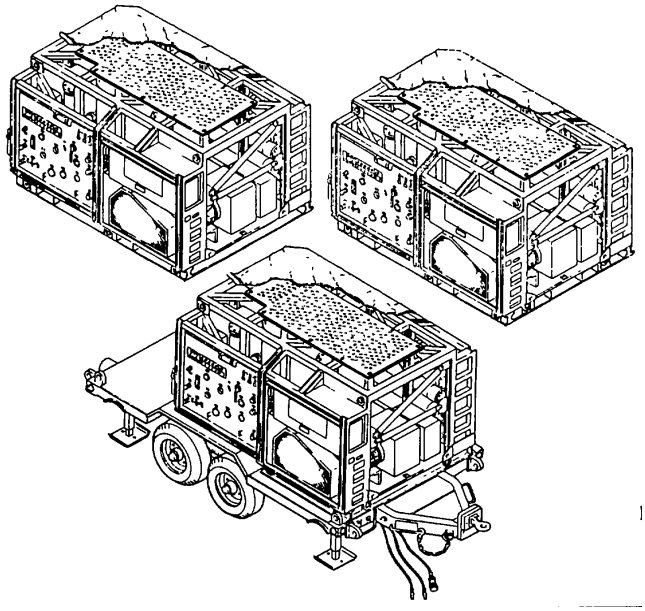
TECHNICAL MANUAL

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR WATER PURIFICATION UNIT, REVERSE OSMOSIS, 600-GPH

TRAILER MOUNTED, FLATBED CARGO
5-TON, 4-WHEEL TANDEM
MODEL WPES-1 (ARMY)
(NSN 4610-01-295-2720)

AND
SKID-MOUNTED
MODEL WPES-2 (AIR FORCE)
(NSN 4610-01-300-0198)
MODEL WPES-3 (MARINE CORPS)
(NSN 4610-01-295-2719)



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HEADQUARTERS, DEPARTMENT OF THE ARMY
HEADQUARTERS, U.S. MARINE CORPS
15 May 1991

WARNING

HIGH VOLTAGE

is used in the operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid When the technician is aided by operators, he must warn them about dangerous areas

Be careful not to contact high-voltage connections of 115-volt ac input connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body

WARNING

Do not be misled by the term "low voltage". Potentials as low as 50 volts may cause death under adverse conditions.

For Artificial Respiration, refer to FM 21-11.

WARNING

SOLVENT HAZARD

Drycleaning solvent, P-D-680, Type II, used to clean parts is potentially dangerous to personnel and property Avoid repeated and prolonged skin contact by wearing rubber or nonporous gloves when handling the solvent or material wet with drycleaning solvent. Wash hands immediately after exposure with soap and water and use a lanolin based skin cream to prevent skin drying. Do not use near open flame or excessive heat. Flash point of solvent is 180°F (38°C) Do not work with solvent in a closed room. Be sure there is good ventilation or the solvent vapors will build up in the air and become a poisonous mixture which can cause physical injury or even death.

WARNING

HIGH PRESSURE HAZARD

ROWPU piping and equipment can contain extremely high water pressure during and after operation If this pressure is not relieved before working on these pipes or equipment, serious injury or death may occur. Be sure to open all drains and vents before beginning any disassembly.

WARNING

HEAVY EQUIPMENT HAZARD

Lifting or moving heavy equipment incorrectly can cause serious injury. Do not try to lift or move more than 50 pounds by yourself. Get an assistant. Bend legs while lifting. Don't support heavy weight with your back.

WARNING

COMPRESSED AIR HAZARD

Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psig (207 kPag) air pressure.

WARNING

- Compressed air in airbrake system can blow dust into eyes Do not work on airbrake system until air pressure is released. Wear eye protection.

- Open draincock on air reservoir slowly to avoid a sudden rush of air when releasing air pressure from airbrake system.

WARNING

- Always use assistants during lifting operations. Use guide ropes to move hanging assemblies

- A lack of attention or being in an improper position during lifting operations can result in serious injury or death Pay close attention to movements of assemblies being lifted Do not stand under lifted assembly or in a position where you could be pinned against another object. Watch your footing

WARNING

Flatbed cargo trailer is unstable and can tip over when jacks are not down. Before raising or removing jack assemblies; make sure that trailer wheels are choked, trailer is level, and front of the trailer is supported.

WARNING

TOXIC CHEMICAL HAZARD

Sodium bisulfite is toxic to skin, eyes, and breathing passages. Wear rubber gloves and apron and eye and respiratory protection. Avoid repeated or prolonged contact

WARNING

Rivets can shatter during removal or installation and cause serious injury to eyes. Wear eye protection.

TECHNICAL MANUAL
ARMY NO. 10--4610-240-24
MARINE CORPS 08580C-24/2
AIR FORCE TO 40W4-13-22

HEADQUARTERS,
DEPARTMENTS OF THE ARMY,
AIR FORCE AND HEADQUARTERS,
UNITED STATES MARINE CORPS
Washington, D.C. 15 May 1991

Unit, Direct Support, and
General Support Maintenance Manual
For

WATER PURIFICATION UNIT, REVERSE OSMOSIS, 600-GPH

TRAILER MOUNTED, FLATBED CARGO,
5 -TON, 4-WHEEL TANDEM
MODEL WPES-1 (ARMY)
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MODEL WPES-2 (AIR FORCE)
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AND
SKID MOUNTED
MODEL WPES-3 (MARINE CORPS)
(NSN 4610-01-295-2719)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: US Army Troop Support Command, ATTN: AMSTR-MMTS, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. Marine Corps users submit NAVMC Form 10722 to: Commanding General, Marine Corps Logistics Bases (Code 850), Albany, Georgia, 31704-5000, Air Force users submit AFTO Form 22 to WR-ALC/LZD, Robins AFB, Georgia 31098-5609. A reply will be furnished directly to you.

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TABLE OF CONTENTS - Continued

HOW TO USE THIS MANUAL

Spend a few minutes looking through this manual It has a new look that is very different from the manuals you've been using. You'll find the new look is a lot easier to use, and you can find what you're looking for a lot faster.

Each chapter begins with an index that lists each paragraph or section in the chapter Each section in the maintenance chapter also has an index that lists the procedures in the section and gives page numbers. Or you can look for the information you want in the alphabetical subject index at the back of the manual.

We got rid of as many words as we could and put in lots of illustrations to show just about everything you'll be doing to maintain your equipment.

The text is keyed to the illustration with callout numbers (sometimes words) The callout numbers are in parentheses in the text.

So, HOW DO YOU USE THIS MANUAL?

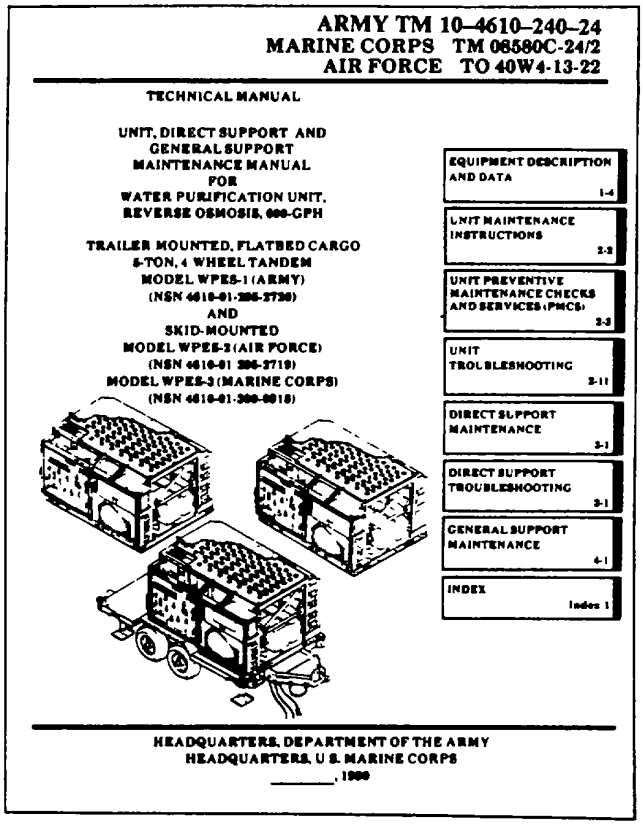
Like This:

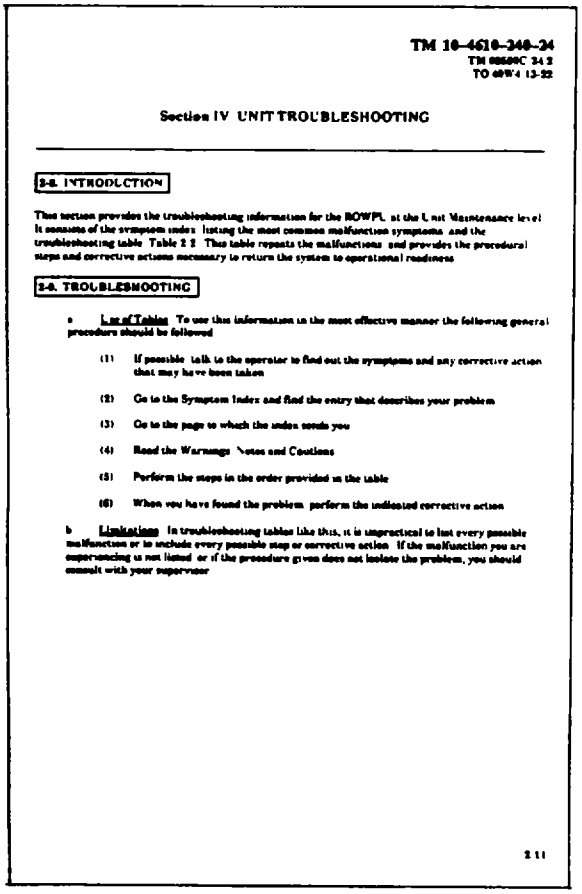
1. Suppose the trailer vibrates when being towed and you want to troubleshoot the unit.

2. Look at the cover and you'll see index boxes near the right-hand edge with subject titles in them You'll find "UNIT TROUBLESHOOTING 2-11" You can skip over to page 2-11.

OR

3. Bend the pages a bit and look at the edges. You'll see black bars on some of the pages that are lined up with the index boxes on the cover.





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Section IV UNIT TROUBLESHOOTING

2-8. INTRODUCTION

This section provides the troubleshooting information for the ROWPU at the Unit Maintenance level It consists of the symptom index listing the most common malfunction symptoms and the troubleshooting table Table 2 2 This table repeats the malfunctions and provides the procedural steps and corrective actions necessary to return the system to operational readiness

2-9. TROUBLESHOOTING

a Use of Tables To use this information in the most effective manner the following general procedure should be followed

(1) If possible talk to the operator to find out the symptoms and any corrective action that may have been taken

(2) Go to the Symptom Index and find the entry that describes your problem

(3) Go to the page to which the index sends you

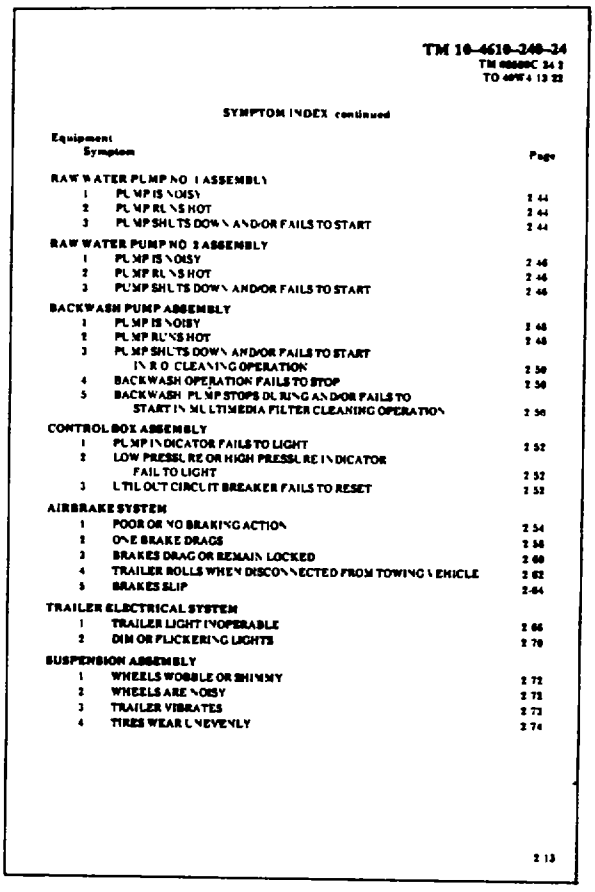
(4) Read the Warnings Notes and Cautions

(5) Perform the steps in the order provided in the table

(6) When you have found the problem perform the indicated corrective action

b Limitations In troubleshooting tables like this, it is impractical to list every possible malfunction or to include every possible step or corrective action If the malfunction you are experiencing is not listed or if the procedure given does not isolate the problem, you should consult with your supervisor

2 11



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SYMPTOM INDEX continued

2 13

4. If you put your thumbnail on the black bar that is lined up with the box on the cover for UNIT TROUBLESHOOTING and open the manual, you'll be on page 2-11

5. On page 2-11, you'll find Section IV, TROUBLESHOOTING The first major item in the section is a SYSTEM INDEX listing the systems and major assemblies that make up the flatbed cargo trailer and the ROWPU. Look for TRAILER ELECTRICAL SYSTEM in the Equipment column. Item 2 under TRAILER ELECTRICAL SYSTEM will give you page number 2-70 for "DIM OR FLICKERING LAMPS "

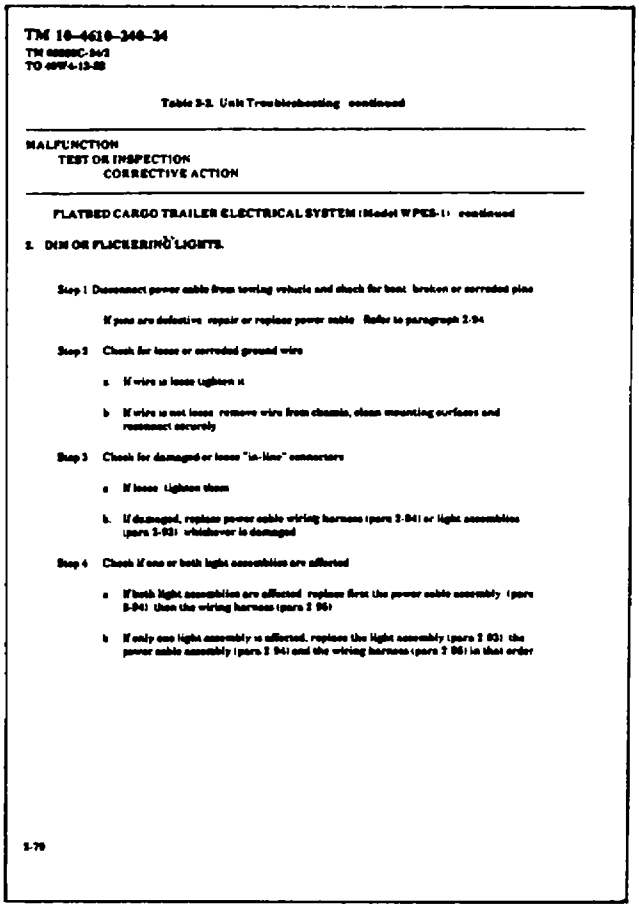

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Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

FLATBED CARGO TRAILER ELECTRICAL SYSTEM (Model WPES-1) - continued

2. DIM OR FLICKERING LIGHTS.

Step 1. Disconnect power cable from towing vehicle and check for bent, broken or corroded pins.

If pins are defective, repair or replace power cable. Refer to paragraph 2-94.

Step 2. Check for loose or corroded ground wire.

a. If wire is loose, tighten it.

b. If wire is not loose, remove wire from chassis, clean mounting surfaces and reconnect securely.

Step 3. Check for damaged or loose "in-line" connectors.

a. If loose, tighten them.

b. If damaged, replace power cable wiring harness (para 2-94) or light assemblies (para 2-93), whichever is damaged.

Step 4. Check if one or both light assemblies are affected.

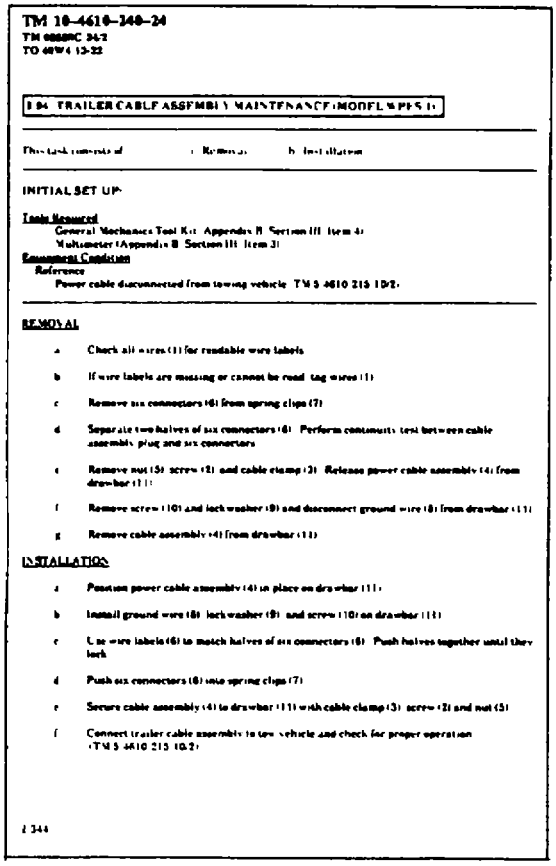
a. If both light assemblies are affected, replace first the power cable assembly (para 2-94), then the wiring harness (para 2-96).

b. If only one light assembly is affected, replace the light assembly (para 2-93), the power cable assembly (para 2-94) and the wiring harness (para 2-96) in that order.

2-70

6. Turn to page 2-70 and find the symptom DIM OR FLICKERING LAMPS.

7. As you do the tests and corrective actions in the order listed, you will get to "If pins are defective, repair or replace power cable. Refer to paragraph 2-94."



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2-94 TRAILER CABLE ASSEMBLY MAINTENANCE (MODEL M-PES-1)

This task consists of : a. Removal b. Installation

INITIAL SET UP

Tools Required
General Mechanics Tool Kit: Appendix B, Section III, Item 4
Multimeter (Appendix B, Section III, Item 3)

Equipment Condition
Reference
Power cable disconnected from towing vehicle (TM 5-4610-215-10-2).

REMOVAL

a. Check all wires (1) for readable wire labels.

b. If wire labels are missing or cannot be read, tag wires (1).

c. Remove six connectors (6) from spring clips (7).

d. Separate two halves of six connectors (6). Perform continuity test between cable assembly plug and six connectors.

e. Remove nut (5), screw (2), and cable clamp (3). Release power cable assembly (4) from drawbar (11).

f. Remove screw (10) and lock washer (9) and disconnect ground wire (8) from drawbar (11).

g. Remove cable assembly (4) from drawbar (11).

INSTALLATION

a. Position power cable assembly (4) in place on drawbar (11).

b. Install ground wire (8), lock washer (9), and screw (10) on drawbar (11).

c. Line wire labels (6) to match halves of six connectors (6). Push halves together until they lock.

d. Push six connectors (6) into spring clips (7).

e. Secure cable assembly (4) to drawbar (11) with cable clamp (3), screw (2), and nut (5).

f. Connect trailer cable assembly to tow vehicle and check for proper operation (TM 5-4610-215-10-2).

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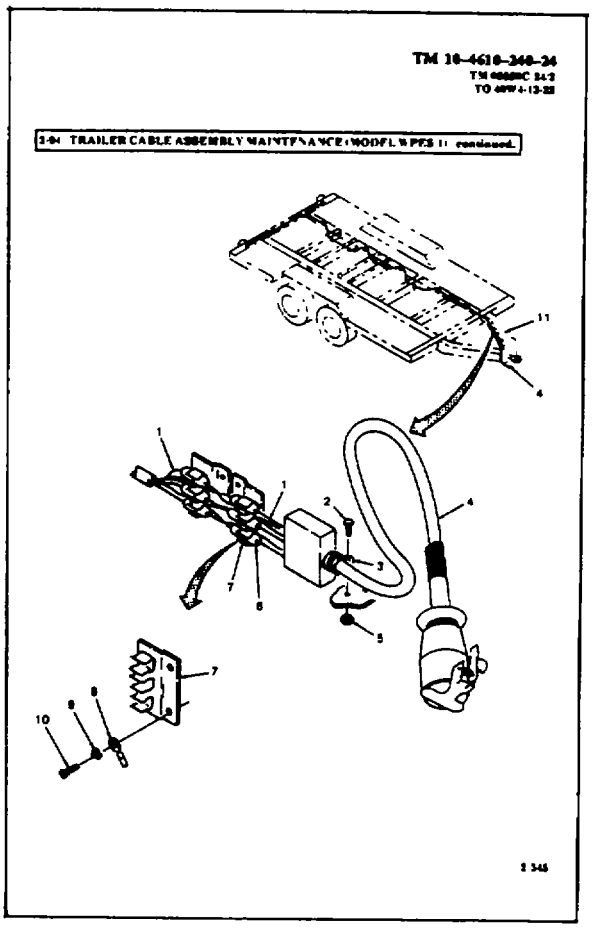

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2-94 TRAILER CABLE ASSEMBLY MAINTENANCE (MODEL M-PES-1) continued.

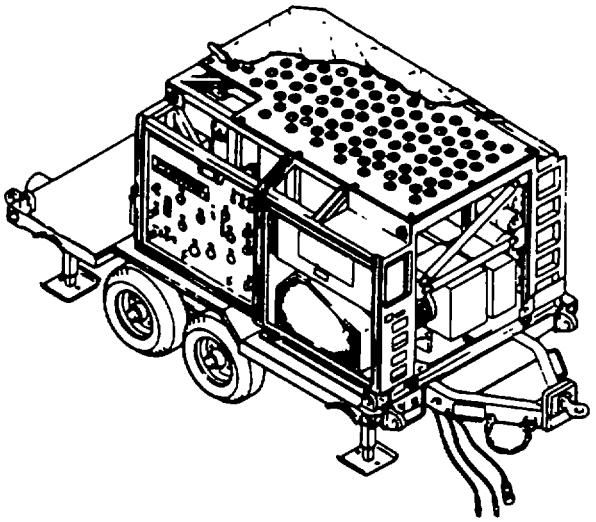
2-345

8. Turn to paragraph 2-94 and look at the procedure. The 'INITIAL SETUP" section tells you what tools, materials, and parts are needed to do this task. It also tells you anything you must do before starting this task and it gives general warnings about hazards that can exist while you do this task.

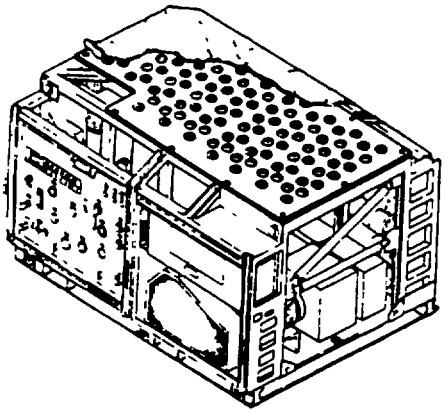
9. The procedure itself has a picture to show you where to look and what to look at, plus the steps you will do to perform the task.

10. Notice the numbered arrows. These are the callout numbers. As you read each step, we tell you where to look by including the callout number (in parentheses) after the name of each thing we call out.

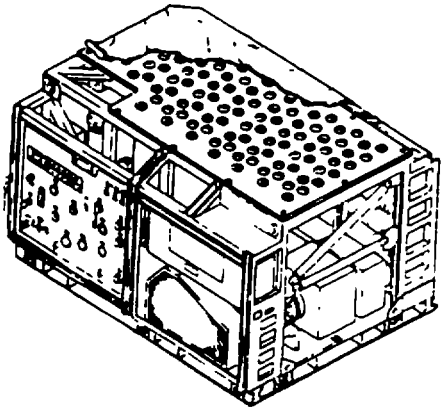
11. Do the procedure, then check to see if you have corrected the fault symptom.



MODEL WPES-1



MODEL WPES-2



MODEL WPES-3

CHAPTER I
INTRODUCTION

Section I. GENERAL INFORMATION
Alphabetical Index

1-1. SCOPE.

This manual covers unit, direct support, and general support troubleshooting and maintenance procedures required to repair and maintain the 600-gallon per hour (gph) Reverse Osmosis Water Purification Unit (ROWPU), Models WPES-1 (Army), WPES-2 (Air Force), and WPES-3 (Marines). The ROWPU produces up to 600 gph of drinking water from any nonpure water source, i.e., streams, rivers, lakes, or salt water.

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

a Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update. Marine Corps personnel refer to TM 4700- 15/1 for equipment records and forms procedures. Air Force personnel will comply with MASCOM requirements for maintenance data reporting.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 [Report of Discrepancy ROD)] as prescribed in AR 735-11/2DLAR 4140.55/NAVMATINST 4355.73B/ MCO 4430.3H.

c Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/MCO P4610.19D/DLAR 4500 1

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

Methods and/or procedures for the destruction of Army materiel to prevent enemy use are covered in TM 750-244-3

1-4. PREPARATION FOR STORAGE OR SHIPMENT.

Instructions on preparation for storage or shipment are found in Chapter 2, Section VI.

1-5. OFFICIAL NOMENCLATURE, NAMES AND DESIGNATIONS.

Common Name	Official Nomenclature
ROWPU	Reverse Osmosis Water Purification Unit, 600 GPH

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

a. Army. If your ROWPU 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. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, U. S Army Troop Support Command, ATTN: AMSTR-MPTF, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. We'll send you a reply.

b. Marine Corps. USMC personnel submit EIRs in accordance with MCO 1650.17.

c. Air Force AF personnel submit improvement reports in accordance with AFR 900-4 or T.O. 00-5-1 as applicable

1-7. WARRANTY INFORMATION

The ROWPU is warranted by Engineered Air Systems, Inc. in accordance with the terms of contract DAAK-01-87-C-A018 Refer to TB 10-4610-240-24 for details of the warranty program. Report all defects in material or workmanship to your supervisor who will take appropriate action

1-8. SAFETY, CARE AND HANDLING

Observe all WARNINGS, CAUTIONS and NOTES in this manual. This equipment can be dangerous or may be damaged if these instructions are not followed

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Section II. EQUIPMENT DESCRIPTION AND DATA

Alphabetical Index

1-9. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

For information on equipment characteristics, capabilities, and features of the equipment covered in this manual, refer to TM 10-4610-240-10 ; TM 08580C-10/1, T.O 40W4-13-21

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

For information on the location and description of the major components, refer to TM 5-4610-215-10/2, TM 08580A-10/; T 0 40W4-13-11

1-11. DIFFERENCES BETWEEN MODELS.

There are three models of the ROWPU covered in this manual. These model are designated as follows

Army ..... Model WPES-1
Air Force ..... Model WPES-2
Marine Corps ..... Model WPES3

Major differences between the three models are listed below and are described in subsequent paragraphs Maintenance procedures appearing in this manual that are applicable to only specific models of the ROWPU are identified with the designation (Model WPES-1, Model WPES-2 or Model WPES-3) in the paragraph heading or procedural step Procedures applicable to all three models do not contain any designation

DIFFERENCES BETWEEN MODELS			
	WPES-1	**WPES-2**	**WPES-2**
USER	**ARMY**	**AIR FORCE**	**MARINE CORPS**
EQUIPMENT			
Flatbed cargo trailer	x		
30KW Generator set	x		
Two forklift pockets in frame		x	
Four forklift pockets in frame			X
Single power input	X		X
Dual power input		x	
Front removal of R.O elements	x		
Front/rear removal of R O elements		x	x

1-11. DIFFERENCES BETWEEN MODELS- continued.

a. Only model WPES-1 is mounted on a flatbed cargo trailer. A self contained 30KW generator set installed on the trailer supplies electrical power for operation of the unit Models WPES-2 and WPES-3 are skid mounted (no trailer)

b. Both models WPES-2 and WPES-3 get electrical power from an external source that is not supplied with the unit

c. Differences In the electrical systems are

(1) Models WPES-1 and WPES-3 have only one external power connector on the junction box internal wiring between these two models is identical

(2) Model WPES-2 has two external power connectors on the junction box One connector supplies power to the high pressure pump (R.O. pump) motor, the other supplies power to remaining system components Both power cords must be connected to operate the unit Internal wiring is different between this unit and models WPES-1 and WPES-3

d. Differences In the piping systems are

(1) Piping on models WPES-2 and WPES-3 is identical On both models, the R.O. elements must be removed from both the front and back of the of the R.O vessels.

(2) The 30KW generator set installed on the flatbed cargo trailer of model WPES-I prevents removal of the R O elements from the back of the R.O. vessels. Piping is different on this model to allow removal of all R O elements from the front of the R O vessels

1-12. EQUIPMENT DATA.

For equipment data pertaining to the ROWPU, refer to TM 10-4610-240-10, TM 08580C-10/1, TO 40W4-13-21

Section III. TECHNICAL PRINCIPLES OF OPERATION
Alphabetical Index

1-13. SYSTEM TECHNICAL PRINCIPLES OF OPERATION.

Reverse osmosis is the process by which purified water is separated from the available seawater or brackish water source Pressure is applied to the raw water side of a semipermeable membrane, and desalinated water diffuses through the membrane to the freshwater side The 600 GPH ROWPU is arranged so that prefiltered water is pumped under pressure across the semi-permeable membranes, called R O membranes The R O membranes separate this water stream into a product water stream and brine concentrate stream, both of which continuously flow away from the membranes

1-13. SYSTEM TECHNICAL PRINCIPLES OF OPERATION - continued.

a. Raw water is drawn through a strainer, which keeps large particles of trash from entering the system. Depending on the distance between the ROWPU and water source, one or two raw water pumps are used to move the raw water As water enters the ROWPU, the chemical feed pump assembly adds two chemicals to it The polymer drive unit adds polyelectrolyte (polymer) solution and the sodium hex drive unit adds sodium hexameta- phosphate (sodium hex) The polymer material collects small pieces of floating solid matter into particles large enough to be removed by the multimedia filter Sodium hex prevents scaling

b The raw water, containing the added chemicals, flows through the multimedia filter which performs first stage filtration Second stage filtration is performed by the cartridge filter Water from the cartridge filter is supplied to the inlet side of the R O pump The R O pump then raises the pressure to that needed to force water through the membranes of the R O elements. Since the R.O pump output pulsates, it is passed through the pulse dampener which smooths the flow before the water reaches the R 0. elements The R.O elements are connected in series and the waste water (brine) from all elements is sent out of the ROWPU to the backwash water tank When that tank is full, any additional brine is discharged to the ground downstream of the suction hose strainer.

c. The chlorine drive unit adds chlorine to the filtered output of the R 0. elements to kill any bacteria present in the water. The chlorinated water is then carried out of the ROWPU through a hose for storage in two product water tanks connected in series When water is needed, the distribution pump sends the stored potable (drinkable) water through the distribution nozzle to a container provided by the user.

d. There are two cleaning procedures performed after 20 operating hours and one cleaning procedure performed whenever water flow rate or water pressure exceed certain limits After 20 operating hours, citric acid is injected into the system by the chemical feed pump before ROWPU shutdown After shutdown, the multimedia filter is backwashed When system conditions require it, an R 0. element cleaning procedure is performed.

e In the first procedure, the citric acid drive unit injects citric acid into the multimedia filter output The citric acid removes scaling that accumulated in the system during operation. When the procedure is complete, the ROWPU is shut down.

f. After shutdown, the multimedia filter backwash cycle is manually activated then controlled by a solid-state timer. Brine stored in the backwash tank is forced backward through the multimedia filter by the backwash pump Flow is in the direction opposite to that followed by the raw water during filtration, so trapped particles are forced from the filter and are discharged through a drain connected to the top of the multimedia filter

g A brine and citric acid solution or detergent solution is circulated through the R O elements to clean them Citric acid or detergent is added to brine that remains in the backwash water tank after backwash is complete The backwash pump is then connected to the input of the R 0. elements. This routes the solution through the elements, then back to the backwash water tank. When repeated recirculation has cleaned the R O elements, the ROWPU is operated normally to remove residue and drain it outside the product water tank

1-13. SYSTEM TECHNICAL PRINCIPLES OF OPERATION - continued.

h. When chemical or nuclear contaminates are present in product water, they are filtered out between the two product water tanks The ROWPU is overpacked with two portable filters that can be connected with one of the raw water pumps in the line that connects the two tanks. One of the filters is used when the water is contaminated with chemicals. The other filter is used for nuclear contaminants

1-14. COMPONENT TECHNICAL PRINCIPLES OF OPERATION.

a. *Suction Hose Strainer (1*). Prevents large pieces of trash from entering system.

b. *Float (2).* Holds suction hose strainer between surface and bottom of raw water source

c. Raw Water Pumps (3). Draw raw water through suction hose stainer and send it under pressure to multimedia filter When chemical or radiological filters are used in the product water line, one raw water pump is used between the two product water tanks to force water through the filter.

d *Chemical Feed Metering Pump Assembly (4).* Draws chemical solutions from chemical cans and injects them into water at various points in purification system.

e. *Chemical Feed Metering Pump Motor (5).* Provides power for four chemical feed metering pump drive units.

f. *Polymer Drive Unit (6)* Adds polymer solution to raw water Polymer solution collects small pieces of floating solid matter into groups large enough to be removed by multimedia filter.

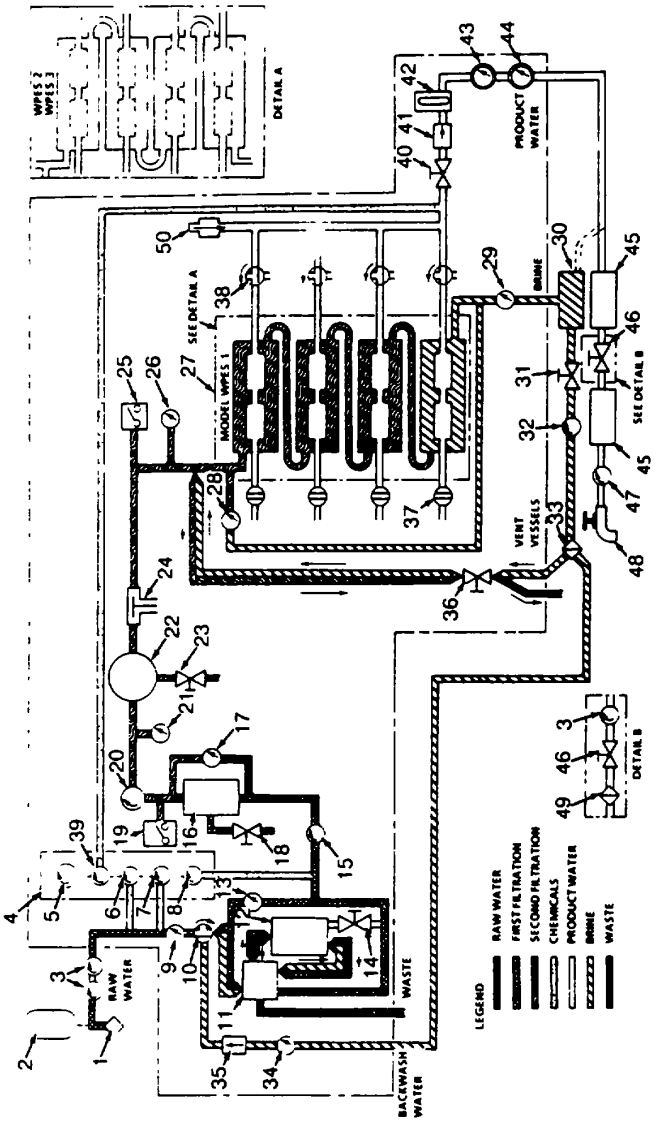
g. *Sodium Hex Drive Unit (7).* Adds sodium hex to raw water. Sodium hex prevents scaling.

h. *Citric Acid Drive Unit (8).* Adds citric acid to output of multimedia filter prior to ROWPU shutdown. Citric acid removes scaling developed in system during operation

i. *Raw Water Flow Meter (9)*. Indicates rate of flow of water drawn in by raw water pumps.

j. *Backwash Valve (10).* In NORMAL position, allows raw water to enter multimedia filter and closes the backwash line. In BACKWASH position, allows brine to enter multimedia filter and closes raw water line.

k. *Multimedia Filter Control Valve (11).* Routes water flow into and out of multimedia filter. During normal ROWPU operation, the multimedia filter control valve routes raw water from the backwash valve to top of multimedia filter while routing filtered output from bottom of multimedia filter to booster pump. During backwash, the multimedia control valve routes brine from backwash valve to bottom of multimedia filter while routing contaminated water from top of multimedia filter out of ROWPU through WASTE outlet on front panel. The multimedia filter control valve also changes flow rate during different stages of backwash.


DETAIL A
SEE DETAIL A
MODEL WPES-1
PRODUCT WATER
BRINE
SEE DETAIL B
VENT VESSELS
DETAIL B
RAW WATER
WASTE
BACKWASH WATER
LEGEND
RAW WATER
FIRST FILTRATION
SECOND FILTRATION
CHEMICALS
PRODUCT WATER
BRINE
WASTE

11-14. COMPONENT TECHNICAL PRINCIPLES OF OPERATION continued.

l. *Multimedia Filter* (12). Performs first stage filtration Removes most dissolved solids

m. *Multimedia Filter Gage (13).* Indicates differential pressure across multimedia filter

n. *Vent Multimedia Filter Valve (14)*. Releases air from multimedia filter while filter is filling during ROWPU startup

o. *Booster Pump (15)* Forces output of multimedia filter through the cartridge filter

p. *Cartridge Filter (16)*. Performs second stage filtration Removes very small dissolved solids.

q. *Cartridge Filter Gage (17)*. Indicates differential pressure across cartridge filter.

r. *Vent Cartridge Filter Valve (18*). Release air from cartridge filter while filter is filling during ROWPU startup.

s. *Low-Pressure Switch (19).* Senses pressure in output line from cartridge filter. When line pressure drops below 10 psi, causes R.O. pump to shut down and RO PUMP LOW PRESSURE indicator to light.

t. *R.O Pump (20).* Develops high pressure needed to force output of cartridge filter through R.O. elements

u. *Rupture Disk (21).* Ruptures to relieve pressure if pressure reaches 1425 psi as indicated on R.O. PRESSURE PSI gage. Prevents damage to system if high-pressure relief valve fails to open and high-pressure switch fails to shut down the R.O. pump.

v. *Pulse Dampener (22).* Reduces pulsing effect of R.O. pump. Smooths flow of water through R.O. elements

w. *Vent Pulse Dampener Valve (23).* Releases air from pulse dampener while pulse dampener is filling during ROWPU startup.

x. *High-Pressure Relief Value (24).* Opens to relieve pressure if pressure in line between pulse dampener and R.O. elements goes above 1100 psi.

y. *High-Pressure Switch (25).* Senses pressure in line between pulse dampener and R.O elements. If pressure rises above 1250 psi and high-pressure relief valve fails to open, causes R O pump to shut down and R.O. PUMP HIGH PRESSURE indicator to light.

z. *R O. Pressure PSI Gage (26)* Indicates output pressure of R.O. pump.

aa. *R 0. Elements (27).* Perform final filtration. Water from pulse dampener flows into outer shell of one pressure vessel Inside the pressure vessel, pure water is forced into the two filter elements through their permeable membrane surfaces Water still containing foreign matter flows through the other three pressure vessels in series In each pressure vessel, pure water is forced into the filter elements The remaining

1-14. COMPONENT TECHNICAL PRINCIPLES OF OPERATION - continued.

unfiltered water (brine) flows out of the ROWPU for storage in the backwash water tank Pure water flows out of the center of each pair of filter elements into a common pipe that carries the water out of the ROWPU for storage in the product water tanks. Connections between pressure vessels in models WPES-2 and WPES-3 are different than model WPES-, but operation is identical.

ab. *R 0. Vessels Gage (28).* Indicates differential pressure across the R.O elements

ac. *Brine Flow Meter (29)*. Indicates rate of brine flow out to backwash water tank

ad. *Backwash Water Tank (30)* Collects water rejected by R O elements (brine) for use in backwashing multimedia and in cleaning the R 0 elements.

ae. *Backwash Tank Value (31)* Controls flow of brine from backwash water tank.

af. *Backwash Pump (32).* Forces brine backward through multimedia filter during backwash. Output of multimedia filter is dumped out of ROWPU through WASTE hose. When backwash cycle is complete, output of backwash pump is connected to VENT VESSELS line Brine mixed with citric acid is then forced through R.O. elements to clean them. The solution is returned to backwash water tank and recirculated by backwash pump. Product water is sent to backwash water tank during this procedure to keep the citric acid solution from becoming concentrated.

ag. *Backwash Pump Strainer (33).* Filters brine before it enters multimedia filter or R.O elements.

ah. *Backwash Water Flow Gage (34)* Indicates rate of brine flow into multimedia filter during backwash.

ai. *Check Valve (35).* Prevents raw water from entering backwash water line.

aj. *Vent Vessels Valve (36).* During ROWPU startup, bypasses R.O. pump output around R 0. elements until multimedia filter stabilizes. During element cleaning, passes brine/citric acid solution from backwash pump to R.O. element.

ak. *Product Water Sample Ball Values (37).* Provide samples of filtered water at input ends of pressure vessels.

al. *Product Water Sample Elliptic Valves (38).* In normal position, pass product water out of R 0. elements to product water tanks. In sample position, direct product water of out each R.O. vessel as a sample Design prevents shutdown of water flow while switching between normal and sample positions.

am. *Chemical Feed Meter Pump Chlorine Drive Unit (39)* Adds chlorine to product water to prevent bacteria growth.

an. *Regulate Product Flow Value (40)* Controls rate of product water flow to product water tanks.

1-14. COMPONENT TECHNICAL PRINCIPLES OF OPERATION - continued. |

ao. *Check Value (41)* Prevents backflow in product water line.

ap. *Product Water Flow Gage (42).* Indicates rate of product water flow to product water tanks.

aq. *Water Meter (43)* Totalizer type meter. Indicates total amount of potable water produced by ROWPU.

ar. *In-Line TDS Monitor (44).* Indicates quality of product water. Calibrated in total dissolved solids (TDS). Sensor is installed in product water line. Meter is an overpack item installed on control panel during ROWPU operations.

as. *Product Water Tanks (2) (45).* Store product water.

at. *Value (46).* Controls flow of product water from first product water tank to second au. Distribution Pump (47). Develops pressure to move product water from product water tanks through distribution nozzle.

av. *Distribution Nozzle (48).* Controls rate of flow of product water from water tanks to user

aw. Chemlcal/Radrological Falters (49) Overpack items used to remove chemical or radiological contaminates from product water. Overpack contains all hardware and tubing needed to connect one or both filters in line between the two product water tanks Only installed when needed Operating life is 100 hours for either type.

ax. *Vacuum Breaker (50).* Prevents damage to R.O. elements during shutdown and stops flow down of R.O. vessel brine water when system is not pressurized.

CHAPTER 2

UNIT MAINTENANCE INSTRUCTIONS

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

Alphabetical Index

2-1. COMMON TOOLS AND EQUIPMENT.

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

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

Refer to TM 10-4610-240-24P and the Maintenance Allocation Chart in Appendix B of this manual.

2-3. REPAIR PARTS. I

Repair parts are listed and illustrated in the repair parts and special tools list, TM 10-4610-24024P, covering unit, direct support, and general support maintenance of this equipment

Section II. SERVICE UPON RECEIPT

2-4. SITE AND SHELTER REQUIREMENTS.

When not in use, the ROWPU does not require special siting or shelter If shelter Is available, storing the ROWPU under cover will minimize routine maintenance For site and shelter requirements during routine operation, refer to TM 10-4610-240-10

2-5. SERVICE UPON RECEIPT OF MATERIEL.

a. Checking Unpacked Equipment.

(1) Inspect the equipment for damage incurred during shipment If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report. Marine Corps personnel refer to MCO 4430.3

(2) Check the equipment against the packing slip to see if the shipment is complete Report all discrepancies in accordance with the instructions of DA Pam 738-750 Marine Corps personnel refer to TM 4700-15/1 (3) Check to see whether the equipment has been modified

b. Deprocesslng Unpacked Equipment.

(1) Remove all preservative coatings, grease, tape and packing materials

CAUTION
To prevent damage to equipment, do not operate R.O pump or chemical feed pump on preservative oil Pumps must be serviced with correct operating oil during deprocessing

(2) Drain shipping fluid from R 0. pump and chemical feed pumps Service pumps with fresh oil in accordance with LO 10-4610-240-12.

2-6. INSTALLATION INSTRUCTIONS.

For installation Instructions, refer to TM 5-4610-215-10/2

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

2-7. PREVENTIVE MAINTENANCE CHECKS AND SERVICES.

a. General

2-7. PREVENTIVE MAINTENANCE CHECKS AND SERVICES continued.

(1) The preventive maintenance checks and services (PMCS) listed In the PMCS table cover procedures to be performed by unit maintenance personnel Preventive maintenance checks and services are done to find and fix problems before they can cause major damage to the equipment To save time and make sure that all items are checked, do the PMCS in the order given in the table Write down any problems on the proper forms Refer to DA PAM 738-750

(2) If something doesn't work, troubleshoot it with the Instructions In this manual or notify your supervisor

(3) Always do your preventive maintenance in the same order so it gets to be a habit

b. Procedures for Services and Inspections The following general procedures are for unit maintenance PMCS and for all inspections They are just as important as the specific procedures In addition to the specific procedures, any of these general procedures that apply to PMCS items will be done automatically

(1) Check to see if items are In good condition, properly assembly or stowed, not leaking, loose, or excessively worn, and properly lubricated

(a) Checking that items are in good condition is usually a visual check to see if the items are safe and usable Good condition means not bent or twisted, not chafed or burred, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut, not rusted or rotted, and not leaking

(b) Checking that items are properly assembly or stowed usually is a visual inspection also. See if the items are in normal positions in the ROWPU and if all parts are present.

(c) Excessively worn means worn beyond usable limits and likely to fail before the next scheduled Inspection This includes too much play (lash or lost motion) in linkages and mating parts This also includes unreadable markings, data and caution plates, and other printed matter

(d) Check that bolts, nuts, and screws are not loose, missing, bent, or broken You can't try them all with a tool of course, but look for chipped paint, bare metal, or rust around bolt heads Tighten any that you find loose

(e) Inspect welds for loose or chipped paint, rust, or gaps where parts are welded together If you find a bad weld, report It to Direct Support Maintenance

(f) Check electric wires and connectors for cracked or broken insulation, bare wires, and loose or broken connectors Tighten loose connections and make sure the wires are in good condition

2-7. PREVENTIVE MAINTENANCE CHECKS AND SERVICES - continued.

(g) Check hoses and fluid lines for wear, damage, and leaks Make sure clamps and fittings are tight Wet spots show leaks, of course, but a stain around a fitting or connector can mean a leak If a leak comes from a loose fitting or connector, tighten it If something is broken or worn out, either correct It or report it to Direct Support Maintenance (refer to the Maintenance Allocation Chart, Appendix B)

(2) 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 Leakage definitions for unit PMCS

CAUTION

When operating with Class I or Class II leaks, continue to check fluid levels in addition to that required in PMCS. Parts without fluid will stop working and/or cause damage to the parts

NOTE

Equipment operation is allowable with minor leakage (Class I or II) Consideration must be given to the fluid capacity in the item being checked/inspected When In doubt, notify your supervisor

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

(3) The specific PMCS procedures do not say "adjust if necessary" or "replace if necessary " It is understood that whenever inspection shows the need for adjustment, repairs, or replacement, that work will be done

(4) Cleaning instructions are in the maintenance sections for those Items being inspected

(5) Unit maintenance services are those general procedures listed below, unless approval is given for other services

(a) Adjust. Make all adjustments by following the procedures given In this manual or in bulletins

(b) Clean. items by following the general cleaning procedures given in the applicable maintenance paragraphs

2-7. PREVENTIVE MAINTENANCE CHECKS AND SERVICES continued.

(c) Service Normally, service includes filling the tires with air and changing or cleaning filters

(d) Tighten Tighten items with enough force on the wrench handle to tighten according to good mechanical practice. Do not overtighten, this may strip threads or cause distortion. Tightening includes using lockwashers, locknuts, lock wire, or cotter pins when needed. Use a torque wrench when the procedure calls for one.

(e) Modification work order application. Write all needed modification work orders (MWO) for the equipment on DA Form 2408-5.

(f) When it is hard to do all the PMCS procedures at one time, they can sometimes be done in parts. If possible, plan to do all the procedures within 24 hours. All available time at halts and in bivouac areas must be used, if needed, to make sure the PMCS is done.

c. PMCS Procedures.

(1) PMCS Support Diagrams Figure 2-1 gives location of components for the flatbed cargo trailer and figure 2-2 gives location of components for ROWPU.

(2) PMCS Table Table 2-1 gives PMCS procedures The PMCS table is made up of the following columns:

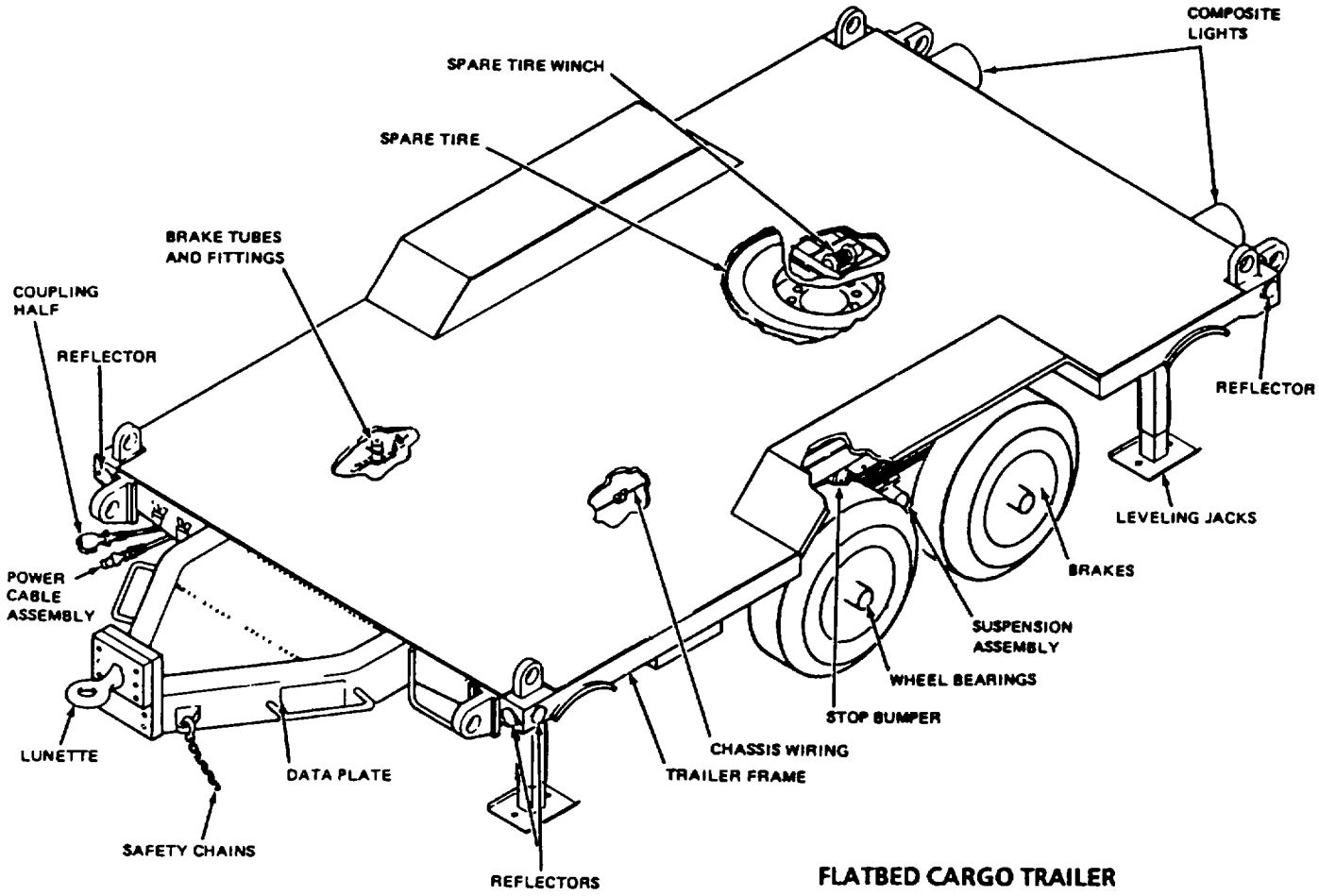
(a) Item No This column gives the order in which the checks and services are to be done Use these item numbers when filling out the TM Item No. column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, or Marine Corps forms as prescribed by TM 4700-15/1.

(b) Interval. These columns state, in calendar days, the amount of time between schedule checks and services. A dot (•) is placed in the column that applies to each procedure

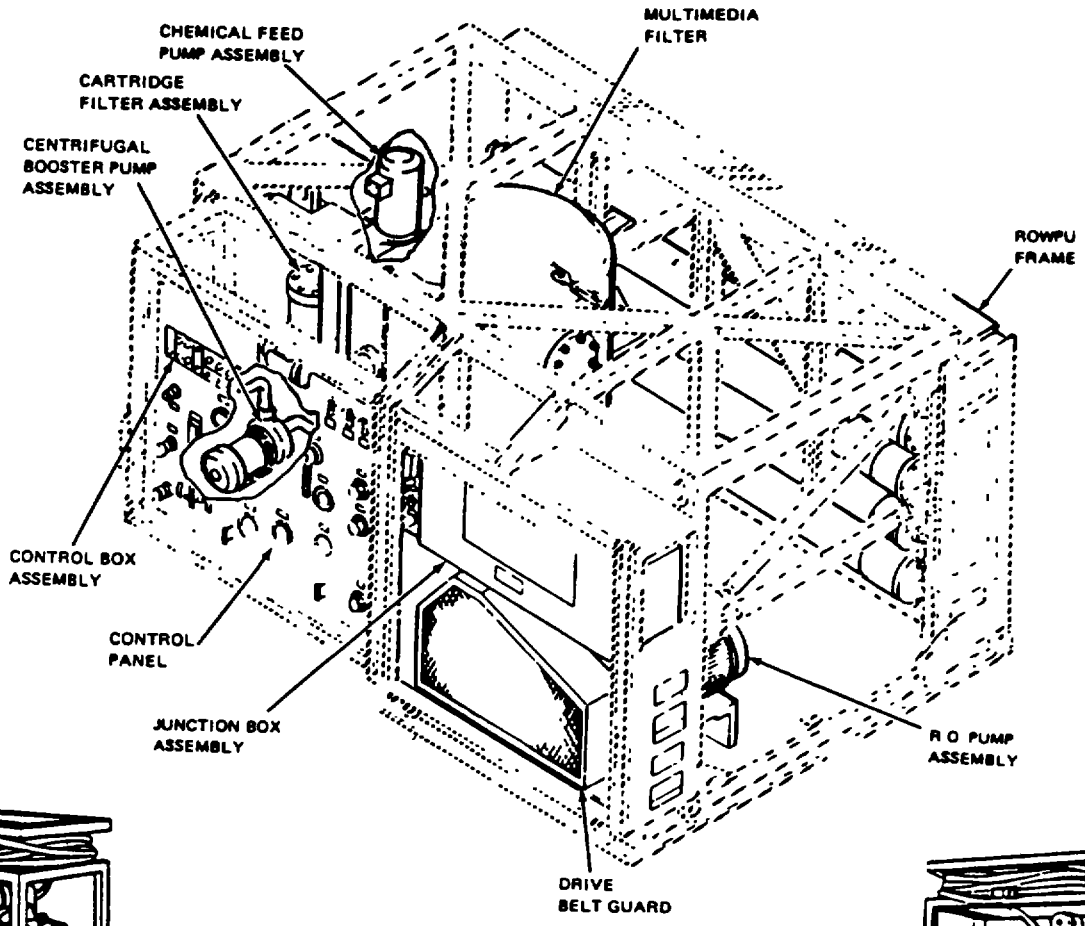
M-Monthly **Q-Quarterly** **A-Annually**

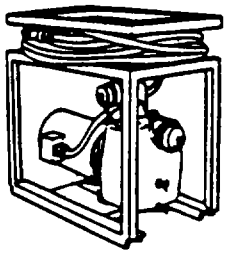
(c) Items To be Inspected This column names the item to be checked or serviced.

(d) Procedures This column gives the checks and services that need to be done on the item

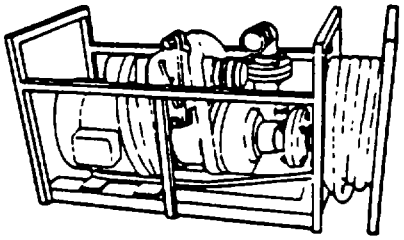


FLATBED CARGO TRAILER
(MODEL WPES-1 ONLY)

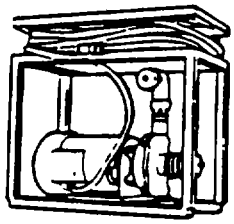




RAW WATER
PUMP ASSEMBLY (2 USED)



BACKWASH PUMP ASSEMBLY



ROWPU

Table 2-1. Unit Preventive Maintenance Checks and Services

NOTE

- **These checks are to be made in the order listed, within the designated interval**
- **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 serviced when the equipment can be shut down**

M - Monthly Q - Quarterly A - Annually

ITEM NO.	Interval			ITEM TO BE INSPECTED	Procedures
	M	Q	A		
				TRAILER (Model WPES-I Only)	
1		•		Trailer frame	Inspect for broken welds and cracks. Refer to Direct Support Maintenance for repair
2		•		Lunette	Inspect for loose or damaged bolts, and cracked lunette ring
3		•		Safety chains	Inspect for rusted or worn links.
4			•	Leveling jacks	Inspect for broken welds and proper operation Lubricate levelingjacks (LO 104610-240-12)
5		•		Stop bumper	Inspect for cracks, wear, or crushed condition
6	•			Airbrake system	Check that wheels do not turn when air pressure is relieved
7			•	Wiring harness	Inspect for frayed, cuts, or burned wiring. Inspect for corrosion on all connectors
8		•		Suspension assembly	Inspect for broken springs, corrosion, and missing bolts

Table 2-1. Unit Preventive Maintenance Checks and Services (cont.)

M - Monthly Q - Quarterly A - Annually

ITEM NO.	Interval			ITEM TO BE INSPECTED	Procedures
	M	Q	A		
9		•		Brakes	Inspect brake linings for wear, cracks and glazing Inspect brake assembly for rusted or worn parts
10		•		Wheel bearings	Clean and repack (para 2-100). Refer to (LO 14610-240-12)
				ROWPU	
11			•	ROW PU frame	Inspect for broken welds, cracks or corrosion Inspect for missing bolts and nuts
12				Generator (Model WPES-I Only)	Perform generator PMCS. Refer to TM 5-6115-465-12
13		•		Control panel	Check operation of all flowmeters and gages and fittings pressure gages Inspect for leaks. Inspect for damage
14			•	Cartridge filter	Inspect for leaks. assembly Inspect for worn paint **WARNING** High voltages in this equipment can cause serious injury or death Be certain that all power Is removed before performing maintenance
15			•	Cable Assemblies	Inspect for cracked, broken, burned or cut insulation. Inspect connectors for damage and corrosion

Table 2-1. Unit Preventive Maintenance Checks and Services (cont.)

M - Monthly Q - Quarterly A - Annually

ITEM NO.	Interval			ITEM TO BE INSPECTED	Procedures
	M	Q	A		
16			•	Chemical feed pump assembly	Change pump oil (LO 10-461024-12.) Inspect control knobs for ease of operation
17			•	Control box assembly	Inspect wiring harness for damaged insulation and corrosion. Inspect all electrical jacks and connections for damage and corrosion Inspect all cable plugs and pins for damage and corrosion
18			•	Junction box	Inspect wiring harness for corrosion assembly Inspect all electrical jacks and connections for damage and corrosion Inspect all cable plugs and pins for damage and corrosion. Inspect motor starters for loose mounting screws, pitted and corroded electrical terminal connections, loose terminal screws, damaged or broken wiring, and dirt or foreign matter
19		•		R.O. pump assembly	Check that breather is not clogged. Change oil in R 0 pump (LO 104610-240-12) Inspect for traces of water in sight gage Inspect five V-belts for cracks and signs of wear Check belt tension, belt should push down 1/2 inch at center of span Inspect pulleys for wear and damage. Inspect for loose or damaged drive belt guard
20		•		Multimedia filter assembly	Inspect for loose fittings and mounting hardware

Section IV. UNIT TROUBLESHOOTING

2-8. INTRODUCTION.

This section provides the troubleshooting information for the ROWPU at the Unit Maintenance level It consists of the symptom index, listing the most common malfunction symptoms, and the troubleshooting table, Table 2-2. This table repeats the malfunctions, and provides the procedural steps and corrective actions necessary to return the system to operational readiness

2-9. TROUBLESHOOTING.

a. Use of Tables To use this information in the most effective manner the following general procedure should be followed.

(1) If possible, talk to the operator to find out the symptoms and any corrective action that may have been taken

(2) Go to the Symptom Index and find the entry that describes your problem

(3) Go to the page to which the index sends you

(4) Read the Warnings, Notes and Cautions

(5) Perform the steps in the order provided in the table

(6) When you have found the problem, perform the indicated corrective action

b. Limitations. In troubleshooting tables like this, it is impractical to list every possible malfunction or to include every possible step or corrective action If the malfunction you are experiencing is not listed, or if the procedure given does not isolate the problem, you should consult with your supervisor.

SYMPTOM INDEX

SYMPTOM INDEX- continued

Table 2-2. Unit Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY

1. ALL PUMPS INOPERABLE.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Check for 208 VAC, three phase power at P1 (power input plug) of power cable Check between pins A-B, B-C and C-A.

If 208 VAC is measured in all three tests, notify Direct Support Maintenance.

Step 2 Check for 208 VAC, three phase power at power source output lugs.

a. If 208 VAC, three phase power is measured, replace power cable assembly. Refer to paragraph 2-64 (Models WPES-1 and WPES-3).

b. If 208 VAC, three phase power is not measured, refer to power source manual

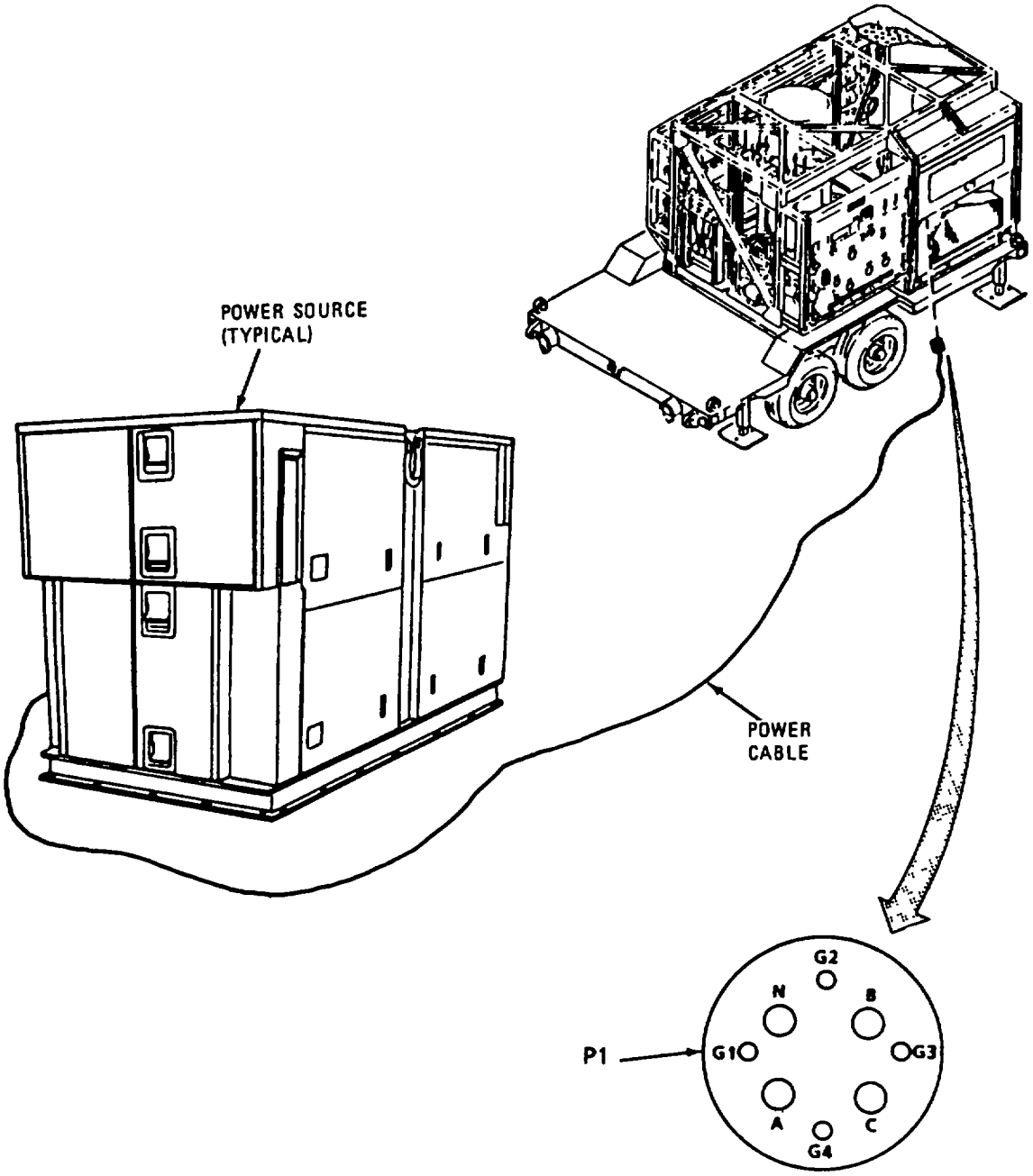

POWER SOURCE
(TYPICAL)
POWER
CABLE
P1
G2
N
B
G1
G3
A
C
G4

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PIPING INSTALLATION

WARNING

ROWPU piping and components may contain extremely high pressure during and after operation. If this pressure is not relieved before working on pipes or equipment, serious injury or death may occur Be sure to open all drains and vents before beginning any work.

1. HIGH-PRESSURE RELIEF VALVE OPENS REPEATEDLY.

Step 1. Check R.O. PRESSURE gage.

a. If gage indicates 1100 psi or higher when valve opens, go to step 2.

b. If gage indicates less than 1100 psi, replace high pressure relief valve. Refer to paragraph 2-59.

Step 2. Inspect R.O. vessels. Refer to TM 10-4610-240-10.

a. If R.O. elements are clogged but not damaged, flush R.O. vessels. Refer to TM 104610-240-10 .

b. If R.O. elements are damaged, replace R.O. elements. Refer to TM 10-4610-240 10 .

2. RUPTURE DISK RUPTURES.

Step 1. Replace rupture disk (TM 10-4610-240-10), high pressure switch (para 2-65) and pressure relief valve (para 2-59).

Step 2. Operate ROWPU and note pressure reading on R.O. PRESSURE gage If pressure stays below 1000 psi, malfunction is fixed, continue with normal operation.

Step 3. Remove and inspect R.O. elements. Refer to TM 10-4610-240-10.

a. If R.O. elements are clogged but not damaged, flush R.O. vessels. Refer to TM 104610-240-10.

b. If R.O. elements are damaged, replace R 0. elements. Refer to TM 10-4610-240-10

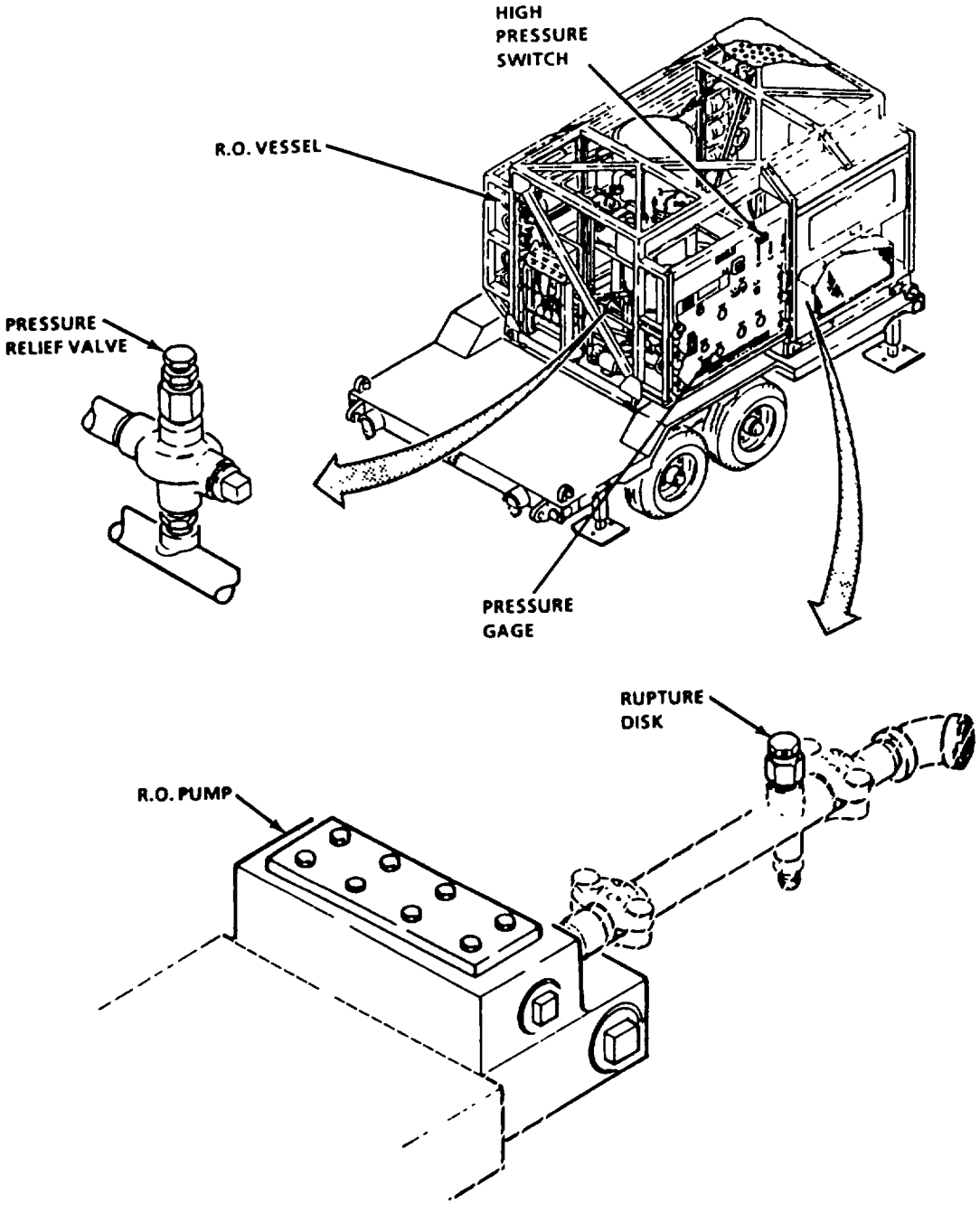

HIGH
PRESSURE
SWITCH
R.O. VESSEL
PRESSURE
RELIEF VALVE
PRESSURE
GAGE
RUPTURE
DISK
R.O. PUMP

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PIPING INSTALLATION - continued

3. HIGH-PRESSURE LIGHT ILLUMINATES.

Step 1. Start ROWPU and observe R.O. PRESSURE gage and HIGH PRESSURE light.

a. If light comes on at 1100 psi go to step 2.

b. If light comes on below 1100 psi replace high pressure switch. Refer to paragraph 2-65.

Step 2. Inspect R 0. vessels. Refer to TM 10-4610240-10.

a. If R.O elements are clogged but not damaged, flush R.O. vessels Refer to TM 10-4610-240-10.

b If R.O. elements are damaged, replace R.O. elements. Refer to TM 10-4610-240-10.

4. UNABLE TO JOG R.O. PUMP.

Notify Direct Support Maintenance if this condition exists.

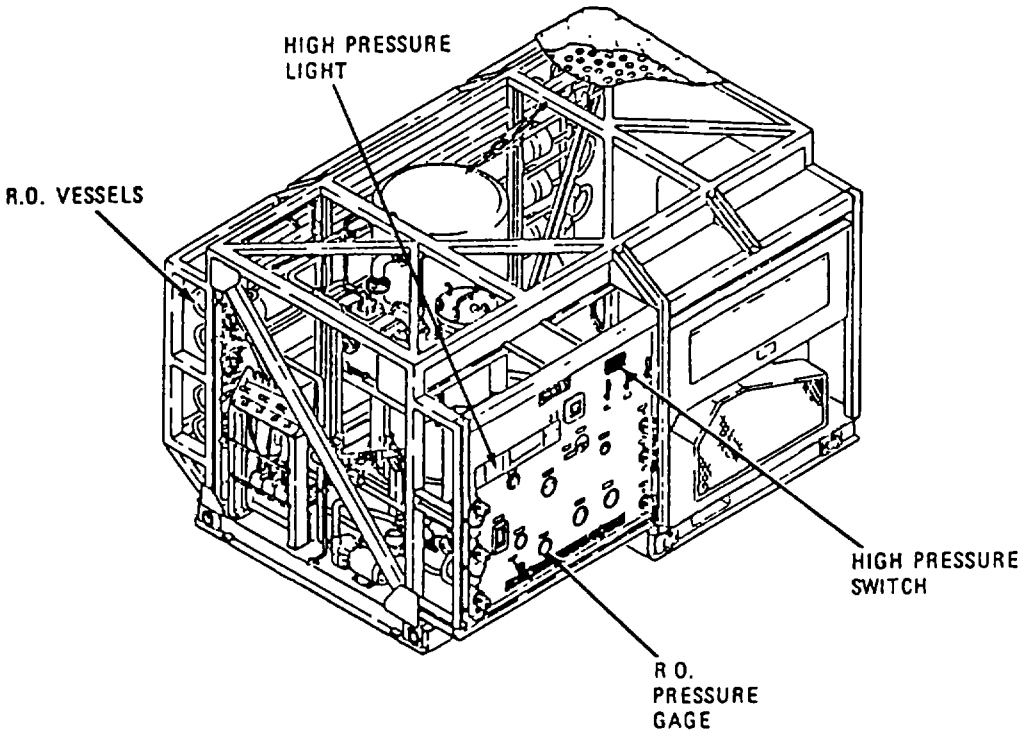

HIGH PRESSURE
LIGHT
R.O. VESSELS
HIGH PRESSURE
SWITCH
R O.
PRESSURE
GAGE

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PIPING INSTALLATION - continued

5. ABNORMAL MULTIMEDIA FILTER DIFFERENTIAL PRESSURE INDICATION.

Step 1 Note if pressure is high or low and check RAW WATER FLOW meter

If pressure is at, or close to zero and RAW WATER FLOW meter is normal (35 GPM approximately), replace pressure gage. Refer to paragraph 2-49.

Step 2. Check for leaking control hoses.

If control hoses leak, tighten connections and/or replace hoses that leak. If trouble persists, replace control valve assembly. Refer to paragraph 2-79.

6. ABNORMAL R.O. VESSEL DIFFERENTIAL PRESSURE GAGE INDICATION.

Step 1. Check if gage is at or near zero and RAW WATER FLOW meter is normal (35 GPM approximately).

If gage is at or near zero at normal flow, replace gage. Refer to paragraph 2-49.

Step 2. Check R.O. vessels for damaged, clogged or missing elements and/or foreign objects Refer to TM 10-4610-240-10 .

a. Clean, install or replace elements as required.

b. If rubber chunks are found in vessels, replace fluid pressure dampener. Refer to paragraph 2-73

7. ABNORMAL R.O. PRESSURE GAGE INDICATION.

Step 1. Check if gage is at or near zero and RAW WATER FLOW meter is normal (35 GPM approximately).

If gage is at or near zero at normal flow, replace gage Refer to paragraph 2-49.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 2. Check R.O. vessels for damaged, clogged or missing elements and/or foreign objects Refer to TM 10-4610-240-10

a Clean, install or replace elements as required

b. If rubber chunks are found in vessels, replace fluid pressure dampener. Refer to paragraph 2-73

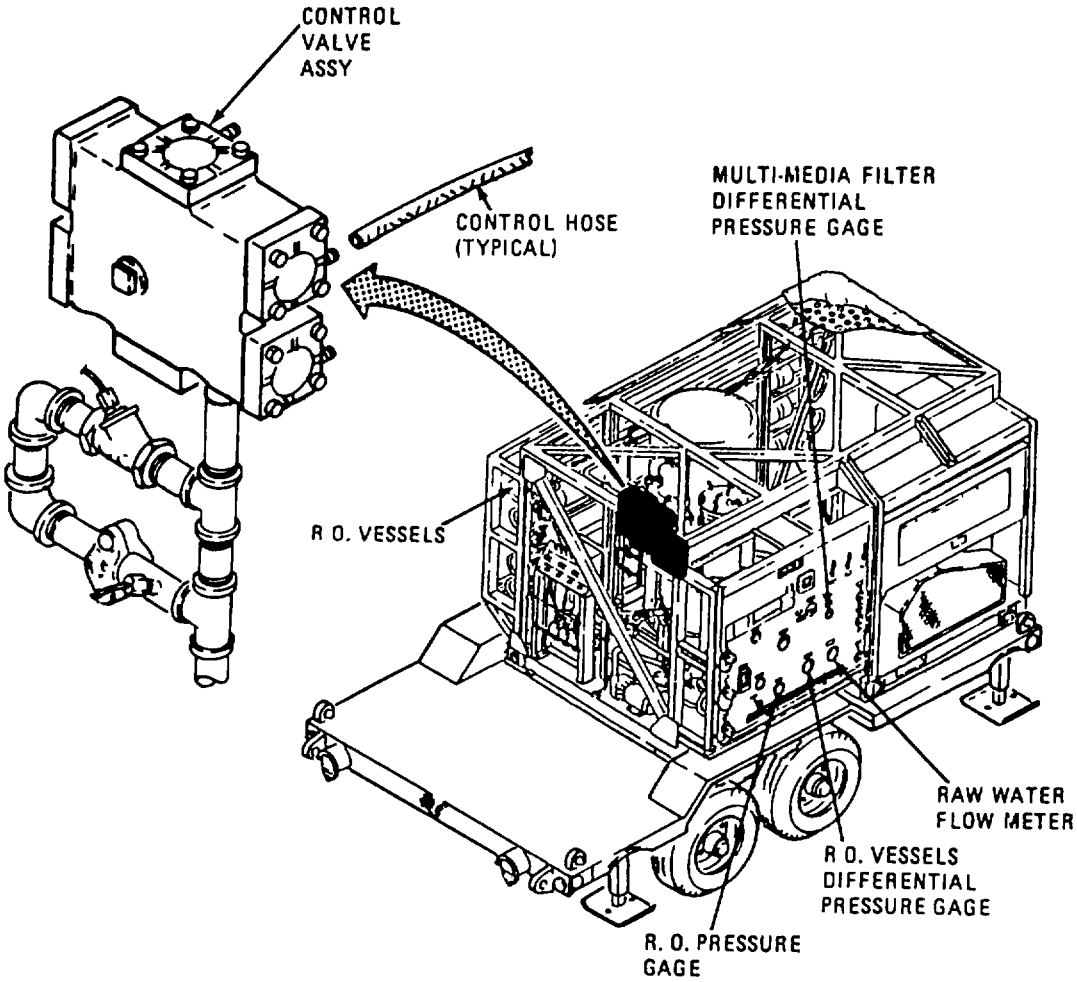


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PIPING INSTALLATION - continued

Step 3. Check for restricted or defective RAW WATER FLOW meter, PRODUCT WATER FLOW meter and check valve

a. If PRODUCT WATER FLOW meter is restricted or defective, remove restriction and/or replace flow meter. Refer to paragraph 2-42.

b. If RAW WATER FLOW meter is restricted or defective, remove restriction and/or replace flow meter. Refer to paragraph 2-43.

c. If check valve is restricted or defective, remove restriction and/or replace check valve Refer to paragraph 2-44.

8. ABNORMAL CARTRIDGE FILTER DIFFERENTIAL PRESSURE GAGE INDICATION.

Step 1. Check if gage is at or near zero and RAW WATER FLOW meter is normal (35 GPM approximately).

If gage is at, or near zero at normal flow, replace gage. Refer to paragraph 2-49.

Step 2. Check cartridge filter for damaged, clogged or missing elements.

Clean, install or replace elements as required.

9. INADEQUATE BRINE FLOW IN MULTIMEDIA FILTER CLEANING OPERATION.

Step 1. Check if stager cycles.

If not, press PUSH TO RESET button.

Step 2. Check for 115 VAC input voltage TB-1 to TB-2 (ground), and 115 VAC start signal at TB-4 in timer assembly.

NOTE

To measure start signal, if it is necessary to hold ELEMENT CLEANING switch (S-2) to the START position.

a. If input voltage and/or start signal is absent, notify Direct Support Maintenance.

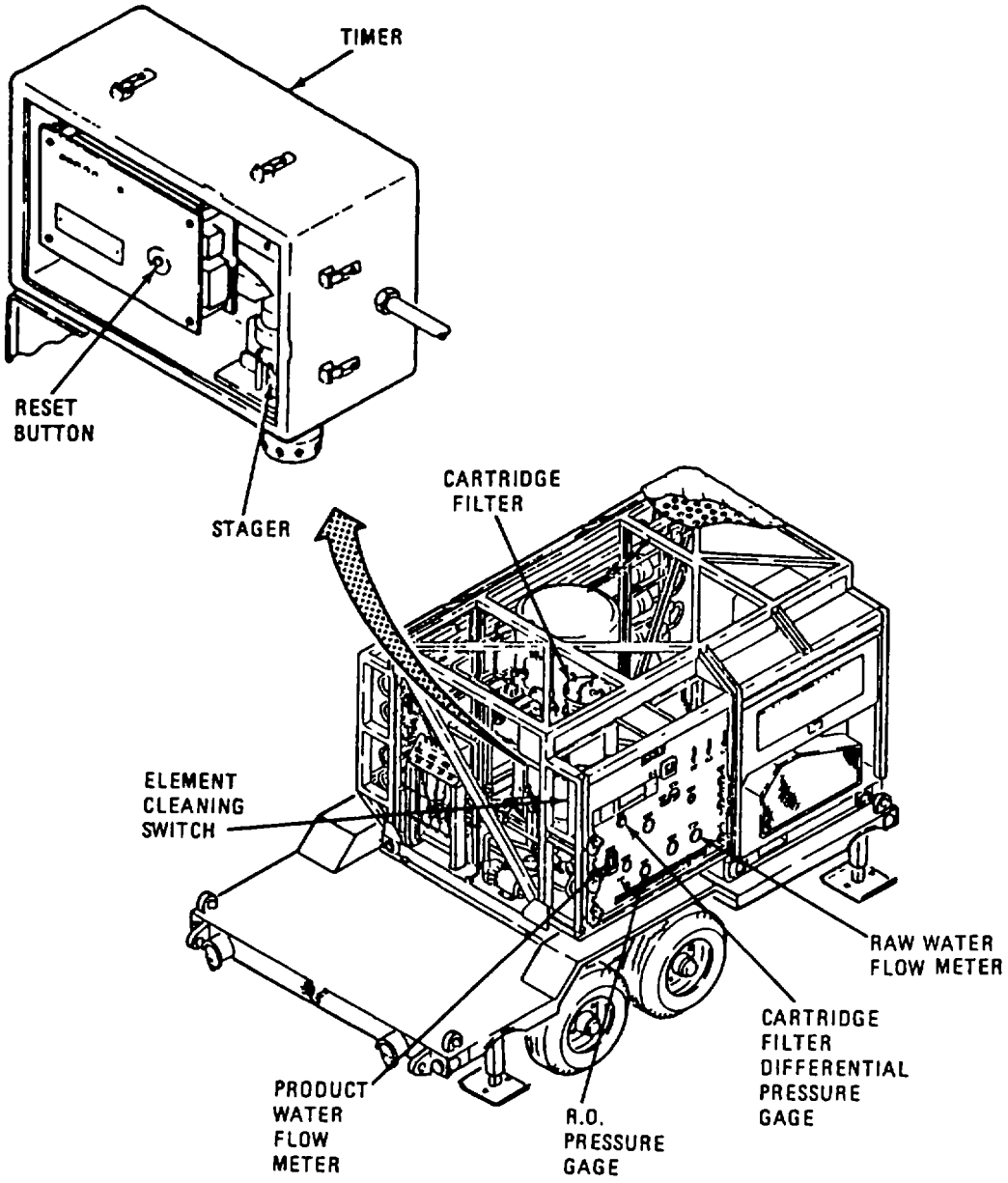

TIMER
RESET BUTTON
STAGER
CARTRIDGE FILTER
ELEMENT CLEANING SWITCH
RAW WATER FLOW METER
CARTRIDGE FILTER DIFFERENTIAL PRESSURE GAGE
PRODUCT WATER FLOW METER
R.O. PRESSURE GAGE

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PIPING INSTALLATION - continued

b. If both voltages are present, replace timer assembly. Refer to paragraph 2-78.

Step 3. Check for clogged control hoses.

Remove restrictions if clogged.

Step 4. Remove "in line" diaphragm valve (paragraph 2-80) and check for restrictions and damaged components.

Remove restrictions and/or replace damaged components; if trouble persists, replace control valve assembly. Paragraph 2-79.

Step 5. Check for restrictions and/or damage in BRINE FLOW meter, BACKWASH VALVE, check valve attached to BACKWASH VALVE, pipes and orifices

a. If BRINE FLOW meter is damaged or restricted, remove restriction and/or replace brine flow meter. Refer to paragraph 2-47.

b. If BACKWASH VALVE and/or check valves are restricted or damaged, remove restriction and/or replace valves. Refer to paragraph 2-52.

c. If restriction or damage is in pipes and orifices, disconnect pipes as necessary and remove restriction.

10. INOPERABLE TDS MONITOR.

Remove monitor cover and check for defective fuse and broken or disconnected wires

a. If defective, replace fuse.

b. If wires are disconnected, reconnect wires.

c. If wires are broken and cannot be connected, or no obvious defect is found, notify Direct Support Maintenance

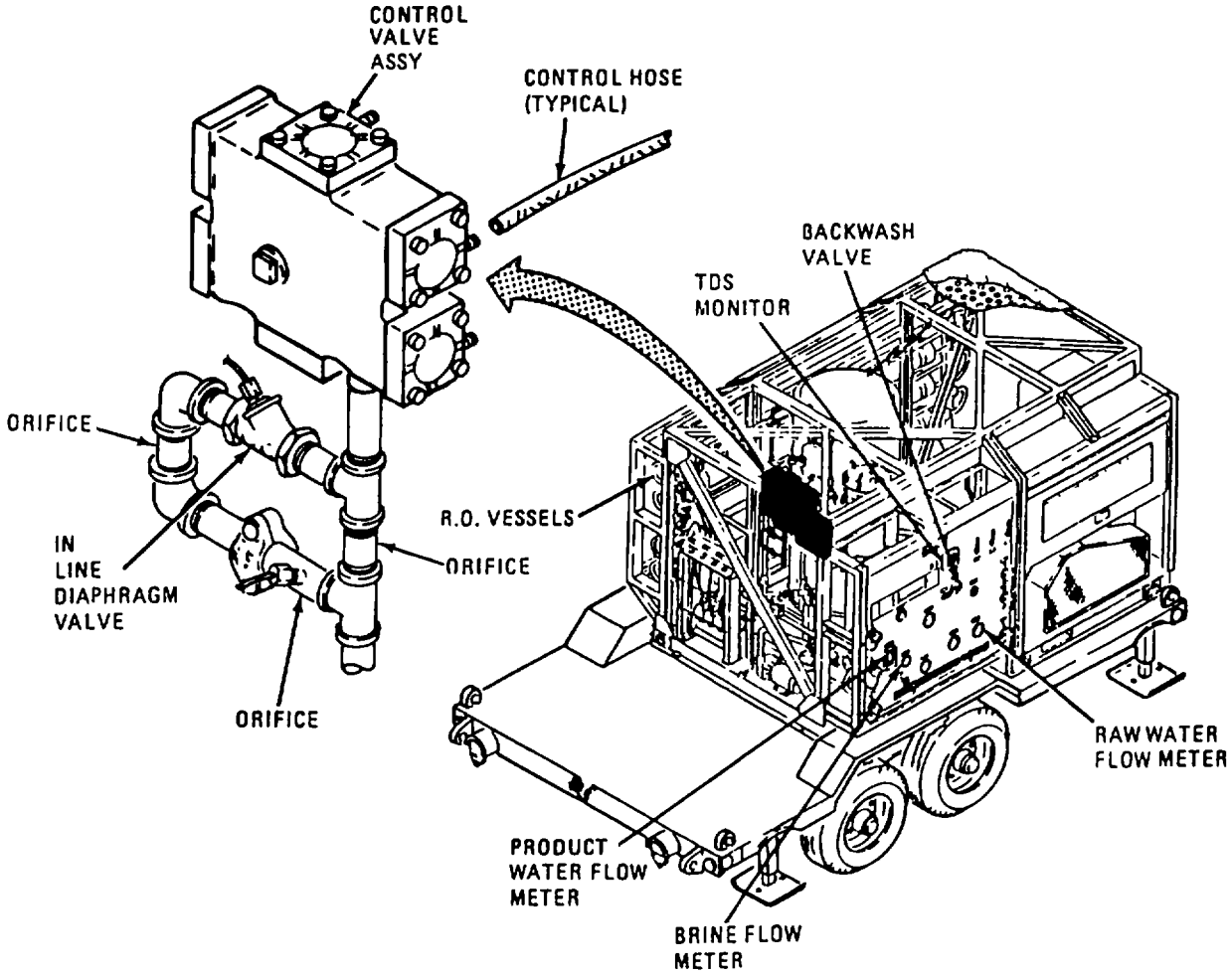

CONTROL VALVE ASSY
CONTROL HOSE (TYPICAL)
BACKWASH VALVE
TDS MONITOR
ORIFICE
R.O. VESSELS
IN LINE DIAPHRAGM VALVE
ORIFICE
ORIFICE
RAW WATER FLOW METER
PRODUCT WATER FLOW METER
BRINE FLOW METER

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BOOSTER PUMP ASSEMBLY

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

1. PUMP FAILS TO OPERATE.

Step 1. Check if CB6 and/or K6 heater assembly injunction box are tripped.

If either CB7 or K6 heater assembly is tripped, go to step 3

Step 2. Check for 208 VAC power on K6 heater assembly output terminals. Check between T1 - T2, T1 - T3 and T2 - T3.

If 208 VAC is not measured in all three tests, notify Direct Support Maintenance.

Step 3. Remove power at power source and disconnect pump power cable assembly at booster pump and heater output terminals, T1, T2, and T3 injunction box. Check cable assembly for continuity and shorts.

a. If cable assembly is not defective, replace booster pump Refer to paragraph 2-67

b. If cable assembly is defective notify Direct Support Maintenance.

2. PUMP IS NOISY

Check if booster pump is securely mounted to ROWPU frame.

a. If booster pump is not secure, secure booster pump.

b. If booster pump is secure, replace booster pump. Refer to paragraph 2-67.

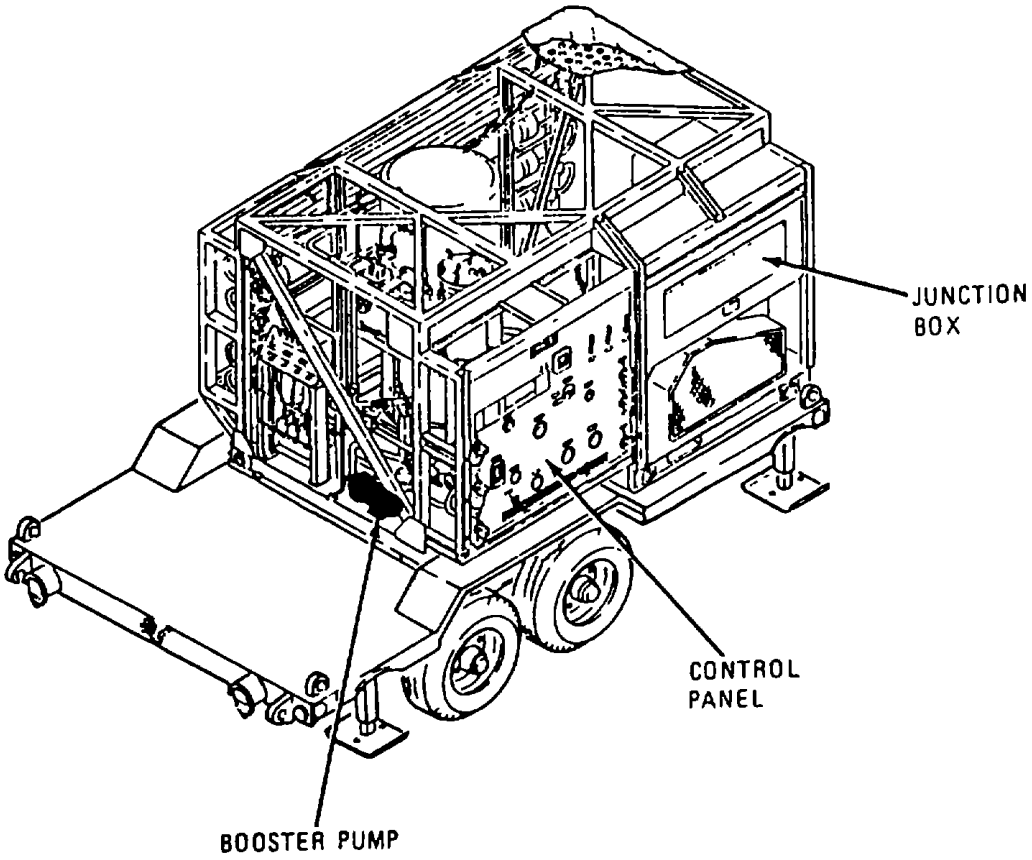

JUNCTION
BOX
CONTROL
PANEL
BOOSTER PUMP

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED METERING PUMP ASSEMBLY

1. PUMP FAILS TO PRIME.

Step 1. Check chemical container for chemical level.

a. If chemical level is not full, fill chemical container Refer to TM 10-4610-240-10

Step 2. Check prime and chemical feed tubes for leaks and loose connections

a If connections are loose, tighten connections

b. If tube is defective, replace tube. Refer to paragraph 2-68.

Step 3. Disconnect prime and chemical feed tubes from chemical container, set three way valve to PRIME position and pour water into fitting of prime tube

a. If water comes out of chemical feed tube, repair chemical feed diaphragm pump Refer to paragraph 2-69

b. If water does not come out of chemical feed tube, replace three-way ball valve Refer to paragraph 2-61.

2. INADEQUATE FLOW OF CHEMICALS.

NOTE

If all chemicals fail to feed, refer to Malfunction 4, Chemical Feed Metering Pump Assembly

Step 1. Check chemical container for chemical level.

If chemical level is not full, fill chemical container

Step 2. Check for leaks at tubes and three-way ball valves

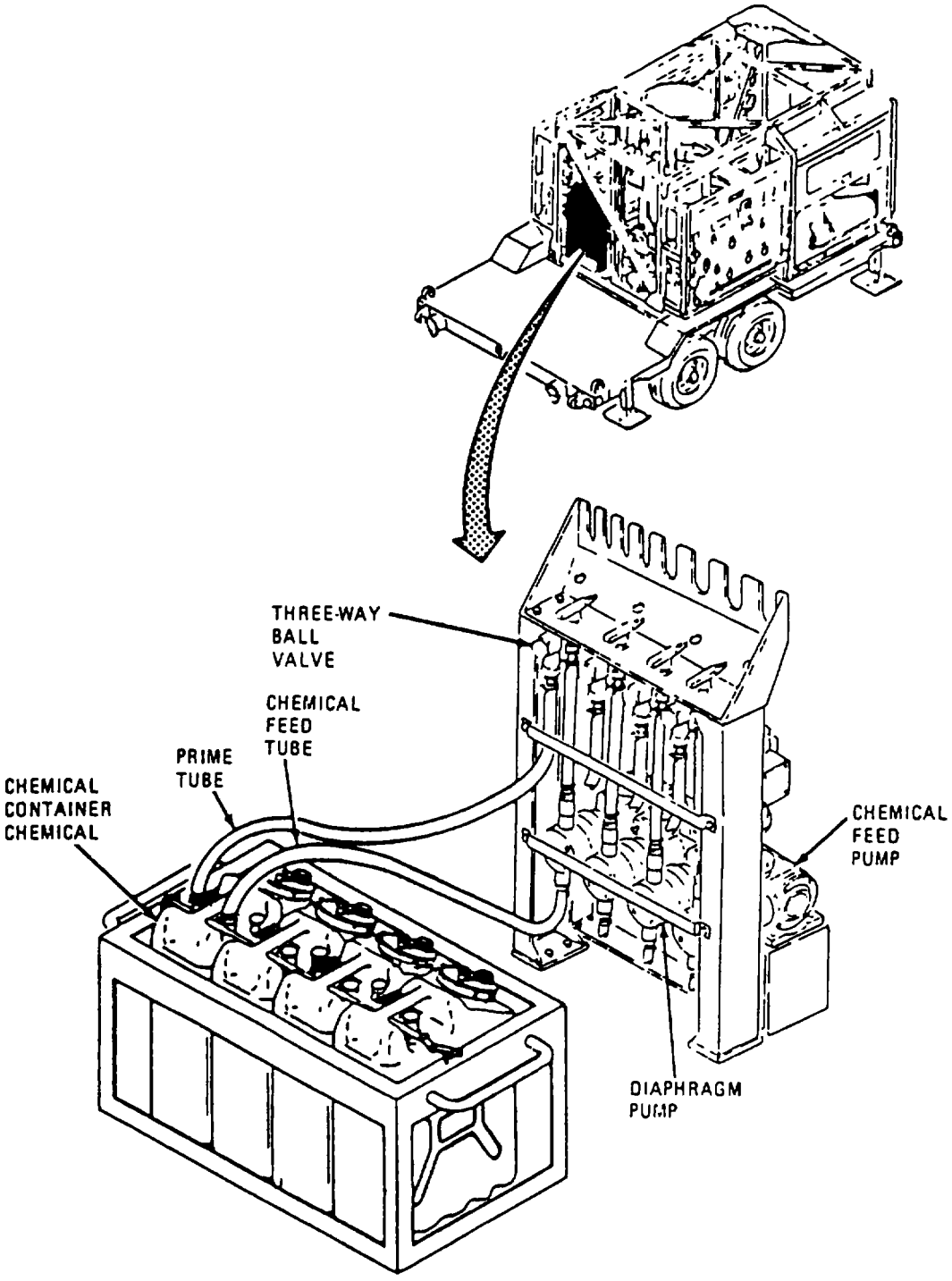

THREE-WAY
BALL
VALVE
CHEMICAL
FEED
TUBE
PRIME
TUBE
CHEMICAL
CONTAINER
CHEMICAL
CHEMICAL
FEED
PUMP
DIAPHRAGM
PUMP

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED METERING PUMP ASSEMBLY - continued

2. INADEQUATE FLOW OF CHEMICALS - continued.

a. If there are no leaks, repair defective diaphragm pump. Refer to paragraph 2-69

b. If tube leaks, replace faulty tube. Refer to paragraph 2-68.

c. If three-way ball valve leaks, replace faulty valve. Refer to paragraph 2-61.

3. PUMP IS NOISY.

Step 1. Check that chemical feed pump is secured to ROWPU frame

a. If pump is secure, go to step 2.

b. If pump is not secure, secure pump.

Step 2. Check that pump motor is secured to chemical feed pump.

a. If motor is not secure, secure motor.

b. If motor is secure, replace chemical feed pump. Refer to paragraph 2-68.

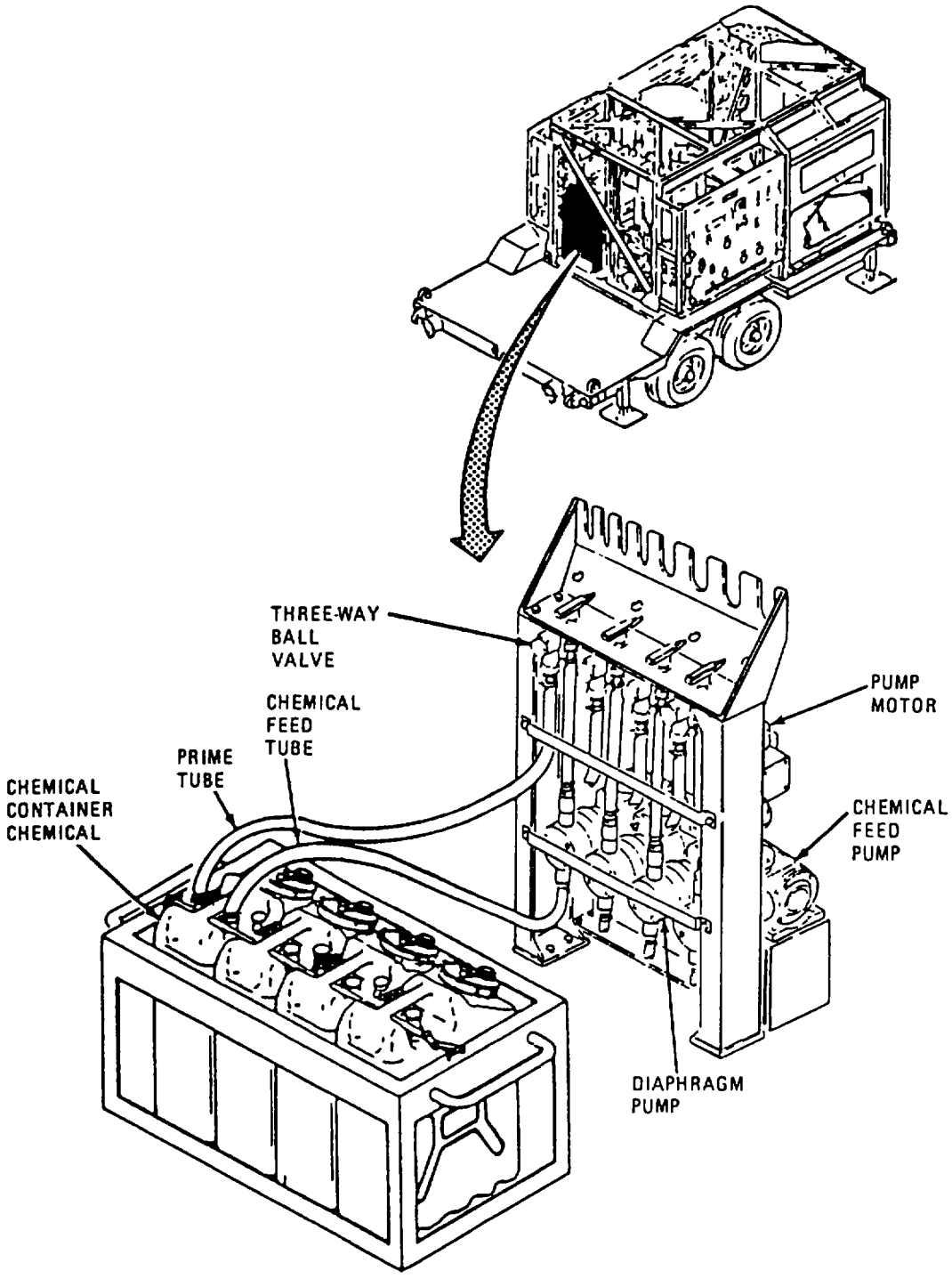

THREE-WAY
BALL
VALVE
CHEMICAL
FEED
TUBE
PRIME
TUBE
CHEMICAL
CONTAINER
CHEMICAL
PUMP
MOTOR
CHEMICAL
FEED
PUMP
DIAPHRAGM
PUMP

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED METERING PUMP ASSEMBLY - continued

4. PUMP FAILS TO OPERATE (ALL DIAPHRAGM PUMPS)

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid

Step 1.Check if CB7 and/or K7 heater assembly injunction box are tripped.

If either, CB7 or K7 heater assembly is tripped, go to step 3.

Step 2. Check for 208 VAC on K7 heater assembly ouptput terminals injunction box Check between T1 and T4.

If 208 VAC is not measured, notify Direct Support Maintenance.

Step 3. Disconnect pump power cable assembly at booster pump and heater output terminals, T1 and T4 and check cable assembly for continuity and shorts.

a. If cable assembly is not defective, replace chemical feed pump. Refer to paragraph 2-68.

b. If cable assembly is defective, notify Direct Support Maintenance.

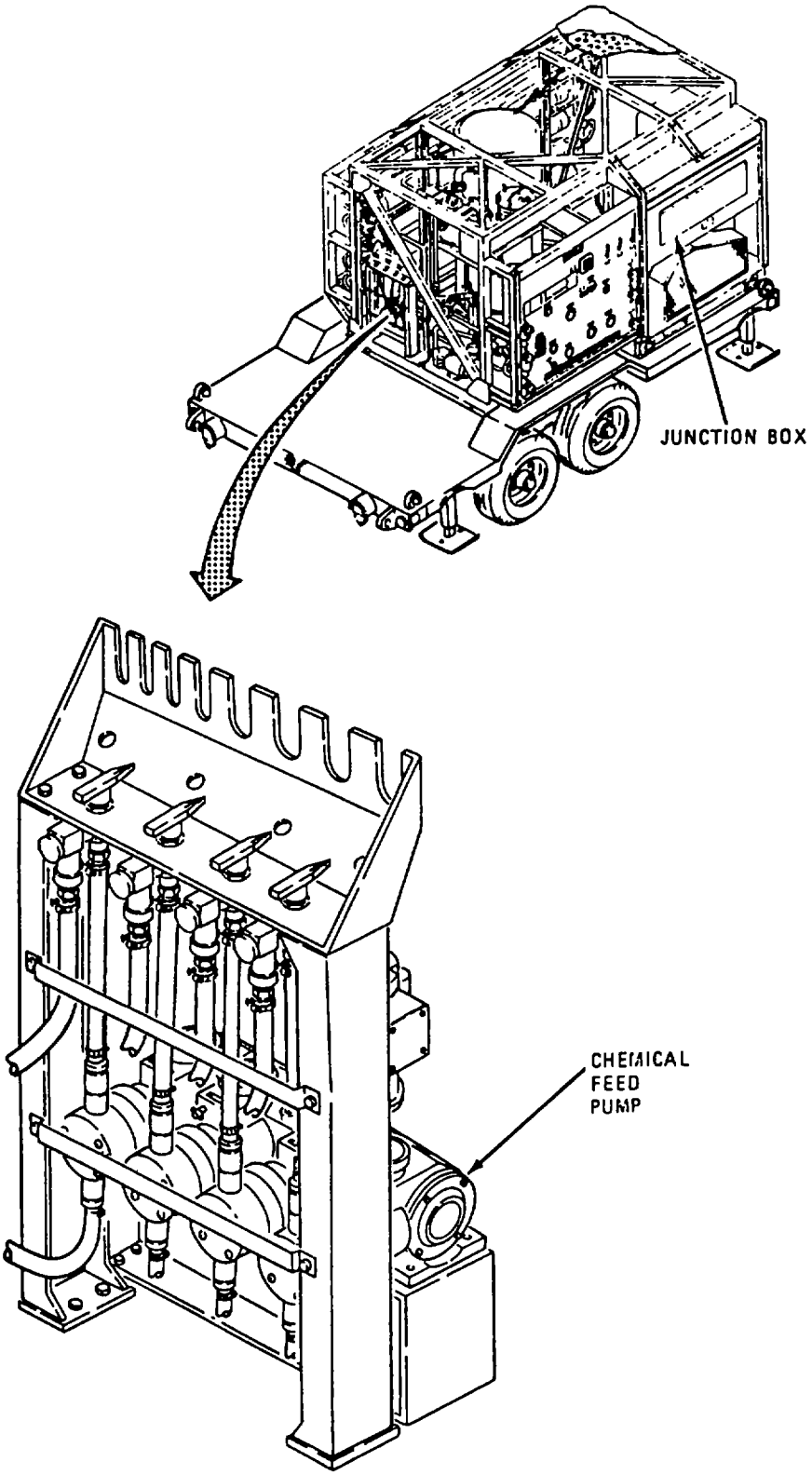

JUNCTION BOX
CHEMICAL
FEED
PUMP

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

R.O.PUMP ASSEMBLY

1. PUMP DRIVE BELTS FRAY AFTER SHORT USE OR BREAK FREQUENTLY.

CAUTION

R 0. pump drive belts must be replaced as a set. Replacement of a single belt will overstress new belt and result in shortened life.

Step 1. Check R O pump and pump motor sheaves for cracks, chips, burrs, or bent grooves which may damage belts.

a If sheaves are good, go to step 2.

b File burrs and sharp edges, and smooth with emery cloth. If damage cannot be repaired, notify Direct Support Maintenance.

Step 2. Run R.O pump and check if sheaves wobble.

a If sheaves do not wobble, go to step 3.

b If pump or pump motor sheave wobbles, notify Direct Support Maintenance.

Step 3. Check sheave alinement. Refer to paragraph 2-75.

a. If sheave alinement is good, go to step 4.

b. If sheaves are out of alinement, aline sheaves. Refer to paragraph 2-75.

Step 4. Check belt tension. Refer to paragraph 2-75.

Adjust belt tension if too loose or too tight. Refer to paragraph 2-75.

2. PUMP IS NOISY.

Step 1. Check that motor is secured to mounting plate.

a. If motor is secure, go to step 2.

b. If motor is not secure, secure motor.

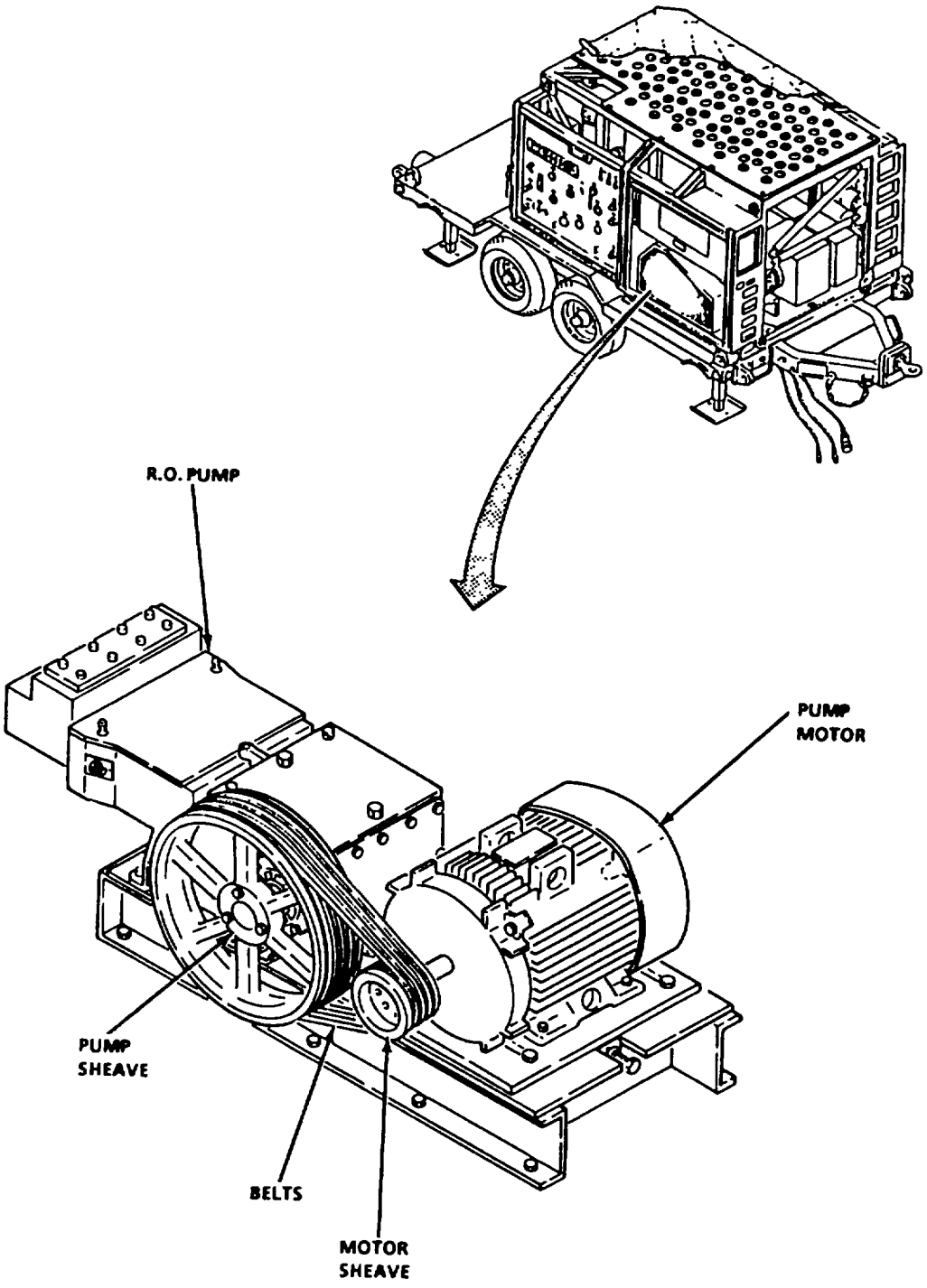

R.O. PUMP
PUMP MOTOR
PUMP SHEAVE
BELTS
MOTOR SHEAVE

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

R.O.PUMP ASSEMBLY - continued

2. PUMP IS NOISY - continued.

Step 2. Check that pump and mounting plate are securely mounted.

a. If pump and mounting plate are secure, go to step 3.

b. If pump is not secure, secure pump.

c. If mounting plate is not secure, secure mounting plate.

Step 3. Check that stand assembly is secured to ROWPU frame.

a. If stand assembly is secure, go to step 4.

b. If stand assembly is not secure, secure stand assembly.

Step 4. Isolate noise to pump or motor.

a. If pump is noisy, notify Direct Support Maintenance.

b. If pump motor is noisy, notify Direct Support Maintenance.

3. PUMP SHUTS DOWN OR FAILS TO START.

Step 1. Check if HIGH PRESSURE light on control box is on.

If HIGH PRESSURE light is on, go to Malfunction 3, Piping Installation.

Step 2. Check if circuit breaker CB1 and or K1 heaters injunction box are OFF.

a. If circuit breaker CBI and/or K1 heater assembly are OFF, go to step 4.

b. If neither circuit breaker CB1 nor K1 heater assembly are OFF, go to step 3.

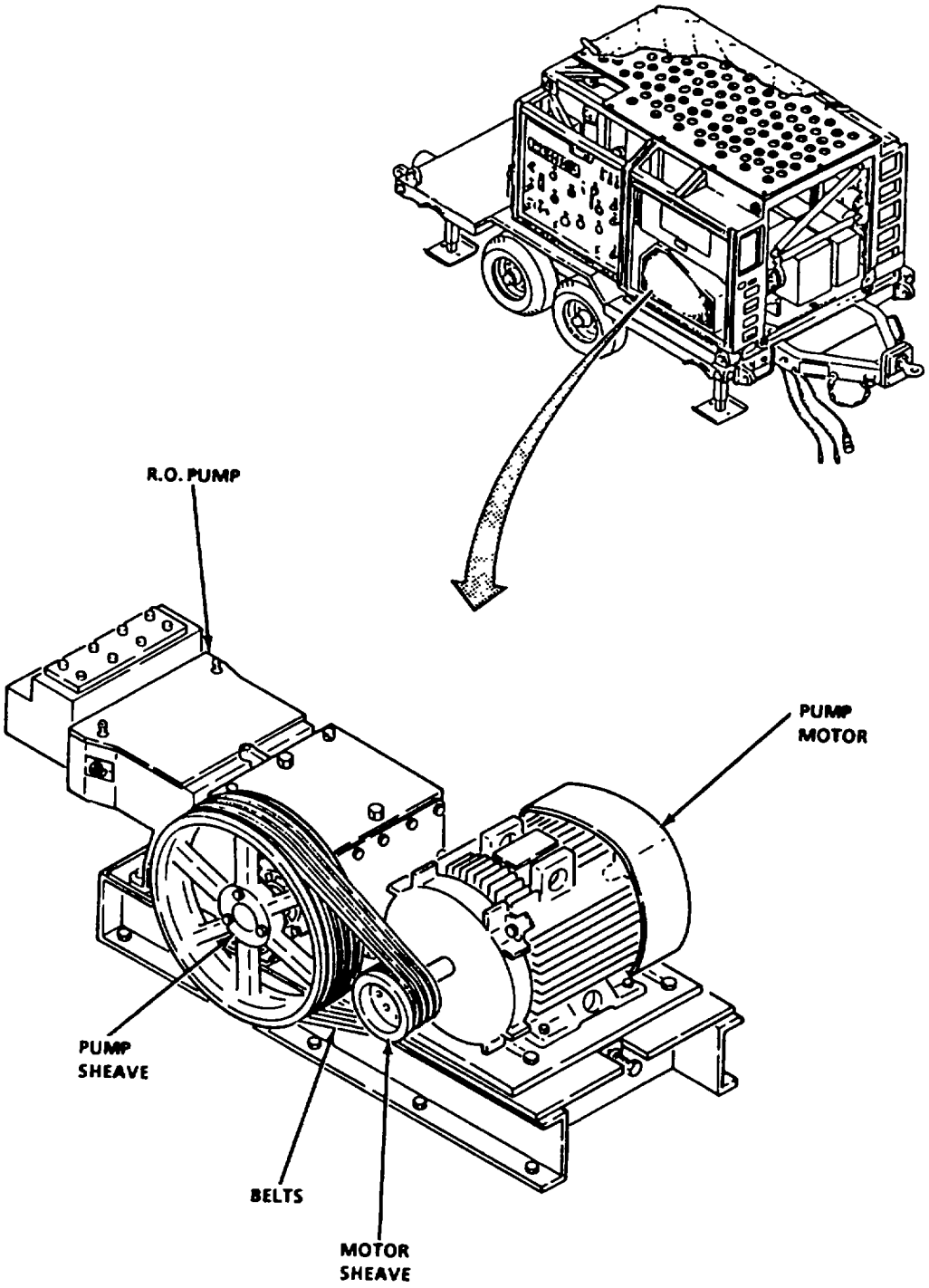

R.O. PUMP
PUMP MOTOR
PUMP SHEAVE
BELTS
MOTOR SHEAVE

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

R.O.PUMP ASSEMBLY - continued

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test take, proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 3. Disconnect pump cable assembly from back of junction box at power jack, J6 and check for 208 VAC, three phase power at J6.

If 208 VAC, three phase power is not measured in all three tests (A-B, B-C and A-C), notify Direct Support Maintenance.

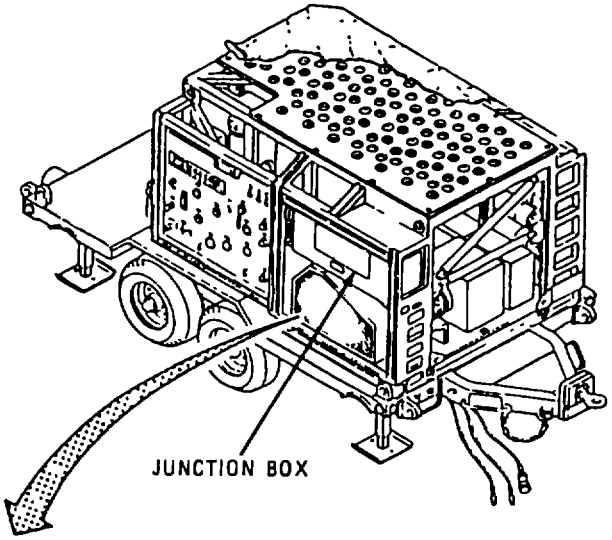
Step 4. Disconnect cable assembly at pump motor and check cable assembly for continuity and shorts.

a. If defective, replace cable assembly Refer to paragraph 2-62.

b. If cable assembly is not defective, notify Direct Support Maintenance.

4. PUMP MOTOR OVERHEATS.

Notify Direct Support Maintenance if this condition exists.


JUNCTION BOX

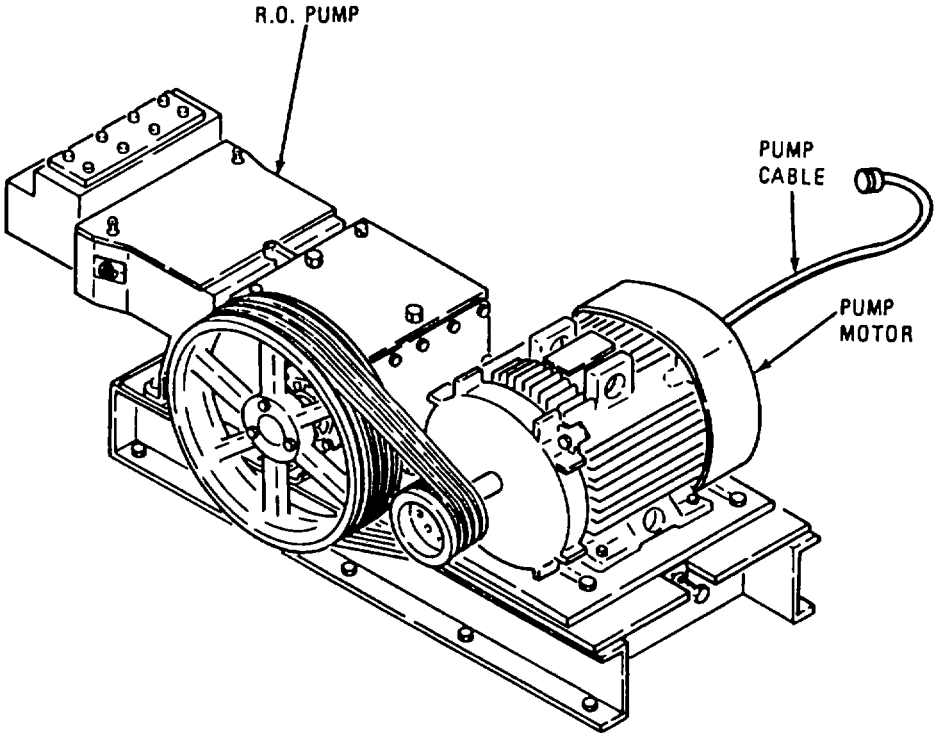

R.O. PUMP
PUMP CABLE
PUMP MOTOR

Table 2-2. Unit Troubleshooting- continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY

1. PUMP MOTOR RUNS HOT.

Step 1. Hold distribution nozzle operating lever in the fully open position and allow water to flow.

a. If water does not flow steadily, go to step 2.

b. If water flows steadily for 30 seconds and pump motor stays hot, replace centrifugal pump. Refer to paragraph 2-26

Step 2. Check suction hose for blockage.

a. If suction hose is blocked, clean out suction hose between product water tank and pump.

b. If suction hose is not blocked, replace centrifugal pump. Refer to paragraph 2-26.

2. PUMP IS NOISY.

Check for loose components

a. If components are loose, tighten securely.

b. If no external loose components are found, replace centrifugal pump assembly. Refer to paragraph 2-26.

3. PUMP SHUTS DOWN AND/OR FAILS TO START.

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Check ifCB5 and/or K5 heater assembly injunction box are OFF.

If CB5 and/or K5 heater assembly are not OFF, go to step 3

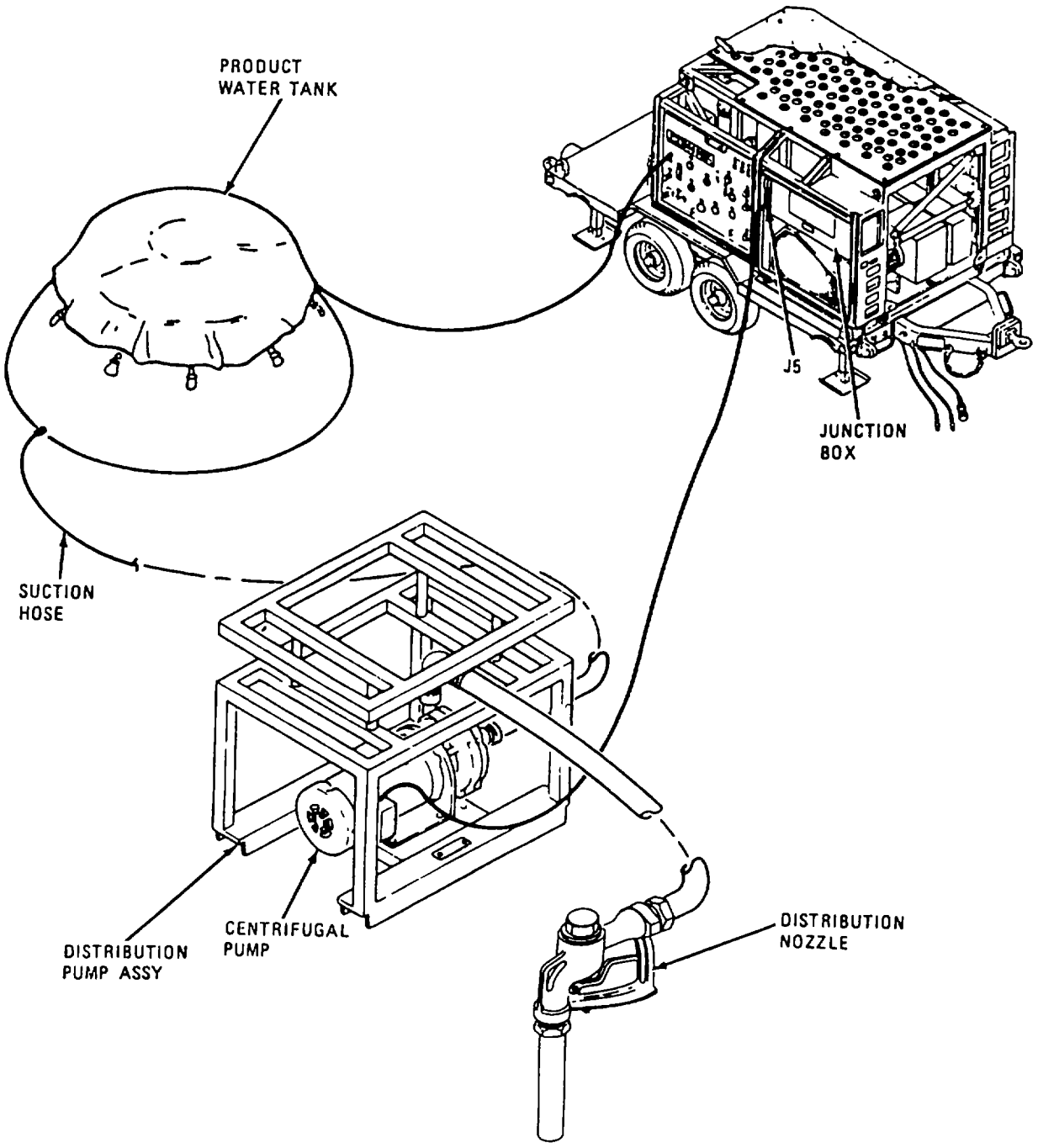

PRODUCT
WATER TANK
J5
JUNCTION
BOX
SUCTION
HOSE
DISTRIBUTION
PUMP ASSY
CENTRIFUGAL
PUMP
DISTRIBUTION
NOZZLE

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY - continued

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 2. Disconnect pump at DISTRIBUTION PUMP jack (J5) on junction box and check for 208 VAC, three phase power at J5.

If 208 VAC, three phase power is not measured in all three tests (A-B, A-C and B-C), notify Direct Support Maintenance.

Step 3. Remove power at power source and check pump cable assembly for continuity and shorts

a. If defective, replace cable assembly Refer to paragraph 2-25.

b. If cable assembly is not defective, replace centrifugal pump. Refer to paragraph 2- 24.

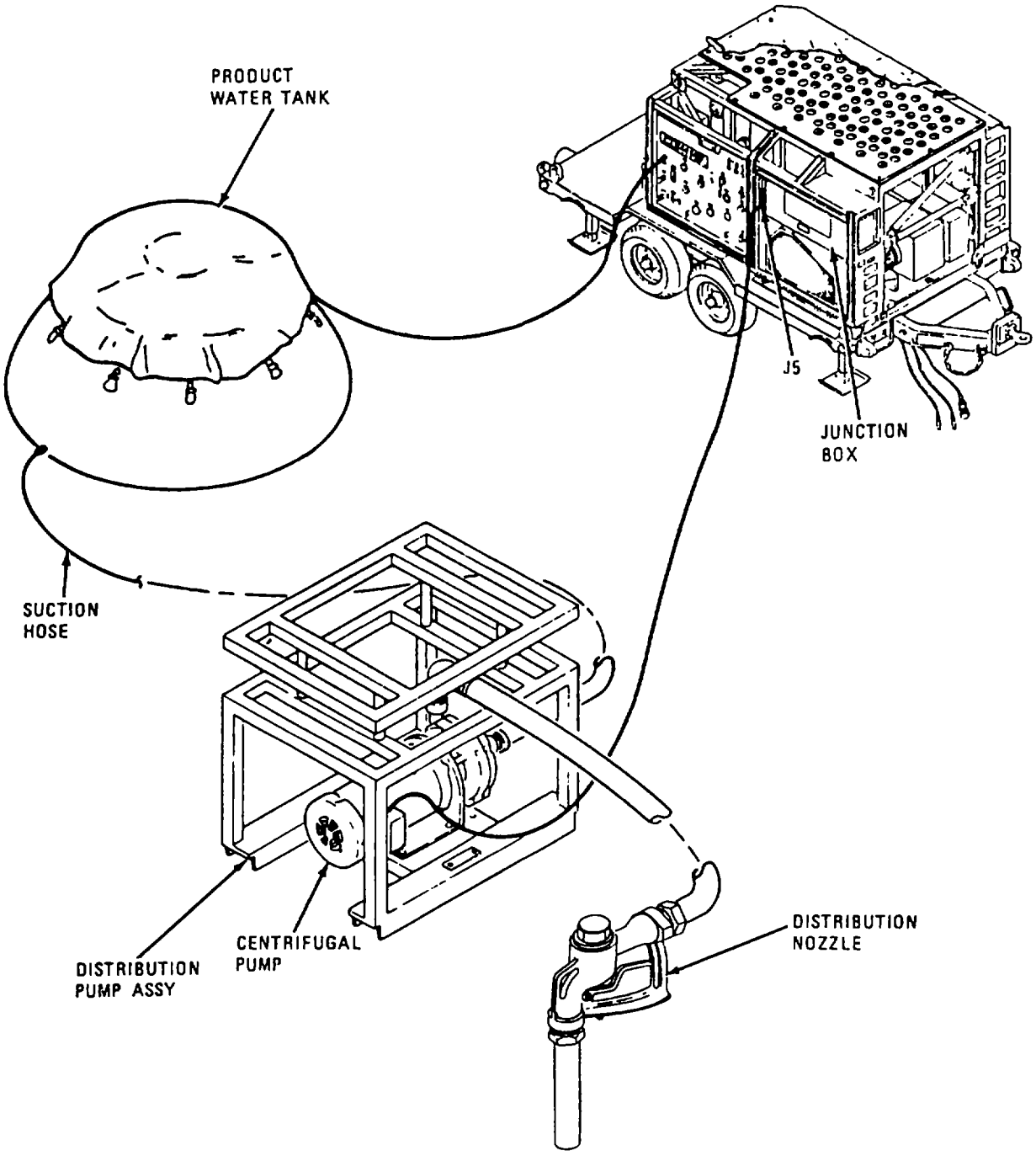

PRODUCT
WATER TANK
J5
JUNCTION
BOX
SUCTION
HOSE
DISTRIBUTION
PUMP ASSY
CENTRIFUGAL
PUMP
DISTRIBUTION
NOZZLE

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

RAW WATER PUMP NO. 1 ASSEMBLY

1. PUMP IS NOISY.

Check for loose external pump components.

a. If external components are loose, tighten them.

b. If no loose external components are found, replace centrifugal pump Refer to paragraph 2-22.

2. PUMP RUNS HOT.

Replace centrifugal pump assembly (paragraph. 2-22), if this condition occurs.

3. PUMP SHUTS DOWN AND/OR FAILS TO START.

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1 Disconnect pump cable assembly at J3 (RAW WATER PUMP NO. 1 jack) and temporarily connect to J4 (RAW WATER PUMP NO. 2 jack).

If pump works now, notify Direct Support Maintenance.

Step 2. Check if CB3 and/or K3 heater assembly injunction box are OFF.

If CB3 and/or K3 heater assembly are OFF, go to step 4.

Step 3. Disconnect pump at RAW WATER PUMP NO. 1 jack, J3 and check for 208 VAC three phase power.

If 208 VAC is measured in all three tests (A-B, B-C, A-C), notify Direct Support Maintenance.

Step 4. Remove power at power source and check pump cable assembly for continuity and shorts.

Table 2-2. Unit Troubleshooting- continued

MALFUNCTION / TEST OR INSPECTION / CORRECTIVE ACTION
RAW WATER PUMP NO. 1 ASSEMBLY - continued

a. If defective, replace pump cable assembly Refer to paragraph 2-21.

b. If pump cable assembly is not defective replace pump. Refer to paragraph 2-22.

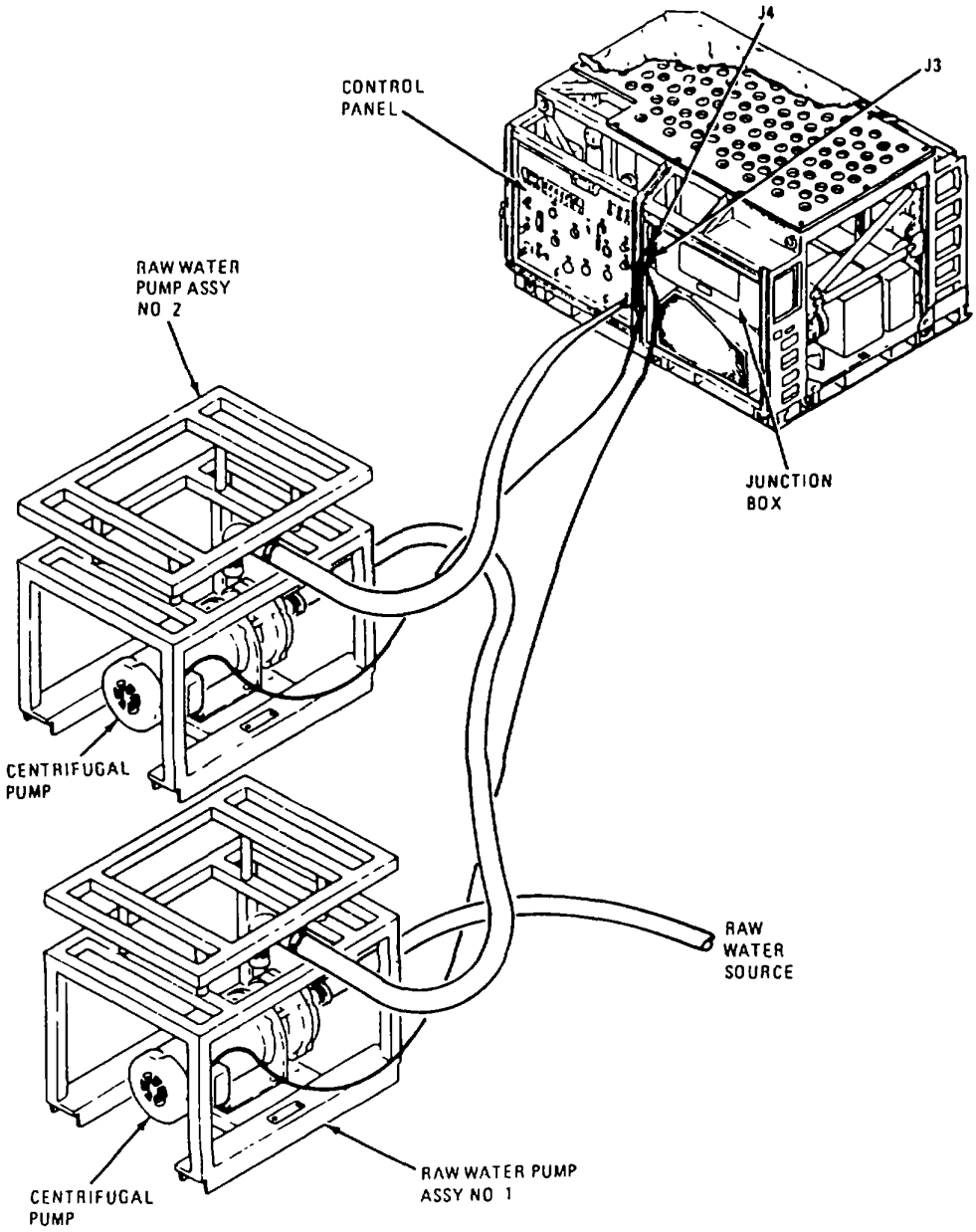


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

RAW WATER PUMP NO. 2 ASSEMBLY

1. PUMP IS NOISY.

Check for loose external pump components

a If external components are loose, tighten them.

b. If no loose external components are found, replace centrifugal pump assembly Refer to paragraph 2-22

2. PUMP RUNS HOT.

Replace pump (paragraph. 2-22) if this condition occurs

3. PUMP SHUTS DOWN ANDIOR FAILS TO START.

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Disconnect pump cable at J4 (RAW WATER PUMP NO 2 jack) and temporarily connect to J3 (RAW WATER PUMP NO. 1 jack).

If pump works now, notify Direct Support Maintenance

Step 2 Check if CB4 and/or K4 heater assembly injunction box are OFF

If CB4 and/or K4 heaters assembly are OFF, go to step 4

Step 3 Disconnect pump at RAW WATER PUMP NO 2jack (J4) and check for three 208 VAC three phase power

If 208 VAC is measured in all three tests (A-B, B-C and A-C), notify Direct Support Maintenance.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

RAW WATER PUMP NO. 2 ASSEMBLY - continued

Step 4 Remove power at power source and check pump cable assembly for continuity and shorts

a. If pump cable assembly is defective, replace it. Refer to paragraph 2-21

b If pump cable assembly is not defective replace centrifugal pump Refer to paragraph.2-22.

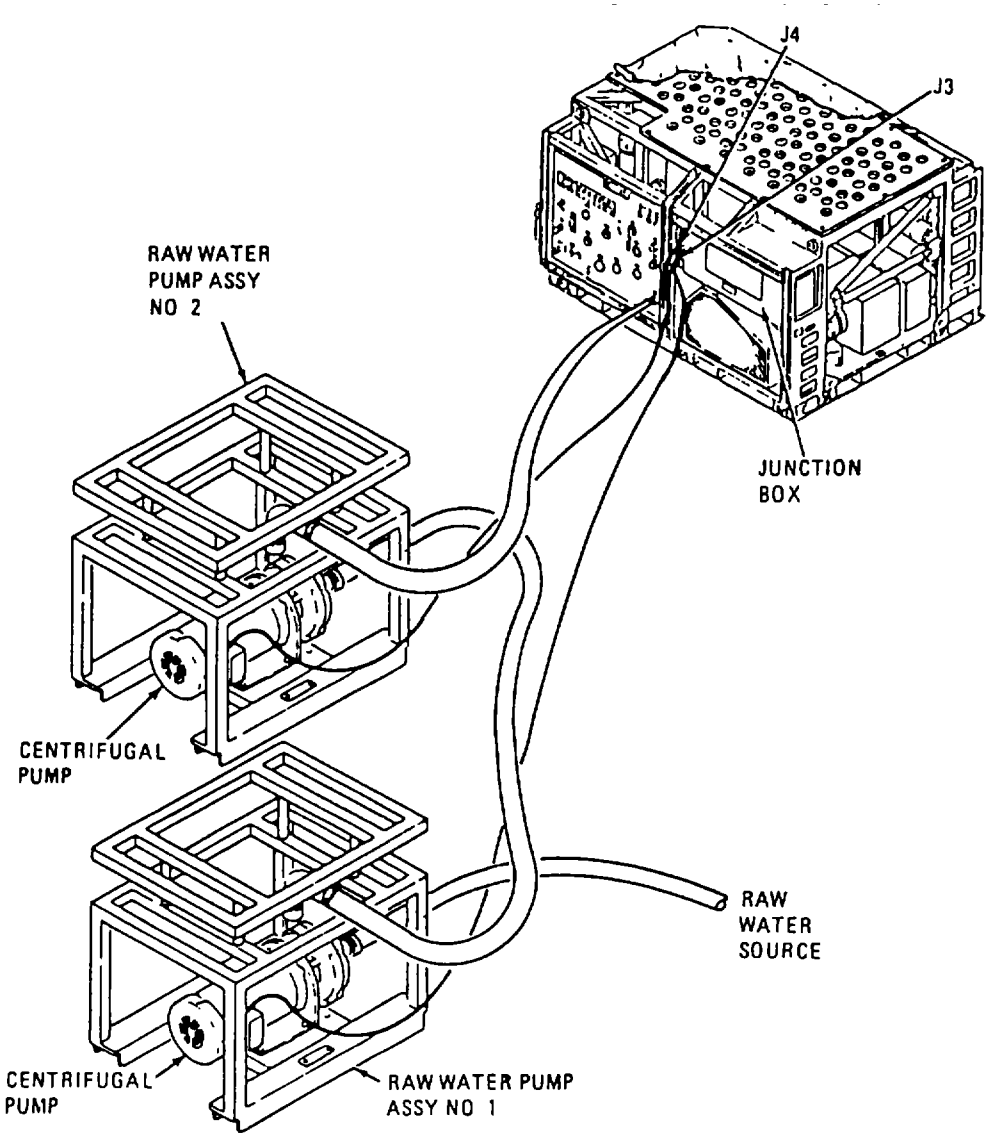


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY

1. PUMP IS NOISY.

Check for loose external pump components.

a. If external components are loose, tighten them.

b. If no loose external components are found, replace centrifugal pump Refer to paragraph 2-18.

2. PUMP RUNS HOT.

Replace centrifugal assembly if this condition occurs Refer to paragraph 2-18.

3. PUMP SHUTS DOWN AND/OR FAILS TO START IN R.O. ELEMENT CLEANING OPERATION.

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1 Check if CB2 or K2 heaters in junction box are OFF.

a. IfCB2 and/or K2 heaters are OFF, go to step 3.

b If CB2 and/or K2 heaters are not OFF, go to step 2.

Step 2 Disconnect pump at BACKWASH PUMP jack, J2 and check for 208 VAC three phase power at J2.

a. If 208 VAC is not measured in all three tests (A-B, B-C and A-C), notify Direct Support Maintenance.

b If 208 VAC is measured In all three tests, go to step 3.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

Step 3 Remove power it power source and check pump cable assembly for continuity and shorts.

a If pump cable assembly Is defective, replace It Refer to paragraph 2-16.

b If pump cable is not defective, replace centrifugal pump Refer to paragraph 2-18.

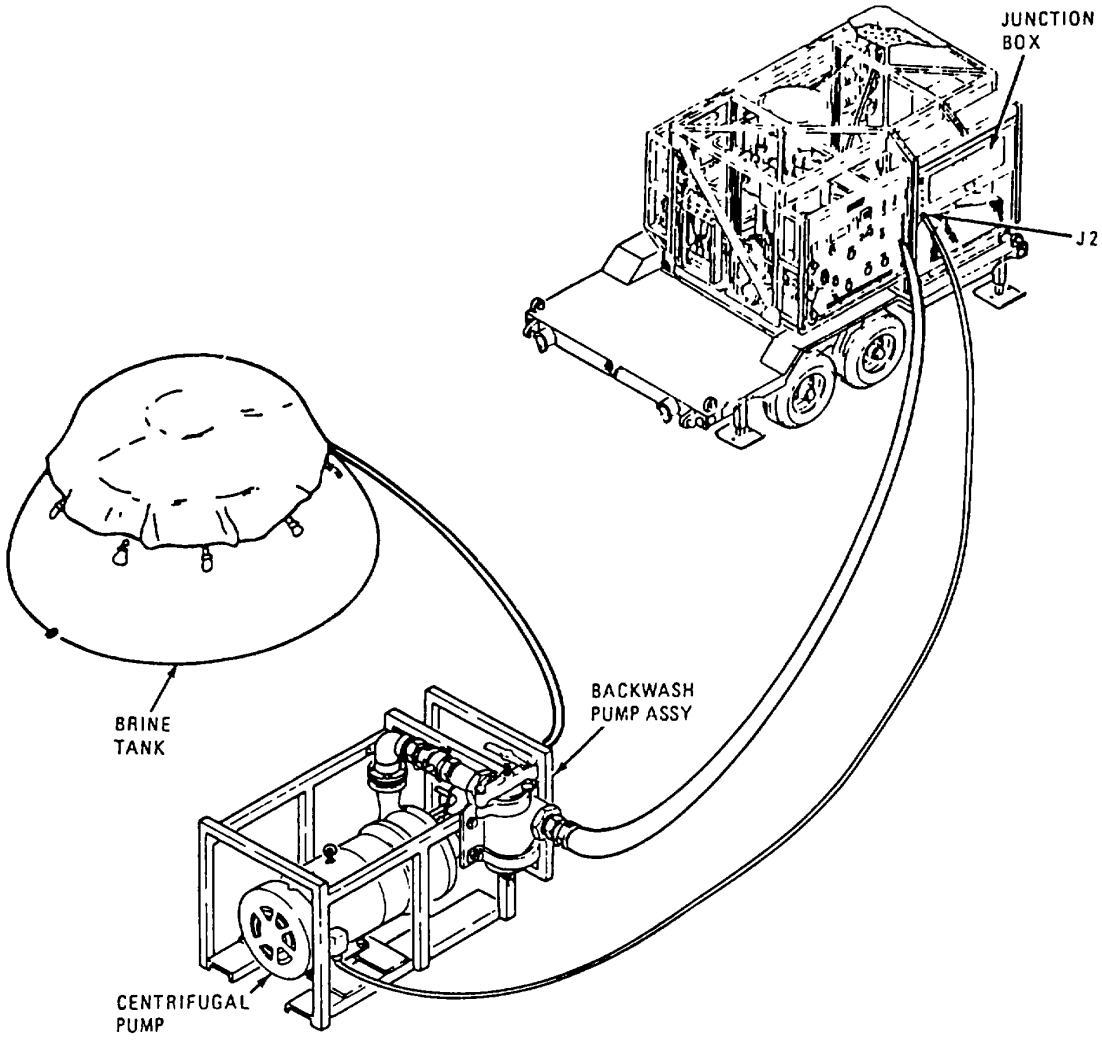


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY

4. BACKWASH OPERATION FAILS TO STOP.

Step 1. Check If timer is tripped.

a If timer is tripped, press PUSH TO RESET switch and go to step 2.

b If timer Is not tripped, go to step 3.

Step 2. Restart backwash operation.

If timer trips again, replace timer assembly Refer to paragraph 2-78.

WARNING

High voltages In this equipment can cause serious injury or death When applying power during a test take proper measures to ensure personal safety Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 3 Check for 115 VAC on terminal board, TB-1 and TB-2 (ground) in timer.

a If voltage is measured, replace timer assembly Refer to paragraph 2-78.

b If voltage is not measured, notify Direct Support Maintenance.

5. BACKWASH PUMP STOPS DURING AND/OR FAILS TO START IN MULTIMEDIA FILTER CLEANING OPERATION.

Step 1 Check If CB2 and/or K2 heater assembly in junction box are tripped.

If either are tripped, go to step 2 of Malfunction 3, Backwash Pump Assembly.

Step 2 Check If stager cycles.

If stager cycles, go to step 2 Malfunction 3, Backwash Pump Assembly.

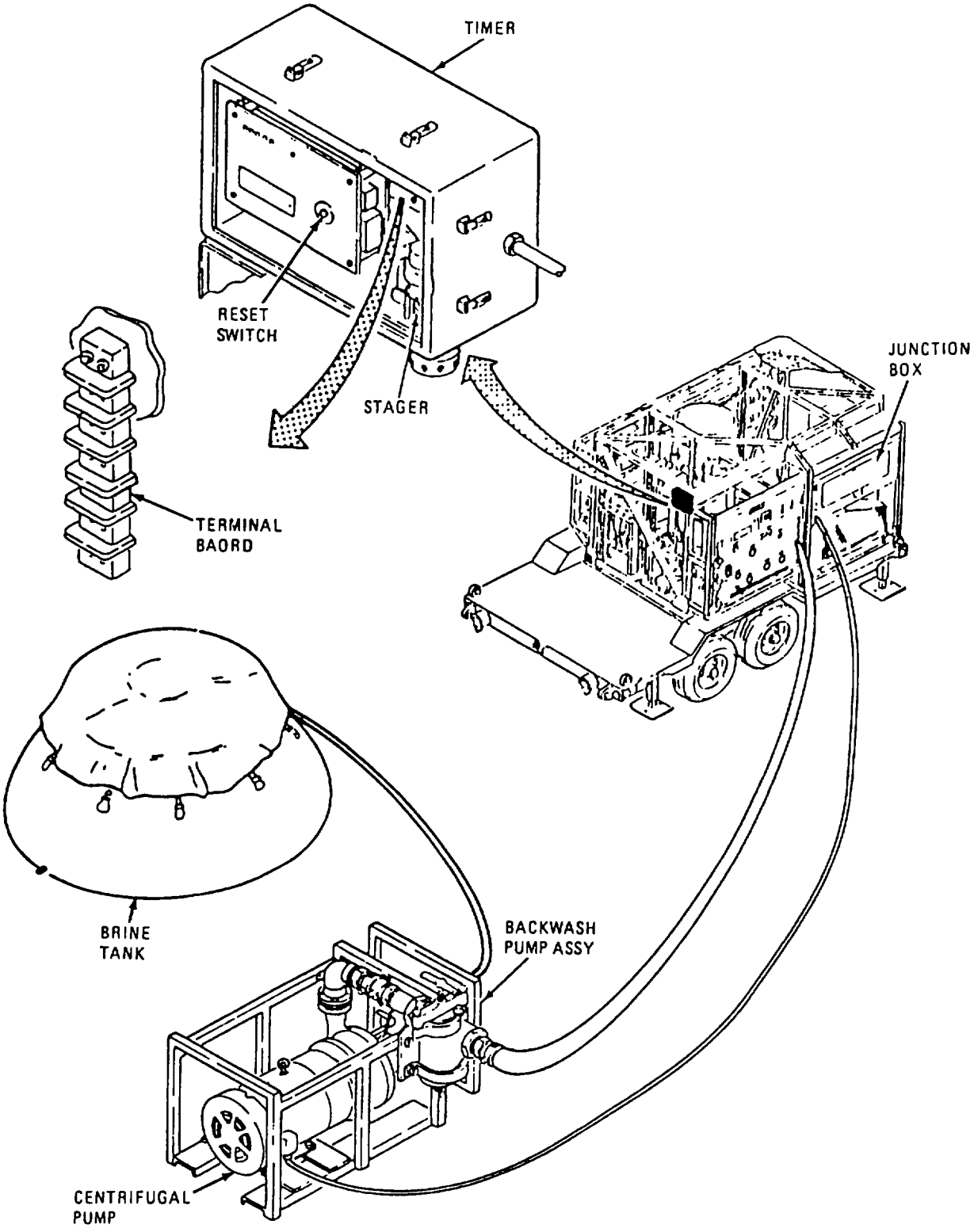

TIMER
RESET SWITCH
STAGER
JUNCTION BOX
TERMINAL BAORD
BRINE TANK
BACKWASH PUMP ASSY
CENTRIFUGAL PUMP

Table 2-2. Unit Troubleshooting -continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY- continued

Step 3. Check for 115 VAC between TB-1 and TB-2 (ground) on terminal board in timer assembly.

a. If voltage is measured, replace timer assembly Refer to paragraph 2-78.

b. If voltage is not measured, notify Direct Support Maintenance.

CONTROL BOX ASSEMBLY

1. PUMP INDICATOR FAILS TO LIGHT.

Push PANEL LIGHT switch on control box to TEST INDICATOR LIGHTS position.

a. If failed indicator lamp does not light, replace lamp Refer to paragraph 2-83.

b. If failed indicator lamp lights, notify Direct Support Maintenance.

2. LOW PRESSURE OR HIGH PRESSURE INDICATOR FAIL TO LIGHT.

Push PANEL LIGHT switch on control box to TEST INDICATOR LIGHTS position.

a. If failed indicator lamp lights, notify Direct Support Maintenance.

b. If failed indicator lamp does not light, replace lamp Refer to paragraph 2-83.

3. UTIL OUT CIRCUIT BREAKER FAILS TO RESET.

Disconnect any device connected to utility receptacle J7 Reset UTIL OUT circuit breaker.

a. If UTIL OUT circuit breaker trips, notify Direct Support Maintenance.

b. If UTIL OUT circuit breaker does not trip, replace connected device.

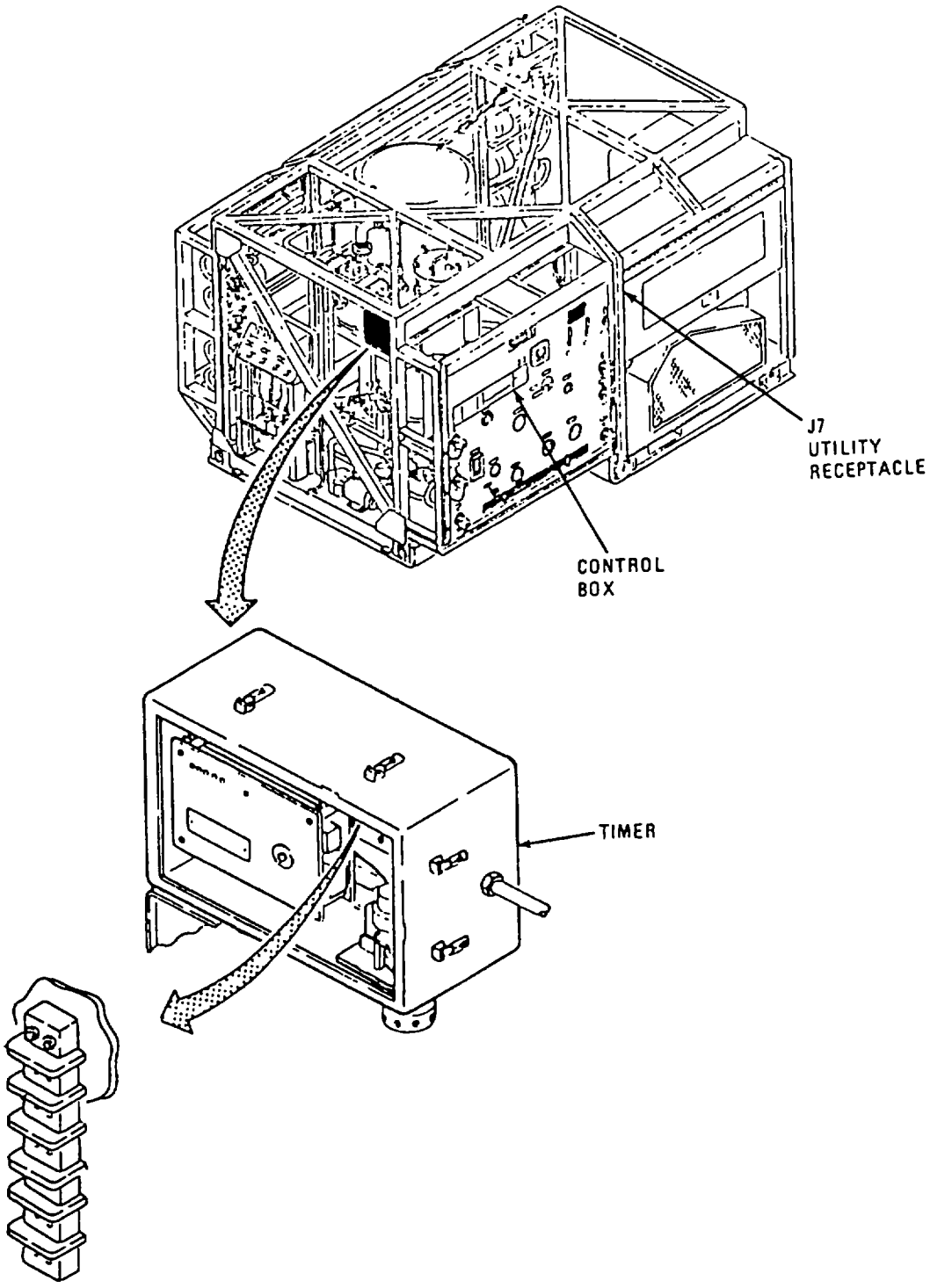

J7
UTILITY
RECEPTACLE
CONTROL
BOX
TIMER

Table 2-2. Unit Troubleshooting -continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AIRBRAKE SYSTEM (Model WPES-1)

NOTE

- **Ensure that towing vehicle brakes are operating properly.**
- **Connect trailer coupling halves to towing vehicle.**
- **Refer to illustrations in text to assist in troubleshooting.**

1. POOR OR NO BRAKING ACTION.

Step 1. Check all compressed air system tubes, fittings, and components for leaking air.

a. If compressed air system is not losing air pressure, go to step 2.

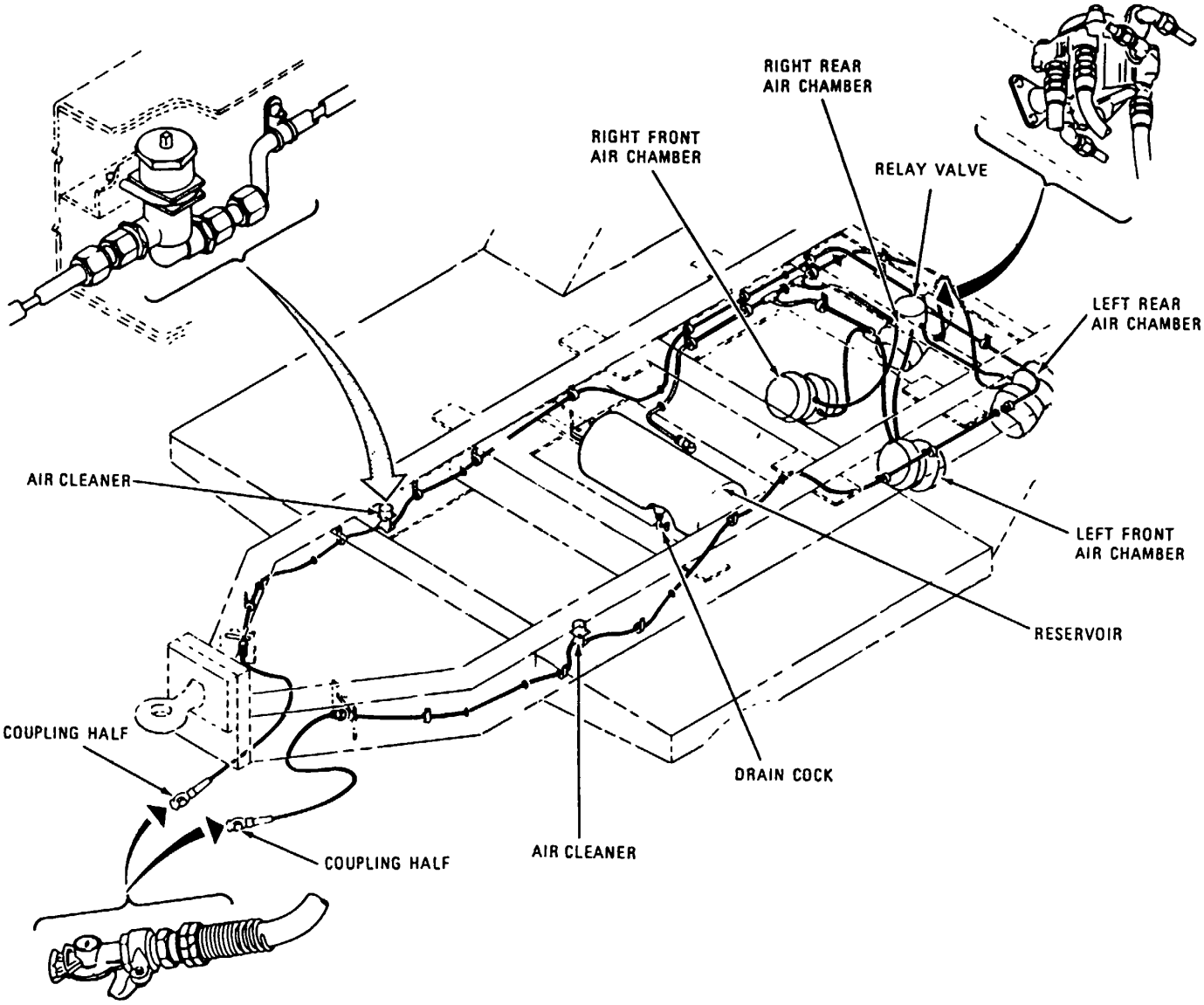
b. If compressed air tube or fitting is leaking air, repair or replace airbrake system tubing. Refer to paragraph 2-96.

c. If coupling half is leaking air, repair or replace airbrake hose assembly Refer to paragraph 2-96.

d. If brake line air cleaner is leaking air, tighten loose connections and/or repair brake line air cleaner. Refer to paragraph 2-97.

e. If reservoir is leaking air, replace reservoir. Refer to paragraph 2-96.

f. If reservoir drain cock is leaking air, replace reservoir drain cock. Refer to paragraph 2-96.


RIGHT REAR
AIR CHAMBER
RIGHT FRONT
AIR CHAMBER
RELAY VALVE
LEFT REAR
AIR CHAMBER
AIR CLEANER
LEFT FRONT
AIR CHAMBER
RESERVOIR
COUPLING HALF
DRAIN COCK
AIR CLEANER
COUPLING HALF

MODEL WPES-1

Table 2-2. Unit Troubleshooting -continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AIRBRAKE SYSTEM (Model WPES-l) - continued

g. If air chamber assembly is leaking air, replace air chamber assembly. Refer to paragraph 2-102.

h. If airbrake relay valve is leaking air, notify Direct Support Maintenance.

Step 2. Loosen service brake line air filter tube fitting on tube leading to airbrake relay valve. Check for high-pressure air leaking.

a. If high-pressure air is leaking, tighten fitting and go to step 3.

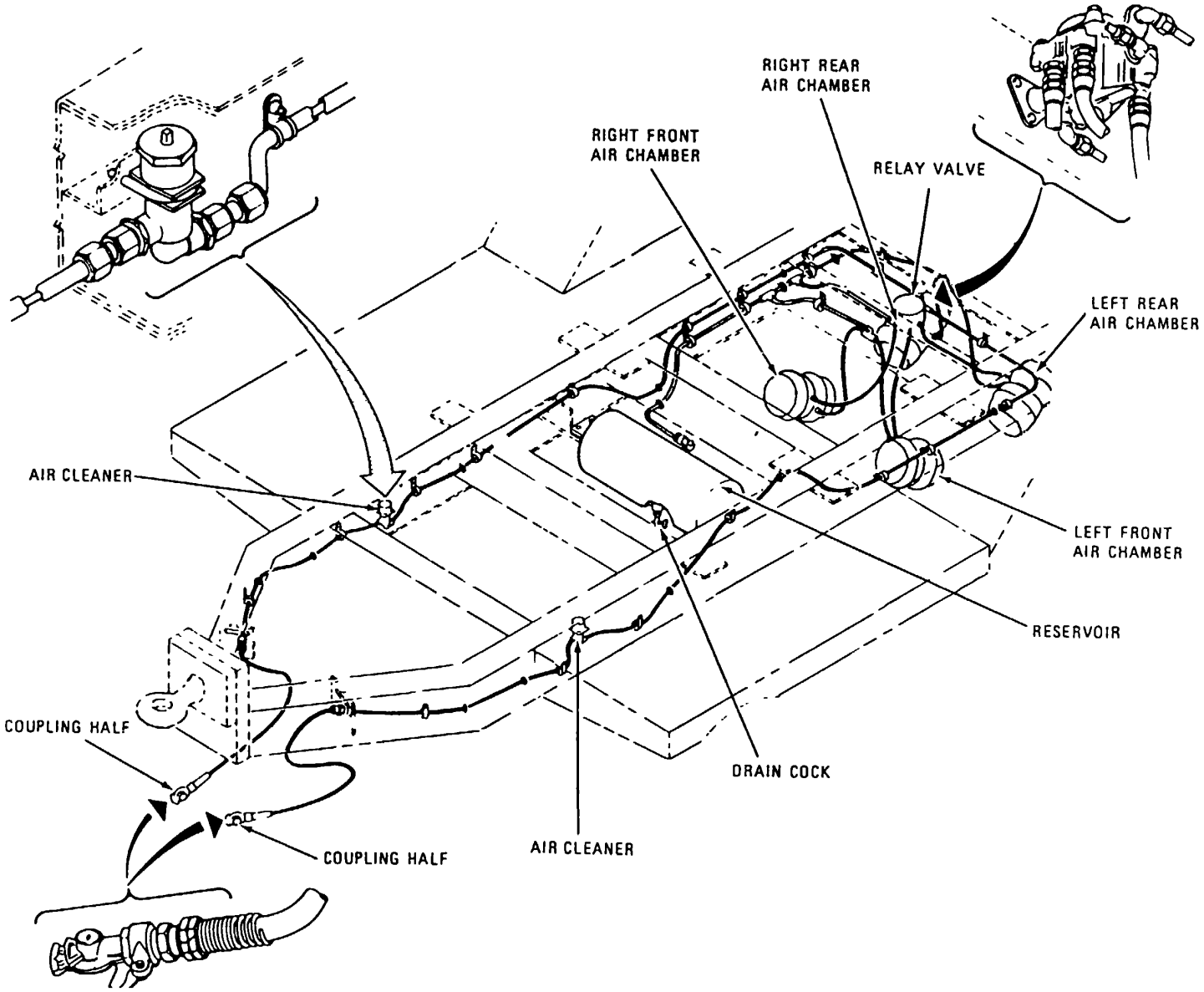
b. If air leaks slowly or not at all, repair or service brake line air cleaner. Refer to paragraph 2-97.

Step 3. Tell assistant to pump towing vehicle brake pedal several times while you are watching air chamber action on all four brakes.

a. If all air chambers assemblies operate, go to step 4.

b. If one or more air chamber assemblies pushrods fail to operate, replace defective air chamber. Refer to paragraph 2-102.

c. If all air chamber assembly pushrods do not operate or operate slowly, replace airbrake relay valve. Refer to paragraph 2-98.


RIGHT REAR
AIR CHAMBER
RIGHT FRONT
AIR CHAMBER
RELAY VALVE
LEFT REAR
AIR CHAMBER
AIR CLEANER
LEFT FRONT
AIR CHAMBER
RESERVOIR
COUPLING HALF
DRAIN COCK
COUPLING HALF
AIR CLEANER

MODEL WPES-1

Table 2-2. Unit Troubleshooting -continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AIRBRAKE SYSTEM (Model WPES-1) - continued

Step 4. Remove hub and drum assembly for each wheel (refer to paragraph 2-100). Inspect brakeshoe linings for wear. Using 6-inch scale, measure brakeshoe lining thickness.

a. If brakeshoe linings are greater than 1/8 inch (3.2 mm) thick, adjust service brakes. Refer to paragraph 2-101.

b. If brakeshoe linings are less than 1/8 inch (3.2 mm) thick, notify Direct Support Maintenance.

2. ONE BRAKE DRAGS.

Step 1. Tell assistant to pump towing vehicle brake pedal several times while you are watching air chamber action on wheel that drags.

a. If air chamber assembly pushrod moves out and returns quickly as brakes are engaged and released, go to step 2.

b. If air chamber assembly pushrod on any wheel returns slowly, go to step 4.

Step 2. Check brakeshoe adjustment on wheel that drags. Refer to paragraph 2-101.

a. If brakeshoe adjustment is good, go to step 3.

b. If brakeshoe adjustment is too tight, adjust brakeshoes Refer to paragraph 2-101.

Step 3. Remove hub and drum assembly for wheel that drags (refer to paragraph 2-100) and check for rusted or damaged brake parts or weak return spring.

Notify Direct Support Maintenance if parts are damaged/or corroded.

Step 4. Tell assistant to hold down towing vehicle brake pedal. Loosen uppermost hose fitting on slow returning air chamber.

a. If air chamber assembly pushrod returns slowly, go to step 5.

b. If air chamber assembly pushrod returns quickly, tighten hose fitting and replace airbrake relay valve. Refer to paragraph 2-98.

Table 2-2. Unit Troubleshooting -continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

AIRBRAKE SYSTEM (Model WPES-1) - continued

Step 5. Disconnect clevis from slack adjuster and repeat step 4.

a. If air chamber assembly pushrod returns quickly, tighten hose fitting and go to step 6.

b. If air chamber assembly pushrod returns slowly, replace defective air chamber assembly. Refer to paragraph 2-102.

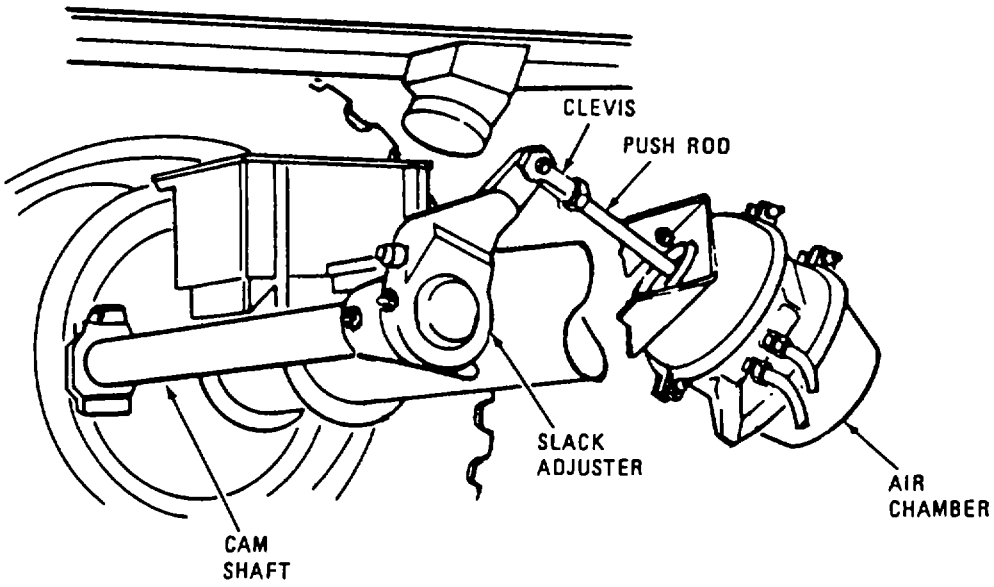


Table 2-2. Unit Troubleshooting -continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AIRBRAKE SYSTEM (Model WPES-1) - continued

Step 6. Remove hub and drum assembly for wheel that drags (refer to paragraph 2-100) and check for rusted or damaged brake parts or weak return spring.

Notify Direct Support Maintenance if brake parts are damaged, worn or corroded

3. BRAKES DRAG OR REMAIN LOCKED.

Step 1. Check all compressed air system tubes, fittings, and components for leaking air.

a. If compressed air system is not losing pressure, replace relay valve. Refer to paragraph 2-98.

b. If compressed air tube or fitting is leaking air, repair air brake system tubing. Refer to paragraph 2-96.

c. If coupling half is leaking, repair airbrake hose assembly. Refer to paragraph 2-96.

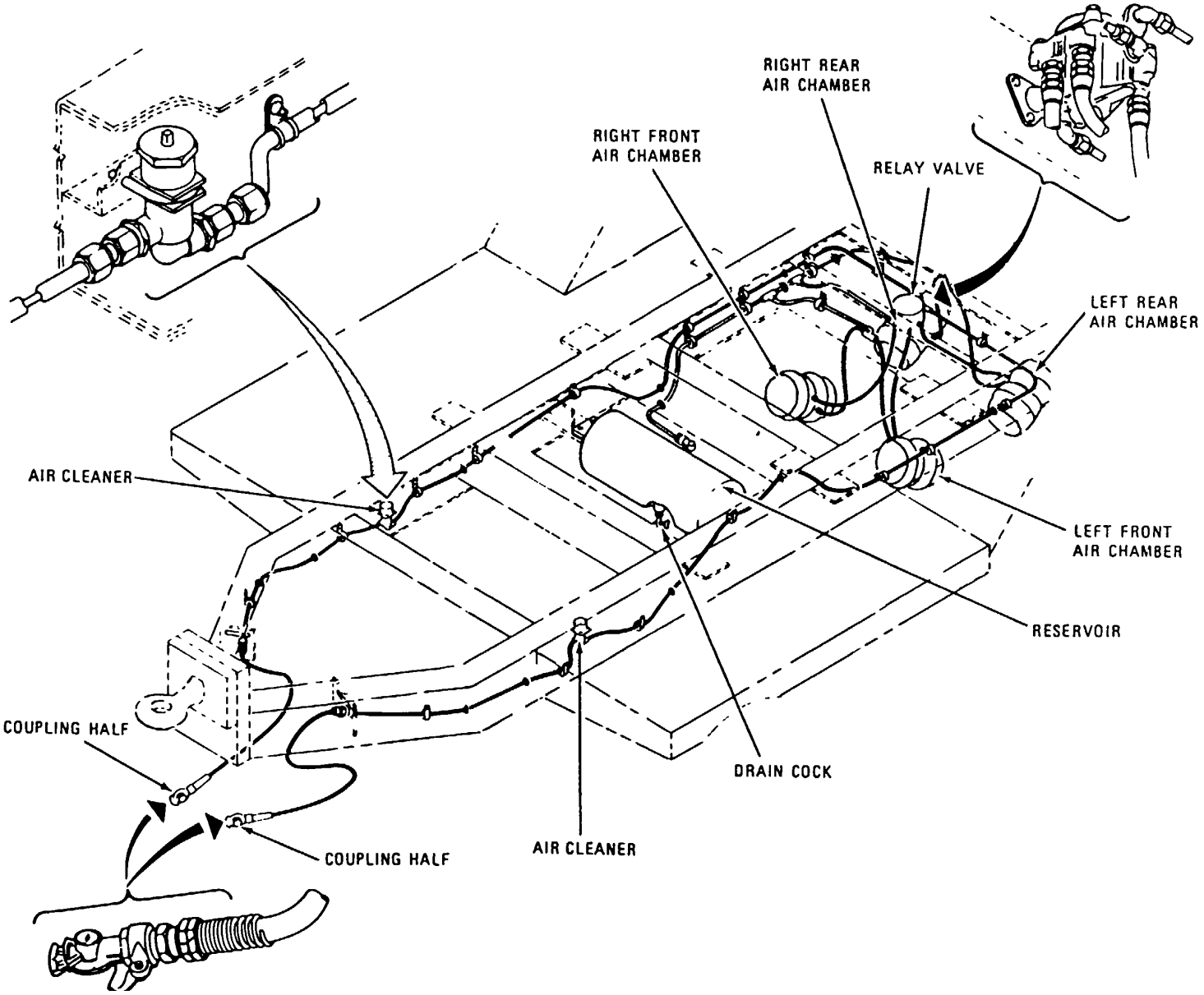
d. If brake line air cleaner is leaking air, replace brake line air cleaner Refer to paragraph 2-97.

e. If reservoir is leaking air, replace reservoir. Refer to paragraph 2-96.

f. If reservoir drain cock is leaking air, replace reservoir drain cock. Refer to paragraph 2-96.

g. If air chamber assembly is leaking air, replace air chamber assembly. Refer to paragraph 2-2-102.

h. If airbrake relay valve is leaking air, replace airbrake relay valve. Refer to paragraph 2-98.


RIGHT REAR
AIR CHAMBER
RIGHT FRONT
AIR CHAMBER
RELAY VALVE
LEFT REAR
AIR CHAMBER
AIR CLEANER
LEFT FRONT
AIR CHAMBER
RESERVOIR
COUPLING HALF
DRAIN COCK
COUPLING HALF
AIR CLEANER

MODEL WPES-1

Table 2-2. Unit Troubleshooting -continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AIRBRAKE SYSTEM (Model WPES-1) - continued

4. TRAILER ROLLS WHEN DISCONNECTED FROM TOWING VEHICLE.

Step 1. Check all compressed air system tubes, fittings, and components for leaking air.

a. If compressed air system is not losing pressure, go to step 2.

b. If compressed air tube or fitting is leaking air, replace airbrake system tubing. Refer to paragraph 2-96.

c. If coupling half is leaking air, replace airbrake hose assembly. Refer to paragraph 2-96.

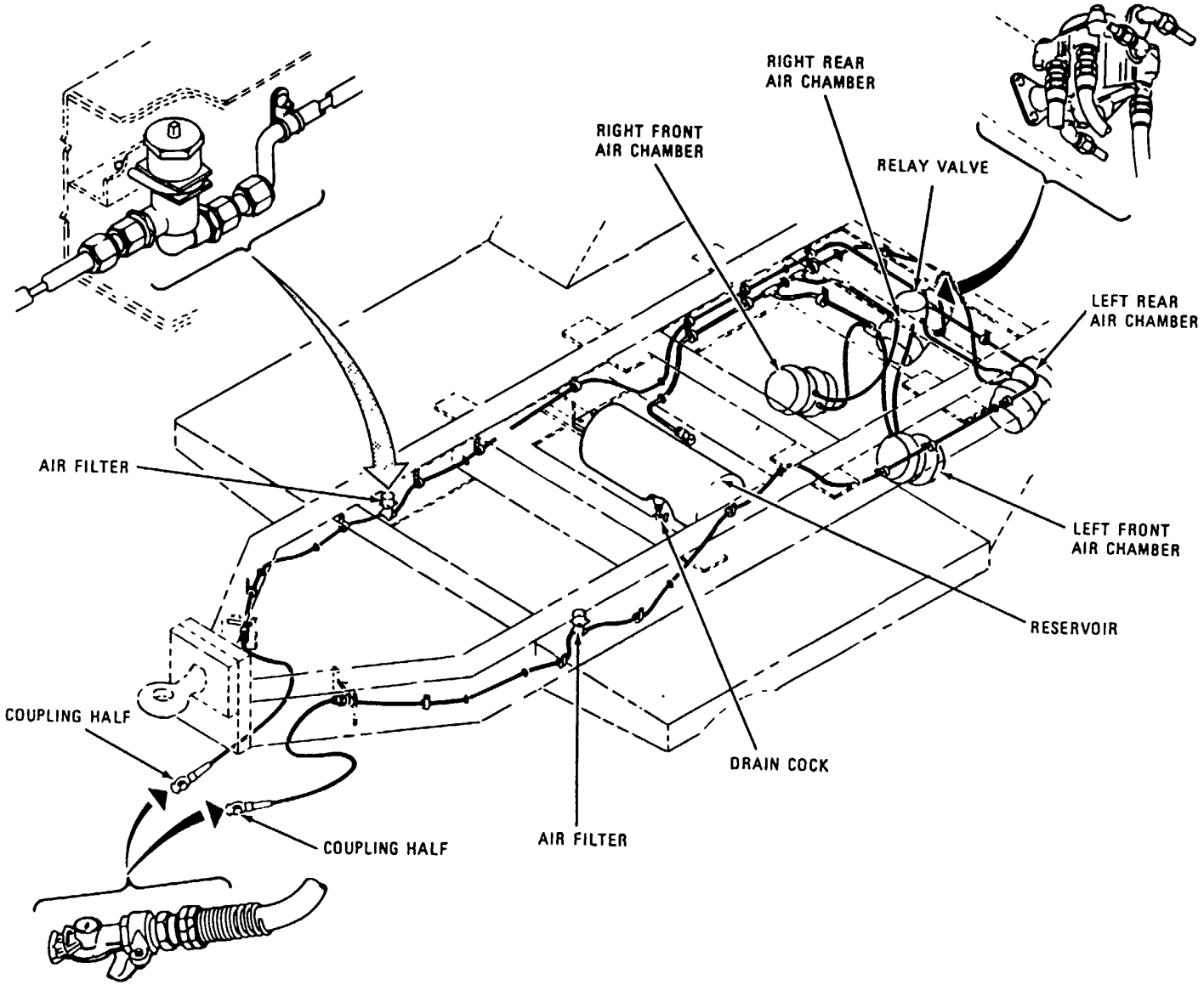
d. If brake line air cleaner is leaking air, replace brake line air cleaner. Refer to paragraph 2-97.

e. If reservoir is leaking air, replace reservoir. Refer to paragraph 2-96.

f. If reservoir drain cock is leaking air, replace reservoir drain cock. Refer to paragraph 2-96.

g. If air chamber assembly is leaking air, replace air chamber assembly. Refer to paragraph 2-96.

h. If airbrake relay valve is leaking air, replace airbrake relay valve. Refer to paragraph 2-98.


RIGHT REAR
AIR CHAMBER
RIGHT FRONT
AIR CHAMBER
RELAY VALVE
LEFT REAR
AIR CHAMBER
AIR FILTER
LEFT FRONT
AIR CHAMBER
RESERVOIR
COUPLING HALF
DRAIN COCK
COUPLING HALF
AIR FILTER

MODEL WPES-1

Table 2-2. Unit Troubleshooting -continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AIRBRAKE SYSTEM (Model WPES-1) - continued

Step 2. Check that compressed air system tubes between reservoir and air chamber assemblies are not crimped or crushed.

a. If compressed air system tubes are good, go to step 3.

b. If compressed air system tubes are damaged, repair airbrake system tubing. Refer to paragraph 2-96.

Step 3. Remove hub and drum assembly for each wheel (refer to paragraph 2-100). Inspect brakeshoe linings for wear. Using 6-inch scale, measure brakeshoe lining thickness.

a. If brakeshoe linings are greater than 1/8 inch (3.2 mm) thick, adjust service brakes. Refer to paragraph 2-101.

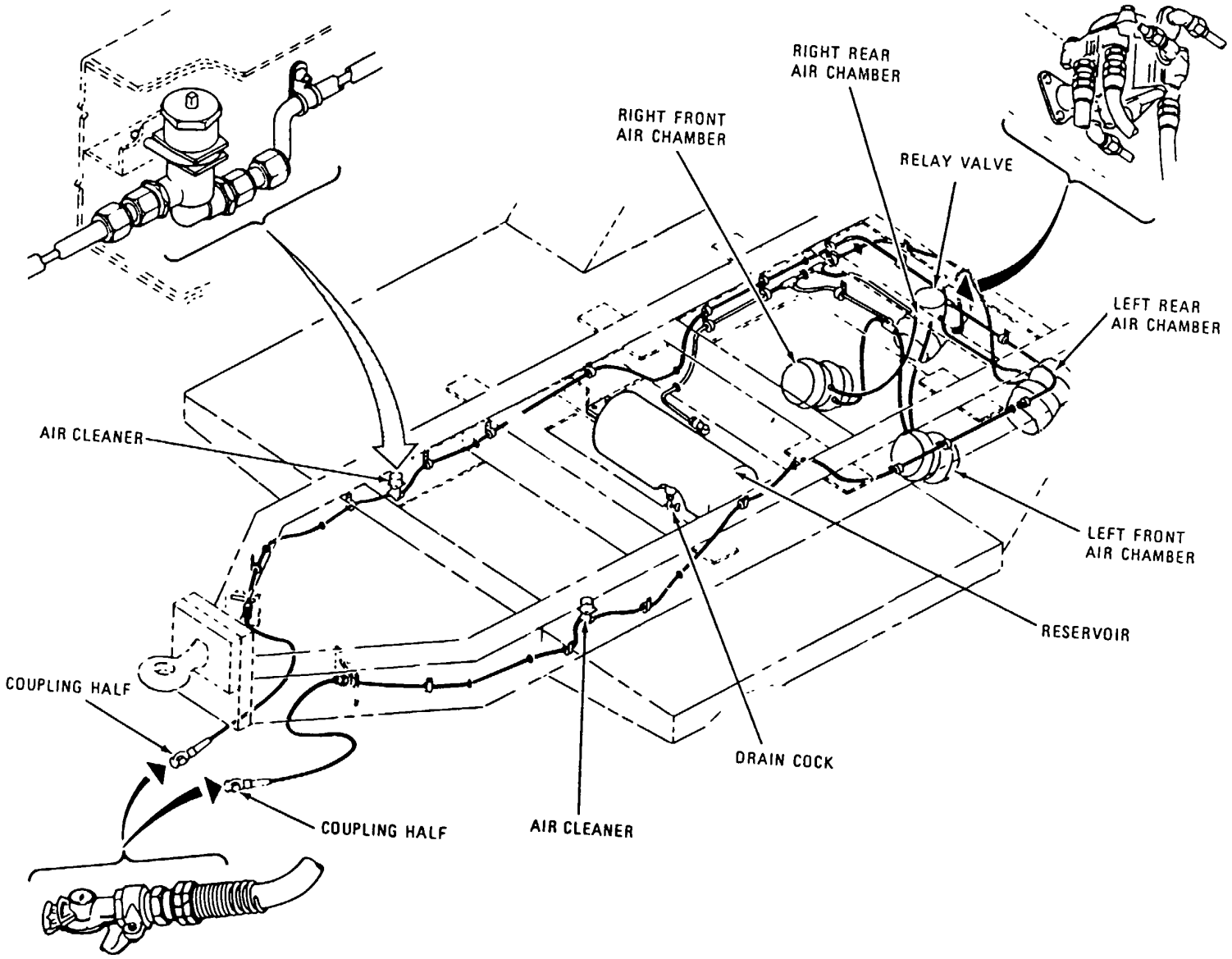
b. If brakeshoe linings are less than 1/8 inch (3 2 mm) thick, notify Direct Support Maintenance.

5. BRAKES SLIP.

Step 1. Remove hub and drum assembly for each wheel (refer to paragraph 2-100). Inspect brakeshoe linings for wear, using 6-inch scale to measure brakeshoe lining for thickness, and check for rusted or damaged brake parts.

a. If brakeshoe linings are less than 1/8 inch (3 2 mm) thick or brake parts are rusted or damaged, notify Direct Support Maintenance.

b. If brakeshoe linings are greater than 1/8 inch (3.2 mm) thick and brake parts are good, adjust service brakes. Refer to paragraph 2-101.


RIGHT REAR
AIR CHAMBER
RIGHT FRONT
AIR CHAMBER
RELAY VALVE
LEFT REAR
AIR CHAMBER
AIR CLEANER
LEFT FRONT
AIR CHAMBER
RESERVOIR
COUPLING HALF
DRAIN COCK
COUPLING HALF
AIR CLEANER

MODEL WPES-1

Table 2-2. Unit Troubleshooting -continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

FLATBED CARGO TRAILER ELECTRICAL SYSTEM (Model WPES-I)

WARNING

Flatbed cargo trailer electrical system contains 24 VDC which can cause severe burns. Be sure to remove watches, bracelets, rings and other metal objects when working on brake electrical system.

CAUTION

Testing electrical system with power connected can cause damage to flatbed cargo trailer electrical system. Take proper measures to ensure wires do not touch trailer chassis during testing.

NOTE

- **Before troubleshooting flatbed cargo trailer electrical system, ensure that towing vehicle's battery is fully charged.**
- **Ensure that there are no burned out lamps on trailer.**
- **Turn lights on at towing vehicle.**

1. TRAILER LIGHT INOPERABLE.

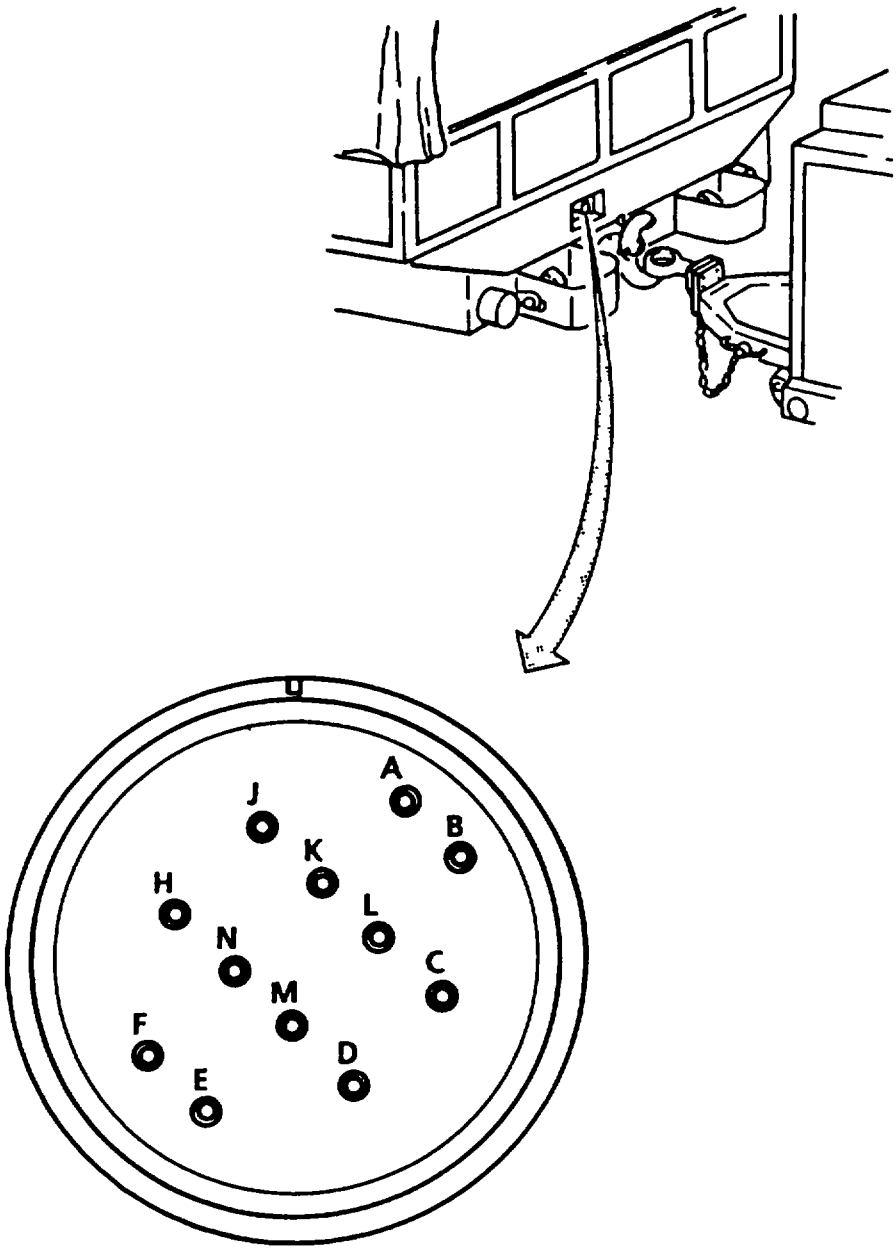
Step 1. Inspect connectors for damage and corrosion and check that power cable assembly is securely connected to towing vehicle receptacle.

Plug in power cable assembly

Step 2. Unplug power cable assembly from towing vehicle and check that 24 VDC is available between pins D (ground) and pins A, B, C, E, F and J at the towing vehicle.

a. If 24 VDC is present, go to step 3.

b. If 24 VDC is not available. Refer to towing vehicle maintenance manual.



MODEL WPES-1

Table 2-2. Unit Troubleshooting -continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

FLATBED CARGO TRAILER ELECTRICAL SYSTEM (Model WPES-1) - continued

Step 3. Check that chassis ground wire is securely mounted to the trailer.

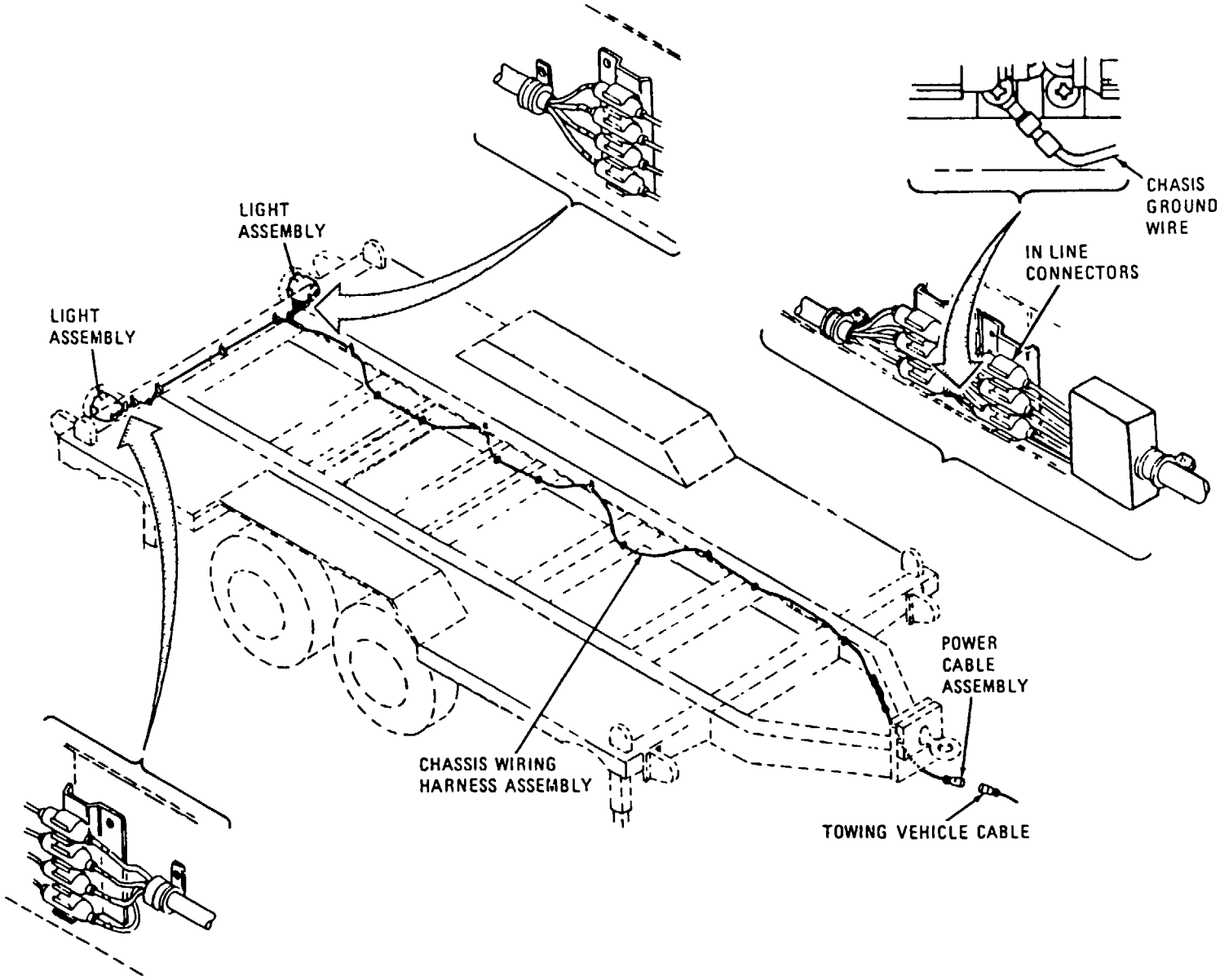
a. If ground wire is loose, tighten it.

b. If ground wire appears tight, remove it, clean the mounting surfaces and reinstall securely.

Step 4. Check for 24 VDC between chassis wiring harness connectors and chassis.

a. If 24 VDC is measured on all lines, repair light assemblies. Refer to paragraph 2-93.

b. If 24 VDC is not measured on all lines, replace chassis wiring harness. Refer to paragraph 2-95.


LIGHT ASSEMBLY
LIGHT ASSEMBLY
CHASIS GROUND WIRE
IN LINE CONNECTORS
POWER CABLE ASSEMBLY
CHASSIS WIRING HARNESS ASSEMBLY
TOWING VEHICLE CABLE

MODEL WPES-1

Table 2-2. Unit Troubleshooting -continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

FLATBED CARGO TRAILER ELECTRICAL SYSTEM (Model WPES-1) - continued

2. DIM OR FLICKERING LIGHTS.

Step 1. Disconnect power cable from towing vehicle and check for bent, broken or corroded pins.

If pins are defective, repair or replace power cable. Refer to paragraph 2-94.

Step 2. Check for loose or corroded ground wire.

a. If wire is loose tighten it.

b. If wire is not loose, remove wire from chassis, clean mounting surfaces and reconnect securely.

Step 3. Check for damaged or loose "in-line" connectors.

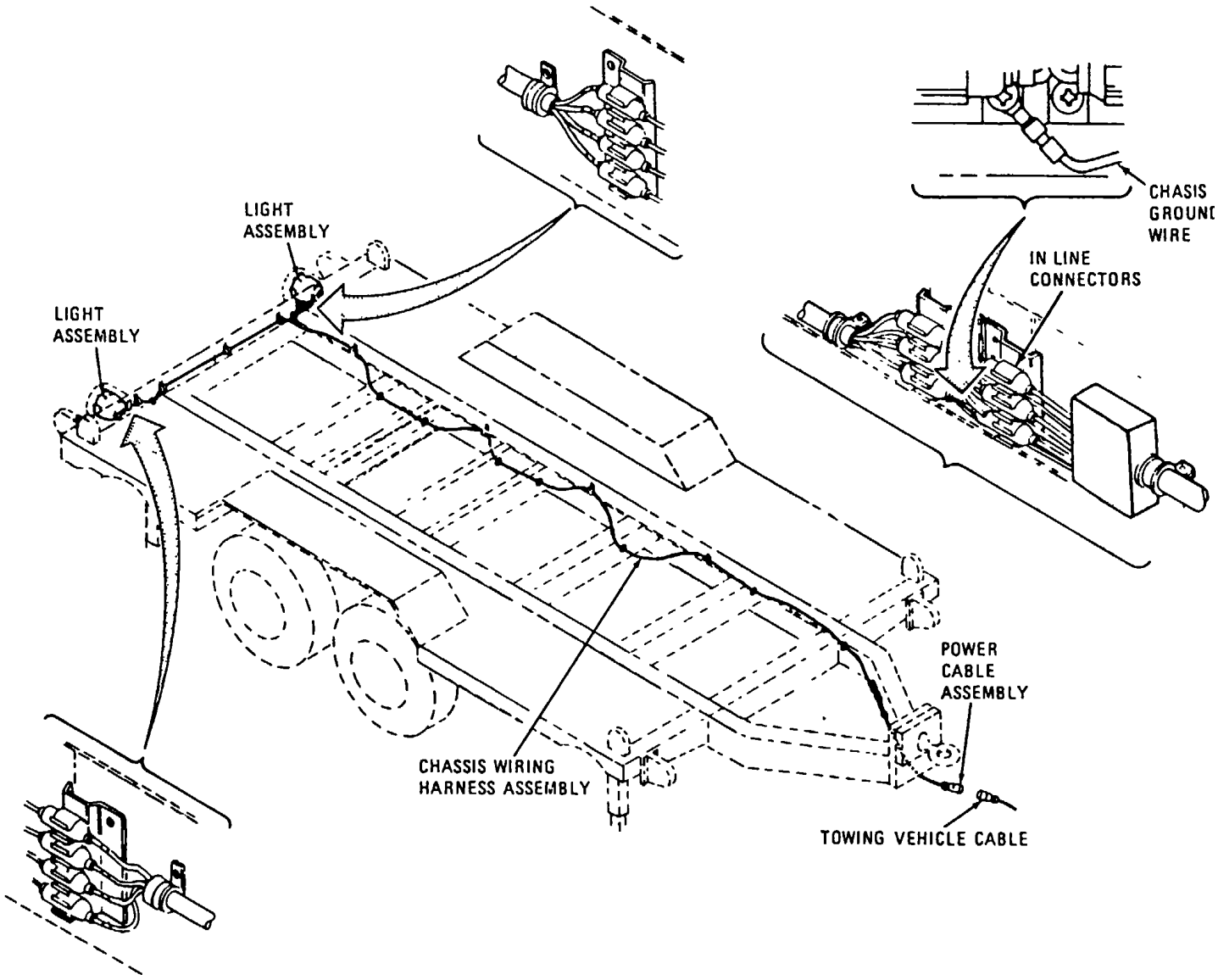
a. If loose, tighten them.

b. If damaged, replace power cable wiring harness (para 2-94) or light assemblies (para 2-93), whichever is damaged.

Step 4. Check if one or both light assemblies are affected.

a. If both light assemblies are affected, replace first the power cable assembly, (para 2-94), then the wiring harness (para 2-95).

b. If only one light assembly is affected, replace the light assembly (para 2-93), the power cable assembly (para 2-94) and the wiring harness (para 2-95) in that order.



MODEL WPES-1

2-71

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

SUSPENSION ASSEMBLY (Model WPES-1)

1. WHEELS WOBBLE OR SHIMMY.

Step 1. Jack up trailer on all four leveling jacks and spin each tire to check for bent wheels and out of round or damaged tires.

a. If wheels and tires are good, go to step 2.

b If wheel is bent or tire is out of round or damaged, replace defective wheel or tire Refer to paragraph 2-99.

Step 2. Check wheel bearing adjustment on each wheel Refer to paragraph 2-100.

a. if wheel bearing adjustments are good, go to step 3.

b. If wheel bearings are out of adjustment, adjust wheel bearings Refer to paragraph 2-100.

Step 3. Check for bent axles and damaged springs and trunnions.

Notify Direct Support Maintenance if this condition exists.

2. WHEELS ARE NOISY.

Step 1. Jack up trailer on all four leveling jacks and spin each tire to check for bent wheels and out of round or damaged tires.

a. If wheels and tires are good, go to step 2.

b If any wheel is bent or any tire is out of round or damaged, replace defective wheel or tire. Refer to paragraph 2-99.

Step 2. Check wheel bearing adjustment on each wheel Refer to paragraph 2-100.

a. If wheel bearing adjustments are good, go to step 3.

b. If wheel bearings are out of adjustment, adjust wheel bearings Refer to paragraph 2-100.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

SUSPENSION ASSEMBLY (Model WPES-1) - continued

Step 3. Inspect wheel bearings for overheating or damage Refer to paragraph 2-100.

Replace damaged wheel bearings Refer to paragraph 2-100.

3. TRAILER VIBRATES.

Step 1. Jack up trailer on all four leveling jacks and spin each tire to check for bent wheels and out of round or damaged tires. Refer to page 2-75 for tire wear chart.

a If wheels and tires are good, go to step 2.

b If any wheel is bent or any tire is out of round or damaged, replace defective wheel or tire. Refer to paragraph 2-99.

Step 2. Check for bent axles, trunnions, bad springs, other suspension damage.

a. If axles, trunnions springs and other suspension components are good, go to step 3.

b. Notify Direct Support Maintenance if suspension assembly is defective.

Step 3. Check wheel bearing adjustment on each wheel. Refer to paragraph 2-100.

a. If wheel bearing adjustments are good, notify Intermediate Direct Support Maintenance.

b. If wheel bearings are out of adjustment, adjust wheel bearings Refer to paragraph 2-100.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

SUSPENSION ASSEMBLY (Model WPES-1) continued

4. TIRES WEAR UNEVENLY.

Step 1. Check for proper inflations of tires.

If inflation is high or low, add or remove air as necessary.

NOTE

Tire wear chart on opposite page provides additional clues as to the cause of abnormal tire wear.

Step 2. Check trailer for proper loading.

If loading is improper, correct trailer loading.

Step 3. Check wheel bearing adjustment on each wheel.

If wheel bearings are out of adjustment, adjust wheel bearings. Refer to paragraph 2-100.

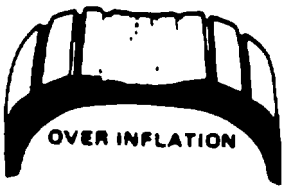
Step 4. Check for bent axles, trunnions, broken springs damaged and/or loose/damaged trunnion brackets.

Notify Direct Support Maintenance if trunnions or axles are bent, or trunnion brackets or springs are loose or damaged.

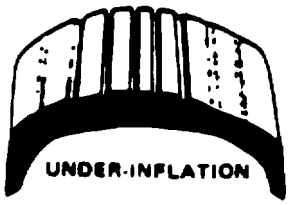
HOW TO READ TIRE WEAR

THE WAY TIRES WEAR IS A GOOD INDICATOR OF OTHER PARTS OF THE SUSPENSION. ABNORMAL WEAR PATTERNS ARE OFTEN CAUSED BY THE NEED FOR SIMPLE TIRE MAINTENANCE.

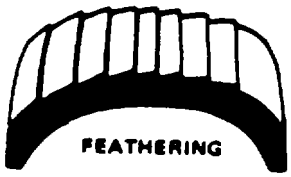
EXCESSIVE WEAR AT THE CENTER OF THE TREAD INDICATES THAT THE AIR PRESSURE IN THE TIRE IS TOO HIGH. THE TIRE IS RIDING ON THE CENTER OF THE TREAD AND WEARING IT PREMATURELY.



THIS TYPE OF WEAR RESULTS FROM UNDER-INFLATION WHEN A TIRE IS UNDER-INFLATED. THERE TOO MUCH CONTACT WITH THE ROAD BY THE OUTER TREADS, WHICH WEAR PREMATURELY. WHEN THIS TYPE OF WEAR OCCURS AND THE TIRE PRESSURE IS KNOWN TO BE CORRECT, A BENT AXLE OR OUT OF ADJUSTMENT WHEEL BEARINGS COULD BE INDICATED.

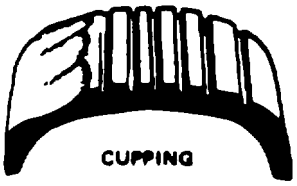


FEATHERING IS A CONDITION WHEN THE EDGE OF EACH TREAD RIB DEVELOPS A SLIGHTLY ROUNDED EDGE ON ONE SIDE AND A SHARP EDGE ON THE OTHER. BY RUNNING YOUR HAND OVER THE TIRE, YOU CAN USUALLY FEEL THE SHARPER EDGES BEFORE YOU'LL BE ABLE TO SEE THEM. THE MOST COMMON CAUSE OF FEATHERING IS A BENT AXLE.



WHEN AN INNER OR OUTER RIB WEARS FASTER THAN THE REST OF THE TIRE, THE NEED FOR WHEEL BEARING ADJUSTMENT IS INDICATED. THERE IS EXCESSIVE WEIGHT ON ONE SIDE OF TRAILER, CAUSING THE WHEEL TO LEAN TOO MUCH. PUTTING EXCESSIVE LOAD ON ONE SIDE OF THE TIRE MISALIGNMENT COULD ALSO BE DUE TO SAGGING SPRINGS. BE SURE THE VEHICLE IS LOADED EVENLY.

CUPS OR SCALLOPED DIPS APPEARING AROUND THE EDGE OF THE TREAD ALMOST ALWAYS INDICATE WORN (SOMETIMES BENT) SUSPENSION PARTS. ANY WORN COMPONENT THAT CONNECTS THE WHEEL TO THE SUSPENSION CAN CAUSE THIS TYPE OF WEAR OCCASIONALLY, WHEELS THAT ARE OUT OF BALANCE WILL WEAR LIKE THIS. BUT WHEEL IMBALANCE USUALLY SHOWS UP AS BALD SPOTS BETWEEN THE OUTSIDE EDGES AND CENTER OF THE TREAD.



SECOND-RIB WEAR CAN BE KEPT TO A MINIMUM BY PAYING CAREFUL ATTENTION TO TIRE PRESSURE AND FREQUENTLY ROTATING THE TIRES. THIS IS OFTEN CONSIDERED NORMAL WEAR.

Section V. UNIT MAINTENANCE PROCEDURES

Alphabetical Index

Paragraph Title **Paragraph**

Alphabetical Index

Paragraph Title **Paragraph**

2-77/(2-78 Blank)

2-10. GENERAL.

This section contains instructions for performing unit level maintenance on the ROWPU.

2-11. PERSONNEL SAFETY.

To ensure safety of personnel, proper care should be used when handling assemblies and parts. Many assemblies are heavy. The assistance of another person, lifting device, or other support equipment may be required to move or position heavy items.

Personnel must remove all items of jewelry (rings, bracelets, watches, necklaces etc.) and loose clothing before working on the equipment. Jewelry and loose clothing can get caught in moving equipment and result in injury to personnel. Jewelry can cause electrical shorts or severe injury when working around electrical equipment.

When performing maintenance on the ROWPU, keep in mind that the purpose of the equipment is to produce potable water. Cleaning fluids, lubricants, preservatives, paint or other chemicals must not be allowed to enter the water system. Clean piping and related components with only approved materials. Operate the ROWPU after performing maintenance and have product water tested for chemical contaminants.

2-12. PROPER EQUIPMENT.

Obtain proper equipment before beginning maintenance. This includes hand tools and/or special tools, receptacles for storing small parts, and expendable materials required by the maintenance task.

2-13. STORAGE CHEST MAINTENANCE.

This task consists of: a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Detergent (Appendix C, Section II, Item 10)
Rags, Wiping (Appendix C, Section II, Item 23)

REMOVAL

Unit level maintenance of the storage chest is limited to replacement. After removing components, turn storage chest over to supply.

REPAIR

a. Disassembly.

(1) Open lid (1).

(2) Remove four screws (4) and information plate (3).

b. Cleaning.

(1) Wash out storage chest with clean water and detergent.

(2) Rinse storage chest m clean water and dry with wiping rag Do not allow pools of water to remain in chest for a long period.

c. Inspection.

(1) Inspect information plate (3) for damaged, faded or badly scratched lettering.

(2) Inspect storage chest (2) for damage.

d. Repair.

(1) Replace information plate (3) if damaged.

(2) Replace storage chest (2) if no longer serviceable.

2-13. STORAGE CHEST MAINTENANCE - continued.

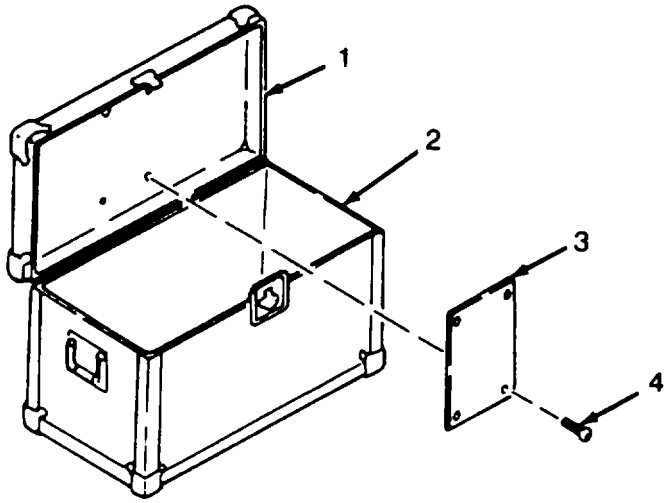
e. Assembly.

(1) Position information plate (3) on lid (1).

(2) Install four screws (4).

INSTALLATION

Install components in storage chest.



2-14. STORAGE CHEST MAINTENANCE.

This task consists of: a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Detergent (Appendix C, Section II, Item 10)
Rags, Wiping (Appendix C, Section II, Item 23)

REMOVAL

Unit level maintenance of the storage chest is limited to replacement. After removing components, turn storage chest over to supply.

REPAIR

a. Disassembly.

(1) Open lid (1).

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(1) Wash out storage chest with clean water and detergent.

(2) Rinse storage chest in clean water and dry with wiping rag. Do not allow pools of water to remain in chest for a long period.

c. Inspection.

(1) Inspect information plate (3) for damaged, faded or badly scratched lettering.

(2) Inspect storage chest (2) for damage.

d. Repair.

(1) Replace information plate (3) if damaged.

(2) Replace storage chest (2) if no longer serviceable.

2-14. STORAGE CHEST MAINTENANCE - continued.

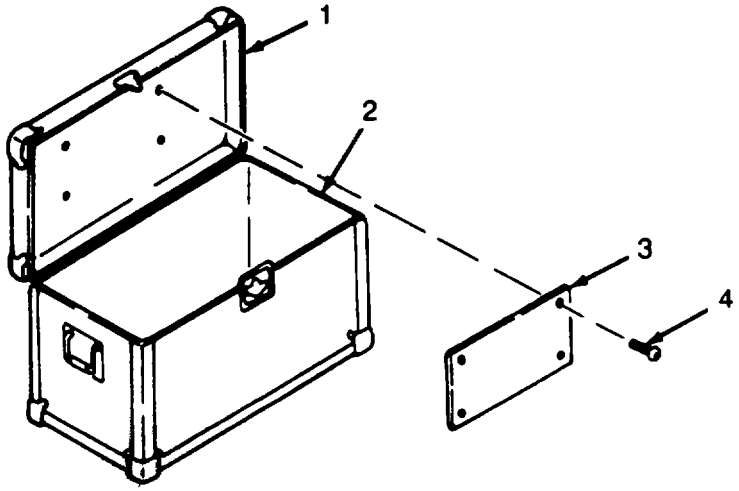
e. Assembly.

(1) Position information plate (3) on lid (1).

(2) Install four screws (4).

INSTALLATION

Install components in storage chest.



2-15. BACKWASH PUMP ASSEMBLY MAINTENANCE.

This task consists of: a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Vice (Appendix B, Section III, Item 3)
- Pipe Wrench (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Detergent (Appendix C, Section II, Item 10)
- Rags, Wiping (Appendix C, Section II, Item 23)
- Gaskets (2) - 095X0200COBUNA
- Gasket- 13221E8287-1
- Gasket- 13221E8287-2
- Lockwasher (8) - MS35338-145

Equipment Condition

Reference
- Inlet/outlet hoses removed (TM 10-4610-240-10).
- Backwash pump cable assembly disconnected from ROWPU (TM 10-4610-240-10).

General Safety Instructions

WARNING
Lifting heavy/difficult to handle equipment can cause serious injury.

REMOVAL

a Open drain cock (15) and remove plugs (9 and 4).

b Tip backwash pump assembly on end and allow water to drain.

REPAIR

a. Disassembly.

(1) Unwind cable assembly (22) from frame (19).

(2) Remove screw (18), flat washer (17), lanyard from plug (4), and nut (16) from left side of frame (19).

(3) Remove nut (16), screw (18), flat washer (17), and lanyard from plug (9) from right side of frame (19).

(4) Remove four nuts (34), lockwashers (33), flat washer (32), screws (27), and flat washers (28).

(5) Remove flange (30), gasket (31), and attached parts from pump (35).

2-15. BACKWASH PUMP ASSEMBLY MAINTENANCE - continued.

(6) Position flange (30) and attached parts in vice.

(7) Unscrew adapter (2), elbow (1), and pipe (29) from flange (30).

(8) Remove four nuts (14), lockwashers (13), flat washer (12), screws (10), and flat washer (11).

(9) Remove reducer (6), gasket (5), and attached parts from pump (35).

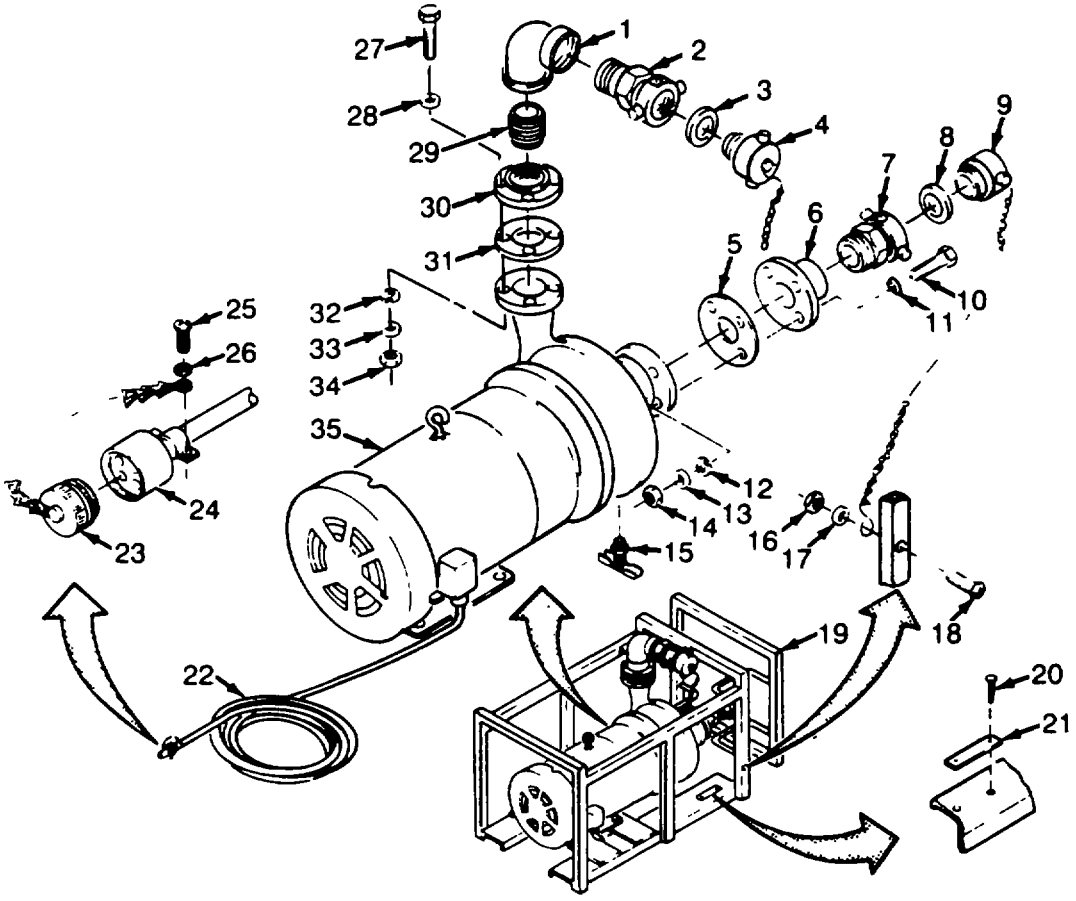
(10) Position reducer (6) in vice and remove adapter (7).

(11) Remove drain cock (15) from bottom of pump (35).

(12) Remove two drive screws (20) and information plate (21).

(13) Remove gaskets (3 and 8) from adapters (2 and 7).

(14) Remove screw (25), starwasher (26) and cover (23) from plug (24).



2-85

2-15. BACKWASH PUMP ASSEMBLY MAINTENANCE - continued.

b. Cleaning.

(1) Wash all components with clean water and detergent.

(2) Rinse components in clean water and dry with wiping rag.

c. Inspection.

(1) Inspect all threaded components for damaged threads.

(2) Inspect plug (24) for damaged or missing pins.

(3) Inspect cable assembly (22) for damaged or missing cover (23).

(4) Inspect all components for corrosion.

(5) Inspect pump (35) and frame (19) for loose or missing hardware.

d. Repair.

(1) Replace damaged components.

(2) Replace all gaskets.

e. Assembly.

(1) Apply anti-seize tape to all male fittings Be sure tape is wrapped in same direction as pipe thread.

(2) Install cover (23), starwasher (26), and screw (25) on plug (24).

(3) Install gaskets (3 and 8) In adapters (2 and 7).

(4) Install information plate (21) and two drivescrews (20) on frame (19).

(5) Install drain cock (15) in bottom of pump (35).

(6) Position reducer (6) in vice Install adapter (7) In reducer.

(7) Install gasket (5), reducer (6), and attached parts on pump (35).

(8) Install four flat washers (11), screws (10), flatwashers (12), lockwashers (13), and nuts (14).

(9) Position flange (30) In vice.

(10) Screw pipe (29), elbow (1), and adapter (2) into flange (30).

(11) Install gasket (31), flange (30) and attached parts on pump (35).

2-15. BACKWASH PUMP ASSEMBLY MAINTENANCE- continued.

(12) Install four flat washers (28), screws (27), flatwashers (32), lockwasher , (33), and nuts (34).

(13) Install screw (18), lanyard from plug (4), flat washer (17), and nut (I 6) on left side frame (19).

(13) Install screw (18), lanyard from plug (9), flat washer (17),and nut (16) on right side f frame (19).

(14) Wind cable assembly (22) onto frame (19).

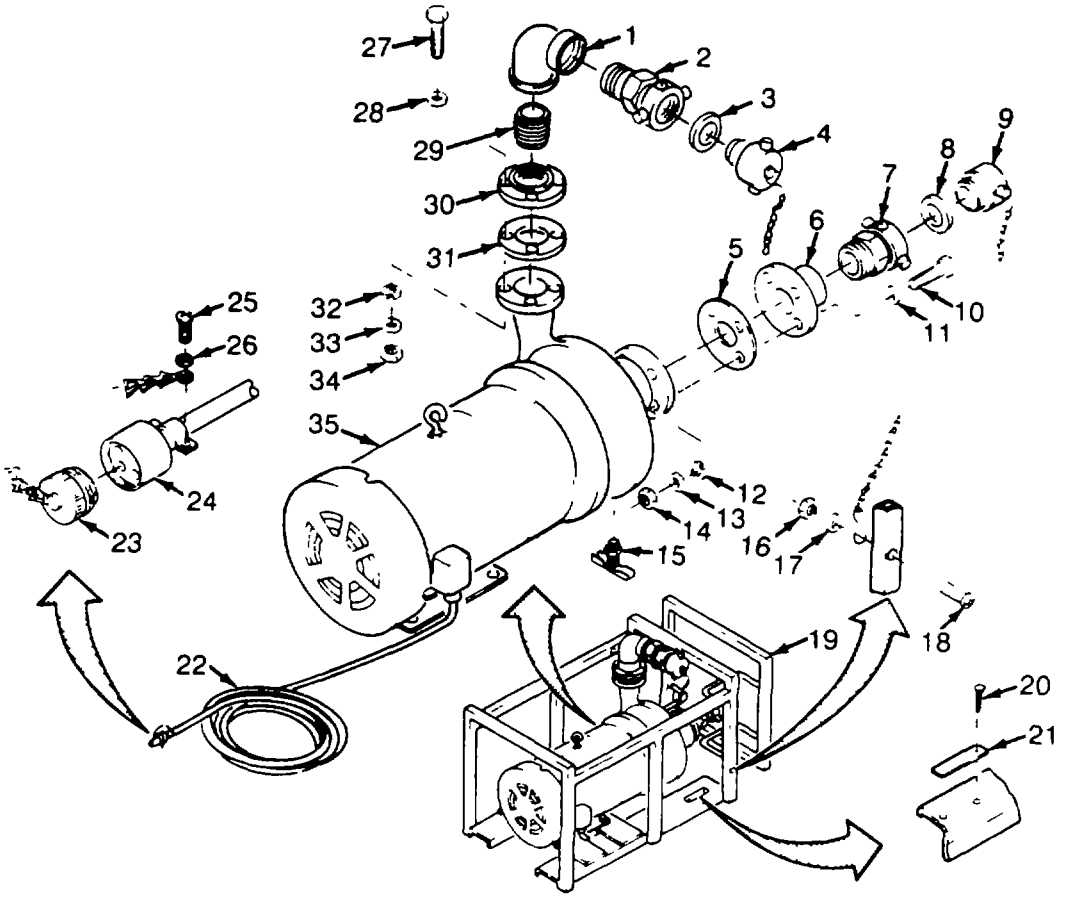
INSTALLATION

a. Close drain cock (15).

b. Install plug (4) in adapter (2).

c. Install plug (9) in adapter (7).

d. Operate backwash pump and test for leaks (TM 10-4610-240-10).



2-87

2-16. CABLE ASSEMBLY W42 (BACKWASH PUMP) MAINTENANCE.

This task consists of: a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Multimeter (Appendix B, Section II, Item 3)

Material/Parts Required
- Tape, Electrical (Appendix C, Section II, Item 31)
- Twine (Appendix C, Section II, Item 33)
- Lockwasher (4) - MS35338-108

Equipment Condition
- Reference
  - Power shutdown (power source manual).
  - ROWPU shutdown (TM 10-4610-240-10).

REMOVAL

a. Unwind cable assembly (15) clear of frame (2).

b Remove four screws (12), conduit box cover (11), and gasket (10) from conduit box (4).

c. Remove screw (17) securing ground wire lug (18) to conduit box (4).

d. Pull bundle of four wire sets (19) from conduit box (4). Remove twine (14) and tape (5).

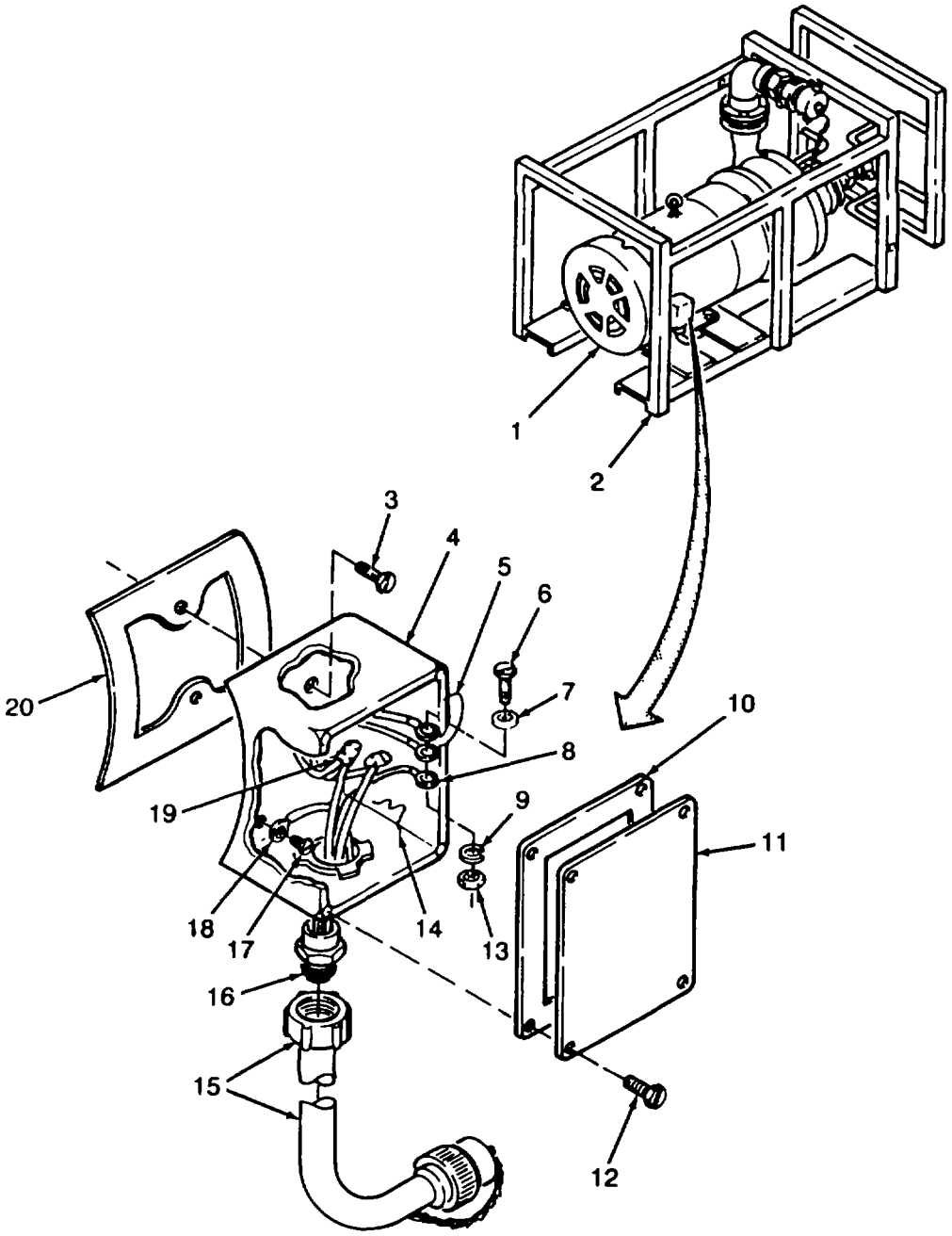
NOTE
Tag and identify wires by set before removal.

e . Remove nut (13), lockwasher (9), flat washer (7), three wire lugs (8), and screws (6). Repeat this step for each wire set (19).

f. Loosen sealing grip (16) and pull wires of cable assembly (15) from conduit box (4).

g As required, remove two screws (3), gasket (20), and conduit box (4) from motor (1).

2-16. CABLE ASSEMBLY W42 (BACKWASH PUMP) MAINTENANCE - continued.



2-89

2-16. CABLE ASSEMBLY W42(BACKWASH PUMP) MAINTENANCE - continued.

TEST

CAUTION

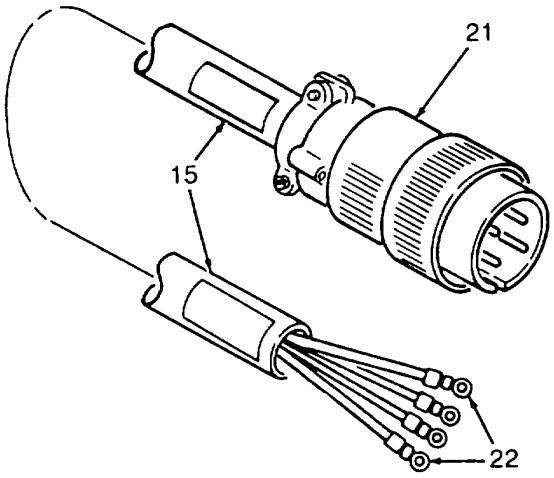
- The following tests are performed to determine if the cable assembly LS defective. Before testing, cable assembly must be disconnected from the motor. Failure to disconnect cable can result In false test indications.
- Make sure wire terminals (22) are not touching each other.

a. Using multimeter, test for continuity between plug (21) pins and wire terminals (22) as follows:

CABLE ASSEMBLY W42 CONTINUITY TEST

FROM	TO
PIN	WIRE COLOR
A	BLACK
B	WHITE
C	RED
D	GREEN

b. If continuity does not exist between two points, replace cable assembly.



BLACK	A
WHITE	B
RED	C
GREEN	D

CABLE ELECTRICAL SCHEMATIC

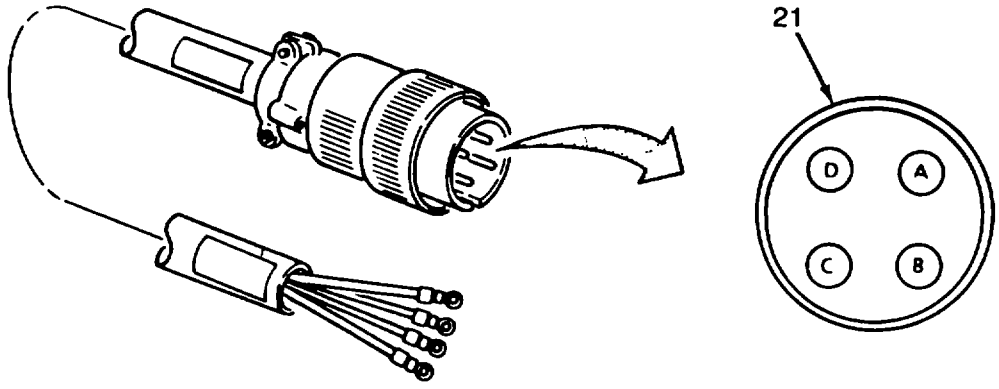
2-16. CABLE ASSEMBLY W42(BACKWASH PUMP) MAINTENANCE- continued.

c. Using multimeter, test for internal electrical short between plug (21) pins as follows:

CABLE ASSEMBLY W42 SHORTING TEST

FROM	TO
PIN	PIN
A	8
A	C
A	D
B	C
B	D
C	D

d. If continuity exist between any two points, replace cable assembly.



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2-16. CABLE ASSEMBLY MAINTENANCE - continued..

INSTALLATION

a Position gasket (20) and conduit box (4) on motor (1) and install two screws (3).

b Insert wires of cable assembly (15) through hole in conduit box (4) and tighten sealing grip (16).

c. Position wires out of conduit box (4).

NOTE
Install wires by set as tagged.

d. On each set of three wire lugs (8), install screw (6), flat washer (7), lockwasher (9), and nut (13).

e Using electrical tape (5), wrap each wire set (19) separately.

f Secure ends of electrical tape (5) with twine (14).

g Position bundle of four wire sets (19) in conduit box (4).

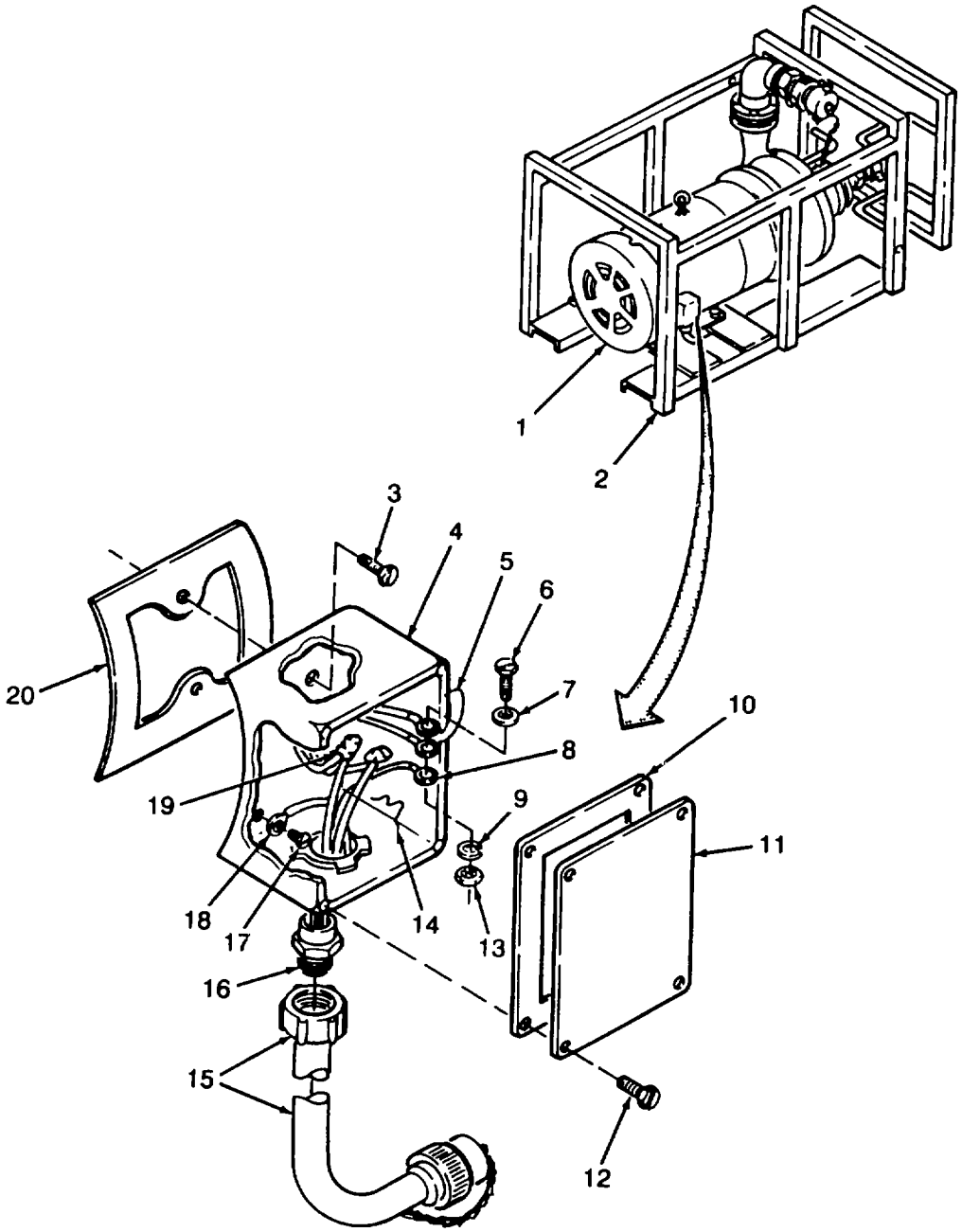
h Install ground wire lug (18) with screw (17).

l Install gasket (10), conduit box cover (11), and four screws (12).

j Wind cable assembly (15) onto backwash pump assembly frame (2).

k. Start backwash pump and check for proper operation (TM 10-4610-240-10).

2-16. CABLE ASSEMBLY W42 (BACKWASH PUMP) MAINTENANCE - continued.



2-17. STRAINER(BACKWASH PUMP) MAINTENANCE..

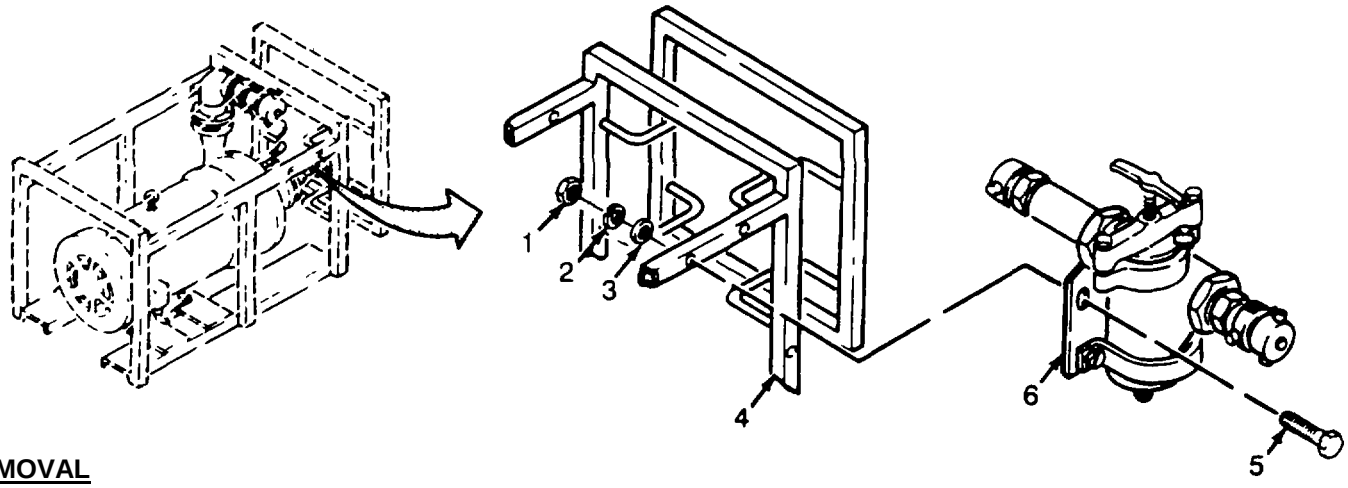
This task consists of.. a. Removal. b. Repair. c. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Vice (Appendix B, Section III, Item 3)
- Pipe Wrench (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Lockwasher (4) - MS35338-139
- Gasket (2) - 095X0200COBUNA
- Gasket - ST26425

Equipment Condition
- Reference
- ROWPU shutdown (TM 10-4610-240-10)
- Power shutdown (power source manual)



REMOVAL

a. Remove two nuts (1), lockwashers (2), flat washers (3), and bolts (5) from frame (4).
b. Remove backwash pump strainer (6).

REPAIR

a. Disassembly.

(1) Remove two nuts (23), lockwashers (22), fiat washers (21) and screws (19) from mounting plate (24).

(2) Separate strap (20) and plate (24) from body (13).

2-17. STRAINER (BACKWASH PUMP) MAINTENANCE - continued.

(3) Unscrew yoke screw (7) from yoke (9)

(4) Remove two studs (8) and yoke (9) from body (13)

(5) Remove cover (10), packing(11), and basket(12) from body (13)

(6) Clamp body (13) In vice

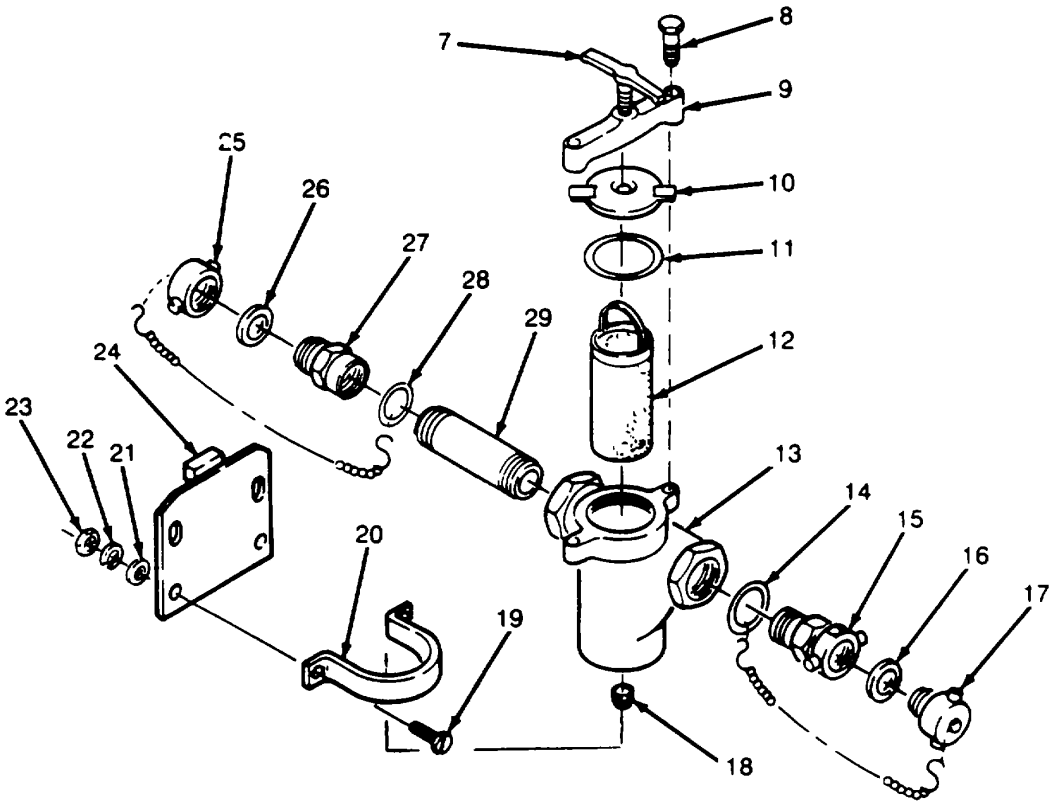
(7) Remove cap (25), adapter (27), wire (28) and pipe (29) from body (13)

(8) Remove gasket (26) from cap (25)

(9) Remove plug (17), adapter (15), and wire (14) from body (13)

(10) Remove gasket (16) from adapter (15)

(11) Remove plug (18) from body (13)



2-17. STRAINER (BACKWASH PUMP) MAINTENANCE - continued.

b. Cleaning
(1) Wash all parts with clean water and detergent
(2) Rinse components In clean water and dry with wiping rag

c. Inspection
(1) Inspect all threaded components for damaged threads.
(2) Inspect body (13) for cracks and corrosion.
(3) Inspect basket (12) for tears, ripped or clogged screen

d. Repair
(1) Replace all damaged components.
(2) Replace gaskets (26 and 16) and packing (11)

e.. Assembly
(1) Apply anti-seize tape to male threads of pipe (29), adapters (15 and 27) and plug (18).
(2) Install plug (18) in body (13).
(3) Install gasket (16) in adapter (15)
(4) Install wire (14), adapter (15), and plug (17) on body (13)
(5) Install gasket (26) in cap (25).
(6) Install pipe (29), wire (28), adapter (27), and cap (25) on body (13).
(7) Position basket (12), packing (11) and cover (10) on body (13).
(8) Install yoke (9) with two studs (8)
(9) Screw yoke screw (7) into yoke (9).
(10) Position plate (24) and strap (20) on body (13)

NOTE

Before tightening nuts (23), align plate (24) with body (13) as shown.

(11) Install two screws (19), flat washers (21), lockwashers (22) and nuts (23)

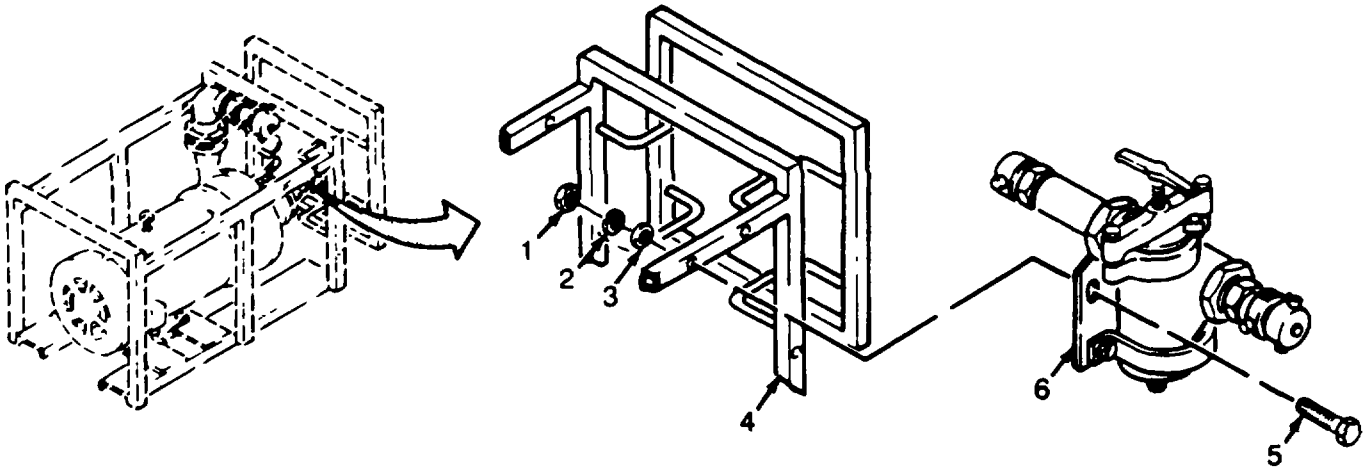
INSTALLATION

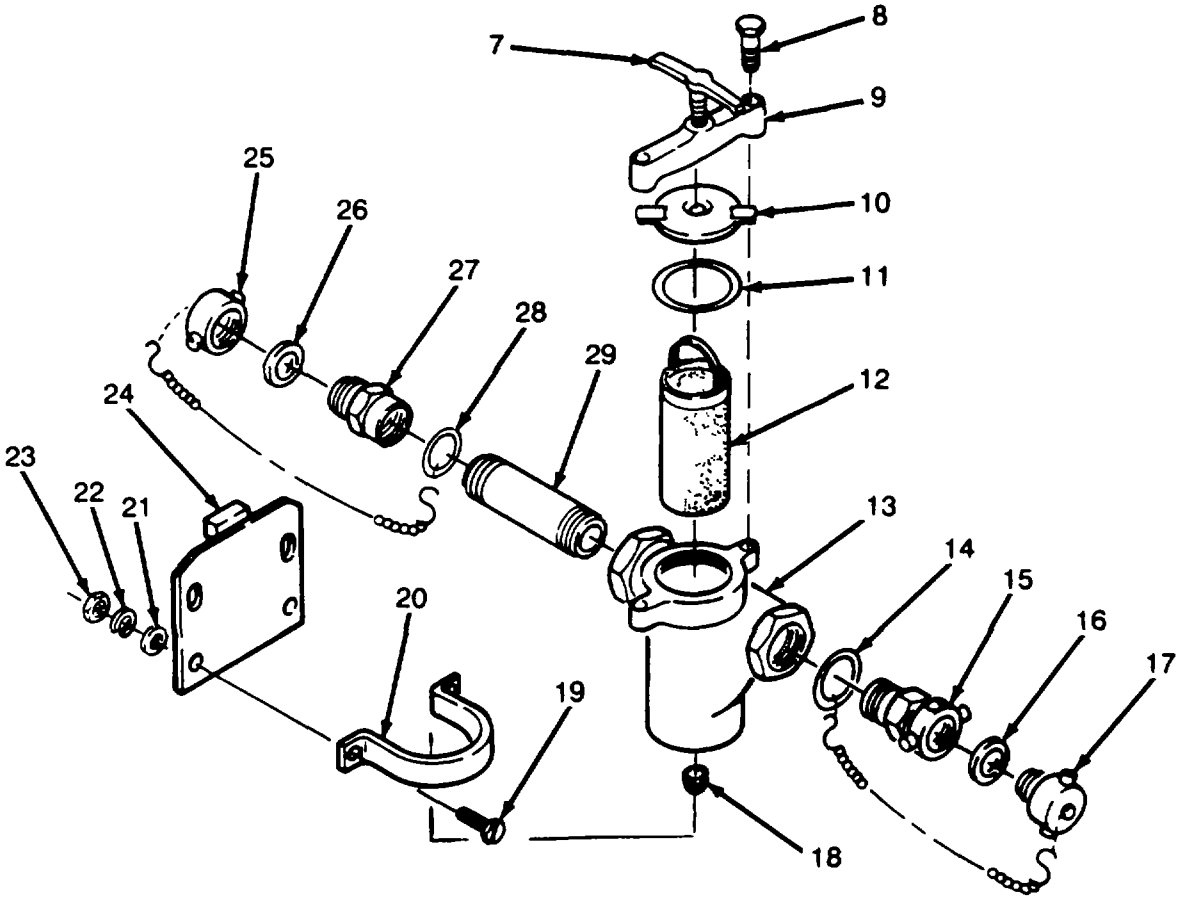
a. Position backwash pump strainer (6) on frame (4) and aline mounting holes

b Install two bolts (5), flat washers (3), lockwashers (2), and nuts (1)

c Start backwash pump and check for leaks and proper operation (TM 10-4610-240-10).

2-17. STRAINER (BACKWASH PUMP) MAINTENANCE -continued.





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2-18. CENTRIFUGAL PUMP (BACKWASH PUMP) MAINTENANCE. I

This task consists of. a. Removal. b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Self-Locking Nut (4) - MS17830-SC
Personnel Required
Two (2)
Equipment Condition
Reference
Backwash pump fittings removed (para 2-15).
Backwash pump cable assembly removed (para 2-16)
Backwash pump strainer assembly removed (para 2-17)
General Safety Instructions

WARNING

Lifting heavy/difficult to handle equipment incorrectly can cause serious injury Two personnel are required for replacement

REMOVAL

a. Remove four locknuts (4), flat washers (2), and bolts (1).

WARNING

Backwash pump assembly is heavy/difficult to handle. Two people are needed to lift it to prevent personal injury or damage to the equipment

b. Remove backwash pump assembly (5) from frame (3).

INSTALLATION

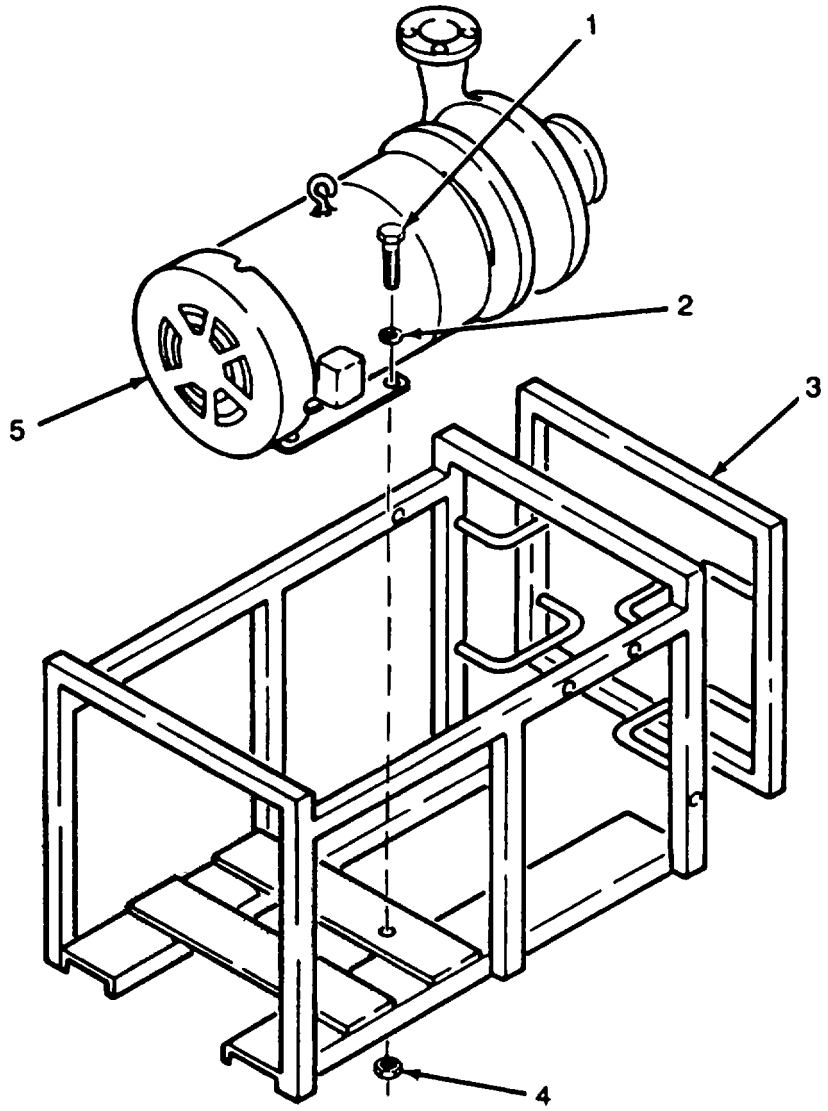
WARNING

Backwash pump assembly is heavy/difficult to handle. Two people are need to lift it to prevent personal injury or damage to the equipment

a Position backwash pump assembly (5) on frame (3)

b Install four bolts (1), flat washers (2), and locknuts (4)

2-18. CENTRIFUGAL PUMP (BACKWASH PUMP) MAINTENANCE - continued.



2-99

2-19. BACKWASH PUMP FRAME MAINTENANCE.

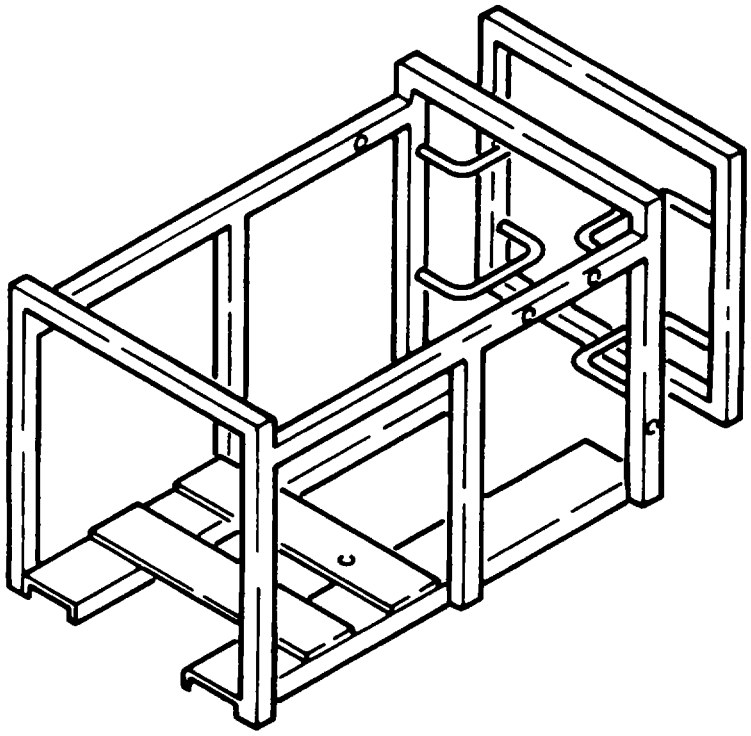
This task consists of.. a. Removal. B. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Equipment Condition
Reference
Backwash pump assembly fittings removed (para 2-15).
Cable assembly removed (para. 2-16)
Strainer removed (para 2-17)
Centrifugal pump removed (2-18).

Unit level maintenance of the backwash pump frame is limited to replacement After removing components from frame, send frame to Direct Support Maintenance

2-19. BACKWASH PUMP FRAME MAINTENANCE - continued.



2-101

2-20. RAW WATER PUMP ASSEMBLY MAINTENANCE.

This task consists of.. a. Removal. b. Repair. c. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Pipe Wrench (Appendix B, Section III, Item 3).
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Detergent (Appendix C, Section II, Item 10)
Rags, Wiping (Appendix C, Section 11, Item 23).
Gasket (2) - 0095X0150COBUNA.
Screw, Drive (2) MS21318-20.
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Inlet/outlet hoses removed (TM 10-4610-240-10).
Raw water pump cable assembly disconnected from ROWPU (TM 104610-240-10).

REMOVAL

a Open drain cock (8).

b Remove cap (6) and plug (9).

c Tip raw water pump assembly on end and allow water to drain.

REPAIR

a. Disassembly

(1) Unwind cable assembly (19) from frame (20).

(2) Remove screw (18), star washer (17), and cap (15) from electrical plug (16).

(3) Remove two drain cocks (8) from pump (14).

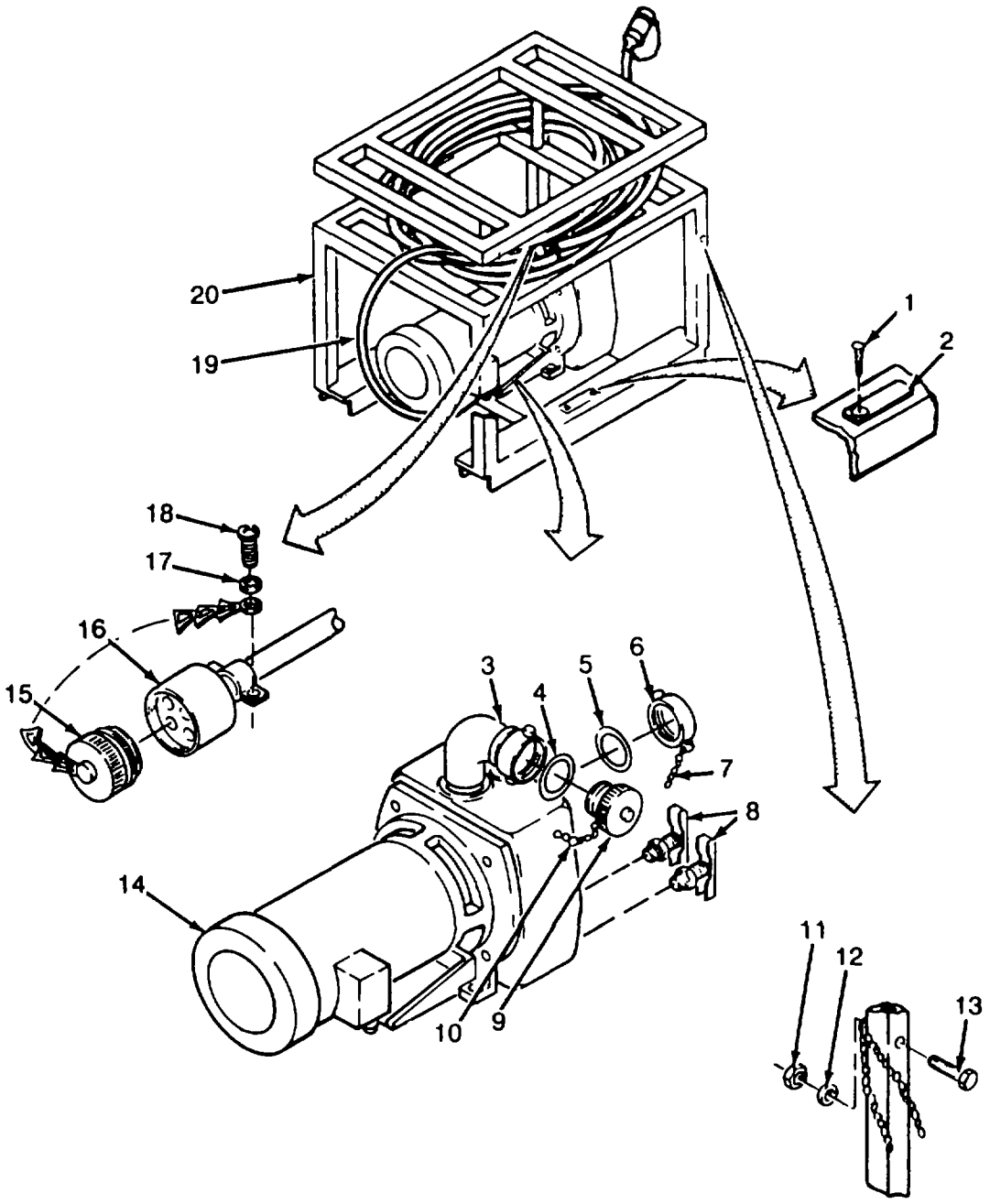
(4) Remove nut (11), two chains (7 and 10), flat washer (12), and screw (13).

(5) Remove two screws (1) and information plate (2) from frame (20).

(6) Remove gasket (4) from adapter (3).

(7) Remove gasket (5) from cap (6).

2-20. RAW WATER PUMP ASSEMBLY MAINTENANCE - continued.



2-20. RAW WATER PUMP ASSEMBLY MAINTENANCE - continued.

b. Cleaning.

(1) Wash all components with clean water and detergent.

(2) Rinse components in clean water and dry with wiping rag.

c. Inspection

(1) Inspect plug (9), adapter (3) and cap (6) for damaged threads.

(2) Inspect electrical plug (16) for damaged or missing pins.

(3) Inspect cable assembly (19) for damaged or missing cover (15).

(4) Inspect all components for corrosion.

(5) Inspect pump (14) and frame (20) for loose or missing hardware.

d. Repair.

(1) Replace damaged components.

(2) Replace gaskets (4 and 5).

e. Assembly.

(3) Install gasket (5) in cap (6)

(4) Install gasket (4) in adapters (3).

(5) Install information plate (2) on frame (20) with two screws (1)

(6) Install screw (13), two chains (7 and 10), flat washer (12), and nut (11)

(6) Apply anti-seize tape to threads of drain cocks (8) Be sure to wrap tape in same direction as thread.

(7) Install two drain cocks (8) in pump (14).

(8) Install cap (15), starwasher (17), and screw (18) on electrical plug (16)

(9) Wind cable assembly (19) onto frame (20)

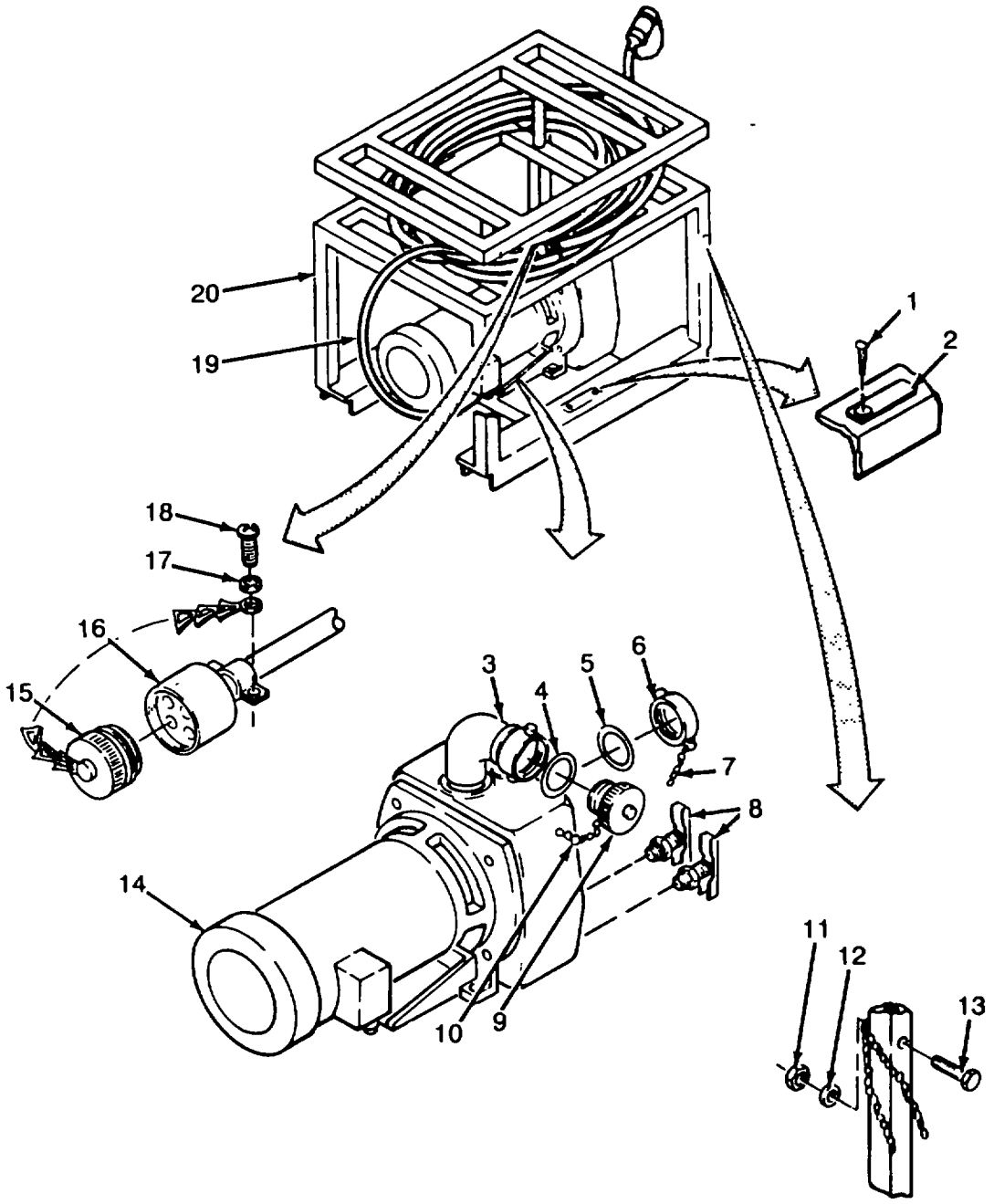
INSTALLATION

a Install cap (6) and plug (9).

b Close drain cocks (8)

c Operate raw water pump and test for leaks (TM 10-4610-240-10).

2-20. RAW WATER PUMP ASSEMBLY MAINTENANCE - continued.



2-21. CABLE ASSEMBLY (RAW WATER PUMP) MAINTENANCE.

This task consists of.. a. Removal. b. Test. c. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Multimeter (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Electrical (Appendix C, Section II, Item 31)
- Twine (Appendix C, Section II, Item 33)
- Lockwasher (4) - MS35333-108

Equipment Condition

Reference
- ROWPU Shutdown (TM 10-4610-240-10).
- Power shutdown (power source manual)
- Cable assembly disconnected from ROWPU (TM 10-4610-240-10).

REMOVAL

a. Unwrap cable assembly (16) from raw water pump assembly frame (15).

b. Remove two screws (19), cover (18), and gasket (17)

NOTES

- Tag wires by set before removal.
- There are four sets of wires in conduit box One bundle is shown, the others are similar

c Pull four wire sets (3) from conduit box (4) Remove twine (12) and electrical tape (7).

d Remove screw (11) securing grounding wire (13) to conduit box (4)

e Remove nut (10), lockwasher (9), three wire lugs (8), and flat washer (6) from screw (5) for each set of wires (3).

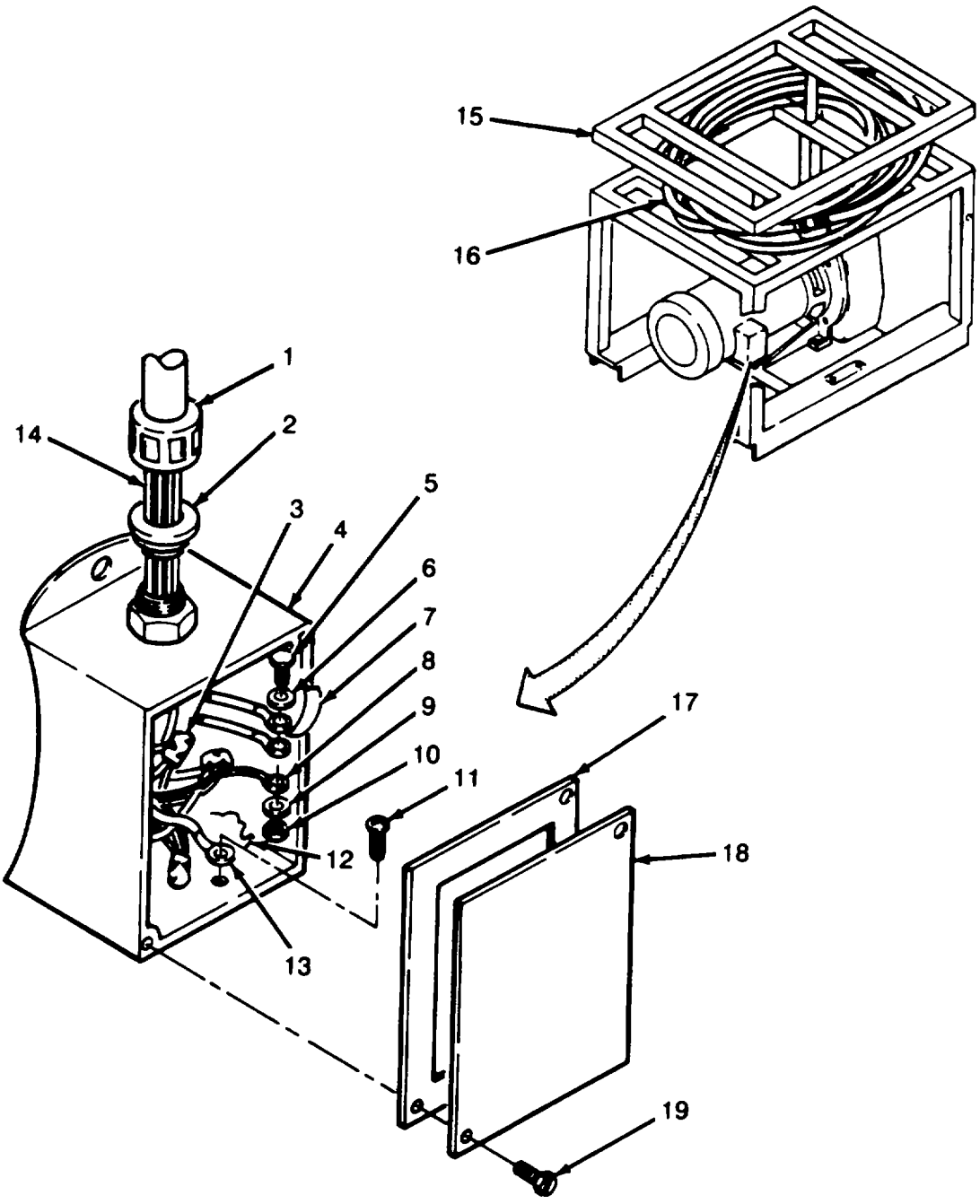
f. Install flat washer (6), lugs of two cream-colored wires (14), lockwasher (9), and nut (10) on screw (5)

CAUTION

Wire insulation can be damaged when wires are pulled through conduit box. Be careful when pulling wires

g.. Remove sealing grip (1) and gasket (2) with wires (14) from conduit box (4)

2-21. CABLE ASSEMBLY (RAW WATER PUMP) MAINTENANCE - continued.



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2-21. CABLE ASSEMBLY (RAW WATER PUMP) MAINTENANCE- continued. .

TEST

CAUTION

- The following tests are performed to determine if the cable assembly is defective Before testing, cable assembly must be disconnected from the motor Failure to disconnect cable can result in false test indications

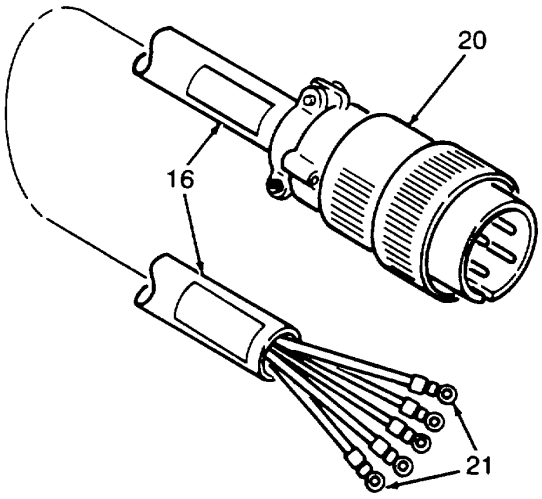
- Make sure wire terminals (21) are not touching each other

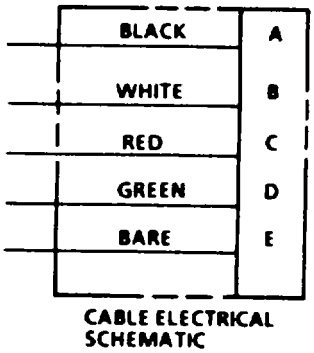
a. Using multimeter, test for continuity between plug (20) pins and wire terminals (21) as follows

CABLE ASSEMBLY W43 - W44 CONTINUITY TEST

FROM	TO
PIN	WIRE COLOR
A	BLACK
B	WHITE
C	RED
D	GREEN
E	BARE

b. If continually does not exit between two positions replace cable assembly





CABLE ELECTRICAL SCHEMATIC

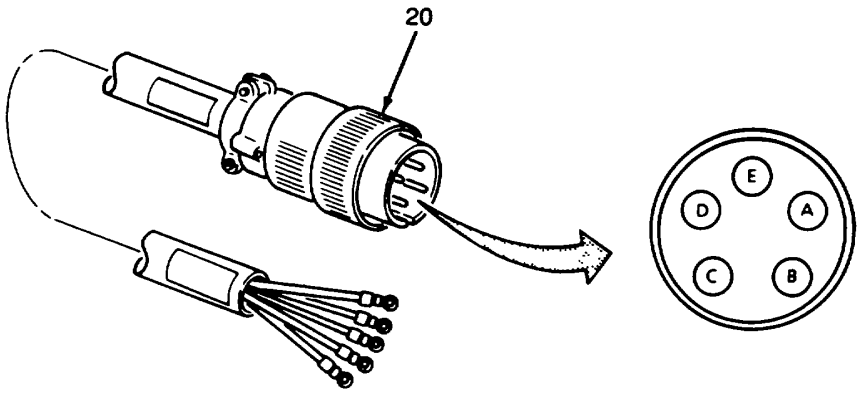
2-21. CABLE ASSEMBLY (RAW WATER PUMP) MAINTENANCE - continued.

c. Using multimeter, test for internal electrical short between plug (20) pins as follows.

CABLE ASSEMBLY W43 - W44 SHORTING TEST

FROM	TO
PIN	PIN
A	B
A	C
A	D
A	E
B	C
B	D
B	E
C	D
C	E
D	E

d. If continuity exist between any two points, replace cable assembly



2-109

2-21. CABLE ASSEMBLY (RAW WATER PUMP) MAINTENANCE - continued. .

INSTALLATION

a. Position sealing grip (1) and gasket (2) on cable assembly (16)

CAUTION

Wire insulation can be damaged when wires are pulled through conduit box Be careful when pulling wires.

b.. Pull four wires from cable (14) into conduit box (4) and install gasket (2) and sealing grip (1).

NOTE

There are four sets of motor wires to connect to cable wires. Each wire from cable is added to a motor wire set the same way One set is shown, the others are similar

c Remove nut (10) and lockwasher (9) from screw (5)

d. Install wire lugs (8) of colored wire from cable (14) as tagged, lockwasher (9), and nut (10) on screw (5).

e. Position grounding wire (13) in conduit box (4) and secure with screw (11)

f Using electrical tape (7), wrap each wire set (3).

g Tie three wire sets (3) into bundle with twine (12)

h. Secure electrical tape (7) to each wire sets (3) with twine (12)

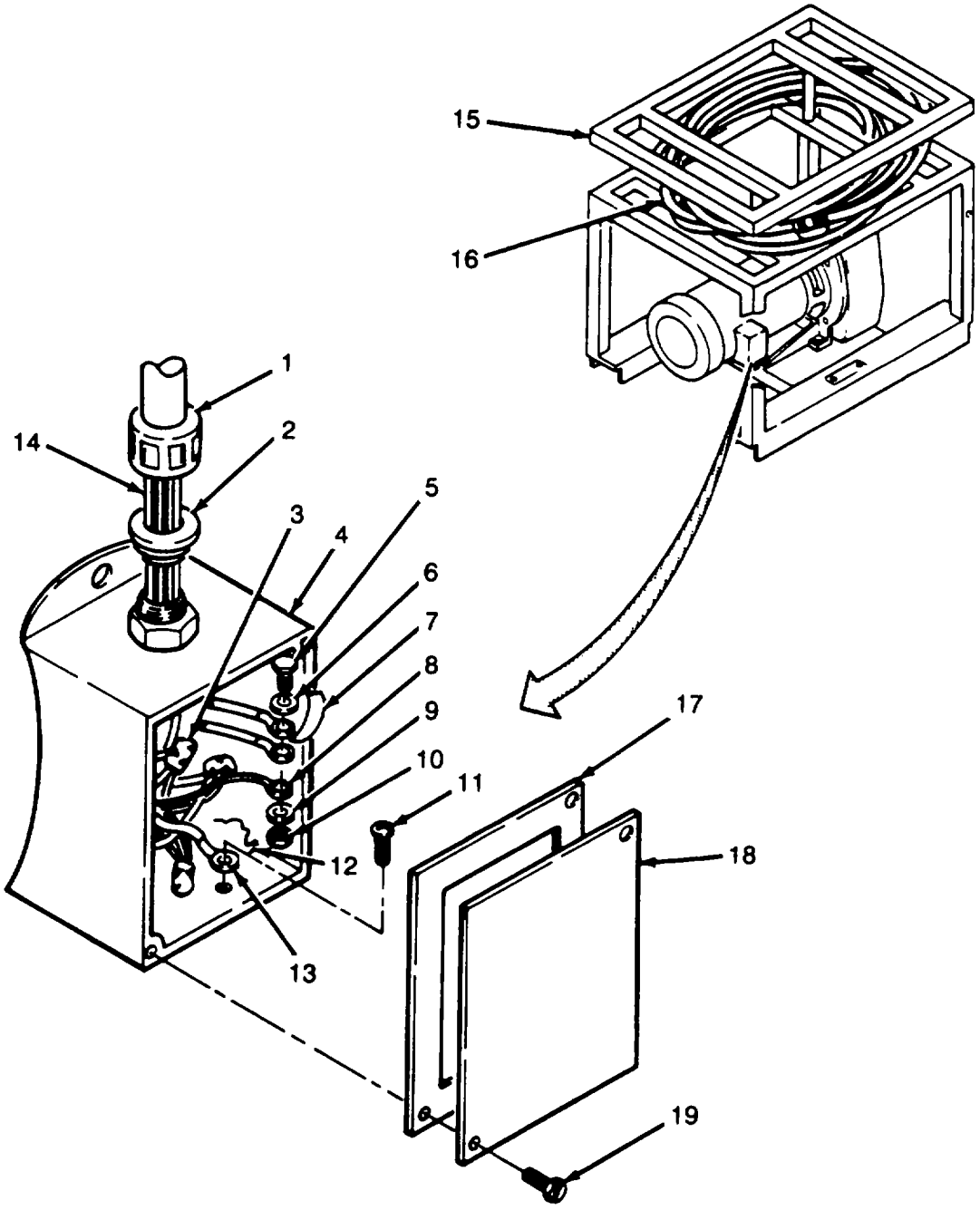
i Position four wire sets (3) in conduit box (4)

j Position gasket (17) and cover (18) on conduit box (4) and install two screws (19)

k. Wrap cable assembly (16) on raw water pump assembly frame (15)

l. Start raw water pump and check for proper operation (TM 10-4610-240-10).

2-21. CABLE ASSEMBLY (RAW WATER PUMP) MAINTENANCE - continued.



2-22. CENTRIFUGAL PUMP (RAW WATER PUMP) MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix 13, Section III, item 4)

Material/Parts Required
Lockwashers (2) - MS35338-141

Equipment Condition
Reference
ROWPU Shutdown (TM 10-4610-240-10).
Power shut down (power source manual)
External hoses disconnected (TM 10-4610-240-10).
Cable assembly removed (para 2-21)

REMOVAL

a. Remove locknut (14), flat washer (13), two chain lugs (12), and screw (2).

b. Remove hose cap (6), hose plug (5), straight adapter (7), swivel adapter (4), and elbow (3).

c. Remove two nuts (9), lockwashers (10), flat washers (11), and screws (15).

d. Remove centrifugal pump (8) from frame (1).

INSTALLATION

a. Position centrifugal pump (8) on frame (1).

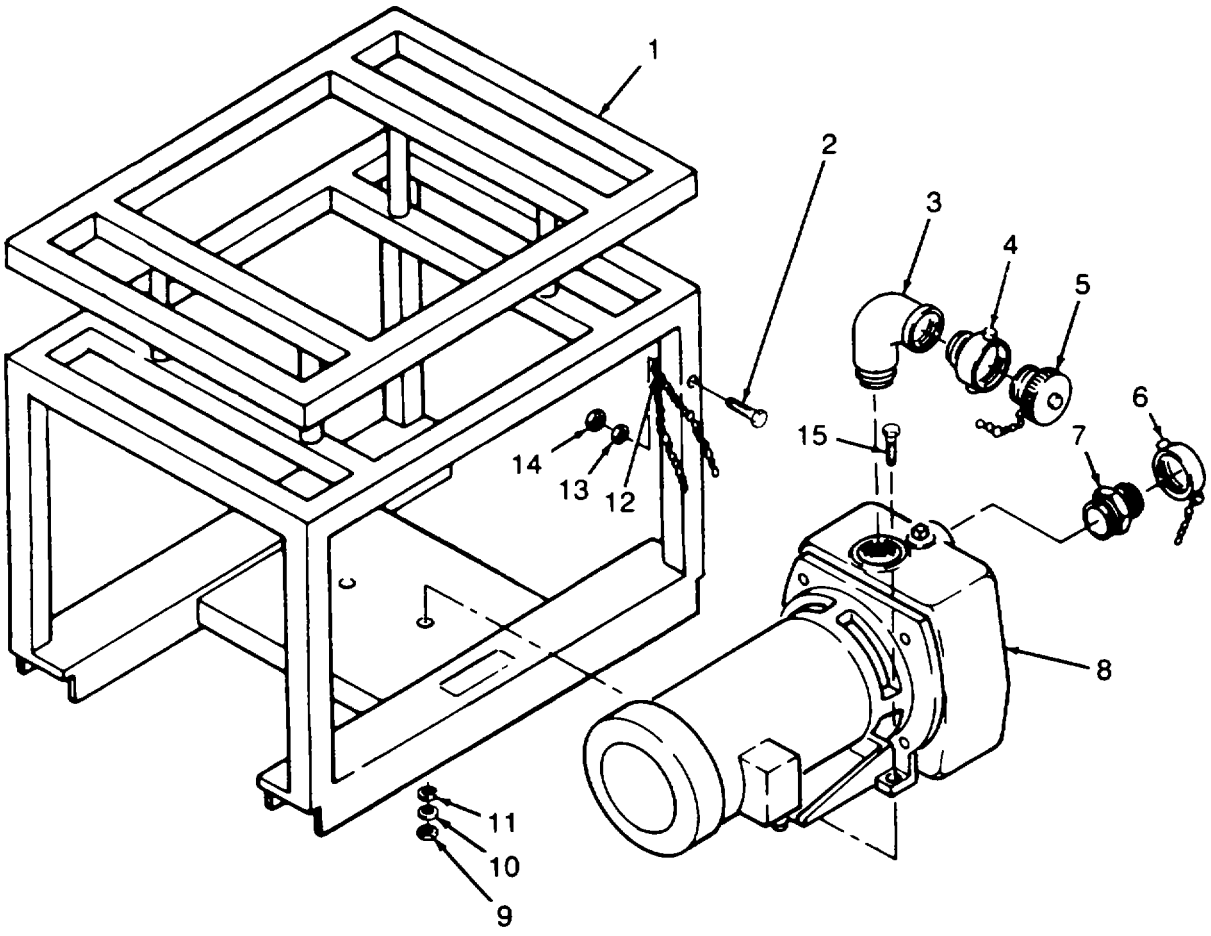
b. Install two screws (15), flat washers (11), lockwashers (10), and nuts (9)

c. Install elbow (3), swivel adapter (4), straight adapter (7), hose plug (5), and hose cap (6).

d. Install screw (2), two chain lugs (12), flat washer (13), and locknut (14).

e. Start raw water pump and check for leaks (TM 10-4610-240-10).

2-22. CENTRIFUGAL PUMP (RAW WATER PUMP) MAINTENANCE - continued.



2-23. RAW WATER PUMP FRAME MAINTENANCE.

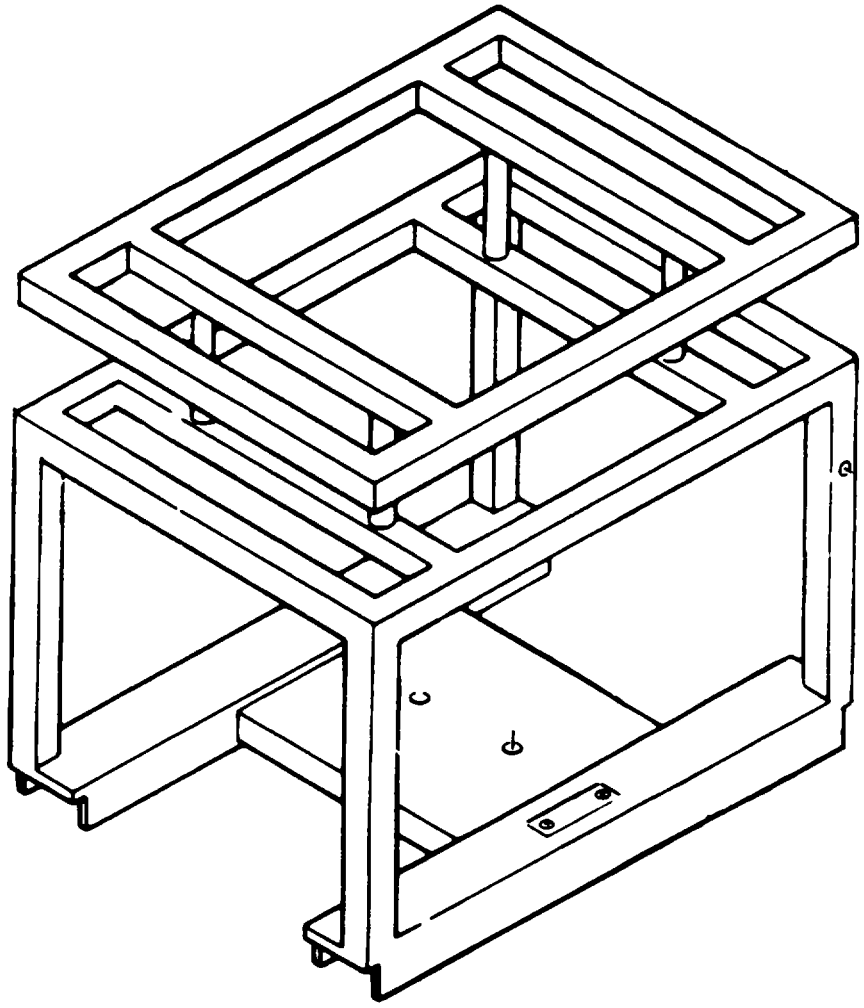
This task consists of a Removal b Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Equipment Condition
Reference
Centrifugal pump piping removed (para 2-20).
Cable assembly removed (para 2-21).
Centrifugal pump removed (para 2-22).

Unit level maintenance of the backwash pump frame is limited to replacement. After removing components from frame, send frame to Direct Support Maintenance.

2-23. RAW WATER PUMP FRAME MAINTENANCE - continued.



2-24. DISTRIBUTION PUMP ASSEMBLY MAINTENANCE.

This task consists of a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Detergent (Appendix C, Section II, Item 10)
Rags, wiping (Appendix C, Section II, Item 23)
Gasket (2) - 095X01 50CBUNA
Screw, drive (2) - MS21318-20
Equipment Condition
Reference
ROWPU shutdown (TM 104610-240-10).
Power shutdown (power source manual).
Inlet/outlet hoses removed (TM 10-4610-240-10).
Distribution pump cable assembly disconnected from ROWPU (TM 10-4610-240-10).

REMOVAL

Removal of the distribution pump is limited to removal of defective assembly from service

REPAIR

a. Disassembly.

(1) Unwind cable assembly (1) from frame (20).

(2) Remove screw (2), star washer (3), and cap (4) from electrical plug (5).

(3) Remove locknut (14), flat washer (15), chains (9 and 13) and screw (16).

(4) Remove plug (12) and gasket(11) from adapter (10).

(5) Remove cap (8) from adapter (6).

(6) Remove gasket (7) from adapter (6).

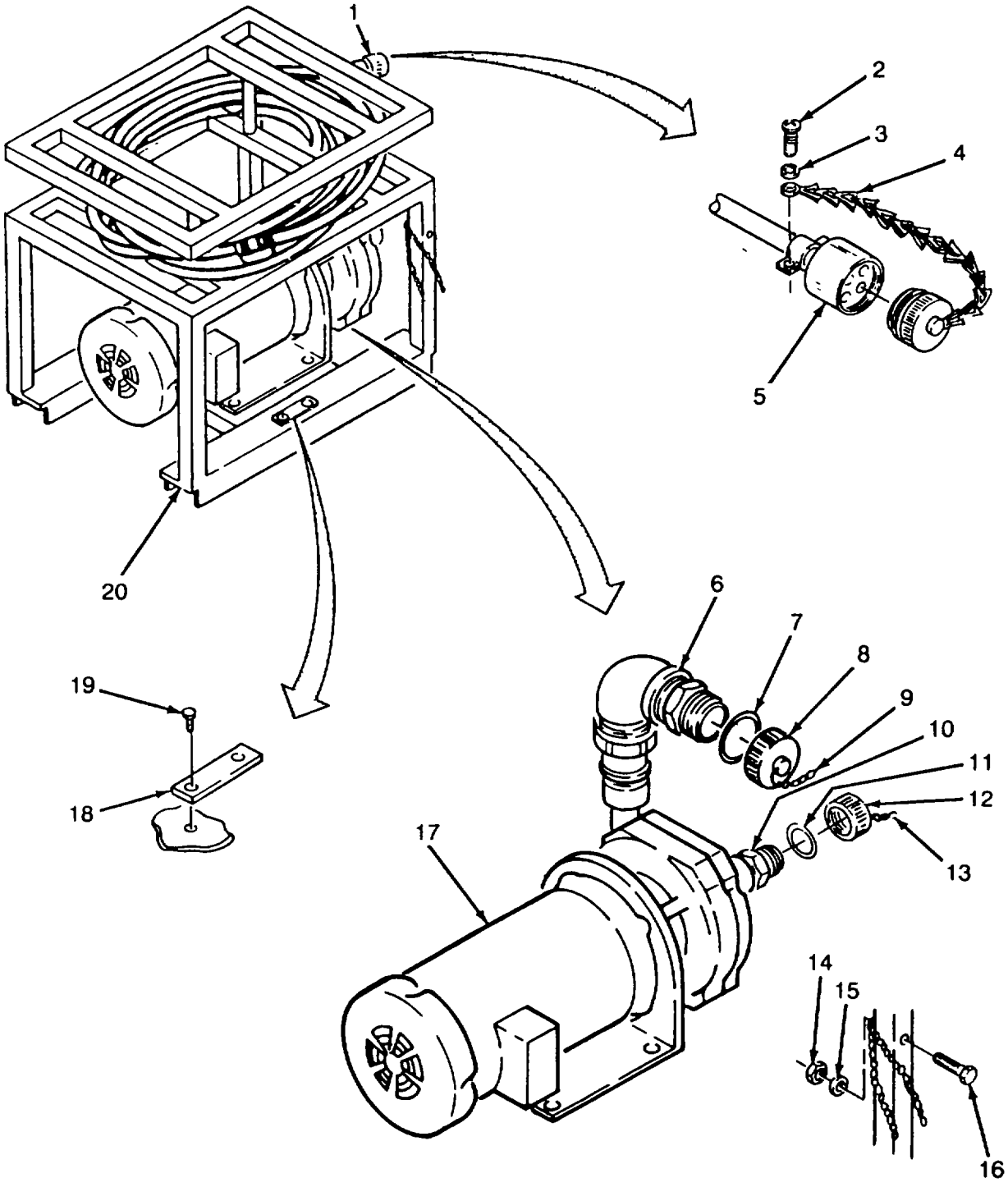
(7) Remove two screws (19) and information plate (18) from frame (20).

b. Cleaning.

(1) Wash all components with clean water and detergent.

(2) Rinse components In clean water and dry with wiping rag.

2-24. DISTRIBUTION PUMP ASSEMBLY MAINTENANCE - continued.



2-24. DISTRIBUTION PUMP ASSEMBLY MAINTENANCE -continued.

c. Inspection.

(1) Inspect all threaded components for damaged threads.

(2) Inspect plug (5) for damaged or missing pins.

(3) Inspect cable assembly (1) for damaged or missing cap (4).

(4) Inspect plug (12) and cap (8) for broken or missing chains (9 and 13).

(5) Inspect all components for corrosion.

(6) Inspect pump (17) and frame (20) for loose or missing hardware.

d. Repair.

(1) Replace damaged components.

(2) Replace all gaskets (7 and 11).

e Assembly.

(1) Install information plate (18) on frame (20) with two screws (19).

(2) Install gasket (7) in adapter (6).

(5) Install cap (8) on adapter (6).

(4) Install gasket (11) and plug (12) on adapter (10).

(5) Install screw (16), chains (9 and 13), flat washer (15) and locknut (14) on frame (20).

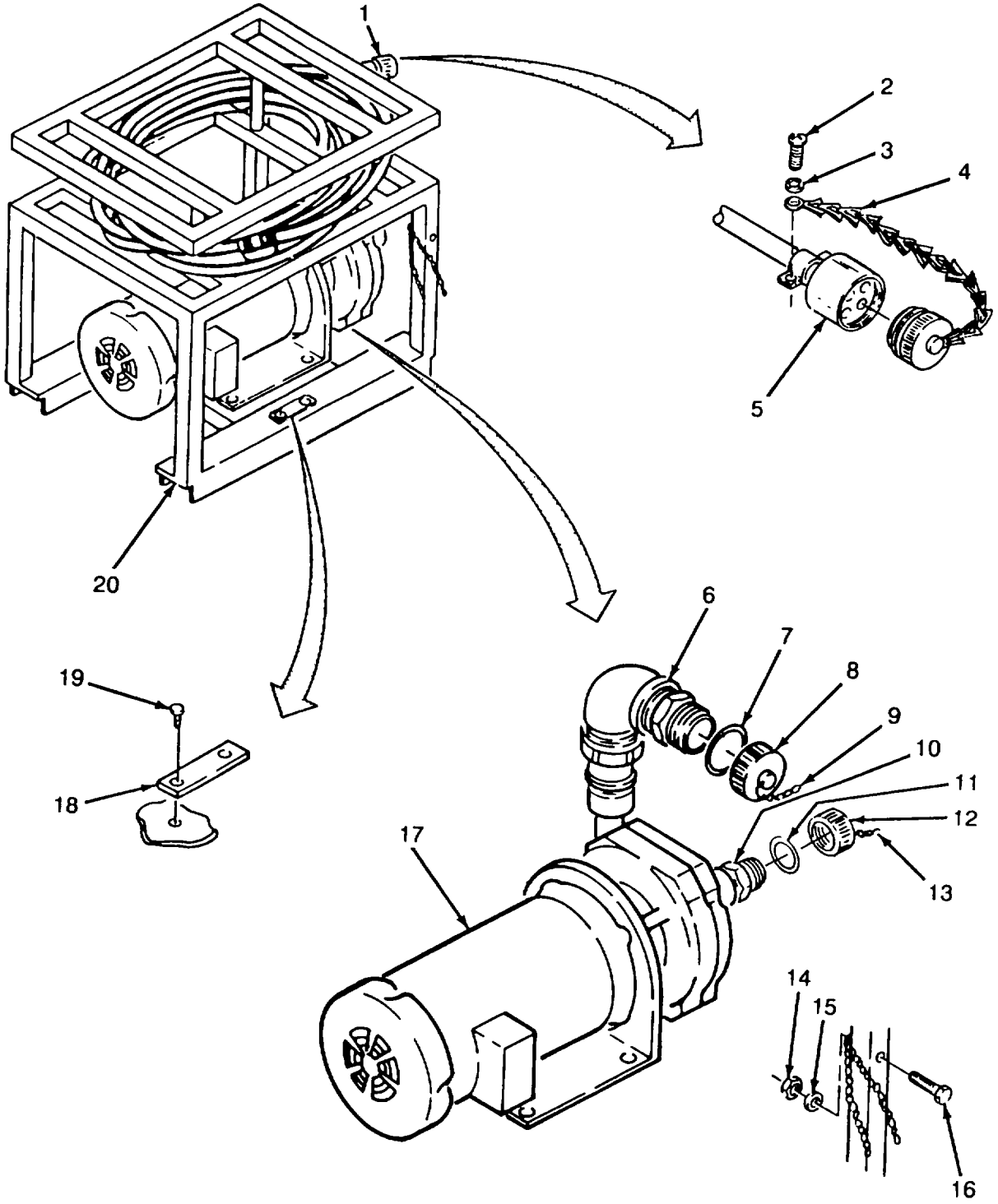
(6) Install cap (4), star washer (3), and screw (2) on electrical plug (5).

(7) Wind cable assembly (1) onto frame (20).

INSTALLATION

Start distribution pump (TM 10-4610-240-10). Check for leaks and proper operation.

2-24. DISTRIBUTION PUMP ASSEMBLY MAINTENANCE- continued.



2-25. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) MAINTENANCE.

This task consists of: a. Removal b. Test c. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Multimeter (Appendix B, Section III, Item 3)

Material/Parts Required
- Twine (Appendix C, Section II, Item 33)
- Tape, electrical (Appendix C, Section II, Item 31)
- Lockwasher (4) - MS35333-100

Equipment Condition
- Reference
  - ROWPU shutdown (TM 10-461240-10).
  - Power shut down (power source manual).
  - Distribution pump cable assembly disconnected from ROWPU (TM 10-4610-240-10).

REMOVAL

a. Unwrap cable assembly (1) from distribution pump assembly frame (2)

b. Remove four screws (3), cover (4), and gasket (5).

NOTE
Tag wires by set before removal.

c. Pull bundle of four wire sets (6) from conduit box (7).

d. Set aside wire bundle with three cream-colored wires.

e. Tag three other bundles with color of wires from power source.

f. Remove twine (14) and electrical tape (8) from three tagged wire sets.

g. Remove screw (17) securing grounding wire (16).

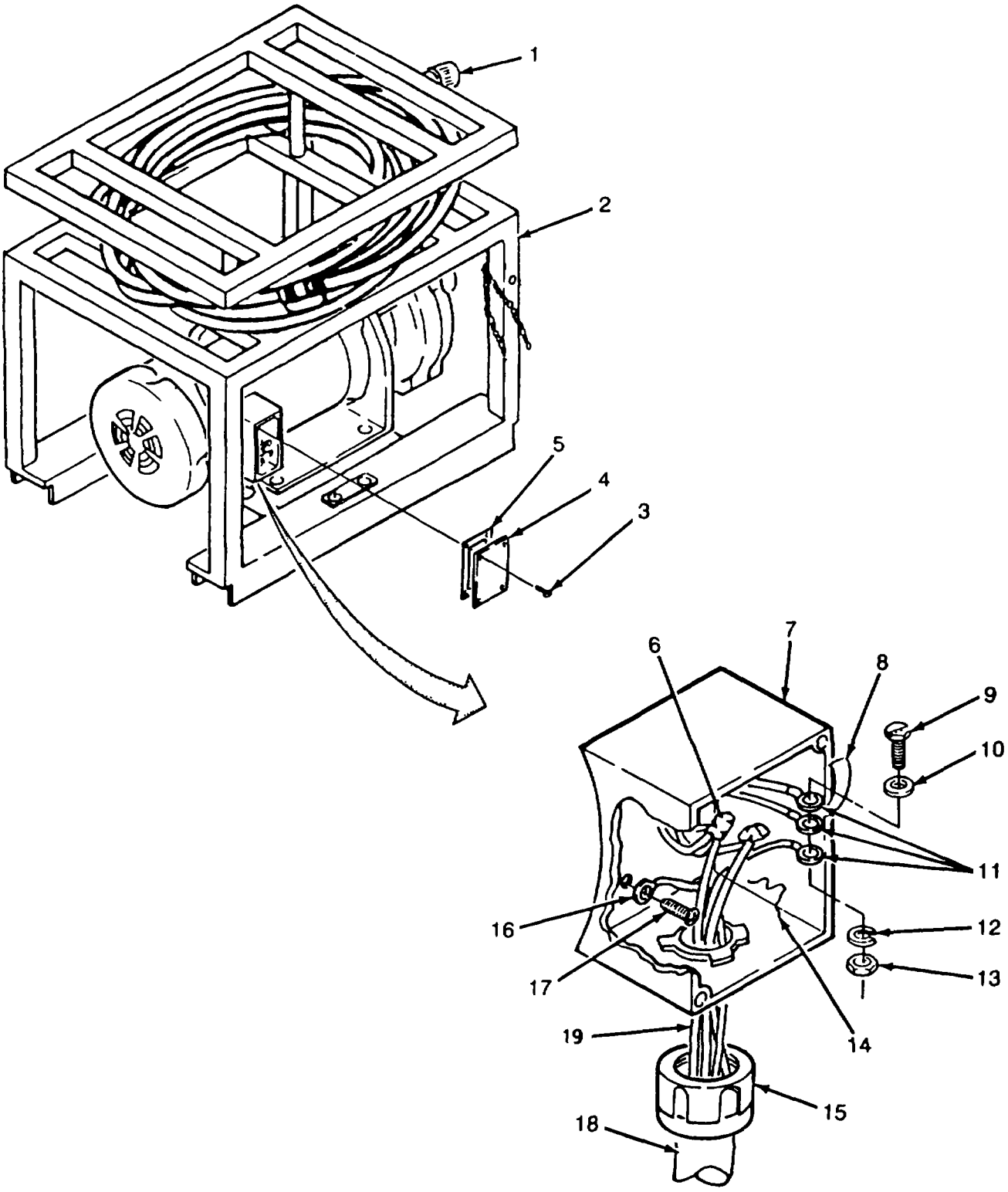
h. Remove nut (13), lockwasher (12), three wire lugs (11), and flat washer (10) from screw (9) on each set of wires (6) that have been untaped.

i. Install flat washer (10), lugs of two cream-colored wires (11), lockwasher (12), and nut (13) on screw (9).

CAUTION
Wire insulation can be damaged when wires are pulled through conduit box Be careful when pulling wires.

j. Loosen sealing grip (15) and remove cable assembly (19) from conduit box (7).

2-25. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) MAINTENANCE - continued.



2-25. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) MAINTENANCE - continued.

TEST

CAUTION

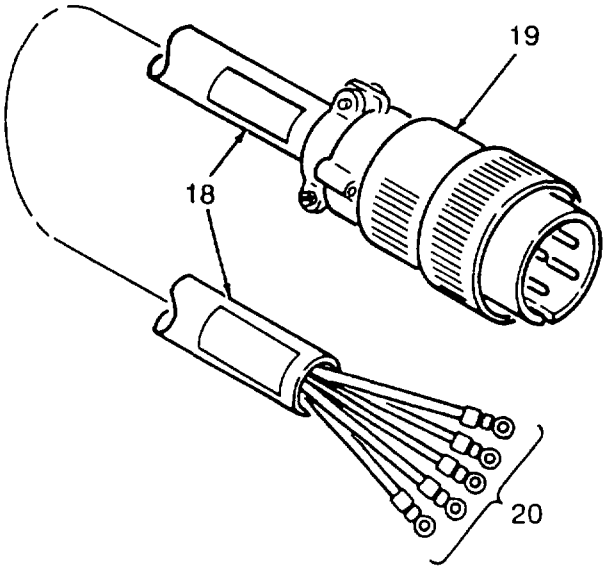
- The following tests are performed to determine if the cable assembly is defective. Before testing, cable assembly must be disconnected from the motor. Failure to disconnect cable can result in false test indications.
- Make sure wire terminals (21) are not touching each other.

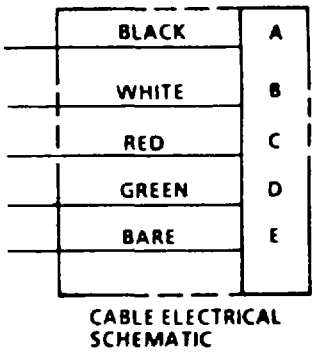
a. Using multimeter, test for continuity between plug (19) pins and wire terminals (20) as follows:

CABLE ASSEMBLY W45 CONTINUITY TEST

FROM	TO
PIN	WIRE COLOR
A	BLACK
B	WHITE
C	RED
D	GREEN
E	BARE

b. If continuity does not exist between two points, replace cable assembly.





CABLE ELECTRICAL SCHEMATIC

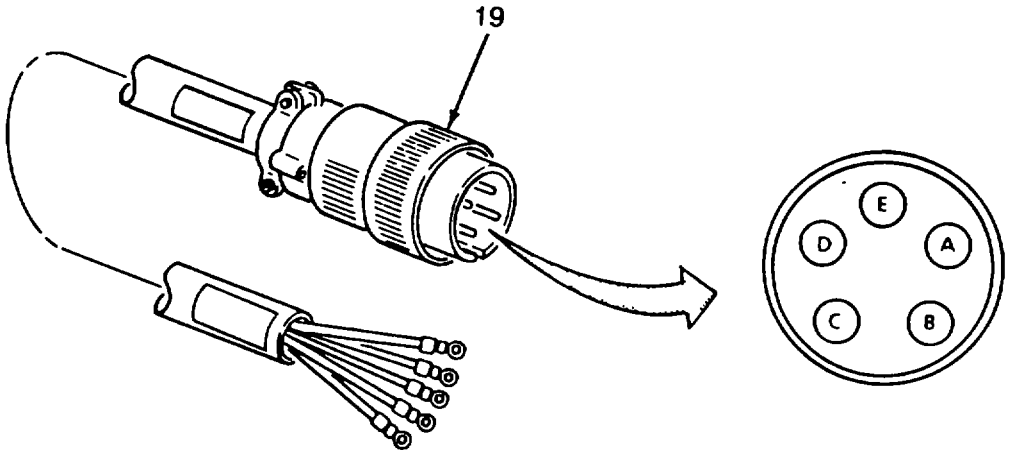
2-25. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) MAINTENANCE - continued.

c. Using multimeter, test for internal electrical short between plug (20) pins as follows:

CABLE ASSEMBLY W45 SHORTING TEST

FROM	TO
PIN	PIN
A	B
A	C
A	D
A	E
B	C
B	D
B	E
C	D
C	E
D	E

d. If continuity exist between any two points, replace cable assembly.



2-25. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) MAINTENANCE - continued.

INSTALLATION

CAUTION

Wire insulation can be damaged when wires are pulled through conduit box. Be careful when pulling wires.

a. Position cable wires in conduit box (7) and tighten sealing grip (15).

NOTE

There are three sets of motor wires to connect to power source. Each wire from the power source is added to a motor wire set in the same way. One is shown.

b. Remove nut (13), lockwasher (12) and flat washer (10) from screw (9).

c Install colored wire (11) from power source as tagged, lockwasher (12), and nut (13) on screw (9).

d. Position grounding wire (16) in conduit box (7) and secure with screw (17).

e. Using electrical tape (8), wrap each wire set (6).

f. Secure electrical tape (8) on each wire set (6) with twine (14).

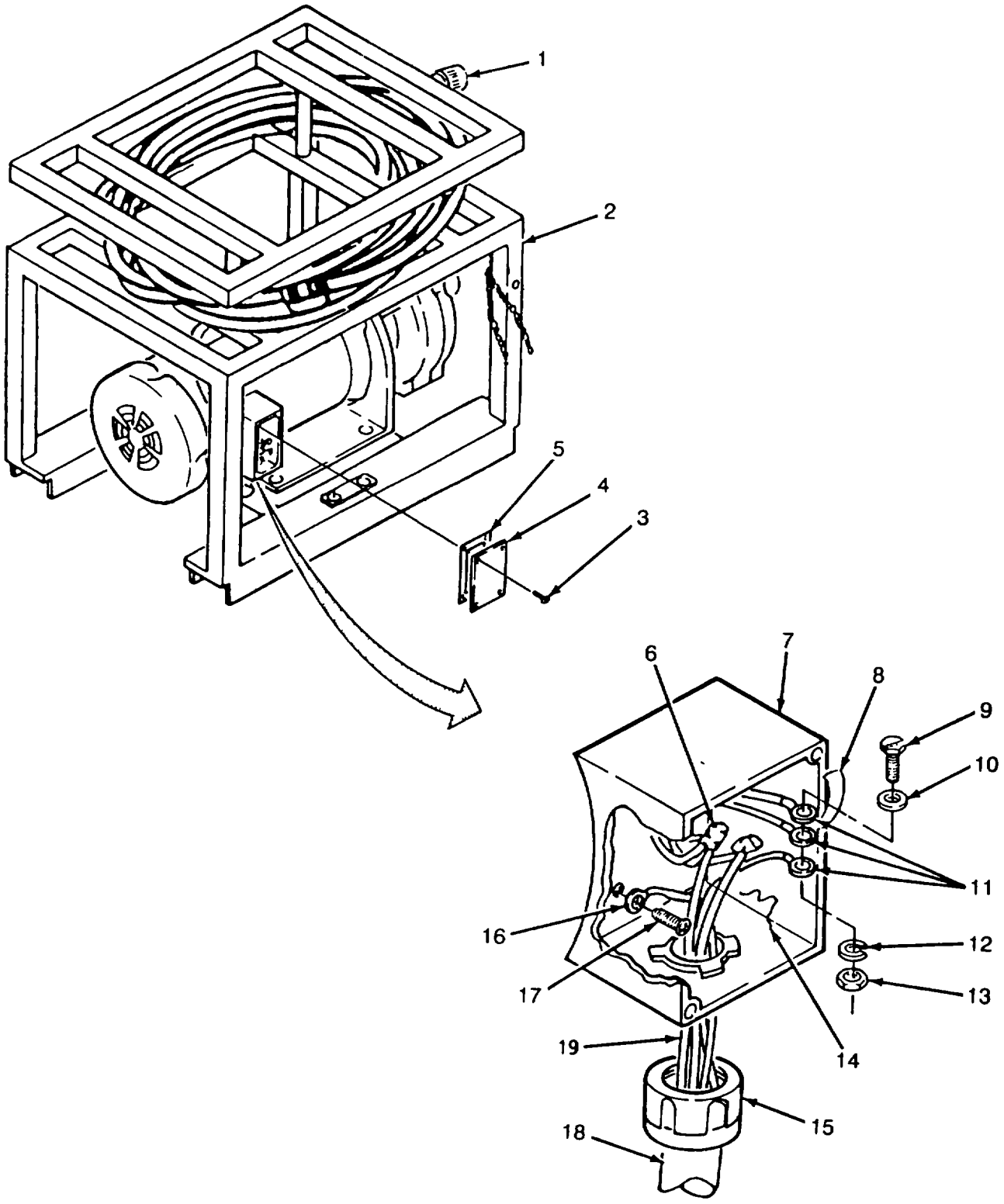
g. Position bundle of four wire sets (6) in conduit box (7).

h. Position gasket (5) and conduit box cover (4) on conduit box (7). Install four screws (3).

i Wrap cable assembly (1) on distribution pump assembly frame (2).

j. Start distribution pump and check for proper operation (TM 10-4610-240-10).

2-25. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) MAINTENANCE -continued.



2-26. CENTRIFUGAL PUMP (DISTRIBUTION PUMP) MAINTENANCE.

This. task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Pipe Wrench (Appendix B, Section III, Item 3)

Material/Parts Required
- Anti-seize tape (Appendix C, Section II, Item 30)
- Lockwasher (4) - MS35338-141

Equipment Condition
- Reference
  - Inlet/outlet hoses disconnected (TM 10-4610-240-10).
  - Distribution pump cable assembly removed (para 2-25).

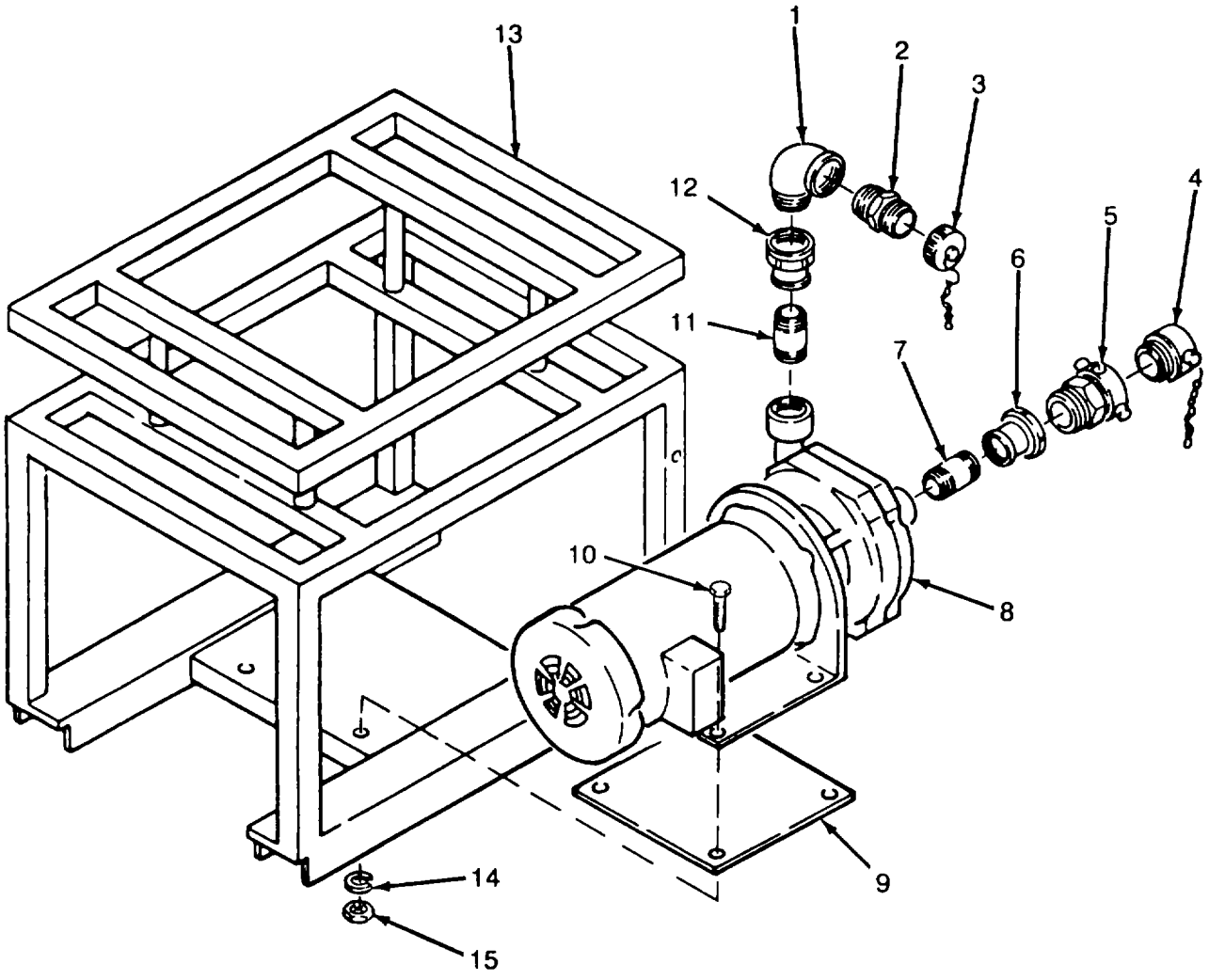
REMOVAL

a. Remove cap (3) and plug (4).
b. Remove four nuts (15), lockwashers (14), and screws (10).
c. Remove centrifugal pump (8) and spacer plate (9) from frame (13).
d. Remove swivel adapter (5), reducer (6), and nipple (7) from centrifugal pump (8).
e Remove straight adapter (2), elbow (1), reducer (12), and nipple (1) from centrifugal pump (8).

INSTALLATION

a. Apply anti-seize tape to all male fittings. Make sure tape is wrapped in same direction as pipe threads.
b. Install nipple (11), reducer (12), elbow (1), and straight adapter (2) on centrifugal pump (8).
c Install nipple (7), reducer (6), and swivel adapter (5).
d. Position spacer plate (9) and centrifugal pump (8) on frame (13).
e Install four screws (10), lockwashers (14), and nuts (15).
f Install cap (3) and plug (4).
g Start distribution pump (TM 10-4610-240-10). Check for leaks and proper operation.

2-26. CENTRIFUGAL PUMP(DISTRIBUTION PUMP) MAINTENANCE - continued.



2-27. DISTRIBUTION PUMP FRAME MAINTENANCE.

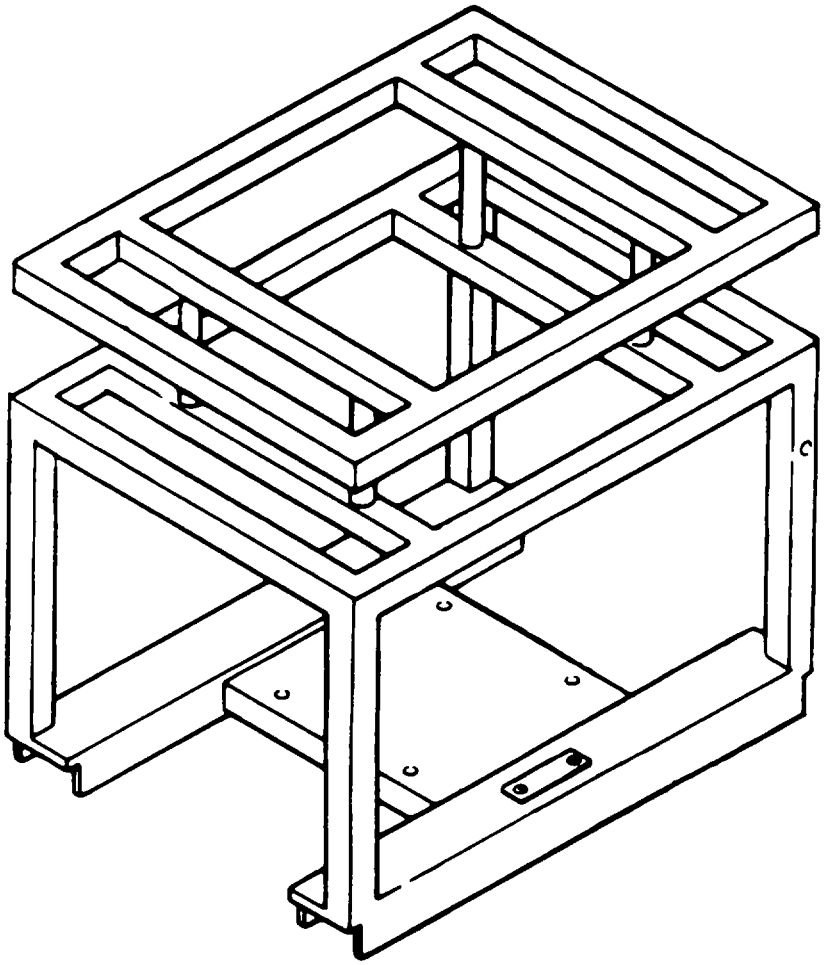
This task consists of a. Removal b. Installation

INITIAL SET-UP:

Equipment Condition
Reference
Cable assembly removed (para 2-25).
Centrifugal pump removed (para 2-26).

Unit level maintenance of the distribution pump frame is limited to replacement. After removing components from frame, send frame to Direct Support Maintenance.

2-27. DISTRIBUTION PUMP FRAME MAINTENANCE - continued.



2-28. HOSE ASSEMBLIES MAINTENANCE.

This task consists of a. Removal b. Repair c. Installation

INITIAL SET-UP:

Material/Parts Required
- Detergent (Appendix C, Section II, Item 10)
- Rags, wiping (Appendix C, Section II, Item 23)
- Gasket - MS27030-5

Equipment Condition
- Reference
  - ROWPU shutdown (TM 10-4610240-10)
  - Power shutdown (power source manual)

NOTE

The ROWPU uses both collapsible discharge hoses and noncollapsible suction hoses. Repair of both type hoses is the same. One type hose is shown, the others are similar .

REMOVAL

Disconnect hose assembly from ROWPU (TM 104610-240-10).

REPAIR

a. Disassembly.

Remove defective gasket (1) from hose coupling (2).

b. Cleaning.

(1) Wash all components with clean water and detergent.

(2) Rinse components in clean water and dry with wiping rag.

c. Inspection.

(1) Inspect couplings (2 and 4) for cracks and damaged threads.

(2) Inspect hose (3) for cuts, tears, and deep scratches.

d. Repair.

(1) Replace gasket (1).

(2) If hose (:3) or couplings (2 and 4) a re damaged, replace hose assembly.

e. Assembly.

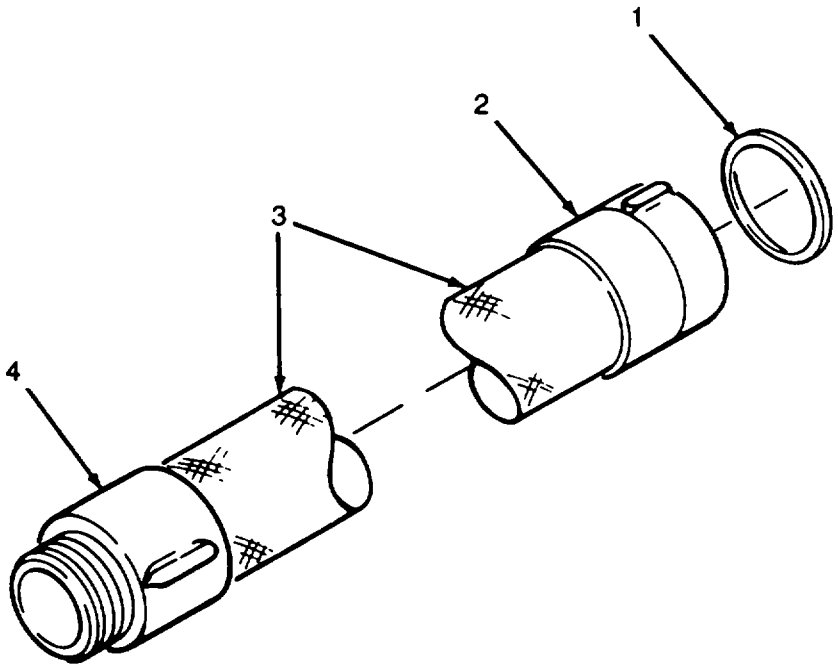
Install gasket (1) in hose coupling (2).

2-28. HOSE ASSEMBLIES MAINTENANCE - continued.

INSTALLATION

Connect hose assembly to ROWPU (TM 10-4610-240-10).

Operate ROWPU and check for leaks (TM 10-4610-240-10).



2-29. GATE VALVES AND FITTINGS MAINTENANCE.

This task consists of: a. Removal b. Repair c. Installation

INITIAL SET-UP:

Material/Parts Required
Detergent (Appendix C, Section II, Item 10)
Rags, wiping (Appendix C, Section II, Item 23)
Packing-GATE 148-9 1-1/2 in
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).

NOTE

The following procedures describe typical gate valves and fittings used with the ROWPU These components are supplied as accessory items and their use and location may vary depending on operational requirements.

REMOVAL

Disconnect defective gate valves and fittings from ROWPU, distribution pump, backwash pump and raw water pumps as required (TM 10-4610-240-10).

REPAIR

Gate Valves

a. Disassembly.

Remove nut (1), washer (2), and hand wheel (3) from stem (7).

Remove packing nut (4), gland (5), and packing (6).

b. Cleaning.

(1) Wash all components with clean water and detergent.

(2) Rinse components in clean water and dry with wiping rag.

c. Inspection.

(1) Inspect stem (7) and body (8) for damaged threads.

(2) Inspect body (8) for cracks and corrosion.

d. Repair.

(1) Replace packing (6).

(2) If body (8) or stem (7) is cracked, corroded, or damaged, replace gate valve.

2-29. GATE VALVES AND FITTINGS MAINTENANCE-continued.

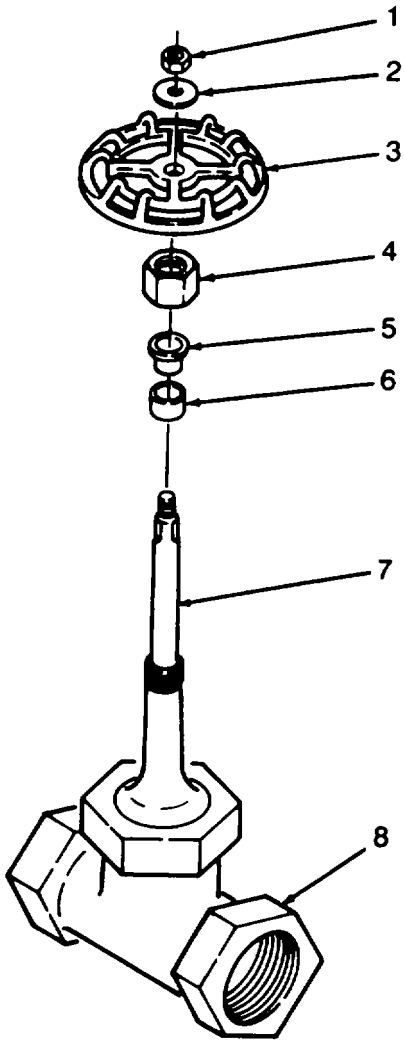
e. Assembly.

(1) Push packing (6)into place on stem (7).

(2) Install gland (5) and packing nut (4).

(3) Position hand wheel (3) on stem (7).

(4) Install washer (2) and nut (1).



2-29. GATE VALVES AND FITTINGS MAINTENANCE - continued.

Fittings/Adapters

NOTE
Repair of fittings/adapters is limited to replacement of gaskets.

a. Disassembly

(1) Remove gasket (10) from quick disconnect adapter (9).

(2) Remove gasket (12) from straight adapter (11).

(3) Remove gasket (14) from swivel adapter (13).

b. Cleaning

(1) Wash all components with clean water and detergent.

(2) Rinse components in clean water and dry with wiping rag.

c. Inspection.

Inspect adapters (9, 11, and 13) for cracks, damaged threads and corrosion.

d. Repair.

(1) Replace defective adapters.

(2) Replace all gaskets.

e. Assembly

(1) Install gasket (14) in swivel adapter (13).

(2) Install gasket (12) in straight adapter (11).

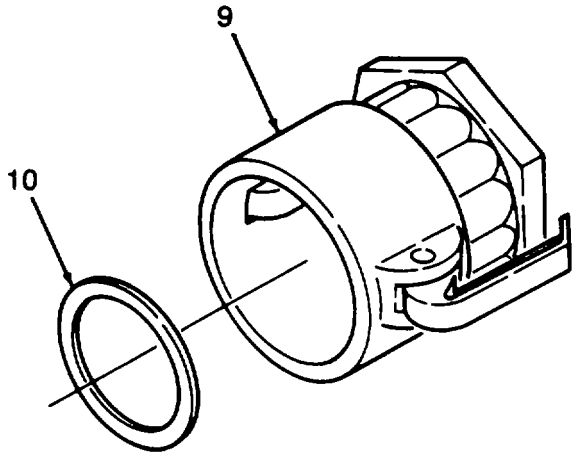
(3) Install gasket (10) in quick disconnect adapter (9).

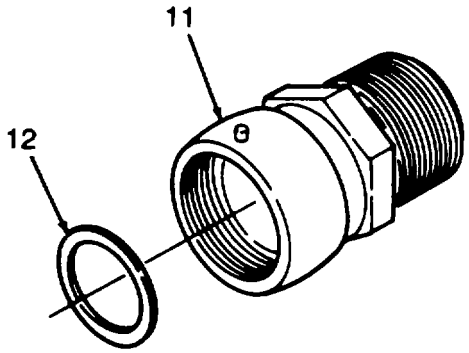
INSTALLATION

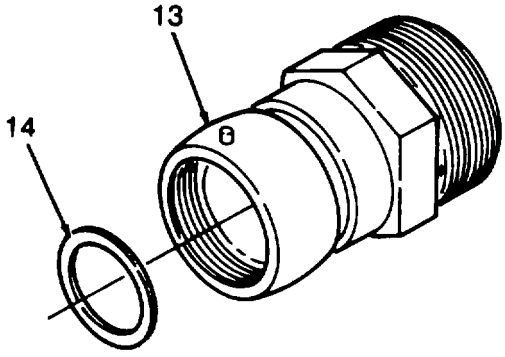
a. Connect gate valves and fittings/adapters to ROWPU, distribution pump, backwash pump and raw water pumps as required (TM 10-4610-240-10).

b. Operate ROWPU and check for leaks (TM 10-4610-240-10).

2-29. GATE VALVES AND FITTINGS MAINTENANCE - continued.







2-30. CHEMICAL CANS AND FRAME MAINTENANCE.

This task consists of: a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Detergent (Appendix C, Section II, Item 10)
Rags, wiping (Appendix C, Section II, Item 23)
Equipment Condition
Reference
ROWPU shutdown (TM 104610-240-10).
Chemical can removed from ROWPU (TM 10-4610-240-10).
General Safety Instructions

WARNING

To prevent injury to personnel, chemical cans must be empty and flushed clean with fresh water before performing maintenance.

NOTE

The following procedures apply to all four chemical feed cans.

REMOVAL

Remove straps (9) and lift chemical can(s) (18) from rack (8).

REPAIR

a. Disassembly.

(1) Open lid (24).

(2) Remove two clip rings (1 and 3) and nut (2) from stem (6). Remove nut (4) from fitting (5).

(3) Working from inside can (18), remove float (7), stem (6) and fitting (5).

(4) Unscrew stem (6) from float (7).

(5) Remove plug coupling (10), dust cap (11), and adapter (12) from suction tube (15).

(6) Remove knurled nut (13) and gasket (14) from suction tube (15).

(7) Remove suction tube (15) and attached parts from inside can (18).

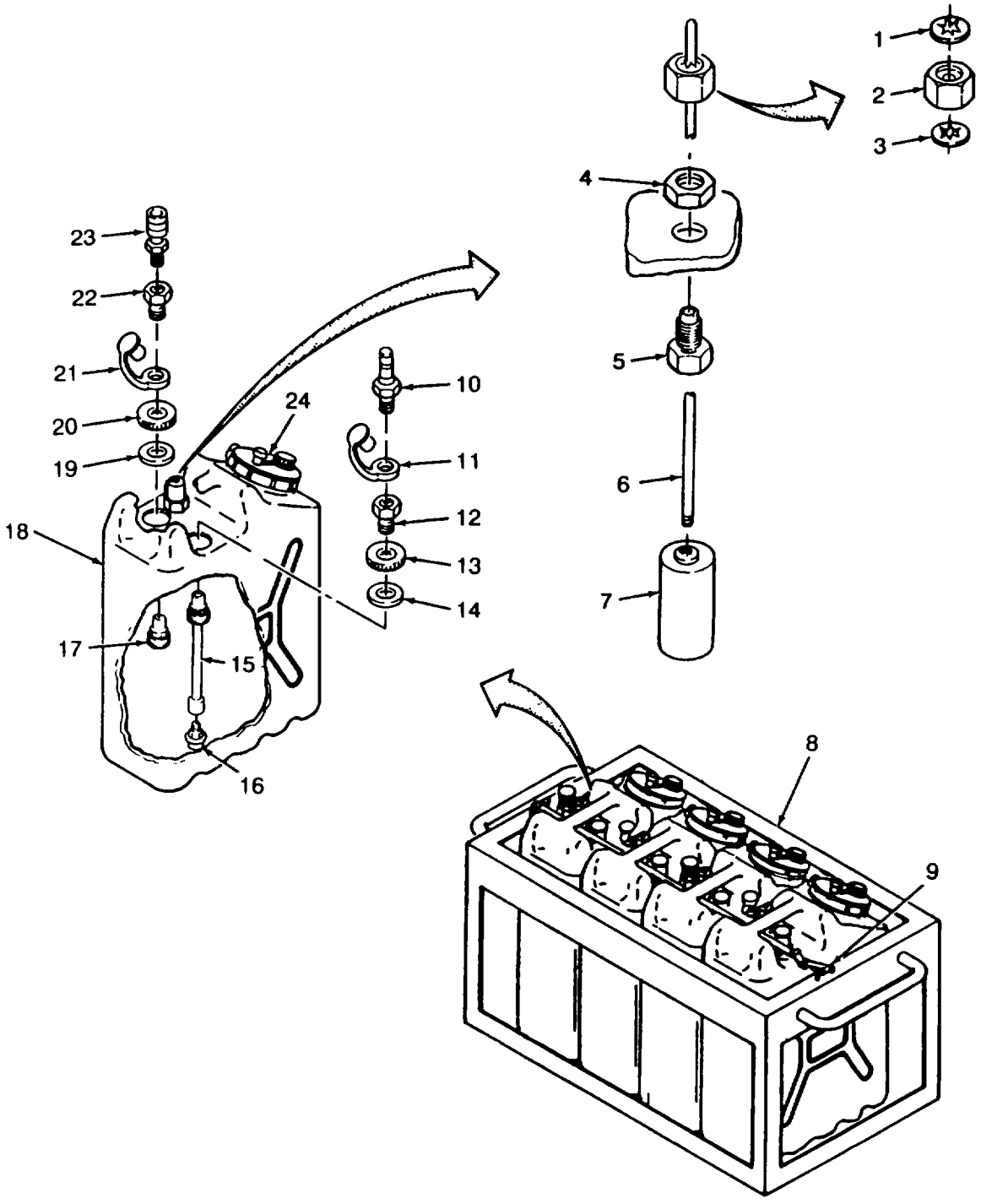
(8) Remove strainer (16) from suction tube (15).

(9) Remove knurled nut (20) and gasket (19) from fitting (17).

2-30. CHEMICAL CANS AND FRAME MAINTENANCE - continued.

(10) Remove fitting (17) and attached parts from inside can (18).

(11) Remove socket coupling (23), adapter (22), and dust plug (21) from fitting (17).



2-30. CHEMICAL CANS AND FRAME MAINTENANCE - continued.

b. Cleaning.

(1) Wash all components with clean water and detergent.

(2) Inspect components in clean water and dry with wiping rag.

c. Inspection.

(1) Inspect all threaded components for damaged threads.

(2) Inspect for clogged or cracked suction tube (15).

(3) Inspect for clogged or damaged strainer (16).

(4) Inspect stem (6) for bends or cracks.

(5) Inspect can (18) for cracks, splits, and broken or missing lid (24).

(6) Inspect frame (8) for cracks, bent or broken framework, and corrosion.

d. Repair.

(1) Replace damaged or missing components.

(2) If frame is bent, or damaged, or no longer serviceable, send to Direct Support Maintenance.

c. Assembly

(1) Apply anti-seize tape to male threads of all fittings. Be sure to wrap tape in same direction as thread.

(2) Install dust plug (21), adapter (22), and socket coupling (23) on flitting (17).

(3) Position fitting (17) and attached parts inside can (18).

(4) Install gasket (19) and knurled nut (20) on fitting (17).

(5) Install strainer (16) on suction tube (15).

(6) Install suction tube (15) and attached parts inside can (18).

(7) Install gasket (14) and knurled nut (13) on suction tube (15).

(8) Install adapter (12), dust cap (11) plug coupling (10) on suction tube (15).

(9) Screw stem (6) onto float (7).

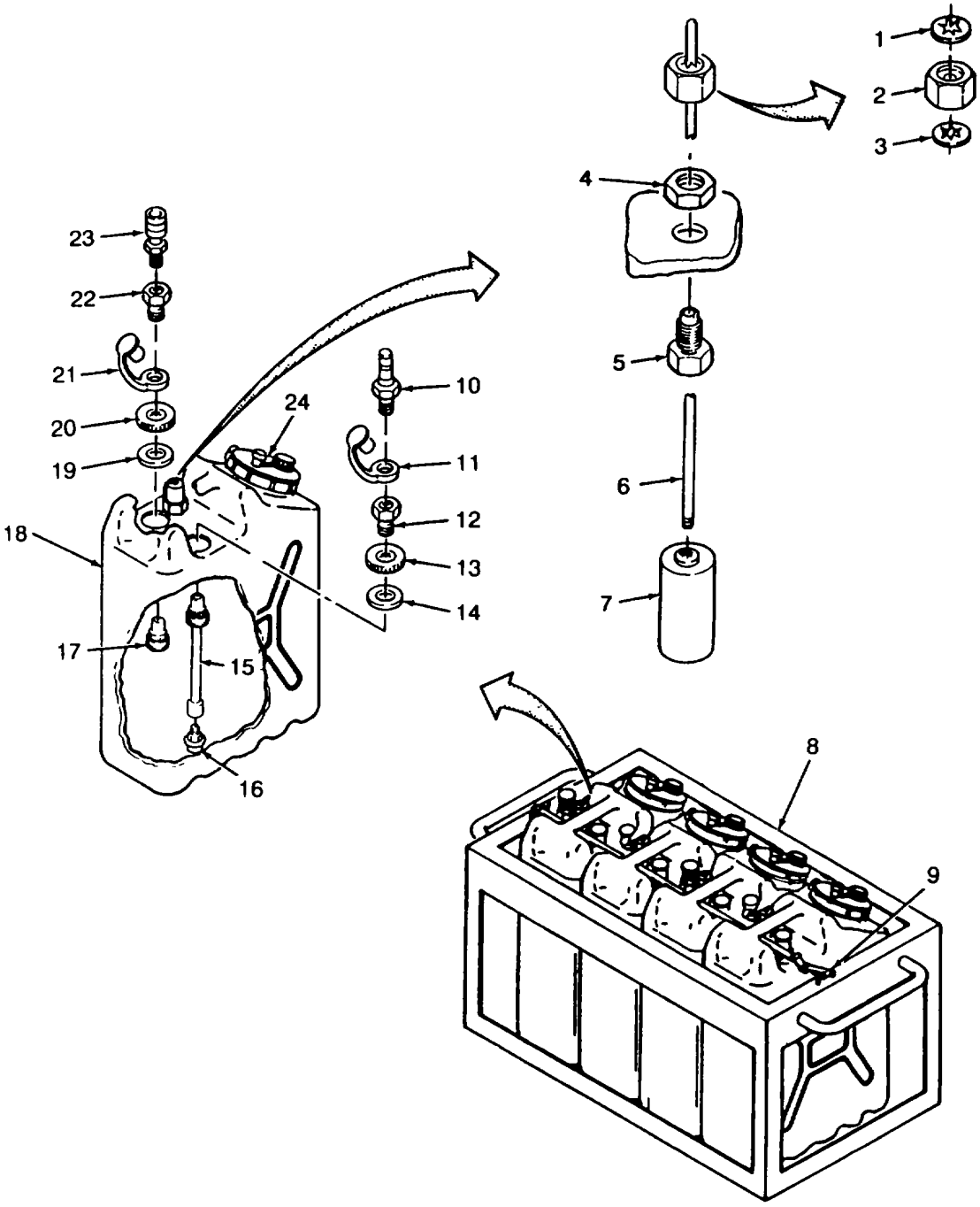
(10) Position float (7), stem (6) and fitting (5) inside can (18).

2-30. CHEMICAL CANS AND FRAME MAINTENANCE - continued.

(11) Install nut (4) on fitting (5).

(12) Install clip rings (3 and 1) and nut (2) on stem (6).

(13) Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operations.



2-31. TDS MONITOR MAINTENANCE.

This task consists of: a. Calibration b. Removal c. Installation

INITAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix 13, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual)
General Safety Instructions

WARNING

Use extreme caution when performing maintenance procedures with power ON. Death or serious injury may result.

CALBRATION

a. Loosen two screws (1) and open cover (2) on TDS monitor (3).

b. Set TDS monitor mechanical zero as follows:

CAUTION

To prevent damage to TDS monitor, electrical power must be off when setting mechanical zero.

(1) Note position of monitor needle (14).

(2) If needle (14) is not pointing at zero on meter scale (15), turn adjustment screw (13) left or right as required to obtain correct indication.

c. Calibrate TDS monitor as follows:

(1) Ensure TDS monitor cable assemblies are connected to ROWPU.

(2) Pull out on four fasteners (11) and release panel meter (12) from circuit box (10).

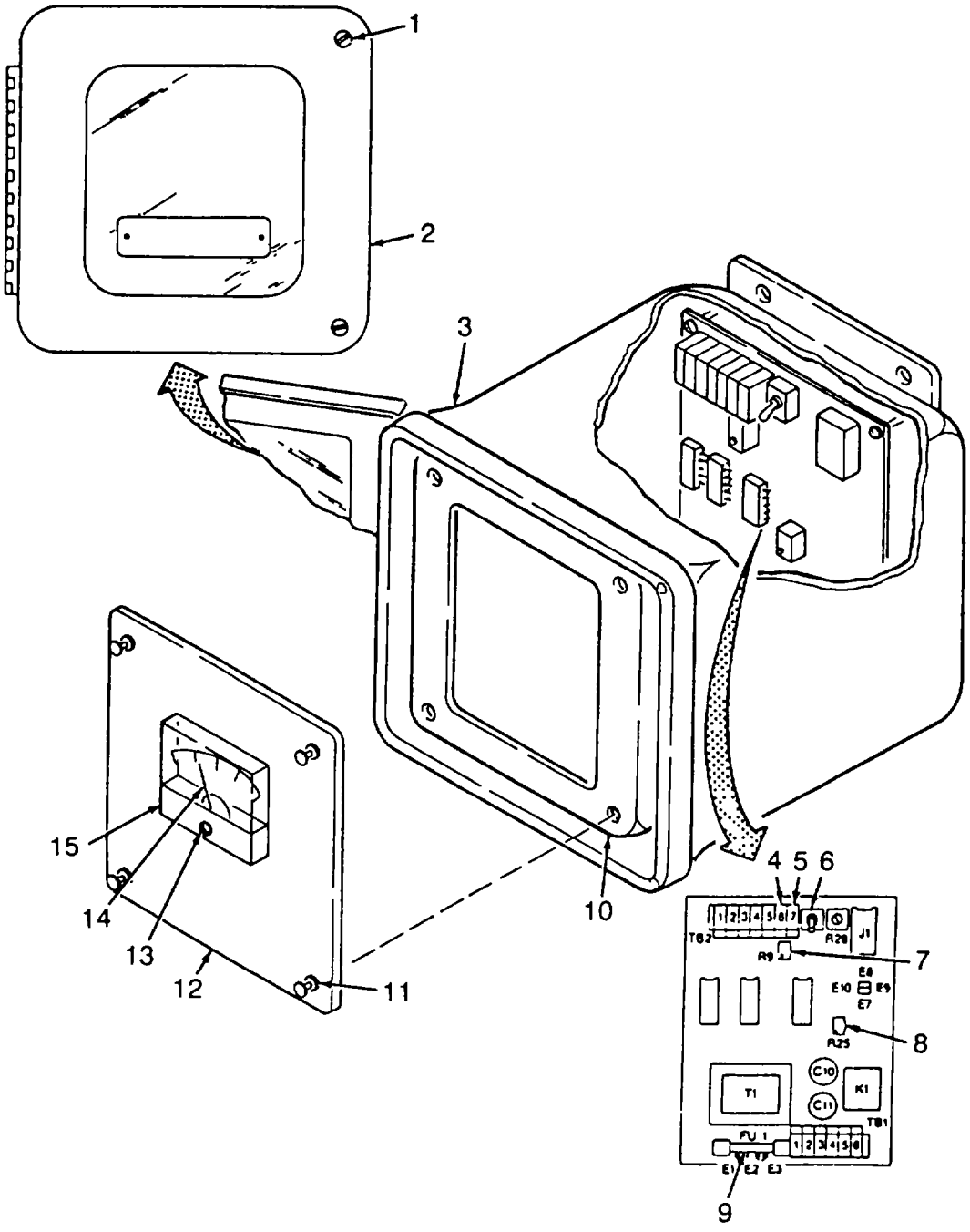
(3) Inspect fuse (9). Replace fuse if blown, burned, or broken.

(4) Set multimeter to indicate voltage (0-10VDC).

(5) Connect positive-lead (+) of multimeter to recorder output terminal TB2-7(5).

(6) Connect negative lead (-) of multimeter to recorder output terminal TB2-6(4).

2-31. TDS MONITOR MAINTENANCE - continued.



2-31. TDS MONITOR MAINTENANCE - continued.

WARNING

Use extreme caution when performing the following procedures with power ON Death or serious injury may result.

CAUTION

Use extreme care to avoid contacting the fuse or control circuitry other than trimmer calibration screws Failure to do so could result in damage to the equipment.

(7) Start power source (power source manual). Turn on electrical power (TM 10-4610-240-10).

(8) Press and hold calibration test switch SW1 (6) in the up position Multimeter should indicate + 10 volts.

(9) If multimeter does not Indicate + 10 volts, adjust main calibration trimmer R9 (7) to obtain correct indication.

(10) Press and hold calibration test switch SW1 (6) in the up position. Adjust front panel meter trimmer R25 (8) to obtain full scale indication (2000) on panel meter (11).

(11) Shut off electrical power (TM 10-4610-240-10). Shut down power source (power source manual).

(12) Remove multimeter leads from TB2-7(5) and TB2-6(4).

(13) Position panel meter (12) on circuit box (10) and press four fasteners (11).

d. Close cover (2) on TDS monitor and tighten two screws (1).

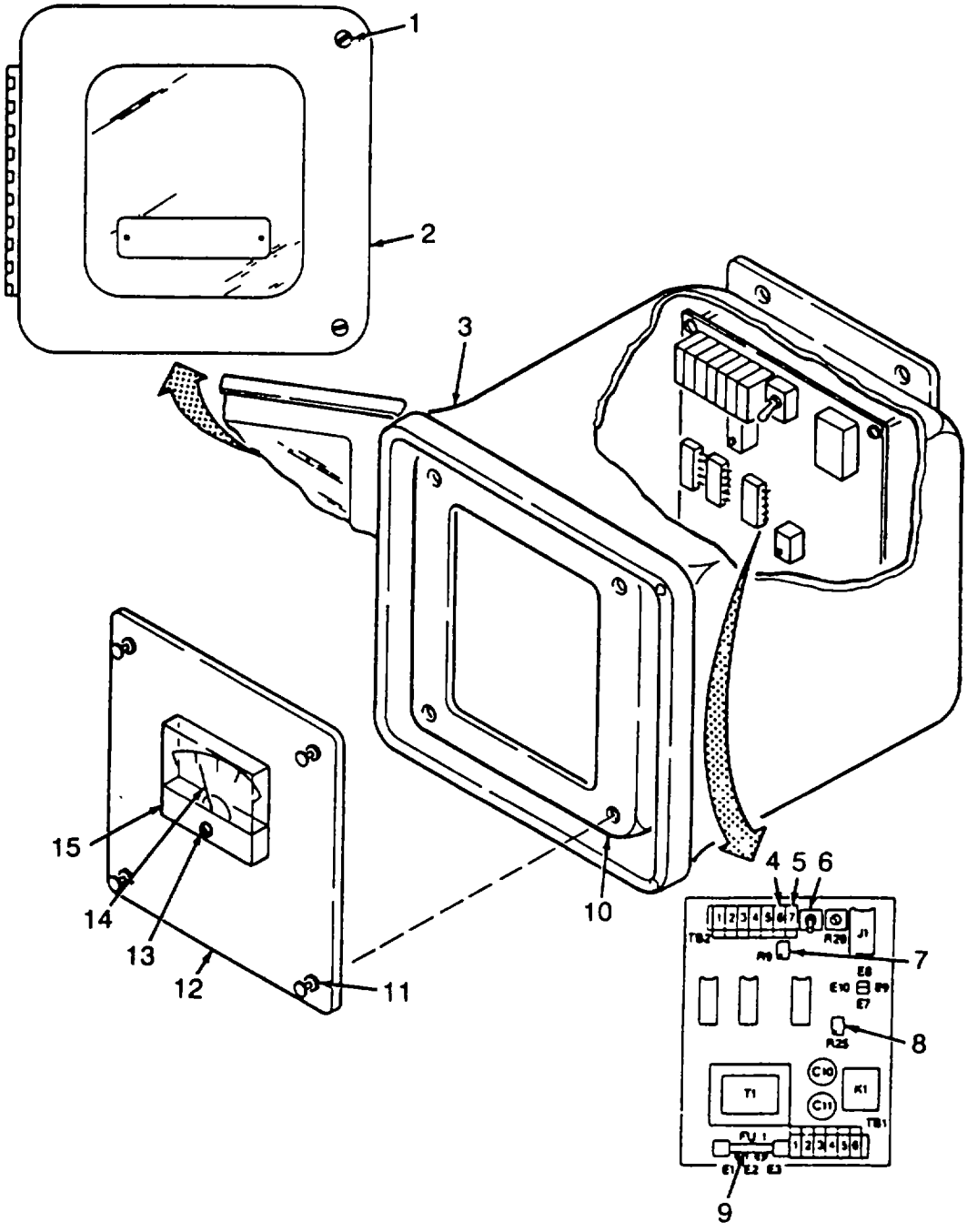
REMOVAL

Remove defective TDS monitor (TM 10-4610-240-10). Send TDS monitor to Direct Support Maintenance.

INSTALLATION

Install replacement TDS monitor (TM 10-4610-240-10).

2-31. TDS MONITOR MAINTENANCE - continued.



2-32 WATER TANK MAINTENANCE.

For unit level maintenance of the water tank, refer to TM 5-5430-225-12&P.

2-33. GENERATOR SET MAINTENANCE (WPES-1).

For unit level maintenance of the generator set, refer to TM 5-6115-465-12.

2-34. ROWPU MAINTENANCE (WPES-1).

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Hoisting sling (10 ton minimum capacity)
Crane or lifting device (10 ton minimum capacity)
Personnel Required
Four (4)
Materials/Parts
Compound, locking (Appendix c, Section II, Item 9)
Lockwasher (16) - MS35338-50
Equipment Condition
Reference
ROWPU prepared for movement, all loose accessories removed (TM 10-4610-240-10).
Landing jacks set (TM 10-4610240-10).
Generator set removed.
General Safety Instructions

WARNING

- **Weight of ROWPU is 11,380 pounds (6 tonnes) To prevent injury to personnel and damage to the equipment, use proper lifting equipment rated at 10 tons (9.1 tonnes) or greater.**
- **Lack of attention or being in an improper position during lifting operations can result in serious injury or death. Pay close attention to movements of equipment being lifted. Do not stand under or in a position where you could be pinned against another object. Watch your footing.**

REMOVAL

a. Position ROWPU (2) and trailer (4) on flat level surface and chock trailer wheels

b. Remove 16 bolts (7), lockwashers (6), and flatwashers (5) from bottom of trailer (4)

2-34. ROWPU MAINTENANCE (WPES-1) - continued.

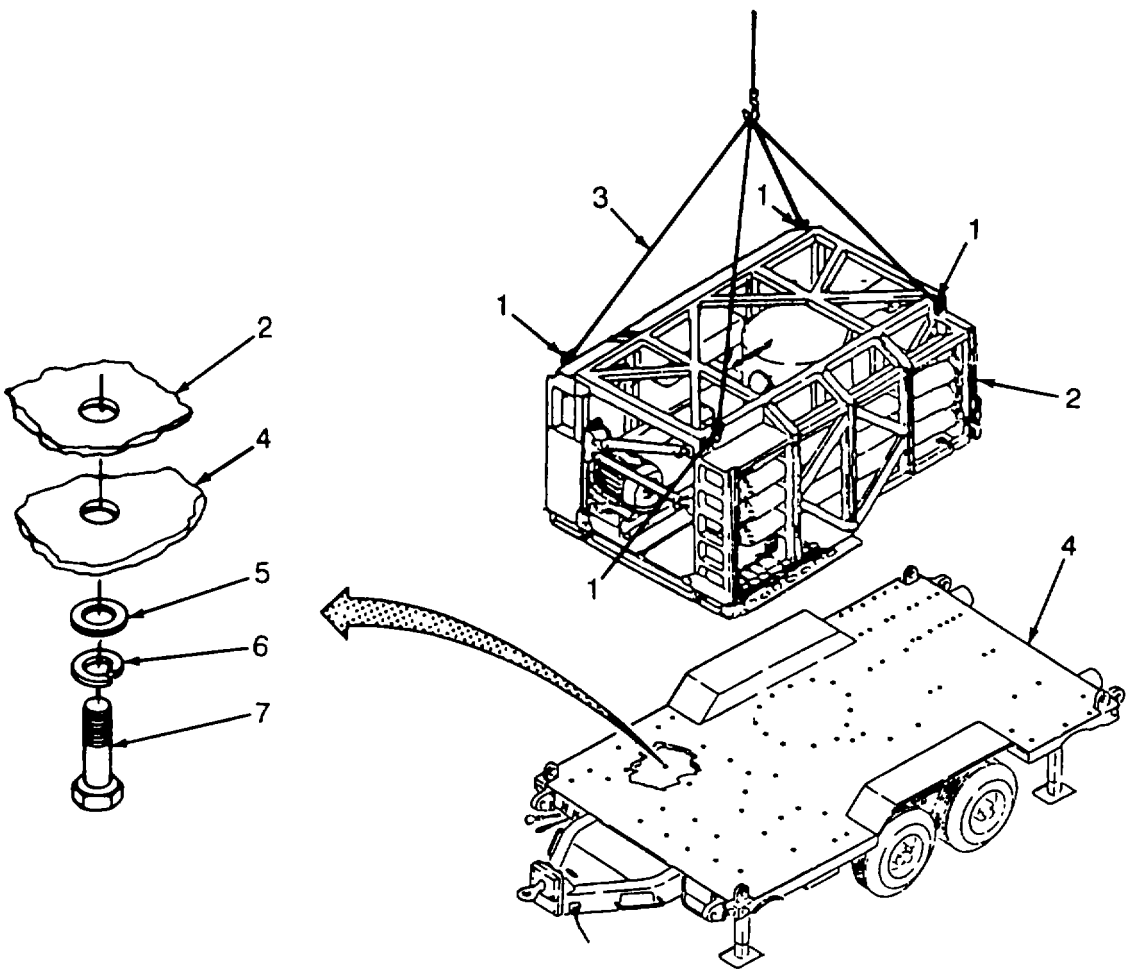
c. Connect hoisting sling (3) to four lifting eyes (1).

d. Connect lifting device to hoisting sling (3).

WARNING

- **Weight of ROWPU is 11,380 pounds (6 tonnes). To prevent injury to personnel and damage to the equipment, use proper lifting equipment rated at 10 tons (9 1 tonnes) or greater.**
- **Always use assistants during lifting operations. Use guide ropes to move and position hanging equipment.**
- **Lack of attention or being in an improper position during lifting operations can result in serious injury or death. Pay close attention to movements of equipment being lifted. Do not stand under or in a position where you could be pinned against another object. Watch your footing.**

e. Using crane, lift ROWPU (2) from trailer (4).



2-34. ROWPU MAINTENANCE (WPES-1) - continued.

INSTALLATION

WARNING

- **Weight of ROWPU Is 11,380 pounds (6 tonnes). To prevent injury to personnel and damage to the equipment, use proper lifting equipment rated at 10 tons (9.1 tonnes) or greater.**
- **Always use assistants during lifting operations. Use guide ropes to move and position hanging equipment.**
- **Lack of attention or being in an improper position during lifting operations can result in serious injury or death. Pay close attention to movements of equipment being lifted. Do not stand under or in a position where you could be pinned against another object. Watch your footing.**

a. Using crane, lower ROWPU (2) into position over trailer (4).

b. Aline mounting holes in ROWPU (2) with mounting holes in trailer (4).

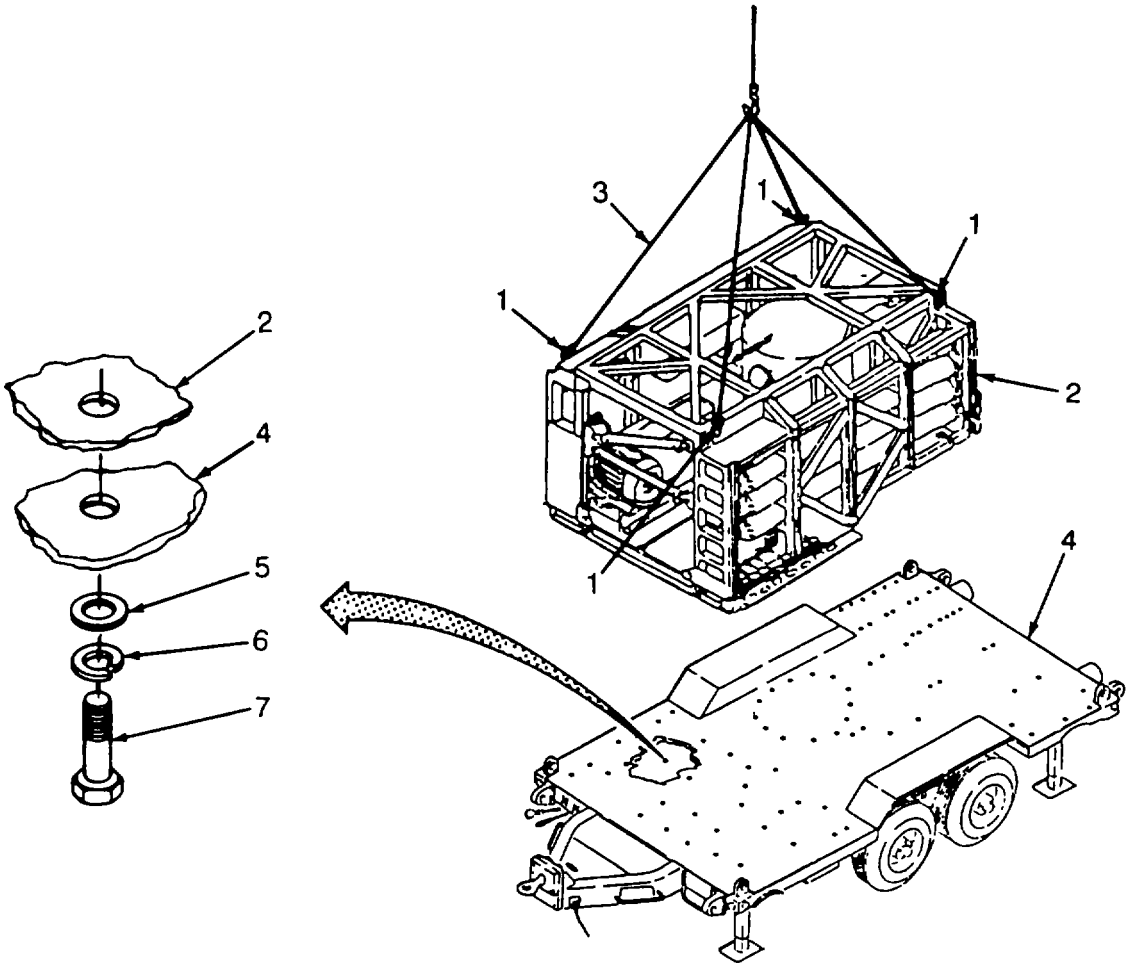
c. Apply locking compound to threads of 16 bolts (7).

d. Install 16 flatwashers (5), lockwashers (6), and bolts (7) through bottom of trailer (4) and into frame of ROWPU (2).

e. Remove lifting device from hoisting sling (3).

f. Remove hoisting sling (3) from four lifting eyes (1).

2-34. ROWPU MAINTENANCE (WPES-1) - continued.



2-35. COVER MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:
Equipment Condition
Reference
ROWPU shutdown (TM 5-4610-215-10/2)
Power shutdown (power source manual)

REMOVAL

Remove defective cover from ROWPU frame (TM 10-4610-240-10) and send to Direct Support Maintenance.

INSTALLATION

Install replacement cover on ROWPU frame (TM 10-4610-240-10).

2-36. COVER PLATE MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:
Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Materials/Parts Required
Lockwasher (16) - MS35338-140
Equipment Condition
Reference
Cover removed (TM 10-4610-240-10).

REMOVAL

a. Remove twelve nuts (6), lockwashers (5), and flat washers (4) from bottom of cover plate (3).

b. Remove twelve screws (1) and flat washers (2) from top of cover plate (3).

c. Remove cover plate (3) from frame (7).

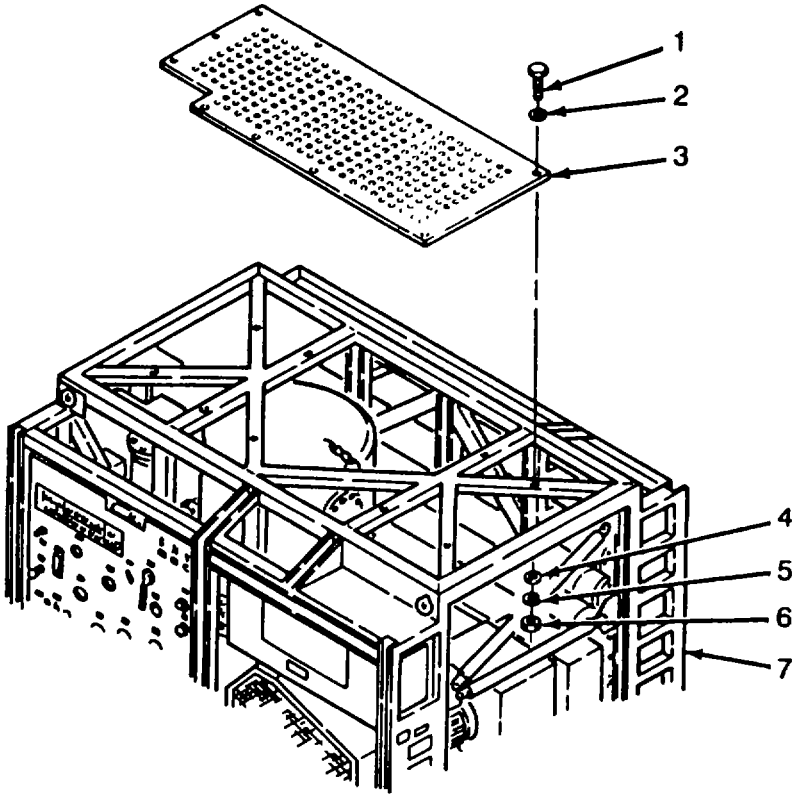
2-36. COVER PLATE MAINTENANCE- continued.

INSTALLATION

a. Position cover plate (3) on frame (7).

b. Install twelve flat washers (2) and screws (1) in top of cover plate (3).

c. Install twelve flat washers (4), lockwashers (5), and nuts (6).



2-37. PIPING INSTALLATION MAINTENANCE.

ROWPU piping consists of three types of plumbing, grooved pipe, threaded pipe and tubing Maintenance of the piping installation consists of replacing/repairing defective piping components. Refer to the following paragraphs for specific maintenance instructions.

2-38. GROOVED PIPE (PIPE SECTIONS, ELBOWS, FITTINGS, ETC.) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Item 30)
Tape, Insulation (Appendix C, Item 32)
Lockwasher (A/R) - MS35338-139
Equipment Condition
Reference
ROWPU shutdown (TM 104610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 104610-240-10).
General Safety Instructions

WARNING

ROWPU piping and equipment can contain extremely high pressure during and after operation If this pressure is not relieved before performing maintenance, serious injury or death may result. Be sure to open all drains and vents before performing maintenance.

NOTE

The following procedures are typical for all grooved piping, elbows and couplings used in the ROWPU. Some of the removal and installation instructions may not be applicable to your maintenance task. Perform only those tasks that affect replacement of the defective components.

REMOVAL

a. Locate ends of grooved pipe (5) to be removed.

NOTE

Some grooved pipe sections are held in place with retaining straps. Remove retaining straps as required.

b. Remove two screws (8), flat washers (10), lockwashers (9), retaining strap (11), insulation tape (12).

c. As required, remove sensing lines (6) and adapters (7) from grooved pipe (5).

2-38. GROOVED PIPE (PIPE SECTIONS, ELBOWS, FITTINGS, ETC.)
MAINTENANCE - continued.

d. Remove two nuts (3), bolts (1) and clamp halves (2) from both ends of grooved pipe (5)

e. Separate grooved pipe (5) from system and remove gasket (4) from each end of pipe

f. Remove pipe support (13).

INSTALLATION

a. Install pipe support (13)

b. Slide one gasket (4) over each end of grooved pipe (5)

c. Position grooved pipe (5) in unit Slide gasket (4) over grooves of the two connecting pipes.

d. Place clamp halves (2) over gasket (4) and install two bolts (1) and nuts (3). Repeat for gasket at other end of pipe

e. Apply anti-seize tape to male threads of adapters (7) Be sure to wrap tape in same direction as threads.

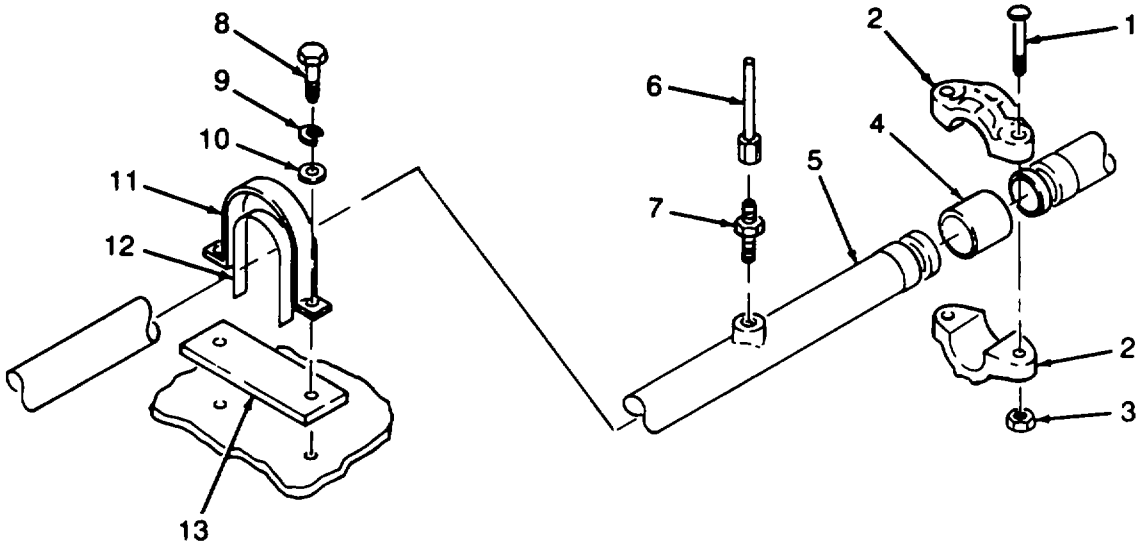
f. If removed, install adapters (7) and connect sensing lines (6) to grooved pipe (5)

NOTE

Some grooved pipe sections are held in place with retaining straps Install retaining straps as required.

g. Install insulation tape (12), retaining strap (11), and two lockwashers (9), flat washers (10), and screws (8).

h. Operate ROWPU and test for leaks (TM 10-4610-240-10).



2-39. THREADED PIPE MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Pipewrench (Appendix B, Section III, Item 3)
- Vice (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Tape, Insulation (Appendix C, Section II, Item 32)

Equipment Condition

Reference
- ROWPU shutdown (TM 10-4610-240-10).
- Power shutdown (power source manual)
- ROWPU piping drained (TM 10-4610-240-10).

General Safety Instructions

WARNING

ROWPU piping and equipment can contain extremely high pressure during and after operation. If this pressure is not relieved before performing maintenance, serious injury or death may result. Be sure to open all drains and vents before performing maintenance

NOTE

The following procedures are typical for threaded piping, elbows, couplings, and pipe sections used in the ROWPU Some of the removal and installation instructions may not be applicable to your maintenance task Perform only those tasks that affect replacement of the defective component.

REMOVAL

NOTE

Some threaded pipe sections are held in place with retaining straps Remove retaining straps as required

a. Remove retaining straps as follows:

(1) Remove two screws (8), flat washers (10), lockwashers (9), retaining strap (13)

(2) Remove insulation tape (11) and pipe support (12) from threaded pipe (5)

b. Remove nipple strap as follows

(1) Remove two nuts (21), lockwashers (22), flat washers (16) and screws (15)

2-39. THREADED PIPE MAINTENANCE- continued.

(2) Hold up two-piece clamp (18) and remove two nuts (20), lockwashers (19) and screws (24)

(3) Separate and remove two-piece clamp (18)

(4) Remove ring filler (23) and insulation tape (17) from nipple (25)

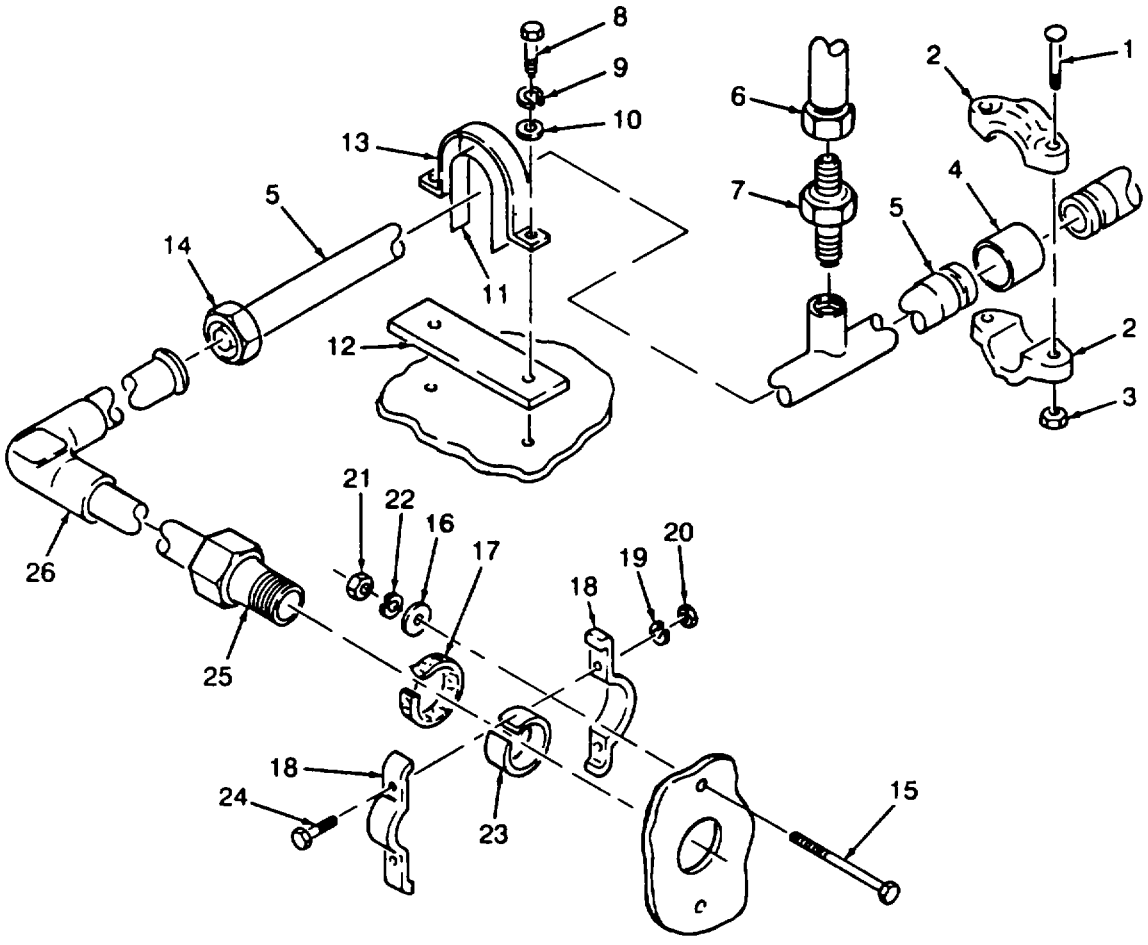
c. Remove adapter (7) and sensing tube (6) from threaded pipe (5)

d. Disconnect pipe section as follows:

(1) Locate nearest upstream and downstream pipe coupling points The coupling device may be a clamp or threaded pipe union.

(2) Disconnect pipe union (s) (14)

(3) Remove two nuts (3), screws (1), coupling clamp halves (2), and gasket (4).



2-39. THREADED PIPE MAINTENANCE - continued.

e. Remove threaded pipe (5) from unit.

f. Place threaded pipe (5) in vice.

g. Remove pipe (5), elbow (26), or nipple (25) as required to get access to defective piping component.

INSTALLATION

a. Apply anti-seize tape to male pipe fittings Be sure to wrap tape in same direction as pipe thread.

b. Place threaded pipe (5) in vice Install nipple (25), pipe (5), or elbow (26), as required.

c. Position threaded pipe (5) in unit.

d. Connect pipe section as follows.

(1) Connect pipe union(s) (14).

(2) Install gasket (4), coupling clamp halves (2), two screws (1) and nuts (3).

e. Install adapter (7) and sensing tube (6) on threaded pipe (5).

f. Install nipple strap as follows:

(1) Position insulation tape (17) and filler ring (23) on nipple (25)

(2) Position and install two-piece clamp (18) with two screws (24), lockwashers (19), and nuts (20)

(3) Install two flat washers (16), screws (15) lockwashers (22), and nuts (21).

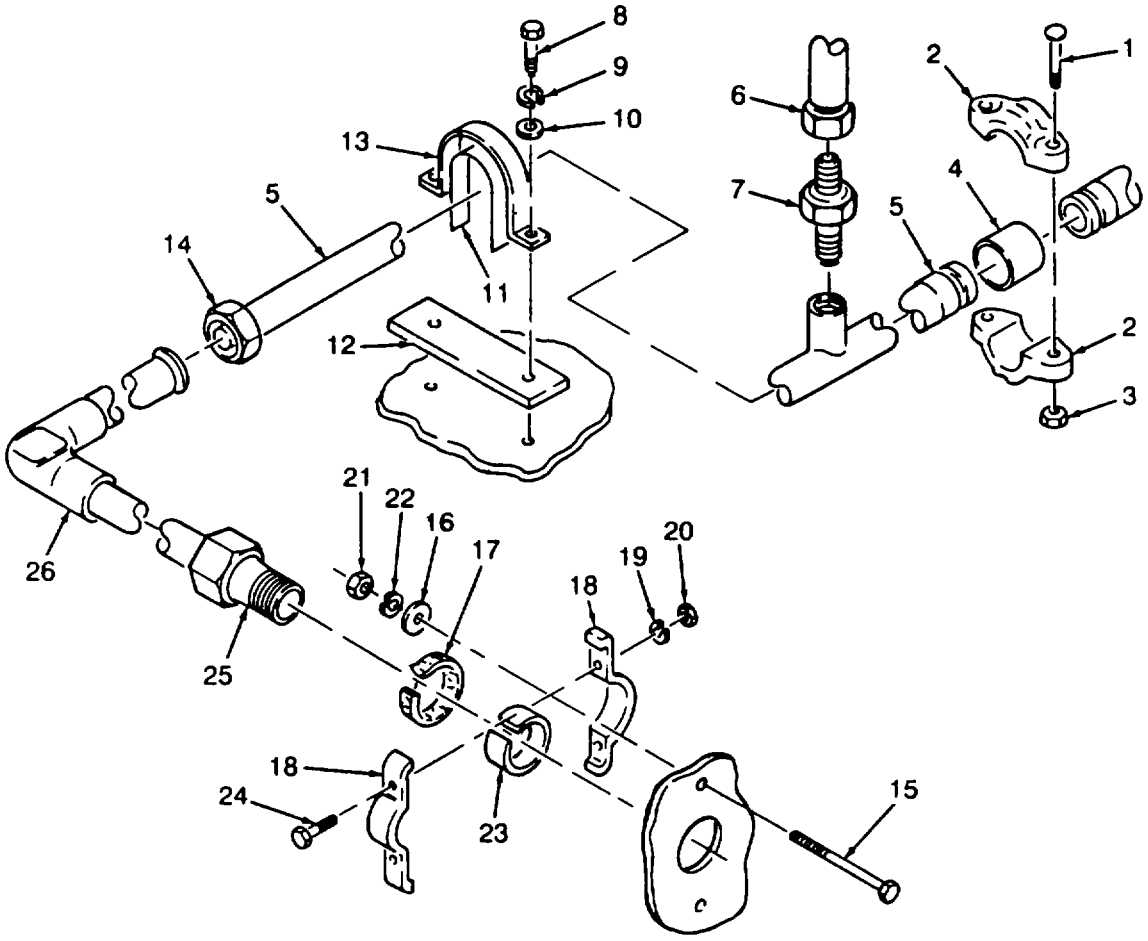
g. Install retaining strap as follows

(1) Install insulation tape (11) and pipe support (12) on threaded pipe (5).

(2) Install retaining strap (13), two lockwashers (10), flat washers (9), and screws (8).

h. Operate system and test for leaks (TM 104610-240-10).

2-39. THREADED PIPE MAINTENANCE - continued.



2-40. TUBING MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Tape, Insulation (Appendix C, Section II, Item 32)
Lockwasher (A/R) - MS35338-139
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).
General Safety Instructions

WARNING

ROWPU piping and equipment can contain extremely high pressure during and after operation. If this pressure is not relieved before performing maintenance, serious injury or death may result. Be sure to open all drains and vents before performing maintenance.

NOTE

These procedures are typical for metal and plastic tubing used throughout the ROWPU Some of the following instructions may not be applicable to your maintenance task. Perform only those tasks that affect replacement of the defective component

REMOVAL

a. Remove metal tubing as follows:

NOTE

Locate two nearest connection points on metal tubing to be removed. Only clamps and tube supports between these two points must be removed

(1) Remove two nuts (9), lockwashers (10), and screws (4).

(2) Separate and remove two tube support blocks (1 and 11) and insulation tape (12) from metal tubing (2).

(4) Remove screws (5), lockwasher (6) and clamps (7) from metal tubing (2)

(5) Unscrew tubing nuts (3 and 8) from adapters (13 and 14).

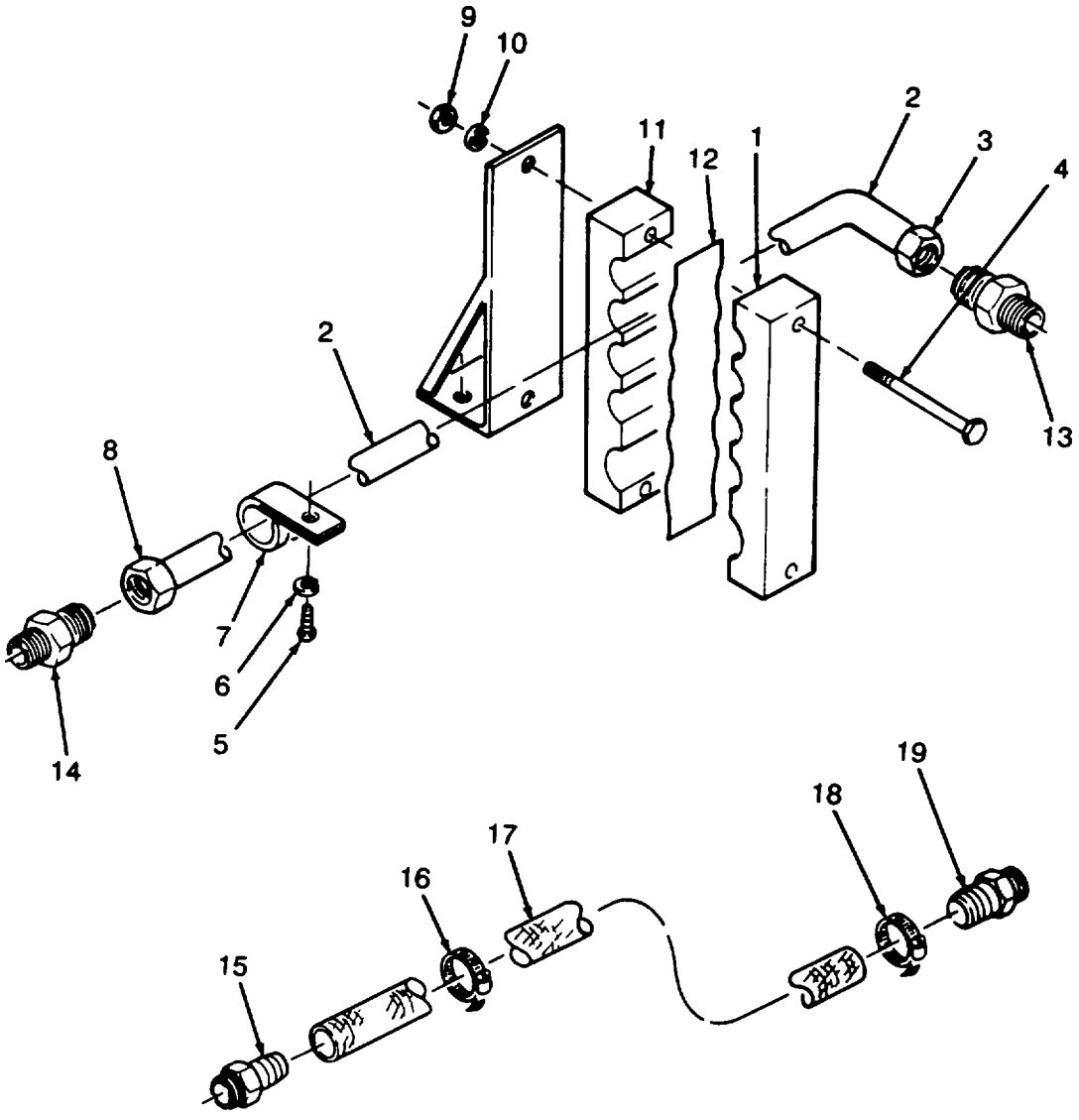
2-40. TUBING MAINTENANCE- continued.

(6) Remove metal tubing (2) from unit

b. Remove flexible tubing as follows:

(1) Remove clamp (16 and 18) from ends of flexible tubing (17)

(2) Remove flexible tubing (17) from tubing adapters (15 and 19).



2-40. TUBING MAINTENANCE- continued.

INSTALLATION

a. Install flexible tubing as follows:

(1) Slide clamps (16 and 18) onto both ends of flexible tubing (17).

(2) Connect flexible tubing (17) to tubing adapters (15 and 19) and tighten clamps (16 and 18).

b. Install metal tubing as follows.

(1) Apply anti-seize tape to male fittings. Be sure to wrap tape in same direction as pipe thread.

(2) Connect metal tubing (2) to adapters (13 and 14) and tighten tubing nuts (3 and 8).

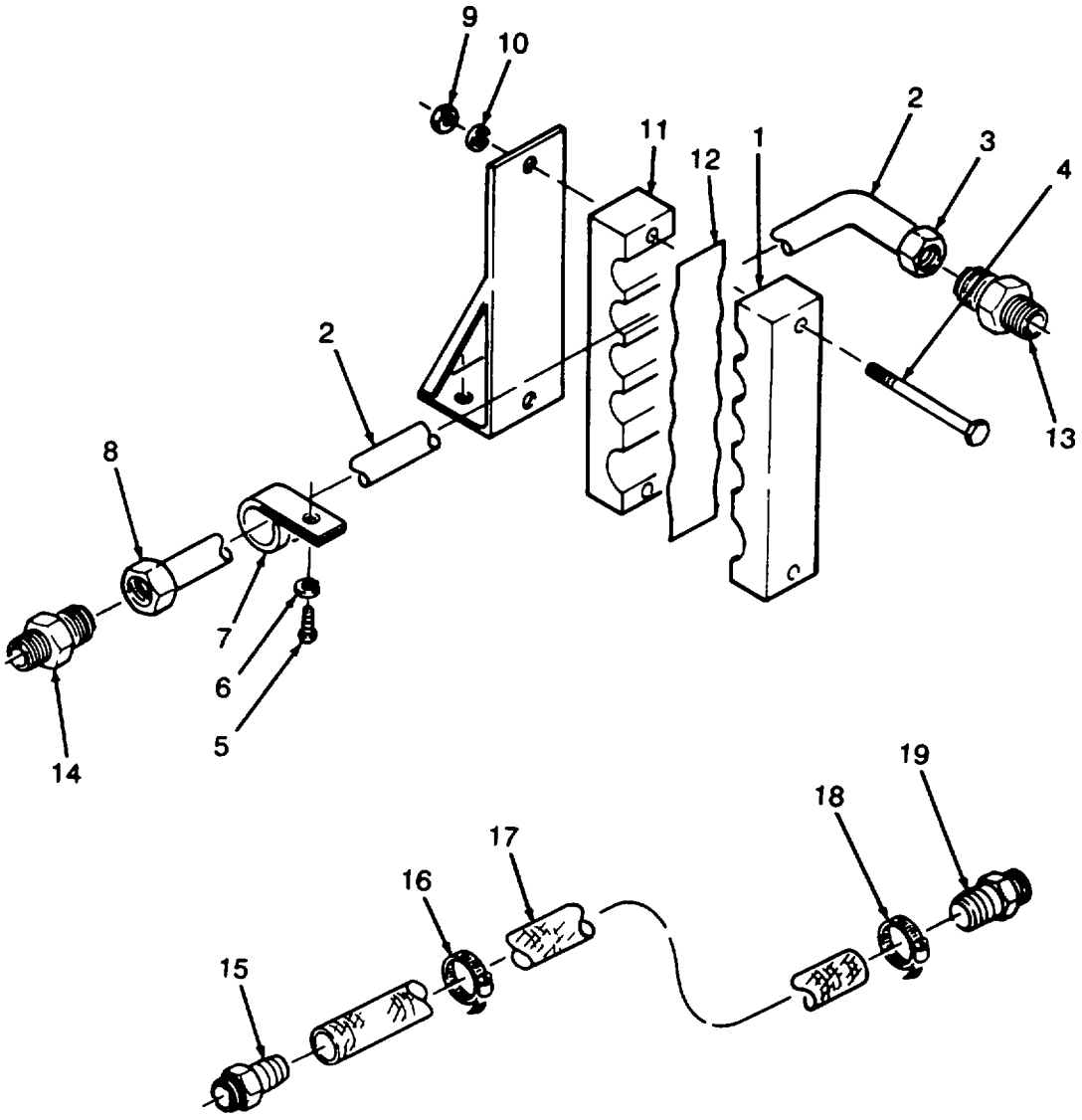
(4) Install clamps (7), lockwashers (6) and screws (5) on metal tubing (2).

(5) Position two tube support blocks (1 and 11) and insulation tape (12) on metal tubing (2)

(6) Install two screws (4), lockwashers (10), and nuts (9).

c. Operate ROWPU and test for leaks (TM 10-4610-240-10).

2-40. TUBING MAINTENANCE -continued.



2-41. GATE VALVE (VENT VESSELS) MAINTENANCE.

This task consists of: a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Vice (Appendix B, Section III, Item 3)
- Pipe Wrench (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Detergent (Appendix C, Section II, Item 10)
- Rags, wiping (Appendix C, Section II, Item 23)
- Packing- D-924-L-12

Equipment Condition
- Reference
- ROWPU shutdown (TM 10-4610-240-10).
- Power shutdown (power source manual).
- ROWPU piping drained (TM 10-4610-240-10).

REMOVAL

a. Remove cap (1).

b. Open gate valve (14) and allow water to drain.

c. Loosen two nuts (3 and 19).

d. Remove two nuts (7), screws (17), and clamp halves (6 and 16).

e. Remove two nuts (12), screws (9), and clamp halves (10 and 11).

f. Remove gate valve (14) and attached parts from control panel (2).

g. Remove gasket (8).

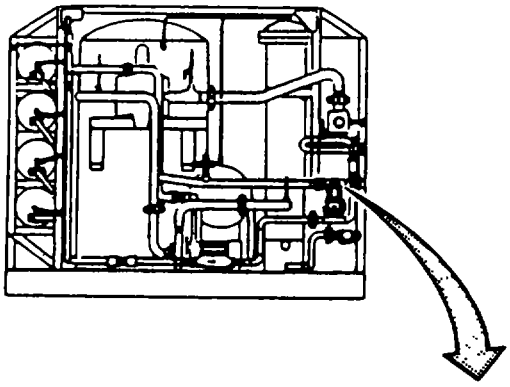
h. Position gate valve (14) and attached parts in vice.

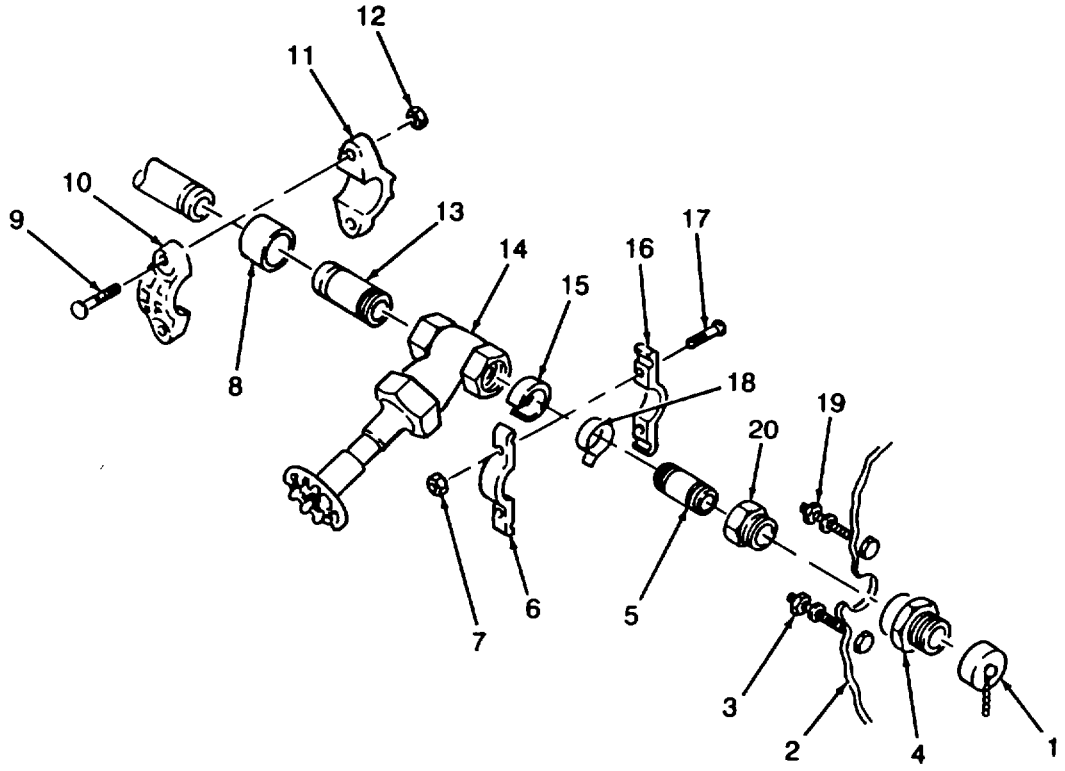
i. Remove adapter (13) from gate valve (14)

j. Remove ring filler (15) and insulation tape (18) from nipple (5).

k. Remove bushing (4), adapter (20) and nipple (5) from gate valve (14).

2-41. GATE VALVE (VENT VESSELS) MAINTENANCE - continued.





2-41. GATE VALVE (VENT VESSELS) MAINTENANCE - continued.

REPAIR

NOTE
Gate valve may be repaired while installed in unit.

a. Disassembly

(1) Remove nut (20), washers (21), and hand wheel (22) from stem (26).

(2) Remove packing nut (23), gland (24) and packing (25).

b. Cleaning

(1) Wash all components with clean water and detergent.

(2) Rinse components in clean water and dry with wiping rag

c. Inspection

(1) Inspect all threaded components for damaged threads

(2) Inspect all components for corrosion

d. Repair

(1) Replace damaged components

(2) Replace packing (25)

e. Assembly

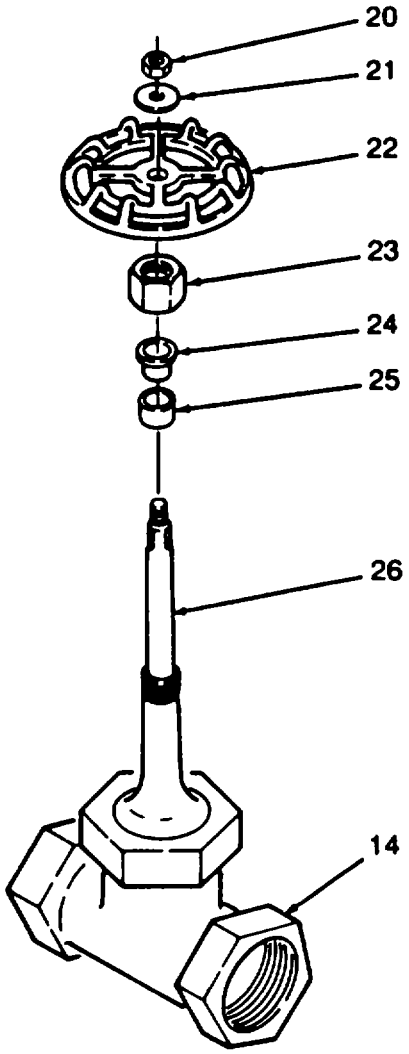
(1) Push packing (25) into place on stem (26).

(2) Install gland (24) and packing nut (23)

(3) Position hand wheel (22) on stem (26)

(4) Install washer (21) and nut (20)

2-41. GATE VALVE (VENT VESSELS) MAINTENANCE- continued.



2-41. GATE VALVE (VENT VESSELS) MAINTENANCE- continued.

INSTALLATION

a. Apply anti-seize tape to male fittings. Be sure to wrap tape in same direction as pipe thread.

b. Position gate valve (14) in vice.

c. Install nipple (5), adapter (20), and bushing (4) on gate vale (14)

d. Install insulation tape (18) and ring filler (15) on nipple (5)

e. Install adapter (13) on gate valve (14)

f. Position gate valve (14) and attached parts in control panel (2)

g. Install clamp halves (10 and 11), screws (9), and two nuts (12).

h. Install gasket (8).

i. Install clamp halves (6 and 16), screws (17), and nuts (7).

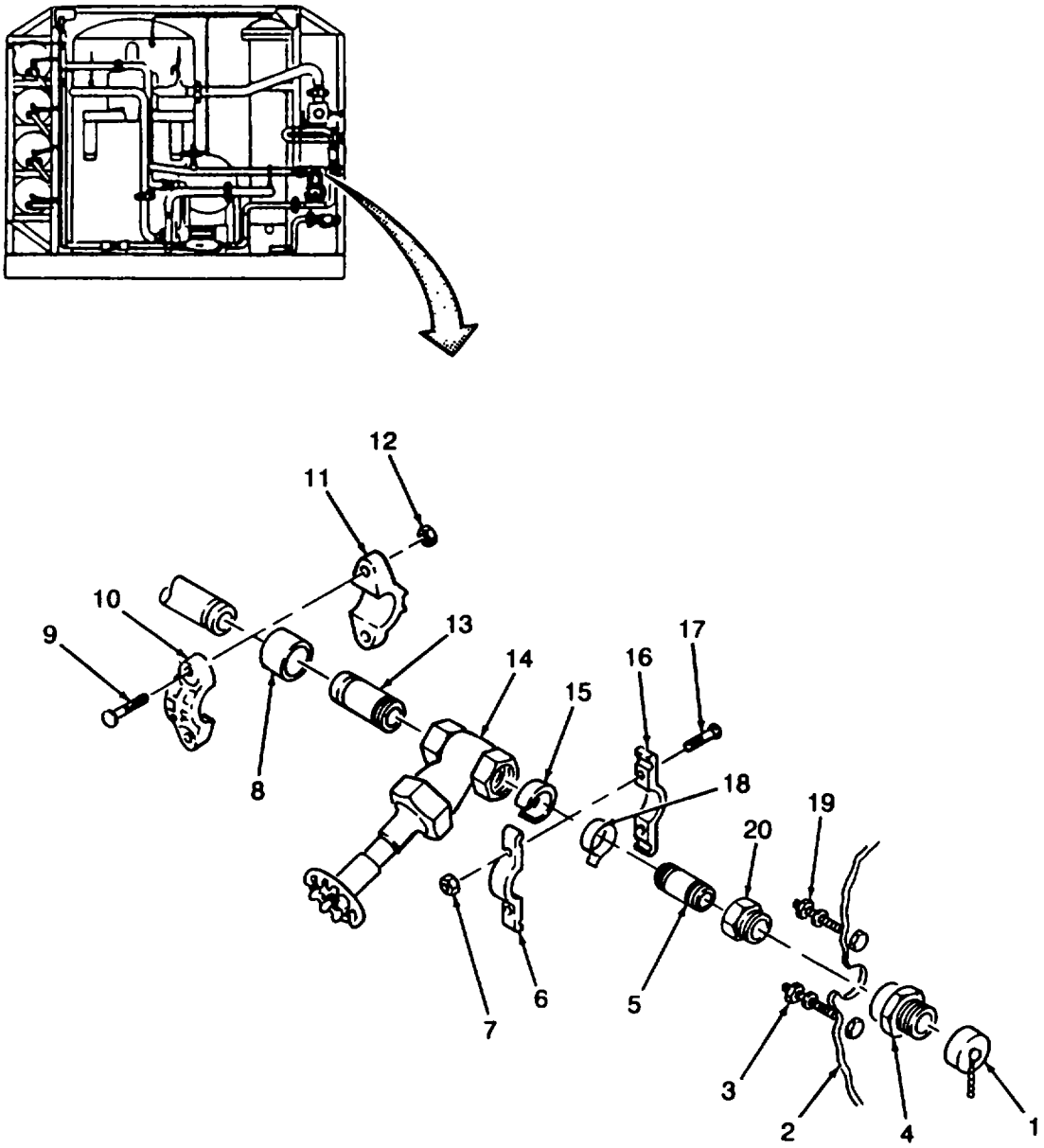
j. Tighten two nuts (3 and 19)

k. Close gate valve (14).

l. Install cap (1).

m. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.

2-41. GATE VALVE (VENT VESSELS) MAINTENANCE- continued.



2-42. FLOW METER (PRODUCT WATER) MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Tape, insulating (Appendix C, Section II, Item 32)
Lockwasher (2) - MS35338-139
Gasket- M103873 DOZ
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10)

REMOVAL

a Remove cap (2) from pipe section (20).

b Disconnect tubing (23) from pipe section (20)

c. Remove two nuts (7), screws (11), clamp halves (10), and gasket (8) from pipe sections (6 and 9).

d Remove four screws (14) and starwashers (13) from bracket (12).

e Remove four nuts (3), lockwashers (4), screws (5), and bracket (12) from control panel (1).

f Loosen two nuts (21)

g While supporting flowmeter (15), remove two nuts (18), lockwashers (19), screws (22), and two-piece scrap (17)

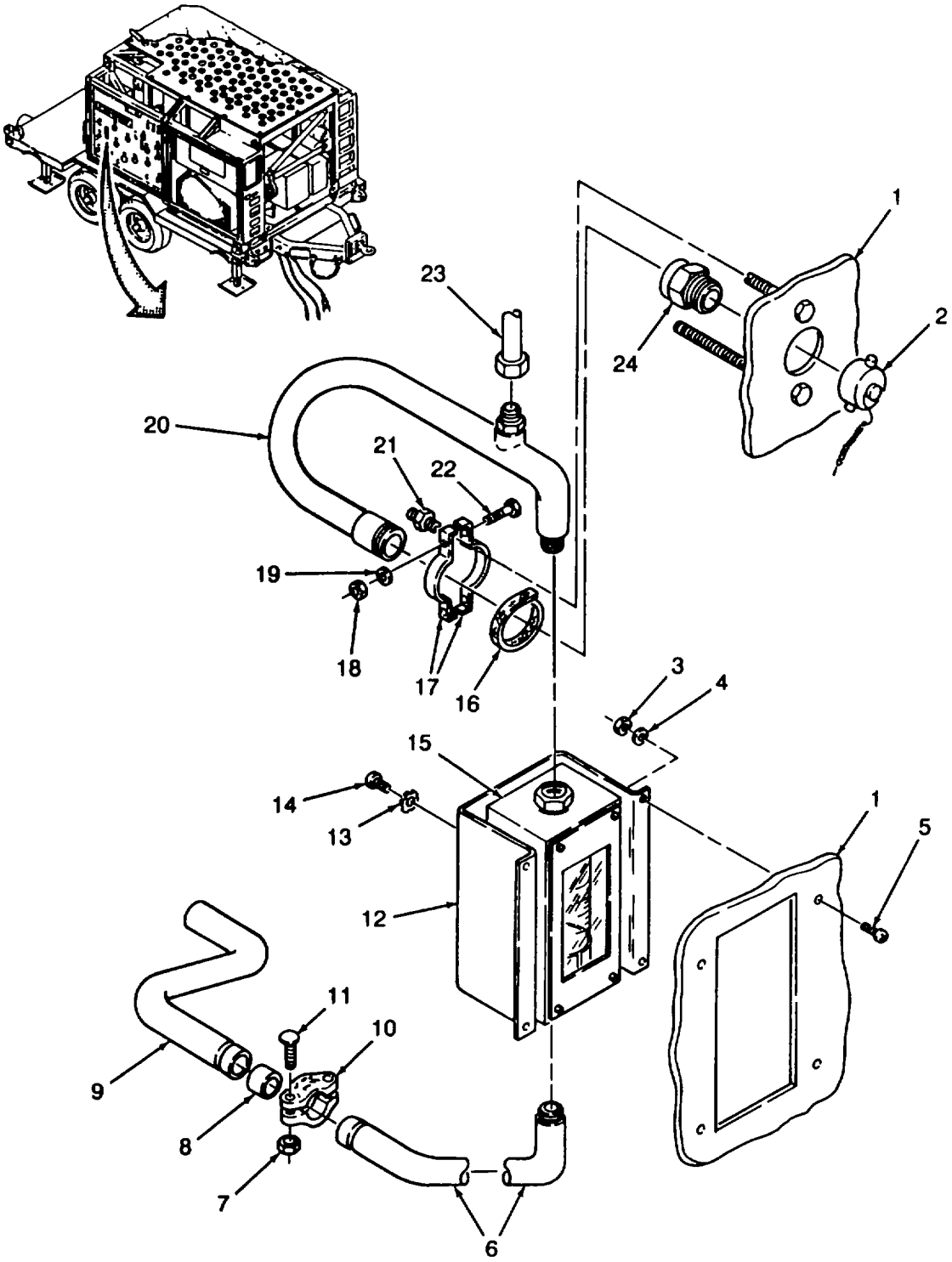
h. Remove pipe sections (20 and 6) with flowmeter (15) from control panel (1).

i. Remove two pipe sections (6 and 20) from flowmeter (15)

j Remove insulating tape (16) from pipe section (20)

k If required, remove adapter (24) from pipe section (20)

2-42. FLOW METER (PRODUCT WATER) MAINTENANCE - continued.



2-42. FLOW METER (PRODUCT WATER) MAINTENANCE - continued.

INSTALLATION

NOTE
Apply anti-seize tap to all male pipe threads before installation.

a If removed, install adapter (24) on pipe section (20).

b. Install pipe sections (6 and 20) on flowmeter (15)

CAUTION
Pipe section can be badly damaged by corrosion if it contacts strap Be sure to separate pipe section from strap with insulating tape.

c. Install insulating tape (16) on pipe section (20) where two piece strap (17) will clamp.

d. Position flowmeter (15) in cutout on control panel (1) and position end of pipe section (20) through hole in control panel

e. While supporting flowmeter (15), install two-piece strap (17), two screws (22), lockwashers (19), and nuts (18).

f Tighten two nuts (21)

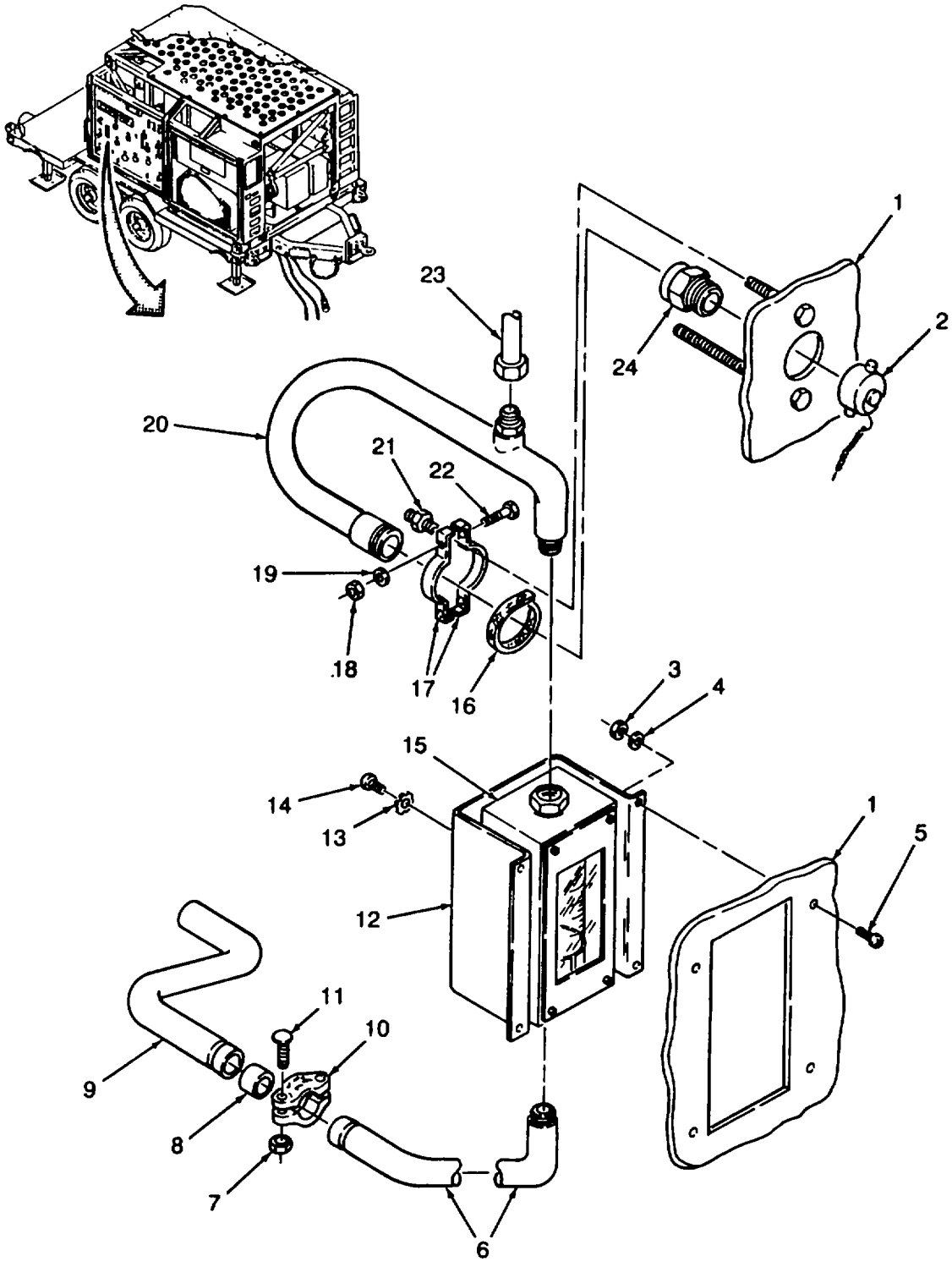
g Position bracket (12) on flowmeter (15) and install four starwashers (13) and screws (14).

h. Install four screws (5), lockwashers (4), and nuts (3).

i. Install gasket (8), clamp halves (10), two screws (11), and nuts (7) on pipe sections (6 and 9)

j. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.

2-42. FLOW METER (PRODUCT WATER) MAINTENANCE - continued.



2-43. FLOW METER (RAW WATER) MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Vice (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Lockwashers (2) - MS35338-140
- Gasket (2) - M103873DO4

Equipment Condition
Reference
- ROWPU shutdown (TM 104610-240-10).
- Power shutdown (power source manual)
- ROWPU piping drained (l M 10-4610-240-10).

REMOVAL

a. Remove two nuts (7), lockwashers (8), and bracket (1) from studs (17).

b. Remove two nuts (6), bolts (4), clamp halves (5), and gasket (3)

c. Support flowmeter (18) and remove two nuts (10), bolts (13), clamp halves (11), and gasket (12)

d. Remove flowmeter (18) and attached parts from control panel (14).

e. If required, remove two nuts (15 and 16) and studs (17).

f. Place flowmeter (18) in vice and remove two adapters (2 and 9)

INSTALLATION

a. Apply antiseize tape to threads of all male pipe fittings. Be sure to wrap tape in same directions as threads.

b. Install two adapters (2 and 9) on flowmeter (18).

c. Install two studs (17) and nuts (15 and 16). End of stud must be flush with nut (15) when installed.

d. Position flowmeter (18) in cutout on control panel (14).

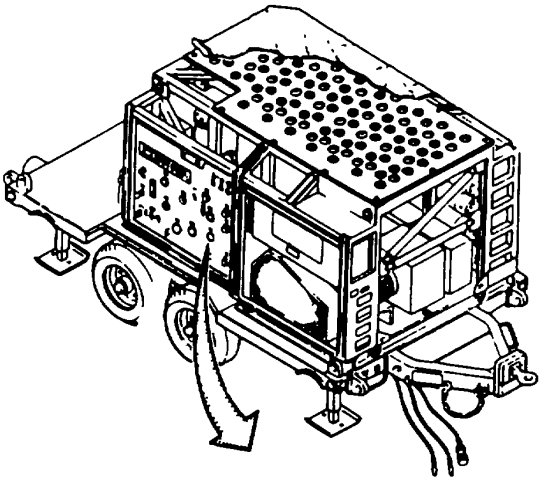
e. Install gasket (12), clamp halves (11), two bolts (13), and nuts (10).

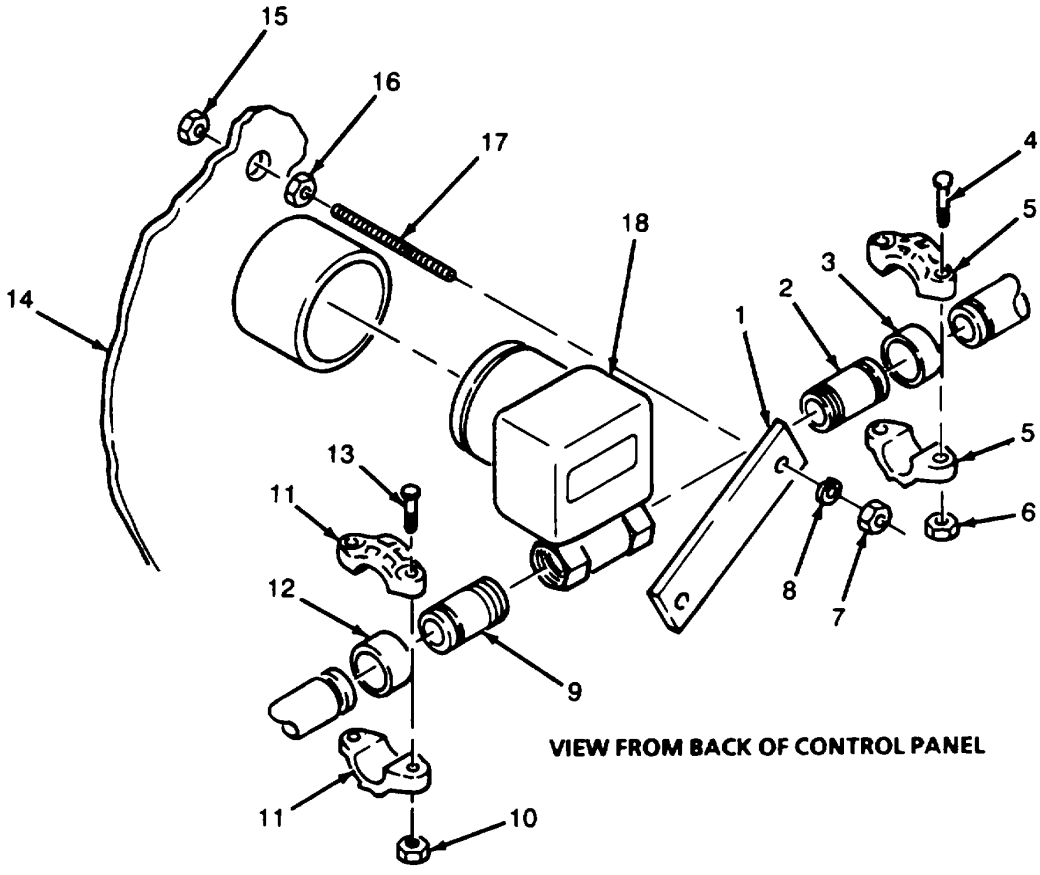
2-43. FLOW METER (RAW WATER) MAINTENANCE - continued.

f. Install gasket (3), clamp halves (5), two bolts (4), and nuts (6).

g. Position bracket (1) on two studs (17) and install two lockwashers (8) and nuts (7).

h. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.





2-171

2-44. CHECK VALVE (PRODUCT WATER) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Vice (Appendix B, Section III, Item 3)
- Pipewrench (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Tape, insulating (Appendix C, Section II, Item 32)
- Lockwashers (2) - MS35338-140

Equipment Condition
- Reference
  - ROWPU shutdown (TM 104610-240-10).
  - Power shutdown (power source manual)
  - ROWPU piping drained (TM 10-4610-240-10).

REMOVAL

a. Disconnect unions (I and 3) and remove water meter (2).

b. Remove tube (9) and adapter (8).

c. Loosen clamp (10) and remove hose (11) and adapter (12) from pipe section (5).

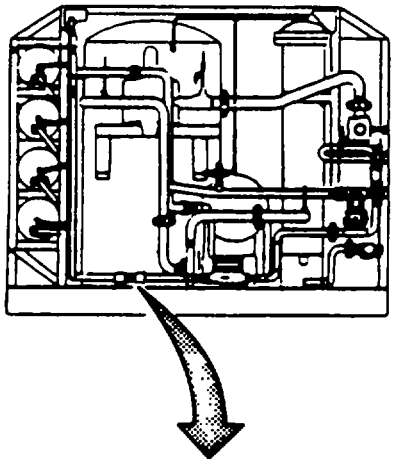
d. Remove two bolts (14), two lockwashers (15), two flat washers (16), clamp (13), and insulating tape (4).

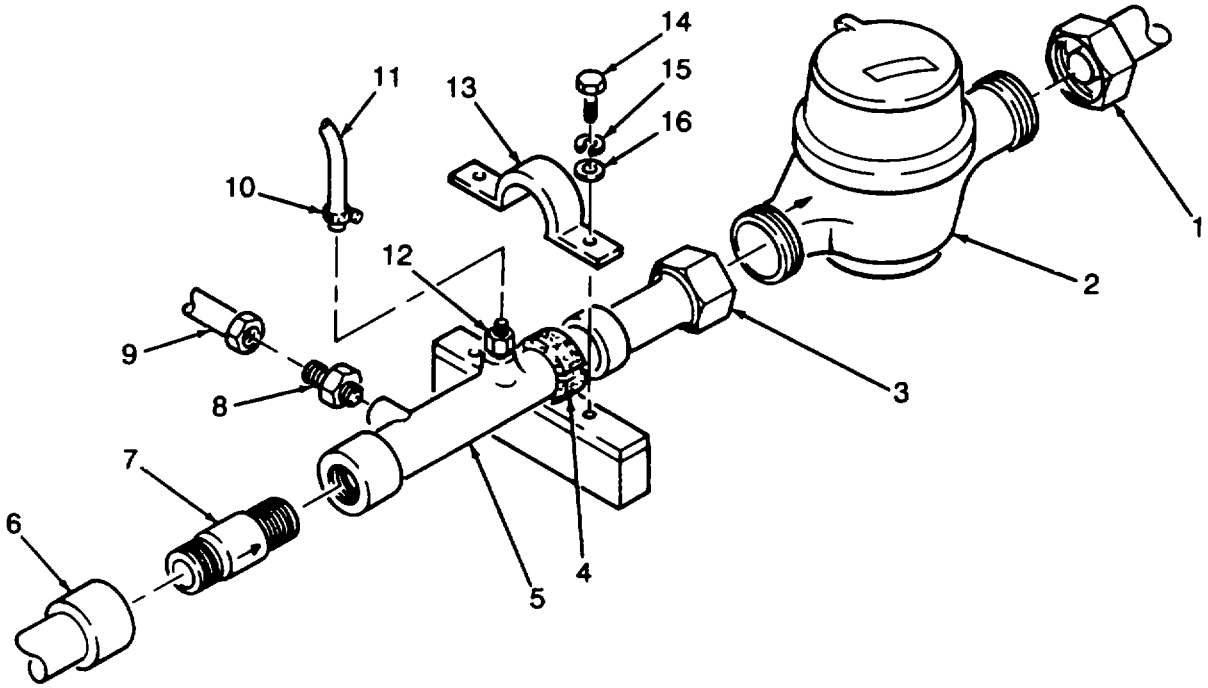
e. Remove pipe section (5) and check valve (7) from pipe section (6).

f. Place pipe section in vice.

g. Remove check valve (7) from pipe section (5).

2-44. CHECK VALVE (PRODUCT WATER) MAINTENANCE - continued.





2-44. CHECK VALVE (PRODUCT WATER) MAINTENANCE - continued.

INSTALLATION

a. Apply antiseize tape to all male pipe threads Be sure tape is wrapped in same direction as threads.

b. Install check valve (7) on end of pipe section (5) nearest threaded adapter (8). Ensure arrow on check valve points toward pipe section (5).

c. Install pipe section (5) and check valve (7) on pipe section (6) Be sure threaded adapter (8) points toward multimedia filter and hose adapter (12) points upward.

CAUTION

Pipe section can be badly damaged by corrosion if it is installed in contact with plate or clamp. Be sure to separate pipe section from plate and clamp with insulating tape.

d. Wrap pipe section (5) with insulating tape (4).

e. Install clamp (13), two flat washers (16), two lockwashers (15), and two bolts (14)

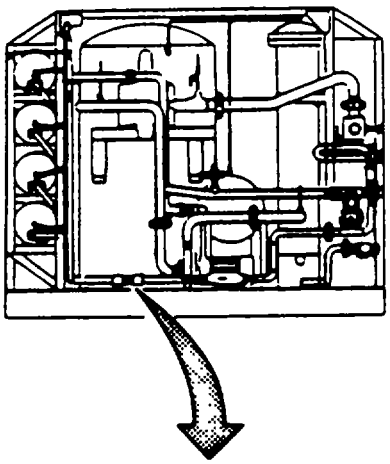
f. Install adapter (12) and hose (11) and tighten clamp (10).

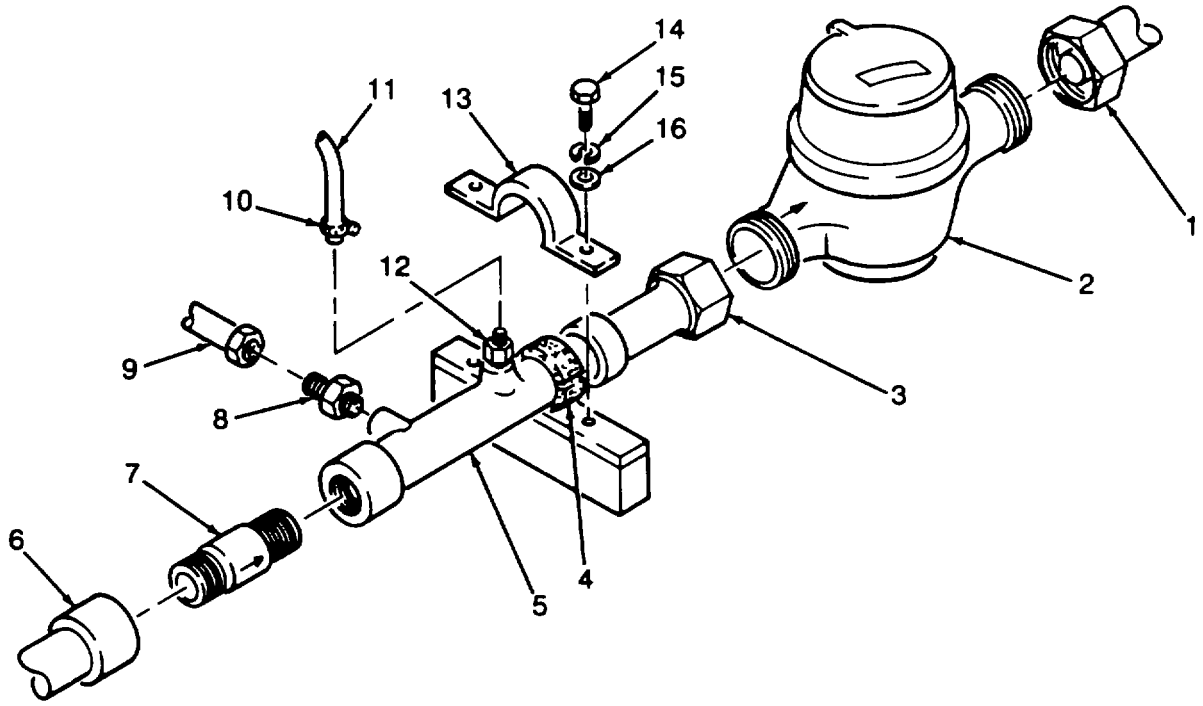
g. Install adapter (8) and tube (9).

h. Position water meter (2) and connect unions (1 and 3).

i. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.

2-44. CHECK VALVE (PRODUCT WATER) MAINTENANCE- continued.





2-44. CHECK VALVE (PRODUCT WATER) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Pipewrench (Appendix B, Section III, Item 3)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Lockwasher (6) - MS35338-138
Equipment Condition
Reference
ROWPU shutdown (TM 104610-240-10).
Power shutdown (power source manual)
ROWPU piping drained (TM 104610-240-10).

REMOVAL

NOTE

- The cartridge filter, pulse dampener, and multimedia filter vent valve handles are removed the same One is shown, the others are similar.
- Tag handles and valves before removal.

a. Working at front of control panel (1), remove nut (5) and handle (4).

b. Remove six screws (3) and lockwashers (2).

c. Working at rear control panel (1), loosen hose clamp (8) and remove flexible tubing (9).

d. Disconnect two tubes (25 and 21).

e. Disconnect union (16).

f. Remove three valves (10, 22 and 18) and attached hardware from unit.

g. Remove three adapters (7, 24 and 20).

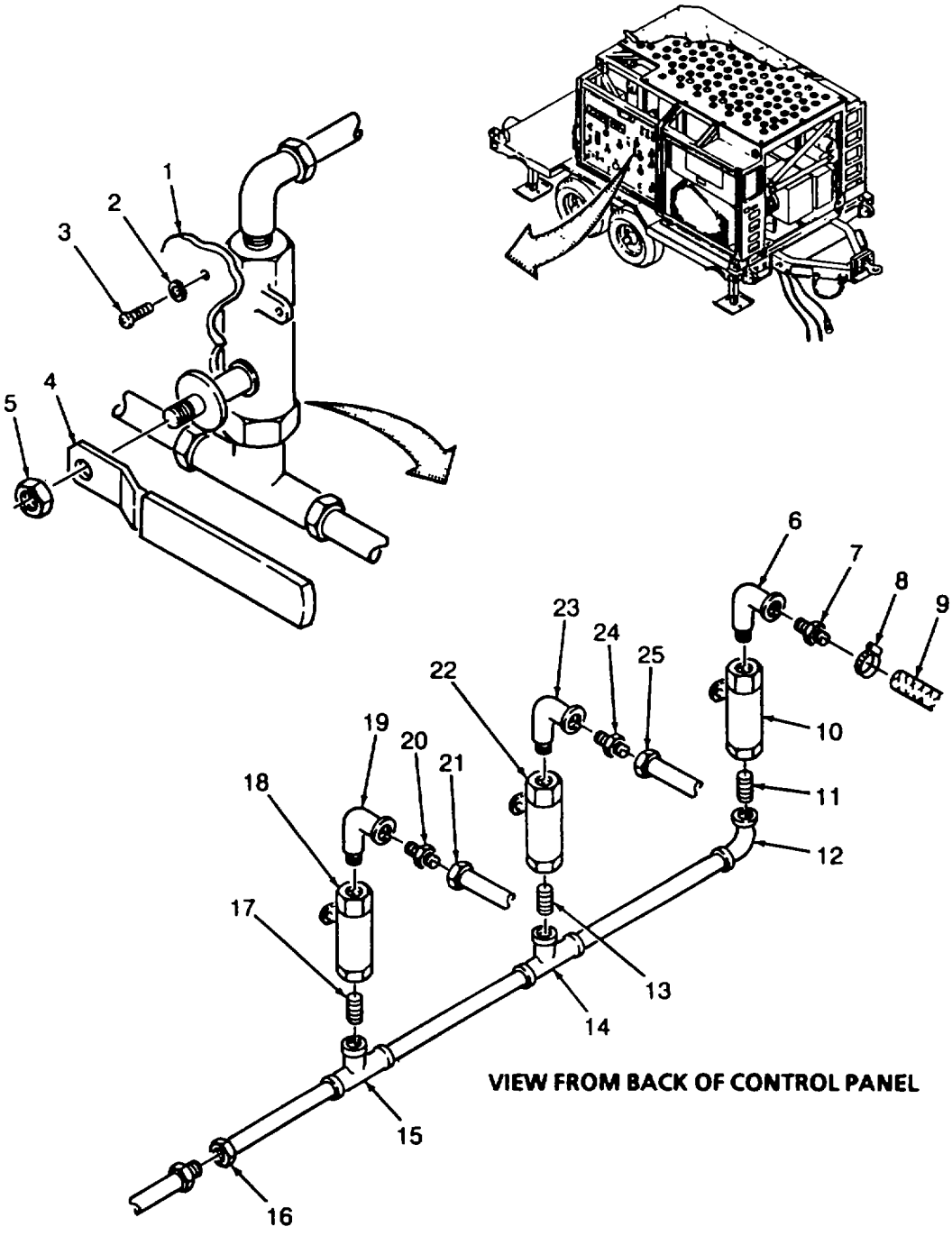
h. Remove three elbows (6, 23, and 19) from three valves (10, 22 and 18).

NOTE
Tag valves before removal.

i. Remove three valves (10, 22, and 18) and elbow (12) from nipples (11, 13, and 17).

j. Remove three nipples (11, 13, and 17) from tees (14 and 15) and elbow (12).

2-45. BALL VALVES (VENT VALVES) MAINTENANCE- continued.



2-45. BALL VALVE (VENT VALVES) MAINTENANCE - continued.

INSTALLATION

a. Apply antiseize tape to all male pipe threads. Be sure tape is wrapped in same direction as threads

b. Install three nipples (17, 13, and l)on three valves(18, 22,10).

c. Install three elbows (19, 23, and 6) on three valves (18,22, and 10).

d. Install three valves (18, 22, ad 10) on two pipe tees (15 and 14) and elbow (12) as tagged.

e. Install three adapters (20, 24, and 7).

f. Working at rear of control panel (1), position three valves (18, 22, and 10) and attached parts in unit with valves alined with cutouts and screw holes in control panel (1).

g. Connect union (16).

h. Connect tubes (21 and 25).

i. Install flexible tubing (9) on adapter (7). Slide hose clamp (8) on flexible tubing and tighten hose clamp.

j. Working at front of control panel (1), install six screws (3) and lockwashers (2).

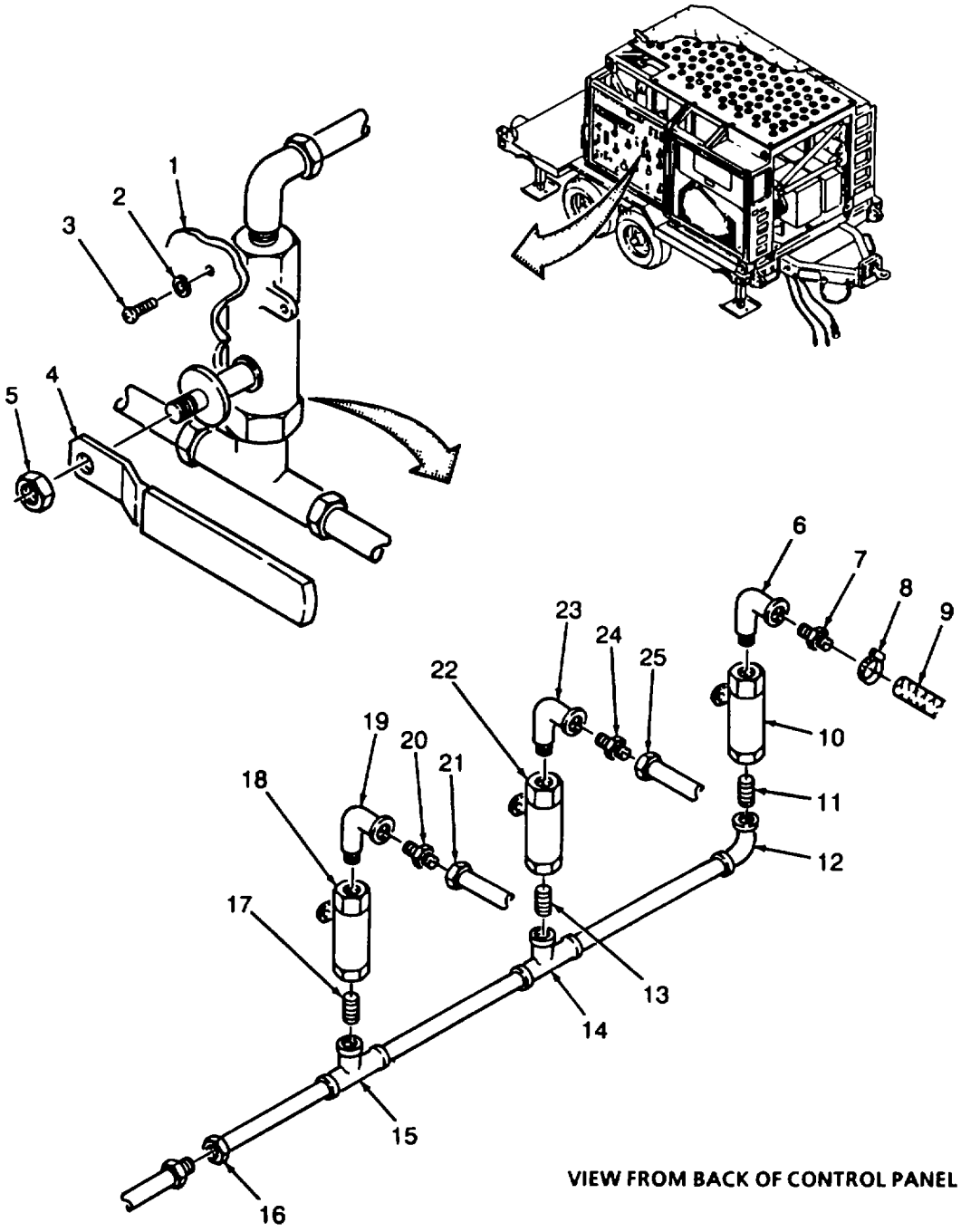
NOTE

The cartridge filter, pulse dampener, and multimedia filter vent valve handles are installed the same. One is shown, the others are similar.

k. Position handles (4) on valves as tagged, and install nuts (5).

l. Operate ROWPU (TM 1--4610-240-10). Check for leaks and proper operation.

2-45. BALL VALVES (VENT VALVES) MAINTENANCE - continued.



2-46. DIFFERENTIAL PRESSURE GAGE (CARTRIDGE FILTER) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Lockwasher (3) - MS35338-137
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-24010).
Power shutdown (power source manual)
ROWPU piping drained (TM 10-4610-240-10).
General Safety Instructions

WARNING

ROWPU piping and equipment can contain extremely high pressure during and after operation. If this pressure is not relieved before performing maintenance, serious injury or death may result Be sure to open all drains and vents before performing maintenance.

REMOVAL

a. Remove tubing (11) adapter (10), and elbow (9) from differential gage (7).

b. Remove tubing (1) and adapter (2) from tee (3).

c. Remove tubing (5) and adapter (4) from tee (3).

d. Remove tee (3) nipple (14) from differential gage (7).

e. Remove three nuts (12), lockwashers (13) and screws (6).

f. Remove differential gage (7) from control panel (8).

INSTALLATION

a. Position differential gage (7) in control panel (8).

b. Install three screws (6), lockwashers (13) and nuts (12).

c. Apply anti-seize tape to male fittings. Be sure to wrap tape in same direction as pipe thread.

d. Install nipple (14) and tee (3) on differential gage (7).

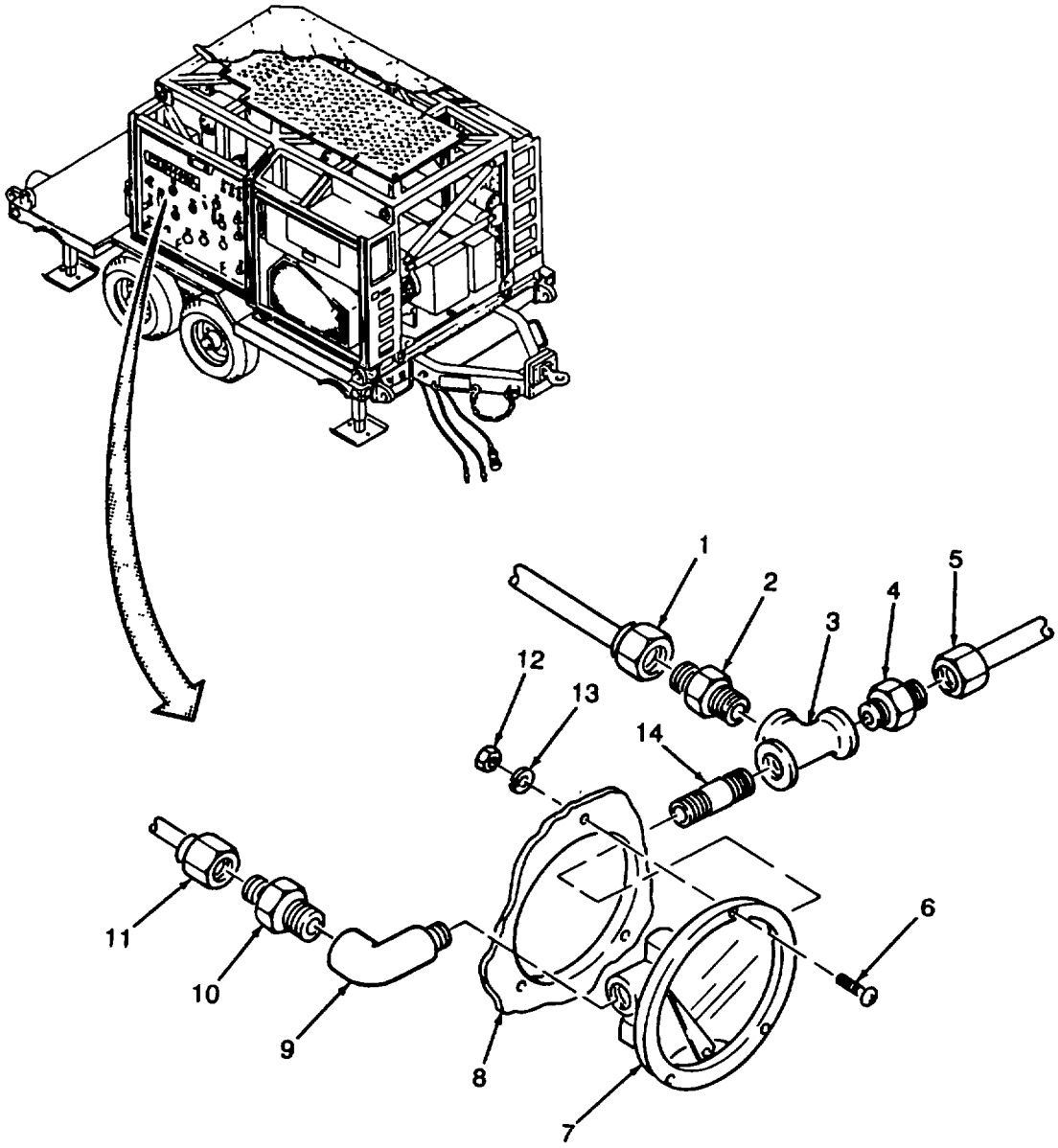
e. Install adapter (4) and tubing (5) on tee (3).

2-46. DIFFERENTIAL PRESSURE GAGE (CARTRIDGE FILTER) MAINTENANCE - continued.

f. Install adapter (2) and tubing (1) on tee (3).

g. Install elbow (9), adapter (10), and tubing (11) on differential gage (7).

h. Operate ROWPU (TM 104610-240-10). Check for leaks and proper operation.



2-47. FLOW METER (BRINE WATER) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Vice (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Tape, insulating (Appendix C, Section II, Item 32)
- Gasket - M103873DO2
- Lockwasher (2) - MS35338-139
- Lockwasher (2) - MS35338-140

Equipment Condition
- Reference
  - ROWPU shutdown (TM 10-4610-240-10).
  - Power shutdown (power source manual)
  - ROWPU piping drained (TM 10-4610-240-10).

REMOVAL

a. Remove cap (1) from pipe section (3).

b. Remove two nuts (10), lockwashers (9), flat washers (8), and screw (5).

c. Loosen two nuts (6) and remove clamp halves (4).

d. Remove two nuts (17) lockwashers (16), and bracket (15) from studs (20).

e. Remove two nuts (11), screws (13), clamp halves (12), and gasket (14).

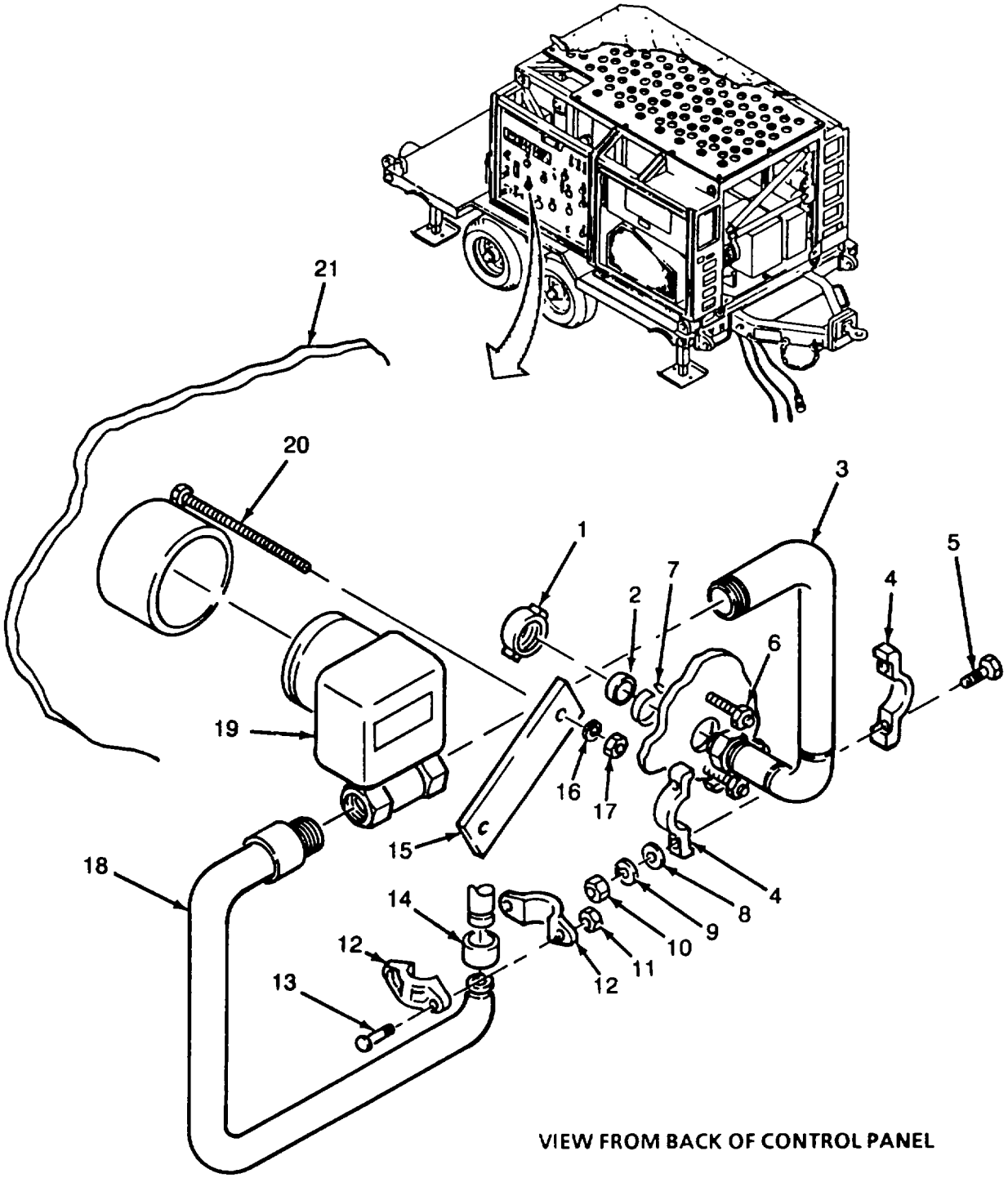
f. Tilt pipe sections (3 and 18) and remove from control panel (21) with flowmeter (19) attached.

NOTE
Tag ends of pipe sections before removal.

g. Place flowmeter (19) in vice and remove pipe sections (18) and (3) from flowmeter.

h. Remove ring filler (2) and insulating tape (7) from pipe section (3).

2-47. FLOW METER (BRINE WATER) MAINTENANCE - continued.



2-47. FLOW METER (BRINE WATER) MAINTENANCE - continued.

INSTALLATION

a. Apply antiseize tape to all male pipe threads. Be sure tape is wrapped in same direction as threads.

b Install pipe sections (18 and 3) on flowmeter (19) as tagged.

c Position flowmeter (19) face in cutout on control panel (21). End of pipe section (3) must extend through control panel cutout.

d. Position bracket (15) on two studs (20) and install lockwashers (16) and nuts (17).

e Install gasket (14), clamp halves (12), two screws (13), and nuts (11).

CAUTION

Piping can be badly damaged by corrosion if pipe section and ring filler are in contact. Be sure that insulating tape separates pipe section and ring filler.

f. Install insulating tape (7) and ring filler (2) on pipe section (3) where two-piece strap (4) will clamp.

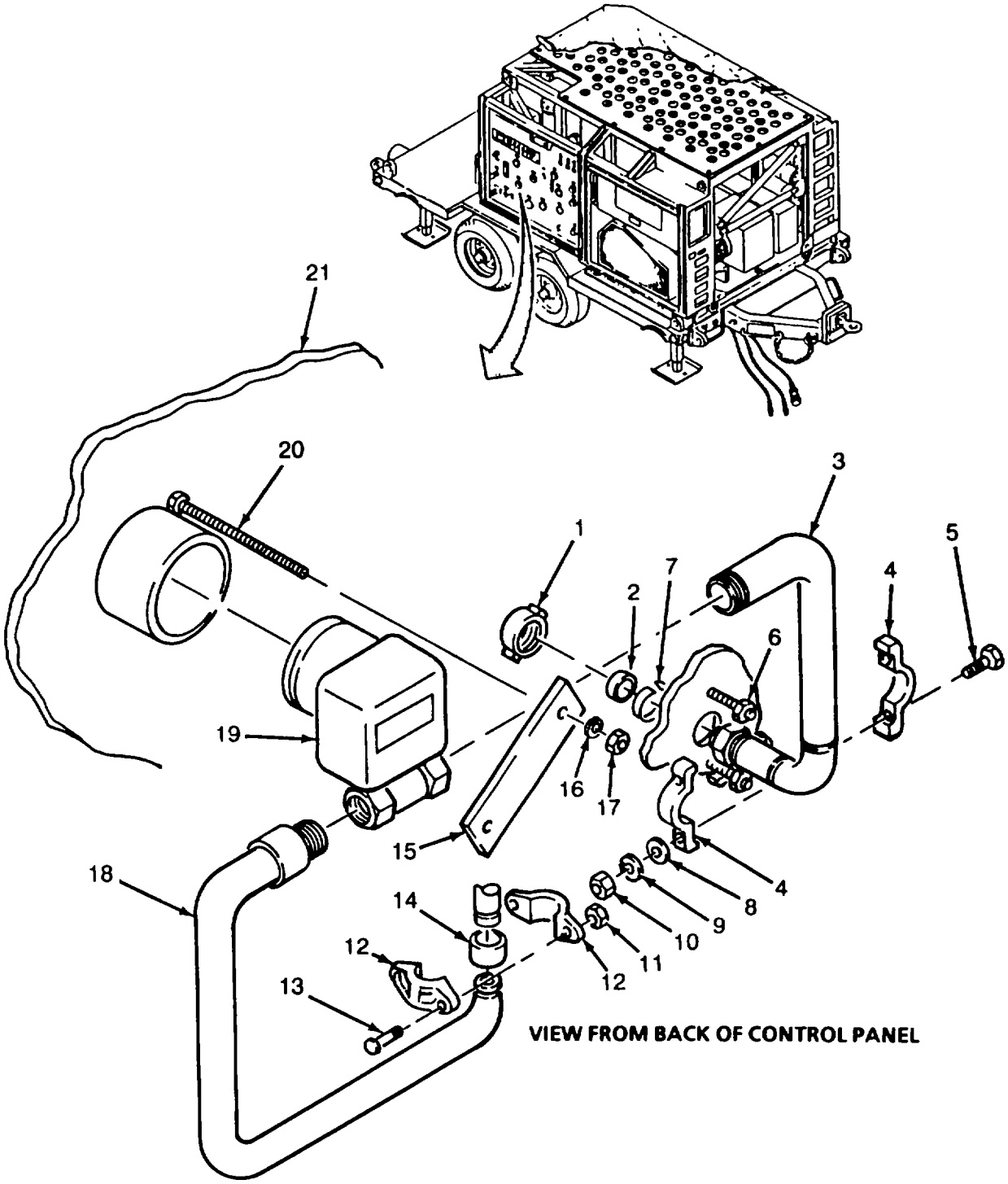
g. Position two-piece strap (4) on pipe section (3) and install two screws (5), flat washers (8), lockwashers (9) and nuts (10).

h. Tighten two nuts (6).

i. Install cap (1) on pipe section (3).

j. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.

2-47. FLOW METER (BRINE WATER) MAINTENANCE - continued.



2-48. NEEDLE VALVE (PRODUCT WATER REGULATING) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Pipe Wrench (Appendix B, Section III, Item 3)
Vice (Appendix B, Section III, Item 3)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Lockwasher (2) - MS35338-139
Gasket (2) - M103873-D02
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual)
ROWPU piping drained (TM 10-4610-240-10).

REMOVAL

a. Using punch, remove roll pin (3) and valve handle (2) from needle valve (18).

b. Remove two nuts (4) and screws (7), clamp halves (5), and gasket (6).

c. Remove two nuts (17) and screws (15), clamp halves (13), and gasket (14).

d. Remove two screws (12), lockwashers (11), flat washers (10), bar (9), and needle valve (18) with two adapters (8 and 16) from control panel (1).

e. Place needle valve (18) in vice and remove two adapters (8 and 16).

INSTALLATION

a. Apply antiseize tape to male pipe threads. Be sure to wrap tape in same direction as threads.

b. Install two adapters (16 and 8) on needle valve (18).

c. Position needle valve (18) and bar (9) on control panel (1) and install two flat washers (10), lockwashers (11), and screws (12).

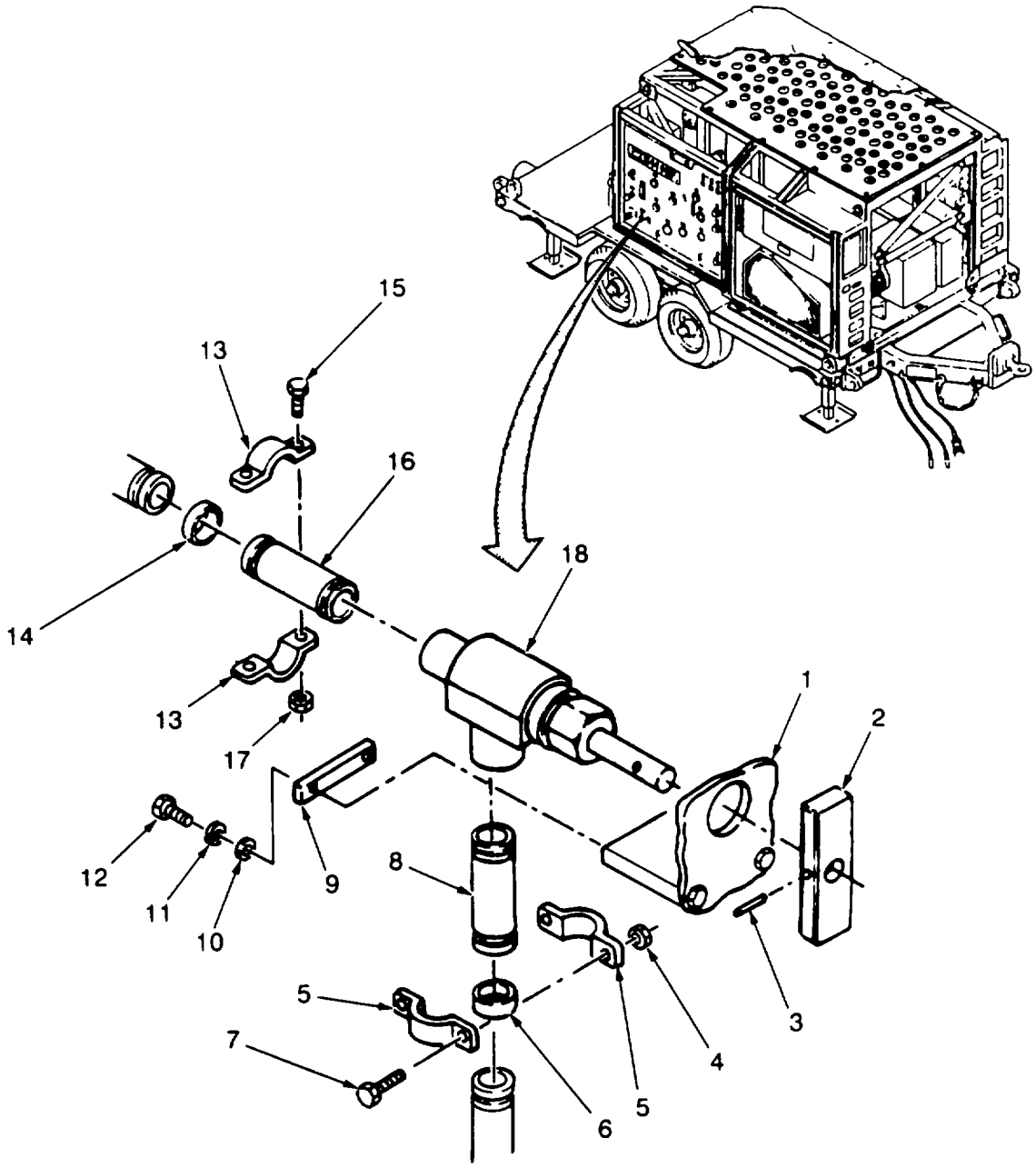
d. Install gasket (14), clamp halves (13), two screws (15), and two nuts (17).

e. Install gasket (6), clamp halves (5), two screws (7) and two nuts (4).

f. Position handle (2) and install roll pin (3).

g. Operate ROWPU (TM 104610-240-10). Check for leaks and proper operation

2-48. NEEDLE VALVE (PRODUCT WATER REGULATING) MAINTENANCE - continued.



2-49. DIFFERENTIAL PRESSURE GAGE (R. O. VESSELS) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Lockwasher (3) - MS35338-137
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).
General Safety Instructions

WARNING

ROWPU piping and equipment can contain extremely high pressure during and after operation. If this pressure is not relieved before performing maintenance, serious injury or death may result. Be sure to open all drains and vents before performing maintenance.

REMOVAL

a. Remove tubing (1), adapter (2), elbow (3) from differential gage (5).

b. Remove tubing (7) and adapter (8) from differential gage (5).

c. Remove three nuts (9), lockwashers (10), and screws (4).

d. Remove differential gage (5) from control panel (6).

INSTALLATION

a. Position differential gage (5) in control panel (6).

b. Install three screws (4), lockwashers (10) and nuts (9).

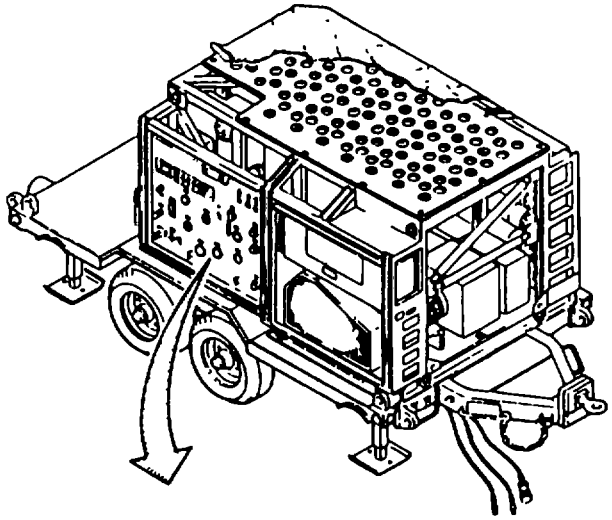
c. Apply anti-seize tape to male fittings Be sure to wrap tape in same direction as pipe thread.

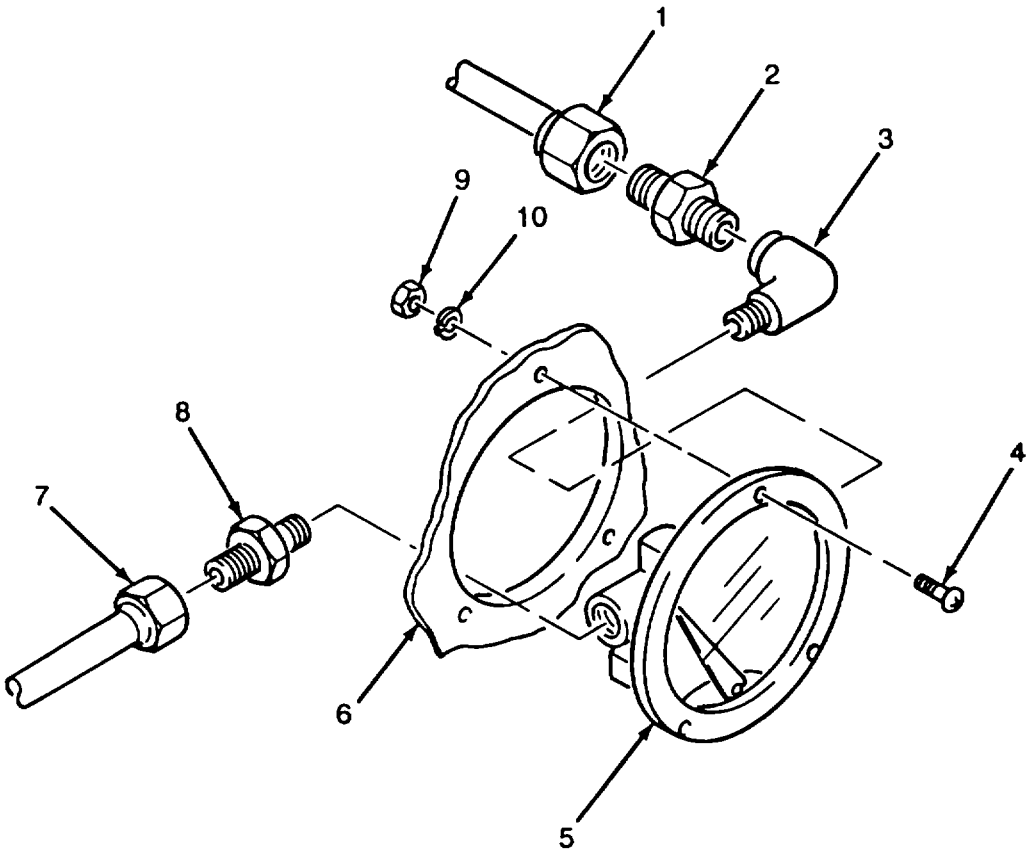
d. Install adapter (8) and tubing (7) on differential gage (5).

e. Install elbow (3), adapter (2), and tubing (1) on differential gage (5).

f. Operate ROWPU (TM 1-4610-240-10). Check for leaks and proper operation.

2-49. DIFFERENTIAL PRESSURE GAGE (R. O. VESSELS) MAINTENANCE- continued.





2-50. 2-WAY VALVE (ON/OFF) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual)

REMOVAL

NOTE

Three are four 2-way valves on the ROWPU All are removed and installed the same. One is shown, the others are similar.

a. Loosen clamp 7), and remove flexible tubing (8) from adapter (6).

b Loosen clamp (3), and remove flexible tubing (2) from adapter (4).

c. Remove valve (5) from bracket (1).

d. Remove two adapters (4 and 6) from valve (5).

INSTALLATION

a. Apply antiseize tape to male pipe threads. Be sure tape is wrapped in same direction as threads.

b. Install adapters (4 and 6) on valve (5).

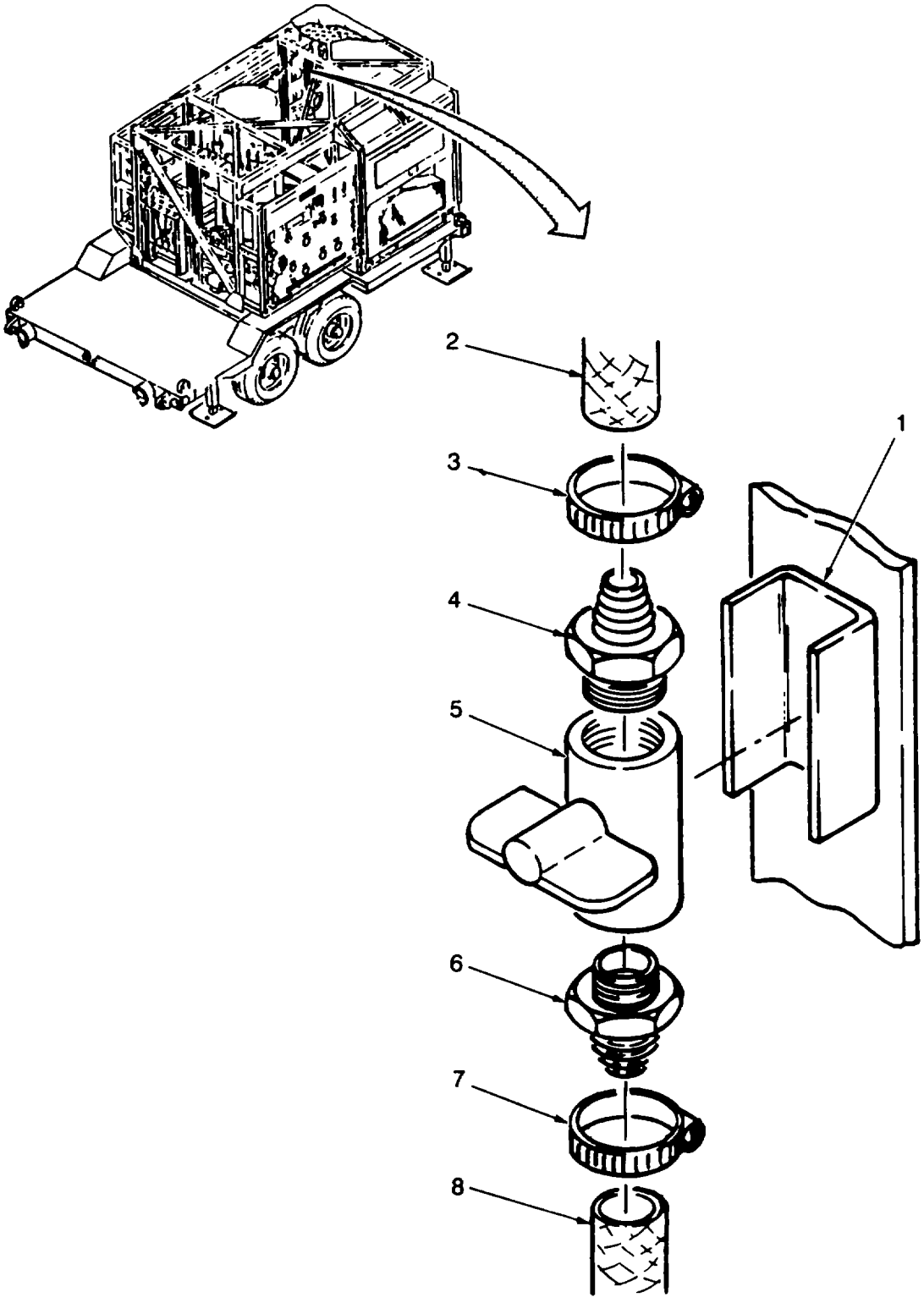
c. Install valve (5) on bracket (1).

d. Install flexible tube (2) and clamp (3) on adapter (4). Tighten clamp.

e. Install flexible tube (8) and clamp (7) on adapter (6). Tighten clamp

f. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.

2-50. 2-WAY VALVE (ON/OFF) MAINTENANCE - continued.



2-51. BALL VALVES (DRAIN) MAINTENANCE.

This task consists of. a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B. Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Lockwasher (2) - MS35338- 138
Equipment Condition
Reference
ROWPU shutdown (TM 10-61-24-10).
Power shutdown (power source manual)
ROWPU piping drained(TM 10461-24-10).

REMOVAL

NOTE
There are seven train ball valves. All are removed the same. One is shown, the others are similar.

a Remove tube (3) from adapter (4).

NOTE
Tag drain ball valves before removal Valves must be installed in same location from which removed.

b. Remove nut (1) and handle (2) from drain ball valve (5)

c. Support drain ball valve (5) and remove two screws (7) and lockwashers (8)

d. Lower drain ball valve (5) and tilt to remove from hole in bracket (6)

e. Remove adapter (4) from drain ball valve (5).

INSTALLATION

NOTE

- **There are seven drain ball valves All are installed the same. One is shown, the others are similar.**
- **Install drain ball valve in position tagged during removal.**

a. Apply antiseize tape to male pipe threads. Be sure tape is wrapped in same direction as threads.

b. Install adapter (4) on drain ball valve (5).

2-51. BALL VALVES (DRAIN) MAINTENANCE - continued.

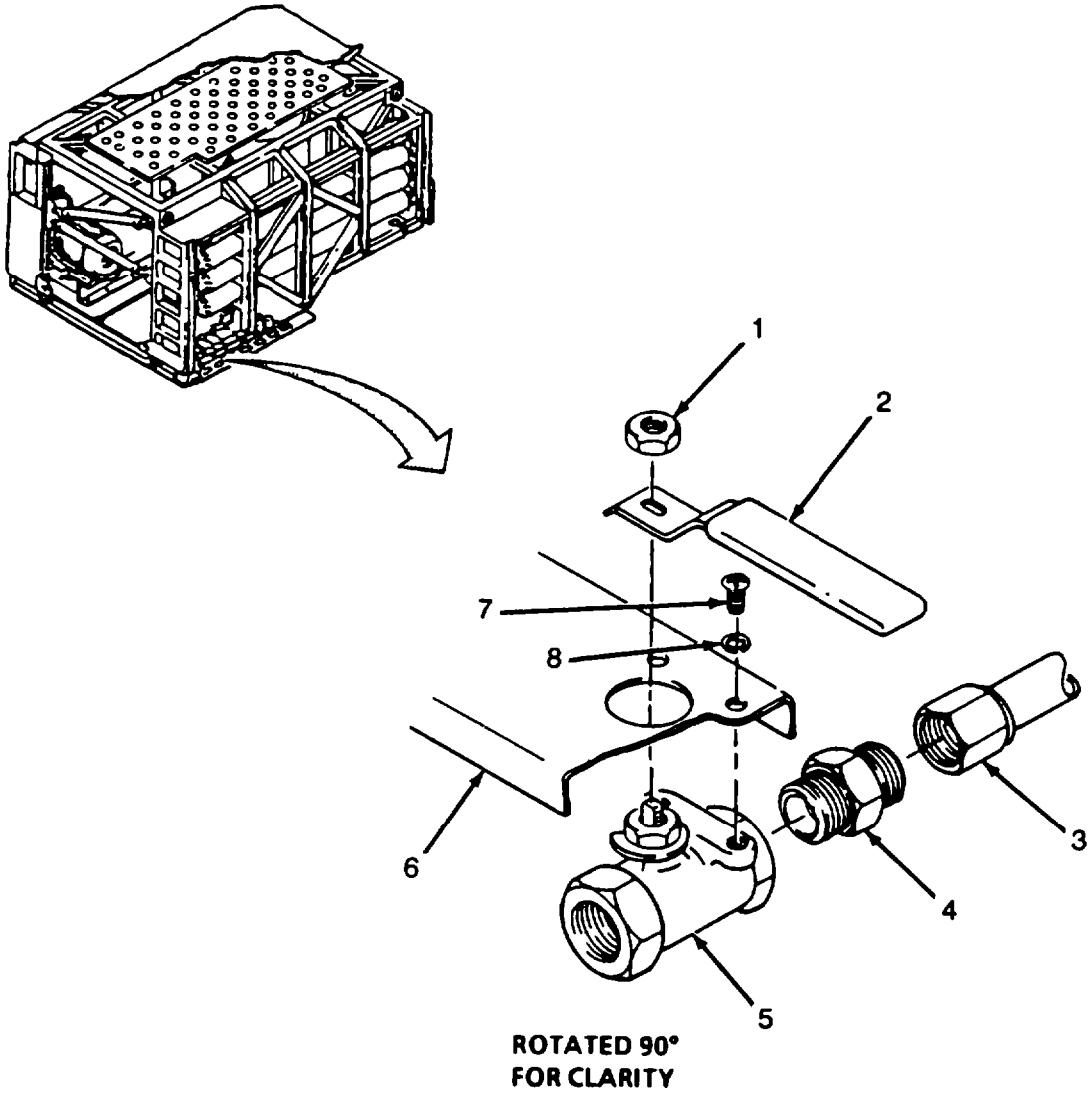
c. Position drain ball valve (5) in bracket (6) and Install two lockwashers (8) and screws (7) finger tight.

d. Install handle (2) and nut (l) on drain ball valve (5).

e. Install tube (3) on adapter (4).

f. Tighten two screws (7).

g. Operate ROWPU (TM 10-161-240-10). Check for leaks and proper operation.



2-52. 3-WAY BALL VALVE (BACKWASH) MAINTENANCE.

This task consists of a. Removal b. Installation c. Installation

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B. Section III, Item 4)
Vice (Appendix B. Section III, Item 3)
Pipewrench (Appendix B. Section III, Item 3)

Material/Parts Required

Tape, Anti-seize (Appendix C, Section II, Item 30)
Detergent (Appendix C, Section II, Item 10)
Rags, wiping (Appendix C, Item 23)
O-ring - 0200A100-1105A-210
O-ring- 0200A100-1105A-214
O-ring- 0200A100-1105A-239
Gasket- 103873D04
Gasket (2) - 103873D05
Lockwasher (4) - MS35338-139

Equipment Condition

Reference
ROWPU shutdown (TM 10-61-24-10).
Power shutdown (power source manual)
ROWPU piping drained (TM 10-61-240-10).

General Safety Instructions

WARNING

ROWPU piping and equipment can contain extremely high pressure during and after operation. If this pressure is not relieved before performing maintenance, serious injury or death may result. Be sure to open all drains and vents before performing maintenance.

REMOVAL

a. Remove nut (14), flat washer (15), and handle (131 from 3-way valve (24).

b. Remove two nuts (21), screws (17), clamp halves (16), and gasket (18).

c. Remove two nuts (2), screws (19), clamp halves (1), and gasket (23).

d. Remove two nuts (6), screws (3), clamp halves (4), and gasket (5).

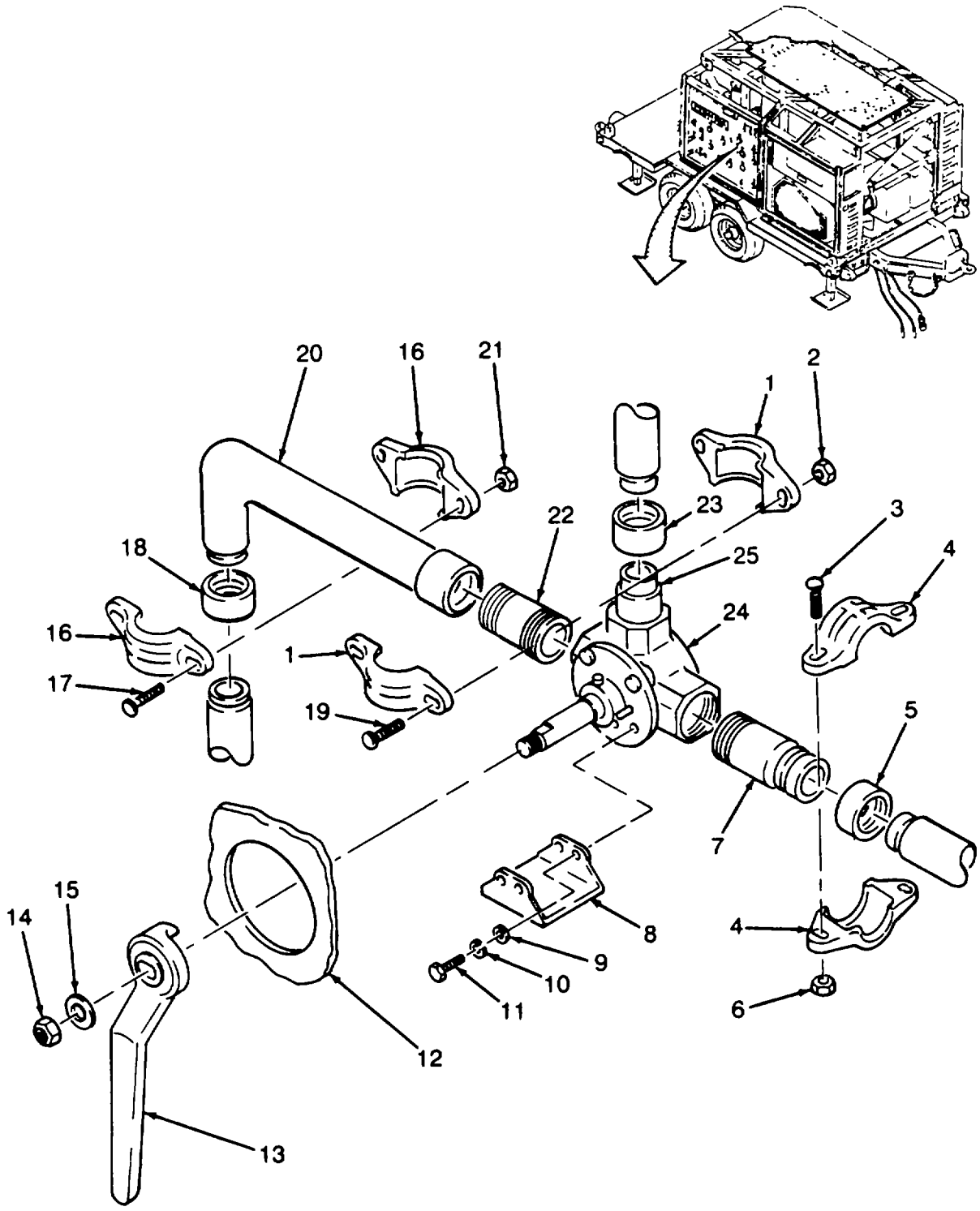
e. Remove four screws (11), lockwashers (10), and flat washers (9) from bracket (8).

f. Disconnect electrical cable (W52) from control box (J8).

g. Remove 3-way valve (24) and attached parts from control panel (12).

h. Place 3-way valve (24) In vice and remove pipe section (20), check valve (22) and adapters (7 and 25).

2-52. 3-WAY BALL VALVE (BACKWASH) MAINTENANCE -continued.



2-52. 3-WAY BALL VALVE (BACKWASH) MAINTENANCE -continued.

REPAIR

a Disassembly

NOTE
Mark location of collar on rotor shaft before removal.

(1) Loosen two setscrews (38) and remove collar (39).

NOTE
Mark location of cap on body before removal.

(2) Remove four screws (37), lockwashers (36), and cap (35).

(3) Remove three o-rings (34, 33, and 32) and washer (31) from rotor shaft (30).

(4) Pull rotor shaft (30) from body (26).

(5) Separate rotor shaft (30) from port (28) and remove key (29).

(6) Remove washer (27) from body (26).

b. Cleaning.

(1) Wash all components with clean water and detergent.

(2) Rinse components in clean water and dry with wiping rag.

c. Inspection.

(1) Inspect all threaded components for damaged threads.

(2) Inspect rotor shaft (30) and port (28) for deep scratches and corrosion.

(3) Inspect body (26) for cracks and corrosion.

d. Repair.

(1) Replace damaged components.

(2) Replace all wrings.

e. Assembly.

(1) Install washer (27) in body (26).

(2) Install key (29) and rotor shaft (30) in port (28).

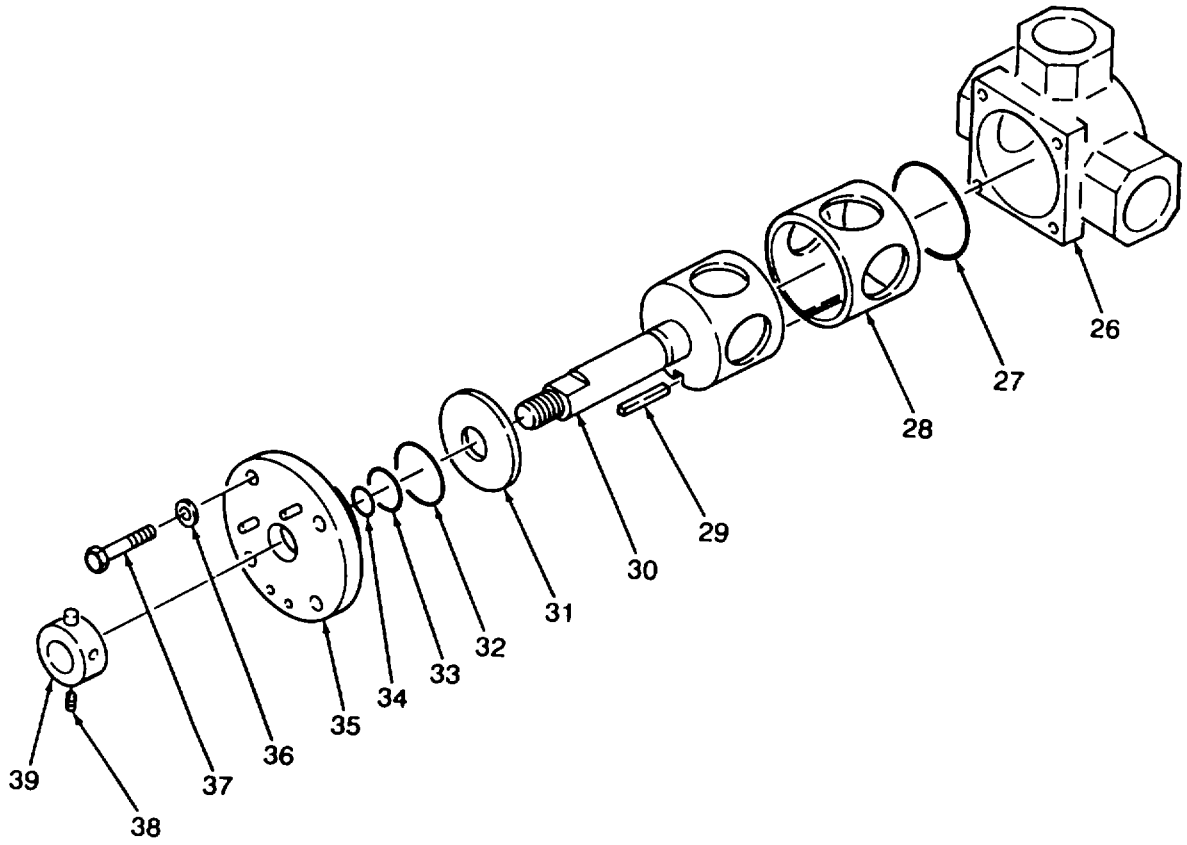
(3) Install rotor shaft (30) and port (28) in body (26).

(4) Install washer (31) and three o-rings (32, 33, and 34) on rotor shaft (30).

2-52. 3-WAY BALL VALVE (BACKWASH) MAINTENANCE -continued.

(5) Install cap (35), four lockwashers (36), and four screws (37) on body (26) as marked during disassembly.

(6) Position collar (39) on rotor shaft (30) and tighten setscrews (38) as marked during disassembly.



2 52. 3-WAY BALL VALVE (BACKWASH) MAINTENANCE -continued.

INSTALLATION

a. Apply anti-seize tape to male fittings. Be sure to wrap tape in same direction as pipe thread.

b. Place 3-way valve (24) In vice and install check valve (22), pipe section (20), and adapters (7 and 25)

c. Position 3-way valve (24) and attached parts in control panel (12). Align mounting holes in valve with holes in bracket (8).

d. Install four lockwashers (10), flat washers (9), and four screws (11) through bracket (8) and into 3-way valve (24).

e. Install gasket (5), clamp halves (4), two screws (3), and two nuts (6).

f. Install gasket (23), clamp halves (1), two screws (19), and two nuts (2).

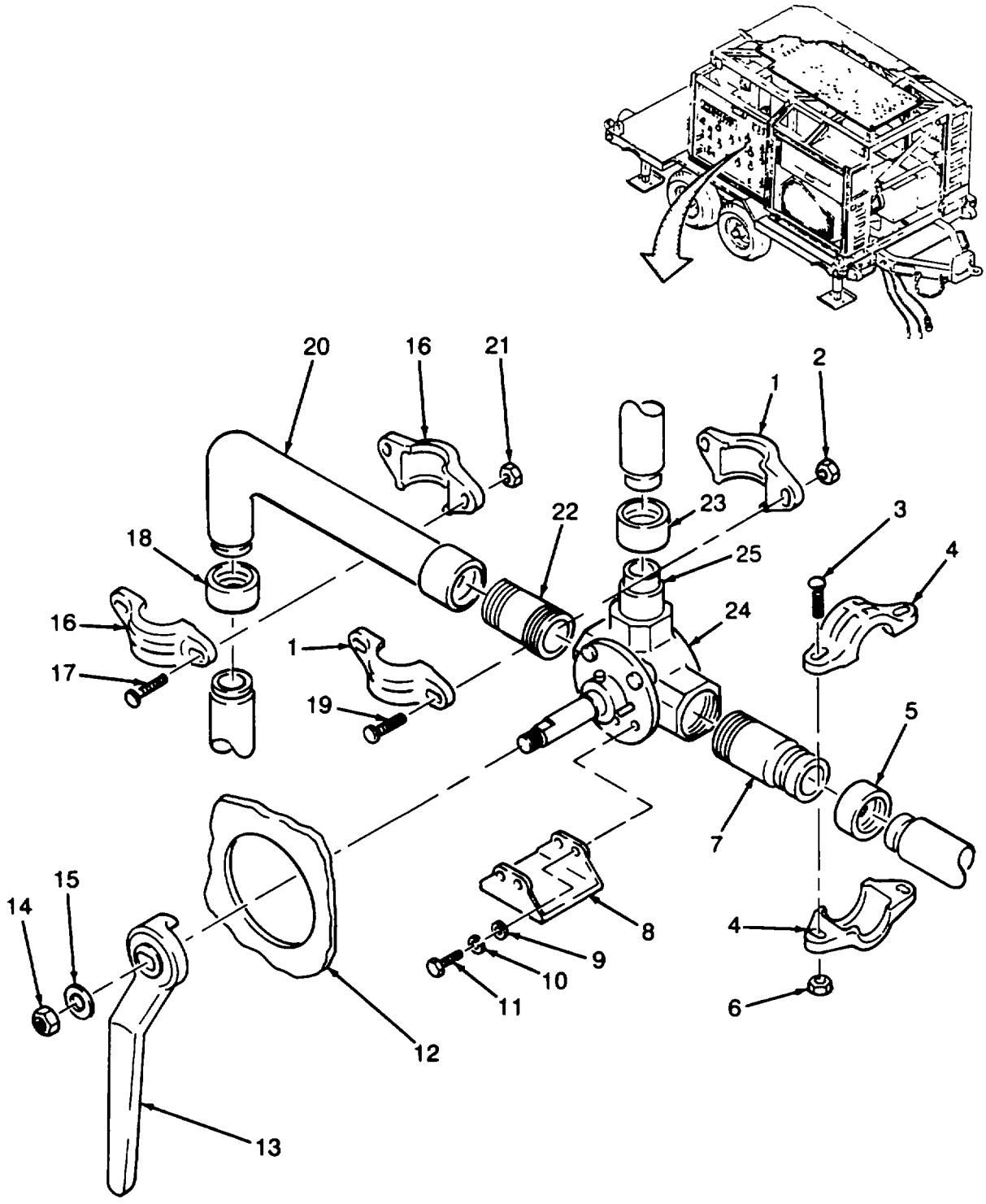
g. Install gasket (18), clamp halves (16), two screws (17), and two nuts (21).

h. Connect electrical cable (W52) to control box.

i. Install handle (13), net washer (15), and nut (14).

j. Operate ROWPU (TM 10-461-240-10). Check for leaks and proper operation.

2 52. 3-WAY BALL VALVE (BACKWASH) MAINTENANCE -continued.



2-53. CHECK VALVE (BACKWASH) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B. Section III, Item 4)
- Vice (Appendix B. Section III, Item 3)
- Pipe Wrench (Appendix B. Section III, Item 3)

Materials/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)

Equipment Condition
- Reference
  - ROWPU shutdown (TM 1-4610-240-10).
  - Power shutdown (power source manual)
  - ROWPU piping drained (TM 10-461-240-10).
  - 3-Way ball valve (backwash) removed (para. 2-52).

REMOVAL

Remove check valve (1) from pipe section (2).

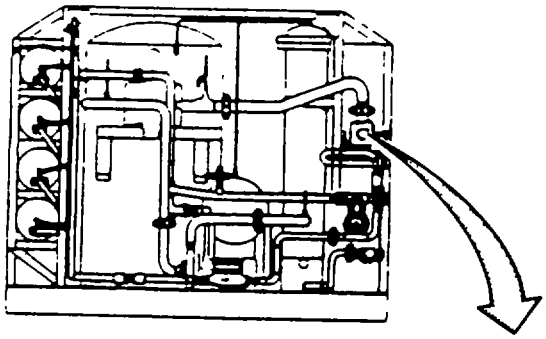
INSTALLATION

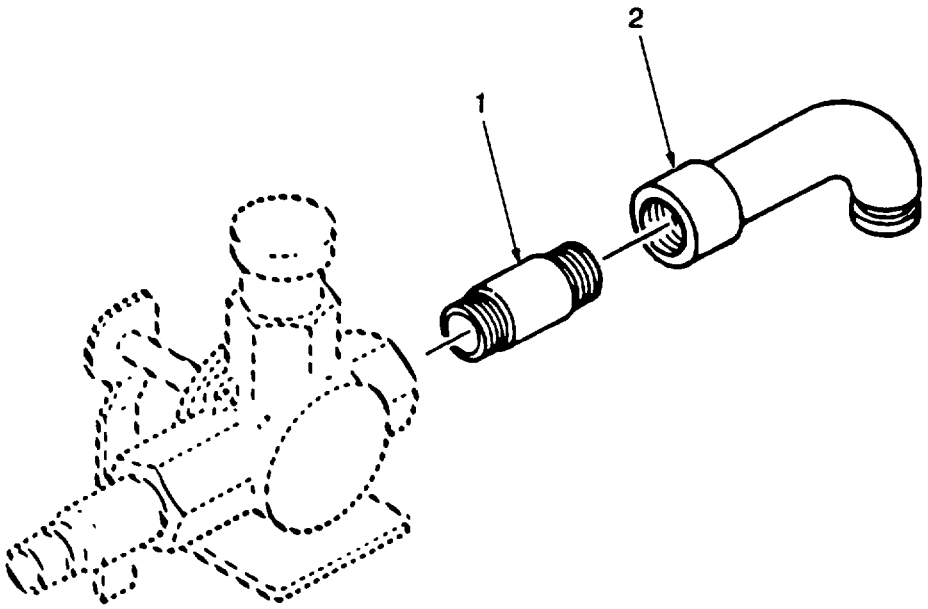
a. Apply antiseize tape to male pipe threads Be sure tape is wrapped in same direction as threads.

b. Install check valve (1) on pipe section (2).

c. Operate ROWPU (TM 1-461-24-10). Check for leaks and proper operation.

2-53. CHECK VALVE (BACKWASH) MAINTENANCE - continued.





2-54. WATER METER (FLOW RATE INDICATOR) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B. Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual)
ROWPU piping drained (TM 1-4610-24-10).

REMOVAL

a. Disconnect two unions (1 and 3).

b. Remove water meter (2) from unit.

INSTALLATION

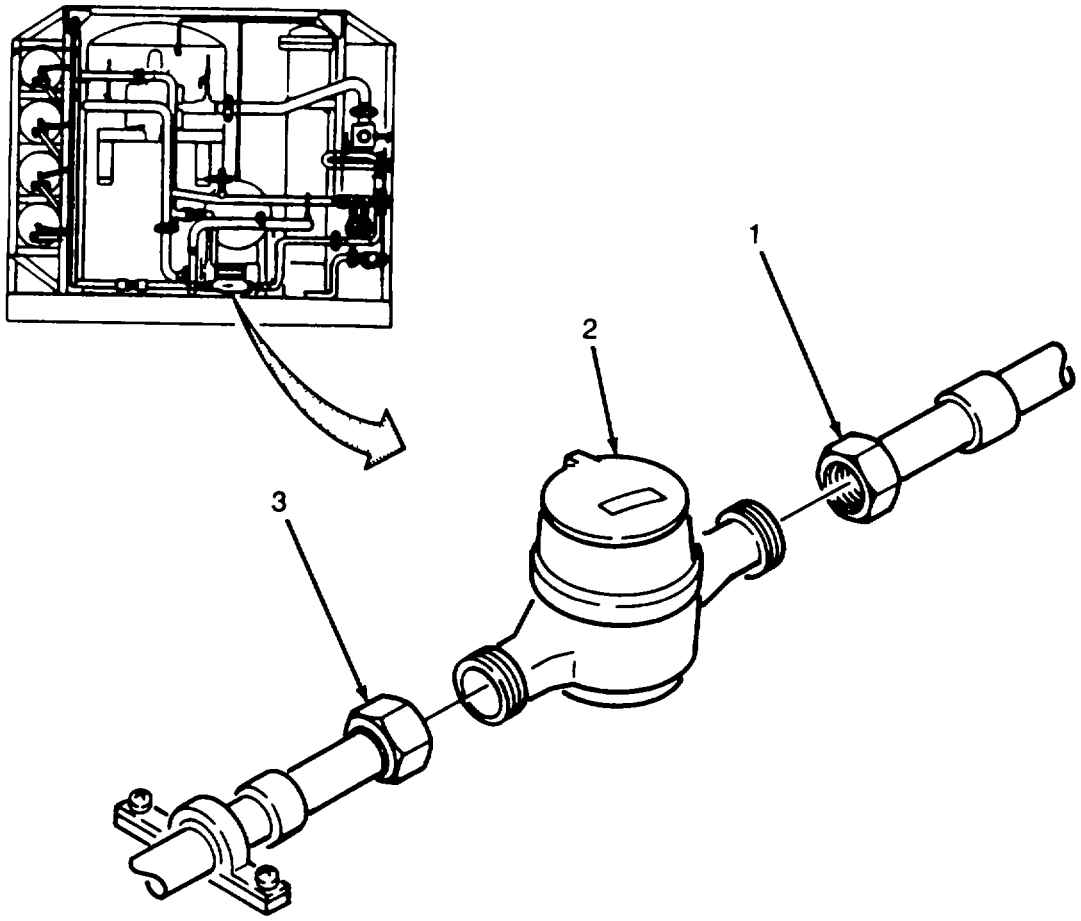
a. Apply antiseize tape to male pipe threads Be sure tape is wrapped in same direction as threads.

b. Position water meter (2) between unions (1 and 3).

c. Connect and tighten unions (1 and 3).

d. Operate ROWPU (TM 10-61-240-10). Check for leaks and proper operation.

2 54 WATER METER (FLOW RATE INDICATOR) MAINTENANCE - continued.



2-55. VACUUM BREAKER MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B. Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).

REMOVAL

a. Remove vacuum breaker (3) and adapter (2) from tee (1).

b. Remove adapter (2) from vacuum breaker (3).

INSTALLATION

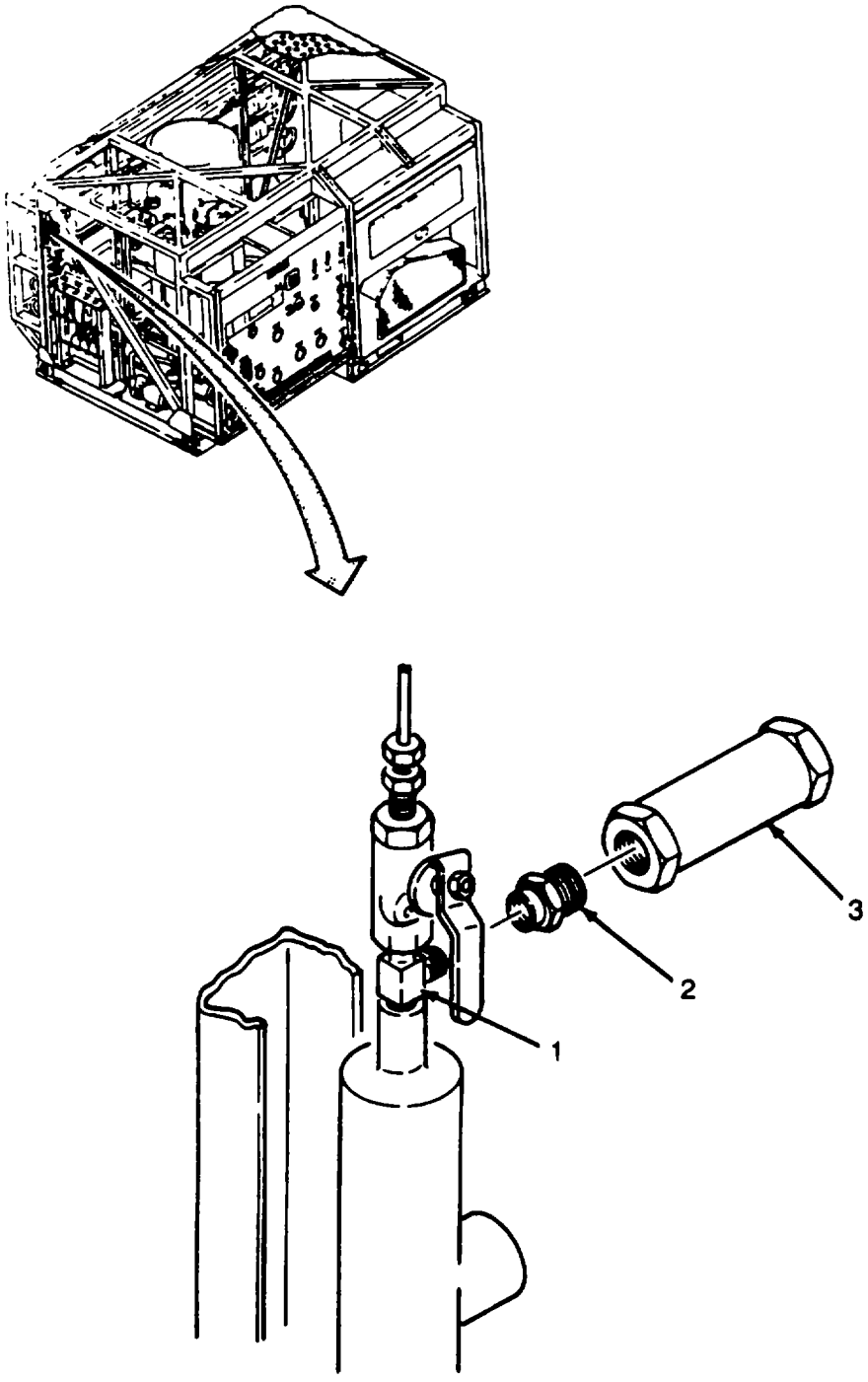
a. Apply anti-seize tape to male fittings Be sure to wrap tape in same direction as pipe thread

b. Install adapter (2) in vacuum breaker (3).

c. Install vacuum breaker (3) and adapter (2), on tee (1).

d. Operate ROWPU (TM 1(-610-240-10). Check for leaks ant proper operation.

2-55. VACUUM BREAKER MAINTENANCE-continued.



2-56. DIFFERENTIAL PRESSURE GAGE (MULTIMEDIA FILTER) MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B. Section III, Item 4)
Material/Parts Required
Tape, Anti-seize(Appendix C, Section II, Item 30)
Lockwasher (3) MS35338-137
Equipment Condition
Reference
ROWPU shutdown (TM 10-610-240-10)
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-24-10).
General Safety Instructions

WARNING

ROWPU piping and equipment can contain extremely high pressure during and after operation If this pressure is not relieved before performing maintenance, serious injury or death may result. Be sure to open all drains and vents before performing maintenance.

REMOVAL

a. Remove tubing (2) and adapter (1) from differential gage (4).

b. Remove tubing (6) and adapter (7) from differential gage (4).

c. Remove three nuts (8), lockwashers (9) and screws (3).

d. Remove differential gage (4) from control panel (5).

INSTALLATION

a. Position differential gage (4) in control panel (5).

b. Install three screws (3), lockwashers (9) and nuts (8).

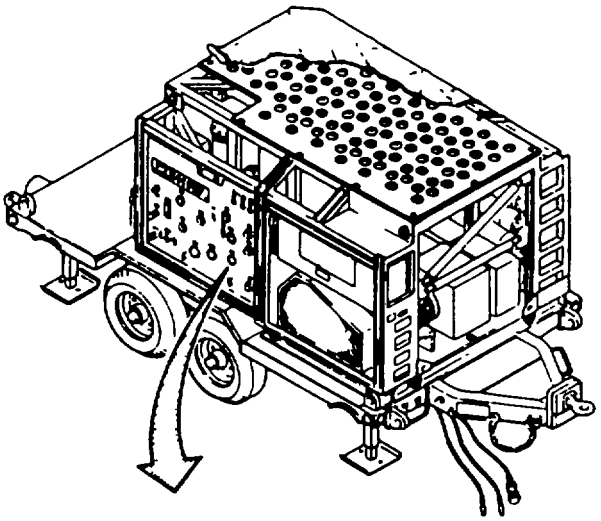
c. Apply anti-seize tape to male fittings. Be sure to wrap tape in same direction as pipe thread.

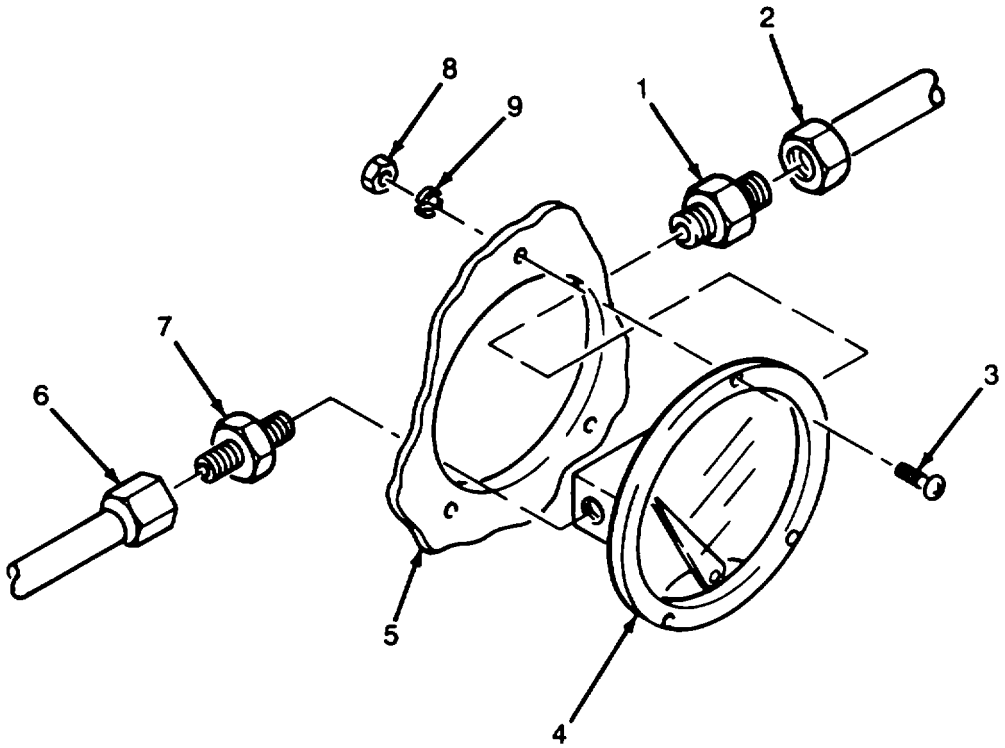
d. Install adapter (1) and tubing (2) on differential gage (4).

e. Install adapter (7) and tubing (6) on differential gage (4).

f. Operate ROWPU (TM 10-61-24-10). Check for leaks and proper operation.

2 56. DIFFERENTIAL PRESSURE GAGE (MULTIMEDIA FILTER) MAINTENANCE - continued.





2-57. FLOW METER (BACKWASH) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B. Section III, Item 4)
- Pipewrench (Appendix B. Section III, Item 3)
- Vice (Appendix B. Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Tape, Insulating (Appendix C, Section II, Item 32)
- Gasket- M103873D05

Equipment Condition
- Reference
  - ROWPU shutdown (TM 10 4610-240-10).
  - Power shutdown (power source manual)
  - ROWPU piping drained (TM 10-461-240-10).

REMOVAL

a. Remove cap (19) from pipe section (11).

b. Loosen two nuts (16) on studs (15).

c. Remove two nuts (12), lockwashers (13), and screws (18).

d. Remove two-piece strap (14), ring filler (22), and insulating tape (17) from pipe section (11).

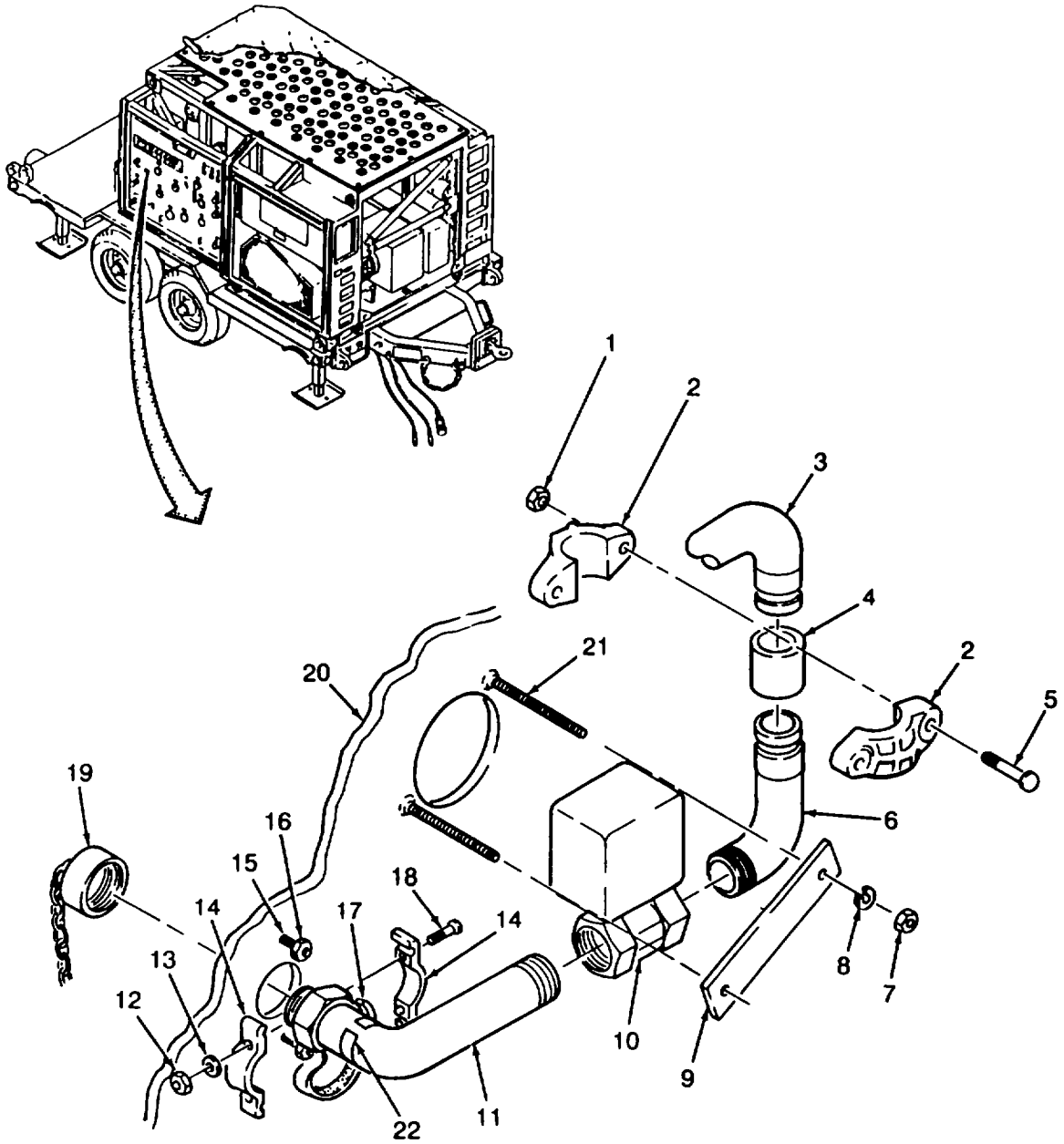
e. Remove two nuts (1), screws (5), clamp halves (2), and gasket (4) from pipe sections (3 and 6).

f. Remove two nuts (7), lockwashers (8), and bracket clamp (9) from two studs (21).

g. Remove flowmeter (10) with pipe sections(6 end 11) from beck of control panel (20).

h. Place flowmeter (10) in vice and remove two pipe sections (6 and 11).

2 57. FLOW METER (BACKWASH) MAINTENANCE - continued.



VIEW FROM BACK OF CONTROL PANEL

2-57. FLOW METER (BACKWASH) MAINTENANCE - continued.

INSTALLATION

a. Apply anti-seize tape to male pipe fittings Be sure tape is wrapped in same direction as pipe thread

b. Install pipe sections (11) and (6) on flowmeter (10)

c. Position flowmeter (10) In cutout on control panel (20)

d. Install gasket (4), clamp halves (2), two screws (5) and nuts (1) on pipe sections (3 and 6).

e. Wrap pipe section (11) with insulating tape (17) and install ring filler (22) Install two-piece clamp (14) on pipe section (11) and two studs (15)

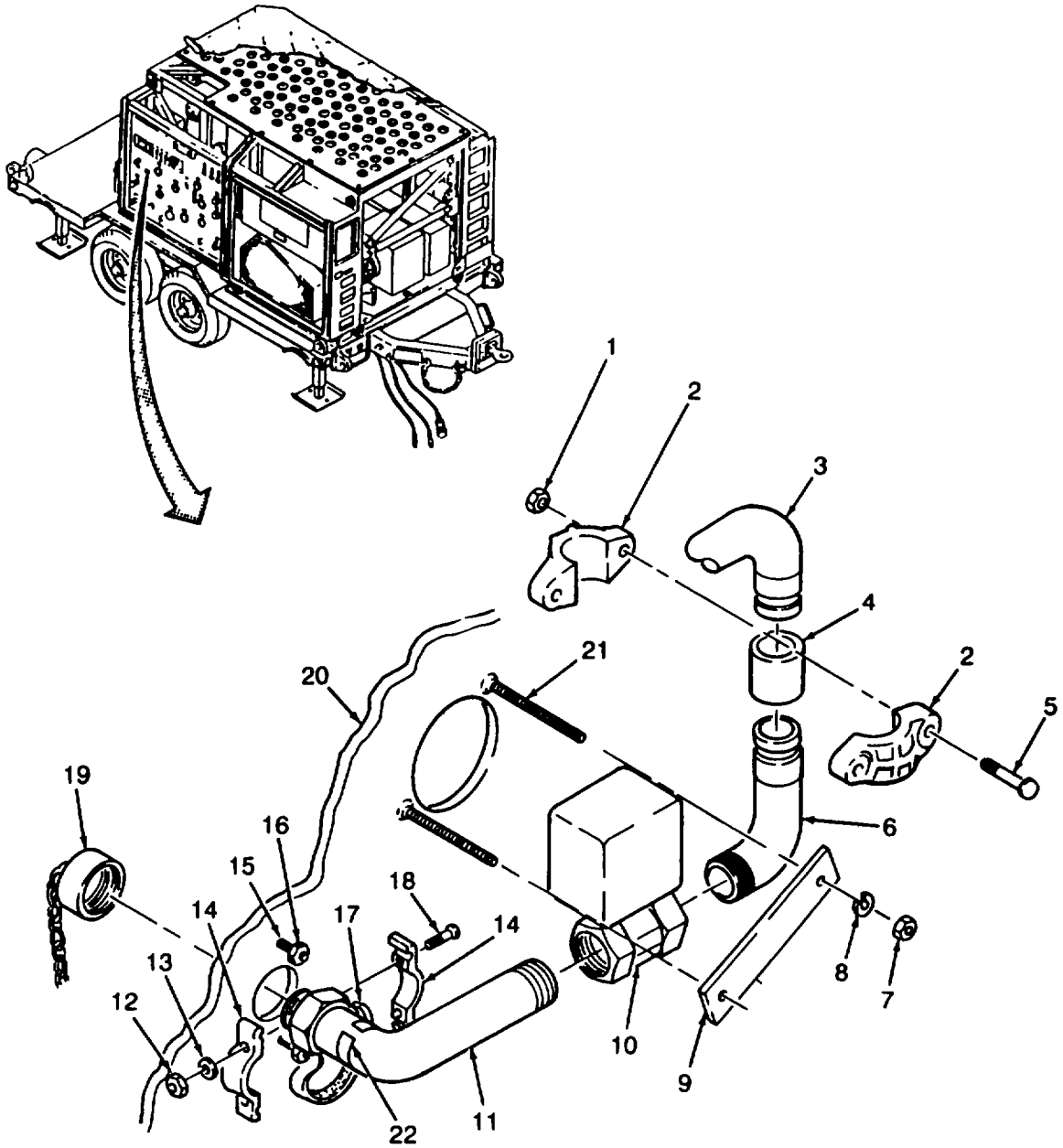
f. Install two screws (18), lockwashers (13), and nuts (12) Tighten two nuts (16)

g. Position bracket clamp (9) on two studs (21) and install two lockwashers (8) and nuts (7).

h. Install cap (19) on pipe section (11)

i. Operate ROWPU (TM 10 4610-240-10). Check for leaks and proper operation.

2-57. FLOW METER (BACKWASH) MAINTENANCE - continued.



VIEW FROM BACK OF CONTROL PANEL

2-58. PRESSURE GAGE (R.O.) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material / Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).

REMOVAL

a. Disconnect three tubes (1, 8, and 9) from distribution block (2).

b. Remove distribution block (2) from pressure gage (7).

c. Remove two nuts (3), lockwashers (4), and bracket (5).

c. Remove pressure gage (7) from front of control panel (6).

INSTALLATION

a. Apply anti-seize tape to all male pipe fitting threads. Make sure tape is wrapped in same direction as pipe threads.

b Position pressure gage (7) in cutout on control panel (6).

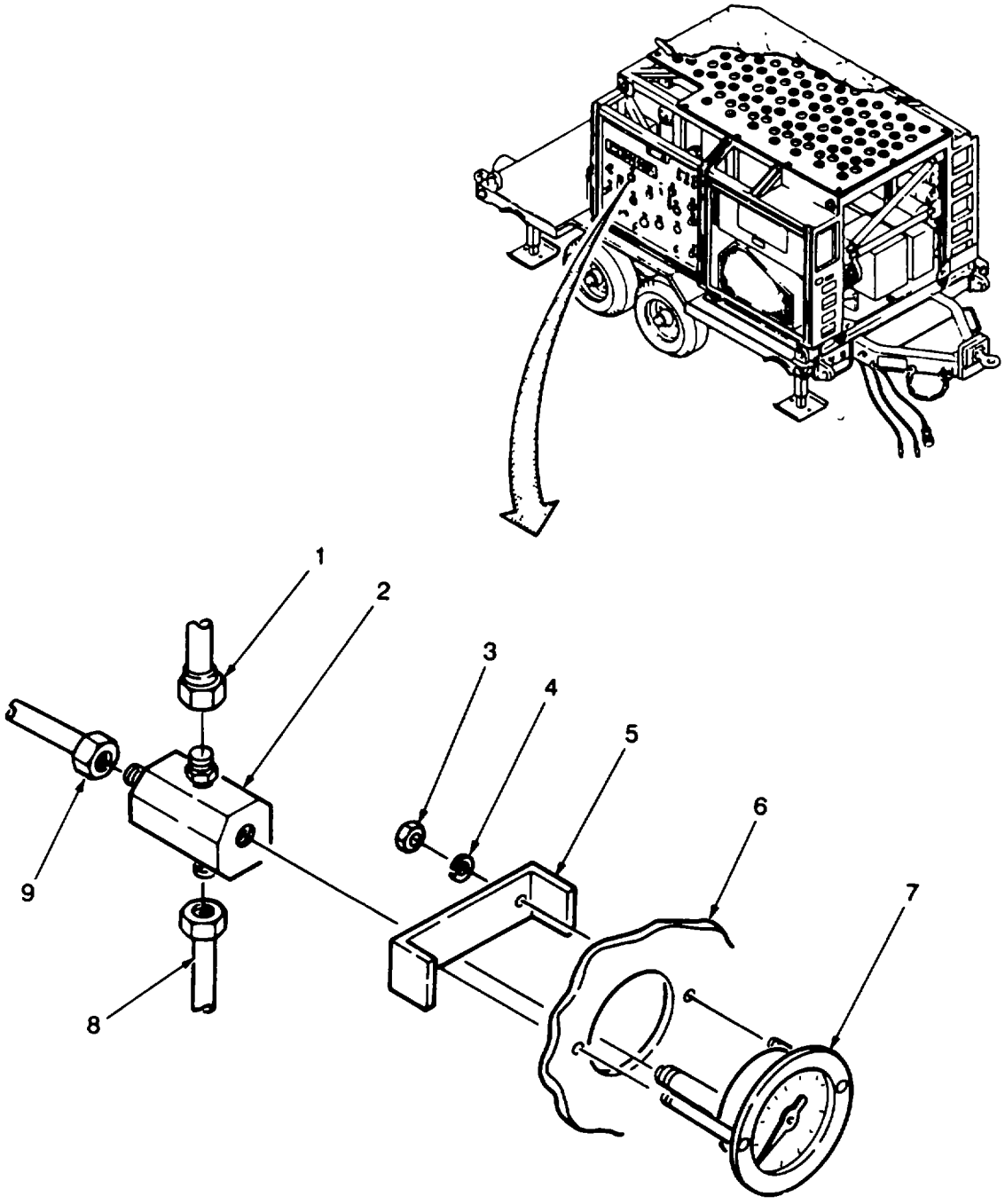
c Position bracket (5) on rear of pressure gage (7) and install two lockwashers (4) and nuts (3).

d. Install distribution block (2) on pressure gage (7).

e. Connect three tubes (9, 8, and 1) to distribution block (2).

f. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.

2-58. PRESSURE GAGE (R.O.) MAINTENANCE - continued.



2-59. RELIEF VALVE MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Vice (Appendix B, Section III, Item 3)
Pipewrench (Appendix B, Section III, Item 3)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).

REMOVAL

a. Remove screw (3) and loop clamp (2).

b. Remove pipe section (4) from pipe section (5).

c. Remove pipe section (5) from relief valve (6).

d. Remove relief valve (6) from adapter (1).

INSTALLATION

a Apply anti-seize tape to male pipe threads. Be sure to wrap tape in same direction as pipe threads.

b. Install relief valve (6) on adapter (1).

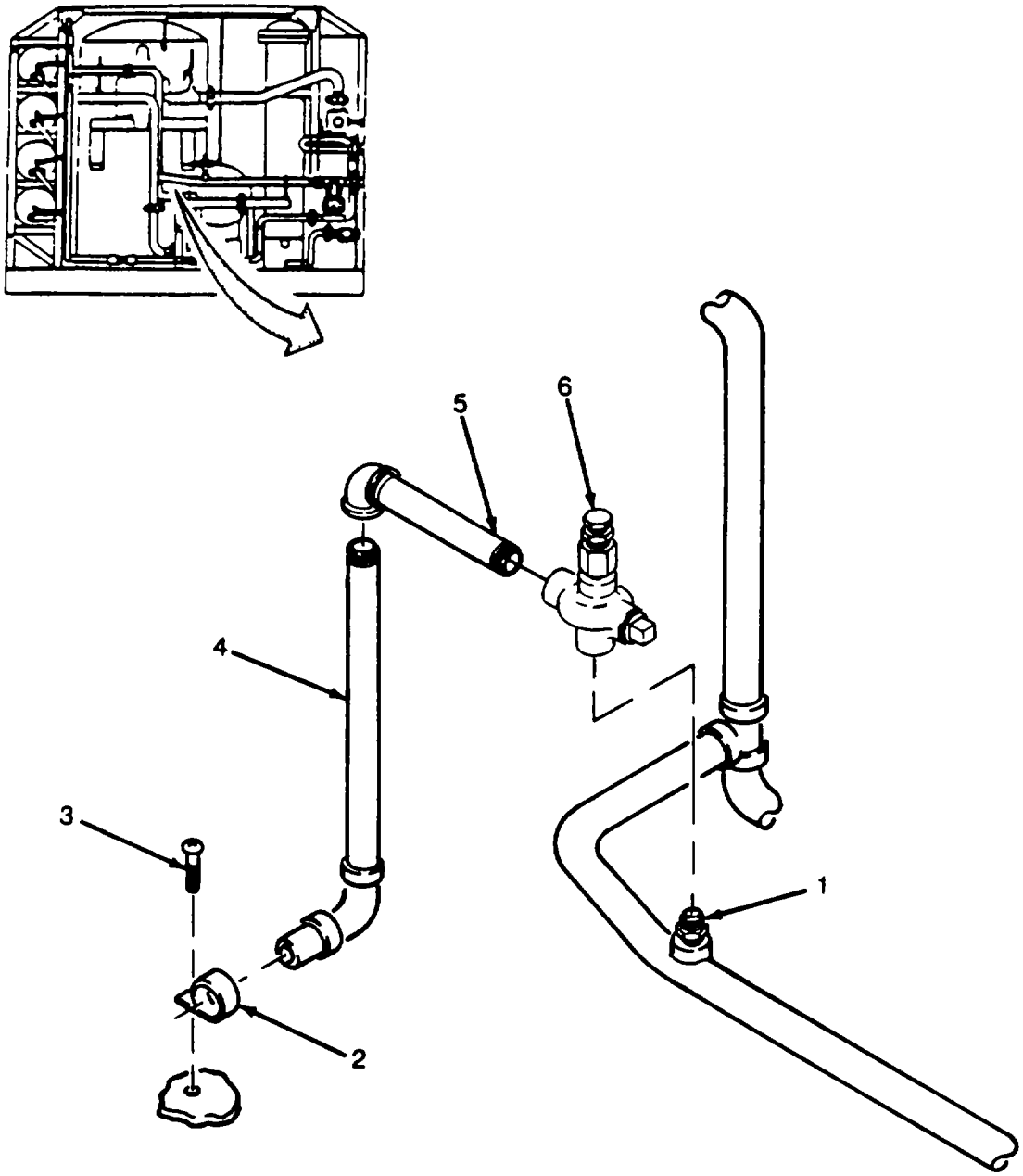
c. Install pipe section (5) on relief valve (6).

d. Install pipe section (4) on pipe section (5)

e. Install clamp (2) and screw (3).

f. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.

2-59. RELIEF VALVE MAINTENANCE- continued.



2-60. ELLIPTIC VALVE MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).

NOTE

There are four elliptic valves on the product manifold. All are removed and installed the same. One is shown, the others are similar.

REMOVAL

a. Loosen clamp (2) and remove flexible tubing (3) from adapter (1).

b. Loosen clamp (5) and remove flexible tubing (6) from adapter (4).

c. Remove two adapters (1 and 4) from elliptic valve (8).

d. Remove elliptic valve (8) from nipple (7).

INSTALLATION

a. Apply anti-seize tape to male pipe threads Be sure tape is wrapped in same direction as pipe threads.

b. Install elliptic valve (8) on nipple (7).

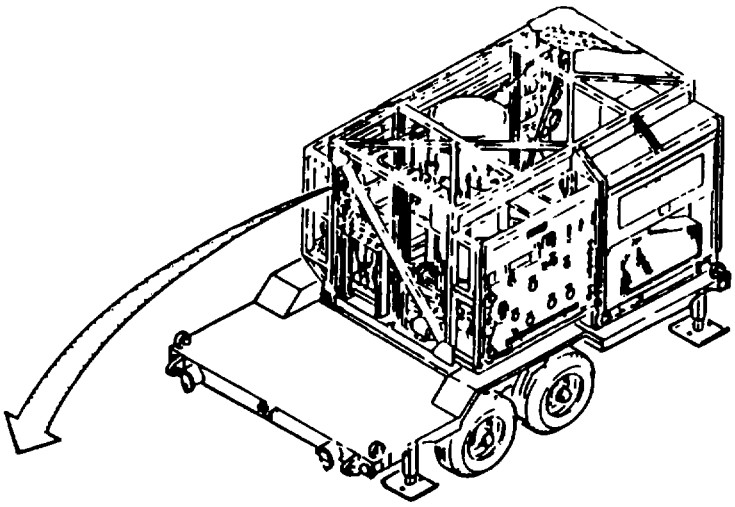
c. Install two adapters (1 and 4) on elliptic valve (8).

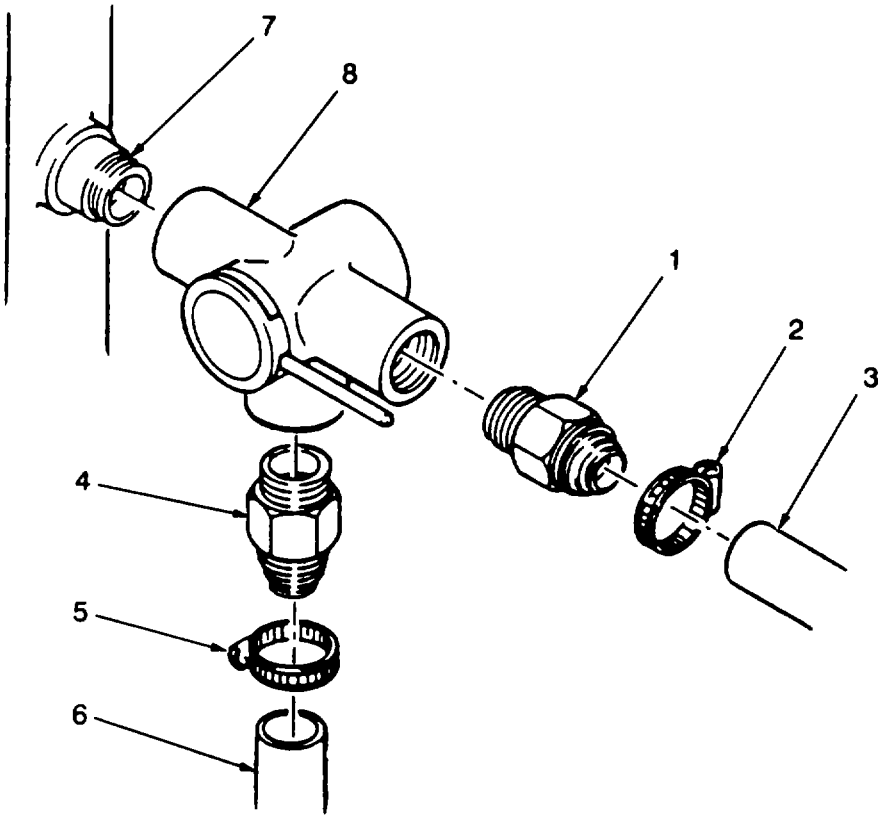
d. Install flexible tube (6) and clamp (5) on adapter (4). Tighten clamp.

e. Install flexible tube (3) and clamp (2) on adapter (1). Tighten clamp.

f. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.

2-60. ELLIPTIC VALVE MAINTENANCE -continued.





2-61. THREE WAY BALL VALVE (CHEMICAL FEED) MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Chemical can and frame removed (TM 10-4610-240-10).

NOTE
There are four three-way ball valves mounted on the chemical feed pump mounting plate. All are removed and installed the same. One is shown, the others are similar.

REMOVAL

a Remove setscrew (1) and handle (2) from three-way ball valve (16).

NOTE
Tag flexible tubing before removal.

b. Loosen three clamps (7, 10, and 13) and remove flexible tubing (8, 11, and 12).
c. Remove locknut (3) and three-way ball valve (16) from mounting plate (4).
d. Remove three adapters (6, 9, and 14) and elbows (5 and 15) from three-way ball valve (16).

INSTALLATION

a. Apply anti-seize tape to male pipe fittings. Be sure tape is wrapped in same direction as pipe threads.

b. Install elbows (5 and 15) and three adapters (14, 9, and 6) on three way ball valve (16).

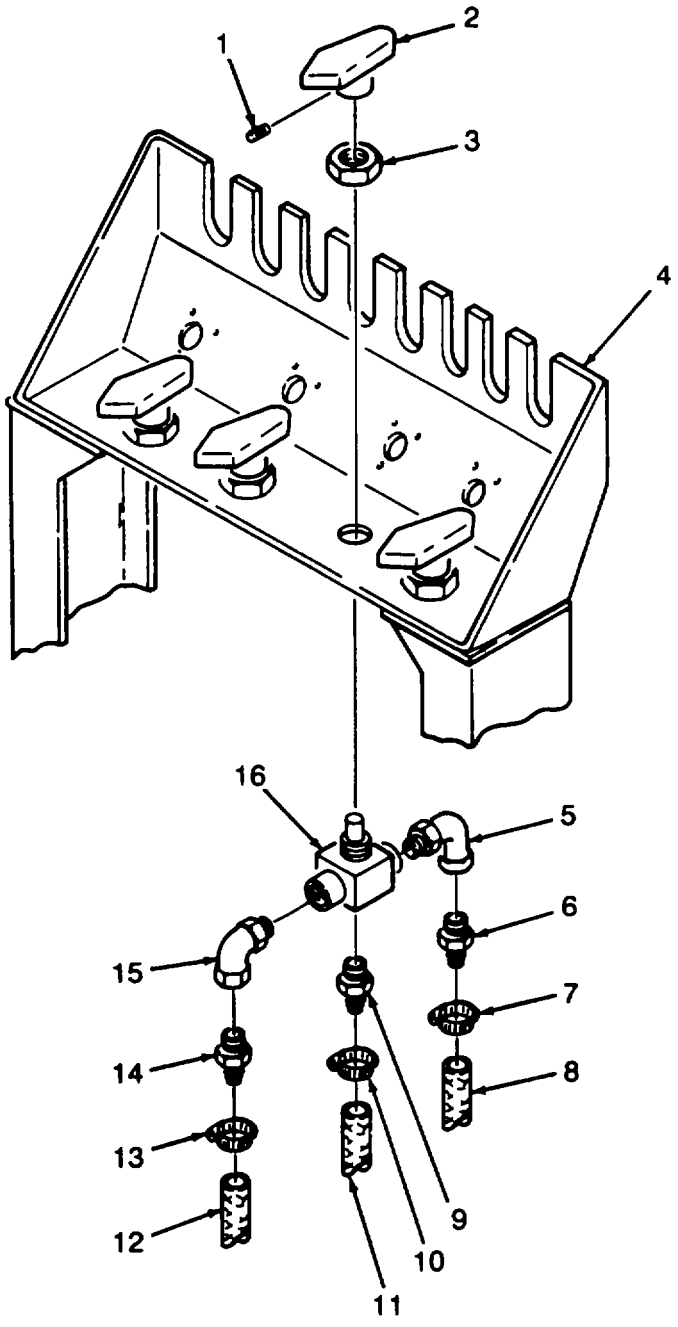
c. Position three-way ball valve (16) on mounting plate (4) and install locknut (3), handle (2), and setscrew (1).

d Place three clamps (13, 10 and 7) on flexible tubing (12, 11 and 8).

e. Connect flexible tubing (12, 11 and 8) to adapters (14, 9, and 6) and tighten clamps (13, 10 and 7).

f. Operate ROWPU (TM 1-4610-240-10) Check for leaks and proper operation.

2-61. THREE WAY BALL VALVE (CHEMICAL FEED) MAINTENANCE - continued.



2-62. CABLE ASSEMBLY (R.O. PUMP) MAINTENANCE.

This task consists of: a. Removal b. Test c. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Multimeter (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Tape, Electrical (Appendix C, Section II, Item 31)
- Twine (Appendix C, Section II, Item 33)

Equipment Condition
- Reference
  - ROWPU shutdown (TM 1-4610-240-10).
  - Power shutdown (TM 10-4610-240-10).

REMOVAL

a. Disconnect cable connector (12) from unit.

b. Remove four screws (23), star washers (22), cover (21), and gasket (20) from conduit box (19).

c. Pull slack in three wire bundles (6) from conduit box (19). Remove twine (5) and electrical tape (4) from each bundle.

NOTE

- **There are three wire bundles in conduit box. All are disassembled the same One is shown, the others are similar.**
- **Tag wires by set before removal.**

d. Remove nut (7), lockwasher (8), flat washer (10), and two wire lugs (9) from screw (11).

e. Remove screw (3) and ground wire (1) at wire lug (2) from conduit box (19).

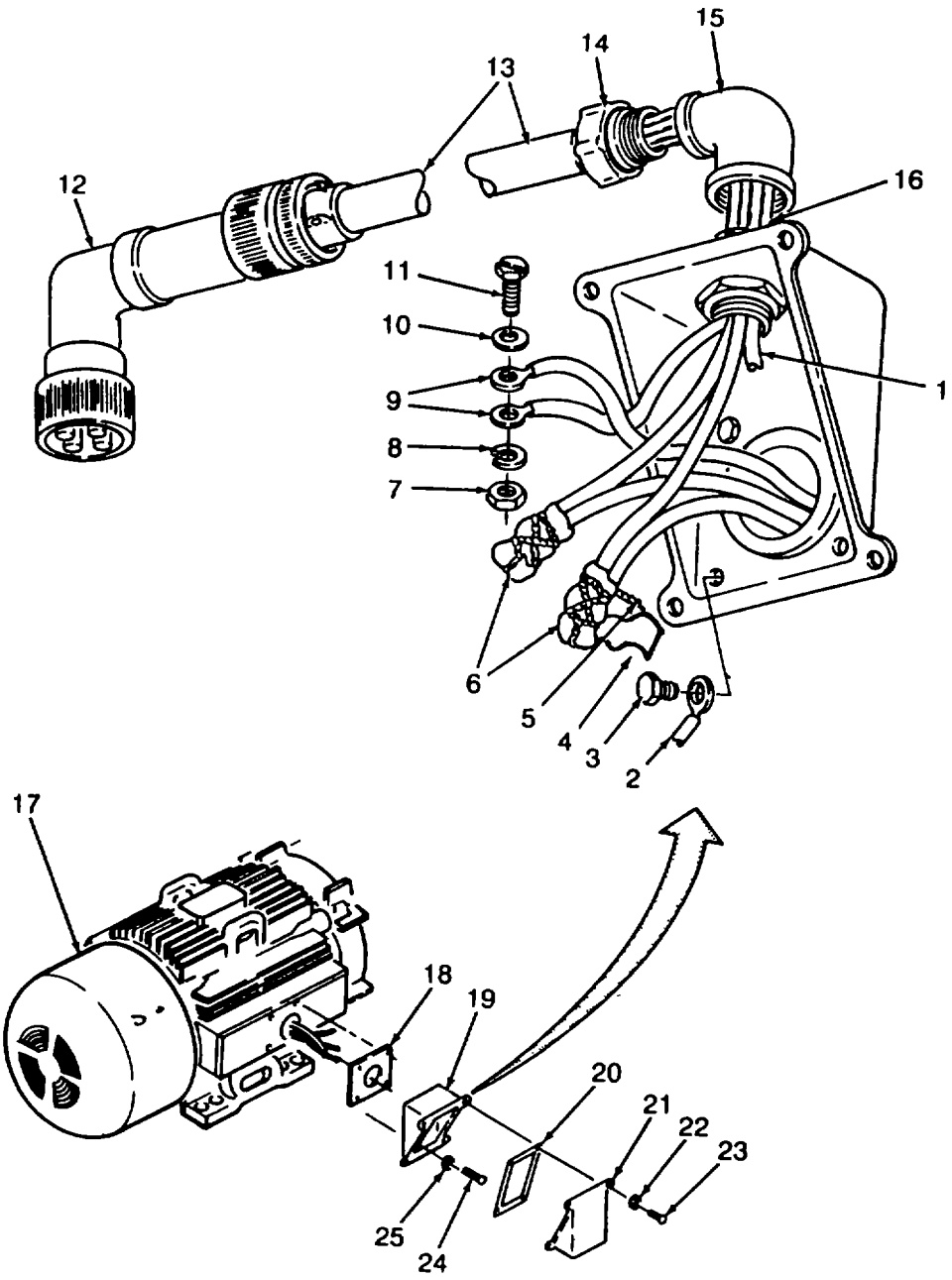
f. Unscrew cable connector (14) from elbow (15).

g. Carefully pull wires (16) from conduit box (19) and elbow (15), and remove cable (13) from unit.

h. If required, remove four screws (24), starwashers (25), conduit box (19) and gasket (18) from motor (17).

i. If required, remove elbow (15) from conduit box (19)

2-62. CABLE ASSEMBLY (R.O. PUMP) MAINTENANCE - continued.



2-62. CABLE ASSEMBLY (R.O. PUMP) MAINTENANCE- continued.

TEST

CAUTION

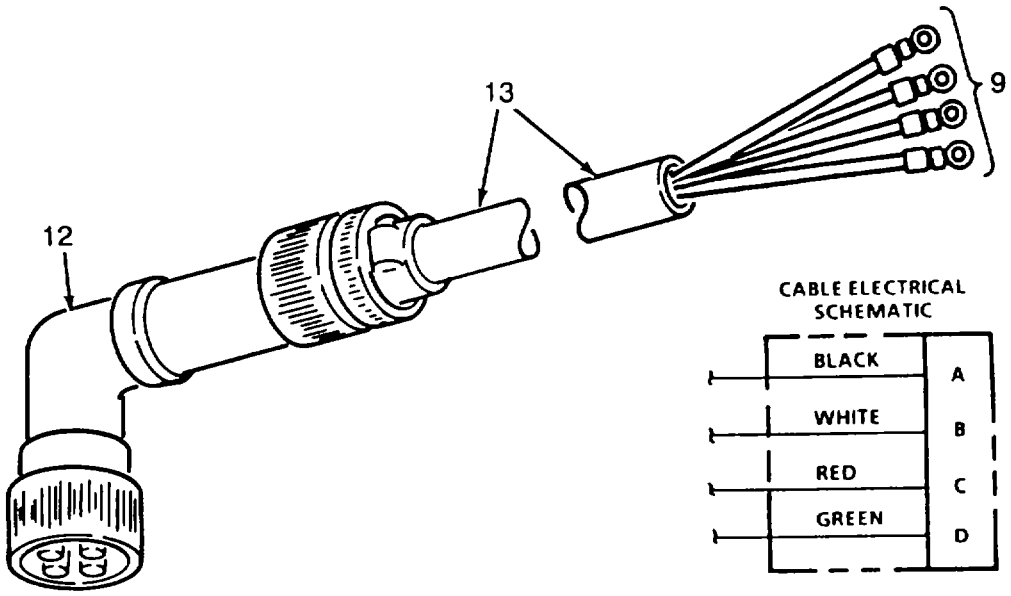
- **The following tests are performed to determine if the cable assembly is defective. Before testing, cable assembly must be disconnected from the motor. Failure to disconnect cable can result in false test indications.**
- **Make sure wire lugs (9) are not touching each other.**

a. Using multimeter, test for continuity between plug (12) pins and wire lugs (9) as follows:

CABLE ASSEMBLY W41 CONTINUITY TEST

FROM	TO
PIN	WIRE COLOR
A	BLACK
B	WHITE
C	RED
D	GREEN

b. If continuity does not exist between two points, replace cable assembly.



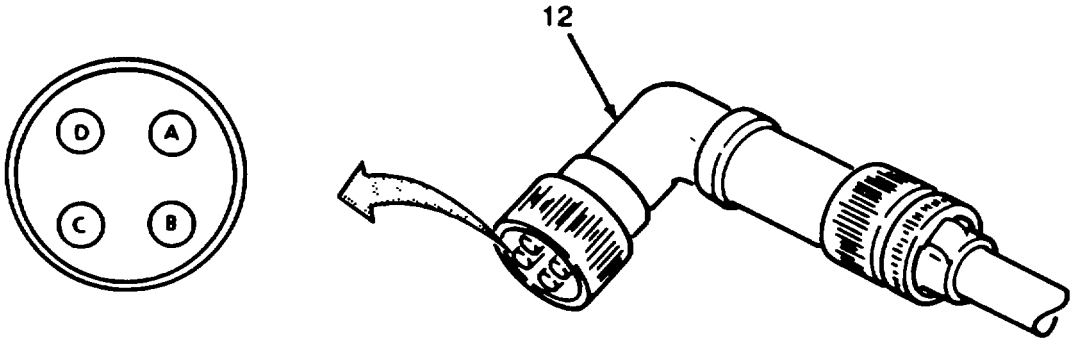
2-62. CABLE ASSEMBLY (R.O. PUMP) MAINTENANCE - continued.

c. Using multimeter, test for internal electrical short between plug (12) pins as follows:

CABLE ASSEMBLY W41 SHORTING TEST

FROM	TO
PIN	PIN
A	B
A	C
A	D
B	C
B	D
C	D

d. if continuity does not exist between any two points, replace cable assembly.



2-62. CABLE ASSEMBLY (R.O. PUMP) MAINTENANCE - continued.

INSTALLATION

a If removed, install elbow (15) on conduit box (19).

b If removed, position gasket (18) and conduit box (19) on motor (17) and install four starwashers (25) and screws (24).

c. Carefully pull four wires (16) through elbow (15) into conduit box (19).

d Screw cable connector (14) onto elbow (15).

e Install wire lug (2) of ground wire (1) with screw (3).

NOTE

There are three wire bundles in conduit box. All are assembled the same One is shown, the others are similar.

f Install two wire lugs (9), flat washer (10), screw (11), lockwasher (8) and nut (7).

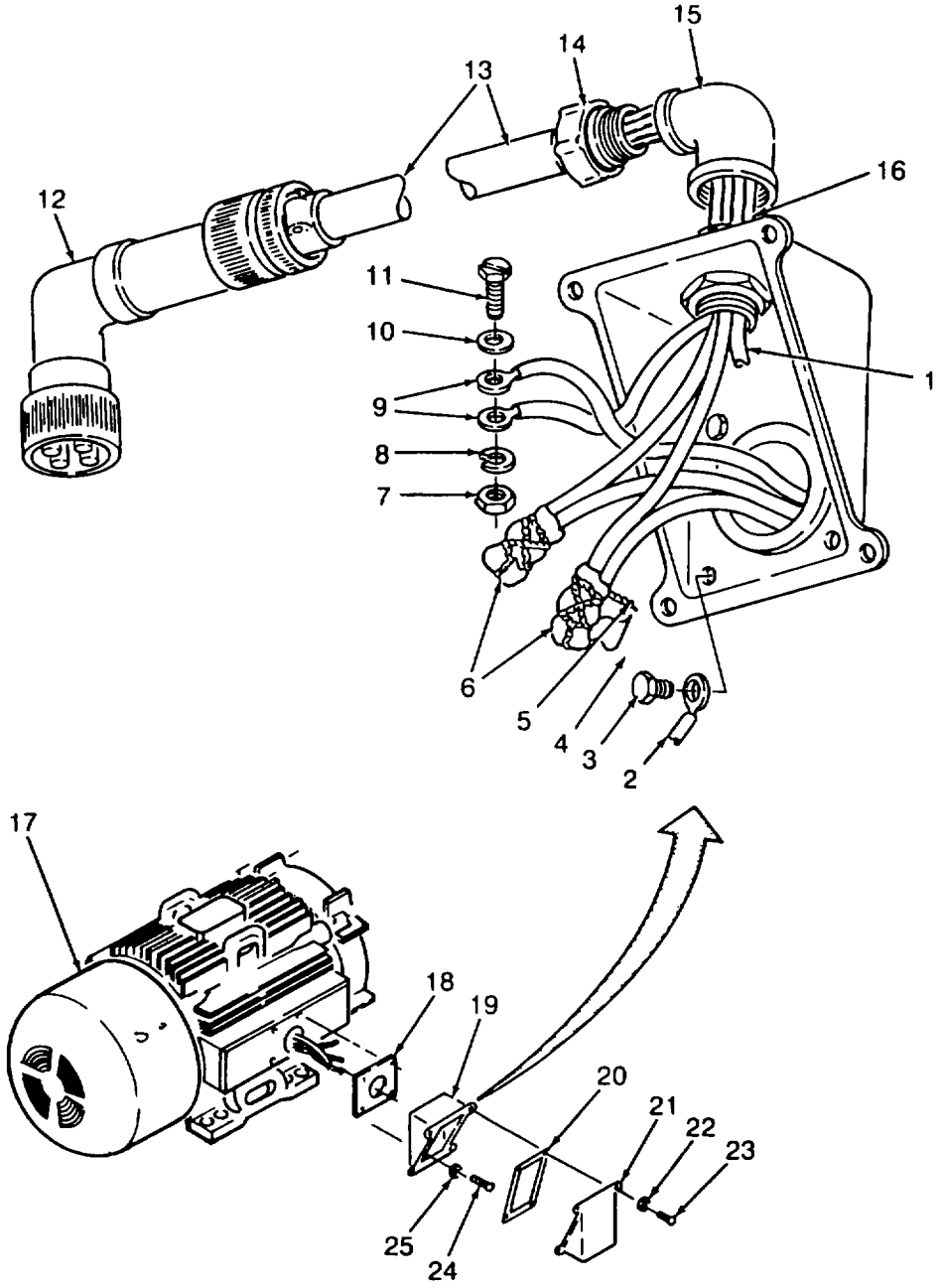
g Using electrical tape (4), wrap bare metal parts on each wire bundle (6).

h Using twine (5), secure electrical tape (4) on each wire bundle (6) and position three bundles in conduct box (19).

i. Position gasket (20) and conduit box cover (21) on conduit box (19) and install four starwashers (22) and screws (23).

j. Operate ROWPU and check for proper operation (TM 10-4610-240-10).

2-62. CABLE ASSEMBLY (R.O. PUMP) MAINTENANCE - continued.



2-63. CABLE ASSEMBLY W52 (JUNCTION BOX) MAINTENANCE.

This task consists of a. Removal b. Test c. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).

REMOVAL

a Disconnect cable socket (4) from junction box (5).

b Disconnect cable plug (2) from control box (1).

c. Remove cable assembly (3) from unit.

TEST

CAUTION

The following tests is performed to determine if the cable assembly is defective Before testing, cable assembly must be disconnected.

a. Using multimeter, test for continuity between cable socket (4) and corresponding lug (2) pins on opposite end of cable assembly (3).

b. If continuity does not exist between any two points, replace cable assembly (3).

INSTALLATION

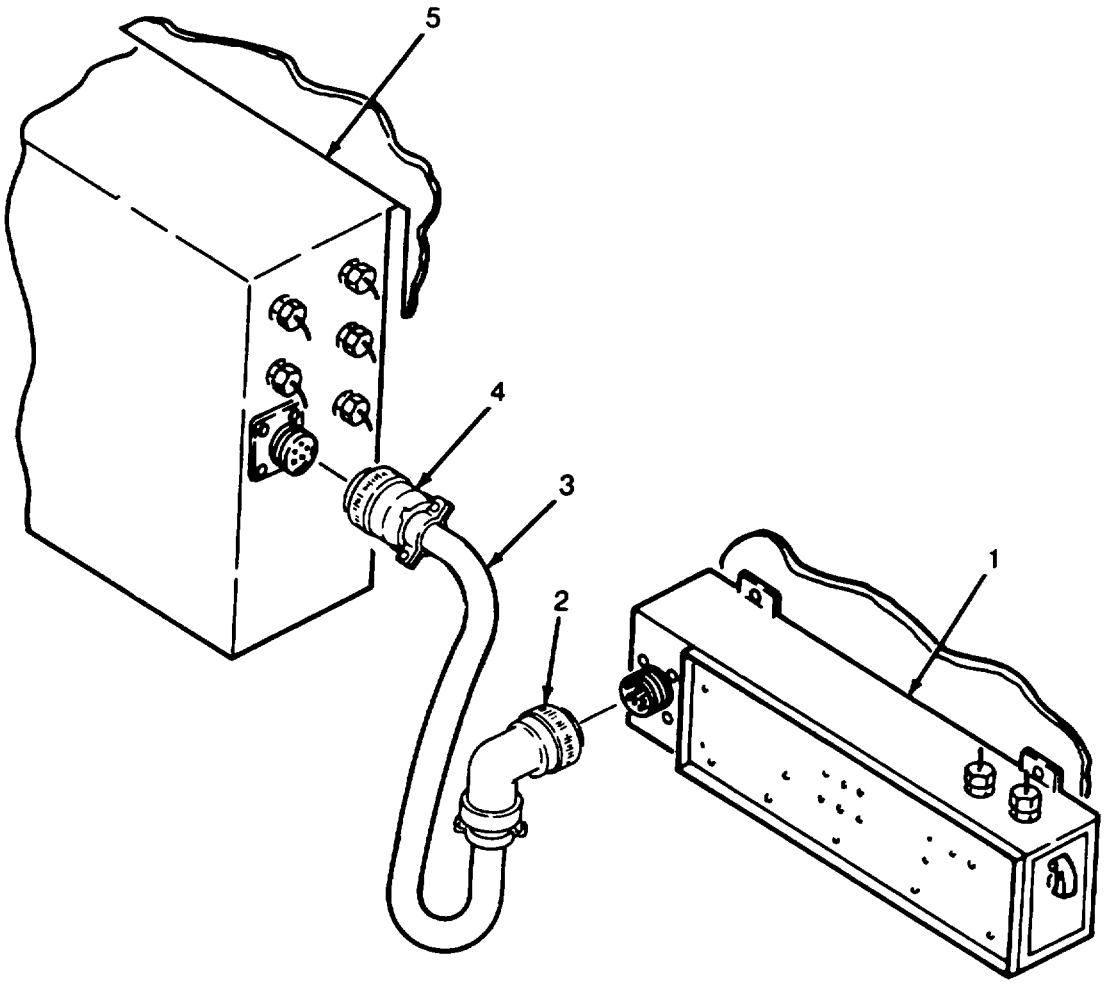
a Position cable assembly (3) in unit.

b. Connect cable plug (2) to control box (1).

c. Connect socket (4) to junction box (5).

d. Operate ROWPU and check for proper operation (TM 10-4610-240-10).

2-63. CABLE ASSEMBLY W52 (JUNCTION BOX) MAINTENANCE - continued.



VIEW FROM BACK OF CONTROL PANEL

2-64. CABLE ASSEMBLY W40 (GENERATOR) MAINTENANCE (MODELS WPES-1 AND WPES-3)

This task consists of: a. Removal b. Test c. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Equipment condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).

REMOVAL

WARNINGS

- **High voltage can cause burns and electrical shock. All electrical power must be off before performing these procedures.**
- **Lethal voltages are present at load connection board of the ROGEN during operation. Do not attempt to connect or disconnect load leads while either the ROGEN or the ROWPU are powered up or while the ROGEN is parallel to another unit which is in operation.**

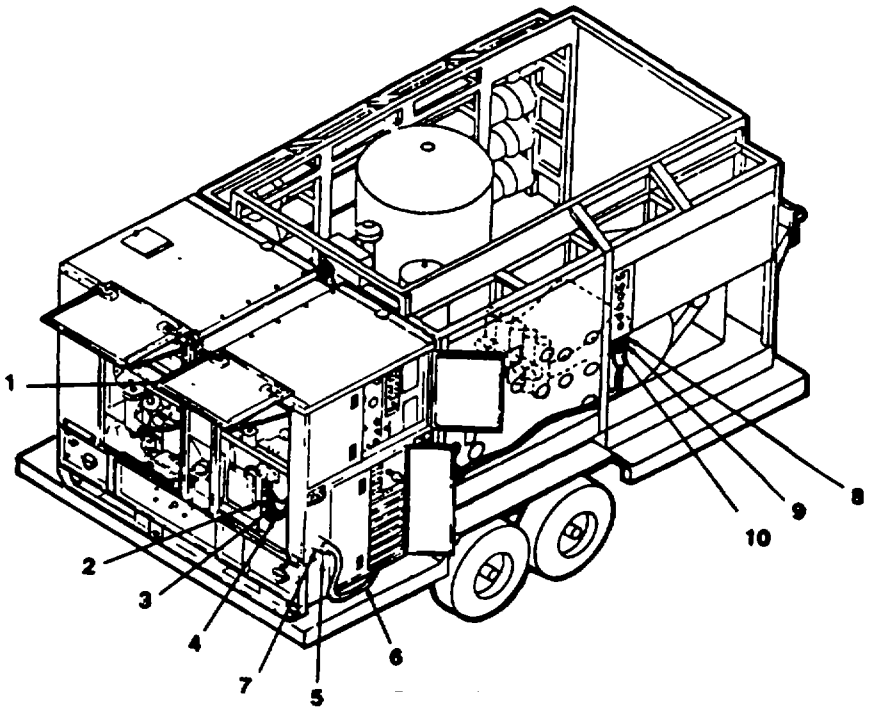
a. Open access cover (1) to access ROGEN terminal board (2).

b. Loosen four terminal bolts (3), and disconnect four wires (4) from ROGEN terminal board (2).

c. Loosen dust boot draw string (5), and pull power cable (6) through dust boot (7).

d. At ROWPU junction box (8), loosen locking connector (9), and disconnect power cable (10) from ROWPU junction box (8)

2-64. CABLE ASSEMBLY W40 (GENERATOR) MAINTENANCE (MODELS WPES-1 AND WPES-3) - continued



TEST

CAUTION

- **The following test is performed to determine if the cable assembly is defective. Before testing, cable assembly must be disconnected.**
- **Make sure wire ends are not touching each other.**

a. Using multimeter, test cable assembly for continuity between cable jack sockets and ends of wires.

CABLE ASSEMBLY W40 CONTINUITY TEST

FROM	TO
PIN	WIRE COLOR
B	BLACK
C	WHITE
A	RED
N	GREEN
G1, G2, G3, G4	BARE

b. If continuity does not exist between any two points, replace the cable assembly.

2-64. CABLE ASSEMBLY W40 (GENERATOR) MAINTENANCE (MODELS WPES-1 AND WPES3) - continued.

INSTALLATION

a. At ROWPU junction box (1), insert female end of cable connector (2) into male connector (3) and tighten locking connector (4).

b. Push taped end of power cable (5) along floor inside ROWPU flatbed trailer (6) toward and then under ROGEN skid (7).

c. Insert and pull taped end of power cable (5) through dust boot (8).

d. Untape power cable ends (9) and strip approximately 12 inches of outside insulation (10) from around five terminal wires (11).

e. Strip approximately 1 1/2 Inch insulation from each terminal wire (11).

f. Connect all green wires (five each) to terminal marked LO, connect wire marked L3 (red) to terminal L3, connect wire marked L1 (white) to terminal L2, and connect wire marked L2 (black) to terminal L1, and tighten five terminal bolts.

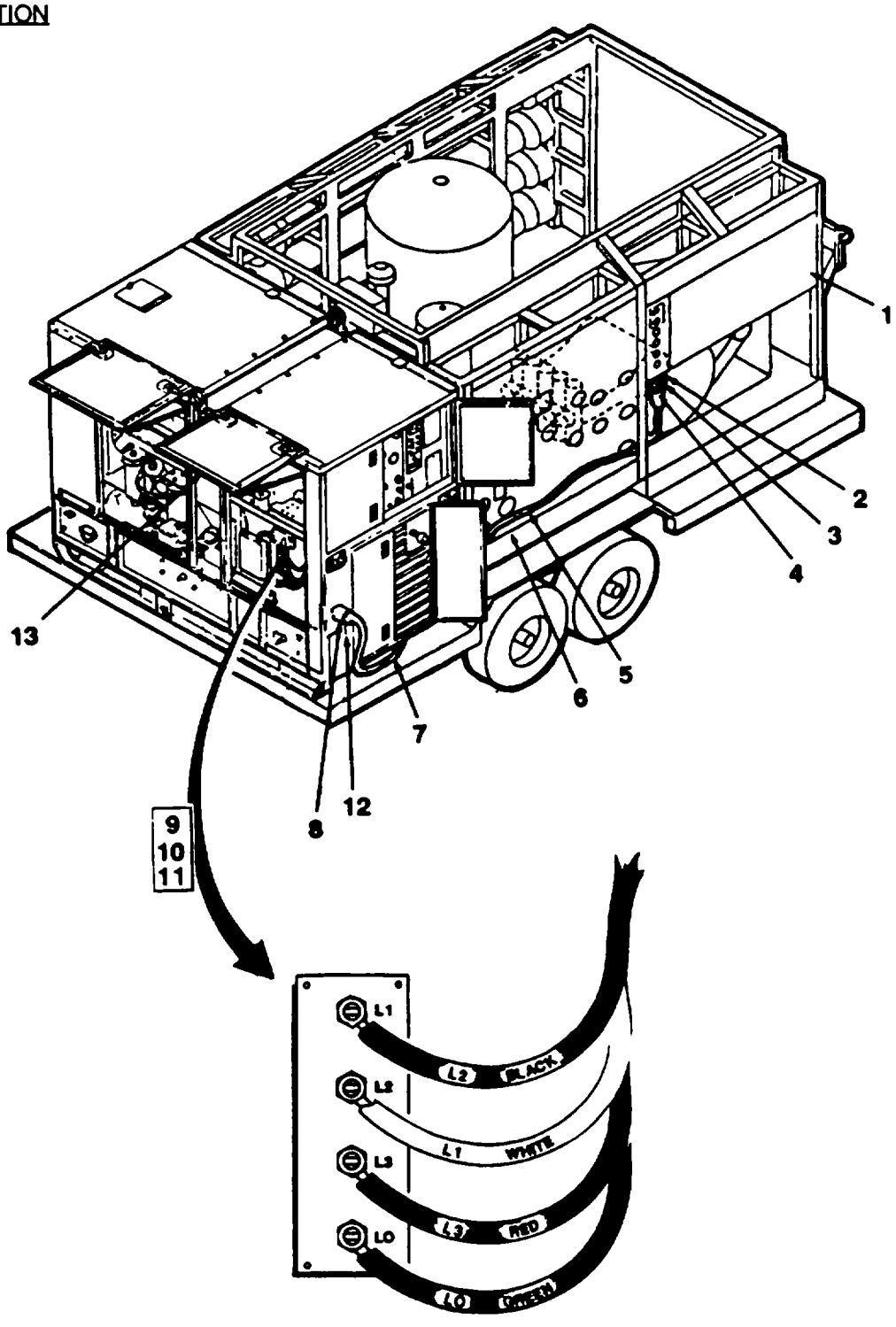
g Pull excess power cable (5) through dust boot (8) until cable lies smoothly on platform of ROWPU flatbed trailer (6) and just under ROGEN skid (7).

h. Tighten draw string (12) to draw dust boot (8) snugly around power cable (5).

i. Close ROGEN terminal board access cover (13).

2-64. CABLE ASSEMBLY W40 (GENERATOR) MAINTENANCE (MODELS WPES-1 ANDWPES-3)-continued

INSTALLATION



2-65. HIGH PRESSURE SWITCH MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Lockwasher (2) - MS35338-139
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).
General Safety Instructions

WARNING

- **High voltage can cause burns and electrical shock. Electrical power must be off before replacing electrical components.**
- **ROWPU piping and equipment can contain extremely high pressure during the after operation. If this pressure is not relieved before working on these pipes or equipment, serious injury or death may occur. Be sure to open all drains and vents before beginning any disassembly.**

REMOVAL

a. Remove four screws (4), starwashers (3), cover (2) and gasket (1).

NOTE
Tag wires before removal.

b. Remove three screws (5) and wire lugs (8).

c. Loosen sealing grip (11) and pull cable assembly wiring from high-pressure switch (13).

d. Disconnect pressure tube (6) from adapter (7).

e. Remove two nuts (16), lockwashers (15), flat washers (14), screws (10) and high-pressure switch (13) from control panel (9).

f. Remove two adapters (7 and 12) from high-pressure switch (13).

2-65. HIGH PRESSURE SWITCH MAINTENANCE - continued.

INSTALLATION

a. Apply anti-seize tape to all male pipe threads of adapter (7) Be sure tape is wrapped in same direction as pipe threads.

b. Install adapter (7) on high-pressure switch (13).

c. Install adapter (12) on high-pressure switch (13).

d. Position high-pressure switch (13) on control panel (9) and install two screws (10), flat washers (14), lockwasher (15), and nuts (16).

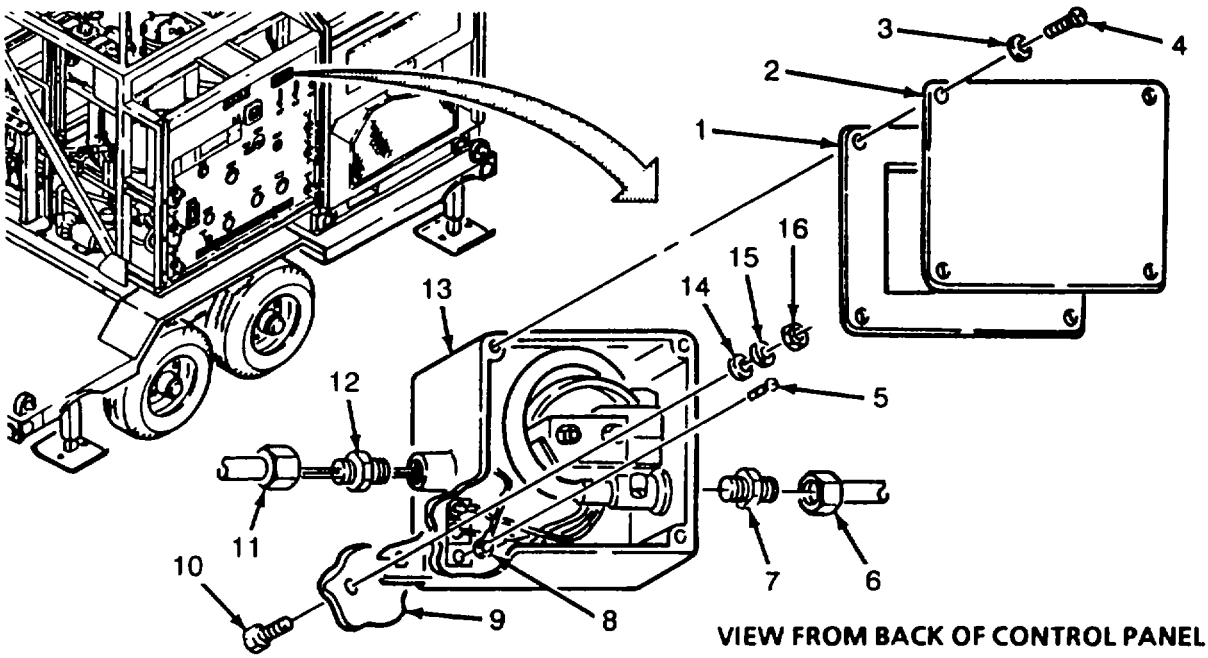
e. Thread cable assembly wiring through adapter (12) and tighten sealing grip (11).

NOTE
White wire connects to C terminal. Blue wire connects to NC terminal.

f.. Install three wire lugs (8) and screws (5) as marked during removal.

g. Install gasket (1), cover (2), four starwashers (3) and four screws (4) on high-pressure switch (13).

h. Operate ROWPU (TM 10-4610-240-10). Check for proper operation for leaks.



2-66. LOW PRESSURE SWITCH MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Materials Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Lockwasher (2) MS35338-139
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).

REMOVAL

a. Remove screws (9), lockwasher (8), and chain lug (7). Remove three screws (6) and lockwashers (5) Remove cover (4), and gasket (3) from low pressure switch (18).

NOTE
Tag all wiring before removal.

b. Remove screw (17) and wire lug (16).

c. Remove two screws (21), washers (20), and wire lugs (19).

d. Loosen sealing grip (2), and pull cable (22) and wires (23) from low pressure switch (18).

e. Disconnect pressure tube (10) from adapter (11).

f. Remove two nuts (12), lockwashers (13), screws (14), and low-pressure switch (18) from control panel (15).

g. Remove elbow connector (1) and adapter (11) from low pressure switch (18).

INSTALLATION

a. Apply anti-seize tape to male threads of adapter (11). Be sure tape is wrapped in same direction as pipe threads.

b. Install elbow connector (1) and adapter (11) on low-pressure switch (18).

c. Position low-pressure switch (18) on control panel (15) and install two screws (14), lockwashers (13), and nuts (12).

d. Connect pressure tube (10) to adapter (11).

2-66. LOW PRESSURE SWITCH MAINTENANCE - continued.

e. Route wires (23) into low-pressure switch (18) and connect cable (22) to elbow connector (1) with sealing grip (2).

NOTE
White wires connects to COM lug. Black wires connects to NC lug.

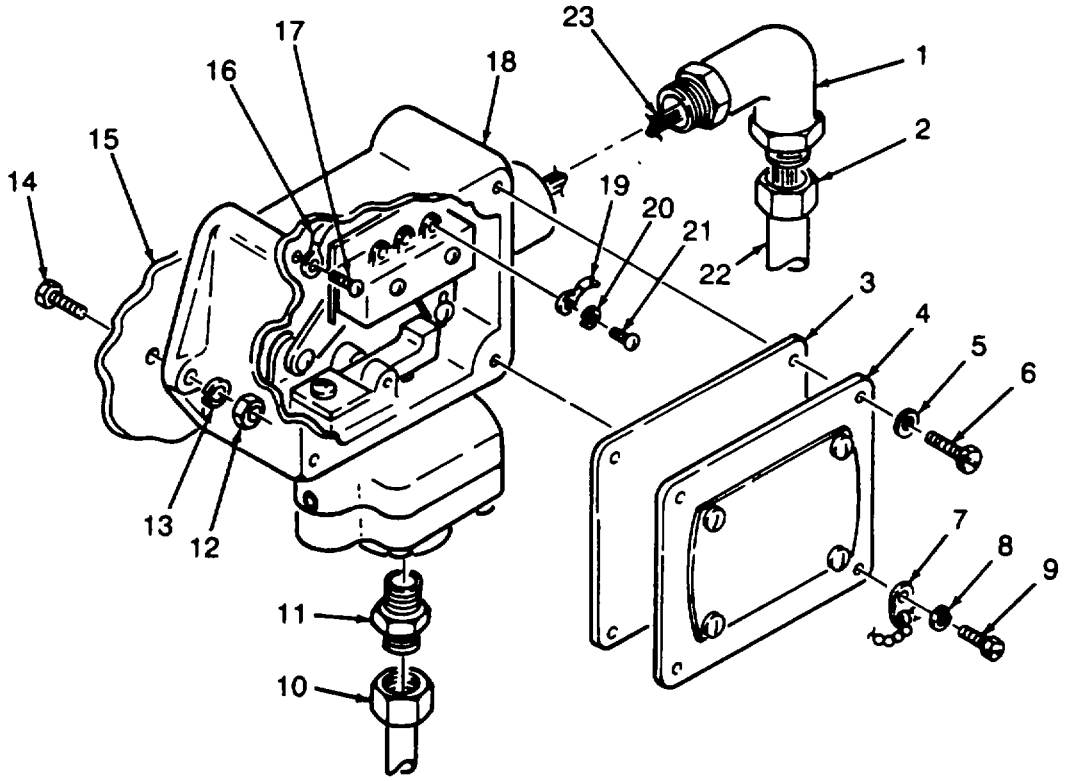
f. Install two wire lugs (19), washers (20) and screws (21) on low pressure switch (18) as marked during removal..

g. Position wire lug (16) of green wire and install screw (17).

h. Install gasket (3), cover (4), chain lug (7), lockwasher (8) and screw (9) on low pressure switch (18).

i. Install three lockwashers (5) and screws (6) on low pressure switch (18).

j. Operate ROWPU (TM 10-4610-24010). Check for leaks and proper operation.



VIEW FROM BEHIND CONTROL PANEL

2-67. CENTRIFUGAL PUMP (BOOSTER) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Electrical (Appendix C, Section II, Item 31)
Twine (Appendix C, Section II, Item 33)
Gasket (2) M103873D04
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).
General Safety Instructions

WARNING
Lifting heavy/difficult to handle equipment incorrectly can cause serious injury.

REMOVAL

a. Remove two nuts (1) and screws (28), two clamp halves (29), and gasket (30).

b. Remove two nuts (25), screws (27), two clamp halves (26), and gasket (24).

c. Remove four bolts (3) and lockwashers (4) securing booster pump assembly (2) and spacer plate (5) to unit.

WARNING
The booster pump assembly is heavy/difficult to handle.

d. Position booster pump assembly (2) to get access to conduit box (7).

e. Remove four screws (12), cover (13), and gasket (14).

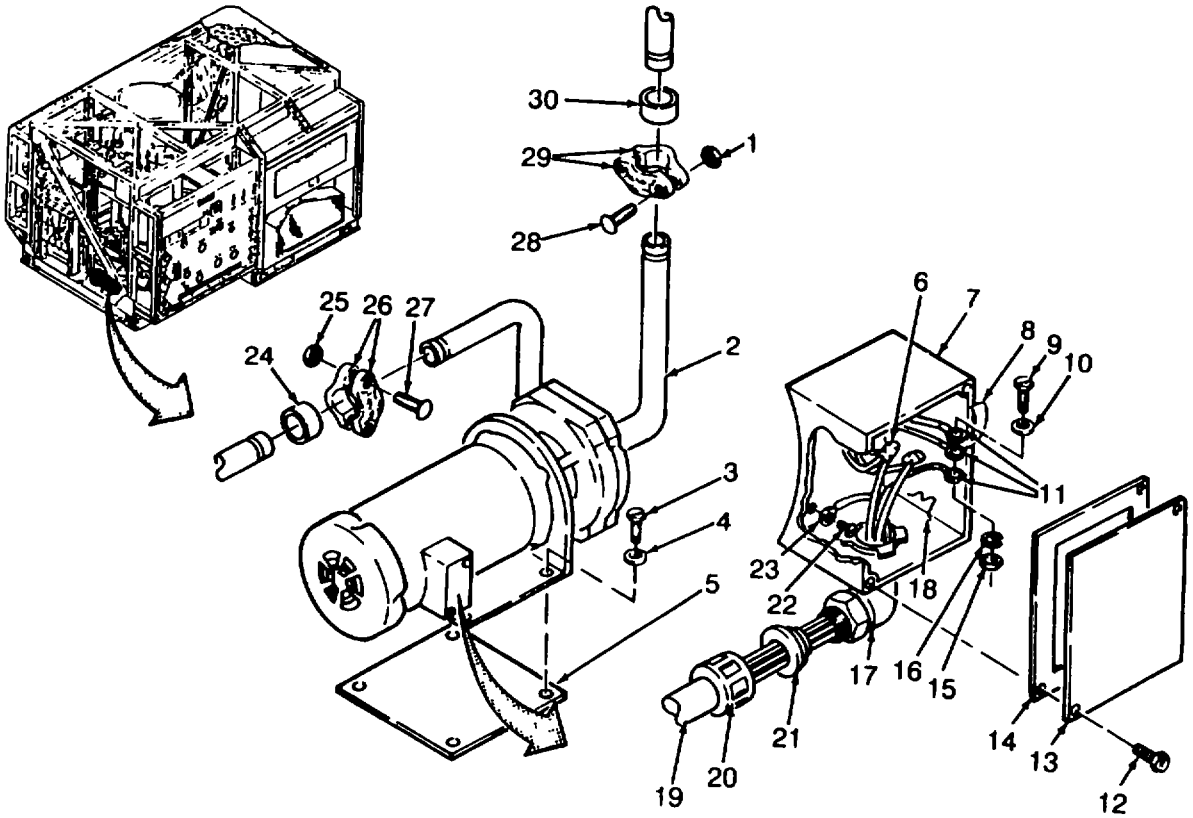
f. Pull bundle of four wires sets (6) from conduit box (7).

g. Tag and identify three wire sets (6).

h. Remove twine (18) and tape (8) from three tagged wire sets.

i. Remove screw (22) securing grounding wire (23) to conduit box (7).

2-67. CENTRIFUGAL PUMP (BOOSTER) MAINTENANCE - continued.



2-67. CENTRIFUGAL PUMP (BOOSTER) MAINTENANCE - continued.

NOTE

There are three sets of motor wires to disconnect from power source. Each set is removed the same One is shown, the others are similar.

j. Remove nut (15), lockwashers (16), three wire lugs (11), and fat washers (10) from screw (9) on each set of wires (6) that have been untaped.

k. Install flat washers (10), lugs of two cream-colored wires (11), lockwasher (16), and nut (15) on screw (9).

CAUTION

Wire insulation can be damaged when wires are pulled through elbow. Be careful when pulling wires

l. Remove cable (19), sealing grip (20) and gasket (21) with wires from elbow (17).

m. Remove booster pump assembly (2) from unit.

INSTALLATION

CAUTION

Wire insulation can be damaged when wires are pulled through elbow. Be careful when pulling wires.

a. Install sealing grip (20) and gasket (21) on cable (19).

b. Pull four wires from cable assembly (19) through elbow (17) into conduit box (7).

NOTE

There are three sets of motor wires to connect to power source. Each wire from the power source is added to a motor wire set in the same way. One is shown, the others are similar.

c. Remove nut (15) and lockwasher (16) from screw (9).

d. Install wires (11) from power source as tagged, lockwasher (16), and nut (15) on screw (9).

e. Position grounding wire (23) in conduit box (7) and secure with screw (22).

f. Using electrical tape (8), wrap each wire set (6).

g. Secure tape on each wire set (6) with twine (18).

h. Position four wire sets (6) in conduit box (7).

i. Position gasket (14) and conduit box cover (13) on conduit box (7) and install four screws (12).

2-67. CENTRIFUGAL PUMP (BOOSTER) MAINTENANCE - continued.

WARNING
The booster pump assembly is heavy/difficult to handle.

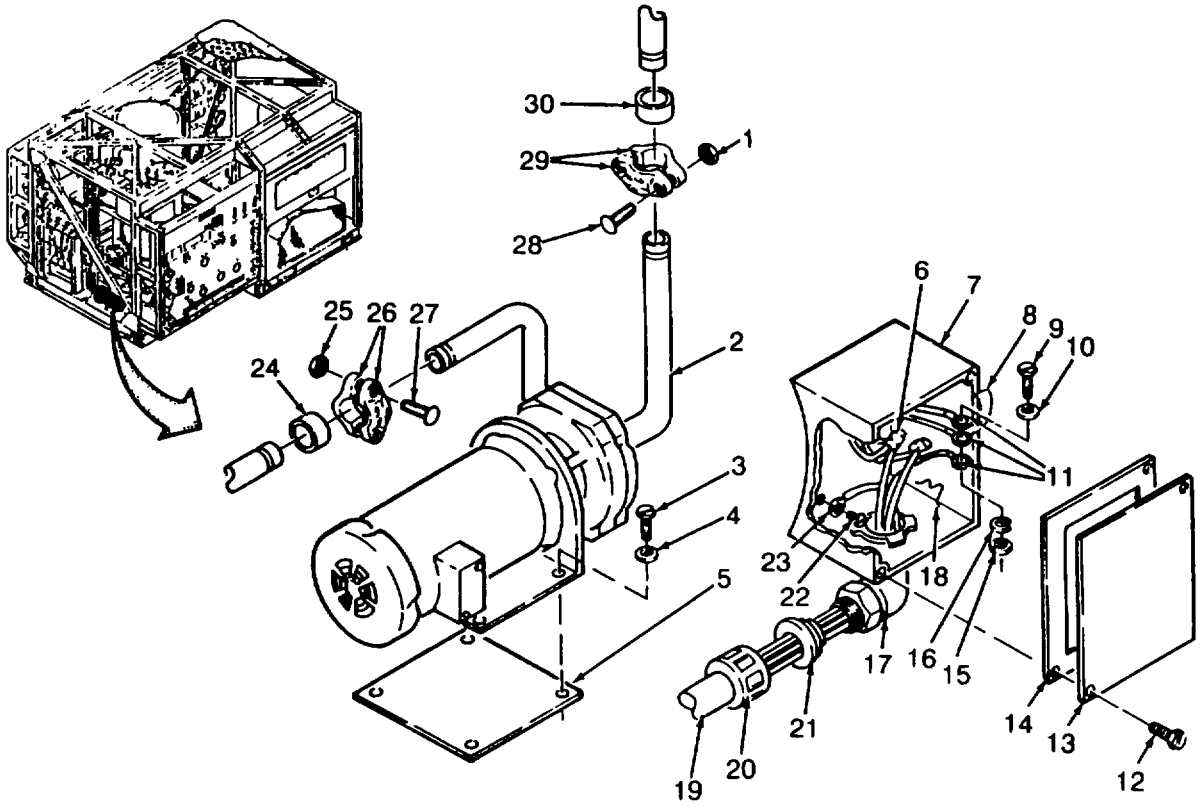
j. Position booster pump assembly (2) on spacer plate (5) with mounting holes alined.

k. Install four bolts (3) and lockwashers (4).

l. Position gasket (24) and clamp halves (26) on piping and install two screws (27) and nuts (25).

m. Position gasket (30) and clamp halves (29) on piping and install two screws (28) and nuts (1).

n. Operate ROWPU (TM 14610-240-10). Check for leaks and proper operation.



2-68. CHEMICAL FEED PUMP MAINTENANCE.

This task consists of: a. Service b. Removal c. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, electrical (Appendix C, Sect II, Item 31)
Twine (Appendix C, Sect II, Item 33)
Oil, lubricating (LO 5-4610-215-12/3)
Lockwasher (4) - MS35338-140
Lockwasher (2) - MS35338-108
Lockwasher (4) - MS35338-141
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
Chemical cans and frame removed (TM 10-4610-240-10).

SERVICE

a. Place suitable container (6 ounce capacity) below chemical feed pump drain plug (3).

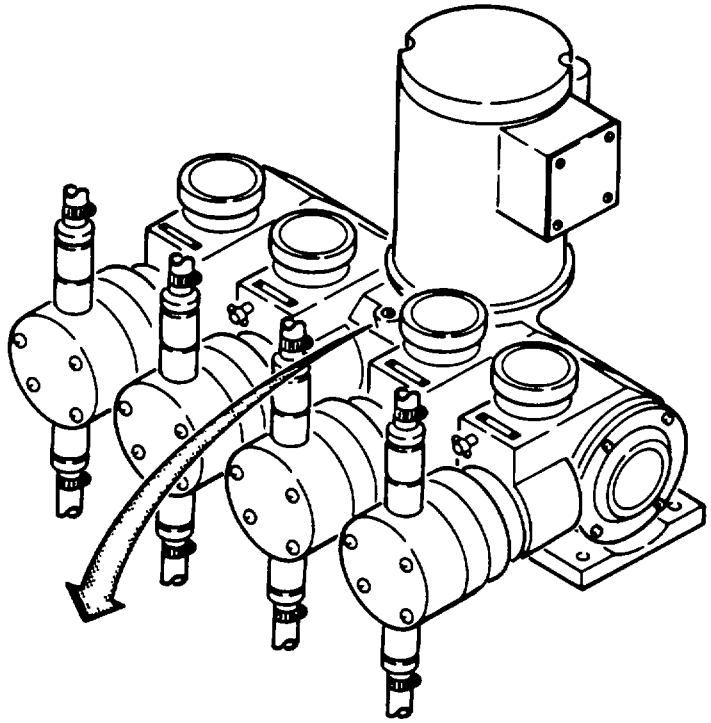
b. Remove drain plug (3) and allow oil to drain into container.

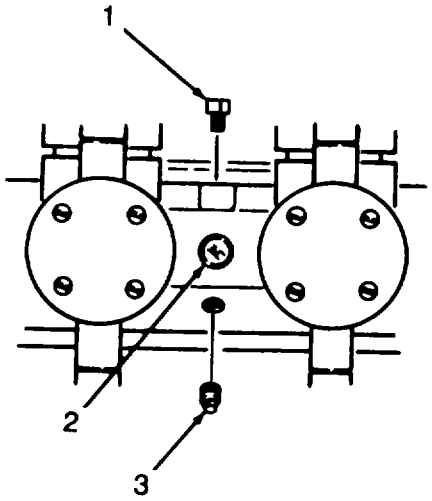
c. Install drain plug (3) and remove fill plug (1).

d. Add oil through fill hole until oil level rises to center of sight glass (2).

e. Install fill plug (1).

2-68. CHEMICAL FEED PUMP MAINTENANCE - continued.





2-68. CHEMICAL FEED PUMP MAINTENANCE - continued.

REMOVAL

a. Remove four nuts (27), lockwashers (28), screws (30), and two brackets (31) (upper and lower) from upright frame (29).

b Remove four screws (10), cover plate (11), and gasket (12) from conduit box (19).

c. Pull two wire sets (18) from conduit box (19).

d. Tag and identify wires in each wire set (18) to aid installation.

NOTE
Removal of one wire set is shown. The other wire set is similar.

e. Remove twine (15) and tape (20) from each wire set (18).

f. Remove nut (13), lockwasher (14), flat washer (8) and screw (7) from wire lugs (9).

g. Remove screw (16) and ground lug (17) from conduit box (19).

h. Unscrew sealing grip (4) from conduit box (19).

i. Carefully pull wiring (5) from conduit box (19).

NOTE
One suction and discharge flexible hose is shown. Other suction and discharge flexible hoses are similar.

j. Tag flexible hoses (36 and 32) to aid installation.

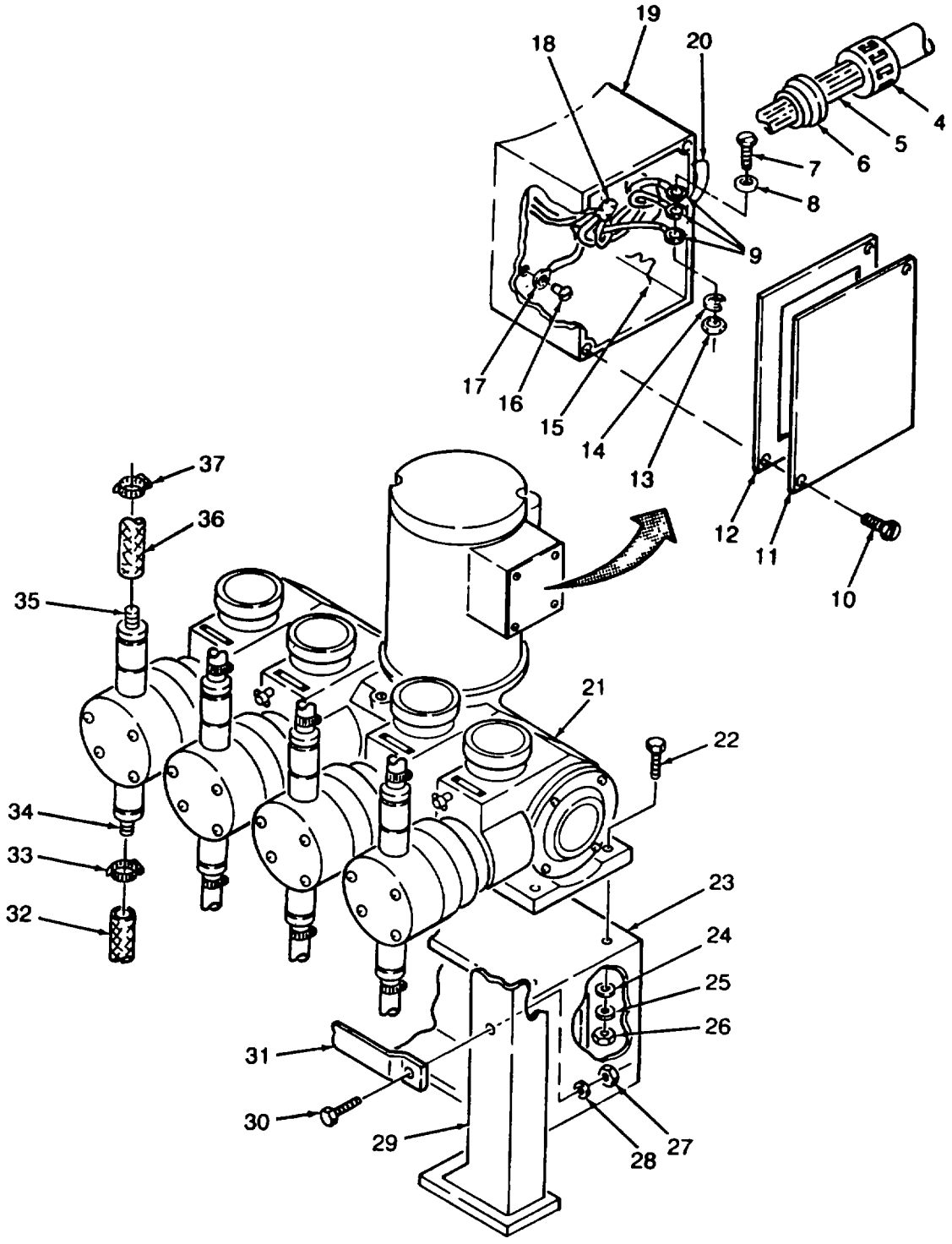
k. Loosen clamp (37) and disconnect flexible hose (36) from adapter (35).

l. Loosen clamp (33) and disconnect flexible hose (32) from adapter (34).

m. Remove four nuts (26), lockwashers (25), flat washers (24), and screws (22).

n. Remove chemical feed pump (21) from stand (23).

2-68. CHEMICAL FEED PUMP MAINTENANCE - continued.



2-68. CHEMICAL FEED PUMP MAINTENANCE - continued.

INSTALLATION

a. Position chemical feed pump (21) on stand (23).

b. Install four screws (22), flat washers (24), lockwashers (25) and nuts (26).

NOTE

One suction and discharge flexible hose is shown. Other suction and discharge flexible hoses are similar.

c. Place clamp (33) on flexible hose (32).

d. Connect flexible hose (32) to adapter (34). Position and tighten clamp (33) onto hose.

e. Place clamp (37) on flexible hose (36).

f. Connect flexible hose (36) to adapter (35). Position and tighten clamp (37) onto hose

g. Feed wiring (5) into conduit box (19)

h. Position seal (6) in sealing grip (4) and screw sealing grip into conduit box (19).

i. Position ground lug (17) on conduit box (19) and install screw (16).

j. Install screw (7), flat washer (8), lockwasher (14), and nut (13) on lugs (9) of each wire set (18). Be sure wiring in each wire set (18) is connected as tagged during removal.

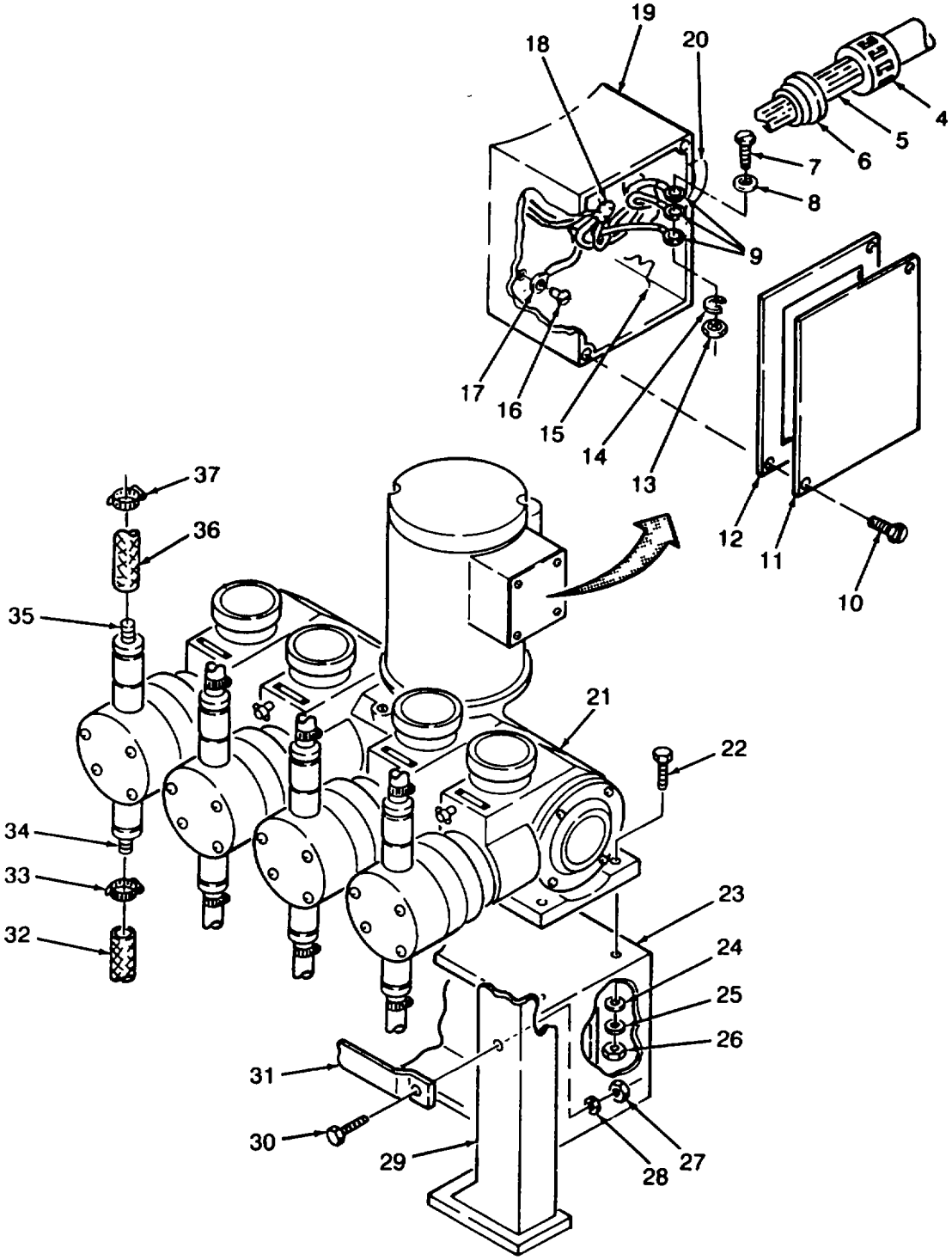
k. Wrap wire sets (18) with tape (20) Secure ends of tape with twine (15).

l. Install gasket (12), cover plate (11) and four screws (10) on conduit box (19).

m. Position two brackets (31) (upper and lower) on upright frame (29) and install four screws (30), lockwashers (28) and four nuts (27).

n. Operate ROWPU. Check for leaks and proper operation (TM 10-4610-240-10).

2-68. CHEMICAL FEED PUMP MAINTENANCE - continued.



2-69. DIAPHRAGM PUMPS (CHEMICAL FEED PUMP) MAINTENANCE.

This task consists of: a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Detergent (Appendix C, Section II, Item 10)
Rags, Wiping (Appendix C, Section II, Item 23)
Diaphragm - LD-BO-0010-HY-D
Diaphragm - LD-AO-0010-HE-D
O-ring (4) - ZM-PA-3908-VI-Y
Lockwasher (2) - MS35338-141
Equipment Condition
Reference
Power shutdown (power source manual).
ROWPU shutdown (TM 10-4610-240-10).
Chemical cans and frame removed (TM 10-4610-240-10).

REMOVAL

a. Remove two nuts (20), lockwashers (19), screws (17) and bracket (16) from frame (18).

NOTE
Removal of one diaphragm pump is shown. The other diaphragm pumps are similar.

b. Loosen clamp (2) and disconnect flexible hose (1) from reagent head (3).

c. Loosen clamp (5) and disconnect flexible hose (6) from reagent head (3).

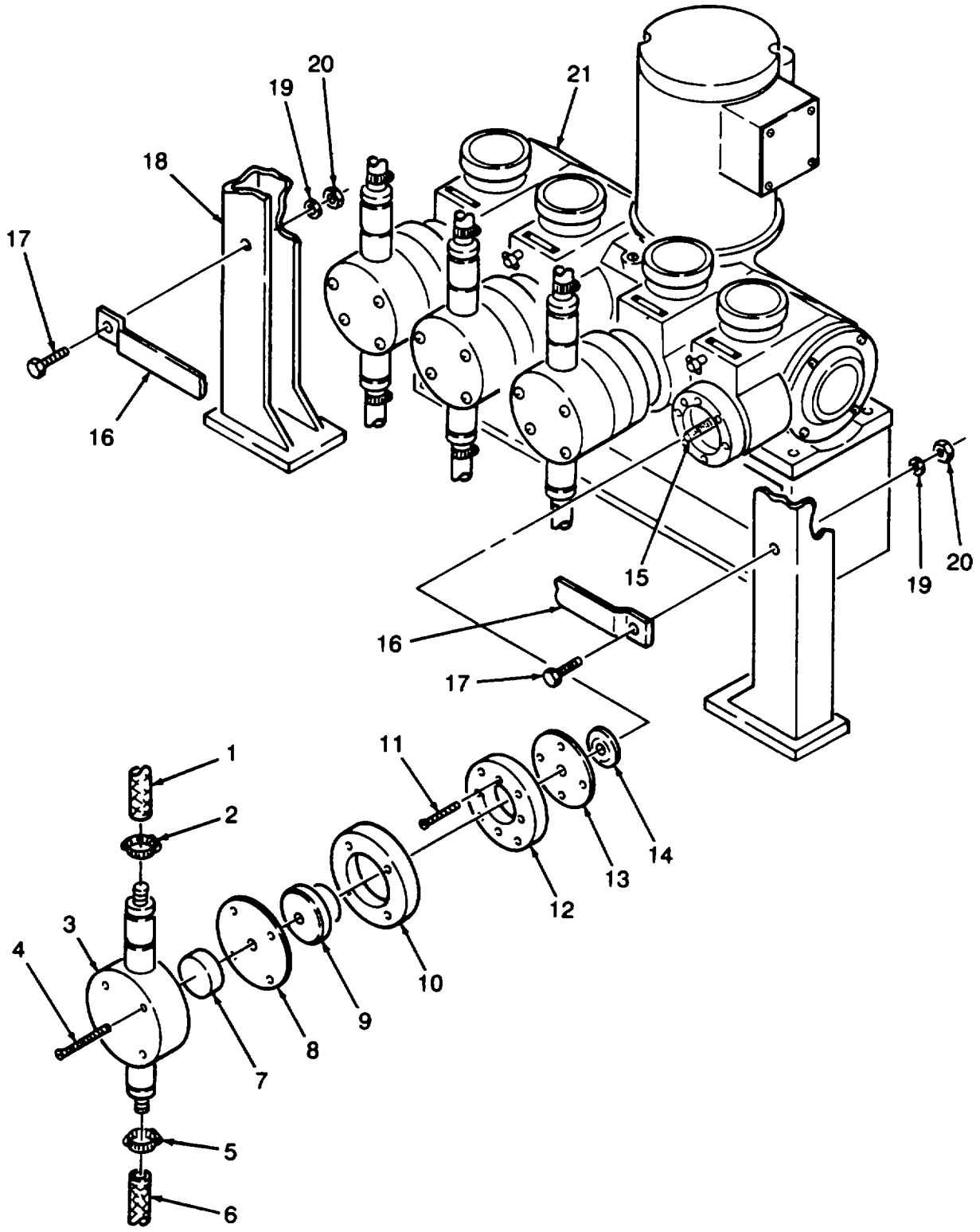
d. Remove four screws (4) and separate reagent head (3) and attached parts from chemical feed pump (21).

e. Remove diaphragm nut (7), working diaphragm (8), backing plate (9) and outer adapter ring (10) from inner adapter ring (12).

NOTE
Mark location of four screws (11) to aid installation.

f. Remove four screws (11), inner adapter ring (12), guard diaphragm (13), and support disk (14) from actuating shaft (15).

2-69. DIAPHRAGM PUMPS (CHEMICAL FEED PUMP) MAINTENANCE - continued.



2-69. DIAPHRAGM PUMPS (CHEMICAL FEED PUMP) MAINTENANCE - continued.

REPAIR

a. Disassembly.

(1) Unscrew adapter (39) from valve body (35).

(2) Remove o-ring (38), ball stop (36), and valve ball (37) from adapter (39).

(3) Unscrew valve body (35) from reagent head (3).

(4) Remove o-ring (34), ball stop (32) and valve ball (33) from valve body (35).

(5) Unscrew adapter (22) from valve body (26) and remove o-ring (23).

(6) Unscrew valve body (26) from valve body (30).

(7) Remove o-ring (27), ball stop (24), and valve ball (25) from valve body (26).

(8) Unscrew valve body (30) from reagent head (3).

(9) Remove o-ring (31), ball stop (28), and valve ball (29) from valve body (30).

b. Cleaning.

(1) Wash all components with clean water and detergent.

(2) Rinse components in clean water and dry with wiping rag.

(3) Clean valve body (26, 30, and 35) passages. Remove all dirt, particles, and contaminates. Pay close attention to valve ball seats. Even small particles of dirt in this area can effect operation of diaphragm pump.

c. Inspection.

(1) Inspect all threaded components for damaged threads

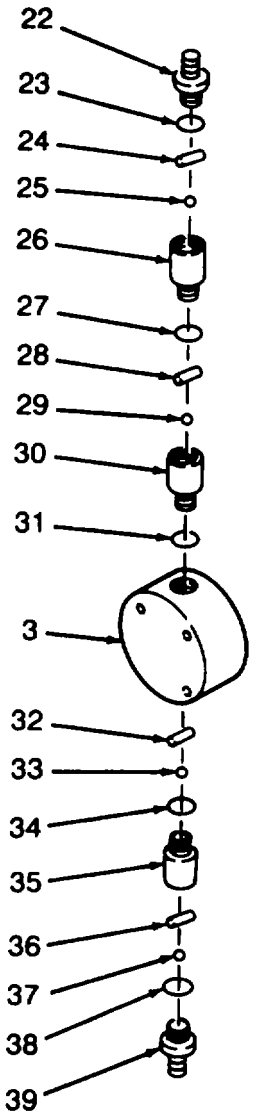
(2) Inspect valve bodies (26, 30, and 35) for clogged passages.

(3) Inspect working diaphragm (8) and guard diaphragm (13) for holes, cracks, and deterioration.

(4) Inspect backing plate (9) for corrosion.

(5) Inspect valve balls (25, 29, 33, and 37) for flat spots and irregular surface.

2-69. DIAPHRAGM PUMPS (CHEMICAL FEED PUMP) MAINTENANCE - continued.



2-69. DIAPHRAGM PUMPS (CHEMICAL FEED PUMP) MAINTENANCE - continued.

d. Repair.

(1) Replace damaged components.

(2) Replace all o-rings and diaphragms.

e. Assembly.

(1) Install o-ring (31) valve ball (29) and ball stop (28) on valve body (30). Screw valve body into reagent head (3).

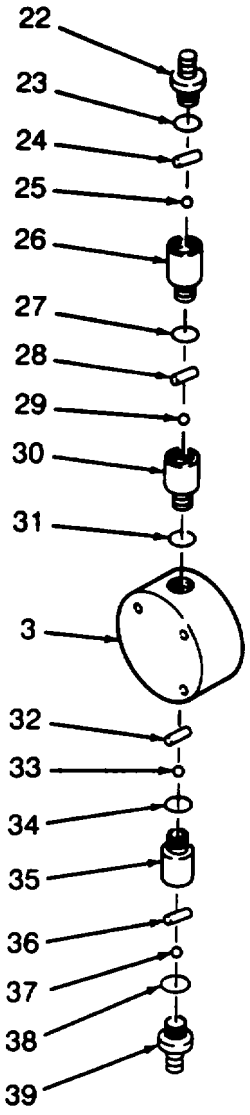
(2) Install o-ring (27), valve ball (25) and ball stop (24) in valve body (26). Install valve body (26) on valve body (30).

(3) Install o-ring (23) on adapter (22) Install adapter in valve body (26).

(4) Install o-ring (34), valve ball (33), and ball stop (3 2) in valve body (35). Screw valve body into reagent head (3).

(5) Install o-ring (38), valve ball (37), and ball stop (36) in adapter (39). Install adapter in valve body (35).

2-69. DIAPHRAGM PUMPS (CHEMICAL FEED PUMP) MAINTENANCE - continued. I



2-69. DIAPHRAGM PUMPS (CHEMICAL FEED PUMP) MAINTENANCE - continued.

INSTALLATION

NOTE
Installation of one diaphragm pump is shown. The other diaphragm pumps are similar

a. Position support disk (14), guard diaphragm (13), and inner adapter ring (12) on actuating shaft (15).

b. Aline screw holes as marked during removal and install four screws (11).

c. Position outer adapter ring (10) and backing plate (9) on housing (21). Aline holes in working diaphragm (8) and outer adapter ring (10) with inner adapter ring (12), then install diaphragm nut (7).

d. Position reagent head (3) and attached parts on working diaphragm (8) and install four screws (4).

e. Place clamp (2) on flexible hose (1).

f. Connect flexible hose (1) to reagent head (3) as marked, and tighten clamp (2).

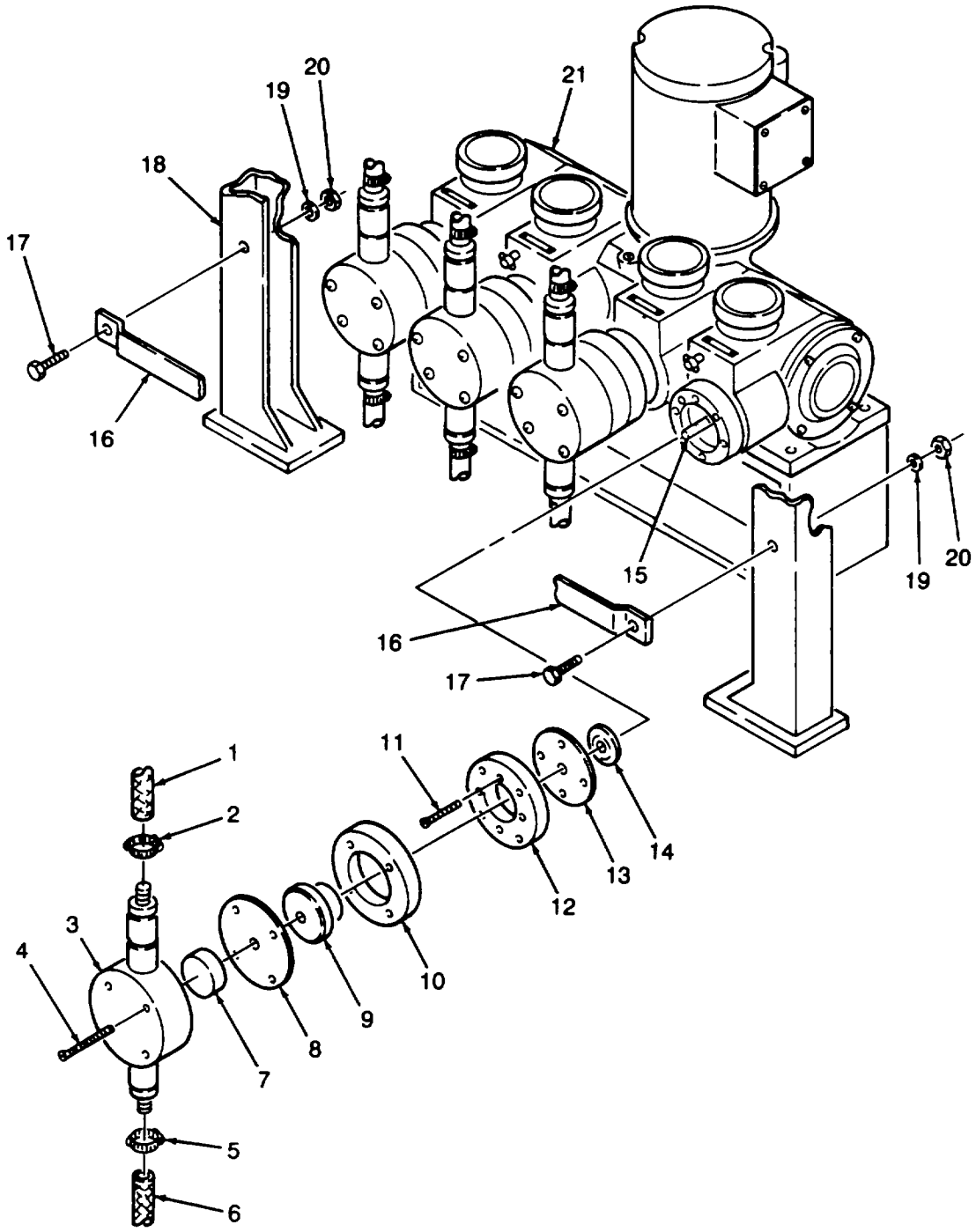
g. Place clamp (5) on flexible hose (6).

h. Connect flexible hose (6) to reagent head (3) as marked, and tighten clamp (5).

i. Position bracket (16) on frame (18) and install two screws (17), lockwashers (19) and nuts (20).

j. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.

2-69. DIAPHRAGM PUMPS (CHEMICAL FEED PUMP) MAINTENANCE - continued.



2-70. MOTOR (CHEMICAL FEED PUMP) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual)
Chemical feed pump removed (para. 2-68)

REMOVAL

a. Remove two mounting bolts (1).

NOTE
Mark location of stator on housing before removing stator.

b. Lift stator (2) from rotor (3).

NOTE
Rotor bearing is supported by pump housing and is sealed by o-ring. Bearing fit may be tight. Move end of rotor back and forth to loosen bearing and remove rotor.

c. Remove rotor (3) from housing (7).

d. Remove pin (6) and pull worm gear (5) from rotor (3).

INSTALLATION

a. Position worm gear (5) on rotor (3) and install pin (6).

CAUTION
To prevent damage to chemical feed pump, make sure worm gear, rotor, and bearing are alined with housing before pushing rotor in place.

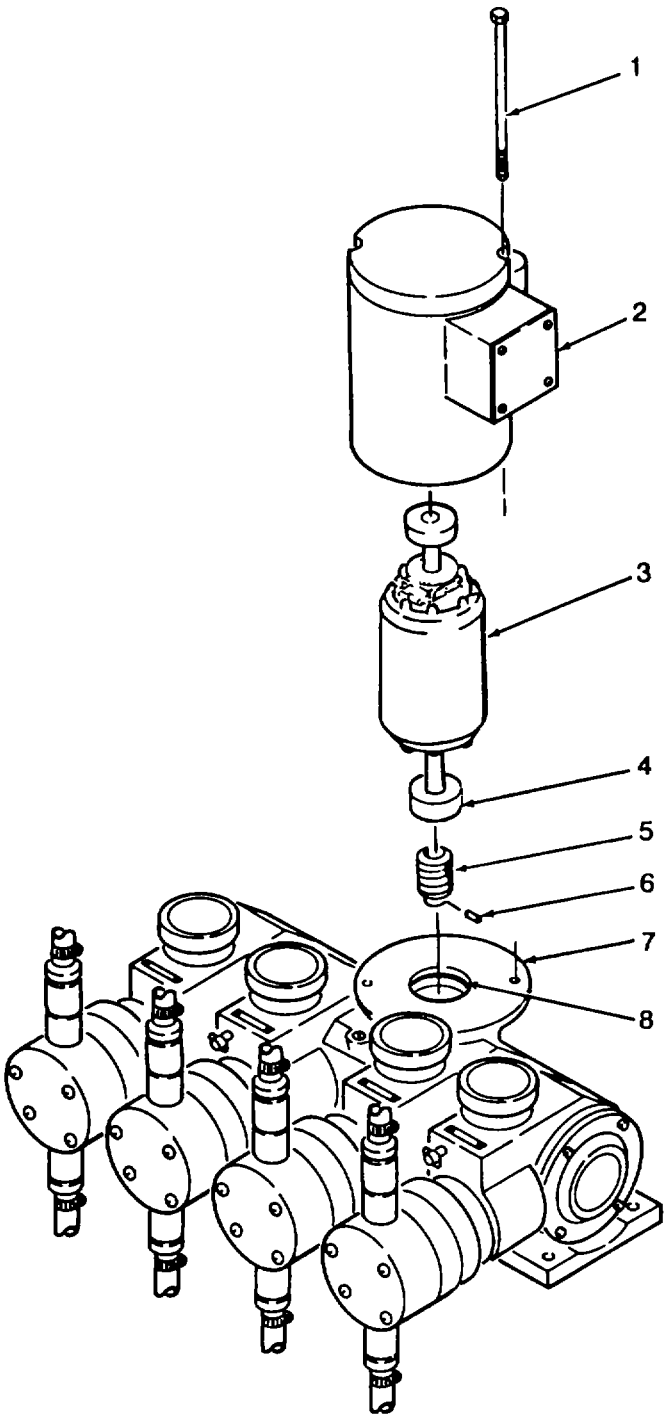
b. Install rotor (3) on housing (7). Make sure bearing (4) is fully seated in o-ring (8).

c. Position stator (2) over rotor (3). Aline marks made during removal.

d. Install two mounting bolts (1).

e. Operate ROWPU (TM 10-4610-240-10). Check for proper operation of chemical feed pump.

2-70. MOTOR (CHEMICAL FEED PUMP) MAINTENANCE - continued.



2-71. CARTRIDGE FILTER MAINTENANCE

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Chain Hoist (Appendix B, Section III, Item 3)
- Pipewrench (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Lockwasher (2) - MS35338-139
- Gasket (2) - M10387D04
- Gasket- M103873D02

Personnel Required
- Three (3)

Equipment Condition

Reference
- ROWPU shutdown (TM 10-4610-240-10).
- Power shutdown (power source manual)
- ROWPU piping drained (TM 104610-240-10).
- Cover plate removed (para 2-36)

General Safety Instructions

WARNING

Lifting heavy/difficult to handle equipment incorrectly can cause serious injury.

REMOVAL

a. Release quick-disconnect (37) and remove flexible tubing (36).

b. Loosen clamp (5) and remove flexible tubing (4).

c. Unscrew tubing (7) from adapter (8).

d. Remove two nuts (9) and screws (13), clamp halves (10), and gaskets (11).

e. Remove two nuts (14) and screws (17), clamp halves (15), and gasket (16).

f. Loosen union (19) and remove pipe section (18).

g. Remove two nuts (35) and screws (34), clamp halves (33), and gasket (32).

h. Loosen hose clamp (26) and remove flexible tubing (27).

i. Remove two nuts (3), lockwashers (2), screws (28), flat washers (29) and bracket (30). Discard lockwashers.

2-71. CARTRIDGE FILTER MAINTENANCE - continued.

j. Remove four screws (25), lockwashers (24), flat washers (23), and bushings (22).

k. Remove additional system piping as required to aid removal of cartridge filter (1) (para 2-38).

WARNING

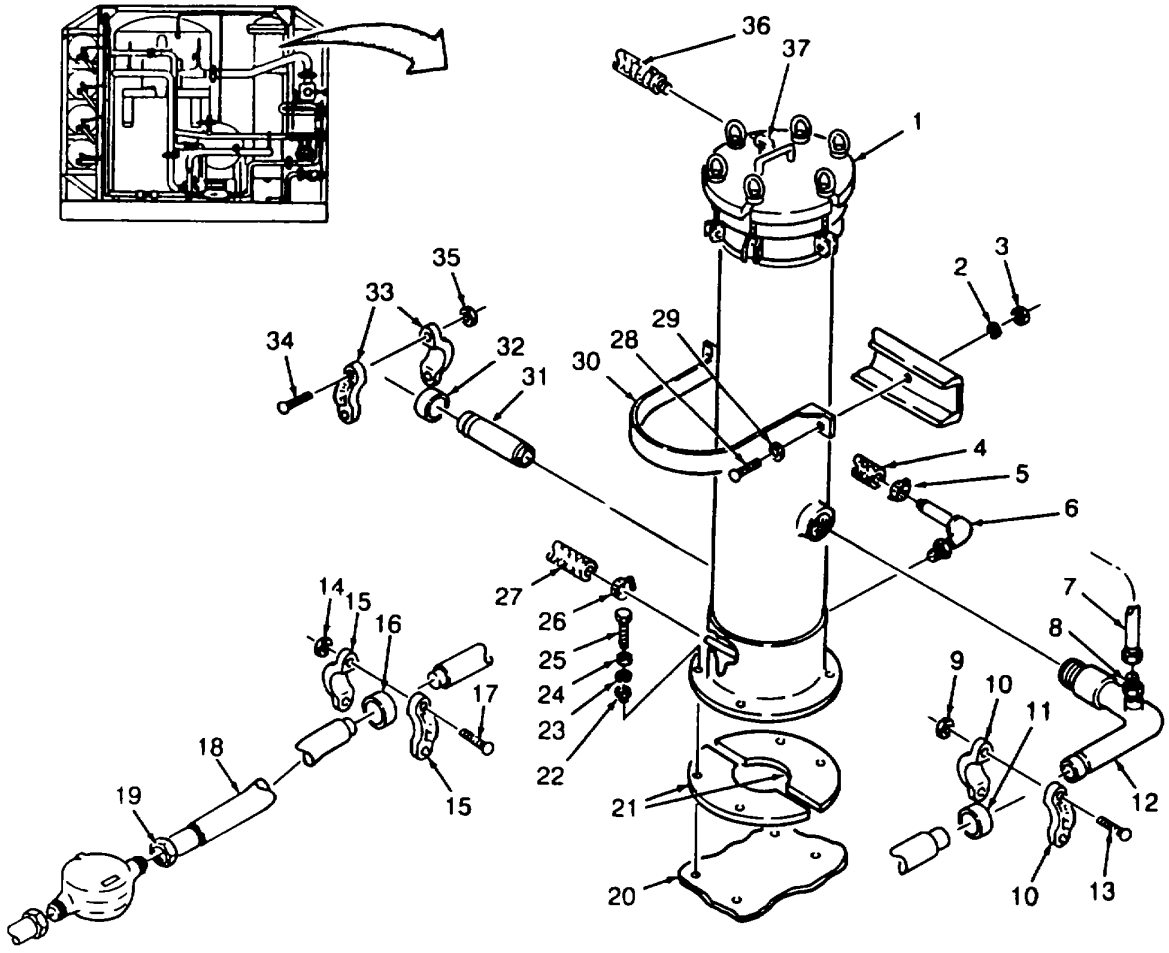
Removal of cartridge filter requires the use of a lifting device rated at 1 ton (0.91 ton) or greater in order to prevent damage to the equipment and injury to personnel.

l. Using chain hoist and two assistants, tilt cartridge filter (1) and remove it from ROWPU deck (20).

m. Remove two gasket halves (21) from ROWPU deck (20).

n. Remove pipe section (12) and adapter (31) from cartridge filter (1).

o. Remove elbow (6) from cartridge filter (1).



2-71. CARTRIDGE FILTER MAINTENANCE - continued.

REPAIR

a. Disassembly.

NOTE

- Cover is installed under spring tension. Relieve tension by loosening eyebolts a few turns at a time in an alternating pattern.
- Mark position of cover (38) on shell (44) before removal.

(1) Loosen six eyebolts (43) and rotate them out of notches in cover (38). Remove cover with attached parts.

(2) Remove eight cartridge seats (40) and springs (39) from cover (38).

(3) Remove o-ring (42) from shell (44). Discard o-ring.

(4) Lift eight filter elements (41) from shell (44) Discard filter elements.

(5) Remove nipple (47), elbow (46), and nipple (45) from bottom of shell (44).

b. Cleaning.

(1) Wash parts with detergent and clean, fresh water.

(2) Rinse parts with clean water and dry with wiping rag.

c. Inspection.

(1) Inspect shell (44) for cracks, deep scratches, and delamination.

(2) Inspect o-ring seat in shell (44) for particles of dirt, cracks, and delamination.

(3) Inspect for broken springs (39).

(4) Inspect for torn or deformed seats (40).

d. Repair.

(1) Replace defective components.

(2) Replace eight filter elements (41).

(3) Replace o-ring (42).

e. Assembly.

(1) Apply anti-seize tape to threads of nipples (45 and 47).

2-71. CARTRIDGE FILTER MAINTENANCE - continued.

(2) Install nipple (45), elbow (46) and nipple (47) on bottom of shell (44).

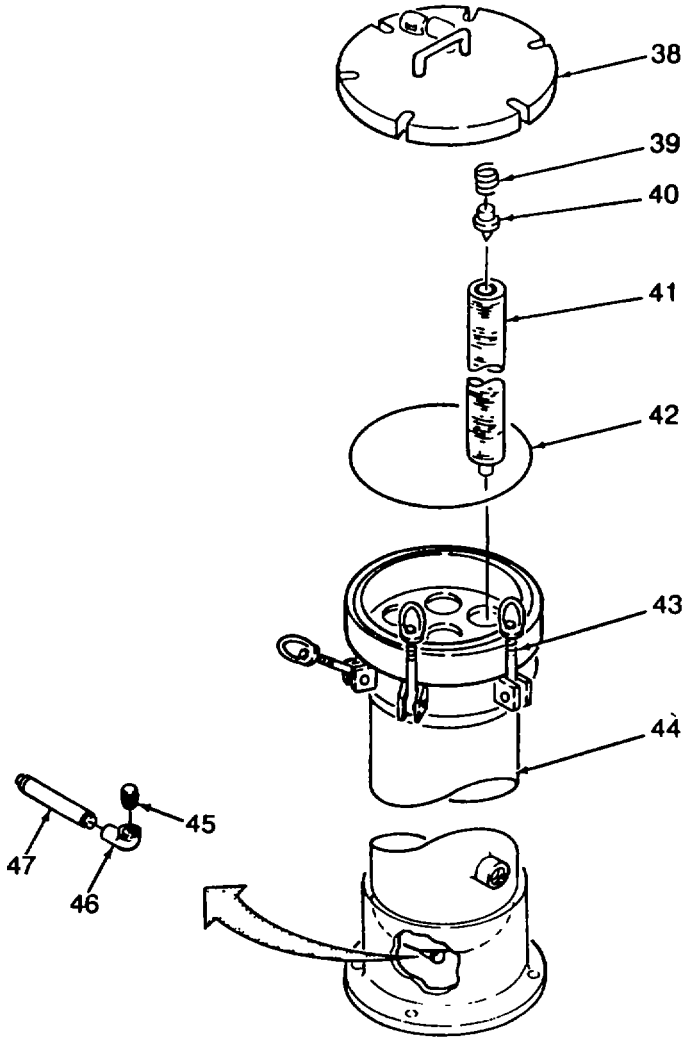
(3) Install eight filter elements (41) in shell (44).

(4) Install o-ring (42) in groove at top of shell (44).

(5) Install eight springs (39) and cartridge seats (40) on cover (38).

(6) Position cover (38) on shell (44) as marked during disassembly Be sure cartridge seats (40) fit onto filter elements (41).

(7) Rotate six eyebolts (43) up into notches in cover (38) Tighten eyebolts a few turns at a time in an alternating pattern until cover is secure.



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2-71. CARTRIDGE FILTER MAINTENANCE - continued.

INSTALLATION

a. Apply anti-seize tape to male pipe threads. Be sure tape is wrapped in same direction as pipe threads.

b. Install elbow (6) on cartridge filter (1).

c. Install adapter (31) and pipe section (12) on cartridge filter (1).

d. Position two gasket halves (21) on deck (20). Aline holes with threaded inserts in deck.

WARNING

Installation of cartridge filter requires the use of a crane rated at 1 ton (0.91 ton) or greater in order to prevent damage to the equipment and injury to personnel.

e. Using lifting equipment and two assistants, lower cartridge filter assembly (1) and position on ROWPU deck. Aline mounting holes with holes in gasket halves (21)

f. Install four bushings (22), four flat washers (23), four lockwashers (24), and four screws (25).

g. Position bracket (30) and install two flat washers (29), screws (28), lockwashers (2), and two nuts (3).

h. Install system piping removed to aid replacement of cartridge filter (1) (para 2-38).

i. Install hose (27) on nipple (47) and tighten hose clamp (26).

j. Position pipe section (18) and tighten union (19).

k. Install gasket (16), clamp halves (15), two screws (17) and nuts (14).

l. Install gasket (32), clamp halves (33), two screws (34) and nuts (35).

m. Install gasket (11), clamp halves (10), two screws (13) and nuts (9).

n. Install tubing (7) on elbow and adapter (8).

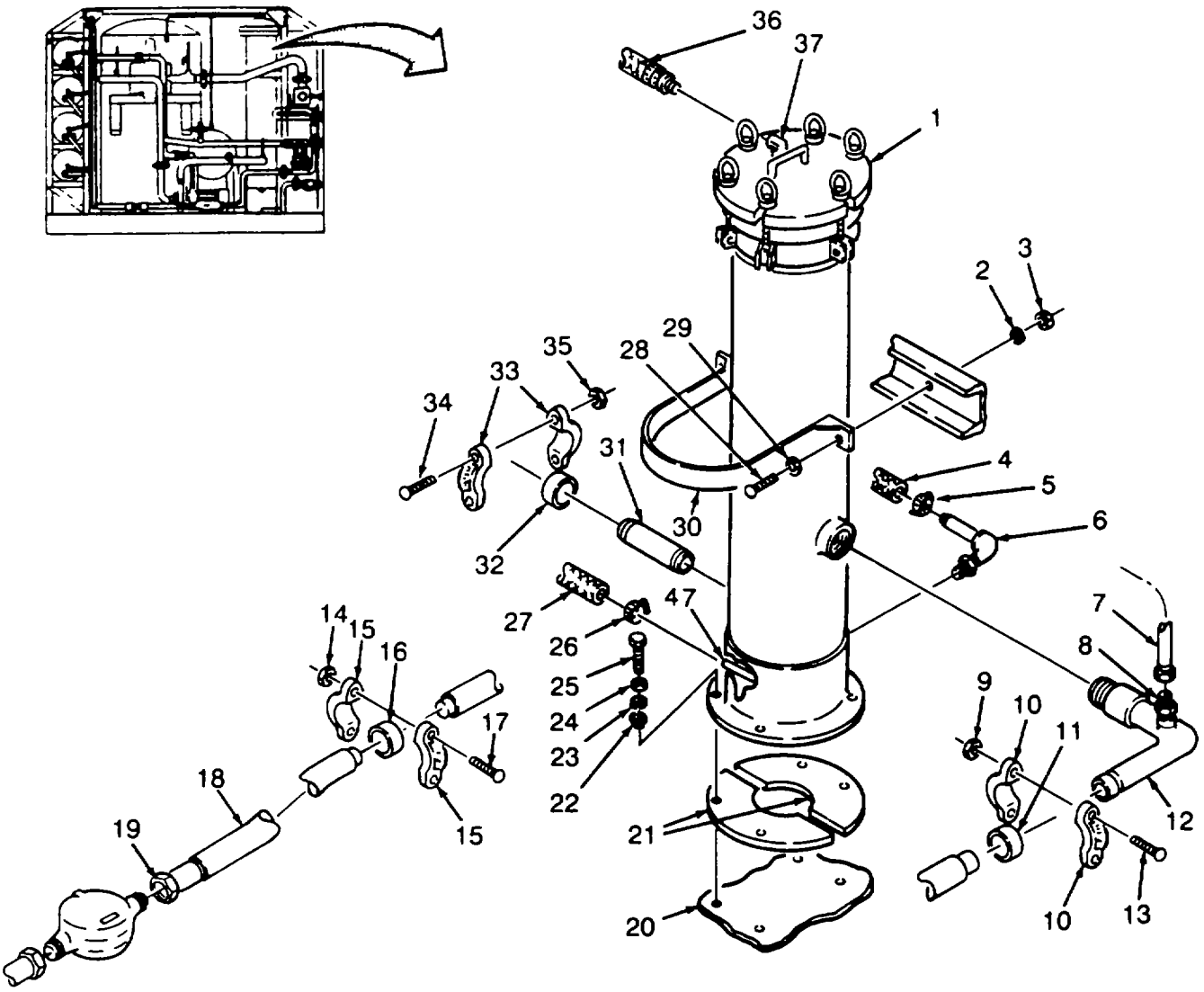
o. Install flexible tubing (4) on elbow (6) and tighten hose clamp (5).

p. Connect flexible tubing (36) and fasten quick-disconnect (37).

q. Install cover plate (para. 2-36).

r. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.

2-71. CARTRIDGE FILTER MAINTENANCE - continued.



2-72. R. O. PUMP ASSEMBLY MAINTENANCE.

Unit level maintenance of the R. O pump assembly is limited to replacement of the fluid pressure dampener, belt guard, V-belts and drain plumbing Specific procedures are contained in the following paragraphs.

12-73. FLUID PRESSURE DAMPENER MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Pipewrench (Appendix B, Section III, Item 3)
Materials Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Lockwasher (4) - MS35338-139
Gasket (2) M103873D03
Personnel Required
Two (2)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).
General Safety Instructions

WARNING

- ROWPU piping and equipment can contain extremely high pressure during and after operation. If this pressure is not relieved before performing maintenance, serious injury or death may result. Be sure to open all drains and vents before performing maintenance.
- Fluid pressure dampener is heavy/difficult to handle.

REMOVAL

a. Remove two nuts (3), two screws (1), clamp halves (2), and gasket (4).

b Remove two nuts (9), two screws (12), clamp halves (10), and gasket (11).

c Remove adapter (13) and elbow (5) from fluid pressure dampener (14).

d Remove four nuts (7), lockwashers (6), flat washers (16) and screws (17).

2-73. FLUID PRESSURE DAMPENER MAINTENANCE - continued.

WARNING

Fluid pressure dampener is heavy/difficult to handle. Two personnel are required to move the fluid pressure dampener.

e. Remove two straps (15) and separate fluid pressure dampener (14) from frame supports (8).

INSTALLATION

WARNING

Fluid pressure dampener is heavy and difficult to handle. Two personnel are required to move the fluid pressure dampener.

a. Position fluid pressure dampener (14) on frame supports (8).

b. Apply anti-seize tape to male fittings. Be sure to wrap tape in same direction as pipe thread.

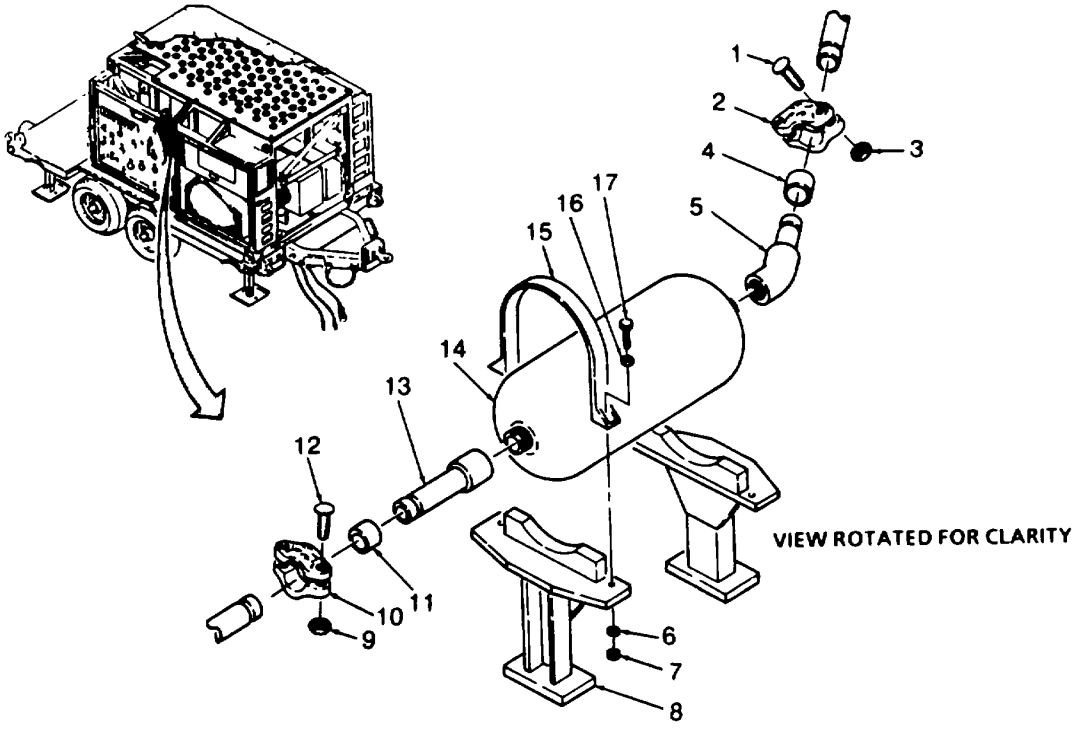
c. Install two straps (15), four flat washers (16), screws (17), lockwashers (6), and nuts (7).

d. Install adapter (13) and elbow (5) on fluid pressure dampener (14).

e. Install gasket (11), clamp halves (10), two screws (12), and two nuts (9).

f. Install gasket (4), clamp halves (2), two screws (1), and two nuts (3).

g. Operate ROWPU (TM 10-4610-240-10). Check for leaks and proper operation.



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2-74. BELT GUARD MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Materials Required
Lockwasher (4) - MS35338-138
Lockwasher (6) - MS35338-139
Equipment Condition
Reference
ROWPU shutdown (TM 104610-240-10).
Power shutdown (power source manual).

REMOVAL

a. Remove four screws (2) and lockwashers (3).

b. Remove belt guard (1) from belt shroud (4).

c. Remove six nuts (5), lockwashers (6), and flat washers (7).

d. Remove belt shroud (4) from frame (8).

INSTALLATION

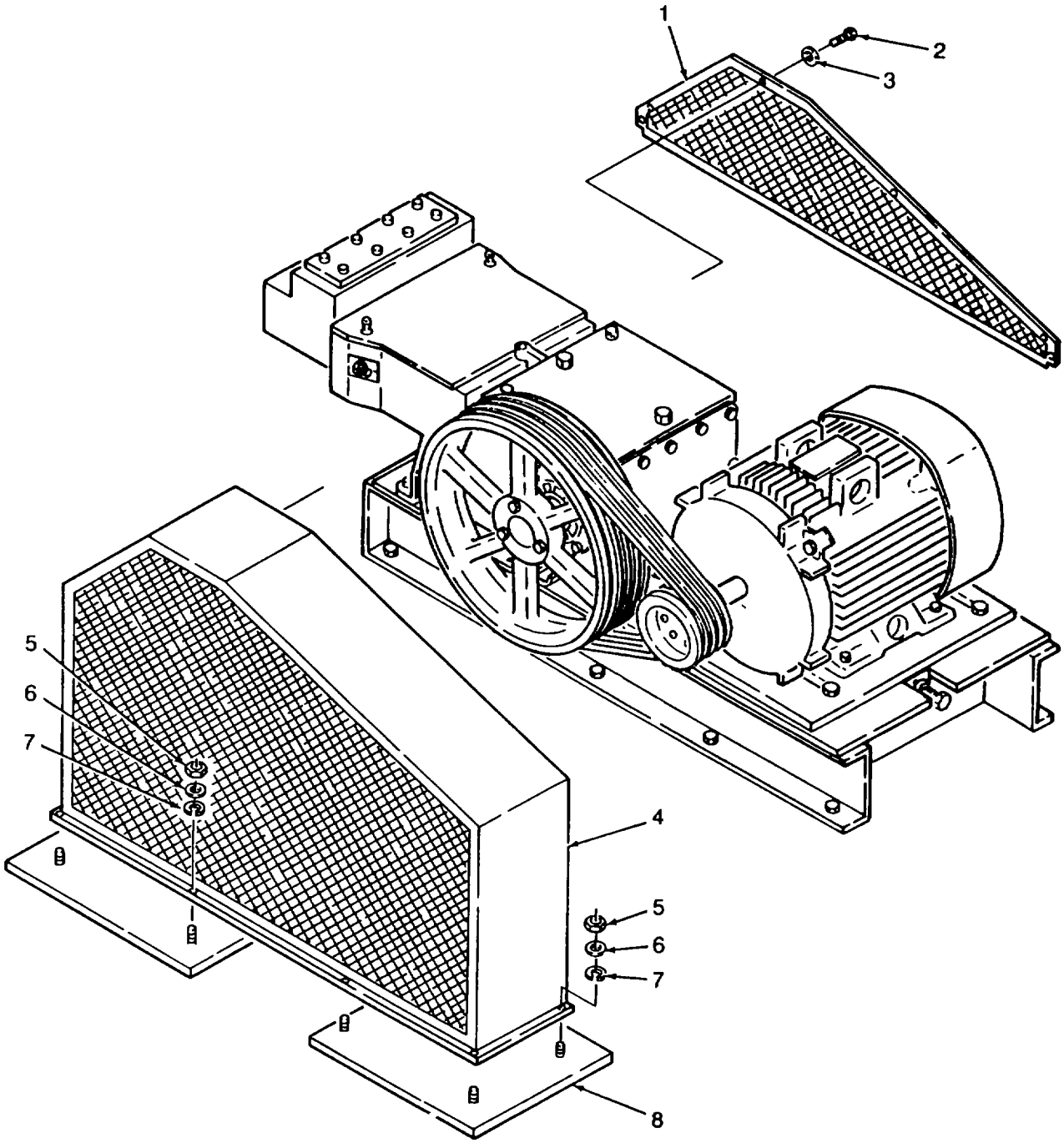
a. Position belt shroud (4) on frame (8).

b. Install six flat washers (7), lockwashers (6), and nuts (5).

c. Position belt guard (1) on belt shroud (4).

d. Install four lockwashers (3) and screws (2).

2-74. BELT GUARD MAINTENANCE- continued.

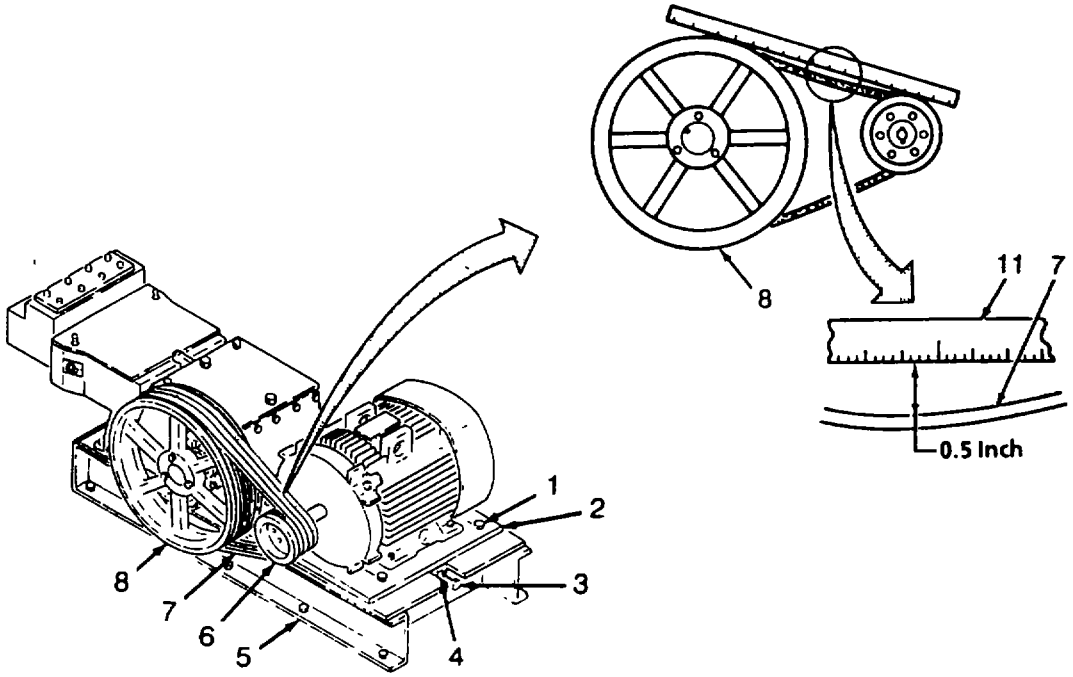


2-75. V-BELTS MAINTENANCE

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 5)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shut down (power source manual)
Belt guard removed (para. 2-74)



REMOVAL

a. Loosen four bolts (1) securing motor mounting plate (2) to stand (5).

b. Loosen locknut (4) on adjusting screw (3).

2-75. V-BELTS MAINTENANCE - continued.

c. Turn adjusting screw (3) counterclockwise until belts (7) are loose on two sheaves (6 and 8).

d. Inspect belts (7) for cracks, dry rot, and excessive wear. Replace belts as a set if required.

NOTE

If any belt is damaged, replace all five belts with new ones. Do not replace one belt or use a mismatched set.

e. Remove five belts (7) from two sheaves (6 and 8).

INSTALLATION

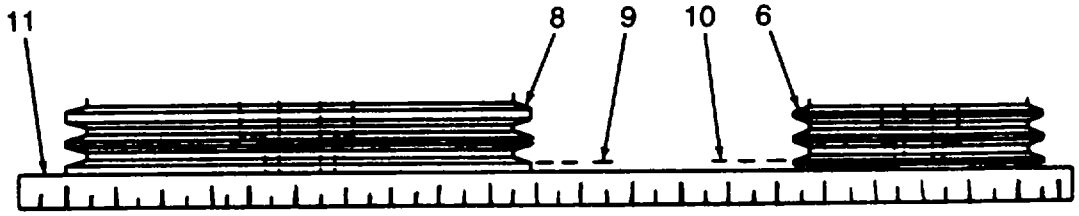
NOTE

If any belt is damaged, replace all five belts with new ones. Do not replace one belt or use a mismatched set.

a. Install five belts (7) on two sheaves (6 and 8).

b. Position straightedge across top of pump assembly sheave (8) and electric motor sheave (6) as shown.

c. Turn adjusting screw (3) clockwise until belt deflection is 0 5 inch (1 3 cm) midway between two sheaves (6 and 8).



d. Tighten locknut (4) on adjusting screw (3).

e. Position straightedge (11) across front of pump assembly sheave (8) and electric motor sheave (6).

f. Measure distance from straightedge (11) to outer belt groove (9) of pump assembly sheave (8).

g. Measure distance from straightedge (11) to outer belt groove (10) of electric motor sheave (6).

h. If distances measured in steps b and c are not the same (± 0 08 inch), reposition motor mounting plate (2) as required. If correct measurement cannot be obtained, perform sheave alinement procedure.

2-75. V-BELTS MAINTENANCE- continued.

i. Tighten four bolts (1) securing mounting plate (2) on stand (5).

SHEAVE ALINEMENT

a. Remove three bolts (15) and lockwashers (14).

NOTE
Mark location of motor sheave on motor shaft before removal.

b. Reinstall three bolts (15) in threaded holes in motor sheave (6) and screw in alternately until motor sheave (6) is off motor hub (13).

c Loosen setscrew (12) until motor hub (13) is just snug on shaft of motor (16).

d. Manually adjust position of hub on motor shaft as required.

e Remove three bolts (15) from motor sheave (6).

f. Position motor sheave (6) on motor hub (13) with unthreaded holes in motor sheave alined with threaded holes in motor hub

g Install thee bolts (15) and lockwashers (14) snug. Do not tighten bolts at this time.

h. Position straightedge (11) across front of pump sheave (8) and motor sheave (6).

i. Measure distance from straightedge (11) to outer belt groove (9) of pump sheave (8).

j. Measure distance from straightedge (11) to outer belt groove (10) of motor sheave (6).

NOTE
If motor hub (13) has been removed, position hub on motor shaft about 2.75 inches from face of motor. This distance will provide a starting point for further adjustment.

k. If distances measured in steps h and i are not the same, loosen three bolts (15) and reposition motor hub (13) and motor sheave (6) on shaft of motor (16) until distances are the same.

l. Mark location of motor hub (13) on shaft of motor (16).

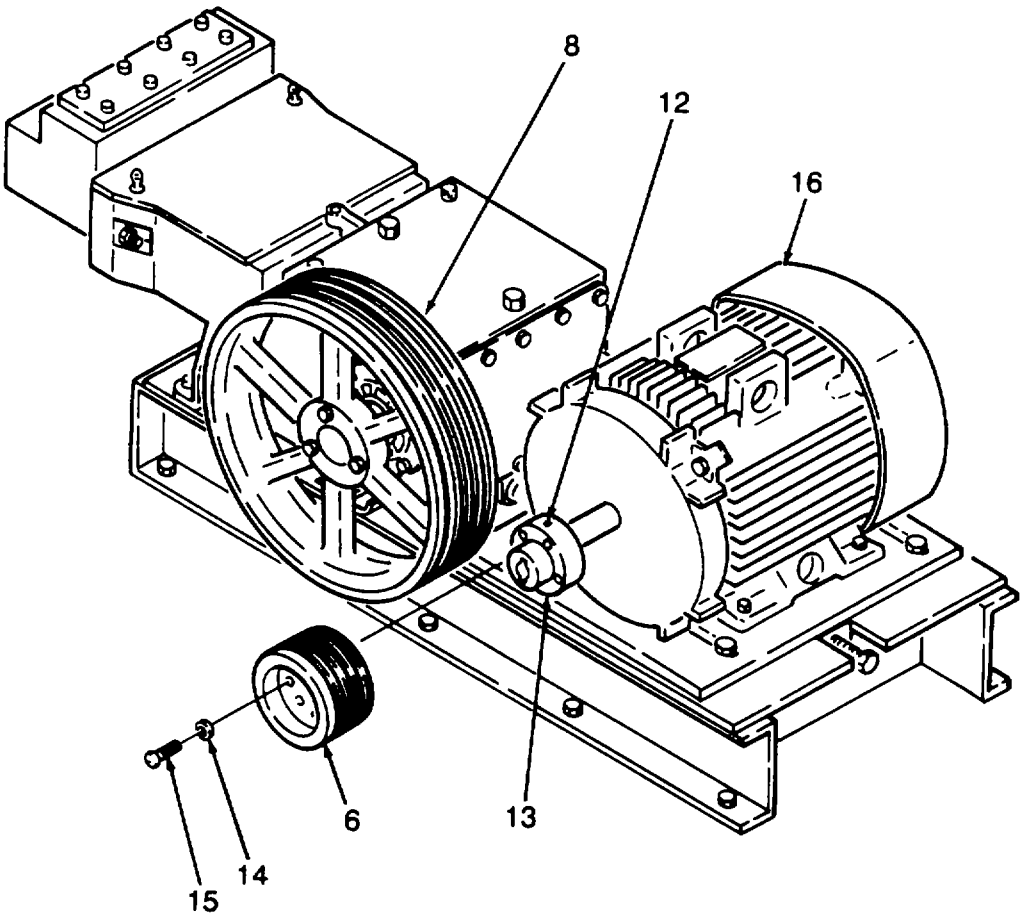
m. Remove three bolts (15), lockwashers (14), and motor sheave (6) from motor hub (13), then tighten setscrew (12).

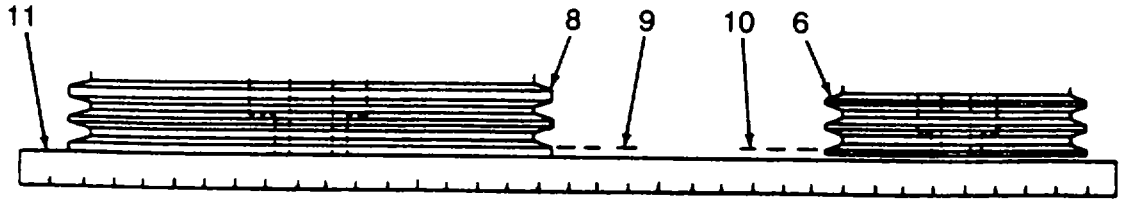
n. Reinstall motor sheave (6), lockwashers (14), and bolts (15) on motor hub (13).

o. Install V-belts.

p. Recheck belt alinement.

2-75. V-BELTS MAINTENANCE- continued.





2-76. HIGH PRESSURE PUMP MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Detergent (Appendix C, Section II, Item 10)
Rags, Wiping (Appendix C, Section II, Item 23)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual)
Belt guard removed (para. 2-24)

REMOVAL

a. Position suitable container (4 quart capacity) under end of drain hose (10).

b Open drain valve (6) and allow oil to drain from high pressure pump (1).

c. Remove screw (15) and clamp (14) from drain hose (10).

d Remove screw (13) and clamp (12) from drain hose (10).

e Loosen clamp (9) and disconnect drain hose (10) from adapter (8).

f Remove drain hose (10) from frame (11).

g. Remove site glass from tee (4).

h. Remove nut (17) and handle (4) from drain valve (6).

i. Remove tee (4) and attached parts from high pressure pump (1) If required for clearance, loosen drain valve (6) at nipple (5).

REPAIR

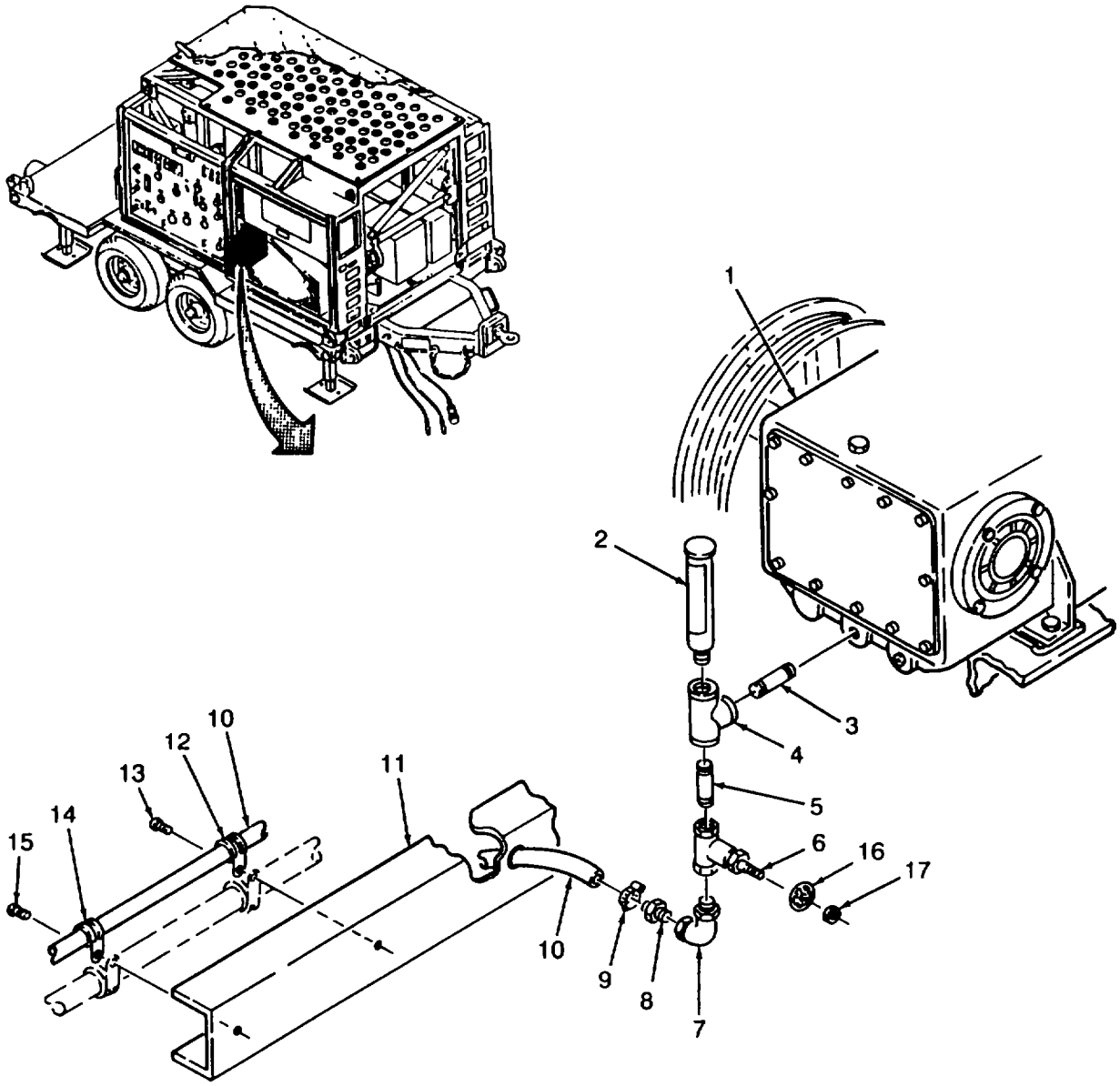
a. Disassembly.

(1) Remove adapter (8) and elbow (7) from drain valve (6).

(2) Remove drain valve (6) from nipple (5).

(3) Remove two nipples (3) and (5) from tee (4).

2-76. HIGH PRESSURE PUMP MAINTENANCE - continued



2-76. HIGH PRESSURE PUMP MAINTENANCE - continued.

b Cleaning

(1) Wash all components with clean water and detergent.

(2) Rinse components in clean water and dry with wiping rag.

c. Inspection

(1) Inspect all threaded components for damaged threads

(2) Inspect sight gage (2) for cracked or dirty lens.

d. Repair.

Replace damaged components

e. Assembly.

(1) Apply anti-seize tape to male fittings. Be sure to wrap tape in same direction as pipe thread.

(2) Install two nipples (5 and 3) on tee (4).

(3) Install drain valve (6) on nipple (5)

(4) Install elbow (7) and adapter (8) on drain valve (6).

INSTALLATION

a. Install tee (4) and attached parts on high pressure pump (1). If required for clearance, remove nut (17) and handle (16) from new drain valve.

b. Position drain hose (10) in frame (11).

c. Connect drain hose (10) to adapter (8) and tighten clamp (9)

d. Install sight glass (2) on tee (4).

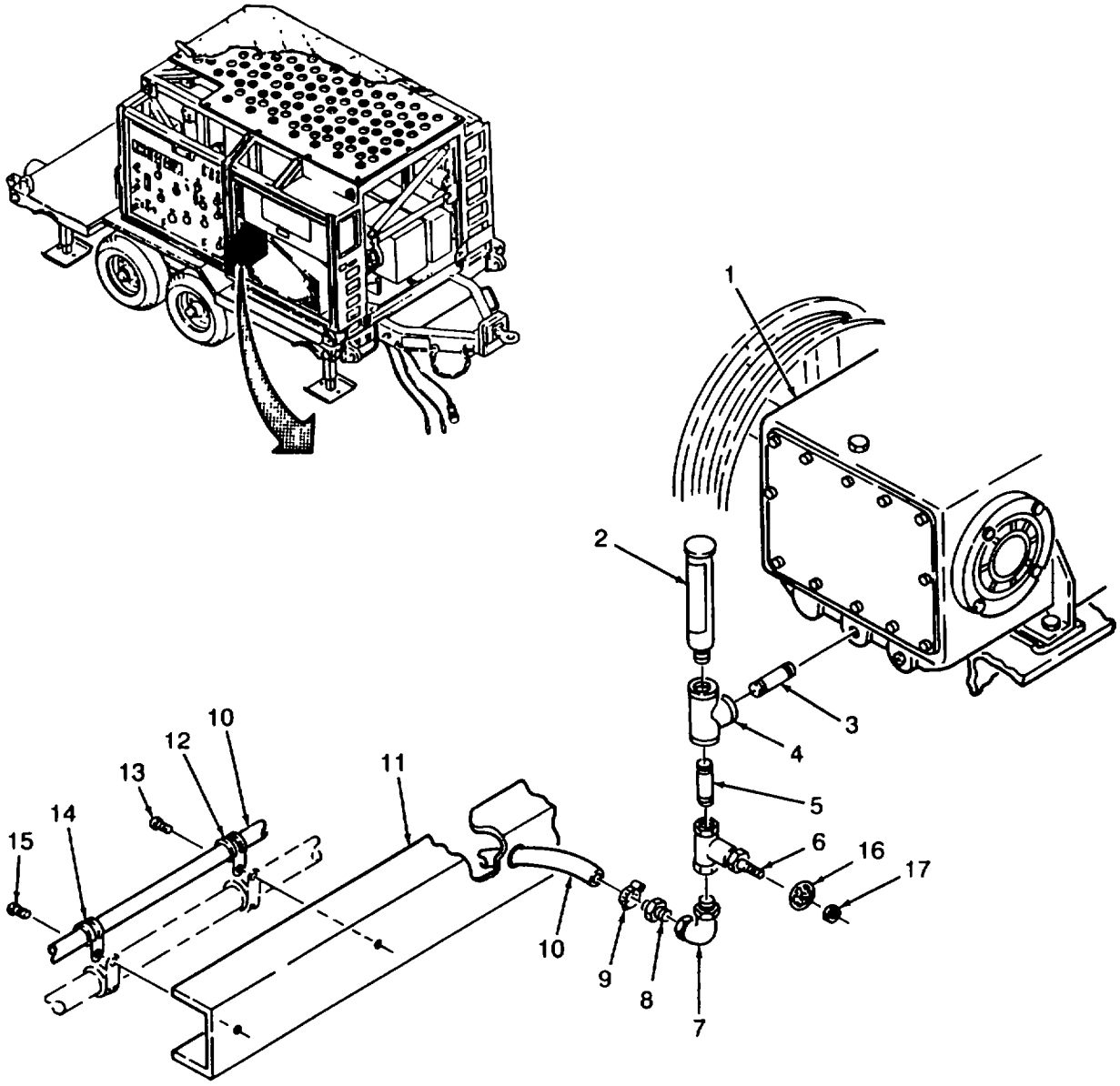
e. Position clamp (12) on drain hose (10) and install screw (13)

f. Position clamp (14) on drain hose (10) and install screw (15)

g. Service high pressure pump with oil (LO 10-4610-240-12).

h. Operate ROWPU (TM 1 0 4610- 240-10). Check for leaks and proper operation.

2-76. HIGH PRESSURE PUMP MAINTENANCE-continued



2-77. MULTIMEDIA FILTER MAINTENANCE.

Unit level maintenance of the multimedia filter consists of replacement of the timer, control valve, and diaphragm valve To aid maintenance, the diaphragm valve can be repaired while installed.

2-78. TIMER MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B. Section III, Item 5)
Material/Parts Required
Lockwasher (2) - MS35338-139
Equipment Condition
Reference
ROWPU shutdown (TM 10 4610-240-10).
Power shutdown (power source manual)

REMOVAL

a. Unfasten six latches (2) and open cover (14).
b. Disconnect electrical cable (5) from terminal board (3). Loosen sealing grip (4) and pull cable from timer (1).

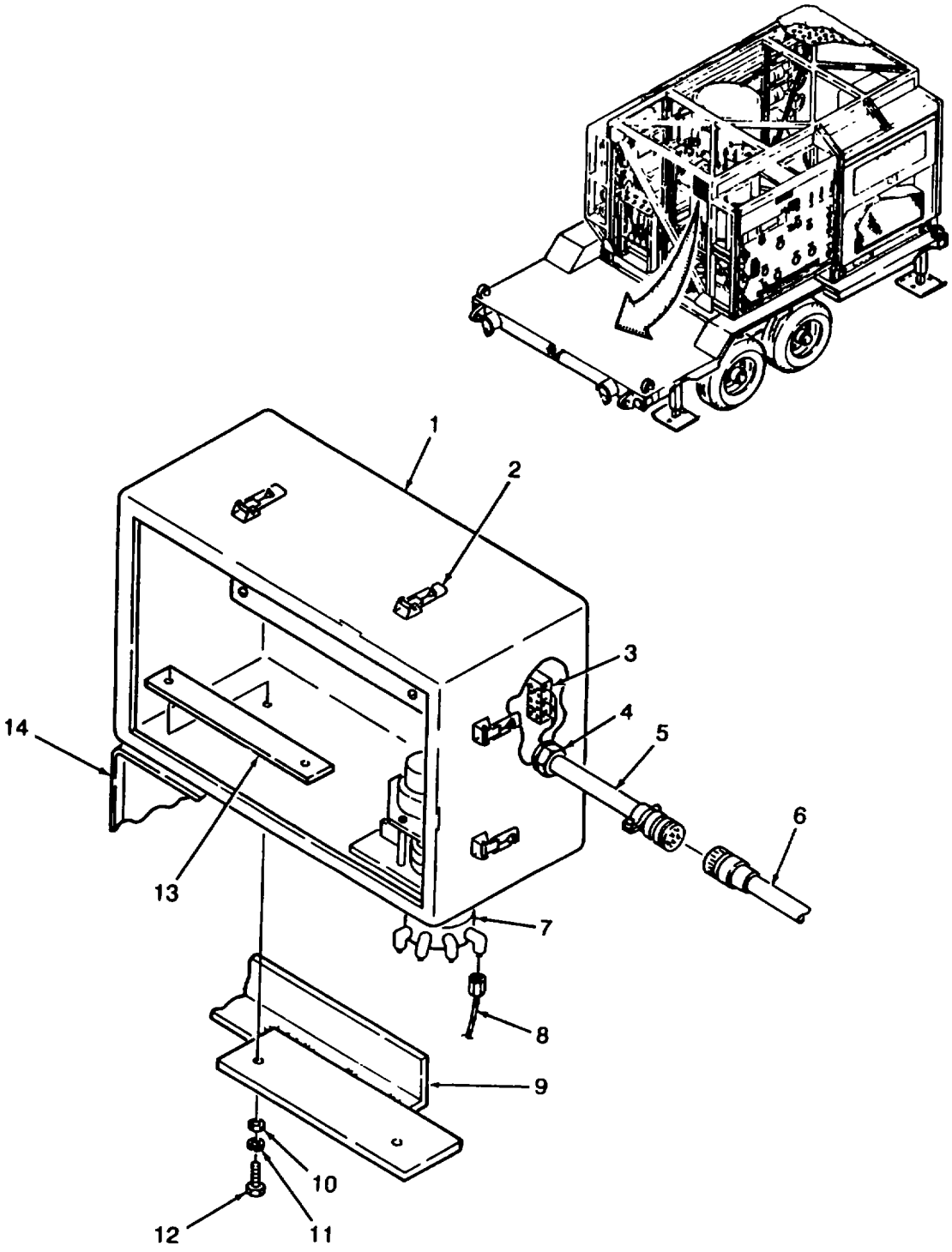
c. Disconnect electrical cable (5) from electrical cable (6) .

NOTE

To aid installation and prevent malfunction of equipment, be sure to tag and identify each flexible tube before disconnecting tubing from stager.

d. Tag and disconnect eight flexible tubes (8) from stager (7).
e. Remove two screws (12), lockwashers (11), flat washers (10), and bracket (13).
f. Remove timer (1) from multimedia filter frame (9)

2-78. TIMER MAINTENANCE - continued.



2-78. TIMER MAINTENANCE continued.

INSTALLATION

a Position timer (1) on multimedia filter frame (9)

b Position bracket (13) in timer (1) and install two net washers (10), lockwashers (11), and screws (12).

c Connect eight flexible tubes (8) to stager (7). Be sure tubes are connected as tagged during removal.

d. Install electrical cable (5) through sealing grip (4) and into timer (1)

e. Connect electrical cable (5) to terminal board (3)

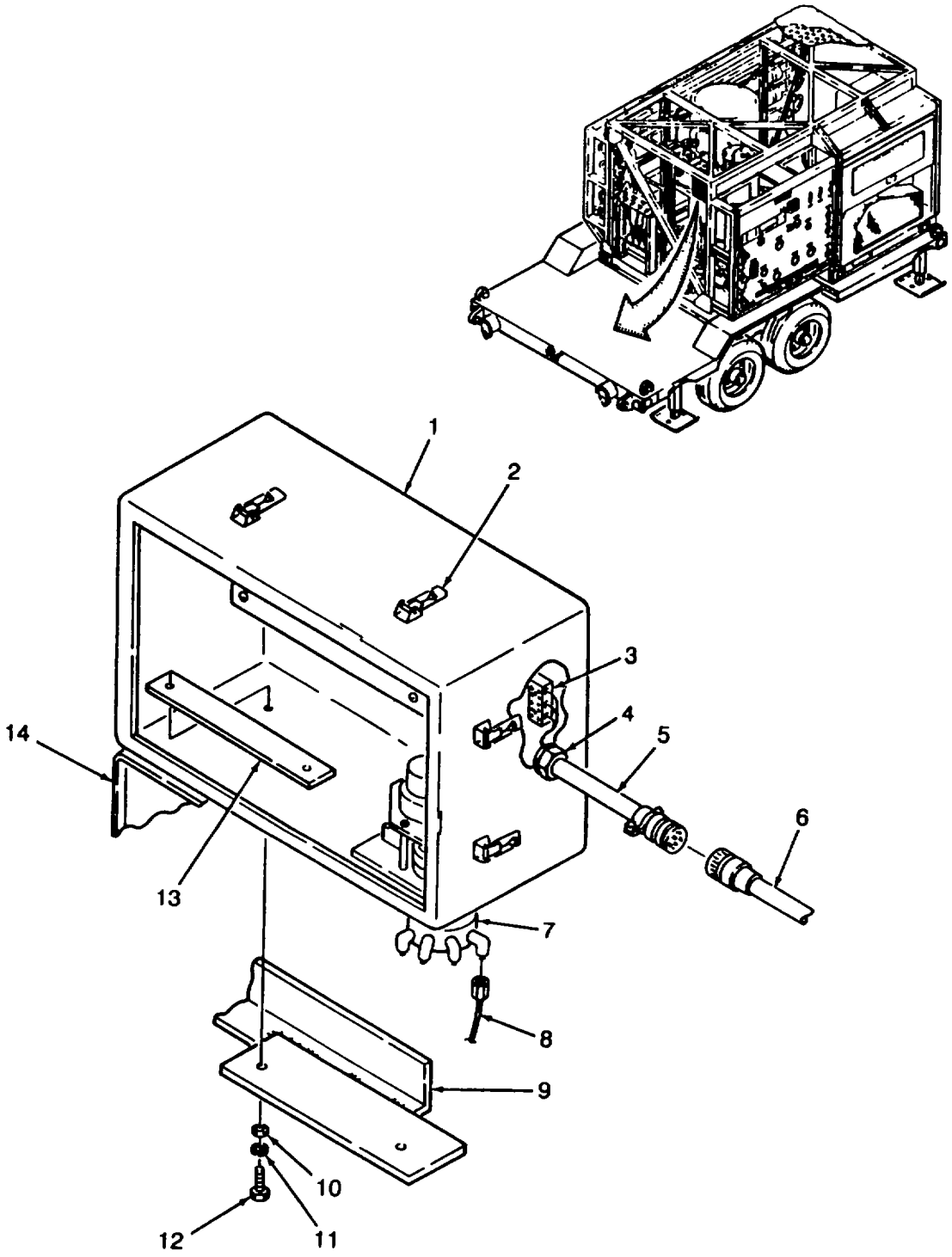
f. Tighten sealing grip (4).

g Connect electrical cable (5) to electrical cable (6)

h Close cover (14) and fasten six latches (2).

i. Operate ROWPU (TM 10-4610-240-10). Check for correct operation and inspect for leaks.

2-78. TIMER MAINTENANCE continued.



2-79. CONTROL VALVE MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B. Section III, Item 4)
Vice (Appendix B. Section III, Item 3)
Pipewrench (Appendix B. Section III, Item 3)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 30)
Equipment Condition
Reference
ROWPU shutdown (TM 10 4610-240 10).
Power shutdown (power source manual).
ROWPU piping drained (TM 10-4610-240-10).
Timer removed (pare 2-78)

REMOVAL

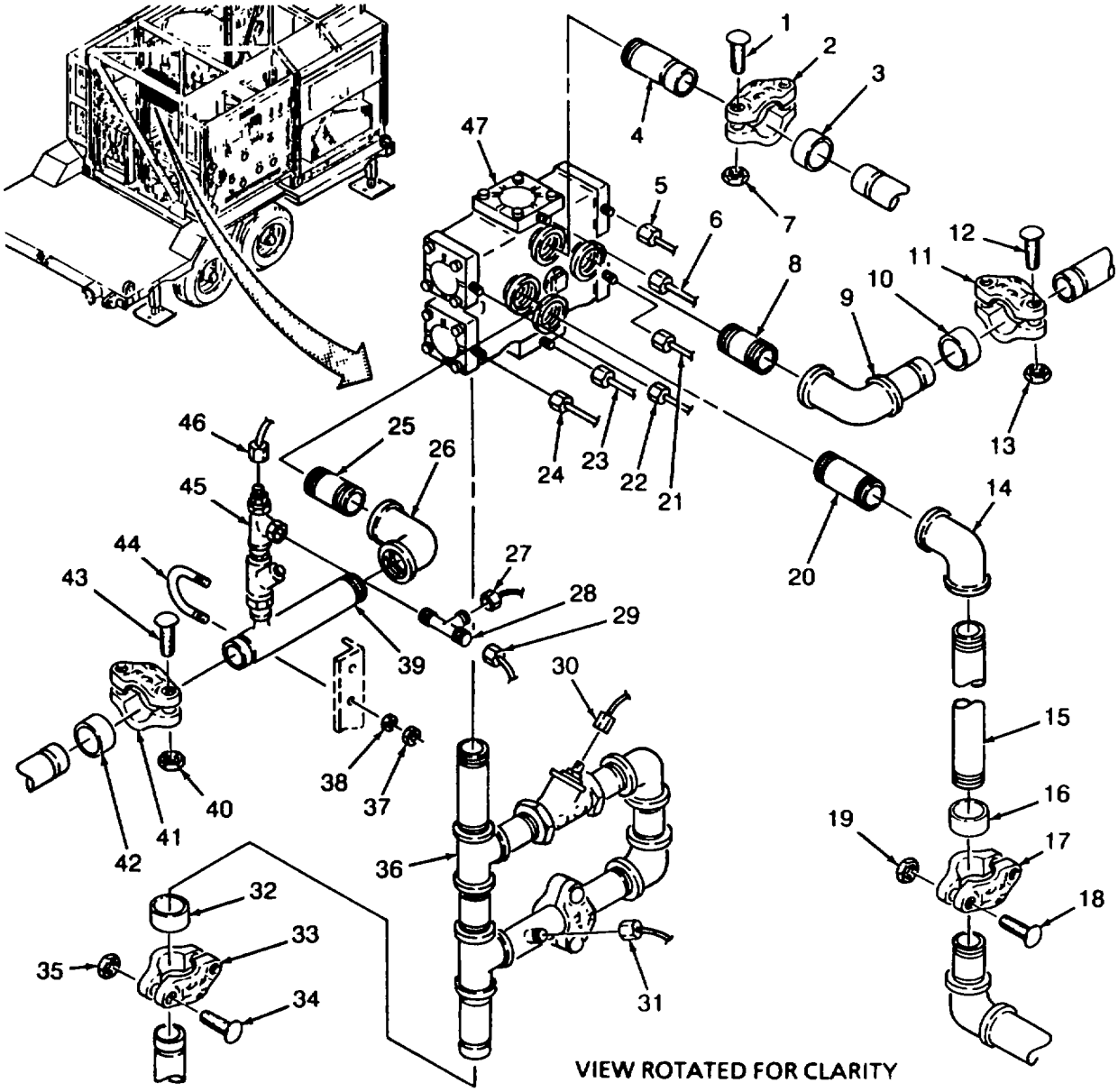
NOTE
To aid installation and prevent malfunction of equipment, be sure to tag and identify each flexible tube before removal

a Tag and disconnect ten plastic tubes (5,6,21,22,23,24,27,29, 30 and 31).
b Disconnect metal tube (46) and tee (28) from tee (45)
c Remove two nuts (7), screws (1), clamp halves (2), and gasket (3).
d Remove two nuts (13), screws (12), clamp halves (11), and gasket (10).
e. Remove two nuts (19), screws (18), clamp halves (17), and gasket (16).
f. Remove two nuts (35), screws (34), clamp halves (33), and gasket (32).
g Remove two nuts (40), screws (43), clamp halves (41), and gasket (42).
h. Remove two nuts (37) and lockwashers (38), and U-bolt (44) from adapter (39).
i Remove control valve (47) and attached parts from unit.
j Place control valve (47) m vice Remove pipe assembly (36) from bottom of control valve
k. Remove adapter (4) from control valve (47).
l Remove elbow (9) and nipple (8) from control valve (47).

2-79. CONTROL VALVE MAINTENANCE - continued.

m. Remove adapter (15), elbow (14), and nipple (20) from control valve (47)

n. Remove adapter (39), elbow (26) and nipple (25) from control valve (47)



2-79. CONTROL VALVE MAINTENANCE - continued.

INSTALLATION

a Apply anti-seize tape to male pipe fittings. Be sure to wrap tape in same direction as pipe thread.

b Install nipple (25), elbow (26), and adapter (39) on control valve (47)

c Install nipple (20), elbow (14) and adapter (15) on control valve (47).

d Install nipple (8) and elbow (9) on control valve (47).

e Install adapter (4) on control valve (47).

f. Install pipe assembly (36) on bottom of control valve.

g Position control valve (47) and attached parts in unit.

h. Install U-bolts (44) and two lockwashers (38) and nuts (37), on adapter (39).

i. Install gasket (42), two clamp halves (41), screws (43), and nuts (40)

j. Install gasket (32), two clamp halves (33), screws (34), and nuts (35).

k. Install gasket (16), two clamp halves (17), screws (18), and nuts (19).

1. Install gasket (10), two clamp halves (11), screws (12), and nuts (13).

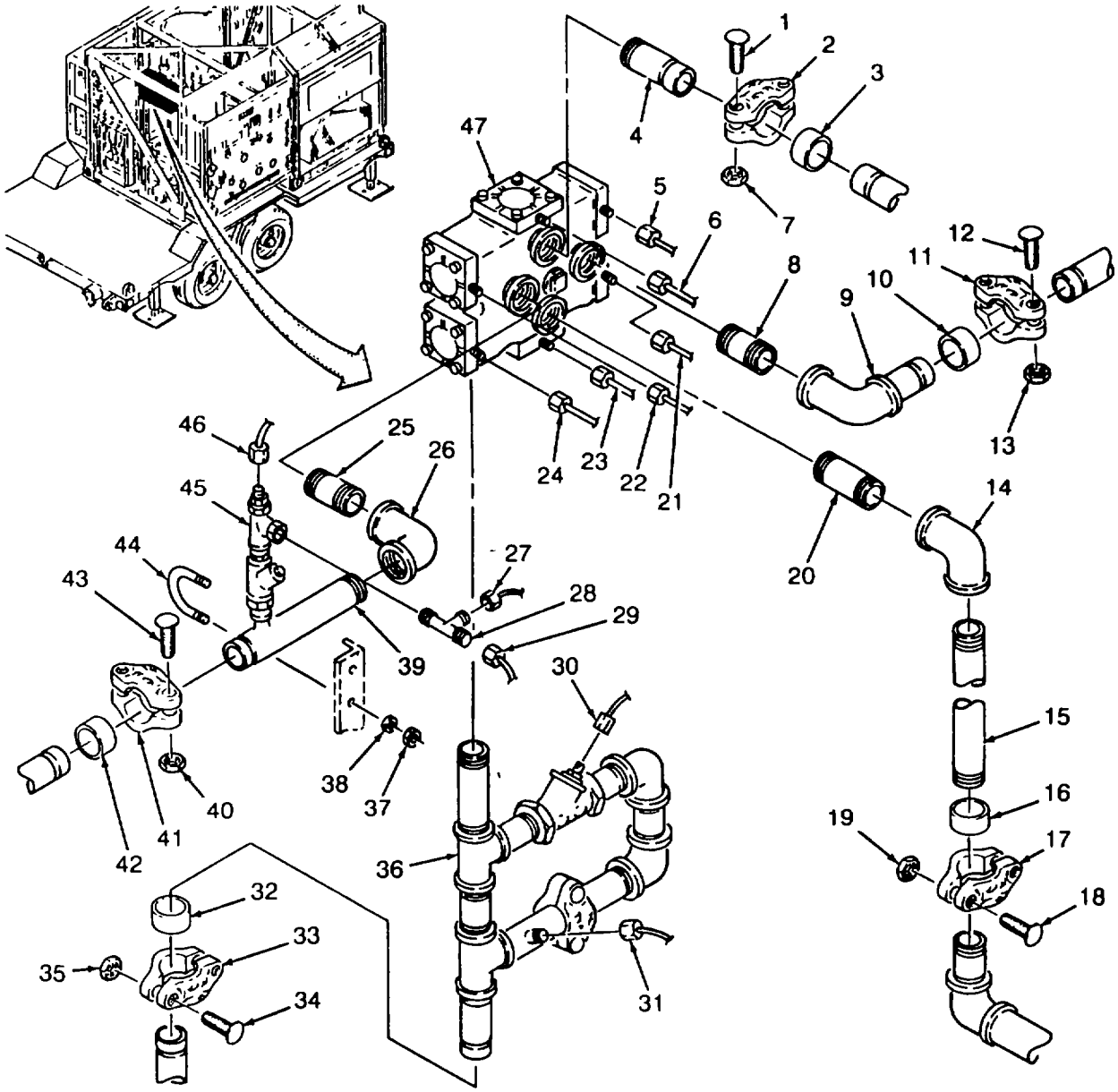
m. Install gasket (3), two clamp halves (2), screws (1), and nuts (7).

n Connect metal tube (46) and tee (28) to tee (45).

o Connect ten plastic tubes (31, 30, 27,29,22,24, 23, 21,5 and 6) Be sure to connect tubes as marked during removal.

p. Operate ROWPU (TM 10 461-24{}10).Check for leaks and proper operation.

2-79. CONTROL VALVE: MAINTENANCE - continued.



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2-80. DIAPHRAGM VALVE MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B. Section III, Item 4)
- Vice (Appendix B. Section III, Item 3)
- Pipewrench (Appendix B. Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 30)
- Detergent (Appendix C, Section II, Item 10)
- Rags, Wiping (Appendix C, Section II, Item 23)
- Diaphragm-424-FB
- Gasket - M103B73D04
- Packing - ORB- 110
- Gasket - ORB-132

Equipment Condition
Reference
- Control valve removed (pare 2-79).

REMOVAL

NOTE
Repair of the diaphragm valve my be performed without removing valve from system If removal is not required, go to repair.

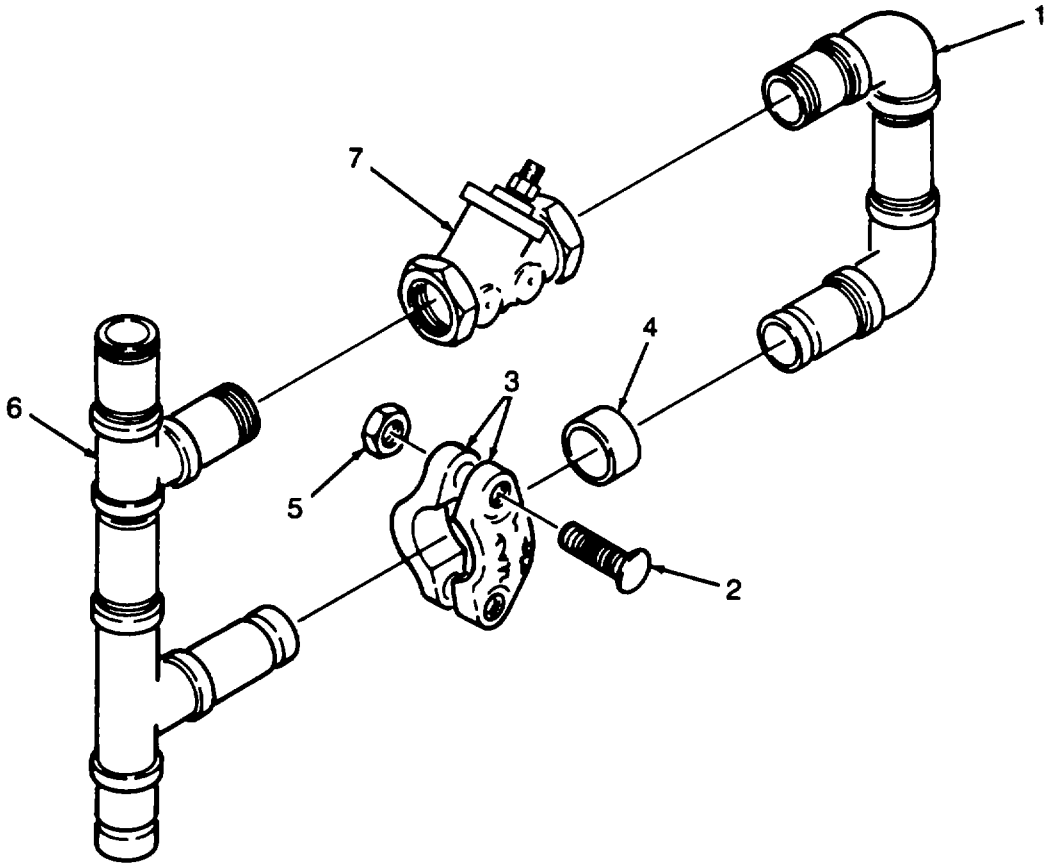
a. Place diaphragm valve (7) and attached pipe sections (1 and 6) in vice.

b. Remove two nuts (5), bolts (2), clamp halves (3), and gasket (4)

c. Remove pipe section (1) from diaphragm valve (7).

d. Remove diaphragm valve (7) from pipe section (6).

2-80. DIAPHRAGM VALVE MAINTENANCR-continued



2-283

2-80. DIAPHRAGM VALVE MAINTENANCE - continued.

REPAIR

a Disassembly.

(1) Remove four nuts (20), screws (31), tag (30), and cap (8).

(2) Remove nut (9) from shaft (29).

(3) Remove upper diaphragm plate (10), diaphragm (11), lower diaphragm plate (12), and spring (13) from shaft (29).

(4) Remove gasket (14), washer (15), and washer (16) from shaft (29).

(5) Remove o-ring retainer (18) from body (21).

(6) Remove shaft (29) and attached parts from body (21).

(7) Remove o-rings (17 and 19) from o-ring retainer (18).

(8) Remove nut (24), disk plate (25), disk (26), disk retainer (27) and flat washer (28), from shaft (29).

(9) Remove lower seat (23).

(10) Remove gasket seat (22) from body (21).

b. Cleaning.

(1) Wash all components with clean water and detergent.

(2) Rinse components in clean water and dry with wiping rag.

c. Inspection.

Inspect all parts, threaded areas, and attaching parts for damage and corrosion.

d. Repair.

Replace damaged components. Replace packing, gaskets and diaphragm.

e. Assembly.

(1) Install gasket seat (22) on body (21).

(2) Install seat (23) in body (21).

(3) Install flat washer (28) disk retainer (27), disk (26), disk plate (25) and nut (24) on shaft (29).

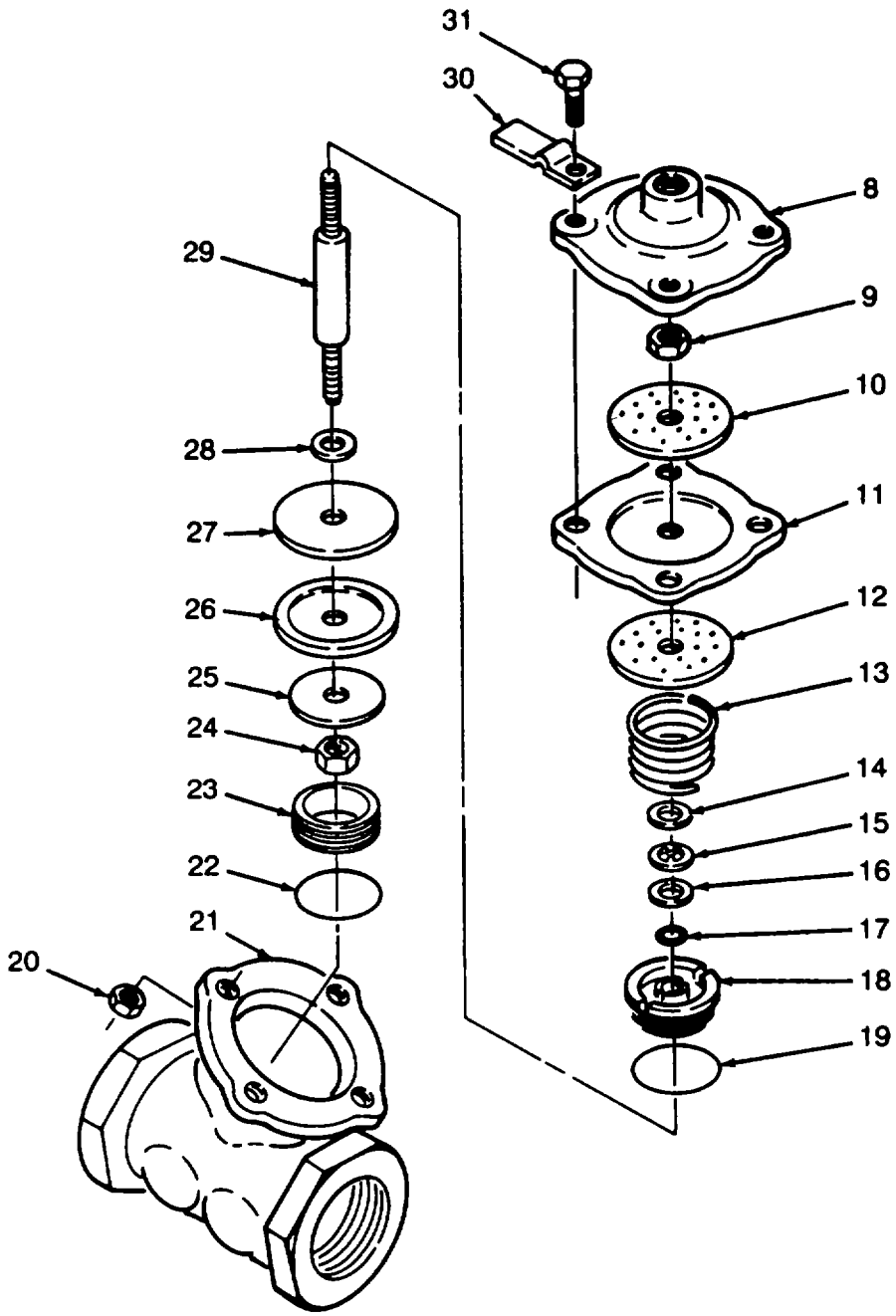
2-80. DIAPHRAGM VALVE MAINTENANCE-continued.

(4) Position shaft (29) and attached parts in body (21).

(5) Install wrings (17 and 19) on wring retainer (18).

(6) Install O-ring retainer (18) over shaft (29) and onto body (21).

(7) Install washer (16), washer (15), and gasket (14) on shaft (29).



2-80. DIAPHRAGM VALVE MAINTENANCE - continued.

REPAIR - cont

(8) Install spring (13), lower diaphragm plate (12), diaphragm (11), and upper diaphragm plate (10) on shaft (29).

(9) Install nut (9) on shaft (29) and aline bolt holes in diaphragm (I 1) with bolt holes in body (21)

(10) Install cap (8), tag (30), four screws (31), and nuts (20) on body (21).

INSTALLATION

a. Apply anti-seize tape to male fittings. Be sure to wrap tape in same direction as pipe thread

b. Install diaphragm valve (7) on pipe section (6) Make sure valve is positioned as shown.

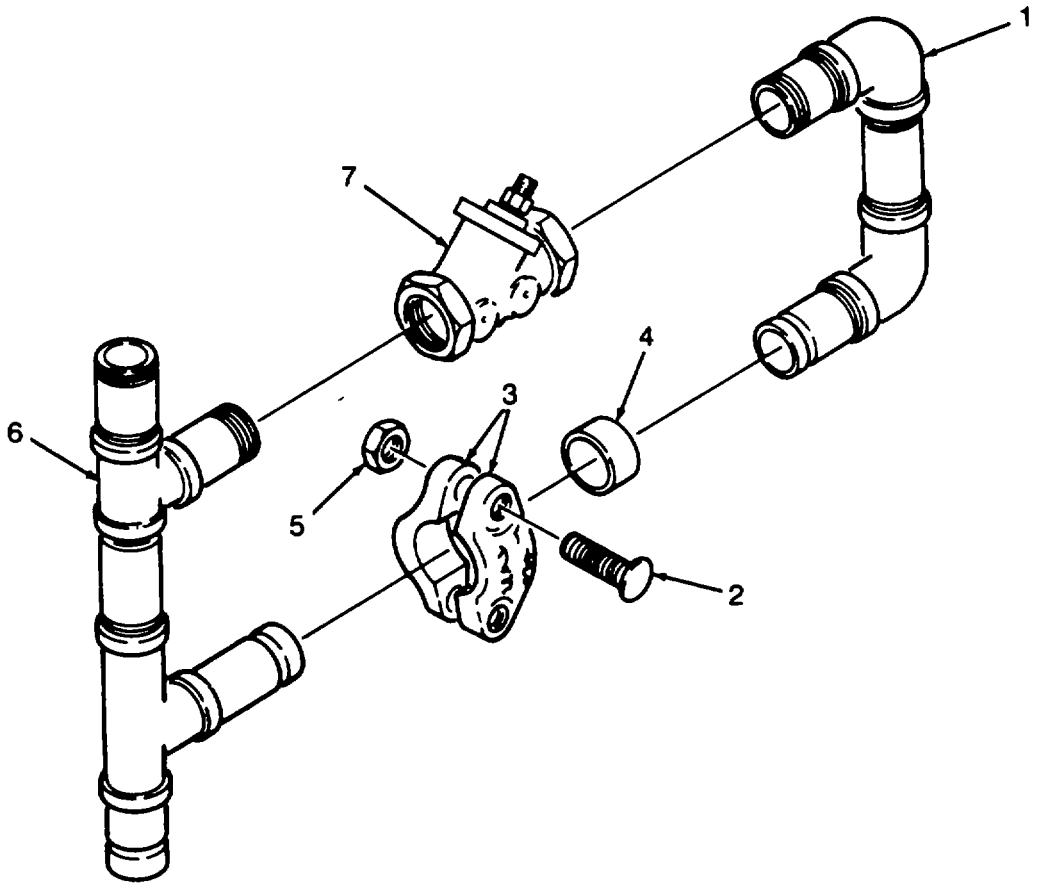
c Install pipe section (1) on diaphragm valve (7).

d. Install gasket (4), clamp halves (3), two screws (2) and nuts (5)

e. Install control valve (pare. 2-79).

f Operate ROWPU (TM 10-610-240 10). Check for leaks and correct operation.

2-80. DIAPHRAGM VALVE MAINTENANCE-continued



2-81. R.O. PRESSURE TUBES MAINTENANCE (MODEL WPES-1).

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B. Section III, Item 4)
- Torque Wrench (Appendix B. Section III, Item 3)

Material/Parts Required
- Grease, silicone (Appendix C, Section II, Item 16)
- Gasket (3) - M103873DOZ
- O-ring (2) - 2-219-E540-80
- O-ring (2) - 2-35-E540-80
- O-ring (2) - 2-217-E540-80
- O-ring (2) - 406012-1
- O-ring (2) - 2-222-E540-80
- Ring, retaining (2) - RSN-131SP
- Ring, retaining (2) - RSN-87SP

Personnel Required
- Two (2)

Equipment Condition
- Reference
- ROWPU shutdown (TM 10-610-240 10).
- Power shutdown (power source manual).
- ROWPU piping drained(TM10 461-240 10).

General Safety Instructions

WARNING

ROWPU piping and equipment can contain extremely height pressure during and after operation. If this pressure is not relieved before performing maintenance, serious injury or death may result. Be sure to open all drains and vents before performing maintenance

REMOVAL

NOTE

Removal of one R O. pressure tube is shown. Removal of other pressure tube is similar.

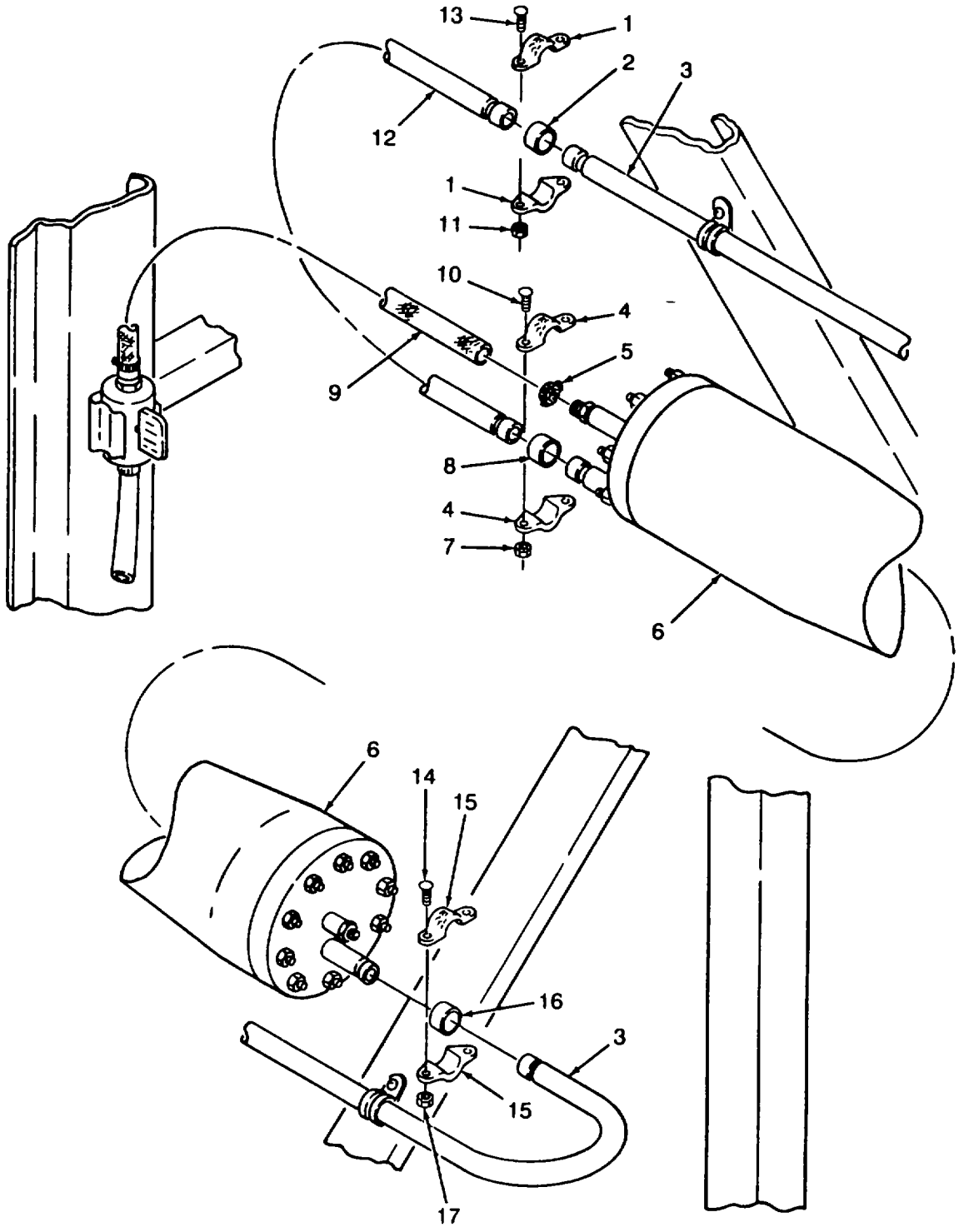
a. At each end of R O. pressure tube (6), loosen hose clamps (5) and disconnect flexible tubing (9).

b. At front end of R.0 pressure tube, remove two nuts (11) and bolts (13), clamp halves (1) and gasket (2)

c. Remove two nuts (7) and bolts (10), clamp halves (4) and gasket (8).

d. Remove pipe section (12).

2-81. R.O. PRESSURE TUBES MAINTENANCE (MODEL WPES- 1) - continued.



2-81. R.O. PRESSURE TUBES MAINTENANCE (MODEL WPES 1) - continued.

e At opposite end of R.0 pressure tube (6), remove two nuts (17) and bolts (14), clamp halves (15), and gasket (16).

NOTE

There are four R O pressure tubes. All are removed the same One is shown, the others are similar.

f. Remove two nuts (24), lockwashers (23), and flat washers (22) from brackets (18)

g Remove two nuts (21), lockwashers (20), and screws (19) from brackets (18).

h. Remove two brackets (18), flat washers (27), and nuts (28) from R.O. pressure tube (6).

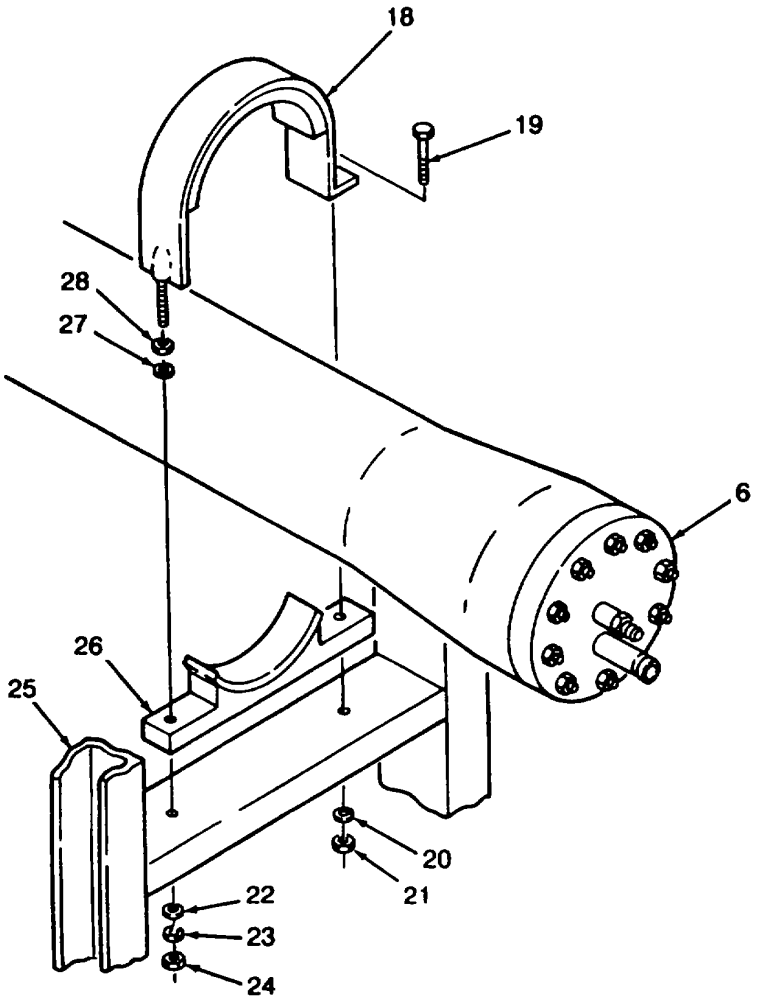
WARNING

The R 0. pressure tube is heavy. Two people are needed to lift it to prevent personal injury or damage to the equipment

i. Remove R.O. pressure tube (6) from frame (25-.

j. Remove two supports (26) from frame (25).

2-81. R.O. PRESSURE TUBES MAINTENANCE (MODEL WPES-I) - continued.



2-81. R.O. PRESSURE TUBES MAINTENANCE(MODEL WPES-1)- continued.

REPAIR

a. Disassembly

NOTE

There are two end plate assemblies on each of four R.O. pressure tubes Disassembly for both end plates and all tubes is the same.

(1) Remove ten nuts (43) and flat washers (42) from studs on R.O pressure tube (6).

NOTE

- To aid installation, mark position of end plate on R O pressure tube before removal.
- If required, remove paint from concentrate port and permeate port.

(2) Screw four end cap puller bolts (from storage box) into threaded holes in end plate (30) Turn puller bolts alternately until end plate is separated from pressure tube (6) Slowly, separate end plate from vessel.

(3) Remove retaining ring (44) from permeate port (37).

(4) Remove two cap screws (41) and end plug (33), from end plate (30).

(5) Remove permeate port (37) and end connector (39).

(6) Remove two o-rings (38) and (40) from end connector (39).

(7) Remove two o-rings (32) and (34) from end plug (33).

(8) Remove adapter (35) and o-ring (36).

(9) Remove retaining ring (31) and concentrate port (29).

(10) Remove filter elements (TM 104610-240-10).

b. Cleaning

(1) Wash all parts with clean water and detergent.

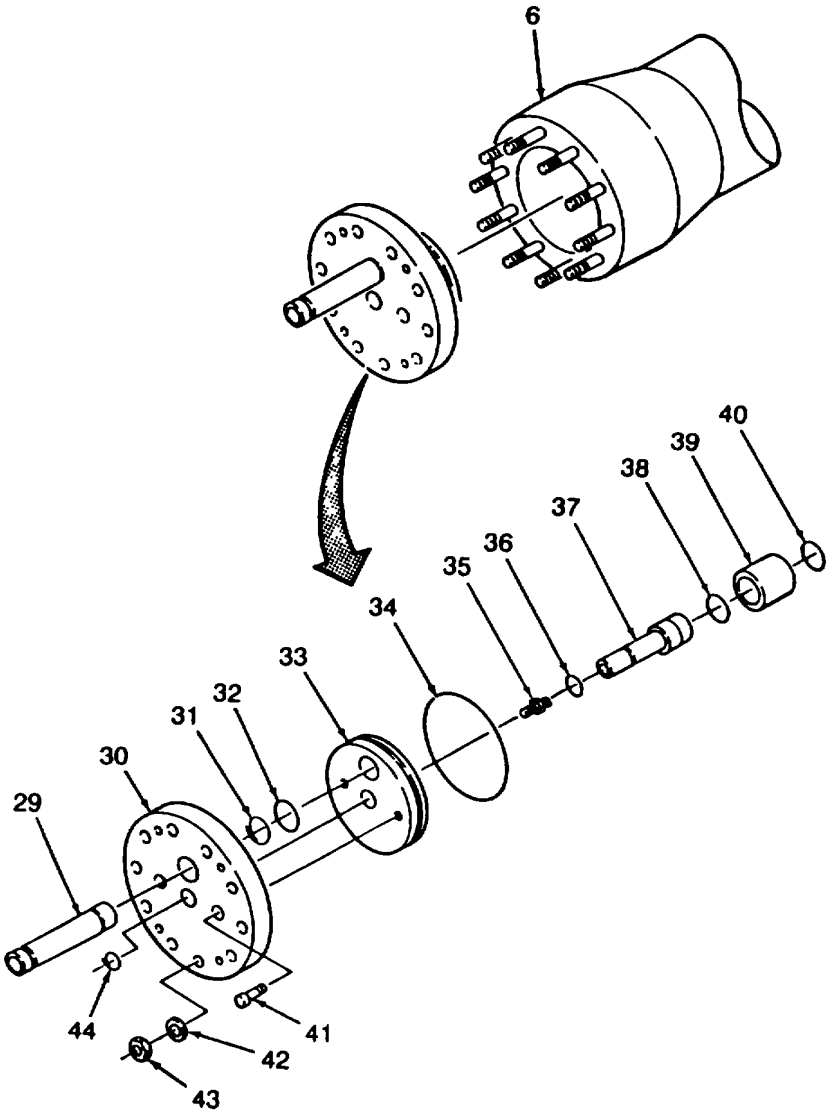
(2) Rinse components with clean water and dry with wiping rag.

c. Inspection

(1) Inspect end connector (39) for damage or deformity.

(2) Inspect end plate (30) for damage, excessive wear, and serviceability.

2-81. R.O. PRESSURE TUBES MAINTENANCE (MODEL WPES-1) - continued.



2-81. R.O. PRESSURE TUBES MAINTENANCE (MODEL WPES-1) - continued.

(3) Inspect end plug (33), permeate port (37), and concentrate port (29) for wear, correct fit, and serviceability.

(4) Inspect R O pressure tube (6) and studs for damage.

d. Repair.

Replace damaged or defective components Replace all O-rings.

e. Assembly.

NOTE

- There are two end plate assemblies on each of four R O. pressure tubes Procedure for both end plates and all tubes is the same One end plate is shown, the others are similar.
- Coat o-rings and o-ring paths with a thin layer of silicone grease to reduce friction during installation.

(1) Install filter elements in R O pressure tubes (TM 10461-240(10).

(2) Position concentrate port (29), in end plate (30) and install retaining ring (31).

(3) Install adapter (35) and o-ring (36) on permeate port (37).

(4) Install two o-rings (32 and 34) in end plug (33).

NOTE

The two o-rings (38 and 40) that fit in the end connector have different outside diameters Feel inside end connector (39) to find the large and small inside-diameter ends. Install large o-ring in large end of end connector Install small o-ring in small end of end connector.

(5) Install two o-rings (38) and (40) in end connector (39).

NOTE

Small inside-diameter end of end connector (39) goes on permeate port (37)

(6) Position end connector (39) on permeate port (37), then position permeate port on end plug (33).

(7) Position end plug (33) on end plate (30) Install two cap screws (41).

(8) Install retaining ring (44) on permeate port (37).

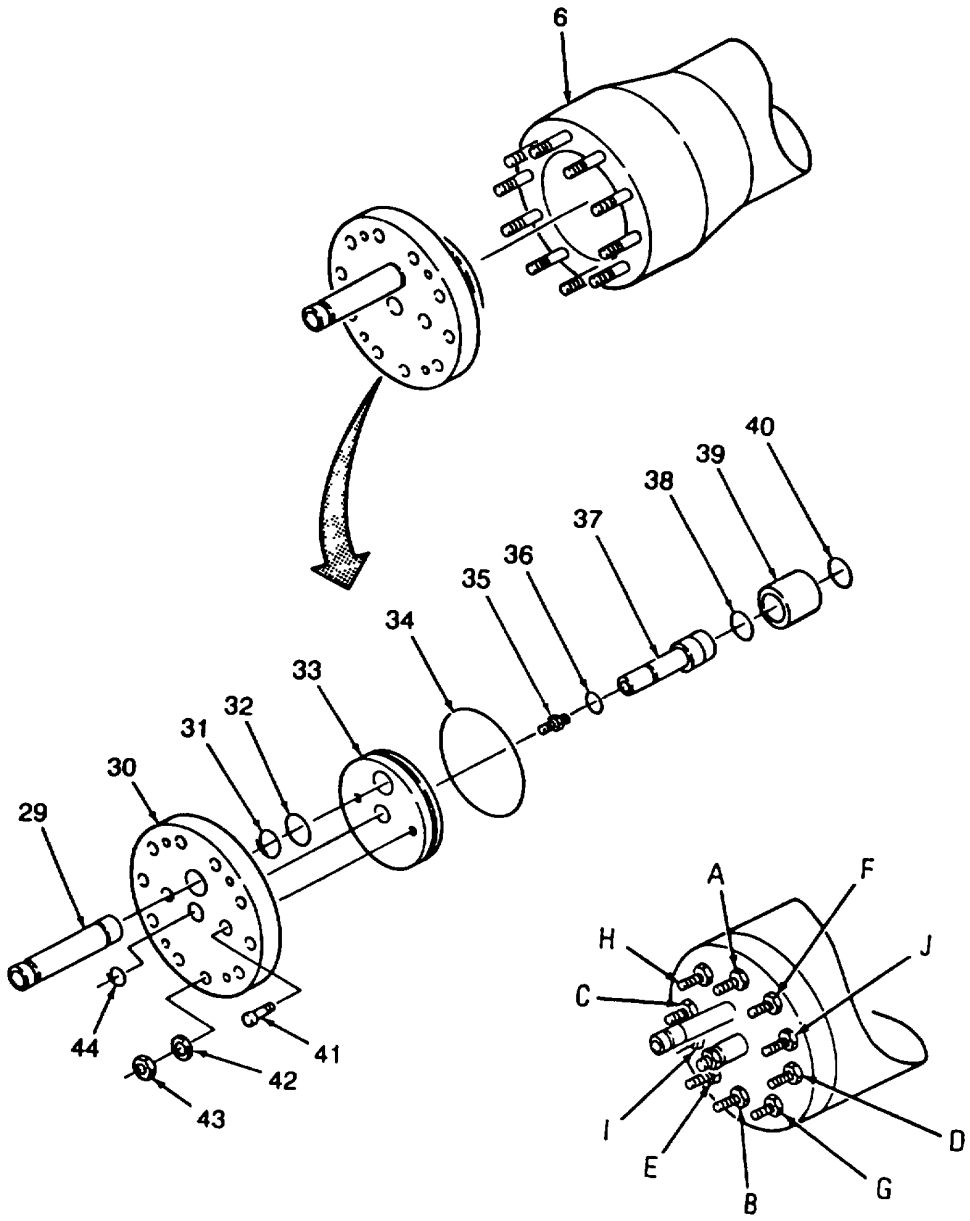
(9) Position end plate (30) with end plug (33) on studs of pressure tube (6) Aline marks made on end plate and pressure tube during assembly.

2-81. R.O. PRESSURE TUBES MAINTENANCE (MODEL WPES-1) - continued.

CAUTION

Unequal torque on any end cap nut can result in damage to equipment. Torque all nuts to 65 inch/pounds (73 5 N.m).

(10) Install ten washers (42) and nuts (43) on studs on pressure tube (6). Torque nuts to 65 inch-pounds (73.5 N.m) in sequence A thru J as shown.



2-81. R.O. PRESSURE TUBES MAINTENANCE (MODEL WPES-1) - continued.

INSTALLATION

NOTE

There are four R O pressure tubes All are installed the same. One is shown, the others are similar.

WARNING

The R O. pressure tube is heavy To prevent injury to personnel and damage to equipment, use two personnel to install R O. pressure tube.

a. Position two supports (26) on frame (25).

b. Position R.O. pressure tube (6) on frame (25).

NOTE

Position R O pressure tube (6) in line with pipe section (3) before tightening nuts (21 and 24) on brackets (18).

c. Position two brackets (18), nut (28), and flat washers (27), one at each end of R.O. pressure tube (6), and install two flat washers (22), lockwashers (29), and nuts (24). Do not tighten nuts (24).

d. Install two screws (19), lockwashers (20), and nuts (21) on brackets (18).

e. At rear of R O. pressure tube (6), aline pressure tube with pipe section (3).

f. Install gasket (16), clamp halves (15), and two bolts (14) and nuts (17).

g. At front of R.O. pressure tube (6), position pipe section (12) and install gasket (2), clamp halves (1), and two bolts (13) and nuts (11).

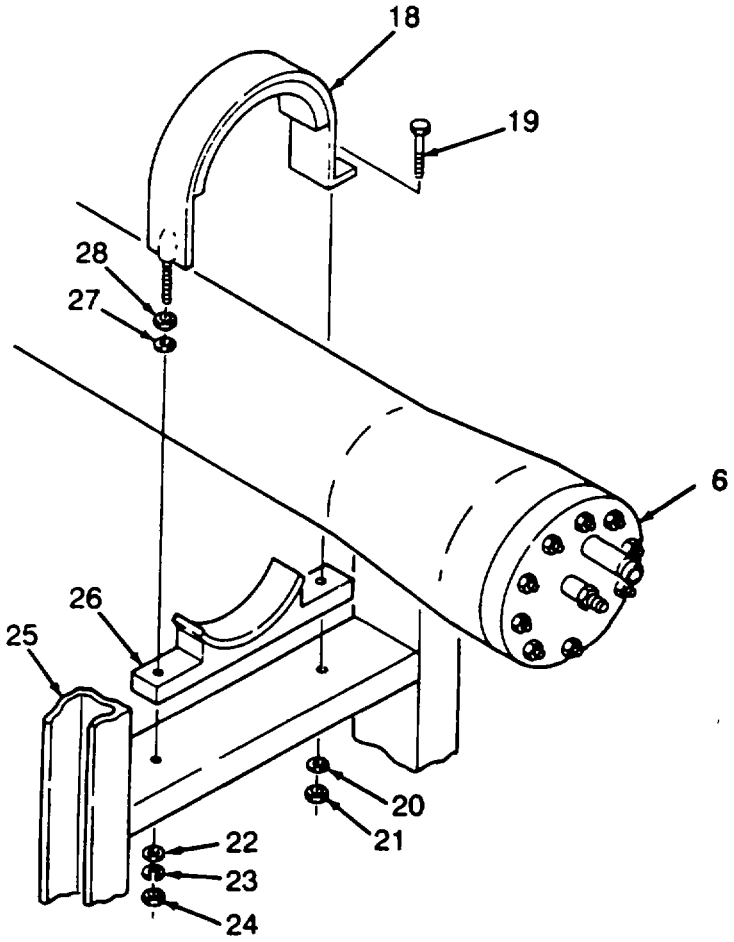
h. Position other end of pipe section (12) and install gasket (8), clamp halves (4), two bolts (10), and two nuts (7).

i. At both ends of R.O. pressure tube (6), connect flexible tubing (9) and tighten hose clamp (5).

j. Tighten nuts (24).

k. Operate ROWPU and test for leaks (TM 104610-240-10).

2-81. R.O. PRESSURE TUBES MAINTENANCE (MODEL WPES-1)- continued.



2-82. R.O. PRESSURE TUBES MAINTENANCE (MODELS WPES-2 AND WPES-3).

This task consists of a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Torque Wrench (Appendix B, Section III, Item 3)

Material/Parts Required
- Grease, silicone (Appendix C, Section II, Item 16)
- Gasket (3) - M103873DOZ
- Ring, retaining (2) - RSN-131SP
- Ring, retaining (2) - RSN-87SP
- O-ring (2) - 2-219-E540-80
- O-ring (2) - 2-358-E540-80
- O-ring (2) - 2-217-E540-80
- O-ring (2) - 406012-1
- O-ring (2) - 2-222-E540-80

Personnel Required
- Two (2)

Equipment Condition
- Reference
- ROWPU shutdown (TM 08580C-10/1, T.O. 40W4-13-21).
- Power shutdown (power source manual).
- ROWPU piping drained (TM 08580C-10/1; T 0. 40W4-13-21)

General Safety Instructions

WARNING

- ROWPU piping and equipment can contain extremely height pressure during and after operation. If this pressure is not relieved before performing maintenance, serious injury or death may result. Be sure to open all drains and vents before performing maintenance.

- The R O. pressure tube is heavy To prevent injury to personnel and damage to equipment, use two people to replace R. O. pressure tube.

REMOVAL

NOTE

One pressure tube is shown, others are similar. Mark ends of pressure tubes to aid installation.

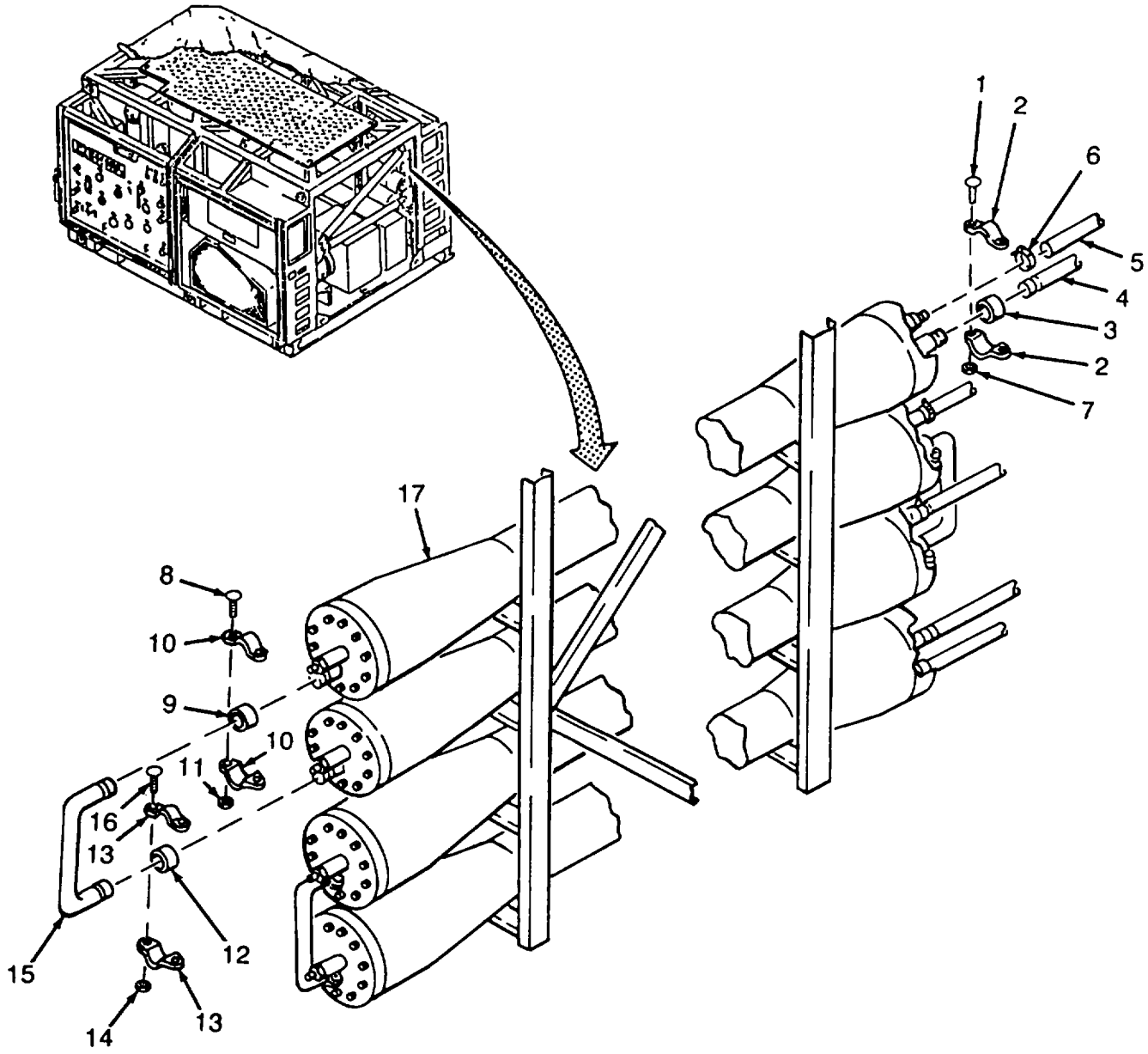
a. At both ends of all four R 0 pressure tubes (17), loosen four hose clamps (6) and remove flexible tube (5).

b. Remove U-shaped pipe sections (15) from R O pressure tubes (17) as follows:

(1) Remove two nuts (11), screws (8), clamp halves (10), and gasket (9).

(2) Remove two nuts (14), screws (16), clamp halves (13), and gasket (12).

2-82. R.O. PRESSURE TUBES MAINTENANCE (MOI)ELS WPES-2 AND WPES-3) - continued.



2-82. R.O. PRESSURE TUBES MAINTENANCE (MODELS WPES-2 AND WPES-3) - continued.

(3) Remove pipe sections (15) from R O pressure tubes (17).

c. At other end of R O. pressure tube (17), remove two nuts (7) and screws (1), clamp halves (2), and gasket (3) from pipe section (4)

NOTE

There are four R.O. pressure tubes. All are removed the same. One is shown, the others are similar

d. Remove two nuts (24), lockwashers (23), and flat washers (22) from two brackets (18).

e. Remove two nuts (21), lockwashers (20), and screws (19) from brackets (18).

f. Remove two brackets (18), one from each end of R.O pressure tube (17).

WARNING

The R.O pressure tube is heavy To prevent injury to personnel and damage to equipment, two people are needed to remove pressure tubes.

g. Remove R.O. pressure tube (17) from frame (25)

h. Remove two supports (26) from frame (25).

REPAIR

a. Disassembly.

NOTE

- There are two end plate assemblies on each R O. pressure tube. Procedures for both end plates and all tubes is the same.
- Mark end plate and pressure tube to aid assembly
- If required, remove paint from concentrate port and permeate port

(1) Remove ten nuts (43) and flat washers (42) from studs on pressure tube (17).

(2) Screw four end cap puller bolts (from storage box) into threaded holes in end plate (30). Turn puller bolts alternately until end plate is separated from pressure tube. Slowly separate end plate from pressure tube (17).

(3) Remove retaining ring (44) from permeate port (37).

(4) Remove two cap screws (41) and end plug (33), from end plate (30).

(5) Remove permeate port (37), and end connector (39).

2-82. R.O. PRESSURE TUBES MAINTENANCE (MODELS WPES-2 AND WPES-3) - continued.

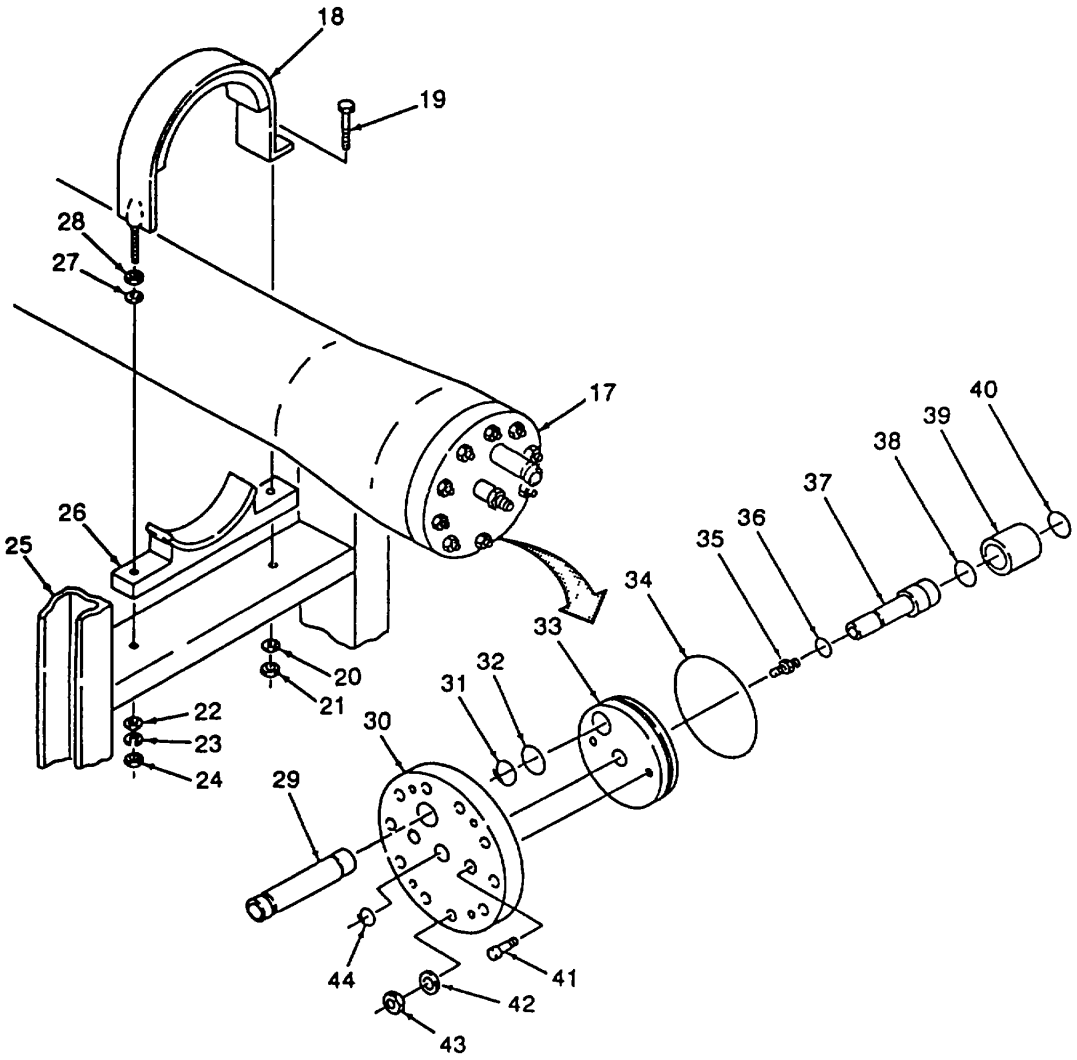
(6) Remove two o-rings (38 and 40) from end connector (39).

(7) Remove two o-rings (32 and 34) from end plug (33).

(8) Remove adapter (35) and O-ring (36) from permeate port (37).

(9) Remove retaining ring (31) and concentrate port (29).

(10) Remove filter elements (TM 08580C-10/1; TO 40W4-13-21).



2-82. R.O. PRESSURE TUBES MAINTENANCE (MODELS WPES-2 AND WPES-3) - continued.

b. Cleaning

(1) Wash all components with clean water and detergent.

(2) Rinse components with clean water and dry with wiping rag.

c. Inspection

(1) Inspect end connector (39) for damage or deformity.

(2) Inspect end plate (30) for damage, excessive wear, and serviceability.

(3) Inspect end plug (33), permeate port (37), and concentrate port (29) for wear, proper fit, and serviceability.

(4) Inspect R.O. pressure tube (17) and studs for damage Replace as required.

d. Repair.

Replace damaged components Replace all o-rings.

e. Assembly

NOTE

- There are two end plate assemblies on each of four R.O. pressure tubes Procedure for both end plates and all tubes is the same.
- Coat o-rings and o-ring paths with a thin layer of silicone grease to reduce friction during installation.

(1) Install filter element in R. O. pressure tubes (TM5-08580C-10/1, TO 40W4-13-21).

(2) Position concentrate port (29), in end plate (30) and install retaining ring (31).

(3) Install adapter (35) and o-ring (36) on permeate port (37).

(4) Install two o-rings (32 and 34) in end plug (33).

NOTE

The two o-rings that fit in the end connector have different outside diameters. Feel Inside end connector to find the large and small inside-diameter ends. Install large o-ring in large end of end connector. Install small o-ring in small end of end connector.

2-82. R.O. PRESSURE TUBES MAINTENANCE (MODELS WPES-2 AND WPES-3) - continued.

(5) Install two o-rings (38 and 40) in end connector (39).

NOTE

Small inside-diameter end of end connector goes on permeate port.

(6) Position end connector (39) on permeate port (37), then position permeate port on end plug (33).

(7) Position end plug (33) on end plate (30). Install two cap screws (41).

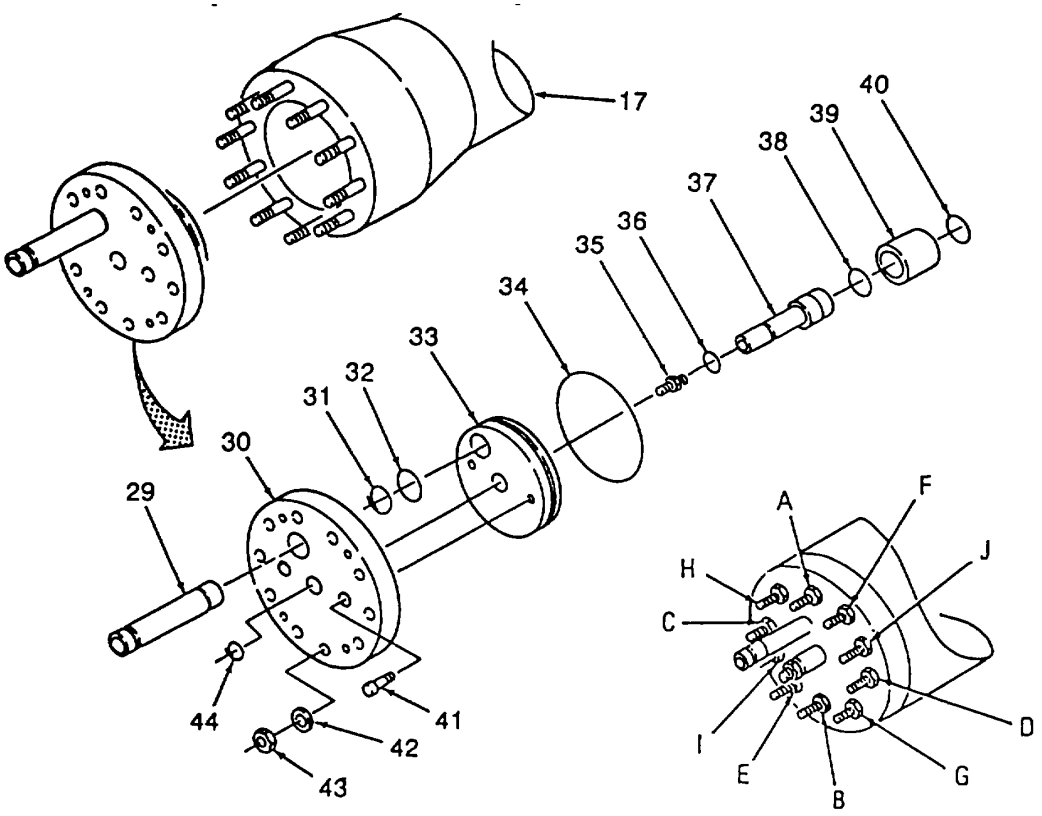
(8) Install retaining ring (44) on permeate port (37).

(9) Position end plate (30) with end plug (33) on studs of pressure tube (17). Aline marks made on end plate and pressure tube during assembly.

CAUTION

Unequal torque on any end cap nut can result in damage to equipment. Torque all nuts to 65 inch/pounds (73.5 N.m).

(10) Install ten washers (42) and nuts (43) on studs on pressure tube (17) Torque nuts to 65 pound-inch (73.5 N m) in sequence A thru J as shown.



2-82. R.O. PRESSURE TUBES MAINTENANCE (MODELS WPES-2 AND WPES-3)- continued.

INSTALLATION

NOTE

There are four R.O. pressure tubes. All are installed the same. One is shown, the others are similar.

a. Install two supports (26) on frame (25).

WARNING

The R O. pressure tube is heavy. To prevent injury to personnel and damage to equipment, two people are needed to install pressure tubes.

b. Position R.O. pressure tube (17) on frame (25) as marked during removal.

c. Install two nuts (28) and flat washers (27) on two brackets (18). Do not tighten nuts.

d. Position two brackets (18), one at each end of R.O. pressure tube (17), and install two flat washers (22), lockwashers (23), and nuts (24) Do not tighten nuts.

e. Install gasket (3), clamp halves (2), two screws (1) and nuts (7) on pipe section (4) and R.O. pressure tube (17).

f. At other end of R.O. pressure tube (17), install U-shaped pipe section (15) on R O pressure tube (17) as follows:

(1) Position pipe section (15) and install gasket (12), clamp halves (13), two screws (16) and nuts (14).

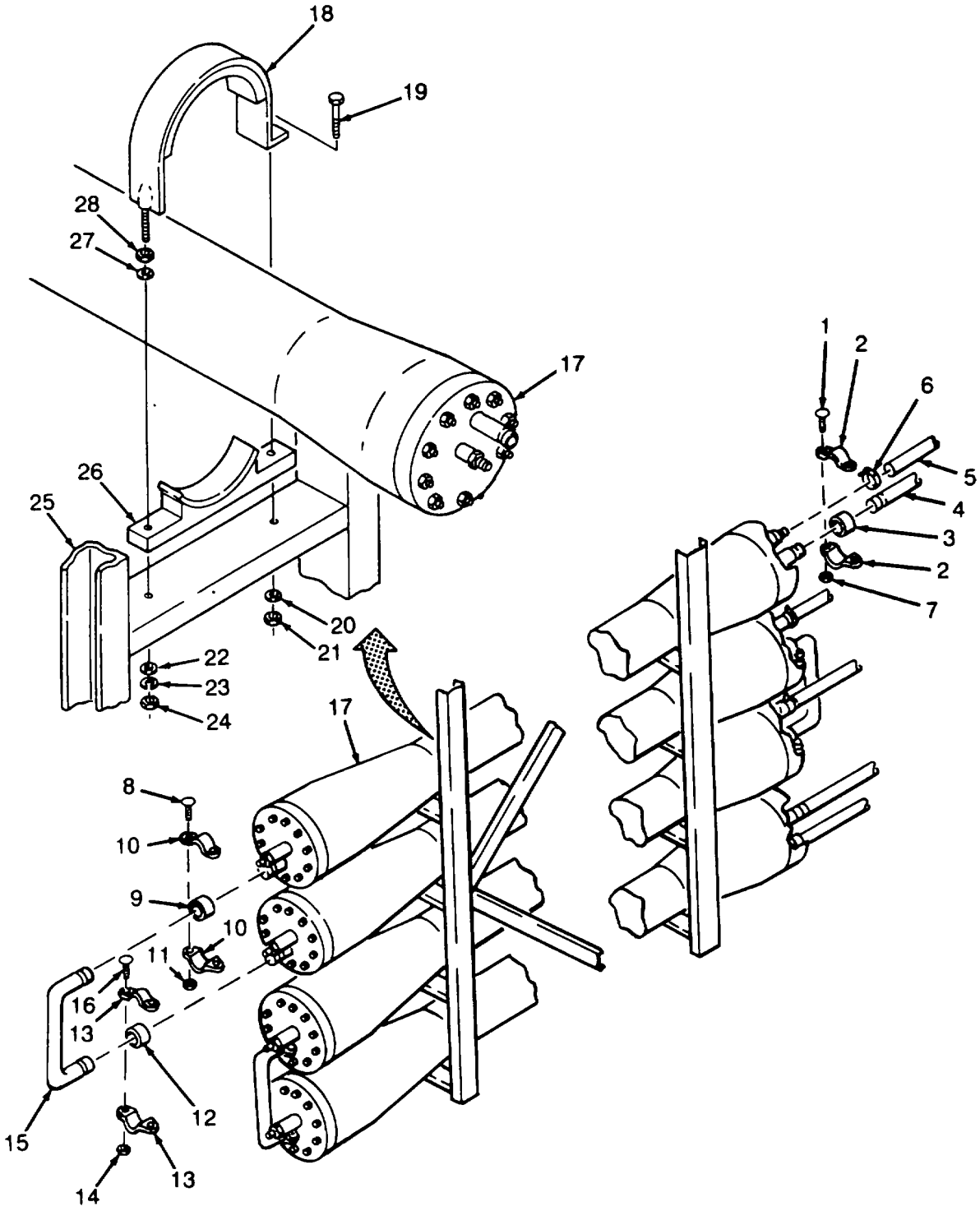
(2) Install gasket (9), clamp halves (10), two screws (8) and nuts (11).

g. Tighten two nuts (21) and two nuts (24)

h. At end of R.O. pressure tubes (17), connect flexible tubing (5) and tighten hose clamp (6)

i. Operate ROWPU and test for leaks (TM 5-4610-215-10/2).

2-82. R.O. PRESSURE TUBES MAINTENANCE (MODELS WPES-2 AND WPES-3) - continued.



2-83. CONTROL BOX ASSEMBLY MAINTENANCE.

Unit level maintenance of the control panel assembly is limited to replacement of panel lamps.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
Lamp extractor (Storage Chest)
Material/Parts Required
Incandescent lamp (Storage Chest)
Equipment Condition
Reference
ROWPU shutdown (TM 10610-240-10).
Power shutdown (power source manual).

NOTE

The control panel contains nine panel lamps. Replacement of one panel lamp is shown, the others are similar.

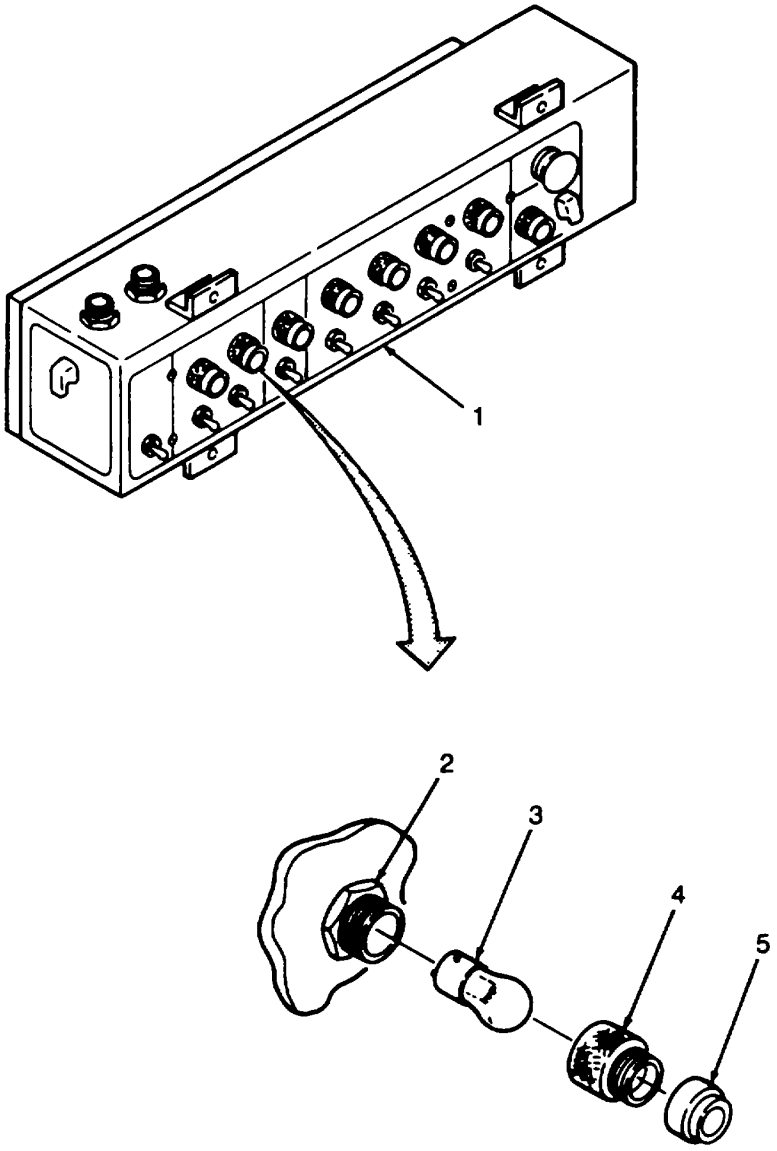
REMOVAL

a. Remove lens (5) from shade (4).
b. Remove shade (4) from lamp socket (2).
c. Using lamp extractor, remove panel lamp (3) from lamp socket (2) on control panel (1).

INSTALLATION

a. Using lamp extractor, install panel lamp (3) in lamp socket (2).
b. Install shade (4) on lamp socket (2).
c. Install lens (5) on shade (4).

2-83. CONTROL BOX ASSEMBLY MAINTENANCE - continued.



2-84. JUNCTION BOX ASSEMBLY MAINTENANCE.

Unit level maintenance of the junction box assembly is limited to replacement of electrical covers and information plates.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Rivet Tool (Appendix B, Section III, Item 3)
- Drill (Appendix B, Section III, Item 3)

Material Parts Required
- Rivets (A/R) - M243/1-A403

Equipment Condition
- Reference
- ROWPU shutdown (TM 10461-240-10).
- Power shutdown (power source manual).

General Safety Instructions

WARNING

To prevent injury or death to personnel, verify that electrical power is off before working in junction box.

REMOVAL

NOTE

There are five information plates mounted on the junction box. One information plate is shown, the others are similar.

a. Open cover assembly (4) on junction box (1).
b. Drill out two drive rivets (3) securing information plate (2) to junction box (1).
c. Remove information plate (2).

NOTE

There are seven electrical covers on Model WPES1 and WPES3 junction boxes and eight on Model WPES-2. One electrical cover is shown, the others are similar.

d. Remove nut (5), lockwasher (6), and flat washer (7) from inside junction box (1).
e. Remove screw (9) and electrical cover (10) from connector (8).

2-84. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

INSTALLATION

NOTE

There are seven electrical covers on Model WPES-1 and WPES-3 junction boxes and eight on Model WPES-2 One electrical cover is shown, the others are similar.

a. Install electrical cover (10) and screw (9) on connector (8).

b. From inside junction box (1), install flat washer (7), lockwasher (6), and nut (5).

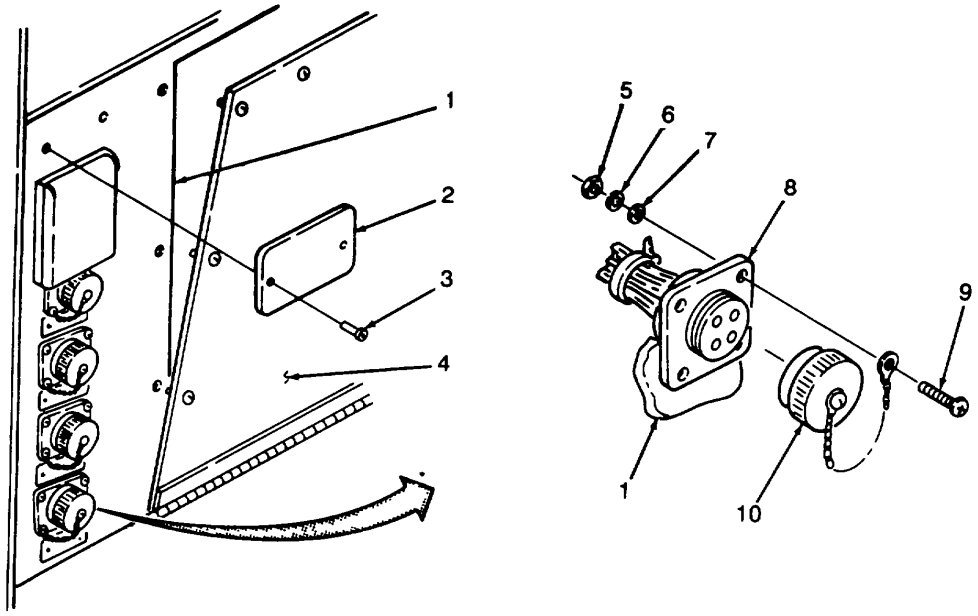
NOTE

There are five information plates mounted on the junction box. One information plate is shown, the others are similar.

c. Position information plate (2) on junction box (1).

d. Install two rivets (3).

e. Close cover assembly (4) on junction box (1).



2-85. COVER ASSEMBLY (JUNCTION BOX) MAINTENANCE.

This task consists of a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Rivet Tool (Appendix B, Section III, Item 3)
- Electric Drill (Appendix B, Section III, Item 3)
- Drill Set (Appendix B, Section III, Item 3)

Material/Parts Required
- Adhesive (Appendix C, Section II, Item 1)
- Rivet (12) - MS20470B3-5
- Rivet (26) - MS20426B3-5
- Gasket (A/R) - 13222E5306-3
- Gasket- 132225306-12

Personnel Required
- Two (2)

Equipment Condition
- Reference
- ROWPU shutdown (TM 104610-240-10).
- Power shutdown (power source manual).

General Safety Instructions

WARNING

- Lifting difficult to handle equipment incorrectly can cause serious injury Use two personnel when removing cover assembly.
- To prevent injury or death to personnel, verify that electrical power is off before working injunction box.

REMOVAL

NOTE

Disassemble cover assembly only to level required to effect repair.

a. Turn thirteen rotary fasteners (3) and open junction box cover (2)

WARNING

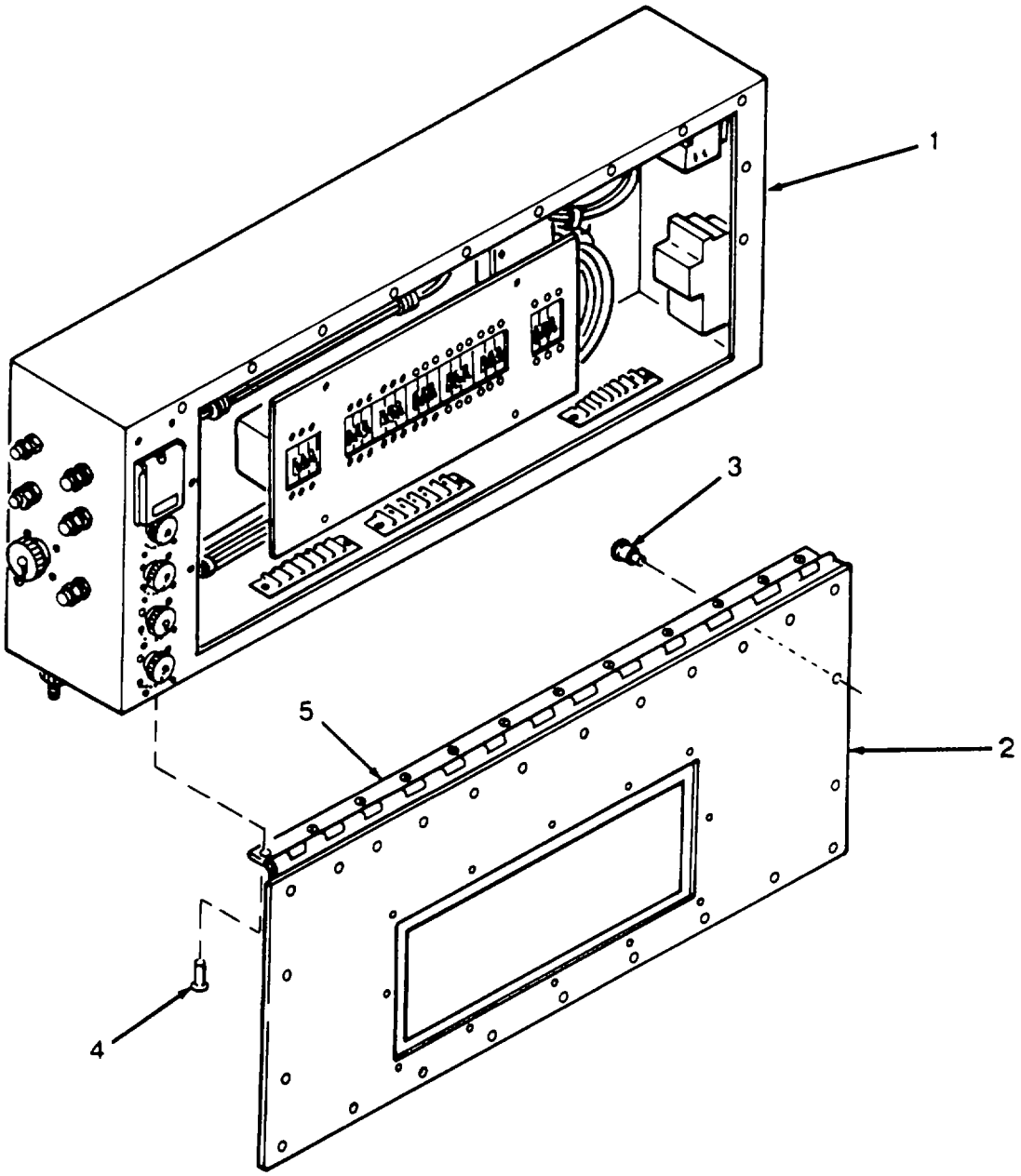
Junction box cover is difficult to handle. Two people are needed to lift it to prevent personal injury or damage to equipment.

CAUTION

To prevent damage to junction box wiring, lift and support wiring off bottom of junction box when removing (drilling) rivets.

b. Close junction box cover (2) and drill out twelve rivets (4) from hinge (5).

2-85. COVER ASSEMBLY (JUNCTION BOX) MAINTENANCE - continued.



2-85. COVER ASSEMBLY (JUNCTION BOX) MAINTENANCE - continued.

c. Remove junction box cover (2).

NOTE

Repair of junction box cover is the same with cover installed on electrical junction box or with cover on workbench after removal.

REPAIR

a. Disassembly.

NOTE

Disassemble cover assembly only to the level required to perform repair.

(1) Remove seven speed nuts (17) and wing screws (11) with retainer washers (12) Remove retainer washers from wing screws.

(2) Peel gasket material (14) from door (13).

(3) Remove thirteen retaining rings (6) and rotary fasteners (8).

(4) Peel gasket material (7) from junction box cover (2).

(5) Remove twelve rivets (15) and hinge (16) from junction box cover (2).

(6) Remove fourteen rivets (10) and hinge (9) from door (13).

b. Inspection.

(1) Check gasket material (7 and 14) on junction box cover (2) and door (13) for tears, cracks, brittleness and separation from metal.

(2) Check junction box cover (2) and door (13) for cracks and deformity.

(3) Check two hinges (9 and 16) for cracks, deformity, and loose or missing rivets (10 and 15).

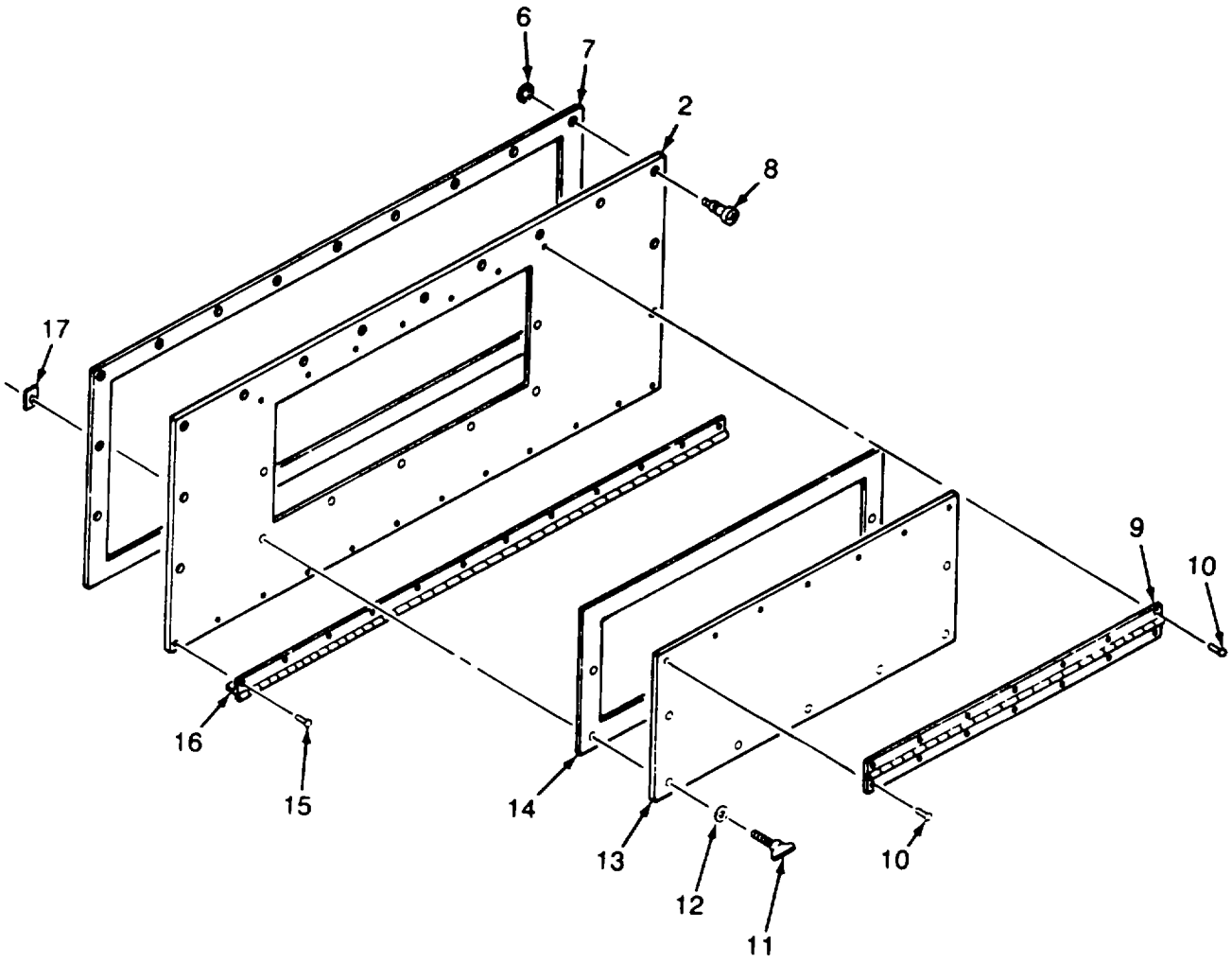
(4) Check retaining rings (6) and speed nuts (17) and retainer washers (12) for deformity.

(5) Check rotary fasteners (8) and wing screws (11) for deformed and damaged threads.

c. Repair.

Replace damaged components.

2-85. COVER ASSEMBLY (JUNCTION BOX) MAINTENANCE - continued.



2-85. COVER ASSEMBLY (JUNCTION BOX) MAINTENANCE - continued.

d. Assembly.

(1) Position hinge (9) on door (13) and install seven rivets (10).

(2) Cut gasket (14) and, using adhesive, install gasket on door (13).

(3) Punch seven holes through gasket (14) at holes for wing screws (11).

(4) Position hinge (16) on junction box cover (2) and install twelve rivets (15).

(5) Cut gasket (7) and, using adhesive, install gasket on junction box cover (2).

(6) Punch thirteen holes through gasket (7) at holes for rotary fasteners (8).

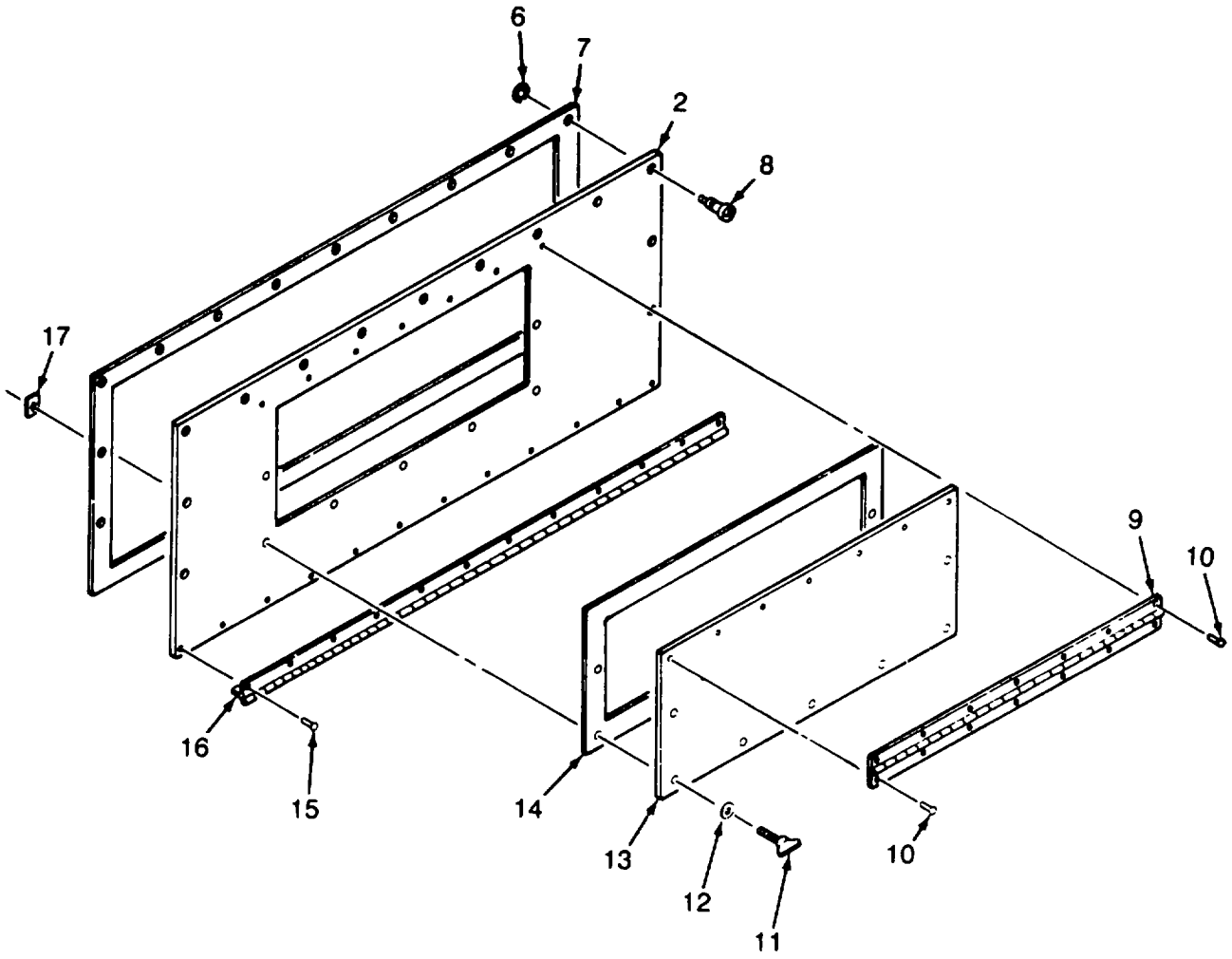
(7) Position door (13) with hinge (9) on junction box cover (2) and install seven rivets (10).

(8) Install seven retainer washers (12) on wing screws (11).

(9) Install seven wing screws (11) with retainer washers (12) and speed nuts (17).

(10) Install thirteen rotary fasteners (8) and retaining rings (6).

2-85. COVER ASSEMBLY (JUNCTION BOX) MAINTENANCE - continued.



2-85. COVER ASSEMBLY (JUNCTION BOX) MAINTENANCE - continued.

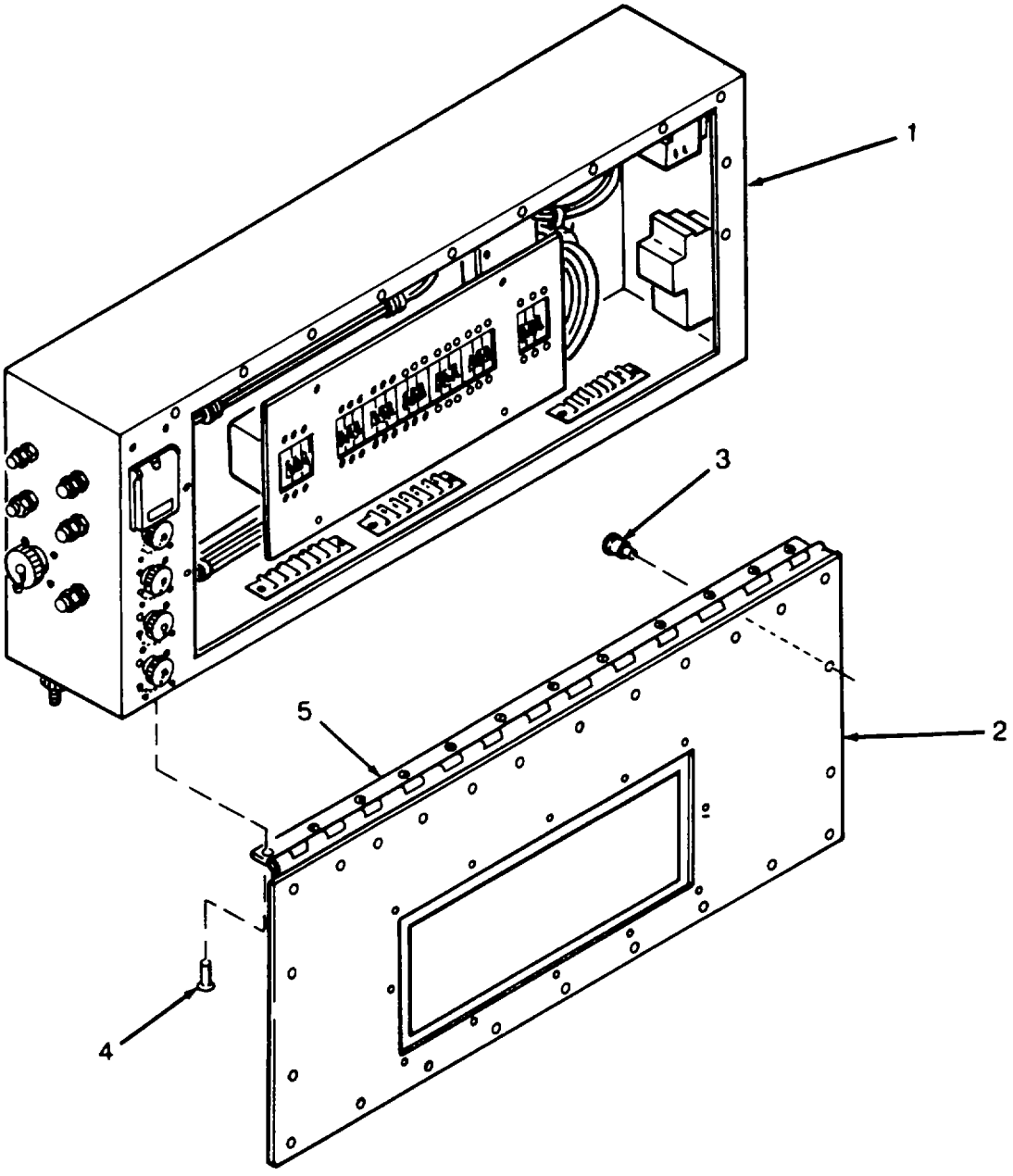
INSTALLATION

a. Position and support junction box cover hinge (5) on junction box (1).

b. Using rivet tool, install twelve rivets (4) in hinge (5) and junction box (1).

c. Close junction box cover (2) and turn thirteen rotary fasteners (3) to secure.

2-85. COVER ASSEMBLY (JUNCTION BOX) MAINTENANCE - continued.



2-86. LIGHT ASSEMBLY (PANEL) MAINTENANCE.

This task consists of a. Removal b. Repair c. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Lockwasher (2) - MS35338-139
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610240-10).
Power shutdown (power source manual)

REMOVAL

a Loosen four bolts (23) and pull out panel light bracket (2) from control panel (22).

b Loosen setscrew (9) and remove guard (10) from fixture body (19).

c. Remove globe (8) from fixture body (19).

d. Remove light bulb (7) from socket (16).

REPAIR

a. Disassembly

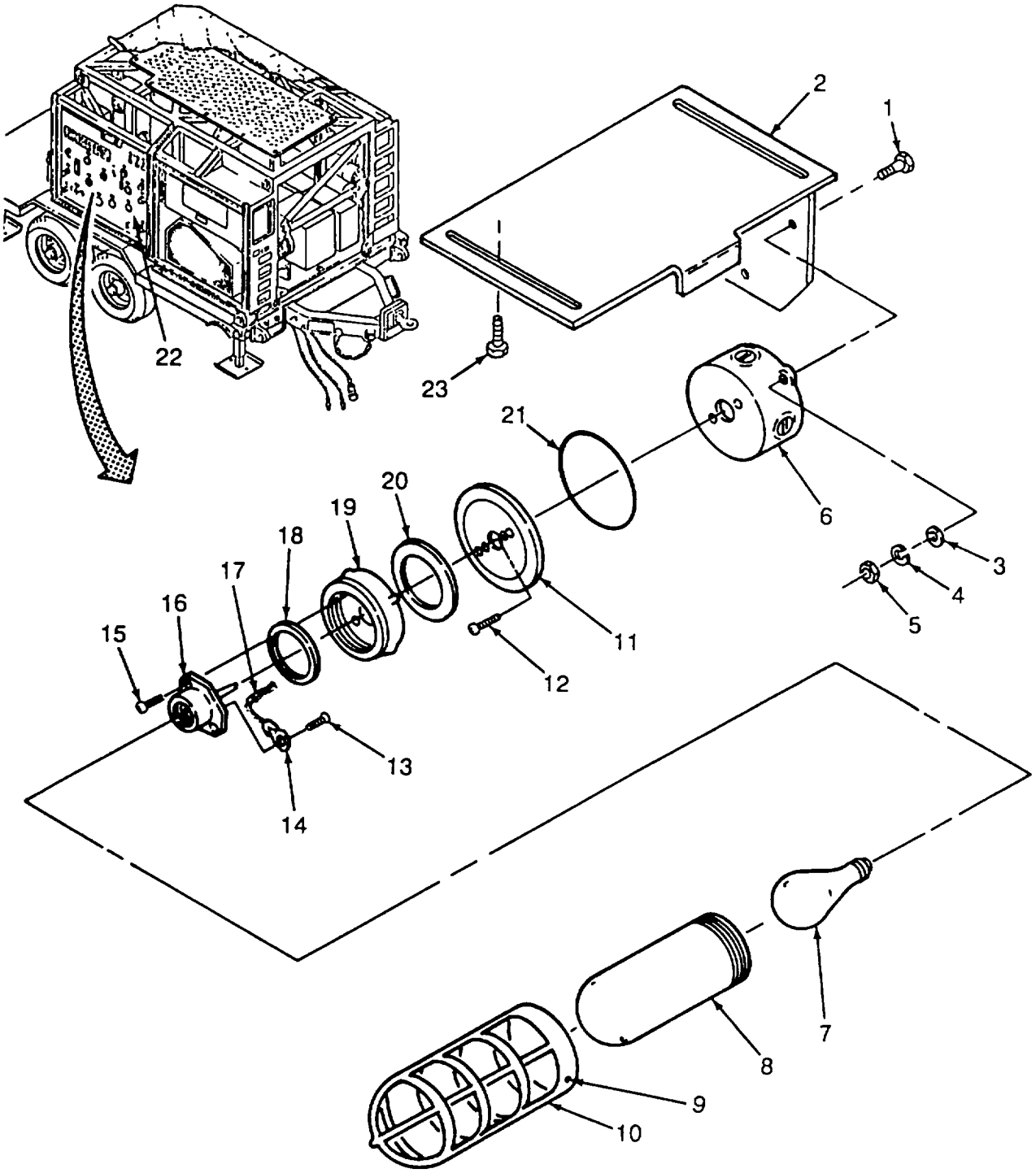
(1) Remove two nuts (5), lockwashers (4), flat washers (3), screws (1), and splice box (6) from panel light bracket (2).

(2) Remove two screws (15), socket (16), gasket (18), fixture body (19) and gasket (20) from adapter ring(11).

(3) To aid assembly, tag wiring (17) at socket (16). Remove two screws (13) and disconnect terminals (14) from socket.

(4) Remove two screws (12), adapter ring (11), and gasket (21) from splice box (6).

2-86. LIGHT ASSEMBLY (PANEL) MAINTENANCE - continued.



2-86. LIGHT ASSEMBLY (PANEL) MAINTENANCE - continued.

c. Inspection.

(1) Inspect splice box (6), adapter ring (11), and fixture body (19) for damage.

(2) Inspect socket (16) for cracks in ceramic holder and corrosion on contacts. Clean contacts with sandpaper if required.

(3) Inspect globe (8) and bulb (7) for cracks.

(4) Inspect gaskets (18, 20,and 21) for cracks or tears.

d. Repair.

Replace defective components.

e. Assembly.

(1) Position gasket and adapter plate on splice box and install two screws.

NOTE

Wiring must run through center of splice box, gasket, adapter plate, gasket, fixture body and gasket.

(2) Position wiring (17) through center of light assembly components Connect terminals (14) to socket (16) with two screws (13) as tagged.

(3) Position gasket (20), fixture body (19), gasket (18) and socket (16) on adapter plate (11) and install two screws (15).

(4) Position splice box (6) and attached parts on panel light bracket (2). Install two screws (1), flat washers (3), lockwashers (4) and nuts (5).

INSTALLATION

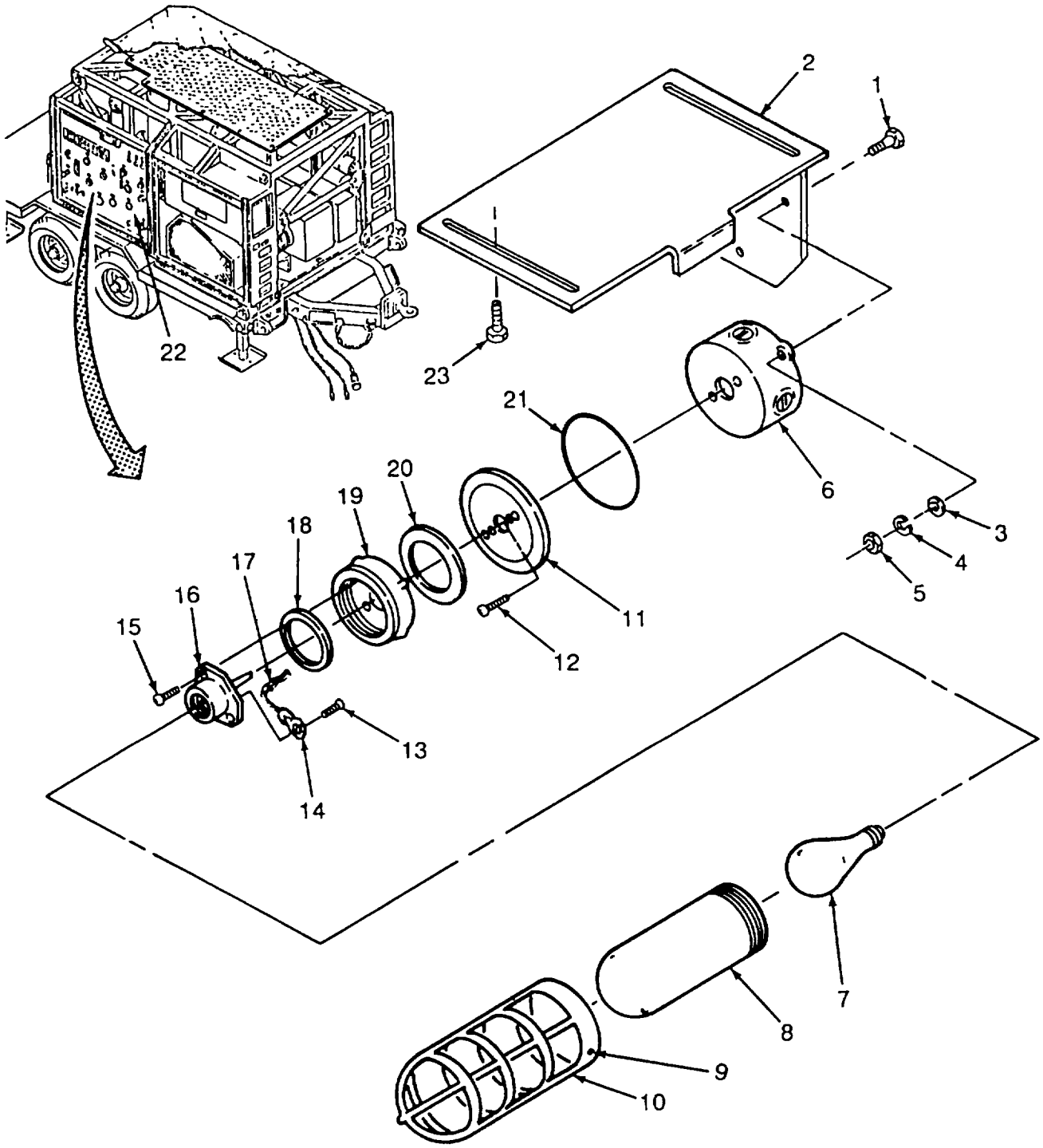
a. Install light bulb (7) in socket (16).

b Install globe (8) on fixture body (19).

c. Install guard (10) on fixture body (19) and tighten setscrew (9).

d Push panel light bracket (2) into control panel (22), and tighten four bolts (23).

2-86. LIGHT ASSEMBLY (PANEL) MAINTENANCE - continued.



2-87. STORAGE BOX (R.O. TUBES) MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Materials/Parts Required
Lockwasher (9) - MS35338-139
Lockwasher (2) - MS15795-809
Personnel Required
Two (2)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual)
Cover plate removed (para 2-36)
General Safety Instructions

WARNING

Storage box is heavy and difficult to handle To prevent injury to personnel and damage to equipment, use two personnel when replacing storage box

REMOVAL

a. Remove nut (10), lockwasher (9), and screw (8) from center support on storage box (7).

b. Remove six nuts (12), lockwashers (13), and screws (11) from supports on storage box (7).

WARNING

Storage box is heavy and difficult to handle To prevent injury to personnel and damage to equipment, use two personnel when replacing storage box.

c. Remove storage box (7) from frame (1).

d. Remove two nuts (2), lockwashers (3), flatwasher (4), screws (6) and brackets (5) from storage box (7).

INSTALLATION

a. Install two brackets (5), screws (6), flatwasher (4), lockwashers (3) and nuts (2) on storage box (7).

2-87. STORAGE BOX (R.O. TUBES) MAINTENANCE - continued.

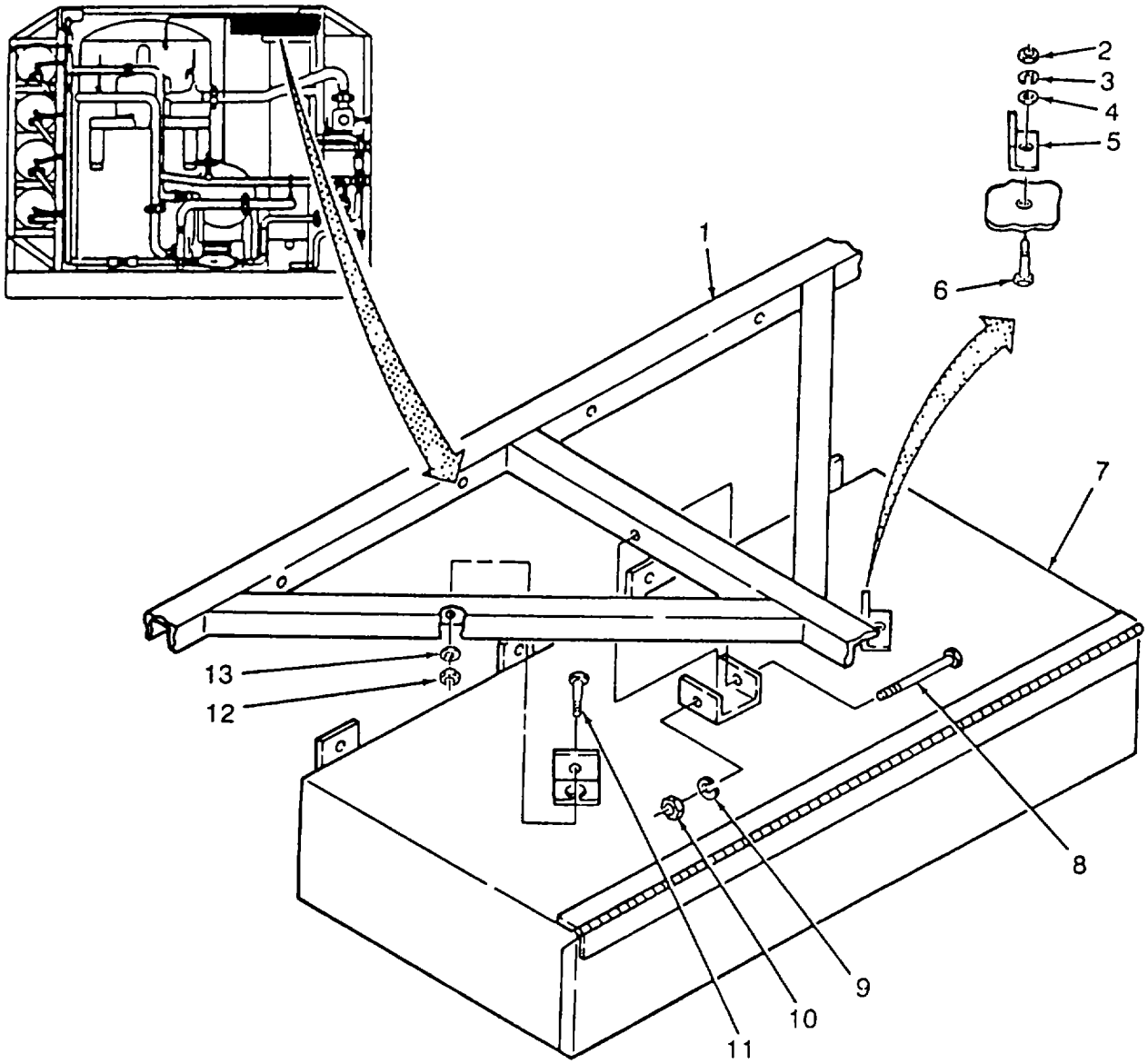
WARNING

Storage box is heavy and difficult to handle To present Injury to personnel and damage to equipment, use two personnel when replacing storage box.

b. Position storage box (7) on frame (1).

c. Install screw (8), lockwasher (9), and nut (10) through center support of storage box (7).

d. Install six screws (11), lockwashers (13) and nuts (12) through supports on storage box (7).



2-88. FRAME (ROWPU) MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Lockwasher (16) - MS35338-141
Lockwasher (4) - MS35338-140
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
Three way ball valves removed (para. 2-61).
Chemical cans and frame removed (TM 10-4610-240-10).

REPLACE CHEMICAL FEED METERING STAND. BRACKETS AND MOUNTING PLATE.

a. Removal.

(1) Remove four nuts (13), lockwashers (12), screws (14) and mounting plate (1).

(2) Remove four nuts (11), lockwashers (10), screws (4), and two cross bars (5).

(3) Remove four screws (7), lockwashers (6) and two brackets (2) from unit frame (15).

(4) Remove chemical feed pump (para. 2-68).

(5) Remove four screws (9), lockwashers (8), and chemical feed metering pump stand (3) from frame (15).

b. Installation.

(1) Position chemical feed metering pump stand (3) on frame (15) and install four lockwashers (8) and screws (9).

(2) Install chemical feed pump (para 2-68).

(3) Position two brackets (2) and install four screws (7) and lockwashers (6).

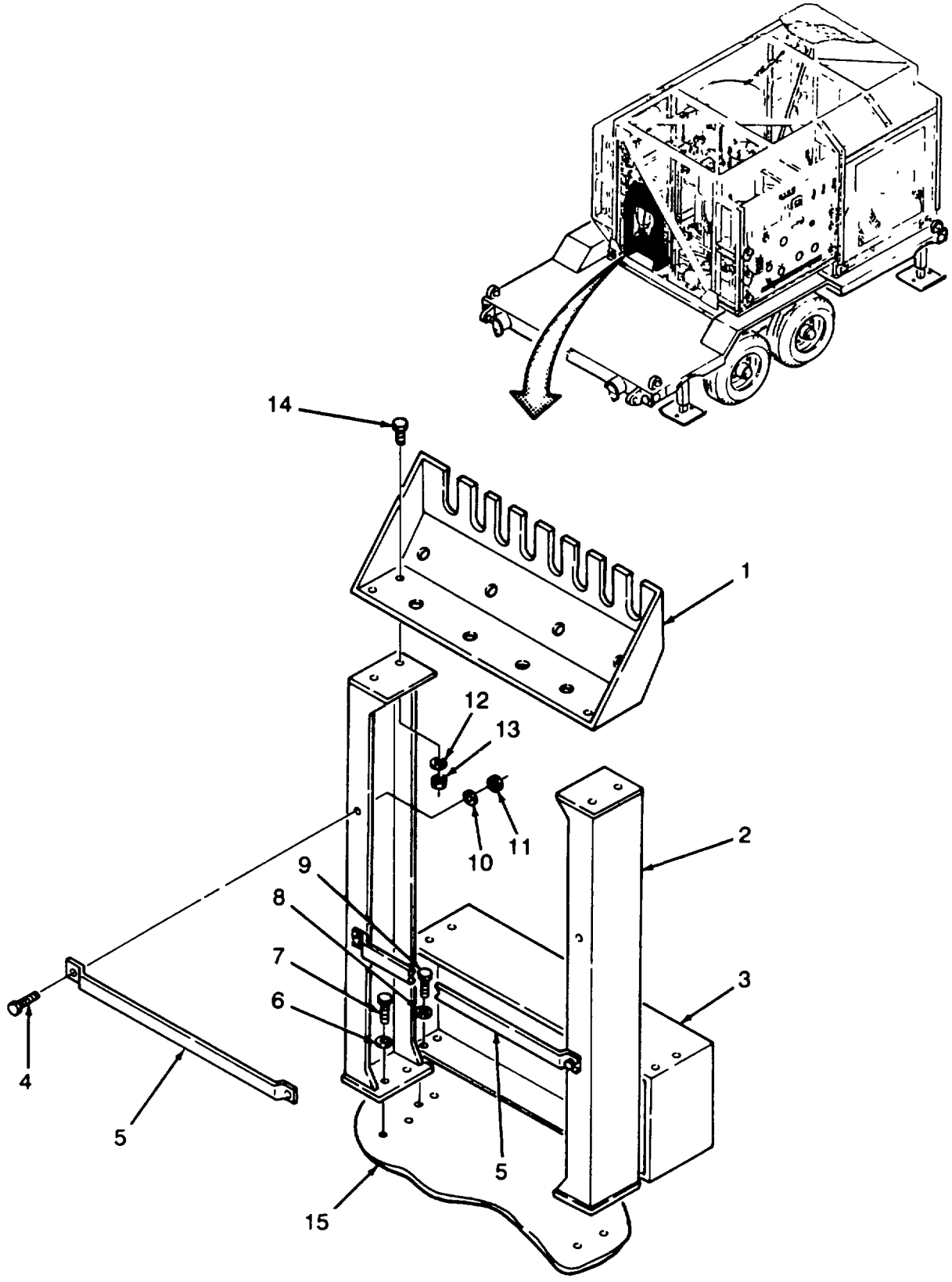
(4) Position two crossbars (5) and install four screws (4), lockwashers (10), and nuts (11).

(5) Position mounting plate (1) on brackets (2) and aline mounting holes.

(6) Install four screws (14), lockwashers (12), and nuts (13).

(7) Install three way ball valves (para. 2-61).

2-88 FRAME (ROWPU) MAINTENANCE - continued.



2-88. FRAME (ROWPU) MAINTENANCE -continued.

REPLACE STRAP ASSEMBLIES

NOTE

The following procedures describe replacement of a strap assembly used on the ROWPU One strap is shown, all others are similar.

a. Removal.

(1) Remove four screws (1) and two strap fastener loops (2) from frame (4).

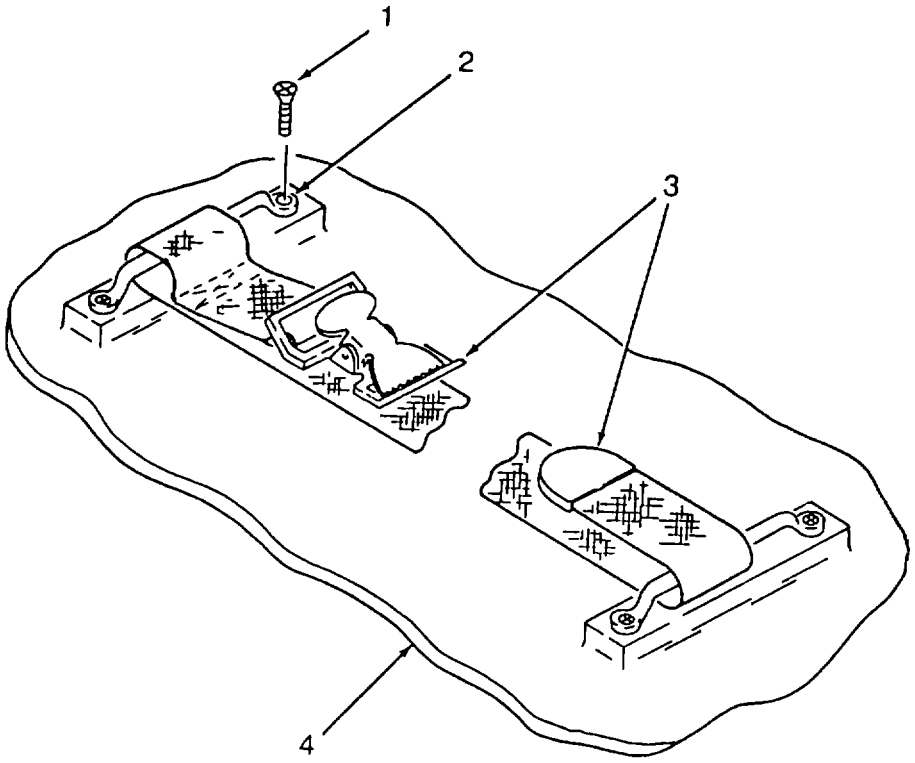
(2) Remove strap assembly (3) from fastener loops (2).

b. Installation.

(1) Slide one strap fastener loop (2) through each end of strap assembly (3).

(2) Position two strap fastener loops (2) on frame (4).

(3) Aline two strap fastener loops (2) with frame (4) and install four screws (1).



2-88. FRAME (ROWPU) MAINTENANCE- continued.

REPLACE INFORMATION PLATES

NOTE

The following procedures describe replacement of a typical information plate used on the ROWPU One information plate is shown, all others are similar.

a. Removal.

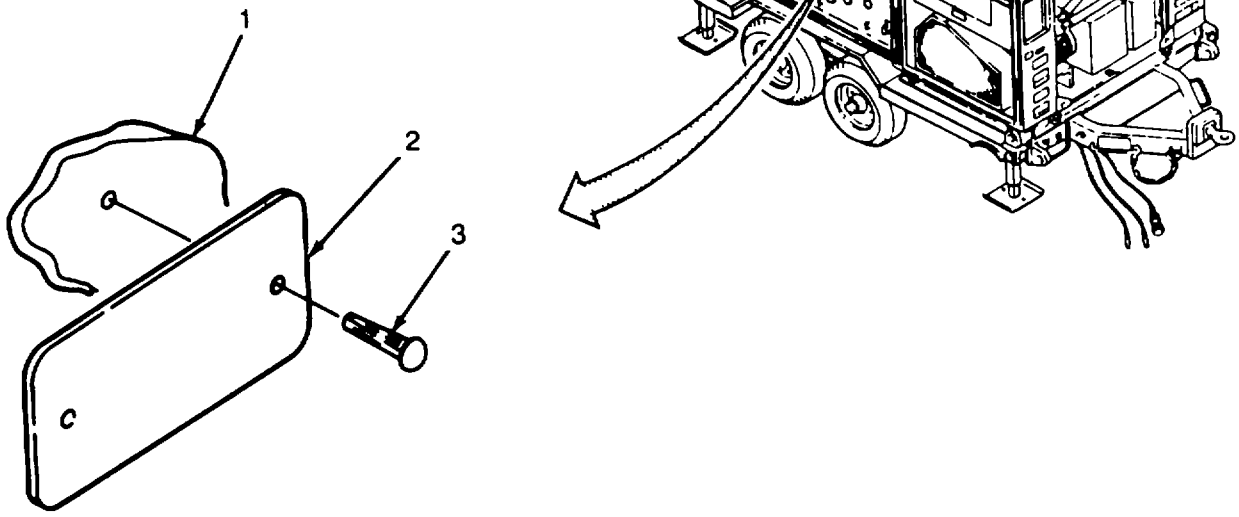
(1) Remove two drive screws (3) from information plate (2).

(2) Remove information plate (2) from frame (1).

b. Installation.

(1) Position information plate (2) on frame (1).

(2) Install two drive screws (3).



2-88. FRAME (ROWPU) MAINTENANCE - continued.

REPLACE CARGO TIE RINGS

NOTE

There are four cargo tie rings located on the upper part of the ROWPU frame and four on the lower part of the frame (two at each corner). The following procedures describe replacement of one typical upper and lower cargo tie ring. One of each type cargo tie ring is shown, all others are similar.

a. Removal.

(1) Remove two screws (3) and plate (2) from frame (1).

(2) Remove upper cargo tie ring (4) from frame (1).

(3) Remove lower cargo tie ring (5) from plate (8).

(4) Remove two screws (6), two lockwashers (7) and plate (8) from frame (1).

b. Installation.

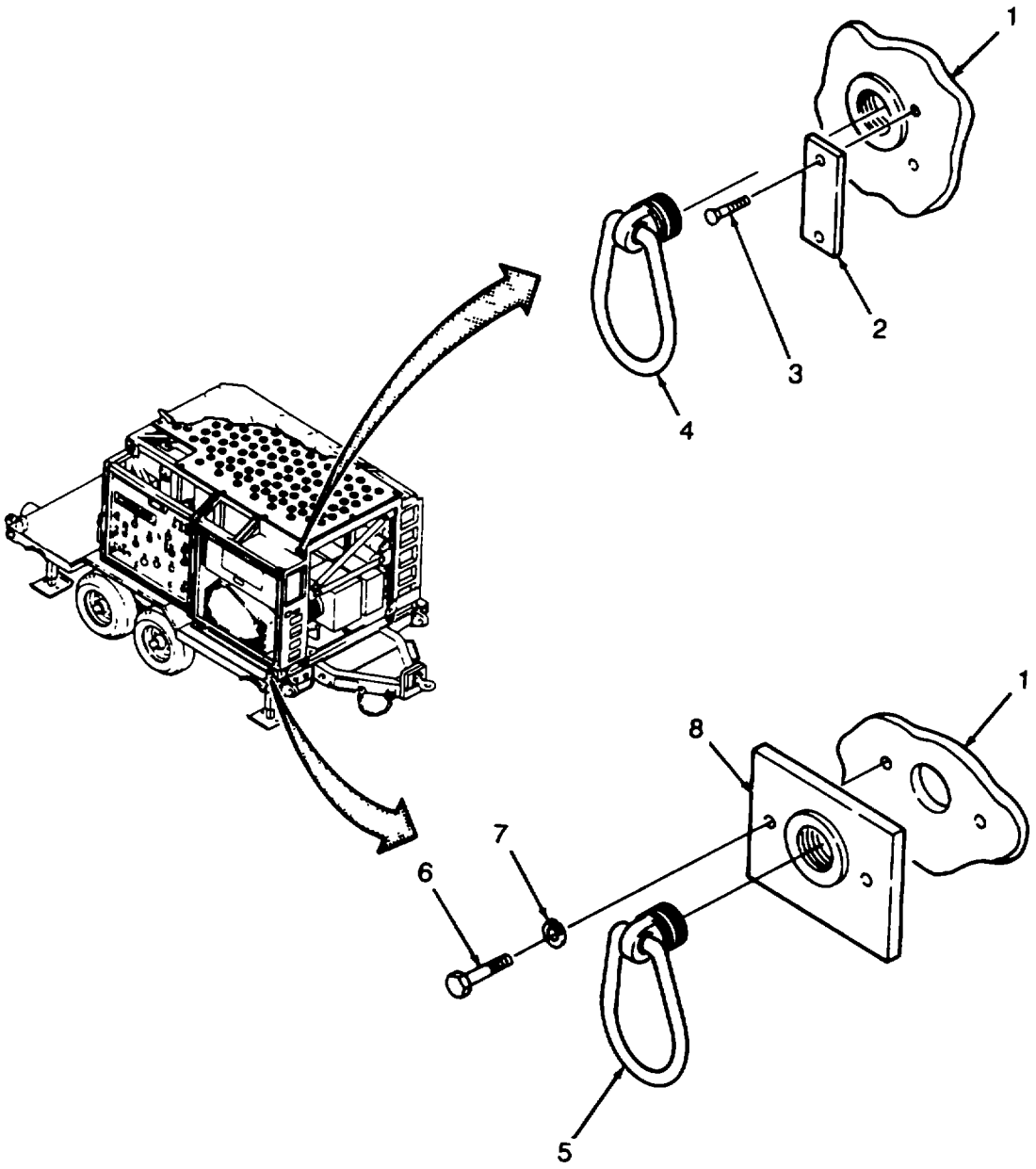
(1) Install plate (8), two lockwashers (7) and two screws (6) on frame (1).

(2) Install lower cargo tie ring (5).

(3) Install upper cargo tie ring (4) in frame (1).

(4) Install plate (2) and two screws (3) on frame (1).

2-88. FRAME (ROWPU) MAINTENANCE- continued.



2-89. FLATBED CARGO TRAILER MAINTENANCE (MODEL WPES-1).

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
1-1/8 Inch Wrench (Appendix B, Section III, Item 3)
Vice (Appendix B, Section III, Item 3)
Material /Parts Required
Drive Screw (A/R) - MS21318-57
Lockwasher (6) - MS35338-51
Lockwasher (4) - MS35338-33
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
Trailer disconnected from towing vehicle (TM 10-4610-240-10).
Personnel Required
Two (2)
General Safety Instructions

WARNING

Lunette is heavy/difficult to handle.

REPLACE REFLECTORS

NOTE

There are eight reflectors on the trailer, one is shown the others are similar.

a. Removal.
(1) Remove two screws (4) and ring (3) from reflector (2).

(2) Remove reflector (2) and gasket (1) from frame (5).

b. Installation

(1) Position gasket (1) and reflector (2) on frame (5).

(2) Install ring (3) and two screws (4) on reflector (2).

REPLACE LUNETTE

a. Removal.

(1) Using 1-1/8 inch wrench, remove six nuts (9), lockwashers (8), bolts (6).

2-89. FLATBED CARGO TRAILER MAINTENANCE (MODEL WPES-1) - continued.

WARNING

The lunette is heavy To prevent injury to personnel two people are required to lift lunette

(2) Remove lunette (7) from frame (5)

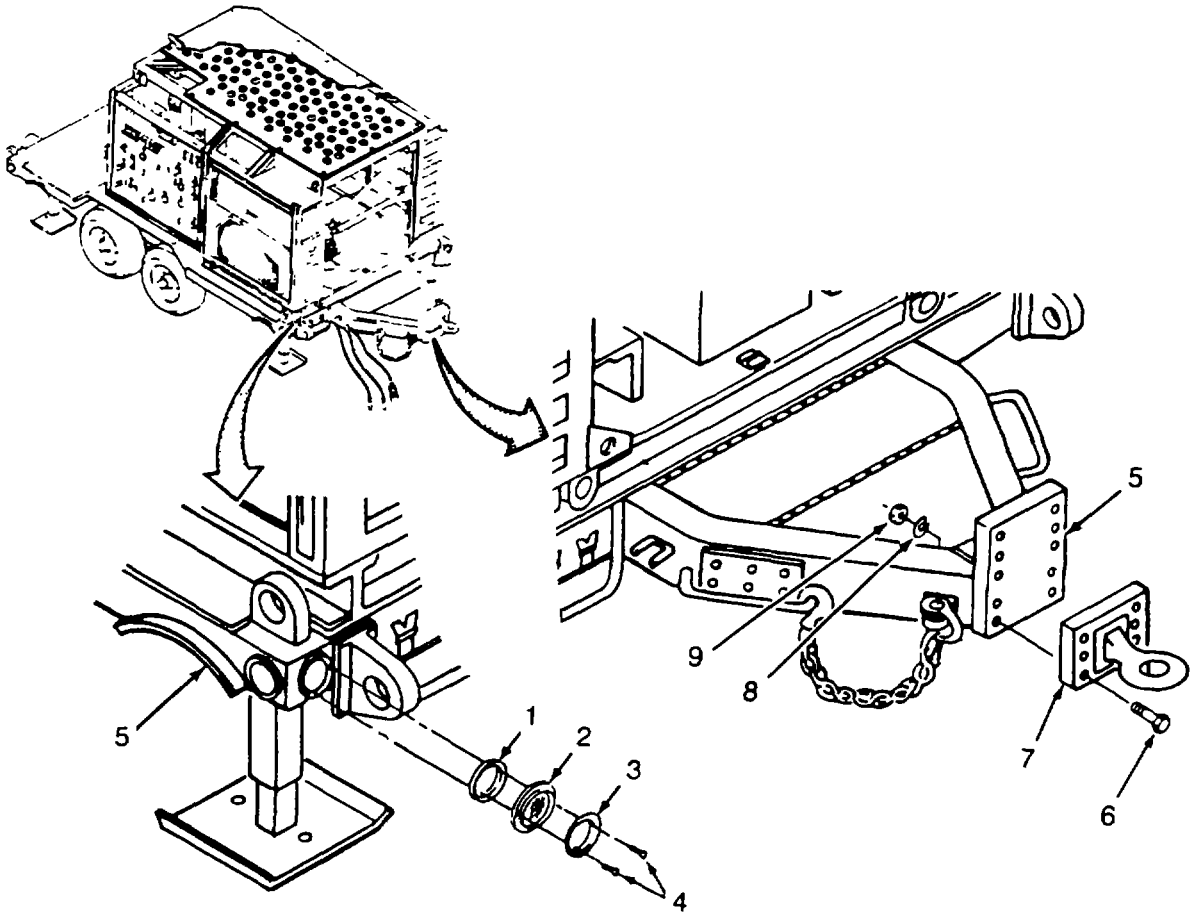
b. Installation.

WARNING

The lunette is heavy To prevent injury to personnel two people are required to lift lunette

(1) Position lunette (7) on frame (5)

(2) Using 1-1/8 inch wrench, install six bolts (6), lockwashers (8), and nuts (9)



2-89. FLATBED CARGO TRAILER MAINTENANCE (MODEL WPES-1) - continued.

REPLACE CHAIN ASSEMBLY

NOTE

There are two chain assemblies on the flatbed cargo trailer. Both are removed and installed the same One is shown, the other is similar.

a. Removal

(1) Using 1-1/8 inch wrench, remove nut (12), screw (10), and latch (11) from frame (5)

(2) Separate chain (13) from latch (11)

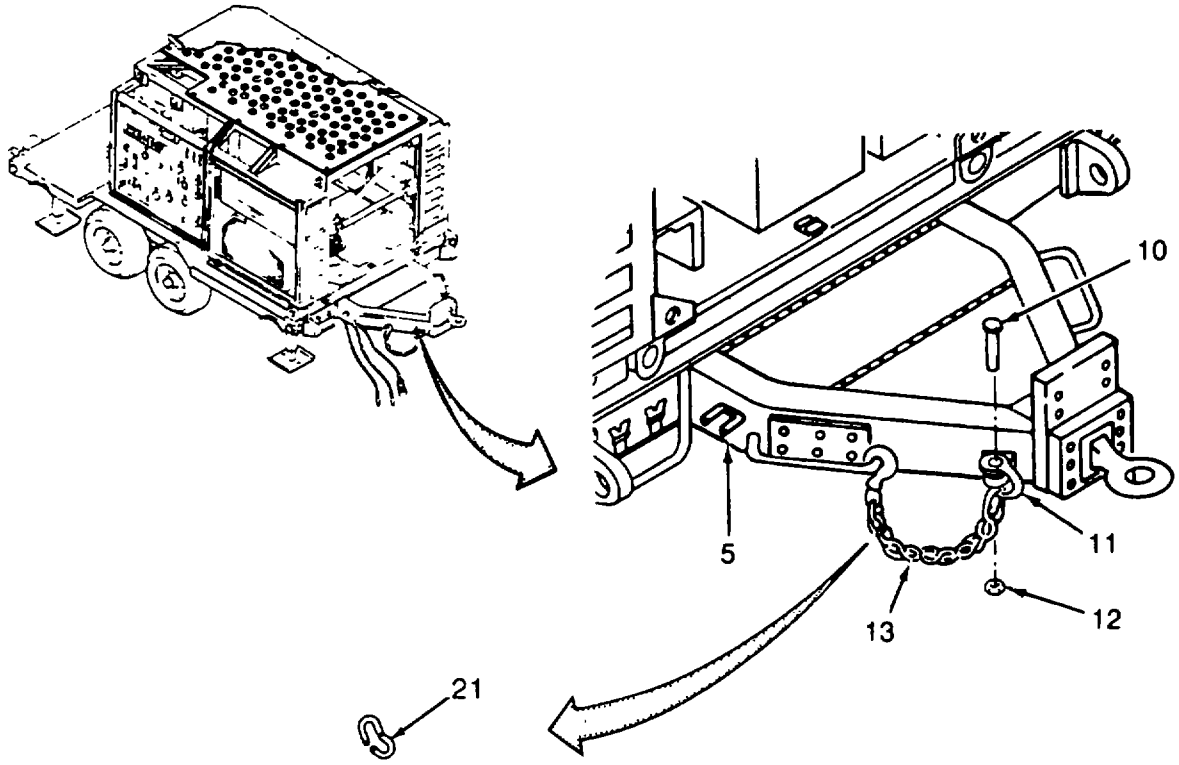
(3) If required, place chain link (21) in vice and separate chain link halves using hammer and chisel.

b. Installation.

(1) If removed, position chain link halves (21) on chain (13) Clamp chain link halves in vice and hammer rivet tabs flush with face of link. Make sure link halves are securely fastened together.

(2) Position chain (13) on latch (11).

(3) Using 1-1/8 inch wrench, install latch (11), screw (10), and nut (12) on frame (5).



2-89. FLATBED CARGO TRAILER MAINTENANCE (MODEL WPES-1)- continued.

REPLACE DATA PLATES

NOTE
Replacement of one data plate is shown Replacement of other data plates is similar

a. Removal

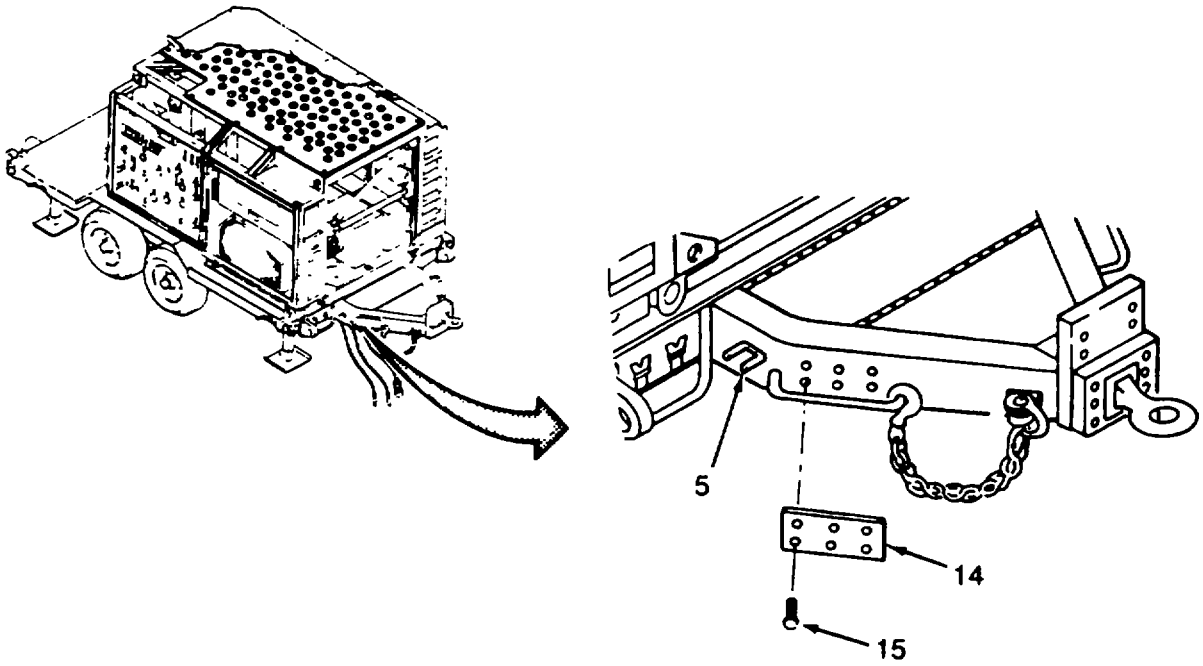
(1) Remove six drive screws (15) from data plate (14).

(2) Remove data plate (14) from frame (5).

b Installation.

(1) Position data plate (14) on frame (5)

(2) Install six drive screws (15)



2-89. FLATBED CARGO TRAILER MAINTENANCE (MODEL WPES-1) - continued.

REPLACE MANUAL CONTAINER

a. Removal.

(1) Remove four nuts (16), lockwashers (17) and screws (20).

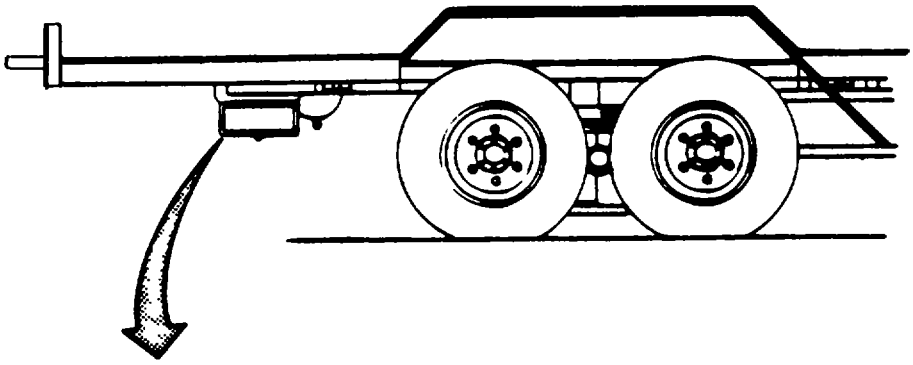
(2) Lower manual container (19) from brackets (18).

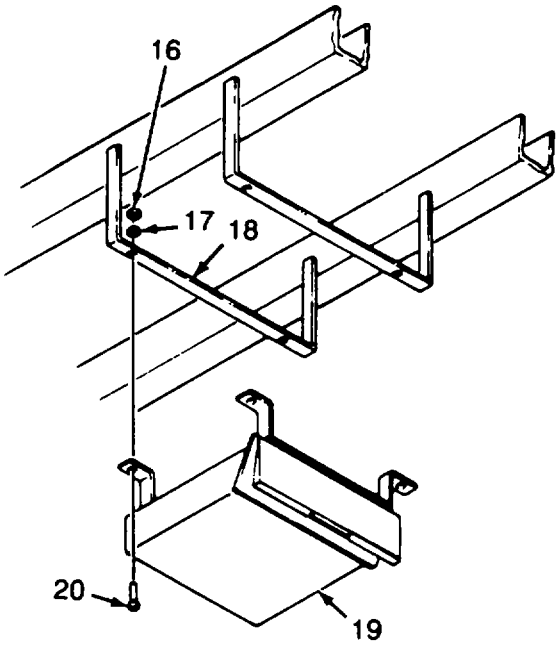
b. Installation.

(1) Position manual container (19) on brackets (18).

(2) Install four screws (20), lockwashers (17) and nuts (16).

2-89. FLATBED CARGO TRAILER MAINTENANCE (MODEL WPES-1)- continued.





2-90. SPARE TIRE AND WHEEL MAINTENANCE (MODEL WPES-1).

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Spring Tester (Appendix B, Section III, Item 3)
Material/Parts Required
Solvent, Drycleaning (Appendix C, Section II, Item 28)
Personnel Required
Two (2)
General Safety Instructions

WARNING

- **Lifting heavy equipment can cause serious injury Two personnel are required when replacing spare tire and wheel assembly.**
- **Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.**

REMOVAL

a. Using lug nut wrench and handle, remove two nuts (5).
b. Remove safety pin (10) and leveling jack handle (6) from jack assembly (11).
c. Install leveling jack handle (6) on ratchet shaft (3).

WARNING

Tire and wheel assembly weighs 122 pounds (55.34 kg). Use care when releasing pawl to prevent personal injury or equipment damage

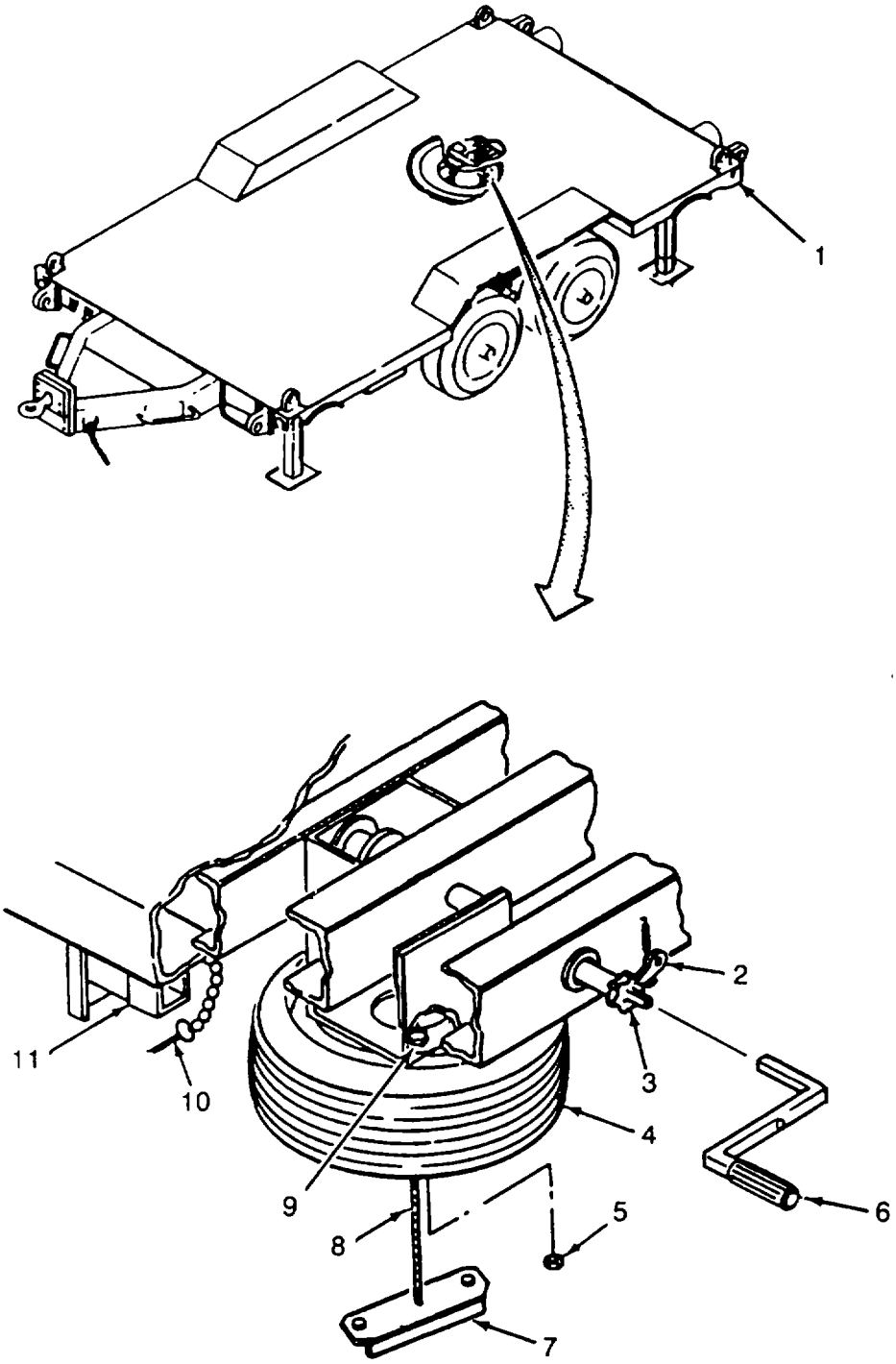
d. Push pawl (2) down and, using leveling jack handle (6), turn ratchet shaft (3) to lower spare tire and wheel assembly (4).
e. Unwind cable (8) until spare tire and wheel assembly (4) are on ground and tire carrier support (7) can be pulled through spare tire and wheel assembly

WARNING

Tire and wheel assembly weighs 122 pounds (55.34 kg). Use care in lifting tire and wheel assembly to prevent personal injury.

f. Slide spare tire and wheel assembly (4) from under flatbed cargo trailer (1) and lift to upright position.

2-90. SPARE TIRE AND WHEEL MAINTENANCE (MODEL WPES-1) -continued.



VIEW FROM REAR OF TRAILER

2-90. SPARE TIRE AND WHEEL MAINTENANCE (MODEL WPES-1) - continued.

REPAIR

a. Disassembly

(1) Disconnect extension spring (13) from pawl (2) and eyepad (12).

(2) Remove jamnut (16) from screw (14)

(3) Remove screw (14), flat washer (15), and pawl (2).

(4) Remove two nuts (20), U-bolt (18), U-bolt plate (7), cable (4), and tire carrier support (7)

(5) Remove two nuts (25), U-bolt (24), and cable (8) from ratchet shaft (3).

(6) Remove cotter pin (23), flat washer (22), and cotter pin (17) from ratchet shaft (3).

(7) Remove ratchet shaft (3), spool (21), and flat washer (26) from frame (4).

b. Cleaning

WARNING

- **Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection Use in a well-ventilated area**
- **Using drycleaning solvent and a stiff-bristled brush, scrub dirt and grease from all parts. Let air dry.**

c. Inspection.

(1) Inspect cable (8) for fraying and cuts or loose or missing end pieces.

(2) Inspect ratchet shaft (3) and pawl (2) for rounded or missing teeth.

(3) Inspect all threaded parts for worn or deformed threads

(4) Inspect all parts for excessive wear or deformity

(5) Inspect for worn or broken spring (13). Spring should measure 15 ± 2 pounds tension at 2.91 inches

d. Repair.

Replace damaged components

e. Assembly

(1) Install flat washers (26) on shaft (3).

(2) Position spool (21) and install ratchet shaft (3) through spool

2-90. SPARE TIRE AND) WHEEL MAINTENANCE (MODEL WPES-1)- continued.

(3) Install cotter pin (17) in spool (21)

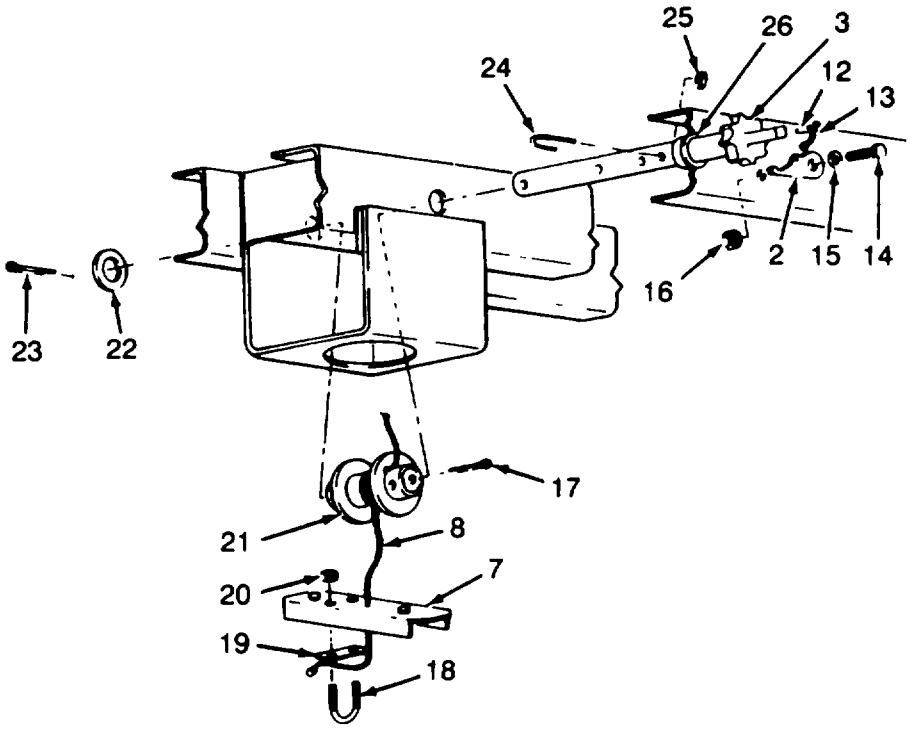
(4) Install flat washers (22) and cotter pin (23)

(5) Thread cable (8) through spool (21) and Install U-bolt (24) and two nuts (25) to hold end of cable

(6) Position U-bolt plate (19) and cable (8) on tire carrier support (7) and install U-bolt (18) and two nuts (20)

(7) Position pawl (2) and install screw (14), flat washer (15), and jamnut (16)

(8) Attach extension spring (13) to pawl (2) and eyepad (12)



2-339

2-90. SPARE TIRE AND WHEEL MAINTENANCE (MODEL WPES-1) - continued.

INSTALLATION

WARNING

Tire and wheel assembly weighs 122 pounds (55.34 kg). Use care in moving tire and wheel assembly to prevent personal injury.

a. Position spare tire and wheel assembly (4) under tire carrier support (7) and insert tire carrier support through spare tire and wheel assembly.

WARNING

Tire and wheel assembly weighs 122 pounds (55.34 kg). Oo prevent to personnel, make sure that pawl holds ratchet shaft when lifting tire and wheel assembly.

b. Using leveling jack handle (6), turn ratchet shaft (3) and wind cable (8) to raise spare tire and wheel assembly (4) to flatbed cargo trailer (1)

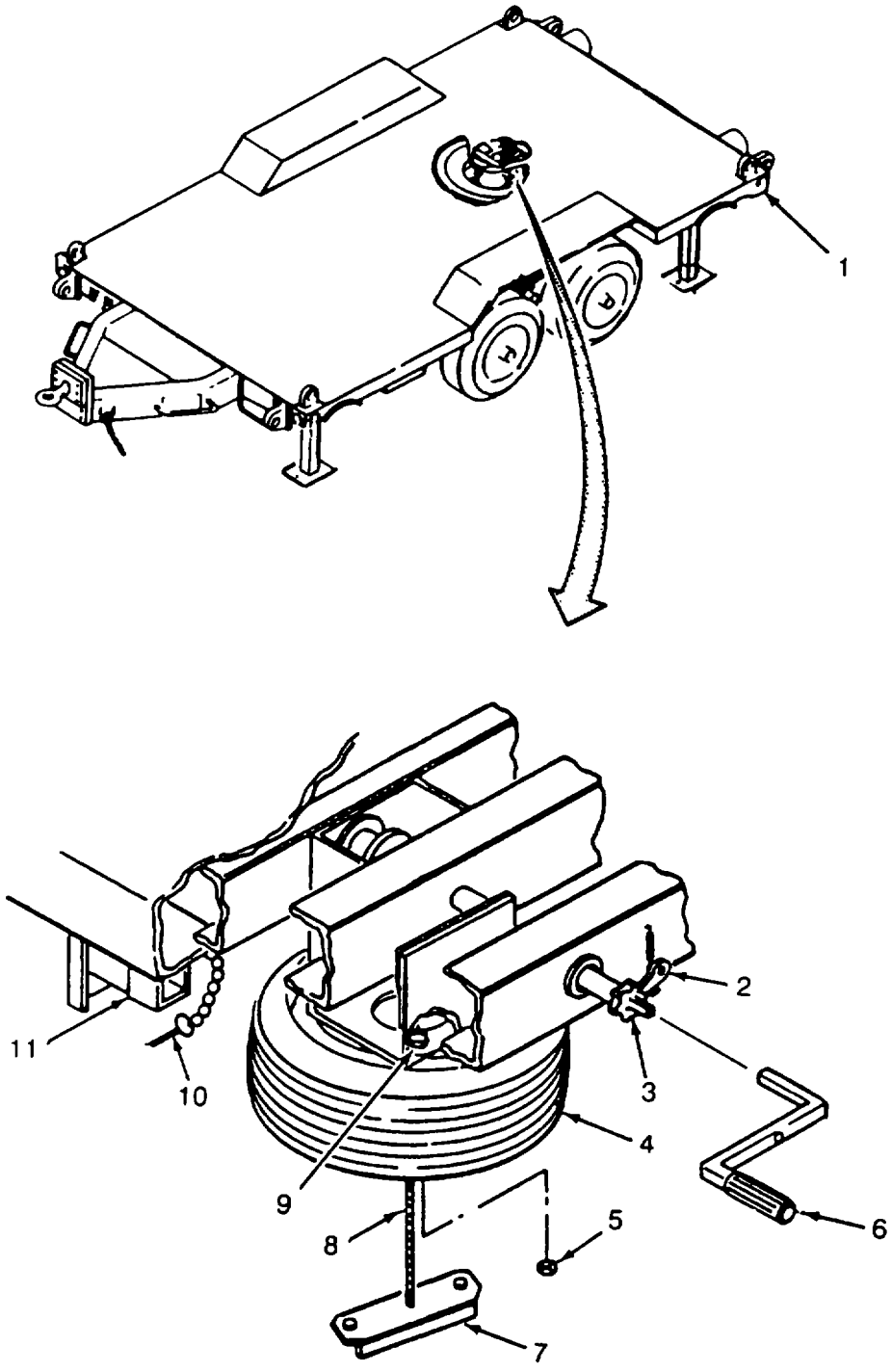
c. Aline holes on spare tire and wheel assembly (4) with two screws (9).

d Install two nuts (5).

e. Remove leveling jack handle (6) from ratchet shaft (3).

f. Position leveling jack handle (6) at rear leveling jack (11) and install safety pin (10).

2-90. SPARE TIRE AND WHEEL MAINTENANCE (MODEL WPES-1) - continued.



2-91. JACK ASSEMBLY MAINTENANCE (MODEL WPES-1).

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Personnel Required
Two (2)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).
General Safety Instructions

WARNING

- **Lifting heavy equipment incorrectly can cause serious injury Use two personnel to replace jack assembly.**
- **Flatbed cargo trailer is unstable when jacks are not down. Make sure that trailer wheels are chocked, trailer is level, and front of trailer is supported before removing jack assembly.**
- **The jack assembly is heavy. Two people are needed to lift it to prevent personal injury or damage to the equipment**

NOTE
There are four jack assemblies on the flatbed cargo trailer. All are removed and installed the same. One is shown, the others are similar.

REMOVAL

NOTE
Mark location of stud before removal

a. Remove stud (3) from jack assembly (1).

b. While supporting jack assembly (1), remove three bolts (2).

WARNING
The jack assembly is heavy Two people are needed to lift it to prevent personal injury or damage to the equipment.

c. Remove jack assembly (1) from trailer (4).

2-91. JACK ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.

INSTALLATION

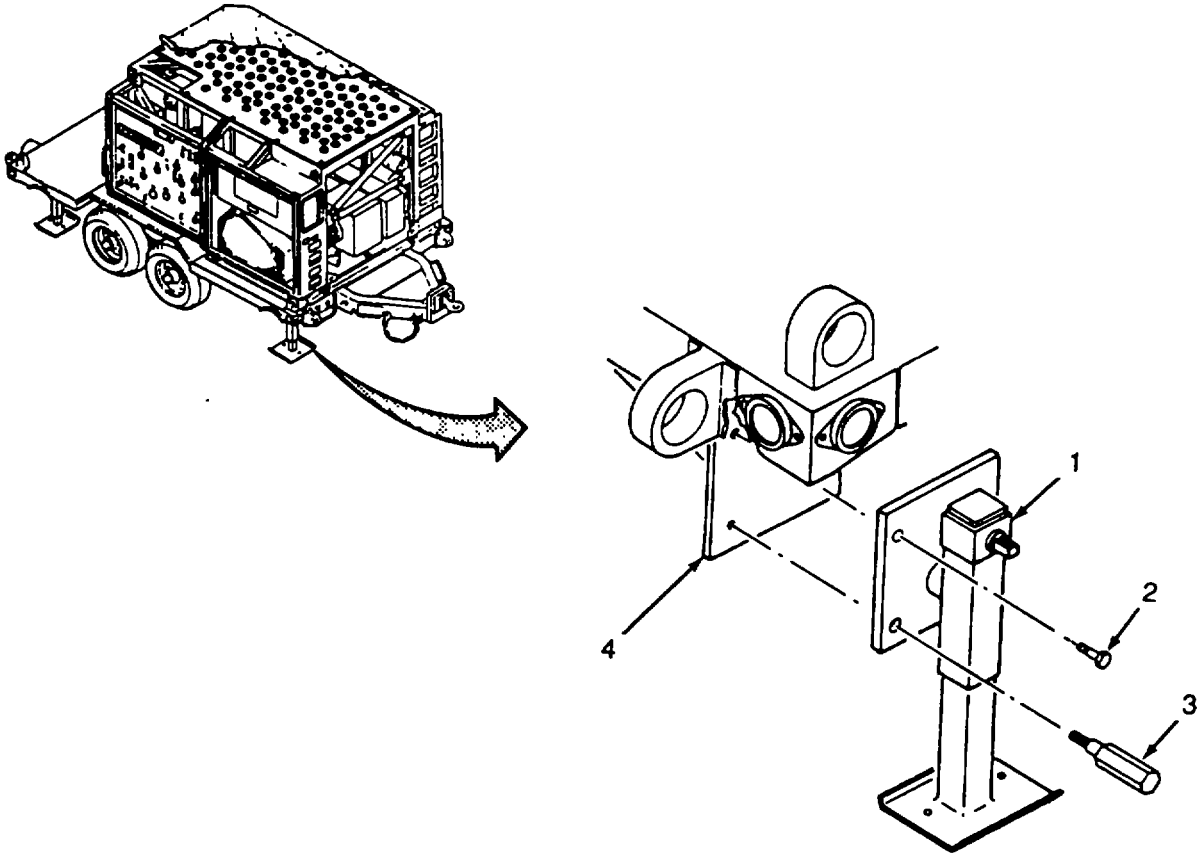
WARNING

The jack assembly is heavy Two people are needed to lift it to prevent personal injury or damage to the equipment

a. Position jack assembly (1) so that mounting holes on jack assembly plate aline with holes on trailer (4).

b. Install three bolts (2).

c. Install stud (3) on jack assembly (1).



2-92. ELECTRICAL INSTALLATION (TRAILER) MAINTENANCE (MODEL WPES-1).

Unit level maintenance of the electrical installation is limited to replacement of the light assembly, trailer cable assembly and wiring harness. Maintenance procedures for these assemblies are described in subsequent paragraphs.

2-93. LIGHT ASSEMBLY MAINTENANCE.

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Wiping Rag (Appendix C, Section II, Item 23)
Detergent (Appendix C, Section II, Item 10)
Sandpaper (Appendix C, Section II, Item 25)
Lockwasher (2) - MS35338-46
Equipment Condition
Reference
Flatbed cargo trailer electrical cable disconnected from towing vehicle (TM 10-4610-24010).

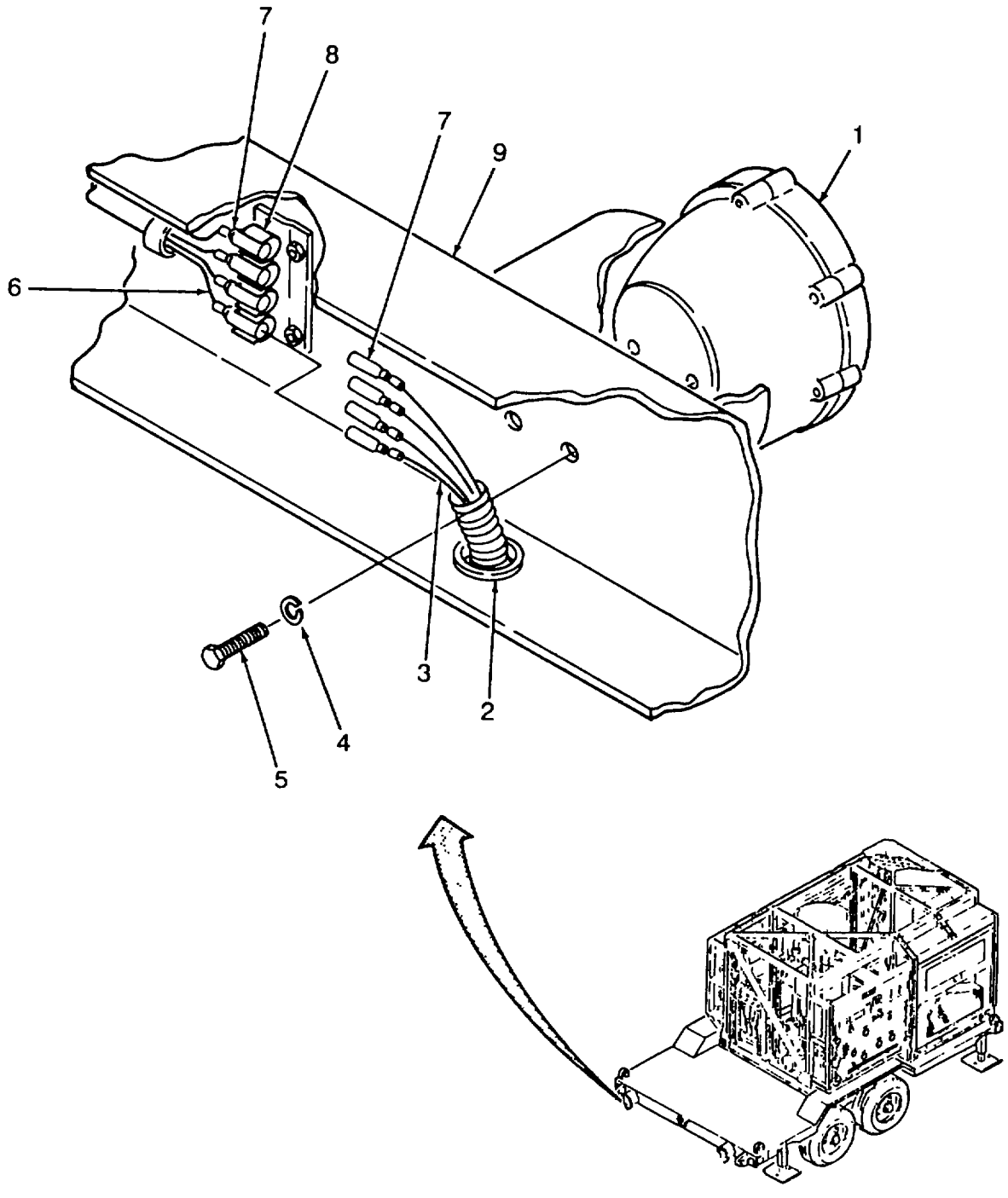
NOTE
Repair of the light assembly can be performed while light is installed on trailer. Go to repair if removal is not required.

REMOVAL

NOTE
There are two composite lights on the flatbed cargo trailer. Both are removed the same One is shown, the other is similar.

a. Check all wires for readable wire labels (6).
b If wire labels (6) are missing or cannot be read, tag wires.
c. Pull four connectors (7) from spring clips (8).
d. Separate two halves of four connectors (7)
e Work grommet (2) out of hole in chassis (9).
f. Pull cable (3) out of grommet (2) and through hole in chassis (9).
g Support composite light (1) and remove two cap screws (5), two lockwashers (4) and composite light

2-93. LIGHT ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.



2-93. LIGHT ASSEMBLY MAINTENANCE (MODEL WPES-1)- continued.

NOTE
There are two composite lights on the flatbed cargo trailer. Both are repaired the same. One is shown, the other is similar.

REPAIR

a. Disassembly.

(1) Loosen six captive screws (13) and remove door (11) and preformed packing (14).

NOTE
There are two types of bulbs in composite light. Note bulb type as you remove bulb from each socket.

(2) Remove four bulbs (10).

b. Cleaning.

(1) Using clean water and detergent, wash door (11), body (15), and three lenses (12).

(2) Rinse parts in clean water and dry with wiping rag.

c. Inspection.

(1) Inspect door (11) for cracked, broken, or leaking lenses (12), cracked or bent door and damaged heads or threads on screws (13).

(2) Inspect body (15) for cracks or broken lamp sockets or burnt, brittle, or cut wiring (17).

(3) Inspect bulbs (10) for cracks or loose or deformed bases.

(4) Inspect preformed packing (14) for nicks, cuts, or brittleness.

(5) Inspect lamp sockets (16) for corrosion.

d. Repair

(1) Replace defective components.

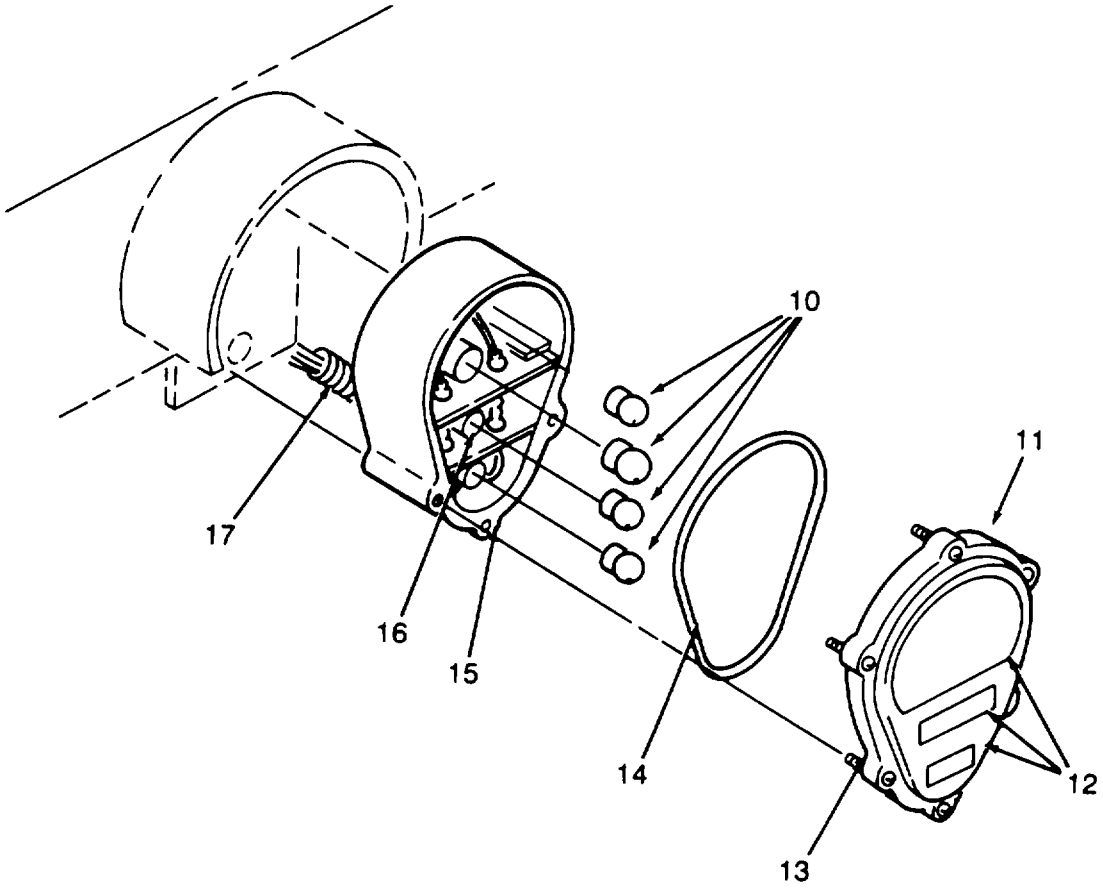
(2) Using sandpaper, remove corrosion from lamp sockets as required

e. Assembly.

(1) Install four bulbs (10) in lamp sockets (16) as noted during disassembly.

(2) Position preformed packing (14) and door (11) on body (15) and tighten six captive screws (13)

2-93. LIGHT ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.



2-93. LIGHT ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.

INSTALLATION

NOTE

There are two composite lights on the flatbed cargo trailer. Both are installed the same One is shown, the other is similar.

(1) Position composite light (1) on chassis (9) Install two lockwashers (4) and cap screws (5)

(2) Pull cable (3) through hole in chassis (9) and grommet (2).

(3) Work grommet (2) into hole in chassis (9).

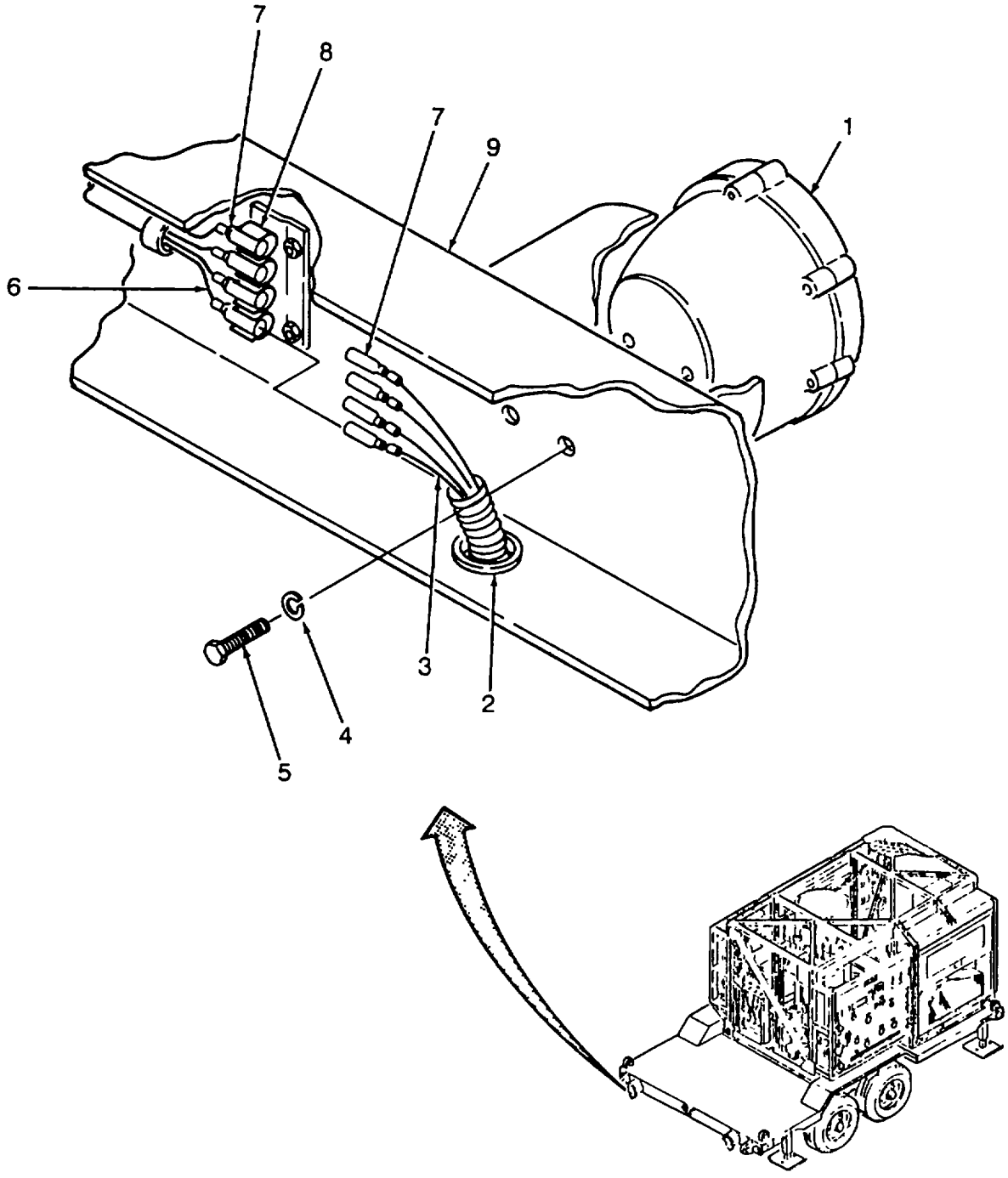
CAUTION

Failure to match wires as marked will cause electrical malfunctions. Be sure to connect wires as labeled.

(4) Use wire labels (6) to match halves of four connectors (7). Push matching halves together until they lock.

(5) Push four connectors (7) into spring clips (8)

2-93. LIGHT ASSEMBLY MAINTENANCE (MOI)EL WPES-1) - continued.



2-94. TRAILER CABLE ASSEMBLY MAINTENANCE (MODEL WPES-1).

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Equipment Condition
Reference
Power cable disconnected from towing vehicle (TM 10-4610-240-10).

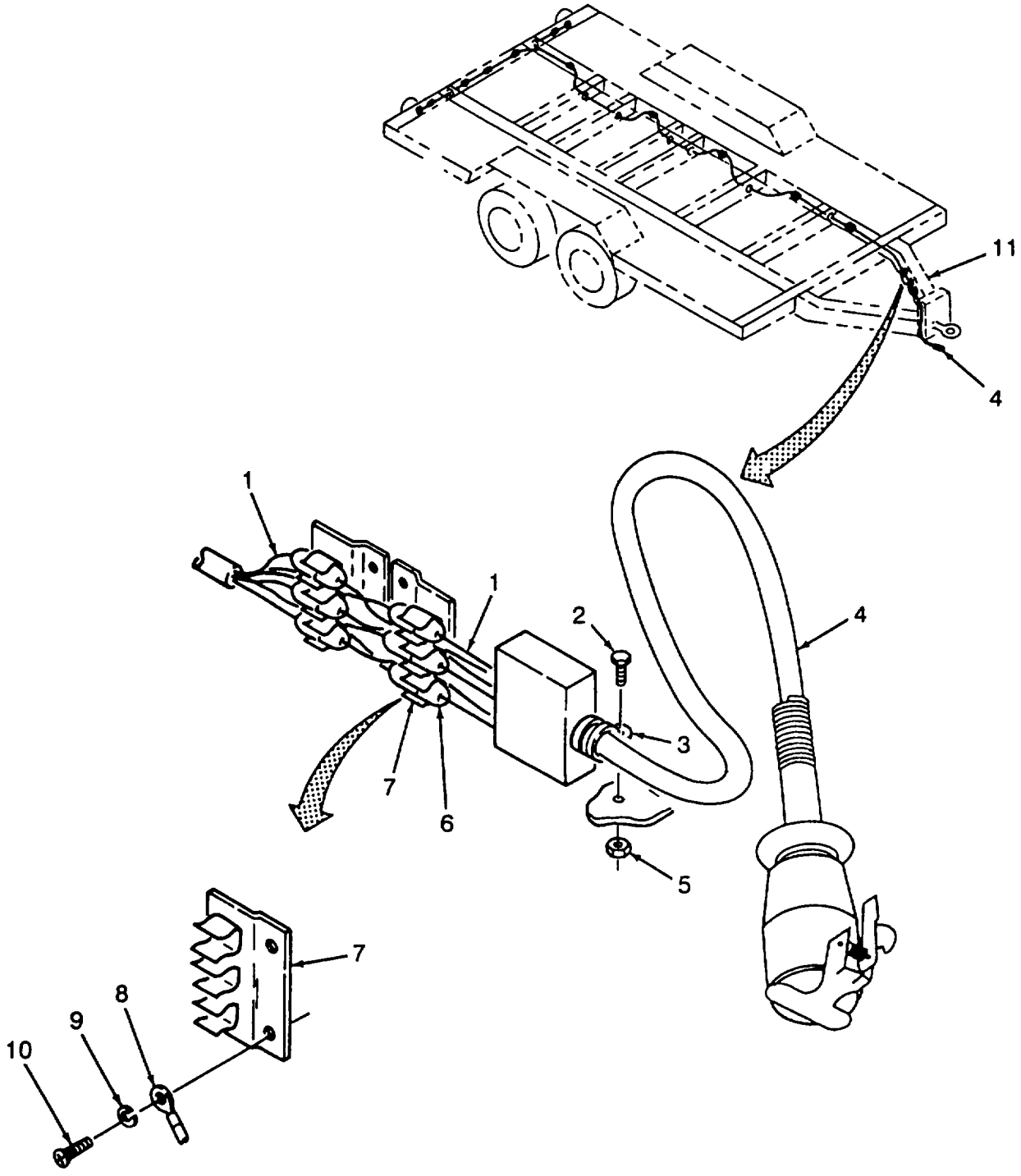
REMOVAL

a. Check all wires (1) for readable wire labels.
b. If wire labels are missing or cannot be read, tag wires (1).
c. Remove six connectors (6) from spring clips (7).
d. Separate two halves of six connectors (6). Perform continuity test between cable assembly plug and six connectors.
e. Remove nut (5), screw (2) and cable clamp (3). Release power cable assembly (4) from drawbar (11).
f. Remove screw (10) and lockwasher (9) and disconnect ground wire (8) from drawbar (11).
g. Remove cable assembly (4) from drawbar (11).

INSTALLATION

a. Position power cable assembly (4) in place on drawbar (11).
b. Install ground wire (8), lockwasher (9), and screw (10) on drawbar (11).
c. Use wire labels (6) to match halves of six connectors (6). Push halves together until they lock.
d. Push six connectors (6) into spring clips (7).
e. Secure cable assembly (4) to drawbar (11) with cable clamp (3), screw (2) and nut (5).
f. Connect trailer cable assembly to tow vehicle and check for proper operation (TM 104610-240-10).

2-94. TRAILER CABLE ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.



2-95. WIRING HARNESS (TRAILER) MAINTENANCE (MODEL WPES-1).

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Equipment Condition
Reference
Trailer disconnected from towing vehicle (TM 10-610-240-10).
Light assemblies removed from trailer (para 2-93).
Trailer cable assembly removed (para. 2-94).

REMOVAL

a. Remove nut (8), screw (10) and clamp (9) from wiring harness (2).

b. Remove four nuts (4) and screws (7) from connector clips (6 and 5). Remove clips from trailer frame (1).

c. Remove four nuts (11) from connector clips (12 and 15). Remove clips from trailer frame (1).

NOTE

There are eight clamps holding wiring harness to trailer frame. All are removed the same. One is shown, the others are similar.

d. Remove nuts (13) and clamps (14) from wiring harness (2).

NOTE

There are 11 grommets on the wiring harness. All are removed the same. One is shown, the others are similar.

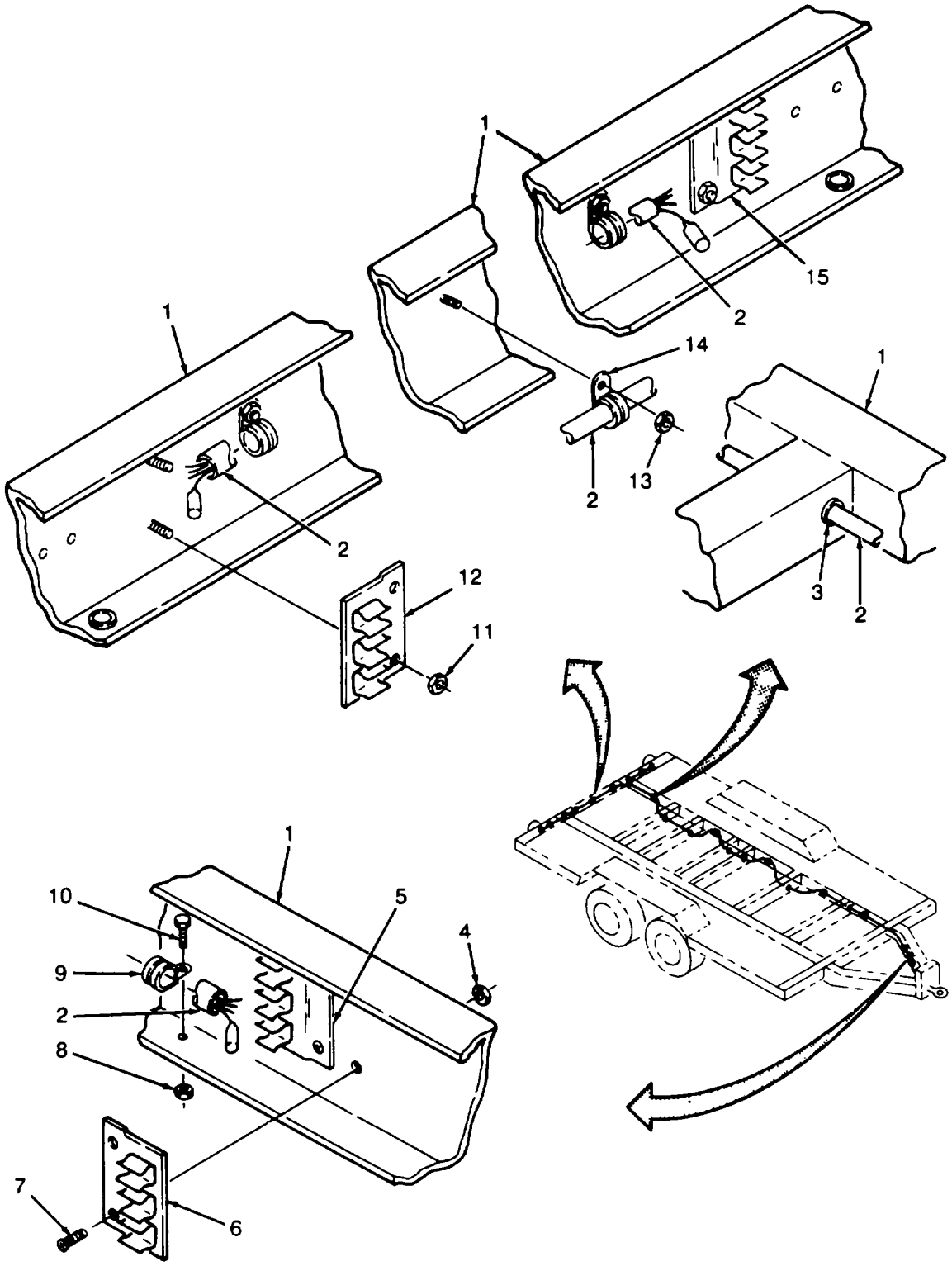
e. Remove grommets (3) from holes in trailer frame (1).

CAUTION

To prevent damage to wiring harness connectors, use care when pulling harness (2) through holes in trailer frame.

f. Working from front of trailer frame (1) to rear, pull wiring harness (2) from frame.

2-95. **WIRING HARNESS (TRAILER) MAINTENANCE (MODEL WPES-1) - continued.**



2-95. WIRING HARNESS (TRAILER) MAINTENANCE (MODEL WPES-1) - continued.

INSTALLATION

CAUTION

To prevent damage to wiring harness connectors, use care when pushing harness through holes in trailer frame.

a. Install grommets (3) on wiring harness.

b Working from rear of trailer frame (1) to front, insert wiring harness (2) through holes in frame.

NOTE

There are 11 grommets on the wiring harness. All are installed the same One is shown, the others are similar.

c. Install grommets (3) into holes in trailer frame (1).

NOTE

There are eight clamps holding wiring harness to trailer frame All are installed the same. One is shown, the others are similar.

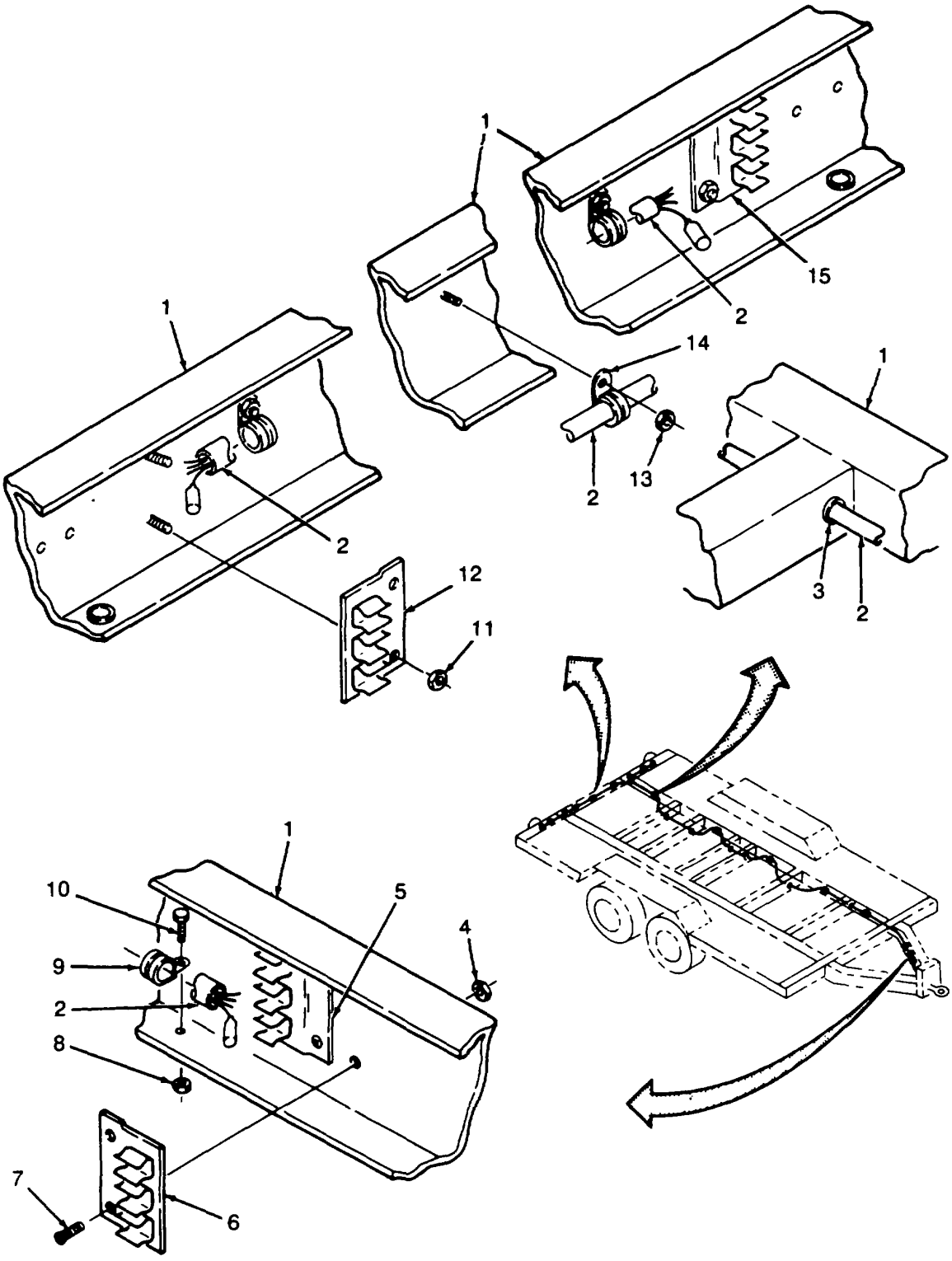
d. Position clamps (14) on wiring harness (2) and install nuts (13).

e. Position connector clips (12 and 15) on trailer frame (1) and install four nuts (11).

f. Position connector clips (5 and 6) on trailer frame (1) and install four screws (7) and nuts (4).

g. Install clamp (9), screw (10), and nut (8) on wiring harness (2).

2-95. WIRING HARNESS (TRAILER) MAINTENANCE (MODEL WPES-1) - continued.



2-96. AIRBRAKE INSTALLATION MAINTENANCE (MODEL WPES-1).

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
1-1/16 inch Wrench (Appendix B, Section III, Item 3)

Material/Parts Required
Tape, Anti-seize (Appendix C, Item 30)

Personnel Required
Two (2)

Equipment Condition
Reference
Trailer disconnected from towing vehicle (TM 104610-240-10).
Trailer leveling jacks set (TM 5-4610-215-10/2).
All four air chamber compression springs caged (M 10-4610-240-10).

General Safety Instructions

WARNING

- Compressed air in airbrake system can be dangerous.
- Airbrake reservoir is heavy/difficult to handle.

REMOVAL

WARNING

Compressed air can blow dust into eyes. Wear eye protection when releasing pressure from reservoir. Open draincock slowly.

NOTE

The following procedures describe removal of components used throughout the airbrake system. Removal of one of each type part is shown. Removal of other like parts is similar.

a. Open drain cock (1) slowly and allow all air to bleed from reservoir (2).

b. Unscrew airbrake hose assembly (11) from pipe coupling body (3). Remove coupling (13), adapter (12) and adapter (10) from hose assembly.

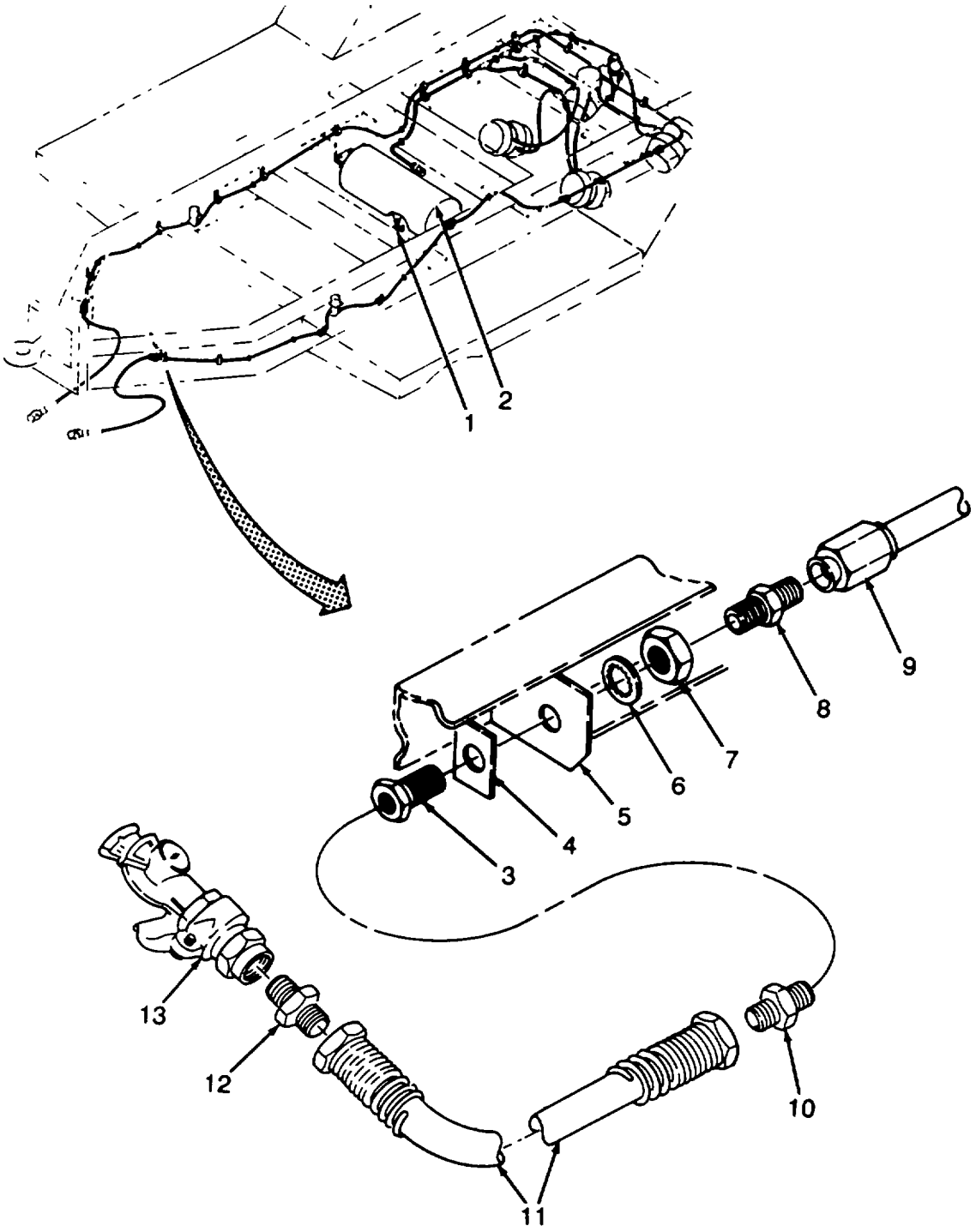
c. Remove tubing (9) from adapter (8).

d. Remove adapter (8) from pipe coupling body (3).

NOTE

Identification plate for roadside hose assembly pipe coupling is red Identification plate for curbside pipe coupling is blue.

2-96. AIRBRAKE INSTALLATION MAINTENANCE (MODEL WPES-1) - continued.



2-96. **AIRBRAKE INSTALLATION MAINTENANCE (MODEL WPES-1) - continued.**

e. Remove nut (7), lockwasher (6), identification plate (4) and pipe coupling body (3) from bracket (5).

f. Disconnect tube fitting (15) from elbow fitting (14).

g. Remove elbow fitting (14) and attached parts from reservoir (2).

h Remove draincock (1) from reservoir (2).

i. Remove four locknuts (16) and capscrews (18) from reservoir (2).

WARNING

The reservoir is heavy. To prevent injury to personnel and damage to the equipment, two personnel are required to lower reservoir from trailer frame.

j. Slide reservoir (2) off trailer frame (17) and lower it to the ground.

k. Disconnect tubing (27) from elbow (19).

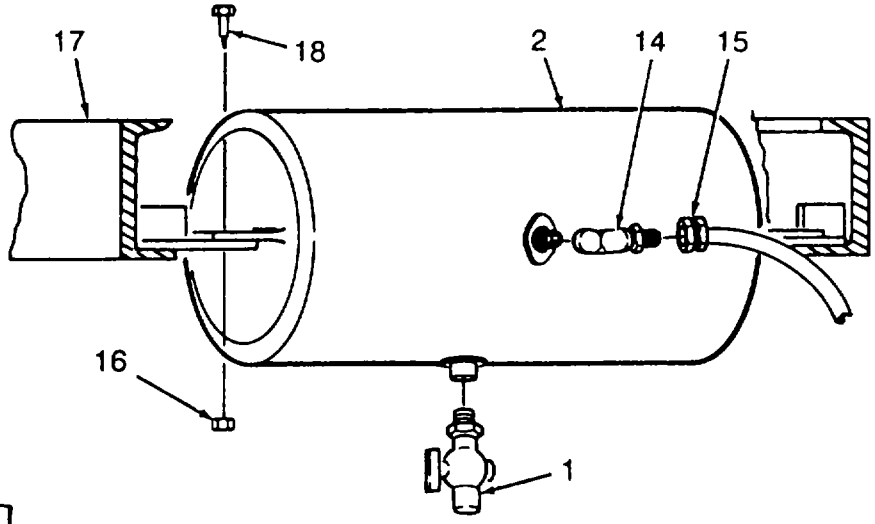
l. Disconnect hose (21) from adapter fitting (17).

m. Disconnect hose (24) from adapter fitting (25).

n. Remove two nuts (26), two cap screws (22) and anchor tee (23) from trailer frame (17).

o. Remove elbow (19), and adapters (20 and 25) from anchor tee (23).

2-96. AIRBRAKE INSTALLATION MAINTENANCE (MODEL WPES-1) - continued.



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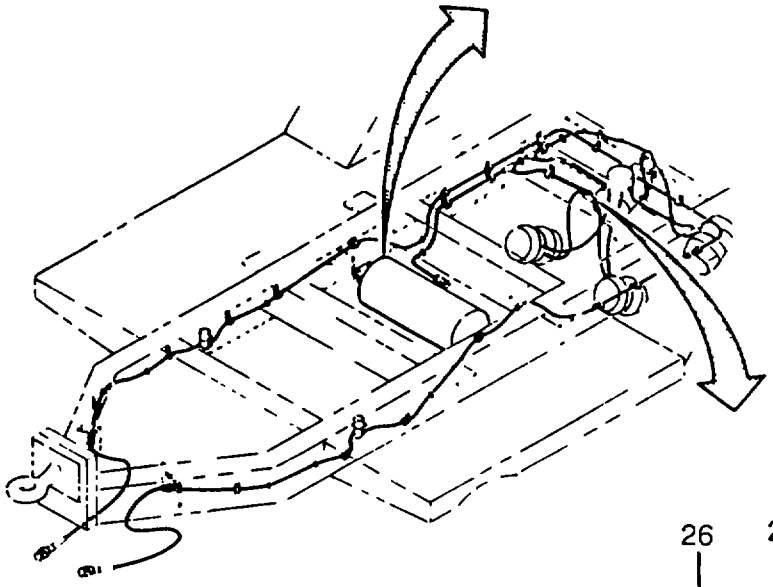
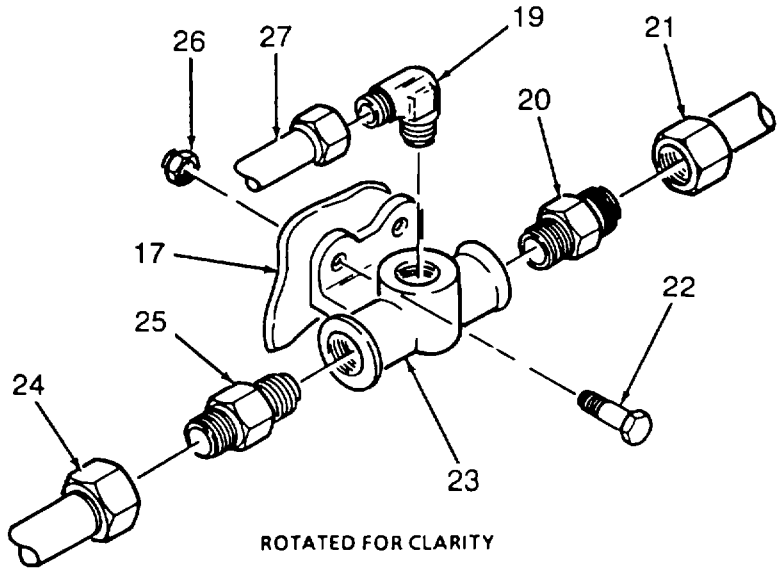




ROTATED FOR CLARITY

2-96. AIRBRAKE INSTALLATION MAINTENANCE (MODEL WPES-1) - continued.

p. Remove nut (30) from loop clamp(s) (29).

q. Open loop clamp (29) and remove from stud (28) and attached hose/tube.

r. Tag and disconnect tubing (31) from tee (32) and remove tee.

s. Tag and disconnect opposite end of tubing (31) and remove tubing.

t. Disconnect and remove hoses (33 and 34).

INSTALLATION

NOTE

The following procedures describe installation of airbrake components used throughout the brake installation. Removal of one of each type part is shown. Removal of other like parts is similar.

a. Apply anti-seize tape to male fittings. Be sure to wrap tape in same direction as pipe thread.

b. Position and connect hoses (33 and 34).

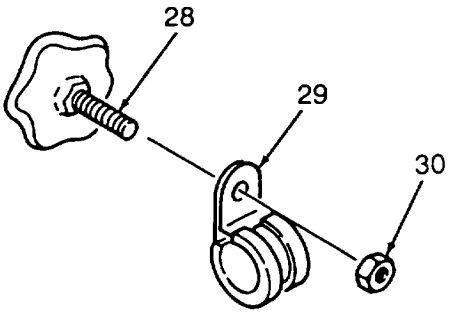
c. Position tubing (31) and connect one end as tagged during removal.

d. Connect opposite ends of tubing (31) to tee (32).

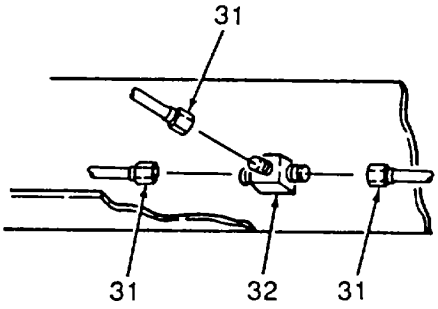
e. Position loop clamp (29) around attaching hose/tube and position on stud (28).

f. Install nut (30) on stud (28).

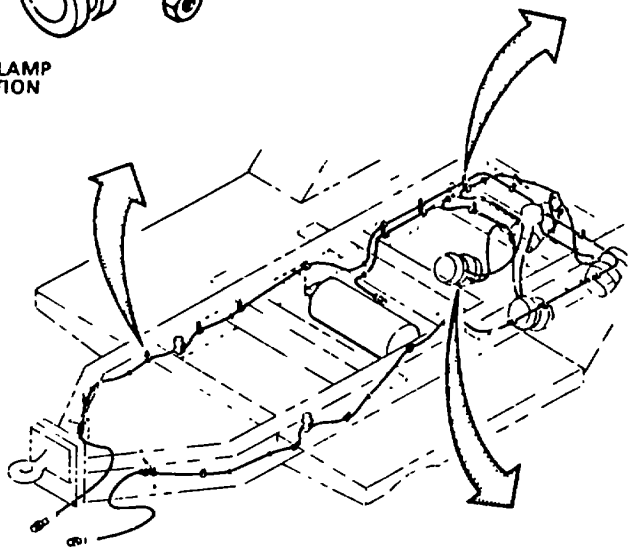
2-96. AIRBRAKE INSTALLATION MAINTENANCE (MODEL WPES-1) - continued.

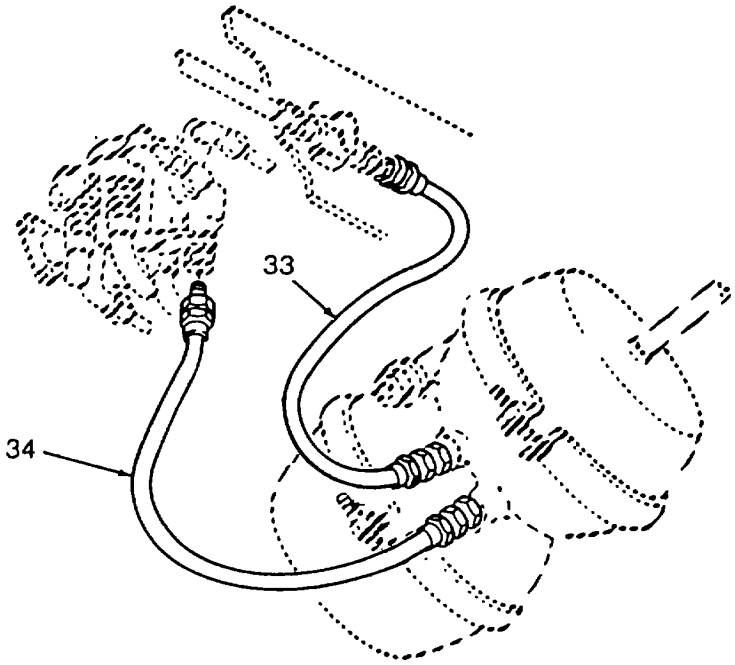


TYPICAL CLAMP INSTALLATION



TYPICAL TEE AND TUBING INSTALLATION





2-96. AIRBRAKE INSTALLATION MAINTENANCE (MODEL WPES-1) - continued.

g. Install elbow (19) on anchor tee (23).

h. Install adapters (20 and 25) on anchor tee (23).

h. Install anchor tee (23), two cap screws (22), and two nuts (26) on trailer frame (17).

i. Connect hose (24) to adapter fitting (25).

j. Connect hose (21) to adapter fitting (20).

k. Connect tubing (27) to elbow (19).

WARNING

The reservoir is heavy. To prevent injury to personnel and damage to the equipment, two personnel are required to position reservoir in trailer frame.

I. Install elbow fitting (14) and attached parts on reservoir (2).

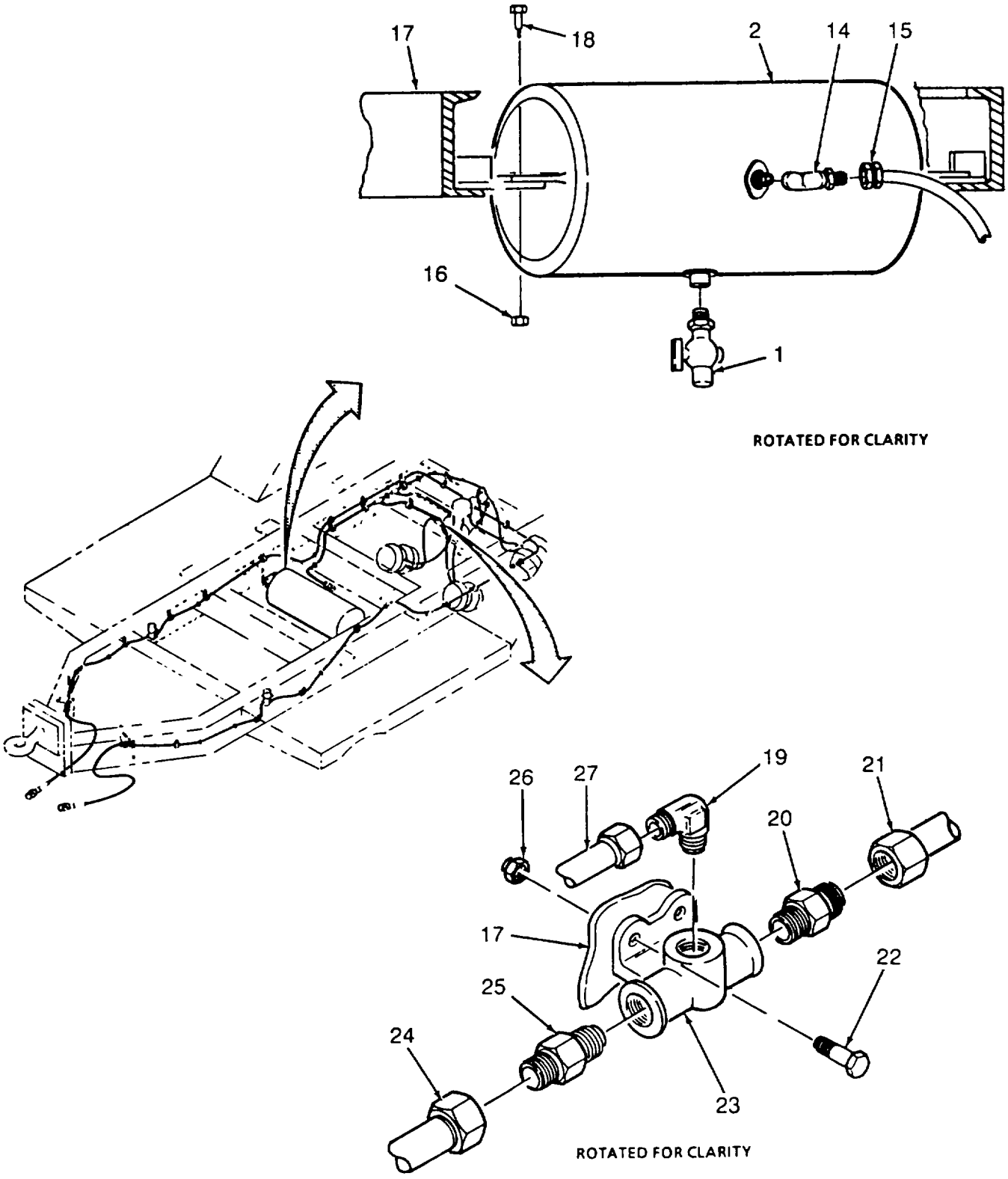
m. Position reservoir (2) in trailer frame (17).

n. Install four capscrews (18), and locknuts (16) on reservoir (2).

o. Install draincock (1) on reservoir (2).

p. Connect tube fitting (15) to elbow fitting (14).

2-96. AIRBRAKE INSTALLATION MAINTENANCE (MODEL WPES-I) - continued.



2-96. AIRBRAKE INSTALLATION MAINTENANCE (MODEL WPES-1) - continued.

NOTE

Identification plate for roadside hose assembly pipe coupling is red Identification plate for curbside pipe coupling is blue.

q. Install adapter (10 an 12) and coupling (13) on hose assembly (11).

r. Install identification plate (4), pipe coupling body (3), lockwasher (6) and nut (7) on bracket (5).

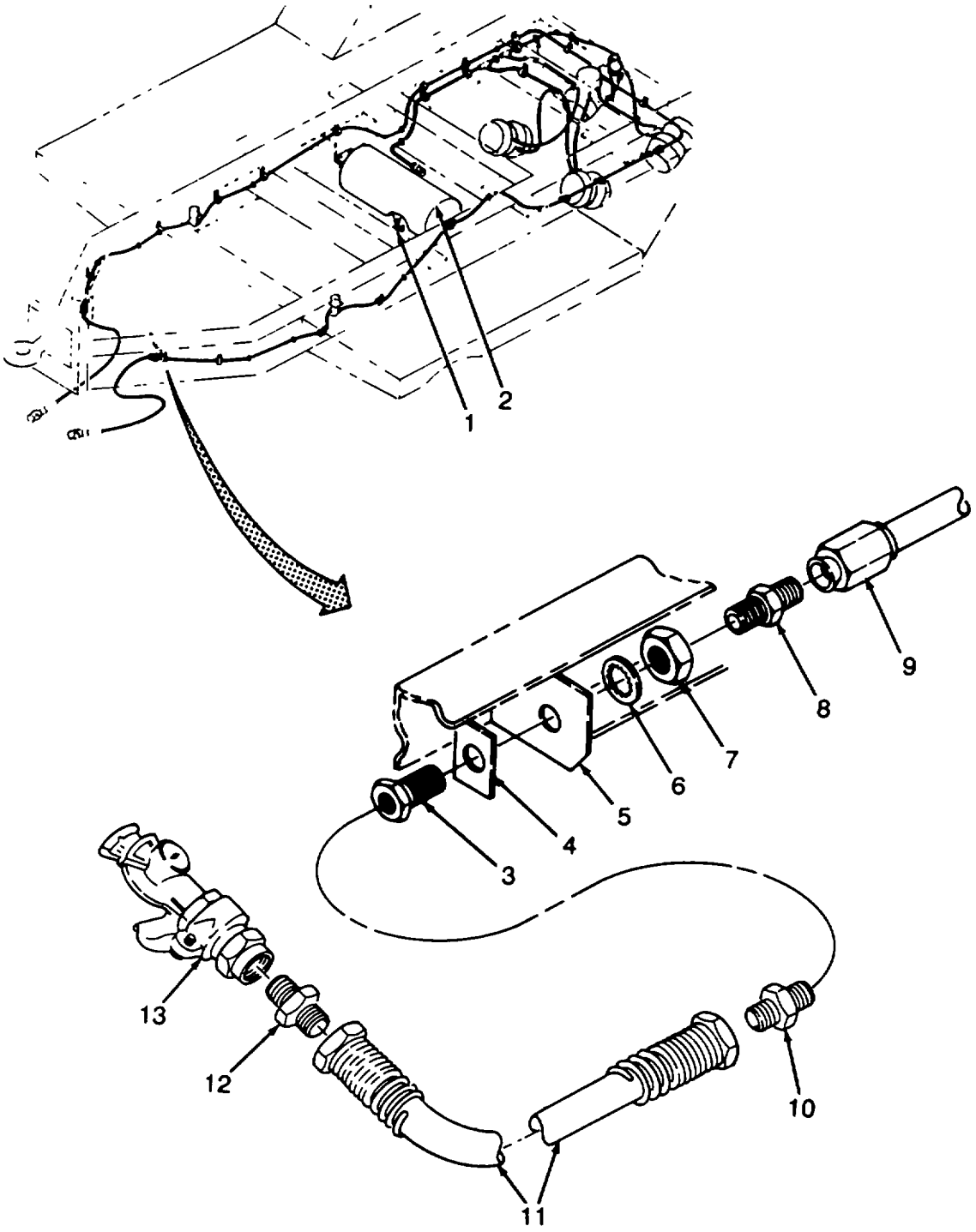
s. Install adapter (8) on pipe coupling body (3).

t. Install tubing (9) on adapter (8).

u. Install airbrake hose assembly (11) on pipe coupling body (3).

v. Close drain cock (1) on reservoir (2).

2-96. AIRBRAKE INSTALLATION MAINTENANCE (MODEL WPES-1) - continued.



2-97. AIR CLEANER ASSEMBLY (BRAKES) MAINTENANCE (MODEL WPES-1).

This task consists of: a. Removal b. Service c. Installation

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B, Section III, Item 4)
1-3/4 Inch Wrench (Appendix B, Section III, Item 3)

Material/Parts Required

Towing vehicle equipped with airbrakes.
Tape, Anti-seize (Appendix C, Section II, Item 30)
Detergent (Appendix C, Section II, Item 10)
Rag, Wiping (Appendix C, Section II, Item 23)
Gasket- 235092
Element - 23095

Equipment Condition

Reference

Leveling jacks set (TM 10-610-240-10).
Airbrake hoses disconnected from towing vehicle (TM 10-4610-240-10).
All four air chamber compression springs caged (TM 10-4610-240-10).

General Safety Instructions

WARNING

Compressed air in airbrake system can be dangerous.

NOTE

There are two brake line air filters, one on each side of the flatbed cargo trailer. Both are removed and installed the same. One is shown.

REMOVAL

WARNING

Compressed air can blow dust into the eyes. Wear eye protection and open drain cock slowly to avoid a sudden rush of air when releasing reservoir pressure.

a. Turn drain cock (2) slowly to release air pressure from reservoir (1).

NOTE

Ensure that airflow from reservoir has stopped before closing drain cock (2).

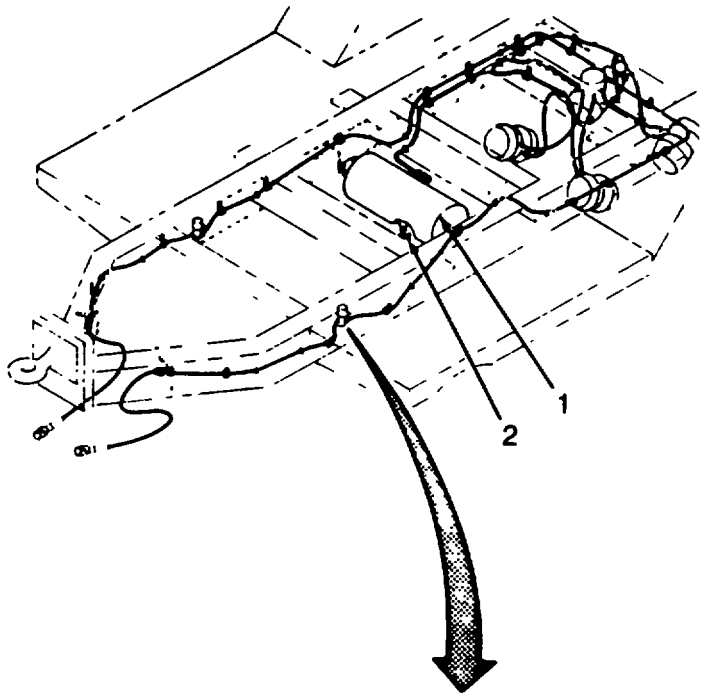
b Disconnect two tube assemblies (4 and 7) from air cleaner (3).

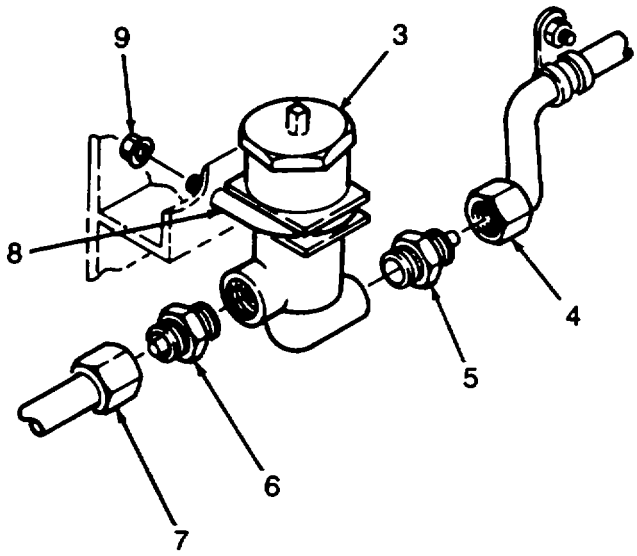
c. Support air cleaner (3) and remove two nuts (9) and one U-bolt clamp (8).

d. Remove air cleaner (3).

e. Remove two tube fittings (5 and 6) from air filter (3).

2-97. AIR CLEANER ASSEMBLY (BRAKES) MAINTENANCE (MODEL WPES-1) - continued.





2-97. AIR CLEANER ASSEMBLY (BRAKES) MAINTENANCE (MODEL WPES-1) - continued.

SERVICING

a. Disassembly.

(1) Remove pipe plug (10) from bushing adapter (11).

NOTE

Bushing adapter is under spring tension Hold bushing adapter and housing while releasing pressure.

(2) Remove bushing adapter (11), gasket (12), compression spring (13), spring tension washer (14), and filter element (15) from body (16).

b. Cleaning.

(1) Using clean water and detergent, wash dirt and grease from all parts.

(2) Using clean water, rinse all parts Dry with wiping rag.

c. Inspection.

(1) Inspect filter (15) form imbedded dirt or torn or deformed filter screen Replace as required.

(2) Inspect spring (13) and spring tension washer (14) for cracks or deformity Replace air cleaner assembly if damaged.

(3) Inspect pipe plug (10), bushing adapter (11), and housing (16) for cracks, deformity, or damaged threads.

d. Repair.

Replace damaged components.

e. Assembly.

(1) Install filter element (15), spring tension washer (14), and compression spring (13) in body (16).

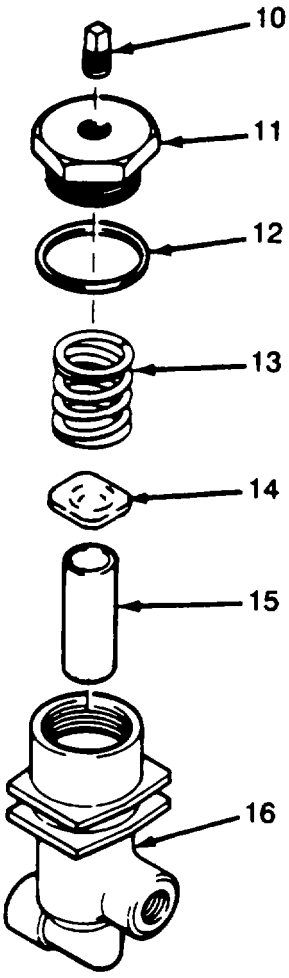
CAUTION

Compression spring causes resistance to installation of bushing adapter Lack of attention while installing bushing adapter can cause thread damage. Install bushing adapter carefully.

(2) Install gasket (12) and bushing adapter (11) on body (16).

(3) Install pipe plug (10) on bushing adapter (1).

2-97. AIR CLEANER ASSEMBLY (BRAKES) MAINTENANCE (MODEL WPES-1) - continued.



2-97. AIR CLEANER ASSEMBLY (BRAKES) MAINTENANCE (MODEL WPES-1)-continued.

INSTALLATION

a. Apply anti-seize tape to threads of tube fittings (5 and 6). Install two tube fittings on air cleaner (3).

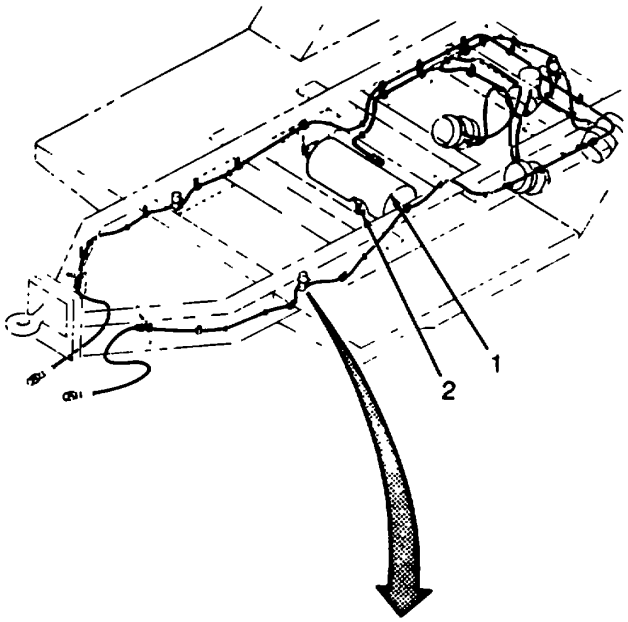
b. Position air cleaner (3) and install U-bolt clamp (8) and two nuts (9).

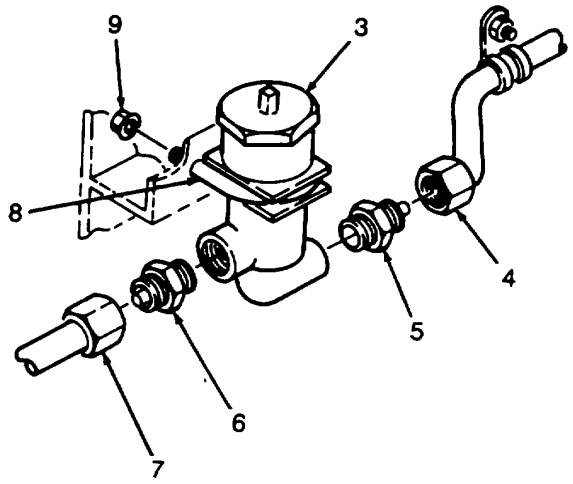
c. Install two tube assemblies (4 and 7).

d. Close drain cock (2).

e. Operate airbrake system and test for leaks (TM 10-4610240-10).

2-97. AIR CLEANER ASSEMBLY (BRAKES) MAINTENANCE (MODEL WPES-1) - continued.





2-98. RELAY VALVE MAINTENANCE (MODEL WPES-1).

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Equipment Condition
Leveling jacks set (TM 104610-240-10).
Airbrake hoses disconnected from towing vehicle (TM 104610-240-10).
All four air chamber compression springs caged (TM 10-4610-240-10).
General Safety Instructions

REMOVAL

WARNING
Compressed air in airbrake system can be dangerous. Wear proper eye protection.

REMOVAL

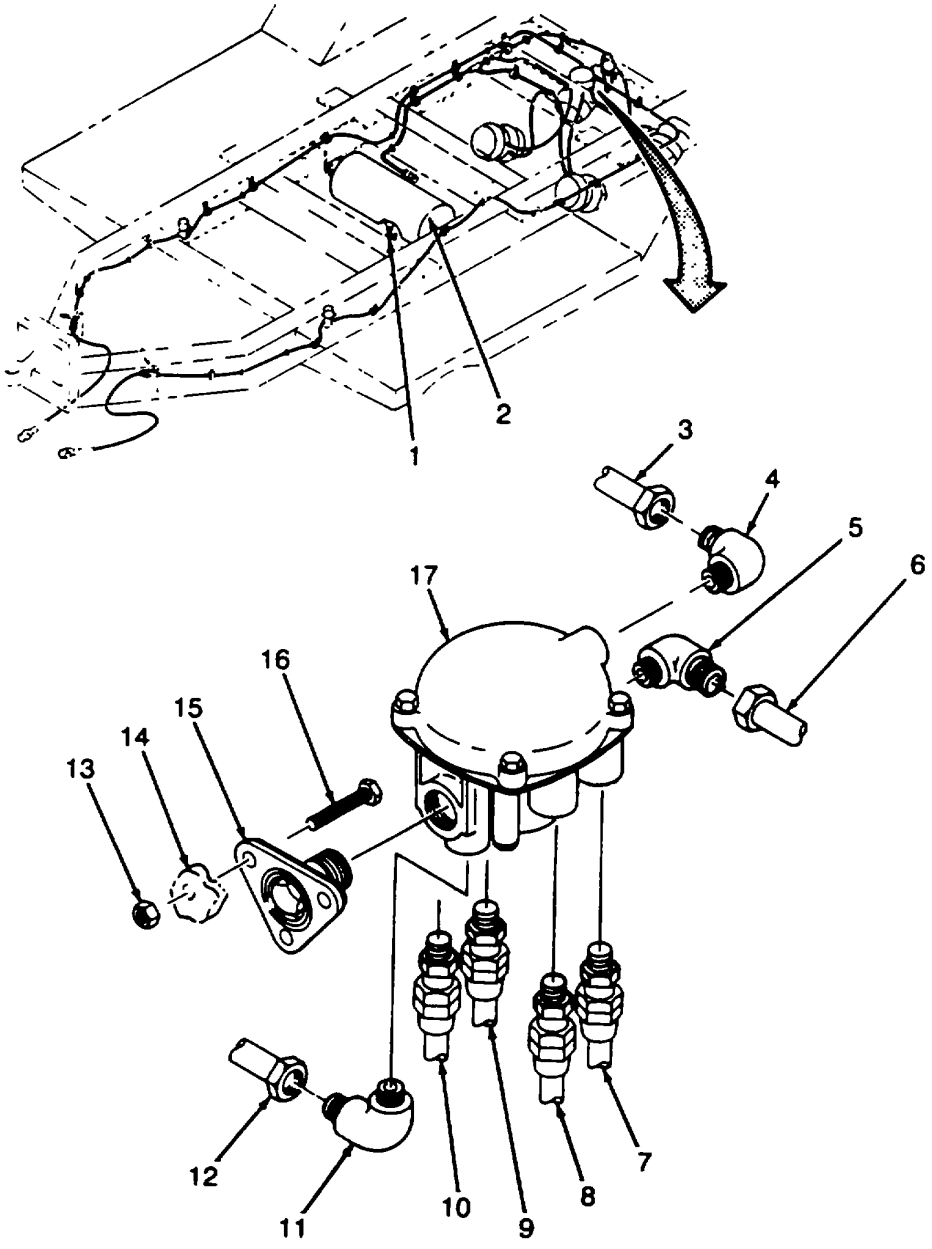
WARNING
Compressed air can blow dust into eyes. Wear eye protection and open drain cock slowly to avoid a sudden rush of air when releasing reservoir pressure.

a. Open drain cock (1) slowly to release air pressure from reservoir (2).

NOTE
Ensure that airflow from reservoir has stopped before closing drain cock.

b. Tag and disconnect four hoses (7, 8, 9 and 10) from relay valve (17).
c. Tag and disconnect three tubes (3, 6, and 12).
d. Remove three locknuts (13), and lower relay valve (17) from frame (14).
e. Remove adapter (15) from relay valve (17).
f. Remove tube elbows (4, 5, and 11) from relay valve (17).

2-98. RELAY VALVE MAINTENANCE (MODEL WPES-1) - continued.



ROTATED FOR CLARITY

2-98. RELAY VALVE MAINTENANCE (MODEL WPES-1) - continued.

INSTALLATION

a. Install three tube elbows (11, 5, and 4) on relay valve (17).

CAUTION

Using wrench on tube fittings threads will cause damage to threads. Use wrench only on wrenching surfaces.

b. Install adapter (15) with bolts (16) onto airbrake relay valve (17).

c. Position relay valve (17) on frame and install three locknuts (13).

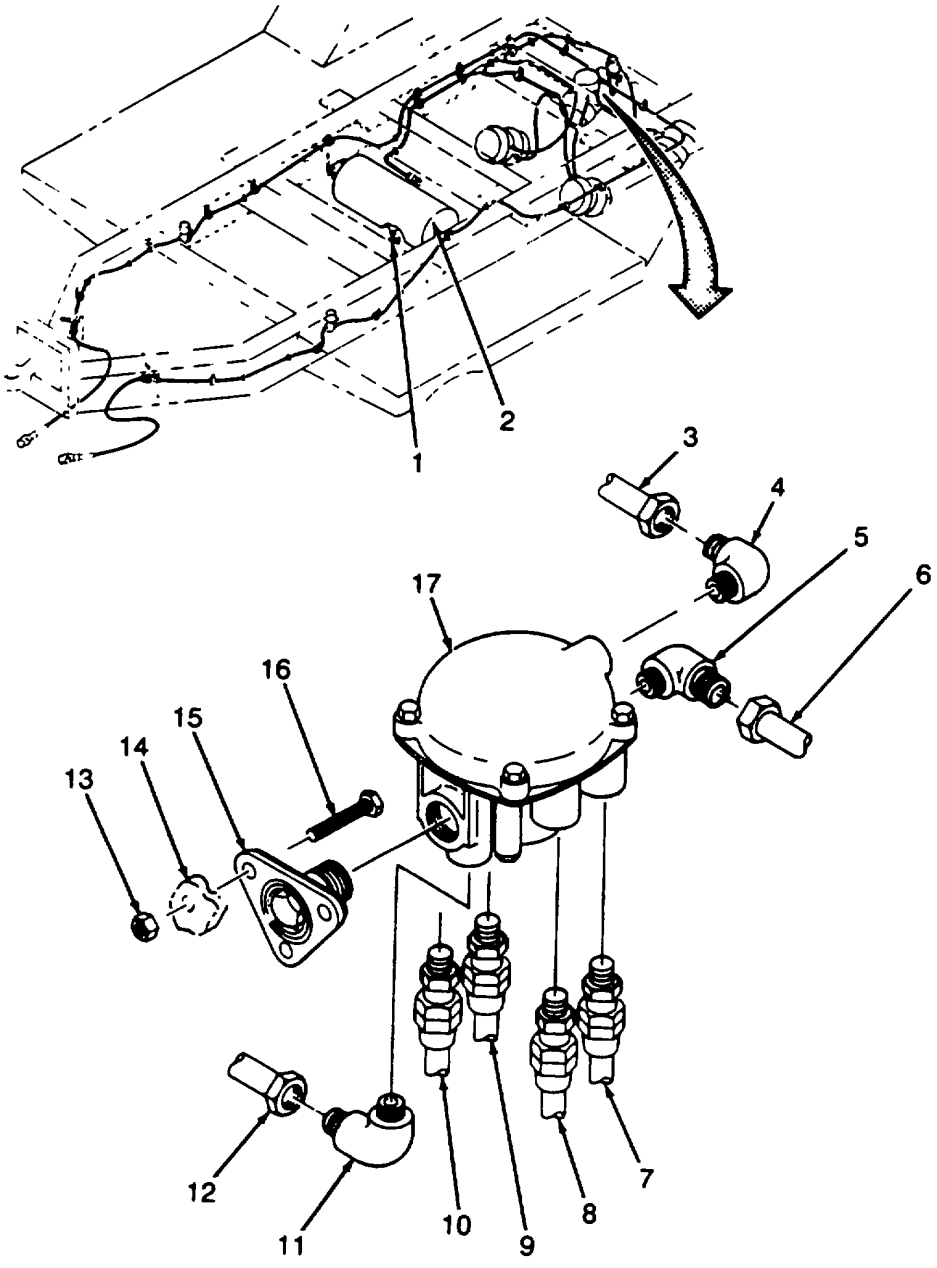
d. Connect three tubes (12, 6, and 3) to airbrake relay valve (17).

e. Connect four hoses (10, 9, 8 and 7) to airbrake relay valve (17) as tagged.

f. Check that drain cock (1) is turned fully closed.

g. Operate airbrake system and check for leaks (TM 10-4610-240-10).

2-98. RELAY VALVE MAINTENANCE (MODEL WPES-1) - continued.



ROTATED FOR CLARITY

2-99. TIRE AND WHEEL ASSEMBLY MAINTENANCE (MODEL WPES-1).

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Lugnut wrench and handle (towing vehicle)
Personnel Required
Two (2)
Equipment Condition
Reference
Trailer on flat and solid ground or floor.
Trailer disconnect from towing vehicle (TM 104610-24010).
General Safety Instructions

WARNING
Lifting heavy equipment incorrectly can cause serious injury.

REMOVAL

WARNING

- To avoid injury to personnel, tire removal should ONLY be done on solid ground, i e., concrete or asphalt surfaces or hard ground or floors or similar hard surfaces.
- To prevent the trailer from rolling or sliding, use blocks under the tires.

a. If the front (trailer hitch) tire is being changed, block both rear (generator end) tires. If the rear (generator end) tire is being changed, block both front (trailer hitch end) tires.

NOTE
Do not remove lug nuts at this time.

b. Using a lug nut wrench and handle, loosen lug nuts (1 through 6) one turn.

c. If the front (trailer hitch end) tire is being changed, rotate both front jack assemblies to the vertical position. If the rear (generator end) tire is being changed, rotate both rear jack assemblies to the vertical position (refer to TM 10-4610240-10).

d. For each jack assembly, remove safety pin and crank handle from rear of jack support bracket.

NOTE
The jacks should be lowered at the same time and at the same speed.

e. For each jack, install crack handle on jack and turn crank handle to lower jack pad.

2-99. TIRE AND WHEEL ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.

f. Continue to lower both jack until the pads are firmly on the ground and tire to be removed is clear of the floor or ground.

WARNING

The tire and wheel assembly weight is 122 pounds (55.39 kg). Injury can occur if caution is not used when removing wheel from hub. To prevent injury to personnel, place block or lug wrench under tire before removing wheel.

g. Carefully remove tire and wheel assembly (7) from studs (8)

INSTALLATION

WARNING

The tire and wheel assembly is heavy. Two people are needed to lift it to prevent personal injury or damage to the equipment.

CAUTION

Be careful not to drag wheel across threads of studs. Studs could be damaged

a. Position tire and wheel assembly (7) on studs (8)

NOTE

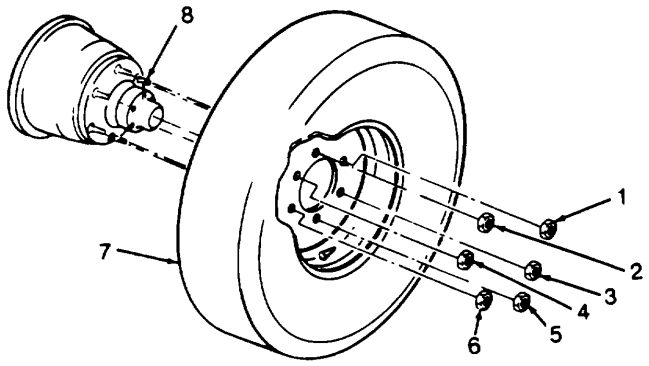
Do not fully tighten lug nuts at this time.

b. Install six lug nuts (I through 6) fingertight.

c. Using lug nut wrench and handle, tighten lug nuts (I through 6) until snug

d. Raise leveling jacks until tires are firmly on ground (refer to TM 5-4610-215-10/2).

e. Using lug nut wrench and handle, tighten lug nuts (1 through 6) in sequence (1, 6, 5,2, 4 and 3) Torque lug nuts to 250 pound-feet (339 N.m).



2-100. AXLE ASSEMBLY (HUB AND DRUM) MAINTENANCE (MODEL WPES-1).

This task consists of: a. Removal b. Installation c. Adjust Bearings

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Wheel Bearing Nut Wrench (Appendix B, Section III, Item 3)
- Bearing Cup Puller (Appendix B, Section III, Item 3)
- Ten Ton Jack (Appendix B, Section III, Item 3)
- Ten Ton Jack Stand (Appendix B, Section III, Item 3)

Equipment Condition
- Reference
  - Towing vehicle air hose connected (TM 10-4610-240-10).
  - Tire and wheel assembly removed (para 2-99).

General Safety Instructions

WARNING

Lifting heavy equipment incorrectly can cause serious injury.

REMOVAL

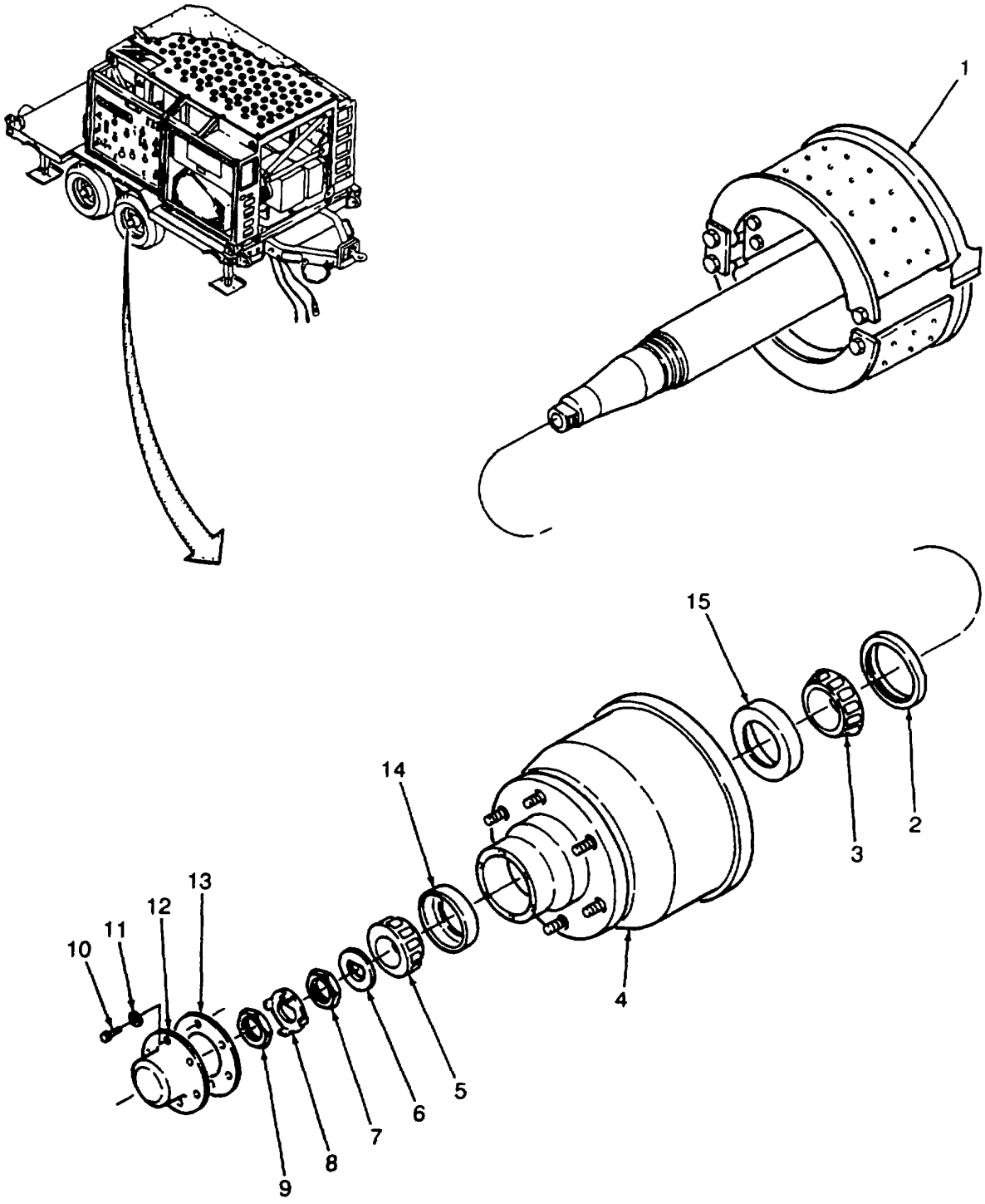
a. Remove six bolts (10) and lockwashers (11), hubcap (12), and gasket (13).
b. Bend key washer (8) off of outer spindle nut (9).
c. Using wheel bearing nut wrench, remove outer spindle nut (9).
d. Remove key washer (8).
e. Using wheel bearing nut wrench, remove inner spindle nut (7).
f. Remove key washer (6).

NOTE

Outer bearing cups will remain in hub and wheel assembly (4) when bearings (5) are removed.

g. Remove hub and drum assembly (4) from spindle (1). Remove outer bearing (5) from hub (4).
h. Remove seal (2) and inner bearing (3) from hub (4).
i. Using bearing cup puller, remove inner and outer bearing cups (14 and 15).

2-100. AXLE ASSEMBLY (HUB AND DRUM) MAINTENANCE (MODEL WPES-1) - continued.



2-100. AXLE ASSEMBLY (HUB AND DRUM) MAINTENANCE (MODEL WPES-1) - continued.

CLEANING

WARNING

Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

a. Using drycleaning solvent, clean bearings (3 and 5) and bearing cups (14 and 15) by wiping and scrubbing

b. If old grease in bearing cone and rollers is gummed or caked, soak bearing in drycleaning solvent, then repeat step a.

WARNING

Do not dry bearing cone and rollers with compressed air. Spinning bearings may come apart and cause serious injury to personnel

CAUTION

After cleaning, keep bearings clean and dry Dirt and moisture can damage bearings.

c. Rinse bearings (3 and 5) and bearing cups (14 and 15) in clean drycleaning solvent and allow to air dry.

INSPECTION

a. Hold bearing cone (16) and slowly turn inner race (18).

NOTE

Bearings and bearing cups are a matched set. If either part of set is defective, replace both parts.

b. Check that rollers (17) and bearing cone (16) have no cracks, flaking, pitting, or long or deep scratches.

c. Check that bearing cone (16) has not overheated. Bearing cone turns blue where overheated.

d. Check that bearing cups (14 and 15) are not splintered or chipped.

LUBRICATION

Pack bearings (3 and 5) with grease (refer to LO .10-4610-240-12,).

2-100. AXLE ASSEMBLY (HUB AND DRUM) MAINTENANCE (MODEL WPES-1) - continued.

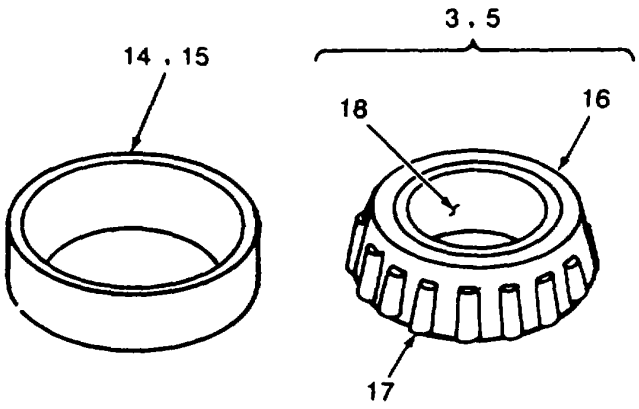
INSTALLATION

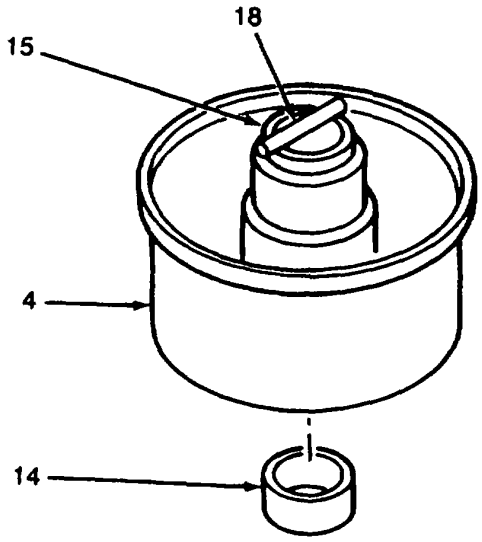
a. Position inner bearing cup (15) in hub and wheel assembly (4).

b. Lay brass drift pin (18) across top of inner bearing cup (15).

c. Using hammer, tap brass drift pin (18), move brass drift pin to another position on inner bearing cup (15), then tap again Repeat until inner bearing cup is seated completely inside hub and wheel assembly (4).

d. Turn over hub and drum assembly (4) and repeat steps a thru c for outer bearing cup (14).





2-100. AXLE ASSEMBLY (HUB AND DRUM) MAINTENANCE (MODEL WPES-1) - continued.

e. Install inner bearing (3) and seal (2) in hub and drum assembly (4).

f. Position hub and drum assembly (4) on spindle (1).

g. Install outer bearing (5) in hub and drum assembly (4).

h. Install key washer (6) and inner spindle nut (7) Tighten inner spindle nut fingertight.

i. Install tire and wheel assembly (para. 2-99).

ADJUST

a. Rotate hub and drum assembly (4). Tighten inner spindle nut (7) until hub and drum assembly starts to bind.

b. Loosen inner spindle nut (7) one-sixth turn, or until hub and drum assembly (4) doesn't bind.

c. Put one hand on bottom and one hand on top of tire and wheel and hub and drum assembly (4). Push with one hand and pull with the other hand. Tire and wheel and hub and drum assembly should not move.

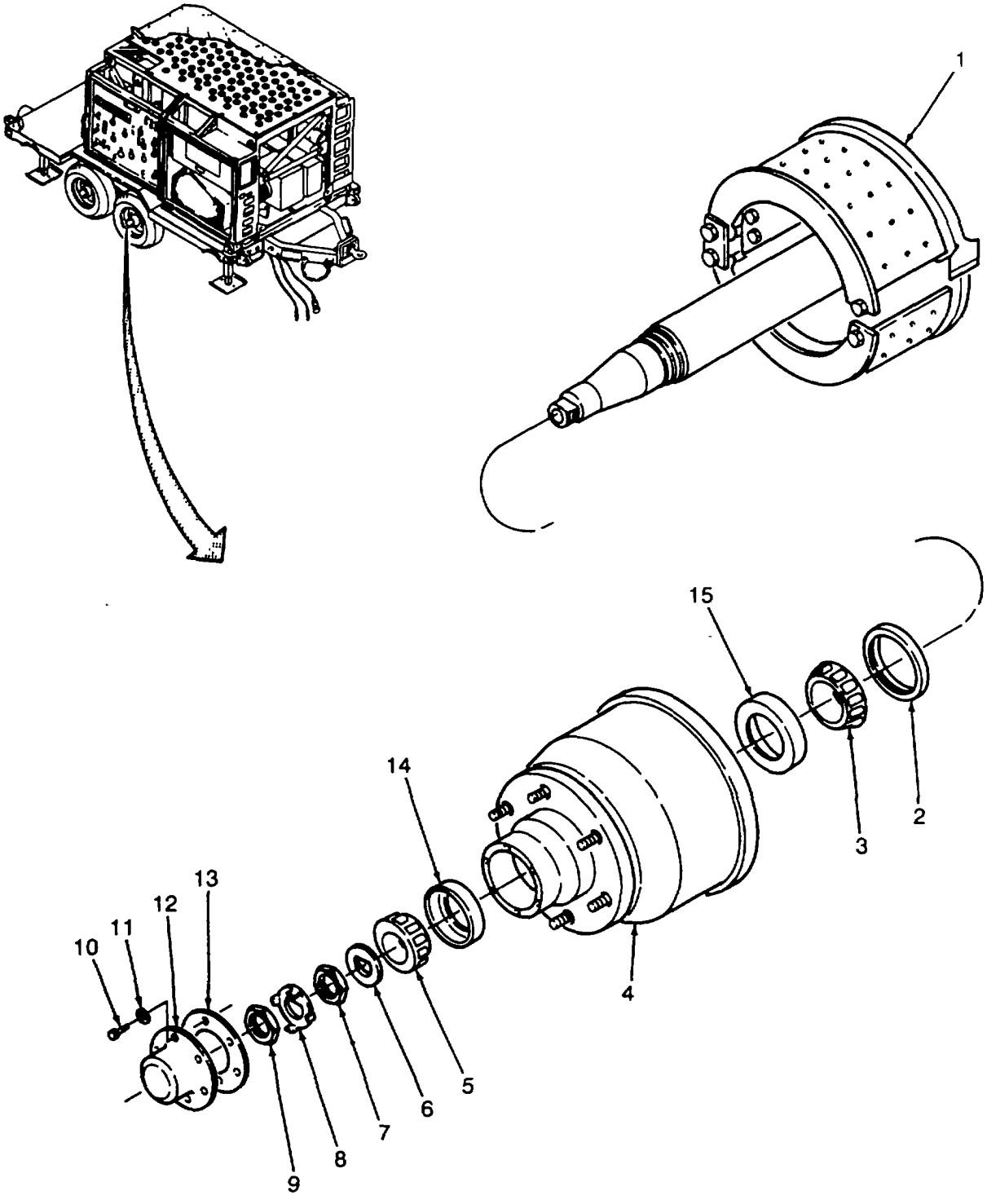
d. If tire and wheel and hub and drum assembly (4) moves, repeat steps a thru c.

e. Install key washer (8) Bend one side of key washer over one flat of inner spindle nut (7).

f. Install outer spindle nut (9). Bend one side of key washer (8) over one flat of outer spindle nut.

g. Install gasket (13), hubcap (12), six lockwashers (11), and bolts (10).

2-100. AXLE ASSEMBLY (HUB AND DRUM) MAINTENANCE (MODEL WPES-1) - continued.



2-101. SERVICE BRAKE MAINTENANCE (MODEL WPES-1).

This task consists of: Adjust

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Jack, Dolly (Appendix B, Section III, Item 3)
Trestle, Motor (Appendix B, Section III Item 3)
Personnel Required
Two (2)
Equipment Condition
Trailer connected to towing vehicle (TM 10-4610-240-10).
Airbrake hoses connected to towing vehicle (TM 10-4610-240-10).
Towing vehicle compressor supplying normal brake air pressure to trailer.

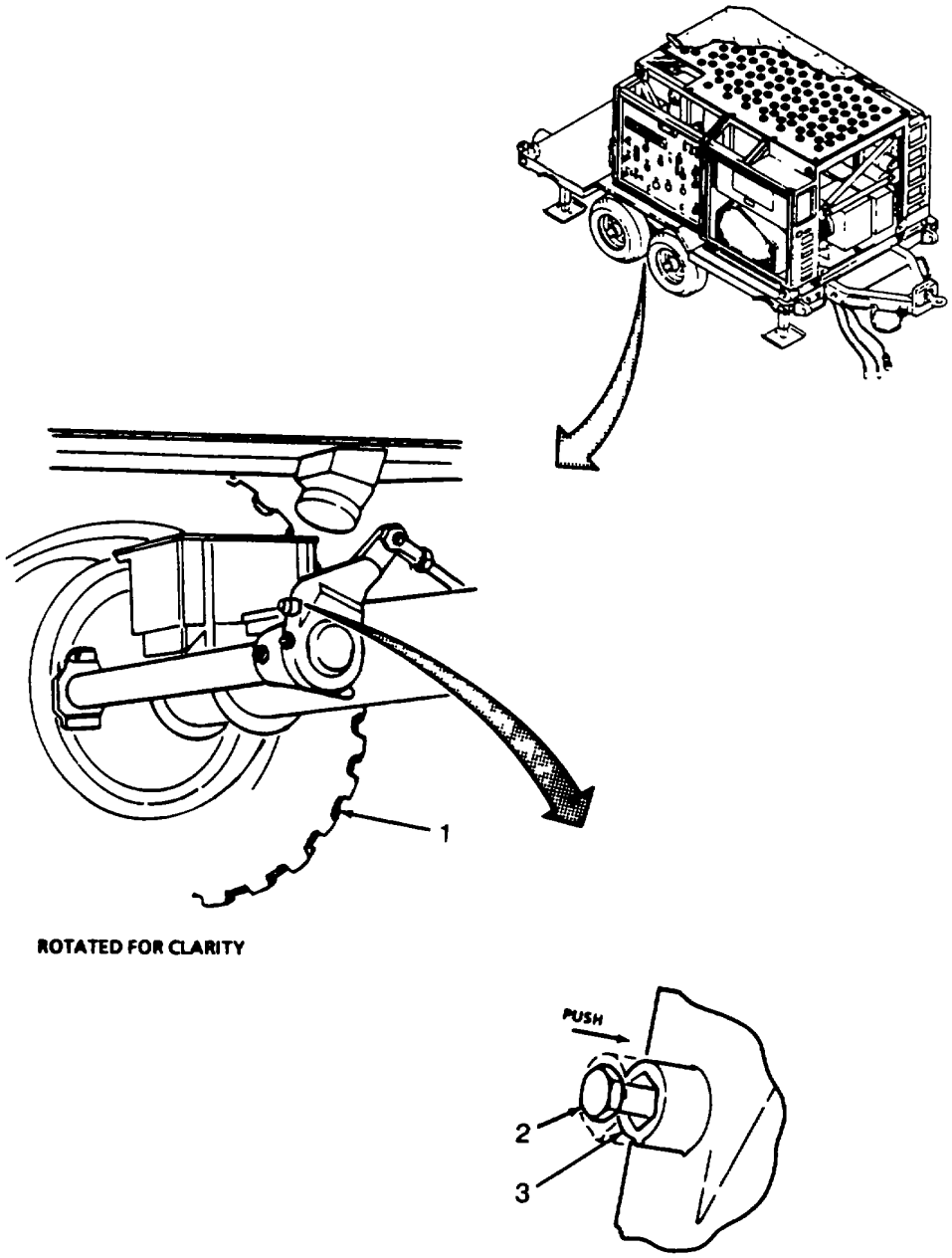
ADJUST

NOTE

There are four service breaks on the flatbed cargo trailer, two per axle. Adjustment of one service break is shown, the others are similar. If adjustment of one is required, adjust all four service brakes.

a. Position 10 ton jacks at both ends of axle being serviced. Jack up axle evenly until wheels clear ground.
b. Install trestles at both ends of axle being serviced.
c. Position socket wrench over adjusting bolt (2) and push in against spring loaded keeper (3).
d. Turn tire and wheel assembly (1) by hand.
e. While keeping pressure against keeper (3), turn adjusting bolt (2) until brakes begin to drag.
f. Slowly back off on adjusting bolt (2) until drum stops dragging on brake.
g. Remove socket wrench from adjusting bolt (2). Make sure keeper (3) extends and alines with head of adjusting bolt.
h. Remove trestles from beneath axle.
i. Lower and remove both jacks.

2-101. SERVICE BRAKE MAINTENANCE (MODEL WPES-1).



2-102. AIR CHAMBER MAINTENANCE (MODEL WPES-1).

This task consists of. a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Equipment Condition
Reference
Landing jacks set and wheels chocked (TM 10-4610-240-10)
General Safety Instructions

WARNING
Compressed air can blow dust into eyes. Wear eye protection when releasing reservoir air pressure

REMOVAL

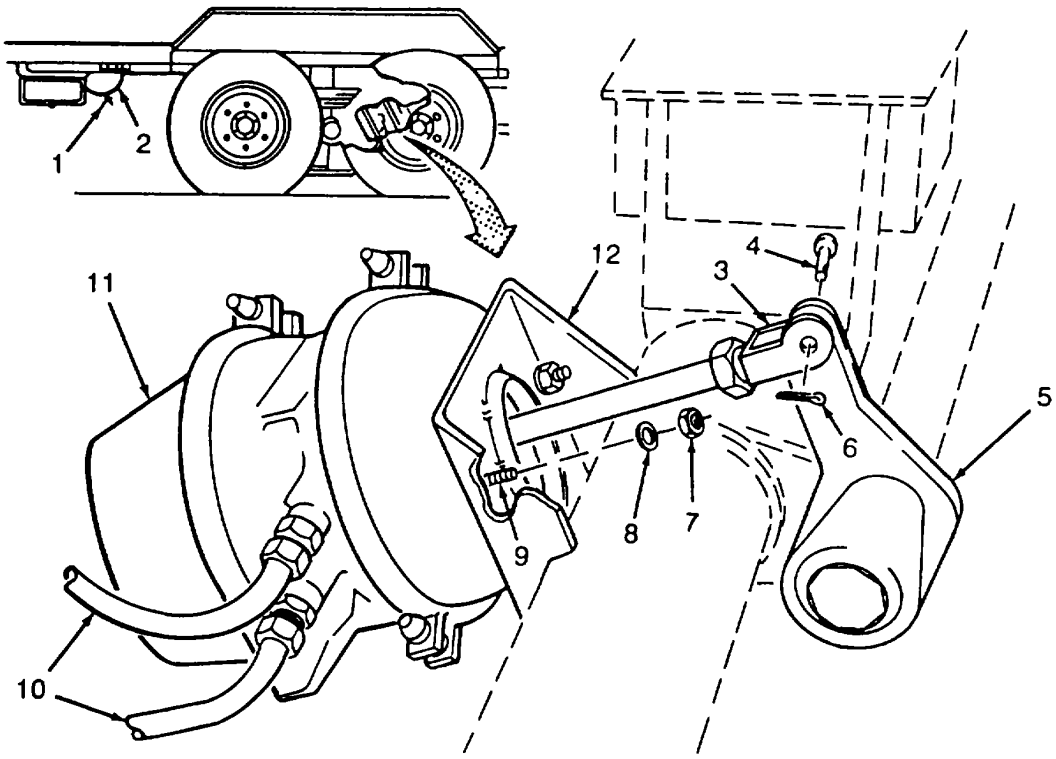
WARNING
Compressed air can blow dust into eyes. Wear proper eye protection and open drain cock slowly to avoid a sudden rush of air when releasing reservoir air pressure.

a. Open drain cock (1) slowly to release air pressure from reservoir (2).

NOTE
Insure that airflow from reservoir has stopped before closing drain cock.

b. Close drain cock (1).
c. Tag and disconnect two hoses (10) from air chamber (11).
d. Remove cotter pin (6) and clevis pin (4).
e. While supporting air chamber (11), remove two nuts (7) and lockwashers (8)
f. Lower air chamber (11), guiding clevis (3) through bracket (11)

2-102. AIR CHAMBER MAINTENANCE (MODEL WPES-1) - continued.



2-102 AIR CHAMBER MAINTENANCE (MODEL WPES-1) - continued.

INSTALLATION

a. Guide clevis (3) and two mounting studs (9) through bracket (12) while positioning air chamber (11) against bracket. Make sure clevis is positioned on arm (5).

b. Install two lockwashers (8) and nuts (7).

c. Install clevis pin (4) and cotter pin (6).

WARNING

Air chamber will lock brake if hoses are reversed when installed. A locked brake can result in injury to personnel and damage to equipment. Install hoses as tagged.

d. Install two hoses (10) as tagged during removal.

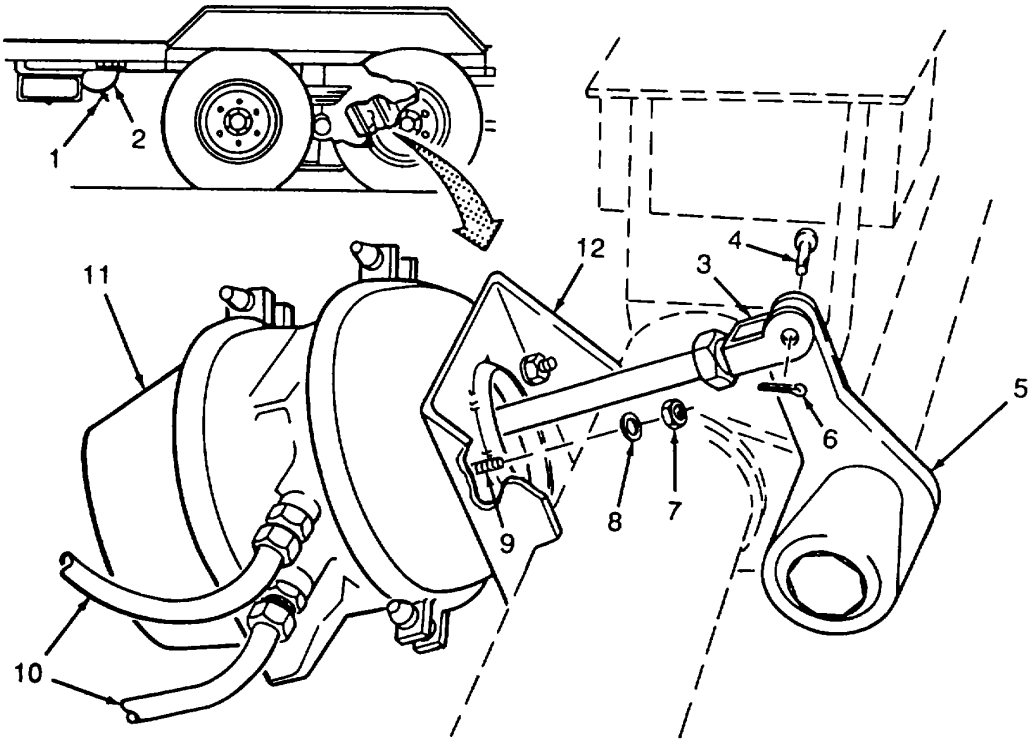
e. Connect flatbed cargo trailer air hoses to towing vehicle (TM 104610-240-10).

f. Start engine of towing vehicle and wait for towing vehicle air compressor to fully charge flatbed cargo trailer brake system. Refer to Operator's Manual for towing vehicle.

g. Uncage compression springs on all four air chambers (TM 10-4610-240-10).

h. Adjust service brakes (para. 2-101).

2-102. AIR CHAMBER MAINTENANCE (MODEL WPES-1) - continued.



Section VI. PREPARATION FOR STORAGE OR SHIPMENT

ALPHABETICAL INDEX

2-103. SECURITY PROCEDURES.

Refer to AR 190-11 or 190-13.

2-104. PREPARATION FOR MOVEMENT.

Refer to TM 10-4610-240-10 to prepare the ROWPU for movement.

2-105. ADMINISTRATIVE STORAGE.

a. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists Items should be mission readiness within 24 hours or within the item factors as determined by the directing authority. During the shortage period, appropriate maintenance records will be kept.

b. Before placing equipment in administrative storage, current maintenance services and equipment serviceable criteria (ECS) evaluations should be completed, shortcomings and deficiencies should be corrected, and all modification work orders (MWOs) should be applied.

c. Remove R O elements and end cap O-rings (para. 2-81).

d. Attach tag to pressure vessels that reads "R O. elements and end cap O-rings have been removed. Reinstall before operating unit ".

e. Remove all chemicals, spare parts, and consumables from the ROWPU.

e. Install ROWPU cover.

f. Storage Site Section. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, convex containers and other containers may be used.

CHAPTER 3

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Section I. DIRECT SUPPORT TROUBLESHOOTING

3-1. SCOPE.

This section provides the troubleshooting information for the ROWPU at the Direct Support Maintenance level. It consists of the symptom index, listing the most common malfunction symptoms, and the troubleshooting table, Table 3-1, which repeats the malfunctions, and provides the procedural steps and corrective actions necessary to return the system to operational readiness.

3-2. USE OF TABLES.

To use this information in the most effective manner the following general procedure should be followed.

a. If possible, talk to the operator and/or organizational repairman to find out the symptoms and any corrective action that may have been taken.

b. Go to the Symptom Index and find the entry that describes your problem.

c. Go to the page to which the index sends you.

d Read the Warnings, Notes and Cautions.

e. Perform the steps in the order provided in the table.

f. When you have found the problem perform the indicated corrective action.

3-3. LIMITATIONS.

In troubleshooting tables like this, it is impractical to list every possible malfunction or to include every possible step or corrective action. If the malfunction you are experiencing is not listed, or if the procedure given does not isolate the problem you should consult with your supervisor.

NOTE

Although partial interconnecting diagrams are provided where needed throughout this troubleshooting section, it may, on occasions, be necessary to refer to a full interconnecting or schematic diagram. This data is available in Appendix F of this manual as follows:

Electrical Schematic Diagram - Models WPES-1/WPES-3 - Figure F-1
- Model WPES-3 - Figure F-3
Electrical Interconnecting Diagram - Models WPES-1/WPES-3 - Figure F-2
- Model WPES-3 - Figure 4
Piping Schematic - Model WPES-1
- Model WPES-2/WPES-3

Electrical interconnecting diagrams, identical to Figures F2 or F4, depending on models, are also provided as decals on the front door of the junction box.

SYMPTOM INDEX

SYMPTOM INDEX- Continued

Equipment
Symptom **Page**

Table 3-1. Direct Support Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY

1. ALL PUMPS INOPERABLE (On Model WPES-2 "all Pumps" shall mean all but R.O. Pump).

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid

Step 1. Check if 208 VAC, 3 phase power is supplied by generator. Refer to generator manual.

If 208 VAC, 3 phase power is not supplied, troubleshoot and repair generator.

Step 2. Disconnect power cable at power input jack, J1 and check for 208 VAC between the following pins on cable connector.

A-B, A-C, B-C

If power is not measured in all three tests, replace power cable. Refer to paragraph 3-32.

Step 3. Perform a point-to -point continuity check of circuit A.

If continuity is absent, tighten loose connections or repair/replace defective wire.

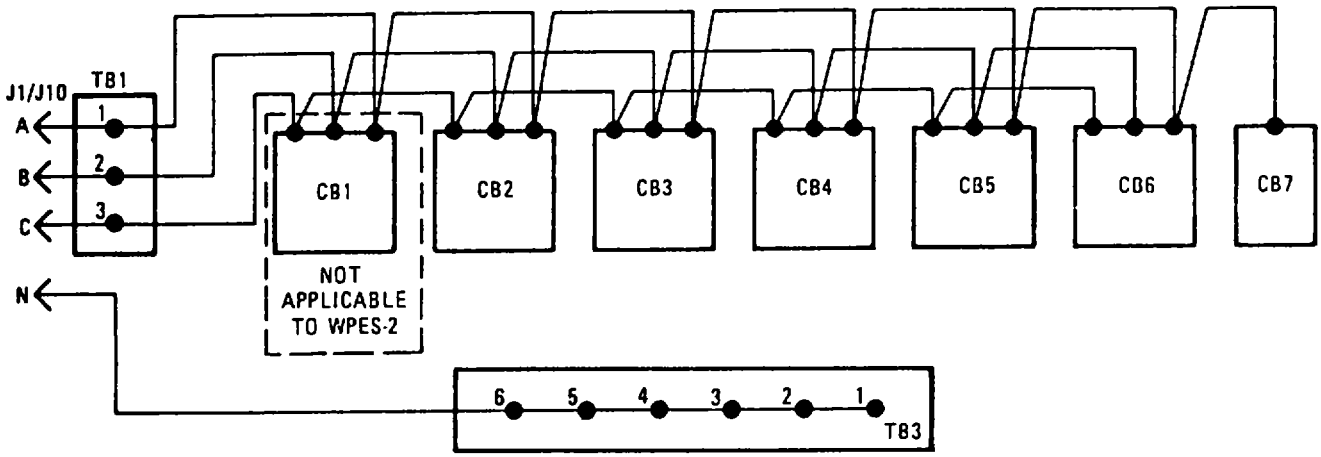
Step 4. Perform a point-to-point continuity check, circuit B.

a. If continuity is absent through switch S13 (switch ON), replace defective switch. Refer to paragraph 3-45.

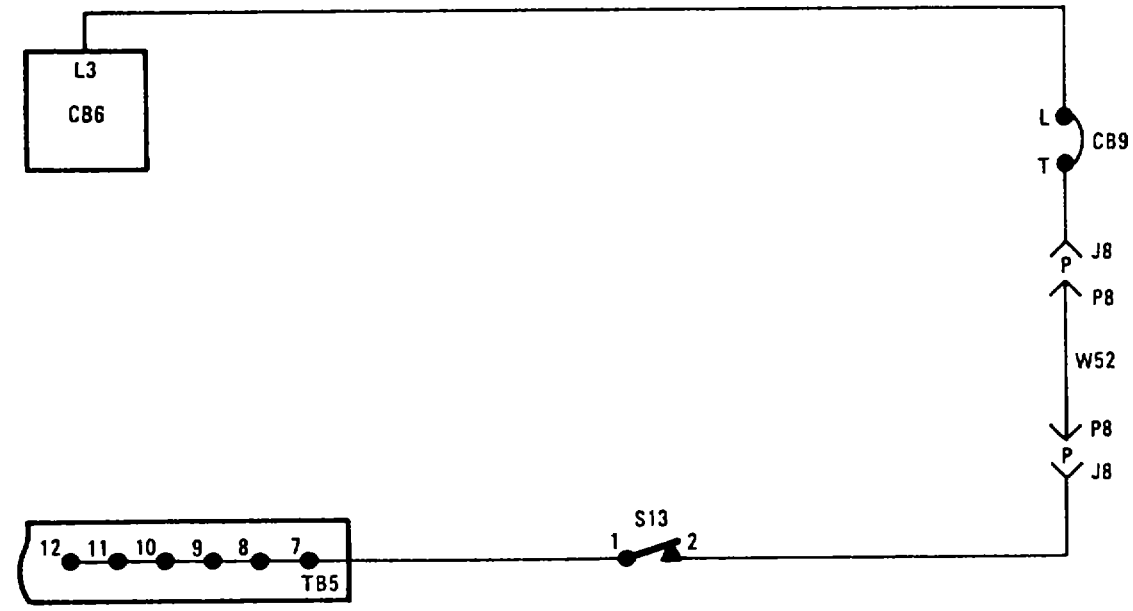
b. If continuity is absent through cable assembly, W52, repair cable assembly. Refer to paragraph 3-22.

c. If continuity is absent through circuit breaker, CB9 (CB9 ON), replace CB9. Refer to paragraph 3-49.

d. If continuity is absent in wiring, tighten loose connections or repair/replace defective wire.



CIRCUIT A



NOTE:

J1 = MODELS WPES-1/WPES-3
J10 = MODEL WPES-2

CIRCUIT B

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

2. ITEM PLUGGED INTO UTILITY RECEPTACLE DOES NOT WORK.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Remove item, connected to outlet and check if RESET button on electrical outlet is IN.

If reset button is popped out, reset circuit by pressing IN. If it pops again, replace outlet assembly Refer to paragraph 3-49.

Step 2. Check for 115 VAC at outlet.

If 115 VAC is measured, troubleshoot Item disconnected from outlet..

Step 3. Check if 208 VAC, three phase power is available at generator output lugs.

If power is not available, refer to power source manual.

Step 4. Check for 115 VAC at power cable P1/P10 between pins N (ground) and B.

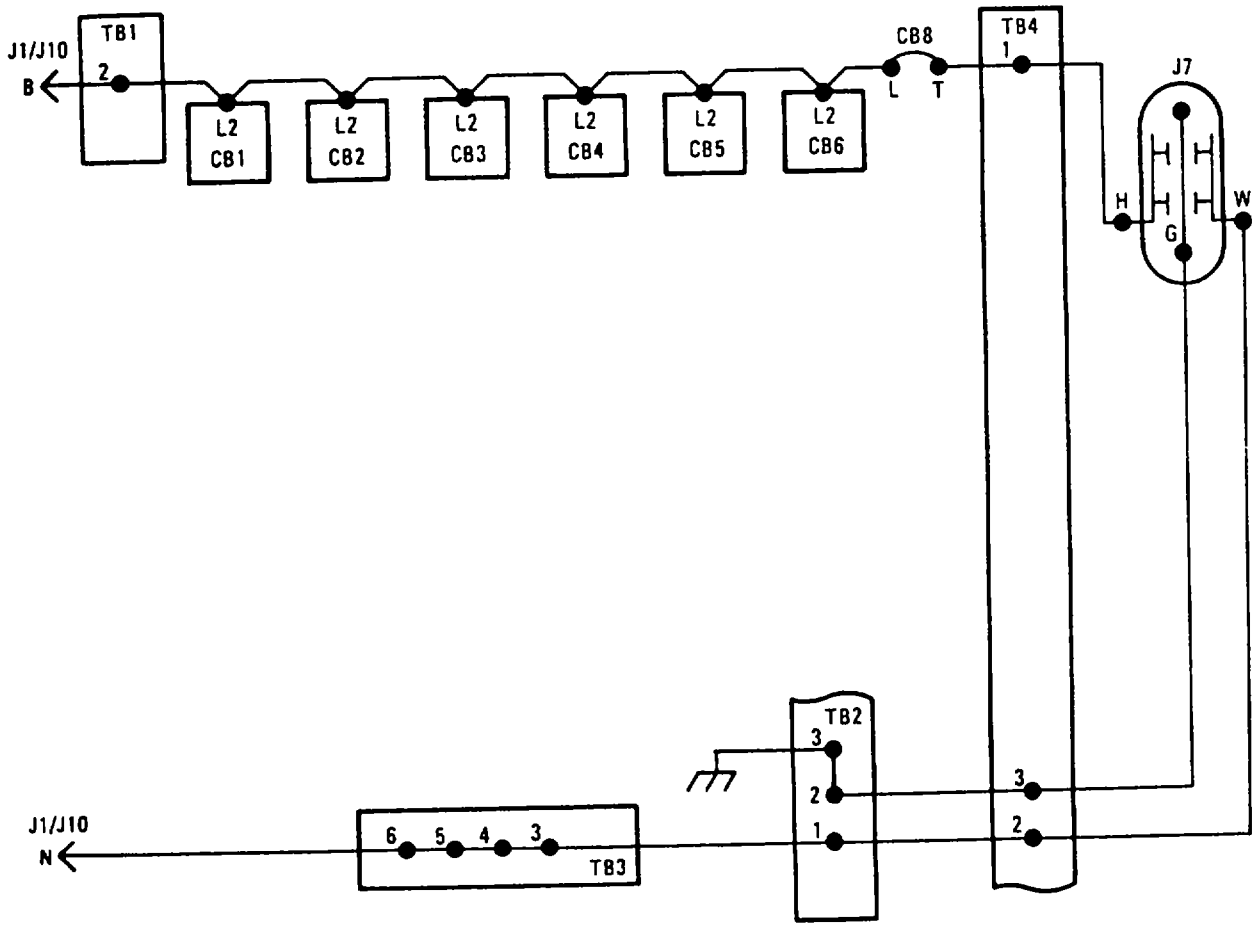
If power is not available, repair power cable assembly Refer to paragraph 3-23.

Step 5. Perform a point-to-point continuity check of power circuit.

a. If continuity is absent through circuit breaker CB8 (CB8 ON), replace CB8. Refer to paragraph 3-49.

b. If continuity is absent between external connections of UTILITY OUTLET receptacle, J7 and corresponding outlet contacts, replace outlet assembly. Refer to paragraph 349.

c. If continuity is absent in wiring, tighten loose connections or repair/replace defective wire.



NOTE:

J1 = MODELS WPES-1/WPES-3
J10 = MODEL WPES-2

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

3. PANEL LAMP FAILS TO LIGHT.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid

Step 1. Perform lamp test by pushing light switch S11 momentarily to the "all up" position.

If all lamps, except panel lamp, illuminate, go to step 4.

Step 2. Check if 208 VAC, three phase power is supplied by power source.

If 208 VAC, 3 phase power is not supplied by power source, refer to power source manual.

Step 3. Disconnect power cable at power input jack, J1 (Model WPES1 and WPES-3) or J10 (Model WPES-2) and check for 208 VAC between pins A-B, A-C, and B-C on cable.

If power is not measured in all three tests, replace power cable assembly. Refer to paragraph 3-23.

Step 4. Remove guard, globe and fixture from panel light assembly (para 2-86) and check for 115 VAC at terminals removed from fixture.

If 115 VAC is measured, replace light fixture Refer to paragraph 345.

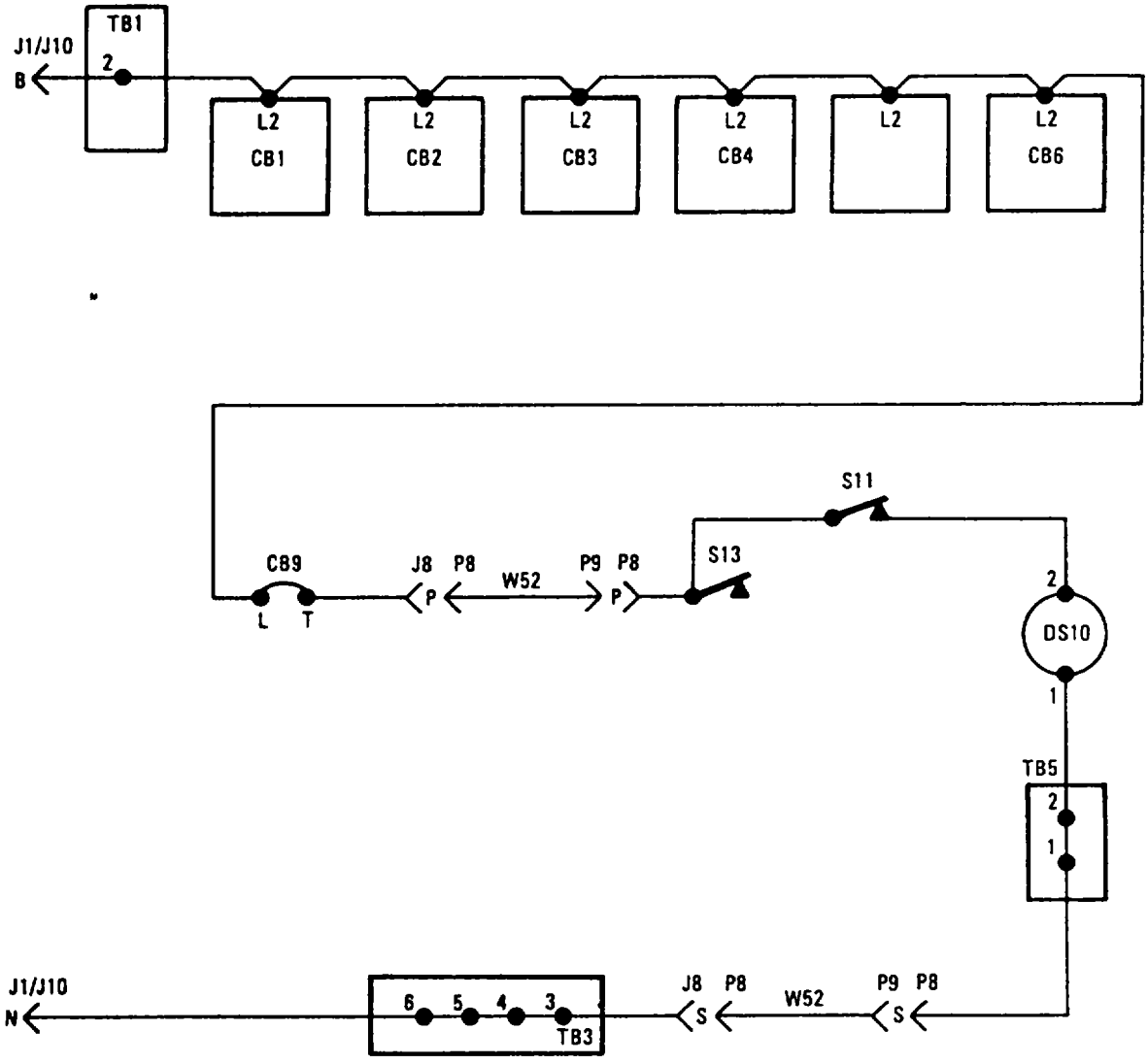
Step 5. Perform a point-to-point continuity test of light circuit from J1/J10(C) to DS10 and from DS10 to J1/J10(N).

a. If light switch, S11 is open (In ON position), replace S11. Refer to paragraph 345.

b. If cable assembly, W52 is open, repair It Refer to paragraph or 3-23.

d. If circuit breaker CB9 Is open (CB9 ON) replace it Refer to paragraph 3-49.

c. If continuity is not measured through wiring, tighten loose connections or replace defective wire



NOTE:

J1 = MODELS WPES-1/WPES-3
J10 = MODEL WPES-2

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

4. UTILITY OUTLET CIRCUIT BREAKER (CB8) FAILS TO RESET.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid

Step 1. Disconnect external device connected to UTILITY OUTLET receptacle, J7 Reset UTIL OUT circuit breaker.

If UTIL OUT circuit breaker does not trip, repair connected device.

Step 2. Remove power at power source and disconnect wire lead from UTIL OUT circuit breaker, terminal T.

Step 3. Reset UTIL, OUT circuit breaker and apply power.

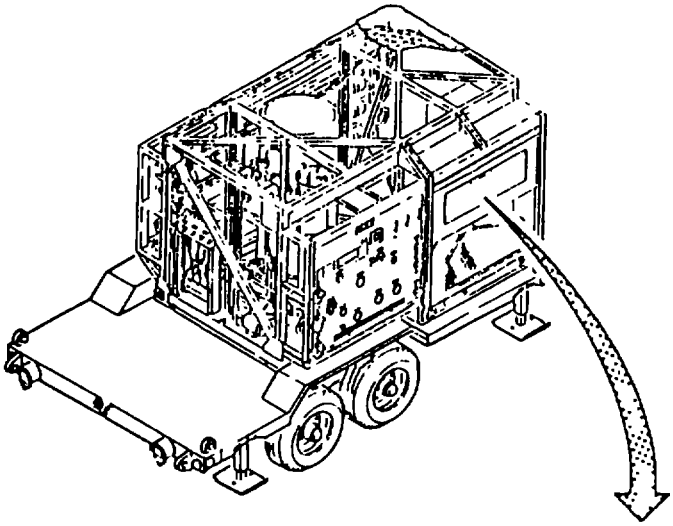
If UTIL OUT circuit breaker trips, replace circuit breaker. Refer to paragraph 3-49.

Step 4. Remove power at power source, reconnect open wire, disconnect wires connected to UTILITY OUTLET and check for continuity between power and ground sockets on outlet.

If continuity exists, replace utility outlet receptacle. Refer to paragraph 3-49.

Step 5. Remove power at power source and check for bare/disconnected wiring in junction box.

Reattach loose wires or replace defective wire.



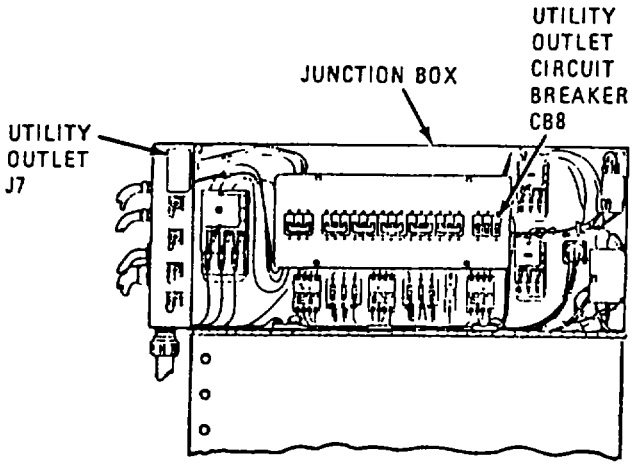

UTILITY
OUTLET
CIRCUIT
BREAKER
CB8
JUNCTION BOX
UTILITY
OUTLET
J7

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

5. TIMER CONT CIRCUIT BREAKER (CB9) FAILS TO RESET.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Remove power at power source, disconnect wire from circuit breaker, CB9 at terminal T and attempt to reset.

If circuit breaker trips, replace circuit breaker, CB9. Refer to paragraph 3-9.

Step 2. Remove power at power source, reconnect wire to CB9, disconnect cable assembly, W52 at junction box, apply power and attempt to reset circuit breaker.

If circuit breaker does not trip, go to step 4.

Step 3. Remove power at power source and check for loose and frayed wires injunction box.

a. If wire is frayed, replace frayed wire.

b. If wire is disconnected, reconnect it.

Step 4. Remove power at power source, reconnect cable assembly, W52 to junction box, and disconnect at control box. Apply power and attempt to reset circuit breaker.

If circuit breaker trips, repair cable assembly, W52 Refer to paragraph 3-22.

Step 5. Remove power at power source, reconnect cable assembly, W52 and disconnect cable assembly, W49 from timer cable.

If circuit breaker does not trip, repair timer assembly. Refer to paragraph 3-42.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

Step 6. Remove power at power source and check for frayed or disconnected wire in control box.

If wire is frayed, replace it; if wire is loose, reconnect it.

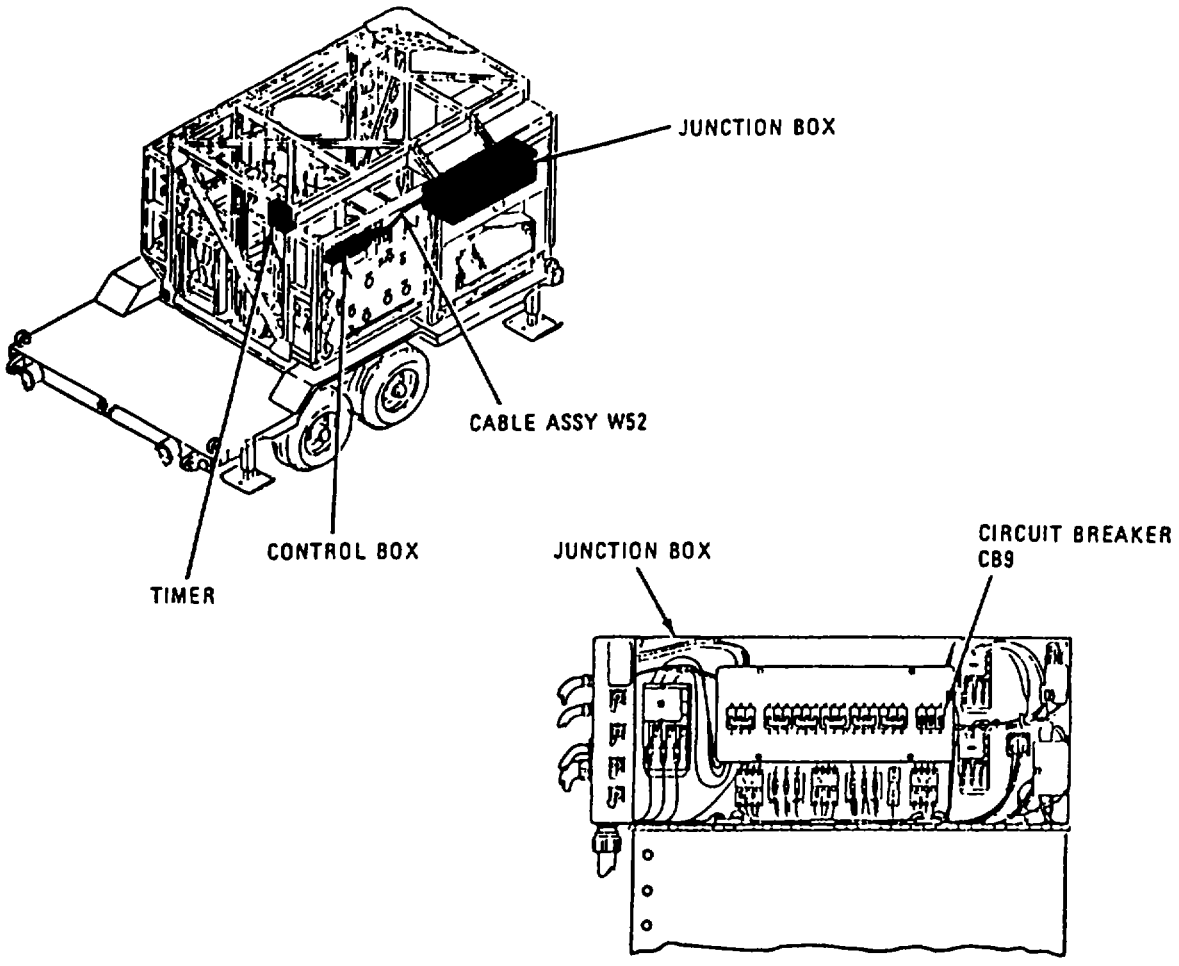


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

6. INOPERABLE DISSOLVED SOLIDS MONITOR SYSTEM

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Remove cover from TDS monitor and check for blown/defective fuse and disconnected wires.

Replace fuse and/or reconnect wire.

Step 2. Check for 115 VAC at TDS MONITOR POWERjack, J12.

If voltage is measured, go to step 4.

Step 3. Remove power at power source and perform a point-to-point continuity check of power circuit.

a. If CB8 is open (in ON position), replace it Refer to paragraph 3-49.

b. If wiring is open, tighten connections and/or replace defective wire.

Step 4. Check for defective sensor as follows:

a. Disconnect sensor at pipe.

b. Check continuity as follows

Check Point A	Check Point B	Required Value in Ohms
Pin B, J11	Outer Electrode	0-0.2
Pin A, J11	Inner Electrode	0-0.2
Pin C	Pin D	8-10K
Pin E	All other pins	Infinity

Replace sensor if any measurement is incorrect. Refer to paragraph 3-17.

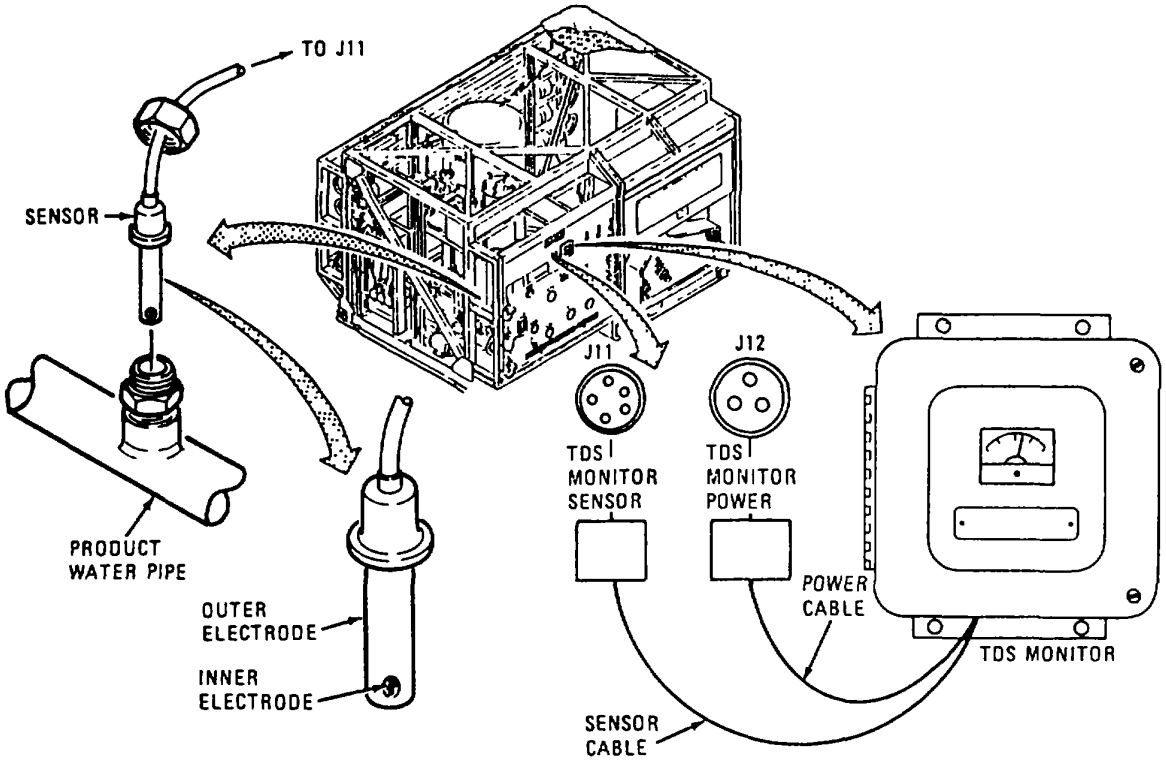
Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

Step 5. Check for continuity of sensor cable (P11 to monitor) and power cable (P12 to monitor).

Replace cable if open, if trouble persists, replace TDS monitor Refer to paragraph 3-17.



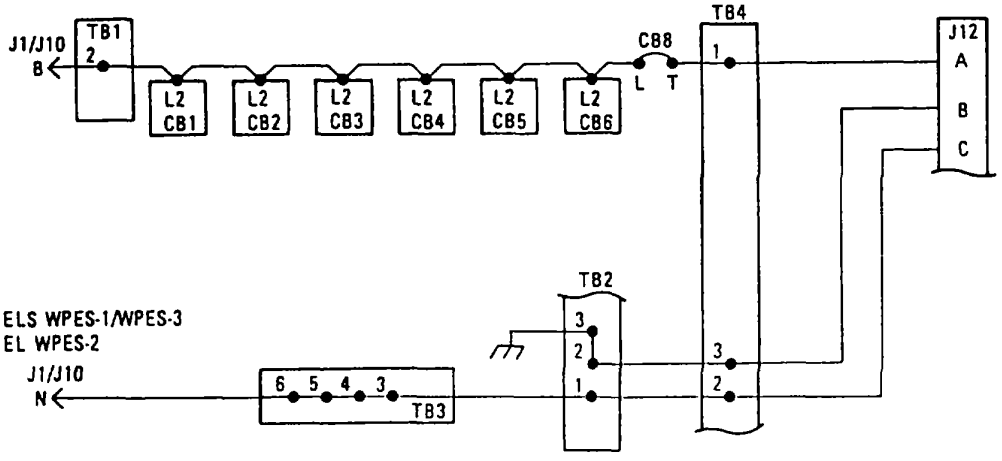


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BOOSTER PUMP ASSEMBLY

1. BOOSTER PUMP STOPS AND/OR FAILS TO START

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Check if circuit breaker CB6 and/or heater assembly are tripped.

If circuit breaker, heater assembly, or both are tripped, go to Malfunction 2, Booster Pump Assembly.

Step 2. Check if other pumps operate.

If other pumps are inoperable, go to Malfunction 1, ROWPU Assembly.

Step 3. Visually check If relay K6 is ON or OFF.

If relay is OFF, go to step 7.

Step 4. Check if 208 VAC is available between T1-T2, T2-T3 and T1-T3 on heater assembly.

If voltage is measured in all three tests, go to step 6.

Step 5. Perform a continuity check of power circuit as follows, make additional point-to-point checks as necessary to find defective components:

NOTE

To check continuity thru K6 it is necessary to physically push in relay plunger while making the check.

L1, CB5	-	T1, Heater Assembly
L2, CB5	-	T2, Heater Assembly
L3, CB5	-	T3, Heater Assembly.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BOOSTER PUMP ASSEMBLY- continued

a. If continuity is absent through heater assembly, replace defective heater (para 3-49) and reset heater assembly.

b. If continuity is absent through circuit breaker CB6 (CB6 ON), replace CB6. Refer to paragraph 3-49.

c. If continuity is absent through relay, K6 (see above note) replace motor starter. Refer to paragraph 3-49.

d. If continuity is absent through wiring, tighten loose connections or replace defective wire.

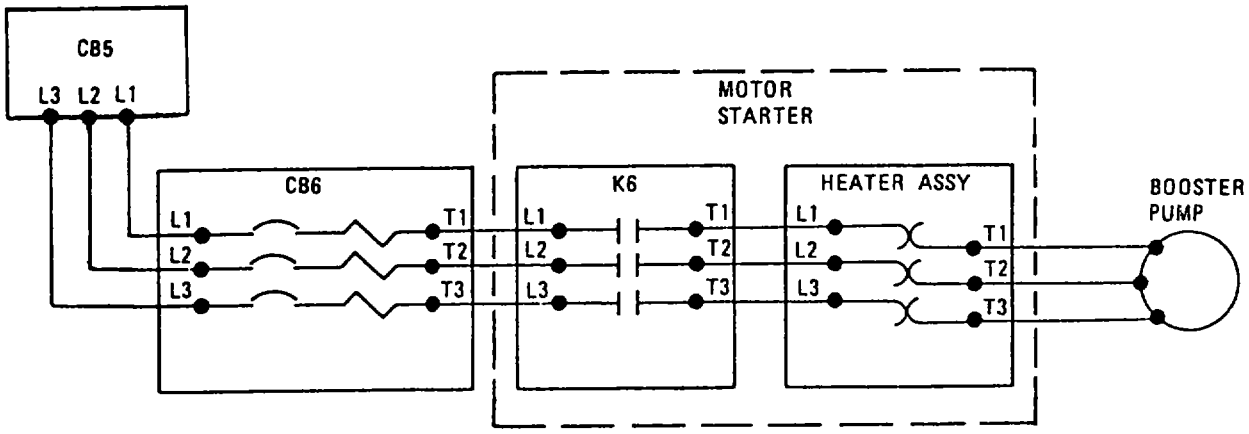


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BOOSTER PUMP ASSEMBLY - continued

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid

Step 6. Check if continuity exists through pump cable assembly.

If continuity exists, repair pump. Refer to paragraph 3-32.

If continuity does not exist, repair pump cable assembly. Refer to paragraph 3-29.

Step 7. Check for continuity/resistance of control circuits and as follows; make additional point-to-point checks as necessary to isolate fault to a specific component.

NOTE

To measure continuity thru K6 contacts it is necessary to physically close contacts by pushing in on relay plunger.

CB5, L3	-	J8(P)
J9 (P)	-	P8(J)
P9(J)	-	P8(J)
P9(I)	-	P8(I)
P9(P)	-	P8(P)
J8 (I)	-	K6 (A2) (See above note)
J8 (J)	-	K6 (3)
K 6 (A2)	-	K6 (A1) (Required value is 450 - 600 ohms)
J1/J10(N)	-	K6(A1)

a. If continuity does not exist through switches, S13 and S6 (switches ON), replace them. Refer to paragraph 3-45.

b. If continuity does not exist thru circuit breaker CB9 (CB9 ON), replace CB9 Refer to paragraph 3-49.

c. If continuity does not exist through heater assembly, replace defective heater (para 3-49) and reset heater assembly.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BOOSTER PUMP ASSEMBLY - continued

d. If continuity is absent through cable assembly, W52, replace cable assembly. Refer to paragraph 3-22.

e. If continuity does not exist thru K6, contacts (2-3) and/or 450-600 Ohms is not measured from A2 to A1, replace motor starter, paragraph 3-49.

f. If continuity is absent in wiring, tighten loose connections and/or replace defective wire.

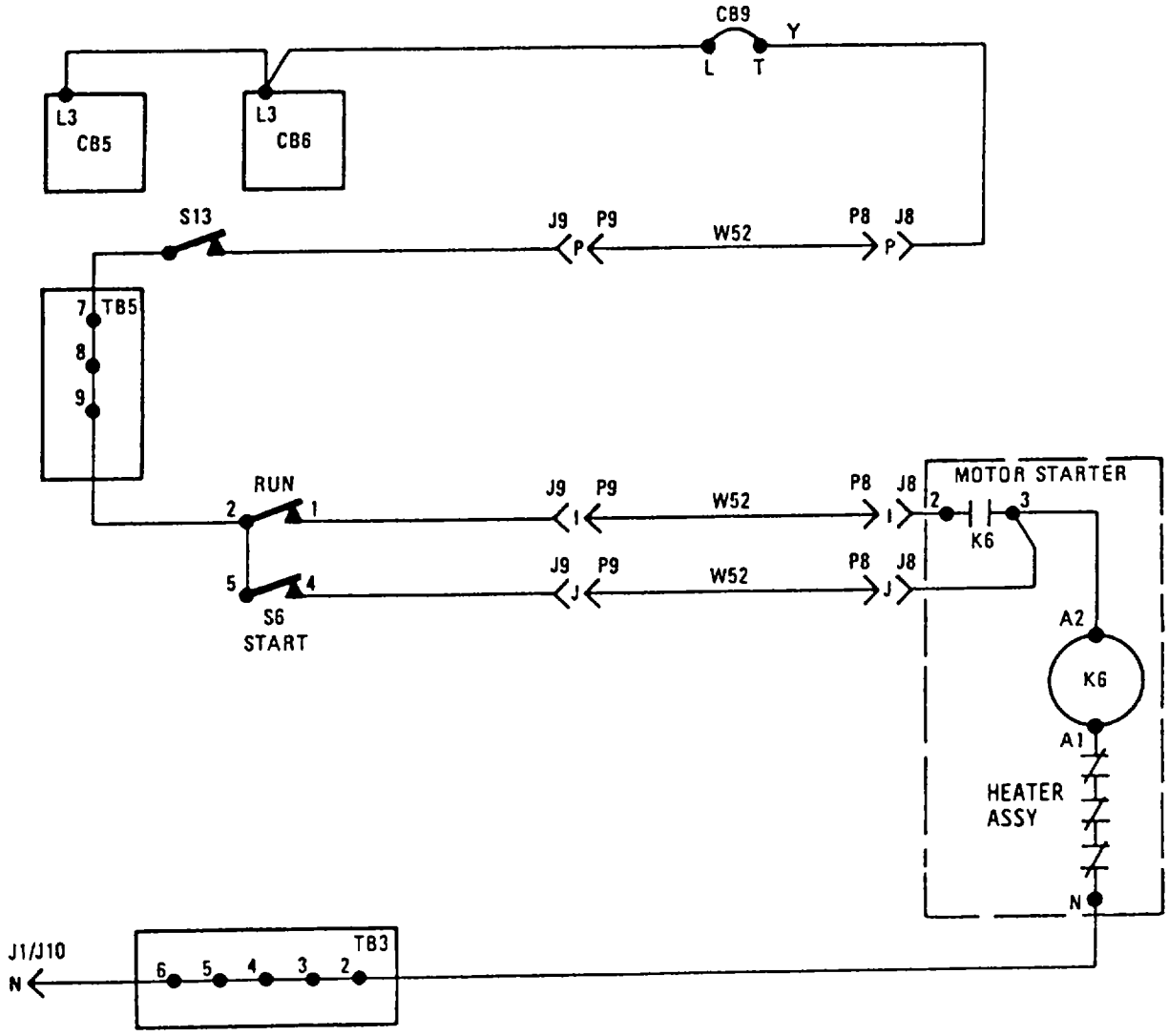


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BOOSTER PUMP ASSEMBLY - continued

2. BOOSTER PUMP CIRCUIT BREAKER (CB6) AND/OR OVERLOAD HEATERS TRIP.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Remove power at power source, reset circuit breaker, CB6 and disconnect wires on CB6 output terminals (T1, T2 and T3).

Step 2. Turn on power.

If circuit breaker CB6 trips, check for bare/disconnected wires injunction box and tighten loose connections or replace wire, trouble persists, replace CB6. Refer to paragraph 349.

Step 3. Remove power at power source, reconnect wires to CB6, if tripped, reset heater assembly, and disconnect wires (T1, T2 and T3) from heater assembly.

Step 4. Turn on power.

If heaters trip, check for defective heaters, replace as necessary (para 349) and reset heater assembly If trouble persists, replace motor starter.

Step 5. Remove power at power source and reconnect wires to heater assembly.

Step 6. Check pump cable for continuity and shorts.

a. If continuity is absent through cable assembly, or cable assembly is shorted, replace cable assembly. Refer to paragraph 3-29.

b. If cable assembly is not defective, repair booster pump. Refer to paragraph 3-32.

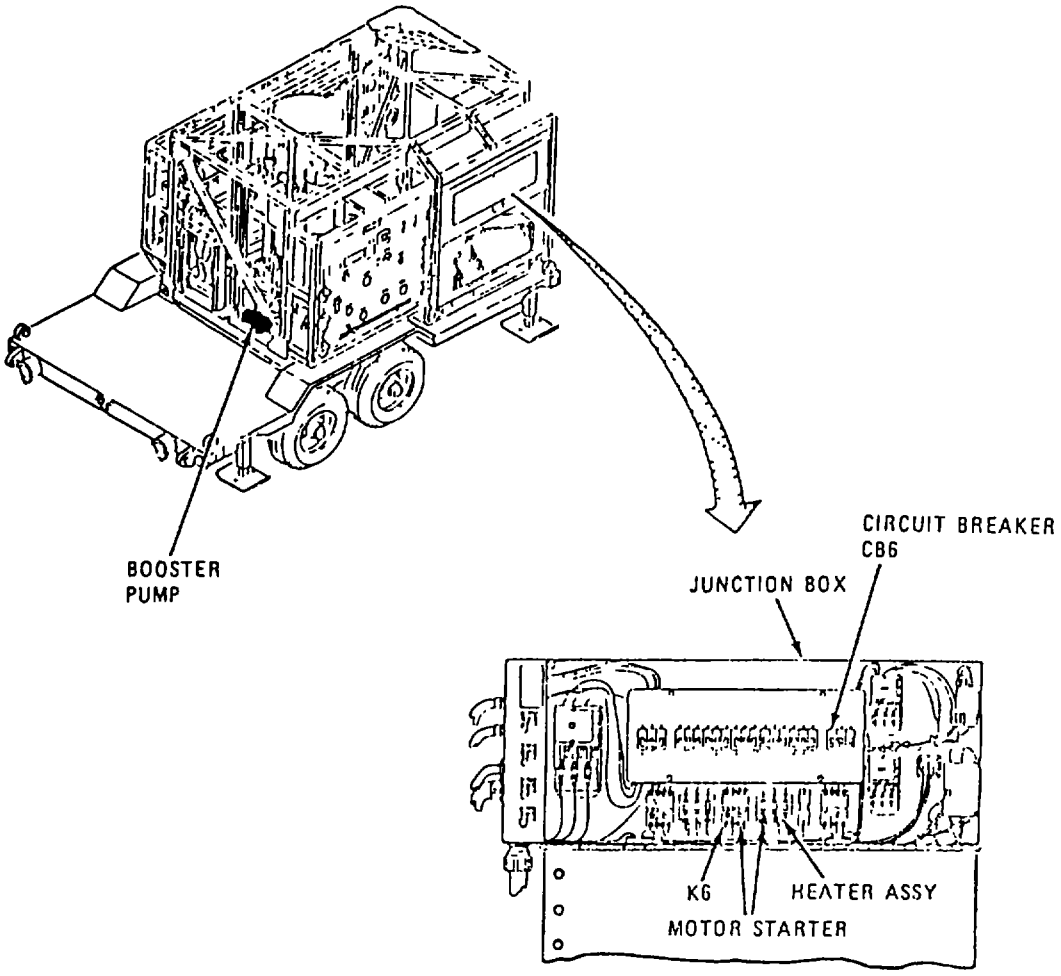

BOOSTER
PUMP
CIRCUIT BREAKER
CB6
JUNCTION BOX
K6
HEATER ASSY
MOTOR STARTER

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY

1. DISTRIBUTION PUMP STOPS AND/OR FAILS TO START.

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Check if circuit breaker CB5 and/or heater assembly are tripped

If circuit breaker, heater assembly, or both are tripped, go to Malfunction 2, Distribution Pump Assembly.

Step 2. Check if other pumps operate

If other pumps are inoperable, go to Malfunction 1 ROWPU Assembly

Step 3. Visually check if relay K5 is ON or OFF

If relay is OFF, go to step 7

Step 4. Check if 208 VAC is available between T1-T2, T2-T3 and T1-T3 on heater assembly. If voltage is measured in all three tests, go to step 6

Step 5. Remove power at power source and perform a continuity check of power circuit as follows, make additional point-to-point continuity checks as necessary to find defective component:

NOTE

To check continuity through K6 it is necessary to physically push in on relay plunger while making the test.

L1, CB4 - J5(A)
L2, CB4 - J5(B)
L3, CB4 - J5(C)

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY- continued

a. If continuity is absent through heater assembly, replace heaters (para 3-49) and reset heater assembly.

b. If continuity is absent through K5 (see above note), replace motor starter Refer to paragraph 3-49.

c. If continuity is absent thru CB5 (CB5 ON), replace CB5. Refer to paragraph 349.

d. If continuity is absent through wires, tighten loose connections and/or replace defective wire.

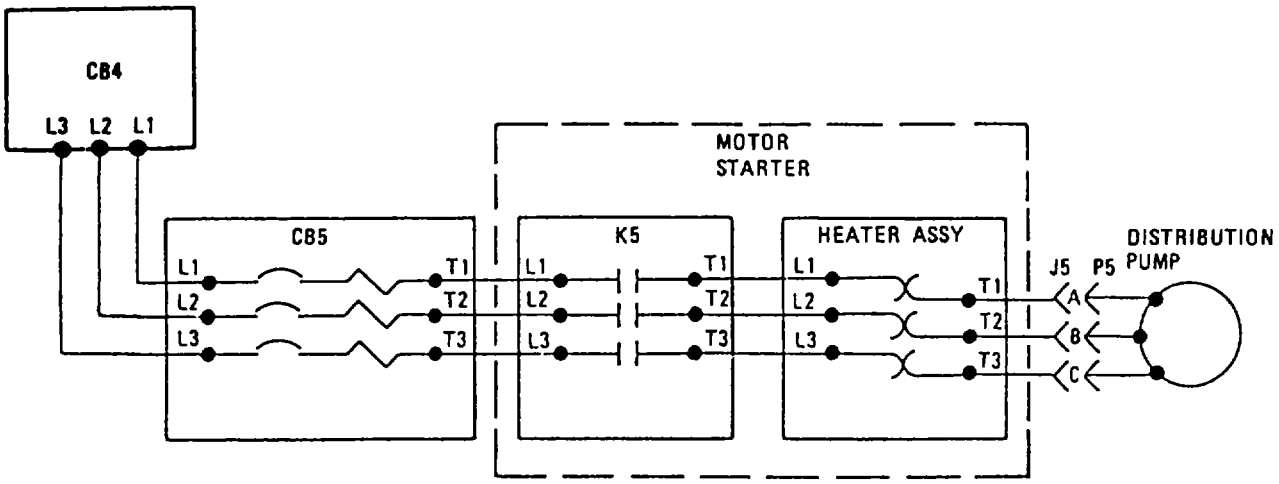


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY- continued

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent In administering first aid.

Step 6. Remove power at power source and check if continuity exists through pump cable assembly

a. If continuity exists through cable assembly, repair pump Refer to paragraph 3-13

b. If continuity does not exist, repair pump cable assembly Refer to paragraph 3-12.

Step 7. Check for continuity of control circuits as follows; make additional point-to-point checks as necessary to isolate fault to a specific component:

NOTE

To measure continuity through K5 contacts, it is necessary to physically close contacts by pushing In on relay plunger

L3, CB4	- J8(P)
J9(P) -	J9(G) and (H)
P9(P) -	P8(P)
P9(G) -	P8(G)
P9(H)-	P8(H)
J8(G) -	K5(2)
J8(H) -	K5(3)
K5(2) -	K5(A2) (see above note)
Jl/J10	- K5(A1)
K5(A2)	- K5(A1) (Required value is 450-600 ohms)

a. If continuity does not exist through switches S13 and S5 (switches closed) replace defective switch Refer to paragraph 3-45.

b. If continuity does not exist through circuit breaker CB9 (CB9 ON), replace CB9 Refer to paragraph 3-49.

c. If continuity does not exist through heater assembly, replace defective heater (paragraph 3-49) and reset heater assembly

d. If continuity is absent through cable assembly, W52 repair cable assembly Refer to paragraph 3-22.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY - continued

e. If continuity does not exist through K6 contacts (2-3) and/or 450-600 Ohms is measured from A2 - Al, replace motor starter Refer to paragraph 3-49.

f. If continuity is absent in wiring, tighten loose connections and/or replace defective wire.

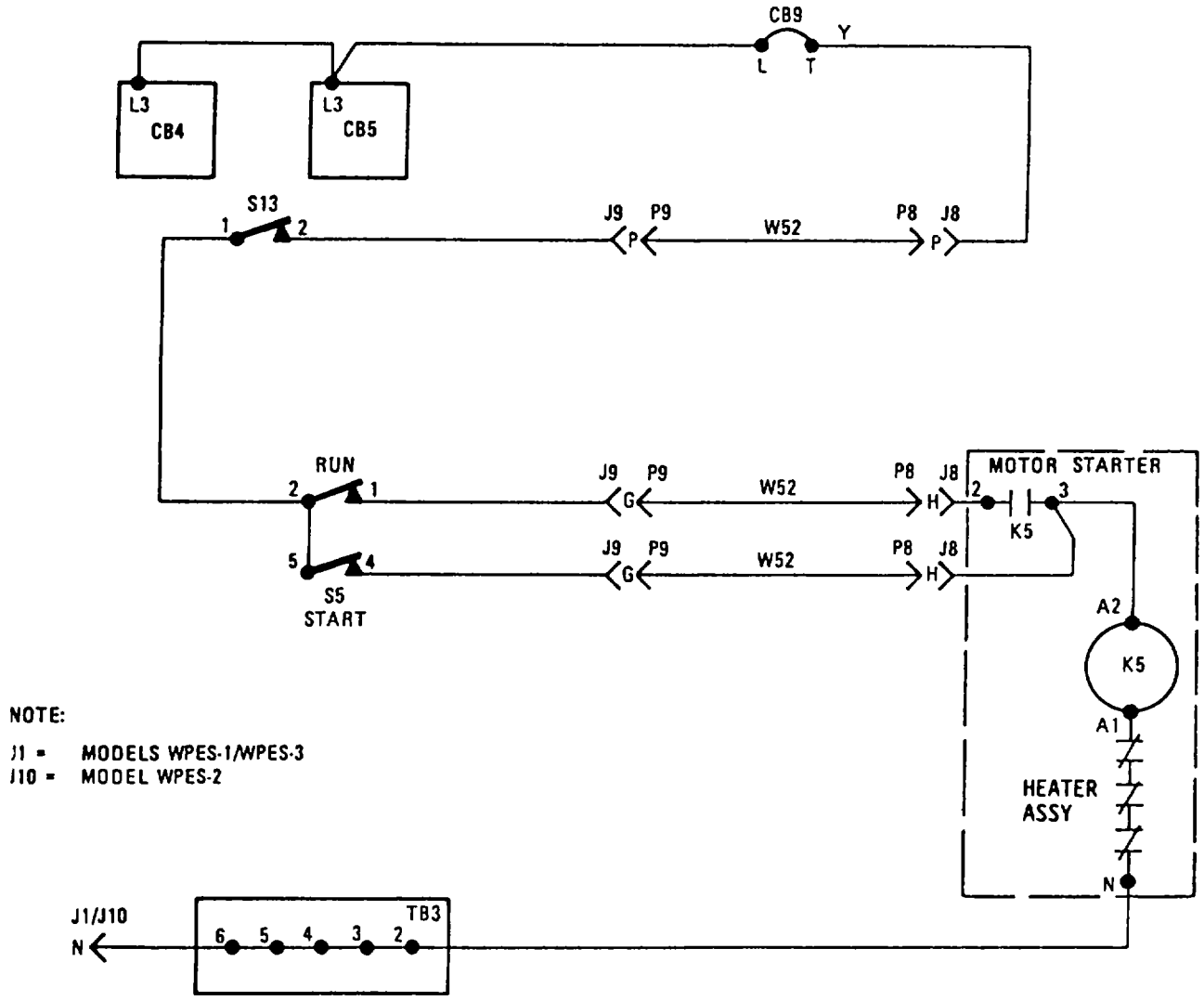


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY - continued

2. DISTRIBUTION PUMP CIRCUIT BREAKER (CB5) AND/OR OVERLOAD HEATERS TRIP.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Remove power at power source, reset circuit breaker (CB5) and disconnect wires on CB5 output terminals (T1, T2 and T3)

Step 2. Turn on power.

If circuit breaker CB5 trips, check for bare/disconnected wires injunction box and tighten loose connections or replace defective wire If trouble persists, replace CB5 Refer to paragraph 3-49.

Step 3. Remove power at power source, reconnect wires to CB5; if tripped, reset heater assembly, and disconnect wires (T1, T2 and T3) from heater assembly

Step 4. Turn on power

If heater assembly trips, check for detective heaters, replace as necessary (para 349) and reset heater assembly.

Step 5. Remove power at power source and reconnect wires to heater assembly.

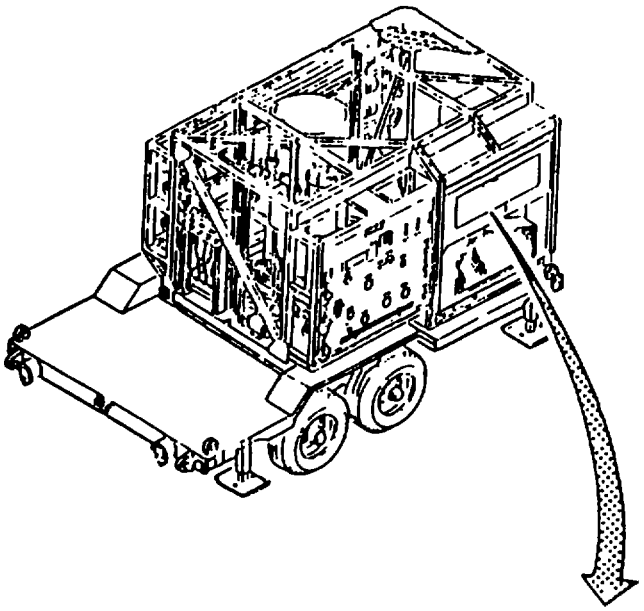
Step 6. Check pump cable assembly for continuity and shorts.

a If a short is indicated, replace cable assembly. Refer to paragraph 3-12.

b. If cable assembly is not defective, repair pump Refer to paragraph 3-13

Step 7. Remove power at power source and check for bare and/or disconnected wires in junction box

Tighten loose connections and/or replace defective wires



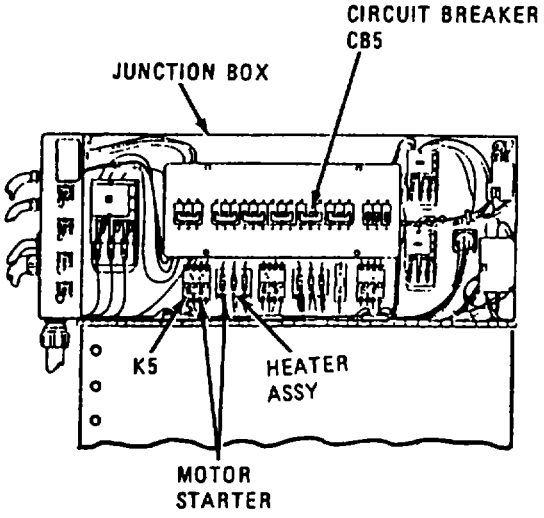

CIRCUIT BREAKER
CB5
JUNCTION BOX
K5
HEATER
ASSY
MOTOR
STARTER

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CONTROL BOX ASSEMBLY

1. INDICATOR LAMP INOPERABLE.

Step 1. Perform lamp test

If four or more lamps fail, go to Malfunction 2, Control Box Assembly.

Step 2. Perform a point-to-point continuity test of appropriate circuit between relay contacts of K through K9 injunction box and light assemblies DS1 thru DS9.

a. If open is measured between relay contacts, replace relay K10 or K11 as required

b. If open is measured in wiring, tighten connections and/or replace defective wire

c. If open, repair cable assembly, W52 Refer to paragraph 3-22.

d. If continuity exists through entire circuit, replace defective light assembly Refer to paragraph 345.

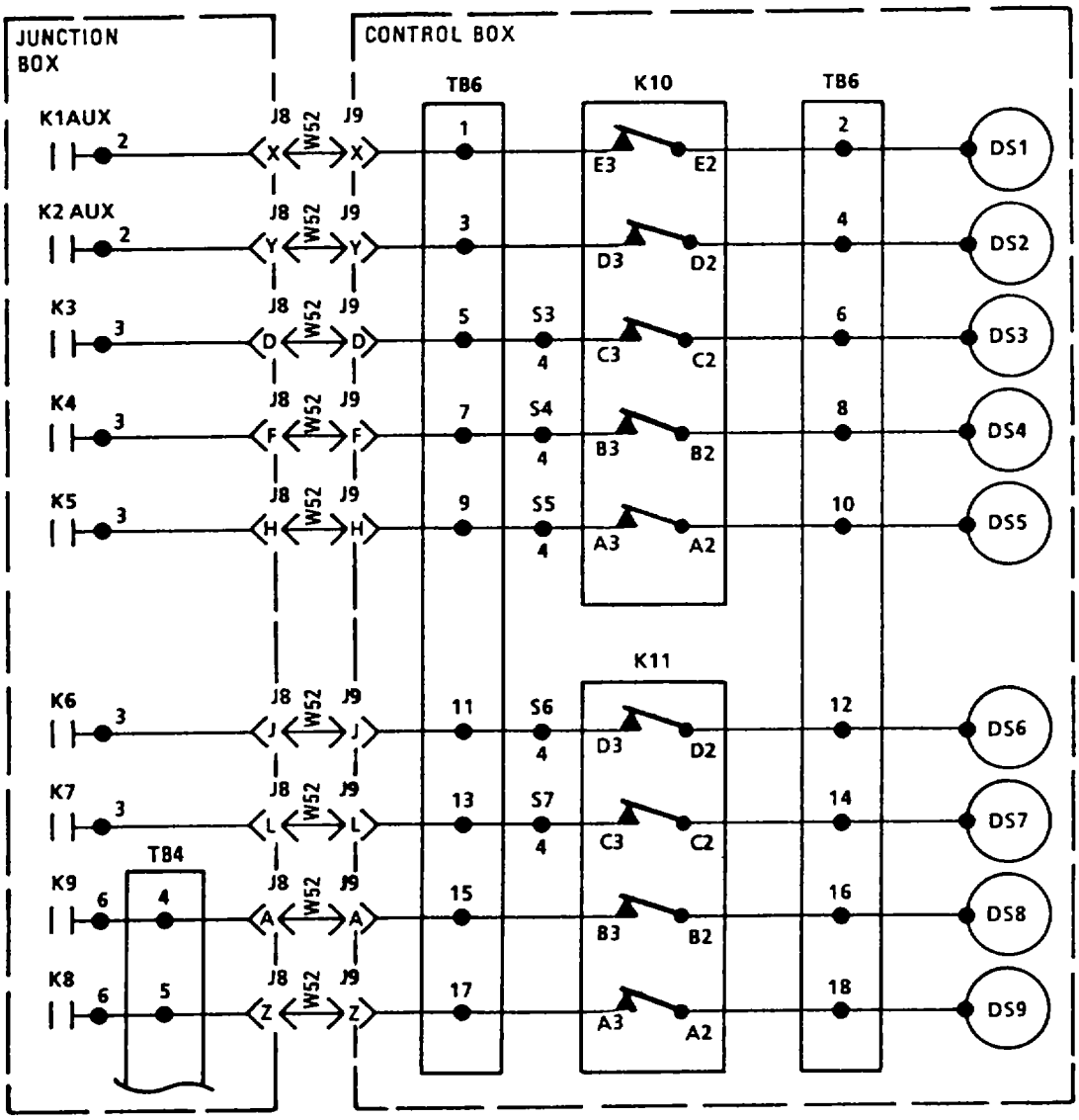

JUNCTION BOX
CONTROL BOX
TB6
K10
TB6
K1AUX
K2 AUX
K3
K4
K5
K6
K7
K9
K8
TB4
K11
J8
W52
J9
S3
S4
S5
S6
S7
DS1
DS2
DS3
DS4
DS5
DS6
DS7
DS8
DS9

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CONTROL BOX ASSEMBLY - continued

2. ROWPU FAILS LAMP TEST.

Step 1 Refer to circuit diagram and perform a point-to-point continuity test of ground circuit. Pins JI/J 10(N) to lights and X of relays

If open, replace wires or cable assembly, W52 Refer to paragraph 3-21

Step 2. With S11 closed, perform point-to-point continuity test of power circuit from JI/J0O(C) to relay coils X2 and contacts Al, BI, C1, Dl and El (K10 only) of relays

a If circuit breaker, CB9 is open (CB9 ON), replace it. Refer to paragraph 3-49.

b If switch, SI l is open (switch ON), replace it Refer to paragraph 3-45.

c. If cable assembly, W52 is open, repair cable assembly. Refer to paragraph 3-22.

d. If wires are open, tighten loose connections and/or replace defective wire.

Step 3. Momentarily apply power and note which lights are inoperable.

a. If DS1 through DS5 are inoperable, replace relay, K10 Refer to paragraph 345.

b If DS6 through DS9 are inoperable, replace relay, K11 Refer to paragraph 3-45.

Step 4. Perform continuity test between relays, K10, K 11 as appropriate and defective light.

If wires are loose or defective, tighten loose wires or replace defective wires

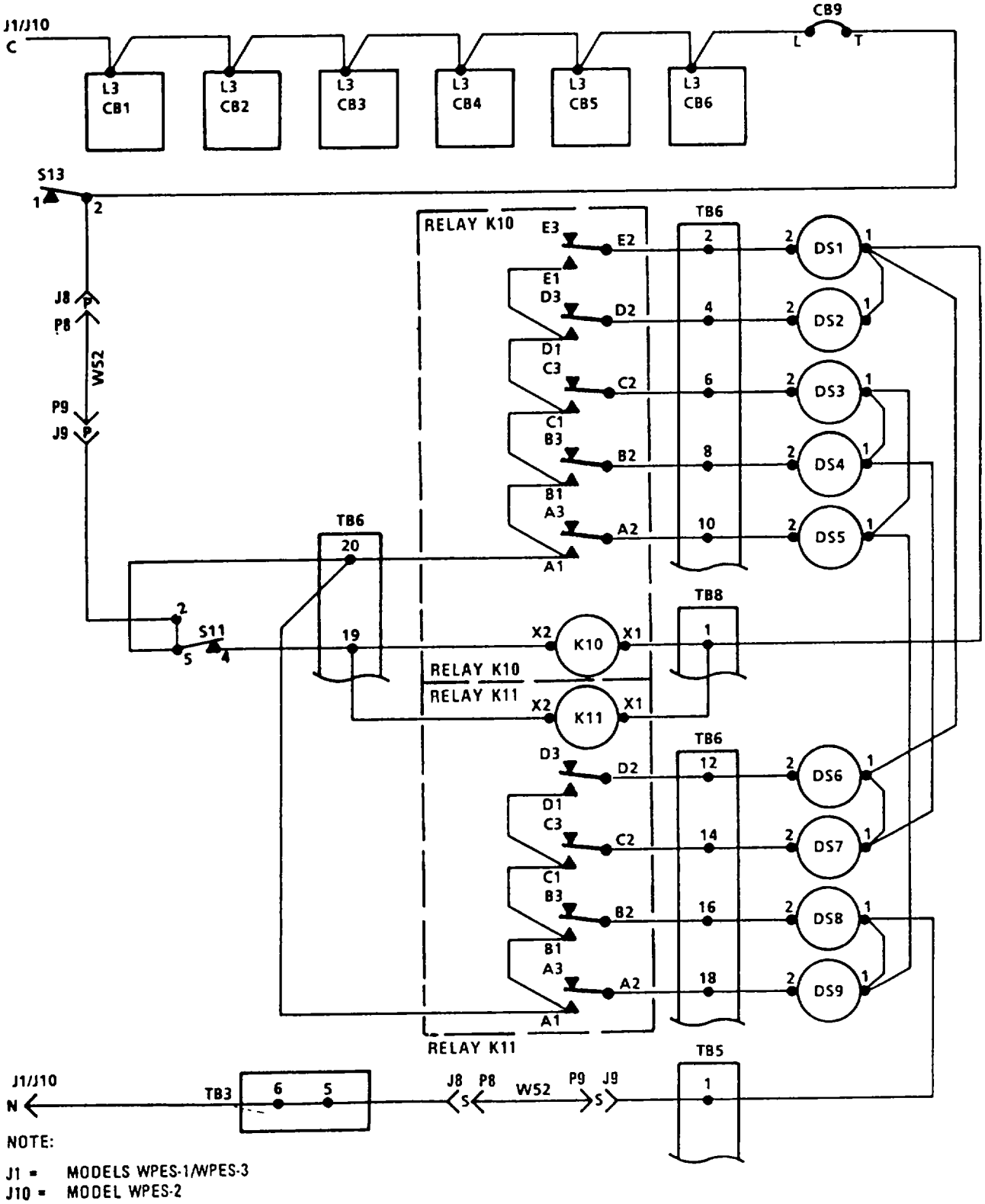

J1/J10
C
CB9
L
T
L3 CB1
L3 CB2
L3 CB3
L3 CB4
L3 CB5
L3 CB6
S13
1
2
J8
P8
WS2
P9
J9
RELAY K10
E3
E2
E1
D3
D2
D1
C3
C2
C1
B3
B2
B1
A3
A2
A1
TB6
2
4
6
8
10
20
DS1
DS2
DS3
DS4
DS5
TB8
1
19
S11
X2
K10
X1
RELAY K10
RELAY K11
K11
12
14
16
18
DS6
DS7
DS8
DS9
TB5
J1/J10
N
TB3
6
5
J8
P8
WS2
P9
J9
S
NOTE:
J1 = MODELS WPES-1/WPES-3
J10 = MODEL WPES-2

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED PUMP

1. CHEMICAL FEED PUMP STOPS AND/OR FAILS TO START.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid

Step 1. Check if circuit breaker, CB7 and/or heater assembly are tripped

if circuit breaker or heater assembly is tripped, go to Malfunction 2, Chemical Feed pump

Step 2. Check if other pumps operate

If other pumps are inoperable, go to Malfunction 1, ROWPU Assembly

Step 3. Check if relay, K7 is ON

If relay is not ON, go to step 7

Step 4. Check if 115 VAC is available at T1 of heater assembly

If voltage is measured, go to step 6.

Step 5. Perform a continuity check of power circuit as follows, make additional point to point checks as necessary to find defective component

NOTE

To check continuity through K7, it is necessary to physically close contact by pushing in on relay plunger while making the check

L1, CB6 - T1 on Heater
L2, K7 - T4 on K7
J1/JIO(N) - L2

a If continuity is absent through heater assembly, replace defective heater (para 3-48) and reset heater assembly

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED PUMP- continued

b. If continuity is absent through K7, replace motor starter Refer to paragraph 3-49.

c. If continuity is absent through circuit breaker, CB7 (CB7 ON), replace CB7 Refer to paragraph 3-49.

d. If continuity is absent in wiring, tighten loose connections and/or replace defective wire

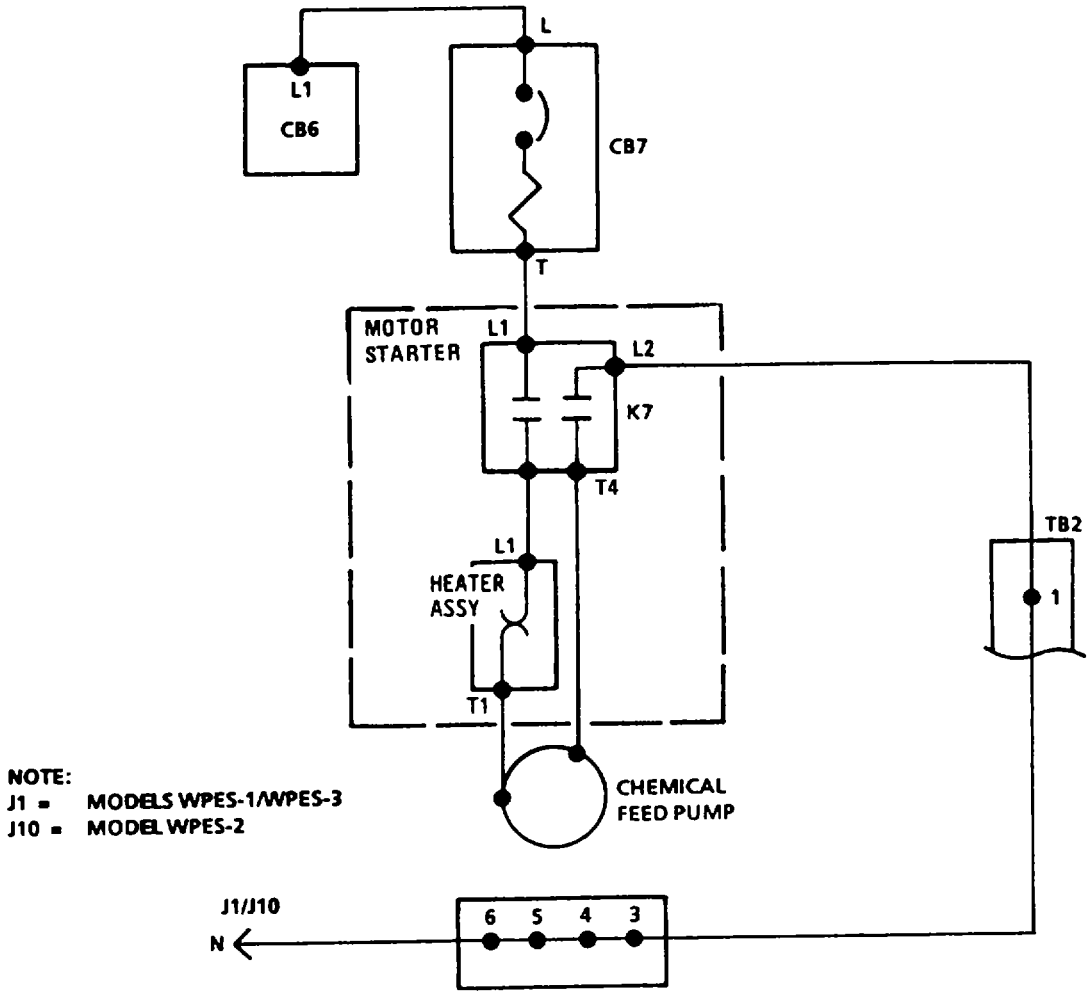


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED PUMP - continued

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 6. Check if continuity exists through pump cable assembly

a If continuity exists, repair pump Refer to paragraph 3-34.

b If continuity does not exist, repair cable assembly Refer to paragraph 3-24.

Step 7. Check for continuity of control circuits as follows, make additional point-to-point checks as necessary to isolate fault to a specific component.

NOTE

To measure continuity through K7 contacts, it is necessary to physically close contacts by pushing in on relay plunger

L3, CB6 - J8(P)
J9(P) - J9(K) and(L)
P9(P) - P8(P)
P9(K)- P8(K)
P9(L) - P8(L)
J8(K)- K7(2)
J8(L) - K7(3)
K7(2) - K7(A2) (see above note)
K7(A1) - K7(A2) (Required value is 450-600 ohms)
J1/J10(N)- K7(A1)

a. If continuity does not exist through switches, S13 or S7 (switches ON), replace defective switch. Refer to paragraph 3-45.

b. If continuity does not exist through CB9 (CB9 ON), replace CB9. Refer to paragraph 3-49.

c. If continuity does not exist through heater assembly, replace heater (para 3-49) and reset heater assembly

Table 3-1. Direct Support Troubleshooting - continued

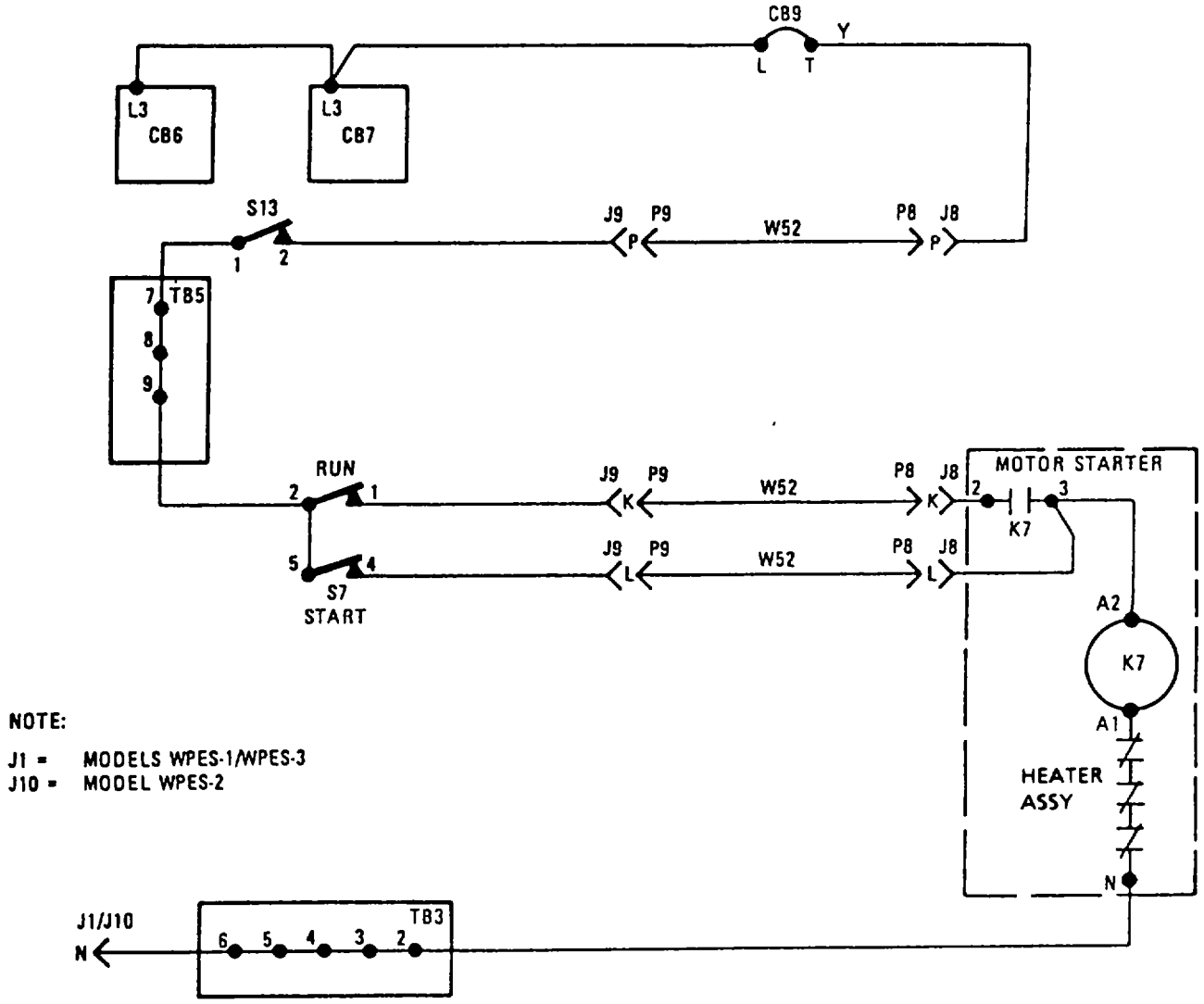
MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED PUMP - continued

d. If continuity does not exist through cable assembly, W-52, repair cable. Refer to paragraph 3-22.

e. If continuity does not exist through K7 contacts and/or 450-600 Ohms is not measured between Al and A2, replace motor starter. Refer to paragraph 3-49.

f. If continuity does not exist through wires, tighten loose connections and/or replace defective wires.



NOTE:

J1 = MODELS WPES-1/WPES-3
J10 = MODEL WPES-2

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED PUMP - continued

2. CHEMICAL FEED PUMP CIRCUIT BREAKER (CB7) AND/OR OVER LOAD HEATER TRIP.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Remove power at power source, reset CB7, and disconnect wires on CB7 output terminal T.

Step 2. Turn on power

If circuit breaker trips, check for bare/disconnected wires and tighten loose connections or replace bare wire. If trouble persists replace CB7. Refer to paragraph 349.

Step 3. Remove power at power source, reconnect wire and disconnect wires from heater at T1 and T4

Step 4. Turn on power

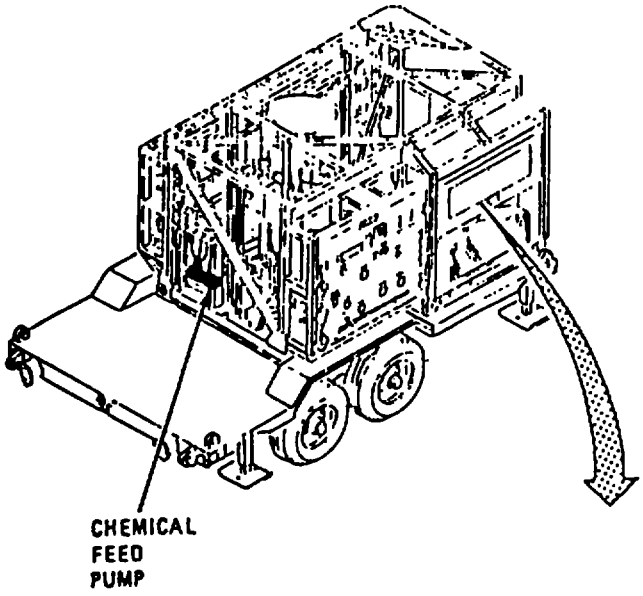
If heater assembly trips, check for defective heater, replace as necessary (para 3-49) and reset heater assembly

Step 5. Remove power at power source, reconnect wires to heater assembly and disconnect wires from pump motor.

Step 6. Check pump power cable for continuity and shorts.

a If a short is indicated, replace cable assembly Refer to paragraph 3-24.

b If pump cable is not defective, repair chemical feed pump Refer to paragraph 3-34.


CHEMICAL
FEED
PUMP

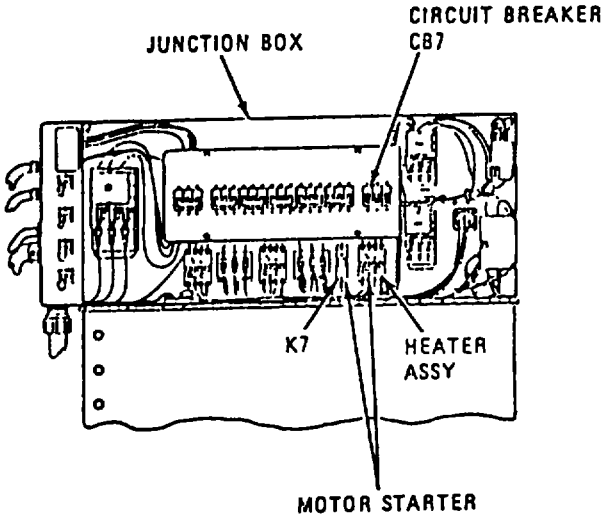

JUNCTION BOX
CIRCUIT BREAKER
CB7
K7
HEATER
ASSY
MOTOR STARTER

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY

1. PUMP SHUTS DOWN AND/OR FAILS TO START.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Check if circuit breaker CB1 and/or heater assembly are tripped.

If circuit breaker or heater assembly is tripped, go to Malfunction 2, R.O. Pump Assembly.

Step 2. Check if DS8 (HIGH PRESSURE) or DS9 (LOW PRESSURE) lamps on control box are ON at normal operating pressure

a. If DS8 is ON at operating pressure of less then 1000 psi, replace high pressure switch, S10. Refer to paragraph 3-45.

b. If DS9 is ON at operating pressure of 10 psi or above, replace low pressure switch, S9. Refer to paragraph 3-45.

Step 3. Check if other pumps operate.

If other pumps are inoperable, go to Malfunction 1, ROWPU Assembly.

Step 4. Check relay window to see if relay is ON

If relay is not ON, go to step 8.

Step 5. Check for 208 VAC, three phase power at connector, J6 (back of junction box)

b. If voltage is measured in all three tests (A-B, A-C and B-C), go to step 7.

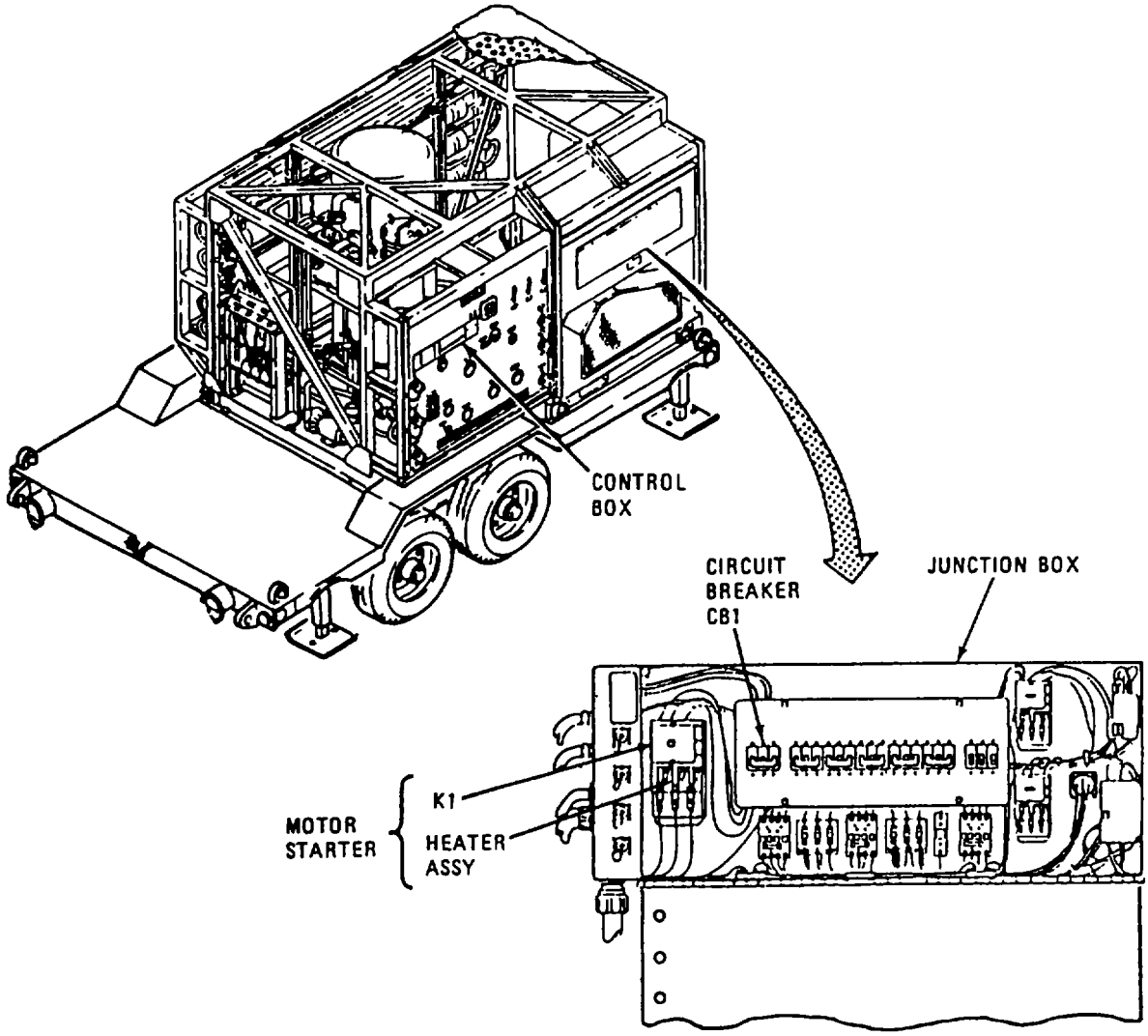

CONTROL
BOX
CIRCUIT
BREAKER
CB1
JUNCTION BOX
MOTOR
STARTER
K1
HEATER
ASSY

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 6. Perform a continuity check of power circuit as follows; make additional point-to-point checks as necessary to find defective component:

NOTE

To check continuity through K1, it is necessary to physically push up relay plunger while making the check

J1, A - J6(A)
J1, B - J6(B)
J1, C - J6(C)

a. If continuity is absent through heater assembly, replace heaters (paragraph 3-49) and reset heater assembly

b. If continuity is absent through CB1, replace CB1. Refer to paragraph 349.

c. If continuity is absent through K1 (see above note) replace motor starter. Refer to paragraph 3-49.

d. If continuity is absent through wires, tighten loose connections or replace defective wire.

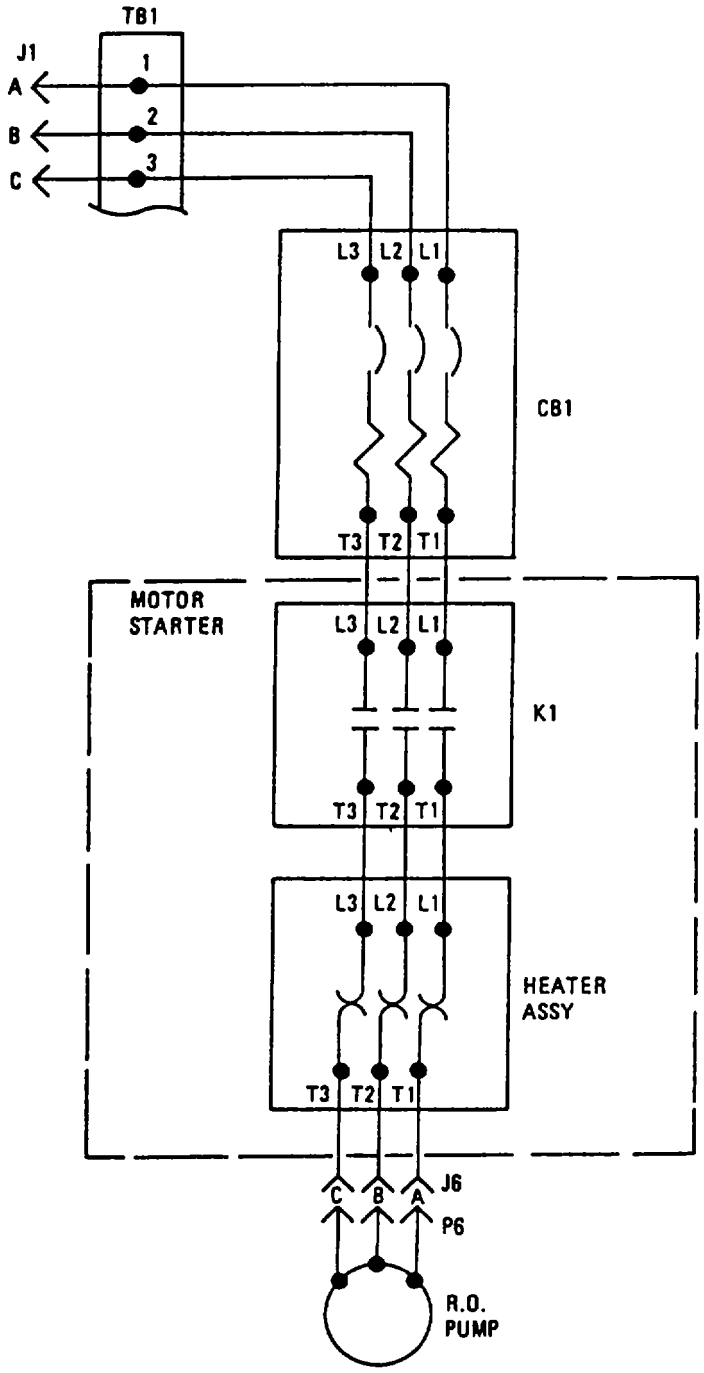

TB1
J1
A
B
C
1
2
3
L3
L2
L1
CB1
T3
T2
T1
MOTOR
STARTER
K1
HEATER
ASSY
J6
P6
R.O.
PUMP

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there Is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 7. Check for continuity of pump cable assembly.

a. If continuity does not exist, repair cable assembly Refer to paragraph 3-21.

b. If continuity exists, repair motor Refer to paragraph 3-38.

Step 8. Check for continuity of control circuits and as follows, make additional point-to-point check as necessary to isolate fault to a specific component.

NOTE

To check continuity through K1, it is necessary to physically push up relay plunger while making the check.

J1(N) - J8(P)
J9(P) - J9(A) and (B)
P9(A) - P8(A)
P9(B) - P8(B)
P9(P) - P8(P)
J8(A) - K1(2)
J8(B) - K9(2)
K1(2) - K1(A1) (See note above)
J1(N) - K1(A2)
KI(Al) - K1(A2) (Required value is 90-120 ohms).

a. If continuity does not exist through switches S13 or S1 (switches ON), replace defective switch Refer to paragraphs 3-45.

b. If continuity does not exist through CB9 (CB ON), replace it. Refer to paragraph 3-49.

c. If continuity does not exist through heater assembly, replace heaters (paragraph 3-49) and reset heater assembly.

d. If continuity does not exist through K1 (contacts 2-3) with K1 closed or 90-120 Ohms is not measured between A1 and A2, replace motor starter Refer to paragraph 3-49.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

e. If continuity does not exist through cable assembly, W52, repair cable assembly Refer to paragraph 3-22.

f. If continuity does not exist through relays K8 or K9, replace defective relay Refer to paragraph 3-49.

g. If continuity does not exist through wires or cables, replace defective wire and/or tighten loose connections.

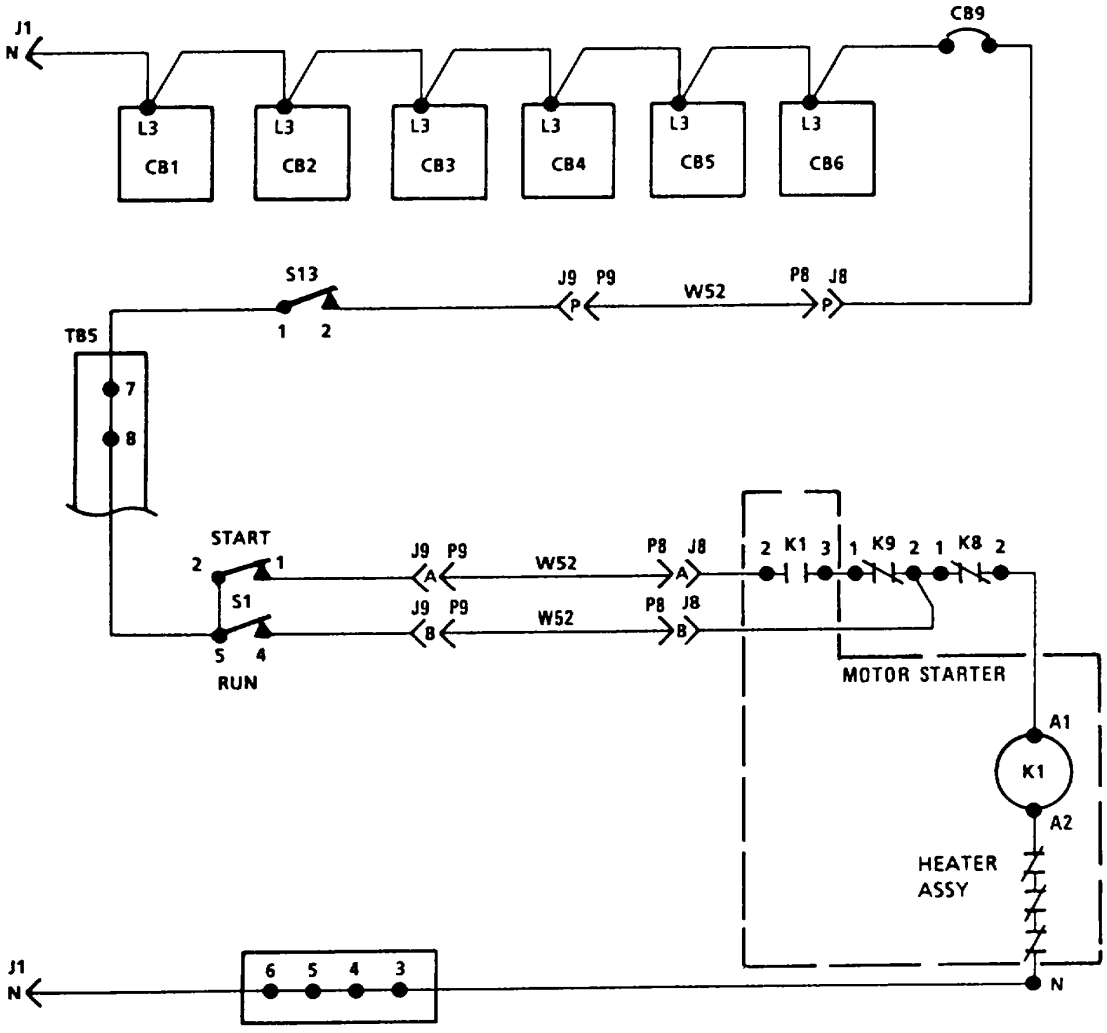


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

2. REVERSE OSMOSIS (R.O.) PUMP CIRCUIT BREAKER (CBI) AND/OR OVERLOAD HEATERS TRIP.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Remove power at power source, reset CB1 and disconnect wires on CBI output terminals (T1 , T2 and T3).

Step 2. Turn on power.

If circuit breaker trips, check for bare or disconnected wires between power source and CBI and repair or replace it. If trouble persists, replace CB1 Refer to paragraph 3-49.

Step 3. Remove power at power source, reconnect wires to circuit breaker and disconnect wires from heater assembly at T1, T2 and T3.

Step 4. Turn on power.

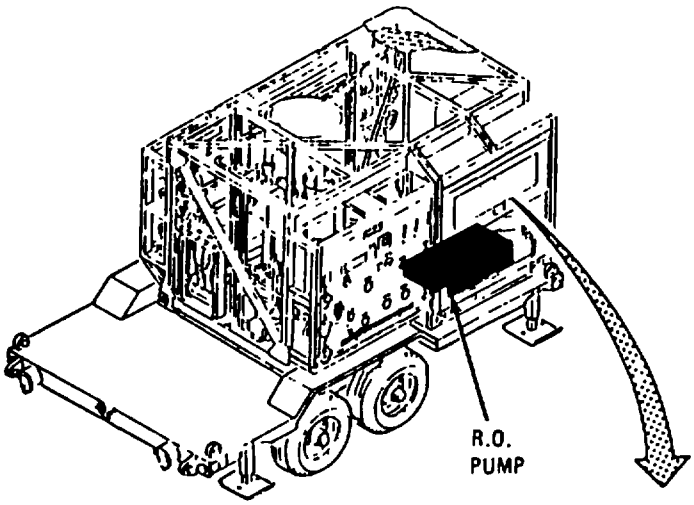
If heater assembly trips, check for defective heaters and replace as necessary (para 3-49). If trouble persists, replace motor starter.

Step 5. Remove power at power source and reconnect wires to heater assembly.

Step 6. Check motor power cable for continuity and shorts.

a. If shorted or open, repair power cable assembly. Refer to paragraph 3-21.

b. If cable assembly is not defective, repair pump motor Refer to paragraph 3-38.


R.O.
PUMP

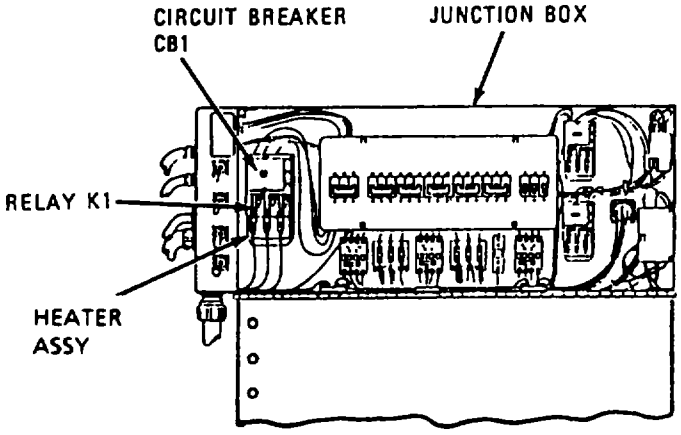

CIRCUIT BREAKER
CB1
JUNCTION BOX
RELAY K1
HEATER
ASSY

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

3. UNABLE TO JOG R.O. PUMP.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Check if circuit breaker, CB1 and/or heater assembly are tripped.

If either one or both are tripped, go to Malfunction 2, Reverse Osmosis Pump Assembly

Step 2. Check if other pumps operate.

If other pumps do not operate, go to Malfunction 1, ROWPU Assembly.

Step 3. Check if relay, K1 comes ON when jog switch is held to ON position.

If relay does not come on when jog switch is held to ON, go to step 7.

Step 4. Check if 208 VAC, three phase power is available at pump jack, J6 (back of junction box) when jog switch is held to ON position.

If power is available in all three tests (A-B, A-C and B-C), go to step 6.

Step 5. Check power circuit for continuity as follows, make additional point-to-point continuity checks as necessary to find individual malfunctioning component

NOTE

To check continuity through K1, it is necessary to physically push up relay plunger while making the check.

J1 (A) - J6 (A)
J1 (B) - J6 (B)
J1 (C) - J6 (C)

a. If CB1 is open (CB1 ON), replace CBI Refer to paragraph 3-49.

b. If K1 is open, replace motor starter Refer to paragraph 3-49.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

c. If heater assembly is open, replace defective heater (paragraph 3-49) and reset heater assembly.

d. If wires are open, replace defective wire and/or tighten loose connections.

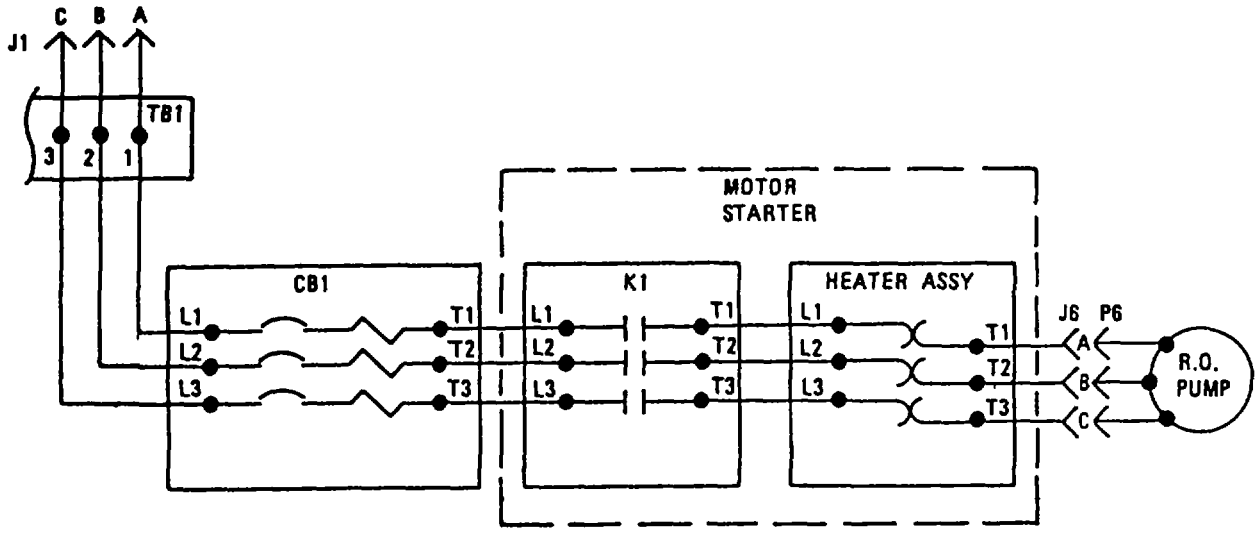


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

Step 6. Perform continuity check of R O pump motor cable assembly.

a. If pump motor cable assembly is open, repair it. Refer to paragraph 3-21.

b. If pump motor cable is not defective, repair pump motor. Refer to paragraph 3-38.

Step 7. Check jog circuit for continuity as follows' make additional point-to-point continuity checks as necessary to isolate faulty component.

J1(C)	-	P8 (P)
J9(P)	-	J9 (M)
P9(P)	-	P8 (P)
P9(M)	-	P8 (M)
J8(M)		K1 (A2)
K1(A1)	-	K1 (A2) (90 - 120 Ohms)
J1(N)	-	K1 (AI)

a. If switches, S13 or S12 are defective (switches ON), replace them. Refer to paragraph 3-45.

b. If CB9 is open (CB9 ON), replace CB9 Refer to paragraph 3-49.

c. If cable assembly, W-52 is defective, repair it. Refer to paragraph 3-22.

d. If relay K1 is open and/or 90-120 Ohms is not measured between A1 and A2, replace motor starter. Refer to paragraph 3-49.

e. If heater assembly is open, replace defective heaters (para 3-49) and reset heater assembly.

f. If wires are open, tighten loose connections or replace defective wire.

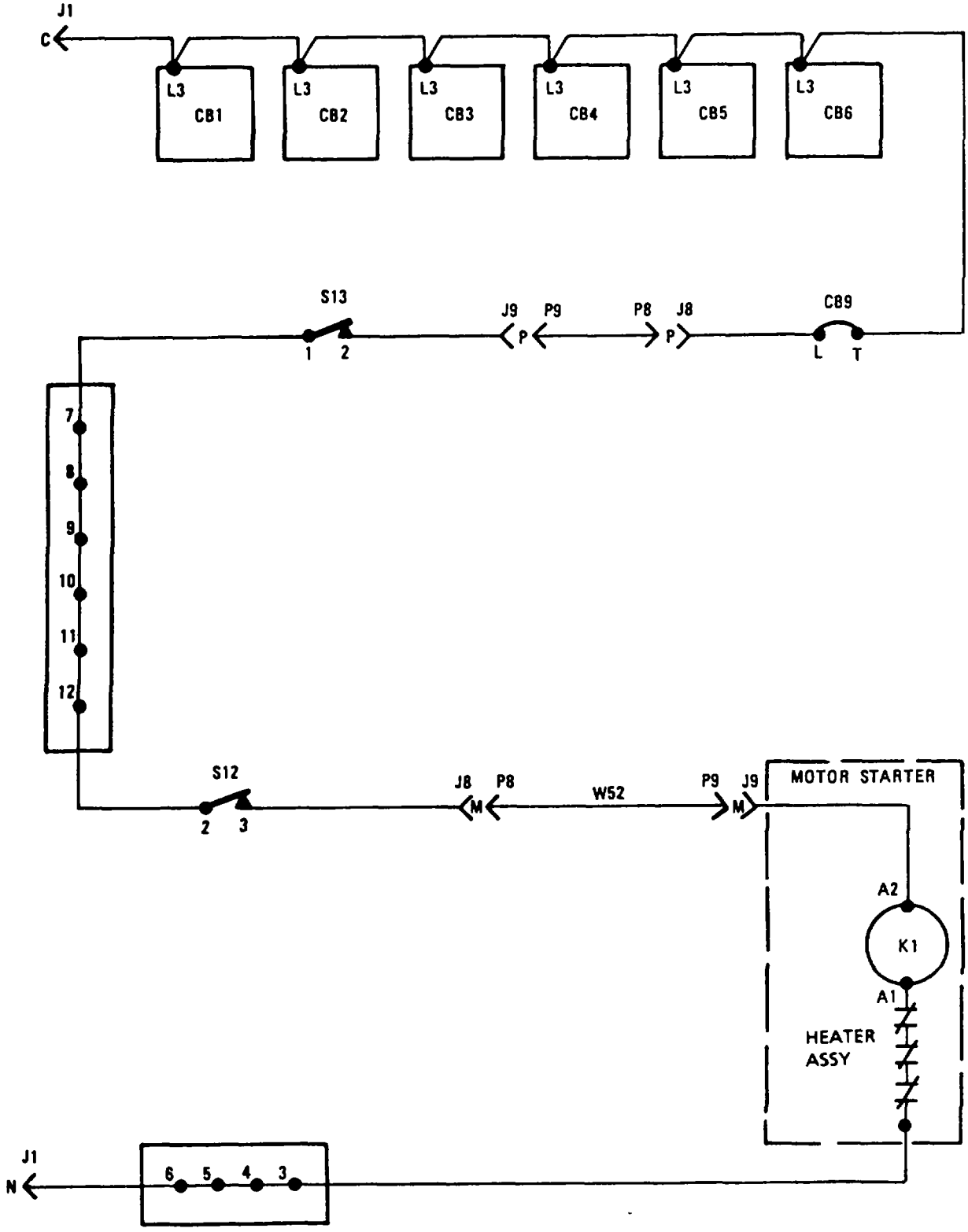

J1
C
L3
CB1
L3
CB2
L3
CB3
L3
CB4
L3
CB5
L3
CB6
S13
1
2
J9
P9
P
P8
J8
P
CB9
L
T
7
8
9
10
11
12
S12
2
3
J8
P8
M
W52
P9
J9
M
MOTOR STARTER
A2
K1
A1
HEATER
ASSY
J1
N
6
5
4
3

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 1

1. RAW WATER PUMP NO. 1 STOPS AND/OR FAILS TO START.

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid

Step 1. Check if circuit breaker CB3 and/or heater assembly are tripped.

If circuit breaker or heater assembly is tripped, go to Malfunction 2, Raw Water Pump Assembly No 1

Step 2. Check if other pumps operate.

If other pumps do not work, go to Malfunction 1, ROWPU Assembly.

Step 3. Check if relay K3 is ON.

If relay is not ON, go to step 8.

Step 4. Check voltage at RAW WATER PUMP NO I connector, J3.

If voltage is measured, go to step 6.

Step 5. Perform a continuity check of power circuit as follows, make additional checks as necessary to find defective components.

NOTE

To check continuity through K3 it is necessary to physically push up on relay plunger while making the check.

L3, CB2 - J3(C)
L2, CB2 - J3(B)
L1,CB1 - J3(A)

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 1-continued

a. If continuity Is absent through heater assembly, replace defective heaters (paragraph 3-49) and reset heater assembly.

b. If continuity is absent through K3 (see above note), replace motor starter Refer to paragraph 3-48.

c. If continuity is absent through CB3 (CB3 ON), replace CB3. Refer to paragraph 3-49.

d. If continuity is absent through wires, tighten loose connections and/or replace defective wire.

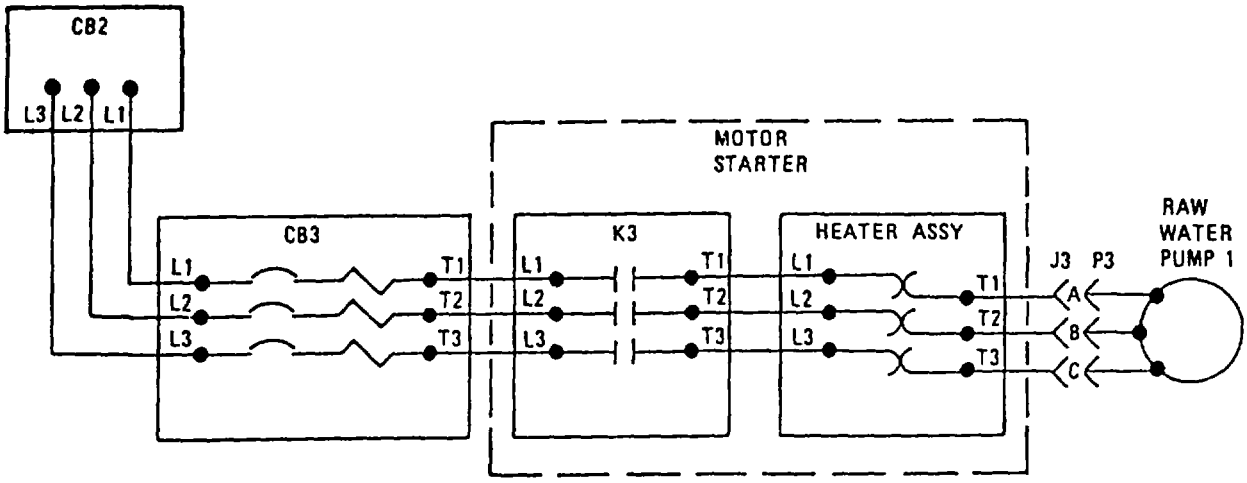


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO 1 - continued

WARNING

High voltages In this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 6. Check continuity of pump cable assembly.

a. If open, repair pump cable assembly Refer to paragraph 3-8.

b. If pump cable assembly is not defective, repair pump Refer to paragraph 3-10.

Step 7. Check for continuity through control circuit as follows; make additional point-to-point continuity checks as necessary to isolate fault to a specific component.

NOTE

To measure continuity through K3 it is necessary to close K3 by physically pushing relay handle up.

L3, CB2	-	J8(P)
J9(P)	-	J((C) and (D)
P9(P)	-	P8(P)
P9(C)	-	P8(C)
P9(D)	-	P8(D)
J8(C)	-	K3(2)
J8(D)	-	K3(3)
K3(2)	-	K3(A2) (See above note)
K3(A1)	-	K3(A2) (90-120ohms)
J1/J1O(N)	-	K3(A1)

a. If switch S13 or S3 is open (switches ON) replace it. Refer to paragraph 3-45.

b. If continuity does not exist through CB9 (CB9 ON), replace CB9. Refer to paragraph 3-49.

c. If cable assembly, W52 is open, repair cable assembly. Refer to paragraph 3-22..

d. If continuity is not measured through heater assembly, replace defective heaters (para 3-49) and reset heater assembly.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 1 - continued

e. If continuity does not exist through K3 contacts (2-3) and/or 90-120 Ohms is not measured from A2 to A1, replace motor starter Refer to paragraph 3-9.

f. If continuity is absent through wiring, tighten loose connections and/or replace defective wires.

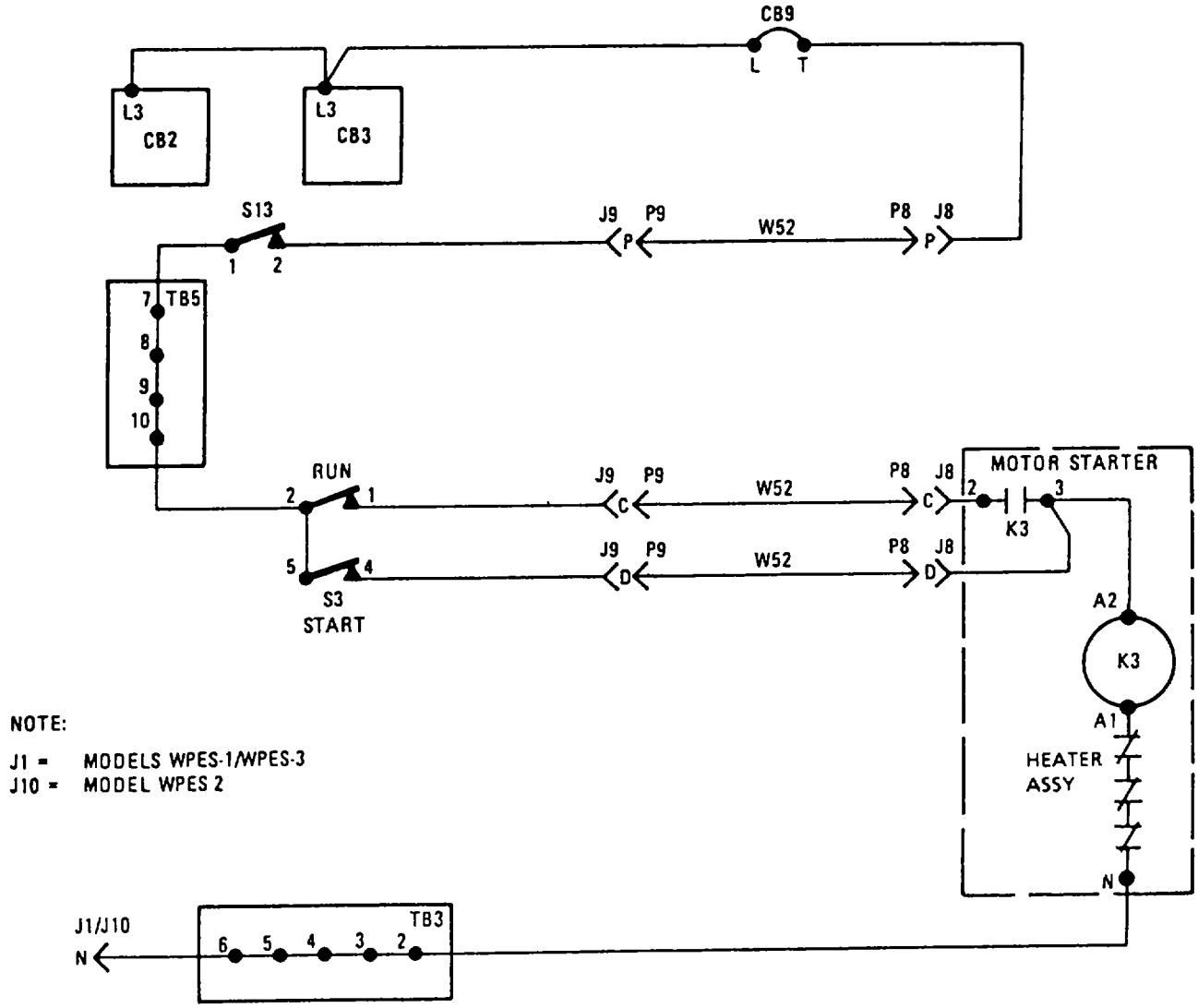


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 1 - continued

2. RAW WATER PUMP CIRCUIT BREAKER (CB3) AND/OR OVERLOAD HEATERS TRIP.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Remove power at power source, reset CB3 and disconnect wires from T1, T2 and T3 of CB3.

Step 2. Turn on power.

If circuit breaker CB3 trips, check for bare/disconnected wires injunction box and tighten/replace them. If trouble persists, replace CB3 Refer to paragraph 3-49.

Step 3. Remove power at power source, reconnect wires to CB3 and disconnect wires from K3 heater assembly at T1, T2 and T3.

Step 4. Turn on power.

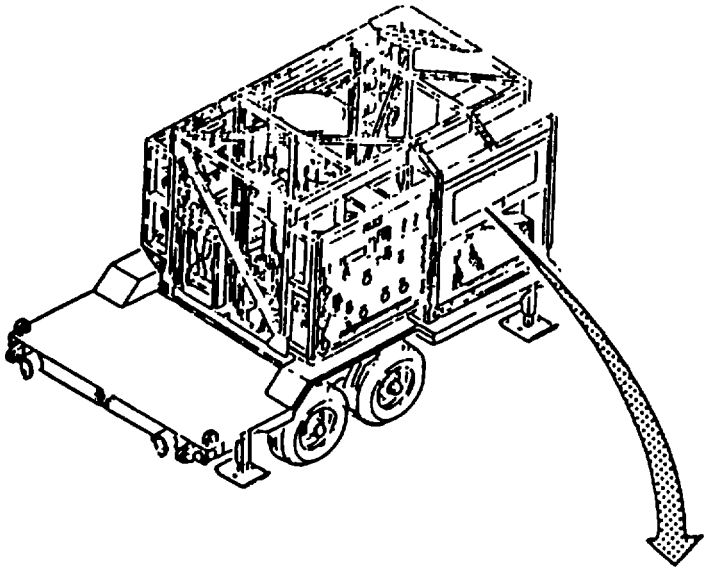
If heater assembly is tripped, check for defective heaters, replace as necessary (para 3-49) and reset heater assembly.

Step 5. Remove power at power source, reconnect wires to heater assembly and disconnect wires from pump motor.

Step 6. Check pump cable assembly for continuity and shorts.

a. If a short is indicated, replace cable assembly. Refer to paragraph 3-8.

b. If pump cable assembly is not defective, repair pump. Refer to paragraph 3-10.



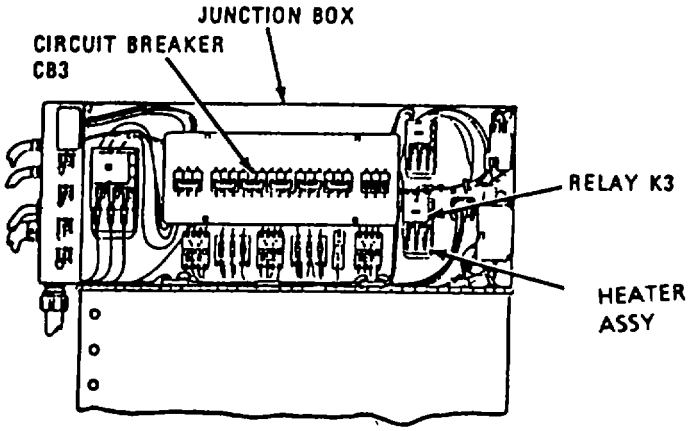

JUNCTION BOX
CIRCUIT BREAKER
CB3
RELAY K3
HEATER
ASSY

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 2

1. RAW WATER PUMP NO. 2 STOPS AND/OR FAILS TO START.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Check if circuit breaker CB4 and/or heater assembly are tripped.

If circuit breaker or heater assembly is tripped, go to Malfunction 2, Raw Water Pump Assembly No 2.

Step 2. Check if other pumps operate.

If other pumps do not work, go to Malfunction 1, ROWPU Assembly.

Step 3. Check if relay K4 is ON.

If relay is not ON, go to step 8.

Step 4. Check voltage at RAW WATER PUMP NO 2 connector, J4.

If voltage is measured, go to step 6.

Step 5. Perform a continuity check of power circuit as follows, make additional point-to-point checks as necessary to find defective components.

NOTE

To check continuity through K4 it is necessary to physically push up on relay plunger while making the check.

L3, CB3 - J4(A)
L2, CB3 - J4(B)
L1, CB3 - J4(C)

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 2 - continued

a. If continuity is absent through heater assembly, replace heaters (paragraph 3-49) and reset heater assembly.

b. If continuity is absent through K4 (see above note), replace motor starter. Refer to paragraph 3-49.

c. If continuity is absent through CB4 (CB4 ON), replace CB4 Refer to paragraph 3-49.

d. If continuity is absent through wires, tighten connections and/or replace defective wire.

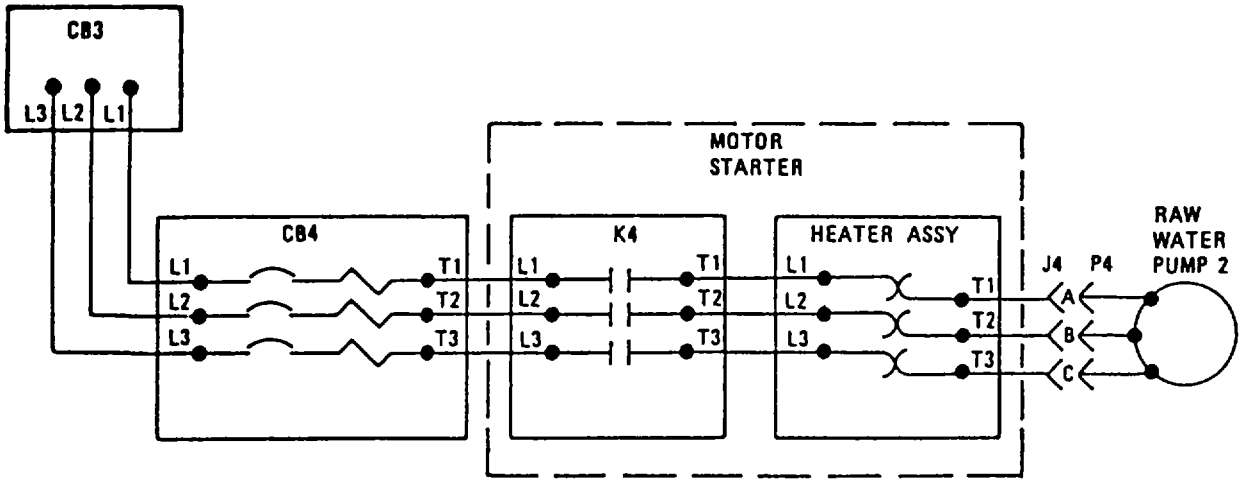


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 2 - continued

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 6. Check for continuity of pump cable assembly.

a. If open, repair pump cable assembly. Refer to paragraph 3-8.

b. If pump cable is not defective, repair pump assembly. Refer to paragraph 3-10.

Step 7. Check for continuity through control circuit as follows, make additional continuity checks as necessary to isolate fault to a specific component.

NOTE

To measure continuity through K4 it is necessary to close K4 by physically pushing relay handle up.

L3, CB3-	J8(P)
J9(P) -	J9(E) and (F)
P9(P) -	P8(P)
P9(E) -	P8(E)
P9(F) -	P8(F)
J8(E) -	K4(2)
J8(F) -	K4(3)
K4(2) -	K4(A2) (See note above)
K4(A1)-	K4(A2) (90-120 Ohms)
J/J10O(N)-	K4(A1)

a. If switch S13 or S4 is open (switches ON), replace it Refer to paragraph 3-45.

b. If continuity does not exist through CB9 (CB9 ON), replace CB9. Refer to paragraph 3-49.

c. If continuity does not exist through K3 contacts (2-3) and/or 90 to 120 Ohms is not measured from A2 to A1, replace motor starter. Refer to paragraph 3-49.

d. If continuity is not measured through heater assembly, replace defective heater (para 3-49) and reset heater assembly.

e. If continuity is absent through wires, tighten loose connections or replace defective wire.

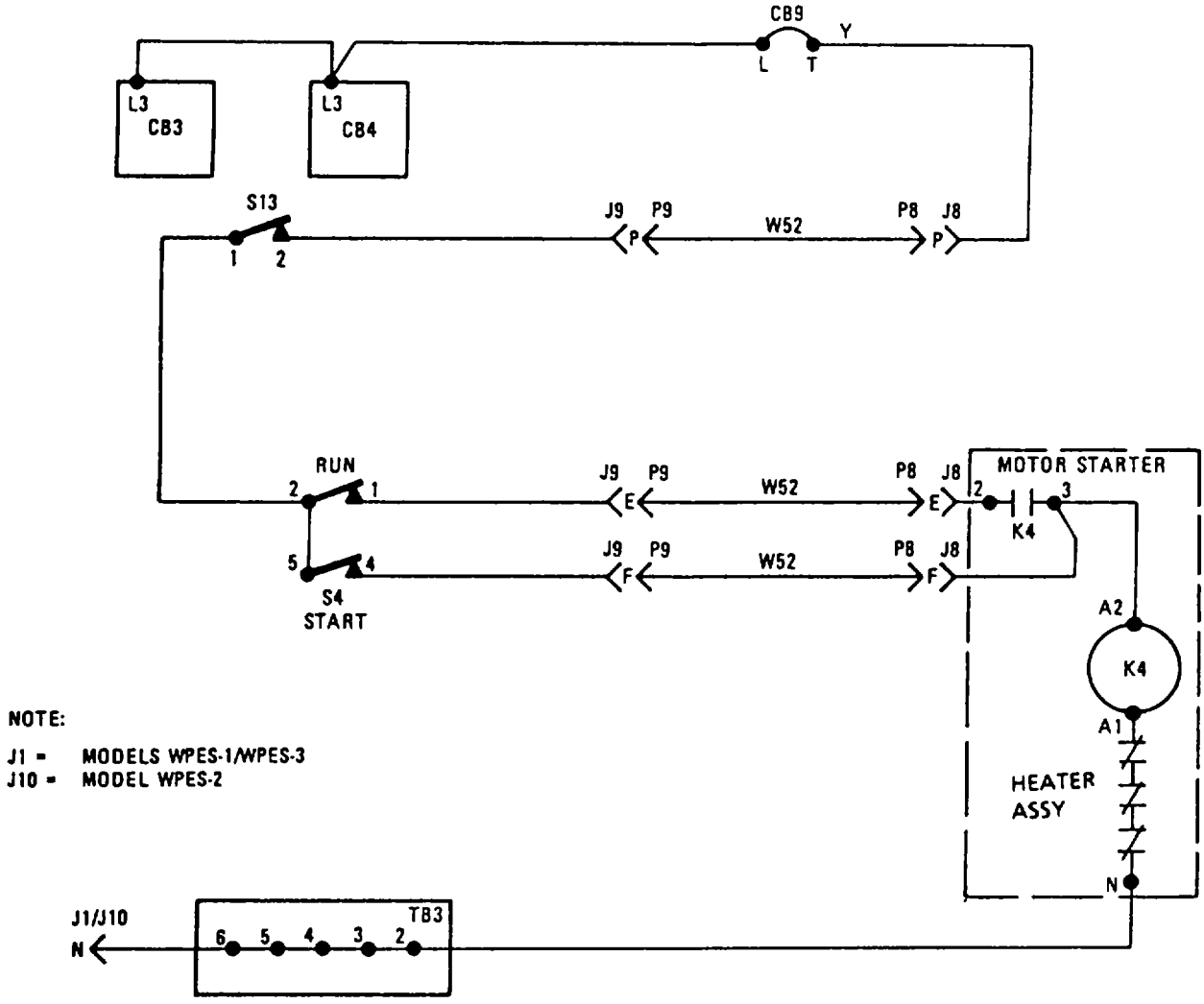

CB9
Y
L
T
L3
CB3
L3
CB4
S13
1
2
J9
P9
P
W52
P8
J8
P
RUN
2
1
J9
P9
E
W52
P8
J8
E
MOTOR STARTER
2
3
K4
5
4
J9
P9
F
W52
P8
J8
F
S4
START
A2
K4
A1
HEATER
ASSY
N
NOTE:
J1 = MODELS WPES-1/WPES-3
J10 = MODEL WPES-2
J1/J10
N
TB3
6
5
4
3
2

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 2 - continued

2. RAW WATER PUMP NO. 2 CIRCUIT BREAKER (CB4) AND/OR OVERLOAD HEATERS TRIP.

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Remove power at power source, reset CB4 and disconnect wires from T1, T2 and T3 of CB4.

Step 2. Turn on power.

If circuit breaker CB4 trips, check for bare/disconnected wires in junction box and tighten/replace them. If trouble persists, replace CB6 Refer to paragraph 3-49.

Step 3. Remove power at power source, reconnect wires to CB4 and disconnect wires from heater assembly at T1, T2 and T3.

Step 4. Turn on power.

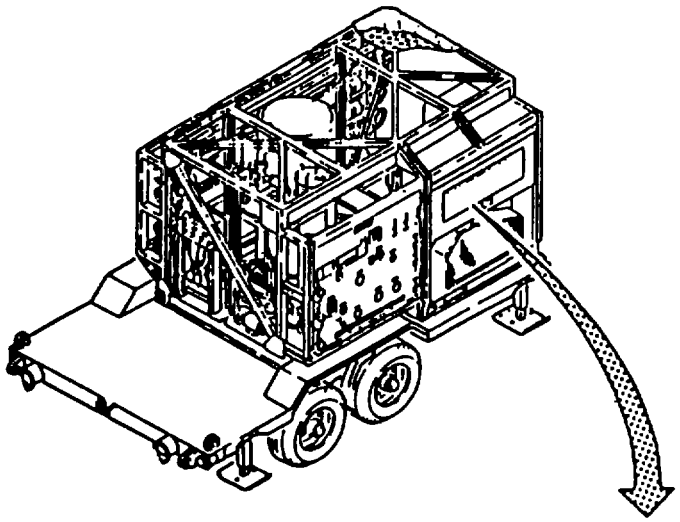
If heaters trip, check for defective heaters, replace as necessary (paragraph 3-49) and reset heater assembly.

Step 5. Remove power at power source, reconnect wires to heater assembly and disconnect wires from pump motor.

Step 6. Check pump cable assembly for continuity and shorts.

a. If a short is indicated, repair cable assembly Refer to paragraph 3-8.

b. If cable assembly is not defective, repair pump Refer to paragraph 3-10.



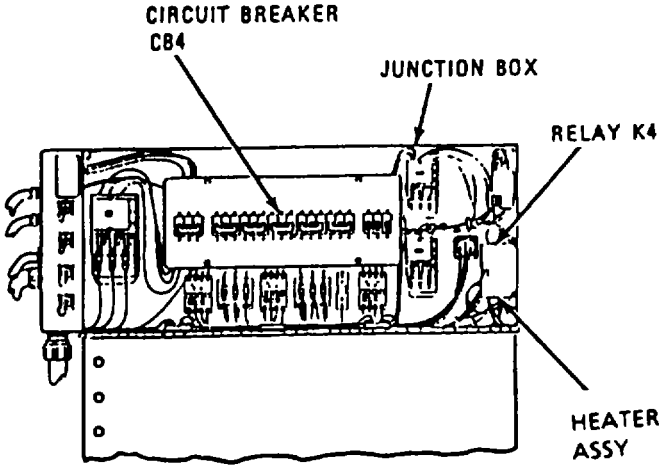

CIRCUIT BREAKER
CB4
JUNCTION BOX
RELAY K4
HEATER
ASSY

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY

1. BACKWASH PUMP SHUTS DOWN AND/OR FAILS TO START (R.O. ELEMENT CLEANING).

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Check if circuit breaker CB2 and/or heater assembly are tripped

If circuit breaker or heater assembly is tripped, go to Malfunction 2, Backwash Pump Assembly.

Step 2. Check if other pumps operate.

If other pumps do not work, go to Malfunction 1, ROWPU Assembly

Step 3. Check if relay K2 is on.

If relay is not on go to step 7.

Step 4. Check voltage at BACKWASH PUMP jack, J2

If 208 VAC is measured in all three tests (A-B, A-C and B-D), go to step 6.

Step 5. Perform a continuity check of power circuit as follows, make additional point-to-point checks as necessary to find defective components.

NOTE

To check continuity through K2, it is necessary to close contacts by raising handles on side of relay.

L3, CB1 or J10C	-	J2(C)
L2, CB1 or J10B	-	J2(B)
L1,CB1 or J10A	-	J2(A)

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

a. If continuity is absent through heater assembly, replace heaters (refer to paragraph 3-49) and reset heater assembly.

b. If continuity is absent through CB2 (CB2 ON), replace CB2. Refer to paragraph 3-49.

c. If continuity is absent through K2 (see above note), replace motor starter Refer to paragraph 3-49.

d. If continuity is absent through wires, tighten connections and/or replace defective wire.

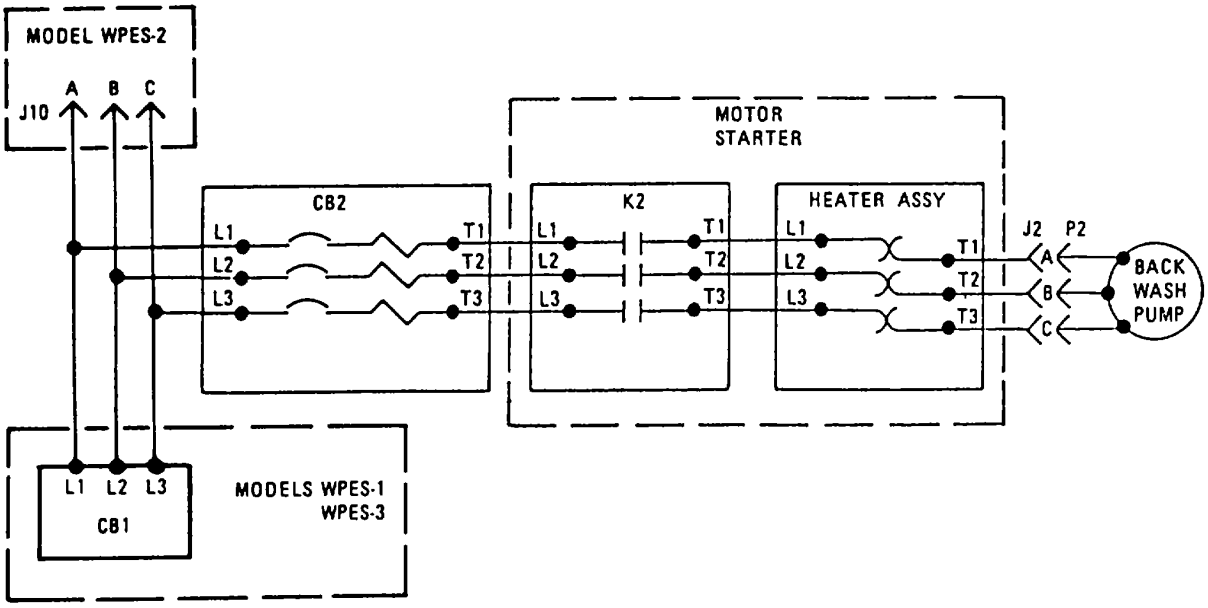


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid

Step 6. Check for continuity through pump cable assembly.

a. If continuity exists, repair pump Refer to paragraph 3-5.
b. If continuity does not exist, repair pump cable assembly Refer to paragraph 3-4.

Step 7. Check for continuity through control circuit as follows, make additional point-to-point checks as necessary to isolate fault to a specific component

NOTE

To measure continuity through K6 contacts, it is necessary to close contacts by physically raising handles on side of relay.

CB1orJ10	-	J8(P)
J9(P)	-	J9(D) and (W)
P9(W)	-	P8(W)
P9(D)	-	P8(D)
P9(P)	-	P8(P)
J8(D)	-	K2(2)
J8(W)	-	K2(3)
K2(2)	-	K2(A2) (See above note)
K2(A1)	-	K2(A2) (Required value is 90-120 ohms)
J1/J10(N)	-	K2(A1)

a. If switchS13 or S3 is open (switches ON), replace it. Refer to paragraph 3-45.

b. If continuity does not exist through CB9 (CB9 ON), replace CB9. Refer to paragraph 3-49.

c. If continuity does not exist through heater assembly, replace defective heaters (para 3-49) and reset heater assembly

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

d. If open, repair cable assembly, W52. Refer to paragraph 3-22.

e. If continuity does not exist through K2 contacts and/or 90-120 Ohms is not measured between Al and A2, replace motors starter. Refer to paragraph 3-49.

f. If wiring is defective, tighten loose connections and/or replace defective wire.

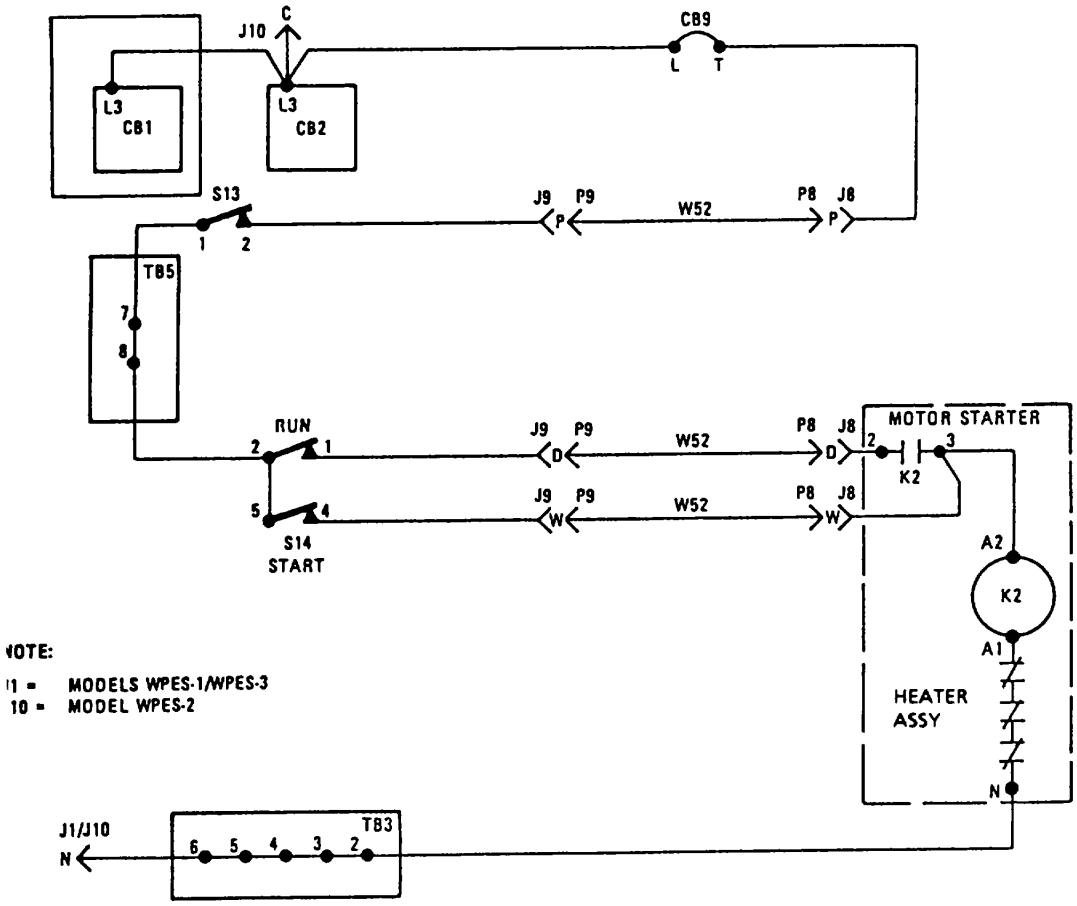


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

2. BACKWASH PUMP SHUTS DOWN AND/OR FAILS TO START (MULTIMEDIA CLEANING).

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Check if circuit breaker CB2 and/or heater assembly are tripped.

If circuit breaker or heater is tripped, go to Malfunction 2, Backwash Pump Assembly.

Step 2. Check if other pumps operate.

If other pumps work, go to Malfunction 1, ROWPU Assembly.

Step 3. Check if relay K3 is on.

If relay is not on go to step 7.

Step 4. Check voltage at BACKWASH PUMP jack, J2.

If voltage is measured, go to step 6.

Step 5. Perform a continuity check of power circuit as follows; make additional point-to-point checks as necessary to isolate fault to a specific component.

NOTE

To check continuity through K2 it is necessary to close contacts by physically raising handle on side of relay while making the check.

L3, CBI or J10(C)	-	J2(C)
L2, CB1 orJ10(B)	-	J2(B)
L1, CBI or J10(A)	-	J2(A)

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

a. If continuity is absent through heater assembly, replace defective heater (para 3-49) and reset heater assembly

b. If continuity is absent through CB6 (CB6 ON), replace CB6 Refer to paragraph 3-49.

c. If continuity is absent through K2, replace motor starter. Refer to paragraph 3-49.

d. If continuity is absent through wiring, tighten connections and/or replace defective wire.

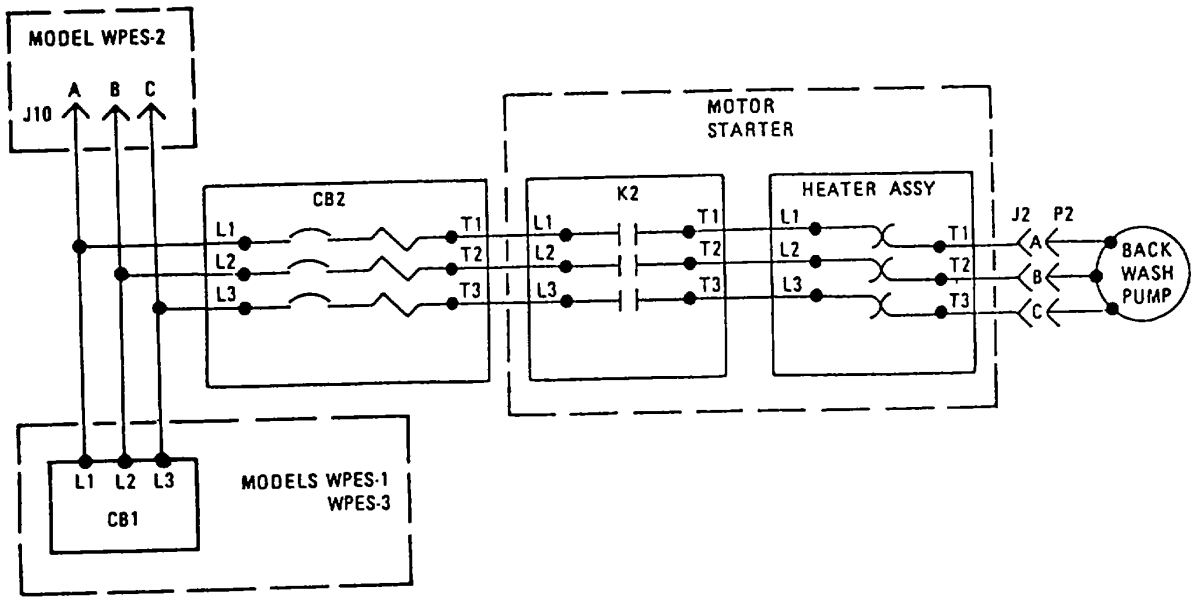


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

WARNING

High voltages in this equipment can cause serious injury or death. When applying power during a test, take proper measures to ensure personal safety Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 6. Check pump cable for continuity.

a. If cable is defective, repair cable assembly. Refer to paragraph 3-4.

b. If cable is not defective, repair pump Refer to paragraph 3-5.

Step 7. Check for continuity through control circuit; make additional point-to-point continuity checks as required to isolate fault to a specific component

NOTE

To check continuity through K2 contacts, it is necessary to close contacts by holding handle on side of relay to the UP position.

L3, CB1 or J10(C)	-	J8(P)
J9(P)	-	J9(L)
P9(P)	-	P8(P)
P9(L)	-	P8(L)
P9(C)	-	P8(C)
P9(W)	-	P8(W)
TB5(7)	-	TB-1 (Timer)
J8(W)	-	K2(A2)
TB-5 (Timer) -	-	J9(W)
J8(L)	-	J8(C)
J1/10(N)	-	A1
K1(A1)	-	K1(A2) (Required value is 90-120 ohms)
TB-4	-	J9(C)

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

a. Replace switches S13 or S3 (switches ON), if open. Refer to paragraph 3-45.

b. Replace CB6 (CB6 ON) if open. Refer to paragraph 3-49.

c. Repair cable assembly, W52, if open Refer to paragraph 3-22.

d. Replace motor starter, if relay auxiliary contacts (3-4) on relay K2 are open and/or 90-120 Ohms is not measured between Al and A2. Refer to paragraph 3-49.

e. If continuity is absent through wiring, tighten loose connections and/or replace defective wire.

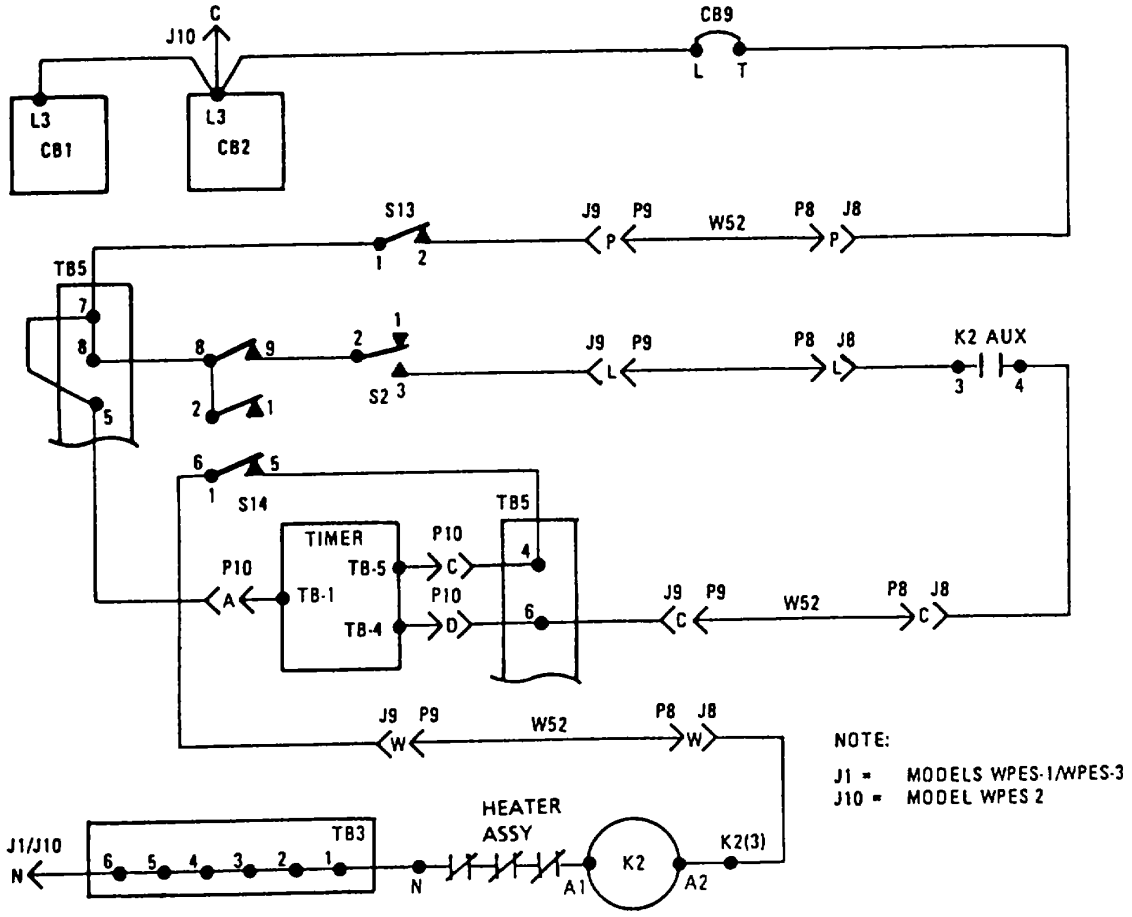


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

3. BACKWASH PUMP CIRCUIT BREAKER (CB2) AND/OR OVERLOAD HEATERS TRIP.

WARNING

High voltages in this equipment can cause serious injury or death When applying power during a test, take proper measures to ensure personal safety Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

Step 1. Remove power at power source, reset circuit breaker CB2 and disconnect wires from CB2 at terminals (L1, L2 and L3).

Step 2. Turn on power.

If circuit breaker CB2 trips, check for loose/bare wires and tighten connections/replace defective wire. If trouble persists, replace circuit breaker. Refer to paragraph 3-49.

Step 3. Remove power at power source, reconnect wires to CB2; if tripped, reset heater assembly; and disconnect wires from relay K4 at T1, T2 and T3.

Step 4. Turn on power.

If heater assembly is tripped, replace defective heater (para 3-49) and reset heater assembly. If trouble persists, replace motor starter.

Step 5. Remove power at power source and reconnect wires to heater assembly.

Step 6. Check continuity of pump cable assembly.

a. If cable assembly is defective, repair it. Refer to paragraph 3-4.

b. If cable assembly is not defective, repair pump assembly. Refer to paragraph 3-5.

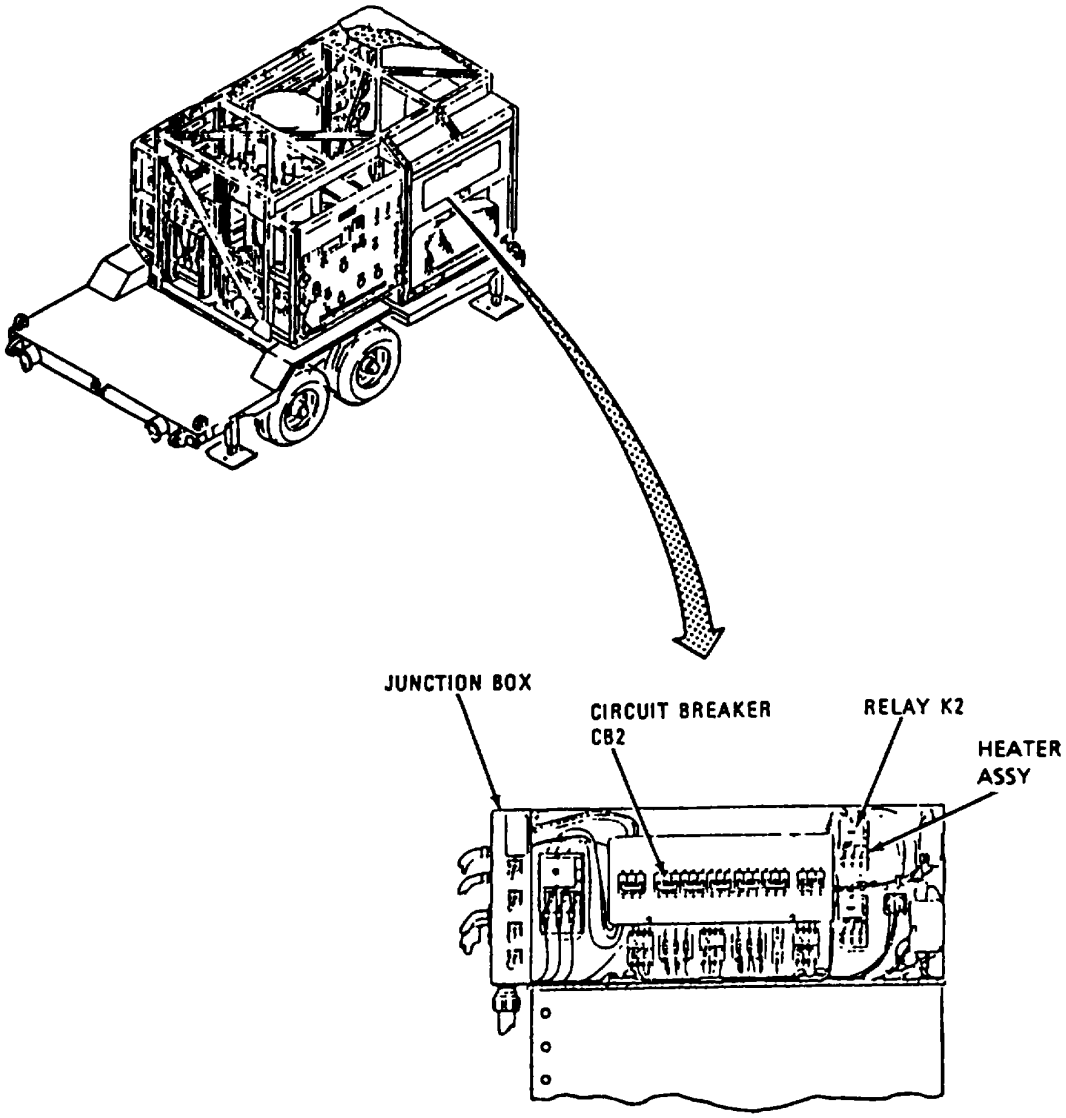

JUNCTION BOX
CIRCUIT BREAKER
CB2
RELAY K2
HEATER
ASSY

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

FLATBED CARGO TRAILER

1. TRAILER VIBRATES, SAGS, LEANS OR SIDETRACKS. (Model WPES-1 Only)

Step 1. Check for worn or broken spring leaves.

If spring leaves are worn or broken, replace both spring assemblies Refer to paragraph 3-69

Step 2. Check for worn or broken trunnion brackets.

If trunnion brackets are worn or broken, replace trunnion brackets Refer to paragraph 3-7.

Step 3. Check for bent trunnion.

If trunnion axle is bent, replace trunnion axle. Refer to paragraph 367.

Step 4. Check for bent axles.

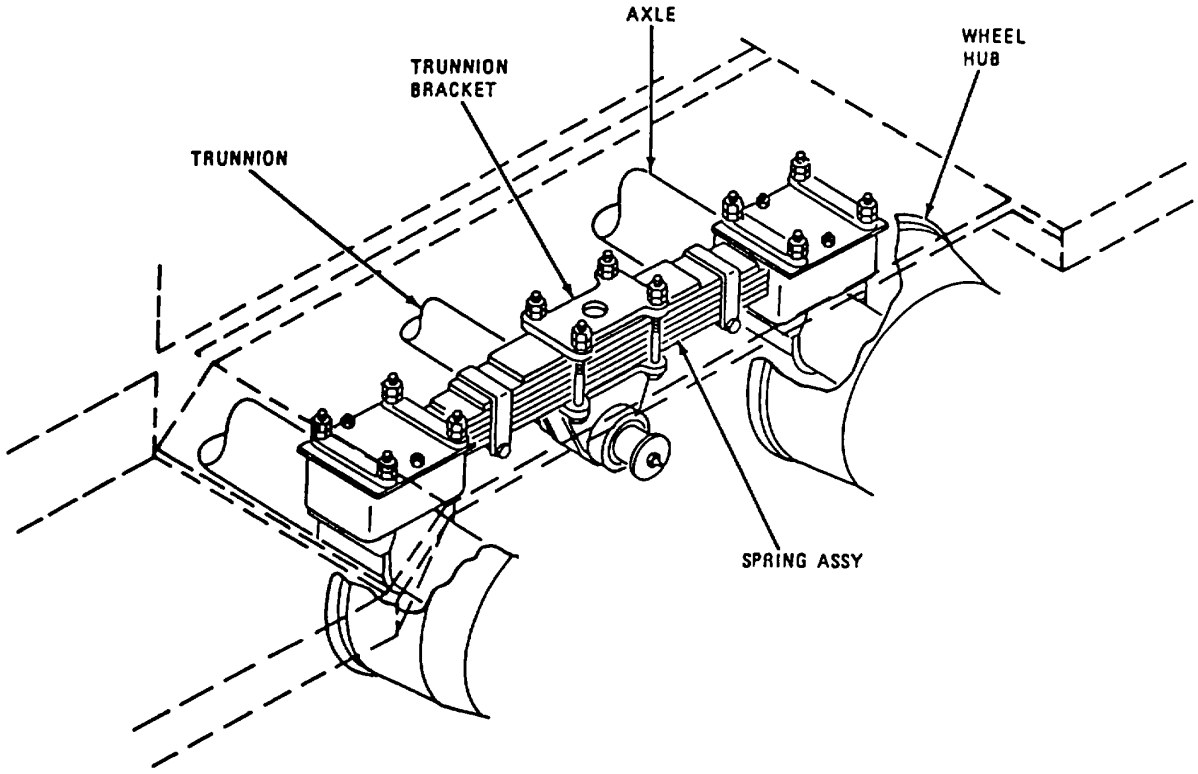
If axles are bent, replace bent or worn axles Refer to paragraph 3-70. If trouble persists, replace suspension assembly Refer to paragraph 3-7.

2. ONE BRAKE DRAGS.

Repair brake assembly on dragging wheel in accordance with paragraph 3-8.

3. BRAKES DRAG OR REMAIN LOCKED.

Repair brake assemblies in accordance with paragraph 3-8.


AXLE
WHEEL HUB
TRUNNION BRACKET
TRUNNION
SPRING ASSY

Section II. BACKWASH PUMP ASSEMBLY MAINTENANCE PROCEDURES

3-4. CABLE ASSEMBLY (BACKWASH PUMP) MAINTENANCE.

This task consists of:	a. Inspection	b. Disassembly
	c. Repair	d. Assembly
	e. Test	

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section III, Item 3).
- Multimeter (Appendix B, Section III, Item 3)
- Electrical Repair Kit (Appendix B, Section III, Item 3).
- Crimping Tool (Appendix B, Section III, Item 3).
- Wire Stripper (Appendix B, Section III, Item 3).

Materials/Parts Required
- Tape Electrical (Appendix C, Section II, Item 31).
- Solder (Appendix C, Section II, Item 27).

Equipment Condition

Reference
- Cable assembly removed (para. 2-16).

INSPECTION.

For inspection procedures, refer to paragraph 3-23.

DISASSEMBLY.

For disassembly procedures, refer to paragraph 3-23.

TEST.

For test procedures, refer to paragraph 3-23.

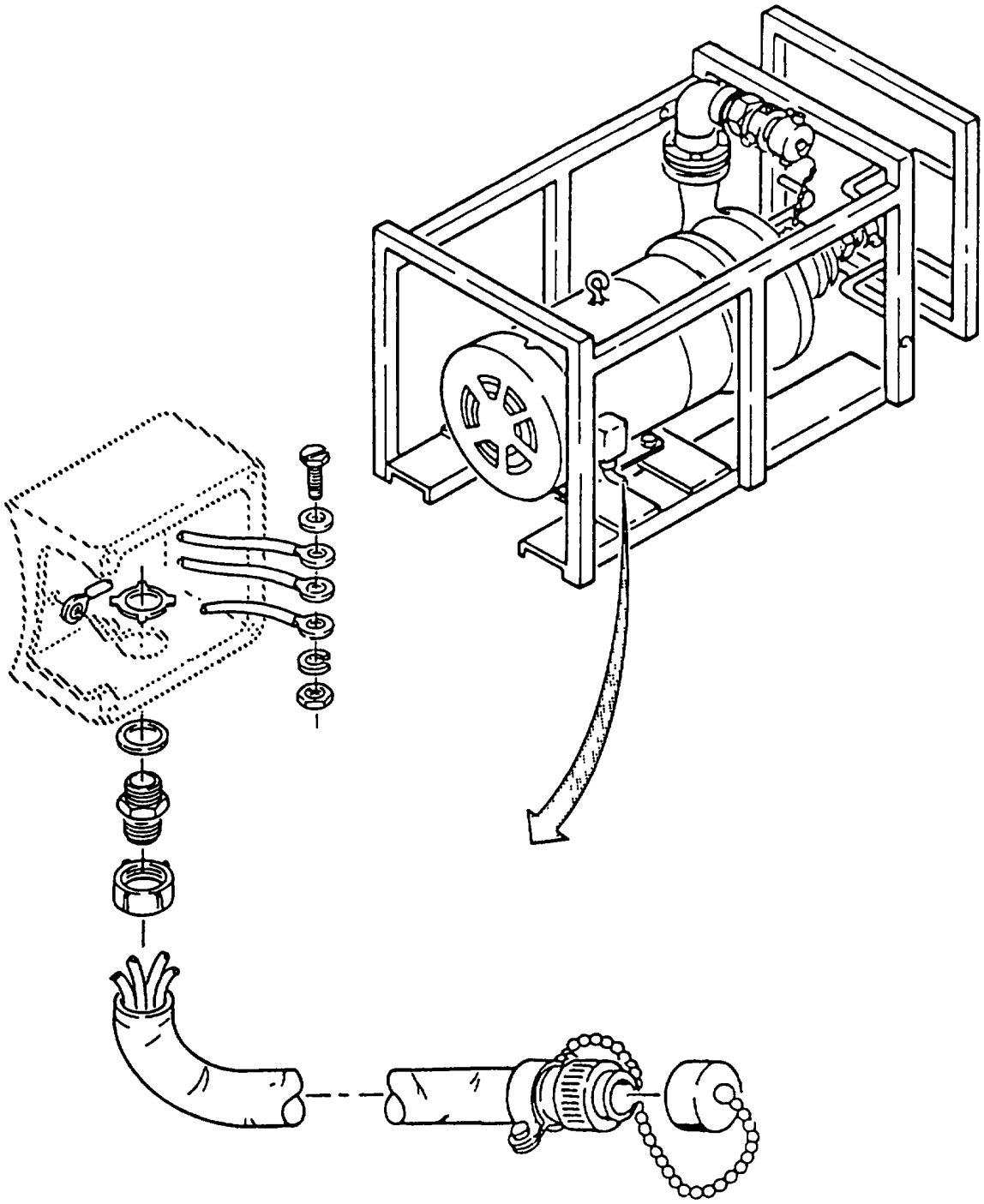
ASSEMBLY.

For assembly procedures, refer to paragraph 323.

REPAIR.

For repair procedures, refer to paragraph 3-23.

3-4. CABLE ASSEMBLY (BACKWASH PUMP) MAINTENANCE.



3-5. CENTRIFUGAL PUMP(BACKWASH PUMP) MAINTENANCE.

This task consists of: a. Disassembly b. Cleaning c. Inspection d. Repair e. Assembly

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Stiff-Bristled Brush (Appendix B, Section III, Item 4).
Arbor Press (Appendix B, Item III, Item 3).
3/16 Inch Drill Bit (Appendix B, Section III, Item 3).
Drill (Appendix B, Section III, Item 3).
Rubber Mallet (Appendix B, Section III, Item 3).

Materials/Parts Required

Solvent, drycleaning (Appendix C, Section II, Item 28)
Detergent (Appendix C, Section II, Item 10).
Compound, locking (Appendix C, Section II, Item 9).
Gasket- 500-410
O-ring- 500-983

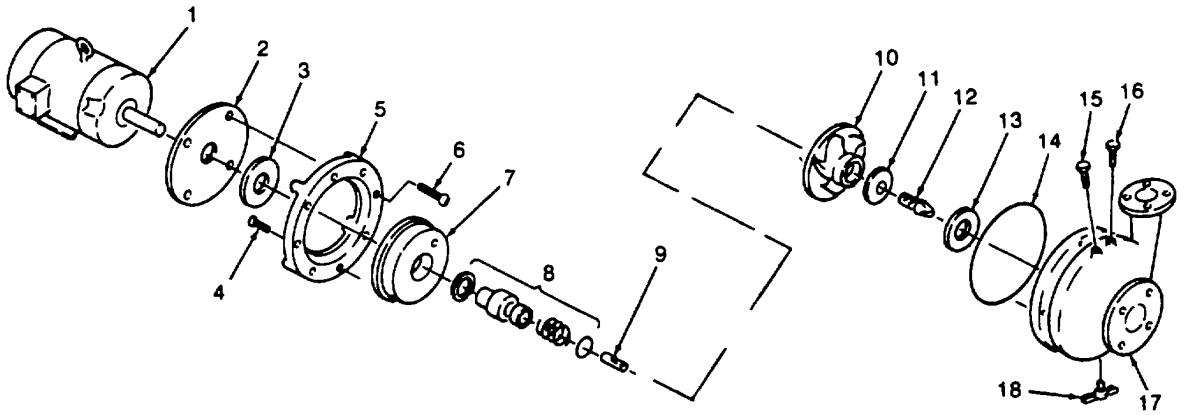
Equipment Condition

Reference
Centrifugal pump assembly removed (para. 2-18).

General Safety Instructions

WARNING

Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.



3-5. CENTRIFUGAL PUMP (BACKWASH PUMP) MAINTENANCE - continued.

DISASSEMBLY.

a. Remove drain cock (18), vent plug (16), and primer plug (15).

NOTE
Note position of long screws.

b. Remove eight screws (4) and pump case (17).

c. Remove pump case gasket (14). Discard gasket.

CAUTION
Because of tight fit of wear ring in housing, wear ring must be removed in pieces Remove wear ring only when excessively worn.

d. Position pump case (17) on drill press and drill two 3/16-inch (4 76 mm) holes in wear ring (13). Drill holes on opposite sides of ring, not to exceed 3/4 inch (19 05 mm) deep.

e. Separate wear ring (13) and remove pieces from pump case (17).

NOTE
Note position of key for assembly.

f. Remove impeller retaining screw (12), gasket (11), key (9), and impeller (10) from shaft of motor (1). Discard gasket.

g. Remove seal assembly (8) and cover (7). Discard seal assembly.

h. Remove four screws (6), adapter (5), slinger (3) and splash plate (2).

CLEANING

WARNING

- Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.
- Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.

a. Using drycleaning solvent, clean pump case (17) and adapter (5). Air dry parts.

b. Using wire brush, clean rust and corrosion from pump case and adapter

c. Using mild soap solution, wash pump case internally, impeller (10), and retaining assembly.

3-5. CENTRIFUGAL PUMP (BACKWASH PUMP) MAINTENANCE - continued.

INSPECTION.

Inspect pump case (17), impeller wear ring (13), and adapter (5) for cracks, damage, and excessive wear.

REPAIR.

Replace all damaged components

ASSEMBLY.

a. Position splash plate (2) and adapter (5) on shaft of motor (1) and install four screws (6)

b. Install slinger (3) on motor shaft (1).

c. Install cover (7) on adapter (5).

d. Install new seal assembly (8) on motor shaft (1) as noted during disassembly

e. Install impeller (10) and key (9) on shaft of motor (1)

f. Install new gasket (11) and using locktite install impeller retaining screw (12).

CAUTION

Wear ring must be installed in exact alinement with seat in case. If incorrectly alined, pump case may be damaged.

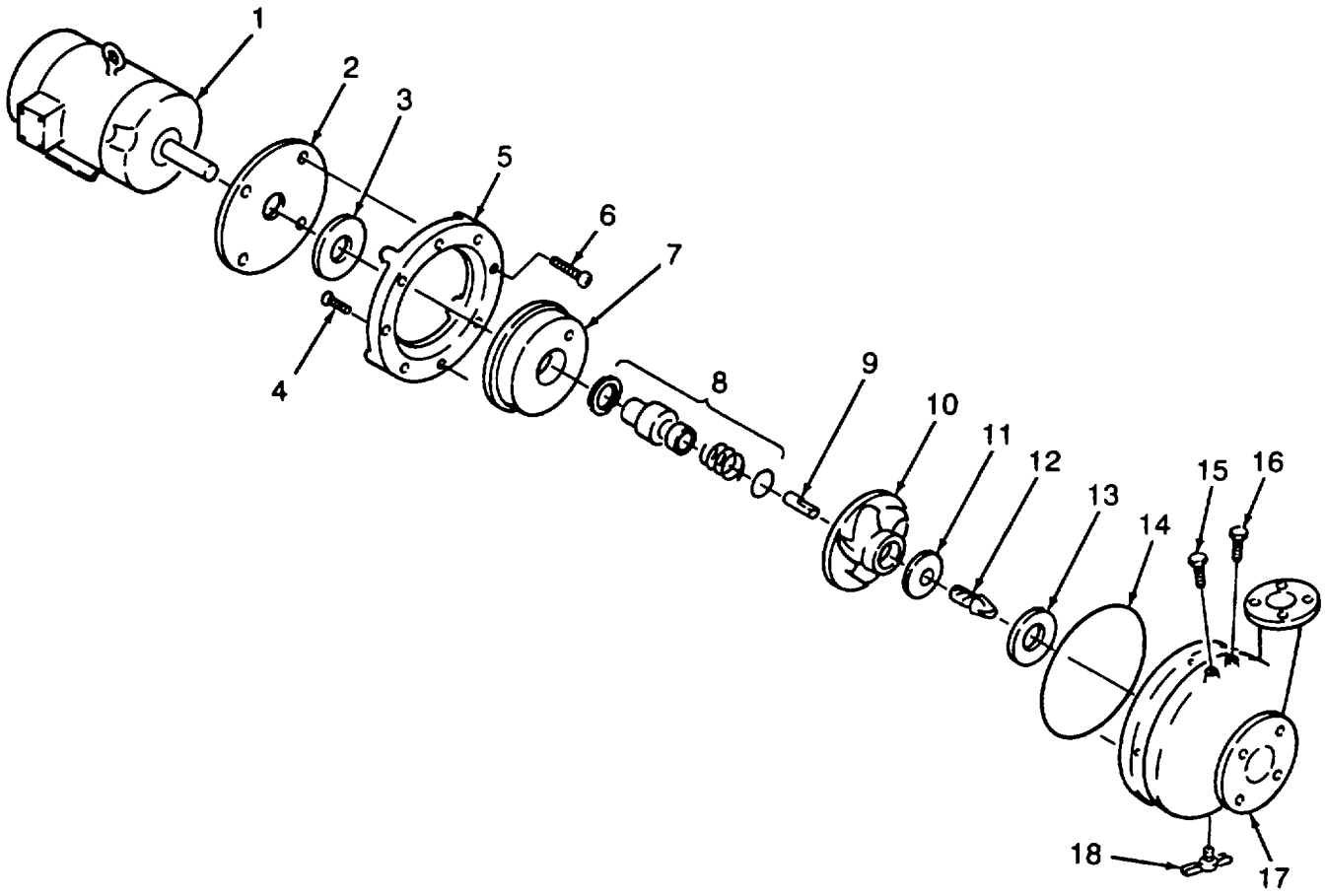
g. Position new wear ring (13) in pump case (17) Using arbor press, press wear ring into place.

h. Install new pump case gasket (14)

i. Position pump case (17) in place and install eight screws (4) as noted

j. Install primer plug (15), vent plug (16), and drain cock (18).

13-5. CENTRIFUGAL PUMP(BACKWASH PUMP) MAINTENANCE - continued. I



3-6. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) MAINTENANCE.

This task consists of
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly
f. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Arbor Press (Appendix B, Section III, Item 3)
Multimeter (Appendix B, Section III, Item 3)
Growler (Appendix B, Section III, Item 3)
Materials/Parts Required
Grease (Appendix C, Section II, Item 15).
Lockwasher (2) - HW1001A25
Equipment Condition
Reference
Centrifugal pump removed (para. 3-5).
General Safety Instructions

WARNING

- Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates Wear eye, skin, and respiratory protection Use in a well-ventilated area
- Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure

DISASSEMBLY

Remove three screws (1) and fan cover (2)

Loosen screw 3) and remove fan (4) and key (11) from rotor shaft (12).

NOTE

Mark fan end housing, stator, and shaft end plate to assist in alinement during assembly

c. Remove four nuts (5) and four bolts (17)
d. Tap fan end housing (6) with soft-faced mallet to break bond with stator assembly (10) and remove fan end housing
e. Tap shaft end plate (16) with soft-faced mallet to break bond with stator assembly (10) and remove shaft end plate (16)
f. Remove wavy washer (7) from rotor shaft (12)

3-6. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) MAINTENANCE - continued.

g. Remove four screws (19) from bearing retainer plate (14)

h. Remove seal (18) from shaft end plate (16).

i. Using arbor press, remove bearing (15), retainer plate (14), and sleeve (13) from rotor shaft (12)

CAUTION

Wiring inside stator assembly can be damaged by rotor shaft if rotor is not removed carefully.

j. Remove rotor (12) through pump end of stator assembly (10)

k. Using arbor press, remove bearing (8) from rotor shaft (12)

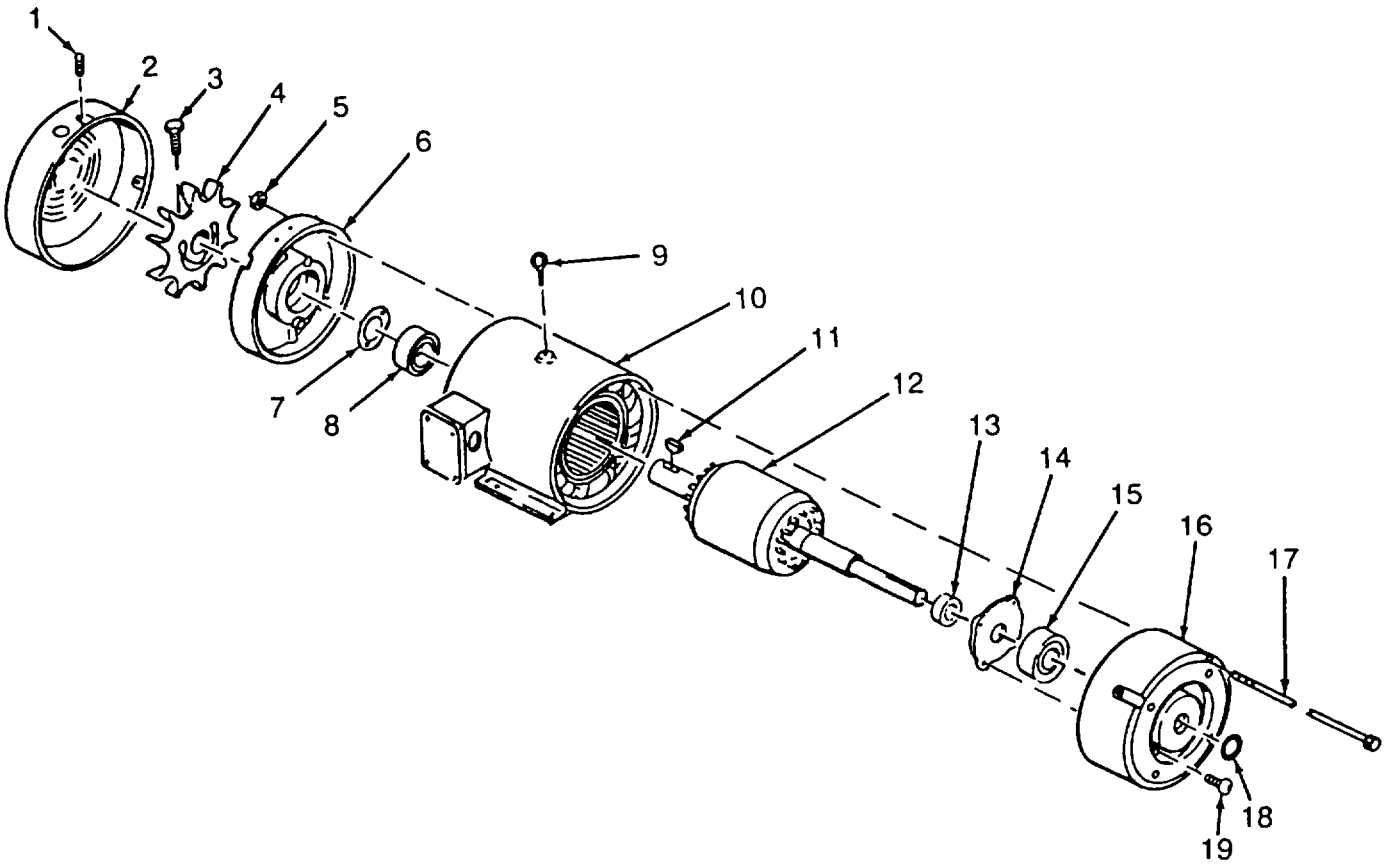
l. Remove eyebolt (9)

CLEANING.

WARNING

Compressed air can blow dust into the eyes Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.

a. Scrap loose paint from fan cover, stator, and shaft end plate Prime and paint as



3-6. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) AMALIEANCE-continued

b. Using compressed air, blow dust and grit from stator assembly (10) and rotor shaft (12) Wipe rotor shaft with clean wiping rag

c. Wipe bearings (8 and 15) with clean rag if grease is dry or dirty

d. Clean fan cover (2) vent slots with compressed air and wipe with clean rag.

INSPECTION.

a. Inspect leads and windings of stator assembly (10) for evidence of cracked or burned insulation Replace as required

b. Inspect rotor shaft (12) for loose or burned conducting bars.

c. Inspect bearings (8 and 15) for wear

d. Inspect shaft end plate (16) and fan end housing (6) for cracks.

e. Using multimeter set to OHMS X1 scale, connect test leads to pairs of motor leads in the following order: T1 and T2, T1 and T3, T2 and T3

f. If multimeter indication is not 0 ohm for each pair of windings, replace stator assembly (10)

g. Set multimeter to OHMS X1000 scale Connect one lead to stator housing. Connect other lead to each motor lead in turn

h. If multimeter indication is not infinity for each motor lead, replace stator assembly (10).

REPAIR.

Replace all damaged components

ASSEMBLY

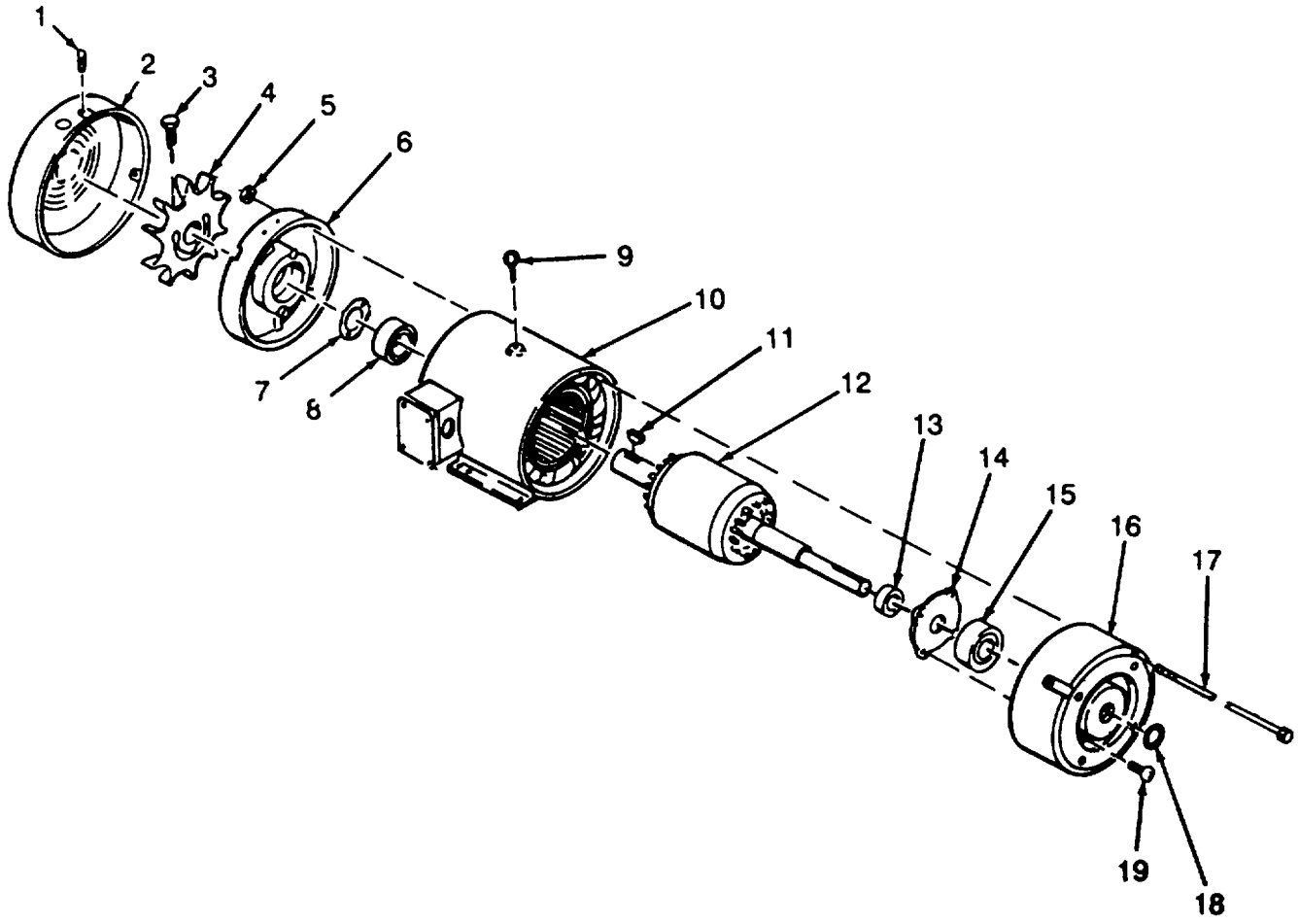
a. Install eyebolt (9).

b. Pack two bearing (8).with grease Using arbor press, install bearing (8) on short end of rotor shaft (12).

c. Pack two bearing (15).with grease Install sleeve (13) and retainer plate (14). Using arbor press, install bearing (15) on long end of rotor shaft (12)

d. Install shaft end plate (16) on long end of rotor shaft (12) and install four screws (19) and ring seal (18)

3-6. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) MAINTENANCE - continued.



3-6. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) MAINTENANCE - continued.

CAUTION

Wiring inside stator can be damaged by rotor shaft if rotor is not installed carefully.

e. Position endplate (16) with rotor (12) in stator assembly (10).

f. Install wavy washer (7) on short end of rotor shaft (12).

g. Position fan end housing (6) Aline mark made during disassembly with mark on stator assembly (10).

h. While holding shaft end plate (16) alined on one end of stator assembly (10) position fan end housing (6) on other end. Aline mark made on fan end housing during disassembly with mark on stator assembly.

i. Install four bolts (17) and nuts (5)

j. Install fan (4) and tighten screw (3).

k. Install fan cover (2) and three screws (1)

TEST.

a. Secure motor to test bench

WARNING

Electrical high voltage can cause serious injury or death. Some test require power to be connected. Always take proper measures to ensure personal safety.

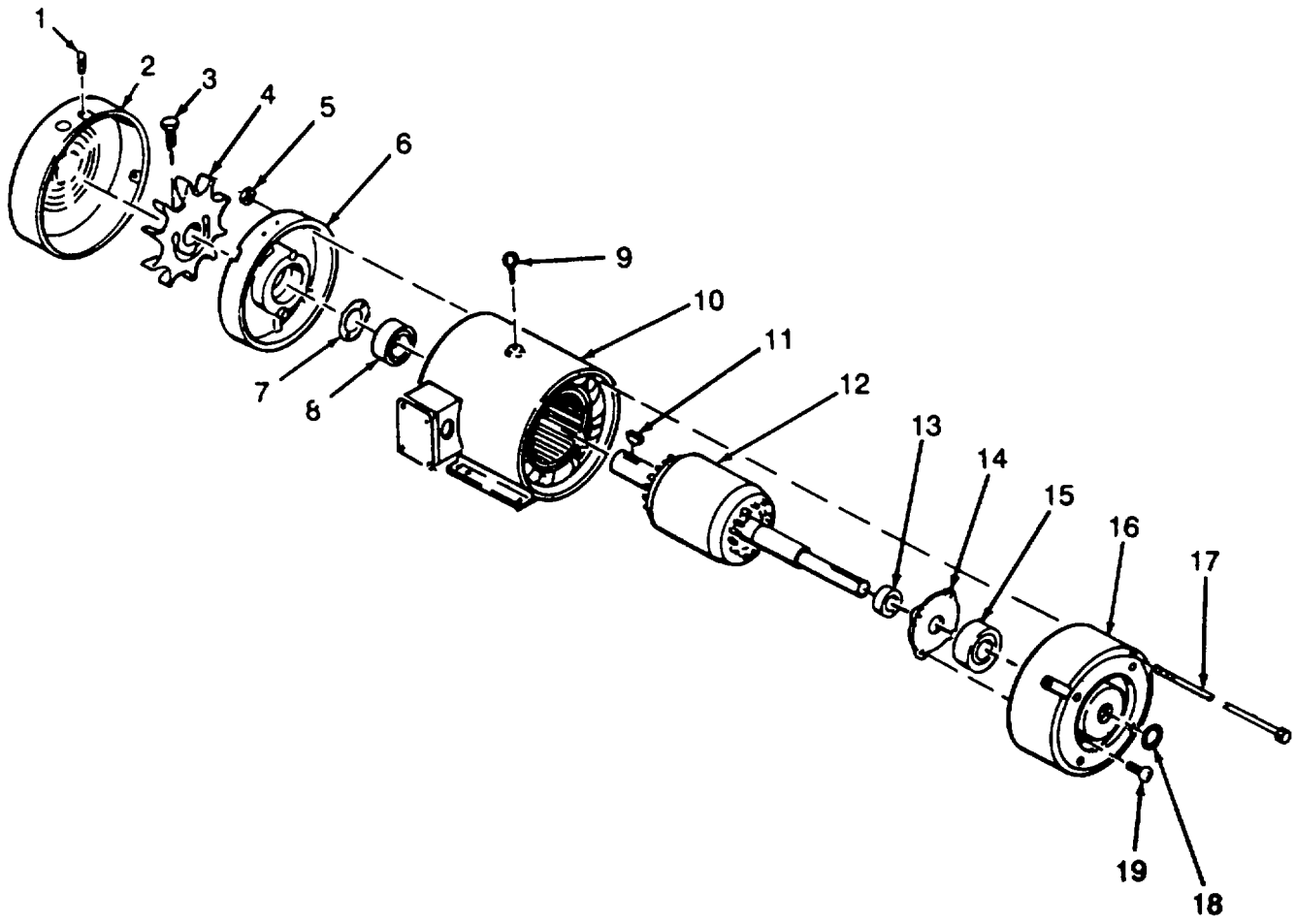
b. Connect motor wiring to test bench leads

c. Connect power and run motor with and without load.

d. Check motor for excessive vibration and fast temperature rise

e. Disconnect motor from test bench leads.

3-6. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) MAINTENANCE - continued.



3-7. BACKWASH PUMP FRAME MAINTENANCE.

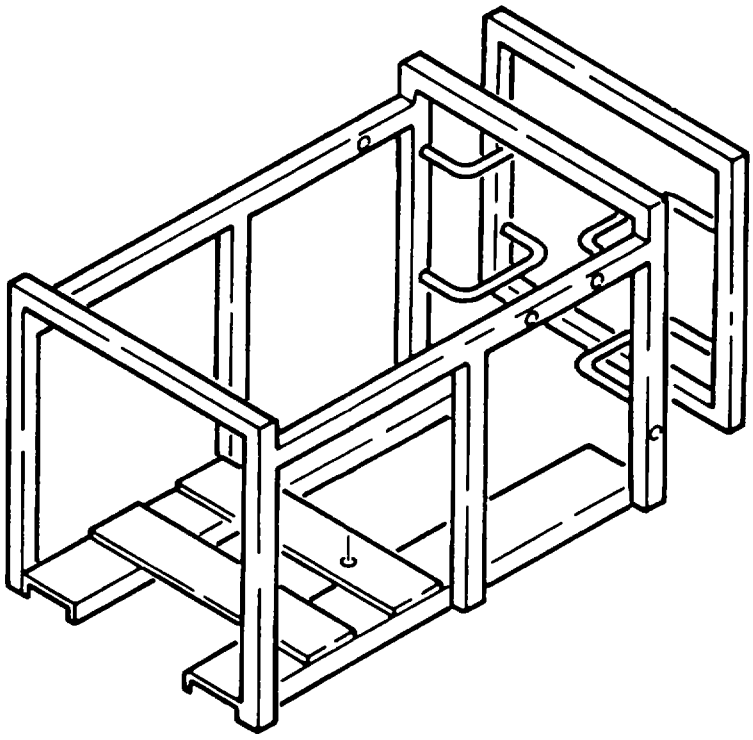
This task consists of Repair

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
References
TM 9-237 Welding Theory and Application.
TM 43-0139 Painting Instructions for Army Materiel.

REPAIR.

a. For standard removal and installation instructions, refer to paragraph 2-8
b. Inspect for bent or broken frame components and cracked welds.
c. Weld frame as required in accordance with TM 9-237
d. Paint frame in accordance with TM 43-0139



Section III. RAW WATER PUMP ASSEMBLY MAINTENANCE PROCEDURES

3-8. CABLE ASSEMBLY (RAW WATER PUMP) MAINTENANCE.

This task consists of
a. Inspection
b. Disassembly
c. Repair
d. Assembly
e. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Soldering Gun Kit (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3).
Electrical Repair Kit (Appendix B, Section III, Item 3)
Crimping Tool (Appendix B, Section III, Item 3)
Wire Stripper (Appendix B, Section III, Item 3)
Materials/Parts Required
Tape, Electrical (Appendix C, Section II, Item 31)
Solder (Appendix C, Section II, Item 27)
Equipment Condition
Reference
ROWPU shutdown (TM 104610-240-10).
Cable assembly removed (para 2-21).

INSPECTION

For inspection procedures, refer to paragraph 3-20.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-20.

TEST.

For test procedures, refer to paragraph 3-20.

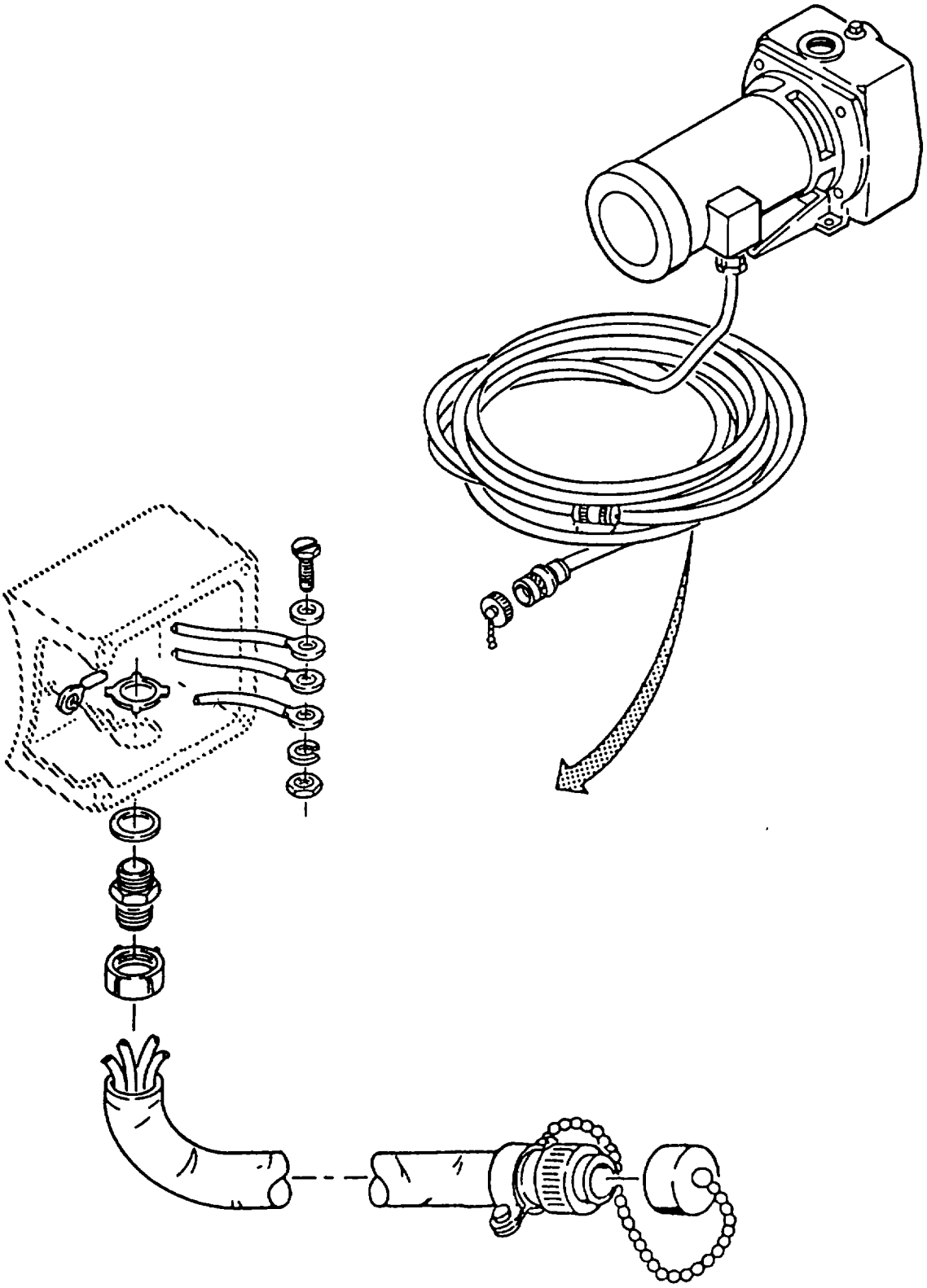
ASSEMBLY

For assembly procedures, refer to paragraph 3-20.

REPAIR.

For repair procedures, refer to paragraph 3-20.

3-8. CABLE ASSEMBLY (RAW WATER PUMP) MAINTENANCE.



3-9. CENTRIFUGAL PUMP (RAW WATER PUMP) MAINTENANCE.

This task consists of
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly
f. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Stiff-Bristled Brush (Appendix B, Section III, Item 4).
Strap Wrench (Appendix B, Section III, Item 3).
Materials/Parts Required
Solvent, drycleaning Solvent (Appendix C, Section II, Item 28)
Detergent (Appendix C, Section II, Item 10).
Gasket- 8988
Equipment Condition
Reference
Centrifugal pump assembly removed (para 2-22).
General Safety Instructions

WARNING

- Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates Wear eye, skin, and respiratory protection Use in a well-ventilated area.
- Compressed air can blow dust into the eyes Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure

REMOVAL.

a. Remove four screws (20) and lockwashers (21) and separate pump case assembly (14) from motor (1).

DISASSEMBLY.

a. Remove seal (12), diffuser (11), gasket (6), and dowel pins (15).
b. Remove screw (10) and washer (9).
c. Unscrew impeller (8) and remove seal assembly (7) and washer (16). Discard seal assembly.
d. Mark motor and remove four screws (4) lockwashers (3) and separate adapter (5) from motor (1).
e. Remove screw (19), lockwasher (18), and bracket (17).
f. Remove priming plug (13).

3-9. CENTRIFUGAL PUMP (RAW WATER PUMP) MAINTENANCE - continued.

g. Remove slinger (2) from motor shaft (22).

CLEANING.

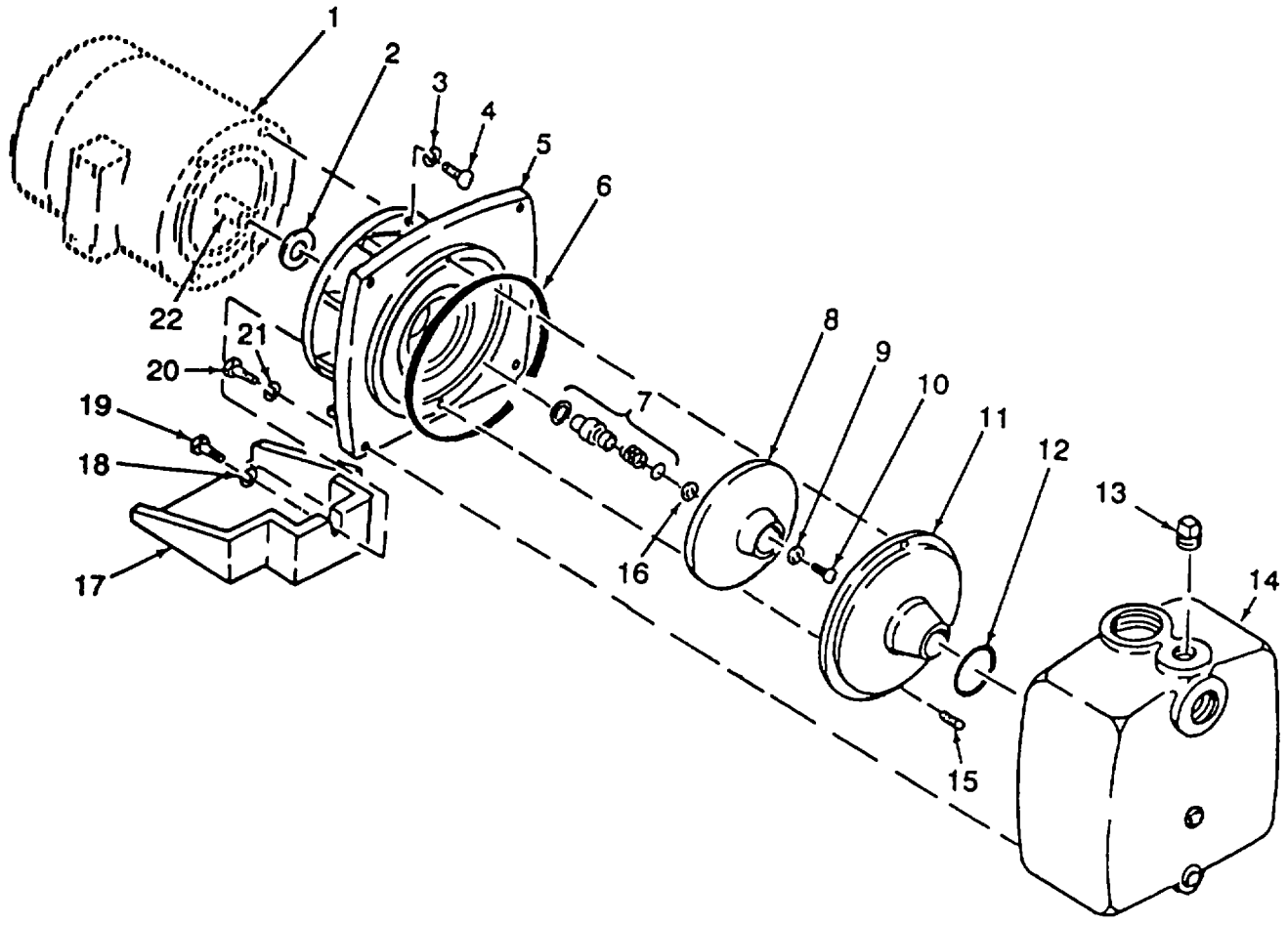
WARNING

- Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.
- Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure

a. Clean pump case (14) and adapter (5) with drycleaning solvent. Dry with compressed air.

b. Using a stiff-bristled brush, remove rust and corrosion from pump case and adapter

c. Wash all internal surfaces with clear water and detergent.



3-9. CENTRIFUGAL PUMP (RAW WATER PUMP) MAINTENANCE - continued.

INSPECTION.

a. Inspect attaching hardware for damage.

b. Inspect impeller (8), diffuser (11), slinger (2), bracket (17), case (16), and adapter (5) for cracks and serviceability.

ASSEMBLY.

a. Instal priming plug (13) on pump case (14).

b. Position adapter (5) on bracket (17) and secure with screw (19) and lockwasher (18).

c. Install flinger (2) on electric motor shaft (22).

d. Position adapter (5) on motor (1) and install four lockwashers (3) and screws (4).

e Install new seal assembly (7) with groove side down on electric motor shaft (22) and install washer (16).

f. Install impeller (8) hand tight, washer (9), and screw (10) on electric motor shaft (22)

g. Install gasket (6).

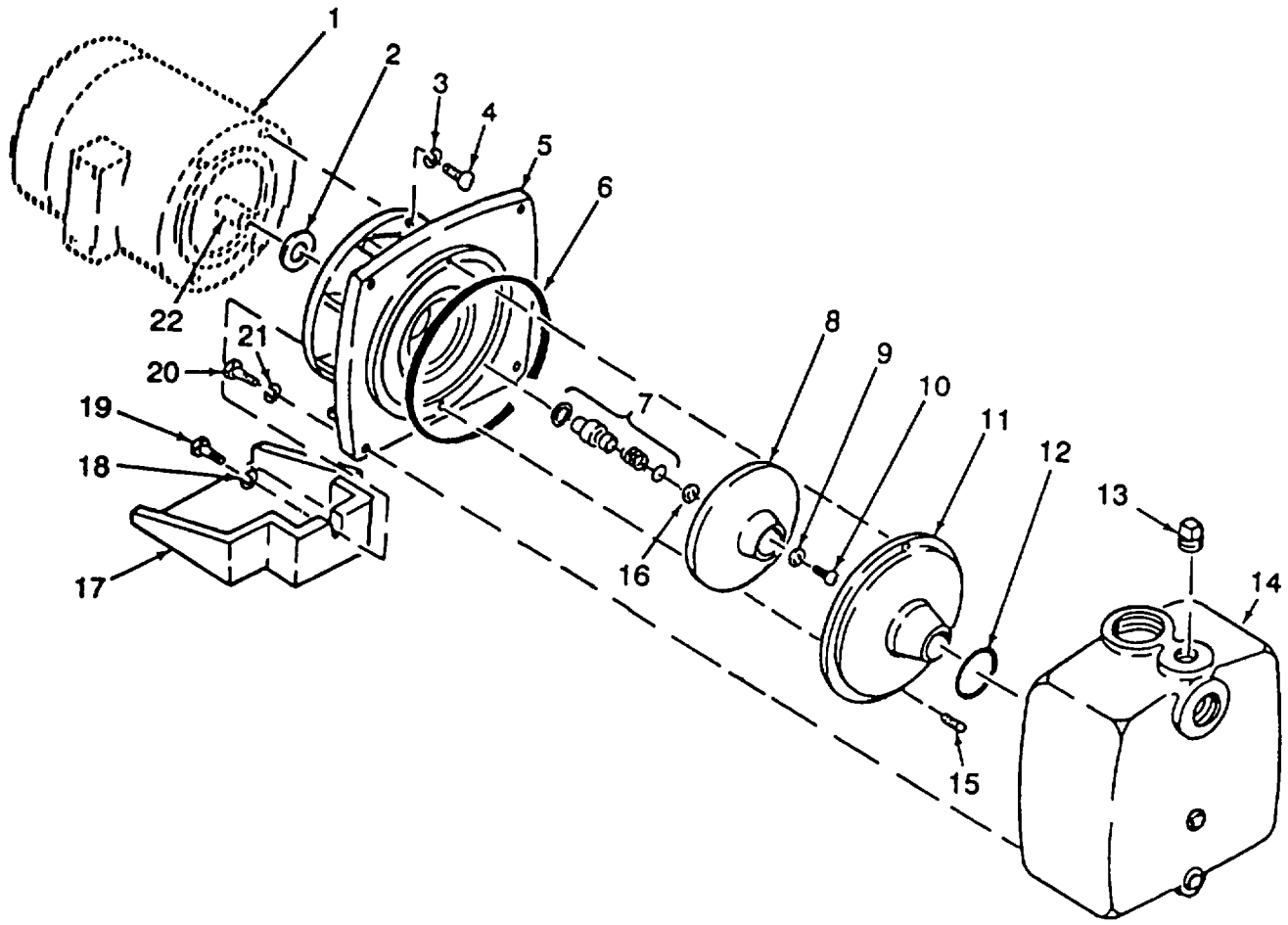
h. Install two dowel pins (15).

i. Install diffuser (11) and seal (12).

INSTALLATION.

a. Position pump case (14) and install four screws (20) and washers (21).

3-9. CENTRIFUGAL PUMP (RAW WATER PUMP) MAINTENANCE - continued.



3-10. CENTRIFUGAL PUMP MOTOR (RAW WATER PUMP) MAINTENANCE.

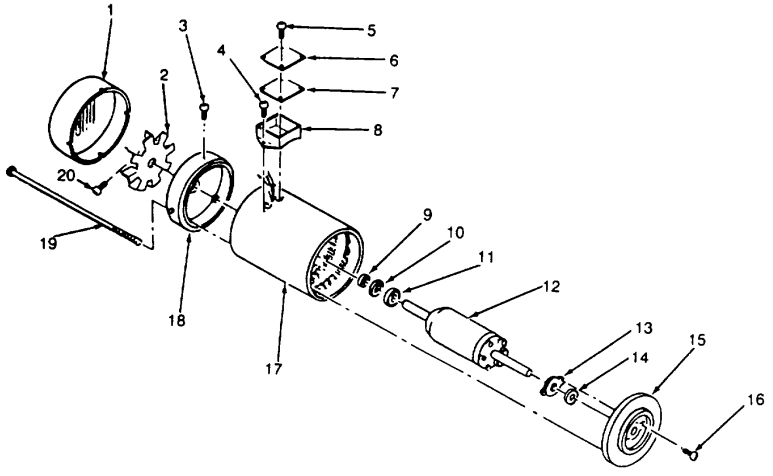
This task consists of
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly
f. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Arbor Press (Appendix B, Section III, Item 3)
Bearing Puller (Appendix B, Section III, Item 3).
Growler (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3).
Material/Parts Required
Grease (Appendix C, Section II, Item 15).
Wiping Rags (Appendix C, Section II, Item 23).
Equipment Condition
Reference
Raw water pump removed (para. 3-9).
General Safetv Instructions

WARNING

- Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.
- Compressed air can blow dust into the eyes. Wear eye protection Do not exceed 30 psi (207 kPa) air pressure



3-10. CENTRIFUGAL PUMP MOTOR(RAW WATER PUMP) MAINTENANCE - continued.

DISASSEMBLY.

a. Remove two screws (5) and conduit box cover (6) and gasket (7), as required

b. Remove two screws (4) and conduit box (8), as required.

c. Remove four screws (3) and fan cover (1).

d. Loosen set screw (20) and remove fan (2) from shaft of rotor (12).

NOTE

Mark fan end plate, motor casing, and pump end plate to assist in alinement during assembly.

e. Remove four through-bolts (19)

f. Remove two screws (16).

g. Tap pump end plate (15) with soft-faced mallet to break bond with stator assembly (17) and remove pump end plate (15).

CAUTION

Stator wiring inside motor casing can be damaged by rotor or shaft if rotor is not removed carefully.

h. Remove rotor (12) from stator assembly (17)

i Pull bearing (14) from shaft of rotor (12).

j. Remove bearing retainer (13).

k. Tap fan end plate (18) with soft-faced mallet to break bond with stator assembly (17) and remove fan end plate.

1. Remove flat washer (10) and wavy washer (9) from shaft of rotor (12).

m. Using arbor press, remove bearing (11) from shaft of rotor (12)

CLEANING.

WARNING

Compressed air can blow dust into the eyes. Wear eye protection Do not exceed 30 psi /(207 kPa) air pressure.

a. Scrape loose paint from stator assembly (17) and fan cover (18).

b. Using compressed air, blow dust and grit from stator and rotor assemblies Wipe rotor assembly (12) with clean rag

3-10. CENTRIFUGAL PUMP MOTOR(RAW WATER PUMP) MAINTENANCE - continued.

c Clean fan cover vent (1) slots with compressed air and wipe with clean rag

d Wipe bearings (11 and 14) with clean rag

INSPECTION.

a. Inspect leads and windings of stator assembly (17) for evidence of cracked or burned insulation.

b. Inspect rotor assembly for loose or burned conducting bars

c. Using growler check rotor assembly for shorts

d. Inspect bearings for wear

e. Inspect end plates for cracks

f. Inspect bushings for cracks or brittleness

g. Using multimeter set to OHMS X1 scale, connect test leads to pairs of motor leads in the following order T1 and T2, TI and T3, T2 and T3.

h. If multimeter indication is not 0 ohm for each pair of windings, replace stator

i. Set multimeter to OHMS X1000 scale. Connect one lead to stator housing Connect other lead to each motor lead in turn.

j. If multimeter indication is not infinity for each motor lead, replace stator.

REPAIR.

Replace damage component

ASSEMBLY.

a Pack two bearings (11 and 14) with grease and use arbor press to install bearing (11) on fan end shaft of rotor (12).

b Install wavy washer (10) and flat washer (9) on fan end shaft of rotor (12).

c. Position fan end plate (18) Aline marks on end plate and stator assembly (17) made during disassembly

d. Install and press bearing retainer (13), bearing (14), and two screws (16) on pump end plate (15).

CAUTION

Wiring inside stator can be damaged by rotor or shaft if rotor is not installed carefully

e Install rotor (12) in stator assembly (17) with rotor shaft through fan end plate (18)

3-10. CENTRIFUGAL PUMP MOTOR(RAW WATER PUMP) MAINTENANCE - continued.

f. Position pump endplate (15). Aline marks on end plate (15)and stator assembly (17) made during disassembly and install four through-bolts (19)

g. Position fan (2) on rotor shaft (12) and tighten setscrew (20).

h. Position fan cover (1) and install four screws (3).

i. Position conduit box (8) and install two screws (4), as required.

j. Position gasket (7), conduit box cover (6) and install two screws (5), as required

TEST.

a. Secure motor to test bench.

WARNING

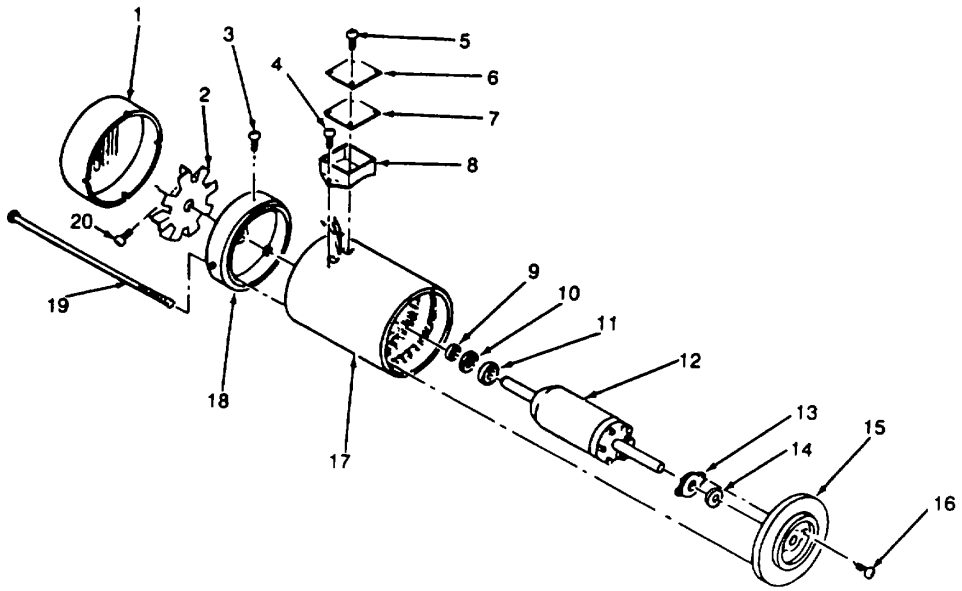
Electrical high voltage can cause serious injury or death. Some tests require power to be connected. Always take proper measures to ensure personal safety.

b. Connect motor wiring to test bench leads

c. Connect power and run motor with and without load

d. Check motor for excessive vibration and fast temperature rise.

e Disconnect motor from test bench leads.



3-11. RAW WATER PUMP FRAME MAINTENANCE.

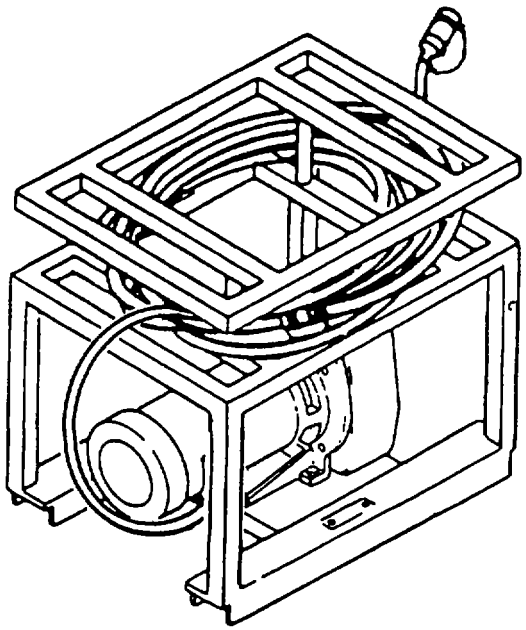
This task consists of
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly
f. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
References
TM 9-237 Welding Theory and Application.
TM 43-0139 Painting Instructions for Army Materiel

REPAIR.

a. For standard removal and installation instructions, refer to paragraph 2-20.
b. Inspect for bent or broken frame components and cracked welds.
c. Weld frame as required in accordance with TM 9-237
d. Paint frame in accordance with TM 43-0139.



Section IV. DISTRIBUTION PUMP ASSEMBLIES MAINTENANCE PROCEDURES

3-12. CABLE ASSEMBLY (DISTRIBUTION PUMP) MAINTENANCE.

This task consists of:
a. Inspection
b. Disassembly
c. Test
d. Assembly
e. Repair

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3).
Electrical Repair Kit (Appendix B, Section III, Item 3).
Crimping Tool (Appendix B, Section III, Item 3).
Wire Stripper (Appendix B, Section III, Item 3)
Material/Parts Required
Tape, Electrical (Appendix C, Section II, Item 31).
Solder (Appendix C, Section II, Item 27).
Equipment Condition
Reference
Cable assembly removed (para. 2-25).

INSPECTION

For inspection procedures, refer to paragraph 3-20.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-20.

TEST

For test procedures, refer to paragraph 3-20.

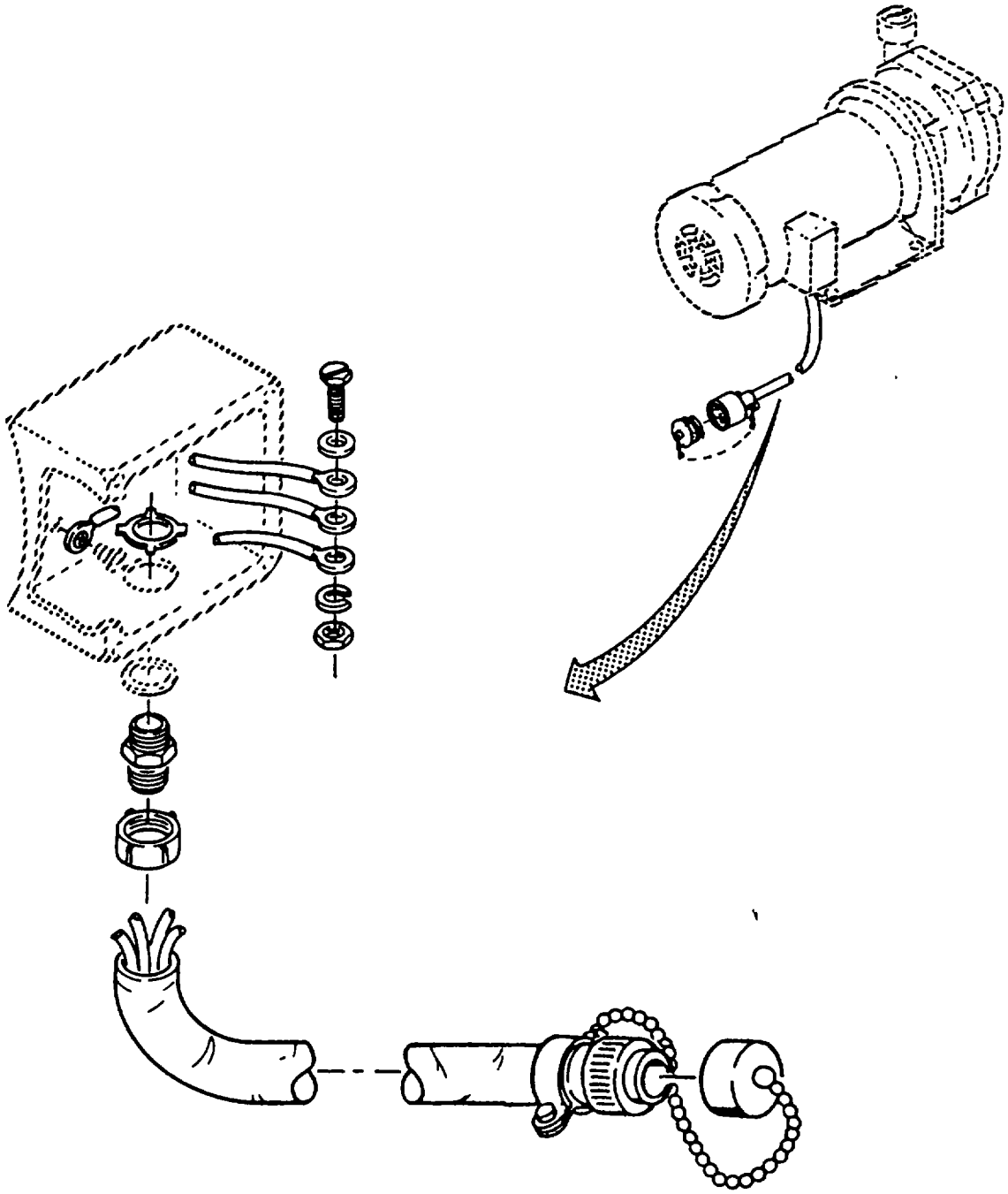
ASSEMBLY

For assembly procedures, refer to paragraph 3-20.

REPAIR

For repair procedures, refer to paragraph 3-20.

3-12. CABLE ASSEMBLY (DISTRIBUTION PUMP) MAINTENANCE - continued.



3-13. CENTRIFUGAL PUMP (DISTRIBUTION PUMP) MAINTENANCE.

This task consists of:
a. Disassembly
b. Cleaning
c. Inspection.
d. Repair
e. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Strap Wrench (Appendix B, Section III, Item 3)
Stiff-Bristled Brush (Appendix B, Section III, Item 3)
Materials/Parts Required
Solvent, drycleaning (Appendix C, Section II, Item 28)
Detergent (Appendix C, Section II, Item 10)
Equipment Condition
Reference
Centrifugal pump assembly removed (para. 2-26).
General Safety Instructions

WARNING

- Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.
- Compressed air can blow dust into the eyes Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.

DISASSEMBLY

a. Remove four screws (13), cover (12), and gasket (11).

b. Remove cap (1) and insert screwdriver in shaft slot (2).

c. While holding shaft with screwdriver, remove impeller (9) and mechanical seal (8).

d. Remove seal (10) from impeller (9).

e. Remove four cap screws (6), from bracket (5).

f. Rotate bracket (5) and remove bracket from casing (7).

g. Remove remaining parts of mechanical seal (8) from casing (7).

h. Remove slinger (4) from shaft of electric motor (3).

3-13. CENTRIFUGAL PUMP (DISTRIBUTION PUMP) MAINTENANCE - continued.

CLEANING

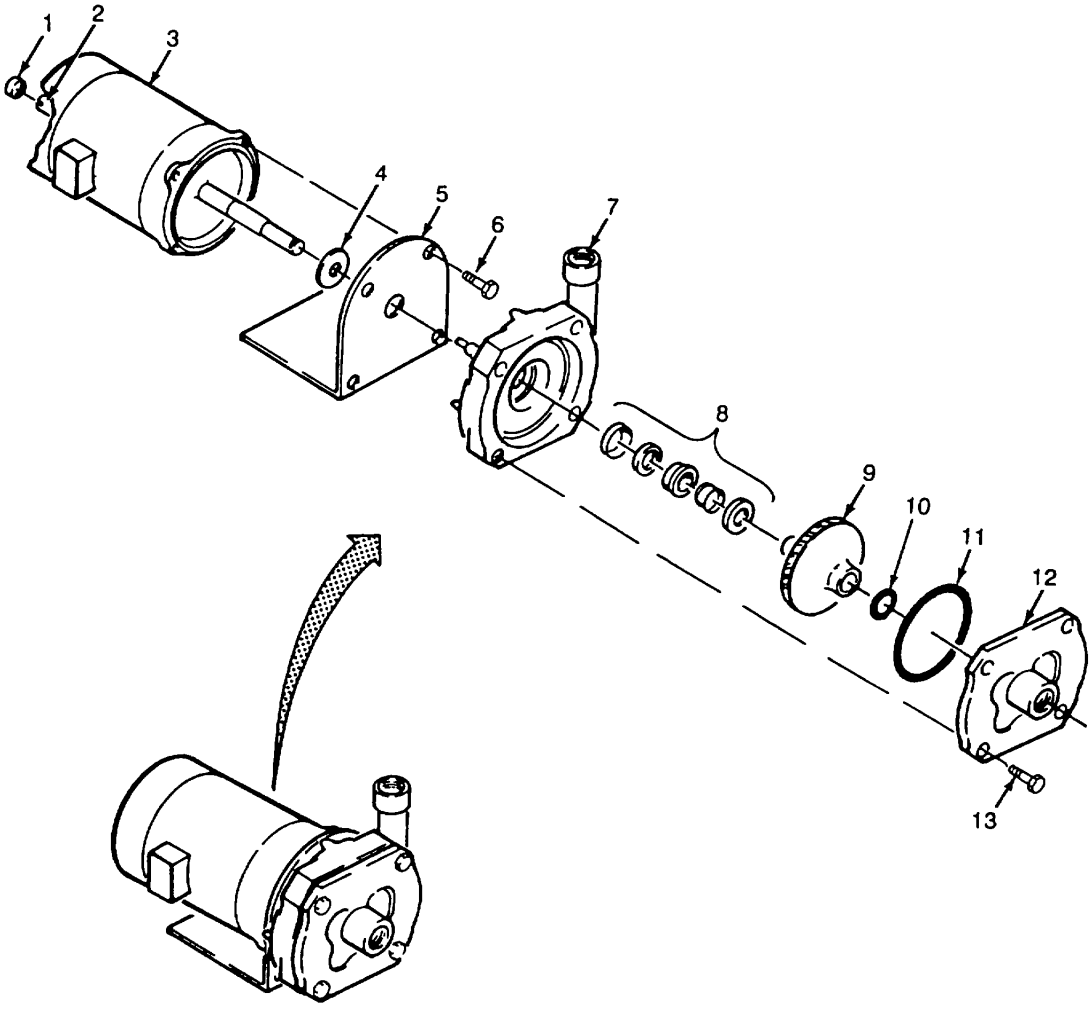
WARNING

- Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.
- Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psi (107 kPa) air pressure

a. Using drycleaning solvent, clean outside of casing (7).

b. Using wire brush, clean rust and corrosion from casing (7).

c. Using mild soap solution, wash impeller (9) and inside of casing (7).



3-13 CENTRIFUGAL PUMP (DISTRIBUTION PUMP) MAINTENANCE - continued.

INSPECTION

a. Inspect casing (7) and impeller (9) for cracks and damage.

b. Inspect mounting hardware for excessive wear or other damage.

REPAIR

Replace damaged components.

ASSEMBLY

a. Install new slinger (4) on shaft of electric motor (3).

b. Rotate casing (7) on bracket (5) and install new mechanical seal (8).

c. Position electric motor (3) on bracket (5) and install four cap screws (6).

CAUTION

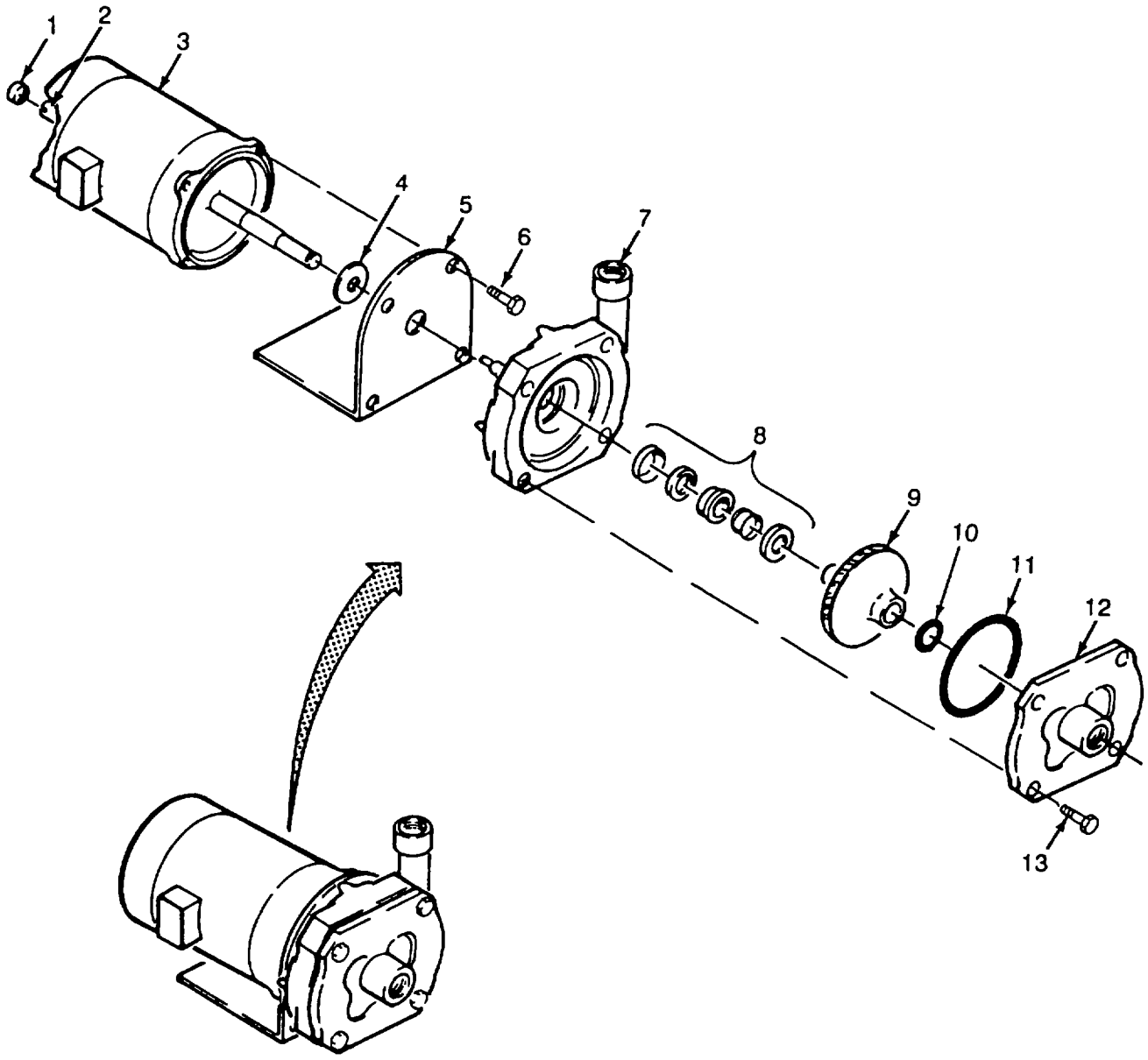
Seal assembly must be installed in casing with raised end first

d. Insert blade of screwdriver in shaft slot (2) and install impeller (9) and new seal (10).

e. Position gasket (11) in cover (12). Install four screws (13).

f. Install cap (1).

3-13. CENTRIFUGAL PUMP (DISTRIBUTION PUMP) MAINTENANCE - continued.



3-14. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) MAINTENANCE.

This task consists of:
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly
f. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Arbor Press (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3)
Growler (Appendix B, Section III, Item 3)
Material/Parts Required
Grease (Appendix C, Section II, Item 15)
Rags, wiping (Appendix C, Section II, Item 23)
Gasket - 34GS1000
Gasket- 34GS1001
Equipment Condition
Reference
Centrifugal pump motor removed (para 3-13).
General Safety Instructions

WARNING

- High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.
- Compressed air can blow dust into the eyes Wear eye protection Do not exceed 30 psi (207kPa) air pressure

DISASSEMBLY

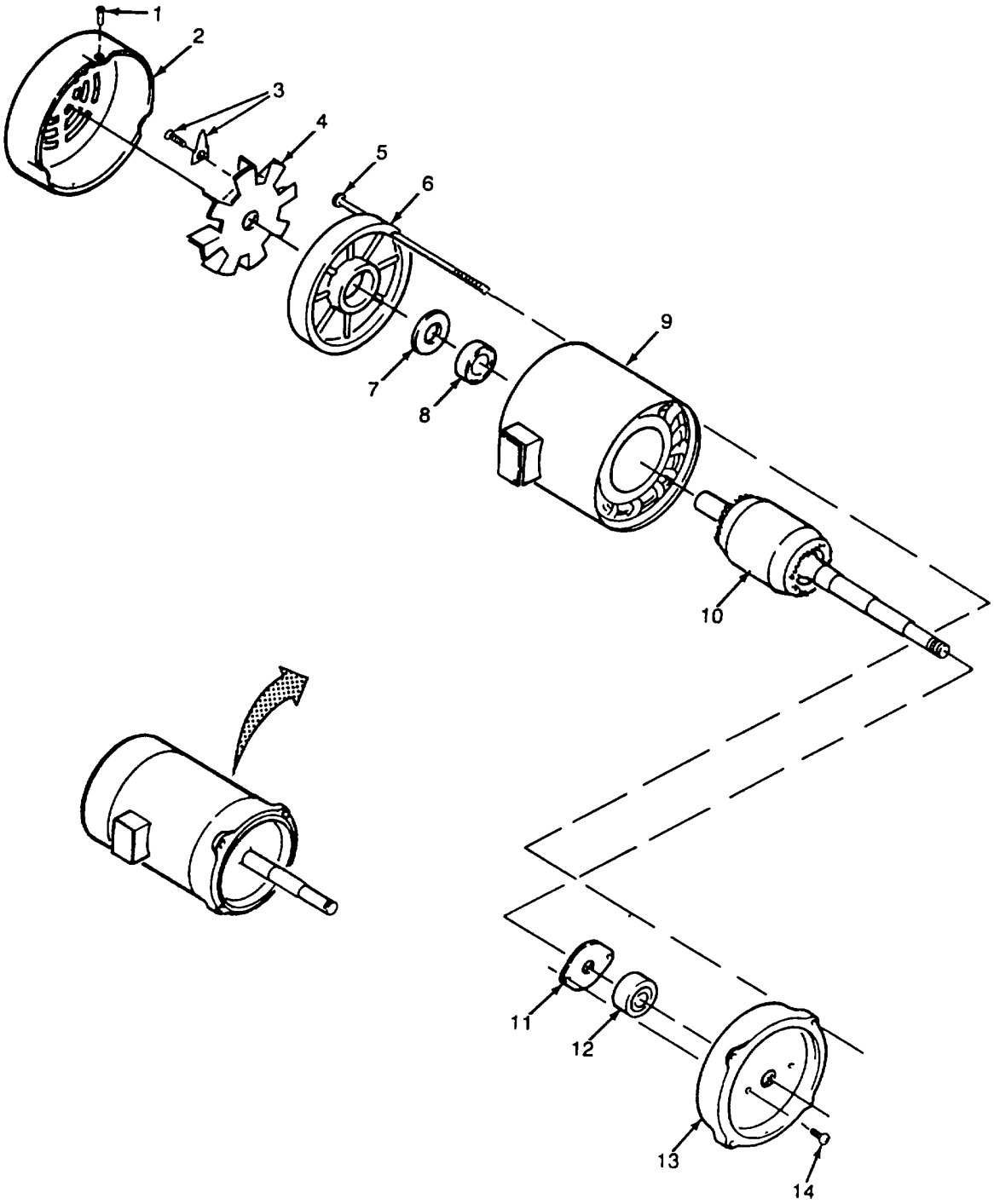
a. Remove three screws (1) and fan cover (2)

b. Remove screw and retainer (3), and external fan (4) from rotor shaft (10).

NOTE

Mark fan end plate, case, and pump end plate to assist in alinement during assembly

3-14. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) MAINTENANCE - continued.



3-14. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) MAINTENANCE - continued.

c. Remove four bolts (5).

d. Tap plate (6) with soft-faced mallet to break bond with stator assembly (9) and remove plate

e. Remove washer (7) from rotor shaft (10).

CAUTION

Stator wiring inside case can be damaged by rotor shaft if rotor shaft is not removed carefully Guide rotor shaft carefully while removing it.

f. Tap plate (13) with soft-faced mallet to break bond with stator assembly (9) and remove plate with rotor shaft (10) attached.

g. Remove two screws (14) and plate (13) from rotor shaft (10).

h Using arbor press, remove bearing (8) from rotor shaft (10).

i. Using arbor press, remove bearing (12) from rotor shaft (10).

j. Remove retainer ring (11).

CLEANING

WARNING

Compressed air can blow dust into the eyes Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.

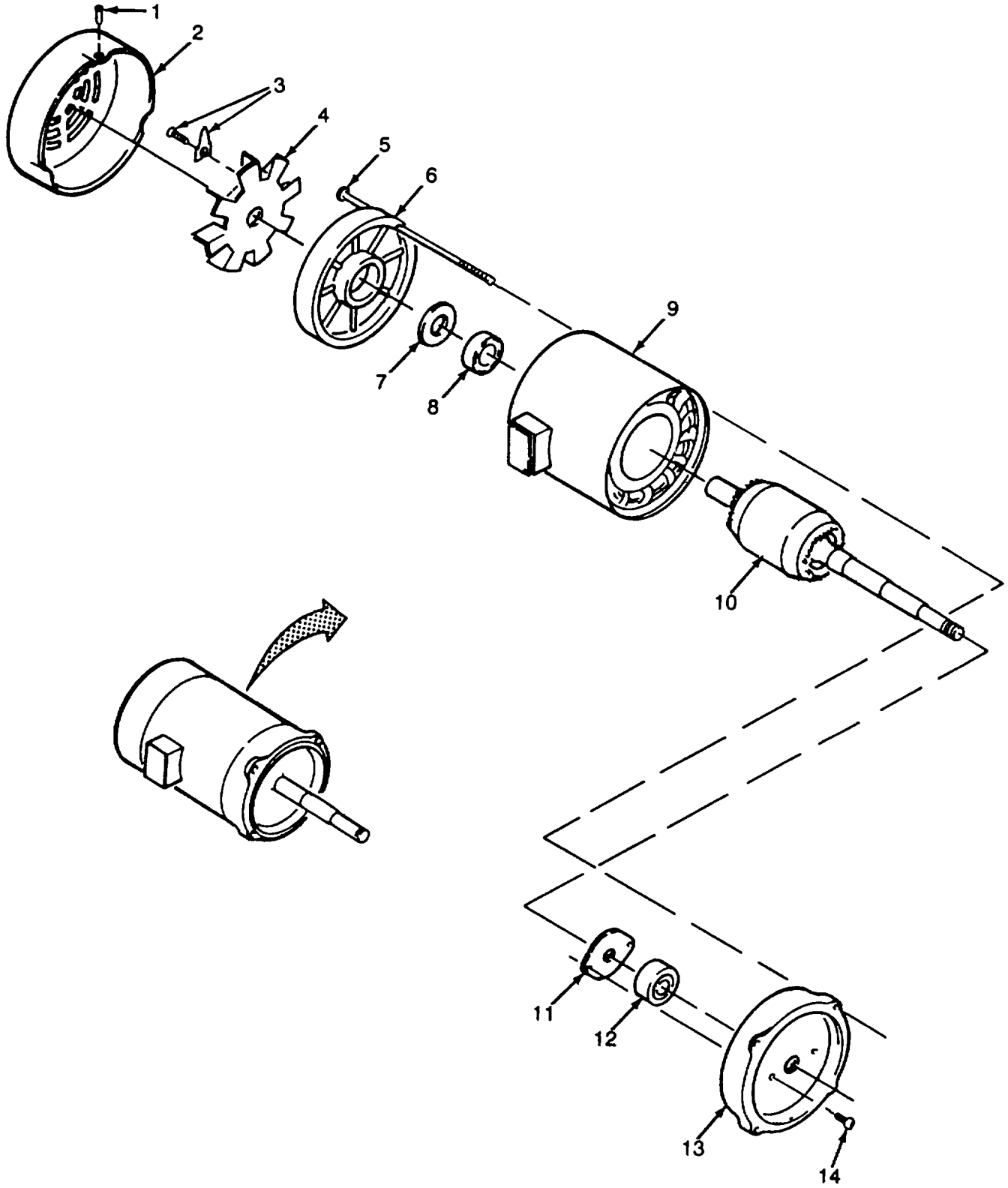
a. Using compressed air, blow dust and grit from stator assembly (9) and rotor shaft (10). Wipe rotor assembly with clean rag.

b. Clean fan cover (2) vent slots with compressed air and wipe with clean rag.

c. Wipe bearings (8 and 12) with clean rag.

d. Scrape loose paint from fan cover (2), stator assembly (9), and pump end plate (13).

3-14. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) MAINTENANCE - continued.



3-14. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) MAINTENANCE- continued.

INSPECTION

a. Inspect leads and windings of stator in stator assembly (9) for evidence of cracked or burned insulation

b Inspect rotor shaft (10) for loose or burned conducting bars Replace as required

c. Using growler check rotor assembly for shorts

d. Inspect bearings (8 and 12) for wear

e Inspect end plates (6 and 13) for cracks.

f Using multimeter set to OHMS X1 scale, connect test leads to pairs of motor lead sets 4, 5, and 9 to 1 and 7, 1 and 7 to 2 and 8, 1 and 7 to 3 and 6, and 2 and 8 to 3 and 6.

g. If multimeter indication is not 0 ohm for each pair of windings, replace stator assembly (9).

h. Set multimeter to OHMS X1000 scale. Connect one lead to stator housing. Connect other lead to each motor lead in turn.

i. If multimeter indication is not infinity for each motor lead, replace stator assembly (9)

REPAIR

Replace defective components

ASSEMBLY

a. Pack two bearings (8 and 12) with grease and use arbor press to install bearing (8) on short end of rotor shaft (10)

b. Install retainer ring (11)

c. Using arbor press, install bearing (12) on rotor shaft (10)

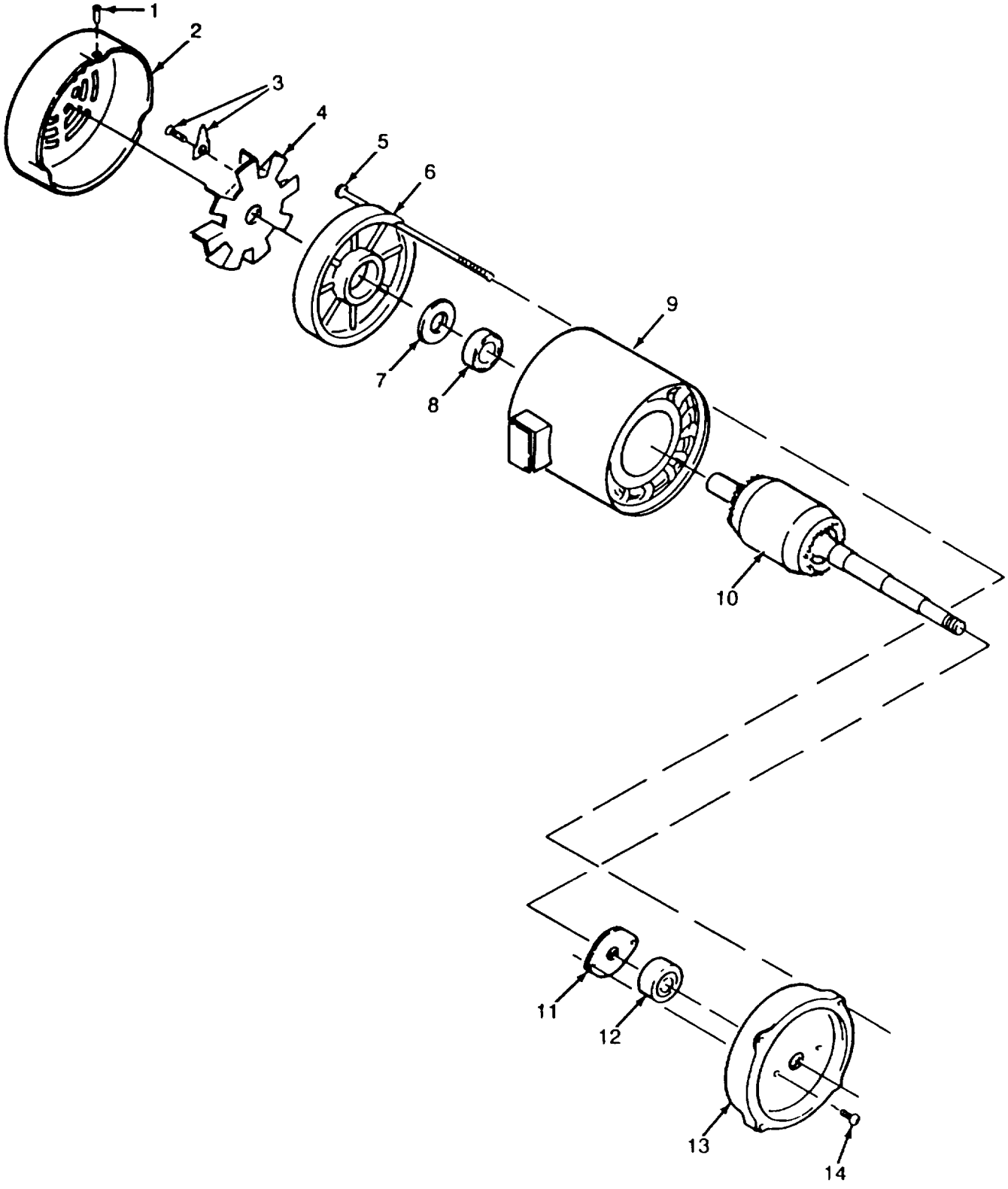
d. Install two screws (14) on plate (13).

CAUTION

Stator wiring inside case can be damaged by rotor shaft if rotor shaft is not installed carefully. Guide rotor shaft carefully while installing it

e. Insert rotor shaft (10) through stator assembly (9)

3-14. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) MAINTENANCE - continued.



3-14. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) MAINTENANCE - continued.

f. Position plate (13) Aline mark made during assembly with mark on stator assembly (9).

g. Install washer (7) on short end of rotor shaft (10).

h. While holding plate (13) alined on one end of stator assembly (9), position plate (6) on other end Aline mark made on plate during disassembly with mark on stator assembly (9).

i. Install four bolts (5).

j. Install fan (4), and screw and retainer (3).

k. Install fan cover (2) and three screws (1).

TEST

a. Secure motor to test bench.

WARNING

Electrical high voltages can cause serious injury or death Some tests require power to be connected. Always take proper measures to ensure personal safety.

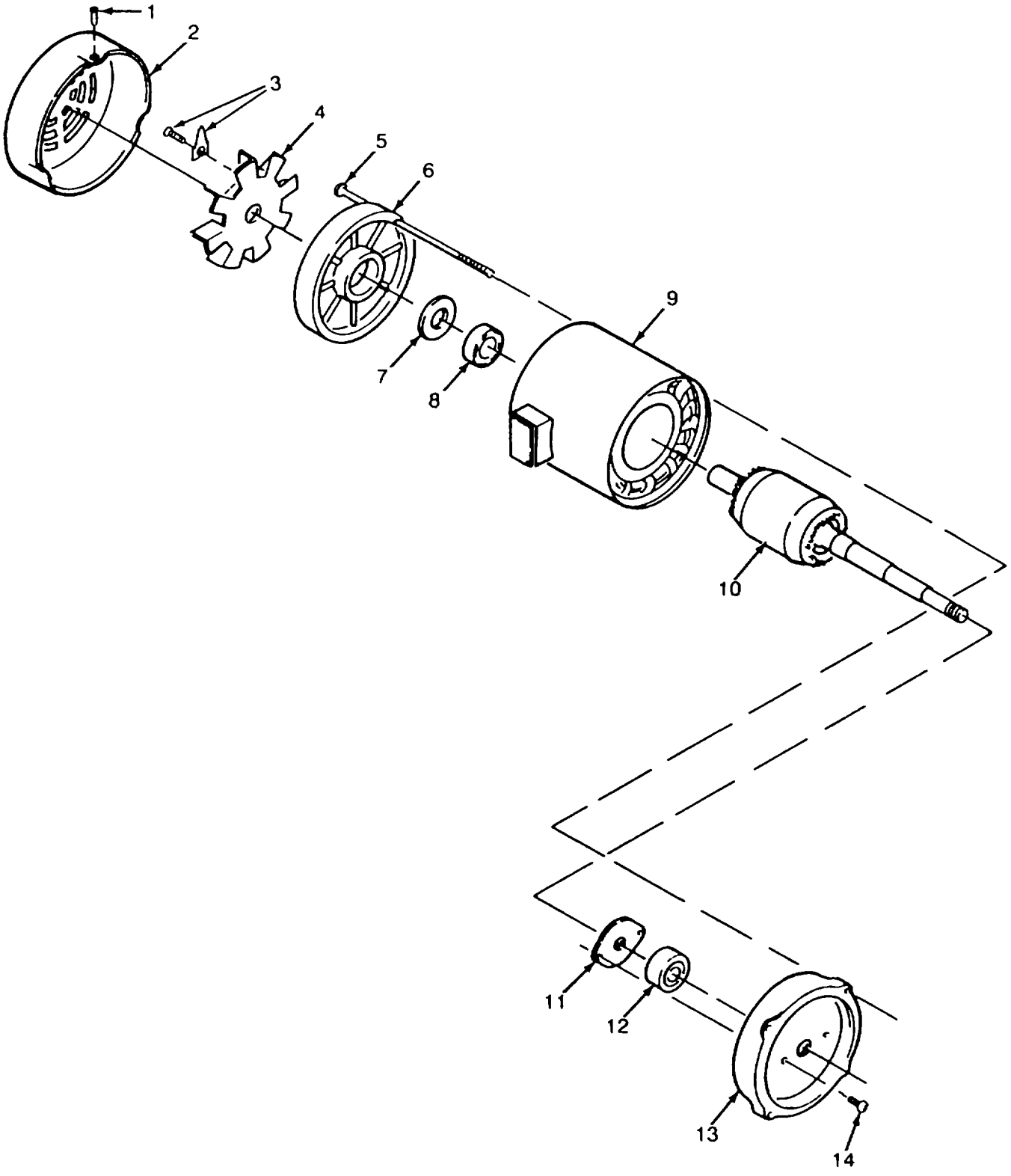
b. Connect motor wiring to test bench leads.

c. Connect power and run motor with and without load.

d. Check motor for excessive vibration and fast temperature rise.

e. Disconnect motor from test bench leads

3-14. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) MAINTENANCE - continued.



13-15. DISTRIBUTION PUMP FRAME MAINTENANCE.

This task consists of. Repair

INITIAL SET-UP:

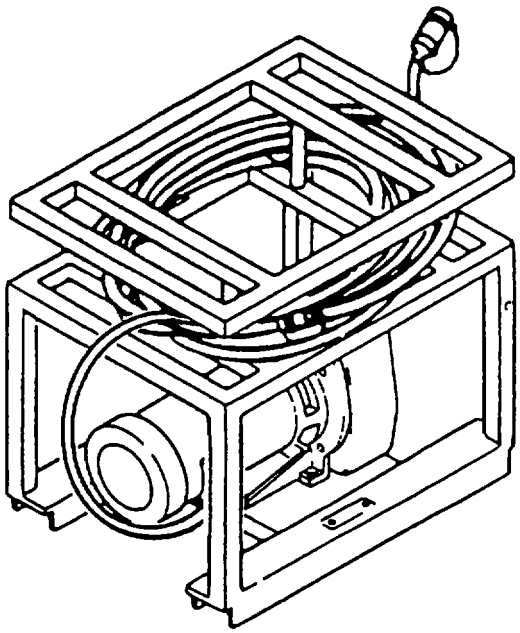
Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
TM 9-237 Welding Theory and Application.
TM 43-0139 Painting Instructions for Army Materiel.
Equipment Condition
Reference
Cable Assembly removed (para. 2-25).
Centrifugal Pump assembly removed (para 2-26).

REPAIR

a. Inspect for bent or broken frame components and cracked welds

b. Weld frame as required in accordance with TM 9-237.

c. Paint frame in accordance with TM 43-0139.



Section V. ROWPU ASSEMBLY MAINTENANCE PROCEDURES

3-16. CHEMICAL CANS AND FRAME MAINTENANCE.

This task consists of: Repair

INITIAL SET-UP:

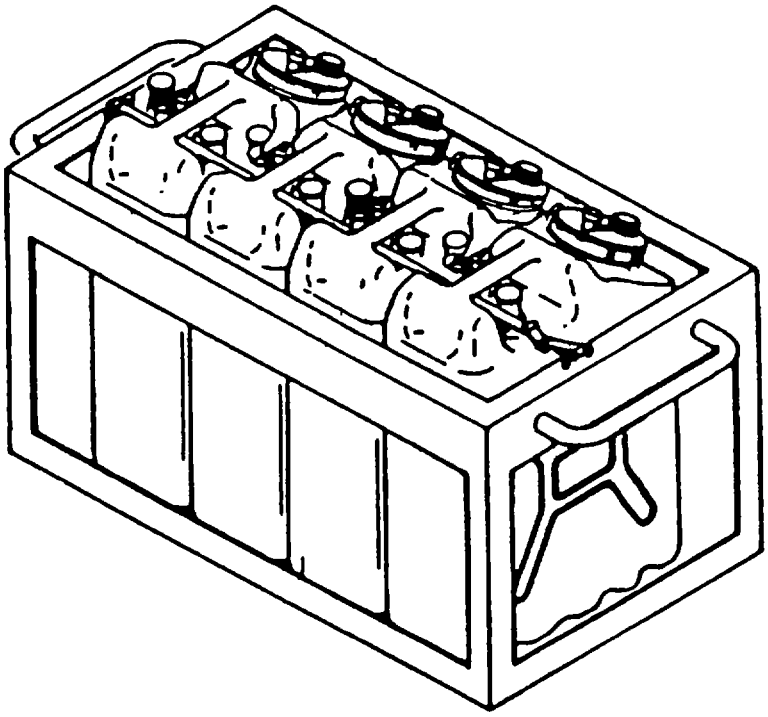
Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
References
TM 9-237 Welding Theory and Application.
TM 43-0139 Painting Instructions for Army Materiel.

REPAIR

a. Inspect for bent for broken frame components and cracked welds.

b. Weld frame as required in accordance with TM 9-237.

c. Paint frame in accordance with TM 43-0139.



3-17. TDS MONITOR MAINTENANCE.

This task consists of: a. Disassembly b. Repair c. Assembly d. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Personnel Required
Two (2)
Material/Parts Required
O-ring (2) - 5262
Equipment Condition
Reference
ROWPU shut down (TM 10-4610-240-10).
General Safety Instructions

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

DISASSEMBLY

NOTE

This procedure is the same for both cables except as noted.

a. Disconnect cable assemblies (6) and (7) from receptacles (11) and (12).

b. Loosen two screws (9) and open cover (8).

c. Pull four snap locks (1) and remove meter cover (2).

NOTE

For cable assembly (7), go to step d.

For cable assembly (6), go to step e.

d. Tag and disconnect three wires from TDS monitor (10).

e. Tag and disconnect five wires from TDS monitor (10).

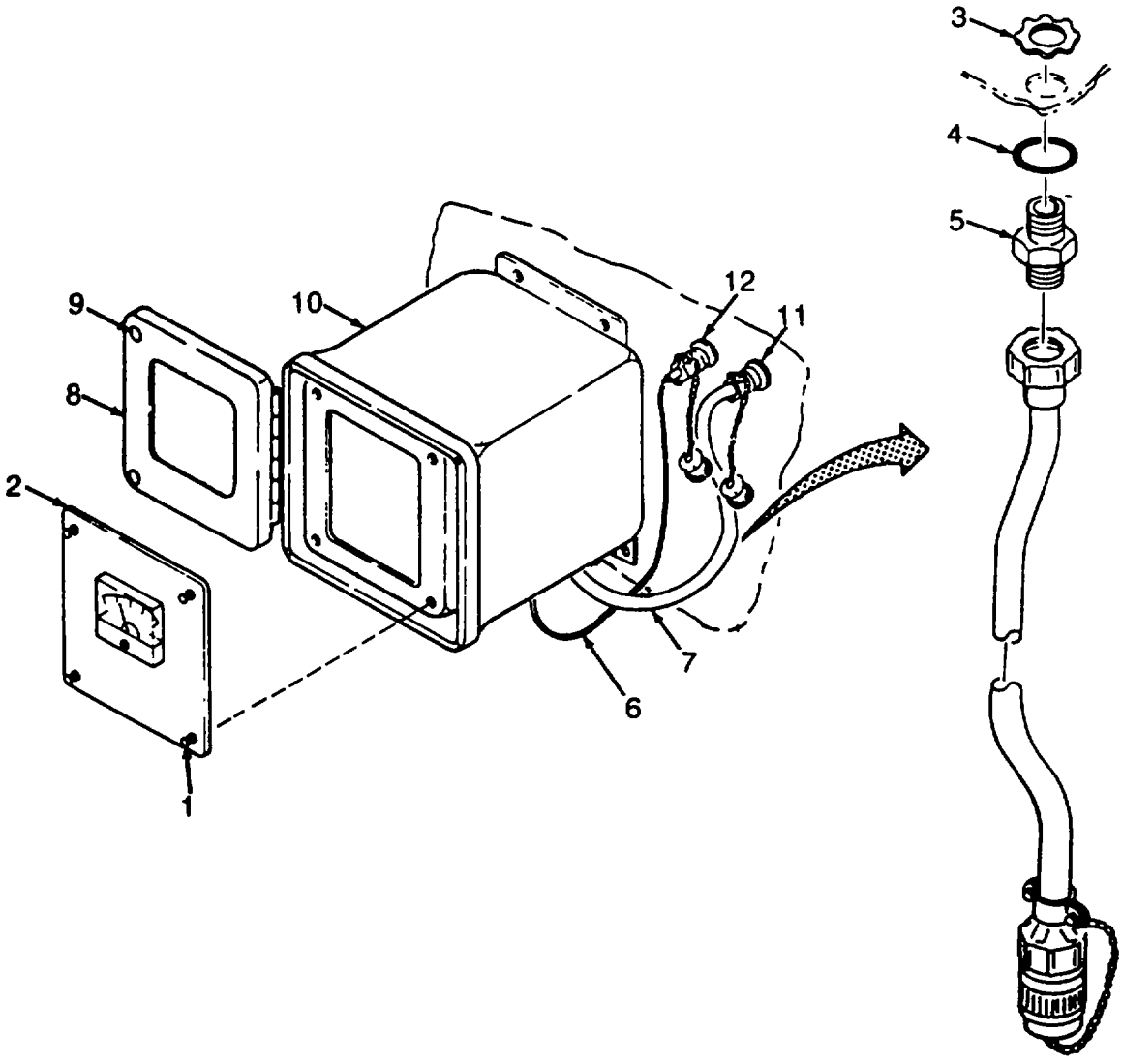
f. Remove locknut (3) and O-ring (4) from connector (5).

g. Remove adapter (5) from cable assembly

3-17. TDS MONITOR MAINTENANCE -continued.

REPAIR

Refer to paragraph 3-20 for repair of cable assemblies.



3-17. TDS MONITOR MAINTENANCE - continued.

ASSEMBLY

NOTE

This procedure is the same for both cables except as noted.

a Install adapter (5) and O-ring (4) on cable assembly (6 or 7).

b. Position cable assembly in place and install locknut (3). Refer to wiring schematic in Appendix F for cable assembly being repaired.

NOTE

For cable assembly (7), go to step c

For cable assembly (6), go to step d.

c. Connect three wires as tagged to TDS monitor (10).

d. Connect five wires as tagged to TDS monitor (10)

e Position meter cover (2) in place and push in snap locks (1)

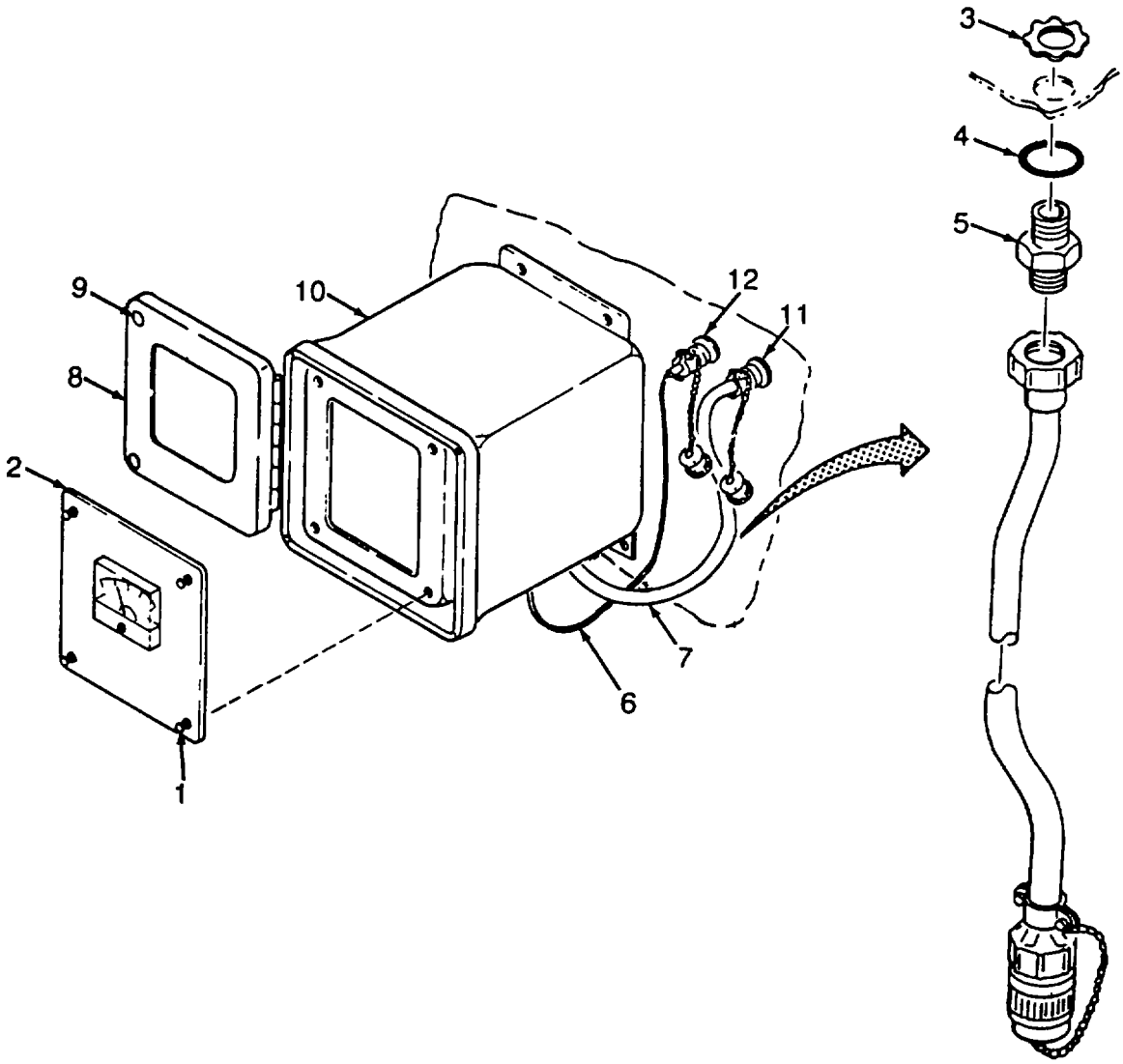
f. Close cover (8) and secure with two screws (9).

g. Connect cable assemblies (6) and (7) to receptacles (11) and (12).

TEST

Calibrate and test TDS monitor (para. 2-31).

3-17. TDS MONITOR MAINTENANCE -continued.



3-18. GENERATOR SET MAINTENANCE (MODEL WPES-1)

This task consists of a. Removal b. Installation

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Torque Wrench (Appendix B, Section III, Item 3)
Ratchet (Appendix B, Section III, Item 3)
Open End/ Box Wrench (Appendix B, Section III, Item 3)

Material/Parts Required

Lockwashers, P/N MS-35338-50
Flatwashers, P/N MS-27183-21

Equipment Condition

Reference
ROWPU shutdown (TM 10-4610-240-10).
ROGEN shutdown (TM 5-6115-465-12).

Personnel Required

Three (3)

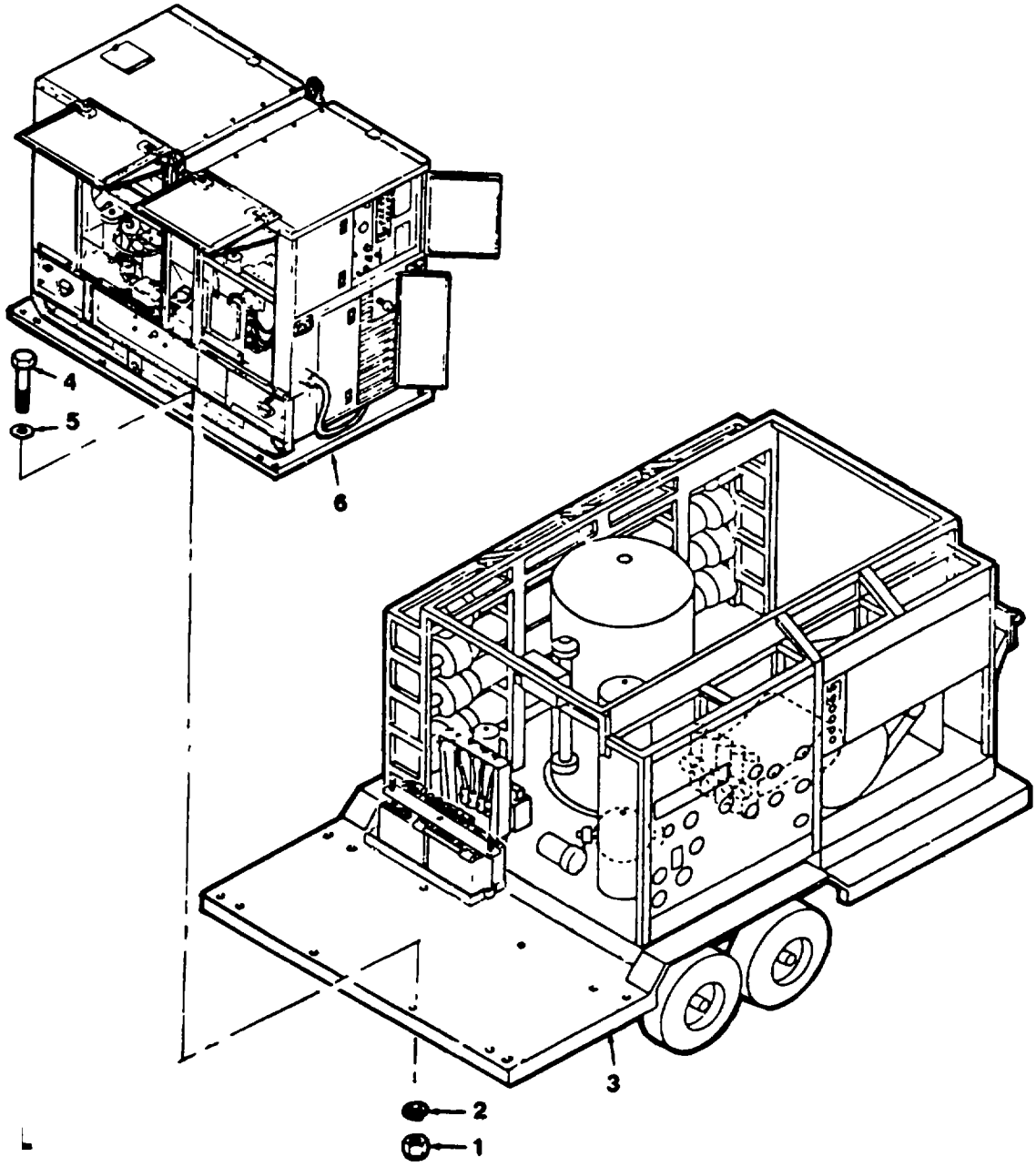
General Safety Requirements

WARNINGS

- High voltage can cause burns and electrical shock All electrical power must be off before performing these procedures.

- Lifting heavy/difficult to handle equipment incorrectly can cause serious injury.

3-18. GENERATOR SET MAINTENANCE (MODEL WPES-1) - continued



REMOVAL

a. Remove eight nuts (1) and eight lockwashers (2) from under side of flatbed trailer (3).

b. Remove eight bolts (4) and eight flatwashers (5), from top side of generator mounts (6).

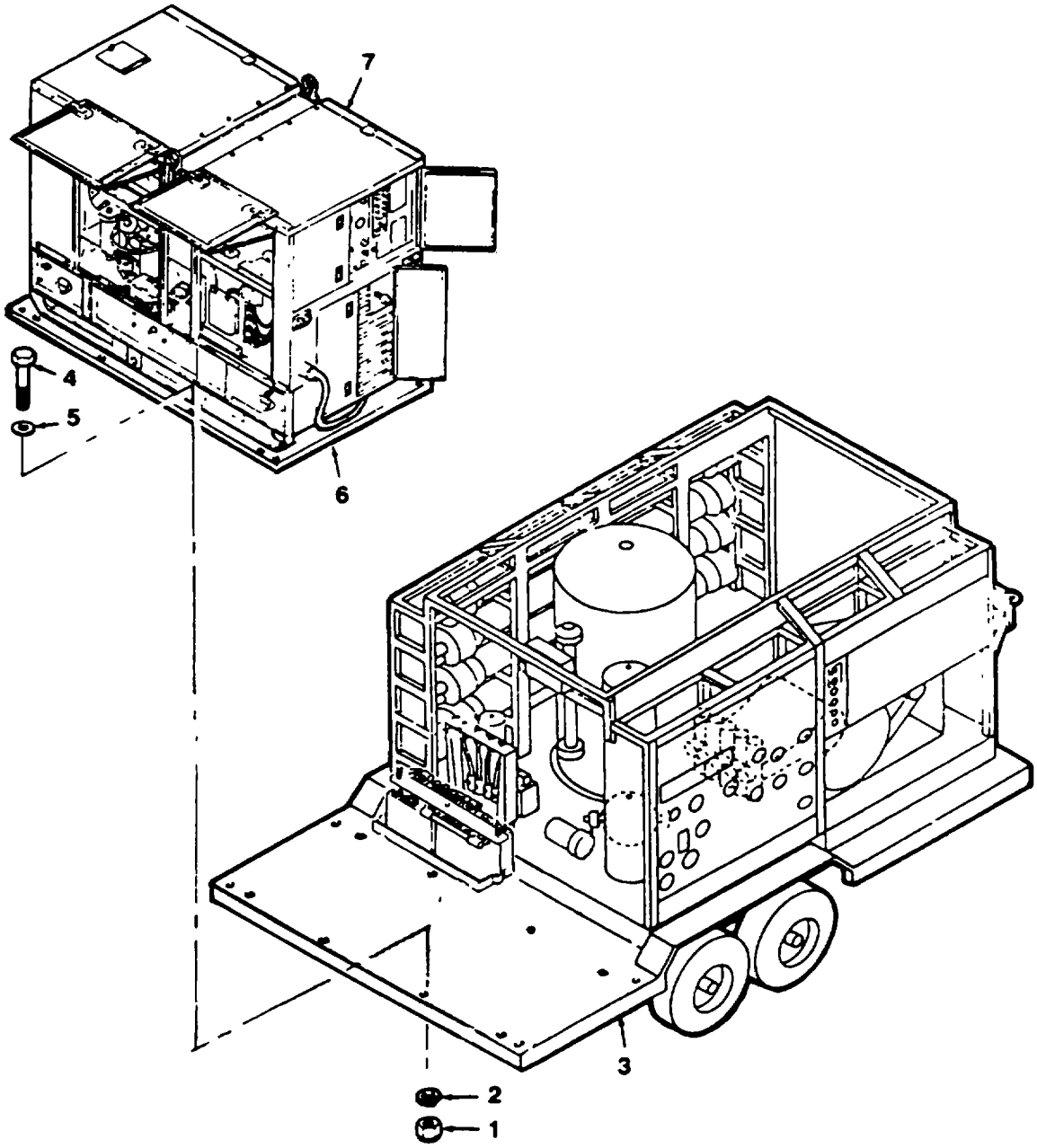
c. Using lifting device, lift generator from flatbed trailer (3).

3-18. GENERATOR SET MAINTENANCE (MODEL WPES-1) - continued

INSTALLATION

NOTE

- Generator is mounted with its control panel to the right side of ROWPU.
- Only the inside eight mounting holes are utilized when mounting the 30 kW generator on the ROWPU.



3-18. GENERATOR SET MAINTENANCE (MODEL WPES-1) - continued

a. Using lifting device, position generator (7) over flatbed trailer (3) and install flatwashers (5) and eight bolts (4) into mounting holes on generator skids (3).

b. With generator still supported by lifting device, align bolts (4) with mounting holes on flatbed trailer (3).

c. Carefully lower generator (8) onto flatbed trailer (3) so that bolts (4) can be inserted into mounting holes on flatbed trailer (3).

d. Set generator (7) in place with bolts in proper mounting holes on flatbed trailer (3) and install eight lockwashers (2), and eight nuts (1) on under side of flatbed trailer (3).

e. Torque nuts (1) to 100-115 ft lb.

3-19. COVER MAINTENANCE.

This task consists of
a. Canvas Cover Cleaning
b. ROWPU Frame Cover Inspection
c. ROWPU Frame Cover Repair
d. Pump Cover Inspection
e. Pump Cover Repair

INITIAL SET-UP:

Reference
Refer to FM 43-3
Material/Parts Required
Detergent (Appendix C, Section II, Item 10)
Equipment Condition
Reference
Cover removed from equipment (TM 10-4610-240-10).

CANVAS COVER CLEANING

NOTE

This procedure is the same for all canvas covers except as noted

a. Spread cover on a clean surface with good drainage Ensure cover is inside out.

CAUTION

Pump cover has felt lining Use of excessive water during cleaning can cause damage to lining. Use minimum water necessary to wash and rinse pump cover.

b. Using mild soapy water and firm-bristled brush, wash outside surface of cover

c. Using clean water, rinse cover

NOTE

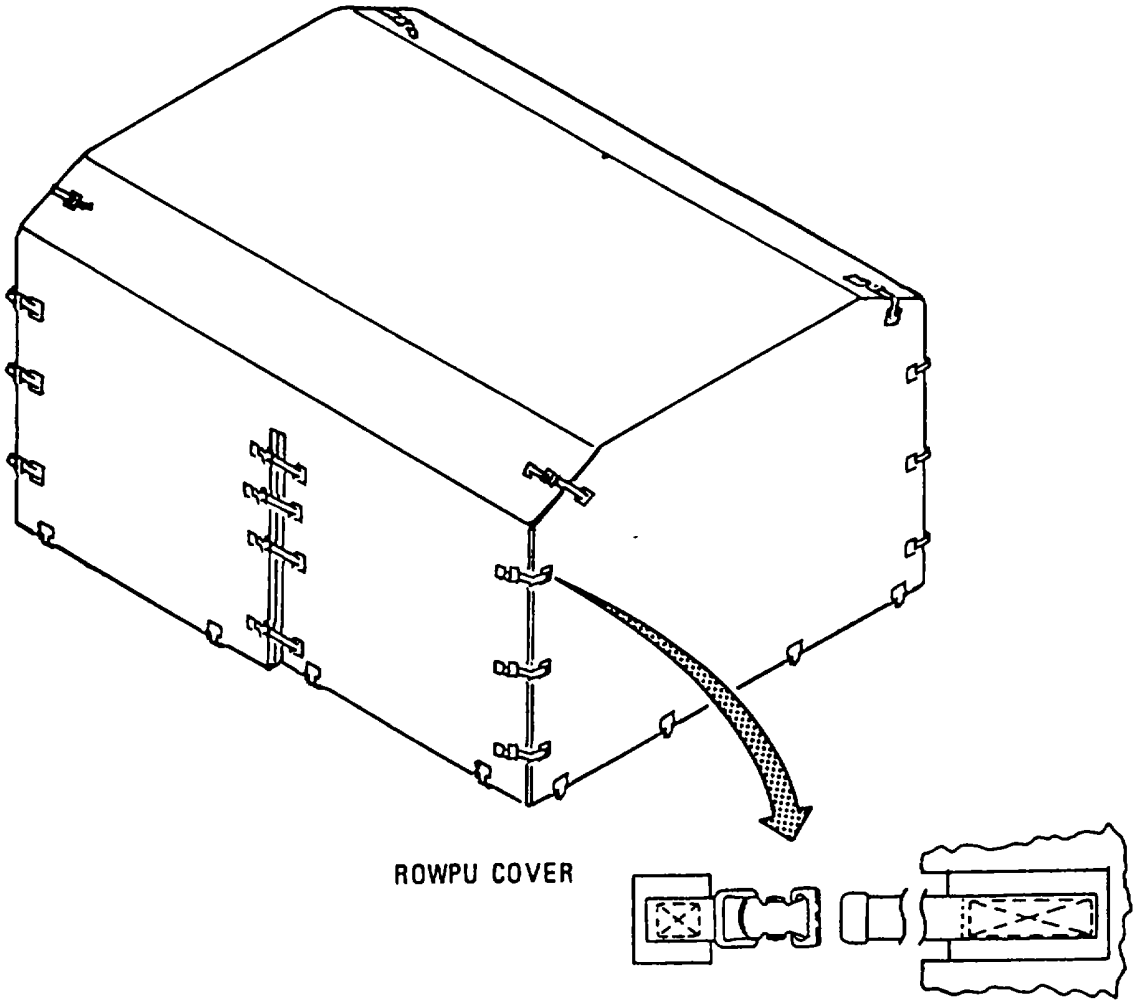
- For ROWPU cover, go to step d
- For pump cover, go to step f

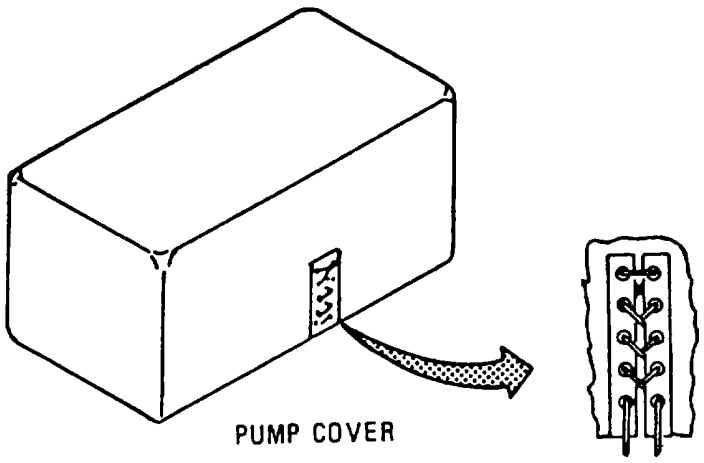
d. Turn cover inside out

e Repeat steps b and c

f Hang cover vertically and allow to air dry

3-19. COVER MAINTENANCE - continued.





3-19. COVER MAINTENANCE - continued.

ROWPU FRAME COVER INSPECTION

a. Spread cover flat on a clean surface Ensure outside of cover is up

b. Check that rim strip around edge of cover is not coming unstitched

c. Check webbing straps for end clips

d. Check spring buckles.

e. Check that all straps are securely sewn to cover. Mark loose stitching for repair

f. Check cover for tears and dry rot. Mark for repair.

g. Turn cover over Check buckles on underside for serviceability.

ROWPU FRAME COVER REPAIR.

a. Sew patches on tears Refer to FM 43-3.

b. Sew loose rim strip or webbing straps Refer to FM 43-3.

c. Apply water-repellent solution Refer to FM 43-3

PUMP COVER INSPECTION.

a. Spread cover flat on a clean surface with covers insideout

b. Inspect outside cover and inner felt lining for tears, dry rot, loose stitches, or wear.

c. Inspect laces for wear.

d. Check for missing or damaged grommets

PUMP COVER REPAIR.

a. Replace damaged or missing grommets Refer to FM 43-3

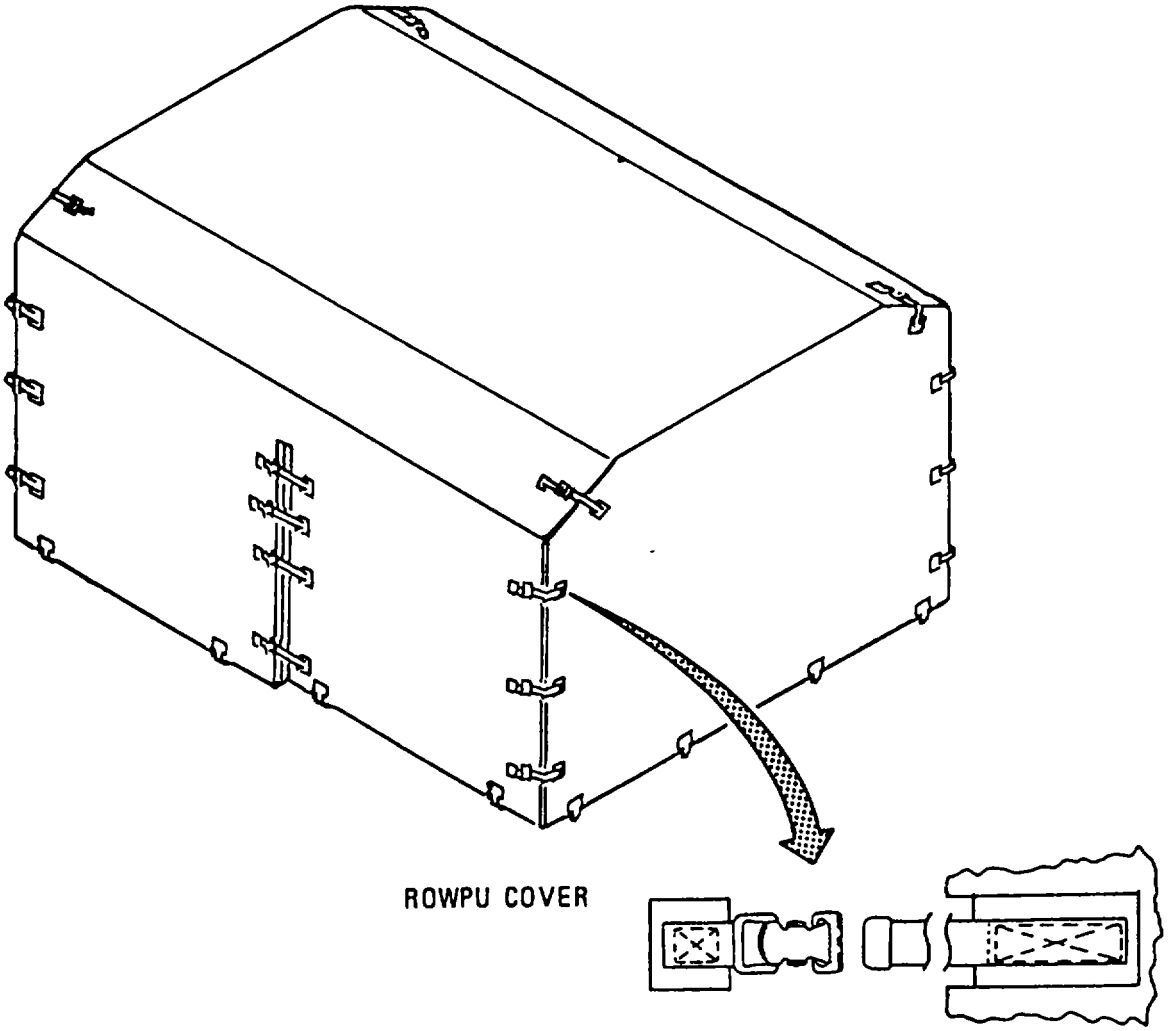
b. Replace worn or frayed laces. Refer to FM 43-3.

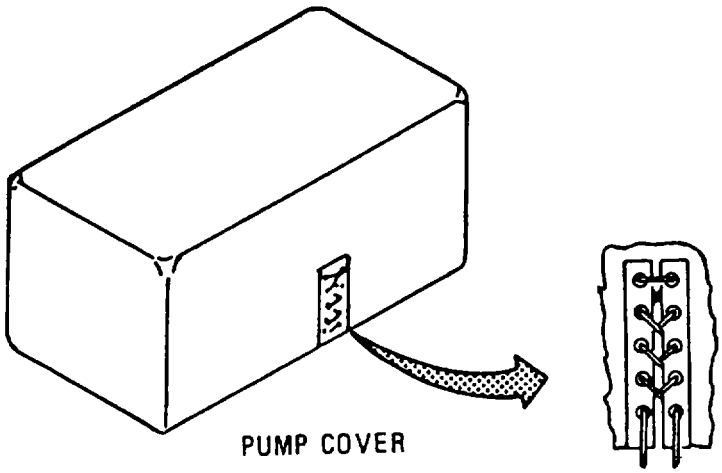
c. Replace or repair inner felt lining Refer to FM 43-3.

d. Patch tears in cover Refer to FM 43-3

e. Sew loose stitching Refer to FM 43-3

3-19. COVER MAINTENANCE - continued.





Section VI. ELECTRICAL INSTALLATION MAINTENANCE PROCEDURES

3-20. ELECTRICAL INSTALLATION MAINTENANCE.

This task consists of
a. Inspection
b. Disassembly
c. Repair
d. Assembly
e. Test

INITIAL SET-UP:

Tools Required

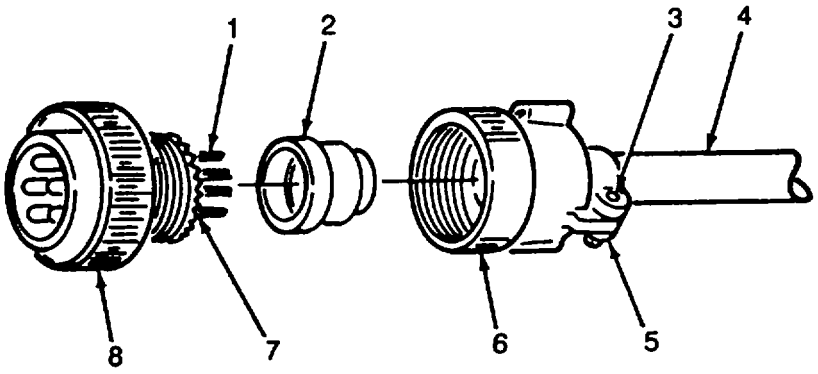
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3).
Electrical Repair Kit (Appendix B, Section III, Item 3).
Crimping Tool (Appendix B, Section III, Item 3).
Wire Stripper (Appendix B, Section III, Item 3).

Materials/Parts Required

Tape, Electrical (Appendix C, Section II, Item 31).
Solder (Appendix C, Section II, Item 27).

Equipment Condition

Reference
TM9-237 Welding Theory and Application.
Cable assemblies removed: junction box (paragraph 2-63); control box (para. 3-44).
Assemblies removed: R.O. pump motor (para. 3-38) raw water pump motor (para. 3-10); backwash pump motor (para. 3-6), booster pump motor (para. 3-33); chemical feed pump motor (para. 2-70); distribution pump motor (para. 3-14).



3-20. ELECTRICAL INSTALLATION MAINTENANCE- continued.

INSPECTION

a. Inspect cable assemblies for cracked or, cut, wires Tag damaged wires.

b. Inspect receptacle connectors for good connection. Tag damaged wires.

c. Check for continuity on all wires Tag faulty wires.

NOTE

- Procedures are typical and can be used for all cable assemblies in the ROWPU.
- Refer to wiring diagram in Appendix F for cable assembly being repaired.

DISASSEMBLY

a. Lay out cable assembly on a flat surface.

NOTE

Tag all wires before removal.

b. Loosen two screws (3) securing clamp (5) to wiring harness (4).

c. Unscrew coupling (6) from shell (8) and slide coupling (6) and insulator bushing (2) clear of shell (8).

d. Using soldering gun, unsolder wires (1) from terminals (7). Tag and remove faulty wire.

3-20. ELECTRICAL INSTALLATION MAINTENANCE- continued.

REPAIR

NOTE

All wires are spliced the same. One is shown

a. Remove 6 inches (15 .24 cm) of insulation (3) from both sides of break in wire (6).

b. Cut off 3-inch (7. 62 cm) piece of damaged wire (5) with damage in middle of removed piece.

c. Measure and cut a piece of new wire (2) to replace damaged piece.

d. Strip both ends of wire (4) and free ends of wire (2).

NOTE

When crimping, be sure to make a good electrical and mechanical connection between terminal and wire.

e. Install and crimp splice (1) on each end of new wire (2).

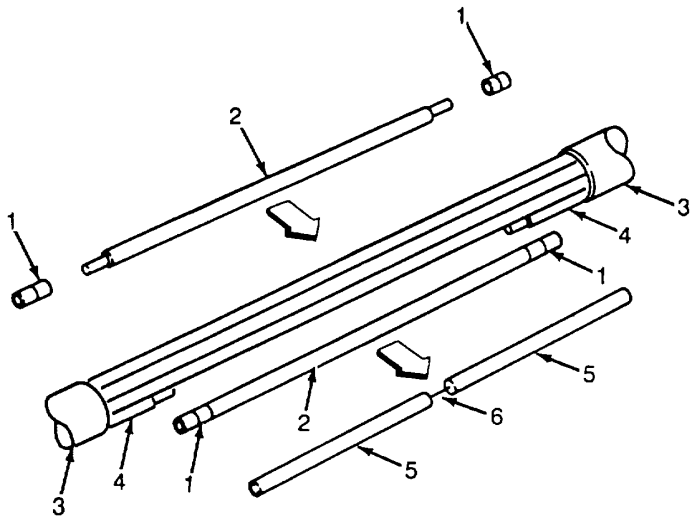
f. Install and crimp the new wire splices onto free ends of cable wire (4).

g. Wrap splices and wire 1 inch (2.54 cm) on each side of splices with electrical tape.

NOTE

Make sure electrical tape overlaps insulation on both ends of repair area.

h. Using electrical tape, completely wrap all wires together.



3-20. ELECTRICAL INSTALLATION MAINTENANCE - continued.

ASSEMBLY

NOTE

Refer to wiring diagram in Appendix F for cable assembly being repaired.

a Slide insulator bushing (2) and coupling (6) over terminals (7) and wires (1)

b. Using soldering gun, solder wires (1) to terminal (7) as tagged Remove tags.

c Screw coupling (6) to shell (8).

d. Tighten screws (3) securing clamp (5) to cable assembly (4).

TEST

CAUTION

- The following tests are performed to determine if the cable assembly is defective. Before testing, cable assembly must be disconnected. Failure to disconnect cable can result in false test indications.

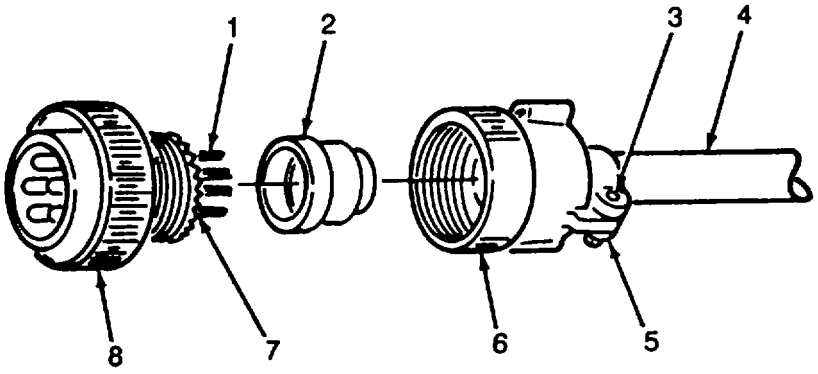
- Make sure wire terminals are not touching each other.

NOTE

Refer to wiring diagram in Appendix F for cable assembly being tested.

a Using multimeter, test for continuity.

b. If continuity does not exist between any two points, replace damaged or faulty wire.



3-21. CABLE ASSEMBLY W41 (R. O. PUMP) MAINTENANCE.

This task consists of. a. Inspection b. Disassembly c. Repair d. Assembly e. Test

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3)
Multimeter (Appendix B, Section III, Item 3)
Electrical Repair Kit (Appendix B, Section III, Item 3).
Crimping Tool (Appendix B, Section III, Item 3)
Wire Stripper (Appendix B, Section III, Item 3).

Materials/Parts Required

Reference
Tape, Electrical (Appendix C, Section II, Item 31).
Solder (Appendix C, Section II, Item 27).

Equipment Condition

Reference
ROWPU shutdown (TM 10-4610-240-10).
Cable Assembly W41 (R.O. Pump) removed (para. 2-62).

INSPECTION.

For inspection procedures, refer to paragraph 3-20.

DISASSEMBLY.

For disassembly procedures, refer to paragraph 3-20.

TEST.

For test procedures, refer to paragraph 3-20.

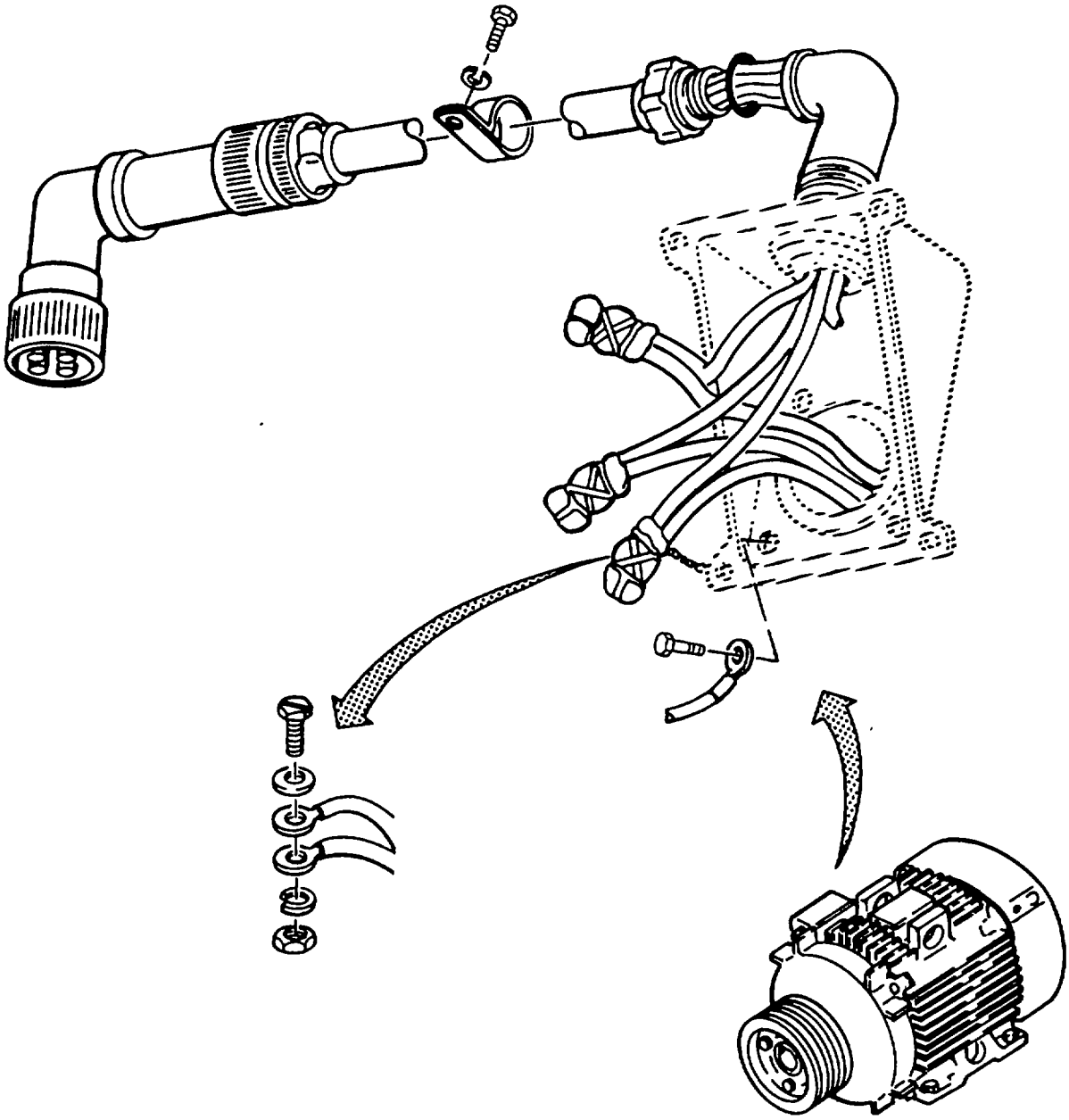
ASSEMBLY.

For assembly procedures, refer to paragraph 3-20.

REPAIR.

For repair procedures, refer to paragraph 3-20.

3-21. CABLE ASSEMBLY 41 (R. O. PUMP) MAINTENANCE - continued.



3-22. CABLE ASSEMBLY W52 (JUNCTION BOX) MAINTENANCE.

This task consists of
a. Inspection
b. Disassembly
c. Repair
d. Assembly
e. Test

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Soldering Gun Kit (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3)
Electrical Repair Kit (Appendix B, Section III, Item 3)
Crimping Tool (Appendix B, Section III, Item 3)
Wire Stripper (Appendix B, Section [II, Item 3).

Materials/Parts Required

Tape, Electrical (Appendix C, Section II, Item 31).
Solder (Appendix C, Section II, Item 27)

Equipment Condition

Reference
Cable Assembly W52 (Junction Box) removed (para. 2-63)

INSPECTION

For inspection procedures, refer to paragraph 3-20.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-20.

TEST

For test procedures, refer to paragraph 3-20.

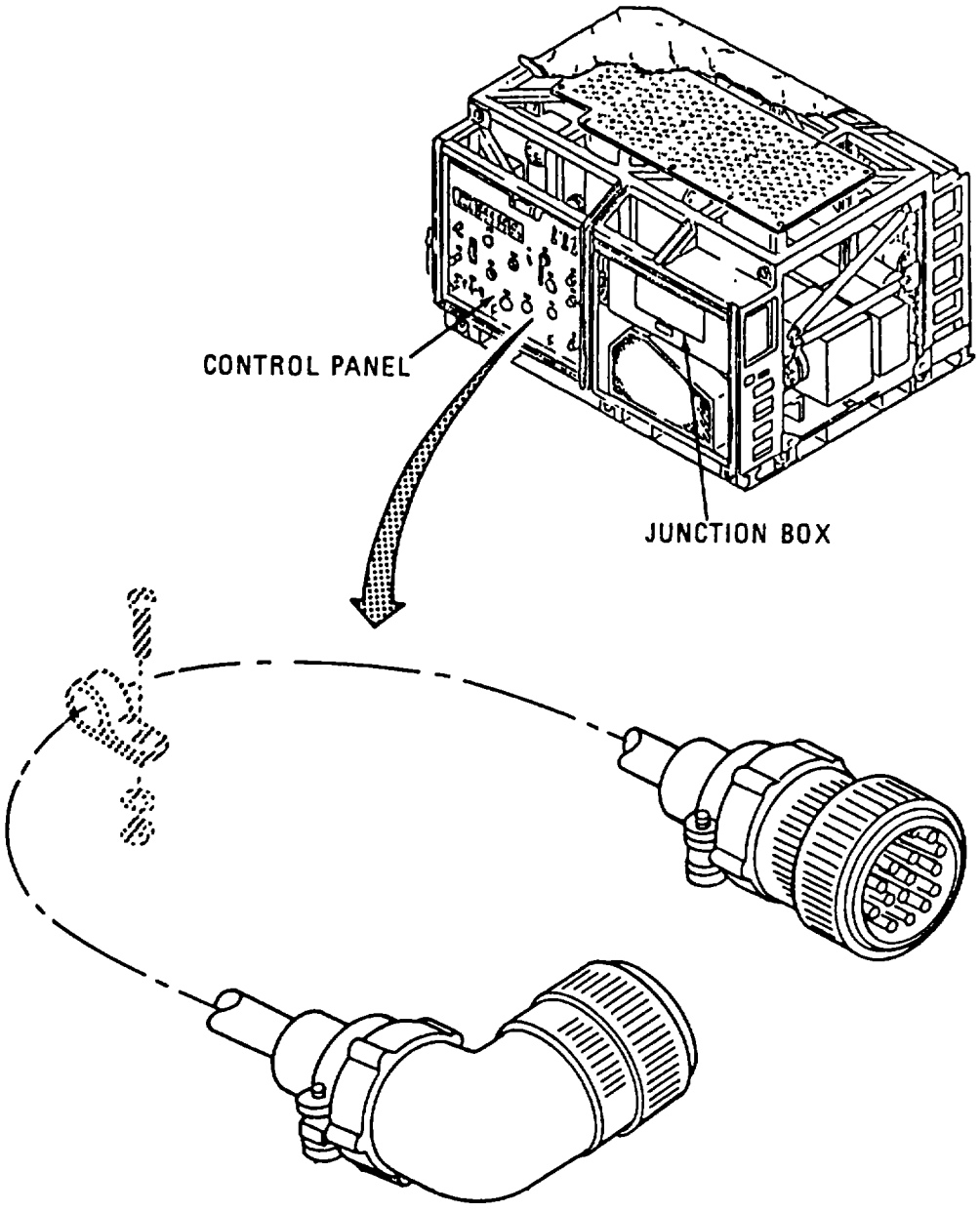
ASSEMBLY

For assembly procedures, refer to paragraph 3-20.

REPAIR

For repair procedures, refer to paragraph 3-20.

3-22. CABLE ASSEMBLY W52 (JUNCTION BOX) MAINTENANCE - continued.



3-23. CABLE ASSEMBLY W40 (GENERATOR) MAINTENANCE (MODEL WPES-1).

This task consists of: a. Inspection b. Disassembly c. Repair d. Assembly e. Test

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section III, Item 3).
- Multimeter (Appendix B, Section III, Item 3)
- Electrical Repair Kit (Appendix B, Section III, Item 3).
- Crimping Tool (Appendix B, Section III, Item 3).
- Wire Stripper (Appendix B, Section III, Item 3)

Materials/Parts Required
- Tape, Electrical (Appendix C, Section II, Item 31).
- Solder (Appendix C, Section II, Item 27).

Equipment Condition

Reference
- ROWPU shutdown (TM 10-4610-240-10).
- Cable Assembly W40 (Generator) removed (power source manual).

INSPECTION

For inspection procedures, refer to paragraph 3-20.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-20.

TEST

For test procedures, refer to paragraph 3-20.

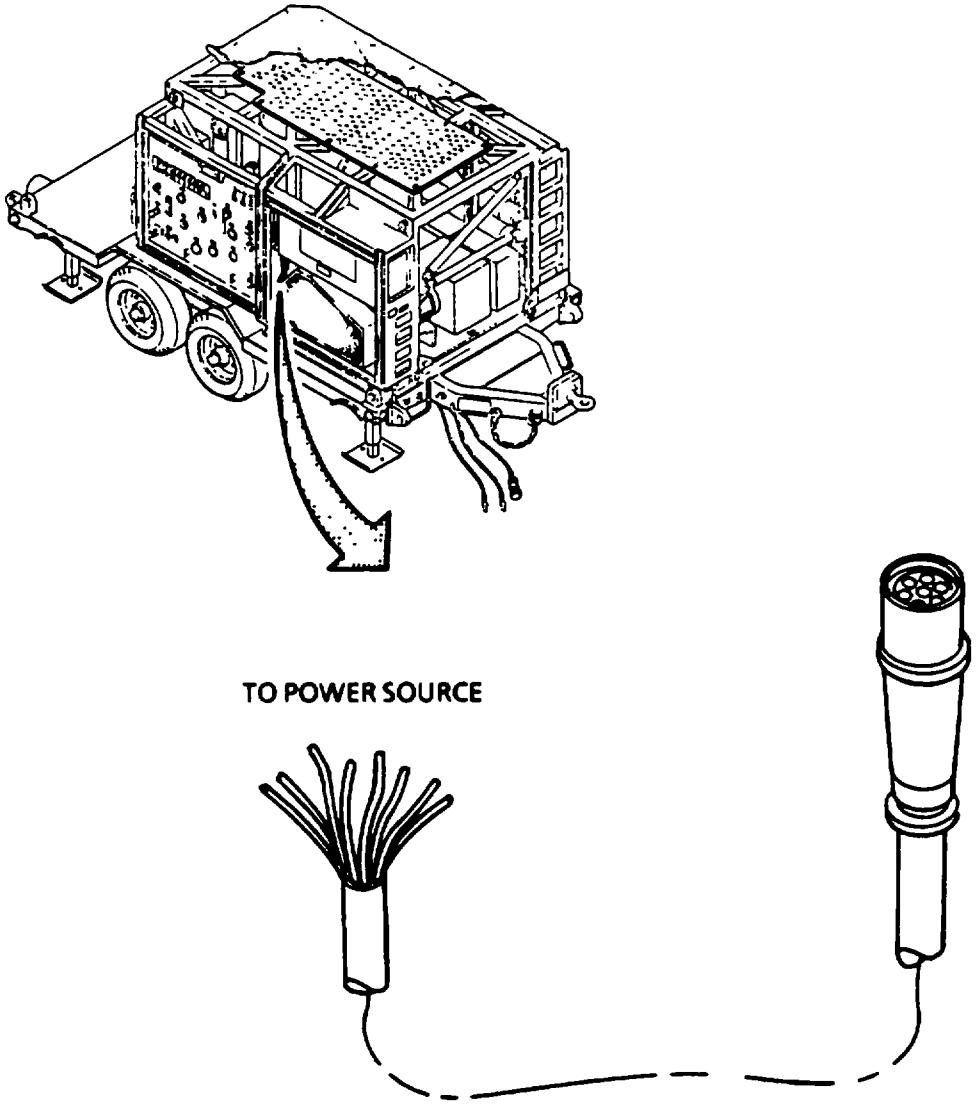
ASSEMBLY

For assembly procedures, refer to paragraph 3-20.

REPAIR

For repair procedures, refer to paragraph 3-20.

3-23. CABLE ASSEMBLY W40 (GENERATOR) MAINTENANCE (MODEL WPES-1)- continued.



3-24. ELECTRICAL CABLE W50 (CHEM FEED PUMP) MAINTENANCE.

This task consists of: a. Removal b. Inspection c. Test d. Repair e. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Multimeter (Appendix B, Section III, Item 3)

Material/Parts Required
- Twine (Appendix C, Section II, Item 33)
- Tape, Electrical (Appendix C, Section II, Item 31).
- O-ring - 5262

Equipment Condition

Reference
- ROWPU shut down (TM 10-4610-240-10).
- Power shutdown (power source manual).

REMOVAL

a. Remove four screws (10) conduit box cover (11), and gasket (12) from conduit box (2).

NOTE
Tag all wires before removal

b. Pull two wire bundles (1) out of conduit box (2) far enough to expose taped ends. Remove twine (15) from both bundles

c. Remove electrical tape (3) from two wire bundles (1) and tag motor wires with color of power source wire in each bundle

d. Remove nut (13), lockwasher (14), four wire lugs (9), and flat washer (8) from screw (7) on each wire bundle (1)

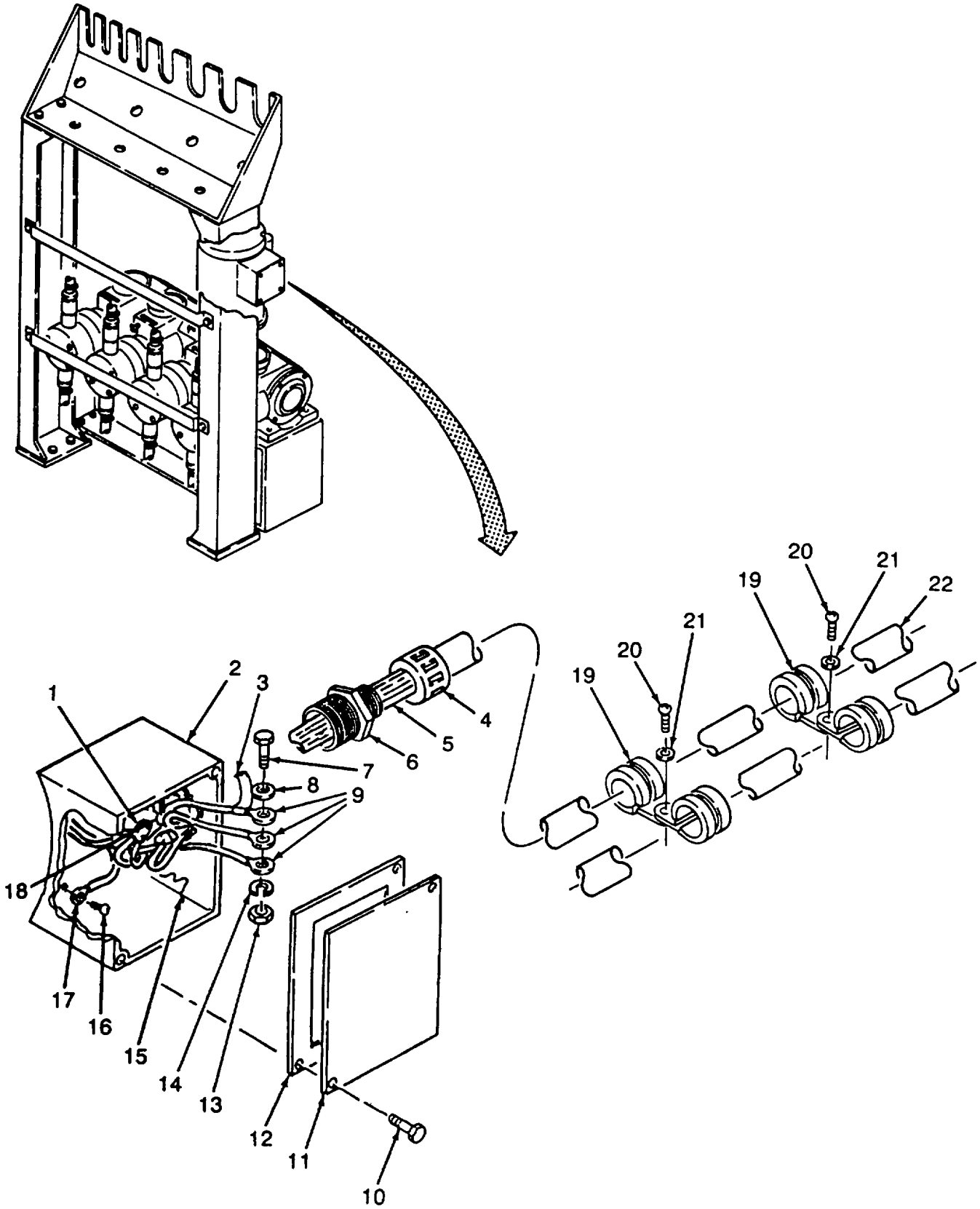
e. Install flat washer (8), three wire lugs (9) from motor, lockwasher (14), and nut (13) on screw (7) on each wire bundle (1)

f. Tag wire lug (17) and remove screw (16) and wire lug from conduit box (2)

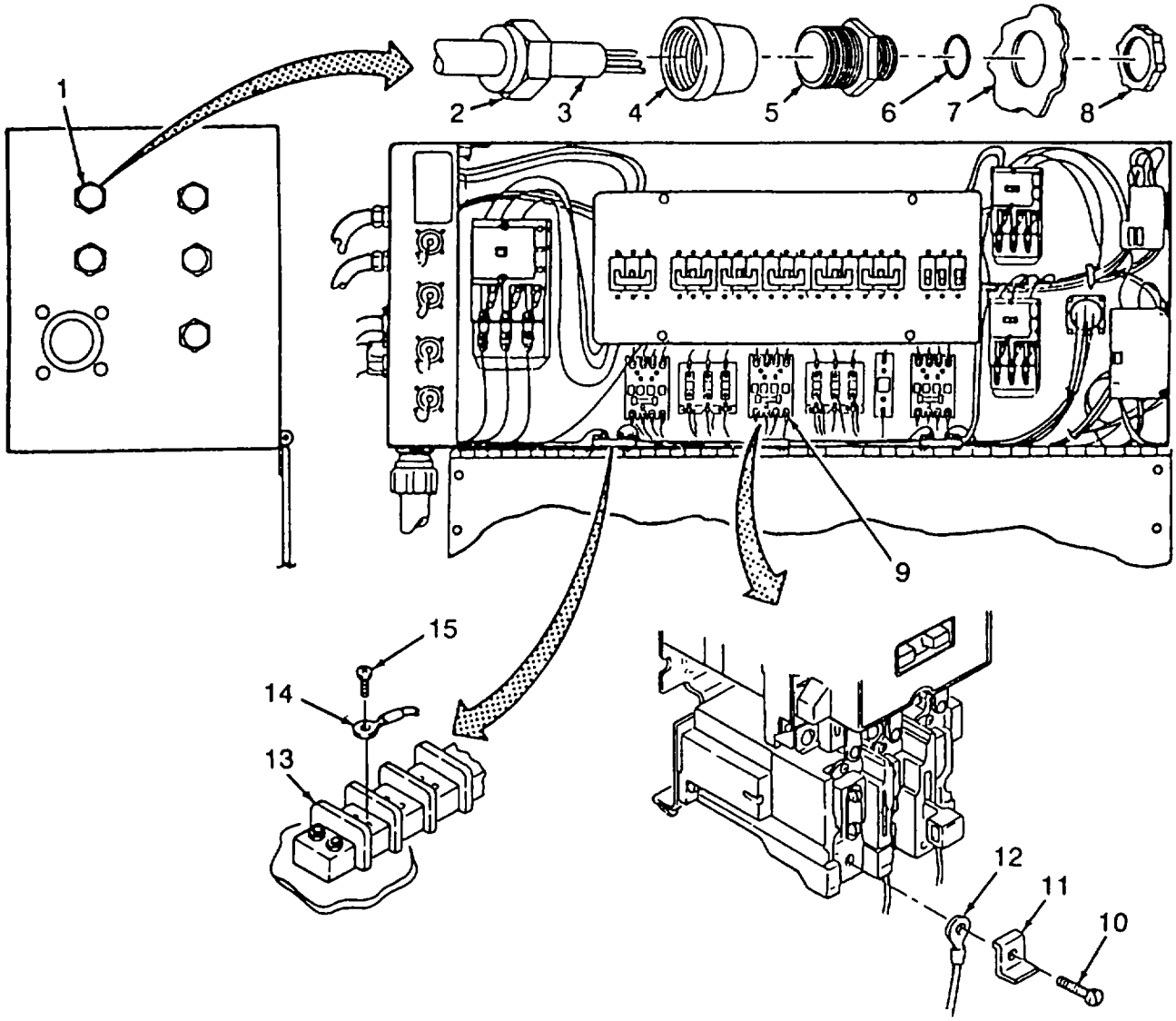
g. Remove cable grip nut (18) from adapter (6) and pull adapter (6) and wires (5) out of conduit box (2)

h. Remove two screws (20), flat washers (21), and cable clamps (19) securing chemical feed metering pump cable assembly (22) to ROWPU deck.

3-24. ELECTRICAL CABLE W50 (CH EM FEED PUMP) MAINTENANCE - continued.



3-24. ELECTRICAL CABLE W50 (CHEM FEED PUMP) MAINTENANCE - continued.



i. Working inside electrical junction box, cut wire ties containing wires between sealing grip (1) and motor controller K7 (9).

NOTE
Tag all wires before removal.

j. Remove two screws (10), two lug washers (11), and two wire lugs (12) from bottom terminals of motor controller K7 (9)

k. Remove screw (15) and wire lug (14) from terminal TB2 (13)

3-24. ELECTRICAL CABLE W50 (CHEM FEED PUMP) MAINTENANCE - continued.

l. Loosen nut (2)

m. Remove locknut (8)

n. Carefully pull chemical feed metering pump cable assembly (3) and adapter (5) from electrical junction box (7)

o. Remove adapter, O-ring (6), sealing grip (4), and nut (2) from chemical feed metering pump cable assembly (3) and remove cable assembly from ROWPU.

INSPECTION.

For inspection procedures, refer to paragraph 3-20.

TEST.

For test procedures, refer to paragraph 3-20.

REPAIR.

For repair procedures, refer to paragraph 3-20.

INSTALLATION.

a. Position nut (2), sealing grip (4), O-ring (6), and adapter (5) on chemical feed metering pump cable assembly (3).

b. Carefully pull chemical feed metering pump cable assembly (3) into electrical junction box (7) until wire lugs (12) reach motor controller K7 (9) and install locknut (8).

c. Position two wire lugs (12) on bottom terminals of motor controller K7 (9) as tagged and install two lug washers (11) and screws (10).

d. Position wire lug (14) on terminal TB2 (13) as tagged and install screw (15)

e. Route chemical feed metering pump cable assembly (3) along wire bundles between sealing grip assembly (1) and motor controller K7 (9) Use wire ties to secure chemical feed metering pump cable assembly to wire bundles.

f. Tighten nut (2) on adapter (5).

3-24. ELECTRICAL CABLE W50 (CHEM FEED) PUMP) MAINTENANCE- continued.

g. Carefully pull three wires (9) into conduit box (2) until adapter (6) is positioned in hole in conduit box.

h. Position cable grip nut (18) on three wires (9) and install cable grip nut (18) on cable adapter (6).

i. Position wire lug (17) as tagged on inside of conduit box (2) and install screw (16).

j. Pull two wire bundles (1) out of conduit box (2) far enough to work on wire lugs and connecting hardware.

k. Remove nut (13), lockwasher (14), three wire lugs (9), and flat washer (8) from screw (7) on each wire bundle (1).

I. Install flat washer (8), four wire lugs (9) as tagged, lockwasher (14), and nut (13) on screw (7) on each wire bundle (1).

m. Using electrical tape (3), tape end of each wire bundle (1) to completely cover all hardware, including tube portion of all wire lugs.

n. Secure electrical tape (3) on each wire bundle (1) with twine (15).

o. Position two wire bundles (1) In conduit box (2).

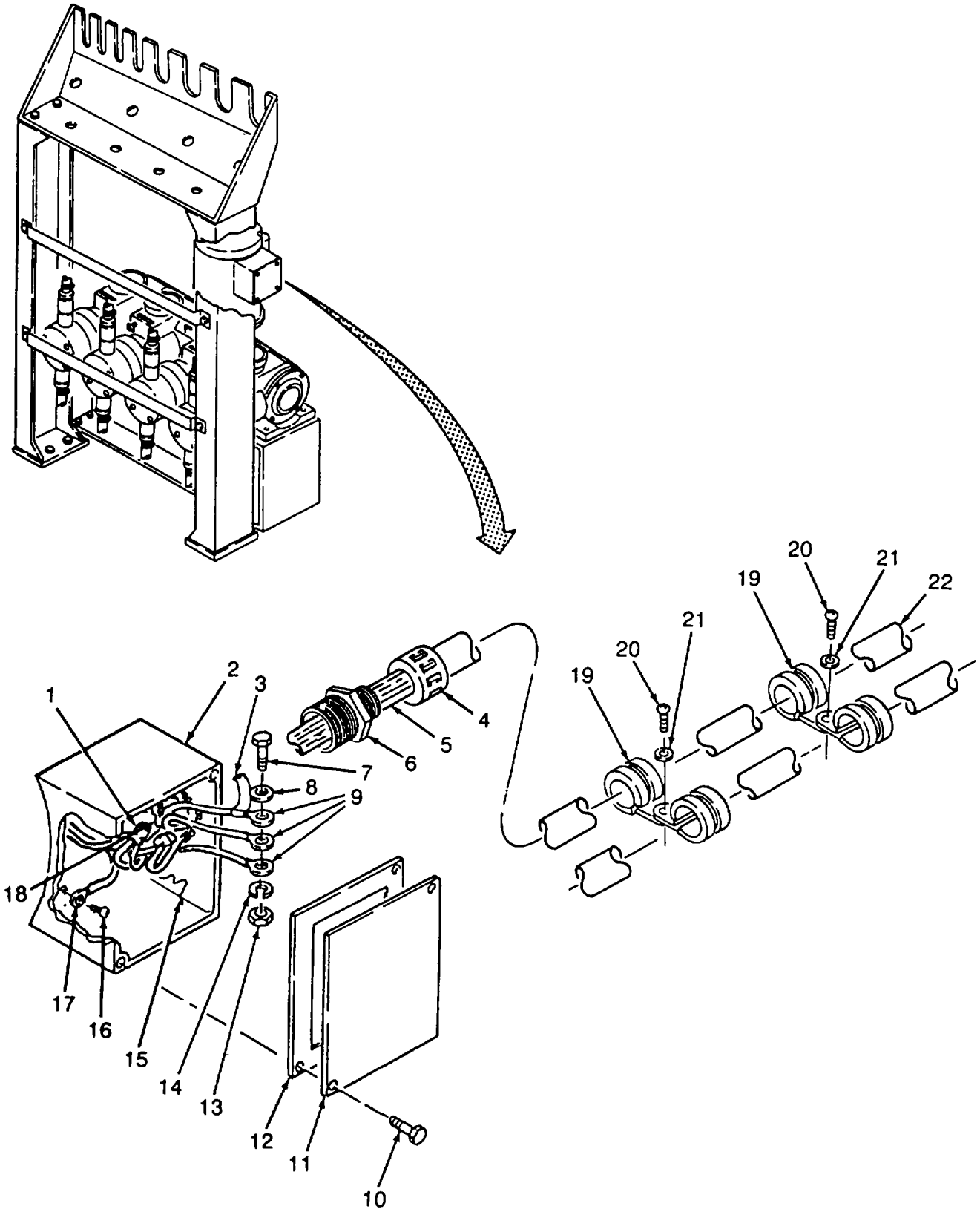
p. Position gasket (12) and conduit box cover (11) on conduit box (2) and install four screws (10).

q. Tighten nut (4).

r. Route chemical feed entering pump cable assembly (3) across ROWPU deck and install two cable clamps (19), flat washers (21), and screws (20).

s. Perform operating procedures.

3-24. ELECTRICAL CABLE W50 (CHEM FEED PUMP) MAINTENANCE - continued.



3-25. CABLE ASSEMBLY(W56) MAINTENANCE.

This task consists of.
a. Removal
b. Inspection
c. Disassembly
d. Repair
e. Assembly
f. Test
g. Installation

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3).
Electrical Repair Kit (Appendix B, Section III, Item 3).
Crimping Tool (Appendix B, Section III, Item 3)
Wire Stripper (Appendix B, Section III, Item 3).

Materials/Parts Required

Tape, Electrical (Appendix C, Section II, Item 31).
Solder (Appendix C, Section II, Item 27).

Equipment Condition

Reference

ROWPU shutdown (TM 10-4610-240-10).

REMOVAL

For removal procedures, refer to paragraph 3-20.

INSPECTION

Fur inspection procedures, refer to paragraph 3-20.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-20.

TEST

For test procedures, refer to paragraph 3-19.

ASSEMBLY

For assembly procedures, refer to paragraph 3-20.

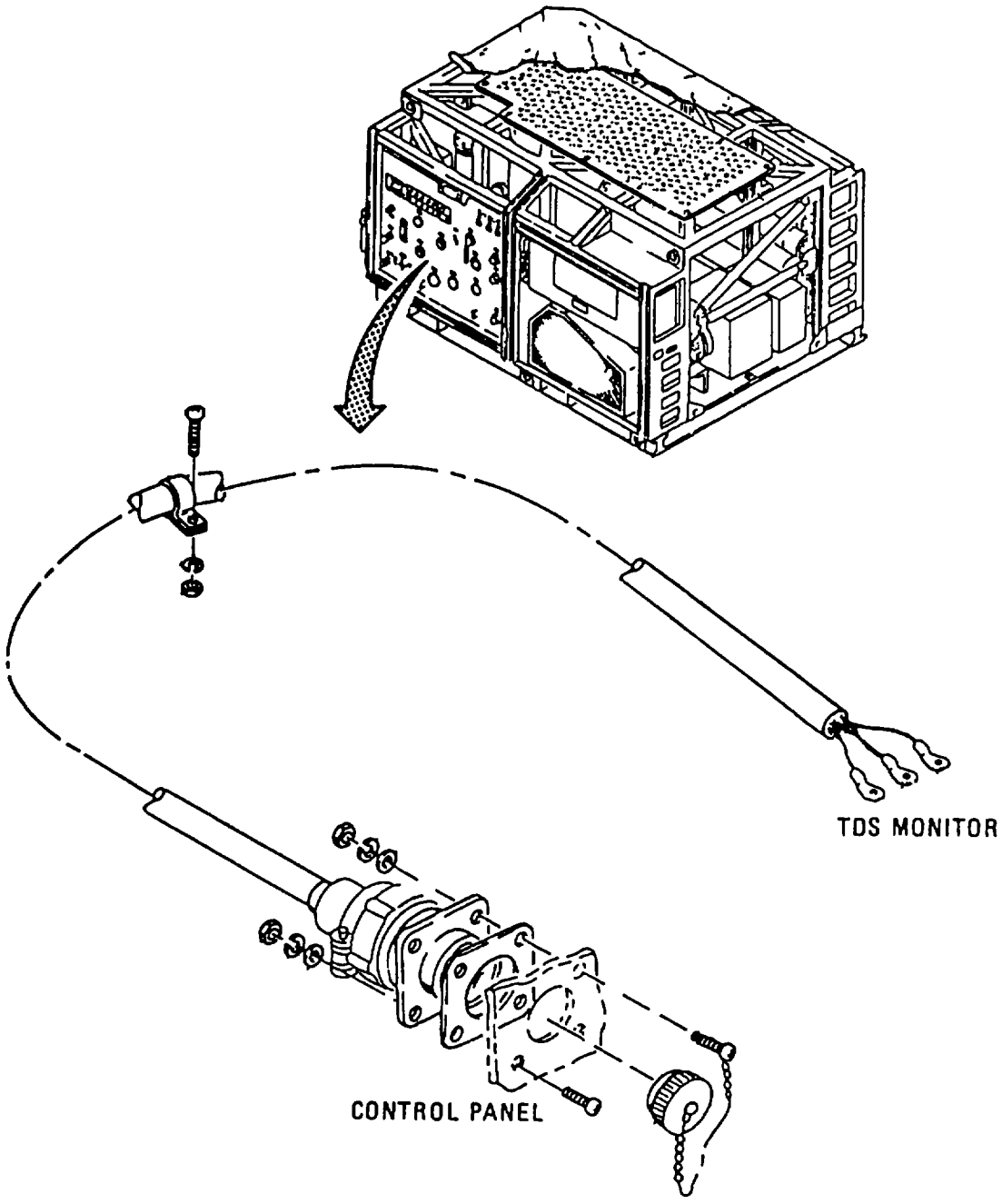
REPAIR

For repair procedures, refer to paragraph 3-20.

INSTALLATION

For installation procedures, refer to paragraph 3-20.

3-25. CABLE ASSEMBLY (W56) MAINTENANCE - continued.



3-26. ELECTRICAL CABLE W46 (HIGH PRESS SWITCH) MAINTENANCE.

This task consists of: a. Removal b. Inspection c. Test d. Repair e. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
O-ring- 5262
Equipment Condition
Reference
ROWPU shut down (TM 10-4610-240-10).
Power shut down (power source manual)
General Safety Instructions

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

REMOVAL

ELECTRICAL, CABLE W46 (HIGH PRESSURE SWITCH)

a. Remove four screws (9), lockwashers (8) and remove cover (7) and gasket (6) from high pressure switch (4)

NOTE
Tag all wires before removal.

b. Remove three screws (10) and three wires (11)

c. Loosen nut (2) from adapter (3)

d. Remove locknut (5) and pull cable assembly (1) from high pressure switch (4)

e. Working at electrical junction box loosen nut (12)

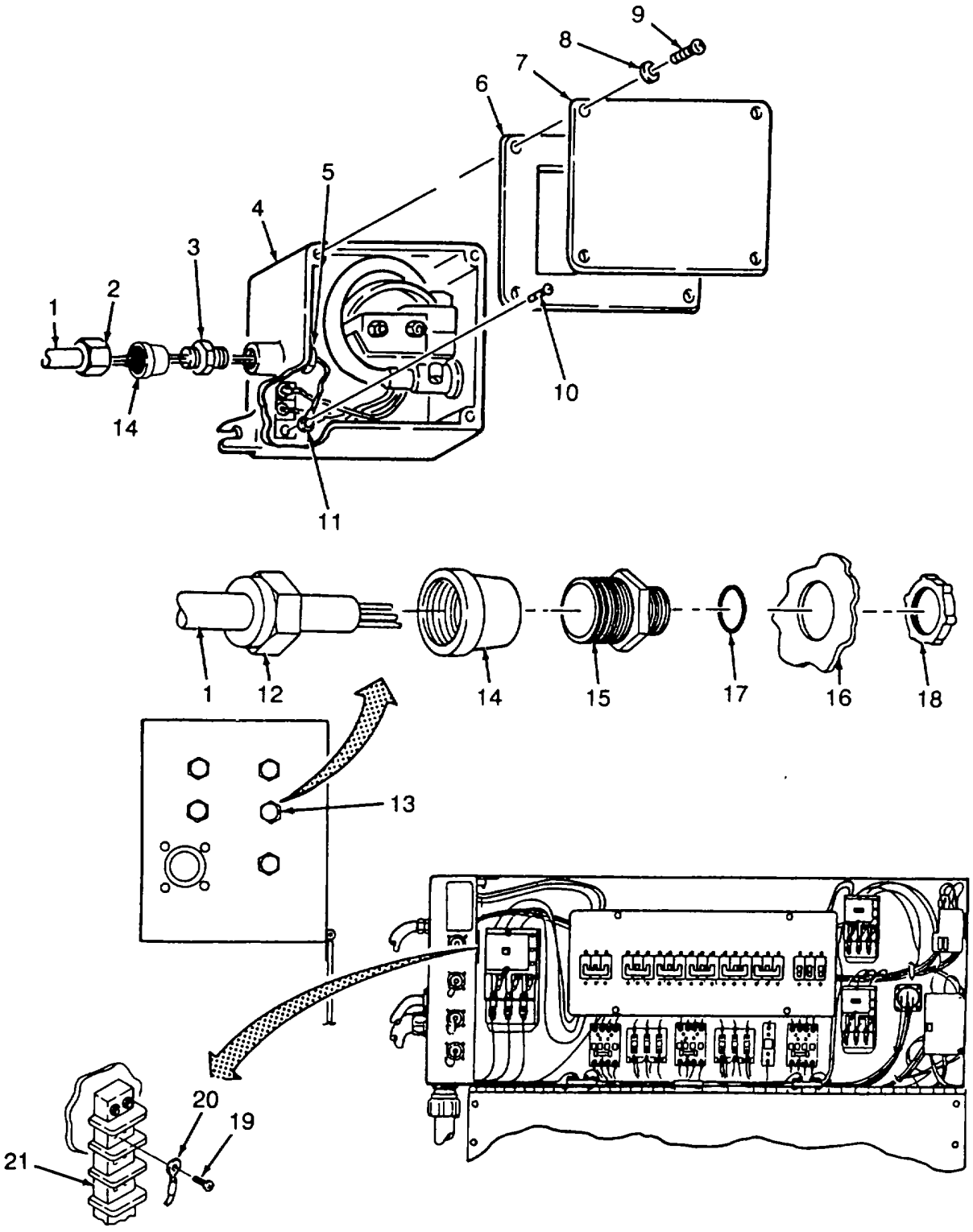
NOTE
Tag all wires before removal

f. Remove three screws (19) and three wires (20) from terminal board (21)

g. Remove locknut (18)

3-26. ELECTRICAL CABLE W46 (HIGH PRESS SWITCH) MAINTENANCE - continued.

h. Remove adapter (15), O-ring (17) and discard sealing grip (14), and nut (12) from electrical junction box (16), switch assembly (1) and remove cable from ROWPU



3-26. ELECTRICAL CABLE W46 (HIGH AND LOW PRESS SWITCH) MAINTENANCE -continued.

INSPECTION

For inspection procedures, refer to paragraph 3-20.

TEST

For test procedures, refer to paragraph 3-20.

REPAIR

For repair procedures, refer to paragraph 3-20.

INSTALLATION

HIGH PRESSURE SWITCH CABLE (W46)

a. Slide nut (12), sealing grip (14), adapter (15) and new O-ring (17) on high pressure switch cable (1)

b. Pull high pressure switch cable (1) through wall of electrical junction box (16) and position cable grip assembly (13)

c. Install locknut (18) on adapter (15)

d. Working inside electrical junction box, position three wires (20) as tagged and secure with three screws (19)

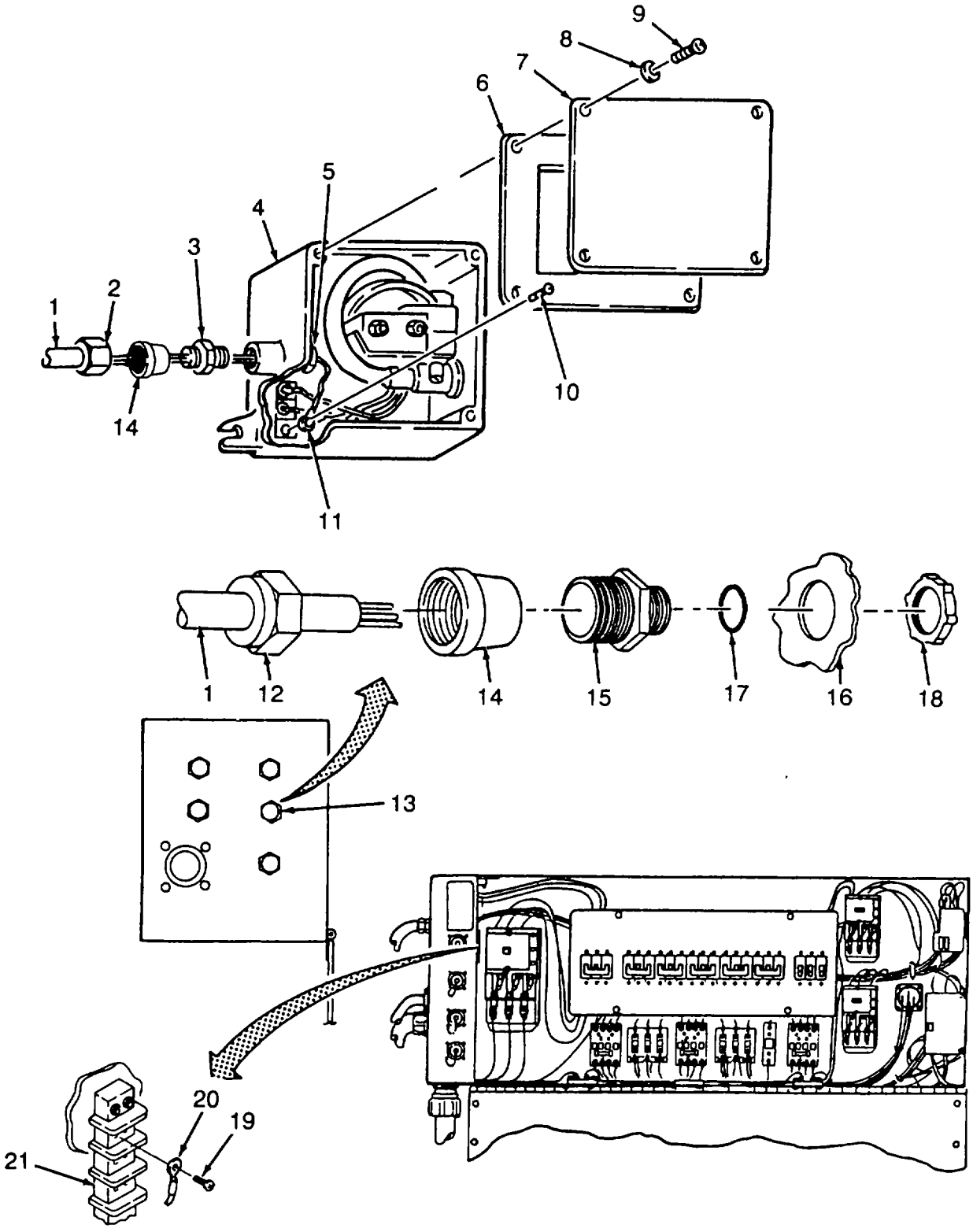
e. Working at high pressure switch end slide nut (2), sealing grip (14) and adapter (3) on cable (1)

f. Pull wires through pressure switch, and connect three wires (11) as tagged and secure with three screws (10) and install locknut (5).

g. Tighten nut (2)

i. Position gasket (6) and cover (7) in place and secure with four lockwashers (8) and screws (9)

3-26. ELECTRICAL CABLE W46 (HIGH PRESS SWITCH) MAINTENANCE - continued.



3-27. ELECTRICAL CABLE W47 AND (LOW PRESS SWITCH) MAINTENANCE.

This task consists of: a. Removal b. Inspection c. Test d. Repair e. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
O-ring- 5262
Equipment Condition
Reference
ROWPU shut down (TM 10-4610-240-10).
General Safety Instructions

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

REMOVAL

a. Remove screw (10), lockwasher (11) chain lug (12) Remove three screws (9) and lockwashers (8) and remove cover (7) and gasket (6) from low pressure switch (2).

NOTE
Tag all wires before removal

b. Remove two screws (13) and two wires (14). Remove screw (15) and ground wire (16).

c. Loosen nut (4).

d. Remove locknut (1) from elbow (3) and pull cable assembly (5) from elbow (3).

e. Working at electrical junction box loosen nut (18)

NOTE
Tag all wires before removal.

f. Remove three screws (23) and three wires (24) from terminal board (25)

g. Remove locknut (22).

h. Carefully pull low pressure switch cable assembly (5) and adapter (20) from electrical junction box (17).

i. Remove adapter (20) O-ring (21), sealing grip (19) and nut (18) from low pressure switch cable assembly (5) and remove cable from ROWPU Discard o-ring (21)

3-27. ELECTRICAL CABLE W47 (LOW PRESS SWITCH) MAINTENANCE - continued.

INSPECTION

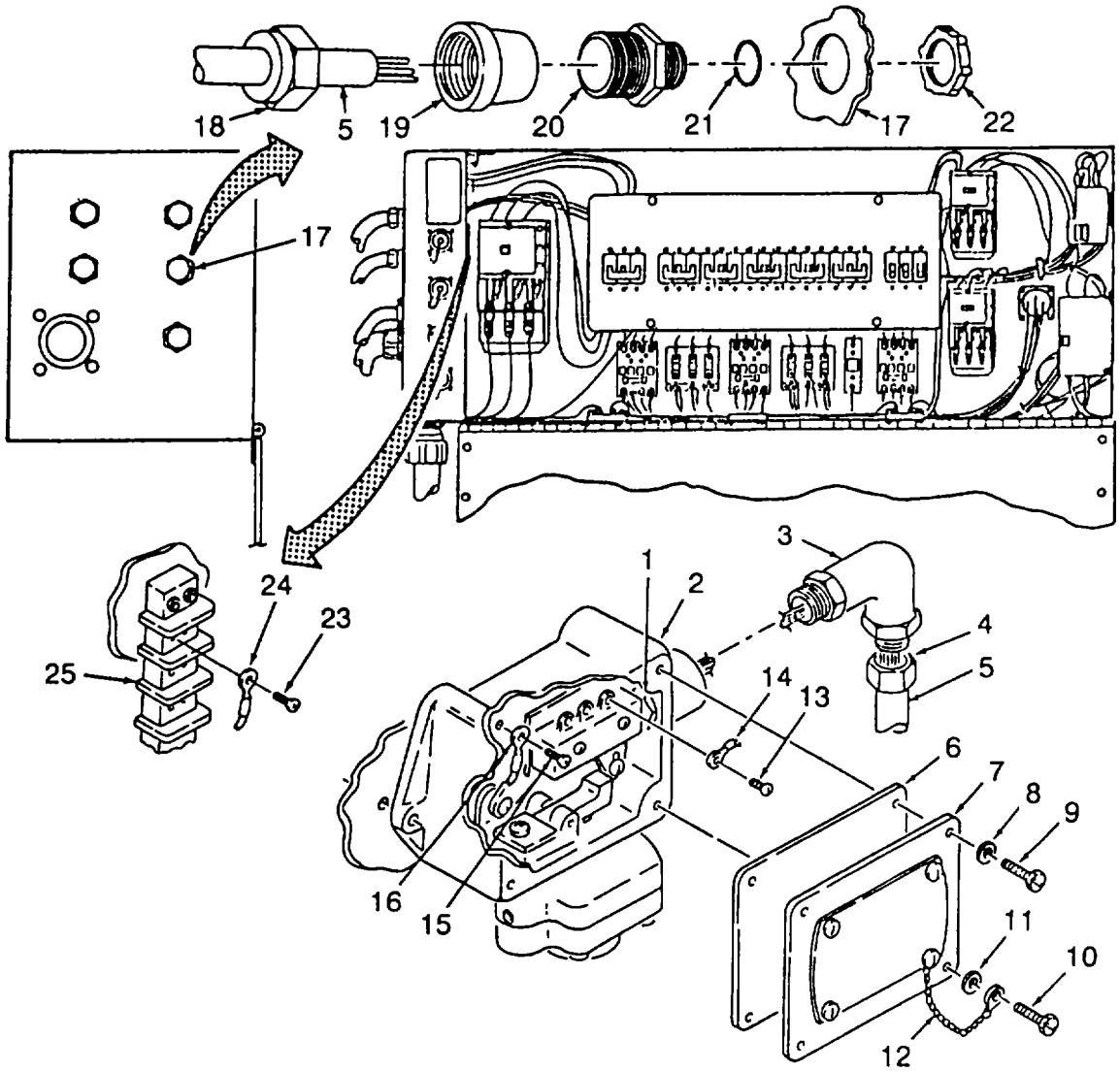
For inspection procedures, refer to paragraph 3-20.

TEST

For test procedures, refer to paragraph 3-20.

REPAIR

For repair procedures, refer to paragraph 3-20.



3-27. ELECTRICAL CABLE W46 AND W47 (HIGH AND LOW PRESS SWITCH) MAINTENANCE -continued.

INSTALLATION

a. Slide nut (18), sealing grip (19), new O-ring (21), and adapter (20) on low pressure switch cable (5).

b. Pull low pressure switch cable (5) through wall of electrical junction box (17) and position adapter (20).

c. Install locknut (22) on adapter (20):

d. Tighten nut (18) on adapter (20).

e. Working inside electrical junction box, position three wires (24) as tagged and secure with three screws (23) on terminal board (25).

f. Working at low pressure switch end of cable (5) position elbow (3) and install locknut (1).

NOTE
White wires connect to COM lug. Black wires connect to NC lug.

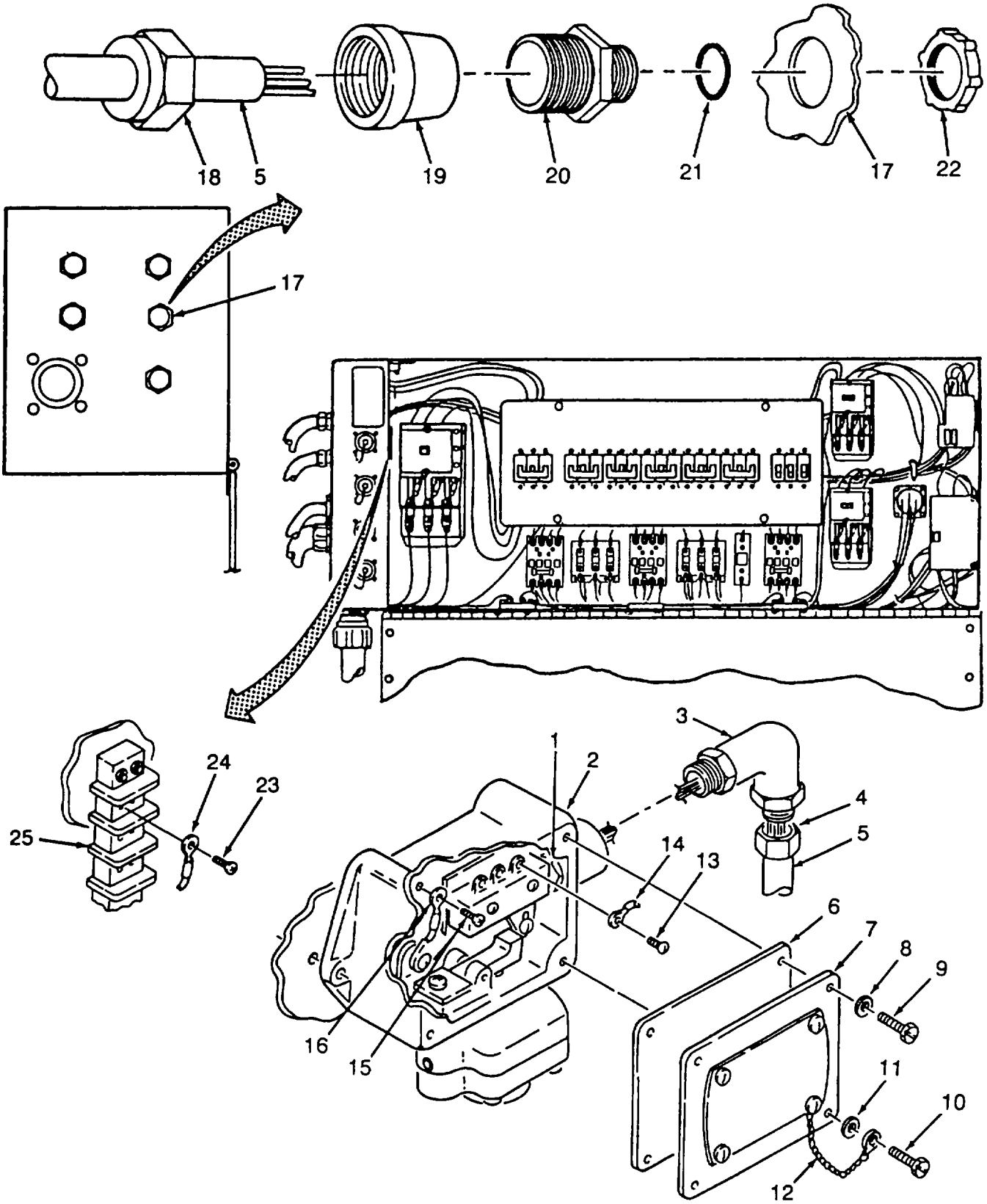
g. Route wires (11) into low pressure switch (2) and secure cable (5) to elbow connector (3) with nut (4).

h. Install two wire lugs (14) and screws (13) on low pressure switch (2) as marked during removal.

i. Position wire lug (16) of green wire and install screw (15).

j. Install gasket (6) cover (7), chain lug (12), lockwasher (11) and screw (10) on low pressure switch (2). Install three lockwashers (8) and three screws (9).

3-27. ELECTRICAL CABLE W47 (LOW PRESS SWITCH) MAINTENANCE - continued.



3-28. CABLE ASSEMBLY W49 (FILTER CONTROL) MAINTENANCE.

This task consists of: a. Removal b. Inspection c. Test d. Repair e. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Soldering Gun Kit (Appendix B, Section III, Item 3).
- Multimeter (Appendix B, Section III, Item 3).
- Electrical Repair Kit (Appendix B, Section III, Item 3).
- Crimping Tool (Appendix B, Section III, Item 3)
- Wire Stripper (Appendix B, Section III, Item 3).

Materials/Parts Required
- Tape, Electrical (Appendix C, Section II, Item 31).
- Solder (Appendix C, Section II, Item 27).
- Lockwasher (14) - MS35338-137

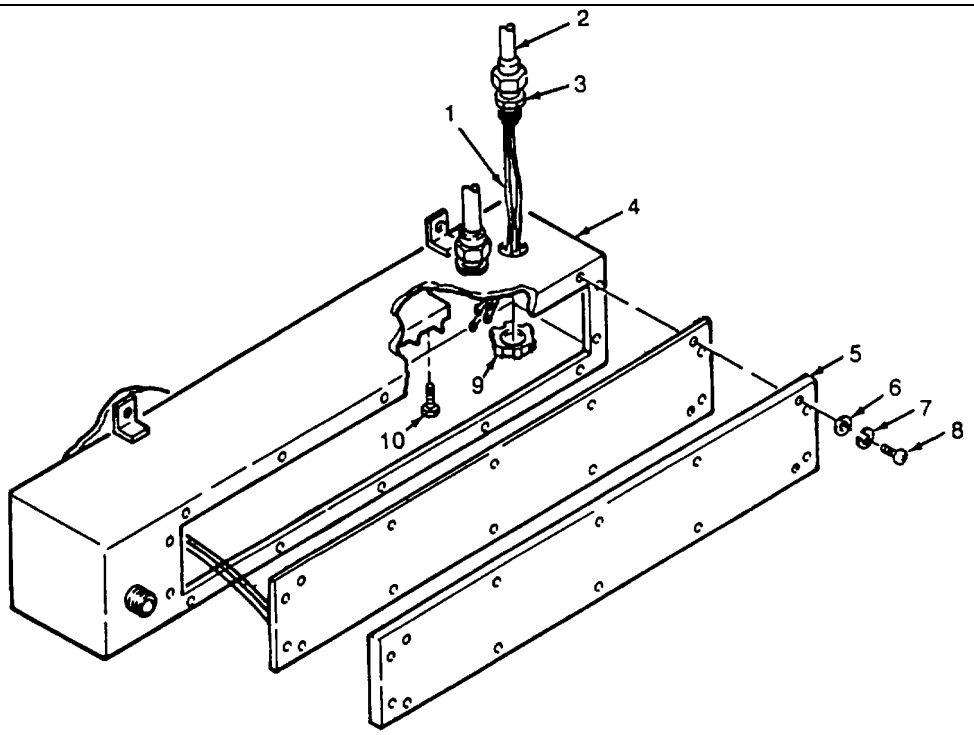
Equipment Condition

Reference
- ROWPU shutdown (TM 10-4610-240-10).
- Power shutdown (power source manual).

General Safety Instructions

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.



3-28. CABLE ASSEMBLY W49 (FILTER CONTROL) MAINTENANCE

REMOVAL

a. Remove 14 screws (8), lockwashers (7), flat washers (6) and control box cover (5).

WARNING

High voltages in this equipment can cause serious Injury or death. Be certain that all power is removed before performing maintenance.

NOTE

- **Tag wires before removal.**
- **Remove clamps as required.**

b. Remove five screws (10) and wires (1).

c Remove locknut (9) from adapter (3) and remove electrical cable (2).

d Close control box cover (5) and install but do not tighten 14 screws (8), lockwashers (7), and flat washers (6).

INSPECTION

For inspection procedures, refer to paragraph 3-20.

TEST

For test procedures, refer to paragraph 3-20.

REPAIR

For repair procedures refer to paragraph 3-20.

INSTALLATION

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

a. Remove 14 screws (8), lockwashers (7), flat washers (6) and control box cover (5). Discard lockwashers.

b. Position electrical cable (2) and install locknut (9) on adapter (3).

c. Position five wires (1) on terminals as tagged and install five screws (10).

NOTE

Install clamps as required.

d. Position control box cover (5) and install 14 screws (8), new lockwashers (7) and flat washers (6).

3-29. CABLE ASSEMBLY W51 (BOOSTER PUMP) MAINTENANCE.

This task consists of:
a. Removal
b. Inspection
c. Test
d. Repair
e. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section III, Item 3)
- Multimeter (Appendix B, Section III, Item 3)
- Electrical Repair Kit (Appendix B, Section III, Item 3).
- Crimping Tool (Appendix B, Section III, Item 3)
- Wire Stripper (Appendix B, Section III, Item 3)

Material/Parts Required
- Twine (Appendix C, Section II, Item 33).
- Tape, Electrical (Appendix C, Section II, Item 31).
- Lockwasher (4) - MS35338-108
- O-ring- 5262

Equipment Condition

Reference
- ROWPU shutdown (TM 10-4610-240-10).
- Water meter removed (Para. 2-42).

REMOVAL

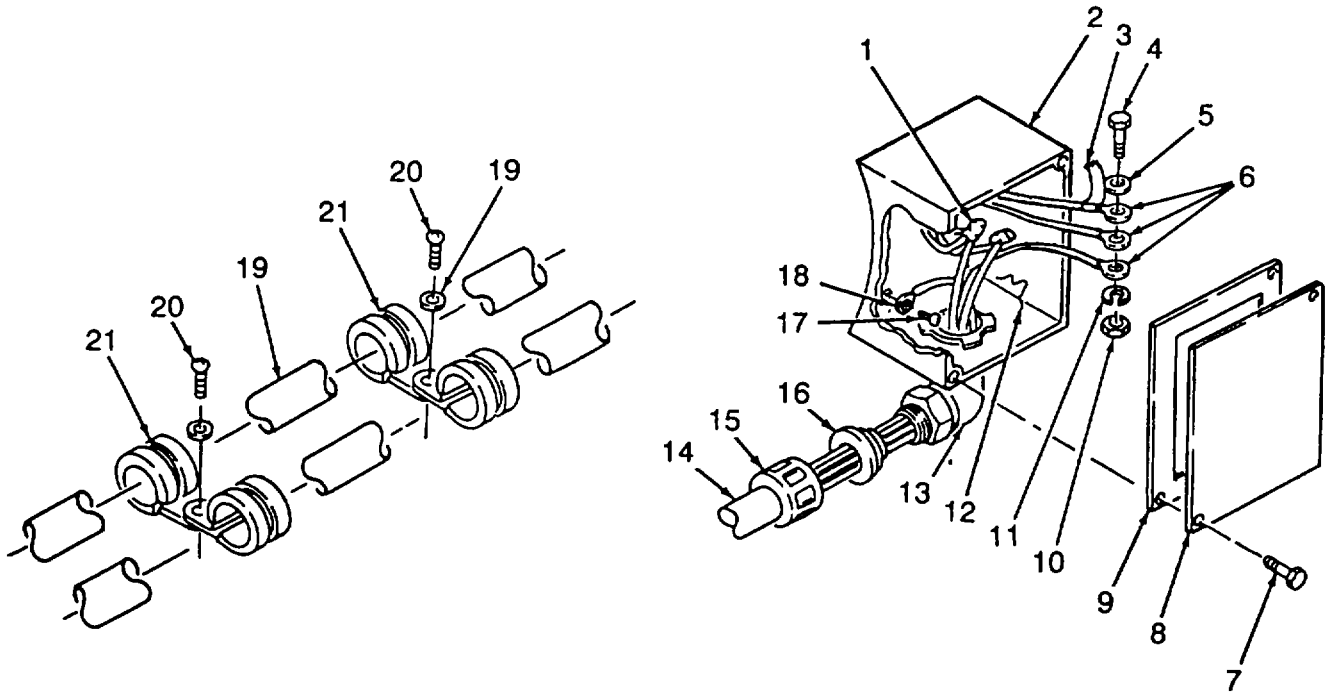
NOTE

Note routing of booster pump cable assembly before removal.

a. Remove two screws (20), flat washers (19), and clamps (21) securing booster pump cable assembly (14) to ROWPU deck.

b. Remove four screws (7), cover (8), and gasket (9).

3-29. CABLE ASSEMBLY W51 (BOOSTER PUMP) MAINTENANCE - continued.



3-29. CABLE ASSEMBLY W51 (BOOSTER PUMP) MAINTENANCE - continued.

c Pull bundle of four wire sets (6) from conduit box (2).

d Set aside bundle of wires with three cream-colored wires.

e. Tag three other bundles.

f Remove twine (12) and electrical tape (3) from three tagged wire sets.

g. Remove screw (17) securing grounding wire (18).

NOTE

There are three sets of motor wires to disconnect. Each set is removed the same. One is shown.

h Remove nut (10), lockwasher (11), three wire lugs (6), and flat washer (5) from screw (4) on each set of wires (6) that have been untaped.

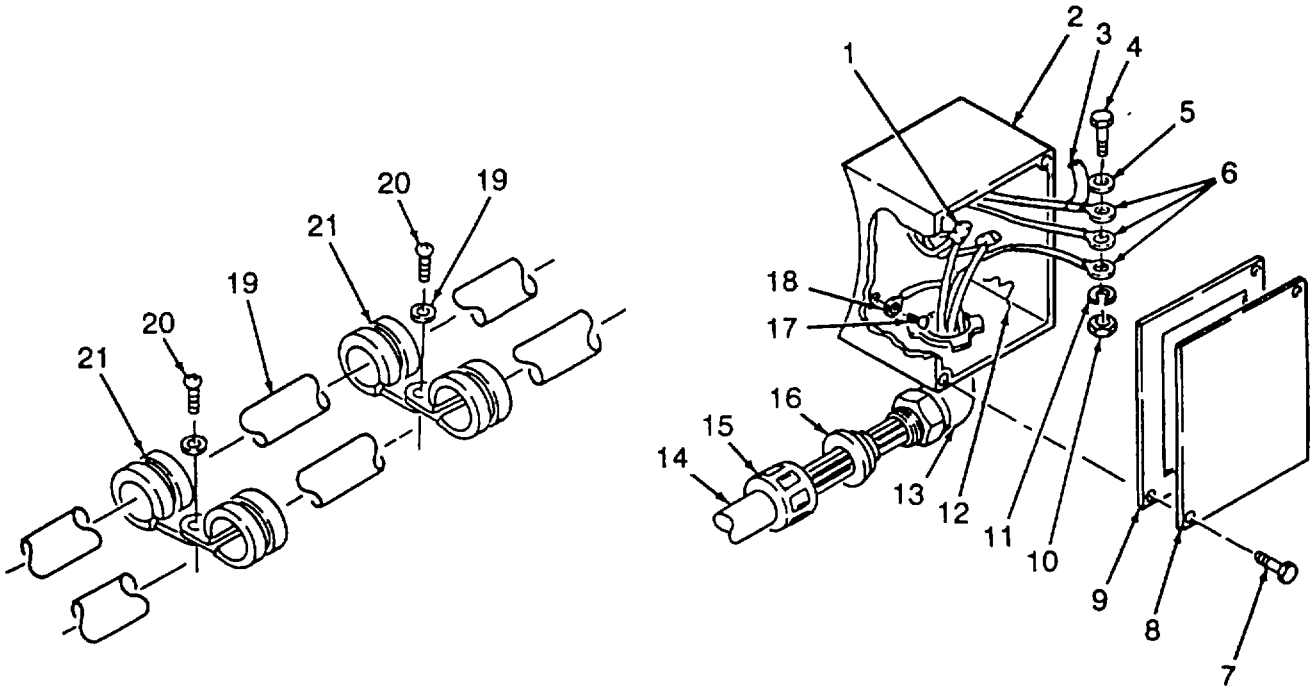
i. Install flat washer (5), lugs of two cream-colored wires (6), lockwasher (11), and nut (10) on screw (4).

CAUTION

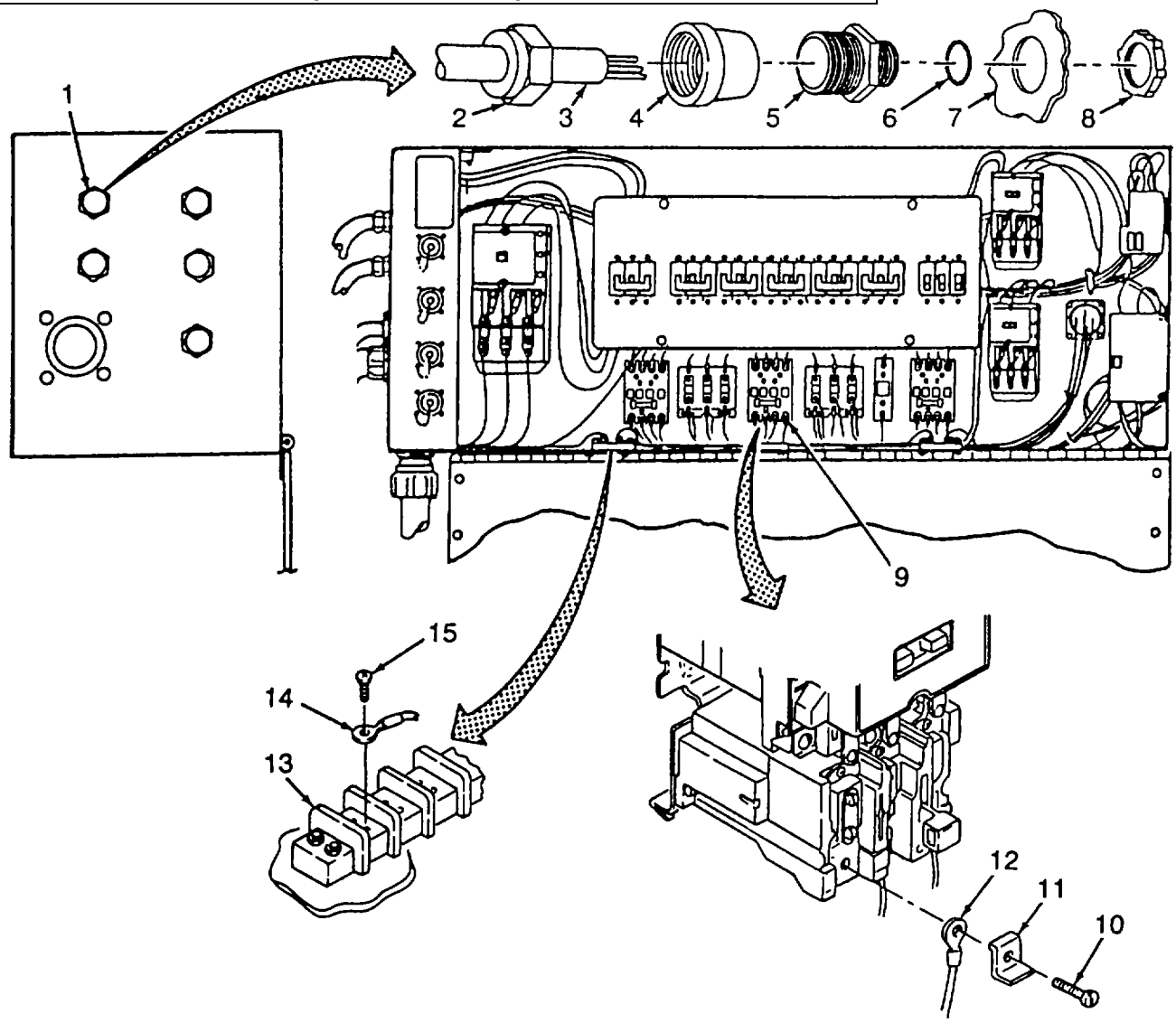
Wire insulation can be damaged when wires are pulled through elbow. Be careful when pulling wires.

j. Loosen nut (15) and remove wires from elbow (13).

k. Remove nut (15) and gasket (16) from booster pump cable assembly (14).



3-29. CABLE ASSEMBLY W51 (BOOSTER PUMP) MAINTENANCE - continued.



l. Working at electrical junction box, cut wire ties containing wires between sealing grip (1) and motor controller K6 (9).

NOTE

Tag all wires before removal.

m. Remove three screws (10), lug washers (11), and wire lugs (12) from bottom terminals of motor controller K6 (9).

n. Remove screw (15) and wire lug (14) from terminal (13).

o. Loosen nut (2).

3-29. CABLE ASSEMBLY W51 (BOOSTER PUMP) MAINTENANCE- continued.

p. Remove locknut (8).

q. Carefully pull booster pump cable assembly (3) and adapter (5) from electrical junction box (7).

r. Remove adapter (5), sealing grip (4), nut (2) and O-ring (6) (discard O-ring) from booster pump cable assembly (3) and remove cable from ROWPU.

INSPECTION

For inspection procedures, refer to paragraph 3-20.

TEST

For test procedures, refer to paragraph 3-20.

REPAIR

For repair procedures, refer to paragraph 3-20.

INSTALLATION

a. Slide nut (2), sealing grip (4), adapter (5) and new -ring (6) on booster pump cable assembly (3).

b. Pull booster pump cable assembly (3) through wall of electrical junction box (7) and position adapter (5).

c. Install new O-ring (6) and locknut (8) on adapter (5).

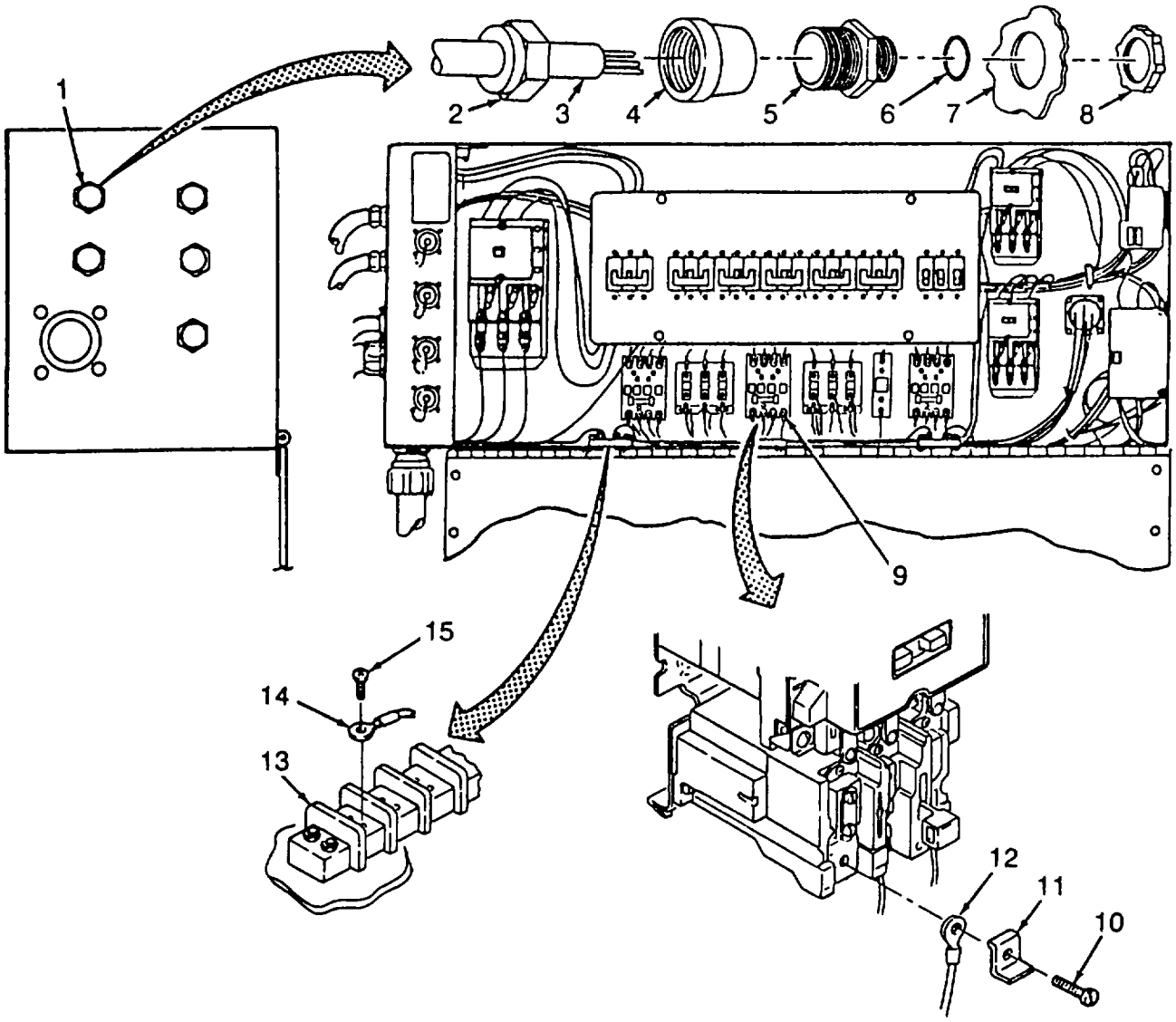
d. Install nut (2) on adapter (5).

e. Working inside electrical junction box, position three wire lugs (12) as tagged, lug washers (12), and screws (10) on bottom terminals of motor controller K6 (9).

f. Position wire lug (14) on terminal (13) as tagged and secure with screw (15).

g. Use wire ties to secure three wires to wire bundle on bottom and left wall of electrical junction box.

3-29. CABLE ASSEMBLY W51 (BOOSTER PUMP) MAINTENANCE - continued.



3-29. CABLE ASSEMBLY W51 (BOOSTER PUMP) MAINTENANCE - continued.

h. Working at motor end of booster pump cable assembly (25), position nut (26) and sealing grip (27) on booster pump cable assembly.

CAUTION

Wire insulation can be damaged when wires are pulled through elbow
Be careful when pulling wires

i. Pull four wires from booster pump cable assembly (14) through elbow (21) into conduit box (2) and install sealing grip (16) and nut (15).

NOTE

There are three sets of motor wires to connect to power source. Each wire from the power source is added to a motor wire set in the same way. One is shown.

j. Remove nut (10), lockwasher (11), and flat washer (5) from screw (4).

k Install wires (6) as tagged, install flat washer (5), lockwasher (11), and nut (10) on screw (4).

l. Position grounding wire (10) in conduit box (2) and secure with screw (17).

m Using electrical tape (2), wrap each wire set (6).

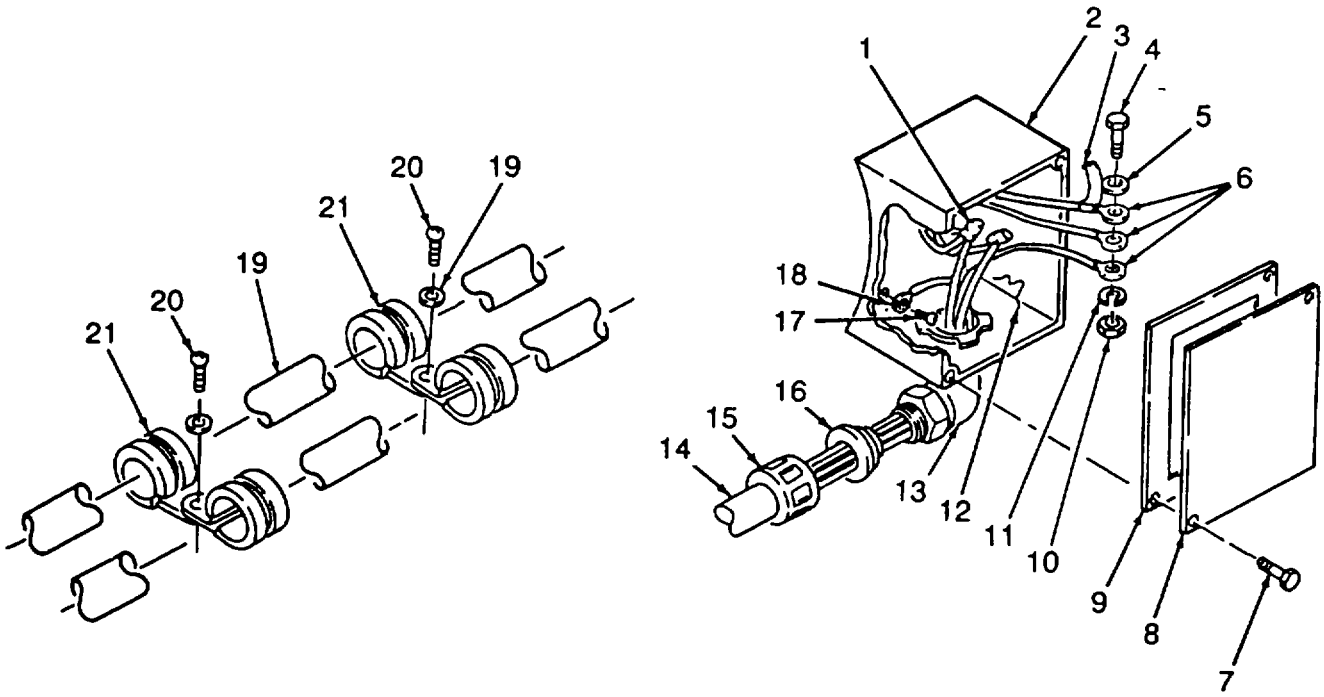
n. Secure electrical tape (3) on each wire set (6) with twine (12).

o. Position bundle of four wire sets (6) in conduit box (2).

p Position gasket (9) and conduit box cover (8) on conduit box (2) Install four screws (7).

q Position booster pump cable assembly (14) on ROWPU deck as noted during removal and install two clamps (21), flat washers (19), and screws (20).

3-29. CABLE ASSEMBLY W51 (BOOSTER PUMP) MAINTENANCE - continued.



3-30. CABLE ASSEMBLY W53 (BACKWASH TIMER) MAINTENANCE.

This task consists of:
a. Removal
b. Inspection
c. Test
d. Repair
e. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3)
Multimeter (Appendix B, Section III, Item 3).
Electrical Repair Kit (Appendix B, Section III, Item 3)
Crimping Tool (Appendix B, Section III, Item 3).
Wire Stripper (Appendix B, Section III, Item 3)
Materials/Parts Required
Tape, Electrical (Appendix C, Section II, Item 31).
Solder (Appendix C, Section II, Item 27)
O-ring - 5262
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shutdown (power source manual).

REMOVAL

a. Open door (11) of backwash timer (1).

NOTE

Tag all wires before removal.

b. Loosen five screws (2) and disconnect five wires (3) from terminal board (4).

c. Loosen nut (5).

d. Remove locknut (10).

e. Carefully pull backwash timer cable assembly (6) and adapter (8) from backwash timer (1).

f. Remove adapter (8), sealing grip (7), nut (5) from backwash timer cable assembly (6). Discard O-ring (9).

g. Disconnect connector (P10).

INSPECTION

For inspection procedures, refer to paragraph 3-20.

3 30. CABLE ASSEMBLY W53 (BACKWASH TIMER) MAINTENANCE - continued.

TEST

For test procedures, refer to paragraph 3-20.

REPAIR

For repair procedures, refer to paragraph 3-20.

INSTALLATION

a. Slide nut (5), sealing grip (7), adapter (8) and new O-ring (9) on backwash timer cable assembly (6).

b. Pull backwash timer cable assembly (6) through wall of backwash timer (1) and position adapter (8).

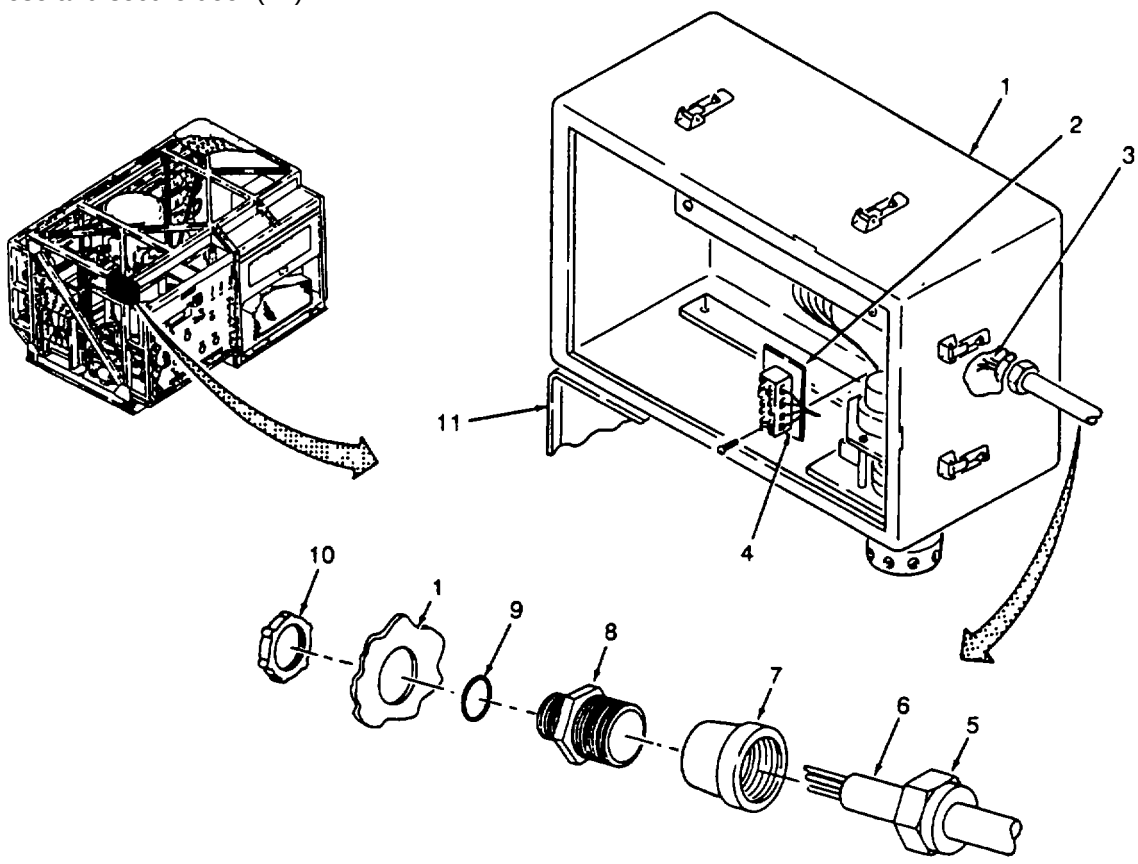
c. Install locknut (10) on adapter (8).

d. Install nut (5) on adapter (8).

e. Connect five wires (3) as tagged and secure with five screws (2).

f. Connect connector (P10)

g. Close and secure door (11)



3-31. CABLE ASSEMBLY W57 (DISSOLVED SOLIDS SENSOR) MAINTENANCE.

This task consists of:
a. Removal
b. Inspection
c. Test
d. Repair
e. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Soldering Gun Kit (Appendix B, Section III, Item 3)
Multimeter (Appendix B, Section III, Item 3)
Electrical Repair Kit (Appendix B, Section III, Item 3)
Crimping Tool (Appendix B, Section III, Item 3)
Wire Stripper (Appendix B, Section III, Item 3).
Material/Parts Required
Tape, Electrical (Appendix C, Section II, Item 31)
Solder (Appendix C, Section II, Item 27)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10)
Power shutdown (power source manual).
General Safety Instructions

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

REMOVAL

a. Remove sensor (14) from product water pipe (13).

b. Remove two screw (3), and nuts (5), and remove clamps (4).

c. Remove cap (8) from receptacle connector (6).

d. Remove three screws (7), washers (2), nuts (1), and remove cable assembly (15).

e Remove screw (10), washer (11), nut (12) and remove chain (9).

INSPECTION

For inspection procedures, refer to paragraph 3-20.

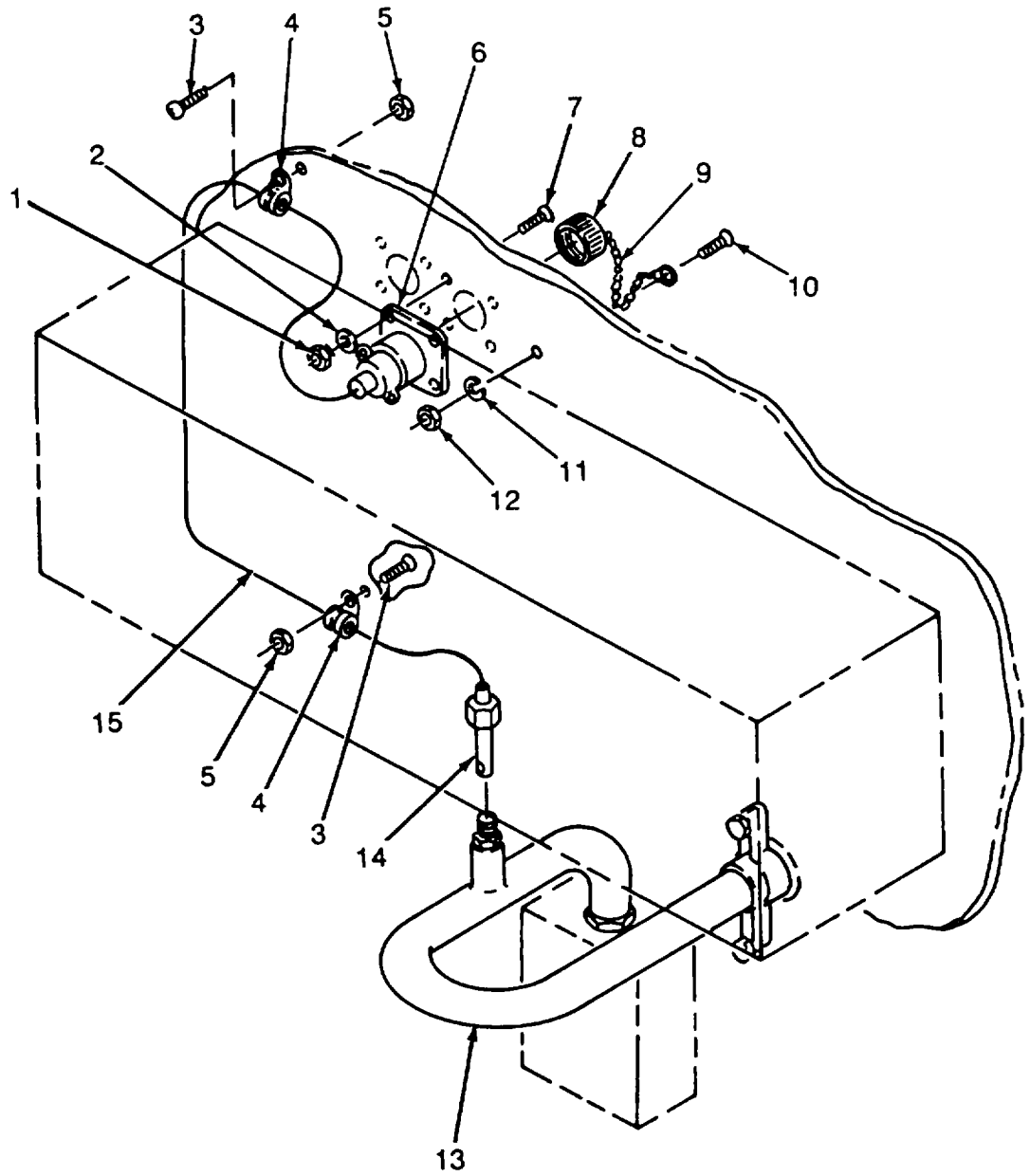
TEST

For test procedures, refer to table 3-1.

REPAIR

For repair procedures, refer to paragraph 3-20.

3-31. CABLE ASSEMBLY W57 (DISSOLVED SOLIDS SENSOR) MAINTENANCE - continued.



3-31. CABLE ASSEMBLY W57 (DISSOLVED SOLIDS SENSOR) MAINTENANCE - continued

INSTALLATION

a. Position cable assembly (15) in place and install three screws (7), washers (2) and nuts (1).

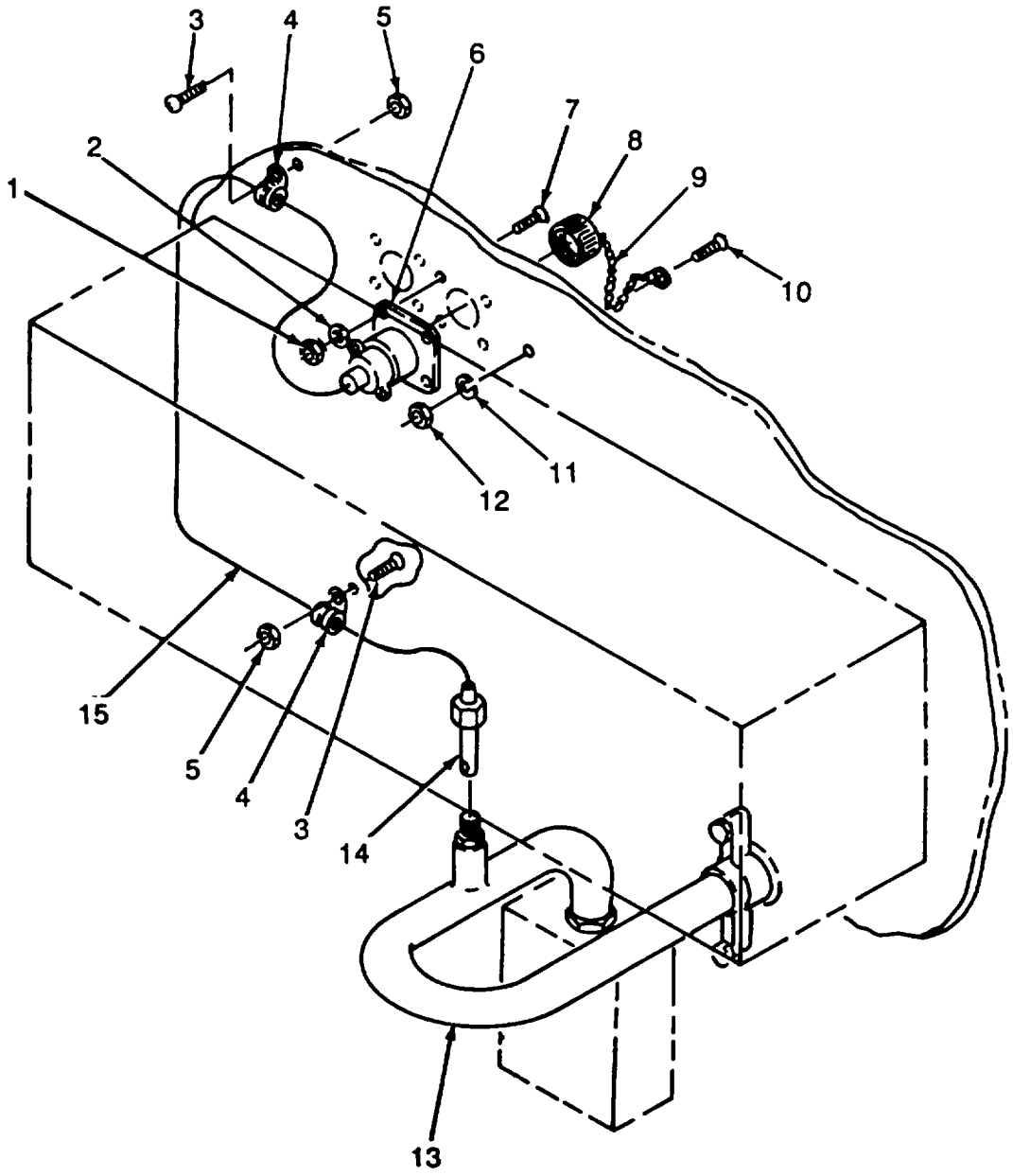
b Position chain (9) in place and install screw (10), washer (11) and nut (12).

c Install cap (8) on receptacle (6).

d. Position clamp (4) in place and secure with two screw (3) and nuts (5).

e. Install sensor (14) in product water pipe (13).

3-31. CABLE ASSEMBLY W57 (DISSOLVED SOLIDS SENSOR) MAINTENANCE - continued



Section VII. BOOSTER PUMP ASSEMBLY MAINTENANCE PROCEDURES

3-32. CENTRIFUGAL PUMP (BOOSTER) MAINTENANCE.

This task consists of:
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Strap Wrench (Appendix B, Section III, Item 3).
Materials/Parts Required
Drycleaning Solvent (Appendix C, Section II, Item 28)
Detergent (Appendix C, Section II, Item 10).
Lockwasher (4) - MS35338-141
Gasket - 500-398
O-ring - 511-044
Seal - 500-976
Equipment Condition
Reference
Centrifugal (booster) pump assembly removed (para. 2-67).
General Safety Instructions

WARNING

- Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.
- Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.

DISASSEMBLY

a. Remove four screws (13), cover (12), and gasket (11).

b. Remove cap (1) and insert screwdriver in shaft slot (2).

c. While holding shaft with screwdriver, remove impeller (9) and mechanical seal (8).

d. Remove seal (10) from impeller (9).

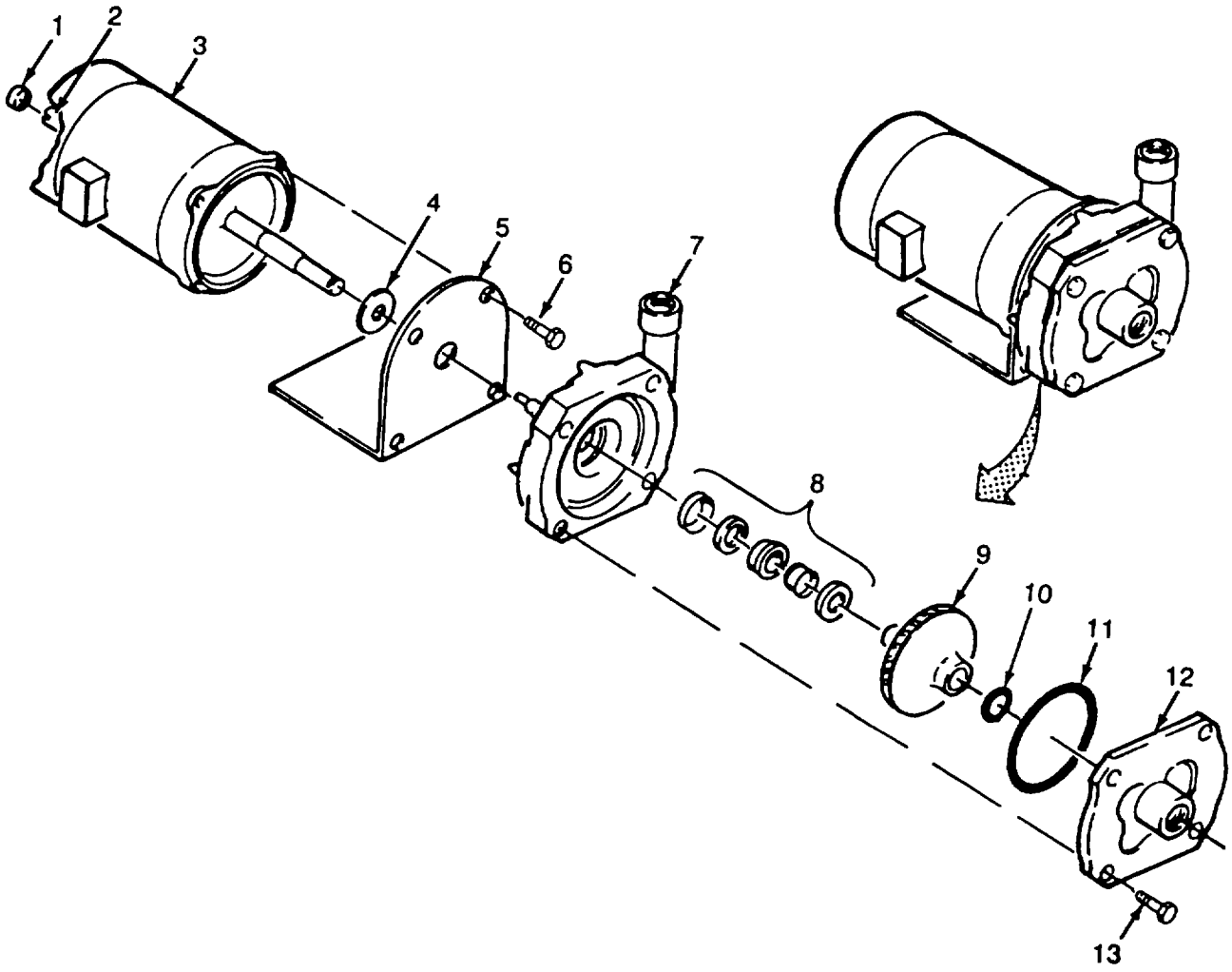
e. Remove four cap screws (6), from bracket (5).

f. Rotate bracket (5) and remove bracket from casing (7).

g. Remove remaining parts of mechanical seal (8) from casing (7).

h. Remove slinger (4) from shaft of electric motor (3).

3-32. CENTRIFUGAL PUMP(BOOSTER) MAINTENANCE.



3-32. CENTRIFUGAL PUMP (BOOSTER) MAINTENANCE- continued.

CLEANING

WARNING

- Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

- Compressed air can blow dust into the eyes. Wear eye protection Do not exceed 30 psi (207 kPa) air pressure.

a Using drycleaning solvent, clean bracket (5) and casing (7) externally Air dry parts.

b Using wire brush, clean rust and corrosion from casing (7) and bracket (5).

c. Using mild soap solution, wash impeller (9) and casing (7) internally.

INSPECTION

a. Inspect casing (7) and impeller (9) for cracks and damage.

b. Inspect mounting hardware for excessive wear or other damage

REPAIR

Replace all damaged components.

ASSEMBLY

a. Install new slinger (4) on shaft of electric motor (3).

CAUTION

Seal assembly must be installed in casing with raised end first.

b. Rotate casing (7) on bracket (5) and install new mechanical seal (8).

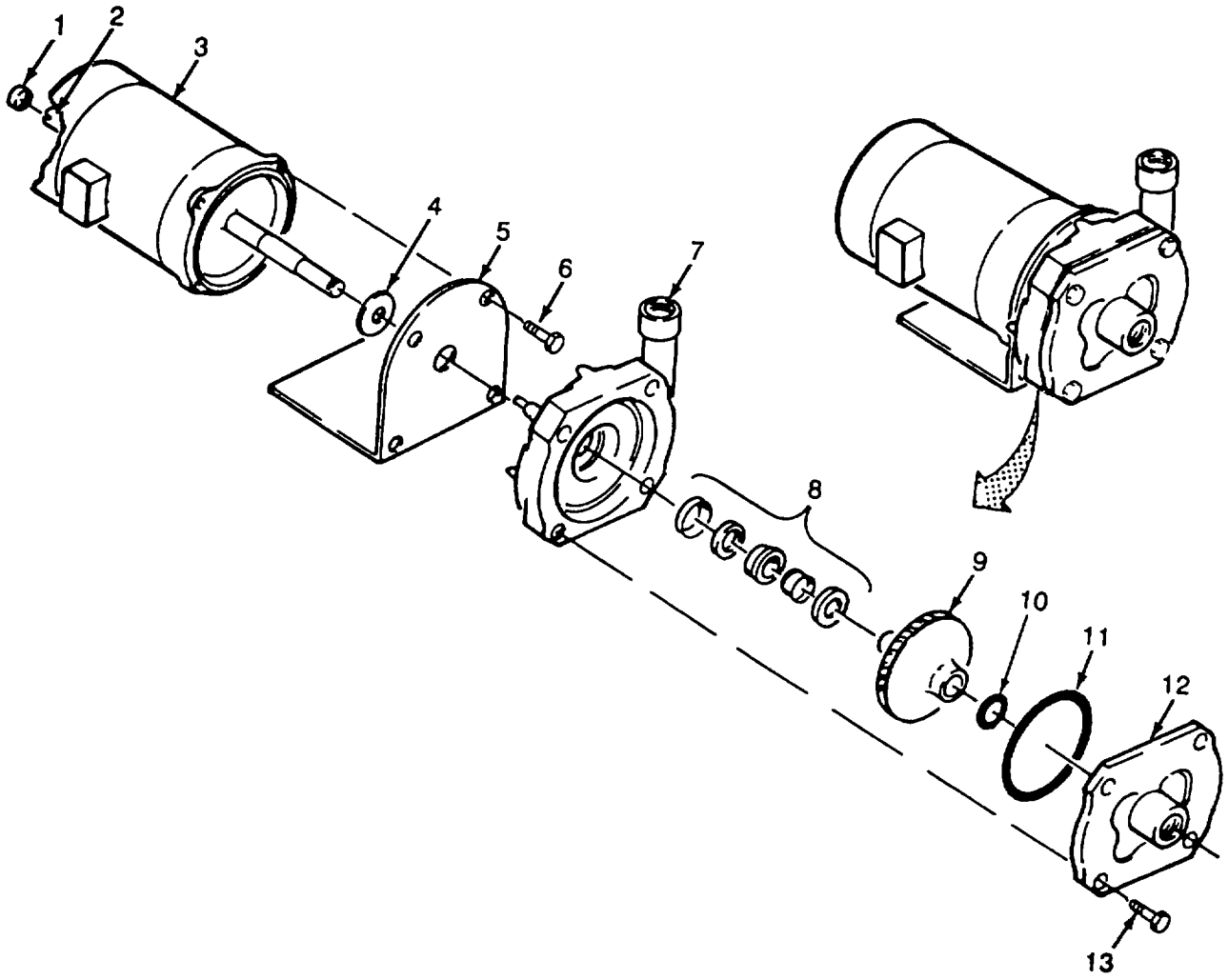
c. Position electric motor (3) on bracket (5) and install four cap screws (6).

d Insert blade of screwdriver in shaft slot (2) and install impeller (9) hand tight and install new seal (10).

e. Position gasket (11) in cover (12) and install on casing (7). Install four screws (13).

f. Install cap (1).

3-32. CENTRIFUGAL PUMP(BOOSTER) MAINTENANCE.



3-33. CENTRIFUGAL PUMP MOTOR (BOOSTER) MAINTENANCE.

This task consists of:
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly
e. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section 1II, Item 3)
Arbor Press (Appendix B, Section III, Item 3)
Growler (Appendix B, Section III, Item 3)
Material/Parts Required
Grease (Appendix C, Section II, Item 15).
Rags, wiping (Appendix C, Section II, Item 23)
Equipment Condition
Reference
Centrifugal pump removed (para 3-32
General Safety Instructions

WARNING

- High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.
- Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.

DISASSEMBLY.

a. Remove three screws (1) and fan cover (2).

b. Remove screw and retainer (3), and external fan (4) from rotor shaft (10).

NOTE

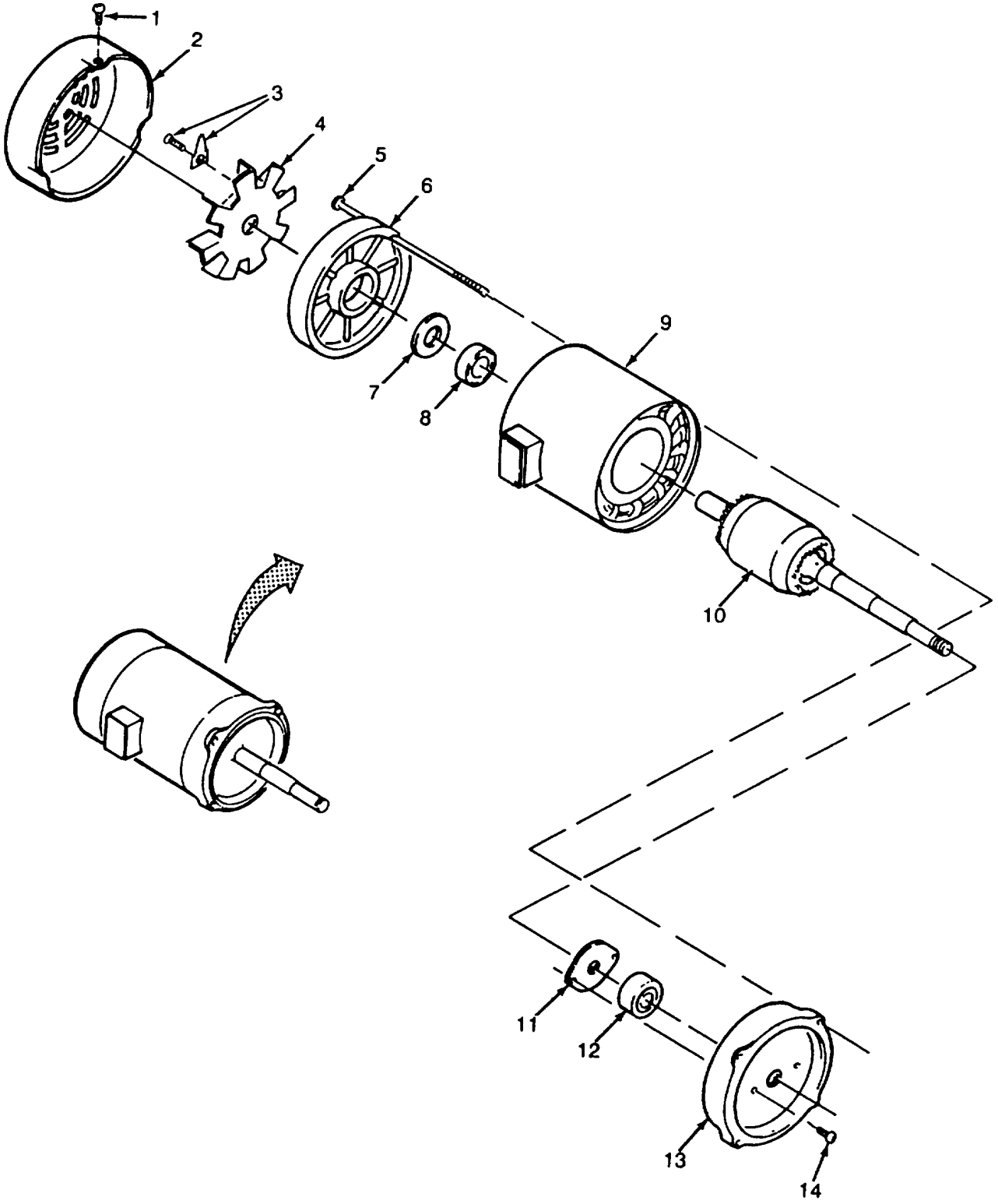
Mark fan plate, stator assembly, and end plate to assist in alinement during assembly.

c. Remove four bolts (5).

d. Tap plate (6) with soft-faced mallet to break bond with stator assembly (9) and remove plate.

e. Remove washer (7) from rotor shaft (10).

3-33 CENTRIFUGAL PUMP MOTOR (BOOSTER) MAINTENANCE- continued.



3-32. CENTRIFUGAL PUMP MOTOR (BOOSTER) MAINTENANCE - continued.

CAUTION

Stator wiring inside case can be damaged by rotor shaft if rotor shaft is not removed carefully. Guide rotor shaft carefully while removing it.

f. Tap end plate (13) with soft-faced mallet to break bond with stator assembly (9) and remove plate with rotor shaft (10) attached.

g. Remove two screws (14) and end plate (13) from rotor shaft (10).

h Using arbor press, remove bearing (8) from rotor shaft (10).

i Using arbor press, remove bearing (12) from rotor shaft (10).

j. Remove retainer ring (11).

CLEANING

WARNING

Compressed air can blow dust into the eyes Wear eye protection Do not exceed 30 psi (207 kPa) air pressure.

a. Using compressed air, blow dust and grit from stator assembly (9) and rotor (10) assemblies. Wipe rotor (10) assembly with clean rag.

b Clean fan cover (2) vent slots with compressed air and wipe with clean rag.

c. Wipe bearings (8 and 12) with clean rag.

d Scrape loose paint from fan cover (2), stator assembly (9), and end plate (13).

INSPECTION

a. Inspect leads and windings of stator in stator assembly (9) for evidence of cracked or burned insulation.

b. Inspect rotor shaft (10) for loose or burned conducting bars.

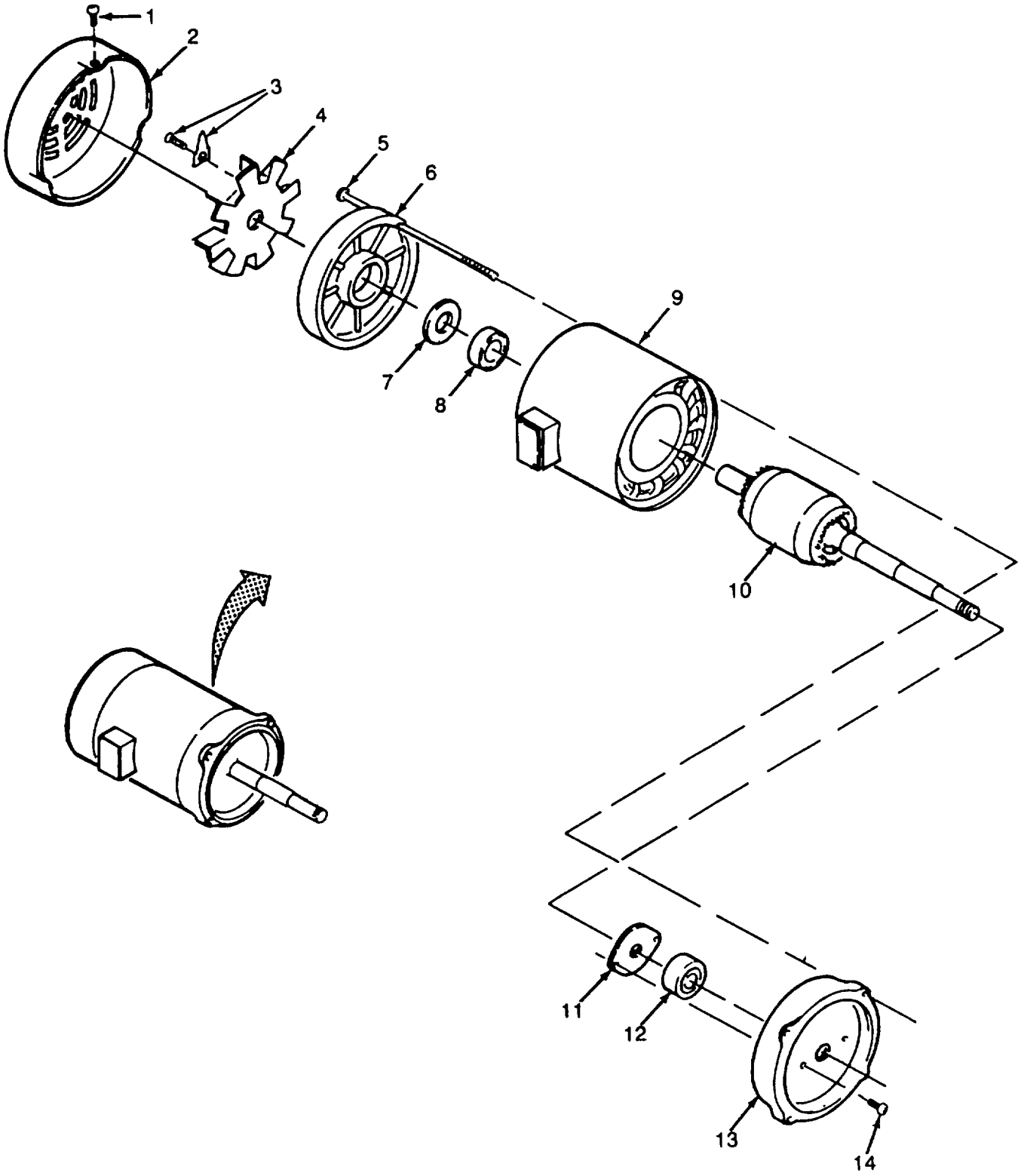
c Using growler check rotor for shorts.

d Inspect bearings (8 and 12) for wear.

e. Inspect plates (6 and 13) for cracks.

f Using multimeter set to OHMS X1 scale, connect test leads to pairs of motor lead sets 4, 5, and 9 to 1 and 7; 1 and 7 to 2 and 8, 1 and 7 to 3 and 6, and 2 and 8 to 3 and 6.

3-33. CENTRIFUGAL PUMP MOTOR (BOOSTER) MAINTENANCE - continued.



3-33. CENTRIFUGAL PUMP MOTOR (BOOSTER) MAINTENANCE - continued.

g If multimeter indication is not 0 ohm for each pair of windings, replace stator assembly.

h Set multimeter to OHMS X1000 scale. Connect one lead to stator housing. Connect other lead to each motor lead in turn.

i. If multimeter indication is not infinity for each motor lead, replace stator assembly.

ASSEMBLY

a. Pack two bearings (8) and (12) and use arbor press to install bearing (8) on short end of rotor shaft (10).

b. Install retainer ring (11).

c. Using arbor press, install bearing (12) on rotor shaft (10).

d. Install two screws (14) on end plate (13).

CAUTION

Stator wiring inside case can be damaged by rotor shaft if rotor shaft is not installed carefully. Guide rotor shaft carefully while installing it.

e. Insert rotor shaft (10) through stator assembly (9).

f. Position end plate (13) Aline mark made during assembly with mark on stator assembly (9).

g. Install washer (7) on short end of rotor shaft (10).

h. While holding end plate (13) alined on one end of stator assembly (9), position plate (6) on other end Aline mark made on plate during disassembly with mark on stator assembly (9).

i. Install four bolts (5).

j. Install fan (4), and screw retainer (3).

k. Install fan cover (2) and three screws (1).

TEST

a. Secure motor to test bench.

3-33. CENTRIFUGAL PUMP MOTOR (BOOSTER) MAINTENANCE - continued.

WARNING

Electrical high voltages can cause serious injury or death. Some tests require power to be connected. Always take proper measures to ensure personal safety

b. Connect motor wiring to test bench leads.

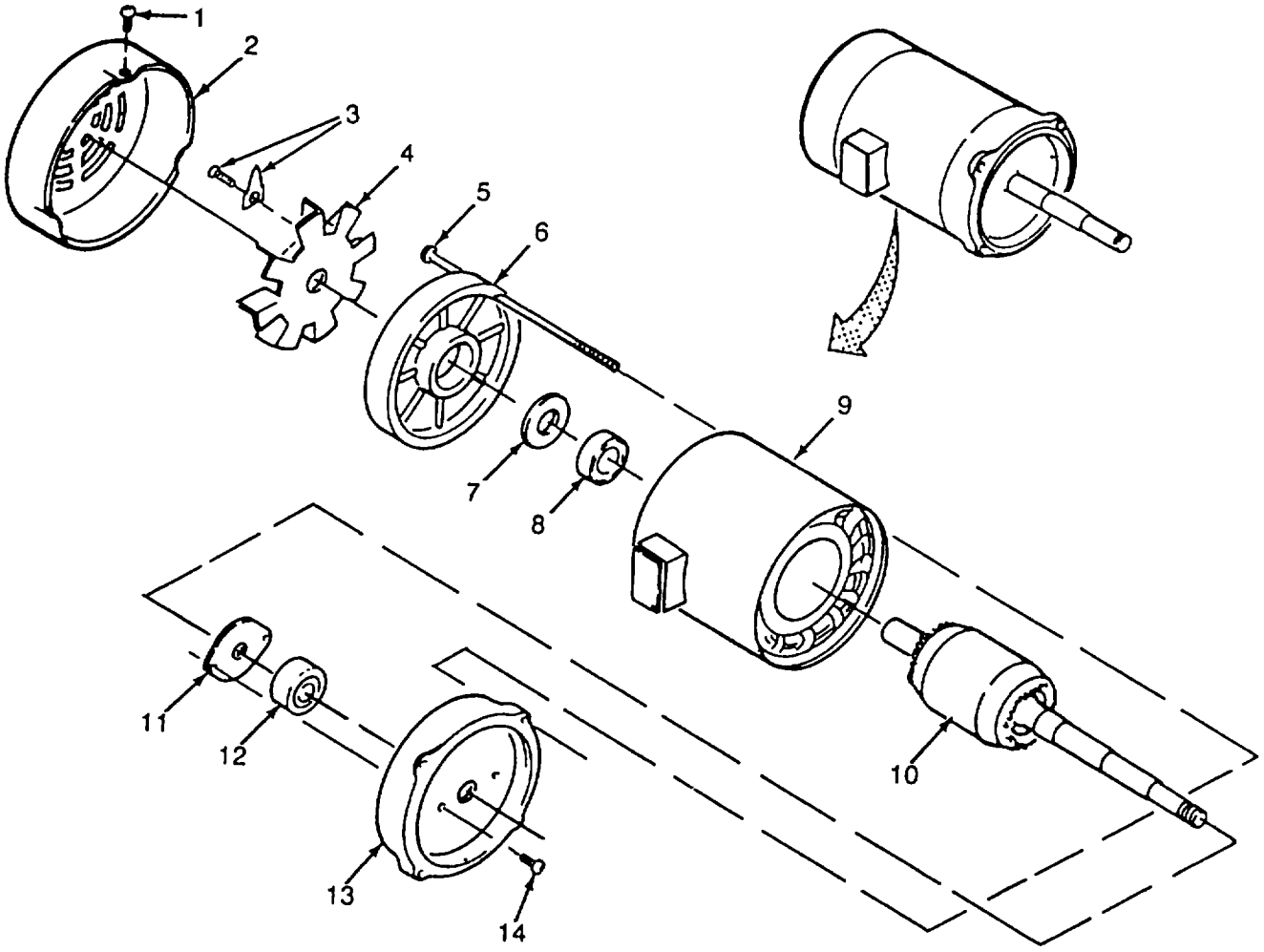
c. Connect power and run motor with and without load.

d. Check motor for excessive vibration and fast temperature rise.

e. Disconnect motor from test bench leads.

REPAIR

Replace all damaged components.



Section VIII. CHEMICAL FEED PUMP AND R.O. PUMP ASSEMBLIES MAINTENANCE PROCEDURES

3-34. MOTOR (CHEMICAL FEED PUMP) MAINTENANCE.

This task consists of:
a. Test
b. Disassembly
c. Cleaning
d. Inspection
e. Repair
e. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Arbor Press (Appendix B, Section III, Item 3).
Growler (Appendix B, Section III, Item 3).
Materials/Parts Required
Rags, wiping (Appendix C, Section II, Item 23)
Equipment Condition
Reference
Chemical feed pump electric motor removed (para. 2-70).
General Safety Instructions

WARNING

- High voltages in this equipment can cause serious injury or death. Be careful when testing motors with electrical power on.
- Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.

TEST

a. Secure motor to test bench.

WARNING

Electrical high voltages can cause serious injury or death. Some tests require power to be connected. Always take proper measures to ensure personal safety.

b. Connect motor wiring to test bench leads.

c. Connect power and run motor with and without load.

d. If motor won't start, turn off power, spin shaft by hand, and turn on power while shaft is spinning. If motor continues to run, stationary switch must be tested after disassembly.

e. Disconnect motor from test bench leads.

3-34. MOTOR (CHEMICAL FEED PUMP) MAINTENANCE - continued.

DISASSEMBLY

CAUTION

Stator assembly wiring can be damaged by rotor or rotor shaft if it is not removed carefully.

a. Carefully pull rotor (17) and attached parts from stator assembly (21).

b. Remove wavy washer (20) and thrust washer (19) from shaft of rotor (17).

c Remove two screws (9), cover (10), and gasket (11) from conduit box (12).

NOTE

To aid installation, tag all wiring before removal.

d. Separate wiring (14) located inside conduit box (12).

e Remove two screws (13) and conduit box (12) from stator assembly (21).

f. Remove two screws(8), cover (7), and gasket (6) from stator assembly (21).

NOTE

To aid installation, tag all wiring before removal.

g. Disconnect wiring and remove capacitor (5) from stator assembly.

h. Remove gasket (4) from stator assembly (21).

i. If required, remove two bolts (23) from end plate (1).

j. Tap end plate (1) with soft-faced mallet to break bond with stator assembly (21).

CAUTION

Stationary switch is mounted on end plate with two screws. Switch wiring is routed through stator assembly. To prevent damage to stator assembly wiring, make sure stationary switch wiring is disconnected before removing end plate.

k. Carefully separate end plate (1) from stator assembly (21) while guiding wiring (22) through side of stator assembly.

l. Remove two screws (3) and stationary switch (2) from end plate (1).

m. Using arbor press, remove two bearings (15 and 18) and centrifugal switch (16) from shaft of rotor (17).

3-34. MOTOR (CHEMICAL FEED PUMP) MAINTENANCE - continued.

CLEANING

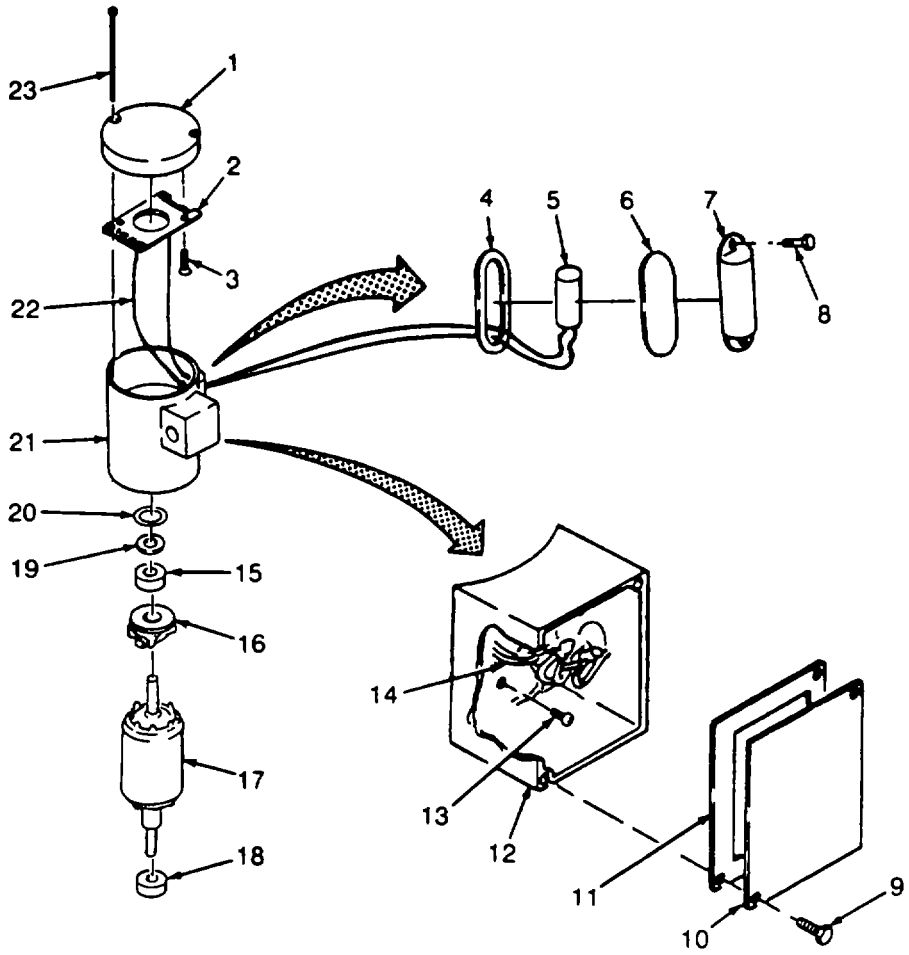
WARNING

Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.

a. Remove loose paint from end plate (1) and stator assembly (21).

b Using compressed air, blow dust and grit from stator assembly (21) and rotor(17). Wipe rotor with wiping rag.

c. Wipe dirt and grit from bearings (16 and 18) with wiping rag.



3-34. MOTOR (CHEMICAL FEED PUMP) MAINTENANCE - continued.

INSPECTION

a. Inspect leads and windings of stator assembly (21) for evidence of cracked or burned insulation.

b. Inspect rotor (17) shaft for loose or burned conducting bars.

c Using growler, check rotor for shorts.

d. Inspect bearings (16 and 18) for wear or damaged seals.

e. Inspect end plate (1) for cracks.

f. Using multimeter set to OHMS X 1 scale, check for shorts between stator assembly windings. If multimeter indication is not 0 ohm, for each pair of windings, replace stator assembly.

g. Set multimeter to OHMS X1000 scale. Connect one lead to stator assembly (21) housing. Connect other lead to each set of stator assembly leads in turn. If multimeter indication is not infinity for each stator assembly lead, replace stator assembly.

h. Connect multimeter leads to capacitor leads. If multimeter indication is not infinity, replace capacitor.

i. Set multimeter to OHMS XI scale. Connect leads to stationary switch leads. If multimeter indication is not 0 ohm, replace stationary switch. If multimeter indication is 0 ohm, but motor started only by hand during test, replace centrifugal switch.

REPAIR

Replace defective components.

ASSEMBLY

a. Using arbor press, install centrifugal switch (16) onto short end of rotor (17) shaft.

b Install two bearings (15 and 18) on shaft of rotor (17).

c Position stationary switch (2) on end plate (1) and install two screws (3).

d. Carefully install end plate (1) on stator assembly (21) while guiding wiring (22) through side of stator assembly (one wire goes to capacitor, the other to conduit box as tagged).

e. Install end plate (1) on stator assembly (21).

f. Position end plate (1) on stator assembly (21) as required, and install two bolts (23) through end plate and stator assembly (21).

g. Position gasket (4) on stator assembly (21).

3-34. MOTOR (CHEMICAL FEED PUMP) MAINTENANCE - continued.

h. Position capacitor (5) on stator assembly (21) and connect wiring as tagged during disassembly.

i. Install gasket (6), cover (7) and two screws (8) on stator assembly (21).

j. Position wiring through hole in conduit box (12), install conduit box with two screws (13), then connect wiring (14) as tagged.

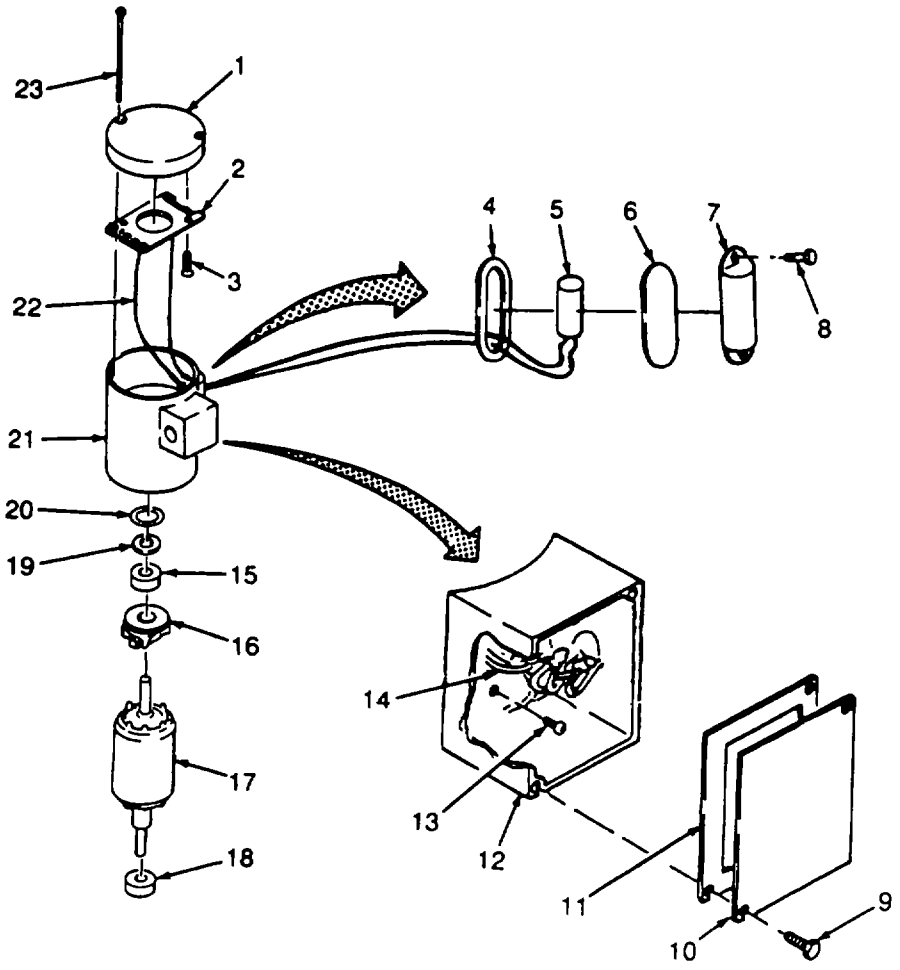
k. Install gasket (11), cover (10) and two screws (9) on conduit box (12).

l. Install thrust washer (19) and wavy washer (20) on shaft of rotor (17).

CAUTION

Stator assembly wiring can be damaged by rotor or rotor shaft if rotor is not installed carefully.

m. Install rotor (17) in stator assembly (21). Make sure bearing (15) seats properly in and cap (1).



3-35. HOUSING (CHEMICAL FEED PUMP) MAINTENANCE.

This task consists of:
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Materials/Parts Required
Solvent, drycleaning (Appendix C, Section II, Item 28)
Detergent (Appendix C, Section II, Item 10)
Tape, Anti-seize (Appendix C, Section II, Item 30)
O-ring - ZM-PA-1229-EM-Y
Equipment Condition
Reference
Chemical feed pump removed (para. 2-68).
Chemical feed pump diaphragms removed (para 2-69).
Chemical feed pump electric motor removed (para 2-70)
General Safety Instructions

WARNING

Using drycleaning solvent incorrectly can cause injury or even death.

DISASSEMBLY

a. Remove oil drain plug (6) and drain oil from chemical feed metering pump (12).

b. Remove oil fill plug (3) from housing (5).

WARNING

Bearing holder is under spring tension. Use care in removing bearing holder to prevent personal injury or damage to equipment.

NOTE

- There are four diaphragm drive assemblies on the chemical feed metering pump. All are disassembled the same. One is shown, the others are similar.
- To aid installation, mark position of bearing holder screws before removal.

c. Remove two screws (13) and bearing holder (12).

d. Remove shaft (9), washer (10), and spring (11).

e Remove key (14) and stop pin (8) from shaft (9).

3-35. HOUSING (CHEMICAL FEED PUMP) MAINTENANCE.

f. Remove thumbscrew (15) and slug (16) from housing (5).

g. Remove stop pin (2) from housing (5).

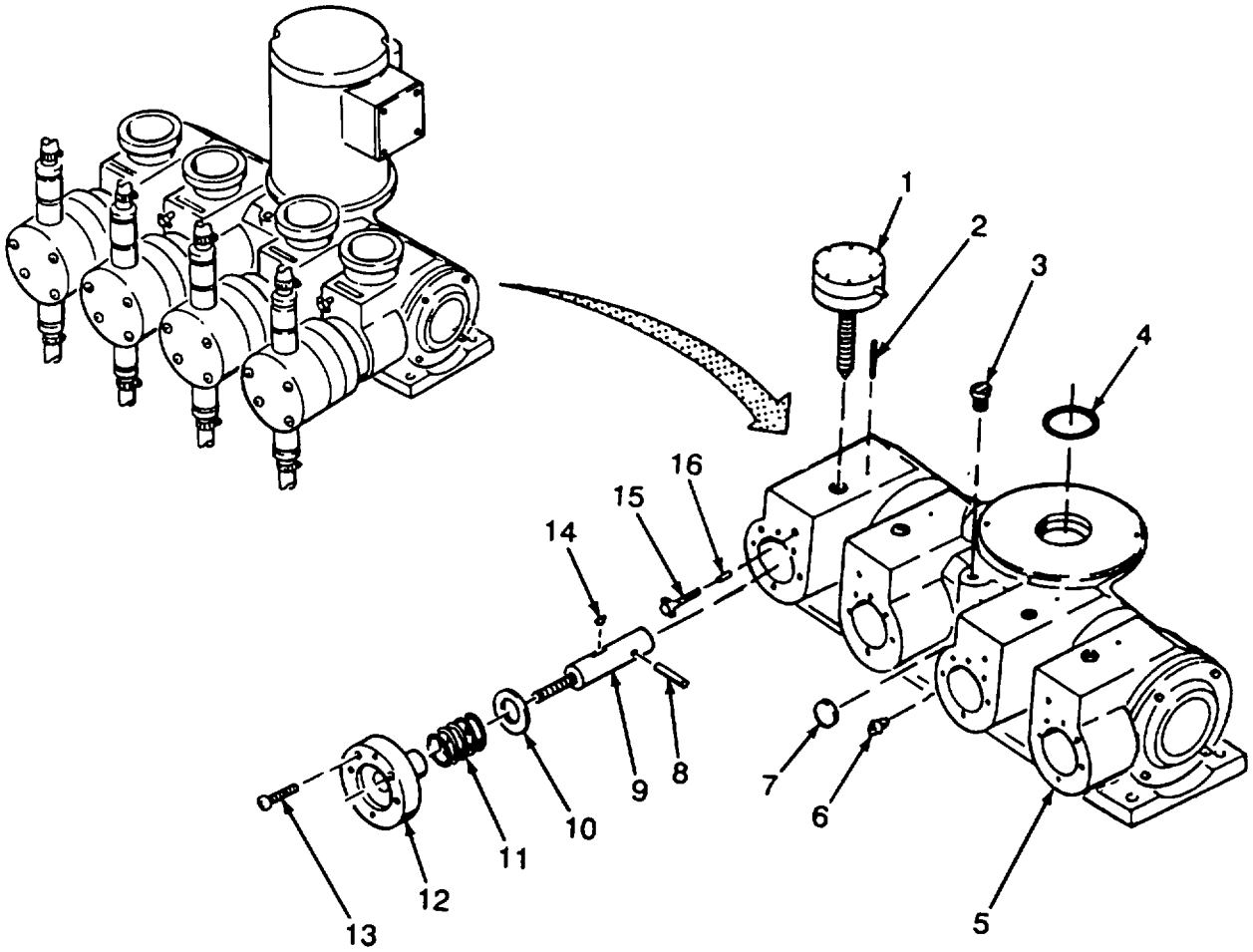
NOTE

To aid installation, count and record the number of turns required to remove control knob. Mark position of knob on housing before removal.

h. Mark position of knob (1) on housing (5). While counting the number of turns, unscrew knob from housing.

i. Remove o-ring (4) from housing (5).

j. If broken, remove sight glass (7) from housing (5).



3-35. HOUSING (CHEMICAL FEED PUMP) MAINTENANCE - continued.

k Remove four screws (32) and gently pry offend cap (31) from housing (5).

l. Remove four screws (60) and gently pry offend cap (61) from housing (5).

m Using wooden block and rubber mallet, drive mainshaft (40) and attached parts from housing (5).

n. Remove shim (30), snap ring (29), bearing (28), and shim (27).

o. Remove cam (25) and key (26) from mainshaft (40).

p. Remove bearing (24), washer (23), and sleeve (22).

q Remove washer (21) and bearing (20).

r. Remove cam (18), key (19), and washer (17).

s. Remove o-ring (45), bearing holder (44), sleeve (43), o-ring (42), and washer (41).

t. Remove shim (46), snap ring (47), bearing (48), and shim (49).

u. Remove cam (50) and key (51) from mainshaft (40).

v. Remove bearing (52), washer (53) and sleeve (54).

w. Remove washer (55) and bearing (56).

x. Remove cam (57), key (58), and washer (59).

y. Remove o-rings (33), bearing holder (34), sleeve (35), o-ring (36), and washer (37).

z. Remove worm gear (38) and key (39), from mainshaft (40).

CLEANING

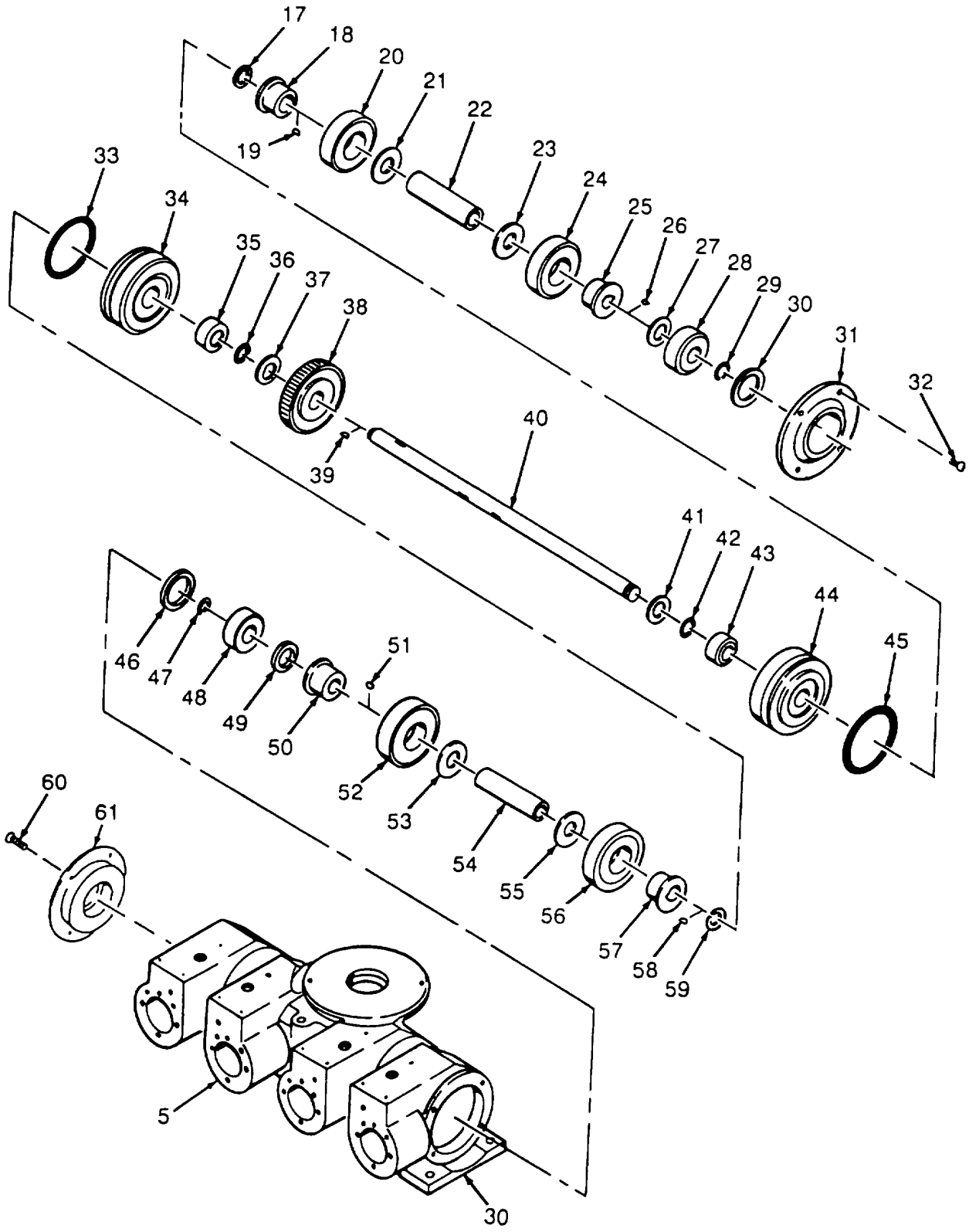
WARNING

Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

a. Using a soft-bristled brush and drycleaning solvent, clean all metal components of the housing. Allow parts to air dry.

b. Using soap solution, clean plastic parts. Rinse parts in clean water and dry with wiping rag.

3-35. HOUSING (CHEMICAL FEED PUMP) MAINTENANCE - continued.



3-35. HOUSING (CHEMICAL FEED PUMP) MAINTENANCE - continued.

INSPECTION

a. Inspect treaded components for stripped or damaged threads.

b. Inspect housing (5) for cracks, corrosion, and stripped threads.

c. Inspect bearings (20, 24, 28, 52, and 56) for cracked, damaged, or missing seals.

d Inspect cams (18, 25, 50, and 57) for deep scratches, nicks, and corrosion.

e Inspect worm gear (38) for cracked, damaged or missing teeth.

f Inspect for bent or cracked mainshaft (40).

g Inspect spring (11) for cracked or broken coils. Overall spring length should be 2 00 inches.

h Inspect bearing holder (12) for cracks.

i. Inspect shaft (9) for cracks and stripped threads.

REPAIR

Replace defective components.

ASSEMBLY

a Install key (39) and worm gear (38) on mainshaft (40).

b. Install washer (37), o-ring (36), sleeve (35) and bearing holder (34) on mainshaft (40) Install o-ring (33) on bearing holder.

c. Install washer (59), key (58) and cam (57).

d Install bearing (56) and washer (55).

e. Install sleeve (54), washer (53), and bearing (52).

f Install key (51) and cam (50) on mainshaft (40).

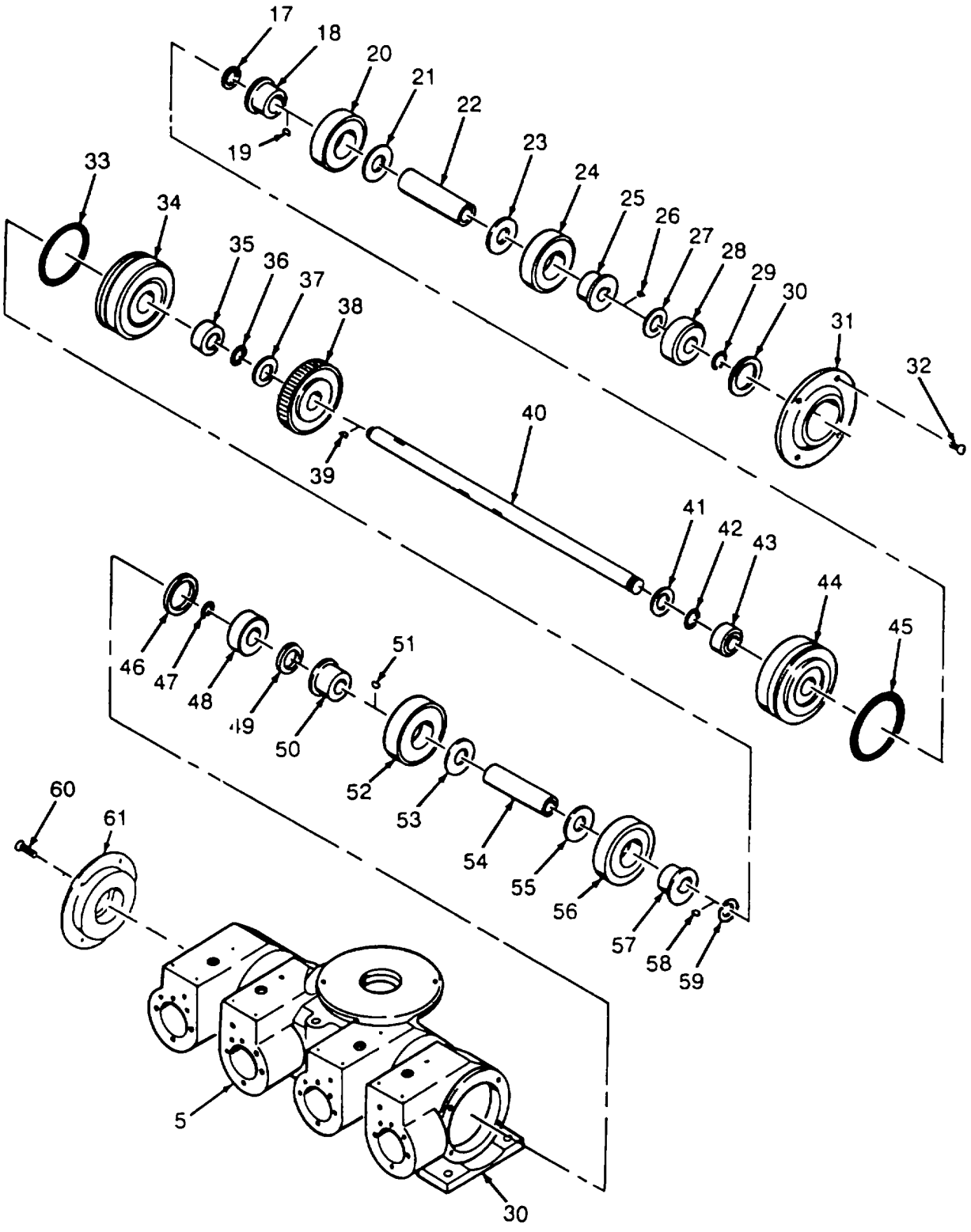
g Install shim (49), bearing (48), snap ring (47), and shim (46).

h. Install washer (41), o-ring (42), sleeve (43) and bearing holder (44). Install o-ring (45) on bearing holder.

i. Install washer (17), key (19), and cam (18).

j. Install bearing (20) and washer (21).

3-35. HOUSING (CHEMICAL FEED PUMP) MAINTENANCE - continued.



3-35. HOUSING (CHEMICAL FEED PUMP) MAINTENANCE - continued.

k Install sleeve (22),washer (23), and bearing (24).

l. Install key (26) and cam (25) on mainshaft (40).

m Install shim (27), bearing (28), snap ring (29), and shim (30).

n Carefully install mainshaft (40) and attached parts in housing (5) Make sure mainshaft is centered in housing.

o. Install end cap (61) and four screws (60) on housing (5).

p. Install end cap (31) and four screws (32) on housing (5).

q. If sight glass (7) was removed, apply adhesive to mounting hole in housing (5) and install sight glass.

r. Install o-ring (4) in housing (5).

NOTE

- There are four diaphragm drive assemblies on the chemical feed metering pump All are disassembled the same One is shown, the others are similar.
- Knob must be installed the same number of turns as recorded during removal.

s. Install knob (1) in housing (5). Turn knob into housing the same number of turns as recorded during disassembly.

t. Install stop pin (2) in housing (5).

u. Install slug (16) and thumbscrew (15) In housing (5).

v Install stop pin (8) in shaft (9).

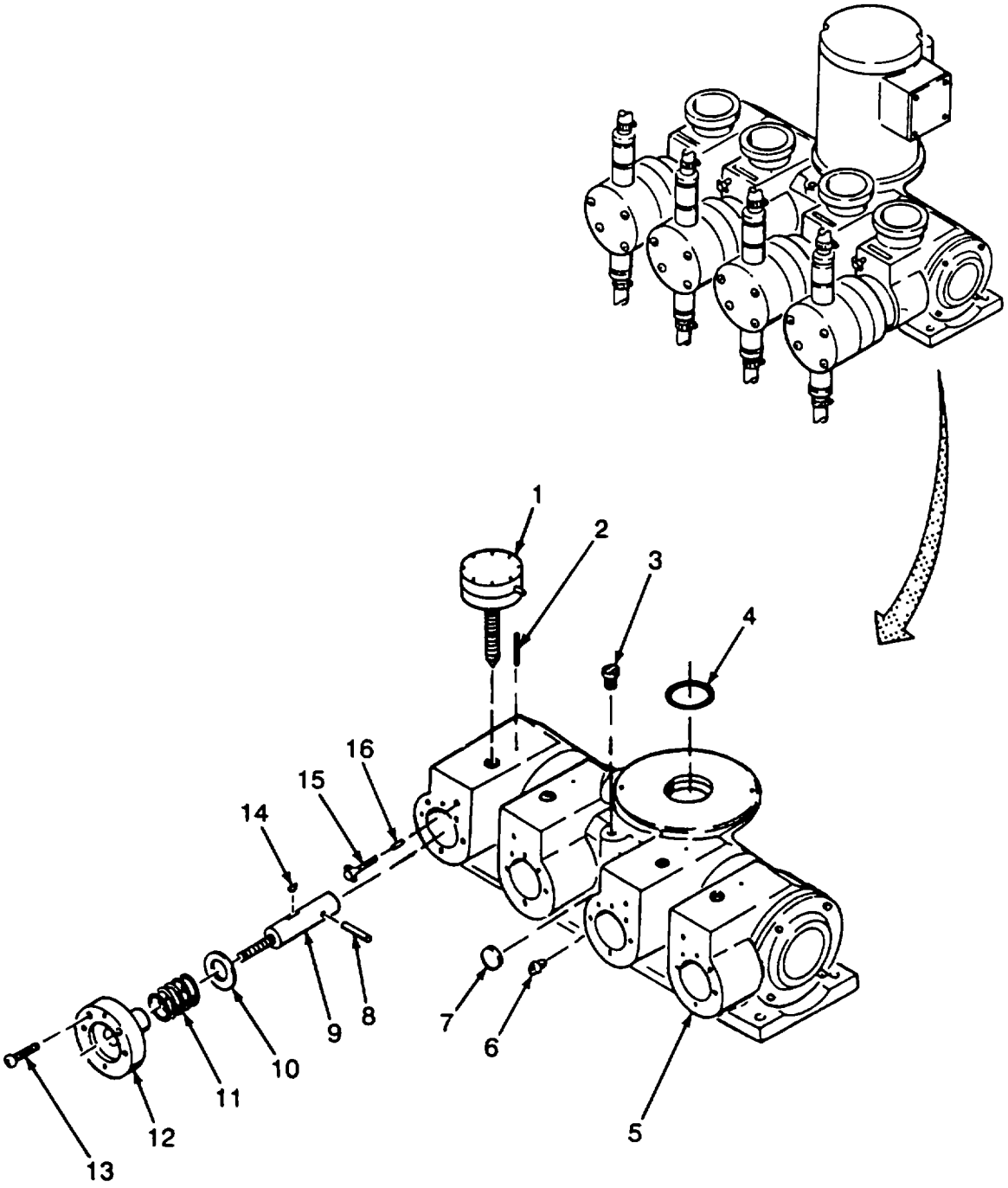
w Position key (14) on shaft (9) and install shaft in housing (5).

x. Install washer (10) and spring (11) on shaft (9).

y. Position bearing holder (12)with screw holes alined with housing (5) Install two screws (13) as marked during disassembly.

z. Install fill plug (3) and drain plug in housing (5).

3-35. HOUSING (CHEMICAL FEED PUMP) MAINTENANCE - continued.



3-36. CARTRIDGE FILTER MAINTENANCE.

This task consists of:
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Materials/Parts Required
Rag, wiping (Appendix C, Section II, Item 23)
Detergent (Appendix C, Section II, Item v 0)
Grease, silicone (Appendix C, Section II, Item 16).
Lockwasher (4) - 11-0355
Locknut (6) - 11-0519
Equipment Condition
Cartridge filter removed and disassembled (paragraph 2-71)

DISASSEMBLY

a. Mark position of cover (6) on shell (13)

b. Loosen six swing bolts (24) and remove cover (6).

c. If required, remove eight seats (8) and springs (7) from cover (6).

d. Remove two rings (2) from coupling (3).

e. Fold back locking arms on coupling (3). Remove coupling and nipple (1) from elbow (4).

f. If required, remove elbow (4) and nipple (5) from cover (6).

g. Remove o-ring (9) from shell (13).

h. Remove six locknuts (22), bolts (23) and swing bolts (24) from bracket (10).

i. Mark position of bracket (10) on shell (13).

j. Remove two nuts (11), lockwashers (12) bolts (20), flat washers (21), and bracket (10) from shell.

k. Mark position of skirt (16) on shell (13).

l. Remove two nuts (17), lockwashers (18), flatwashers (19 and 15), bolts (14) and skirt (16) from shell (13)

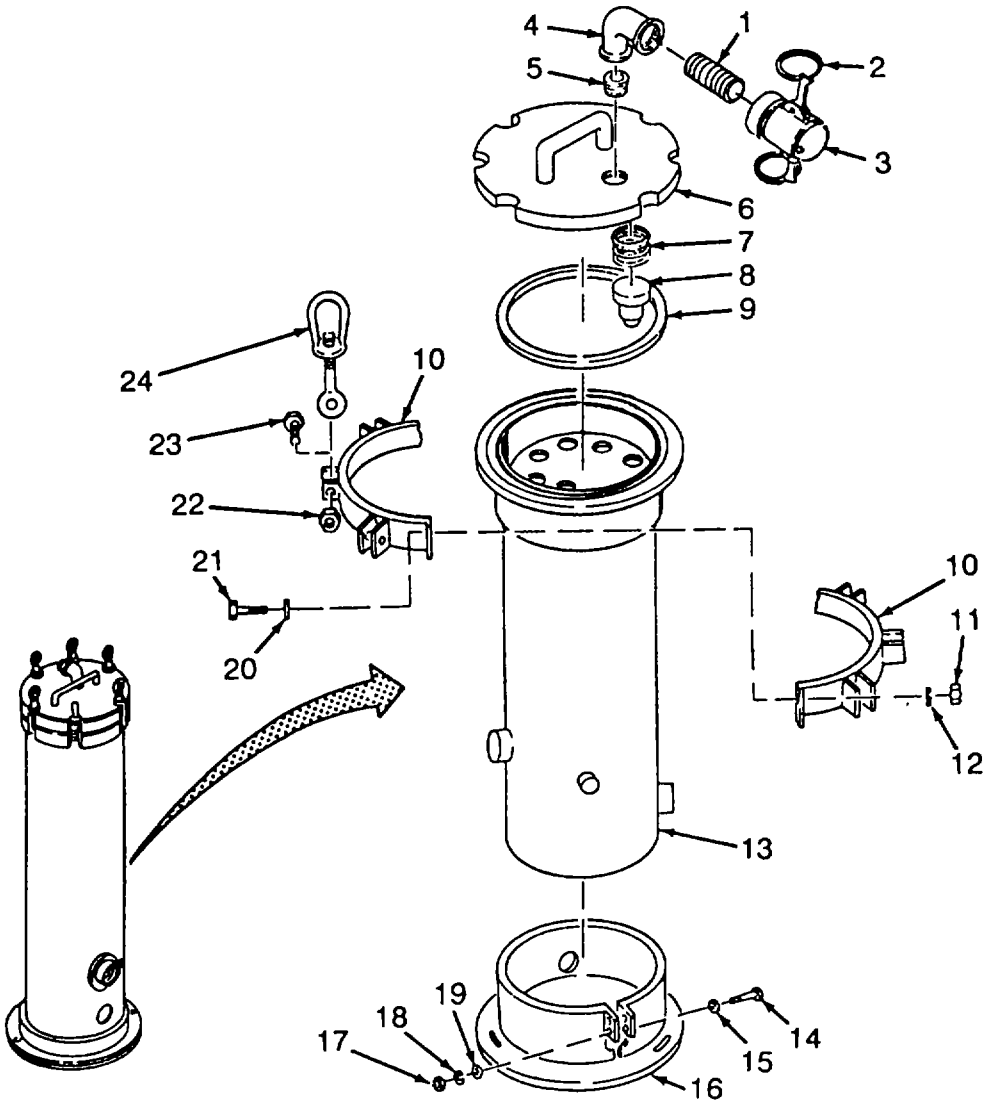
3-36. CARTRIDGE FILTER MAINTENANCE - continued.

CLEANING

a. Using clean wiping rag and mild soap solution, wash all components. Make sure o-ring seat in shell (13) is clear of dirt and loose particles.

b. Rinse components with clean water

c. Dry with clean wiping rag.



3-36. CARTRIDGE FILTER MAINTENANCE - continued.

REPAIR

Replace defective components, o-ring (9), and lock nuts (22).

ASSEMBLY

a. Position skirt (16) on shell (13) as marked during disassembly.

b. Install two flat washers (15), bolts (14), flat washers (19), lockwashers (18) and nuts (17) in skirt (16).

c Position bracket (10) on shell (13) as marked during disassembly.

d. Install two flat washers(21), bolts (20), lockwashers (12) and nuts (11).

e. Install six swing bolts (24), bolts (23) and lock nuts (22) on bracket (10)

f. Apply anti-seize tape to nipples (1 and 5) Be sure to wrap tape in same direction as pipe thread.

g. If removed, install nipple (5) and elbow (4) on cover (6).

h. Fold back locking arms on coupling (3). Install nipple (1) and coupling (3) on elbow (4)

i. Install two rings (2) on coupling (3)

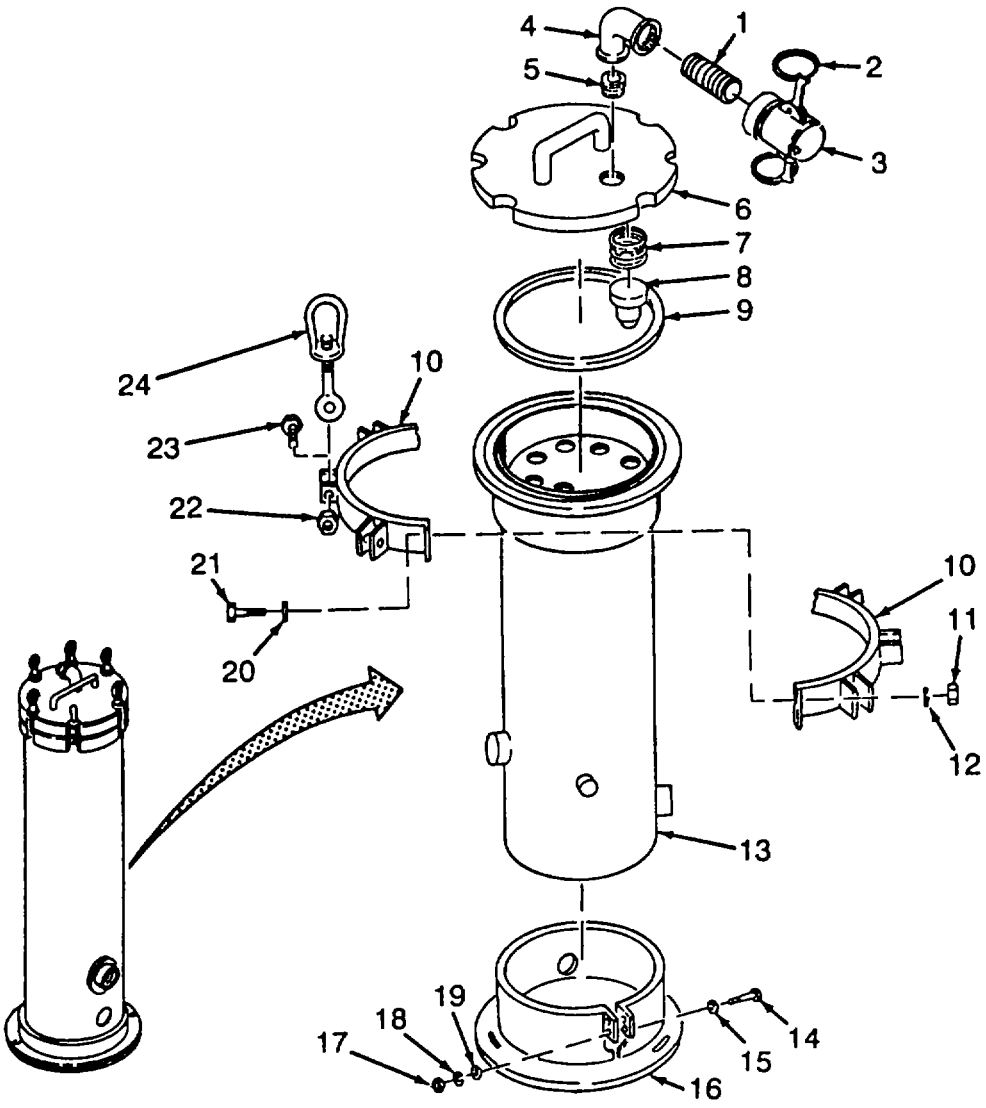
j. If removed, install eight springs (7) and seats (8) on cover (6).

k. Apply silicone grease to o-ring (9). Install o-ring (9) on shell (13).

l. Position cover and attached parts on shell (13) as marked during disassembly.

m. Position six swing bolts (24) on cover (6) and hand tighten in cross pattern. Make sure cover seats evenly on shell (13).

3-36. CARTRIDGE FILTER MAINTENANCE - continued.



3-37. R.O. PUMP ASSEMBLY MAINTENANCE.

Repair of the R.O. pump assembly consists of replacement and/or repair of the electric motor, high pressure pump, and stand.

3-38. ELECTRIC MOTOR (R.O. PUMP) MAINTENANCE.

This task consists of

a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Repair
f. Assembly
g. Test
h. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Chain hoist (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3)
Materials/Parts Required
Grease (Appendix C, Section II, Item 15).
Rags, wiping (Appendix C, Section II, Item 23)
Lockwashers (4) - MS35338-142
Equipment Condition
Reference
Electrical cable removed (paragraph 2-62)
Belt Guard removed (paragraph 2-74).
V-belts removed (paragraph 2-75)
Personnel Required
Two (2)
General Safety Instructions

WARNING

- **Lifting heavy equipment incorrectly can cause serious injury.**
- **Using compressed air can be dangerous.**

REMOVAL

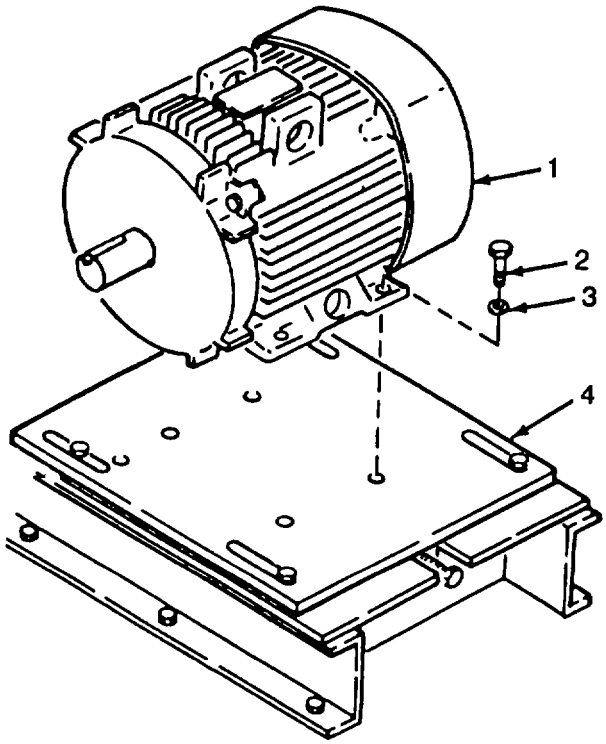
a. Remove four bolts (2) and lockwashers (3).

WARNING

Weight of R.O. pump motor is 251 pounds (114 kg). Attempting to move it without proper equipment could cause serious injury Hoist motor with equipment rated at 1 ton or more.

b. Using chain hoist, remove motor (1) from pump stand (4) and position on work bench.

3-38. ELECTRIC MOTOR (R.O. PUMP) MAINTENANCE - continued.



3-38. ELECTRIC MOTOR (R.O. PUMP) MAINTENANCE - continued.

DISASSEMBLY

a. Remove four screws (19) lockwashers (18), conduit box cover (17), and gasket (16).

b. Remove nut (20), ground lug (21), nut (22), and grounding stud (23).

c. Remove four screws (15), lockwashers (14), conduit box (13), and gasket (12) from stator assembly (32).

d. Remove four screws (27) and fan cover (26) from stator assembly (32).

NOTE
Clamp and nuts should not be removed from fan. These parts are not supplied separately.

e. Loosen three screws (25) and pull fan assembly (29) from shaft of rotor (8). Do not remove screws, (25), clamp (28), or nuts (24) from fan.

f. Remove key (9) from shaft of rotor (8).

NOTE
Mark position of shield on stator assembly to aid assembly.

g. Remove four bolts (30).

h. Tap shield (31) with soft-faced mallet to break bond with stator assembly (32), then remove shield.

WARNING
Rotor is heavy/difficult to handle. Use two personnel when removing rotor from stator assembly.

CAUTION
Stator assembly wiring inside motor casing can be damaged by rotor or rotor shaft if rotor is not removed carefully. Guide rotor carefully while removing it.

i. Remove wavy washer (11) from shield (31)

j. Remove rotor (8) through fan side of stator assembly (32).

k. Remove four bolts (5).

l. Tap shield (6) with soft-faced mallet to break bond with stator assembly (32), then remove shield.

m. Using arbor press, remove bearings (7 and 10), from shaft of rotor (8).

3-38. ELECTRIC MOTOR (R.O. PUMP) MAINTENANCE - continued.

CLEANING

WARNING

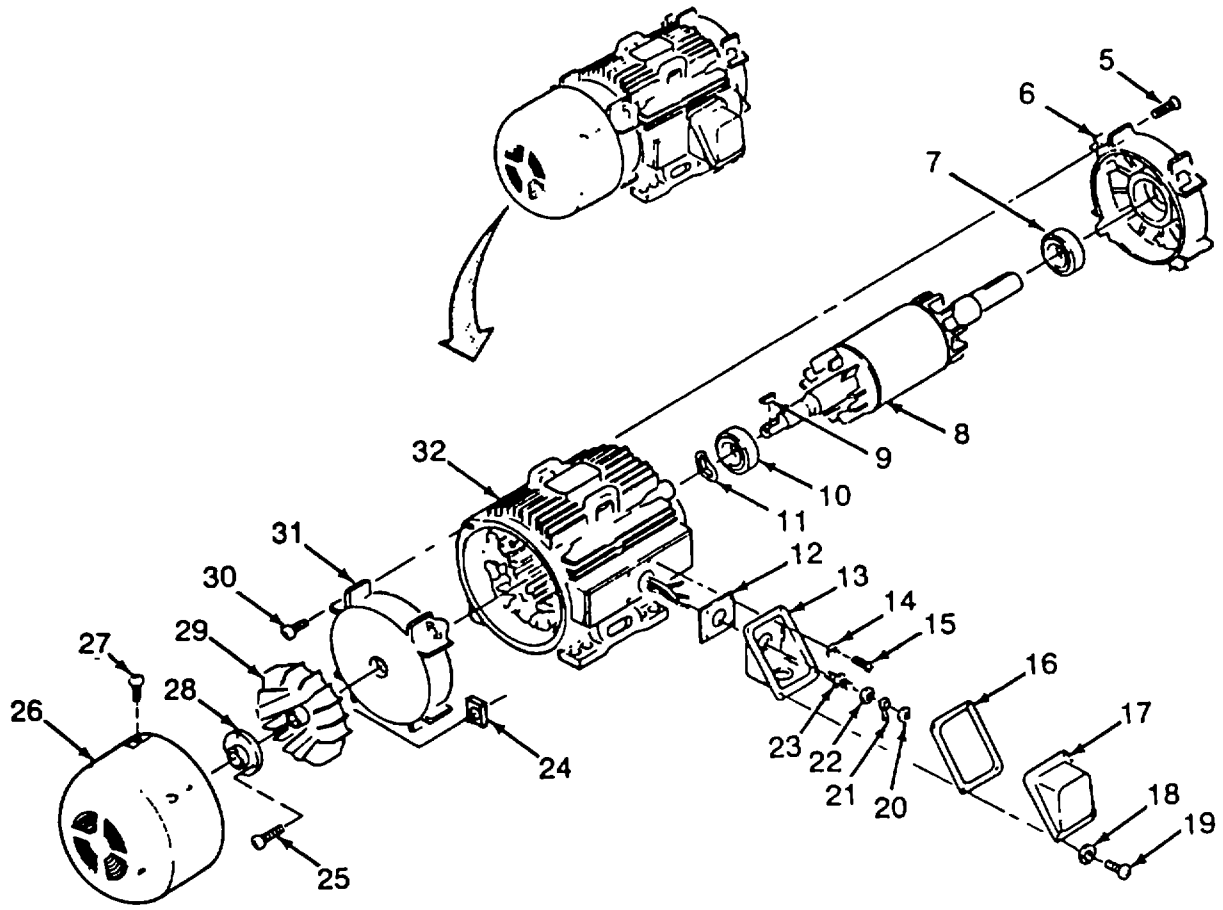
Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.

a. Wipe rotor(8) with clean rag. Using compressed air, blow dust and grit from stator assembly (32) and rotor (8).

b. Clean fan cover (26) vent slots with compressed air and wipe with clean rag.

c. Clean and repack bearings (7 and 10) with grease.

d. Scrape loose paint from shaft of rotor (8), stator assembly (32), and shields (5 and 31). Prime and paint as necessary.



3-38. ELECTRIC MOTOR (R.O. PUMP) MAINTENANCE - continued.

INSPECTION

a. Inspect leads and windings of stator assembly (32) for evidence of cracked or burned insulation.

b. Inspect rotor (8) for loose or burned conducting bars.

c. Inspect bearings (7 and 10) for wear.

d. Inspect shields (6 and 31) for cracks and corrosion.

e. Using multimeter set to OHMS Xl scale, connect test leads to pairs of motor leads, 1 and 7 to 2 and 8, 1 and 7 to 3 and 6,2 and 8 to 3 and 6.

f. If multimeter indication is not 0 ohm for each pair of windings, replace stator assembly.

g. Set multimeter to OHMS X1000 scale. Connect one lead to stator assembly housing. Connect other lead to each motor lead in turn.

h. If multimeter indication is not infinity for each motor lead, replace stator assembly.

REPAIR

Replace defective components.

ASSEMBLY

a. Using arbor press, install bearings (7 and 10) on shaft of rotor (8).

b. Position shield (6) on stator assembly (32) as marked during disassembly.

c. Install four bolts (5).

WARNING

Rotor is heavy/difficult to handle. Use two personnel when installing rotor in stator assembly.

CAUTION

Stator assembly wiring inside motor casing can be damaged by rotor or rotor shaft if rotor is not installed carefully Guide rotor carefully while installing it.

d. Position rotor (8) through fan side of stator assembly (32) and into shield (6). Bearing (7) must seat in shield (6).

e. Install wavy washer (11) in bearing seat of shield (31).

3-38. ELECTRIC MOTOR (R.O. PUMP) MAINTENANCE - continued.

f. Position shield (31) over shaft of rotor (8). Aline shield with stator assembly as marked during disassembly. While manually positioning rotor, press shield onto stator assembly (32).

g. Install four bolts (30).

h. Install key (9) on shaft of rotor (8).

i. With keyway in fan assembly (29) alined with key (9), push fan assembly (29) onto shaft of rotor (8).

j. Tighten three screws (25).

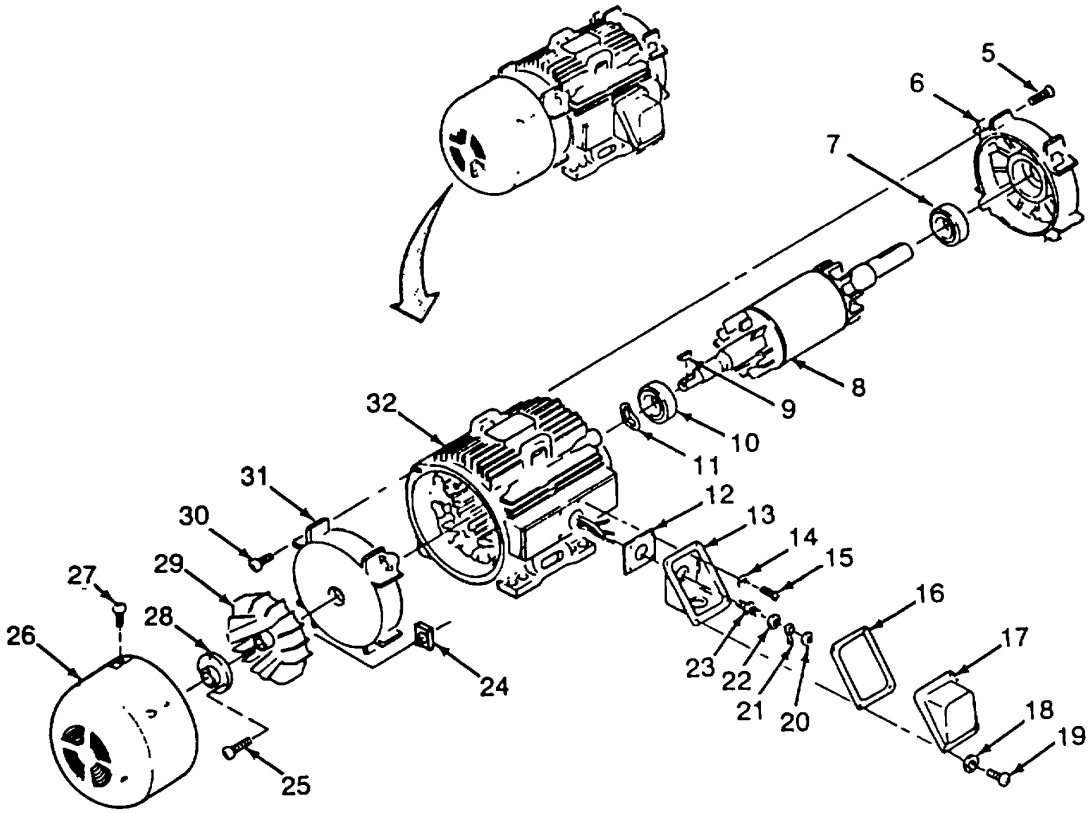
k. Position fan cover (26) on shield (32) as marked during disassembly. Install four screws (27).

l. Position gasket (12) and conduit box (13) on stator assembly (32). Insert wiring through conduit box.

m. Install four lockwashers (14) and screws (15) in conduit box (13).

n. Install grounding stud (23), nut (22) ground lug (21) and nut (20).

o. Install gasket (16), conduit box cover (17), four lockwashers (18), and screws (19).



3-38. ELECTRIC MOTOR (R.O. PUMP) MAINTENANCE- continued.

TEST

WARNING

Weight of R.O pump motor is 251 pounds (114 kg). Attempting to move it without proper equipment could cause serious injury. Hoist motor with equipment rated at 1 ton or more.

a. Secure motor to test bench.

WARNING

Electrical high voltage can cause serious injury or death. Some test require power to be connected Always take proper measures to ensure personal safety.

b. Connect motor wiring to test bench leads.

c. Connect power and run motor with and without load.

d Check motor for excessive vibration and fast temperature rise.

e. Disconnect motor from test bench leads.

INSTALLATION

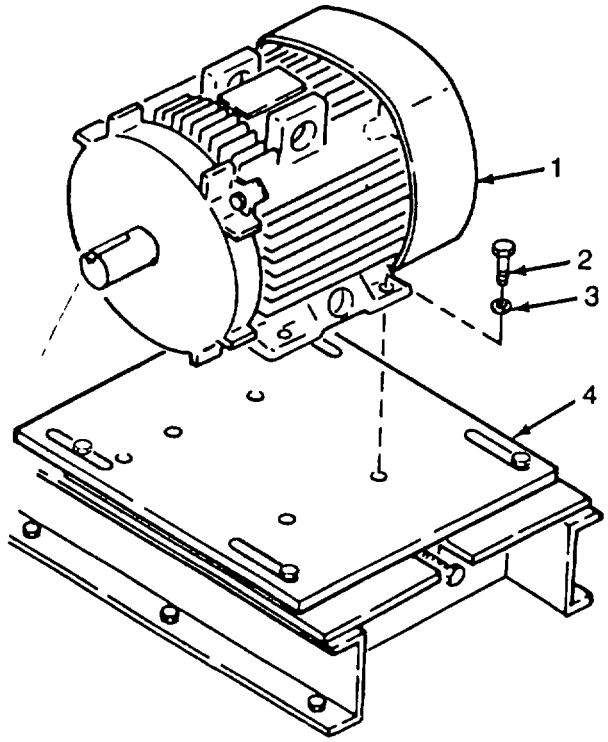
WARNING

Weight of R.O. pump motor is 251 pounds (114 kg). Attempting to move it without proper equipment could cause serious injury. Hoist motor with equipment rated at 1 ton or more.

a. Using hoist, position motor (1) on stand (4).

b. Install four lockwashers (3) and bolts (2).

3-38. ELECTRIC MOTOR (R.O. PUMP) MAINTENANCE - continued.



3-39. HIGH PRESSURE PUMP (R.O. PUMP) MAINTENANCE.

This task consists of:

a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Repair
f. Assembly
g. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Valve Seat Removal Tool (Appendix B, Section III, Item 2)
- Gland Nut Adjustment Tool (Appendix B, Section III, Item 5)

Materials/Parts Required
- Rags (Appendix C, Section II, Item 23)
- Cleaning Solvent (Appendix C, Section II, Item 28)
- Lockwasher (4) - MS 35338143
- O-ring (3) - 9410A14600M
- Utex Packing (6) - 9300W000119
- O-ring (3) - 9410A23100M
- Gasket (1) - M103873D05
- Gasket (1) - M103873D03

Personnel Required:
- Two (2)

Equipment Condition

Reference
- ROWPU shut down and power removed (TM 10-4610-240-10).
- Oil drained from high pressure pump assembly (para 2-76)
- Water drained (TM 10-4610-240-10).
- High pressure pump drive belts removed. (para 2-75)

General Safety Instructions:

WARNING

Cleaning solvents used are toxic and flammable. Observe safety precautions when using this material. See general warning page at front of this manual.

REMOVAL

a. Remove nuts (20), screws (1), clamps (2) and gaskets (3).

b. As required, remove nipples (4) from pump assembly for installation on replacement pump.

c. Remove three screws (12) and washers (13). Thread screws in extra holes on sheave and tighten to remove sheave (14).

d. Remove sheave (14) and loosen setscrew (15).

e. Insert a screwdriver in split of hub (16) and tap lightly with a hammer to loosen hub. Remove hub and key (17).

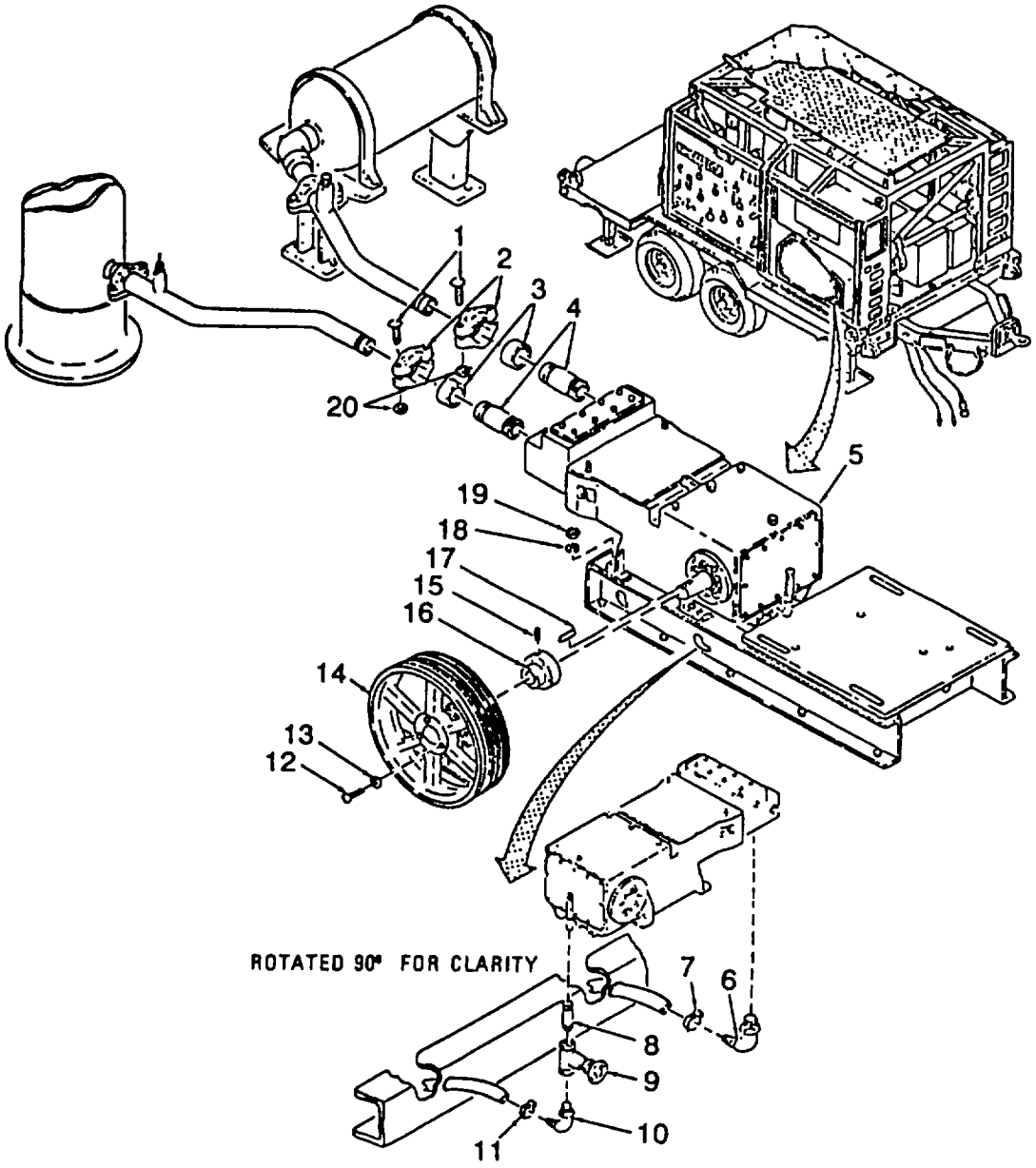
3-39. HIGH PRESSURE PUMP (R.O. PUMP) MAINTENANCE - continued.

f. Remove four nuts (19) and lockwashers (18).

g. Loosen clamps (11) and (7) and disconnect drain hoses.

h. Remove pump assembly, using a suitable lifting fixture.

i. As required for installation on replacement pump, remove elbows (6 and 10), nipple (8) and valve (9).



3-39. HIGH PRESSURE PUMP (R.O. PUMP) MAINTENANCE - continued.

DISASSEMBLY

a. Remove two thumbscrews (26) and cover (25).

b. Unscrew coupling nuts (21) on plungers (20) and, using gland adjustment tool as illustrated, loosen gland nuts (19).

WARNING

Valve block is heavy/difficult to handle and must be supported while it is being separated from pump assembly to prevent injury or damage to equipment.

c. Remove two nuts (23) and carefully separate fluid cylinder (10) from power frame (24).

d. Remove eight screws (8), cover (9), three caps (1) and O-rings (2).

e. Remove cap screws (3), valve guides (4), springs (5) and disks (6) on all three channels.

f. Using valve removal tool, remove valve seats (7) as illustrated.

g. Remove three gland nuts (19), plungers (20) and packing bushings (18).

h. As required, remove retaining rings (22) and nuts (21) from plungers (20).

i. Remove eight screws (15) and plate (14).

j. Remove stuffing boxes (27) and O-rings (28).

k. Remove packings (17) and packing bushings (16) from stuffing boxes (27).

l. Remove three capscrews (29), valve guides (30), springs (31 and 32) and discs (33).

m. Remove valve seats (34), using valve seat removal tool as illustrated.

n. If required, remove studs (13) and plugs (11 and 12).

CLEANING

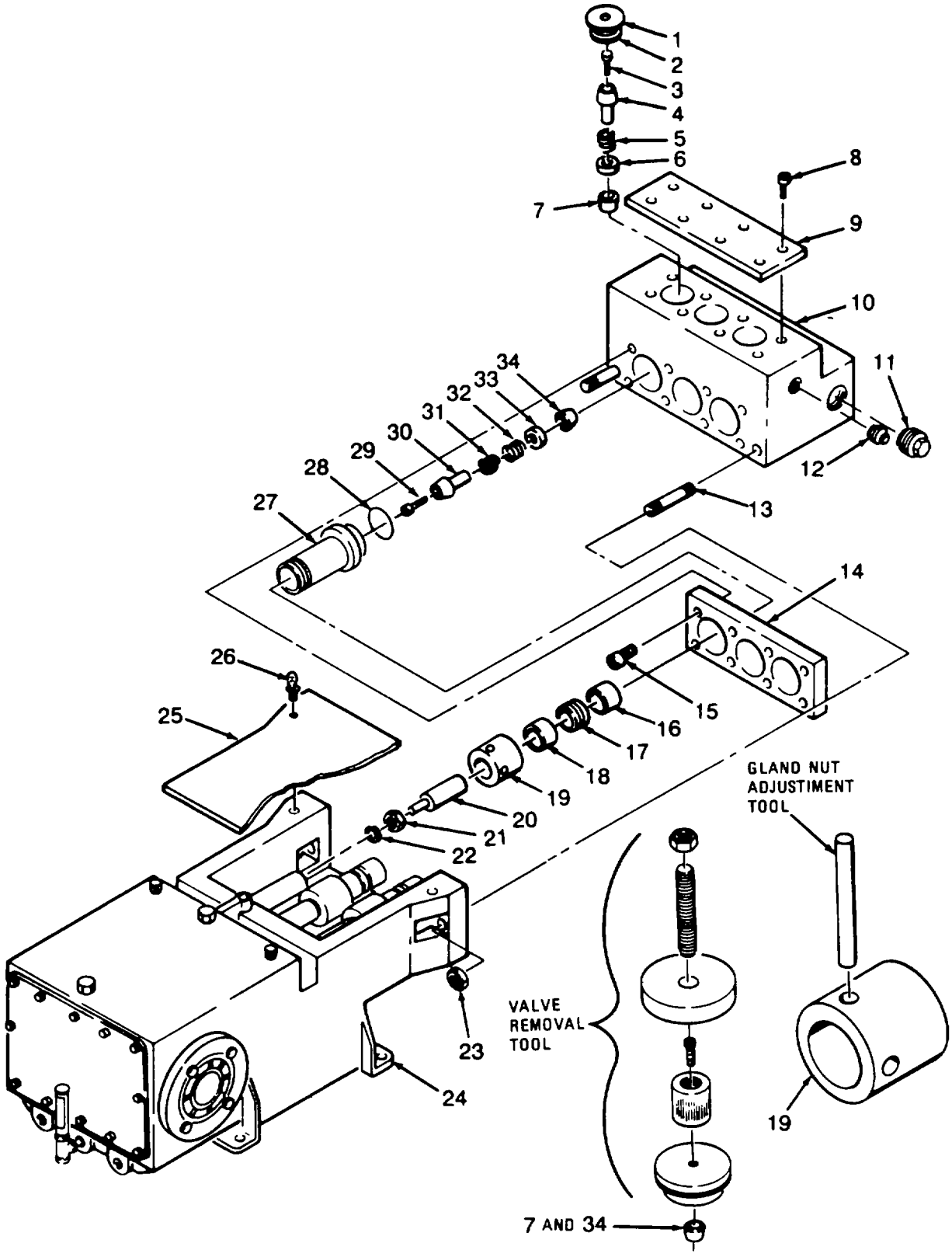
WARNING

Dry cleaning solvent PD-680 is highly toxic and can ignite organic materials, nitrates, carbides and chlorates. Wear eye, skin and respiratory protection. Use in well-ventilated area.

a. Clean large parts (power frame, fluid cylinder, etc.) with rags and cleaning solvent.

b. Clean all small items (bearings, bolts, etc.) by dipping in cleaning solvent and allowing to air dry.

3-39. HIGH PRESSURE PUMP (R.O. PUMP) MAINTENANCE - continued.



3-39. HIGH PRESSURE PUMP (R.O. PUMP) MAINTENANCE - continued.

INSPECTION

a. Fluid Cylinder (10). Inspect block for cracks, gouges, stripped threads and other visible damage. Replace cylinder if cracked or severely gouged, or if threads are stripped.

b. Valve Seats (7 and 34). Check valve seats for wear, scratches, stripped threads and other damage. Replace seats if unserviceable.

c. Plungers (20). Check for cracks and chips in ceramic coating of plungers and damaged/stripped connecting nut or nut retainer. Replace plunger if chipped, or cracked If connecting nuts and/or retaining rings are damaged, replace them.

d. Miscellaneous hardware. Check all remaining hardware for cracks, damaged threads, excessive wear, corrosion, deformation and other damage making the item unserviceable. Replace unserviceable items.

REPAIR

Repair of pump assembly at the fluid end is limited to replacement of defective components

ASSEMBLY

a. Place valve block on a clean work bench and install valve seats (7 and 34) as follows.

(1) Lay valve seats on top of valve seat bores.

(2) Position socket from valve seat removal tool on top of seat and, using a drift pin and hammer tap lightly until seats are firmly lodged in valve block.

b. Install disks (33), springs (31 and 32) valve guides (30) and screws (29) on valve seats (34). Torque screws to 25 lbs ft.

c. Install disks (6), springs (5), valve guides (4) and screws (3) on valve seats (7). Torque screws to 25 lbs ft.

d. Position O-rings (2) on caps (1) and install caps (1) with O-rings, plate (9) and screws (8). Torque screws to 80 lbs ft in sequence as illustrated.

e. If removed, install studs (13), plugs (11 and 12), nuts (21) and retainers (22).

f.. Position O-rings (28), stuffing boxes (27) and plate (14) on fluid cylinder (10) and secure with eight screws (15). Torque screws to 40 lbs ft in sequence as illustrated.

g. Insert packing bushings (16), two Utex packings (17), and packing bushings (18) in stuffing boxes (27). Tap lightly with a soft mallet to insure proper seating.

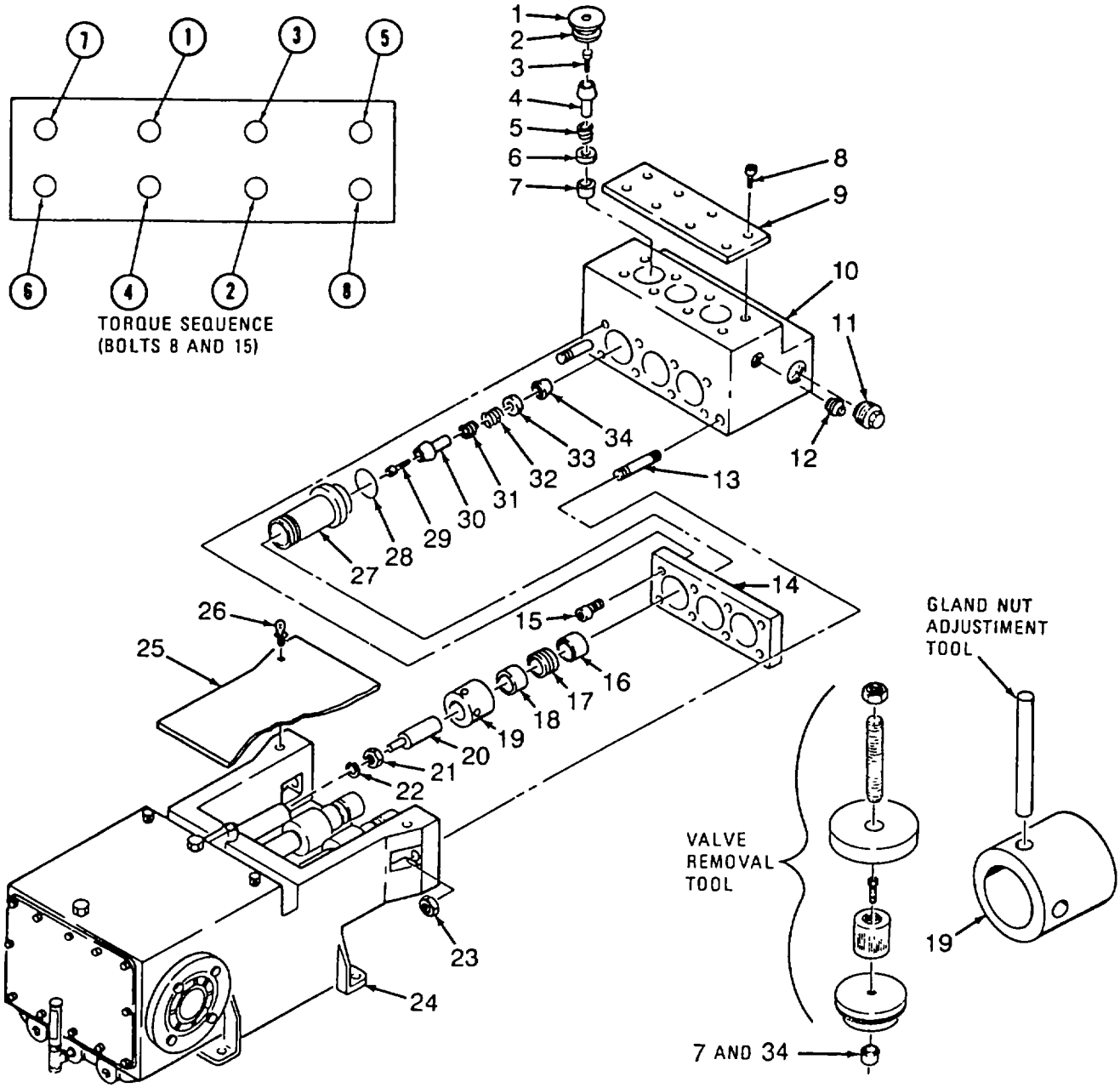
h. Insert plungers (20) in stuffing boxes (27) and install gland nuts (19) fingertight.

3-39. HIGH PRESSURE PUMP (R.O. PUMP) MAINTENANCE- continued.

NOTE
Gland nut will be further tightened during checkout and after installation of pump.

i. Position fluid cylinder (10) on power frame (24) and install two nuts (23). Torque nuts to 130 lbs ft.

j. Reconnect plungers (20) to crossheads of power frame, using nuts (21). Torque nuts to 20 lbs ft.



3-39. HIGH PRESSURE PUMP(R.O. PUMP) MAINTENANCE -continued.

INSTALLATION

WARNING

Dry cleaning solvent PD-680 is highly toxic and can ignite organic materials, nitrates, carbides and chlorates. Wear eye, skin and respiratory protection. Use in well-ventilated area.

a. Using cleaning solvent and rags clean pump mounting surfaces.

b. Using lifting device, position pump assembly (5) over studs of pump stand and secure with four nuts (19) and lockwashers (18).

c. Install nipples (4).

d. Install seals (3).

e. Install clamps (2) with screws (1) and nuts (20).

f. Position key (17) on pump shaft and install hub (16). Be sure to tighten setscrew (15).

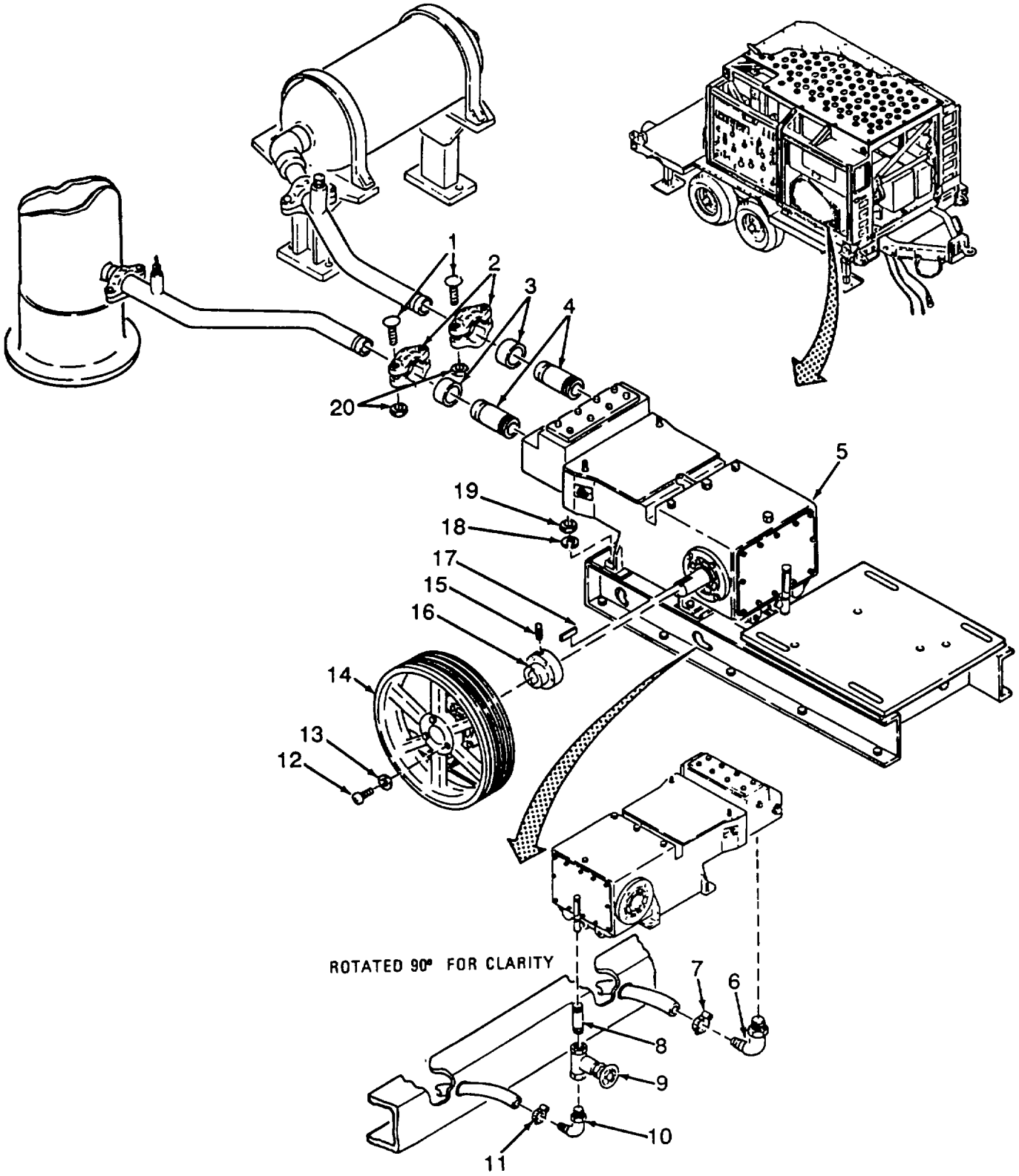
g. Install sheave (14) with three washers (13) and screws (12).

h. Install elbows (6 and 10) nipple (8) and valve (9).

i. Reconnect drain hoses and tighten clamps (7 and 11).

j. Operate ROWPU and check for proper operation and leaks in accordance with operators manual (TM 10-4610-240-10).

3-39. HIGH PRESSURE PUMP (R.O. PUMP) MAINTENANCE - continued.



3-40. PUMP AND MOTOR STAND MAINTENANCE.

This task consists of: a. Removal b. Disassembly c. Cleaning d. Inspection e. Repair f. Assembly g. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Chain Hoist (Appendix B, Section III, Item 4).
Materials/Parts Required
Solvent, drycleaning (Appendix C, Section II, Items 28).
Rags, wiping (Appendix C, Section II, Items 23).
Equipment Condition
Reference
R.O. pump removed (para. 3-39)
Electric motor removed (para. 3-38).
General Safety Instructions

WARNING

- **Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.**
- **Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.**

REMOVAL

a. Remove ten screws (16) and lockwashers (15).

b. Using chain hoist, remove pump and motor stand from ROWPU frame.

DISASSEMBLY

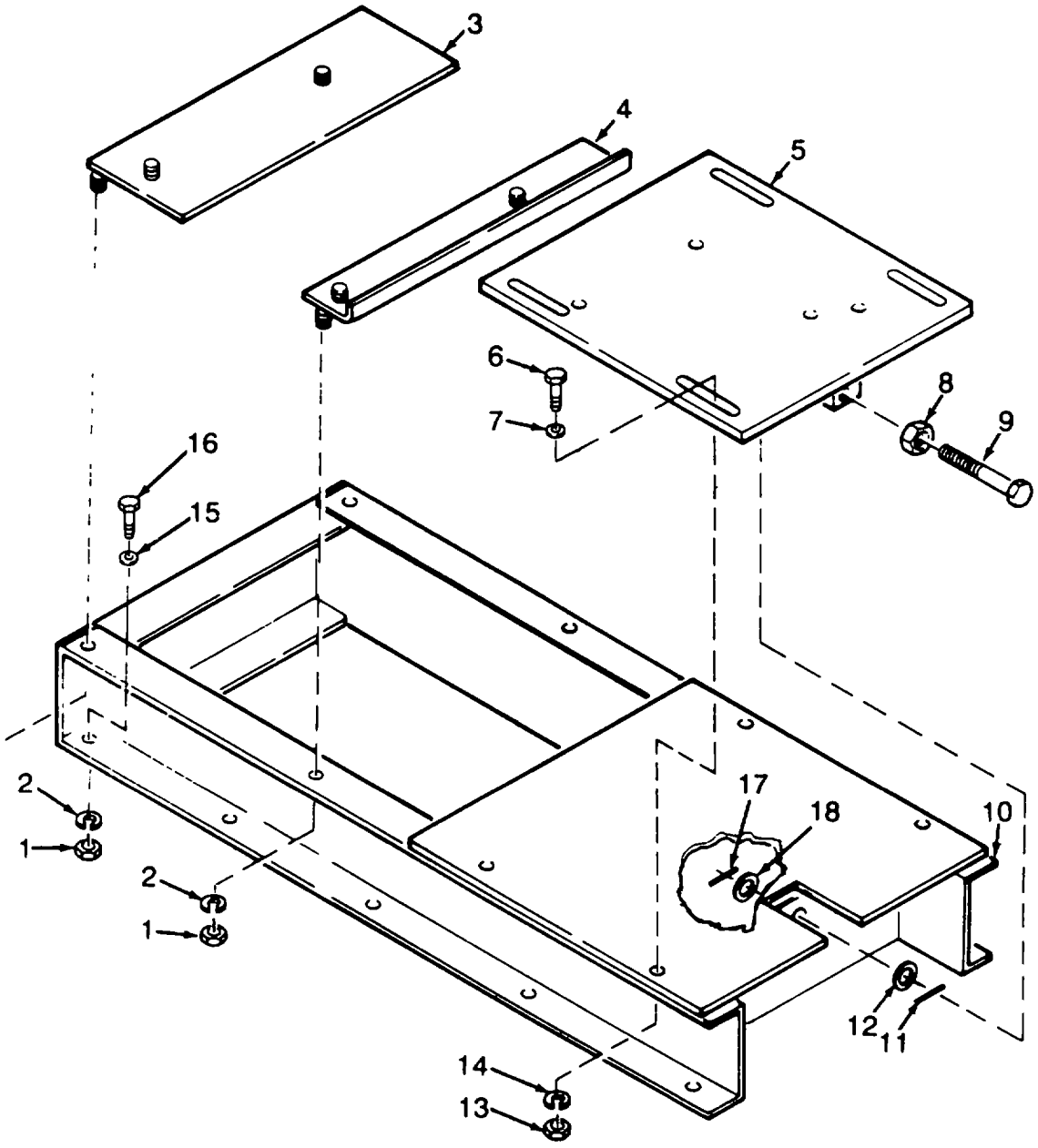
a. Remove four nuts (1),lockwashers (2) and remove two plate adapters (3 and 4) from stand (10).

b. Remove pin (17) and washer (18) from screw (9).

c. Remove screw (9), nut (8), two pins (11), and two washers (12).

d. Remove four nuts (13), lockwashers (14), flatwashers (7), screws (6), and mounting plate (5).

3-40. PUMP AND MOTOR STAND MAINTENANCE - continued.



3-40. PUMP AND MOTOR STAND MAINTENANCE - continued.

CLEANING

WARNING

Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection Use in a well-ventilated area

a. Using drycleaning solvent, clean stand Dry with wiping rag.

b. Using wire brush, clean rust and corrosion from stand.

INSPECTION

a. Inspect stand (10) for cracks and damage.

b. Inspect mounting hardware for excessive wear or other damage

c. Inspect plate adapters (3 and 4) and mounting plate (5) for cracks and corrosion

REPAIR

a. Replace defective components

b. For general repair procedures, refer to paragraph 3-63

c. For welding procedures refer to TM 9-237.

ASSEMBLY

a. Install mounting plate (5) on stand (10) with four screws (6), washers (7), lockwashers (14), and nuts (13)

b. Install screw (9), nut (8), two pins (11), and washers (12).

c. Install washer (18) and pin (17) on bolt (9).

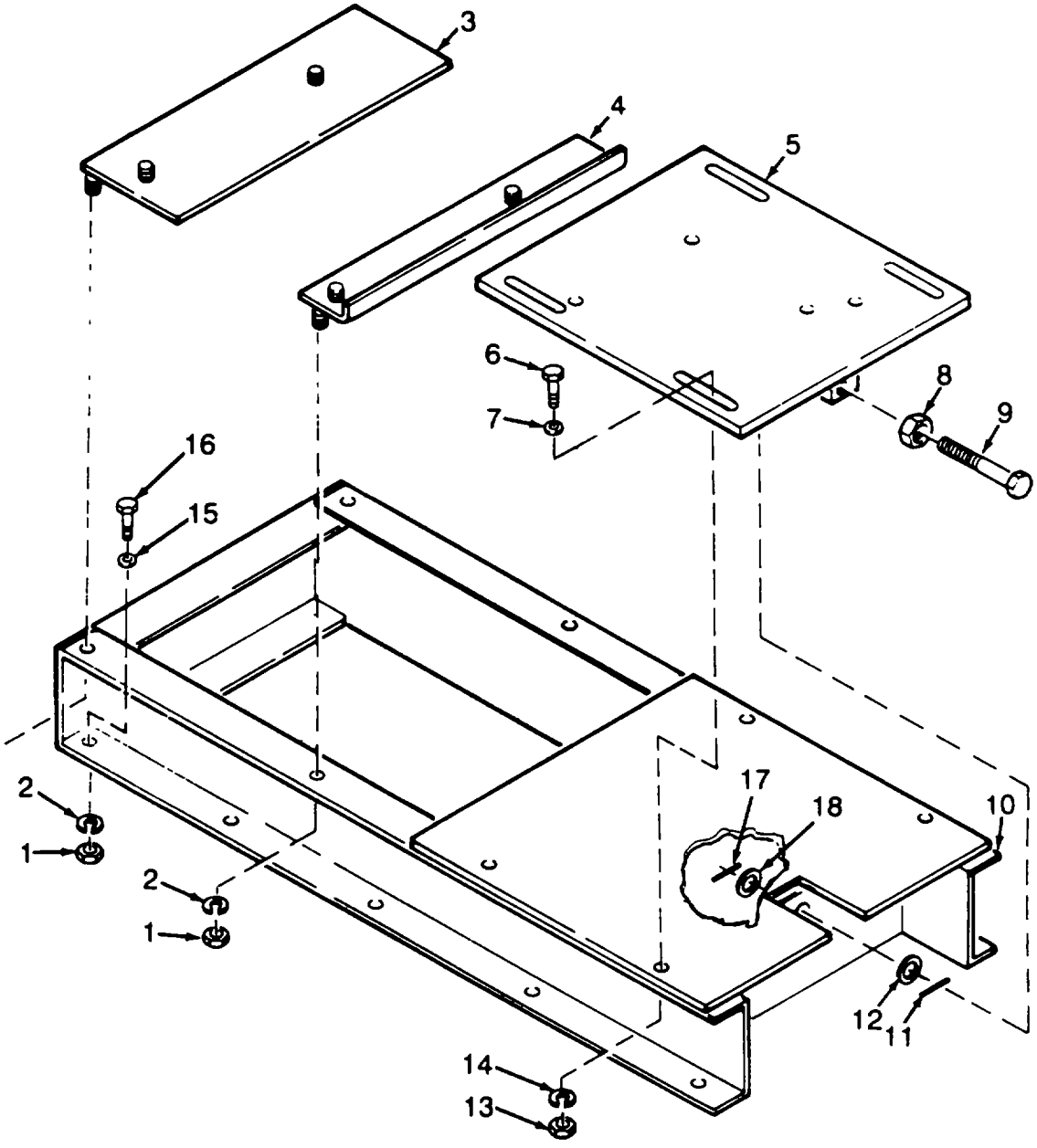
d. Install plate adapters (3 and 4) using four lockwashers (2), and nuts (1).

INSTALLATION

a. Using chain hoist, position stand (10) on ROWPU frame

b. Install ten lockwashers (15), screws (16), and washers (15).

3-40. PUMP AND MOTOR STAND MAINTENANCE - continued.



Section IX. MULTIMEDIA FILTER ASSEMBLY MAINTENANCE PROCEDURES

3-41. MULTIMEDIA FILTER MAINTENANCE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
5-Ton Crane
Personnel Required
Two and Crane Operator
Equipment Condition
Reference
Coverplate removed (para. 2-36).
Control valve removed (para. 2-79).
Timer removed (para. 2-78)
General Safety Instructions

WARNING

Use care when lifting large, heavy objects with a crane can result in injury or death. Lack of attention or being in an improper position during lifting operation can result in serious injury or death.

REMOVAL

a. Remove nut (5), lockwasher (4), washer (2), screw (3) and bracket (1).

b. Loosen and remove two turnbuckles (7).

c. Remove two nuts (9) from fittings (10).

d. Remove 12 bolts (11), and 12 lockwashers (12) and remove drain line (13) from adapter (14).

WARNING

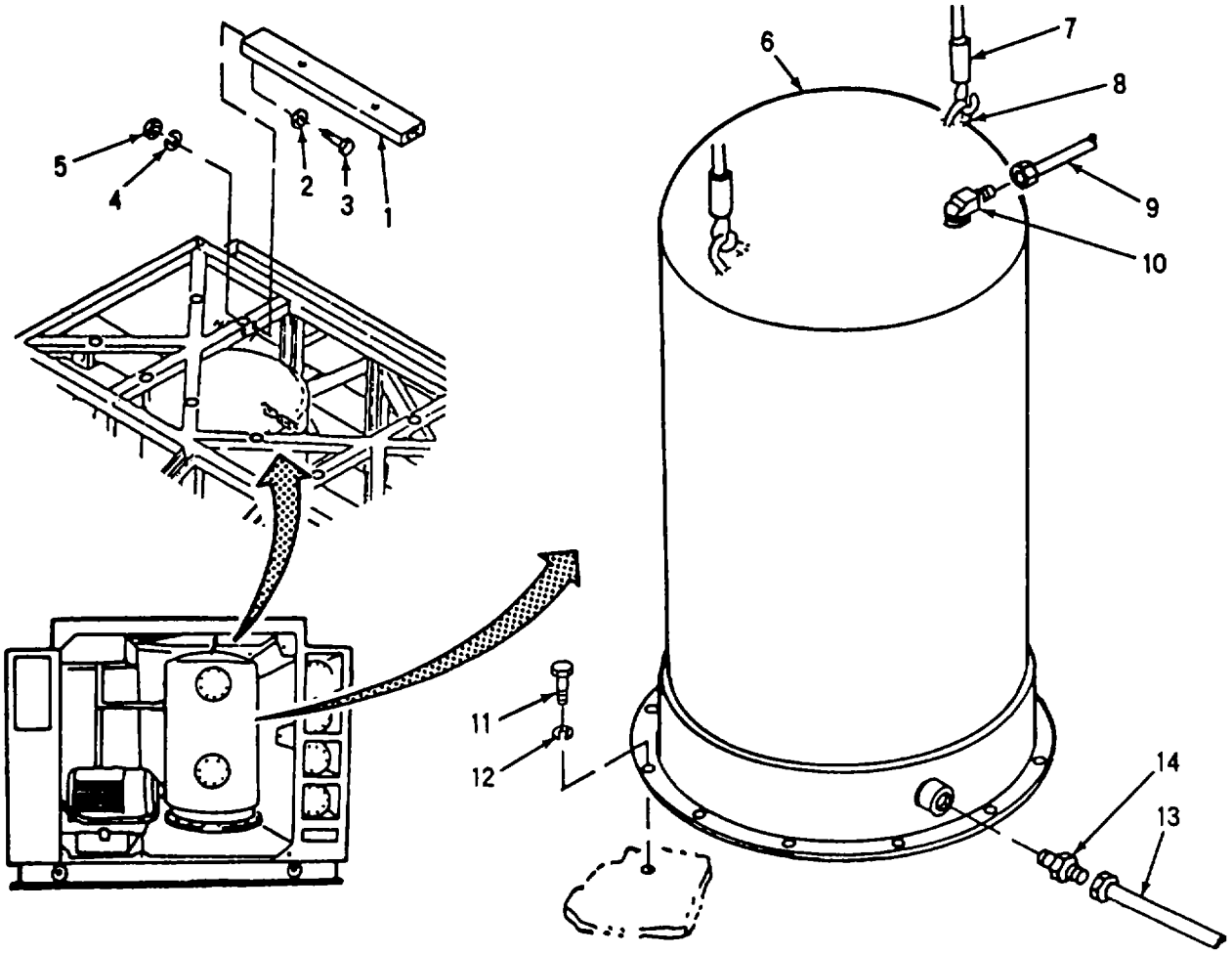
Lack of attention or being in an improper position during lifting operation can result in serious injury or death. Pay close attention to movements of multimedia filter. Do not stand under multimedia filter or in a position where you could be pinned against another object. Watch your footing.

CAUTION

- Uncontrolled sideways motion of multimedia filter during lifting can cause damage to equipment. Two assistants are needed on ROWPU to control motion of multimedia filter.
- Ensure all lines are clear of the multimedia filter.

3-41. MULTIMEDIA FILTER MAINTENANCE - continued.

e. Attach two crane hooks to two lifting eyes (8) and carefully lift multimedia filter (6) through opening in top of ROWPU frame.



3-41. MULTIMEDIA FILTER MAINTENANCE - continued.

INSTALLATION

WARNING

Lack of attention or being in an improper position during lifting operation can result in serious injury or death. Pay close attention to movements of multimedia filter. Do not stand under multimedia filter or in a position where you could be pinned against another object. Watch your footing.

CAUTION

Uncontrolled sideways motion of multimedia filter during lifting can cause damage to equipment. Two people are needed on ROWPU to control motion of multimedia filter.

a. Attach two crane hooks to two lifting eyes (8) and carefully lift multimedia filter (6) over opening in top of ROWPU frame.

NOTE

Ensure bolt holes line up on frame while lowering into position.

b. Slowly lower multimedia filter (6) while two assistants on ROWPU guide it into position

c. Install 12 new lockwashers (12), and bolts (11).

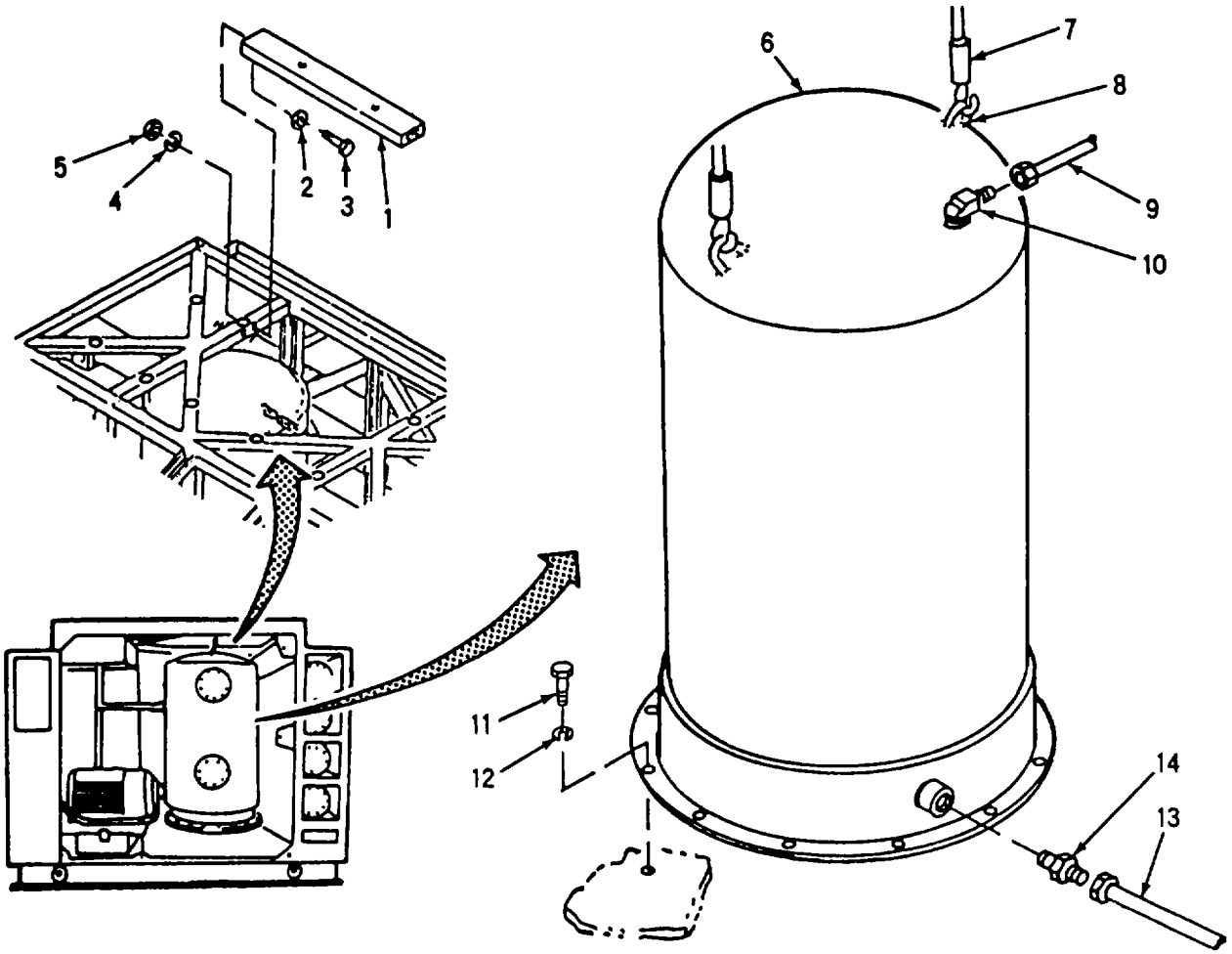
d. Remove two crane hooks and install two turnbuckles (7).

e. Connect drain line (13) to adapter (14).

f. Install two nuts (9) on fittings (10).

g. Install bracket (1) using four screws (3), washers (2), lockwashers (4) and nuts (5).

3-41. MULTIMEDIA FILTER MAINTENANCE - continued.



3-42. TIMER MAINTENANCE.

This task consists of
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Soft-Bristled Brush (Appendix B, Section III, Item 3)
Materials/Parts Required
Solvent, drycleaning (Appendix C, Section II, Item 28).
Tape, anti-seize (Appendix C, Section II, Item 30).
Rags, wiping (Appendix C, Section II, Items 23).
Equipment Condition
Reference
Timer removed (para. 2-78).
General Safety Instructions

WARNING

- **Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates Wear eye, skin, and respiratory protection. Use in a well-ventilated area.**

DISASSEMBLY

a. Position backwash timer (3) on workbench.

NOTE

Mark elbows, plugs and adapters as numbered on bottom of stager for ease in reassembly

b. Remove elbows (13), plugs (12) adapters (10) and inlet strainer (11) from bottom of stager (9).

c. Open cover and tag and disconnect six wires (15) from terminal board (16).

d. Tag and disconnect five wires (4) to terminal board (8).

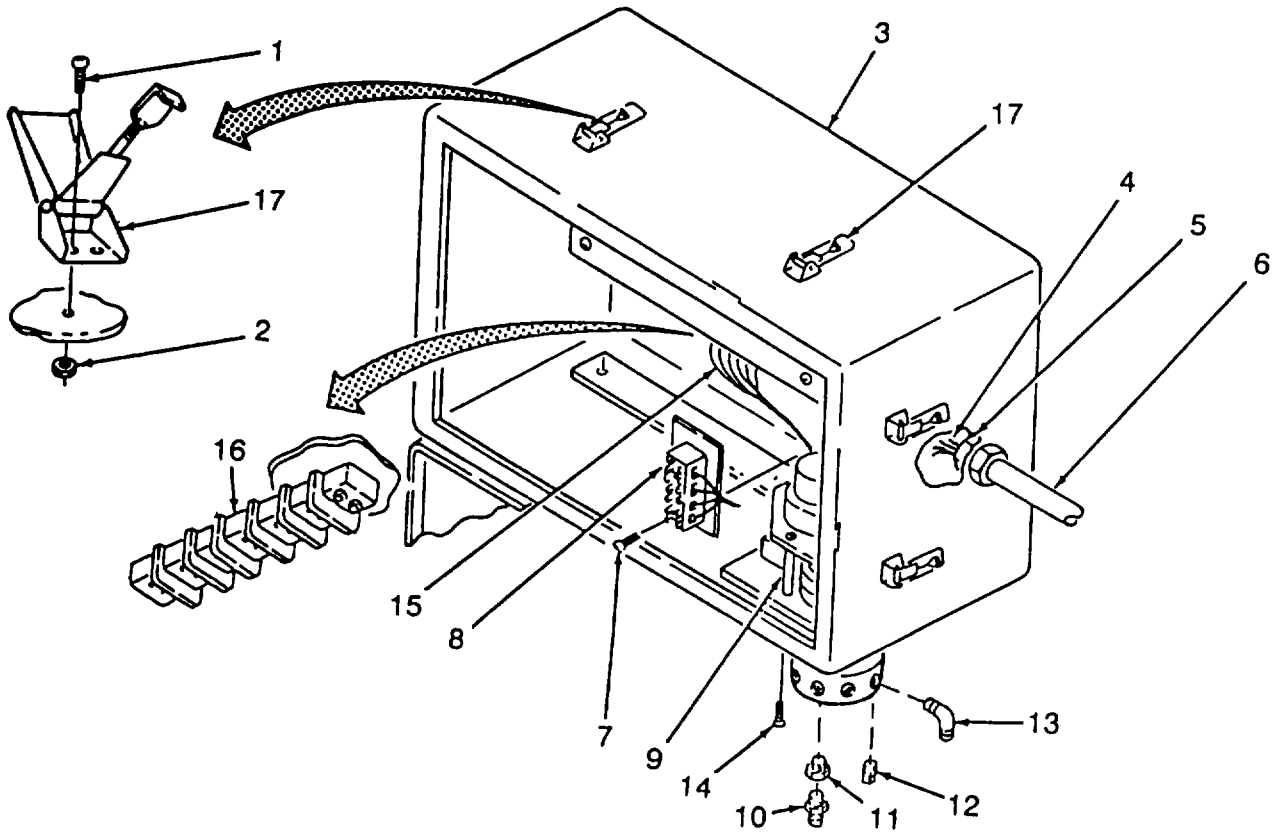
e. Remove nut (5) and cable assembly (6) from backwash timer (3)

f. Remove four screws (14) and stager (9).

g. Remove two screws (7) and terminal board (8).

h. Remove twelve locknuts (2), screws (1) and remove latches (17)

3 42. TIMER MAINTENANCE- continued.



3-42. TIMER MAINTENANCE- continued.

CLEANING

WARNING

Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection Use in a well-ventilated area

a. Using a soft-bristled brush and drycleaning solvent, clean electric connector, cover mounting hardware, and latches

b. Using dry cloth, clean box gasket.

INSPECTION

a. Inspect terminal strip, and stager for breaks, overheating, and terminal damage

b. Inspect printed circuit board for cracks, breaks, overheating, and circuitry damage

c. Inspect gasket for cracks, damage, and excessive wear

d. Inspect all pipe fittings for stripped or damaged threads.

e. Inspect timer box and cover for damage.

REPAIR

Replace all damaged components

ASSEMBLY

a. Position stager (9) in place and install four screws (14) Connect six wires (15) as tagged. Remove tags.

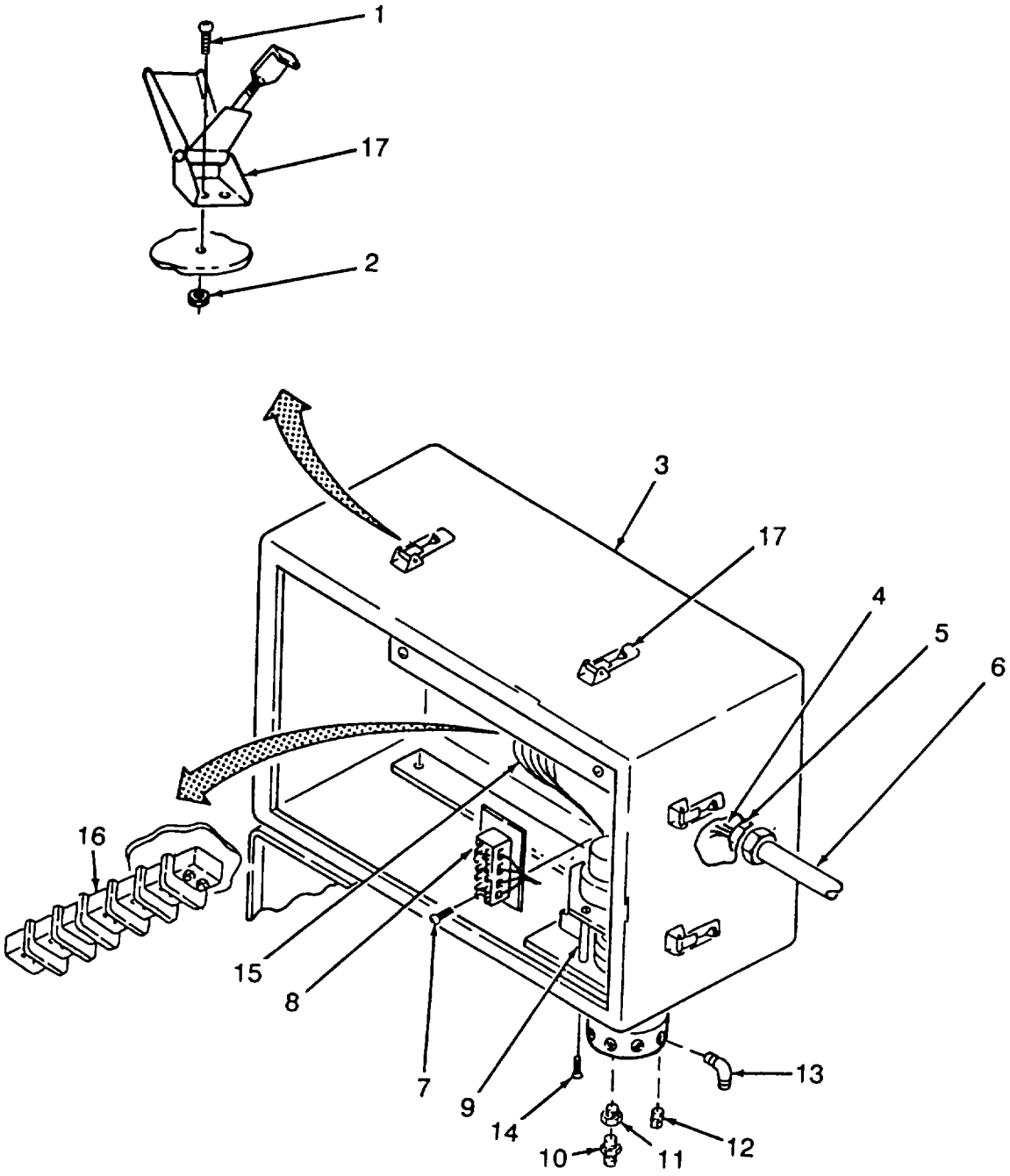
b. Position terminal board (8) in place and install two screws (7).

c. Position cable assembly (6) in backwash timer (3) and install nut (5).

d. Connect five wires (4) as tagged Remove tags.

e. Position latches (17) in place and install four screws (1) and locknuts (2). Close cover.

3-42. TIMER MAINTENANCE -continued.



3-43. CONTROL VALVE MAINTENANCE.

This task consists of: a. Disassembly b. Cleaning c. Inspection d. Repair e. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Torque Wrench (Appendix B, Section III, Item 3).

Materials/Parts Required
Solvent, drycleaning (Appendix C, Section II, Item 28).
Diaphragm (6) - 5500654000
Diaphragm - 5500653003
Gasket- 5500653008
O-ring- 5400753000
O-ring- 5400755000

Equipment Condition
Reference
Multimedia filter control valve removed (para. 2-77).

General Safety Instructions

WARNING

- Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

DISASSEMBLY

NOTE

There are six cartridges in the multimedia filter control valve. All are disassembled the same. One is shown.

a. Remove four screws (1) and washers (2) and remove cartridge cap (3).

b. Remove cartridge assembly (4), o-ring gasket (18).

c. Remove nut (4), lockwasher (5), washer (6), diaphragm (7) diaphragm keeper (8) from diaphragm housing (9).

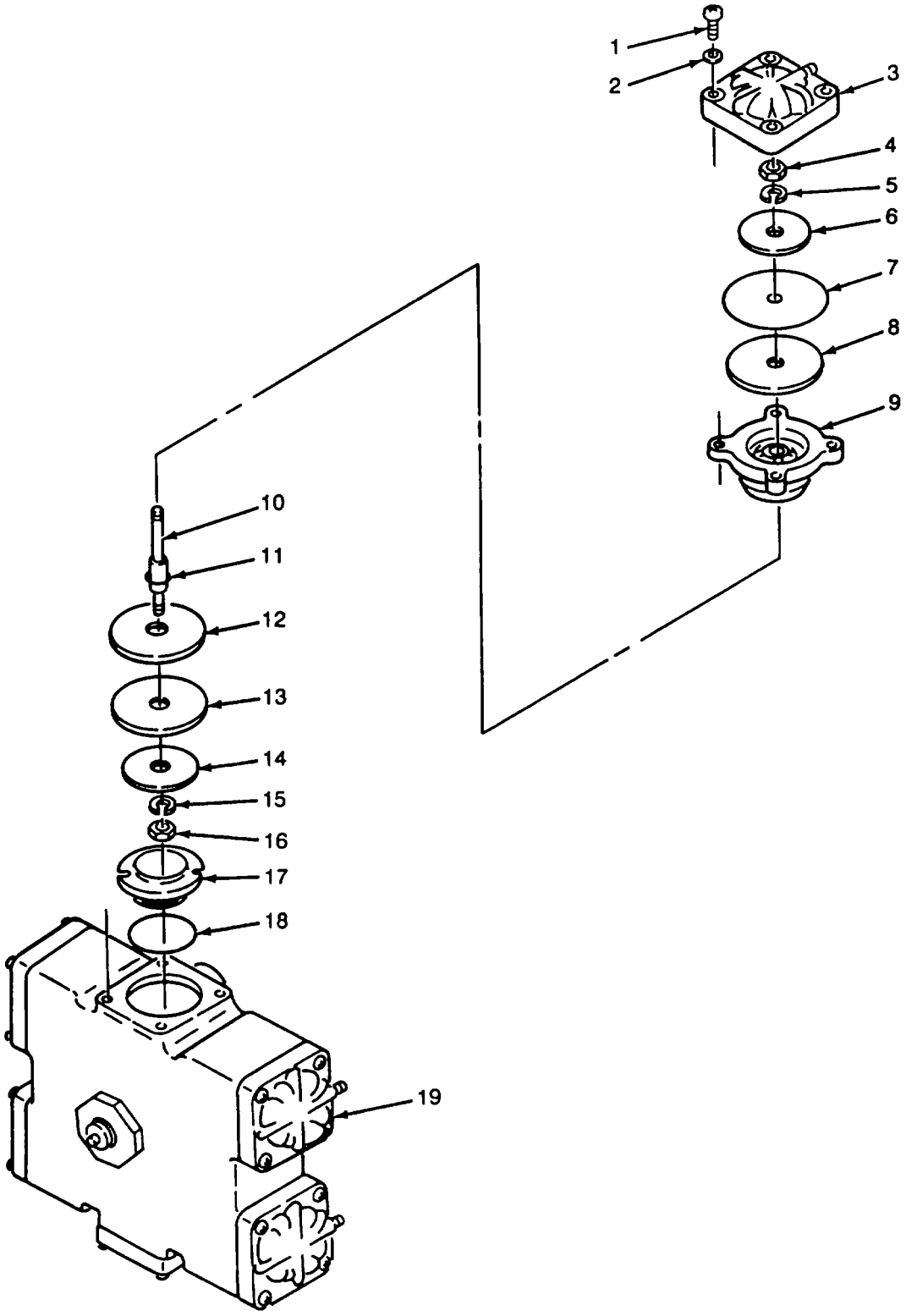
d. Remove valve shaft (10) and o-ring (11) from diaphragm housing (9).

e Remove nut (16), lockwasher (15), washer (14), rubber washer (13) and keeper washer (12) from valve shaft (10).

f. Remove valve seat (17).

g. Discard all rubber washers, o-rings and diaphragm

3-43. CONTROL VALVE MAINTENANCE continued.



3-43. CONTROL VALVE MAINTENANCE continued.

CLEANING

WARNING

Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in well-ventilated are.

a. Thoroughly clean multimedia filter control valve metal parts using drycleaning solvent.

b. Allow parts to air dry.

INSPECTION

Inspect all valve parts, cartridge assembly, cap assembly, all threaded parts, and screws for damage and/or corrosion. Replace damaged items. Clean corroded items.

REPAIR

Replace all damaged components.

ASSEMBLY

NOTE

There are six cartridges in the multimedia filter control valve. All are assembled the same. One is shown.

a. Install valve seat (17).

b. Install keeper washer (12), rubber washer (13), washer (14), lockwasher (15) and nut (16) on valve shaft (10).

c. Install o-ring (11) and install valve shaft (10) in diaphragm housing (9).

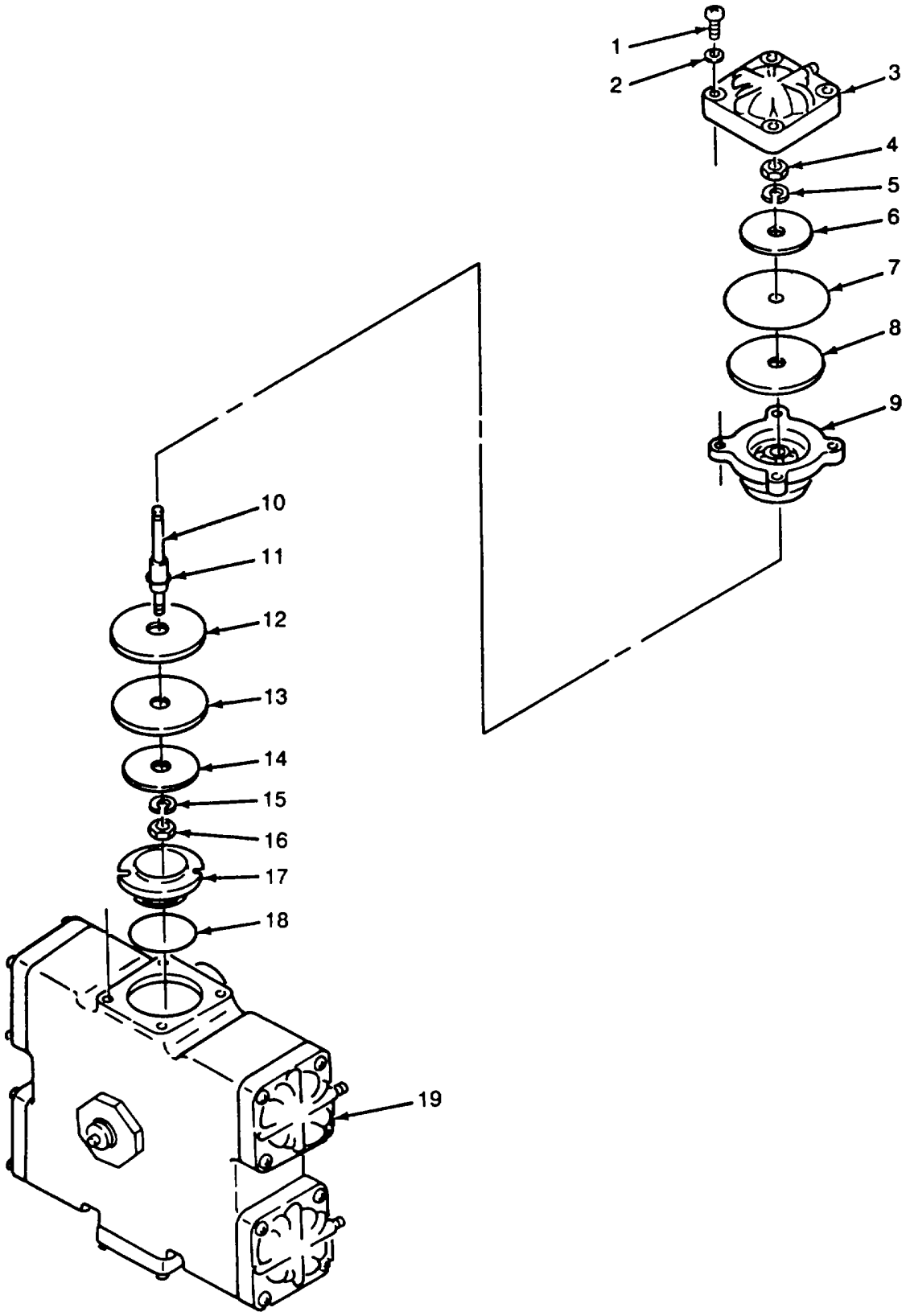
d Install diaphragm keeper (8), diaphragm (7), washer (6), lockwasher (5) and nut (4) in diaphragm housing (9).

CAUTION

Cartridge cap can be cracked if screws are overtightened. Do not exceed torque limits.

e. Install cartridge cap (3), washers (2) and four screws (1). Torque screws to 65 pound-inches (7.345 N M.)

3-43. CONTROL VALVE MAINTENANCE continued.



3-44. FILTER TANK MAINTENANCE.

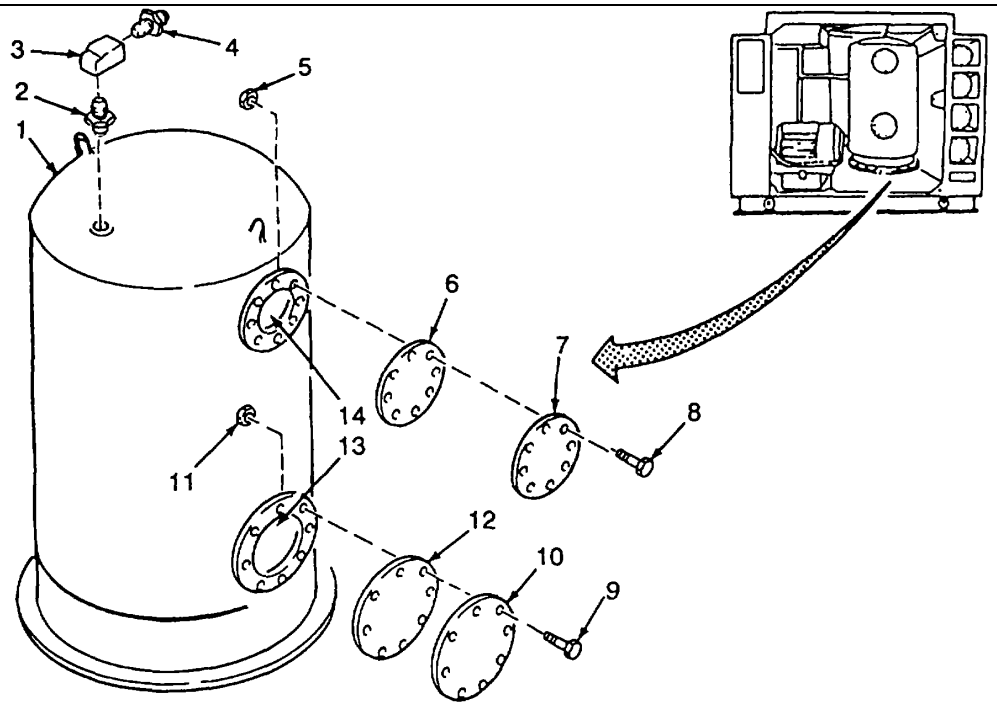
This task consists of: a. Disassembly b. Cleaning c. Inspection d. Repair e. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Nonmetallic Hose (Appendix B, Section III, Item 3).
Stiff-bristled Brush (Appendix B, Section III, Item 3).

Materials/Parts Required
Detergent (Appendix C, Section II, Item 10).
Gravel (Appendix C, Section II, Item 13).
Garnet, coarse (Appendix C, Section II, Item 11).
Garnet, fine (Appendix C, Section II, Item 12).
Sand, Filter (Appendix C, Section II, Item 24).
Anthracite (Appendix C, Section II, Item 3).
Media, Plastic (Appendix C, Section II, Item 19).
Gasket- 5500690000
Gasket- 5500691000

Equipment Condition
Reference
ROWPU shut down (TM 104610-24010).
Multimedia filter removed (paragraph 3-41).



3-44. FILTER TANK MAINTENANCE - continued.

DISASSEMBLY

WARNING
Wear protective equipment while working with media.

NOTE
Cover a 6-foot (1.83m) square area of the floor in front of lower flange cover to catch filtration material

a. Remove eight screws (8), nuts (5) flange cover (7), and gasket (6) from top handhole (14). Discard gasket.

WARNING
Weight of media is over 1000 pounds (454 kg). Remove flange cover carefully to avoid personal injury from flange cover movement.

b. Remove twelve screws (9), nuts (11), flange cover (10), and gasket (12) from bottom handhole (13). Discard gasket.

c. Remove fitting (2), elbow (3) and reducer (4) from multimedia filter (1).

REPAIR

Replace all damaged components.

CAUTION
Be careful while removing media not to damage laterals with tools.

a Using a hand scoop, remove filtration material from multimedia filter (1) and discard.

b. Turn multimedia filter (1) on side and use garden hose to flush out remaining media.

CLEANING

a Using soap solution and stiff-bristled brush, clean flange covers (7 and 10).

b. Clean flange ports (13 and 14), mounting screws, and nuts.

INSPECTION

a. Inspect inside and outside of multimedia filter (1) for cracks, evidence of leaks, damage, or excessive corrosion.

b. Inspect flange covers (7 and 10) for excessive corrosion and wear.

c. Inspect all inside parts for corrosion and wear. Ensure diffuser tube vent lines and screens are not clogged.

3-44. FILTER TANK MAINTENANCE - continued.

ASSEMBLY

a. Install reducer (4), elbow (3) and fitting (2) on multimedia filter (1).

CAUTION
Pouring coarse gravel through upper hand hole opening may damage filter lining.

b. Place a total of 240 pounds (109 kg) of 1/4-inch medium under bed gravel in multimedia filter (12) through lower handhole opening (8).

c. Use paddle or narrow board to level gravel.

d. On lower handhole opening (13), install new flange gasket (12), flange cover (10), and twelve bolts (9) and nuts (11).

NOTE
Steps e through i must be performed in sequence.

e. Using hand scoop, place 170 pounds (77 kg) of No. 12 coarse garnet through upper handhole opening (4).

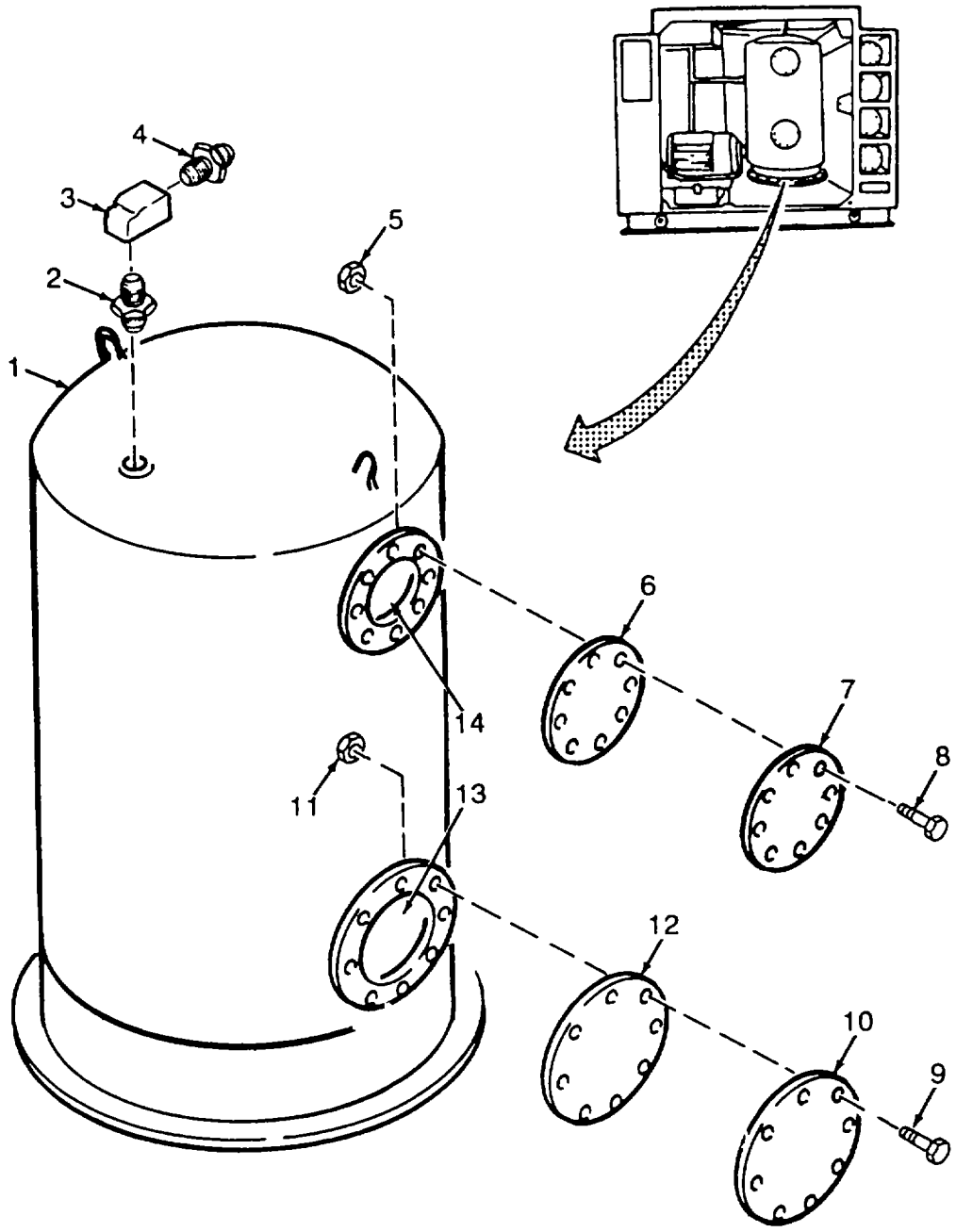
f. Repeat step e for 180 pounds (82 kg) of No 50 fine garnet.

g. Repeat step e for 230 pounds (104 kg) of filter sand.

h. Using hand scoop place 345 pounds (156 kg) of No. 2 anthracite.

i. On upper handhole opening (14), install new gasket (6), flange cover (7), eight bolts (8) and nuts (5).

3-44. FILTER TANK MAINTENANCE - continued.



Section X. CONTROL BOX ASSEMBLY MAINTENANCE PROCEDURES

3-45. CONTROL BOX ASSEMBLY MAINTENANCE.

This task consists of:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Repair
f. Assembly
g. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Materials/Parts Reauired
Detergent (Appendix C, Section II, Item 10)
Rags, wiping (Appendix C, Section II, Item 23)
Gasket- MS51007-12
Lockwasher (30) MS35338137
Lockwasher (4) - MS35338-138
Lockwasher- MS35338-136
0-ring - 5262
Personnel Required
Two (2)
Equipment Condition
Reference
ROWPU shut down (TM 10-4610-240-10).
General Safety Instructions

WARNING

- **High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.**
- **Lifting heavy/difficult to handle equipment incorrectly can cause serious injury.**

REMOVAL

a. Remove 14 screws (9), lockwashers (8), flat washers (7), and lower control box cover (6).

b. Remove cable connector (15) from receptacle connector (16).

NOTE

- **There are two electrical cables installed on terminals in the control box assembly. Both are removed the same.**
- **Tag wires before removal.**

c. Remove three screws (11) and wires (1).

3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

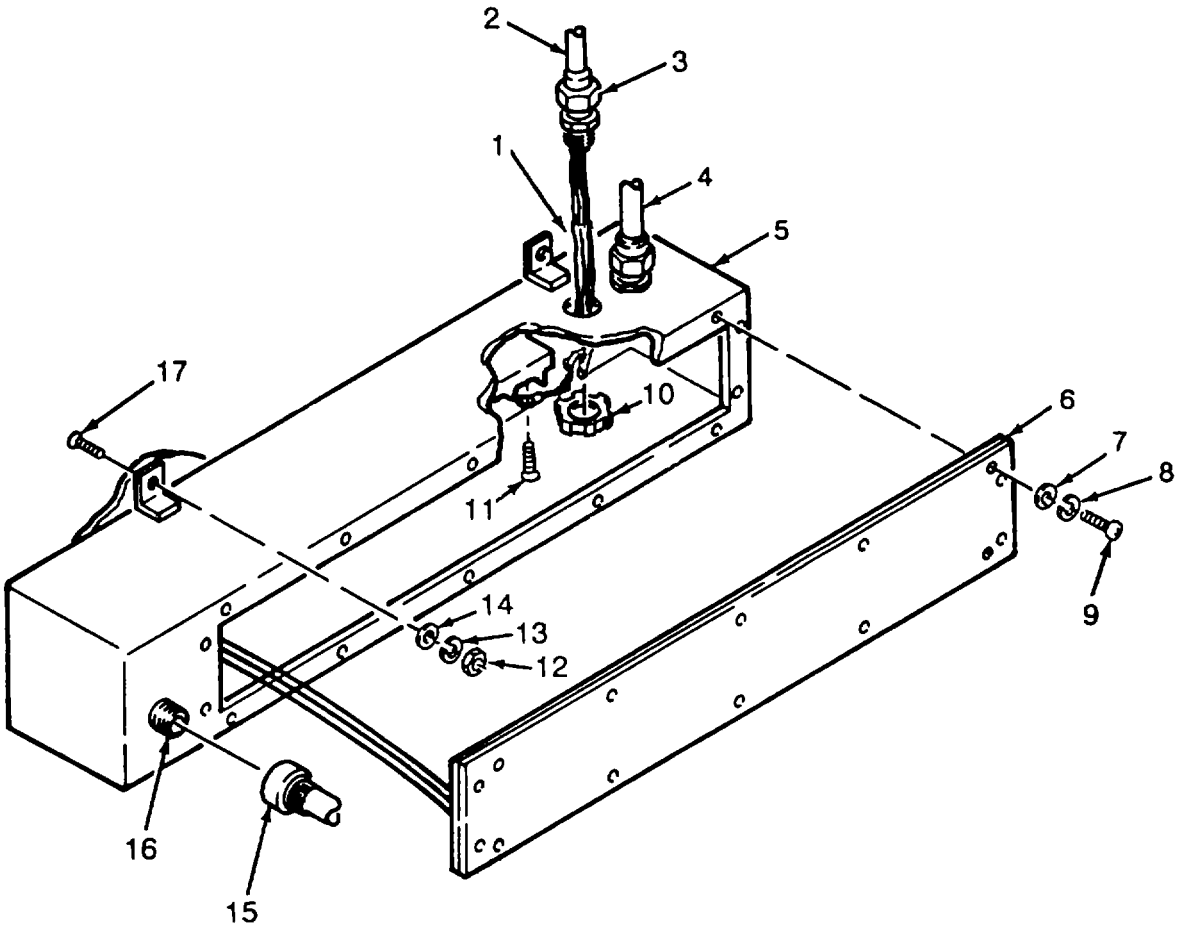
d. Remove locknut (10) from cable grip (3) and remove electrical cable (2).

e. Repeat steps c and d for electrical cable (4)

f. Support control box assembly (5) and remove four nuts (12), lockwashers (13), flat washers (14), and screws (17). Discard lockwashers.

g. Remove control box assembly (5).

h. Install control box cover (6) and install but do not tighten 14 screws (9), lockwashers (8), and flat washers (7).



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

TOGGLE SWITCHES.

NOTE

- **There are 11 toggle switches. The number of wires attached to each switch may vary depending on use. All switches are removed the same. One is shown**
- **Tag all wires before removal.**

a. Remove 14 screws (4), lockwashers (3), and flat washers (2). Lower control box cover (1).

b. From inside control box assembly, remove screws (17) and remove wires (18).

c. From front of control box assembly, remove mounting nut (13) and lockwasher (14).

d. Remove locking (15) and switch body (16).

e. Install control box cover (1) and install but do not tighten 14 screws (4), lockwashers (3), and flat washers (2).

EMERGENCY STOP SWITCH.

NOTE
Tag all wires before removal.

a. Remove 14 screws (4), lockwashers (3), and flat washers (2) Lower control box cover (1).

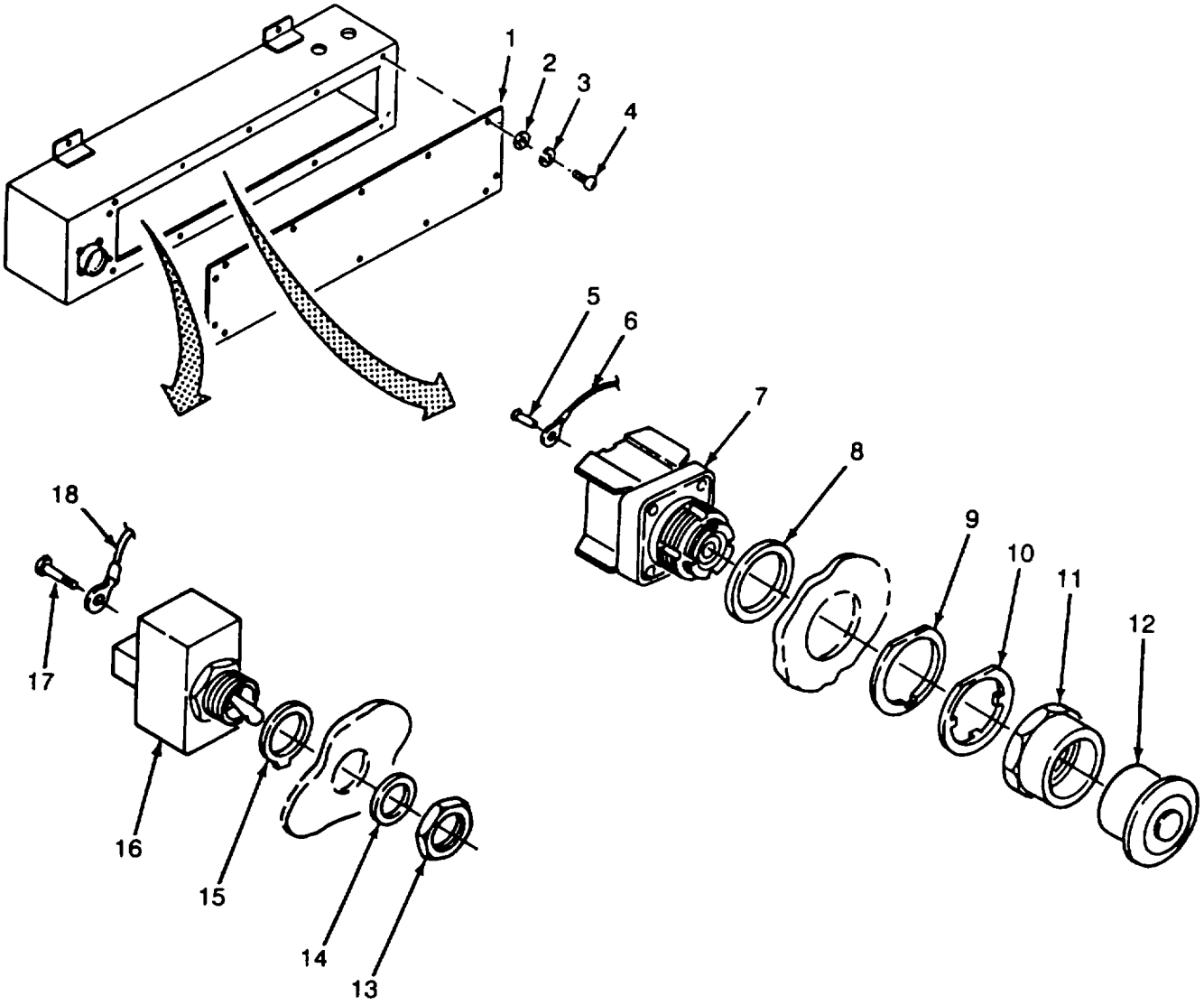
b. Remove cap (12), locknut (11), keyway washer (10), and fiber washer (9) from switch body (7).

c. Loosen two screws (5) tag and remove wires (6).

d. Remove switch body (7) and rubber washer (8).

e. Install control box cover (1) and install but do not tighten 14 screws (4), lockwashers (3), and flat washers (2)

3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

INDICATOR LAMPHOLDERS.

NOTE

- **There are nine lampholders. All are removed the same. One is shown.**
- **Tag all wires before removal.**

a. Remove 14 screws (3), lockwashers (2), and flat washers (1). Lower control box cover (4).

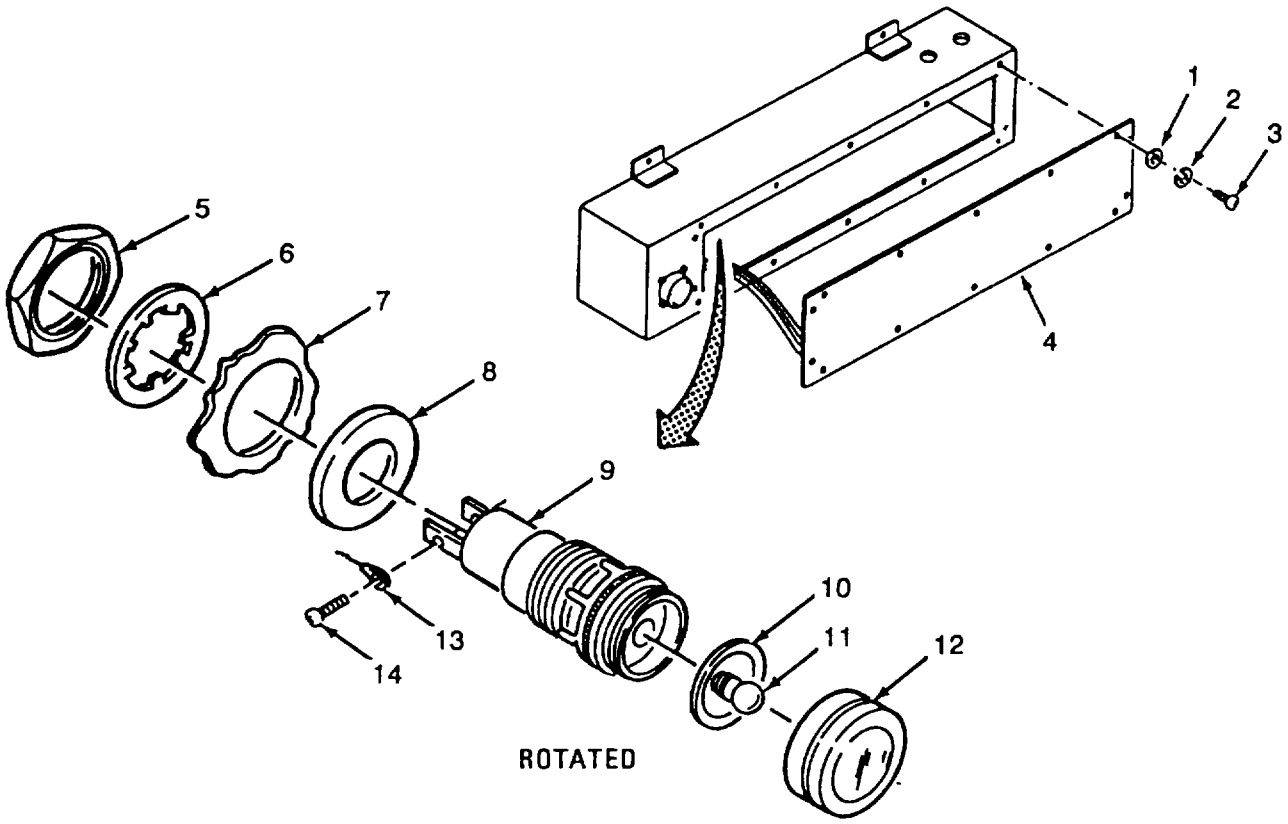
b. From inside control box assembly, remove two screws (14) and three wires (13) from lampholder (9).

c. Remove nut (5) and lockwasher (6).

d. Remove lampholder (9) and rubber washer (8) from front of control box (7).

e. Remove lens (12), flange (10), and bulb (11).

f. Install control box cover (4) and install but do not tighten 14 screws (3), lockwashers (2), and flat washers (1).



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

TERMINAL BOARD.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

NOTE

This task is the same for control box and junction box assemblies.

a. If working on a control box assembly, remove 14 screws (4), lockwashers (3), and flat washers (2) Lower control box cover (1).

b. If working on junction box assembly, turn 13 rotary fasteners (11) and lower junction box cover (10).

NOTE

Tag all wires before removal.

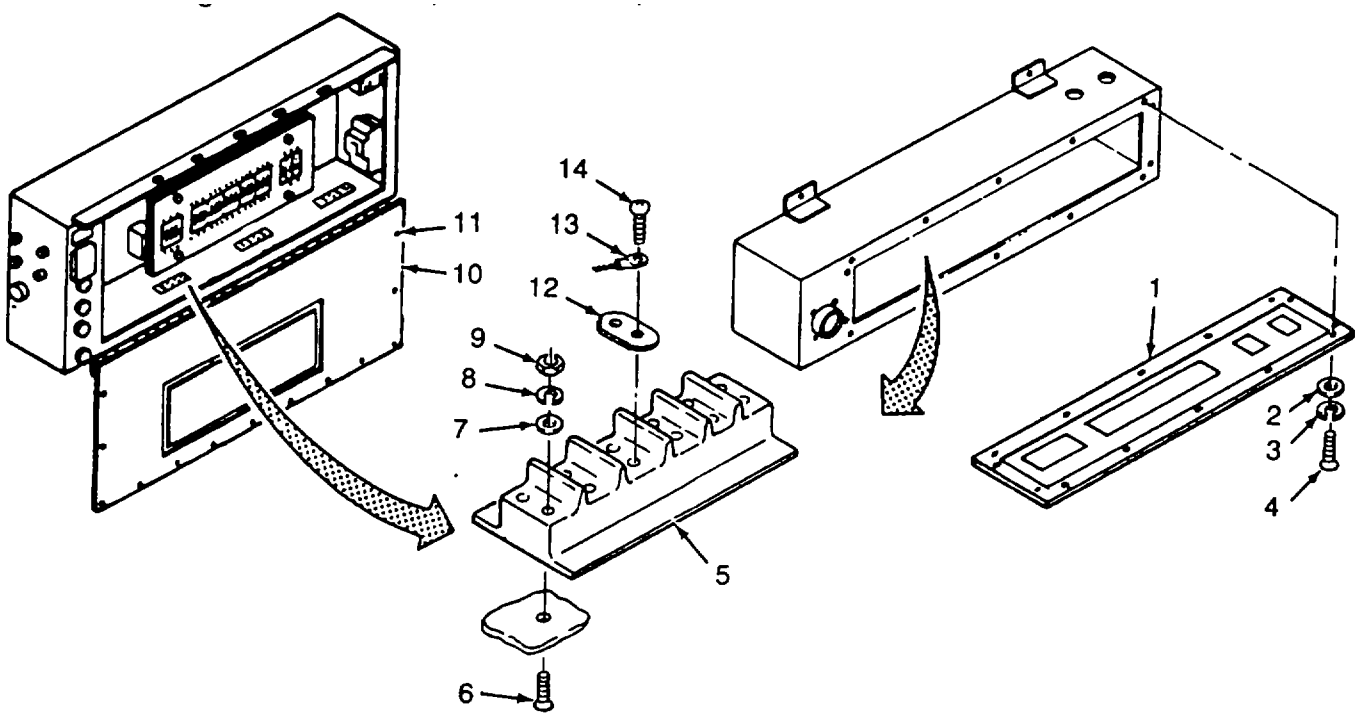
c. At each terminal on terminal board (5), remove screws (14) and wires (13).

d. Remove terminal link (12).

e. At each end of terminal board (5), remove two nuts (9), lockwashers (8), flat washers (7) and screws (6).

f. Remove terminal board (5).

g. If working on control box assembly, install control box cover (1) and install but do not tighten 14 screws (4), lockwashers (3), and flat washers (2)



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

RECEPTACLE CONNECTORS.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

NOTE

All receptacle connectors in the control box and junction box assemblies are removed the same. One receptacle connector is shown as typical.

a. Remove cap (16) from receptacle connector (2).

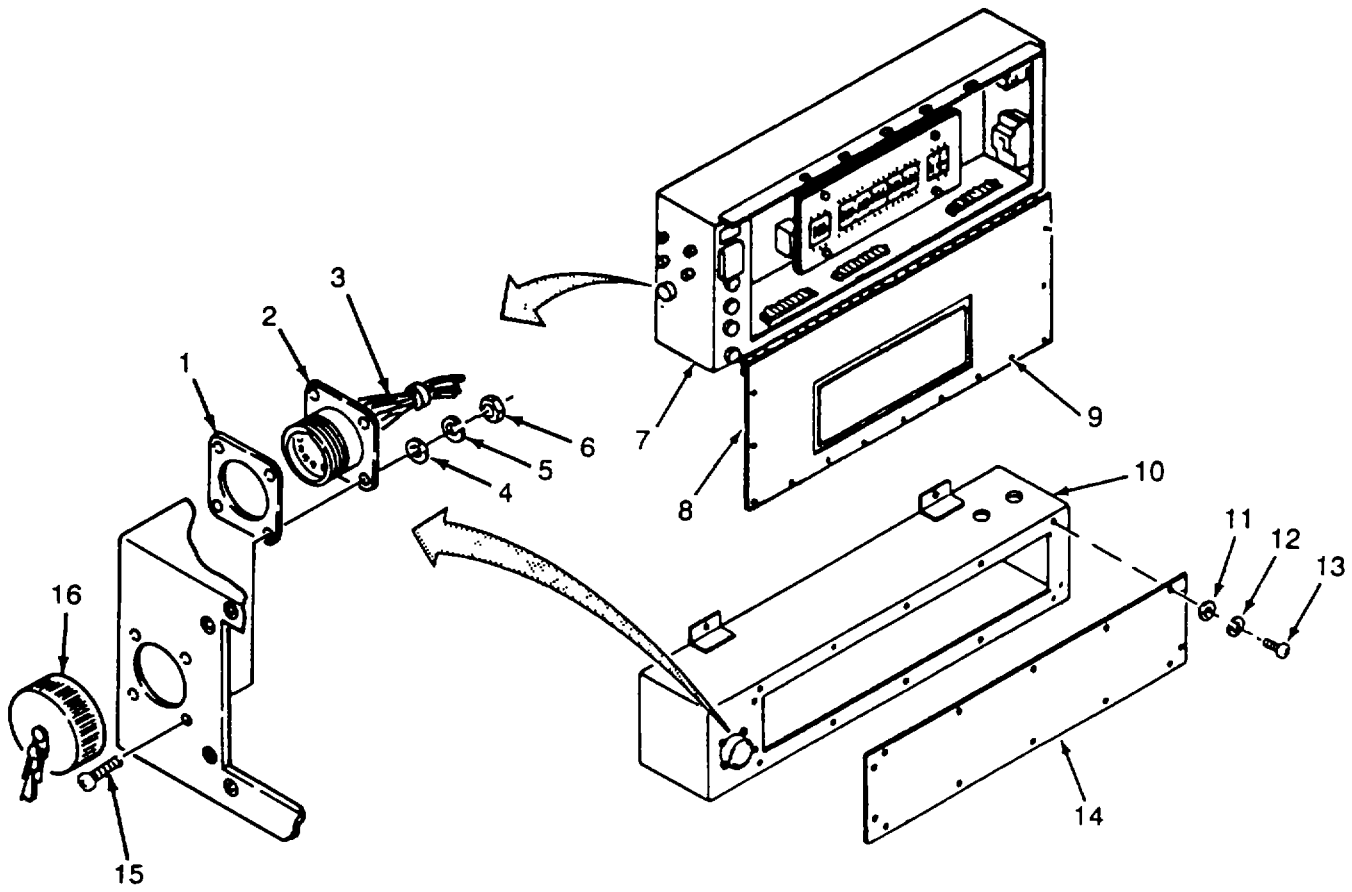
NOTE

If working on junction box assembly, go to step d.

b. To remove receptacle connector located in the control box assembly (10), remove 14 screws (13), lockwashers (12) and flat washers (11).

c. Lower control box cover (14) and go to step e.

d. To remove receptacle connector from the junction box assembly (7), turn 13 rotary



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

RECEPTACLE CONNECTORS.

e. Remove four nuts (6), lockwashers (5), flat washers (4), and screws (15).

f. Remove receptacle connector (2) and gasket (1).

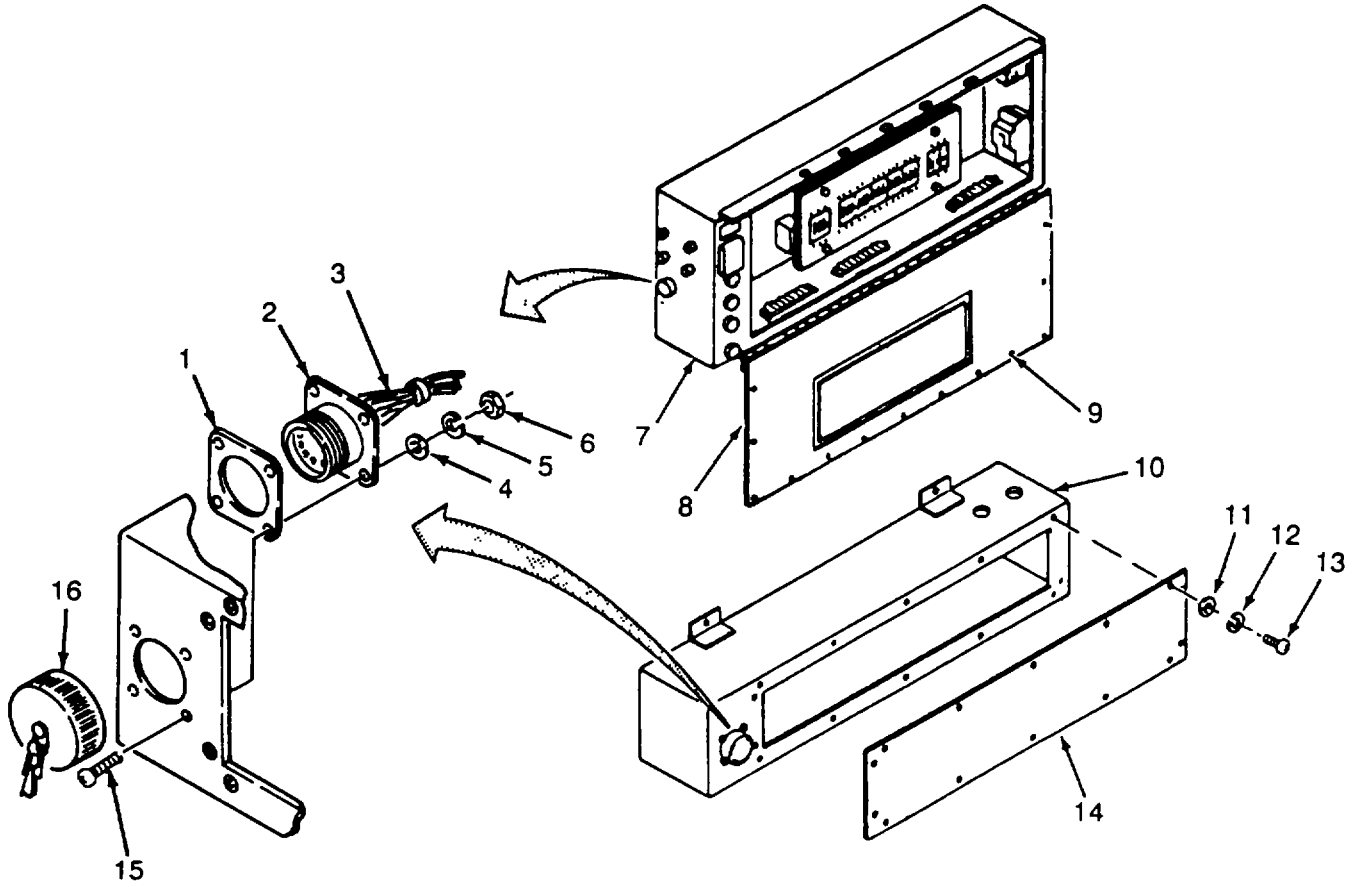
NOTE

To unsolder wires from receptacle connectors, it may be necessary to remove wiring harness clamps for access.

- **Tag wires with pin connection before unsoldering**.

g. Using soldering gun, unsolder wires (3) from receptacle connector (2) and remove receptacle connector.

h. If working on control box assembly, install control box cover (14) and install but do not tighten 14 screws (13), lockwashers (12), and flat washers (11).



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

ELECTRICAL RELAYS K10 AND K11.

a. Remove 14 screws (14), lockwashers (15), and flat washers (16). Lower control box cover (13).

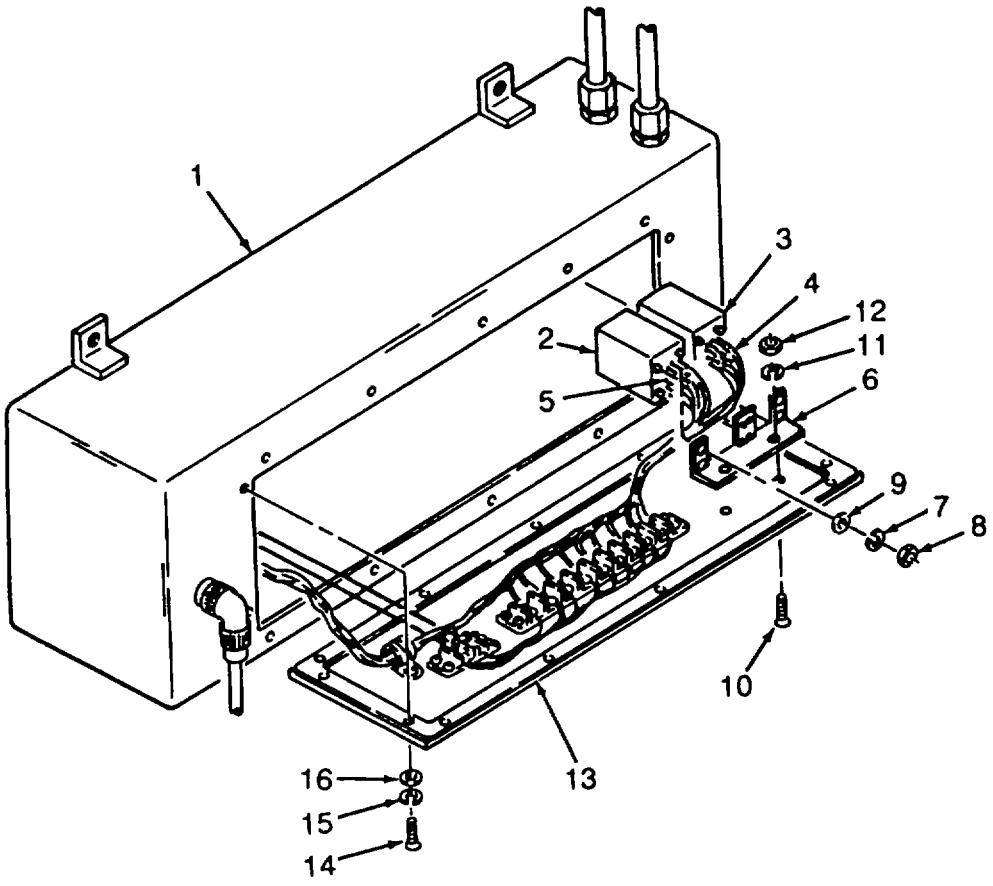
b. Remove screw (10), nut (12) and lockwasher (11).

c. Remove eight nuts (8), lockwashers (7), and flat washers (9) from bracket (6).

NOTE
Tag all wires before removal.

d. Unsolder 11 wires (4) from relay K11 (3) and 13 wires (5) from relay K10 (2) and remove relays K11 (3) and K10 (2). Discard lockwashers..

e. Install control box cover (13) and install but do not tighten 14 screws (14), lockwashers (15), and flat washers (16).



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

CLEANING.

a. Using soap solution, clean control box assembly and control box cover. Wipe dry with clean cloth.

b. Clean attaching hardware.

INSPECTION.

a. Inspect control box assembly and control box cover for dents, cracks, and excessive corrosion.

b. Inspect cover gasket for cracks, deterioration, and general serviceability.

c. Inspect attaching hardware for damage and corrosion. Replace as required.

REPAIR.

Replace defective components as required.

3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

ASSEMBLY.

TOGGLE SWITCHES.

NOTE

There are 11 toggle switches. The number of wires attached to each switch may vary depending on use. All switches are installed the same. One is shown.

a. Remove 14 screws (4), lockwashers (3), and flat washers (2). Lower control box cover (1).

b. Install locking (15) and position switch body (16) in control box assembly.

c. Apply RTV to locking (15) to seal the switch.

d. Install new lockwashers (14) and mounting nut (13)

e. Install wires (18) as tagged and two screws (17).

f. Install control box cover (1) and install but do not tighten 14 screws (4), lockwashers (3), and flat washers (2).

EMERGENCY STOP SWITCH.

a. Remove 14 screws (4), lockwashers (3), and flat washers (2). Lower control box cover (1).

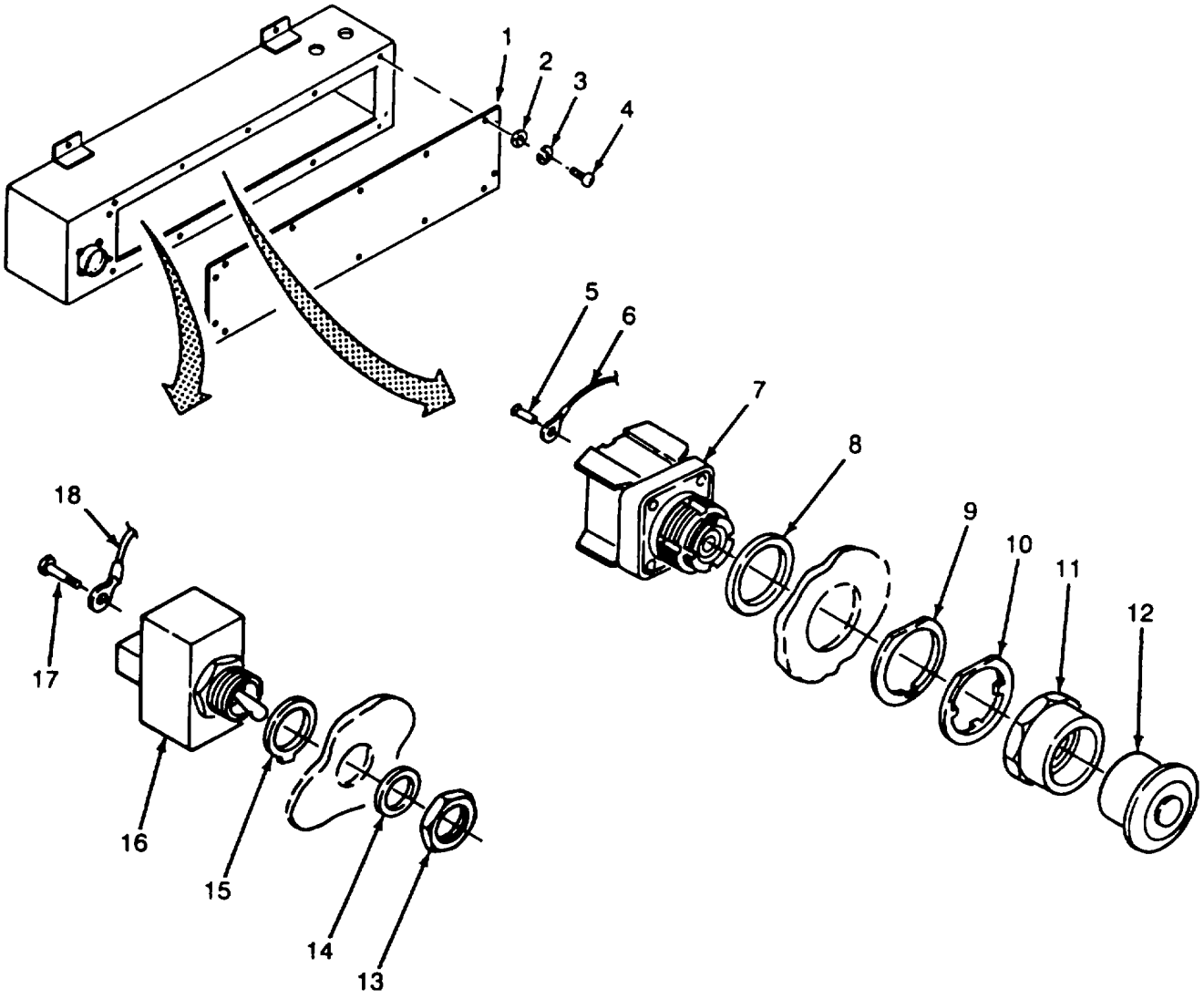
b. Install new rubber washer (8) and position switch body (7) in control box assembly.

c. Install fiber washer (9), keyway washer (10), locknut (11), and cap (12).

d. Install wires (6) as tagged and tighten screws (5).

e. Install control box cover (1) and install but do not tighten 14 screws (4) lockwashers (3), and flat washers (2).

3-45. CONTROL BOX ASSEMBLY MAINTENANCE- continued.



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

INDICATOR LAMPHOLDERS.

NOTE

There are nine lampholders. All are installed the same. One is shown.

a. Remove 14 screws (3), lockwashers (2), and flat washers (1). Lower control box cover (4).

b. Install bulb (11), flange (10), and lens (12). Allow about 1/8 inch between flange and lens.

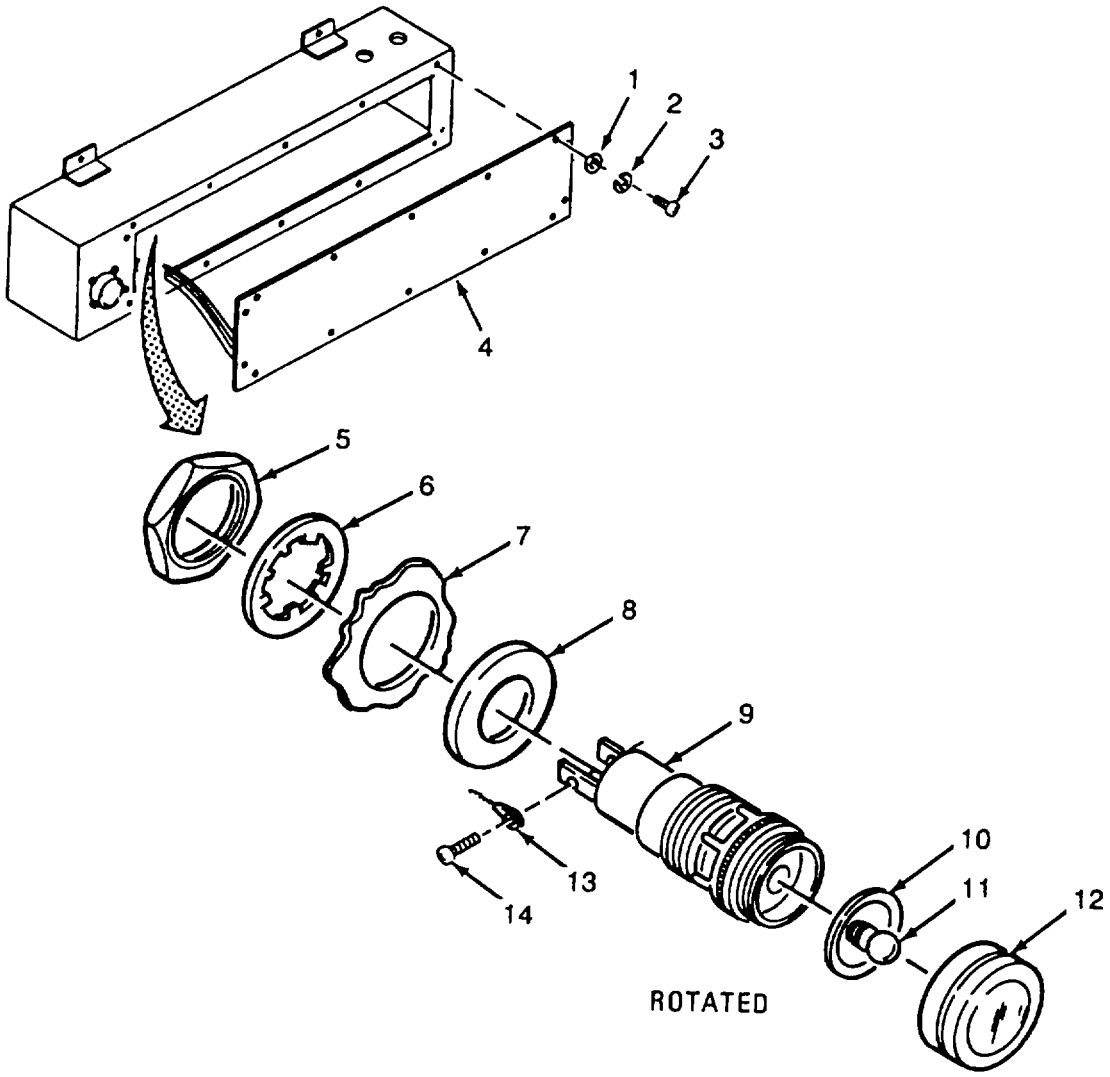
c. From the front of control box assembly (7), install rubber washer (8) and lampholder (9).

d. Install new lockwasher (6) and nut (5).

e. Install three wires (13) as tagged and two screws (14).

f. Install control box cover (4) and install but do not tighten 14 screws (3), lockwashers (2), and flat washers (1).

3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

TERMINAL BOARD

a. If working on control box assembly, remove 14 screws (4), lockwashers (3), and flat washers (2). Lower control box cover (1).

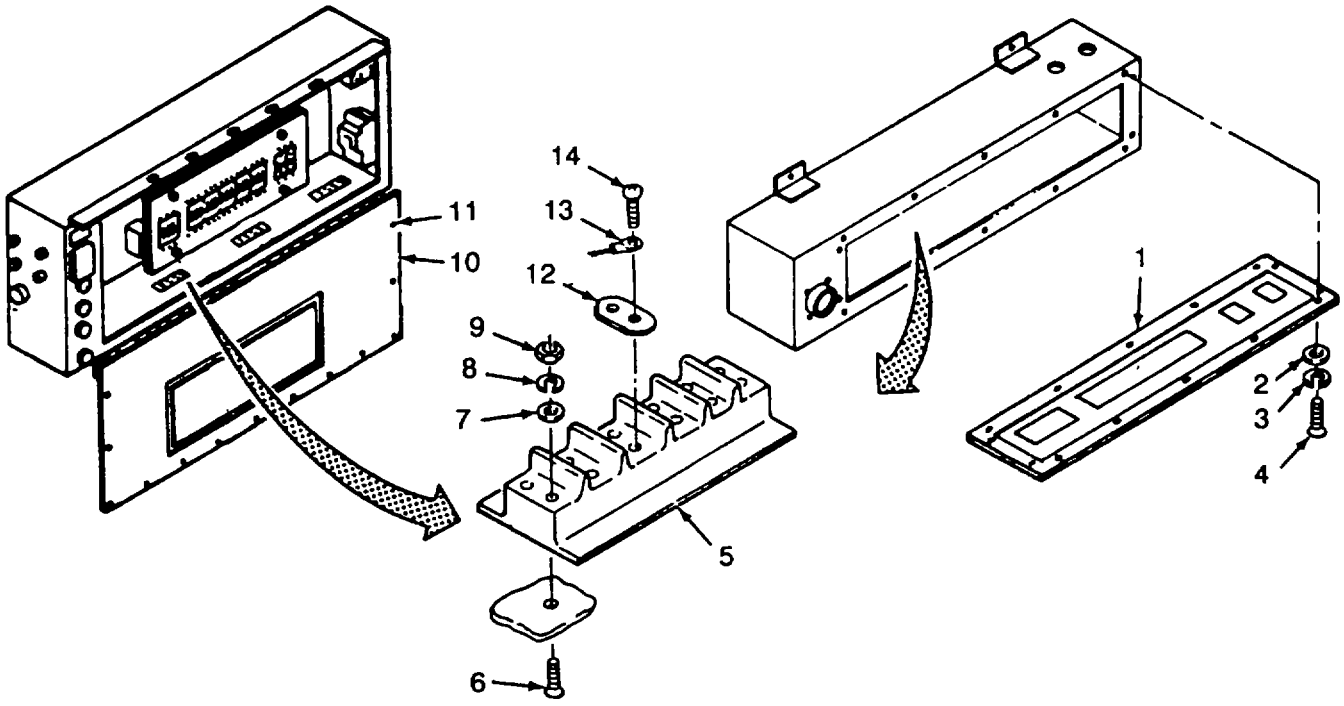
b. Position terminal board (5) in place and aline mounting holes.

c. At each end of terminal board (5), install two screws (6), flat washers (7), new lockwashers (8), and nuts (9)

d. Position terminal link (12) and wires (13) as tagged and install screws (14).

e. If working on junction box assembly, close junction box cover (10) and secure 13 rotary fasteners (11).

f. If working on control box assembly, install control box cover (1). Install but do not tighten 14 screws (4), lockwashers (3), and flat washers (2).



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

RECEPTACLE CONNECTORS

NOTE

- All receptacle connectors in the control box and junction box assemblies are removed and installed the same. One receptacle connector is shown as typical.
- Wires must be soldered to pin connections as tagged.

a. If working on control box assembly, remove 14 screws (13), lockwashers (12), and flat washers (11). Lower control box cover (14).

b. Using soldering gun, solder wires (3) to receptacle connector (2) as tagged.

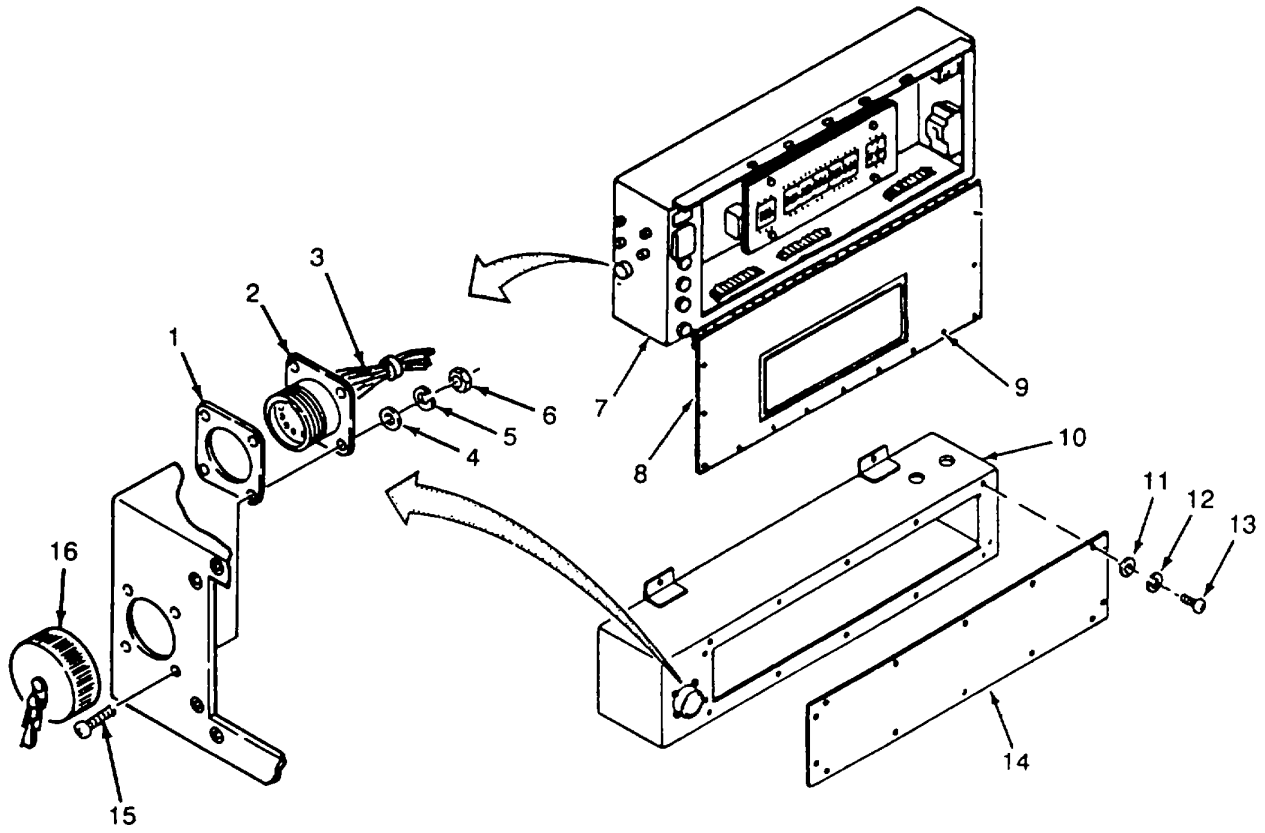
c. Position gasket (1) on box (10) or (7) and position receptacle connector (2) in box cutout.

d. Install four screws (15), flat washers (4), new lockwashers (5), and nuts (6).

e. Install cap (16) on receptacle connector (2).

f. If working on control box assembly, install control box cover (14). Install but do not tighten 14 screws (13), lockwashers (12) and flat washers (11)

g. If working on junction box assembly, close junction box cover (8) and secure 13 rotary



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

ELECTRICAL RELAYS K10 AND K11.

a. Remove 14 screws (14) lockwashers (15) and flat washers (16). Lower control box cover (13).

b. Solder 13 wires (5) to pins on relay K10 (2) as tagged.

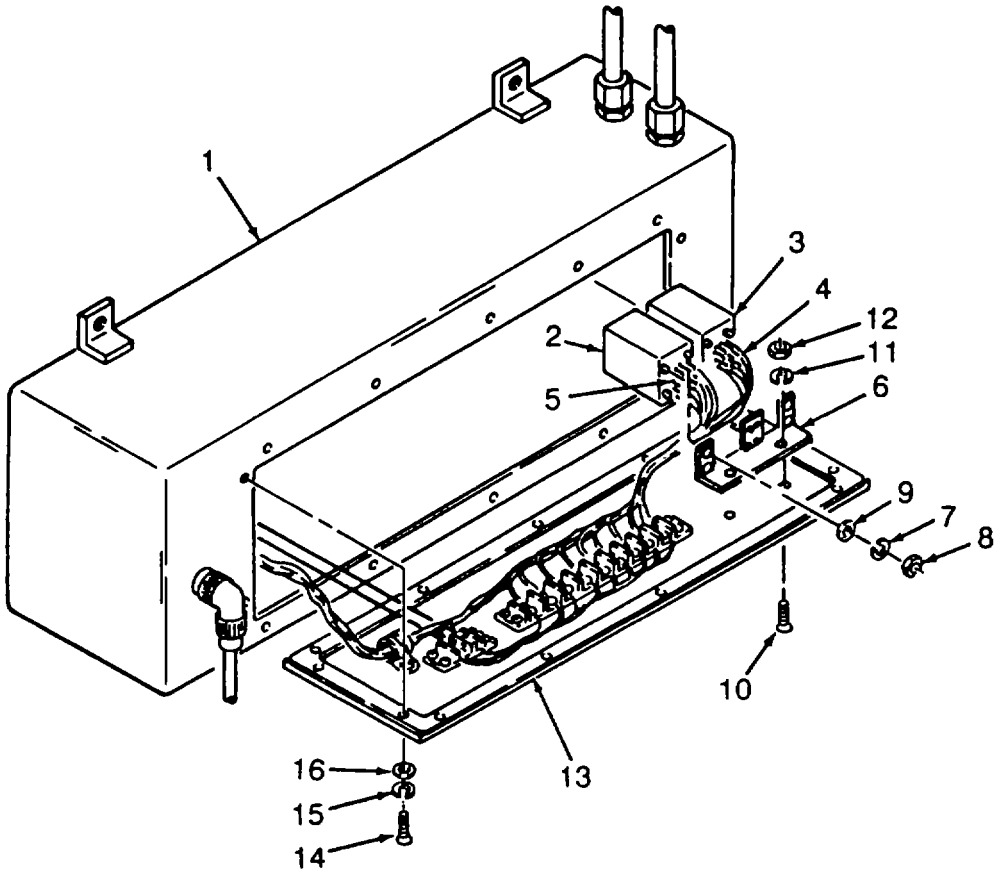
c. Position relay K10 (2) on bracket (6) and install four flat washers (9), new lockwashers (7), and nut (8).

d. Position relay K11 (3) on bracket (6). Install four flat washers (9), new lockwashers (7), nuts (8), screws (10), lockwashers (11) and nuts (12).

e. Solder 11 wires (4) to pins on relay K11 (3) as tagged.

f. Install control box cover (13) and install but do not tighten 14 screws (14), lockwashers (15), and flat washers (16).

3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.



3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.

INSTALLATION.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance

a. Remove 14 screws (9), lockwashers (8), and flat washers (7) Lower control box cover (6)

WARNING

The control box assembly is heavy/difficult to handle. Two people are needed to lift it to prevent personal injury or damage to the equipment

b. Support control box assembly (5) and install four screws (17), flat washers (14), new lockwashers (13), and nuts (12).

c. Install cable connector (15) on receptacle connector (16)

NOTE

There are two electrical cables installed on terminal in the control box assembly. Both are installed the same.

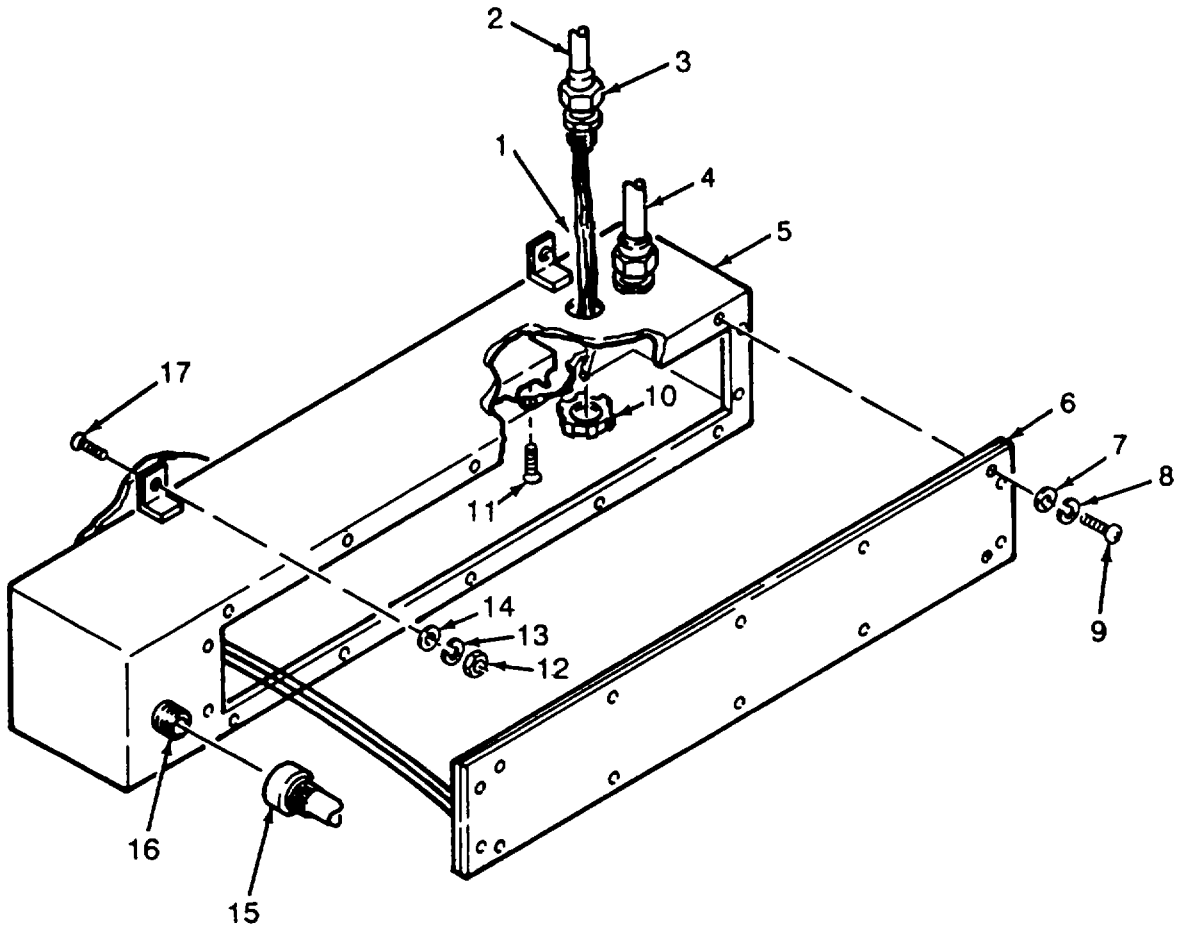
d. Position electrical cable (2) in place and install new cable grip locknut (10) on cable grip (3).

e. Position three wires (1) on terminals as tagged and install three screws (11).

f. Repeat steps d and e for electrical cable (4).

g. Position control box cover (6) and install 14 screws (9), lockwashers (8) and flat washers (7).

3-45. CONTROL BOX ASSEMBLY MAINTENANCE - continued.



3.46. WIRING HARNESSW1 MAINTENANCE.

This task consists of: a. Removal b. Inspection c. Repair d. Test e. Disassembly f. Assembly g. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section III, Item 3)
- Multimeter (Appendix B, Section III, Item 3).
- Electrical Repair Kit (Appendix B, Section III, Item 3)
- Crimping Tool (Appendix B, Section III, Item 3).
- Wire Stripper (Appendix B, Section III, Item 3).
- Lockwasher (4) - MS35338137

Material/Parts Required
- Tape, Electrical (Appendix C, Section II, Item 31)
- Solder (Appendix C, Section II, Item 27).

Equipment Condition

Reference
- ROWPU shutdown (TM 1ll10-240-10).
- Power shut down (power source manual).
- Control box assembly removed (paragraph 345).

NOTE

Procedures are typical and can be used for all wiring harnesses in the ROWPU. Wiring harness in control box assembly is shown.

REMOVAL

a. Remove four nuts (4), lockwashers (5), flat washers (6), and screws (10).

b. Remove receptacle connector (2) and gasket (1). Discard gasket.

NOTE

Note routing of wiring harness.

c. Cut all wire ties and remove all clamps.

NOTE

- Tag all wires before removal
- There are multiple wires with terminal lugs at end. One is shown.

e. Remove screw (7) and remove wire lug (8). Install screw in place.

f. Remove wiring harness (9).

3-46. WIRING HARNESS W1 MAINTENANCE - continued.

INSPECTION

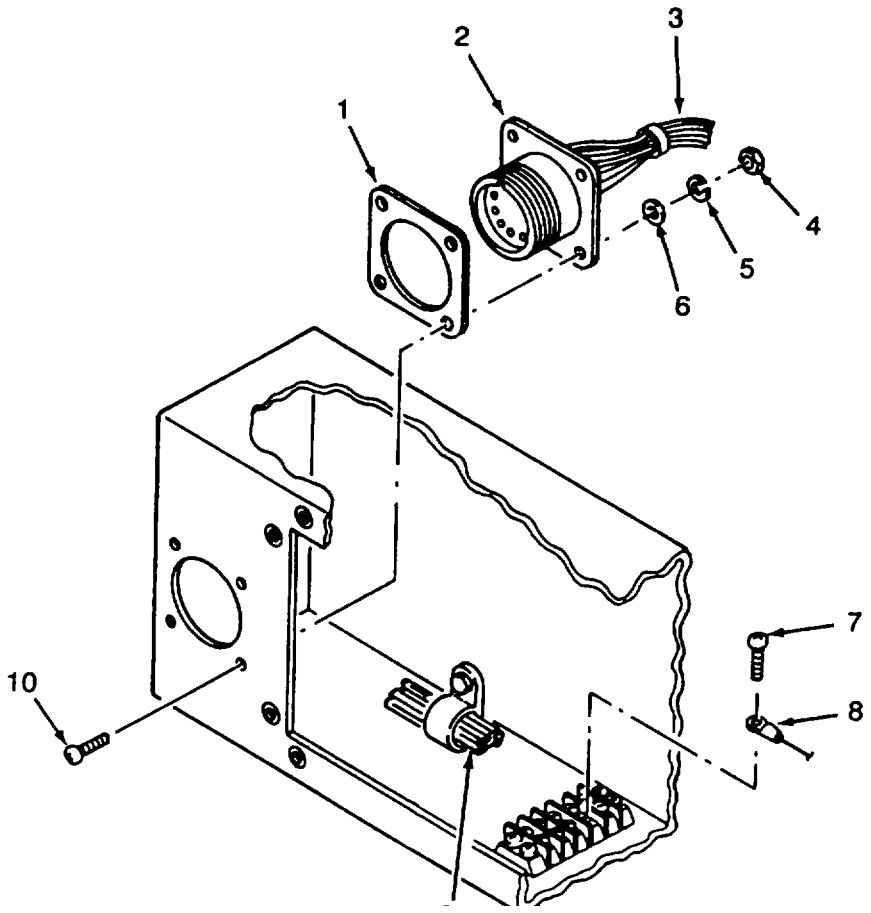
a. Inspect wiring harness for cracked, cut, or burned wires. Tag damaged wires.

b. Inspect terminals for good connection. Tag damaged wires.

c. Check for continuity on all wires. Tag faulty wires.

REPAIR

Replace all damaged components.



3-6. WIRING HARNESS W1 MAINTENANCE - continued.

TEST

CAUTION

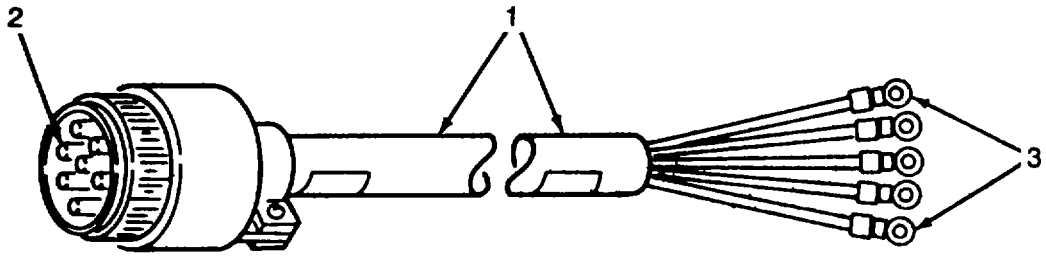
- The following tests are performed to determine if the wiring harness is defective. Before testing, wiring harness must be disconnected. Failure to disconnect wiring harness can result in false test indications.
- Make sure wire terminals are not touching each other.

NOTE

Refer to wiring diagram in Appendix F for wiring harness being tested.

a. Using multimeter, test for continuity between pins (2) and wire terminals (3).

b. If continuity does not exist between any two points, replace de raged or faulty wire.



3-46. WIRING HARNESS W1 MAINTENANCE - continued.

NOTE

- Procedures are typical and can be used for all wiring harnesses and wire leads in the ROWPU.
- Refer to wiring diagram in Appendix F for wiring harness being repaired.

DISASSEMBLY

a. Lay out wiring harness on a flat surface.

NOTE

- For wires attached to a female multipin connector, do step b.
- For wires attached to an male multipin connector, go to step c.

NOTE

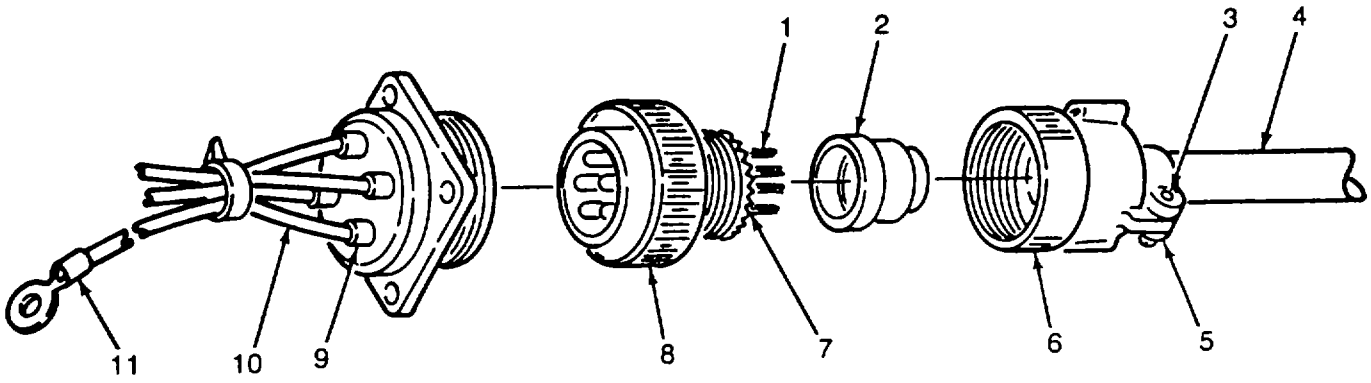
Tag all wires before removal.

b. Using soldering gun, unsolder wires (10) from terminals (9) and remove wires. Tag and remove faulty wire.

c. Loosen two screws (3) securing clamp (5) to wiring harness (4)

d. Unscrew coupling (6) from shell (8) and slide coupling (6) and insulator bushing (2) clear of shell (8).

e. Using soldering gun, unsolder wires (1) from terminals (7). Tag and remove faulty wire.



3-4. WIRING HARNESS W1 MAINTENANCE - continued.

ASSEMBLY

NOTE

- Refer to wiring diagram in Appendix F for wiring harness or cable assembly being repaired.
- When crimping, be sure to make a good electrical connection between terminal lugs and wire.

a. Cut a new length of wire the same size as faulty wire.

b. Using crimping tool, crimp new terminal lugs (11) to wires.

NOTE

- For wires attached to a female multipin connector do step c.
- For wires attached to a male multipin connector, go to step d.

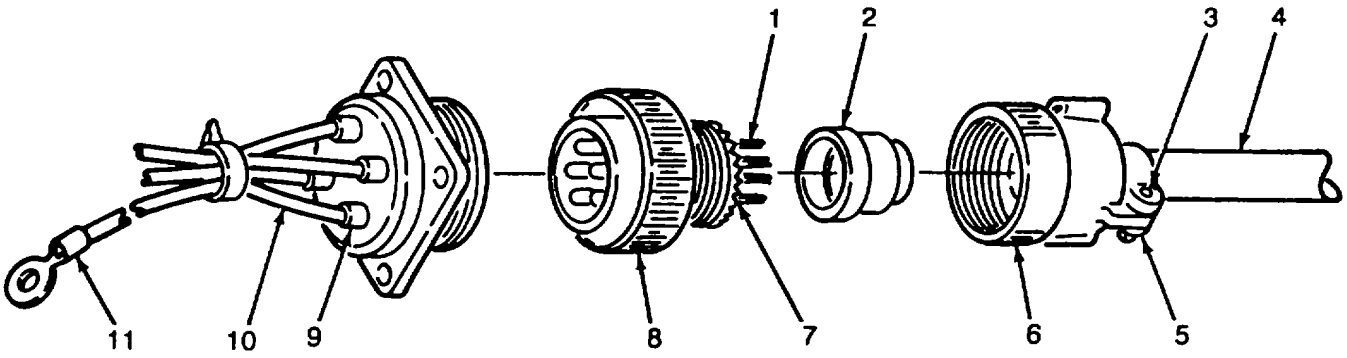
c. Using soldering gun, solder wires (10) to terminal (9) as tagged.

d. Slide insulator bushing (2) and coupling (6) over terminals (7) and wires (1).

e. Using soldering gun, solder wires (1) to terminal (7) as tagged.

f. Screw coupling (6) to shell (8).

g. Tighten screws (3) securing clamp (5) to wiring harness (4).



3-46. WIRING HARNESS W1 MAINTENANCE - continued.

INSTALLATION

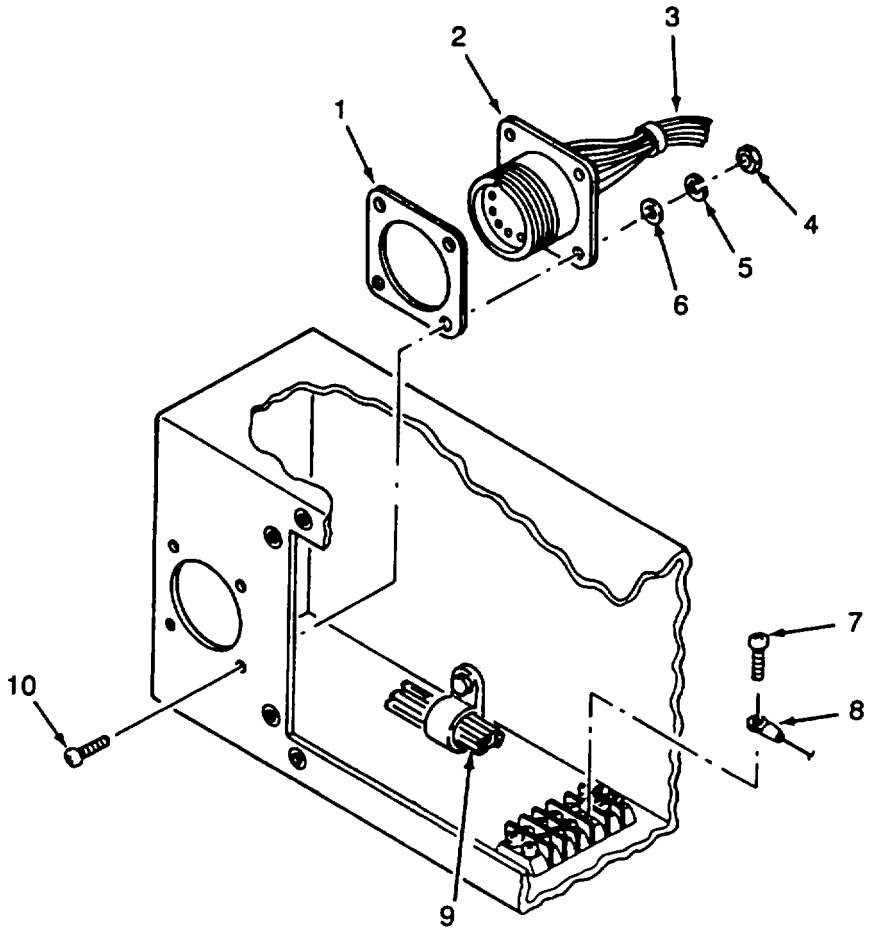
a. Route wiring harness (9) as noted during removal.

b. Install wire lug (8) as tagged and screw (7).

c. Install wire ties or clamps on wiring harness (9).

d. Position new gasket (1) and receptacle connector (2) in place alining mounting holes.

e. Install four screws (10), flat washers (6), new lockwashers (5) and nuts (4).



3-47. WIRING HARNESS W2 MAINTENANCE.

This task consists of: a. Removal b. Inspection c. Test d. Disassembly e. Assembly f. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section III, Item 3).
- Multimeter (Appendix B, Section III, Item 3).
- Electrical Repair Kit (Appendix B, Section III, Item 3)
- Crimping Tool (Appendix B, Section III, Item 3).
- Wire Stripper (Appendix B, Section III, Item 3).

Material/Parts Required
- Tape, Electrical (Appendix C, Section II, Item 31)
- Solder (Appendix C, Section II, Item 27).

Equipment Condition

Reference
- Power shutdown (power source manual).
- ROWPU shutdown (TM 104610-240-10).

REMOVAL

For removal procedures, refer to paragraph 346

INSPECTION

For inspection procedures, refer to paragraph 346

TEST

For test procedures, refer to paragraph 3 46

DISASSEMBLY

For disassembly procedures, refer to paragraph 316

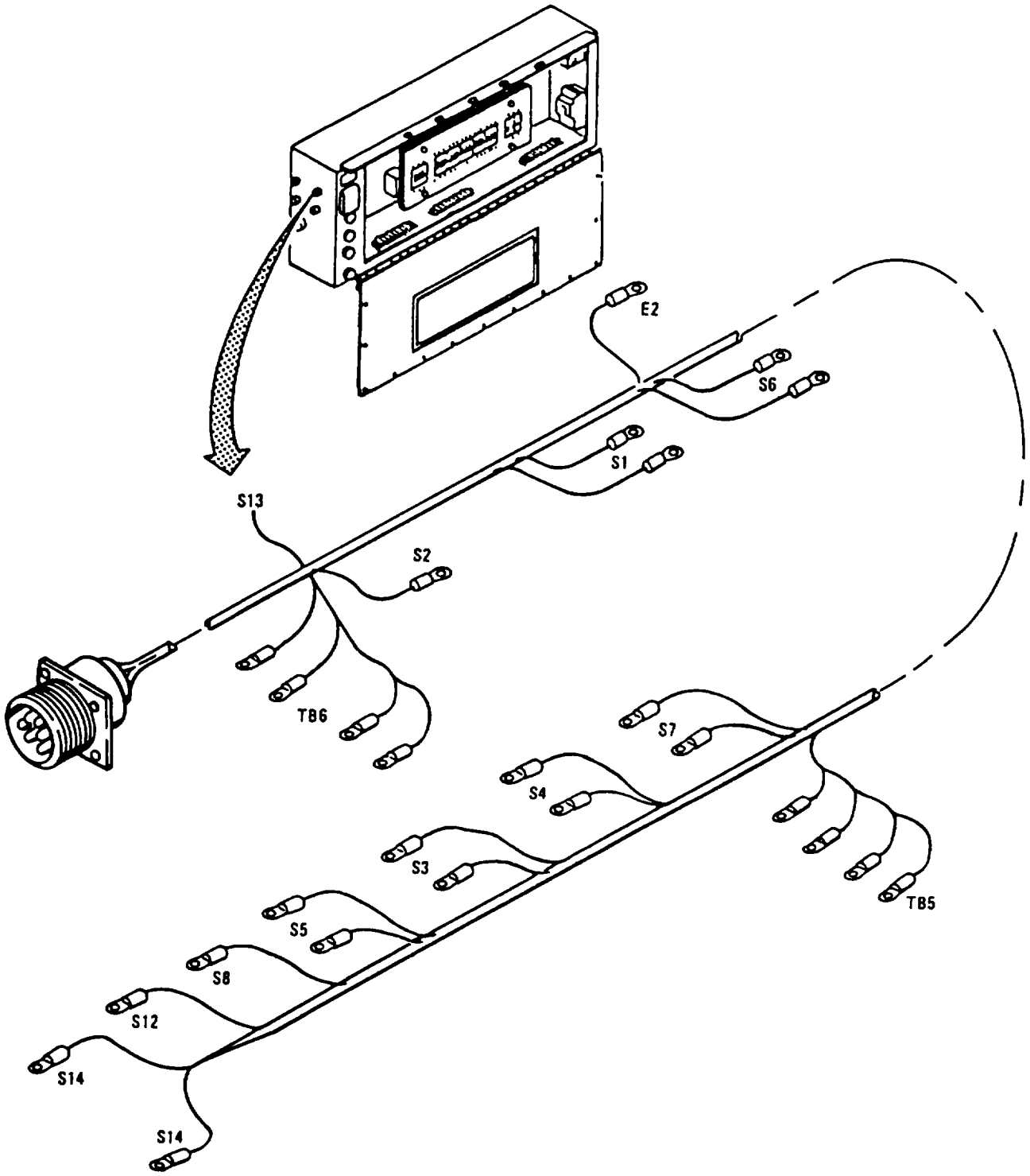
ASSEMBLY

For assembly procedures, refer to paragraph 346

INSTALLATION

For installation procedures, refer to paragraph 346

3-47. WIRING HARNESS W2 MAINTENANCE - continued.



3-48 WIRING HARNESS W54 MAINTENANCE.

This task consists of: a. Removal b. Inspection c. Test d. Disassembly e. Assembly f. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section III, Item 3).
- Multimeter (Appendix B, Section III, Item 3).
- Electrical Repair Kit (Appendix B, Section III, Item 3).
- Crimping Tool (Appendix B, Section III, Item 3).
- Wire Stripper (Appendix B, Section III, Item 3).

Material/Parts Required
- Tape, Electrical (Appendix C, Section II, Item 31)
- Solder (Appendix C, Section II, Item 27).

Equipment Condition

Reference
- Power shutdown (power source manual).
- ROWPU shutdown (TM 104610-240-10).

REMOVAL

For removal procedures, refer to paragraph 346

INSPECTION

For inspection procedures, refer to paragraph 316

TEST

For test procedures, refer to paragraph 346

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-46

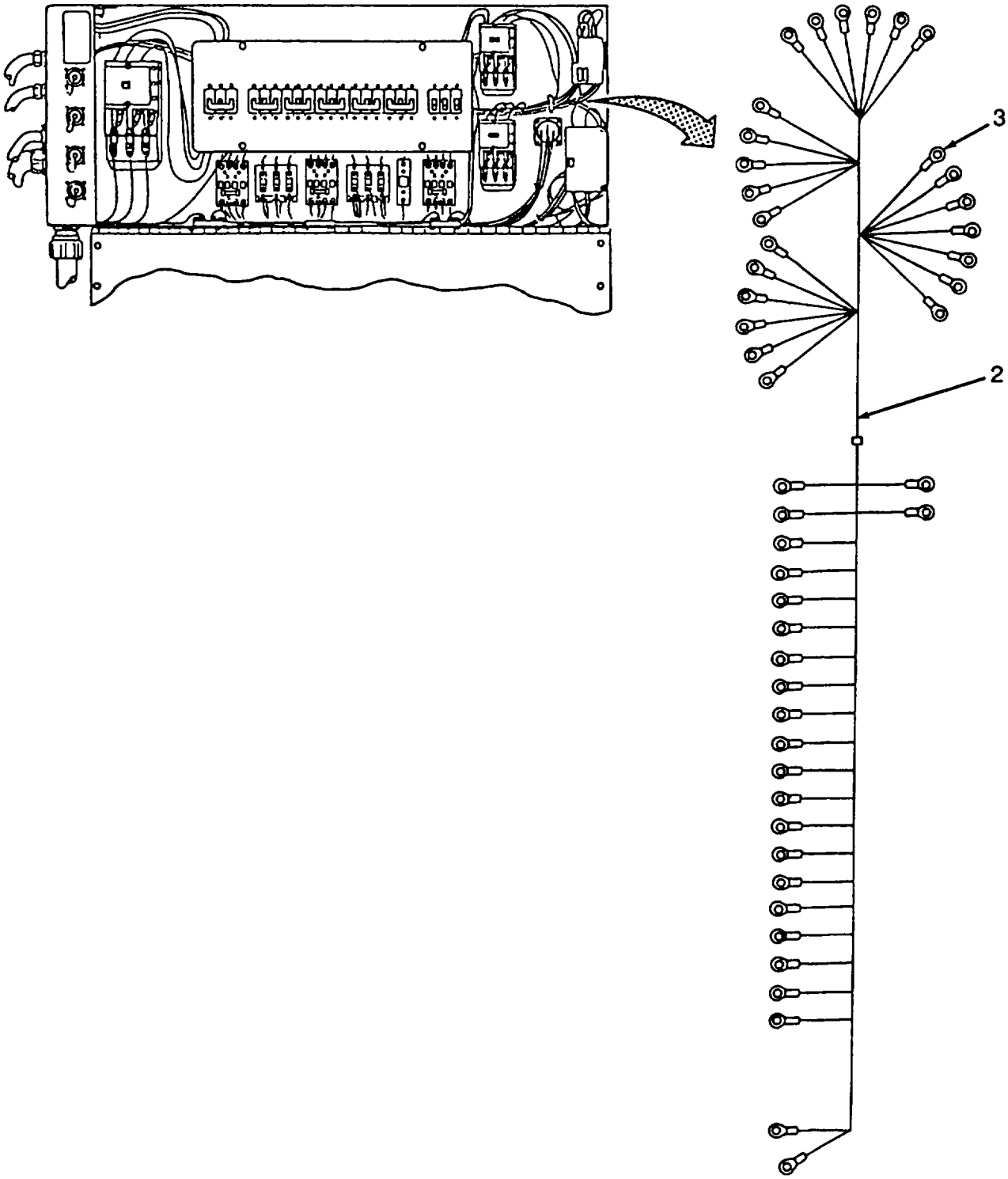
ASSEMBLY

For assembly procedures, refer to paragraph 16

INSTALLATION

For installation procedures, refer to paragraph 3-46

3-48. WIRING HARNESS W54 MAINTENANCE - continued.



Section XI. JUNCTION BOX ASSEMBLY MAINTENANCE PROCEDURES

3-49. JUNCTION BOX ASSEMBLY MAINTENANCE.

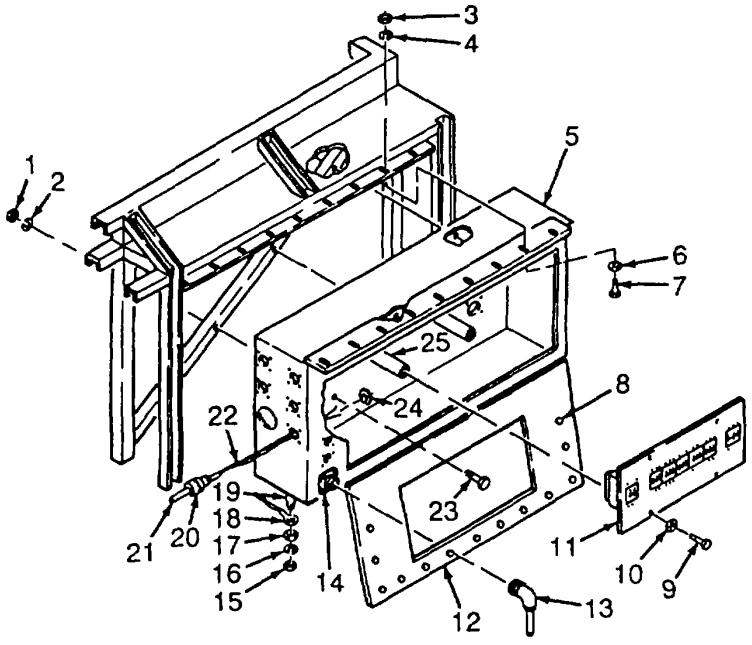
This task consists of.
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Repair
f. Assembly
g. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Materials/Parts Required
Detergent (Appendix C, Section II, Item 10).
Rags, wiping (Appendix C, Section II, Item 23).
Lockwasher - MS35338141
Lockwashers - (50) - MS35338-136
Personnel Required
Three (3)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Power shut down (power source manual).
General Safety Instructions

WARNING

- High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.
- Lifting heavy/difficult to handle equipment incorrectly can cause serious injury.



3-278

3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

REMOVAL

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

a. Turn 13 rotary fasteners (8) and lower junction box cover (12).

NOTE

- Tag all wires before removal.
- There are six electrical cables connected to terminals in the junction box assembly. All are removed the same One is shown.

b. Tag and disconnect wires (22) from inside junction box (5).

c. Loosen nut (20) and remove locknut (24).

d. Remove electrical cable (21) from junction box assembly (5). Refer to paragraph 3-47.

NOTE

There are seven cables with connectors which attach to receptacles mounted on the junction box assembly. All are removed the same. One is shown.

e. Remove cable connector (13) from receptacle (14).

f. Remove nut (15), lockwasher (16), flat washer (17), and wire lug (18) from ground stud (19).

g. Remove four screws (9) and flat washers (10) from standoff (25).

h. Tilt circuit breaker plate (11) forward to access mounting hardware.

i. Remove three nuts (1), lockwashers (2), and screws (23).

j. Position circuit breaker plate (11) on standoffs (25) and install four screws (9) and flat washers (10).

k. Close junction box cover (12) and turn 13 rotary fasteners (8).

WARNING

The junction box assembly is heavy/difficult to handle. Three people are needed to support/lift it to prevent personal injury or damage to the equipment.

l. Support junction box assembly (5) and remove nine nuts (3), lockwashers (4), flatwashers (6) and screws (7).

m. Remove junction box assembly (5)

3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

DISASSEMBLY

Circuit Breakers and Circuit Breaker Plate.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

a. Turn 13 rotary fasteners (1) and open junction box cover (2).

b. Remove four screws (5) and flat washers (6) from standoffs (16).

c. Tilt circuit breaker plate (4) forward to reach wires and attaching hardware.

NOTE

- Tag all wires before removal.
- To remove circuit breaker plate, remove all circuit breakers
- To remove CB1 or CB2, go to step d.
- To remove CB3, CB4, CB5 or CB6, go to step e.
- To remove CB7, CB8 or CB9, go to step f.

d. Tag nine wires and remove six nuts (13), twelve flat washers (14), nine wire lugs (15), and two spade connected wires (12). Go to step g.

e. Tag nine wires and remove six nuts (13), twelve flat washers (14), and nine wire lugs (15). Go to step g.

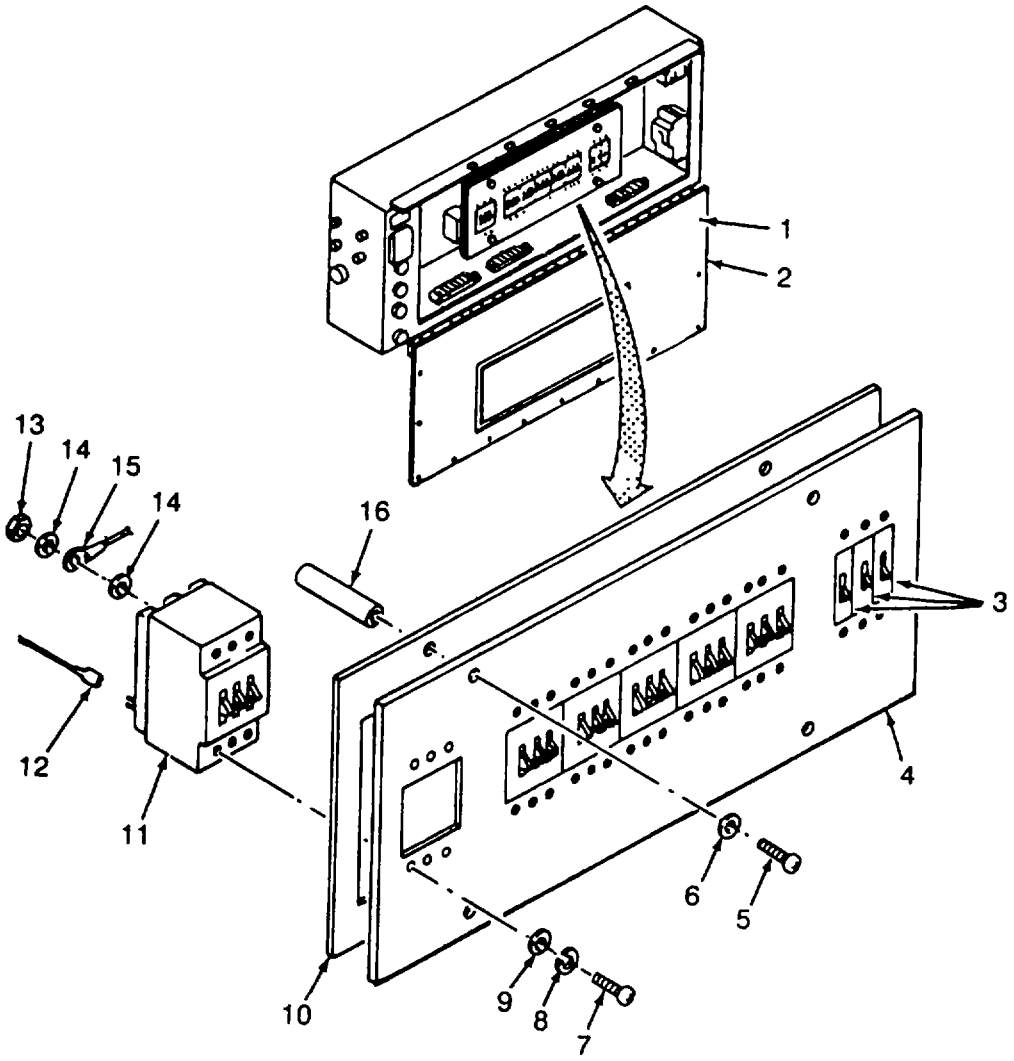
f. Remove two nuts (13), four flat washers (14), and two wire lugs (15) Go to step h.

g. Remove six screws (7), lockwashers (8), flat washers (9), and circuit breaker (11). Discard lockwashers This completes removal of circuit breaker

h. Remove two screws (7), lockwashers (8), flat washers (9), and circuit breaker (3). Discard lockwashers This complete removal of circuit breaker

i. Remove circuit breaker plate (4) and insulating plate (10).

3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.



3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

CONTROL RELAY

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

NOTE

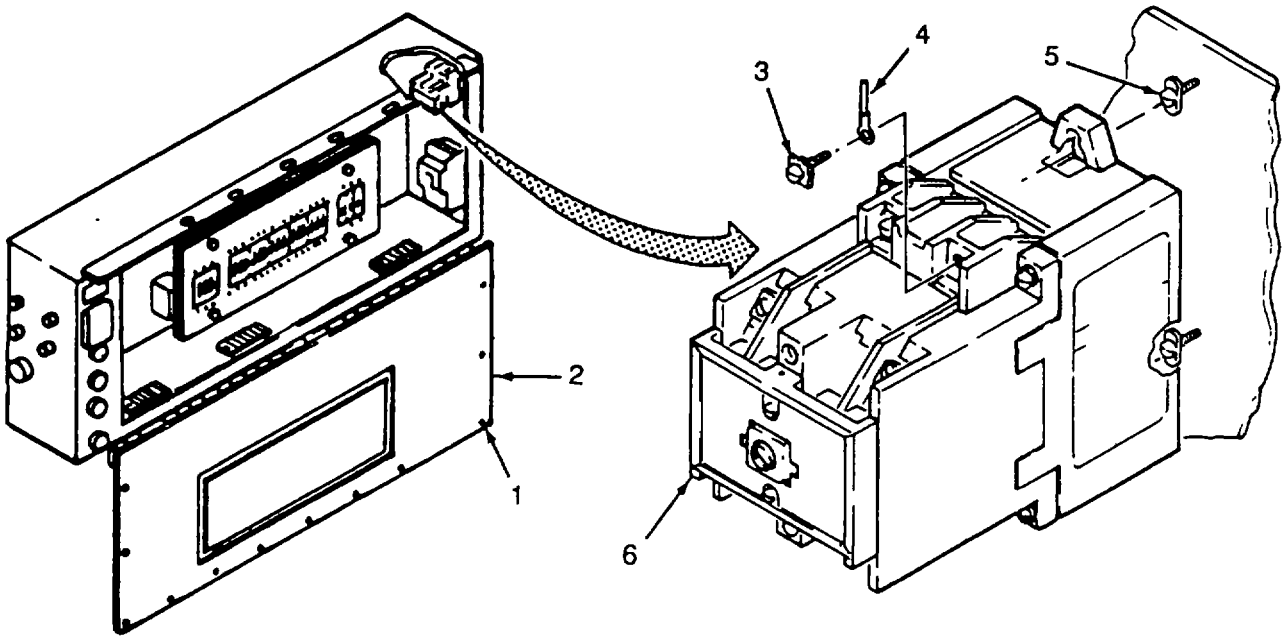
There are two control relays in the electrical junction box assembly. Both are removed and installed the same. One is shown.

NOTE

Tag all wires before removal.

a Remove six screws (3) and eight wires (4) from control relay (6).

b. Loosen two screws (5) and lift up and remove control relay (6).



3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

UTILITY RECEPTACLE

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

a. Remove two nuts (6), lockwashers (5), and screws (4). Discard lockwashers.

b. Remove utility receptacle cover (16) and gasket (15) from electrical junction box assembly (13).

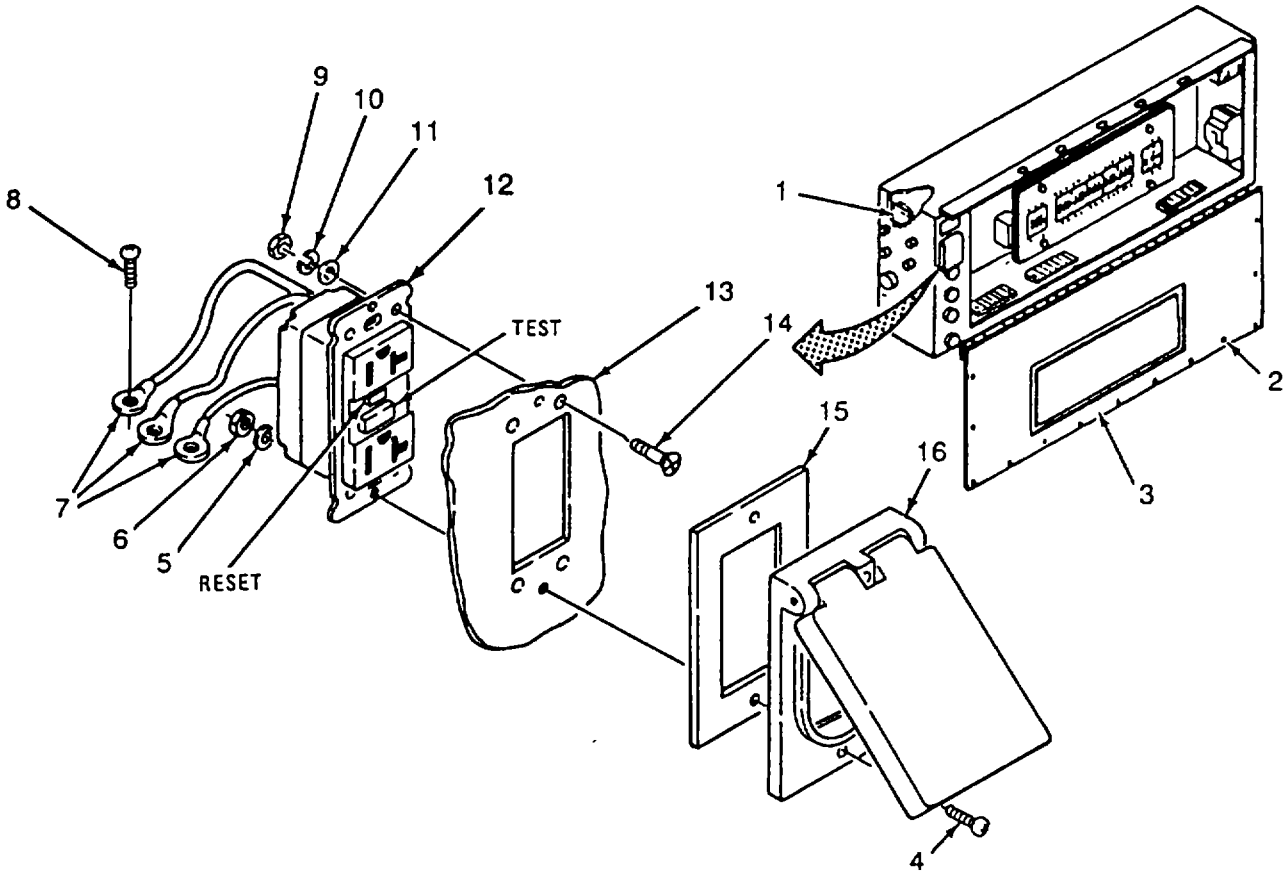
c. Remove four nuts (9), lockwashers (10), flat washers (11), and screws (14). Discard lockwashers.

NOTE

Tag wires before removal.

d. At back of utility receptacle (12), remove three screws (8) and three wires (7) from terminal board (1).

e. Remove utility receptacle (8).



3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

MOTOR STARTER

Remove motor starters. Refer to paragraph 3-59.

TERMINAL BOARDS

Remove terminal boards Refer to paragraph 3-43.

WIRING HARNESSES

Remove wiring harnesses, wire leads and receptacle connectors. Refer to paragraph 3-46.

CLEANING

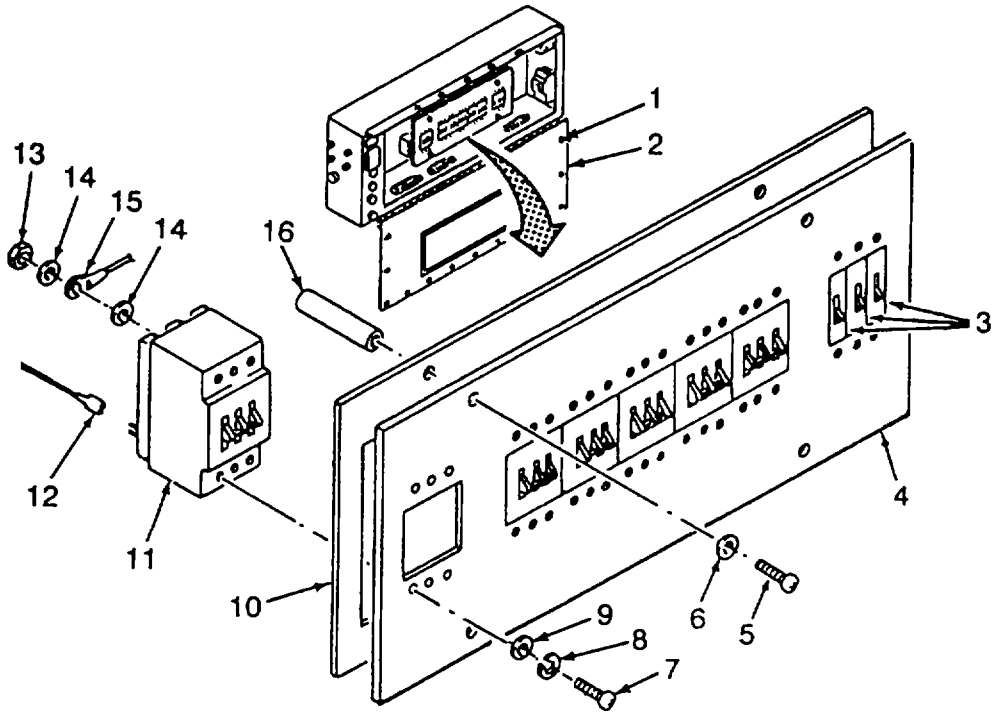
Using soap solution, clean electrical junction box assembly. Wipe dry with clean cloth.

INSPECTION

a. Inspect electrical junction box assembly and junction box cover for dents, cracks, and excessive corrosion Repair or replace as required. To replace junction box cover, refer to paragraph 2-84. To repair junction box cover, refer to paragraph 2-84.

b. Inspect cover gasket for cracks, deterioration, and general service ability.

REPAIR



3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

ASSEMBLY

CIRCUIT BREAKERS AND CIRCUIT BREAKER PLATE.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

NOTE

- For installation of circuit breaker, go to step b.
- For installation of circuit breaker plate, go to step a.

a. Position insulating plate (10) on circuit breaker plate (4).

NOTE

- For installation of circuit breaker plate, install all circuit breakers.
- To install CB7, CB8 or CB9, go to step b.
- To install CB3, CB4, CB5 or CB6, go to step c.
- To install CB1 or CB2, go to step d.

b. Position circuit breaker (3). Install two screws (7), new lockwashers (8), and flat washers (9). Go to step e.

c. Position circuit breaker (11). Install six screws (7), new lockwashers (8), and flat washers (9). Go to step f.

d. Position circuit breaker (11). Install six screws (7), new lockwashers (8), and flat washers (9). Go to step g.

e Install two wire lugs (15) as tagged, two nuts (13), and four flat washes (14). Go to step h.

f. Install nine wire lugs (15) as tagged, twelve flat washers (14), and six nuts (13). Go to step h.

g. Install twelve flat washers (14), nine wire lugs (15) as tagged, six nuts (13), and two spade connected wires (12) as tagged. Go to step h.

h. Position circuit breaker plate (4) flush with four standoffs (16) Install four screws (5) and flat washers (1).

i. Position all circuit breakers to OFF.

3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

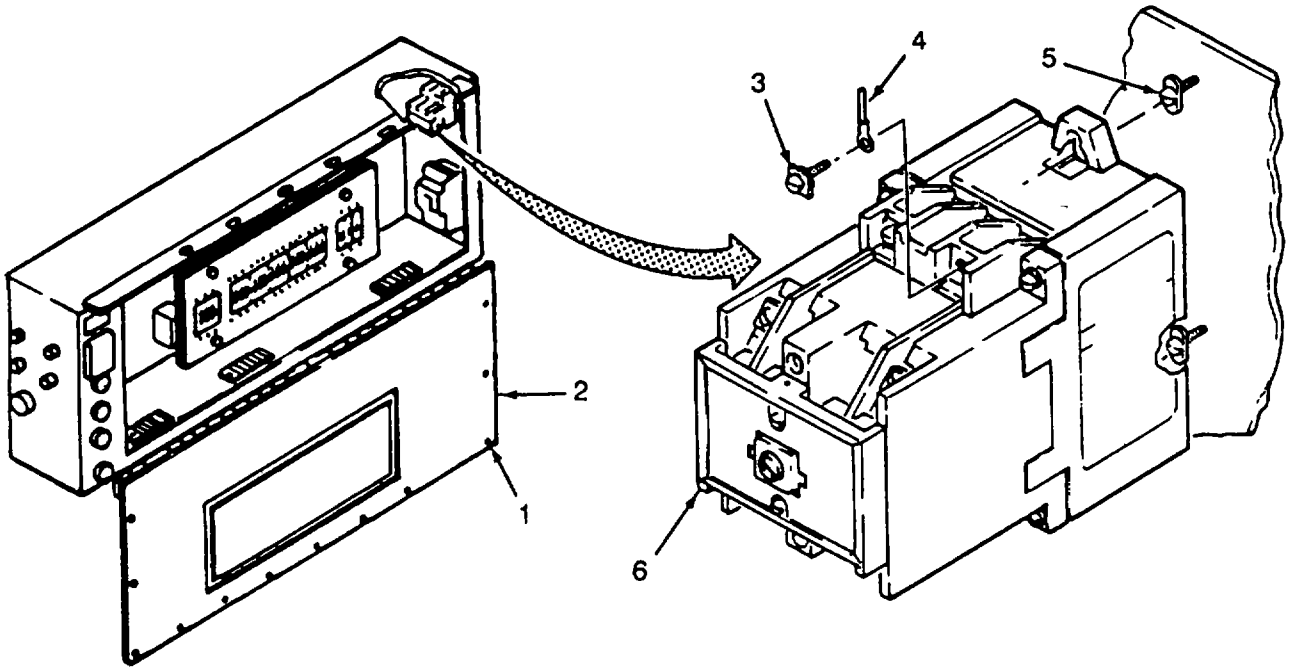
NOTE

There are two control relays in the electrical junction box assembly. Both are removed and installed the same. One is shown.

CONTROL RELAY

a. Position control relay (6) and tighten two screws (5).

b. Position eight wires (4) as tagged and install six screws (3).



3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

WARNING

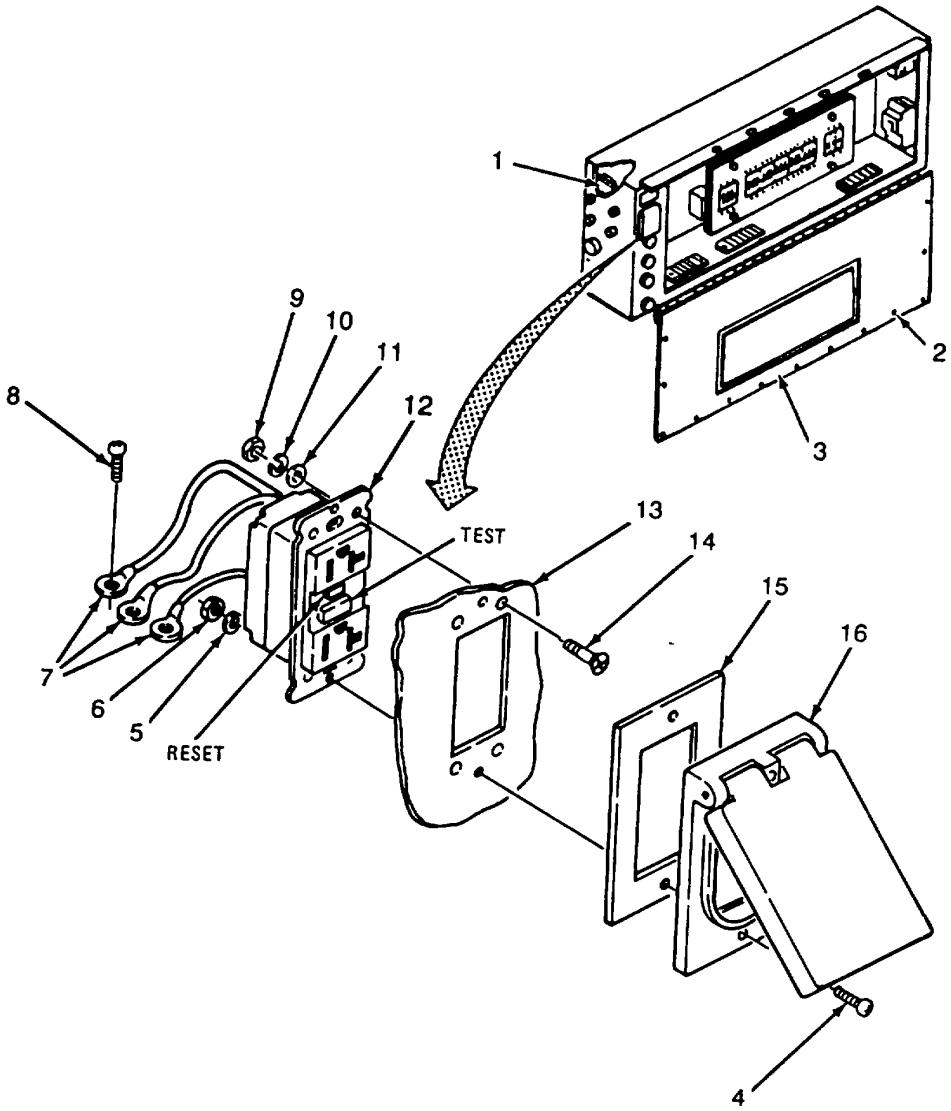
High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

UTILITY RECEPTACLE

a. Install three wires (7) and screws (8) and terminal board (1) as tagged.

b. Position utility receptacle (12) and install four screws (14), flat washers (11), new lockwashers (10), and nuts (9).

c. Position gasket (15) and utility receptacle cover (16) on electrical junction box assembly.



3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

MOTOR STARTERS

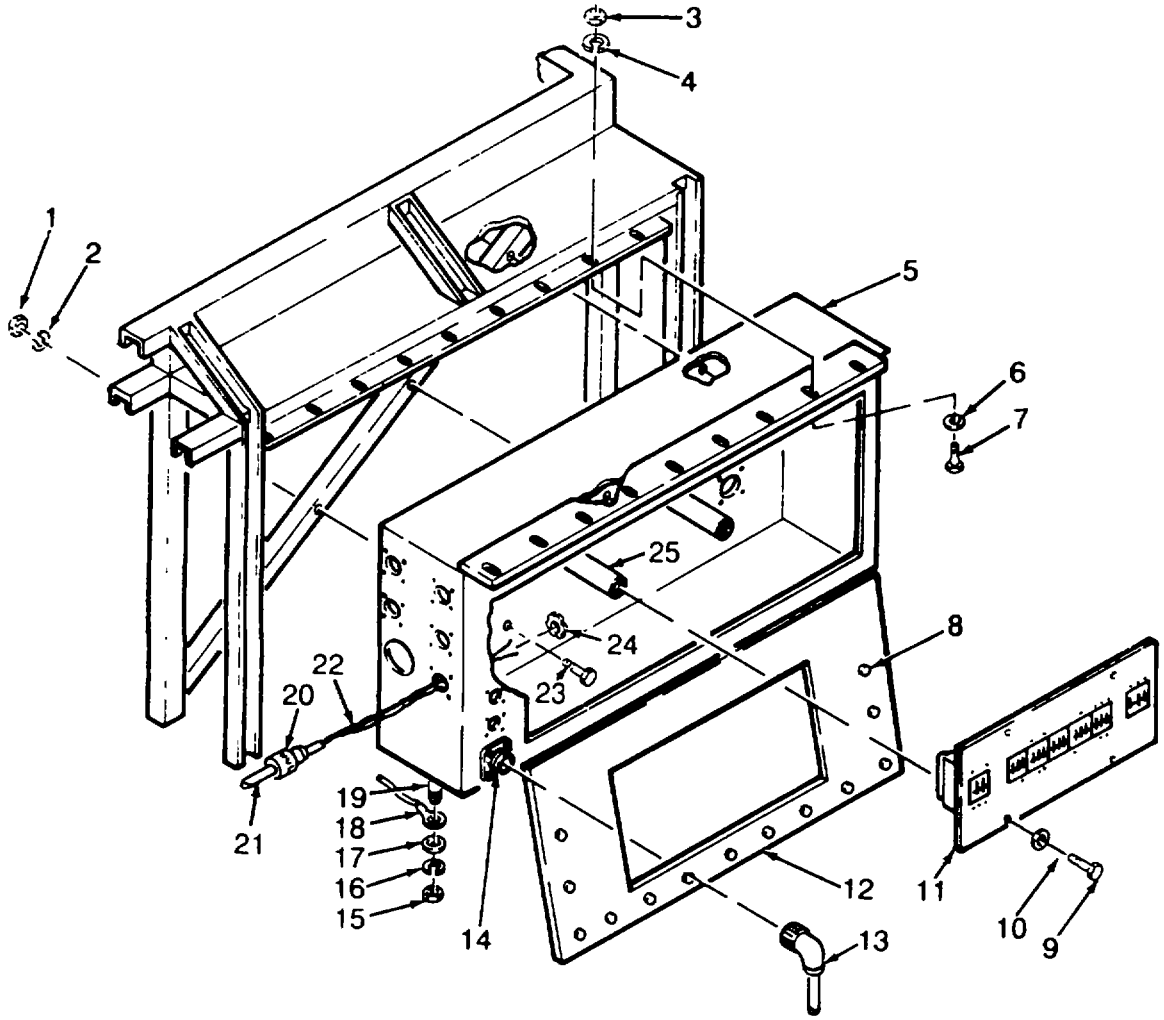
Install motor starters. Refer to paragraph 3-59.

TERMINAL BOARDS

Install terminal boards. Refer to paragraph 3-45.

WIRING HARNESSES

Install wiring harnesses, wire leads and receptacle connectors. Refer to paragraph 3-46.



3-49. JUNCTION BOX ASSEMBLY MAINTENANCE - continued.

INSTALLATION

WARNING

- High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.
- he junction box assembly is heavy/difficult to handle. Three people are needed to lift it to prevent personal injury or damage to the equipment.

a. Support junction box assembly (5) and install nine screws (7), new lockwashers (4), flatwashers (6) and nuts (3). Do not tighten screws.

b. Remove four screws (9) and flat washers (10) and tilt circuit breaker plate (11) forward.

c. Aline junction box and install three screws (23), new lockwashers (2), and nuts (1).

d. Tighten 12 screws (23) and (7).

e. Position circuit breaker plate (11) on four standoffs (25) and install four screws (9) and flat washers (10).

NOTE

There are seven cables with connectors which attach to receptacles mounted on the junction box assembly. All are installed the same One is shown.

f. Install cable connector (13) on receptacle (14).

NOTE

There are six electrical cables connected to terminals in the junction box assembly. All are installed the same. One is shown.

g. Route cable (21) through junction box (5) and install locknut (24).

h. Connect wires (22) as tagged and tighten nut (20) Remove tags.

i. Close junction box cover (12) and turn 13 rotary fasteners (8) to secure.

j. Install wire lug (18), flat washer (17), new lockwasher (16), and nut (15) on ground stud (19).

3-50. WIRING HARNESS W3 MAINTENANCE.

This task consists of:
a. Removal
b. Inspection
c. Test
d. Disassembly
e. Assembly
f. Installation

INITIAL SET-UP.

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3).
Electrical Repair Kit (Appendix B, Section III, Item 3).
Crimping Tool (Appendix B, Section III, Item 3).
Wire Stripper (Appendix B, Section III, Item 3).
Material/Parts Required
Tape, Electrical (Appendix C, Section II, Item 31).
Solder (Appendix C, Section II Item 27).
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).

REMOVAL

For removal procedures, refer to paragraph 3-46.

INSPECTION

For inspection procedures, refer to paragraph 3-46.

TEST

For test procedures, refer to paragraph 3-46.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-46.

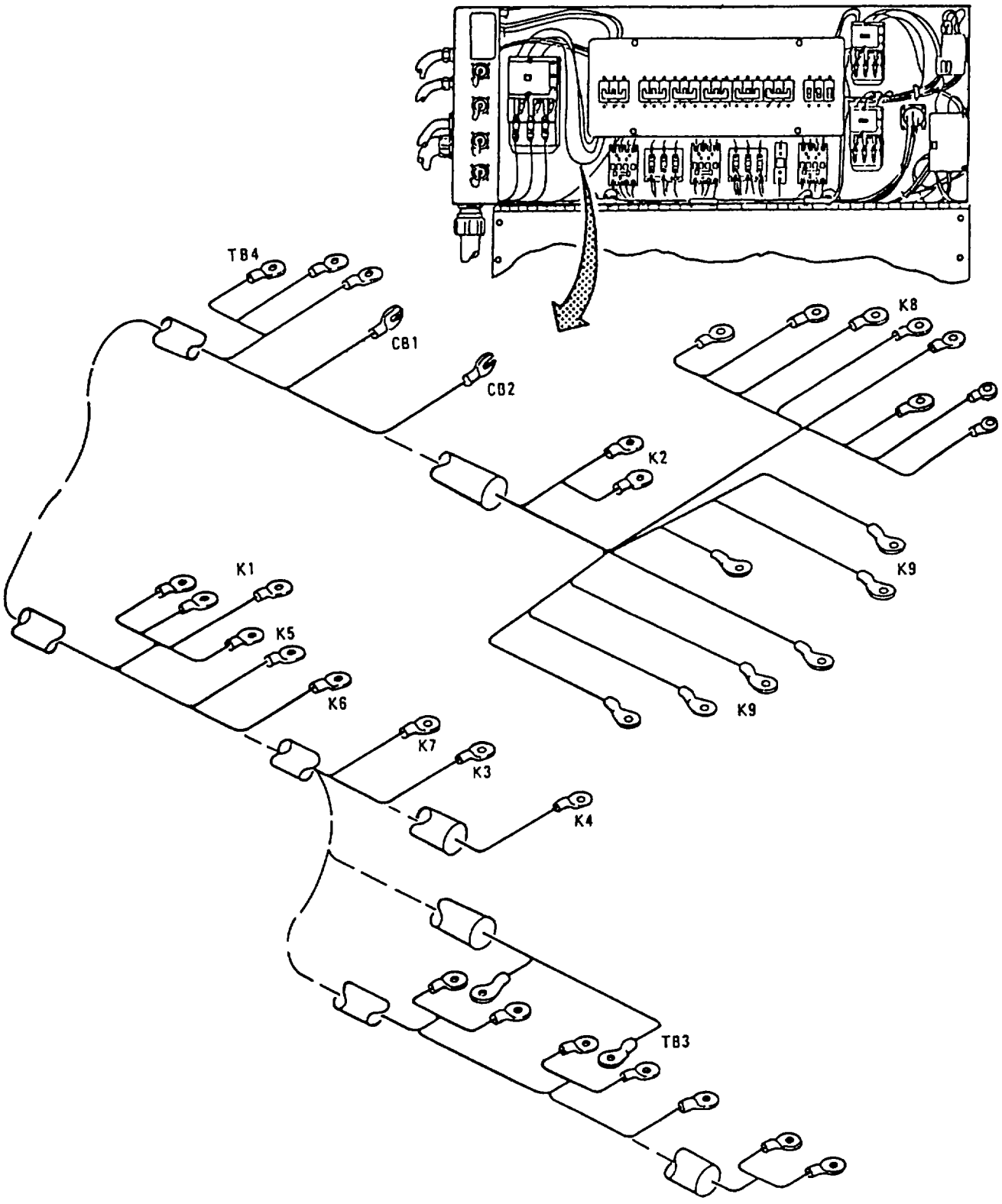
ASSEMBLY

For assembly procedures, refer to paragraph 3-46.

INSTALLATION

For installation procedures, refer to paragraph 3-46.

3-50. WIRING HARNESS W3 MAINTENANCE - continued.



3-51. WIRING HARNESS W4 (CONTROL BOX) MAINTENANCE.

This task consists of:
a. Removal
b. Inspection
c. Test
d. Disassembly
e. Assembly
f. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section III, Item 3).
- Multimeter (Appendix B, Section III, Item 3).
- Electrical Repair Kit (Appendix B, Section III, Item 3).
- Crimping Tool (Appendix B, Section III, Item 3)
- Wire Stripper (Appendix B, Section III, Item 3).

Material/Parts Required
- Tape, Electrical (Appendix C, Section II, Item 31).
- Solder (Appendix C, Section II Item 27)

Equipment Condition
Reference
- ROWPU shutdown (TM 10-4610-240-10).

REMOVAL

For removal procedures, refer to paragraph 3-46.

INSPECTION

For inspection procedures, refer to paragraph 3-46.

TEST

For test procedures, refer to paragraph 3-46.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-46.

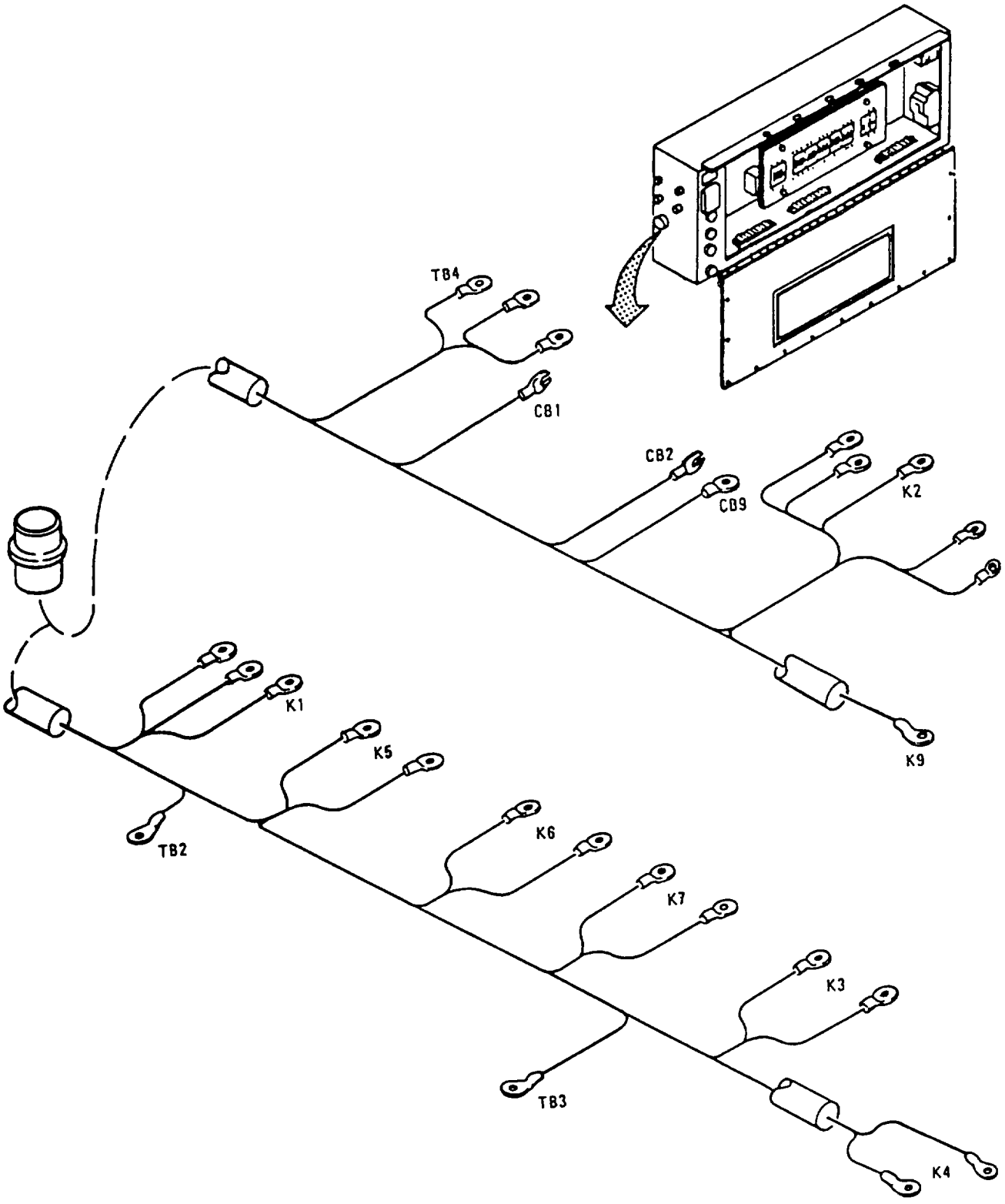
ASSEMBLY

For assembly procedures, refer to paragraph 3-46.

INSTALLATION

For installation procedures, refer to paragraph 3-46.

3-51. WIRING HARNESS W4 (CONTROL BOX) MAINTENANCE - continued



3-52. WIRING HARNESS W5 (GENERATOR) MAINTENANCE (MODEL WPES-1).

This task consists of:
a. Removal
b. Inspection
c. Test
d. Disassembly
e. Assembly
f. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section III, Item 3).
- Multimeter (Appendix B, Section III, Item 3).
- Electrical Repair Kit (Appendix B, Section III, Item 3).
- Crimping Tool (Appendix B, Section III, Item 3).
- Wire Stripper (Appendix B, Section III, Item 3).

Material/Parts Required
- Tape Electrical (Appendix C, Section II, Item 31).
- Solder (Appendix C, Section II Item 27).

Equipment Condition

Reference
- ROWPU shutdown (TM 104610-240-10).

REMOVAL

For removal procedures, refer to paragraph 3-46.

INSPECTION

For inspection procedures, refer to paragraph 3-46.

TEST

For test procedures, refer to paragraph 3-46.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-46.

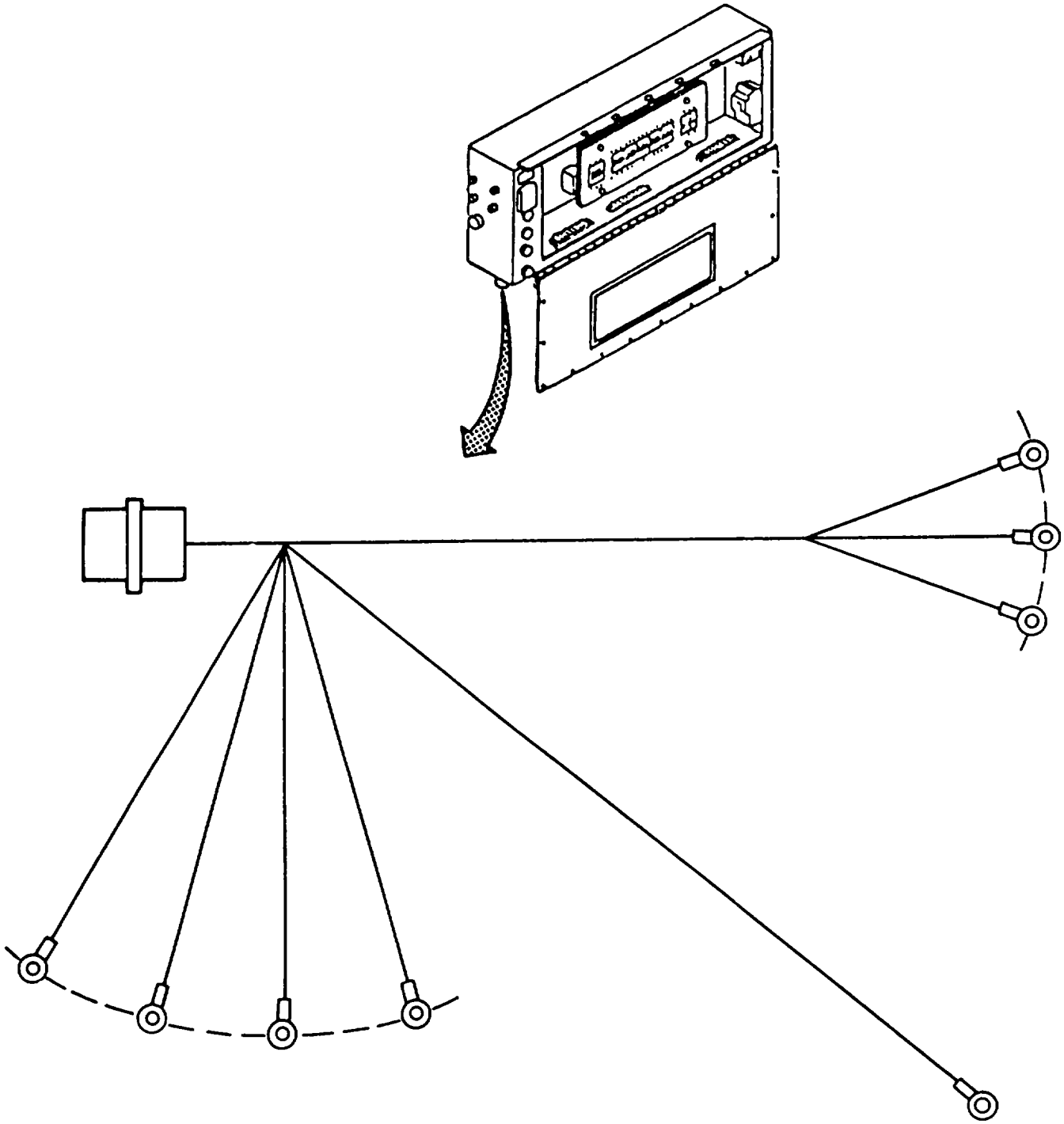
ASSEMBLY

For assembly procedures, refer to paragraph 3-46.

INSTALLATION

For installation procedures, refer to paragraph 3-46.

3-52. WIRING HARNESS W5 (GENERATOR) MAINTENANCE (MODEL - WPES-1) - continued.



3-53. WIRING HARNESS W6 (BACKWASH PUMP) MAINTENANCE.

This task consists of:
a. Removal
b. Inspection
c. Test
d. Disassembly
e. Assembly
f. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section III, Item 3).
- Multimeter (Appendix B, Section III, Item 3)
- Electrical Repair Kit (Appendix B, Section III, Item 3).
- Crimping Tool (Appendix B, Section III, Item 3)
- Wire Stripper (Appendix B, Section III, Item 3).

Material/Parts
- Tape Electrical (Appendix C, Section II, Item 31)
- Solder (Appendix C, Section II Item 27)

Equipment Condition
Reference
- Power shutdown (power source manual).
- ROWPU shutdown (TM 104610-240-10).

REMOVAL

For removal procedures, refer to paragraph 3-46.

INSPECTION

For inspection procedures, refer to paragraph 3-46.

TEST

For test procedures, refer to paragraph 3-46.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-46.

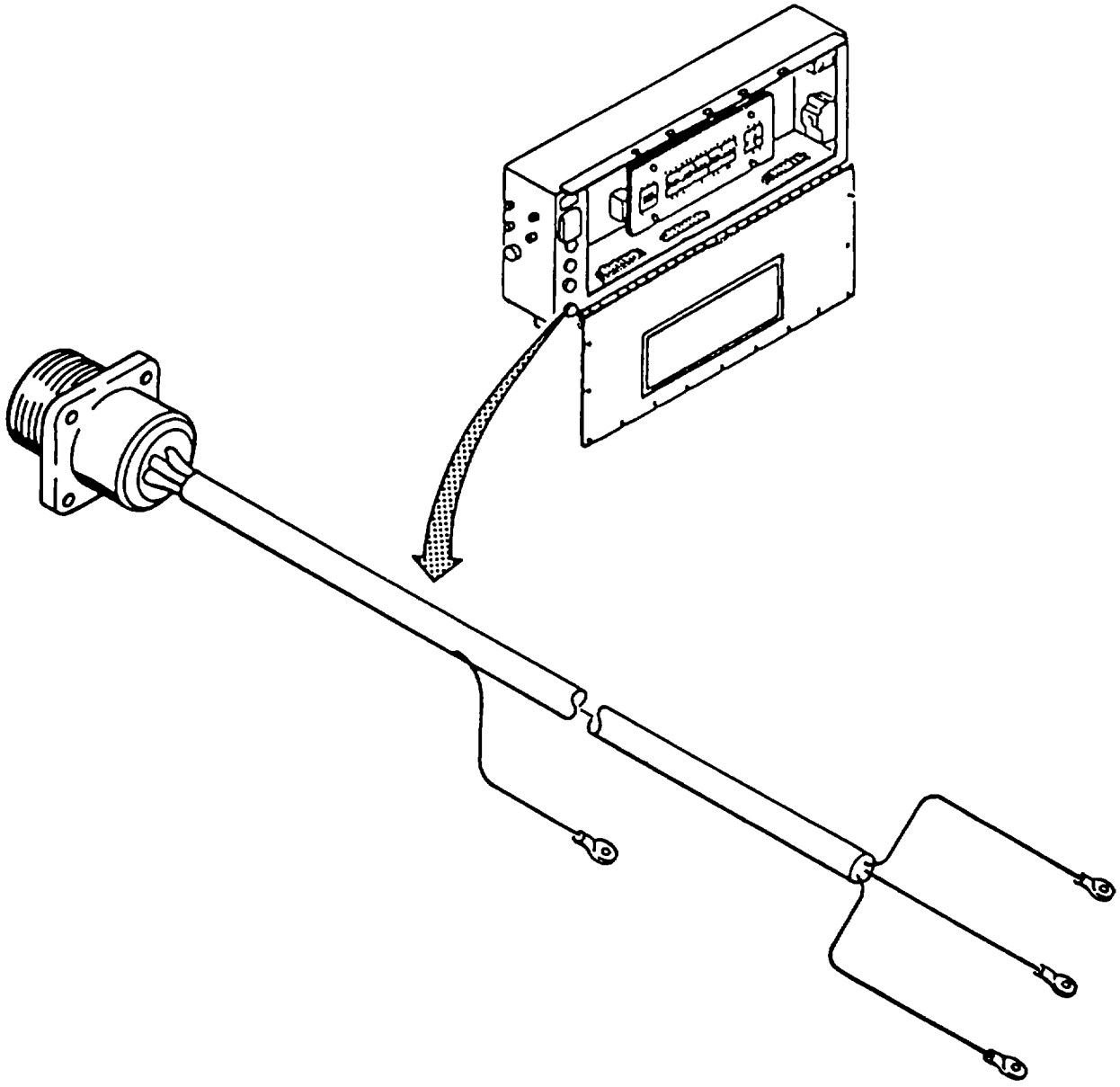
ASSEMBLY

For assembly procedures, refer to paragraph 3-46.

INSTALLATION

For installation procedures, refer to paragraph 3-46.

3-53. WIRING HARNESS W6 (BACKWASH PUMP) MAINTENANCE - continued.



3-54. WIRING HARNESS W7 (RAW WATER PUMP NO.1) MAINTENANCE.

This task consists of:
a. Removal
b. Inspection
c. Test
d. Disassembly
e. Assembly
f. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section [II, Item 3).
- Multimeter (Appendix B, Section III, Item 3).
- Electrical Repair Kit (Appendix B, Section III, Item 3)
- Crimping Tool (Appendix B, Section III, Item 3).
- Wire Stripper (Appendix B, Section III, Item 3).

Material/Parts
- Tape Electrical (Appendix C, Section II, Item 31).
- Solder (Appendix C, Section II Item 27).

Equipment Condition
- ROWPU shutdown (TM 104610-240-10).

REMOVAL

For removal procedures, refer to paragraph 3-46.

INSPECTION

For inspection procedures, refer to paragraph 3-46.

TEST

For test procedures, refer to paragraph 3-46.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-46.

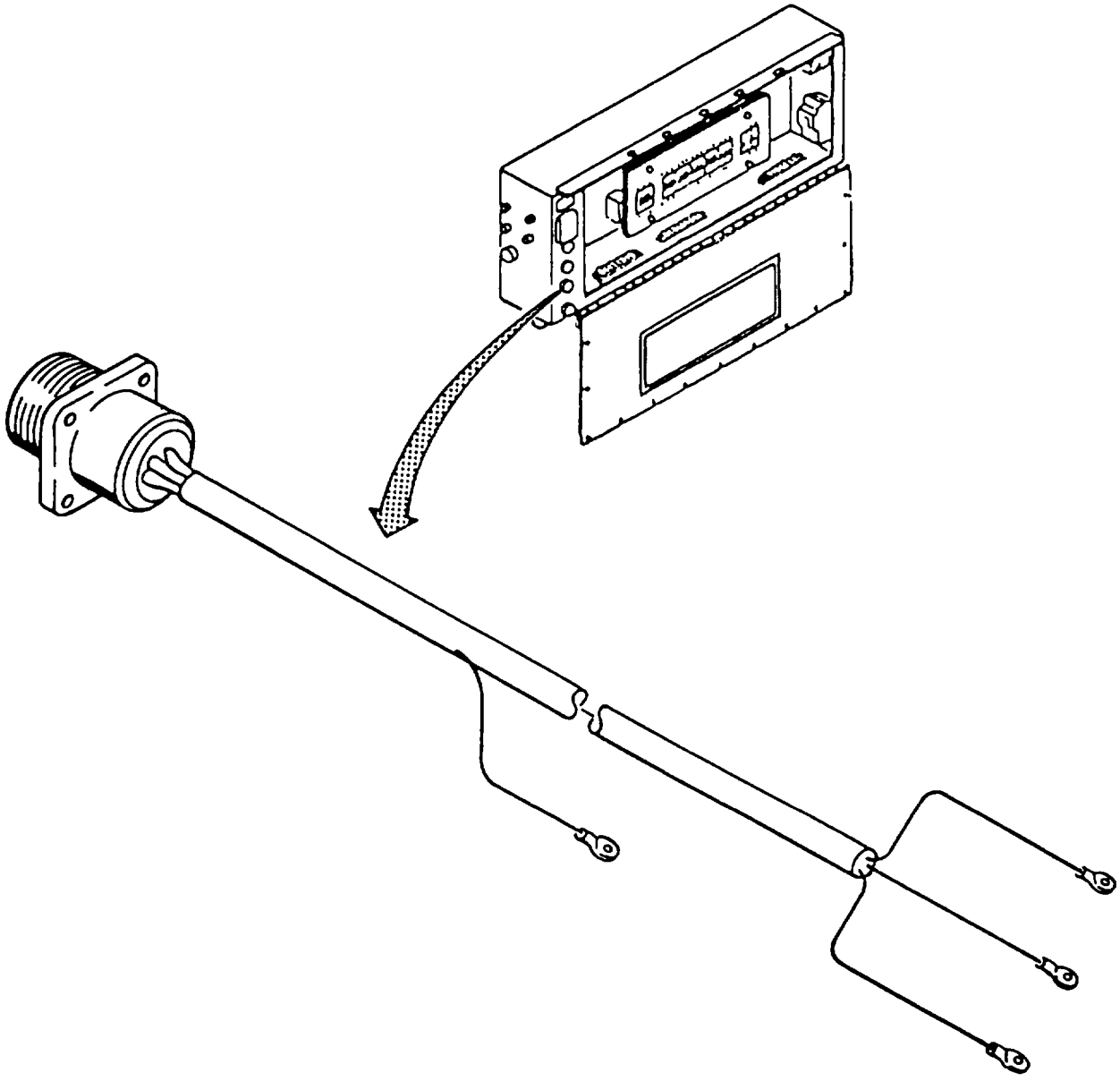
ASSEMBLY

For assembly procedures, refer to paragraph 3-46.

INSTALLATION

For installation procedures, refer to paragraph 3-46.

3-54. WIRING HARNESS W7 (RAW WATER PUMP NO. 1) MAINTENANCE - continued.



3-55. WIRING HARNESS WS(RAW WATER PUMP NO. 2) MAINTENANCE.

This task consists of: a. Removal b. Inspection c. Test d. Disassembly e. Assembly f. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Soldering Gun Kit (Appendix B, Section III, Item 3)
- Multimeter (Appendix B, Section III, Item 3).
- Electrical Repair Kit (Appendix B, Section III, Item 3).
- Crimping Tool (Appendix B, Section III, Item 3)
- Wire Stripper (Appendix B, Section III, Item 3).

Material/Parts Required
- Tape Electrical (Appendix C, Section II, Item 31)
- Solder (Appendix C, Section II Item 27).

Equipment Condition

Reference
- ROWPU shutdown (TM 104610-240-10).

REMOVAL

For removal procedures, refer to paragraph 3-46.

INSPECTION

For inspection procedures, refer to paragraph 3-46.

TEST

For test procedures, refer to paragraph 3-46.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-46.

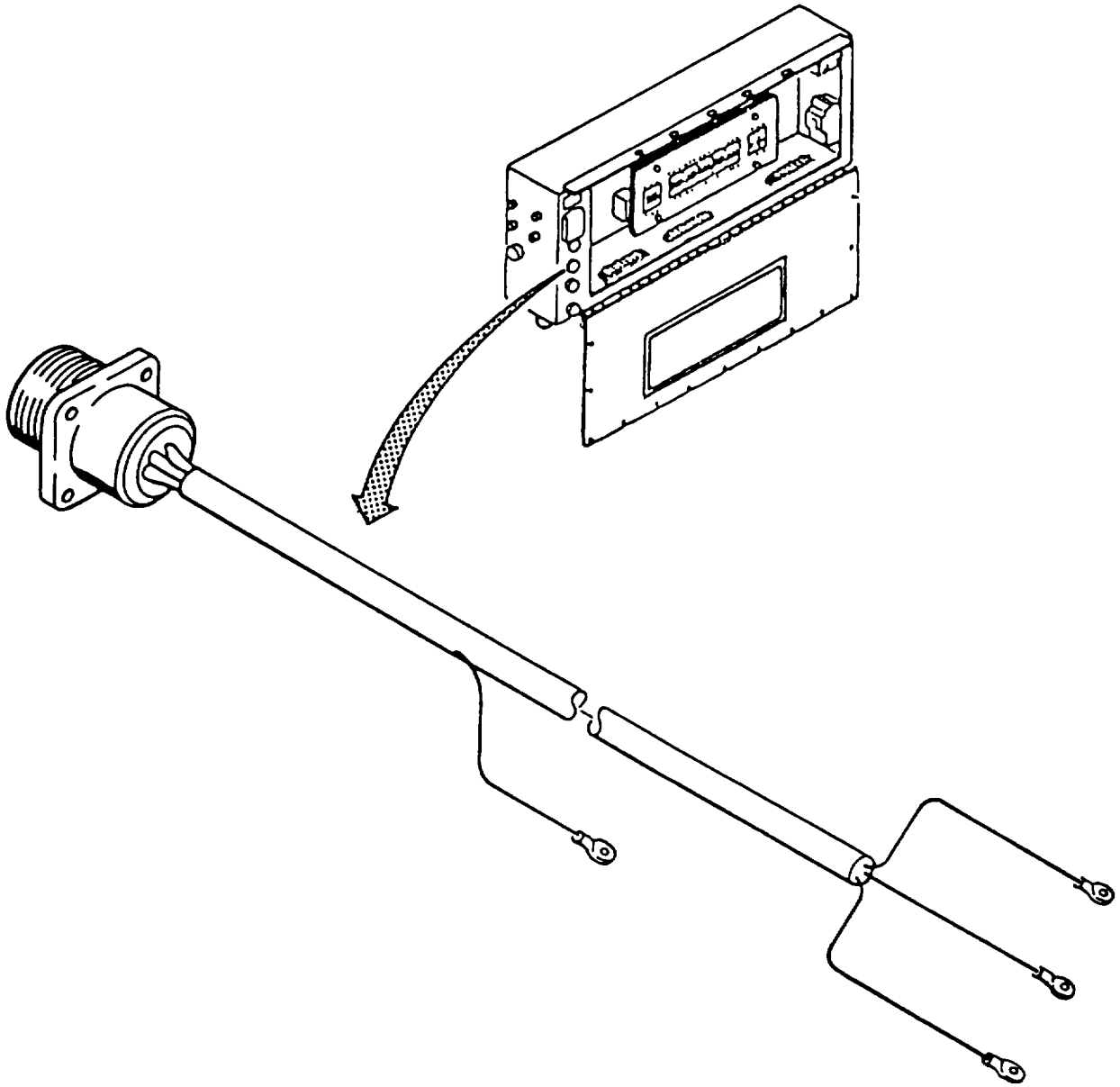
ASSEMBLY

For assembly procedures, refer to paragraph 3-46.

INSTALLATION

For installation procedures, refer to paragraph 3-46.

3-55. WIRING HARNESS W8 (RAW WATER PUMP NO. 2 MAINTENANCE - continued.



3-56. WIRING HARNESS W9 (DISTRIBUTION PUMP) MAINTENANCE.

This task consists of:

a. Removal
b. Inspection
c. Test
d. Disassembly
e. Assembly
f. Installation

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3).
Electrical Repair Kit (Appendix B, Section III, Item 3).
Crimping Tool (Appendix B, section III, item 3).
Wire Stripper (Appendix B, Section III, Item 3).

Material/Parts

Tape Electrical (Appendix C, Section II, Item 31).
Solder (Appendix C, Section II Item 27).

Equipment Condition

ROWPU shutdown (TM 10-4610-240-10).

REMOVAL

For removal procedures, refer to paragraph 346.

INSPECTION

For inspection procedures, refer to paragraph 3-46.

TEST

For test procedures, refer to paragraph 3-46.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-46.

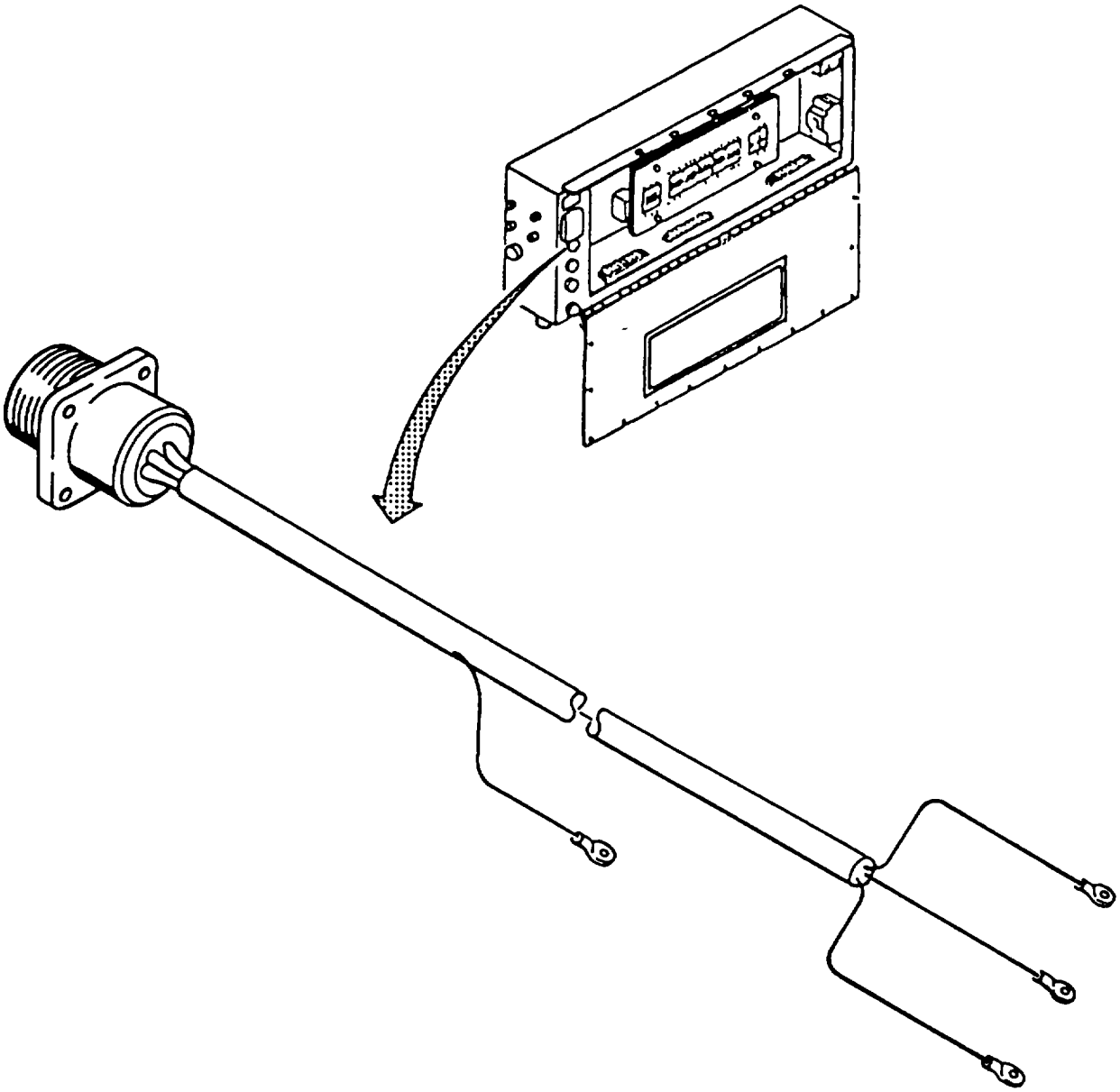
ASSEMBLY

For assembly procedures, refer to paragraph 3-46.

INSTALLATION

For installation procedures, refer to paragraph 3-46.

3-56. WIRING HARNESS W9 (DISTRIBUTION PUMP) MAINTENANCE - continued.



3-57. WIRING HARNESS W10 MAINTENANCE.

This task consists of:

a. Removal
b. Inspection
c. Test
d. Disassembly
e. Assembly
f. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Soldering Gun Kit (Appendix B, Section III, Item 3)
- Multimeter (Appendix B, Section III, Item 3)
- Electrical Repair Kit (Appendix B, Section III, Item 3).
- Crimping Tool (Appendix B, section III, Item 3)
- Wire Stripper (Appendix B, Section III, Item 3).

Material/Parts Required
- Tape Electrical (Appendix C, Section II, Item 31).
- Solder (Appendix C, Section II Item 27).

Equipment Condition
- Reference
- ROWPU shutdown (TM 10-4610-240-10).

REMOVAL

For removal procedures, refer to paragraph 3-46.

INSPECTION

For inspection procedures, refer to paragraph 3-46.

TEST

For test procedures, refer to paragraph 3-46.

DISASSEMBLY

For disassembly procedures, refer to paragraph 346.

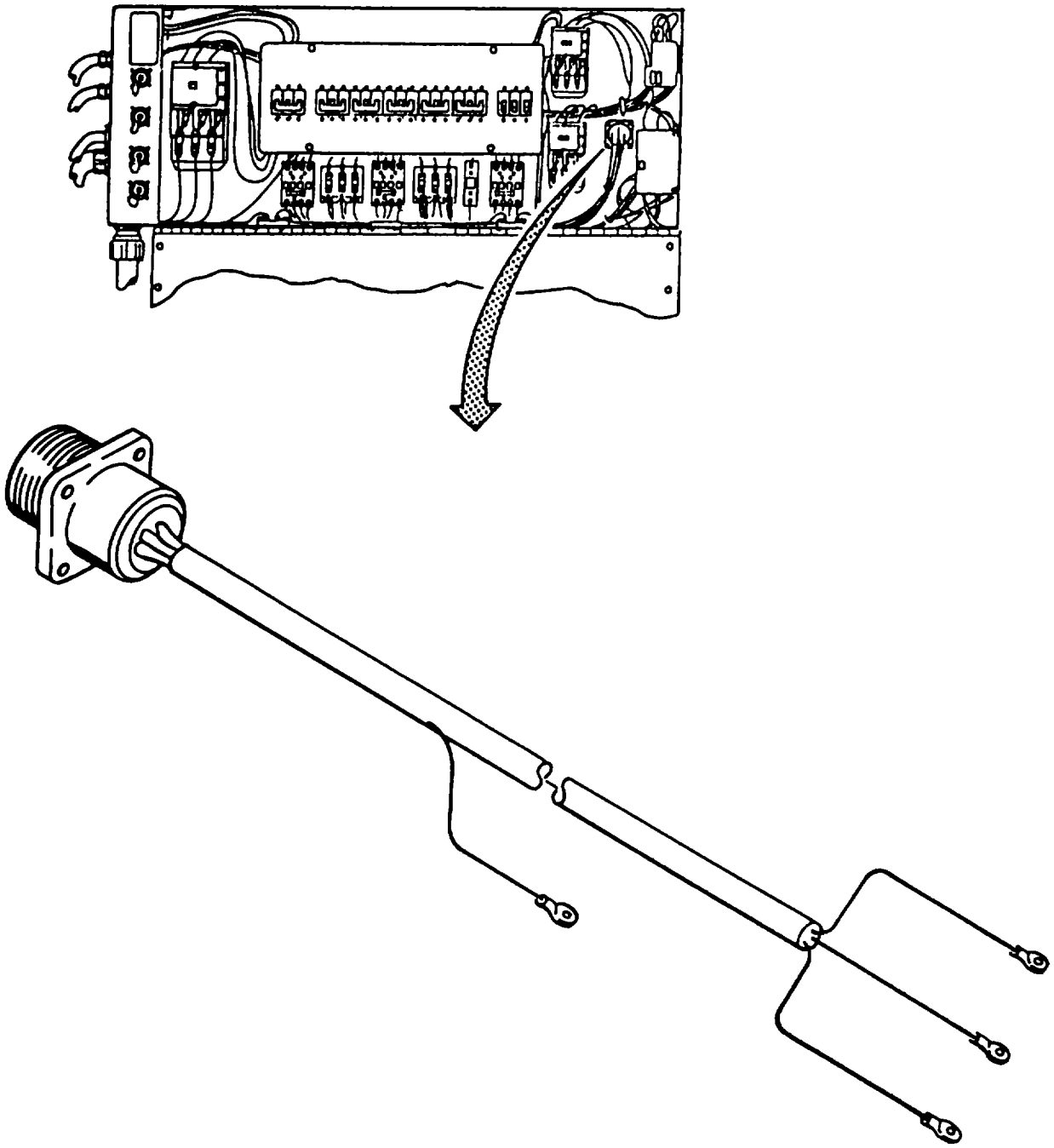
ASSEMBLY

For assembly procedures, refer to paragraph 3-46.

INSTALLATION

For installation procedures, refer to paragraph 3-46

3-57. WIRING HARNESS W10 MAINTENANCE -continued.



3-58. WIRING HARNESS W39 MAINTENANCE.

This task consists of:
a. Removal
b. Inspection
c. Test
d. Disassembly
e. Assembly
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3)
Multimeter (Appendix B, Section III, Item 3).
Electrical Repair Kit (Appendix B, Section III, Item 3).
Crimping Tool (Appendix B, Section III, Item 3).
Wire Stripper (Appendix B, Section III, Item 3).
Material/Parts Required
Tape Electrical (Appendix C, Section II, Item 31).
Solder (Appendix C, Section II Item 27).
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).

REMOVAL

For removal procedures, refer to paragraph 346.

INSPECTION

For inspection procedures, refer to paragraph 3-46.

TEST

For test procedures, refer to paragraph 3-46.

DISASSEMBLY

For disassembly procedures, refer to paragraph 346.

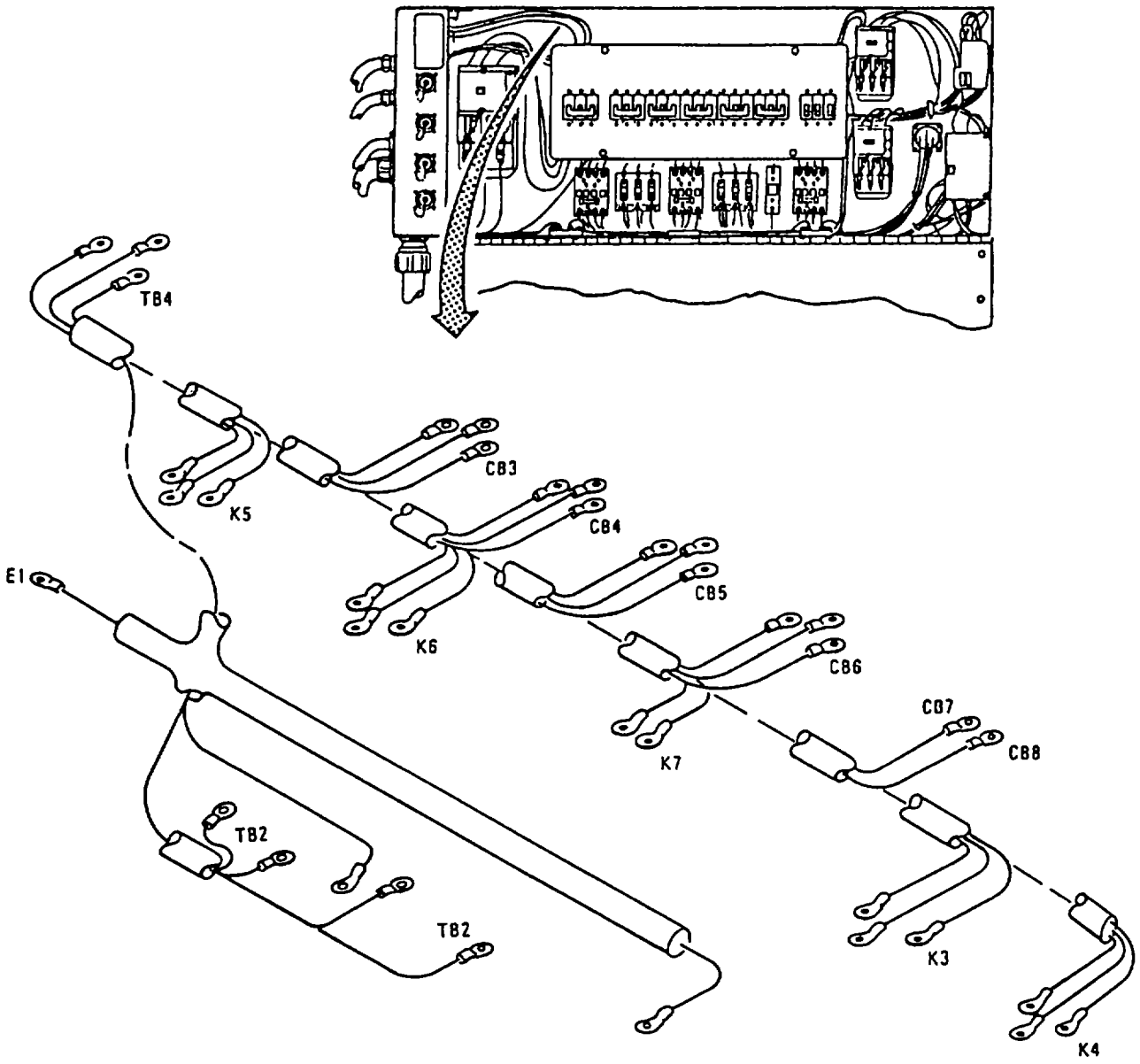
ASSEMBLY

For assembly procedures, refer to paragraph 3-46.

INSTALLATION

For installation procedures, refer to paragraph 3-46.

3-58. WIRING HARNESS W39 MAINTENANCE - continued.



3-59. MOTOR STARTERS.

This task consists of:

a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Assembly
f. Test
g. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3).
Multimeter (Appendix B, Section III, Item 3)
Electrical Repair Kit (Appendix B, Section III, Item 3).
Crimping Tool (Appendix B, Section III, Item 3).
Wire Stripper (Appendix B, Section III, Item 3)
Material/Parts
Solder (Appendix C, Section II, Item 27)
Solvent, drycleaning (Appendix C, Section II, Item 28).
Tape, Electrical (Appendix C, Section II, Item 31)
Lockwasher (A/R) - MS35338-139
Personnel Required
Two (2)
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
General Safety Instructions

WARNING

- High voltage can cause burns and electrical shock.
- Using drycleaning solvent incorrectly can cause injury or even death.
- Burned out overload relay may cause fire or electrical shock.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

REMOVAL

K1 and K2.

a. Turn 13 rotary fasteners (1) and lower junction box cover (2).

3-59. MOTOR STARTERS- continued.

NOTE

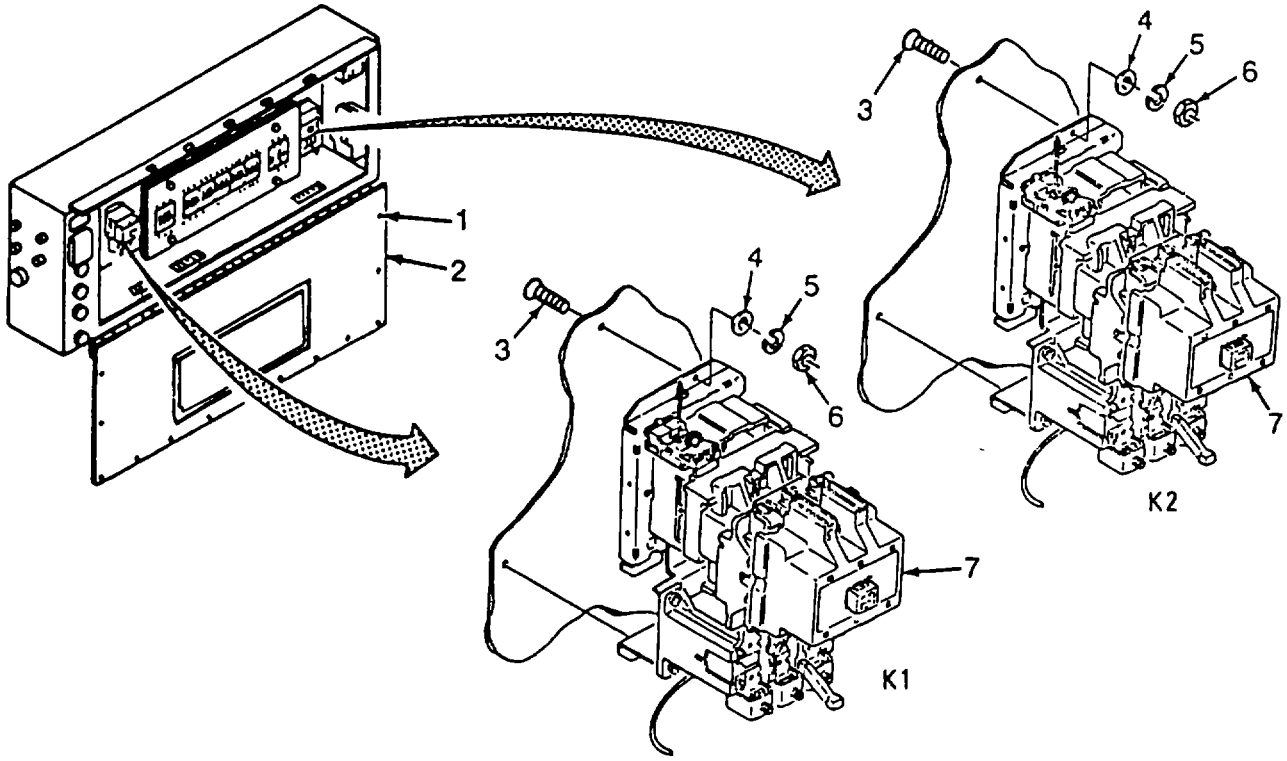
- Motor controllers K1 and K2 are removed and installed the same. One is shown.
- Tag all wires before removal.

b. Disconnect and remove 13 external wires from motor controller (7).

c. Remove three nuts (6), lockwashers (5), and flat washers (4) from three screws (7). Discard lockwashers.

d. Remove motor controller (7).

e. Remove screws (3).



3-59. MOTORSTARTERS- continued.

K3 thru K7.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

NOTE

- Motor controllers K3 thru K7 are removed the same. One is shown.
- To remove motor controllers K5 thru K7, remove circuit breaker plate. Refer to paragraph 3-51.
- Tag all external wires before removal.
- Motor controller K7 has seven external wires connected to upper base structure.

a. Remove nine screws (7) and external wires (6) from upper base structure (5).

b. Install nine screws (7) and jumper wires. Go to step e.

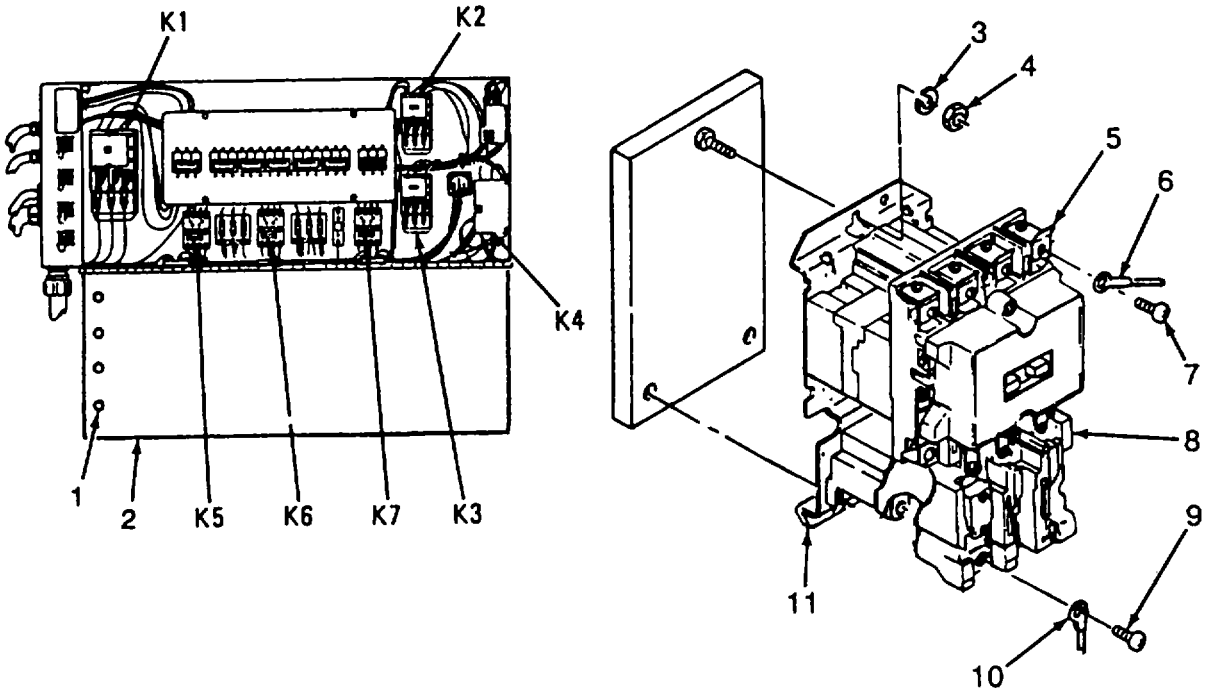
c. Remove seven screws (9) and external wires (10) from overload relay (8).

d. Install seven screws (9) and jumper wires. Go to step e.

e. Support motor controller, remove three nuts (4), and lockwashers (3). Discard lockwasher.

f. Remove motor controller (11).

3-59. MOTOR STARTERS- continued.



3-59. MOTOR STARTERS - continued.

DISASSEMBLY

K1 thru K7.

NOTE

Disassembly of CB K1 thru K7 is the same. One is shown, the other is similar.

Remove two screws (13) and heater (12) from overload relay (14).

ASSEMBLY

K1 thru K7.

NOTE

Assembly of CB K1 thru K7 is the same. One is shown, the other is similar.

Install heater (12) and two screws (13) on overload relay (14).

CLEANING

WARNING

Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

a. Remove dirt, dust, and contaminants from metal and plastic parts.

b. Using fine sand paper remove dirt, carbon, and dust from electrical contacts.

c. Clean threads of parts and hardware.

INSPECTION

a. Inspect plastic parts for cracks, fractures, or chipped edges.

WARNING

To provide continued protection against fire and shock hazard, replace overload relay and heater element if a heater element burns out.

b. Inspect heat element for cracks and signs of burns. Replace as required.

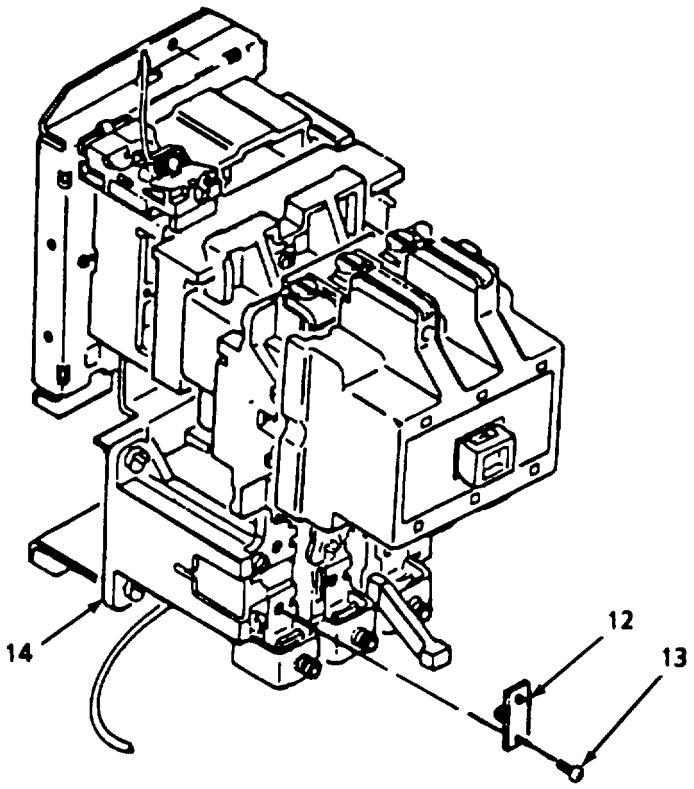
c. Inspect overload relay for overheating, fractures, or breaks. Replace as required.

d. Inspect reset lever for freedom of movement. Replace overload relay if movement is impaired.

e. Inspect mounting bracket for damage. Replace as required.

f. Inspect all hardware for damaged heads or threads. Replace as required.

3-59. MOTOR STARTERS -continued.



3-59. MOTOR STARTERS - continued.

TEST

K1 and K2.

a. Using multimeter set at 0 to 100 ohms, check between upper and lower sets of stationary contacts (2). Check for 0 ohm for each pair.

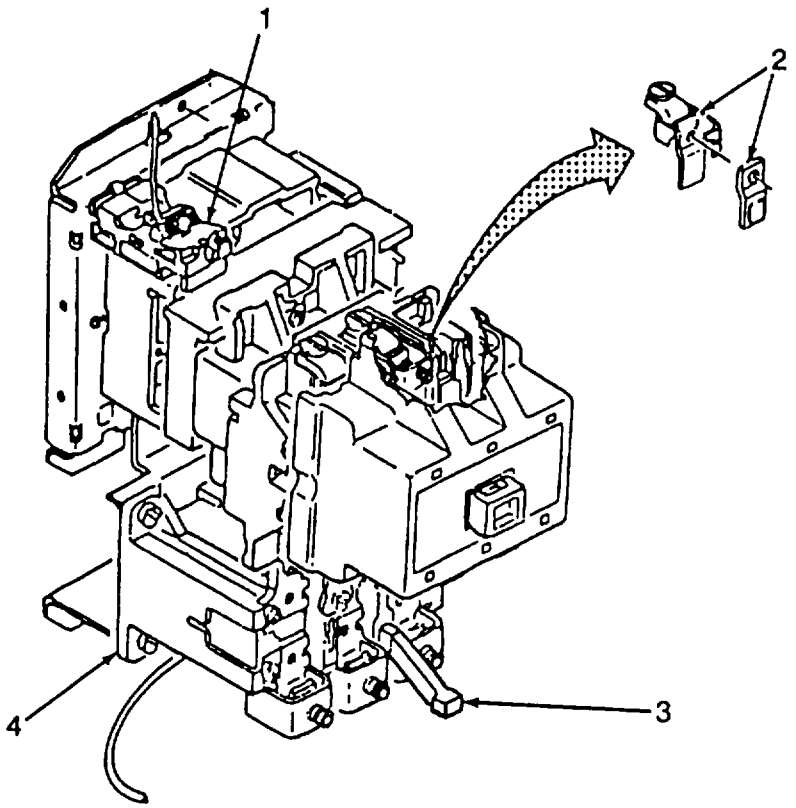
b. Check across terminal of overload relay (4). Indication should be infinity indicating a open. If indication is 0, press reset rod (3) and recheck. If indication remains 0, replace overload relay.

c. Check between two terminals of auxiliary contacts (1). Indication should be 0 ohm. If indication is infinity, replace auxiliary contact.

NOTE
Two people are required for step d

d. Install motor controller.

3-59. MOTOR STARTERS - continued.



3-59. MOTOR STARTERS -continued.

K3 thru K7.

a. Using multimeter set at 0 to 100 ohms, check between upper and lower sets of stationary contacts (1). Check for 0 ohm for each pair.

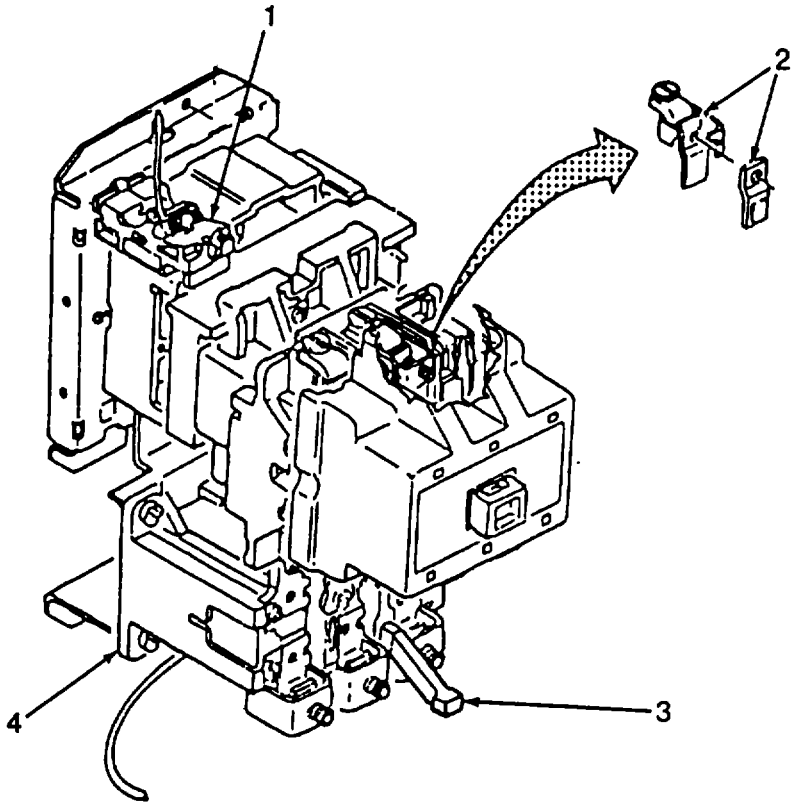
b. Check across terminal of overload relay (2). Indication should be infinity indicating a open. If indication is 0, press reset rod (3) and recheck. If indication remains 0, replace overload relay.

WARNING

Electrical high voltage can cause serious injury or death. When applying power during a test, take proper measure to ensure personal safety.

c. Install motor controller.

3-59. MOTOR STARTERS - continued.



3-59. MOTOR STARTERS - continued.

INSTALLATION

K1 and K2.

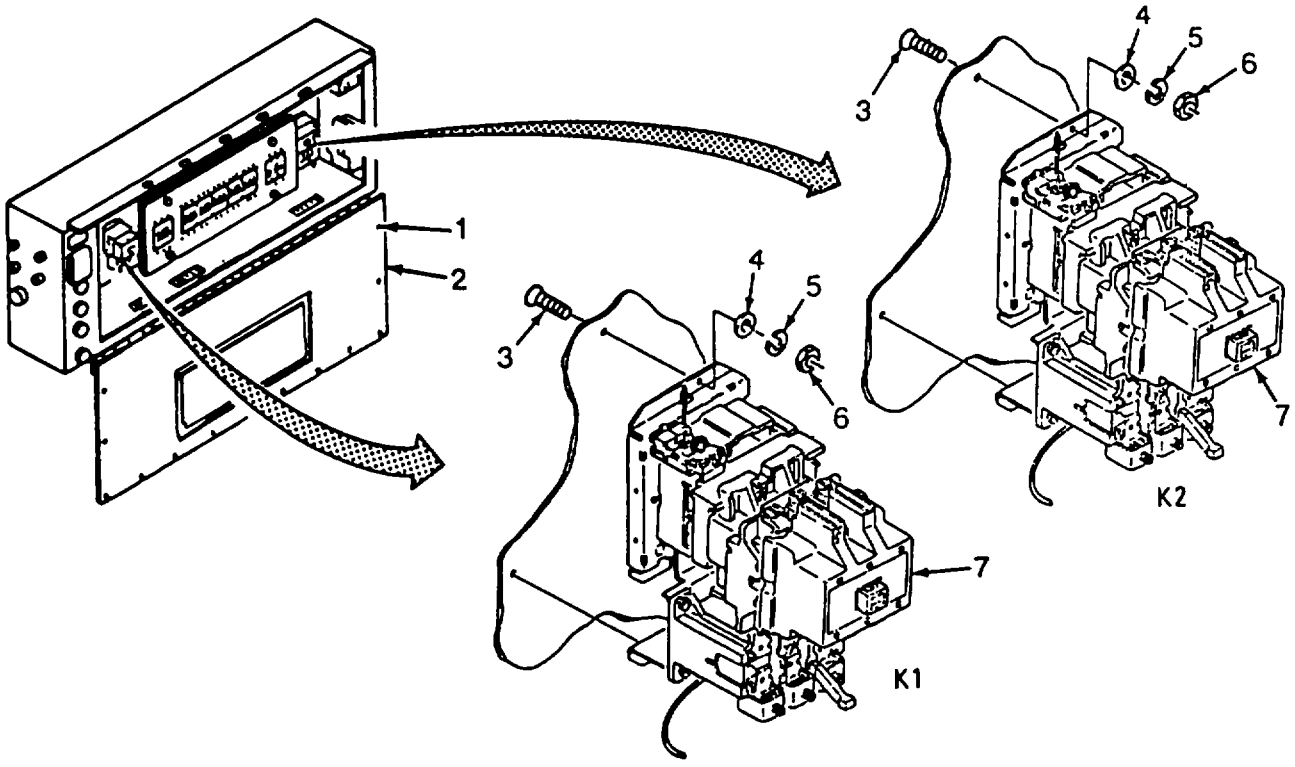
a. Position three screws (3) and motor controller (7).

b. Install three flat washers (4), new lockwashers (5), and nuts (6).

c. Install 13 wires on motor controller (7) as tagged.

d. Close junction box cover (2) and turn 13 rotary fasteners (1).

3-59. MOTOR STARTERS - continued.



3-59. MOTOR STARTERS - continued.

K3 thru K7.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

NOTE

Motor controllers K3 thru K7 are installed the same. One is shown.

a. Position motor controller (11).

NOTE

If installing motor controllers K5 thru K7, go to step c.

b. Support motor controller (11), install new lockwasher (3), and nut (4). Go to step d.

c. Remove nine screws (7) from upper base structure (5).

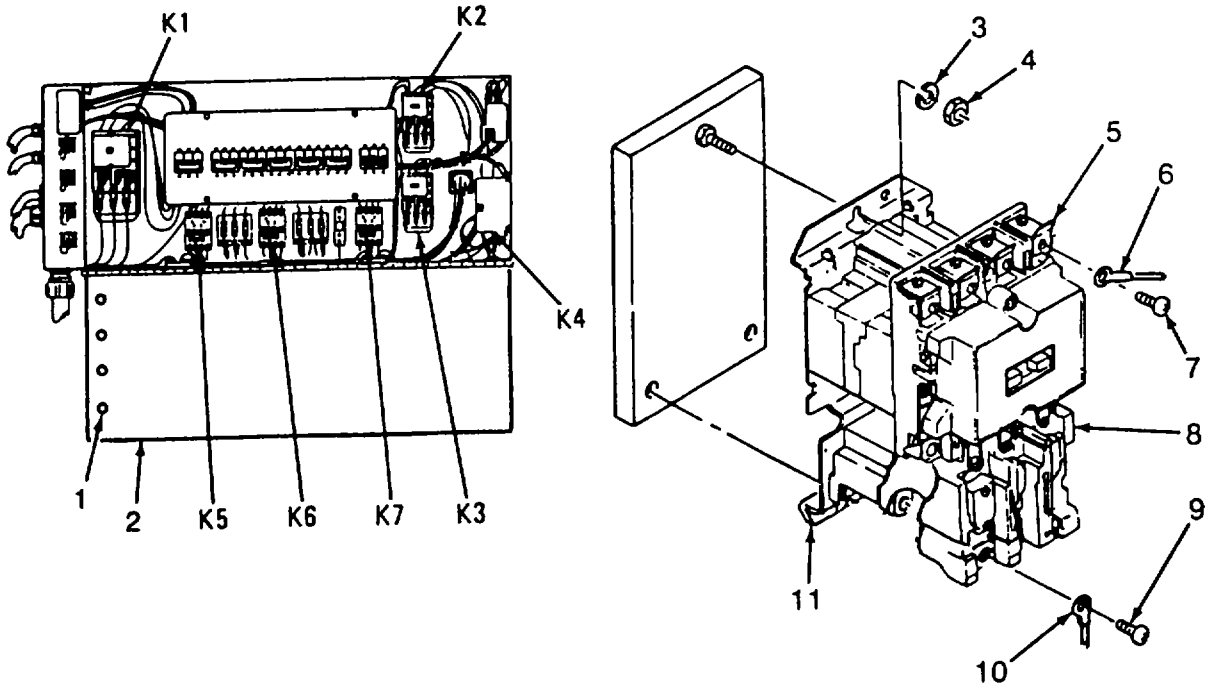
d. Install nine external wires (6) as tagged and screws (7) on upper base structure (5).

e. Remove seven screws (9) from overload relay (8).

f. Install seven external wires (10) as tagged and screws (9) on overload relay (8).

g. Close junction box cover (2) and turn 13 rotary fasteners (1).

3-59. MOTOR STARTERS- continued.



Section XII. FLATBED CARGO TRAILER MAINTENANCE PROCEDURES

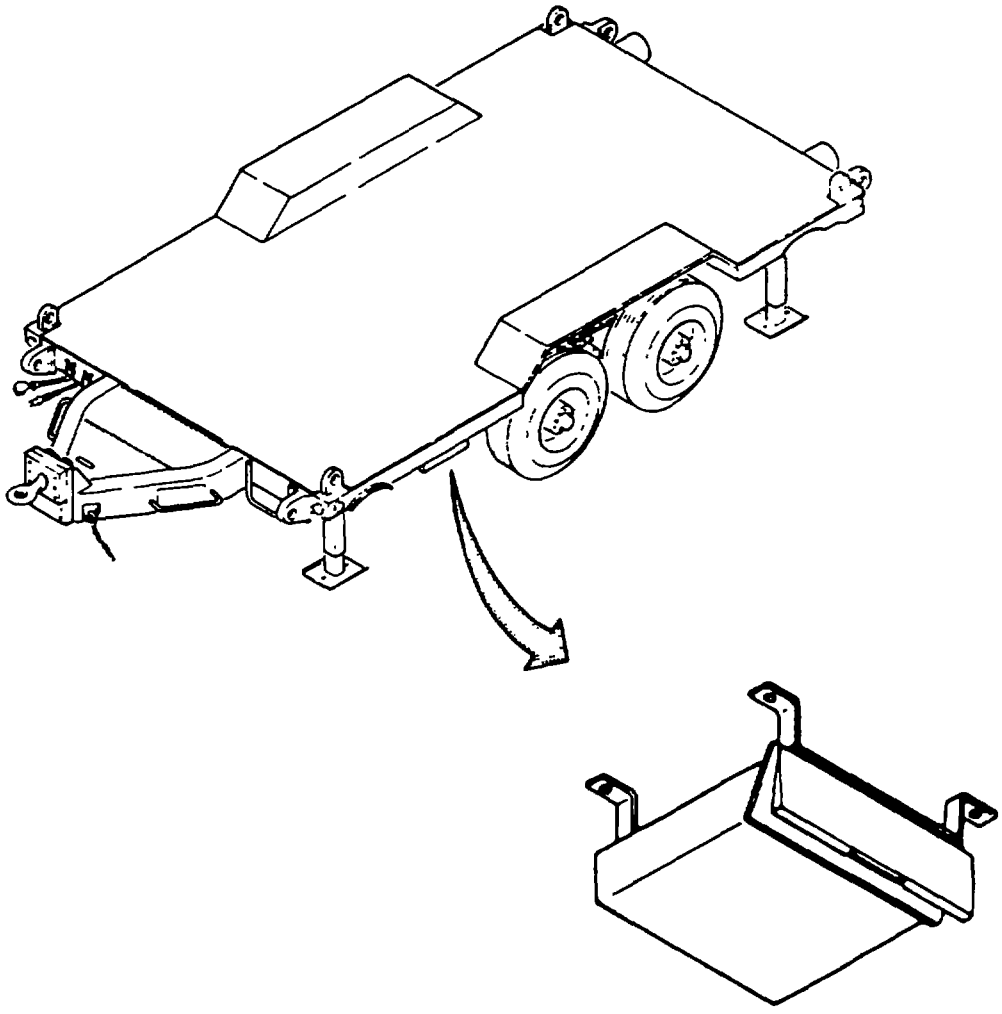
3-60. STORAGE BOX MAINTENANCE-

This task consists of: Repair

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Equipment Condition
Storage box removed (para. 2-89).

For welding procedures, refer to TM 9-237.



3-61. FRAME (TRAILER) MAINTENANCE (MODEL WPES-I).

This task consists of a. General Repairs b. Weld

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Vernier Caliper (Appendix B, Section III, Item 3).
Tap Wrench (Appendix B, Section III, Item 3)
Portable Electric Drill (Appendix B, Section III, Item 3).
Standard Insert Repair Kit (Appendix B, Section III, Item 3).
Oversize Insert Repair Kit (Appendix B, Section III, Item 3).
Swage Tool Stop (Appendix B, Section III, Item 3).
Helicoil Repair Kit (Appendix B, Section III, Item 3).
Machinist Scriber (Appendix B, Section III, Item 3)
Tap Handle (Appendix B, Section III, Items 3).
Depth Micrometer (Appendix B, Section III, Item 3)

Materials/Parts Required

Solvent, drycleaning (Appendix C, Section II, Item 28.).
Oil, lubricating (Appendix, C, Section II, Item 20).
Rags, wiping (Appendix C, Section II, Item 23).

General Safety Instructions

WARNING

Using compressed air can be dangerous. Wear proper eye protection

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For standard procedures for removal, cleaning, inspection, and installation, refer to Chapter 2, Section VI, of this manual

GENERAL REPAIRS

a. Removing Threaded Inserts.

(1) Inspect all threaded parts for burrs and stripped or damaged threads

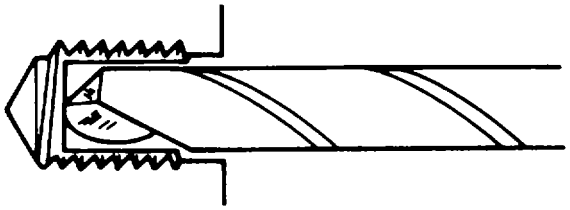
3-61. FRAME (TRAILER) MAINTENANCE (MODEL WPES-I) - continued.

NOTE

If possible, chase threads with used tap or die. New tap may cut oversize, while new die may cut undersize.

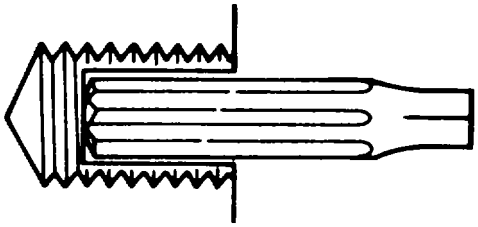
(2) Replace all parts that have stripped threads. Replace parts that cannot be repaired by chasing threads with used tap or die. Replace parts that cannot be repaired by installing helical coil inserts.

(3) Remove tight broken studs or screws as follows:



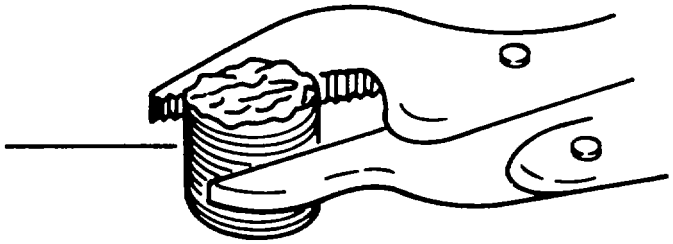
a. Center punch broken stud or screw.

b. Drill three quarters way deep into broken stud or screw using a drill bit 1116 inch less the diameter of the broken stud or screw.



c. Using a screw extractor, remove broken stud or screw.

(4) Remove studs or screws that have not broken flush to surface as follows:



a. Clamp broken stud or screw using vise grip pliers.

b. Back out broken stud or screw

3-61. FRAME (TRAILER) MAINTENANCE (MODEL WPES-I) - continued.

(5) Repair threads that are damaged and cannot be restored by installing a helical coil insert. The following gives standard procedures for installation of a helical insert and removal of a previous installed damaged one.

b. Installing Helical Coil Insert.

NOTE

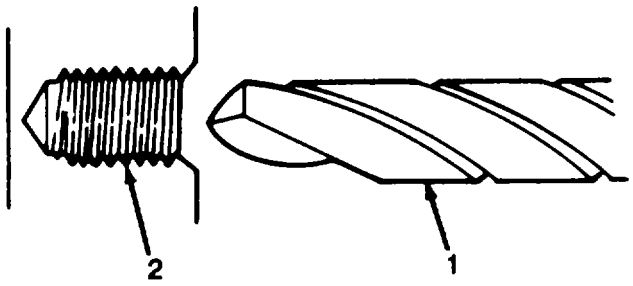
All sizes for tools and helicoils depend on original bolt size. Refer to repair kit.

(1) Using portable electric drill, vernier caliper, and step drill (1); bore out damaged threads (2) to original depth.

WARNING

Compressed air can blow into the eyes. Wear eye protection. Do not exceed 30 psi (207 kPa) air pressure.

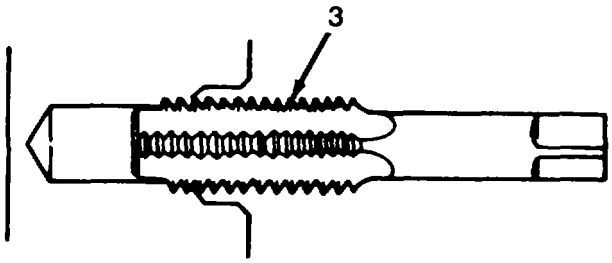
(2) Clean newly bored hole using compressed air.



(3) Coat thread cutting tap (3) with lubricating oil.

(4) Using tap wrench and tap, cut threads until tap bottoms.

3-61. FRAME (TRAILER) MAINTENANCE (MODEL WPES-1) - continued.



WARNING

Compressed air can blow dust into the eyes. Wear eye protection Do not exceed 30 psi (207 kPa) air pressure.

(5) Using compressed air, blow out dirt and any loose metal chips in threads

WARNING

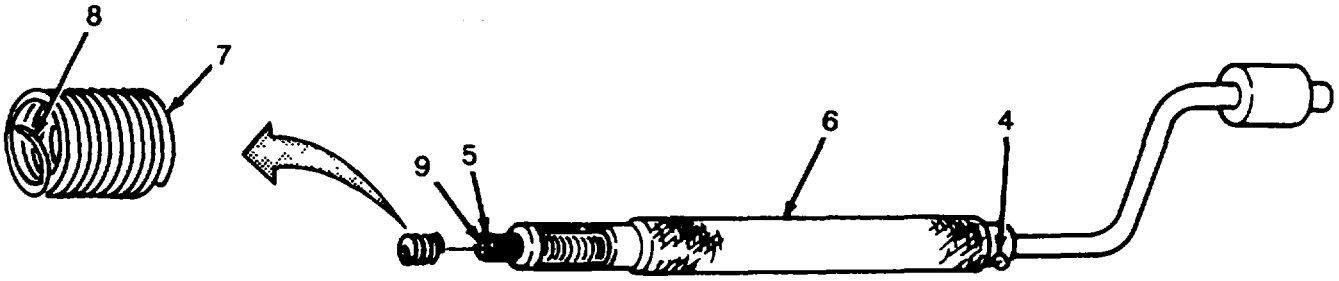
Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

(6) Using wiping rag dampened with cleaning solvent, clean hole.

(7) Loosen setscrew (4).

(8) Turn handle until shaft (5) extends past tip of insertion tool (6) slightly longer than length of insert (7).

(9) Screw new insert (7) on shaft until tang (8) of insert goes into shaft notch (9).

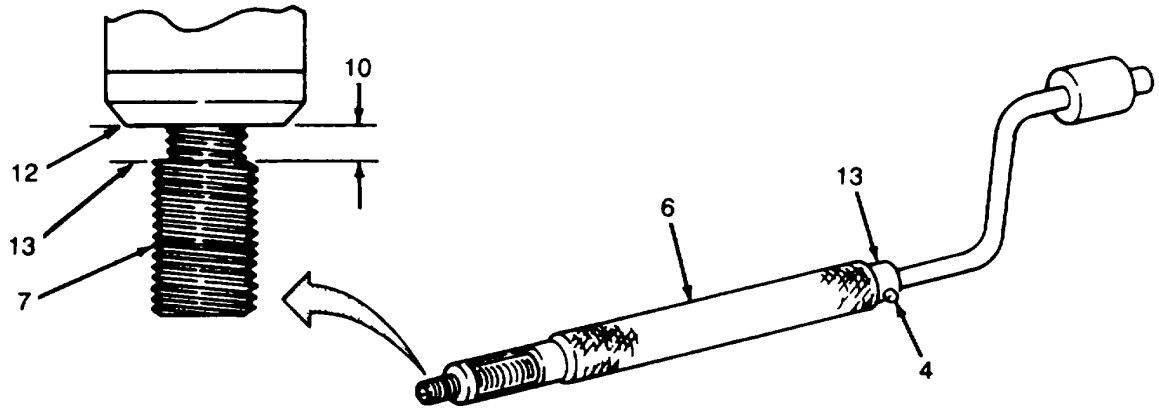


(10) Using insertion tool (6) and vernier caliper, adjust distance (10) between end (11) of insert (7) and tip (12). Turn handle until distance is equal to installing depth below surface of tapped hole.

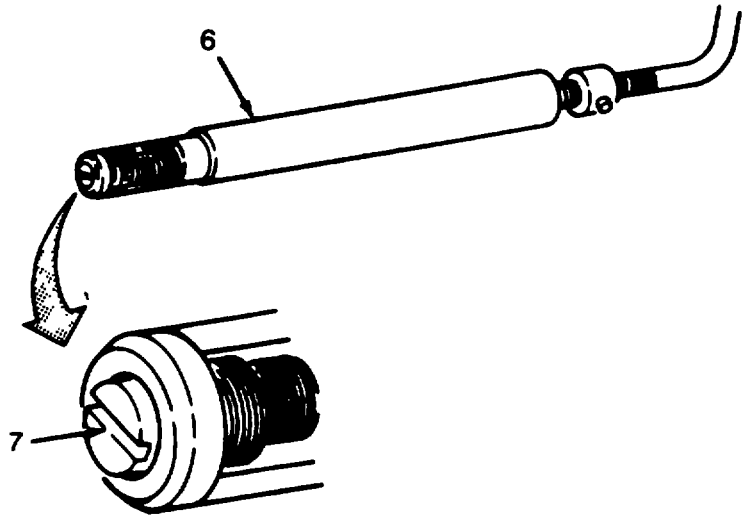
(11) Push down stop collar (13) until it contacts body of insertion tool (6).

(12) Tighten setscrew (4).

3-61. FRAME (TRAILER) MAINTENANCE (MODEL WPES-1) - continued.



(13) Turn handle until tang of insert (7) is even with tip of insertion (6).



CAUTION

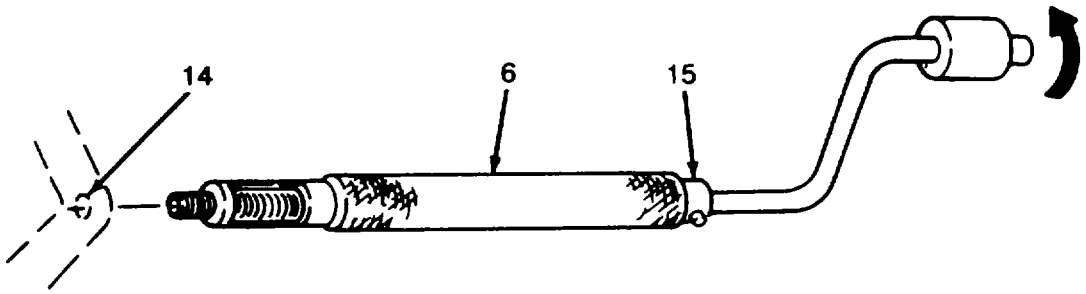
Insertion tool must be straight and not allowed to wobble when installing insert. Equipment can be damaged.

Do not force insert into tapped hole. Threads will be damaged.

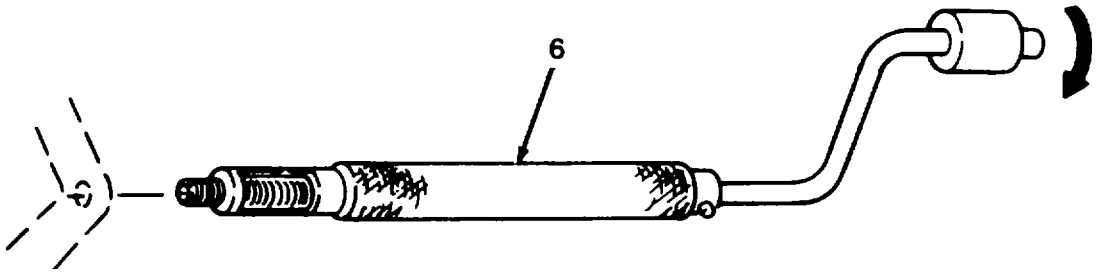
(14) Put tip of insertion tool (6) against tapped hole (14) being sure that insertion tool is straight.

3-61. FRAME (TRAILER) MAINTENANCE (MODEL WPES-1) - continued.

(15) Slowly turn handles of insertion tool (6) right until stop collar (15) contacts body of insertion tool.

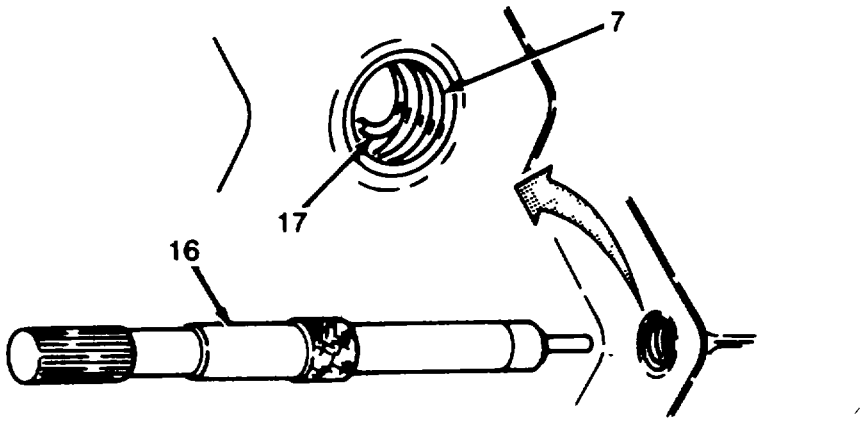


(16) Turn handle of insertion tool (6) to left until



(17) Place tang breakoff tool 916) in tapped hole with installed insert.

(18) Push down end of breakoff tool (16) until tang (17) breaks off of insert (7).



3-61. FRAME (TRAILER) MAINTENANCE (MODEL WPES-1)- continued.

c. Removing Damaged Helical Coil Insert.

CAUTION

Do not damaged threads of tapped hole when using extraction tool.

Remove inserts from end of tapped hole that the insert is closest to Threads in tapped hole can be damaged.

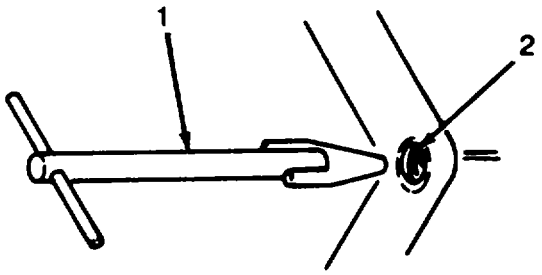
NOTE

All sizes for tools and helicoils depend on original helicoil size.

(1) Place extraction tool (1) in insert (2). Tap top of extraction tool.

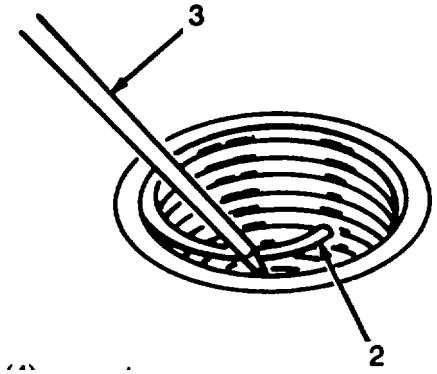
(2) Maintaining a steady downward pressure, turn tool (1) to the left Remove insert(2)

(3) If insert (2) does not come out of tapped hole, go to step (4). If insert does come out of tapped hole, go to step (8).



(4) Insert scribe (3) between end of insert (2) and tapped hole.

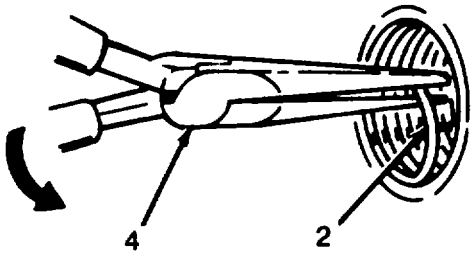
(5) Work end of insert (2) away from tapped hole and form a tang equal in length to diameter of insert.



(6) Using needle nose pliers t4), grasp tang.

3-61. FRAME (TRAILER) MAINTENANCE (MODEL WPES-1)- continued.

(7) Turn insert (2) to the left until insert is out of tapped hole. Discard insert.



WARNING

Compressed air can blow dust into the eyes Wear eye protection
Do not exceed 30 psi (207 kPa) air pressure.

(8) Lubricate finishing tap (5) with lubricating oil.

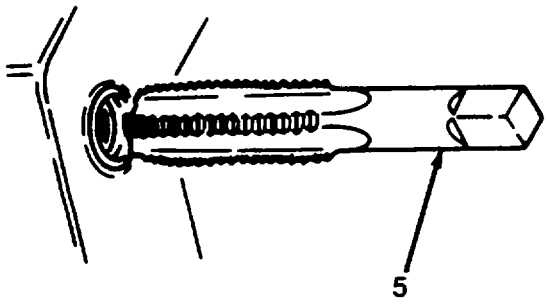
(9) Using finishing tap and tap handle, slowly thread tap in and out of tapped hole.

(10) Using compressed air, blow out dirt and any loose metal chips in tapped hole.

WARNING

Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

(11) Use wiping rag dampened with cleaning solvent to clean tapped hole.

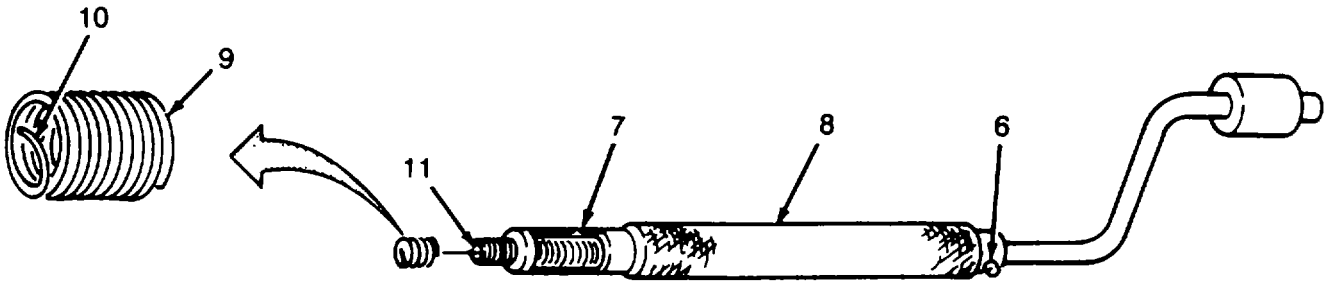


(12) Loosen setscrew (6).

(13) Turn handle until shaft (7) extends past tip of insertion tool (8) slightly longer than length of new insert (9).

3-61. FRAME (TRAILER) MAINTENANCE (MODEL WPES-1) - continued.

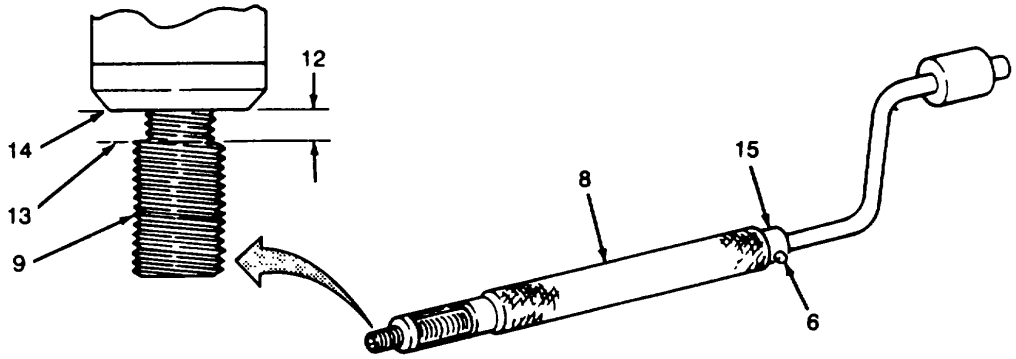
(14) Screw insert (9) on shaft until tang (10) of insert goes into shaft notch (11)



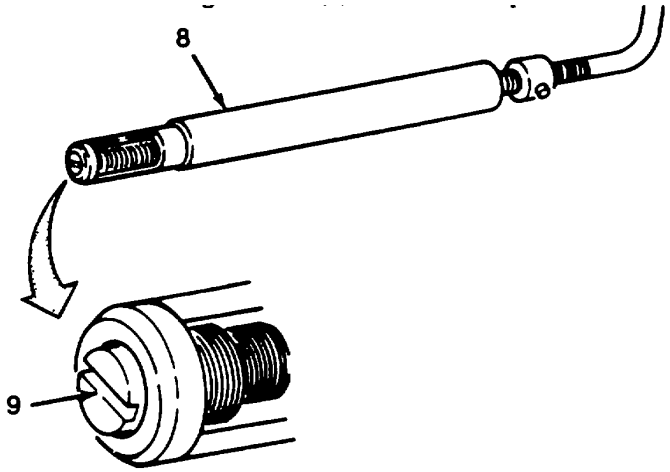
(15) Using insertion tool (8) and vernier caliper, adjust distance (12) between end (13) of insert (9) and tip (14) Turn handle until distance is equal to installation depth below surface of tapped hole.

(16) Push down stop collar (15) until it contacts body of insertion tool (8).

(17) Tighten setscrew (6).



(18) Turn handle until tang insert (9) is even with tip of insertion tool (8).



3-61. FRAME (TRAILER) MAINTENANCE (MODEL WPES-I) - continued.

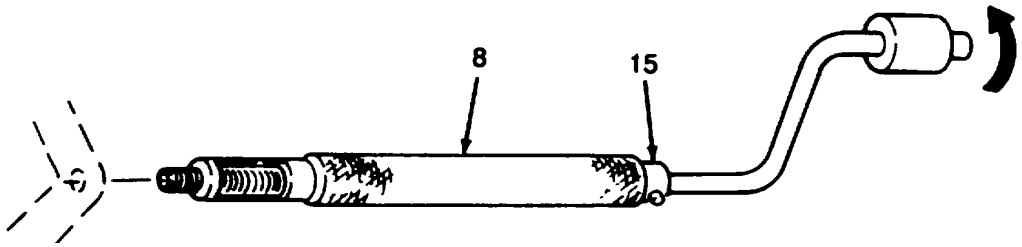
CAUTION

Insertion tool must be straight and not allowed to wobble when installing insert. Equipment can be damaged.

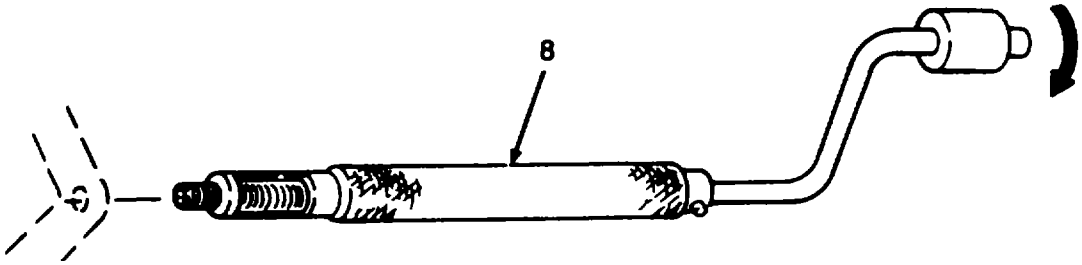
Do not force insert into tapped hole. Threads will be damaged.

(19) Put tip of insertion tool (8) against tapped hole being sure that insertion tool is straight.

(20) Slowly turn handle of insertion tool right until stop collar (15) contacts body of insertion tool.

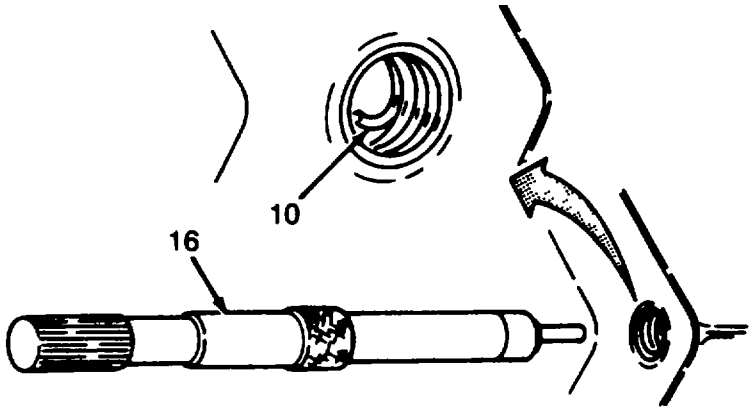


(21) Turn handle of insertion tool 98) to the left until insertion tool can be removed.



(22) Place tang breakoff tool 916) in tapped hole with installed insert.

(23) Push down end of breakoff tool 916) until (10) breaks off of insert.



WELD

For welding procedures, refer to TM 9-237

3-62. FLATBED CARGO TRAILER MAINTENANCE (MODEL WPES-1).

Direct support maintenance of the flatbed cargo trailer consists of repair of the following items.

3-63. ELECTRICAL INSTALLATION (TRAILER) MAINTENANCE (MODEL WPES-1).

This task consists of
a. Inspection
b. Disassembly
c. Repair
d. Assembly
e. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3).
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).

INSPECTION

For inspection procedures, refer to paragraph 3-20.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-20.

TEST

For test procedures, refer to paragraph 3-20.

ASSEMBLY

For assembly procedures, refer to paragraph 3-20.

REPAIR

For repair procedures, refer to paragraph 3-20.

3-64. TRAILER CABLE ASSEMBLY MAINTENANCE (MODEL WPES-1).

This task consists of:
a. Inspection
b. Disassembly
c. Repair
d. Assembly
e. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Soldering Gun Kit (Appendix B, Section III, Item 3).
Equipment Condition
Reference
ROWPU shutdown (TM 10-4610-240-10).
Cable Assembly removed (para. 2-94).

INSPECTION

For inspection procedures, refer to paragraph 320.

DISASSEMBLY

For disassembly procedures, refer to paragraph 3-20.

TEST

For test procedures, refer to paragraph 320.

ASSEMBLY

For assembly procedures, refer to paragraph 3-20.

REPAIR

For repair procedures, refer to paragraph 3-20.

3-65. WIRING HARNESS (TRAILER) MAINTENANCE (MODEL WPES-1).

This task consists of:	a	Inspection	b.	Disassembly
	c.	Repair	d.	Assembly
	e.	Test		

INITIAL SET-UP:

Tools Reauired
General Mechanics Tool Kit (Appendix B, Section III, Item 04.
Soldering Gun Kit (Appendix B, Section III, Item 3).
Equipment Condition
Reference
ROWPU shut down (TM 10610-240-10).

INSPECTION.

For inspection procedures, refer to paragraph 3-20.

DISASSEMBLY.

For disassembly procedures, refer to paragraph 3-20.

TEST.

For test procedures, refer to paragraph 3-20.

ASSEMBLY.

For assembly procedures, refer to paragraph 3-20.

REPAIR.

For repair procedures, refer to paragraph 3-20.

3-66. RELAY VALVE MAINTENANCE (MODEL WPES-1).

This task consists of: a. Disassembly b Cleaning c. Inspection d Repair e Assembly

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Snap Ring Pliers (Appendix B, Section III, Item 3).

Material/Parts Required
- Detergent (Appendix C, Section II, Item 10)
- Rags, wiping (Appendix C, Section II, Item 23)
- Diaphragm- 246086
- O-ring 246083
- O-ring 240337
- O-ring 235063
- O-ring - 238327

Equipment Condition
- Airbrake relay valve removed (para. 2-96).

DISASSEMBLY

a. Remove screw (18), diaphragm washer (19), and exhaust diaphragm (20).

CAUTION

Exhaust cover is installed under spring tension. Failure to release pressure slowly can cause loss of parts. Keep pressure on exhaust cover during removal.

b. Remove three cap screws (17), spacers (16), and exhaust cover (15).

c. Remove O-ring (14) and o-ring (21) from exhaust cover (15).

d. Remove emergency spring (13), piston and valve assembly (5), and O-ring (4).

e. Remove retaining ring (12) and inlet and exhaust valve assembly (24) from emergency piston (6).

f Remove valve guide (11), o-ring (10), valve spring (9), and valve retainer (8) from inlet and exhaust valve (7).

g. Remove o-ring (10) from valve guide (11).

h. Remove compression spring (22) and check valve ball (23).

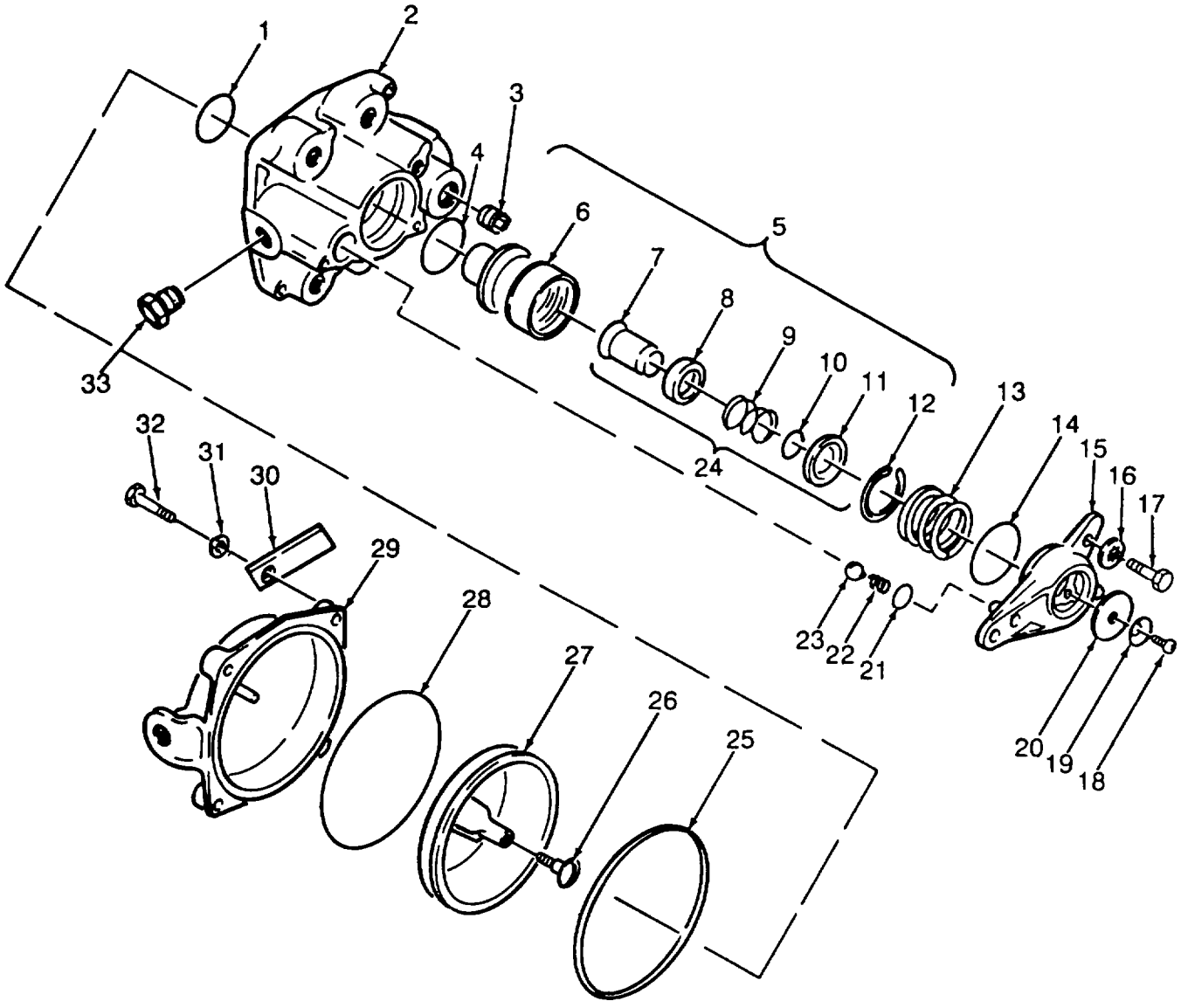
3-66. RELAY VALVE MAINTENANCE (MODEL WPES-1)- continued.

i. Remove four cap screws (32) flat washer (31), part number plate (30), cover (29) and sealing ring (28).

j. Remove piston assembly (27).

k. Remove exhaust valve seat (26), o-ring (1) and o-ring (25).

l. Remove adapter (3) and filter (33) from body (2).



3-66. RELAY VALVE MAINTENANCE (MODEL WPES-1) - continued.

CLEANING

a. Using mild soapy water, wash all parts.

b. Using clean, lint-free rags, wipe all parts dry.

INSPECTION

a. Inspect springs for deformity

b. Inspect exhaust diaphragm, relay piston, exhaust cover, body, cover, adapter, and inlet and exhaust valve for corrosion, cracks, excessive wear, or damaged threads.

REPAIR

Replace defective components as required.

ASSEMBLY

a. Install adapter (3) and filter in body (2).

b. Install new o-rings (1 and 25) on piston assembly (27).

c. Install exhaust valve seat (26) in piston assembly (27).

d. Install piston assembly (27) in body (2).

e. Install new sealing ring (28) in body (2) and install cover (29), part number plate (30), flat washer (31), and cap screws (32) on body (2).

f. Position check valve ball (23) and compression spring (22) in body (2).

g. Install new o-ring (10) in valve guide (11).

h. Install new O-ring (14) in emergency piston (6).

i. Install valve retainer (8), valve spring (9), and valve guide (11) on inlet and exhaust valve (7)

j. Position inlet and exhaust valve assembly (24) in emergency piston (6) and install retaining ring (12).

k. Position new O-ring (4), piston and valve assembly (5), and emergency spring (13) in body (2).

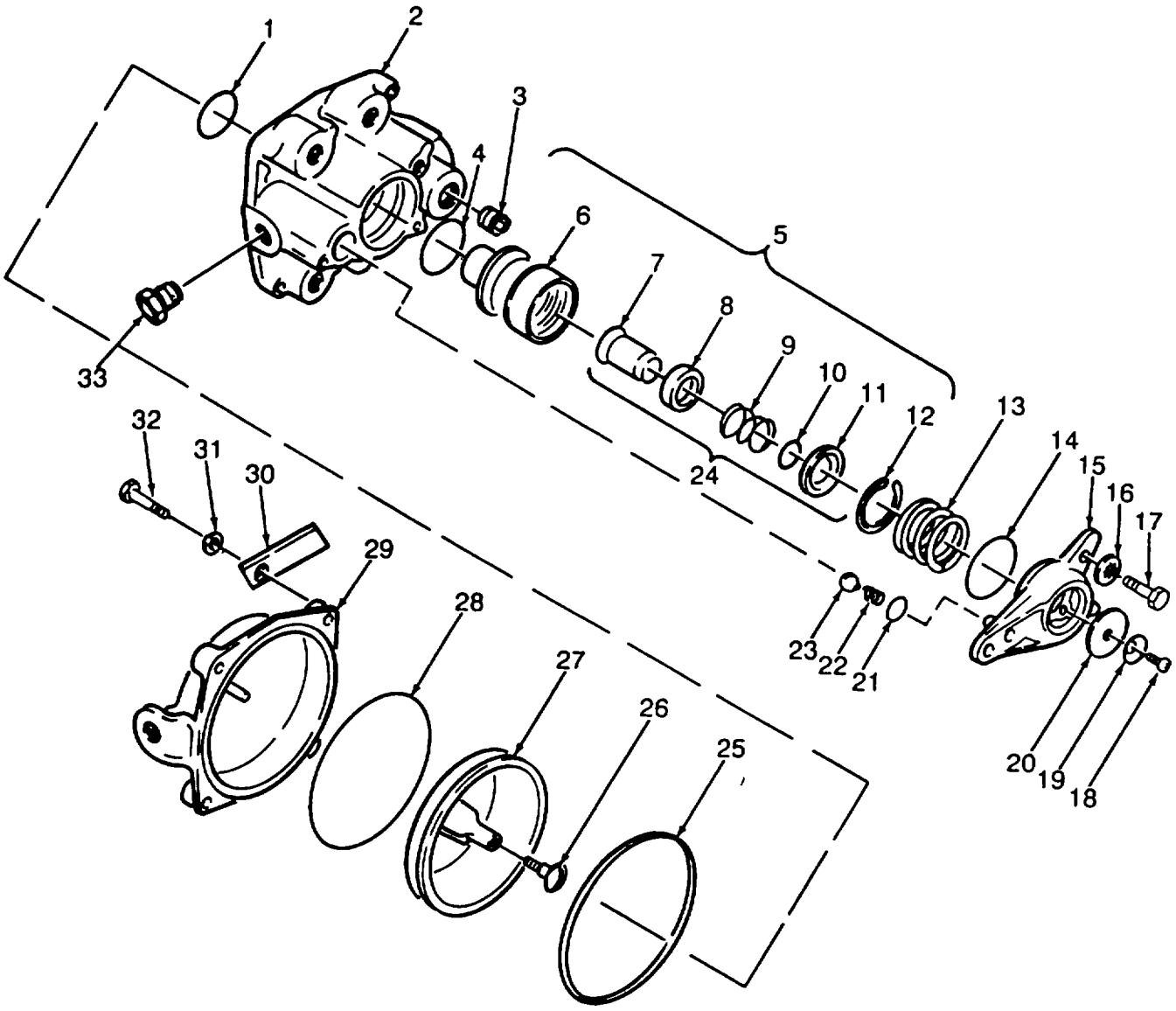
l. Install new preformed packing (21) on exhaust cover (15).

m. Position exhaust cover (15) on emergency spring (13) and compression spring (22).

3-66. RELAY VALVE MAINTENANCE (MODEL WPES-1)- continued.

n. Push exhaust cover (18) down and install shims if required and cap screws (17).

o. Position exhaust diaphragm (20) and diaphragm washer (19) in exhaust cover (15) and install screw (18).



3-67. SUSPENSION ASSEMBLY MAINTENANCE (MODEL WPES-1).

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Lifting Device (Appendix B, Section III, Item 3)
- Chain Hoist (5 Ton)(Appendix B, Section III, Item 3)
- 1-3/16 Wrench (Appendix B, Section III, Item 3)
- Towing Vehicle Equipped with Airbrakes

Material/Parts Required
- Lockwasher (8) - MS35338-50

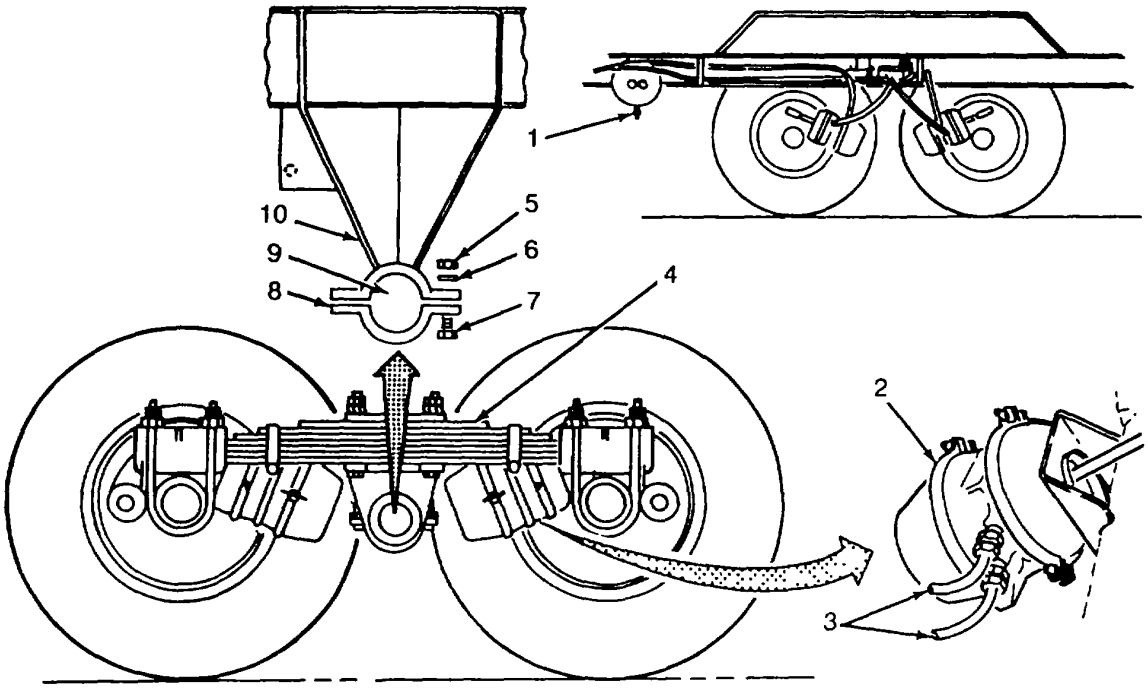
Personnel Required
- Three (3)

Equipment Condition
Reference
- Air hoses disconnected from towing vehicle (TM 104610-240-10).
- Generator removed.
- ROWPU removed.

General Safety Instructions

WARNING

- **Compressed air in airbrake system can be dangerous**
- **Moving heavy equipment incorrectly can cause serious injury.**



3-67. SUSPENSION ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.

REMOVAL

WARNING

Compressed air can blow dust into eyes Wear eye protection and turn drain cock T-handle slowly to avoid a sudden rush of air when releasing reservoir pressure.

a. Turn drain cock T-handle (1) slowly counterclockwise to release air pressure from reservoir.

b. Tag eight air lines (3).

c. Disconnect eight air lines (3) from four air chamber assemblies (2).

WARNING

The suspension assembly is heavy Two people are needed to move it to prevent personal injury or damage to the equipment.

d. Using lifting device and guide lines, raise flatbed cargo trailer clear of suspension assembly (4).

e. Remove four nuts (5), lockwashers (6), and bolts (7).

f. Remove trunnion clamp (8) from trunnion mount (10)

g. Repeat steps e and f for trunnion clamp on opposite side.

h. Roll suspension assembly (4) from under flatbed cargo trailer.

INSTALLATION

WARNING

The suspension assembly is heavy Three people are needed to move it to prevent personal injury or damage to the equipment.

a. Using lifting device, raise flatbed cargo trailer clear of suspension assembly (4)

b. Roll suspension assembly (4) into position under flatbed cargo trailer.

c Lower flatbed cargo trailer onto jack stands until trunnion mount (10) rests on trunnion axle (9).

3-67. SUSPENSION ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.

d. Place trunnion clamp (8) in position under trunnion mount (10) and around trunnion axle (9) with mounting bolt holes alined.

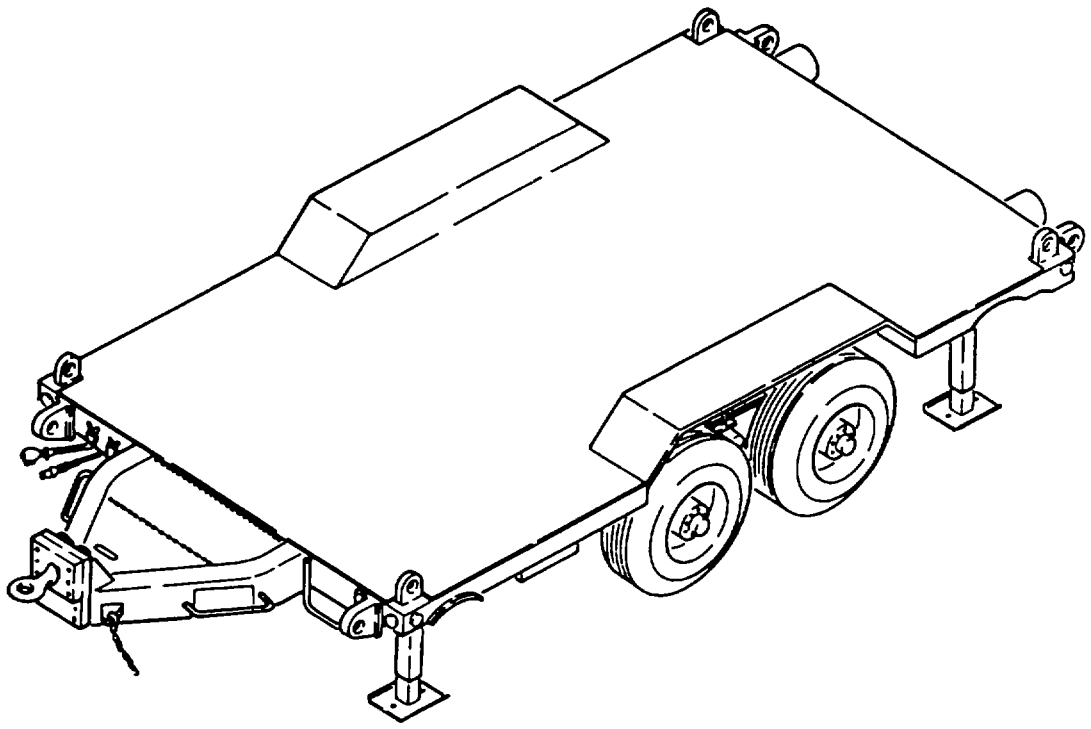
e. Install four bolts (7), lockwashers (6), and nuts (5).

f. Repeat steps d and e for trunnion clamp on opposite side.

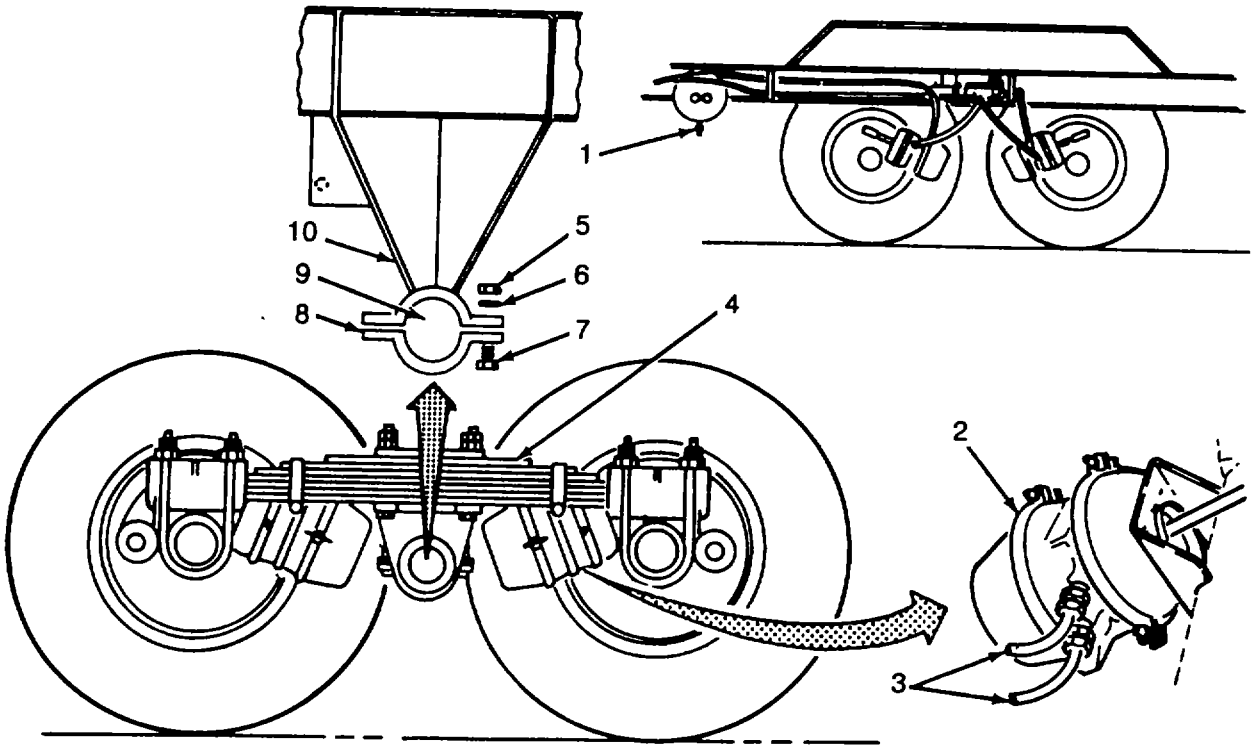
g. Connect eight air lines (3) to four air chamber assemblies (2). Turn drain cock T-handle (1) clockwise to close drain cock.

h. Connect air hoses to towing vehicle (TM 10-4610-240-10).

i. Start engine of towing vehicle and wait for towing vehicle air compressor to fully charge flatbed cargo trailer brake system. Refer to TM5-4610-240-10 and towing vehicle manual.



3-67. SUSPENSION ASSEMBLY MAINTENANCE MODEL (WPES-1)- continued.)



3-68. BRAKE ASSEMBLY MAINTENANCE (MODEL WPES-1).

This task consists of: a. Removal b. Disassembly c. Cleaning d. Inspection e. Repair f. Assembly g. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item- 4)
- Stiff-Bristled Brush (Appendix B, Section III, Item 3)
- Soft-Bristled Brush (Appendix B, Section III, Item 3)
- Brake Spring Tool (Appendix B, Section III, Item 3)
- Hand Grease Gun (Appendix B, Section III, Item 3)

Materials/Parts Required
- Solvent, drycleaning (Appendix C, Section II, Item 28)
- Grease (Appendix C, Section II, Item 15)
- Rags, wiping (Appendix C, Section II, Items 23)
- Lockwasher (2) - 500358-17
- Lockwasher (8) - 500357-13
- Seal, Oil (2) - M16HH100

Equipment Condition
- Tire and wheel assembly removed (para. 2-99)
- Trailer disconnected from towing vehicle (TM 10-4610-240-10).
- Hub and drum assembly removed (para. 2-100).

General Safety Instructions

WARNING

- **Using drycleaning solvent incorrectly can cause injury or even death.**
- **Using compressed air can be dangerous.**

REMOVAL

a. Remove cotter pin (3) and clevis pin (4). Separate slack adjuster (2) from air chamber pushrod clevis (5).

b. Remove lockring (6) and slack adjuster (2) from camshaft (14).

c. Remove four nuts (13), four bolts (7), cover plate (8), and tapered bushing (9).

d. Remove eight nuts (15), washers (16), and bolts (18).

CAUTION

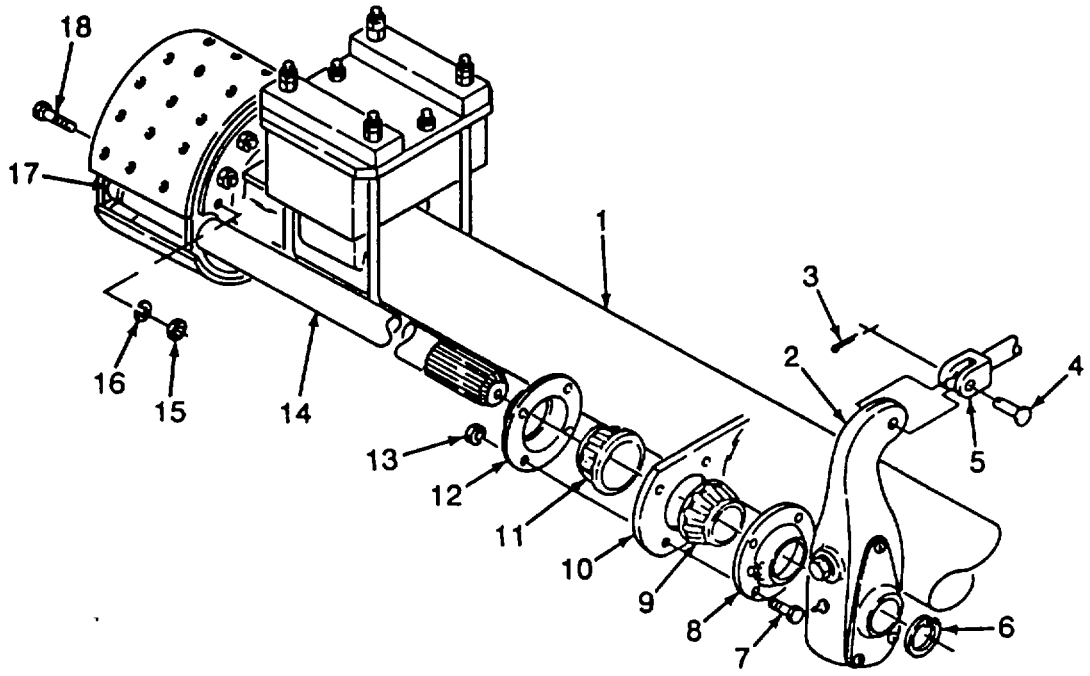
Pull brake assembly straight out from trailer. Any vertical or side-to-side movement can cause damage to splined end of camshaft.

NOTE

Cover plate and tapered bushing might slide off camshaft when camshaft is pulled through camshaft bracket.

e. Remove brake assembly (17), tapered bushing (11), and cover plate (12) from axle (1) and camshaft bracket (10).

3-68. (MODEL WPES-1) BRAKE ASSEMBLY MAINTENANCE - continued.



3-68. (MODEL WPES-1) BRAKE ASSEMBLY MAINTENANCE - continued.

DISASSEMBLY

a. Remove two anchor pin nuts (19), anchor pin lockwashers (20), anchor pins (25), flat washers (26), retaining rings (27), and anchor pin links (22).

b. Remove two flat washers (26) and retaining rings (27) from anchor pins (25).

c. Remove brakeshoe assembly (23) from spider (21).

d. Remove retract spring (30) and two retract spring pins (31).

e. Remove anchor pin retainer (29) and brake rollers (28).

f. Remove two lubrication fittings (38 and 40).

g. Remove cam lockring (39), camshaft spacer washer (37), and seal (36).

h. Remove camshaft (32), camshaft retaining washer (33), and seal (34).

i. Using brass drift pin, tap spider bushing (35) out of spider (21).

CLEANING

a. Using rags, wipe grease that is not solidified off all parts.

WARNING

Drycleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

NOTE

Repeat steps b through d until all grease is removed.

b. Soak spider, slack adjuster, and other parts, except brakeshoes, with solidified grease in drycleaning solvent for 1 hour.

c. Using stiff-bristled brush, scrub grease off all parts except brakeshoes.

d. Using clean, lint-free rags, wipe all parts dry.

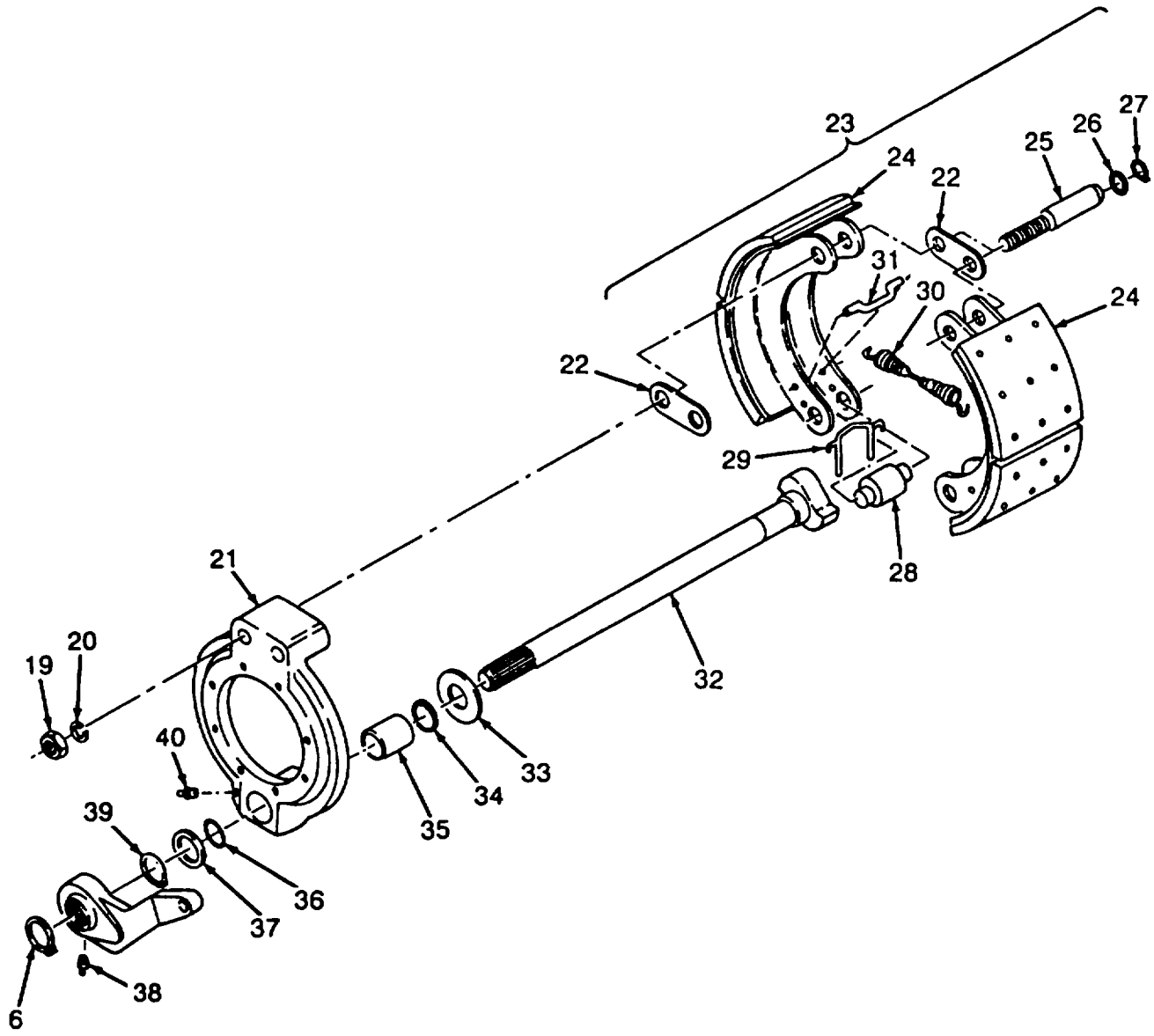
WARNING

Compressed air can blow dust into the eyes. Wear eye protection. Do not exceed 30 [psi (207 kPa) air pressure.

e. Hold rags loosely over both ends of tube through spider to catch dirt and solvent. Blow low-pressure compressed air into lubrication fitting hole on spider.

f. Move rags so that clean material is over ends of tube and blow air into lubrication fitting hole. Repeat until rags stay clean and dry.

3-68. (MODEL WPES-1) BRAKE ASSEMBLY MAINTENANCE - continued.



3-68. (MODEL WPES-1) BRAKE ASSEMBLY MAINTENANCE - continued.

g. Hold rags loosely over both ends of splined tube through slack adjuster to catch dirt and solvent. Blow low-pressure compressed air into lubrication fitting hole on slack adjuster.

h. Move rags so that clean material is over end of tube and blow air into lubrication fitting hole. Repeat until rags stay clean and dry.

i. Using soft-bristled brush, sweep dirt and metal filings off brakeshoes and brakeshoe linings.

INSPECTION

NOTE
Replace all four brakeshoe linings as a set.

a. Inspect brakeshoe linings for excessive or uneven wear.

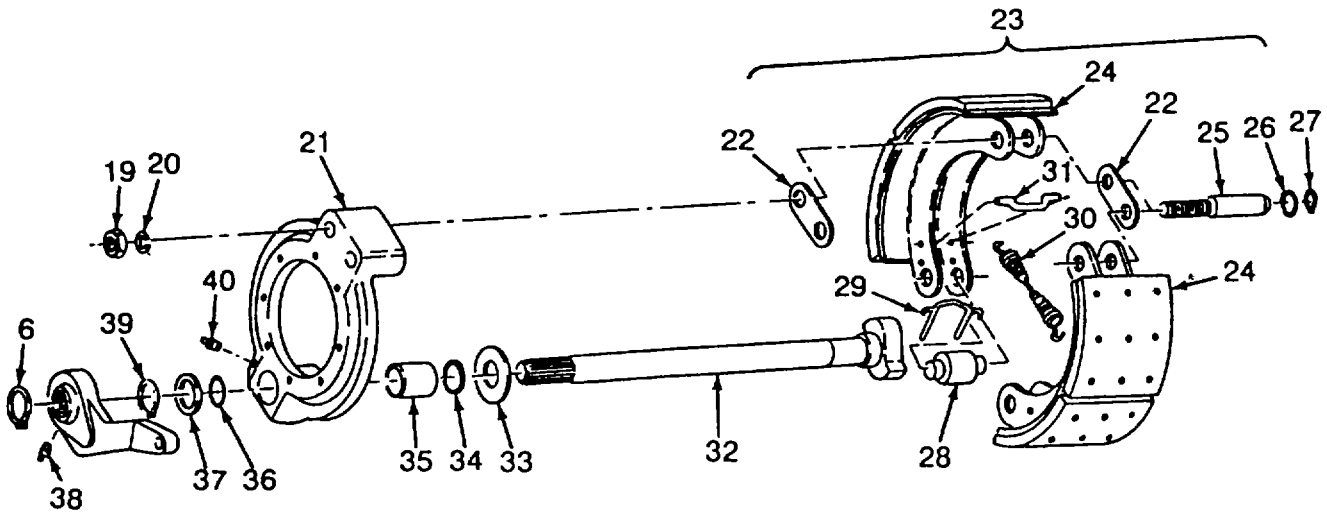
b. Inspect brakeshoe linings for oil or grease.

c. Inspect splines of camshaft and slack adjuster for chipping, cracking, or excessive wear.

d. Inspect washers, bushing, anchor pin links, brake roller pins, and bearing surfaces of camshaft and spider for excessive wear or deformity.

e. Inspect spring for cracks or deformity.

f. Inspect retract spring pins for stuck or missing end pins, excessive wear, or deformity.



3-68. (MODEL WPES-1) BRAKE ASSEMBLY MAINTENANCE - continued.

REPAIR

Replace all damaged components.

ASSEMBLY

a. Using brass drift pin, tap spider bushing (35) into spider (21).

b. Install new seal (34), camshaft retaining washer (33), and camshaft (32).

c. Install new seal (36), camshaft spacer washer (37), and cam lockring (39).

d. Install two lubrication fittings (38 and 40).

e. Using hand grease gun, force grease into lubrication fittings (38 and 40) until grease comes out along camshaft (32) Wipe off grease.

f. Install two brake rollers (28), and anchor pin retainer (29).

g. Install one retract spring pin (31) in each brakeshoe (24).

h. Install one end of retract spring (30) on one retract spring pin (31).

i. Install free end of retract spring (30) on other retract spring pin (31).

j. Install two retaining rings (27) and flat washers (26) on two anchor pins (25).

k. Position two anchor pin links (22) on opposite sides of brakeshoes (24).

l. Push free ends of brakeshoes together while inserting two anchor pins (25) through brakeshoes (24) and anchor pin links (22).

m. Install two anchor pin lockwashers (20) and anchor pin nuts (19).

n. Adjust service brakes. Refer to paragraph 2-101.

3-68. (MODEL WPES-1) BRAKE ASSEMBLY MAINTENANCE - continued.

INSTALLATION

a. Position cover plate (12) and tapered bushing (11) on camshaft (14).

CAUTION

Guide camshaft into camshaft bracket. If camshaft does not enter straight, splined end can be damaged

b. Position brake assembly (17) on axle (1), guiding camshaft (14) through camshaft bracket (10).

c. Install eight bolts (18), washers (16), and nuts (15).

d. Position two tapered bushings (9) and (11) and two cover plates (8) and (12) on camshaft against camshaft bracket (10). Aline four holes in cover plates with four holes in camshaft bracket.

e. Install four bolts (7) and nuts (13).

NOTE

If hole in slack adjuster arm does not aline with holes in clevis, adjust brake. Refer to paragraph 2-101.

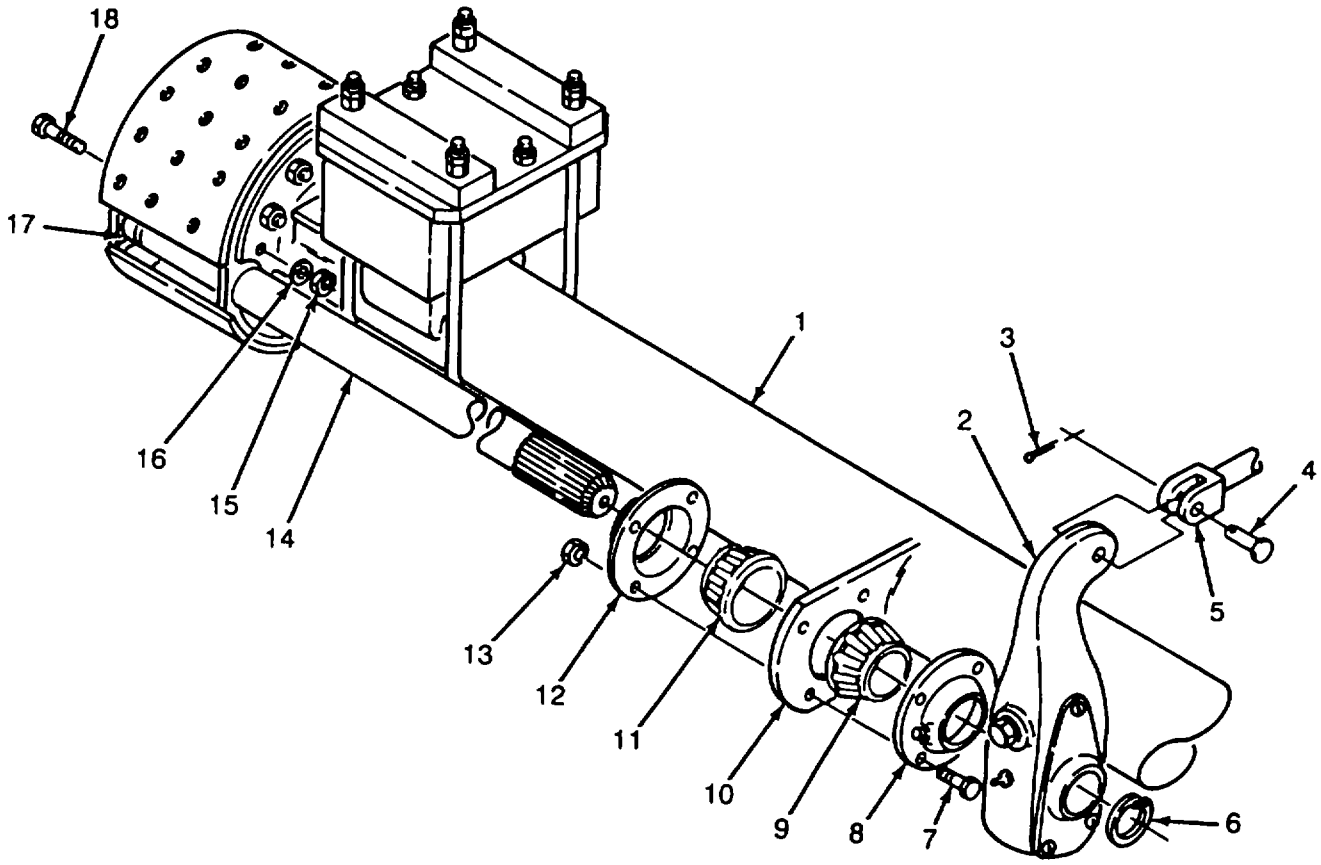
f. Position slack adjuster (2) on camshaft (14) with hole in slack adjuster arm alined with holes in clevis (5).

g. Install lockring (6).

h. Install clevis pin (4) and cotter pin (3).

i. Adjust service brakes. Refer to paragraph 2-101.

3-48. (MODEL WPES-1) BRAKE ASSEMBLY MAINTENANCE - continued.



3-69. SPRING ASSEMBLY MAINTENANCE (MODEL WPES-1).

This task consists of: a. Removal b. Disassembly c. Cleaning d. Inspection e. Repair f. Assembly g. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Hydraulic Jack (Appendix B, Section III, Item 3).
Jack Stand (Appendix B, Section III, Item 3)
Materials/Parts Required.
Solvent, drycleaning (Appendix C, Section II, Item 28).
Oil, Lubricating (Appendix C, Section II, Item 21).
Personnel Required
Two (2)
Equipment Condition
Tire and wheel assemblies removed (paragraph 3-70).
General Safety Instructions

WARNING

- Using dry cleaning solvent incorrectly can cause injury or even death. See general warning page.
- Lifting heavy equipment incorrectly can cause serious injury. See general warning page.

REMOVAL.

a. Jack up side of flatbed cargo trailer and block from which spring assembly (4) is to be removed so that weight is just relieved on tires. Refer to TM 5-4610-215-10/2.

b. Remove eight backing nuts (1) and eight retaining nuts (2) and four U-bolts (3) holding spring assembly (4) to axle.

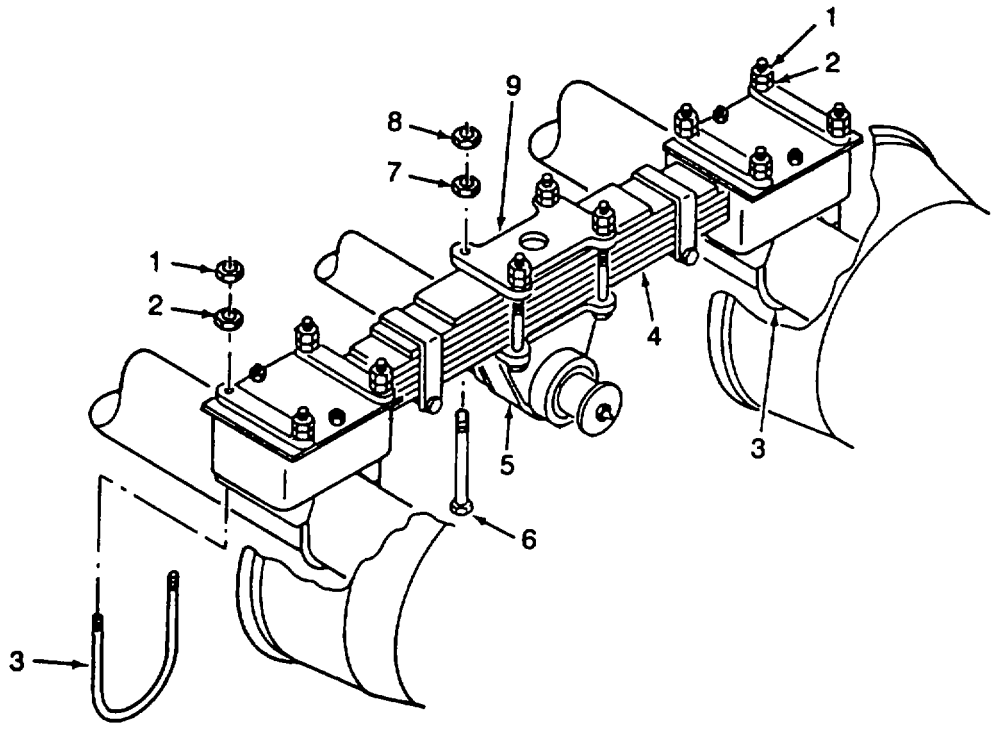
c. Remove four backing nuts (8), retaining nuts (7) and bolts (6) and trunnion bracket plate (9) holding spring assembly (4) to trunnion bracket (5).

WARNING

The spring assembly is heavy. Two people are needed to lift it to prevent personal injury or damage to the equipment.

d. Lift spring assembly (4) off trunnion bracket (5).

3-69. SPRING ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.



3-69. SPRING ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.

DISASSEMBLY

a. Place spring assembly (1) on workbench

b. Remove two nuts (2), two bolts (4), two spacer tubes (6), and two angle bars (3).

c. Remove nut (7) and bolt (5).

CLEANING

WARNING

Dry cleaning solvent P-D-680 is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

a. Clean all parts with a wire brush.

b. Soak all parts in dry cleaning solvent and let air dry.

INSPECTION

a. Inspect spring assembly for distortion, damage such as cracks, thread damage (bolts/nuts), excessive rust, and missing parts.

b. Ensure that all fitting assembly holes are not elongated or oversize.

c. Inspect for broken spring bars.

ASSEMBLY

NOTE

Clean all spring assembly parts thoroughly and coat with light oil.

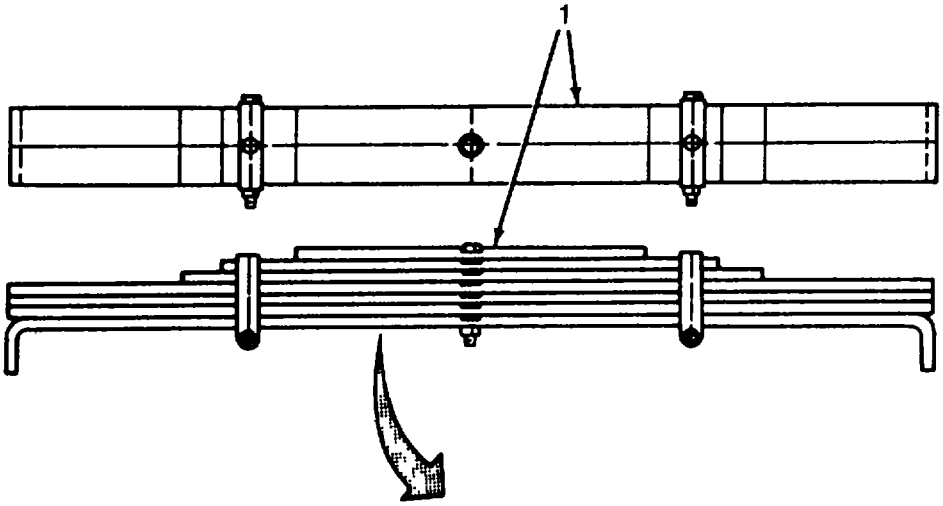
a. Position all spring bars in place so that center holes aline.

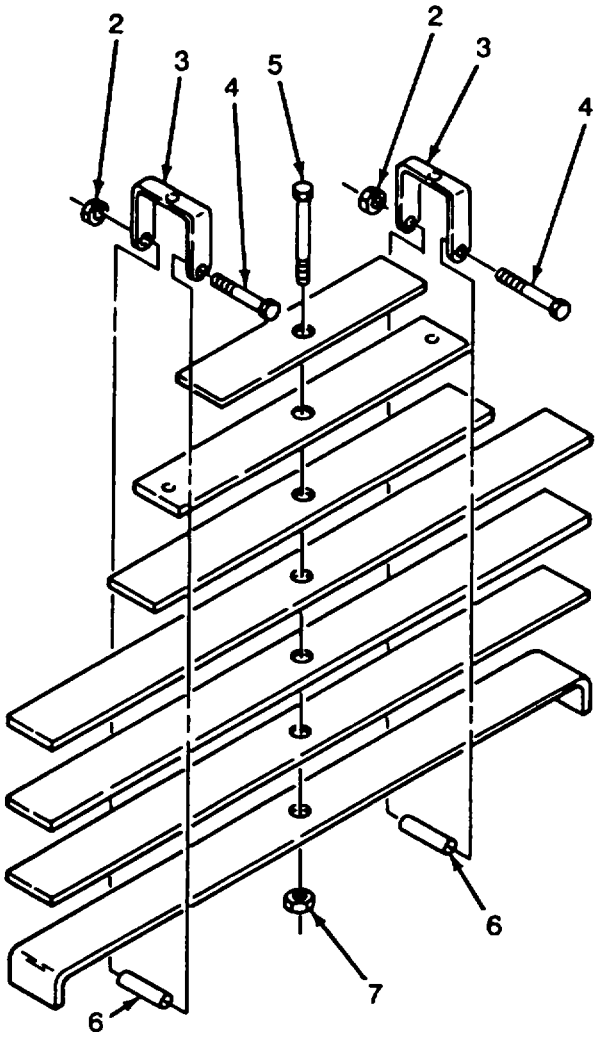
b. Install bolt (5) and nut (7).

c. Install two angle bars (3) with rivet pin keyed to hole in second spring bar from top.

d. Install two spacer tubes (6), two bolts (4), and two nuts (2).

3-69. SPRING ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.





3-69. (MODEL WPES-1) SPRING ASSEMBLY MAINTENANCE - continued.

INSTALLATION

WARNING

The spring assembly is heavy. Two people are needed to lift it to prevent personal injury or damage to the equipment

b. Lift and position spring assembly (4) to trunnion bracket (5).

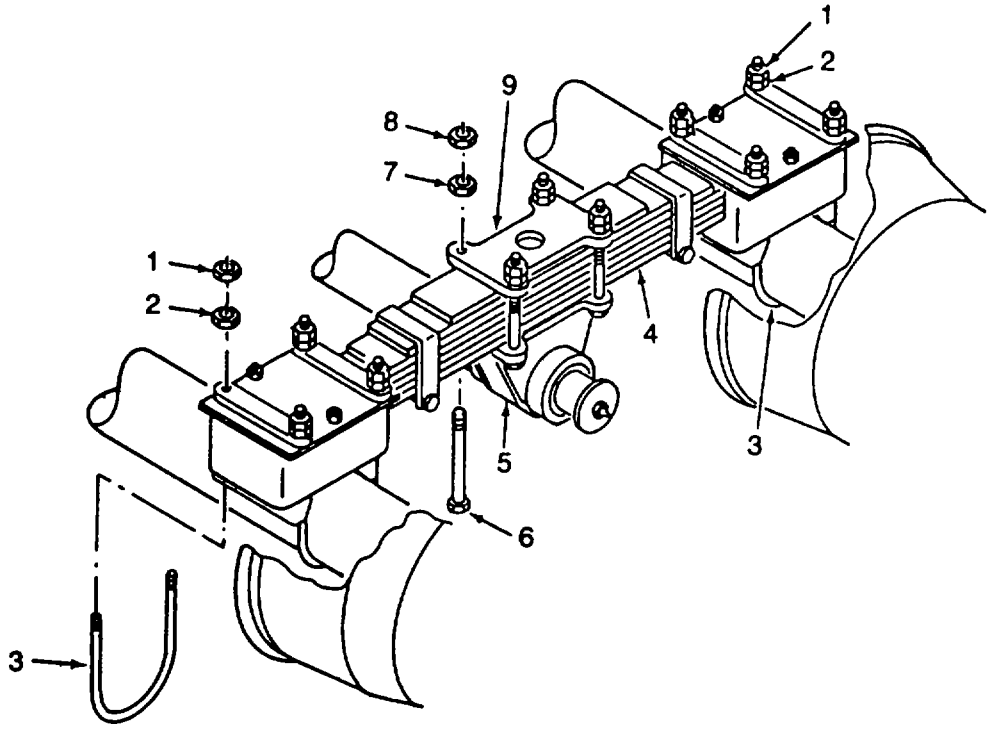
c. Position trunnion bracket plate (9) on spring assembly (4) and aline holes with holes in trunnion bracket (5).

d. Install eight bolts (6), eight retaining nuts (7), and eight backing nuts (8).

e. Install four U-bolts (3) and eight retaining nuts (2) and eight backing nuts (1).

f. Lower flatbed cargo trailer to normal operating position Refer to TM 10-4610-240-10.

3-69. SPRING ASSEMBLY MAINTENANCE (MODEL WPES-1) - continued.



3-70. AXLE ASSEMBLY MAINTENANCE (MODEL WPES-1).

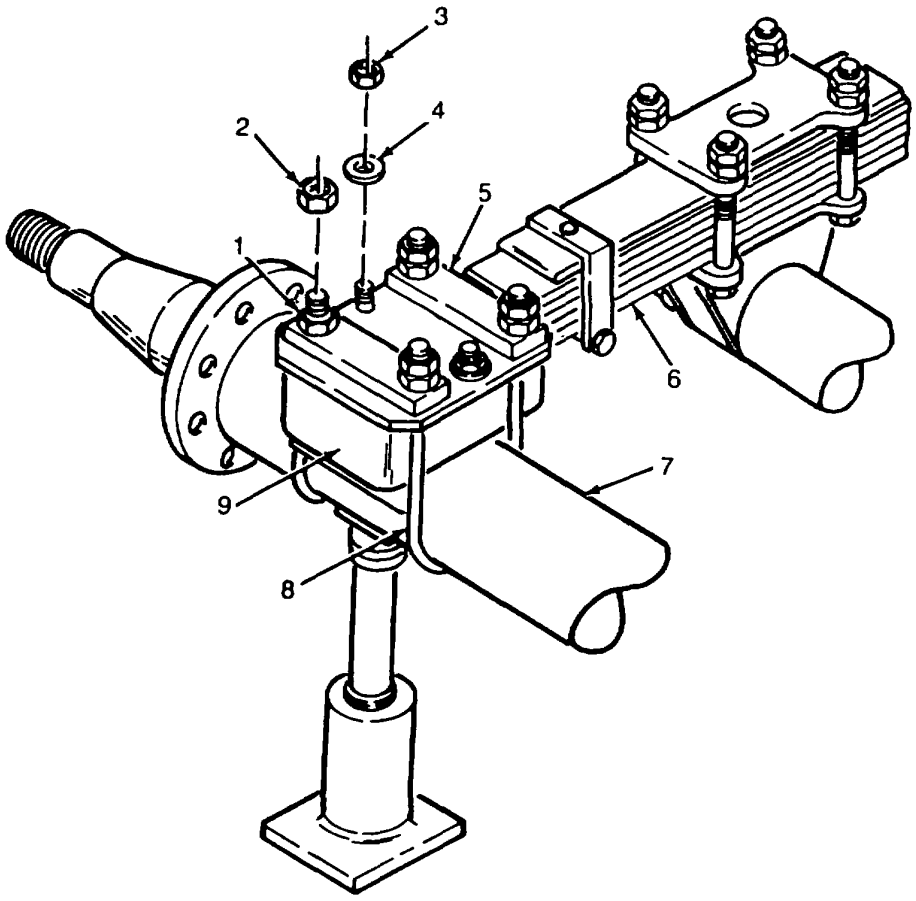
This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Two Hydraulic or Screw-Type Jacks (Appendix B, Section III, Item 3).
Jack Stands (Appendix B, Section III, Item 3)
Material/Parts Required
Lockwasher (4) - MS35338-48
Personnel Required
Two (2)
Equipment Condition
Both hub and drum assemblies removed (para. 2-100)
Both air chambers removed (para 2-102).
General Safety Requirements

WARNING

Lifting heavy equipment incorrectly can cause serious injury. See general warning page.



3-362

3-70. AXLE ASSEMBLY MAINTENANCE (MODEL WPES-1)- continued.

REMOVAL.

a. Using two hydraulic or screw-type jacks, support axle (7) to be removed at both ends.

WARNING

The axle is heavy. Two people are needed to lift it to prevent personal injury or damage to the equipment.

b. Remove eight backing nuts (2), eight retaining nuts (1), and four U-bolts (8).

c. Remove four nuts (3), four lockwashers (4), and two covers (5).

d. Lower and remove axle.

INSTALLATION.

WARNING

The axle is heavy. Two people are needed to lift it to prevent personal injury or damage to the equipment.

a. Place axle (7) in position underneath flatbed cargo trailer with a hydraulic or screw-type jack supporting each end of axle.

b. Raise axle (7) into position with springs (6) alined with spring box (9).

c. Install two covers (5), four lockwashers (4), and four nuts (3).

d. Install four U-bolts (8) around axle (7) and through cover (5).

e. Install eight retaining nuts (1) and eight backing nuts (2).

f. Torque retaining nuts (1) to 85-105 pound-feet (115.26-146.38 N.m) and install eight backing nuts (2) against them.

g. Install two air chambers. Refer to paragraph 2-96.

h. Install two hub and drum assemblies. Refer to paragraph 3-69.

CHAPTER 4

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

4-1. GENERAL.I

This section contains procedures for maintaining components that are the responsibility of General Support Maintenance

4-2. R. O. PUMP ASSEMBLY POWER END MAINTENANCE.

This task consists of:
a. Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4).
- Dial Gage, (Appendix B. Section III, Item 3).
- Arbor Press (Appendix B. Section III, Item 3).
- Gland Nut Adjustment Tool (Appendix B. Section III, Item 5).

Material/Parts Required
- Cleaning Solvent (Appendix C, Section II, Item 28).
- Rags (Appendix C, Section II, Item 23).
- Gasket (3) - 623A0619501051100
- Seal (3) -94111000103
- Seal (1) - 94111000127
- Gasket (1) - 624B0823400061000

Equipment Condition
- References
  - High pressure pump removed (paragraph 3-50).

General Safety Instructions

WARNING

Cleaning solvents are toxic and flammable. Observe safety precautions when using this material. See warning page at front of this manual.

4-2. R. O. PUMP ASSEMBLY POWER END MAINTENANCE - continued.

DISASSEMBLY

a. Drain oil from power frame (13) and remove screws (1) and cover (2)

b. Disconnect plungers (8) from crossheads (23) by unscrewing coupling nuts (9).

c. Loosen gland nuts (12), using gland nut adjustment tool and push plunger into the fluid cylinder (10) for clearance

d. Remove crosshead stub deflectors (7)

e. Remove bolts (6), stub seal caps (5), seals (4) (two per cap) and gaskets (3).

f. Remove oil level indicator (21), tee (20) and nipple (19).

g. Remove crankcase cover screws (28), crankcase cover (29) and gasket (30)

NOTE

If bearings are to be reused, mark bearings to ensure reinstallation on same connecting rod. Caps are pre-marked 1, 2 and 3 to correspond with like marks on connecting rod

h. Disconnect connecting rods (27) from crankshaft (31) by removing the connecting rod bolts (26), caps (25) and bearings (24). Push rods and crossheads (23) as far as possible into the fluid cylinder (13) for clearance

NOTE

Keep shims, if used, together with end cap for reassembly. If original crankshaft and/or bearings are to be reinstalled, shims should indicate correct end play. If any components were replaced, end play adjustment may be required during assembly.

i. Remove bolts (18 and 37), end caps (17 and 36) and shims (16 and 35).

NOTE

Crankshaft may be removed from either end of pump assembly. Bearing cup (15 or 33), depending on how crankshaft is removed, will come off with crankshaft

j. Remove crankshaft (31) and bearing cup (15 or 33)

k. Remove remaining bearing cups (15 or 33) and seal (34)

NOTE

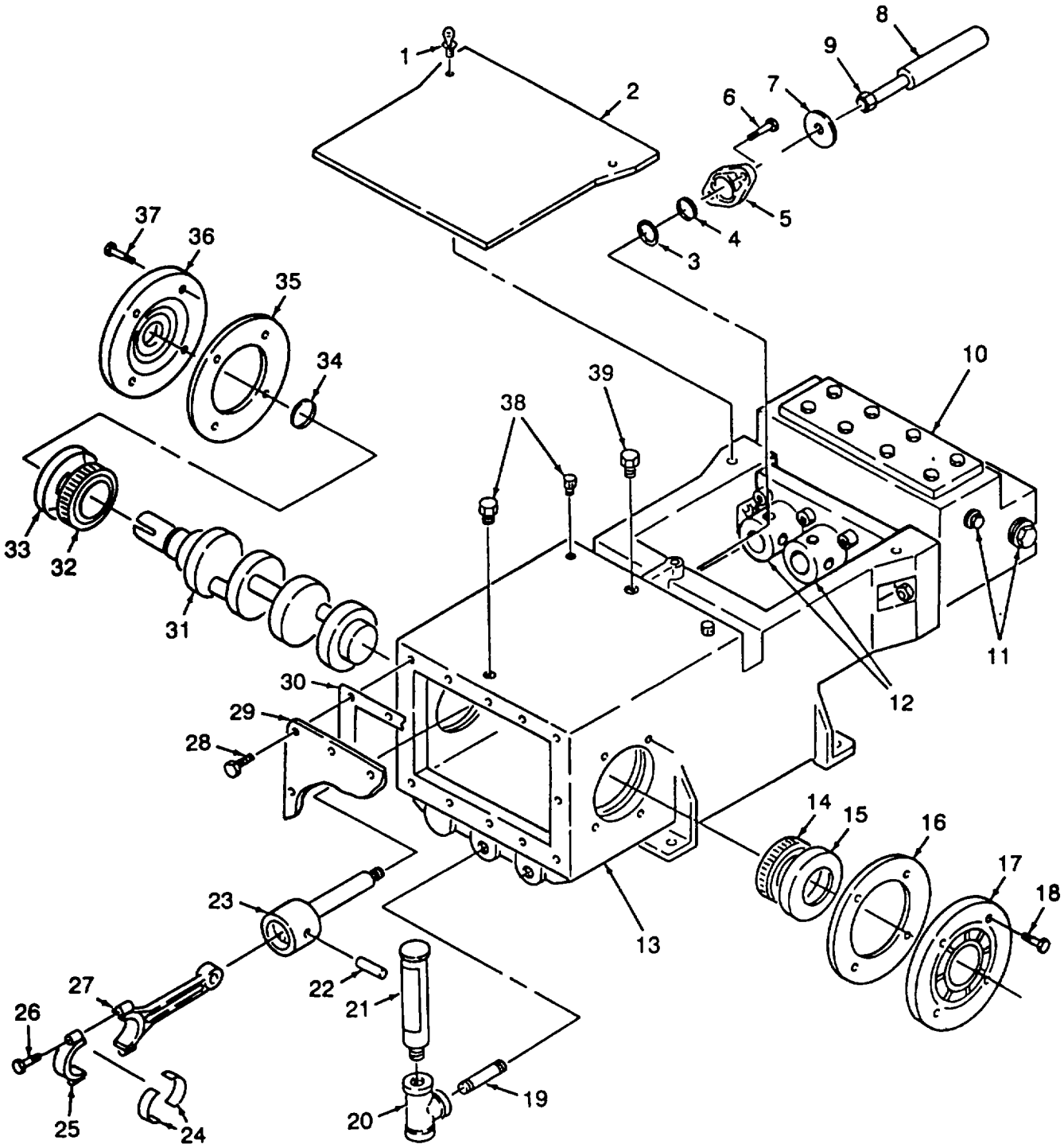
To remove bearing cones, use an arbor press or heat cones to 300 ° F at inner race.

l. Remove bearing cones (14 and 32)

4-2. R. O. PUMP ASSEMBLY POWER END MAINTENANCE - continued

m. Remove crossheads (23) and separate from connecting rods (27) by removing cross head pins (22).

n. As necessary remove plugs (11 and 38) and crankshaft breather (39).



4-2. R O. PUMP ASSEMBLY POWER END MAINTENANCE - continued

CLEANING

WARNING

Dry cleaning solvent PD-680 is highly toxic and can ignite organic materials, nitrates, carbides and chlorates. Wear eye, skin and respiratory protection. Use in well-ventilated area.

Clean all components with cleaning solvent and rags.

INSPECTION

a. Power Frame (13). Inspect frame for cracks, stripped threads and scratched or scored bearing surfaces, particularly in the crosshead bores, and excessive wear. If threads are stripped or power frame is cracked, badly scratched or scored, or if difference between inside diameter of bore and outside diameter of crosshead (with known good crosshead) exceeds 0.009 in, power frame should be replaced.

b. Crossheads (23). Check crossheads for wear, scratches and stripped threads. If crosshead is severely scratched, threads are stripped or, if difference between inside diameter of crosshead bore and outside diameter of crosshead exceeds 0.009 in, crosshead should be replaced

c. Connecting Rods (27). Check rods for cracks, deformation and excessive wear. Replace if unserviceable.

d. Crankshaft (31) and Connecting Rod Bearings (24). Check for worn journals and damaged/ worn bearings. If journals are rough, crankshaft should be replaced. If bearings are rough and /or if difference between internal diameter of bearings (bearings assembled on connecting rod, but without crankshaft) and outside diameter of corresponding crank shaft journal, exceeds 0.005 in, bearings should be replaced.

e. Plungers (8). Check for cracked or chipped ceramic material on sides of plunger and for worn/damaged connecting nut and retaining ring. Replace plunger if ceramic material is chipped or cracked. If connecting nut or retaining ring are damaged, replace them.

f. Miscellaneous Hardware. Check all remaining hardware for cracks, damaged threads, excessive wear, corrosion, deformation and other damage, making the item unserviceable. Replace unserviceable hardware.

Repair

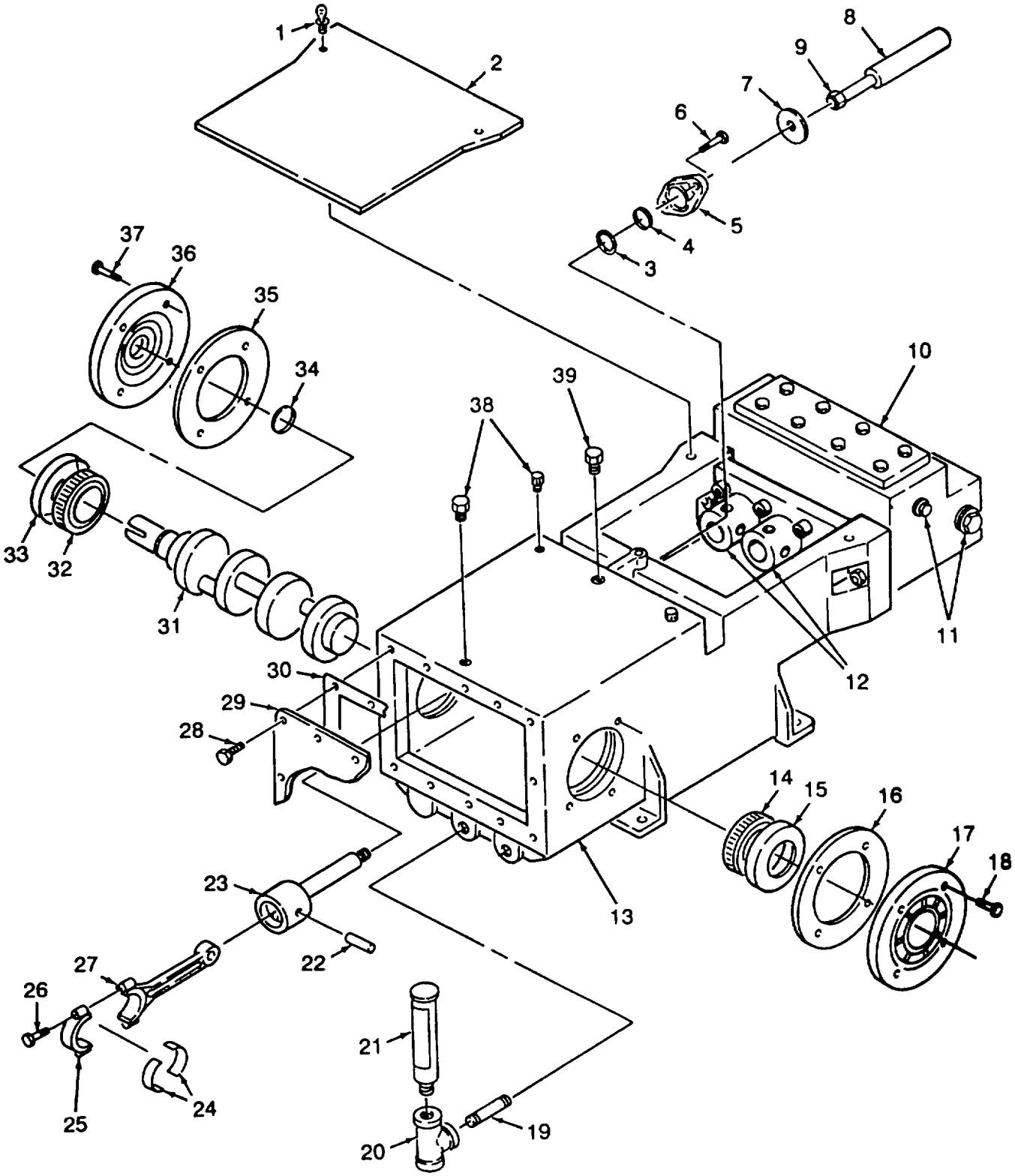
Repair of pump assembly at the power end shall consist of replacement of defective components. No attempt should be made to repair components by sanding, welding, honing or machining.

ASSEMBLY

a. Place power frame on a clean work bench.

b. Connect crossheads (23) to connecting rods (27), using pins (22)

4-2. R.O. PUMP ASSEMBLY POWER END MAINTENANCE - continued



4-2. R. O. PUMP ASSEMBLY POWER END MAINTENANCE - continued.

c. Insert crossheads (23) in power frame (13).

NOTE
To install bearing cones, use an arbor press or heat cones to 300 ° F at inner race.

d. Install bearing cones (14 and 32) on crankshaft (31) and position crankshaft in power frame (13).

e. Install bearing cups (15 and 33) in power frame (13).

f. Install seal (34) on end cap (36), tapping seal lightly with a soft mallet.

g. Install bearings (24), bearing caps (25) and screws (26). Torque screws to 20 lbs ft.

NOTE
Shims are provided in thicknesses of 0.005, 0.007 and 0.020 in. For best results a 0.005 and a 0.020 in shim should be installed to provide a starting point for initial measurement. Some shims may need to be removed, or additional shims added to obtain correct shaft end play.

h. Install two shims (16 and 35), end caps (17 and 36) and screws (18 and 37)). Check/adjust end play as follows:

(1) Install a dial gage as indicated.

(2) Push crankshaft (31) all the way to one side and zero dial gage.

(3) Push crankshaft (31) to other side and note end play on dial gage.

(4) If necessary add or remove shims (16 and 35) for correct end play of 0.001 to 0.003 in.

NOTE
When shimming is correct, connecting rods and pin bearings of connecting rod should be positioned near the center of the crosshead openings and should not touch the inside of the crosshead openings.

(5) Check if connecting rod pin bearings and/or connecting rods (27) touch the inside of their crosshead (23) openings.

(6) As necessary, transfer shims (16 or 35) from one side to the other to ensure that pin bearings are positioned properly and do not touch inside of crosshead openings.

(7) When adjustment is complete, torque screws (18 and 37) to 20 lbs ft.

4-2. R. O. PUMP ASSEMBLY POWER END MAINTENANCE - continued.

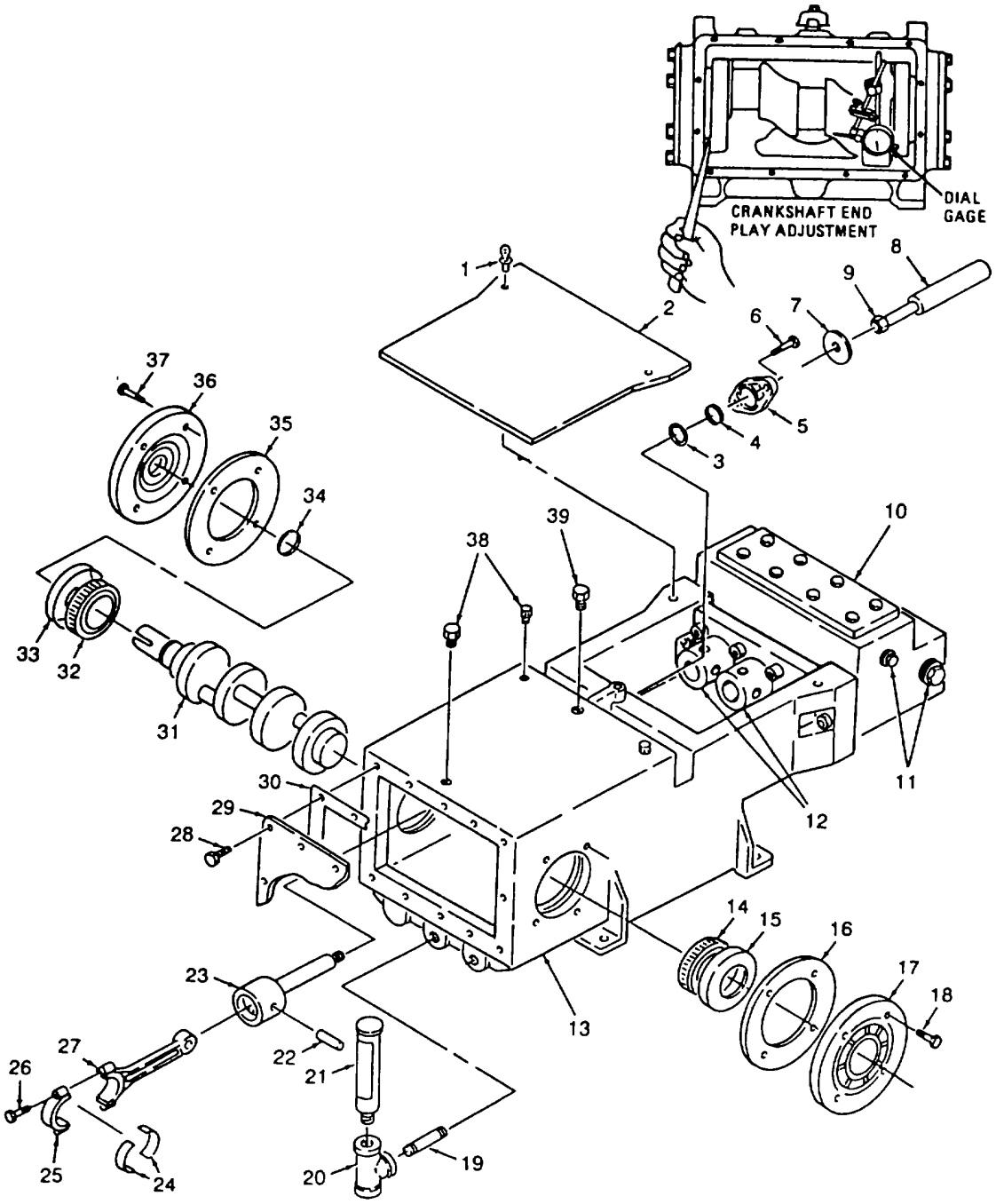
i. Install gaskets (3), seals (4) and caps (5) and secure with screws (6).

j. Install deflectors (7) and connect plungers (8) to crossheads (23). Torque nuts (9) to

k. Install top cover (2) and secure with screws (1).

l. Install gasket (30) and cover 929) with screws (28). Torque screws to 15 lbs ft.

m. If removed, install lugs (11 and 38)), sight gage (21), nipple (19) and tee (20).



APPENDIX A

REFERENCES

A-1. SCOPE.

This appendix contains all forms, pamphlets and technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS.

Discrepancy in Shipment Report	Form SF 361
Equipment Inspection and Maintenance Worksheet	DA Form 2404
Recommended Changes to Publications and Blank Forms	DA Form 2028
Maintenance Request	DA Form 2407
Modification Work Order	DA Form 2408-5
Packaging Improvement Report	DD Form 6
Recommended Changes to Equipment Technical Manuals	DA Form 2028-2
Report of Discrepancy	Form SF 364
Quality Deficiency Report	Form SF 368

A-3. TECHNICAL MANUALS

Destruction of Army Materiel to Prevent Enemy Use	TM 750-244-3
Equipment Records Procedures	TM 4700-15/1
Inspection, Care and Maintenance of Antifriction Bearings	TM 9-214
Lubrication Order; Water Purification Unit, Reverse Osmosis 600 GPH, Trailer Mounted, Flatbed Cargo, 5 Ton, 4 Wheel Tandem Model WPES-1, and Skid Mounted Models WPES-2 and WPES-3	LO 10-4610-240-12 LI 08580C-12 TO 40W4-13-31
Metal Body Repair and Related Operations	TM 9-450

A-3. TECHNICAL MANUALS - continued. |

Operator's Manual; Water Purification Unit, Reverse Osmosis, 600 GPH Trailer Mounted, Flatbed Cargo, 5 Ton 4 Wheel Tandem ROWPU Model WPES1 and Skid Mounted Models WPES-2 and WPES3	TM 10-4610-240-10
	TM 08580C-10/1
	TO 40W4-13-11
Operator's and Unit Maintenance Manual Including Repair Parts and Special Tools List for Tank, Fabric, Collapsible; Air Column Supported, Open Top, Water Storage, 3, 000 Gallons, Model 90028, NSN 5430-01-318-9434	TM 5-5430-225- 2&P
Operator's and Organizational Maintenance Manual for Generator Set, Diesel Engine Driven, Tactical Skid MTD, 30KW, 3 Phase, 4 Wire, 120/208 and 240/416 Volts	TM 5-6115-465-12
Operator's Manual: Welding Theory and Application	TM 9-237
Operator's Manual: Lather, Brake Drum, Floor Mounted	TM 9-4910-482-10
Organizational Care, Maintenance and Repair of Pneumatic Tires and Inner Tubes	TM 9-2610-200-20
Preservation, Packaging and Packing of Military Supplies and Equipment	TM 38-230-1/-2
Painting Instructions for Field Use	TM 9-213
Painting Instructions for Field Use	TM 43-0139
Painting, Preservation, and Waterproofing Instructions	TM 740-90-1
Unit, Direct Support, and General Support Repair Parts and Special Tools List; Water Purification Unit, Reverse Osmosis, 600-gph; Trailer-Mounted, Flatbed Cargo, 5-Ton, 4Wheel Tandem Model WPES-1 and Skid-Mounted Models WPES-2 and WPES-3	TM 10-4610-240-24P
	TM 08580C-24P/3
	T.O. 40W413-14

A-4. MISCELLANEOUS.

Camouflage of Vehicles	FM 5-20B
Consolidated Index of Army Publications and Blank Forms	DA Pam 25-30
Discrepancy and Shipment Report	MCO P4610.19

A-4. MISCELLANEOUS-continued.

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

General Repair for Canvas and Webbing..... FM 43-3

Index of Authorized Publications SL-1-2

Marine Corps, Military Incentive Awards Program ..... MCO 1650.17

Packaging Improvement Reporting ..... AR 735-11-2

Report of Item and Packaging Discrepancy..... MCO 4430.3

Report of Item and Packaging Discrepancy.....NAVMATINST 4355.73B

Reporting of Transportation Discrepancies in Shipment ..... AR 55-38

Security Procedures.....AR 190-11, AR 190-13

The Army Maintenance Management System (TAMMS) ..... DA Pam 738-750

Warranty Program for 600 GPH Reverse Osmosis Water Purification Unit (ROWPU)..... TM 10-4610-240-24

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL I

a. This section provides a general explanation of all maintenance and repair function authorized at various maintenance categories.

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

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

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

B-2. MAINTENANCE FUNCTIONS.

Maintenance functions will be limited to and are defined as follows:

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

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

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

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

e. .Aline. To adjust specified variable elements of an item to bring about a optimum 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.

B-2. MAINTENANCE FUNCTIONS- cont

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

h. Replace To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3rd position code of the SMR code.

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

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

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

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

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group numbers are “00".

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

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

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

The system designations for the various maintenance levels are shown on the following page

C.....	Operator or crew
O.....	Unit Maintenance
F	Direct Support Maintenance
H.....	General Support Maintenance
D.....	Depot Maintenance

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) common TMDE, and special tools, special TMDE, and support equipment required to perform the designated function.

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

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

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

b. Column 2, Maintenance Level. The lowest category of maintenance authorized to use the tool or test equipment c Column 3. Nomenclature Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The national stock number of the tool or test equipment.

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

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

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

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

Section II. MAINTENANCE ALLOCATION CHART FOR 600 GPM ROWPU

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
00	600 GPH ROWPU TYPES I, II, AND III								
01	STORAGE CHEST	INSPECT	0.1						
	(13221E8380-2)	REPLACE		0 1					
		REPAIR		1 0				4	
02	STORAGE CHEST	INSPECT	0 1						
	(13221E8380-1)	REPLACE		0.1					
		REPAIR		1.0				4	
03	BACKWASH PUMP ASSY	INSPECT	0 8						
	(13222E5260)	SERVICE	0.5						
		REPLACE		0.2				4	
		REPAIR		2 5	5.0				
0301	• CABLE ASSY (W42)	INSPECT	0.2						
	(13222E5311-5)	TEST		0.3				3	
		REPLACE		0.5				4	
		REPAIR			2 0			3, 4	
0302	• STRAINER (ASSY)	INSPECT	0 2						
	(13222E5231-1)	SERVICE	0 5						
		REPLACE		1.0				4	
		REPAIR		0.5				4	
0303	• CENTRIFUGAL PUMP (ASSY)	INSPECT	0 2						
	(13222E5262)	REPLACE		1 0				4	
		REPAIR			1.5			4	
	• • PUMP	REPLACE			1.0			4	
		REPAIR			1.5			4	
	• • MOTOR	REPLACE			0.5			4	
		REPAIR			1.5			3, 4	
0304	• BACK WASH PUMP FRAME	INSPECT	0.2						
	(13222E5261)	REPLACE		0.2				4	
		REPAIR			1.5			6	
04	RAW WATER PUMP ASSY	INSPECT	0.5						
	(13222E5250)	REPLACE		0.2					
		REPAIR		1.7	4.5			4	

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0401	• CABLE ASSY	INSPECT	0.2						
	(13222E5311-1	TEST		0.5				3	
		REPLACE		0.5				4	
		REPAIR			1.5			3,4	
0402	• CENTRIFUGAL PUMP (ASSY)	INSPECT	0.2						
	(13222E5338)	REPLACE		1.5				4	
		REPAIR			1.5			3,4	
	• • PUMP	REPLACE			1 0			4	
		REPAIR			1 5			4	
	• • MOTOR	REPLACE			0.5			4	
		REPAIR			2.0			3,4	
0403	• PUMP FRAME	INSPECT	0.1						
	(13222E5251-1)	REPLACE		0.2					
		REPAIR			1.5			6	
05	DISTRIBUTION PUMP ASSY	INSPECT	0.5						
	(13222E5265)	REPLACE		0.2					
		REPAIR		1.7	4.5			3,4	
0501	• CABLE ASSY	INSPECT	0.1						
	(13222E5311-2)	TEST		0.5				3	
		REPLACE		0.5				4	
		REPAIR			2.0			3,4	
0502	• CENTRIFUGAL PUMP (ASSY)	INSPECT	0.2						
	(13222E5337)	REPLACE		1.0				4	
		REPAIR			1.5			3,4	
	• • PUMP	REPLACE			1.0			4	
		REPAIR			1.5			4	
	• • MOTOR	REPLACE			0 5			4	
		REPAIR			1.0			3,4	
0503	• PUMP FRAME	INSPECT	0.1						
	(13222E5251-2	REPLACE		0.2					
		REPAIR			2.0			6	
06	• HOSE ASSEMBLIES	INSPECT	0.4						
		REPLACE		0.4					
		REPAIR		.5					K
07	GATE VALVES AND FITTINGS	INSPECT	0.1						
		REPLACE		0.5				4	
		REPAIR		0.7				4	K

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
08	CHEMICAL CANS AND FRAME (13226E7990)	INSPECT	0.1						
		REPLACE		0 2				4	
		REPAIR		1.0	2 0			4, 6	L
09	DEIONIZATION CARTRIDGES (13221E8341)	INSPECT	0 1						
		REPLACE	0.2					4	
10	TDS MONITOR (13227E7585)	INSPECT	0 1						
		CALIBRATE		1 0				3, 4	
		REPLACE		0 2					
		REPAIR			2 0			3, 4	M
11	WATER TANK								N
12	GENERATOR SET	REMOVE/ INSTALL			1.0				P
13	600 GPH ROWPU (ARMY/AF/MC)	REMOVE/ INSTALL		2.0				3, 4	
1301	• COVER (13222E5239-5)	INSPECT	0 2						
		REPLACE		0 5					
		REPAIR			2 0				
1302	• COVER PLATE (13228E8306)	INSPECT	0 2					4	
		REPLACE		0.5					
1303	• PIPING INSTALLATION (13228E8260-2)								
	• • GROOVED PIPE (PIPE SECTIONS, CLAMPS, FITTINGS, ETC.)	INSPECT	0.5					4	
		REPLACE		1.0					
	• • THREADED PIPE (PIPE SECTIONS, ELBOWS, FITTINGS, ETC.)	INSPECT	0.1						
		REPLACE		1 2				4	
	• • TUBING (TUBE SECTIONS, ELBOWS, FITTINGS, ETC.)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • GATE VALVE (VENT VESSELS, 13228E8260-40)	INSPECT	0.1						
		REPLACE		0.5				4	
		REPAIR		0.5				4	A
	• • FLOW METER (PRODUCT WATER FLOW, 13222E5278)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • FLOWMETER (RAW WATER, 13222E5247-1)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • CHECK VALVE (13228E8300)	INSPECT	0 1						
		REPLACE		1 0				4	

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
	• • BALL VALVE (13221E8271-4)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • BALL VALVE (13221E8271-7)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • DIFF PRESSURE GAGE (13222E5329-4)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • FLOWMETER (BRINE WATER, 13222E5247-2)	INSPECT	0.1						
		REPLACE		1 0				4	
	• • NEEDLE VALVE (PRODUCT WATER REGULATING, 13228E8305)	INSPECT	0.1						
		REPLACE		1 0				4	
	• • DIFF PRESS GAGE (R.O. VESSELS, 13221E8316-2)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • 2-WAY VALVE (ON-OFF) (13226E7981-1)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • BALL VALVE (13221E8271-5)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • BALL VALVE (13221E8271-8)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • BALL VALVE (13221E8217-6)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • 3-WAY BALL VALVE (BACKWASH, 13221E8282-6)	INSPECT	0.1						
		REPLACE		1 0				4	
		REPAIR		1.5				4	B
	• • CHECK VALVE (13228E8301)	INSPECT	0.1						
		REPLACE		1 0				4	
	• • WATER METER (FLOW RATE INDICATOR, 13227E7586)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • VACUUM BREAKER (13227E9238)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • DIFF. PRESS. GAGE (MULTI-MEDIA FILTER, 13222E5329-3)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • FLOWMETER (RAW WATER, 13222E5247-3)	INSPECT	0.1						
		REPLACE		1 0				4	
	• • PRESSURE GAGE (13221E8340)	INSPECT	0.1						
		REPLACE		1.0				4	

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
	• • RELIEF VALVE (13222E5238)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • ELLIPTIC VALVE	INSPECT	0.1						
	(13226E7982-4)	REPLACE		0 5				4	
	• • 3-WAY BALL VALVE	INSPECT	0.1						
	(13222E5276)	REPLACE		0.5				4	
1304	• ELECTRICAL INSTALLATION								
	• • CABLE ASSEMBLY (R.O.	INSPECT	0.1						
	PUMP, 1322E5311-4)	TEST		1 0				3	
		REPLACE		0.5				4	
		REPAIR			2.0			3, 4	
	• • CABLE ASSEMBLY W52	INSPECT	0.1						
	(JUNCTION BOX, 13222E5288-2)	TEST		1.0				3	
		REPLACE		0.5				4	
		REPAIR			3.0			3, 4	
	• • CABLE ASSEMBLY W40	INSPECT	0.1						
	(GENERATOR, 13227E9244)	TEST		0.5				3	
	(ARMY/MC ONLY)	REPLACE		0.5				4	
		REPAIR			2.5			3, 4	
	• • ELECTRICAL CABLE W50	INSPECT	0.1						
	(CHEM FEED PUMP, 13222E5312-	TEST			0.5			3	
	5)	REPLACE			0.5			4	
		REPAIR			1.0			3, 4	
	• • CABLE ASSEMBLY W56	INSPECT	0.1						
	(13221E8326-5)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1 5			3, 4	
	• • ELECTRICAL CABLE W46	INSPECT	0.1						
	(HIGH PRESS SWITCH,	TEST			0.5			3	
	13222E5312-1)	REPLACE			1 0			4	
		REPAIR			1.0			3, 4	
	• • CABLE ASSEMBLY W49	INSPECT	0.1						
	(FILTER CONTROL, 13221E8326-1)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1 0			3, 4	
	• • ELECTRICAL CABLE W51	INSPECT	0.1						
	(BOOSTER PUMP, 13222E5312-6)	TEST			0 5			3	
		REPLACE			1.5			4	
		REPAIR			1.0			3, 4	

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
	• • ELECTRICAL CABLE W48 (13222E5312-3)	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			1.5			4	
		REPAIR			1.0			3, 4	
	• • ELECTRICAL CABLE W47 (13222E5312-2)	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			1.5			4	
		REPAIR			1.0			3, 4	
	• • CABLE ASSEMBLY W53 (BACKWASH TIMER, 13221E8326-2)	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.0			3, 4	
	• • CABLE ASSY W57 (DISSOLVED SOLIDS SENSOR, 13227E7584)	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			0.5			4	
		REPAIR			1.0			3, 4	
1305	• HIGH PRESSURE SWITCH (13228E8303)	INSPECT	0.1						
		REPLACE		1.0				4	
1306	• LOW PRESSURE SWITCH (13228E8302)	INSPECT	0.1						
		REPLACE		1.0				4	
1307	• CENTRIFUGAL PUMP (BOOSTER) (13222E5337)	INSPECT	0.1						
		REPLACE		1.0				4	
		REPAIR			2.5			3, 4	
	• • PUMP	REPLACE			1.0			4	
		REPAIR			1.5			4	
	• • MOTOR	REPLACE			1.0			4	
		REPAIR			2.0			3, 4	
1308	• CHEMICAL FEED PUMP (13226E8326)	INSPECT	0.2						
		SERVICE	0.5	1.0				4	
		REPLACE		1.5				4	
		REPAIR		1.0	2.5			3,4	
	• • DIAPHRAGM PUMPS	REPLACE		0.5				4	
		REPAIR		0.7				4	
	• • MOTOR	REPLACE		0.5				4	
		REPAIR			1.0			4	
	• • HOUSING	REPLACE			1.0			4	
		REPAIR			2.0			3, 4	

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
1309	• CARTRIDGE FILTER	INSPECT	0.2						
	(13226E8333)	REPLACE		1.5				4	
		REPAIR		2.0	3 0			4	C
1310	• R.O. PUMP ASSEMBLY	INSPECT	0.4						
	(13229E5635-1)	ADJUST		0.5				4	
		SERVICE	0.5	1.0				4	
		REPLACE			4.0			3, 4	
		REPAIR		2.0		12.0		2, 3, 4, 5	J
	• • FLUID PRESSURE	INSPECT	0.1						
	DAMPENER (13229E5631)	REPLACE		0.5				4	
	• • BELT GUARD (13221E8291)	INSPECT	0.5						
		REPLACE		0.5				4	
	• • V-BELTS	INSPECT	0.2						
		REPLACE		1.0				4	
	• • ELECTRIC MOTOR	INSPECT	0.2						
		REPLACE			2 0			3, 4	
		REPAIR			3 0			3, 4	
	• • HIGH PRESSURE PUMP	INSPECT	0.2						
		ADJUST	0.5					4	
		REPLACE			2.0			3, 4	
		REPAIR		1.0	2.0	6.0		2, 3, 4, 5	D
	• • • FLUID END	REPLACE			1 0			4	
		REPAIR			2 0			2, 3, 4, 5	
	• • • POWER END	REPLACE			2 0			3, 4	
		REPAIR				6 0		3, 4	
	• • PUMP AND MOTOR STAND	INSPECT	0.2						
	(13222E6292)	REPLACE			1 5			3, 4	
		REPAIR			2.0			3, 4	
1311	• MULTIMEDIA FILTER	INSPECT	0.4						
	(13222E5328)	REPLACE			2.0			3, 4	
		REPAIR		0.5	4.0			1, 3, 4	
	• • TIMER	INSPECT	0.2						
		REPLACE		1.0				4	
		REPAIR			1.2			4	
	• • CONTROL VALVE	INSPECT	0.2						
		REPLACE		1.0				4	
		REPAIR			1 5			4	

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
	• • DIAPHRAGM VALVE	INSPECT	0 2						
		REPLACE		1.0				4	
		REPAIR		0 5				4	E
	• • FILTER TANK	INSPECT	0 2						
		REPLACE			2.5			3, 4	
		REPAIR			3.0			1, 4	
1312	• R.O. PRESSURE TUBES	INSPECT	0.4						
	(13222E5320)	SERVICE	1 0					4	
		REPLACE		2 0				4	
		REPAIR		1 5				4	
1313	• CONTROL BOX ASSEMBLY	INSPECT	.02						
	(13222E5340	REPLACE			4.0			4	
		REPAIR		0 5	6.0			3, 4	F
	• • WIRING HARNESS W1	TEST			0.5			3	
	(13222E5344)	REPLACE			1 0			4	
		REPAIR			1 0			3, 4	
	• • WIRING HARNESS W2	TEST			0.5			3	
	(13222E5287)	REPLACE			1.0			4	
		REPAIR			1.0			3, 4	
	• • WIRING HARNESS W54	TEST			0.5			3	
	(13226E8340)	REPLACE			1.0			4	
		REPAIR			1.0			3, 4	
1314	• JUNCTION BOX ASSEMBLY	INSPECT	0.2						
	(13222E5300)	REPLACE			3 0			4	
		REPAIR		2.5	6.0			3, 4	G
	• • COVER (13222E5306)	INSPECT	0.2	0.5					
		REPLACE		0.5				4	
		REPAIR		1.5				4	
	• • WIRING HARNESS W3	TEST			0.5			3	
	(13222E5308)	REPLACE			1.0			4	
		REPAIR			1.5			3, 4	
	• • WIRING HARNESS W4	TEST			0.5			3	
	(CONTROL BOX, 13222E5299)	REPLACE			1.0			4	
		REPAIR			1.5			3, 4	
	• • WIRING HARNESS W5	TEST			0.5			3	
	(GENERATOR,13227E9243)	REPLACE			1.0			4	
		REPAIR			1.5			3, 4	

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
	• • WIRING HARNESS W6 (BACKWASH PUMP, 13222E5982)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	• • WIRING HARNESS W7 (RAW WATER PUMP NO. 1, 132225298-3)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	• • WIRING HARNESS W8 (RAW WATER PUMP NO. 2, 13222E5298-4)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	• • WIRING HARNESS W9 (DISTRIBUTION PUMP, 13222E5298-5)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	• • WIRING HARNESS W10 (13222E5298-6)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	• • WIRING HARNESS W39 (13222E5309)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	• • MOTOR STARTERS	REPLACE			1.0			4	
		REPAIR			0.5			4	H
1315	• LIGHT ASSEMBLY (PANEL, 13222E5271)	INSPECT	0.2	0.5					
		REPLACE		1.0				4	
		REPAIR		0.5				4	
1316	• STORAGE BOX (R.O. TUBES, 13222E8348)	INSPECT	0.2						
		REPLACE		0.5				4	
		REPAIR			2.0			6	
1317	• FRAME	INSPECT	0.5						
		REPAIR		2.0	4.0			4,6	
14	FLAT BED CARGO TRAILER (13222E7100M)	INSPECT	0.5						
		SERVICE		0.5				4	
		REPLACE			3.0			3,4	
		REPAIR			8.0			3,4	
1401	• JACK ASSEMBLY (13227E9242)	INSPECT	0.2						
		REPLACE		1.5				4	
1402	• ELECTRICAL INSTALLATION (13222E7120)	INSPECT	0.5						
		REPLACE		2.5				4	
		REPAIR		0.5	2.5			3,4	

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) RE-MARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
	• • LIGHT ASSY	INSPECT	0.1						
	(MS52125-2)	REPAIR		0.5				4	
	• • TRAILER CABLE ASSY	INSPECT	0.2						
	(13222E7122)	REPLACE		1 0				4	
		REPAIR			1 5			3, 4	
	• • WIRING HARNESS	INSPECT	0 2						
	(13222E7126)	REPLACE		1 5				4	
		REPAIR			1.0			3, 4	
1403	• AIR BRAKE INSTALLATION	INSPECT	0.2						
	(13222E7110)	REPLACE		2.0				4	
		REPAIR			1.5			3, 4	
	• • AIR CLEANER ASSY	INSPECT	.01						
	(13222E7114)	SERVICE		.05				4	
		REPLACE		.05				4	
	• • RELAY VALVE (13222E7116)	INSPECT	0 2						
		REPLACE		1.0				4	
		REPAIR			1.5			4 .	
1404	• SUSPENSION ASSY	INSPECT	0.6						
	(13222E7090)	SERVICE		1.5				3, 4	
		ADJUST		0.5				3, 4	
		REPLACE			3.0			3, 4	
		REPAIR			10.5			3, 4	
	• • BRAKE ASSY	INSPECT	0.2						
		REPAIR		1.0	2.0			3, 4	Q
	• • SPRING ASSY	INSPECT	0.2						
		REPAIR			3.0			3, 4	
	• • AXLE ASSY	INSPECT	0.2						
		SERVICE		1.5				4	
		REPAIR			1.5			3, 4	
1405	• FRAME (13222E5337)	INSPECT	0.5						
		REPAIR			4.0			3, 4, 6	

Section III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

(1) REFERENCE CODE	(2) MAINTENANCE CATEGORY	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER (NSN)	(5) TOOL NUMBER
1	F	Hose, Nonmetallic, 5/8-in. Diamter	4720-01-199-7806	
2	F	Puller Assembly, Valve (61748) 8111428		
3	O	Shop Set, Automotive Vehicle	4910-00-754-0654	SC-4910-95-CL-A72
4	O	Tool Kit, General Mechanics	5180-00-177-7033	SC 5180-90-CL-N26
5	F	Tool, Gland Adjusting (61748) 003		
6	F	Welding Shop, Trailer Mounted	3431-01-090-1231	SC3431-95-CL-A04

Section IV. Remarks

REFERENCE CODE	REMARKS
A	ORG REPAIR LIMITED TO REPLACEMENT OF STEM PACKING AND HANDLE
B	ORG REPAIR LIMIT TO REPLACEMENT OF O-RINGS
C	ORG REPAIR LIMITED TO REPLACEMENT OF COVER. FILTER TUBES, SEATS, SPRINGS, AND O-RINGS
D	ORG REPAIR LIMITED TO REPLACEMENT OF SIGHT GAGE, DRAIN HOSE, DRAIN VALVE AND CLAMPS
E	ORG WILL REPLACE INTERNAL DIAPHRAGM COMPONENTS
F	ORG REPAIR LIMITED TO REPLACEMENT OF LAMPS
G	ORG REPAIR OF JUNCTION BOX ASSEMBLY LIMITED TO REPLACEMENT OF INFORMATION PLATES, ELECTRICAL COVERS AND GFI RECEPTACLE
H	REPAIR LIMITED TO REPLACEMENT OF CONTACTS AND HEATERS
I	ORG LEVEL REPAIR LIMITED TO REPLACEMENT OF STRAPS, BRACKETS, AND RELATED HARDWARE
J	ORG REPAIR LIMITED TO REPLACEMENT OF MOTOR AND PUMP SHEAVES
K	ORG REPAIR LIMITED TO REPLACEMENT OF GASKETS, CAPS, AND CHAINS
L	DS REPAIR LIMITED TO WELDING OF FRAME
M	REPAIR LIMITED TO REPLACEMENT OF ELECTRICAL CABLES.
N	GOVERNMENT FURNISHED EQUIPMENT REFER TO TM5-5430-227-12&P
O	CLEAN AND REPACK WHEEL BEARINGS
P	GOVERNMENT FURNISHED EQUIPMENT REFER TO TM5-6115-465 12
Q	UNIT LEVEL REPAIR LIMITED TO REPLACEMENT OF BRAKE SHOES

APPENDIX C

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

C-1. SCOPE.

This appendix lists expendable/durable supplies and materials you will need to operate and maintain the Reverse Osmosis Water Purification Unit. This listing is for informational purpose only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

C-2. EXPLANATION OF COLUMNS.

a. Column 1 Item Number. This number is assigned to the entry in the listing and is referenced in the task Initial Setup instructions to identify the material; e. g. , "Drycleaning solvent (Appx C). "

b. Column 2 Category. This column identified the lowest category of maintenance that requires the listed item:

C Operator/Crew
O Unit Maintenance
F Direct Support Maintenance
G General Support Maintenance

c. Column 3 National Stock Number. This is the national stock number assigned to the item; use it to request or requisition the items.

d. Column 4 Description. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Commercial And Government Entity (CAGE) Code for Manufacturer in parentheses, if applicable.

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 rest of the issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Item Number	Category	National Stock Number	Description	U/M
1	F	8040-00-078-9774	Adhesive (71984) 732RTV	TU
2	F	8040-00-262-9005	Adhesive (81348) MMM-A-1617, Type II	TB
3	O		Anthracite, No. 2 (71726) 1610-16	EA
4	O	6810-00-242-4770	Calcium Hypochlorite, Technical. 3-3/4 lb Plastic bottle (81348) O-C-114, Type I	EA
5	O	6810-01-044-0315	Chlorine Test Tablets: Palin, DPD Chlorine #1: 100 Per Box, (79172) U-2510	BX
6	O	6810-01-164-3975	Citric Acid, Anhydrous, Technical· Crystalline, 3/4 Lb Plastic Bottle; (81349) MIL-C-52947	EA
7	F	8305-00-059-5074	Cloth, Chessescloth	LB
8	O	6850-01-167-5318	Coagulant, Liquid, Water Treatment: 2.35 lb Plastic Bottle; (81549) MIL-I-52701	EA
9	F	4925-01-241-5013	Compound, locking (81349) MIL-S-46163	OZ
10	O	7930-00-282-9699	Detergent, GP, Liq, WS, A (81349) MIL-D-16791	GL
11	O		Garnet, No 12 (71726) 1633-16	EA
12	O		Garnet, No. 50 fine (71726) 1630-16	EA
13	O		Gravel, 1/4-inch (71726) 1621-16	EA
14	O		Grease, 35-616	LB

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Item Number	Category	National Stock Number	Description	U/M
15	O	9150-00-190-0904	Grease, automotive and artillery, GAA (81349) MIL-G-10924	EA
16	O	9150-01-161-4600	Grease, silicone (71984) DC-18	TB
17	O	6810-00-87-2340	Indicator Solution, pH Wide Range 16 Oz Plastic Bottle (81349) MIL-I-52701	EA
18	O	9150-01-132-8871	Lubricant, O-Ring, Silicone Base: Moisture Resistant; −65°F to 400°F, 2 Oz Tube (02697) 884-2	EA
19	O		Media, plastic (71726) 1631-16	EA
20	O	9150-01-035-5395	Oil, lubricating (81349) MIL-L-2105	GL
21	O	9150-01-152-4117	Oil, lubricating, internal combustion engine (81349) MIL-L-2104	GL
22	O		Oil, lubricating, multipurpose	GL
23	O	7920-00-205-1711	Rags, wiping (58536) A-A-531	LB
24	O		Sand, filter (71726) 1632-16	EA
25	O		Sandpaper, No. 00	EA
26	O	6810-01-164-3941	Sodium Hexametaphosphate, Technical, 2 lb Plastic Bottle, (81349) MIL-S-51078	EA
27	F	3439-00-003-8602	Solder, lead-tin alloy (81349) QQ-S-571	LB
28	F	6850-00-110-4498	Solvent, drycleaning (81349) PD-680, Type II	PT

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Item Number	Category	National Stock Number	Description	U/M
29	O	6850-01-163-7635	Sulfactant, Liquid Anhydrous, Non-Ionic (Isooctylphenoxypoly-ethoxyethanol; 10 Moles Ethylene Oxide; 2 Lb Plastic Bottle (77902)	EA
30	O	8030-00-889-3534	Tape, antiseize, roll (81349) MIL-T-27730	EA
31	O	5970-00-147-5674	Tape, electrical roll (81349) MIL-I-24391	EA
32	O		Tape, nomex, roll	EA
33	O	4020-00-138-7042	Twine, ball (81349) MIL-T-713	EA

APPENDIX D

ILLUSTRATED LIST OF MANUFACTU RED ITEMS

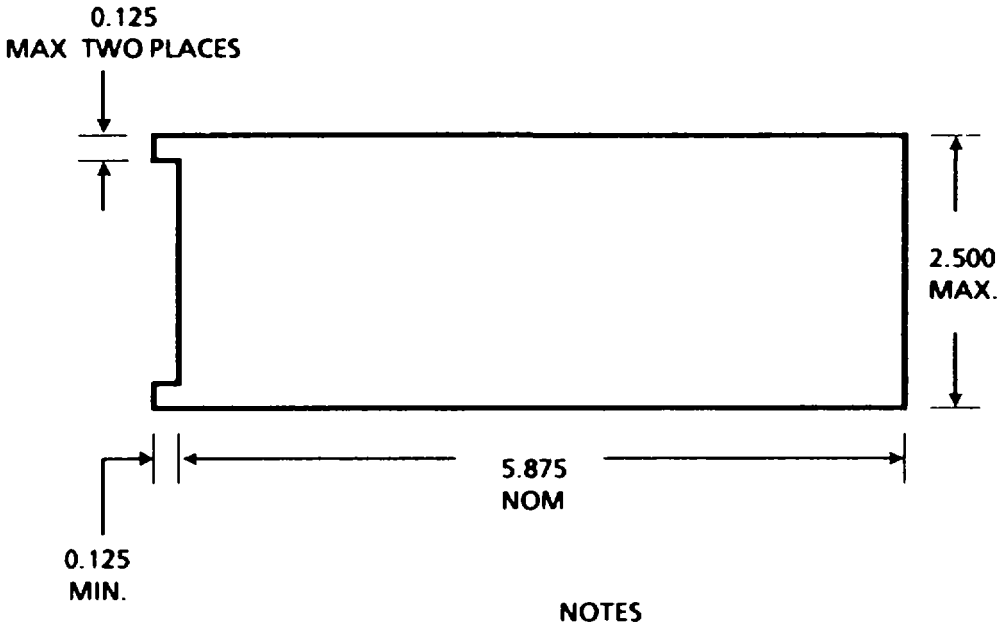
Alphabetical Index

D-1. INTRODUCTION.

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at unit maintenance A part number index in alphanumeric order is provided for cross- referencing the part number of the item to be manufactured to the figure which covers fabrication criteria. All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

D-2. MANUFACTURED ITEMS PART NUMBER INDEX.

Part Name: Gland Removal Tool



NOTES

1. ALL DIMENSIONS IN INCHES.
2 CUT FROM BULK ALUMINUM SHEET 0 125 INCH THICK.
3 MACHINE TO INDICATED DIMENSIONS
4 REMOVE ALL BURRS.

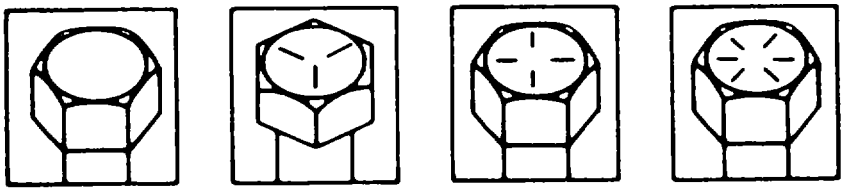
APPENDIX E

TORQUE LIMITS

USAGE	MUCH USED	MUCH USED	USED AT TIMES	USED AT TIMES
CAPSCREW DIAMETER AND MINIMUM TENSILE STRENGTH PSI (KG/SQ CM)	To 1/2–69 000 (4850 7000) To 3/4–64 000 (4499 2000) To 1 –55 000 (3866 5000)	To 3/4–120 000 (8436 0000) To 1 –115 000 (8084 5000)	To 5/8–140 000 (9842 0000) To 3/4–133 000 (9349 9000)	150 000 (10545 0000)
QUALITY OF MATERIAL	INDETERMINATE	MINIMUM COMMERCIAL	MEDIUM COMMERCIAL	BEST COMMERCIAL
SAE GRADE NUMBER	1 or 2	5	6 or 7	8

CAPSCREW HEAD MARKINGS

Manufacturer s marks may vary These are all SAE Grade 5 (3 line)



CAPSCREW BODY SIZE (INCHES)–(THREAD)	TORQUE FT LB (KG M)		TORQUE FT LB (KG M)		TORQUE FT LB (KG M)		TORQUE FT LB (KG M)	
1/4- 20	5	(0 6915)	8	(1 1064)	10	(1 3830)	12	(1 6596)
–28	6	(0 8293)	10	(1 3830)			14	(1 9362)
5/16–18	11	(1 5213)	17	(2 3511)	19	(2 6277)	24	(3 3192)
–24	13	(1 7979)	19	(2 6277)			27	(3 7341)
3/8–16	18	(2 4894)	31	(4 2873)	34	(4 7022)	44	(6 0852)
–24	20	(2 7660)	35	(4 8405)			49	(6 7767)
7/16–14	28	(3 8132)	49	(6 7767)	55	(7 6065)	70	(9 6810)
–20	30	(4 1490)	55	(7 6065)			78	(10 7874)
1/2- 13	39	(5 3937)	75	(10 3725)	85	(11 7555)	105	(14 5215)
–20	41	(5 6703)	85	(11 7555)			120	(16 5960)
9/16–12	51	(7 0533)	110	(15 2130)	120	(16 5960)	155	(21 4365)
–18	55	(7 6065)	120	(16 5960)			170	(23 5110)
5/8–11	83	(11 4769)	150	(20 7450)	167	(23 0961)	210	(29 0430)
–18	95	(13 1385)	170	(23 5110)			240	(33 1920)
3/4–10	105	(14 5215)	270	(37 3410)	280	(38 7240)	375	(51 8625)
–16	115	(15 9045)	295	(40 7985)			420	(58 0860)
7/8–9	160	(22 1280)	395	(54 6285)	440	(60 8520)	605	(83 6715)
–14	175	(24 2025)	435	(60 1605)			675	(93 3525)
1–8	235	(32 5005)	590	(81 5970)	660	(91 2780)	910	(125 8530)
–14	250	(34 5750)	660	(91 2780)			990	(136 9170)

1 Always use the torque values listed above when specific specifications are are not available

NOTE

Do not use above values in place of those specified in this manual special attentional should be observed in case of SAE Grade 6 7 and 8 capscrews

2 The above is based on use of clean and dry threads

3 Reduce torque by 10% when oil is used as a lubricant

4 Reduce torque by 20% if new plated capscrews are used

CAUTION

Capscrews threaded into aluminum may require reductions in torque of 30% or more, unless inserts are used

GLOSSARY

Section I. ABBREVIATIONS

R.O ..... Reverse Osmosis
ROWPU ..... Reverse Osmosis Water Purification Unit

Section II. DEFINITION OF UNUSUALTERMS

There are no unusual terms used in this manual

ALPHABETICAL INDEX

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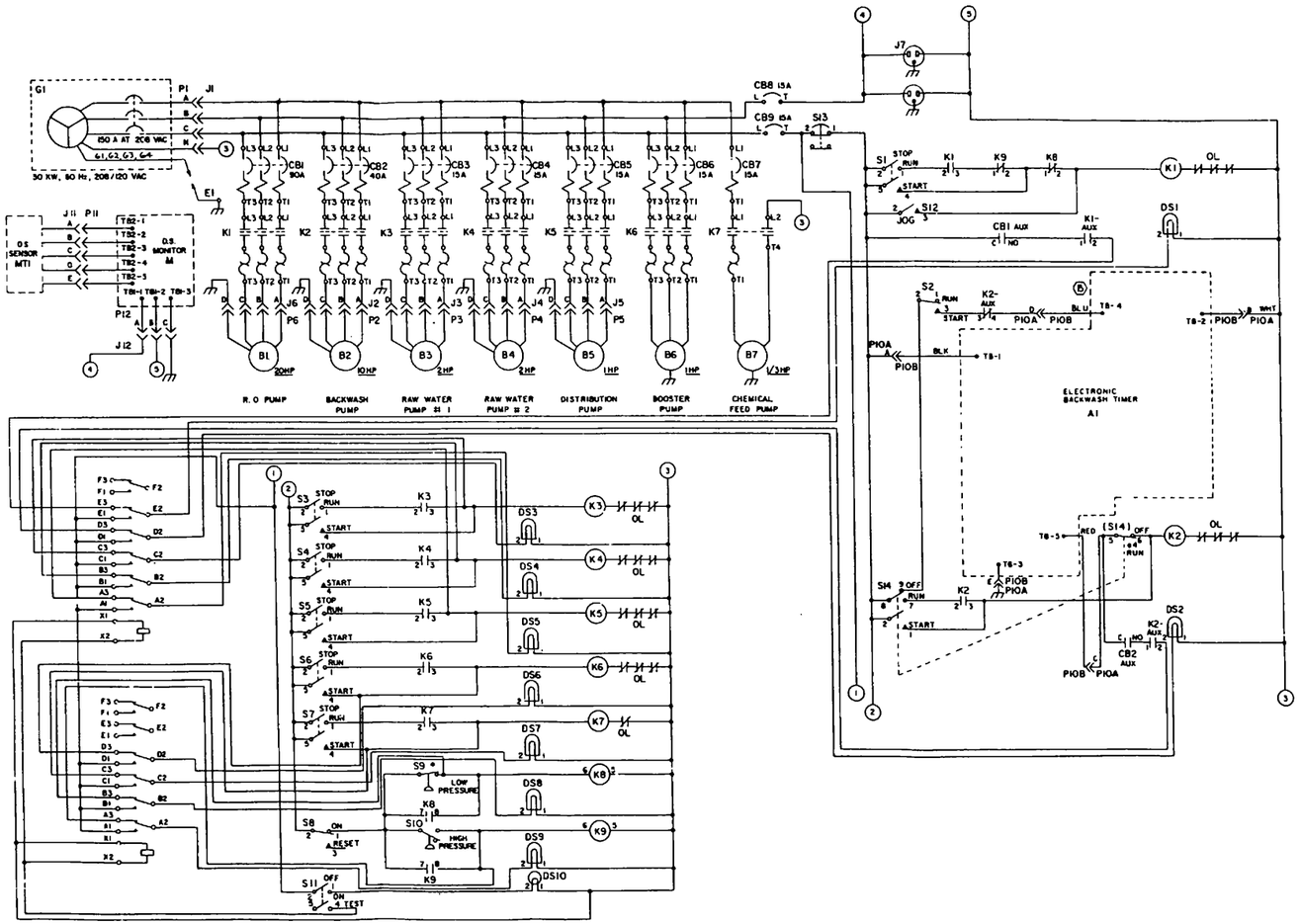
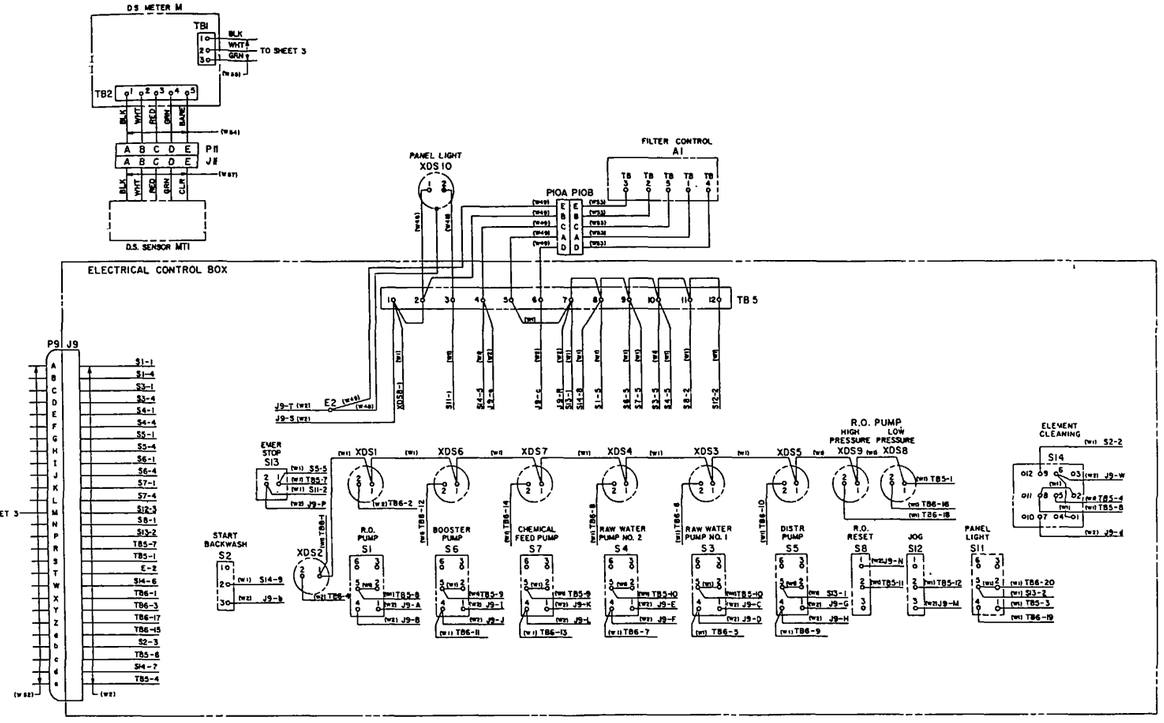
COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
A1	1322215328	MULTIMEDIA FILTER CONTROL ASSEMBLY
B1	1322218267	MOTOR R.O. PUMP
B2	1322215262	MOTOR, BACKWASH PUMP
B3	1322215338	MOTOR, RAW WATER PUMP NO. 1
B4	1322215338	MOTOR, RAW WATER PUMP NO. 2
B5	1322215265	MOTOR, DISTRIBUTION PUMP
B6	1322648326	MOTOR, BOOSTER PUMP
B7	1322215259	MOTOR, CHEMICAL FEED PUMP
CB1	1322118301-1	CIRCUIT BREAKER, R.O. PUMP MOTOR
CB2	1322118301-2	CIRCUIT BREAKER, BACKWASH PUMP MOTOR
CB3	1322118302-1	CIRCUIT BREAKER, RAW WATER NO. 1 PUMP MOTOR
CB4	1322118302-1	CIRCUIT BREAKER, RAW WATER NO. 2 PUMP MOTOR
CB5	1322118302-1	CIRCUIT BREAKER, DISTRIBUTION PUMP MOTOR
CB6	1322118302-1	CIRCUIT BREAKER, BOOSTER PUMP MOTOR
CB7	1322118303-1	CIRCUIT BREAKER, CHEMICAL FEED PUMP MOTOR
CB8	1322118303-1	CIRCUIT BREAKER, UTILITY OUTLET
CB9	1322118303-1	CIRCUIT BREAKER, CONTROL
DS1 THRU DS9	MS35347-2	INDICATING LAMP, POWER "ON"
DS10	W-L-101/77	ILLUMINATING LAMP, CONTROL PANEL
J1	MS90558-C32412P	CONNECTOR
J2	MS3102R24-22S	CONNECTOR
J3 J4, J5	MS3102R18-11S	CONNECTOR
J6	MS3102R36-5S	CONNECTOR
J7	1322118318	CIRCUIT INTERRUPTER, GROUND FAULT
J8	MS3102R32-7S	CONNECTOR
J9	MS3102R32-7P	CONNECTOR
J10	MS90558-C32412P	CONNECTOR
K1	1322215272	MOTOR STARTER, ELECTRIC, 3 PHASE, MAGNETIC
K2	1322215273	MOTOR STARTER, ELECTRIC, 3 PHASE, MAGNETIC
K3, K4	1322215326	MOTOR STARTER, ELECTRIC, 3 PHASE, MAGNETIC
K5, K6	1322215327	MOTOR STARTER, ELECTRIC, 3 PHASE, MAGNETIC
K7	1322215324	MOTOR STARTER, ELECTRIC, SINGLE PHASE
K8	1322K55791	RELAY, MAGNETIC
K9	1321HE0749	RELAY, MAGNETIC
K10, K11	M5757/16-005	RELAY, ELEC, HERMETICALLY SEALED, 6 PDT, 5 A
P2	MS3106F24-22P	CONNECTOR
P3, P4, P5	MS3106F18-11P	CONNECTOR
P6	MS3108R36-5P	CONNECTOR
P8	MS3106F32-7P	CONNECTOR
P9	MS3108R32-7S	CONNECTOR
P10A	MS3106F18-11S	CONNECTOR
P10B	MS3106F18-11P	CONNECTOR
S1, S3 THRU S7, S11	MS27407-3	SWITCH, TOGGLE, TWO POLE, 3 POSITION (SEE NOTE 1)
S2, S8, S12	MS24523-32	SWITCH, TOGGLE, ONE POLE
S9	1322DE8306	SWITCH, LOW PRESSURE
S10	1322DE8303	SWITCH, HIGH PRESSURE
S13	1322215313	SWITCH, PUSH-PULL
S14	MS27406-2	SWITCH, TOGGLE, FOUR POLE, 3 POSITION (SEE NOTES 1 AND 2)
M	1322217581	METER, MONITOR, DISSOLVED SOLIDS
MT1	1322217583	SENSOR, DISSOLVED SOLIDS
J11	MS3100F18S-8S	CONNECTOR
J12	MS3100F16-10S	CONNECTOR
P11	MS3106F18S-5P	CONNECTOR
P12	MS3106F16S-10P	CONNECTOR
K10, K11	M5757/16-005	RELAY, ELECTRIC, HERMETICALLY SEALED, 6 POT, 5 A

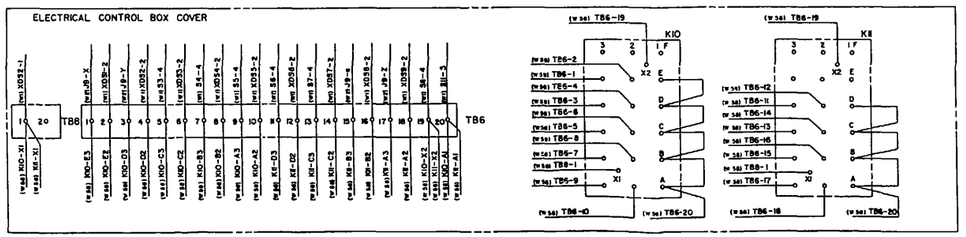


FO-1. Electric Schematic - Models WPES-1 AND WPES-3
FP-1/(FP-2 blank)

COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
A1	13222E5328	MULTIMEDIA FILTER CONTROL ASSEMBLY
B1	13227E5267	MOTOR R O PUMP
B2	13227E5262	MOTOR BACKWASH PUMP
B3, B4	13222E5336	MOTOR RAW WATER PUMPS
B5	13222E5327	MOTOR DISTRIBUTION PUMP
B6	13227E5337	MOTOR BOOSTER PUMP
B7	13276E8326	MOTOR CHEMICAL FEED PUMP
CB1	13221E8301-1	CIRCUIT BREAKER 90 AMP, 3 PHASE, 208 VAC W/ARS CONTACT
CB2	13221E8301-2	CIRCUIT BREAKER 90 AMP, 3 PHASE, 208 VAC, W/ART CONTACT
CB3 THRU CB6	13221E8302-1	CIRCUIT BREAKER 15 AMP, 3 PHASE, 208 VAC
CB7, CB8, CB9	13221E8303-1	CIRCUIT BREAKER 15 AMP 1 PHASE, 120 VAC
E1	———	STUD, PART OF JUNCTION BOX ASSEMBLY 13222E5300
E2	———	STUD, PART OF CONTROL BOX ASSEMBLY 13227E5348
E3	———	STUD, PART OF ELECTRICAL INSTALLATION 13222E5306
G1	6115-08-077-8600	GENERATOR SET, 30 KW, 208 VAC
J1	MS90955BC4W13P	CONNECTOR, RECEPTACLE, PART OF 13227E5293
J2	MS3180E24-22C	CONNECTOR, RECEPTACLE, PART OF 13222E5298-2
J3	MS3182E18-11S	CONNECTOR, RECEPTACLE, PART OF 13222E5298-3
J4	MS3102E18-11S	CONNECTOR, RECEPTACLE, PART OF 13227E5298-4
J5	MS3102E18-11S	CONNECTOR, RECEPTACLE, PART OF 13227E5298-5
J6	MS3102E36-5S	CONNECTOR RECEPTACLE, PART OF 13222E5298-6
J7	13221E8318	INTERRUPTER, GROUND FAULT CIRCUIT
J8	MS3102E32-7S	CONNECTOR, RECEPTACLE, PART OF 13222E5298
J9	MS3102E32-7P	CONNECTOR, RECEPTACLE, PART OF 13222E5287
K1	13222E5272	STARTER MOTOR, NEMA SIZE 3, 3 PHASE, 208 VAC, COIL 120 VAC
K2	13222E5273	STARTER MOTOR, NEMA SIZE 1, 3 PHASE, 208 VAC, COIL 120 VAC
K3, K5	13222E5326	STARTER, MOTOR NEMA SIZE 0, 3 PHASE, 208 VAC, COIL 120 VAC
K4, K6	13222E5327	STARTER, MOTOR, NEMA SIZE 00, 3 PHASE, 208 VAC, COIL 120 VAC
K7	13227E5324	STARTER, MOTOR, NEMA SIZE 00, 1 PHASE, 120 VAC, COIL 120 VAC
K8, K9	13276E5349	RELAY, CONTROL, 2P DT, 120 VAC, COIL 120 VAC
P1	MS90562C14W12S	CONNECTOR, PLUG, PART OF 13227E5294
P2	MS3106F24-22P	CONNECTOR, PLUG, PART OF 13222E5311-5
P3, P4	MS3106F18-11P	CONNECTOR PLUG, PART OF 13222E5311-1
P5	MS3106F18-11P	CONNECTOR, PLUG, PART OF 13222E5311-2
P6	MS3106E32-5P	CONNECTOR, PLUG, PART OF 13227E5311-4
P8	MS3106F22-22P	CONNECTOR PLUG PART OF 13222E5288
P9	MS3106E32-7S	CONNECTOR, PLUG, PART OF 13222E5288
P10A	MS3106F18-11S	CONNECTOR, PLUG, PART OF 13281E8306-1
P10B	MS3101F18-11P	CONNECTOR, PLUG, PART OF 13281E8306-2
S1, S3 THRU S7, S9	MS27907-5	SWITCH, TOGGLE, DP, (ON-ON-MOM, ON)
S11 **	MS27907-5	SWITCH, TOGGLE, DP, (ON-ON-MOM ON)
S2, S8, S12	MS24523-32	SWITCH, TOGGLE, SP (MOM-ON-MOM ON)
S8	13230E8305	SWITCH, LOW PRESSURE
S10	13286E8303	SWITCH, HIGH PRESSURE
S13	13222E5313	SWITCH, PUSH-PULL
S16	MS27988-9	SWITCH, TOGGLE, FOUR POLE, (ON-ON-MOM, ON)
T81	13222E5318-1	TERMINAL BOARD
TB2 AND TB3	MIL-T-55164/2-3B186	TERMINAL BOARD
TB6	MIL-T-55164/2-3B182	TERMINAL BOARD
W1	13227E5344	WIRING HARNESS CONTROL BOX
W2	13227E5287	WIRING HARNESS, CONTROL BOX
W3	13222E5298	WIRING HARNESS, JUNCTION BOX, CONTROL
W4	13222E5299	WIRING HARNESS, JUNCTION BOX, POWER
W5	13227E5292	WIRING HARNESS, JUNCTION BOX
W6	13227E5290-2	WIRING HARNESS, JUNCTION BOX
W54	13221E8326-2	CABLE ASSEMBLY
W55	13221E8326-4	CABLE ASSEMBLY
W56	13221E8326-5	CABLE ASSEMBLY
W57	13227E5304	CABLE ASSEMBLY
W58	13290E5348	WIRING HARNESS CONTROL BOX
W90	13227E5297-29	LEAD, ELECTRICAL
W60	13222E5297-30	LEAD, ELECTRICAL

COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
W7	13223E5258-3	WIRING HARNESS, JUNCTION BOX
W8	13222E5298-4	WIRING HARNESS, JUNCTION BOX
W9	13222E5298-5	WIRING HARNESS JUNCTION BOX
W10	13222E5298-6	WIRING HARNESS, JUNCTION BOX
W11	13227E5297-1	LEAD, ELECTRICAL
W12	13227E5297-2	LEAD, ELECTRICAL
W13	13222E5297-3	LEAD, ELECTRICAL
W14	13227E5297-4	LEAD, ELECTRICAL
W15	13227E5297-5	LEAD, ELECTRICAL
W16	13227E5297-6	LEAD, ELECTRICAL
W17	13227E5297-7	LEAD, ELECTRICAL
W18	13227E5297-8	LEAD, ELECTRICAL
W19	13227E5297-9	LEAD, ELECTRICAL
W20	13227E5297-10	LEAD, ELECTRICAL
W21	13227E5297-11	LEAD, ELECTRICAL
W22	13227E5297-12	LEAD, ELECTRICAL
W23	13227E5297-13	LEAD, ELECTRICAL
W24	13227E5297-14	LEAD, ELECTRICAL
W25	13227E5297-15	LEAD, ELECTRICAL
W26	13227E5297-16	LEAD, ELECTRICAL
W27	13227E5297-17	LEAD, ELECTRICAL
W28	13227E5297-18	LEAD, ELECTRICAL
W29	13227E5297-19	LEAD, ELECTRICAL
W30	13227E5297-20	LEAD, ELECTRICAL
W31	13222E5297-21	LEAD, ELECTRICAL
W32	13227E5297-22	LEAD, ELECTRICAL
W33	13222E5297-23	LEAD, ELECTRICAL
W34	13227E5297-24	LEAD, ELECTRICAL
W35	13227E5297-25	LEAD, ELECTRICAL
W36	13227E5297-26	LEAD, ELECTRICAL
W37	13227E5297-27	LEAD, ELECTRICAL
W38	13227E5297-28	LEAD ELECTRICAL
W39	13227E5309	WIRING HARNESS
W40	13227E8296	CABLE ASSEMBLY
W41	13227E5311-4	CABLE ASSEMBLY
W42	13222E5311-5	CABLE ASSEMBLY
W43	13222E5311-1	CABLE ASSEMBLY
W44	13222E5311-1	CABLE ASSEMBLY
W45	13222E5311-2	CABLE ASSEMBLY
W46	13227E5312-1	CABLE, ELECTRICAL
W47	13222E5312-2	CABLE, ELECTRICAL
W48	13227E5312-3	CABLE, ELECTRICAL
W49	13221E8329-1	CABLE ASSEMBLY
W50	13227E5312-5	CABLE ELECTRICAL
W51	13227E5312-6	CABLE, ELECTRICAL
W52	13227E5308	CABLE ASSEMBLY
W53	13221E8326-2	CABLE ASSEMBLY
XDS1 THRU XDS9	13227E5239	LAMPHOLDER, DIAL GR TYPE
XDS10	13227E5271	LIGHT PANEL
n	13227E7581	WATER MONITOR, DISSOLVED SOLIDS
MT1	13227E7583	SENSOR DISSOLVED SOLIDS
J11	MS3100F14S-5S	CONNECTOR
J12	MS3100F16-10S	CONNECTOR
P11	MS3106F14S-5P	CONNECTOR
P12	MS3106F16S-10P	CONNECTOR
K10, K11	m9757/16-009	RELAY, ELECTRICAL, MSC 6PDT, 5A
TB8	MIL-T-55154/2-3B18-20	TERMINAL BOARD
T3M	MIL-T-55164/2-3B18-7	TERMINAL BOARD
T87	MIL-T-55164/2-3B18-8	TERMINAL BOARD
T89	MIL-T-55164/2-3B18-2	TERMINAL BOARD
WG1	13222E5297-31	LEAD, ELECTRICAL
WG2	13222E5297-32	LEAD ELECTRICAL
WG3	13222E5297-33	LEAD, ELECTRICAL





FO-2. Electrical Diagram - Diagram - Models WPES - 1 and WPES-3 (Sheet 1 of 2).
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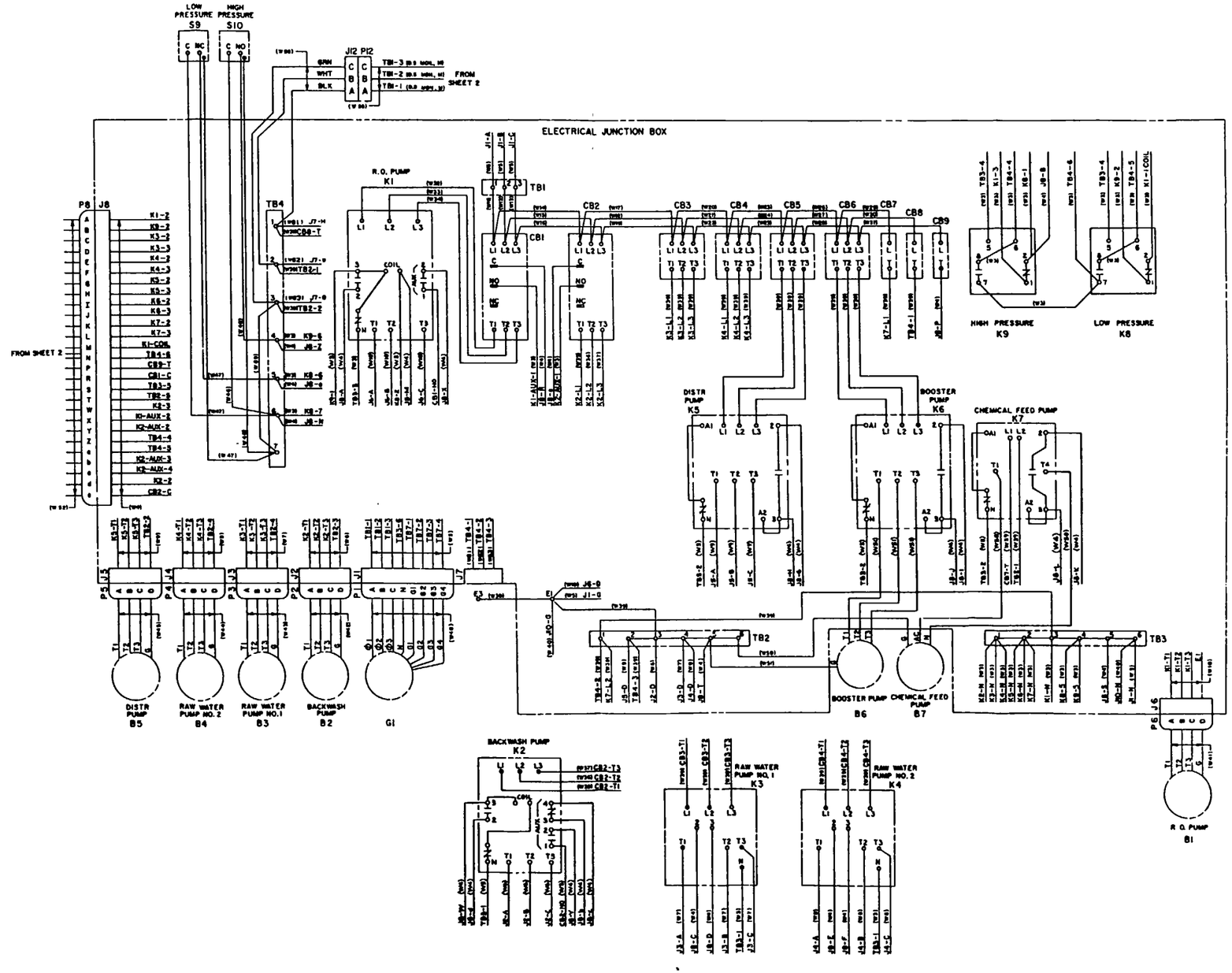
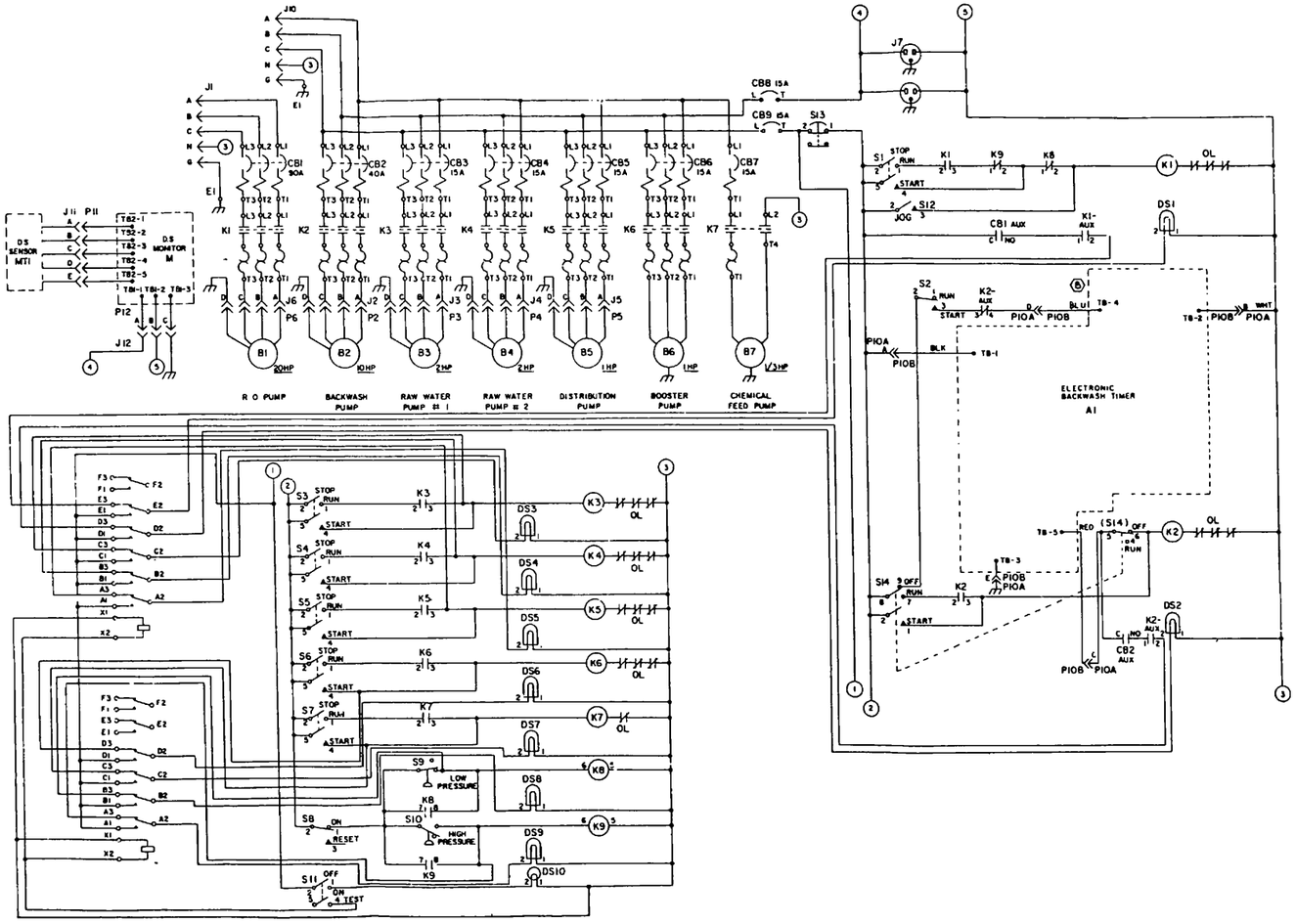


FO-2. Electrical Diagram-Models WPES-1 and WPES-3 (Sheet 2 of 2).

FP-5/(FP-6 blank)

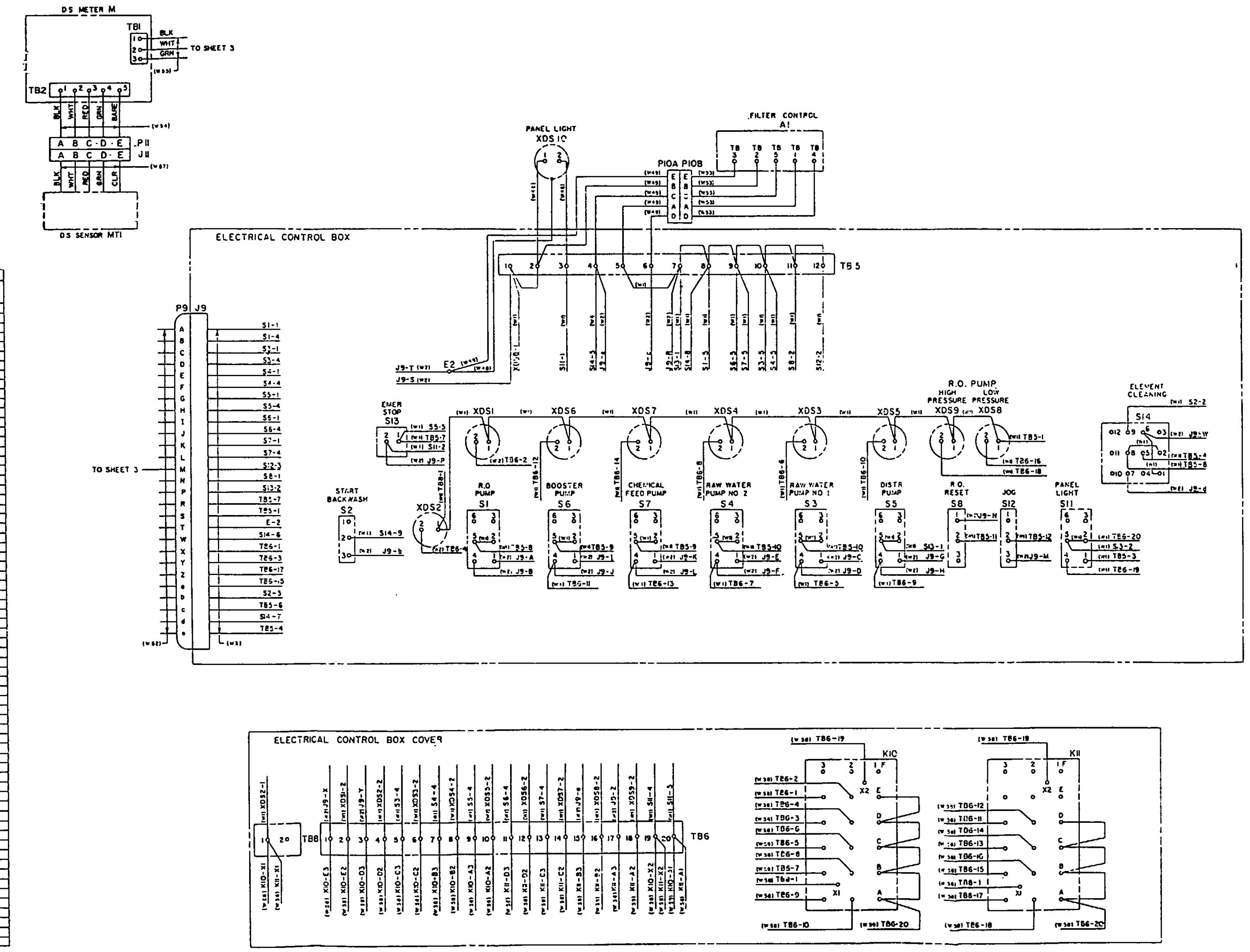
COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
A1	13222E5328	MULTIMEDIA FILTER CONTROL ASSEMBLY
B1	13222E5267	MOTOR R.O. PUMP
B2	13222E5262	MOTOR,BACKWASH PUMP
B3	13222E5338	MOTOR,RAW WATER PUMP NO. 1
B4	13222E5338	MOTOR,RAW WATER PUMP NO. 2
B5	13222E5265	MOTOR,DISTRIBUTION PUMP
B6	13226E8326	MOTOR,BOOSTER PUMP
B7	13222E5259	MOTOR,CHEMICAL FEED PUMP
CB1	13221E8301-1	CIRCUIT BREAKER,R.O. PUMP MOTOR
CB2	13221E8301-2	CIRCUIT BREAKER,BACKWASH PUMP MOTOR
CB3	13221E8302-1	CIRCUIT BREAKER,RAW WATER NO. 1 PUMP MOTOR
CB4	13221E8302-1	CIRCUIT BREAKER,RAW WATER NO. 2 PUMP MOTOR
CB5	13221E8302-1	CIRCUIT BREAKER,DISTRIBUTION PUMP MOTOR
CB6	13221E8302-1	CIRCUIT BREAKER,BOOSTER PUMP MOTOR
CB7	13221E8303-1	CIRCUIT BREAKER,CHEMICAL FEED PUMP MOTOR
CB8	13221E8303-1	CIRCUIT BREAKER,UTILITY OUTLET
CB9	13221E8303-1	CIRCUIT BREAKER,CONTROL
DS1 THRU DS9	MS15547-2	INDICATING LAMP,POWER "ON"
DS10	W-L-101/77	ILLUMINATING LAMP,CONTROL PANEL
J1	MS90558-C32412P	CONNECTOR
J2	MS3102R24-22S	CONNECTOR
J3 J4,J5	MS3102R18-11S	CONNECTOR
J6	MS3102R36-5S	CONNECTOR
J7	13221E8318	CIRCUIT INTERRUPTER,GROUND FAULT
J8	MS3102R32-7S	CONNECTOR
J9	MS3102R32-7P	CONNECTOR
J10	MS90558-C32412P	CONNECTOR
K1	13222E5272	MOTOR STARTER,ELECTRIC,3 PHASE,MAGNETIC
K2	13222E5273	MOTOR STARTER,ELECTRIC,3 PHASE,MAGNETIC
K3,K4	13222E5326	MOTOR STARTER,ELECTRIC,3 PHASE,MAGNETIC
K5,K6	13222E5327	MOTOR STARTER,ELECTRIC,3 PHASE,MAGNETIC
K7	13222E5324	MOTOR STARTER,ELECTRIC,SINGLE PHASE
K8	13226C5591	RELAY,MAGNETIC
K9	13216E0748	RELAY,MAGNETIC
K10,K11	MS757/16-005	RELAY,ELEC,HERMETICALLY SEALED,6 POT,5 A
P2	MS3106F24-22P	CONNECTOR
P3,P4,P5	MS3106F18-11P	CONNECTOR
P6	MS3108R36-5P	CONNECTOR
P8	MS3106F32-7P	CONNECTOR
P9	MS3108R32-7S	CONNECTOR
P10A	MS3106F18-11S	CONNECTOR
P10B	MS3[illegible]F18-11P	CONNECTOR
S1,S3 THRU S7,S11	MS27407-5	SWITCH,TOGGLE,TWO POLE,3 POSITION (SEE NOTE 1)
S2,S8,S12	MS24523-32	SWITCH,TOGGLE,ONE POLE
S9	13225E8302	SWITCH,LOW PRESSURE
S10	13225E8303	SWITCH,HIGH PRESSURE
S13	13222E5313	SWITCH,PUSH-PULL
S14	MS27406-2	SWITCH,TOGGLE,FOUR POLE,3 POSITION (SEE NOTES 1 AND 2)
M	13227E7581	METER,MONITOR,DISSOLVED SOLIDS
MT1	13227E7583	SENSOR,DISSOLVED SOLIDS
J11	MS3100F14S-5S	CONNECTOR
J12	MS3100F16-10S	CONNECTOR
P11	MS3106F14S-5P	CONNECTOR
P12	MS3106F16S-10P	CONNECTOR



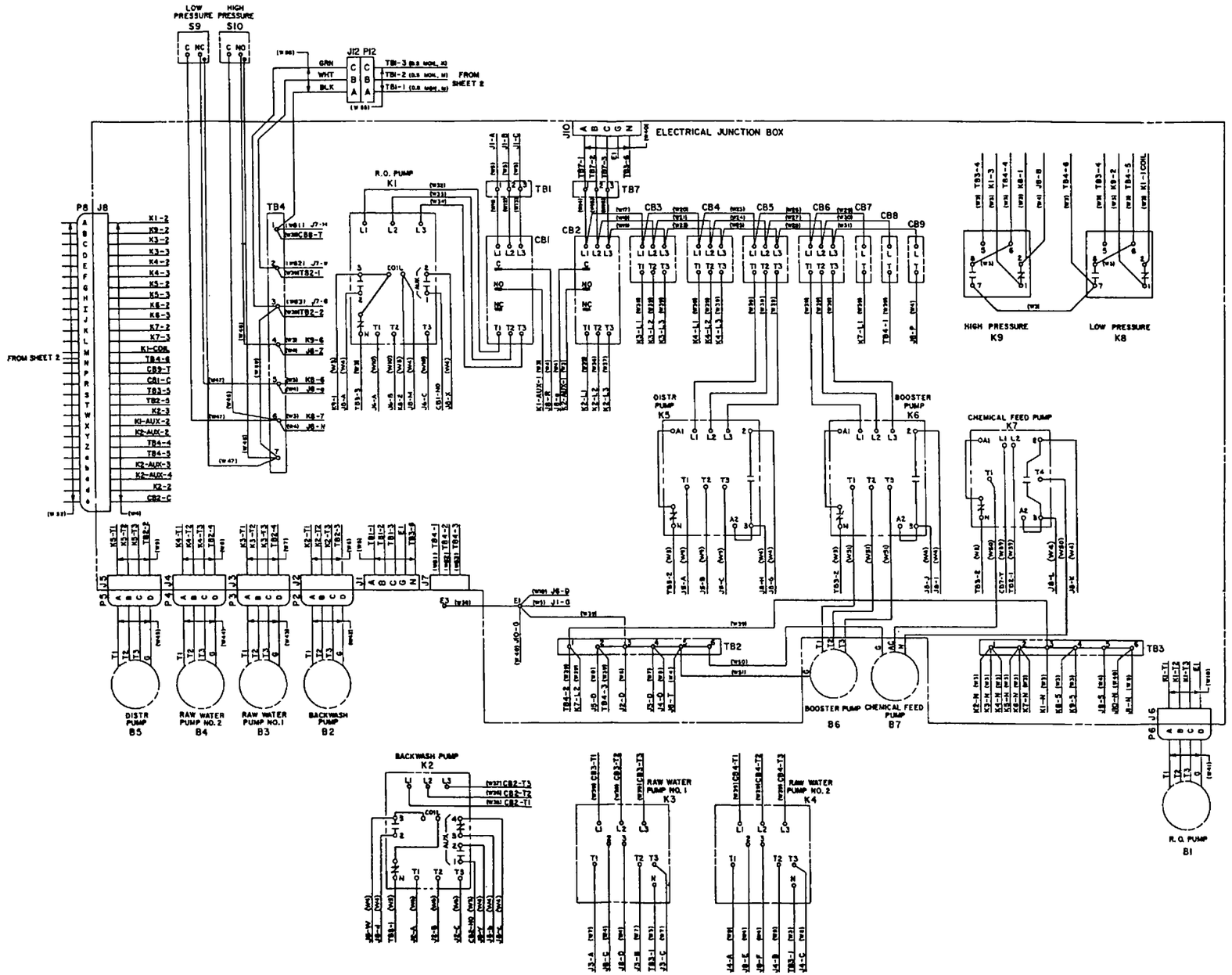
FO-3. Electrical Schematic - Model WPES- 3.
FP-7/(FP-8 blank)

COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
A1	13222E5289	MULT MEDIA FILTER CONTROL ASSEMBLY
B1	13222E5267	MOTOR, R O PUMP
B2	13222E5262	MOTOR, BACKWASH PUMP
B3, B4	13222E5336	MOTOR, RAW WATER PUMPS
B5	13222E5337	MOTOR, DISTRIBUTION PUMP
B6	13222E5337	MOTOR, BOOSTER PUMP
B7	13226C0326	MOTOR, CHEMICAL FEED PUMP
CB1	13221E8301-1	CIRCUIT BREAKER, 90 AMP, 3 PHASE, 208 VAC, W/AUX CONTACT
CB2	13221E8301-2	CIRCUIT BREAKER, 40 AMP, 3 PHASE 208 VAC, W/AUX CONTACT
CB3 THRU CB6	13221E8302-1	CIRCUIT BREAKER, 15 AMP, 3 PHASE, 208 VAC
CB7, CB8, CB9	13221E8303-1	CIRCUIT BREAKER, 15 AMP, 1 PHASE, 120 VAC
E1	———	STUD, PART OF JUNCTION BOX ASSEMBLY 13227E9230
E2	———	STUD, PART OF CONTROL BOX ASSEMBLY 13227E9230
E3	———	STUD, PART OF ELECTRICAL INSTALLATION 13227E9223
J1	MS90558-C32412P	CONNECTOR, RECEPTACLE, PART OF 13227E9222-1
J2	MS3102R24-22S	CONNECTOR, RECEPTACLE, PART OF 13222E5298-2
J3	MS3102R18-11S	CONNECTOR, RECEPTACLE, PART OF 13222E5298-3
J4	MS3102R18-11S	CONNECTOR, RECEPTACLE, PART OF 13222E5298-4
J5	MS3102R18-11S	CONNECTOR, RECEPTACLE, PART OF 13222E5298-5
J6	MS3102R36-5S	CONNECTOR, RECEPTACLE, PART OF 13222E5298-6
J7	13221E8318	INTERRUPTER, GROUND FAULT CIRCUIT
J8	MS3102R32-7S	CONNECTOR, RECEPTACLE PART OF 13222E5299
J9	MS3102R32-7P	CONNECTOR, RECEPTACLE, PART OF 13222E5287
J10	MS90558-C32412P	CONNECTOR, RECEPTACLE, PART OF 13227E9222-2
K1	13222E5272	STARTER, MOTOR, NEMA SIZE 3, 3 PHASE, 208 VAC, COIL 120 VAC
K2	13222E5273	STARTER, MOTOR, NEMA SIZE 1, 3 PHASE, 208 VAC, COIL 120 VAC
K3, K4	13222E5326	STARTER, MOTOR, NEMA SIZE 0, 3 PHASE, 208 VAC, COIL 120 VAC
K5, K6	13222E5327	STARTER, MOTOR, NEMA SIZE 00, 3 PHASE, 208 VAC, COIL 120 VAC
K7	13222E5324	STARTER, MOTOR, NEMA SIZE 00, 1 PHASE, 120 VAC, COIL 120 VAC
K8, K9	13227E5591	RELAY, CONTROL, 2P DT, 120 VAC, COIL 120 VAC
P2	MS3106F24-22P	CONNECTOR, PLUG, PART OF 13222E5311-5
P3, P4	MS3106F18-11P	CONNECTOR, PLUG, PART OF 13222E5311-1
P5	MS3106F18-11P	CONNECTOR, PLUG, PART OF 13222E5311-2
P6	MS3106R36-5P	CONNECTOR, PLUG, PART OF 13222E5311-4
P8	MS3106F32-7P	CONNECTOR, PLUG, PART OF 13222E5288
P9	MS3106A32-7S	CONNECTOR, PLUG, PART OF 13222E5288
P10A	MS3106F18-11S	CONNECTOR, PLUG, PART OF 13221E8326-1
P10B	MS3101F18-11P	CONNECTOR, PLUG, PART OF 13221E8326-2
S1, S3 THRU S7 S11	MS27407-5	SWITCH, TOGGLE, DP, (ON-ON-MOM, ON)
S2, S8, S12	MS24523-32	SWITCH, TOGGLE, SP, (NONE-ON-MOM, ON)
S9	13226E8322	SWITCH, LOW PRESSURE
S10	13226C6343	SWITCH, HIGH PRESSURE
S13	13222E5313	SWITCH, PUSH-PULL
S14	MS27406-2	SWITCH, TOGGLE, FOUR POLE, (ON-ON-MOM, ON)
TB1, TB7	13222E5316-1	TERMINAL BOARD
TB2, TB3	MIL-T-55164/2-38TB6	TERMINAL BOARD
TB5	MIL-T-55164/2-38TB12	TERMINAL BOARD
W1	13222E5344	WIRING HARNESS, CONTROL BOX
W2	13222E5287	WIRING HARNESS, CONTROL BOX
W3	13222E5308	WIRING HARNESS, JUNCTION BOX, CONTROL
W4	13222E5299	WIRING HARNESS, JUNCTION BOX, POWER
W5	13227E9222-1	WIRING HARNESS, JUNCTION BOX
W6	13222E5298 2	WIRING HARNESS, JUNCTION BOX

COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
W7	13222E5298-3	WIRING HARNESS, JUNCTION BOX
W8	13222E5298-4	WIRING HARNESS, JUNCTION BOX
W9	13222E5298-5	WIRING HARNESS, JUNCTION BOX
W10	13222E5298-6	WIRING HARNESS, JUNCTION BOX
W11	13227E9228-1	LEAD ELECTRICAL
W12	13227E9228-2	LEAD, ELECTRICAL
W13	13227E9228-3	LEAD, ELECTRICAL
W14	13227E9228-4	LEAD ELECTRICAL
W15	13227E9228-5	LEAD, ELECTRICAL
W16	13227E9228-6	LEAD, ELECTRICAL
W17	13227E9228-7	LEAD, ELECTRICAL
W18	13227E9228-8	LEAD, ELECTRICAL
W19	13227E9228-9	LEAD, ELECTRICAL
W20	13227E9228-10	LEAD, ELECTRICAL
W21	13227E9228-11	LEAD, ELECTRICAL
W22	13227E9228-12	LEAD, ELECTRICAL
W23	13227E9228-13	LEAD, ELECTRICAL
W24	13227E9228-14	LEAD, ELECTRICAL
W25	13227E9228-15	LEAD, ELECTRICAL
W26	13227E9228-16	LEAD, ELECTRICAL
W27	13227E9228-17	LEAD, ELECTRICAL
W28	13227E9228-18	LEAD, ELECTRICAL
W29	13227E9228-19	LEAD, ELECTRICAL
W30	13227E9228-20	LEAD, ELECTRICAL
W31	13227E9228-21	LEAD, ELECTRICAL
W32	13227E9228-22	LEAD, ELECTRICAL
W33	13227E9228-23	LEAD, ELECTRICAL
W34	13227E9228-24	LEAD, ELECTRICAL
W35	13227E9228-25	LEAD, ELECTRICAL
W36	13227E9228-26	LEAD, ELECTRICAL
W37	13227E9228-27	LEAD, ELECTRICAL
W38	13227E9228-28	LEAD, ELECTRICAL
W39	13222E5309	WIRING HARNESS
W40	13227E9222-2	WIRING HARNESS, JUNCTION BOX
W41	13222E5311-4	CABLE ASSEMBLY
W42	13222E5311-5	CABLE ASSEMBLY
W43	13222E5311-1	CABLE ASSEMBLY
W44	13222E5311-1	CABLE ASSEMBLY
W45	13222E5311-2	CABLE ASSEMBLY
W46	13222E5312-1	CABLE, ELECTRICAL
W47	13222E5312-2	CABLE, ELECTRICAL
W48	13222E5312-3	CABLE, ELECTRICAL
W49	13221E8326-1	CABLE ASSEMBLY
W50	13222E5312-5	CABLE, ELECTRICAL
W51	13222E5312-6	CABLE, ELECTRICAL
W52	13222E5289	CABLE ASSEMBLY
W53	13221E8326-2	CABLE ASSEMBLY
XDS10	13222E5271	LIGHT, PANEL
M	13227E7581	METER, MONITOR DISSOLVED SOLIDS
MT1	13227E7583	SENSOR DISSOLVED SOLIDS
J11	MS3100F14S-5S	CONNECTOR RECEPTACLE PART OF 13227E7584
J12	MS3100F16-10S	CONNECTOR RECEPTACLE PART OF 13221E8326-5
P11	MS3106F14S-5P	CONNECTOR PLUG, PART OF 13221E8326-3
P12	MS3106F16S-1GP	CONNECTOR, PLUG PART OF 13221E8326-4
TB4	MIL-T-55164/2-38TB-7	TERMINAL BOARD
TB6	MIL-T-55164/2-38TB-20	TERMINAL BOARD
TB8	MIL-T 55164/2-38TB-2	TERMINAL BOARD
W54	13221E8326-3	CABLE ASSY
W55	13221E8326-4	CABLE ASSY
W56	13221E8326-5	CABLE ASSY
W57	13227E7584	CABLE ASSY
W58	13226E8340	WIRING HARNESS CONTROL BOX
W59	13227E9228-29	LEAD ELECTRICAL
K10 K11	MS757/14-005	RELAY ELECTRICAL, MSC 6PDT 5A
W61	13222E5297-31	LEAD, ELECTRICAL
W62	13222E5297-32	LEAD, ELECTRICAL
W63	13222E5297-33	LEAD, ELECTRICAL



FO-4. Electrical Diagram - Model WPES - 3 (Sheet 1 of 2).



FO-4. Electrical Diagram - Model WPES-3 (Sheet 2 of 2)

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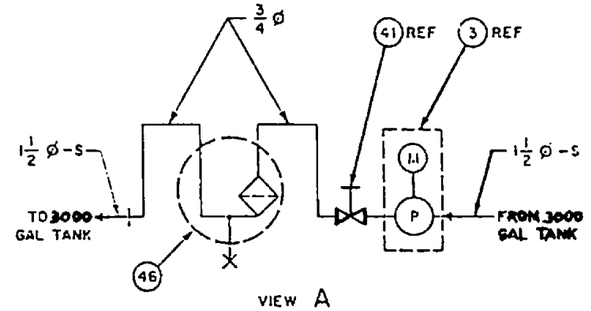
COMPONENT REFERENCE LIST			
FIG. NO.	QTY REQD	PART OR IDENTIFYING NO.	DESCRIPTION
1	1	13228E8307	STRAINER SUCTION HOSE, MIL-S-12165, TYPE II
2	1	NSN 4610-00-066-2970	FLOAT, FIGURE 4, MIL-W-52482
3	2	13222E5338	PUMP, CENTRIFUGAL, SELF PRIMING END
4	1	13226E8324	PUMP, CHEMICAL FEED
5	4	13222E5276	VALVE, BALL, 3-WAY
6			
7	1	13222E5247-1	FLOWMETER
8	1	13221E8282-6	VALVE, BALL, 3-WAY
9	1	13222E5329-3	GAGE, DIFFERENTIAL PRESSURE
10	1	13222E5328	FILTER, MULTI-MEDIA
11	3	13221E8271-4	VALVE, BALL
12	1	13221E8271-6	VALVE, BALL
13	1	13222E5337	PUMP, CENTRIFUGAL, END
14	1	13222E5329-4	GAGE, DIFFERENTIAL PRESSURE
15	1	13226E8333	FILTER, CARTRIDGE
16	1	13226E8300	VALVE, CHECK
17	1	13222E5238	VALVE, RELIEF
18	1	13222E8302	SWITCH, LOW PRESSURE
19	1	13229C5635	PUMP, HIGH PRESSURE
20	1	13222E5267	MOTOR, ELECTRIC
21	1	13228E9304	HOLDER, RUPTURE DISC
22	1	13228E8304	RUPTURE DISC
23	4	13221E8271-5	VALVE, BALL
24	1	13221E0271-7	VALVE, BALL
25	1	13222E5249	DAMPENER, FLUID PRESSURE
26	1	13228E8303	SWITCH, HIGH PRESSURE
27	1	13221E8340	GAUGE, PRESSURE
28	4	13222E5320	PRESSURE TUBE, REVERSE OSMOSIS
29	4	13226E7981-1	VALVE, 2-WAY, ON-OFF
30	1	MSS-SP80	VALVE, GATE
31	1	13228E8305	VALVE, NEEDLE
31	1	13226E2209 OPT	VALVE, NEEDLE
32	1	13222E5247-2	FLOWMETER
33	1	13222E5278	FLOWMETER
34	1	13222E5247-3	FLOWMETER
35	1	13222E5262	PUMP, CENTRIFUGAL, END
36	1	13222E5253	STRAINER, SINGLE
37	1	13222E5319-8	VALVE, GATE
38	3	MIL-T-53048	TANK ASSEMBLY, FABRIC, COLLAPSIBLE, WATER, NYLON
			RUBBER COATED, CAPACITY: 3000 GAL.
39	1	NSN 4930-00-360-0611	NOZZLE
40	1	13222E5235	PUMP, CENTRIFUGAL, END
41	1	13222E5319-7	VALVE, GATE
42	4	13226E8328	STRAINER, SUMP
43	1	13226E7990-1	CAN ASSEMBLY, CHEMICAL FEED, POLYMER
44	1	13228E8301	VALVE, CHECK
45	1	13221E8316-2	GAGE, DIFFERENTIAL PRESSURE
46	1	13221E8341-1 OR -2	CARTRIDGE, DEIONIZATION PURIFICATION
47	4	13220E7982-4	ELLIPTIC VALVE, 2 POSITION, 3-WAY
48	1	13226E7990-2	CAN ASSEMBLY, CHEMICAL FEED, SODIUM HEX
49	1	13226E7990-3	CAN ASSEMBLY, CHEMICAL FEED, CITRIC ACID
50	1	13226E7990-4	CAN ASSEMBLY, CHEMICAL FEED, CHLORINE
51	1	13227E7584	CABLE ASSEMBLY, SENSOR, DISSOLVED SOLIDS
52	1	13227E7585	MONITOR METER ASSEMBLY, DISSOLVED SOLIDS
53	1	13227E7586	METER, WATER, 5/8 INCH
54	2	13221E8271-8	VALVE, BALL
55	1	13227E9238	VACUUM BREAKER



VIEW A
SPECIAL INSTALLATION FOR RADIOLOGICAL OR CHEMICAL CONTAMINATION

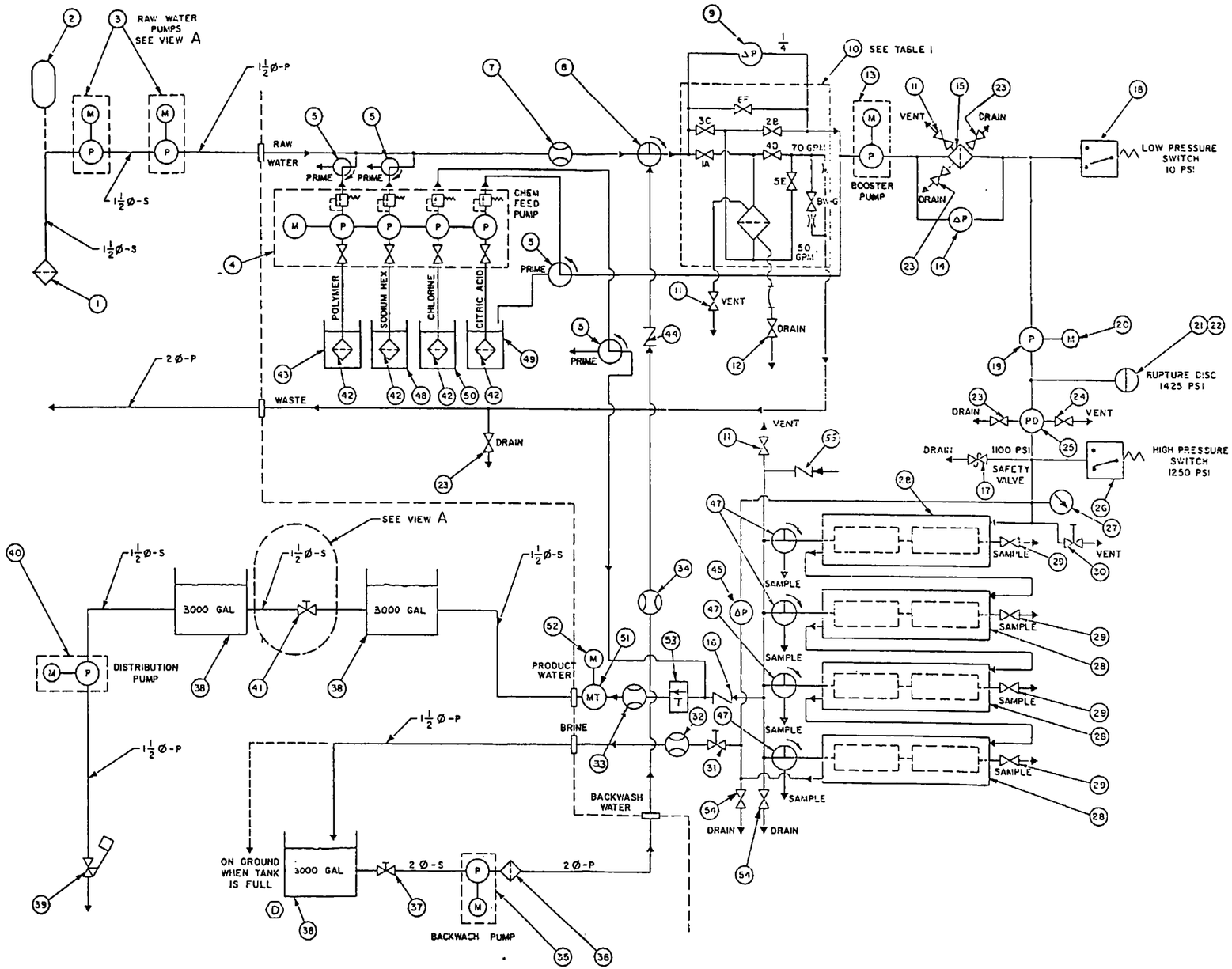
TABLE I

SEQUENCE OF OPERATIONS IN ITEM 10

FUNCTION	1A	2B	3C	4D	5E	6F	8W-G
SERVICE	O	O	X	X	X	X	X
BACKWASH 2-3 MINUTES	X	X	O	O	X	X	X
RINSE 6-7 MINUTES	X	X	O	O	X	X	O
BACKWASH 2-3 MINUTES	X	X	O	O	X	X	X
OFF	X	X	X	X	O	X	X
PURGE	O	X	X	X	O	X	X

O= VALVE OPEN
X= VALVE CLOSED

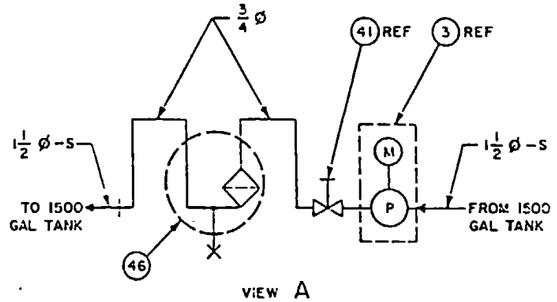
FO-5. Piping Schematic - Model WPES-1 (Sheet 1 of 2)



FO-5. Piping Schematic - Model WPES-1 (Sheet 2 of 2)

FP-15/(FP-16 blank)

COMPONENT REFERENCE LIST			
FIND NO.	QTY REQD	PART OR IDENTIFYING NO.	DESCRIPTION
1	1	□□32668307	STRAINER SUCTION HOSE, MIL-S-12165, TYPE □
2	1	NSN 4610-00-064-2478	FLOAT, FIGURE 4, MIL-W-52482
3	2	13222E5335	PUMP, CENTRIFUGAL, SELF PRIMING EMD
4	1	13226E8326	PUMP, CHEMICAL FEED
5	4	13222E5276	VALVE, BALL, 3-WAY
6			
7	1	13222E5247-1	FLOWMETER
8	1	13221E8282-4	VALVE, BALL, 3-WAY
9	1	13222E5329-1	GAGE, DIFFERENTIAL PRESSURE
10	1	13222E5328	FILTER, MULTI-MEDIA
11	3	13221E8271-1	VALVE, BALL
12	1	13221E8271-3	VALVE, BALL
13	1	13222E5337	PUMP, CENTRIFUGAL, EMD
14	1	13222E5329-2	GAGE, DIFFERENTIAL PRESSURE
15	1	13225E8333	FILTER, CARTRIDGE
16	1	13221E8345	VALVE, CHECK
17	1	13222E5238	VALVE, RELIEF
18	1	13225E8332	SWITCH, LOW PRESSURE
19	1	13229E5435	PUMP, HIGH PRESSURE
20	1	13222E5267	MOTOR, ELECTRIC
21	1	13225E8304	HOLDER, RUPTURE DISC
22	1	13225E8305	RUPTURE DISC
23	6	13221E8271-2	VALVE, BALL
24	1	13221E8271-1	VALVE, BALL
25	1	13222E5249	DAMPENER, FLUID PRESSURE
26	1	13225E8303	SWITCH, HIGH PRESSURE
27	1	13221E8340	GAUGE, PRESSURE
28	4	13222E5320	PRESSURE TUBE, REVERSE OSMOSIS
29	4	13226E7981	VALVE, 2-WAY, ON-OFF
30	1	MSS-SP80	VALVE, GATE
31	1	13225E8305	VALVE, NEEDLE
31	1	13226E2209 OPT	VALVE, NEEDLE
32	1	13222E5247-2	FLOWMETER
33	1	13222E5278	FLOWMETER
34	1	13222E5247-3	FLOWMETER
35	1	13222E5262	PUMP, CENTRIFUGAL, EMD
36	1	13222E5253	STRAINER, SINGLE
37	1	13222E5319-8	VALVE, GATE
38	3	MIL-T-53016	TANK ASSEMBLY, FABRIC, COLLAPSIBLE, WATER, NYLON
			RUBBER COATED, CAPACITY: 3000 GALLONS
39	1	NSN 4930-00-360-0611	NOZZLE
40	1	13222E5337	PUMP, CENTRIFUGAL, EMD
41	1	13222E5319-7	VALVE, GATE
42	4	13226E8328	STRAINER, SUMP
43	1	13226E7680-1	CAN ASSY, CHEMICAL FEED, POLYMER
44	1	13226E8307	VALVE, CHECK
45	1	13221E8316	GAGE, DIFFERENTIAL PRESSURE
46	1	13221E8341-1 OR -2	CARTRIDGE, DEIONIZATION PURIFICATION
47	4	13226E7982-4	ELLIPTIC VALVE, 2 POSITION, 3-WAY
48	1	13226E7990-2	CAN ASSY, CHEMICAL FEED, SODIUM HEX
49	1	13226E7990-3	CAN ASSY, CHEMICAL FEED, CITRIC ACID
50	1	13226E7990-4	CAN ASSY, CHEMICAL FEED, CHLORINE
51	1	13227E7588	CABLE ASSEMBLY, SENSOR, DISSOLVED SOLIDS
52	1	13227E7585	MONITOR METER ASSEMBLY, DISSOLVED SOLIDS
53	1	13227E7586	METER, WATER, 5/8 INCH
55	1	13227E9238	VACUUM BREAKER



VIEW A
SPECIAL INSTALLATION FOR RADIOLOGICAL OR CHEMICAL CONTAMINATION

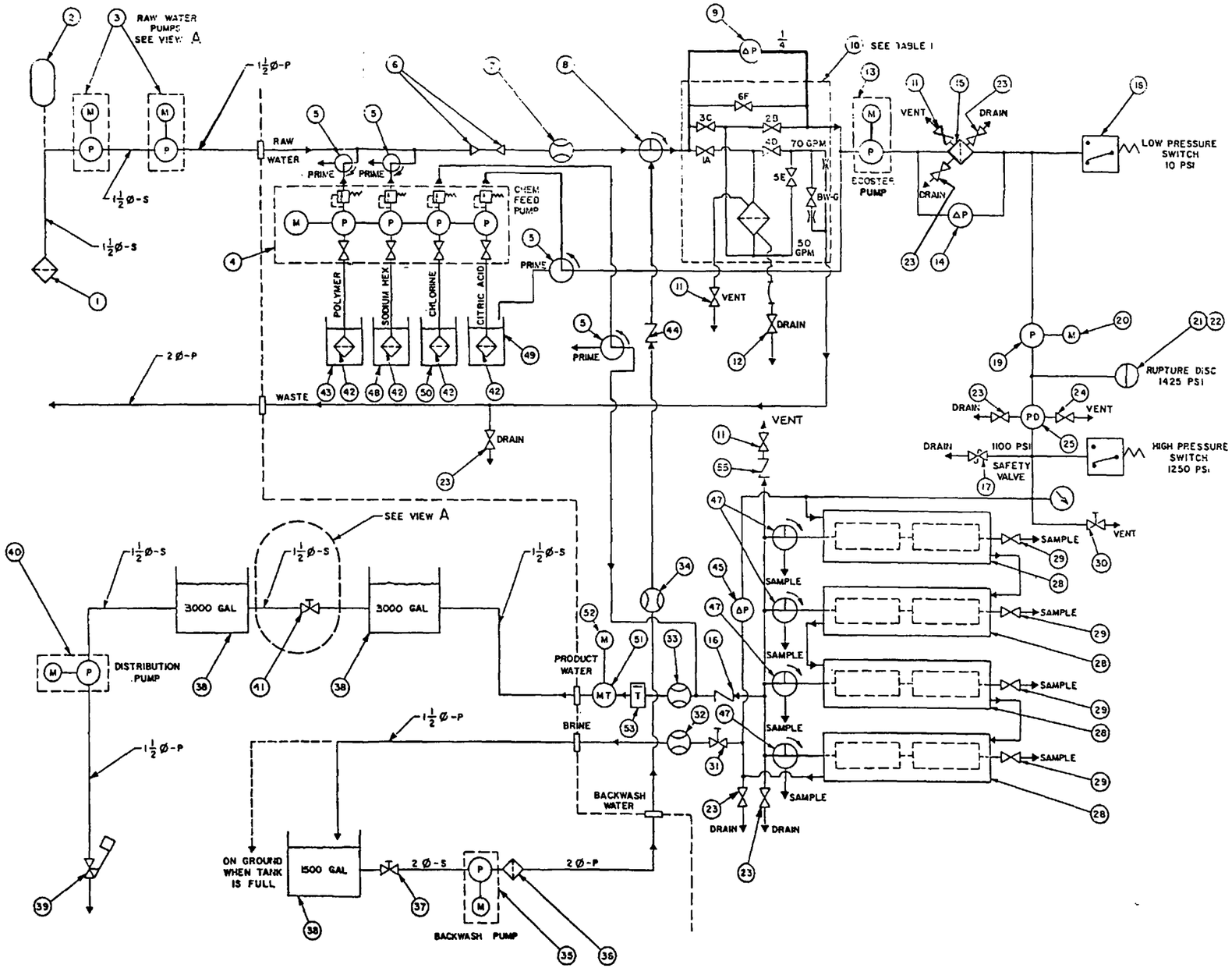
TABLE I

SEQUENCE OF OPERATIONS IN ITEM 10

FUNCTION	1A	2B	3C	4D	5E	6F	BW-G
SERVICE	O	O	X	X	X	X	X
BACKWASH 2-3 MINUTES	X	X	O	O	X	X	X
BACKWASH 6-7 MINUTES	X	X	O	O	X	X	O
BACKWASH 2-3 MINUTES	X	X	O	O	X	X	X
OFF	X	X	X	X	O	X	X
PURGE	O	X	X	X	O	X	X

O= VALVE OPEN
X= VALVE CLOSED

FO 6. Piping Schematic - Model WPES-2 and WPES-3 (Sheet 1 of 2)



FO 6. Piping Schematic - Model WPES-2 and WPES-3 (Sheet 2 of 2)

By order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

PATRICIA P. HICKERSON
Colonel, United States Army
The Adjutant General

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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 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

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

Square Measure

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

Cubic Measure

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

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 069001-000