the checks and services listed in the PMCS table.

WARNING

Dry cleaning solvent PD-680 used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame or excessive heat. Wear eye protection and protective clothing Flash point of solvent is 100 - 138°F (38 - 60°C)

a. *Keep it clean*. Dirt, grease, oil, and debris get in the way and may cover up a serious problem. Clean as you work and as needed Use dry cleaning solvent on all metal surfaces. Use soap and water to clean rubber or plastic material.

b. *Bolts. Nuts. and Screws.* Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, but look for chipped paint, bare metal, or rust around boltheads. If you find one you think is loose, tighten It, or report It to unit maintenance if you can't tighten it.

c. *Electrical Wires and Cable Connectors* Look for bare wires, and loose or broken connectors Report defects to unit maintenance.

d. *Fluid Lines*. Look for wear, damage, and leaks Make sure clamps and fittings are tight. Wet spots and stains around a fitting or connector can mean a leak if a leak comes from a loose connector, tighten it if something is broken or worn out, report It to unit maintenance.

e. *Leakage Definitions*. It is necessary for you to know how fluid leakage affects the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn and be familiar with them. When in doubt, NOTIFY YOUR SUPERVISOR!

Leakage Definitions

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops
Class II	Leakage of fluid great enough to form drops but not enough to cause drops to drip from Item being checked/inspected.

Class III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

Equipment operation is allowable with minor leakage (Class I or II) of any fluid except fuel. Of course, consideration must be given to the fluid capacity in the Item being checked/inspected. When in doubt, notify your supervisor.

When operating with Class I or II leaks, continue to check fluid level more often than required in the PMCS.

Class III leaks should be reported to your supervisor or unit maintenance.

f. *Painting.* Touch-up equipment as needed Refer to TM 43-0139 for specific painting procedures.

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

NOTE

Within designated intervals, these checks are to be performed in the order listed.

If the equipment must be kept in continuous operation, check and service only those Items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

B - Before D - During A - After W - Weekly

ITEM NO.	INTERVAL				Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					TYPE I OR TYPE II MANIFOLD SERVICING UNITS.	
1	•				Housing Group. Visually Inspect exterior surfaces for damage or missing parts.	
2	•				Service Trough. Inspect interior of trough for rust. Inspect drain valve for damage and proper operation.	Trough is rusted through or drain valve is damaged or inoperable.
					WARNING Under no circumstance will cartridges be inter-changed between the air or oxygen purifier cylinders on the Type II Manifold Servicing Unit. Interchanging of cartridges may cause injury or death.	

Table 2-1 Operator Preventive Maintenance Checks and Services (PMCS) (Cont).

B - Before D - During A - After W - Weekly

ITEM NO.	INTERVAL				Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
					NOTE Actual frequency of cartridge change depends on governing weather conditions at a given time or place, and the conditions of the compressed gas being used.	
3	•				Air/oxygen purifier cartridge. Check operations record to determine previous period of use Have direct support maintenance replace cartridge if previous period of use is more than 8 hours.	Air/oxygen cartridge has more than 8 hours of use on it
4	•				CT-1 trailer lights. Visually inspect lights and lens for damage and proper operation. Notify unit maintenance if lights are damaged or inoperative.	
5	•				Tires inspect tires for unusual tread wear, cuts, or foreign objects. Check tire pressure when tires are cold. Tire pressure should be 35 psi (241 kPa).	One tire or both tires are flat, missing, or Unserviceable.
6	•				Brake lines and fittings. Visually inspect brake lines for cracks or leaks Inspect fittings for tightness and leaks.	Brake lines are cracked or class III brake fluid leak is Present.
7	•				Air brake lines and fittings. Visually inspect lines for cracks or other damage. Inspect fittings for tightness.	Lines are cracked or otherwise damaged, fittings are loose.
8	•				Master cylinder. Check fluid level and replenish as needed.	
9	•				Service air reservoir (para 3-7).	
10	•				Jack assemblies Inspect the lacks for damage, missing items, and proper operation.	Jack is damaged, missing, or inoperative.
11	•				Service control panel (para. 3-6).	
12	•				Control panel gages. Inspect gages for damage and proper readings.	Any gage is damaged or missing.

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) (Cont).

B - Before D - During A - After W - Weekly

ITEM NO.	INTERVAL				Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
13	•	•			Control panel valves Any valve is damaged, loose fittings and proper operation. loose	Inspect valves for damage, inoperative, or fittings are
14	•	•			Pressure regulator Inspect pressure regulator for proper operation	Pressure regulator is inoperable
15	•				Cylinder clamping band Inspect clamping band for damage and tightness Notify unit maintenance if clamping band Is damaged.	Clamping band cannot be fully tightened.
16	•	•			Gas system lines and fittings. Inspect gas system lines for cracks, chafing, or leaks. Inspect fittings for tightness and leaks.	Any gas line Is damaged or leaking Fittings are loose or leaking
17	•	•	•		Gas cylinders inspect gas cylinder for dents or rust. Check pressure in each cylinder and replenish if low.	Any gas cylinder is dented or rusted
18	•		•		Charging whip inspect charging whip for frays, corrosion, and rust Check date of last hydrostatic test.	Charging whip has signs of rust, fraying, corrosion or other damage. Hydrostatic test out of date.
					OXYGEN BOOSTER PUMP	
19	•				Oxygen booster pump. Inspect oxygen booster pump for damage, loose or missing components.	
20	•	•			Gas input, output and air drive gages. Inspect gages for damage and proper readings.	Any gage is damaged or Inoperative.
21	•	•			Result regulator inspect result regulator for proper operation	Result regulator is inoperative
22	•	•			Valve regulator control inspect valve regulator control for damage and proper operation	Valve regulator control is damaged or inoperative.
23	•	•	•		Filter/water separator inspect for water, and drain as necessary.	

Table 2-1. Operator Preventive Maintenance Checks and Services (PMCS) (Cont).

B - Before D - During A - After W - Weekly

ITEM NO.	INTERVAL				Item To Be Inspected Procedure	Equipment Is Not Ready/Available If:
	B	D	A	W		
24	•	•			Air speed control valve Check air speed control valve for damage and proper operation.	Air speed control valve is damaged or inoperative
25	•	•	•		Input and output gas connectors Inspect input and output gas connectors for damage and ensure protective caps are present.	Input and output connectors are damaged.
26	•		•		Input/output 5-micron filters Check records to determine how long the filters have been In use. Notify direct support maintenance to change filters if they have been in service longer than 8 hours.	Input/output 5-micron filters have been in service more than 8 hours.
					OXYGEN CHARGING STATION	
27	•				Inspect oxygen charging station for damaged or missing components.	
28	•				Inspect charging whips for loose or damaged connectors, or chaffing of flex hose.	Charging whips are Damaged.
29	•	•	•		Inspect pressure gage for signs of damage and proper operation.	Pressure gage is damaged or inoperative.
30	•				Inspect shut-off valves for leaks, damage, and proper operation.	Shut-off valves are leaking. or inoperable.
31	•		•		Inspect oxygen supply whip for loose, damaged, or missing connectors, and signs of chaffing of flex hose.	Supply whip is damaged.

Section III. OPERATION UNDER USUAL CONDITIONS

2-13. **General.** The following paragraphs provide the normal operation and use of Type I and Type II Manifold Servicing Units, Oxygen Booster Pump, and Charging Station.

NOTE

The Type II Manifold Service Unit, Oxygen Booster Pump and Oxygen Charging Station together, using charging whips, make up the components for charging closed circuit underwater breathing apparatus cylinders

2-14. **Type I and Type II Manifold Servicing Units Operating Procedures**. (figure 2-5, 2-6). The operating procedures for charging cylinders with breathable air and oxygen are unique because of differences in configuration for the manifold servicing units. With the Type II Manifold Service Unit, much lower operating pressure is used on the air side and the Oxygen Booster Pump and Oxygen Charging Station must be connected on the oxygen side.

a. Type I Manifold Service Unit Operating Procedures. (figure 2-5)

(1) Locate the Manifold Servicing Unit in a level area. Set the hand brake and both stabilizing jacks.

(2) Unclip and remove the two service troughs (1) from the Manifold Servicing Unit (2) and place them on the ground near the control panel (3).

(3) At the control panel (3) close all valves including bleed valves.

NOTE

Type I air system has four SCUBA charge connections, each located underneath the four charging valves No 1, No 2, No 3 and No 4.

(4) Use charging whip with yoke connector and connect to charge connection (4).

(5) Place SCUBA/UBA cylinders into the service trough (1) and fill the trough with water.

(6) Check that the bleed valve on the yoke adapter is closed. Close the SCUBA cylinder manifold valve and connect the yoke adapter to the manifold.

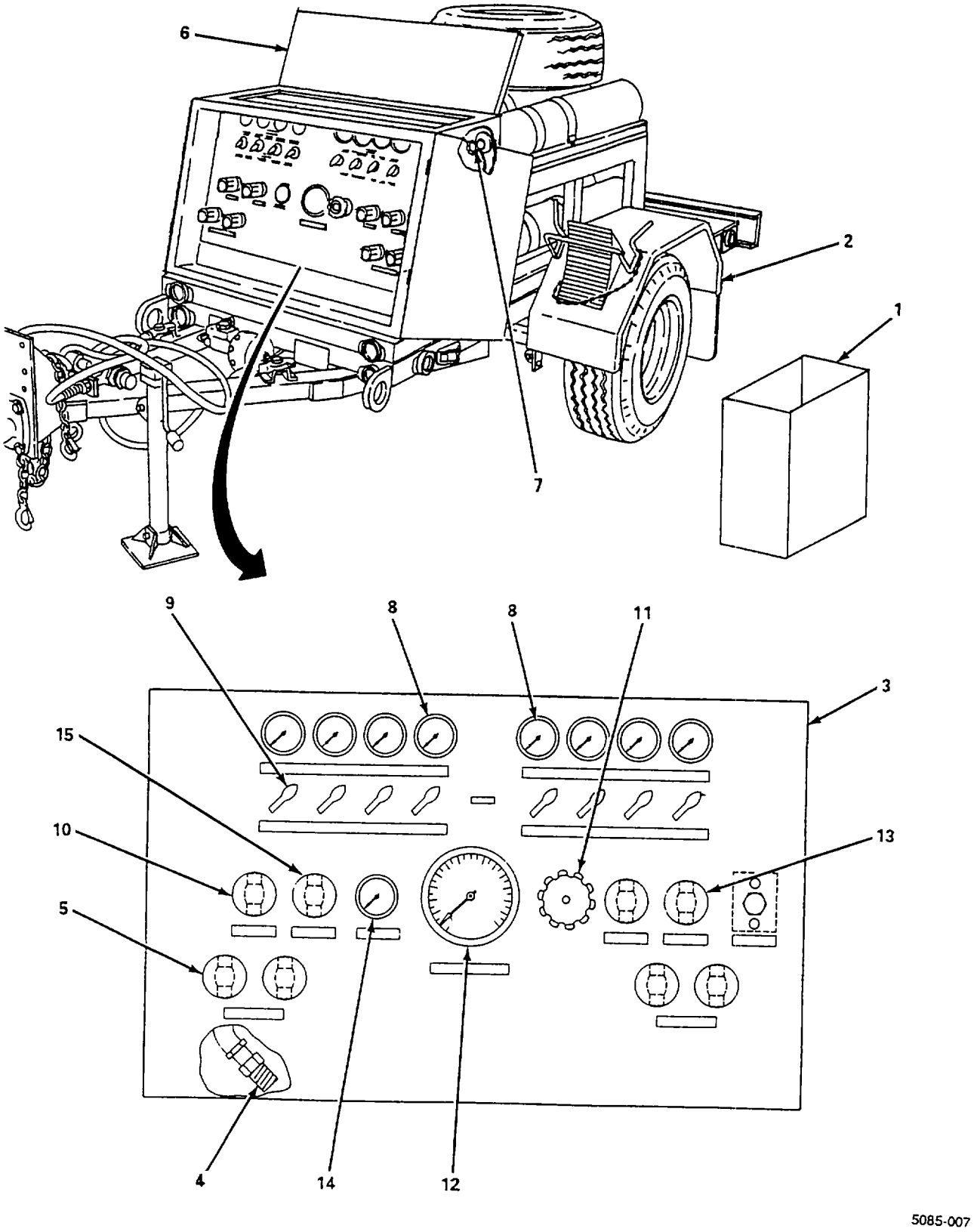


Figure 2-5. Type I Manifold Servicing Unit, Operation.

WARNING

- Inspect Manifold Servicing Unit Servicing Hose and Yoke Adapters before each use
- High pressure air or oxygen is dangerous, do not direct air or oxygen stream toward body Serious injury or death may result from high pressure gas entering the skin.
- Wear safety glasses when working with high pressure gas

(7) Open cover (6) on control panel housing and open the cylinder valves (7) of the cylinders being used.

(8) Observe each cylinder pressure gage (8) on the front control panel (3) and confirm each cylinder is pressurized. Then open the quarter-turn control valves (9) for each cylinder being used. This allows gas pressure to enter the supply manifold.

(9) Open the manifold shut-off valve (10). This allows gas pressure to pass to the purifier and to the pressure regulator.

(10) Adjust the pressure regulator (11) for 3000 psi for aluminum. SCUBA cylinders or 2250 psi for steel SCUBA cylinders. Observe the regulator gage (12) while making this adjustment.

CAUTION

All air cylinders are to be charged at a rate not to exceed 400 psi/minute, if SCUBA cylinder is submerged in water, or 200 psi/minute if not.

NOTE

The SCUBA manifold pressure gage is observed to determine the rate of gas charging and when the SCUBA cylinder fill pressure is reached.

(11) Open the SCUBA cylinder shut-off valve. Also open the SCUBA reserve mechanism (lever down) on the SCUBA cylinder

(12) Slowly open the charging valve (5) for the SCUBA cylinder.

NOTE

The SCUBA manifold pressure gage will now show the pressure level remaining in the SCUBA cylinders.

(13) Carefully crack open the servicing valve (13) and observe the SCUBA manifold pressure gage (14) for rate of change in pressure. Adjust this valve opening to achieve a pressure rate change of 100 psi/15 seconds for air or 30 psi/30 seconds for oxygen.

(14) When the SCUBA cylinder has cascaded with the Service Unit cylinder and the required pressure has not been reached, close the service valve (13) and quarter-turn valve (9) for the cylinder being used Open the quarter-turn valve of the cylinder with the next highest pressure reading Repeat step 13 until desired pressure Is obtained.

(15) When the SCUBA cylinders are charged to the proper pressure close the servicing valve (13). Allow the SCUBA cylinder to cool to room temperature The SCUBA manifold pressure gage will show a lower pressure when the cylinder has cooled.

(16) Continue with the SCUBA cylinder charging process until the cylinders have reached the proper pressure.

(17) Close the charging valve (5) of the SCUBA cylinder.

(18) Close the shut-off valve on the SCUBA cylinders and the reserve mechanism (lever up).

(19) Open the bleeder valve on the yoke adapter hose.

(20) Disconnect the SCUBA cylinders from the yoke adapter hose.

NOTE

Additional SCUBA cylinders may now be connected to the manifold servicing unit.

(21) To charge additional cylinders start at step 3 above, or if charging action is completed, perform steps 24 through 31 for shut-down procedures.

CAUTION

Do not over tighten any valves since seats and valve stems may be damaged.

(22) Close off all cylinder valves (7) by turning to the right.

(23) Bleed off all air or oxygen by turning to the left the air or oxygen bleed-off valve (15) Observe pressure gages to assure pressure is bled off.

(24) Turn all front panel quarter-turn valves (9) to the closed position.

(25) Turn the manifold valve (10) off by turning to the right.

(26) Turn pressure regulator (11) to the left until the valve is closed.

(27) Turn off the SCUBA/UBA servicing valve (13) by turning to the right.

(28) Check that all SCUBA/UBA charging valves (5) are off and charging connector caps are installed.

(29) Close bleed-off valve (15) by turning to the right.

(30) Drain water from two troughs (1), dry thoroughly and install the two troughs (1).

(31) Close door panels and cover (6).

b. Type II Manifold Service Unit Operating Procedures (figure 2-6).

(1) Locate the Manifold Servicing Unit in a level area Set the hand brake and both stabilizing lacks.

(2) Unclip and remove the two service troughs (1) from the Manifold Servicing Unit (2) and place them on the ground near the control panel (3).

(3) At the control panel (3) close all valves including bleed valves.

NOTE

Type II air/oxygen system has four charging connections, two on the left half of the control panel under charging valves No. 1 and No 2 used for air, and two on the right half of the control panel under charging valves No 1 and No 2 used for oxygen.

WARNING

Inspect Manifold Service Unit air/oxygen charging whips and connectors before each use. High pressure air and oxygen is dangerous. Do not direct air or oxygen stream toward body. Serious injury or death may result from high pressure gas entering the skin.

Wear safety glasses when working with any pressurized gas.

(4) Use charging whip to connect charge connection (4) on the Manifold Service Unit to the air drive connection (5) on the Oxygen Booster Pump (6)

(5) Connect oxygen charging whip to oxygen charge connection (7) and other end to inlet port (8) on Oxygen Booster Pump (6).

(6) Connect a charging whip from the outlet port (9) on the Oxygen Booster Pump (6) to the supply fitting (10)on Charging Station (11).

(7) Connect the number of oxygen cylinders (up to six) to the Charging Station whips (12).

(8) Open cover (13) and open cylinder valves (14) of the cylinders to be used.

(9) Observe each cylinder pressure gage (15) and confirm each cylinder Is pressurized. Open quarter-turn valves (16) for each of the cylinders used. This allows pressurized gas to enter supply manifold

(10) Open manifold shutoff valve (17). This allows pressurized gas to pass to the purifier and to the pressure regulator.

(11) Adjust air pressure regulator (18) from 60 to 150 psi Adjust oxygen pressure regulator (19) to 300 psi.

NOTE

The final fill pressure for the oxygen cylinders is 2950 psi (200 bar). Adjusting the pressure regulator at 300 psi will achieve the desired pressure as the Oxygen Booster pump will boost the oxygen to the desired final fill pressure of 2950 psi allowing the booster pump to adequately capture the most oxygen possible in the source cylinders.

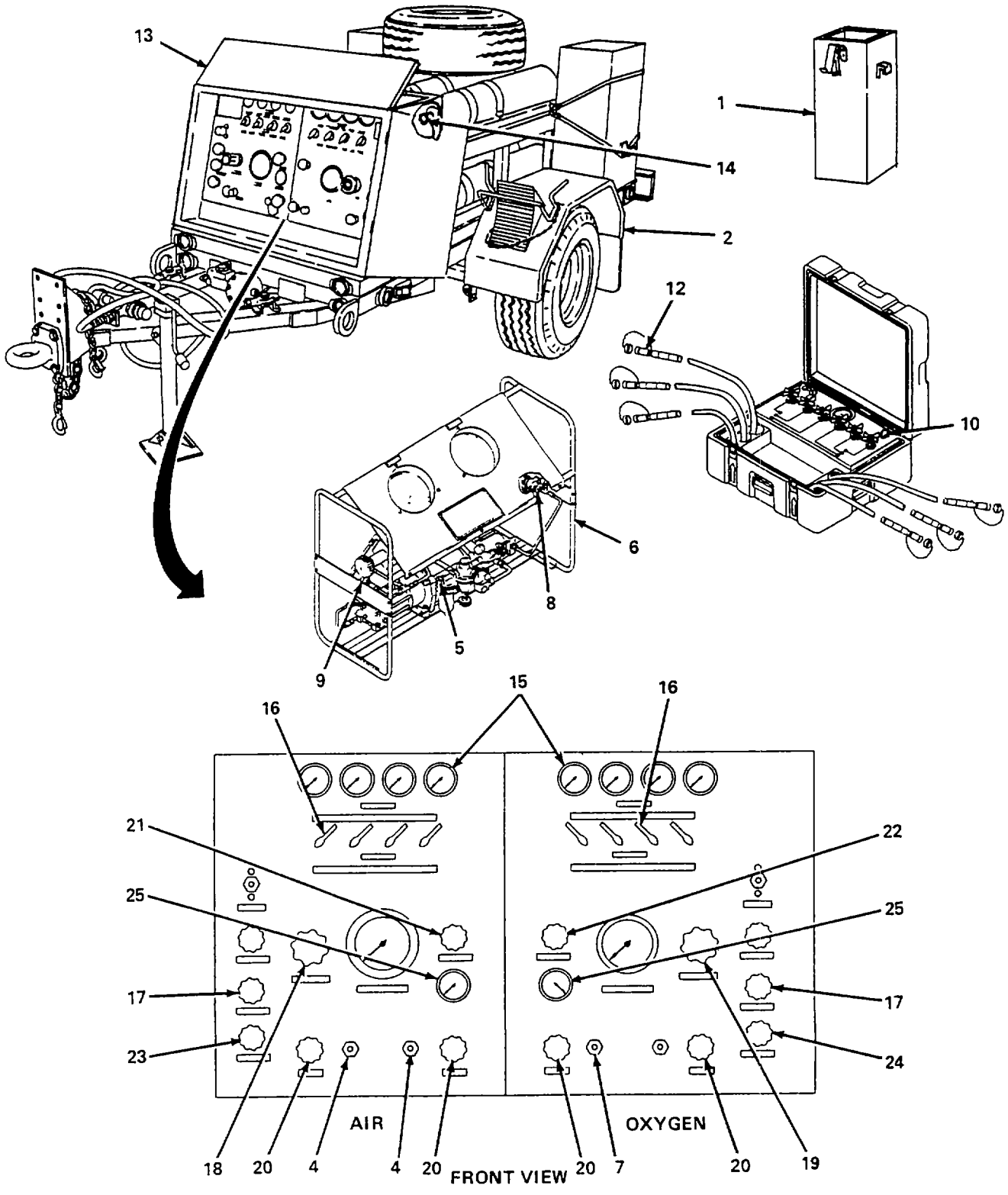


Figure 2-6. Type II Manifold Servicing Unit, Operation

(12) Open the charging valves (20) on both the air side and oxygen side

CAUTION

Care must be taken to insure that the pressure on the air side does not exceed 150 psi as this will cause the Oxygen Booster Pump to be damaged and possibly cause bodily injury to the operator. Therefore the pressure should be set at 100 psi for safety.

(13) Carefully crack open the air servicing valve (21) and oxygen servicing valve (22) This pressurizes charging whips to Oxygen Booster pump Observe that air pressure does not exceed 100 psi and that oxygen pressure does not exceed 300 psi.

(14) Follow procedures in paragraph 2-15 for Oxygen Booster pump and procedures in paragraph 2-17 for Oxygen Charging Station and continue with filling process. Follow steps 15 through 25 for shutdown procedures.

CAUTION

Do not over tighten any valve. The valve seats and stems may be damaged.

(15) Close air servicing valve (21) and oxygen servicing valve (22).

(16) Close all cylinder valves (14) by turning to right.

(17) Open air bleed of valve (23) and oxygen bleed off valve (24). Check pressure gages (15) and (25) and verify pressure is bled off.

(18) Close all quarter-turn valves (16).

(19) Close manifold shutoff valves (17).

(20) Turn air pressure regulator (18) and oxygen pressure regulator (19) to the left until the regulators are closed

(21) Close all charging valves (20)

(22) Disconnect all charging whips between Manifold Service Unit, Oxygen Booster Pump and Oxygen Charging Station and ensure all protective caps are installed on fittings Double bag and seal all charging whip ends.

(23) Close air bleed off valve (23) and oxygen bleed off valve (24).

(24) Close door panels and cover (13)

(25) Drain service troughs (1), dry thoroughly, and install on Manifold Service Unit (2).

2-15. **Oxygen Booster Pump Operating Procedures.** (figure 2-7). The booster pump is a slow speed device used to take oxygen from a partially depleted cylinder and top-off another oxygen cylinder. To transfer oxygen from one cylinder to another oxygen cylinder, perform the following:

NOTE

The Type II Manifold Servicing Unit, Oxygen booster Pump, and the Oxygen Charging Station together, using charging whips, make up the components for charging closed circuit underwater breathing apparatus cylinders.

a. Connect Oxygen Charging Station to gas outlet port (1) on Oxygen Booster Pump (2).

b. Connect closed circuit breathing apparatus cylinders to Oxygen Charging Station whips (3), and place cylinders into service troughs (4) from Manifold Service Unit. Fill service troughs (4) with water.

c. Connect the supply oxygen source to the inlet port (5) on the booster pump (2). Use a whip with bleeder valve for this connection.

d. Check that the bleeder valves on the above whip connections are closed.

e. Open the UBA cylinder Valve slowly and note that the outlet pressure gauge (6) will show the pressure of the UBA cylinder

CAUTION

When the supply cylinder pressure is higher than the UBA cylinder, oxygen will rush in through the pump to the UBA cylinder without the pump operating. This will continue until the pressure Is equal between the two cylinders. Fill no faster than 60 psi/minute

f. Carefully crack open the servicing valve (7) on the Type II Manifold Service Unit, and note the outlet pressure gage (6). If the pressure starts to rise, control the rate of increase to no more than 60 psi per minute by adjusting the servicing valve (7) until pressure is equal.

g. Connect the air side of the Type II Manifold Service Unit to the air drive connection at the front of the oxygen booster pump (2).

h. Check that the speed valve (8) on the oxygen booster pump (2) is closed.

i. Adjust the source air supply at 100 psi Open the servicing valve (7) and adjust the air drive pressure regulator (9) to 100 psi (689.50 kPa).

NOTE

The following procedures are to initially operate the result regulator in increments. To build pressure, adjust the result regulator (10) 1/4 turn. Stop, and then repeat the adjustment of the result regulator The pump action will then continue until the next increment is reached Continue to increment adjustment until the desired pressure is reached. Once the pressure is reached, adjustment of the result regulator should not need any more increment, adjustment and all air drive operations can be done by the speed valve (10).

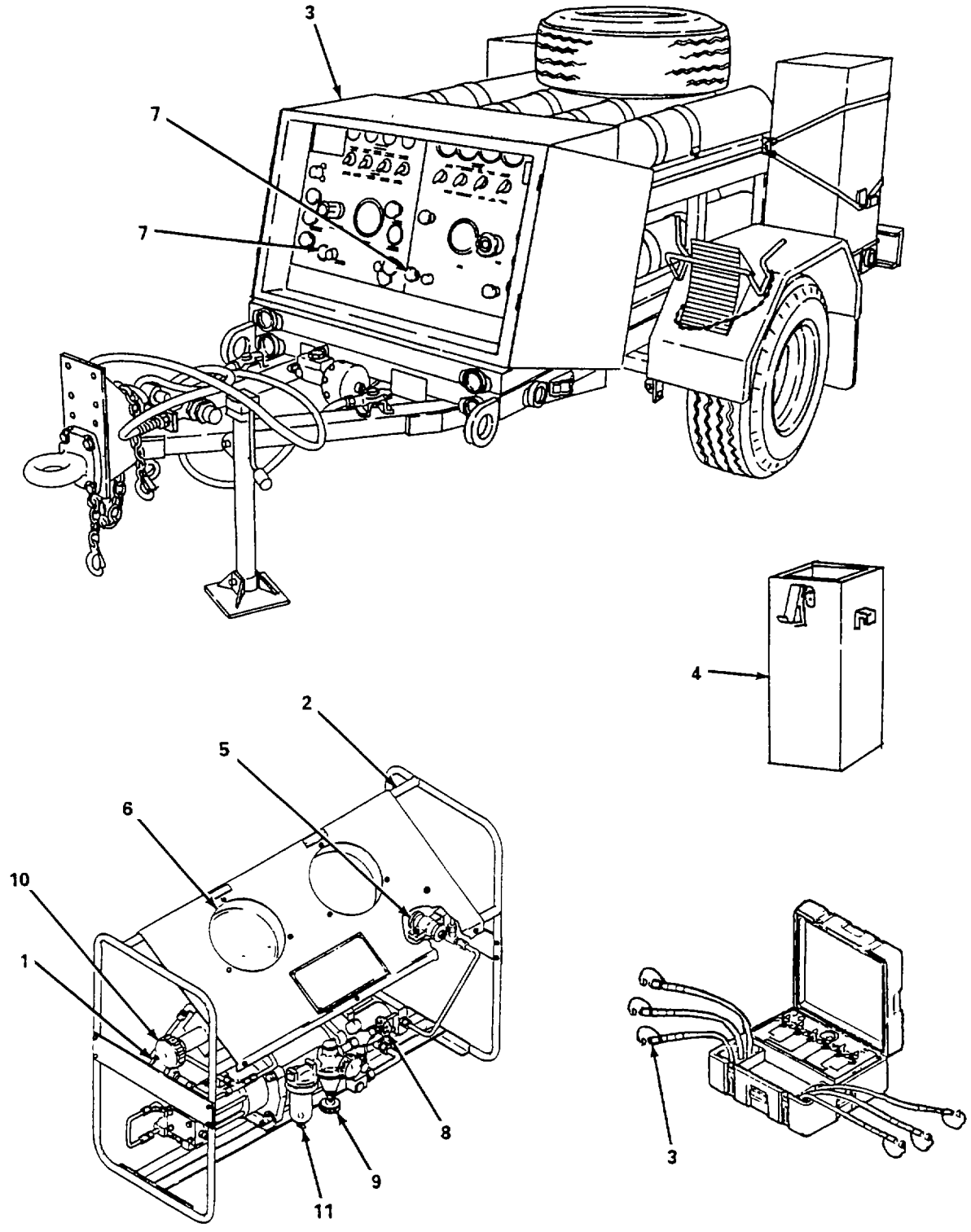


Figure 2-7. Oxygen Booster Pump Operation.

j. Slowly crack open the speed valve (8) on the air drive system and adjust the result regulator (10) from its closed position in increments clockwise to start the pump Observe the rate of increase on the outlet pressure gage (6) and adjust the air drive speed valve (8) so the rate increase is no more than 60 psi (414 kPa) per minute.

k. When the desired outlet pressure is reached, close the air drive speed valve (8) stopping the pump. Allow the UBA cylinder to cool to room temperature. The outlet pressure gage (6) will show a lower pressure when the cylinder has cooled

I. Continue with the UBA cylinder charging process by opening the air drive speed valve (8) and adjusting the result regulator (10), if required.

m. After the UBA cylinder has reached the desired pressure, at room temperature, close the air drive speed control valve and close the UBA cylinder valve.

n. Close the supply cylinder valve.

o. At the UBA connecting whip open the bleed valve, depressurizing the system. Close the bleed valve to maintain the oxygen cleanliness

p. Disconnect the UBA cylinder and the charging whip and double bag to maintain oxygen cleanliness.

q. Turn off the air drive supply and disconnect from the booster pump.

r. To charge additional cylinders, perform steps a through q, if charging action is completed, perform steps s. through v. to shut system down

s. Cover the inlet and outlets with protective caps, covers or double bag to maintain oxygen cleanliness

t. Close the result regulator (10) by turning counterclockwise until closed

u. Check that the speed valve (8) is closed

v. Drain the air drive water separator (11).

2-16 **Air Breathable Cylinder Recharging Procedures.** (figure 2-8 or 2-9). During extended diving operations, it may become necessary to recharge the supply (storage) cylinders on the Type I and Type II manifold servicing units. Perform the following:

a. Connect the 20 CFM, 3200 psi compressor unit to the (air) recharge connection (1) located on the front panel (2) of the Type I or Type II manifold servicing unit (3).

b. Check that the manifold shut-off valve (4) is closed on the Type I or Type II (air) manifold servicing unit

c. Operate the 20 CFM, 3200 psi compressor unit In accordance with Instruction provided in the Manual for 20 CFM compressor.

d. Open the cylinder valve (5) on those storage cylinders to be charged.

e. Open the quarter-turn control valve (6) for each storage cylinder

f. Open the recharge valve (7) Adjust this valve to maintain a charging rate of no more than 400 psi (2758 kPa) per minute

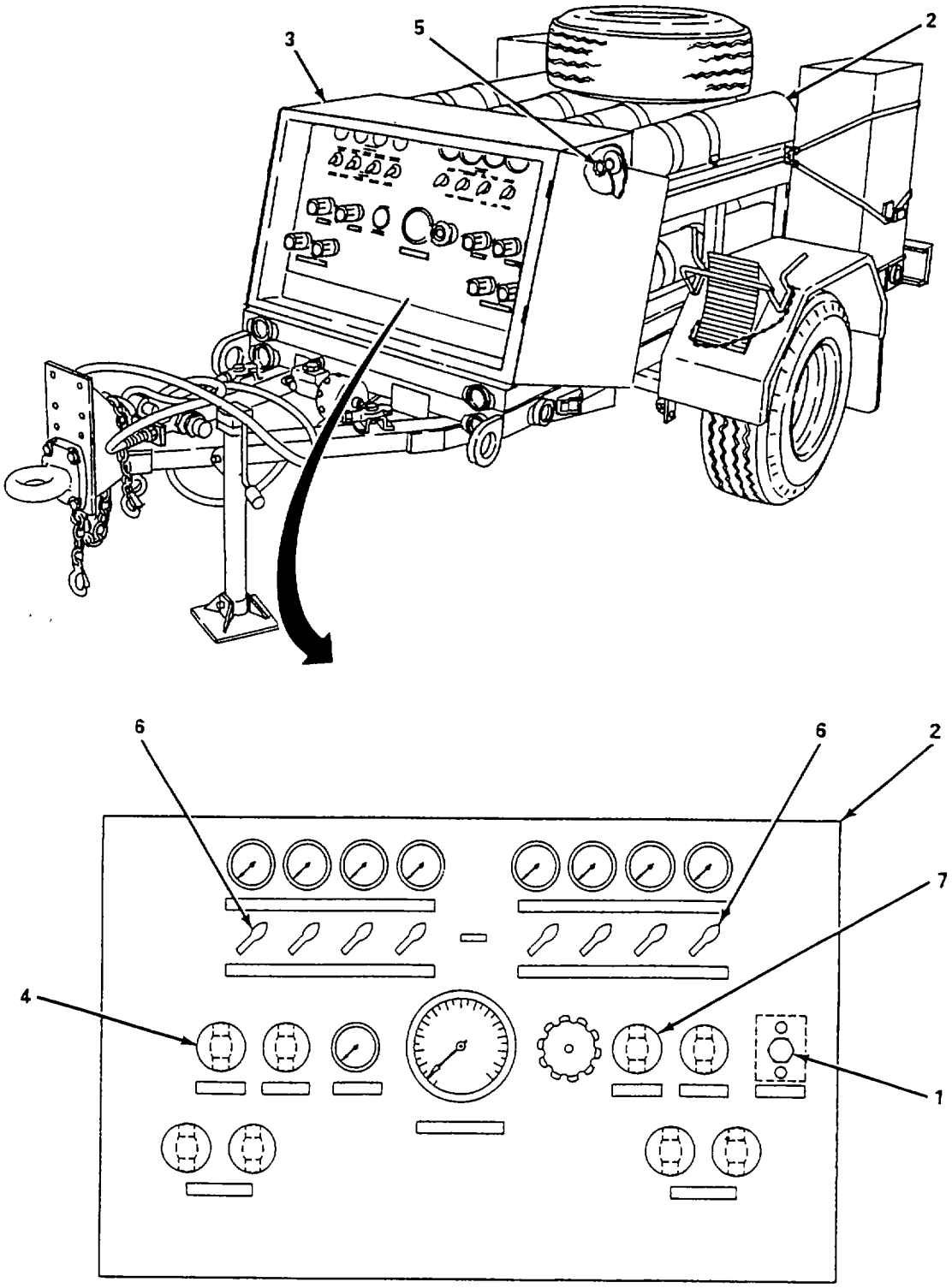


Figure 2-8. Type I Cylinder Recharging Procedures

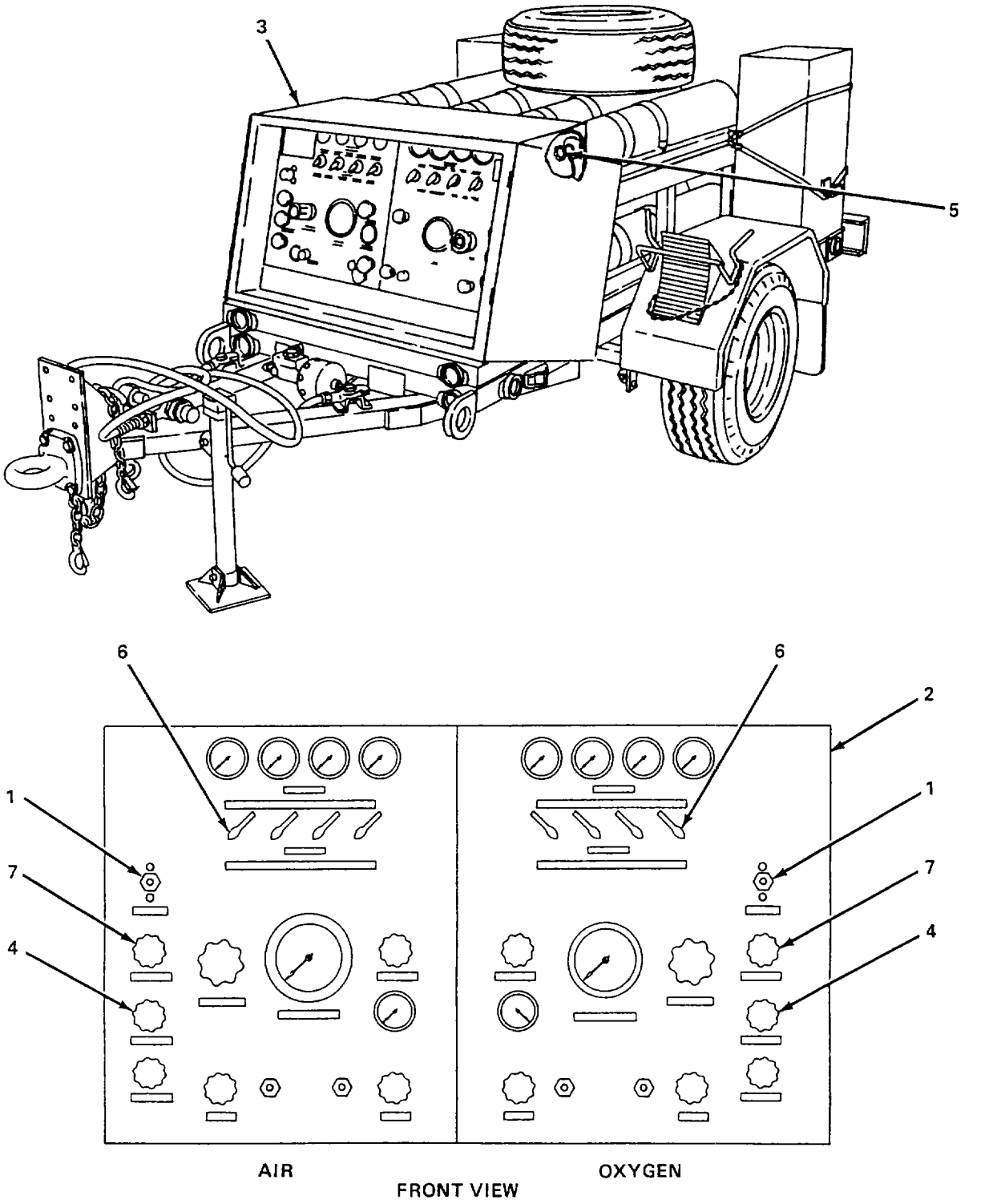


Figure 2-9. Type II Cylinder Recharging Procedures.

g. When the desired pressure has been reached turn off the recharge valve (7) and then each supply cylinder valve (5) being charged.

h. Turn off the 20 CFM, 3200 psi compressor unit and open the compressor bleed valve to reduce pressure on the connecting hose

i. Open the recharge valve (7) on the Type I and Type II (Air) manifold servicing units to bleed off the supply manifold and storage cylinder connecting hose.

NOTE

The oxygen cylinders on the Type II Manifold Service Unit can be recharged from other oxygen tanks using the Oxygen Booster Pump, or the tanks can be exchanged for full tanks.

j. Turn off the recharge valve (7) on the Type I and Type II (Air) manifold servicing units and disconnect the service hose to the compressor unit Cover or cap whips as required, i.e., dual caps or double bag.

2-17. **Oxygen Charging Station Operating Procedures.** (figure 2-10). The oxygen charging station is designed to charge up to six oxygen cylinders simultaneously from a single supply (booster pump or cylinder). The supply end of the supply whip Is connected to either an oxygen booster pump or oxygen cylinder.

WARNING

Do not use this equipment in the vicinity of an open flame, heaters, or other sources of heat or sparks Do not use this equipment in the vicinity of fuel sources. Do not bring oil or grease into contact with high pressure hose fittings.

a. Connect supply whip (1) to oxygen supply and blow out supply whip (1).

b. Loosen five fasteners (2) and open cover (3).

c. Unscrew cap (4) from supply fitting (5) and connect supply whip (1).

d. Ensure all control valves (6) are closed.

e. Start supply oxygen to oxygen charging station.

f. Remove protective cap (7) from end of charging whip (8) being used.

g. Blow out charging whip (8) with supply oxygen.

h. Connect charging whip (8) to oxygen cylinder being charged and place cylinder in container of water.

i. Slowly open valve on oxygen cylinder being charged. After pressure is stabilized, open valve fully.

j. Repeat steps g through i. for remaining oxygen cylinders being charged.

k. Slowly open shut-off valves (6) one at time and allow pressure to stabilize. Open valves (6) sufficiently to maintain a maximum fill rate of 100 psi (7 BAR) per minute.

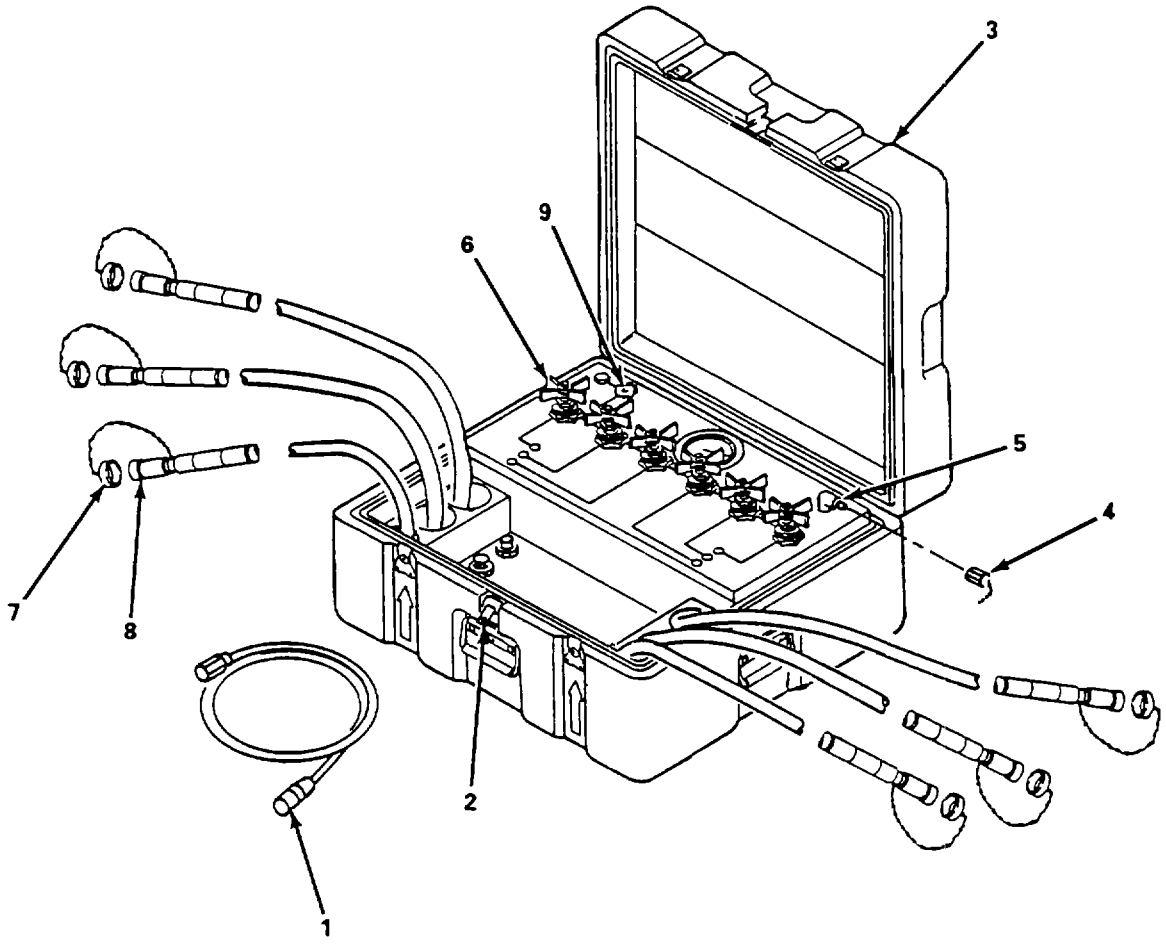


Figure 2-10. Oxygen Charging Station Operating Procedures

l. Close valves (6) when desired pressure is obtained in cylinder being charged. Allow cylinder to cool Pressure reading will be slightly lower Open shut-off valve (6) slowly and top off cylinder.

m. Close cylinder valve on cylinders.

n. Shut off oxygen supply.

o. Open vent valve (9) and bleed off pressure.

p. Disconnect charging whip (8) from cylinder and install protective cap (7).

q. Repeat steps p for remaining cylinders.

r. Close vent valve (9).

s. Repeat steps d through r if there are more cylinders to be charged.

t. Shut down oxygen supply to charging station

u. Open vent valve (9)

v. Disconnect oxygen supply whip (1) from charging station and cap end

w. Close vent valve (9)

x. Store charging whips (8), close cover (3) and secure with fasteners (2)

y. Disconnect oxygen supply whip (1) from oxygen supply and store whip

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-18. **Operating Under Unusual Conditions.** (figure 2-11 or 2-12). Operating conditions may require SCUBA cylinders to be charged while recharging operation of the supply cylinder is underway. When this occurs proceed as follows:

a. Follow paragraph 2-16 Air Breathable Cylinder Recharging Operation.

b. Connect SCUBA cylinders to the SCUBA charging connections (1) on Type I and Type II (Air) manifold servicing unit. Use charging whip with bleed valve for this connection.

c. Place SCUBA cylinder into the water filled trough (2).

d. Open the manifold shut-off valve (3).

e. Set air pressure regulator (4) for desired pressure.

f. Open SCUBA charging valve (5) No 1, 2, 3, or 4 for the SCUBA cylinders being charged.

g. Open SCUBA cylinder valve and reserve mechanism (lever down).

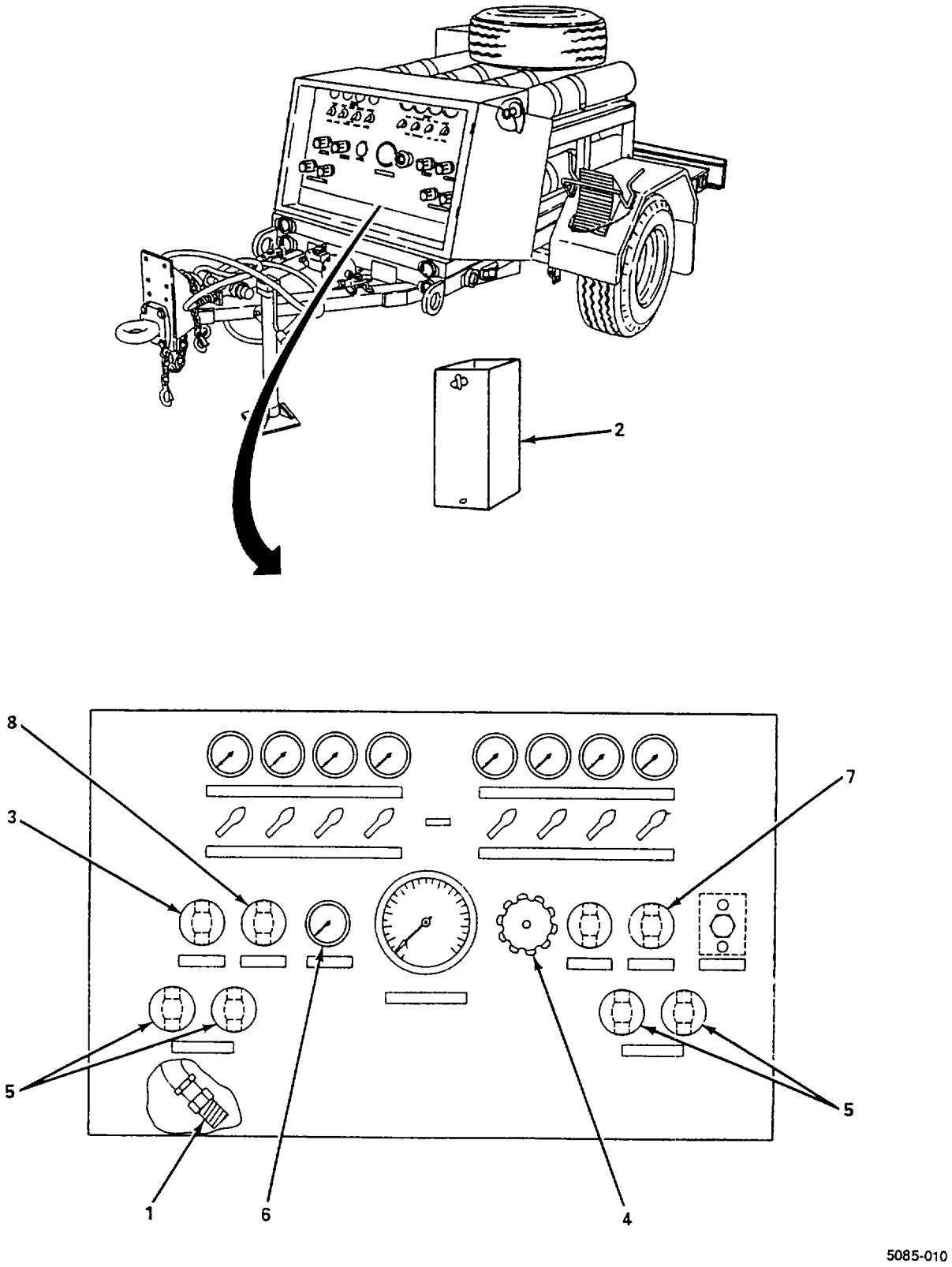


Figure 2-11. Type I Operation Under Unusual Conditions.

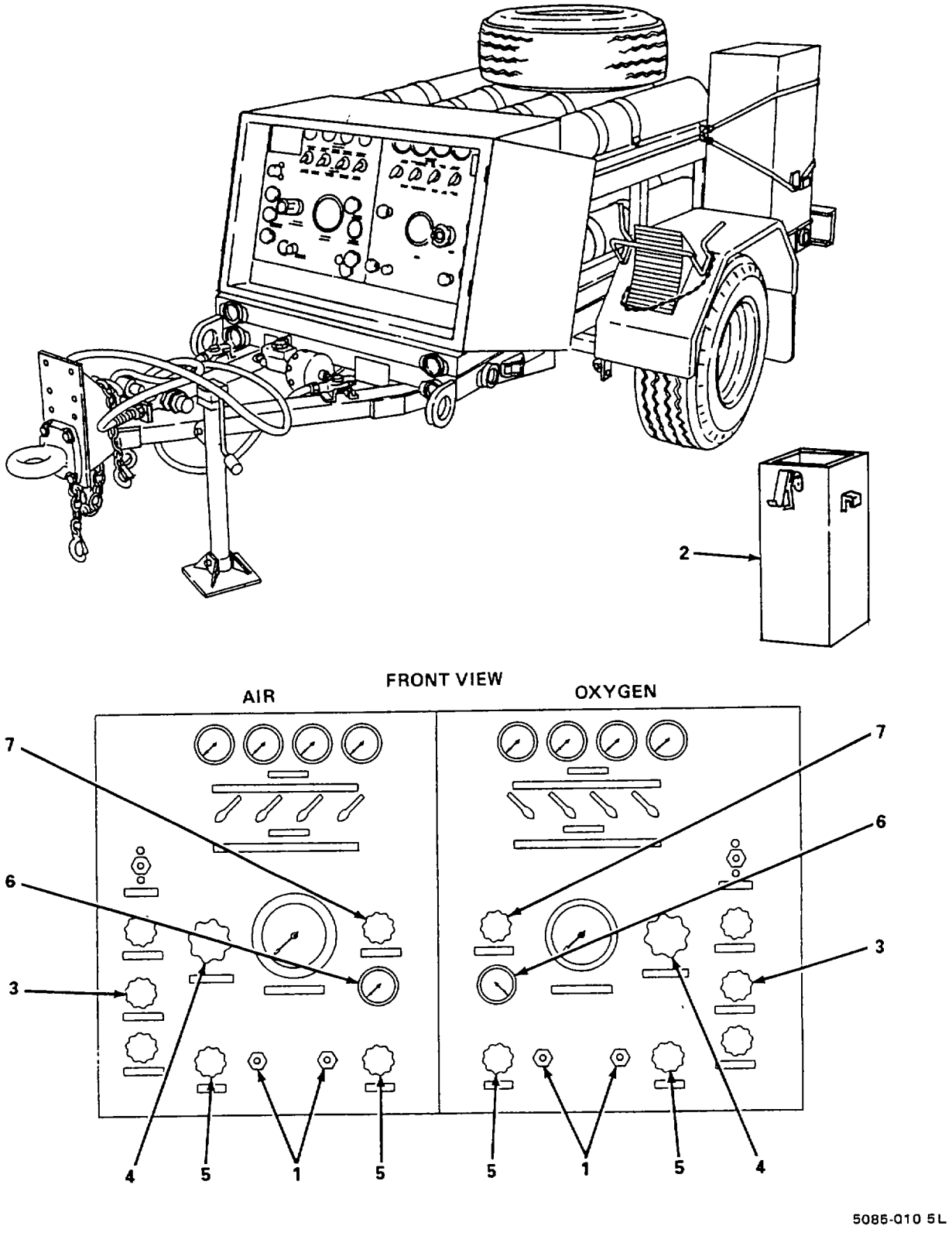


Figure 2-12. Type II Operation Under Unusual Conditions.

h. SCUBA Manifold Pressure gage (6) reads SCUBA Pressure.

i. Slowly open the service valve (7), observe SCUBA manifold pressure gage (6) and adjust the service valve (7) to obtain a pressure increase of no greater than 400 psi (2758 kPa) per minute.

j. When desired pressure is reached, close the service valve (7) and allow SCUBA cylinders to cool.

k. When cylinders have cooled, open the service valve (7) and continue charging until pressure is reached.

I. Close the service valve (7), SCUBA charging valves (5) No. 1, 2, 3 and 4, close the SCUBA cylinder valves and reserve mechanism (lever up).

m. Open the bleed-off valve on the charging whip connection to each SCUBA cylinder.

n. Disconnect SCUBA cylinders and protect whip ends as required.

CHAPTER 3

OPERATOR'S MAINTENANCE INSTRUCTIONS

OVERVIEW

This chapter contains operator level maintenance procedures as authorized by the Maintenance Allocation Chart (MAC) in Appendix B of this manual.

Section I. LUBRICATION INSTRUCTIONS

3-1. **General.** This section contains lubrication procedures as they pertain to Type I and Type II Manifold Servicing Units, Oxygen Booster Pump, and Oxygen Charging Station.

3-2. **Detailed Lubrication Instructions.**

a. Keep all lubricants in closed containers and store In a clean, dry place away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricants Keep all lubrication equipment clean and ready for use

b. Keep all external parts not requiring lubrication clean of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubricating to prevent accumulation of foreign matter.

c. Lubricate all hinges on top cover, and door panels, and all pivot points on hand brake assembly. Refer to TM 9-2330-202-14&P Operator's, Organizational, Direct Support and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for lubrication instructions for the trailer.

Section II. OPERATOR TROUBLESHOOTING PROCEDURES

3-3. **General.** This section contains troubleshooting Information for locating and correcting most of the operating troubles which may develop In the Type I and Type II Manifold Servicing Units and Oxygen Booster Pump. Inspections are provided to isolate the faulty item and corrective actions are provided to eliminate the malfunctions.

3-4. **Operator Troubleshooting Procedures.** Refer to symptom index for the troubleshooting procedure of the observed malfunction.

a. Table 3-1 lists the common malfunctions which you may encounter during operation of the equipment.

b. This manual cannot list all malfunctions that may occur, nor all test or inspections and corrective actions. Notify you supervisor if a malfunction is not corrected by the listed test or inspections.

SYMPTOM INDEX

Table 3-1. Operator Troubleshooting Procedures.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. PRESSURE LOSS IN MANIFOLD SERVICING UNIT.
Step 1. Check fittings for loose connectors.
Tighten loose connectors.
Step 2. Check for faulty valve or gage.
Notify supervisor or dive master.
2. MANIFOLD SERVICING UNIT DOES NOT CHARGE SCUBA/UBA CYLINDERS.
Step 1. Check regulator adjustment.
Adjust regulator output (para. 2-14).
Step 2. Check servicing valve.
Open valve.
Step 3. Check valves on gas cylinders.
Open valves.
3. PRESSURE REGULATOR GAGE ERRATIC, OR LOW.
Check regulator through full range of pressure.
Notify supervisor or dive master If gage reading is erratic or does not move and have regulator replaced.
4. BOOSTER PUMP DOES NOT OPERATE.
Step 1. Check valve on cylinder being charged.
Open valve.
Step 2. Check valve on supply cylinder.
Open valve.

Table 3-1. Operator Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
4. BOOSTER PUMP DOES NOT OPERATE (Cont)
Step 3. Check air drive supply
Ensure pressure is less than 150 psi (1034 kPa).
Step 4. Check speed control valve
Open speed control valve.
Step 5. Check result regulator.
Open fully.
Step 6. Check Inlet pressure gage.
Change supply cylinder if pressure is less than 150 psi (1034 kPa).
Step 7. Check outlet cylinder pressure gage
Replace cylinder if full
5. OXYGEN CHARGING STATION LOSES GAS PRESSURE
Step 1. Check all oxygen lines for tightness
Tighten all loose connections.
Step 2. Check vent valve
Close vent valve
Step 3. Check shut-off valve.
Close all shut-off valves.
Step 4. Check oxygen supply whip for signs of damage.
Replace oxygen supply whip
Step 5. Check charging whips for damage.
Notify your supervisor or dive master if charging whip is damaged.

Table 3-1. Operator Troubleshooting Procedures (Cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

6. OXYGEN CHARGING STATION DOES NOT CHARGE SCUBA/UBA CYLINDERS

Step 1. Check shut-off valve.

Open shut-off valve for appropriate charging whip.

Step 2. Check vent valve.

Close vent valve.

Step 3. Check oxygen supply.

Replace oxygen supply if pressure in cylinder Is low, or oxygen booster pump is inoperable.

Step 4. Check charging whip for proper installation Notify your supervisor or dive master if charging whip is not installed properly (for example green whip is connected to yellow shut-off valve).

7. NO BRAKES

Step 1. Check gladhands.

Ensure gladhands are properly connected to tow vehicle.

Step 2. Check air and hydraulic brake lines.

Notify supervisor or dive master if damage is found.

Step 3. Check automatic drain valve.

Notify supervisor or dive master If drain valve is inoperative.

8. WEAK BRAKES.

Step 1. Check fluid In master cylinder.

Replenish if low

Step 2. Check gladhands for proper installation.

Reconnect as needed.

Table 3-1. Operator Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
9. ALL LAMPS FAIL TO OPERATE
Step 1. Check electrical connection to tow vehicle.
Reconnect cable.
Step 2. Check electrical wiring for damage.
Notify supervisor or dive master if damage Is found.
10. ONE OR MORE LIGHTS FAIL TO OPERATE.
Step 1. Check lamps for damage.
Change defective lamps.
Step 2. Check wiring connectors.
Reconnect connectors as needed.
Step 3. Check electrical wiring for damage.
Notify supervisor or dive master If damage is found.

Section III. OPERATOR'S MAINTENANCE PROCEDURES

Paragraph Page

3-5. **General.** This section contains operator level maintenance procedures as authorized by the maintenance allocation chart in Appendix B of this manual.

3-6. Control Panel Assembly (Air, Air/Oxygen).

This task covers: Service

INITIAL SETUP

Materials/Parts:

Nonionic Detergent (Item 10, Appendix D)
Rags, Wiping (Item 16, Appendix D)

Service. (figure 3-1).

(1) Open door panels (1).

(2) Clean control panel assembly (2) with nonionic detergent and dry thoroughly.

(3) Inspect control panel assembly (2) and report any damage to direct support maintenance.

(4) Close door panels (1).

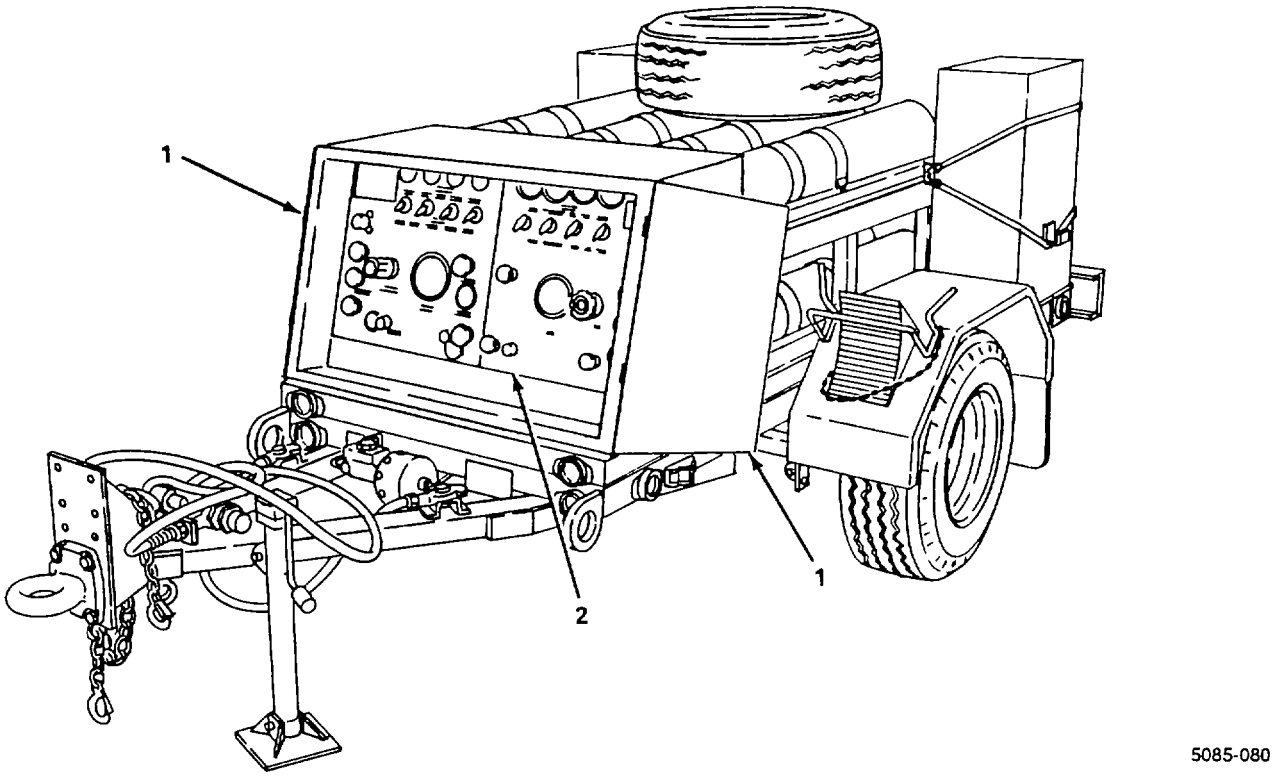


Figure 3-1. Control Panel Assembly, Service

3-7. Air Reservoir.

This task covers: Service

INITIAL SETUP

Materials/Parts:

Rags, Wiping (Item 16, Appendix D)

Service. (figure 3-2)

(1) Depress pin (1) on automatic drain valve (2) and release air and condensation, and release pin (1) when all condensation has been released.

(2) Wipe off condensation from equipment.

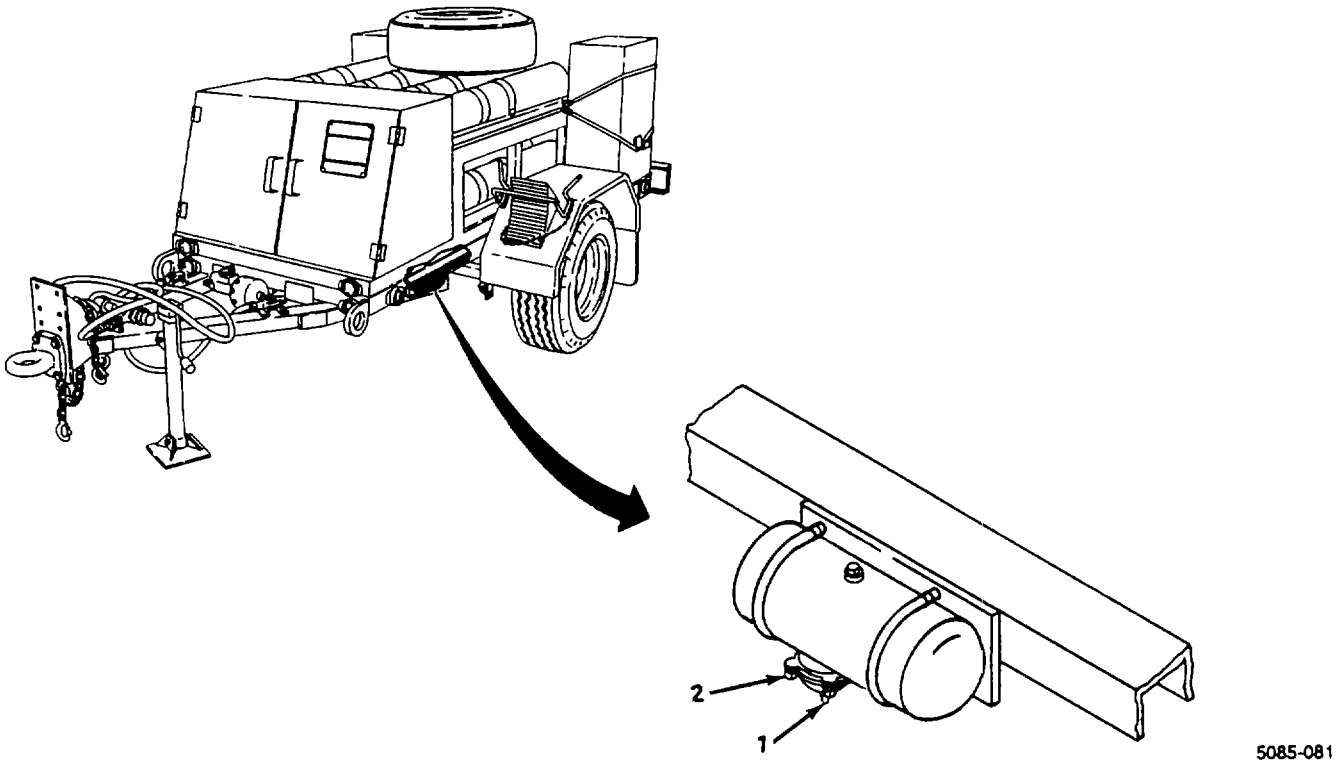


Figure 3-2. Air Reservoir, Service

CHAPTER 4

UNIT MAINTENANCE

OVERVIEW

This chapter contains information for troubleshooting and maintenance of Type I and Type II Manifold Servicing Units, Oxygen Booster Pump, and Oxygen Charging Station by Unit level personnel

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.** There are no Special Tools, TMDE or Support Equipment required in support of the Type I and Type II Manifold Servicing Units, Oxygen Booster Pump and Oxygen Charging Station All tools required are listed in Appendix B Maintenance Allocation Chart (MAC) Section III of this manual.

4-3. **Repair Parts.** Repair parts are listed and illustrated in the Repair Parts and Special Tools List TM 5-4220-228-24P.

Section II. SERVICE UPON RECEIPT

4-4. **Service Upon Receipt.** The Type I and Type II Service Units, Oxygen Booster Pump and Oxygen Charging Station are shipped fully assembled. However, there are certain steps which must be taken prior to placing the equipment into operation.

a. Type I and Type II Manifold Servicing Units.

(1) Refer to DA Form 2258 Preservation and Depreservation Guide for Vehicles and Equipment and deprocess the Manifold Servicing Units.

(2) Remove both service troughs from the trailer and remove three boxes.

(3) Store the two boxes containing the compressed gas cylinder protective caps.

NOTE

Type I manifold servicing unit is shipped with only one filter cartridge

(4) Open box containing two new filter cartridges and four charging whips.

(5) Open top cover of manifold servicing unit.

WARNING

Do not allow any contaminants to enter purification cylinder Contaminants could cause serious injury or death to divers.

(6) Loosen cover on purification cylinder and remove.

WARNING

Do not touch filter canister with bare hand Contamination of system could cause serious injury or death to divers.

(7) Cut open one end of plastic bag and slide filter canister into purification cylinder and Install cover.

(8) Tighten cover to perforate filter canister Do not overtighten cover.

(9) If working on Type II Manifold Servicing Unit, repeat steps 6, 7, and 8 for second purification cylinder.

(10) Leave four charging whips sealed until ready for use.

(11) Store three boxes back on equipment and install service troughs.

(12) Perform all operator and unit preventive maintenance checks and services prior to operation of equipment.

b. Unpacking Oxygen Booster Pump.

(1) Remove oxygen booster pump from crate and retain the crate for later shipment or storage.

(2) Perform all operator and unit PMCS for oxygen booster pump.

(3) Leave all openings bagged or plugged until the equipment will be used.

(4) Unscrew bezel ring and remove bezel.

(5) Remove foam pad from underneath pointer on gage.

(6) Install bezel and secure with bezel ring.

(7) Repeat steps 4, 5, and 6 for remaining gage.

c. Oxygen Charging Station.

(1) Remove oxygen charging station from crate and store crate for later shipment or storage.

(2) Perform all operator PMCS for oxygen charging station.

(3) Store oxygen charging station in a clean area, off the floor until needed.

Section III. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Paragraph Page

4-5. **General.** Unit level maintenance PMCS are done to ensure that the Type I and Type II Manifold Servicing Units are in top operating condition. A comprehensive PMCS program reduces equipment downtime and Increases the operational readiness of the equipment.

4-6. **PMCS Procedures.** Unit level PMCS are in table 4-1. The numbers in the Item No column show the order in which the checks and services should be performed. These numbers should be used when recording deficiencies and shortcomings on DA Form 2404, Equipment Inspection and Maintenance Worksheet. The dot **(**•) in the Interval column indicates when a check or service should be performed.

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

M - Monthly Q - Quarterly S - Semiannually A - Annually

Item no.	Interval M	Q	S	A	Item to be Inspected	Procedures
1			•		Taillights and Marker Lights	Inspect taillights and replace or repair damaged lights (para 4-21).
2			•		Wiring Harness	Inspect and test harness and replace if damaged(para 4-22).
3			•		Reflectors	Inspect reflectors and replace damaged or missing reflectors (para 4-12).

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

M - Monthly Q - Quarterly S - Semiannually A - Annually

Item no.	Interval M	Q	S	A	Item to be Inspected	Procedures
4			•		Axle Assembly	Inspect axle assembly for damaged or missing Items and notify general support maintenance if axle assembly is damaged or missing parts.
5			•		Jack Assemblies	Inspect jack assembly for proper operation and replace if inoperable (para 4-19).
6			•		Brake Shoe Assembly	Inspect brake shoe assembly and replace worn or damaged brake shoe assemblies (para 4-30).
7			•		Frame	Inspect frame for cracks, dents or broken welds. Notify direct support maintenance of damage

Section IV. UNIT TROUBLESHOOTING PROCEDURES

Paragraph Page

4-7. **General.** This section contains troubleshooting procedures to determine the probable cause of observed equipment malfunctions. Test or Inspections are provided to isolate the faulty component and corrective actions are provided to eliminate the malfunction.

4-8. **Unit Troubleshooting Procedures.** Refer to symptom index to locate the troubleshooting procedures for the observed malfunction. Table 4-1 lists the common malfunctions that may occur during the operation or maintenance of the equipment. Perform the tests or Inspections, and the recommended corrective action in the order listed in the troubleshooting table. If the malfunction is corrected by a specific corrective action, do not continue with the remaining steps, if any, of the troubleshooting procedures. If the malfunction is not corrected by the listed corrective actions, notify your supervisor, dive master, or direct support maintenance.

SYMPTOM INDEX

Symptom Page

Table 4-1. Unit Troubleshooting Procedures.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. NO BRAKES.

   Step 1. Check gladhands for proper connection with low vehicle.

   Reconnect gladhands.

   Step 2. Check air and hydraulic brake lines for damage.

   Replace damaged lines (para 4-24).

   Step 3. Check brake shoe assemblies.

   Replace worn or damaged brake shoe assemblies (para 4-30).

2. WEAK BRAKES

   Step 1. Check brake shoe assembly.

   Replace or adjust brake shoe assembly (para.4-30).

   Step 2. Check fluid in hydraulic cylinder.

   Replenish if low.

   Step 3. Check air filter assembly for obstructions or dirt.

   Replace or repair as needed (para. 4-25).

   Step 4. Check air reservoir for damage

   Replace air reservoir if damaged (para. 4-26).

   Step 5. Check power cluster for proper operation

   Replace if inoperable or damaged (para. 4-27).

   Step 6. Check emergency valve RE-6 relay for proper operation.

   Replace emergency valve RE-6 relay if damaged (para. 4-28).

Table 4-1. Unit Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
3. ALL LAMPS FAIL TO OPERATE
Step 1. Test wiring harness.
Replace or repair a damaged or defective wiring harness (para. 4-22).
Step 2. Check lamps.
Replace defective lamps (para 4-21).
Step 3. Check light assemblies
Replace damaged light assemblies (para 4-21).
4. ONE OR MORE LAMPS FAIL TO OPERATE
Step 1. Test wiring harness.
Replace or repair a damaged or defective wiring harness (para. 4-22).
Step 2. Check lamps.
Replace defective lamps (para. 4-21)
5. SERVICE BRAKE DOES NOT HOLD TRAILER
Check adjustment of service brake assembly.
Adjust service brake assembly (para 4-23).

Section V. UNIT MAINTENANCE PROCEDURES

4-9. **General.** The following paragraphs provide procedures to maintain and functionally test the Manifold Servicing Units and Booster Pump. Unit level procedures for the Air and Oxygen Manifold Servicing Units are identical for each maintenance task and therefore are only provided once. When working on the type I and type II manifold servicing units, make sure the trailer is stable Set both jacks when possible and place chocks under each wheel Before working on the trailer, ensure it is stable. If the procedures require the trailer to be raised, be sure and place suitable blocking under the frame to prevent the trailer from falling. There are several different models of the trailer in service. Perform only those maintenance procedures applicable to your equipment.

4-10. **Maintenance and Reentry Control Procedures.** Maintenance and Reentry Control Procedures are established to document and maintain the integrity, cleanliness, and safety of the system and to ensure work is done lAW proper specifications and procedures in Section VII of this chapter.

Reentry control (REC) applies to the air system portion of the Type I and Type II Manifold Service Units, Oxygen Booster Pump, and Oxygen Charging Station.

A reentry control report must be completed and approved for each maintenance action and a control log will be maintained for each system. A sample REC Report Is shown at figure 4-1, and a sample control log Is shown at figure 4-2.

Instructions for completing the REC Report are as follows. (figure 4-1)

a. REC Nr. A sequential three digit number assigned from the control log beginning with 001.

b. Julian Date: Julian Date

c. 2407 Control Nr: Taken from the DA Form 2407, upper lefthand corner.

d. UIC: Unit Identification Code

e. System: Type I and II Manifold Service Units/Oxygen Booster Pump/Oxygen Charging Station.

f. Subassembly: The portion of the system that is being worked on i.e , Type I Manifold Service Unit.

g. Component: The part of the subassembly that will be fixed, i e., Gage, Valve, etc.

h. S/N: Subassembly Serial Number.

i. P/N: Component Part Number.

j. Fault Analysis Performed Describe the problem and any special procedures used to isolate the problem.

k. Action Taken Check the appropriate maintenance action.

I. Maint Level Enter the single element maintenance code IAW the MAC.

m. Work time: Enter the required time to complete the task (hours and tenths).

n. Work Description Describe the procedures used to perform the required maintenance.

o. Old Component Disposition What did you do with the old part (i.e, disposed, turned into general support for repair, etc.)

p. Was system integrity compromised? Check appropriate box.

q. If yes, cleaning procedures used: Enter the cleaning procedure used IAW Section VII, Chapter 4.

r. Was Air Sample Taken? Check appropriate box and enter the analysis results.

s. Reentry Control Log Completed. Enter Initials after log entry is made.

t. Work Performed By: Enter name, rank, title of person performing maintenance.

u. Work Checked By: Enter name, rank, title of person performing check.

REENTRY CONTROL (REC) REPORT

REC NR: _____ JULIAN DATE: _____
2407 Control NR: (Attach 2407) _____ UIC: _____

SYSTEM: _____
SUB-ASSEMBLY: _____ S/N: _____
COMPONENT: _____ P/N: _____

FAULT ANALYSIS PERFORMED: (Describe Problem)

ACTION TAKEN: (Check One)

TEST: _____ ADJUST: _____ REPLACE: _____ REPAIR: _____ OTHER: _____

MAINT LEVEL: _____ WORK TIME: ____ HRS.

WORK DESCRIPTION:

OLD COMPONENT DISPOSITION:

WAS SYSTEM INTEGRITY COMPROMISED? YES _____ NO _____
IF YES, CLEANING PROCEDURE USED:

WAS AIR SAMPLE TAKEN? YES _____ NO _____
ANALYSIS RESULTS:

REENTRY CONTROL LOG COMPLETED: (INITIAL) _____

WORK PERFORMED BY: _____ _____
LAST FIRST MI RANK/TITLE DATE

WORK CHECKED BY: _____ _____
LAST FIRST MI RANK/TITLE DATE

Figure 4-1. REC Report.

Instructions for completing the reentry control log area as follows: (figure 4-2)

a. System Enter system acronym "MSU".

b. UIC Unit Identification Code

c. Page Nr Enter sequential log page number, beginning with 01

d. REC Nr Reentry Control Number, a sequential three digit number assigned to track entries from the REC Reports beginning with 001.

e. Subassembly The portion of the system being worked on (i.e, Type I, Charging Station, etc.) transcribed from REC Report.

f. S/N Serial Number of the subassembly

g. Component The part of the subassembly that will be fixed (i e, gage, valve, etc.)

h. P/N. Part Number of the component

i. Julian Date Julian date

j. Action Taken: Enter replace, repair, etc., from REC Report

k. Maint Level Enter maintenance level from REC Report.

I. Work Time Enter time required to complete task from the REC Report

m. Remarks Enter pertinent remarks, cleaning data, etc., in this block

The reentry control report will be completed for all maintenance actions conducted on the equipment. A record of the maintenance procedures must be maintained for the life of the system This requirement is in addition to other maintenance documentation required through TAMMS or unit requirements.

WARNING

Do not work on trailer mounted equipment unless the trailer is properly stabilized.
The trailer could shift or fall resulting in injury or death to personnel.

SYSTEM. REENTRY CONTROL LOG PAGE NR _____

UIC:

REC NR	SUB-ASSEMBLY	S/N	COMPONENT	P/N	JULIAN DATE	ACTION TAKEN	MAINT LEVEL	WORK TIME	REMARKS

Figure 4-2. REC Log.

4-11. Flex Hose (CGA-346 or CGA-540).

This task covers: Test.

INITIAL SETUP

Equipment Condition

Storage gas cylinders are Installed and connected to front panel quarter-turn valves.

WARNING

High pressure air or oxygen is dangerous. Stand clear of flex hose while making this test. Wear safety glasses when working with high pressure air or oxygen.

Test. (figure 4-3)

(1) Open door panels (1)

(2) Open top cover (2).

(3) Open supply valve (3)

(4) Observe front panel pressure gage (4) for steady pressure and listen for air leaks.

NOTE

If gage pressure drops use soapy water solution and check connections for leaks and tighten.

(5) Open control valve, quarter-turn (5) and close supply valve (3).

(6) Slowly open recharge valve (6) and bleed system.

(7) Close control valve, quarter-turn (5) and bleed valve (7).

(8) Notify supervisor or dive master If leak is detected and cannot be stopped.

(9) Close door panels (1) and top cover (2)

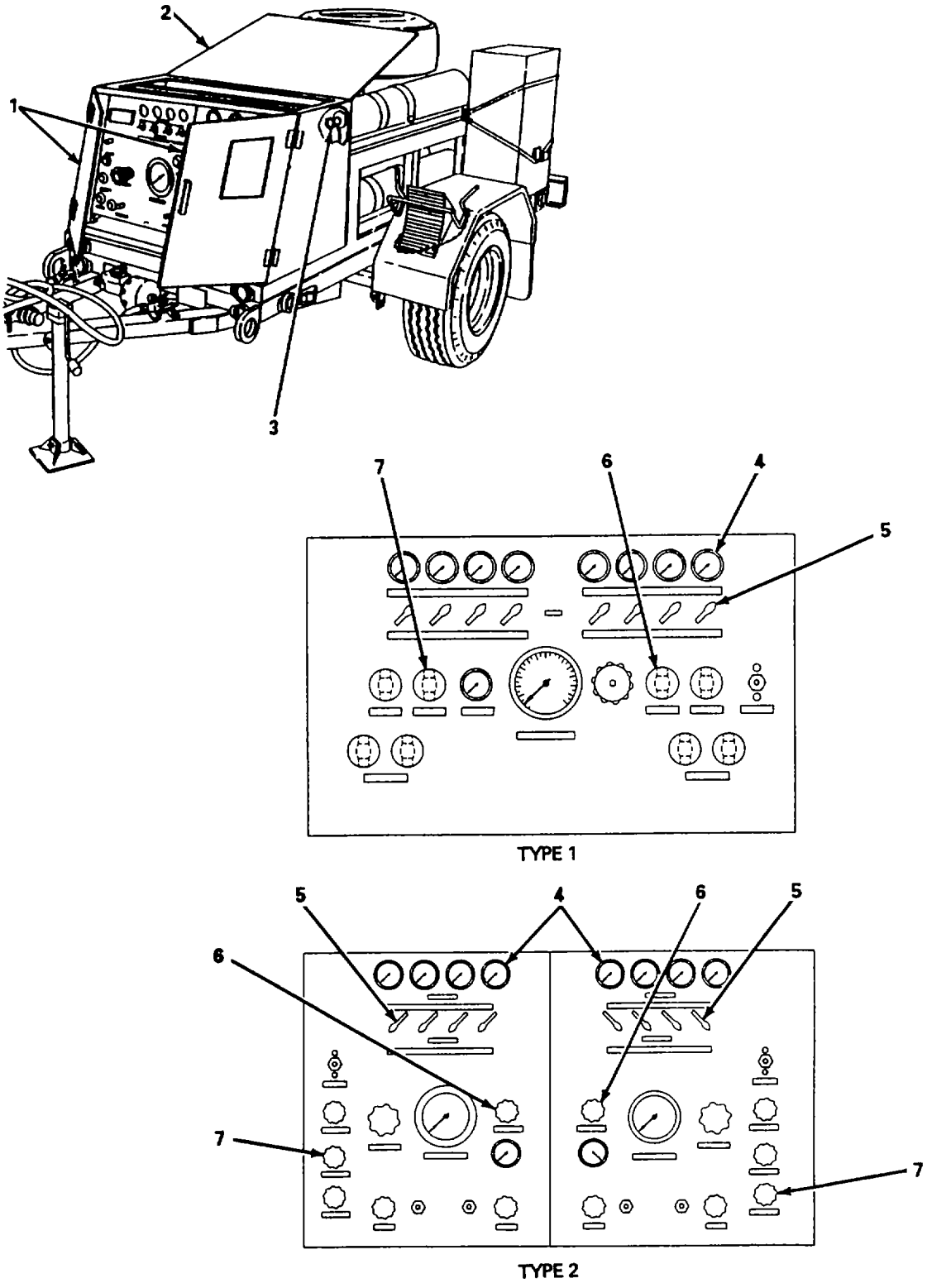


Figure 4-3. Flex Hose (CGA-346 or CGA-540), Test.

4-12. Pressure Gage (Air/Oxygen).

This task covers: Test.

INITIAL SETUP

Equipment Condition:

Manifold Servicing Units, piping and hose are vented of all pressure All valves are closed including bleed valves

WARNING

High pressure air or oxygen is dangerous, do not direct air or oxygen stream toward body. Serious injury or death may result from high pressure gas entering the skin. Wear safety glasses when working with high pressure air or oxygen.

Test. (figure 4-4)

(1) Open front doors (1).

(2) Open top cover (2).

(3) Open air or oxygen cylinder storage valve (3) and observe associated pressure gage (4).

(4) Open control valve, quarter-turn (5) to pressunze supply manifold.

(5) Open the remaining control valve quarter-turn (5).

(6) Observe all cylinder pressure gages (4).

(7) They should all read the same pressure within 5% When one gage reads high or low, notify your supervisor or dive master.

(8) Close cylinder valve (3).

CAUTION

Stand clear of recharge connector (6) on front panel when venting high pressure gas

(9) Open recharge valve (7) and vent system.

(10) Close all control valve quarter-turn (5)

(11) Close recharge valve (7).

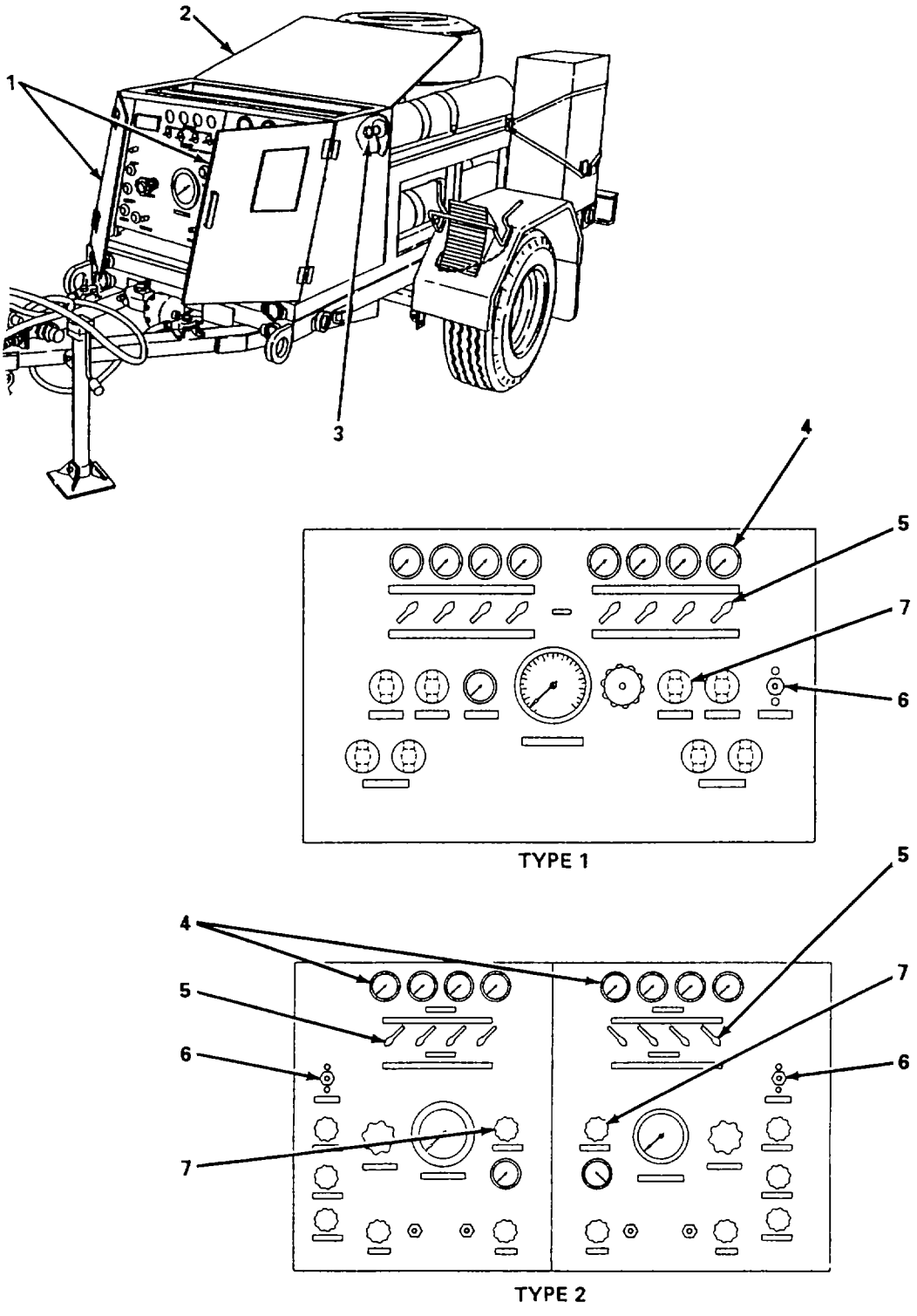


Figure 4-4. Pressure Gage (Air or Oxygen), Test.

4-13. Manifold Service Unit.

This task covers: Repair

INITIAL SETUP

Tools:

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

WARNING

High pressure air or oxygen is dangerous, do not direct air or oxygen stream toward body. Serious injury or death may result from high pressure gas entering the skin. Wear safety glasses when working around high pressure air or oxygen.

Repair.

(1) *Replace spring catch* (figure 4-5)

(a) Open top cover (1).

(b) Pull up on pin (2) and remove spring (3), spring (4) and bracket (5)

(*c)* Install bracket (5), spring (4), spring (3) and secure with pin (2)

(d) Close top cover (1)

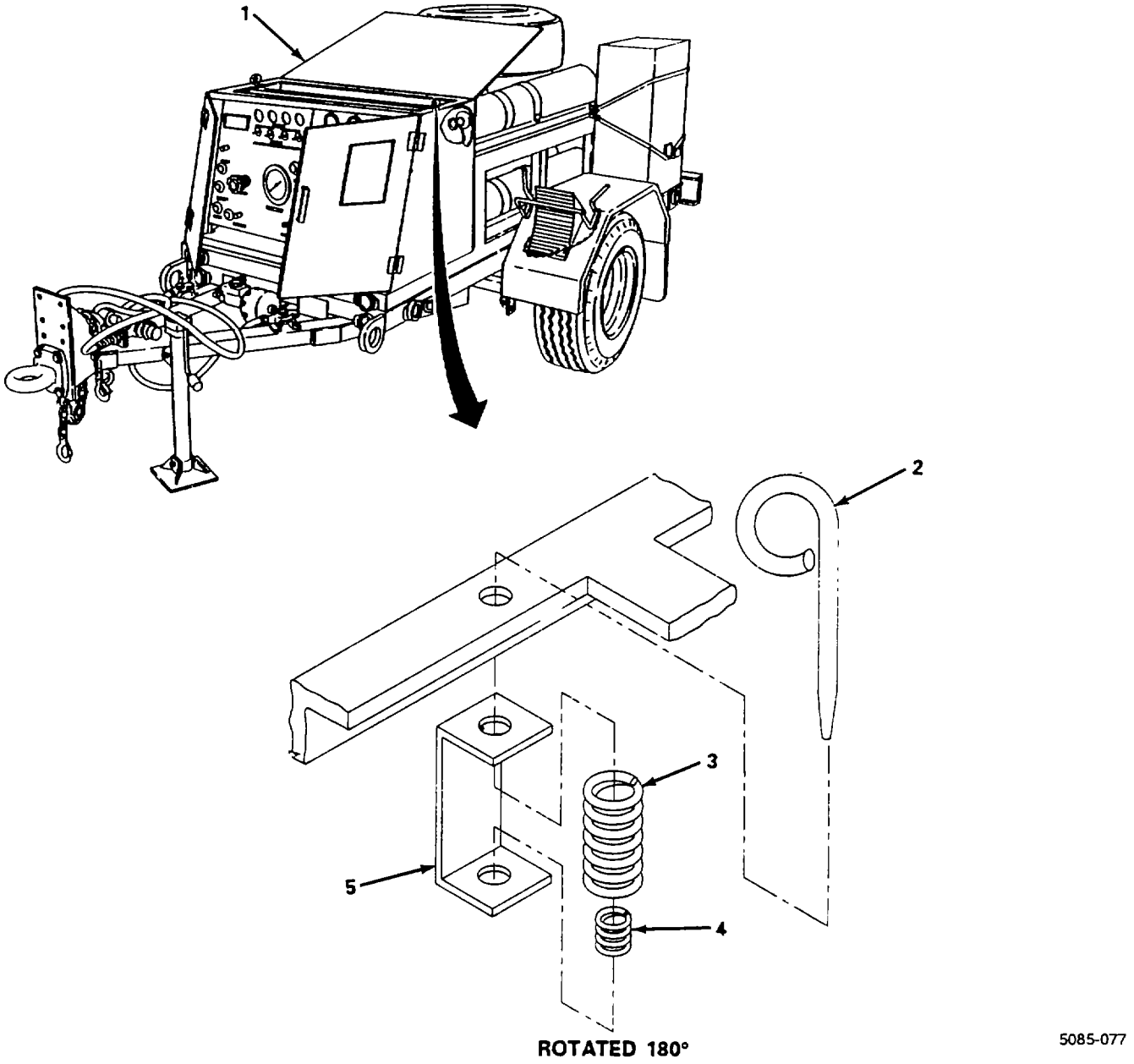


Figure 4-5. Spring Catch, Replace.

4-13. Manifold Service Unit (Cont).

(2) *Replace eye latch.* (figure 4-6)

(a) Remove nut (1) and remove eye latch (2).

(b) Install eye latch (2) and secure with nut (1)

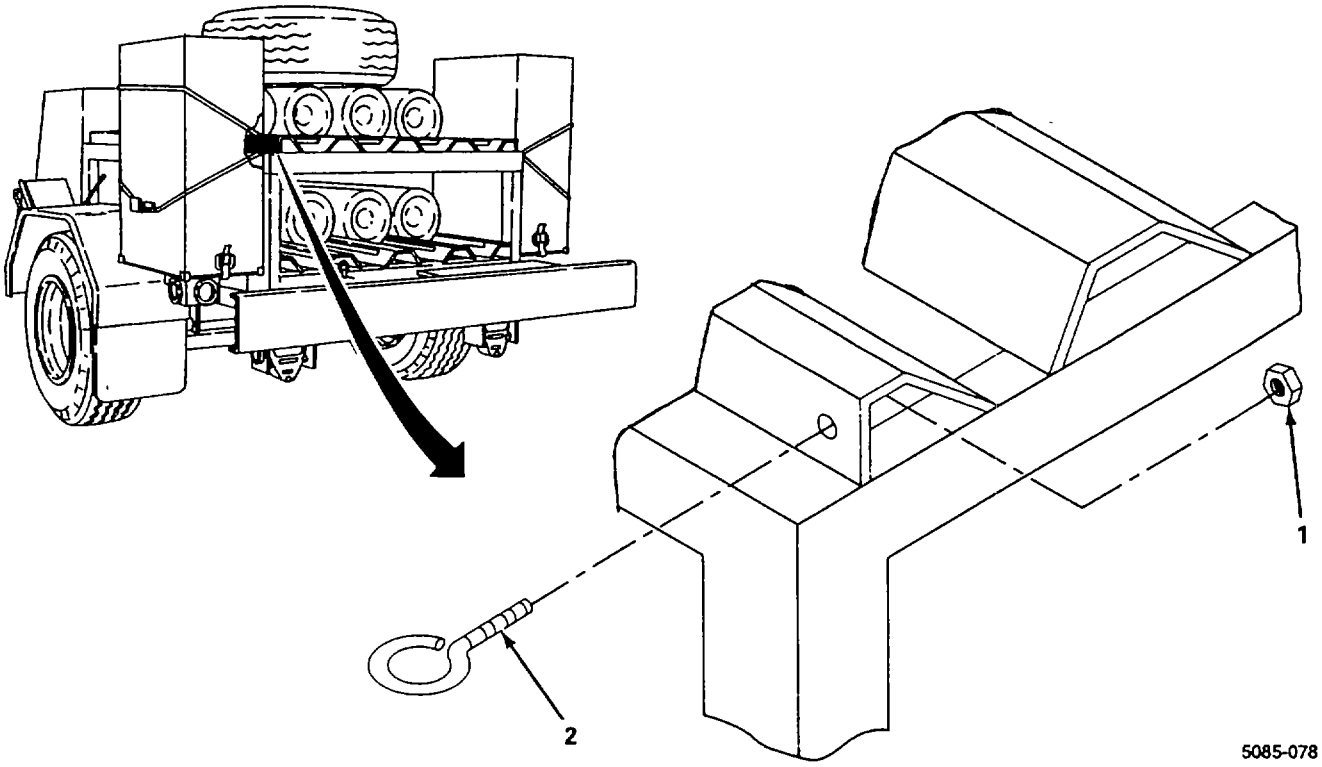


Figure 4-6. Eye Latch, Replace.

(3) Replace tool box (figure 4-7).

(a) Open top cover (1).

(b) Remove four screws (2), and locknuts (3) and remove tool box (4).

(c) Install tool box (4) and secure with four screws (2), and locknuts (3).

(d) Close cover (1).

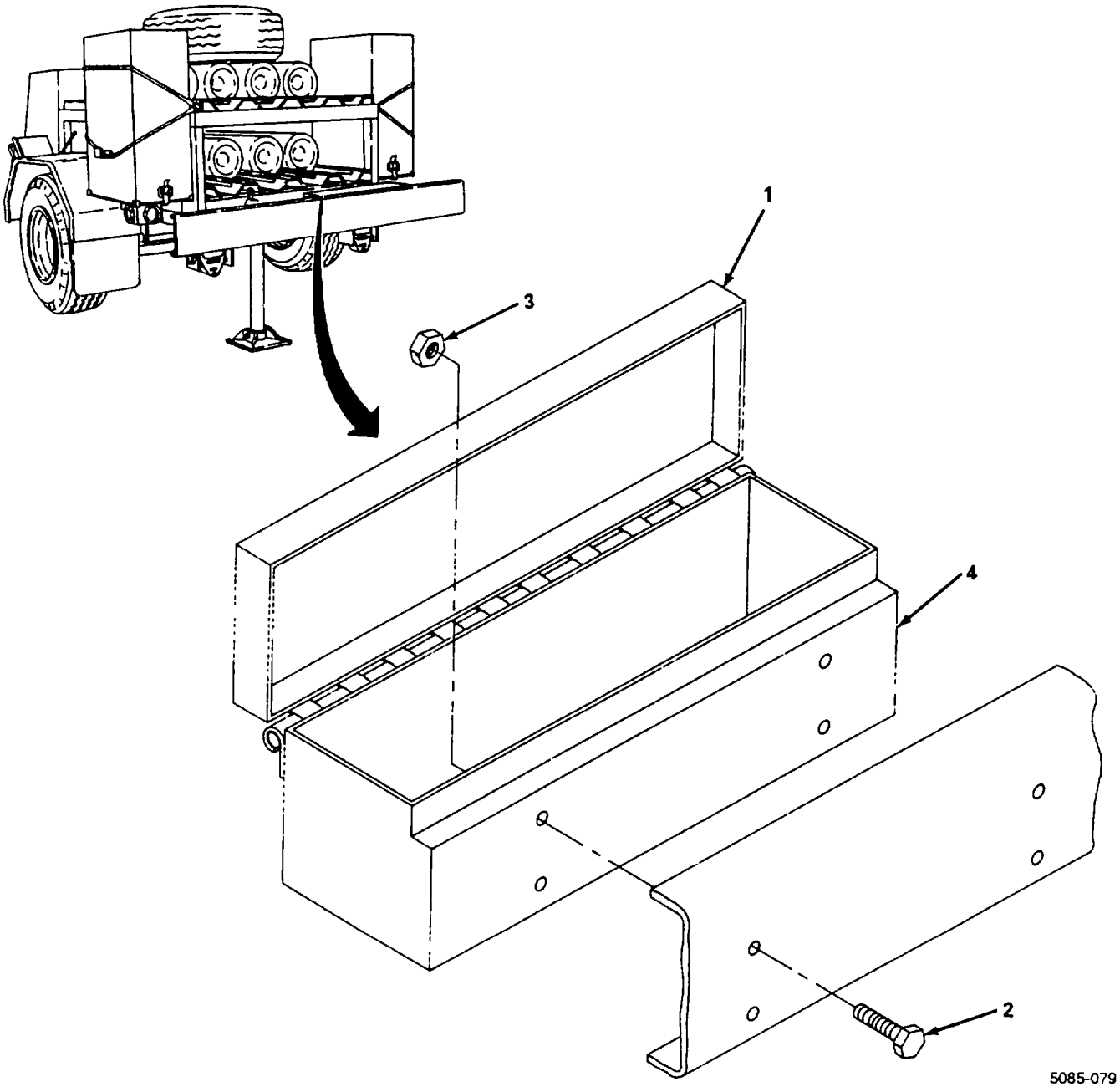


Figure 4-7. Tool Box, Replace.

4-13. **Manifold Service Unit (Cont).**

NOTE

There are several reflectors on the trailer. The replace procedures are the same for all of them.

(4) *Replace reflectors. (figure 4-8)*

(a) Remove two bolts (1), lockwashers (2) and nuts (3) and remove reflector (4).

(b) Install new reflector (4) and secure with two bolts (1), lockwashers (2) and nuts (3).

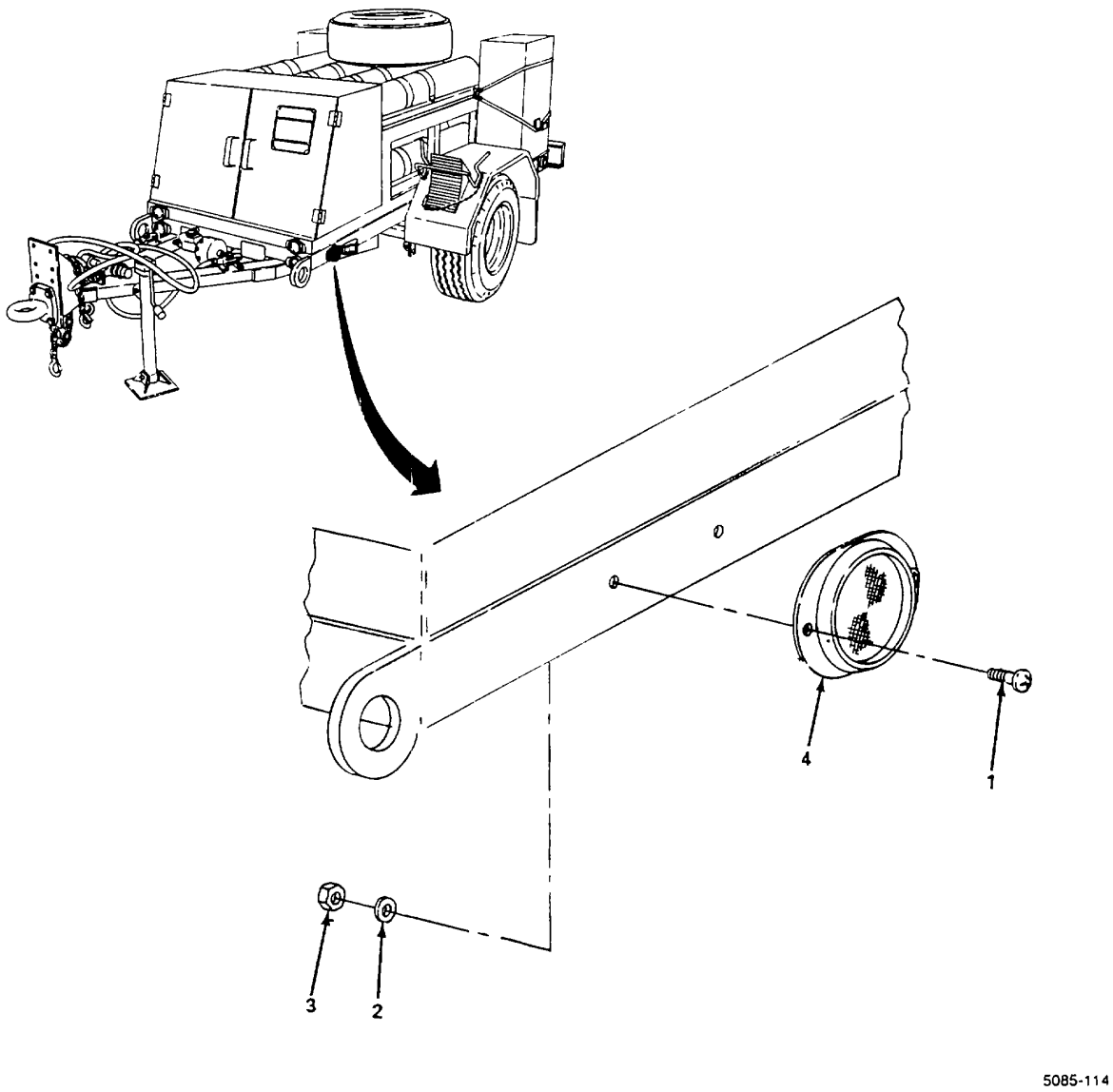


Figure 4-8. Reflectors, Replace.

4-14 **Cover**

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

a. *Replace.* (figure 4-9)

(1) Open top cover (1).

(2) Remove six screws (2), washers (3), and locknuts (4).

(3) Remove cover (1) from frame (5).

(4) Install cover (1) and secure with six screws (2), washers (3), and locknuts (4).

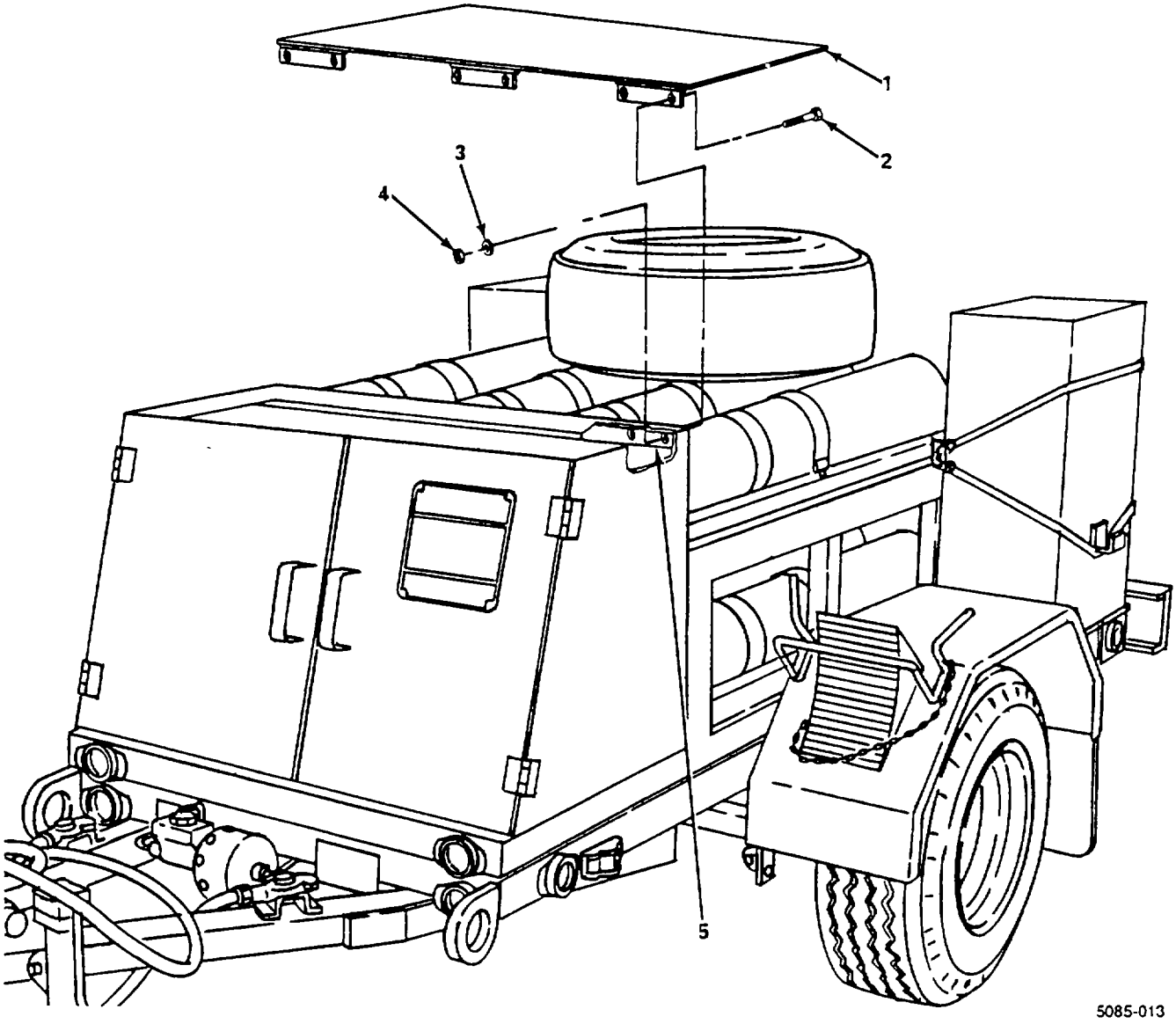


Figure 4-9. Cover, Replace.

4-14. **Cover (Con't).**

b. *Repair*. (figure 4-10)

(1) Remove cover (para. a.).

(2) Inspect cover (1) and remove minor dents, and repaint.

(3) Inspect hinges (2) and replace cover (1) if hinges are excessively worn, cracked, or otherwise damaged.

(4) Install cover (para. a.).

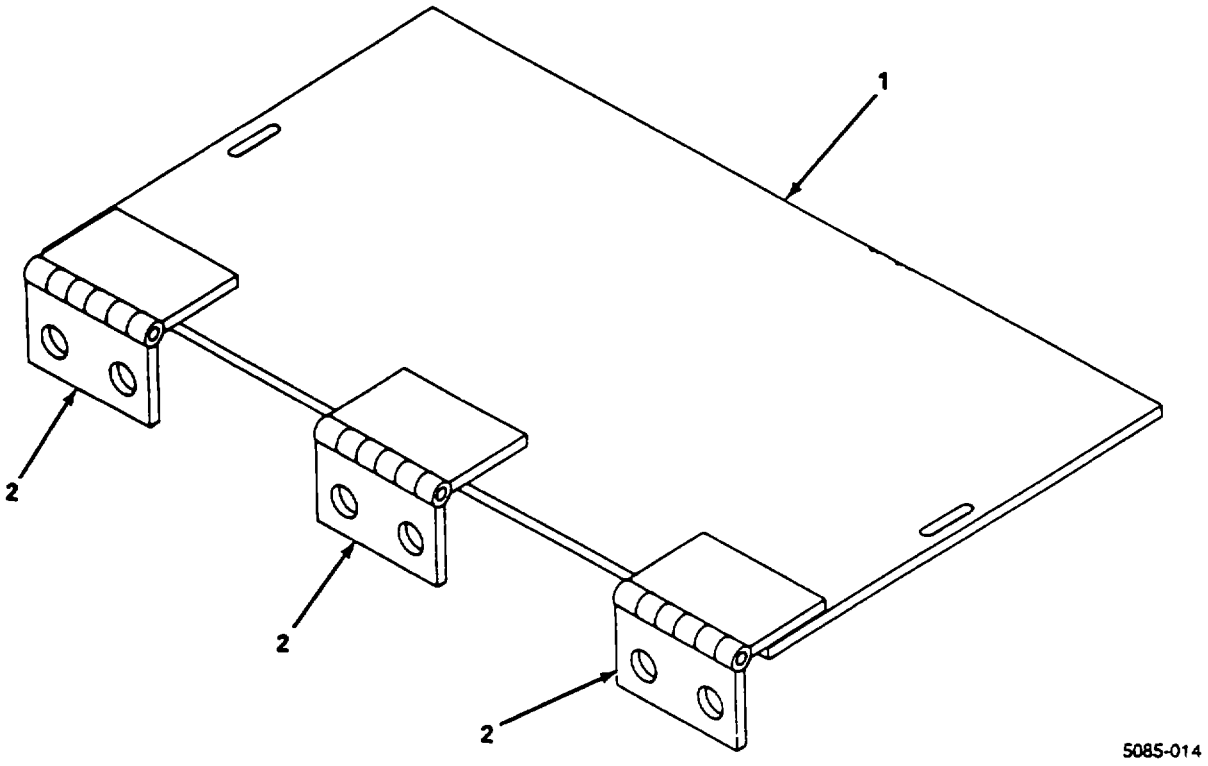


Figure 4-10. Top Cover, Repair.

4-15. Side Panel.

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

a. *Replace.* (figure 4-11)

NOTE

There is a left and right side panel. The replace procedures are the same for both.

(1) Open front doors (1) and (2).

(2) Open top cover (3).

(3) Remove eleven screws (4) and nuts (5) and remove side panel (6).

(4) Install side panel (6) and secure with eleven screws (4) and nuts (5).

(5) Close top cover (2).

(6) Close front doors (1).

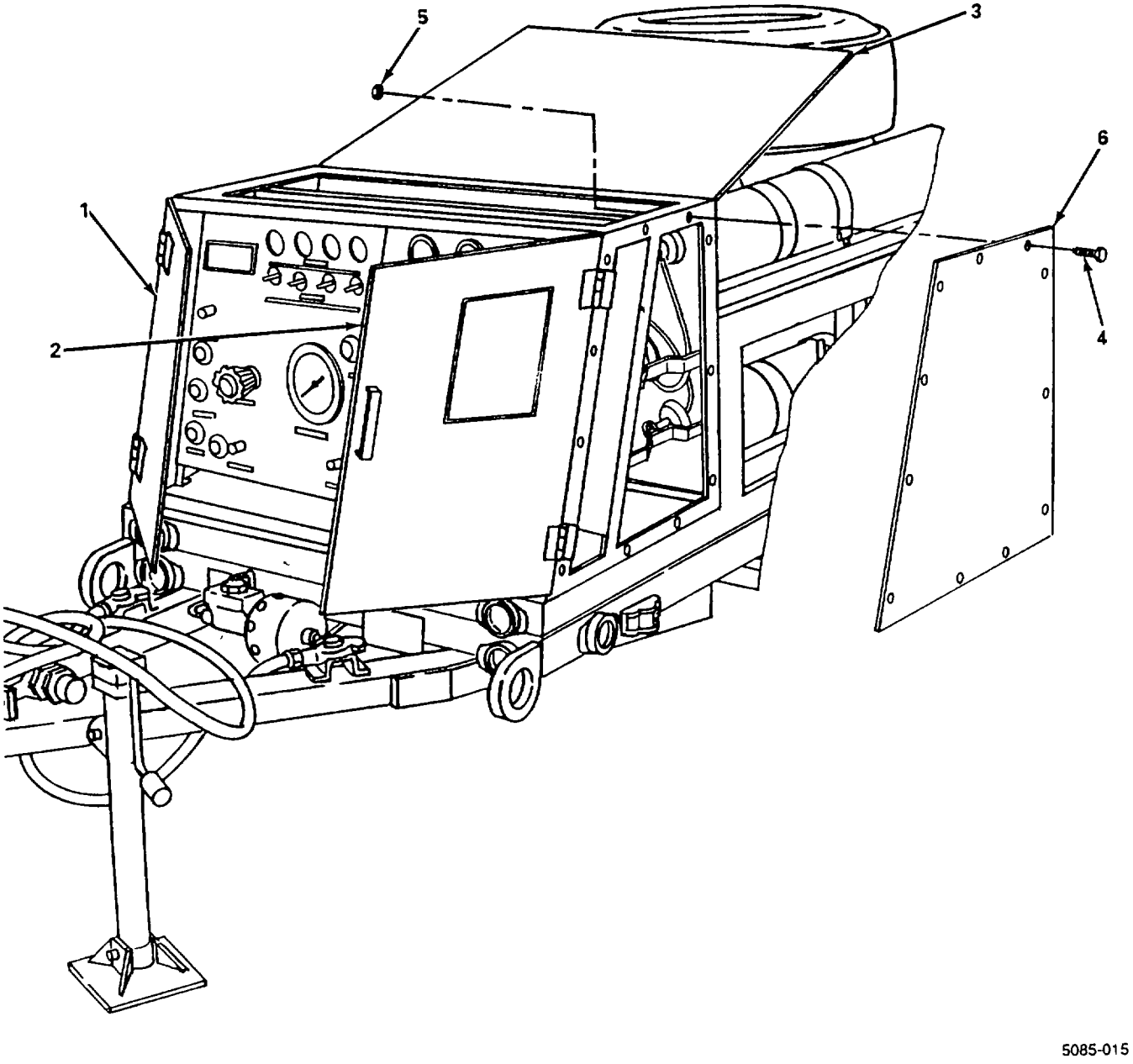


Figure 4-11. Side Panel, Replace.

4-15. Side Panel (Cont).

b. *Repair.* (figure 4-12)

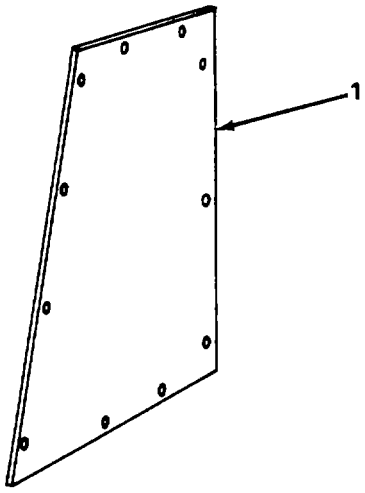
(1) Remove side panel (para. a).

(2) Inspect side panel (1).

(3) Remove minor dents and repaint as needed.

(4) Replace side panel (1) if badly damaged.

(5) Install side panel (para. a.).



5085-016

Figure 4-12. Side Panel, Repair.

4-16 Door Panels.

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

a. *Replace.* (figure 4-13)

NOTE

There is a left and right door panel. The replace procedures are the same for both.

(1) Open doors (1) and (2).

(2) Remove four screws (3), washers (4), and nuts (5) and remove door panel (1).

(3) Install door panel (1) and secure with four screws (3), washers (4), and nuts (5).

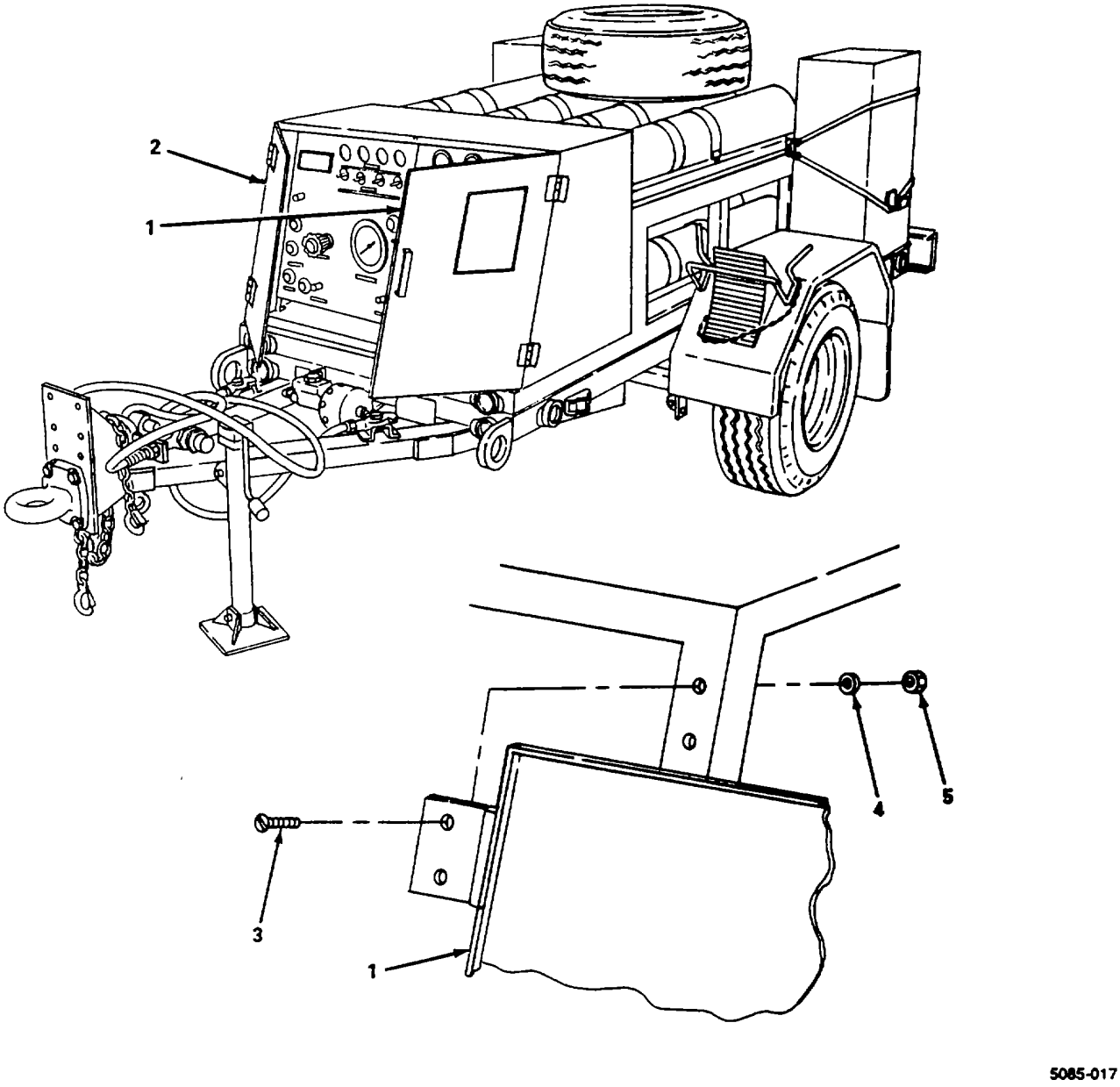


Figure 4-13. Door Panel, Replace.

4-16. Door Panels (Cont).

b. *Repair.* (figure 4-14)

(1) Remove door panel (para. a)

NOTE

Only the right hand door panel has latches.

(2) Remove two screws (1) and nuts (2) and remove latch (3).

(3) Install latch (3) and secure with two screws (1) and nuts (2).

(4) Inspect door panel (4) and remove minor dents.

(5) Repaint door panel (4) as needed.

(6) Install door panel (para. a.).

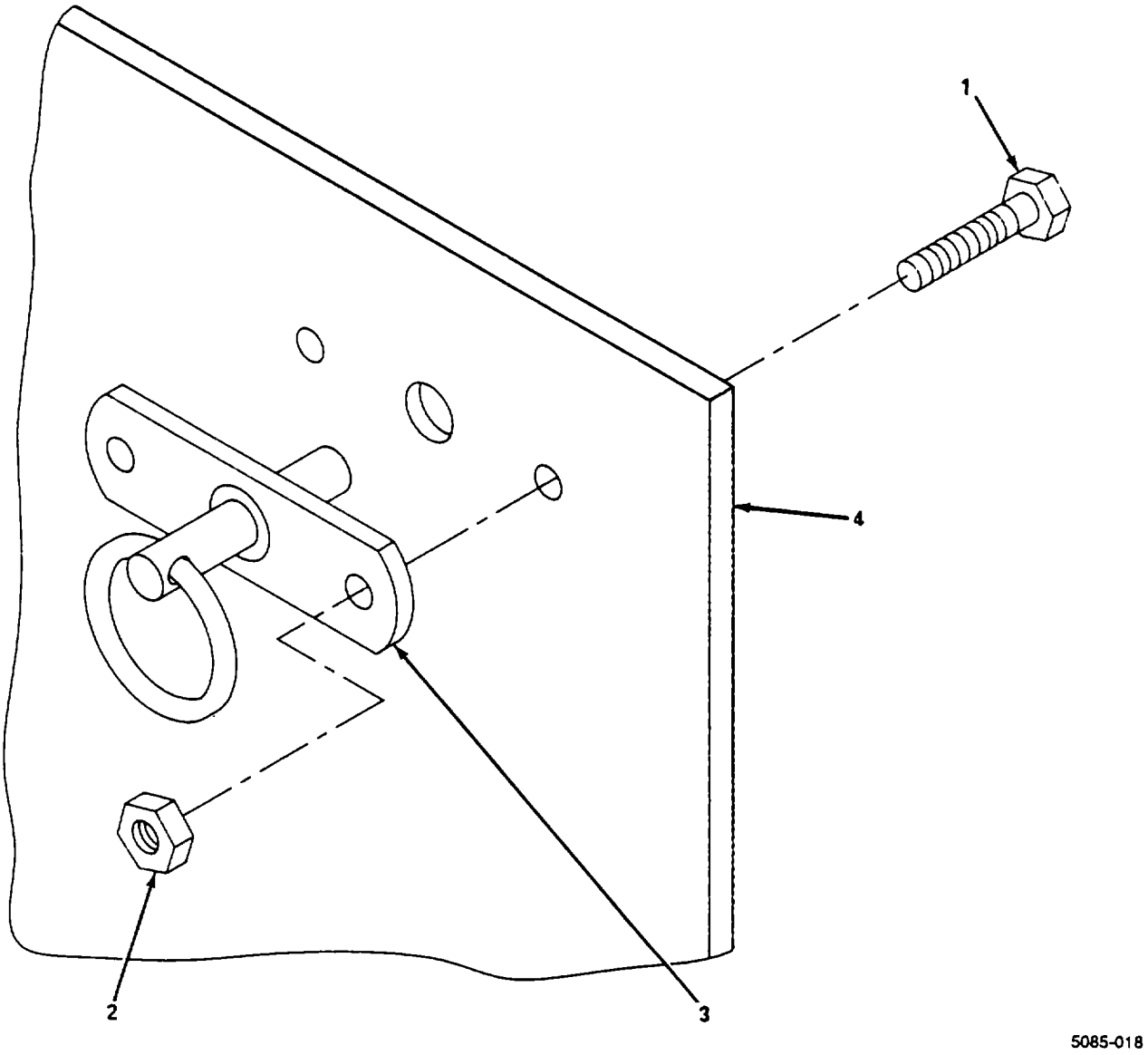


Figure 4-14. Door Panel, Repair.

4-17. Undershield.

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Side panels removed (para. 4-12).

Materials/Parts

Undershield

a. Replace. (figure 4-15)

(1) Open door panels (1) and (2).

(2) Open tool box cover (3).

(3) Remove nine screws (4), flat washers (5), and locknuts (6) securing tool box (7) to frame (8).

(4) Remove three screws (9) from front lip on tool box (7) and remove tool box (7).

(5) Remove seven screws (10), washer (11), and locknuts (12) and remove the undershield (13).

(6) Install undershield (13) and secure with seven screws (10), washers (11), and locknuts (12).

(7) Install tool box (7) and secure with three screws (9).

(8) Install nine screws (4), flat washers (5), and locknuts (6).

(9) Close tool box cover (3).

(10) Close door panels (1) and (2).

FOLLOW-ON MAINTENANCE
Install side panels (para. 4-12).

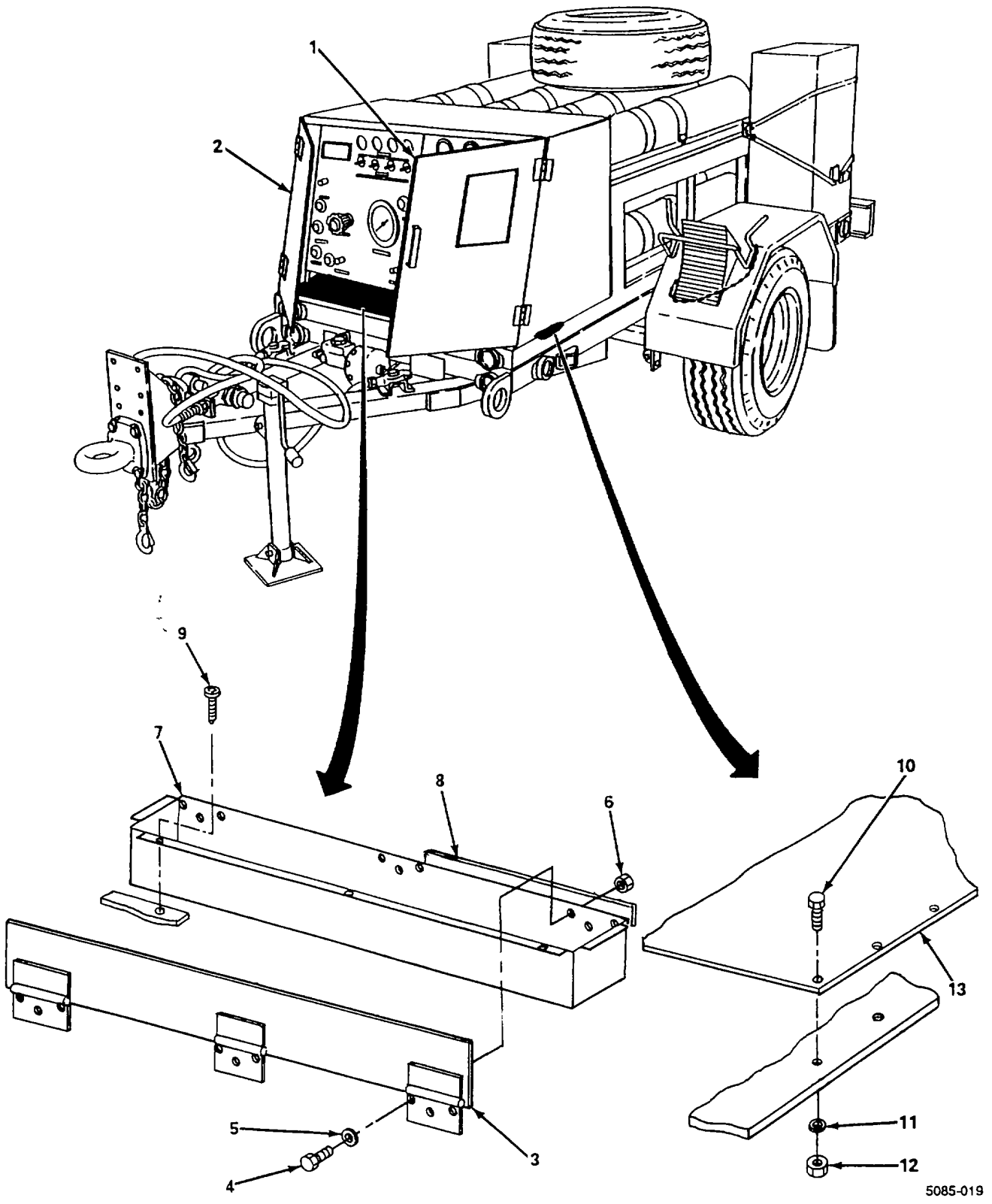


Figure 4-15. Undershield, Replace.

4-17. Undershield (Cont).

b. *Repair* (figure 4-16)

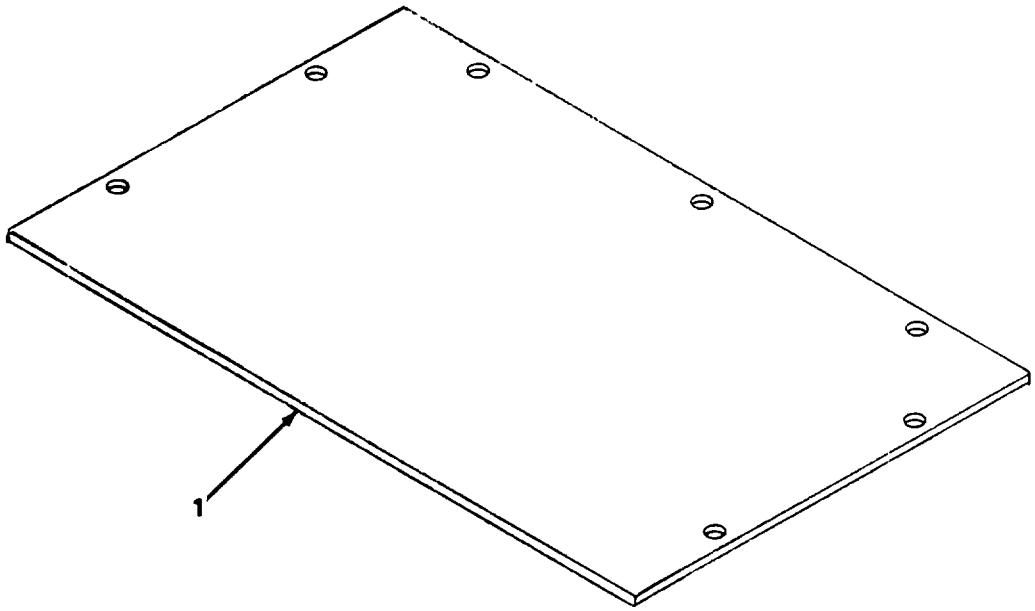
(1) Remove undershield (para. a.)

(2) Inspect undershield (1).

(3) Remove minor dents and repaint as needed.

(4) Replace undershield (1) If severely damaged.

(5) Install undershield (para. a).



5085-020

Figure 4-16. Undershield, Replace.

4-18 Fender.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Replace. (figure 4-17)

(1) Remove chain and chocks (1) from lender (2).

(2) Remove two bolts (3), washer (4), and nuts (5) and remove holder (6).

(3) Remove eight bolts (7), washers (8), and locknuts (9) and remove fender (2).

(4) Remove four screws (10), locknuts (11), and backup plate (12) and remove splash guard (13).

(5) Install splash guard (13) on new fender (2) and secure with backup plate (12), four locknuts (11), and screws (10).

(6) Install fender (2) and secure with eight bolts (7), washers (8), and locknuts (9).

(7) Install holder (6) and secure with two bolts (3), washers (4), and locknuts (5).

(8) Install chain and chock (1).

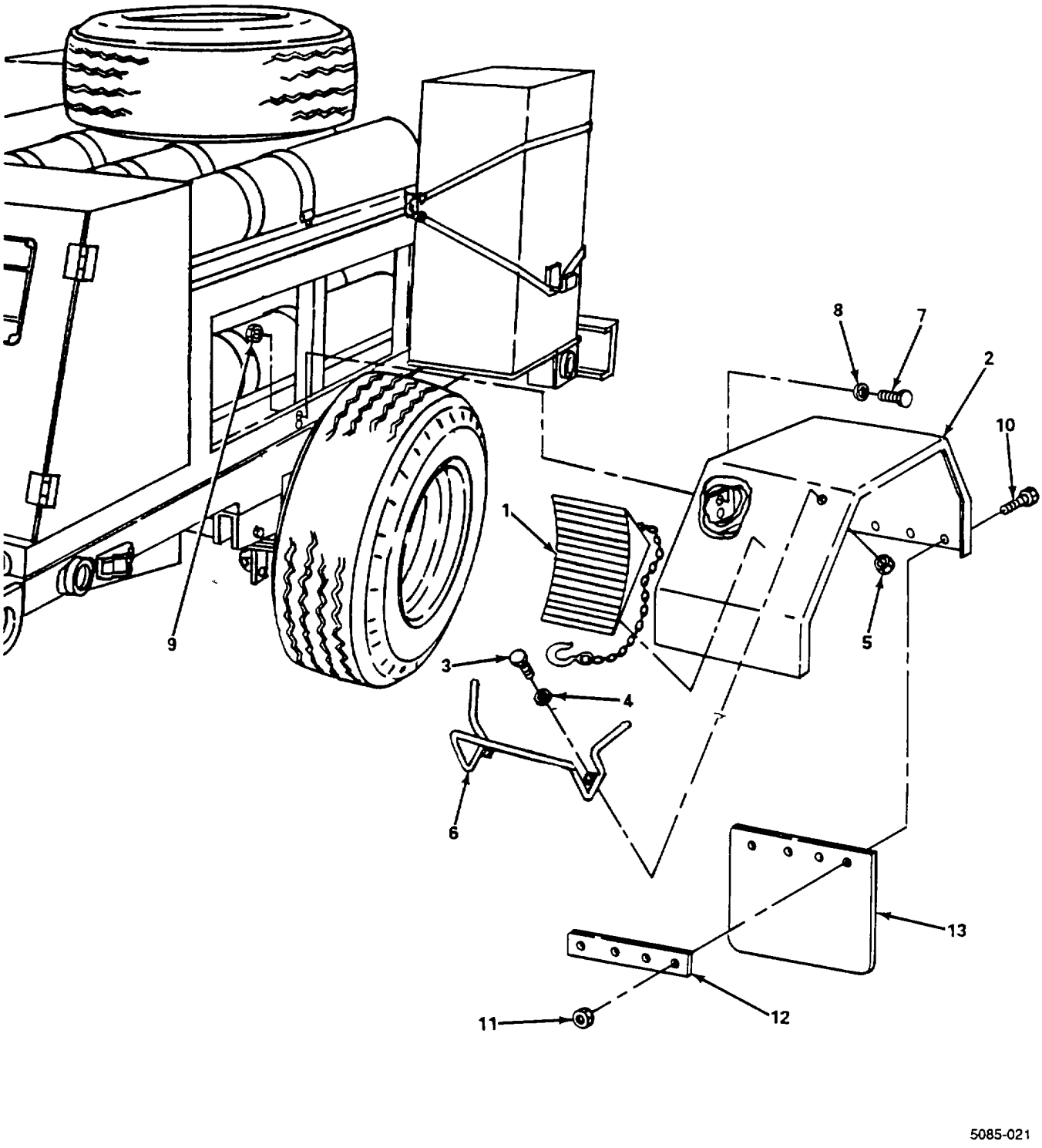


Figure 4-17. Fender, Replace.

4-19. Splash Guard.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Replace. (figure 4-18)

(1) Remove four screws (1), locknuts (2), and backup plate (3) and remove splash guard (4).

(2) Install new splash guard (4) and secure with backup plate (3), four locknuts (2), and screws (1).

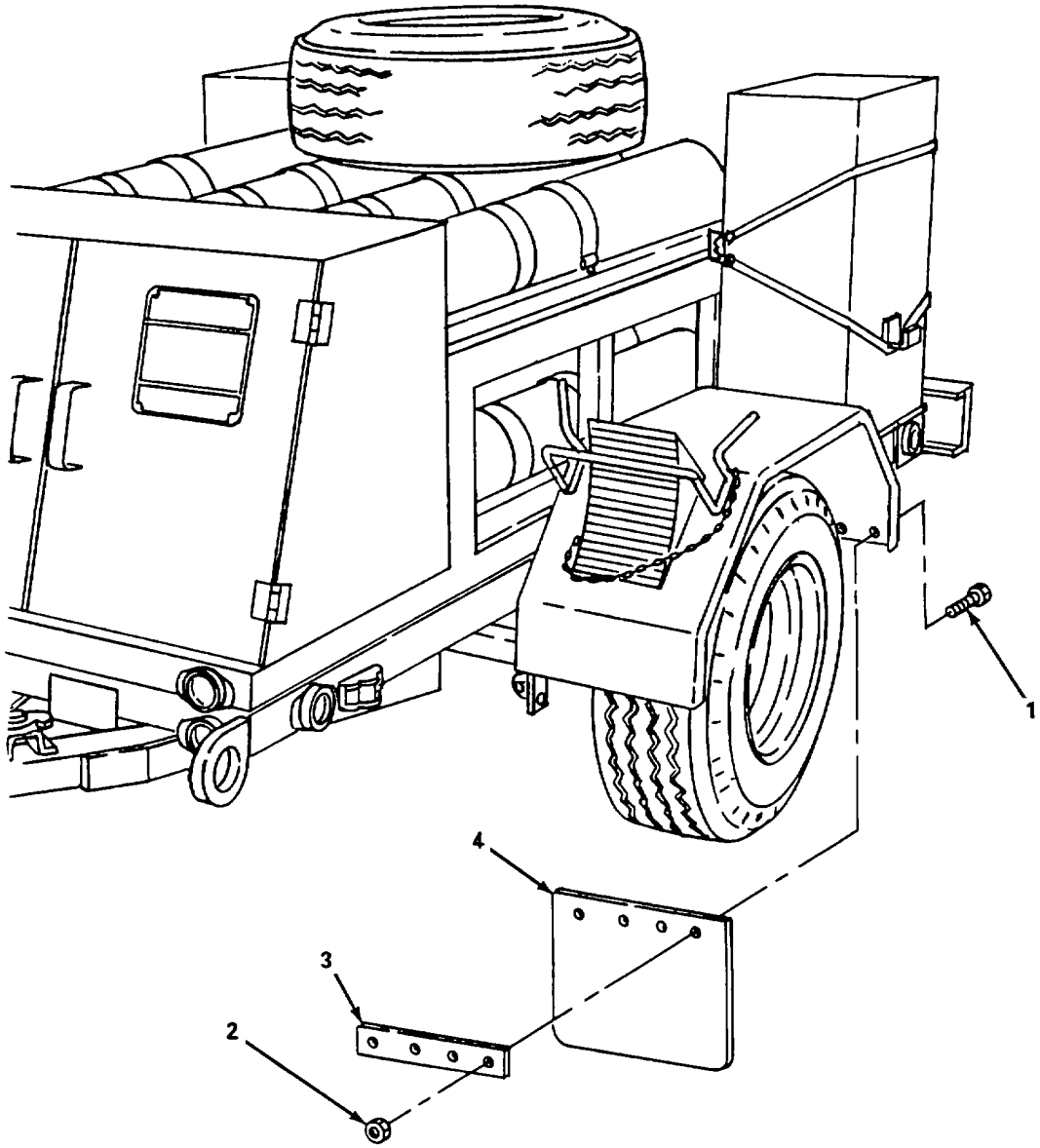


Figure 4-18. Splash Guard, Replace.

4-20. Jack Assembly.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Replace. (figure 4-19)

(1) Remove strap (1) holding jack (2).

(2) Remove lock pin (3) and remove jack (2).

(3) Install new jack (2) and secure with lock pin (3).

(4) Install strap (1).

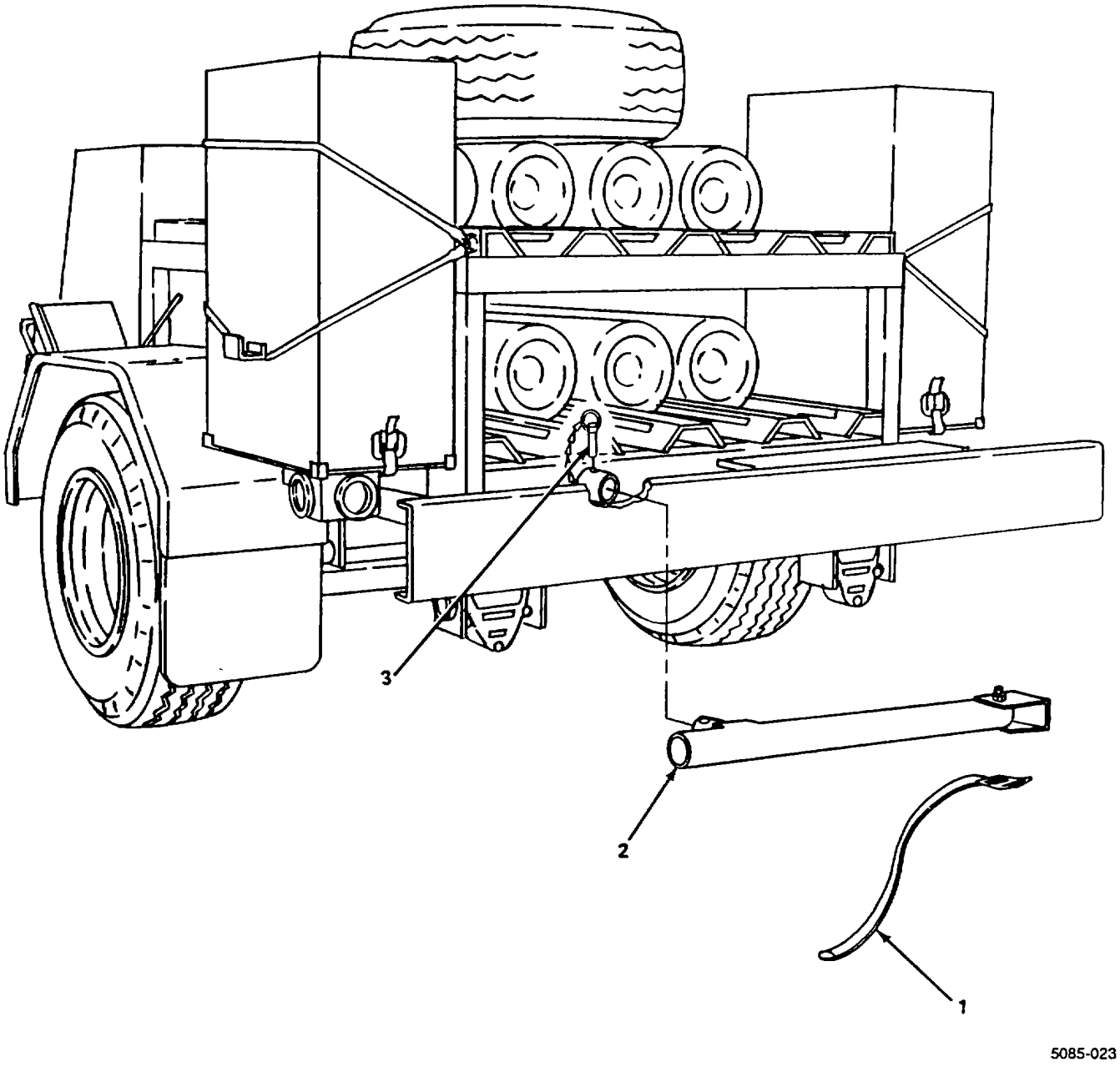


Figure 4-19. Jack Assembly, Replace.

4-21. Service Trough.

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools	*Materials/Parts (Cont)*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Adhesive (Item 1, Appendix D) Teflon Tape (Item 20, Appendix D)

a. *Replace.* (figure 4-20)

NOTE

There are two service troughs, the replace procedures are the same for both.

(1) Unhook two latches (1) and remove service trough (2) from trough support (3).

(2) Remove seven screws (4), lockwashers (5), and nuts (6) and remove trough support (7).

(3) Remove two screws (8), lockwashers (9), and nuts (10) and remove reflector (11).

(4) Repeat step 3 for remaining reflector.

(5) Install reflector (11) on new trough support (7) and secure with two screws (4), lockwashers (5), and nuts (6).

(6) Repeat step 5 for remaining reflector.

(7) Install trough support (7) and secure with seven screws (4), lockwashers (5), and nuts (6).

(8) Install service trough (2) and secure with two latches (1).

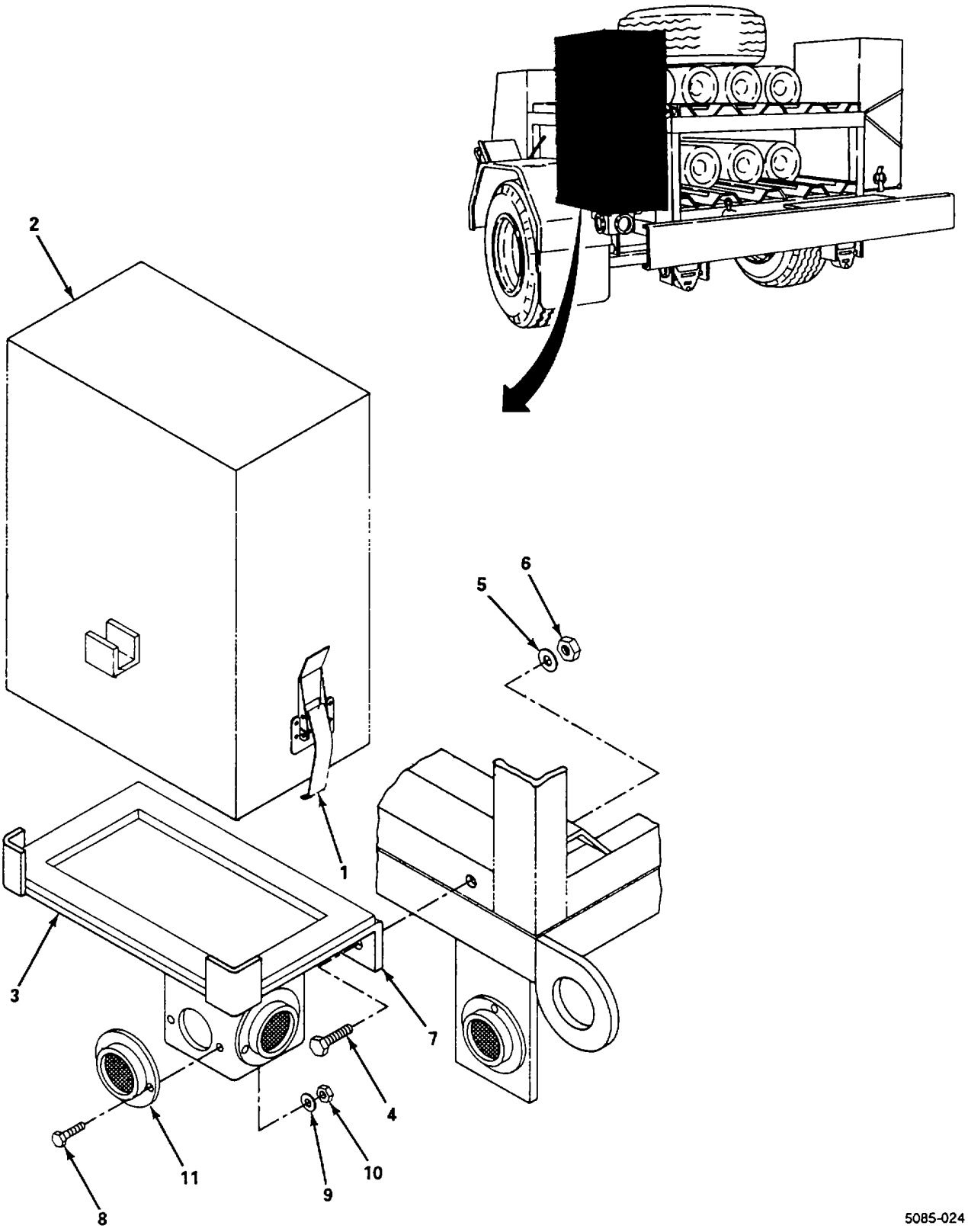


Figure 4-20. Service Trough, Replace.

4-21. Service Trough (Cont).

b. Repair.

(1) Replace latches. (figure 4-21)

NOTE

There are two latches on each service trough, the procedures to replace them are the same.

(a) Remove service trough (para. a.).

(b) Remove four screws (1), washers (2), and two plates (3) and remove latch (4).

(c) Install new latch (4) and secure with four screws (1), washers (2), and locknuts (3).

(d) Install service trough (para. a.).

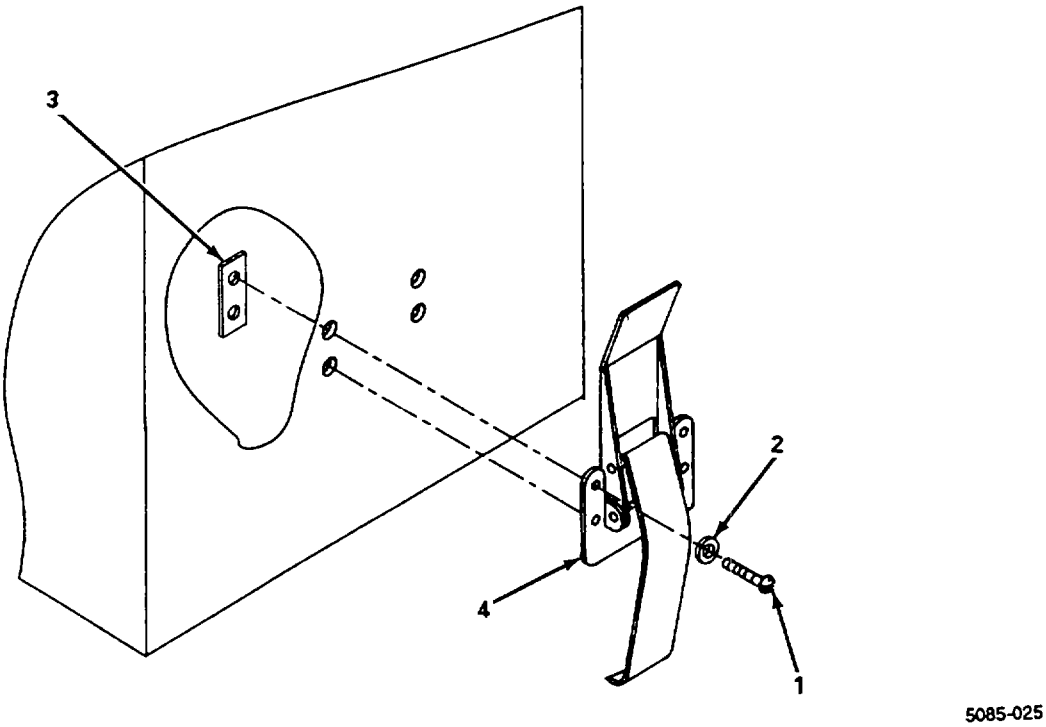


Figure 4-21. Latches, Replace.

(2) Replace drain plug. (figure 4-22)

(a) Remove drain plug (1) from service trough (2).

(b) Wrap threads on new drain plug (1) with teflon tape.

(c) Install new drain plug (1).

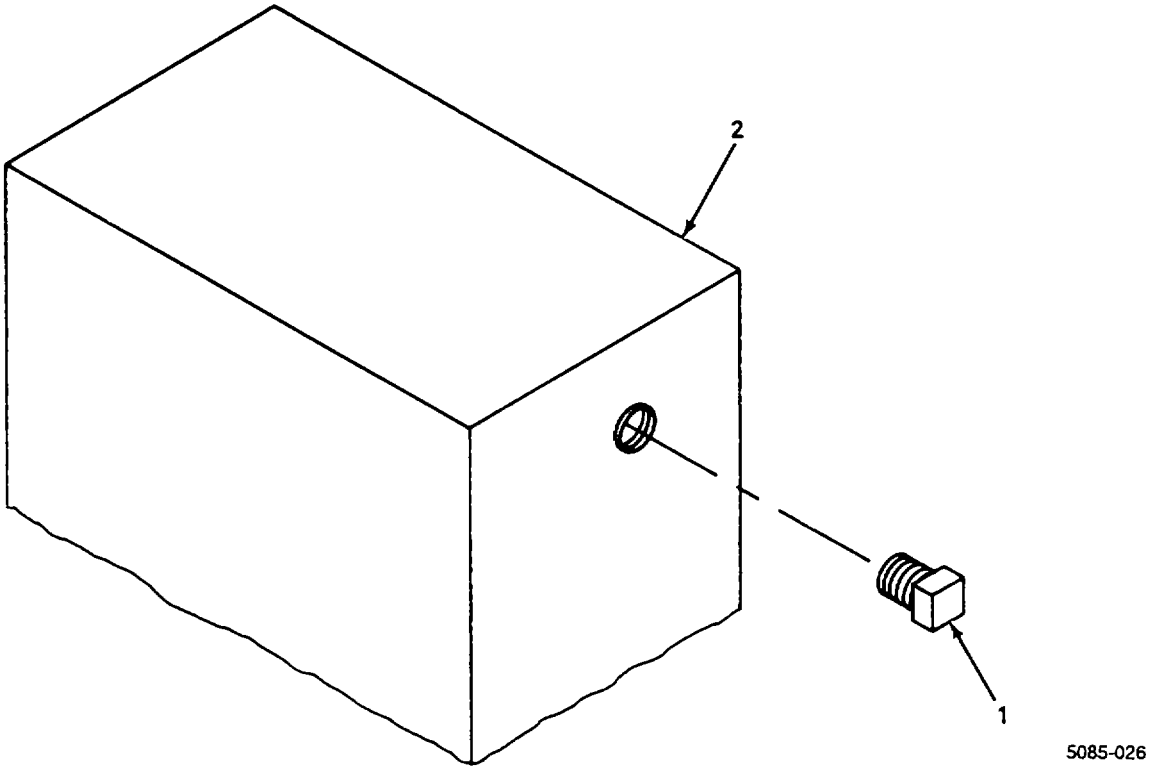


Figure 4-22. Drain Plug, Replace.

4-21. Service Trough (Cont).

(3) Replace webbing strips (figure 4-23).

(a) Remove service trough (para. a).

(b) Remove worn pieces of webbing strips (1).

(c) Clean area of dirt, old adhesive, and foreign material.

(d) Cut new piece of webbing (1) to length.

(e) Apply adhesive to trough support (2) and install new webbing strip (1).

(f) Install service trough (para. a).

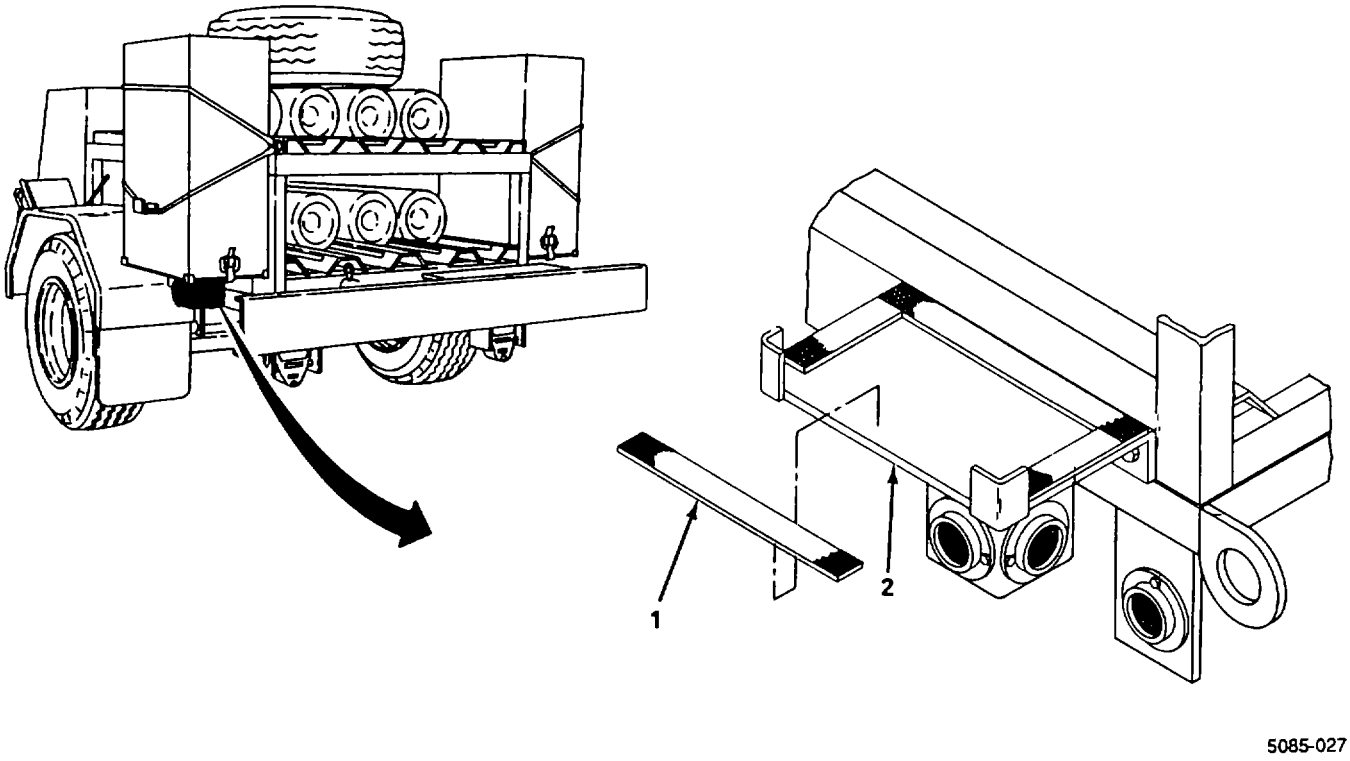


Figure 4-23. Webbing Strips, Replace.

4-22. Light Assemblies.

This task covers:
a. Replace
b. Repair
c. Replace (Marker Light Assembly)
d. Repair (Marker Light Assembly)

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Dry Cleaning Solvent (Item 18, Appendix D)
Rags, Wiping (Item16, Appendix D)

NOTE

The trailer is equipped with two light assemblies. The procedures to replace them are the same for both.

a. *Replace (Combination Light Assembly).* (figure 4-24)

(1) Tag and disconnect four connectors (1).

(2) Remove two bolts (2), and lockwashers (3), and remove light assembly (4).

(3) Install new light assembly (4) and secure with two bolts (2), and lockwashers (3).

(4) Connect four connectors (1) as tagged.

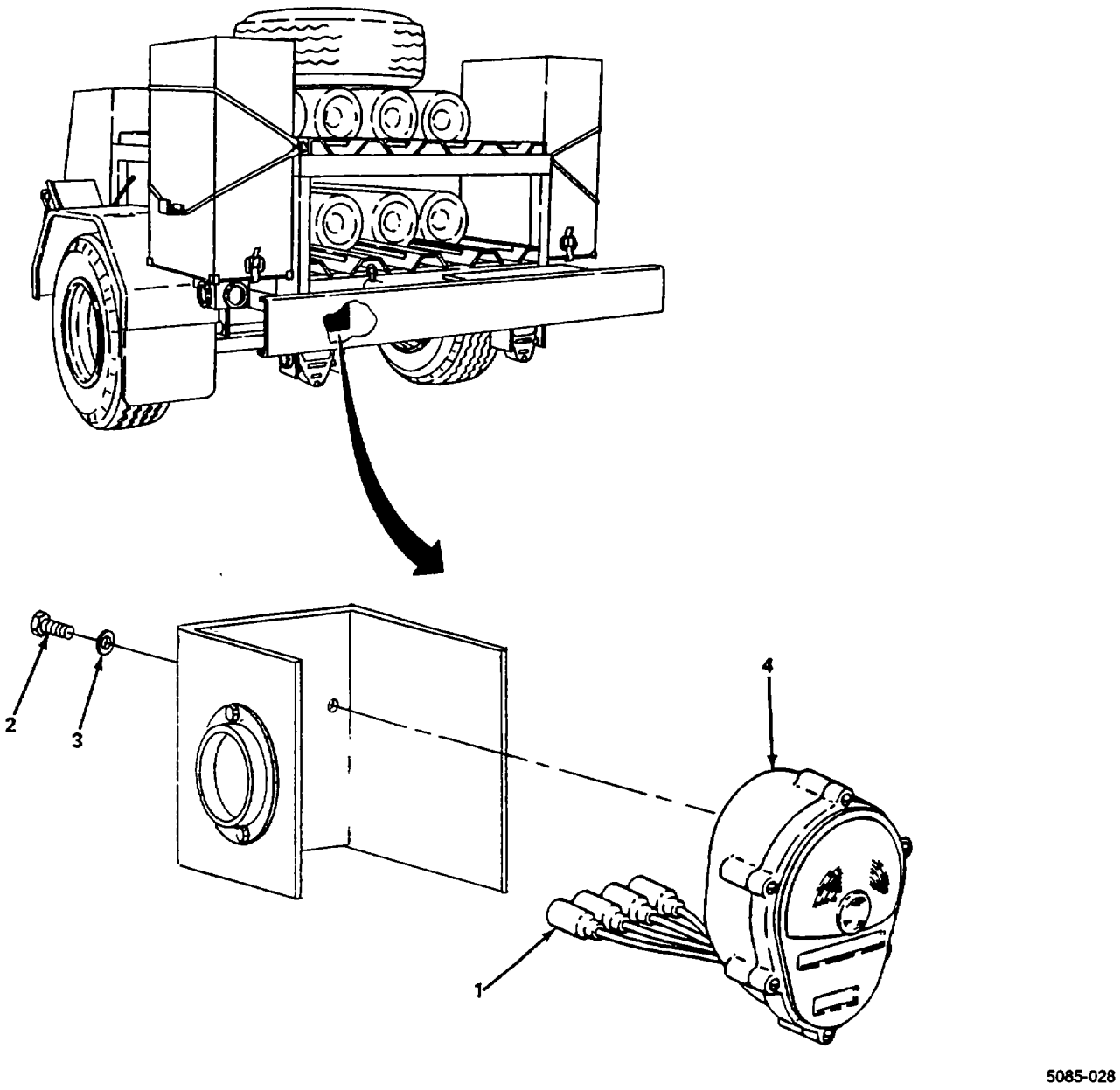


Figure 4-24. Combination Light Assembly, Replace.

4-22. Light Assemblies (Cont).

b. *Repair (Combination Light Assembly).* (figure 4-25)

(1) Loosen six screws (1) and remove door (2) and gasket (3).

NOTE

There are four lamps in each light assembly. The replacement procedures are the same for all lamps.

(2) Push lamp (4) in and turn it counterclockwise and remove.

(3) Install new lamp (4) In light housings (5) and turn clockwise to secure.

WARNING

Dry cleaning solvent PD-680 used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame or excessive heat. Wear eye protection and protective clothing. Flash point of solvent is 100-1380F (38-600C).

(4) Clean door (2) with dry cleaning solvent and dry thoroughly.

(5) Inspect door (2) and replace if lens (6) are cracked or door Is cracked or otherwise damaged.

(6) Inspect gasket (3) and replace if ripped, torn, or otherwise damaged.

(7) Install door (2) and gasket (3) and tighten six screws (1).

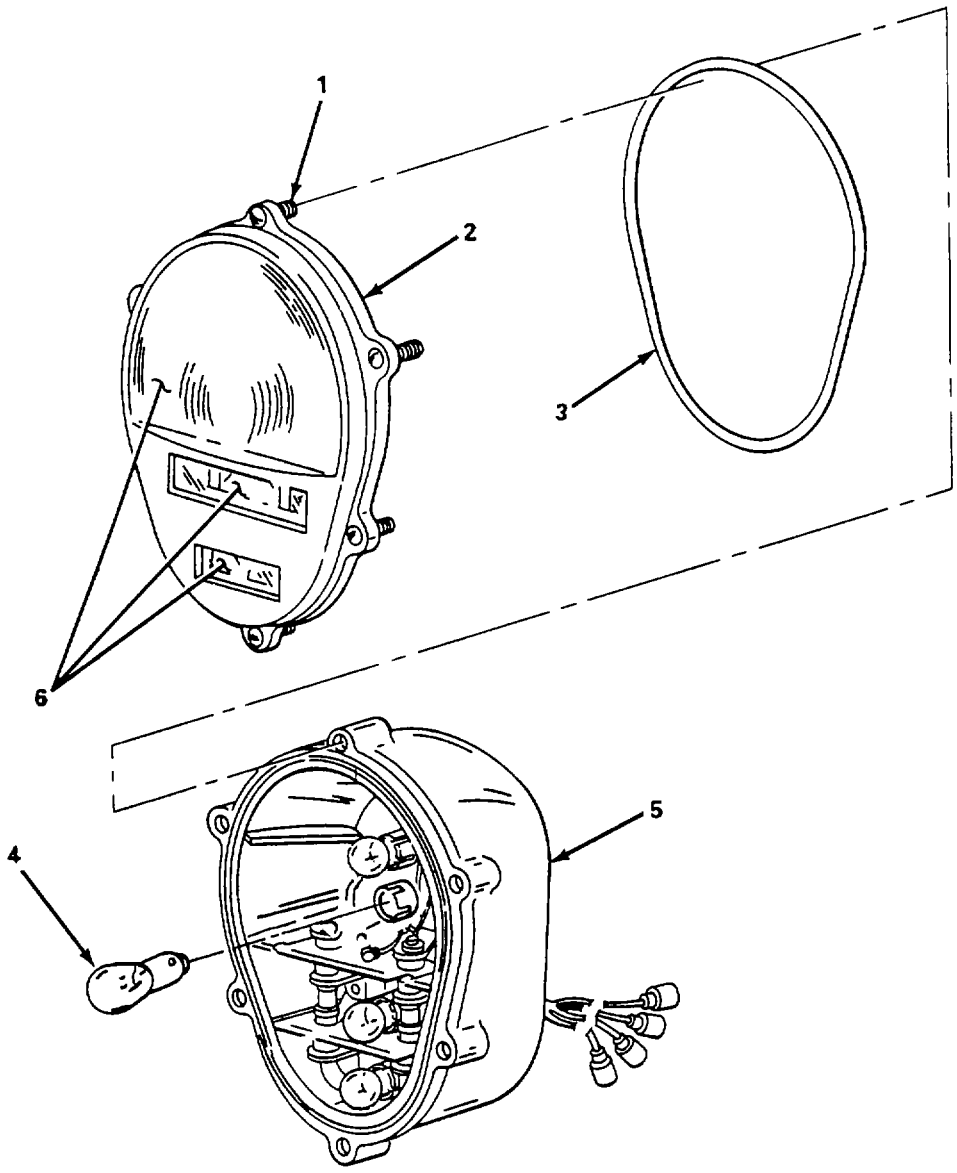


Figure 4-25. Combination Light Assembly, Repair.

4-22. Light Assemblies (Cont).

c. *Replace (Marker Light Assembly)* (figure 4-26)

NOTE

There are four marker light assemblies on the trailer. The procedures to replace them are the same.

(1) Tag and remove lead (1) on mark light assembly (2).

(2) Remove two screws (3) and remove door (4) and lens (5).

(3) Remove four screws (6), nuts (7), one star washer (8), and remove base (9).

(4) Install new base (9) and secure with four screws (6), and nuts (7) and one star washer (8).

(5) Install lens (5), door (4) and secure with two screws (3).

(6) Connect leads (1) as tagged.

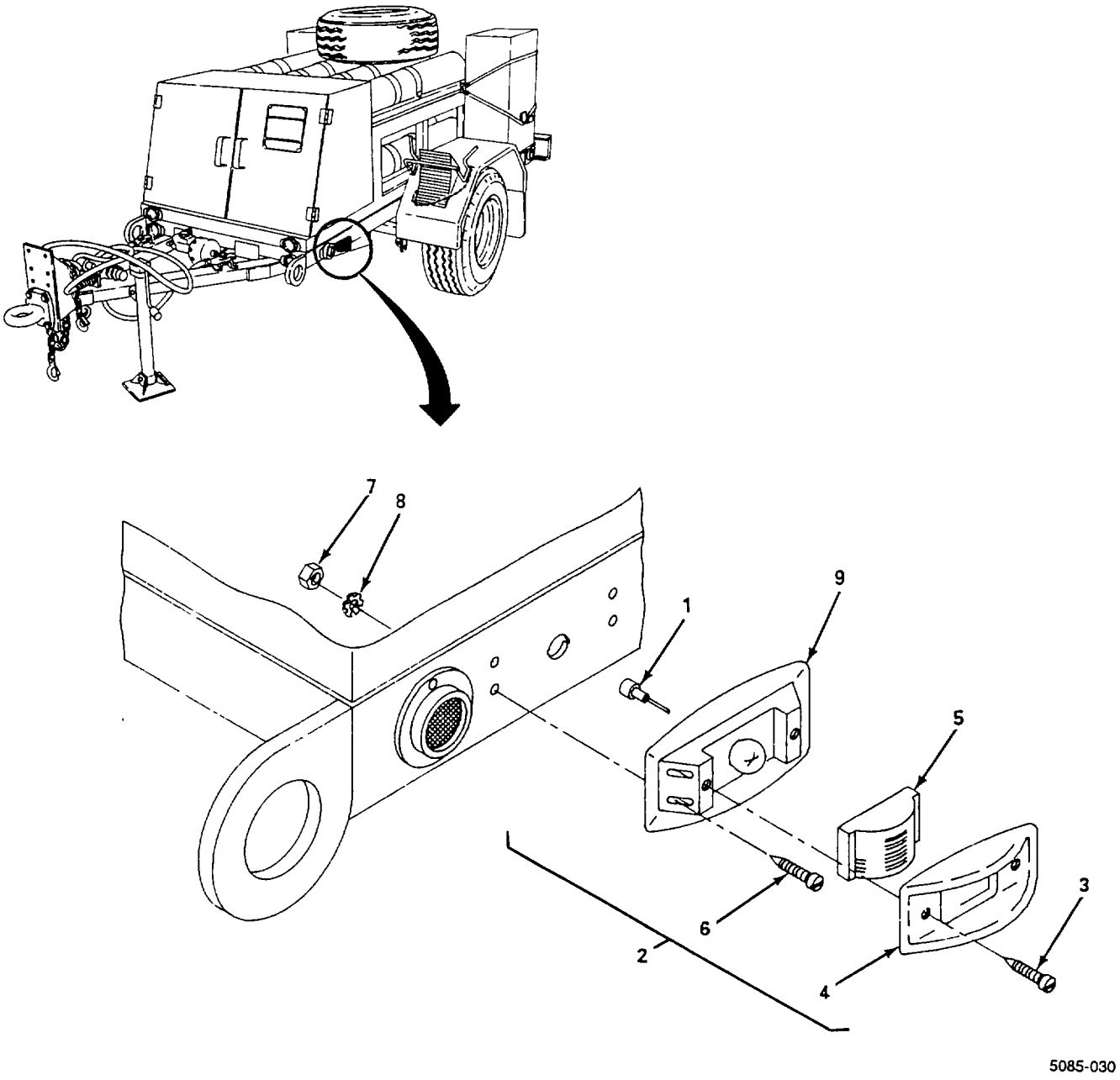


Figure 4-26. Marker Lights Assemblies, Replace.

4-22. Light Assemblies (Cont).

d. *Repair (Marker Light Assembly).* (figure 4-27)

(1) Remove two screws (1) and remove door (2) and lens (3).

(2) Push bulb (4) In and turn counterclockwise and remove.

(3) Tag and disconnect leads (5).

(4) Remove four screws (6), nuts (7), and one star washer (8) and remove base (9).

WARNING

Dry cleaning solvent PD-680 used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame or excessive heat. Wear eye protection and protective clothing. Flash point of solvent is 100-138°F (38-60°C)

(5) Clean lens (3), door (2), and base (7) with dry cleaning solvent and dry thoroughly.

(6) Inspect lens (3) and replace if cracked.

(7) Inspect door (2) and replace if cracked.

(8) Inspect base (9) and replace if cracked or otherwise damaged.

(9) Install base (9) and secure with four screws (6), nuts (7), and one star washer (8).

(10) Install bulb (4) and turn clockwise to secure.

(11) Install lens (3) and door (2) and secure with two screws (1).

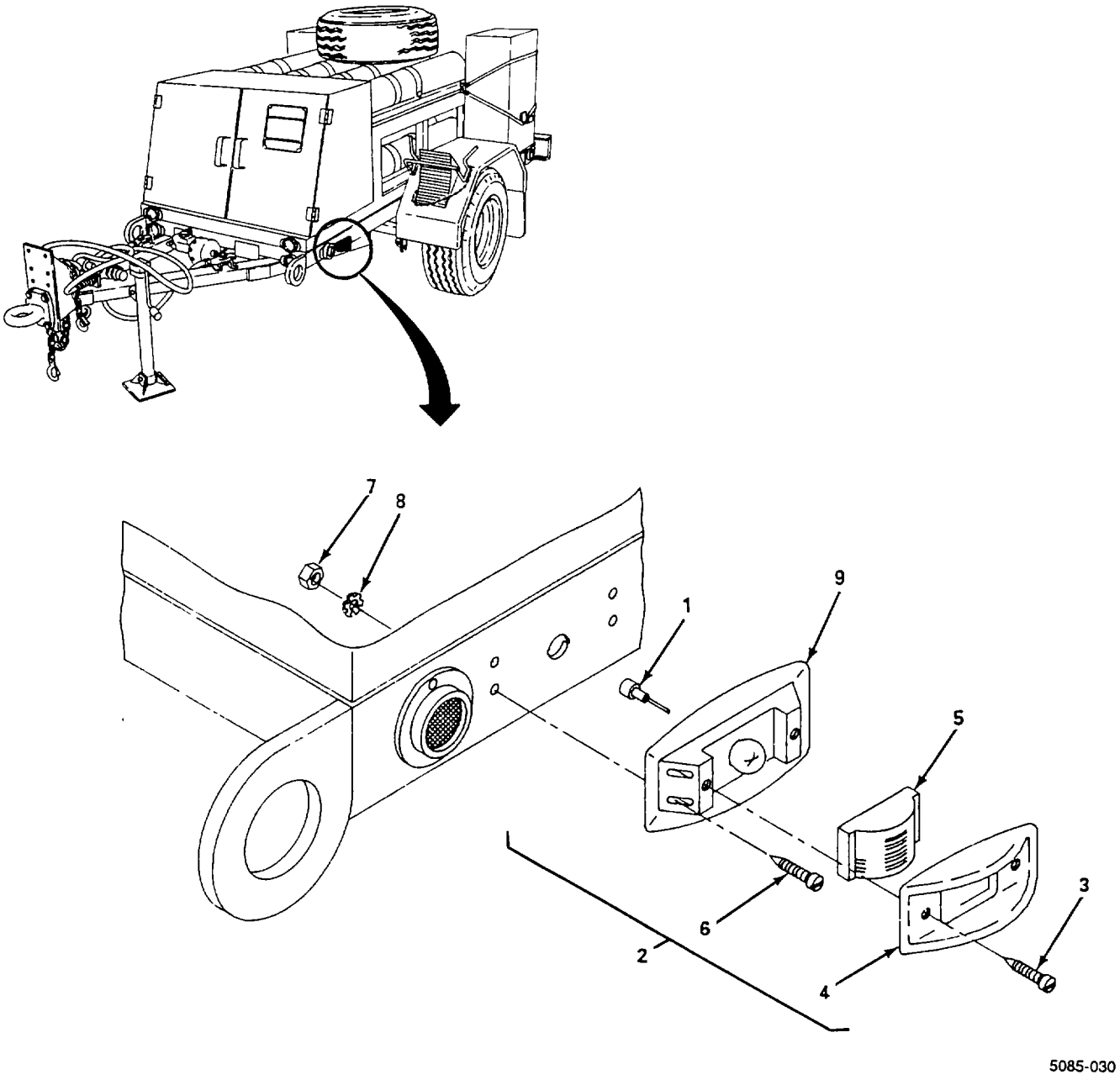


Figure 4-27. Marker Lights Assemblies, Repair.

4-23. Wiring Harness.

This task covers: a. Test b. Replace c. Repair

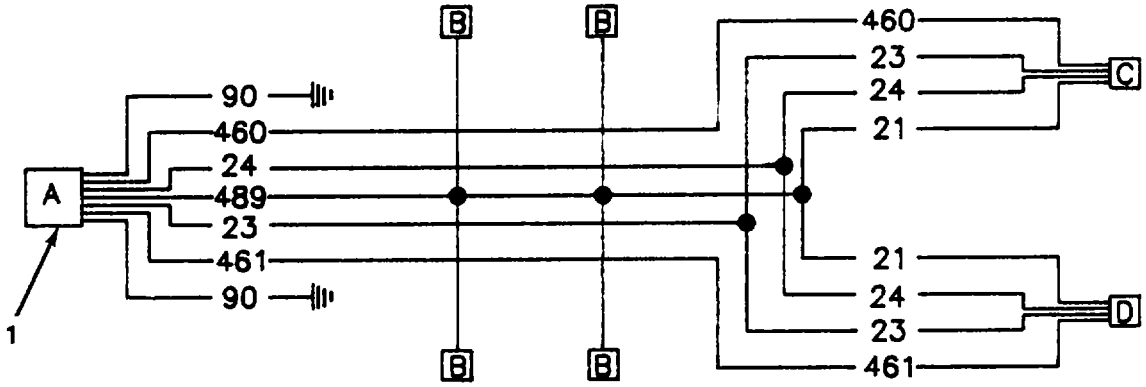
INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)
Multimeter

a. *Test.* (figure 4-28)

(1) Perform an end to end continuity test of wiring harness (1).
(2) Replace or repair a defective wiring harness (1).



5085-032

Figure 4-28. Wiring Harness, Test.

4-23 Wiring Harness (Cont).

b. Replace (figure 4-29)

(1) Remove bolt (1), lockwasher (2), and wiring harness clamp (3).

(2) Repeat step 1 for remaining cable clamps.

(3) Tag and disconnect 12 wiring connectors (4).

(4) Remove screw (5) and lockwasher (6) and nut (7) securing ground lead (8).

(5) Repeat step 4 for remaining ground lead.

(6) Remove wiring harness (9) from trailer (10).

(7) Install new wiring harness (9) on trailer (10).

(8) Install ground lead (8) and secure with screw (5) and lockwasher (6) and nut (7).

(9) Repeat step 8 for remaining ground lead.

(10) Connect 12 connectors (4) as tagged.

(11) Secure wiring harness (8) to trailer (9) with wiring harness clamp (3), bolt (1l), and lockwasher (2).

(12) Repeat step 12 for remaining securing harness clamps.

b. Repair.

(1) Inspect wiring harness.

(2) Replace any terminal lugs or connectors that are missing or damaged (Refer to TM 5-4220-228-24P for parts breakdown).

(3) Replace any wire that has burnt, cracked, or otherwise damaged insulation.

(4) Replace the wiring harness if too badly damaged.

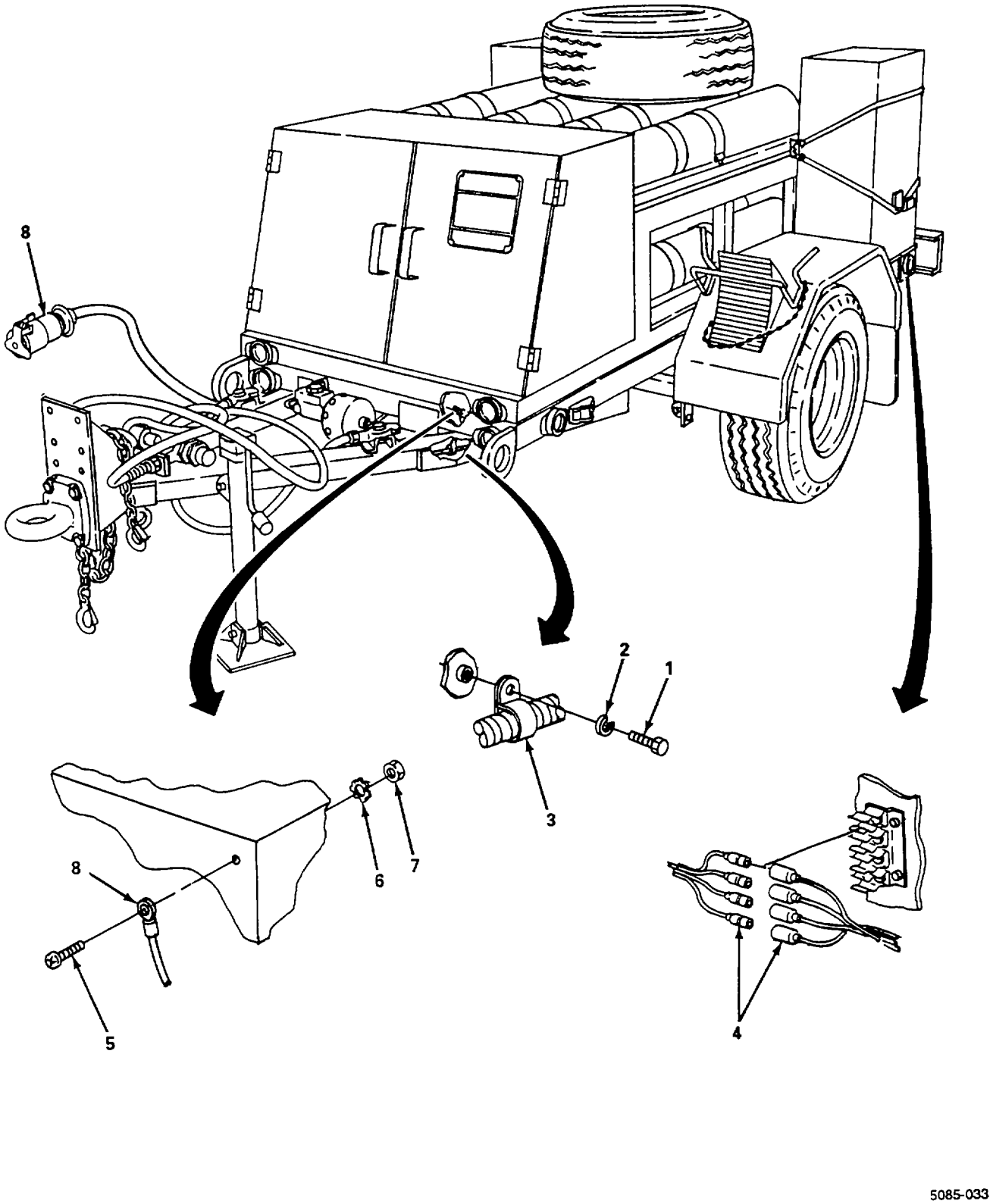


Figure 4-29. Wiring Harness, Replace.

4-24. Service Brake Assembly.

This task covers: a. Adjust b. Replace c. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Service brake released.

Materials/Parts

Grease, Automative and Artillery (Item 13, Appendix D)
Dry Cleaning Cleaning Solvent (Item 18, Appendix E)
Rags, Wiping (Item 16, Appendix E)

a. *Adjust.* (figure 4-30)

(1) Loosen nuts (1) and (2) or bracket (3) mounted on axle (4).

(2) Tighten or loosen nut (2) until brake cable (5) is taut.

(3) Tighten nut (1) while holding nut (2).

(4) Repeat steps 1 through 3 for other wheel.

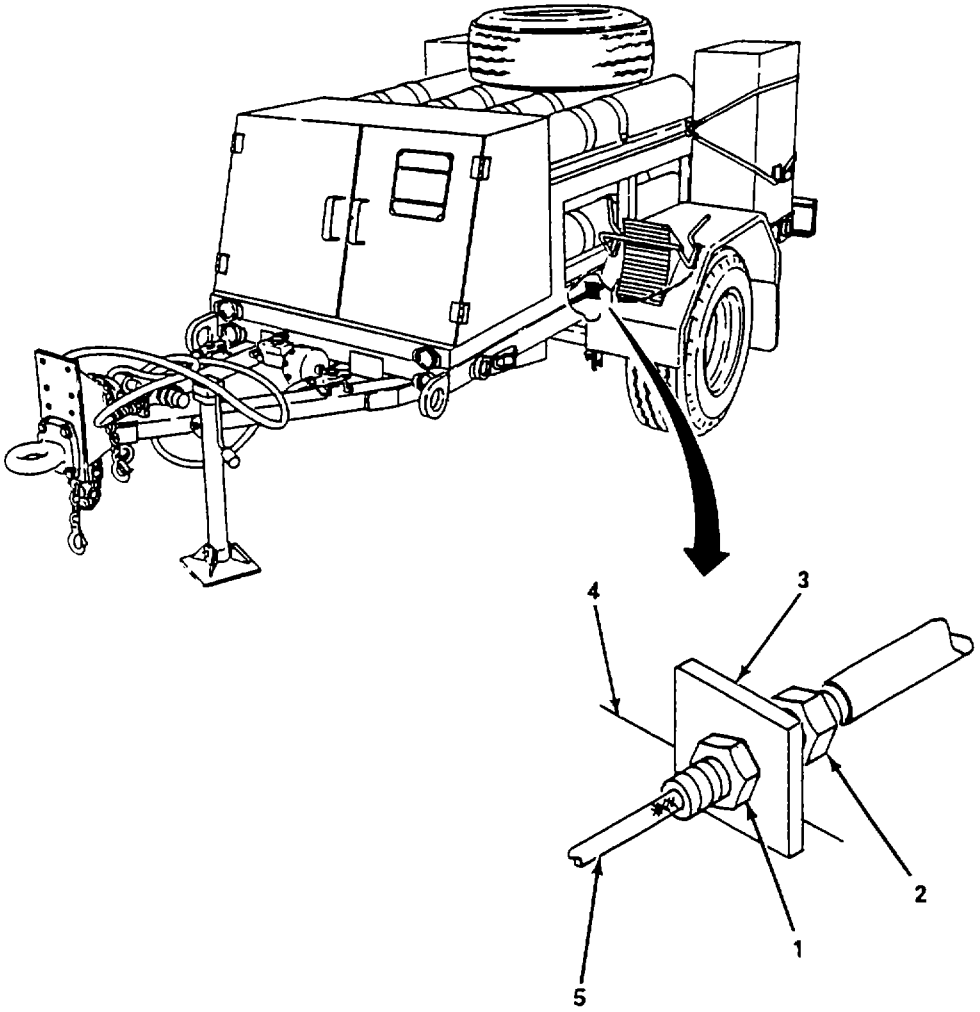


Figure 4-30. Service Brake Assembly, Adjust.

4-24. Service Brake Assembly (Cont).

b. *Replace*. (figure 4-31).

(1) Loosen locknuts (1) and remove cable (2) from coupler (3).

(2) Repeat step 1 for left hand side.

(3) Support service brake assembly (4).

(4) Remove two bolts (5), washers (6), and locknuts (7) and remove service brake assembly (4).

(5) Remove two bolts (8), washers (9), and lockwashers (10) and remove support (11).

(6) Apply grease to bore in support (11).

(7) Install support (11) and secure with two bolts (8), washers (9), and lockwashers (10).

(8) Install service brake assembly (4) and secure with two bolts (5), washers (6), and locknuts (7).

(9) Ensure service brake handle (12) is fully released (toward rear of trailer).

(10) Install cable (2) in coupler (3) and take up slack in cable (2) until taut.

(11) Repeat step 10 for left hand side.

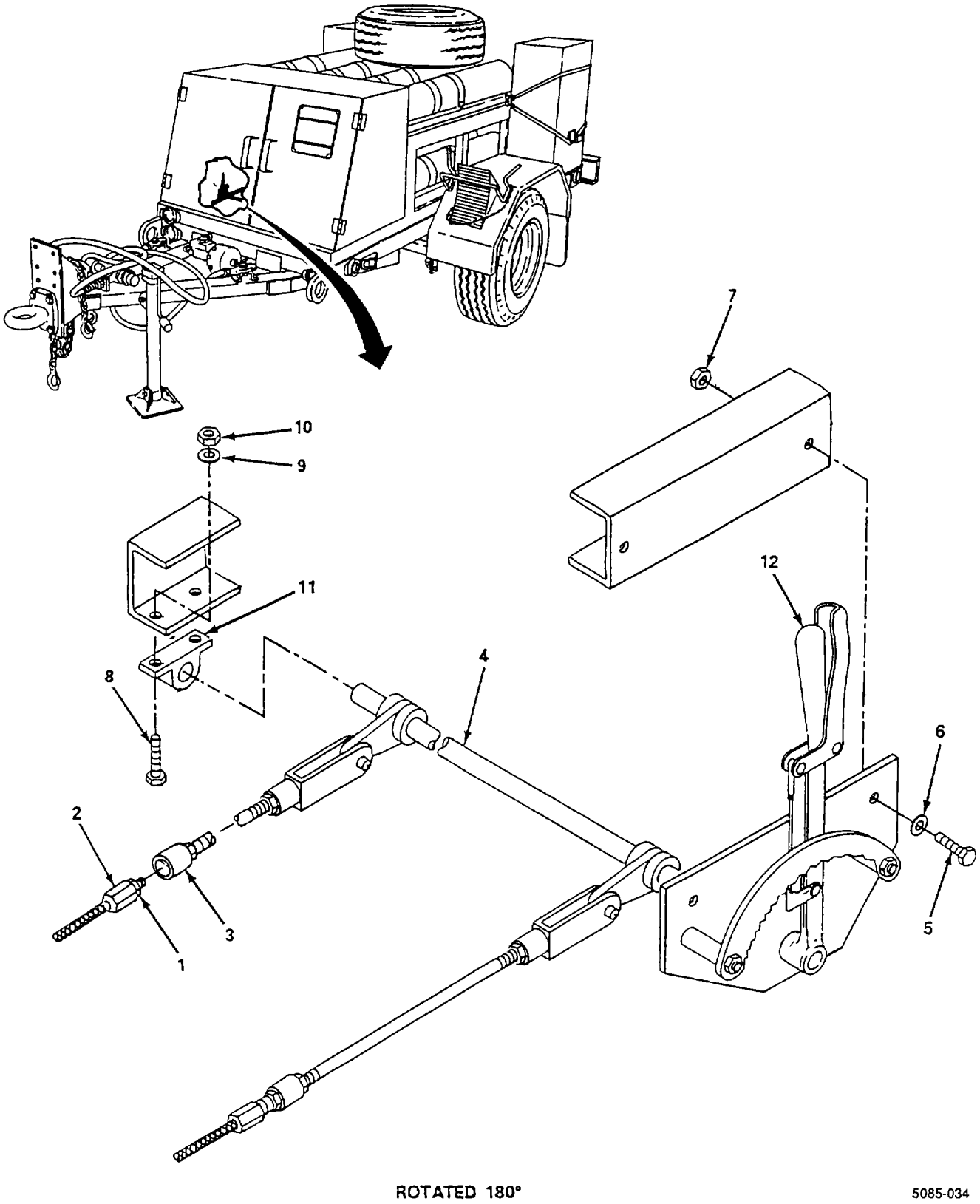


Figure 4-31. Service Brake Assembly, Replace

4-24. Service Brake Assembly (Cont).

c. *Repair*. (figure 4-32)

(1) Remove service brake assembly (para b.)

(2) Remove pin (1) and remove handle assembly (2) from cross shaft (3)

(3) Remove cotter pin (4) and pin (5), and separate clevis (6) from lever (7)

(4) Loosen locknut (8) and remove clevis (6) from rod (9)

(5) Remove coupler (10) from rod (9)

(6) Repeat steps 3 through 5 for left hand side

WARNING

Dry cleaning solvent PD-680 used to clean parts is potentially dangerous to personnel and property Avoid repeated and prolonged breathing of vapors and skin contact Do not use near open flame or excessive heat Wear eye protection and protective clothing Flash point of solvent Is 100 - 138°F (38 - 60°C).

(7) Clean all components with dry cleaning solvent, and dry thoroughly.

(8) Inspect handle assembly (2) and replace if bent, inoperative or otherwise damaged.

(9) Inspect cross shaft (3) and replace if bent, or levers (7) are damaged.

(10) Inspect clevis (6) and replace If bent, cracked or otherwise damaged.

(11) Inspect rod (9) and replace if bent.

(12) Inspect pin (5) and replace If bent or excessively worn.

(13) Inspect coupler (10) and replace if cracked, bent or otherwise damaged.

(14) Inspect support (11) and replace cross shaft assembly (3) if support (11) is cracked or otherwise damaged.

(15) Apply grease to bore In support (11) and Install support (11) on cross shaft (3),

(16) Install coupler (10) on rod (9)

(17) Install clevis (6) on rod (9) and tighten locknut (8)

(18) Install clevis (6) on lever (7) and secure with pin (5) and cotter pin (4)

(19) Perform steps 16 through 18 for left hand side

(20) Install handle assembly (2) on cross shaft (3) and secure with pin (1)

(21) Install service brake assembly (para a.).

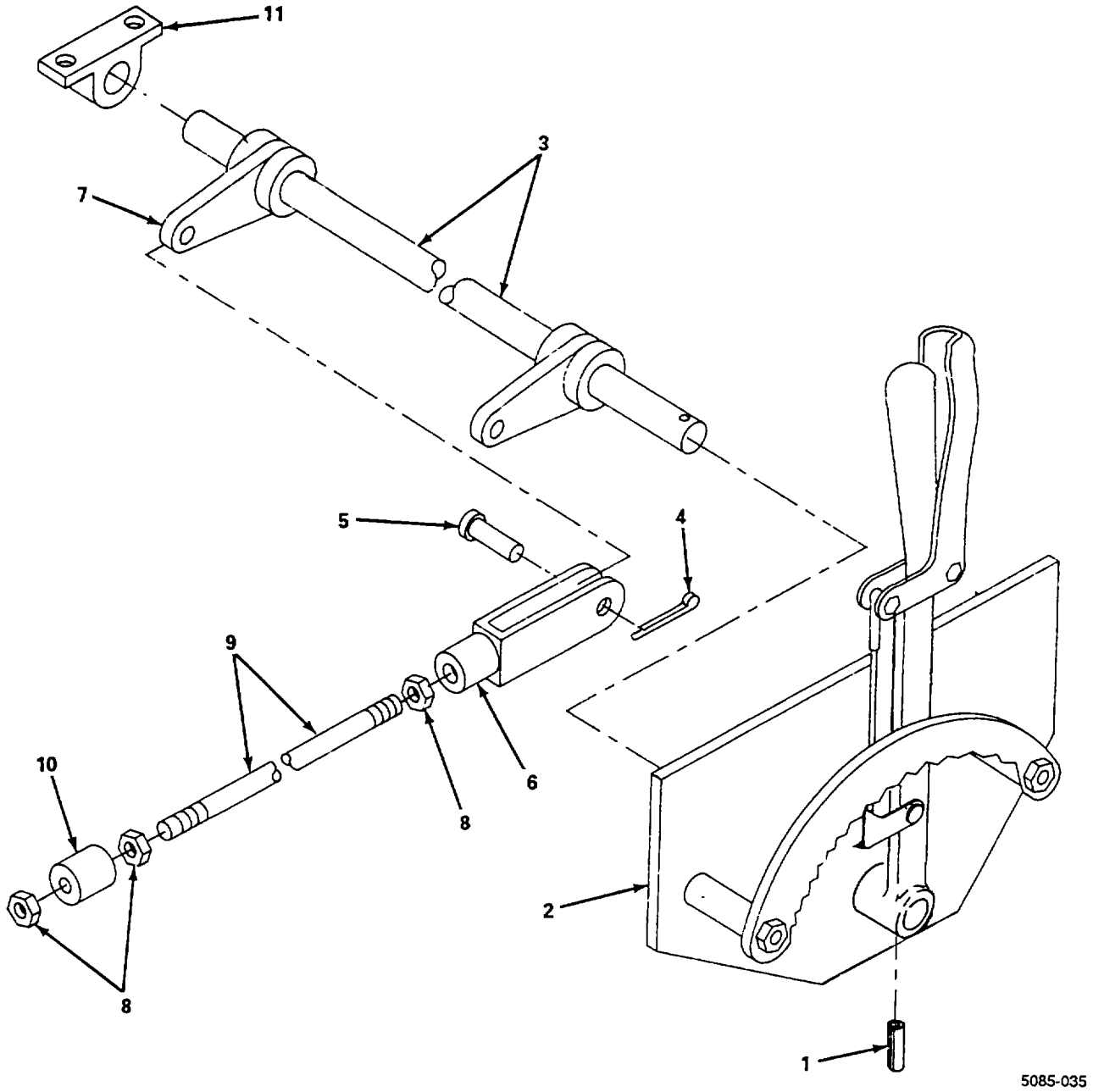


Figure 4-32. Service Brake Assembly, Repair.

4-25 Brake Lines, Fittings, and Hoses.

This task covers Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Air pressure removed from brake system.

Materials/Parts

Hydraulic Brake Fluid (Item 14, Appendix D)
Rags, Wiping (Item 16, Appendix D)
Solvent, Dry Cleaning (Item 18, Appendix D)

Replace:

(1) Gladhands (figure 4-33)

NOTE

There are two gladhands on the trailer The procedures are the same for both

(a) Remove gladhand (1) from hex nipple (2).

(b) Inspect nipple (2) and replace if threads are stripped or nipple Is otherwise damaged

(c) Install gladhand (1).

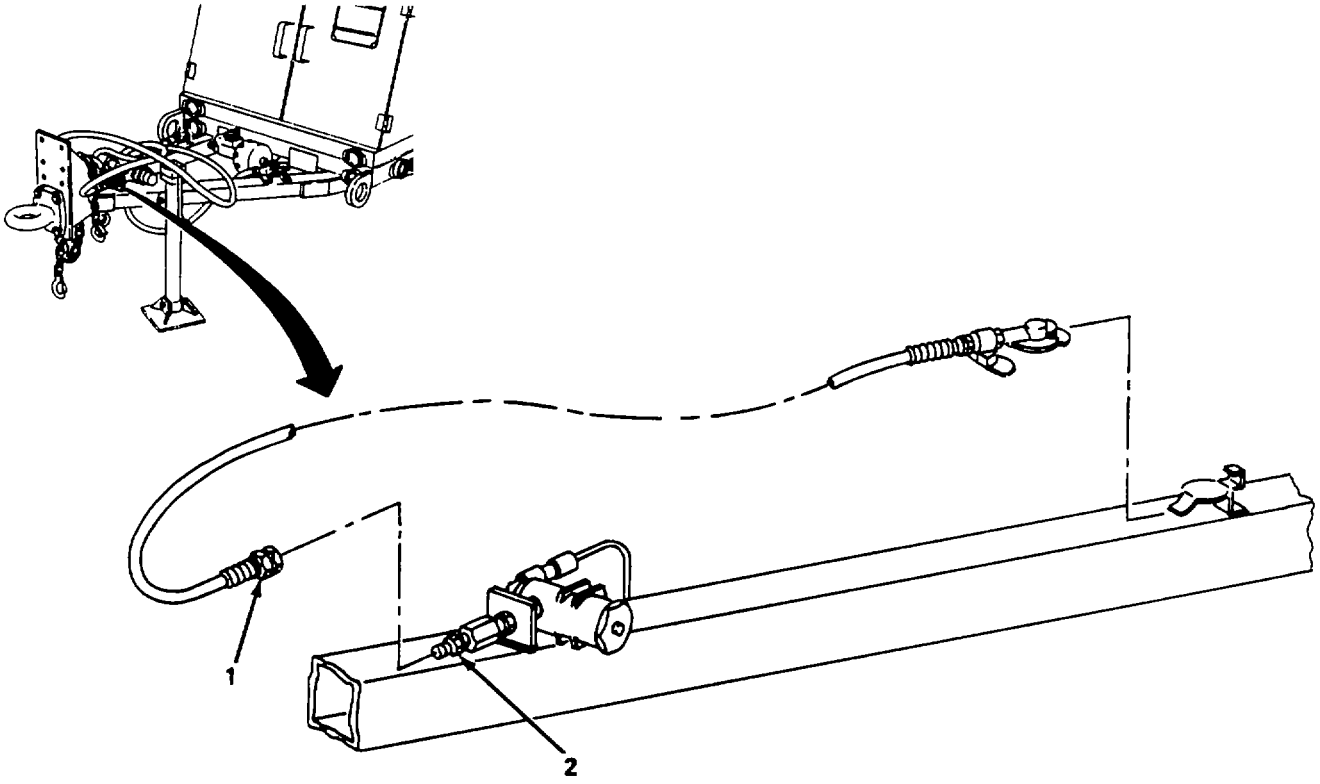


Figure 4-33. Gladhands, Replace.

4-25 Hoses, Lines, and Fittings (Cont).

(2) *Lines and fittings*. (figure 4-34)

NOTE

There are several different lines used on the trailer. Some have air pressure in them others have hydraulic fluid in them. The majority of the lines are hard, although there are two soft lines which go to the brake cylinders in the wheel assemblies The basic procedure to replace a line are the same for all lines.

(a) Loosen connector nut (1).

(b) Remove screw (2) and washer (3) securing clamp (4) and remove clamp (4) from line (5).

(c) Repeat step (b) for remaining clamps holding line (5).

(d) Loosen connector nut (6) and remove line (5).

(e) Inspect fittings where line connects and replace if threads are stripped or fitting Is otherwise damaged

(f) Install line (5) and tighten connector nuts (1) and (6).

(g) Install clamps (4) and secure with screw (2) and washer (3)

(h) If a hydraulic line was replaced, the brake system has to be bled. Refer to para. 4-28 for procedures to bleed the hydraulic brake system.

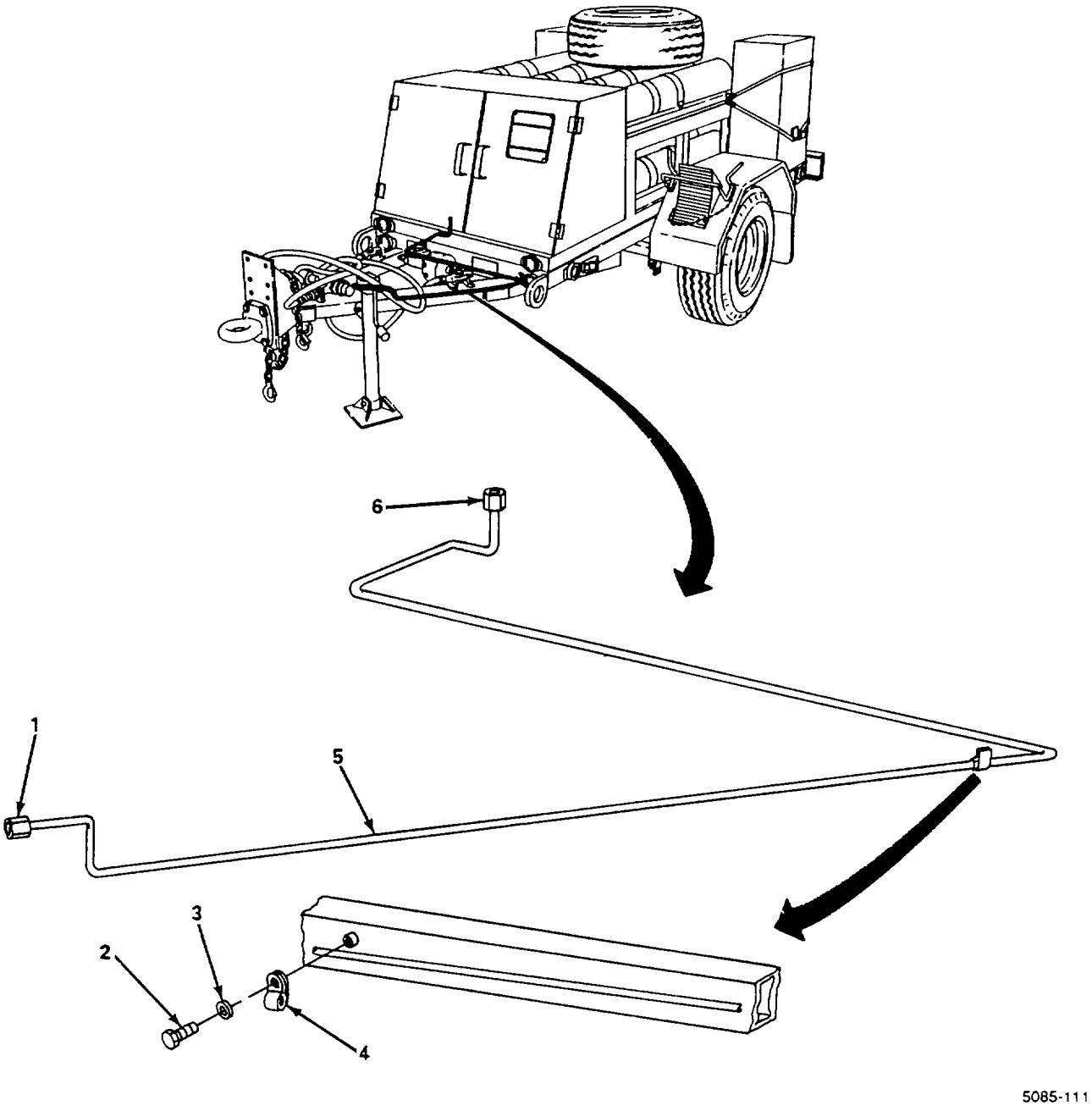


Figure 4-34. Lines and Fittngs, Replace.

4-26 Air Filter Assembly.

This task covers a. Replace b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Air reservoir drained

a. *Replace* (figure 4-35)

WARNING

Do not work on any part of brake system without first relieving all air pressure from brake system.

NOTE

There are two air filter assemblies on the trailer. The replace procedures are the same for both.

(1) Remove hose (1) from hex nipple (2).

(2) Remove hex nipple (2) from union (3).

(3) Loosen connector nut (4) on brake line (5).

(4) Remove nut (6) and lockwasher (7) and remove air filter assembly (8).

(5) Remove hex nipple (9) from air filter assembly (8).

(6) Remove hex nipple (10) from air filter assembly (8).

(7) Install hex nipple (10) on new air filter assembly (8).

(8) Install hex nipple (9) on new air filter assembly (8).

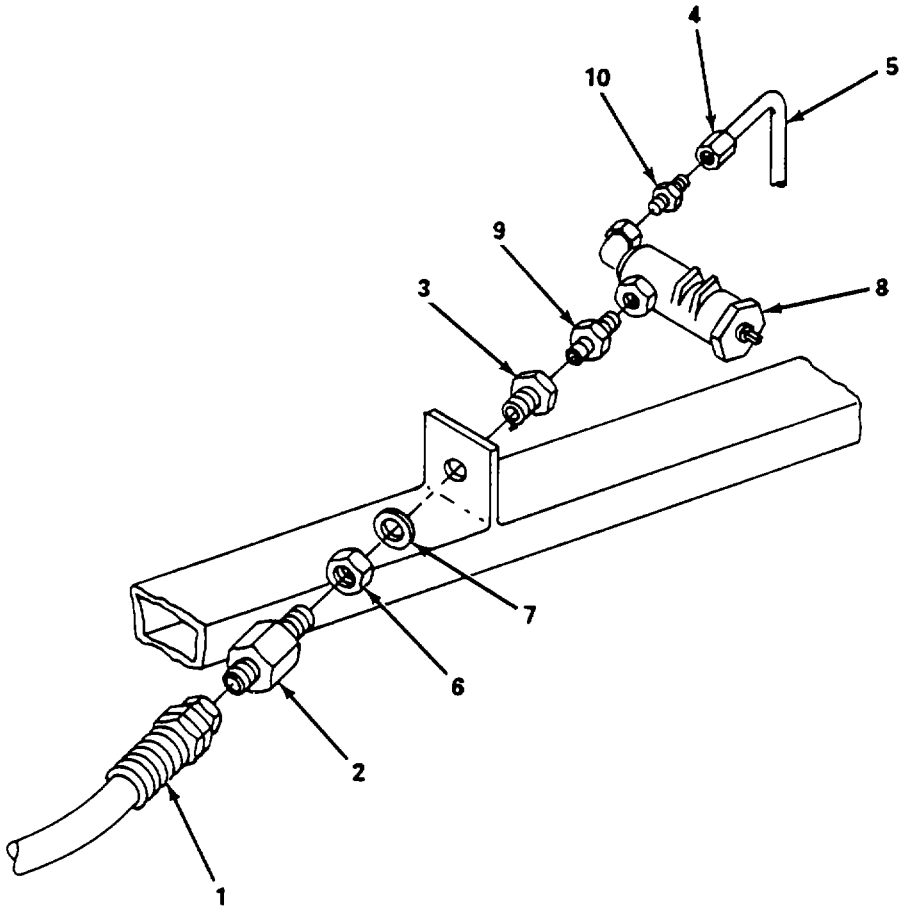
(9) Install union (3) on hex nipple (9).

(10) Install air filter assembly (8) and secure with lockwasher (7) and nut (6).

(11) Install brake line (5) and tighten connector nut (4).

(12) Install hex nipple (2).

(13) Install hose (1).



5085-036

Figure 4-35. Air Filter Assembly, Replace

4-26 Air Filter Assembly (Cont).

b. *Repair*. (figure 4-36)

(1) Remove filter assembly (para. a)

(2) Remove cap nut (1) and seal washer (2) and remove spring (3), retainer (4), and element (5)

(3) Inspect body (6) and replace if cracked

(4) Install new element (5), retainer (4), and spring (3) in body (6)

(5) Install cap nut (1) and seal washer (2)

(6) Install filter assembly (para a.)

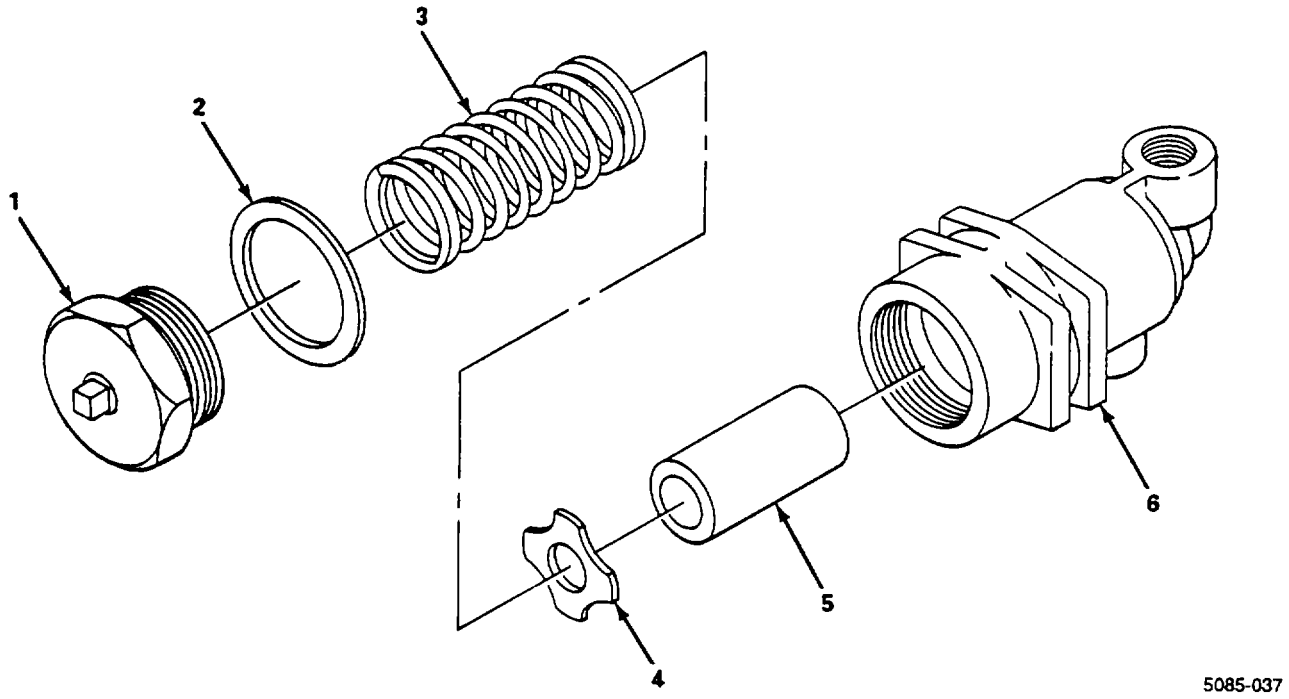


Figure 4-36. Filter Assembly, Repair.

4-27. **Air Reservoir**.

This task covers	Replace

INITIAL SETUP

Tools	*Equipment Condition*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Air reservoir drained

Replace (figure 4-37)

WARNING

Do not work on any part of brake system without first relieving all air pressure from the brake system

(1) Loosen connector nut (1)

(2) Loosen connector nut (2) and move line (3) out of way.

(3) Remove reducer (4) from air reservoir cylinder (5)

(4) Remove automatic drain valve (6) from air reservoir cylinder (5)

(5) Support reservoir cylinder (5)

(6) Remove four nuts (7), lockwashers (8), and two U-bolts (9) and remove air reservoir cylinder (5).

(7) Support air reservoir cylinder (5) In proper position and secure with two U-bolts (9), lockwashers (8), and nuts (7)

(8) Install automatic drain valve (6)

(9) Install reducer (4) in air reservoir cylinder (5)

(10) Install line (3) and tighten two connector nuts (1) and (2)

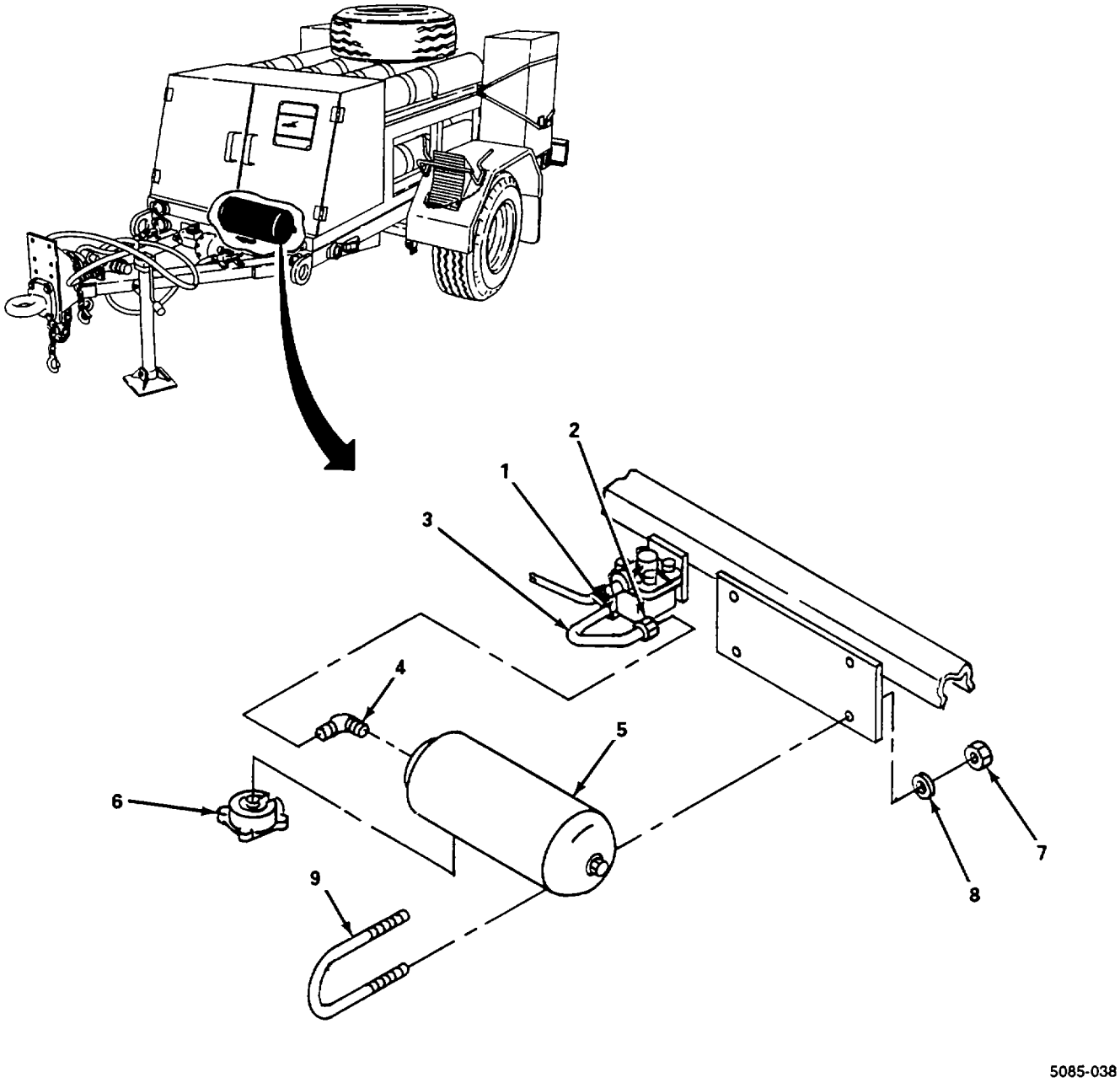


Figure 4-37. Air Reservoir, Replace

4-28 Power Cluster.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Air reservoir drained.

Materials/Parts

Fluid, Hydraulic Brake (Item 14, Appendix D)
Rags, Wiping (Item 16, Appendix D)

Replace (figure 4-38)

WARNING

Do not work on any part of brake system without first relieving all air pressure from the brake system.

(1) Loosen connector nut (1)

WARNING

When disconnecting any hydraulic lines, open slowly and protect face as hydraulic fluid may spray out due to residual pressure In system

NOTE

When removing hoses, have a suitable container to drain oil from hoses Also cap all hoses and ports Immediately to prevent dirt or foreign matter from entenng the system.

(2) Loosen connector nut (2) and drain brake fluid Into suitable container.

(3) Remove four bolts (3) and locknuts (4) and remove power cluster (5) and hydraulic cylinder assembly (6)

(4) Loosen connector nut (7) and remove line (8)

(5) Remove elbow (9)

(6) Remove filler cap (10) and gasket (11).

(7) Install hydraulic cylinder assembly (6) and power cluster (5) and secure with two bolts (3) and lockwashers (4)

(8) Install elbow (9).

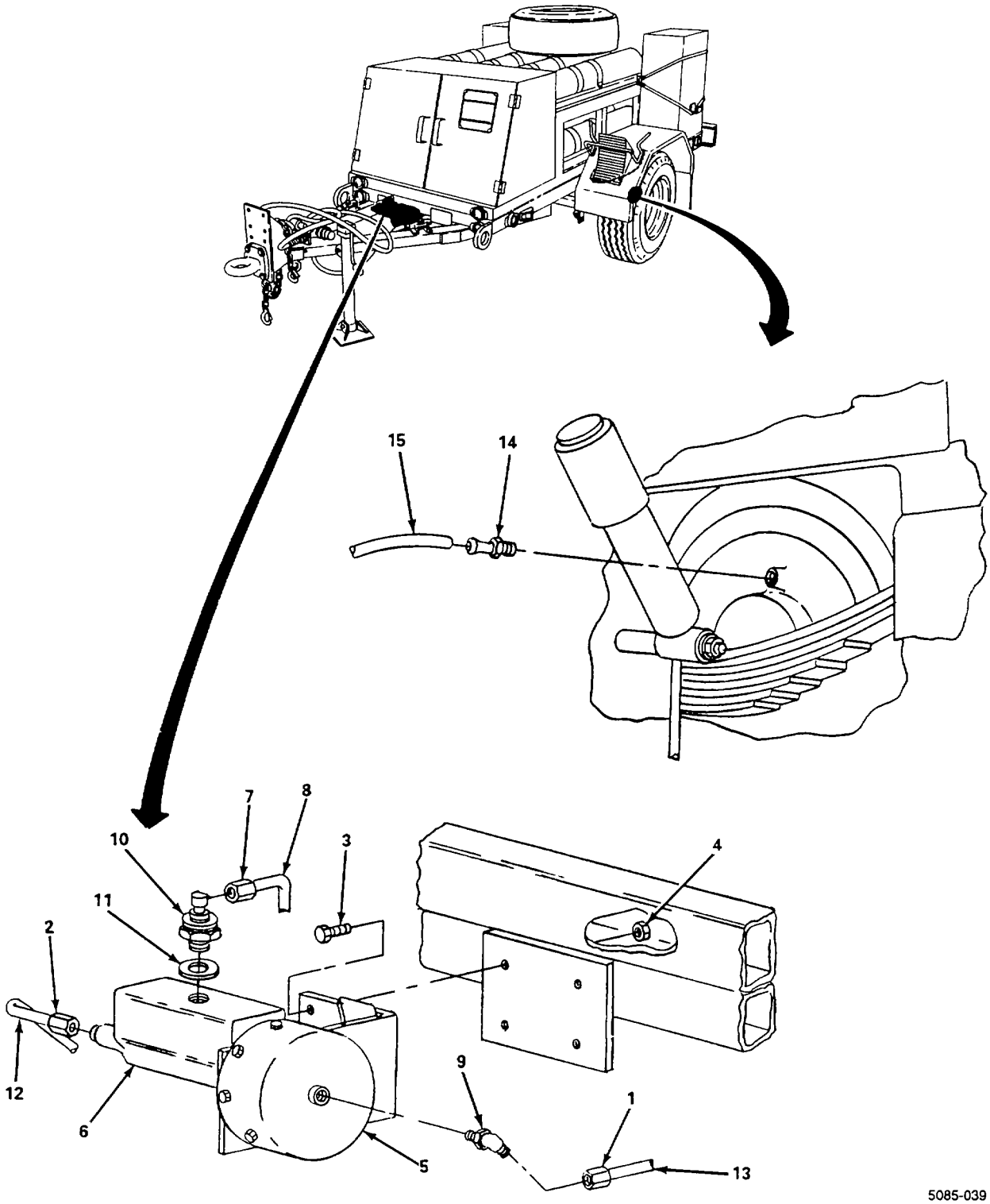


Figure 4-38. Power Cluster, Replace.

(9) Install line (12) and tighten connector nut (2).

(10) Install line (13) and tighten connector nut (1).

(11) Fill hydraulic cylinder assembly (6) with hydraulic fluid.

(12) Install filler cap (10) and gasket (11)

(13) Connect the trailer brake lines to another vehicle to bleed the brake system

(14) Install a clear plastic tube on bleeder valve (14) on wheel cylinder (15)

NOTE

Hydraulic cylinder must be kept full at all times to prevent air from entering the brake system.

(15) Apply vehicle brakes and open bleeder valve (14) to release hydraulic fluid and close bleeder valve (14).

(16) Repeat step 14 until fluid flows from the tube without air bubbles.

(17) Repeat steps 11 through 15 for left side brakes.

(18) Install line (8) and tighten connector nut (7).

4-29 Emergency Valve RE-6 Relay.

This task covers- Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Hand brakes on trailer are set and wheels blocked
Air reservoir drained

Materials/Parts

Hydraulic Brake Fluid (Item 14, Appendix D)
Rags, Wiping (Item 16, Appendix D)

Replace. (figure 4-39)

WARNING

Do not work on any part of brake system without first relieving all air pressure from the brake system

NOTE

Cap all hoses and ports Immediately to prevent dirt or foreign matter from entenng the system

(1) Loosen connector nut (1) and move line (2) out of way

(2) Loosen connector nut (3) and move line (4) out of way.

(3) Loosen connector nut (5) and move line (6) out of way

(4) Loosen connector nut (7) and move line (8) out of way.

(5) Remove three screws (9) and locknuts (10) and remove emergency valve RE-6 relay (11).

(6) Install new emergency valve RE-6 relay (11) and secure with three screws (9) and locknuts (10)

(7) Install line (8) and tighten connector nut (7)

(8) Install line (6) and tighten connector nut (5).

(9) Install line (4) and tighten connector nut (3)

(10) Install line (2) and tighten connector nut (1)

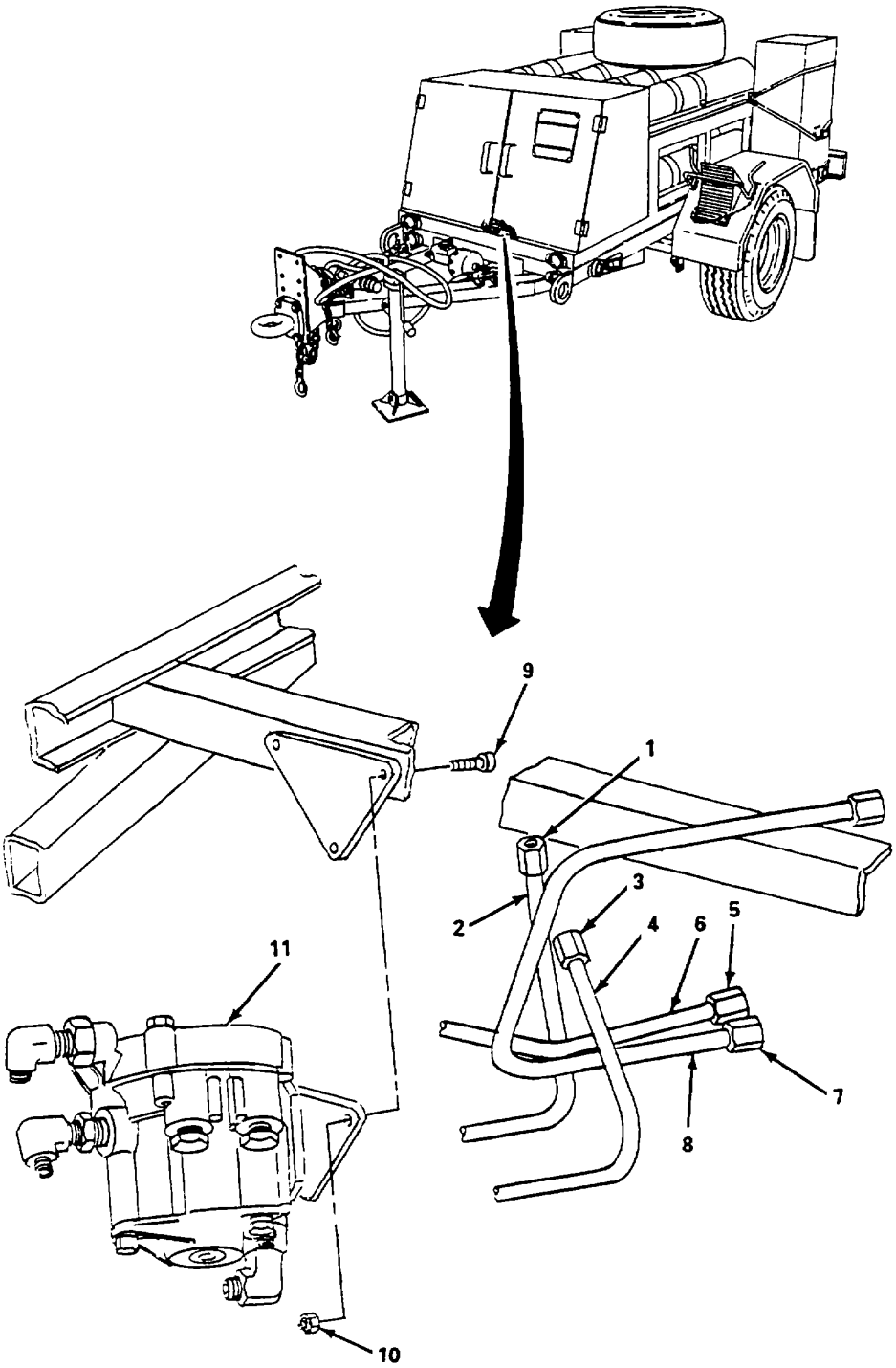


Figure 4-39. Emergency Valve RE-6 Relay, Replace.

4-30. Automatic Drain Valve.

This task covers:	Replace

INITIAL SETUP

Tools	*Equipment Condition*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Air reservoir removed.

Replace. (figure 4-40)

WARNING

Do not work on any part of brake system without first relieving all air pressure from the brake system

(1) Unscrew automatic drain valve (1) from air reservoir (2).

(2) Install new drain valve (1) In air reservoir (2).

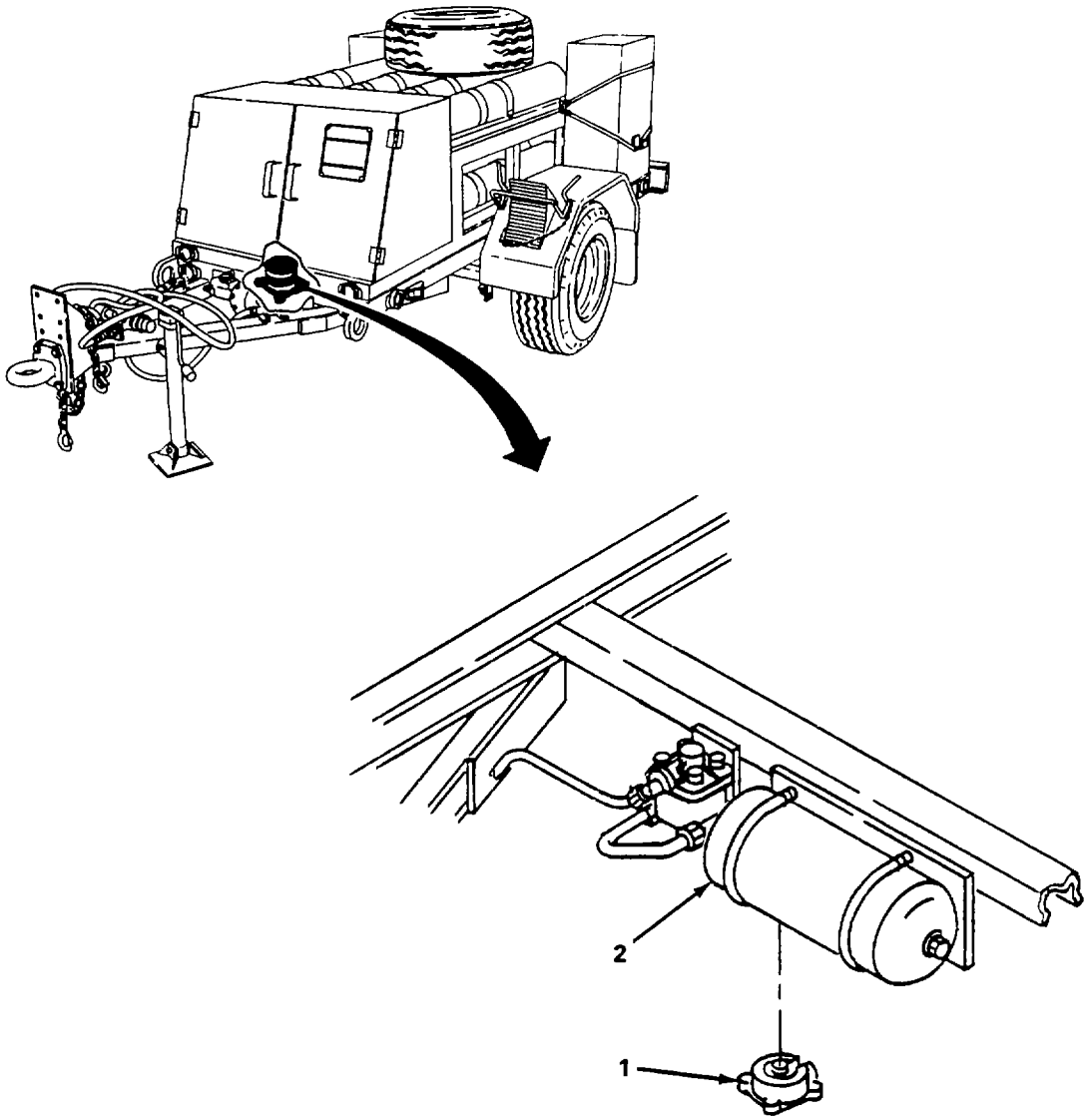


Figure 4-40. Automatic Drain Valve, Replace

4-31. Brake Shoe Assembly.

This task covers Replace

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance
Common No 1 (NSN 4910-00-754-0654)

Replace. (figure 4-41)

(1) Raise trailer (1) and block in position.

(2) Remove eight lug nuts (2) and remove wheel (3)

(3) Remove six socket head cap screws (4) and remove grease cup (5) and gasket (6).

(4) Remove cotter pin (7), nut (8), washer (9), outer wheel bearing (10), and wheel hub (11).

(5) Remove springs (12), (13), and (14) and plate (15)

(6) Screw adjuster (16) to its smallest size.

(7) Remove spring retaining washer (17)

(8) Hold pin (18) from behind and push cup (19) in and rotate 1/4 turn and remove cup (19), spring (20), pin (18), brake shoe (21), strut (22), spring (23), and adjuster (16).

(9) Hold pin (24) from behind and push cup (25) in and rotate 1/4 turn and remove cup (25), spring (26), pin (24), and brake shoe (27)

(10) Inspect springs (12), (13), (14), (20), (23), and (28) and replace if bent, cracked, or deformed.

(11) Inspect strut (22) and replace if bent or cracked

(12) Inspect plate (15) and replace if bent or cracked

(13) Inspect pins (18) and (24) and replace If worn, bent, or otherwise damaged

(14) Inspect cups (19) and (25) and replace if bent or worn

(15) Inspect adjuster (16) and replace if bent, worn, or inoperable

(16) Position new brake shoe (27) in plate (29) and Install pin (24), spring (26) and secure with cup (25).

(17) Install spring (23) on strut (22) and position strut (22) on brake

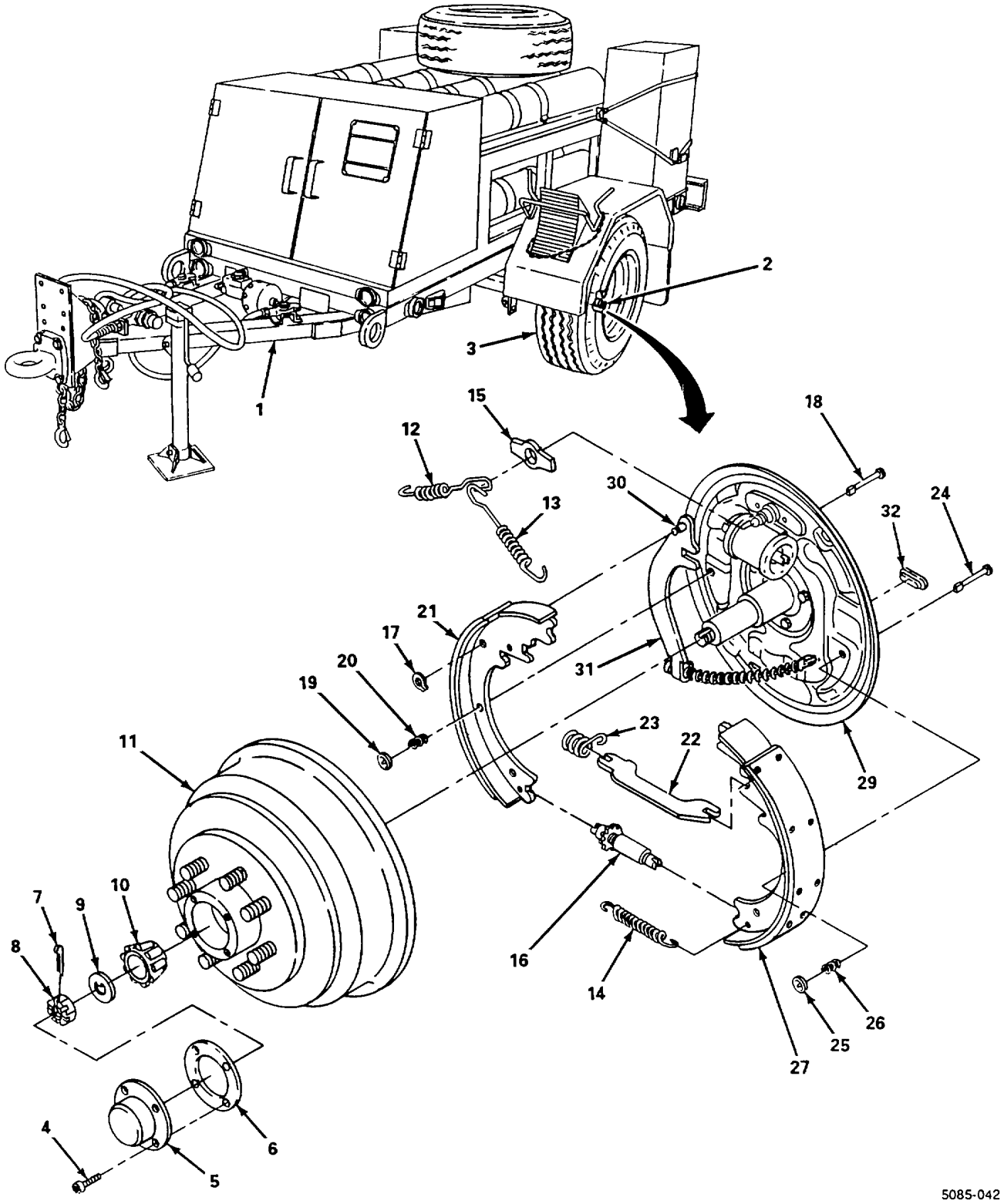


Figure 4-41. Brake Shoe Assembly, Replace

(18) Install pin (30) of service brake lever (31) In new brake shoe (21) and secure with spring retaining washer (17).

(19) Position new brake shoe (21) in plate (29) and Install strut (22), adjuster (16), pin (18), spring (20) and secure with cup (19).

(20) Install plate (15).

(21) Install spring (14).

(22) Install springs (12) and (13).

(23) Install wheel hub (11), outer bearing (10), washer (9), and nut (8).

(24) Tighten nut (8) until drag if felt on wheel hub (11) and back off nut (8) only enough to install cotter pin (7).

(25) Install grease cup (5) and gasket (6) and secure with six socket head cap screws (4).

(26) Install wheel (3) and secure with eight lug nuts (2).

(27) Remove access plug (32) and adjust brakes as follows:

(a) Turn wheel (3).

(b) Using brake shoe adjusting tool, turn brake shoe adjuster (16) until brake drags lightly.

(28) Install access plug (32).

(29) Remove blocking and lower trailer (1).

4-32. Wheel Assembly.

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance
Common No 1 (NSN 4910-00-754-0654)

Replace (figure 4-42).

(1) Jack up trailer (1) and block in position.

(2) Remove eight lug nuts (2) and remove wheel (3).

(3) Remove holddown nut (4) and bracket (5) and remove spare wheel (6).

(4) Install spare wheel (6) on trailer (1) and secure with eight lug nuts (2).

(5) Install wheel (3) and secure with bracket (5) and hold down nut (4).

(6) Remove blocking and lower trailer (1).

(7) Have damaged wheel assembly replaced or repaired.

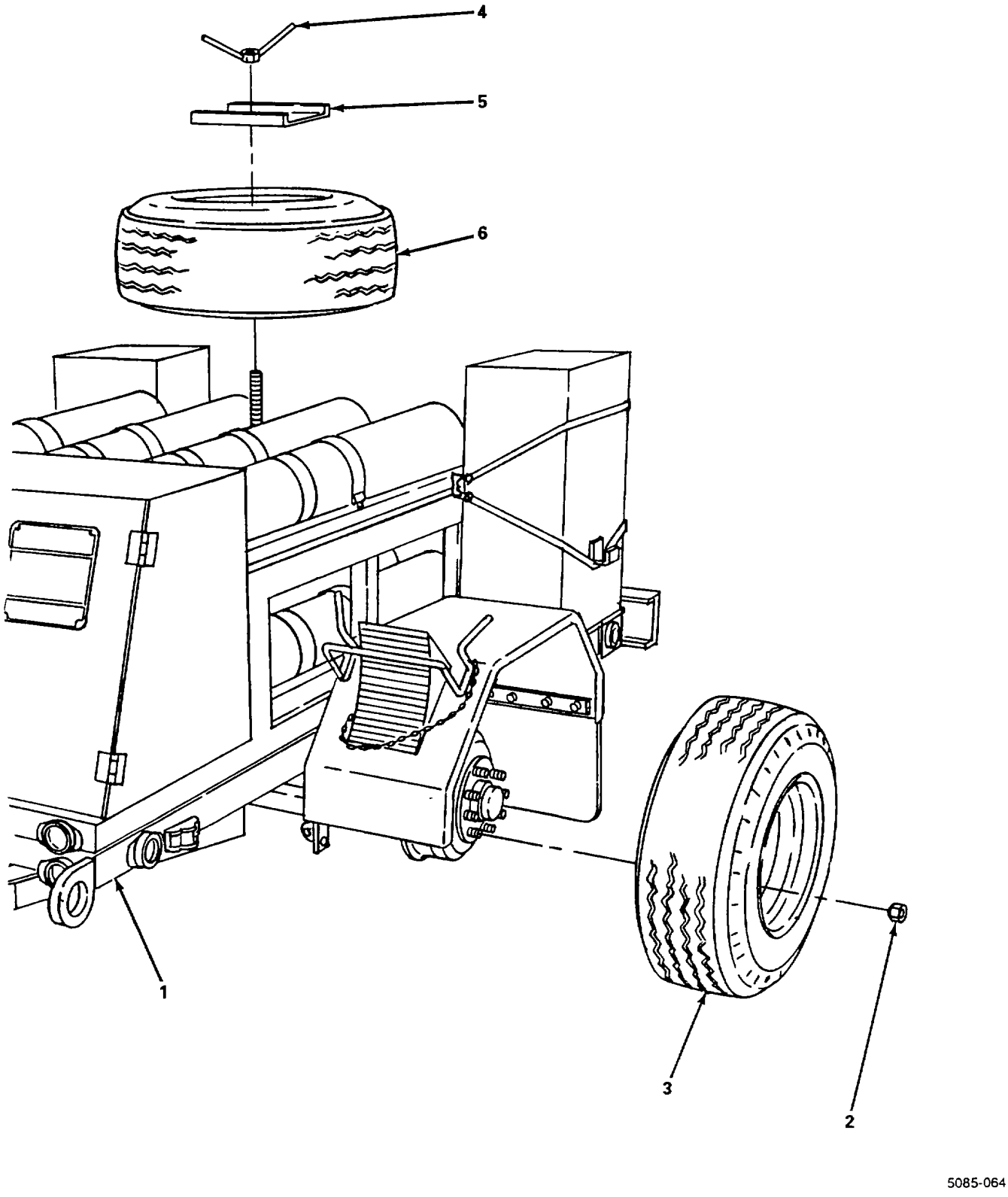


Figure 4-42. Wheel Assembly, Replace.

4-33. Frame and Attachments.

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Repair:

Replace (eye lunette). (figure 4-43)

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

(b) Install eye lunette (4) and secure with four bolts (3), lockwashers (2), and nuts (1).

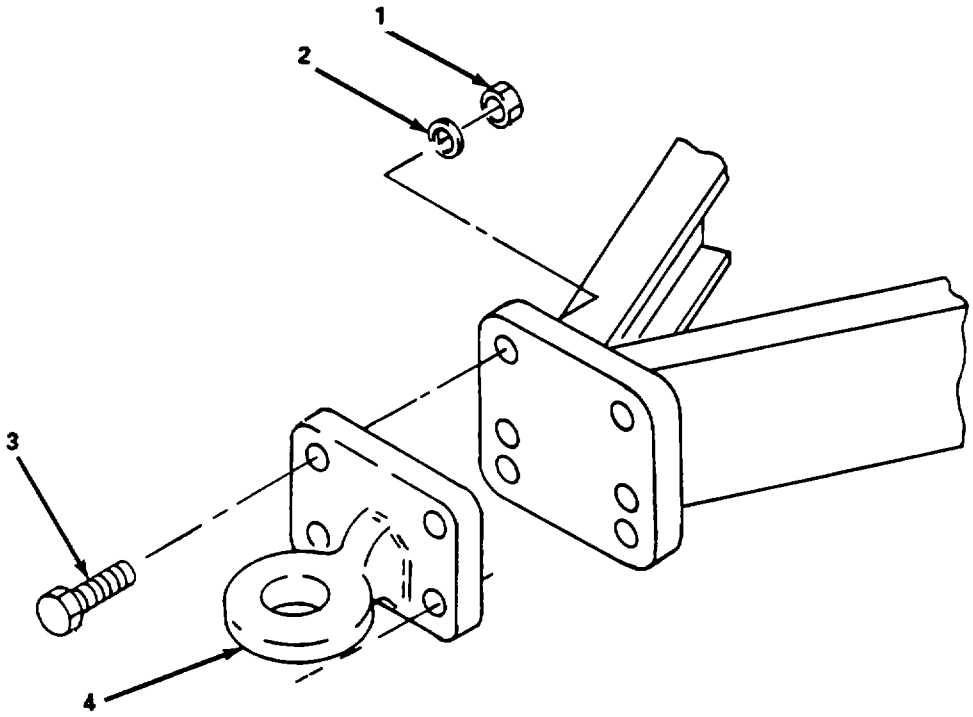


Figure 4-43. Eye Lunette, Replace.

4-34 Filter Assembly.

This task covers. Service

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Reference

Para. 4-10 Maintenance and Reentry Control Procedure

Materials/Parts

Detergent, Nonionic (Item 10, Appendix D)
Rags, Wiping (Item 16, Appendix D)

Service (figure 4-44)

(1) Open drain valve (1) and release condensation and air pressure.

(2) Unscrew collar (2) and remove air filter cup (3) and O-ring (4) and discard O-ring (4).

(3) Clean air filter cup (3) with nonionic detergent and dry thoroughly.

(4) Clean air filter (5) with non-ionic detergent and dry thoroughly.

(5) Install cup (3) and secure with new O-ring (4) and collar (2).

(6) Close drain valve (1).

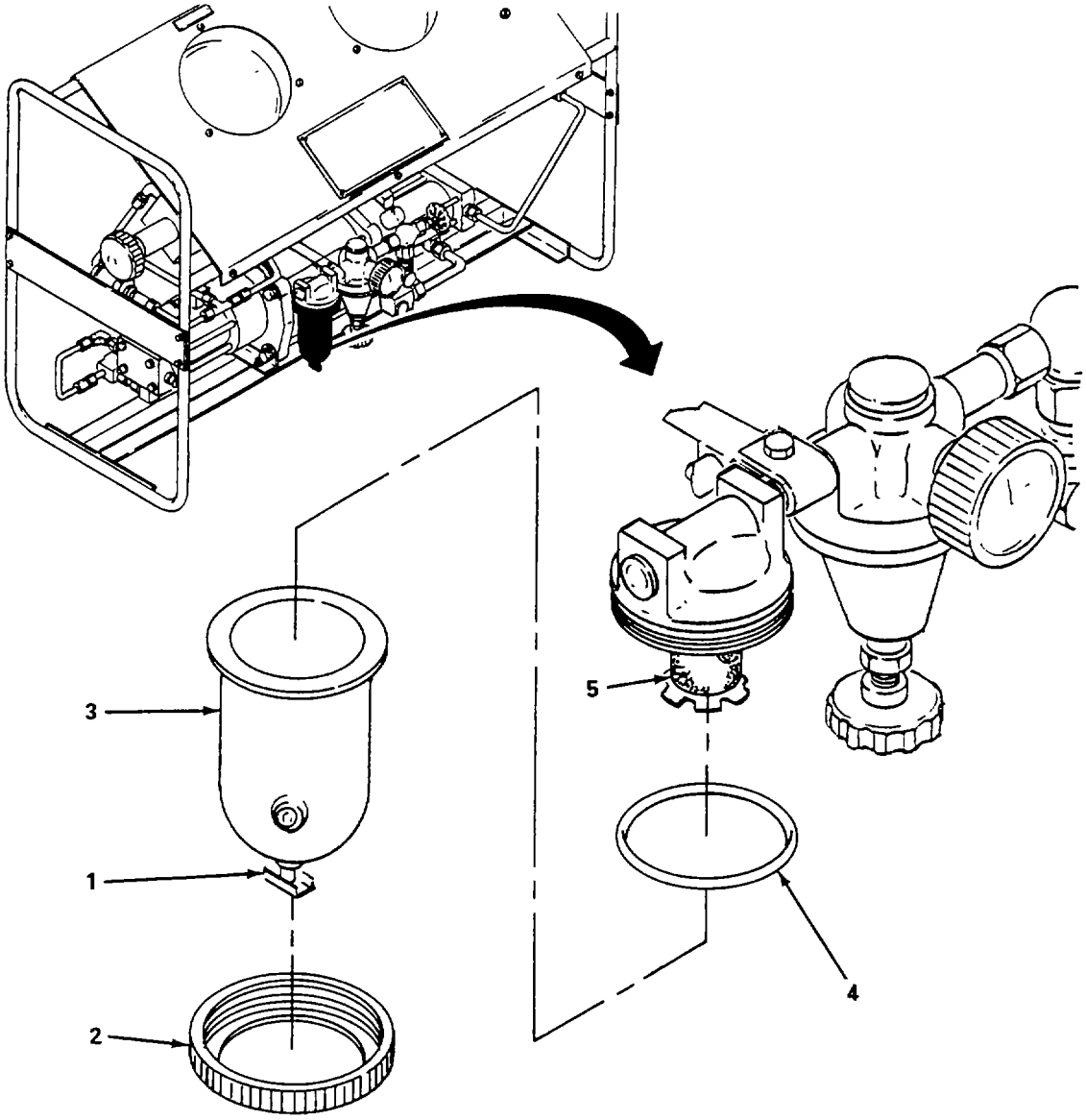


Figure 4-44. Filter Assembly, Service

Section VI. PREPARATION FOR SHIPMENT OR STORAGE

Paragraph **Page**

4-35 **General.** This section contains procedures to place the Type I and Type II Manifold Servicing Units, Oxygen Booster Pump and Oxygen Charging Station into Administrative Storage. General procedures for the manifold Servicing Units is contained in DA Form 2258 Preservation and Depreservation Guide for Vehicles and Equipment.

4-36. **Administrative Storage.**

a. *Type I and Type II Manifold Servicing Units*.

(1) Remove the charging whips from the control panel and double bag the ends of the whips.

(2) Store the whips In plastic bags, seal, and indicate either AIR or OXYGEN on outside of bag.

(3) Store the whips In the original box they came in and store on service trough support.

(4) Double bag all air and oxygen openings.

WARNING

Do not allow any contaminants to enter purification cylinders, contaminants could cause injury or death to divers.

(5) Remove cover assembly on air purification cylinder, remove filter cartridge, and install cover.

NOTE

Step 6 is for Type II Manifold Servicing Unit.

(6) Remove cover assembly on oxygen purification cylinder, remove filter cartridge, and install cover.

(7) Tag purification cylinders Indicating filter cartridges have been removed, and new ones should be Installed prior to use.

(8) Remove water from service troughs and dry thoroughly.

(9) Close top cover and door panels and secure shut.

(10) Install service troughs and secure.

(11) Tag the equipment and indicate all air and oxygen openings are sealed and must be removed prior to use.

b. *Oxygen Booster Pump*

(1) Remove oxygen lines from oxygen booster pump and bag openings on lines and oxygen booster pump.

(2) Remove air supply lines from oxygen booster pump and plug all openings.

(3) Remove bezel ring from pressure gage and remove bezel. Install foam pad under pointer.

(4) Install bezel and bezel ring.

(5) Repeat steps 3 and 4 for remaining pressure gage.

(6) Place oxygen booster pump in original shipping container and seal.

(7) Store container off the floor In a safe clean dry area.

c. *Oxygen Charging Station*

(1) Bag charging whip ends and store.

(2) Close cover and secure.

(3) Place oxygen charging station In original shipping container and seal.

(4) Store container off the floor In a safe clean dry area.

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

Paragraph Page

4-37 **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.

4-38. **Determining System Cleanliness.** A periodic inspection of the air system will verify system cleanliness. If a system Is suspected of contamination, a hydrocarbon an analysis, 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 Troop Command, ATTN AMSTR-M, 4300 Goodfellow Blvd , St. Louis, Missouri 63120-1798.

4-39. **Clean Area.** All cleaning for life support air systems to be performed on components and piping shall be cleaned in a "clean 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 or Formica Floor shall be non-dusting. Walls and ceiling shall be covered with washable vinyl, latex paint or polyurethane-based paint.

4-40. **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 doublebagged. 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.

(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.

4-41. **Pre-Cleaning of Components or Piping**. Upon receipt of new components 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) or non-ionic detergent (NID) 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.

4-42. **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 4-41.

(2) Clean each component by scrubbing with a non-ionic detergent solution (1/2 teaspoon 2 4 mL) detergent to 1 gallon (3.8 L) water using a nylon bristle brush and clean cloths.

(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 on assembly or component drawing.

(7) Double bag all components In plastic 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 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 minimum at a flow rate of not less than 1 gallon (3 8 L) per minute Do not recirculate the water.

(6) Perform a shake test by collecting a 1000 mL sample of rinse water 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 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 to maintain internal cleanliness Secure the bag with 1 inch (2 5 cm) wide tape

(9) When components and systems have been reassembled an air sample shall be taken to verify cleanliness

4-43. **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, 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 4-41) 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 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/tube 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 thirty (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 (617.9 cm3)

(2) Prepare a solution at a ratio of 2 pounds (0.9 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 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 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 4-42.

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

4-44. **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 4-42.

CAUTION

Ensure ventilation Is adequate and avoid breathing vapors.

Personnel should wear chemical protective gloves to prevent skin Irntation 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 Comparable with Soft Goods.

Soft Goods	Freon PCA MIL-C-81302B	TSP O-S-642	NID MIL-D-16791	IA TI-1-735A
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

4-45. 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.

4-46. 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 on the Reentry Control Log (Refer to para 4-10)

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 troubleshooting and maintenance of Type I and Type II Manifold Servicing Units, Oxygen Booster Pump and Oxygen Charging Station by direct support maintenance personnel

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

5-1 Common Tools and Test Equipment. For authorized common tools and support equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

5-2 Special Tools, TMDE, and Support Equipment. There are no special tools or support equipment required Refer to Appendix B Maintenance Allocation Chart, Section III for basic tools.

5-3 Repair Parts. Repair parts are listed and illustrated In the Repair Parts and Special Tools List (RPSTL) for Type I and Type II Manifold Servicing Units, Oxygen Booster Pump and Oxygen Charging Station, TM 5-4220-228-24P

Section II. DIRECT SUPPORT TROUBLESHOOTING

5-4.**General.** This section contains troubleshooting procedures to determine the probable cause of observed equipment malfunctions. Test or inspections are provided to isolate the faulty component and corrective actions are provided to eliminate the malfunction

5-5. **Direct Support Troubleshooting Procedures.** Table 5-1 lists the common malfunctions that may be found during operation. Refer to symptom index to locate the troubleshooting procedure for the malfunction. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions If a malfunction is not corrected by listed corrective actions, notify your supervisor. Verify unit level troubleshooting procedures (table 4-2) have been performed prior to performing direct support troubleshooting for the malfunction observed.

SYMPTOM INDEX

Symptom Page

Table 5-1. Direct Support Troubleshooting Procedures.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. NO BRAKES

Step 1. Inspect brake assembly.

a. Damaged brake shoe assembly (para 4-30).

b. Replace leaking brake cylinder (para 5-40).

Step 2. Inspect power cluster for air and/or hydraulic leaks.

Repair a damaged power cluster (para. 5-38).

Step 3. Inspect emergency valve RE-6 relay for air leaks.

Repair a damaged emergency valve (para. 5-38).

Table 5-1. Direct Support Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
2. **PRESSURE LOSS IN MANIFOLD UNIT**
Step 1. Inspect flex hose.
Replace a damaged flex hose (para 5-10 and 5-24).
Step 2. Inspect pressure gages.
Replace a damaged pressure gage (para 5-12 and 5-26).
Step 3. Inspect control valve quarter turn.
Replace defective control valves, quarter turn (para. 5-13 and 5-27).
Step 4. Inspect servicing, recharge, charging, manifold shut-off, and bleed-off valves.
Replace defective valve (para 5-14 and 5-28).
Step 5. Inspect pressure relief valves.
Replace damaged pressure relief valve (para 5-16 and 5-30).
Step 6. Inspect pressure regulator.
Replace a damaged pressure regulator (para 5-15 and 5-29).
Step 7. Inspect supply piping.
Replace damaged supply piping (para. 5-17 and 5-31).
Step 8. Inspect output piping.
Replace damaged output piping (para 5-19 and 5-33).
Step 9. Inspect supply manifold.
Replace damaged supply manifold (para 5-18 and 5-32).
Step 10. Inspect output manifold.
Replace a damaged output manifold (para 5-20 and 5-34).

Table 5-1 Direct Support Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

2. **PRESSURE LOSS IN MANIFOLD UNIT (Cont).**

Step 11. Inspect cylinder assembly.

Replace or repair a damaged cylinder assembly (para. 5-9 and 5-23).

3. **OXYGEN BOOSTER PUMP OPERATION ERRATIC.**

Connect 0-150 psi (0-1103 kPa) pressure gage to upper end cap Apply air pressure to air drive Inlet.

a. Replace pilot valve if gage reads 0 (para 5-49).

b. Replace upper pilot valve If gage reads 150 psi (1103 kPa) (para 5-49).

4. **OXYGEN BOOSTER PUMP TAKES 1 STROKE AND STOPS**.

Step 1. Check inlet gage.

Replace inlet oxygen supply If gage reads less then 150 psi (1034 kPa).

Step 2. Check output gage.

Replace output cylinder if gage pressure is higher then 2950 psi (20340 kPa)

Step 3. Check pilot valves.

Replace pilot valve (para. 5-49).

5. **OXYGEN BOOSTER PUMP DOES NOT CYCLE**

Step 1. Check air drive air supply.

Adjust pressure to 0-150 psi (0-1034 kPa).

Step 2. Inspect pump assembly.

Replace pump assembly if damage is found or suspected (para. 5-42).

Step 3. Check air drive/air piston.

Notify supervisor or dive master if air leak is detected.

Table 5-1. Direct Support Troubleshooting Procedures (Cont).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

6. **INLET PRESSURE GAGE FLUCTUATES EXCESSIVELY**

Check 15X gas barrel check valve.

Replace 15X gas barrel check valve (para 5-48).

7. **OUTLET PRESSURE GAGE FLUCTUATES EXCESSIVELY**

Check 30X gas barrel check valve.

Replace 30X gas barrel check valve (para.5-48).

8. **OXYGEN CHARGING STATION LOSES PRESSURE** .

Step 1. Check vent valve.

Replace vent valve if valve leaks when closed (para 5-61).

Step 2. Check shut-off valve.

Replace shut-off valve if valve leaks when closed (para 5-61).

Step 3. Check pressure gage.

Replace pressure gage if defective (para 5-59).

Step 4. Check charging whips.

Replace a damaged charging whip (para 5-58).

Step 5. Check piping system.

Replace any piping that is damaged (para 5-57).

Step 6. Check input manifold block.

Replace if cracked or otherwise damaged (para 5-60).

Step 7. Check output manifold blocks.

Replace a cracked or damaged block (para 5-60)

Step 8. Check whip manifold blocks

Replace a cracked or damaged block (para 5-60)

Section III. DIRECT SUPPORT MAINTENANCE PROCEDURES

5-6 General. This section contains direct support maintenance procedures as authorized by the maintenance allocation chart (MAC) In Appendix B of this manual When performing maintenance on Type I and Type II Manifold Servicing Units, Oxygen Booster Pump or Oxygen Charging Station, keep all tools and work area as clean as possible. Remove all oils, grease, rust, or other contaminants In accordance with the procedures. In Chapter 4, Section V of this manual All components must be cleaned with nonionic detergent solution and rinsed thoroughly with fresh distilled water Tools should be thoroughly cleaned after performing maintenance on trailer assembly and before performing maintenance on air or oxygen systems. The Type I and Type II Manifold Servicing Units are very similar pieces of equipment. The Type I and Type II Manifold Servicing Units can be very dangerous to work on Observe all warning, cautions and notes and keep the following In mind always.

WARNING

- Do not Interchange air and oxygen parts.
- Do not disconnect any servicing hose without first making sure no pressure is in the line.
- Do not use a petroleum base cleaning agent on any part of an air or oxygen system.
- Fire suppression equipment of the proper size and type shall be immediately available during use, movement or storage of charged oxygen equipment.
- Do not work on trailer mounted equipment unless the trailer is properly stabilized. The trailer could shift or fall resulting In injury or death to personnel.

5-7 Dehydrator Cylinder Assembly (Air), Type I.

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

All gas pressure vented from dehydrator cylinder
Side panel removed (para. 4-15)

Materials/Parts

Bands, Rubber (Item 5, Appendix D)
Distilled Water (Item 11, Appendix D)
Nonionic Detergent (Item 10, Appendix D)
Cloth, Lint Free (Item 9, Appendix D)
Bags, Plastic (Item 4, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

References

Para 4-10 Maintenance and Reentry Control Procedures

a. *Replace* (figure 5-1)

WARNING

Cleanliness is imperative In maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible Injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provide breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored In a plastic bag and sealed Failure to do so will cause air system to become contaminated and could result in injury or death to the diver

(1) Loosen connector nuts (1) securing line (2).

(2) Loosen connector nuts (3) securing line (4).

(3) Remove four bolts (5), washers (6), and locknuts (7) and remove dehydrator cylinder assembly (8) and brackets (9).

(4) Remove elbows (10) and (11).

(5) Install elbows (11) and (10) on new dehydrator cylinder assembly (8).

(6) Install dehydrator cylinder assembly (8) and brackets (9) and secure with four bolts (5), washers (6), and locknuts (7)

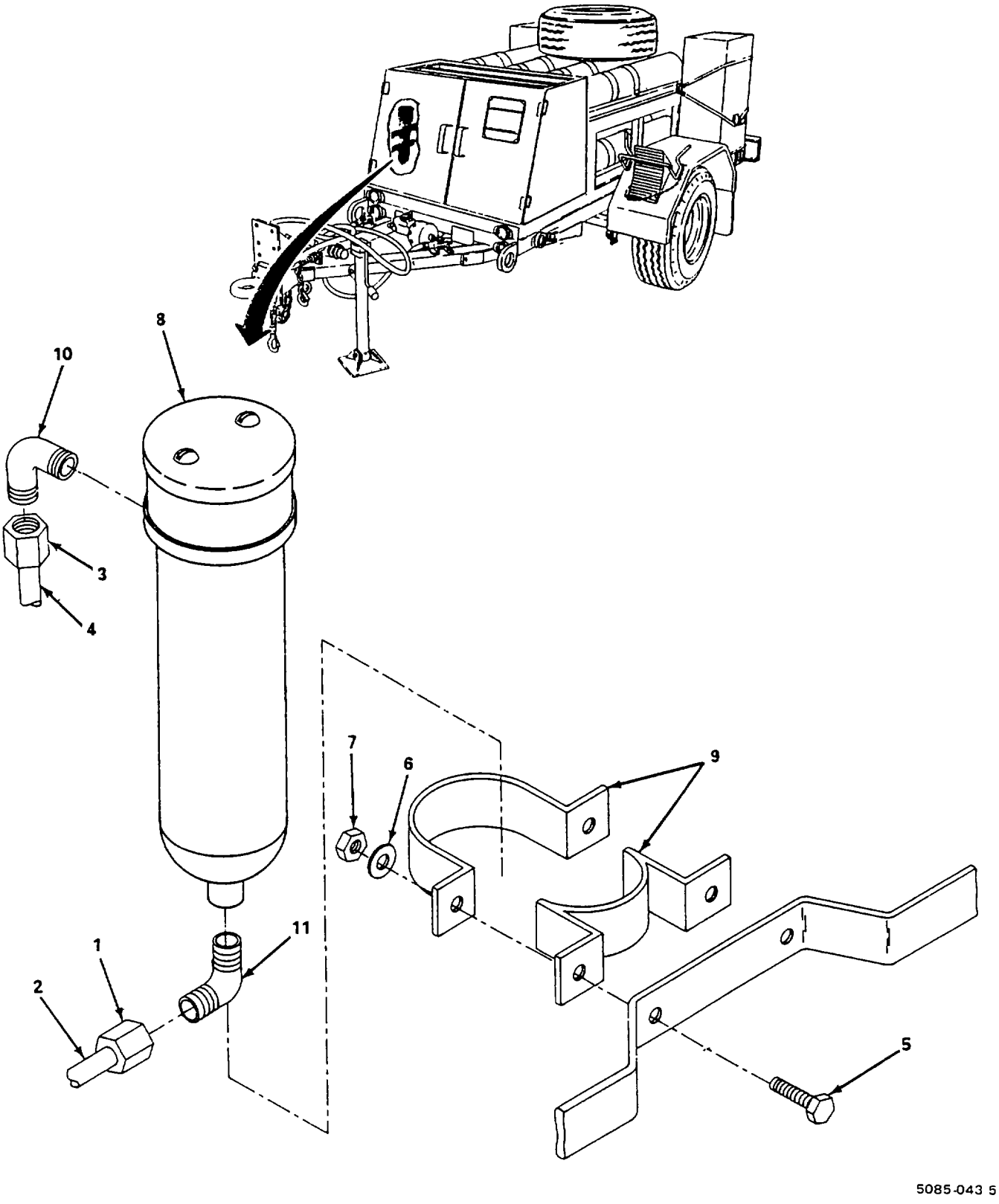


Figure 5-1. Dehydrator Assembly, Replace.

5-7. Dehydrator Cylinder Assembly (Air), Type I (Cont).

(7) Install line (4) and tighten connector nuts (3).

(8) Install line (2) and tighten connector nuts (1).

(9) Pressurize system and check for leaks.

FOLLOW-ON MAINTENANCE
Install side panel (para 4-14).

b. Repair. (figure 5-2)

(1) Remove dehydrator assembly (para a).

(2) Remove cover (1) and cartridge (2).

(3) Remove two screws (3) and gaskets (4) and remove dust cover (5) from cover (1).

(4) Remove retaining ring (6) and remove upper head (7) and O-ring (8).

(5) Remove screw (9) and remove upper perforator (10), lower head (11), and head spring (12).

(6) Remove O-ring (13).

(7) Remove screw (14) and remove lower perforator (15) and spacer (16).

(8) Clean all items except filter cartridge and O-rings with nonionic detergent and dry thoroughly.

(9) Inspect upper (10) and lower (15) perforators and replace if blades are bent or dull.

(10) Inspect dust cover (5) and cover (1) and replace If cracked.

(11) Inspect upper head (7) and lower head (11) and replace if cracked, or excessively worn.

(12) Inspect head spring (12) and replace if cracked or deformed.

(13) Inspect cylinder (17) and replace If cracked.

(14) Install spacer (16) and lower perforator (15) and secure with screw (14).

(15) Install new O-ring (13).

(16) Install head spring (12), lower head (11), and upper perforator (10) and secure with screw (9).

(17) Install new O-ring (8).

(18) Install upper head (7) and secure with retaining ring (6).

(19) Install dust cover (5) and gasket (6) and secure with two screws (3) and gaskets (4).

(20) Install cover (1).

(21) Install dehydrator assembly (para a).

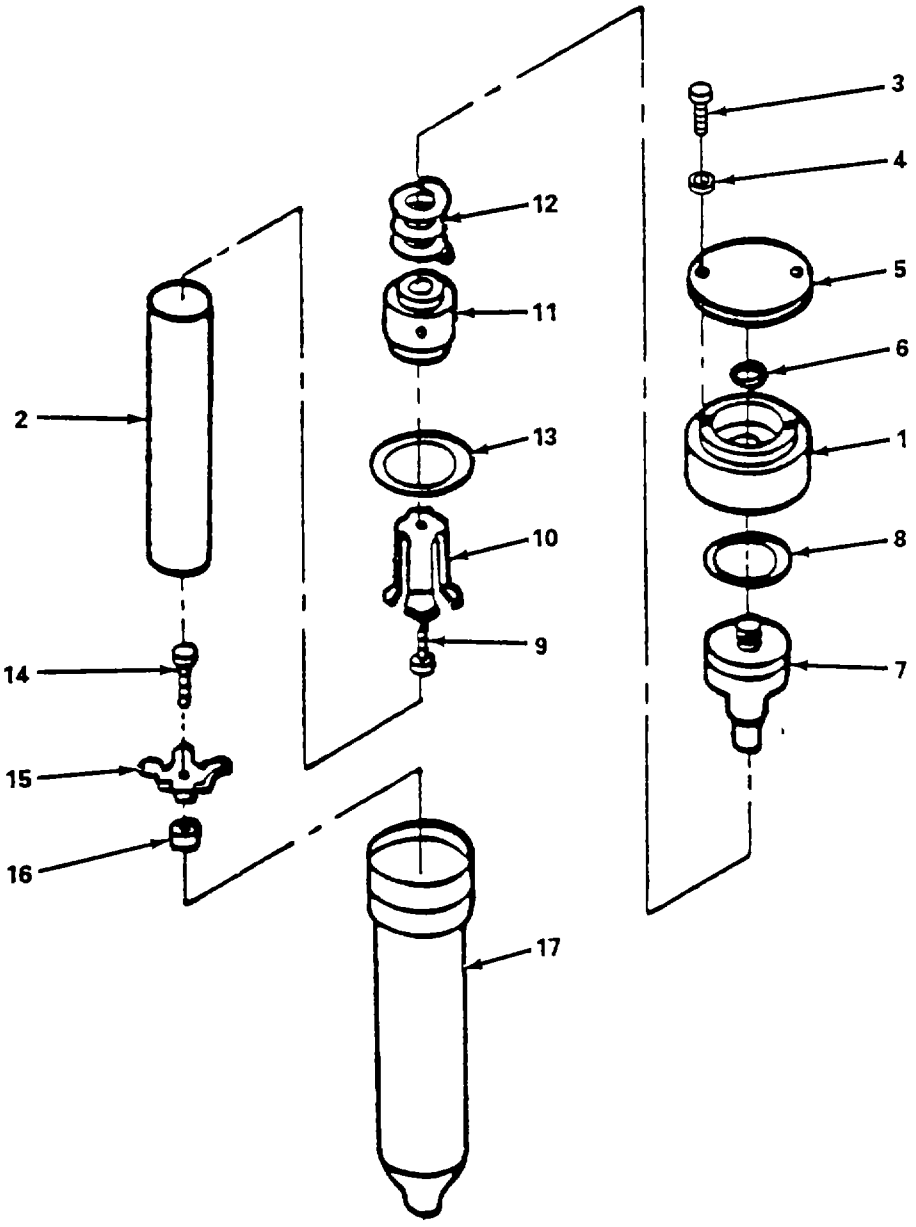


Figure 5-2. Dehydrator Assembly, Repair.

5-8. Band Clamp, Type I.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Replace. (figure 5-3)

(1) Unscrew handle (1).

(2) Remove nut (2) and remove band clamp (3).

(3) Remove retaining ring (4) and remove washer (5), washer (6), and handle (1).

(4) Install handle (1), washer (6), washer (5), and secure with retaining ring (4)

(5) Install band clamp (3) and nut (2).

(6) Tighten handle (1) to secure band clamp (3).

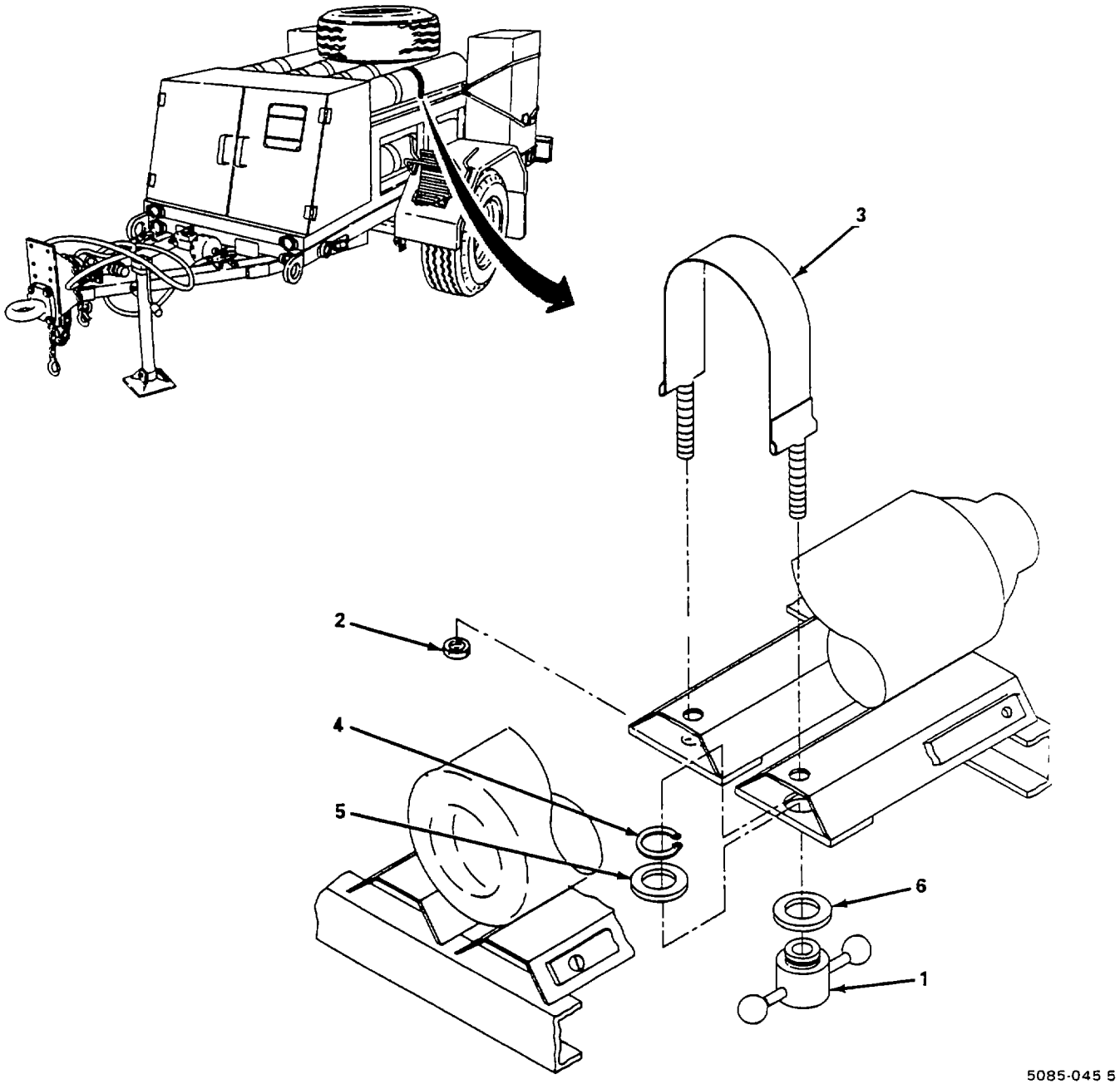


Figure 5-3. Band Clamp, Replace.

5-9. Cylinder Assembly (Air), Type I.

This task covers. Replace

INITIAL SETUP

Tools	*Equipment Condition*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Supply cylinder valve closed, control valve open, supply manifold valve open, service valve open and bleeder valve open
Materials/Parts	*Reference*
Bands, Rubber (Item 5, Appendix D)	Para. 4-10 Maintenance and Reentry Control Procedures
Bags, Plastic (Item 4, Appendix D)	
Tape, Adhesive (Item 20, Appendix D)	

a. *Replace* (figure 5-4)

(1) Open top cover (1) and door panels (2)

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored In a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result In injury or death to the diver.

(2) Loosen connector nut (3) and disconnect line (4) from valve (5).

(3) Loosen two clamp bands (6).

(4) Install protective cap (7) on top of cylinder (8)

(5) Slide cylinder (8) off the back of trailer (9).

(6) Store cylinder (8) in an upright position, and chained to prevent cylinder (8) from falling.

(7) Tag cylinder (8) indicating pressure remaining in cylinder.

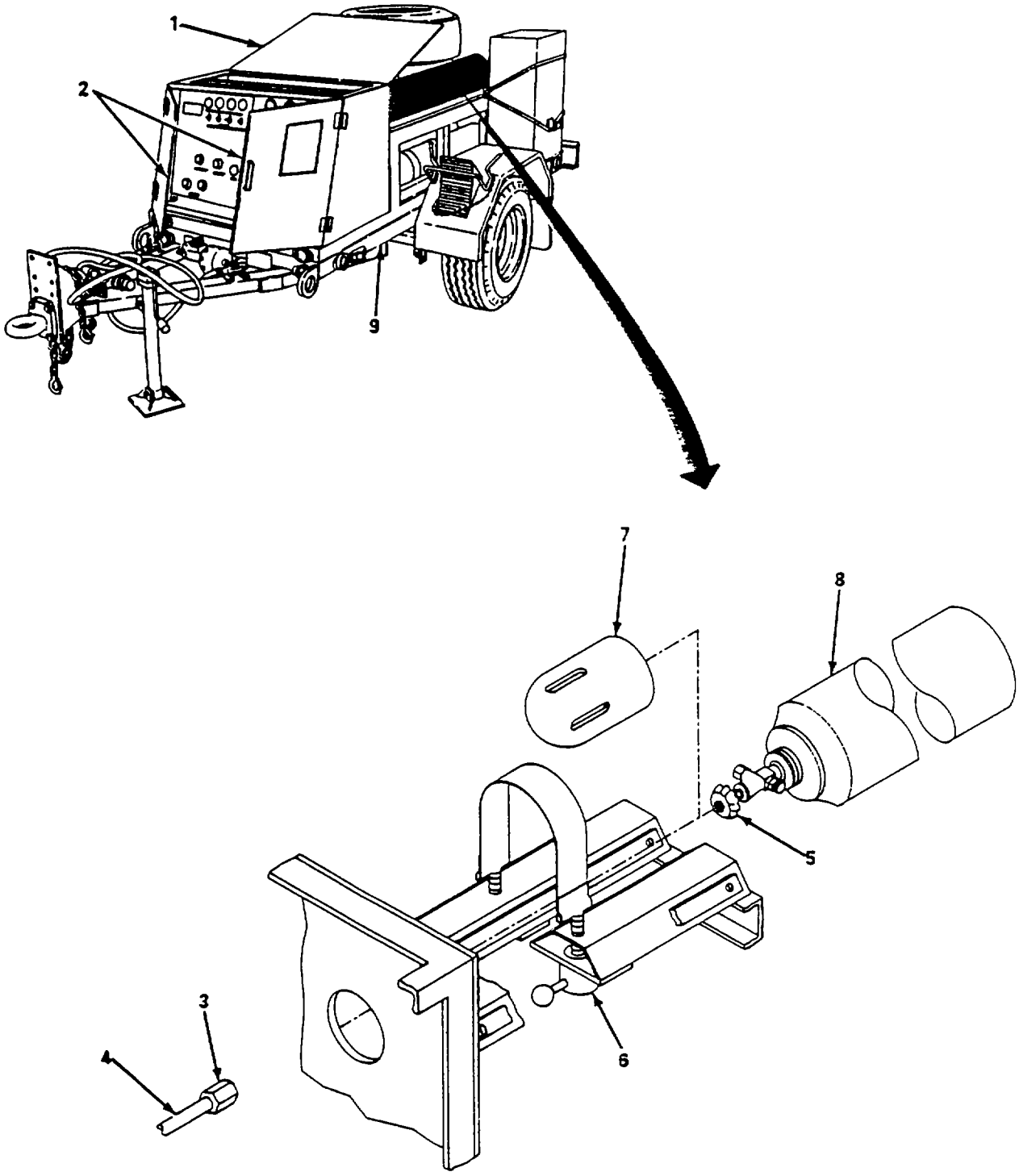


Figure 5-4. Cylinder, Replace

WARNING

Be extremely careful when handling cylinders. There is enormous potential energy stored In cylinder. Severe injury or death may result if cylinder is damaged and compressed gas is allowed to escape uncontrollably.

(8) Install cylinder (8) on trailer (9) and slide fully forward.

(9) Remove protective cap (7) from cylinder (8) and store.

(10) Rotate cylinder (8) to allow easy installation of line (4).

(11) Tighten two clamp bands (6).

(12) Install line (4) and tighten connector nut (3).

(13) Pressurize system and check for leaks

(14) Close door panels (2) and top cover (1).

5-10. Flex Hose (Air), Type I

This task covers: Replace

INITIAL SETUP

Tools	*Equipment Condition*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Supply cylinder valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.
Materials/Parts	*Reference*
Bags, Plastic (Item 5, Appendix D)	
Bands, Rubber (Item 4, Appendix D)	Para 4-10 Maintenance and Reentry Control
Tape, Adhesive (Item 19, Appendix D)	Procedures

Replace. (figure 5-5)

(1) Open top cover (1)

WARNING

Cleanliness is imperative In maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination In accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored In a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in Injury or death to the diver.

(2) Loosen connector nut (2) and disconnect hose (3) from valve (4).

(3) Loosen connector nut (5) and remove hose (3).

(4) Connect hose (3) and tighten connector nut (5).

(5) Connect hose (3) and tighten connector nut (2).

(6) Perform leak test (para 4-11).

(7) Close top cover (1).

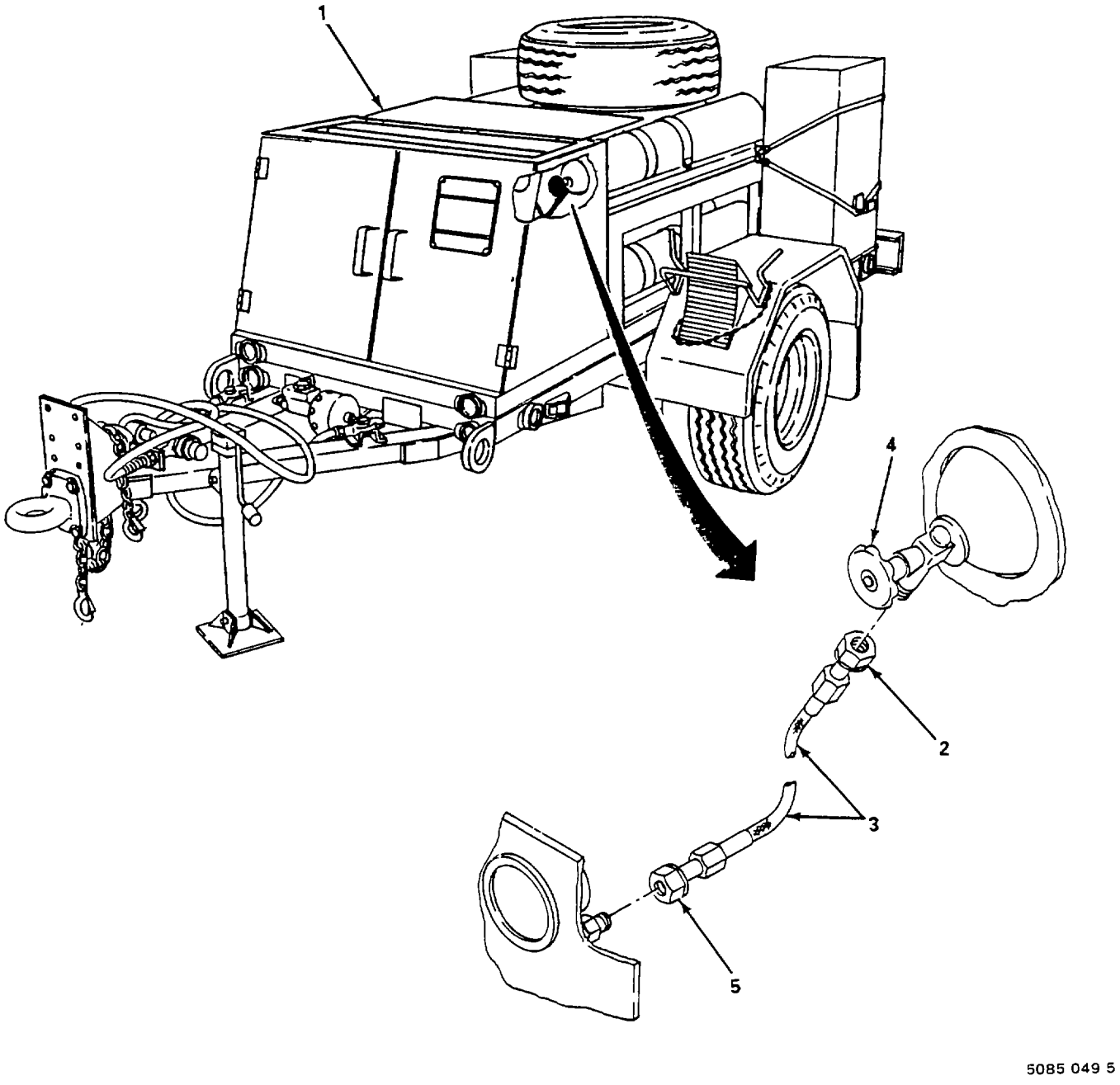


Figure 5-5. Flex Hose, Replace.

5-11. Control Panel Assembly, Type I.

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Repair

(1) Replace panel mount manifold. (figure 5-6).

*(*a) Open top cover (1) and door panels (2).

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination In accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result In equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in Injury or death to the diver.

(b) Loosen two connector nuts (3) and remove line (4).

(c) Remove cap (5).

(d) Remove air line connector (6)

(e) Remove two screws (7), locknuts (8) and washers (9) and remove panel mount manifold (10).

(f) Remove reducer (11).

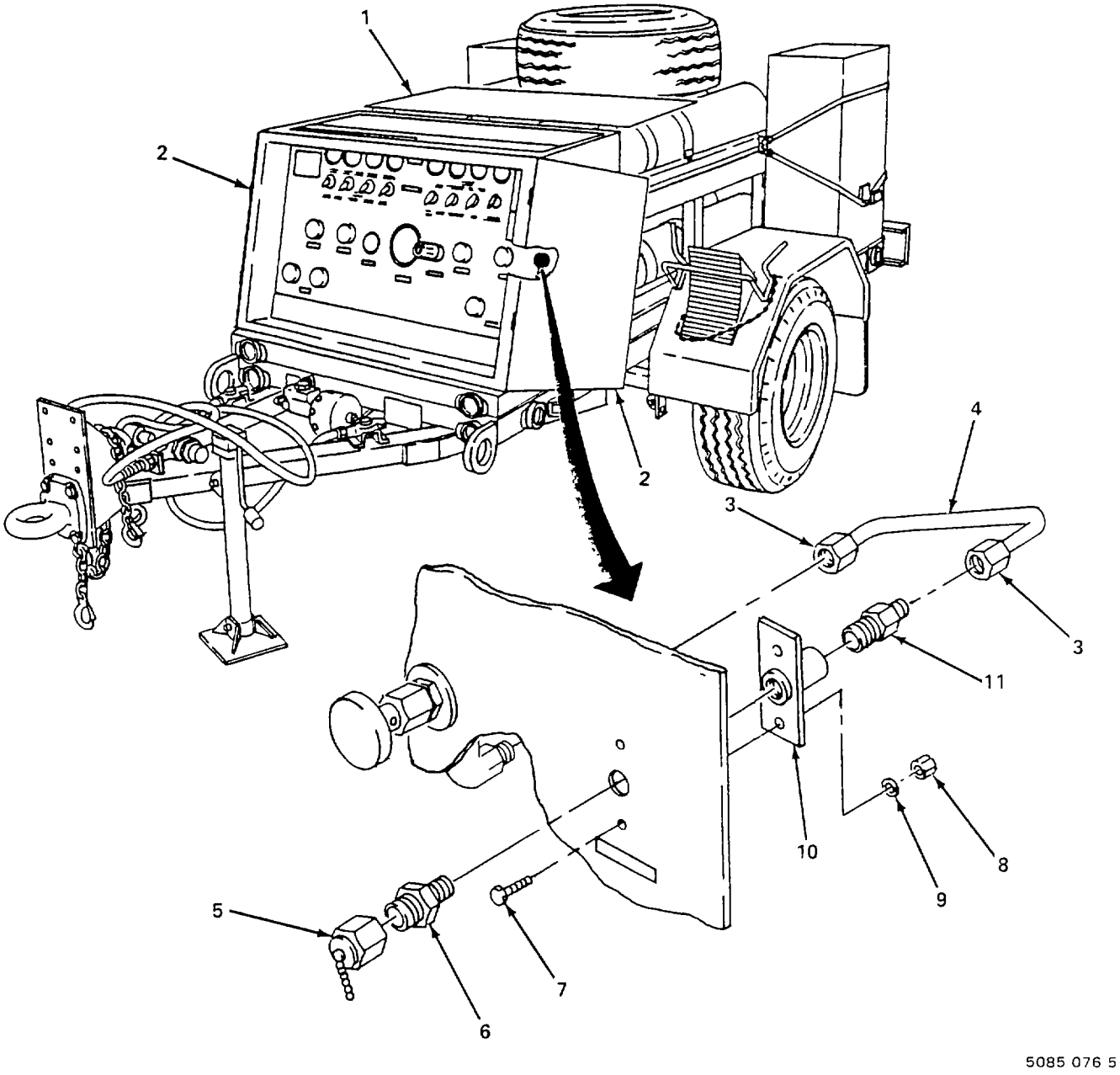


Figure 5-6. Panel Mount Manifold, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape This will ensure that no teflon tape will hang down Inside the air system Teflon tape should be wrapped in such a manner that when the fitting Is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver

(g) Apply teflon tape to threads on reducer (11).

(h) Install reducer (11) on panel mount manifold (10).

(i) Install panel mount manifold (10) and secure with two screws (7), washers (9), and locknuts (8).

(j) Install line (4) and tighten two connector nuts (3).

(k) Install air line connector (6).

(l) Install cap (5).

(m) Pressurize system and perform leak test.

(n) Close door panels (2) and top cover (1).

(*2*) *Replace control panel.* (figure 5-7)

(a) Remove pressure gages (para 5-12).

(b) Remove control valves quarter-turn (para. 5-13).

(c) Remove hand valves (para. 5-14).

(d) Remove pressure regulator (para 5-15).

(e) Remove supply manifold (para 5-18).

(f) Remove output manifold (para 5-20).

(g) Remove eighteen screws (1) and nuts (2) and remove control panel (3) and cross brace (4).

(h) Install new control panel (3) and cross brace (4) and secure with eighteen screws (1) and nuts (2).

(i) Install output manifold (para. 5-20).

(j) Install supply manifold (para 5-18).

(k) Install pressure regulator (para 5-15).

(l) Install hand valves (para 5-14).

(m) Install quarter turn valves (para 5-13).

(n) Install pressure gages (para 5-12).

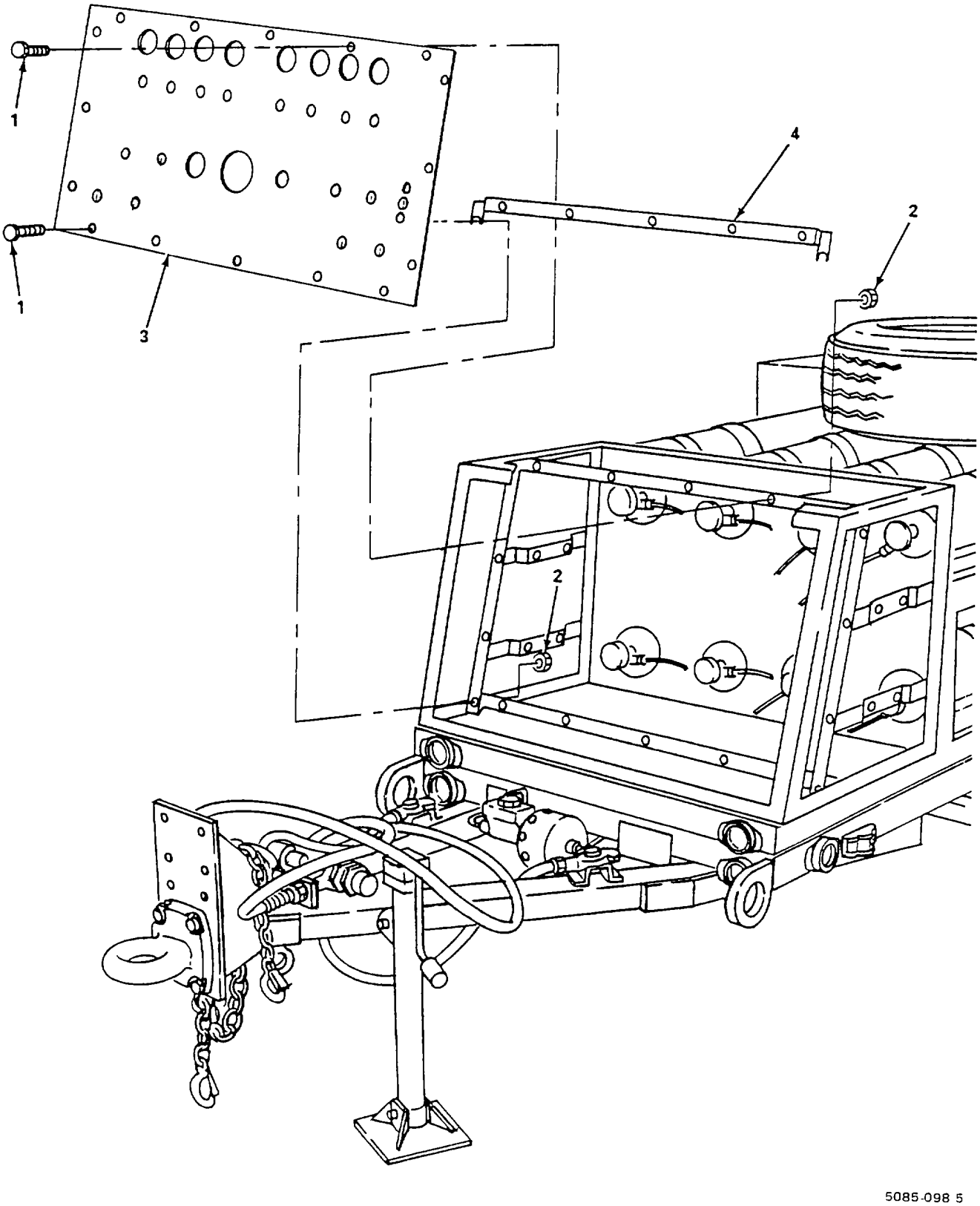


Figure 5-7. Control Panel, Replace.

5-12 Pressure Gage (Air), Type I.

This task covers, Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Replace

(1) Air cylinder and manifold pressure gages. (figure 5-8)

*(*a) Open top cover (1) and door panels (2)

WARNING

Cleanliness is imperative In maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result In equipment failure and possible Injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(b) Loosen two connector nuts (3) and remove line (4).

(c) Remove two nuts (5), brackets (6), and remove pressure gage (7).

(d) Remove reducer (8) from pressure gage (7).

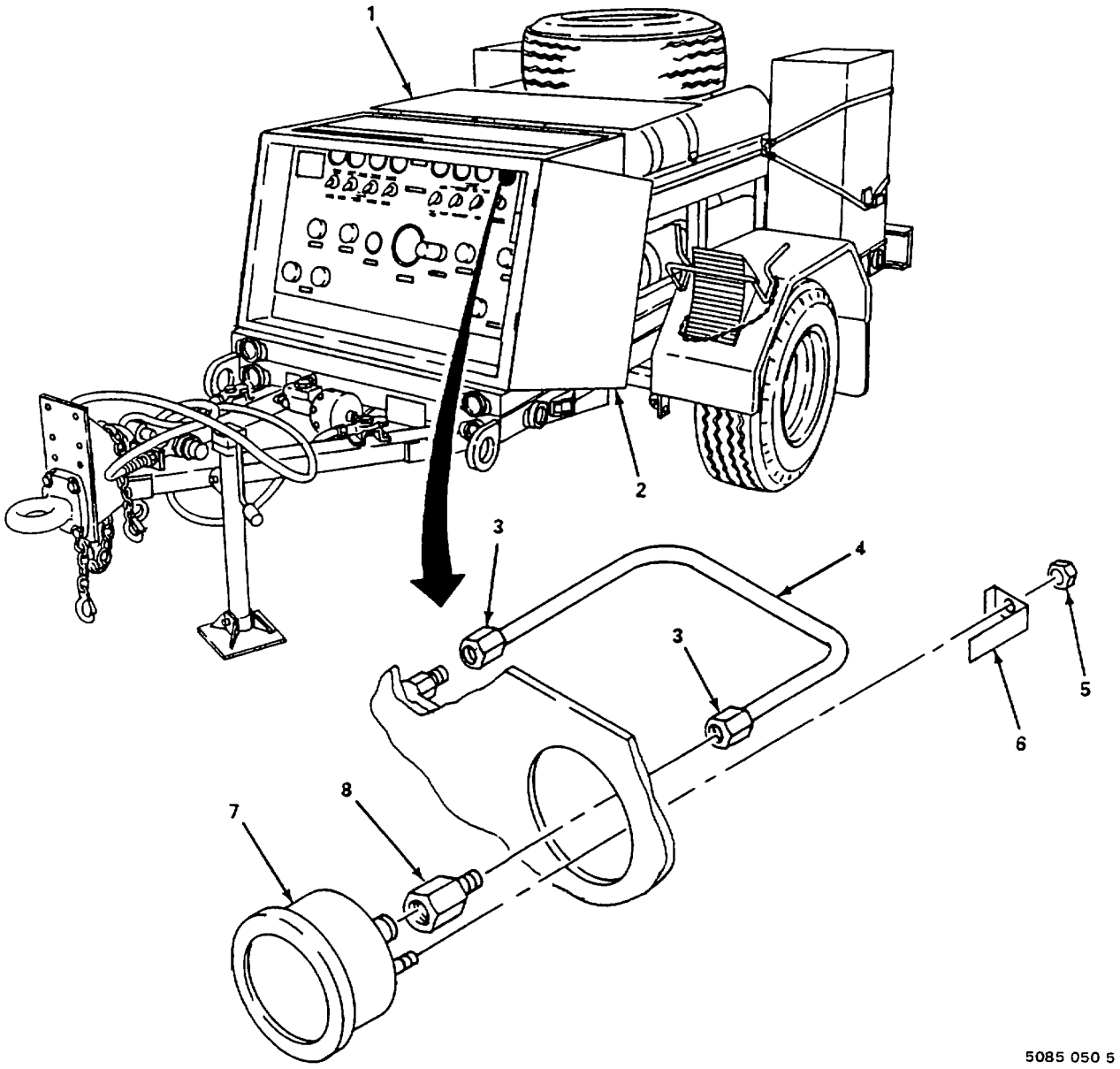


Figure 5-8. Air Pressure Gage, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down Inside the air system. Teflon tape should be wrapped in such a manner that when the fitting Is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

5-12. Pressure Gage (Air), Type I (Cont).

(e) Apply teflon tape to threads on new pressure gage (7).

(f) Install reducer (8) on new pressure gage (7).

(g) Install new pressure gage (7) and secure with two brackets (6) and nuts (5)

(h) Install line (4) and tighten two connector nuts (3).

(i) Pressurize system and perform leak test.

(j) Close door panels (2) and top cover (1)

(2) Air servicing pressure gage. (figure 5-9)

(a) Open top cover (1) and door panels (2).

WARNING

Cleanliness is imperative In maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(b) Loosen two connector nuts (3) and remove line (4).

(c) Loosen two connector nuts (5) and remove line (6)

(d) Remove two nuts (7), bracket (8), and remove air servicing pressure gage (9)

(e) Remove tee (10) with elbow (11) installed from air servicing pressure gage (9)

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver .

(f) Apply teflon tape to threads on gage (9).

(g) Install tee (10) with elbow (11) installed on new air servicing pressure gage (9).

(h) Install new air servicing pressure gage (9) and secure with bracket (8) and two nuts (7).
(i) Install line (6) and tighten two connector nuts (5).
(j) Install line (4) and tighten two connector nuts (3).
(k) Pressurize system and perform leak test.
(l) Close door panels (2) and top cover (1).

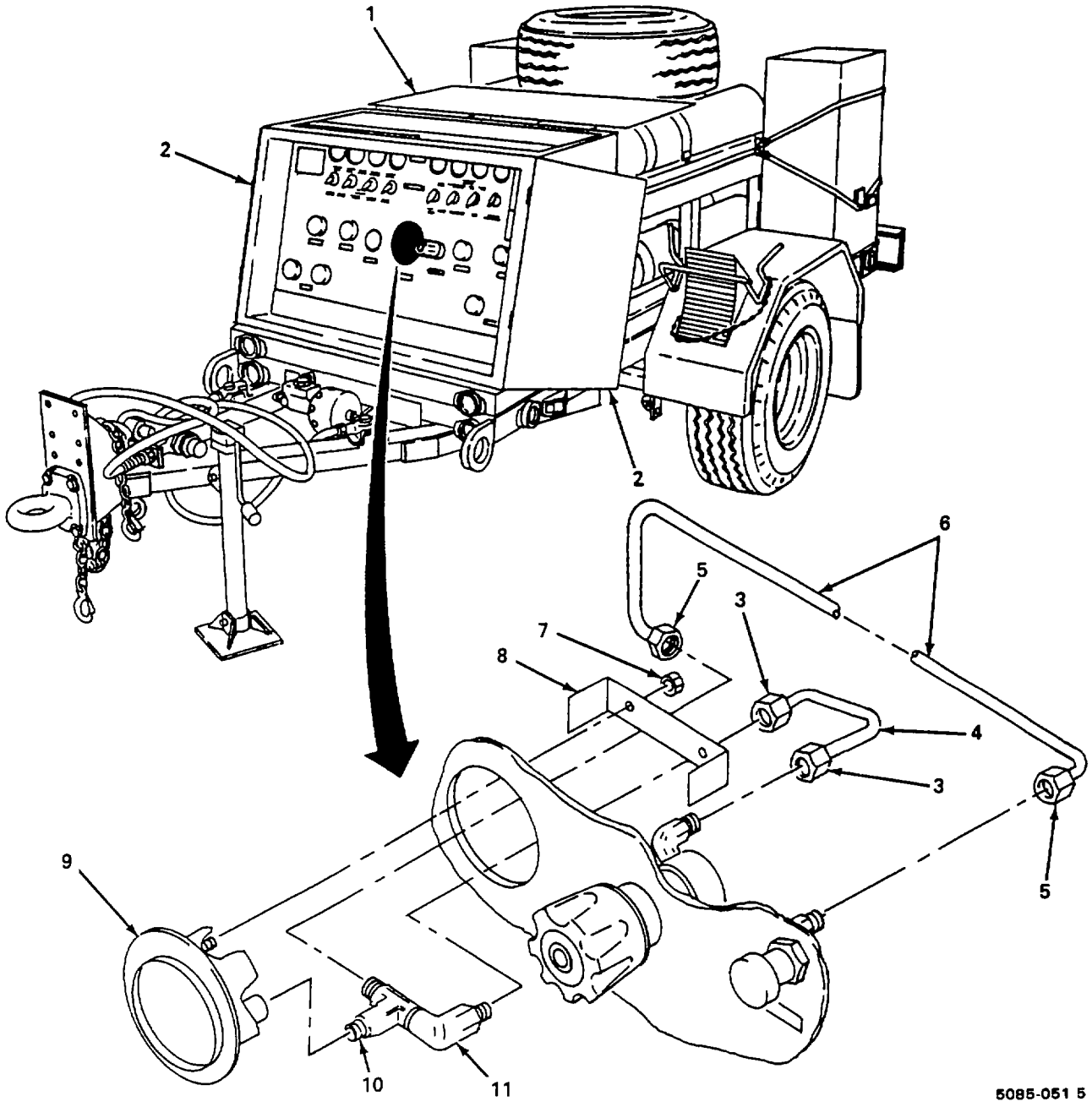


Figure 5-9. Air Servicing Pressure Gage, Replace.

5-13 Quarter-Turn Valve (Air), Type I.

This task covers: Replace

INITIAL SETUP

Tools Equipment Condition

General Mechanic's Tool Kit (NSN 5180-00-177-7033**)**	Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

References

Para. 4-10 Maintenance and Reentry Control Procedure

Replace. (figure 5-10)

(1) Open top cover (1) and door panels (2).

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored In a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(2) Loosen two connector nuts (3) and remove line (4).

(3) Loosen connector nut (5) and disconnect line (6).

(4) Loosen two connector nuts (7) and remove line (8).

(5) Loosen setscrew (9) and remove handle (10).

(6) Remove nut (11), washer (12), and remove control valve, quarter-turn (13) and washer (14).

(7) Remove reducer (15) with elbow (16) installed.

(8) Remove reducer (17) with tee (18), reducer (19), reducer (20), and elbow (21) installed.

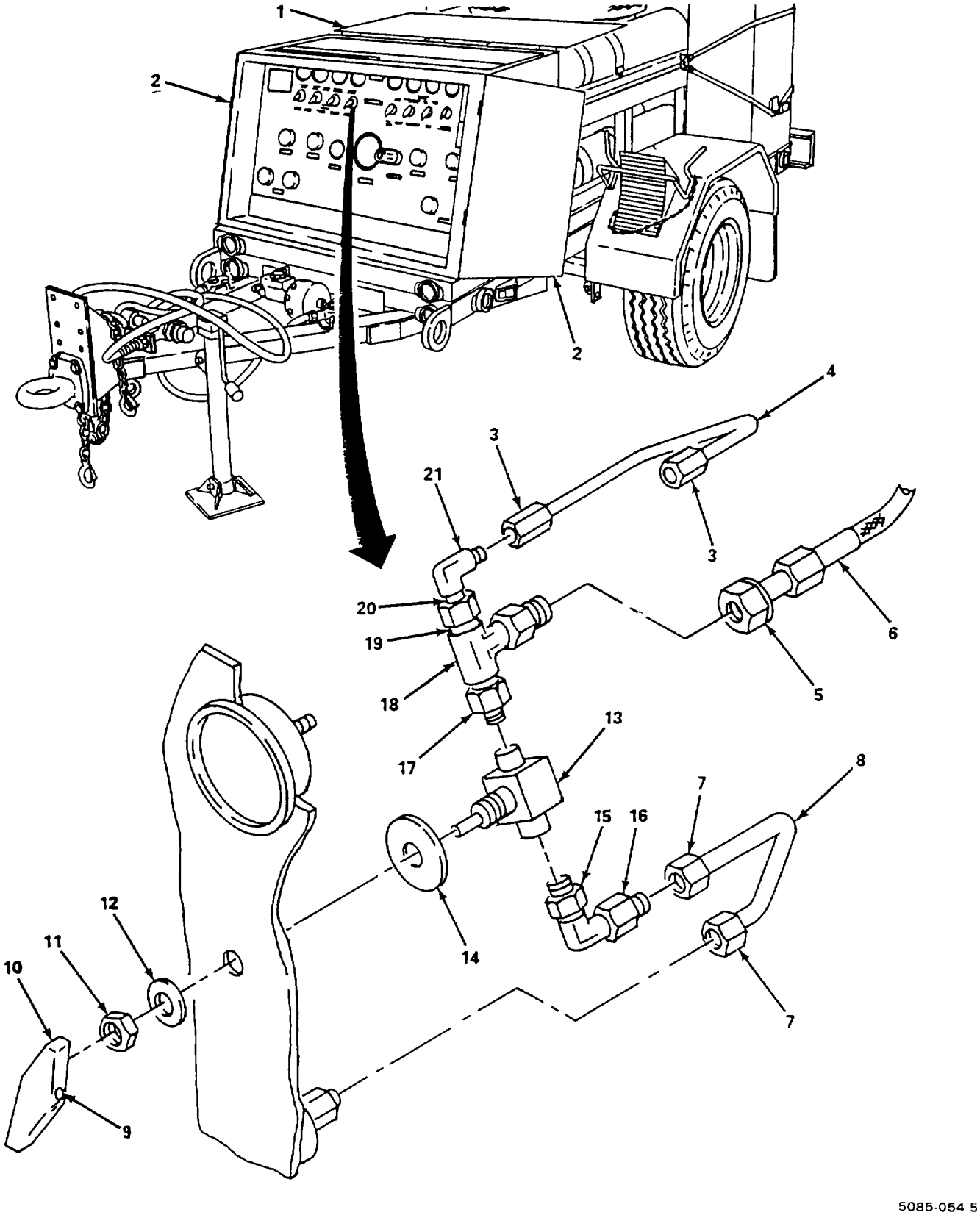


Figure 5-10. Quarter Turn Valve, Replace

(9) Install reducer (17) with tee (18), reducer (19), (20, and elbow (21 on new control valve quarter-turn (13).

(10) Install reducer (15) with elbow (16) on new control calve quarter-turn (13).
(11) Install quarter-turn valve (13), washer (14), washer (12), and secure with nut (11).

(12) Install handle (10) and tighten setscrew (9).
(13) Install line (8) and tighten two connector nuts (7).
(14) Connect line (6) and tighten connector nut (5).
(15) Install line (4) and tighten two connector nuts (3).
(16) Pressurizes system and perform leak test.
(17) Close door panels (2) and top cover (1).

5-14 **Hand Valve (Air), Type I.**

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-11)

NOTE

The following procedures are for all air system hand valves. Although some of the valves have a different configuration of lines or fittings on them, the basic procedure are the same for all.

(1) Open top cover (1) and door panels (2)

WARNING

Cleanliness is imperative in maintaining and handling diving air system components All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel .

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored In a plastic bag and sealed Failure to do so will cause air system to become contaminated and could result In injury or death to the diver.

(2) Loosen two connector nuts (3) and remove line (4).

(3) Loosen two connector nut (5) and remove line (6).

(4) Remove cap (7).

(5) Remove nut (8) and remove knob (9).

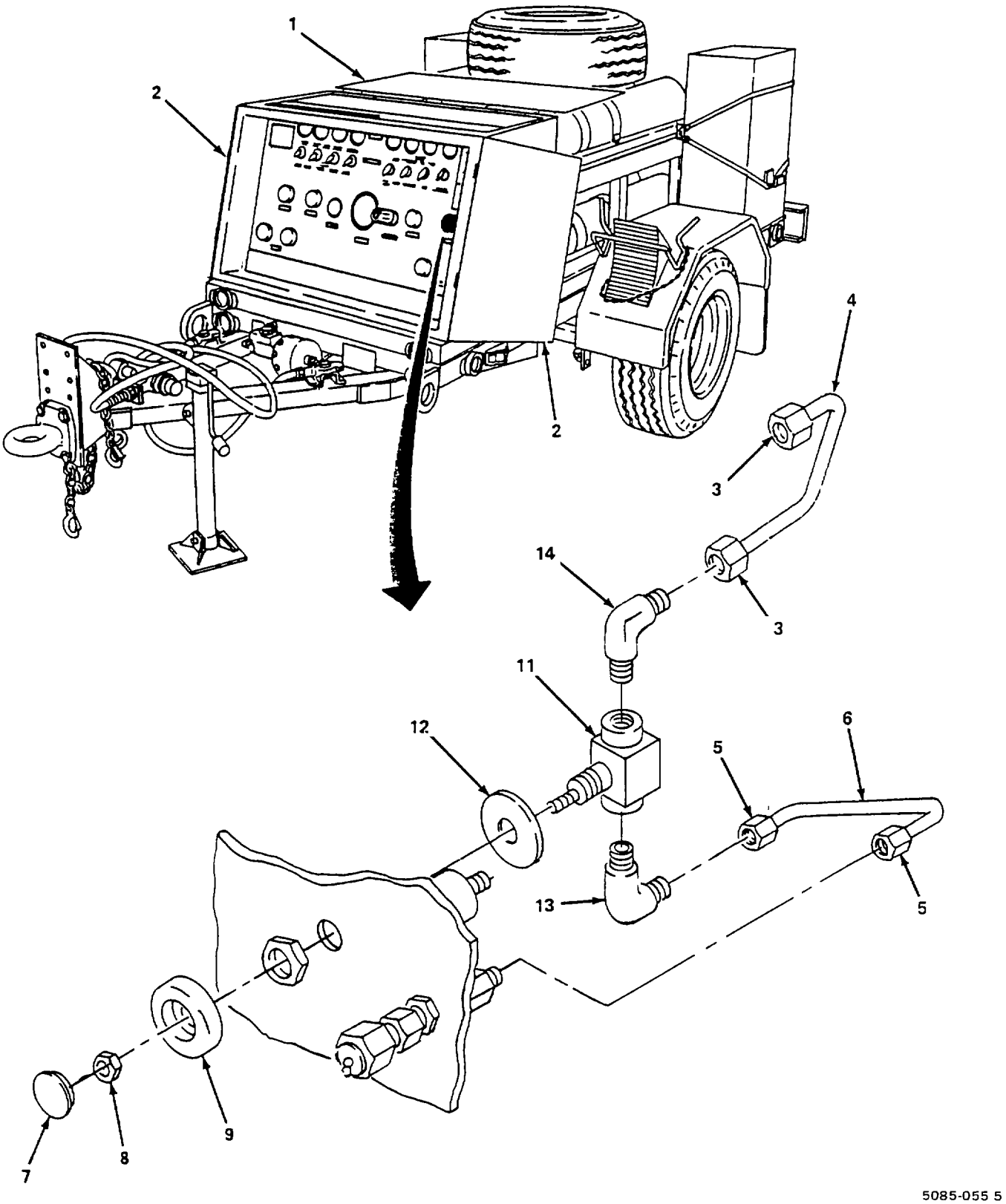


Figure 5-11. Hand Valve Air, Replace.

5-33/(5-34 blank)

(6) Remove nut (10) and remove valve (11) and washer (12).
(7) Remove elbows (13) and (14).

WARNING

Leave 1 ½ threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(8) Apply teflon tape to threads on elbows (13) and (14).

(9) Install elbows (13) and (14) in new valve (11). Ensure elbows face away from control panel (15) when valve is installed.

(10) Install calve (11) and washer (12) and secure with nut (10).

(11) Install knob (9) and secure with nut (8).

(12) Install cap (7).

(13) Install line (6) and t8ighten two connector nuts (5).

(14) Install line (4) and tighten two connector nuts (3).

(15) Pressurize system and perform leak test.

(16) Close door panels (2) and top cover (1).

5-15 **Pressure Regulator (Air), Type I.**

This task covers: Replace

INITIAL SETUP

Tools	*Equipment Condition*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open
Materials/Parts	*References*
Bags, Plastic (Item 4, Appendix D) Bands, Rubber (Item 5, Appendix D) Tape, Adhesive (Item 19, Appendix D)	Para 4-10 Maintenance and Reentry Control Procedures

Replace (figure 5-12)

(1) Open top cover (1) and door panels (2).

WARNING

Cleanliness Is Imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible Injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed Failure to do so will cause air system to become contaminated and could result in Injury or death to the diver.

(2) Loosen two connector nuts (3) and remove line (4).

(3) Loosen two connector nut (5) and remove line (6).

(4) Remove cap (7).

(5) Remove nut (8) and remove knob (9).

(6) Remove two screws (10) and washers (11) and remove pressure regulator (12).

(7) Remove two elbows (13) and (14).

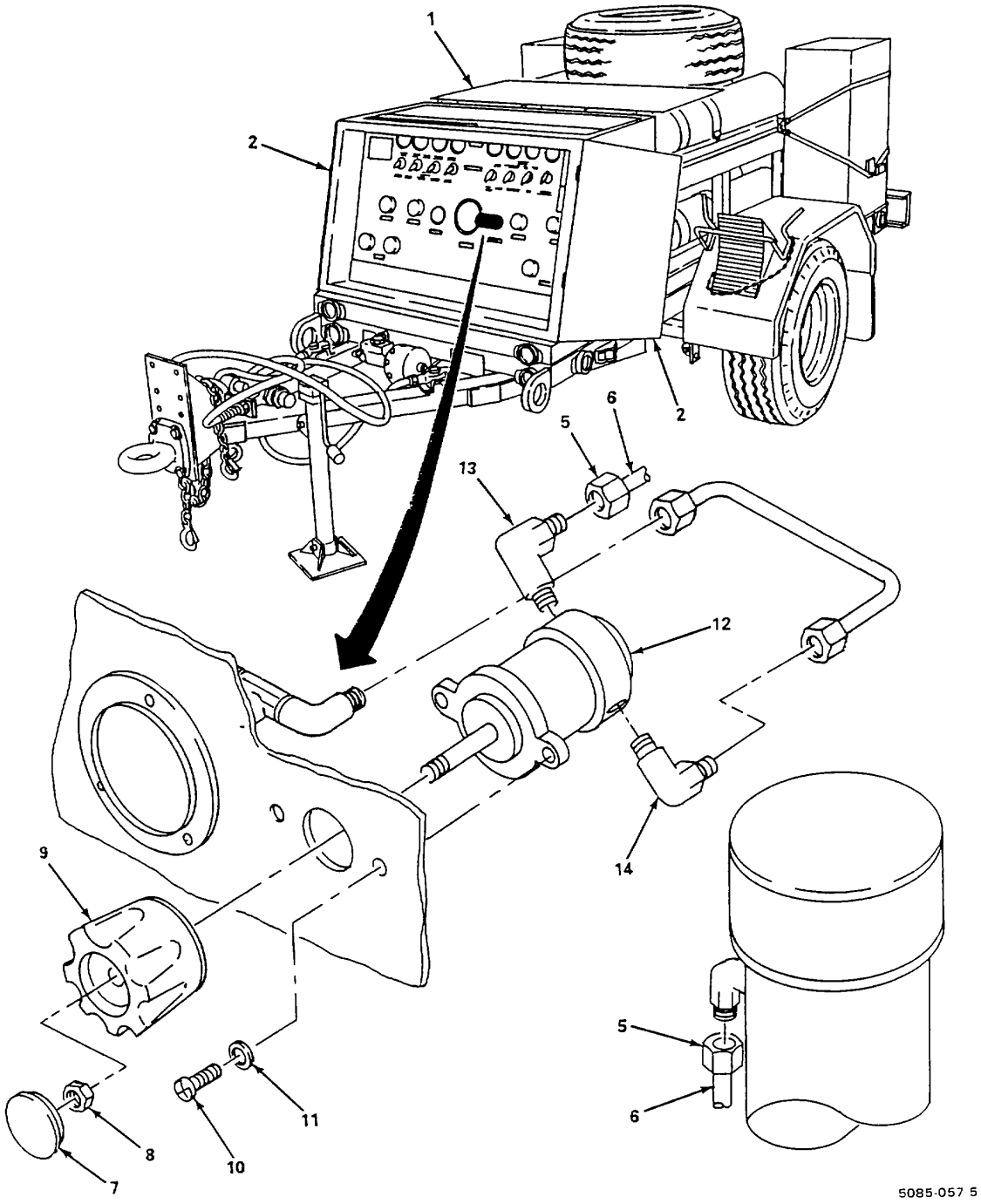


Figure 5-12. Pressure Regulator, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the oxygen system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the oxygen system and subsequent possible injury or death to the diver.

(8) Apply teflon tape to threads on elbows (13) and (14).

(9) Install elbows (13) and (14).

(10) Install regulator (12) and secure with two screws (10) and washers (11).

(11) Install knob (9) and secure with nut (8).

(12) Install cap (7).

(13) Install line (6) and tighten connector nut (5).

(14) Install line (4) and tighten connector nut (3).

(15) Pressurize lines and check for leaks.

(16) Close door panels (2) and top cover (1).

5-16. Pressure Relief Valve (Air), Type I.

This task covers: Replace

INITIAL SETUP

Tools Equipment Condition

General Mechanic's Tool Kit (NSN 5180-00-177-7033)

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

References

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-13)

NOTE

There are two pressure relief valves for the air system The procedures are the same for both.

(1) Open top cover (1).

WARNING

Cleanliness Is imperative in maintaining and handling diving air system components All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result In equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(2) Remove pressure relief valve (2)

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape . This will ensure that no teflon tape will hang down Inside the oxygen system . Teflon tape should be wrapped in such a manner that when the fitting Is tightened the tape will not loosen Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver .

(3) Apply teflon tape to threads on pressure relief valve (2).

(4) Install new pressure relief valve (2).

(5) Close top cover (1).

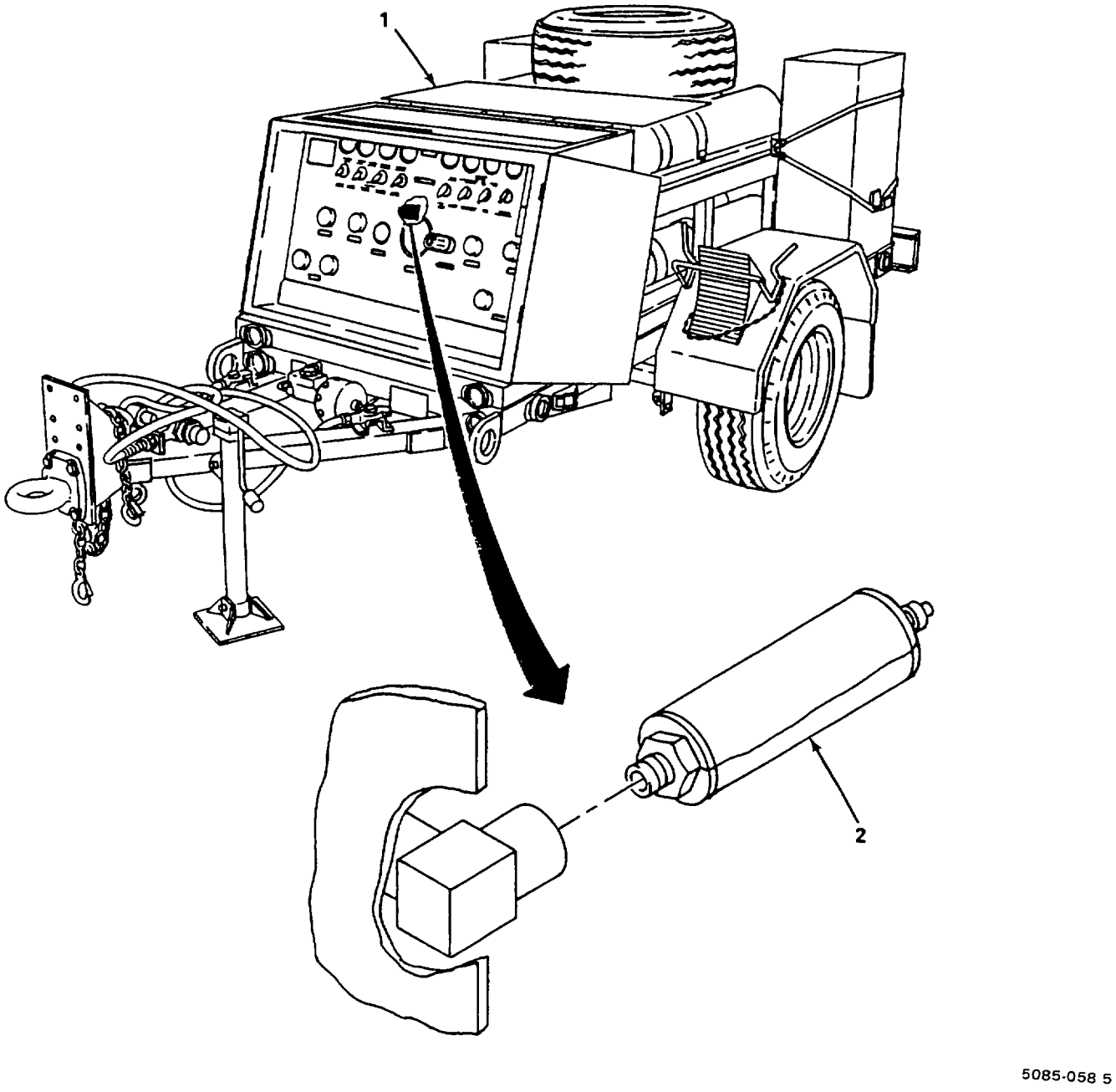


Figure 5-13. Pressure Relief Valve (Air), Replace.

5-17. Supply Piping (Air), Type I.

This task covers: Replace

INITIAL SETUP

Tools Equipment Condition

General Mechanic's Tool Kit (NSN 5180-00-177-7033)

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.

Materials/Parts

Side panel removed (para 4-15)

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Reference

Para .4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-14)

NOTE

The air supply piping is comprised of several piping assemblies The following procedures are for replacement of one supply piping assembly The procedures are the same for all supply piping assemblies.

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances; within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1) and tag and remove line (2).

(2) Install line (2) as tagged and tighten two connector nuts (1).

FOLLOW-ON MAINTENANCE
Install side panels (para 4-14).

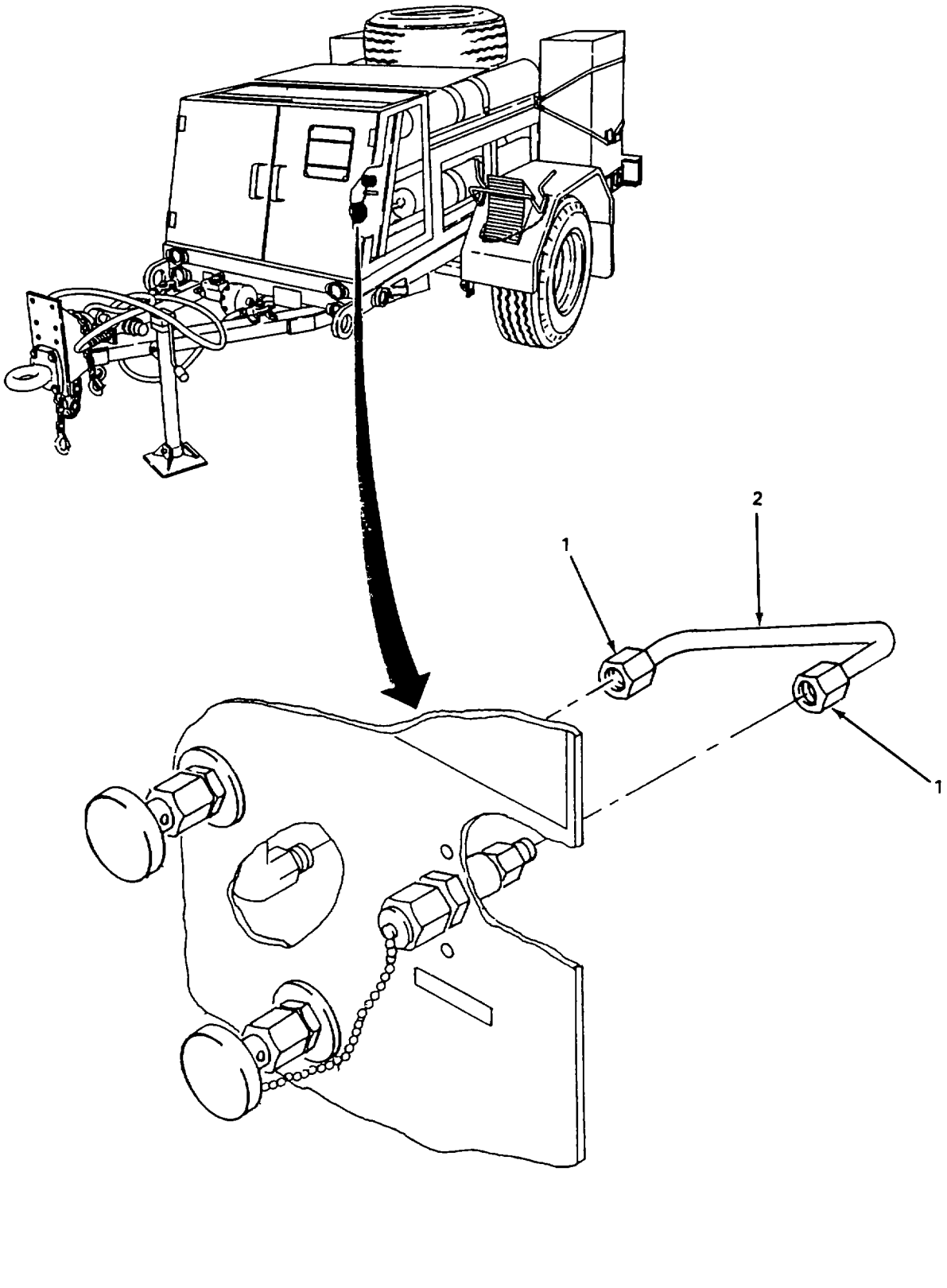


Figure 5-14. Supply Piping, Replace.

5-18. Supply Manifold (Air), Type I.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Teflon Tape (Item 20, Appendix D)
Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.
Side panel removed (para. 4-15).
Pressure relief valve (air) removed (para. 5-16)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace . (figure 5-15)

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1) and tag and remove line (2).

(2) Loosen two connector nuts (3) and tag and remove line (4)

(3) Loosen two connector nuts (5) and tag and remove line (6).

(4) Loosen two connector nuts (7) and tag and remove line (8).

(5) Loosen two connector nuts (9) and tag and remove line (10)

(6) Loosen two connector nuts (11) and tag and remove line (12).

(7) Loosen two connector nuts (13) and tag and remove line (14).

(8) Loosen two connector nuts (15) and tag and remove line (16).

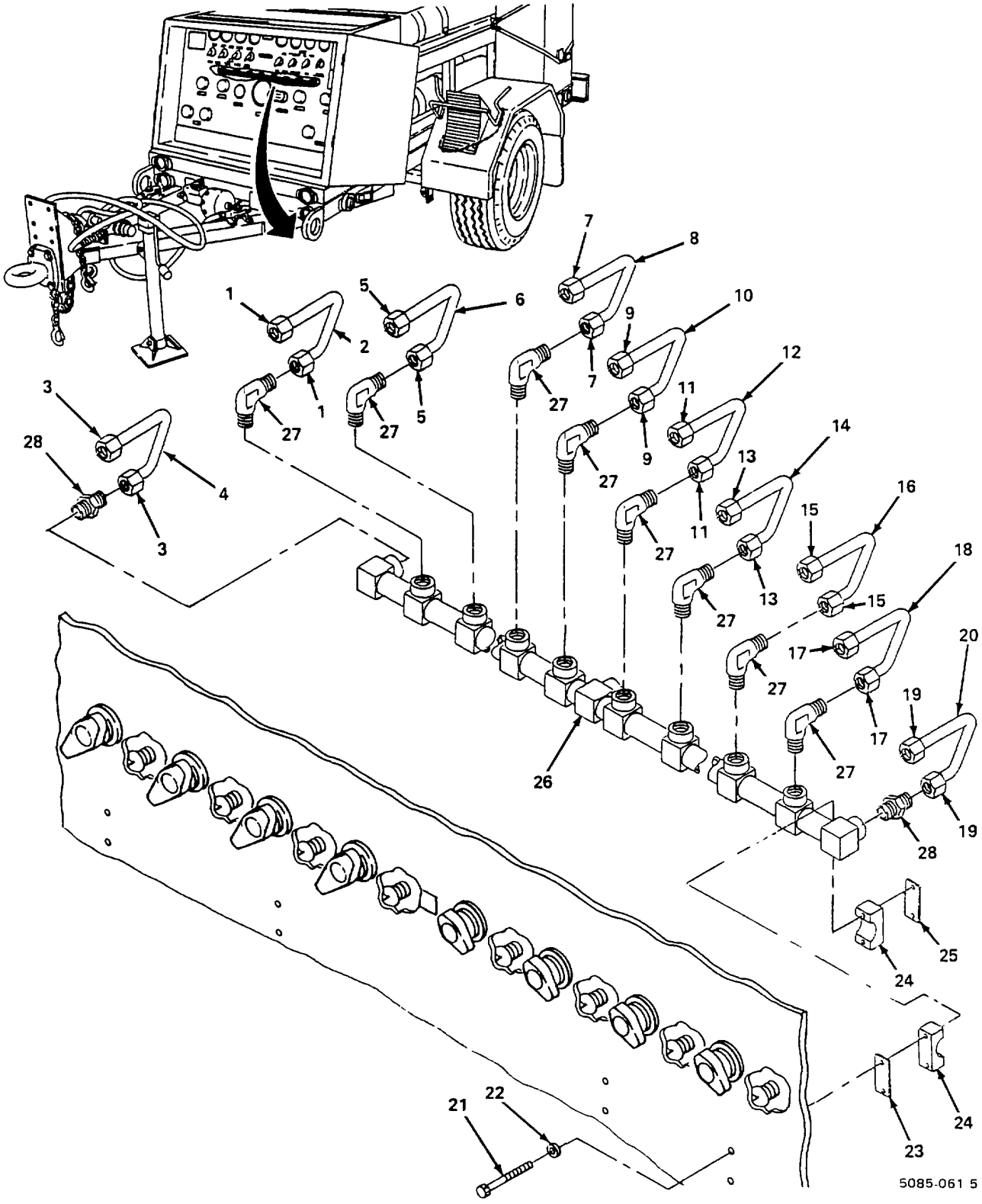


Figure 5-15. Supply Manifold, Replace.

(9) Loosen two connector nuts (17) and tag and remove line (18).

(10) Loosen two connector nuts (19) and tag and remove line (20)

(11) Remove eight bolts (21), washers (22), four plates (23), eight blocks (24) and four nut plates (25) and remove air supply manifold (26)

(12) Remove eight elbows (27) and two hex nipples (28)

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(13) Apply teflon tape to threads on eight elbows (27) and two hex nipples (28)

(14) Install eight elbows (27) and two hex nipples (28), Ensure elbows (27), face in the same direction as the hex nipples (28)

(15) Install air supply manifold (26) and secure with four nut plates (25), eight blocks (24), four plates (23), four washers (22), and bolts (21)

(16) Install line (20) as tagged and tighten two connector nuts (19)

(17) Install line (18) as tagged and tighten two connector nuts (17)

(18) Install line (16) as tagged and tighten two connector nuts (15)

(19) Install line (14) as tagged and tighten two connector nuts (13)

(20) Install line (12) as tagged and tighten two connector nuts (11)

(21) Install line (10) as tagged and tighten two connector nuts (9)

(22) Install line (8) as tagged and tighten two connector nuts (7).

(23) Install line (6) as tagged and tighten two connector nuts (5).

(24) Install line (4) as tagged and tighten two connector nuts (3).

(25) Install line (2) as tagged and tighten two connector nuts (1).

(26) Pressurize system and perform leak test

FOLLOW-ON MAINTENANCE

(1) Install side panels (para 4-14).
(2) Install air pressure relief valve (para 5-16)

5-19. Output Piping (Air), Type I.

This task covers, Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Teflon Tape (Item 20, Appendix D)
Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.
Side panel removed (para 4-15).

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-16)

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1), and tag and remove line (2).

(2) Install line (2) as tagged and tighten two connector nuts (1).

(3) Pressurize system and perform leak test.

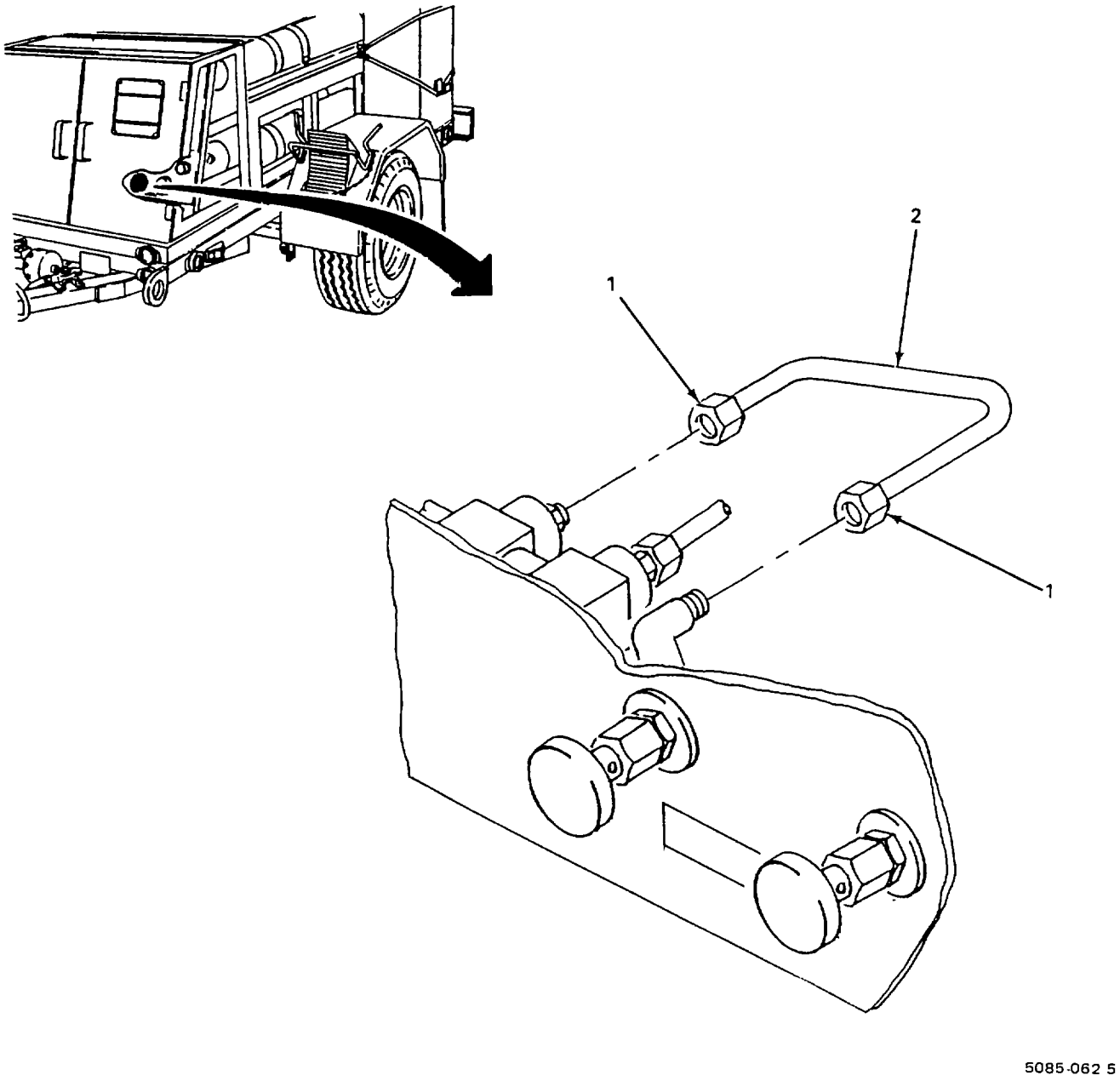


Figure 5-16. Output Piping, Replace.

FOLLOW-ON MAINTENANCE

Install side panels (para. 4-15).

5-20. Output Manifold (Air), Type I.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Teflon Tape (Item 20, Appendix D)
Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open
Remove side panels (para. 4-15).
Air pressure relief valve removed (para. 5-16)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-17)

WARNING

Cleanliness is Imperative in maintaining and handling diving air system components All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver

(1) Loosen two connector nuts (1) and tag and remove line (2)

(2) Loosen two connector nuts (3) and tag and remove line (4).

(3) Loosen two connector nuts (5) and tag and remove line (6).

(4) Loosen two connector nuts (7) and tag and remove line (8).

(5) Loosen two connector nuts (9) and tag and remove line (10)

(6) Loosen two connector nuts (11) and tag and remove line (12).

(7) Loosen two connector nuts (13) and tag and remove line (14)

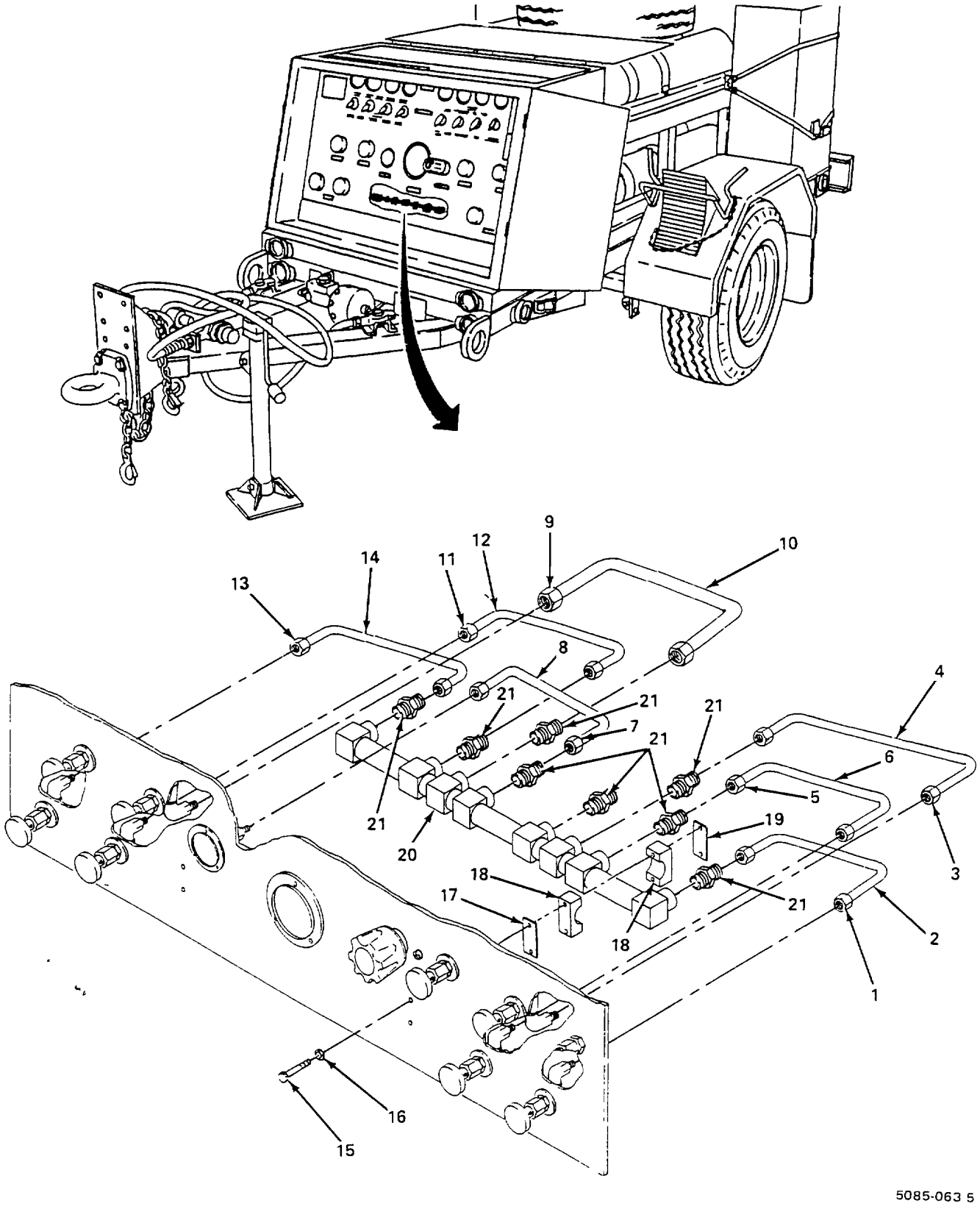


Figure 5-17. Output Manifold, Replace.

(8) Remove four bolts (15), washers (16), two plates (17), four blocks (18), two nut plates (19), and remove output manifold (20).

(9) Remove seven hex nipples (21).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(10) Apply teflon tape to threads on seven hex nipples (18).

(11) Install hex nipples (18) and pressure relief valve (17).

(12) Install manifold (16) and secure with two nut plates (15), four blocks (14), two plates (13), four washers (12), and bolts (11).

(13) Install line (14) as tagged and tighten two connector nuts (13).

(14) Install line (12) as tagged and tighten two connector nuts (11).

(15) Install line (10) as tagged and tighten two connector nuts (9).

(16) Install line (8) as tagged and tighten two connector nuts (7).

(17) Install line (6) as tagged and tighten two connector nuts (5).

(18) Install line (4) as tagged and tighten two connector nuts (3).

(19) Install line (2) as tagged and tighten two connector nuts (1).

(20) Pressurize system and perform leak test

FOLLOW-ON MAINTENANCE

(1) Install side panels (para. 4-15).
(2) Install air pressure relief valve (para. 5-16).

5-21. Dehydrator Cylinder Assembly (Air, Oxygen), Type II.

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bands, Rubber (Item 5, Appendix D)
Distilled Water (Item 11, Appendix D)
Nonionic Detergent (Item 10, Appendix D)
Cloth, Lint Free (Item 9, Appendix D)
Bags, Plastic (Item 4, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open
Side panel removed (para. 4-15)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

a. Replace. (figure 5-18)

NOTE

The Type II Manifold Servicing Unit is equipped with two dehydrator cylinder assemblies, one for air the other for oxygen. The procedures are the same for both, however, do not replace both at the same time. Replace one then the other to avoid accidentally switching air and oxygen components.

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Loosen connector nuts (1), securing line (2)

(2) Loosen connector nuts (3), securing line (4).

(3) Remove four bolts (5), washers (6), and locknuts (7), and remove dehydrator cylinder assembly (8),.and brackets (9)

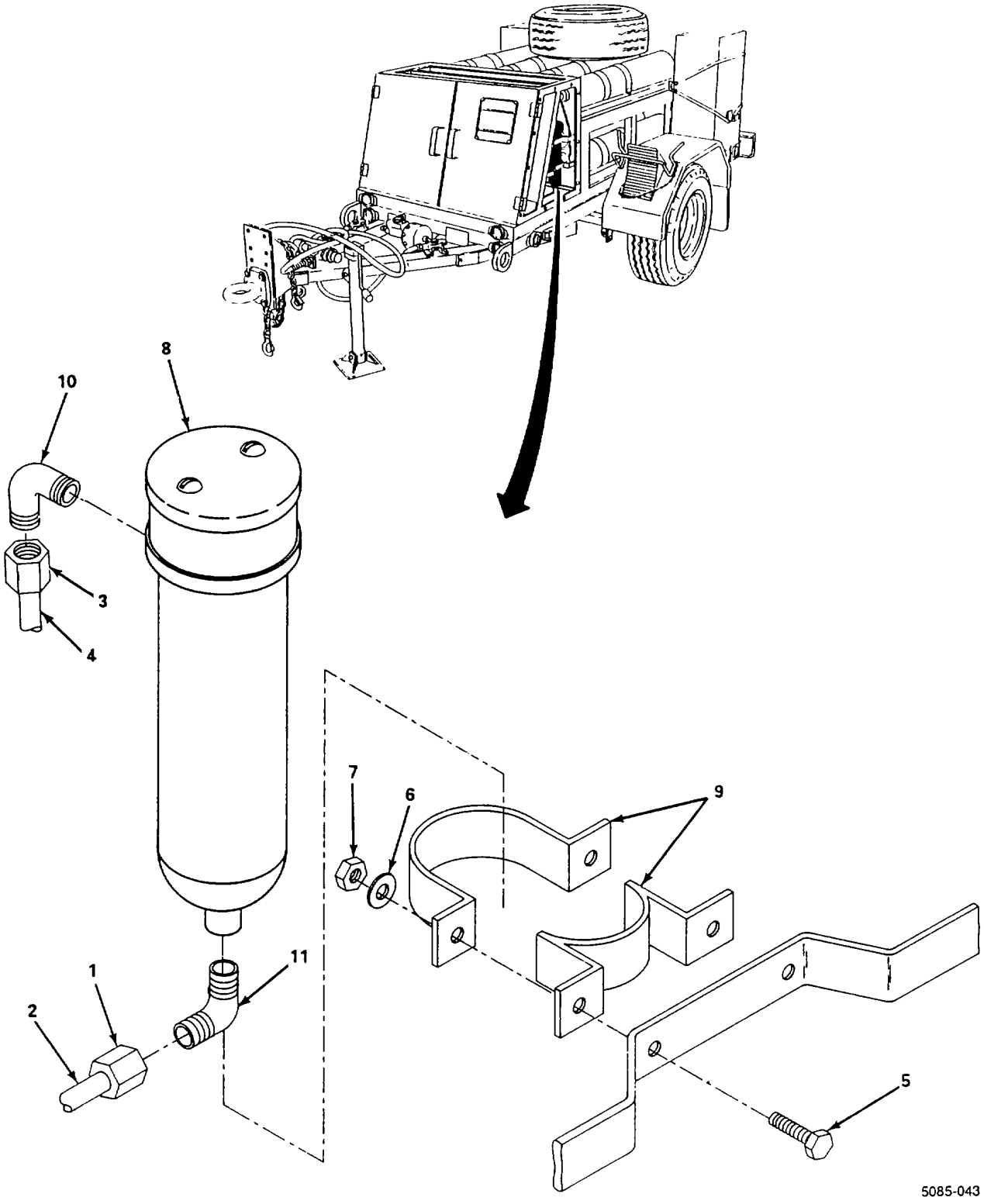


Figure 5-18. Dehydrator Assembly, Replace.

5-21. Dehydrator Cylinder Assembly (Air , Oxygen), Type II (Cont).

(4) Remove elbows (10), and (11).

(5) Install elbows (11), and (10), on new dehydrator cylinder assembly (8).

(6) Install dehydrator cylinder assembly (8) and brackets (9), and secure with four bolts (5), washers (6), and locknuts (7).

(7) Install line (4) and tighten connector nuts (3).

(8) Install line (2) and tighten connector nuts (1).

(9) Pressurize system and perform leak test.

FOLLOW-ON MAINTENANCE
Install side panel (para 4-15).

b. *Repair* (figure 5-19)

(1) Remove dehydrator assembly (para. a).

(2) Remove cover (1), and cartridge (2).

(3) Remove two screws (3) and gaskets (4) and remove dust cover (5), from cover (1).

(4) Remove retaininging (6), and remove upper head (7), and O-ring (8).

(5) Remove screw (9), and remove upper perforator (10), lower head (11), and head spring (12).

(6) Remove O-ring (13).

(7) Remove screw (14), and remove lower perforator (15), and spacer (16).

(8) Clean all items except filter cartridge and O-rings with nonionic detergent and dry thoroughly.

(9) Inspect upper (10), and lower (15), perforators and replace if blades are bent or dull.

(10) Inspect dust cover (5), and cover (1), and replace if cracked

(11) Inspect upper head (7), and lower head (11), and replace if cracked, or excessively worn.

(12) Inspect head spring (12), and replace if cracked or deformed.

(13) Inspect cylinder (17), and replace if cracked.

(14) Install spacer (16), and lower perforator (15), and secure with screw (14).

(15) Install new O-ring (13)

(16) Install head spring (12), lower head (11), and upper perforator (10), and secure with screw (9).

(17) Install new O-ring (8)

(18) Install upper head (7) and secure with retaining ring (6).

(19) Install dust cover (5) and gasket (6) and secure with two screws (3) and gaskets (4).

(20) Install cover (1).

(21) Install dehydrator assembly (para a.).

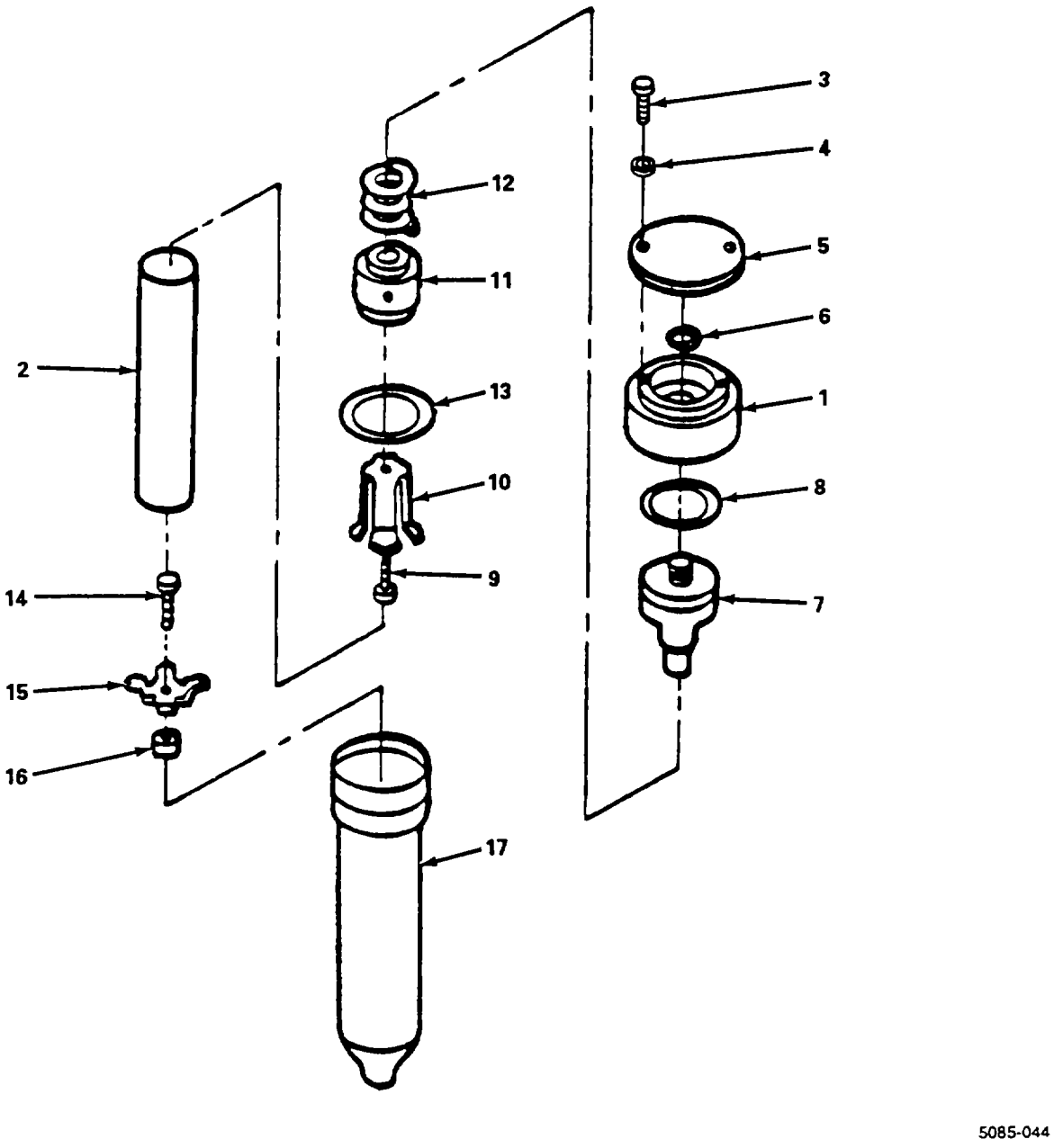


Figure 5-19. Dehydrator Assembly, Repair.

5-22. Band Clamp, Type II.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

a. *Replace.* (figure 5-20)

(1) Unscrew handle (1).

(2) Remove nut (2) and remove band clamp (3)

(3) Remove retaining ring (4), and remove washer (5), washer (6), and handle (1).

(4) Install handle (1), washer (6), washer (5), and secure with retaining ring (4)

(5) Install band clamp (3), and nut (2).

(6) Tighten handle (1), to secure band clamp (3).

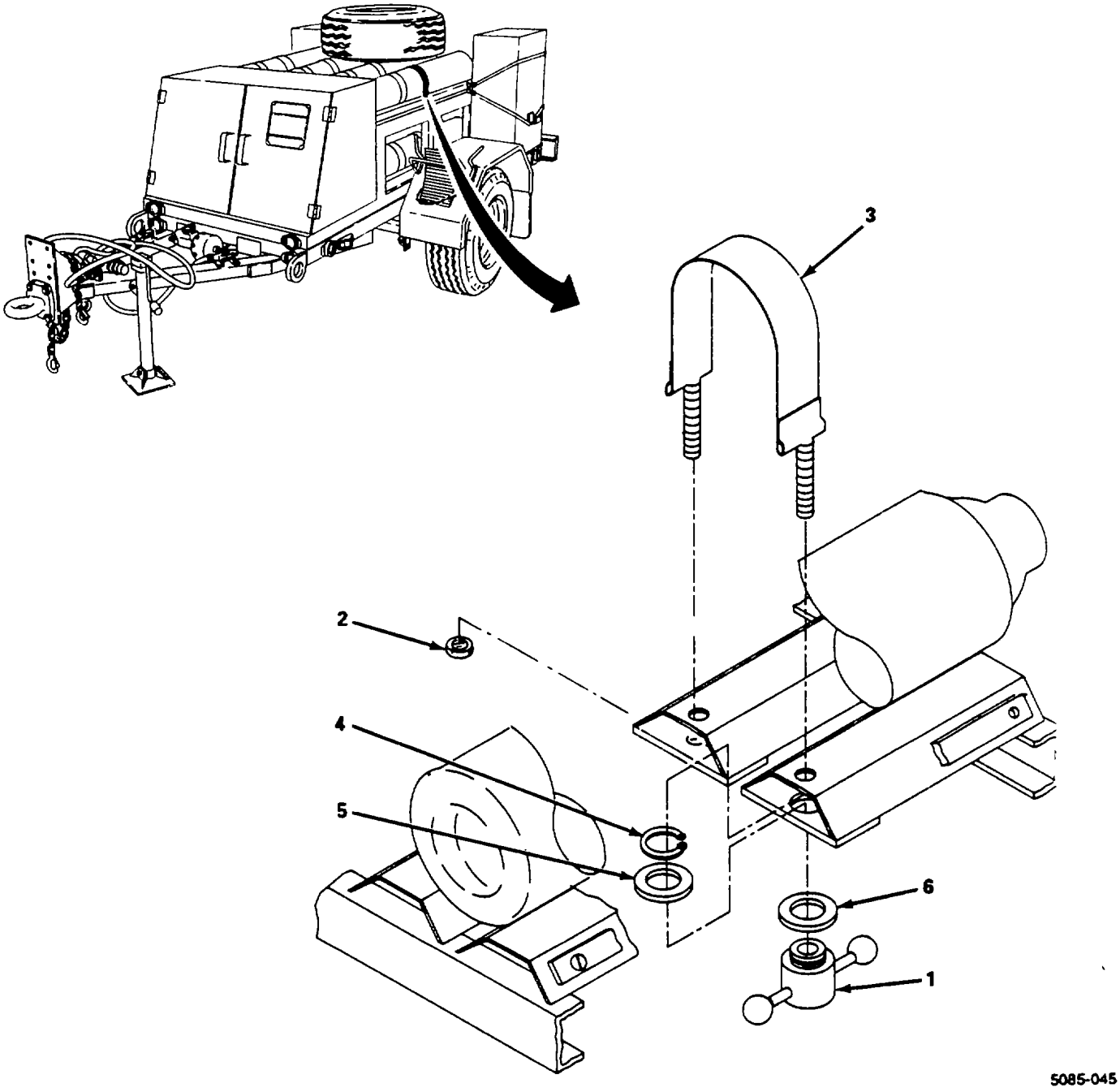


Figure 5-20. Band Clamp, Replace.

5-23. Cylinder Assembly (Air, Oxygen), Type II.

This task covers. Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-21)

(1) Open top cover (1), and door panels (2)

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(2) Loosen connector nut (3), and disconnect line (4), from valve (5).

(3) Loosen two clamp bands (6).

(4) Install protective cap (7)on top of cylinder (8).

(5) Slide cylinder (8), off the back of trailer (9).

(6) Store cylinder (8), in an upright position, and chained to prevent cylinder (8), from falling.

(7) Tag cylinder (8) indicating pressure remaining in cylinder.

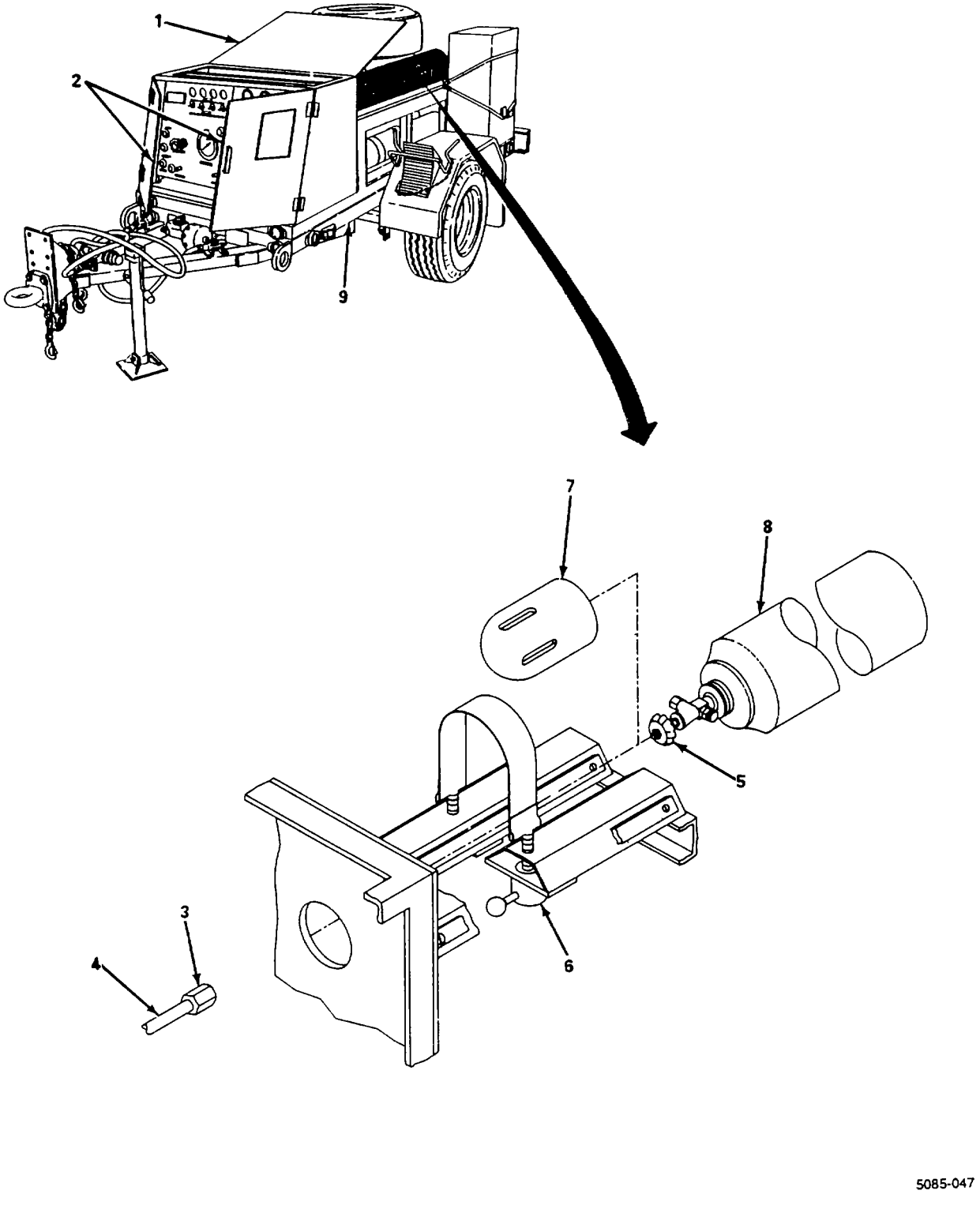


Figure 5-21. Cylinder, Replace.

WARNING

Be extremely careful when handling cylinders. There is enormous potential energy stored in cylinder. Severe injury or death may result if cylinder is damaged and compressed gas is allowed to escape uncontrollably

(8) Install cylinder (8), on trailer (9) and slide fully forward.

(9) Remove protective cap (7), from cylinder (8), and store.

(10) Rotate cylinder (8), to allow easy installation of line (4).

(11) Tighten two clamp bands (6).

(12) Install line (4) and tighten connector nut (3)

(13) Pressurize system and perform leak test.

(14) Close door panels (2) and top cover (1)

5-24. Flex Hose (Air, Oxygen), Type II

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 5, Appendix D)
Bands, Rubber (Item 4, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinder valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-22)

(1) Open top cover (1)

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(2) Loosen connector nut (2), and disconnect hose (3), from valve (4).

(3) Loosen connector nut (5), and remove hose (3).

(4) Connect hose (3), and tighten connector nut (5).

(5) Connect hose (3), and tighten connector nut (2)

(6) Perform leak test (para. 4-11).

(7) Close top cover (1).

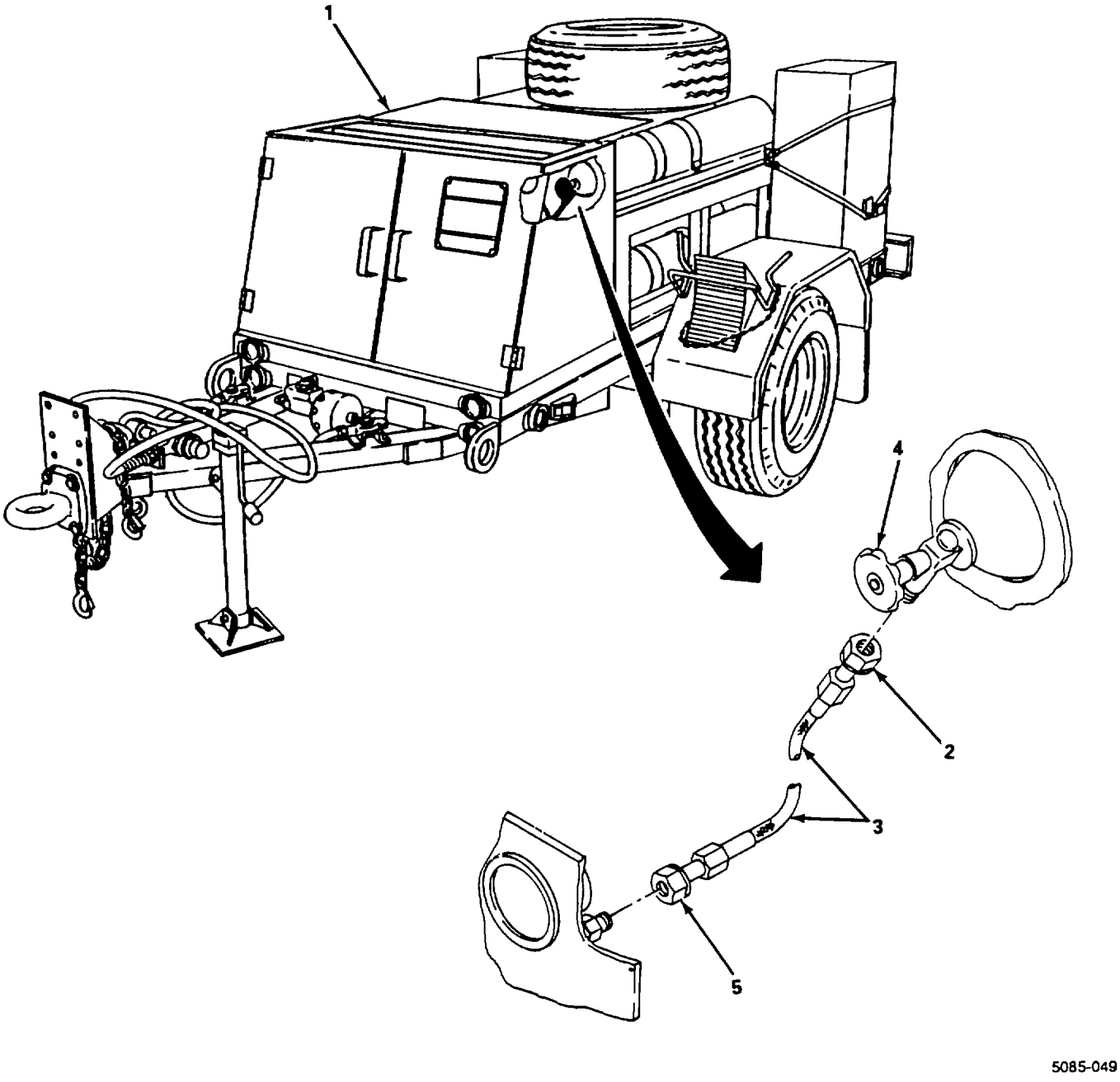


Figure 5-22. Flex Hose, Replace.

5-25. Control Panel Assembly (Air, Oxygen), Type II.

This task covers: Repair

INITIAL SETUP

Tools	Reference
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Para. 4-10 Maintenance and Reentry Control Procedures

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Replace.

WARNING

To prevent accidental interchanging of air and oxygen components, all items should be tagged indicating either air or oxygen component. Failure to do this could cause serious injury or death to personnel.

(1) Replace panel mount manifold (figure 5-23)

(a) Open top cover (1) and door panels (2).

WARNING

Cleanliness is Imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(b) Loosen two connector nuts (3), and remove line (4).

(c) Remove cap (5).

(d) Remove air line connector (6).

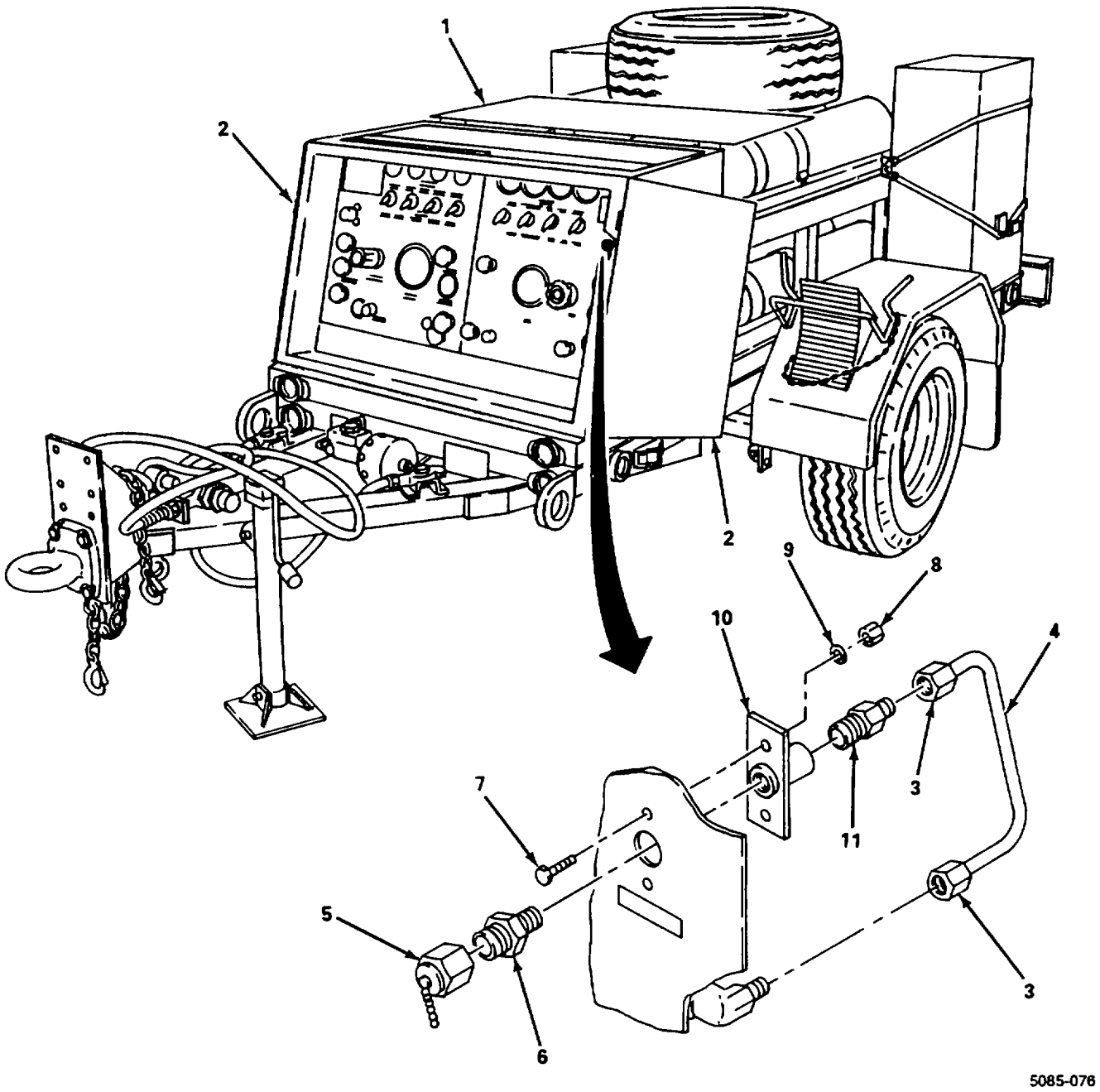


Figure 5-23. Panel Mount Manifold, Replace.

5-25. Control Panel Assembly (Air, Oxygen), Type II (Cont).

(e) Remove two screws (7), locknuts (8), and washers (9) and remove panel mount manifold (10).

(f) Remove reducer (11)

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(g) Apply teflon tape to threads on reducer (11)

(h) Install reducer (11), on panel mount manifold (10).

(i) Install panel mount manifold (10), and secure with two screws (7), washers (9), and locknuts (8).

(j) Install line (4), and tighten two connector nuts (3).

(k) Install air line connector (6).

(l) Pressurize system and perform leak test.

(m) Install cap (5)

(n) Close door panels (2), and top cover (1)

(2) *Replace control panel.* (figure 5-24)

WARNING

To prevent accidental interchanging of air and oxygen components, all items should be tagged indicating either air or oxygen component. Failure to do this could cause serious injury or death to personnel.

(a) Remove pressure gages (para 5-26).

(b) Remove control valves quarter-turn (para. 5-27).

(c) Remove hand valves (para 5-28).

(d) Remove pressure regulators (para. 5-29).

(e) Remove supply manifolds (para. 5-32).

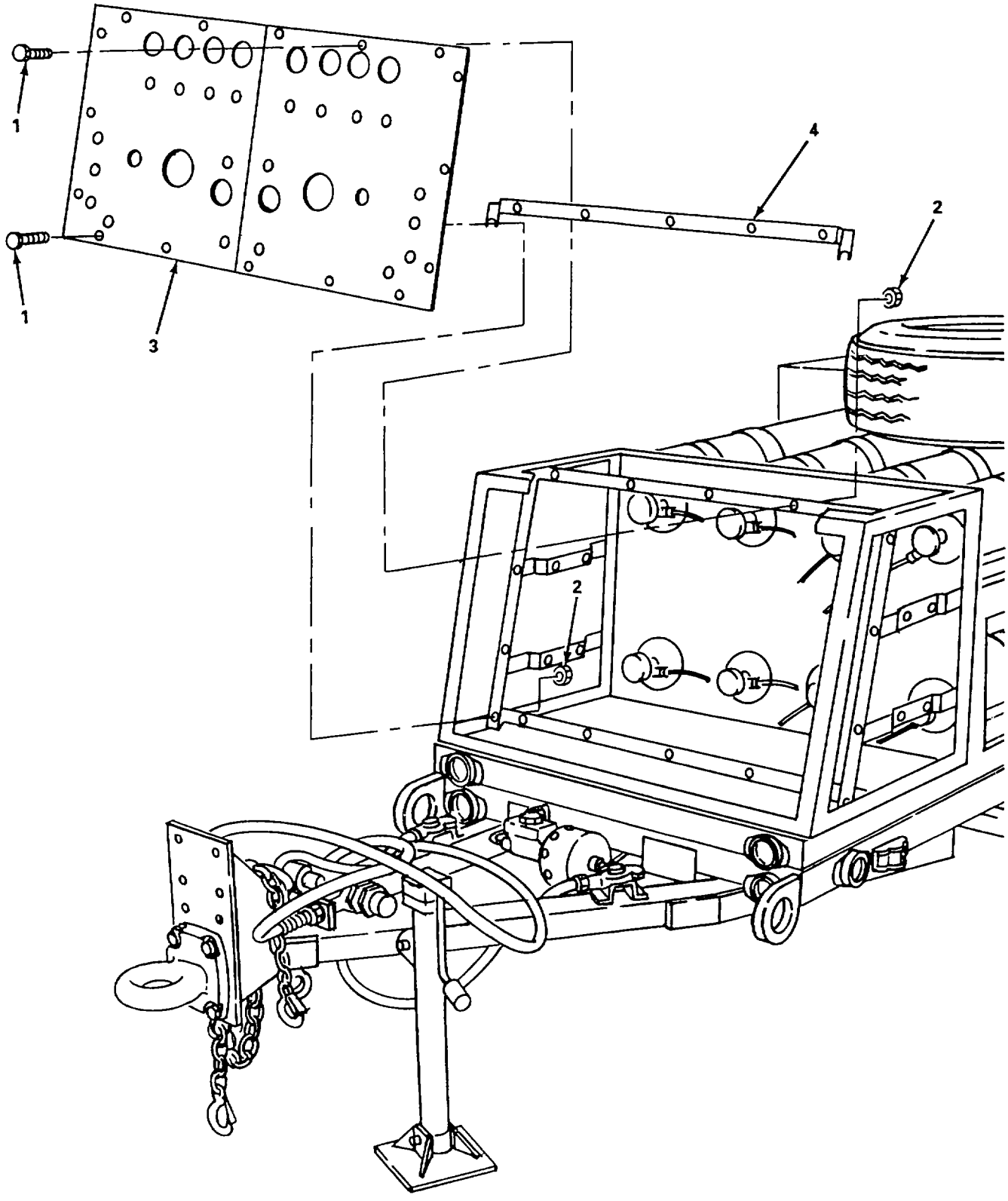


Figure 5-24. Control Panel, Replace.

(f) Remove output manifolds (para 5-34).

(g) Remove eighteen screws (1), and nuts (2), and remove control panel (3) and cross brace (4).

(h) Install new control panel (3), and cross brace (4) and secure with eighteen screws (1), and nuts (2).

(i) Install output manifolds (para 5-34)

(j) Install supply manifolds (para. 5-32).

(k) Install pressure regulators (para. 5-29).

(l) Install hand valves (para 5-28).

(m) Install control valve quarter-turn (para 5-27).

(n) Install pressure gages (para. 5-26).

5-26. Pressure Gage (Air, Oxygen), Type II.

This task covers: a. Replace (Air) b. Replace (Oxygen)

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.

Reference

Para 4-10 Maintenance and Reentry Control Procedures.

a. Replace.

(1) Air cylinder and manifold pressure gages. (figure 5-25)

(a) Open top cover (1), and door panels (2).

WARNING

Cleanliness is Imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(b) Loosen two connector nuts (3), and remove line (4).

(c) Remove two nuts (5), brackets (6), and remove pressure gage (7).

(d) Remove reducer (8), from pressure gage (7).

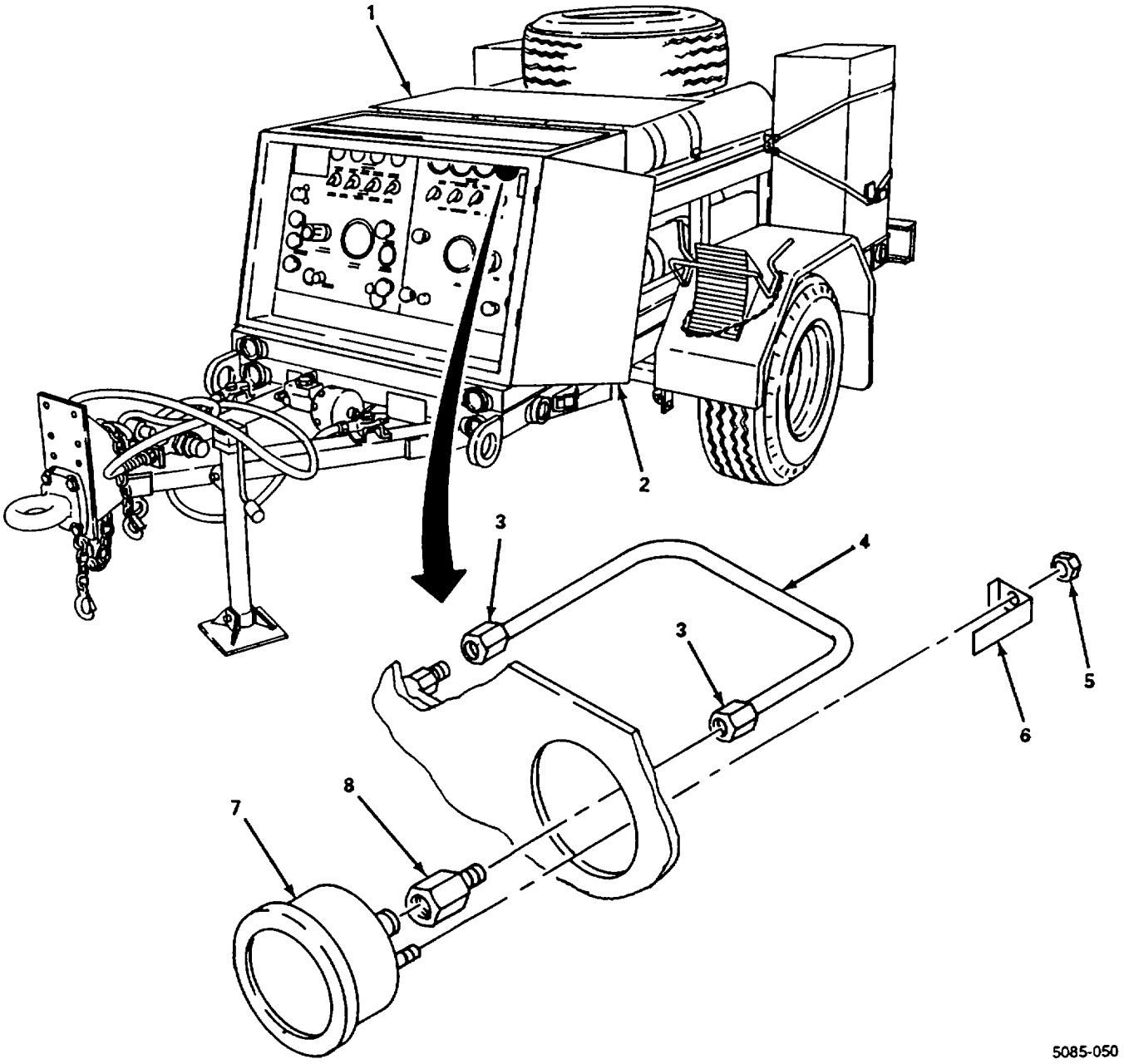


Figure 5-25. Air Pressure Gage, Replace.

5-26. Pressure Gage (Air, Oxygen), Type II (Cont).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(e) Apply teflon tape to threads on new pressure gage (7).

(f) Install reducer (8), on new pressure gage (7).

(g) Install new pressure gage (7), and secure with two brackets (6), and nuts (5).

(h) Install line (4), and tighten two connector nuts (3).

(i) Pressurize system and perform leak test.

(j) Close door panels (2), and top cover (1).

(2) *Air servicing pressure gage.* (figure 5-26)

(a) Open top cover (1), and door panels (2).

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(b) Loosen two connector nuts (3), and remove line (4).

(c) Loosen two connector nuts (5), and remove line (6).

(d) Remove two nuts (7), bracket (8), and remove air servicing pressure gage (9).

(e) Remove tee (10), with elbows (11), installed from air servicing pressure gage (9).

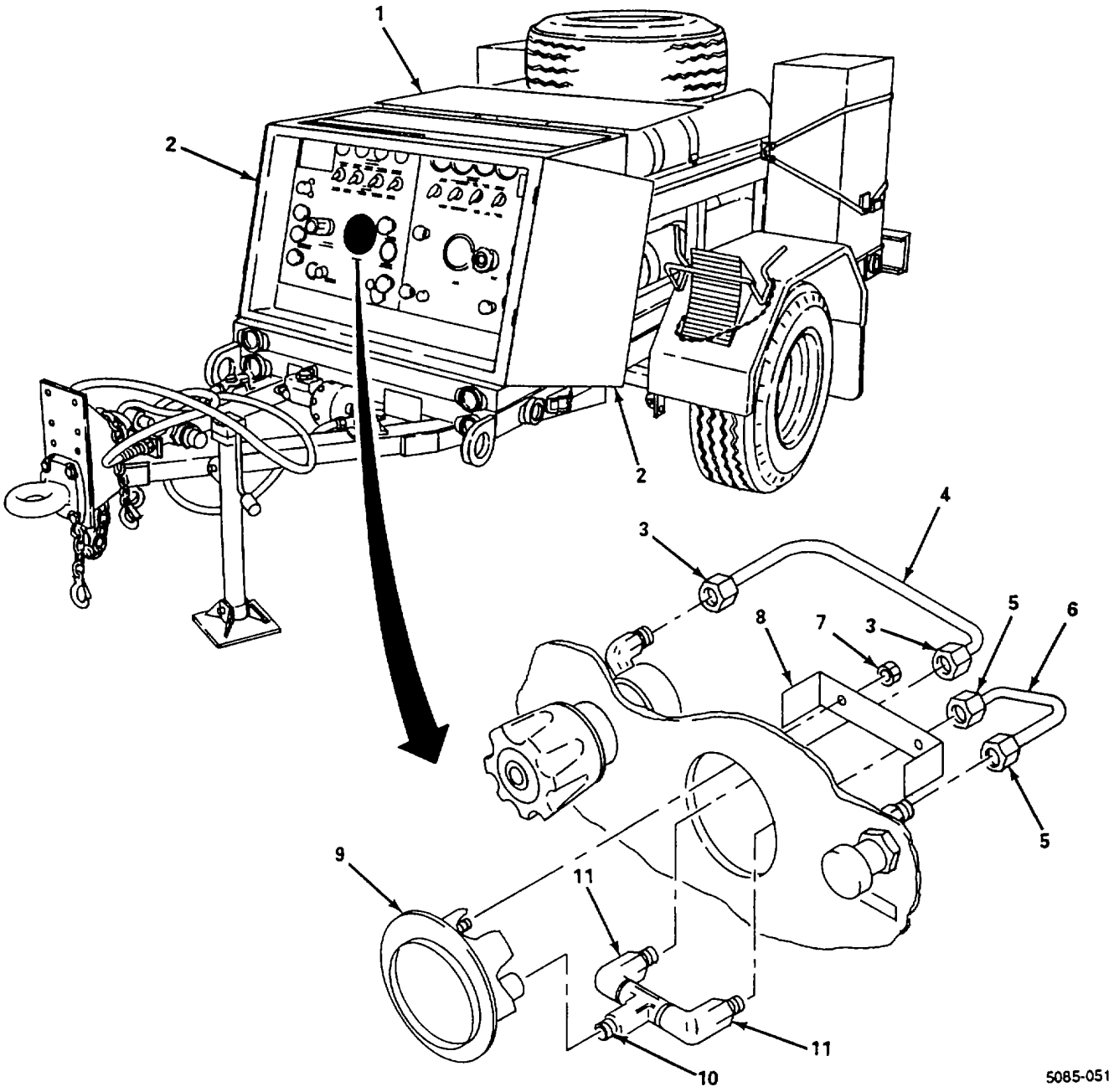


Figure 5-26. Air Servicing Pressure Gage, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

5-26. Pressure Gage (Air, Oxygen), Type II (Cont).

(f) Apply teflon tape to threads on tee (10).

(g) Install tee (10), with elbows (11), installed on new air servicing pressure gage (9).

(h) Install new air servicing pressure gage (9), and secure with bracket (8), and two nuts (7).

(i) Install line (6), and tighten two connector nuts (5)

(j) Install line (4), and tighten two connector nuts (3)

(k) Pressurize system and perform leak test.

(l) Close door panels (2), and top cover (1).

b. *Replace.*

(1) Oxygen cylinder and manifold pressure gages. (figure 5-27)

(a) Open top cover (1), and door panels (2).

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(b) Loosen two connector nuts (3), and remove line (4).

(c) Remove three screws (5), and nuts (6) and remove pressure gage (7)

(d) Remove reducer (8), from pressure gage (7).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(e) Apply teflon tape to threads on pressure gage (7).

(f) Install reducer (8), on pressure gage (7).

(g) Install pressure gage (7), and secure with three screws (5), and nuts (6).

(h) Install line (4), and tighten two connector nuts (3).

(t) Close door panels (2), and top cover (1).

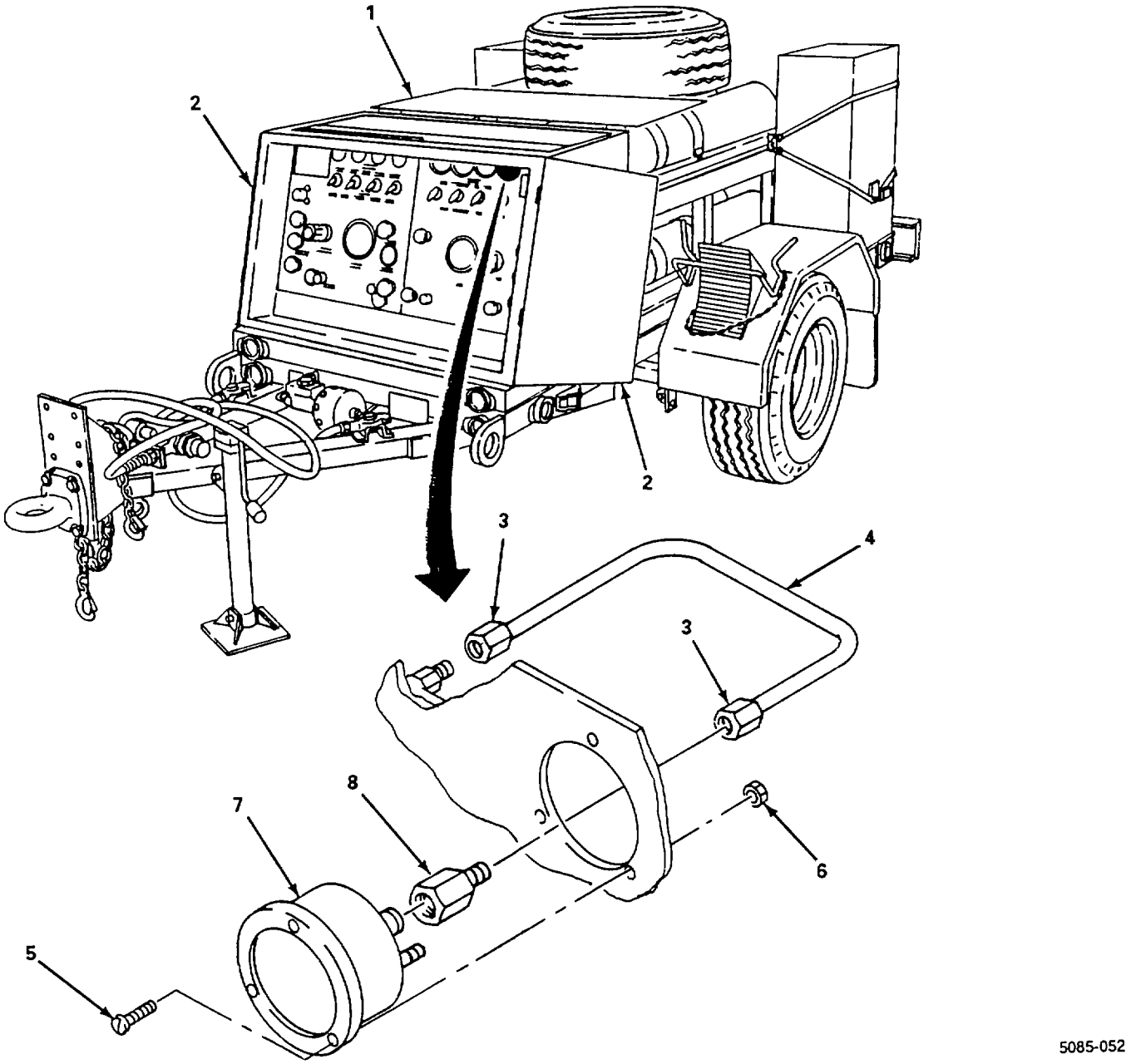


Figure 5-27. Oxygen Pressure Gage, Replace.

5-26. Pressure Gage (Air, Oxygen), Type II (Cont).

(2) Oxygen servicing pressure gage. (figure 5-28)

(a) Open top cover (1) and door panels (2).

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(b) Loosen two connector nuts (3), and tag and remove line (4).

(c) Loosen two connector nuts (5), and tag and remove line (6).

(d) Remove three screws (7), and nuts (8), and remove oxygen servicing pressure gage (9).

(e) Remove tee (10), with elbow (11), and straight adapter (12), installed from oxygen servicing pressure gage (9).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the oxygen system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the oxygen system and subsequent possible injury or death to the diver.

(f) Apply teflon tape to threads on tee (10).

(g) Install tee (10), with elbows (11) and straight adapter (12), on new oxygen servicing pressure gage (9).

(h) Install oxygen servicing pressure gage (9), and secure with three screws (7), and nuts (8).

(i) Install line (6), and tighten two connector nuts (5).

(j) Install line (4), and tighten two connector nuts (3).

(k) Pressurize system and perform leak test.

(l) Close door panels (2) and top cover (1).

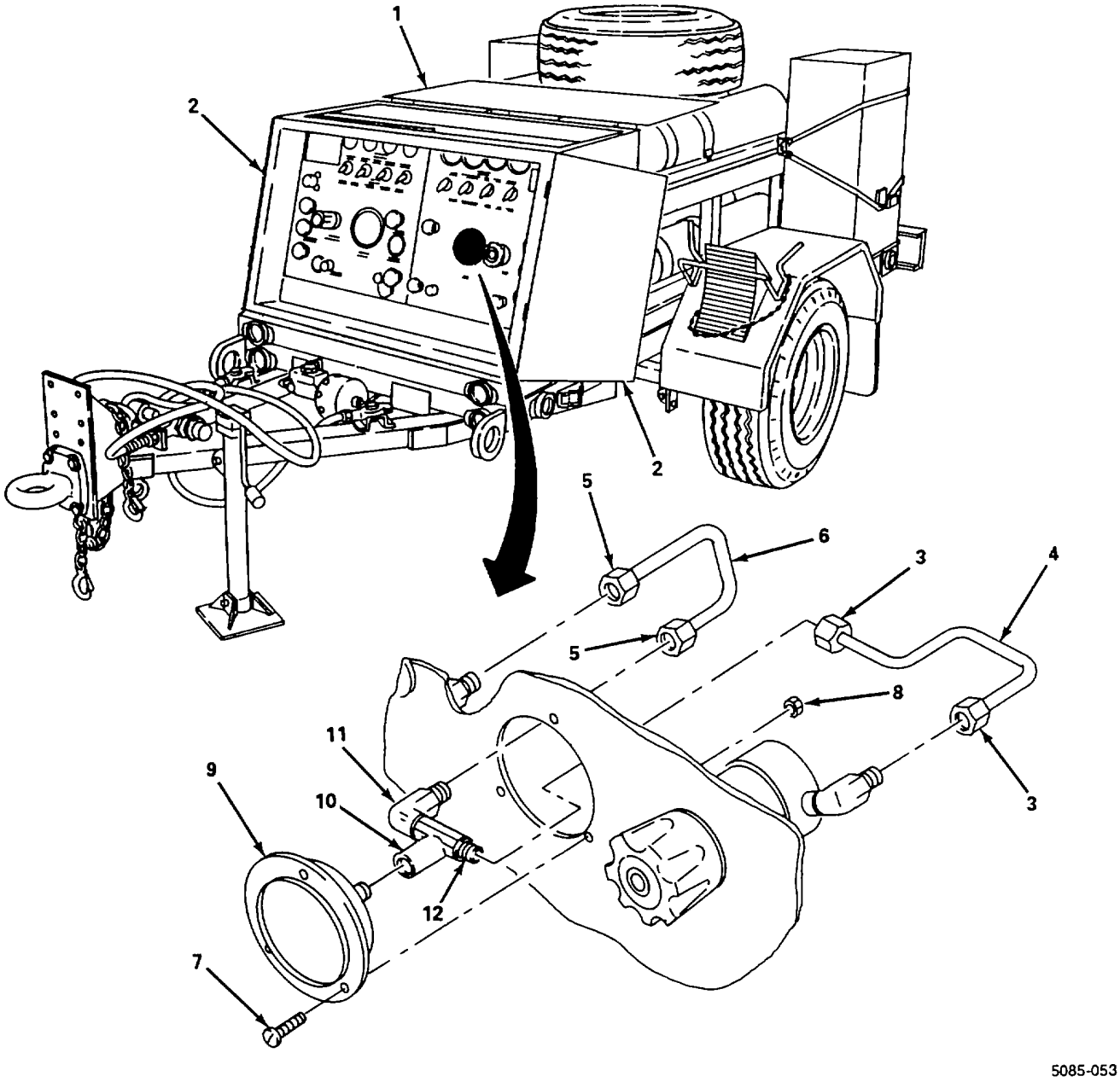


Figure 5-28. Oxygen Servicing Pressure Gage, Replace.

5-27. Quarter-Turn Valve (Air, Oxygen), Type II.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.

Reference

Para 4-10 Maintenance and Reentry Control Procedures

a. Replace. (figure 5-29)

(1) Open top cover (1), and door panels (2).

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(2) Loosen two connector nuts (3), and remove line (4).

(3) Loosen connector nut (5), and disconnect line (6).

(4) Loosen two connector nuts (7), and remove line (8).

(5) Loosen setscrew (9), and remove handle (10).

(6) Remove nut (11), washer (12), and remove control valve quarter-turn (13), and washer (14).

(7) Remove reducer (15), with elbow (16) installed.

(8) Remove reducer (17), with tee (18), reducer (19), reducer (20), and elbow (21), installed.

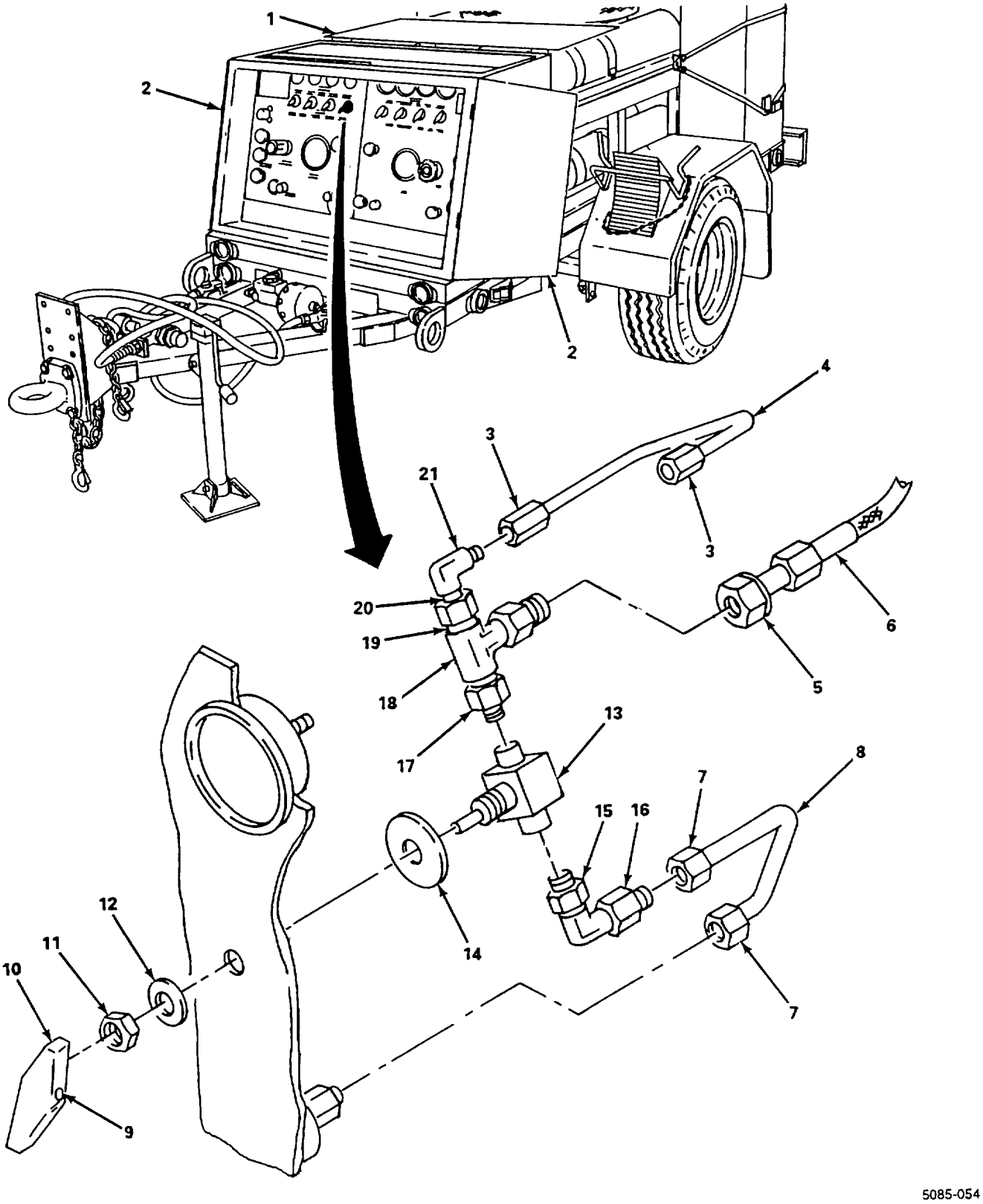


Figure 5-29. Quarter-Turn Valve, Replace.

(9) Install reducer (17), with tee (18), reducer (19), reducer (20), and elbow (21), on new control valve quarter- turn (13).

(10) Install reducer (15), with elbow (16), on new control valve quarter-turn (13).

(11) Install control valve quarter-turn (13), washer (14), washer (12),and secure with nut (11).

(12) Install handle (10), and tighten setscrew (9).

(13) Install line (8), and tighten two connector nuts (7).

(14) Connect line (6) and tighten connector nut (5).

(15) Install line (4), and tighten two connector nuts (3).

(16) Pressurize system and perform leak test.

(17) Close door panels (2), and top cover (1)

5-28. Hand Valve (Air, Oxygen), Type II.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.

Reference

Para 4-10 Maintenance and Reentry Control Procedures

a. Replace (Hand Valve. Air). (figure 5-30)

NOTE

The following procedures are for all air system hand valves. Although some of the valves have a different configuration of lines or fittings on them, the basic procedure is the same for all.

(1) Open top cover (1), and door panels (2)

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with accepted Army diving cleaning procedures. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(2) Loosen two connector nuts (3), and remove line (4).

(3) Loosen two connector nut (5), and remove line (6).

(4) Remove cap (7).

(5) Remove nut (8) and remove knob (9).

(6) Remove nut (10), and remove valve (11), and washer (12).

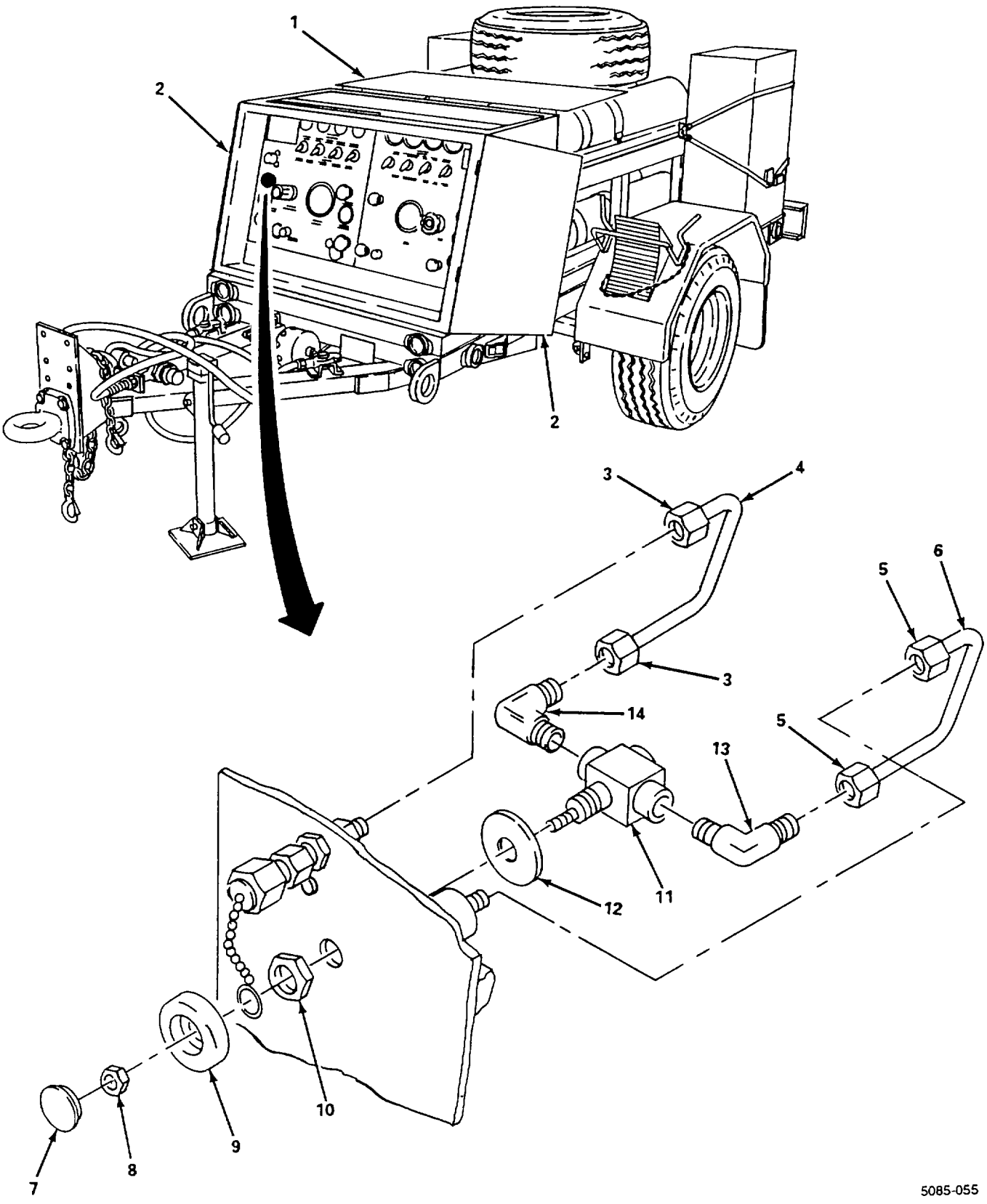


Figure 5-30. Hand Valve Air, Replace.

5-28. Hand Valve (Air, Oxygen), Type II (Cont).

(7) Remove elbows (13), and (14)

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(8) Apply teflon tape to threads on elbows (13), and (14).

(9) Install elbows (13), and (14), in new valve (11). Ensure elbows face away from control panel (15) when valve is installed.

(10) Install valve (11), and washer (12), and secure with nut (10)

(11) Install knob (9) and secure with nut (8)

(12) Install cap (7).

(13) Install line (6), and tighten two connector nuts (5).

(14) Install line (4), and tighten two connector nuts (3)

(15) Pressunze system and perform leak test.

(16) Close door panels (2) and top cover (1).

NOTE

The following procedures are for all oxygen system hand valves. Although some of the valves have a different configuration of lines or fittings on them, the basic procedures are the same for all.

b. *Replace (Hand Valve. Oxygen).* (figure 5-31)

(1) Open top cover (1) and door panels (2).

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

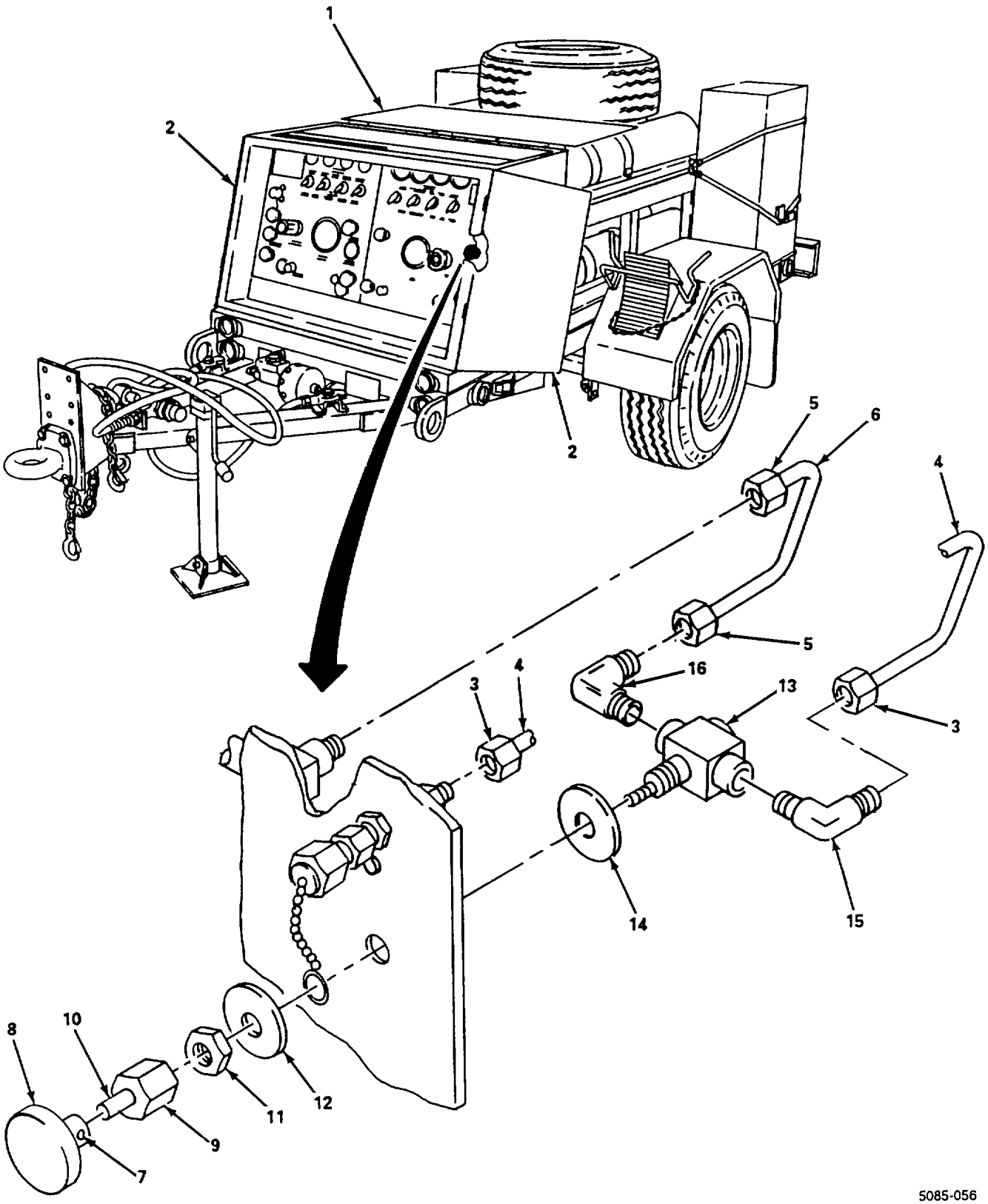


Figure 5-31. Hand Valve Oxygen, Replace.

(2) Loosen two connector nuts (3) and remove line (4).

(3) Loosen two connector nuts (5) and remove line (6).

(4) Loosen setscrew (7) and remove knob (8).

(5) Loosen nut (9) and remove valve stem (10).

(6) Remove nut (11) and washer (12) and remove valve (13) and washer (14).

(7) Remove two elbows (15) and (16) from valve (13).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the oxygen system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the oxygen system and subsequent possible injury or death to the diver.

(8) Apply teflon tape to threads on elbows (15) and (16).

(9) Install elbows (15) and (16) in new valve (13) Ensure elbows face away from control panel (17) when valve (13) is installed.

(10) Install new valve (13), washer (14), washer (12), and secure with nut (11).

(11) Install valve stem (10) and tighten nut (9).

(12) Install knob (8) and tighten setscrew (7).

(13) Install line (6) and tighten two connector nuts (5).

(14) Install line (4) and tighten two connector nuts (3).

(15) Pressurize system and perform leak test.

(16) Close door panels (2) and top cover (1).

5-29. Pressure Regulator (Air, Oxygen), Type II.

This task covers: Replace

INITIAL SETUP

Tools	*Equipment Condition*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.
Materials/Parts	*Reference*
Bags, Plastic (Item 4, Appendix D)	
Bands, Rubber (Item 5, Appendix D)	Para 4-10 Maintenance and Reentry Control
Tape, Adhesive (Item 19, Appendix D)	Procedures

Replace. (figure 5-32)

(1) Open top cover (1) and door panels (2).

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(2) Loosen two connector nuts (3) and remove line (4).

(3) Loosen two connector nut (5) and remove line (6).

(4) Remove cap (7).

(5) Remove nut (8) and remove knob (9).

(6) Remove two screws (10) and washers (11) and remove regulator (12).

(7) Remove two elbows (13) and (14).

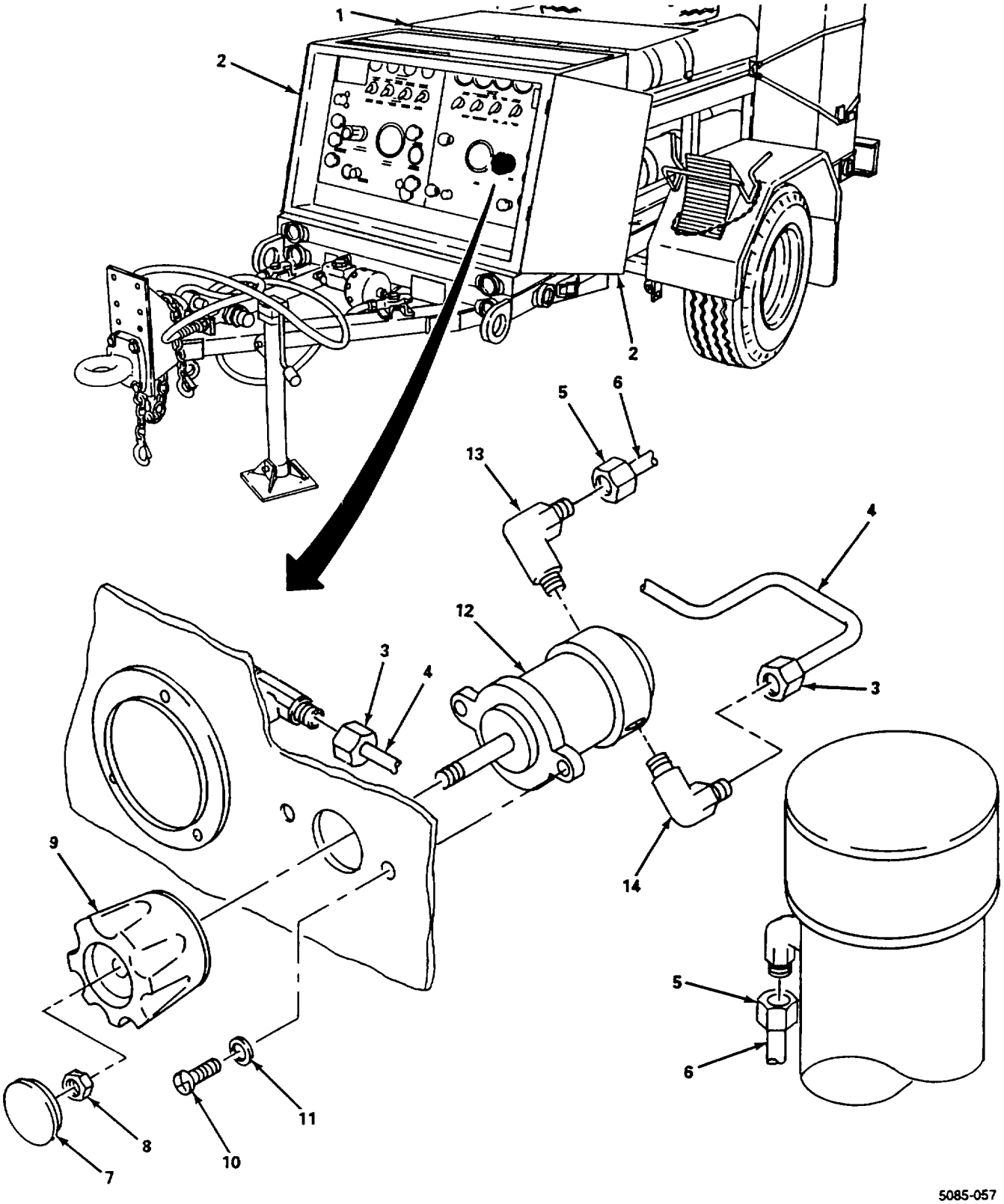


Figure 5-32. Regulator, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down Inside the oxygen system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the oxygen system and subsequent possible injury or death to the diver.

(8) Apply teflon tape to threads on elbows (13) and (14).

(9) Install elbows (13) and (14) Ensure elbows face away from control panel (15) when regulator (12) is installed.

(10) Install regulator (12) and secure with two screws (10) and washers (11).

(11) Install knob (9) and secure with nut (8).

(12) Install cap (7).

(13) Install line (6) and tighten connector nut (5).

(14) Install line (4) and tighten connector nut (3).

(15) Pressurize system and perform leak test.

(16) Close door panels (2) and top cover (1).

5-30. Pressure Relief Valve (Air, Oxygen), Type II.

This task covers: a. Replace (Air) b. Replace (Oxygen)

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.

Reference

Para 4-10 Maintenance and Reentry Control Procedures

a. *Replace. (Air)* (figure 5-33)

NOTE

There are two pressure relief valves for the air system. The procedures are the same for both.

(1) Open top cover (1)

WARNING

Cleanliness is imperative In maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination In accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(2) Remove pressure relief valve (2).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the oxygen system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(3) Apply teflon tape to threads on pressure relief valve (2).

(4) Install new pressure relief valve (2).

(5) Pressurize system and perform leak test.

(6) Close top cover (1).

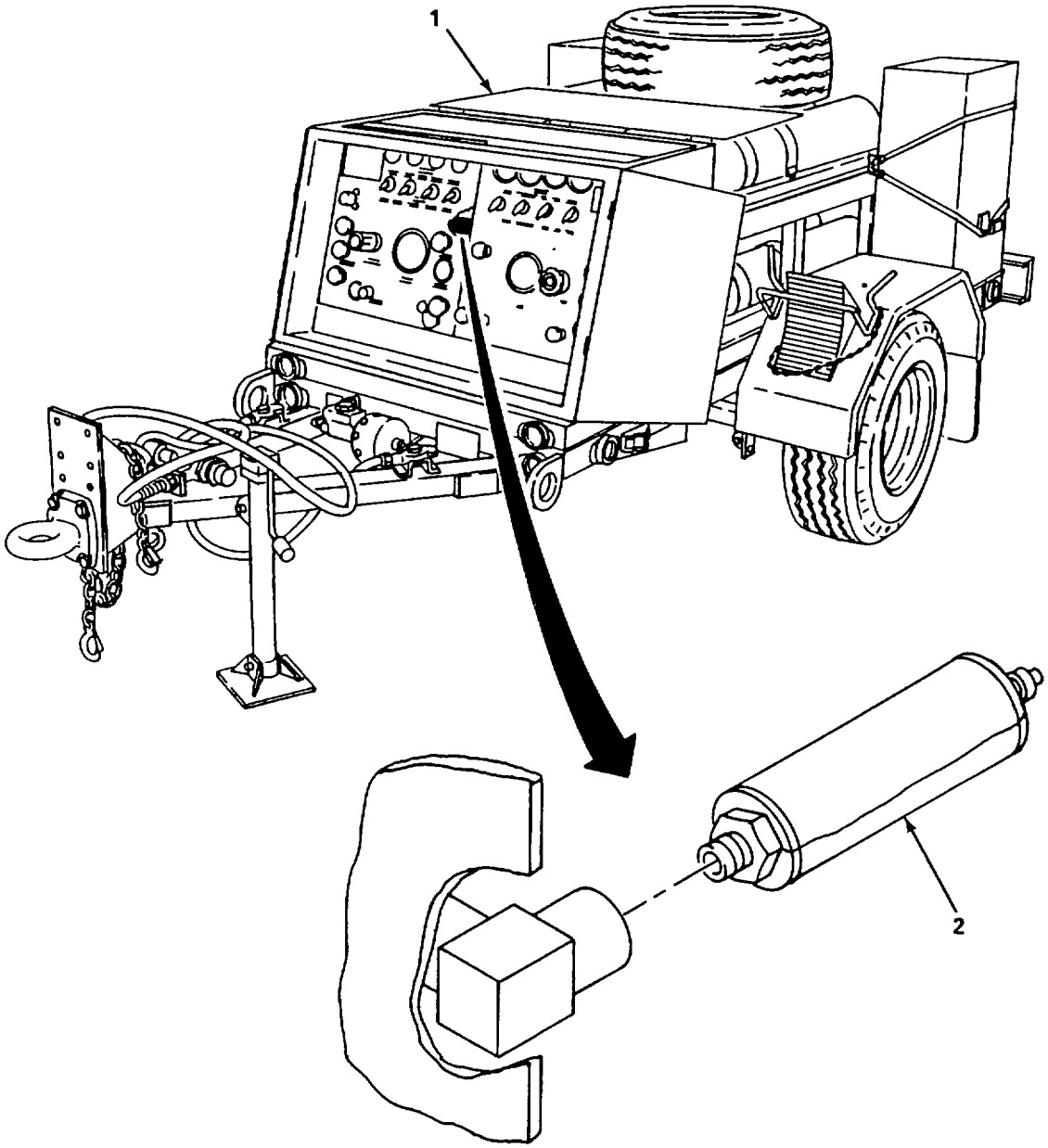


Figure 5-33. Pressure Relief Valve (Air), Replace.

5-30. Pressure Relief Valve (Air, Oxygen), Type II (Cont).

b. *Replace (Oxygen).* (figure 5-34)

(1) Open top cover (1)

WARNING

Cleanliness is imperative in maintaining and handling diving oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(2) Loosen two connector nuts (2) and remove line (3).

(3) Loosen two connector nuts (5) and remove line (5).

(4) Loosen two connector nuts (6) and remove line (7).

(5) Loosen two connector nuts (8) and remove line (9).

(6) Loosen two connector nuts (10) and remove line (11).

(7) Loosen two connector nuts (12) and remove line (13).

(8) Open door panels (14).

(9) Remove four bolts (15), washers (16), two plates (17), four blocks (18), two nut plates (19) and remove upper oxygen manifold (20).

(10) Remove oxygen pressure relief valve (21).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the oxygen system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible Injury or death to the diver.

(11) Apply teflon tape to threads on hex nipple (22).

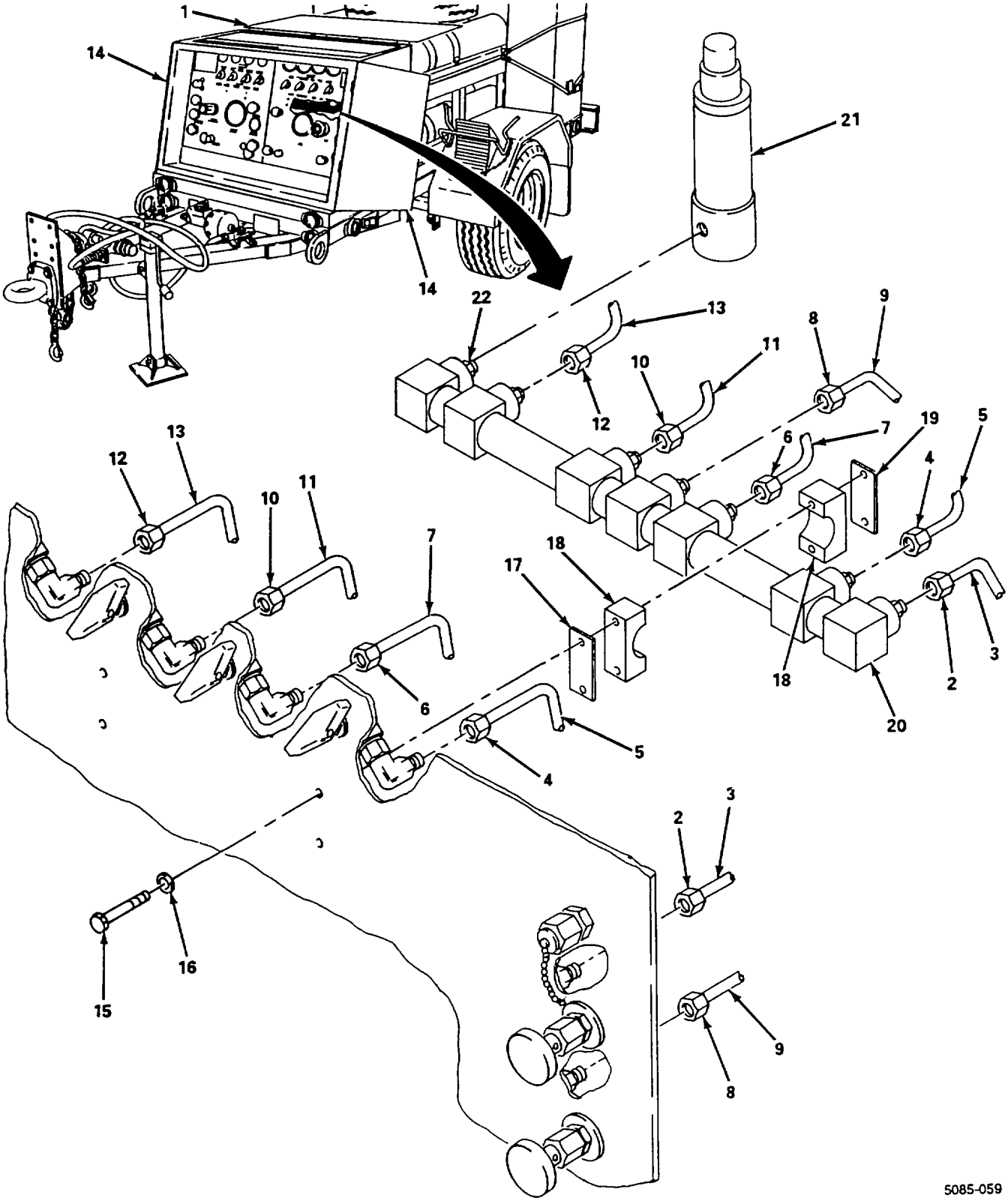


Figure 5-34. Oxygen Pressure Relief Valve, Replace.

(12) Install new oxygen pressure relief valve (21).

(13) Install upper oxygen manifold (20) and secure with two nut plates (19), four blocks (18), two plates (17), four washers (16), and bolts (15).

NOTE

Step 13 is for upper manifold only.

(14) Install line (13) and tighten two connector nuts (12).

(15) Install line (11) and tighten two connector nuts (10).

(16) Install line (9) and tighten two connector nuts (8).

(17) Install line (7) and tighten two connector nuts (6).

(18) Install line (5) and tighten two connector nuts (4).

(19) Install line (3) and tighten two connector nuts (2).

(20) Pressurize system and perform leak test.

(21) Close top cover (1) and door panels (14).

5-31. Supply Piping (Air, Oxygen), Type II.

This task covers: a. Replace b. Replace (Oxygen)

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.
Side panel removed (para 4-15).

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-35)

NOTE

The air and oxygen supply piping is comprised of several piping assemblies. The following procedures are for replacement of one supply piping assembly. The procedures are the same for all supply piping assemblies.

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination In accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1) and tag and remove line (2).

(2) Install line (2) as tagged and tighten two connector nuts (1).

(3) Pressurize system and perform leak test.

FOLLOW-ON MAINTENANCE
Install side panels (para. 4-15).

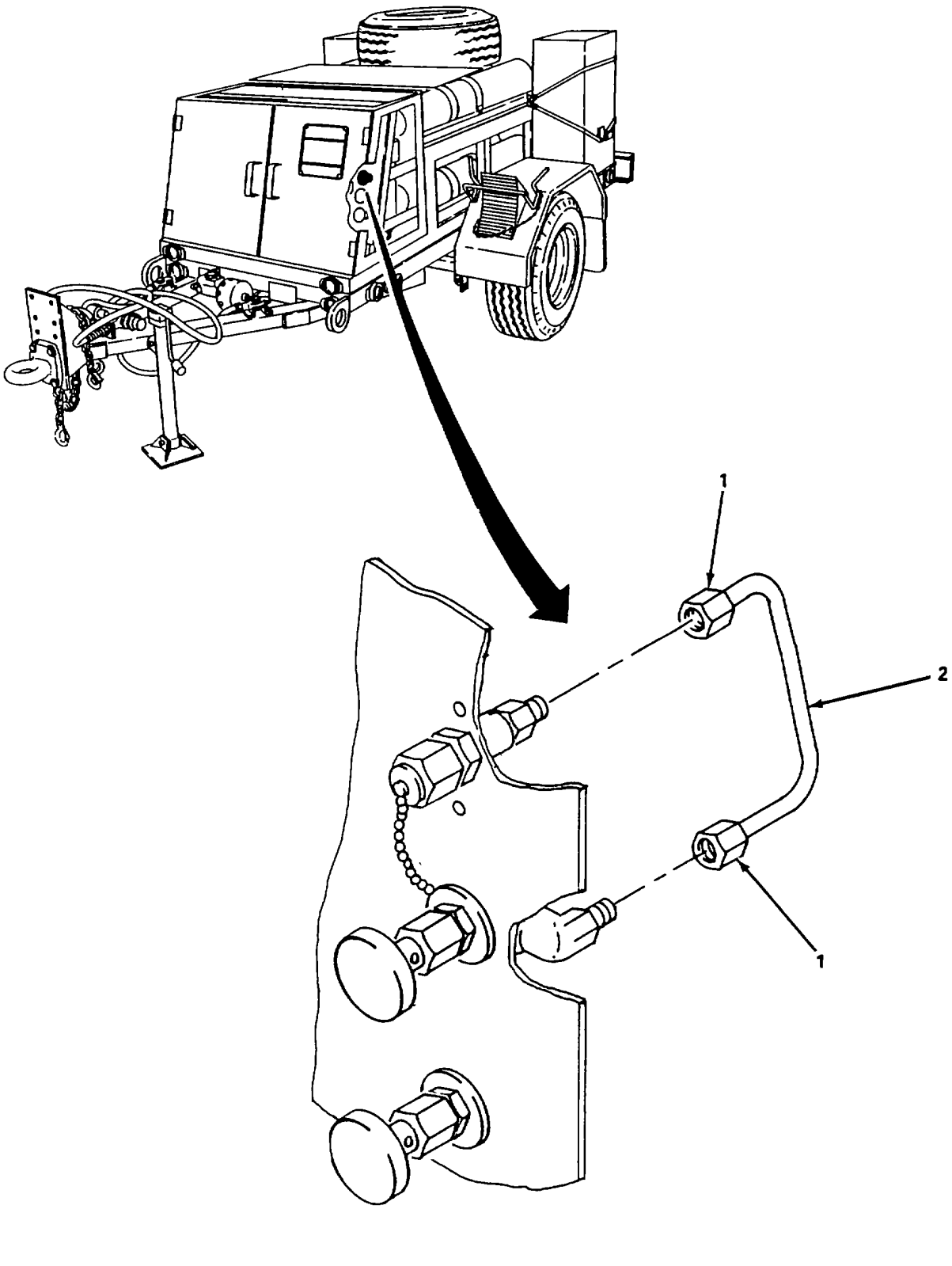


Figure 5-35. Supply Piping, Replace.

5-32. Supply Manifold (Air, Oxygen), Type II.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Teflon Tape (Item 20, Appendix D)
Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.
Side panel removed (para 4-15).
Pressure relief valve (air) removed (para 5-30).

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-36)

NOTE

The following are general procedures for replacing the air or oxygen supply manifold. The supply manifold is the upper manifold when looking at the control panel. The quantity of the lines may vary between the air and oxygen systems but the basic procedures are the same.

WARNING

Cleanliness is imperative in maintaining and handling diving air system components All tools and parts must be kept free of oil, grease, rust, or other contamination In accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result In equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored In a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1) and tag and remove line (2).

(2) Loosen two connector nuts (3) and tag and remove line (4).

(3) Loosen two connector nuts (5) and tag and remove line (6).

(4) Loosen two connector nuts (7) and tag and remove line (8).

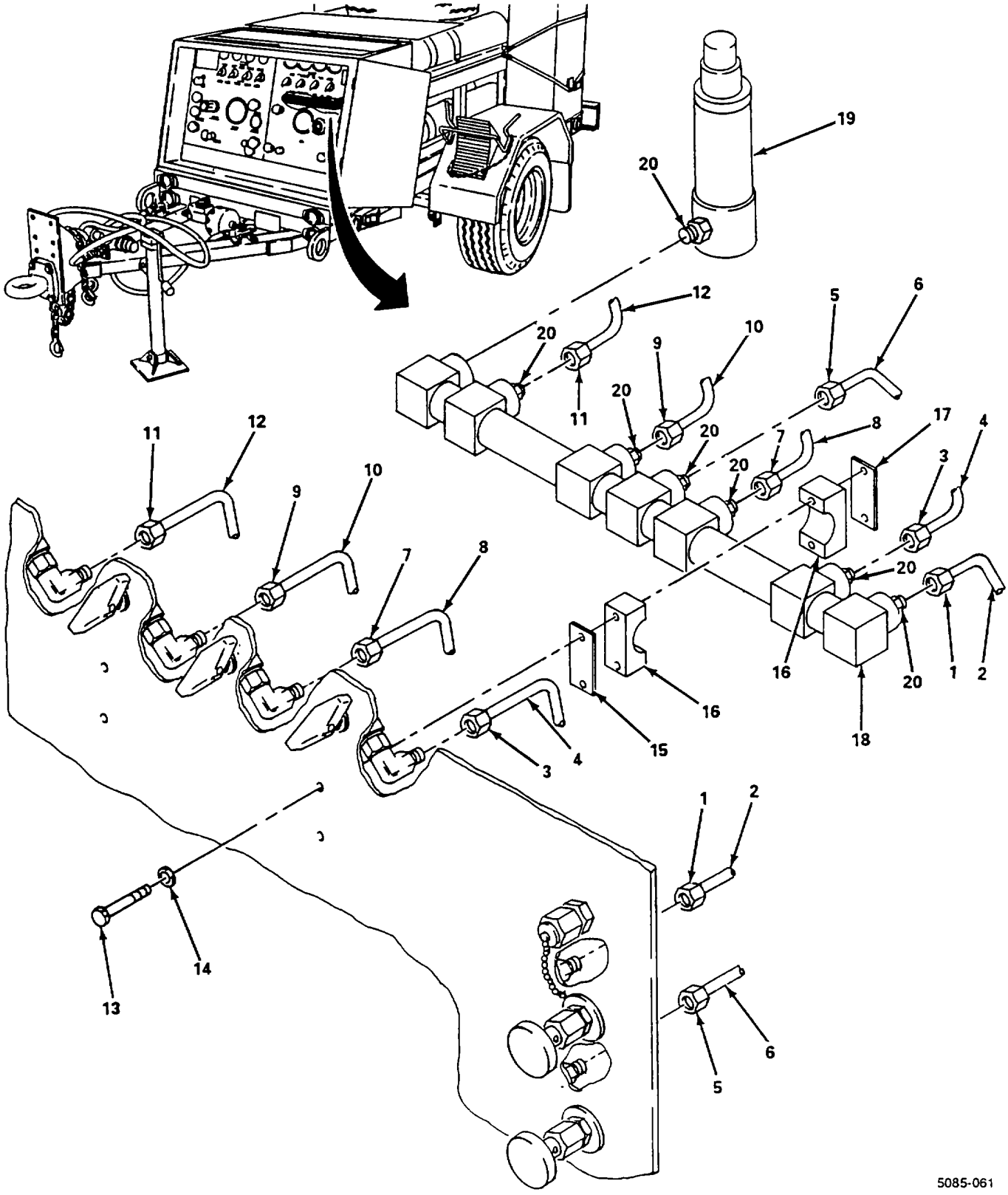


Figure 5-36. Supply Manifold, Replace

(5) Loosen two connector nuts (9) and tag and remove line (10).

(6) Loosen two connector nuts (11) and tag and remove line (12).

(7) Remove four bolts (13), washers (14), two plates (15), four blocks (16) and two nut plates (17) and remove oxygen supply manifold (18).

NOTE

Step 8 is for oxygen supply manifold only.

(8) Remove pressure relief valve (19) and seven hex nipples (20).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(9) Apply teflon tape to threads on seven hex nipples (20).

(10) Install pressure relief valve (19).

(11) Install oxygen supply manifold (18) and secure with two nut plates (17), four blocks (16), two plates (15), four washers (14), and bolts (13).

(12) Install line (12) as tagged and tighten two connector nuts (11).

(13) Install line (10) as tagged and tighten two connector nuts (9).

(14) Install line (8) as tagged and tighten two connector nuts (7).

(15) Install line (6) as tagged and tighten two connector nuts (5).

(16) Install line (4) as tagged and tighten two connector nuts (3).

(17) Install line (2) as tagged and tighten two connector nuts (1).

(18) Pressurize system and perform leak test.

FOLLOW-ON MAINTENANCE
(1) Install side panels (para. 4-15).
(2) Install oxygen pressure relief valve (para 5-30).

5-33. Output Piping (Air, Oxygen), Type II.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Teflon Tape (Item 20, Appendix D)
Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.
Side panel removed (para 4-15).

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-37)

NOTE

The air and oxygen output piping is comprised of several different assemblies. The following procedures are for replacement of one output piping assembly, The procedures are the same for all output piping assemblies.

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1) and tag and remove line (2).

(2) Install line (2) as tagged and tighten two connector nuts (1).

(3) Pressurize system and perform leak test.

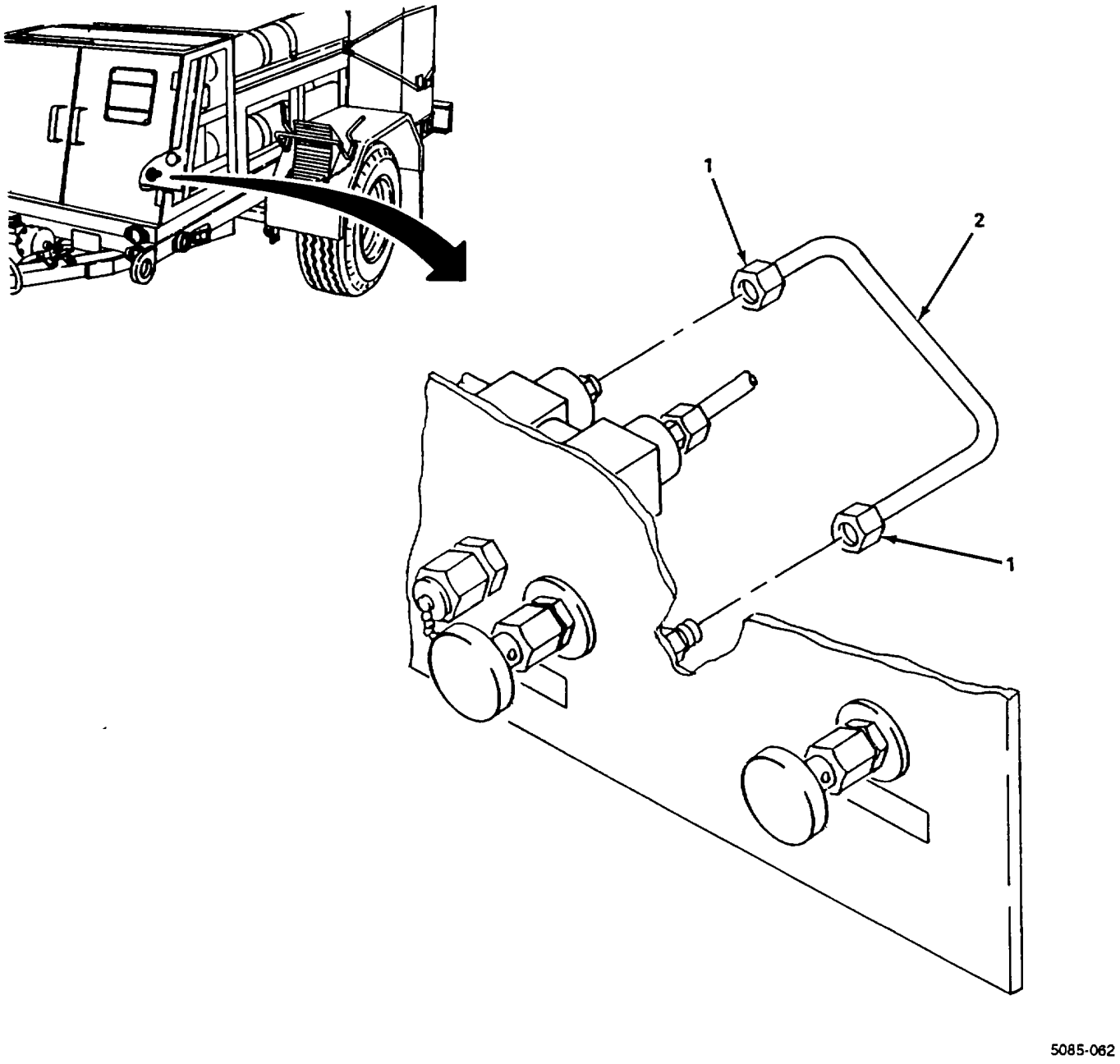


Figure 5-37. Output Piping, Replace.

FOLLOW-ON MAINTENANCE
Install side panels (para 4-15)

5-34. Output Manifold (Air, Oxygen), Type II.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Teflon Tape (Item 20, Appendix D)
Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Supply cylinders valve closed, control valve open, supply manifold valve open, service valve open, and bleeder valve open.
Side panel removed (para 4-15).
Pressure relief valve (air) removed (para 5-30).

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-38)

NOTE

The following are general procedures for replacing the air or oxygen output manifold. The output manifold is the lower manifold when looking at the control panel. The quantity of lines may vary between the air and oxygen systems but the basic procedures are the same.

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system that provides breathing air are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1) and tag and remove line (2).

(2) Loosen two connector nuts (3) and tag and remove line (4).

(3) Loosen two connector nuts (5) and tag and remove line (6).

(4) Loosen two connector nuts (7) and tag and remove line (8).

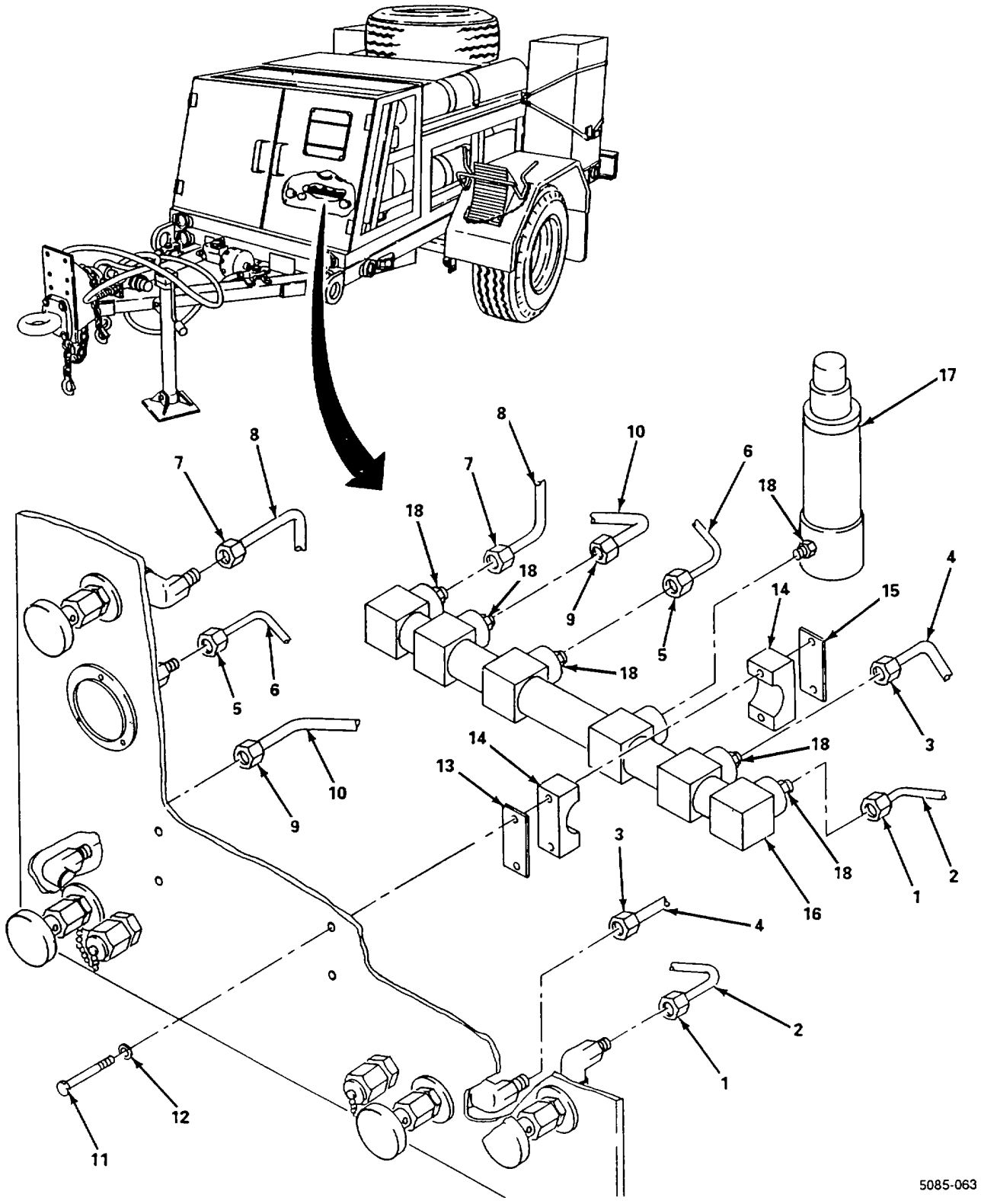


Figure 5-38. Output Manifold, Replace.

(5) Loosen two connector nuts (9) and tag and remove line (10).

(6) Remove four bolts (11), washers (12), two plates (13), four blocks (14), two nut plates (15), and remove output manifold (16).

NOTE

Step 7 is for oxygen system only

(7) Remove oxygen pressure relief valve (17) and six hex nipples (18).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(8) Apply teflon tape to threads on six hex nipples (18).

(9) Install hex nipples (18) and pressure relief valve (17).

(10) Install manifold (16) and secure with two nut plates (15), four blocks (14), two plates (13), four washers (12), and bolts (11).

(11) Install line (10) as tagged and tighten two connector nuts (9).

(12) Install line (8) as tagged and tighten two connector nuts (7).

(13) Install line (6) as tagged and tighten two connector nuts (5).

(14) Install line (4) as tagged and tighten two connector nuts (3).

(15) Install line (2) as tagged and tighten two connector nuts (1).

(16) Pressurize system and perform leak test.

FOLLOW-ON MAINTENANCE
(1) Install side panels (para. 4-15).
(2) Install air pressure relief valve (para 5-30)

5-35 Frame and Attachments.

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Gas cylinders removed (para. 5-23).
Fenders removed (para 4-18)
Service troughs removed (para. 4-21)
Jack assembly removed (para 4-20).

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Replace. (figure 5-39)

(1) Remove 10 bolts (1), washers (2), and lock nuts (3) securing welded frame (4)

(2) Connect suitable lifting device to welded frame (4) in four places

(3) Remove welded frame (4) from trailer (5)

(4) Inspect webbing strips (6) and replace If deteriorated or missing

(5) Install welded frame (4) and secure with 10 bolts (1), washers (2), and locknuts (3).

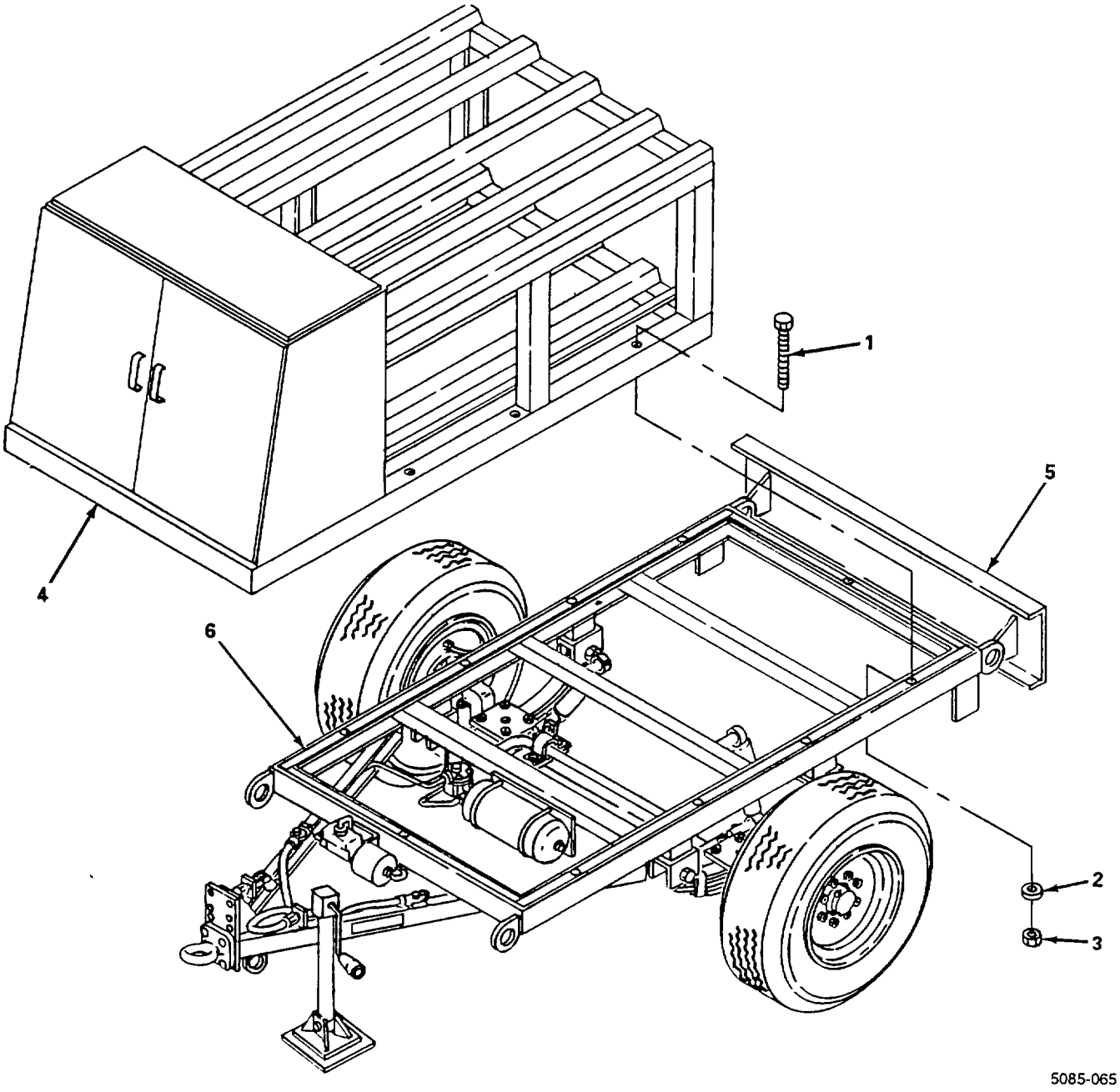


Figure 5-39. Welded Frame Assembly, Replace.

FOLLOW-ON MAINTENANCE
(1) Install fenders (para 4-18).
(2) Install jack assembly (para 4-20).
(3) Install gas cylinders (para 5-23).
(4) Install service troughs (para 4-21).

5-35. Frame and Attachments (Cont).

b. *Repair.* (figure 5-40)

NOTE

There are two wear strips for each cylinder.

(1) Remove cylinder (para. 5-9).

(2) Remove five screws (1) and locknuts (2) and remove wear strip (3).

(3) Install wear strip (3) and secure with five screws (1) and locknuts (2).

(4) Install cylinder (para. 5-9).

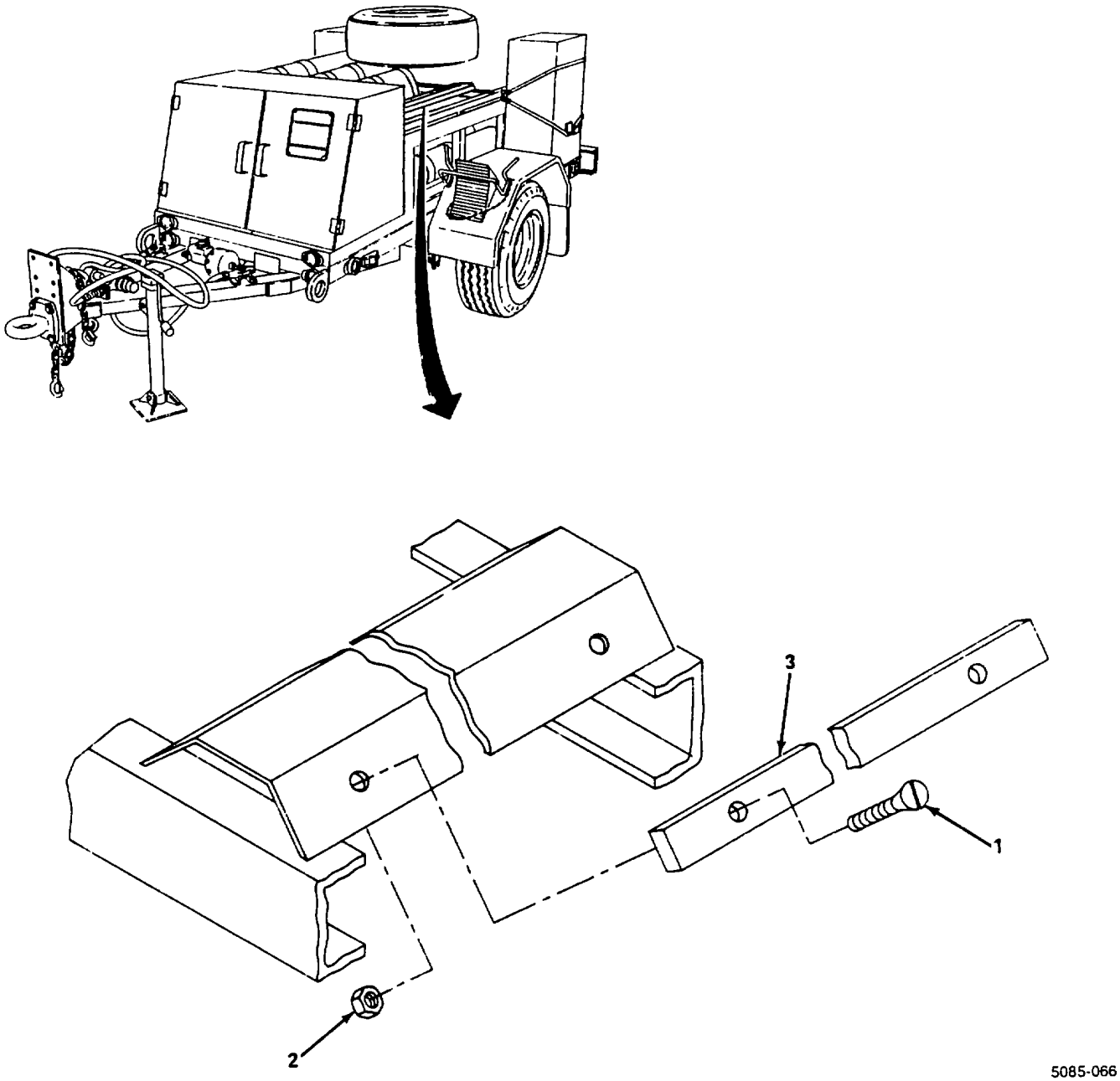


Figure 5-40. Wear Strips, Replace.

5-36. Axle Assembly.

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)
Shop Equipment Automotive Maintenance
Common No 1 (NSN 4910-00-754-0645)

Equipment Condition

All gas cylinders removed (para. 5-9 or 5-23).

Materials/Parts

Axle Assembly

a. *Replace.*

(1) *Remove.* (figure 5-41)

(a) Jack up trailer (1) and support.

(b) Remove eight lugs (2) and remove wheel (3).

(c) Remove six socket head cap screws (4) and remove grease cup (5) and gasket (6).

(d) Remove cotter pin (7), nut (8), washer (9), wheel bearing (10), and wheel hub (11).

(e) Remove six bolts (12), lockwashers (13), nuts (14), and move brake plate assembly (15) out of way.

(f) Repeat steps (b) through (e) for other side wheel.

(g) Support axle assembly (16).

(h) Remove bolt (17) and washer (18) securing shock (19).

(i) Remove nut (20), washer (21), and remove shock (19).

(j) Repeat steps (h) and (I) for remaining shock.

(k) Loosen nut (22) and remove brake cable (23) from coupler (24).

(l) Repeat step (k) for other side.

(m) Remove two screws (25), washers (26), locknuts (27) and remove sway bar bracket (28).

(n) Repeat step (m) for remaining sway bar brackets and remove sway bar (29).

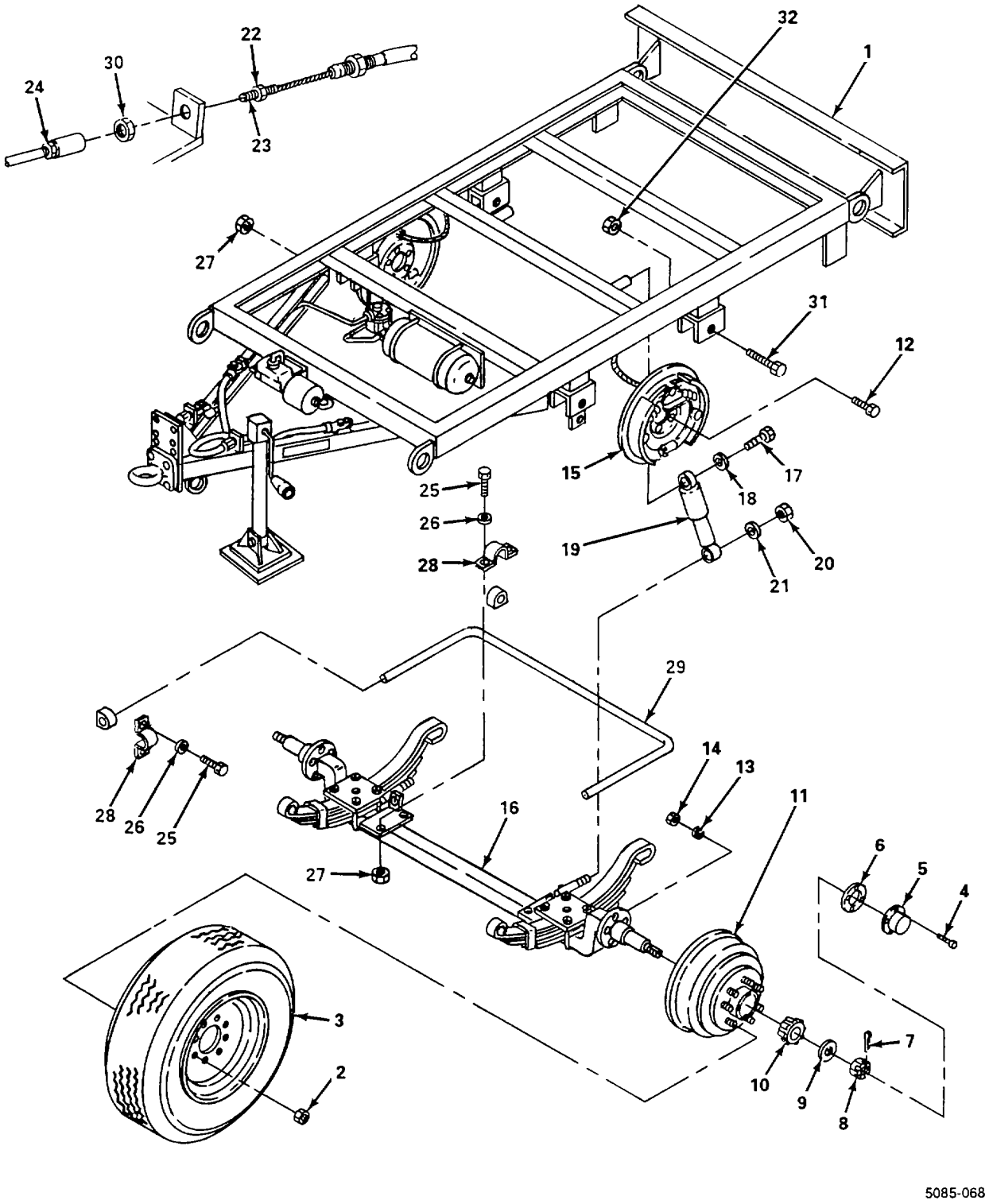


Figure 5-41. Axle Assembly, Replace.

5-36. Axle Assembly (Cont).

(o) Remove nut (30) and remove brake cable (23) from axle assembly (16).

(p) Repeat step (o) for other brake cable.

(q) Remove four bolts (31) and locknuts (32) and remove axle assembly (16).

(2) *Install.* (figure 5-42)

(a) Position axle assembly (16) under trailer (1) and secure with four bolts (31) and locknuts (32).

(b) Install brake cable (23) and secure with nut (30).

(c) Repeat step (b) for remaining brake cable.

(d) Install sway bar (29) and secure with four brackets (28) and eight bolts (25), washers (26), and locknuts (27).

(e) Install brake cable (23) in coupler (24).

(f) Install shock (19) and secure with bolts (17), washer (18), nut (20), and washer (21).

(g) Repeat step (f) for remaining shock.

(h) Install brake plate assembly (15) and secure with six bolts (12), lockwashers (13), and nuts (14).

(l) Repeat step (h) for remaining break plate assembly.

(j) Install wheel hub (11), outer bearing (10), washer (9), and nut (8). Tighten nut (8) until drag is felt on wheel hub (11) and loosen nut (8) only enough to install cotter pin (7).

(k) Repeat step (j) for remaining wheel hub.

(l) Install gasket (6), grease cup (5) and secure with six socket head cap screws (4).

(m) Repeat step (l) for remaining grease cap.

(n) Install wheel (3) and secure with eight lugs (2).

(o) Repeat step (n) for remaining wheel.

FOLLOW-ON MAINTENANCE
Install gas cylinders (para. 5-9 or 5-23).

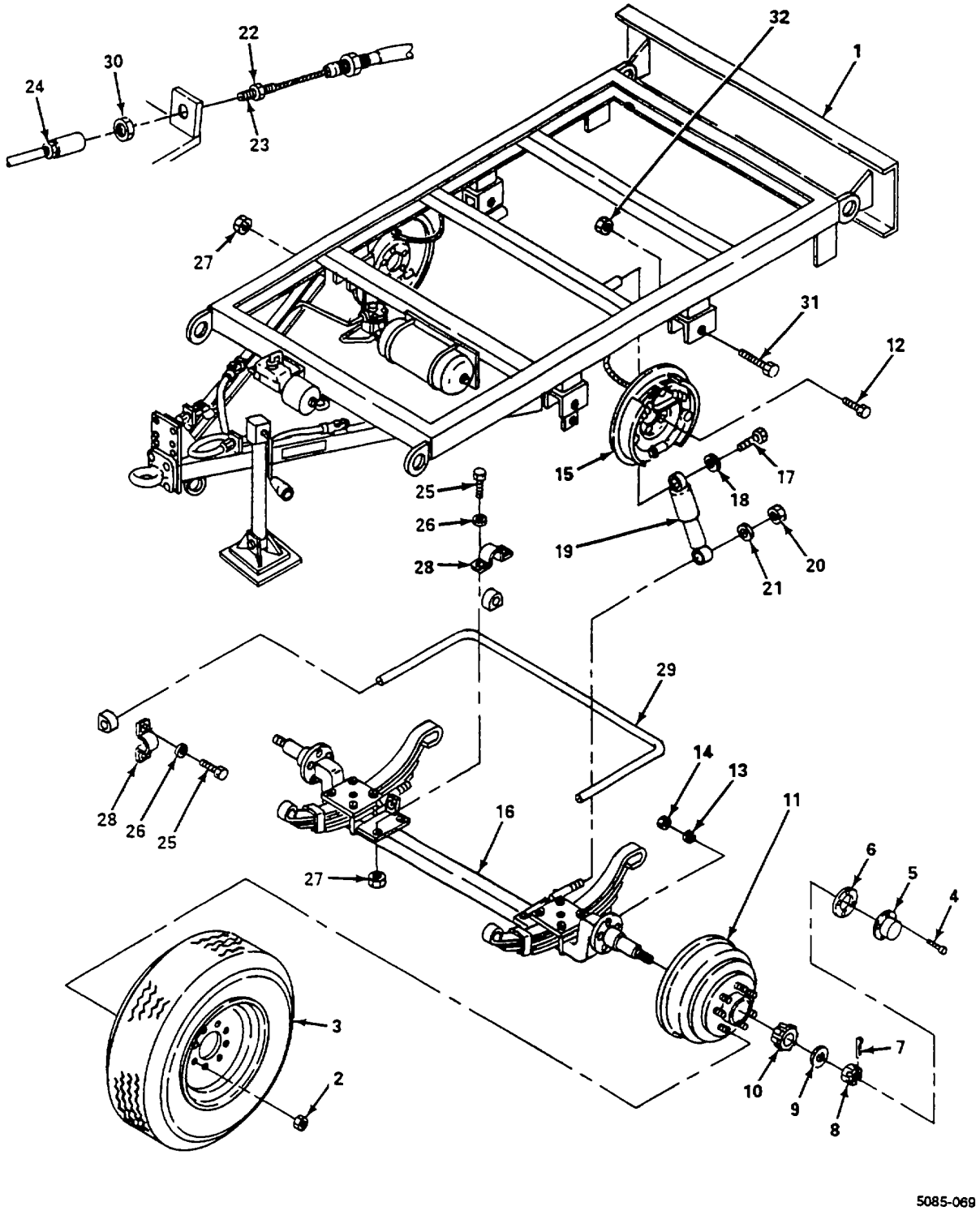


Figure 5-42. Axle Assembly, Install.

5-36. Axle Assembly (Cont).

b. *Repair.*

(1) *Replace (shocks).* (figure 5-43)

NOTE

The trailer is equipped with two shocks. The replace procedures are the same for both. When replacing one shock it is good practice to replace the other shock also.

(a) Jack up trailer (1) and block in position.

(b) Jack up axle assembly (2) only enough to relieve pressure on shocks (3).

(c) Remove bolt (4), washer (5), nut (6), washer (7), and remove shock (3).

(d) Install shock (3) and secure with nut (6), washer (7), bolt (4), and washer (5).

(e) Remove blocking and lower trailer (1).

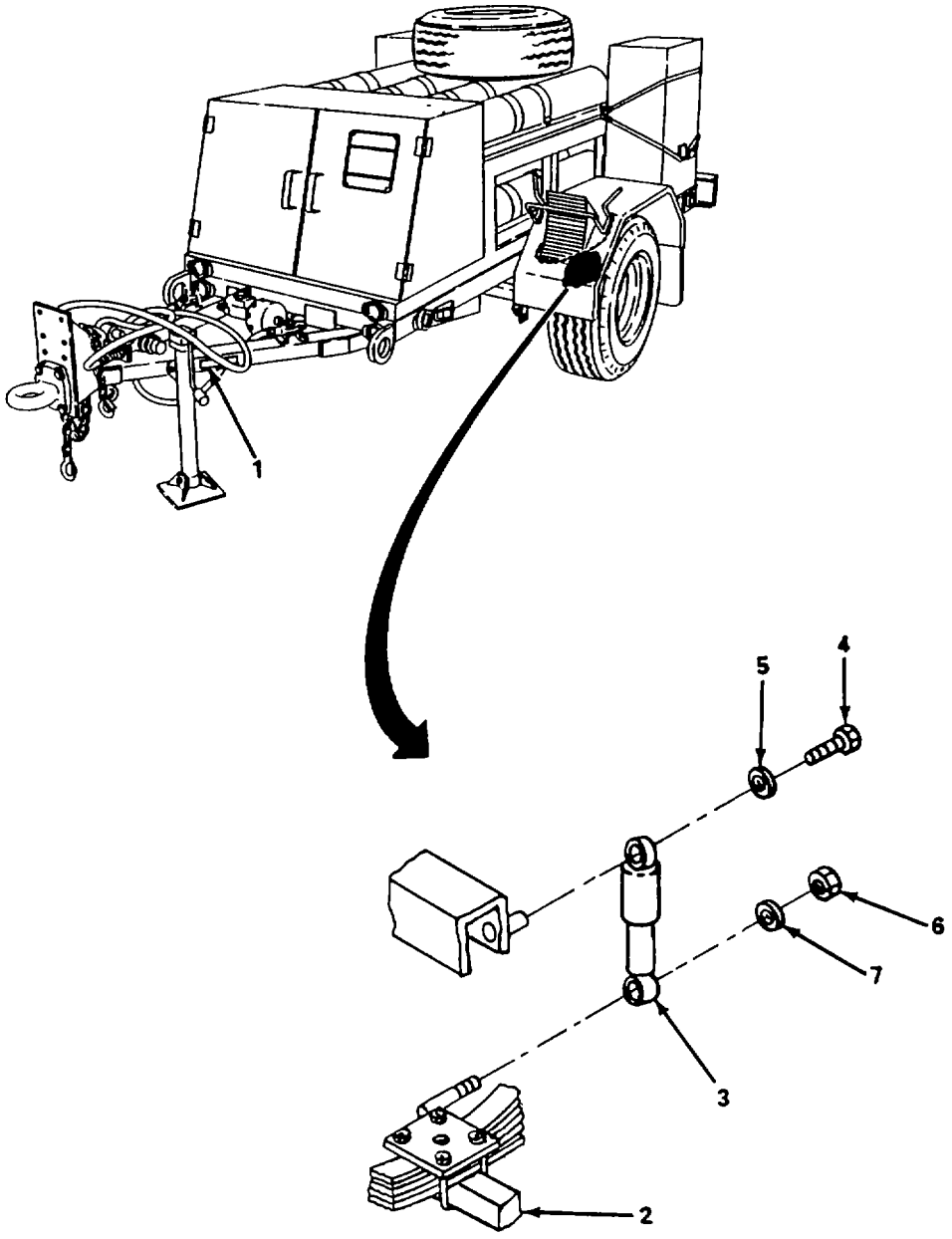


Figure 5-43. Shocks, Replace.

5-36. Axle Assembly (Cont).

(2) *Replace (leaf springs).* (figure 5-44)

NOTE

The trailer is equipped with two sets of leaf springs. The procedures are the same for replacing both It is a good practice to replace both sets of leaf springs if one set is damaged.

(a) Jack up trailer (1) and block in position.

(b) Jack up axle assembly (2) to relieve pressure on leaf springs (3) and block in position.

(c) Remove nut (4) and washer (5) and remove shock (6) from plate (7).

(d) Remove four nuts (8), two U-bolts (9) and remove plate (7).

(e) Remove two bolts (10) and locknuts (11) securing leaf spring (3).

(f) Lower axle assembly (2) slightly to allow room to remove leaf spring (3) and remove.

(g) Position new leaf spring (3) on axle assembly (2).

(h) Raise axle assembly (2) and position leaf spring (3) in mounting blocks (12).

(i) Install two bolts (10) and locknuts (11).

(o) Install plate (7) and secure with two U-bolts (9), and four nuts (8).

(k) Install shock (6) and secure with washer (5) and nut (4).

(l) Remove blocking and lower trailer (1).

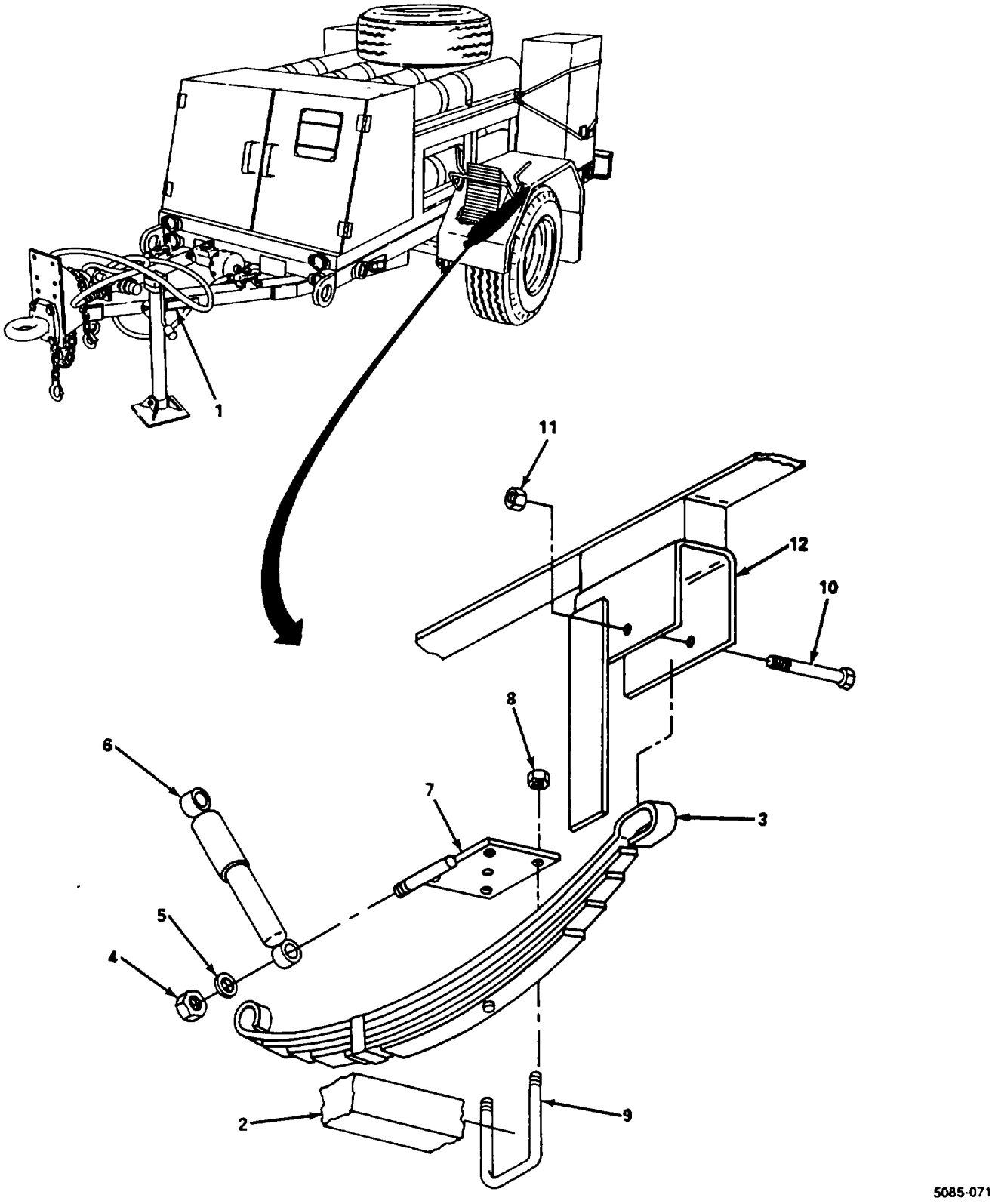


Figure 5-44. Leaf Springs, Replace.

5-36. Axle Assembly (Cont).

(3) *Replace (sway bar).* (figure 5-45)

(a) Jack up trailer (1) and block in position.

(b) Remove eight bolts (2), washers (3), locknuts (4), and four brackets (5) and remove sway bar (6).

(c) Remove four rubber blocks (7) from sway bar (6).

(d) Inspect rubber blocks (7) and replace if ripped, dry rotted, or otherwise damaged.

(e) Install rubber blocks (7) on sway bar (6).

(f) Position sway bar (6) and secure with four brackets (5), eight bolts (2), washers (3), and locknuts (4).

(g) Remove blocking and lower trailer (1).

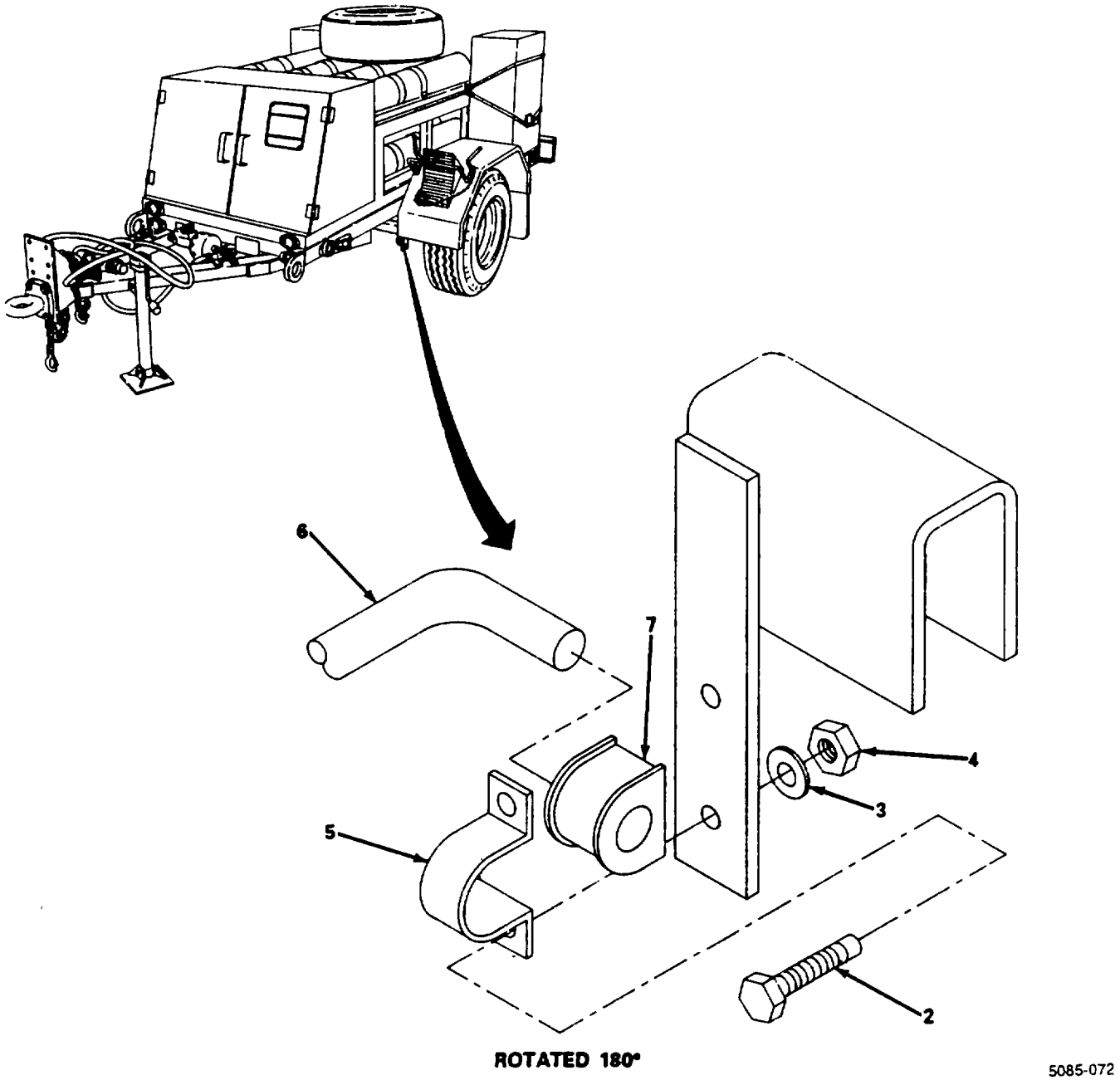


Figure 5-45. Sway Bar, Replace.

5-36. Axle Assembly (Cont).

(4) *Replace (wheelbearings).* (figure 5-46)

NOTE

Both the inner and outer hub bearings should be replaced at the same time. Never replace just the inner or outer bearings separate.

(a) Jack up trailer (1) and block in position.

(b) Remove eight lugs (2) and remove wheel (3).

(c) Remove six socket head cap screws (4) and remove grease cup (5) and gasket (6).

(d) Remove cotter pin (7), nut (8), washer (9), washer bearing (10), and hub (11).

(e) Remove inner grease seal (12) and inner wheel bearing (13).

(f) Remove inner wheel bearing race (14) and outer wheel bearing race (15).

(g) Inspect hub (11) and replace if damaged.

(h) Press new inner wheel bearing race (14) into hub (11) Ensure wheel bearing race (14) goes in straight and seats completely.

(i) Press new outer wheel bearing race (15) into hub (11) Ensure wheel bearing race (15) goes in straight and seats completely.

(j) Pack new wheel bearings (10) and (13) with grease.

(k) Install inner wheel bearing (13) and new grease seal (12).

(l) Install hub (11), wheel bearing (10), washer (9) and nut (8). Tighten nut (8) until resistance is felt and back off nut (8) only enough to Install cotter pin (7).

(m) Install cotter pin (7).

(n) Install grease cup (5), gasket (6) and secure with six socket head cap screws (4).

(o) Install wheel (3) and secure with eight lug nuts (2).

(p) Remove blocking and lower trailer (1).

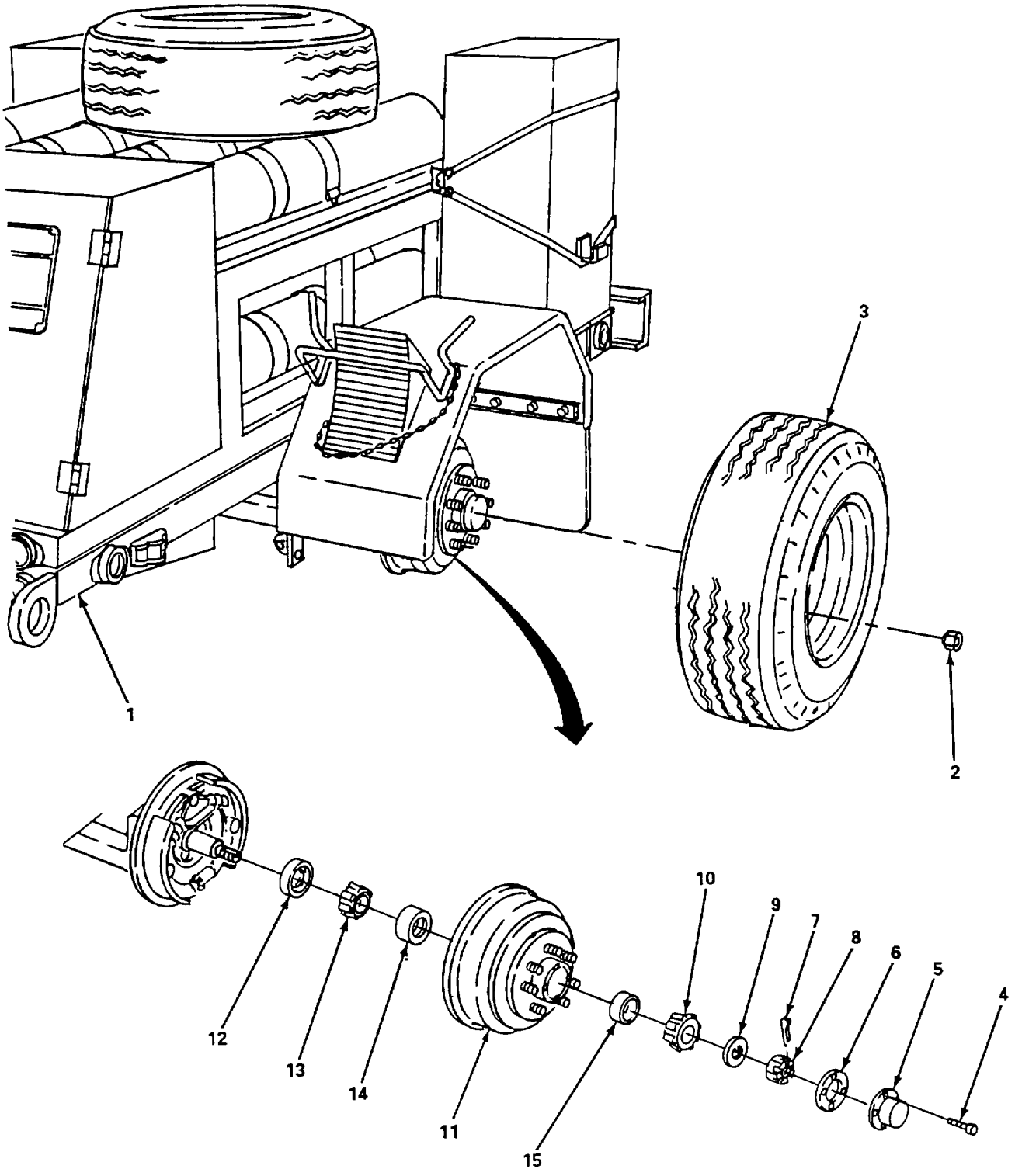


Figure 5-46. Wheel Bearing, Replace.

5-37. Power Cluster.

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Power cluster removed (para 4-28).

Materials/Parts

Solvent, Dry Cleaning (Item 18, Appendix D)
Rags, Wiping (Item 16, Appendix D)
Hydraulic Brake Fluid (Item 14, Appendix D)

Repair. (figure 5-47)

(1) Remove two bolts (1) and lockwashers (2) and separate hydraulic cylinder assembly (3) from air cylinder assembly (4).

(2) Remove eight screws (5) and lockwashers (6) and remove shell (7) from head (8).

(3) Remove cup (9), wiper (10), piston (11), boot (12), and spring (13) from head (8).

(4) Remove retaining (14) and remove stop plate (15), piston assembly (16), primary cup (17), spring (18), check valve retainer (19), valve retainer spring (20), and check valve (21).

(5) Remove nut (22) and remove piston stroke indicator (23).

WARNING

Dry cleaning solvent PD-680 used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame or excessive heat. Wear eye protection and protective clothing. Flash point of solvent is 100°F-138°F (38°C-60°C).

(6) Clean all items except seals, boots and gaskets with dry cleaning solvent and dry thoroughly.

(7) Inspect shell (7) and head (8) and replace if cracked, dented, or otherwise damaged.

(8) Inspect piston (11) and replace if bent, cracked, or otherwise damaged.

(9) Inspect spring (13) and replace if cracked or deformed.

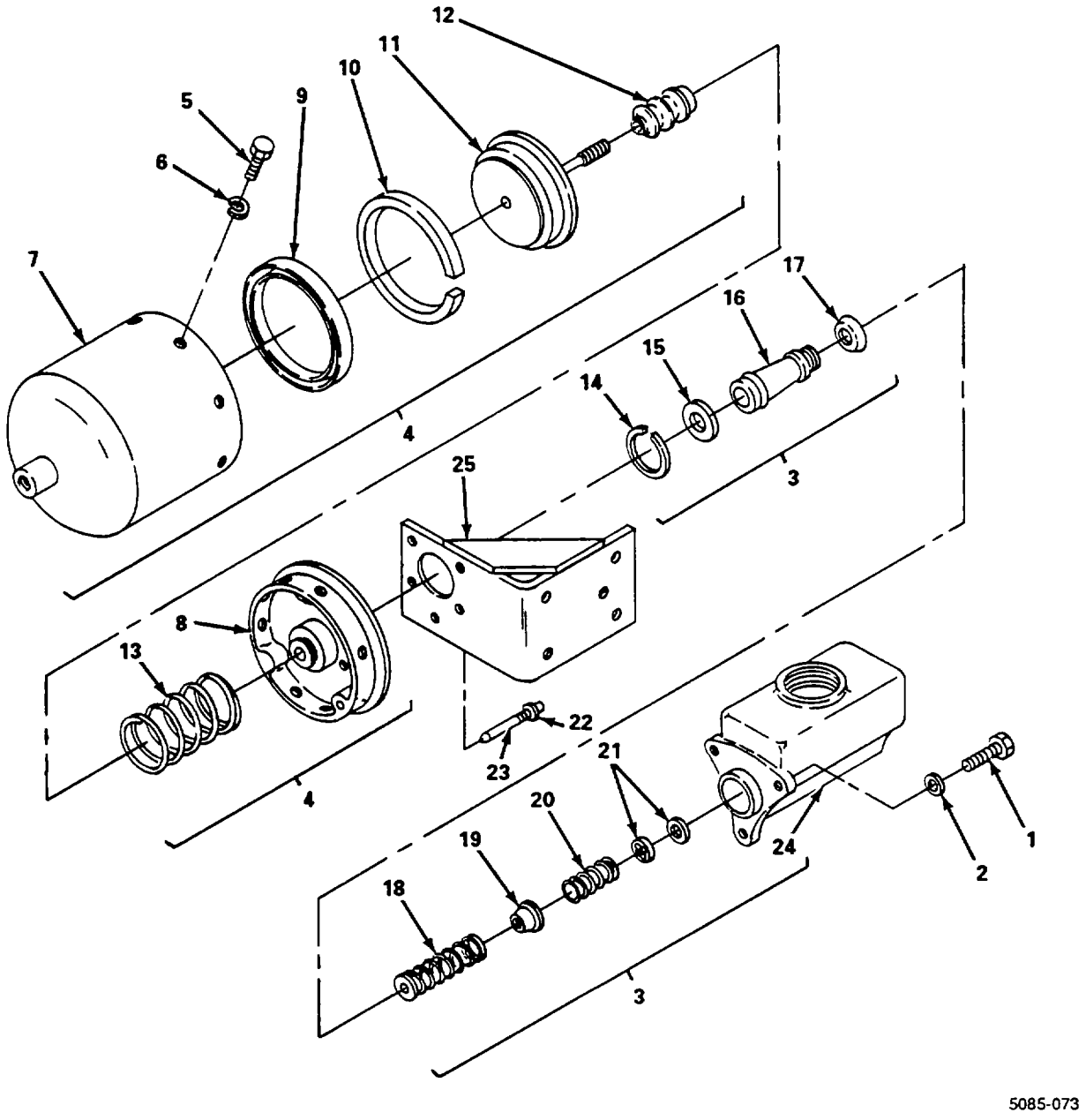


Figure 5-47. Power Cluster, Repair.

(10) Inspect boot (12) and replace if cracked, deformed, dry rotted, or otherwise damaged. Discard and replace cup (9) and wiper (10).

(11) Inspect piston assembly (16) and replace If bent, worn, or otherwise damaged.

(12) Inspect springs (18) and (20) and replace if unserviceable.

(13) Discard primary cup (17) and replace.

(14) Inspect check valve (21) and replace if unserviceable.

NOTE

Minor scoring of cylinder bore can be dressed using emery cloth or hone. Thoroughly clean cylinder bore after dressing and lubricate with clean hydraulic brake fluid.

(15) Inspect hydraulic cylinder housing (24) and replace if housing is cracked or bore is excessively pitted.

(16) Replace any part that is deformed, worn, cracked, or looks to be damaged in any way

(17) Install piston stroke indicator (23) and tighten nut (22).

(18) Lubricate primary cup (17) with clean hydraulic brake fluid

(19) Install check valve (21), valve retainer spring (20), check valve retainer (19), spring (18), primary cup (17), piston assembly (16), stop plate (15) and secure with retaining ring (14).

(20) Install spring (13), boot (12), piston (11), wiper (10), and cup (9) In head (8).

(21) Install shell (7) on head (8) and secure with eight screws (5) and lockwashers (6).

(22) Install hydraulic cylinder assembly (3) and air cylinder assembly (4) on mounting bracket (25) and secure with two bolts (1) and lockwashers (2).

FOLLOW-ON MAINTENANCE
Install power cluster (para. 4-28)

5-38. Emergency Valve RE-6 Relay.

This task covers: Repair

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance Common No 1 (NSN 4910-00-754-0645)

Equipment Condition

Emergency valve RE-6 relay removed (para. 4-29).

Materials/Parts

Solvent, Dry Cleaning (Item 18, Appendix D)
Rags, Wiping (Item 16, Appendix D)
Grease, Automotive Artillery (Item 13, Appendix D)

Repair. (figure 5-48)

(1) Mark cover (1) and body (2) to assure proper orientation when assembling.

(2) Remove two bolts (3) and lockwashers (4) and remove cover (1).

(3) Remove check valve (5), check valve spring (6) and O-rings (7) and (8), and spring (9).

(4) Remove screw (10), washer (11), and diaphragm (12).

(5) Remove four screws (13) and lockwasher (14), and remove cover (15), relay piston (16), and piston return spring (17).

(6) Remove O-ring (18) from piston (16).

(7) Remove seat (19).

(8) Remove sealing ring (20).

(9) Remove filter assembly (21).

(10) Remove emergency piston (22) and inlet/exhaust valve (23).

(11) Remove retaining ring (24) and remove inlet/exhaust valve (23).

(12) Remove O-rings (25) and (26).

(13) Remove retaining (27) and remove valve guide (28), spring (29), retainer (30), and O-ring (31).

(14) Remove O-ring (32).

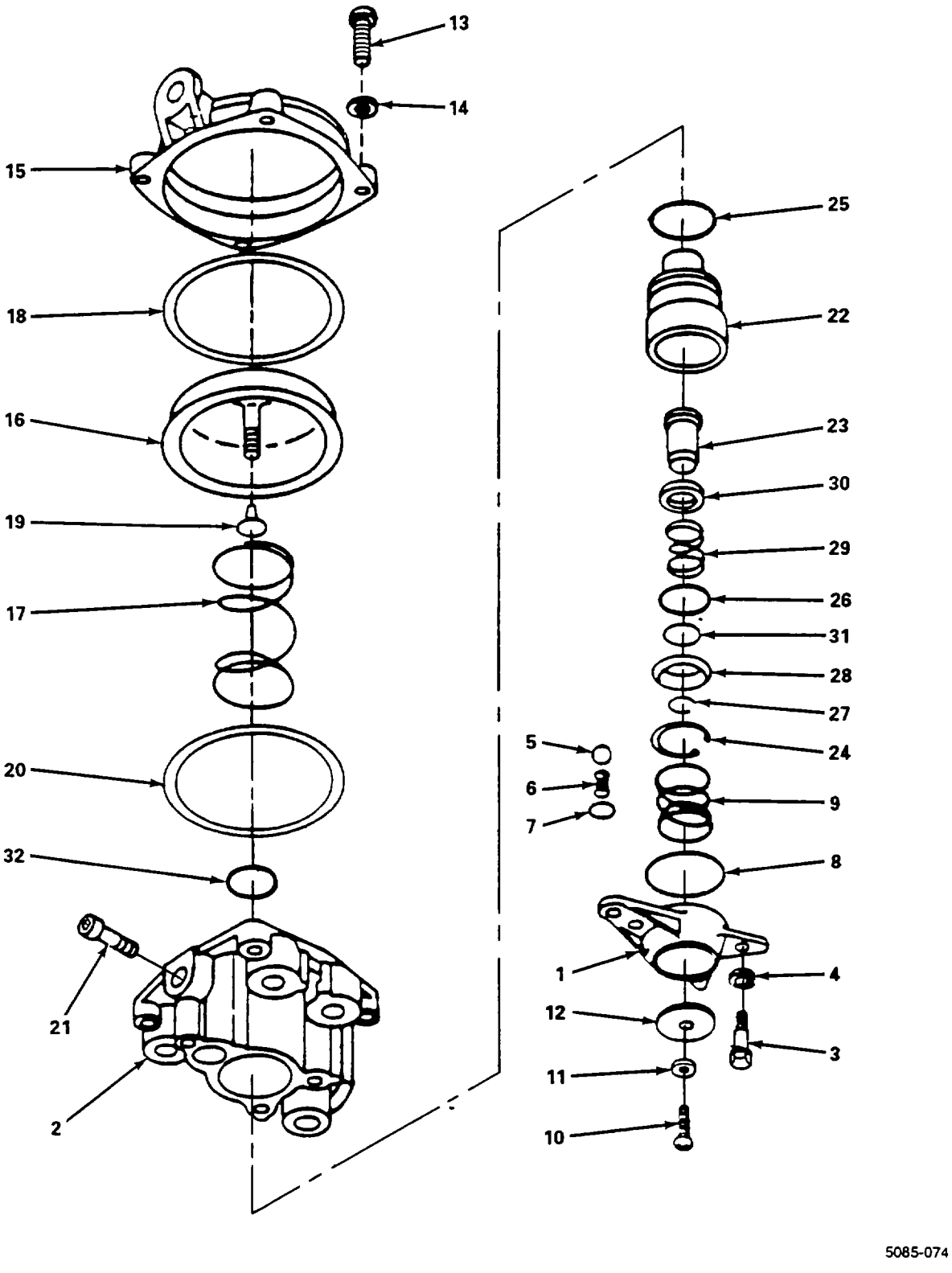


Figure 5-48. Emergency Valve RE-6 Relay, Repair.

5-38. Emergency Valve RE-6 Relay (Cont).

WARNING

Dry cleaning solvent, PD-680 used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame or excessive heat. Wear eye protection and protective clothing. Flash point of solvent is 100°F-138°F (38°C-60ì°C)

(15) Clean all parts except O-rings, gaskets and filters with dry cleaning solvent and dry thoroughly.

(16) Inspect body (2), cover (1), and cover (15) and replace if cracked.

(17) Inspect check valve (5) and replace if cracked, bent, or worn.

(18) Inspect springs (6), (9), (17), and spring (29) and replace if cracked or deformed.

(19) Inspect diaphragm (12) and replace if bent or cracked.

(20) Inspect seat (19) and replace if bent or worn.

(21) Inspect emergency piston (22) and replace if scored or worn.

(22) Inspect inlet and exhaust valve (23) and replace if scored.

(23) Inspect valve guide (28) and replace if scored or worn.

(24) Inspect retainer (30) and replace if worn or bent.

(25) All O-rings, gaskets and seals should be replaced.

(26) Coat all O-rings with grease before installation.

(27) Install O-ring (31) in valve guide (28).

(28) Install valve retainer (30), spring (29), and valve guide (28) in inlet/exhaust valve (23).

(29) Compress spring (29) using guide (28) and install retaining ring (27).

(30) Install O-ring (26) on valve guide (28).

(31) Install inlet/exhaust valve (23) In emergency piston (22) and secure with retaining ring (24).

(32) Install O-ring (25).

(33) Install new filter assembly (21).

(34) Install seat (19).

(35) Install O-ring (18) on piston (16)

(36) Install O-ring (32) in upper bore of body (2) .

(37) Install sealing ring (20) .

(38) Install piston (16) .

(39) Install spring (17) .

(40) Install cover (15) and secure with four screws (13) and lockwashers (14) Torque screws (13) to 100 in. lbs (11 Nm)

(41) Install emergency piston (22) .

(42) Install O-ring (8) in body (2)

(43) Install spring (9) in body (2)

(44) Install exhaust diaphragm (12) and secure with screw (10) and washer (11) .

(45) Install O-ring (7) in cover (1)

(46) Install spring (6) and check valve (5) in cover (1) .

(47) Install cover (2) and secure with two screws (3) and lockwashers (4) Torque screws (3) to 100 lb-in (11 Nm)

FOLLOW-ON MAINTENANCE
Install emergency valve RE-6 relay (para. 4-29)

5-39. Automatic Drain Valve.

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Solvent, Dry Cleaning (Item 18, Appendix D)
Rags, Wiping (Item 16, Appendix D)

Equipment Condition

Automatic drain valve removed (para. 4-30)

Repair. (figure 5-49)

(1) Remove four screws (1) and lockwashers (2) and remove cover (3) and O-ring (4)

(2) Remove inlet valve diaphragm (5) .

WARNING

Dry cleaning solvent, PD-680 used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame or excessive heat. Wear eye protection and protective clothing. Flash point of solvent is 1000F-138°F (380C-600C)

(3) Clean body (6)and cover (3) with dry cleaning solvent and dry thoroughly.

(4) Inspect body (6) and cover (3) and replace if cracked.

(5) Install new inlet valve diaphragm (5) .

(6) Install cover (3)and new O-ring (4) and secure with four screws (1) and lockwashers (2).

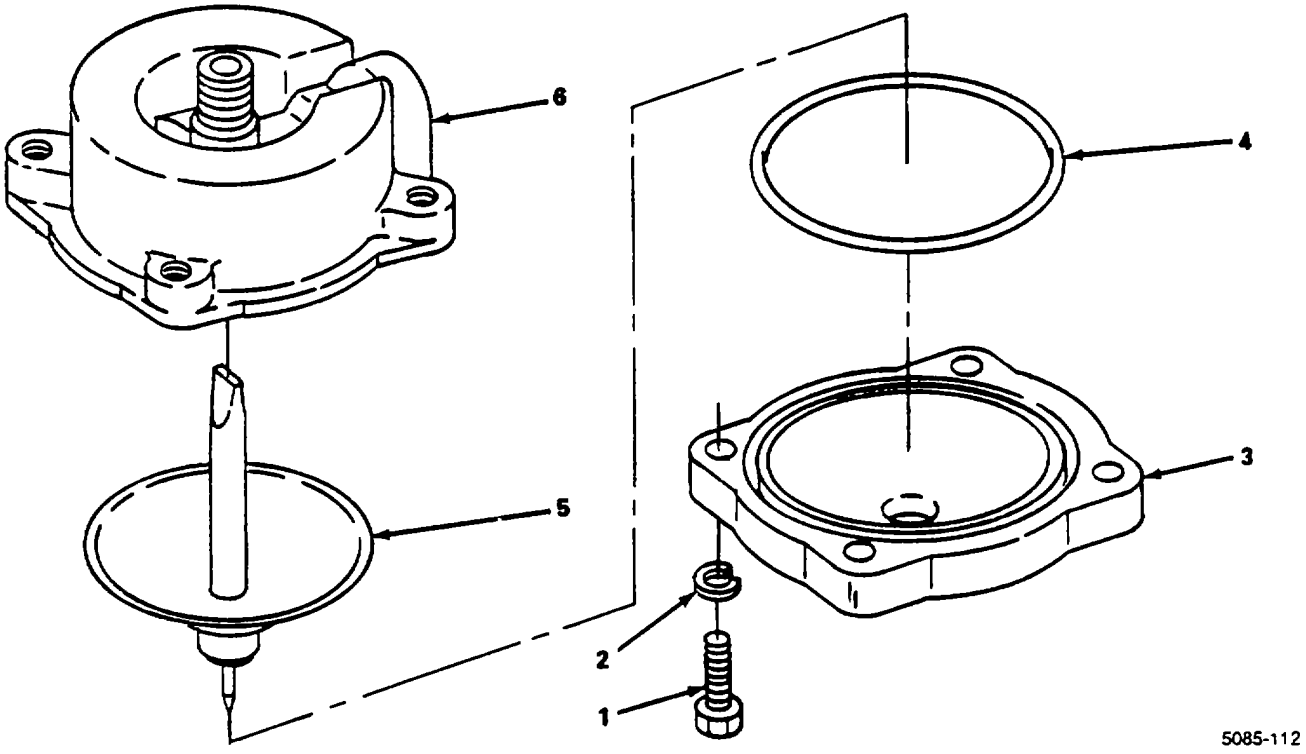


Figure 5-49. Automatic Drain Valve, Repair.

FOLLOW-ON MAINTENANCE
Install automatic drain valve (para. 4-30).

5-40. Brake Assembly.

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Brake shoe assembly removed (para. 4-31).

Materials/Parts

Brake Fluid (Item 14, Appendix D)
Rags, Wiping (Item 16, Appendix D)

Repair.

Replace (brake cylinder). (figure 5-50)

(a) Loosen bleeder valve (1).

(b) Loosen brake line connector nut (2)and drain fluid into a suitable container

(c) Remove two bolts (3)and lockwasher (4)and remove brake cylinder (5)and pins (6).

(d) Install new brake cylinder (5)and pins (6)and secure with two bolts (3)and lockwashers (4).

(e) Connect brake line (7)and tighten connector nut (2).

(f) Install brake shoe assembly (para. 4-30).

(g) Bleed brakes (para. 4-27).

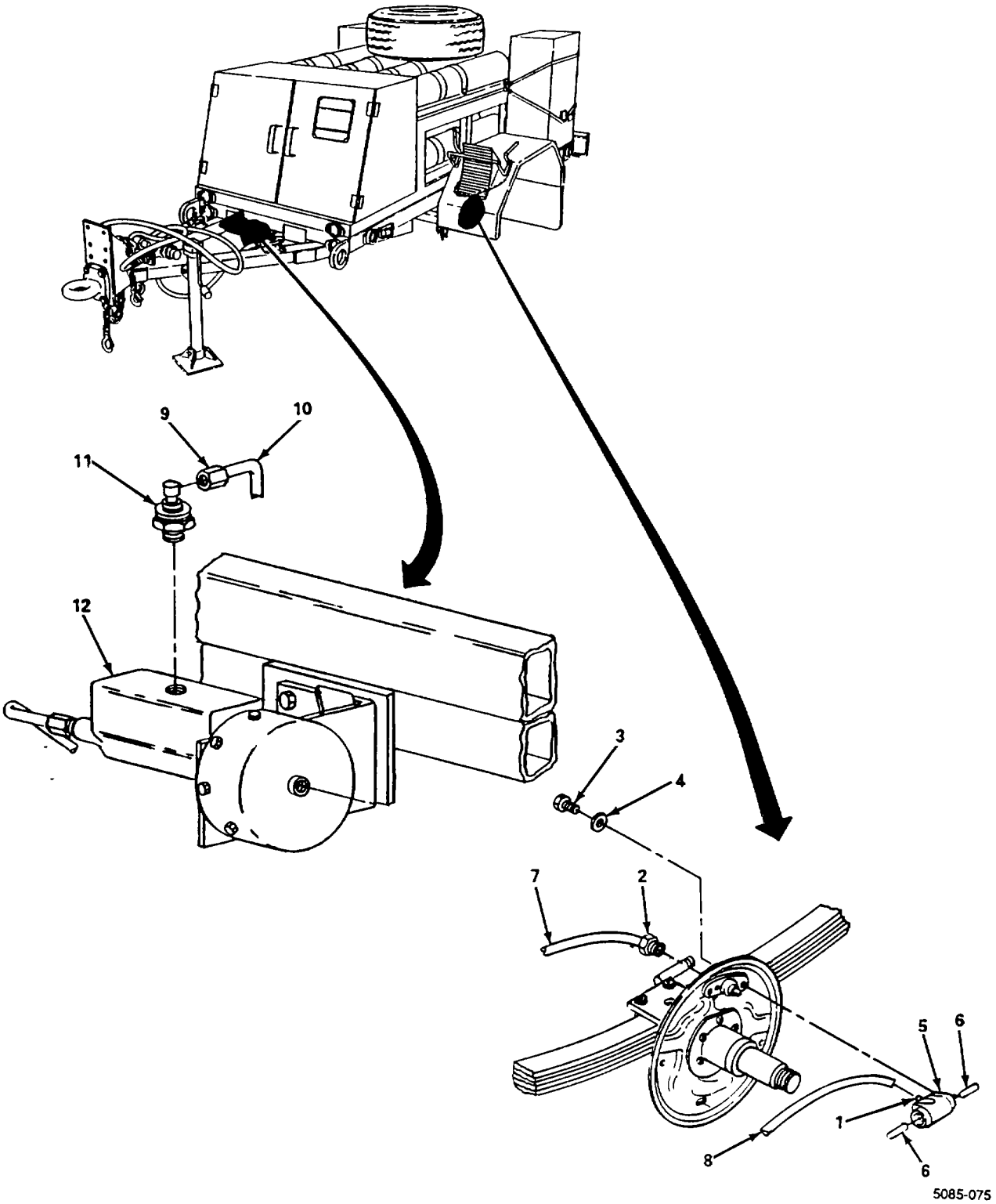


Figure 5-50. Brake Cylinder, Replace

5-41 Oxygen Booster Unit.

This task covers. Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit

(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Repair.

(1) *Replace (muffler).* (figure 5-51)

NOTE

There are two mufflers on the oxygen booster pump, the procedures are the same for both.

WARNING

Cleanliness Is Imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(a) Remove muffler (1).

(b) Install muffler (1)on pump (2).

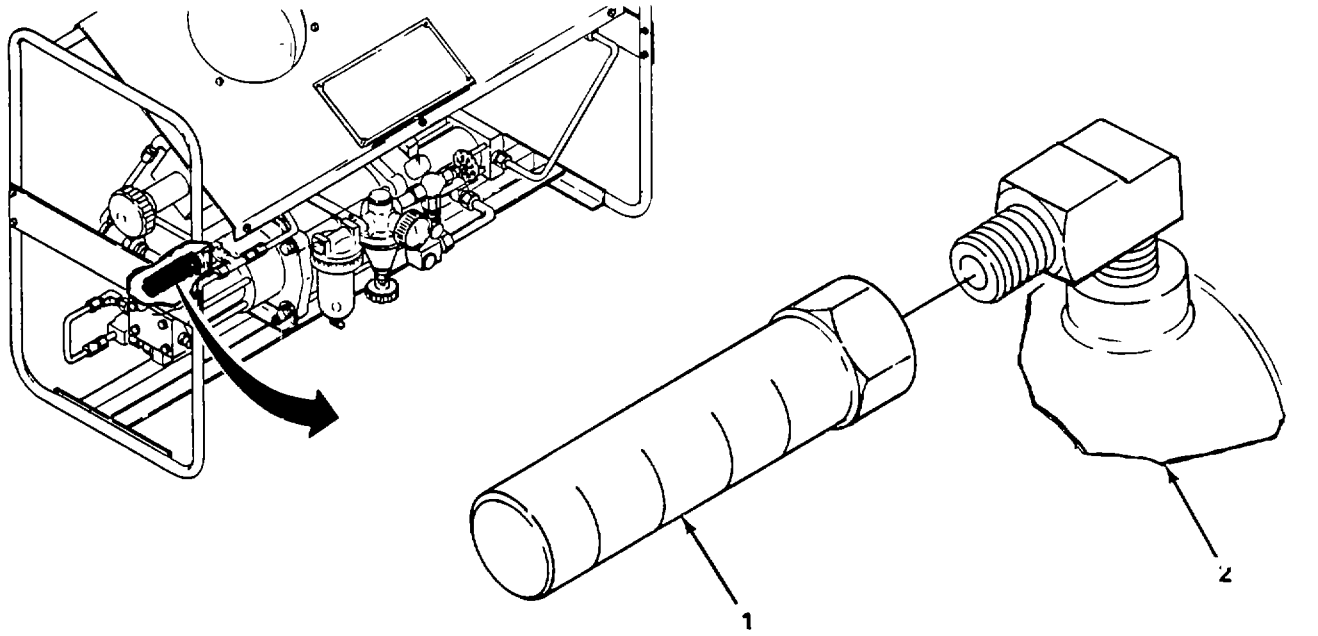


Figure 5-51. Muffler, Replace

5-41 Oxygen Booster Unit (Cont).

(2) *Replace (vent).* (figure 5-52)

NOTE

There are two vents on the pump the procedures are the same for both.

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that diver
all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the

(a) Remove vent (1).

(b) Install vent (1)on pump (2).

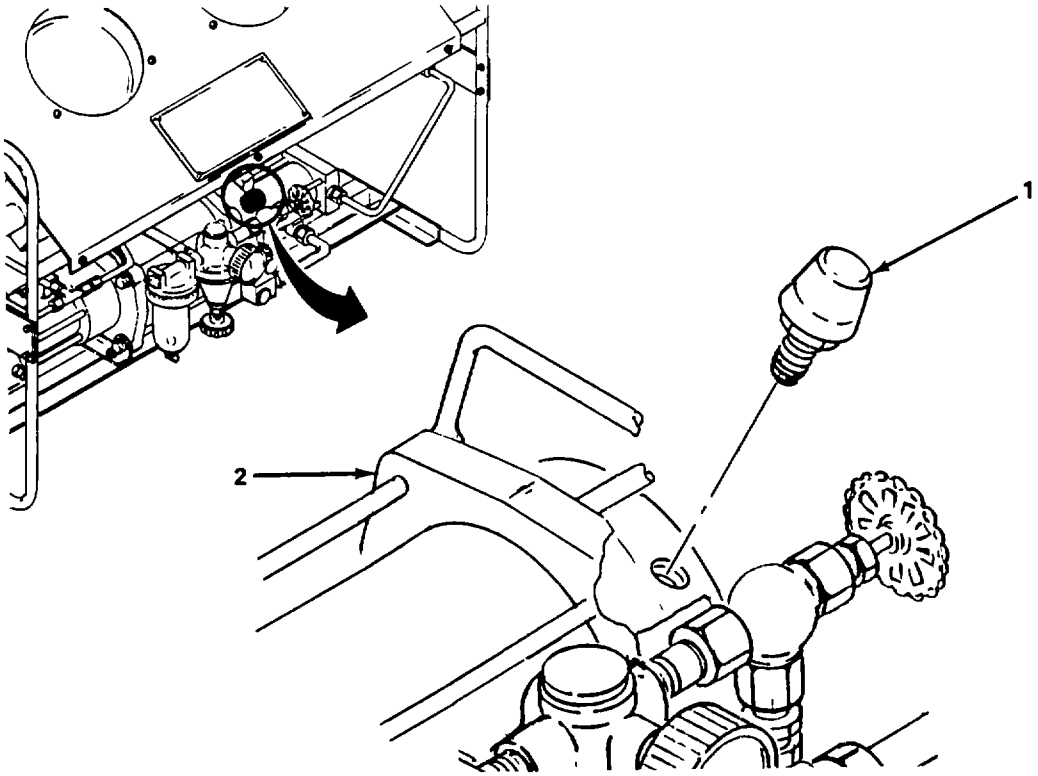


Figure 5-52. Vent, Replace.

5-42 Pump Assembly.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit

(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)

Materials/Parts (Cont)

Tape, Adhesive (Item 19, Appendix D)

Loctite (Item 21, Appendix D)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-53)

WARNING

Cleanliness is imperative In maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(1) Loosen two connector nuts (1)and remove line (2)

(2) Loosen two connector nuts (3)and remove line (4)

(3) Loosen two connector nuts (5)and remove line (6)

(4) Loosen two connector nuts (7)and remove line (8)

(5) Remove screw (9), washer (10), and locknut (11)and remove bracket (12)

(6) Loosen connector nut (13)and remove regulator (14)

(7) Remove four bolts (15), washers (16), lockwashers (17)and nuts (18)and remove pump assembly (19)

(8) Install new pump assembly (19)and Install four bolts (15), washers (16), lockwashers (17), and nuts (18)only finger tight

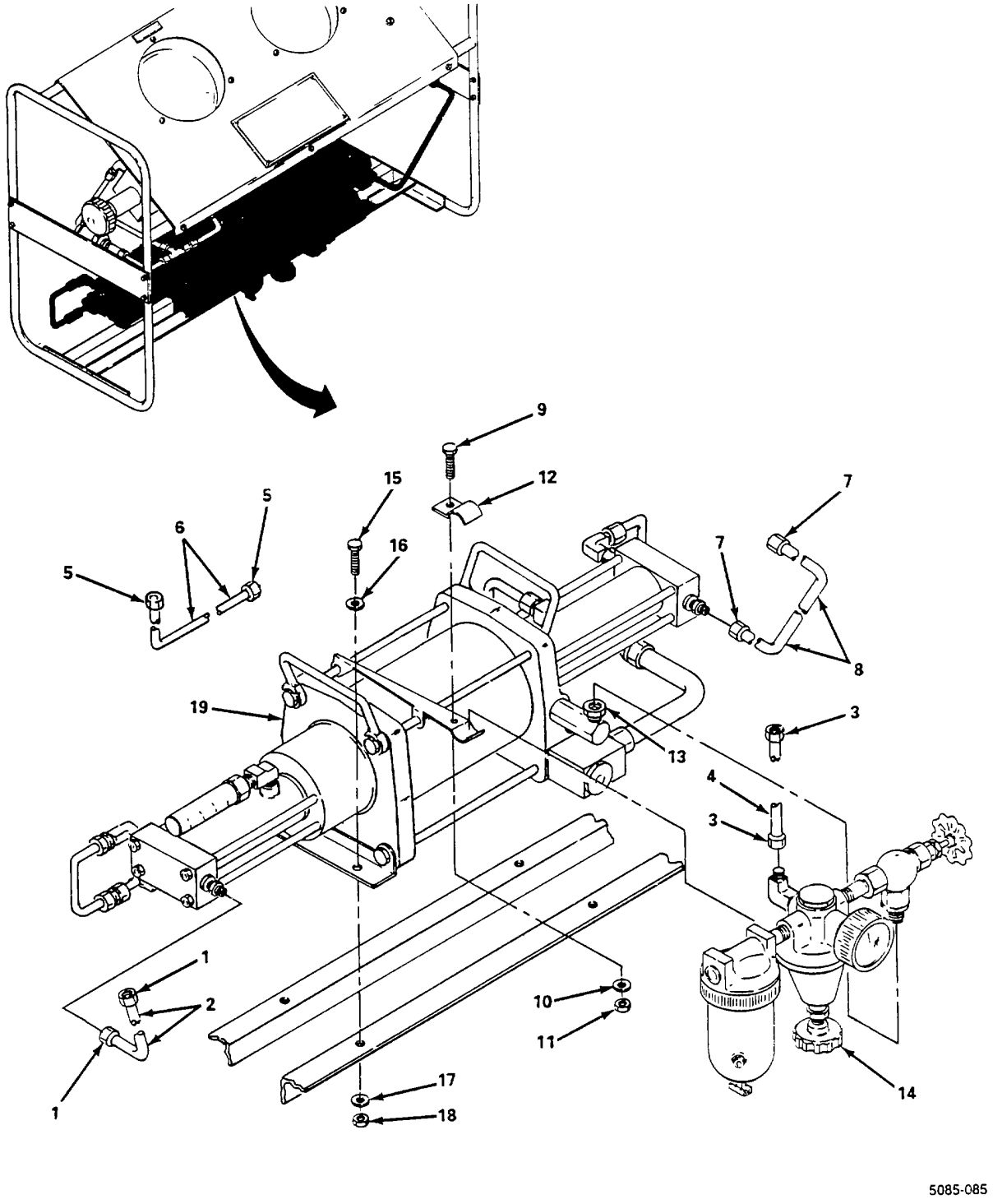


Figure 5-53. Pump Assembly, Replace.

(9) Install regulator (14) and tighten connector nut (13).

(10) Install bracket (12) and secure with screw (9), washer (10), and locknut (11).

(11) Install line (8) and tighten two connector nuts (7).

(12) Install line (6) and tighten two connector nuts (5).

(13) Install line (4) and tighten two connector nuts (3).

(14) Install line (2) and tighten two connector nuts (1).

(15) Apply a bead of loctite between back of connector nuts and lines.

5-43 Filter Assembly.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Materials/Parts (Cont)

Tape, Teflon (Item 20, Appendix D)
Loctite (Item 22, Appendix D)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Replace (figure 5-54)

(1) Remove bolt (1), locknut (2), washer (3), and remove bracket (4).

WARNING

Cleanliness is imperative in maintaining and handling air system components All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel

Ensure that all air lines and components removed or openings into the air system are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result In injury or death to the diver

(2) Loosen connector nut (5)

(3) Loosen connector nut (6)and remove valve (7), regulator (8), and filter assembly (9)

(4) Remove filter assembly (9) from straight nipple (10) on regulator (8)

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped In such a manner that when the fitting is tightened the tape will not loosen Failure to wrap teflon tape correctly may result In contamination or blockage of the air system and subsequent possible injury or death to the diver.

(5) Apply teflon tape to threads on nipple (10)

(6) Install filter assembly (9)

(7) Install valve (7), regulator (8), and filter assembly (9)and tighten connector nut (6)

(8) Tighten connector nut (5)

(9) Install bracket (4)and secure with bolt (1), washer (3), and locknut (2)

(10) Apply a bead of loctite between connector nut and line

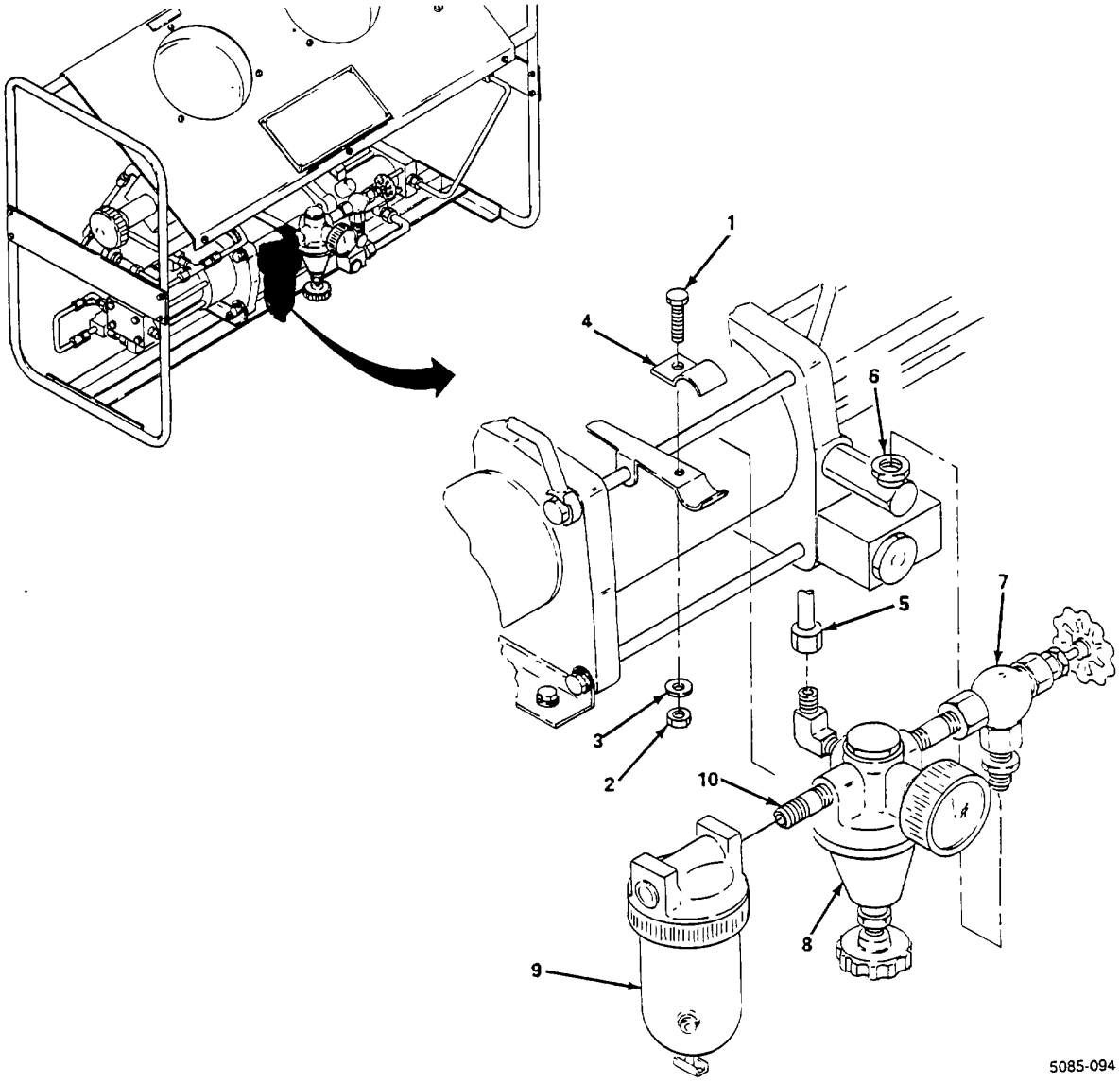


Figure 5-54. Filter Assembly, Replace

5-44. Pressure Gage Air Drive.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)
Tape, Teflon (Item 20, Appendix D)

Replace (figure 5-55)

WARNING

Cleanliness is imperative In maintaining and handling air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver

(1) Remove pressure gage (1).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down Inside the air system. Teflon tape should be wrapped In such a manner that when the fitting is tightened the tape will not loosen Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(2) Apply teflon tape to threads on new gage (1)

(3) Install gage (1)

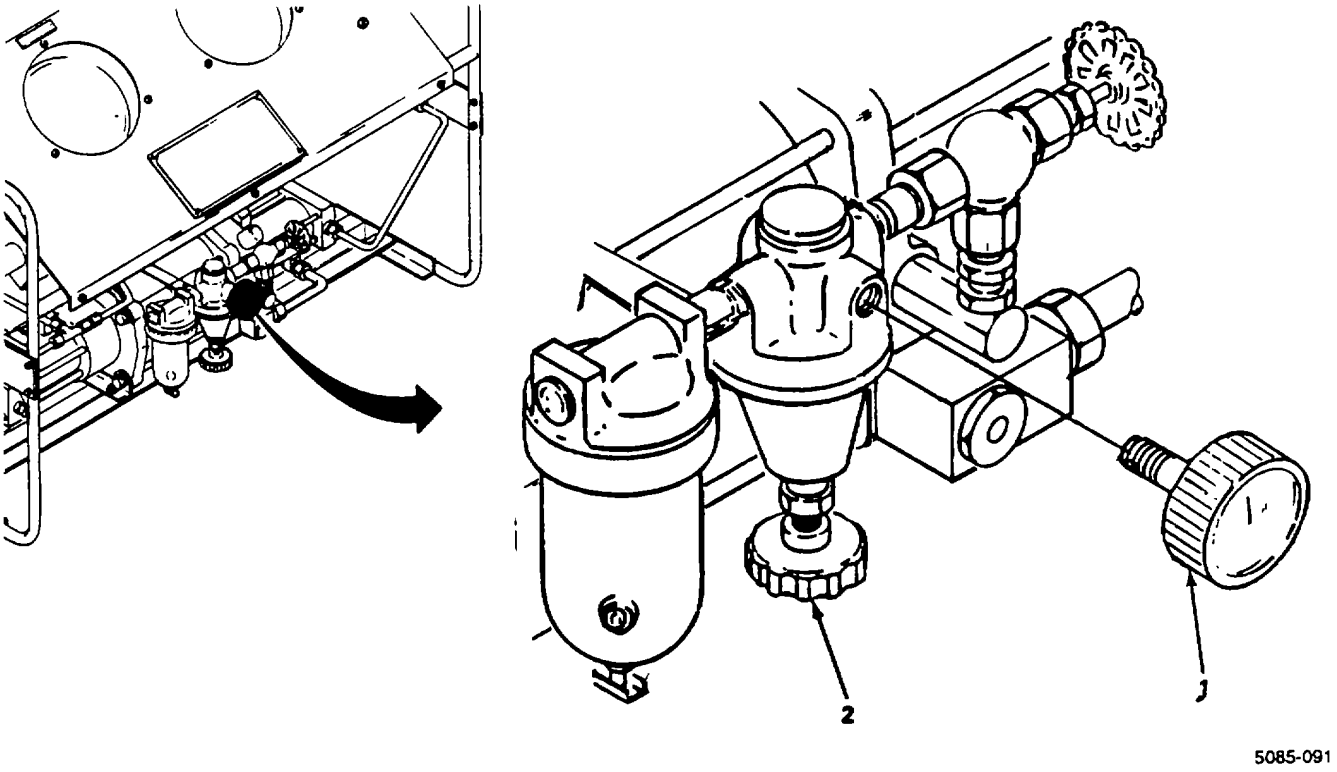


Figure 5-55. Air Drive Pressure Gage, Replace.

5-45 Pressure Regulator.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Materials/Parts (Cont)

Tape, Teflon (Item 20, Appendix D)
Loctite (Item 22, Appendix D)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace (figure 5-56)

(1) Remove bolt (1), locknut (2), washer (3), and remove bracket (4)

WARNING

Cleanliness is imperative in maintaining and handling air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible Injury or death to personnel

Ensure that all air lines and components removed or openings into the air system are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored in a plastic bag and sealed Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(2) Loosen connector nut (5)

(3) Loosen connector nut (6)and remove valve (7), regulator (8), and filter assembly (9)

(4) Remove filter assembly (9)and straight nipple (10)

(5) Remove valve (7)and straight nipple (11)

(6) Remove elbow (12)

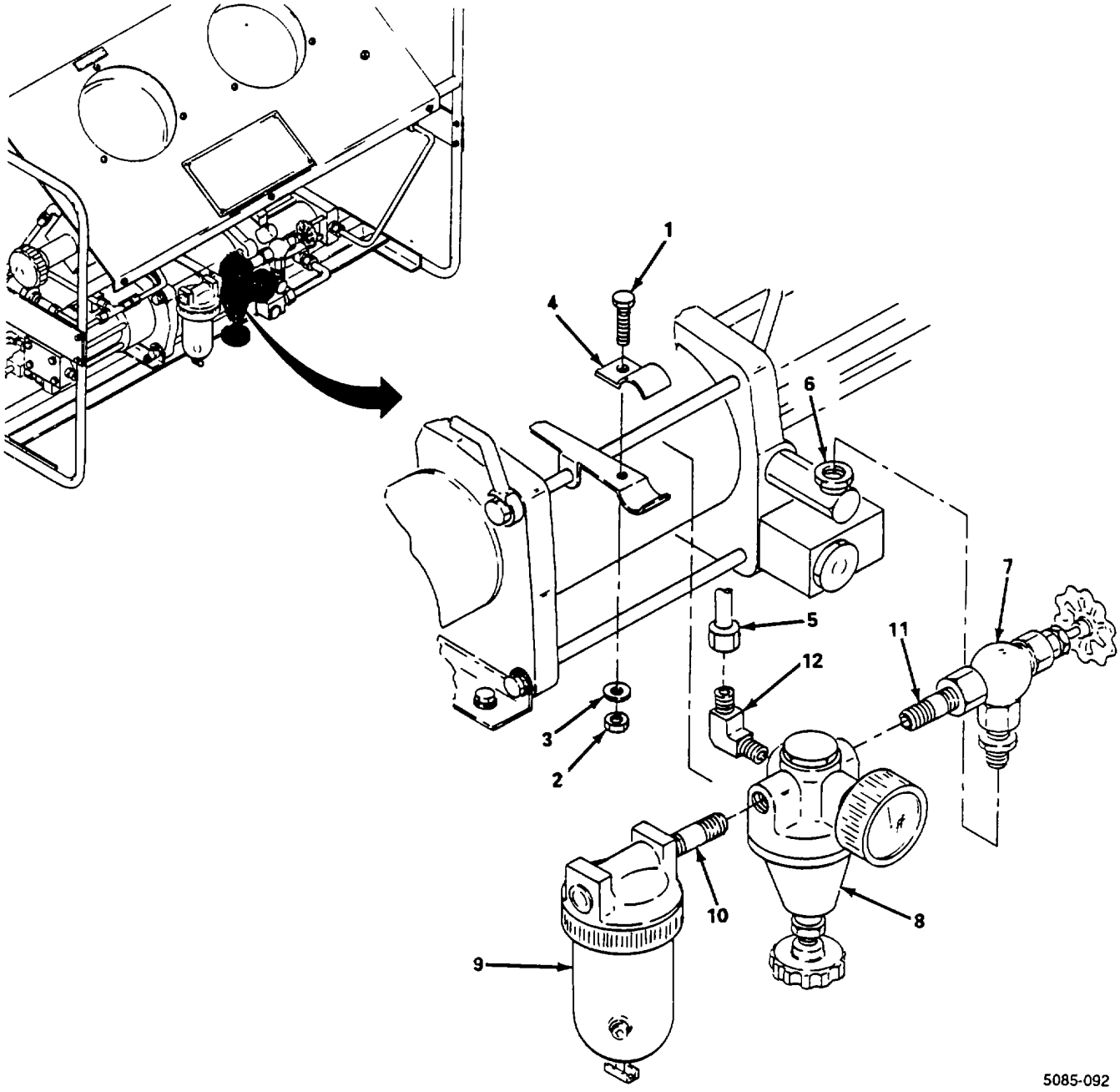


Figure 5-56. Pressure Regulator, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(7) Install elbow (12).

(8) Apply teflon tape to threads on straight nipples (10)and (11).

(9) Install valve (7)and straight nipple (11).

(10) Install filter assembly (9)and straight nipple (10).

(11) Install regulator (8)and tighten connector nut (6).

(12) Tighten connector nut (5)

(13) Install bracket (4)and secure with bolt (1), washer (3), and locknut (2).

(14) Apply a bead of loctite between back of connector and line.

5-46 Speed Control Valve.

This task covers. Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Materials/Parts (Cont)

Tape, Teflon (Item 20, Appendix D)
Loctite (Item 22, Appendix D)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-57)

(1) Remove bolt (1), locknut (2), and washer (3)and remove bracket (4).

WARNING

Cleanliness is imperative in maintaining and handling air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(2) Loosen connector nut (5)

(3) Loosen connector nut (6) and remove valve (7), regulator (8), and filter assembly (9).

(4) Remove valve (7) from straight nipple (10) on regulator (8)

(5) Remove hex nipple (11).

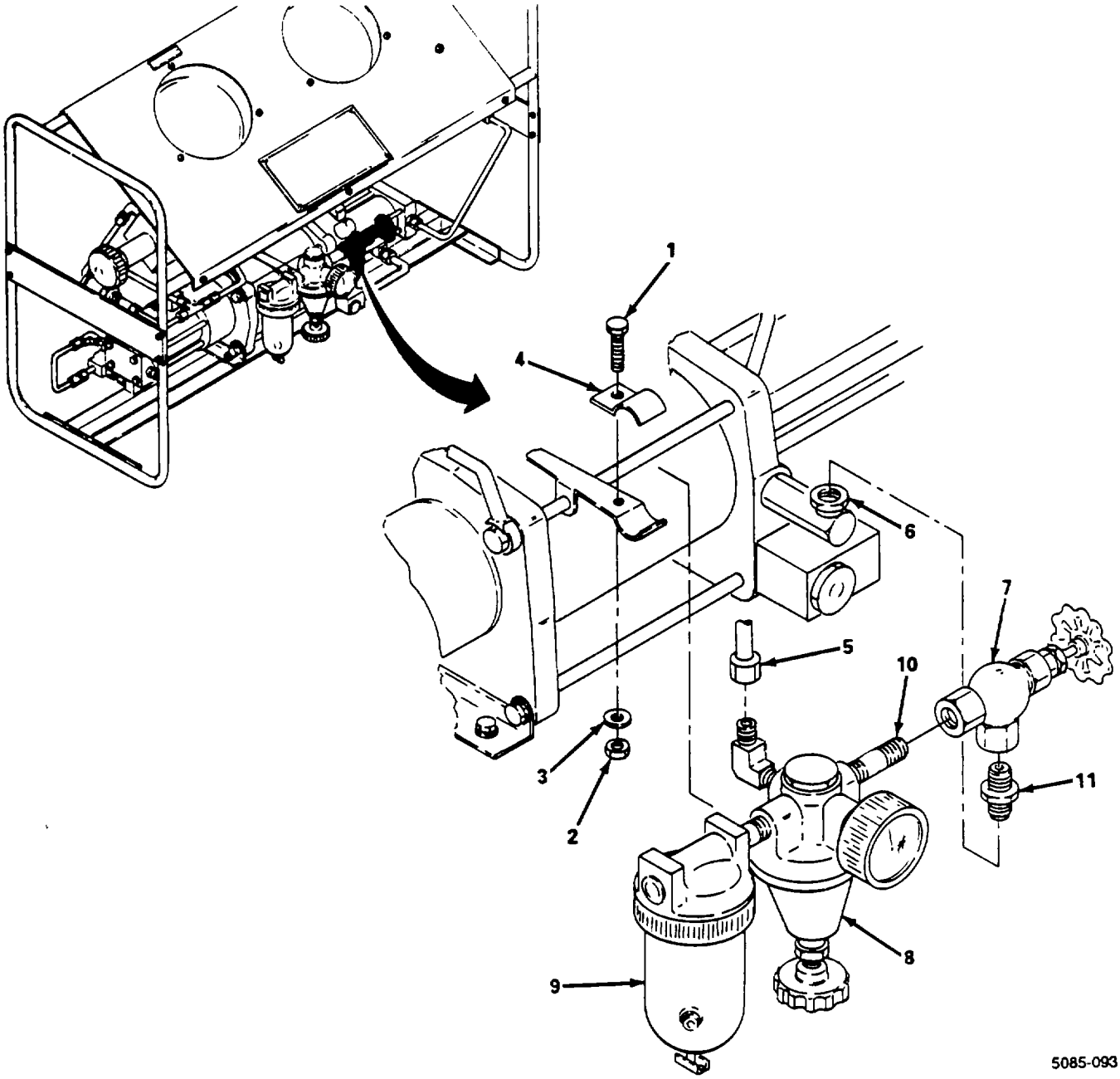


Figure 5-57. Speed Control Valve, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the air system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver

(6) Apply teflon tape to threads on nipples (10)and (11)

(7) Install hex nipple (11).

(8) Install valve (6)on straight nipple (10)on regulator (8)

(9) Install valve (7)and tighten connector nut (6)

(10) Tighten connector nut (5).

(11) Install bracket (4)and secure with bolt (1), washer (3), and locknut (2).

(12) Apply a bead of loctite between back of connector nut and line.

5-47. Air Cycling Valve.

This task covers Replace

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance Common No 1 (NSN 4910-00-754-0705)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)
Tape, Teflon (Item 20, Appendix D)

Replace. (figure 5-58)

WARNING

Cleanliness is Imperative in maintaining and handling oxygen system components All tools and parts must be kept free of oil, grease, rust, or other contamination In accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored In a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(1) Loosen two connector nuts (1) and remove line (2)

(2) Loosen retainer nut (3) and remove retainer nut (3) with fitting (4) and two O-rings (5) and discard two O-rings (5)

(3) Remove hex nipple (6)

(4) Remove spool assembly (7)

(5) Remove sleeve (8).

(6) Remove spacer (9)

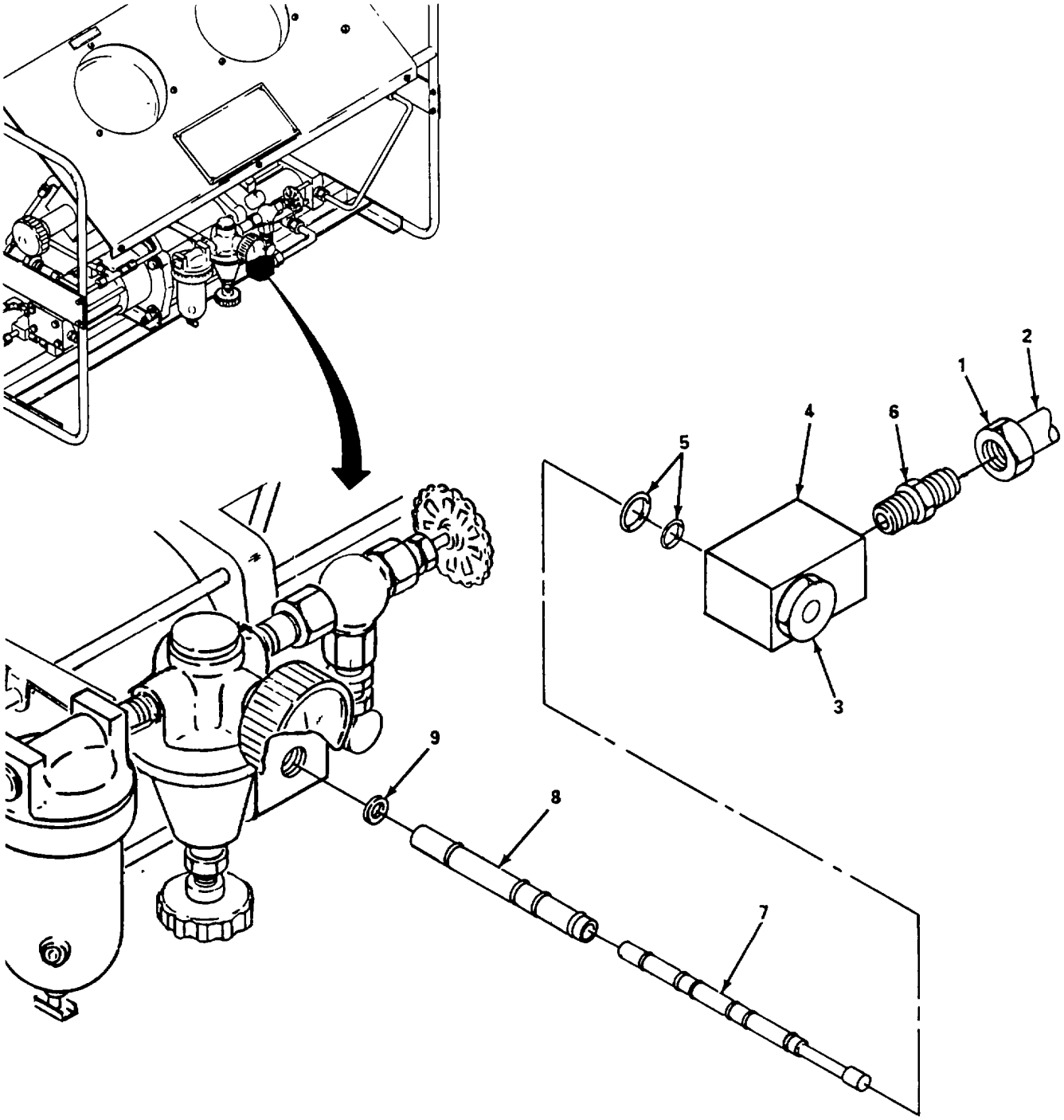


Figure 5-58. Air Cycling Valve, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down Inside the oxygen system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(7) Apply teflon tape to threads on hex nipple (4).

(8) Install new spacer (9)and new sleeve (8).

(9) Install new spool assembly (7)

(10) Install two new O-rings (5).

(11) Install new fitting (4)and tighten new retainer (3). Torque retainer (3) to 10 lb-ft (14 Nm).

(12) Install hex nipple (6)

(13) Install line (2) and tighten connector nuts (1).

5-48 Gas Barrel Check Valves.

This task covers: Repair

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance Common No. 1 (NSN 4910-00-754-0705)
Seat Installation Tool (NSN 4820-01-266-8213)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)

Materials/Parts (Cont)

Tape, Adhesive (Item 19, Appendix D)
Loctite (item 22, Appendix D)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-59)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored In a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(1) Loosen two connector nuts (1) and remove line (2).

(2) Loosen two connector nuts (3) and remove line (4)

(3) Remove straight adapter (5) and straight adapter (6) with elbow.

(4) Remove four nuts (7) and lockwashers (8) and remove end cap (9).

(5) Remove seat (10), bronze back-up (11), TFE back-up (12), O-ring (13), TFE back-up (14), large spring (15), shank (16), small spring (17), ring (18), ball (19), and seat (20).

(6) Remove seat (21), bronze back-up (22), TFE back-up (23), O-ring (24), TFE back-up (25), seat (26), ball (27), small spring (28), ring (29), shank (30), and large spring (31)

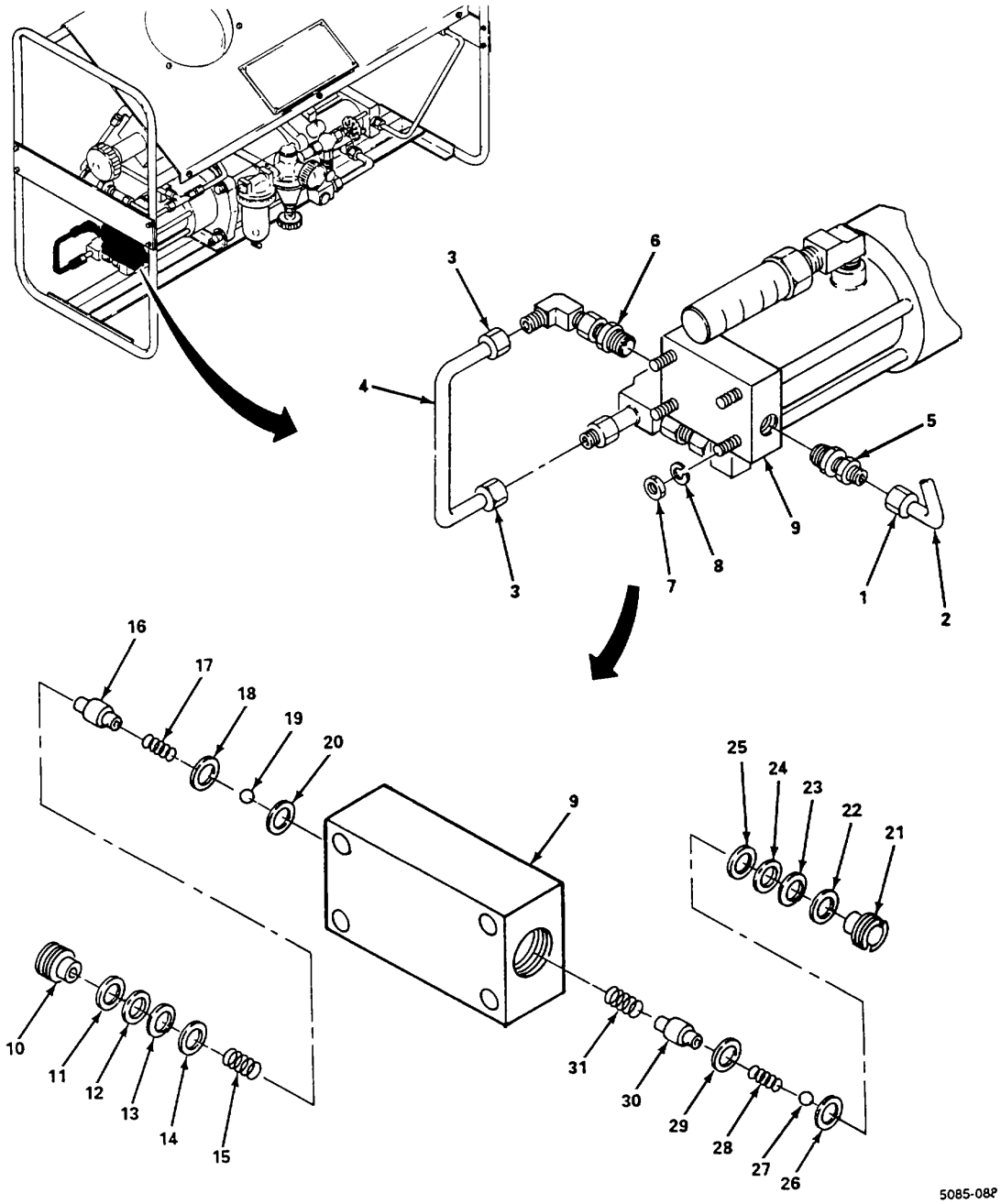


Figure 5-59. Gas Barrel Check Valves, Repair.

(7) Install new large spring (31), shank (30), ring (29), small spring (28), ball (27), seat (26), TFE back-up (25), O-ring (24), TFE back-up (23), bronze back-up (22)and seat (21).

(8) Install new seat (20), ball (19), ring (18), small spring (17), shank (16), large spring (15), TFE back-up (14), O-ring (13), TFE back-up (12), bronze back-up (11), and seat (10).

(9) Install end cap (9) and secure with four nuts (7) and lockwashers (8). Torque nuts to 16-18 lb-ft (21-24 Nm)

(10) Install straight adapter (6) with elbow and straight adapter (5).

(11) Install line (4) and tighten two connector nuts (3).

(12) Install line (2) and tighten two connector nuts (1).

(13) Apply a bead of loctite between back of connector nuts and lines.

5-49. Pilot Valve End Caps.

This task covers: Replace

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance Common No. 1 (NSN 4910-00-754-0705)
Stem Removal Tool (P/N 28584)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)
loctite (Item 22, Appendix D)

Equipment Condition

Pump assembly removed (para. 5-43).

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Replace (figure 5-60)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination In accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1) and remove line (2)

(2) Loosen two connector nuts (3) and remove line (4).

(3) Loosen connector nut (5).

(4) Loosen connector nut (6) and remove Intercooler (7).

(5) Remove four nuts (8), eight lockwashers (9), four bolts (10), two handles (11) and three brackets (12).

(6) Separate two end caps (13) and (14) from barrel (15) enough to access cotter pin (16).

(7) Remove cotter pin (16) from piston rod (17) and remove end cap (13), piston rod (17) and gas barrel (18) as an assembly

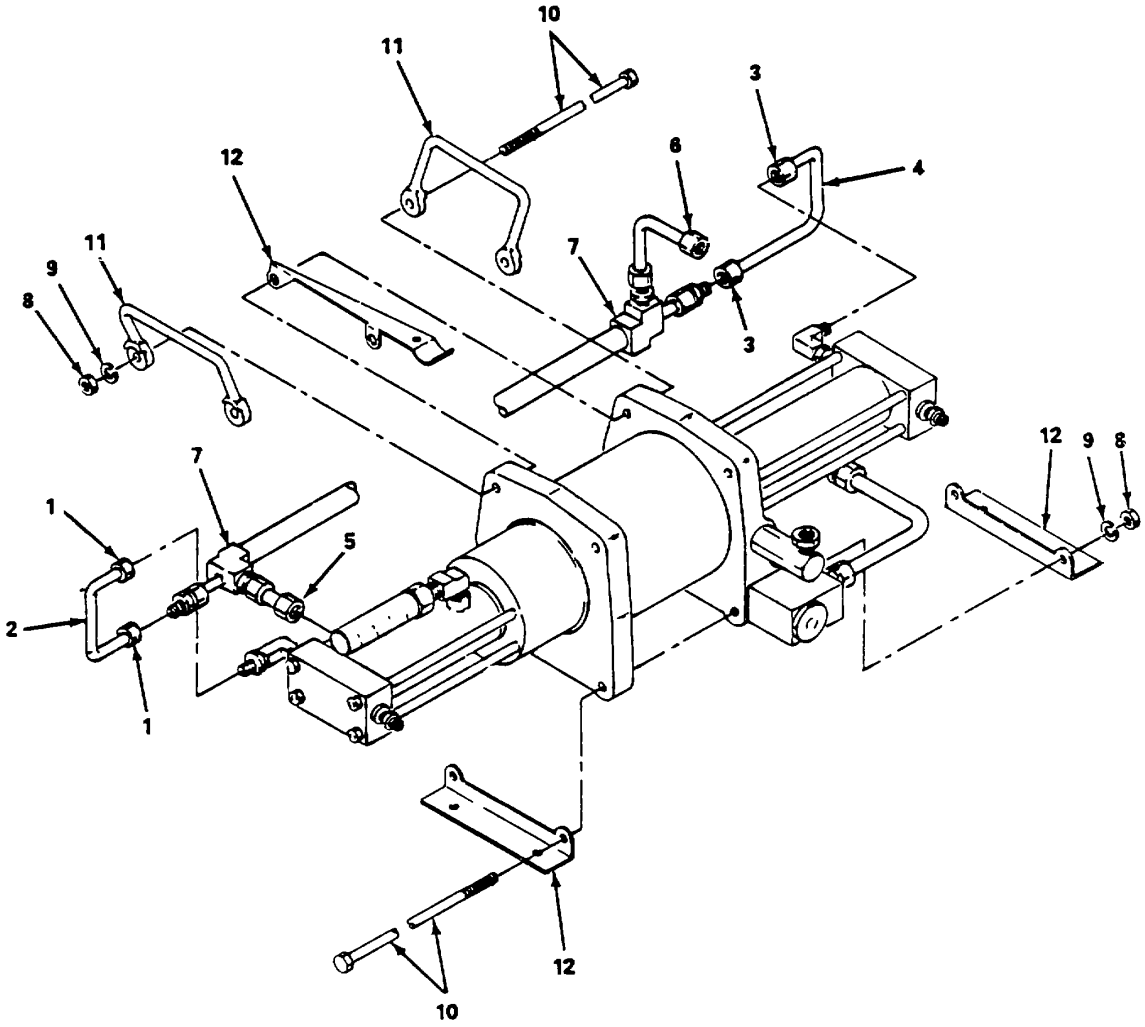


Figure 5-60. Pilot Valves End Cap, Replace (Sheet 1 of 2).

5-49. Pilot Valve End Caps (Cont).

(8) Remove two flow through tubes (19) and four O-rings (20).

(9) Remove barrel (15) from end cap (14).

(10) Remove O-rings (21), (22), and (23).

(11) Remove cotter pin (24) and remove air piston assembly (25).

(12) Remove plug (26), spring (27), and O-ring (28).

(13) Using stem removal tool, remove stem (29).

(14) Remove retainer (30), O-ring (31), and spacer (32).

(15) Install new spacer (33) and new O-ring (31).

(16) Install retainer (30). Using stem (29), seat retainer (30) evenly and ensure legs of retainer (30) bend evenly.

(17) Install O-ring (28) on end of stem (29).

(18) Position piston assembly (25) in end cap (14)fully.

(19) Install stem (29) until stem (29) touches piston assembly (25) and remove stem (29).

(20) Measure the distance from the O-ring (28) to end of stem (29) that touches piston assembly (25).

(21) Add 1/16 in. to measurement of step 20.

(22) The stem (29) must be ground to length obtained in step 21. Measure from face of rubber seal on item (29) the distance obtained in step 20 and mark stem (29).

(23) Grind stem (29) evenly to mark.

(24) Install stem (29), spring (27), new O-ring (28) and secure with plug (26).

(25) Install air piston assembly (25) and install cotter pin (24).

(26) Install new O-rings (21), (22), and (23).

(27) Ensure inside of barrel (15) is clean and lubricate lightly, with seal lube.

(28) Install barrel (15).

(29) Install two flow through tubes (19) and four O-rings (28).

(30) Position end cap (13) and install cotter pin (16) and fully install end cap (13).

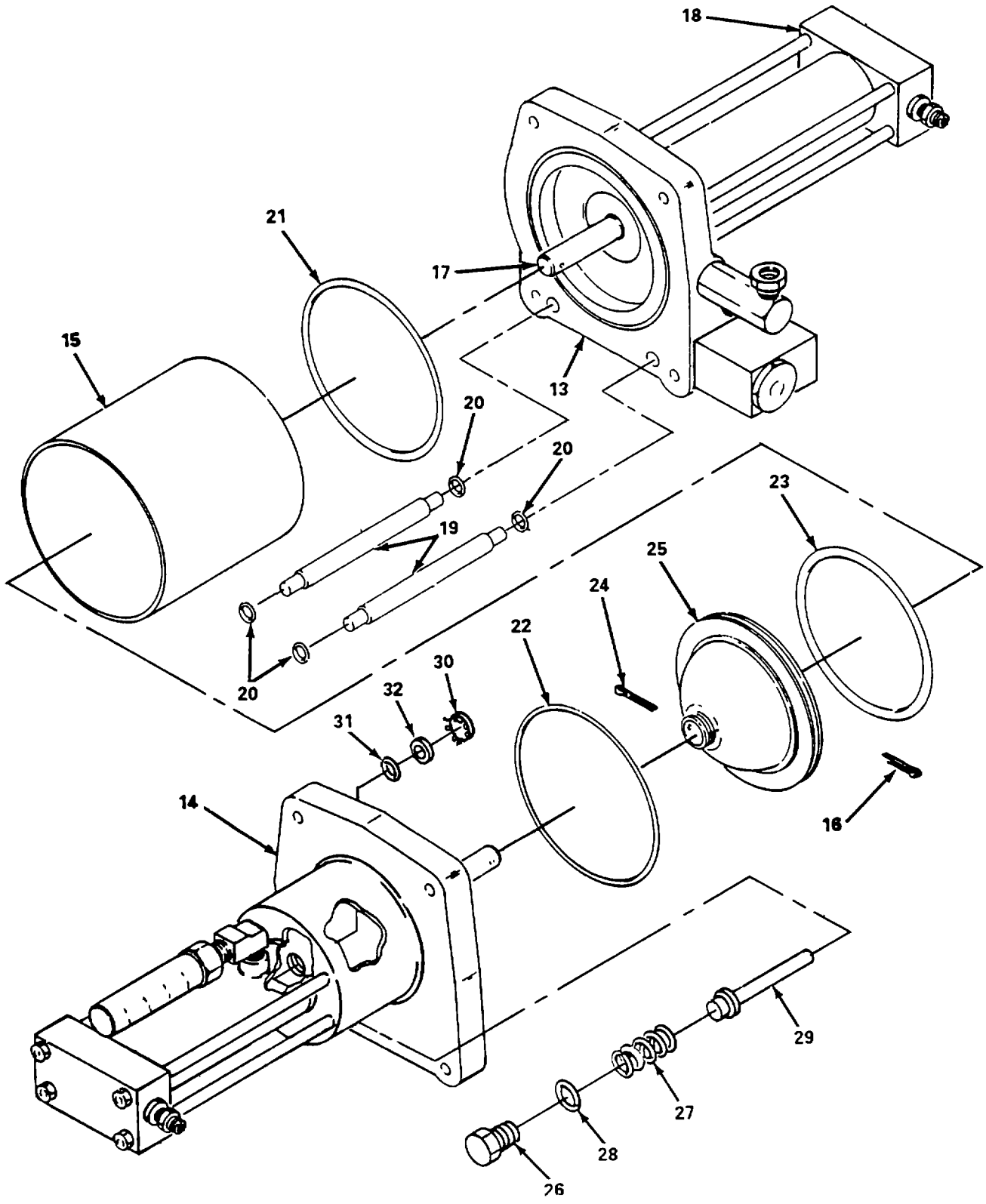


Figure 5-60. Pilot Valves End Cap, Replace (Sheet 2 of 2).

(31) Install three brackets (12) and two handles (11) and secure with four bolts (10), eight lockwashers (9) and four nuts (8) Torque nuts (8) in an alternate crisscross pattern to 16-18 lb-ft (21-24 Nm)

(32) Install Intercooler (7) and tighten connector nut (6)

(33) Tighten connector nut (5)

(34) Install line (4) and tighten two connector nuts (3)

(35) Install line (2) and tighten two connector nuts (1).

(36) Apply a bead of loctite between back of connector nuts and lines

FOLLOW-ON MAINTENANCE
Install pump assembly (para. 5-43).

5-50 Pressure Gage (6000 psi).

This task covers Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)

Materials/Parts (Cont)

Tape, Adhesive (Item 19, Appendix D)
Loctite (Item 22, Appendix D)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-61)

(1) Remove three screws (1), nuts (2), and lockwashers (3)securing gage (4)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result In equipment failure and possible injury or death to personnel

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result In injury or death to the diver

(2) Loosen two connector nuts (5), support gage (4), and turn gage (4) clockwise slightly and remove line (6)and gage (4).

(3) Remove connector (7) and elbow (8).

(4) Install connector (7) and elbow (8).

(5) Install gage (4) and line (6) and tighten two connector nuts (5)

(6) Install three screws (1), lockwashers (3), and nuts (2).

(7) Apply a bead of loctite between back of connector nuts and lines.

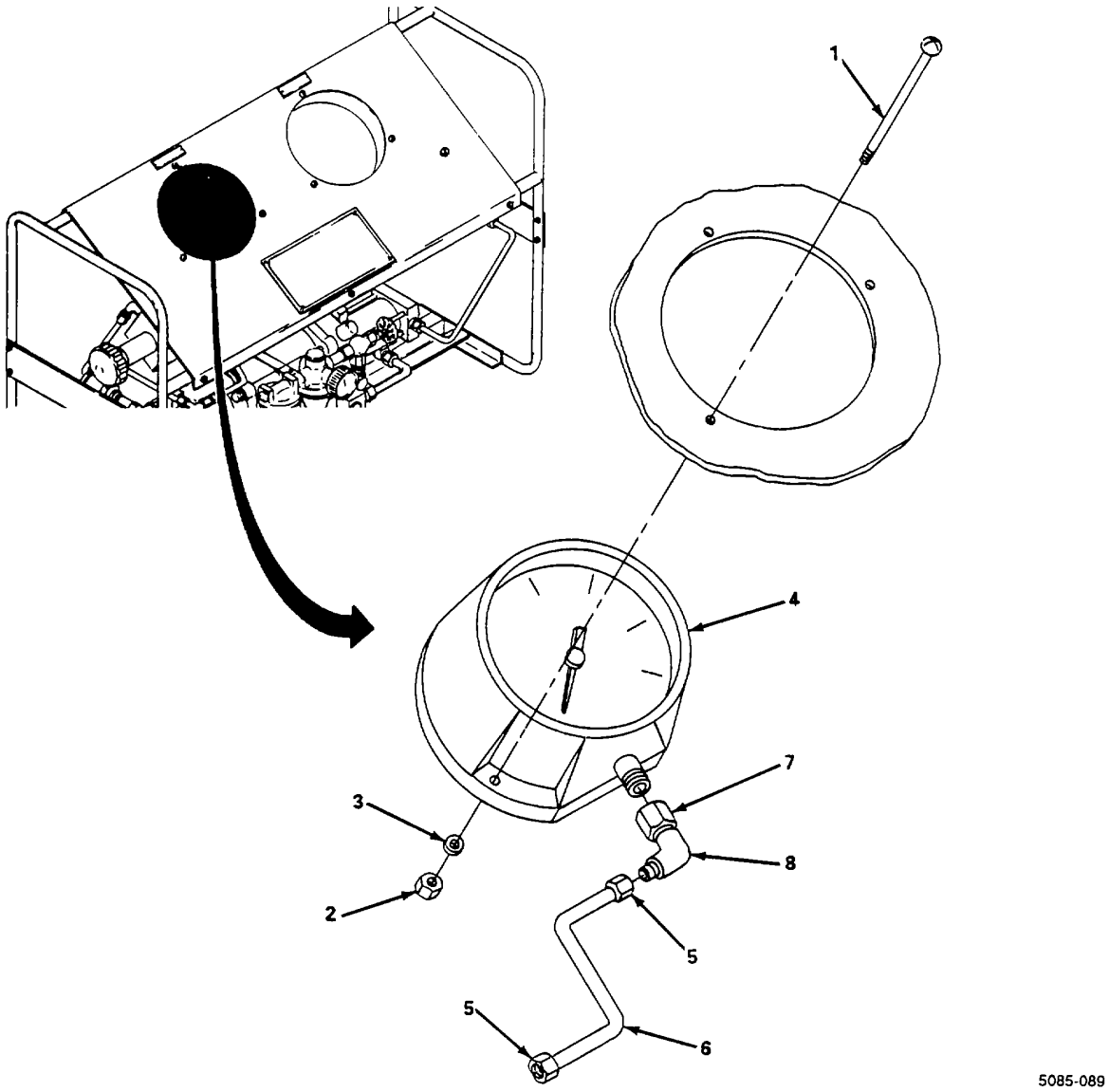


Figure 5-61. Pressure Gage (6000 psi), Replace.

5-51 Pressure Gage (3500 psi).

This task covers Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)

Materials/Parts (Cont)

Tape, Adhesive (Item 19, Appendix D)
Loctite (Item 22, Appendix D)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace (figure 5-62)

(1) Remove three screws (1), nuts (2), and lockwashers (3)

WARNING

Cleanliness is Imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored In a plastic bag and sealed Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(2) Loosen two connector nuts (4), turn gage (5) counterclockwise slightly and remove line (6)and gage (5)

(3) Remove connector (7) and elbow (8)

(4) Install connector (7) and elbow (8).

(5) Install gage (5) and line (6) and tighten two connector nuts (4)

(6) Secure gage (5) with three screws (1), lockwashers (3) and nuts (2)

(7) Apply a bead of loctite between back of connector nuts and lines

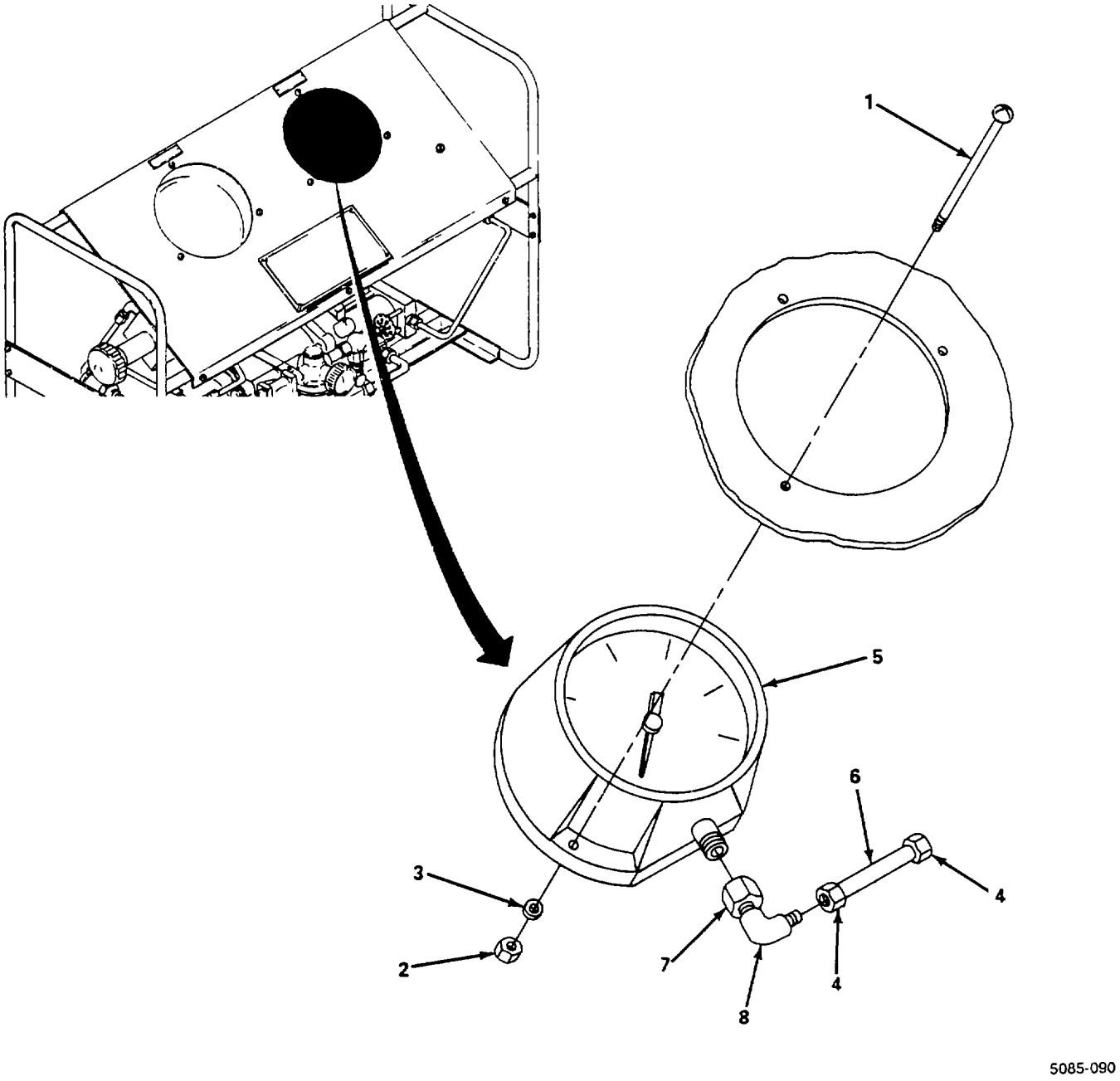


Figure 5-62. Pressure Gage (3500 psi), Replace.

5-52 Oxygen Filter Assembly.

This task covers: a. Replace (Inlet) b. Replace (Outlet)

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)

Material/Parts (Cont)

Tape, Adhesive (Item 19, Appendix D)
Loctite (Item 22, Appendix D)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

a. *Replace (Inlet Filter).* (figure 5-63)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(1) Loosen two connector nuts (1)and remove line (2).

(2) Loosen two connector nuts (3)and remove line (4)

(3) Remove screw (5), nut (6), and lockwasher (7)and remove inlet filter (8).

(4) Remove tee (9).

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the oxygen system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(5) Apply teflon tape to threads on filter end of tee (9).

(6) Install tee (9) in new inlet filter (8)
(7) Install new inlet filter (8) and secure with screw (5), lockwashers (7), and nut (6).
(8) Install line (4) and tighten two connector nuts (3).
(9) Install line (2) and tighten two connector nuts (1).
(10) Apply a bead of loctite between back of connector nuts and lines.

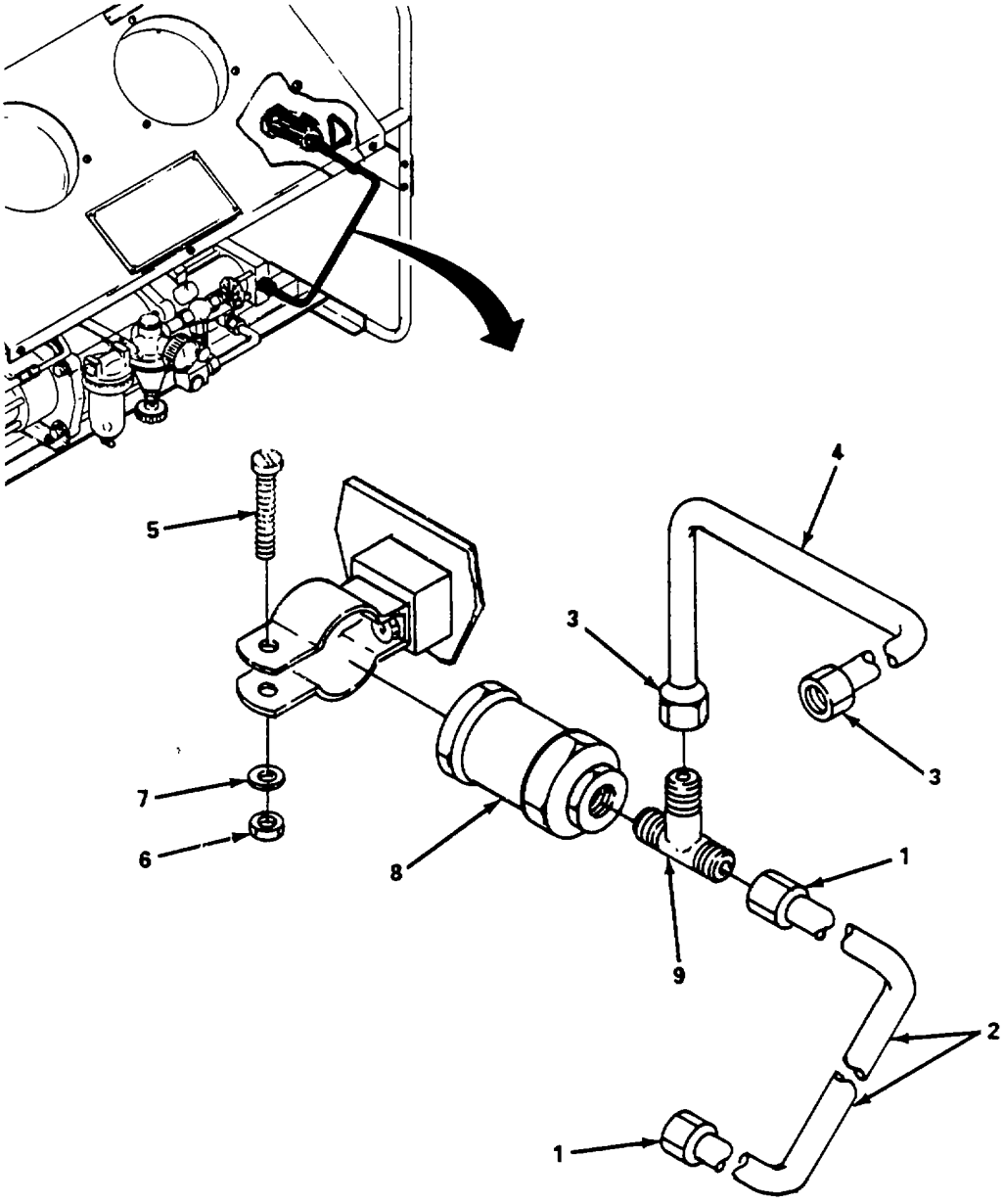


Figure 5-63. Inlet Filter, Replace.

5-52 Oxygen Filter Assembly (Cont).

b *Replace (Outlet Filter)* (figure 5-64)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored In a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(1) Loosen two connector nuts (1)and remove line (2).

(2) Loosen two connector nuts (3)and remove line (4).

(3) Remove screw (5), lockwasher (6), and nut (7)and remove outlet filter (8)

(4) Remove tee (9)

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down Inside the oxygen system Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver

(5) Apply teflon tape to filter end of tee (9).

(6) Install tee (9) in new outlet filter (8)

(7) Install outlet filter (8) and secure with screw (5), lockwasher (6), and nut (7)

(8) Install line (4) and tighten two connector nuts (3).

(9) Install line (2) and tighten two connector nuts (1).

(10) Apply a bead of loctite between back of connector nuts and lines

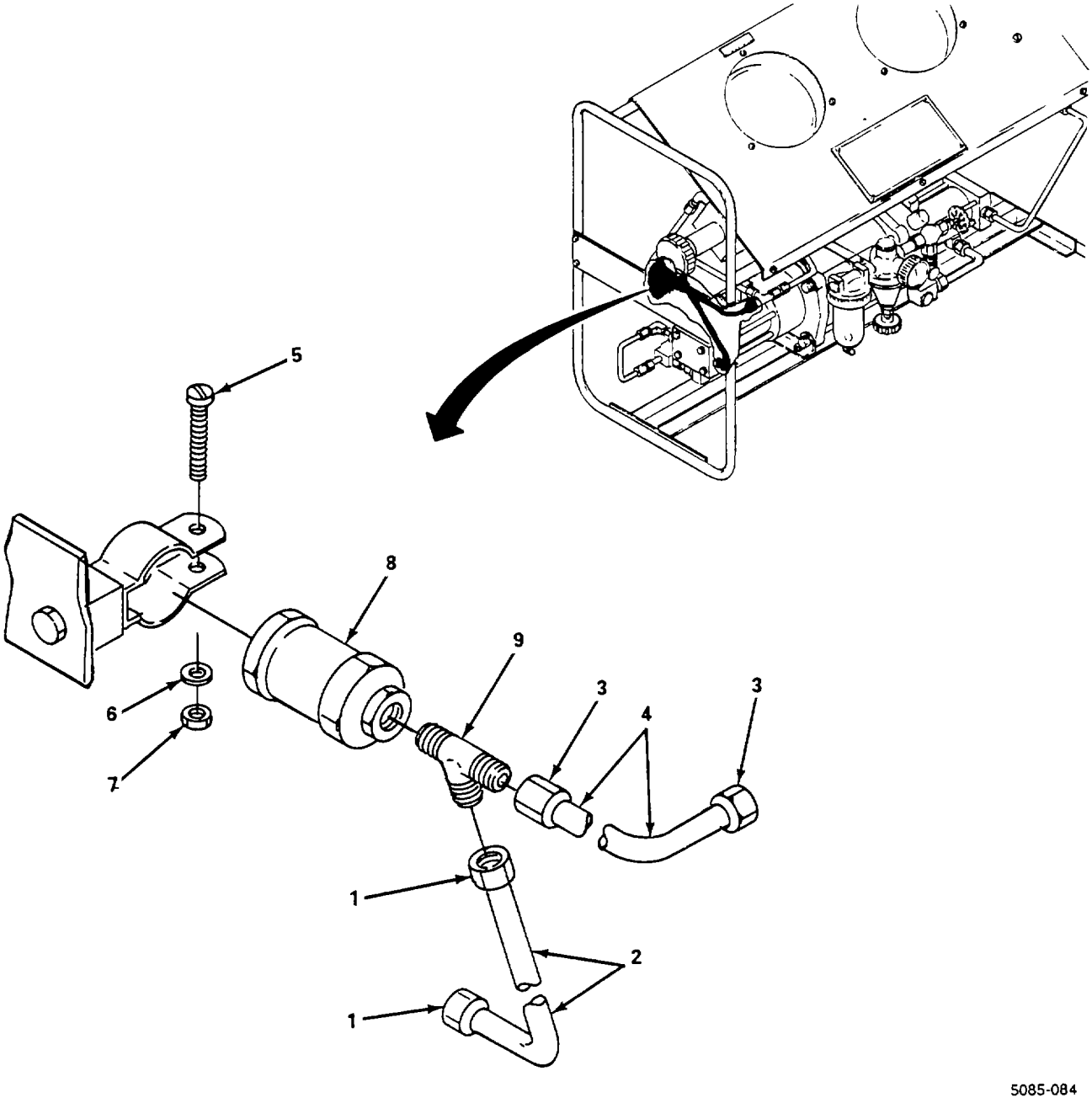


Figure 5-64. Outlet Filter, Replace.

5-53. Result Regulator.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Materials/Parts (Cont)

Tape, Teflon (Item 20, Appendix D)
Loctite (Item 22, Appendix D)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-65)

WARNING

Cleanliness is Imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result In equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1) and remove line (2)

(2) Loosen two connector nuts (3) and remove line (4)

(3) Loosen two connector nuts (5) and remove line (6)

(4) Remove two bolts (7), nuts (8), and washers (9) and remove result regulator (10) and two spacers (11).

(5) Remove three elbows (12), (13), and (14)

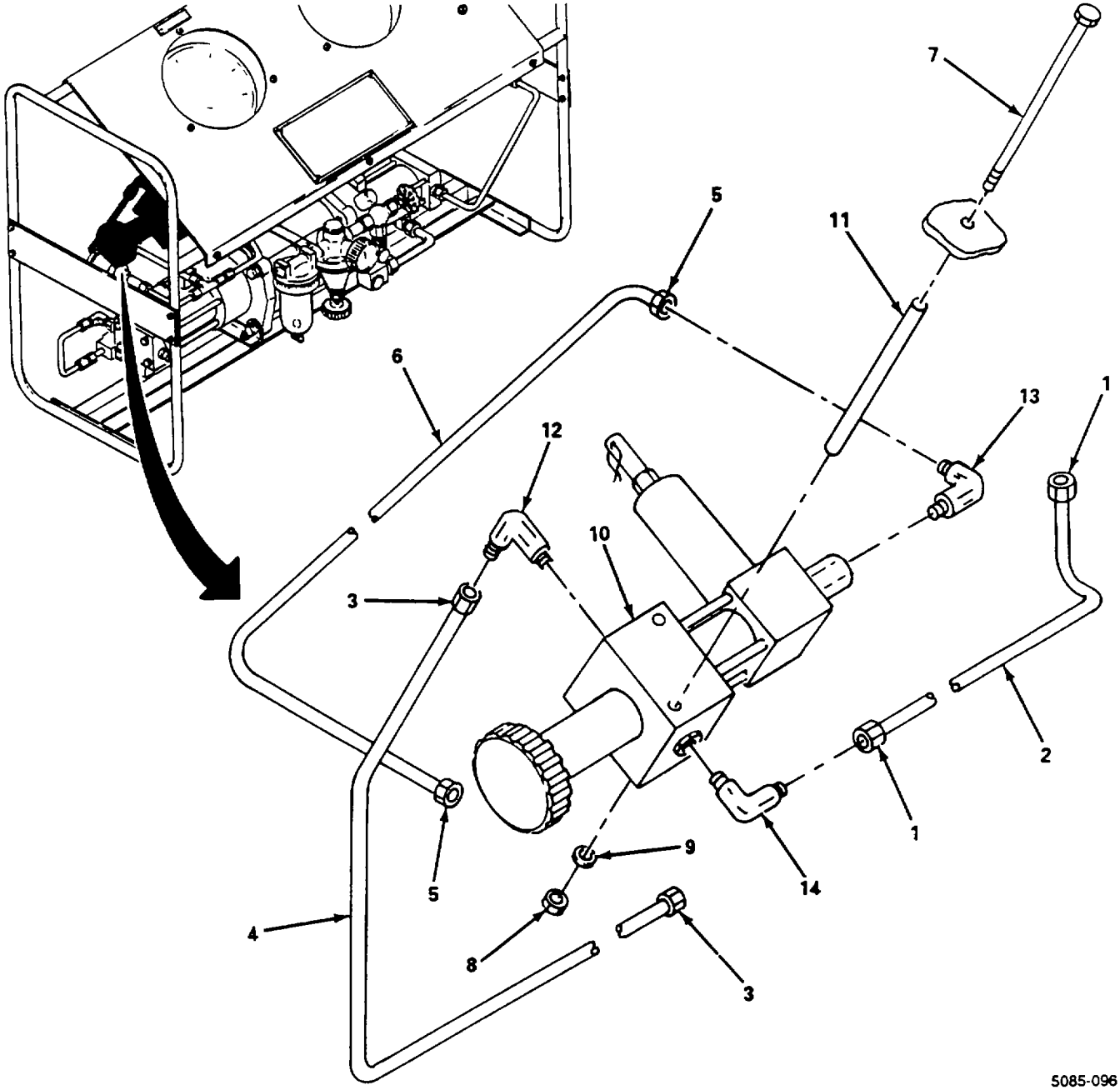


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Figure 5-65. Result Regulator, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down Inside the oxygen system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(6) Apply teflon tape to threads on result regulator end of elbows (12), (13), and (14).

(7) Install three elbows (12), (13), and (14) on new result regulator (10).

(8) Install result regulator (10) and spacers (11) and secure with two bolts (7), washers (9), and nuts (8).

(9) Install line (6) and tighten two connector nuts (5).

(10) Install line (4) and tighten two connector nuts (3).

(11) Install line (2) and tighten two connector nuts (1).

(12) Apply a bead of loctite between back of connector nuts and lines.

5-54. Pilot Valve.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Materials/Parts (Cont)

Tape, Teflon (Item 20, Appendix D)
Loctite (Item 22, Appendix D)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-66)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result In equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1) and remove line (2).

(2) Loosen two connector nuts (3) and remove line (4).

(3) Loosen two connector nuts (5) and remove line (6).

(4) Loosen two connector nuts (7).

(5) Remove screw (8), nut (9), and lockwasher (10) and remove pilot switch (11) and line (12).

(6) Remove tee (13) from pilot switch (11).

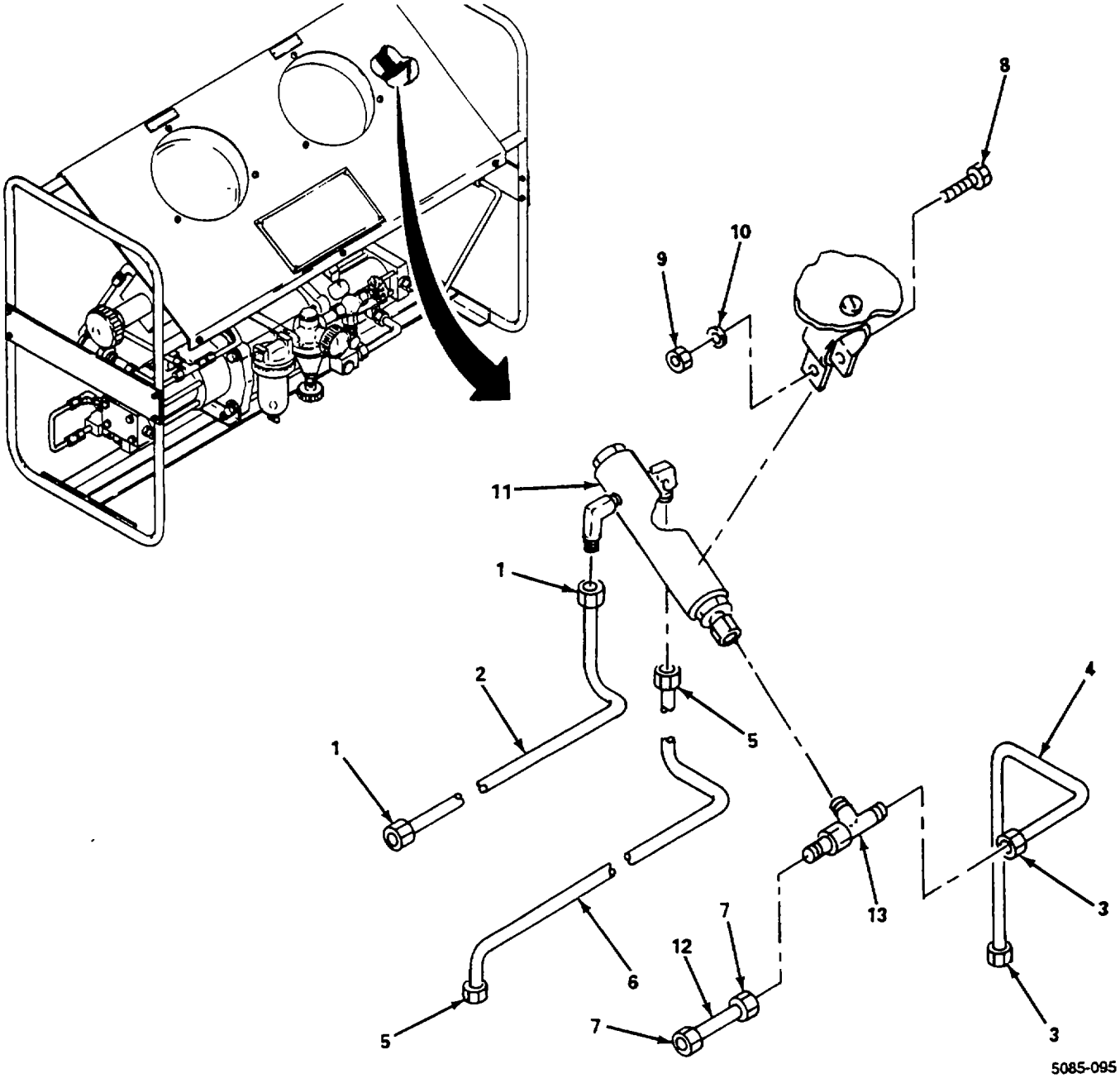

Figure 5-66. Pilot Valve, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the oxygen system Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the air system and subsequent possible injury or death to the diver.

(7) Apply teflon tape to threads on pilot valve end of tee (13).

(8) Install tee (13) on new pilot switch (11).

(9) Install new pilot switch (11) and line (12) and secure with screw (8), nut (9), and bckwasher (10).

(10) Tighten two connector nuts (7).

(11) Install line (6) and tighten two connector nuts (5).

(12) Install line (4) and tighten two connector nuts (3).

(13) Install line (2) and tighten two connector nuts (1).

(14) Apply a bead of loctite between back of connector nuts and lines.

5-55. Lines and Fittings.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)

Materials/Parts (Cont)

Tape, Adhesive (Item 19, Appendix D)
Loctite (Item 22, Appendix D)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Replace. (figure 5-67)

NOTE

There are several piping assemblies on the oxygen booster pump. The procedures to replace them are the same. The following procedure is for all piping on the oxygen booster pump. See Note C in Appendix B, Section IV.

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(1) Loosen two connector nuts (1) and remove line (2).

(2) Install line (2) and tighten two connector nuts (1)

(3) Apply a bead of loctite between back of connector nuts and lines.

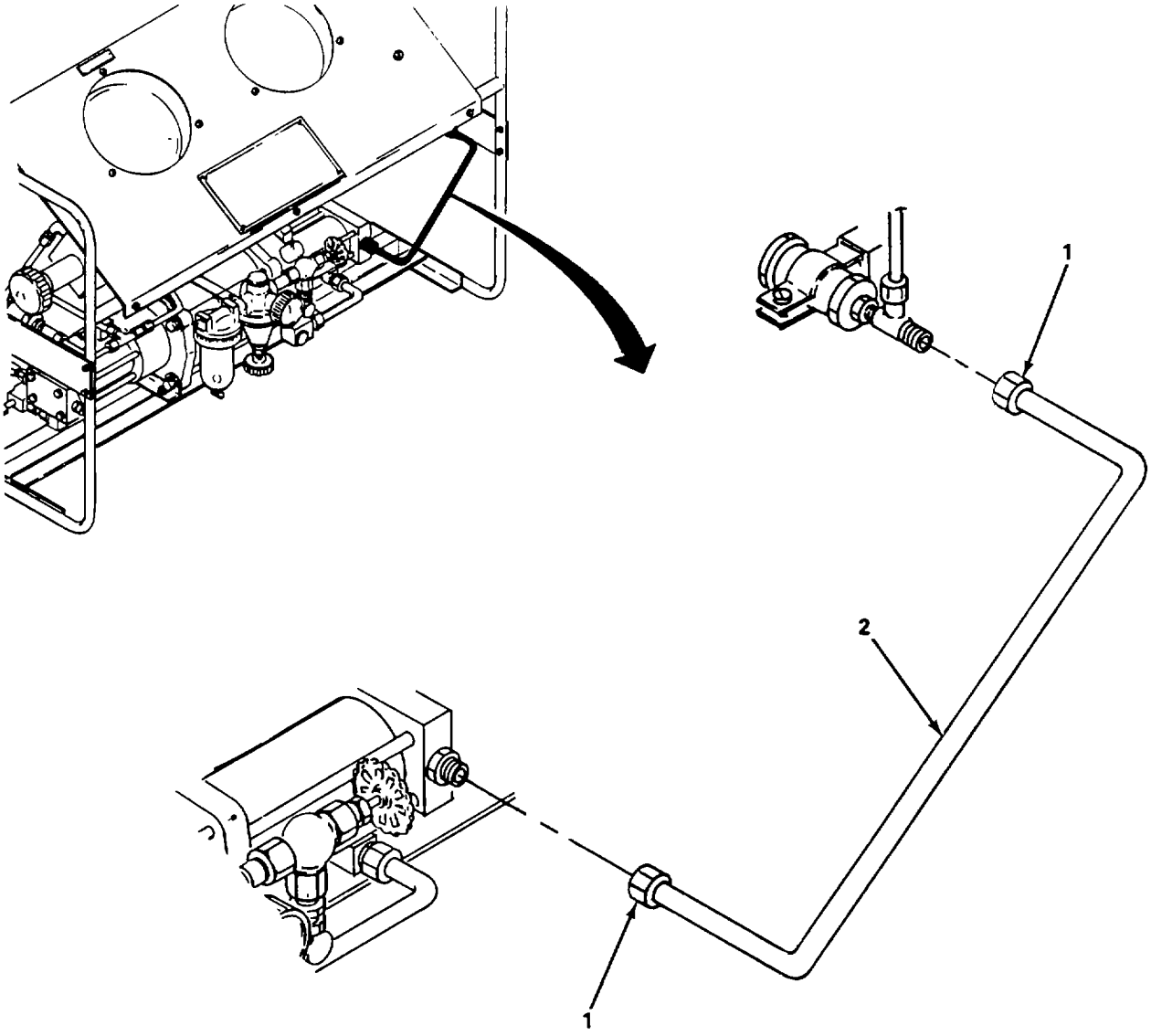

Figure 5-67. Piping, Replaced.

5-56. Frame.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Equipment Condition

Pump assembly removed (para 5-43).
3500 psi gage removed (para 5-52).

Equipment Condition (Cont)

6000 psi gage removed (para. 5-51).
Result regulator removed (para. 5-54)
Pilot valve removed (para. 5-55).
Inlet filter removed (para 5-53).
Outlet filter removed (para 5 53).

Replace. (figure 5-68)

(1) Remove screw (1), nut (2), lockwasher (3), bracket (4), and block (5)

(2) Remove screw (6), nut (7), lockwasher (8), bracket (9) and remove block (10).

(3) Replace damaged frame (11).
(4) Install block (10) and bracket (9) on new fame (11) and secure with lockwasher (8), nut (7), and screw (6)

(5) Install block (5) and bracket (4) on new frame (11) and secure with lockwasher (3), nut (2), and screw (1).

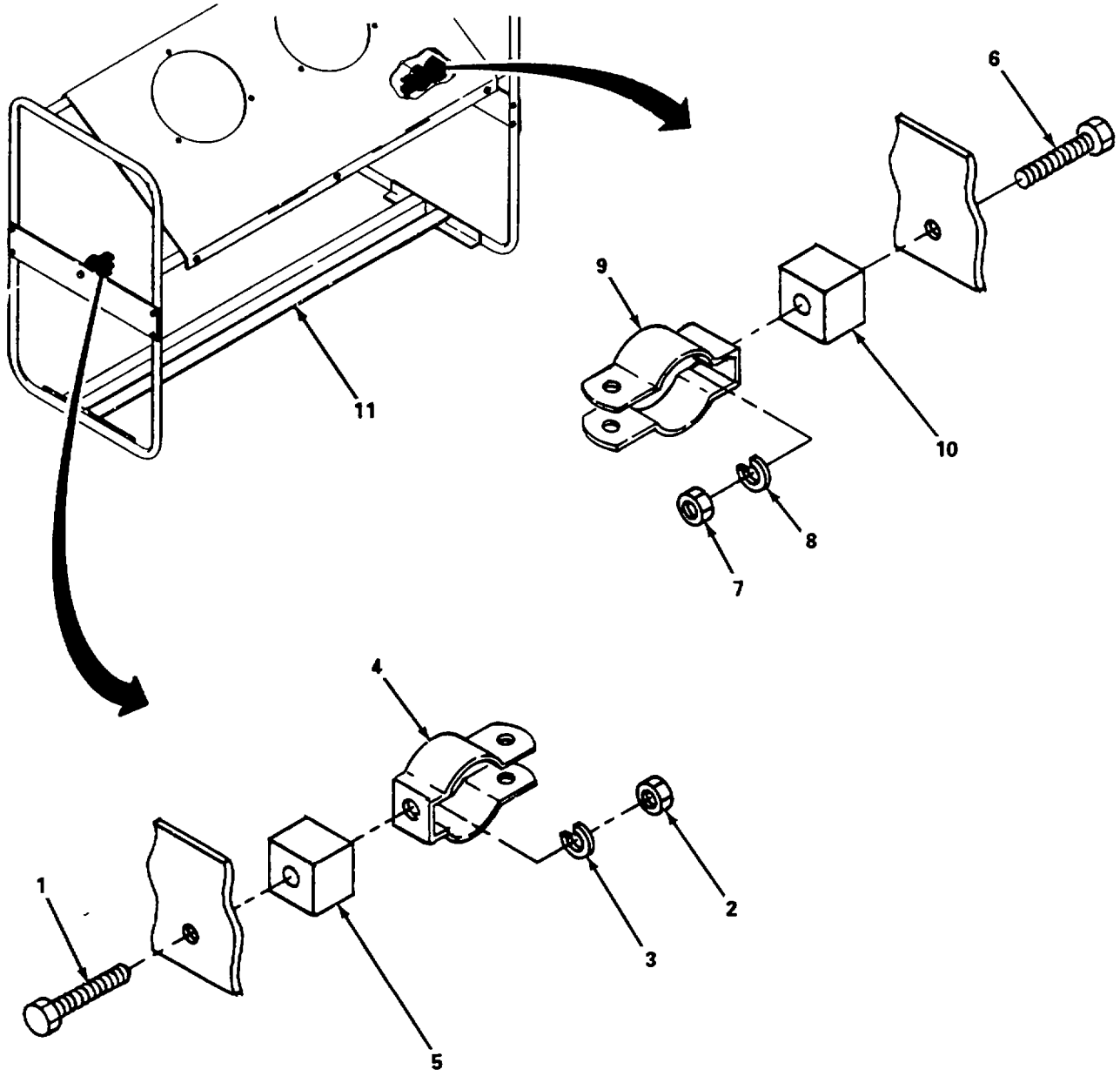

Figure 5-68. Frame, Replaced.

FOLLOW-ON MAINTENANCE
(1) Install outlet filter (para. 5-53).
(2) Install inlet filter (para 5-53).
(3) Install pilot valve (para 5-55).
(4) Install result regulator (para. 5-54).
(5) Install 6000 psi gage (para 5-41).
(6) Install 3500 psi gage (para 5-42).
(7) Install pump assembly (para 5-43).

5-57. Oxygen Charging Station.

This task covers: Repair

INITIAL SETUP

Tools	*Materials/Parts*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Bags, Plastic (Item 4, Appendix D) Bands, Rubber (Item 5, Appendix D) Tape, Adhesive (Item 19, Appendix D)

Repair.

(1) *Remove (lines).* (figure 5-69)

(a) Unsnap five latches (1) and open top cover (2).

(b) Remove charging whips (3) from storagewells (4)

(c) Remove two screws (5) and supportwell bracket tops (6) from supportwell brackets (7).

(d) Repeat step (c) for remaining storagewell

(e) Slide two storagewells (4) straight out

(f) Remove screw (8), disconnect wire rope (9) and open cover (2) fully.

(g) Remove 12 screws (10).

(h) Remove 10 screws (11).

(i) Remove 12 screws (12)

(j) Remove four screws (13), washers (14), and nuts (15) and remove handle (16).

(k) Remove two screws (17), washers (18), and nuts (19)

(l) Remove two screws (20), washers (21), and nuts (22)

(m) Remove control panel (23), storagewell (24) and six whips (3) from case (25).

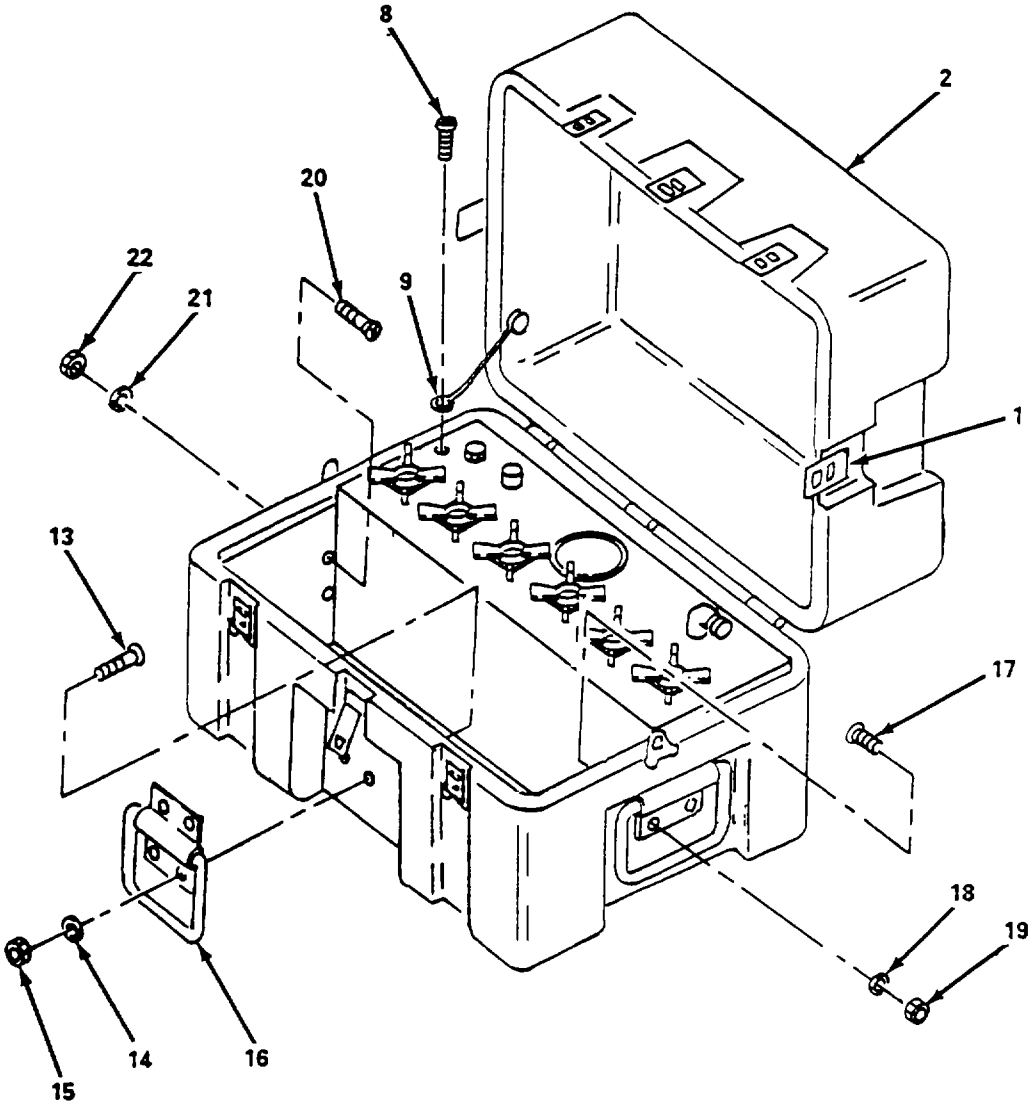

Figure 5-69. Lines, Remove (Sheet 1 of 2).

5-57. Oxygen Charging Station (Cont).

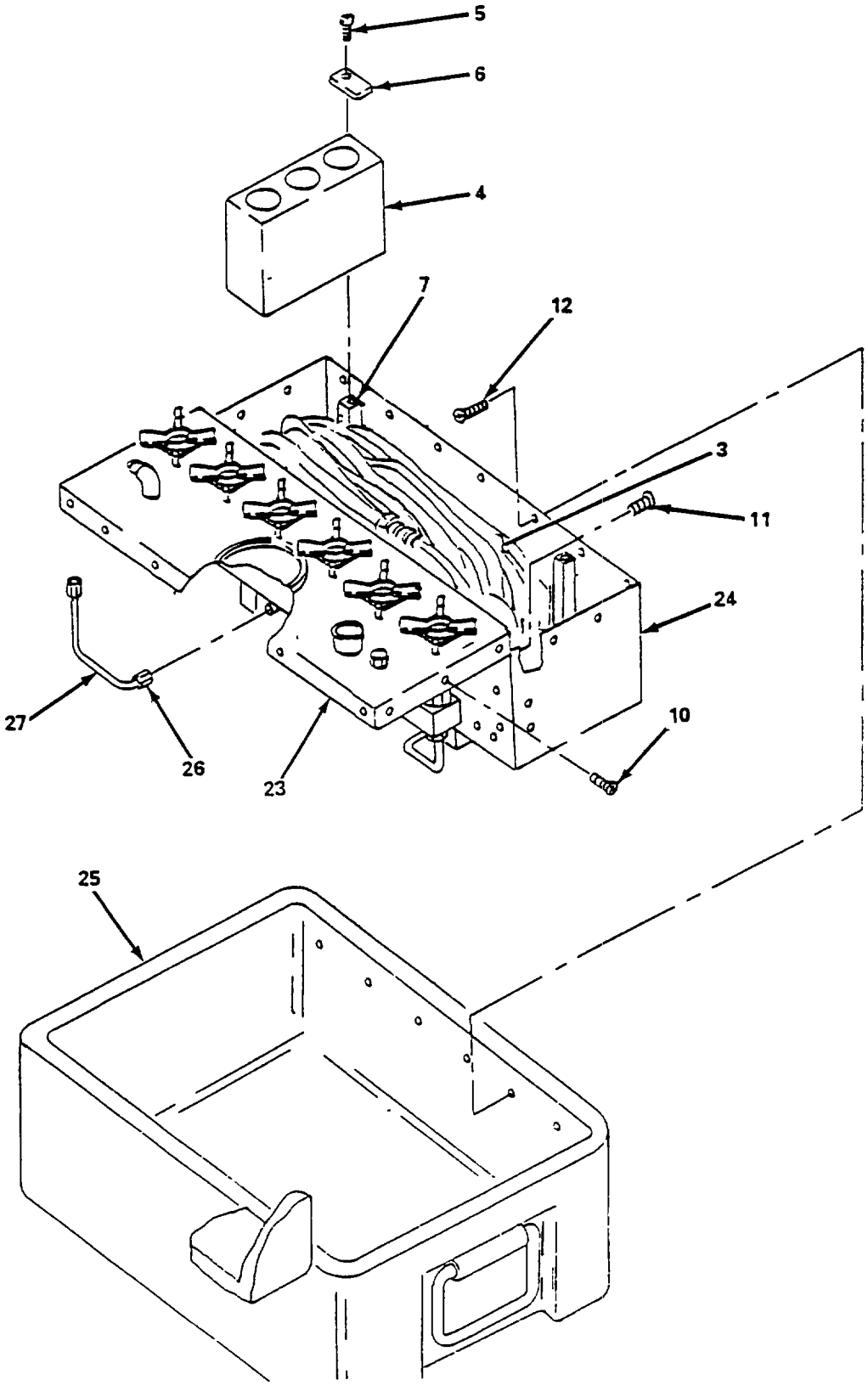

Figure 5-69. Lines, Remove (Sheet 2 of 2).

WARNING

Cleanliness is Imperative In maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(n) Loosen two connector nuts (26) and remove line (27).

5-57. Oxygen Charging Station (Cont).

(2) *Install.* (figure 5-70).

*(*a) Install line (1) and tighten two connector nuts (2).

*(*b) Install control panel (3), storagewell (4) and charging whips (5).

*(*c) Install two screws (6), washers (7), and nuts (8).

(d) Install two screws (9), washers (10), and nuts (11).

(e) Install handle (12) and secure with four screws (13), washers (14), and nuts (15).

(f) Install 12 screws (16).

(g) Install 10 screws (17).

(h) Install 12 screws (18).

(i) Install wire rope (19) and secure with screw (20).

(j) Install storagewell (21) and secure with two supportwell brackets (22), supportwell bracket tops (23), and two screws (24).

(k) Repeat step (i) for remaining storagewell.

(l) Install charging whips (5) in storagewells (21).

(m) Close cover (25) and secure with five latches (26).

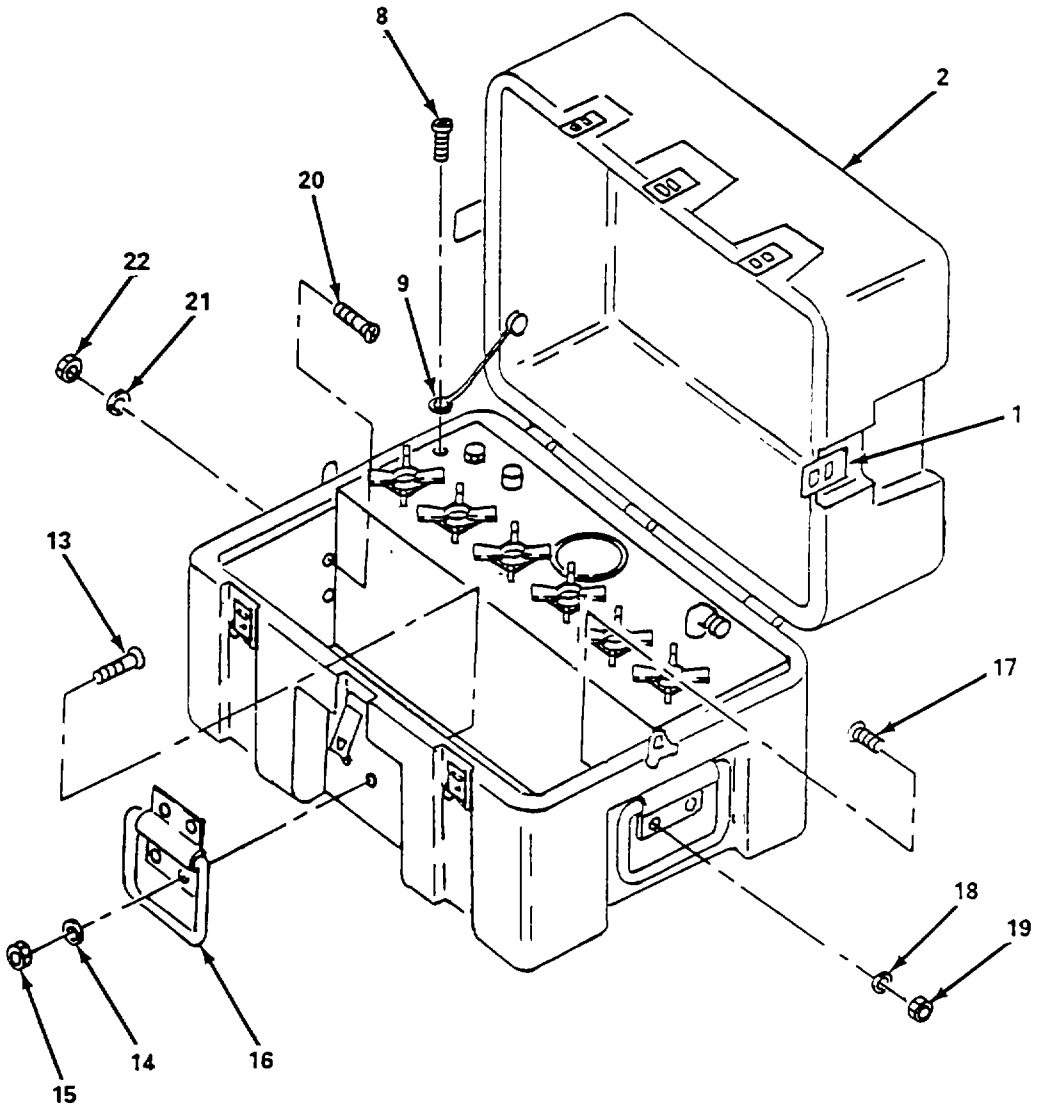

Figure 5-70. Lines, Install (Sheet 1 of 2).

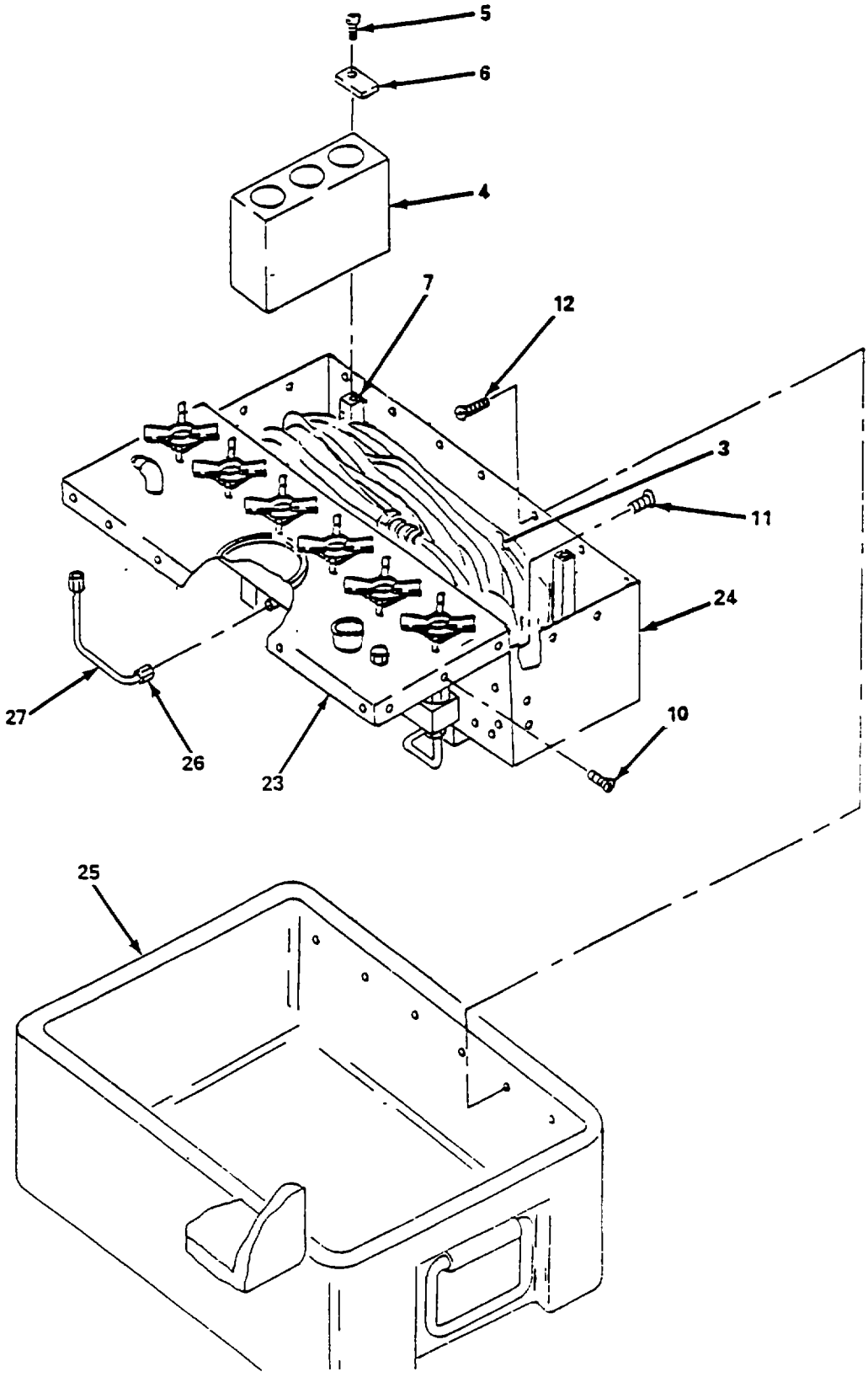

Figure 5-70. Lines, Install (Sheet 2 of 2).

5-58. Charging Whips.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Replace. (figure 5-71)

(1) Unsnap five latches (1) and open cover (2).

(2) Remove six charging whip ends (3) from storagewells (4).

WARNING

Cleanliness is imperative in maintaining and handling air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(3) Loosen connector nut (5) while holding pip nipple (6) and remove charging whip (7).

(4) Remove fitting (8) and identification tag (9) from charging whip (7).

(5) Install fitting (8) and identification tag (9) on new charging whip (7).

(6) Install new charging whip (7) and tighten connector nut (5) while holding pipe nipple (6).

(7) Install charging whip ends (3) in storagewells (4).

(8) Close cover (2) and secure with five latches (1).

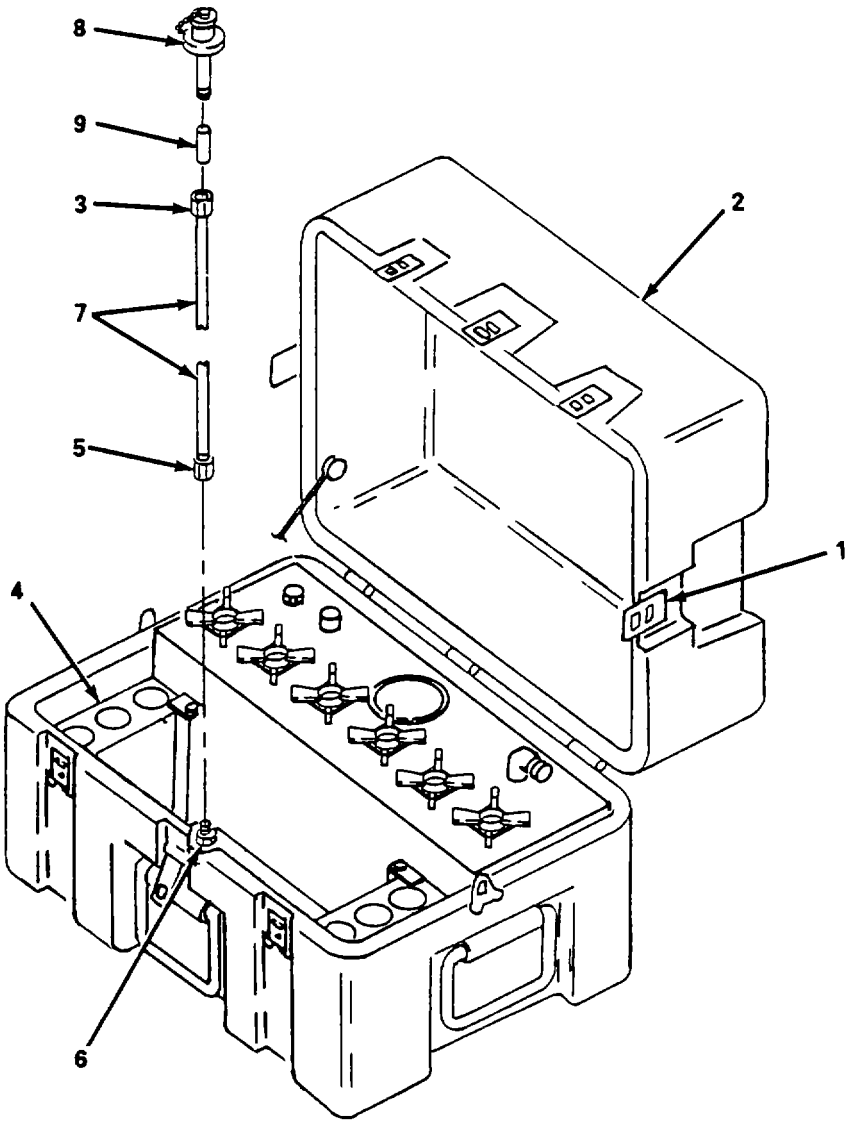

Figure 5-71. Charging Whips, Replaced.

5-59. Pressure Gage.

This task covers: Replace

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Replace.

(1) *Remove.* (figure 5-72)

(a) Unsnap five latches (1) and open top cover (2).

(b) Remove charging whips (3) from storagewells (4).

(c) Remove two screws (5) and supportwell bracket tops (6) from supportwell brackets (7).

(d) Repeat step (c) for remaining storagewell.

(e) Slide two storagewells (4) straight out.

(f) Remove screw (8), disconnect wire rope (9) and open cover (2) fully.

(g) Remove 12 screws (10).

(h) Remove 10 screws (11).

(i) Remove 12 screws (12)

(j) Remove four screws (13), washers (14), and nuts (1**5)** and remove handle (1**6).**

(k) Remove two screws (17), washers (18), and nuts (19).

(l) Remove two screws (20), washers (21), and nuts (22).

(m) Remove control panel (23), storagewell (24) and six whips (3) from case **(25).**

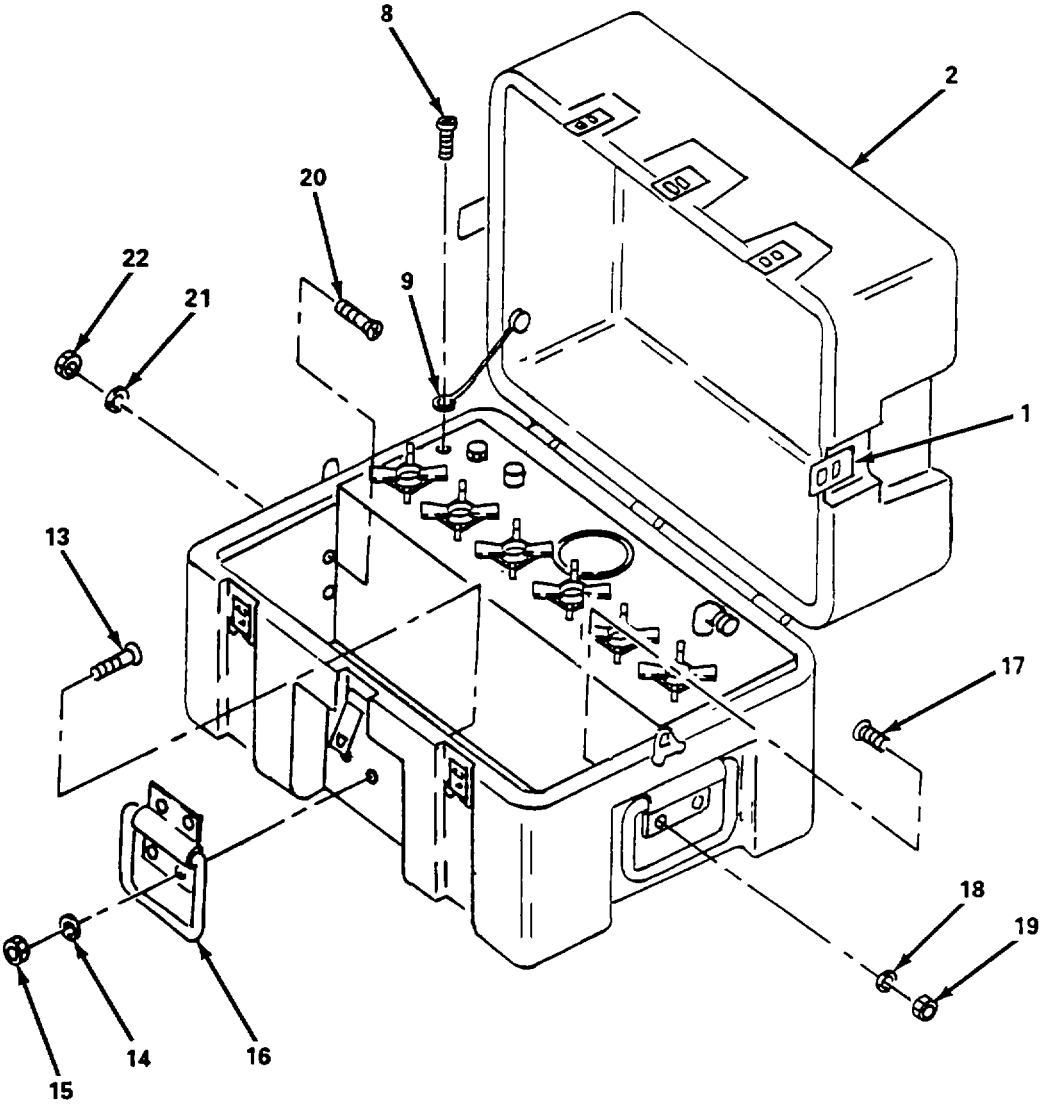

Figure 5-72. Pressure Gage, Remove (Sheet 1 of 2).

5-59. Pressure Gage (Cont).

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(n) Loosen connector nut (26).

(o) Remove two nuts (27), bracket (28), and gage (29).

(p) Remove connector (30) from gage (29).

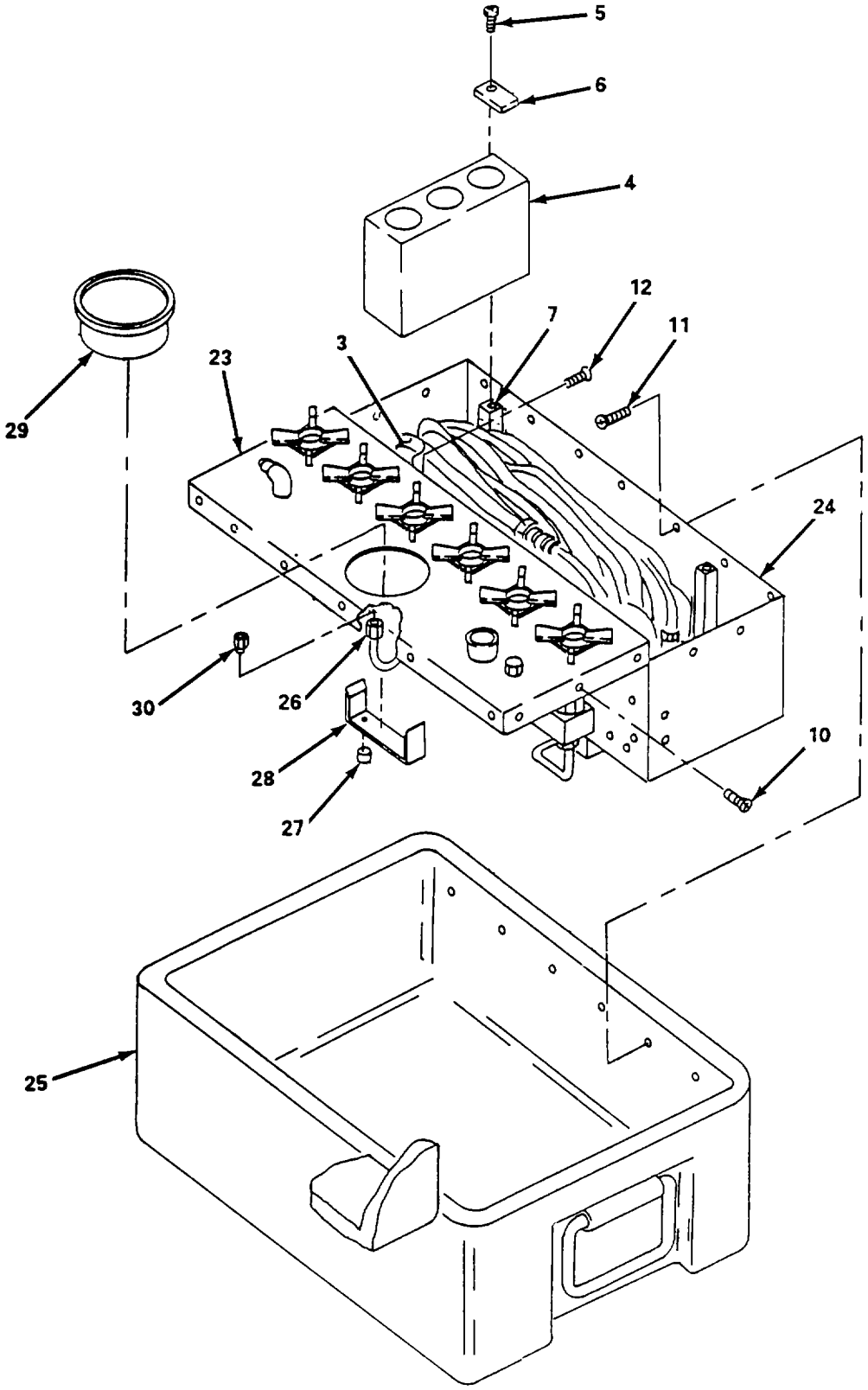

Figure 5-72. Pressure Gage, Remove (Sheet 2 of 2)

5-59. Pressure Gage (Cont).

(2) *Install.* (figure 5-73)

(a) Install connector (1) on new gage (2)

(b) Install new gage (2) and secure with bracket (3) and two nuts (4).

(c) Tighten connector nut (5).

(d) Install control panel (6), storagewell (7) and charging whips (8).

(e) Install two screws (9), washers (10), and nuts (11).

(f) Install two screws (12), washers (13), and nuts (14).

(g) Install handle (15) and secure with four screws (16), washers (17), and nuts (18).

(h) Install 12 screws (19).

(i) Install 10 screws (20).

i) Install 12 screws (21).

(k) Install wire rope (22) and secure with screw (23).

(l) Install storagewell (24) and secure with two supportwell brackets (25), supportwell bracket tops (26), and two screws (27).

(m) Repeat step (k) for remaining storagewell..

(n) Install charging whips (8) in storagewells (24).

(o) Close cover (28) and secure with five latches (29).

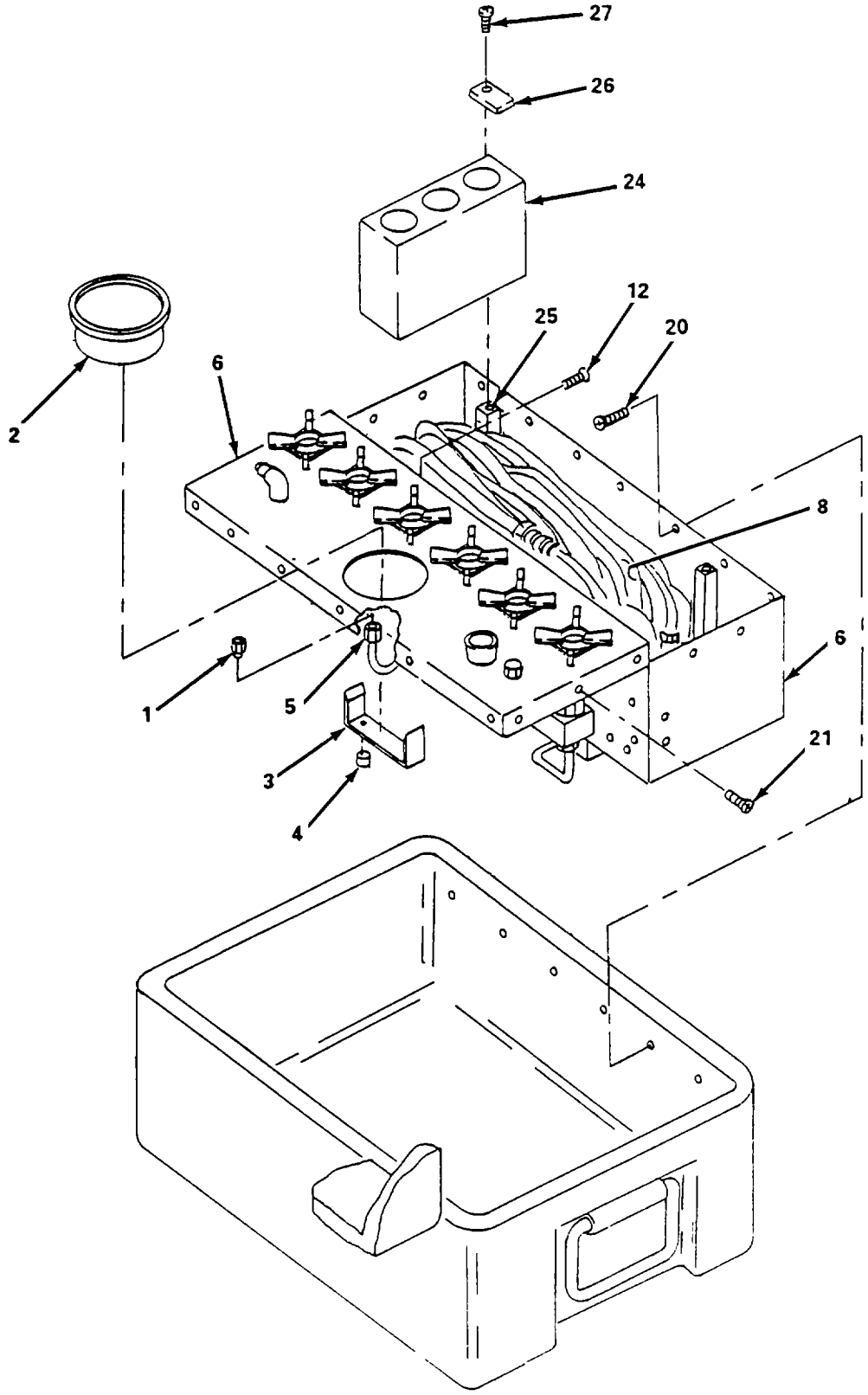

Figure 5-73. Pressure Gage, Install (Sheet 1 of 2).

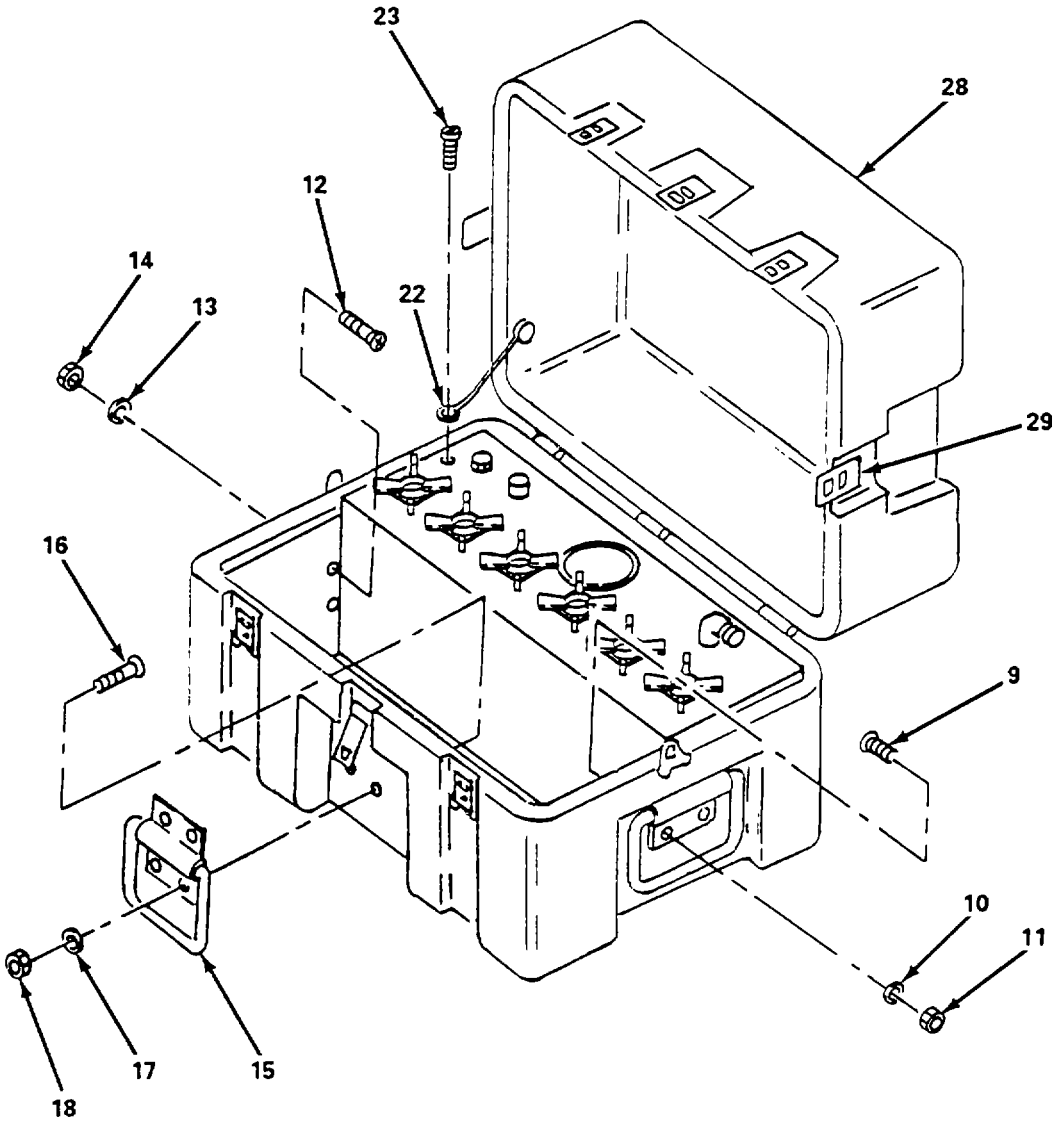

Figure 5-73. Pressure Gage, Install (Sheet 2 of 2).

5-60. Oxygen Manifolds.

This task covers: a Replace (Input) b. Replace (Output) c. Replace (Whip)

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

a. Replace (Input Manifold).

(1) *Remove.* (figure 5-74).

(a) Unsnap five latches (1) and open top cover (2).

(b) Remove six whips (3) from storagewells (4).

(c) Remove two screws (5) and supportwell bracket tops (6) from supportwell brackets (7).

(d) Repeat step (c) for remaining storagewell.

(e) Slide two storagewells (4) straight out.

(f) Remove screw (8), disconnect wire rope (9), and open cover (2) fully.

(g) Remove 12 screws (10).

(h) Remove 10 screws (11).

*(*i) Remove 12 screws (12).

*(*j) Remove four screws (13), washers (14), and nuts (15) and remove handle (16).

(k) Remove two screws (17), washers (18), and nuts (19).

*(*l) Remove two screws (20), washers (21), and nuts (22).

(m) Remove control panel (23), storagewell (24), and six charging whips (3) from case (25).

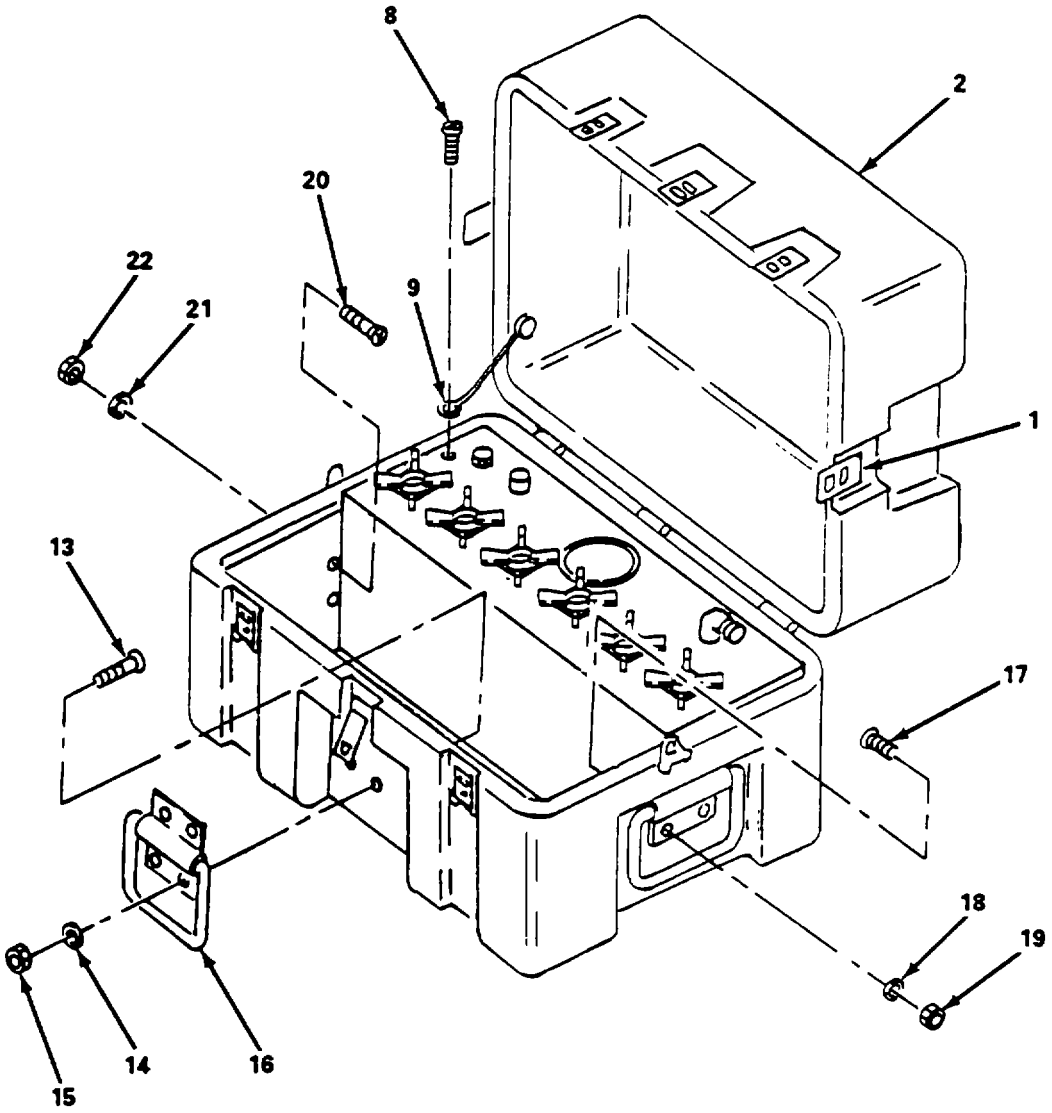

Figure 5-74. Input Manifold, Remove (Sheet 1 of 2).

5-60. Oxygen Manifolds (Cont).

WARNING

Cleanliness is Imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual Foreign substances within an assembly could result In equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(n) Loosen two connector nuts (26) and remove line (27).

*(*o) Loosen two connector nuts (28) and remove line (29).

(p) Loosen two connector nuts (30) and remove line (31).

(q) Remove three pipe nipples (32).

(r) Loosen six union nuts (33).

(s) Remove six tailpieces (34) and O-rings (35) from input manifold (36) and remove input manifold (36).

(t) Remove two plugs (37) from input manifold (36).

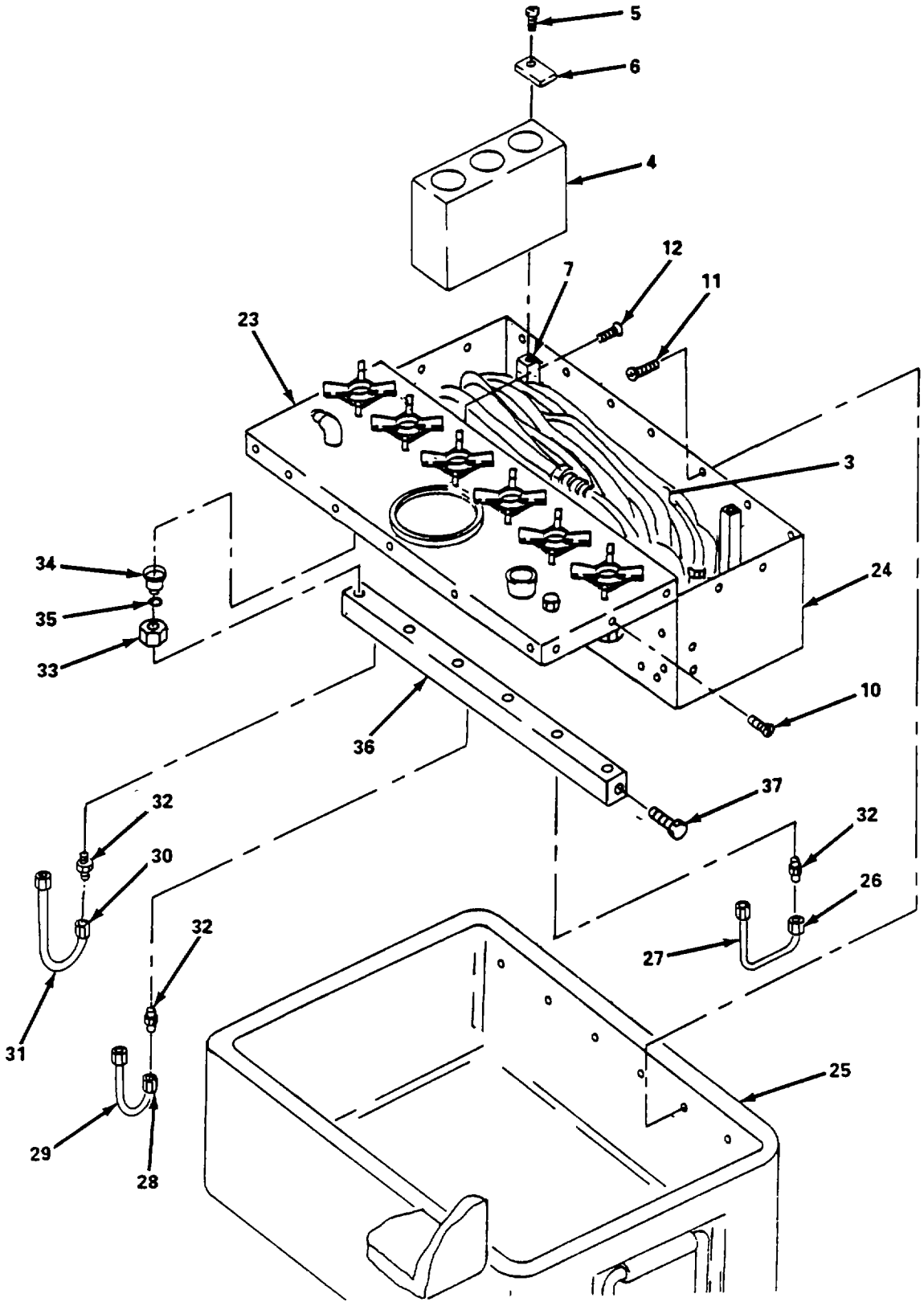

Figure 5-74. Input Manifold, Remove (Sheet 2 of 2).

5-60. Oxygen Manifolds (Cont).

(2) *Install.* (figure 5-75)

(a) Install two plugs (1) In new input manifold (2)

(b) Install six new O-rings (3) and install six tailpieces (4).

(c) Tighten six union nuts (5).

(d) Install three pipe nipples (6)

(e) Install lines (7) and tighten two connector nuts (8).

(f) Install line (9) and lighten two connector nuts (10).

(g) Install line (11) and lighten two connector nuts (12)

(h) Install control panel (13), storagewell (14), and six charging whips (15) in case (16).

(*i)* Install two screws (17), washers (18), and nuts (19).

(j) Install two screws (20), washers (21), and nuts (22).

(k) Install handle (23) and secure with four screws (24), washers (25), and nuts (26).

(l) Install 12 screws (27)

(m) Install 10 screws (28)

(n) Install 12 screws (29)

(o) Install wire rope (30) and secure with screw (31).

(p) Install two storagewells (32) and secure with four screws (33) and supportwell bracket tops (34).

(q) Install six whips (15) in storagewells (32).

(r) Close cover (35) and secure with five latches (36).

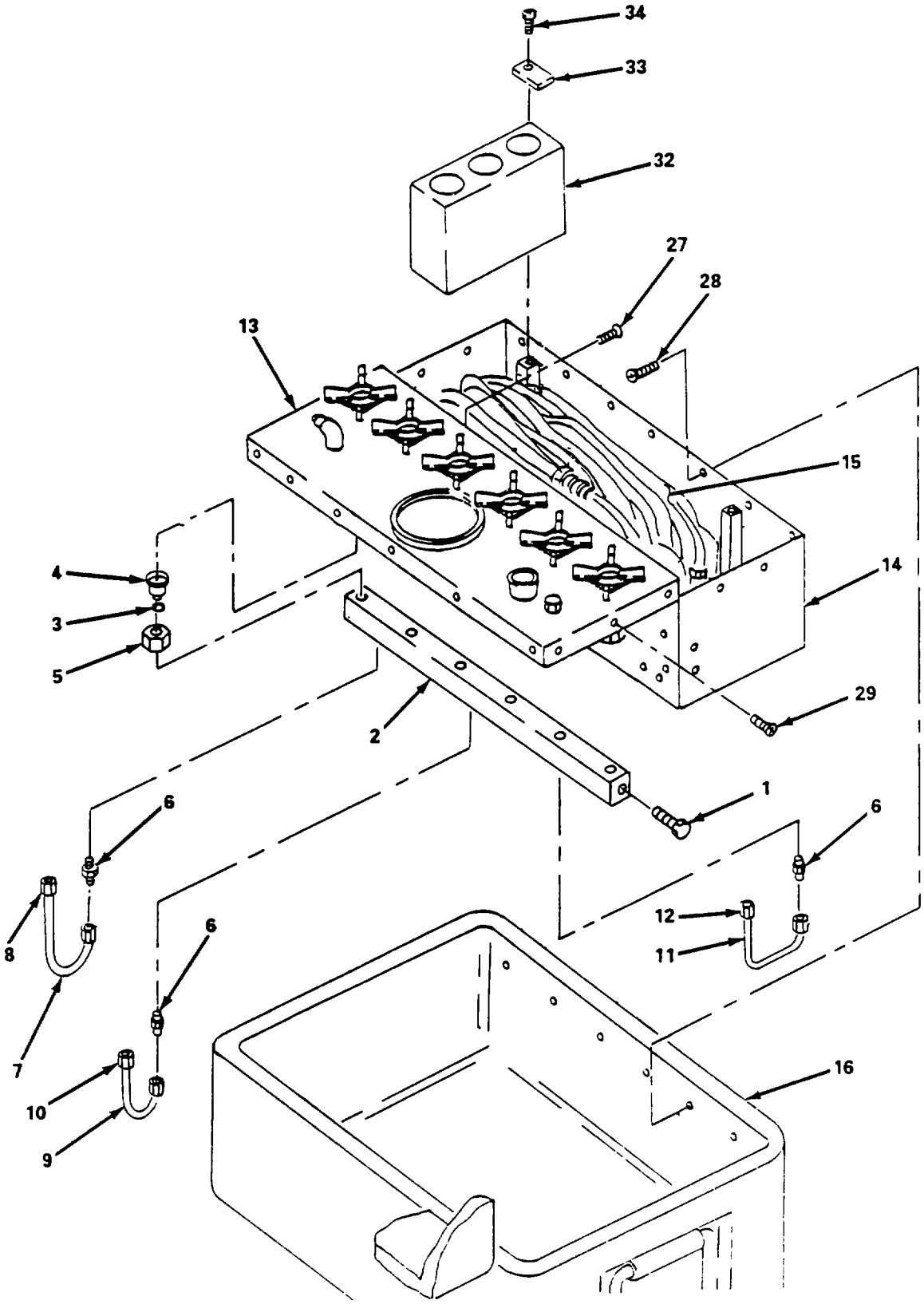

Figure 5-75. Input Manifold, Install (Sheet 1 of 2).

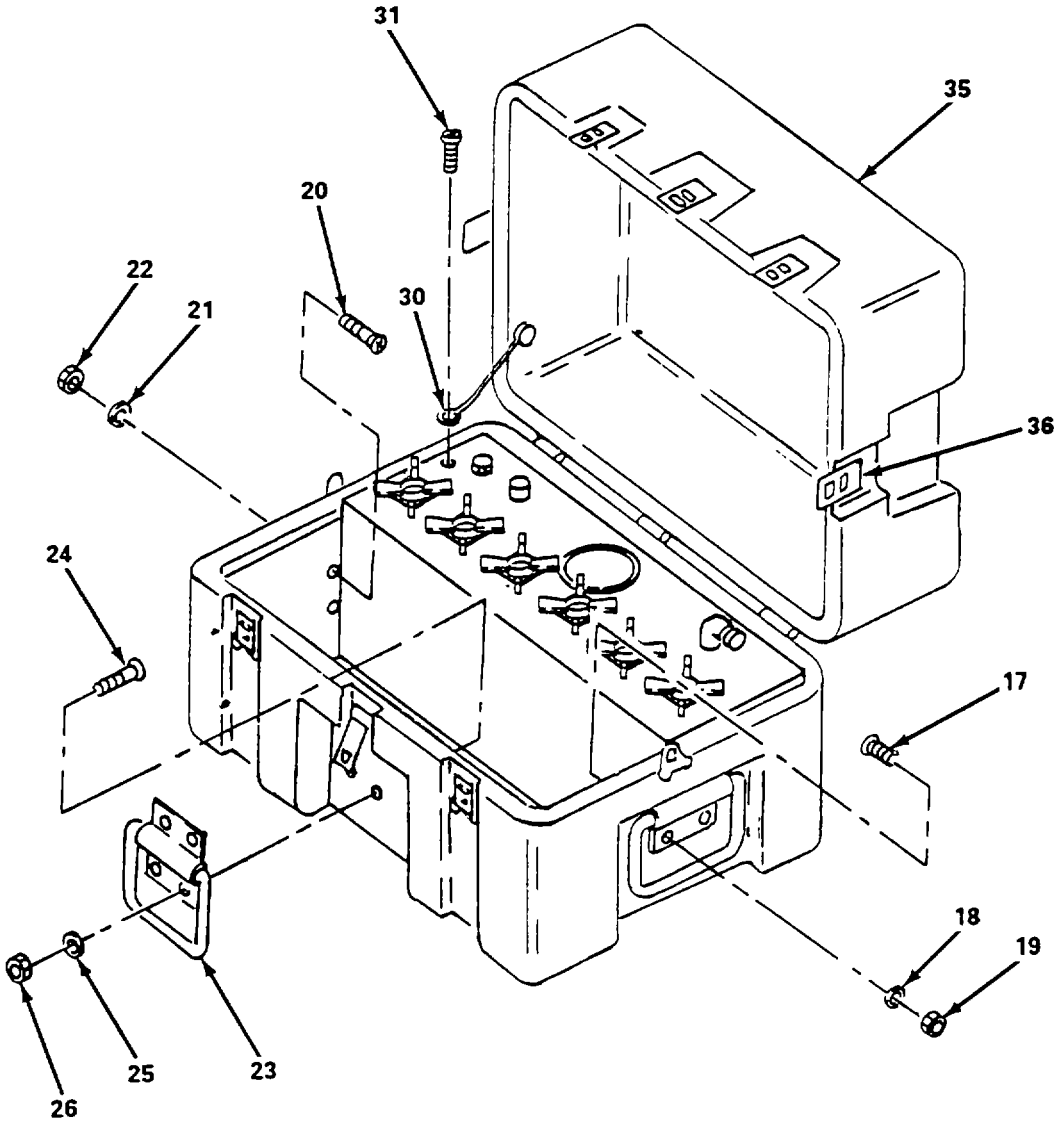

Figure 5-75. Input Manifold, Install (Sheet 2 of 2).

5-60. Oxygen Manifolds (Cont).

b. Replace (Output Manifold).

(1) *Remove.* (figure 5-76)

(a) Unsnap five latches (1) and open top cover (2).

(b) Remove six charging whips (3) from storagewells (4).

(c) Remove four screws (5) and supportwell bracket tops (6) from two supportwells (7).

(d) Remove screw (8) securing wire rope (9) and open cover (2) fully.

(e) Remove 12 screws (10).

(f) Remove 10 screws (11).

(g) Remove 12 screws (12)

(h) Remove four screws (13), washers (14), and nuts (15) and remove handle (16).

(i) Remove two screws (17), washers (18), and nuts (19).

(j) Remove two screws (20), washers (21), and nuts (22).

(k) Remove control panel (23), storagewell (24), and six charging whips (3) from case (25).

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(l) Loosen two connector nuts (26) and remove line (27).

(m) Loosen six union nut (28).

(n) Remove two screw (29) and remove output manifold (30), tailpiece (31), and O-ring (32).

(o) Remove tailpiece (31) and O-ring (33) from output manifold (30).

(p) Remove pipe nipple (34).

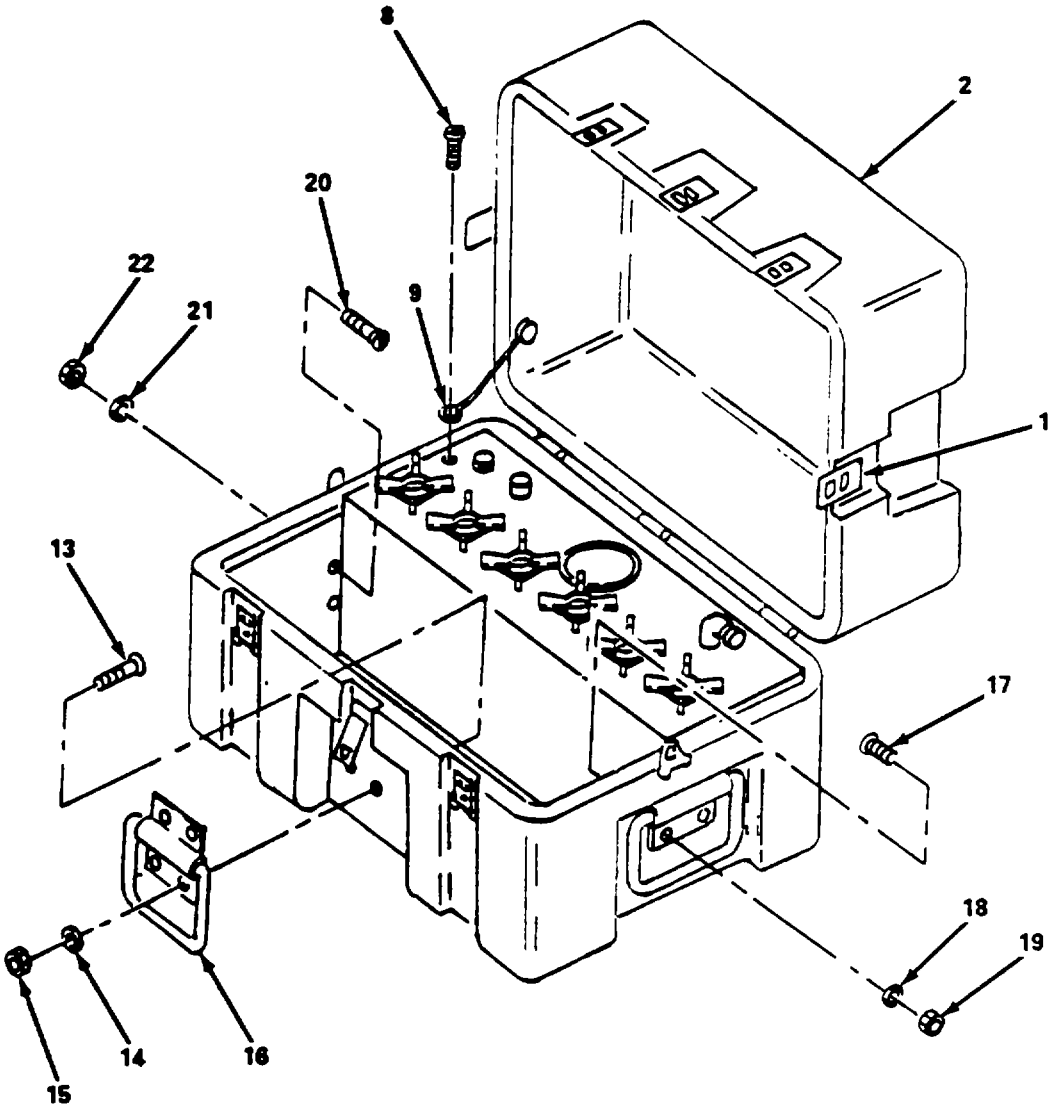

Figure 5-76. Output Manifold, Remove (Sheet 1 of 2).

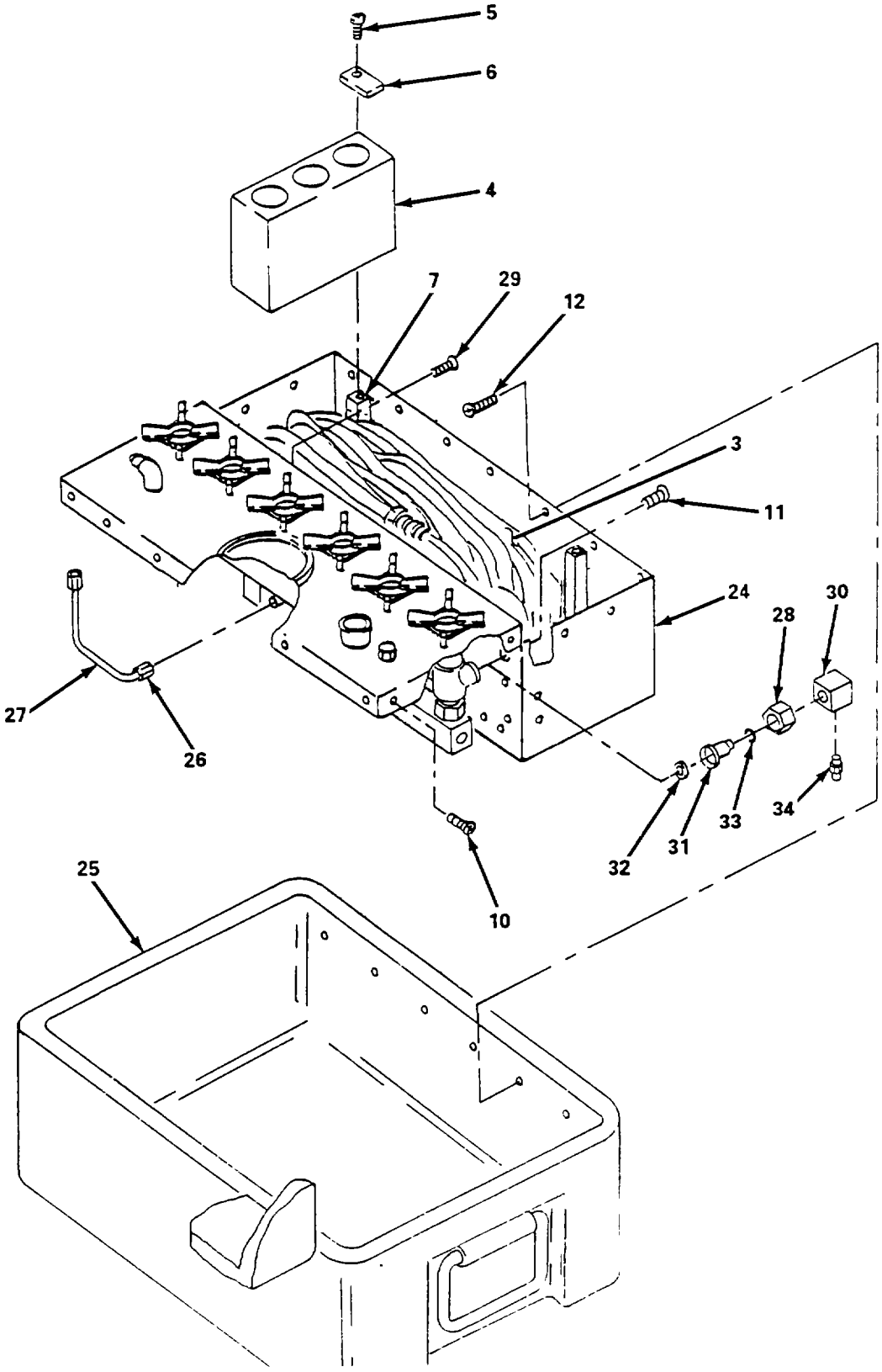

Figure 5-76. Output Manifold, Remove (Sheet 2 of 2).

5-60. Oxygen Manifolds (Cont).

(2) *Install.* (figure 5-77)

(a) Install pipe nipple (1).

(b) Install tailpiece (2), new O-ring (3), and union nut (4).

(c) Install output manifold (5) and O-ring (6) and secure with two screws (7).

(d) Tighten union nut (4).

(e) Install line (8) and tighten two connector nuts (9).

(f) Install control panel (10), storagewell (11) and six charging whips (12).

(g) Install two screws (13), washers (14), and nuts (15).

(h) Install two screws (16), washers (17), and nuts (18).

(i) Install handle (19) and secure with four screws (20), washers (21), and nuts (22).

(j) Install 12 screws (23).

(k) Install 10 screws (24).

(l) Install 12 screws (25).

(m) Install wire rope (26) and secure with screws (27).

(n) Install two storagewells (28) and secure with four screws (29) and supportwell bracket tops (30).

(o) Install six charging whips (12) in storagewells (28)

(p) Close top cover (31) and secure with five latches (32).

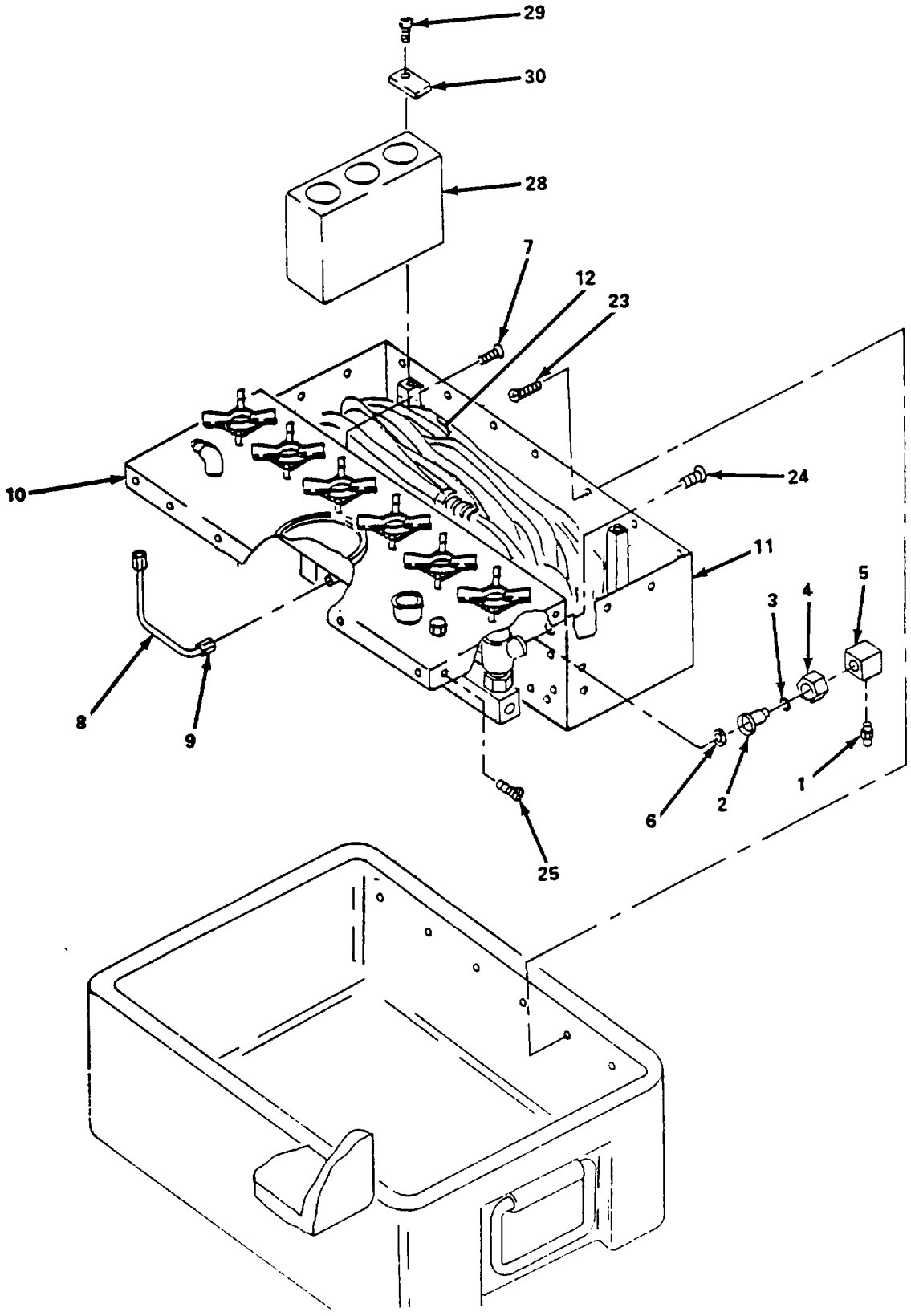

Figure 5-77. Output Manifold, Install (Sheet 1 of 2).

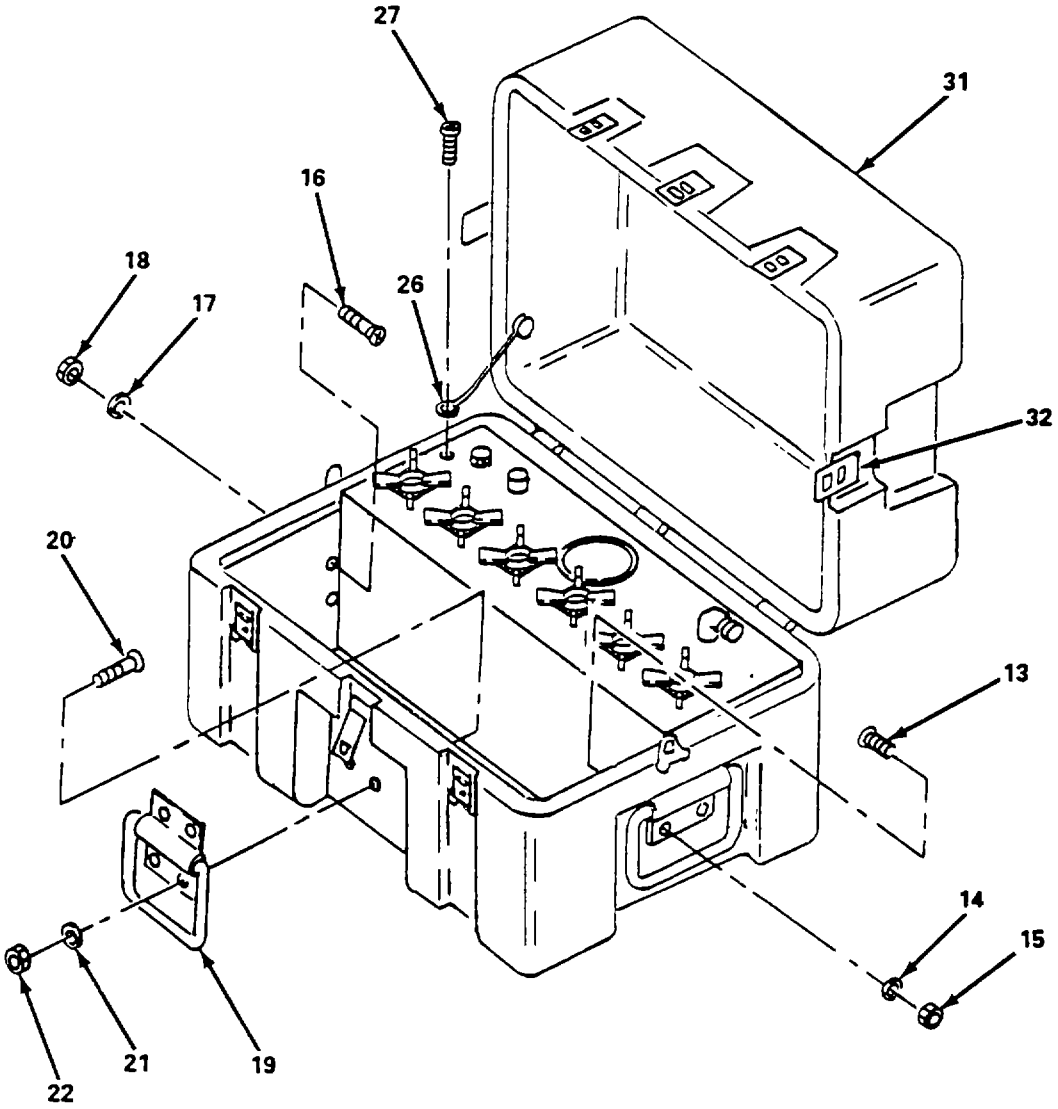

Figure 5-77. Output Manifold, Install (Sheet 2 of 2).

5-60. Oxygen Manifolds (Cont).

c. Replace (Whip Manifold).

(1) *Remove* (figure 5-78).

NOTE

There are two whip manifolds, the procedures to replace them are the same.

(a) Remove charging whips (para 5-58).

(b) Remove four screws (1) and supportwell bracket tops (2) and remove two storagewells (3).

(c) Remove screws (4) securing wire rope (5) and open cover (6) fully.

(d) Remove 12 screws (7).

(e) Remove 10 screws (8).

(f) Remove 12 screws (9).

(g) Remove four screws (10), washers (11), and nuts (12) and remove handle (13).

(h) Remove two screws (14), washers (15), and nuts (16)

(I) Remove two screws (17), washers (18), and nuts (19).

(8) Remove control panel (20) and storagewell (21) from case (22).

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored In a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(k) Loosen two connector nuts (23) and remove line (24).

(l) Loosen two connector nuts (25) and remove line (26).

(m) Loosen two connector nuts (27) and remove line (28).

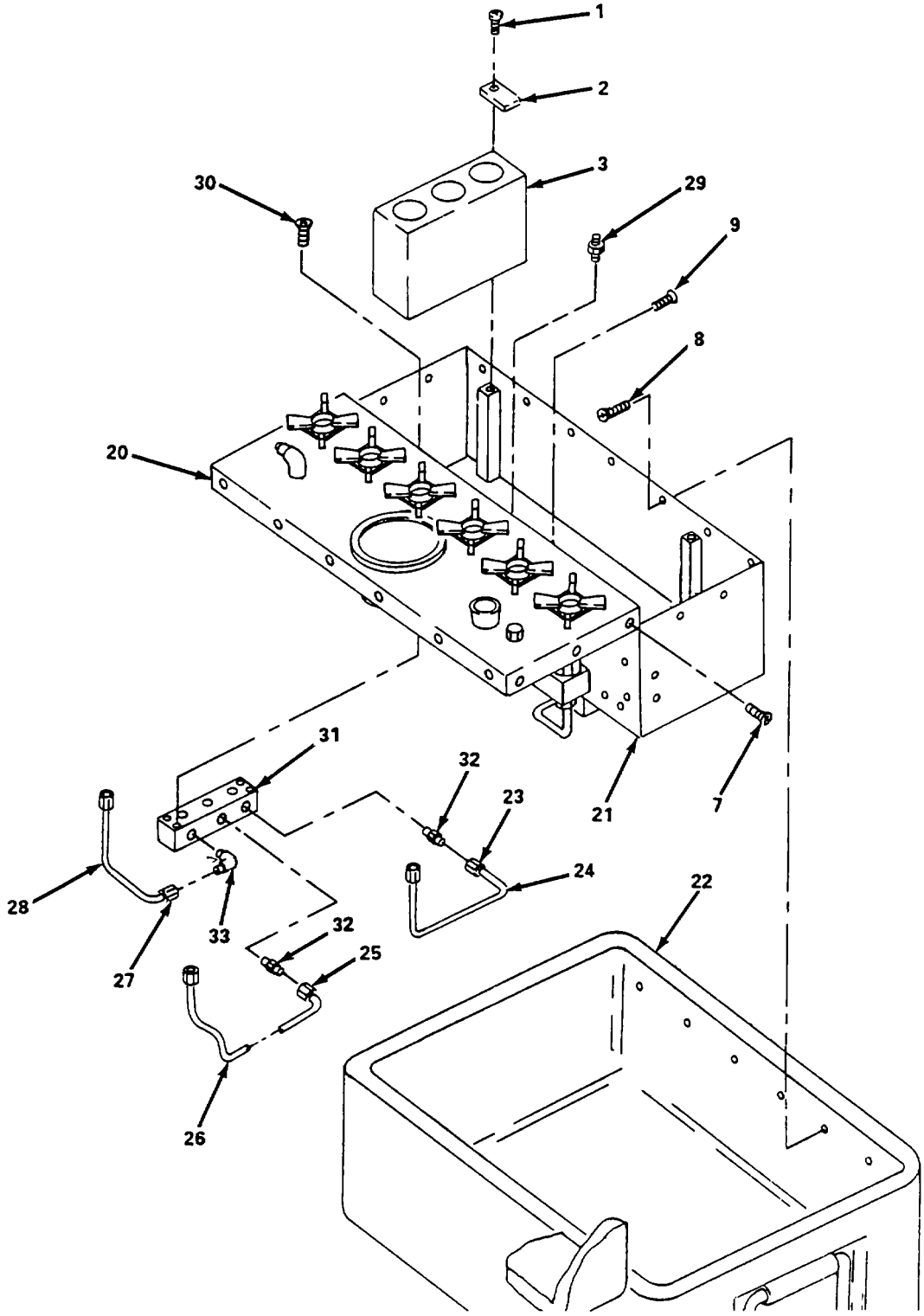

Figure 5-78. Whip Manifold, Remove (Sheet 1 of 2).

5-60 Oxygen Manifolds (Cont).

(n) Remove three connectors (29)

(o) Remove four screws (30) and remove whip manifold (31)

(p) Remove two connectors (32) and one elbow (33).

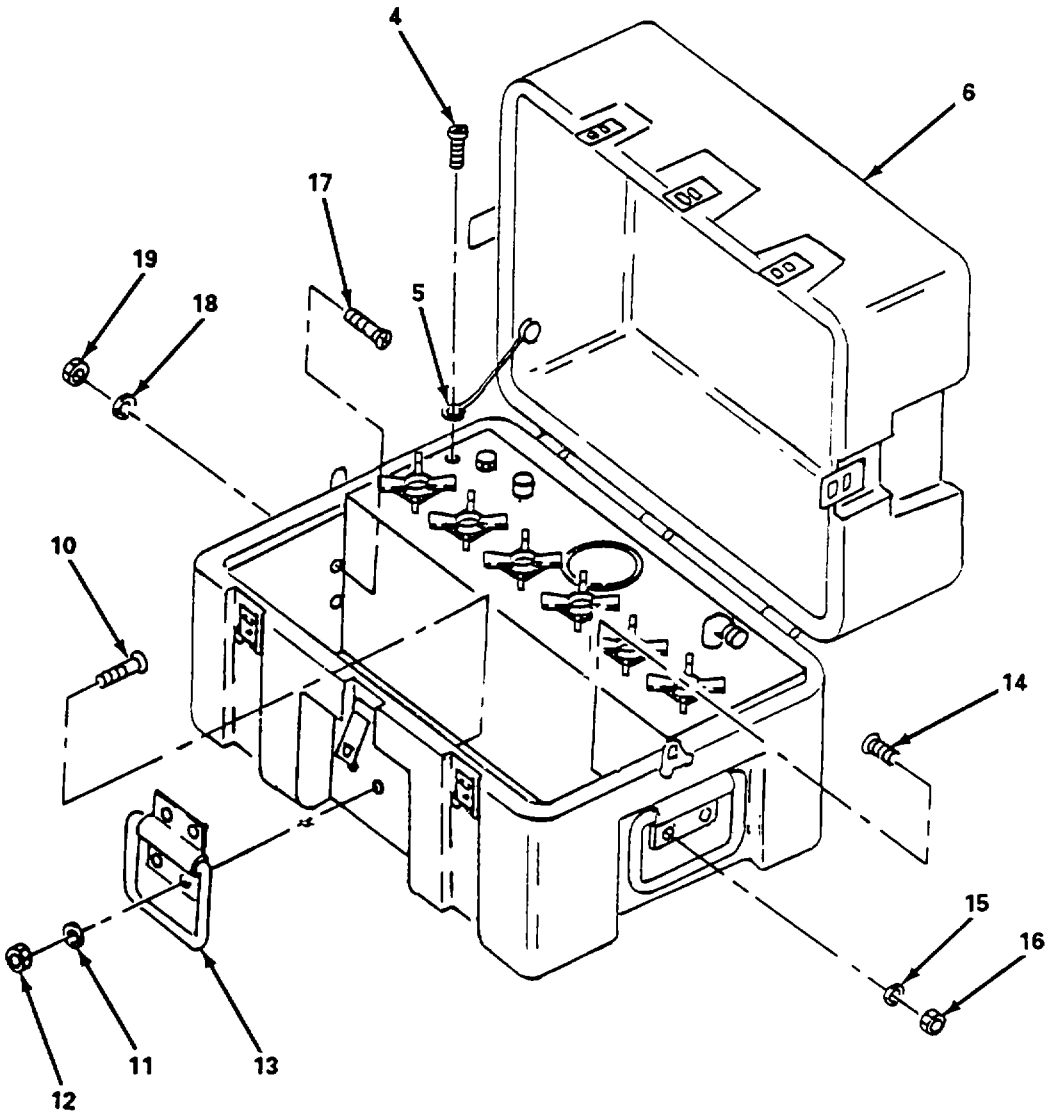

Figure 5-78. Whip Manifold, Remove (Sheet 2 of 2).

5-60 **Oxygen Manifolds (Cont).**

(*2*) *Install.* (figure 5-79)

(a) Install two connectors (1) and elbow (2).

(b) Install whip manifold (3) and secure with four screws (4).

(c) Install three connectors (5).

(d) Install line (6) and tighten two connector nuts (7).

(e) Install line (8) and tighten two connector nuts (9).

(f) Install line (10) and tighten two connector nuts (11).

(g) Install control panel (12) and storagewell (13).

(h) Install two screws (14), washers (15), and nuts (16).

(i) Install two screws (17), washers (18), and nuts (19).

(j) Install handle (20) and secure with four screws (21), washers (22), and nuts (23).

(k) Install 12 screws (24).

(l) Install 10 screws (25).

(m) Install 12 screws (26).

(n) Install wire rope (27) and secure with screw (28).

(o) Install two storagewells (29) and secure with four screws (30) and supportwell bracket tops (31).

(p) Install charging whips (para. 5-44).

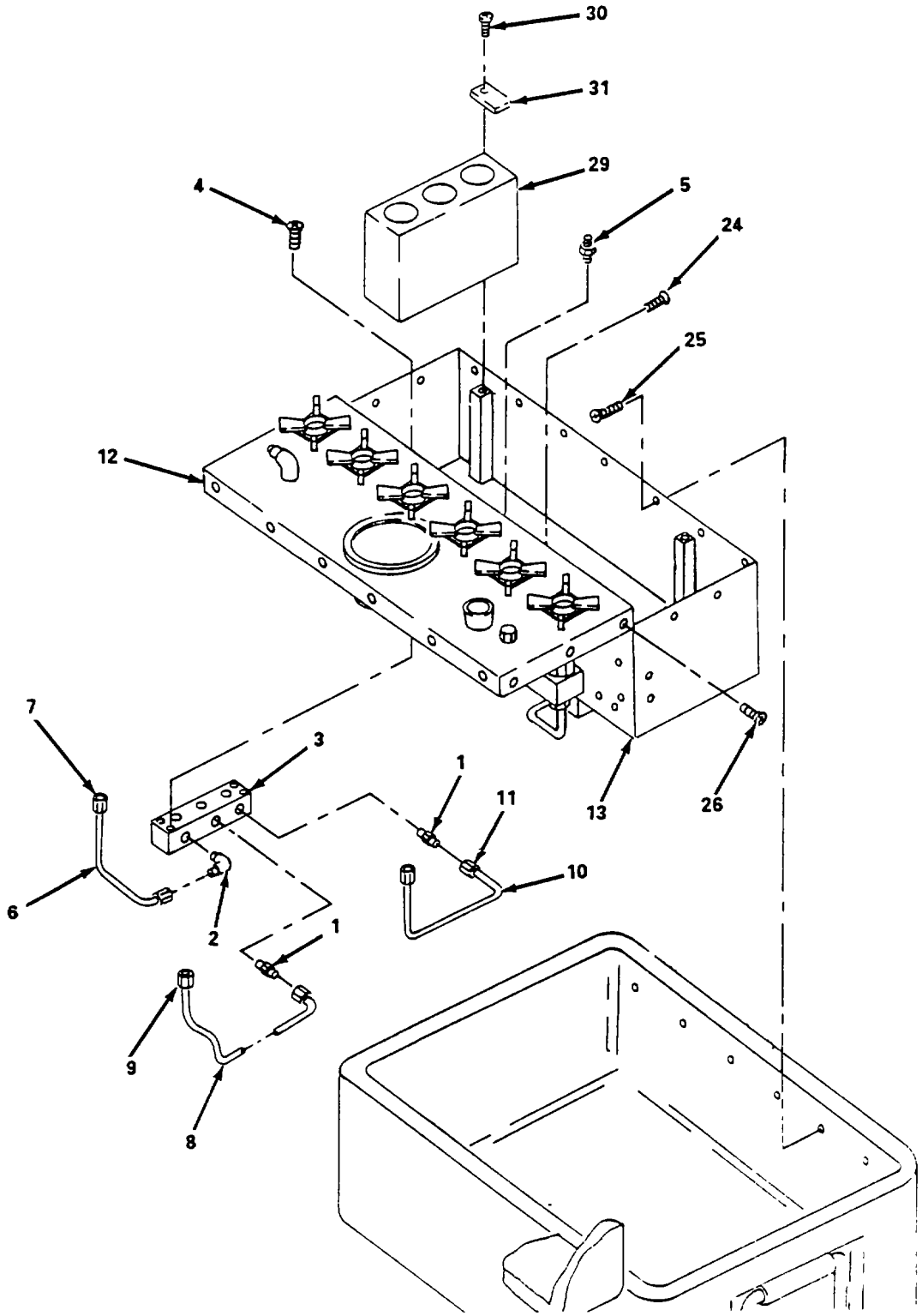

Figure 5-79. Whip Manifold, Install (Sheet 1 of 2).

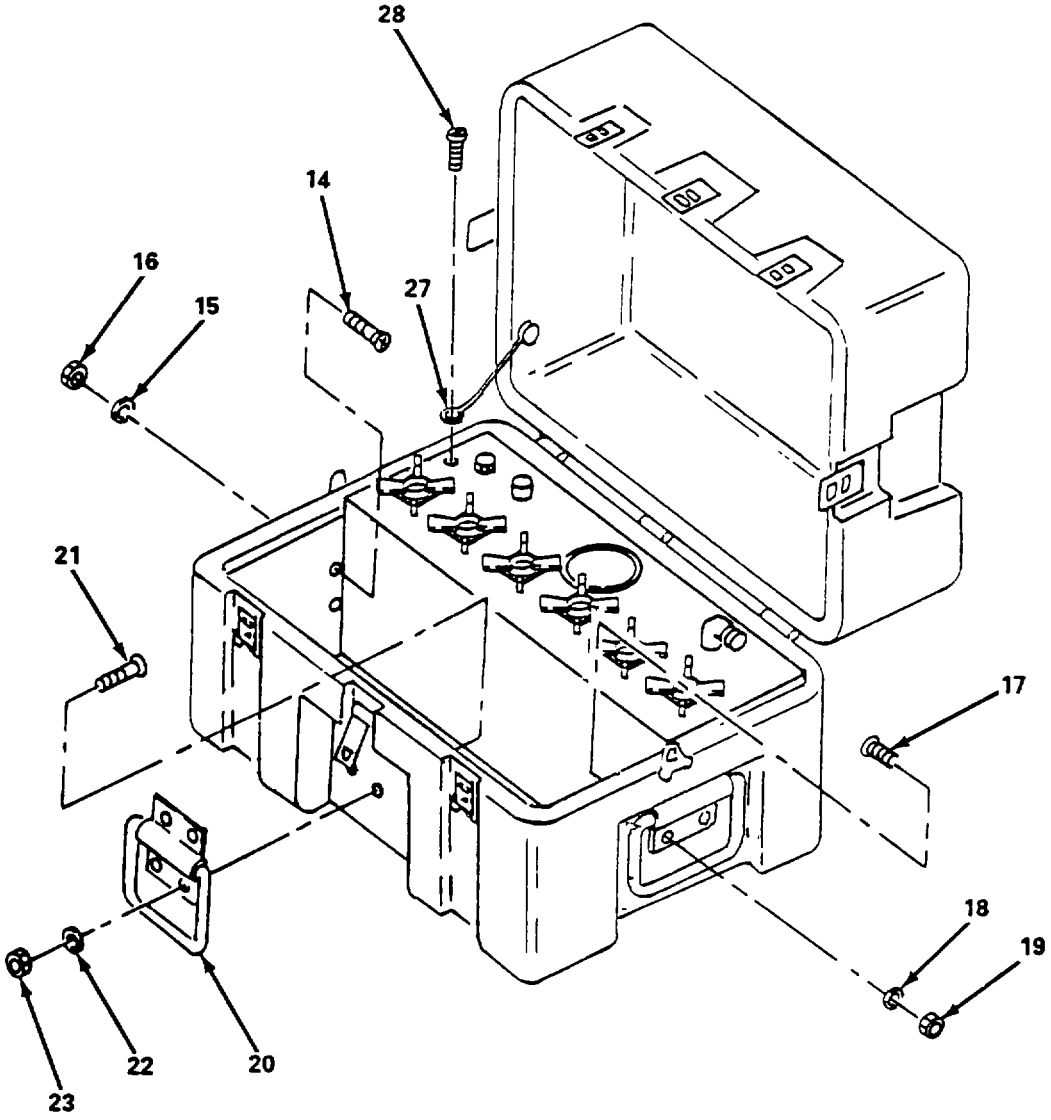

Figure 5-79. Whip Manifold, Install (Sheet 2 of 2).

5-61. Vent Valve.

This task covers	Replace

INITIAL SETUP:

Tools	*Materials/Parts*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Bags, Plastic (Item 4, Appendix D) Bands, Rubber (Item 5, Appendix D) Tape, Adhesive (Item 19, Appendix D)
Reference Para 4-10 Maintenance and Reentry Control Procedures.	

Replace.

(1) Remove. (figure 5-80)

(a) Unsnap five latches (1) and open top cover (2).

(b) Remove charging whips (3) from storagewells (4).

(c) Remove two screws (5) and supportwell bracket tops (6) from supportwell brackets (7).

(d) Repeat step (c) for remaining storagewell.

(e) Slide two storagewells (4) straight out.

(f) Remove screw (8), disconnect wire rope (9), and open cover (2) fully.

(g) Remove 12 screws (10).

(h) Remove 10 screws (11).

(i) Remove 12 screws (12).

(j) Remove four screws (13), washers (14), and nuts (15) and remove handle (16).

(k) Remove two screws (17), washers (18), and nuts (19).

(l) Remove two screws (20), washers (21), and nuts (22).

(m) Remove control panel (23), storagewell (24), and six charging whips (3) from case (25).

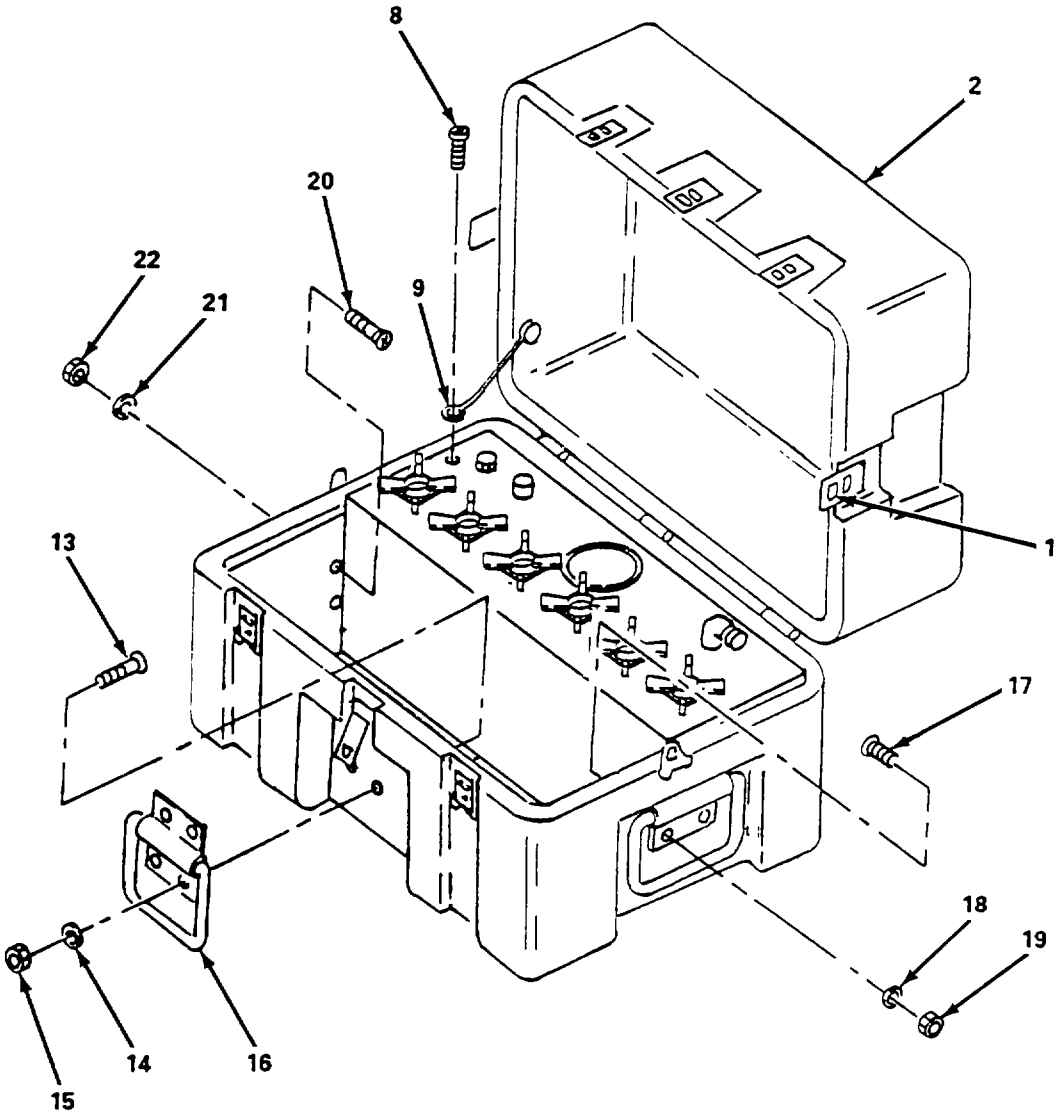

Figure 5-80. Vent Valve, Remove (Sheet 1 of 2).

5-61. **Vent Valve (Cont).**

WARNING

Cleanliness is imperative in maintaining and handling diving air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver.

(n) Loosen two connector nuts (26) and remove line (27).

(o) Loosen setscrew (28) and remove vent valve handle (29).

(p) Remove nut (30).

(q) Remove fitting cap (31) and remove vent valve (32) and elbow (33)

(r) Remove elbow (33) from vent valve (32).

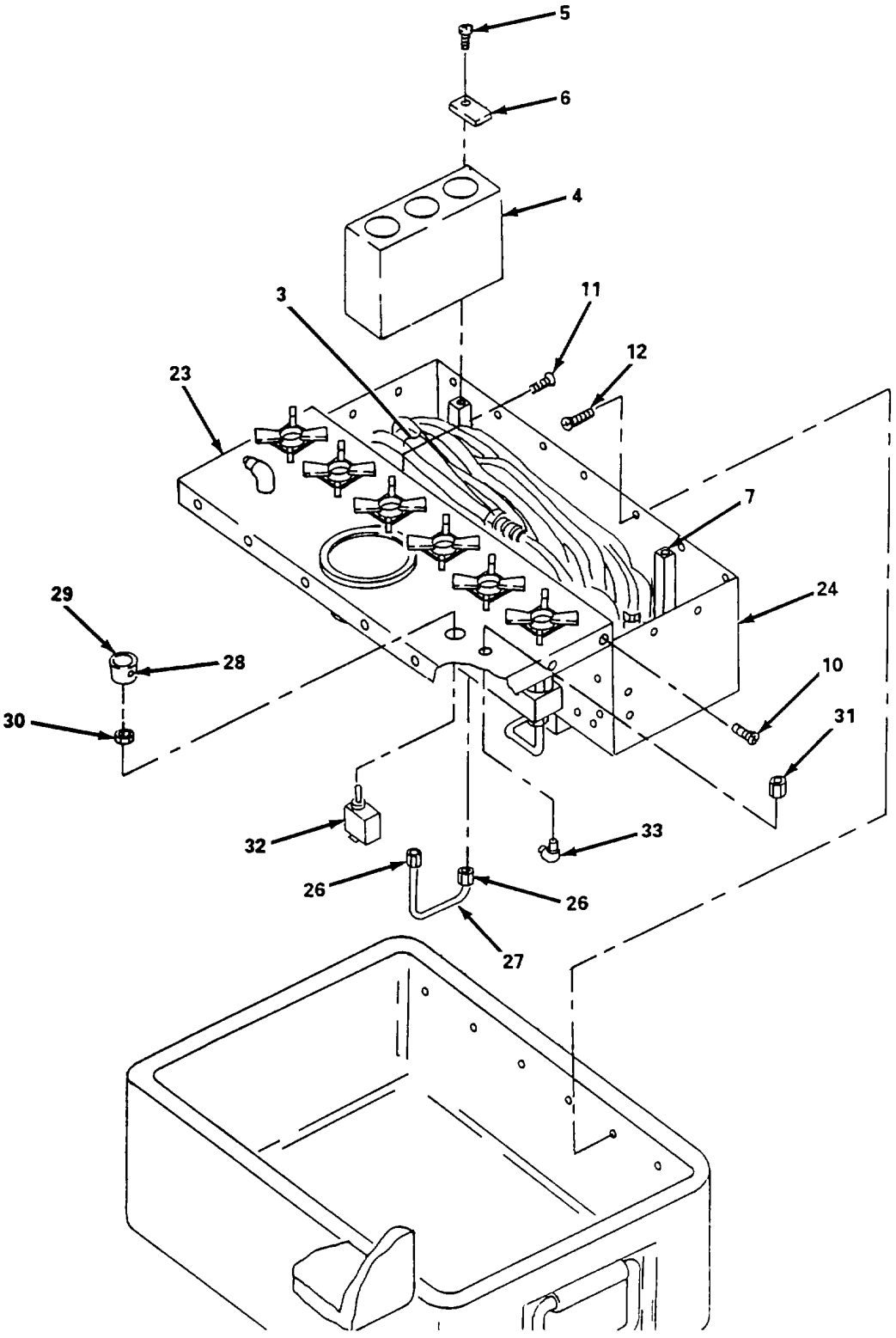

Figure 5-80. Vent Valve, Remove (Sheet 2 of 2).

5-61. **Vent Valve (Cont).**

(2) Install. (figure 5-81)

(a) Install elbow (1) on new vent valve (2) Ensure elbow (1) is pointing in the same direction as valve stem.

(b) Install vent valve (2) and secure with nut (3).

(c) Install fitting cap (4).

(d) Install line (5) and tighten two fitting nuts (6).

(e) Install vent valve handle (7) and tighten setscrew (8).

(f) Install control panel (9), storagewell (10) and six charging whips (11).

(g) Install two screws (12), washers (13), and nuts (14).

(h) Install two screws (15), washers (16), and nuts (17).

(i) Install handle (18) and secure with four screws (19), washers (20), and nuts (21).

(j) Install 12 screws (22).

(k) Install 10 screws (23).

(l) Install 12 screws (24).

(m) Install wire rope (25) and secure with screw (26).

(n) Install storagewell (27) and secure with two storagewell brackets (28), storagewell bracket tops (29), and two screws (30).

(o) Install Repeat step (n) for remaining storagewell.

(p) Install charging whips (9) on storagewells (25).

(q) Close cover (31) and secure with five latches (32).

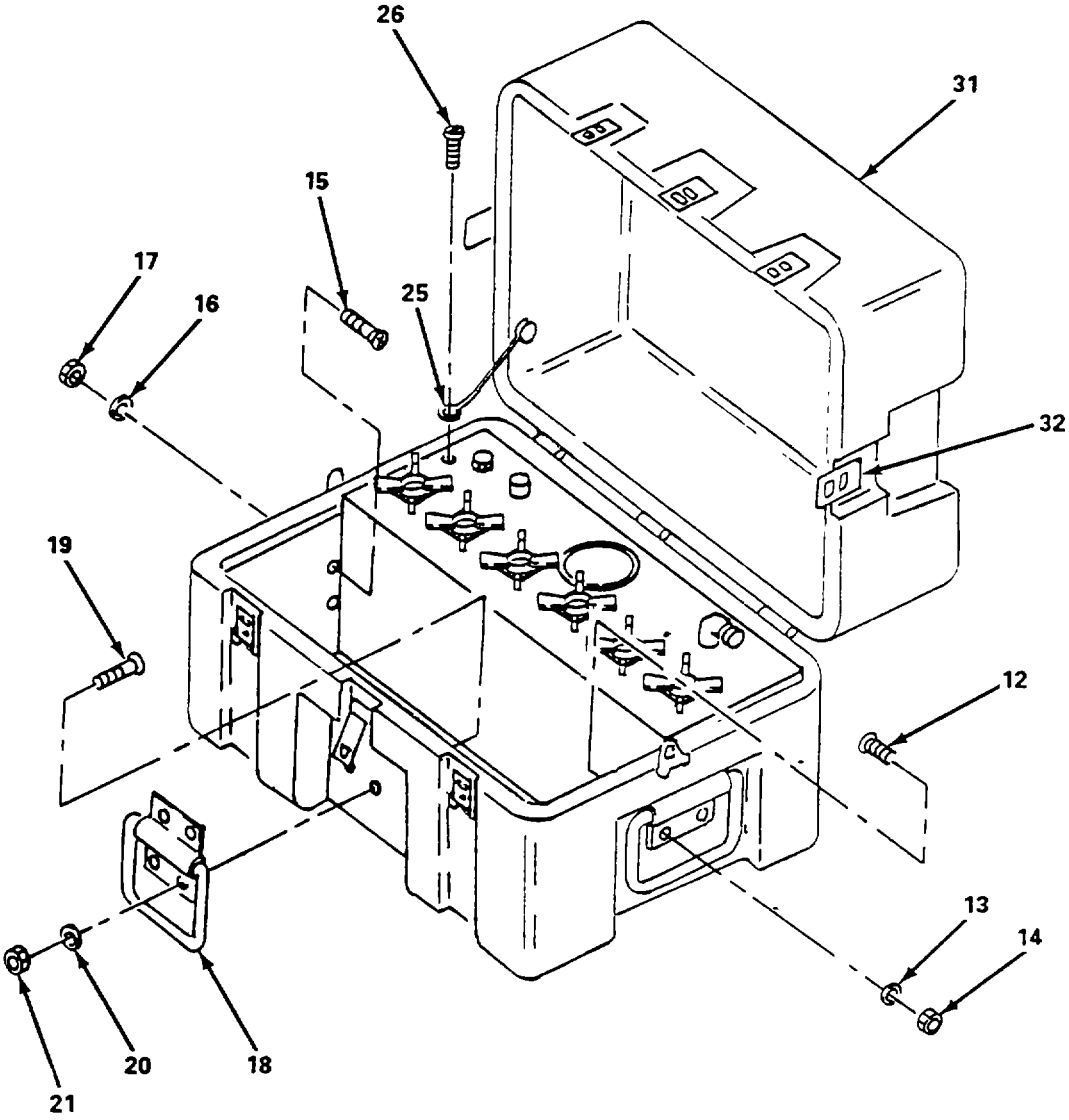

Figure 5-81. Vent Valve, Install (Sheet 1 of 2).

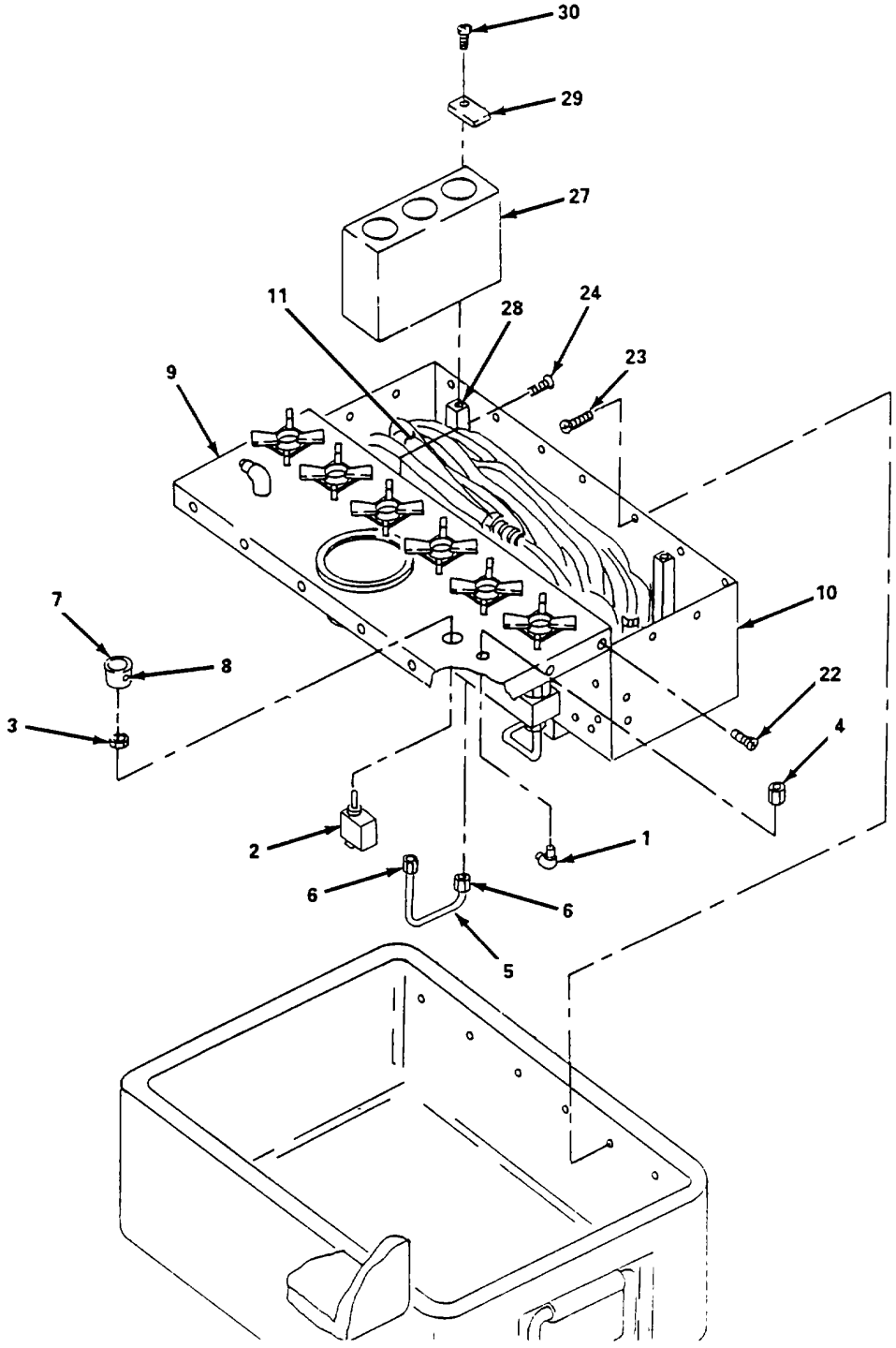

Figure 5-81. Vent Valve, Install (Sheet 2 of 2).

5-62. **Hand Valve.**

This task covers: Replace

INITIAL SETUP

Tools	*Materials/Parts*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Bags, Plastic (Item 4, Appendix D) Bands, Rubber (Item 5, Appendix D) Tape, Adhesive (Item 19, Appendix D)

Replace

(1) Remove. (figure 5-82)

(a) Unsnap five latches (1) and open top cover (2).

(b) Remove whips (3) from storagewell (4).

(c) Remove two screws (5) and supportwell bracket tops (6) from supportwell brackets (7).

(d) Repeat step (c) for remaining storagewell.

(e) Slide two storagewells (4) straight out.

(f) Remove screw (8), disconnect wire rope (9), and open cover (2) fully.

(g) Remove 12 screws (10).

(h) Remove 10 screws (11).

(I) Remove 12 screws (12).

(j) Remove four screws (13), washers (14), and nuts (15) and remove handle (16).

(k) Remove two screws (17), washers (18), and nuts (19).

(l) Remove two screws (20), washers (21), and nuts (22).

(m) Remove control panel (23), storagewell (24), and six whip (3) from case (25).

(n) Remove nut (26), washer (27), and tag and remove handle (28).

(o) Repeat step (n) for remaining handles.

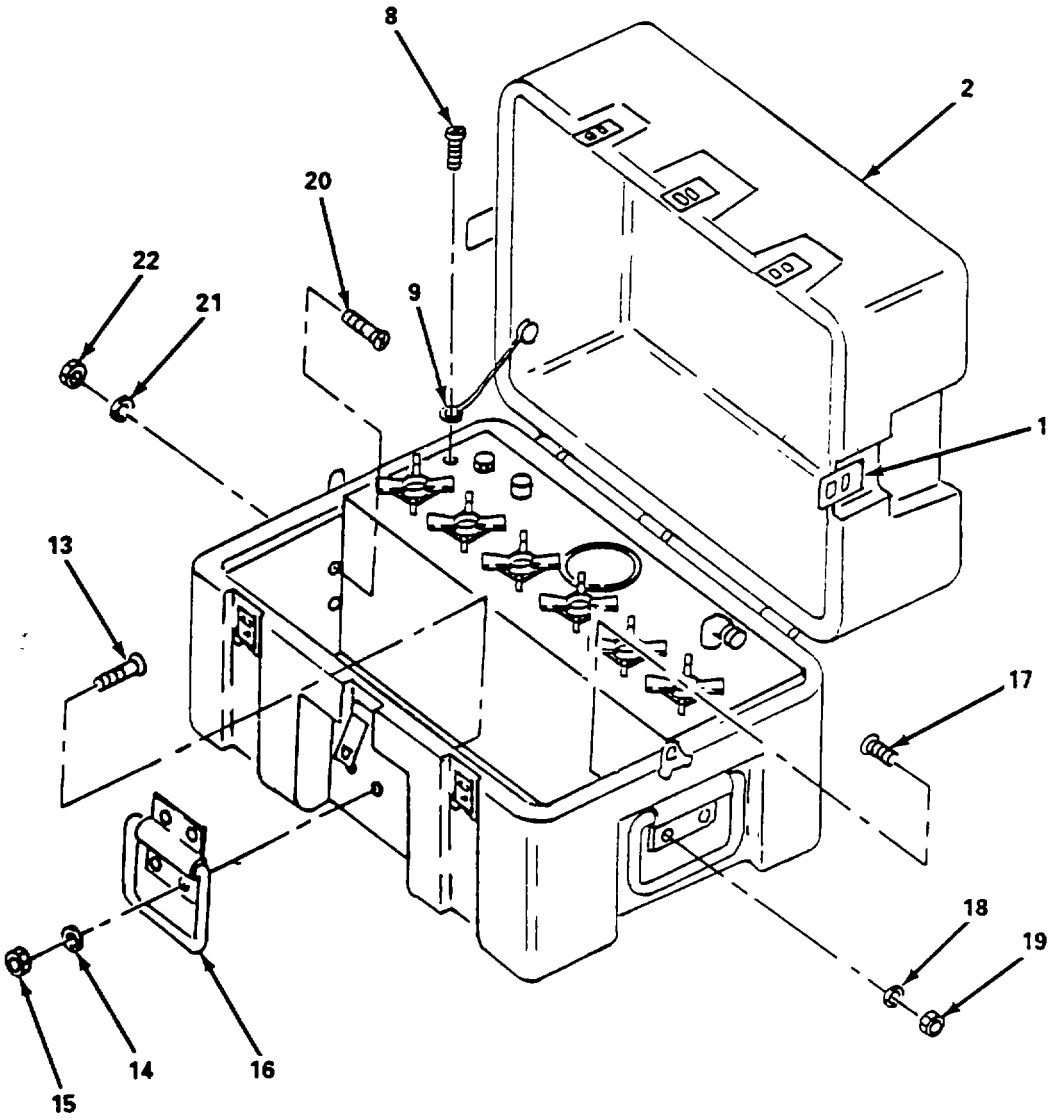

Figure 5-82. Hand Valve, Remove (Sheet 1 of 2).

5-62. **Hand Valve (Cont).**

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(p) Loosen three connector nuts (29).

(q) Remove six nuts (30).

(r) Remove 12 screws (31).

(s) Push valves (32) out of control panel (23).

NOTE

Perform steps (t) and (u) for valve being removed.

(t) Loosen union nut (33) and remove tailpiece (34) and O-ring (35) from valve (32).

(u) Loosen union nut (36) and remove tall piece (37) and O-ring (38) from valve (32) and remove valve (32).

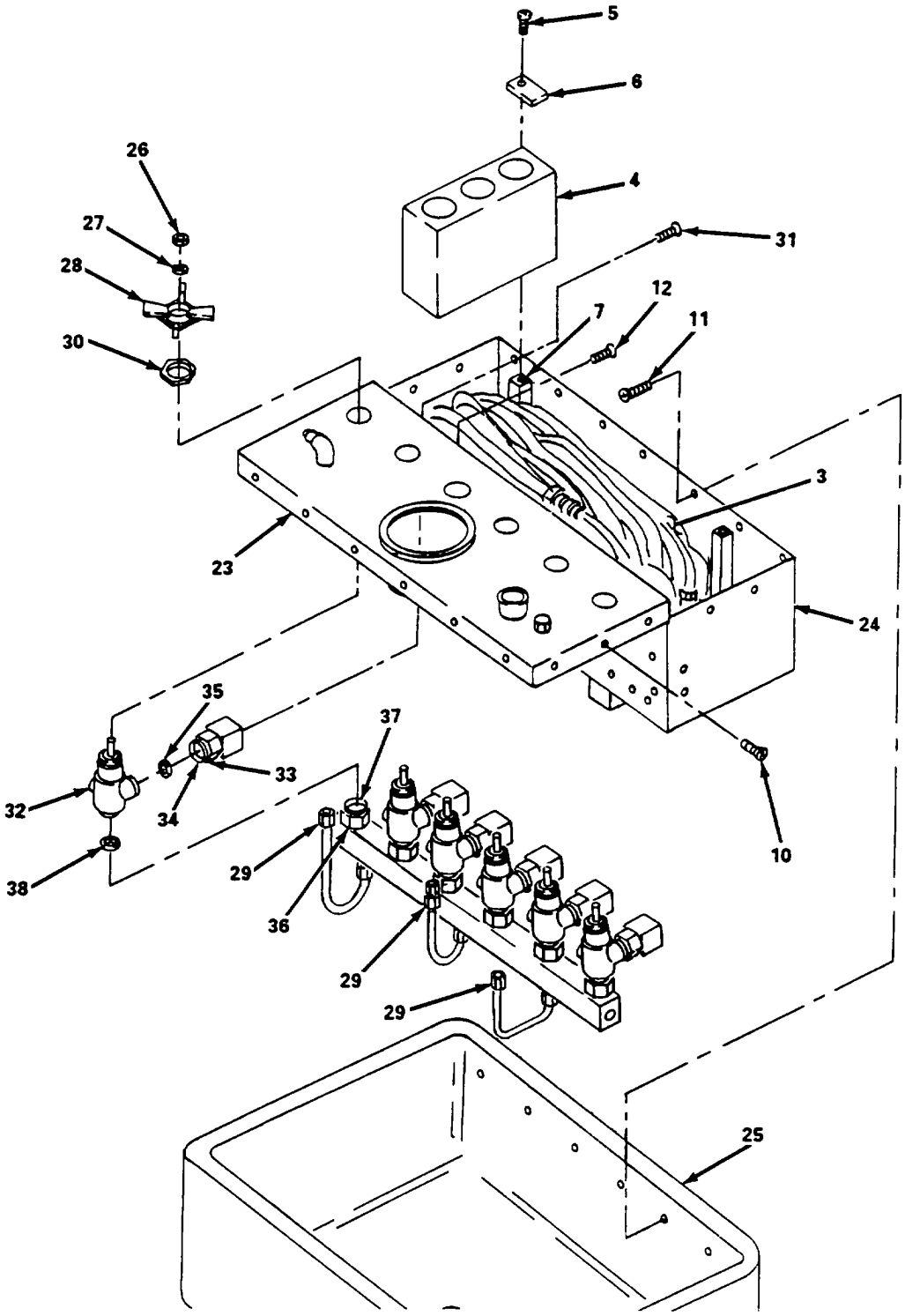

Figure 5-82. Hand Valve, Remove (Sheet 2 of 2).

5-62. **Hand Valve (Cont).**

(*2*) *Install.* (figure 5-83).

(a) Install new O-ring (1), new valve (2), and tailpiece (3) and tighten union nut (4).

(b) Install new O-ring (5) and tighten tailpiece (6) and tighten union nut (7). Ensure screw holes on manifold block (8) are in the correct position.

(c) Install valve (2) in control panel (9) and tighten three connector nut (10).

(d) Install six nuts (11).

(e) Install 12 screws (12).

(f) Install valve handle (13), as tagged, and secure with nut (14) and washer (15).

(g) Repeat step (f) for remaining handles.

(h) Install control panel (9) and storagewell (16) in case (17).

(j) Install two screws (18), washers (19), and nuts (20).

(j) Install two screws (21), washers (22), and nuts (23).

(k) Install handle (24) and secure with four screws (25), washers (26), and nuts (27).

(l) Install wire rope (28) and secure with screw (29).

(m) Install 12 screws (30).

(n) Install 10 screws (31).

(o) Install 12 screws (32).

(p) Install storagewell (33) and secure with four screws (34) and supportwell bracket tops (35).

(q) Install whips (36) in storagewells (33).

(r) Close cover (37) and secure with five latches (38).

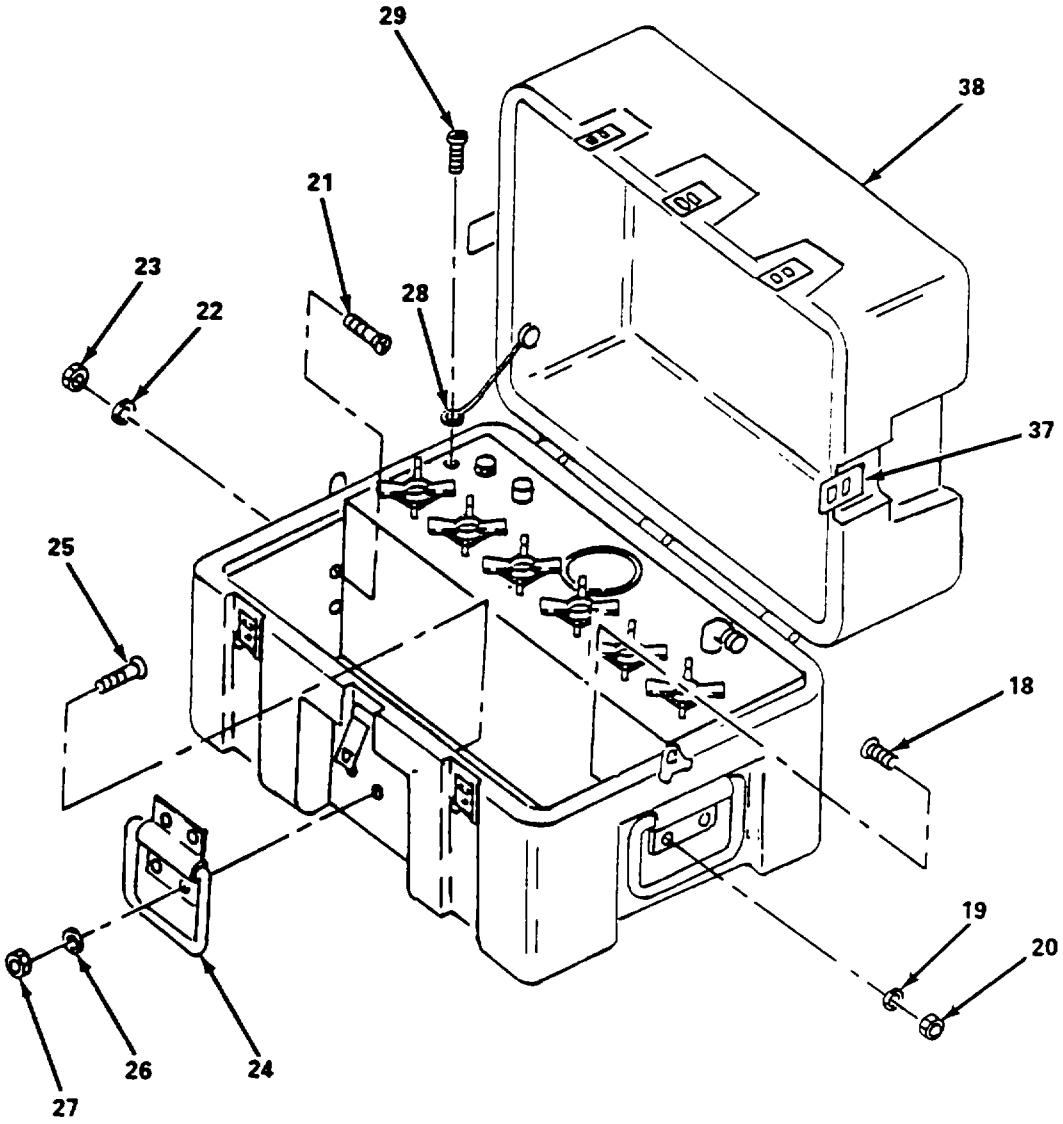

Figure 5-83. Hand Valve, Install (Sheet 1 of 2).

5-62. **Hand Valve (Cont).**

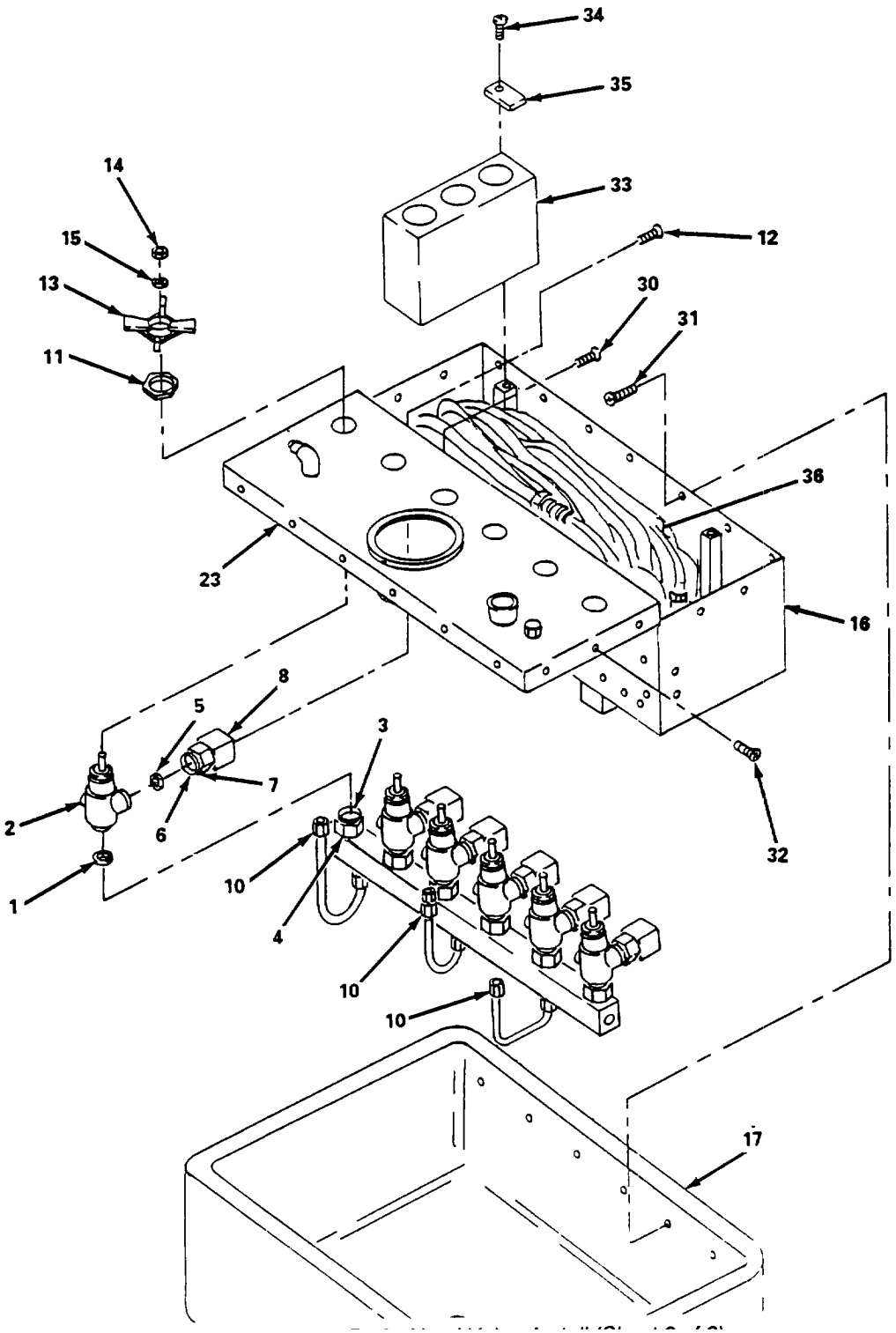

Figure 5-83. Hand Valve, Install (sheet 2 of 2).

CHAPTER 6
GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

OVERVIEW

This chapter contains information for troubleshooting and maintenance of Type I and Type II Manifold Servicing Units, Oxygen Booster Pump and Oxygen Charging Station by general support maintenance personnel

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

6-1. **Common Tools and Test Equipment.** For authorized common tools and support equipment refer to Modified Table of Organization and Equipment (MTOE) applicable to your unit.

6-2**. Special Tools, TMDE, and Support Equipment.** There are no special tools or support equipment required Refer to Appendix B, Maintenance Allocation Chart, Section III for basic tools.

6-3**. Repair Parts.** Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM 5-4220-228-24P Those parts not listed in the RPSTL, but required, are identified in each maintenance task.

Section II. GENERAL SUPPORT TROUBLESHOOTING

6-4. **General.** This section contains troubleshooting procedures to determine the probable cause of observed equipment malfunctions. Test or inspections are provided to isolate the faulty component and corrective actions are provided to eliminate the malfunction.

6-5. **General Support Troubleshooting Procedures.** Table 6-1 lists the common malfunctions that may be found during operation. Refer to the symptom index to locate the troubleshooting procedure for the malfunction This manual cannot list all malfunctions that may occur, nor all tasks or inspections and corrective actions If a malfunction Is not corrected by the listed corrective actions, notify your supervisor.

Symptom Index

Table 6-1 General Support Troubleshooting Procedures.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1**. OXYGEN BOOSTER PUMP DOES NOT OPERATE.**
Step 1. Check air drive/air piston.
Repair damaged air drive/air piston (para 6-18).
Step 2. Check result regulator.
Repair damaged result regulator (para. 6-25).
2. **OXYGEN BOOSTER PUMP CYCLES BUT DOES NOT TRANSFER OXYGEN**
Step 1. Check 15X gas barrel.
Replace or repair 15X gas barrel (para. 6-18).
Step 2. Check 30X gas barrel.
Replace or repair 30X gas barrel (para. 6-19).

Section III. GENERAL SUPPORT MAINTENANCE PROCEDURES

6-6. **General.** This section contains general support maintenance procedures as authorized by the maintenance allocation chart (MAC) in Appendix B of this manual When performing maintenance of Type I and Type II Manifold Servicing Units, Oxygen Booster Pump or Oxygen Charging Station, keep all tools and work area as clean as possible. Remove all oils, grease, rust or other contaminants in accordance with Chapter 4, Section V of this manual All components must be cleaned with distilled water. Tools should be thoroughly cleaned after performing maintenance on trailer and before performing maintenance on air or oxygen systems. The Type I and Type II Manifold Servicing Units are very similar pieces of equipment. Many of the maintenance procedures are the same and have been provided for each system The Type I and Type II Manifold Servicing Units can be very dangerous to work on Observe all Warnings, Cautions and Notes and keep the following Warnings in mind always

WARNING

- Do not interchange air and oxygen parts
- Do not disconnect any servicing hose without first making sure no pressure is in the line
- Do not use a petroleum based cleaning agent on any part of an air or oxygen system
- Fire suppression equipment of the proper size and type shall be immediately available during use, movement or storage of charged oxygen equipment.

6-7. **Cylinder Assembly (Air), Type I.**

This task covers:	Test

INITIAL SETUP

Equipment Condition	*Reference*
Cylinder assembly removed (para. 5-9)	Para. 4-10 Maintenance and Reentry Control Procedures

Test

The cylinder assembly should be hydrostatically tested every five years in accordance with Compressed Gas Association Pamphlet C-1 Hydrostatic Testing Inspect cylinder for last hydrostatic test and have cylinder tested If date Is more than five years old, or cylinder is visibly damaged.

6-8 **Flex Hose (CGA-346), Type I.**

This task covers: Test

INITIAL SETUP

Equipment Condition	*Reference*
Flex hose removed (para 5-10)	Para 4-10 Maintenance and Reentry Control Procedures

Test

Inspect flex hoses for last hydrostatic test date. The flex hoses should be hydrostatically tested If date of last test is more than five years old.

6-9. **Pressure Gage (Air), Type I.**

This task covers: Test

INITIAL SETUP

Equipment Condition	*Reference*
Pressure gage removed (para. 5-12).	Para. 4-10 Maintenance and Reentry Control Procedures

Calibrate.

The pressure gages should be removed from the control panel and calibrated once a year Inspect gage for last calibration date and have the gage calibrated if date on gage is more than 1 year old.

6-10. **Pressure Relief Valve (Air), Type I.**

This task covers: Test

INITIAL SETUP

Tools	*Reference*
General Mechanic's Tool Kit (NSN 5180-00-177-7033)	Para 4-10 Maintenance and Reentry Control Procedures

Equipment Condition

Pressure relief valve removed (para. 5-16)

Test .(figure 6-1)

(1) Connect pressure relief valve (1) to test fixture.

(2) Test valve (1) and pressure relief valve (1) "pop-off" at 3800 psi (26201 Kpa)

(3) Remove pressure relief valve (1) from test fixture

(4) If pressure relief valve (1) requires more or less pressure than specified, the pressure relief valve should be replaced

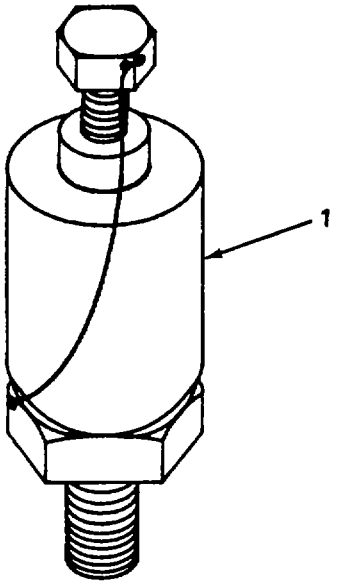

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Figure 6-1 Pressure Relief Valve, Test.

FOLLOW-ON MAINTENANCE
Install pressure relief valve (para. 5-16)

6-11 **Cylinder Assembly (Air or Oxygen), Type II.**

This task covers: Test

INITIAL SETUP

Equipment Condition	*Reference*
Cylinder assembly removed (para. 5-23).	Para. 4-10 Maintenance and Reentry **Control** Procedures

Test.

The cylinder assembly should be hydrostatically tested every five years in accordance with Compressed Gas Association Pamphlet C-1 Hydrostatic Testing. Inspect cylinder for last hydrostatic test and have cylinder tested rf date is more than live years old or cylinder is visibly damaged.

6-12 **Flex Hose (CGA-346 and CGA-540) Type II.**

This task covers: Test

INITIAL SETUP

Equipment Condition	*Reference*
Flex hose removed (para. 5-24)	Para. 4-10 Maintenance and Reentry Control Procedures

Test

Inspect flex hoses for last hydrostatic test date. The flex hoses should be hydrostatically tested if date of last test Is more than five years old

6-13. Pressure Gage (Air or Oxygen), Type II.

This task covers: Calibrate

INITIAL SETUP

Equipment Condition	*Reference*
Pressure gage removed (para. 5-26)	Para. 4-10 Maintenance and Reentry Control Procedures

Calibrate

The pressure gages should be removed from the control panel and calibrated once a year. Inspect gage for last calibration date and have the gage calibrated If date on gage is more than one year old.

6-14 **Pressure Relief Valve (Air and Oxygen), Type II,**

This task covers: Test

INITIAL SETUP

Equipment Condition	*Reference*
Pressure relief valve removed (para 5-30)	Para. 4-10 Maintenance and Reentry Control Procedures

Test (figure 6-2)

(1) Connect pressure relief valve (1) to test fixture.

(2) Test valve (1) and pressure relief valve (1) "pop-off" at 3800 psi (26201 Kpa).

(3) Remove pressure relief valve (1) from test fixture.

(4) If pressure relief valve (1) requires more or less pressure than specified, the pressure relief valve should be replaced.

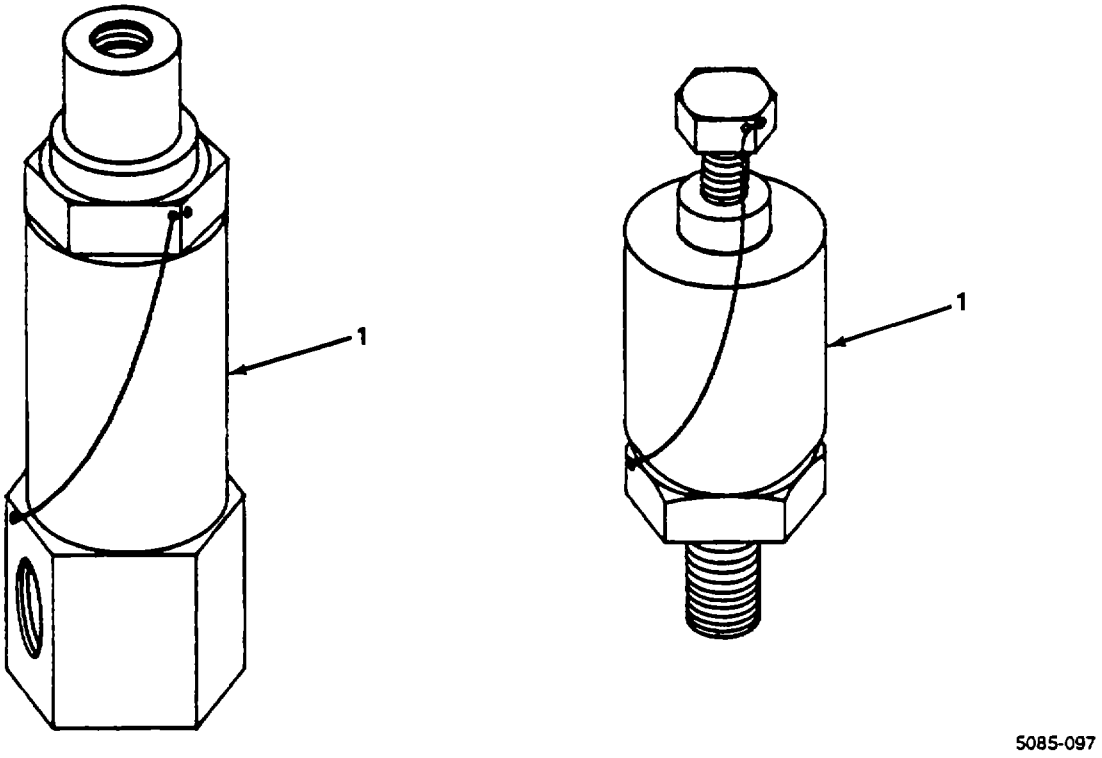

Figure 6-2. Pressure Relief Valve, Test.

FOLLOW-ON MAINTENANCE
Install pressure relief valve (para 5-30).

6-15. **Pump Assembly.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)

Materials/Parts (Cont)

Tape, Adhesive (Item 19, Appendix D)
Loctite (Item 22, Appendix C))

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Repair.

Replace (intercooler) (figure 6-3)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components All tools and parts must be kept free of oil, grease, rust, or other contamination In accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible Injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored In a plastic bag and sealed Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(a) Loosen two connector nuts (1) and remove line (2).

(b) Loosen two connector nuts (3) and remove line (4).

(c) Loosen two connector nuts (5).

(d) Loosen connector nut (6) and remove intercooler (7) and line (8).

(e) Remove line (8) from intercooler (7).

(f) Remove hex nipple (9) from Intercooler (7).

(g) Remove hex nipple (10) from intercooler (7).

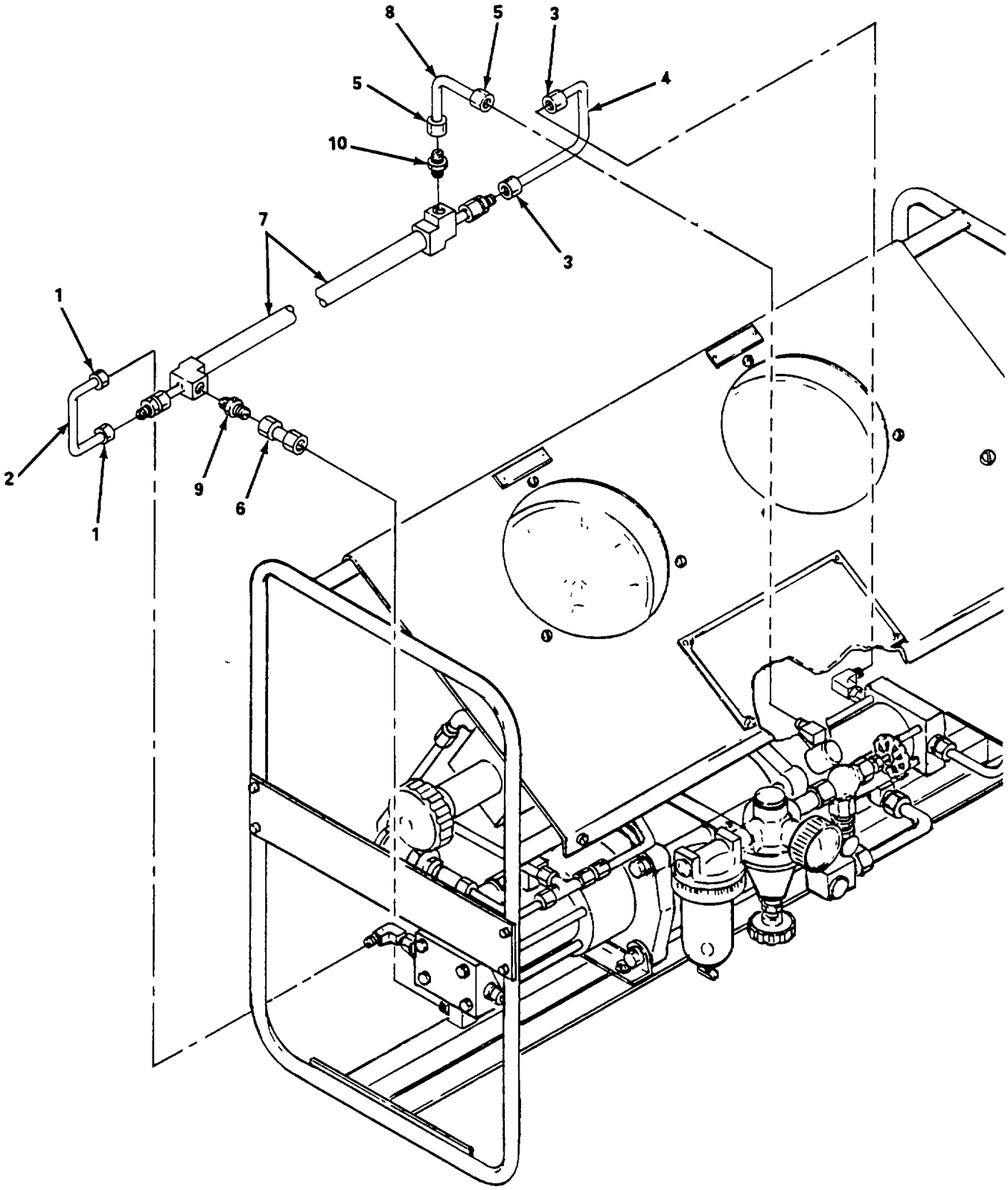

Figure 6-3. Intercooler, Replace.

WARNING

Leave 1 1/2 threads exposed on fitting when applying teflon tape. This will ensure that no teflon tape will hang down inside the oxygen system. Teflon tape should be wrapped in such a manner that when the fitting is tightened the tape will not loosen. Failure to wrap teflon tape correctly may result in contamination or blockage of the oxygen system and subsequent possible injury or death to the diver

(h) Apply teflon tape to threads on hex nipples (9) and (10).

(i) Install hex nipple (9).

(j) Install hex nipple (10).

(k) Install line (8).

(l) Install intercooler (7) and tighten connector nut (6).

(m) Tighten two connector nuts (5).

(n) Install line (4) and tighten two connector nuts (3).

(o) Install line (2) and tighten two connector nuts (1).

(p) Apply a bead of loctite between back of connector nuts and lines.

6-16. **Air Cycling Valve (Air and Oxygen).**

This task covers: Repair

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance, Common No 1 (NSN 4910-00-754-0654)
Stem Removal Tool (NSN 5120-01-260-6245)

Materials/Parts

Seal Lube (Item 21, Appendix D)
Bags, Plastic (Item 4, Appendix D)

Materials/Parts (Cont)

Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Repair. (figure 6-4)

WARNING

Cleanliness is imperative in maintaining and handling air system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result In equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the air system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause air system to become contaminated and could result in injury or death to the diver

(1) Loosen two connector nuts (1) and remove line (2).

(2) Remove retainer nut (3) and O-rings (4).

(3) Remove hex nipple (5)

(4) Remove retaining ring (6) and two O-rings (7) from block (8) and discard O-rings (7).

(5) Remove spool assembly (9) with nine O-rings (10) and discard O-rings (10).

(6) Remove O-rings (10) from spool assembly (9) and discard O-rings (10).

(7) Using stem removal tool, remove sleeve (11) with four O-rings (12) and discard O-rings (12).

(8) Using stem removal tool, remove spacer (13).

(9) Inspect spool assembly (9) and replace if worn, scored, or bent.

(10) Inspect retainer nut (3) and replace rf threads are stripped or retainer nut Is otherwise damaged.

(11) Inspect sleeve (11) and replace if deformed, scored, or otherwise damaged, replace sleeve (11).

(12) Lubricate all O-rings with seal lube.

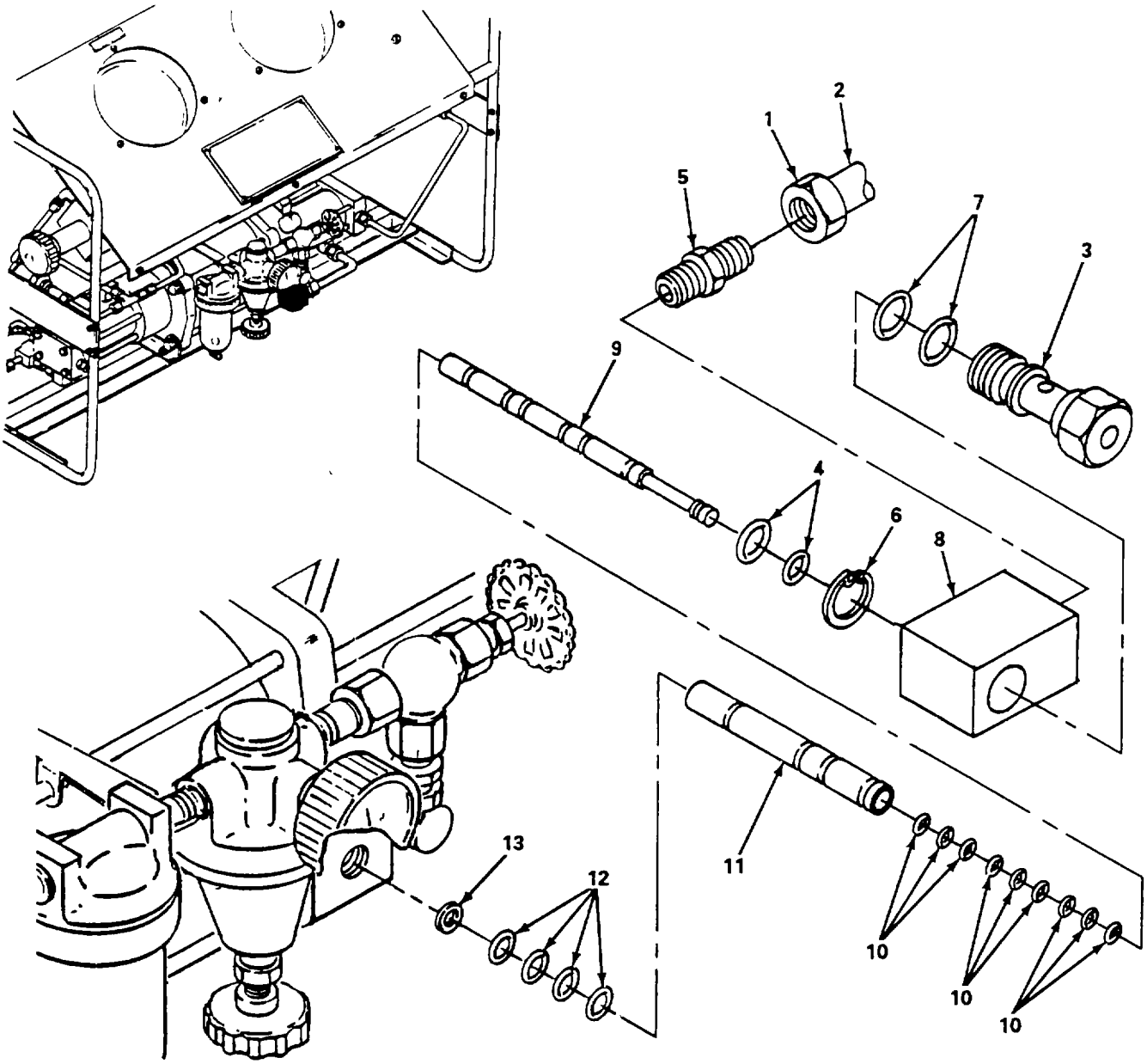

Figure 6-4. Air Cycling Valve, Repair.

(13) Install spacer (13) and ensure It is fully installed.

(14) Install four O-rings (12) on sleeve (11).

(15) Install sleeve (11) and ensure It Is installed fully and seats flush with spacer (13).

(16) Install nine O-Rings (10) on spool assembly (9).

(17) Install spool assembly (9) and ensure it is fully installed.

(18) Install two-O-rings (4).

(19) Install two O-rings (7) on retainer nut (3).

(20) Position block (8) on retainer nut (3) and secure with retaining ring (6).

(21) Install retainer nut (3).

(22) Install hex nipple (5).

(23) Install line (2) and tighten two connector nuts (1).

6-17. **15X Gas Barrel.**

This task covers: a. Replace b. Repair

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance, Common No. 1 (NSN 4910-00-754-0645)
Gas Barrel Assembly Tool (PN 17426)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Materials/Parts

Loctite (Item 22, Appendix D)

a. Replace. (figure 6-5)

WARNING

Cleanliness Is Imperative In maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result In equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut Small components should be stored In a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver .

(1) Loosen two connector nuts (1) and remove line (2).

(2) Loosen two connector nuts (3) and remove line (4).

(3) Loosen connector nuts (5).

(4) Remove four nuts (6) and lockwashers (7) and remove end cap (8), two backups (9), and O-ring (10).

(5) Remove cooling barrel (11) and line (12).

(6) Slide piston rod (13) approximately 1/4 in. (635 cm) out of barrel (14).

(7) Remove cotter pin (15), nut (16), six belleville washers (17), bearing (18), O-ring (19), seal (20), bronze back-up (21), TFE seal (22), bronze back-up (23), piston (24), back-up (25), O-ring (26), from piston rod (13).

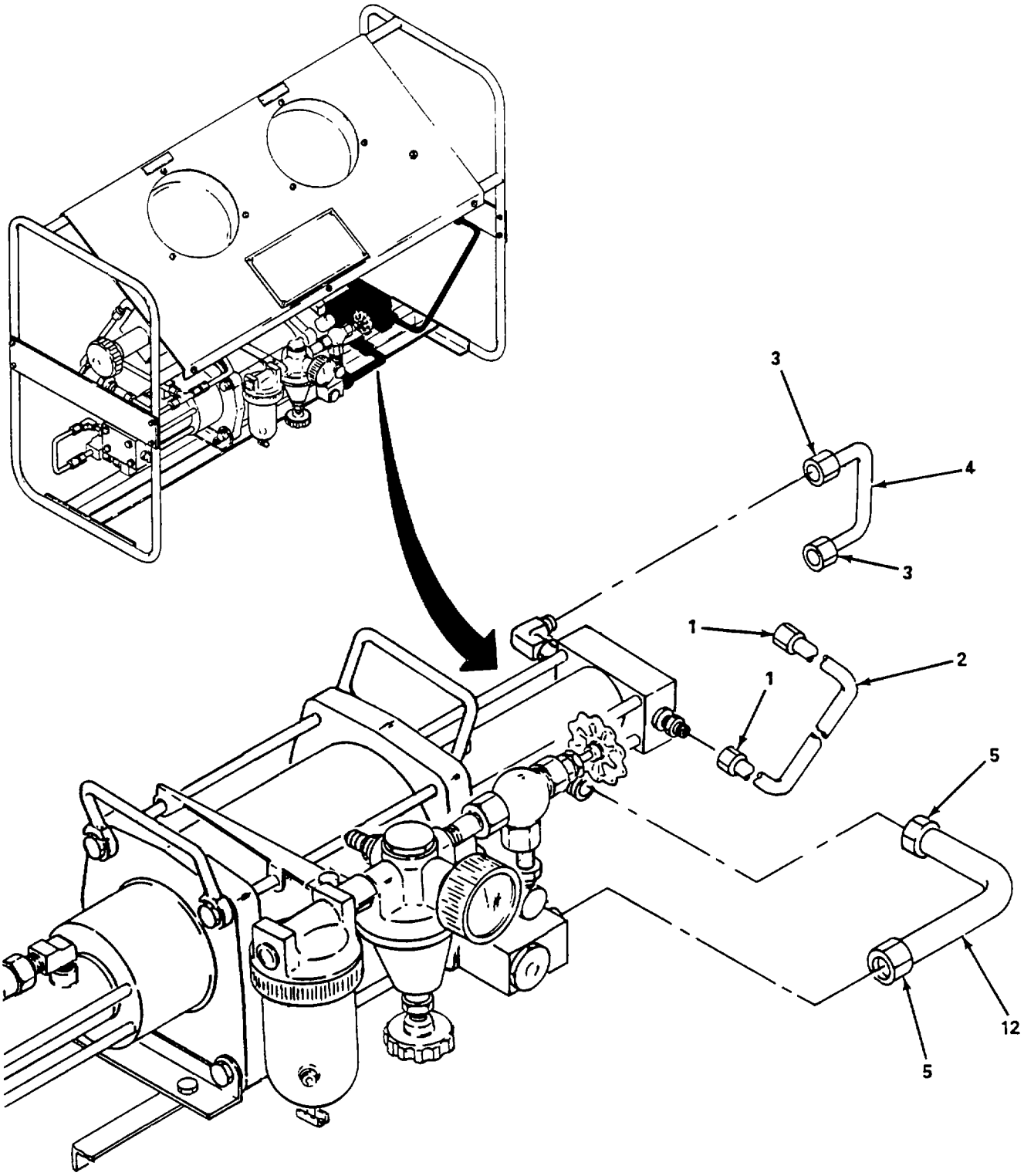

Figure 6-5 15X Gas Barrel, Remove (Sheet 1 of 2).

6-17. 15X Gas Barrel (Cont).

(8) Remove retaining ring (27), retainer (28), bearing (29), O-ring (30), seal (31), spacer (32), O-ring (33), and gilder ring (34).

(9) Remove bushing (35) and two O-ring (36).

(10) Remove gas barrel (12) from end cap (37) and remove four O-rings (38).

(11) Remove O-ring (39.

(12) Install new O-ring (39).

(13) Install four new O-rings (38) on gas barrel (14) and install gas barrel (14).

(14) Install two O-rings (36) on bushing (35) and Install bushing (35) in gas barrel (14) at the air end cap (37) side.

(15) Install O-ring (26) and back-up (25) on piston rod (13).

(16) Install piston (24) on piston rod (13) and Install piston rod (13) into gas barrel (14) through air end cap (37) and bushing (35).

(17) Position piston (24) so that it is flush with oxygen end of gas barrel (14).

(18) Install glider ring (34), O-ring (33), spacer (32), seal (31), O-ring (30), bearing (29), retainer (28), and retaining ring (27) in air end cap (37).

(19) Install bronze back-up (23), TFE seal (22), bronze back-up (21), seal (20), O-ring (19) and bearing (18) in piston (24).

(20) Install the belleville washers (17) on piston rod (13).

NOTE

When nut is properly installed, the nut should contact piston solidly, and be approximately flush with end of piston rod Remove or install belleville washers as needed to obtain desired configuration.

(21) Install nut (16) and tighten until snug, then back off until cotter pin (15) can be Installed.
(22) Install O-ring (10) and two back-ups (9) in end cap (8).
(23) Install cooling barrel (11) and line (12) and tighten connector nuts (5).
(24) Install end cap (8) and secure with four nuts (6) and lockwasher (7) and torque nuts to 16-18 LB-FT (21-24 Nm).
(25) Install line (4) and tighten connector nuts (3).
(26) Install line (2) and tighten connector nuts (1).
(27) Apply a bead of loctite between back of connector nuts and lines.

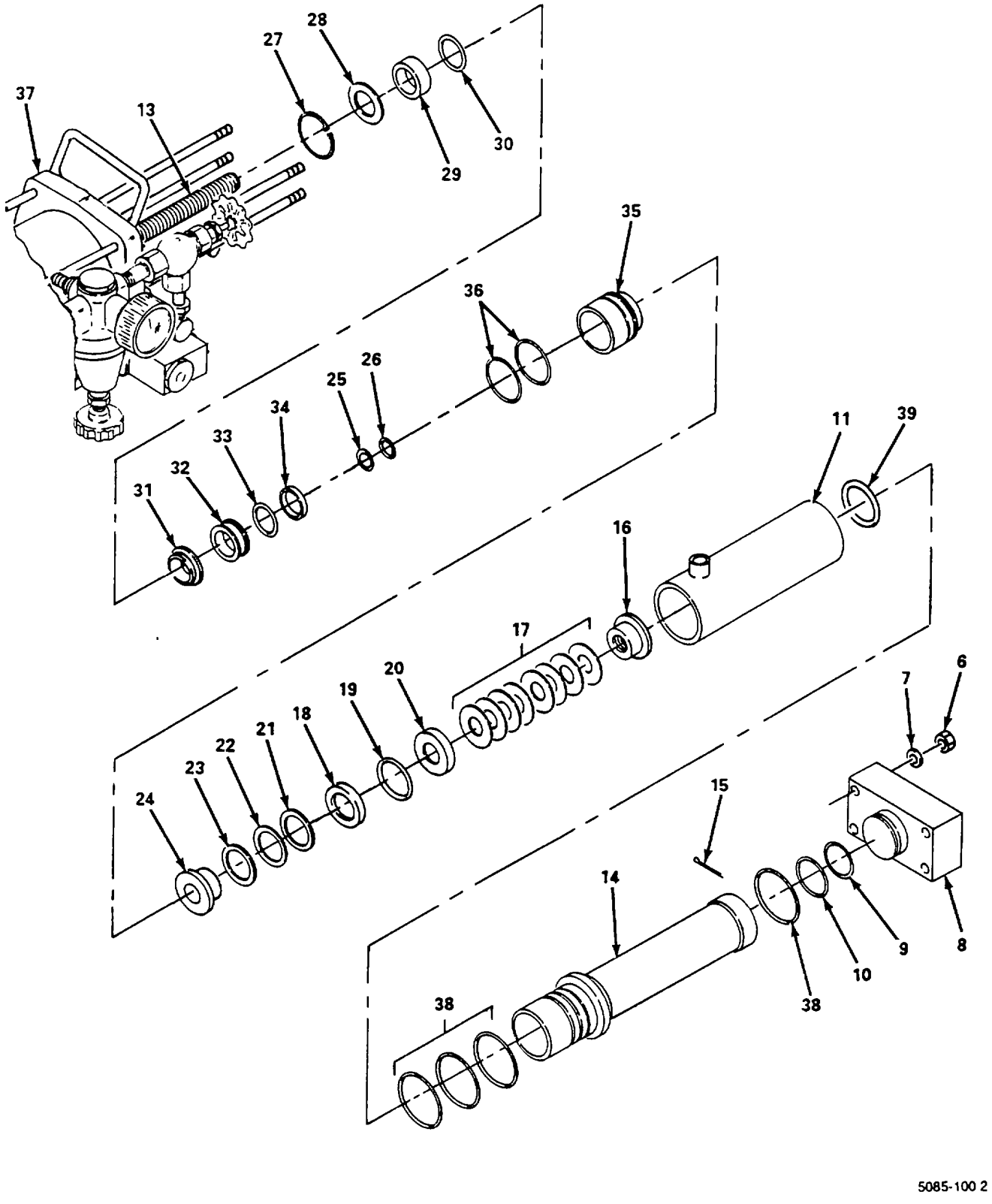

Figure 6-5. 15X Gas Barrel, Remove (Sheet 2 of 2).

6-17. **15X Gas Barrel (Cont).**

b. *Repair.* (figure 6-6)

(1) Remove 15X gas barrel (para. a.).

(2) Inspect piston (1) and replace If scored, worn or excessively worn.

(3) Inspect cooling barrel (2) and gas barrel (3) and replace if dented, cracked or otherwise damaged.

(4) Inspect piston rod (4) and replace if bent, cracked or worn.

(5) Inspect belleville washers (5) and replace if cracked, deformed or otherwise damaged.

(6) Inspect bushing (6) and replace if worn, scored, or otherwise damaged.

(7) Replace all O-rings, seals, retainers, backups, and glide rings.

(8) Install 15X gas barrel (para. a).

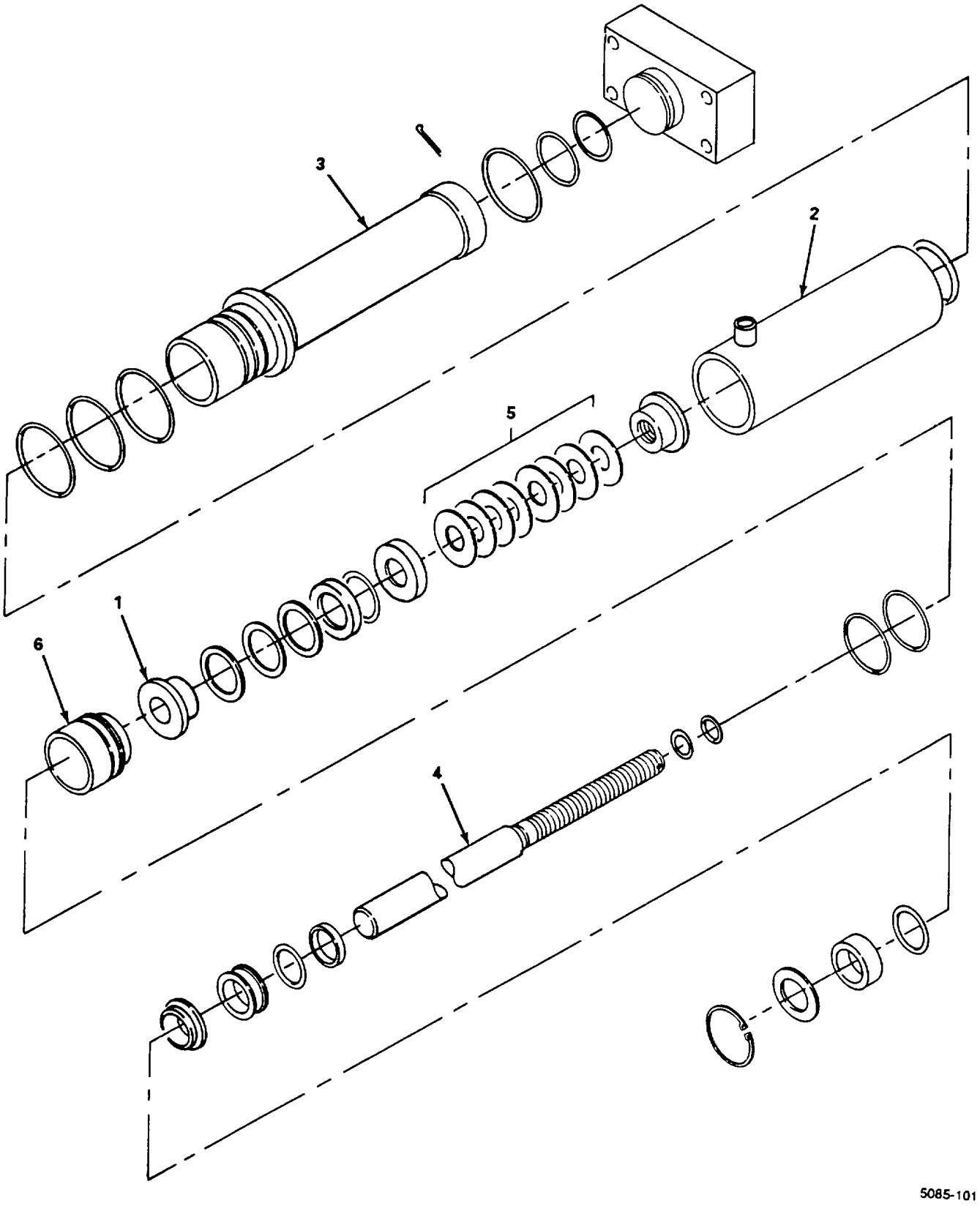

Figure 6-6. 15X Gas Barrel, Repair.

6-18. **30X Gas Barrel.**

This task covers: a. Replace c. Repair

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance, Common No, 1 (NSN 4910-00-754-0645)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Materials/Parts

Loctite (Item 22, Appendix D)

a. *Replace.* (figure 6-7)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(1) Loosen two connector nuts (1) and remove line (2).

(2) Loosen two connector nuts (3) and remove line (4).

(3) Loosen two connector nuts (5).

(4) Remove four nuts (6) and lockwashers (7) and remove check valve end cap (8), two backup (9) and one O-ring (10).

(5) Remove cooling barrel (11).

(6) Slide piston rod (12) approximately 1/4 in (0 63 cm) out of gas barrel (13) and remove cotter pin (14), nut (15), eight belleville washers (16), bearing (17), O-ring (18), seal (19), bronze back-up (20), TFE seal (12), and bronze back-up (22).

(7) Remove retaining ring (23), bearing (24), O-ring (25), seal (26), spacer (27), O-ring (28), and glider ring (29).

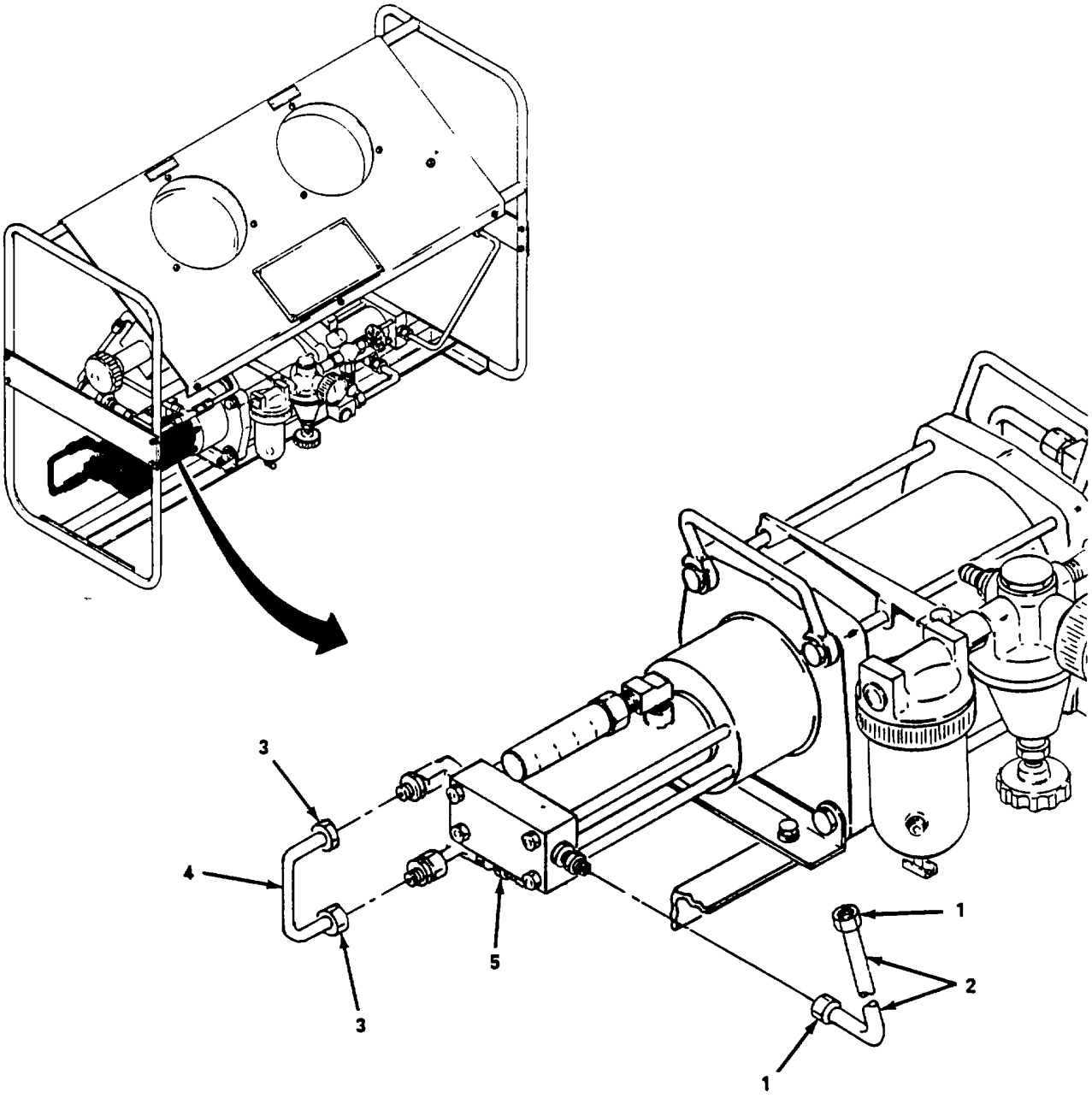

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Figure 6-7. 30X Gas Barrel, Replace (Sheet 1 of 2).

6-18. **30X Gas Barrel (Cont).**

(8) Remove gas barrel (13) and four O-rings (30).

(9) Remove O-ring (31).

(10) Install new O-ring (31)

(11) Install four new O-rings (30) on gas barrel (13).

(12) Install gas barrel (13).

(13) Install piston rod (12) in gas barrel (13) with the threaded end of piston rod (13) extending out of gas barrel (13).

(14) Install bronze back-up (22), TFE seal (21), bronze back-up (20), seal (19), O-ring (18) and bearing (17).

(15) Install glider ring (29), O-ring (28), spacer (27), seal (26), O-ring (25), bearing (24) and retaining ring (23).

(16) Install belleville washers (16) in sets of opposed pairs.

NOTE

When nut is properly tightened the nut should solidly contact the piston rod shoulder and be approximately flush with piston rod end. Add or remove belleville washers as needed to obtain proper configuration.

(17) Install nut (15) and tighten until snug. Back nut off slightly until cotter pin (14) can be installed and install cotter pin (14).

(18) Install O-ring (22) onto gas barrel (13) and install cooling barrel (11) aligning line (30) as cooling barrel (9) in installed.

(19) Install two O-rings (31) and back-ups (32) in end cap (8).

(20) Install end cap (8) and secure with four nuts (6) and lockwashers (7.) Torque nuts to 16-18 LB-FT (21-24 Nm).

(21) Tighten two connector nuts (5).

(22) Install line (4) and tighten two connector nuts (3).

(23) Install line (2) and tighten two connector nuts (1).

(24) Apply a bead of loctite between back of connector nuts and lines.

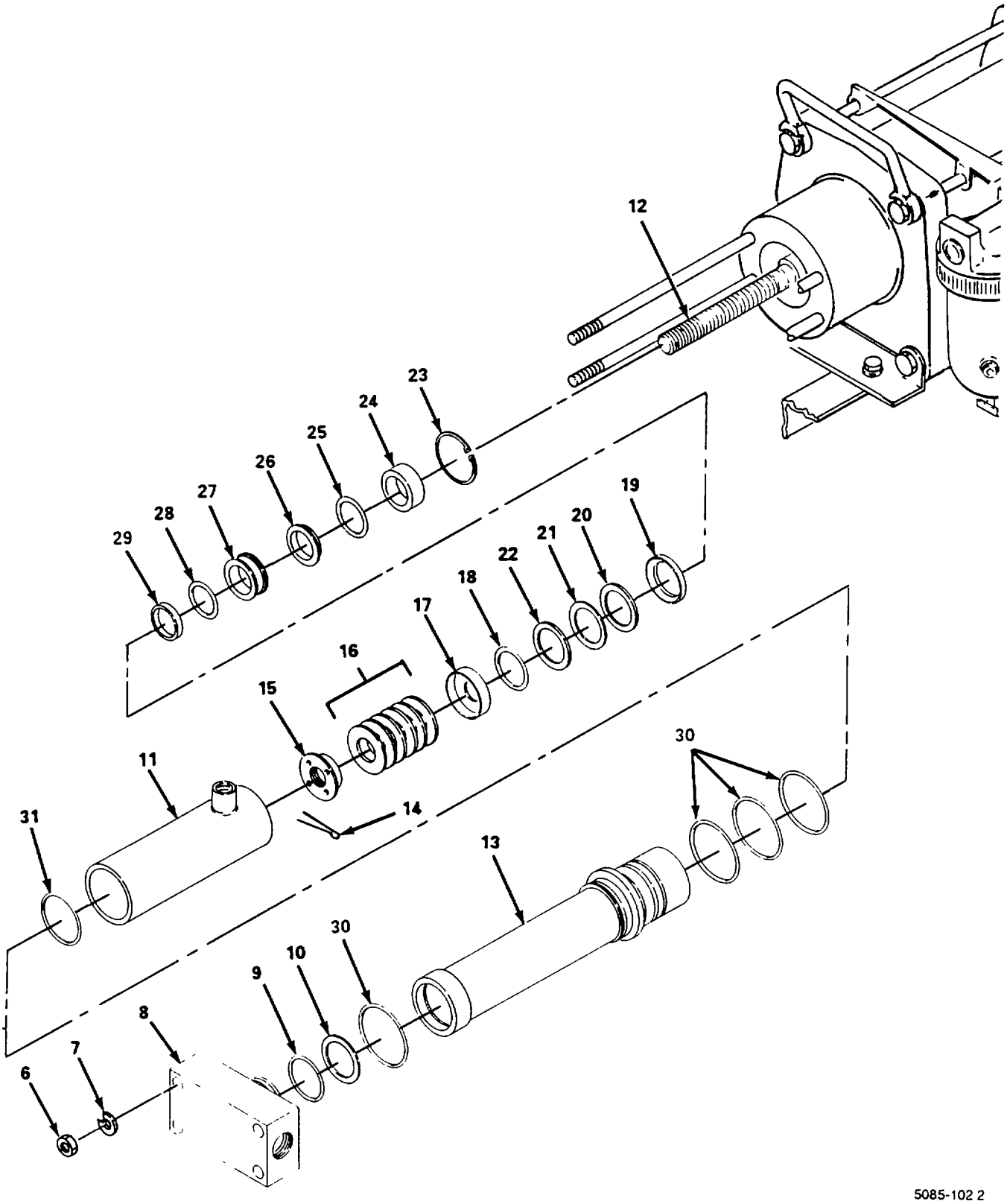

Figure 6-7. 30X Gas Barrel, Replace (Sheet 2 of 2).

6-18. **30X Gas Barrel (Cont).**

b. *Repair.* (figure 6-8)

(1) Remove 30X gas barrel (para. a).

(2) Inspect 30X gas barrel (1) and replace if scored, worn, or otherwise damaged.

(3) Inspect cooling barrel (2) and replace if cracked, bent or otherwise damaged.

(4) Inspect piston rod (3) and replace if bent, cracked or otherwise damaged.

(5) Inspect belleville washers (4) and replace if cracked, deformed, or otherwise damaged.

(6) Replace all bearings, O-rings, seals, and back-ups.

(7) Install 30X gas barrel (para. a).

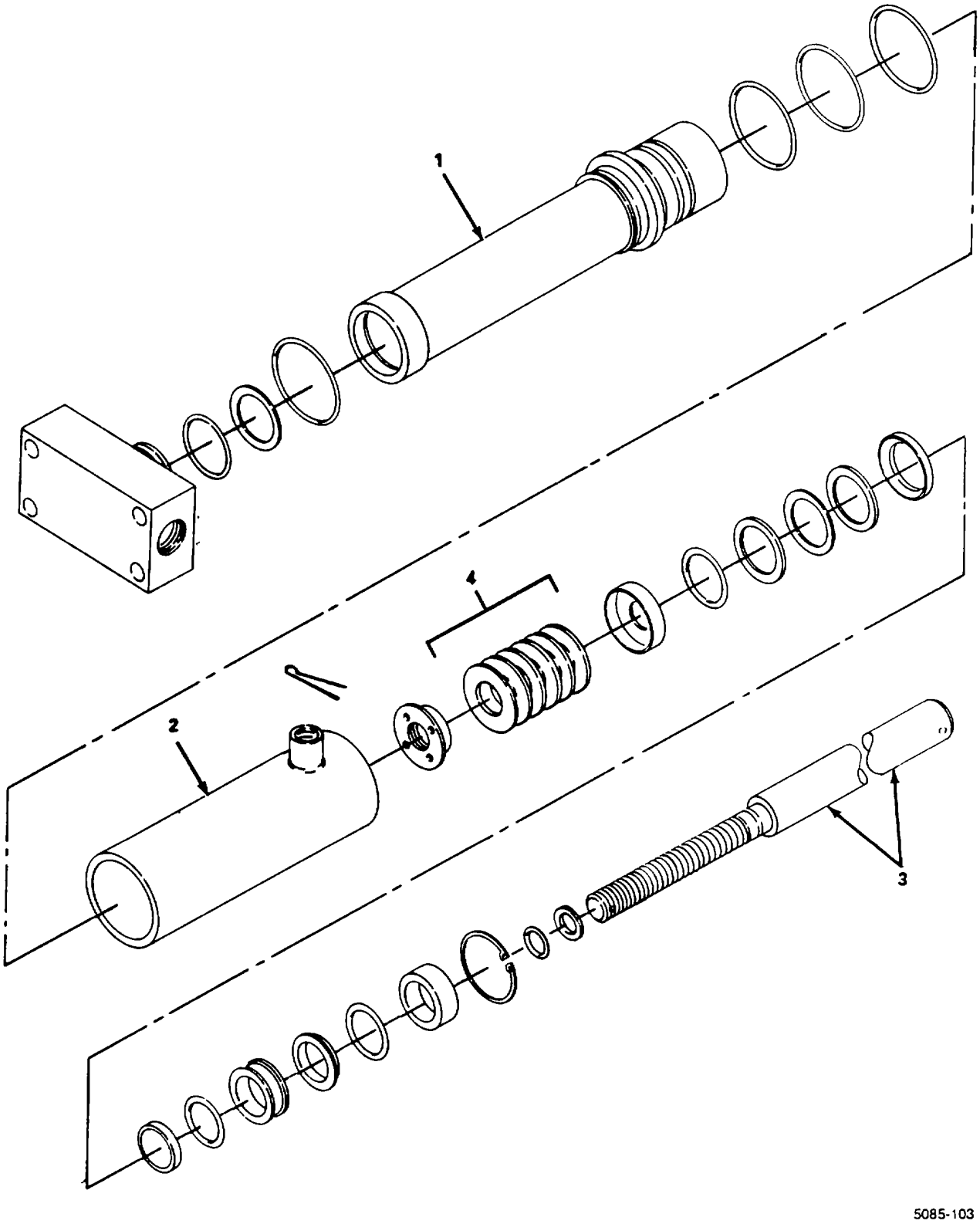

Figure 6-8. 30X Gas Barrel, Repair.

6-19. **Pilot Valve End Cap.**

This task covers: **Repair**

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Equipment Condition

Pilot valve end cap removed (para. 5-49).

Repair. (figure 6-9)

(1) Inspect stem (1) and replace N worn, bent, or damaged.

(2) Inspect spring (2) and replace it unserviceable.

(3) Inspect spacer (3) and replace if unserviceable.

(4) Replace retainer (4). Do not reuse.

(5) Replace two O-rings (5) and (6).

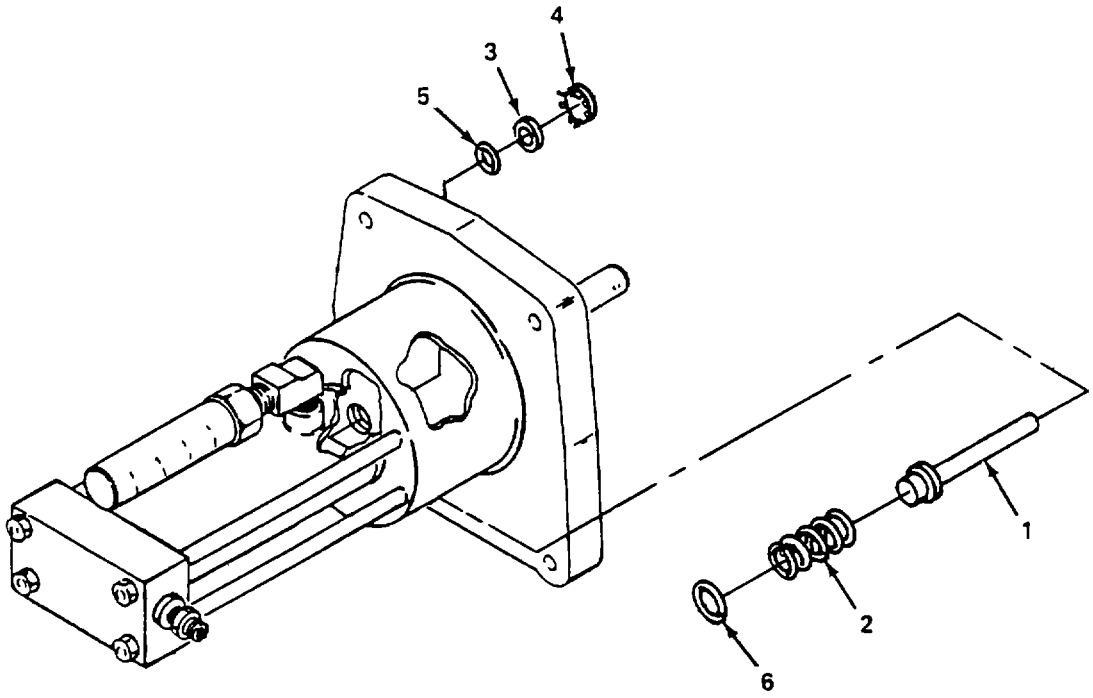

Figure 6-9. Pilot Valve, Repair.

FOLLOW-ON MAINTENANCE
Install pilot valve end cap (para. 5-49).

6-20. **Air Drive/Air Piston.**

This task covers: Repair

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance, Common No 1 (NSN 4910-00-754-0705)

Materials/Parts

Seal Lube (Item 21, Appendix D)
Loctite (Item 22, Appendix D)

Equipment Condition

Pump assembly removed (para. 5-42).

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Repair. (figure 6-10)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver

(1) Loosen two connector nuts (1) and remove line (2).

(2) Loosen two connector nuts (3) and remove line (4).

(3) Loosen connector nut (5).

(4) Loosen connector nut (6) and remove intercooler (7).

(5) Remove four nuts (8), eight lockwashers (9), four bolts (10), two handles (11) and three brackets (12).

(6) Separate two end caps (13) and (14) from barrel (15) enough to access cotter pin (16).

(7) Remove two flow through tubes (17) and four O-rings (18) and discard O-rings (18).

(8) Remove cotter pin (16) from piston rod (19) and remove end cap (13), piston rod (19) and gas barrel (20) as an assembly.

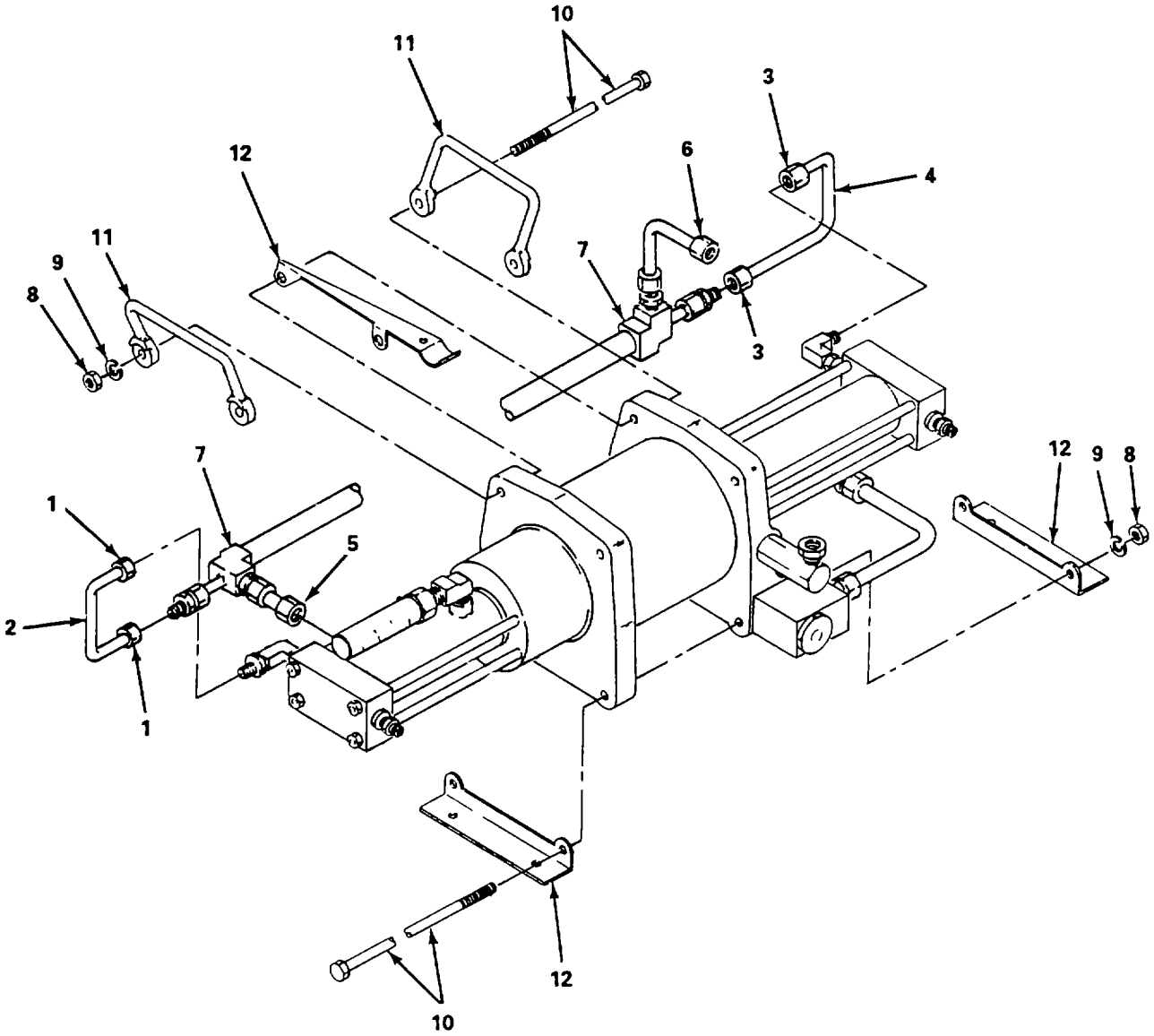

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Figure 6-10. Air Drive/Air Piston, Repair (Sheet 1 of 2).

6-20. **Air Drive/Air Piston (Cont).**

(9) Remove barrel (15) from end cap (14).

(10) Remove O-rings (21), (22), and (23) and discard O-rings (21), (22) and (23).

(11) Remove cotter pin (24) and remove air piston assembly (25).

(12) Inspect air piston assembly (25) and replace if worn, cracked or otherwise damaged.

(13) Inspect barrel (15) and replace if scored, dented, cracked or otherwise damaged.

(14) Install air piston assembly (25) and install cotter pin (24).

(15) Install new O-rings (21), (22), and (23).

(16) Ensure inside of barrel (15) is clean and lubricate lightly with seal lube.

(17) Install barrel (15).

(18) Install two flow through tubes (17) and four new O-rings (18).

(19) Position end cap (13) and install cotter pin (18) and fully install end cap (13).

(20) Install three brackets (12) and two handles (11) and secure with four bolts (10), eight lockwashers (9) and four nuts (8). Torque nuts (8) in an alliterate crisscross pattern to 16-18 LB-FT (21-24 Nm).

(21) Install intercooler (7) and tighten connector nut (6).

(22) Tighten connector nut (5).

(23) Install line (4) and tighten two connector nuts (3).

(24) Install line (2) and tighten two connector nuts (1).

(25) Apply a bead of loctite between back of connector nuts and lines.

FOLLOW-ON MAINTENANCE
Install pump assembly (para. 5-41).

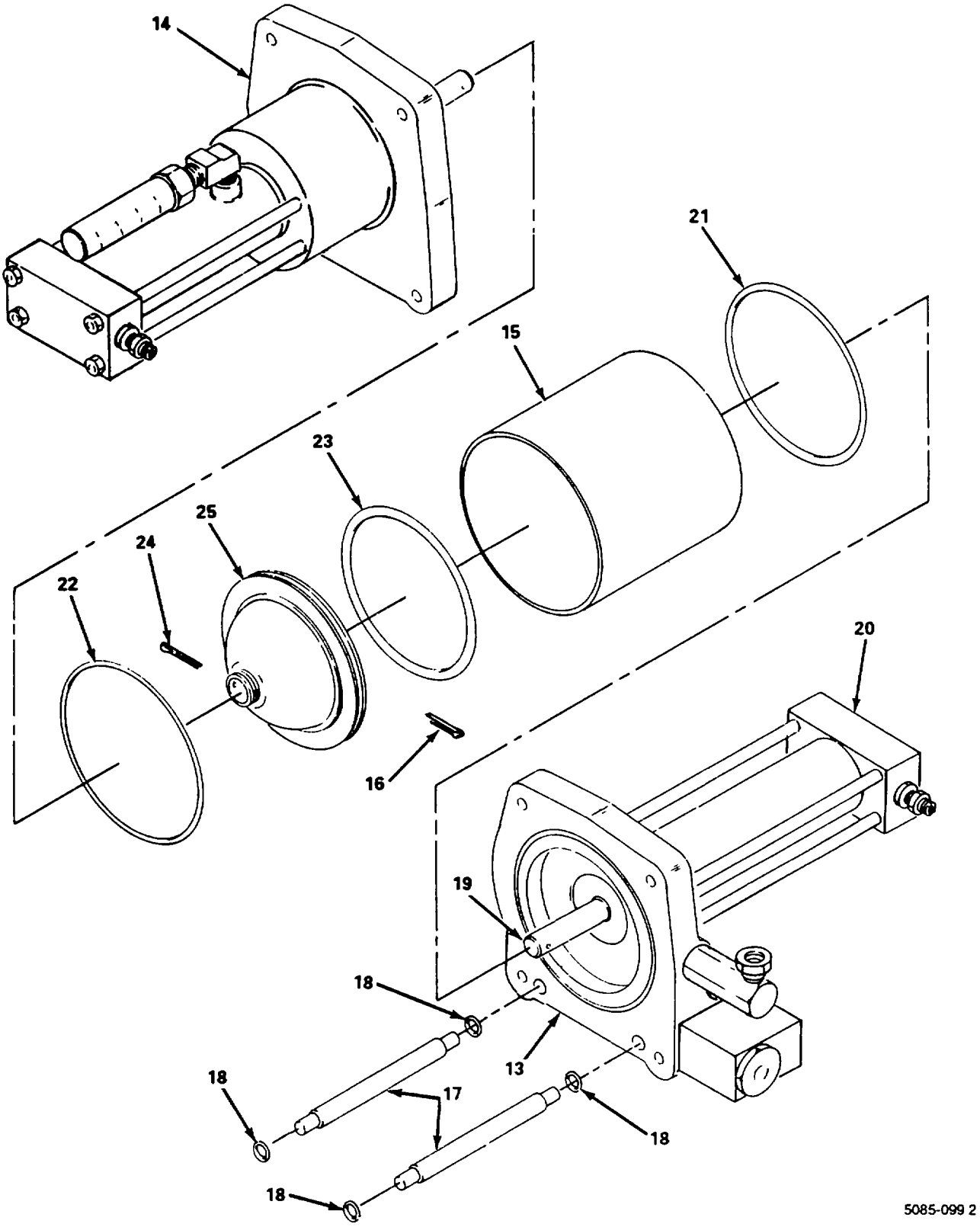


Figure 6-10. Air Drive/Air Piston, Repair (Sheet 2 of 2).

6-21. **Pressure Gage (6000 psi).**

This task covers: Calibrate

INITIAL SETUP

Equipment Condition

Pressure gage removed (para. 5-50).

Calibrate.

The 6000 psi gage should be calibrated at least once a year. Inspect the gage for the date of the last calibration. If the date is more than one year old, have the gage calibrated by an authorized agency.

6-22. **Pressure Gage (3500 psi).**

This task covers: Calibrate

INITIAL SETUP

Equipment Condition

Pressure gage removed (para. 5-51).

Calibrate.

The 3500 psi gage should be calibrated at least once a year. Inspect the gage for the date of the last calibration. If the date is more than one year old, have the gage calibrated by an authorized agency.

6-23. **Oxygen Filter Assembly.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)

Equipment Condition

Filter assembly removed (para. 5-52).

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Repair. (figure 6-11)

NOTE

There are two filter assemblies on the oxygen booster pump. The procedures to repair them are the same.

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination In accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all air lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(1) Remove bushing (1).

(2) Remove filter element (2) and O-ring (3) and discard O-ring (3).

(3) Remove guide tube (4).

(4) Inspect guide tube (4) and replace if worn, scored, or damaged.

(5) Install guide tube (4).

(6) Install new O-ring (3) and filter element (2) in body (5) and secure with bushing (1).

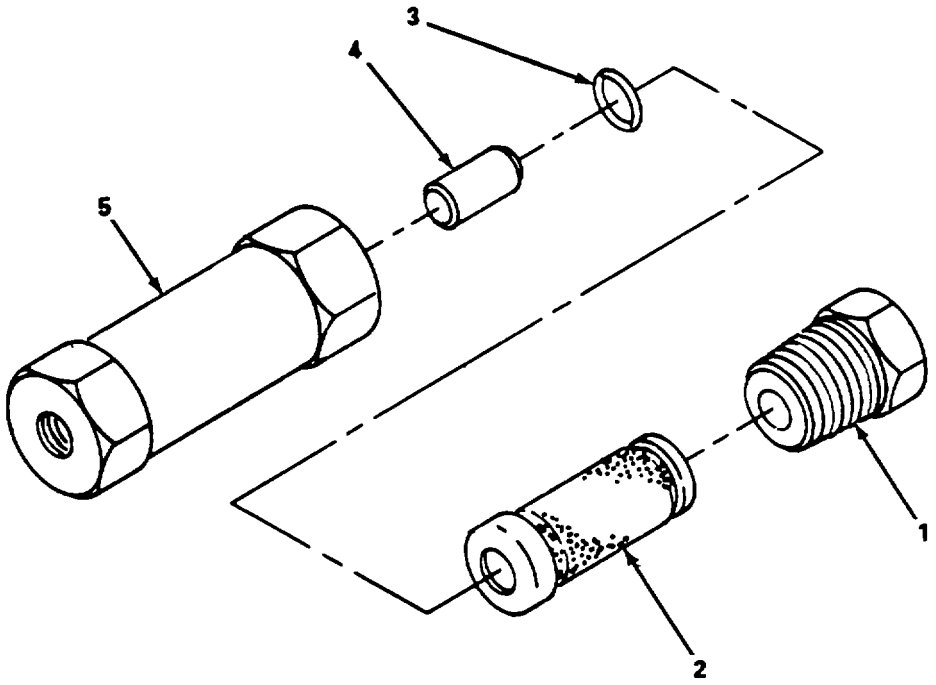


Figure 6-11. Filter Assembly, Repair.

FOLLOW-ON MAINTENANCE
Install filter assembly (para. 5-51).

6-24. **Result Regulator.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber, Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)
Non-ionic Detergent (Item 10, Appendix D)
Water, Distilled (Item 11, Appendix D)
Loctite (Item 22, Appendix D)

Equipment Condition

Result regulator removed, (para 5-52)

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Repair. (figure 6-12)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(1) Remove four bolts (1) and lockwashers (2) and remove pressure relief (3) from spacer (4).

(2) Remove O-ring (5) from spacer (4) and discard O-ring (5).

(3) Remove backup (6), seal (7), and two O-rings (8) and (9) from pressure relief (3) and discard O-rings (8).

(4) Remove pin (10) and O-ring (11) and discard O-ring (11).

(5) Remove spacer (4) from transition piece (12).

(6) Remove transition piece (12) and O-ring (13) from body (14) and discard O-ring (13).

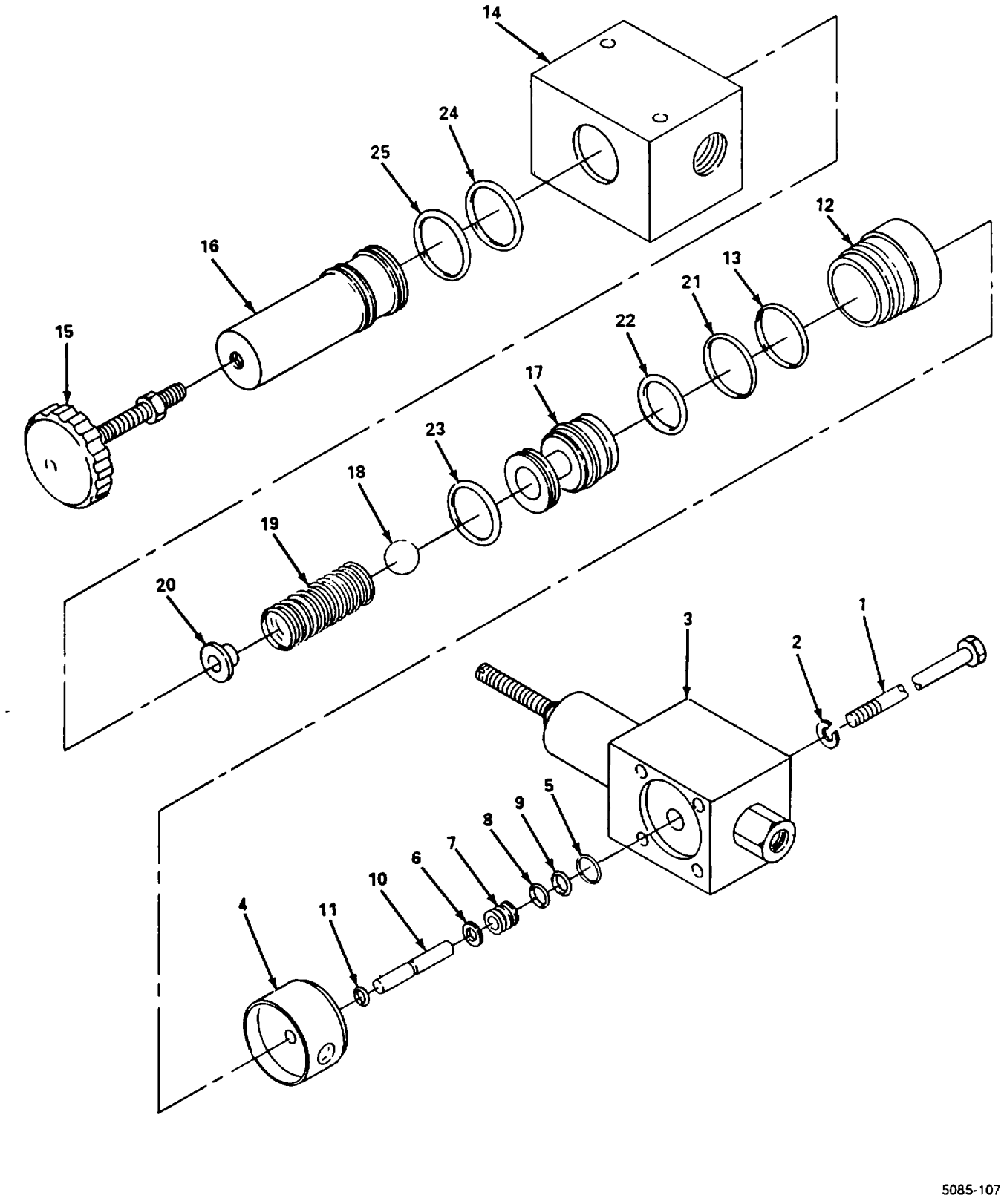


Figure 6-12. Result Regulator, Repair.

6-24. Result Regulator (Cont).

(7) Unscrew handle (15) from spring housing (16).

(8) Remove piston (17), ball (18), spring (19) and guide (20).

(9) Remove three O-rings (21), (22), arid (23) from piston (17) and discard O-rings (21), (22) and (23), and discard O-rings (24) and (25)

(10) Remove body (14) from spring housing (16) and remove two O-rings (24) and (25) and discard O-rings (24) and (25).

NOTE

The pressure relief (3) is a preset and calibrated item. Do not disassemble pressure relief (3). If there is any reason to believe the pressure relief (3) is damaged or defective replace it with a new one.

(11) Clean all items except seals and O-rings with nonionic detergent and dry thoroughly.

(12) Inspect spacer (4) and replace if cracked or worn.

(13) Inspect pin (10) and replace if scored, worn, or bent.

(14) Inspect transition piece (12) and replace if cracked or worn.

(15) Inspect body (14) and spring housing (16) and replace if dented, cracked, scored or excessively worn.

(16) Inspect piston (17) and replace if worn, cracked or bent.

(17) Inspect ball (18) and replace if scored or excessively worn.

(18) Inspect spring (19) and replace if cracked or deformed.

(19) Inspect guide (20) and replace if cracked or worn.

(20) Install two new O-rings (24) and (25) on spring housing (16)

(21) Install spring housing (16) in body (14).

(22) Install new O-rings (21), (22), and (23) on piston (17).

(23) Install guide (20), spring (19), ball (18) and piston (17).

(24) Install handle (15), and jamnut and apply a bead of loctite between jamnut and housing (16).

(25) Install new O-ring (13) on transition piece (12) and install in body (14).

(26) Install spacer (4).

(27) Install new O-ring (11) on pin (10) and install pin (10).

(28) Install two new O-rings (8) and (9), seal (7) and backup (6) in pressure relief (3).

(29) Install new O-ring (5) on spacer (4).

(30) Install pressure relief (3) and secure with four boils (1) and lockwashers (2).

FOLLOW-ON MAINTENANCE

Install result regulator (para. 5-52

6-25. **Pilot Valve.**

This task covers: Repair

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance, Common No 1 (NSN 4910-00-754-0705)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber, Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)
Non-ionic Detergent (Item 10, Appendix D)
Water, Distilled (Item 11, Appendix D)

Equipment Condition

Pilot valve removed, (para. 5-54)

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Repair. (figure 6-13)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result In injury or death to the diver.

(1) Remove fitting (1), O-ring (2), spring (3) and stem (4) and discard O-ring (2)..

(2) Remove fitting (5), O-ring (6), spring (7), pin (8), spring (9), spring follower (10), O-ring (11), seal (12), and backup (13) and discard O-rings (6) and (11) and seal (12).

(3) Remove cap (14) and remove nut (15), spring guide (16), spring (17) two washers (18) and bolt (19) as an assembly.

(4) Unscrew nut (15) and remove spring guide (16), spring (17), two washers (1, 8), and seat (20).

(5) Remove retainer (21), two spacers (22) and O-ring (23) and discard O-ring (23).

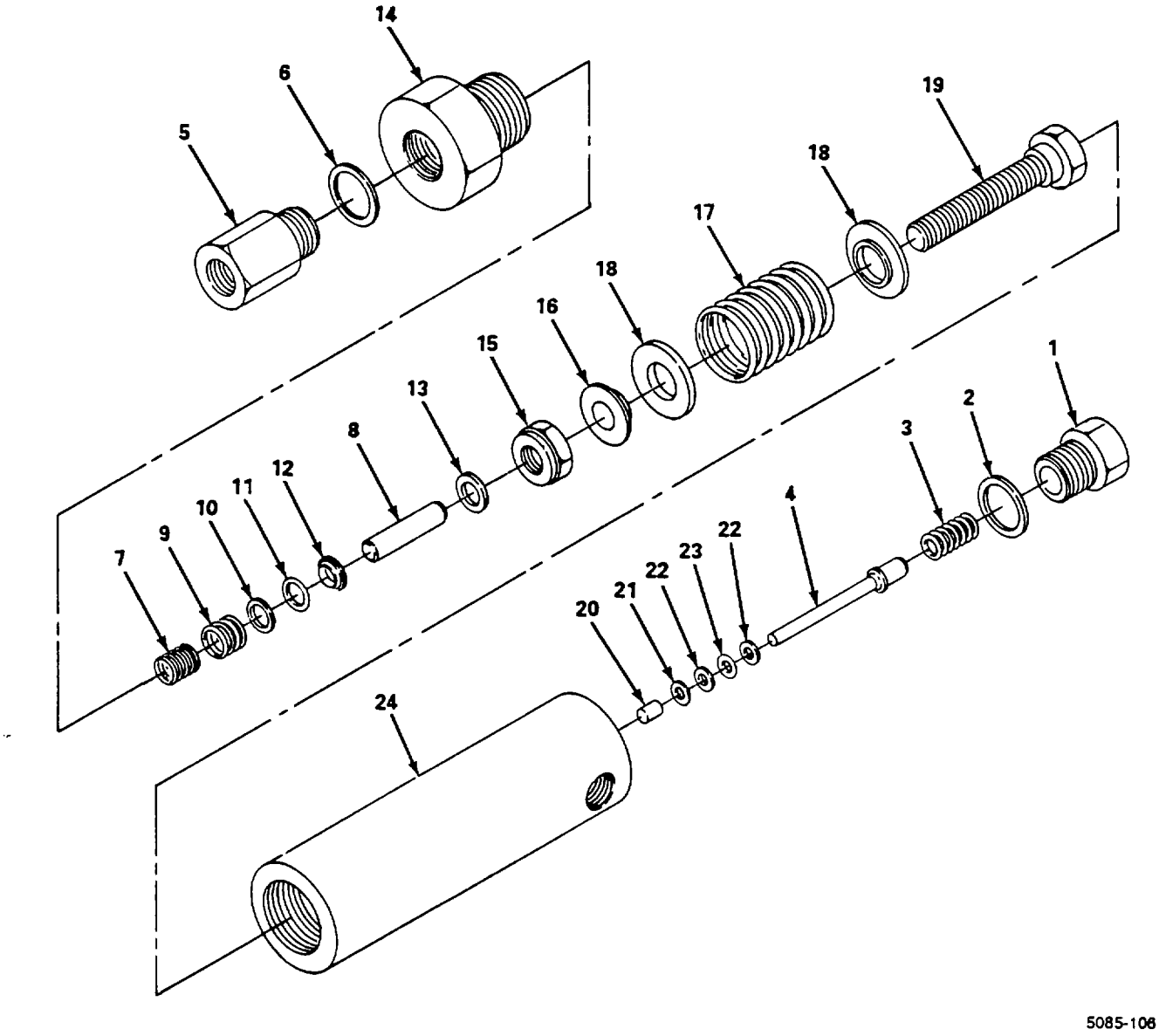


Figure 6-13. Pilot Valve, Repair.

(6) Clean all items except seals and O-rings with non-ionic detergent and rinse thoroughly with distilled water.

(7) Inspect fittings (1), and (5) and replace if threads are stripped on fittings are otherwise damaged.

(8) Inspect springs (3), (7), (9), and (17) and replace if springs are cracked, deformed or otherwise damaged.

(9)Inspect body (24) and replace if dented, cracked or otherwise damaged.

(10) Inspect all items and replace any item that is bent, cracked, scored, worn or otherwise damaged.

(11) Install retainer (21), two spacers (22) and new O-ring (23).

(12) Install seat (20) in bolt (19).

(13) Assemble two washers (18), spring (1 7) and spring guide (16) on nut (15) and secure with nut (15) and install in body (24).

(14) Install cap (14).

(15) Install backup (13), seal (12), new O-ring (11), spring follower (10), spring (9), pin (8), spring (7), new O-ring (6) and secure with fitting (5) Torque fitting to 50 LB-FT (67.8 Nm).

(16) Install stem (4), spring (3) and new O-ring (2) and secure with fitting (1).

FOLLOW-ON MAINTENANCE
Install pilot valve (para. 5-54).

6-26. **Vent Valve.**

This task covers: Repair

INITIAL SETUP

Tools

Shop Equipment Automotive Maintenance, Common No. 1 (NSN 4910-00-754-0705)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Tape, Adhesive (Item 19, Appendix D)
Detergent, Non-ionic (Item 10, Appendix D)
Water, Distilled (Item 11, Appendix D)
Cloth, Lint Free (Item 9, Appendix D)

Equipment Condition

Vent valve removed (para. 5-61).

Reference

Para. 4-10 Maintenance and Reentry Control Procedures

Repair. (figure 6-14)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

(1) Remove seat retainer (1) and valve seat (2).

(2) Remove stem retainer (3) with stem (4) installed.

(3) Remove stem (4), retainer seal (5), O-ring (6), and backup ring (7) and discard O-Ring (3).

(4) Clean all items with non-ionic detergent and rinse thoroughly with distilled water.

(5) Inspect body (8) and replace if threads are stripped or damaged, or body (8) is cracked or otherwise damaged.

(6) Inspect seat retainer (1) and replace if threads are stripped.

(7) Inspect stem retainer (3) and replace if threads are stripped or item retainer is cracked, bent, or otherwise damaged

(8) Inspect stem (4) and replace if threads are stripped or stem (4) is bent.

(9) Install knob (9) and replace if cracked.

(10) Install new backup ring (7) and new O-ring (6) in stem retainer (3).

(11) Install retainer seal (5).

(12) Install stem (4) fully in stem retainer (3).

(13) Install stem retainer (3) fully in body (8) Torque stem retainer to 35-39 Ib-ft (47-53 Nm).

(14) Install new valve seat (2) In seat retainer (1).

(15) Install seat retainer (1) in body (8) Torque retainer to 35-39 Ib-ft (47-53 Nm).

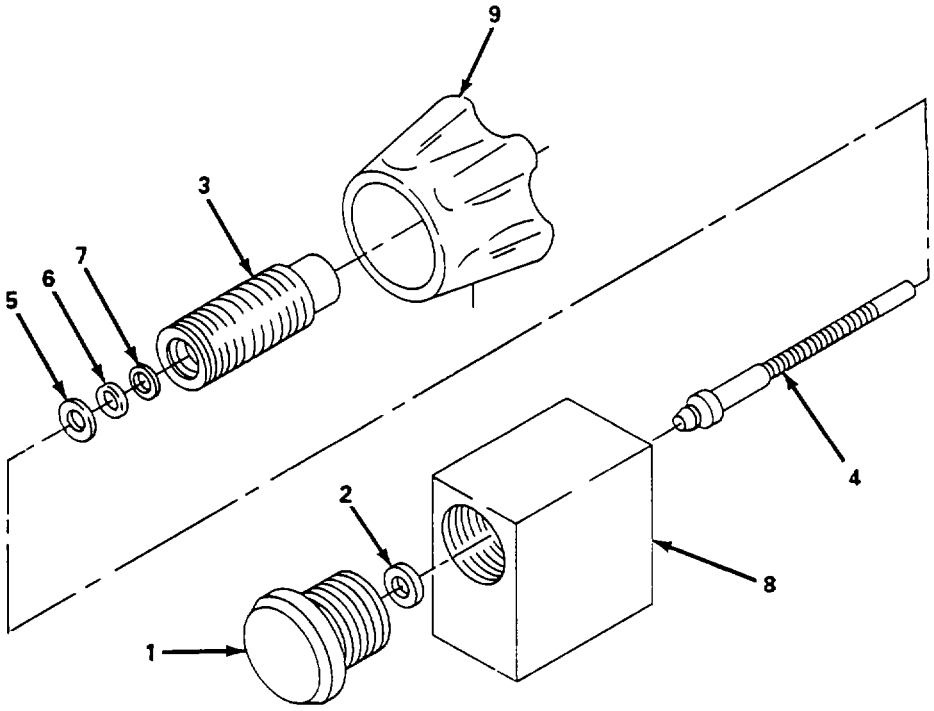


Figure 6-14. Vent Valve, Repair

FOLLOW-ON MAINTENANCE
Install vent valve (para. 5-61).

6-27. **Hand Valve.**

This task covers: Repair

INITIAL SETUP

Tools

General Mechanic's Tool Kit
(NSN 5180-00-177-7033)

Materials/Parts

Bags, Plastic (Item 4, Appendix D)
Bands, Rubber (Item 5, Appendix D)
Detergent, Non-ionic (Item 10, Appendix D)
Water, Distilled (Item 11, Appendix D)
Cloth, Lint Free (Item 9, Appendix D)

Equipment Condition

Shutoff valve removed (para 5-62).

Reference

Para 4-10 Maintenance and Reentry Control Procedures

Repair. (figure 6-15)

WARNING

Cleanliness is imperative in maintaining and handling oxygen system components. All tools and parts must be kept free of oil, grease, rust, or other contamination in accordance with Chapter 4, Section V of this manual. Foreign substances within an assembly could result in equipment failure and possible injury or death to personnel.

Ensure that all oxygen lines and components removed or openings into the oxygen system are covered with a plastic bag and secured with a rubber band or taped shut. Small components should be stored in a plastic bag and sealed. Failure to do so will cause oxygen system to become contaminated and could result in injury or death to the diver.

NOTE

Bonnet has left hand thread.

(1) Remove bonnet (1), backup ring (2), and O-ring (3) from body (4), and discard O-ring (13).

(2) Hold bonnet (1) and turn valve stem (5) clockwise and remove seat (6) and 0-ring (7), and discard O-ring (7).

(3) Remove gland nut (8).

(4) Remove stem (5), and guide assembly (9) from bonnet (1).

(5) Remove seal retainer (10) and stem seal (11) from bonnet (1), and discard stem seal (11).

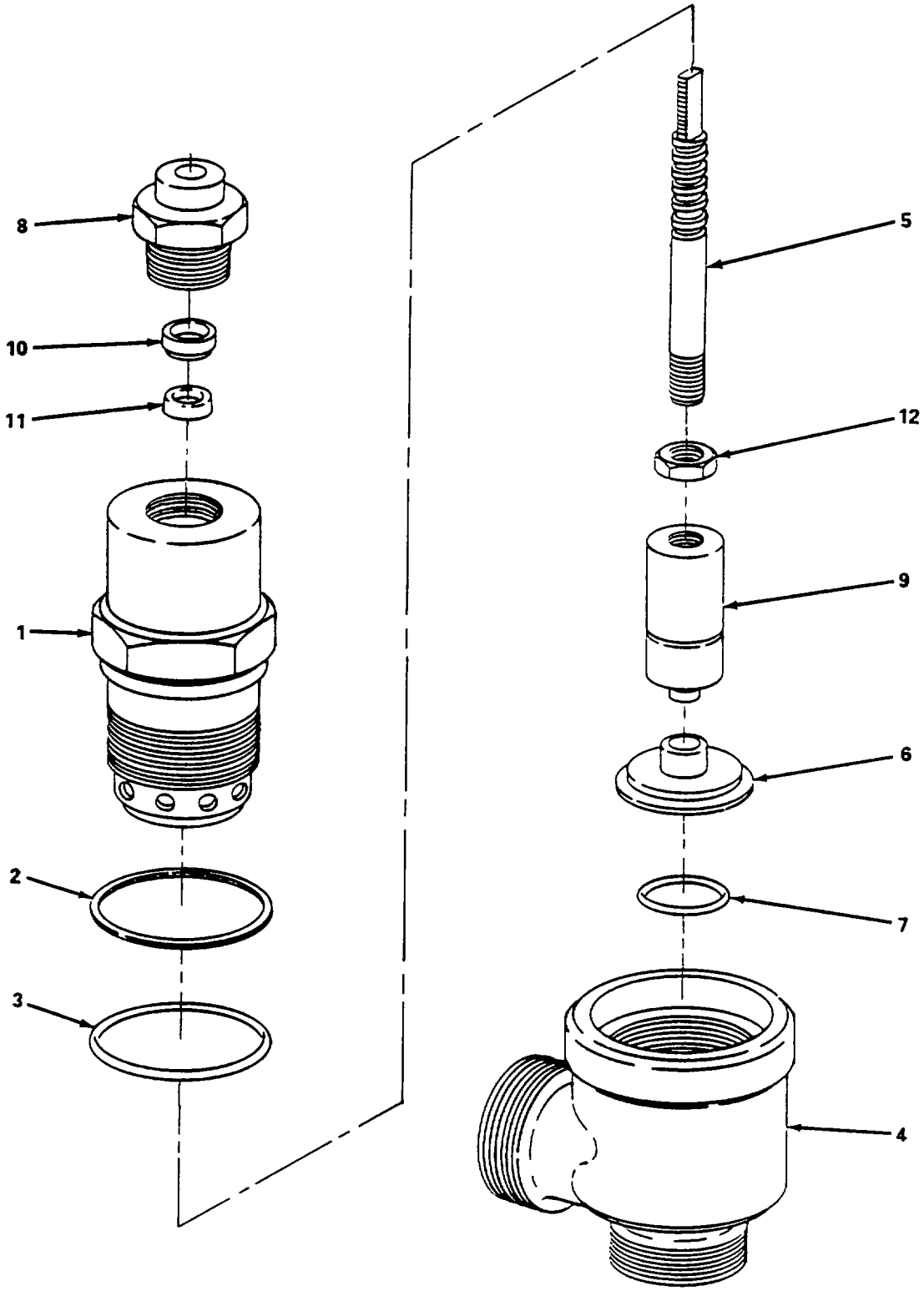


Figure 6-15. Hand Valve, Repair.

6-27. **Hand Valve (Cont).**

(6) Loosen nut (12) and remove guide assembly (9) and nut (12).

(7) Clean all components with non-ionic detergent and rinse thoroughly with distilled water.

(8) Inspect bonnet (1) and body (4) and replace if threads are stripped, or bonnet (1) or body (4) is cracked or otherwise damaged.

(9) Inspect valve stem (5) and replace if threads are stripped or valve stem (5) is worn or bent.

(10) Inspect seal retainer (10) and replace if cracked or otherwise damaged.

(11) Inspect seat (6) and replace if sealing surfaces are pitted, corroded or seat is worn, cracked, or otherwise damaged.

(12) Install new stem seal (11) and seal retainer (10) in bonnet (1).

(13) Install nut (12) and guide assembly (9) on valve stem (5) and tighten nut (12).

(14) Install valve stem (5) in bonnet (4) and secure with gland nut (8).

(15) Install seat (6) In bonnet (1). Ensure seat (6) is seated fully in bonnet (1).

(16) Install new O-ring (7) in body (4).

(17) Install backup (2) and new O-ring (3) on bonnet (1).

NOTE

Bonnet has left hand threads.

(18) Install bonnet (1) in body (4) and tighten securely.

FOLLOW-ON MAINTENANCE
Install shutoff valve (para. 5-62).

APPENDIX A
REFERENCES

A-1 Scope. This appendix lists all forms, field manuals, technical manuals and miscellaneous publications referred to In this manual

A-2 Forms.

Quality Deficiency Report (QDR) ..... SF 368
Recommended Changes to Publications ..... DA Form 2028
Preservation and Depreservation Guide for Vehicles and Equipment ..... DA Form 2258
Equipment Inspection and Work Sheet ..... DA Form 2404

A-3. Field Manuals.

Military Diving Vol I ..... FM 20-11-1
Military Diving Vol II ..... FM 20-11-2

A-4. Technical Manuals.

Packaging of Material. Preservation (Vol I) ..... TM 38-230-1
Packaging of Material Preservation (Vol II) ..... TM 38-230-2
Painting Instructions for Field Use ..... TM 43-0139
Destruction of Army Materiel to Prevent Enemy Use ..... TM 750-244-1-2
Destruction of Army Materiel to Prevent Enemy Use ..... TM 750-244-3
Manifold Servicing Units, Oxygen Booster Pump and Oxygen Charging Station, Repair Parts and Special Tools List (RPSTL) ..... TM 5-4220-228-24P
Operator, Organizational, Direct Support and General Support Maintenance Manual and Repair Parts and Special Tools List (RPSTL) for 3/4 Ton Trailer ..... TM 9-2330-202-14&P

A-5. Technical Bulletins.

Calibration and Repair Requirements for the Maintenance of Army Materiel..... TB 43-180
Calibration Procedure for Diving Equipment Pressure Gages (General) ..... TB 94220-216-35
Calibration Procedures for Dial Indicating Pressure Gages (General) ..... TB 9-6685-319-50

A-6. Miscellaneous Publications.

The Army Maintenance Management Systems (TAMMS) ..... DA PAM 738-750

APPENDIX B
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operations for the Type I and Type II Manifold Service Units, Oxygen Booster Pump, and Oxygen Charging Station. It authorizes levels of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

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.

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

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

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

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

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments 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. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

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

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to 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) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications . Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return 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 equipments/components.

B-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

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

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest 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 number of task-hours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting 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. Subcolumns of column 4 are as follows:

<u>UNIT</u>

C - Operator/Crew
O - Unit

INTERMEDIATE

F - Direct Support
H - General Support

DEPOT

D - Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4. Tool and Test Equipment Requirements (Sect. III and IV)

a. Tool or Test Equipment Reference Code The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Level. The codes in this column indicate the maintenance level allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

B-5. Remarks (Sect. IV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in sections II and V.

Section II. MAINTENANCE ALLOCATION CHART FOR MANIFOLD SERVICE UNITS/OXYGEN BOOSTER PUMP/ OXYGEN CHARGING STATION

(1)	(2)	(3)	MAINTENANCE LEVEL					(5)	(6)
			UNIT		INTERMEDIATE		DEPOT		
GROUP NUMBER	COMPONENT ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	TOOLS	REMARKS
00	MANIFOLD SERVICE UNITS/OXYGEN BOOSTER PUMP/ OXYGEN CHARGING STATION	Inspect Service Repair	0.5 0.2	 1.0					 A
01	MANIFOLD SERVICE UNIT, TYPE I (AIR)	Inspect Service Replace Repair	2.1	 1.5 0.8	 1 0	 1.0 1.5		 1, 2, 3 1, 2, 3	
0101	PURIFICATION CYLINDER GROUP (AIR)	Replace Repair			1 0 1.5				
010101	DEHYDRATOR CYLINDER ASSEMBLY (AIR)	Replace Repair			05 03			1 1	
0102	CLAMP BAND	Replace			03			1	
0103	CYLINDER ASSEMBLY, 3500 PSI (AIR)	Inspect Test Replace	1.3		 0.7	 1.0 		 1	
0104	FLEX HOSE (AIR), CGA-346	Inspect Test Replace	0 3	 0 3	 0.3	 1 0 		 1	
0105	CONTROL PANEL ASSEMBLY (AIR)	Inspect Service Repair	0 3 1 0			 1.0		 1	
010501	PRESSURE GAGE (AIR)	Inspect Test Calibrate Replace	0.1	 0.3	 0.3	 1.0 		 1	
010502	QUARTER TURN VALVE (AIR)	Inspect Replace	0.2		 0.8			 1	

Section II. MAINTENANCE ALLOCATION CHART FOR MANIFOLD SERVICE UNITS/OXYGEN BOOSTER PUMP/ OXYGEN CHARGING STATION

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	MAINTENANCE LEVEL					(5) TOOLS	(6) REMARKS
			UNIT		INTERMEDIATE		DEPOT		
			C	O	F	H	D		
010503	HAND VALVE (AIR)	Inspect Replace	0.2		 0.8			 1	
010504	PRESSURE REGULATOR (AIR)	Inspect Replace	0.1	 0.8				 1	
010505	PRESSURE RELIEF VALVE (AIR)	Inspect Test Replace	0.1		 0.5	 1.0		 1	
010506	SUPPLY PIPING (AIR)	Inspect Replace	0.2		 0.6			 1	
010507	SUPPLY MANIFOLD (AIR)	Inspect Replace	0 2		 1.1			 1	
010508	OUTPUT PIPING (AIR)	Inspect Replace	0 2		 0.6			 1	
010509	OUTPUT MANIFOLD (AIR)	Inspect Replace	0.2		 1.1			 1	
02	MANIFOLD SERVICE UNIT, TYPE II (AIR/OXYGEN)	Inspect Service Replace Repair	2.1 1.5		 0.8	 10		 1, 2, 3 1, 2, 3	 B
0201	PURIFICATION CYLINDER GROUP	Replace Repair			1.0 1 5			1 1	
020101	DEHYDRATOR CYLINDER ASSEMBLY (AIR)	Replace Repair			1.0 0.8			1 1	
020102	DEHYDRATOR CYLINDER ASSEMBLY (OXYGEN)	Replace Repair			1.0 0.8			 1	

Section II. MAINTENANCE ALLOCATION CHART FOR MANIFOLD SERVICE UNITS/OXYGEN BOOSTER PUMP/ OXYGEN CHARGING STATION

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	MAINTENANCE LEVEL					(5) TOOLS	(6) REMARKS
			UNIT		INTERMEDIATE		DEPOT		
			C	O	F	H	D		
0202	CLAMP BAND	Replace			0.3			1	
0203	CYLINDER ASSEMBLY (OXYGEN)	Inspect	1.3						
		Test				1.0			
		Replace			0.7			1	
0204	FLEX HOSE (OXYGEN), CGA-540	Inspect	0 3						
		Test		0 3		1.0			
		Replace			0 3			1	
0205	CONTROL PANEL ASSEMBLY (AIR/OXYGEN)	Inspect	0.3						
		Service	1.0						
		Repair			1.0			1	
020501	PRESSURE GAGE (OXYGEN)	Inspect	0.1						
		Test		03					
		Calibrate				1 0			
		Replace			0.3			1	
020502	QUARTER TURN VALVE (OXYGEN)	Inspect	0.2						
		Replace			08			1	
020503	HAND VALVE (OXYGEN)	Inspect	0 2						
		Replace			08			1	
020504	PRESSURE REGULATOR (OXYGEN)	Inspect	0 1						
		Replace			08			1	
020505	PRESSURE RELIEF VALVE (OXYGEN)	Inspect	0.1						
		Test				1.0			
		Replace		0.3				1	
020506	SUPPLY PIPING (OXYGEN)	Inspect	0.2						
		Replace			0.6			1	
020507	SUPPLY MANIFOLD (OXYGEN)	Inspect	0.2						
		Replace			1.1			1	

Section II. MAINTENANCE ALLOCATION CHART FOR MANIFOLD SERVICE UNITS/OXYGEN BOOSTER PUMP/ OXYGEN CHARGING STATION

(1)	(2)	(3)	MAINTENANCE LEVEL					(5)	(6)
			UNIT		INTERMEDIATE		DEPOT		
GROUP NUMBER	COMPONENT ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	TOOLS	REMARKS
020508	OUTPUT PIPING (OXYGEN)	Inspect Replace	0 2		 0.6			 1	
020509	OUTPUT MANIFOLD (OXYGEN)	Inspect Replace	0.2		 0.6			 1	
020510	PRESSURE GAGE (AIR)	Inspect Test Calibrate Replace	0.1	 0 3		 1.0			
					 0.3			 1	
020511	QUARTER TURN VALVE (AIR)	Inspect Replace	0.2		 0.8			 1	
020512	HAND VALVE (AIR)	Inspect Replace	0.2		 0.8			 1	
020513	PRESSURE REGULATOR (AIR)	Inspect Replace	0 1		 0.8			 1	
020514	PRESSURE RELIEF VALVE (AIR)	Inspect Test Replace	0.1		 0.5	 1.0		 1	
020515 (AIR)	SUPPLY PIPING	Inspect Replace	02		 0.6			 1	
020516	SUPPLY MANIFOLD (AIR)	Inspect Replace	0.2		 1.1			 1	
020517 (AIR)	OUTPUT PIPING	Inspect Replace	0 2		 0.6			 1	
020518	OUTPUT MANIFOLD (AIR)	Inspect Replace	0.2		 1.1			 1	
03	COMMERCIAL TRAILER, MODEL CT-1 (MODIFIED)	Inspect Service Replace Repair	0.3 2.0	 0.5 1.3	 3.5			 1-3 1-3	

Section II. MAINTENANCE ALLOCATION CHART FOR MANIFOLD SERVICE UNITS/OXYGEN BOOSTER PUMP/ OXYGEN CHARGING STATION

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	MAINTENANCE LEVEL					(5) TOOLS	(6) REMARKS
			UNIT		INTERMEDIATE		DEPOT		
			C	O	F	H	D		
0301	WELDED FENDER ASSEMBLY	Inspect Replace	0.2	 1.0				 1	
0302	SPLASH GUARD	Inspect Replace	0.1	 0.5				 1	
0303	WELDED JACK ASSEMBLIES	Inspect Replace	0.2	 1.0				 1	
0304	SERVICE TROUGH	Inspect Replace	0.1	 1.0				 1	
0305	ELECTRICAL SYSTEM	Inspect Replace Repair	0.5	 1.2 1.0				 1 1, 2	
030501	LIGHTS	Replace Repair		0.5 0.5				1 1	
030502	CHASSIS WIRING HARNESS	Inspect Replace Repair	0.5	 1.0 20				 1 1, 3	
0306	AXLE ASSEMBLY	Inspect Replace Repair	0.3		 8.0 10.0			 8 8	
0307	BRAKE SYSTEM	Inspect Replace Repair	0.3	 4.0 1.5	 2.3			 8 8	
030701	SERVICE BRAKE ASSEMBLY (HANDBRAKE)	Adjust Replace Repair		1.0 3.0 3.0				 1 1	
030702	LINES, FITTINGS AND HOSES	Inspect Replace	0.3	 2.0				 1	

Section II. MAINTENANCE ALLOCATION CHART FOR MANIFOLD SERVICE UNITS/OXYGEN BOOSTER PUMP/ OXYGEN CHARGING STATION

(1)	(2)	(3)	MAINTENANCE LEVEL					(5)	(6)
			UNIT		INTERMEDIATE		DEPOT		
GROUP NUMBER	COMPONENT ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	TOOLS	REMARKS
030703	AIR FILTER	Inspect	0 1						
	ASSEMBLY	Replace		0.8				1	
		Repair		1. 0				1	
030704	AIR RESERVOIR	Service	0.1						
		Replace		0.7				1	
030705	POWER CLUSTER	Replace		1.0				1	
		Repair			2.2			1	
030706	EMERGENCY VALVE	Inspect	0 2						
	R-6 RELAY	Replace		1.0				1	
		Repair			2.0			8	
030707	AUTOMATIC DRAIN	Replace		0. 8				1	
	VALVE	Repair			1.3			1	
030708	BRAKE ASSEMBLY	Inspect	0 .6						
		Replace		3.0				8	
		Repair	3.5					8	
0308	WHEEL ASSEMBLY	Inspect	0 4						
		Replace		2 5				1	
		Repair		3.5				1	
0309	FRAME AND	Inspect	0.8						
	ATTACHMENTS	Replace		1 0				1-3	
		Repair		3.0	3.0			1-3	
04	OXYGEN BOOSTER	Inspect	1 9						
	PUMP	Test	1.0						
		Service	1.0						
		Replace		0 2				1	
		Repair			1.0	1.5		1,4, 8	
0401	PUMP ASSEMBLY	Replace			1.5			1	
	(AIR)	Repair				0.8		1	
040101	FILTER ASSEMBLY	Service		0 2					
	(AIR)	Replace			0.6			1	

Section II. MAINTENANCE ALLOCATION CHART FOR MANIFOLD SERVICE UNITS/OXYGEN BOOSTER PUMP/ OXYGEN CHARGING STATION

(1)	(2)	(3)	MAINTENANCE LEVEL					(5)	(6)
			UNIT		INTERMEDIATE		DEPOT		
GROUP NUMBER	COMPONENT ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	TOOLS	REMARKS
40102	PRESSURE GAGE	Inspect	0.1						
	(AIR DRIVE)	Replace		0.3				1	
040103	PRESSURE	Replace		1.0				1	
	REGULATOR (AIR)								
040104	SPEED CONTROL	Replace		0.8				1	
	VALVE (AIR)								
040105	AIR CYCLING VALVE	Replace		1.2				8	
		Repair				1.8		8	
040106	GAS BARREL CHECK	Replace		1 1				4, 8	
	VALVES								
040107	15X GAS BARREL	Replace				1.8		7, 8	
		Repair				2.2		7, 8	
040108	30X GAS BARREL	Replace				1 8		7, 8	
		Repair				2 2		7, 8	
040109	PILOT VALVE END	Replace		1.2				4, 5, 6, 8	
	CAPS	Repair				2 0		8	
040110	AIR DRIVE/AIR PISTON	Repair				21		8	
0402	PRESSURE GAGE,	Inspect	0.1						
	6000 PSI (OXYGEN)	Calibrate				0.5			
		Replace		0.3				1	
0403	PRESSURE GAGE,	Inspect	0.1						
	3500 PSI (OXYGEN)	Calibrate				0 5			
		Replace		0.3				1	
0404	FILTER ASSEMBLY	Replace			0.5				
	(OXYGEN)	Repair				0.6			
0405	RESULT REGULATOR	Replace		1.2				1	
		Repair				2.2		1	

Section II. MAINTENANCE ALLOCATION CHART FOR MANIFOLD SERVICE UNITS/OXYGEN BOOSTER PUMP/ OXYGEN CHARGING STATION

(1)	(2)	(3)	MAINTENANCE LEVEL					(5)	(6)
			UNIT		INTERMEDIATE		DEPOT		
GROUP NUMBER	COMPONENT ASSEMBLY	MAINTENANCE FUNCTION	C	O	F	H	D	TOOLS	REMARKS
0406	PILOT VALVE	Replace			1.2			1	
		Repair				2.2		8	
0407	LINES AND FITTINGS	Inspect	0.1						
		Replace			0 5			1	C
0408	FRAME	Inspect	0 1						
		Replace			1.0		1		
05	OXYGEN CHARGING	Inspect	0.3						
	STATION	Test			1 0				
		Replace		0.3				1	
		Repair			0 6			1	
0501	CHARGING WHIP	Inspect	0 2						
	(OXYGEN)	Test			0.5				
		Replace			1.0			1	
0502	PRESSURE GAGE	Inspect	0 1						
	0-10,000 PSI	Calibrate				1 0			
	(OXYGEN)	Replace			03			1	
0503	MANIFOLDS	Inspect	1 0						
	(OXYGEN)	Replace			4 0			1	
0504	VENT VALVE	Replace			0 3			1	
		Repair				08		8	
0505	VALVE, HAND	Replace			0 5			1	
		Repair				1 0		1	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR MANIFOLD SERVICE UNITS/OXYGEN BOOSTER SYSTEM

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1 Tool Kit	O	General Mechanic's Automotive	5180-00-177-7033	
2	O	Multimeter, Digital	6625-01-139-2512	
3	F	Torch Outfit, Cutting and Welding Oxy Acetylene	3433-00-026-4718	
4	F	Wrench, Torque	5120-00-247-2540	
5	F	Seat Installation Tool	4820-01-266-8213	
6	F	Stem Removal Tool	5120-01-260-6245	28584
7	F	Gas Barrel Assembly Tool		17426
8	O	Shop Equipment Automotive Maintenance, Common No 1	4910-00-754-0654	

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	Replacement of major assemblies.
B	The air side procedures are the same as Type I.
C	Retain tube and send to Haskel, Inc., 100 E. Graham Place, Burbank, CA 91502, for replacement tube.

APPENDIX C
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

C-1. **Scope.**

This appendix lists components of end item and basic issue items for the Type I and Type II Manifold Servicing Units, Oxygen Booster Pump, and Oxygen Charging Station to help you inventory items required for safe and efficient operation.

C-2. **General.**

The Components of End Item and Basic Issue Items Lists are divided into the following sections.

a. Section II Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. The items are part of the end item, but are removed and separately packaged for transportation or shipment As part of the end item, these items must be with the end item whenever it is issued or transferred between properly accounts. Illustrations are furnished to assist you in identifying the items.

b Section III. Basic Issue Items. These are the minimum essential items required to place the Type I and Type II Manifold Servicing Units, Oxygen Booster Pump, and Oxygen Charging Station in operation The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement Bill, based on TOE/MTOE authorization of the end item.

C-3 **Explanation of Columns.**

The following provides an explanation of columns found In the tabular listings:

a. Column (1). Illustration Number (Illus. Number). This column indicates the number of the illustration in which the item is shown.

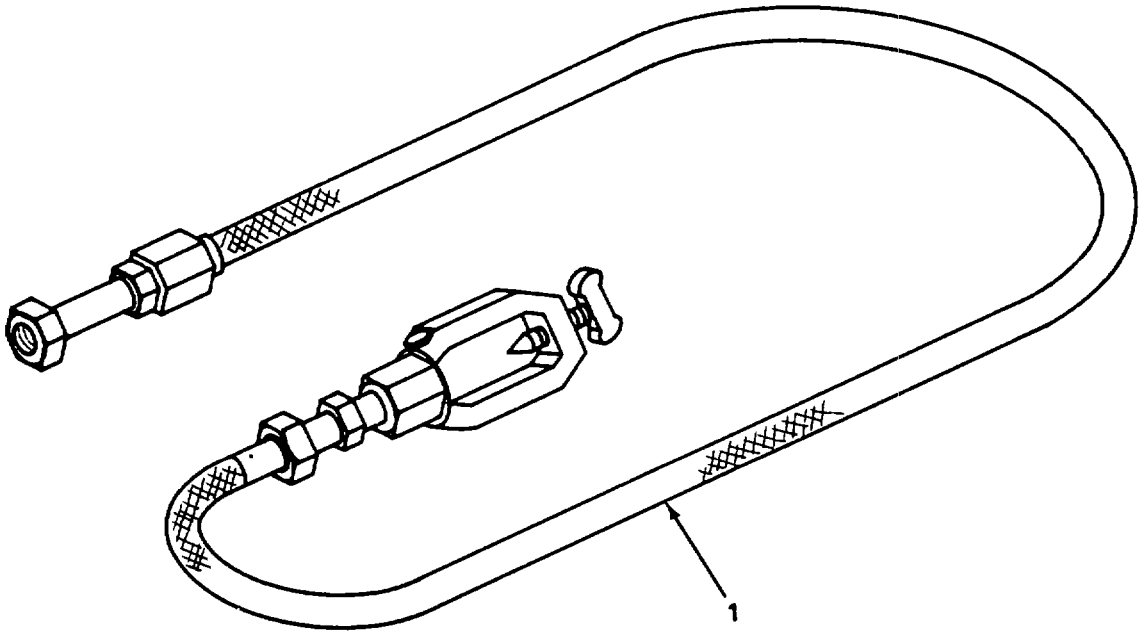
b Column (Z). National Stock Number. Indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.

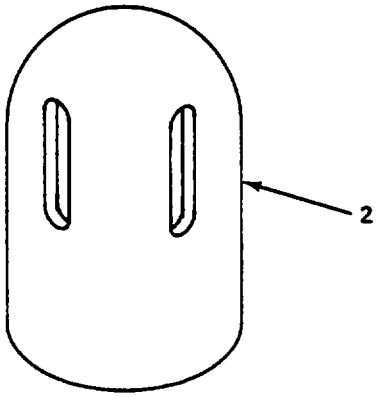
c. Column (3). Description. Indicates the Federal item name, and, If required, a minimum description to identify and locate the item The last line for each Item indicates the FSCM (in parentheses) followed by the part number

d. Column (4). Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function This measure is expressed by a two-character alphabetical abbreviation (e g, ea, in , pr)

e. Column (5). Quantity Required (QTY RQFO. Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEMS

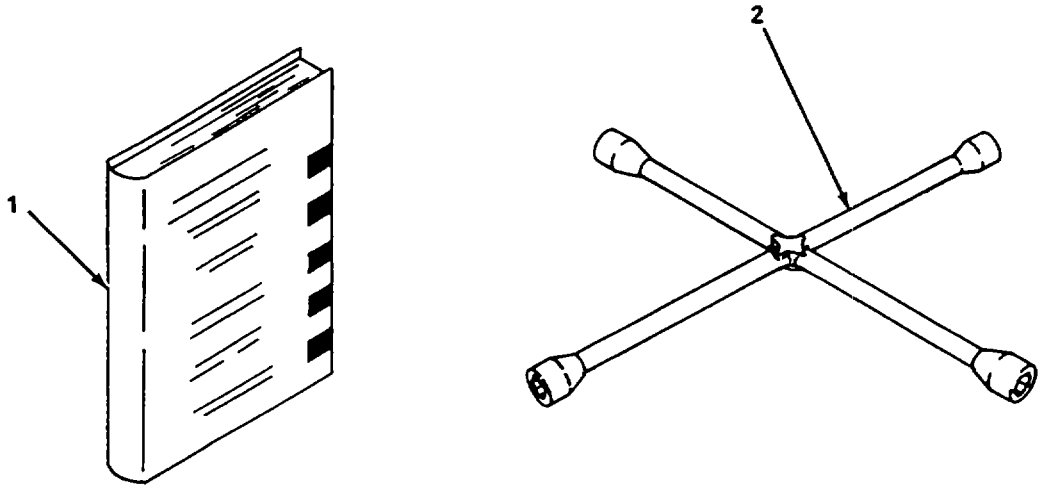




5085-108

(1) Illus. Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
1		Whip Charging, Air (Type I Manifold Servicing Unit) (14819) HP 778A-12			4
		Whip Charging Air (Type II Manifold Servicing Unit) (14819) HP 778A-12		ea	2
		Whip Charging Oxy (Type II Manifold Servicing Unit) (14819) HP 778A-12		ea	2
2	8120-00-178-9814	Compressed Gas Cylinder Cap Air (Type I Manifold Servicing Unit) (14819)		ea	4
	8120-00-178-9814	Compressed Gas Cylinder Cap Oxygen (Type II Manifold Servicing Unit) (14819)		ea	2
	8120-00-178-9814	Compressed Gas Cylinder Cap Air (Type II Manifold Servicing Unit (14819)		ea	2

Section III. BASIC ISSUE ITEMS



5085-109

(1) Illus. Number	(2) National Stock Number	(3) Description FSCM and Part Number	On Code Usable	(4) U/M	(5) Qty Rqr
1		TM 5-4220-228-14 Operator,Unit, Direct Support and General Support Maintenance Manual, Type I and Type II Manifold Servicing Unit and Oxygen Booster Pump		ea	1
2	5120-01-156-7296	Wheel Lug Wrench		ea	1

APPENDIX D
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTIONS

D-1 **Scope**. This appendix lists expendable supplies and materials you need to operate and maintain the Type I and Type II Manifold Servicing Unit, Oxygen Booster Pump, and Oxygen Charging Station. These Items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)

D-2. **Explanation of Columns.**

a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative Instructions to identify the material (e.g. , "Use Cloth, Abrasive Item 2, App. D").

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item. (Enter as applicable)

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

e. Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function This measure Is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) National Level	(3) stock number	(4) Description	(5) U/M
1	O	8040-01-249-3976	Adhesive	qt
2	O	6810-00-286-5435	Alcohol, Isopropyl (81348) TT1735	gal.
	O	6810-00-983-8551	Alcohol, Isopropyl (81348) TT1735	qt
3	O	8415-00-281-7813	Apron, Rubber, Small (81349) MIL-A-2334	ea
	O	8415-00-281-7814	Apron, Rubber, Medium (81349) MIL-A-2334	ea
	O	8415-00-281-7815	Apron, Rubber, Large (81349) MIL-A-2334	ea
4	O	8105-00-837-7757	Bag, Plastic, 12 in x 12 in Interlocking Seal (58536) A-A-1 779	bx
5	O	7510-00-243-3434	Bands, Rubber (81349) ZZ-R-1415	bx
6	O	7530-00-222-3524	Book, Record	ea
7	O	7920-00-205-2401	Brush, Soft Bristle (81349) MIL-B-43871	ea
8	O	7920-00-292-9204	Cloth, Cleaning, Disp, Xtr Heavy 12 in x 15 in. (58536) A-A-1 62	mx
9	O	7920-00-044-9281	Cloth, Lint Free (81349) MIL-C-85043	bx
10	O	7930-00-282-9699	Detergent, Nonionic, MIL-D-16791, Type 1 (80244)	gal
	O	7930-00-985-6911	Detergent, Nonionic, MIL-D-16791, Type I (80244) 5-Gal Can	cn
11	O	6810-00-297-9540	Distilled Water, Technical (96906) MS36300-5	5 gal.
12	O	8415-00-266-8677	Gloves, Rubber (81349) ZZ-G-381 Size 10	pr
13	O	9150-00-190-0905	Grease, Automotive and Artillery (6 5 lb) MIL-G-10924 (81349)	cn
14	O	9150-01-052-6762	Hydraulic Brake Fluid	qt
15	O	6810-00-141-6078	Phosphate, Trisodium (81348) O-S-642	
16	O	7920-00-205-1711	Rag, Wiping, 50/G (58536) A-A-531	

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National stock number	(4) Description	(5) U/M
17	O	4240-00-240-5141	Shield, Face (81349) MIL-S-3126	ea
18	0	6850-00-281-1985	Solvent, Dry Cleaning (81348) PD-680	
19	O	7510-00-754-2522	Tape, Pressure Sensitive Adhesive	gal.
20	0	8030-00-889-3535	Tape, Teflon (81348) MIL-T-27730, 1/2 In	
O		8030-00-889-3534	Tape, Teflon (81348) MIL-T-27730, 1/4 In	ea
21	H	8030-01-286-3924	Seal Lube (81400) 28442	ea
22	H	8030-00-081-2337	Loctite	btl

APPENDIX E

TORQUE LIMITS

E-1. **General**. Table E-1 provides torque limits to be observed when installing attaching hardware.

Table E-1. Torque Limits.

Attaching Parts	Torque Range
End Cap Nuts	16-18 lb-t (21-24 Nm)
Pilot Valve Fitting	50 Oft (67.8 Nm)
Emergency Valve RE-6 Relay Cover Screws	100 lb-ft (67.8 Nm)

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 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 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

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

Cubic Measure

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

Approximate Conversion Factors

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

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