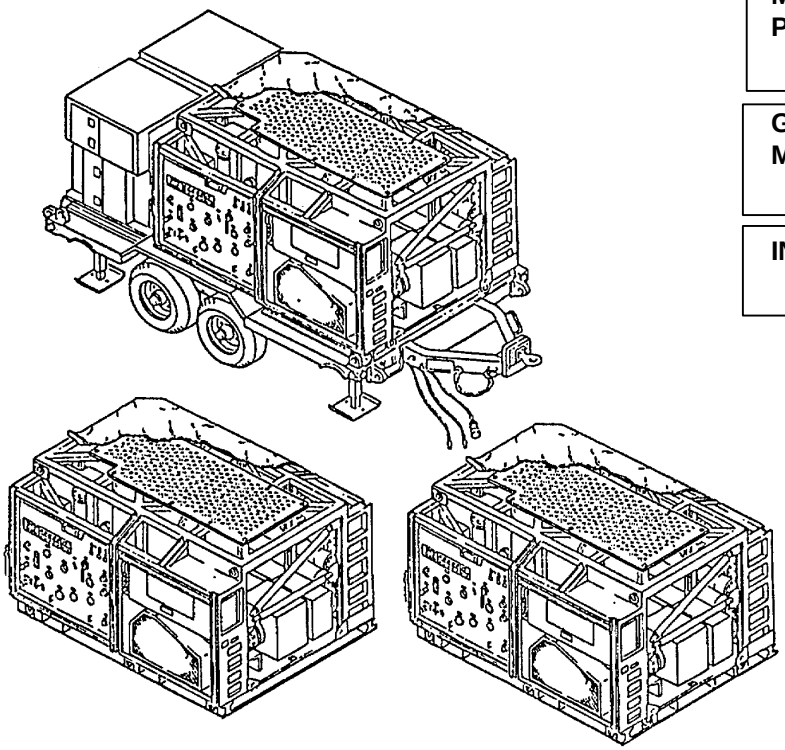
TECHNICAL, MANUAL

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-10 (ARMY)
(NSN 4610-01-341-6289)
AND
SKID-MOUNTED
MODEL WPES-20 (AIR FORCE)
(NSN 4610-01-341-6288)
MODEL WPES-30 (NAVY)
(NSN 4610-01-341-6287)



HEADQUARTERS, DEPARTMENTS OF THE ARMY
AND AIR FORCE
15 JANUARY 1993

CHANGE

NO. 1

HEADQUARTERS
DEPARTMENTS OF THE ARMY
AND AIR FORCE
WASHINGTON, D.C., 26 December 1997

UNIT, DIRECT SUPPORT, AND GENERAL
SUPPORT MAINTENANCE MANUAL

WATER PURIFICATION UNIT,,
REVERSE OSMOSIS (ROWPU)
600 GPH TRAILER MOUNTED, FLATBED CARGO,
5 TON 4 WHEEL TANDEM
MODEL WPES-10 (ARMY) (NSN 4610-01-341-6289)
MODEL H-9518-2 (ARMY) (NSN 4610-01-420-7547)
AND
600 GPH SKID MOUNTED
MODEL WPES-20 (AIR FORCE) (NSN 4610-01-341-6288)
MODEL H-9518-2 (AIR FORCE) (NSN 4610-01-420-7546)
MODEL WPES-30 (NAVY) (NSN 4610-01-341-6287)
MODEL HJ-9518-3 (NAVY) (NSN 4610-01-420-7548)

Approved for public release; distribution is unlimited.

TM 10-4610-241-24, 15 January 1993, is changed as follows:

1. Remove and insert pages as indicated below, New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
i thru iv	i thru iv
vii and 1-0	vii and 1-0
l-l thru 1-8	1-1 thru 1-8
2-1 thru 2-4	2-1 thru 2-4
2-7 thru 2-14	2-7 thru 2-14
2-17 thru 2-24	2-17 thru 2-24
2-29 thru 2-34	2-29 thru 2-34
2-51 thru (2-78 Blank)	2-51 thru (2-78 Blank)
	2-120.1 thru 2-120.8
2-121 and 2-122	(2-121 Blank) and 2-122
2-143 thru 2-146	2-143 thru 2-146
2-163 thru 2-168	2-163 thru 2-168
2-179 thru 2-188	2-179 thru 2-188
	2-188.1 thru 2-188.6
2-189 and 2-190	2-189 and 2-190
2-249 thru 2-268	2-249 thru 2-268
	2-268.1 thru 2.268.4
2-269 thru 2-272	2-269 thru 2-272
	2-272. 1 thru 2-272.4
2-273 thru 2-282	2-273 thru 2-282
2-299 thru 2-366	2-299 thru 2-366

Remove pages	Insert pages
3-1 thru 3-12	3-1 thru 3-12
3-15 thru 3-18	3-15 thru 3-18
3-21 thru 3-24	3-21 thru 3-24
3-27 thru 3-30	3-27 thru 3-30
3-33 thru 3-38	3-33 thru 3-38
3-43 and 3-44	3-43 and 3-44
3-49 and 3-50	3-49 and 3-50
3-57 and 3-58	3-57 and 3-58
3-61 and 3-62	3-61 and 3-62
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3-73 and 3-74	3-73 and 3-74
3-77 and 3-78	3-77 and 3-78
3-81 and 3-82	3-81 and 3-82
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3-147 and 3-148	3-147 and 3-148
3-153 thru 3-164	3-153 thru 3-164
3-173 thru 3-176	3-173 thru 3-176
3-217 and 3-218	3-217 and 3-218
3-235 thru 3-244	3-235 thru 3-244
	3-244.1 thru 3-244.8
3-245 thru 3-254	3-245 thru 3-254
	3-254.1 thru 3-254. 12
3-255 thru 3-258	3-255 thru 3-258
3-265 thru 3-272	3-265 thru 3-272
	3-272.1 thru 3-272.6
3-273 thru 3-275/(3-276 Blank)	3-273 thru 3-275/(3-276 Blank)
3-301 and 3-302	3-301 and 3-302
3-323 and 3-324	3-323 and 3-324
3-331 thru 3-334	3-331 thru 3-334
3-349 thru 3-378	3-349 thru 3-378
4-1 thru 4-7/(4-8 Blank)	4-1 thru 4-7/(4-8 Blank)
A-1 and A-2	A-1 and A-2
B-5 thru B-14	B-5 thru B-14
Index- 1 thru Index-6	Index-1 thru Index-6
FP- 1(FP-2 blank) thru FP-19/(FP-20 blank)	FP-1/(FP-2 blank) thru FP-19/(FP-20 blank)
COVER	COVER

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretaries of the Army and Air Force:

official:

JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army
04289

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

Official

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MERRIL A. McPEAK
General, USAF
Chief of Staff

DISTRIBUTION: to be distributed in accordance with the initial distribution number (IDN) 255996, requirements for TM 10-4610-241-24.

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 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. When the technician is aided by operators, he must warn them about dangerous areas.

Be careful not to contact high-voltage connections when installing or operating this equipment. Voltages of 115 and 208 VAC are common.

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 solvents 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 bisulfate 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

NO. 10-4610-241-24

HEADQUARTERS
DEPARTMENTS OF THE ARMY AND AIR FORCE
WASHINGTON, D.C., 15 JANUARY 1993

Unit, Direct Support, and General Support Maintenance Manual For WATER PURIFICATION UNIT, REVERSE OSMOSIS (ROWPU) 600 GPH TRAILER MOUNTED, FLATBED CARGO, 5 TON 4 WHEEL TANDEM MODEL WPES-10 (ARMY) (NSN 4610-01-341-6289) MODEL H-9518-1 (ARMY) (NSN 4610-01-420-7547) AND 600 GPH SKID MOUNTED MODEL WPES-20 (AIR FORCE) (NSN 4610-01-341-6288) MODEL H-9518-2 (AIR FORCE) (NSN 4610-01-420-7546) MODEL WPES-30 (NAVY) (NSN 4610-01-341-6287) MODEL H-9518-3 (NAVY) (NSN 4610-01-420-7548)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this bulletin. If you find any mistakes or if you know of a wayto improve the procedures, please let us know. Mail your letter, DA Form 2028(Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 located in the back of this manual directly to Commander, U. S. Tank-Automotiveand Armaments Command, Attn:AMSTA-AC-NML, Rock Island, IL 61299-7630. You may also submit your recommended changes buyE-mail directly to amsta-ac-nml@ria-emh2.army.mi1, or fax number 309/782-0726/DSN 793-0726. A reply will be furnished directly to you. Instructions for sending an electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

For Air Force, submit AFT0 Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, T.O. 00-5-1. Forward to Commander, San Antonio Air Logistics Center, ATTN: SA-ALC/TIRTR, Kelly Air Force Base, TX 78241-5000.

TABLE OF CONTENTS

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 TRUBLESHOOTING 2-7." You can skip over to page 2-7.

   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.

ARMY TM 10-4610-241-24
AIR FORCE TO 40W4-13-42

TECHNICAL MANUAL

UNIT, DIRECT. SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR WATER PURIFICATION UNIT, REVERSE OSMOSIS (ROWPU).

600 GPH TRAILOR MOUNTED, FLATBED CARGO 5-TON, 4-WHEEL TANDEM,
MODEL WPES-10(ARMY) (NSN 4610-41-341-6289)
MODEL H-9518-1 (ARMY) (NSN 4610-01-420-7547)
AND
600 GPH SKID-MOUNTED.
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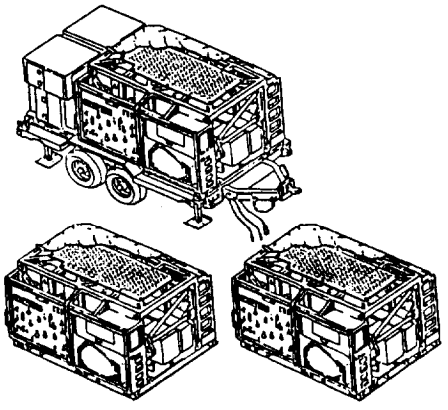
MODEL WPES-30 (NAVY) (NSN 4610-01-341-6287)
MODEL H-9518-3 (NAVY) (NSN 4610-01-420-7548)



HEADQUARTERS, DEPARTMENTS OF THE ARMY
AND AIR FORCE
15 JANUARY 1993

SECTION IV. UNIT TROUBLE, ESHOOTING

2-8.INTRODUCTION

This section provides the troubleshooting information for the Unit Maintenance level. It consists of the sympton index, listing the most common malfunction systoms, 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 systems and any corrective action that may have been taken.

(2) Go to the System 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.

SYMPTON INDEX

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 2-7.

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 2-68 for "DIM OR FLICKERING LIGHTS."

Table 2.2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
TRAILER ELECTRICAL SYSTEM (Model WPES-10) - 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 mounting surfaces and reinstall securely. If trouble persists continue with step 4.
Step 4. Disconnect trailer power cable assembly from wiring harness assembly at in line connectors and check it for availability of 24VDC at each connector while operating the required controls on the vehicle. Use chassis as ground.
Replace trailer cable assembly if it is defective. Refer to Paragraph 2-81.
Step 5. Disconnect trailer wiring harness at light assembly connectors and check for availability of 24VDC at each connector while operating the required controls on the vehicle. Use chassis as ground.
a. If wiring harness is not defective, replace light assembly. Refer to Paragraph 2-80
b. If wiring harness is defective, replace it. Refer to Paragraph 2-82.
2. DIM OR FLICKERING LIGHTS.
Step 1. Disconnect trailer cable assembly from towing vehicle and check for bent, broken or corroded pins.
If pins are defective, repair or replace cable assembly. Refer to Paragraph 2-81.
Step 2. Check for loose or corroded chassis ground wire.
a. If wire is loose tighten it.
b. If wire is not loose, remove it from trailer, clean mounting surfaces and reconnect securely

2-68

6. Turn to page 2-68 and find the symptom "DIM OR FLICKERING LIGHTS."

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 assembly. Refer to paragraph 2-81."

2.81. TRAILER CABLE ASSEMBLY REPLACE(MODEL WPES-10).

2-81. TRAILER CABLE ASSEMBLY REPLACE (MODEL WPES-10).

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

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Lockwashers
Equipment Condition
Reference
Power shut down (Generator Manual)
Trailer Cable disconnected from Towing Vehicle (TM 10-4610-241-10).

a. Removal.

NOTE
Tagging wires, noting connection points will facilitate installation. Be sure to transfer tags to replacement parts before discarding defective parts or turning them in to Supply.

(1) Remove six connectors (1) from spring clips of clamps (2).

(2) Separate two halves of six connectors (1).

(3) Remove screw (3) and lockwasher (4) and disconnect ground wire (5) from clamp (2).

(4) Remove nut (7), screw (8) and cable clamp (9).

(5) Remove cable assembly (10) from drawbar (6) of trailer.

b. Installation.

(1) Position trailer cable assembly (10) in place on drawbar (6) of trailer.

(2) Secure cable assembly (10) to drawbar (6) with cable clamp (9), screw (8) and nut (7).

(3) Install ground wire (5), lockwasher (4), and screw (3) on clamp (2).

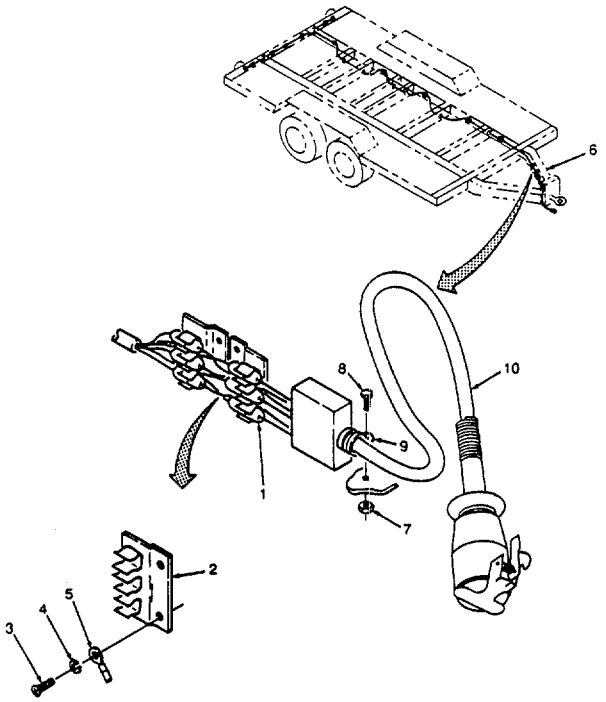
(4) Match halves of six connectors (1) as tagged at removal. Push halves together until they lock.

(5) Push six connectors (1) into spring clips of clamp (2).

(6) Connect trailer cable assembly to towing vehicle and check for proper operation of lights (TM 10-4610-241-10).

2-318

2-81. TRAILER CABLE ASSEMBLY REPLACE (MODEL WPES-10) - continued.



2-319

8. Turn to paragraph 2-81 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.

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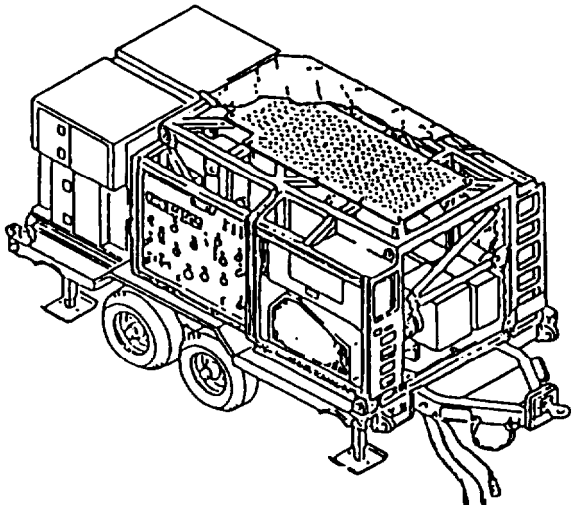
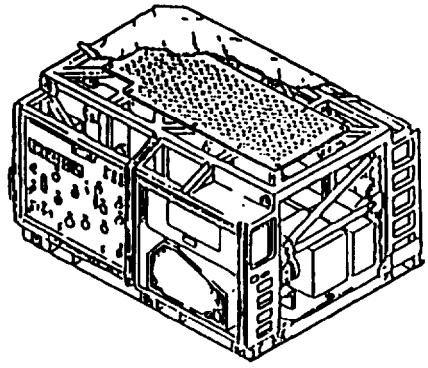


MODEL WPES-10



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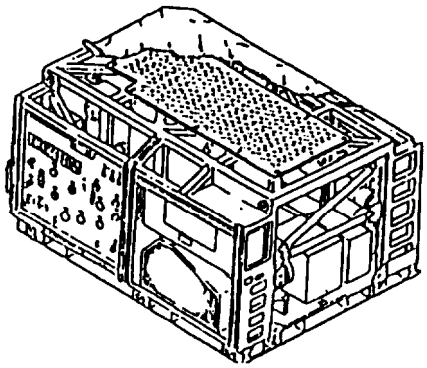

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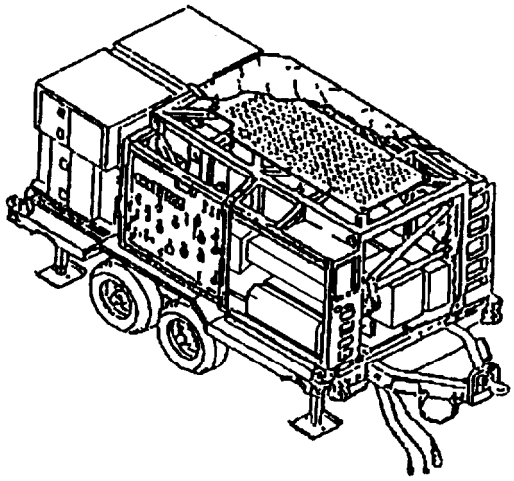
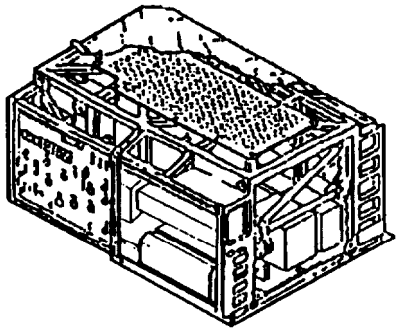
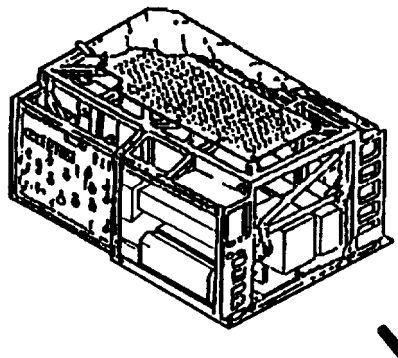


MODEL H-9518-1



MODEL H-9518-2



MODEL H-9518-3

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-10 and H-9518-1 (Army), WPES-20 and H-9518-2 (Air Force), and WPES-30 and H-9518-3 (Navy). 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. 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: AMSAT-I-MDO, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798, We'11 send you a reply.

b. 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. and Highland Engineering, Inc. in accordance with the terms of contracts DAAK-01-91-C-0178 and DAAK01-95-D-0024. Refer to TB 10-4610-241-24 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.

Section II. EQUIPMENT DESCRIPTION AND DATA

Alphabetical Index

Paragraph Title **Paragraph**

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 10-4610-241-10; TM 08580D-10/l; T.O. 40W4-31-41

l-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

For information on the location and description of the major components, refer to TM 10-4610-241-10; T.O. 40W4-13-41.

1-11. DIFFERENCES BETWEEN MODELS.

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

Army	Model WPES- 10 and Model H-9518-1
Air Force	Model WPES-20 and Model H-9518-2
Navy	Model WPES-30 and Model H-9518-3

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-10, Model H-9518-1, Model WPES-20, H-9518-2, Model WPES-30 or H-9518-3) in the paragraph heading or procedural step. Procedures applicable to all six models do not contain any designation.

DIFFERENCES BETWEEN MODELS

	WPES-10 and H-9518-1	WPES-20 and H-9518-2	WPES-30 and H-9518-3
USER	**ARMY**	**AIR FORCE**	**NAVY**
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
Power cable supplied	X		

1-11. DIFFERENCES BETWEEN MODELS-continued.

a. Only models WPES- 10 and H-9518-1 are 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-20, H-9518-2, WPES-30 and H-9518-3 are skid mounted (no trailer).

b. Models WPES-20, H-9518-2, WPES-30, H-9518-3 get electrical power from an external source that is not supplied with the unit.

c. Differences in the electrical systems are:

(1) Models WPES-10, H-9518-1, WPES-30 and H-9518-3 have only one external power connector on the junction box. Internal wiring between these four models is identical.

(2) Models WPES-20 and H-9518-2 have 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 cables must be connected to operate the unit. Internal wiring is different between these units and models WPES-10, H-9518-1, WPES-30 and H-9518-3.

d. Differences in the piping systems are:

(1) Piping on models WPES-20, H-9518-2, WPES-30 and H-9518-3 are identical. On these models, the R.O. elements must be removed from both the front and back of the R.O. vessels.

(2) The 30KW generator set installed on the flatbed cargo trailer of models WPES-10 and H-9518-1 prevents removal of the R.O. elements from the back of the R.O. vessels. Piping is different on these models 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 11-4610-241-10; TO 40W4-13-41.

Section III. TECHNICAL PRINCIPLES OF OPERATION

Alphabetical Index

1-13. SYSTEM TECHNICAL PRINCIPLES OF OPERATION.

a. General. The ROWPU removes suspended solids (called turbidity), chemicals, and solids held in solution (called dissolved solids), found in most fresh water and seawater sources to a level fit for human consumption. This is done by filtering, reverse osmosis, and treating the water with selected chemicals.

b. Reverse Osmosis. Reverse osmosis is the process by which purified water is separated from the available fresh, seawater, or brackish water sources. High pressure is applied to the raw water side of a semipermeable membrane and desalinated product 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. elements. The R.O. elements separate this water stream into a product water stream and a brine concentrate stream, both of which continuously flow away from the membranes through the R.O. pressure tubes. About 10 gallon of product water is produced for every 30 gallon of raw water processed.

c. Water Processing. Water flowing through the ROWPU is processed as follows:

CAUTION

Petroleum contaminated raw water will damage R.O. elements, multimedia filter and cartridge filter.

(1) First Stage of Filtration - Multimedia Filter. The multimedia filter is the first stage of filtration. Large particles of suspended solids are removed by the various layers of filter material in the tank. Polymer, added to the raw water by the chemical feed pump, collects suspended solids into groups large enough to be removed by the multimedia filter in a process called coagulation.

(2) Second Stage of Filtration - Cartridge Filter. The cartridge filter removes finer suspended solids that pass through the multimedia filter.

(3) Reverse Osmosis (R.O.). The R.O. elements remove dissolved solids from the water and any suspended solids that may have passed through the multimedia and cartridge filters.

(4) Chemical Injection - Chemical Feed Pump. The chemical feed pump is comprised of four liquid heads which inject chemicals into the water system. Polymer is injected into the raw water before entry into the multimedia filter. Polymer aids in the removal of suspended solids by the multimedia filter through a process called coagulation. Sodium hex is injected into the raw water to reduce scaling and corrosion of pipes, pumps and filters caused by hard water deposits. Chlorine is added to the product water to reduce bacteria and make the water safe for consumption. Citric acid is injected downstream of the multimedia filter to remove scale deposits that build up on the R.O. elements and maintain pH.

1-14. COMPONENT PRINCIPLES OF OPERATION.

The following paragraphs describe the principles of operation for components and assemblies of the ROWPU. Refer to figure 1-5.

CAUTION

Source water must be free of chlorine. Chlorine will instantly destroy the R.O. elements. Destruction of the R.O. elements will make the ROWPU unable to perform its mission.

RAW WATER SOURCE (1). The raw water source can be any reservoir of fresh, brackish or saltwater. Water source should contain enough water to perform your mission.

STRAINER (2). The strainer prevents small stones, twigs and debris from entering suction hose.

OCEAN INTAKE STRUCTURE (2a) (Models H-9518-1, H-9518-2, and H-9518-3). Utilizes self-jetting wellpoints to extract water from a variety of water sources, but especially from an ocean-type environment.

RAW WATER PUMPS (3 and 4). Two portable, electrically driven, centrifugal pumps draw raw water from the water source and supply it to the ROWPU under pressure. These pumps are normally connected in series. One pump is used in the product water system during NBC operations to pressurize the water flow through the deionization cartridges.

CHEMICAL FEED PUMP. The chemical feed pump consists of an electric motor, housing, four feed heads and four stroke adjustment assemblies. The electric motor turns a camshaft inside the housing. A shaft inside each stroke adjustment assembly converts the rotating action of the camshaft to a reciprocating stroke that operates a diaphragm inside each feed head. Each feed head performs the following function:

POLYMER FEED HEAD (5). Adds the polymer solution to the raw water to coagulate solids in multimedia filter.

SODIUM HEX FEED HEAD (6). Adds diluted sodium hex to the raw water to prevent scaling and corrosion.

CHLORINE FEED HEAD (13). Adds chlorine to the product water after the R.O. process takes place. Chlorine reduces bacteria in the product water to a level safe for human consumption.

CITRIC ACID FEED HEAD (17). Adds diluted citric acid to filtered water to maintain the optimal pH (5.0 - 8.0) for the R.O. process; aids in preventing scale buildup inside the R.O. membranes.

MULTIMEDIA FILTER (7). Removes large suspended solids from the raw water. The multimedia filter contains six types of media: gravel, coarse garnet, fine garnet, silica sand, anthracite, and plastic, Water entering the filter flows through a baffle to prevent disruption of the filter media. The water then flows through the filter media leaving larger suspended solids behind. The media bed is backwashed when: the loss of head pressure through the filter bed increases above a certain level; or the quality of the water flowing out fails to meet standards.

BOOSTER PUMP (8). Electrically driven, centrifugal pump increases water pressure to the cartridge filter.

1-14 COMPONENT PRINCIPLES OF OPERATION.

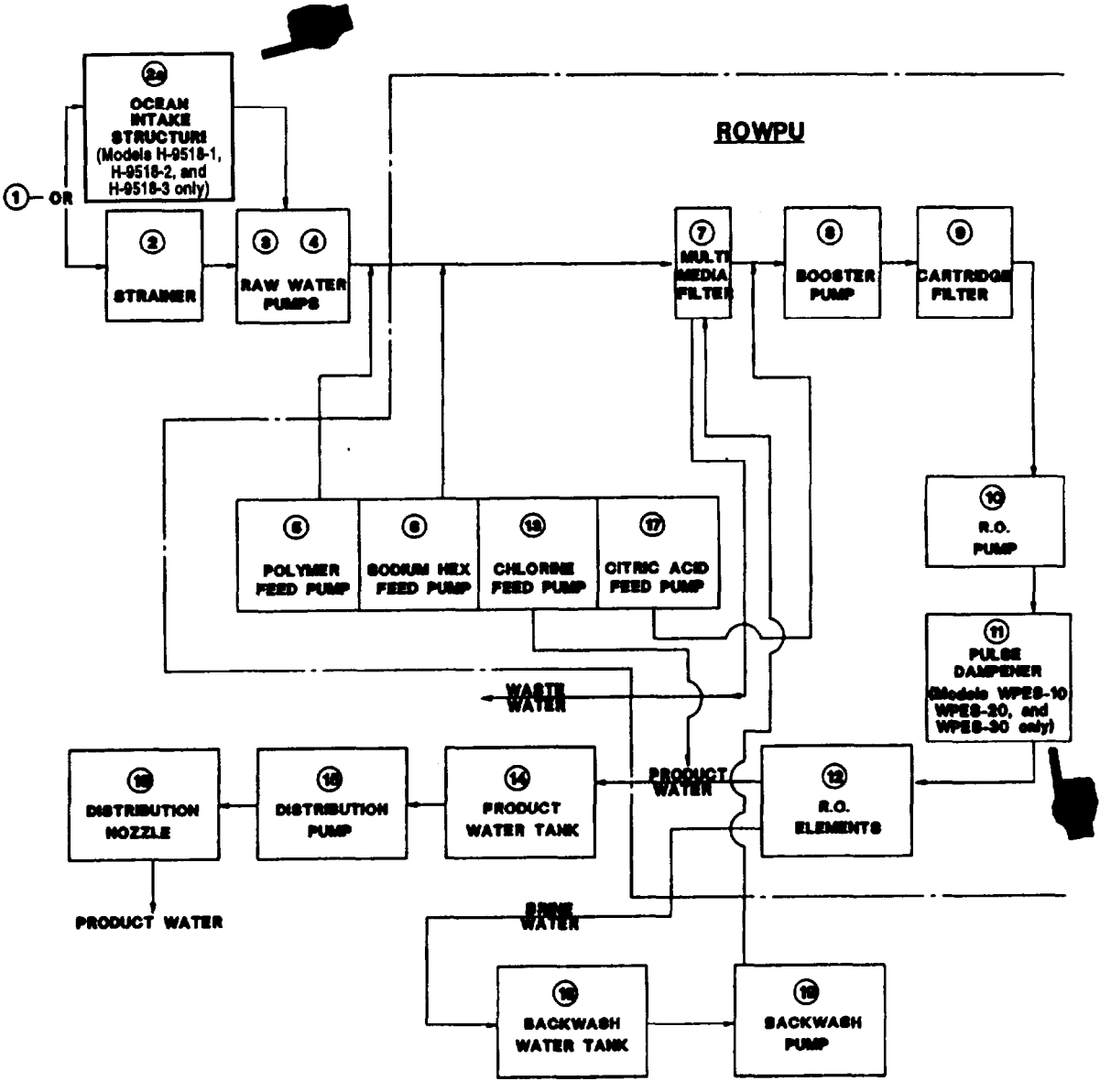


Figure 1-5. Water Processing Diagram.

11-14. COMPONENT PRINCIPLES OF OPERATION-continued.

CARTRIDGE FILTER (9). Removes small suspended solids that pass through the multimedia filter. Solids are trapped on eight replaceable cartridges filter tubes inside the filter body. Elements should be replaced when cartridge filter gage differential pressure rises above 20 psid.

RO. PUMP (10). Electrically driven high pressure pump increases system water pressure to the R.O. pressure tubes for operation of the R.O. process.

PULSE DAMPENER (11) (Models WPES-10, WPES-20 and WPES-30 only). A cylindrical metal tank installed between the R.O. pump and the R.O. pressure tubes removes pulses in water flow caused by the reciprocating action of the R.O. pump pistons.

R.O. PRESSURE TUBES (12). The four fiberglass R.O. pressure tubes each contain two R.O. elements. Water entering the R.O. pressure tubes is under high pressure, The semi-permeable R.O. elements use the high pressure to separate (strain) dissolved solids from the filtered water. Product water is removed from the center of the elements. Dissolved solids are flushed out of the R.O. pressure tubes as brine.

PRODUCT WATER TANKS (14). Two 3,000 gallon collapsible water tanks store product (potable) water produced by the ROWPU.

DISTRIBUTION PUMP (15). Pumps and distributes potable water from the product water tanks to user containers.

DISTRIBUTION NOZZLE(16). Controls water flow from the distribution pump, Used for filling small hand held containers or portable water tanks.

BACKWASH WATER TANK (18). Collapsible 3,000 gallon water tank stores brine water produced by the R.O. process for use during the backwash cycle and cleaning R.O. elements.

BACKWASH PUMP (19). Pumps brine water from the backwash water tank to the multimedia filter for operation of the backwash cycle. A strainer connected to the outlet of the backwash pump removes large particles of debris that may have entered the brine water tank.

CHAPTER 2

UNIT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIALTOOLS, 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.

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

Refer to TM 10-4610-241-24P and the Maintenance Allocation Chart in Appendix B of this manual.

2-3. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list, TM 10-4610-241-24p, 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 10-4610-241-10.

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.

(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.

(3) Check to see if the equipment has been modified.

b. Deprocessing Unpacked Equipment.

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

CAUTION

To prevent damage to equipment, do not operate R.O. pump (Models WPES-10, WPES-20 and WPES-30 only) or chemical feed pump on preservative oil. Pumps must be serviced with correct operating oil during deprocessing.

(2) Drain shipping fluid from R.O. pump (Models WPES-10, WPES-20 and WPES-30 only) and chemical feed pumps. Service pumps with fresh oil in accordance with LO 10-4610-241-12.

2-6. INSTALLATION INSTRUCTIONS.

For installation instructions, refer to TM 10-4610-241-10.

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

2-7. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

a. GENERAL. Preventive Maintenance Checks and Services (PMCS) means systematic caring, inspecting, and servicing of equipment to keep it in good condition and prevent breakdowns, As the ROWPU's maintainer, your mission is to:

(1) Be sure to preform your SEMI-ANNUAL (SA) and ANNUAL (A) PMCS regularly.Always do your PMCS in the same order, so it gets to be a habit. Once you've had some practice. you'll quickly spot anything wrong. Pay attention to WARNINGs. CAUTIONs, and NOTEs.

(2) se DA form 2404 (Equipment Inspection and Maintenance Worksheet) to record and faults that you discover while preforming your SEMI-ANNUAL and ANNUAL checks and services, unless you can fix them. You DO NOT need to record faults that you fix.

b. PMCS PROCEDURES

(1) Your Preventive Maintenance Checks and Services. Table 2-1. lists inspections and care required to keep your ROWPU in good operating condition. It is set up so you can make your SEMI-ANNUAL and ANNUAL checks as you walk around the ROWPU.

(2) Checks and Services are numbered in chronological order regardless of interval. This column is used a a source of tire number for the "TM Number" column on DA form 2404, Equipment Inspections and Maintenance Worksheet, in recording results of PMCS.

(3) The"INTERVAL"column of Table 2-1 tells you when to do a certain check or service.

(4) THE "PROCEDURE" column of Table 2-1 tells you how to do required checks and services. Carefully follow these istructions. If you do not have tools. or if the procedure tells you to, notify your supervisor.

CAUTION

Terms "ready/available" and "mission capable" refer to same status Equip ment is on hand and ready to perform its combat missions. (See DA Pam 738-750)

(5) The "EQUIPMENT IS NOT READY/AVAILABLE:" column in Table 2-1 tells you when your ROWPU is nonmission capable and why the ROWPU cannot be used.

(6) If the ROWPU does not perform as required, refer to Troubleshooting, Table 2-2.

(7) If anything looks wrong and you can't fix it, write it on your DA form 2404. IMMEDIAATELY, report it to your supervisor.

(8) when you do your PMCS, you will always need a rag or two. Following are checks that are common to the entire ROWPU:

(a) Keep It Clean. Dirt. grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work after and as needed.

(b) Rust and Corrosion. Check ROWPU body and frame for rust and corrosion. If any bare metal or corrosion exists, clean, and apply a thin coat of oil. Report it to your supervisor.

(c) Bolts. Nuts, and Screws. Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool. but look for chipped paint. bare metal, or rust around bolt heads. If you find a bolt, nut, or screw you think is loose, tighten it or report it to your supervisor.

(d) Welds. Look for loose or chipped paint. rust. or gaps where parts are welded together. If you find a bad weld. report it to your supervisor.

(e) Electric Wires and Connectors. Look for cracked, frayed, or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors. Report any damaged wires to your supervisor.

(f) Hoses and Fluid Lines. Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, replace it or report it to your supervisor.

c. CLEANING AGENTS

CAUTION

- **DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well-ventilated places. Flash point of solvent is 138°F (60°C).**
- **USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact shin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.**
- **Use only those authorized cleaning solvents or agents listed in Appendix D.**

(1) Treating Mildewed Areas. Canvas that has mildewed can be cleaned by scrubbing with a dry brush. If it is necessary to use water to remove dirt, it should not be used until mildew has been removed. After removing mildew, examine fabric. Look for evidence of deterioration. If canvas has deteriorated, it should be replaced.

(2) Cleaning Rust or Grease. When cleaning grease buildup or rusty places, use a cleaning solvent. Then apply a thin coat of light oil to affected area.

d. LEAKAGE DEFINITIONS FOR UNIT PMCS. Following are types/classes of leakage a maintainer needs to know to be able to determine the status of the ROWPU. Learn these leakage definitions and remember that it is necessary for you to know how fluid leakage affects the status of the ROWPU.

CLASS I - Seepage of fluid (as indicated by wetness of 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 item being checked/inspected.

Table 2-1. Unit Preventive Maintenance Checks and Services

Item No.	Interval	Location Item To Check/ Service	Procedure	Not Fully Mission Capable If-
1	Semi-Annual	RO Pump Assembly (Models WPES-10 WPES-20 and WPES-30 only)	a. Check Pump and Motor Pulleys for wear, cracks and damage.	Any pulley damaged or missing
			b. Check Drive Belt for cracking, fraying or breaks.	Belt is brokencracked to the belt fiber, has more than one crack (l/8 inch in depth or 50% of belt thickness), has brays more than 2 inches long or excessive play (stretched)
			c. Check Belt adjustment for 1/2 inch play	Cannot be adjusted
			d. Drain oil and check for metal particles on magnetic plug and milky condition. Replace oil as necessary, check that filter cover is tight and breather is not clogged	Oil is milky or has metal particles. Breather is un-serviceable

Table 2-1. Unit Preventive Maintenance Checks and Services

Item No.	Interval Service	Location Item To Check/	Procedure	Not Fully Mission Capable If:
2	Semi-Annual	Control Box	a. Check electrical connections or box and cables for tightness and proper mounting. Inspect cable pins and inserts for corrosion, bums, looseness and missing components.	Any cable connection, pin or insert damaged.
			b. Check cable pins, inserts and wires to screw connectors for burns, damage, looseness and missing cornponents.-	Any connector, pin, insert, screw or wire damaged, burnt or missing
3	Semi-Annual	Booster Pump	a. Check electrical connector box and cables for tightness and proper mounting.	Any cable connection, pin or insert damaged
			b. Check cable pins, inserts and wires to screw connectors for burns. damage, looseness and missing components.-	Any connector, pin, insert, screw or wire damaged, burnt or missing
			c. Check for loose screws and mounts on pump motor and between pump and motor . **WARNING** **High voltages in equipment can cause serious injury or death. Be certain all power is removed before performing inspection checks.**	Any bolt loose causing excessive vibration or Class III leak
4	Semi-Annual	Junction Box	a. Check all wiring harness connec-tors for damage, corrosion, looseness and connector boots for sealing .	Any connector, pin, insert or boot missing or damaged
			(1) Wiring harness and terminal boards for damage, corrosion, pitted terminals, loose screws, broken wires, dirt and foreign matter.	Any harness or board damaged or screw missing
			(2) Circuit breakers, control relays, switches, lamps, resistors and transformers for damage, corrosion, pitted terminals, loose screw, broken wires, dirt and foreign matter .	Any harness or board damaged or screw missing
			(3) Gasket for damage.(4) Inside of compartment for signs of water leakage	Any harness or board damaged or screw missing
			(4) Inside of compartment for signs of water leakage.	

Table 2-1. Unit Preventive Maintenance Checks and Services

Item No.	Interval Service	Location Item To Check/	Procedure	Not Fully Mission Capable If:
			(5) Latches operation, tight door closure and loose mounting hardware.	
			(6) Ground connections for looseness and completeness. for panel and box.	Ground strap mounting screw missing
			d. Inspect wire from main control panel to ground lug on frame for looseness and corrosion.	Ground wire or wire mounting screw missing
5	Semi-Annual	Chemical Feed Pump Assembly	a. Drain oil and check for metal par-tides on magnetic plug and milky condition.	Oil is milky or has metal particles
			b. Replace oil, and check that filler cover is tight and breather is not clogged	Breather unserviceable
6	Semi-Annual	Generator Set, 30 Kw	In accordance with TM-6115-545-12	In accordance with genera-tor TM
7	Semi-Annual	Storage Tanks, 3000 Gallon	In accordance with TM 5-5430-227-12&P	In accordance with tank TM
8	Semi-Annual	Leveling Jacks	Inspect for broken welds and proper operation. Levelingjacks. (LO 10-4610-241-12)	Broken welds or improper operation
9	Semi-Annual	Airbrake System	Check that wheels do not turn when air pressure is relieved	Airbrakes do not hold
10	Semi-Annual	Suspension As-sembly	Inspect for broken springs, corro-sion, and missing bolts	Springs broken or bolts missing
11	Semi-Annual	Brakes	Inspect brake linings for wear, cracks and glazing	Brake linings wom
12	Semi-Annual	Wheel Bearings	Clean, lubricate (LO 10-4610-241-12) and repack wheel bearings (para. 2-87)	

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) Co to the Symptom index and find the entry that describes your problem.

(3) Co 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Check Model number of ROWPU.

a. If model is WPES-20 or H-9518-2, troubleshoot and repair power source.

b. If model is WPES-10, H-9518-1, WPES-30 or H-9518-3, go to step 2.

Step 2. Shut down generator and disconnect generator cable, from jack J-1 on junction box.

Step 3. Start generator and apply power to ROWPU.

Step 4. Check for 208 VAC, three phase power at P1 (power input plug) of generator cable. Check between pins A-B, A-C and B-C.

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

Step 5. Check for 208 VAC, three phase power at generator output lugs. Check between lugs L1 - L2, L1 - L3 and L2-L3.

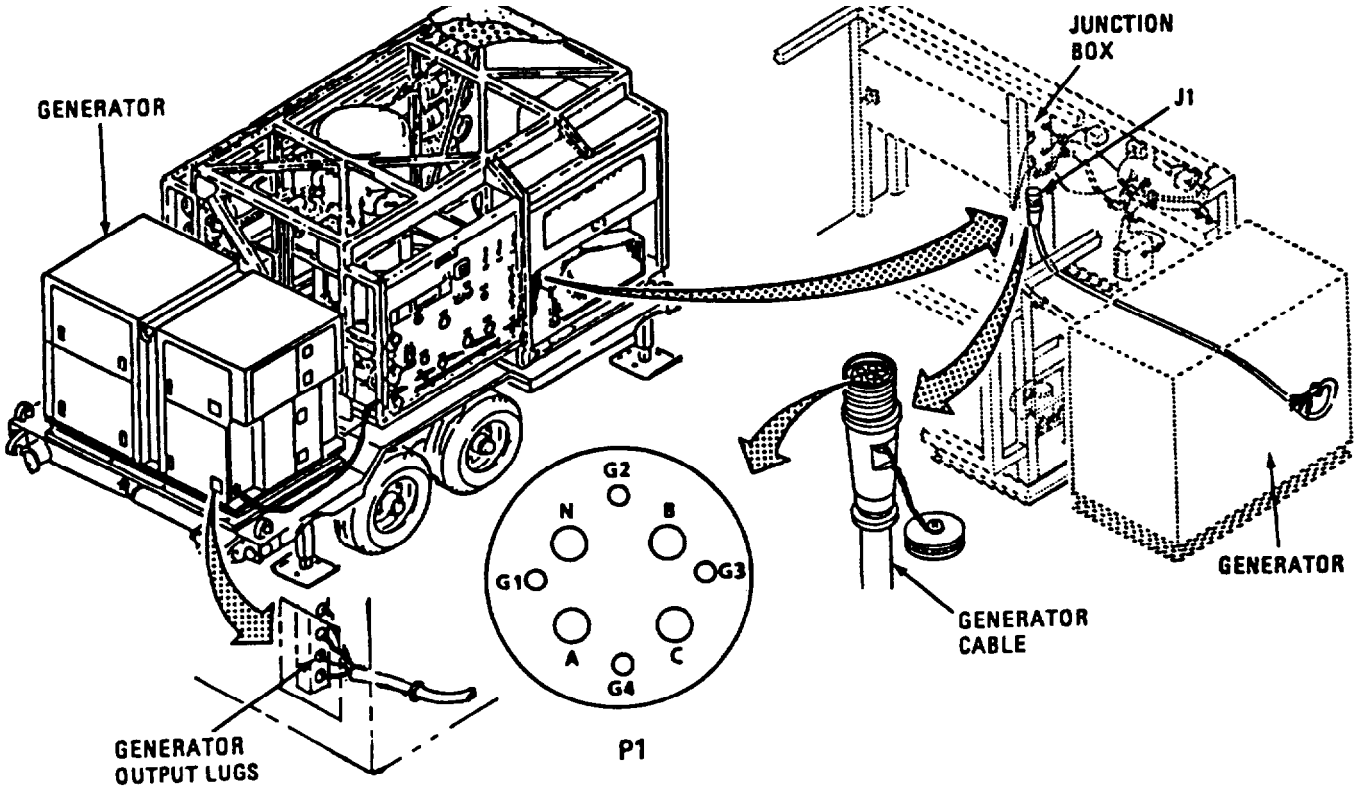
a. If 208 VAC is measured in all tests, replace generator cable. Refer to Paragraph 2-56.

b. If 208 VAC is not measured in all tests, refer to generator manual.

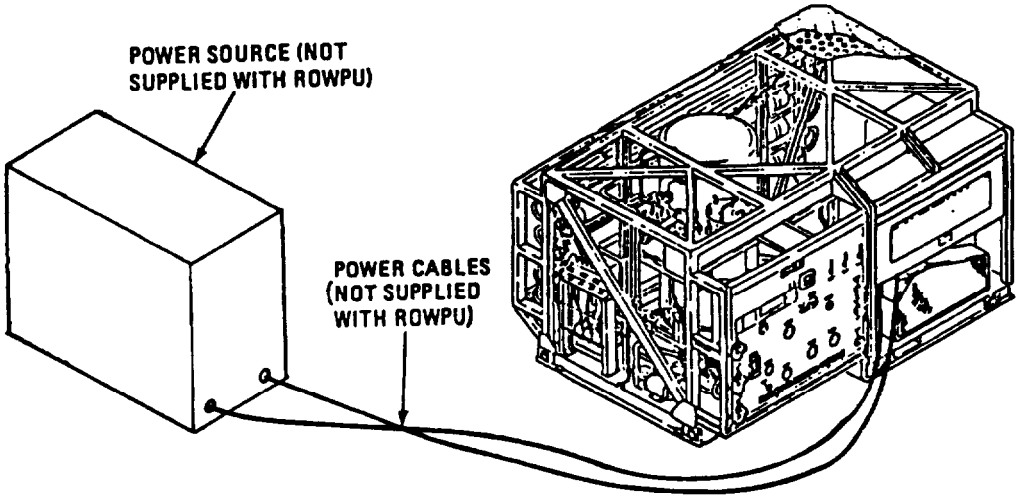
Table 2-2. Unit Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY-continued



MODELS WPES-10, H-9518-1, WPES-30 AND H-95184



MODELS WPES-20 AND H-9518-2

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 FAILS TO OPERATE.

Replace high pressure relief valve (Paragraph 2-5 1) if this malfunction occurs.

2. HIGH-PRESSURE RELIEF VALVE OPENS BELOW 1100 PSI.

Replace high pressure relief valve (Paragraph 2-5 1) if this malfunction occurs.

3. RUPTURE DISK RUPTURES (Models WPES-10, WPES-20 and WPES-30 only).

Replace rupture disk (Paragraph 2-32). high pressure switch (Paragraph 2-58) and high pressure relief valve (Paragraph 2-5 1) if this malfunction occurs.

4. VENT LINE/VALVE OBSTRUCTED.

Step 1. From operator, or by operating the unit, determine which line or lines are obstructed.

If all lines are obstructed (no water flows from discharge tube when vent valves are open), disconnect tubing downstream of valves (Paragraph 2-39) and remove obstruction from downstream tubing and fittings.

Step 2. Shut down ROWPU and disconnect upstream tubing at valve in faulty branch. Refer to Paragraph 2-38.

Step 3. Briefly operate ROWPU and check for water now from disconnected tubing,

a. If water flows from disconnected tubing, clean and/or replace valve. Refer to Paragraph 2-38.

b. If no water flow is noted, remove obstruction from upstream tubing.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PIPING INSTALLATION - continued

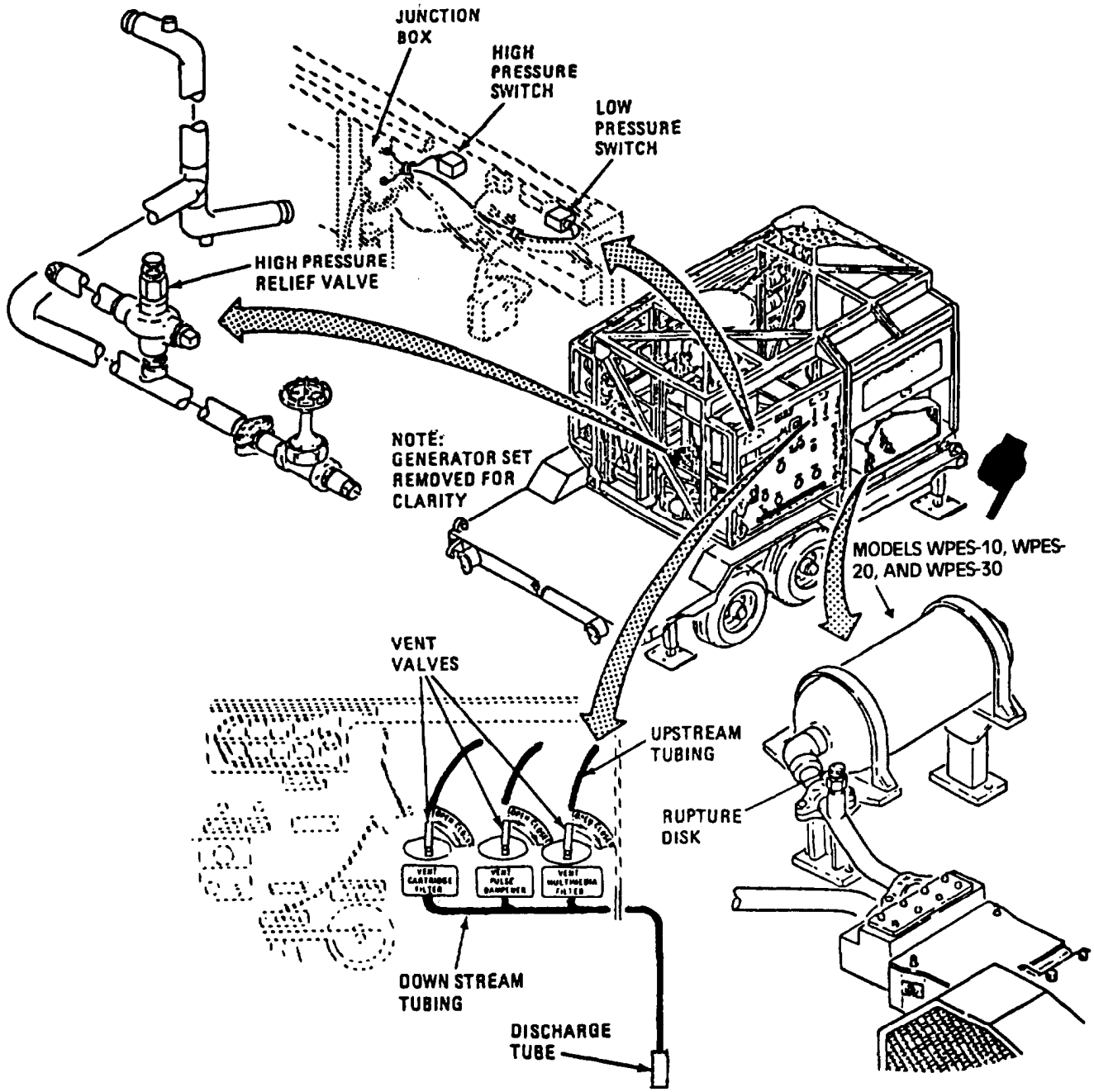


Table 2-2. Unit Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PIPING INSTALLATION - continued

5. HIGH-PRESSURE LIGHT ILLUMINATES.

Start ROWPU and observe R.O. pressure gage and high pressure light.

a. If light comes on at 1250 psi, replace high pressure relief valve (Paragraph 2-5 1).

b. If light comes on below 1250 psi replace high pressure switch. Refer to Paragraph 2-58.

6. LOW-PRESSURE LIGHT ILLUMINATES.

Step 1. Check and see if booster pump and both raw water pumps, operate.

a. If booster pump is not operating, go to Malfunction 1, Booster Pump Assembly.

b. If raw water pump No 1 is not operating go to Malfunction 3, Raw Water Pump Assembly No 1.

b. If raw water pump No 2 is not operating go to Malfunction 3, Raw Water Pump Assembly No 2.

Step 2. Shut down generator.

Step 3. Remove cover from low pressure switch (Paragraph 2-57) and disconnect wire from NC contact of switch.

Step 4. Make a continuity check between C and NC contacts of switch.

a. If continuity exists, indicating a shorted switch, replace low pressure switch. Refer to Paragraph 2-58.

b. If continuity does not exist, notify Direct Support Maintenance.

7. UNABLE TO JOG RO. PUMP.

Notify Direct Support Maintenance if this malfunction occurs.

Table 2-2. Unit Troubleshooting- continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PIPING INSTALLATION - continued

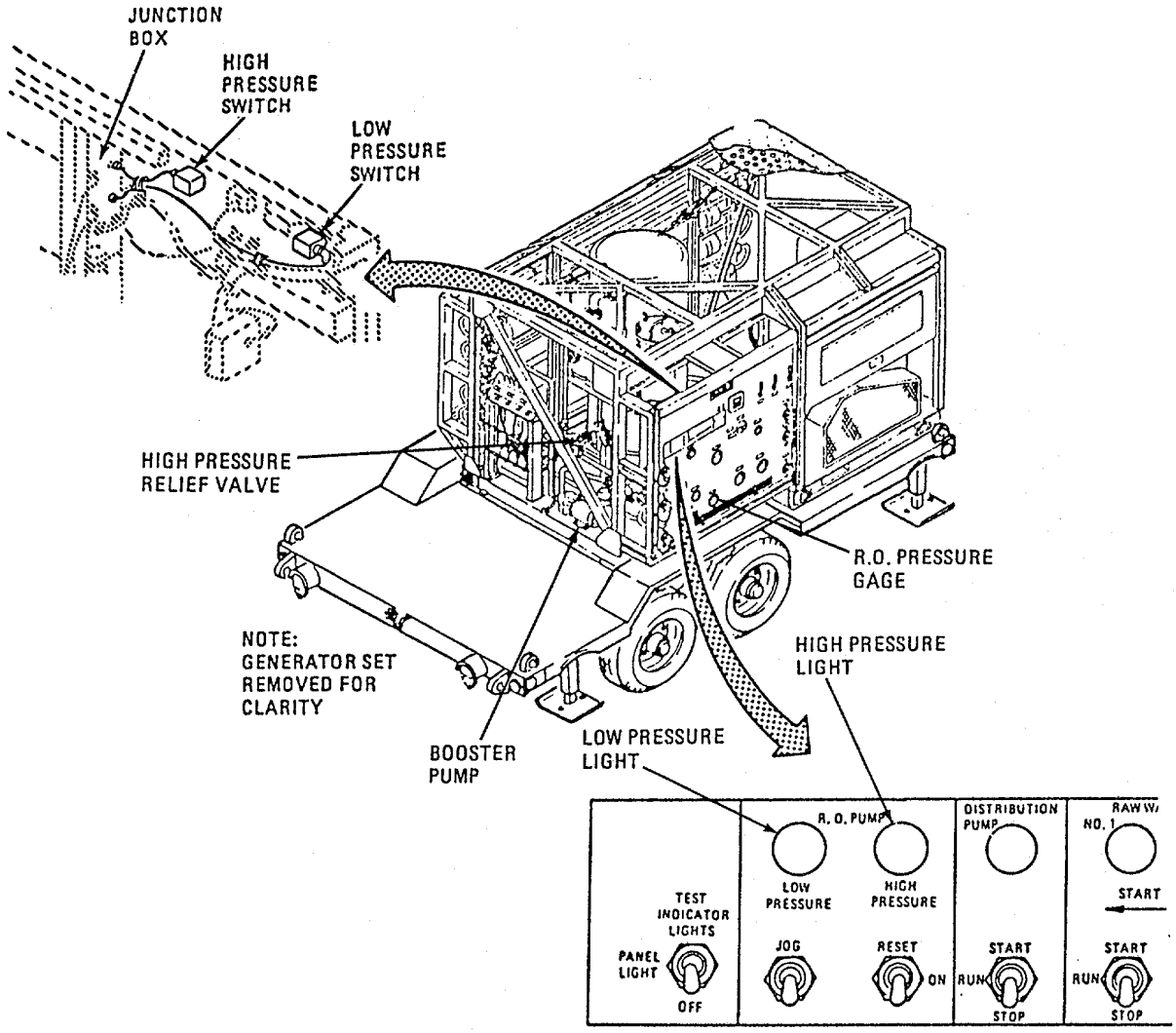


Table 2-2. Unit Troubleshooting- continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PIPING INSTALLATION - continued

8. ABNORMAL MULTIMEDIA FILTER DIFFERENTIAL PRESSURE INDICATION.

Step 1. Check for clogged or leaking sensing lines. Refer to Paragraph 2-31.

a. Tighten connections or replace lines if they are leaking.

b. Clear lines if they are clogged.

Step 2. Check for clogged or leaking control tubes. Refer to Paragraph 2-68 for routing of tubes.

a. If control tubes leak, tighten connections and/or replace tubes that leak.

b. If control tubes are clogged, disconnect and clean them.

c. If control tubes are not clogged and don't leak, replace multimedia filter differential pressure gage.

Step 3. If trouble persists, notify Direct Support Maintenance to troubleshoot and repair the control valve assembly. Refer to Paragraph 2-69

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

Check for clogged **or** leaking sensing lines. Refer to paragraph 2-31.

b. If leaking, tighten connections and/or replace lines.

a. If clogged, remove obstruction.

c. If lines are not clogged and don't leak, replace pressure gage (Paragraph 2-42).

10. ABNORMAL R.O. PRESSURE GAGE INDI**CATION.**

Check for clogged or leaking sensing lines. Refer to Paragraph 2-31.

a. If clogged, remove obstruction,

b**.** If leaking, tighten connections, and/or replace lines.

c. If lines are not clogged and don't leak, replace pressure gage (Paragraph 2-50).

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PIPING INSTALLATION - continued

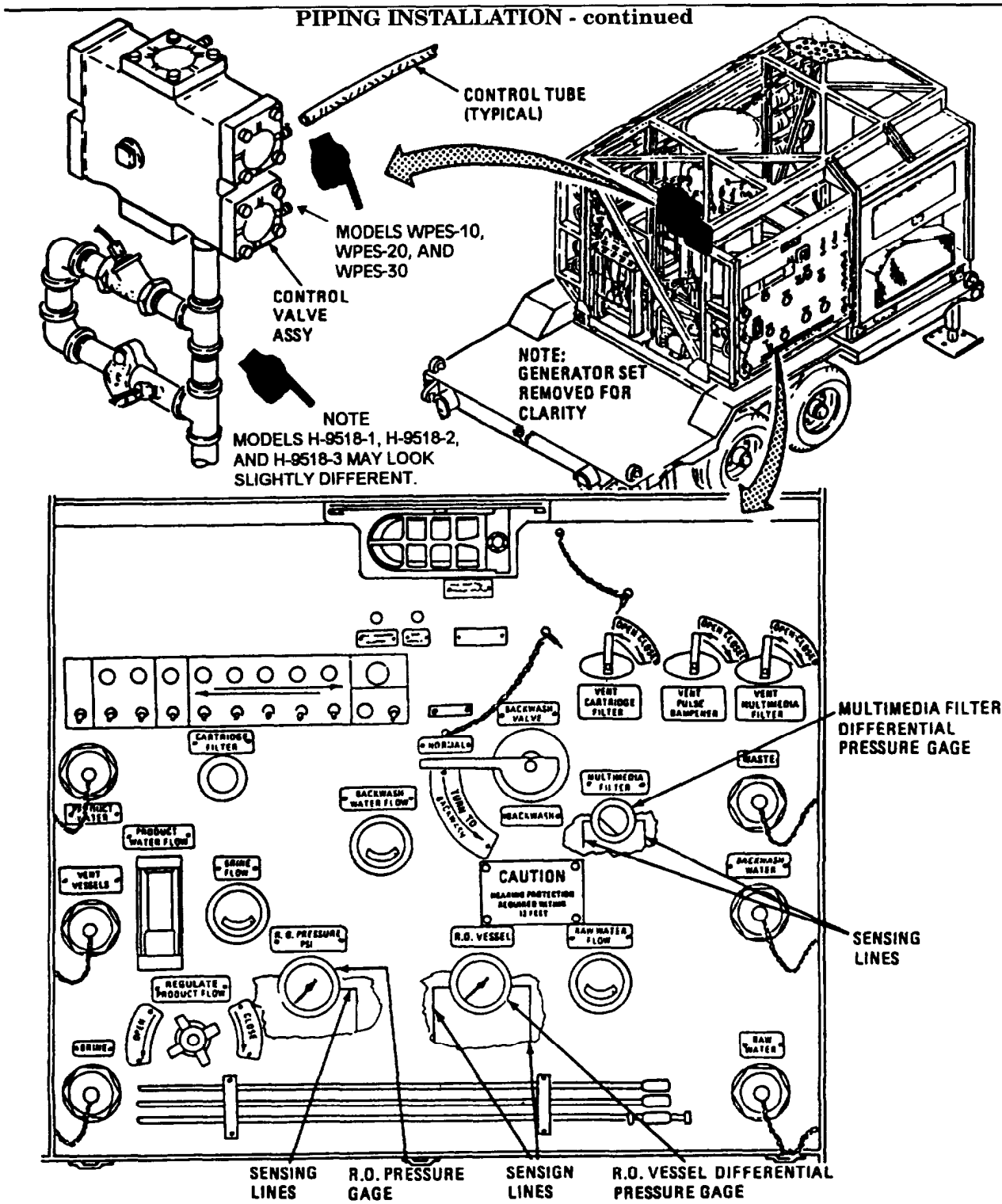


Table 2-2. Unit Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PIPING INSTALLATION - continued

11. ABNORMAL CARTRIDGE FILTER DIFFERENTIAL PRESSURE GAGE INDICATION.

Check for clogged or leaking sensing lines. Refer to Paragraph 2-31.

a. If clogged, remove obstruction.

b. If leaking, tighten connections, and/or replace lines.

C. If lines are not clogged and don't leak, replace pressure gage. Refer to Paragraph 2-39.

12. INADEQUATE BRINE FLOW IN BACKWASH OPERATION.

Step 1. Check if stager cycles (cams turn in direction of arrow).

If stager cycles, go to step 3.

Step 2. Check for 115 VAC input voltage between contacts 1 and 2 (ground), and for a 115 VAC start signal between contacts 4 and 2 (ground) on terminal board (vertical on models WPES-10, WPES-20 and WPES-30, horizontal on models H-95181, H-9518-2, and H-9518-3) in timer.

NOTE

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

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

b. If both voltages are present, notify Direct Support Maintenance to troubleshoot timer.

Table 2-2.Unit Troubleshooting- continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PIPING INSTALLATION - continued

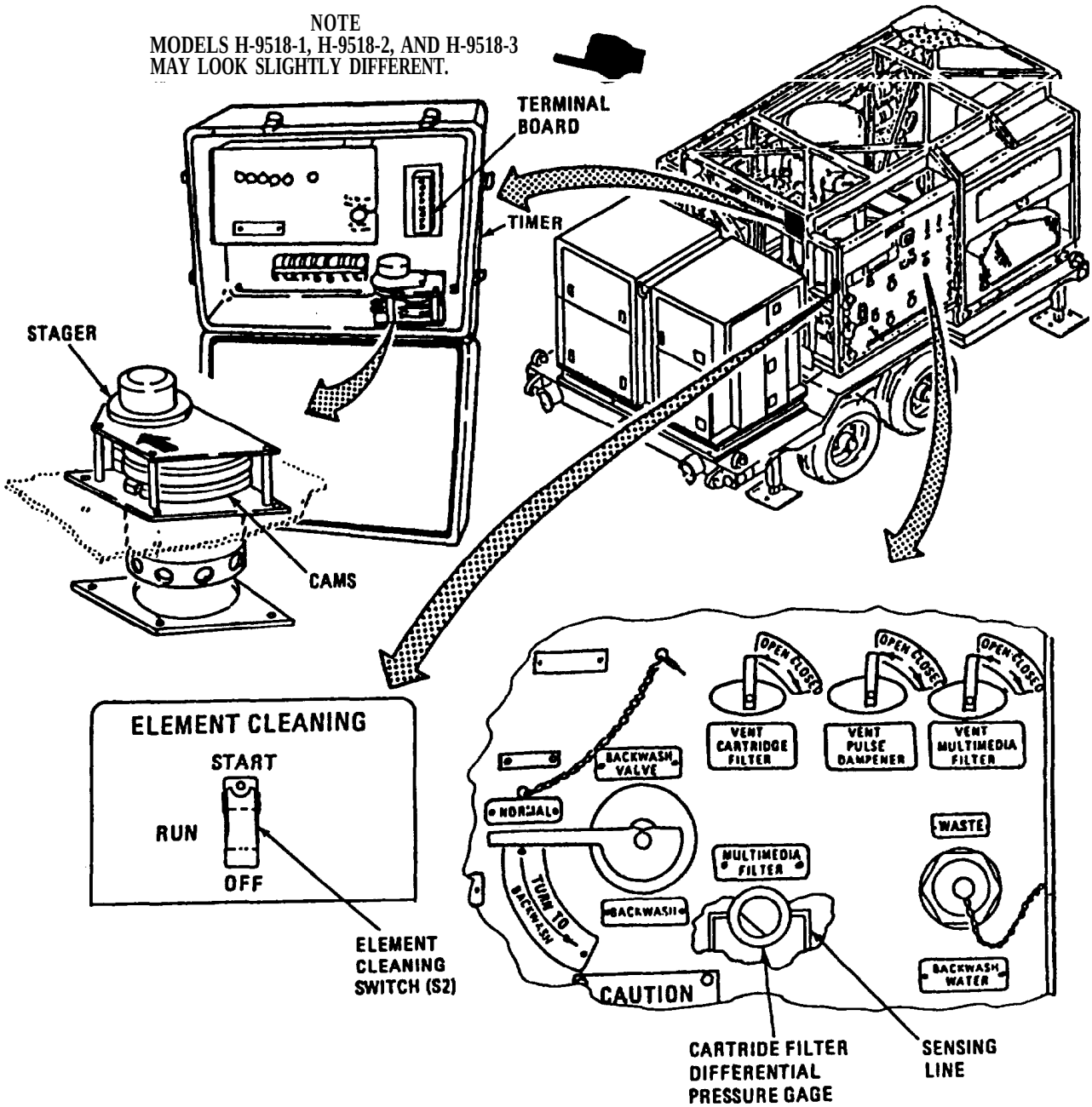


Table 2-2. Unit Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 3. Check for clogged control tubes. Refer to Paragraph 2-68 for routing of tubes.

Remove restrictions if clogged.

Step 4. Remove components from diaphragm valve (Paragraph 2-70) and check for restrictions and damaged components. On models H-9518-1, H-9518-2, and H-9518-3, there are five diaphragm valves and each one needs to be checked.

Remove restrictions and/or replace damaged components. If trouble persists, replace control valve assembly on models WPES-10, WPES-20 and WPES-30. Refer to Paragraph 2-69.

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 2-40.

b. If backwash valve and/or check valves are restricted, or damaged, remove restriction and/or replace valves. Refer to paragraph 2-45.

c. If restriction or damage is in pipes and orifices, disconnect pipes as necessary and remove restriction. Refer to Paragraphs 2-29 and 2-30.

13. INOPERABLE TDS MONITOR.

Step 1. Remove monitor cover (Paragraph 2-26) and check for defective fuse, broken wires and other physical damage.

a. If defective, replace fuse (TM10-4610-241-10).

b. If wires are broken or other physical damage is noted, notify Direct Support Maintenance.

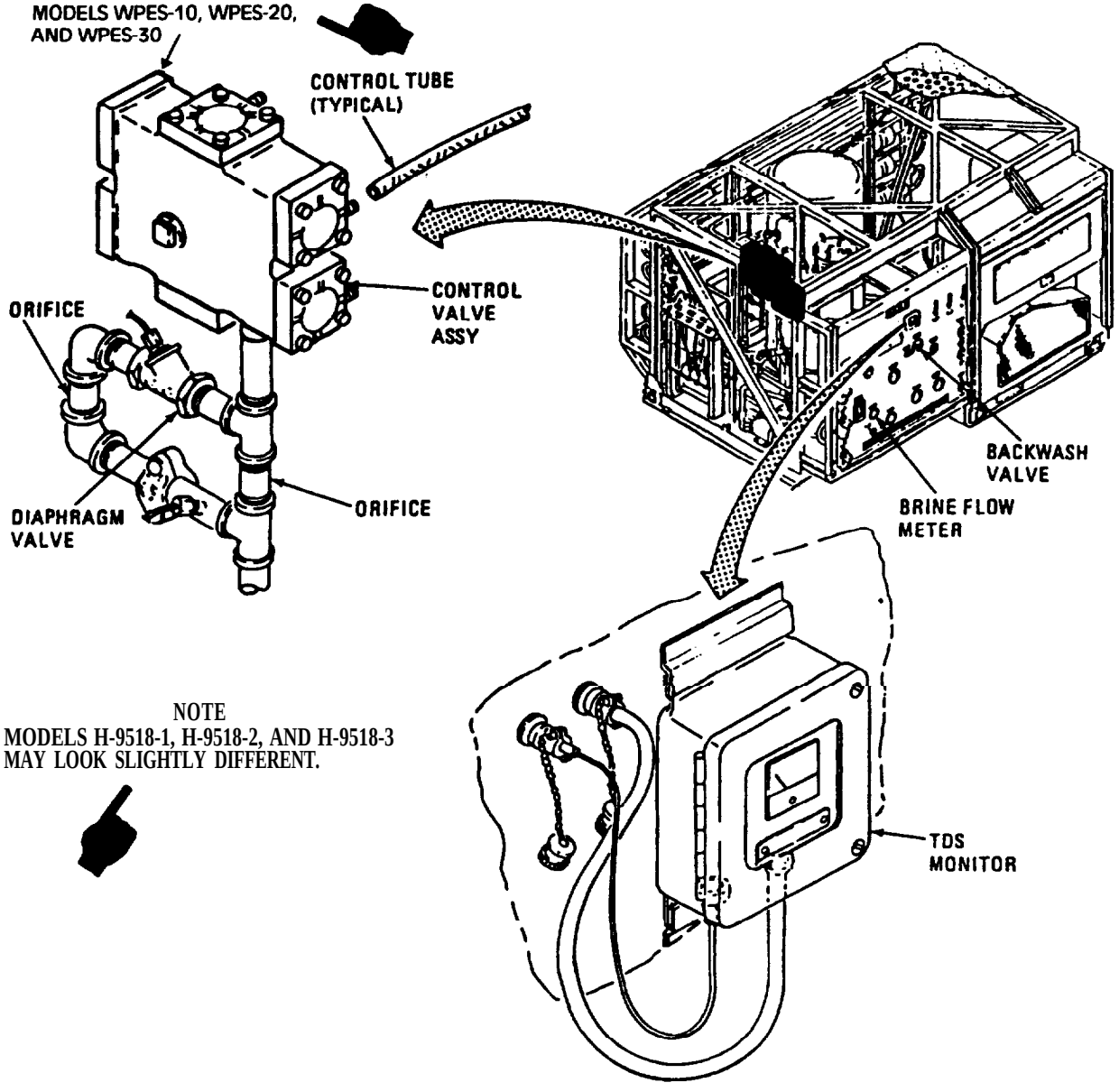
Step 2. Attempt to adjust TDS monitor (Paragraph 2-26).

If monitor cannot be adjusted notify Direct Support Maintenance.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PIPING INSTALLATION - continued



NOTE
MODELS H-9518-1, H-9518-2, AND H-9518-3 MAY LOOK SLIGHTLY DIFFERENT.

Table 2-2. Unit Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PIPING INSTALLATION - continued

14. BACKWASH CYCLES TOO SHORT OR TOO LONG.

NOTE
Normal backwash cycles are as follows. Deviations from these times in excess of 20% should be considered abnormal:

(Models WPES-10, WPES-20 and WPES-30 only)

Cycle 1 - Slow Backwash	2 Minutes
Cycle 2 - Fast Backwash	6 Minutes
Cycle 3 - Slow Backwash	2 Minutes
Cycle 4 - Rinse	2 Minutes

(Models H-9518-1, H-9518-2, and H-9518-3)

Cycle 1- Backwash	12 Minutes
Cycle 2- Rinse	4 Minutes

Step 1. *Models H-9518-1, H-9518-2, and H-9518-3:*

If times are abnormal, replace the timer. Refer to Paragraph 2-68.1

Step 1. *Models WPES-10, WPES-20 and WPES-30 :*

Remove plate for access to DIP switches and compare switch settings with illustration.

a. If settings agree with illustration, replace timer. Refer to Paragraph 2-68.

NOTE
To change position of switches, use a pointed object (small screwdriver or pencil will do) and push in at bottom or top of switch.

- If switch is in ON position, push in at bottom to change it to OFF.
- If switch is in OFF position push in at top to change it to ON.

b. If settings are different, change switch settings to agree with settings in illustration.

Step 2. Operate ROWPU in backwash mode and time each cycle.

If malfunction continues, replace timer. Refer to Paragraph 2-68.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PIPING INSTALLATION - continued

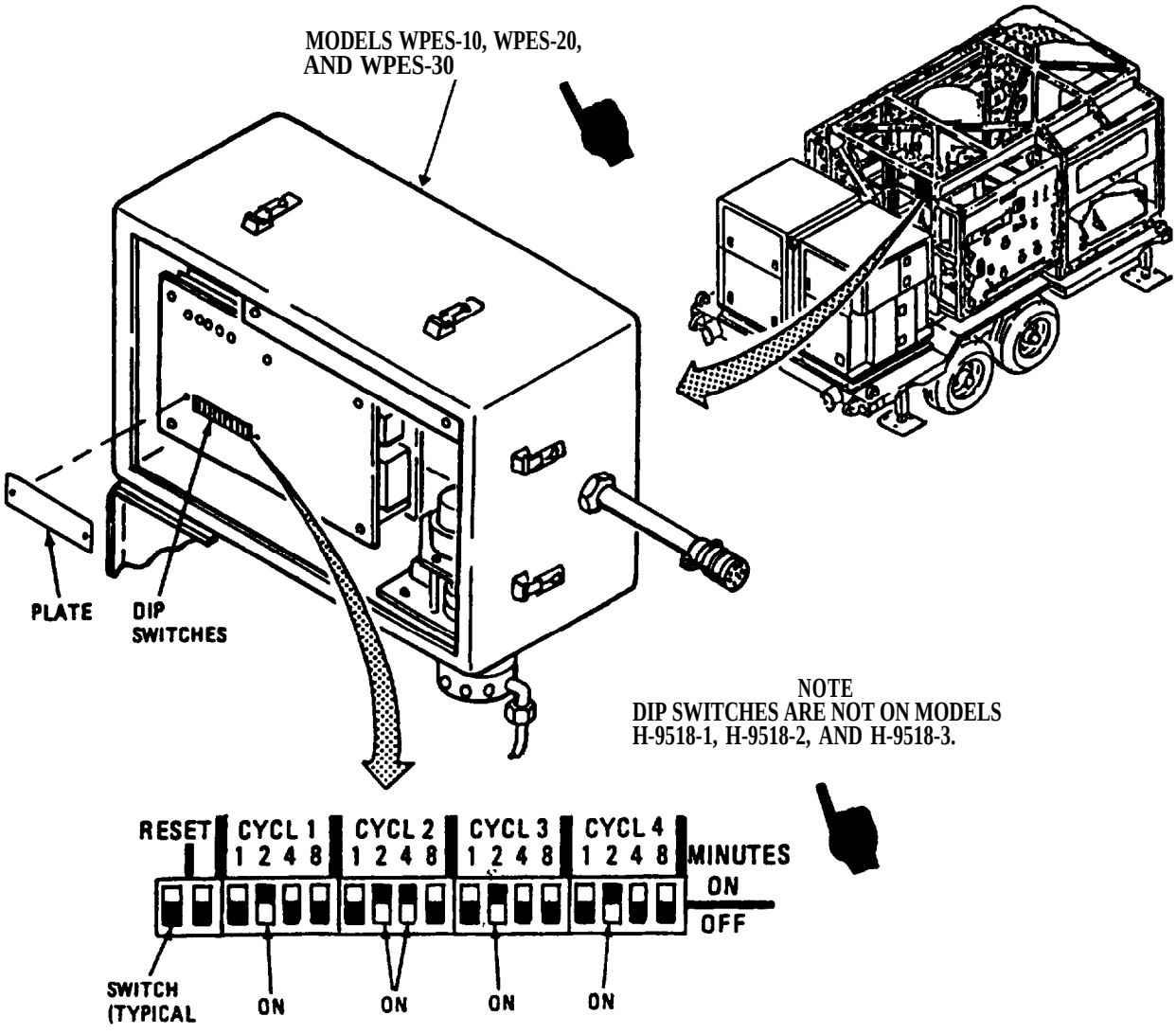


Table 2-2. Unit Troubleshooting - continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

1. PUMP ASSEMBLY FAILS TO OPERATE.

step 1. Check if circuit breaker, CB6 and/or heater assembly of motor starter, K6, are tripped. If heater assembly is tripped, resistance will be felt when reset plunger is pushed in.

If CB6 and/or heater assembly are tripped, go to step 4.

step 2. Check for 208 VAC, three phase power, on heater assembly of motor starter. 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. Turn CB6 to OFF and disconnect pump cable assembly at pump motor (Paragraph 2-59) and cable wires at motor starter, T1, T2 AND T3 Check cable for continuity.

a. If cable assembly is not defective (not open), replace centrifugal pump. Refer to Paragraph 2-59.

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

step 4. Shut down power source and disconnect cable at pump assembly motor. Check for shorts (red-black, red-white, black-white) and from ground wire (green) to all other cable wires in turn.

a. If continuity is measured, indicating a short, in any test, notify Direct Support Maintenance.

b. If continuity is not measured in all tests, replace centrifugal pump. Refer to paragraph 2-59.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BOOSTER PUMIP ASSEMBLY- continued

2. PUMP ASSEMBLY IS NOISY

Replace centrifugal pump (booster pump) if this malfunction occurs. Refer to paragraph 2-59.

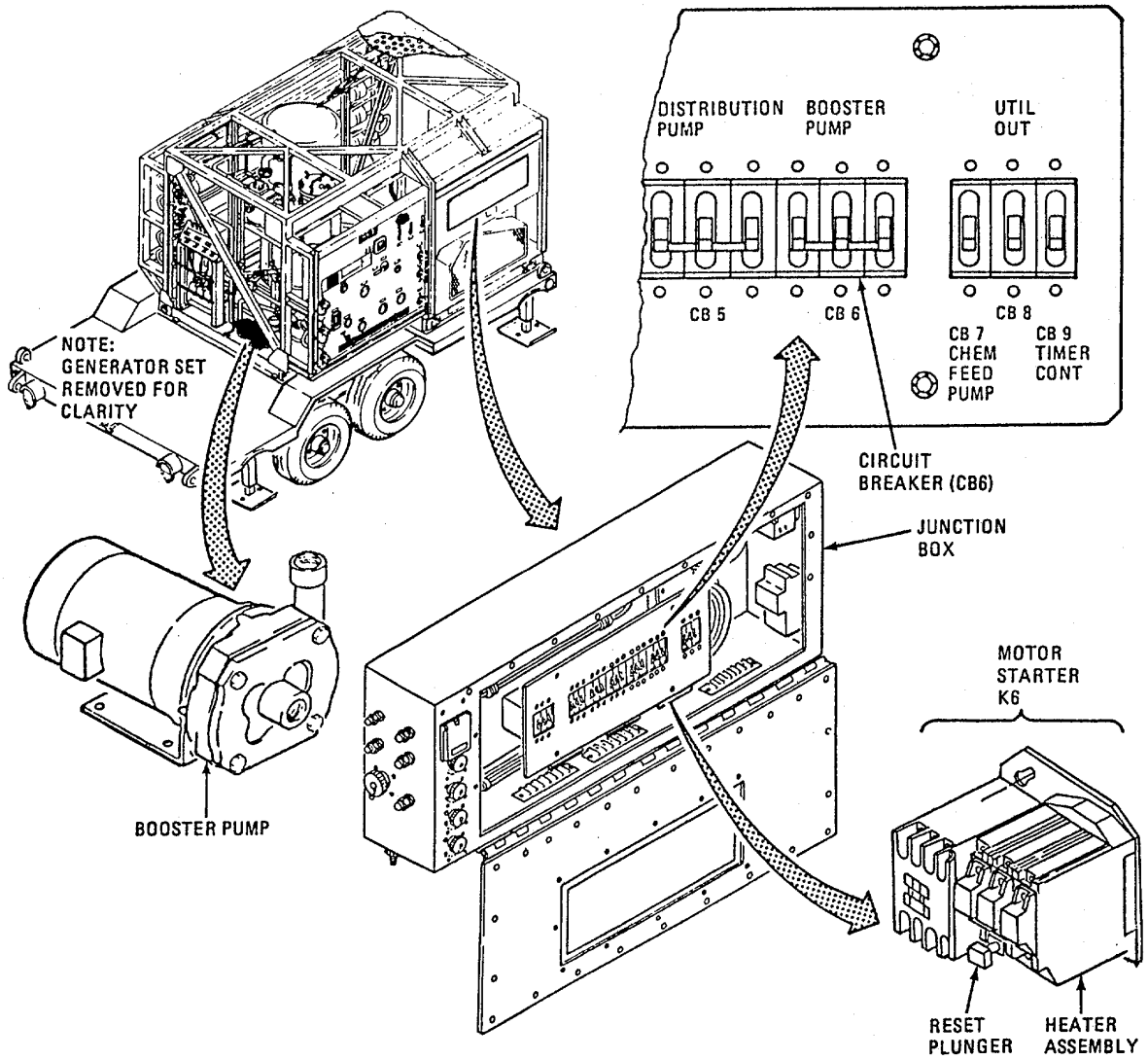


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED PUMP ASSEMBLY

1. PUMP ASSEMBLY FAILS TO PRIME.

WARNING

Chemicals used on ROWPU are toxic. Wear rubber gloves and apron, and eye and respiratory protection when working with components of the chemical feed system.

Step 1. Check for cracked, split or damaged suction, return and and feed tubes.

If tube is defective, replace tube. Refer to Paragraph 2-31.

Step 2. Disconnect return and suction tubes from chemical container, and feed tube from liquid head assembly.

Step 3. Set three way valve to PRII ML, position and pour water into return tube.

If water does not come out of feed tube, replace three way valve. Refer to Paragraph 2-53.

Step 4. Connect feed tube to liquid head assembly on chemical feed pump.

Step 5. Start chemical feed pump and set adjustment on liquid head assembly to 10.

Step 6. Raise suction tube above level of pump and pour water into suction tube.

a. If water comes out return tube, indicating that pump is functioning correctly, repair chemical fed can. Refer to Paragraph 2-25.

b. If water does not come out of return tube, pump is defective. Repair liquid head assembly (Paragraph 2-61). If trouble persists, notify Direct Support Maintenance.

2. INADEQUATE FLOW OF CHEMIICALS.

Refer to Malfunction 1, Chemical Feed Pump Assembly, if this malfunction occurs.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED PUMP ASSEMBLY - continued

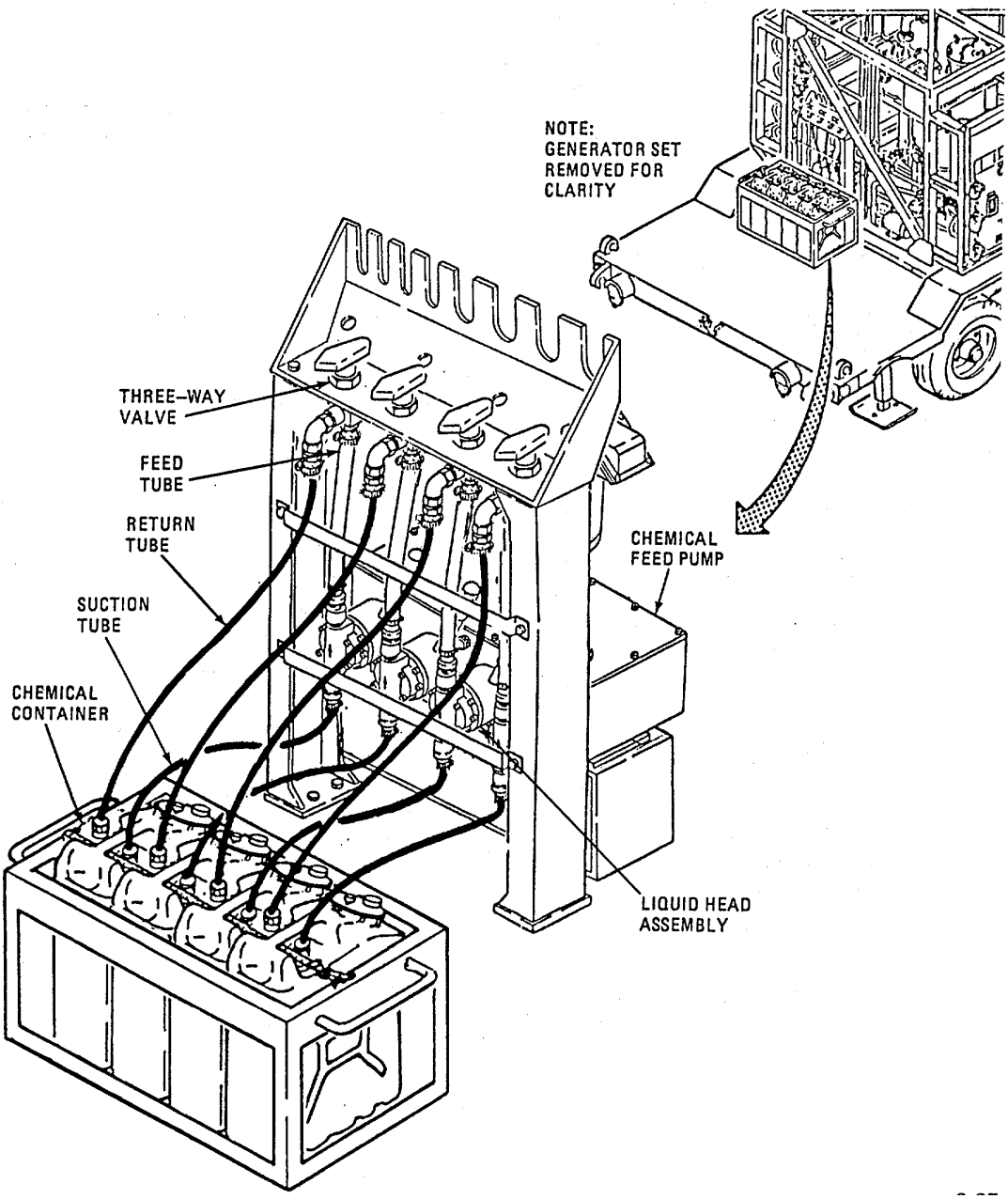


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED PUMP ASSEMBLY -continued

3. PUMP ASSEMBLY IS NOISY

Isolate noise to chemical feed pump motor or pump.

a If noise is coming from motor, remove motor (Paragraph 2-62) and check for defective couplings and coupling spider. If coupling is not defective, refer motor to direct Support Maintenance.

b. If noise is coming from pump, notify Direct Support Maintenance.

4. PUMP ASSEMBLY FAILS TO OPERATE (ALL LIQUID HEAD ASSEMBLIES)

WARNING

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

Step 1. Check if circuit breaker CB7 and/or heater assembly of motor starter ,K7, are tripped. Heater assembly is tripped if resistance is felt when reset plunger is pushed in.

If CB7 and/or heater assembly are tripped, go to step 4.

Step 2. Check for 115 VAC between contacts T1 on heater assembly and T4 on relay of motor starter K7.

If 115 VAC is not measured, notify Direct Support Maintenance.

Step 3. Turn CB7 to OFF and disconnect cable at pump (Paragraph 2-60) and at junction box (T1 and T4). Check cable for continuity.

a. If cable is defective (open), notify Direct Support Maintenance.

b. If cable assembly is not defective (not open) replace pump motor. Refer to Paragraph 2-62.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CHEMICAL FEED PUMP ASSEMBLY - continued

Step 4. Shut down power source and disconnect pump cable assembly at pump motor (Paragraph 2=62). Check for shorts on pump cable assembly, between black and white wires and from green wire (ground) to black and white wires in turn.

a. If short is measured in any test, notify Direct Support Maintenance.

b. If short is not measured, replace chemical feed pump motor (Paragraph 2-62).

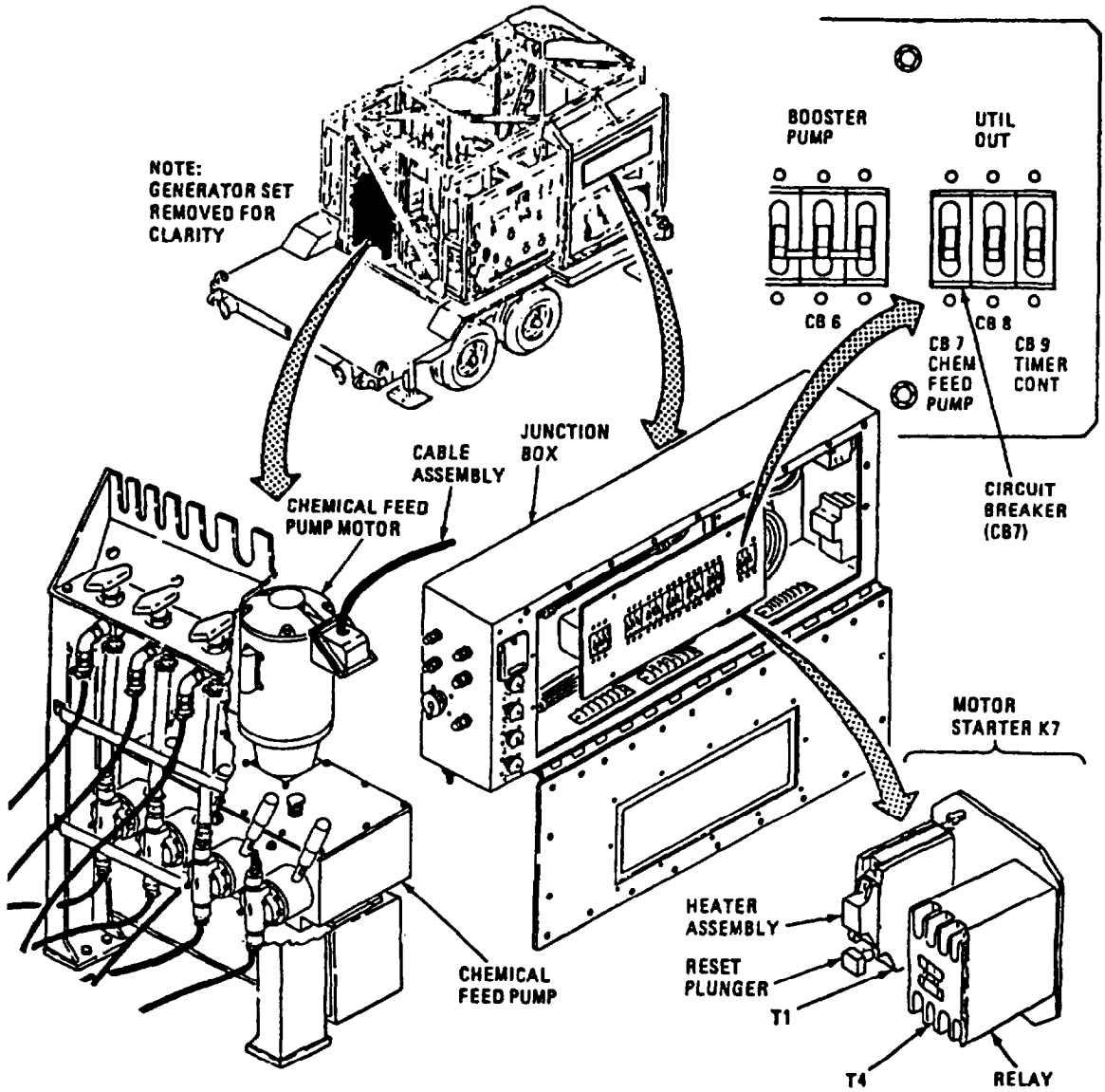


Table 2-2. Unit Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

RO. PUMP ASSEMBLY

1. PUMP DRIVE BELTS FRAY AFTER SHORT USE OR BREAK FREQUENTLY. (MODELS WPES-10, WPES-20 AND WPES-30 ONLY)

CAUTION

R.O. pump drive belts must be replaced as a set. Replacement of less than complete set will overstress new belts 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.

If sheaves are detective, replace sheaves. Refer to Paragraph 2-66.

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

If sheaves wobble, continue with step 3.

If sheaves do not wobble, go to step 4.

Step 3. Check for loose or missing sheave mounting hardware.

Replace and/or tighten hardware as necessary. If sheaves continues to wobble, replace them (Paragraph 2-66).

Step 4. Check sheave alignment. Refer to paragraph 2-66.

If sheaves are out of alignment, align sheaves. Refer to Paragraph 2-66.

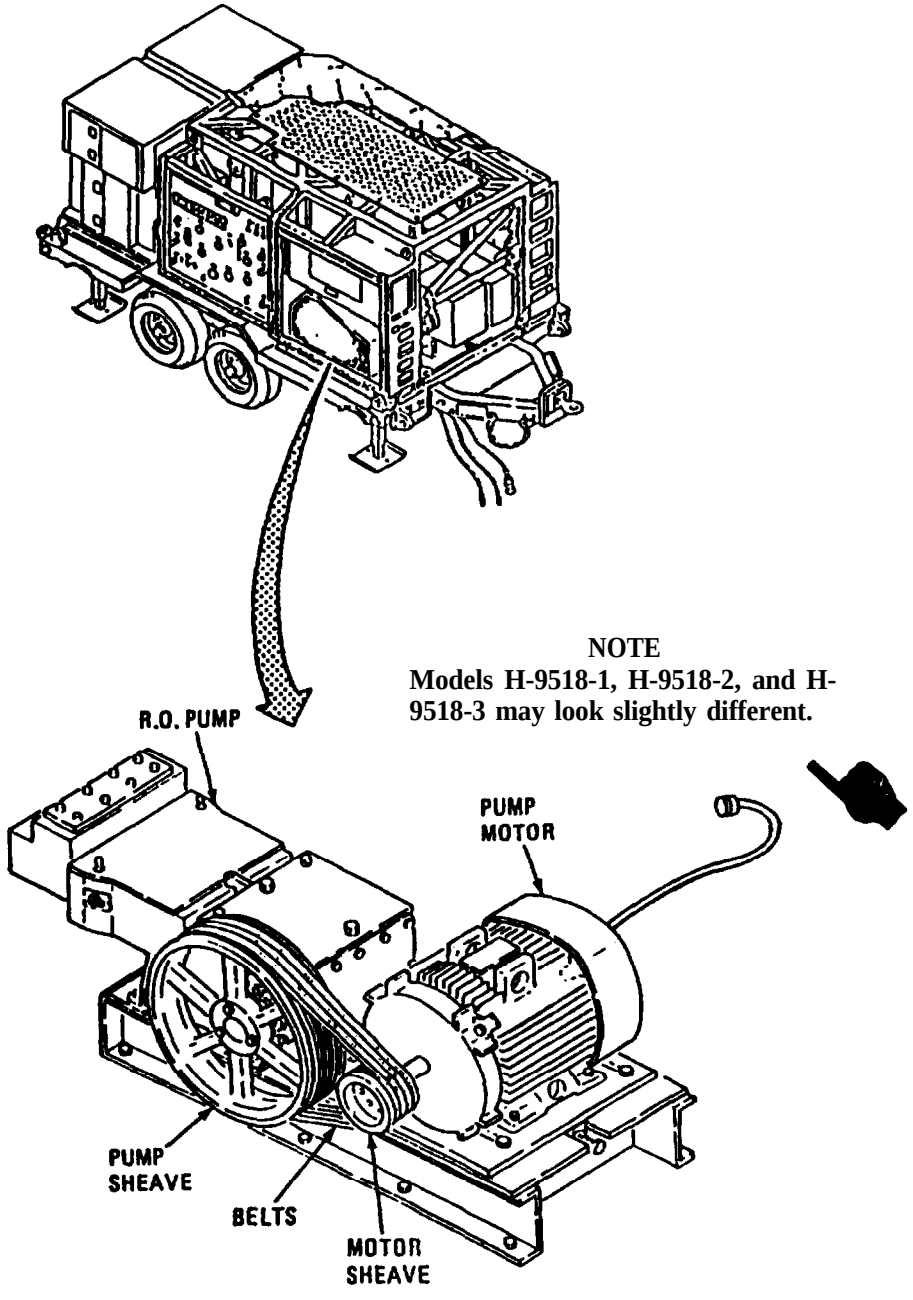
Step 5. Check belt tension. Refer to paragraph 2-66.

Adjust belt tension if too loose or too tight. Refer to Paragraph 2-66.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

R.O. PUMP ASSEMBLY - continued



NOTE
Models H-9518-1, H-9518-2, and H-9518-3 may look slightly different.

Table 2-2. Unit Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

R.O. PUMP ASSEMBLY-continued

2. PUMP ASSEMBLY IS NOISY.

Step 1. Check that pump motor is securely mounted, to motor mounting plate.

If motor is not secured properly, tighten mounting hardware.

Step 2. Check that motor mounting plate is securely attached to pump stand assembly.

If mounting plate is not securely fastened to pump stand assembly tighten mounting hardware.

Step 3. On models WPES-10, WPES-20 and WPES-30, check that R-O. pump is securely mounted to pump mounting plates and that pump mounting plates are securely fastened to pump stand assembly.

If pump or pump mounting plates are not securely fastened, tighten mounting hardware.

On models H-9518-1, H-9518-2, and H-9518-3, check that R.O. pump and motor are securely mounted to motor adapter.

If pump or motor are not securely fastened, tighten mounting hardware.

Step 4. On models WPES-10, WPES-20 and WPES-30, check that pump stand assembly is securely mounted to ROWPU floor.

If stand assembly is not secure, secure stand assembly by tightening mounting hardware.

Step 5. 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 ASSEMBLY SHUTS DOWN AND/OR FAILS TO START.

Step 1, Check if high pressure or low pressure light on control panel is on.

If high pressure light is on, go to Malfunction 5, Piping Installation.

If low pressure light is on, go to Malfunction 6, Piping Installation.

Step 2. Check if circuit breaker CB1 and/or heater assembly of motor starter, K1, are OFF. TRIPPED window on heater assembly of motor starter will indicate white, if heater assembly is tripped.

a. If circuit breaker CB1 and/or heater assembly are OFF, go to step 6.

b. If neither circuit breaker CB1 nor heater assemblv are OFF. continue with step 3.

Table 2-2. Unit Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RO. PUMP ASSEMBLY-continued

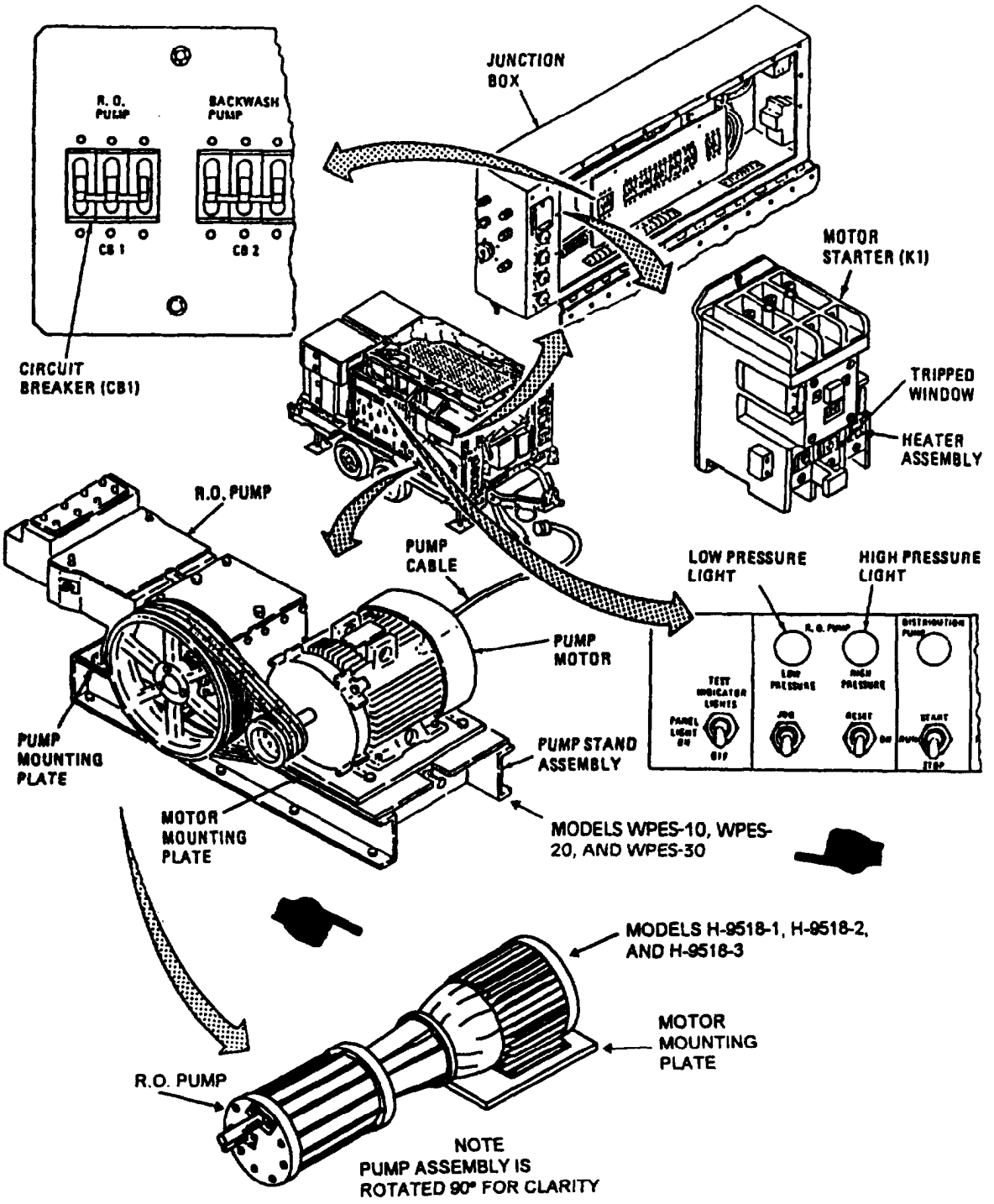


Table2-2. Unit Troubleshooting - continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 3. Turn CB1 to OFF and disconnect R.O. motor cable assembly from back of junction box at R.O. pump powerjack, J6.

Step 4. Turn CB1 to ON and check for 208 VAC three phase power at J6.

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

Step 5. Disconnect cable assembly at pump motor (Paragraph 2-54) and check cable for continuity.

a. If cable assembly is defective (open), replace it. Refer to paragraph 2-54.

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

Step 6. Shut down power at generator and check for shorts between pins A - B, A - C and B - C and from N to A, B, and C in turn on J6.

If continuity is measured, indicating a short, notify Direct Support Maintenance.

Step 7. Disconnect cable assembly at pump motor (Paragraph 2-54) and check cable assembly for shorts.

a. If shorted, replace cable assembly. Refer to paragraph 2-54.

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

4. PUMP MOTOR OVERHEATS.

WARNING

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

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

R.O. PUMP ASSEMBLY - continued

Step 1. Turn circuit breaker CB1 to OFF and disconnect pump cable assembly from back of junction box at R.O. motor powerjack, J6.

Step 2 Turn CBI to ON and check for 208 VAC, three phase power at J6.

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

Step 3. Disconnect cable assembly from R.O. pump motor (Paragraph 2-54). Check cable for continuity.

a. If cable assembly is defective (open), replace it. Refer to Paragraph 2-54.

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

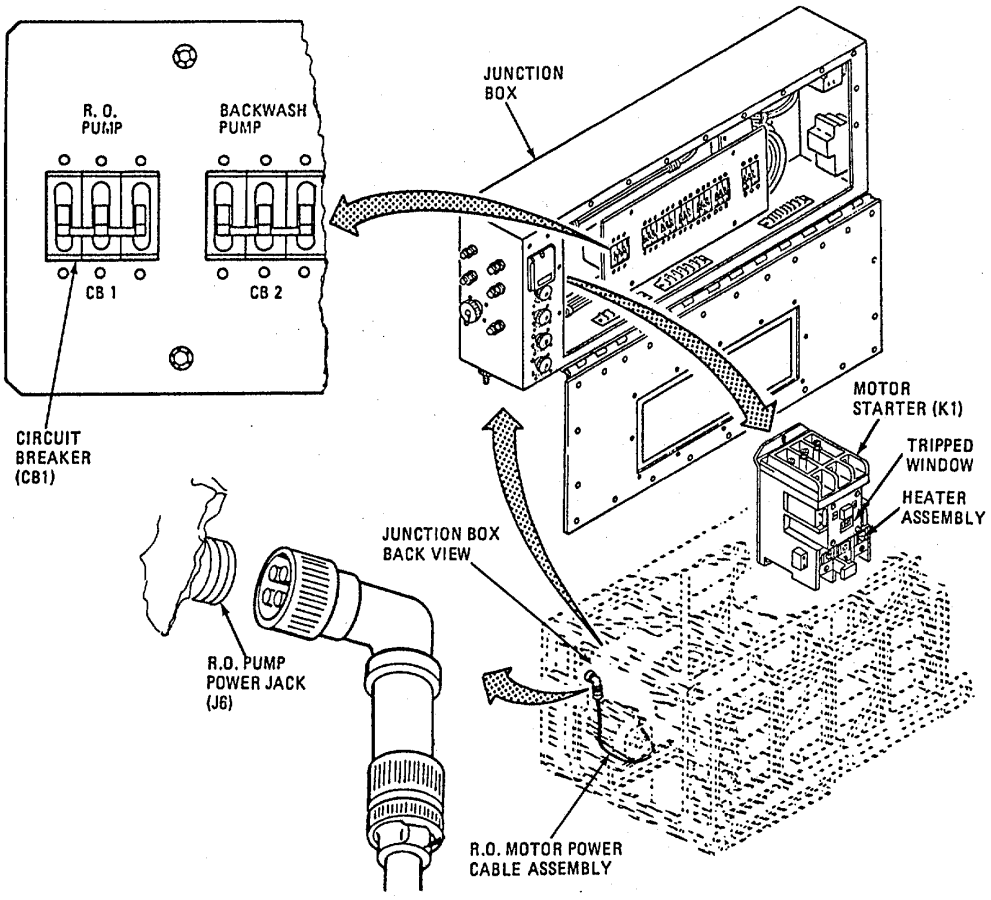


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY

1. PUMP MOTOR RUNS HOT.

Step 1. Check suction hose for blockage.

If suction hose is blocked, clean out suction hose between product water tank and distribution 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 2 Turn circuit breaker CB5 to OFF and disconnect pump cable assembly at DISTRIBUTION PUMP jack, J5 on junction box.

Step 3 Turn CB5 to ON and check for 208 VAC, three phase power at J5.

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

Step 4. Disconnect cable assembly at motor of distribution pump (Paragraph 2-21). Check cable for continuity.

a. If cable assembly is defective (open), replace it. Refer to Paragraph 2-21.

b. If pump cable is not defective, replace centrifugal pump Refer to Paragraph 2-22.

2 PUMP ASSEMBLY IS NOISY.

Notify Direct Support Maintenance if this malfunction occurs.

3. PUMP ASSEMBLY SHUTS DOWN AND.IOR FAILS TO START.

Step 1. Check if circuit breaker CB5 and/or heater assembly injunction box are OFF. Heater assembly is tripped if resistance is felt when reset plunger is pushed in.

a. IfCB5 and/or heater assembly are not OFF, continue with step 2.

b. If CB5 and/or heater assembly are OFF, go to step 5.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY - continued

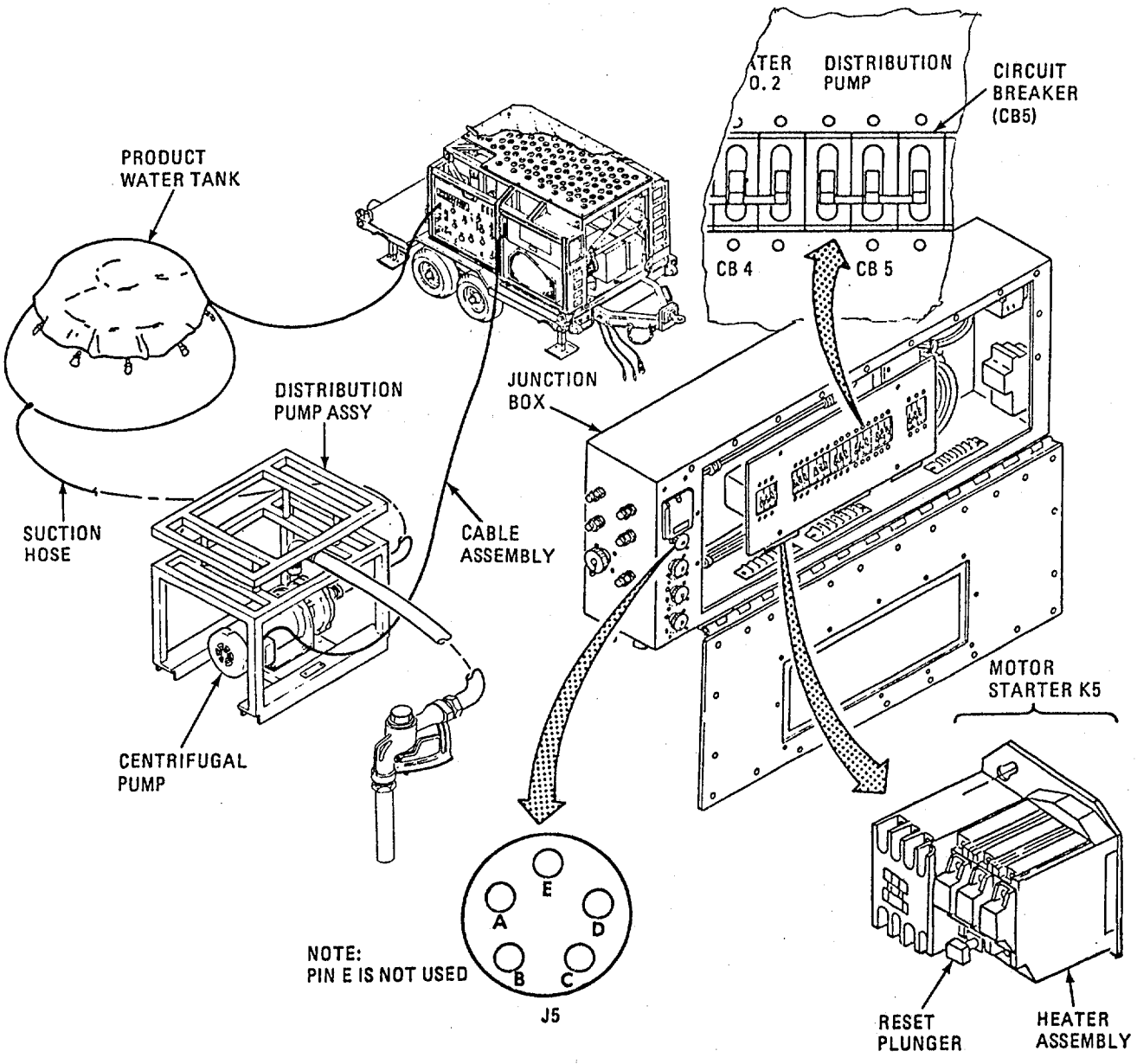


Table 2-2. Unit Troubleshooting - continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 2. Turn CB5 to OFF and disconnect pump at DISTRIBUTION PUMP jack (J5) on junction box.

Step 3. Turn CB5 to ON and check for 208 VAC, three phase power at J5.

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

Step 4. Disconnect cable assembly at pump (Paragraph 2-21) and check cable for continuity.

a. If defective (open), replace cable assembly. Refer to paragraph 2-21.

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

Step 5. Turn off generator and disconnect pump at distribution pump jack (J5) on junction box.

Step 6. Check for continuity between pins A-B, A-C and B-C and from pin D to A,B and C in turn.

If continuity, indicating a short is measured in any test, notify Direct Support Maintenance.

Step 7. Disconnect cable assembly at distribution pump assembly (Paragraph 2-21) and check it for shorts.

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

b. If 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

DISTRIBUTION PUMP ASSEMBLY - continued

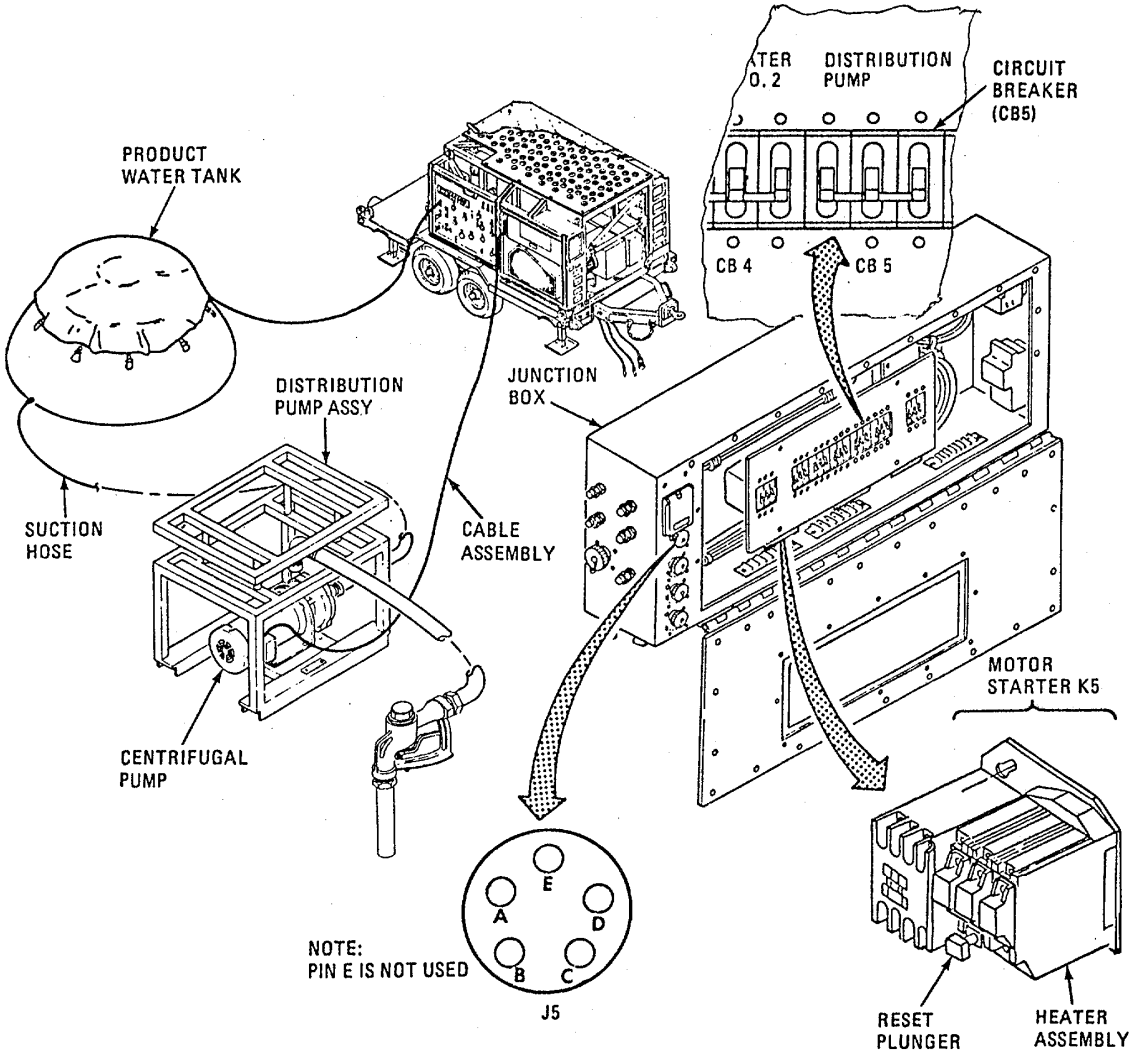


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP NO. 1 ASSEMBLY

1. PUMP ASSEMBLY IS NOISY.

Notify Direct Support Maintenance if this malfunction occurs.

2. PUMP ASSEMBLY RUNS HOT.

WARNING

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

Step 1. Turn circuit breakers CB3 and CB4 to OFF and disconnect both raw water pumps at junction box.

Step 2. Connect raw water pump no 1 to RAW WATER PUMP NO 2jack, J4 and turn on CB4.

If pump does not run hot now, ROWPU is defective, notify Direct Support Maintenance.

Step 3. Turn CB4 to OFF and disconnect raw water pump no 1 at junction box.

Step 4. Disconnect cable assembly from motor of raw water pump no 1 (Paragraph 2-19) and check cable for continuity.

a. If pump cable is defective (open), replace cable assembly. Refer to Paragraph 2- 19).

b. If pump cable is not defective, replace centrifugal pump of raw water pump no 1. Refer to Paragraph 2-20).

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP NO. 1 ASSEMBLY - continued

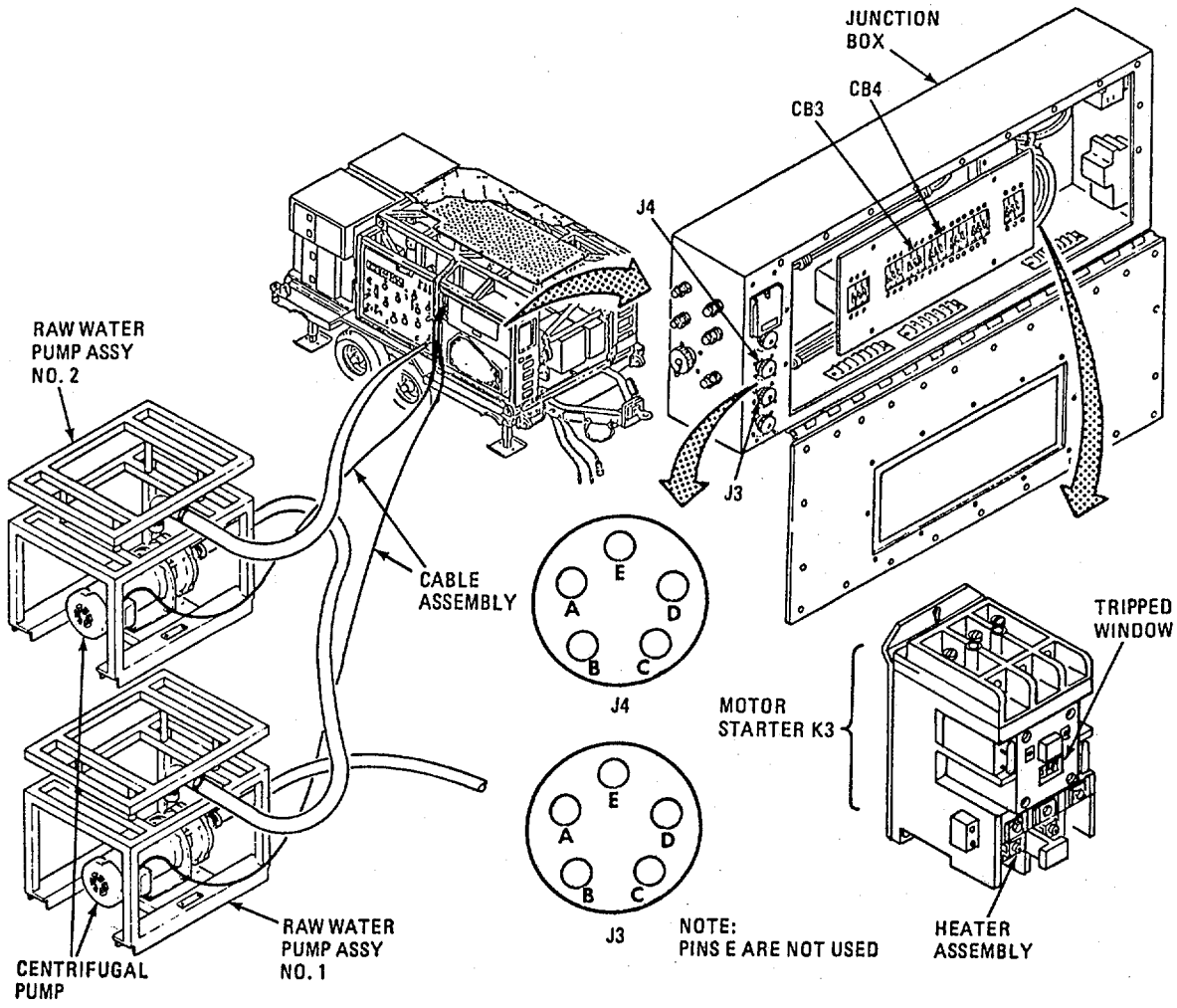


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP NO. 1 ASSEMBLY - continued

3. PUMP ASSEMBLY 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Check and see if CB3 and or heater assembly of motor starter K3 are tripped. TRIPPED window in heater assembly of motor starter K3 will indicate white, if heater assembly is tripped.

If CB3 and/or heater assembly are not tripped, go to step 4.

Step 2. Turn offCB3 and CB4 and connect raw water pump no.1 to RAW WATER PUMP NO. 2 jack, J4. Flip CB4 to ON.

If CB4 and/or heater assembly of motor starter, K4 trip, trouble is in. ROWPU, notify Direct Support Maintenance.

Step 3. Turn CB4 to OFF and disconnect raw water pump no. 1 cable at junction box and at pump motor (Paragraph 2-19). Check cable assembly for shorts.

a. If defective (shorted), replace pump cable assembly (Paragraph 2--19).

b. If cable assembly is not defective, replace centrifugal pump (Paragraph 2-20).

Step 4. Turn CB3 to OFF and disconnect raw water pump no.1 from junction box. Turn CB3 back on and check for 208 VAC three phase power at RAW WATER PUMP NO 1 jack, J3.

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

Step 5. Disconnect cable assembly at motor of raw water no. 1 (Paragraph 2-19) and check cable assembly for continuity.

a. If continuity is absent (open) in any wire, replace cable assembly. Refer to Paragraph 2-19

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMIP NO. 1 ASSEMBLY - continued

b. If cable assembly is not open, replace centrifugal pump assembly. Refer to Paragraph 2-20.

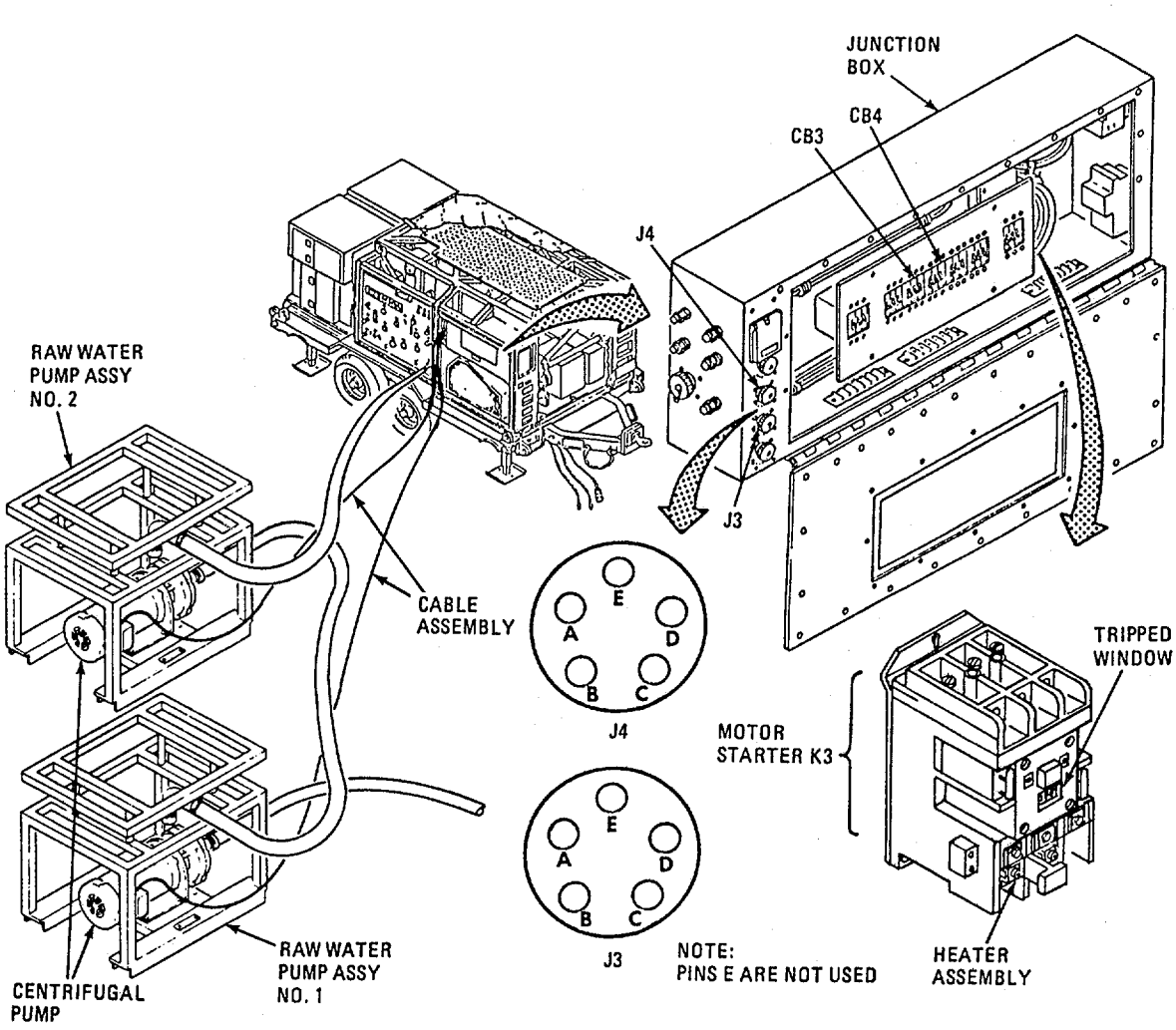


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP NO. 2 ASSEMBLY

1. PUMP ASSEMBLY IS NOISY.

Notify Direct Support Maintenance if this malfunction occurs.

2. PUMP ASSEMBLY RUNS HOT.

WARNING

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

Step 1. Turn circuit breakers CB3 and CB4 to OFF and disconnect both raw water pumps at junction box.

Step 2 Connect raw water pump number 2 to RAW WATER PUMP NO 1 jack, J3 and turn on CB3.

If pump does not run hot now, ROWPU is defective, notify Direct Support Maintenance.

Step 3. Turn CB3 to OFF and disconnect raw water pump no.2 at junction box.

Step 4. Disconnect pump cable assembly at motor of raw water pump no. 2 (Paragraph 2-19) and check for shorts.

a. If defective (shorted), replace cable assembly. Refer to Paragraph 2-19.

b. If cable assembly is not defective, replace centrifugal pump of raw water pump no. 1. Refer to Paragraph 2-20.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP NO. 2 ASSEMBLY - continued

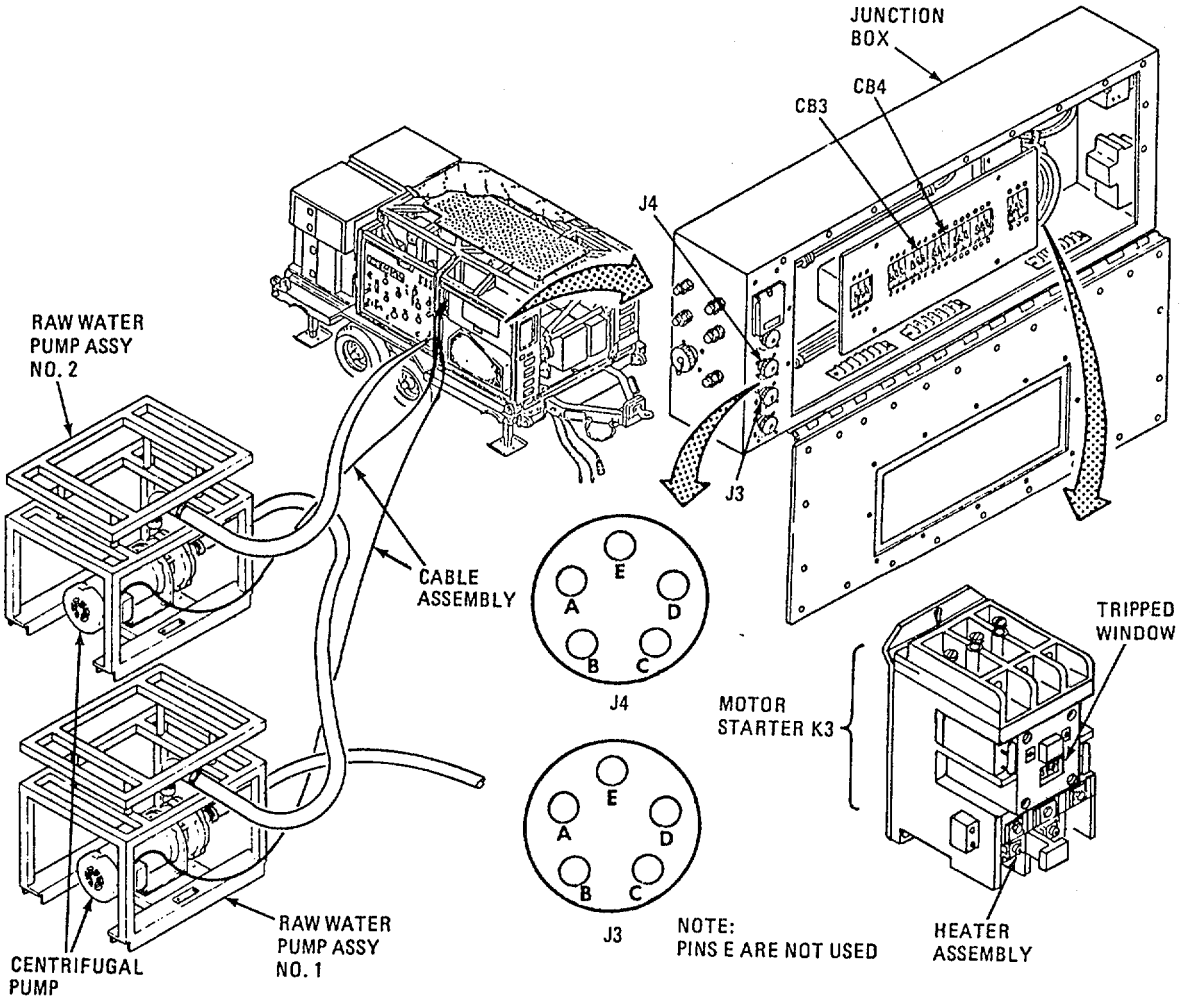


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP NO. 2 ASSEMBLY - continued

3. PUMP ASSEMBLY 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1 Check and see if CB4 and or heater assembly of motor starter K4 are tripped. TRIPPED window in heater assembly of motor starter K4 will indicate white, if heater assembly is tripped.

If CB4 and/or heater assembly are not tripped, go to step 4.

Step 2 Turn CB3 and CB4 to OFF and connect raw water pump no. 2 to RAW WATER PUMP NO. 1 jack, J3. Turn CB3 to ON.

If CB3 and/or heater assembly of motor starter K3 do not trip, trouble is in ROWPU, notify Direct Support Maintenance.

Step 3. Turn CB3 to OFF and disconnect raw water pump no. 2 cable assembly at junction box and at pump motor (paragraph 2-19). Check cable assembly for shorts.

a. If cable assembly is defective (shorted), replace it (Refer to Paragraph 2-19).

b. If cable assembly is not defective, replace centrifugal pump (Paragraph 2-20).

Step 4. Turn CB4 to OFF and disconnect raw water pump no. 2 at junction box. Turn CB4 back on. Check for 208 VAC three phase power at RAW WATER PUMP NO 2jack, J4.

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

Step 5. Disconnect cable assembly at motor of raw water no. 2 (Paragraph 2-19) and check cable assembly for continuity.

a. If continuity is absent (open) in any wire, replace cable assembly (Paragraph 2-19).

b. If cable is not open, replace centrifugal pump assembly (Paragraph 2-20).

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP NO. 2 ASSEMBLY - continued

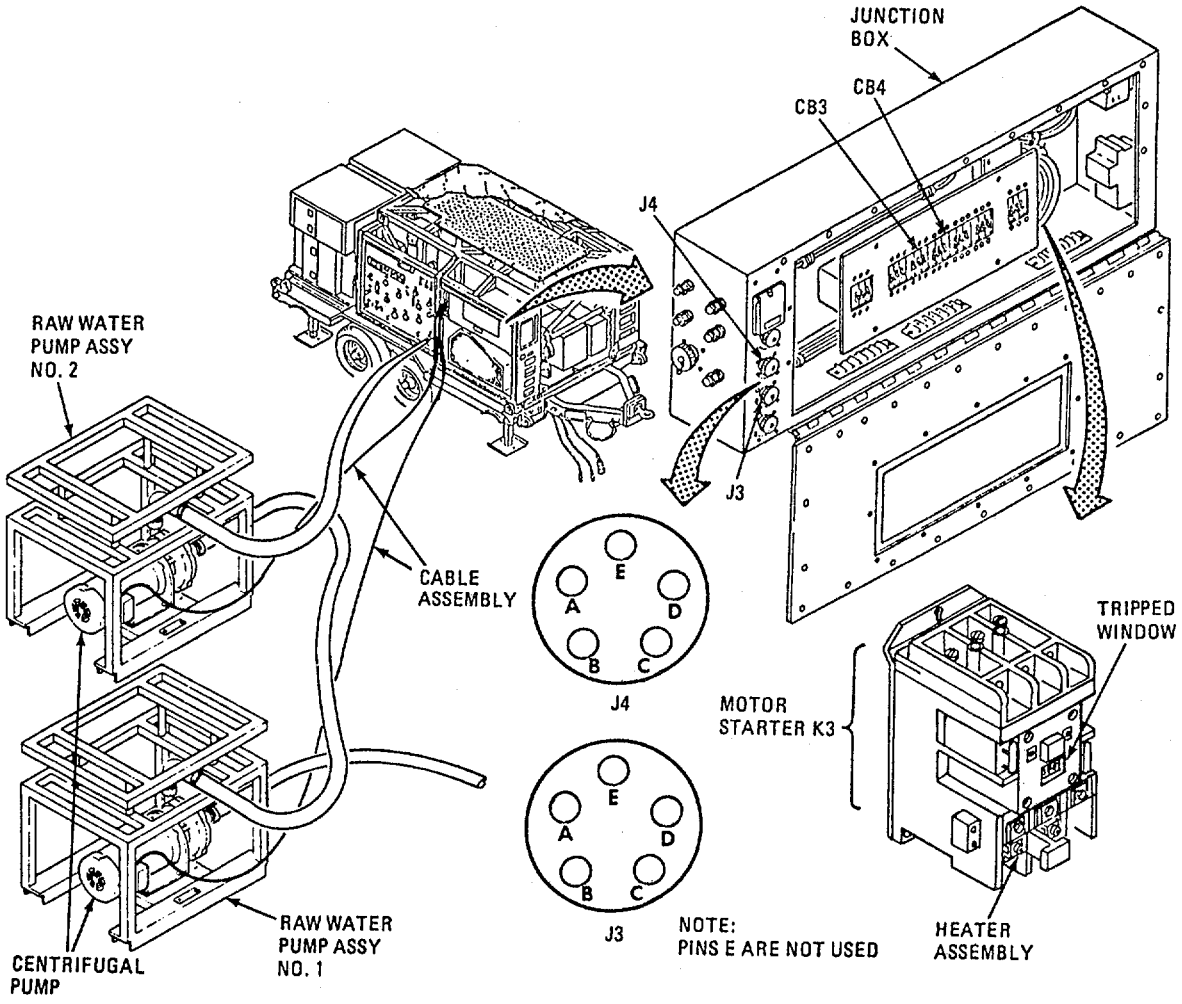


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BACKWASH PUMPASSEMBLY

1. PUMP ASSEMBLY IS NOISY.

Notify Direct Support Maintenance if this malfunction occurs.

2. PUMP ASSEMBLY RUNS HOT.

Step 1. Turn circuit breaker CB2 to OFF and disconnect pump cable at junction box.

WARNING

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

Step 2. Turn CB2 to ON and check for 208 VAC three phase power at BACKWASH PUMP NO 2jack, J2.

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

Step 3. Disconnect cable assembly at backwash pump (Paragraph 2-16). Check cable for continuity.

a. If defective (open), replace cable assembly. Refer to Paragraph 2-16.

b. If cable assembly is not defective, replace centrifugal pump. Refer' to Paragraph 2- 17.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

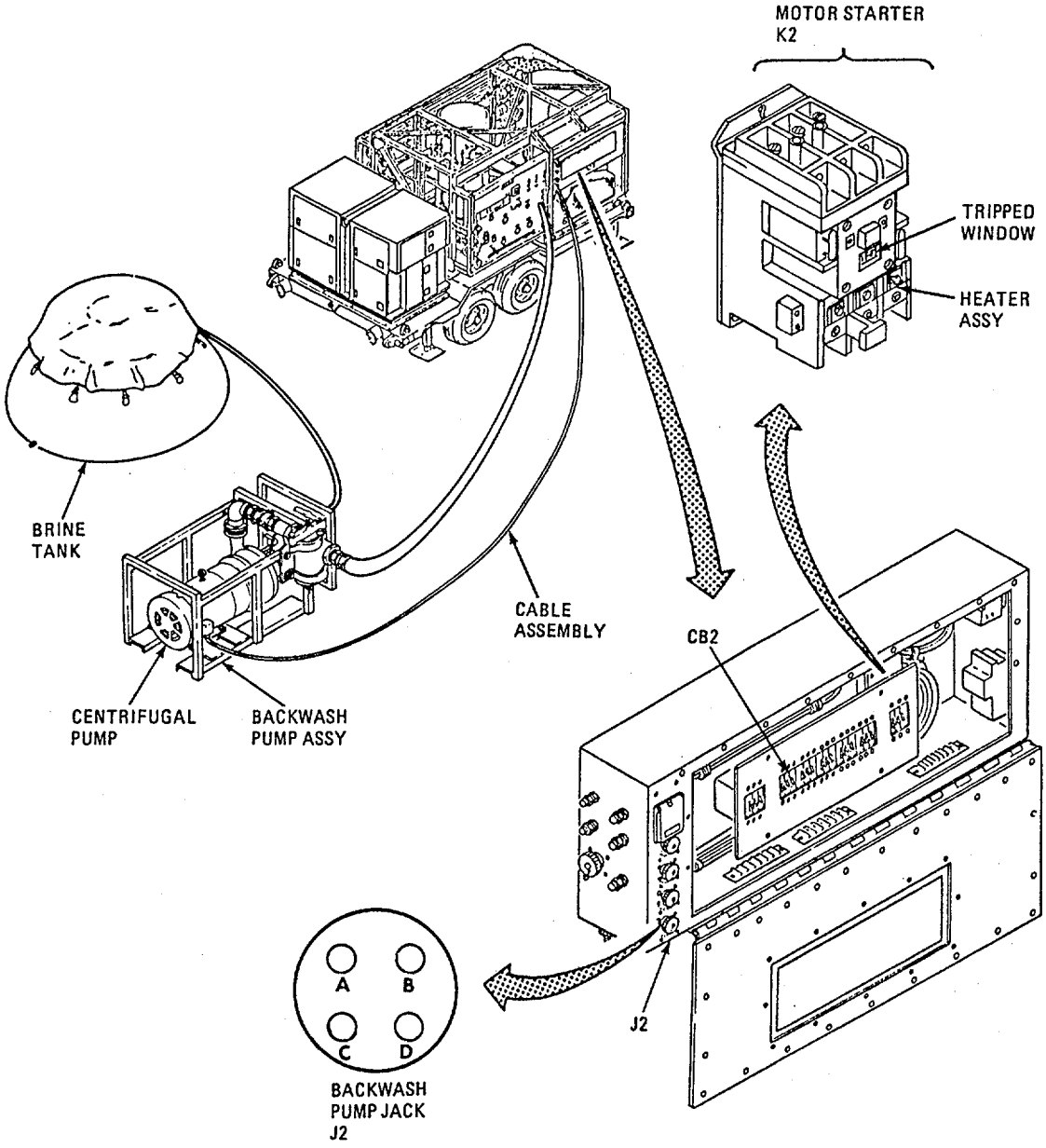


Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

3. PUMP ASSEMBLY 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Check if circuit breaker CB2 and/or heater assembly of motor starter K2 in junction box are OFF. TRIPPED window in heater assembly of K2 will indicate white, if heater assembly is tripped.

a. If CB2 and/or heater assembly are tripped, go to step 5.

b. If CB2 and/or heater assembly are not OFF, continue with step 2.

Step 2. Turn CB2 to OFF and disconnect pump adjunction box.

Step 3. Turn CB2 to ON and check for 208 VAC, three phase power, at BACKWASHI PUMP jack, J2.

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

Step 4. Disconnect pump cable assembly at backwash pump motor (Paragraph 2-16) and check it for continuity.

a. If cable assembly is defective (open), replace it. Refer to Paragraph 2-16.

b. If cable assembly is not defective, replace centrifugal pump. Refer to Paragraph 2-17.

Step 5. Turn off power at generator and disconnect backwash pump at junction box. Check for shorts between pins A - B, A - C and B - C, and from pin D to pins A,B and C, in turn on BACKWASH PUMP jack, J2.

If continuity, indicating a short, is measured, notify Direct Support Maintenance.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
BACKWASH PUMP ASSEMBLY - continued

Step 6. Disconnect cable at backwash pump assembly (Paragraph 2-16) and check it for shorts.

a. If cable assembly is shorted, replace it. Refer to Paragraph 2-16.

b. If cable assembly is not defective, replace centrifugal pump. Refer to Paragraph 2-17.

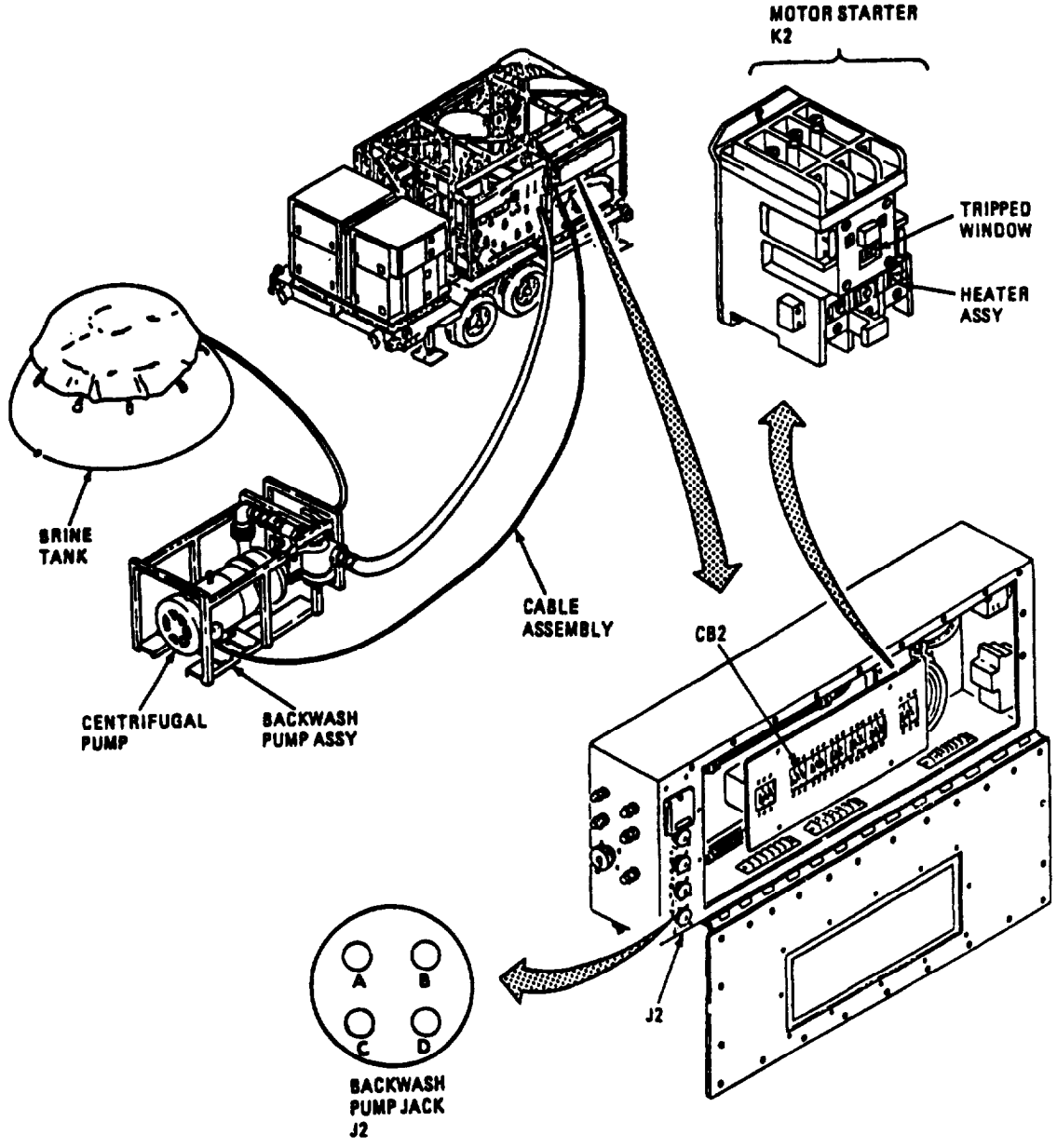


Table 2-2. Unit Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

4. BACKWASH OPERATION FAILS TO STOP.

Step 1. *Models WPES-10, WPES-20 and WPES-30:*

Check if timer is tripped (reset switch popped out).

a. If timer is tripped, press reset switch. If it keeps tripping, replace timer. Refer to Paragraph 2-68.

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

Step 1. *Models H-9518-1, H-9518-2, and H-9518-3:*

Check if circuit breaker on timer is tripped.

a. If timer is tripped, reset the circuit breaker. When circuit breaker is reset, timer should continue and then stop the unit. If this does not happen, replace the timer. Refer to Paragraph 2-68.1.

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

Step 2. Restart backwash operation (Models WPES-10, WPES-20 and WPES-30).

If timer trips again, replace timer. Refer to Paragraph 2-68.

WARNING

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

Step 3. Check for 115 VAC on terminal board (vertical on Models WPES-10, WPES-20 and WPES-30, horizontal on Models H-9518-1, H-9518-2, and H-9518-3), contacts 1 and 2 (ground) in timer.

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

b. If voltage is measured, replace timer. Refer to Paragraph 2-68.

5. BACKWASH PUMP ASSEMBLY STOPS DURING AND/OR FAILS TO START IN BACKWASH OPERATION.

Step 1, Check if circuit breaker, CB2 and/or heater assembly of K2 motor starter are tripped. TRIPPED window in heater assembly of motor starter K2 will indicate white, if heater assembly is tripped.

If CB2 and /or heater assembly are tripped, go to step 2 of Malfunction 3, Backwash Pump Assembly.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
BACKWASH PUMP ASSEMBLY - continued

Step 2. Check if stager cycles (cams turn in direction of arrow).

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

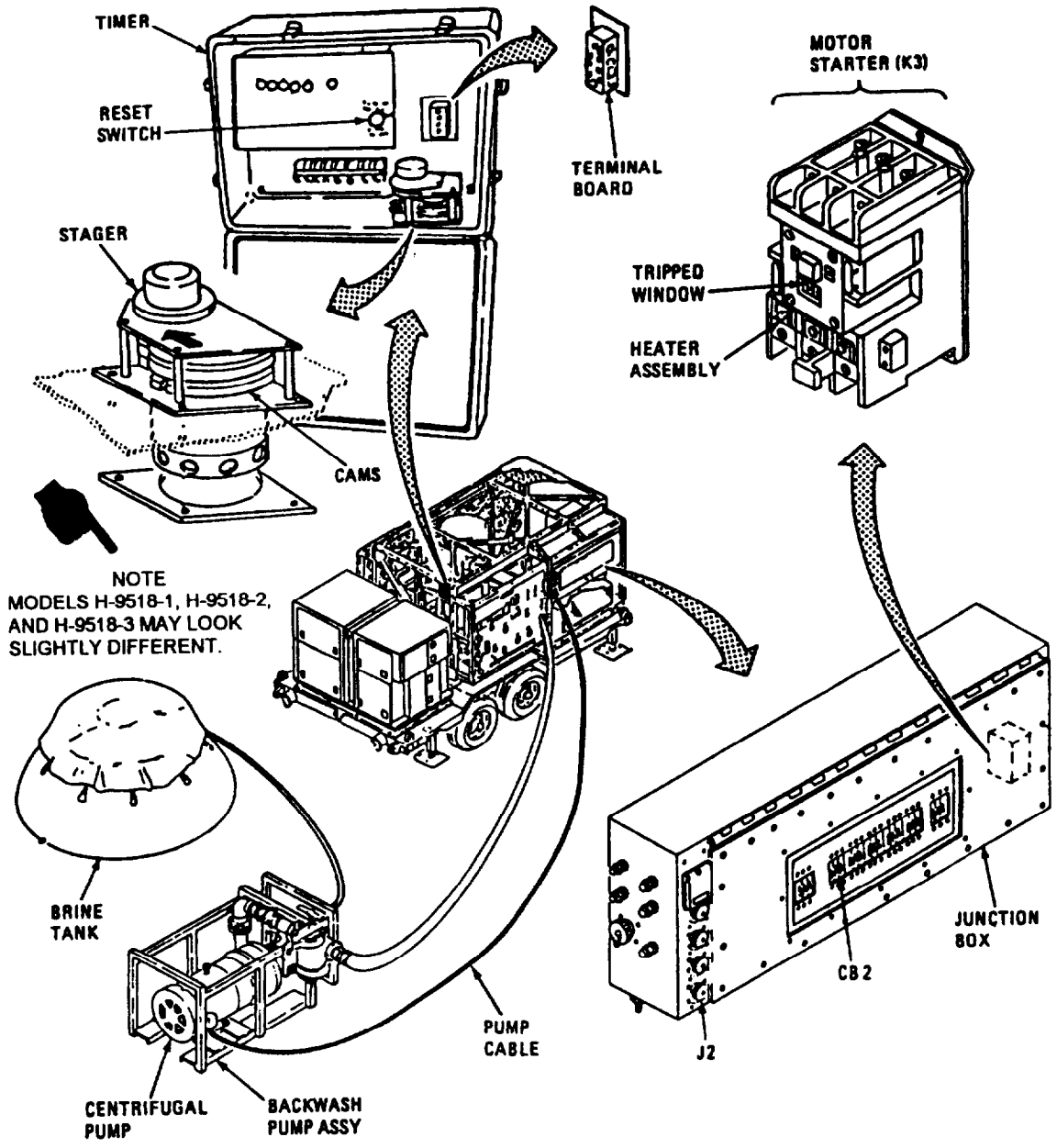


Table 2-2. Unit Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

Step 3. Check for 115 VAC between contacts 1 and 2 (ground) on (vertical on Models WPES-10, WPES-20 and WPES-30, horizontal on Models H-9518-1, H-9518-2, and H-9518-3), terminal board in timer.

a. If voltage is measured, replace timer. Refer to Paragraph 2-68.

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

JUNCTION BOX ASSEMBLY

1. UTILITY OUTLET CIRCUIT BREAKER CBS TRIPS/ FAILS TO RESET.

Step 1. With circuit breaker CB8 OFF, disconnect power, wire (W39) from utility receptacle (para) and wrap with tape to prevent shorting to chassis.

Step 2. Attempt to flip circuit breaker CB8 to ON.

a. If circuit breaker stays on, replace utility outlet. Refer to Paragraph 2-73.

b. If circuit breaker trips again, notify, Direct Support Maintenance.

2. UTILITY OUTLET FAILS TO RESET WHEN RESET BUTTON IS PRESSED.

NOTE
Test button is used by operator to periodically check circuit.

Replace utility outlet if this malfunction occurs. Refer to Paragraph 2-73.

CONTROL BOX ASSEMBLY

1. CONTROL PANEL INDICATORS FAIL TO LIGHT.

Replace light bulbs (Paragraph 2-72) if this malfunction occurs.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
BACKWASH PUMP ASSEMBLY - continued

NOTE
MODELS H-9518-1, H-9518-2, AND H-9518-3
MAY LOOK SLIGHTLY DIFFERENT.

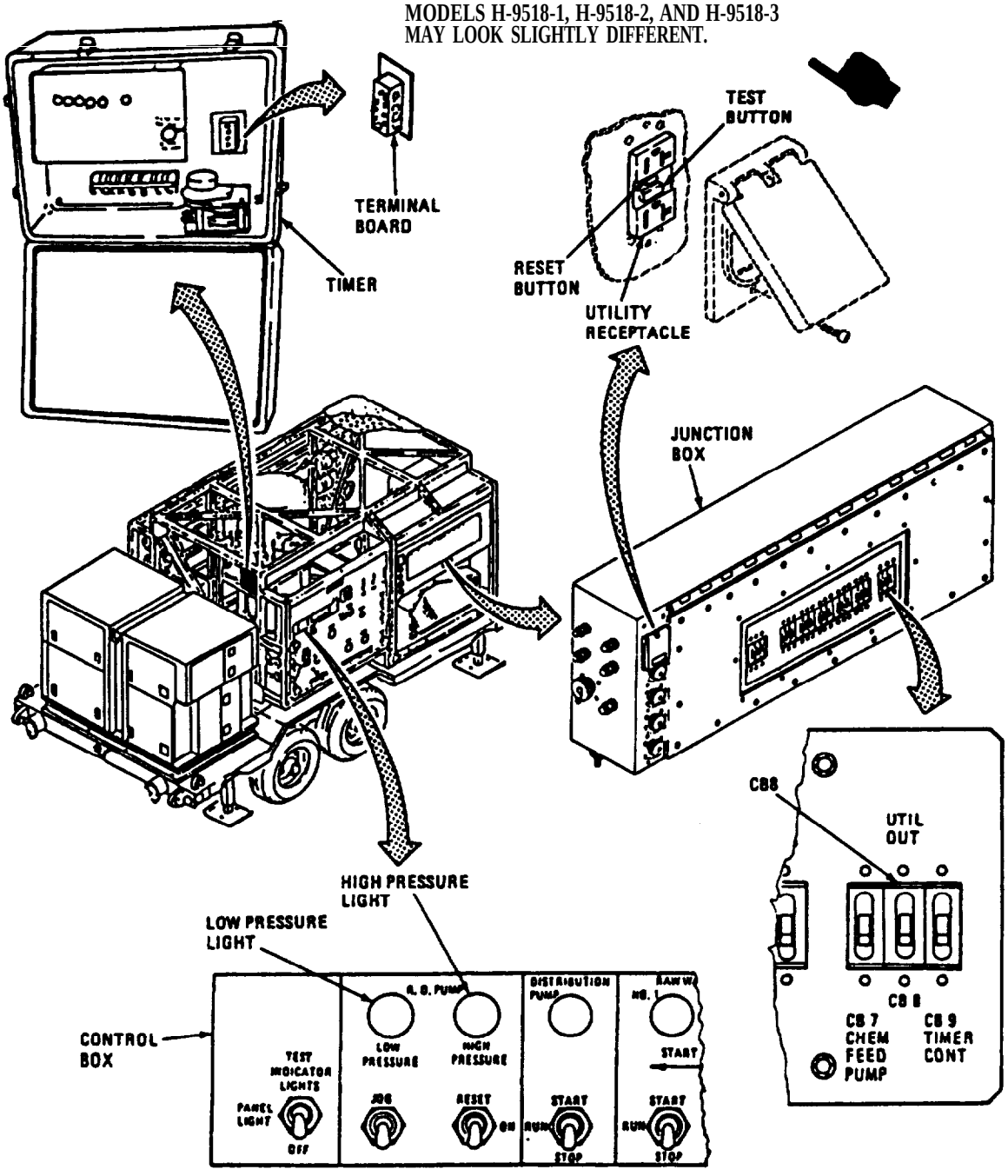


Table 2-2. Unit Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

AIRBRAKE SYSTEM (Models WPES-10 and H-9518-1)

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 using soap solution.

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 2-83.

C. If coupling half is leaking air, repair or replace airbrake hose assembly. Refer to Paragraph 2-83.

d. If air cleaner assembly is leaking air, tighten loose connections and/or repair air cleaner assembly. Refer to Paragraph 2-84.

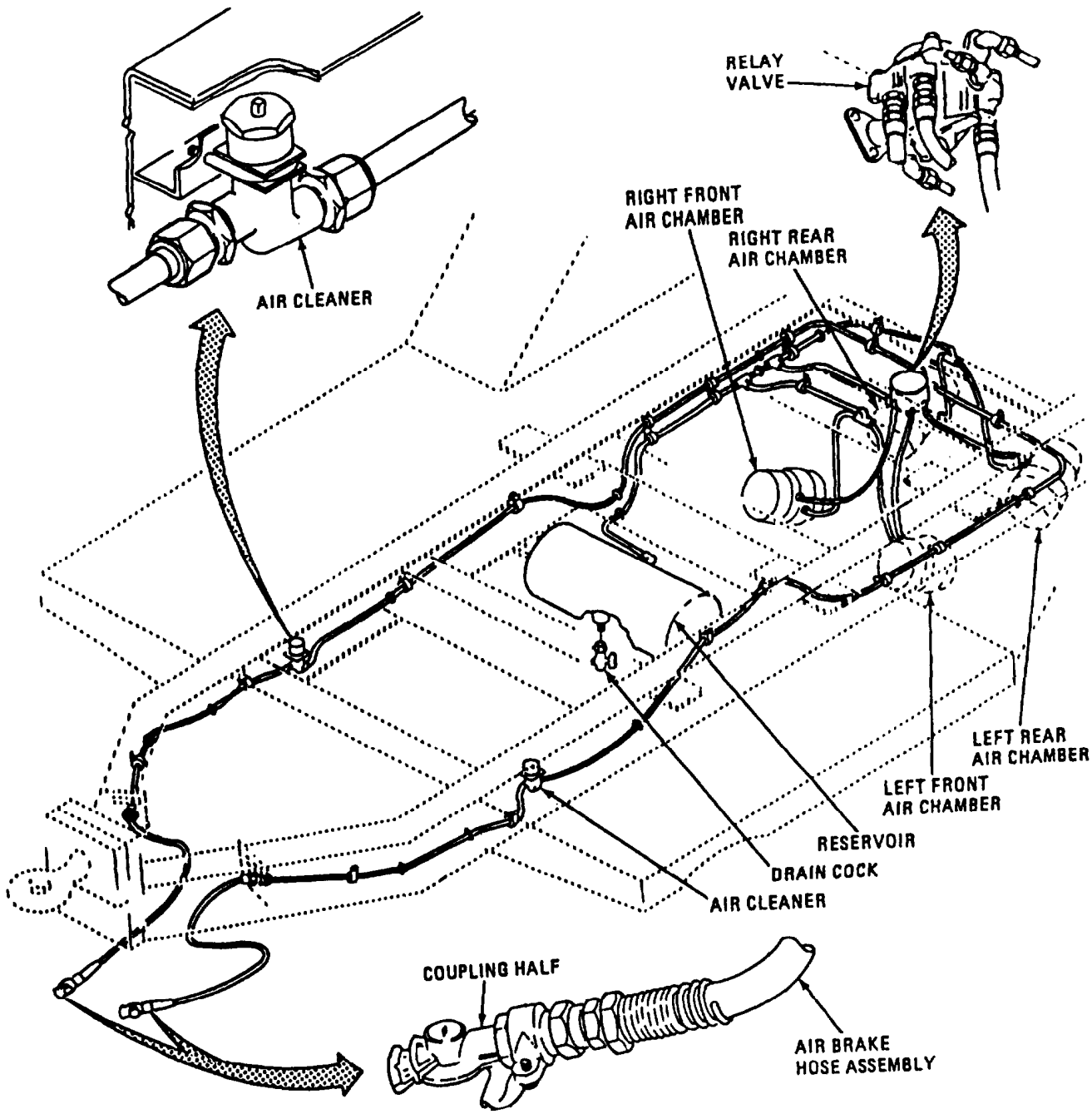
e, If reservoir drain cock is leaking air, replace reservoir dram cock. Refer to Paragraph 2-83.

f. If reservoir is leaking air, replace reservoir. Refer to Paragraph 2-83.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

AIRBRAKE ASSEMBLY (Models WPES-10 and E-9518-1) - continued.



MODELS WPES-10 AND H-9518-1

Table 2-2. Unit Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

AIRBRAKE SYSTEM (Models WPES-10 and H-9518-1) - continued.

g. If air chamber assembly is leaking air, replace air chamber assembly. Refer to Paragraph 2-89.

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

Step 2. Loosen tube ritting on air cleaner, leading to airbrake relay valve. Check for leaking high-pressure air.

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

b. If air leaks slowly or not at all repair or service brake line air cleaner. Refer to Paragraph 2-84.

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.

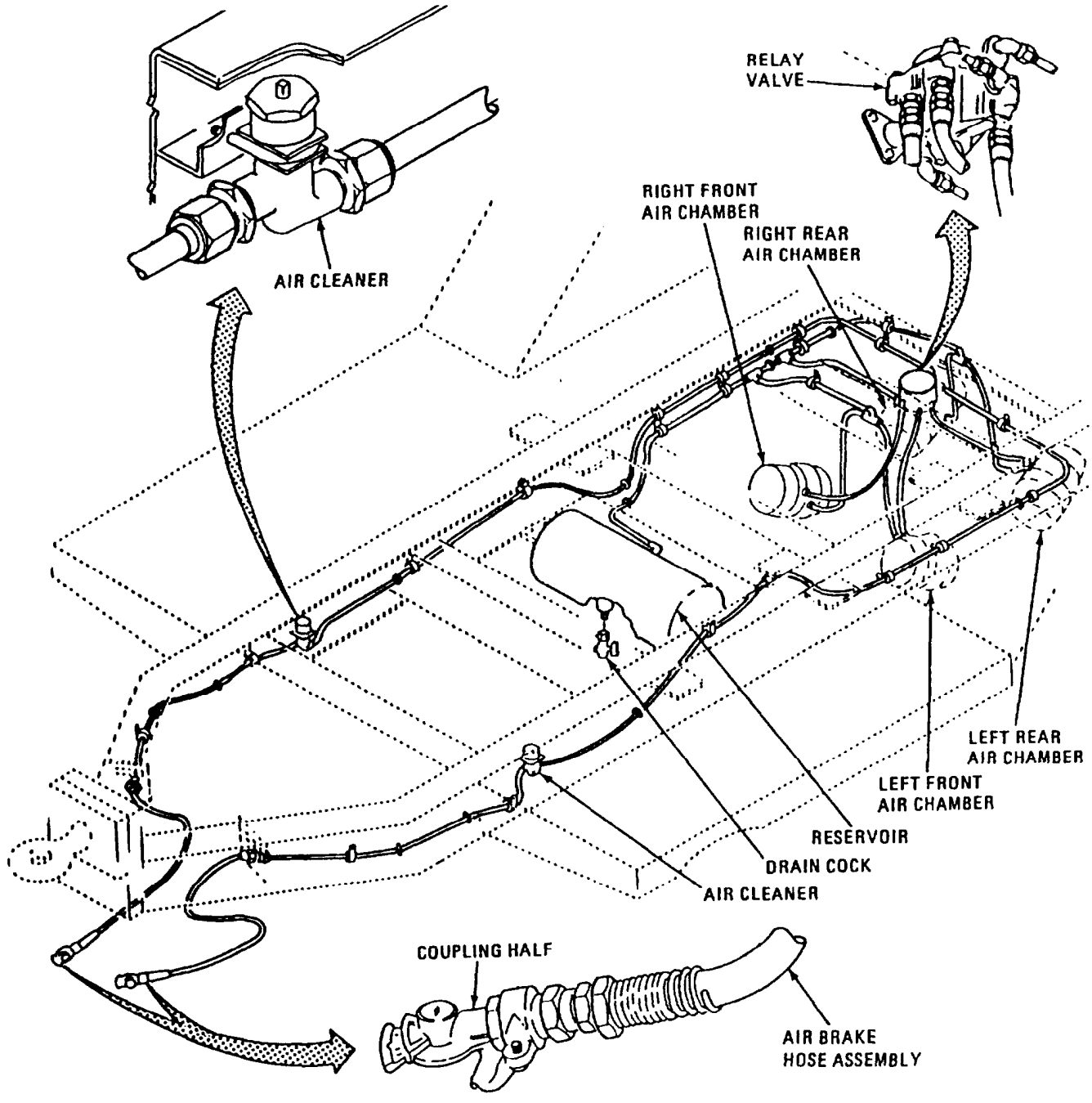
b. If some, but not all air chamber assemblies pushrods fail to operate, replace defective air chambers. Refer to Paragraph 2-89.

c. If all air chamber assembly pushrods do not operate or operate slowly, replace airbrake relay valve. Refer to Paragraph 2-85.

Table 2-2. Unit Troublesbooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

AIRBRAKE ASSEMBLY (Models WPES-10 and H-9518-1) - continued.



MODELS WPES-10 AND H-9518-1

Table 2-2. Unit Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AIRBRAKE SYSTEM (Models WPES-10 and H-9518-1) - continued.

Step 4. Remove hub and drum assembly for each wheel (Paragraph 2-87). Inspect brakeshoe linings for wear. Refer to paragraph 2-88.

a. If brakeshoe lining thickness is greater than 1/8 inch (3.2 mm), adjust service brakes. Refer to Paragraph 2-88.

b. If brakeshoe linings are less than 1/8 inch (3.2 mm) thick, replace brake shoes and adjust brakes. Refer to Paragraph 2-88.

2. ONE BRAKE DRAGS.

Step 1. Check if brake is manually disabled. Refer to Paragraph 2-89.

If disabled, enable it. Refer to Paragraph 2-89.

Step 2. Tell assistant to pump towing vehicle brake pedal several times while 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 returns slowly, go to step 4.

Step 3. Raise wheel that drags and spin wheel to check if brake is adjusted too tightly. Refer to Paragraph 2-88.

If wheel is hard to turn, adjust brakeshoes. Refer to Paragraph 2-88.

Step 4. Remove hub and drum assembly for wheel that drags (Paragraph 2-87) and check for rusted or damaged brake parts or weak return spring (Paragraph 2-88).

Replace defective components.

Step 5. Tell assistant to hold down towing vehicle brake pedal. Loosen uppermost hose fitting on air chamber with slow returing or dragging push rod.

If air chamber assembly pushrod returns quickly, tighten hose fitting and replace airbrake relay valve. Refer to Paragraph 2-85.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

AIRBRAKE ASSEMBLY (Models WPES-10 and H-9518-1) - continued.

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

a. If air chamber assembly pushrod returns quickly, tighten hose fitting.

b. If air chamber assembly pushrod returns slowly, replace defective air chamber assembly. Refer to Paragraph 2-89.

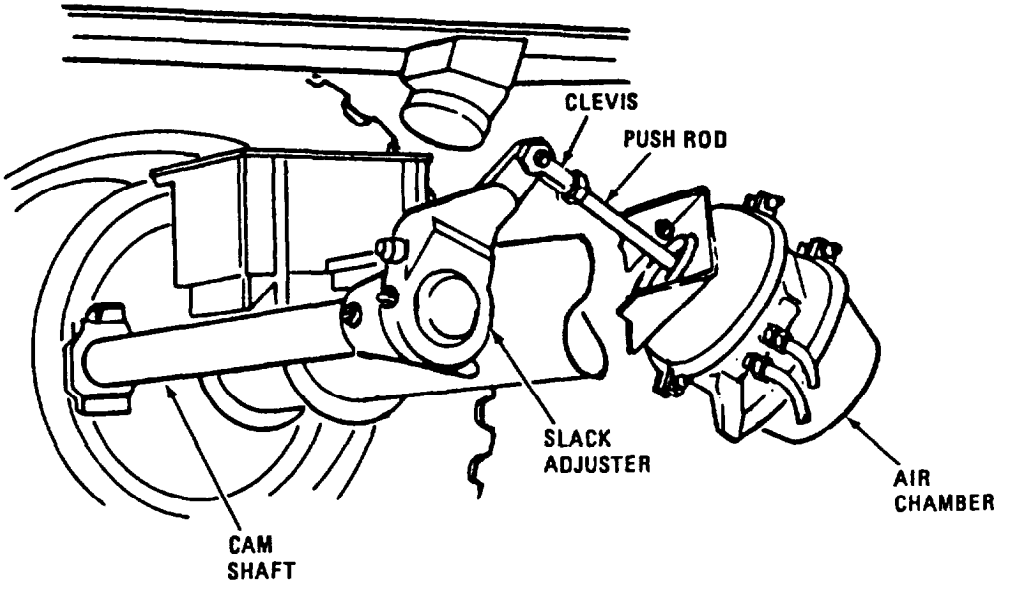


Table 2-2. Unit Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

AIRBRAKE SYSTEM (Models WPES-10 and H-9518-1) - continued.

3. BRAKES DRAG OR REMAIN LOCKED.

Step 1. Check if brakes are manually disabled. Refer to Paragraph 2-89.

If disabled, enable them. Refer to Paragraph 2-89.

Step 2. Check all compressed air system tubes, fittings, and components for leaking air, using soap solution.

a. If compressed air system is not losing pressure, replace relay valve. Refer to Paragraph 2-85.

b. If air tubing or fitting, is leaking air, replace defective tubing. Refer to Paragraph 2-83.

c. If coupling half is leaking, repair airbrake hose assembly. Refer to Paragraph 2-83.

d. If air cleaner assembly is leaking air, replace air cleaner assembly. Refer to Paragraph 2-84.

e. If reservoir is leaking air, replace reservoir, Refer to Paragraph 2-83.

f. If reservoir drain cock is leaking air, replace reservoir drain cock. Refer to Paragraph 2-83.

g. If air chamber assembly is leaking air, replace air chamber assembly. Refer to Paragraph 2-89.

h. If airbrake relay valve is leaking air, replace relay valve. Refer to Paragraph 2-85.

4. TRAILER ROLLS WHEN DISCONNECTED FROM TOWING VEHICLE.

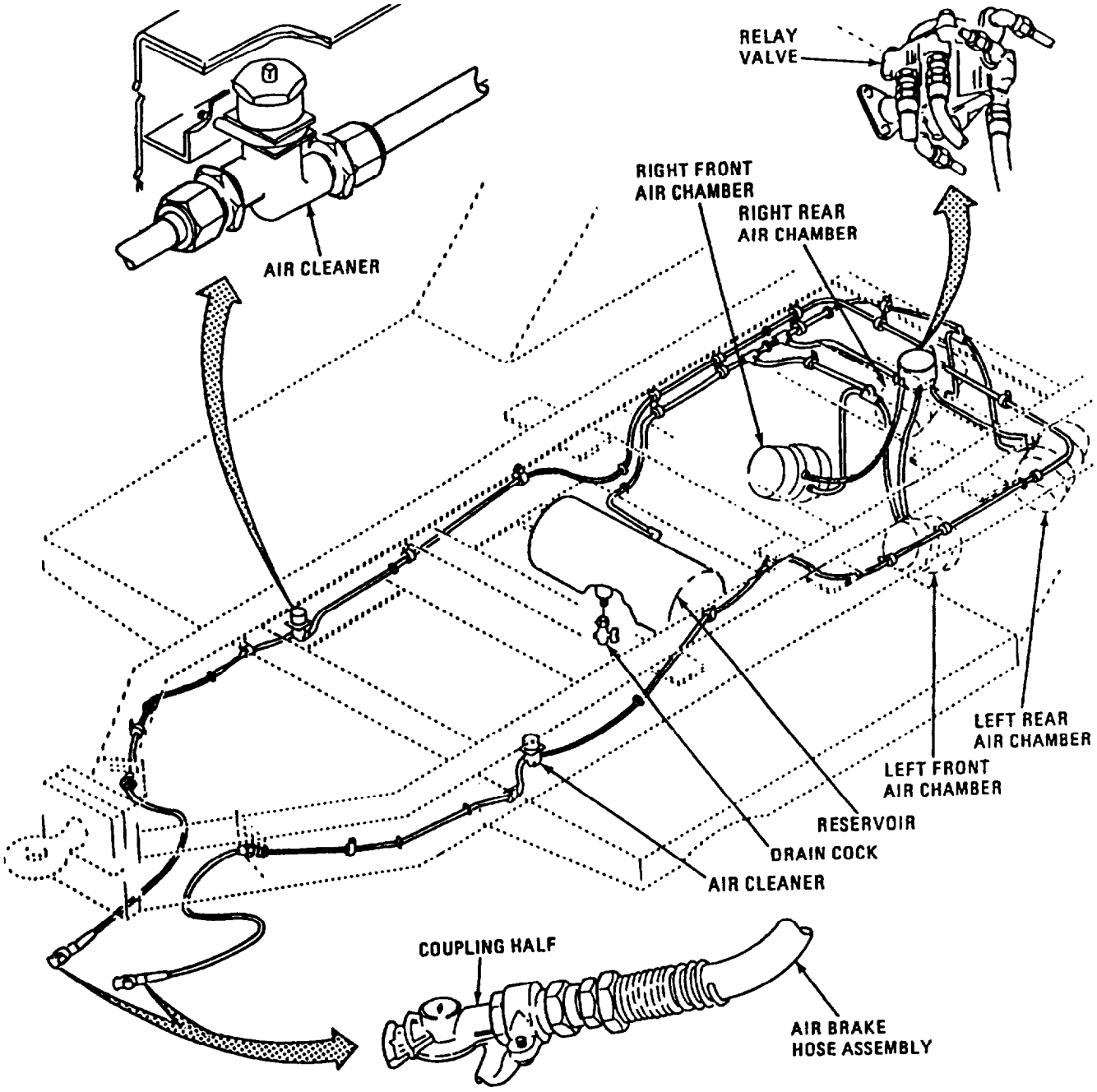
Step 1. Check if brakes are manually disabled. Refer to Paragraph 2-89.

If brakes are disabled, enable them (Paragraph 2-89).

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

AIRBRAKE ASSEMBLY (Models WPES-10 and H-9518-1) - continued.



MODELS WPES-10 AND H-9518-1

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AIRBRAKE SYSTEM (Model WPES-10 and H-9518-1) - continued.

Step 2. Using soap solution 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 2-83.

c. If coupling half is leaking air, replace or repair airbrake hose assembly. Refer to Paragraph 2-83.

d. If air cleaner assembly is leaking air, replace brake line air cleaner. Refer to Paragraph 2-84.

e. If reservoir is leaking air, replace reservoir. Refer to Paragraph 2-83.

f. If reservoir drain cock is leaking air, replace reservoir drain cock. Refer to Paragraph 2-83.

g. If air chamber assembly is leaking air, replace air chamber assembly. Refer to Paragraph 2-89.

h. If airbrake relay valve is leaking air, replace airbrake relay valve. Refer to Paragraph 2-85.

Step 3. Check if compressed air system tubes between reservoir and air chambers are crimped or crushed.

a. If compressed air system tubes are good, go to step 4.

b. If compressed air system tubes are damaged, repair airbrake system tubing. Refer to Paragraph 2-83.

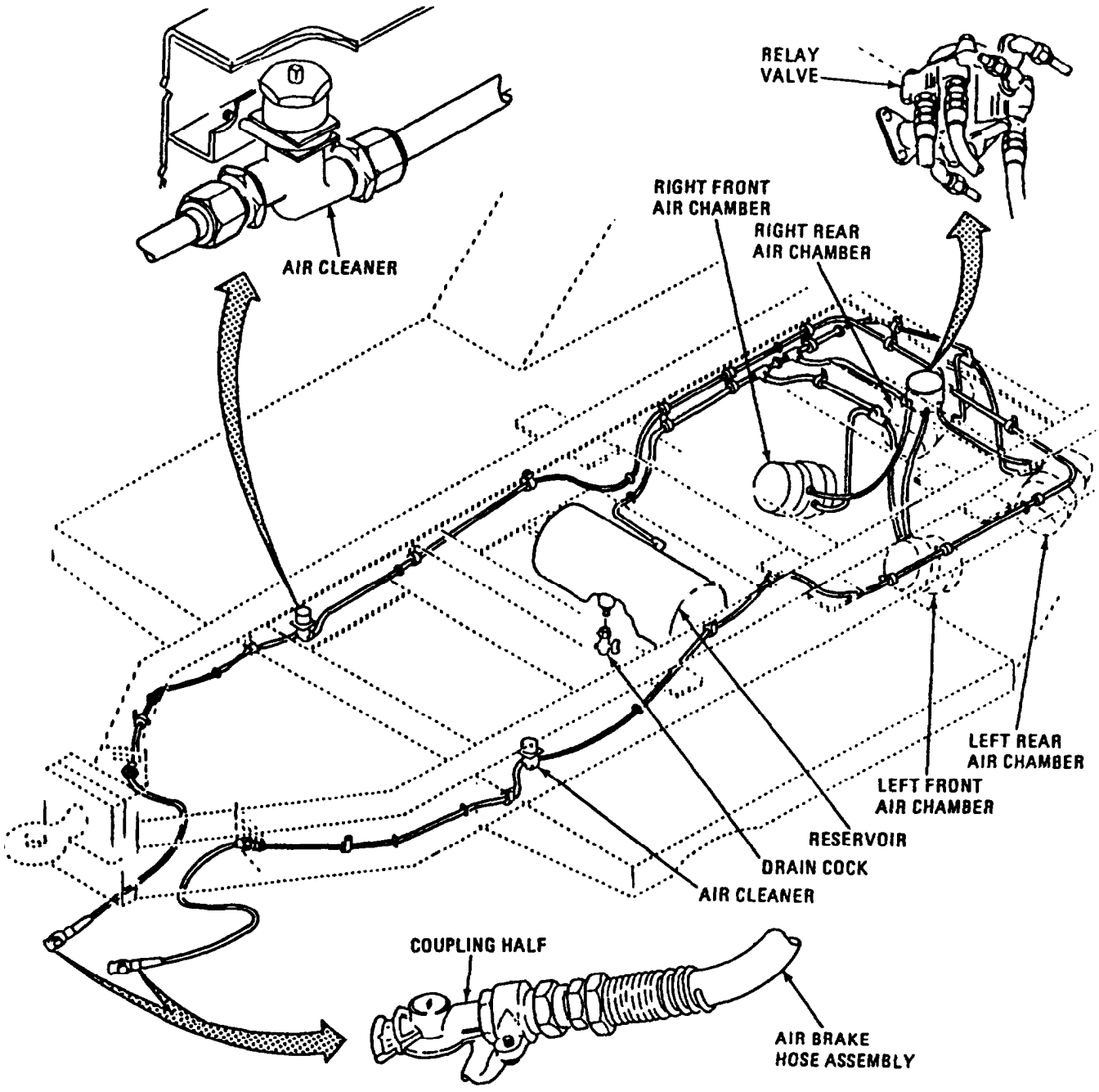
Step 4. Go to Malfunction 1, Air Brake System, Step 4. if trouble persists.

5. BRAKES SLIP.

Go to Malfunction 1, Air Brake System, Step 4, if this malfunction occurs.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION



MODELS WPES-10 AND H-9518-1

Table 2-2. Unit Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

TRAILER ELECTRICAL SYSTEM (Models WPES-10 and H-9518-1)

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 I. Disconnect trailer cable assembly from towing vehicle and check cable connector for bent, missing or corroded pins.

a. If pins are broken or bent, replace cable assembly. Refer to Paragraph 2-81.

b. If pins are corroded, clean them with sandpaper and reconnect cable assembly to vehicle.

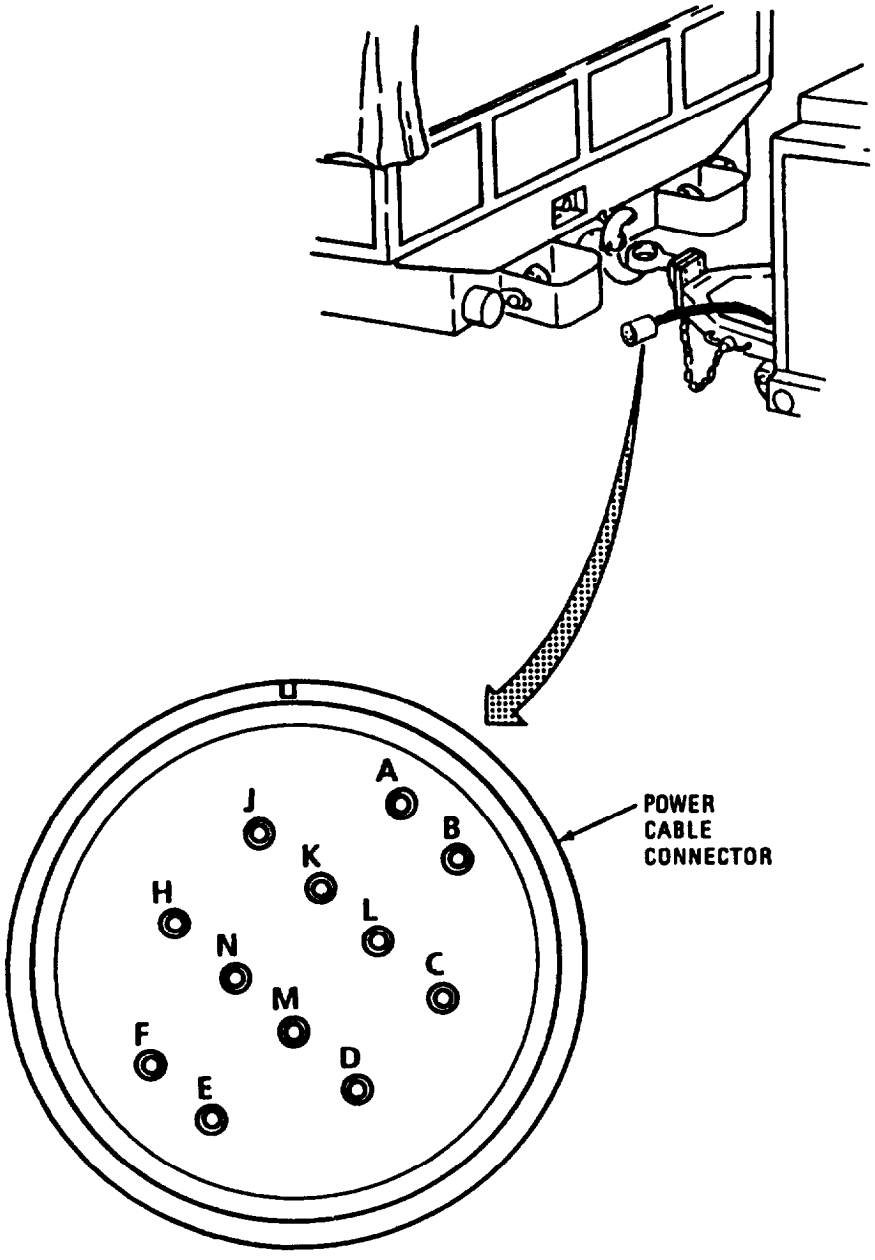
Step 2. Check vehicle connector for damaged socket pins and correct voltage outputs in accordance with vehicle Technical Manual.

If voltages are not available at vehicle connector or socket pins are damaged, refer to towing vehicle Technical Manual for troubleshooting and corrective action procedures.

Table 2-2. Unit Troublershooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

TRAILER ELECTRICAL SYSTEM (Models WPES-10 and H-9518-1) -continued.



MODELS WPES-10 AND H-9518-1

Table 2-2. Unit Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

TRAILER ELECTRICAL SYSTEM (Model WPES-10 and H-9518-1) - 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 mounting surfaces and reinstall securely. If trouble persists continue with step 4.

Step 4. Disconnect trailer power cable assembly from wiring harness assembly at in line connectors and check it for availability of 24 VDC at each connector while operating the required controls on the vehicle. Use chassis as ground.

Replace trailer cable assembly if it is defective. Refer to Paragraph 2-81.

Step 5. Disconnect trailer wiring harness at light assembly connectors and check for availability of 24VDC at each connector while operating the required controls on the vehicle. Use chassis as ground.

a. If wiring harness is not defective, replace light assembly. Refer to Paragraph 2-80

b. If wiring harness is defective, replace it. Refer to Paragraph 2-82,

2. DIM OR FLICKERING LIGHTS.

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

If pins are defective, repair or replace cable assembly. Refer to Paragraph 2-81.

Step 2. Check for loose or corroded chassis ground wire.

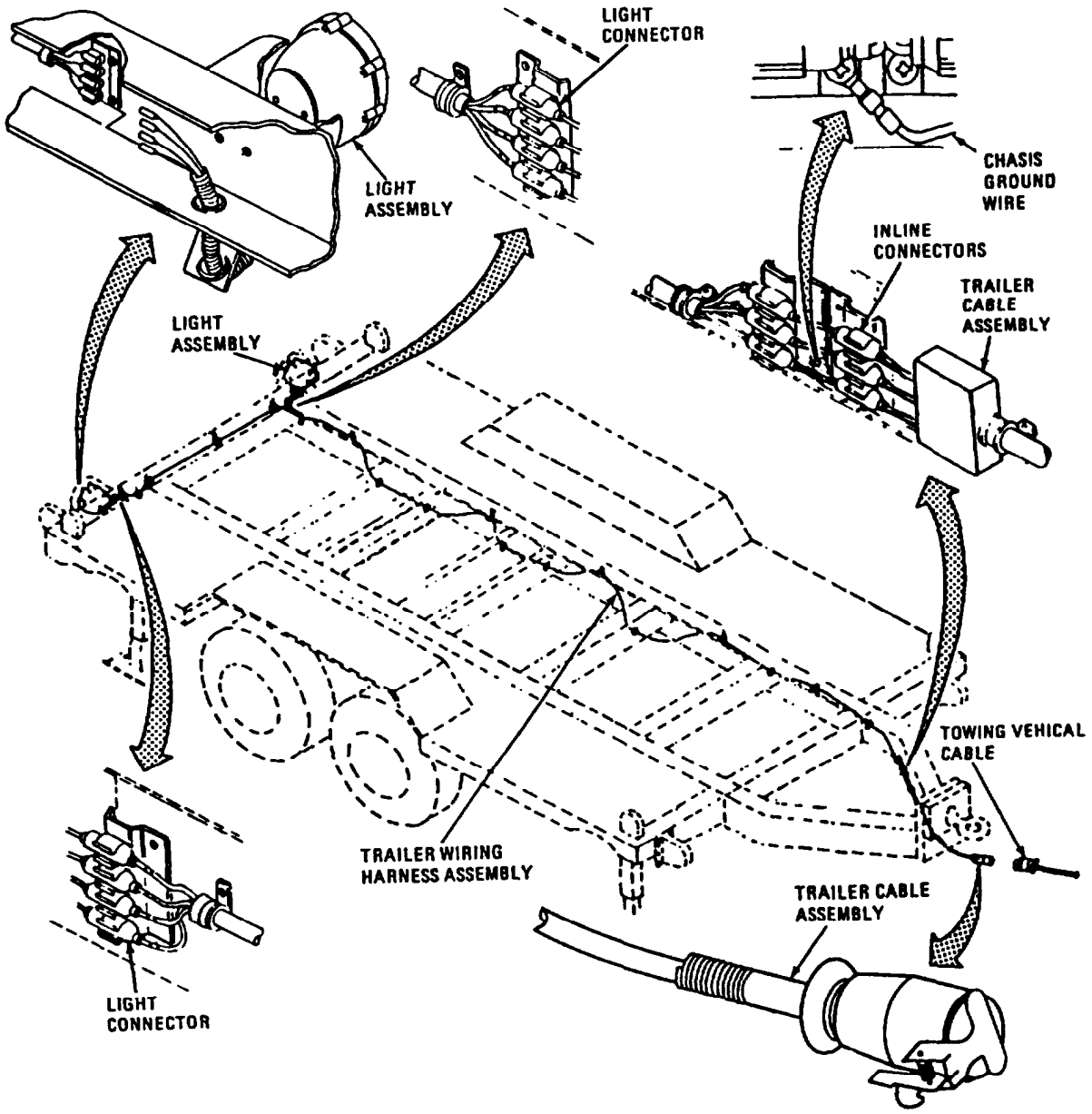
a. If wire is loose tighten it.

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

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

TRAILER ELECTRICAL SYSTEM (Models WPES-10 and H-9518-1) - continued.



MODELS WPES-10 AND H-951 8-1

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

TRAILER ELECTRICAL SYSTEM (Models WPES-10 and H-9518-1) - continued.

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

a. If loose, tighten them.

b. If damaged, replace trailer cable assembly (Paragraph 2-81), wiring harness's (Paragraph 2-82) or light assemblies, (Paragraph 2-80), whichever is damaged.

Step 4. Disconnect in line connectors and check for 24 VDC at each trailer cable connector while operating the required controls on the towing vehicle.

a. If voltage is absent on any plug, replace trailer cable assembly (Paragraph 2-8 1)

Step 5. Reconnect in line connectors and disconnect light connectors. Check for 24 VDC at each trailer cable connector while operating the required controls on the towing vehicle.

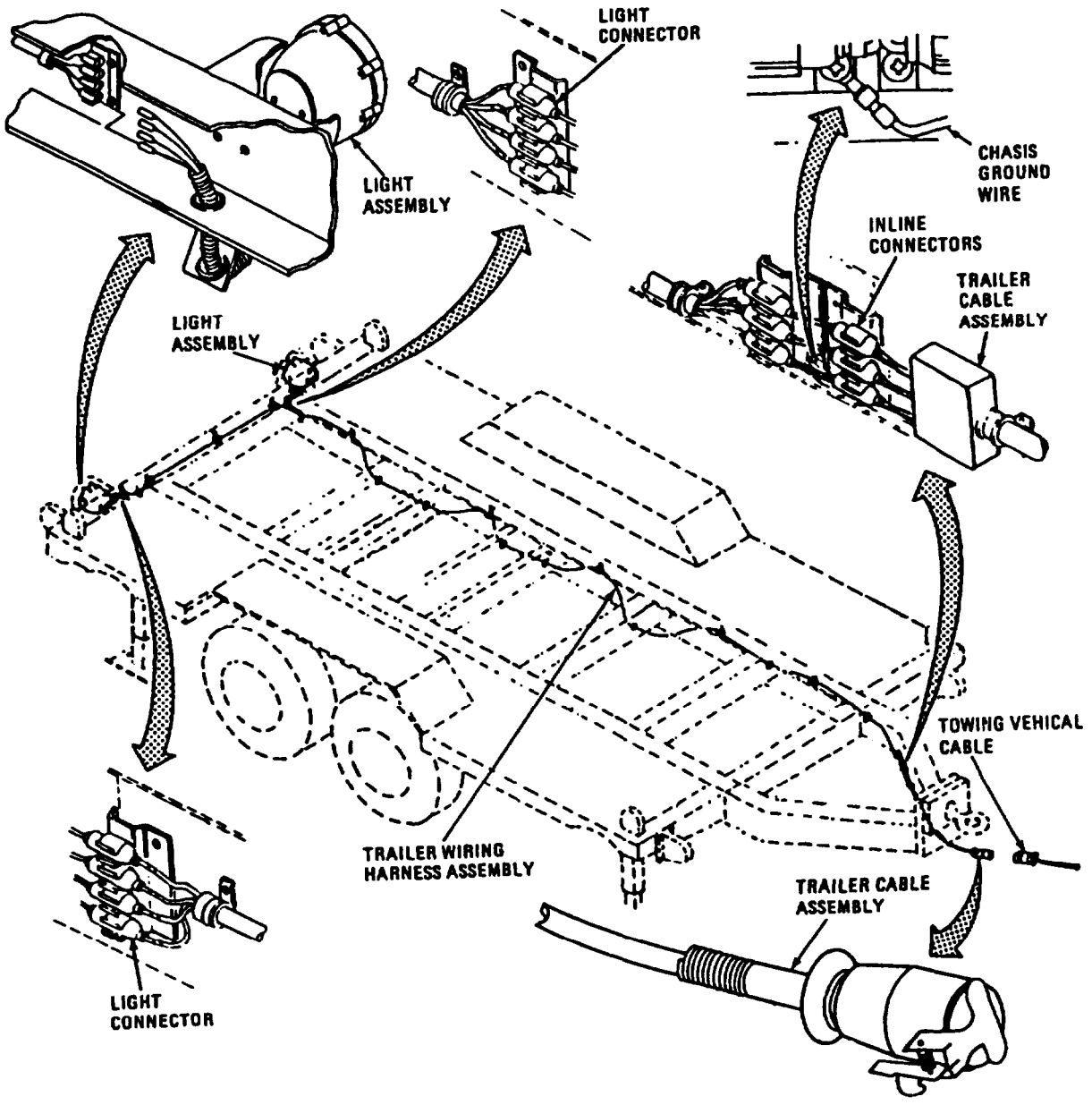
a. If voltage is absent on any wiring harness plug, replace wiring harness assembly. Refer to Paragraph 2-82)

b. If voltage is measured on each plug, replace light assembly (Paragraph 2-80).

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

TRAILER ELECTRICAL SYSTEM (Models WPES-10 and H-9518-1) - continued.



MODELS WPES-10 AND H-9518-1

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

SUSPENSION ASSEMBLY (Models WPES-10 and H-9518-1)

1. WHEELS WOBBLE OR SHIMMY.

Step 1. Jack up trailer on all four leveling jacks and spin each wheel and tire assembly 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 assembly. Refer to Paragraph 2-86.

Step 2. Check wheel bearing adjustment on each wheel. Refer to Paragraph 2-87.

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

b. If wheel bearing are out of adjustment, adjust wheel bearings, Refer to Paragraph 2-87.

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 and wheel assembly 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 assembly. Refer to Paragraph 2-86.

Step 2. Check wheel bearing adjustment on each wheel. Refer to Paragraph 2-87.

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 2-87.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

SUSPENSION ASSEMBLY (Models WPES-10 and H-9518-1) - continued.

Step 3. Inspect wheel bearings for overheating or damage. Refer to Paragraph 2-87.

Replace damaged wheel bearings. Refer to Paragraph 2-87.

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.

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 assembly. Refer to Paragraph 2-86.

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 2-87.

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

b. If wheel bearings are out of adjustment, adjust wheel bearings. Refer to Paragraph 2-87.

Table 2-2. Unit Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

SUSPENSION ASSEMBLY (Models WPES-10 and H-9518-1) - continued.

4. TIRES WEAR UNEVENLY.

Step 1. Check wheel bearing adjustment (paragraph 2-87) on each wheel.

If wheel bearings are out of adjustment, adjust wheel bearings. Refer to Paragraph 2-87.

Step 2. 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.

Table 2-2. Unit Troubleshooting - continued

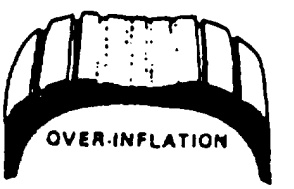
MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

SUSPENSION ASSEMBLY (Models WPES-10 and H-9518-1) - continued.

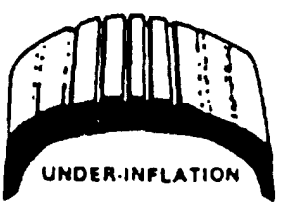
HOW TO READ TIRE WEAR

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.

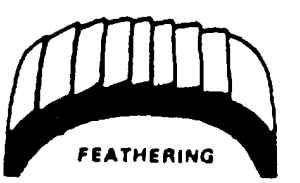
EXCESSIVE WEAR AT THE CENTER OF THE TREAD INDICATES THAT THE AIR PRESSURE IN THE TIRE IS TOO HIGH. THE TIRE IS RIDING ON THE CENTER OF THE TREAD AND WEARING IT PREMATURELY.



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.

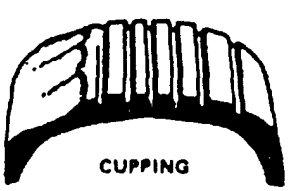


FEATHERING IS A CONDITION WHEN THE EDGE OF EACH TREAD RIB DEVELOPS A SLIGHTLY ROUNDED EDGE ON ONE SIDE AND A SHARP EDGE ON THE OTHER. BY RUNNING YOUR HAND OVER THE TIRE. YOU CAN USUALLY FEEL THE SHARPER EDGES BEFORE YOU'LL BE ABLE TO SEE THEM. THE MOST COMMON CAUSE OF FEATHERING IS A BENT AXLE.

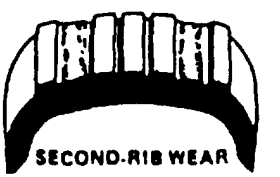


WHEN AN INNER OR OUTER RIB WEARS FASTER THAN THE REST OF THE TIRE. THE NEED FOR WHEEL BEARING ADJUSTMENT IS INDICATED. THERE IS EXCESSIVE WEIGHT ON ONE SIDE OF TRAILER. CAUSING THE WHEEL TO LEAN TOO MUCH. PUTTING EXCESSIVE LOAD ON ONE SIDE OF THE TIRE. MISALIGNMENT COULD ALSO BE DUE TO SAGGING SPRINGS.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



MODELS WPES-10 AND H-9518-1

Section V. UNIT MAINTENANCE PROCEDURES

Paragraph Title **Paragraph**

2-10. GENERAL.

2-11. PERSONNEL SAFETY.

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

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. INFORMATION AND DATA PLATES REPLACE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Rivet Gun (Appendix B, Section III, Item 3)
- Electric Drill (Appendix B, Section Ill, Item 3)
- Grinder (Appendix B, Section III, Item 3)

Material/Parts Required
- Detergent (Appendix C, Section II, Item 5)
- Rags, Wiping (Appendix C, Section II, Item 14)
- Rivets and Drive Screws

Equipment Condition
- Reference
  - Power shut down (Power Source Manual).

a. Removal.

WARNING

Keep data plates from falling into areas where they will be hard to retrieve and pose a possible danger to equipment and personnel.

NOTE

Rivets and drive screws may be removed by drilling thru them and punching out scraps with a drift pin, or by grinding or chiseling off the heads, then punching out the stubs with a drift pin.

(1) Remove rivets or drive screws (1).

(2) Remove data plate (2).

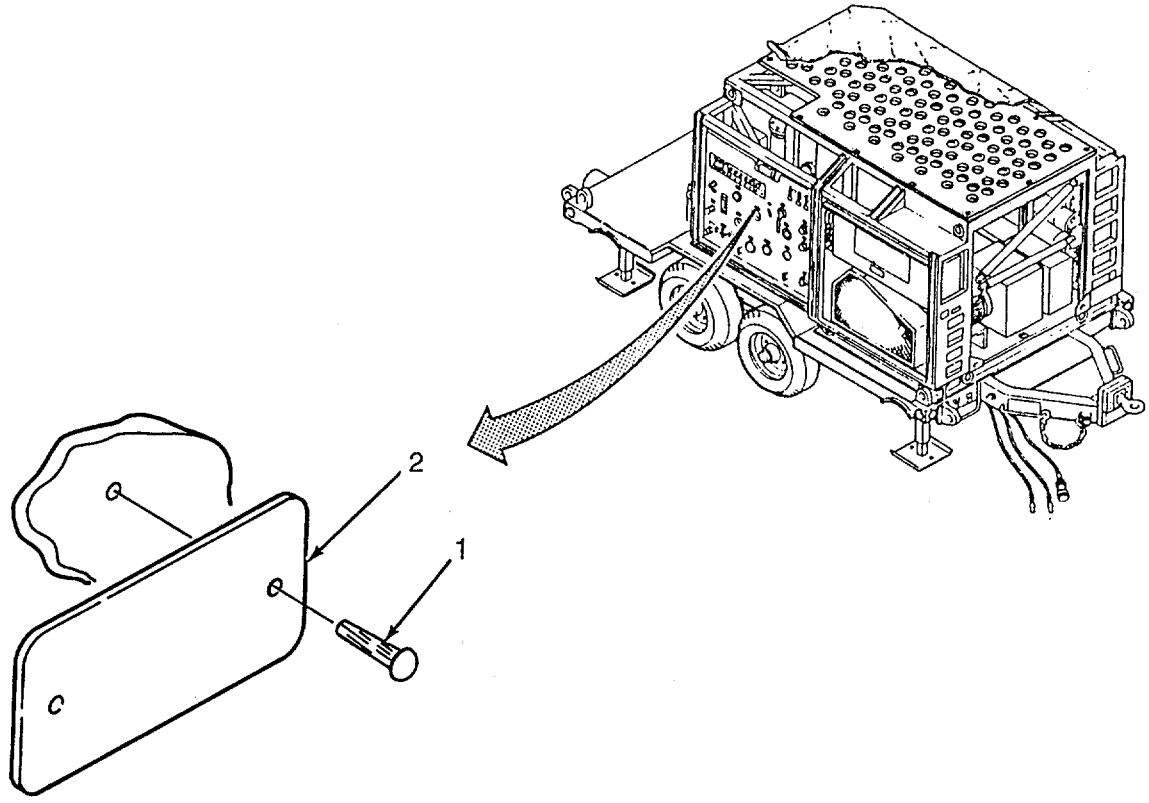
b. Installation.

(1) Clean area to receive data plate with water, detergent and rags as necessary.

(2) When area is clean and dry, install rivets (1) with a rivet gun, and drive screws (1) with a hammer.

(3) If required, remove protective cover (i.e paper or wax covering) with detergent and rags.

2-13. INFORMATION AND DATA PLATES REPLACE - continued.



TYPICAL DATA PLATE

2-14. DUST CAPS AND PLUGS REPLACE.

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
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).

NOTE

Dust caps protect open ended electrical and piping connectors when system is not in use. A variety of caps are used on ROWPU. The following procedure is typical and may vary slightly from case to case.

a. Removal.

(1) Remove nut (1), lockwasher (2) and screw (3).

(2) Disconnect S-hook (4) from dust cap (6).

(3) Disconnect S-hooks (4) from chain (5).

(4) Remove plug or cap (6) from pipe, cable or hose it protects.

b. Installation.

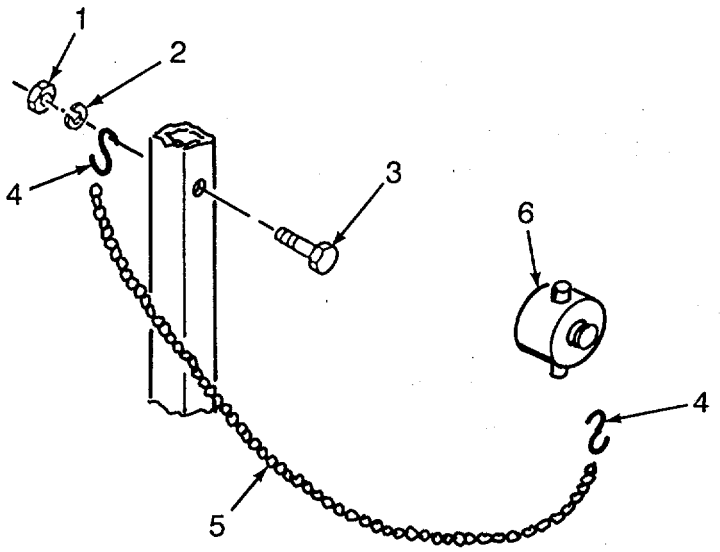
(1) Position cap or plug (6) onto pipe, cable or hose to be protected.

(2) Install S-hooks (4) on chain (5).

(3) Connect one S-hook (4) to cap (6).

(4) Secure other S-hook (4) to ROWPU frame, pump assembly or cable with screw (3), lockwasher (2) and nut (1).

2-14. DUST CAPS, REPLACE - continued.



2-15. STORAGE CHEST REPAIR.

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)
Material/Parts Required
Detergent (Appendix C, Section II, Item 5)
Rags, Wiping (Appendix C, Section II, Item 14)
Equipment Condition
Storage Chest removed from ROWPU (TM 10-4610-241-10).

NOTE

- Unit level maintenance of storage chest is limited to replacement of data plate and tiedown loops.
- This procedure applies to both storage chests.

a. Disassembly.

(1) Open lid (1) of storage chest (2).

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

(3) Remove four screws (5), and two tiedown loops (6).

b. Cleaning.

(1) Wash out storage chest (2) with water and detergent.

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

c. Inspection.

(1) Inspect information plate (4) for damaged, faded or badly scratched lettering.

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

2-15. STORAGE CHEST REPAIR- continued.

d. Repair.

(1) Replace information plate (4) if damaged or illegible.

(2) Replace loops (6) if damaged.

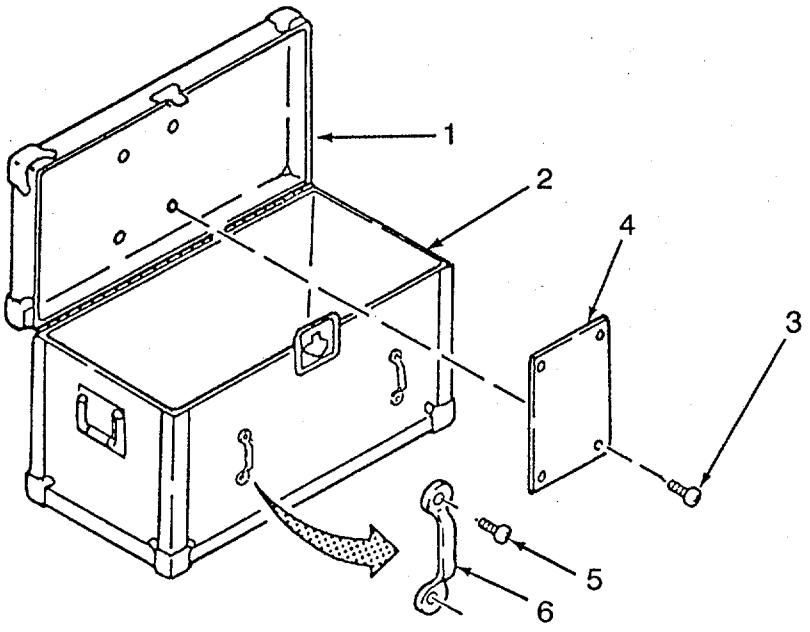
(3) Replace storage chest (2) if severely damaged or deteriorated.

e. Assembly.

(1) Position information plate (4) on lid (1).

(2) Install four screws (3).

(3) Position tiedown loops (6) on storage chest (2) and secure with two screws (5) each.



2-16. CABLE ASSEMBLY, W42 (BACKWASH PUMP) REPLACE.

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 II, Item 3)
- Wrench, Combination, 1 5/8 Inch (Appendix B, Section II, Item 3)

Material/Parts Required
- Tape, Electrical (Appendix C, Section II, Item 20)
- Twine (Appendix C, Section II, Item 27)
- Lockwashers (TM 10-4610-241-24P)

Equipment Condition
- Reference
  - Cable Assembly disconnected from Junction Box (TM 10-4610-241-10).

a. Removal.

(1) Unwind cable assembly (20), clear of pump assembly (1).

(2) Remove four screws (2), conduit box cover (3) and gasket (4) from conduit box (5).

(3) Pull four wire sets (6) from conduit box (5). Remove twine (7) and tape (8).

NOTE

- Tag and identify wires by set before removal.
- If cable only is to be replaced, it is not necessary to separate wire set, containing only the smaller diameter motor wires.

(4) Remove nut (9), lockwasher (10), wire lugs (11), flat washer (12) and screw (13). Repeat this step for each wire set (6) containing a red, black and large diameter, white cable wire.

(5) Remove screw (14), securing ground wire lug (15) to conduit box (5).

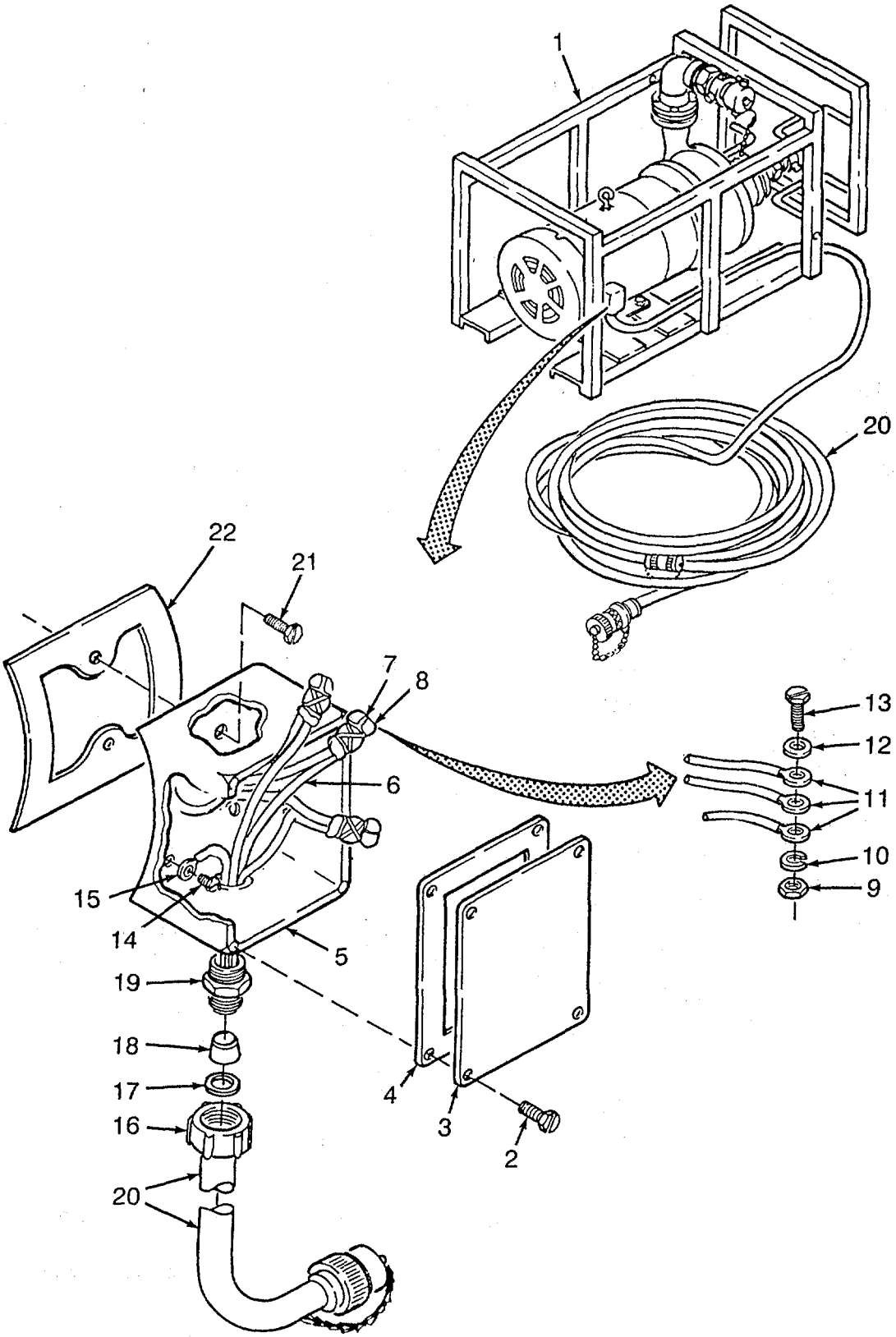
(6) Unscrew nut (16) from adapter (19)

(7) Unscrew adapter (19) from conduit box (5) and pull cable assembly (20) with attached parts from conduit box (5).

(8) Remove adapter (19), seal (18), seal ring (17) and nut (16) from cable assembly (20).

(9) As required, remove two screws (21), gasket (22), and conduit box (5) from motor.

2-16. CABLE ASSEMBLY, W-42 (BACKWASH PUMP) REPLACE - continued.



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

b. Test.

CAUTION

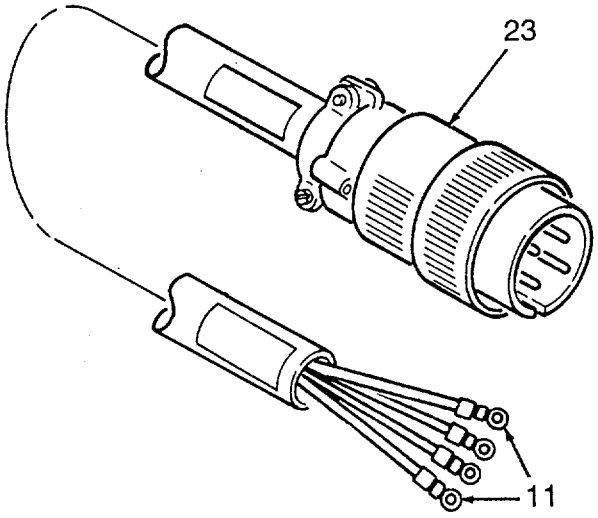
- The following tests are performed to determine if the cable assembly is defective. Before testing, cable assembly must be disconnected from the motor. Failure to disconnect cable can result in false test indications.
- Make sure wire terminals (11) are not touching each other.

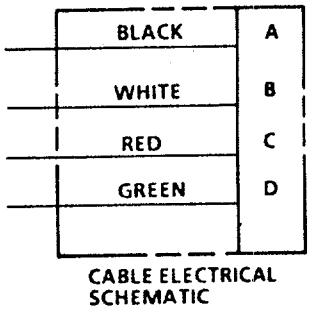
(1) Using multimeter, test for continuity between plug (23) pins and wire terminals (11) as follows:

CABLE ASSEMBLY W42 CONTINUITY TEST

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

(2) If continuity does not exist between two points, notify Direct Support Maintenance.





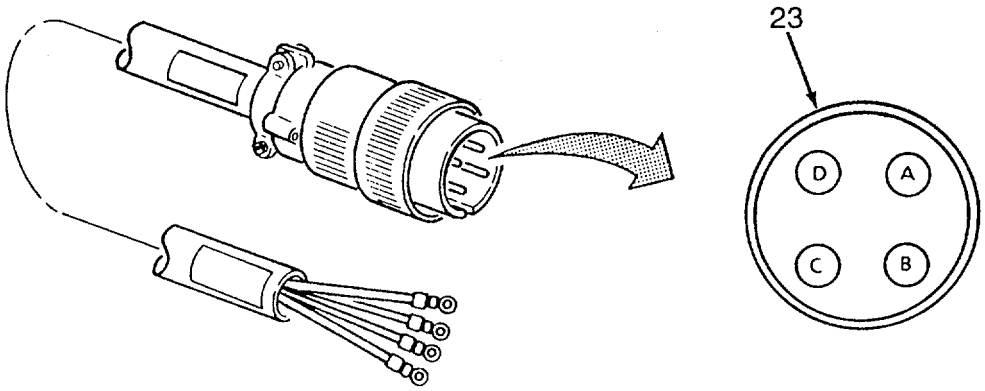
2-16. CABLE ASSEMBLY, W42 (BACKWASH PUMP) REPLACE- continued.

(3) Using multimeter, test for internal electrical short between plug (23) pins and plug shell as follows:

CABLE ASSEMBLY W42 SHORTING TEST

FROM	TO
PIN	PIN
A	B
A	C
A	D
B	C
B	D
C	D
A,B,C,D	CONNECTOR SHELL

(4) If continuity exist between any two points, replace cable assembly.



c. Installation.

(1) If removed, position gasket (22) and conduit box (5) on motor and install two screws (21).

(2) Position nut (16), seal ring (17), seal (18) and adapter (19) on cable assembly (20) in the given order.

(3) Insert lugs (11 and 15) of cable assembly (20) through bottom hole in conduit box (5) and screw adapter (19) into threads of box (5).

(4) Pull motor and cable wire terminals approximately six inches out of square opening in box (5) to facilitate assembly of wire sets (6).

NOTE

Install wires by set as tagged. If tags are lost or illegible, combine wire sets as follows. Wires from motor are marked and cable wires are color coded:

SET 1	SET 2	SET 3	SET 4
T3	T2	T7	T4
T9	T8	T1	T5
Red	White	Black	T6

(5) Position flatwasher (12) on screw (13), then insert screw thru terminal lugs (11) to be tied together and install lockwasher (10) and nut (9). Repeat this step for remaining wire sets.

(6) Using electrical tape (8), wrap each wire set (6).

(7) Secure ends of electrical tape (8) with twine (7).

(8) Install green ground wire lug (15) with screw (14).

(9) Position four wire sets (6) in conduit box (5).

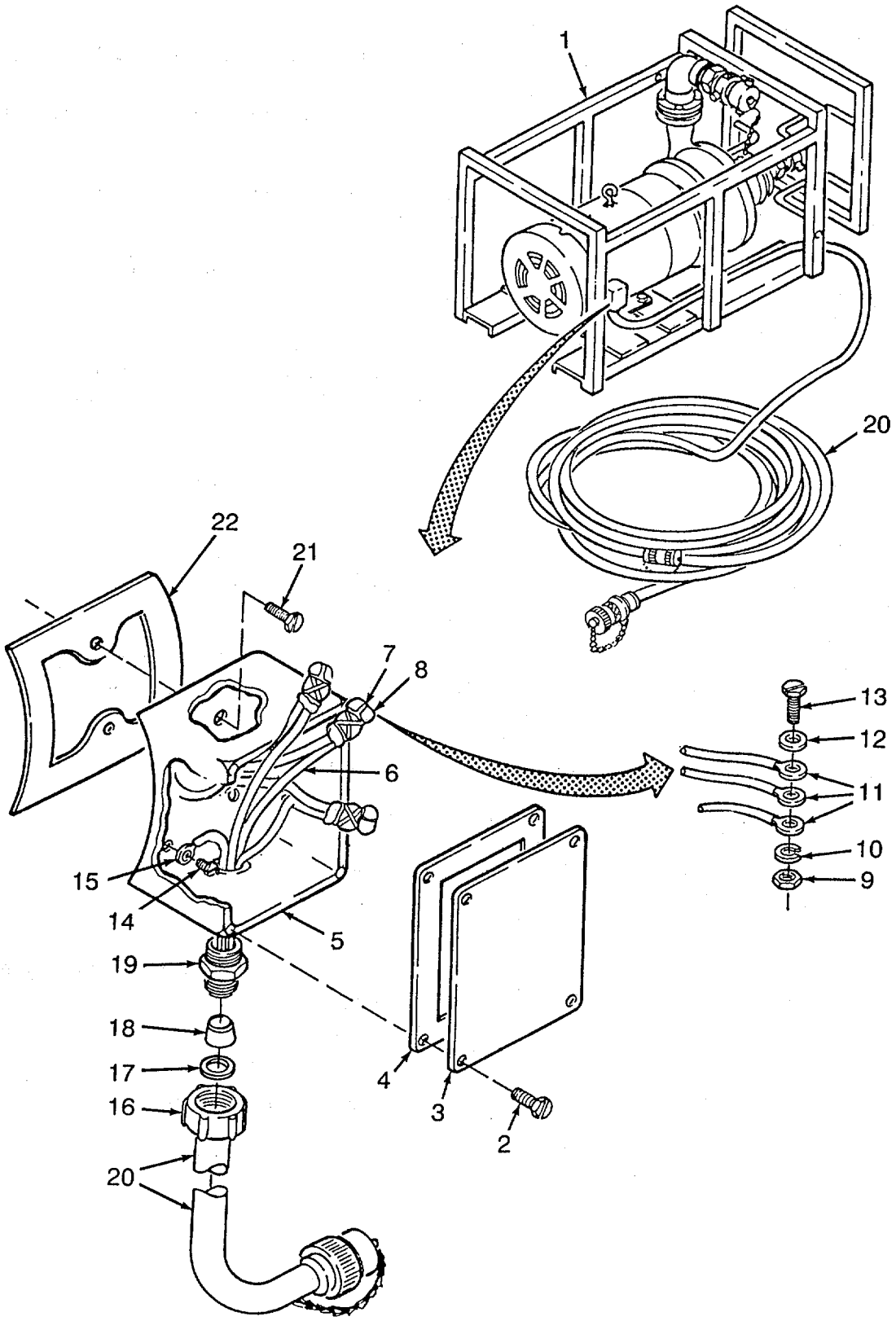
(10) Adjust cable assembly (20) for proper slack, then position seal (18) inside adapter (19) and seal ring (17) in nut (16). Secure nut to adapter.

(11) Install gasket (4), conduit box cover (3), and four screws (2).

(12) Start backwash pump and check for proper operation (TM 10-4610-241-10).

(13) Wind cable assembly (20) onto frame of backwash pump assembly (1).

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



2-17. CENTRIFUGAL PUMP (BACKWASH PUMP) REPLACE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

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

Material/Parts Required
- Gaskets (TM 10-4610-241-24P)
- Lockwashers (TM 10-4610-241-24P)

Personnel Required
- Two

Equipment Condition
- Reference
  - Inlet/outlet Hoses and Backwash Strainer removed (TM 10-4610-241-10).
  - Pump Assembly drained (TM 10-4610-241-10).
  - Cable Assembly disconnected from Pump Motor (Paragraph 2-16).

General Safety Instructions

WARNING

Lifting heavy/difficult to handle equipment can cause serious injury. Centrifugal pump weighs approximately 150 lbs and requires a lifting device for replacement.

a. Removal

(1) Unscrew dust plugs (9) and (10).

(2) Remove four nuts (1), lockwashers (2), flatwashers (3), screws (4) and drain cock (5).

(3) Connect strap or sling of lifting device to eyebolt (6) and lift centrifugal pump (7) from frame (8).

(4) Position centrifugal pump (7) on a suitable surface and disconnect from lifting device.

(5) Remove eyebolt (6).

(6) Remove gaskets (12 and 16).

(7) As required, remove dust caps (9 and 10) (Paragraph 2-14) and data plate (11) (Paragraph 2-13) from frame (8).

2-17. CENTRIFUGAL PUMP (BACKWASH PUMP) REPLACE - continued.

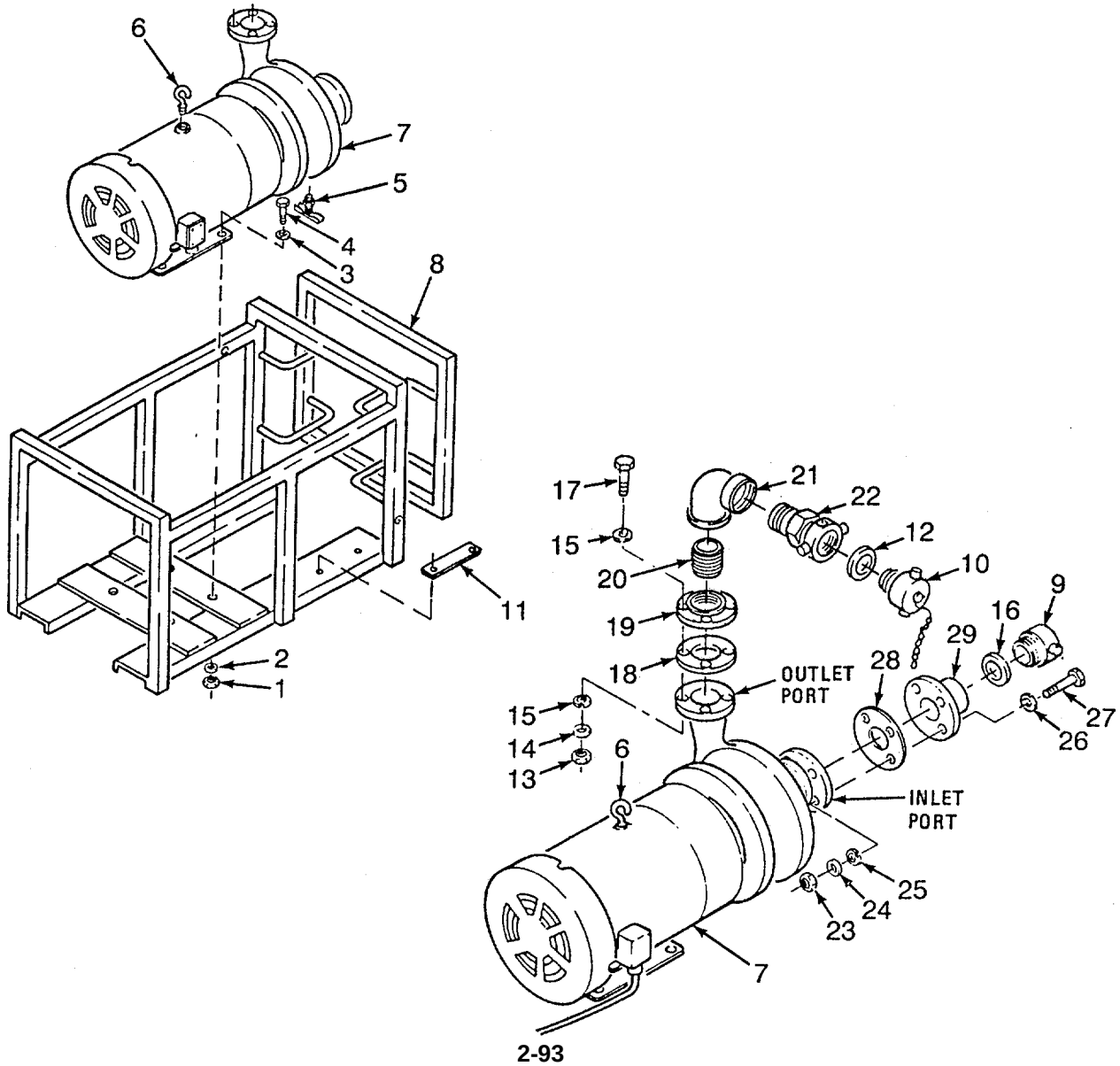
NOTE

Marking position of flange in relation to pump outlet port will facilitate installation. Be sure to transcribe marks to replacement components before discarding defective items or turning them in to Supply.

(8) Scribe a line across junction of flange (19) and outlet port.

(9) Remove four nuts (13), lockwashers (14), flatwashers (15), screws (17), gasket (18) and pipe section, consisting of flange (19), nipple (20), elbow (21) and adapter (22). As required, disassemble pipe section (Paragraph 2-30).

(10) Remove four nuts (23), lockwashers (24), flatwashers (25 and 26), screws (27), gasket (28) and flange (29).



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2-17. CENTRIFUGAL PUMP (BACKWASH PUMP) REPLACE - continued.

b. Installation.

(1) Position gasket (28) and flange (29) on pump inlet port and install four flatwashers (26), screws (27), flatwashers (25), lockwashers (24) and nuts (23).

(2) If disassembled, assemble pipe section, consisting of flange (19), nipple (20), elbow (21) and adapter (22) (Paragraph 2-30).

(3) Position gasket (18) and pipe section, assembled in step (2) above, on discharge port of centrifugal pump as marked during disassembly.

(4) Install four screw (17), flatwashers (15), lockwashers (14) and nuts (13).

(5) Install gasket (12) on adapter (22).

(6) Install eyebolt (6).

(7) Connect lifting device to eyebolt (6) and position centrifugal pump (7) on frame (8) to line up with mounting holes for mounting screws (4).

(8) Install four screws (4) flatwashers (3), lockwashers (2) and nuts (1).

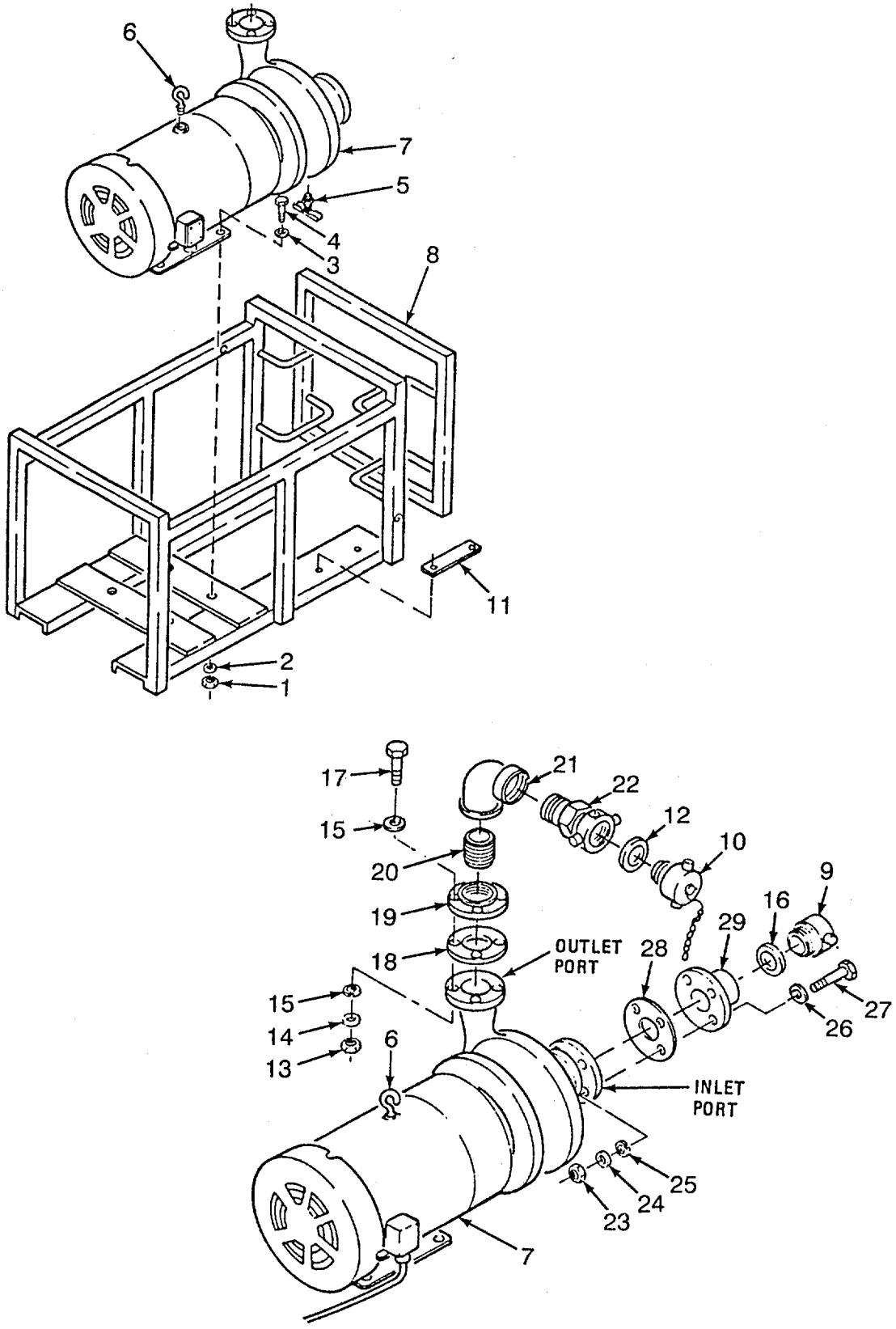
(9) Install gasket (16) and dust plug (9) on flange (29).

(10) Install gasket (12) and dust plug (10) on adapter (22).

(11) If removed, secure dust plugs (9 and 10) to frame (Paragraph 2-14).

(12) If removed, install data plate (11) (Paragraph 2-13).

2-17. CENTRIFUGAL PUMP (BACKWASH PUMP) REPLACE - continued.



2-18. STRAINER (BACKWASH PUMP) REPAIR.

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)
- Vice (Appendix B, Section III, Item 3)
- Pipe Wrench (Appendix B, Section III, Item 3)

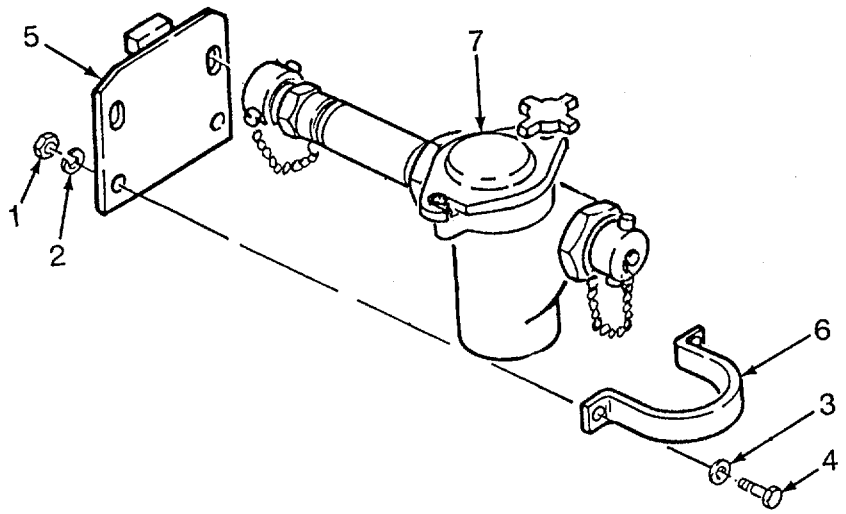
Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)
- Lockwashers (TM 10-4610-241-24P)
- Gaskets (TM 10-4610-241-24P)

Equipment Condition
- Reference
  - Mounting Plate and Strainer removed from Backwash Pump (TM 10-4610-241-10).

a. Disassembly.

(1) Remove two nuts (1), lockwashers (2), flat washers (3) and screws (4) from mounting plate (5).

(2) Remove strap (6) and plate (5) from strainer (7).



2-18. STRAINER (BACKWASH PUMP) REPAIR - continued.

(3) Remove two knobs (8) and cap (9).

(4) Remove basket (10) and packing (11 and 12) from body (13).

(5) Remove two hooks (14) and chain (15).

(6) Remove plug (16) and ring (17).

(7) Disconnect hooks (18) from cap (20) and ring (23).

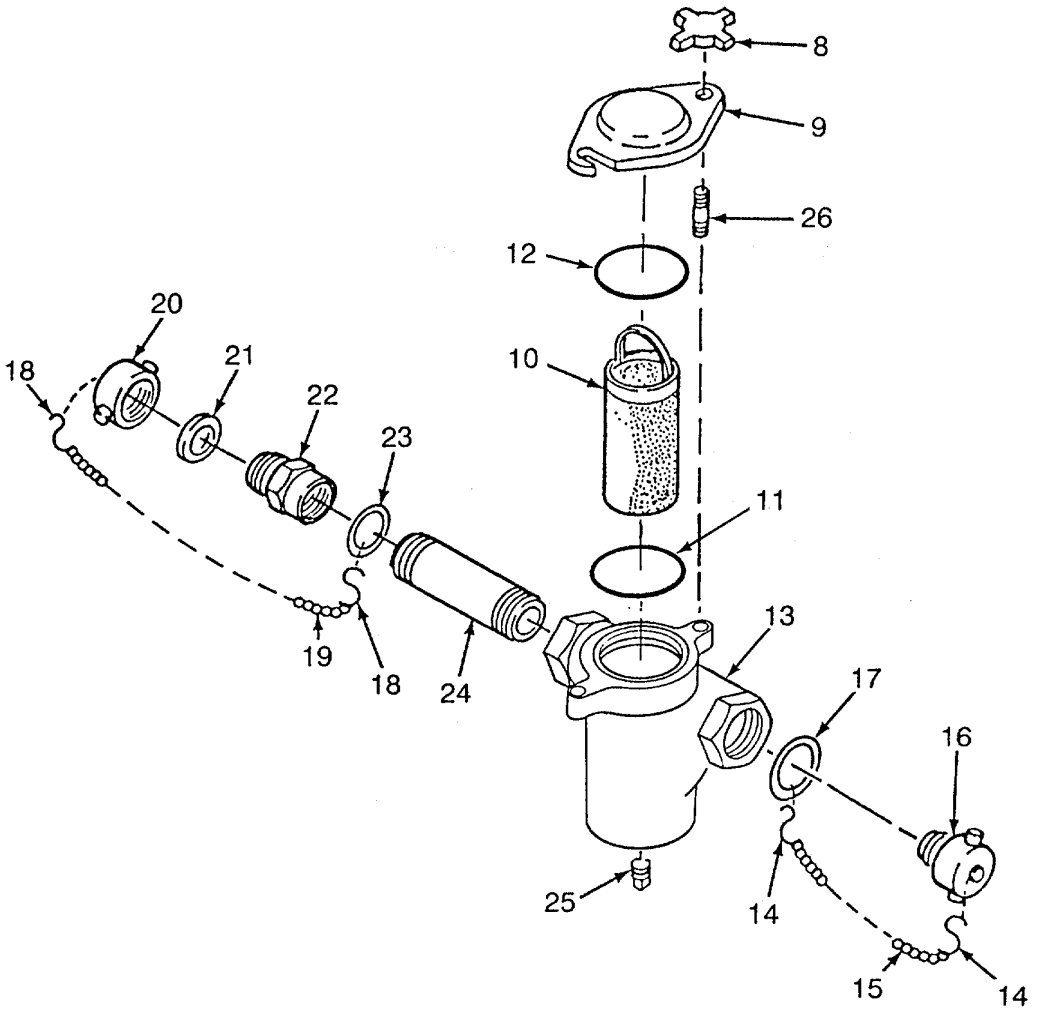
(8) Remove chain (19) from hooks (18).

(8) Remove cap (20) and gasket (21).

(9) Clamp body (13) in vise and remove adapter (22), ring (23) and pipe (24).

(10) Remove two studs (26).

(11) Remove plug (25).



2-18. STRAINER (BACKWASH PUMP) REPAIR- continued.

b. Cleaning.

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

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

c. Inspection.

(1) Inspect all threaded components for damaged threads.

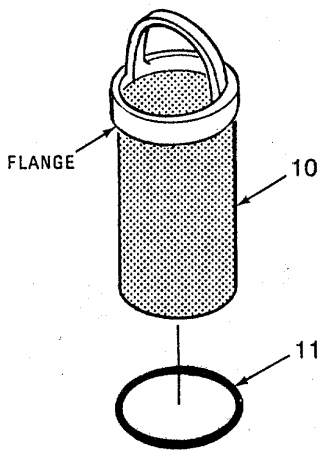
(2) Inspect body (13) for cracks and corrosion.

(3) Inspect basket (10) for tears, ripped or clogged screen.

d. Repair.

(1) Replace all damaged components.

(2) Replace preformed packing (11 and 12).



e. Assembly.

NOTE

Be sure to wrap tape in same direction as threads.

(1) Apply anti-seize tape to male threads of pipe (24) and plug (25).

(2) Clamp body (13) in vise and install pipe (24), ring (23), adapter (22), gasket (21) plug (20) and studs (26).

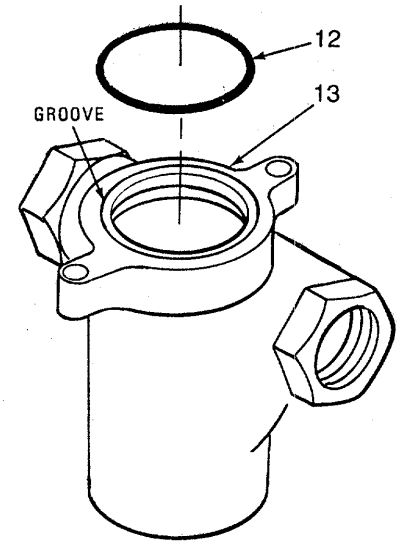
(3) Position packing (11) on basket (10), below flange and packing (12) in groove of body (13).

(4) Install basket (10) and cap (9). Secure cap with two knobs (8).

(5) Connect hooks (18) to chain (19).

(6) Connect one hook (18) to ring (23) and other hook (18) to cap (20).

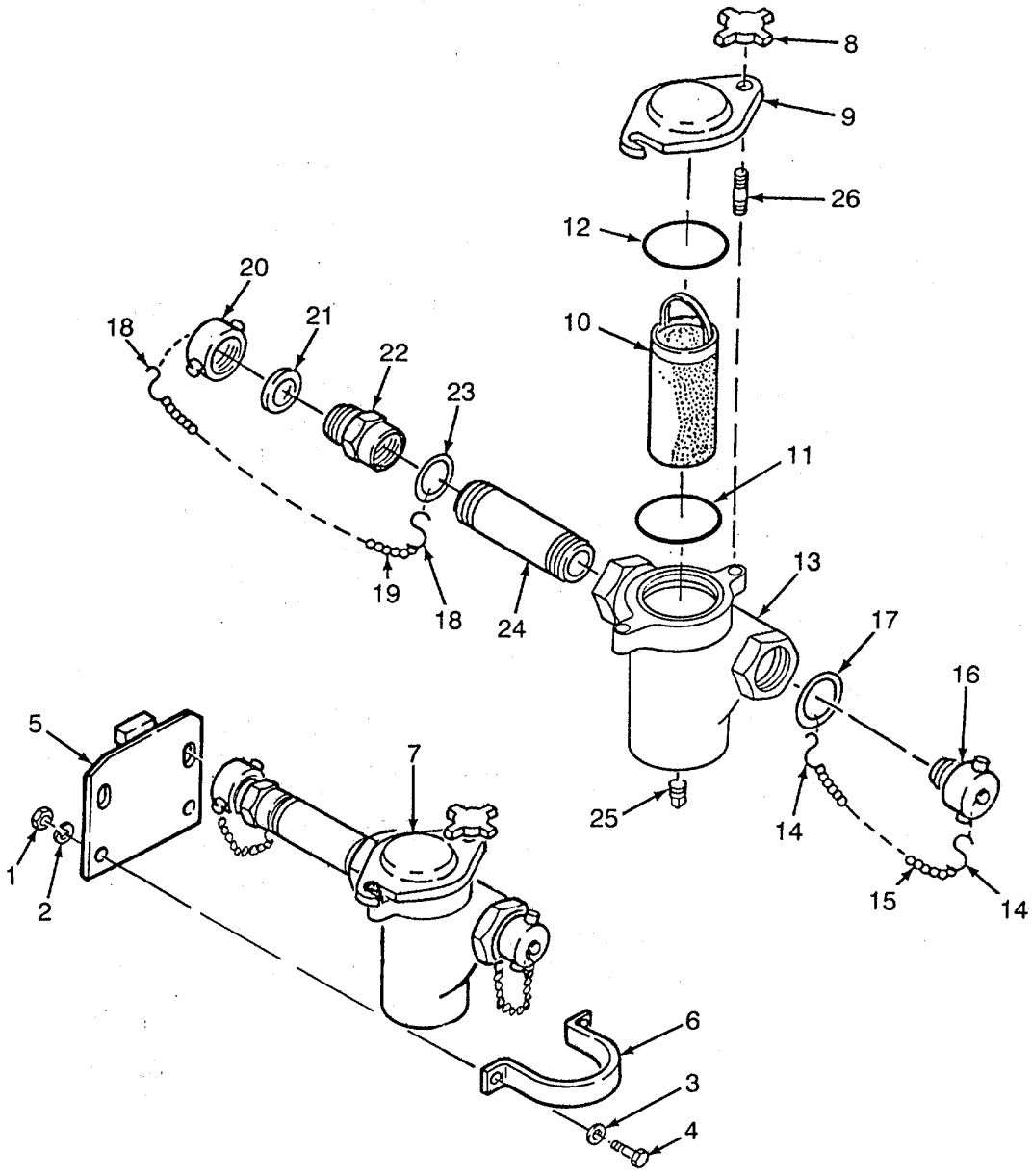
(7) Position ring (17) on threads of plug (16) and install plug on body (13).



2-18. STRAINER (BACKWASH PUMP) REPAIR - continued .

(8) Connect hooks (14) to chain (15), ring (17) and plug (16).

(9) Position strainer (7) on plate (5) and secure strainer to plate with strap (6), screws (4), flatwashers (3), lockwashers (2) and nuts (1).



2-19. CABLE ASSEMBLY, W43 AND W44 (RAW WATER PUMP) REPLACE.

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 20)
Twine (Appendix C, Section II, Item 27)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Cable Assembly disconnected from ROWPU (TM 10-4610-241-10).

a. Removal.

(1) Unwrap cable assembly (22) from frame of raw water pump assembly (1).

(2) Remove two screws (2), cover (3), and gasket (4) from conduit box (5).

NOTES

- Tag wires by set before removal. If marked parts are to be replaced, be sure to transfer tags to replacement parts before discarding or turning them in to Supply.
- If cable assembly only is to be replaced, it is not necessary to separate set, containing only the smaller diameter motor wires.

(3) Pull three wire sets (6) from conduit box (5). Remove twine (7) and electrical tape (8).

(4) Remove nut (9), lockwasher (10), flat washer (12) and screw (13) from wire lugs (11).

(5) Remove screw (14), securing grounding wire (15) to conduit box (5).

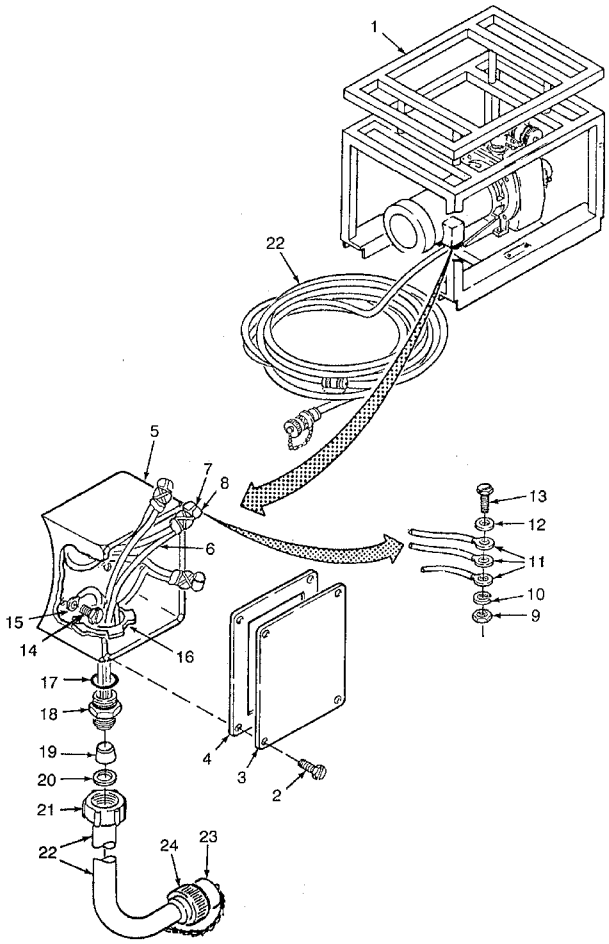
CAUTION
Wire insulation can be damaged when wires are pulled through conduit box. Be careful when pulling wires.

(6) Remove nut (16), then pull cable assembly (22) with gasket (17), adapter, (18), seal (19), seal ring (20) and nut (21) from junction box (5)

2-19. CABLE ASSEMBLY, W43 AND W44 (RAW WATER PUMP) REPLACE - continued.

(7) Unscrew nut (21) from adapter (18), then remove adapter, seal (19), seal ring (20) and nut (21) from cable assembly (22).

(8) As required, remove dust cap (23) from cable assembly connector (24) (Paragraph 2-14).



2-19. CABLE ASSEMBLY, W43 AND W44 (RAW WATER PUMP) REPLACE - continued.

b. Test.

CAUTION

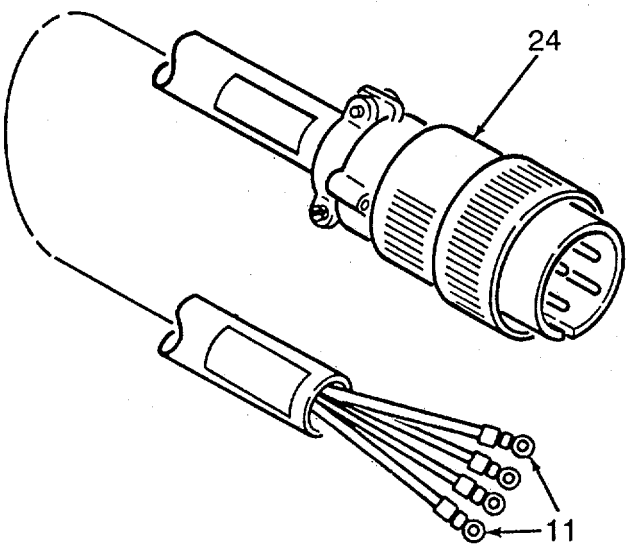
- The following tests are performed to determine if the cable assembly is defective. Before testing, cable assembly must be disconnected from the motor. Failure to disconnect cable can result in false test indications.
- Make sure wire terminals (11) are not touching each other.

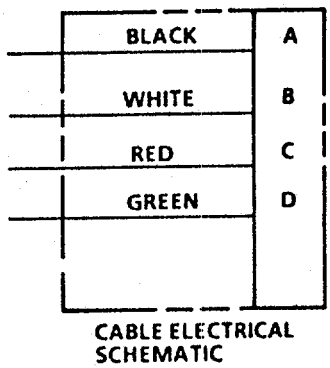
(1) Using multimeter, test for continuity between plug (24) pins and wire terminals (11) as follows:

CABLE ASSEMBLY W43 - W44 CONTINUITY TEST

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

(2) If continuity does not exist between two points, notify Direct Support Maintenance.





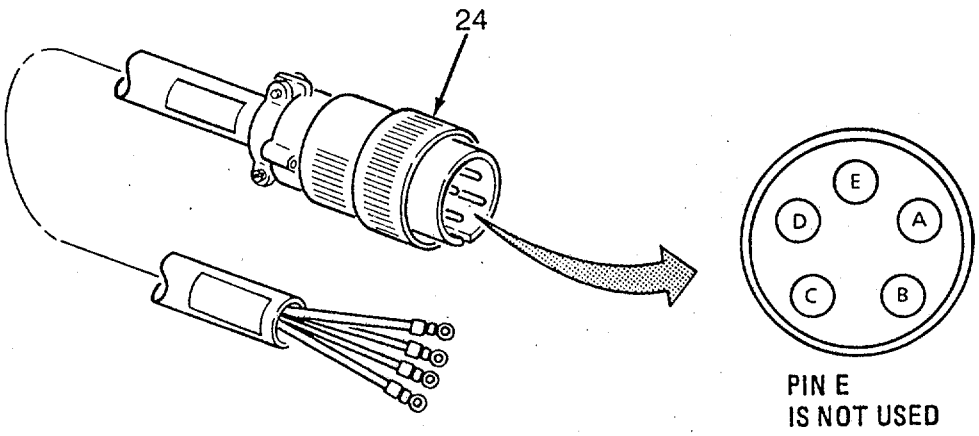
2-19. CABLE ASSEMBLY, W43 AND W44 (RAW WATER PUMP) REPLACE - continued.

(3) Using multimeter, test for internal electrical short between plug (24) pins as follows:

CABLE ASSEMBLY W43 - W44 SHORTING TEST

FROM	TO
PIN	PIN
A	B
A	C
A	D
B	C
B	D
C	D
A, B, C, D	CONNECTOR SHELL

(4) If continuity exist between any two points, replace cable assembly.



2-19. CABLE ASSEMBLY, W43 AND W44 (RAW WATER PUMP) REPLACE - continued.

c. Installation.

(1) If removed, install dust cap (23) on cable assembly (Paragraph 2-14).

(2) Position nut (21), seal ring (20), seal (19), adapter (18) and seal (17) on lug end of cable assembly (22) in the given order.

(3) Feed lug end of cable assembly (22) through bottom hole in conduit box (6). providing about 6 inches of slack.

(4) Position adapter (18) in cutout of junction box (6) and secure with nut (16).

(5) Position green grounding wire (15) on junction box (6) and secure with screw (14).

NOTE

Install wires by set as tagged. If tags are lost or illegible, combine wire sets as follows. Wires from motor are marked and cable wires are color coded:

SET 1	SET 2	SET 3	SET 4
T3	T2	T7	T4
T9	T8	T1	T5
Red	White	Black	T6

(6) Position washer (12), wire lugs (11) and lockwasher (10) on screw (13) and secure with nut (9). Repeat for remaining two wire sets.

(7) Using electrical tape (8), wrap each wire set (6) and secure with twine (7).

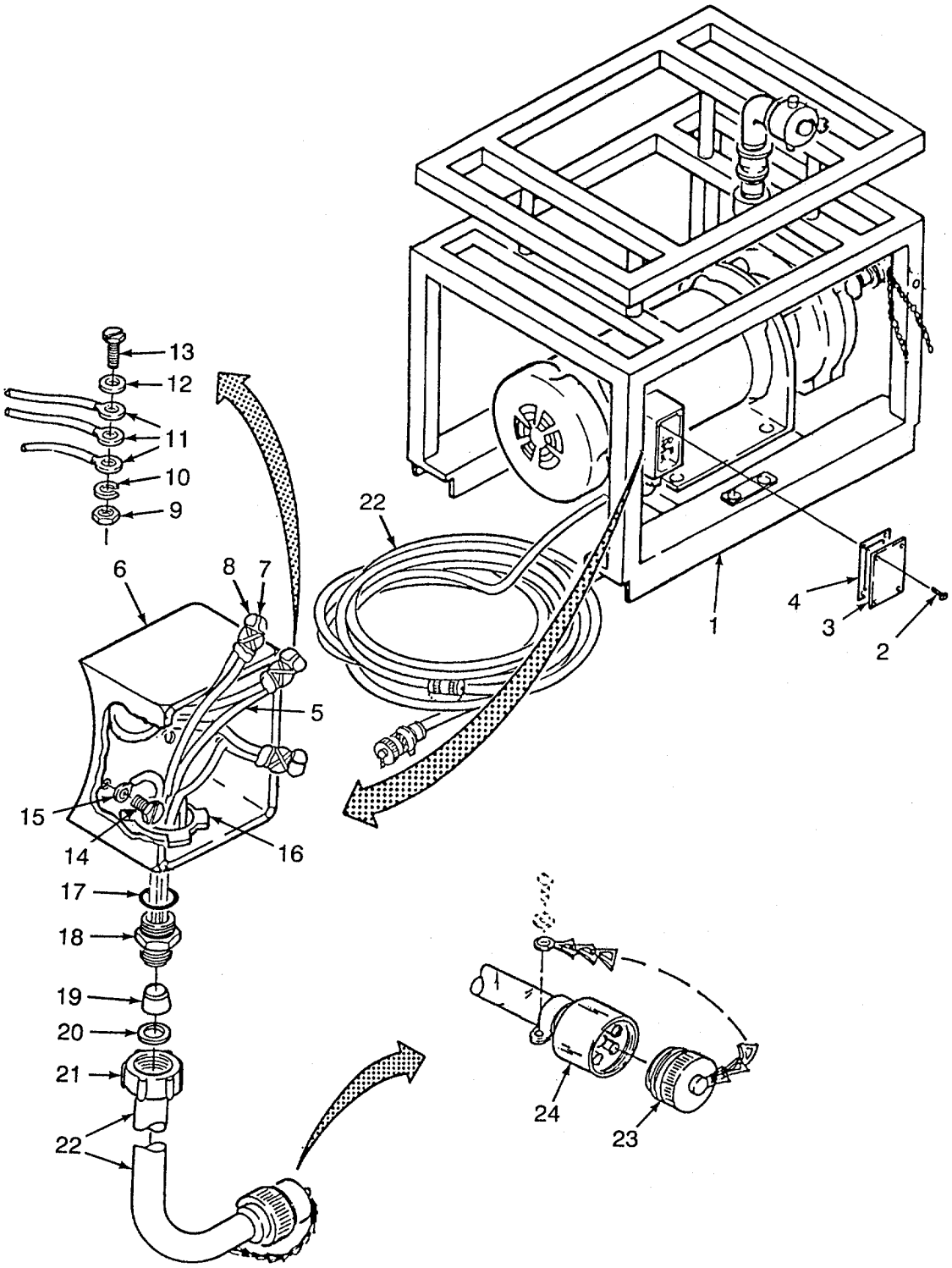
(8) Position four wire sets (5) in conduit box (6) and adjust cable assembly (22) for proper slack.

(9) Position seal (19) in adapter (18) and seal ring (20) in nut (21), then connect nut to adapter (18) and tighten.

(10) Start raw water pump assembly and check for proper operation (TM 10-4610-241-10).

(11) Wrap cable assembly (22) onto frame of raw water pump assembly

2-19. CABLE ASSEMBLY, W43 AND W44 (RAW WATER PUMP) REPLACE - continued.



2-20. CENTRIFUGAL PUMP (RAW WATER PUMP) REPLACE.

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 4)
Material/Parts Required
Tape, Antiseize (Appendix C, Section II, Item 19)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Cable Assembly disconnected from Centrifugal Pump (Paragraph 2-19).

a. Removal.

(1) Remove two nuts (1), lockwashers (2), flatwashers (3) and screws (4).

(2) Remove centrifugal pump (5) from frame (6).

(3) Remove elbow (7) and two petcocks (8) from centrifugal pump (5).

(4) As required, remove data plate (11) from frame (6) (Paragraph 2-13).

(5) As required remove plugs (9 and 10) from frame (6) (Paragraph 2-14).

b. Installation.

NOTE
Be sure to wrap tape in same direction as threads.

(1) Install anti-seize tape on male threads of elbow (7) and two petcocks (8).

(2) Install two petcocks (8) and elbow (7) on centrifugal pump (5).

(3) Position centrifugal pump (5) on frame (6).

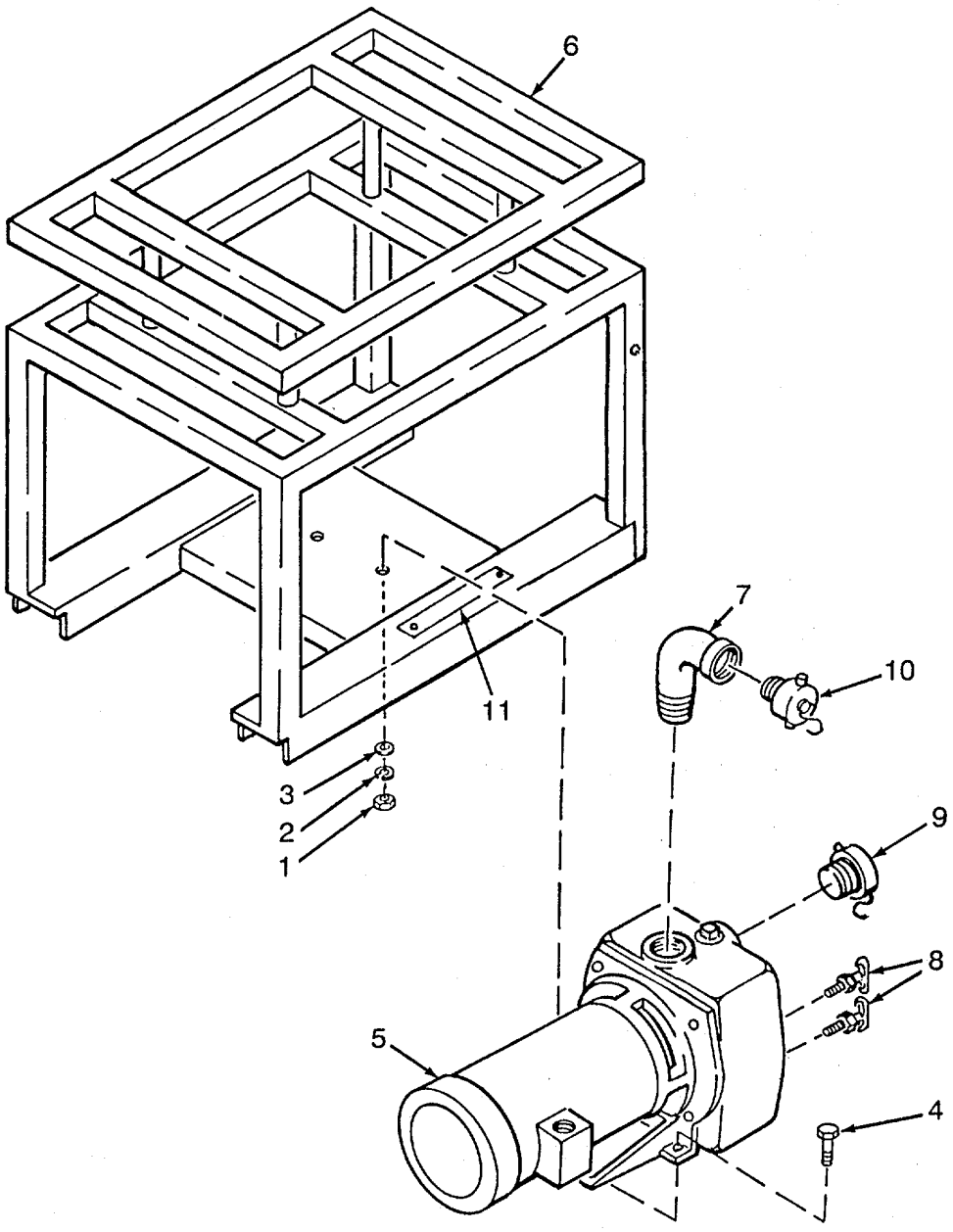
(4) Install two screws (4), flatwashers (3), lockwashers (2) and nuts (1).

(5) If removed, install data plate (11) (Paragraph 2-13) and plugs (9 and 10) (Paragraph 2-14) on frame.

2-20. CENTRIFUGAL PUMP (RAW WATER PUMP) REPLACE . -Continued.

(6) Install cable assembly (Paragraph 2-19).

(7) Start backwash pump assembly and check for proper operation and leaks TM 10-4610-241-10).



2-21. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) REPLACE .

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 27)
- Tape, Electrical (Appendix C, Section II, Item 20)
- Lockwashers (TM 10-4610-241-24P)

Equipment Condition
- Reference
  - Distribution Pump Cable Assembly disconnected from ROWPU (TM 10-4610-241-10).

a. Removal.

(1) Unwind cable assembly (22) from frame of distribution pump assembly (1)1.

(2) Remove four screws (2), cover (3) and gasket (4).

(3) Pull four wire sets (5) from conduit box (6).

(4) Set aside wire set with only cream-colored motorwires. These wires do not have to be separated to replace cable assembly.

NOTE

Tag wires by set before removal (i.e set 1, 2 and 3). If any tagged parts are to be replaced, be sure to transfer tags to replacement parts before discarding or turning them in to Supply.

(5) Tag wires.

(6) Remove twine (7) and electrical tape (8) from tagged wire sets (5).

(7) Remove nut (9), lockwasher (10), three wire lugs (11), and flat washer (12) from screw (13) on each wire set (5).

(8) Remove screw (14), securing grounding wire (15) to conduit box.

(9) Remove nut (16).

2-21. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) REPLACE - continued .

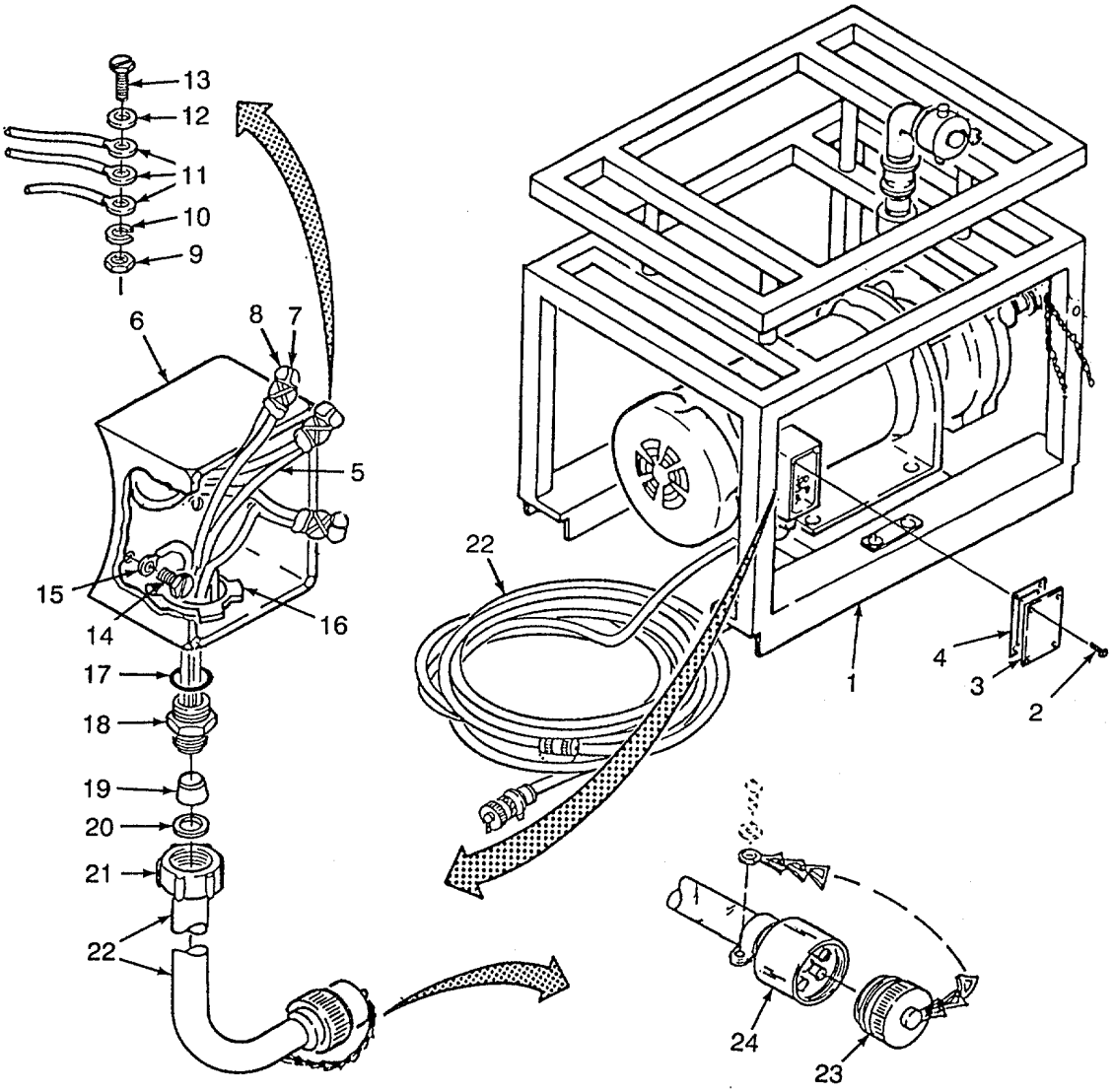
CAUTION

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

(10) Remove cable assembly (22) with attached parts from conduit box and remove gasket (17) from cable assembly.

(11) Unscrew nut (21) from adapter (18) and remove adapter, seal (19), seal ring (20) and nut (21) from cable assembly (22).

(12) As required, remove dust cap (23) from cable connector (24). Refer to Paragraph 2-14.



2-21. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) REPLACE - continued .

b. Test.

CAUTION

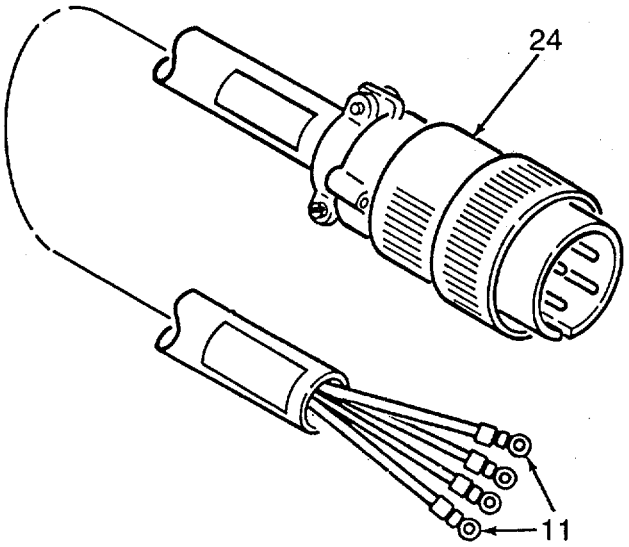
- The following tests are performed to determine if the cable assembly is defective. Before testing, cable assembly must be disconnected from the motor. Failure to disconnect cable can result in false test indications.
- Make sure wire terminals (11) are not touching each other.

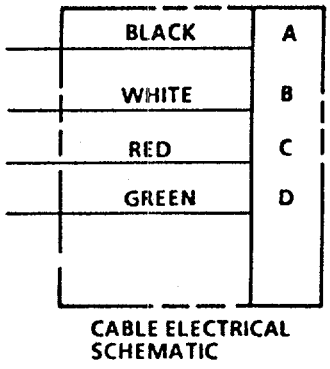
(1) Using multimeter, test for continuity between plug (24) pins and wire terminals (11) as follows:

CABLE ASSEMBLY W45 CONTINUITY TEST

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

(2) If continuity does not exist between two points, notify Direct Support Maintenance.





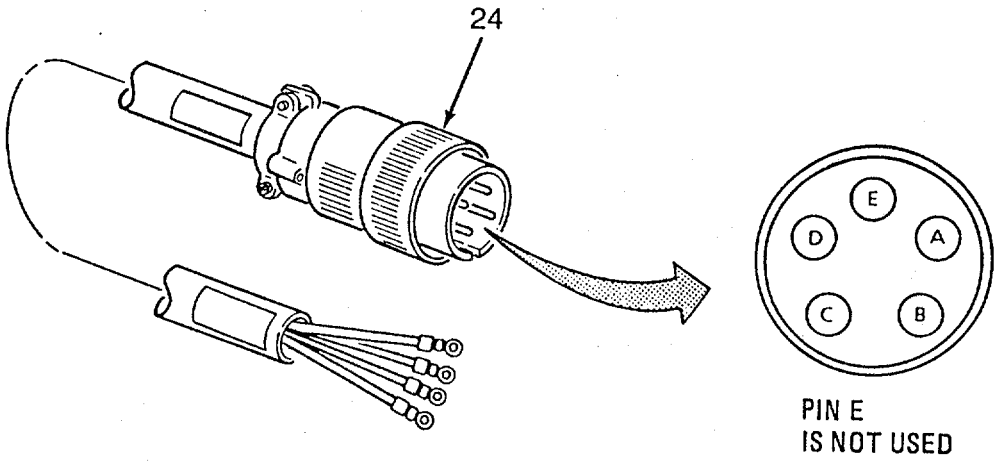
2-21. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) REPLA CE - continued.

(3) Using multimeter, test for internal electrical short between plug (24) pins as follows:

CABLE ASSEMBLY W45 SHORTING TEST

FROM	TO
PIN	PIN
A	B
A	C
A	D
B	C
B	D
C	D
A, B, C, D	CONNECTOR SHELL

(4) If continuity exist between any two points, notify Direct Support Maintenance.



2-21. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) REPLACE - continue d.

c. Installation.

CAUTION

Wire insulation can be damaged when wires are pulled through conduit box. Be careful when pulling wires to keep them from chafing.

(1) If removed, install dust cap (23) on cable assembly (22) (Paragraph 2-14).

(2) Position nut (21), seal ring (20), seal (19), adapter (18) and gasket (17) on cable assembly (22).

(3) Feed cable wires thru cutout in conduit box (6) and pull thru from other end to provide about 6 inches of slack.

(4) Position connector (18) in cutout and install nut (16).

NOTE

Assemble wire sets as tagged; If tags are missing or illegible, assemble wire sets as follows:

SET 1	SET 2	SET 3	SET 4
T3	T2	T7	T4
T9	T8	T1	T5
Red	White	Black	T6

(5) Position washer (12), lugs of one wire set (11), and lockwasher (10) on screw (13) and install nut (9). Repeat for other sets.

(6) Position green grounding wire (15) in conduit box (6) and secure with screw (14).

(7) Using electrical tape (8), wrap each wire set (5).

(8) Secure electrical tape (8) on each wire set (5) with twine (7).

(9) Position four wire sets (5) in conduit box (6) and adjust cable assembly (22) for proper slack.

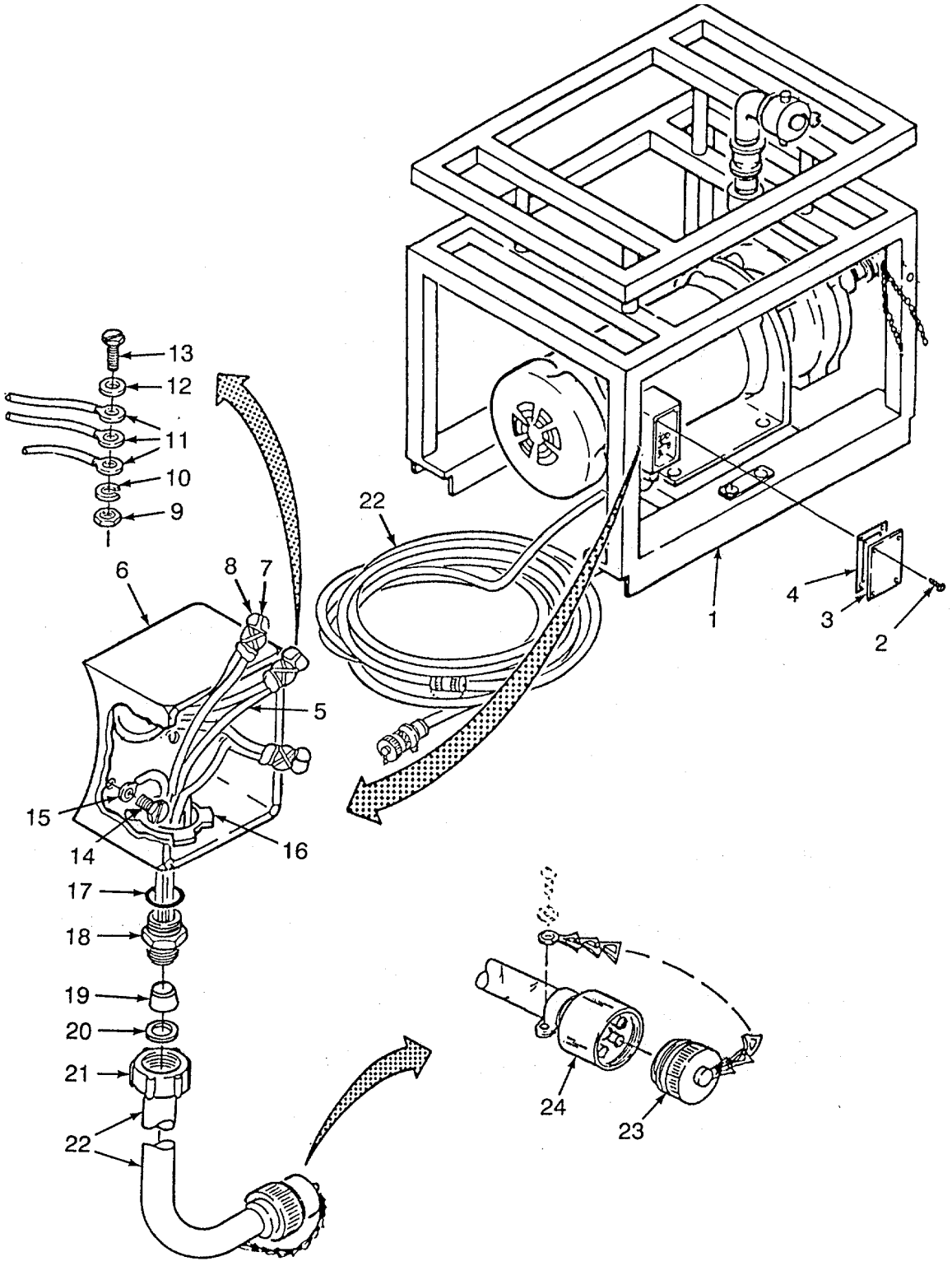
(10) When cable assembly (22) is properly positioned on conduit box, position seal (19) in adapter (18) and seal ring (20) in nut (21) and install nut onto adapter.

(11) Position gasket (4) and conduit box cover (3) on conduit box (6). Install four screws (2).

(12) Start distribution pump and check for proper operation (TM 10-4610-241-10).

(13) Wrap cable assembly (22) on frame of distribution pump assembly (1).

2-21. CABLE ASSEMBLY W45 (DISTRIBUTION PUMP) REPLACE - continued .



2-22. CENTRIFUGAL PUMP (DISTRIBUTION PUMP) REPLACE .

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
Tape, Anti-seize (Appendix C, Section II, Item 19)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Inlet/Outlet Hoses disconnected (TM 10-4610-241-10).
Cable Assembly removed from Pump Motor (Paragraph 2-21).

a. Removal.

(1) Remove four nuts (1), lockwashers (2), and screws (3).

(2) Remove centrifugal pump (4) and spacer plate (5) from frame (6).

(3) Remove elbow (7), reducer (8), and nipple (9) from centrifugal pump (4).

(4) Remove reducer (10), and nipple (11) from centrifugal pump (4).

(5) As required, remove plugs (12 and 13) from frame (6) (Paragraph 2-14).

(6) As required, remove data plate (14) (Paragraph 2-13).

b. Installation.

NOTE

Make sure tape is wrapped in same direction as pipe threads.

(1) Apply anti-seize tape to male threads of nipples (9 and 11) and elbow (7).

(2) Install nipple (9), reducer (8) and elbow (7) on centrifugal pump (4).

(3) Install nipple (11) and reducer (10) on centrifugal pump (4).

(4) Position spacer plate (5) on frame (6).

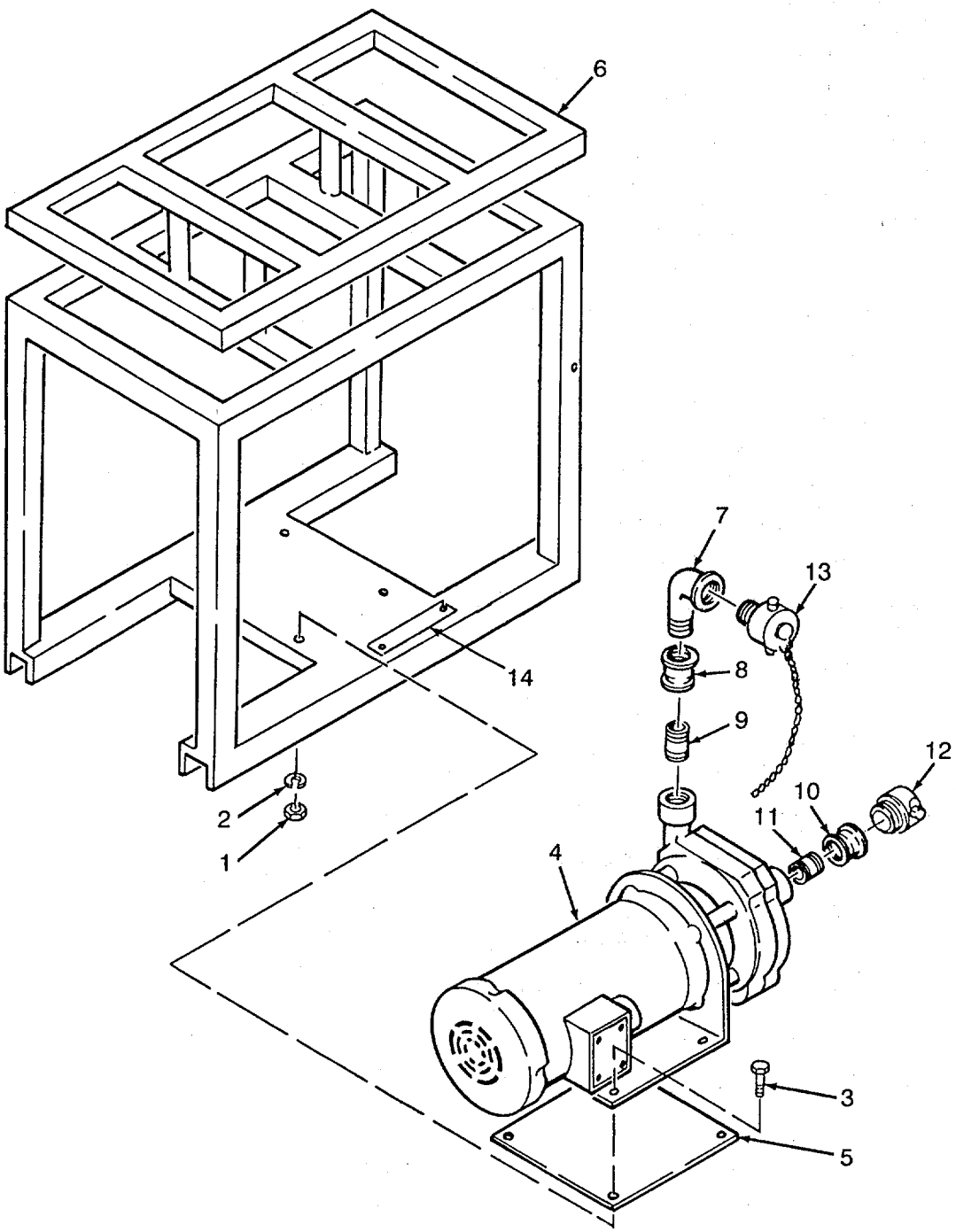
(5) Position pump (4) on plate (5) and install four screws (3), lockwashers (2), and nuts (1).

2-22. CENTRIFUGAL PUMP (DISTRIBUTION PUMP) REPLACE - continued .

(6) If removed, install plugs (13 and 12) on frame (6) (Paragraph 2-14).

(7) If removed, install data plate (14) (Paragraph 2-13).

(8) Install pump cable assembly (Paragraph 2-21).



2-23. HOSE ASSEMBLIES REPAIR.

This task consists of: a. Disassembly b. Cleaning c. Inspection d. Repair e. Assembly

INITIAL SET-UP:

Material/Parts Required
Detergent (Appendix C, Section II, Item 5)
Rags, Wiping (Appendix C, Section II, Item 14)
Gaskets (TM 10-4610-241-24P)
Equipment Condition
Reference
Hose Assembly disconnected from System (TM 10-4610-241-10).

NOTE
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.

a. Disassembly.

(1) Disconnect plug (2) and coupling (10) from hose (12) end couplings.

(2) Remove gaskets (1) and (11).

(3) Remove key rings (3, 5, 6, 8 and 9) from plug (2), coupling (10) and hose assembly (12).

(4) Remove plug (2) and coupling (10).

(5) Remove chains (4) and (7) from key rings.

b. Cleaning.

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

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

c. Inspection.

(1) Inspect all components for cracks, wear and other visible damage.

(2) Inspect hose (12) for cuts, tears, deep scratches and damaged or worn end couplings.

2-23. HOSE ASSEMBLIES REPAIR - continued.

d. Repair.

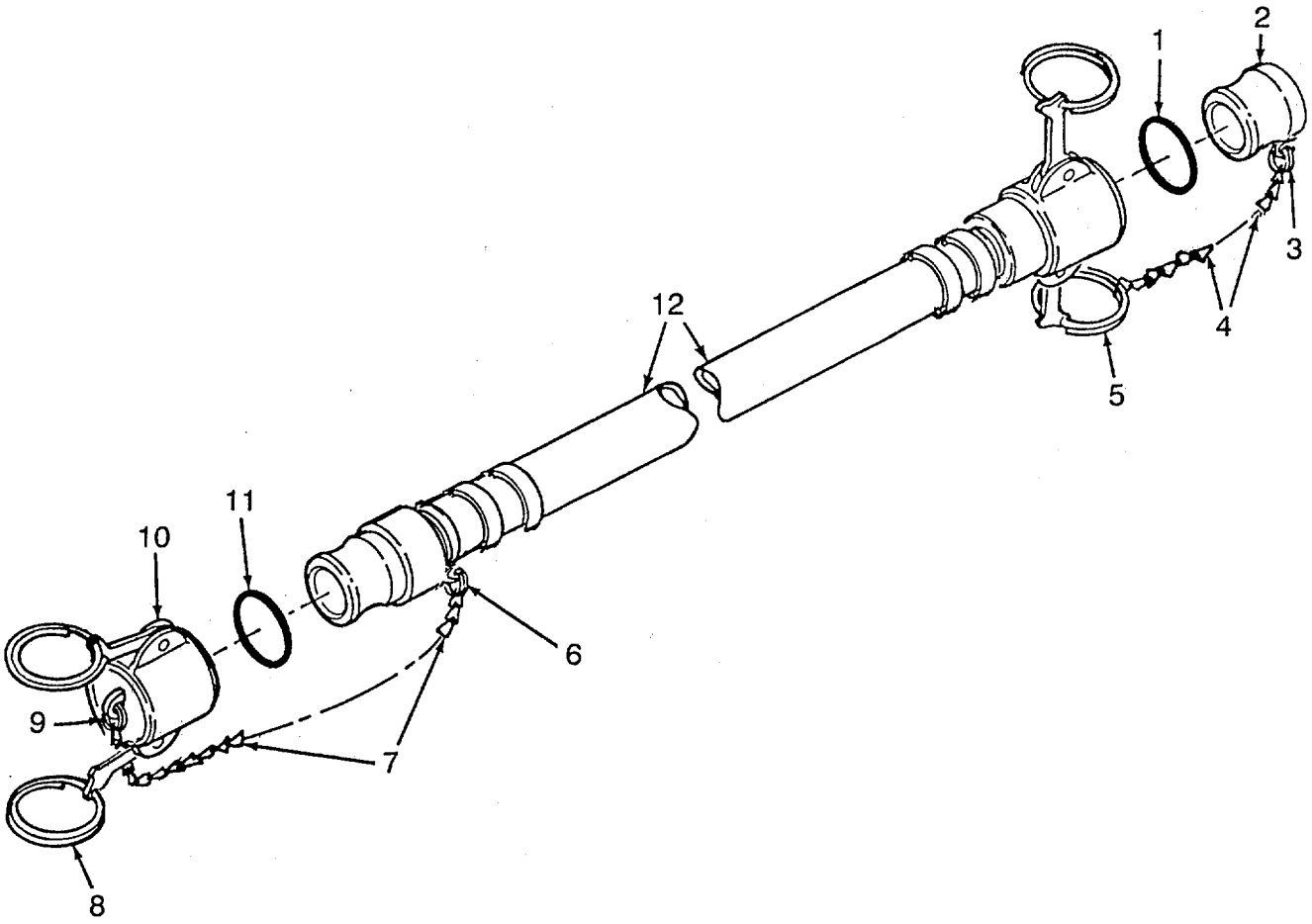
(1) Replace gaskets.

(2) Replace defective components.

e. Assembly.

(1) Assemble coupling assembly, consisting of key rings (6, 8 and 9), chain (7), coupling (10) and gasket (11) and attach to hose assembly (12) end coupling.

(2) Assemble dust plug assembly, consisting of chain (4), key rings (5 and 3) and plug (2) and attach to hose (12) end coupling.



2-24. GATE VALVES AND FITTINGS REPAIR.

This task consists of: a. Disassembly b. Cleaning c. Inspection d. Repair e. Assembly

INITIAL SET-UP:

Material/Parts Required
Detergent (Appendix C, Section II, Item 5)
Rags, Wiping (Appendix C, Section II, Item 14)
Packing (TM 10-4610-241-24P)
Equipment Condition
Reference
Valves and Fittings removed from System(TM 10-4610-241-10).

NOTE
The following procedures describe typical gate valves and fittings used with the distribution, backwash and raw water systems. These components are supplied as accessory items and their use and location may vary depending on operational requirements.

GATE VALVES

a. Disassembly.

(1) Remove nut (1), washer (2), and hand wheel (3) from stem (7).

(2) 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 rags.

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.

(3) Replace other parts if unserviceable.

2-24. GATE VALVES AND FITTINGS REPAIR - continued .

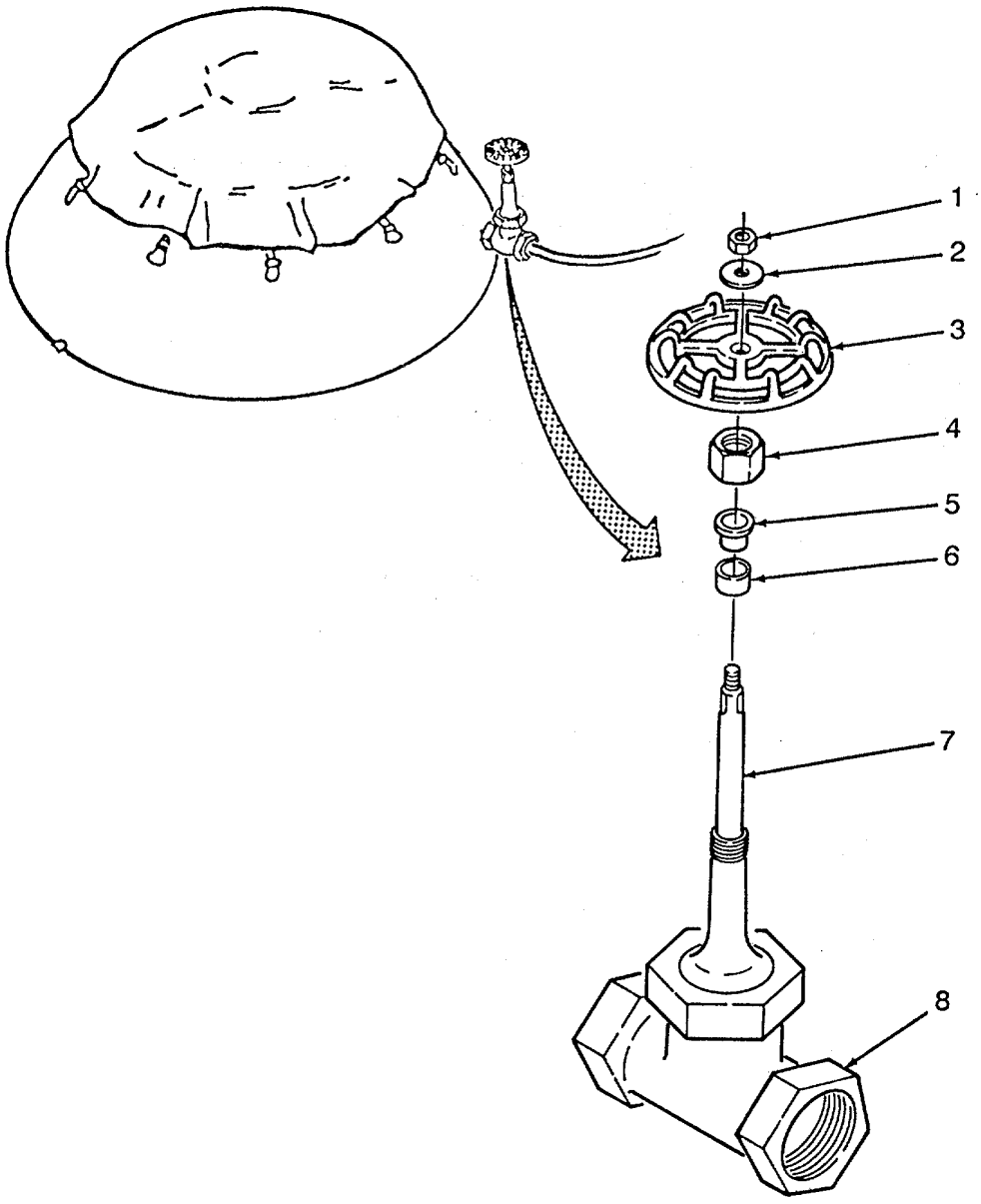
e. Assembly.

(1) Push packing (6) into place on stem (7).

(2) Install gland (5) and packing nut (4). Tighten nut finger tight, then use wrench and tighten an additional 1/4 turn.

(3) Position hand wheel (3) on stem (7).

(4) Install washer (2) and nut (1).



2-24. GATE VALVES AND FITTINGS REPAIR - continued .

FITTINGS/ADAPTERS

NOTE

Repair of fittings/adapters is limited to replacement of gaskets and rings.

a. Disassembly.

(1) Remove gaskets (10) from fittings (9).

(2) Remove rings (11).

b. Cleaning.

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

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

c. Inspection.

Inspect fittings (9) for cracks, damaged threads and corrosion.

d. Repair.

(1) Replace defective fittings (9).

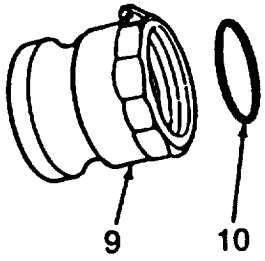
(2) Replace all gaskets (10).

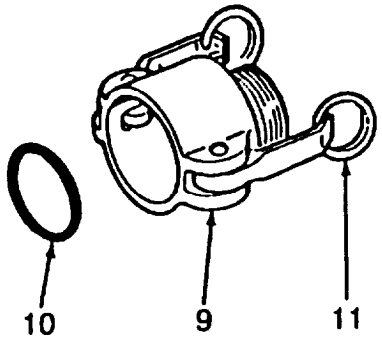
e. Assembly.

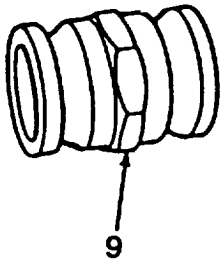
(1) Install gaskets (10) on fittings (9).

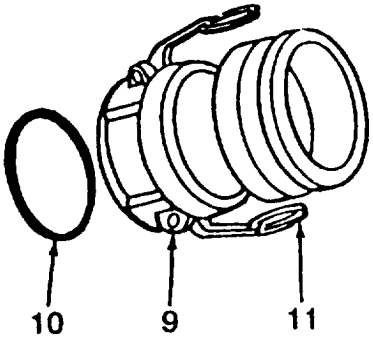
(2) Install rings (11).

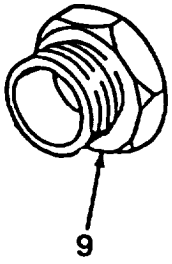
2-24. GATE VALVES AND FITTINGS REPAIR - continued.

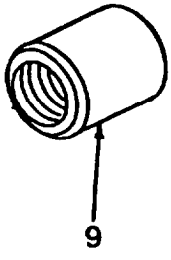


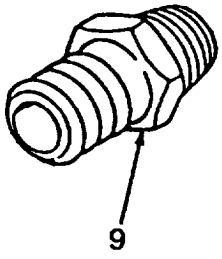


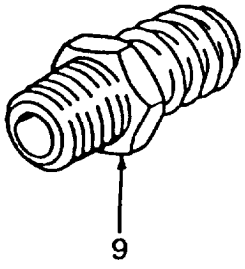












2-24.1 OCEAN INTAKE STRUCTURE REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3).

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 5)
Material/Parts Required
Detergent (Appendix C, Section II, Item 5)
Rags, Wiping (Appendix C, Section II, Item 14)
Tape, Anti-seize (Appendix C, Section II, Item 19)
Coupling (TM 10-4610-241-24P)
Cam-lock replacement fitting (TM 10-4610-24l-24P)
Hose Clamps (TM 10-4610-241-24P)
Adhesive (TM 10-4610-241-24P)
Gaskets (TM 10-4610-241-24P)
Water
Equipment Condition
Reference
Ocean Intake Structure removed from system (TM 10-4610-241-10)

a. Disassembly.

(1) Disconnect two wellpoint assemblies (1), and each hose assembly (2) by releasing the quick disconnect fitting arms.

(2) Remove male quick disconnect fitting (3) from gate valve (4) by turning counterclockwise.

(3) Remove gate valve (4) from nipple (5) by holding nipple with pipe wrench and turning valve counterclockwise.

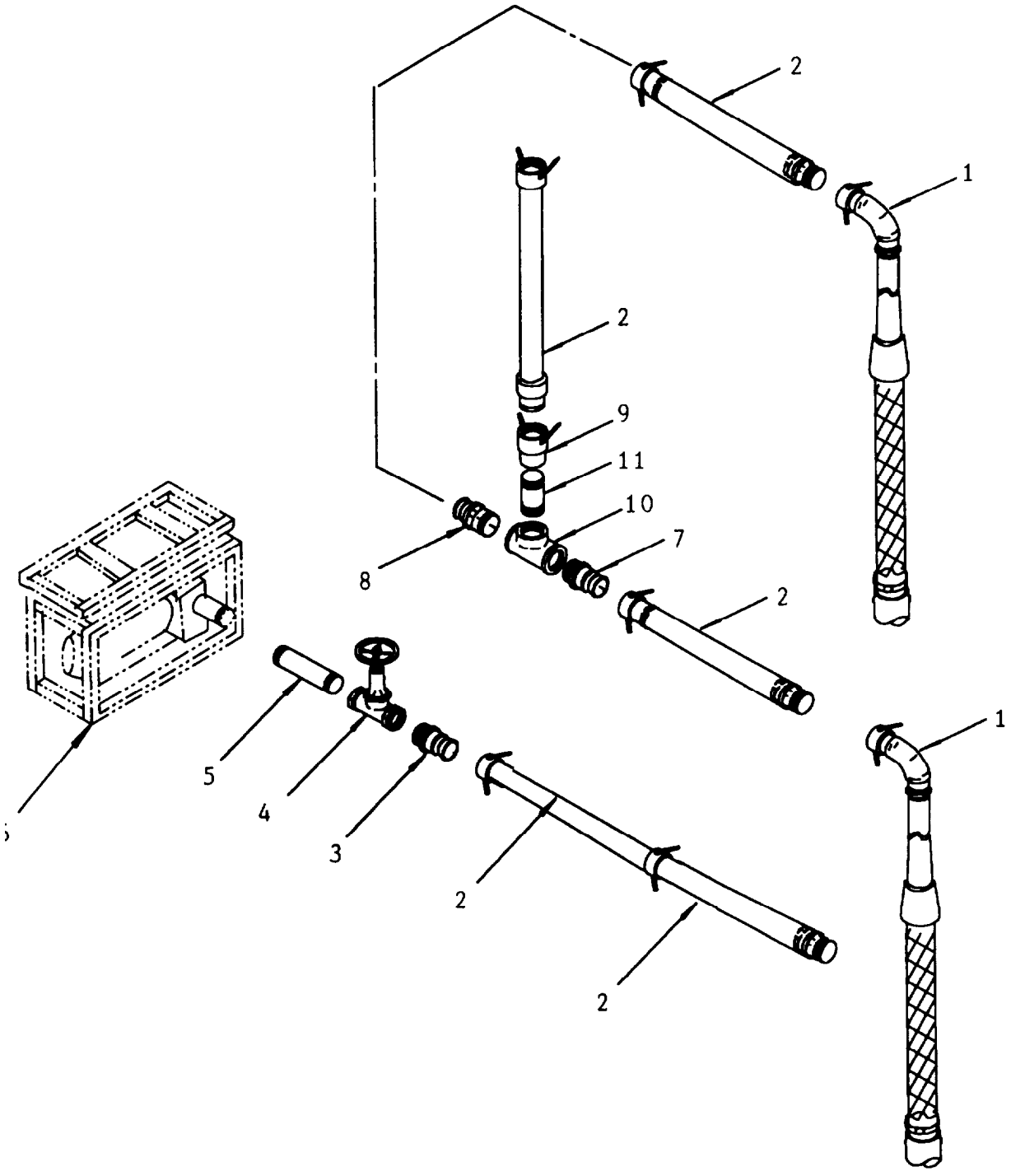
(4) Remove nipple (5) from raw water pump No. 1(6) by turning counterclockwise.

(5) Remove the two male (7 and 8) and female (9) fittings from the tee assembly (10) by turning counterclockwise.

(6) Remove check valve (11) from tee assembly (10) by turning counterclockwise.

NOTE
For gate valve and fittings, refer to Paragraph 2-24 for repair.

2-24.1 OCEAN INTAKE STRUCTURE REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.



2-24.1 OCEAN INTAKE STRUCTURE REPAIR (MODELS H-9518-1, H-9518-2 AND H-9619-3) - continued.

(7) Remove the fitting (12), elbow (13) bushing (14), and nipple (15) in succession from the top of the wellpoint assembly (I) by turning counterclockwise.

NOTE

It may be necessary to hold the top of the wellpoint with a wrench to remove the bushing (14) and nipple (15).

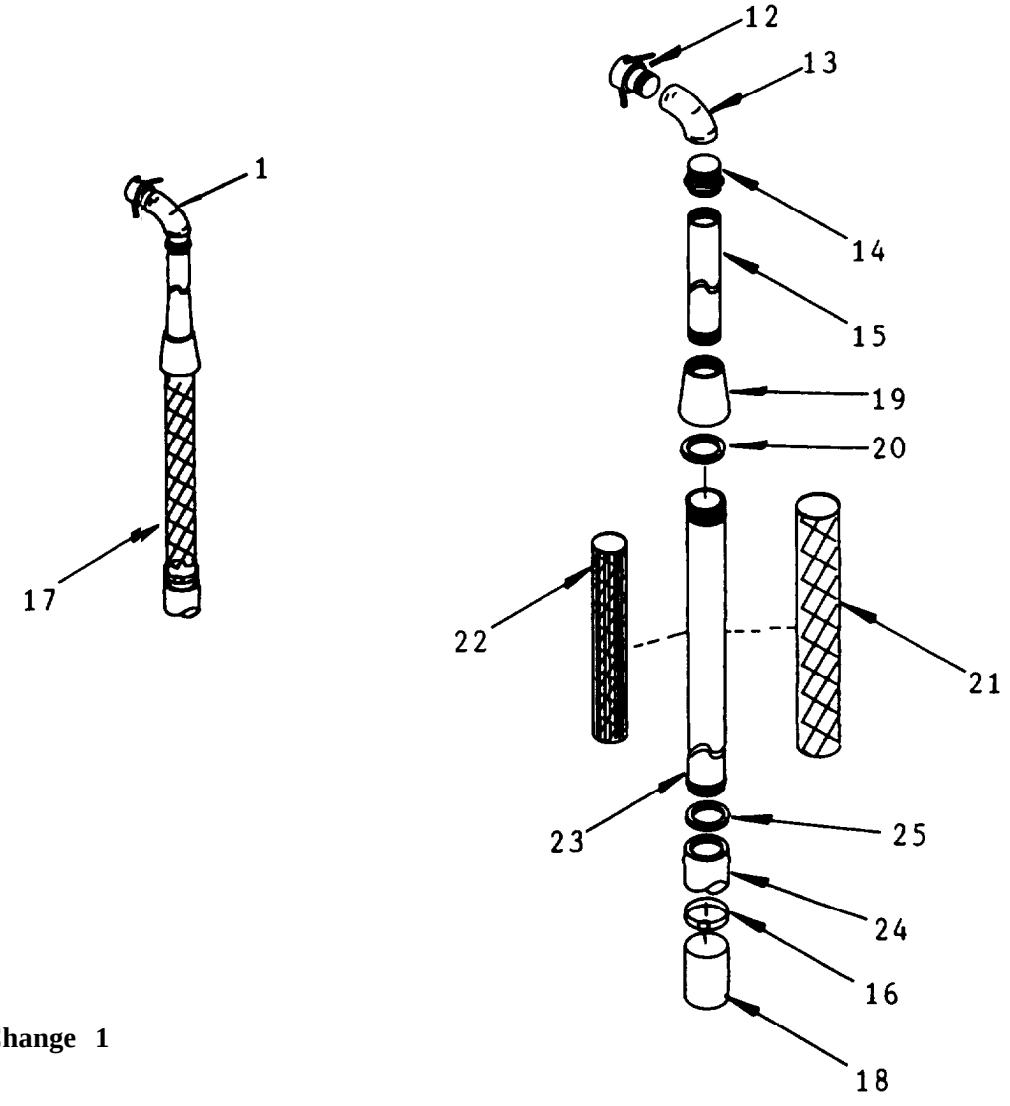
(8) If the boot is on, remove the hose clamp (16) at the bottom of the wellpoint (17) and remove the boot (18).

(8) Remove the cap (19) and gasket (20) on the top of the wellpoint (I 9) by holding the bottom and turning counterclockwise.

(9) After the wellpoint is separated, remove the guard (2 1).

(10) Remove the screen (22) from the riser pipe (23).

(11) Remove the wellpoint tip (24) and gasket (25) from riser pipe (23). Use a vise if necessary



2-24.1 OCEAN INTAKE STRUCTURE REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) -continued.

b. Cleaning.

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

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

(3) Remove debris from guard (21).

c. Inspection.

(1) Inspect all components for cracks, wear and other visible damage.

(2) Inspect all hose sections (2) thoroughly. Look for cracks, squashed sections, broken fittings, missing or damaged gaskets, missing hose clamps, hose damage near fitting, etc. Make sure no gravel or debris are inside hose sections.

(3) Inspect check valve (11) to make sure it is oriented correctly with the bolt in the vertical position. Also insure that the wings of the valve move freely and that the rubber sealing portions are not damaged.

(4) Inspect the guard (2 1). If damaged, replace.

(5) Inspect the screen (22) for imbedded sand particles. Use a wire brush to remove any sand.

(6) Inspect the wellpoint tip (24) to make sure the rubber coated ball is in place. Make sure that the ball can seat freely and no debris is present. Make sure that the rubber coating on the ball is not damaged. If ball is damaged, replace wellpoint tip (24).

(7) Inspect the gate valve (4) to make sure it turns freely from the fully open position to the closed position. Make sure the packing nut is tight.

d. Repair.

NOTE

If hose is damaged within four foot of the end, the hose should be shortened, instead of repaired with a coupling.

(1) If repairing the end of a hose, remove the hose clamps (26) from the end being repaired. Remove the fitting (27) from the hose (28) end (it may be necessary to slit the hose with a knife or hacksaw to remove the fitting).

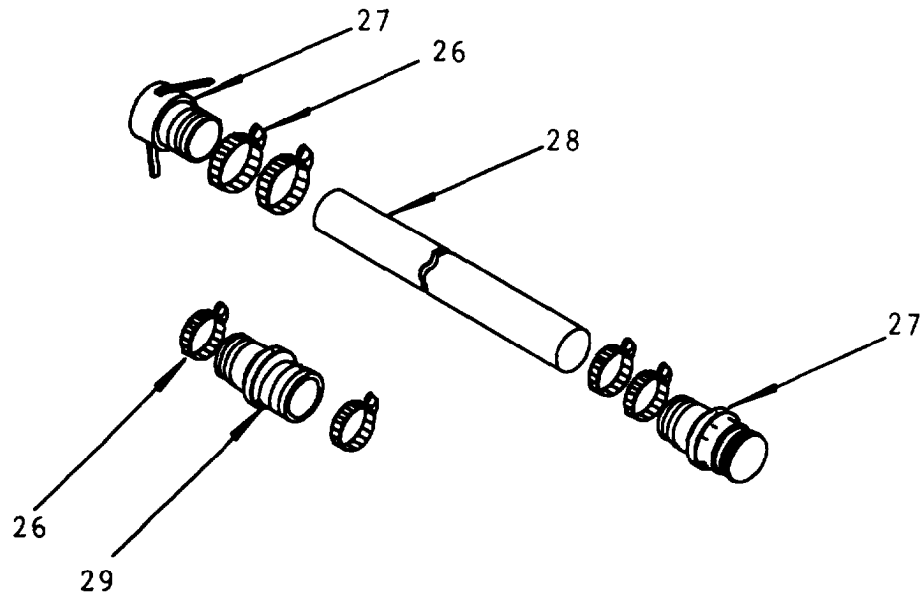
(2) For all damaged hose, cut the damaged hose area off squarely. If making a repair other than at the end (a splice) cut enough hose away to ensure all damaged areas are removed.

(3) Slide hose clamps up onto the hose near the repair.

(4) Lubricate the outside of the coupling or end fitting (whichever is applicable) with silicone adhesive. Push coupling (29)or end fitting (27) into the hose (28). Two people might be necessary.

(5) Tighten hose clamps (26).

2-24.1 OCEAN INTAKE STRUCTURE REPAIR (MODELS H-9518-1, H-9518-2, AND H-9618-3) - continued.



(6) Replace all other parts if unserviceable.

e. Assembly.

NOTE
Use anti-seize tape on all male threaded fittings when assembling.

(1) Install wellpoint tip (24) onto riser pipe (23) on the end with the holes. Make sure gasket (25) is seated properly.

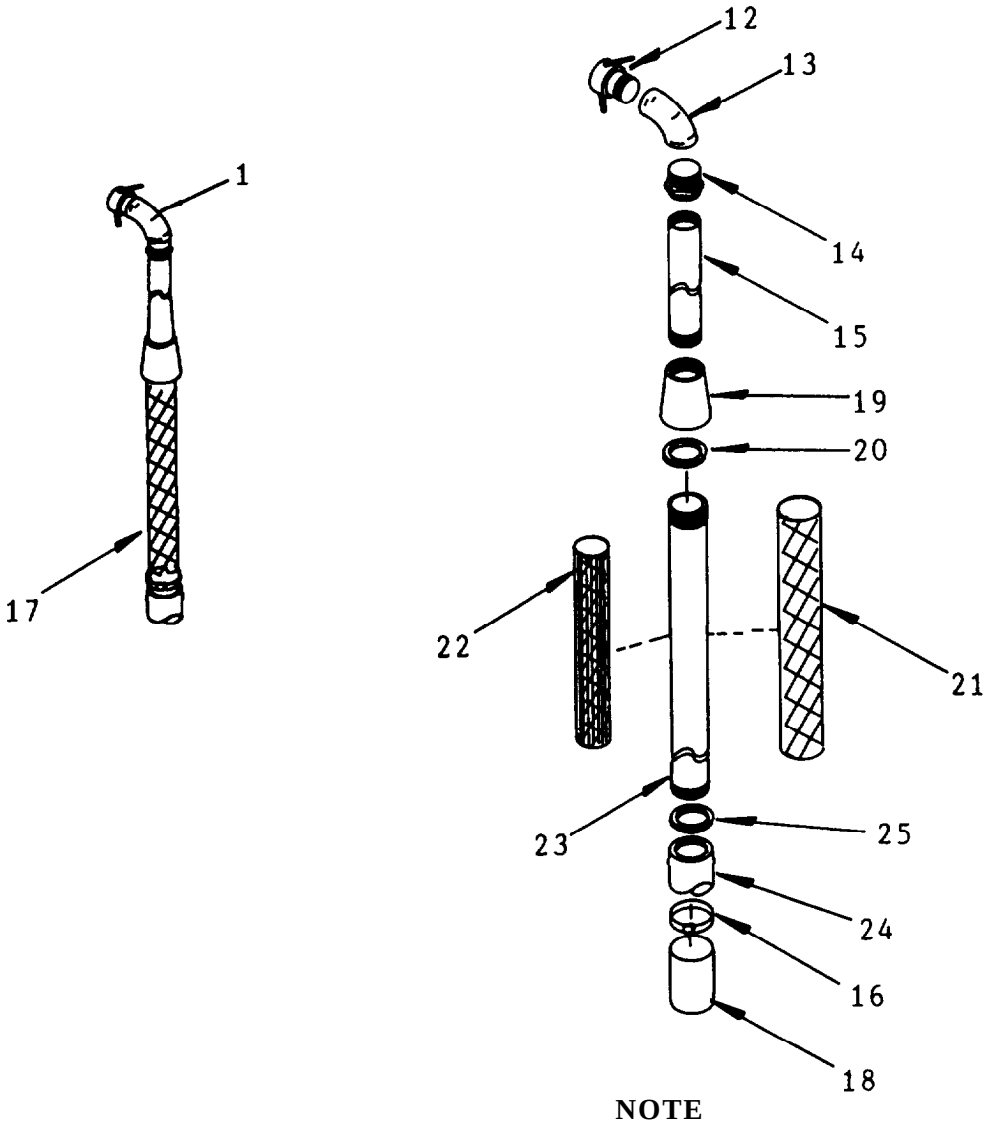
(2) Install screen (22) over riser pipe (23).

(3) Slide guard (2 1) onto wellpoint (17) and install the wellpoint cap (19) and gasket (20).

(4) If necessary, install boot (18) onto wellpoint (17) and secure with hose clamp (16).

(5) Install the nipple (15), bushing (14), elbow (13), and fitting (12) to the wellpoint cap (19) by turning clockwise.

2-24.1 OCEAN INTAKE STRUCTURE REPAIR (MODELS H-9818-1, H-9518-2, AND H-9618-3) - continued.



NOTE

Install check valve so that water flows from the tee.

(4) Install the check valve (11) into the tee (10).

(5) Install the two male fittings (7 and 8) into the tee (10).

(6) Install the female fitting (9) onto the check valve (11).

(7) Install nipple (5) on raw water pump No. 1 by turning clockwise.

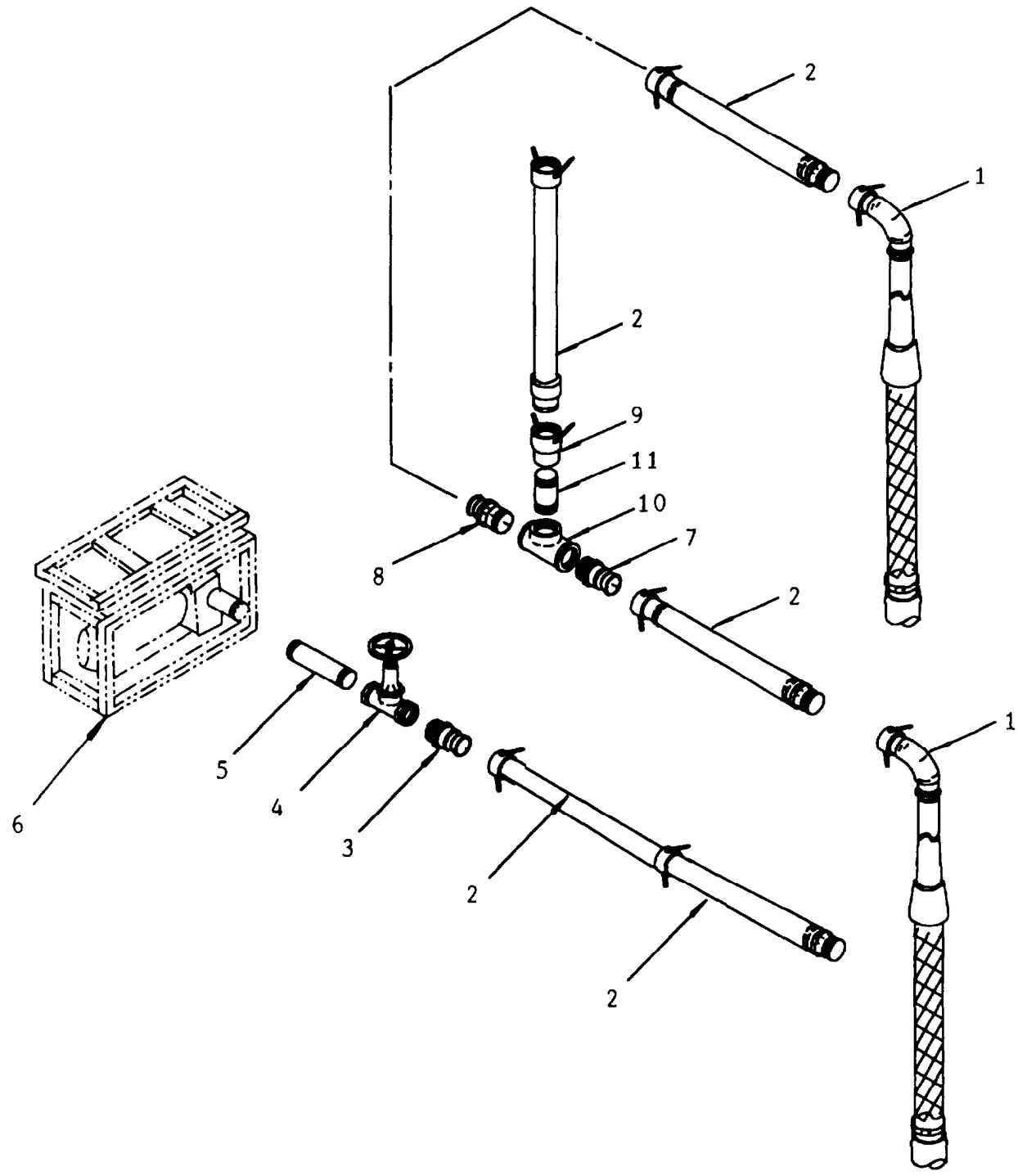
(8) Install gate valve (4) onto nipple (5) by turning clockwise.

(9) Install male fitting (3) into gate valve by turning clockwise.

(10) Install wellpoint assemblies (1) and hose assemblies (2) as required for operation.

(11) Operate Ocean Intake Structure (TM 10-4610-241-10).

2-24.1 OCEAN INTAKE STRUCTURE REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.



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2-25. CHEMICAL CANS AND FRAME REPAIR

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 4)
Material/Parts Required
Detergent (Appendix C, Section II, ltem 5)
Rags, Wiping (Appendix C, Section II, Item 14)
Equipment Condition
Reference
ROWPU Shut down (TM 10-4610-241-10).
Chemical Cans and Frame removed (TM 10-4610-241-10).
General Safety Instructions

WARNING

To prevent injury to personnel from chemical contamination, 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.

a. Disassembly.

(1) Open lid (1).

(2) Remove clip ring (2), nut (3) and clip ring (4) from stem (5).

(3) Reach inside can (6) and unscrew float (7) from stem (5). Remove float and stem.

(4) Holding fitting (8) inside can, to keep from turning, unscrew nut (9) and remove nut and fitting.

(5) Unplug dust cap (10) from coupling (11). Remove coupling, adapter (12) and dust cap.

(6) Holding suction tube (13) inside can, to keep from turning, unscrew knurled nut (14). Remove nut and gasket (15).

2-25. CHEMICAL CANS AND FRAME REPAIR - continued .

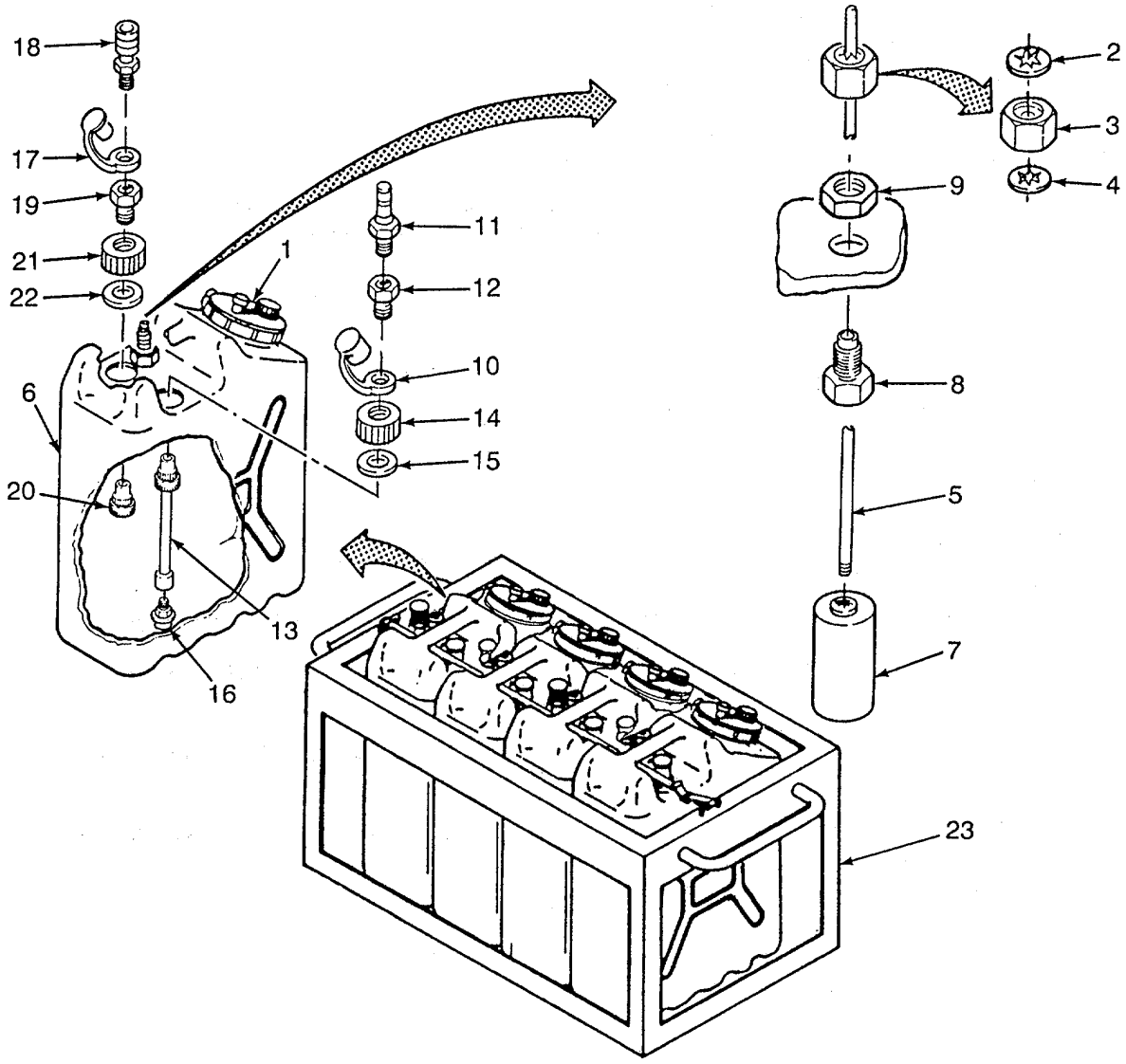
(7) Pull bottom of suction tube (13) toward front of can while pushing down from the top and remove suction tube (13) and attached strainer (16) from inside of can (6).

(8) Unscrew strainer (16) from suction tube (13).

(9) Unplug dust cap (17) and remove coupling (18), dust cap and adapter (19).

(10) Holding fitting (20) from inside can (6), to keep it from turning, unscrew knurled nut (21) and remove nut and gasket (22).

(11) Remove fitting (20) from inside of can (6).



2-25. CHEMICAL CANS AND FRAME REPAIR - 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 for clogged and cracked suction tube (13).

(3) Inspect for clogged and damaged strainer (16).

(4) Inspect stem (5) for bends and cracks.

(5) Inspect can (6) for cracks, splits, damaged threads and broken or missing lid (1).

(6) Inspect frame (23) for cracks, bent or broken framework, and corrosion.

d. Repair.

(1) Replace damaged, corroded or missing components.

(2) If frame is bent, damaged, or no longer serviceable, send to Direct Support Maintenance.

e. Assembly.

NOTE
Be sure to wrap tape in same direction as thread.

(1) Apply anti-seize tape to male threads of all fittings.

(2) From inside of can (6), position fitting (20) in cutout of can and secure with gasket (22) and knurled nut (21).

(3) Install adapter (19) into internal threads of fitting (20).

(4) Position dust cap (17) on external threads of coupling (18) and install coupling in adapter (19).

(5) Install screen (16) on suction tube (13) and position suction tube in cutout of can (6) from inside of can.

(6) Install gasket (15) and knurled nut (14) on suction tube (13).

(7) Position dust cap (10) on external threads of adapter (12) and install adapter into inside threads of suction tube (13).

2-25. CHEMICAL CANS AND FRAME REPAIR- continued .

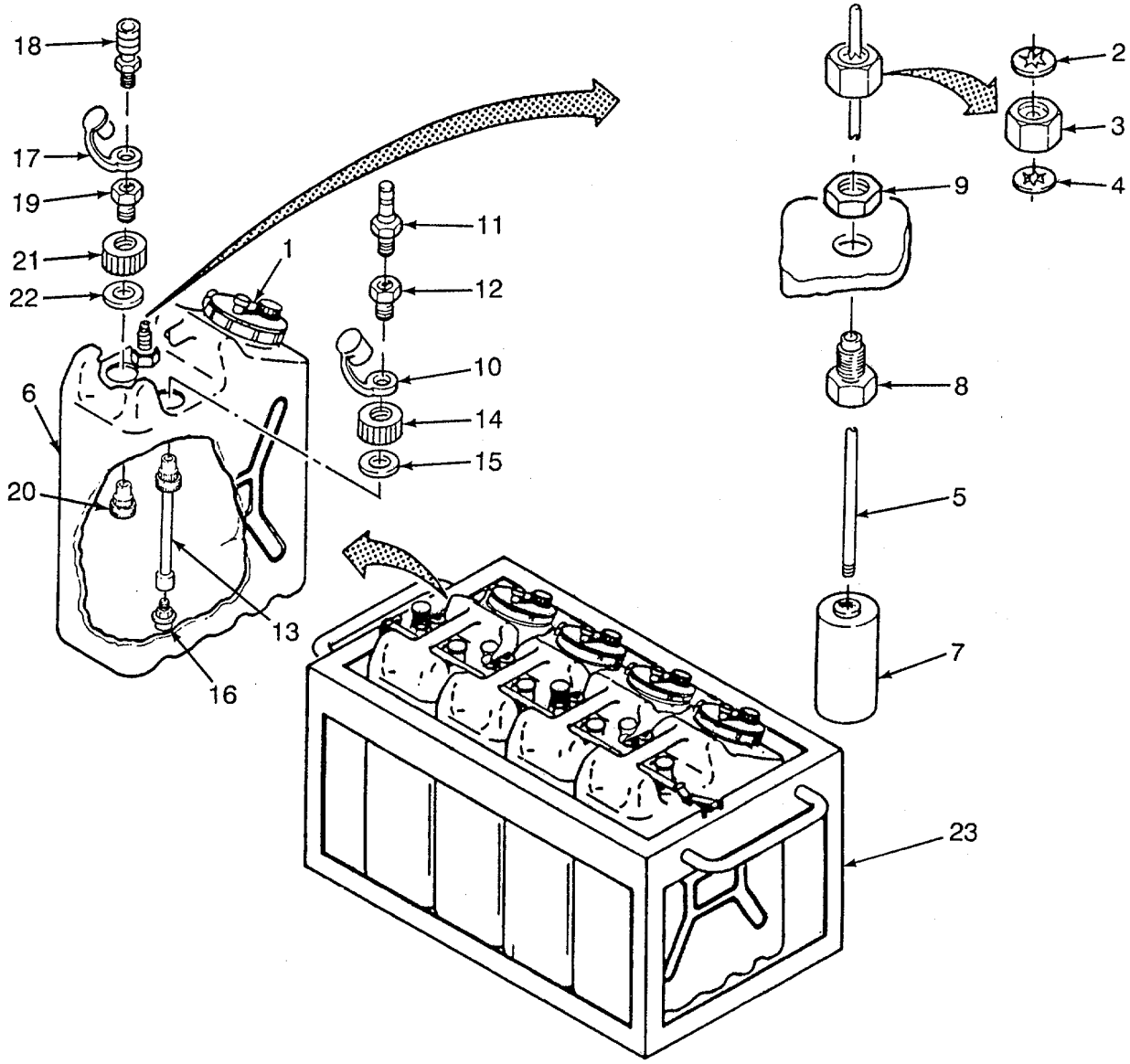
(8) Install plug coupling (11).

(9) From inside of can (6), position adapter (8) in cutout of can and secure with nut (9).

(10) Push threaded part of stem (5) thru nut (9) and adapter (8) into can (6) and attach to float (7) inside of can.

(11) Install clip ring (4), nut (3) and clip ring (2) on stem (5).

(12) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation of cans.



2-26 TDS MONITOR ADJUSTMENT.

This task consists of: Adjustment

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 shut down (TM 10-4610-241-10).
Power shut down (Power Source Manual).

General Safety Instructions

WARNING

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

Adjustment

a. Loosen two captive 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) With power off, note position of monitor needle (4).

(2) If needle (4) is not pointing at zero on meter scale (5), turn adjustment screw (6) left or right as required to obtain correct indication.

c. Adjust TDS monitor as follows:

(1) Ensure TDS monitor cable assemblies are connected to ROWPU (TM 10-4610-241-10).

(2) Pull out on four fasteners (7) and release panel meter (8) from circuit box (9).

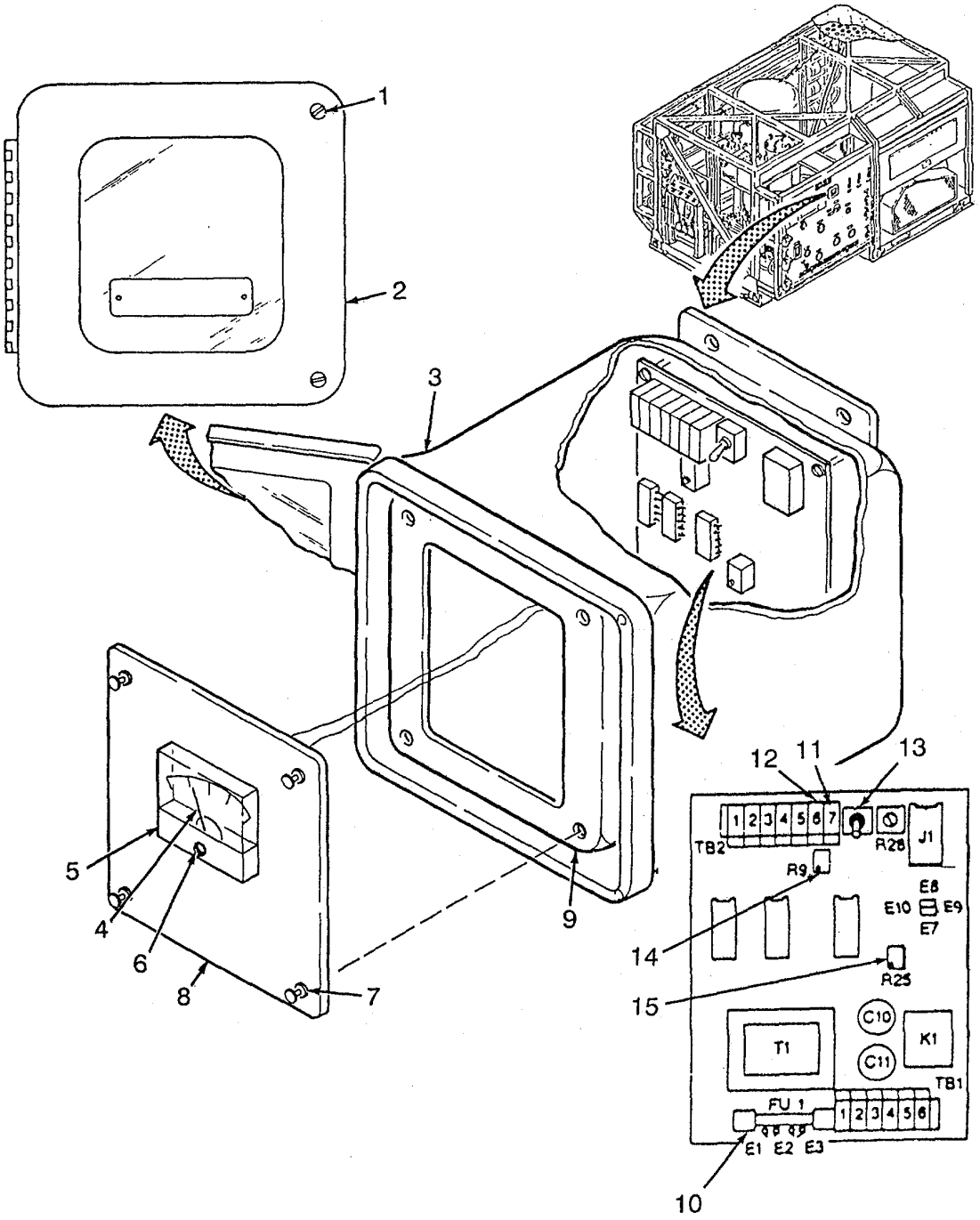
(3) Inspect fuse (10). Replace fuse if blown, burned, or broken.

(4) Set multimeter to indicate voltage (0-10VDC).

2-26. TDS MONITOR ADJUSTMENT - continued .

(5) Connect positive lead (+) of multimeter to recorder output terminal TB2-7 (11).

(6) Connect negative lead (-) of multimeter to recorder output terminal TB2-6 (12).



2-26. TDS MONITOR ADJUSTMENT - continued .

WARNING

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

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) and apply electrical power to ROWPU (TM 10-4610-241-10).

(8) Push and hold calibration test switch SW1 (13) in the up position. Multimeter should indicate + 10 volts.

(9) If multimeter does not indicate + 10 volts, adjust main calibration trimmer R9 (14) to obtain correct indication.

(10) Push and hold calibration test switch SW1 (13) in the up position. Adjust front panel meter trimmer R25 (15) to obtain full scale indication (2000) on panel meter (5).

(11) Shut off electrical power to ROWPU (TM 10-4610-241-10). Shut down power source (power source manual).

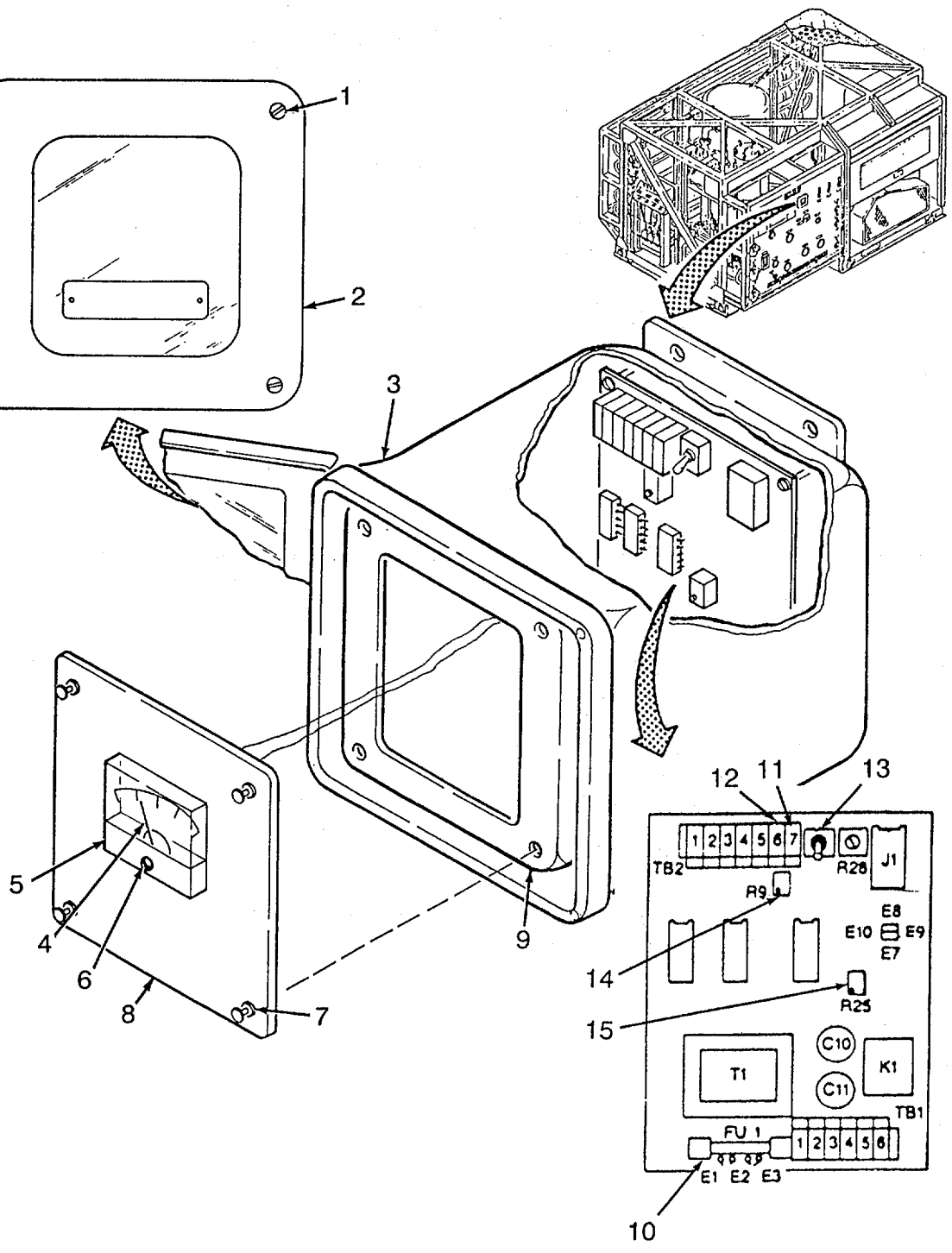
(12) Remove multimeter leads from TB2-7 (11) and TB2-6 (12).

(13) Position panel meter (8) on circuit box (9) and press in four fasteners (7).

d. Close cover (2) on TDS monitor and tighten two screws (1).

e. Remove TDS monitor that is damaged or cannot be adjusted (TM 10-4610-241-10). Send TDS monitor to Direct Support Maintenance.

2-26. TDS MONITOR ADJUSTMENT - continued.



2-27. COVER REPAIR.

This task consists of: Repair

INITIAL SET-UP:
Equipment Condition
Reference
Cover removed (TM 10-4610-241-10).

Repair

Repair at unit level shall be limited to repair of minor tears and patching.

2-28. COVER PLATE REPLACE.

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
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Cover removed (TM 10-4610-241-10).
Personnel
Two

a. Removal

(1) Remove twelve nuts (1), lockwashers (2), and flat washers (3) from bottom of cover plate (6).

(2) Remove twelve screws (4) and flat washers (5) from top of cover plate (6).

(3) Remove cover plate (6) from frame (7).

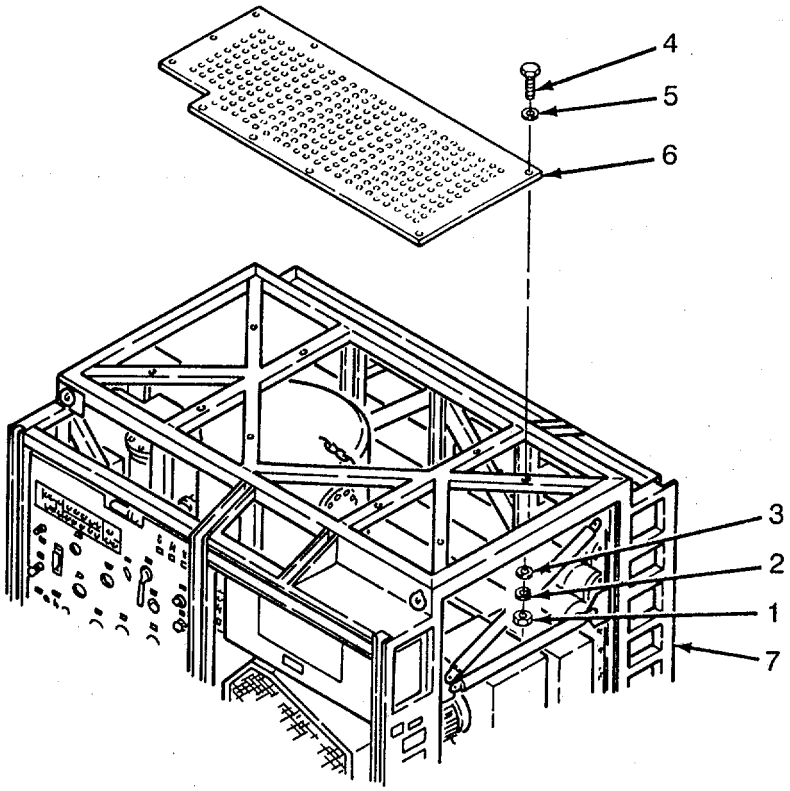
2-28 COVER PLATE REPLACE - continued.

b. Installation

(1) Position cover plate (6) on frame (7).

(2) Position twelve flat washers (5) and screws (4) in top of cover plate (6).

(3) Install twelve flat washers (2), lockwashers (3), and nuts (1).



2-29: GROOVED PIPE (PIPE SECTIONS, ELBOWS, FI'TTING S, ETC.) REPLACE.

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 19)
Tape, Insulation (Appendix C, Item 21)
Tape, Color Code (Appendix C, Items 22 thru 26)
Grease, Silicone (Appendix C, Item 10)
Lockwashers and Gaskets (TM 10-4610-241-24P)

Equipment Condition

Reference

Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).

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 on 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.

a. Removal

(1) Locate ends of grooved pipe (1) to be removed.

NOTE

Some grooved pipe sections are held in place with retaining straps. Remove retaining straps as required.

(2) Remove two screws (2), flatwashers (3), lock washers (4), retaining strap (5) and insulation tape (6).

(3) Loosen nut (7) and remove sensing line (8) and adapter (9) from grooved pipe (1).

2-29. GROOVED PIPE (PIPE SECTIONS, ELBOWS, FITTINGS, ETC.) REPLACE - continued .

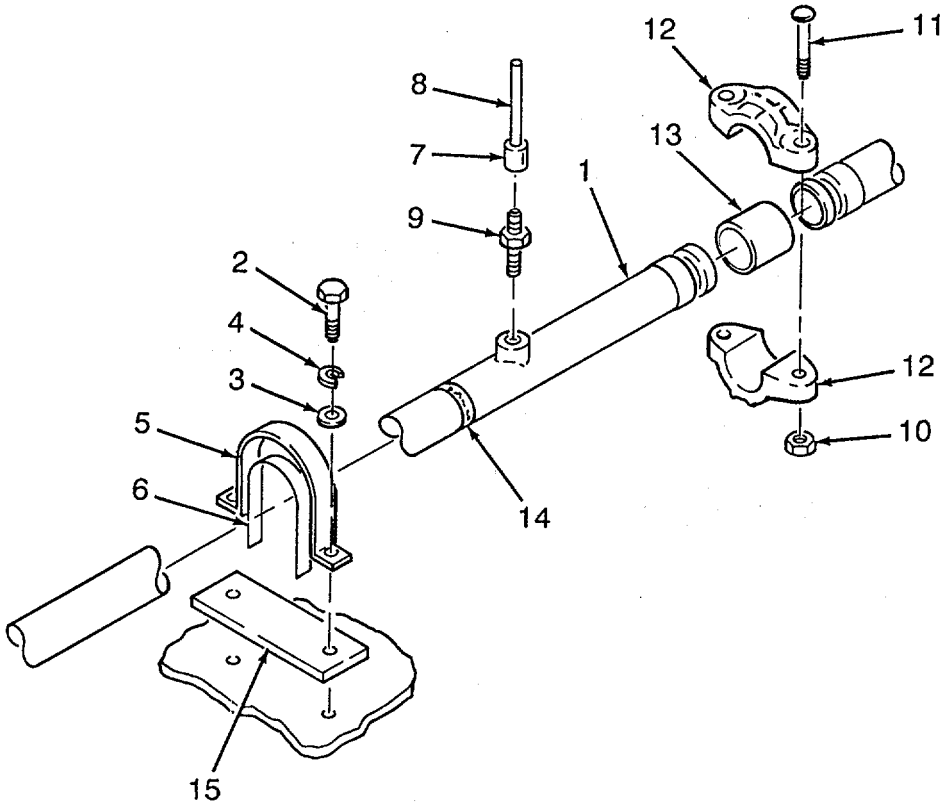
(4) Remove two nuts (10), bolts (11) and clamp halves (12) from both ends of grooved pipe (1).

(5) Slide gasket (13) away from pipe junction and onto pipe (1).

(6) Separate grooved pipe (1) from system and remove gasket (13) from each end of pipe.

(7) Remove color code tape (14).

(8) Remove pipe support (15).



2-29. GROOVED PIPE (PIPE SECTIONS, ELBOWS, FITTINGS, ETC) REPLACE -continued.)

b. Installation.

(1) Position pipe support (15) on floor of ROWPU.

(2) Lubricate gaskets (13) and position on pipe (1).

(3) Position grooved pipe (1) in unit. Slide gaskets (13) over pipe joint.

(4) Place clamp halves (12) over gasket (13) and install two bolts (11) and nuts (10). Repeat for joint at other end of pipe.

NOTE
Be sure to wrap tape in same direction as threads.

(5) Apply anti-seize tape to male threads of adapter (9).

(6) Install adapter (9) and connect sensing lines (8) to adapter (9). Tighten nut (7)

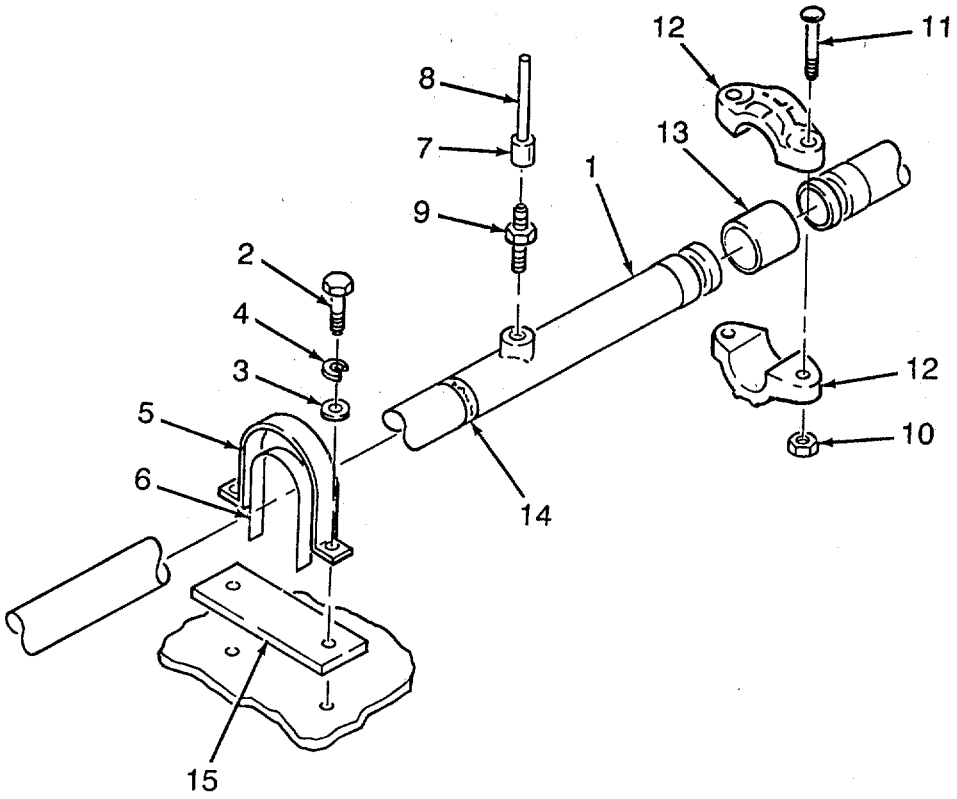
NOTE
Some grooved pipe sections are held in place with retaining straps. Install retaining straps as required.

(7) Install insulation tape (6), retaining strap (5), two lockwashers (4), flat washers (3), and screws (2).

(8) Install color code tape (14) as required.

(9) Operate ROWPU and test for leaks (TM 10-4610-241-10).

2-29. GROOVED PIPE (PIPE SECTICONS, ELBOWS, FITTINGS, ETC.) REPLACE - continued.



2-30 THREADED PIPE REPLACE.

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)
- Vise (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)
- Tape, Insulation (Appendix C, Section II, Item 21)
- Tape, Packing (Color Code) Appendix C, Section II, Items 22 thur 26)

Equipment Condition

Reference
- Power shut down (Power Source Manual).
- ROWPU Piping drained (TM 10-4610-241-10).

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.

a. Removal.

(1) Remove threaded pipes, attached to one end with grooved coupling as follows:

(a) Refer to Paragraph 2-29 to disconnect grooved coupling end.

(b) Select one or more steps in this Paragraph to remove pipe section From ROWPU.

(2) Remove threaded pipes, attached to ROWPU with one-piece straps, as follows:

(a) Remove two bolts (1), lockwashers (2), clamps (3) and plate (6). As required remove tape (5) from pipe (4).

(b) Select one or more steps in this paragraph to remove pipe section (4) from ROWPU and remove color code tape as necessary.

(3) Remove threaded pipes attached to front panel with two-piece strap as follows:

(a) Remove nuts (7), lockwashers (8), washers (9) and screws (10).

(b) Remove nuts (11), lockwashers (12), screws (13) and two-piece strap (14).

2-30 THREADED PIPE REPLACE- continued.

(c) Select one or more steps in this Paragraph to remove pipe section (15) from ROWPU and remove color code tape as necessary.

(d) Remove ring filler (17) and tape (16) from pipe section (15).

(4) Remove pipe section connected to other pipe or active component with union nut as follows:

(a) Unscrew union nut (18) from active component (19) (i.e. water meter).

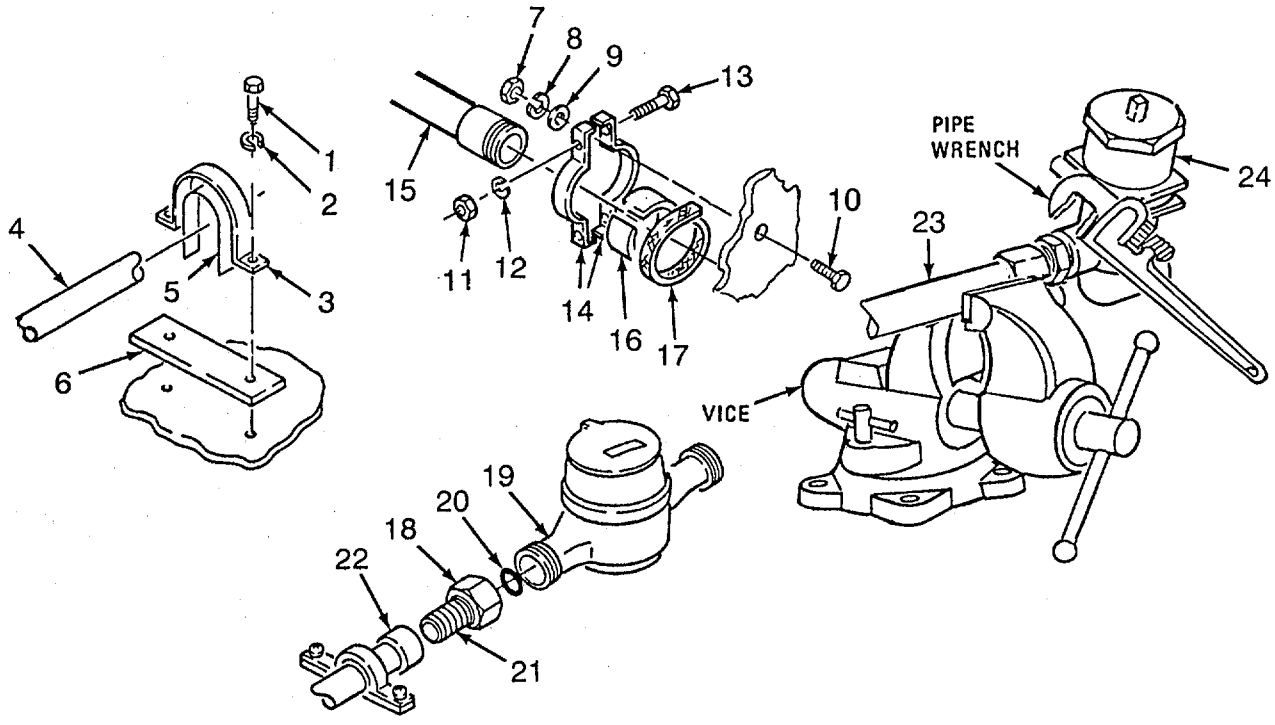
(b) Remove active component (19), then remove gasket (20).

(c) Unscrew adapter (21) from pipe section (22).

(d) Select one or more steps in this Paragraph to remove pipe section (22) from ROWPU and remove color code tape as necessary.

(5) Remove threaded pipe from other threaded pipe or active component (i.e check valve, gage etc.) as follows:

(a) Remove pipe section (23) with attached active component (24) by one or more of the steps in this Paragraph and remove color code tape as necessary.



2-30. THREADED PIPE REPLACE - continued.

(b) Clamp pipe (23) or active component in vise and remove component (24) to which it is attached with pipe wrench.

b. Installation.

(1) Install threaded pipes, connected to pipe with grooved coupling clamp, as follows:

(a) Refer to Paragraph (2-29) to connect grooved end of pipe.

(b) Go to one or more steps in this Paragraph to secure pipe section to ROWPU or other piping. As required, install color code tape.

(2) Install threaded pipe section, attached to ROWPU with one-piece straps as follows:

(a) Position plate (6) on frame or floor of ROWPU.

(b) Wrap tape (5) around pipe section to be in contact with strap (3).

(c) Install strap (3) with two lockwashers (2) and screws (1).

(d) Go to one or more procedures in this Paragraph to secure pipe section to ROWPU frame or other piping. As required, install color code tape.

(3) Install threaded pipes, attached to front panel with two-piece straps as follows:

(a) Install tape (16) and filler (17) on pipe section (15) where two-piece strap (3) will be installed.

(b) Position pipe section on front panel and install two piece-strap (14), with screws (13), lockwashers (12) and nuts (11).

(c) Position screws (10) thru control panel and two piece-strap (14) and install flatwashers (9), lockwashers (8) and nuts (7).

(d) Go to one or more procedures in this Paragraph to secure pipe section to ROWPU frame or other piping. As required, install color code tape.

(4) Install pipe section, connected to other pipe, with union nut as follows:

NOTE
Be sure to wrap tape in direction of threads.

(a) Wrap male pipe threads with teflon tape.

2-30. THREADED PIPE REPLACE - continued

(b) Install adapter (18) on threaded pipe (22) and install gasket (20) in adapter.

(c) Connect union nut (18) to active component (19).

(d) Complete installation, using one or more steps of this Paragraph. If required install color code tape.

(5) Install threaded pipe on other threaded pipe or active component (i.e check valve or gage) as follows:

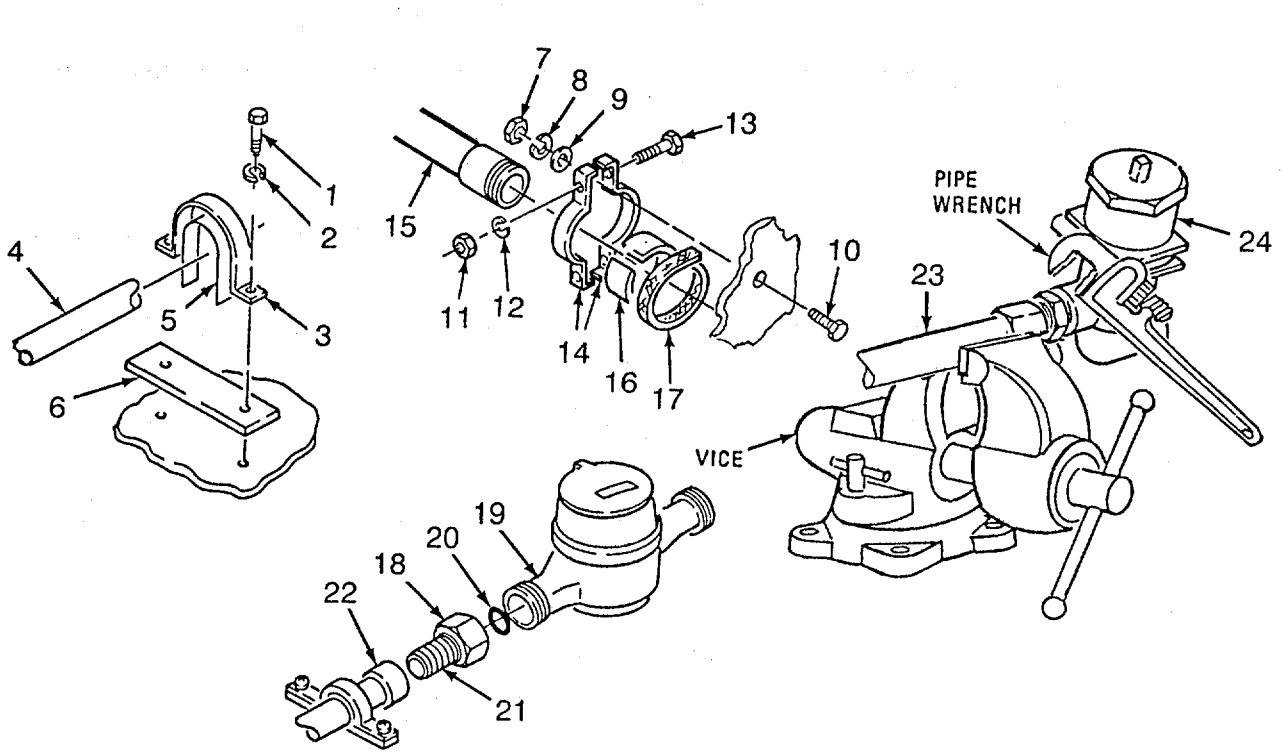
(a) Clamp pipe (23) or active component in vise.

NOTE

Be sure to wrap tape in direction of threads.

(b) Wrap male pipe threads with teflon tape.

(c) Screw pipe (23) into threads of active component (23) with pipe wrench.



12-31. TUBING REPLACE

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 19)
Tape, Insulation (Appendix C, Section II, Item 21)
Lockwashers (TM 10-4610-241-24P)

Equipment Condition

Reference

Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).

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.

a. Removal.

(1) 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 (1), lockwashers (2), and screws (3).

(2) Separate and remove two tube support blocks (4 and 5) and insulation tape (6) from metal tubing (7).

2-31. TUBING REPLACE -continued.

(3) Remove screws (8), lockwasher (9) and clamps (10) from metal tubing (7).

(4) Unscrew tubing nuts (11 and 12) from adapters (13 and 14).

(5) Remove metal tubing (7) from unit.

(2) Remove flexible tubing as follows:

(a) Loosen clamps (15 and 16).

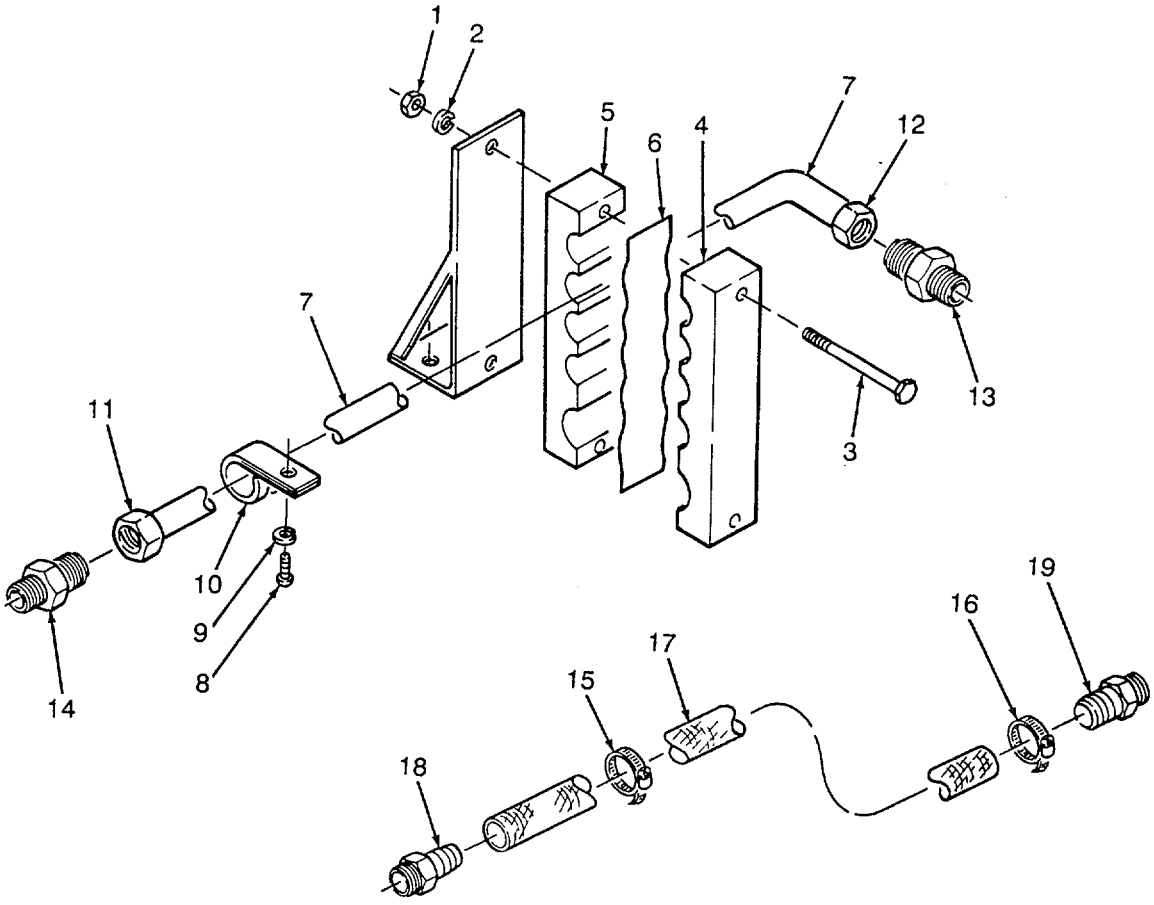
(b) Remove flexible tubing (17) from tubing adapters (18 and 19).

(c) Remove clamps (10) from tubing (7).

b. Installation

(1) Install flexible tubing as follows:

(a) Slide clamps (16 and 15) onto both ends of flexible tubing (17).



2-31. TUBING REPLACE - continued.

(b) Connect flexible tubing (17) to tubing adapters (18 and 19) and tighten clamps (16 and 15).

(2) Install metal tubing as follows:

NOTE
Be sure to wrap tape in same direction as pipe thread.

(a) Apply anti-seize tape to male fittings.

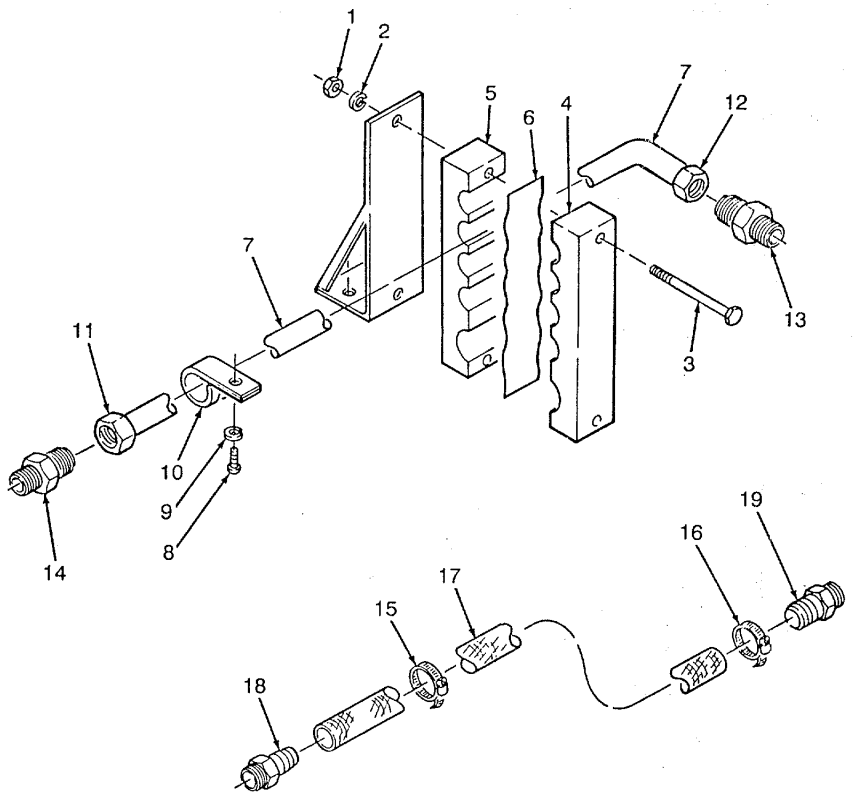
(b) Connect metal tubing (7) to adapters (13 and 14) and tighten tubing nuts (11 and 12).

(c) Install clamps (10), lockwashers (9) and screws (8) on metal tubing (7).

(d) Position two tube support blocks (4 and 5) and insulation tape (6) on metal tubing (7).

(e) Install two screws (3), lockwashers (2), and nuts (1).

(3) Operate ROWPU and check for leaks (TM 10-4610-241-10).



2-32. RUPTURE DISK ASSEMBLY REPAIR (Models WPES-10, WPES-20, and WPES-30).

This task consists of: a Removal b. Disassembly c. Cleaning d. Inspection e. Repair f. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/PartsRequired
Tape, Anti-seize (Appendix C, Section II, Item 19)
Equipment Condition
Power shut down (Power source Manual).
Piping drained (TM 10-4610-241-10).
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.

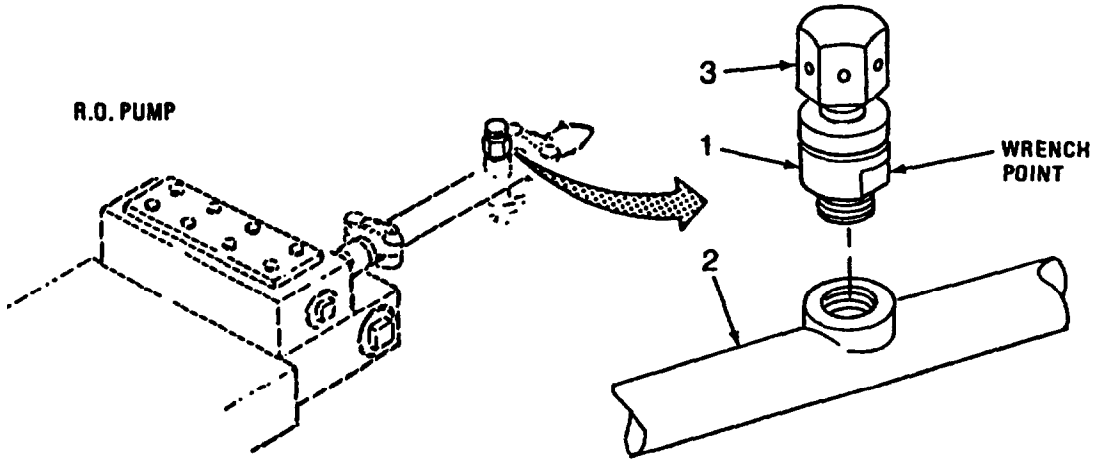
a. Removal.

NOTE

Rupture disk assembly can be repair in place.

(1) Apply wrench at wrench points of rupture disk assembly (1) and unscrew rupture disk assembly.

(2) Remove rupture disk assembly (1) from pipe section (2).



2-32. RUPTURE DISK ASSEMBLY REPAIR (Models WPES-10, WPES-20 and WPES-30)- continued.

b. Disassembly.

CAUTION

Do not use sharp tools to disassembly rupture disk assembly. Brass ring and/or rupture disk may get damaged.

(1) Unscrew plug (3).

(2) Remove ring (4) and rupture disk (5) from housing (6).

c. Cleaning.

(1) Remove antiseize tape from housing (6).

(2) Remove any tape particles, or other foreign materials from plug (3) and housing (6).

d. Inspection.

(1) Inspect rupture disk (5) for corrosion and deformation.

(2) Inspect ring (4) for deformation, nicks or deep scratches.

(3) Inspect housing (6) and plug (3) for damaged or corroded threads.

e. Repair.

Replace defective components.

f. Assembly.

WARNING

Incorrect installation of disk and/or ring may result in injury of personnel and damage to equipment.

(1) Apply anti-seize tape to external threads of housing (6).

(2) Insert rupture disk (5) in housing (6) with curved center up as shown.

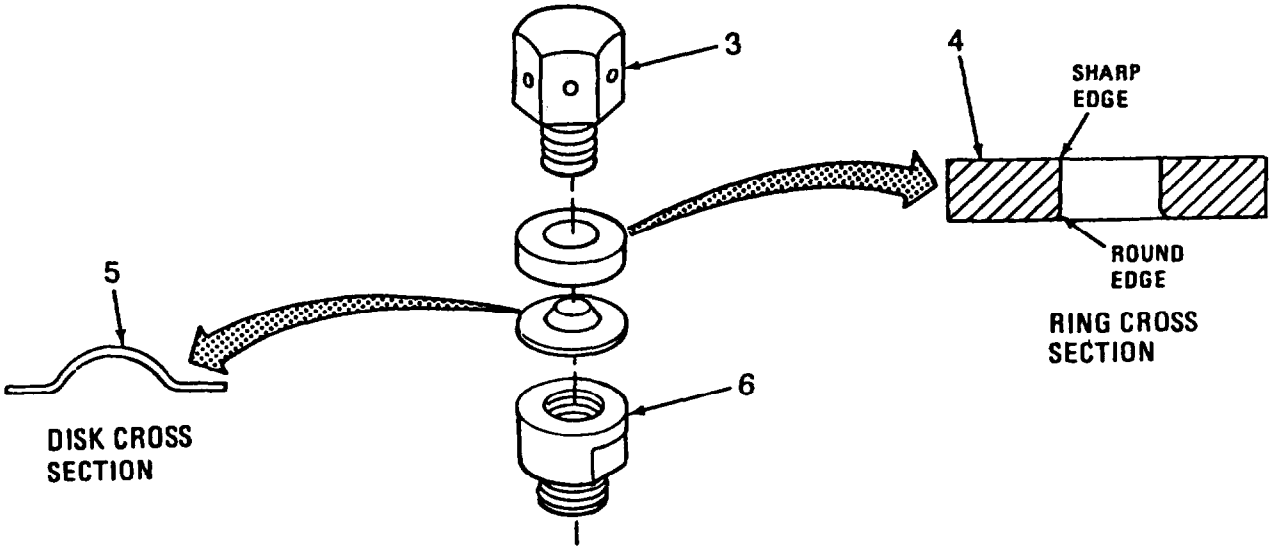
NOTE

Inside wall of ring (4) has a round edge and a sharp edge. Be sure round edge is down, in contact with disk (5) when installed.

(3) Insert ring (4) in housing (6), round edge down, as shown.

(4) Screw plug (3) into housing (6) and snug.

2-32. RUPTURE DISK ASSEMBLY REPAIR (Models WPES-10, WPES-20, WPES-30) - continued.



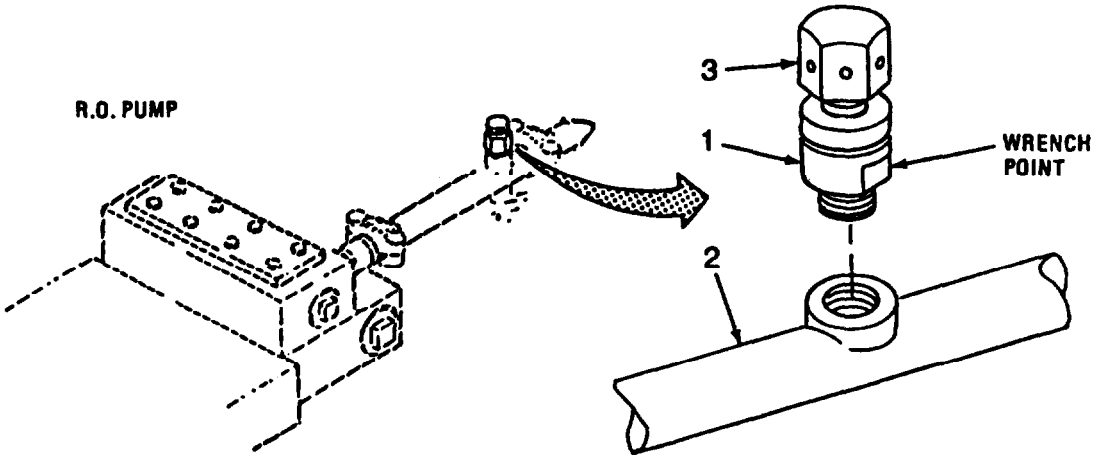
g. Installation

NOTE
Be sure to wrap tape in the direction of threads.

(1) Apply anti-seize tape to external threads of rupture disk assembly (3).

(2) Apply wrench at wrench point of rupture disk assembly (1) and screw rupture disk assembly into pipe section(2).

(3) Tighten nut (3).



2-33. GATE VALVE (VENT VESSELS) REPAIR.

This tasks 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)
- Vise (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 19)
- Detergent (Appendix C, Section II, Item 5)
- Rags, Wiping (Appendix C, Section II, Item 14)
- Lockwashers, Packing and Gaskets (TM 10-4610-241 -24P)

Equipment Condition
Reference
- Power shut down (Power Source Manual).
- ROWPU Piping drained (TM 10-4610-241-10).
- Camlock Fittings removed (TM 10-4610-241-10).

NOTE
Gate valve can be repaired while installed in ROWPU.

a. Removal.

(1) Unscrew cap (1) from adapter (19). If required, remove cap from ROWPU (Paragraph 2-14).

(2) Open gate valve (16) to allow water to drain.

(3) Remove two nuts (2), lockwashers (3), flatwashers (4) and screws (5).

(4) Remove two nuts (6), lockwashers (7), screws (8), and two-piece strap (9).

(5) Remove two nuts (10), bolts (11), and clamp halves (12 and 13).

(6) Slide gasket (14) onto adapter (15).

(7) Remove gate valve (16) and attached parts.

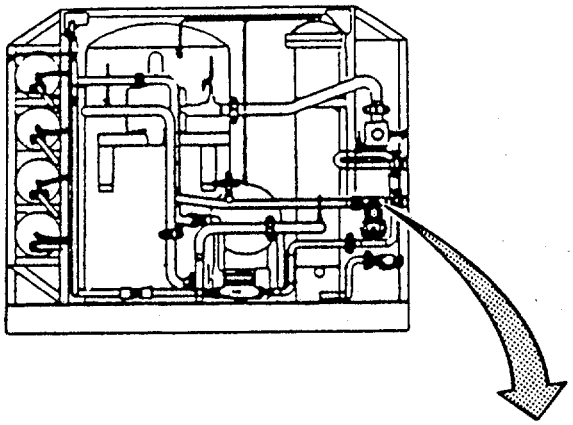
(8) Remove gasket (14) from adapter (15).

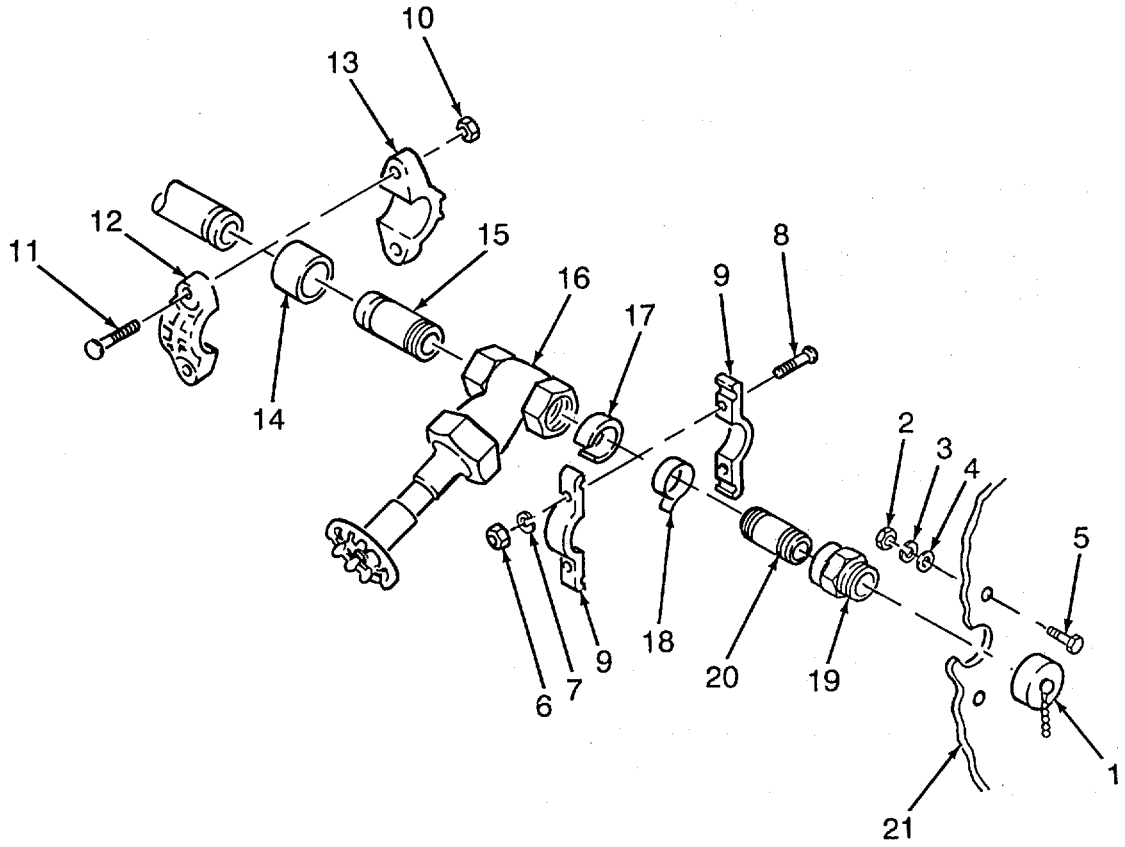
(9) Position gate valve (16) and attached parts in vise.

2-33. GATE VALVE (VENT VESSELS) REPAIR - continued.

(10) Remove adapter (15) from gate valve (16).

(11) Remove ring filter (17), insulation tape (18), adapter (19) and nipple (20).





2-33. GATE VALVE (VENT VESSELS) REPAIR - continued.

b. Disassembly.

(1) Remove nut (22), data plate (23), and hand wheel (24) from stem (28).

(2) Remove packing nut (25), gland (26) and packing (27).

c. Cleaning.

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

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

d. Inspection.

(1) Inspect all threaded components for damaged threads.

(2) Inspect all components for corrosion.

e. Repair.

(1) Replace damaged components.

(2) Replace packing (27).

f. Assembly.

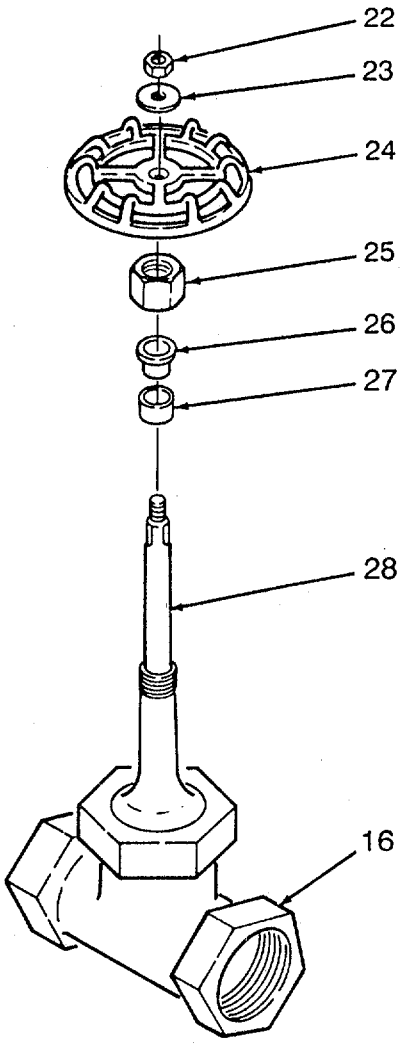
(1) Push packing (27) into place on stem (28).

(2) Install gland (26) and packing nut (25)

(3) Position hand wheel (24) on stem (28).

(4) Install data plate (23) and nut (22).

2-33. GATE VALVE (VENT VESSELS) REPAIR - continued.



2-33. GATE VALVE (VENT VESSELS) REPAIR - continued.

g. Installation.

NOTE
Be sure to wrap tape in same direction as pipe thread.

(1) Apply anti-seize tape to male threads of fittings.

(2) Position gate valve (16) in vise.

(3) Install nipple (20) and adapter (19) on gate vale (16).

(4) Install insulation tape (18) and ring filler (17) on nipple (20) where two-piece strap (9) will clamp.

(5) Install adapter (15) on gate valve (16).

(6) Lubricate gasket (14) and position on adapter (15).

(7) Position gate valve (16) and attached parts on control panel (21).

(8) Slide gasket (14) over pipe junction.

(9) Install clamp halves (12 and 13), bolts (11), and nuts (10).

(10) Position two piece strap (9) on ring filler (17) and secure with screws (8), lockwashers (7) and nuts (6).

(11) Insert screws (5) thru control panel (21) and two piece strap (9) and install washers (4) lockwashers (3) and nuts (2).

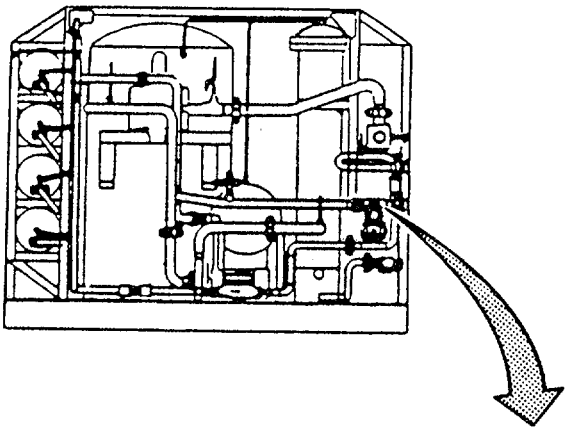
(12) Close gate valve (16).

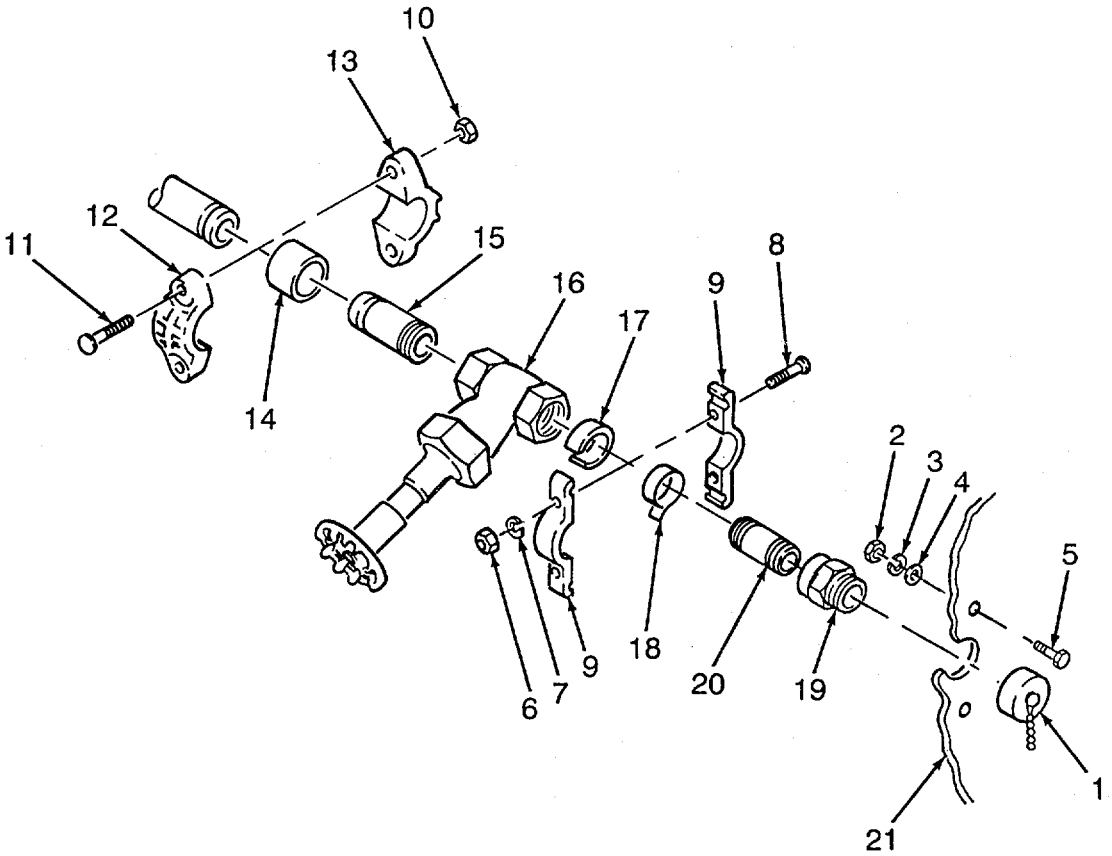
(13) Install cap (1) on bushing(19).

(14) If removed install cap (1) on ROWPU frame (Paragraph 2-14).

(15) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.

2-34. FLOW METER (PRODUCT WATER) REPLACE.





12-34. FLOW METER (PRODUCT WATER) REPLACE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- 1 7/8 Combination Wrench (Appendix B, Section III, Item 4)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)
- Tape, Insulating (Appendix C, Section II, Item 21)
- Grease, Silicone (Appendix C, Section II, Item 10)
- Lockwashers and Gaskets (TM 10-4610-241-24P)

Personnel Required
- Two

Equipment Condition
- Reference
  - ROWPU Piping drained (TM 10-4610-241-10).
  - Cam Lock Fittings removed (TM 10-4610-241-10).

a. Removal.

(1) Disconnect cap (1) from adapter (27). If required, remove cap from ROWPU frame (Paragraph 2-14).

(2) Unscrew nut (2) and disconnect tubing (3) from pipe section (23).

(3) Remove two nuts (4), lockwashers (5) washers (6) and screws (7).

(4) Remove two nuts (8), lockwashers (9) and screws (10) and two-piece strap (11).

(5) Remove two nuts (12), bolts (13) and clamp halves (14). Slide gasket (21) onto pipe section (22).

(6) Remove four screws (15) and lockwashers (16) from bracket (20).

(7) Remove four nuts (17), lockwashers (18), screws (19), and bracket (20) from control panel (28).

(8) Remove pipe sections (22 and 23) with flowmeter (24) from control panel (28) and remove gasket (21).

CAUTION
Make sure scraps from anti-seize tape and/or paint chips do not enter flow meter.

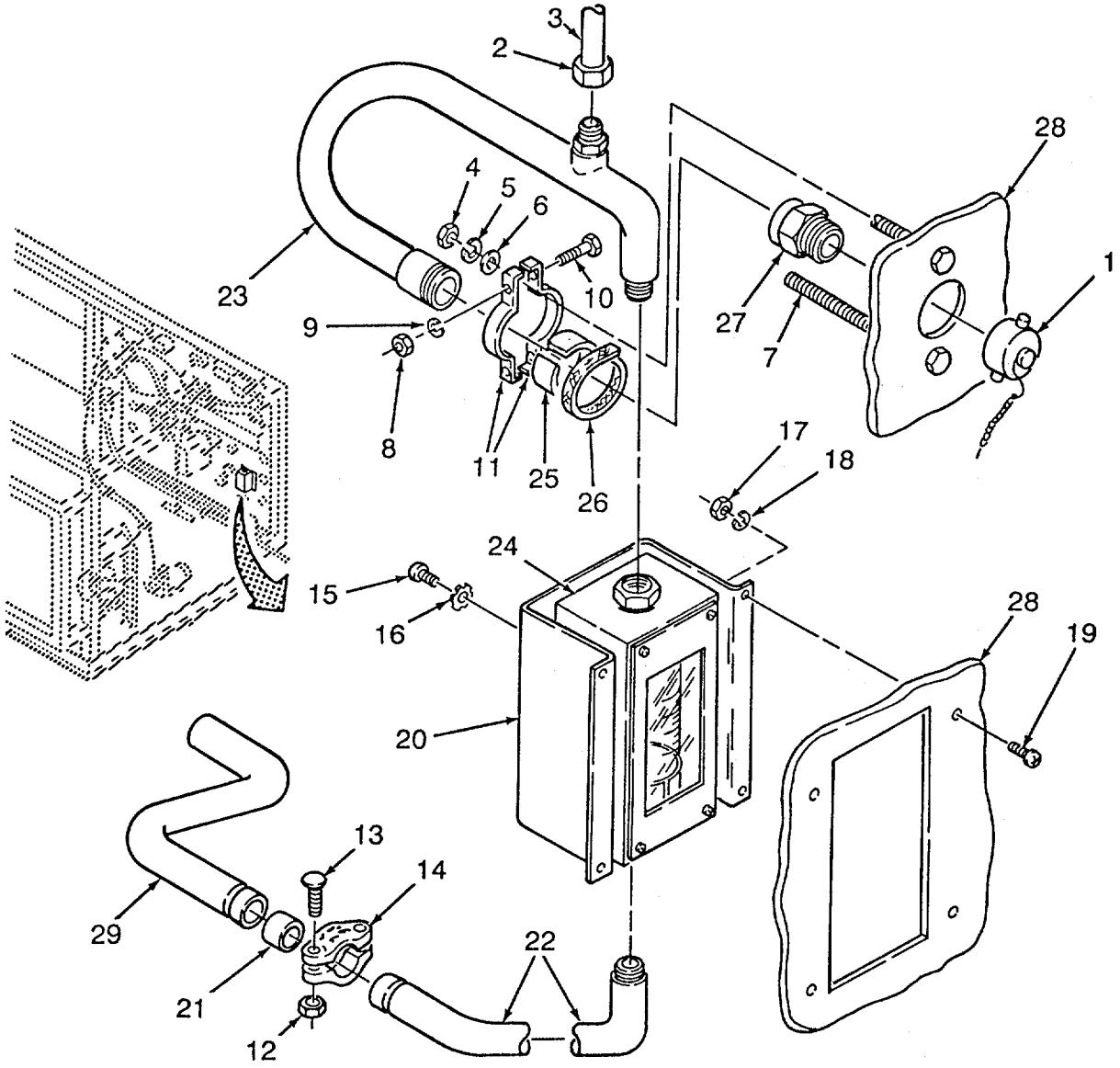
12-34. FLOW METER (PRODUCT WATER) REPLACE- continued.

NOTE

Marking position of pipe sections in relation to flowmeter will facilitate installation. Be sure transcribe alignment marks to replacement parts before discarding them or turning them in to Supply.

(9) Mark position of pipes on flowmeter (24) and remove two pipe sections (22 and 23) from flowmeter (24).

(10) As required, remove ring filler (25), insulating tape (26) and adapter (27).



12-34. FLOW METER (PRODUCT WATER) REPLACE - continued.

b. Installation.

NOTE
Be sure to wrap tape in same direction as threads.

(1) Apply anti-seize tape to all male pipe threads.

(2) If removed, install adapter (27) on pipe (23).

CAUTION
Pipe section can be badly damaged by corrosion if it contacts strap. Be sure to separate pipe section from strap with insulating tape.

(3) If removed, install insulating tape (26) and ring filler (25) on pipe section (23), where two piece strap (11) will clamp.

(4) Install pipe sections (22 and 23) on flowmeter (24) as marked at disassembly.

(5) Lubricate gasket (21) and slide onto pipe (22).

(6) Position flowmeter (24) and pipes (22 and 23) on back of control panel (28).

(7) Position bracket (20) on flowmeter (24) and install four lockwashers (16) and screws (15).

(8) Install four screws (19), lockwashers (18), and nuts (17) to secure bracket (20) to control panel (28).

(9) Slide gasket (21) over pipe junction and install clamp halves (14), two bolts (13), and nuts (12) to connect pipe sections (22 and 29).

(10) While supporting flowmeter (24), install two-piece strap (11), two screws (10), lockwashers (9), and nuts (8).

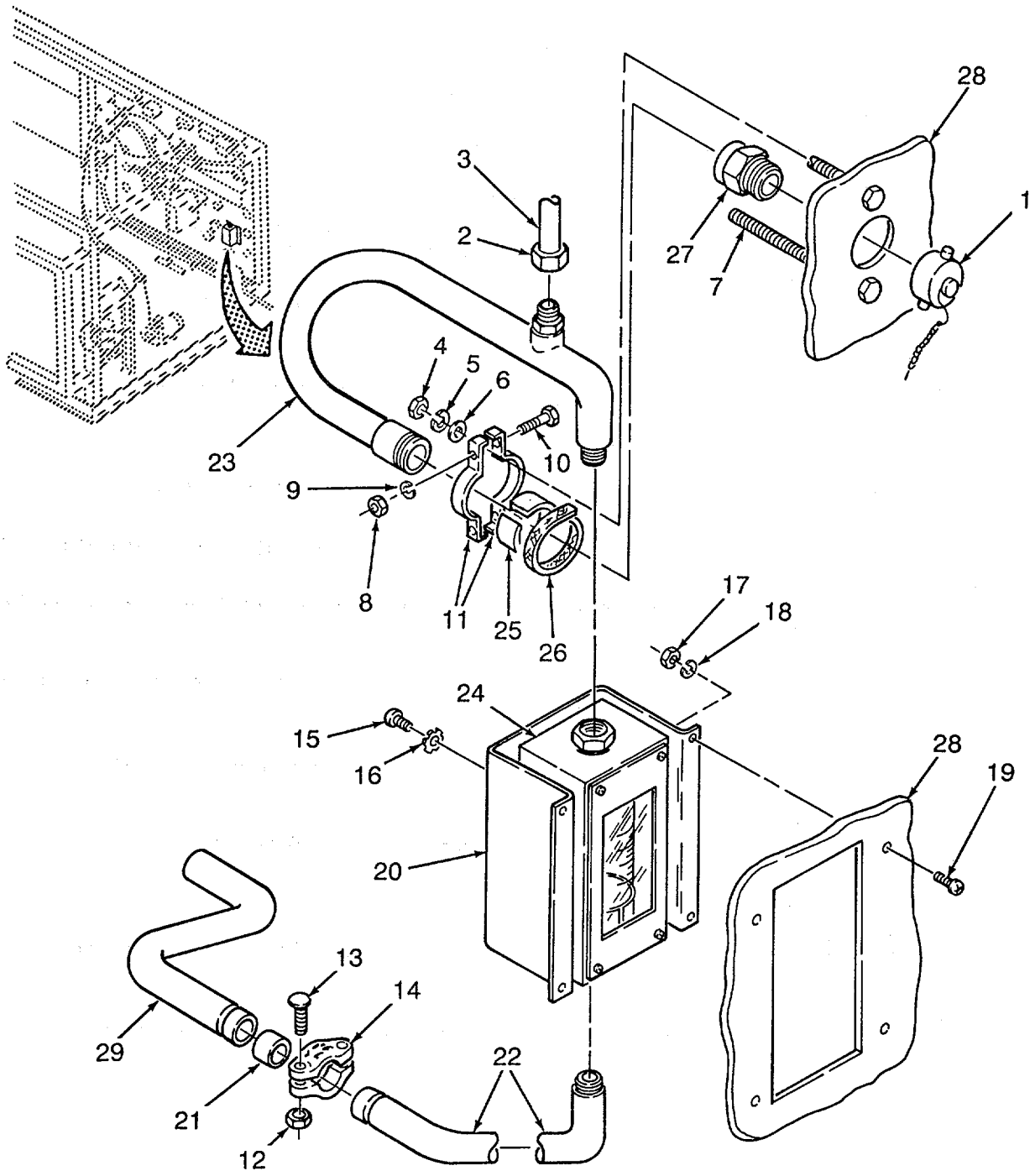
(11) Install two screws (7), flatwashers (6), lockwashers (5) and nuts (4).

(12) Connect tube (3) to pipe (23) and secure with nut (2).

(13) Install cap (1) to adapter (27). If removed secure chain of cap to ROWPU frame (Paragraph 2-14).

(14) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.

12-35. FLOW METER (RAW WATER) REPLACE.



12-35. FLOW METER (RAW WATER) REPLACE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Vise (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)
- Lockwashers (TM 10-4610-241-24P)
- Gaskets (TM 10-4610-241-24P)

Equipment Condition
Reference
- Power shut down (Power Source Manual).
- ROWPU Piping drained (TM 10-4610-241-10).

a. Removal.

(1) Remove two nuts (1), lockwashers (2), and bracket (3) from studs (12).

(2) Remove two nuts (4), bolts (5) and clamp halves (6). Slide gasket (14) onto adapter (16).

(3) Support flowmeter (17) and remove two nuts (7), bolts (8) and clamp halves (9). Slide gasket (14) onto adapter (16).

(4) Remove flowmeter (17) and attached parts from control panel (18).

(5) Remove gaskets (13 and 14).

(6) If required, remove two nuts (10 and 11) and studs (12).

(7) Place flowmeter (17) in vise and remove two adapters (15 and 16).

b. Installation.

NOTE
Be sure to wrap tape in same direction as threads.

(1) Apply anti-seize tape to male threads of adapters (15 and 16).

(2) Install two adapters (15 and 16) on flowmeter (17). Lubricate gaskets (1.3 and 14) and slide onto adapters (15 and 16).

(3) If removed, install two studs (12) and nuts (10 and 11). End of studs must be flush with nut (11) when installed and nut (10) must be tightened against back of control panel.

2-35. FLOW METER (RAW WATER) REPLACE - continued.

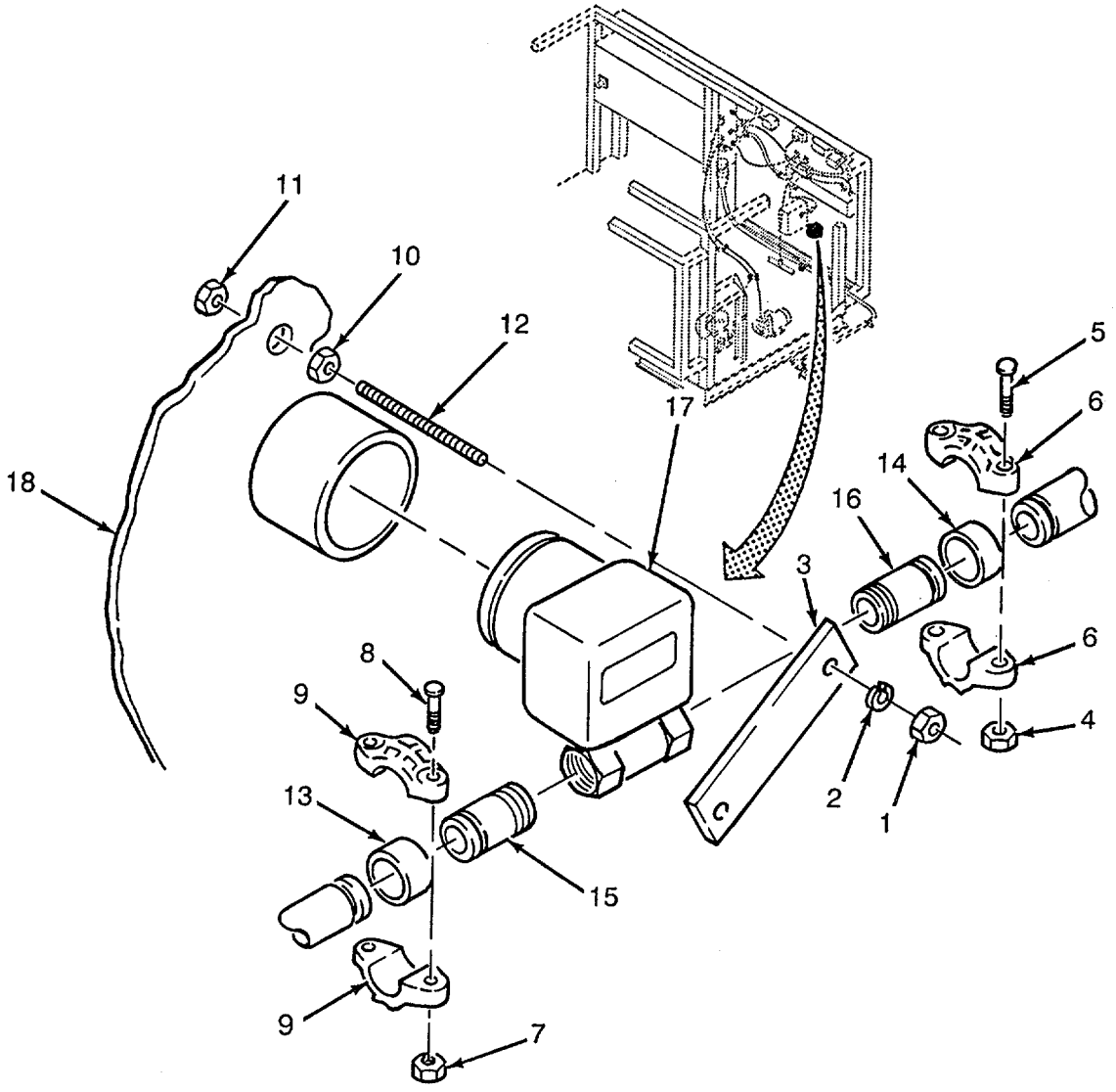
(4) Position flowmeter (17) in cutout on control panel (18).

(5) Position gasket (13) over pipe joint and install clamp halves (9), two bolts (8), and nuts (7).

(6) Position gasket (14) over pipe joint and install clamp halves (6), two bolts (5), and nuts (4).

(7) Position bracket (3) on two studs (12) and install two lockwashers (2) and nuts (1).

(8) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-36. WATER METER (FLOW RATE INDICATOR) REPLACE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Strapwrench (Appendix B, Section III, Item 3)
1 1/2 Inch Combination Wrench (Appendix B, Section III, Item 3)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 19)
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).
Chemical Cans and Frame removed (TM 10-4610-241-10).

a. Removal.

(1) Unscrew union nuts (6 and 7) from water meter (1).

(2) Remove water meter (1) .

(3) Remove adapters (2 and 3) from pipes (8 and 9).

(4) Remove gaskets (4 and 5).

b. Installation.

NOTE
Be sure to wrap tape in the same direction as threads.

(1) Apply anti-seize tape to male pipe threads.

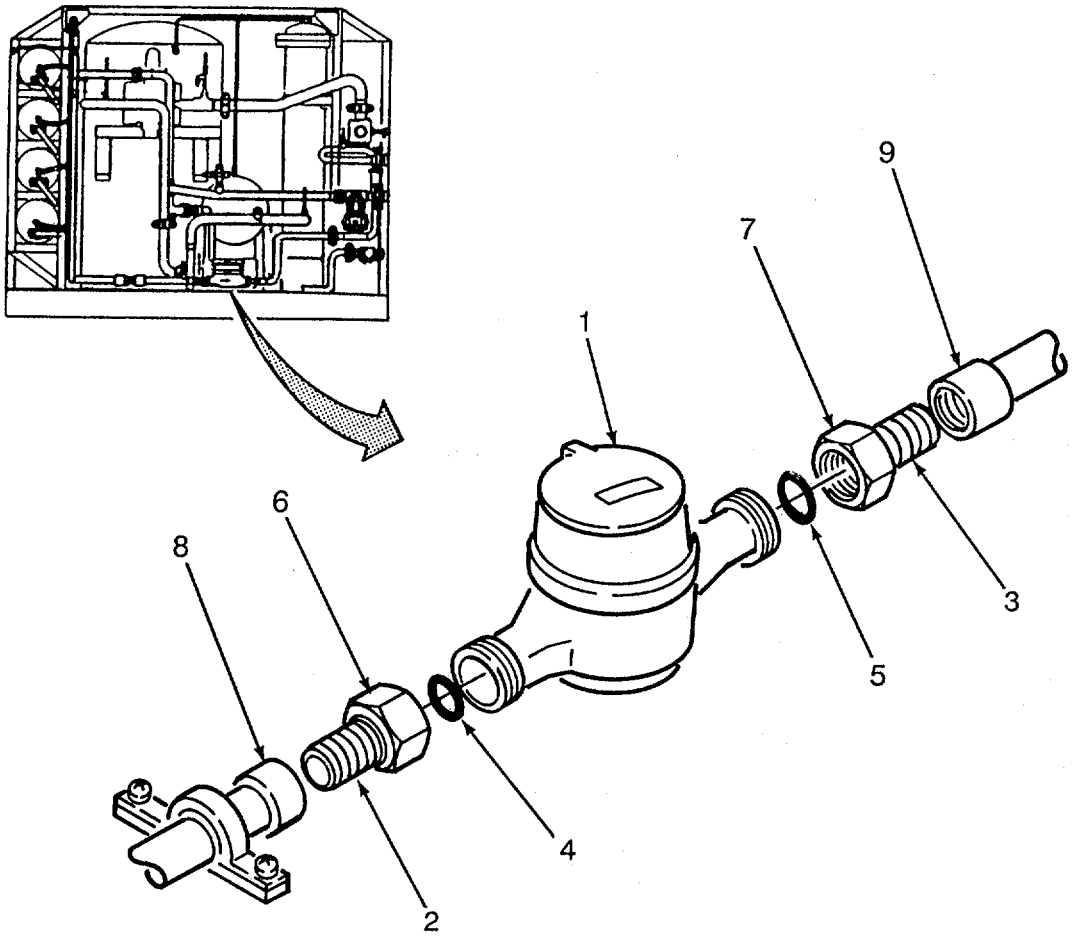
(2) Install gaskets (4 and 5) on union nuts (6 and 7).

(3) Install adapters (2 and 3) on pipes (8 and 9).

(4) Position meter (1) between adapters (2 and 3) and connect adapters to water meter with union nuts (6 and 7).

(5) Operate ROWPU (TM 5-4610-241-10). Check for leaks and proper operation.

2-36. WATER METER (FLOWRATE INDICATOR) REPLACE - continued.



2-37. CHECK VALVE (PRODUCT WATER) REPLACE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

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

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)
- Tape, Insulating (Appendix C, Section II, Item 21)
- Lockwashers (TM 10-4610-241-24P)

Equipment Condition

Reference
- Power shut down (Power Source Manual).
- ROWPU Piping drained (TM 5-4610-241-10).
- Water Meter removed. (Paragraph 2-36).

a. Removal.

(1) Remove four bolts (1) and lockwashers (2), securing chemical feed pump frame (3) to ROWPU.

(2) Move frame (3) back and off ROWPU floor for access to check valve.

(3) Unscrew nut (4) and remove tube (5) from nipple (6). Then remove nipple.

(4) Loosen clamp (7) and remove hose (8) and adapter (9). If required, remove clamp (7).

(5) Remove two bolts (10), two lockwashers (11) and two flat washers (12).

(6) Remove bracket (13).

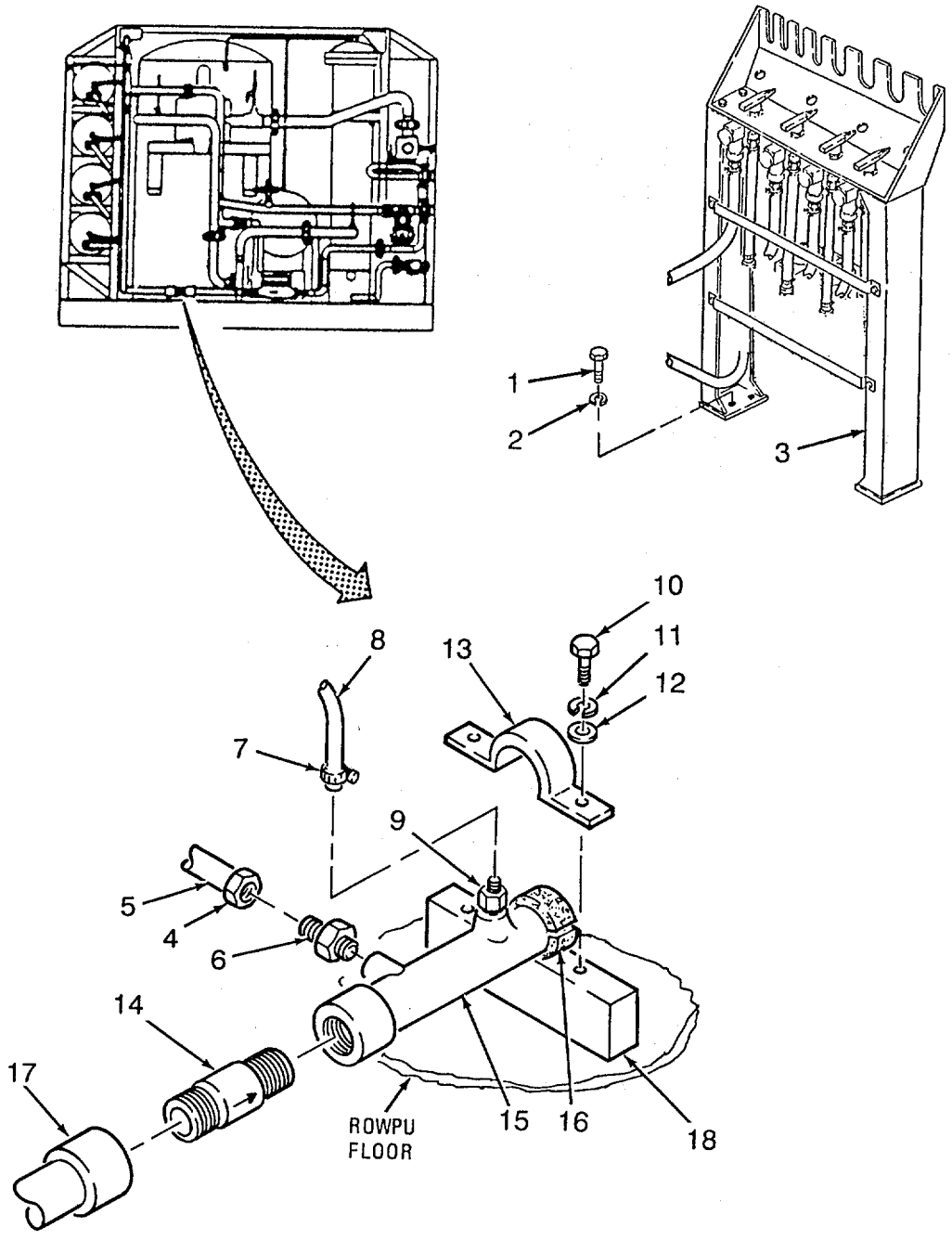
(7) Remove pipe section (15) and check valve (14) from pipe section (17) as a unit.

(8) Place pipe section (15) in vise.

(9) Remove check valve (14) from pipe section (15)

(10) As required, remove block (18).

2-37. CHECK VALVE (PRODUCT WATER) REPLACE - continued.



2-37. CHECK VALVE (PRODUCT WATER) REPLACE - continued.

b. Installation.

CAUTION
Make sure pipes and check valve are free of debris prior to installation.

NOTE
Be sure tape is wrapped in same direction as threads.

(1) Apply anti-seize tape to all male pipe threads.

CAUTION
Installing check valve backwards will prevent equipment from operating properly and may cause equipment damage.

(2) Place pipe (15) in vise and install check valve (14) on end of pipe section with arrow pointing toward pipe (15) as illustrated.

(3) Install pipe section (15) and check valve (14) on pipe section (17) Be sure pipe threads for adapter (6) point toward multimedia filter and pipe threads for hose adapter (9) point upward when installed..

(4) Install adapter (6) and connect tube (5) to adapter. Tighten nut (4).

(5) If removed, position clamp (7) on hose (8).

(6) Install adapter (9) and connect hose (8). Adjust and tighten clamp (7).

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.

(7) Wrap pipe section (15) with insulating tape (16).

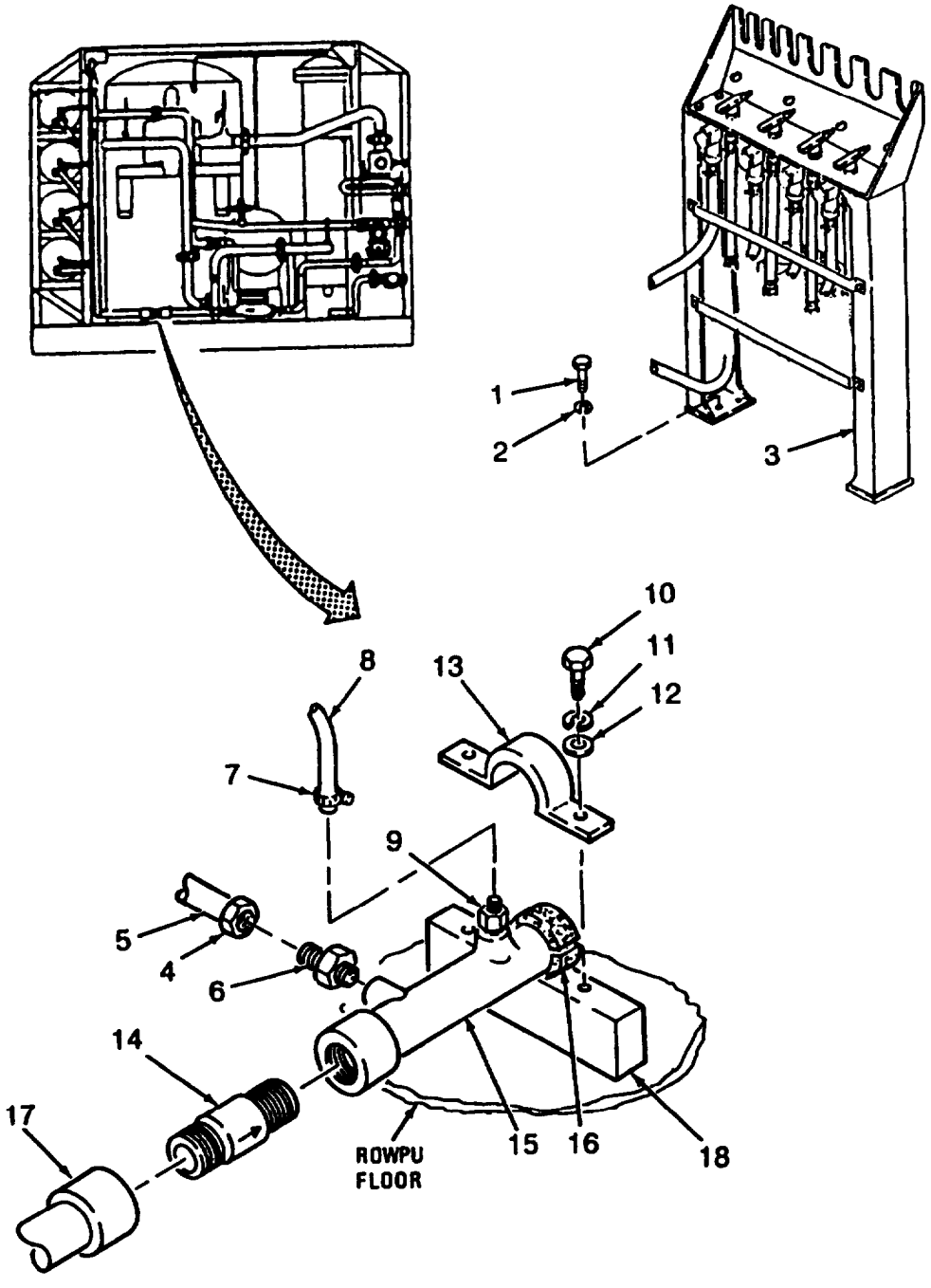
(8) Position block (18) under pipe (15) and install clamp (13), two flat washers (12), two lockwashers (11), and two bolts (10).

(9) Install water meter (Paragraph 2-36).

(10) Install chemical feed pump stand (3) with lockwashers (2) and screws (1).

(11) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.

2-37. CHECK VALVE (PRODUCT WATER) REPLACE-continued



2-38. BALL VALVES (VENT VALVES) REPLACE.

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 111, Item 3)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section 11, Item 30)
Lockwashers (TM 10-4610-241 -24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).
Personnel Required
Two
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

On Models H-9518-1, H-9518-2, and H-9518-3, there are only two drain valves. Items 8, 11, 14, 18, 21 and 24 are not present.

a. Removal.

(1) Working at front of control panel (26), remove nut (1) and handle (2).

(2) Remove six screws (3) and lo&washers (4).

(3) Working at rear of control panel (26), loosen hose clamp (5) and disconnect flexible tubing (6). If required, remove clamp from tubing.

(4) Unscrew nuts on tubes (7, 8 and 9) and disconnect tubes.

CAUTION

Pulse dampener line (center valve) requires a high pressure valve. If more than one valve is removed be sure to tag valves to prevent installation of low pressure valve in high pressure line.

(5) Remove three valves (10, 11 and 12) and attached hardware.

(6) Remove four adapters (13, 14, 15 and 16).

NOTE

Marking position of elbows on valves will facilitate installation. Be sure to transcribe markings to replacement valve prior to discarding valves or turning them in to Supply.

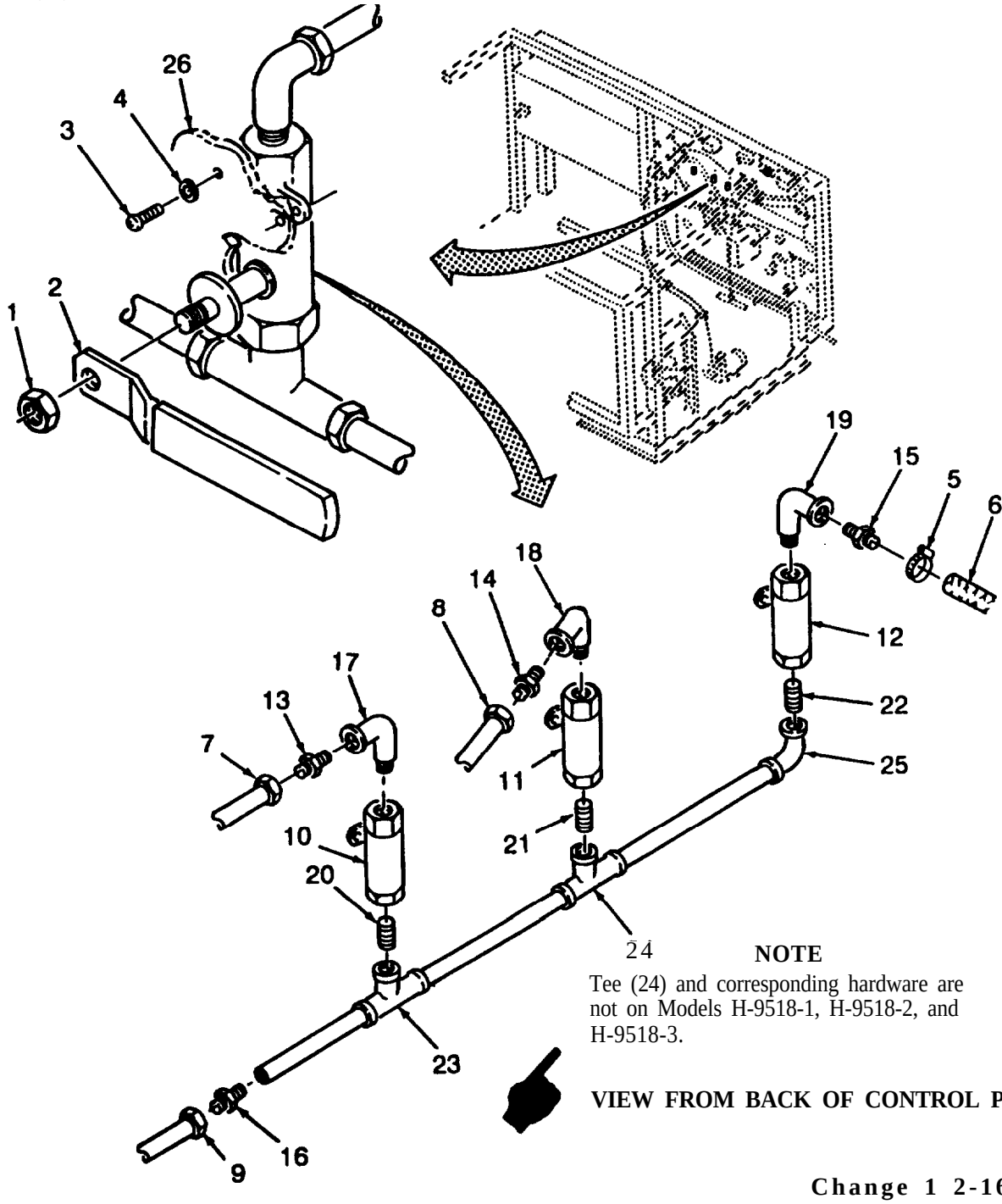
2-38. BALL VALVES (VENT VALVES) REPLACE.

(7) Mark position of elbows in relation to valves on valves and remove three elbows (17, 18, and 19) from three valves (10, 11 and 12).

(8) Remove three valves (10, 11, and 12) from nipples (20, 21, and 22).

(9) Remove three nipples (20, 21, and 22) from tees (23 and 24) and elbow (25).

(10) If required, refer to Paragraph 2-30 for further disassembly of piping.



NOTE

Tee (24) and corresponding hardware are not on Models H-9518-1, H-9518-2, and H-9518-3.

2-38. BALL VALVE (VENT VALVES) REPLACE - continued.

b. Installation.

(1) If disassembled, assemble tees (23 and 24), elbow (25) and pipes (Paragraph 2-30).

NOTE
Be sure tape is wrapped in same direction as threads.

(2) Apply anti-seize tape to all male pipe threads.

(3) Install three nipples (20, 21, and 22) on three valves (10, 11 and 12).

(4) Install three elbows (17, 18, and 19) on three valves (10, 11, and 12) as marked during disassembly.

WARNING
Be sure to install a high pressure valve in pulse dampener line (center valve). A low pressure valve in this position may cause valve to blow up and cause injury to personnel.

(5) Install three valves (10, 11 and 12) on two pipe tees (23 and 24) and elbow (25) as tagged.

(6) Install four adapters (13, 14, 15 and 16).

(7) Working at rear of control panel (26), position three valves (10, 11, and 12) and attached parts on control panel.

(8) Screw nuts of tubes (7, 8 and 9) onto nipples (13, 14, and 16).

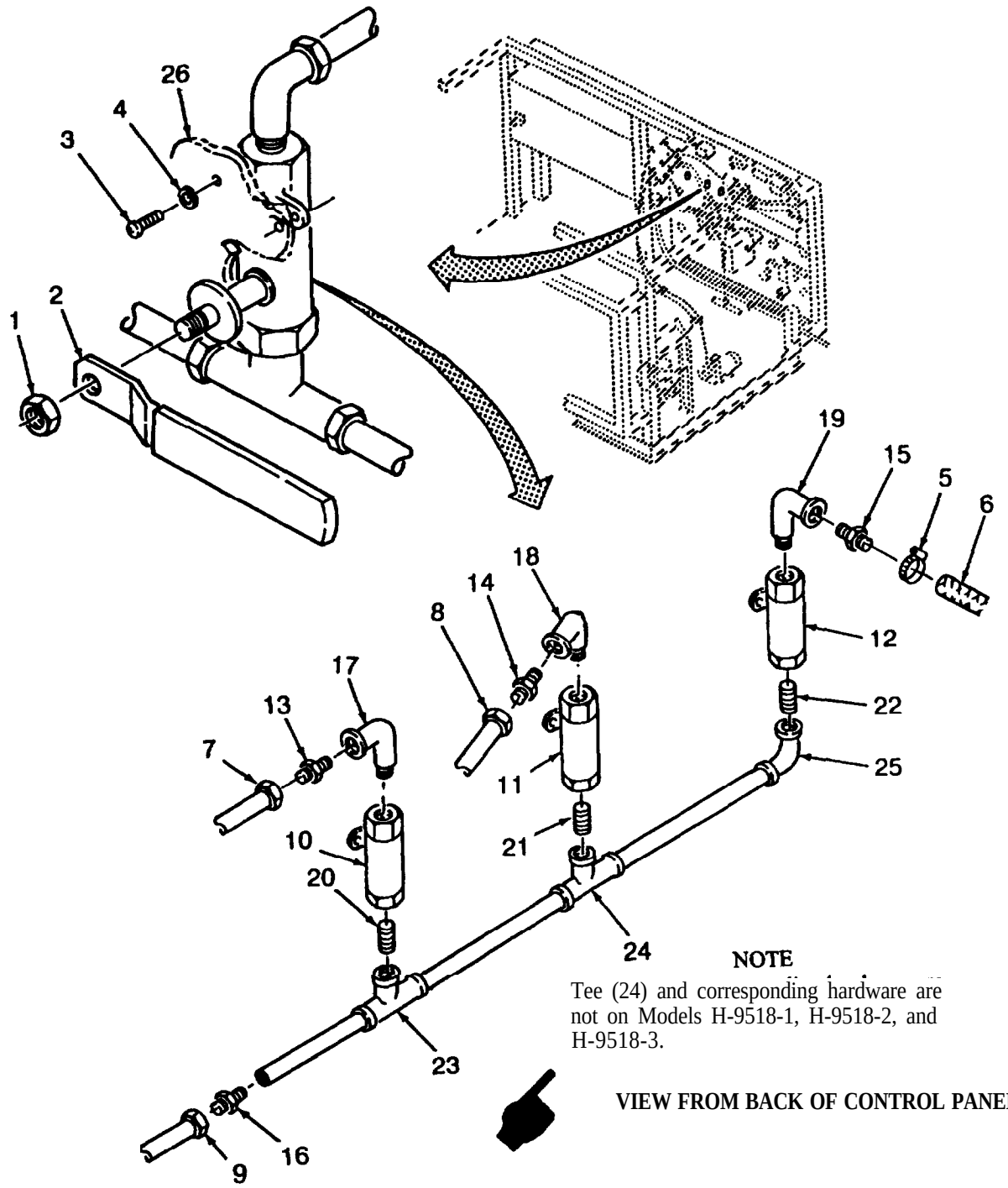
(9) Position hose clamp (5) on flexible tubing (6) and connect hose to nipple (15). Adjust and tighten hose clamp.

(10) Working at front of control panel (26), install six screws (3) and lockwashers (4).

(11) Position handles (2) on valves, making sure center valve gets a red handle and other valve handles are green, and install nuts (1).

(12) Operate ROWPU (TM 5-4610-241-10). Check for leaks and proper operation.

2-38. BALL VALVES (VENT VALVES) REPLACE-continued



NOTE

Tee (24) and corresponding hardware are not on Models H-9518-1, H-9518-2, and H-9518-3.

VIEW FROM BACK OF CONTROL PANEL

2-39. DIFFERENTIAL PRESSURE GAGE (CARTRIDGE FILTER) REPLACE.

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
Tape, Anti-seize (Appendix C, Section II, Item 19)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).
Personnel Required
Two
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.

a. Removal

(1) Loosen nut (1) and remove tube (2) from adapter (3). Remove elbow (4) from gage (16).

(2) Loosen nut (5) and remove tubing (6) and adapter (7) from tee (11).

(3) Loosen nut (8) and remove tubing (9) and adapter (10) from tee (11).

(4) Remove tee (11) and nipple (12) from differential gage (16).

(5) Remove three nuts (13), lo&washers (14) and screws (15).

(6) Remove differential gage (16) from control panel (17).

b. Installation

NOTE

Be sure to wrap tape in same direction as threads.

(1) Apply anti-seize tape to all male pipe threads.

(2) Position differential gage (16) in cutout on control panel (17).

(3) Install three screws (15), lockwashers (14) and nuts (13).

2-39. DIFFERENTIAL PRESSURE GAGE (CARTRIDGE FILTER) REPLACE - continued.

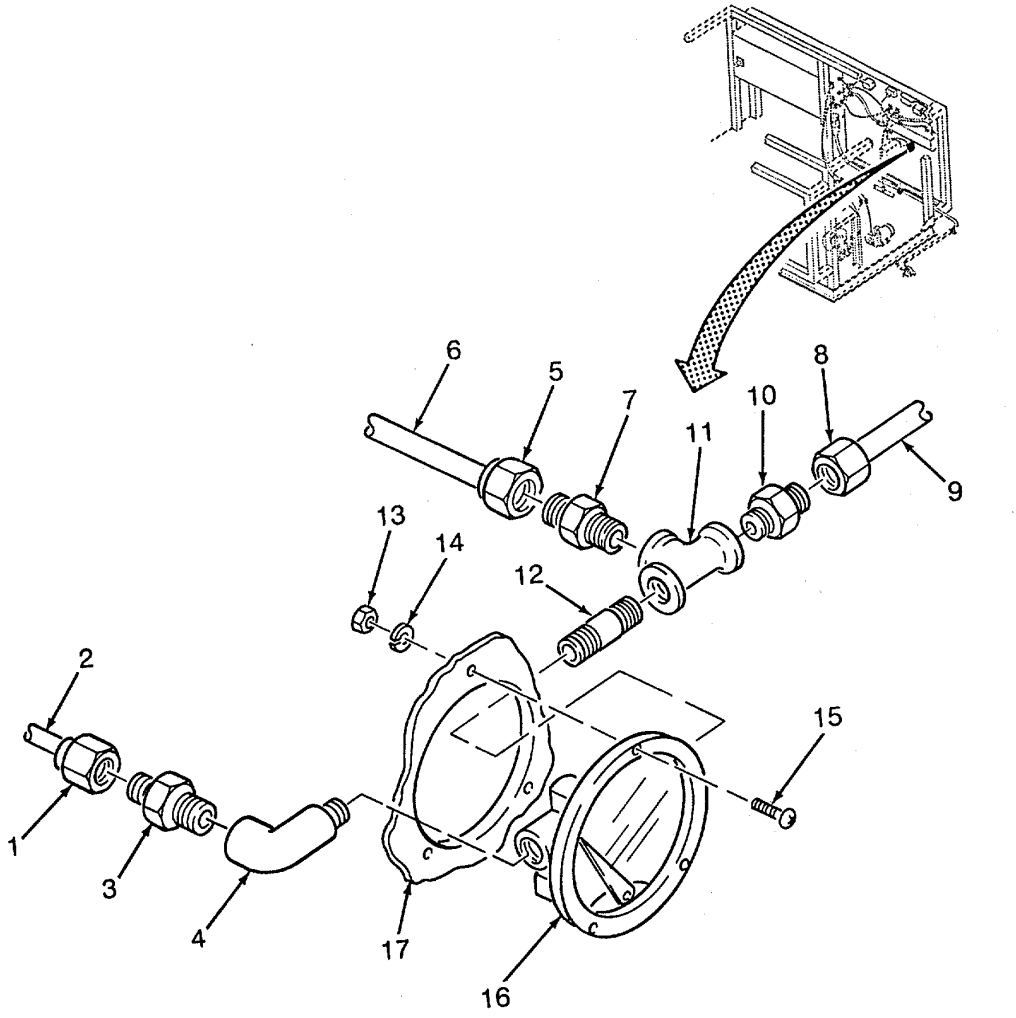
(4) Install nipple (12) and tee (11) on differential gage (16).

(5) Install adapter (10) and tubing (9) on tee (11) and secure tubing with nut (8).

(6) Install adapter (7) and tubing (6) on tee (11). Tighten nut (5).

(7) Install elbow (4), adapter (3) and tubing (2) on differential gage (16). Tighten nut (1).

(8) Operate ROWPU (TM 5-4610-241-10). Check for leaks and proper operation.



2-40. FLOW METER (BRINE WATER) REPLACE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

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

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)
- Tape, Insulating (Appendix C, Section II, Item 21)
- Grease, Silicone (Appendix C, Section II, Item 10)
- Lockwashers and Gaskets (TM 10-4610-241-24P)

Personnel
- Two

Reference
- Power shut down (Power Source Manual).
- ROWPU Piping drained (TM 10-4610-241-10).

a. Removal.

(1) Unscrew cap (1) from pipe section (22). As required, remove cap from ROWPU frame (Paragraph 2-14).

(2) Remove nuts (2), screws (3), washers (4) and lockwashers (5).

(3) Remove two nuts (6), lockwashers (7), flat washers (8), screws (9) and two-piece strap (10).

(4) Remove two nuts (11), bolts (12) and clamp halves (13). Slide gasket (21) onto pipe (23).

(5) Remove two nuts (14), lockwashers (15), and bracket (16) from studs (19).

(6) Tilt pipe sections (22 and 23) and remove from control panel (20) with flowmeter (24) attached. Remove gasket (21).

(7) As required, remove nuts (17 and 18) and studs (19).

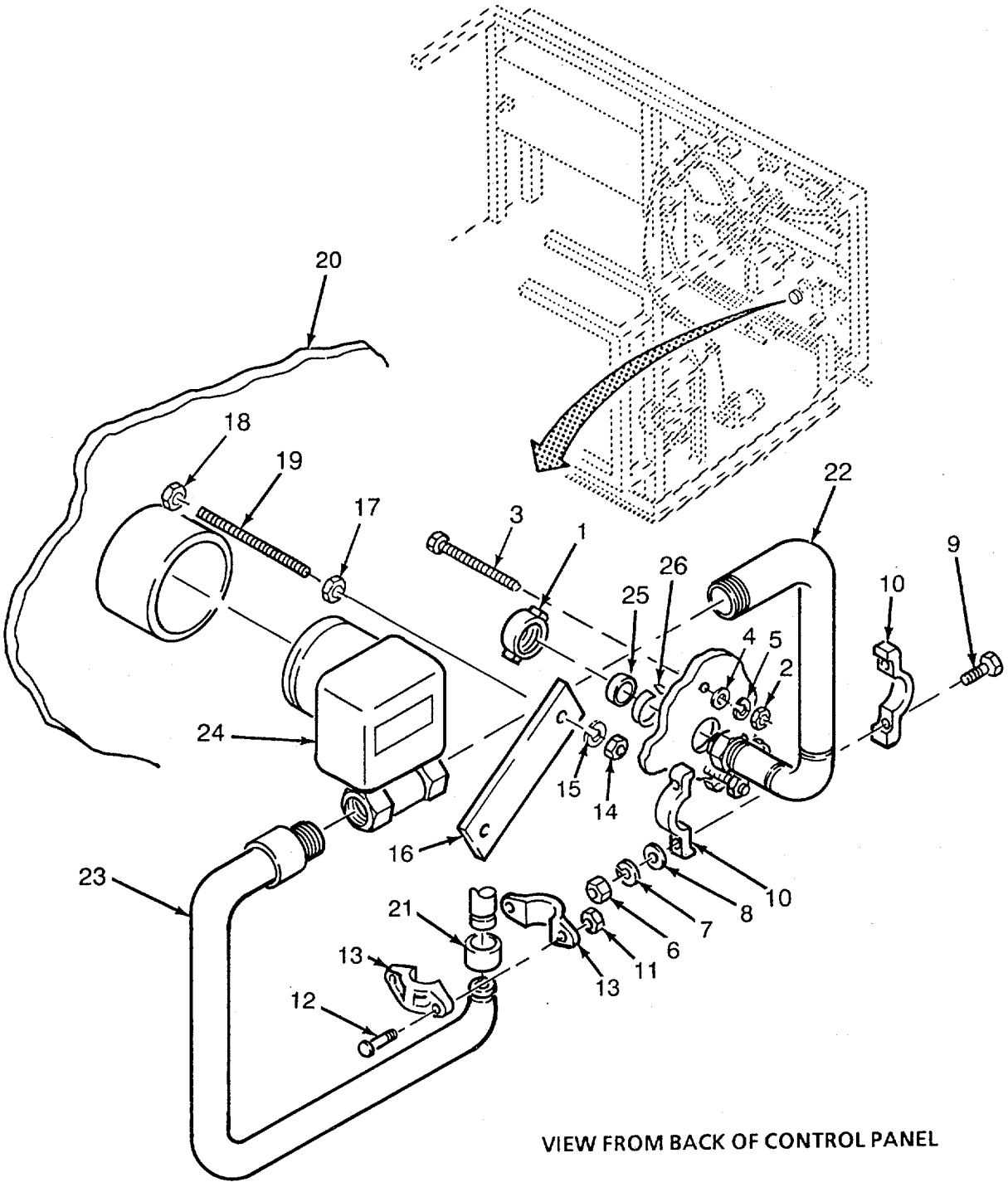
NOTE

Marking positions of pipes in relation to flowmeter will facilitate installation. Be sure to transcribe marks to replacement parts before parts are discarded or turned in to Supply.

(8) Scribe a line across junctions of pipes (22 and 23) and flow meter (24). Place flowmeter in vise and remove pipe sections (22) and (23).

(9) As required, remove ring filler (25) and insulating tape (26) from pipe (22).

2-40. FLOW METER (BRINE WATER) REPLACE - continued.



2-40. FLOW METER (BRINE WATER) REPLACE - continued.

b. Installation.

NOTE
Be sure tape is wrapped in same direction as threads

(1) Apply anti-seize tape to all male pipe threads.

(2) Install pipe sections (22 and 23) on flow meter (24) as marked during removal.

(3) Lubricate gasket (21) and position on pipe (23).

(4) If removed, install studs (19) and nuts (18 and 17). Tighten nuts to secure studs to control panel. Stud (19) must be flush with nut (18).

(5) Position face of flowmeter (24) in BRINE FLOWMETER cutout on control panel (20) and end of pipe section (22) in BRINE pipe cutout on panel.

(6) Position bracket (16) on two studs (19) and install lockwashers (15) and nuts (14).

(7) Slide gasket (21) over pipe joint and install clamp halves (13), two bolts (12), 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.

(8) Install insulating tape (26) and ring filler (25) on pipe section (22) where two-piece strap (10) will clamp.

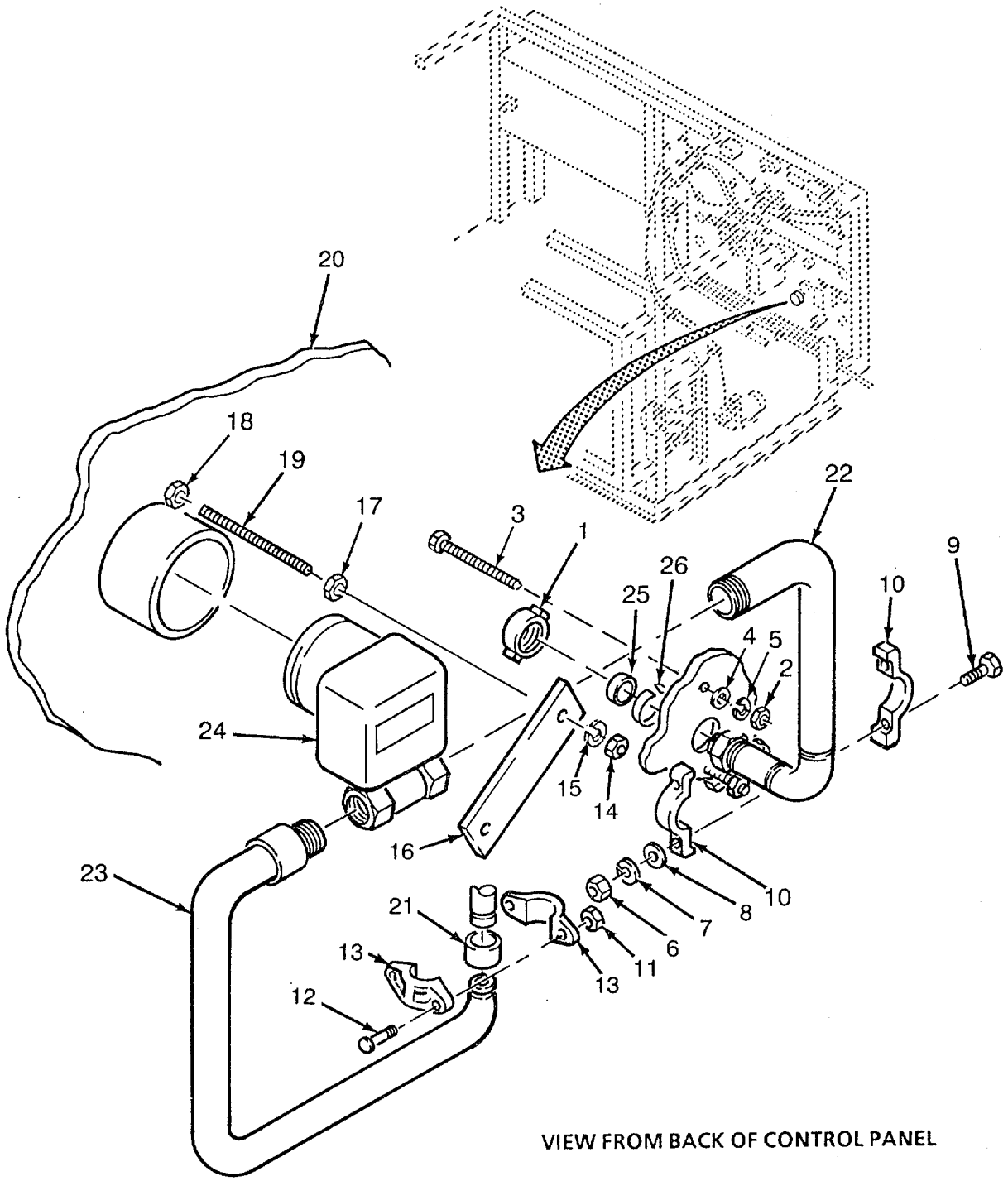
(9) Position two-piece strap (10) on pipe section (22) and install two screws (9), flat washers (8), lockwashers (7) and nuts (6).

(10) Insert two screws (3) into front of control panel (20) thru control panel and between 2-piece straps (10) and install two flatwashers (4), lockwashers (5) and nuts (2).

(11) Screw cap (1) onto end of pipe section (22). If removed, attach cap to ROWPU frame (Paragraph 2-14).

(12) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.

2-40. FLOW METER (BRINE WATER) REPLACE - continued.



12-41. NEEDLE VALVE (PRODUCT WATER REGULATING) REPLACE.

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)
- Vise (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)
- Grease, Silicone (Appendix C, Section II, Item 10)
- Lockwashers and Gaskets (TM 10-4610-241-24P)

Personnel Required
- Two

Equipment Condition
- Reference
  - Power shut down (Power Source Manual).
  - ROWPU Piping drained (TM 10-4610-241-10).

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.

a. Removal.

(1) Using punch, remove roll pin (1) and valve handle (2) from needle valve (17).

(2) Remove two nuts (3), bolts (4) and clamp halves (5). Slide gasket (13) onto adapter (15).

(3) Remove two nuts (6), bolts (7) and clamp halves (8). Slide gasket (14) onto adapter (16).

(4) Remove two screws (9), lockwashers (10), flat washers (11), bar (12) and needle valve (17) from control panel (21).

(5) Remove gaskets (13 and 14).

(6) Place needle valve (17) in vise and remove two adapters (15 and 16).

(7) As required, remove two screws (18), lockwashers (19) and restraint block (20)

b. Installation.

(1) If removed, position restraint block (20) on back of control panel (21) and secure with two lockwashers (19) and screws (18).

2-41. NEEDLE VALVE (PRODUCT WATER REGULATING) REPLACE - continued.

CAUTION
Be sure to wrap tape in same direction as threads.

(2) Apply anti-seize tape to male pipe threads.

(3) Install two adapters (16 and 15) on needle valve (17).

(4) Lubricate gaskets (13 and 14) and slide onto adapters (15 and 16).

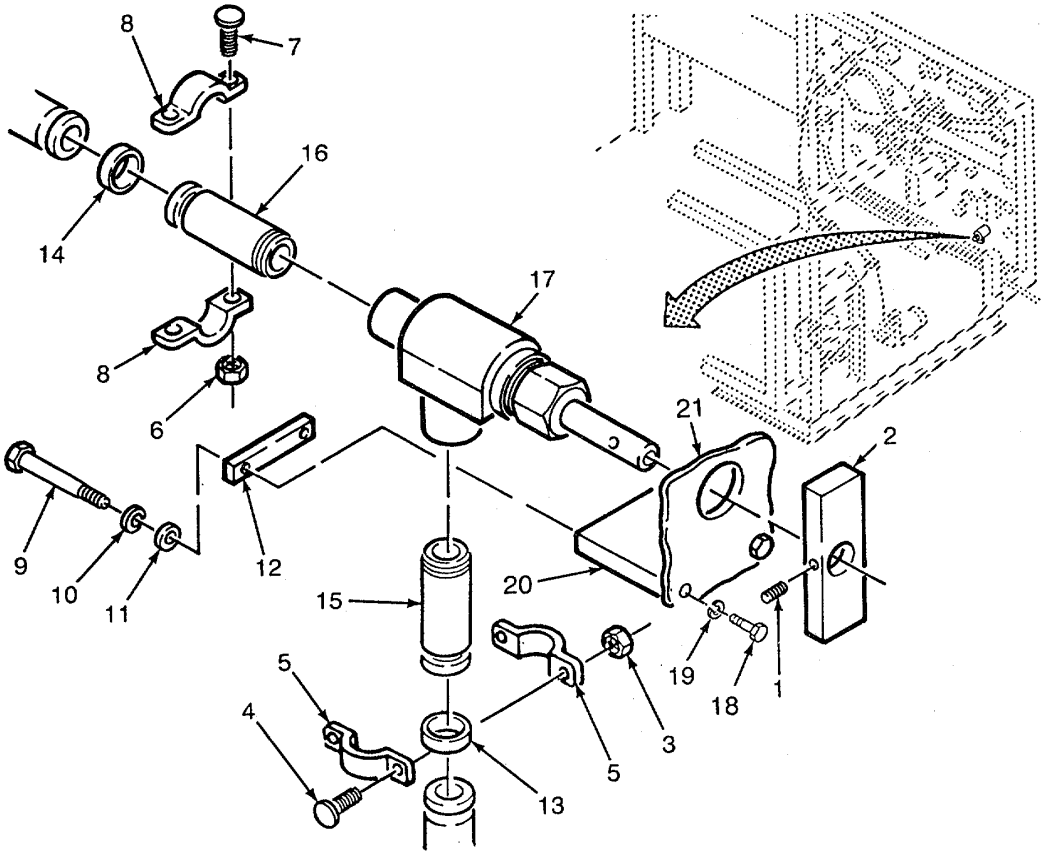
(5) Position needle valve (17) and bar (12) on control panel (21) and restraint block (20) and install two flat washers (11), lockwashers (10), and screws (9).

(6) Position gasket (14) over pipe joint, and install clamp halves (8), two bolts (7), and two nuts (6).

(7) Position gasket (13) over pipe joint and install clamp halves (5), two bolts (4) and two nuts (3).

(8) Position handle (2) on valve stem and install roll pin (1).

(9) Operate ROWPU (TM 10-4610-4610-241-10). Check for leaks and proper operation.



2-42. DIFFERENTIAL PRESSURE GAGE (R. O. VESSELS) REPLACE.

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 19)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).
Personnel Required
Two
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.

a. Removal.

(1) Loosen nut (1) and disconnect tubing (2) from adapter (3). Remove elbow (4L) from differential pressure gage (11).

(2) Loosen nut (5) and disconnect tubing (6) and adapter (7) from differential gage (11).

(3) Remove three nuts (8), lockwashers (9) and screws (10).

(4) Remove differential pressure gage (11) from control panel (12).

b. Installation.

(1) Position differential gage (11) in cutout on control panel (12).

(2) Install three screws (10), lockwashers (9) and nuts (8).

NOTE

Be sure to wrap tape in same direction as pipe threads.

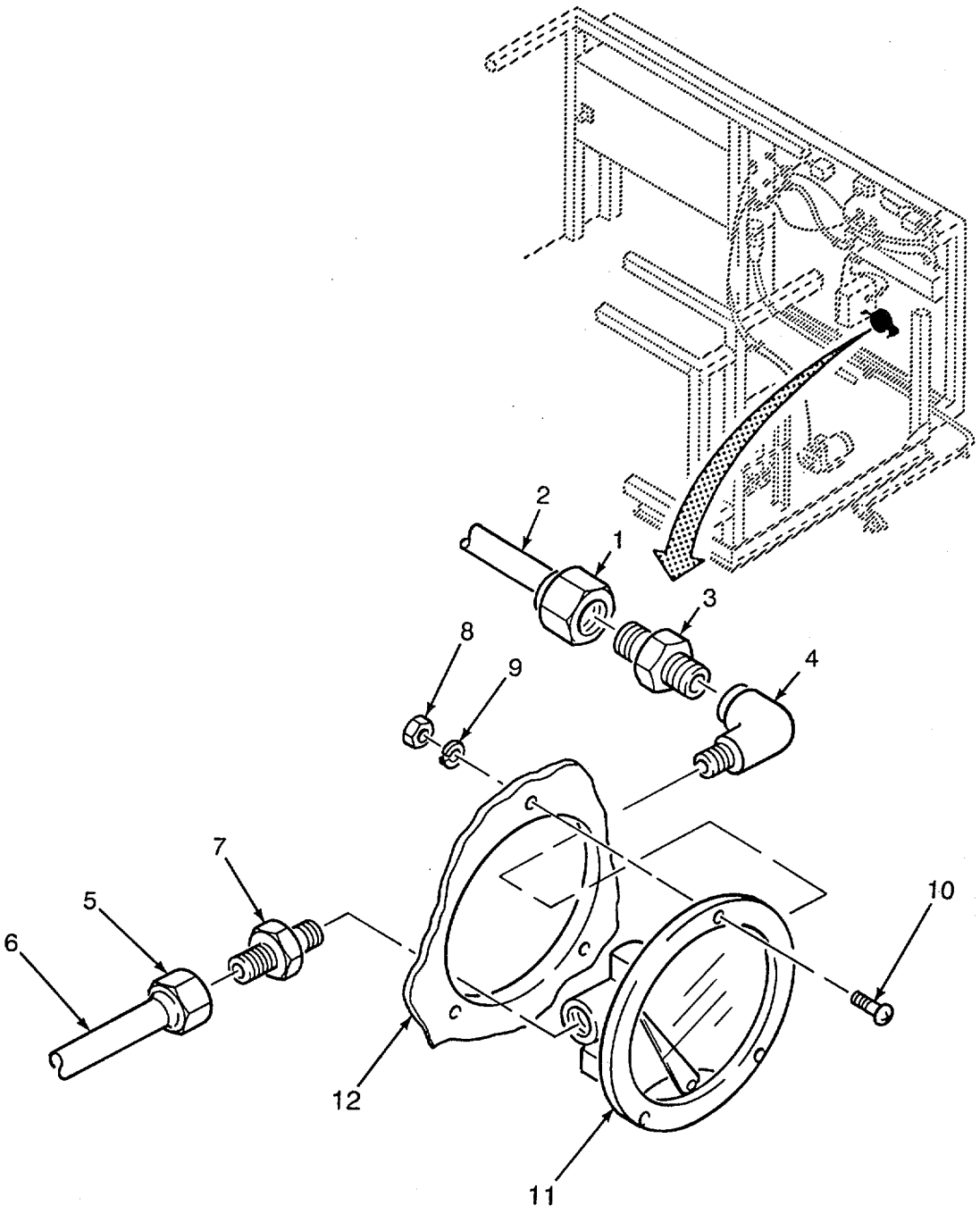
(3) Apply anti-seize tape to male pipe threads.

2-42. DIFFERENTIAL PRESSURE GAGE (R. O. VESSELS) REPLACE.

(4) Install adapter (7) and tubing (6) on differential pressure gage (11). Tighten nut (5).

(5) Install elbow (4), adapter (3), and tubing (2) on differential pressure gage (11). Tighten nut (1).

(6) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-43. TWO-WAY VALVE (ON/OFF) REPLACE.

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 19)
Equipment Condition
Reference
Power shut down (Power Source Manual).

a. Removal.

NOTE
There are four 2-way valves on the ROWPU. All are removed and installed the same. One is shown, the others are similar.

(1) Loosen clamp (2), and remove flexible tubing (1) from adapter (5). As required, remove clamp from tubing.

(2) Loosen clamp (4), and remove flexible tubing (3) from adapter (6). As required, remove clamp from tubing.

(3) Remove valve (7) from spring clip (11).

(4) Remove two adapters (5 and 6) from valve (7).

(5) As required, remove two nuts (8), lockwashers (9), screws (10) and clip (11).

b. Installation.

(1) If removed, install clip (11), two screws (10) lockwasher (9) and nut (8).

NOTE
Be sure tape is wrapped in same direction as threads.

(1) Apply antiseize tape to male threads of adapters (5 and 6).

(2) Install adapters (5 and 6) on valve (7).

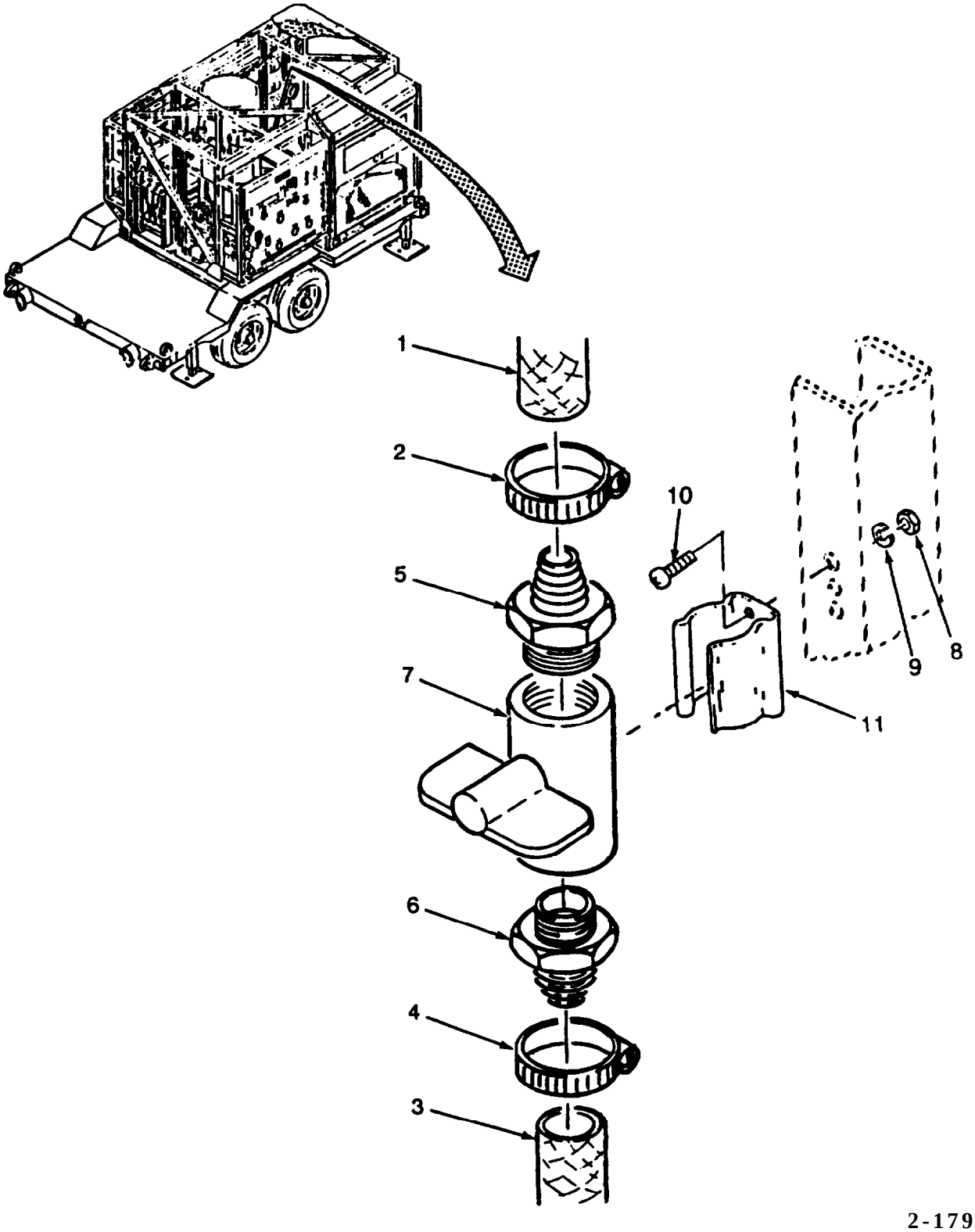
(3) Position clamp (4) on flexible tubing (3) and connect tubing to adapter (6). Adjust and tighten clamp.

(4) Position clamp (2) on flexible tubing (1) and connect tubing to adapter (5). Adjust and tighten clamp.

2-43. TWO-WAY VALVE (ON/OFF) REPLACE -continued

(5) Position valve (7) on spring clip (11).

(6) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-44. BALL VALVES (DRAIN) REPLACE.

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 19)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).
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.

a. Removal.

NOTE

On Models WPES-10, WPES-20, and WPES-30, there are seven drain ball valves. On Models H-9518-1, H-9518-2, and H-9518-3, there are six drain ball valves. All are installed the same. One is shown, the others are similar.

(1) Loosen nut (1) and disconnect tube (2) from adapter (8).

(2) Remove nut (3), lockwasher (4) (high pressure valve only) and handle (5) form drain ball valve (9).

CAUTION

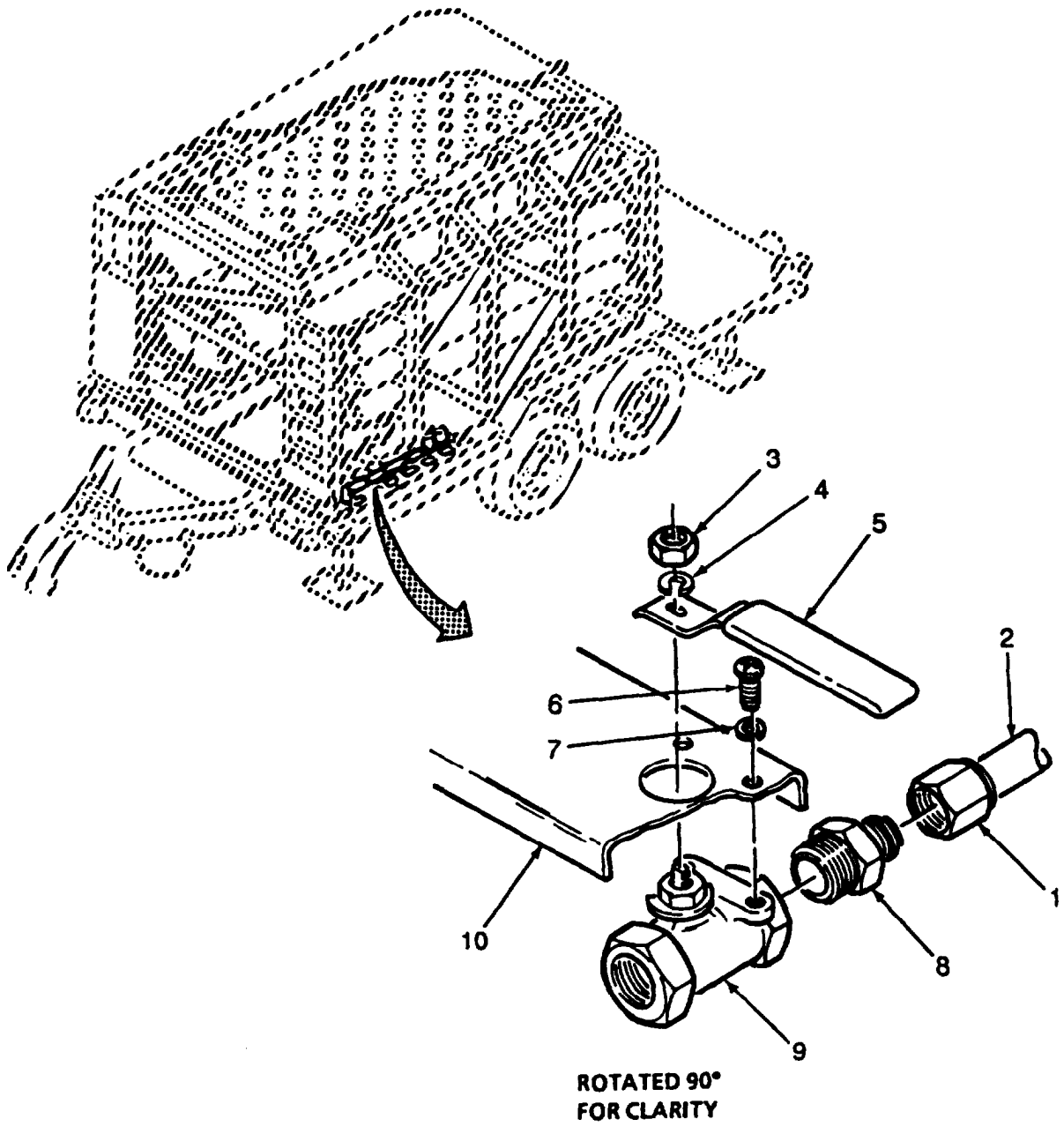
Vessel and pulse dampener lines require high pressure valves (Models H-9518-1, H-9518-2, and H-9518-3 do not have a pulse dampener line). If more than one valve is to be replaced, be sure to tag valves, identifying them as high or low pressure valves to ensure correct installation.

(3) Support drain ball valve (9) and remove two screws (6) and lo&washers (7).

(4) Lower drain ball valve (9) and tilt to remove from cutout in bracket (10).

(5) Remove adapter (8) from drain ball valve (9).

2-44. BALL VALVES (DRAIN) REPLACE - continued.



2-44. BALL VALVES (DRAIN) REPLACE - continued.

b. Installation.

NOTE
Be sure tape is wrapped in same direction as threads.

(1) Apply anti-seize tape to male pipe threads.

(2) Install adapter (8) on drain ball valve (9).

WARNING
Be sure to install high pressure valves in high pressure lines (vessels and pulse dampener). Models H-9518-1, H-9518-2, and H-9518-3 do not have a pulse dampener line. Installing a low pressure valve in a high pressure line may cause the valve to blow up and injure personnel.

(3) Position drain ball valve (9) in bracket (10) and install two lo&washers (7) and screws (6) finger tight.

NOTE
Be sure to install correct handle. Vessel drain lines and pulse dampener drain lines are high pressure lines and get red handles (Models H-9518-1, H-9518-2, and H-9518-3 do not have a pulse dampener line). All other lines are low pressure lines and require green handles.

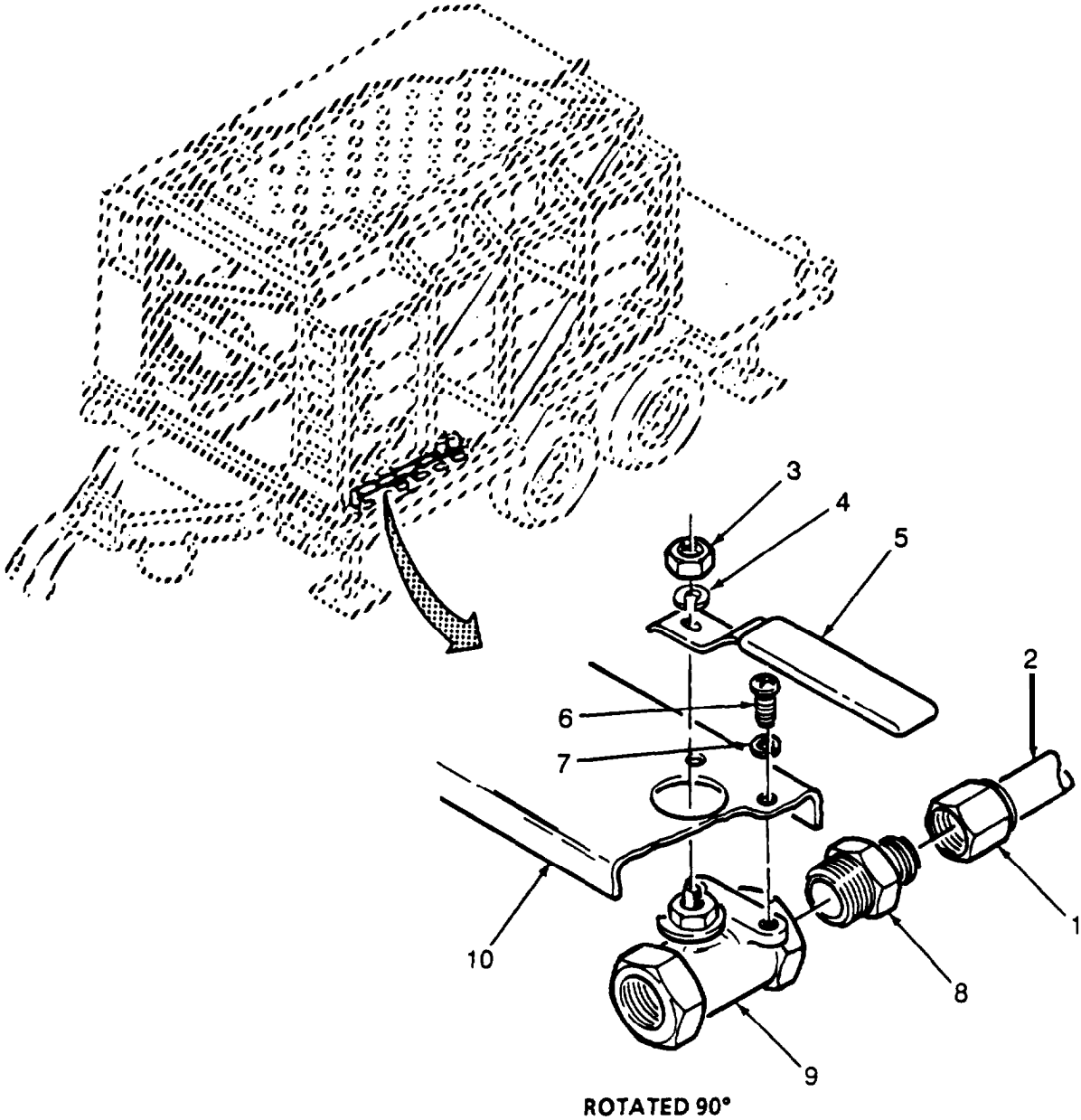
(4) Install handle (5), lockwasher (4) (high pressure valve only) and nut (3) on dram ball valve (9).

(5) Connect tube (2) to adapter (8) and tighten nut (1).

(6) Tighten two screws (6).

(7) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.

2-44. BALL VALVES (DRAIN) REPLACE - continued.



2-45. 3-WAY BALL VALVE (BACKWASH) REPAIR (Models WPES-10, WPES-20 and WPES-30).

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)
Vise (Appendix B, Section III, Item 3)
Pipewrench (Appendix B, Section III, Item 3)

Material/Parts Required

Tape, Anti-seize (Appendix C, Section II, Item 19)
Detergent (Appendix C, Section II, Item 5)
Rags, Wiping (Appendix C, Item 14)
Lo&washers (TM 10-4610-241 -24P)
Gaskets and Packing (TM 10-4610-241-24P)

Equipment Condition

Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241 -10).

Personnel Required

Two

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.

a. Removal

(1) Remove nut (1), lockwasher (2) and handle (3) from 3-way valve (25). Reinstall nut and lo&washer on valve.

(2) Remove two nuts (4), bolts (5) and clamp halves (6). Slide gasket (14) onto elbow (17).

(3) Remove two nuts (7), bolts (8) and clamp halves (9). Slide gasket (13) onto adapter (20).

(4) Remove two nuts (10), bolts (11) and clamp halves (12). Slide gasket (15) onto adapter (19).

(5) Loosen four setscrews (16).

(6) Remove 3-way valve (25) and attached parts from back of control panel and remove gaskets (13, 14 and 15) from elbow (17) and adapters (19 and 20).

2-45. 3-WAY BALL VALVE (BACKWASH) REPAIR (Models WPES-10, WPES-20 and WPES-30) - continued.

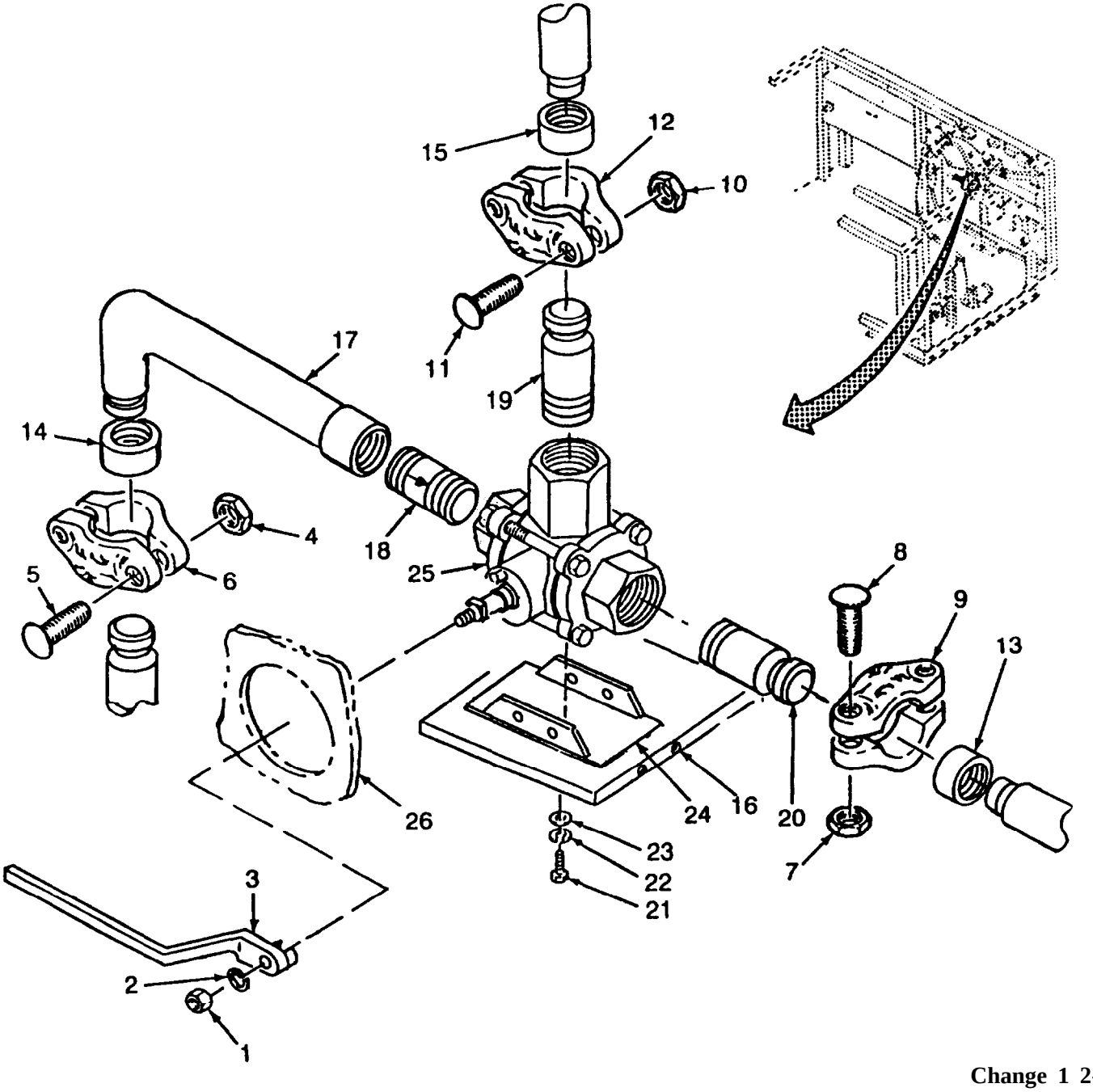
NOTE

Marking elbow in relation to valve will facilitale assembly. Be sure to transcribe markings to replacement valve before discarding or turning it in to Supply.

(7) Scribe a line on valve (25), indicating the direction of angle in elbow (17).

(8) Place 3-way valve (25) in vise and remove elbow (17), check valve (18) and adapters (19 and 20).

(9) As required, remove screw (21). lockwasher (22), washer (23) and bracket (24.



2-45. 3-WAY BALL VALVE (BACKWASH) REPAIR (Models WPES-10, WPES-20 and WPES-30) - continued.

b. Disassembly.

(1) Clamp 3-way valve in vise and unscrew and remove gland (27).

(2) Using vise grip or pliers on nut (1) pull out stem (28). Remove packing (30) and ring (29) from stem (28).

(3) If required, pull out stop pin (31).

(4) Remove four nuts (32), lockwashers (33) and bolts (34).

(5) Remove end fittings (35 and 36), gaskets (37 and 38) and ball (39). Pry seats (40 and 41) out of end caps (35 and 36).

c. Cleaning.

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

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

(3) Use wire brush to clean all threaded fittings.

d. Inspection.

(1) Inspect all threaded components for damaged threads.

(2) Inspect ball (39) and ball seats (40 and 41) for deep scratches and corrosion.

(3) Inspect body (42) for cracks and corrosion.

e. Repair.

(1) Replace gaskets and packing.

(2) Replace damaged components.

f. Assembly.

(1) Install ring (29) and packing (30) on stem (28) and set aside.

CAUTION

ROWPU will blow a discharge line if ball is incorrectly installed.

(2) Position ball (39) in housing (42) with one large hole pointing toward large threaded hole in housing, the other large hole pointing to the right as illustrated and the slot pointing toward the stem (28).

(3) Position stem (28) in housing (42). Make sure it engages slot in ball (39).

(4) Install gland nut (27) and snug, then mark position of stem (28) in relation to valve body (42).

2-45. 3-WAY BALL VALVE (BACKWASH) REPAIR (Models WPES-10, WPES-20 and WPES-30) - continued.

(5) Position scats (40 and 41) on end caps (35 and 36). Be sure concave side of seats (see crossection) point toward hall (39).

(6) Position gaskets (37 and 38) on valve body (42).

(7) Position end caps (35 and 36) on valve body (42) and install bolts (34), lockwashers (33) and nuts (32) . Tighten nuts until lockwashers just start to compress.

(8) Verify position of ball (39) in housing (step 2 above) and torque 3-way valve assembly as follows:

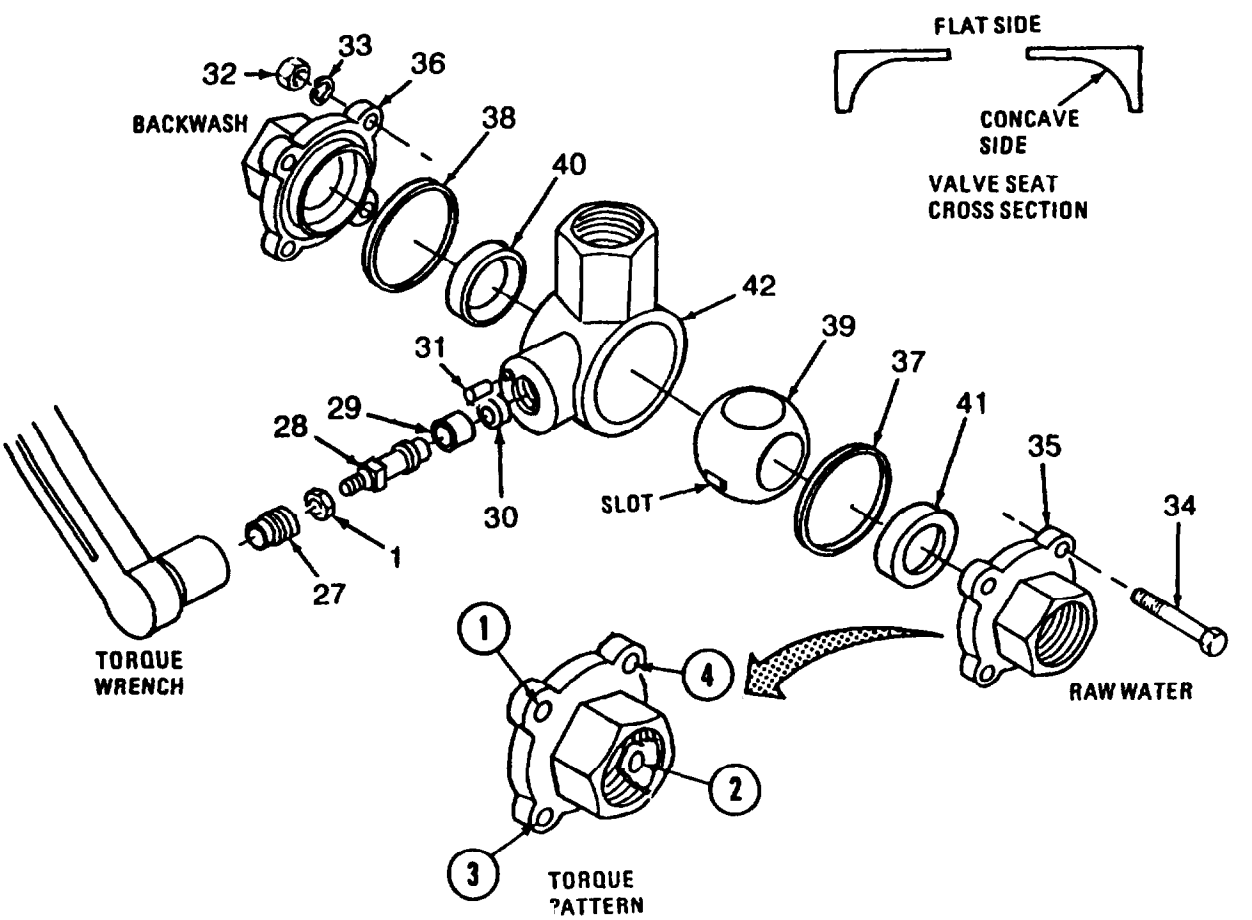
(a) Tighten nuts (32) 1/4 turn in illustrated torque pattern.

(b) Position torque wrench on nut (1) and turn wrench clockwise while viewing needle on torque wrench.

If torque wrench indicates 14-20 Ibs ft when stem (28) starts turning (breakaway torque), valve is torqucd correctly.

If torque wrench indicates less than 14-20 Ibs ft when stem (28) starts turning, repeat steps (a) and (b) above until correct torque of 14-20 Ibs ft is acheived.

(9) Visually verify that ball (39) is still in correct position (step 2 above). If not, turn as required



2-45. 3-WAY BALL VALVE (BACKWASH) REPAIR (Models WPES-10, WPES-20 and WPES-30) - continued.

g. Installation.

NOTE
Be sure to wrap tape in same direction as pipe thread.

(1) Apply anti-seize tape to male pipe fittings.

(2) If removed, install bracket (24) on valve (25), using flatwasher (23), lockwasher (22) and screw (21).

CAUTION
ROWPU will not work in normal operation and may be damaged if check valve is incorrectly installed. Arrow has to point toward valve.

(3) Place 3 way valve (25) in vise and install check valve (18), elbow (17), is marked at disassembly, and adapters (19 and 20) on valve.

NOTE
Casket (13) and associated clamps and hardware are smaller then gaskets (14 and 15) and their hardware.

(4) Lubricate gaskets (13, 14 and 15) and position on adapters (19 and 20) and check valve (18).

(5) Loosen setscrews (16) to insure that bracket will slide into cutout on shelf of control panel (26).

(6) Position 3-way valve (25) and attached parts in cutout for bracket (24) with stem of valve (25) pointing toward cutout on control panel (26).

(7) Position gasket (15) over pipe joint and install clamp halves (12), two bolts (1 1), and two nuts (10).

(8) Position gasket (13) over pipe joint and install two clamp halves (9), bolts (8), and nuts (7).

(9) Position gasket (14) over pipe joint and install two clamp halves (6), bolts (5), and two nuts (4).

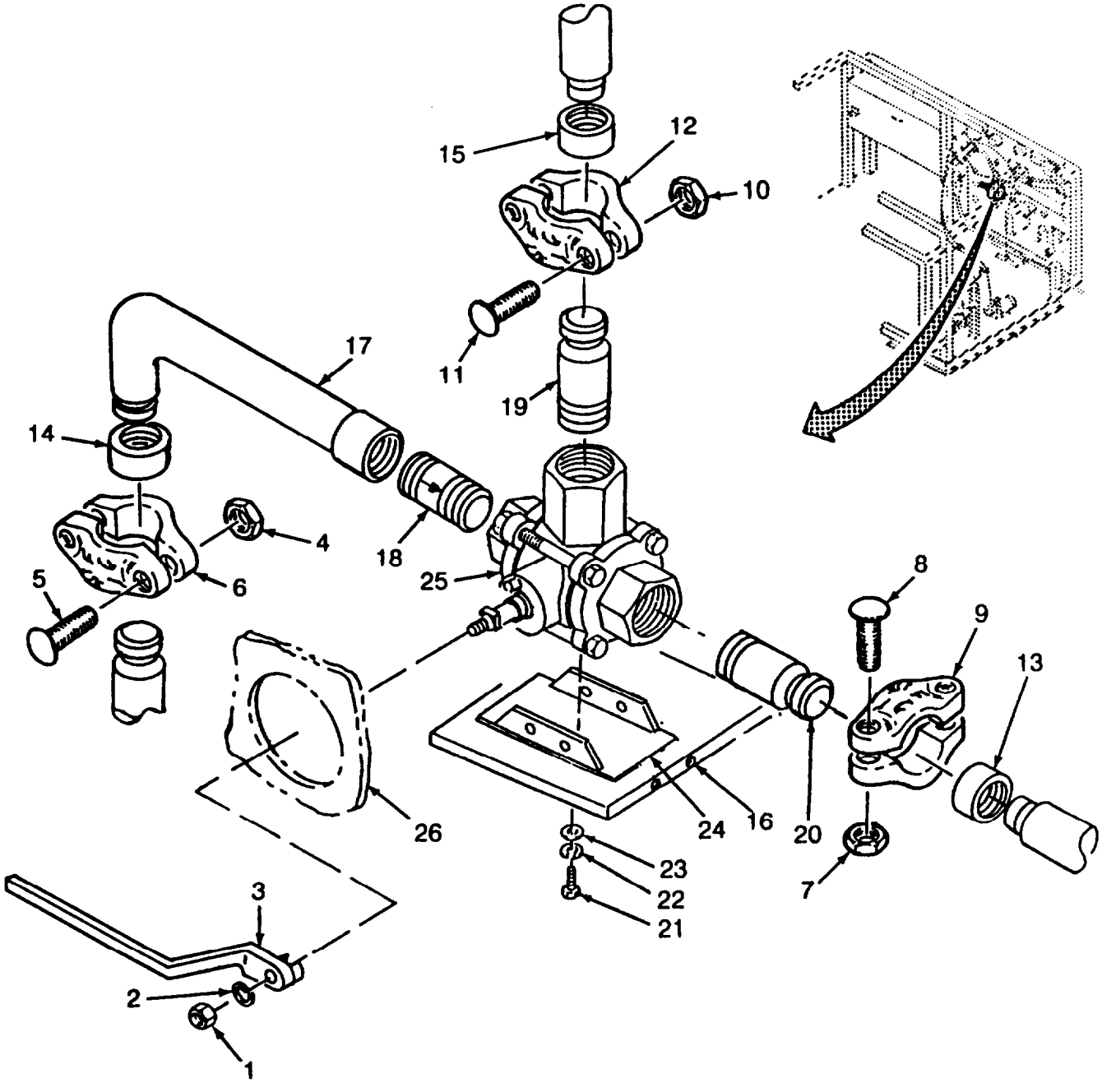
(10) Tighten setscrews (16).

NOTE
When installed, handle must be positioned in the BACKWASH position.

(11) If installed, remove nut (1) from stem of 3-way valve (25) and position handle (3) and lockwasher (2) on stem of valve. Install and tighten nut (1) and turn valve to NORMAL.

(12) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.

2-45. 3-WAY BALL VALVE (BACKWASH) REPAIR (Models WPES-10, WPES-20 and WPES-30) - continued.



2-45.1. 3-WAY BALL VALVE (BACKWASH) REPAIR (Models H-9518-1, H-9518-2, and H-9518-3).

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)
Vise (Appendix B, Section III, Item 3)
Pipewrench (Appendix B, Section III, Item 3)

Material/Parts Required

Tape, Anti-seize (Appendix C, Section II, Item 19)
Detergent (Appendix C, Section II, Item 5)
Lubricant, O-Ring (Appendix C, Section II, Item 11)
Rags, Wiping (Appendix C, Section, II, Item 14)
Lo&washers (TM 10-4610-241-24P)
Packing and Seal Kit (TM 10-4610-241-24P)

Equipment Condition

Reference

Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).

Personnel Required

Two

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.

a . Removal

(1) Remove nut (1), lockwasher (2) and handle (3) from 3-way valve (25). Install nut (1) and lockwasher (2) on 3-way valve (25).

(2) Remove two nuts (4), bolts (5) and clamp halves (6). Slide gasket (14) onto elbow (17).

(3) Remove two nuts (7), bolts (8) and clamp halves (9). Slide gasket (13) onto adapter (20).

(4) Remove two nuts (10), bolts (11) and clamp halves (12). Slide gasket (I 5) onto adapter (19).

(5) Loosen four setscrews (16).

(6) Remove 3-way valve (25) and attached parts from back of control panel and remove gaskets (13, 14 and 15) from elbow (17) and adapters (19 and 20).

2-45.1. 3-WAY BALL VALVE (BACKWASH) REPAIR (Models H-9518-1, H-9518-2, and H-9518-3) - continued.

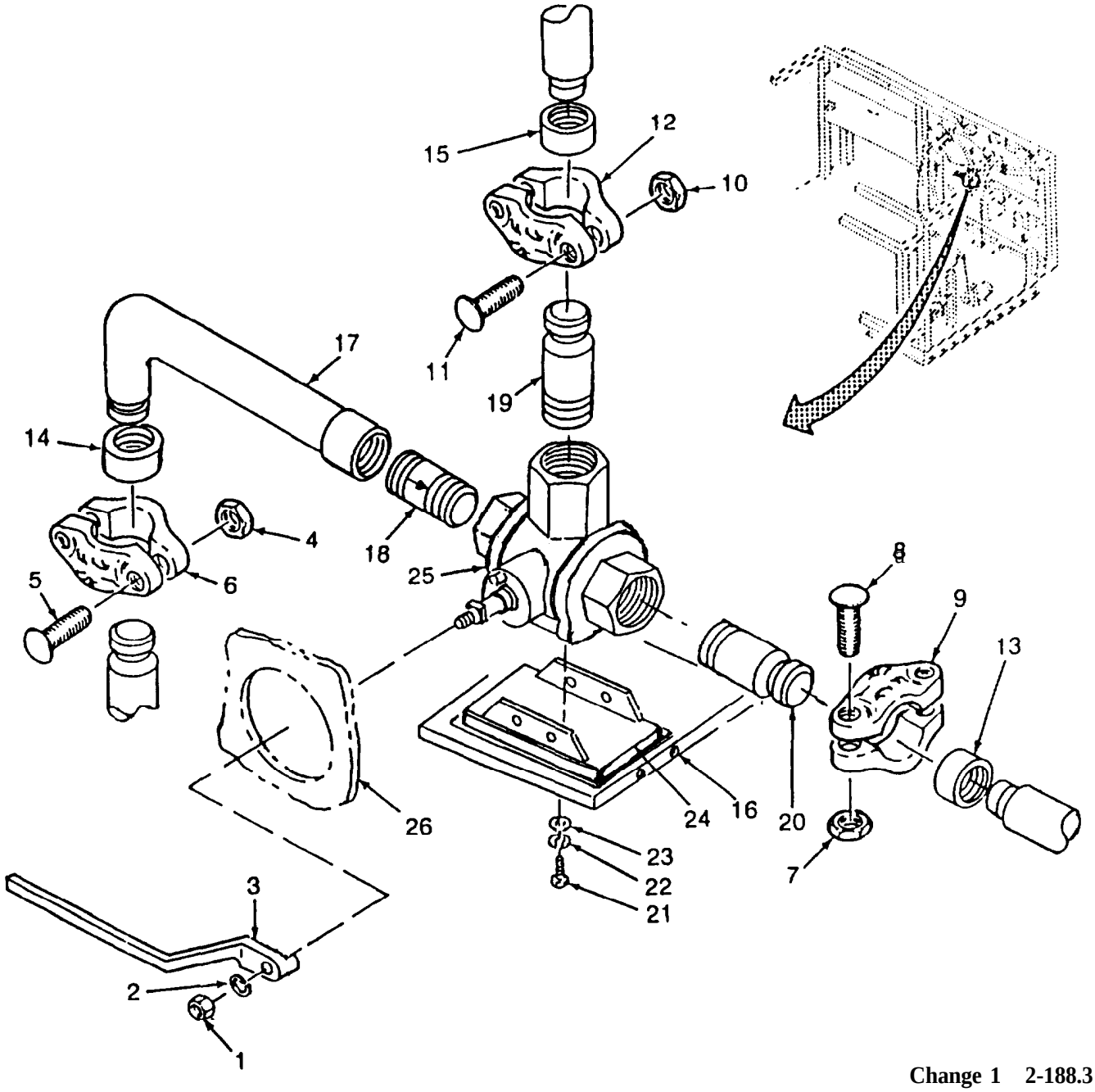
NOTE

Marking elbow in relation to valve will facilitate assembly. Be sure to transcribe markings to replacement valve before discarding or turning it in to Supply.

(7) Scribe a line on 3-way valve (25), indicating the direction of angle in elbow (17).

(8) Place 3-way valve (25) in vise and remove elbow (17) check valve (18) and adapters (19 and 20).

(9) As required, remove screw (21) lockwasher (22). washer (23) and bracket (24).



2-45.1 3-WAY BALL VALVE (BACKWASH) REPAIR (MODELS H-9518-1, H-9518-2, and H-9518-3) - continued.

b. Disassembly.

(1) Clamp 3-way valve in vise and remove adapter (27).

CAUTION
Make sure that the ball does not get scratched during removal.

(2) Using an adjustable wrench turn stem (28) to a position with the water passage to the right when viewed from the stem, which allows the ball (29) to be removed.

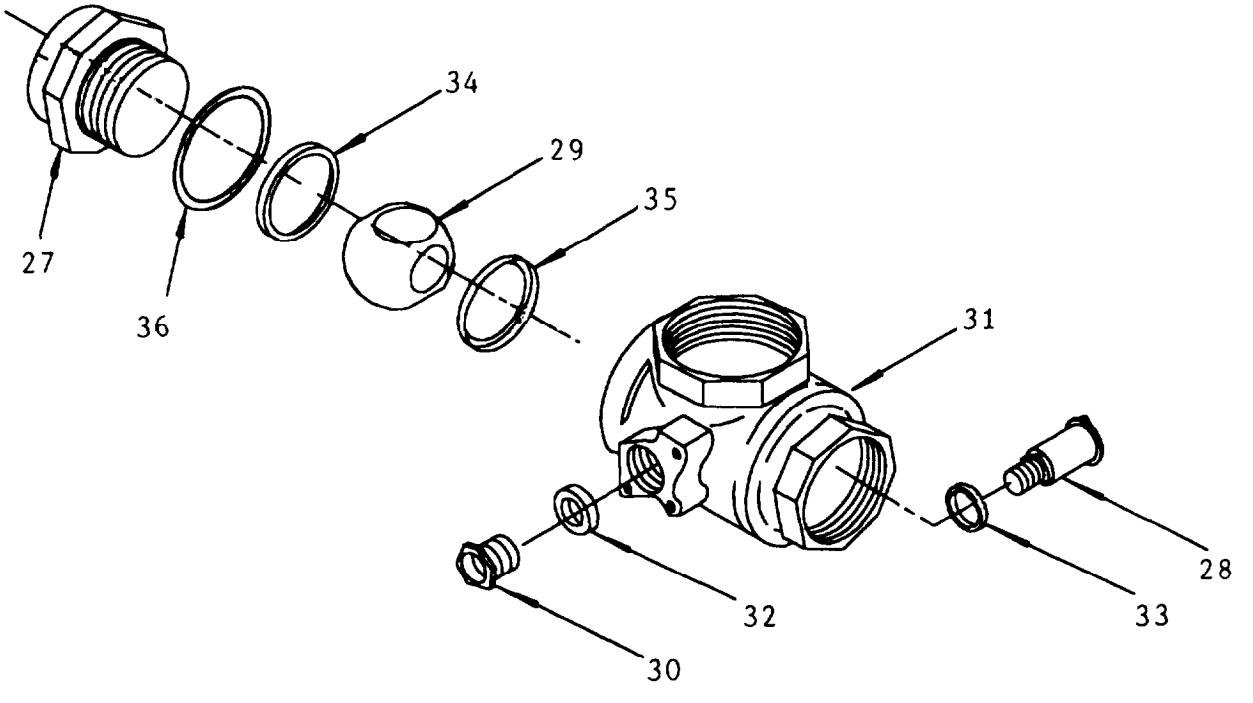
NOTE
Stem and thrust washer are removed from inside the valve. The packing is removed by driving and prying it out from the inside of the valve to the outside of the valve. Once the packing is removed, the packing must be replaced.

(3) If necessary, remove packing nut (30) and push stem (28) into body (31). Remove the stem (28), packing (32), and thrust washer (33).

NOTE
The seats are removed by prying them out. Once removed, they must be replaced.

(4) If necessary, remove the seats (34 and 35) from the body (3 1) and adapter (27) by prying.

(5) Remove the body seal (36) from the adapter (27) by twisting and rocking it over the threads.



2-45.1. 3-WAY BALL VALVE (BACKWASH) REPAIR (Models H-9518-1 H-9518-2, and H-9518-3)-continued.

C. **Cleaning.**

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

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

(3) Use wire brush to clean all threaded fittings.

d. Inspection.

(1) Inspect all threaded components for damaged threads,

(2) Inspect ball (29) and ball seats (34 and 35) for deep scratches and corrosion.

(3) Inspect body (31) for cracks and corrosion.

(4) Inspect check valve (18) for damage. Replace if damaged.

e. Repair.

(1) Replace packing (32), thrust washer (33) seats (34 and 35), and body seal (36).

(2) Replace damaged components.

f. Assembly.

(1) Replace the stem (28), packing (32), thrust washer (33), and packing nut (30). Be careful not to damage any of the components. If necessary, drive the items in with a soft piece of scrap wood. Tighten the packing nut (30) until the stem (28) is resistant to movement but will still move.

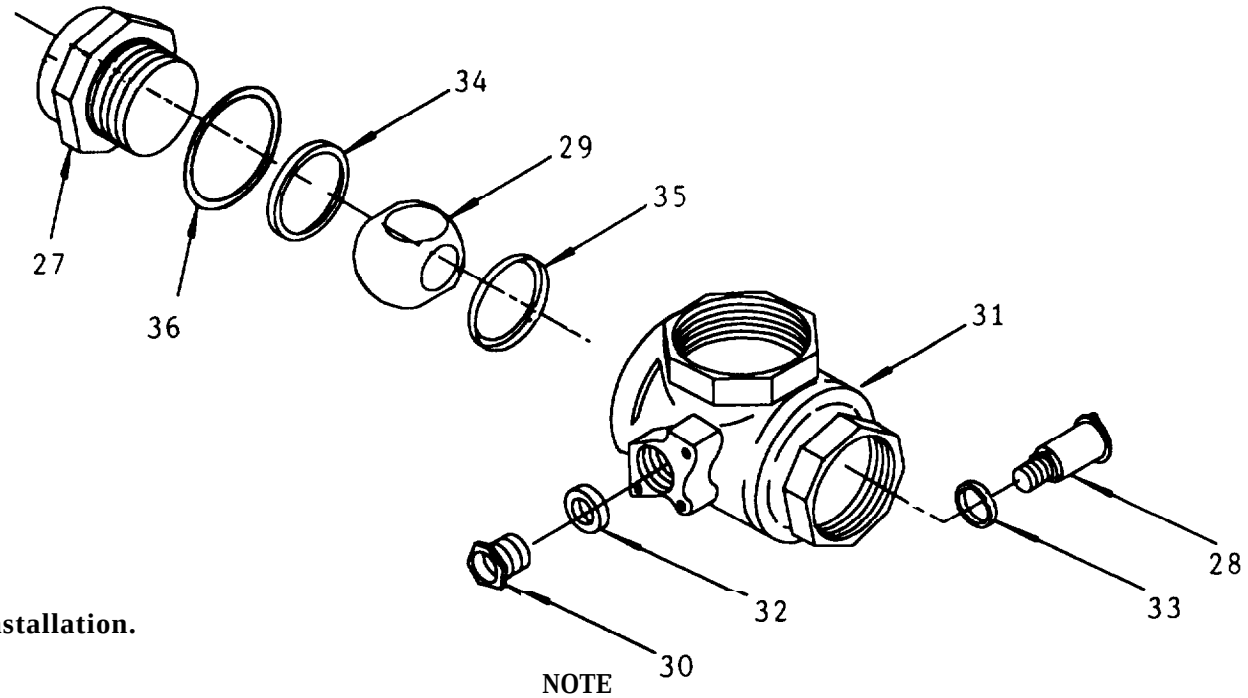
(2) Replace the seats (34 and 35) in the body (31) and in the adapter (27), again using care not to damage the components. The concave side of the seat (34 and 35) must face away from the brass casting surfaces.

(3) Position stem (28) and insert ball (29). Twist the ball (29) until it engages stem (28). Position the ball (29) with one large hole pointed towards the valve body opening (right side when viewed from the stem) and the other hole towards the top pipe connection.

(4) Replace the body seal (36) into the body (31) and screw adapter (27) into body (31). Make sure that the adapter (27) does not pinch the seal when tightening. While tightening the adapter (27), turn the stem (28) and ball (29) to make sure nothing is binding. Screw the adapter (27) into the body (3 1) until no gap exists.

(5) Turn the stem (28) back to a position where water can flow from the adapter end (27) [left when viewing from stem] to the top.

2-45.1 3-WAY BALL VALVE (BACKWASH) REPAIR (Models H-9518-1, H-9518-2, and H-9518-3) - continued.



g. Installation.

NOTE
Be sure to wrap tape in same direction as pipe thread.

(1) Apply anti-seize tape to male pipe fittings.

(2) If removed, install bracket (24) on valve (25), using flatwasher (23), lockwasher (22) and screw (21).

CAUTION
ROWPU will not work in normal operation and may be damaged if check valve is incorrectly installed. Arrow has to point toward valve (Water flows toward valve).

(3) Place 3-way valve (25) in vise and install check valve (18), elbow (17) as marked at disassembly. Install 2 inch adapter (19) and 1 ½ inch adapter (20) on valve.

(4) Lubricate gaskets (13, 14, and 15) and position on adapters (19 and 20) and elbow (17).

(5) Loosen setscrews (16) to insure that bracket will slide into cutout on shelf of control panel (26).

(6) Position 3-way valve (25) and attached parts in cutout for bracket (24) with stem of valve (25) pointing toward cutout on control panel (26).

(7) Position gasket (15) over pipe joint and install clamp halves (12), two bolts (11). and two nuts (10).

(8) Position gasket (13) over pipe joint and install two clamp halves (9), bolts (8), and nuts (7).

(9) Position gasket (14) over pipe joint and install two clamp halves (6), bolts (5), and two nuts (4).

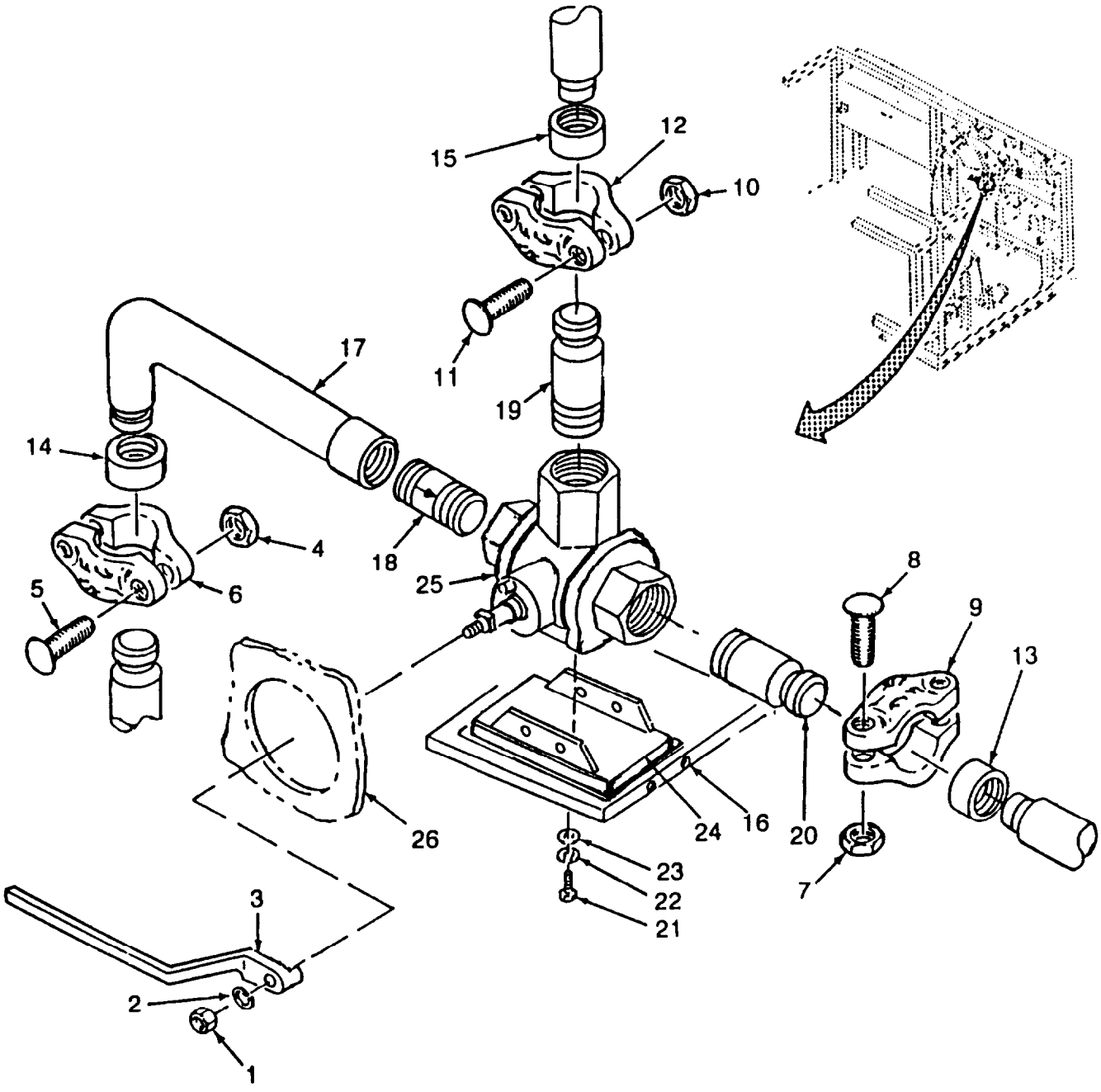
(10) Tighten setscrews (16).

248.1 3-WAY BALL VALVE (BACKWASH) REPAIR (Models H-9518-1, H-9518-2, and H-9518-3) - continued.

NOTE
When installed, handle must be positioned in the BACKWASH position.

(11) If installed, remove nut (1) from stem of 3-way valve (25) and position handle (3) and lock washer (2) on stem of valve. Install and tighten nut (1) and turn valve to NORMAL.

(12) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-46. CHEMICAL FEED STAND REPLACE.

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
Detergent (Appendix C, Section II, Item 5)
Rags, Wiping (Appendix C, Item 14)

Equipment Condition
Reference
Power shutdown (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).
Ball Valves Removed

General Safety Instructions

a. Removal

NOTE
If it is necessary to remove entire chemical feed stand, proceed to step 3.

(1) Remove four nuts (1), lockwashers (2) screws (3) and mounting plate (4).

(2) Remove four nuts (5), lockwashers (6), screws (7) and two cross bars (8).

(3) Remove four screws (9), lockwashers (10) and two brackets (11) from floor (12) of ROWPU.

(4) If required, remove data plates from plate (4) (Paragraph 2-13).

b. Installation.

NOTE
If entire stand has been removed, only first step is necessary.

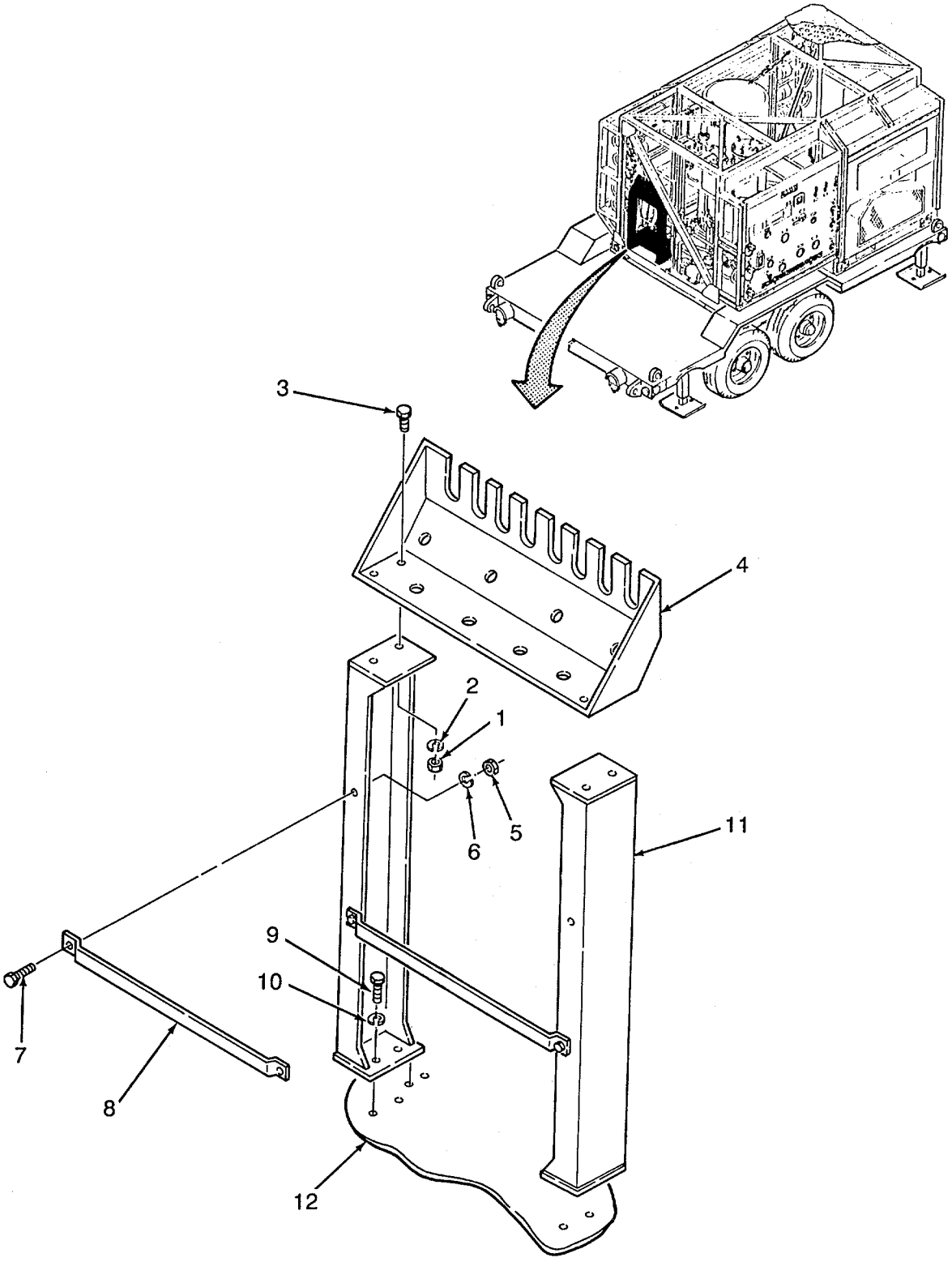
(1) Position two brackets (11) on floor (12) of ROWPU and install four lockwashers (10) and screws (9).

(2) Position two crossbars (8) on brackets (11) and install four screws (7), lockwashers (6) and nuts (5).

(3) Position mounting plate (4) on top of brackets (11) and aline mounting holes.

(4) Install four screws (3), lockwashers (2) and nuts (1).

2-46. CHEMICAL FEED STAND REPLACE - continued.



2-47. VACUUM BREAKER AND VENT PRODUCT WATER VALVE REPLACE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
1 1/2 Inch Combination Wrench (Appendix B, Section III, Item 4)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 19)
Equipment Condition
Reference
Power shut down (Power Source Manual)
ROWPU Piping drained (TM 10-4610-241-10

a. Removal

(1) Remove vacuum breaker (1) and adapter (2) from tee (7).

(2) Remove nut (3) and handle (4) from vent product water valve (9).

(3) Unscrew nut (5) and disconnect tube (6).

(4) Remove product water valve (9), nipple (8), and tee (7) from pipe (10).

(5) As required, remove adapter (8) and tee (7) from vacuum breaker (9).

b. Installation

NOTE

Be sure to wrap tape in same direction as pipe thread.

(1) Apply anti-seize tape to male fittings.

(2) Install adapter (8) and tee (7) on vent product water valve (9).

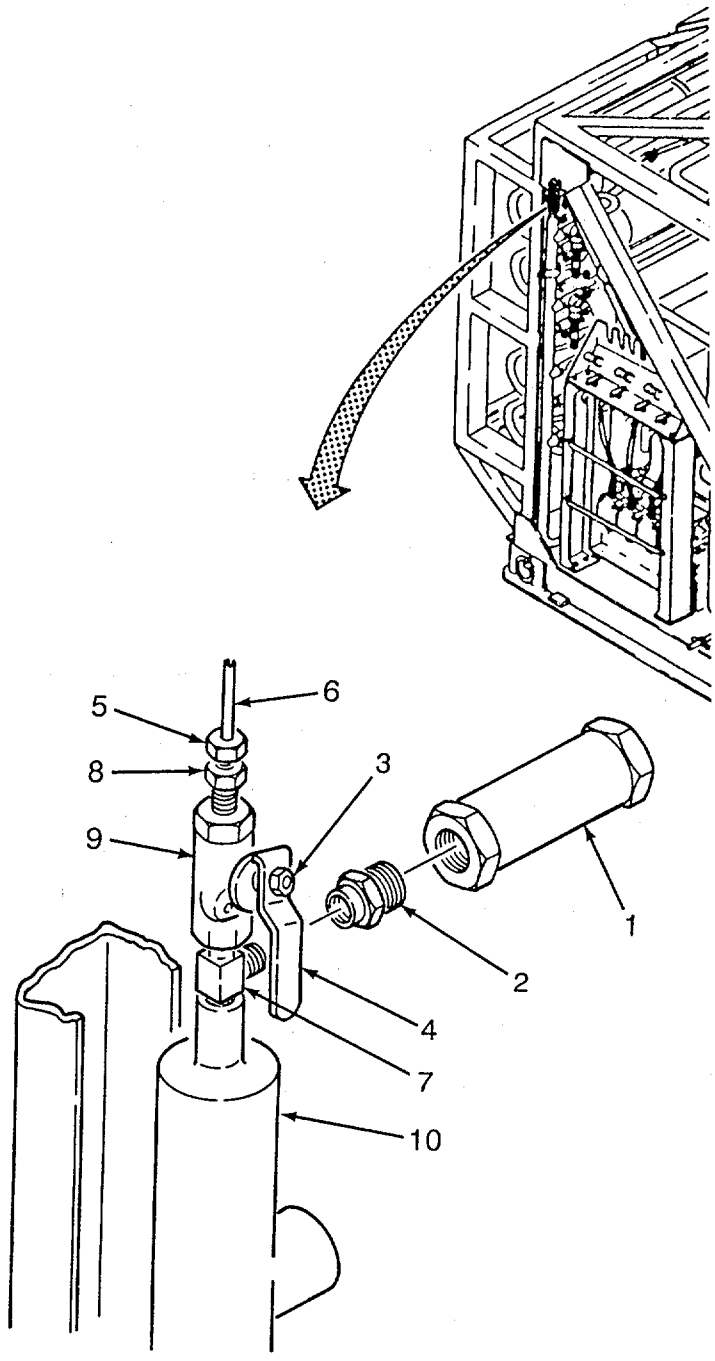
(3) Install items assembled in step 2 above on pipe (10).

(4) Install nipple (2) and breaker (1).

(5) Connect tube (6) to nipple (8) and tighten nut (5).

(6) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.

2-47. VACUUM BREAKER AND VENT PRODUCT WATER VALVE REPLACE - continued.



2-48. DIFFERENTIAL PRESSURE GAGE (MULTIMEDIA FILTER) REPLACE.

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 19)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).
General Safety Instructions

WARNING

ROWPU piping and equipment can contain 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.

a. Removal

(1) Loosen nut (1) and remove tubing (2) and adapter (3) from the differential gage (10).

(2) Loosen nut (4) and remove tubing (5) and adapter (6) from differential gage (10).

(3) Remove three nuts (7), lockwashers (8) and screws (9).

(4) Remove differential gage (10) from control panel (11).

b. Installation

(1) Position differential gage (10) in cutout on control panel (11).

(2) Install three screws (9), lockwashers (8) and nuts (7).

NOTE

Be sure to wrap tape in the same direction as pipe thread.

(3) Apply anti-seize tape to male pipe threads.

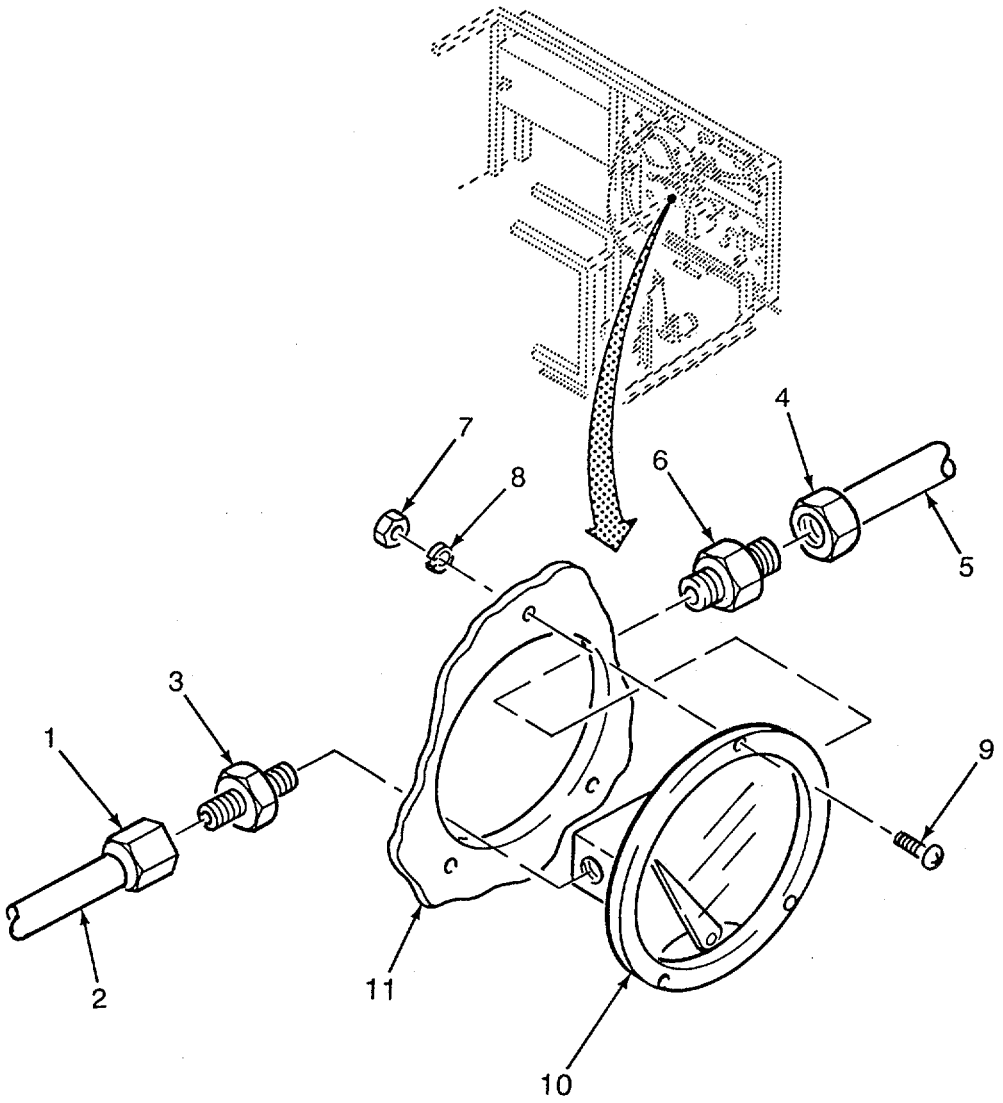
(4) Install adapters (3 and 6) on differential gage (10).

(5) Connect tube (5) to nipple (6) and tighten nut (4).

2-48. DIFFERENTIAL PRESSURE GAGE (MULTIMEDIA FILTER) REPLACE - continued.

(6) Connect tube (2) to nipple (3) and tighten nut (1).

(7) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-49. FLOW METER (BACKWASH) REPLACE.

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)
- Vise (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)
- Tape, Insulating (Appendix C, Section II, Item 21)
- Gaskets and Lockwashers (TM 10-4610-241-24P)

Equipment Condition
- Reference
  - Power shut down (Power Source Manual).
  - ROWPU Piping drained (TM 10-4610-241-10).

a. Removal.

(1) Unscrew cap (1) from pipe section (22). If required remove cap from ROWPU frame (Paragraph 2-14).

(2) Remove nuts (2), screws (3), lockwasher (4) and flatwasher (5).

(3) Remove two nuts (6), lockwashers (7), flat washers (8), screws (9) and straps (10).

(4) Remove two nuts (11), bolts (12) and clamp halves (13). Slide gasket (21) onto pipe (23).

(5) Remove two nuts (14), lockwashers (15) and bracket (16) from studs (19). If required, remove nuts (17 and 18) and studs (19).

(6) Tilt flowmeter (24) and remove from control panel (20). Remove gasket (21) from pipe (23).

NOTE

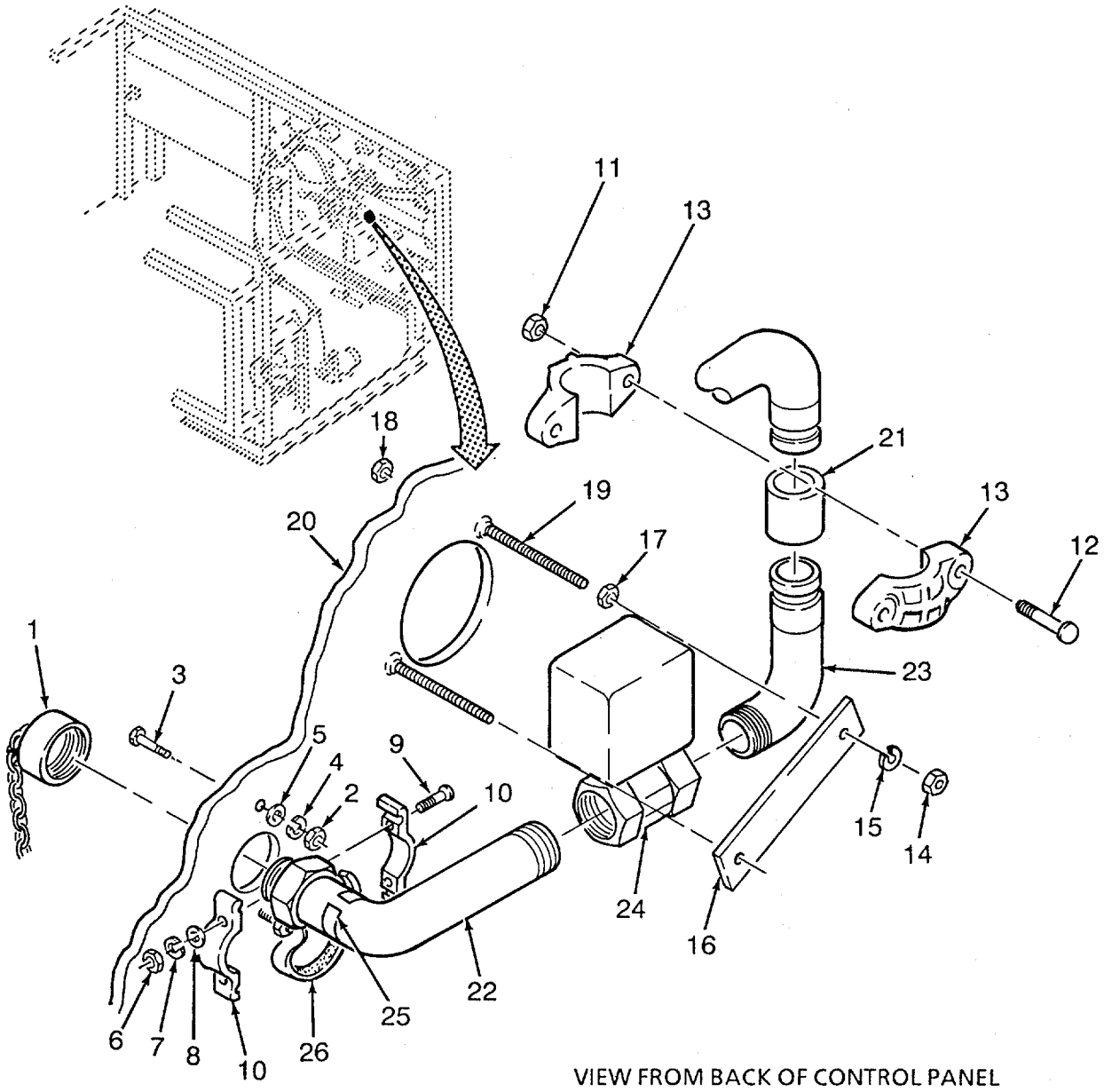
Marking position of pipes in relation to flow meter will facilitate installation. Be sure to transcribe markings to replacement parts before discarding defective parts or turning them in to Supply.

(7) Scribe a line across intersections of pipes (22 and 23) and flowmeter (24).

(8) Place flowmeter (24) in vise and remove pipe sections (22) and (23).

(9) As required, remove ring filler (25) and insulating tape (26) from pipe section (22).

2-49. FLOW METER (BACKWASH) REPLACE - continued.



2-49. FLOW METER (BACKWASH) REPLACE - continued.

b. Installation.

NOTE

Be sure tape is wrapped in same direction as threads

(1) Apply anti-seize tape to all male pipe threads.

(2) Clamp flowmeter (24) in vise and install pipe sections (22 and 23) on flow meter (24) as marked during removal.

(3) Lubricate gasket (21) and position on pipe (23).

(4) If removed, install studs (19) and nuts (18 and 17). Tighten nuts (17) to secure studs to control panel. Stud (19) must be flush with nut (18).

(5) Position face of flowmeter (24) in BRINE FLOWMETER cutout on control panel (20) and end of pipe section (22) in BRINE pipe cutout on panel.

(6) Position bracket (16) on two studs (19) and install lockwashers (15) and nuts (14).

(7) Slide gasket (21) over pipe joint and install clamp halves (13), two bolts (12), 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.

(8) Install insulating tape (26) and ring filler (25) on pipe section (22) where two-piece strap (10) will clamp.

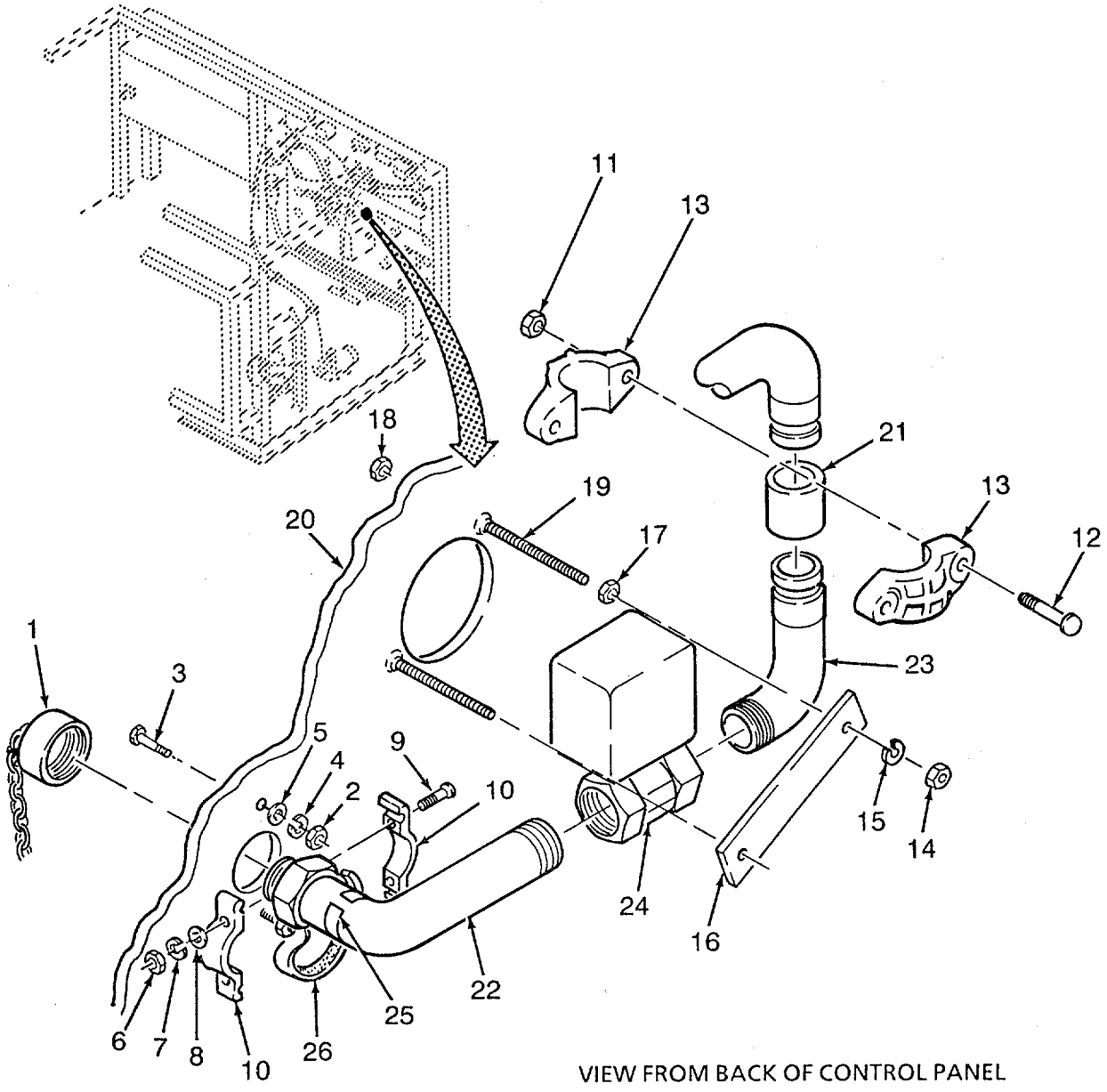
(9) Position two-piece strap (10) on pipe section (22) and install two screws (9), flatwashers (8), lockwashers (7) and nuts (6).

(10) Insert two bolts (3) from front of control panel (20) thru control panel and between 2-piece strap (10) and install two flatwashers (5), lockwashers (4) and nuts (2).

(11) Screw cap (1) onto end of pipe (22). If removed, connect cap to ROWPU frame (Paragraph 2-14).

(12) Operate ROWPU (TM 10-4610-241- 10) and check for leaks and proper operation.

2-49. FLOW METER (BACKWASH) REPLACE - continued.



2-50. PRESSURE GAGE(R.O.) REPLACE.

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 19)
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).
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.

a. Removal.

(1) Loosen nuts on tubes (1, 2 and 3) and disconnect tubes from distribution block (4).

(2) Unscrew distribution block (4) from pressure gage (8).

(3) Remove two nuts (5), lockwashers (6), and bracket (7).

(4) Remove pressure gage (8) from front of control panel (9).

(5) As required, remove nipples (10, 11 and 12) from distribution block (4).

b. Installation

NOTE

Make sure tape is wrapped in same direction as pipe threads.

(1) Apply anti-seize tape to all male pipe fitting threads.

(2) Position pressure gage (8) in cutout on control panel (9).

(3) Position bracket (7) on rear of pressure gage (8) and install two lockwashers (6) and nuts (5).

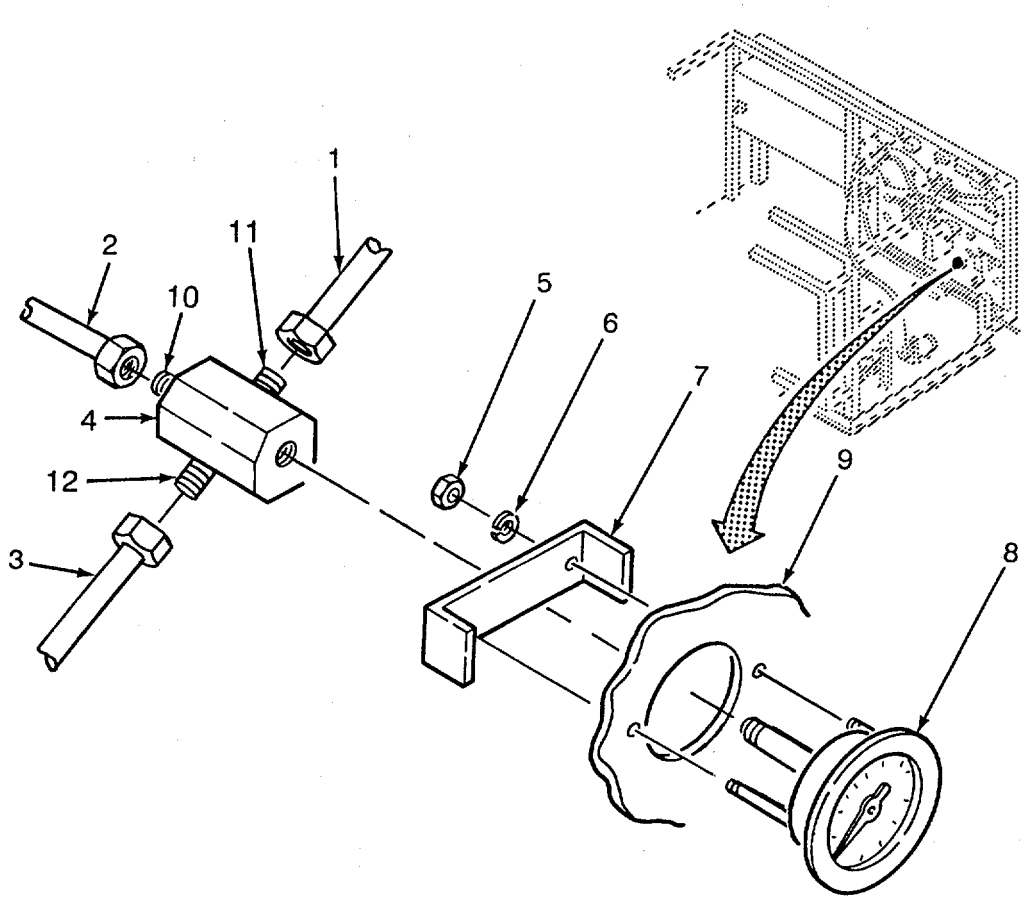
2-50. PRESSURE GAGE (R.O.) REPLACE - continued.

(4) If removed, install nipples (10,11 and 12) on distribution block (4).

(5) Install distribution block (4) on pressure gage (8).

(6) Connect three tubes (1, 2, and 3) to distribution block (4) and tighten tube nuts.

(7) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-51. RELIEF VALVE REPLACE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

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

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)

Equipment Condition
- Reference
  - Power shut down (Power Source Manual).
  - ROWPU Piping drained (TM 10-4610-241-10).

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.

a. Removal.

(1) Remove screw (1) and loop clamp (2).

(2) Remove pipe section (3).

(3) Remove pipe section (4) from pipe section (5).

(4) Remove pipe section (5) from relief valve (6).

(5) Remove relief valve (6) from adapter (8) and remove plug (7) from relief valve.

(6) As required, remove adapter (8) and disassemble pipe sections (5) and (4) (Paragraph 230)

b. Installation.

(1) If disassembled, assemble pipe sections (5 and 4) (Paragraph 2-30).

NOTE

Be sure to wrap tape in same direction as pipe threads.

(2) Apply anti-seize tape to male pipe threads.

2-51. RELIEF VALVE REPLACE - continued.

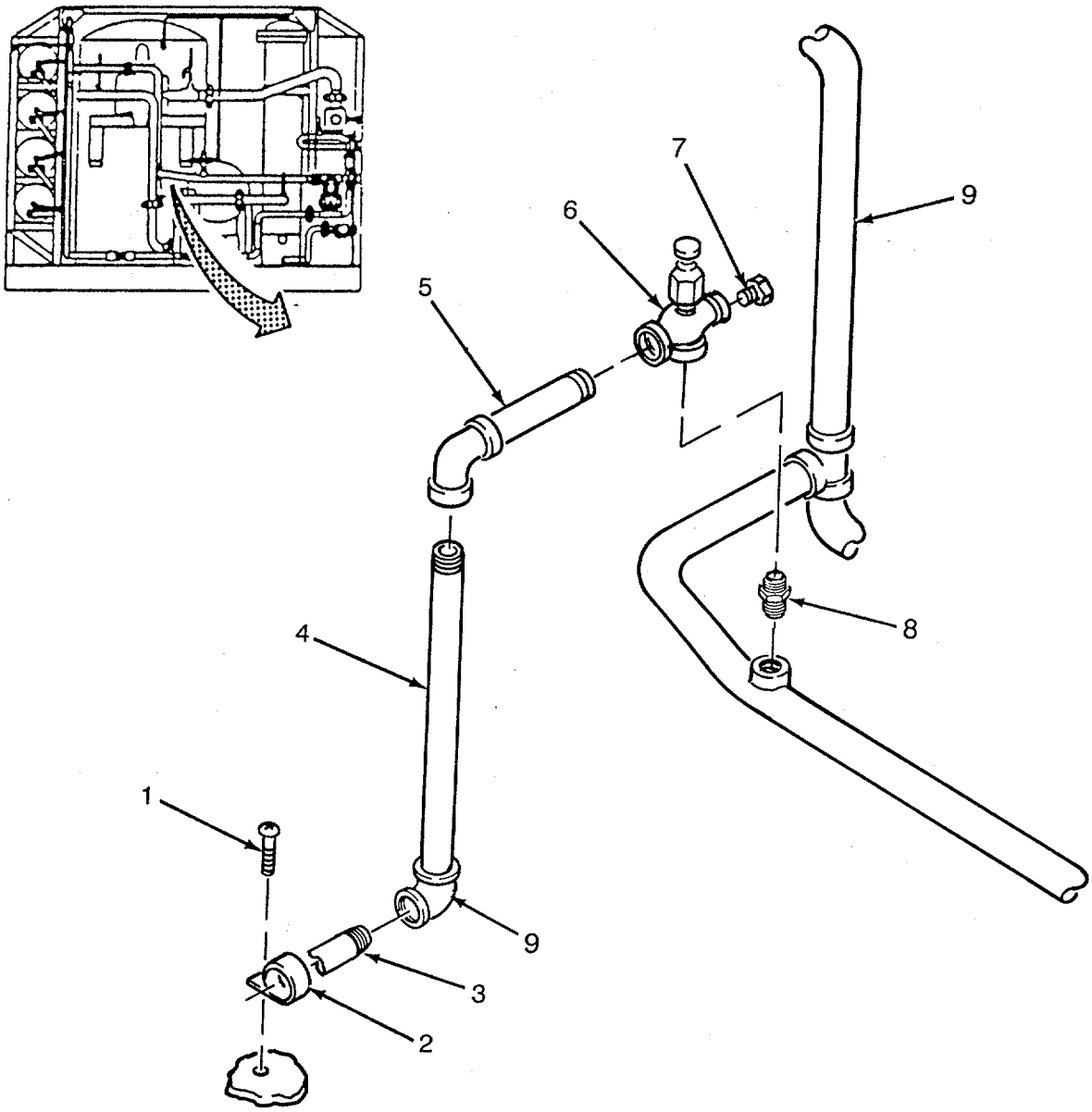
(3) If removed, install adapter (8) on pipe section (10).

(4) Install relief valve (6) on adapter (8), and plug (7) on valve.

(5) Install pipe sections (5, 4 and 3) in the given order.

(6) Secure pipe section (3) to floor of ROWPU with clamp (2) and screw (1).

(7) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-52. ELLIPTIC VALVE REPLACE.

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 19)
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 5-4610-241-10).
Chemical Cans removed (TM 5-4610-241-10).

NOTE

There are four elliptic valves on the product water manifold. All are removed and installed the same. One is shown, the others are similar.

a. Removal.

(1) Loosen clamp (1) and remove flexible tubing (2) from adapter (6).

(2) Loosen clamp (3) and remove flexible tubing (4) from adapter (5).

(3) Remove two adapters (5 and 6) from elliptic valve (7).

(4) Remove elliptic valve (7) from nipple (8).

(5) As required, remove nipple (8) and hose clamps (1 and 3).

b. Installation.

NOTE

Be sure tape is wrapped in same direction as pipe threads.

(1) Apply anti-seize tape to male pipe threads.

(2) If removed, install nipple (8).

(3) Install elliptic valve (7) on nipple (8).

CAUTION

Do not overtighten adapters as this may break the valves.

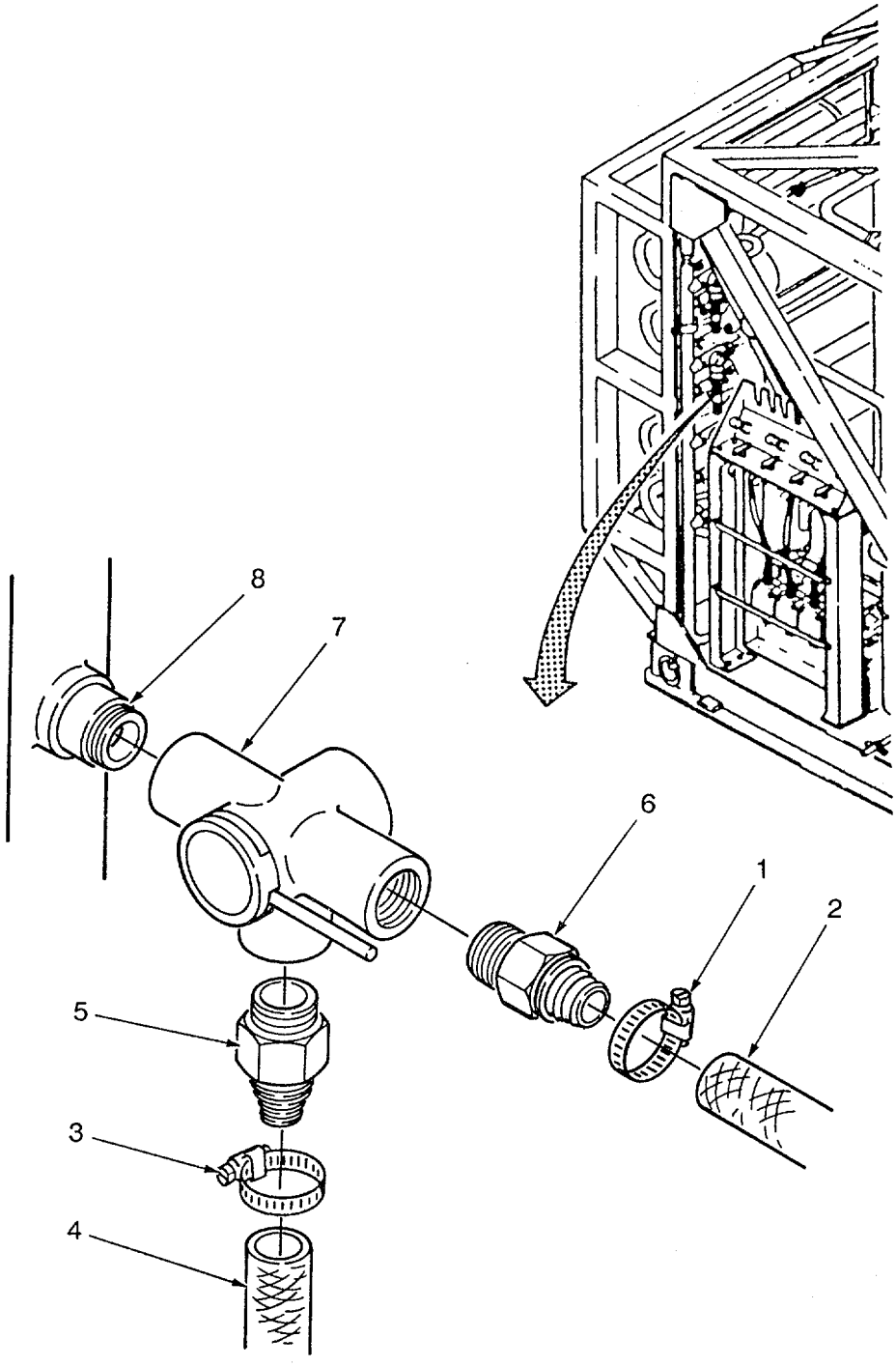
(4) Install two adapters (6 and 5) on elliptic valve (7).

(5) If removed, position clamps (1 and 3) on hoses (2 and 4).

2-52. ELLIPTIC VALVE REPLACE - continued

(6) Connect hoses (2 and 4) to adapters (5 and 6). Adjust and tighten clamps (1 and 3).

(7) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-53. THREE-WAY BALL VALVE (CHEMICAL FEED) REPLACE.

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 19)
Equipment Condition
Reference
Power Source shutdown (TM 10-4610-241-10).
Chemical Can and Frame removed (TM 10-4610-241-10) .

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.

a. Removal.

(1) Remove setscrew (1) and handle (2) from three-way ball valve (15).

WARNING

To ensure correct installation and to prevent contamination of product water, be sure to tag all tubes, indicating their connection points.

(2) Tag flexible tubes (3,4 and 5) and loosen three clamps (6,7, and 8). Remove flexible tubes.

(3) Remove locknut (9) and valves from mounting plate (16).

(4) Remove three adapters (10,11, and 12) and elbows (13 and 14) from three-way ball valve (15). As required remove clamps (6,7 and 8) from flexible tubes (3,4 and 5).

b. Installation.

NOTE

Be sure tape is wrapped in same direction as pipe threads.

(1) Apply anti-seize tape to male pipe fittings.

(2) Install elbows (13 and 14) and three adapters (10, 11, and 12) on three-way ball valve (15).

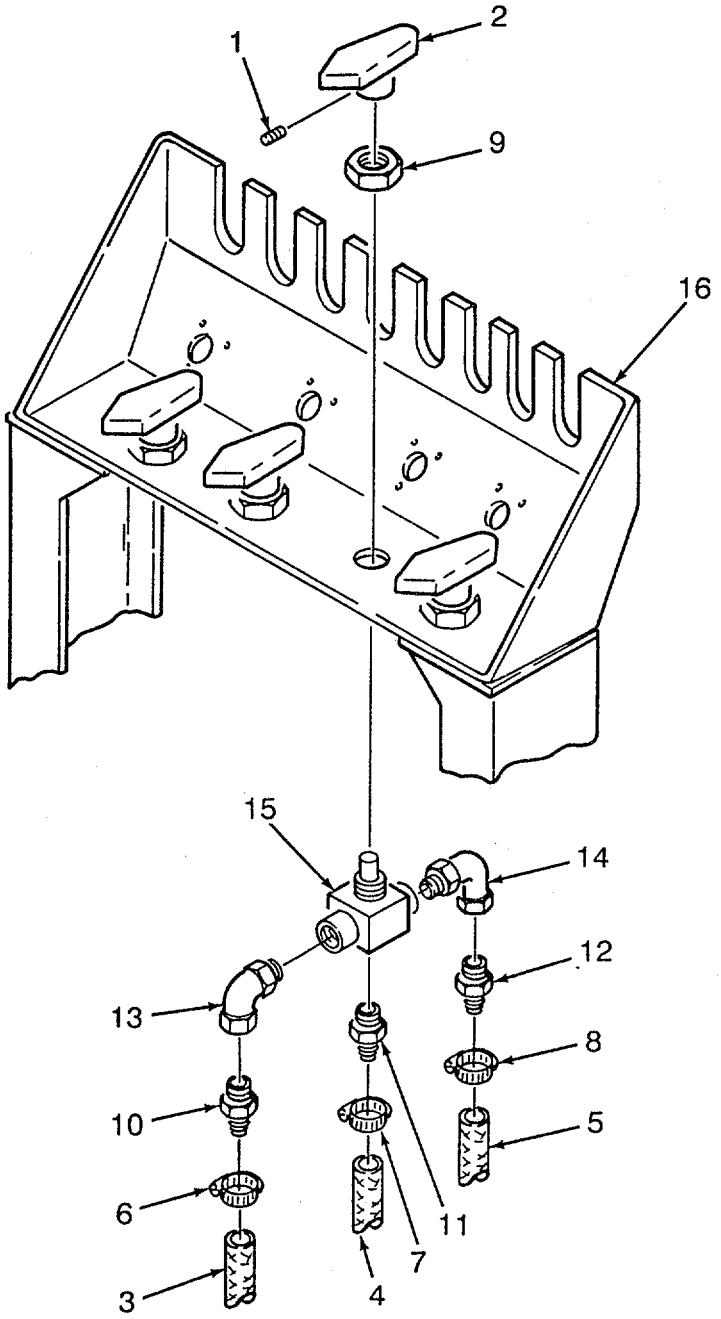
(3) Position three-way ball valve (15) on mounting plate (16) and install locknut (9), handle (2), and setscrew (1).

(4) Position three clamps (6,7 and 8) on flexible tubing (3, 4 and 5).

2-53. THREE-WAY BALL VALVE (CHEMICAL FEED) REPLACE - continued.

(5) Connect flexible tubing (3, 4, and 5) to adapters (10, 11, and 12) as tagged. Adjust and tighten clamps (6, 7, and 8).

(6) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-54. CABLE ASSEMBLY (R.O. PUMP) REPLACE.

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

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix 13, Section III, Item 4)
- Multimeter (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)
- Tape, Electrical (Appendix C, Section II, Item 20)
- Twine (Appendix C, Section II, Item 27)
- Lockwashers, Seals and Gaskets (TM 10-4610-241-24P)

Equipment Condition
- Reference
  - Power shut down (Power Source Manual).

a. Removal.

(1) Disconnect cable assembly (21) from ROWPU.

(2) Remove screw (1), lockwasher (2) and clamp (3) from motor mounting plate (29).

(3) Remove four screws (4), lockwashers (5), cover (6) and gasket (7) from conduit box (24).

(4) Pull three wire sets (8) from conduit box (24). Remove twine (9) and electrical tape (10) from each set.

NOTE

- There are three wire sets in conduit box. All are disassembled the same. One is shown, the others are similar.
- Tag wires by set before removal. If tagged parts are to be replaced, be sure to transfer tags to replacement parts before discarding defective parts or turning them in to Supply.

(5) Remove nut (11), lockwasher (12), flat washer (13), and two wire lugs (14) from screw (15).

(6) Remove screw (16) and ground wire (17) from conduit box (24).

(7) Unscrew nut (20) from elbow (26).

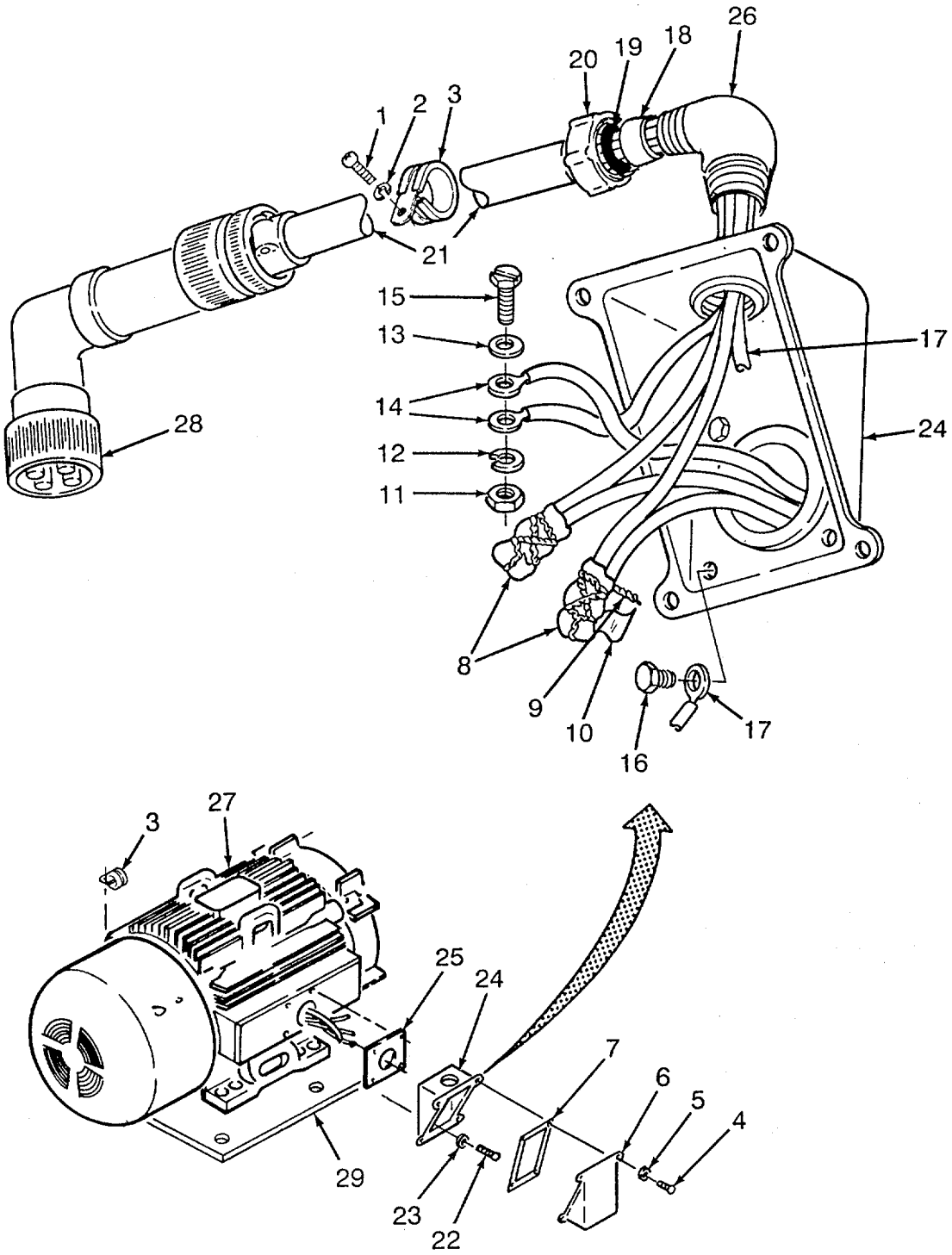
(8) Carefully pull wires from conduit box (24).

(9) Remove seal (18), seal ring (19) and nut (20) from cable assembly (21).

2-54. CABLE ASSEMBLY (R.O. PUMP) REPLACE - continued.

(10) If required, remove four screws (22), lockwashers (23), conduit box (24) and gasket (25) from motor (27).

(11) If required, remove elbow (26) from conduit box (24).



2-54. CABLE ASSEMBLY (R.O. PUMP) REPLACE - continued.

b. Test

CAUTION

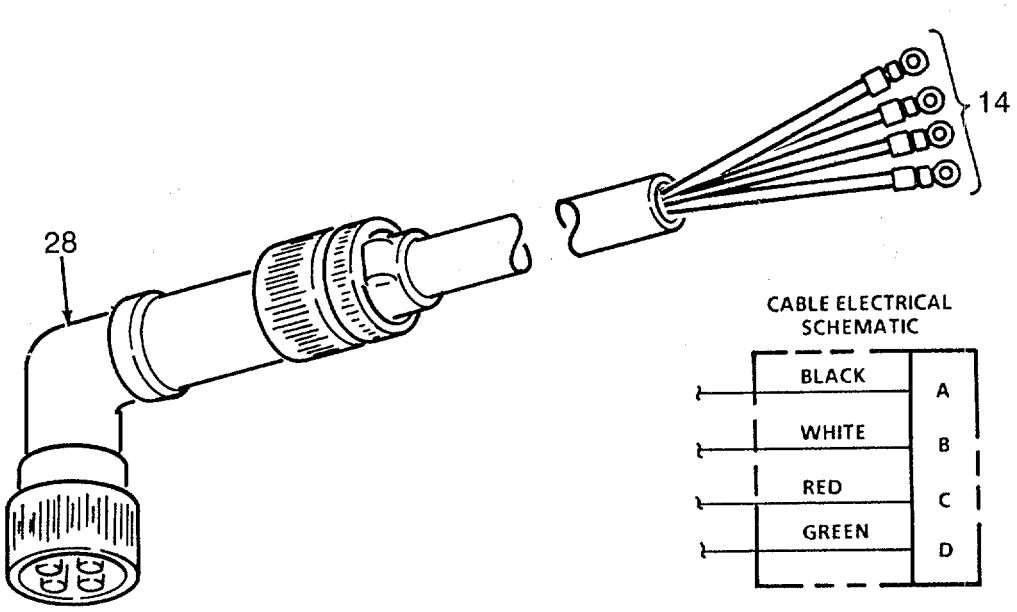
- The following tests are performed to determine if the cable assembly is defective. Before testing, cable assembly must be disconnected from the motor. Failure to disconnect cable can result in false test indications.
- Make sure wire lugs (14) are not touching each other.

(1) Using multimeter, test for continuity between plug (28) pins and wire lugs (14) as follows:

CABLE ASSEMBLY W41 CONTINUITY TEST

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

(2) If continuity does not exist between two points, replace cable assembly.



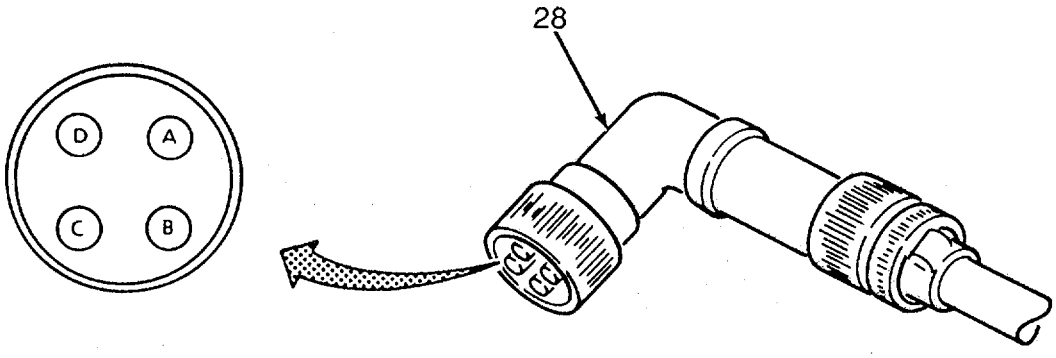
2-54. CABLE ASSEMBLY (R.O. PUMP) REPLACE - continued.

(3) Using multimeter, test for internal short between plug (28) pins as follows:

CABLE ASSEMBLY W41 SHORTING TEST

FROM	TO
PIN	PIN
A	B
A	C
A	D
B	C
B	D
C	D
A,B,C,D	CONNECTOR SHELL

(4) If continuity exist between any two points, replace cable assembly.



2-54. CABLE ASSEMBLY (R.O. PUMP) REPLACE - continued.

c. Installation.

(1) If removed, install elbow (26) on conduit box (24).

(2) If removed, position gasket (25) and conduit box (24) on motor (27) and install four lockwashers (23) and screws (22).

(3) Position nut (20), seal ring (19) and seal (18) on lug end of cable assembly (:21).

(4) Feed four wires of cable assembly (21) through elbow (26) into conduit box (24), providing about 6 inches of slack.

(5) Position seal (18) in elbow (26) and seal ring (19) in nut (20) and screw nut onto elbow.

NOTE

Ground wire insulation may be green, or GREEN may be written on black ground wire.

(6) Secure ground wire (17) (green) to conduit box (24) with screw (16).

NOTE

- There are three wire bundles in conduit box. All are assembled the same. One is shown, the others are similar.
- Wire sets must consist of wires as marked at removal. If wire markings are lost or illegible, use the following table for electrical connections. Wire insulation may actually be black on all three wires. If this is the case, color code is written on insulation:

SET 1	SET 2	SET 3
T1 Black	T2 White	T3 Red

(7) Position flatwasher (13), two wire lugs (14) (as marked), lockwasher (12) and nut (11) on screw (15) and tighten nut. Repeat for other two sets.

(8) Using electrical tape (10), wrap bare metal parts on each wire set (8).

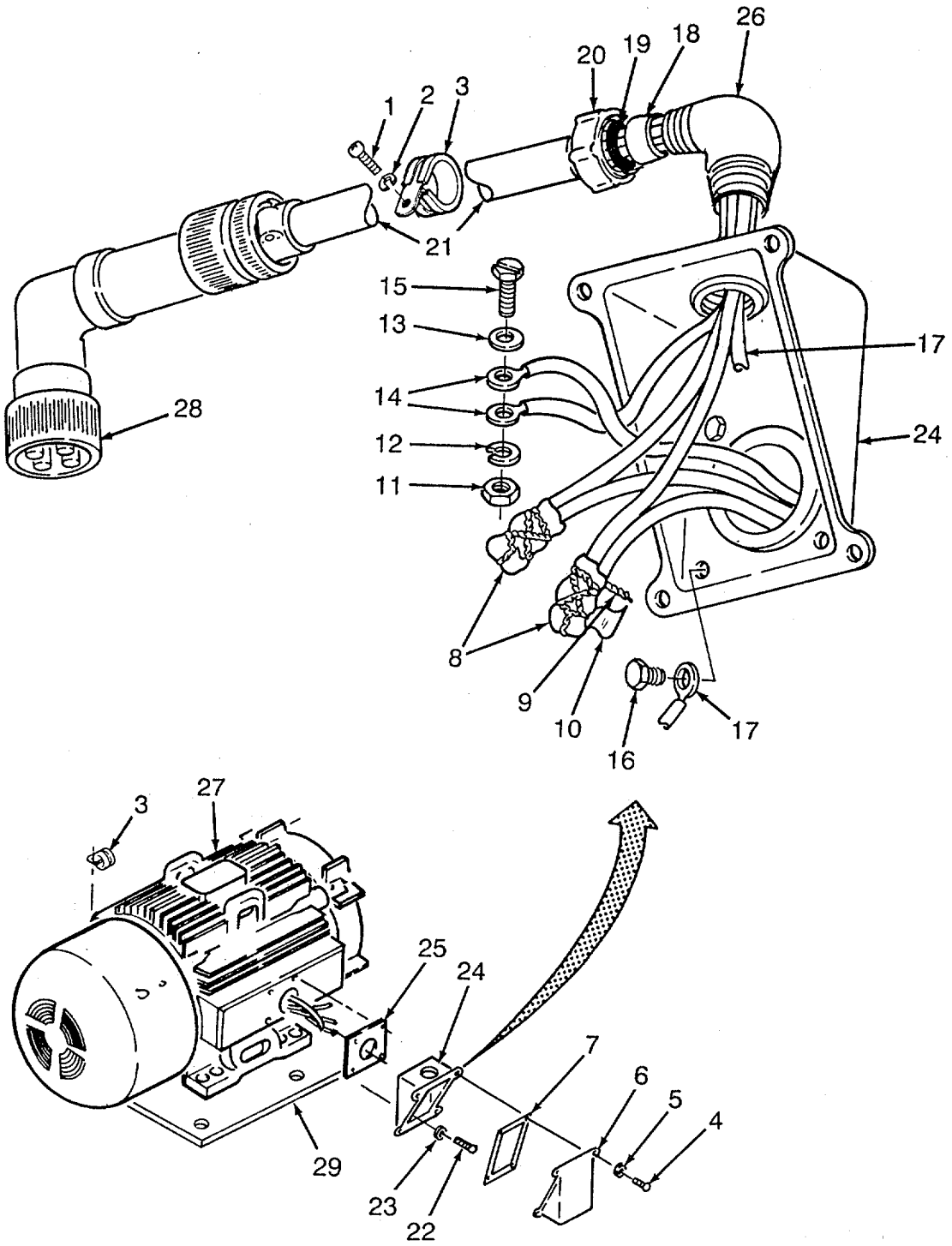
(9) Using twine (9), secure electrical tape (10) on each wire set (8) and position three wire sets in conduct box (24).

(10) Position gasket (7) and conduit box cover (6) on conduit box (24) and install four lockwashers (5) and screws (4).

(11) Secure cable assembly with clamp (3), lockwashers (2) and screws (1) to motor mounting plate (29).

(12) Operate ROWPU and check for proper operation (TM 10-4610-241-10).

2-54. CABLE ASSEMBLY (R.O. PUMP) REPLACE - continued.



2-55 CABLE ASSEMBLY W52 (JUNCTION BOX) REPLACE.

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

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix *13,* Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Material/Parts Required
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).

a. Removal.

(1) Remove nut (1), lockwasher (2), screw (3) and clamp (4) from control panel (10).

(2) Unscrew cable nut (6) at junction box (7) and disconnect cable assembly (5) at junction box.

(3) Unscrew cable nut (8) and disconnect cable assembly (5) at control box (9).

(4) Remove cable assembly (5) from unit.

b. Test.

NOTE

The following tests are performed to determine if the cable assembly is defective. Cable assembly must be disconnected to prevent false indications.

(1) Using multimeter, test for continuity between termination points A and B (see table on opposite page). Cable is defective if continuity is not measured in all tests.

(2) Using multimeter, test for continuity (short) from each connector socket to connector shells; and between each connector socket, termination point A, to all other sockets at termination points A and B. Cable is defective if continuity is measured in any test.

c. Installation.

(1) Position cable assembly (5) on back of control panel (10).

(2) Aline the alignment pins and connect cable nut (6) to junction box (7).

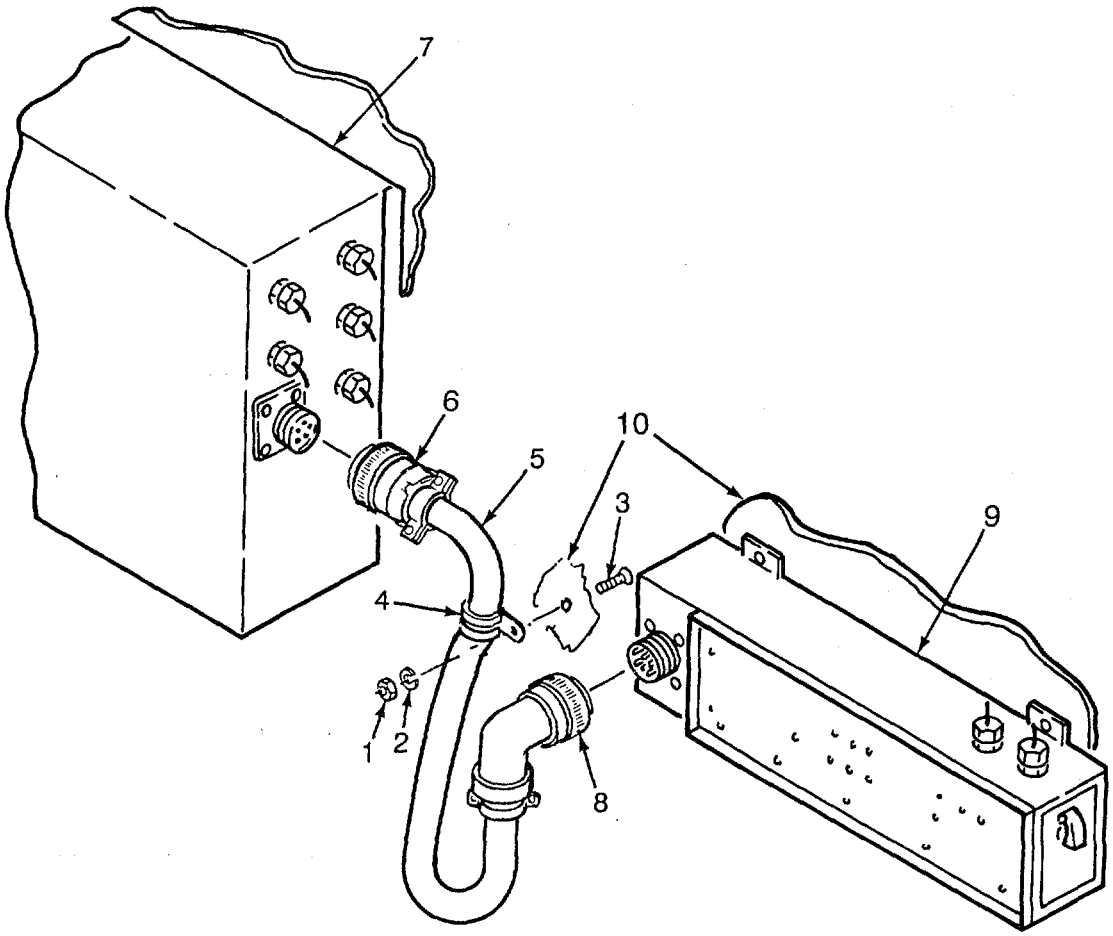
(3) Aline the alignment pins and connect cable nut (8) to control box (9).

(4) Secure cable assembly to back of control panel (10) with clamp (4), screw (3), lockwasher (2) and nut (1).

(5) Operate ROWPU and check for proper operation (TM 10-4610-241-10).

2-55. CABLE ASSEMBLY W52 (JUNCTION BOX) REPLACE - continued.

Termination Point A	Termination Point B	Termination Point A	Termination Point B	Termination Point A	Termination Point B
P8-P	P9-P	P8-1	P9-1	P8-a	P9-a
P8-R	P9-R	P8-J	P9-J	P8-S	P9-S
P8-A	P9-A	P8-K	P9-K	P8-b	P9-b
P8-B	P9-B	P8-L	P9-L	P8-c	P9-c
P8-C	P9-C	P8-M	P9-M	P8-d	P9-d
P8-D	P9-D	P8-N	P9-N	P8-o	P9-o
P8-E	P9-E	P8-W	P9-W	P8-T	P9-T
P8-F	P9-F	P8-X	P9-X	P8-V	P9-V
P8-G	P9-G	P8-Y	P9-Y	P8-f	P9-f
P8-H	P9-H	P8-Z	P9-Z	P8-C	P9-C



2-56. CABLE ASSEMBLY, W40 (GENERATOR) REPLACE (MODEL WPES-10)

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

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section II, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Equipment Condition
Reference
Power shut down (Power Source Manual).

a. Removal.

WARNING

Lethal voltages are present at output lugs of generator during operation. Do not attempt to connect or disconnect load leads while either the generator or the ROWPU are powered up or while the generator is paralleled to another generator which is in operation.

(1) Open access cover (1) to gain access to generator terminal lugs.

(2) As necessary, remove six screws (2), lockwashers (3), plastic cover (4) and standoffs (5).

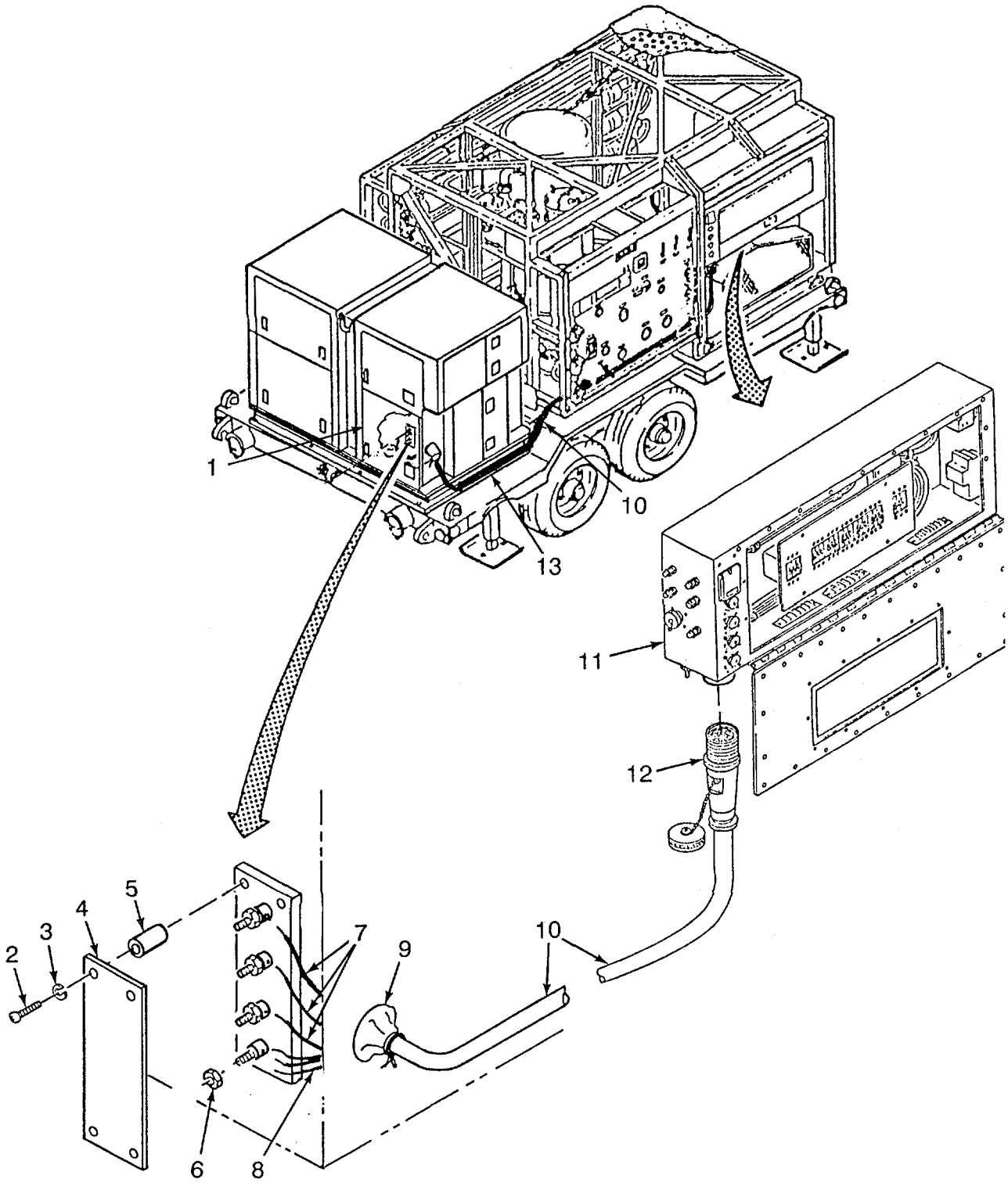
(3) Loosen four terminal nuts (6), and disconnect three wires (7) and wire bundle (8) from terminal lugs.

(4) Loosen draw string on dust boot (9) and pull power cable (10) through dust boot, away from generator.

(5) At ROWPU junction box (11), unscrew connector nut (12) and disconnect cable assembly (10) from junction box.

(6) Remove cable assembly (10) from ROWPU, pulling from plug (12) end.

2-56. CABLE ASSEMBLY, W40 (GENERATOR) REPLACE (MODELS WPES-10) - continued.



2-56. CABLE ASSEMBLY, W40 (GENERATOR) REPLACE (MODELS WPES-10) - continued.

b. Test.

NOTE

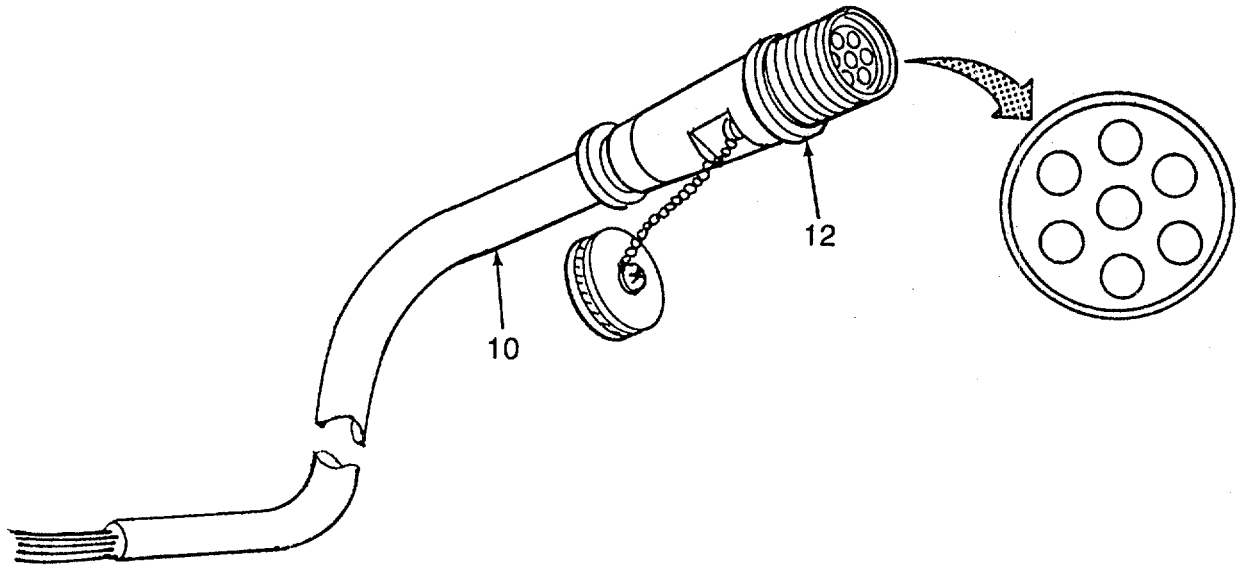
- The following test is performed to determine if the cable assembly is defective. Cable assembly must be disconnected. Failure to disconnect cable can result in false indications.
- Make sure wire ends are not touching each other.

(1) Using multimeter, test cable assembly (10) for continuity between sockets of cable connector (12) and ends of wires.

CABLE ASSEMBLY W40 CONTINUITY TEST

FROM	TO
SOCKET	WIRE COLOR
B	BLACK
C	WHITE
A	RED
N	GREEN
G1,G2,G3,G4	GREEN

(2) If continuity does not exist between any two points, notify Direct Support Maintenance.



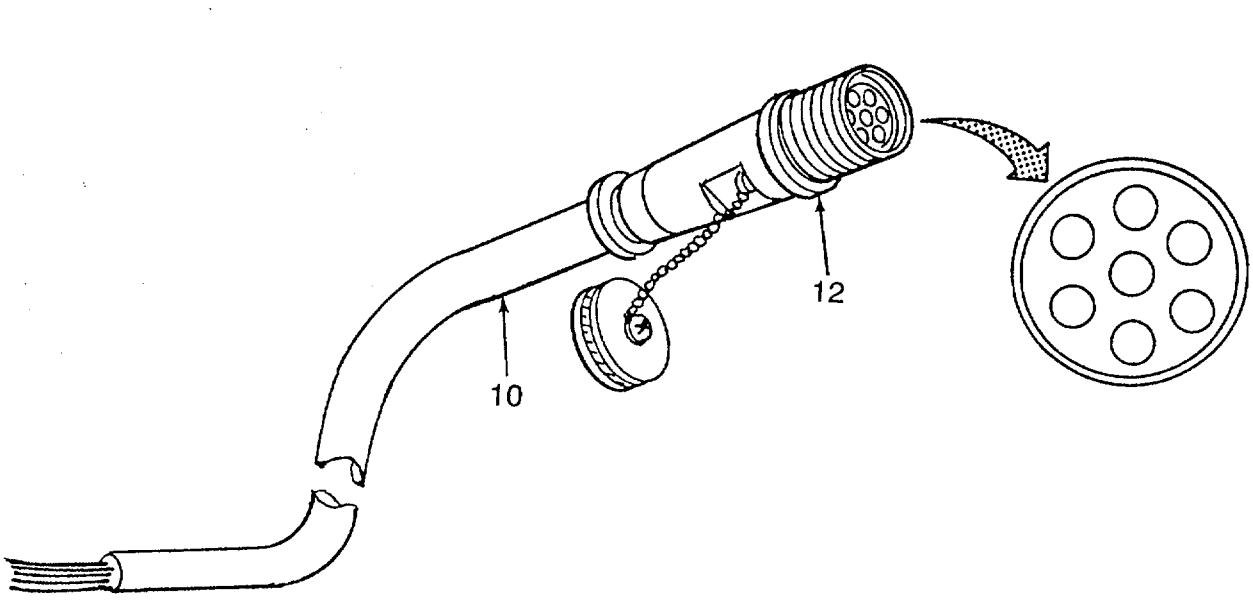
2-56. CABLE ASSEMBLY W40 (GENERATOR) RE[PLACE (MODELS WPES-10) - continued.

(3) Using multimeter, test for internal electrical shorts between plug (12) sockets and connector shells as follows:

CABLE ASSEMBLY SHORT TEST

FROM (SOCKET)	TO (SOCKET/ CONNECTOR SHELL)
A	ALL OTHER SOCKETS AND CONNECTOR SHELL
B	AS ABOVE
C	AS ABOVE
N	AS ABOVE
G1	AS ABOVE
G2	AS ABOVE
G3	AS ABOVE
G4	AS ABOVE

(4) If continuity does not exist between any two points, notify Direct Support Maintenance.



2-56. CABLE ASSEMBLY W40 (GENERATOR) REPLACE (MODELS WPES-10) - continued.

c. Installation.

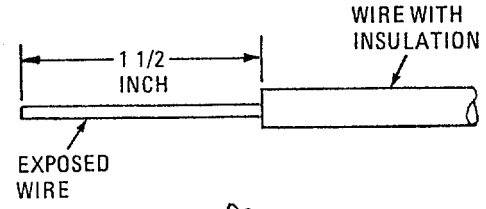
NOTE
When installed, cable assembly must be laying flat on floor of ROWPU.

(1) With dust cap installed, feed plug end of cable assembly (10) from generator side to power connector on junction box (11) .

(2) Aline alinement pins and connect cable plug (12) to connector on junction box (11).

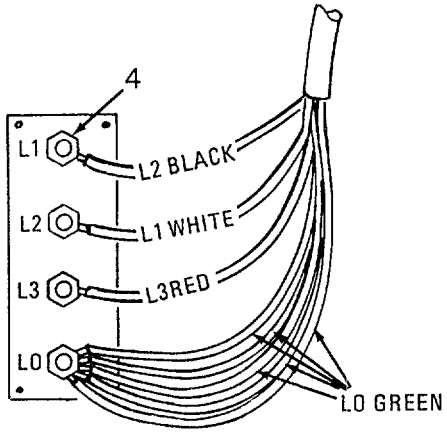
(3) Feed other end of cable (10) through cable channel (13) on skid of generator and thru dust boot (9).

(4) As required, untape power cable ends and strip approximately 1 1/2 inches of insulation from end of wires.



CAUTION
Generator is not connected to ROWPU in usual manner. Be sure to connect wires exactly as stated. If connections are made different, all pumps will run backwards.

(5) Connect all five green wires to terminal marked LO; connect wire, marked 1,3 (red) to terminal L3; connect wire, marked L1 (white) to terminal L2; and connect wire, marked L2 (black) to terminal L1. Tighten four terminal nuts (6).



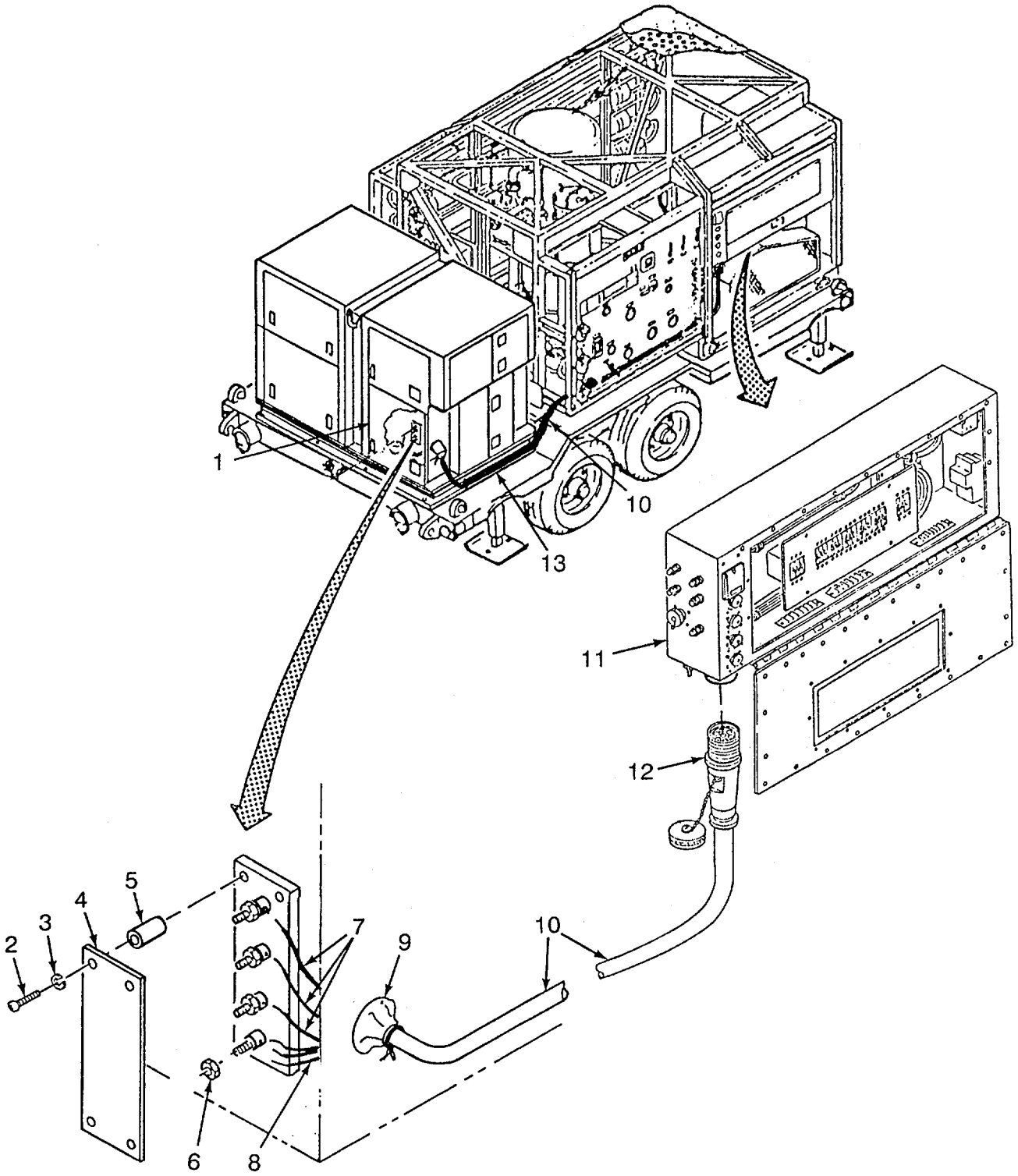
(6) From inside of generator, pull excess power cable (10) through dust boot (9) until cable lies flat on floor of ROWPU.

(7) Tighten draw string on dust boot (9) to draw dust boot snugly around power cable (10).

(8) Install six standoffs (5), cover (4), lockwashers (3) and screws (2).

(9) Close generator access cover (1).

2-56. CABLE ASSEMBLY W40 (GENERATOR) REPLACE (MODELS WPES-10) - continued.



2-57. HIGH PRESSURE SWITCH REPLACE.

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 19)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).
Personnel Required
Two
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 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 disassembly.

a. Removal.

(1) Remove four screws (1), lockwashers (2), cover (3) and gasket (4).

NOTE
Tag wires, noting their connection points, before removal. If tagged parts are to be replaced be sure to transcribe tags to replacement parts before discarding them or turning them in to Supply.

(2) Remove three screws (5) and wire lugs (6).

(3) Unscrew nut (7) and pull wires of cable assembly (8) from high-pressure switch (17). As required, remove (9), seal ring (10) and nut (7) from cable assembly.

(4) Unscrew nut (11) and disconnect pressure tube (12) from adapter (19).

(5) Remove two nuts (13), lockwashers (14), flat washers (15), screws (16) and high-pressure switch (17) from control panel (20).

(6) Remove two adapters (18 and 19) from high-pressure switch (17).

2-57. HIGH PRESSURE SWITCH REPLACE - continued.

b. Installation.

NOTE
Be sure tape is wrapped in same direction as pipe threads.

(1) Apply anti-seize tape to all male pipe threads.

(2) Install adapter (18 and 19) on high-pressure switch (17).

(3) Position high-pressure switch (17) on back of control panel (20) and install two screws (16), flat washers (15), lockwasher (14), and nuts (13).

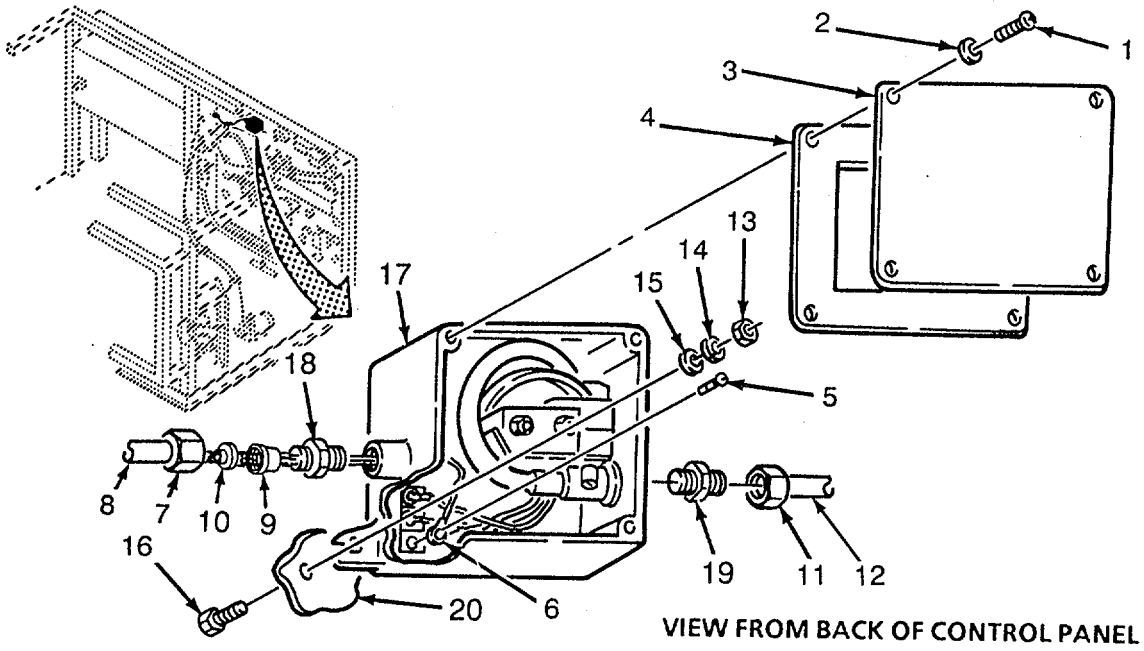
(4) If removed, install nut (7), seal ring (10) and seal (9) on cable assembly (8) and feed wires of cable assembly through adapter (18). Connect nut (7) to adapter (18) and tighten.

NOTE
White wire connects to C terminal, blue wire to NC terminal and green wire (ground) to box.

(5) Install three wire lugs (6) and screws (5) as marked during removal or use color code.

(6) Install gasket (4), cover (3), four lockwashers (2) and four screws (1) on high-pressure switch (17).

(7) Operate ROWPU (TM 10-4610-241-10). Check for proper operation and leaks.



2-58. LOW PRESSURE SWITCH REPLACE.

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 19)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).

a. Removal.

(1) Remove screw (1), lockwasher (2), and chain lug (3). Remove three screws (4) and lockwashers (5). Remove cover (6), and gasket (7) from low pressure switch (24).

NOTE
Tag all wiring before removal. Be sure to transfer tags to replacement parts if tagged parts are to be discarded or turned in to Supply.

(2) Remove screw (8), lockwasher (9) and wire lug (10) (ground wire).

(3) Remove two screws (11), lockwashers (12), and wire lugs (13).

(4) Loosen nut (17), and pull wires of cable assembly (14) from low pressure switch (24).

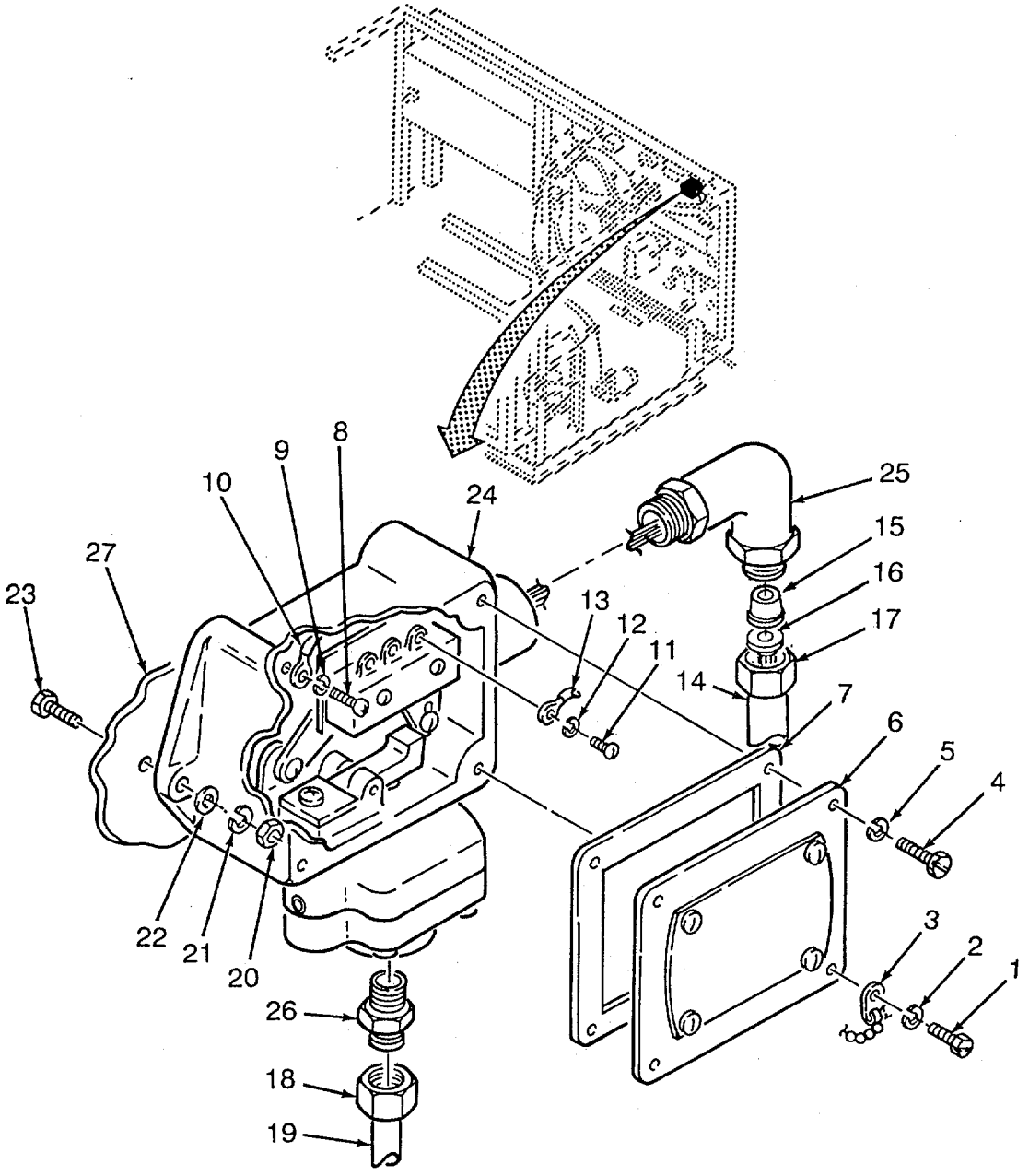
(5) Remove seal (15), seal ring (16) and nut (17) from cable assembly (14).

(6) Loosen nut (18) and disconnect pressure tube (19) from adapter (26).

(7) Remove two nuts (20), lockwashers (21), flatwasher (22), screws (23), and low pressure switch (24) from back of control panel (27).

(8) Remove elbow connector (25) and adapter (26) from low pressure switch (24).

2-58. LOW PRESSURE SWITCH REPLACE - continued.



VIEW FROM BEHIND CONTROL PANEL

2-58. LOW PRESSURE SWITCH REPLACE - continued.

b. Installation.

NOTE
Be sure tape is wrapped in same direction as pipe threads.

(1) Apply anti-seize tape to male threads of adapter (26).

(2) Install elbow connector (25) and adapter (26) on low-pressure switch (24).

(3) Position low-pressure switch (24) on back of control panel (27) and install two screws (23), flatwashers (22), lockwashers (21), and nuts (20).

(4) Connect pressure tube (19) to adapter (26) and tighten nut (18).

(5) Position nut (17), seal ring (16) and seal (15) on cable assembly (14).

(6) Feed wires of cable assembly (14) into low-pressure switch (24) through elbow connector (25), providing about 6 inches of slack and connect nut (17) to elbow connector (25).

NOTE
White wire connects to COM lug. Black wires connects to NC lug.

(7) Install two wire lugs (13), lockwashers (12) and screws (11) on low pressure switch (24) as tagged during removal or use color code above.

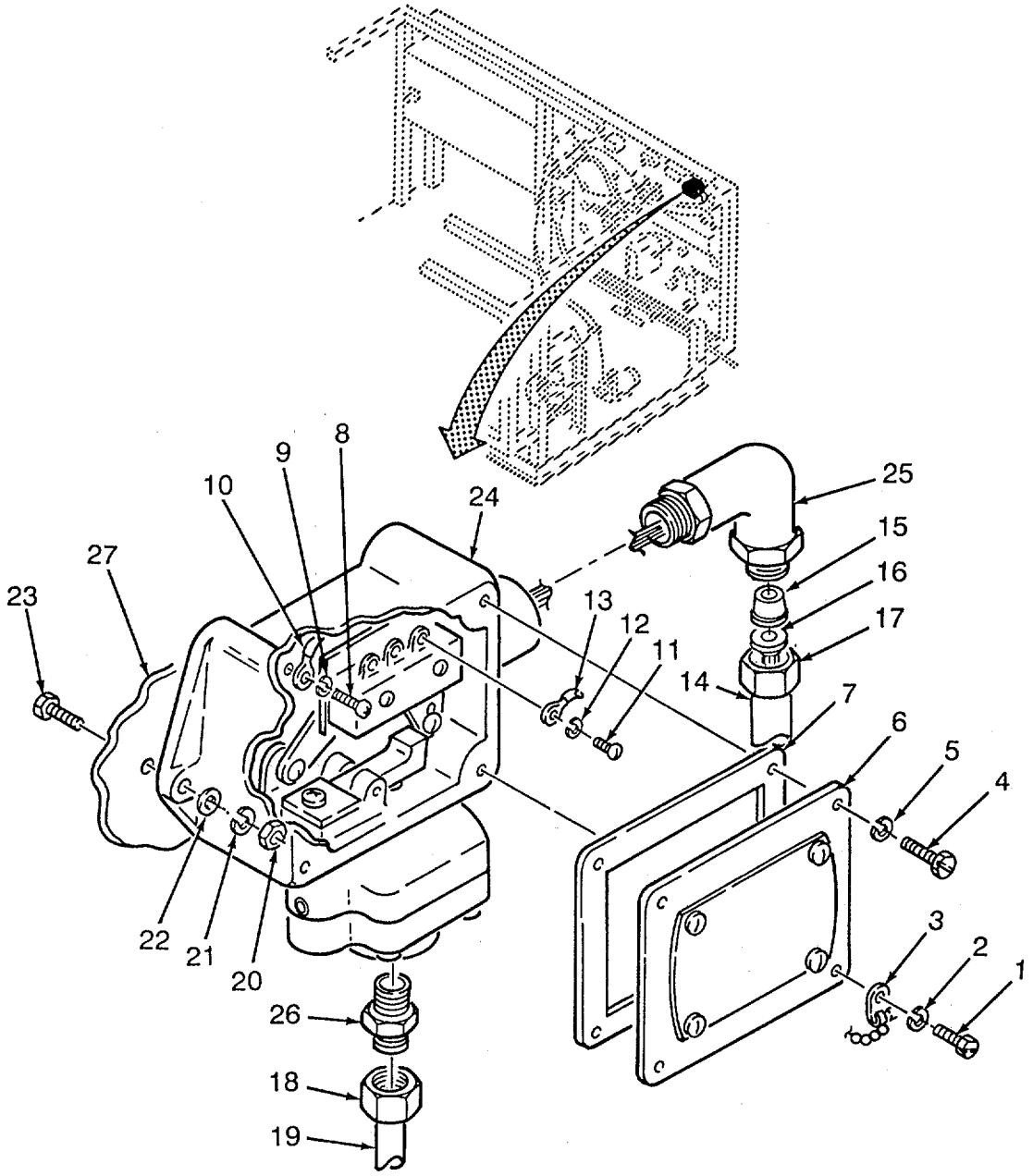
(8) Position wire lug (10) of green wire (ground wire) on low pressure switch (24) and install lockwasher (9) and screw (8).

(9) Install gasket (7), cover (6), chain lug (3), lockwasher (2) and screw (1) on low pressure switch (24).

(10) Install three lockwashers (5) and screws (4) on low pressure switch (24).

(11) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.

2-58. LOW PRESSURE SWITCH REPLACE - continued.



VIEW FROM BEHIND
CONTROL PANEL

2-59. CENTRIFUGAL PUMP (BOOSTER) REPLACE.

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 20)
Twine (Appendix C, Section II, Item 27)
Grease, Silicone (Appendix C, Section II, Item 10)
Gaskets (TM 10-4610-241-24P)

Equipment Condition

Reference

Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).

General Safety Instructions

WARNING

Lifting heavy/difficult to handle equipment incorrectly can cause serious injury. Pump weighs approximately 50 lbs.

---

a. Removal.

(1) Remove two nuts (1) bolts (2) and two clamp halves (3). Slide gasket (28) onto pipe (30).

(2) Remove two nuts (4), bolts (5) and two clamp halves (6). Slide gasket (27) onto pipe (29).

(3) Remove four bolts (7) and lockwashers (8), securing booster pump assembly (26) and spacer plate (31) to floor of ROWPU.

WARNING

Booster pump assembly is heavy/difficult to handle.

(4) Position booster pump assembly (26) to obtain access to conduit box (34).

(5) Remove four screws (9), cover (10), and gasket (11).

NOTE

Disassembly of wire set, containing only the smaller diameter motor wires, is not necessary if only the pump is being replaced.

(6) Pull three wire sets (12), containing large diameter cable wires, from conduit box (34).

2-59. CENTRIFUGAL PUMP (BOOSTER) REPLACE - continued.

NOTE

Tag wires before removal, noting their connection points. If wiring harness should also be replaced be sure to transfer tags to replacement harness before discarding or turning it in to Supply.

(7) Tag and identify three wire sets (12).

(8) Remove twine (13) and tape (14) from three tagged wire sets (12).

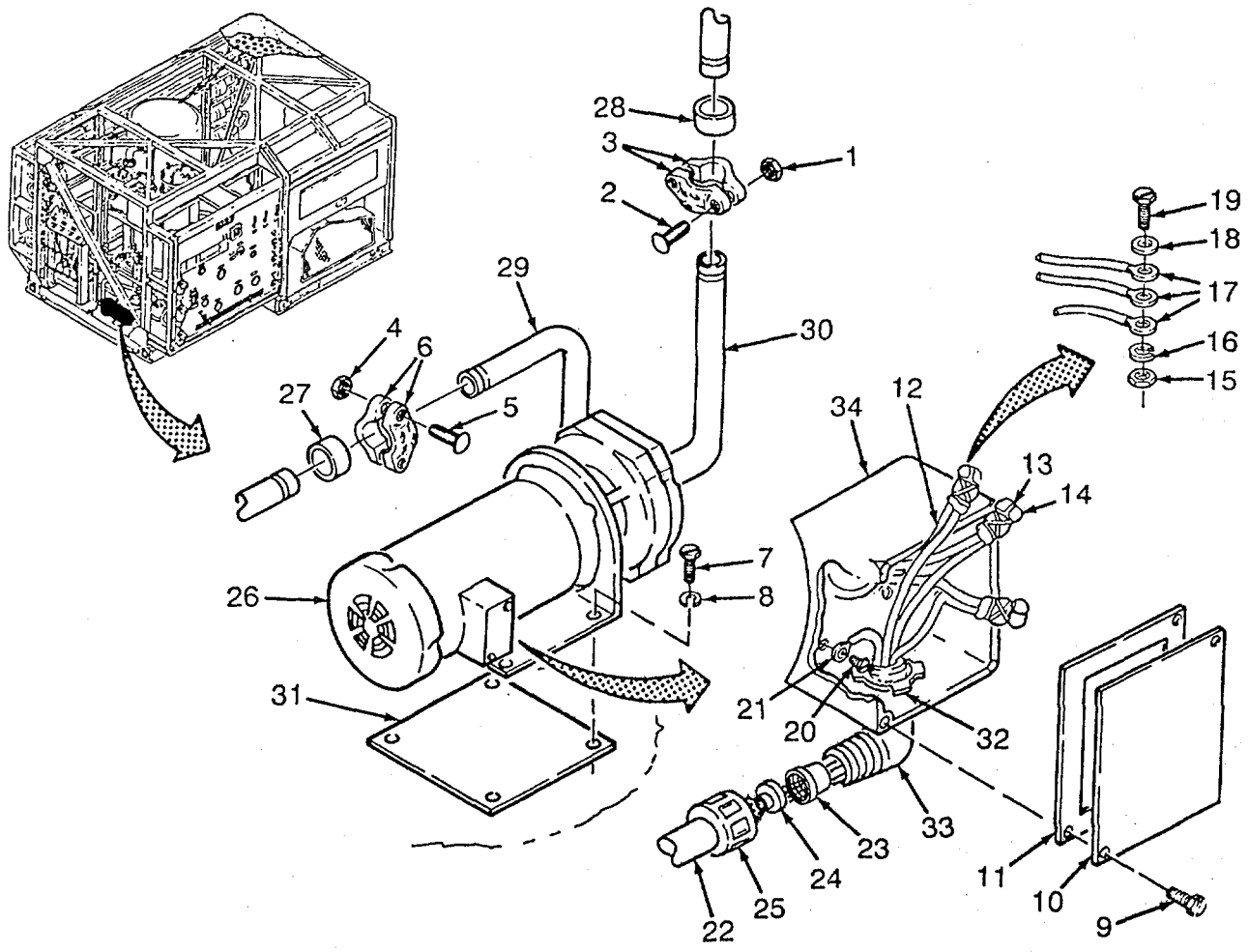
(9) From each wire set (12) that has been untaped, remove nut (15), lockwasher (16), lugs (17), flatwasher (18) and screw (19).

(10) Remove screw (20), securing ground wire (21) to conduit box (34).

CAUTION

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

(11) Unscrew nut (25) and remove cable assembly (22) from conduit box (34). Remove seal (23), seal ring (24) and nut (25) from cable assembly.



2-59. CENTRIFUGAL PUMP (BOOSTER) REPLACE - continued.

(12) Remove booster pump assembly (26) from unit and remove gaskets (27 and 28) from pipes (29 and 30).

(13) As required, remove mounting plate (31), nut (32) and elbow (33).

(14) Scribe a line across intersections of pipes (29 and 30) and pump (26) to facilitate installation and remove pipes from pump.

b. Installation.

NOTE
Be sure to wrap tape in same direction as threads.

(1) Install anti-seize tape on male threads of pipes (29 and 30), install pipes on pump assembly (26) as marked at removal, lubricate gaskets (27 and 28) and position gaskets on pipes (29 and 30).

WARNING
Booster pump assembly is heavy/difficult to handle.

(2) If removed, install elbow (33) and nut (32) on junction box (34).

(3) If removed, position nut (25), seal ring (24) and seal (23) on cable assembly (22).

(4) Position pump on floor of ROWPU in a way to permit easy access to conduit box (34).

(5) Feed wires of cable assembly (22) into junction box (34), thru elbow (33), providing about 6 inches of slack.

NOTE
Be sure to connect wires as tagged. If tags are lost or illegible, connect wires as follows:

SET 1	SET 2	SET 3	SET 4
2	4	7	3
8	5	1	9
White	6	Black	Red

(6) Position washer (18), wire lugs (17) as tagged or using color code, lockwasher (16), and nut (15) on screw (19) and tighten nut.

(7) Using electrical tape (14), wrap each wire set (12). Secure tape on each wire set (12) with twine (13) and position in conduit box (34).

(8) Position grounding wire (21) in conduit box (34) as illustrated and secure with screw (20).

2-59. CENTRIFUGAL PUMP (BOOSTER) REPLACE - continued .

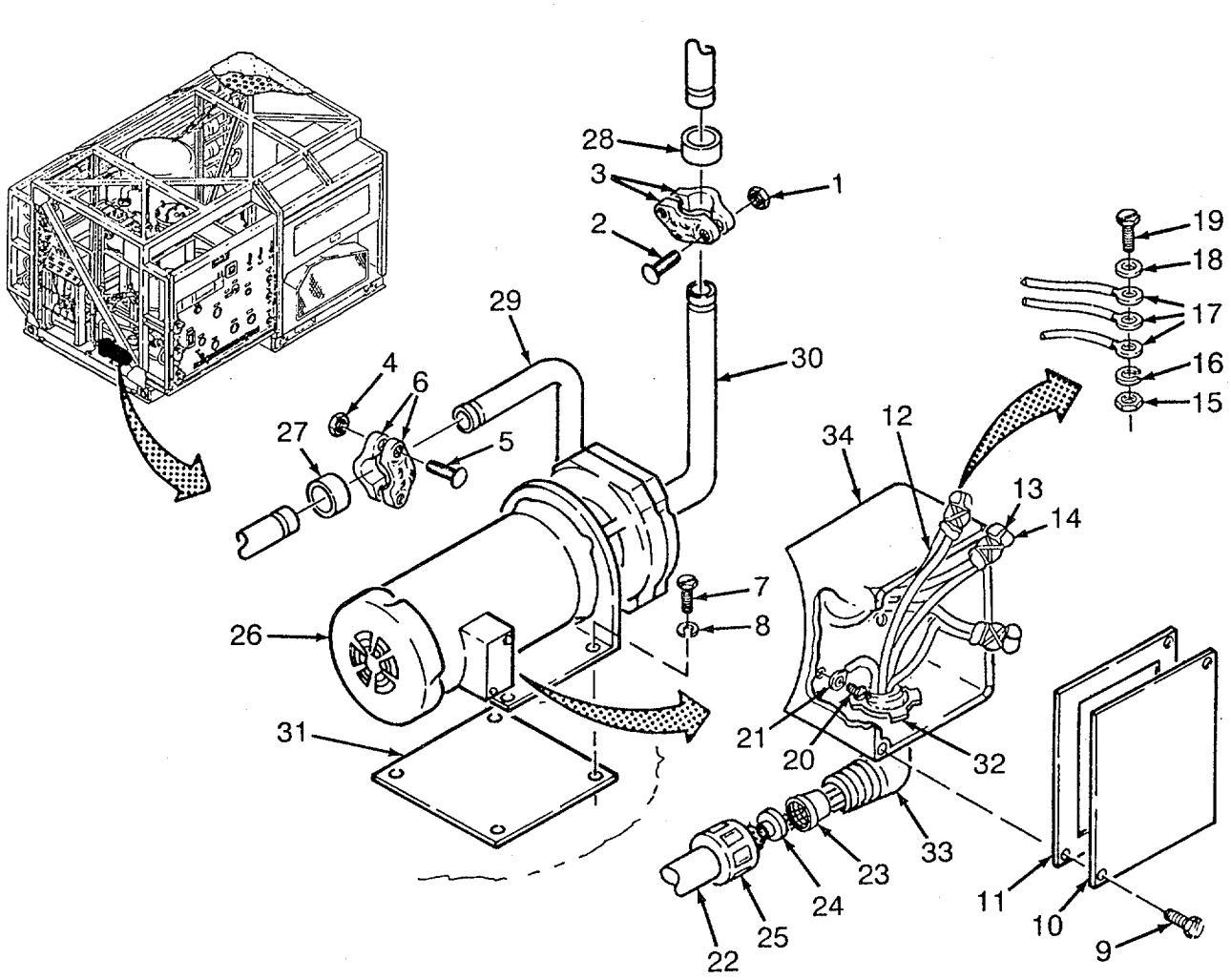
(9) Position gasket (11) and conduit box cover (10) on conduit box (34) and install four screws (9).

(10) Position plate (31) and pump (26) on ROWPU floor and secure with four lockwashers (8) and screws (7).

(11) Position gasket (27) over pipe joint and install clamp halves (6) two bolts (5) and nuts (4).

(12) Position gasket (28) over pipe joint and install clamp halves (3) two bolts (2) and nuts (1).

(13) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-60. CHEMICAL FEED PUMP REPLACE.

This task consists of: a. Service b. Remove c. Repair d. 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 20)
Twine (Appendix C, Sect II, Item 27)
Oil, Lubricating (LO 10-4610-241-12)
Lockwashers (TM 10-4610-241-24P)
Personnel
Two
Equipment Condition
Reference
Power shut down (Power Source Manual).
Chemical Cans and Frame removed (TM 10-4610-241-10).
General Safety Instructions

WARNING

Chemicals used with chemical feed pump are toxic to skin, eyes and breathing passages. Wear rubber gloves, eye and respiratory protection while working on chemical feed pump.

a. Service.

(1) Place suitable container (5 quart capacity or greater) under chemical feed pump drain plug (1).

(2) Remove drain plug (1) and allow oil to drain into container.

(3) Install drain plug (1) and flip open fill plug (2).

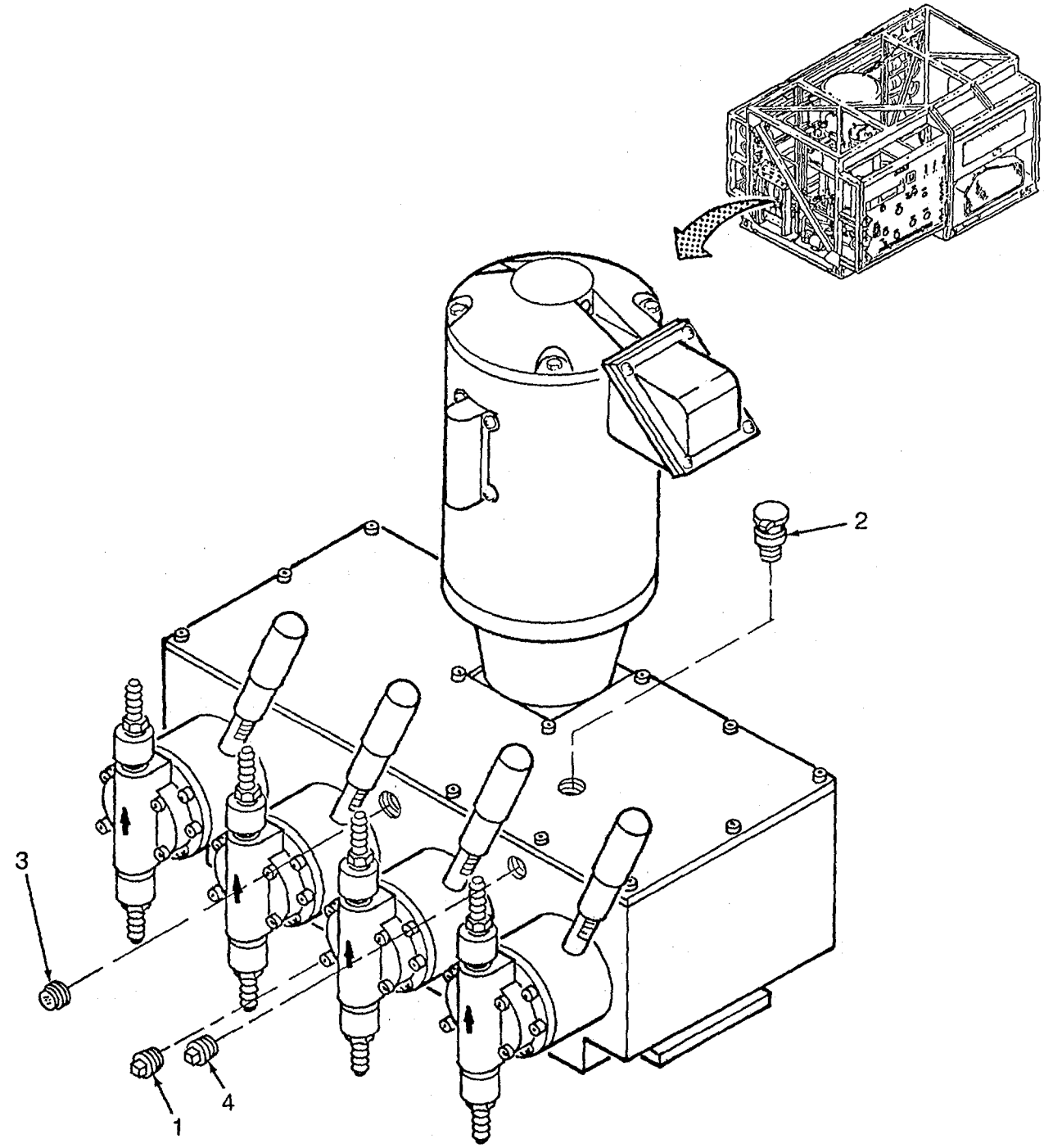
(4) Add oil through fill plug hole until oil level rises to center of sight glass (3).

(5) Close fill plug (2).

(6) Recheck sight glass (3) for proper oil level. If too much oil has been added, remove overflow plug (4) and allow excess to drain.

(7) When oil level is correct, install plug (4)

2-60. CHEMICAL FEED PUMP REPLACE - continued.



2-60. CHEMICAL FEED PUMP REPLACE - continued.

b. Removal.

(1) Loosen setscrews on handles (5) and remove four handles and nuts (6).

(2) Grasp all four three way valves (44) with hoses attached and pull away from stand (9).

(3) Remove four screws (7), lockwashers (8) and stand (9).

NOTE
Tagging hoses, noting their connection points will faciliate installation.

(4) Tag flexible hoses (10 and 11).

(5) Loosen clamp (12 and 13) and disconnect eight flexible hoses (10 and 11) at liquid heads (45). If required, remove clamps from hoses.

(6) Remove four screws (14), lockwashers (15) cover (16), and gasket (17) from conduit box (43).

(7) Pull two wire sets (18) from conduit box (43).

NOTE
Tagging wires, noting to which set they belong, will facilitate installation.

(8) Tag and identify wires by set and remove twine (19) and tape (20) from each wire set (18).

(9) Remove nut (21), lockwasher (22), flat washer (24) and screw (25) from lugs (23) of each wire set (18).

(10) Remove screw (26) and ground lug (27) from conduit box (43).

(11) Unscrew nut (30) from adapter (39).

(12) Carefully pull cable assembly (31) from conduit box (43). As required, remove seal (28), seal ring (29) and nut (30) from cable assembly.

(13) Remove four bolts (32), lockwashers (33) and pump assembly (37), with stand (38) attached.

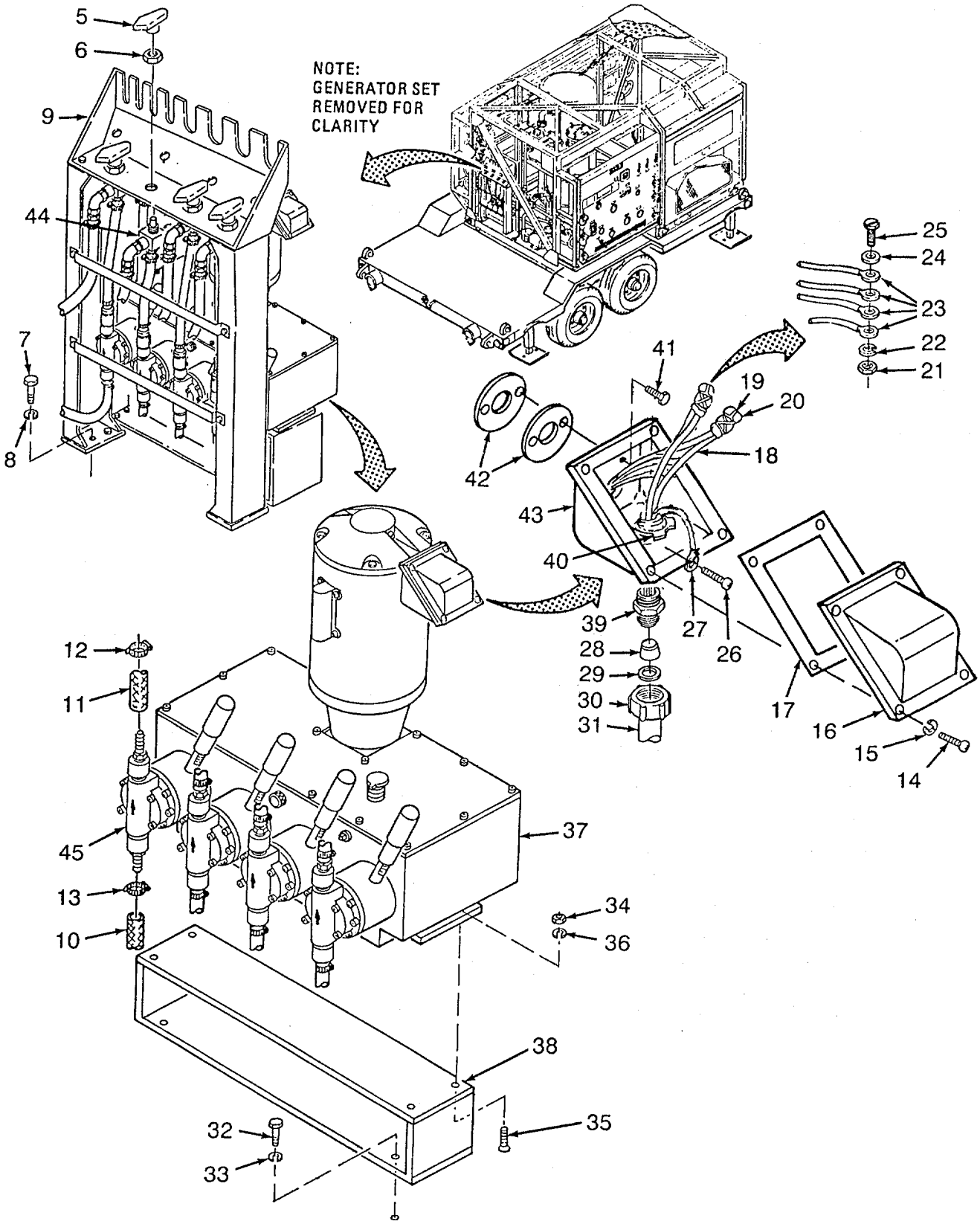
(14) Separate pump assembly (37) from stand (38), removing four screws (35), nuts (34), and lockwashers (36).

(15) As required, remove nut (40) and adapter (39) from conduit box (43) and remove two screws (41) and seals (42) to remove box from motor.

c. Repair

Repair of chemical pump at the Unit level consists of replacement of motor (Paragraph 2-62) and repair and replacement of the liquid head assembly (Paragraph 2-61).

2-60. CHEMICAL FEED PUMP REPLACE - continued.



2-60. CHEMICAL FEED PUMP REPLACE - continued.

d. Installation

(1) If removed, position seals (42) and conduit box (43) on pump motor and secure with two screws (41). Install adapter (39) and nut (40) on conduit box.

(2) Position chemical feed pump (37) on stand (38) and install four screws (35), lock-washers (36) and nuts (34).

(3) Install chemical feed pump (37) with attached stand (38) on ROWPU floor and secure with four screws (32) and lockwashers (33).

(4) Position nut (30), seal ring (29) and seal (28) on cable assembly (31) and feed wires of cable assembly into conduit box (43) thru adapter (39). Adjust cable for slack and connect nut (30) to adapter (39).

(5) Position ground lug (27) (green wire) on conduit box (43) and install screw (26).

NOTE

Be sure to install wires as tagged. If tags are lost or illegible use the following manufacturers identification/color code to connect wires.

SET 1	SET 2
T2, T4, T5, White	T1, T3, T8, Black

(6) Position screw (25), flat washer (24), lockwasher (22) and nut (21) on lugs (23) of each wire set (18) as tagged or using manufacturer's identification and color code.

(7) Wrap wire sets (18) with tape (20). Secure tape with twine (19).

(8) Install gasket (17), cover plate (16), four screws (14) and lockwashers (15) on conduit box (43).

(9) Position clamps (12 and 13) on flexible hoses (10 and 11) and connect hoses as tagged during removal.

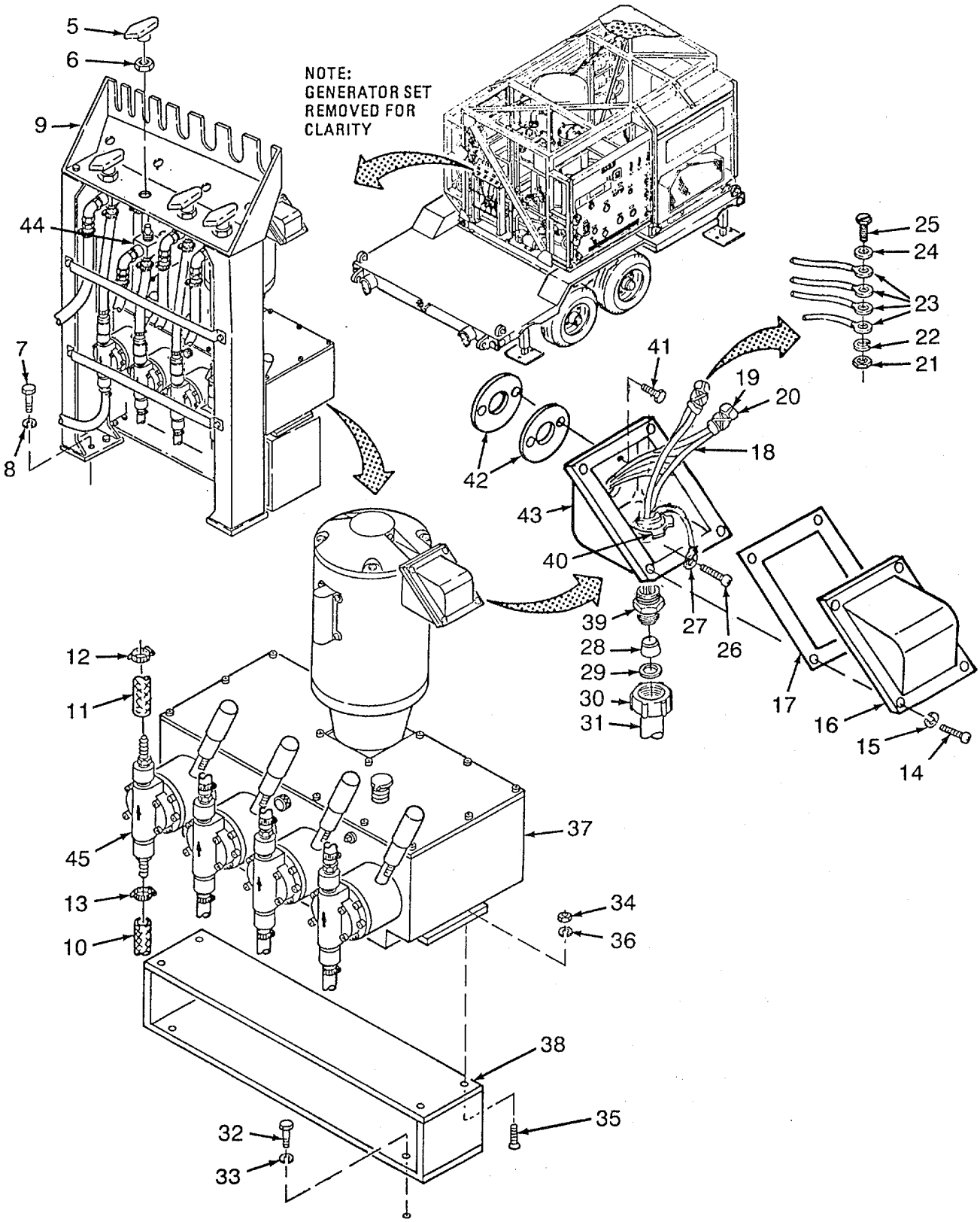
(10) Install stand (9) on trailer and secure with four lockwashers (8) and screws (7).

(11) Install four three-way valves (44), with attached hoses, on stand (9), using locknuts (6).

(12) Position handles (5) on three-way valves (44) and secure with setscrew on handles.

(13) Operate ROWPU. Check for leaks and proper operation (TM 10-4610-241-10).

2-60. CHEMICAL FEED PUMP REPLACE - continued.



2-61. LIQUID HEADS (CHEMICAL FEED PUMP) REPAIR.

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)

Material/Parts Required

Detergent (Appendix C, Section II, Item 10)
Rags, Wiping (Appendix C, Section II, Item 23)
Tape, Anti-seize (Appendix C, Section II, Item 30)
Seals, Packing and Lockwashers (TM 10-4610-241-24P)

Equipment Condition

Reference

Power shut down (Power Source Manual).
Chemical Cans and Frame removed (TM 10-4610-241-10).

---

a. Removal.

NOTE

- Liquid head can be repaired without removing chemical feed pump from unit.
- Removal of one liquid head is covered. The other heads are removed in similar manner.

(1) Loosen clamp (2) and disconnect flexible hose (1) from liquid head (7).

(2) Loosen clamp (4) and disconnect flexible hose (3) from liquid head (7).

(3) Remove four screws (5) and washers (6) and separate liquid head (7) from chemical feed pump (12).

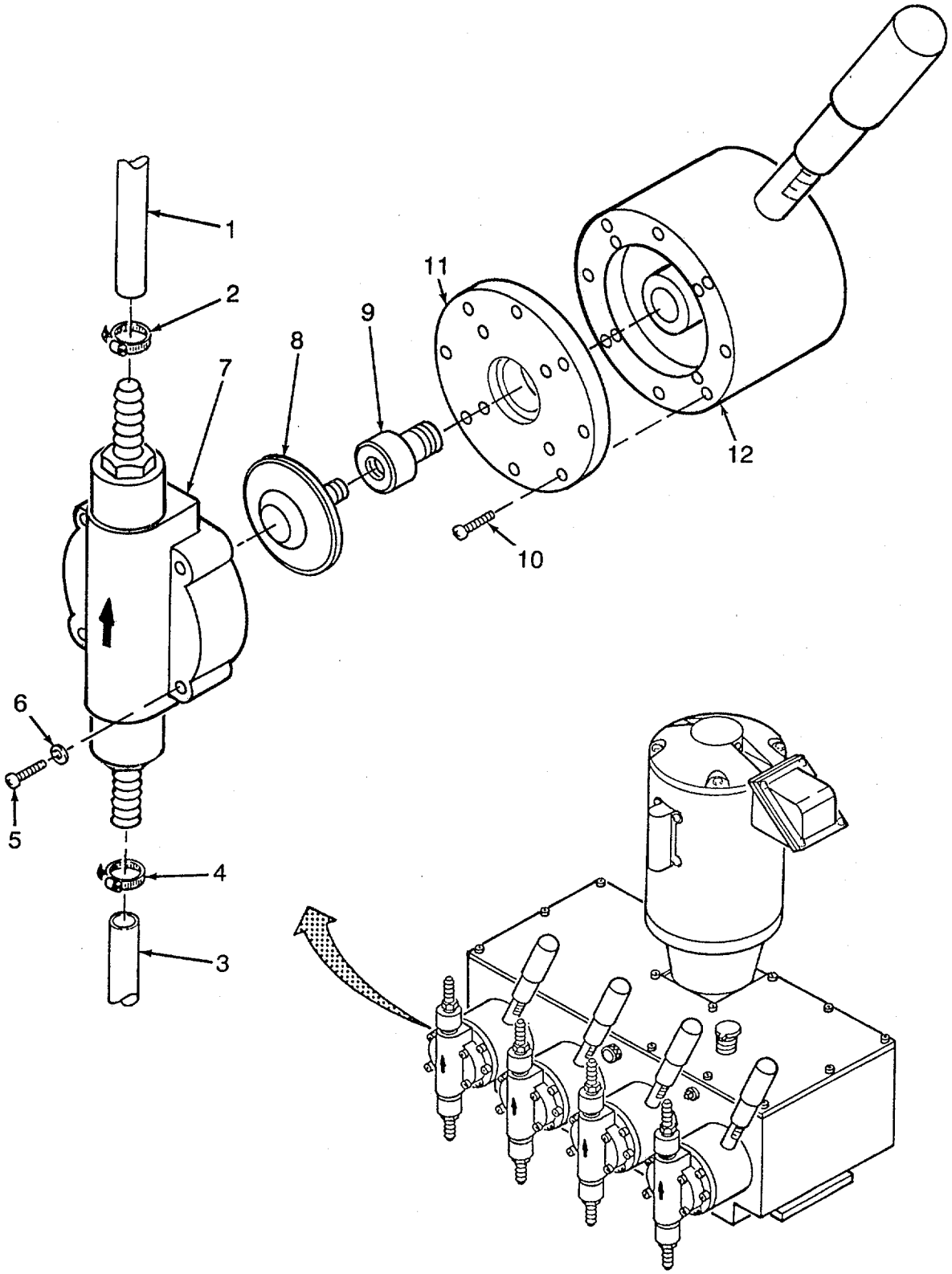
(4) Unscrew diaphragm (8) and diaphragm adapter (9).

NOTE

Marking position of adapter plate in relation to pump will facilitate installation. Be sure to transcribe markings to replacement parts before discarding or turning them in to Supply.

(5) Scribe a line across junction of pump (12) and adapter plate (11) and remove eight screws (10) and adapter plate (11) from chemical feed pump (12).

2-61. LIQUID HEADS (CHEMICAL FEED PUMP) REPAIR - continued.



2-61. LIQUID HEADS (CHEMICAL FEED PUMP) REPAIR - continued .

b. Disassembly.

(1) Unscrew and remove barbed fittings (13) and (14).

(2) Unscrew check valve body (15) and remove poppet (16) and packing (17).

(3) Unscrew check valve body (18) and remove poppet (19) and packing (20).

c. Cleaning.

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

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

(3) Clean liquid head housing (21), removing all dirt particles and contaminants. Pay close attention to poppet seats. Even small particles of dirt in this area can affect operation of pump.

d. Inspection.

(1) Inspect all threaded components for damaged threads.

(2) Inspect liquid head housing (21) for clogged passages.

(3) Inspect barbed fittings (13 and 14) for deformation.

(4) Inspect poppets (16 and 19) for wear, deterioration and damage.

e. Repair.

(1) Replace damaged/unserviceable components.

(2) Replace pre-formed packing (17 and 20).

f. Assembly.

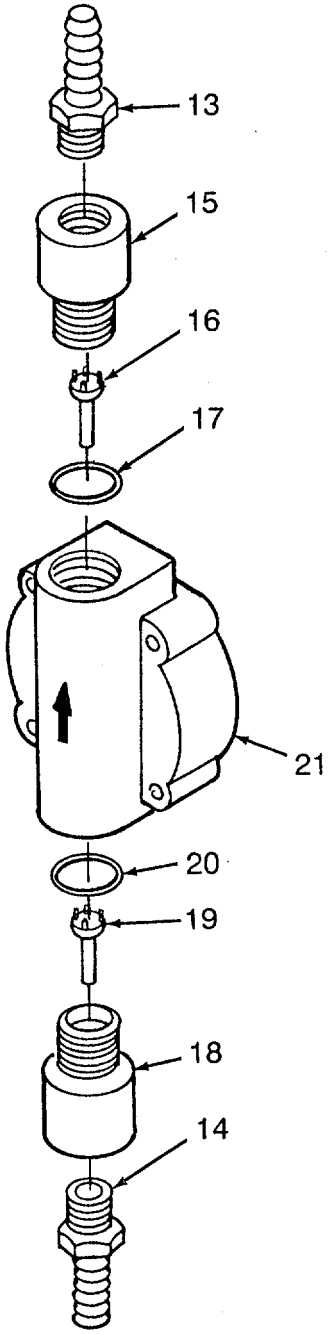
(1) Position packing (20) and poppet (19) on check valve seat (18) and install on liquid head housing (21)

(2) Position packing (17) and poppet (16) on check valve seat (15) and install on liquid head housing (21)

NOTE
Be sure to wrap tape in the same direction as threads.

(4) Install barbed fittings (13 and 14) with anti-seize tape.

2-61. LIQUID HEADS (CHEMICAL FEED PUMP) REPAIR - continued .



2-61. LIQUID HEADS (CHEMICAL FEED PUMP) REPAIR - continued .

g. Installation.

NOTE
Installation of one liquid head is covered. The other heads are similar.

(1) Position adapter plate (11) on pump assembly (12) as marked at disassembly.

(2) Install eight screws (10).

(3) Install diaphragm adapter (9).

(4) Install diaphragm (8).

(5) Position liquid head assembly (7) on pump assembly (12) with arrow pointing up as illustrated and secure with four screws (5) and washers (6).

(6) Position clamp (4) on flexible hose (3).

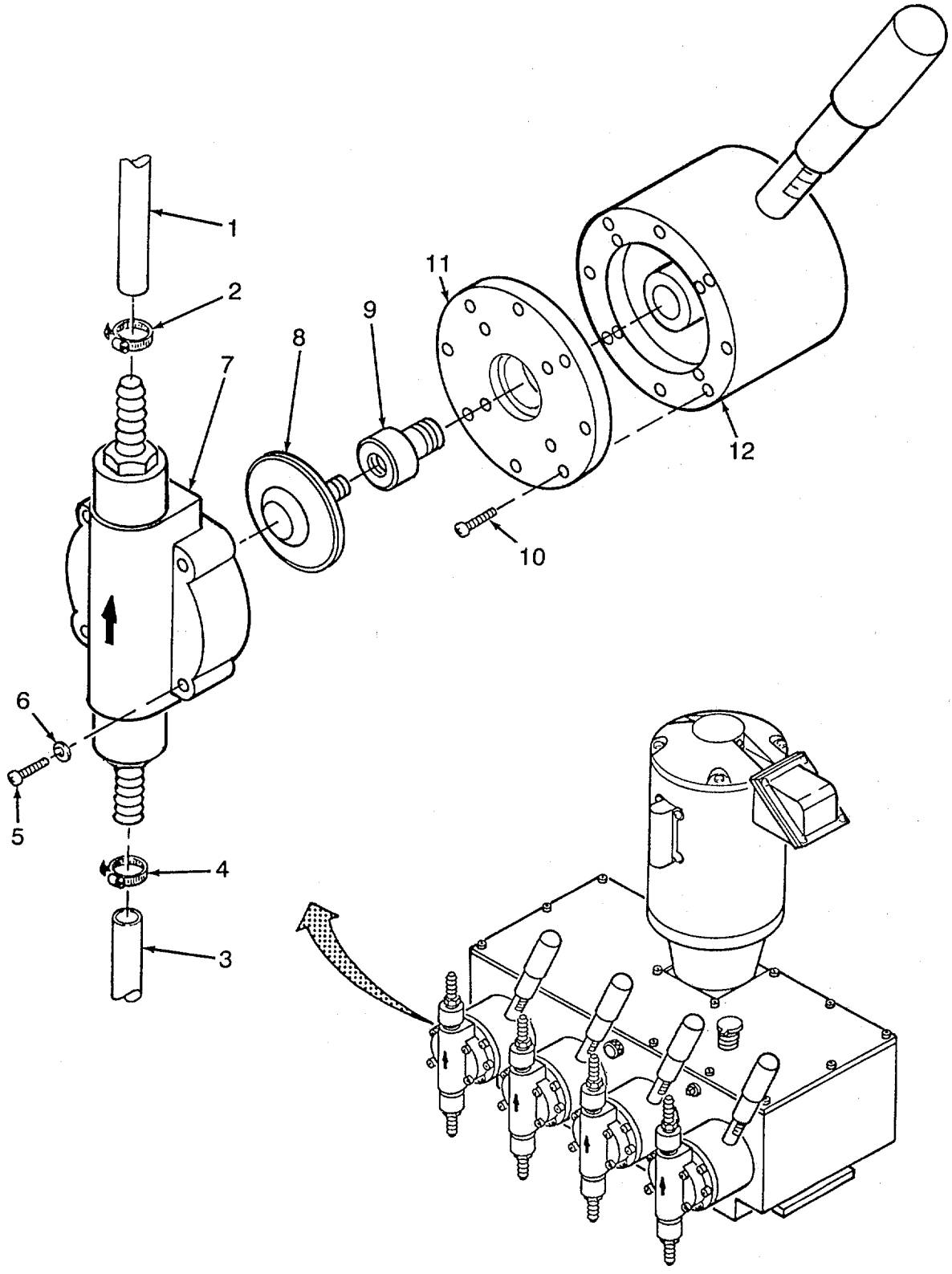
(7) Install flexible hose (3) on liquid head assembly (7) and secure with clamp (4).

(8) Position clamp (2) on flexible hose (1).

(9) Install flexible hose (1) on liquid head (7) and secure with clamp (2).

(10) Operate ROWPU (TM 5-4610-241-10). Check for leaks and proper operation.

2-61. LIQUID HEADS (CHEMICAL FEED PUMP) REPAIR - continued .



2-62. MOTOR (CHEMICAL FEED PUMP) REPLACE.

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
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual)
Chemical Feed Pump removed (Paragraph 2-60)

---

a. Removal.

NOTE
Marking position of motor in relation to pump will facilitate installation. Be sure to transcribe markings to replacement parts before discarding defective parts or turning them in to Supply.

(1) Scribe a line across junction of motor drive housing (6) and motor (3) and remove four motor mounting bolts (1) and lockwashers (2).

(2) Remove motor (3) from motor drive housing (6).

(3) Remove coupling spider (4).

(4) As required, aline setscrew (5) on coupling (7) with access hole in motor drive housing (6). Loosen setscrew and remove coupling from pump shaft.

(5) Measure distance between motor (3) and inner face of coupling (9) and record. This measurement will facilitate installation of replacement motor.

(6) Loosen setscrew (8) on coupling (9) and remove coupling from shaft of motor (3).

b. Installation.

(1) If removed, position coupling (7) on shaft of pump, inside motor drive housing (6), and aline setscrew (5) with access hole in drive housing (6).

(2) Push coupling (7) all the way down on pump shaft and tighten setscrew (5).

(3) Install coupling (9) on shaft of motor (3) at a distance from motor which is equal to distance measured in removing motor. Secure with setscrew (8).

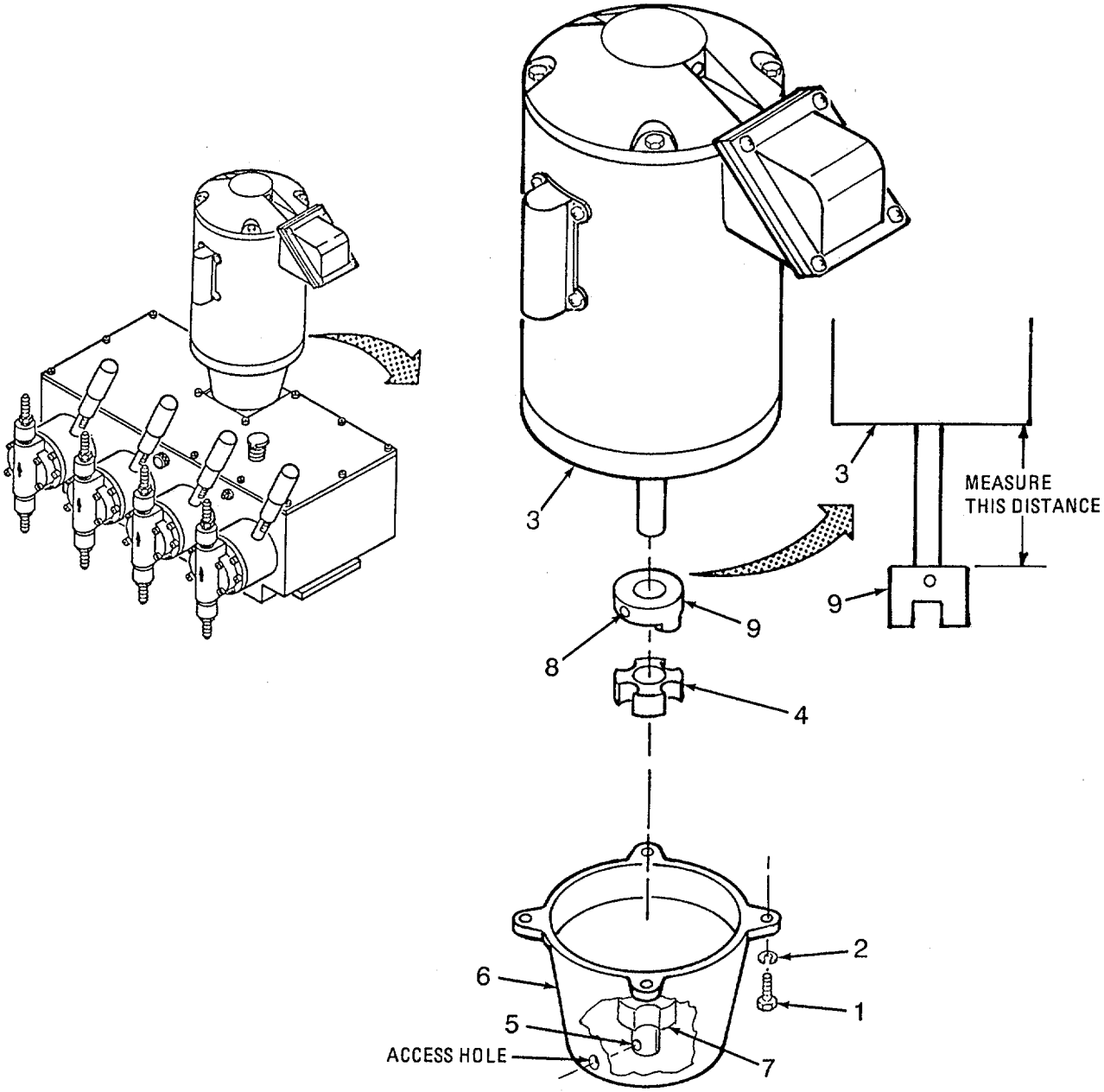
(4) Position coupling spider (4) on coupling (7) in motor drive housing (6).

2-62. MOTOR (CHEMICAL FEED PUMP) REPLACE-continued.

(5) Position motor (3) on motor drive housing (6) as marked at removal, making sure that coupling (9) engages coupling spider (4).

(6) Secure motor (3) to motor drive housing (6) with four screws (1) and lockwashers (2).

(7) Operate ROWPU (TM 10-4610-241-10) and check for proper operation of chemical feed pump.



2-63. CARTRIDGE FILTER REPAIR.

This task consists of: a. Diasassembly b. Cleaning c. Inspection
d. Repair e. Assembly

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 19)
- Grease, Silicone (Appendix C, Section II, Item 10)
- Lockwashers and Gaskets (TM 10-4610-241-24P)

Equipment Condition

Reference
- Power shut down (Power Source Manual).
- ROWPU Piping drained (TM 10-4610-241-10).
- Cover Plate and Filter Elements removed (TM 10-4610-241-10).
- Canvass Cover unzipped (TM 10-4610-241-10).

General Safety Instructions

WARNING

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

---

a. Disassembly.

(1) Loosen clamp (2) and disconnect hose (1) from nipple (3). As required, remove clamp from hose. Unscrew nipple from elbow (4) and remove.

(2) Reach into round cutout on filter and unscrew and remove elbow (4) and nipple (5).

(3) Loosen clamp (6) and disconnect hose (7) from nipple (8). As required, remove clamp from hose. Unscrew nipple from elbow (9) and remove.

(4) Unscrew and remove elbow (9) from nipple (10) and nipple from shell (41).

(5) Remove two nuts (11), screws (12) and clamp halves (13). Slide gasket (15) onto adapter (14).

(6) Remove adapter (14) from filter shell (41) and remove gasket (15) from adapter.

(7) Remove nut (16), screw (17) and eyebolt (18). Repeat for each eyebolt to be removed.

2-63. CARTRIDGE FILTER REPAIR - continued.

NOTE

Marking position of ring in relation to filter shell will facilitate installation. Be sure to transcribe markings to replacement parts before discarding defective parts or turning them in to Supply.

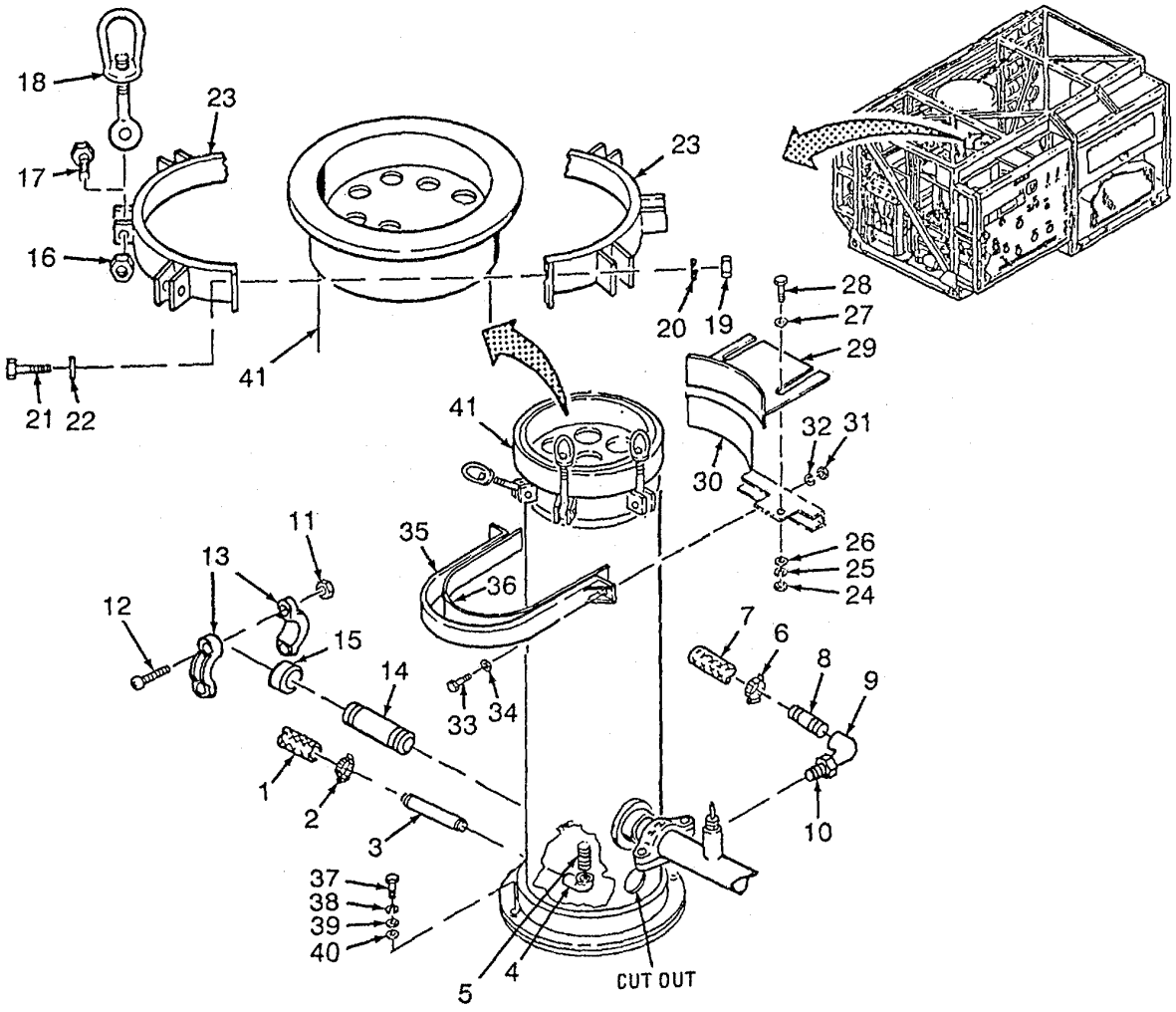
(8) Scribe a line across intersection of shell (41) and ring (23) and remove two nuts (19), lockwashers (20), screws (21) and flatwashers (22).

(9) Spread bracket (23) for clearance and remove over the top of filter shell (41).

(10) Remove two nuts (24), lockwashers (25), flatwashers (26 and 27), screws (28) and bracket (29). As required remove glued on gasket (30) from bracket.

(11) Remove two nuts (31), lockwashers (32), screws (33), flatwashers (34) and strap (35). As required remove glued on gasket (36.)

(12) Remove four screws (37), lockwashers (38), flatwashers (39) and bushings (40).



2-63. CARTRIDGE FILTER REPAIR - continued.

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 (41) for cracks, deep scratches, and delamination.

(2) Inspect packing seat in shell (41) for particles of dirt, cracks, and delamination.

d. Repair.

Replace defective components.

e. Assembly.

(1) Apply adhesive to surface of gasket (36) to be in contact with strap (35) and position on inside of strap.

(2) Position strap (35) on filter and secure to ROWPU frame with two screws (33), flatwashers (34), lockwashers (32) and nuts (31).

(3) Apply adhesive to surface of gasket (30) to be in contact with bracket (29) and position on bracket.

(4) Position bracket (29) on unit and install two screws (28), flatwashers (27 and 26), lockwashers (25) and nuts (24). Push bracket against filter shell (41) and tighten nuts (24).

(5) Position bracket (23) on filter, below top rim as marked at disassembly. Secure with two screws (21), washers (22), lockwashers (20) and nuts (19).

NOTE
Be sure to wrap tape in same direction as threads.

(6) Apply anti-seize tape to threads of all male fittings.

(7) Lubricate gasket (15) and position on adapter (14), then install adapter on filter shell (41).

(8) Slide gasket (15) over pipe joint and install clamps (13), bolts (12) and nuts (11).

(9) Install nipple (10) on filter shell (41) and connect elbow (9) to nipple. Then install nipple (8) on elbow (9).

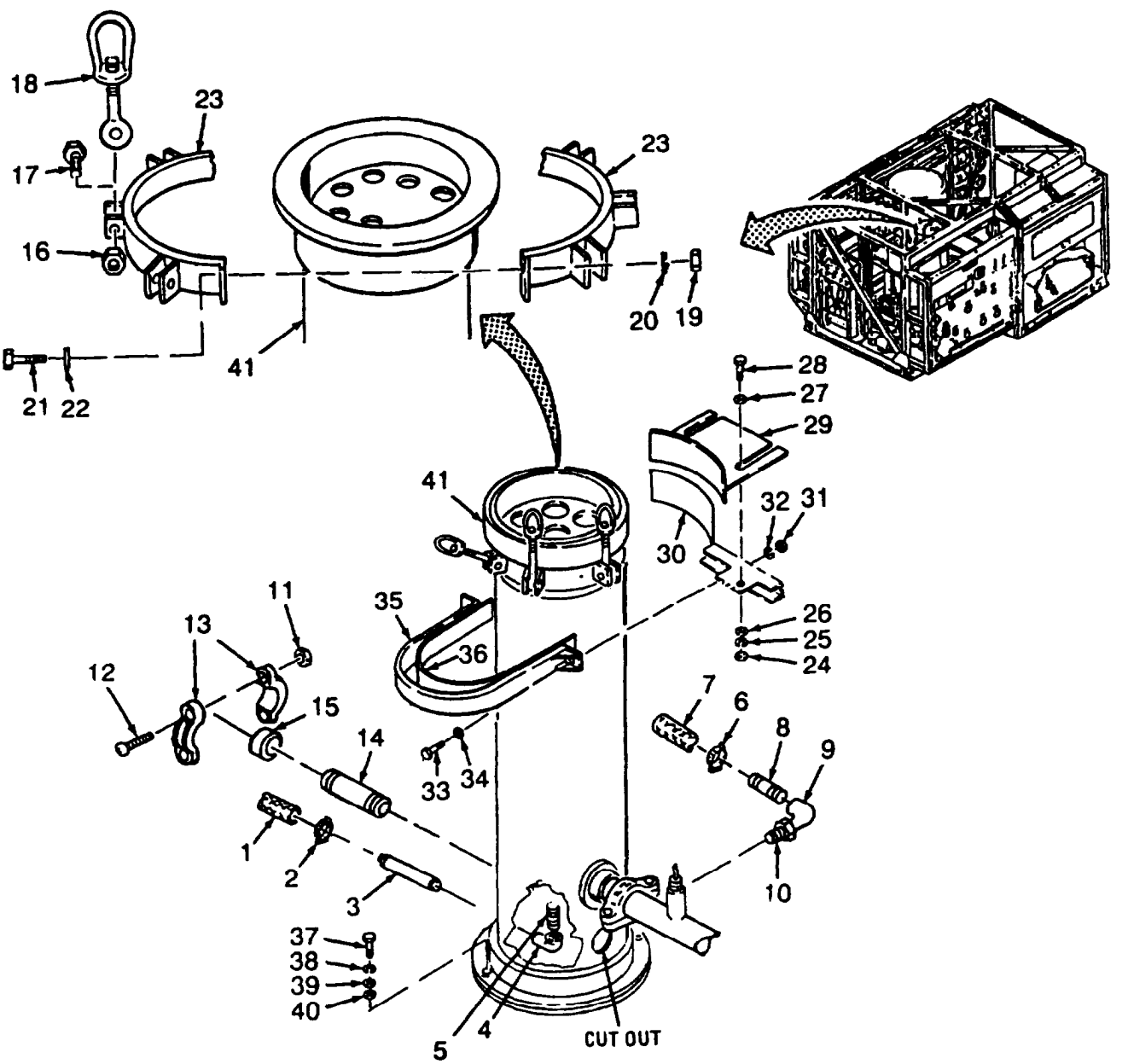
2-63. CARTRIDGE FILTER REPAIR - continued.

(10) Position clamp (6) on hose (7) and connect hose to nipple (8). Adjust and tighten clamp.

(11) Reaching thru round cutout on filter shell, install nipple (5) and elbow (4).

(12) Install nipple (3) on elbow (4).

(13) If removed, position clamp (2) on hose (1) and connect hose to nipple (3). Adjust and tighten clamp (2).



2-64. FLUID PRESSURE DAMPENER REPLACE (MODELS WPES-10, WPES-20, and WPES-30).

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 19)
Grease, Silicone (Appendix C,Section II, Item 10)
Lockwashers and Gaskets TM 10-4610-241-24P)
Personnel Required
Two
Equipment Condition
Reference
Power shut down (Power Source Manual).
ROWPU Piping drained (TM 10-4610-241-10).
General Safety Instructions

W A R N I N G

- 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 and requires two people to lift.

a . Removal.

(1) Remove two nuts (1), two bolts (2) and clamp halves (3). Slide gasket (10) onto adapter (23).

(2) Remove two nuts (4), two bolts (5) and clamp halves (6). Slide gasket (9) onto adapter (7).

(3) Unscrew adapter (7).

NOTE

Marking position of elbow in relation to dampener will facilitate installation. Be sure to transcribe markings to replacement parts before discarding defective parts or turning them in to Supply.

(4) Scribe a line across junction of elbow (8) and fluid pressure dampener (16) and remove elbow.

2-64. FLUID PRESSURE DAMPENER REPLACE (MODELS WPES-10, WPES-20, and WPES-30) - continued.

(5) Remove gaskets (9) and (10) from adapters (7 and 23).

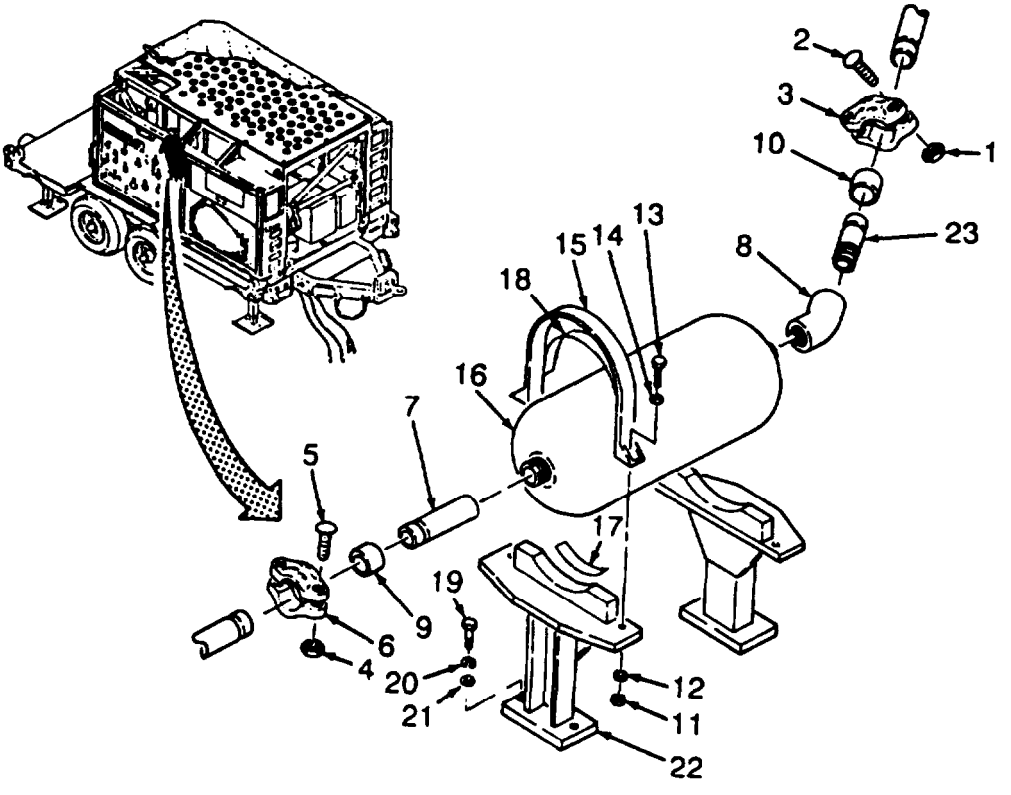
(6) Remove four nuts (11), lockwashers (12), flatwashers (14) and screws (13).

(7) Remove two straps (15) and fluid pressure dampener (16) from support assemblies (22).

(8) As required, remove glued on insulator cushions (17 and 18).

(9) As required remove screws (19), lockwashers (20), flatwashers (21) and support assemblies (22).

(10) As required, remove adapter (23) from elbow (8).



VIEW ROTATED FOR CLARITY

2-64. FLUID PRESSURE DAMPENER REPLACE (MODELS WPES-10, WPES-20, AND WPES-30) - continued.

b. Installation.

(1) If removed, position support assemblies (22) on floor of ROWPU and install four washers (21), lockwashers (20) and bolts (19).

(2) If removed, apply a coat of adhesive to surface of insulator cushions (17 and 18)) to be in contact with straps (15) and support assemblies (22) and position cushions on straps and supports.

WARNING

Fluid pressure dampener is heavy and difficult to handle. Two people are required to lift it.

(3) Position fluid pressure dampener (16) on support assemblies (22).

(4) Install two straps (15), four flat washers (14), screws (13), lockwashers (12), and nuts (11).

NOTE

Be sure to wrap tape in the same direction as pipe threads.

(5) Apply anti-seize tape to male pipe fittings.

(6) If removed, install adapter (23) on elbow (8).

(7) Lubricate gaskets (9 and 10) and position gasket (9) on adapter (7) and gasket (10) on adapter (23).

(8) Install adapter (7).

(9) Install elbow (8) on fluid pressure dampener (16) as marked at removal.

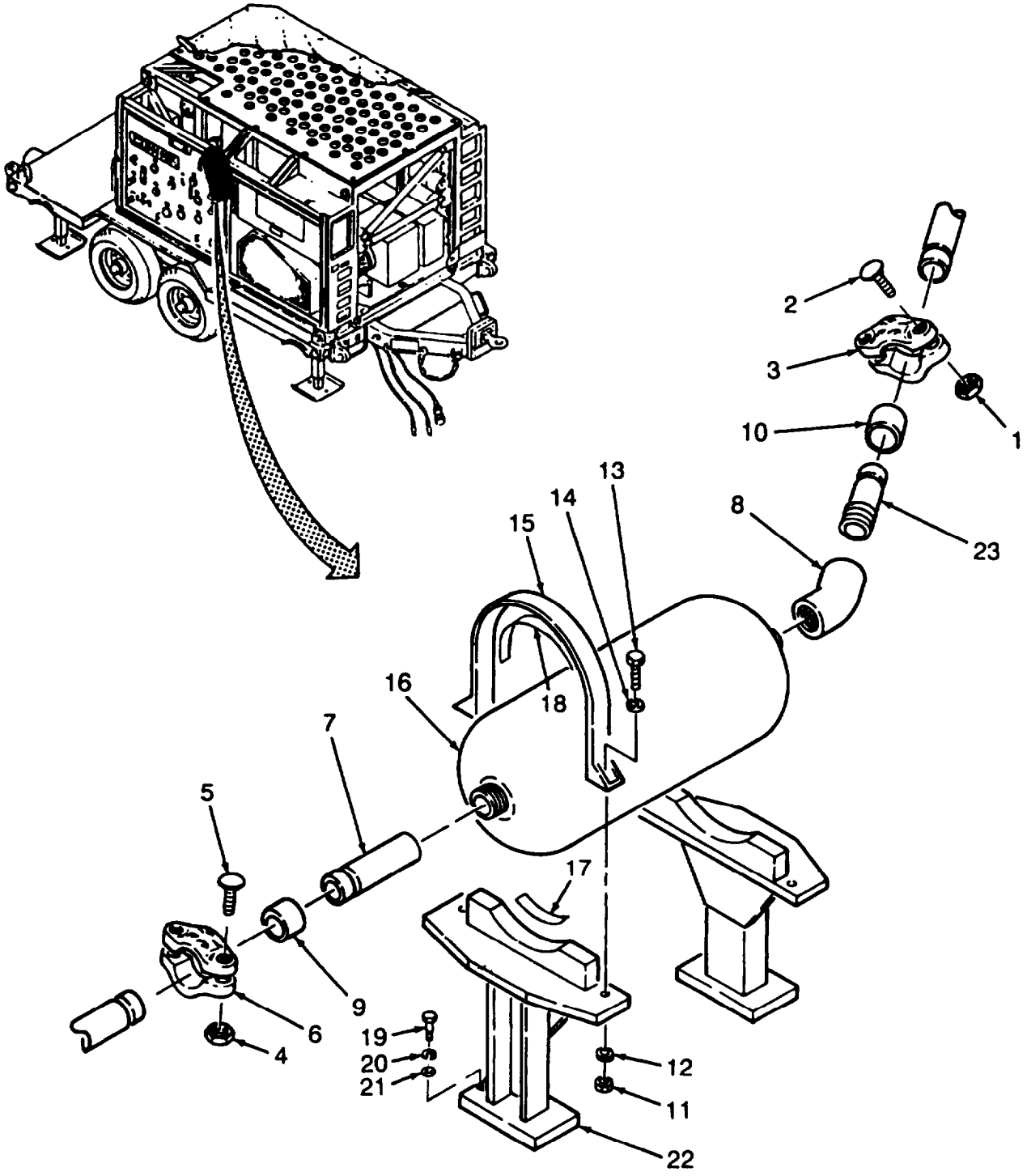
(10) Loosen nuts (11) as required to aline pipes.

(11) Position gasket (9) over pipe joint and install clamp halves (6), two bolts (5), and two nuts (4).

(12) Position gasket (10) over pipe joint and install clamp halves (3), two bolts (2), and two nuts (1).

(13) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.

2-64. FLUID PRESSURE DAMPENER REPLACE (MODELS WPES-10, WPES-20, and WPES-30) - continued.



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2-65. BELT GUARD REPLACE (MODELS WPES-10, WPES-20, and WPES30).

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
Lockwashers (TM 10-4610-241-24P
Equipment Condition
Reference
Power shutdown (Power Source Manual).

a. Removal.

(1) Remove six screws (1), lockwashers (2) and belt guard (3) from belt shroud (7).

(2) Remove six nuts (4), lockwashers (5) and flat washers (6).

(3) Remove belt shroud (7) from mounting plates (10).

(4) As required, remove screws (8), lockwashers (9) and plates (10).

(5) If removal of studs (11) is required, position heads of studs (11) between the partially open jaws of a vise and beat out studs with a hammer as illustrated.

b. Installation.

(1) If removed, install studs on plate (10) with a hammer and vise as illustrated.

(2) Position mounting plates (10) on ROWPU floor and secure with six lockwashers (9) and screws (8).

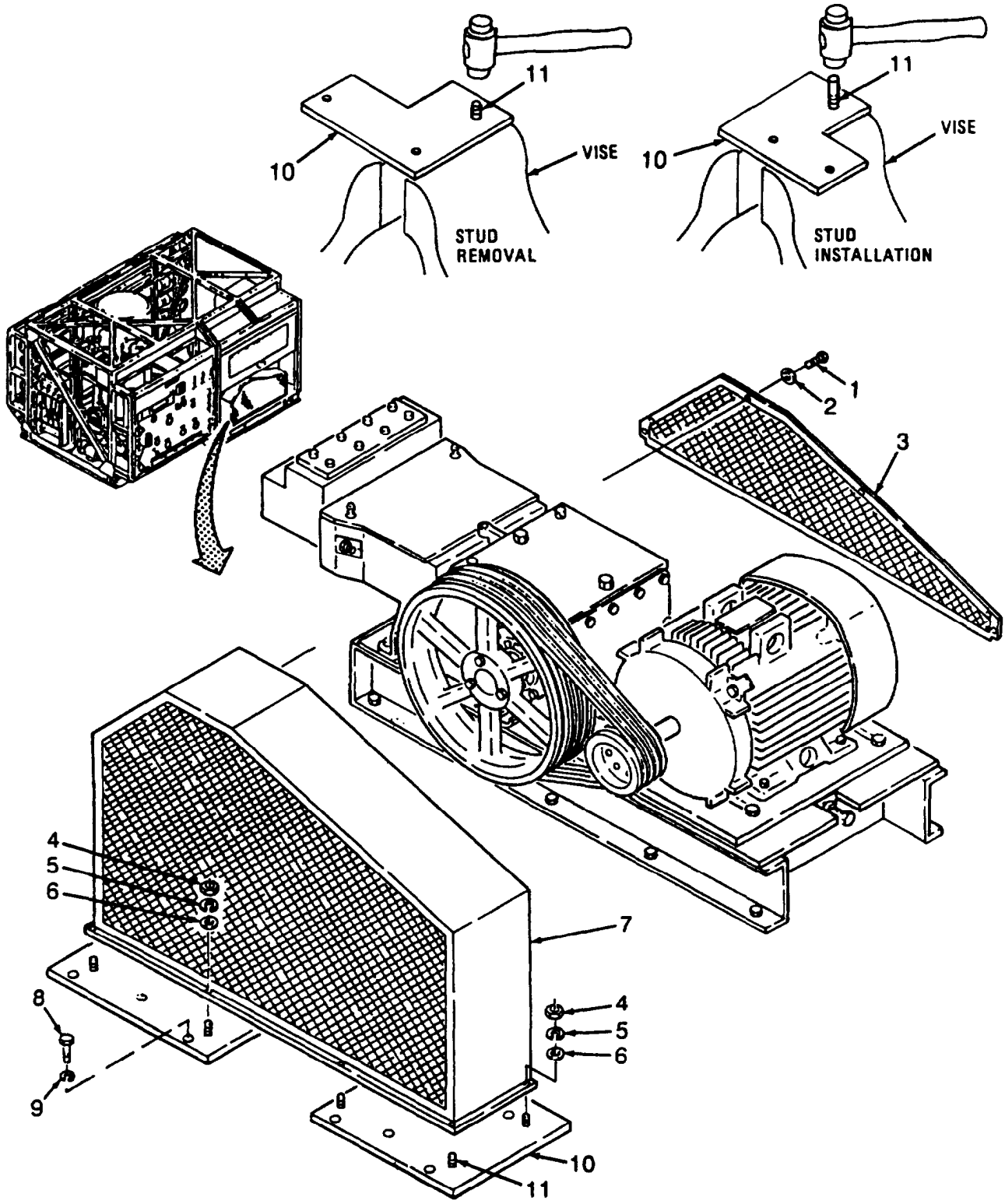
(2) Position belt shroud (7) over studs (11) on mounting plates (10).

(3) Install six flat washers (6), lockwashers (5). and nuts (4).

(4) Position belt guard (3) on belt shroud (7).

(5) Install six lo&washers (2) and screws (1).

2-65. BELT GUARD REPLACE (MODELS WPES-10, WPES-20, and WPES30) - continued.



2-66. V-BELTS AND SHEAVES REPLACE (MODELS WPES-10, WPES-20, and WPES-30).

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

lNITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
1 1/16 Combination Wrench (Appendix B, Section III, Item 4)
1 1/8 Socket (Appendix B, Section III, Item 4)
Belt Tension Gage (Appendix B, Section III, Item 4)
36 Inch Ruler Ruler (Appendix B, Section III, Item 4)
Strap Wrench (Appendix B, Section III, Item 4)
Material/Parts Required
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual)
Belt Guard removed (Paragraph 265)

a. Removal.

(1) Loosen four screws (1), securing motor mounting plate (2) to stand (3).

(2) Loosen locknut (4) on adjusting screw (5).

(3) Turn adjusting screw (5) counterclockwise until belts (6) are loose on sheaves (7 and 16).

(4) Remove belts (6).

(5) Remove three bolts (8) and lockwashers (9) from sheave (7) and install in threaded holes on sheave.

(6) Tighten bolts (8) evenly until sheave (7) is loose from hub (11). Remove sheave.

(7) Measure distance between motor (12) and inner face of hub (11) and record. This measurement is necessary for correct assembly.

(8) Loosen setscrew (10) on hub (11) and drive a wedge (large flatblade screwdriver will do) in split of hub to loosen hub on shaft. Remove hub and wedge.

(9) Remove key (13) from motor shaft, using a drift pin and hammer.

2-66. V-BELTS AND SHEAVES REPLACE (MODELS WPES-10, WPES-20, AND WPES-30) - continued.

(10) Remove three screws (14) and lockwashers (15).

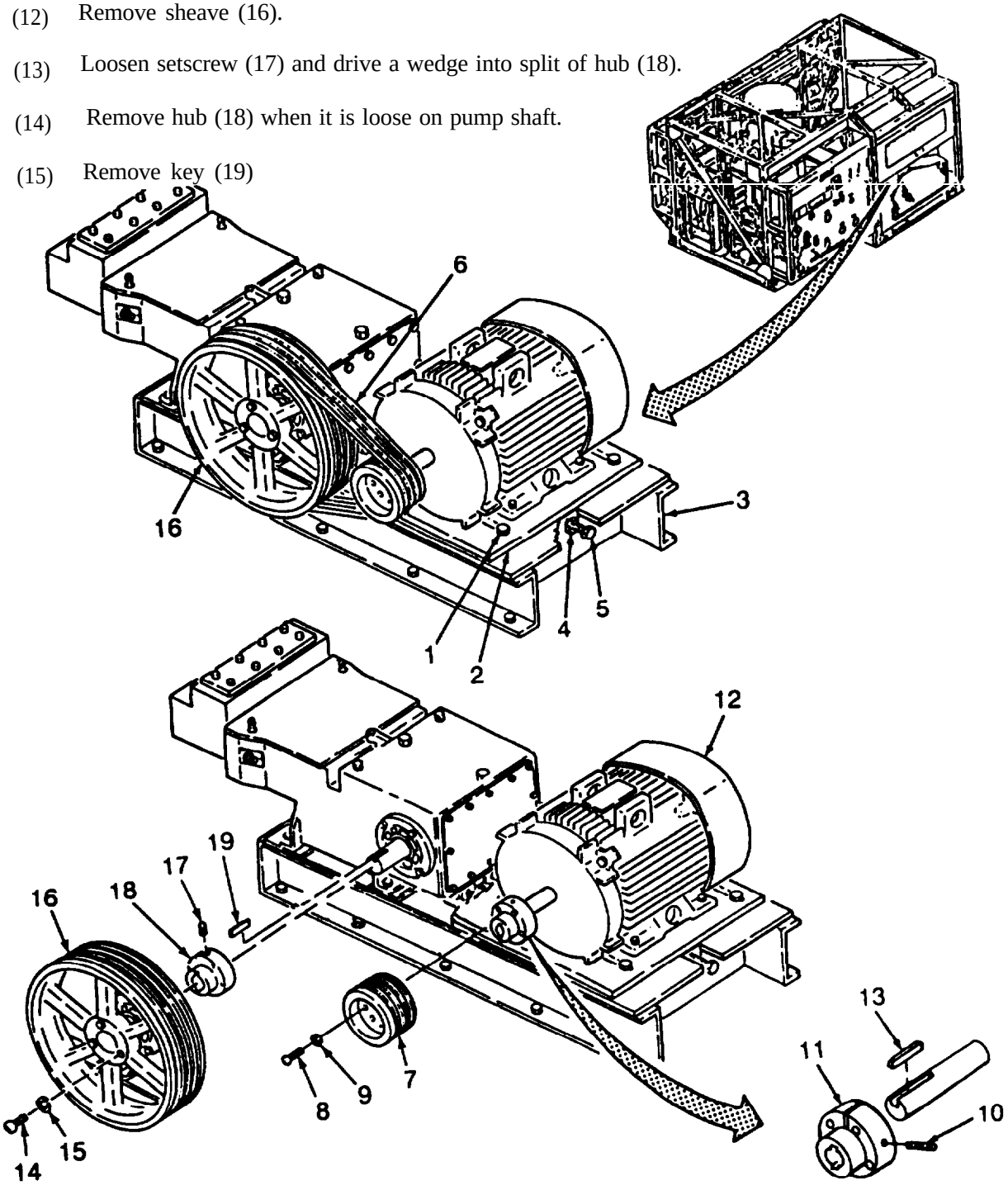
(11) Install srews (14) into threaded holes on sheave (16) and tighten evenly until sheave breaks loose of hub (18).

(12) Remove sheave (16).

(13) Loosen setscrew (17) and drive a wedge into split of hub (18).

(14) Remove hub (18) when it is loose on pump shaft.

(15) Remove key (19)



2-66. V-BELTS AND SHEAVES REPLACE (MODELS WPES-10, WPES-20, AND WPES-30) - continued.

b. Installation

(1) Install key (13) on motor shaft and position hub (11) on end of motor shaft.

(2) Using a soft face mallet, drive hub (11) onto motor shaft until distance from inner face of pulley is equal to measured distance at disassembly. Tighten setscrew ().

(3) Install sheave (7) on hub (11) and secure with three lockwashers (9) and screws (8).

(4) Position key (19) and hub (18) on shaft of pump assembly.

(5) Using a rubber mallet tap on sheave to move it in or out as required to obtain a distance of 0.25 to 0.50 between end of shaft and outside surface of hub.

(6) When sheave is properly positioned, tighten setscrew (17).

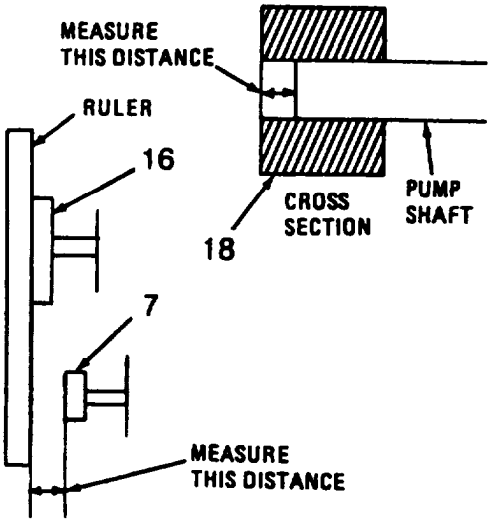
(7) Position sheave (16) on hub (18) and install lockwashers (15) and screws (14).

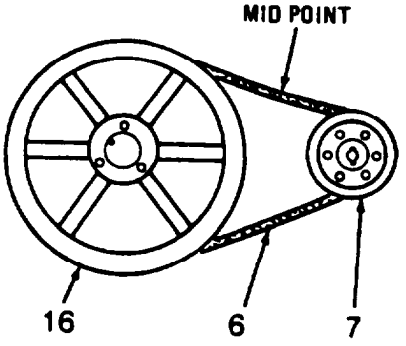
NOTE

Motor sheave may extend out past pump sheave. If this is the case ruler must be held against motor sheave.

(8) Hold edge of a 36 inch ruler against pump sheave (16) [or motor sheave (7)] and measure distance between sheave and ruler.

(9) If measurable distance is noted, record that distance and remove pump sheave as above. Reistall sheave, moving it in or out by the distance recorded.





NOTE

If any belt is damaged, replace all five belts with new ones. Do not replace less than five belts or use a mismatched set.

(10) Install five belts (6) on sheaves (16 and 7) and turn adjusting screw (5) clockwise until belt, at midpoint between sheaves can be depressed approximately 1/2 inch with thumbs.

2-66. V-BELTS AND SHEAVES REPLACE (MODELS WPES-10, WPES-20, and WPES30) - continued.

(11) Check belt tension with tension gage as follows:

(a) Engage belt with fork of gage.

(b) Depress plunger and read tension on gage.

NOTE

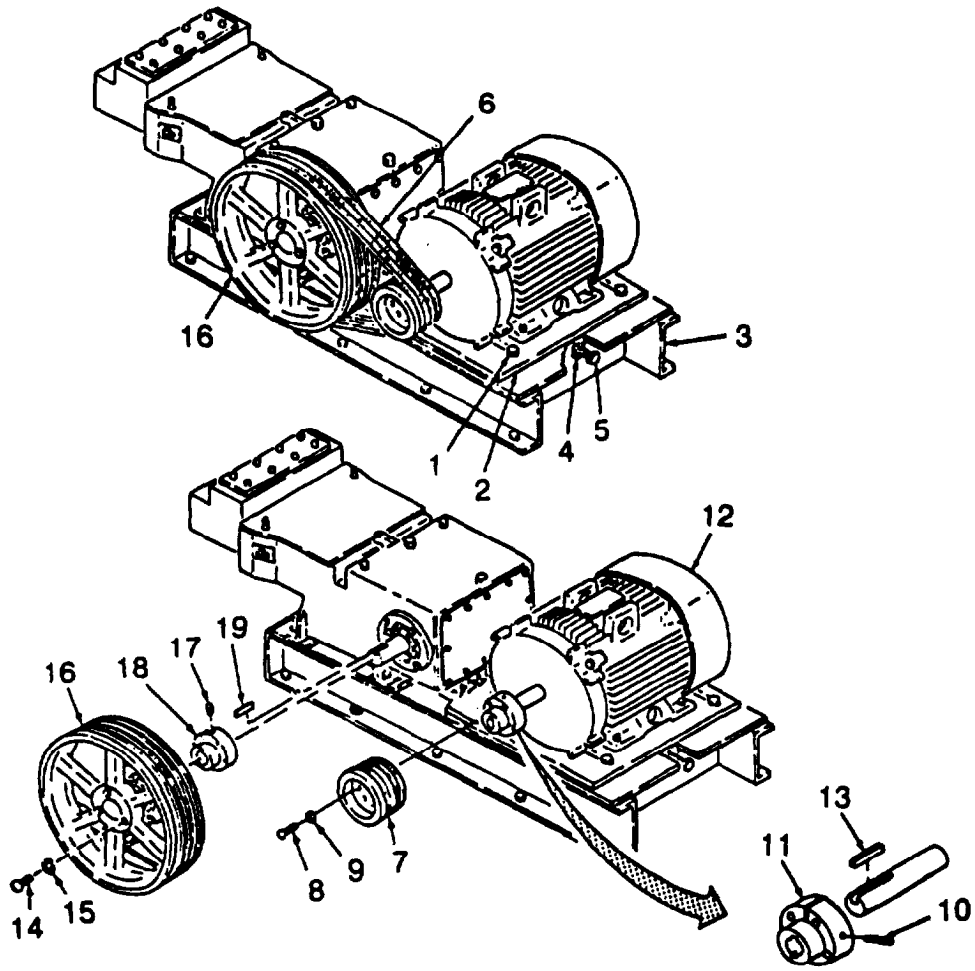
All belts must be checked and reading must be 0.5 plus or minus 0.1 inch.

(c) Turn bolt (5) clockwise or counterclockwise for correct belt tension.

(12) When belt tension and alinwment are correct, tighten bolts (1) and tighten locknut (4) against pump frame.

c. **Adjustment.**

If belts get loose or misalinement of sheaves is suspected during operation, perform steps (8) thru (12) of installation procedure.



2-67. HIGH PRESSURE PUMP REPAIR (MODELS WPES-10, WPES20, and WPES-30).

This task consists of:	a. Service	b. Disassembly	c. Cleaning
	d. Inspection	e. Repair	f. Assembly

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 19)
Detergent (Appendix C, Section II, Item 5)
Rags, Wiping (Appendix C, Section II, Item 14)
Gear Oil (LO-4610-241-12)
Lockwashers, Packing and Gaskets (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).
Belt Guard Removed (Paragraph 2-65).

a. Service.

NOTE

Pump contains approximately 4 quarts of oil when oil is at the full mark on oil level gage.

(1) Place a suitable container under discharge hose at front of trailer and unscrew and remove plug (1) from fill port.

(2) Turn drain valve (15) to fully open position and allow oil to drain.

(3) When oil is fully drained, close drain valve (15).

(4) Using a funnel, pour 4 quarts of oil into pump cavity at fill port.

b. Disassembly.

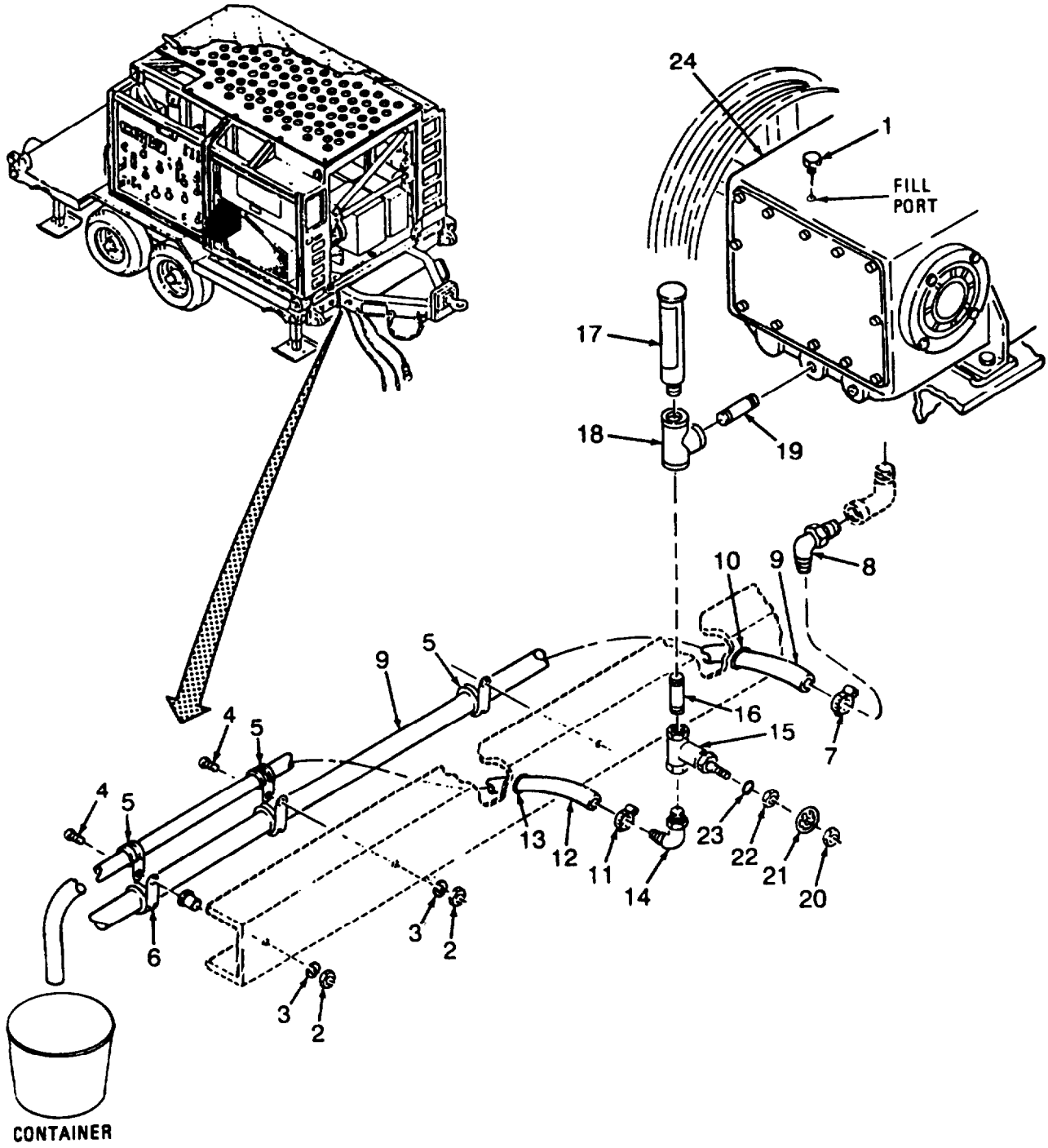
(1) Drain oil from Pump in accordance with paragraph a. above.

(2) Remove three nuts (2), lockwashers (3), screws (4) and clamps (5 and 6)

(3) Loosen clamp (7) and remove water drain hose (9) from elbow (8). As required, remove clamp from hose.

(4) Remove grommet (10).

2-67. HIGH PRESSURE PUMP REPAIR (MODELS WPES-10, WPES-20, and WPES-30) - continued.



2-67. HIGH PRESSURE PUMP REPAIR (MODELS WPES-10, WPES-20, and WPES-30) - continued.

(5) Loosen clamp (11) and disconnect hose (12) from elbow (14). Remove clamp from hose.

(6) Remove hose (12) and grommet (13).

(7) Remove elbow (14), valve (15), nipple (16) and sight glass (17) from tee (18).

(8) Remove tee (18) and nipple (19) from pump assembly (24).

(9) Remove nut (20) handle (21), packing nut (22) and packing (23) from valve (15).

c. Cleaning.

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

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

d. Inspection.

(1) Inspect all threaded components for damaged threads.

(2) Inspect sight gage (17) for cracked or dirty glass.

e. Repair.

(1) Replace lockwashers, packing and grommets.

(2) Replace damaged components.

f. Assembly.

(1) Position packing (23) on stem of valves (15) and install nut (22) fingertight, then tighten an additional 1/4 turn with wrench. Install handle (2 1) and nut (20).

NOTE
Be sure to wrap tape in same direction as threads.

(2) Wrap all male pipe threads with anti-seize tape.

(3) Install nipple (19) and tee (18) on high pressure pump (24).

(4) Install sight gage (17), nipple (16), valve (15) and elbow (14).

(5) Lubricate grommets (10 and 13) and install in pump stand.

(6) Feed oil drain hose (12) thru grommet (13) in pump stand and position clamp (11) on hose (12).

(7) Connect hose (12) to elbow (14). Adjust and tighten clamp (11).

2-67. HIGH PRESSURE PUMP REPAIR (MODELS WPES-10, WPES-20, and WPES-30) - continued.

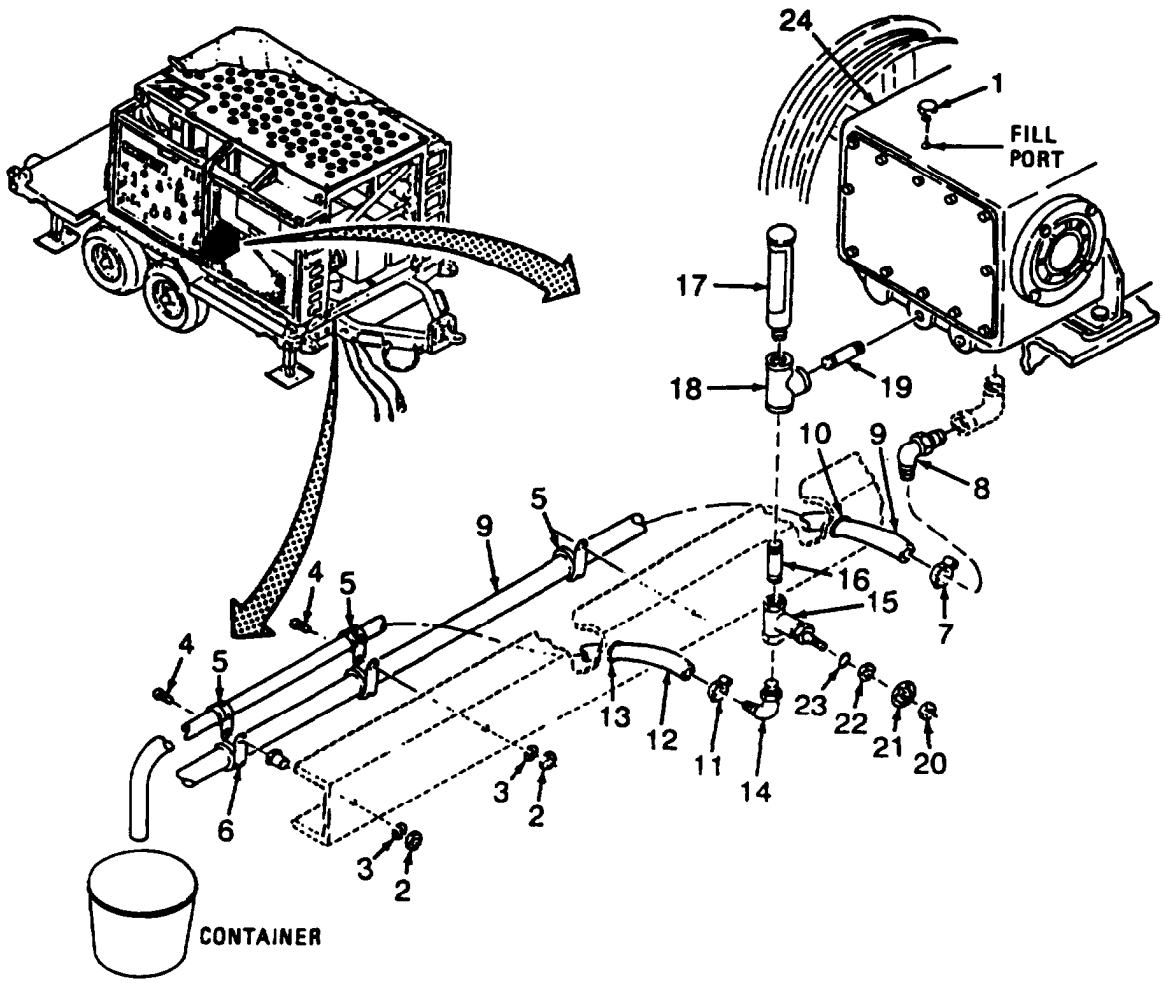
(8) Feed water drain hose (9) thru grommet (10) and position clamp (7) on hose (9).

(9) Connect hose (9) to elbow (8) on pump assembly (24). Adjust and tighten clamp (7).

(10) Install clamps (6 and 5) and secure with screws (4), lockwashers (3) and nuts (2).

(11) Fill high pressure pump with oil in accordance with Service procedure of this Paragraph.

(12) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.



2-68. TIMER REPLACE (Models WPES-10, WPES-20 and WPES30).

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
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).

a. Removal.

NOTE
To facilitate installation and prevent malfunction of equipment, be sure to tag and identify each flexible tube (see tubing diagram) before disconnecting from stager. To replace timer, disconnect tubes at timer only.

(1) Tag tubes (1) and unscrew from timer (9).

(2) Disconnect electrical cable (2) from cable (12).

(3) Unfasten six latches (3) and open cover (4).

(4) Holding timer (9) with one hand, to keep it from falling, remove two screws (5), lockwashers (6) and flat washers (7). Remove bracket (8) from inside of timer (9).

(5) Remove timer (9) from ROWPU.

NOTE
Tagging cable wires, noting their connection points will facilitate installation. Be sure to transfer tags to replacement parts before discarding tagged parts or turning them in to Supply.

(6) Tag wires (1), attached to right side of terminal board (10).

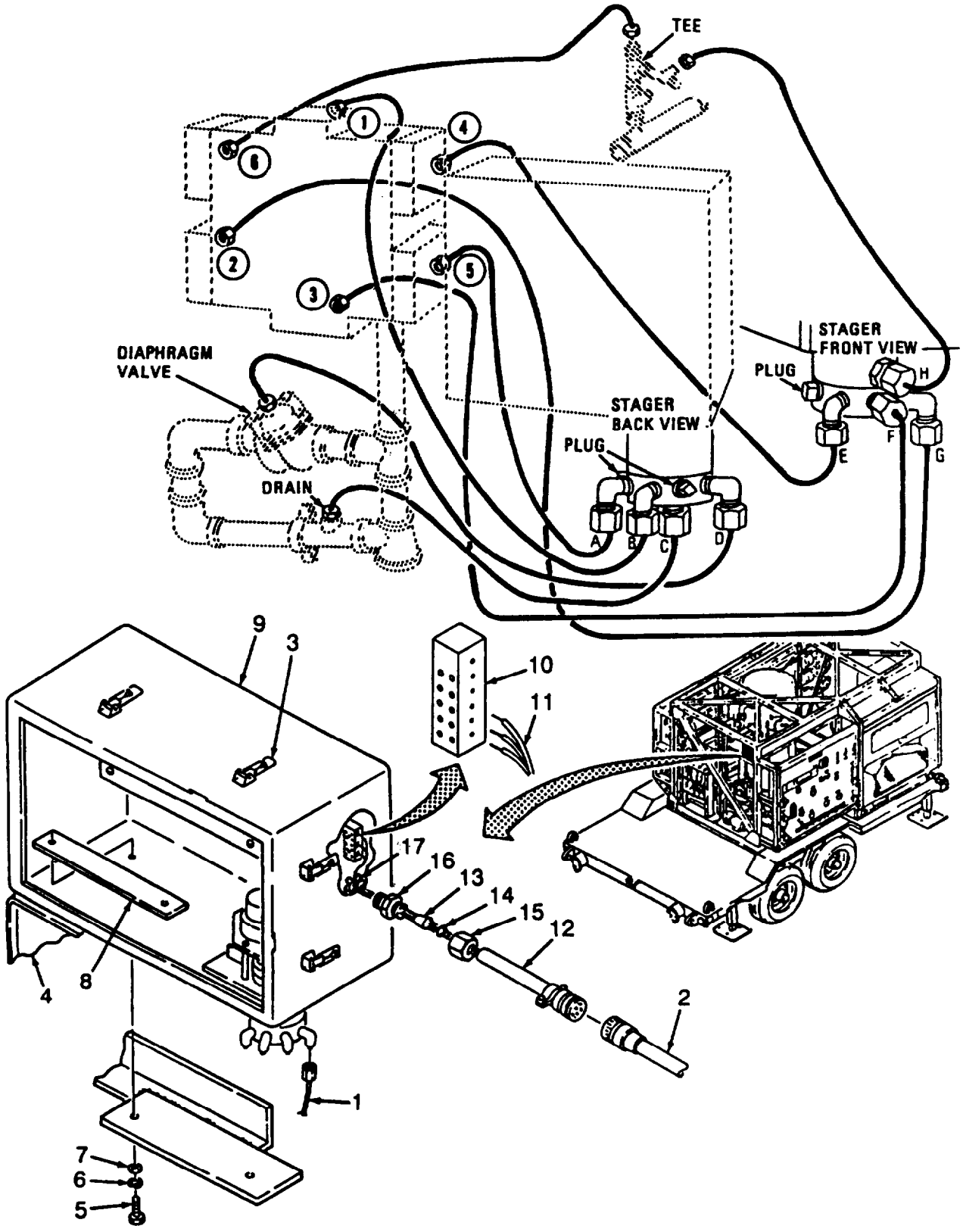
(7) Loosen screws, holding wires (11) to terminal board (10), and remove tagged wires.

(8) Unscrew nut (15) from adapter (16) and remove cable assembly (12) from timer (9).

(9) As required, remove seal (13), seal ring (14) and nut (15) from cable assembly (12).

(10) Remove nut (17) and adapter (16) from timer (9).

2-68. TIMER REPLACE (MODELS WPES-10, WPES-20, and WPES-30) - continued.



2-68. TIMER REPLACE (Models WPES-10, WPES-20 and WPES-30) -continued.

b. Installation.

(1) Install nut (17) and adapter (16) on timer (9).

(2) If removed, position nut (15), seal ring (14) and seal (13) on cable assembly (12).

(3) Feed wires of cable assembly (12) thru adapter (16) into timer (9) and provide about six inches of slack.

(4) Screw nut (15) onto adapter (16).

NOTE

- Be sure to connect wires as tagged. If tags are lost or illegible, use color code as follows to connect wires:

WIRE COLOR	TERMINAL BOARD CONTACT
Black	1
White	2
Green	3
Blue	4
Red	5

- To connect wires to terminal board, loosen tiedown screw on terminal board, insert bare part of wire into opening on terminal board. Tighten tiedown screw. If wire ends are not stripped, strip wires, removing about 1/8 inch of insulation from end of each wire.

(5) Connect wires (11) of electrical cable assembly (12) to terminal board (10) as marked, or use color code.

(6) Position timer (9) on multimedia filter frame.

(7) Position bracket (8) in timer (9) to align with mounting holes in timer and install two flat washers (7), lockwashers (6), and screws (5).

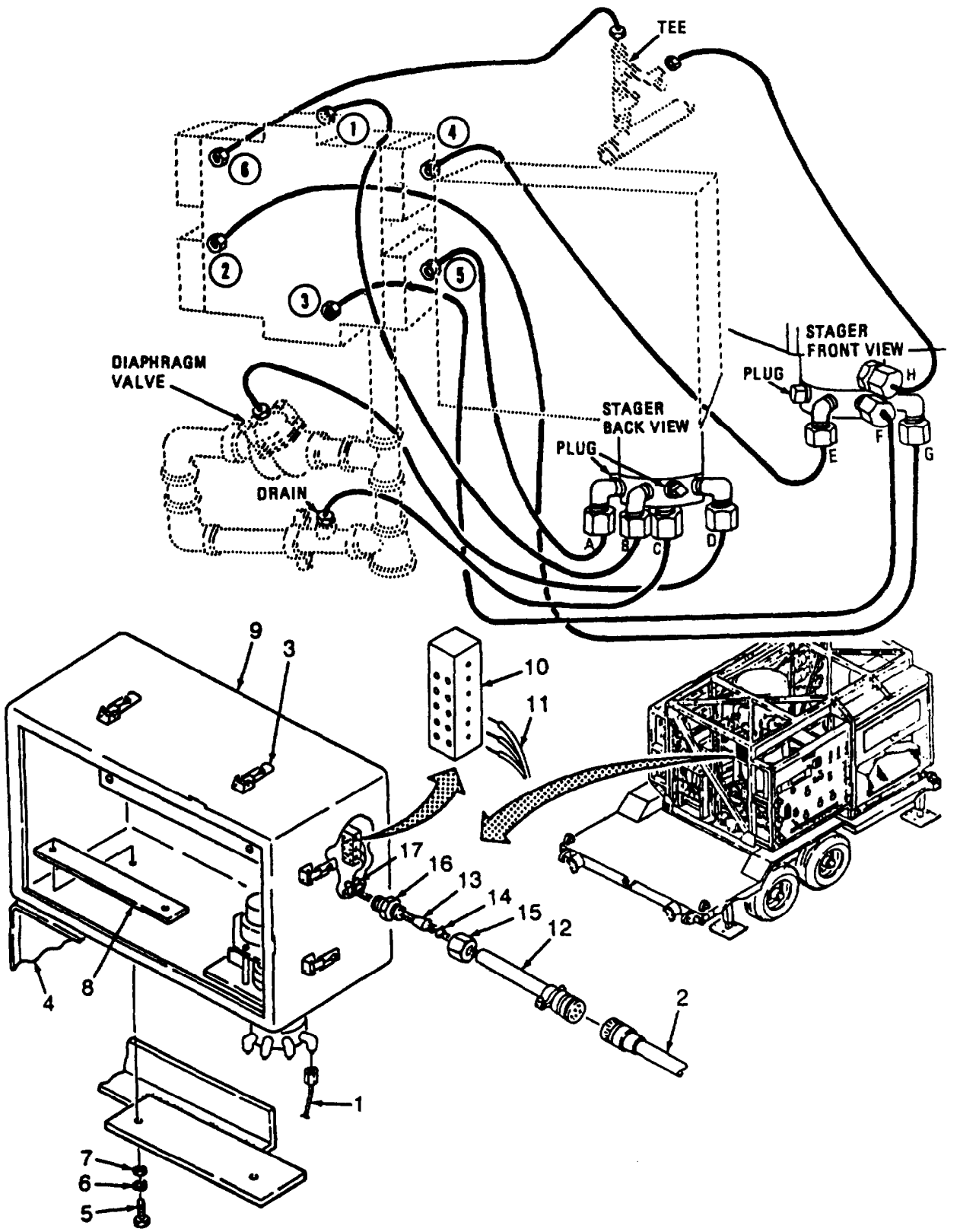
(8) Connect eight flexible tubes (1) to timer (9). Be sure tubes are connected as tagged during removal.

(9) Connect cable assembly (12) to cable assembly (2).

(10) Close cover (4) and fasten six latches (3).

(11) Operate ROWPU (TM 10-4610-241-10). Check for proper operation in backwash mode and inspect for leaks.

2-68. TIMER REPLACE (MODELS WPES-10, WPES-20, and WPES-30) - continued.



2-68.1 TIMER REPLACE- (H-9518-1, H-9518-2, AND H-9518-3).

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
Lo&washers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual)

a. Removal.

NOTE
To facilitate installation and prevent malfuction of equipment, be sure to tag and identify each flexible tube (see tubing diagram) before disconnecting from stager. To replace timer, disconnect tubes at timer only.

(1) Tag control tubes (1) and remove them from connectors (2) by pushing on collars and gently pulling on the tubes at the same time.

(2) Disconnect electrical cable (3) from supply cable (4).

(3) Loosen four screws (5) on the cover of the timer (6) and swing the door open.

(4) Remove four screws (7), four flatwashers (8), four lo&washers (9) and four nuts (10) securing timer (6) to multimedia filter.

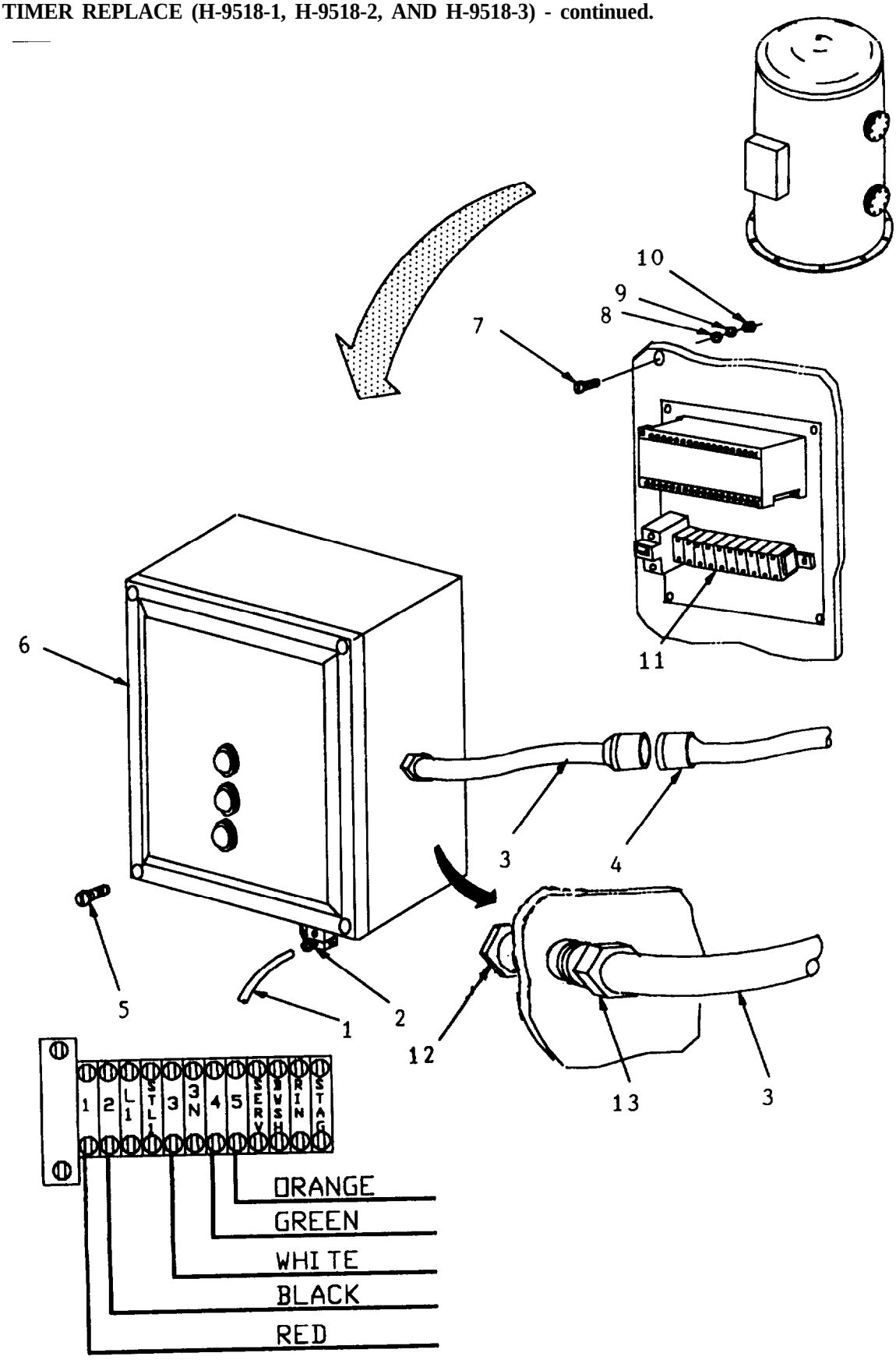
(5) Remove timer (6).

NOTE
Before removing any wires, tag them to facilitate re-installation.

(6) Tag and remove cable wires (3) from the terminal board (11) by loosening the terminal screws.

(7) Remove lock nut (12) from adapter (13) and remove the adapter with the cable (3) from the timer (6).

2-68.1 TIMER REPLACE (H-9518-1, H-9518-2, AND H-9518-3) - continued.



Wiring Diagram

2-68.1 TIMER REPLACE (H-9518-1, H-9518-2, AND H-9518-3) -continued.

b. Installation.

(1) Install adapter (13) with cable (3) into new timer and secure with lock nut (12).

(2) Reconnect cable (3) to terminal strip (11) by following the tags.

NOTE

- Be sure to connect wires as tagged. If tags are lost or illegible, use color code as follows to connect wires:

RED	TERMINAL 1
BLACK	TERMINAL 2
WHITE	TERMINAL 3
GREEN	TERMINAL 4
ORANGE	TERMINAL 5

- To connect wires to terminal board, loosen tiedown screw on terminal board, insert bare part of wire into opening on terminal board. Tighten tiedown screw. If wire ends are not stripped, strip wires, removing about 1/8 inch of insulation from end of wire.

(3) Position timer (6) on multimedia filter and install four screws (7), four flatwashers (8), four lockwashers (9) and four nuts (10).

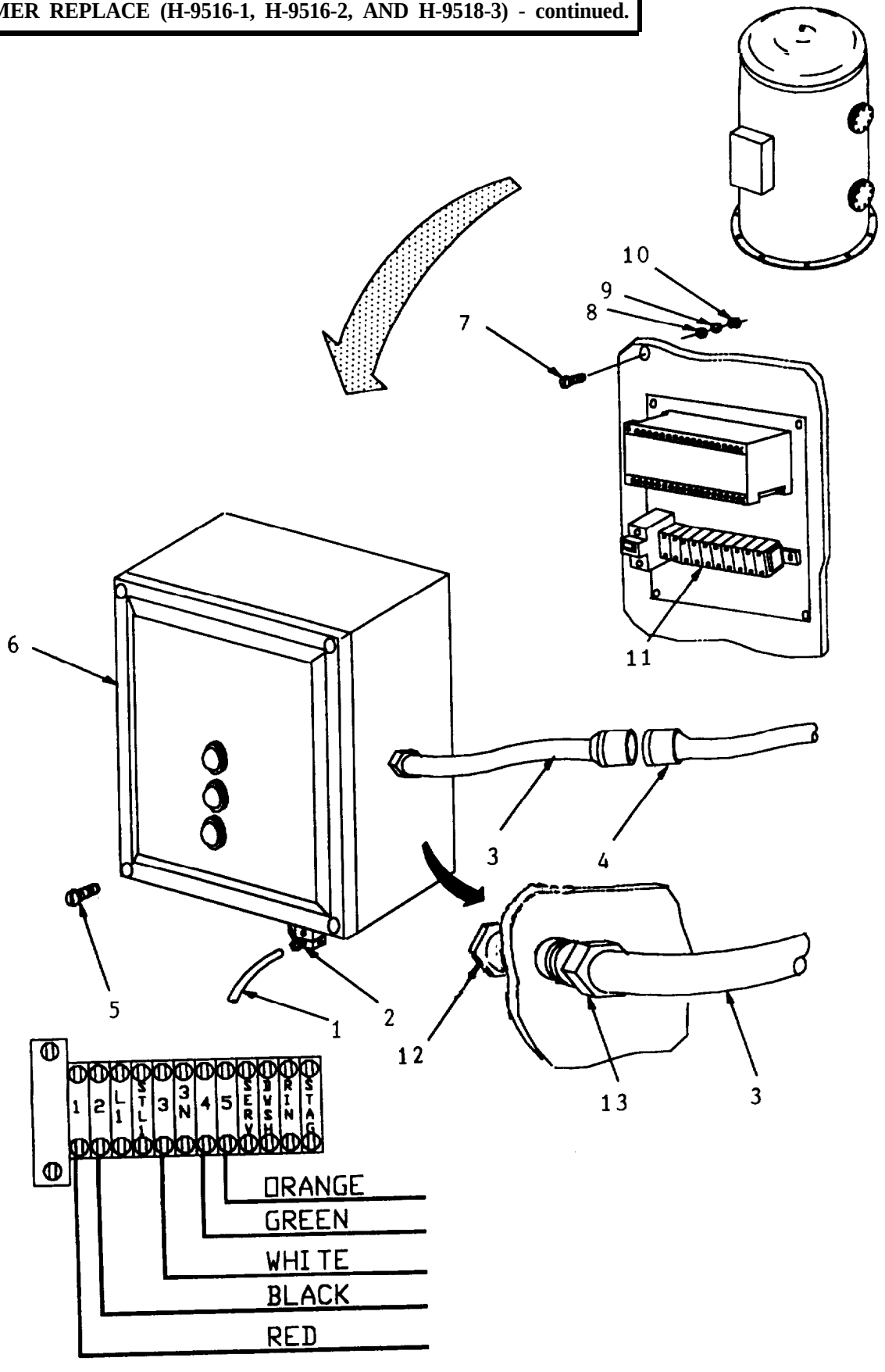
(4) Close the cover on the timer (6) and tighten screws (5).

(5) Connect electrical cable (3) to supply cable (4).

(6) Connect control tubes (1) into the connectors (2) according to the tags. To do this, insert the control tube into the fitting, past the collar. When inserted all the way, tug gently on the tubes to see if it is secure.

(7) Operate the ROWPU (TM 10-4610-241-10). Check for proper operation in backwash mode and inspect for leaks.

268.1 TIMER REPLACE (H-9516-1, H-9516-2, AND H-9518-3) - continued.



Wiring Diagram

2-69. CONTROL VALVE AND PIPING REPLACE (MODELS WPES-10, WPES-20 and WPES-30).

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Vise (Appendix B, Section III, Item 3)
Pipewrench (Appendix B, Section III, Item 3)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 19)
Lockwashers and Gaskets (TM 10-4610-241-24P)
Equipment condition
Reference
Power shut down (Power Source Manual).
ROWFU Piping drained (TM 10-4610-241-10).
Timer removed (Paragraph 2-68).

a. Removal.

NOTE

To facilitate installation and prevent malfunction of equipment, be sure to tag tubing, indicating their connection points (see Paragraph 2-68) before removal.

(1) Tag ten plastic tube connections (1, 2, 3, 4, 5, 6, 7, 8, 9 and 10). Unscrew nuts on each connection (11, 12, 13, 14, 15, 16, 17, 18, 19, 20) and disconnect tubes.

(2) Unscrew nut (21) on metal tube (22) and disconnect metal tube from pipe section (5 1).

(3) Remove two nuts (23). bolts (24) and clamp halves (25). Slide gasket (45) onto adapter (47).

(4) Remove two nuts (26). bolts (27) and clamp halves (28). Slide gasket (44) unto pipe section (48).

(5) Remove two nuts (29) bolts (30) and clamp halves (31). Slide gasket (43) onto pipe section (49).

(6) Remove two nuts (32), bolts (33) and clamp halves (34). Slide gasket (42) onto pipe section (50).

(7) Remove two nuts (35), bolts (36) and clamp halves (37). Slide gasket (41) onto pipe section (51).

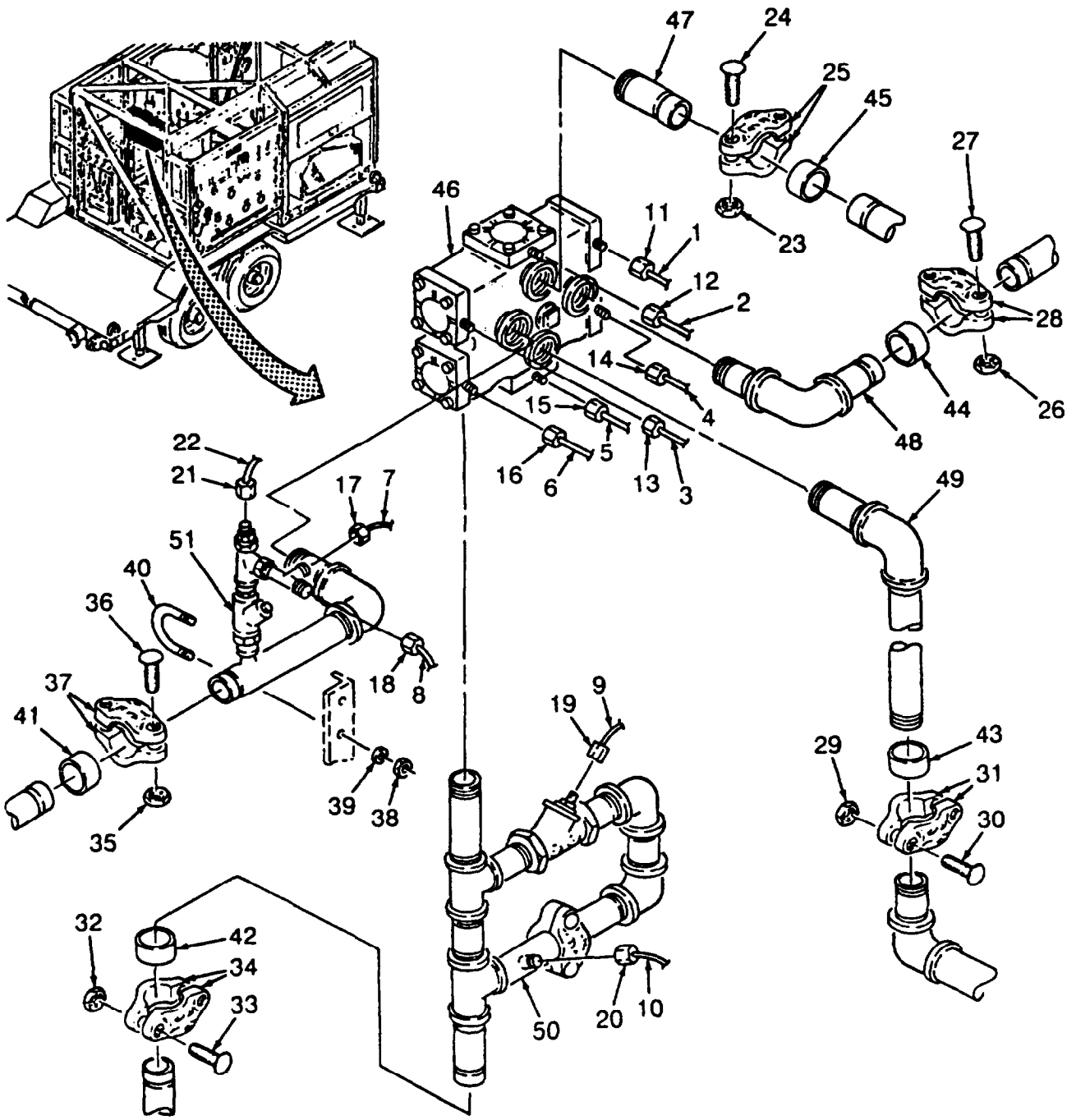
(8) Remove two nuts (38), lockwashers (39), and U-bolt (40).

(9) Remove control valve (46) and attached parts from unit and remove gaskets (41, 42, 43, 44 and 45).

2-69. CONTROL VALVE AND PIPING REPLACE (MODELS WPES-10, WPES-20 and WPES-30) - continued.

(10) Place control valve (46) in vise. Remove adapter (47) and pipe sections (48, 49, 50 and 51) from control valve

(11) Disassemble pipe sections (48, 49, 50 and 51) as required. Refer to Paragraph 2-30.



2-69. CONTROL VALVE AND PIPING REPLACE (MODELS WPES-10, WPES-20 and WPES-30) - continued

b. Installation.

NOTE
Be sure to wrap tape in same direction as pipe thread.

(1) Apply anti-seize tape to male pipe fittings.

(2) If disassembled, assemble pipe section (51, 50, 49 and 48) in accordance with Paragraph 2-30.

(3) Install pipe sections (51, 50, 49, 48) and adapter (47) on control valve (46).

(4) Lubricate gaskets (41, 42, 43 and 45) and position on pipe sections (51, 50, 49, 48) and adapter (47).

(5) Position control valve (46) with attached piping sections on unit and install U-bolt (40), two lockwashers (39) and nuts (38).

(6) Position gasket (41) over pipe joint and install two clamp halves (37), bolts (36). and nuts (35).

(7) Position gasket (42) over pipe joint and install two clamp halves (34), bolts (33), and nuts (32).

(8) Position gasket (43) over pipe joint and install two clamp halves (31), bolts (30). and nuts (29).

(9) Position gasket (45) over pipe joint and install two clamp halves (25). bolts (24), and nuts (23).

(10) Position gasket (44) over pipe joint and install two clamp halves (28), bolts (27), and nuts (26).

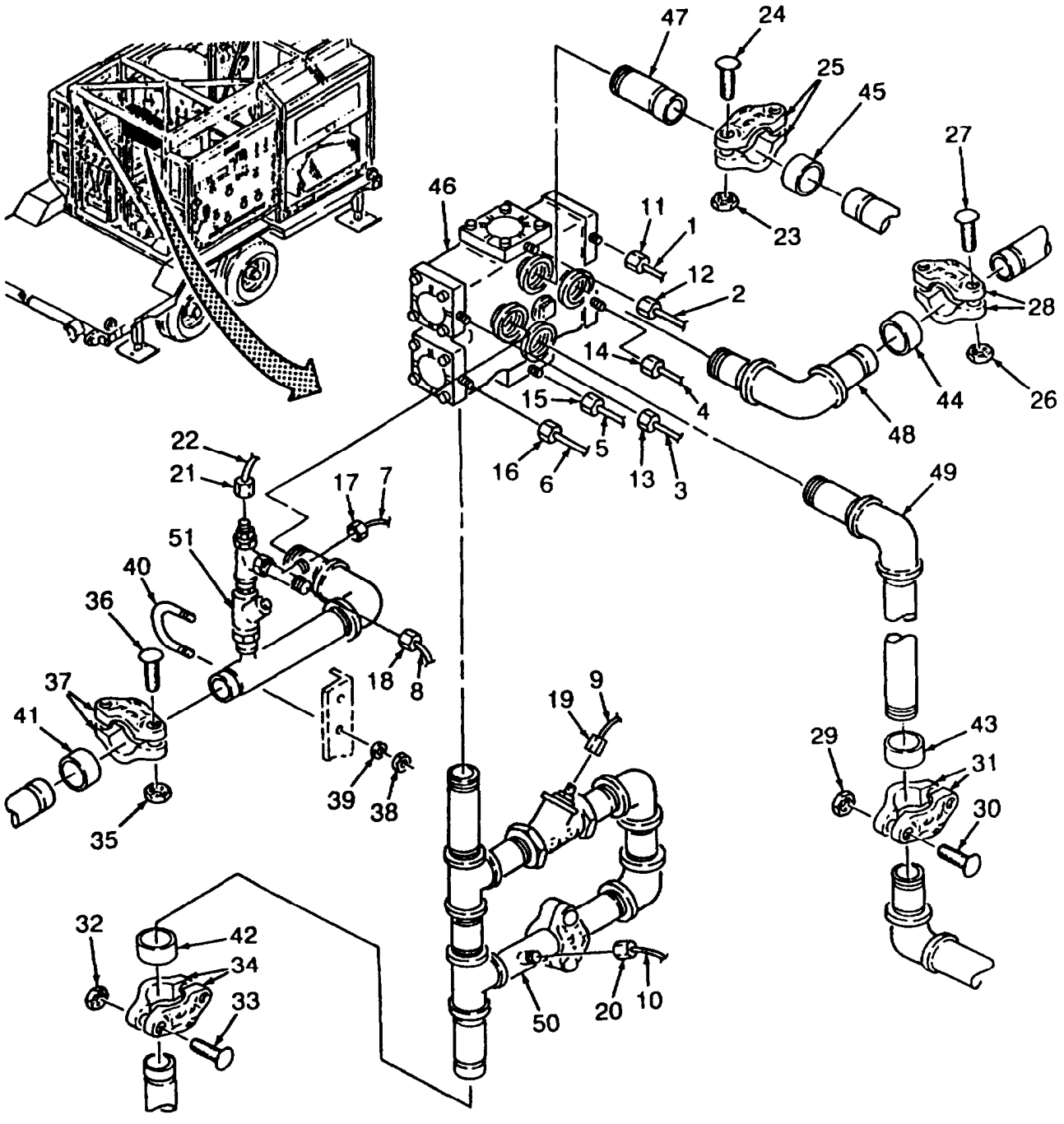
(11) Connect metal tube (22) to pipe section (5 1) and tighten nut (2 1).

CAUTION
ROWPU will not operate properly and may be damaged if hoses are incorrectly installed. If tags installed at removal are not legible or missing, connect tubes in accordance with connection diagrams (Paragraph 2-68).

(12) Connect tube ends (1, 2, 3, 4, 5, 6, 7, 8, 9 and 10) as marked or use diagram (Paragraph 2-68).

(13) Operate ROWPU (TM 10-4610-241-10). Check for leaks and proper operation.

2-69. CONTROL VALVE AND PIPING REPLACE (MODELS WPES-10, WPES-20 and WPES-30) -continued.



2-69.1 DIAPHRAGM VALVE AND PIPING REPLACE (H-9518-1, H-9518-2, AND H-9518-3).

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

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

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)
- Lubricant, O-Ring (Appendix C, Section II, Item 11)
- Lockwashers and Gaskets (TM 10-4610-241-24P)

Equipment Condition
Reference
- Power shut down (Power Source Manual)
- ROWPU Piping drained (TM 10-4610-241-10)

NOTE

- It is not necessary to remove valves from unit to repair them. See Paragraph 2-70 for repair procedures. If valves are not repairable or piping sections are damaged, the following procedures should be used.
- Paragraph 2-30 provides guidance in the removal of threaded pipe sections. Paragraph 2-29 provides guidance for grooved pipe sections.

a. Removal.

NOTE

To facilitate installation and to prevent malfunctions, be sure to tag tubing and indicate their connection points before removal.

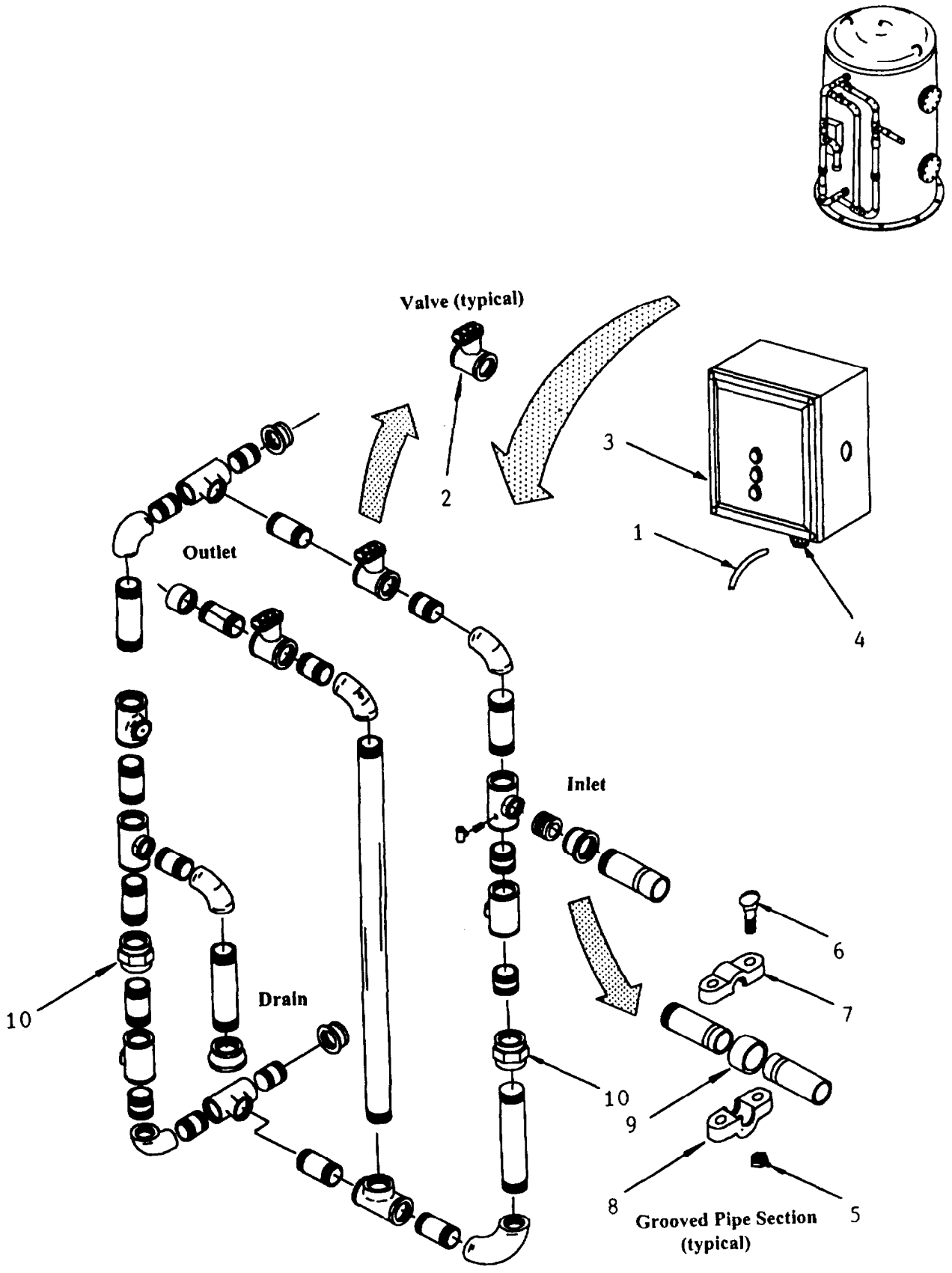
(1) To remove the control lines (1) between the valves (2) and the timer (3), tag all control lines (I) and remove them from connectors (4) by pushing on collars and gently pulling on the tubes at the same time.

(2) There are three piping connection points to the filter piping. Each of these grooved connections disassembles in the same manner. Remove two nuts (5), two bolts (6) and two clamp halves (7 and 8) from each point. Slide gasket (9) onto pipe section.

NOTE

To facilitate installation and prevent malfunctions, before removing any pipe sections from the unit, tag them and note their connection points.

2-69.1 DIAPHRAGM VALVE AND PIPING REPLACE (H-9518-1, H-9518-2, AND H-9518-3) - continued.



2-69.1 DIAPHRAGM VALVE AND PIPING REPLACE (H-9518-1, H-9518-2, AND H-9518-3) - continued.

(3) Determine which pipe section or valve is defective.

(4) Turn the collar on unions (10) counterclockwise to separate the couplings.

(5) Follow the procedures of Paragraph 2-30 to disassemble piping as necessary to reach the item to be replaced.

NOTE

It may be necessary to remove the multimedia filter timer assembly in order disassembly some piping. If this is necessary, follow the procedures in Paragraph 2-68.1.

b. Installation.

NOTE

Before installing any components, apply anti-seize tape to all male pipe ends. Be sure to wrap tape in same direction as pipe thread.

(1) Beginning with the last component removed, reassemble the pipe sections and valves following the procedures in Paragraph 2-30.

(2) Align the union halves (10) over each other and ensure that there is no foriegn material in the joint. Turn the collar clockwise to secure the union.

(3) Lubricate gaskets (9) and position over the pipe joints at the three piping connection points.

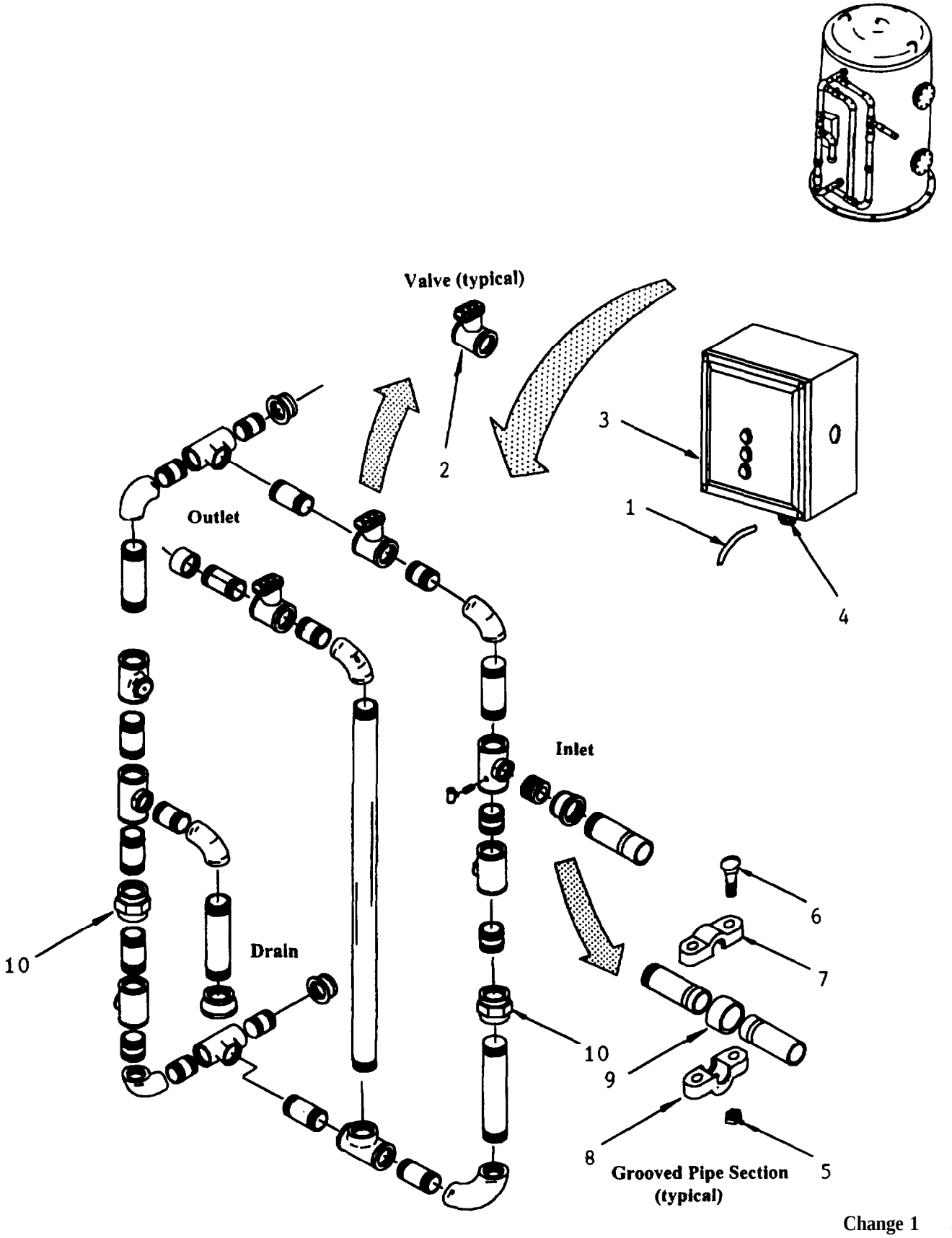
(4) Install clamp halves (7 and 8), bolts (6) and nuts (5) on the three connection points. Use Paragraph 2-29 for guidance.

(5) If removed, install the multimedia filter timer (3) by following Paragraph 2-68.1.

(6) Connect the control lines (1) from the valves (2) to multimedia filter timer assembly (3) by following the tags.

(7) Operate the ROWPU (TM 10-4610-241-10). Check for proper operation in the Backwash mode and inspect for leaks.

2-69.1 DIAPHRAGM VALVE AND PIPING REPLACE (H-9618-1, H-9619-2, AND H-9518-3) - continued.



2-70. DIAPHRAGM VALVE REPAIR.

This task consists of: a. Removal b. Cleaning c. Inspection d. Repair e. Assembly

INITIAL SET-UP:

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

Material/Parts Required
- Tape, Anti-seize (Appendix C, section II, Item 19)
- Detergent (Appendix C, Section II, Item 5)
- Rags, Wiping (Appendix C, Section II, Item 14)
- Diaphragm (TM 10-4610-241-24P)
- Gaskets (TM 10-4610-241-24P)
- Packing (TM 10-4610-241-24P)

Equipment Condition
Reference
- Diaphragm Valve removed from Unit (paragraphs 2-69 and 2-30).

Disassembly.

NOTE

(1) Remove four nuts (1), screws (2), metal tag (3), and cap (4).

(2) Hold shaft (21) with screw driver to keep turning and remove nut (5) from shaft.

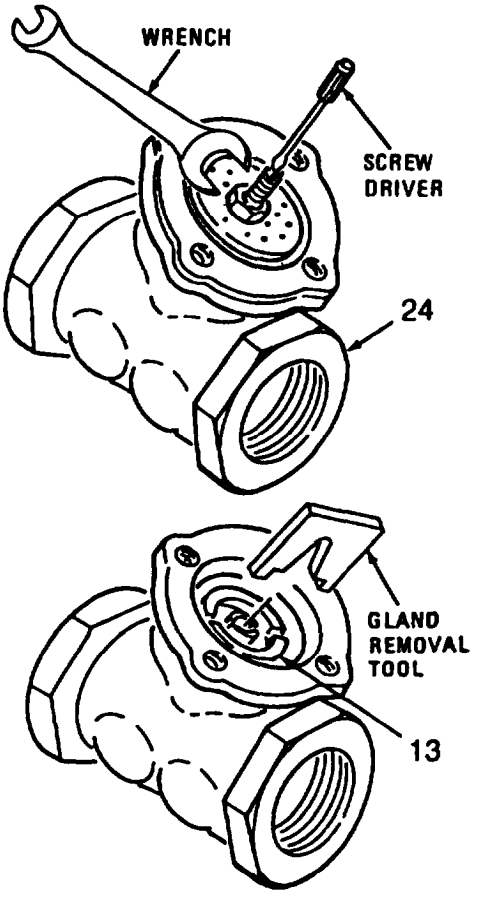
(3) Remove upper diaphragm plate (6), diaphragm (7), lower diaphragm plate (8), end spring (9), from shaft (21). (Spring (9) is only on Models WPES-10, WPES-20 and WPES-30).

(4) Remove gasket (10), washer (11) and (12) from shaft (21).(Washer (11) and gasket (1O) are only on Models WPES-10, WPES-20 and WPES-30).

(5) Using gland removal tool unscrew packing retainer (13), valve body (24) and remove packing (14 and 15).

(6) Remove shaft (21) and attached parts from body (24).

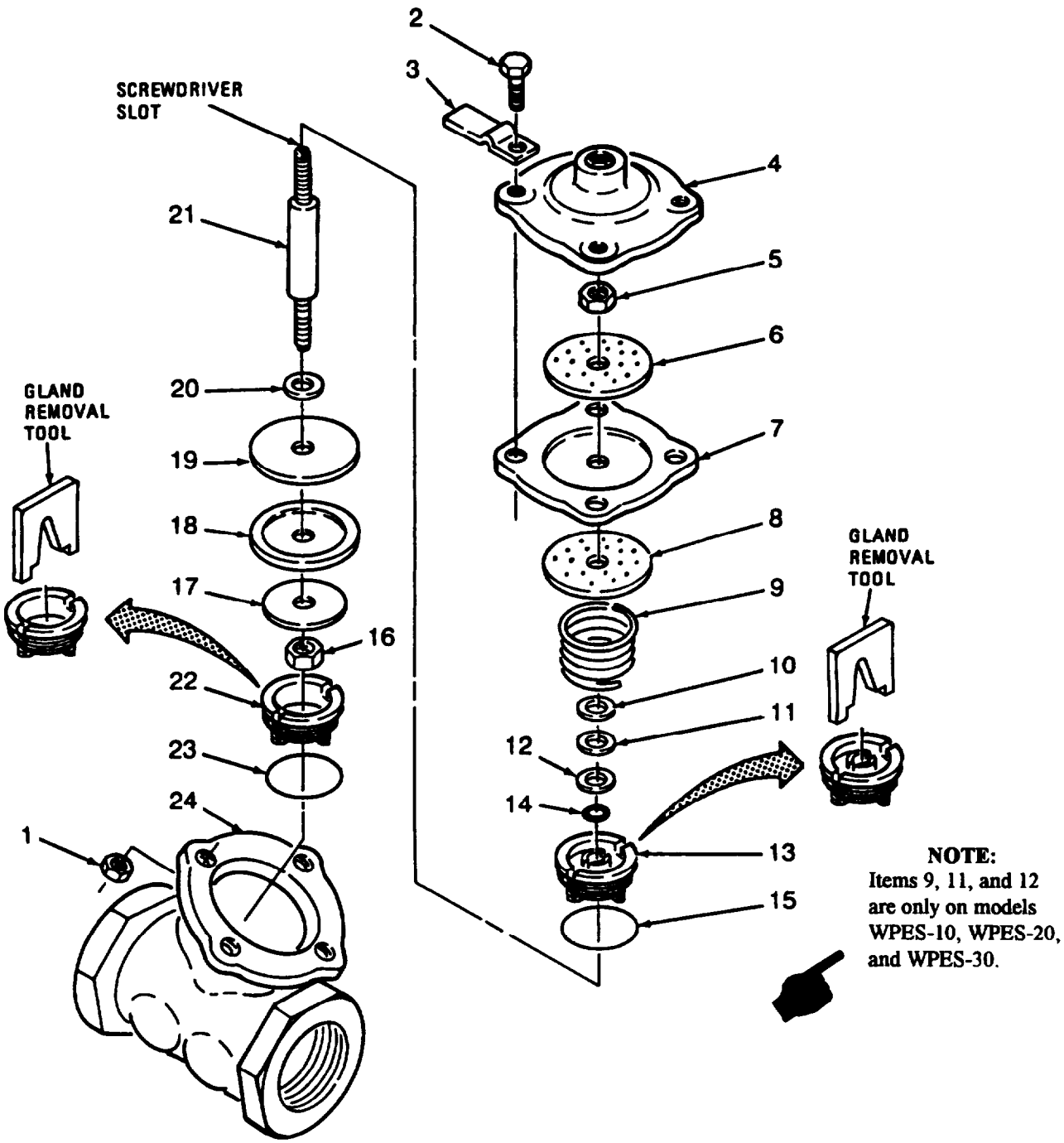
(7) Remove nut (16), disk plate (17), disk (18), disk retainer (19) and flat washer (20), from shaft (21).



2-70. DIAPHRAGM VALVE REPAIR - continued.

(8) Using gland removal tool, unscrew valve seat (22) from valve body (24).

(9) Remove valve seat (22) and packing (23).



2-70. DIAPHRAGM VALVE REPAIR - continued.

b. Cleaning.

(1) Wash all components with water and detergent.

(2) Rinse components in clear water and dry with wiping rags.

c. Inspection.

Inspect all parts, threaded areas, and attaching parts for damage and corrosion.

d. Repair.

(1) Replace packing and gaskets.

(2) Replace defective components.

e. Assembly.

(1) Install packing (23) and valve seat (22) in body (24). Use gland removal tool to tighten seat.

(2) Install flat washer (20), disk retainer (19), disk (18), disk plate (17) and nut (16) on shaft (21).

(3) Position shaft (21) and attached parts in body (24) on valve seat (22).

(4) Position packing (14 and 15) on packing retainer (13).

(5) Install packing retainer (13) over shaft (2 1) and into body (24). Use gland removal tool to tighten retainer.

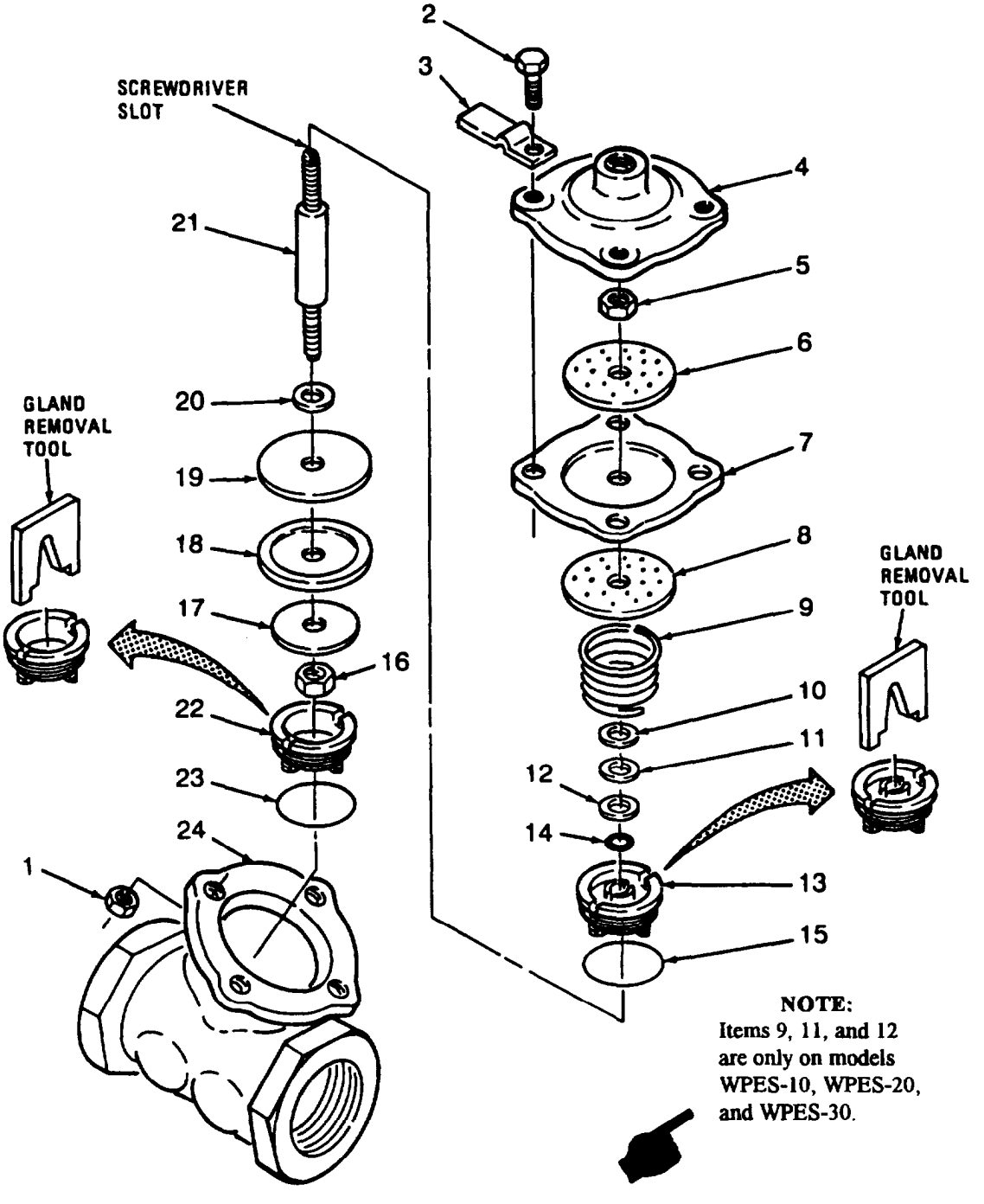
(6) Install gasket (12), washer (1 1) and gasket (10). (Washer and gasket are only on Models WPES- 10, WPES-20 and WPES-30).

(7) Install spring (9), lower diaphragm plate (8), diaphragm (7) and upper diaphragm plate (6) on shaft (21). (Spring is only on Models WPES-10, WPES-20 and WPES-30).

(8) Install nut (5) on shaft (21), holding shaft with screwdriver to keep it from turning.

(9) Aline bolt holes in diaphragm (7) with bolt holes in body (24) and install cap (4), tag (3), four screws (2) and nuts (1).

2-70. DIAPHRAGM VALVE REPAIR - continued.



2-71. R.O. PRESSURE TUBES REPAIR.

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)
Material/Parts Required
Grease, Silicone (Appendix C, Section II, Item 10)
Rags, Wiping (Appendix C, Section II, Item 14)
Solvent, Drycleaning (Appendix C, Section II, Item 18)
Adhesive (Appendix C, Section II, Item 2)
Gaskets and Preformed Packing
Personnel Required
Two
Equipment Condition
Reference
RO Feed Water Lines disconnected (TM 10-4610-241-10).
RO Elements removed (TM 10-4610-241-10).
ROWPU Piping drained (TM 10-4610-241-10).
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.

a. Removal.

NOTE

- There are four R.O. pressure tubes. All are removed the same. One is shown, the others are similar.
- Tiedown clamps on models WPES-20, H-9518-2, WPES-30, and H-9518-3 are different from models WPES-10 and H-9518-1 and require different installation hardware. Steps 1 thru 3 describe Models WPES-10 and H-9518-1 while step 4 pertains only to models WPES-20, H-9518-2, WPES-30, and H-9518-3. The remainder of the procedure is the same for all models.

(1) On models WPES - 10 and H-9518-1, remove one nut (1), lockwasher (2), and flat washer (3) from each clamp (9).

(2) On models WPES - 10 and H-9518-1, remove one nut (4), lockwasher (5), and screw (6) front each clamp (9).

2-71. R.O. PRESSURE TUBES REPAIR - continued.

(3) On models WPES-10 and H-9518-1, remove two clamps (9), then remove one flat washers (7). and one nut (8) from each clamp (9).

(4) On models WPES-20, H-9518-2, WPES-30 and H-9518-3, remove four nuts (4), lockwashers (5), screws (6) and clamps (10).

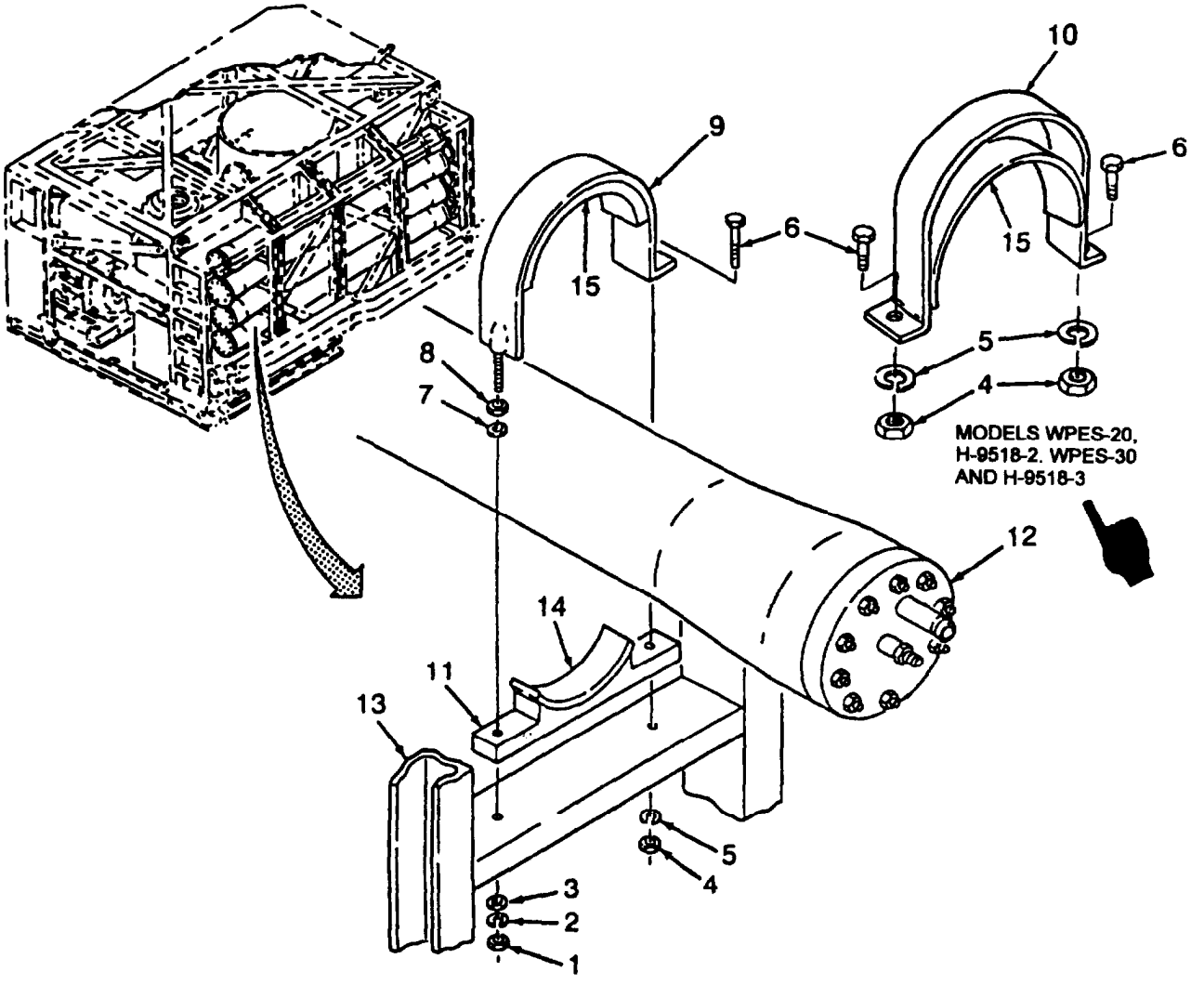
(5) Remove R.O. pressure tube (12) from bases (11).

(6) Remove two bases (11) from frame (13).

WARNING

R.O. pressure tube is heavy. Two people are needed to lift it to prevent injury to personnel or damage to equipment.

(7) As required, remove glued-on rubber cushions (14 and 15).



2-71. R.O. PRESSURE TUBES REPAIR -continued.

b. Disassembly.

NOTE

- This task may be performed with pressure tubes in place.
- If required, remove paint from concentrate port and permeate port.

(1) Remove retaining ring (16) from permeate port (17).

(2) Remove permeate port (17).

(3) Remove two cap screws (18) and scaling plate (19) from end plate (26).

(4) Remove concentrate port (20) from end plate (26).

(5) Remove packing (21) and retaining ring (22) from concentrate port (20).

(6) Remove packing (23) and adapter (24) from permeate port (17).

(7) Remove packing (25) from sealing plate (19).

C. **Cleaning.**

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

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

d. Inspection.

(1) Inspect end plate (26) for damage, excessive wear, and serviceability.

(2) Inspect end plate (26), permeate port (17), sealing plate (19) and concentrate port (20) for cracks and wear.

e. Repair.

(1) Replace seals and packing

(2) Replace defective components.

2-71. R.O. PRESSURE TUBES REPAIR - continued.

f. 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 packing and packing paths with a thin layer of silicone grease to reduce friction during installation.

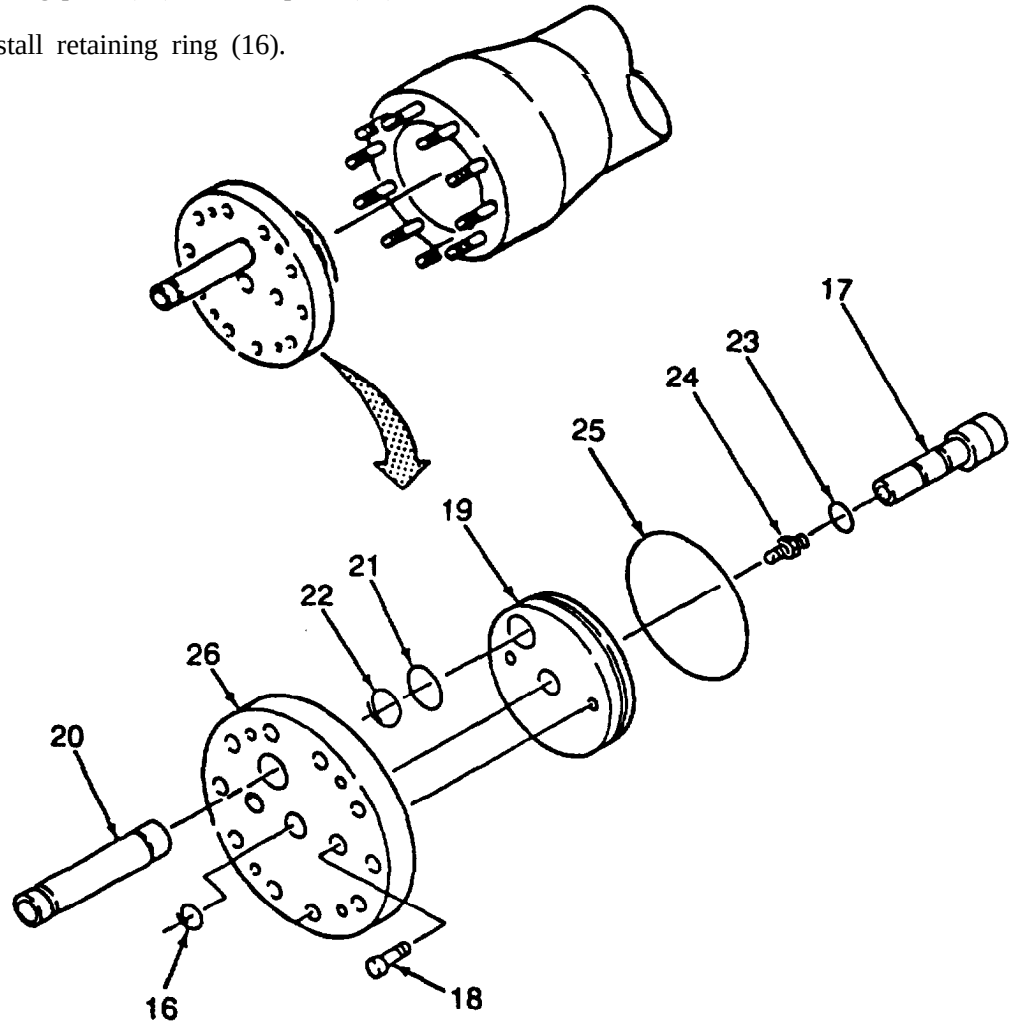
(1) Install retaining ring (22) on concentrate port (20).

(2) Position concentrate port (20) on end plate (26) and install packing (21).

(3) Install sealing plate (19) on end plate (26) with screws (18).

(4) Install packing (23) and adapter (24) on permeate port (17) and feed permeate port thru sealing plate (19) and end plate (26).

(5) Install retaining ring (16).



2-71. R.O. PRESSURE TUBES REPAIR - continued.

g . Installation.

NOTE

There are four R.O. pressure tubes. All are installed the same. One is shown, the others are similar.

WARNING

R.O. pressure tube is heavy. To prevent injury to personnel and damage to equipment, use two personnel to install R.O. pressure tube.

(1) If rubber cushions (14 and 15) were removed, apply a coat of adhesive to surfaces to be in contact with clamp (9) and bases (11) and install on clamps and bases.

(2) Position two supports (11) on frame (13).

(3) Position R.O. pressure tube (12) on bases (11).

NOTE

- Position R.O. pressure tube (11) in line with pipe sections before tightening nuts (4 and 1).
- Tiedown clamps on models WPES-20, H-9518-2, WPES-30, and H-9518-3 are different from models WPES-10 and H-9518-1 and require different installation hardware. Steps 4 and 5 describe Models WPES-10 and H-9518-1, while step 6 pertains only to models WPES-20, H-9518-2, WPES-30, and H-9518-3.

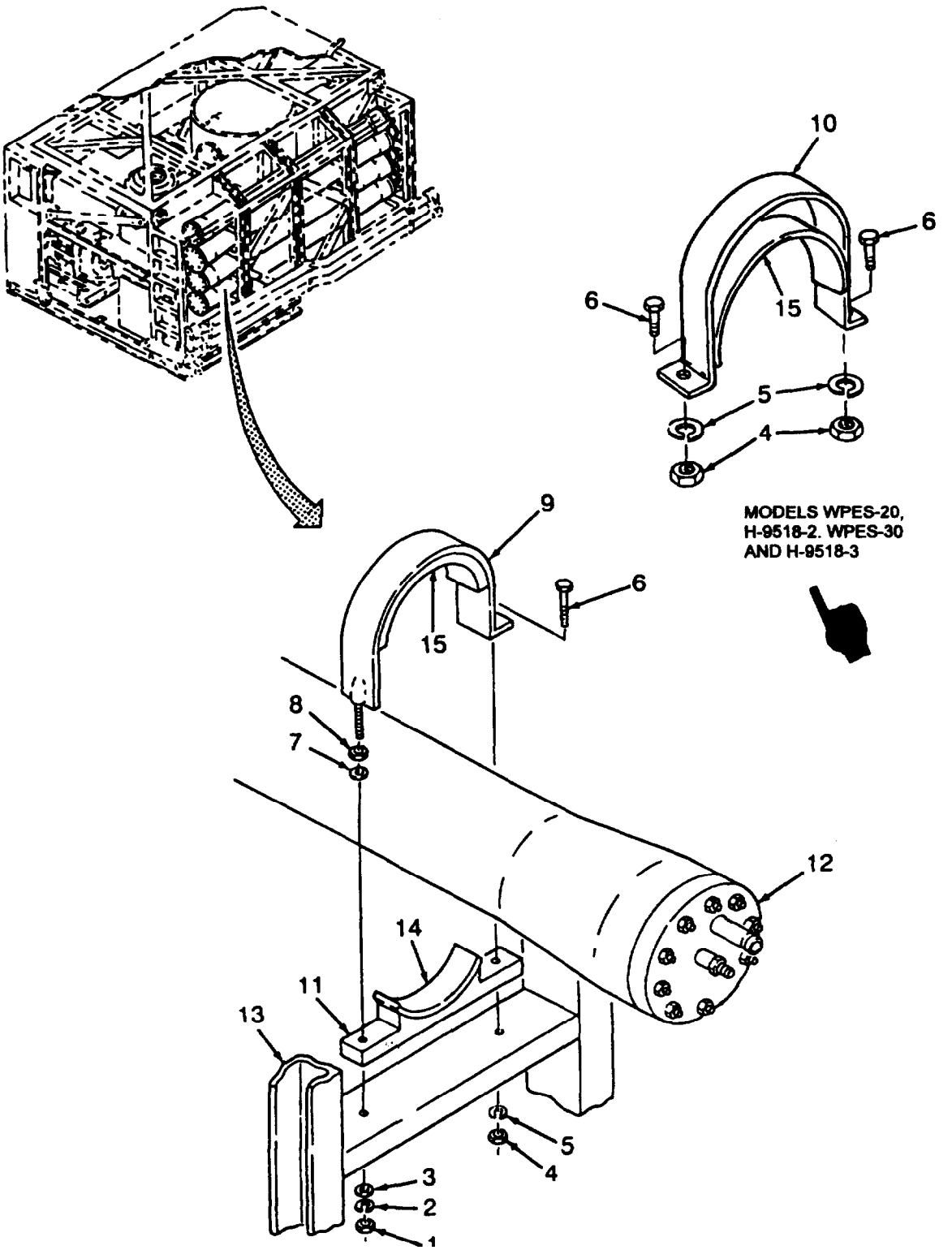
(4) On Models WPES-10 and H-9518-1, install one nut (8) on each clamp (9), position clamps and washers (7) on bases (II) and install one washer (3), lockwasher (2), and nut (1) per clamp. Do not tighten nuts (1).

(5) On Models WPES-10 and H-9518-1, install one screw (6), lockwasher (5), and nut (4) per clamp. Do not tighten nuts (4).

(6) On Models WPES-20, H-9518-2, WPES-30, and H-9518-3, install four screws (6), lockwashers (5), nuts (4) and two clamps (10). Do not tighten nuts.

(7) Complete installation (TM 10-4610-241-10) and tighten nuts (1 and 4).

2-71. R.O. PRESSURE TUBE REPAIR - continued.



2-72. CONTROL BOX ASSEMBLY REPAIR.

Unit level maintenance of the control panel assembly is limited to replacement of panel lamps.

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

INITIAL SET-UP:

Tools Required
Lamp Extractor (Storage Chest)
Material/Parts Required
Incandescent Lamp (Storage Chest)
Equipment Condition
Reference
Power shut down (Power Source Manual).

NOTE
Control box contains nine panel lamps. Replacement of one panel lamp is shown, the others are similar.

a. Removal of Lamps.

(1) Unscrew and remove lens (4) from lens socket (2).

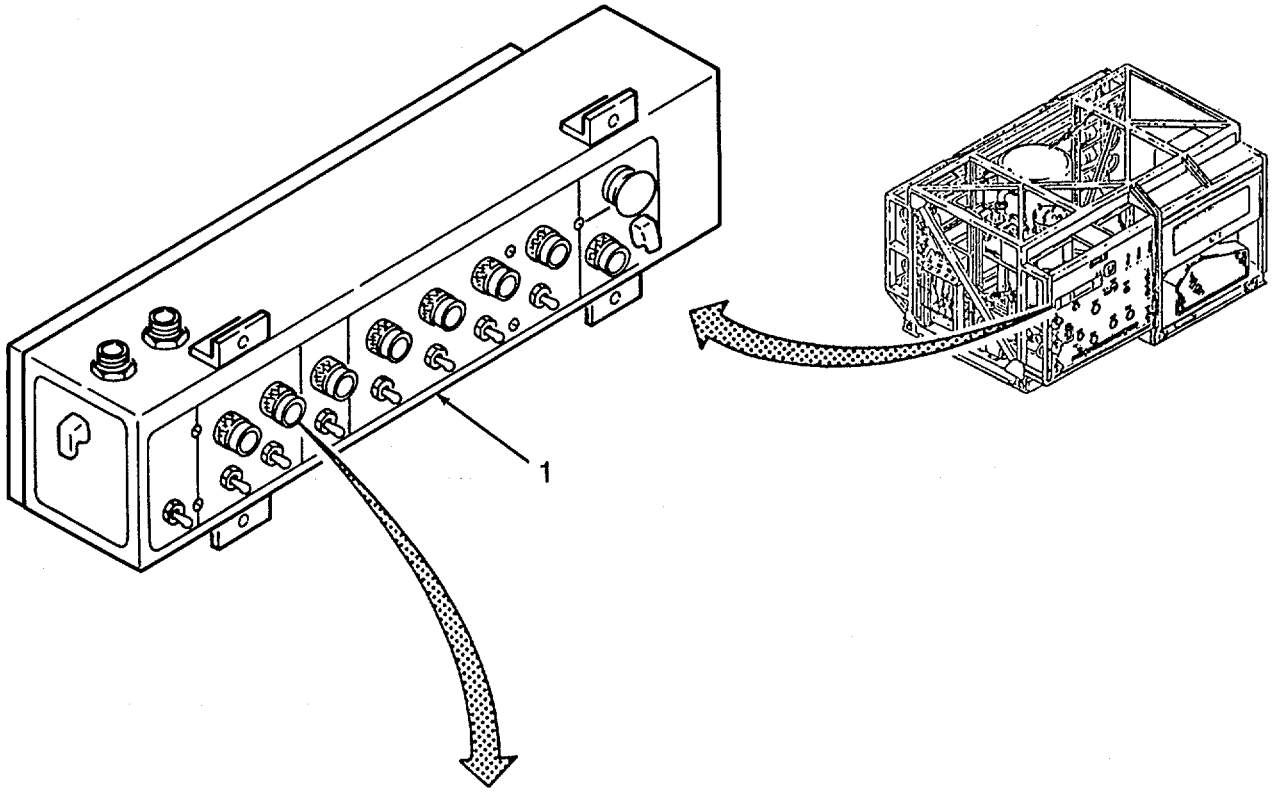
(2) Using lamp extractor, remove panel lamp (3) from lamp socket (2) on control box (1).

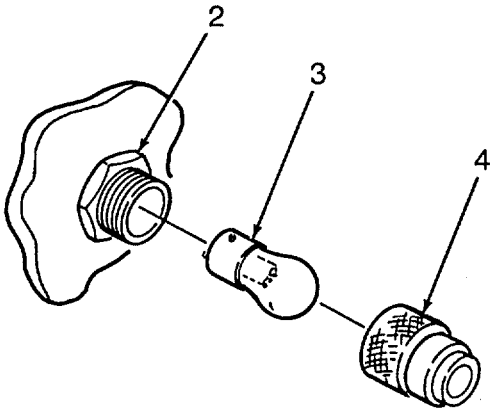
b. Installation of Lamps.

(1) Using lamp extractor, install panel lamp (3) in lamp socket (2).

(2) Install lens (4) on lamp socket (2).

2-72. CONTROL BOX ASSEMBLY REPAIR - continued.





2-73. JUNCTION BOX ASSEMBLY REPAIR.

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)
- Rivet Tool (Appendix B, Section III, Item 3)
- Electric Drill (Appendix B, Section III, Item 3)
- Drill Set (Appendix B, Section III, Item 3)
- Retaining Ring Pliers (Appendix B, Section III, Item 3)

Material/Parts Required
- Adhesive (Appendix C, Section II, Item 1)
- Detergent (Appendix C, Section II, Item 5)
- Lockwashers, Rivets and Gaskets (TM 10-4610-241-24P)

Personnel Required
- Two

Equipment Condition
Reference
- Power shut down (Power Source Manual).

General Safety Instructions

WARNING

- Lifting heavy/difficult to handle equipment incorrectly can cause serious injury. Use two personnel when removing junction box cover assembly.
- To prevent injury or death to personnel, verify that electrical power is off before working injunction box.

a. Disassembly.

(1) **Junction box cover**.

(a) Turn thirteen rotary fasteners (1) 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

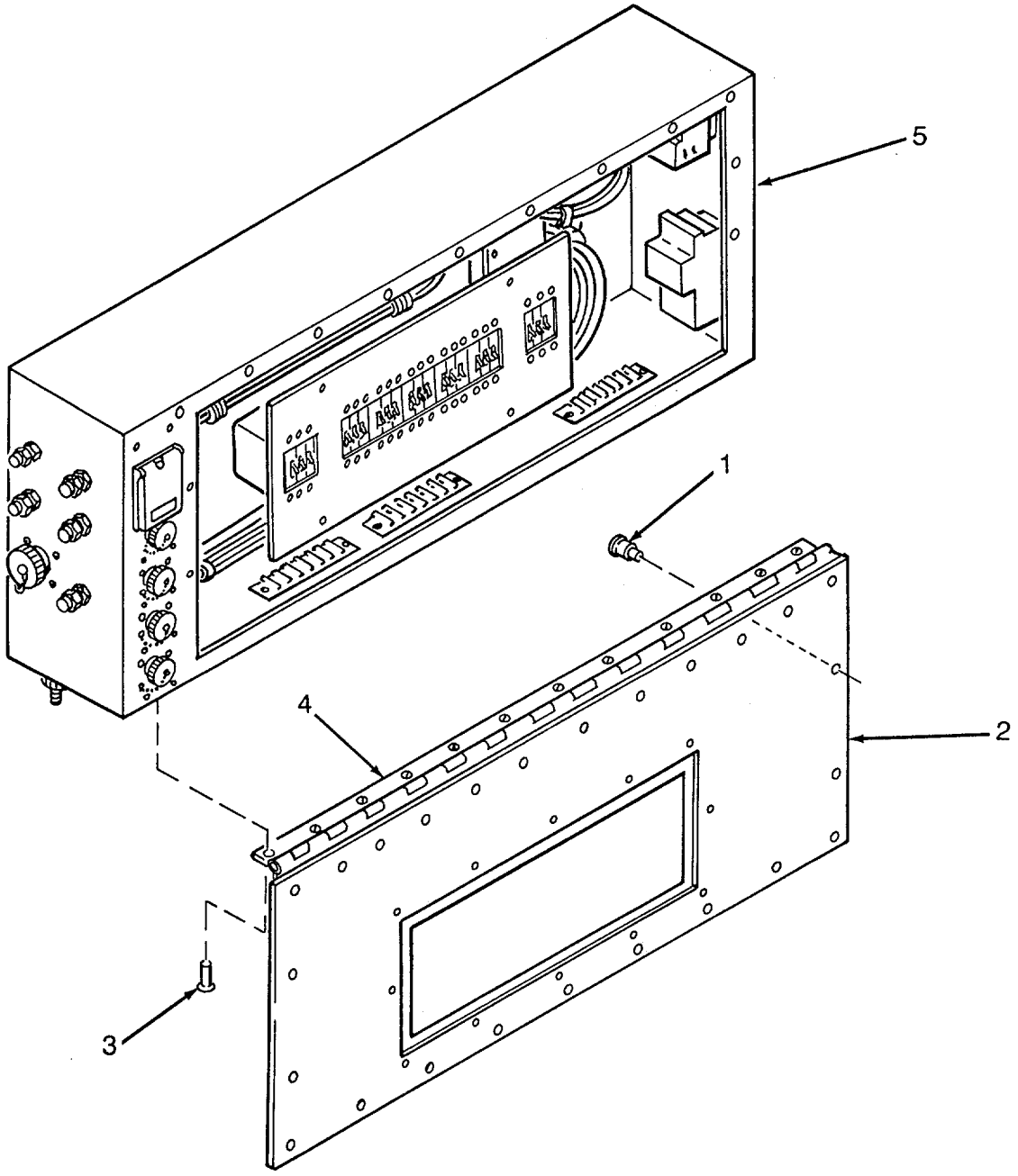
To prevent damage to junction box wiring, lift and support wiring off bottom of junction box when removing (drilling) rivets. Remove all rivet fragments and metal chips to prevent short circuits in wiring.

(b) Lift and support wiring.

2-73. JUNCTION BOX ASSEMBLY REPAIR - continued.

(c) Close junction box cover (2) and remove 12 heads of rivet (3) at bottom of junction box.

(d) Remove junction box cover (2) from junction box (5).



2-73. JUNCTION BOX ASSEMBLY REPAIR - continued.

NOTE
Repair of junction box cover is the same with cover installed on electrical junction box or with cover on workbench after removal.

(e) Remove 14 rivets (6) and seven speed nuts (7) from cover (2).

(f) Unscrew and remove retaining washers (8) from 14 wing screws (9). Remove wing screws (9) and seal washers (10).

(g) Remove gasket (12).

(h) Using retaining ring pliers as illustrated, remove thirteen retaining rings (11) and rotary fasteners (13) from cover (2).

(i) Remove twelve rivets (14) and hinge (4) from junction box cover (2).

(j) Remove seven rivets (15), securing hinge (18) to cover (2).

(k) Remove gasket (17) from door (19).

(l) Remove seven rivets (16) and hinge (18) from door (19).

(2) Utility outlet.

(a) Remove screws (20 and 21) and cover (22).

(b) Remove two nuts (24), lockwashers (25), flatwashers (26) and screws (23). Twist receptacle (27) to the side for access to screws (28).

(c) Remove three screws (28) and disconnect wires from receptacle (27).

b. Cleaning

Clean all components with detergent and water and dry with rags.

c. Inspection.

(1) Inspect junction box cover (2) and door (18) for cracks and deformity.

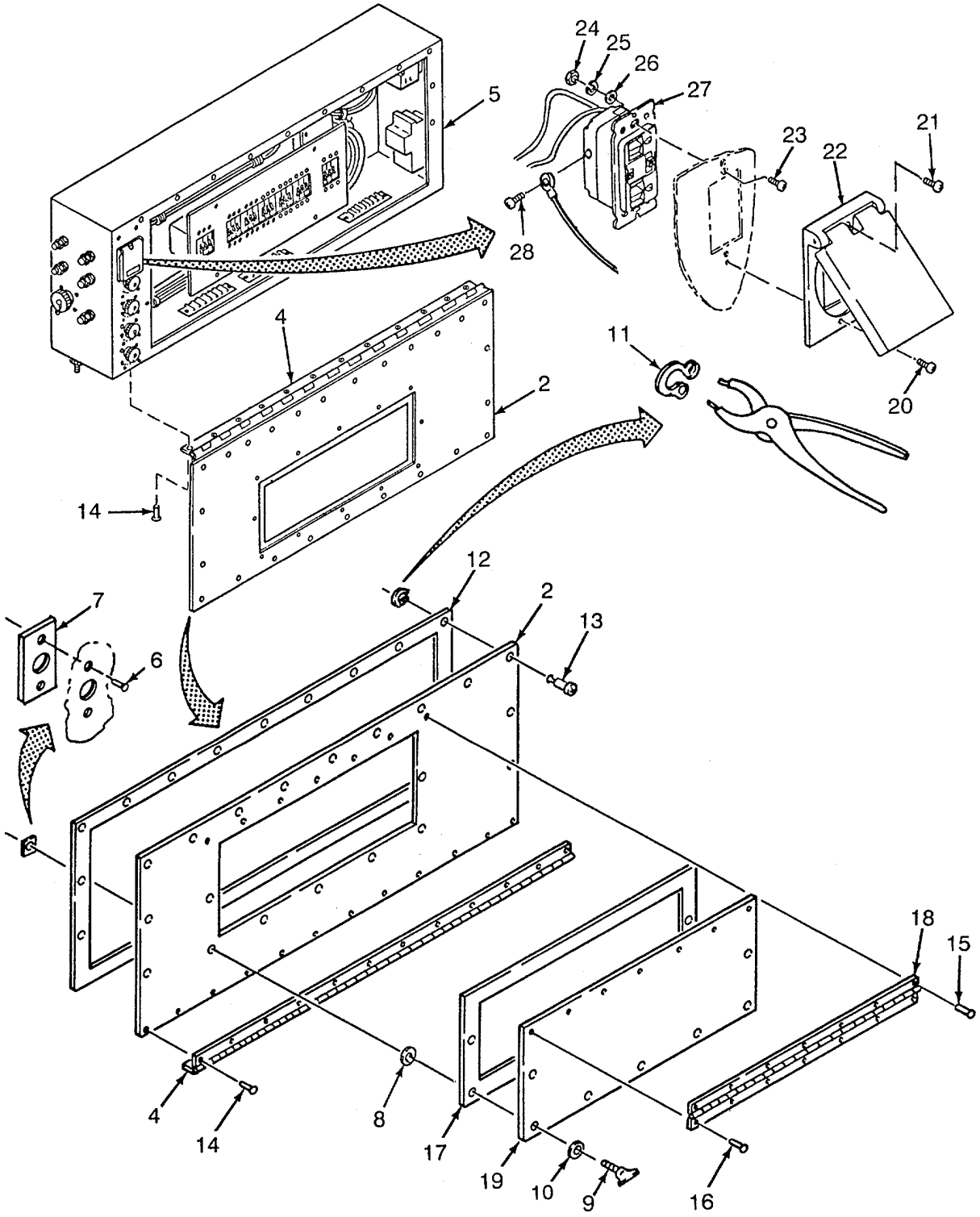
(2) Check hinges (4 and 18) for cracks, and deformity.

(3) Check retaining rings (11), speed nuts (7) and retaining washers (8) for deformity.

(4) Check rotary fasteners (13) and wing screws (9) for deformity and damaged threads.

(5) Inspect receptacle (27) and cover (22) for damage. Check receptacle for burned contacts.

2-73. JUNCTION BOX ASSEMBLY REPAIR - continued.



2-73. JUNCTION BOX ASSEMBLY REPAIR - continued.

d. Repair.

(1) Replace lockwashers and gaskets.

(2) Replace defective components.

e. Assembly.

(1) Cover assembly

(a) Position hinge (18) on door (19) and install seven rivets (16).

(b) Cut gasket (17) from bulk material and install gasket on door (19) with adhesive.

(c) Punch seven holes through gasket (17) at holes for wing screws (9).

(d) Position seven seal washers (10) on wing screws and install wing screws (9) on door (19). Secure with retaining washers (8).

(e) Position hinge (4) on junction box cover (2) and install twelve rivets (14).

(f) Cut gasket (12) and, using adhesive, install gasket on junction box cover (2).

(g) Punch thirteen holes through gasket (12) at holes for rotary fasteners (13).

(h) Position door (19) with hinge (18) on junction box cover (2) and install seven rivets (15).

(i) Install 14 speed nuts (7) with rivets (6).

(j) Position thirteen rotary fasteners (13) on cover (2) and secure with retaining rings (11), using retaining ring pliers as illustrated.

(k) Position and support junction box cover (2) on junction box (5).

(l) Install twelve rivets (14) in hinge (4) and junction box (5).

(m) Close junction box cover (2) and turn thirteen rotary fasteners (12) to close it.

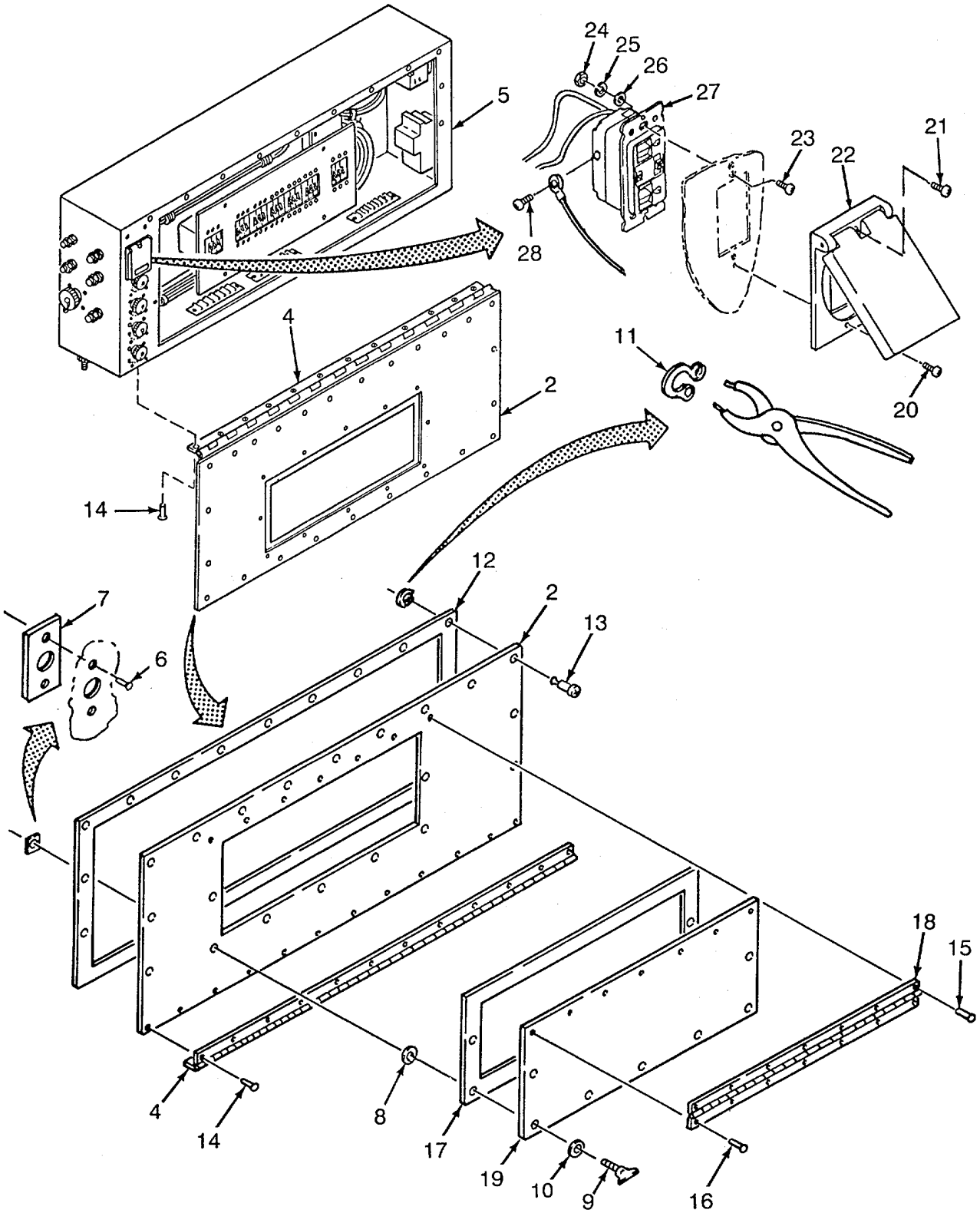
(2) Utility outlet.

(1) Position receptacle (27) behind junction box and connect wires (28) to receptacle as marked on wire. Secure with screws (28).

(2) Position receptacle (27) on junction box and secure with two screws (23), flatwashers (26), lockwashers (25) and nuts (24).

(3) Install cover (22) with screws (20 and 21).

2-73. JUNCTION BOX ASSEMBLY REPAIR - continued.



2-74. LIGHT ASSEMBLY (PANEL) REPAIR.

This task consists of:
a. Removal and Disassembly
b. Cleaning
c. Inspection
d. Repair
e. Assembly and Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Sandpaper, (Appendix C, Section II, Item 16)
Gaskets, Seals and Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Power Source Manual).

a. Removal and Disassembly.

(1) Loosen two screws (31) and two shoulder bolts (29) and pull panel light bracket (33) out from control panel.

(2) Loosen setscrew (1) and remove guard (2) from fixture body (11).

(3) Remove globe (3) from fixture body (11).

(4) Remove light bulb (4) from socket (5).

(5) Remove two screws (7) and disconnect terminals (8) from socket (5). Remove gasket (9).

(6) Remove two screws (6) and socket (5).

(7) Remove two screws (10), fixture body (11) and gasket (12).

(8) Remove two screws (13), adapter plate (14) and gasket (15).

(9) Remove screw (16) and disconnect ground wire (17) (green) from splice box (23).

(10) Remove two nuts (18), lockwashers (19) washers (20) and screws (21).

(11) Pull splice box (23) away from bracket (33) and unscrew nut (26) from adapter (27).

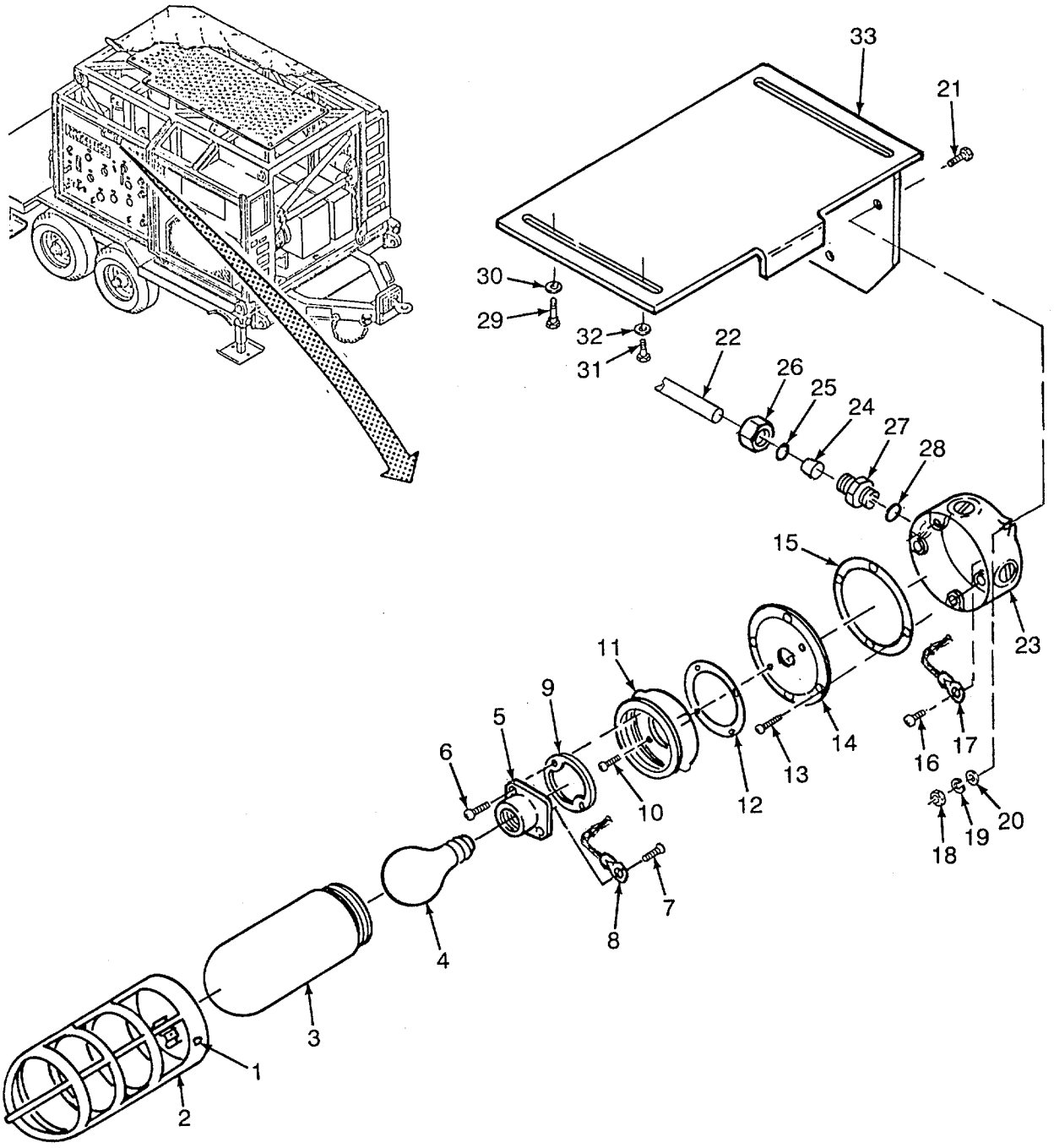
(12) Hold splice box (23) with one hand and pull cable assembly (22) out of box, being careful not to damaged cable wires.

(13) As required, remove seal (24), seal ring (25) and nut (26) from cable assembly (22).

2-74. LIGHT ASSEMBLY (PANEL) REPAIR - continued.

(14) Remove adapter (27) and gasket (28) from splice box (23).

(15) As required, remove two shoulder bolts (29),washers (30), two bolts (31), washers (32) and bracket (33).



2-74. LIGHT ASSEMBLY (PANEL) REPAIR - continued.

b. Cleaning.

(1) Clean non electrical components with detergent and water.

(2) Clean electrical contacts with sandpaper.

c. Inspection.

(1) Inspect splice box (23), adapter plate (14), and fixture body (11) for damage.

(2) Inspect socket (5) for cracks in ceramic holder and corrosion on contacts.

(3) Inspect globe (3), guard (2) and bulb (4) for cracks.

d. Repair.

(1) Replace lockwashers and gaskets

(2) Replace defective components.

e. Assembly and Installation.

(1) If removed, position bracket (33) on unit and install two flatwashers (30), shoulder bolts (29), flatwashers (32) and screws (31). Do no tighten screws (31).

(2) Install gasket (28) and adapter (27) on splice box (23).

(3) If removed, position nut (26), seal ring (25) and seal (24) on cable assembly (22).

(4) Feed terminal end of cable assembly (22) thru adapter (27) into splice box (23).

(5) Pull cable thru to provide about 6 inches of slack in splice box and connect nut (26) to adapter (27).

(6) Secure lug (17) of ground wire (green) to splice box with screw (16).

(7) Feed black and white wires of cable assembly (22) thru center of gasket (15), and adapter plate (14) and install gasket (15), cover (14) and screws (13) on splice box (23).

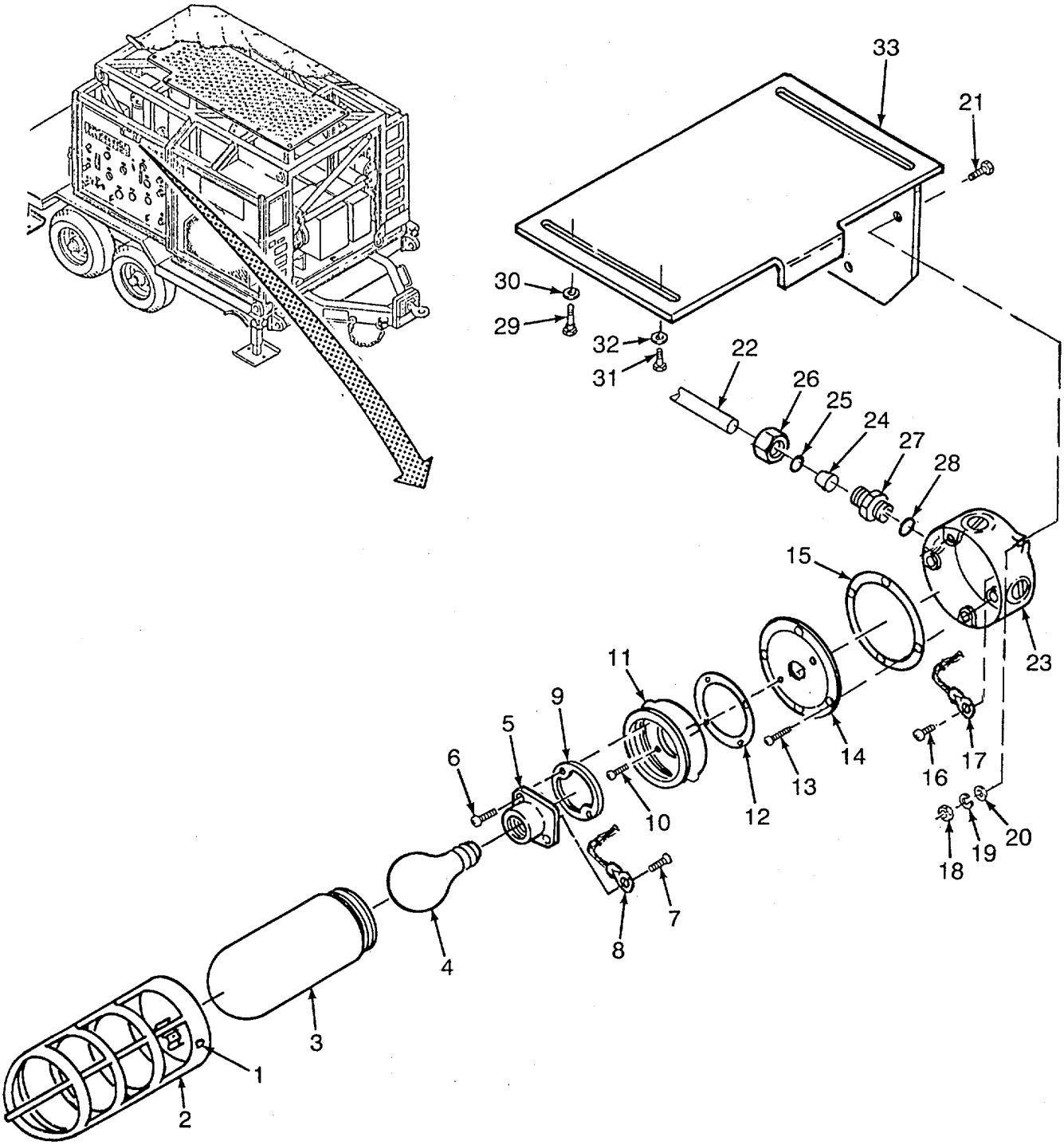
(8) Feed black and white wires of cable assembly (22) thru center of gasket (12), fixture body (11) and gasket (9).

(9) Connect terminals (8) of the two wires (black and white) to socket (5) with screws (8) and install socket (5) and gasket (9) on fixture body (11) with two screws (6).

(10) Install light bulb (4), globe (3) and guard (2) and tighten setscrew (1).

(11) Slide bracket (33) into unit and tighten bolts (31).

2-74. LIGHT ASSEMBLY (PANEL) REPAIR - continued.



2-75. STORAGE BOX (CARTRIDGE FILTERS) REPAIR.

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
Adhesive (Appendix C, Section II, Item 1)
Lockwashers and Gaskets (TM 10-4610-241-24P)
Personnel Required
Two
Equipment Condition
Reference
Power shut down (Power Source Manual).
Cover Plate removed (Paragraph 2-28).
Cartridge Filters removed (TM 10-4610-241-10).
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.

a. Removal.

(1) Remove four nuts (1), lockwasher (2), and screws (3).

(2) Remove two nuts (4), lockwashers (5), and screws (6).

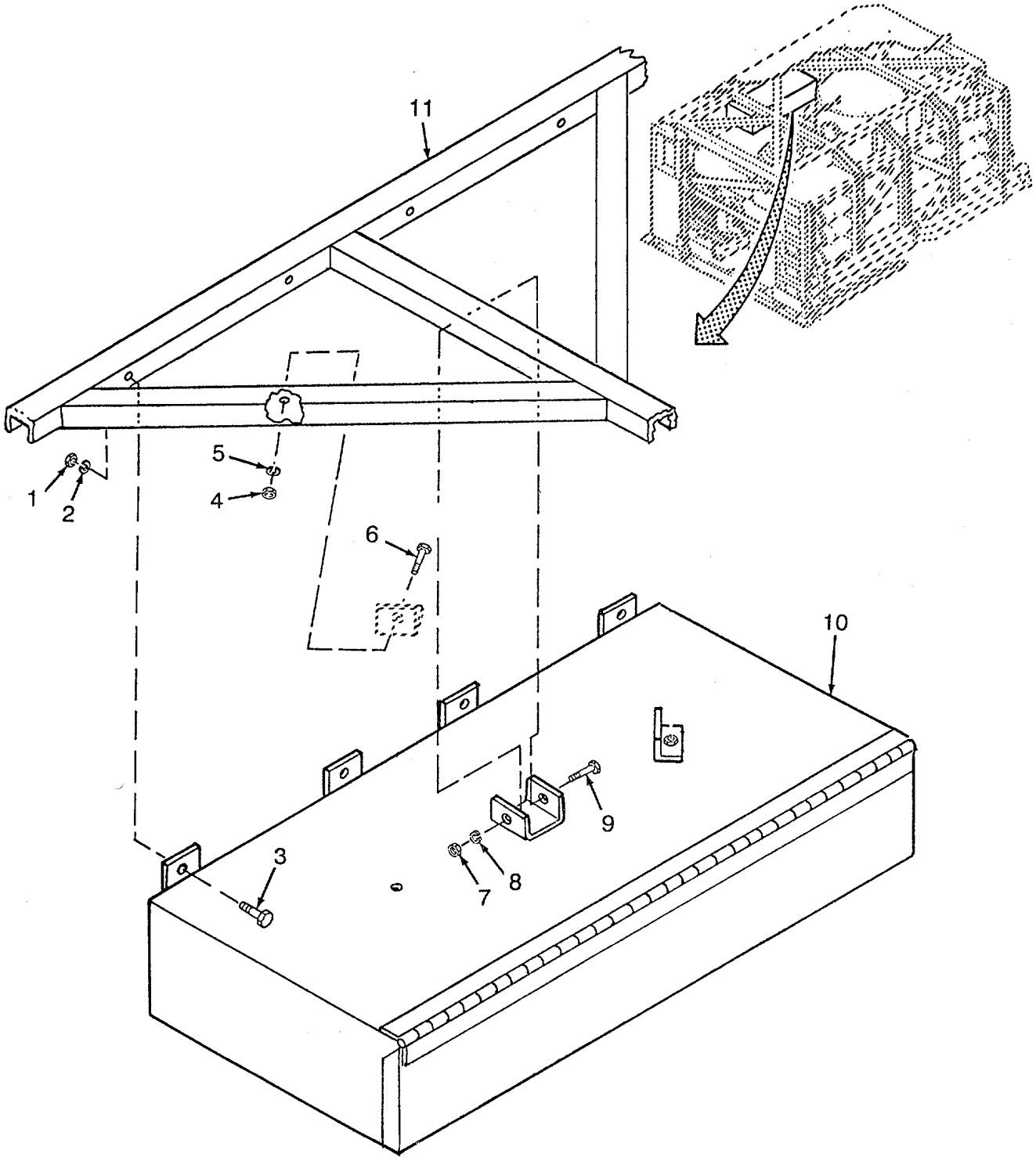
WARNING

Storage box is heavy and difficult to handle. To prevent injury to personnel and damage to equipment, use two people to remove it.

(3) Support storage box (10) and remove nut (7), lockwasher (8) and screw (9).

(4) Remove storage box (10) from frame (11).

2-75. STORAGE BOX (CARTRIDGE FILTERS) REPAIR - continued.



2-75. STORAGE BOX (CARTRIDGE FILTERS) REPAIR - continued.

b. Disassembly.

(1) Remove two nuts (12), lockwashers (13), flatwasher (14), screws (15) and brackets (16) from storage box (10).

(2) Remove rubber gasket (17) from lid of storage box (10).

(3) Remove rivets (18) and latch (19).

(4) Remove keeper (21) by removing two rivets (20) per keeper.

c. Cleaning.

Clean all components with detergent and water and dry with rags.

d. Inspection.

Inspect lid and box for deformation, worn and damaged hinge and broken weld seams.

e. Repair.

(1) Replace lockwashers and gasket.

(2) Replace defective components.

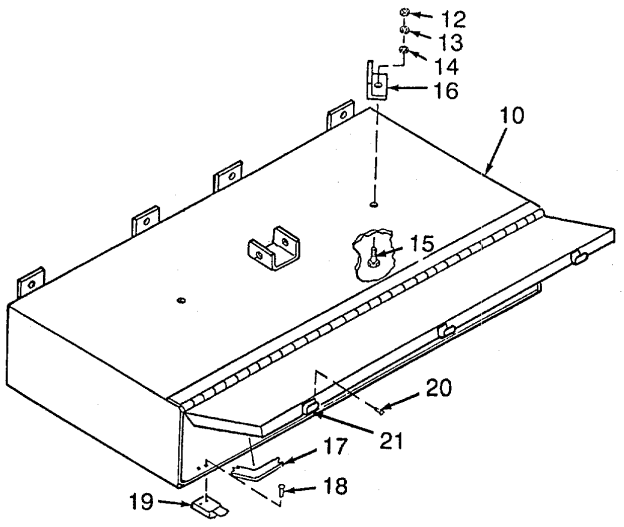
f. Assembly.

(1) Install two brackets (16), screws (15), flatwasher (14), lockwashers (13) and nuts (12) on storage box (10).

(2) Install keepers (21) with two rivets (20) each

(3) Install latches (19) with two rivets (20) each.

(4) Install gasket (17), using adhesive.



2-75. STORAGE BOX (CARTRIDGE FILTERS) REPAIR - continued.

g. Installation.

WARNING

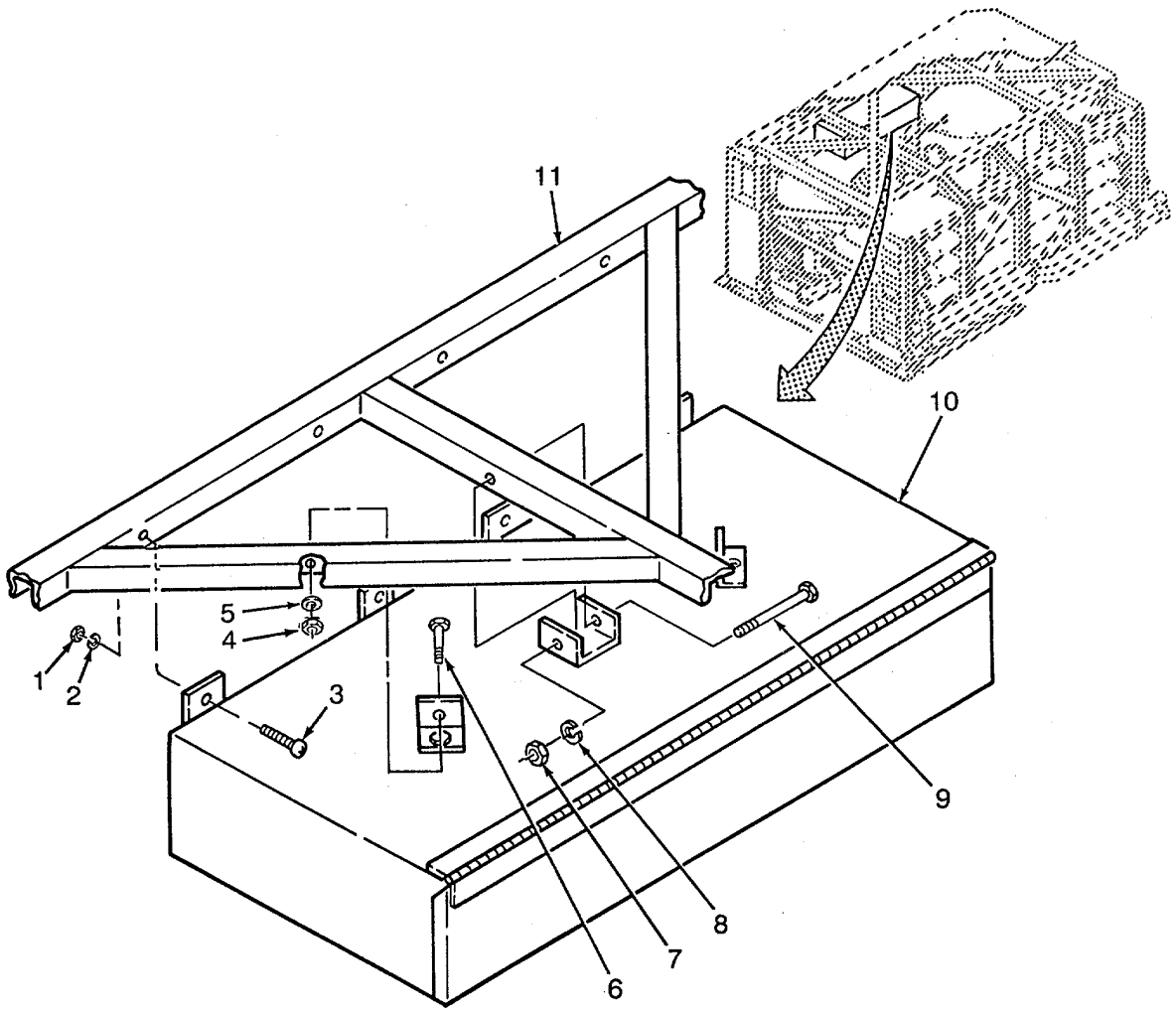
Storage box is heavy and difficult to handle. To prevent injury to personnel and damage to equipment, use two personnel when replacing storage box.

(1) Position box (10) on frame (11) and have assistant support it.

(2) Install screw (9), lockwasher (8), and nut (7).

(3) Install two screws (6), lockwashers (5) and nuts (4).

(3) Install four screws (3), washer (2) and nut (1).



2-76. FRAME(ROWPU) REPAIR.

This task consists of:
a. Replace Strap Assemblies and Loops
b. Replace Cargo Tie Rings

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Lockwashers (TM 10-4610-241-24P)
Reference
Power shut down (Power Source Manual).

a. Replace Strap Assemblies and Loops.

NOTE
The following procedures describe replacement of one strap assembly and one loop. All others are similar.

(1) Removal.

(a) Remove item secured by strap and/or loop to be replaced.

(b) Unbuckle strap assembly (1) and remove from loop (3).

(c) Remove two screws (2).

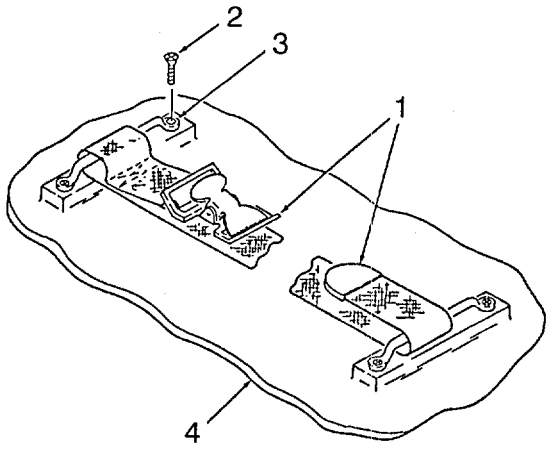
(d) Remove loop (3) from ROWPU frame (4).

(2) Installation.

(a) Position loop (3) on ROWPU frame and secure with two screws (2).

(b) Install strap assembly (1) on loop (3).

(c) Install item removed in step (1) (a) above.



2-76. FRAME (ROWPU) REPAIR - continued.

b. Replace Cargo Tie Rings.

NOTE

There are four cargo tie rings located on the upper part of the ROWPU frame and eight on the lower part of the frame (two on each side and two each at front and rear). The following procedures describe replacement of one typical upper and lower cargo tie ring.

(1) Removal.

(a) Remove two screws (1) and plate (2) from frame (4).

(b) Remove upper cargo tie ring (3) from frame (4).

(c) Remove lower cargo tie ring (5) from plate (8).

(d) Remove two screws (6), two lockwashers (7) and plate (8) from frame (4).

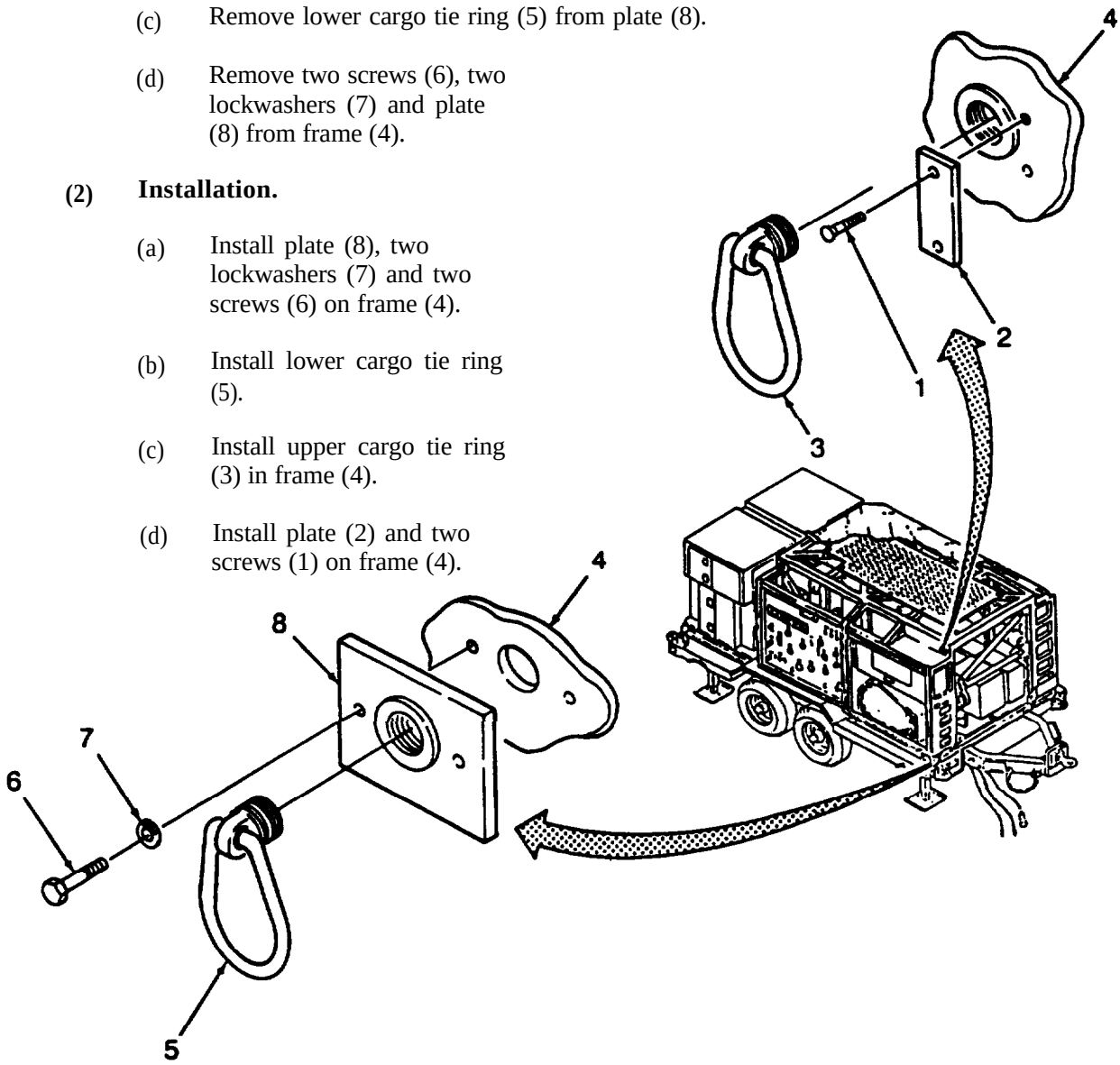
(2) Installation.

(a) Install plate (8), two lockwashers (7) and two screws (6) on frame (4).

(b) Install lower cargo tie ring (5).

(c) Install upper cargo tie ring (3) in frame (4).

(d) Install plate (2) and two screws (1) on frame (4).



2-77. FLATBED CARGO TRAILER REPAIR (WPES-1O AND H-9518-1).

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

INITIAL SET-UP:

Tools required
General Mechanics Tool Kit (Appendix B Section III, Item 4)
1 -l/8 Inch Wrench (Appendix B, Section III, Item 3)
Vise (Appendix B, Section III, Item 3)
Material /Parts Required
Lockwashers and Gaskets (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (GeneratorManual).
Trailer disconnected from Towing Vehicle (TM 10-4610-241 -10).
Personnel Required
Two
General Safety Instructions

WARNING
Lunette is heavy/difficult to handle. To prevent injury, use two people to lift

REPLACE REFLECTORS

NOTE
There are eight reflectors on the trailer, one is shown the others are similar.

a. Removal.

(1) Remove two screws (1) and ring (2) from reflector (3).

(2) Remove reflector (3) and gasket (4) from frame (5).

b. Installation.

(1) Position gasket (4) and reflector (3) on frame (5).

(2) Install ring (2) and two screws (1) on reflector (3).

2-77. FLATBED CARGO TRAILER REPAIR (WPES-10 AND H-9518-1) - continued.

REPLACE LUNETTE

a. Removal.

(1) Mark position of lunette (9) in relation to trailer (5) on trailer and remove six nuts (6), lockwashers (7) and bolts (8).

WARNING

Lunette is heavy. To prevent injury to personnel, use two people to lift it.

(2) Remove lunette (9) from frame (5).

b. Installation.

WARNING

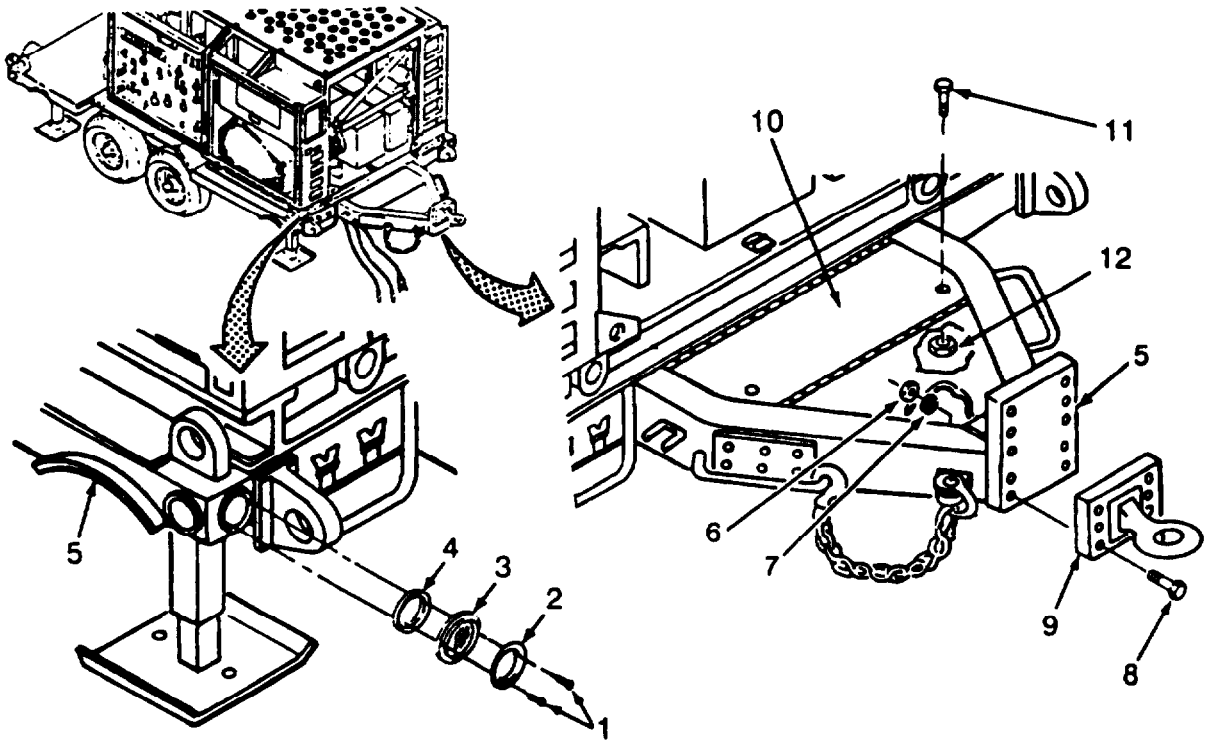
Lunette is heavy. To prevent injury to personnel, use two people to lift it.

(1) Position lunette (9) on frame (5) as marked at removal.

(2) Install six bolts (8), lockwashers (7), and nuts (6).

REPAIR STEP ASSEMBLY

Repair of step assembly (10) at unit level is limited to replacement of bolts (11) and nuts (12).



2-77. FLATBED CARGO TRAILER REPAIR (WPES-10 AND H-9518-1) - 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) Remove nut (13), screw (14), and shackle (15) from frame (5).

(2) Separate chain assembly (16) from shackle (15).

(3) Place two-piece chain link (17) in vise and separate chain link halves using hammer and chisel.

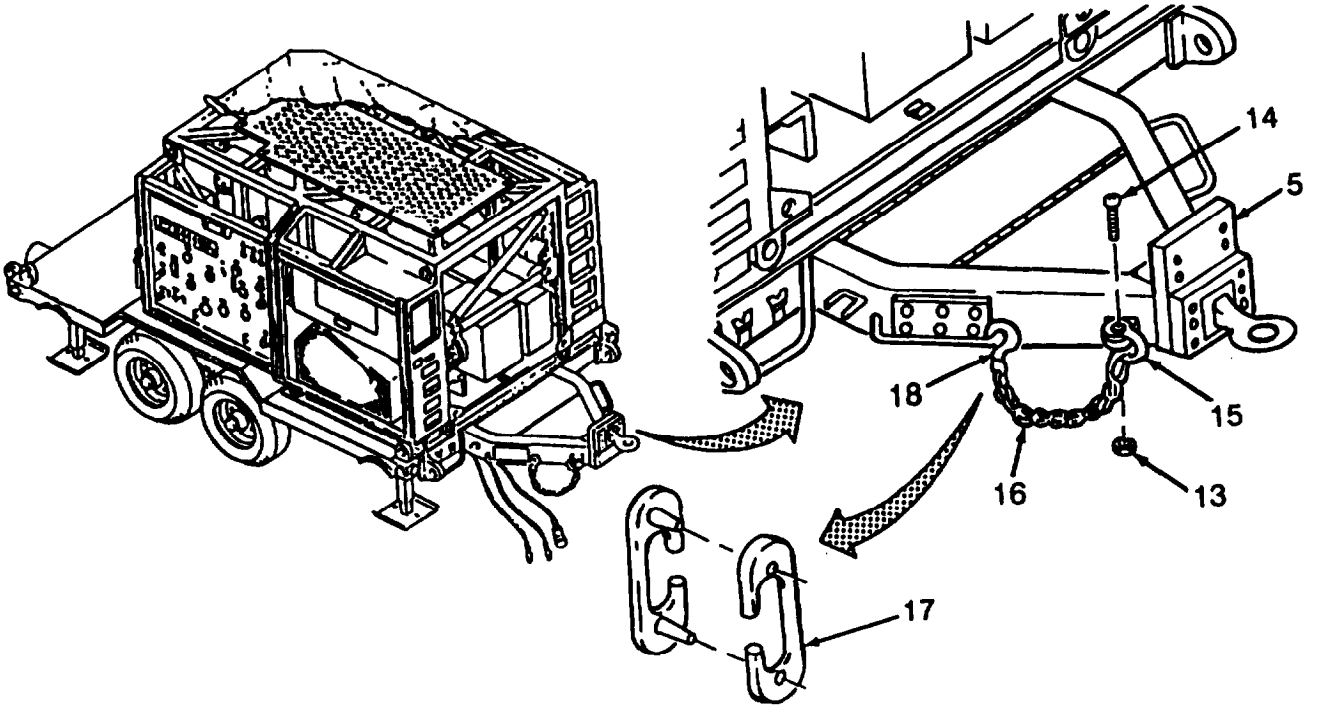
(4) Remove hook (18) and/or chain (16)

b. Installation.

(1) Position chain (16) and /or hook (18) on chain link halves (17). Clamp chain link halves in vise and hammer rivet tabs flush with face of link. Make sure link halves are securely fastened together.

(2) Position chain (16) on shackle (15).

(3) Install shackle (15). screw (14), and nut (13) on frame (5).



2-77. FLATBED CARGO TRAILER REPAIR (WPES-10 AND H-9518-1) - continued.

REPLACE MANUAL CONTAINER

a. Removal.

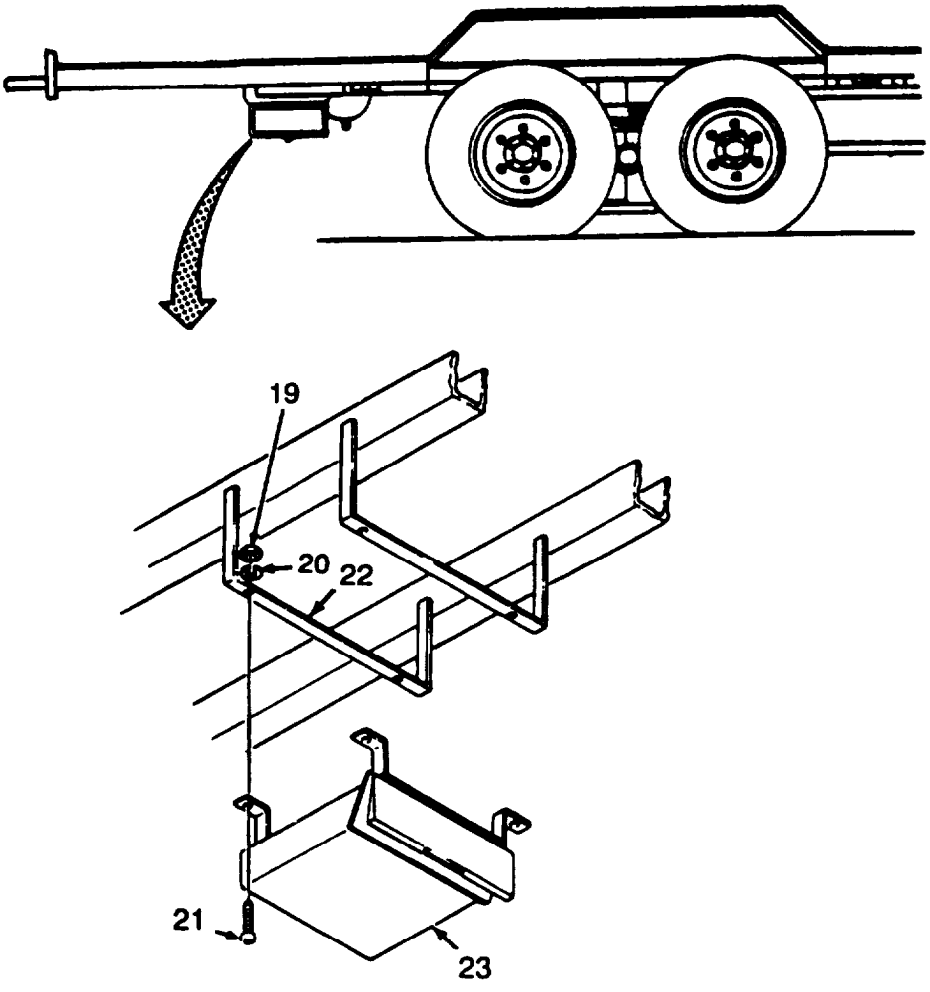
(1) Remove four nuts (19). lockwashers (20) and screws (21).

(2) Remove manual container (23) from brackets (22).

b. Installation.

(1) Position manual container (23) on brackets (22).

(2) Install four screws (21), lockwashers (20) and nuts (19).



2-77. FLATBED CARGO TRAILER REPAIR (WPES-10 AND H-9518-1) - continued.

REPLACE AIR GLANDCOUPLER DUMMY

a. Removal.

NOTE
This procedure is for one air gland coupler dummy. The other coupler dummy on the trailer is removed in the same manner.

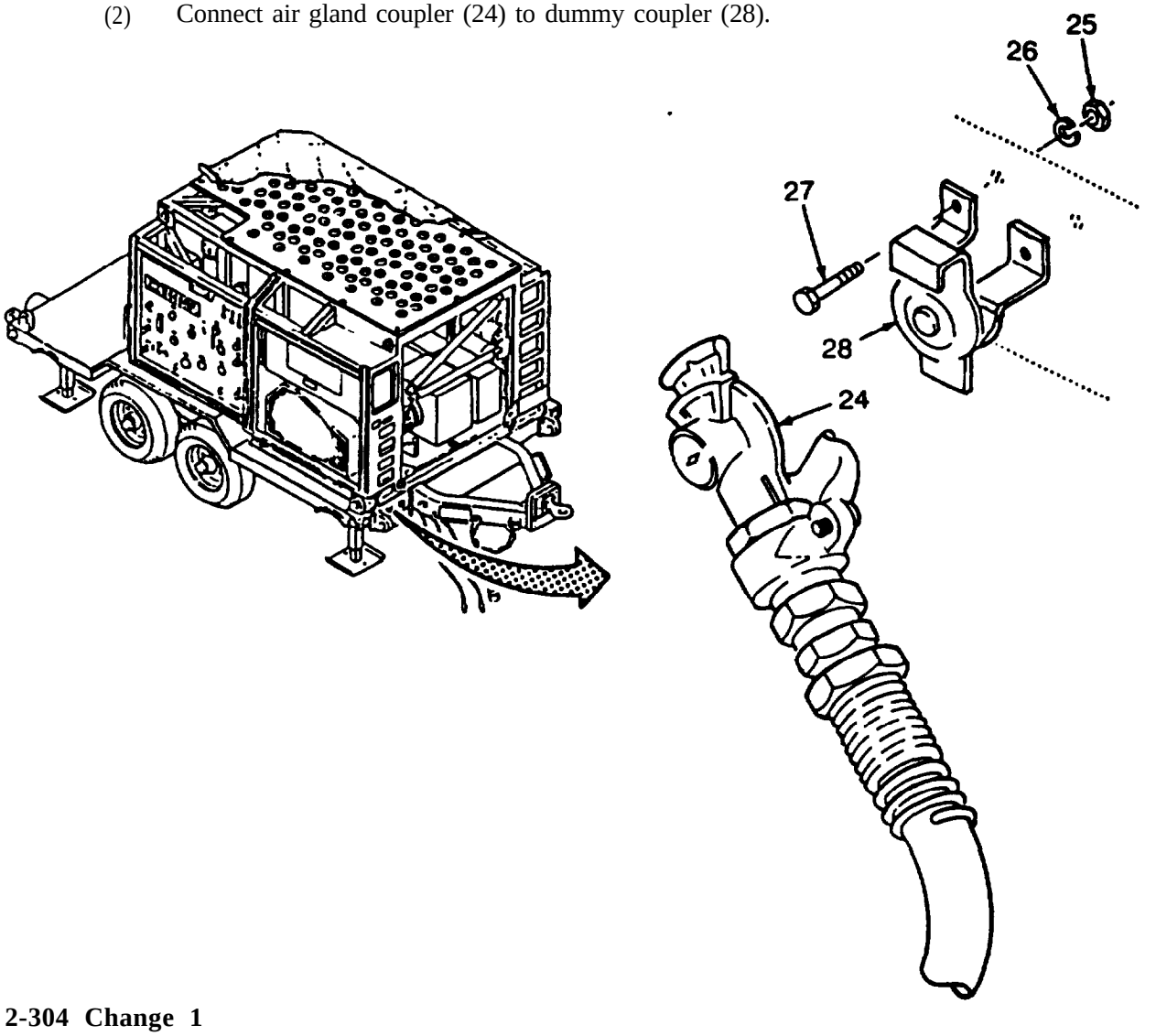
(1) Disconnect air gland coupler (24) from dummy connector (28).

(2) Remove two nuts (29, lock washer (26). screws (27) and dummy connector (28).

b. Installation

(1) Position dummy connector (28) on trailer and install two screws (27). lockwashers (26) and nuts (25).

(2) Connect air gland coupler (24) to dummy coupler (28).



2-77. FLATBED CARGO TRAILER REPAIR (WPES-10 AND H-9518-1) - continued.

c. Service

(1) Load grease gun with grease per LO l0-4610-241-12.

NOTE

Four grease fitting are located at trurnnion axle (29) and one each is located on four spider brake fins (30), four slack adjusters (32), four bushing housings (3 1) and four jack stands (33).

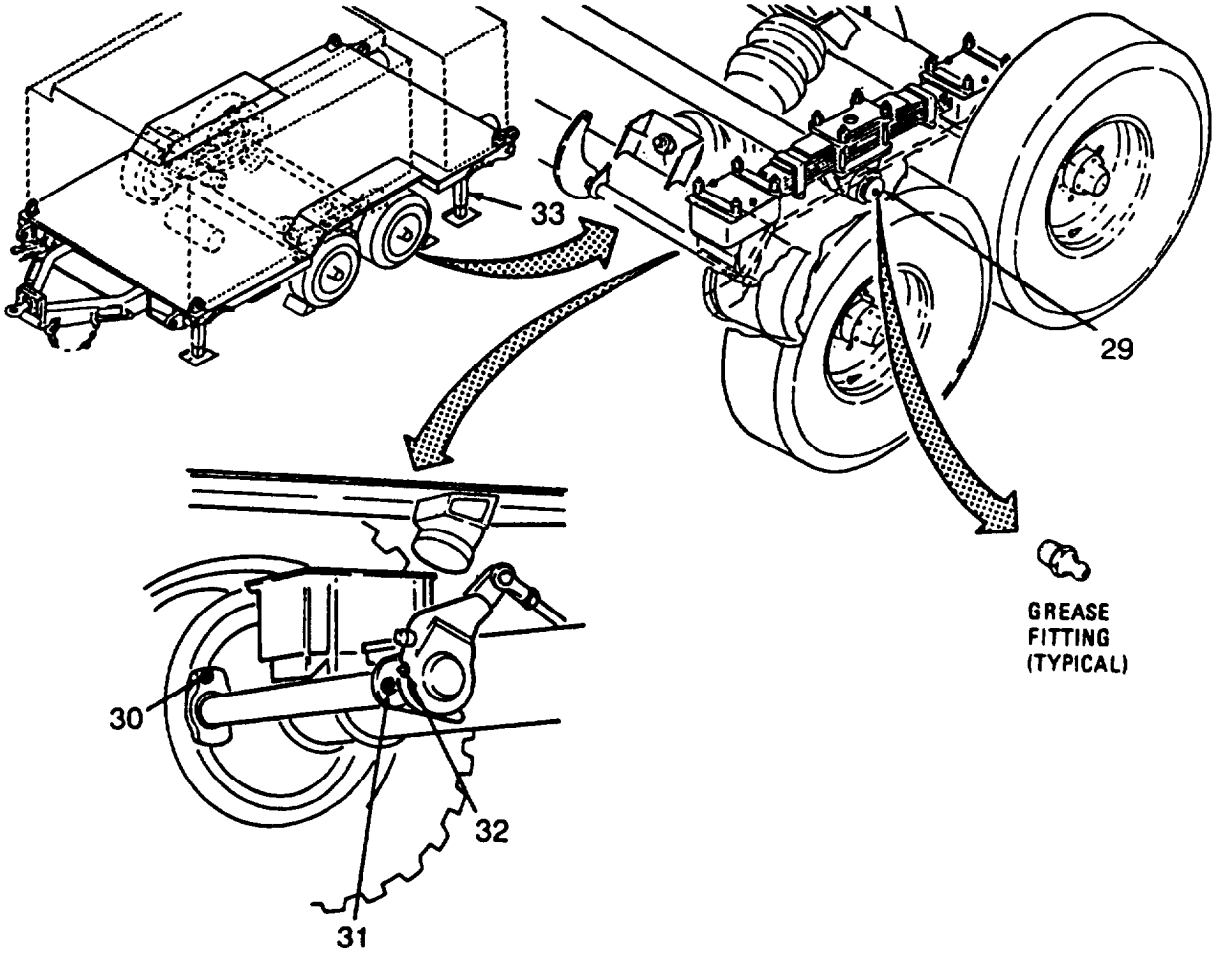
(2) Wipe off each grease fitting with a clean rag and inspect for rust/corrosion and damage.

(3) Replace damaged corroded fitting.

(4) Connect adapter of grease gun to each grease fitting and inject grease, equivalent to three or four strokes on manual grease gun.

(5) If grease cannot be injected because of clogged or inoperable fittings, replace fitting.

(6) Remove grease gun adapter and wipe of all grease on fitting and surrounding areas.



2-78. SPARE TIRE AND WHEEL SUPPORT REPAIR (WPES-10 AND H-9518-1).

This task consists of: a. Removal b. Cleaning c. Inspection d. Repair e. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Solvent, Drycleaning (Appendix C, Section II, Item 18)
Cotter Pins (TM 10-4610-24l -24P)
Equipment Condition
Power shut down (Generator Manual)
Spare Tire removed (TM 10-46 10-241-10)
Personnel Required
Two
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, Cl II, 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. Removal

(1) Disconnect and remove extension spring (1) from paw1 (6) and eyepad (2).

(2) Remove jamnut (3) from screw (4).

(3) Remove screw (4), flat washer (5). and paw1 (6).

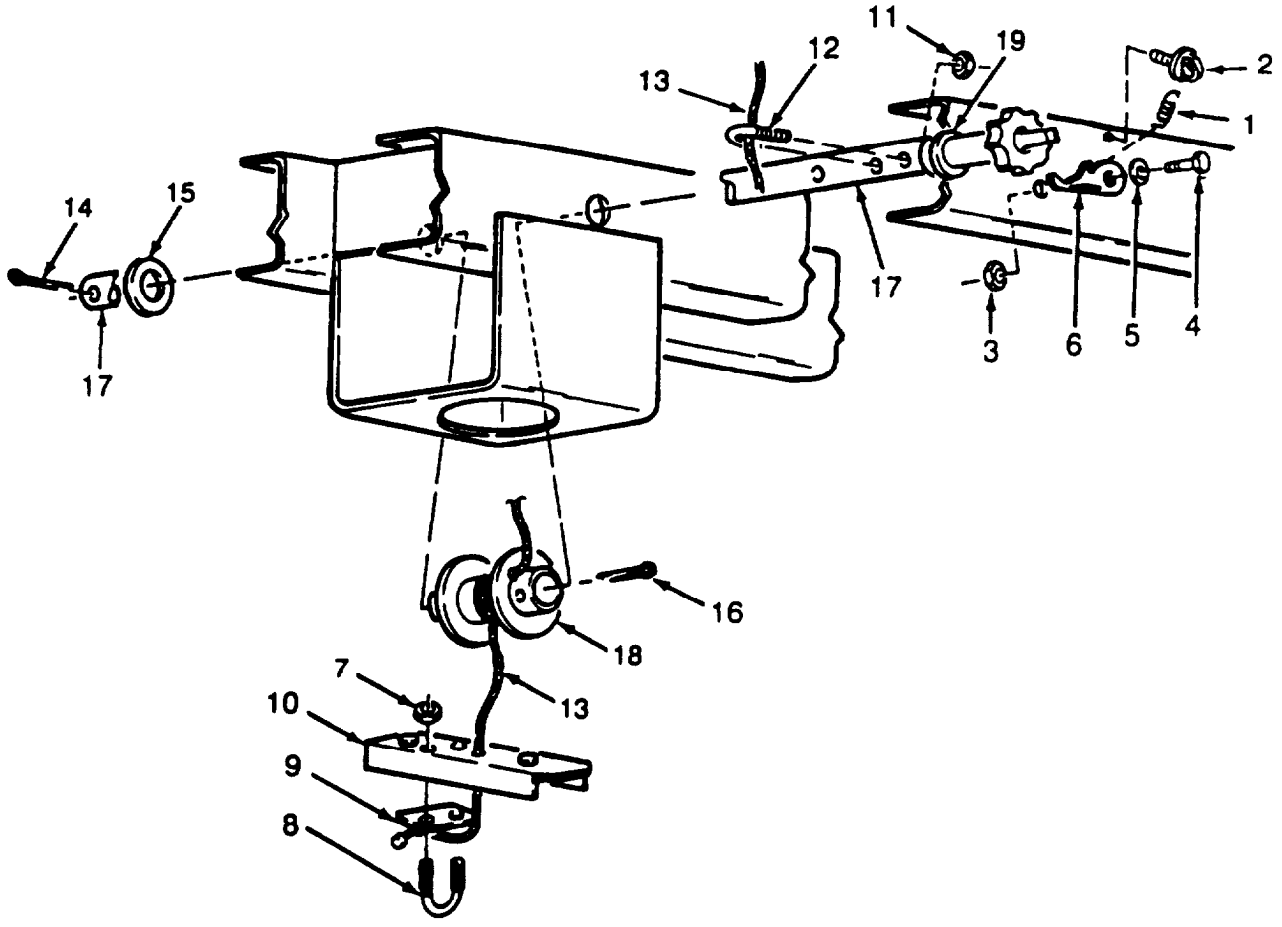
(4) Remove two nuts (7), U-bolt (8), U-bolt plate (9), and tire carrier support (10).

(5) Remove two nuts (11), U-bolt (12), and cable (13) from ratchet shaft (17).

(6) Remove cotter pin (14), flat washer (1 5), and cotter pin (16) from ratchet shaft (17).

(7) Remove ratchet shaft (17), support spool (18), and flat washer (19) from frame.

2-78. SPARE TIRE AND WHEEL SUPPORT REPAIR (WPES-10 AND H-9518-1) - continued.



2-78. SPARE TIRE AND WHEEL SUPPORT REPAIR (WPES-10 AND H-9518-1) - continued.

b. Cleaning.

WARNING

Drycleaning solvent, P-D-680, Cl II, 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.

c. Inspection.

(1) Inspect cable (13) for fraying and cuts and loose and missing end pieces.

(2) Inspect ratchet shaft (17) and paw1 (6) for rounded or missing teeth.

(3) Inspect all threaded parts for worn and deformed threads.

(4) Inspect all parts for excessive wear and deformity.

(5) Inspect for worn and broken spring (1).

d. Repair.

Replace damaged components,

e. Installation.

(1) Position flat washers (19) on shaft (17).

(2) Position spool (18) on frame and install ratchet shaft (17) through spool.

(3) Aline spool (18) with hole in shaft (17) and install cotter pin (16) thru spool (18) and shaft (17).

(4) Install flatwashers (15) and cotter pin (14) on shaft (17).

(5) Thread cable (13) through hole in side of spool (18) and install U-bolt (12) and two nuts (11) to secure end of cable to shaft (17).

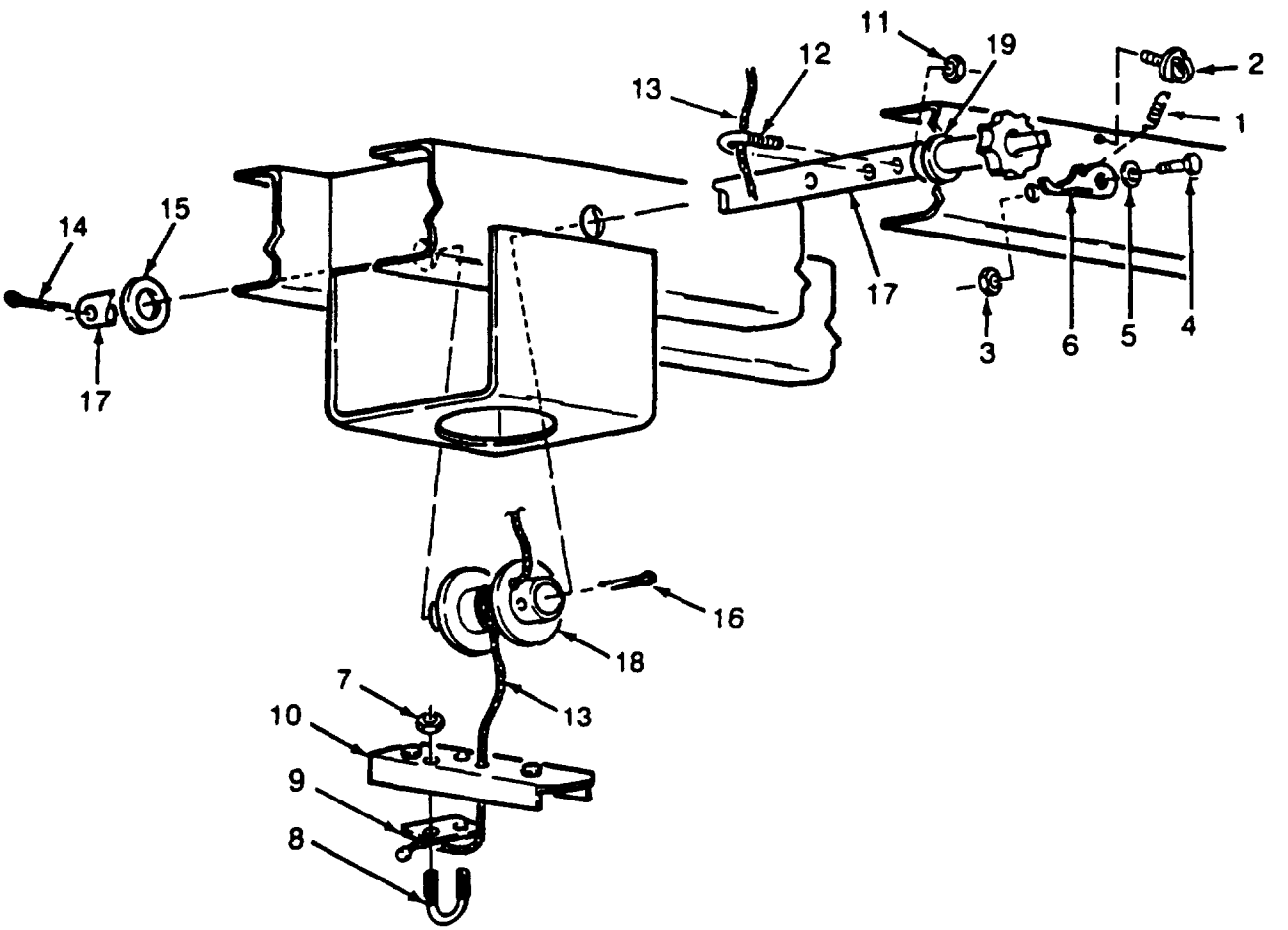
(6) Position U-bolt (8), plate (9) and cable (13) on tire carrier support (10) and install U-bolt (8) and two nuts (7).

(7) Position paw1 (6) on unit frame and install screw (4), flatwasher (5), and jamnut (3).

(8) Attach extension spring (1) to paw1 (6) and eyepad (2).

(9) Install wheel and tire assembly on spare tire support (TM 10-4610-241-10).

2-78. SPARE TIRE AND WHEEL SUPPORT REPAIR (WPES-10 AND H-9518-1) - continued.



2-79. JACK ASSEMBLY REPAIR (WPES-10 AND H-9518-1).

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Jack Stand (Appendix B, Section III, Item 3)
Personnel Required
Two
Equipment Condition
Reference
Power shut down (Generator Manual).
Jacks extended (TM 10-4610-241-10).
General Safey 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.
- Leveling jack assembly is heavy. Two people are needed to lift it to prevent personal injury or damage to the equipment.
- A portable jack stand, minimum capacity of 5 tons, must be placed under trailer when replacing leveling jack. ROWPU weighs 11,380 pounds (approximately 6 tons).

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.

a. Removal.

(1) Position a jack stand (1) under ROWPU to support weigth of unit and crank up jack assembly (4) until jack pad clears the ground.

NOTE
Stud mounting hole must be marked prior to removal of stud to insure installation in correct mounting hole.

(2) Mark stud mounting hole and remove stud (2) from jack assembly (4).

2-79. JACK ASSEMBLY REPAIR (WPES-10 AND H-9518-1) - continued.

WARNING

Jack assembly is heavy. Two people are needed to lift it to prevent personal injury or damage to the equipment.

(3) While supporting jack assembly (4), remove three bolts (3).

(4) Remove jack assembly (4) from trailer.

b. Installation.

WARNING

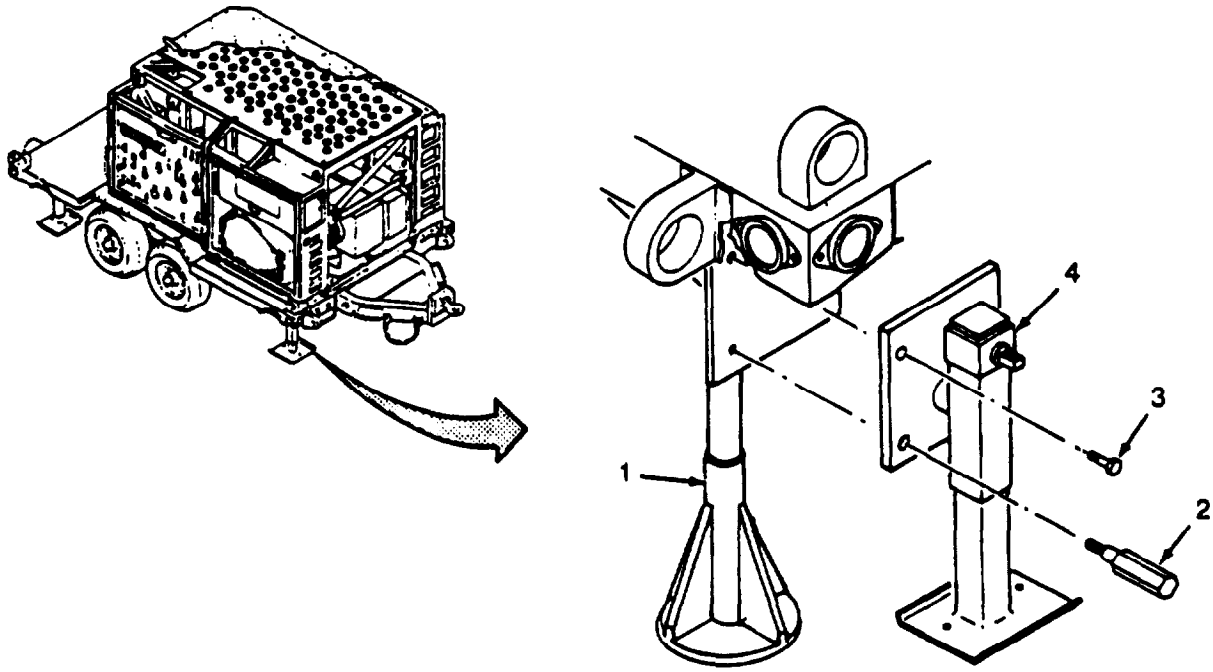
Jack assembly is heavy. Two people are needed to lift it to prevent personal injury or damage to the equipment.

(1) Position jack assembly (4) so that mounting holes *on* jack assembly plate aline with holes on trailer.

(2) Install three bolts (3).

(3) Install stud (2) on jack assembly (4) as marked during removal.

(4) Remove jack stand (1) from under ROWPU.



2-80. LIGHT ASSEMBLY REPAIR (WPES-10 AND H-9518-1).

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)
Material/Parts Required
Rags, Wiping (Appendix C, Section II, Item 14)
Detergent (Appendix C, Section II, Item 5)
Sandpaper (Appendix C, Section II, Item 16)
Lo&washers, Grommets and Packing (TM 10-46l0-241-24P)
Equipment Condition
Reference
Power shut down (Generator Manual).
Electrical Cable Assembly disconnected from Towing vehicle (TM 10-4610-241-10).

NOTE
Repair at light assembly can be performed while light is installed on trailer. Go to Disassembly procedure if repair only is required.

a. Removal.

NOTE
- There are two light assemblies on the flatbed cargo trailer. Both are removed the same. One is shown, the other is similar.
- Tagging wires before removal, noting their connection points will facilitate installation. Be sure to transfer tags to replacement parts before discarding or turning defective parts in to Supply.

(1) Tag all wires to be disconnected.

(2) Pull four connectors (1) from spring clips (2).

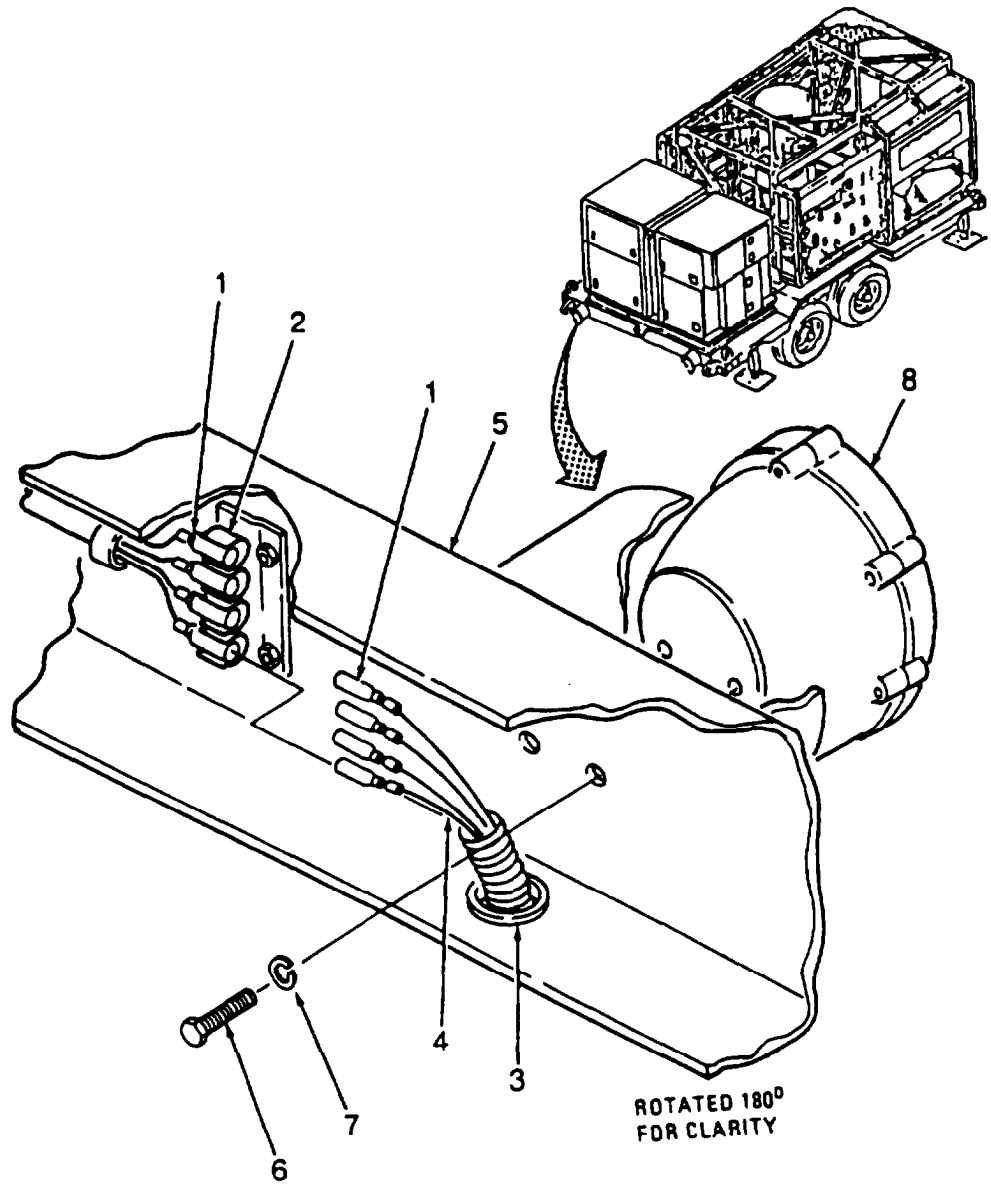
(3) Separate two halves of four connectors (1),

(4) Work grommet (3) out of hole in trailer frame (5).

(5) Pull cable (4) out through hole in trailer frame (5). Grommets will fall off as cable is pulled out.

(6) Support light assembly (8) and remove two screws (6), lo&washers (7) and light assembly (8).

2-80. LIGHT ASSEMBLY REPAIR (WPES-10 AND H-9518-1) - continued.



2-80. LIGHT ASSEMBLY REPAIR (WPES-10 AND H-9518-1) - continued.

NOTE
There are two composite light assemblies on the flatbed cargo trailer. Both are repaired the same. One is shown. the other is similar.

b. Disassembly.

(1) Loosen six captive screws (9) and remove door (10) and preformed packing (11).

NOTE
There are three types of bulbs in light assembly. Note bulb type as you remove bulb from each socket.

(2) Remove four bulbs (12).

(3) Remove lenses (13) from door (10).

c. Cleaning.

(1) Using clean water and detergent, wash door (10), body (15) and three lenses (13).

(2) Rinse parts in clean water and dry with wiping rags.

(3) Using sandpaper, remove corrosion from lamp sockets as required.

d. Inspection.

(1) Inspect for cracked, broken, and leaking lenses (13), cracked and bent door (10) and damaged heads and threads on screws (9).

(2) Inspect body (15) for cracks and broken lamp sockets and burned, brittle, or cut wires on cable (6).

(3) Inspect bulbs (12) for cracks and loose and deformed bases and burned filaments.

(4) Inspect lamp sockets (14) for corrosion.

e. Repair.

(1) Replace lo&washers, packing and gaskets.

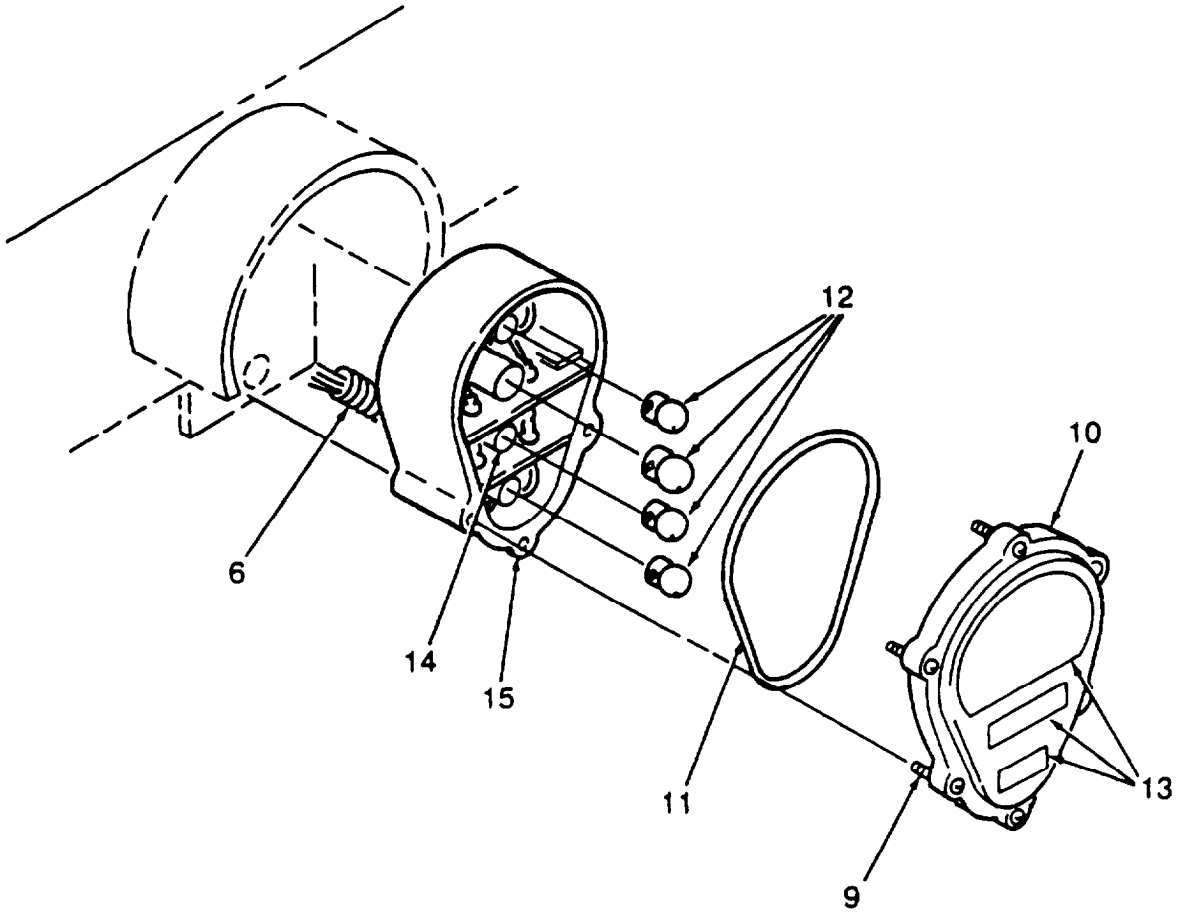
(2) Replace defective components.

2-80. LIGHT ASSEMBLY REPAIR (WPES-10 AND H-9518-1) - continued.

f. Assembly.

(1) Install four bulbs (12) in lamp sockets (14) as noted during disassembly.

(2) Position preformed packing (11) and door (10) on body (15) and tighten six captive screws (9).



2-80. LIGHT ASSEMBLY REPAIR (WPES-10 AND H-9518-1) - continued.

g. Installation.

NOTE

There are two light assemblies on the flatbed cargo trailer. Both are installed the same. One is shown, the other is similar.

(1) Position light assembly (8) on trailer (5). Install two lo&washers (7) and screws (6).

(2) Pull cable (4) through hole in chassis (5) and slip grommet (3) onto end of cable.

(3) Work grommet (3) into grommet hole in chassis (5).

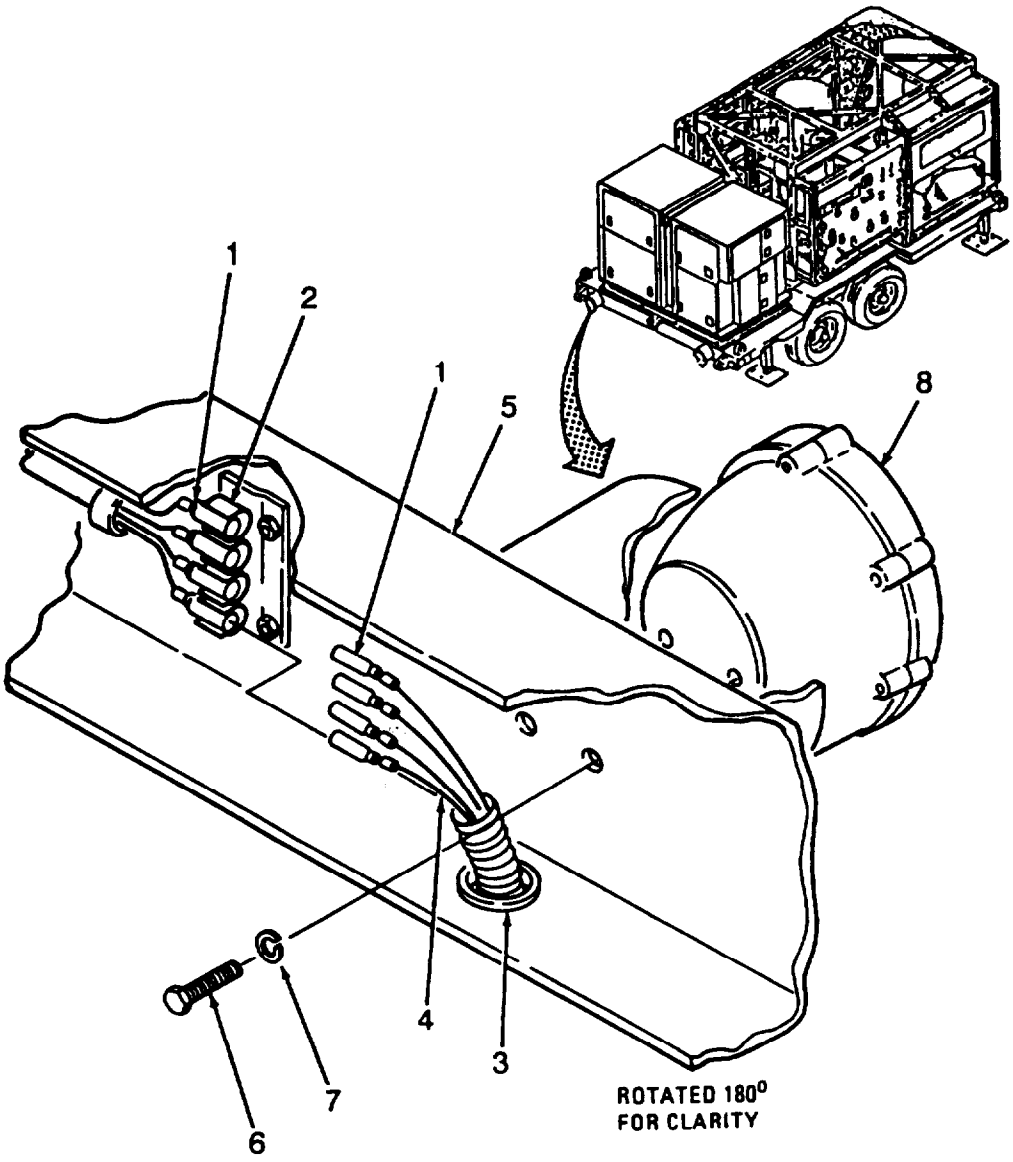
CAUTION

Failure to match wires as marked will cause electrical malfunctions. Be sure to connect wires as labeled during removal.

(4) Match halves of four connectors (1) as marked during diassembly. Push matching halves together until they lock.

(5) Push four connectors (1) into spring clips (2).

2-90. LIGHT ASSEMBLY REPAIR (WPES-10 AND H-9518-1) - continued.



2-81. TRAILER CABLE ASSEMBLY REPLACE (WPES-10 AND H-9518-1).

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

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material Parts Required
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Generator Manual)
Trailer Cable disconnected from Towing Vehicle (TM 10-46 10-241-10).

a. Removal.

NOTE
Tagging wires, noting connection points will facilitate installation. Be sure to transfer tags to replacement parts before discarding defective parts or turning them in to Supply.

(1) Remove six connectors (1) from spring clips of clamps (2).

(2) Separate two halves of six connectors (1).

(3) Remove screw (3) and lockwasher (4) and disconnect ground wire (5) from clamp (2).

(4) Remove nut (7). screw (8) and cable clamp (9).

(5) Remove cable assembly (10) from drawbar (6) of trailer.

b. Installation.

(1) Position trailer cable assembly (10) in place on drawbar (6) of trailer.

(2) Secure cable assembly (10) to drawbar (6) with cable clamp (9), screw (8) and nut (7).

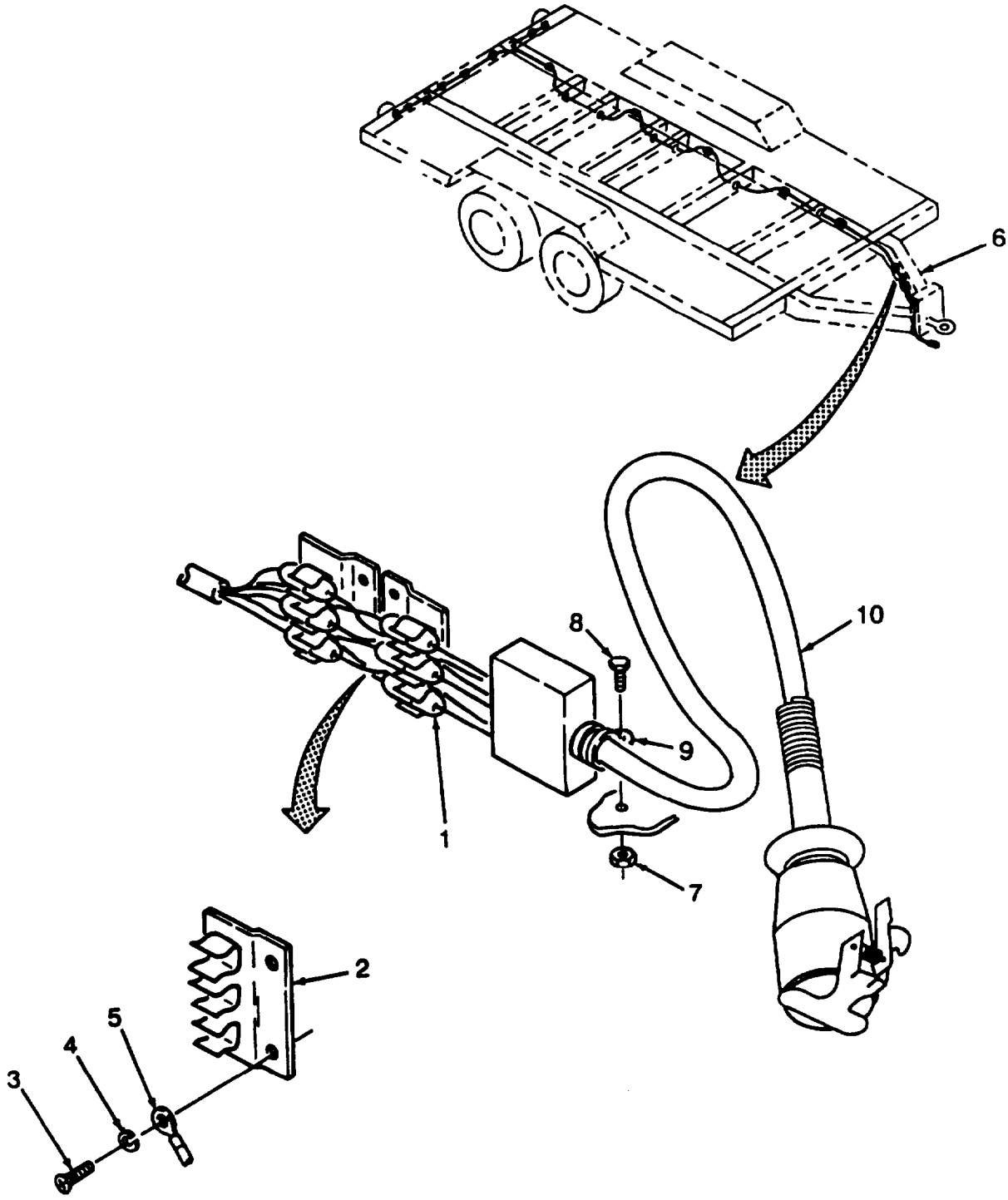
(3) Install ground wire (5), lockwasher (4), and screw (3) on clamp (2).

(4) Match halves of six connectors (1) as tagged at removal. Push halves together until they lock.

(5) Push six connectors (1) into spring clips of clamp (2).

(6) Connect trailer cable assembly to towing vehicle and check for proper operation of lights (TM 10-4610-241-10).

2-81. TRAILER CABLE ASSEMBLY REPLACE (WPES-10 AND H-9818-1) - continued.



2-81. TRAILER CABLE ASSEMBLY REPLACE (WPES-10 AND H-9518-1) - continued.

c. Test.

NOTE

To prevent false indications it is necessary to disconnect cable assembly at one end before performing the continuity tests and at both ends to check it for shorts.

(1) Check cable assembly for continuity between individual connectors and corresponding pin on multiple connector (See table below).

Multiple Pins Connector Pin Number	Individual Connectors
K	37
J	22-460
D	90A
F	23
E	21
C	24-483
B	22-461
A	24-484

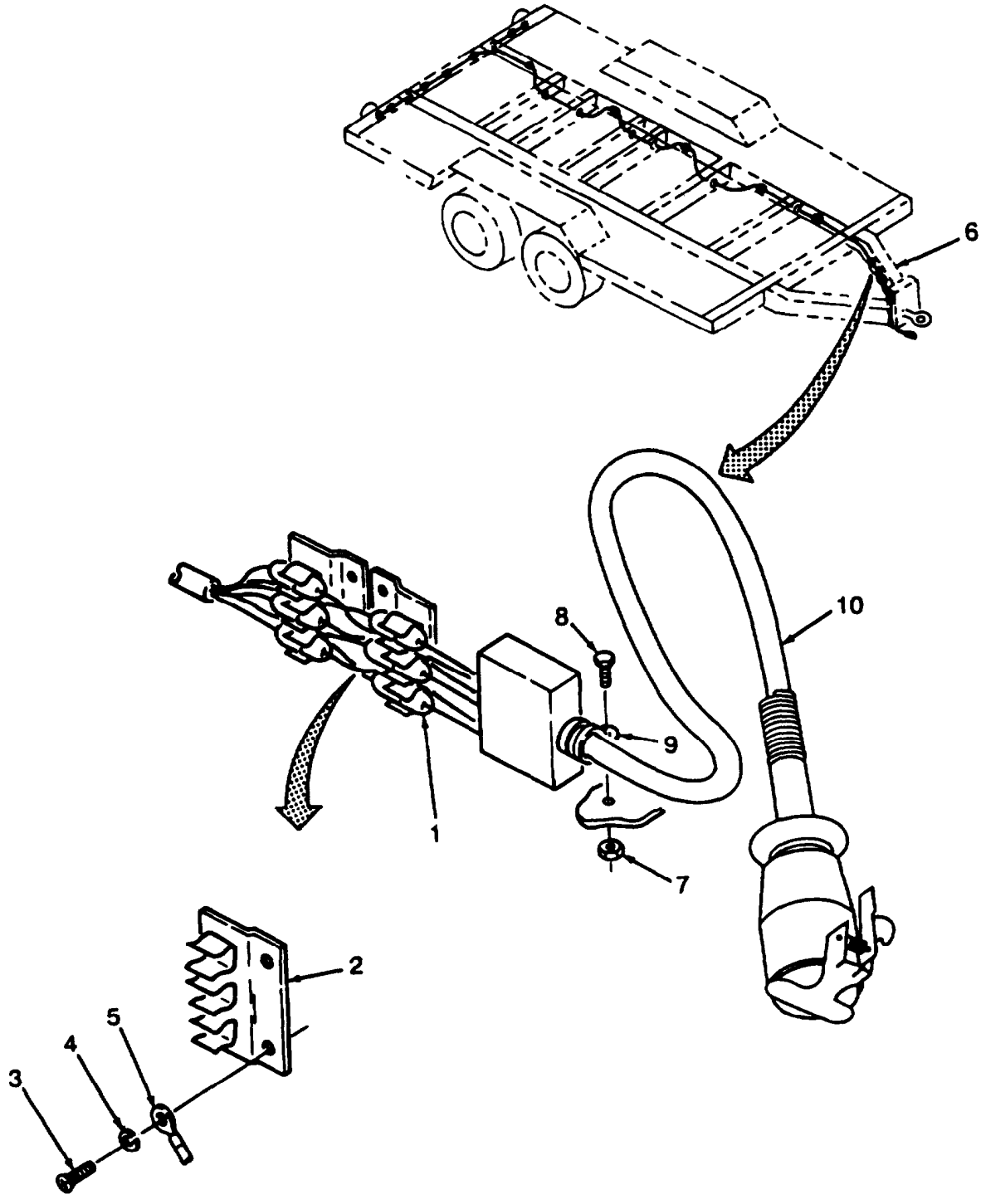
(2) If continuity is absent in any test, refer cable assembly to Direct Support Maintenance.

(3) Check wiring harness for short as indicated in following table.

Multiple Pins Connector Pin Number	Individual Connectors and Shell
K	Each Individual Connector and Multiple Connector Shell
J	(As above)
D	(As above)
F	(As above)
E	(As above)
C	(As above)
B	(As above)
A	(As above)

2-81. TRAILER CABLE ASSEMBLY REPLACE (WPES-10 AND H-95l8-1) - continued.

(4) If cable is shorted refer cable assembly to Direct Support Maintenance.



2-82. WIRING HARNESS (TRAILER) REPLACE (WPES-10 AND H-9518-1).

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

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Material/Parts Required
Grease, Silicone (Appendix B, Section II, Item 10)
Grommets (TM 10-46 10-241-24P)
Equipment Condition
Reference
Trailer disconnected from Towing Vehicle (TM 10-4610-241-10).
Light Assemblies disconnected (Paragraph 2-80).
Trailer Cable Assembly disconnected from Wiring Harness (Paragraph 2-82).

a. Removal.

(1) Remove nut (l), screw (2) and clamp (3) from wiring harness (7).

NOTE
There are eight clamps (5). holding wiring harness to trailer frame. All are removed the same. One is shown, the others are similar.

(2) Remove eigth nuts (4) and clamps (5) from wiring harness (7).

NOTE
There are 11 grommets on the wiring harness. All are removed the same. One is shown, the others are similar.

(3) Remove grommets (6) from holes in trailer frame (8).

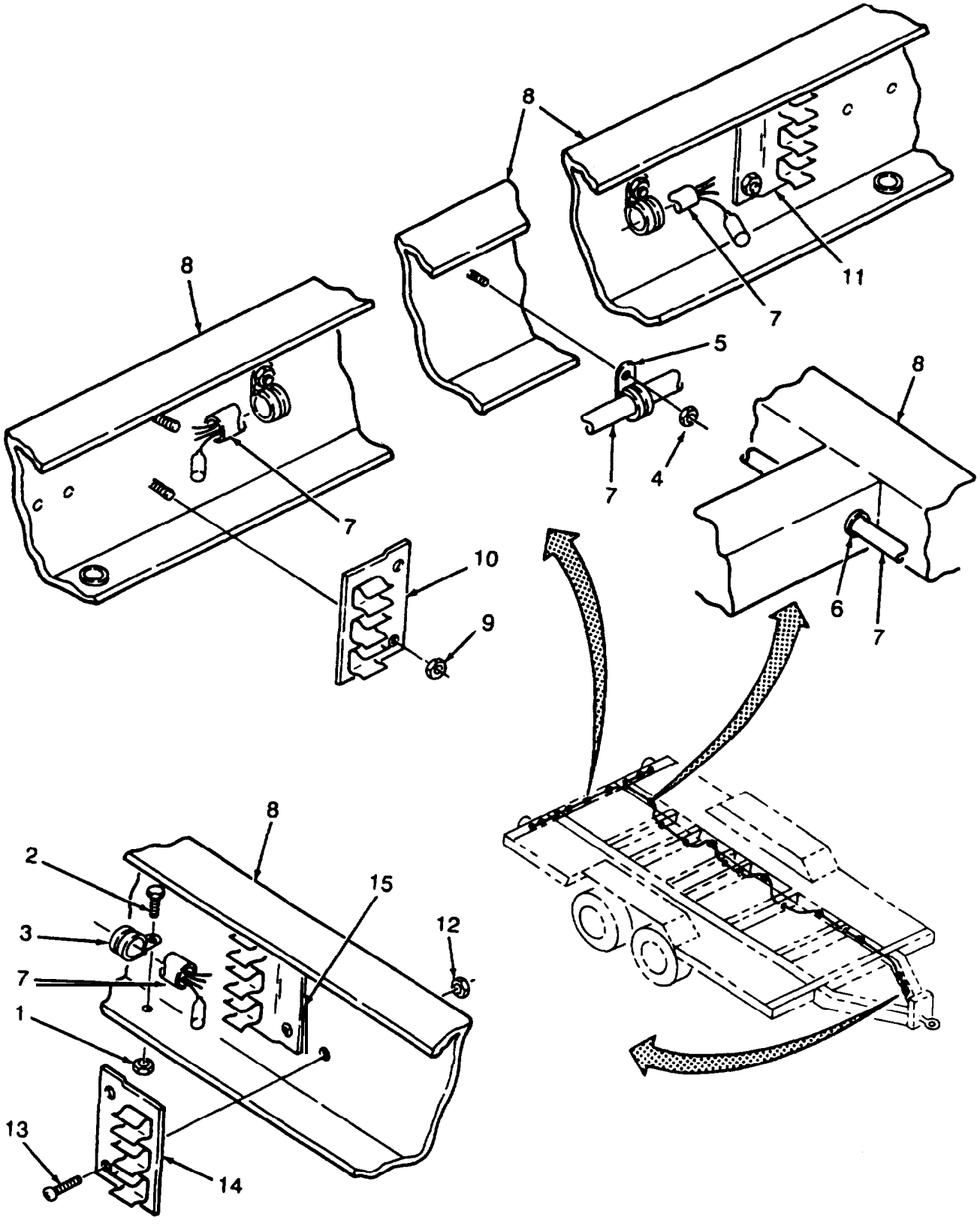
CAUTION
To prevent damage to wiring harness connectors, use care when pulling harness (7) through holes in trailer frame.

(4) Working from front of trailer frame (8) to rear, pull wiring harness (7) from frame.

(5) As required remove four nuts (9) from connector clamps (10 and 11). Remove clamps from trailer frame (8).

(6) As required, remove four nuts (12) and screws (13) from connector clamps (14 and 15). Remove clamps from trailer frame (8).

2-82. WIRING HARNESS (TRAILER) REPLACE (MODELS WPES-10 AND H-9518-1) - continued,



2-82. WIRING HARNESS (TRAILER) REPLACE (MODELS WPES-10 and H-9518-1) - continued.

b. **Installation.**

CAUTION

To prevent damage t wiring harness connectors, use care when pushing harness through holes in trailer frame.

(1) If removed, position connector clamps (15 and 14) on trailer frame (8) and install four screws (13) and nuts (12).

(2) If removed, position connector clamps (11 and 10) on trailer frame (8) and install four outs (9).

(3) Lubricate 11 grommets (6) and set aside.

(4) Working from rear of trailer to front, insert wiring harness (7) through holes in frame (8). positioning a grommet (6) on wiring harness after each pass thru frame.

(5) Work grommets (6) into holes in trailer frame (8).

NOTE

'here are eight clamps of type (5) holding wiring harncss to trailer framc. All are installed the same. One is shown, the others are similar.

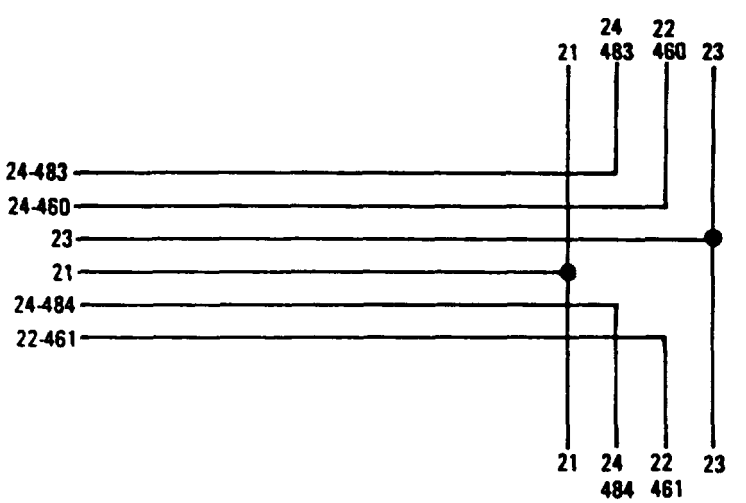
(6) Position clamps (5) on wiring harness (7) and install nuts (4).

(7) Install clamp (3). screw (2). and nut (1) on wiring harness (15).

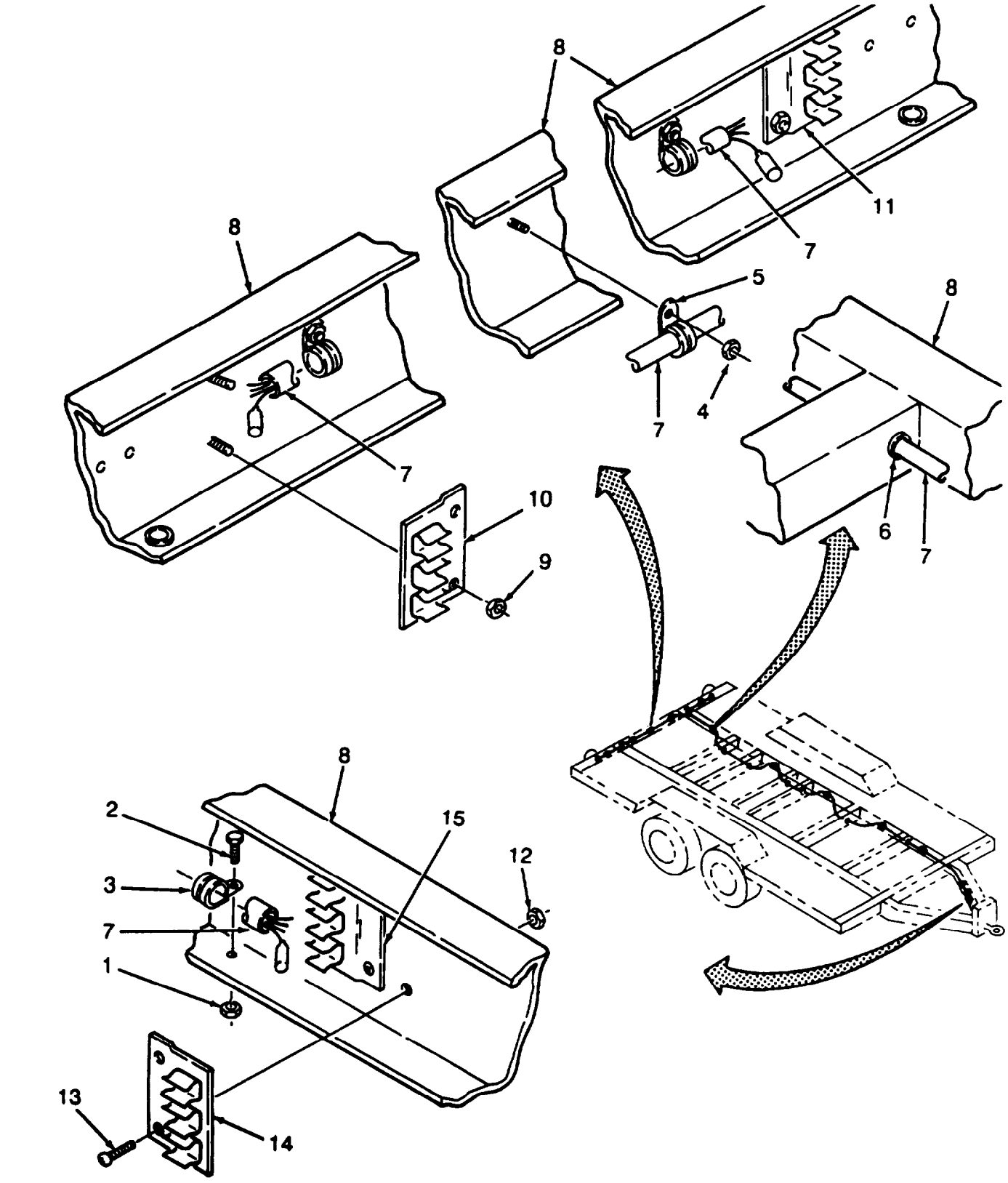
C. **Test.**

(1) Check wiring harness **(7)** for continuity in accordance with schematic diagram below.

(2) Check wiring harness (7) for shorts by checking for continuity between any pin and all other pins. Then repeat this process for all pins.



2-82. WIRING HARNESS (TRAILER) REPLACE (MODELS WPES-10 AND H-9518-l)- continued.



2-83. AIRBRAKE INSTALLATION REPLACE (MODELS WPES-10 AND H-9518-1).

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
1-l/l6 inch Wrench (Appendix B, Section III, Item 3)
Goggles (Appendix B, Section III, Item 3)
Material/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 19)
Lockwashers TM l0-4610-241-24P)
Personnel Required
Two
Equipment Condition
Reference
Power Shut Down (Generator Manual)
Trailer disconnected from Towing Vehicle (TM 10-4610-241-10).
Leveling Jacks extended (TM 10-4610-241-10).
General Safety Instructions

WARNING

- Compressed air in airbrake system can be dangerous.
- Airbrake reservoir is heavy/difftcult to handle.

a. Removal.

WARNING

Compressed air can blow dust into eyes. Wear eye goggles 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.

(1) Open drain cock (14) slowly and allow all air to bleed from reservoir (17).

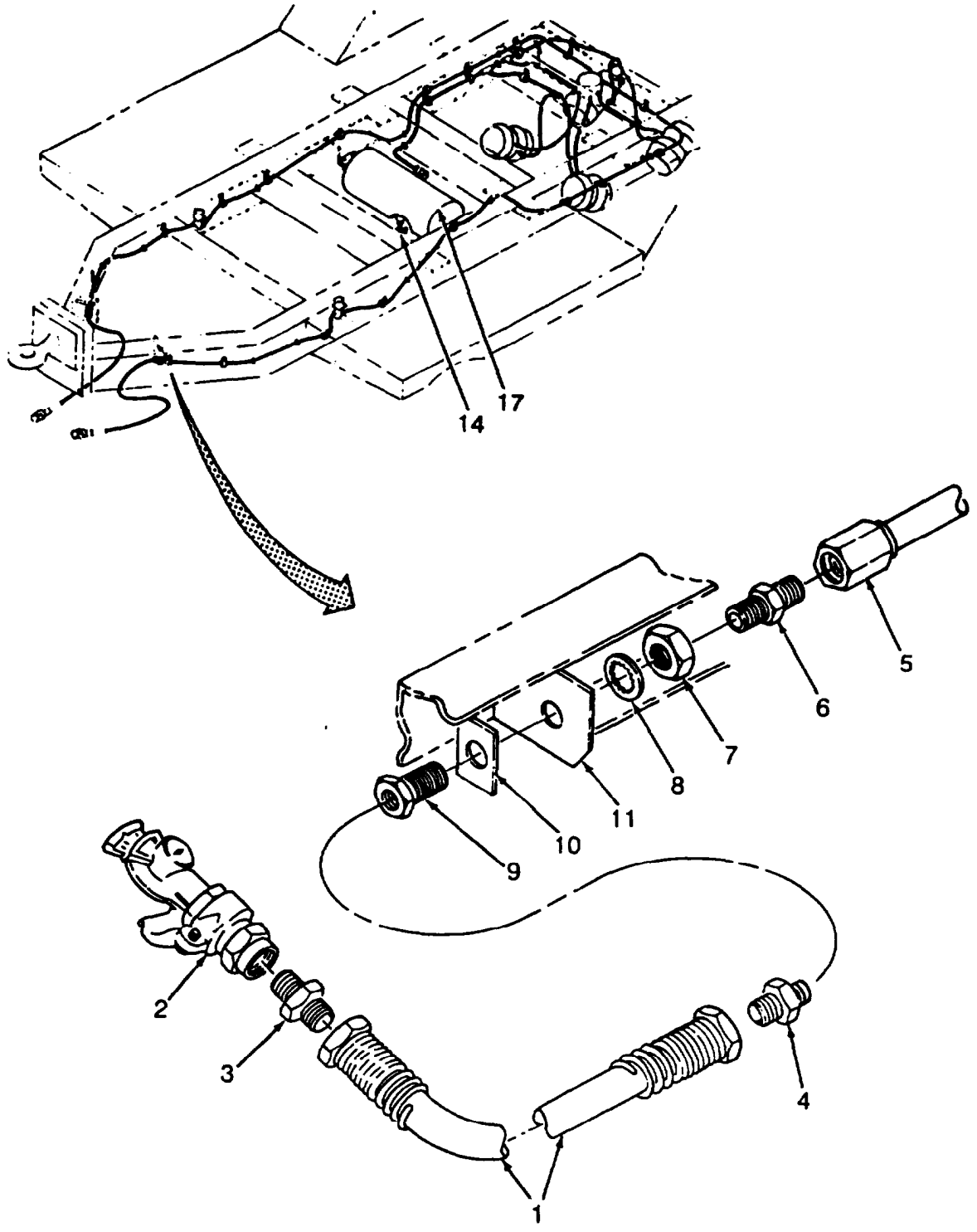
(2) Unscrew airbrake hose assembly (1) from pipe coupling body (9). Remove coupling (2), adapter (3) and adapter (4) from hose assembly.

(3) Unscrew tubing (5) from adapter (6).

(4) Unscrew adapter (6) from pipe coupling body (9).

(5) Remove nut (7), lockwasher (8), pipe coupling body (9) and identification plate (10) from bracket (11).

2-83. AIRBRAKE INSTALLATION REPLACE WPES-10 AND H-9518-l) - continued.



2-83. AIRBRAKE INSTALLATION REPLACE (MODELS WPES-10 AND H-9518-1) - continued.

(6) Unscrew tube fitting (12) from nipple (27).

(7) Remove draincock (13) from reservoir (16).

(8) Remove four locknuts (14) and screws (15) from reservoir (16).

WARNING

Reservoir is heavy. To prevent injury to personnel and damage to the equipment, two people are required to lower reservoir from trailer frame.

(9) Slide reservoir (16) off trailer frame (17) and lower it to the ground.

(10) Unscrew tubing (18) from elbow (23).

(11) Unscrew hose (19) from adapter (25).

(12) Unscrew hose (20) from adapter (24).

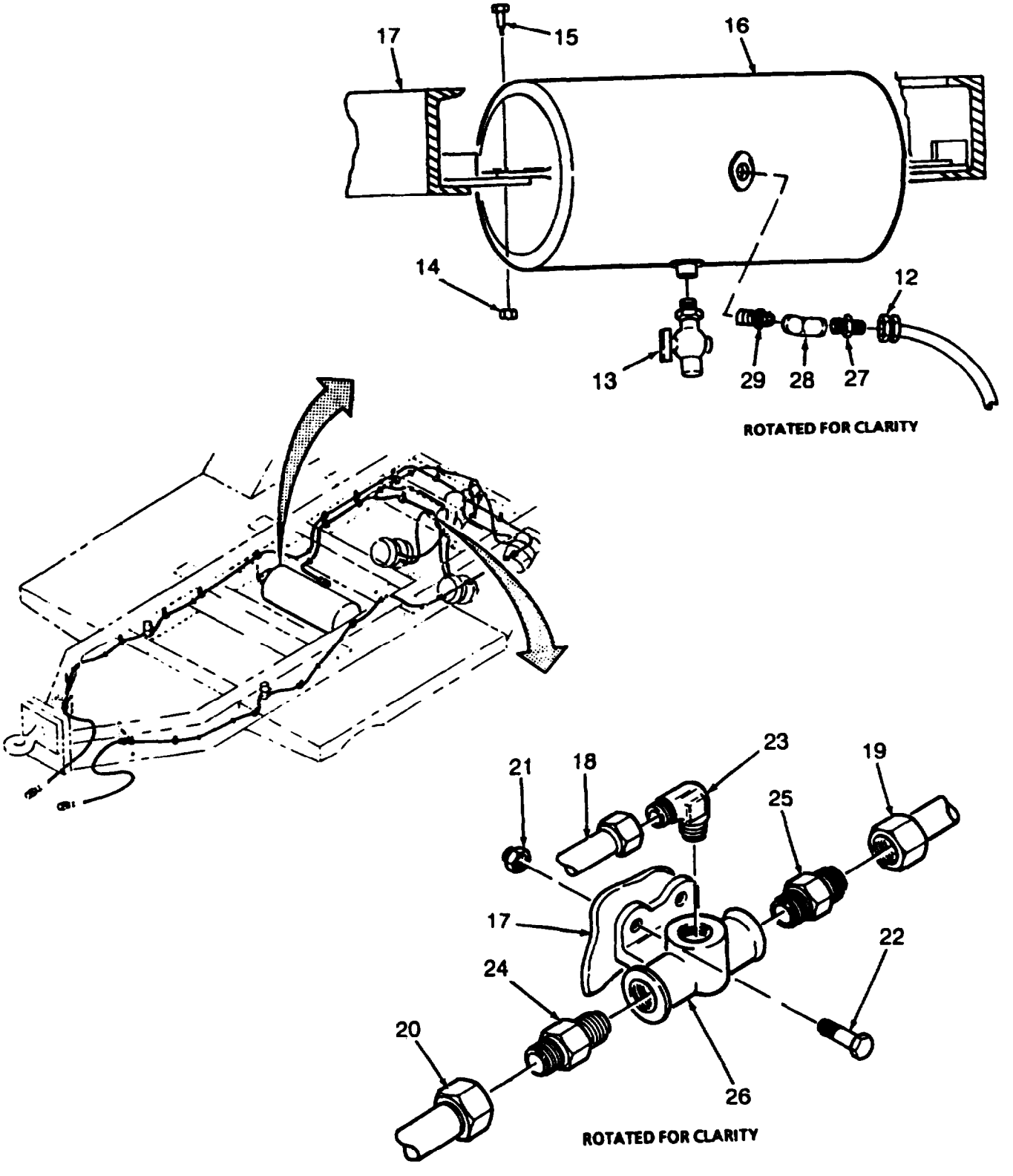
(13) Remove two nuts (2 1), screws (22) and anchor tee (26) from trailer frame (17).

(14) Remove elbow (23) and adapters (24 and 25) from anchor tee (26).

(15) Remove nipple (29) from reservoir (16).

(16) Unscrew nipples (27 and 29) from elbow (28).

2-83. AIRBBAKE INSTALLATION REPLACE (WPES-10 AND H-9518-1) - continued.



2-83. AIRBRAKE INSTALLATION REPLACE (MODELS WPES-10 AND H-9518-1) - continued.

(17) Remove nuts (30) from loop clamps (31).

(18) Open loop clamps (31) and remove from studs (32) and tubes and hoses to which they are attached.

NOTE

Tagging hoses and tubes, indicating their connection points will facilitate installation. Be sure to transfer tags to replacement parts, if defective parts are discarded or turned in to SUPPlY .

(19) Tag and unscrew tubing (33) from tee (34) and remove tees.

(20) Tag and disconnect opposite end of tubing (33) and remove tubing.

(21) Tag and unscrew hoses (35 and 36).

b. Installation.

NOTE

- The following procedures describe installation of airbrake components used throughout the brake system. Installation of one of each type part is shown. Installation of other like parts is similar.
- Be sure to wrap tape in same direction as pipe thread.

(1) Apply anti-seize tape to male threads of fittings.

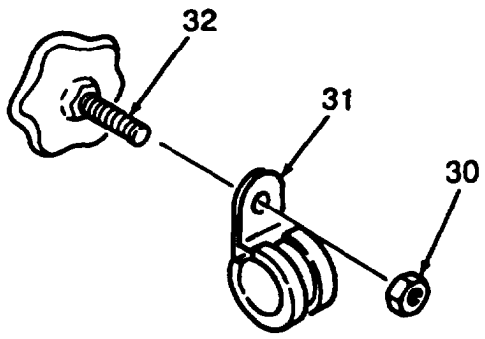
(2) Position and connect hoses (36 and 35) as tagged during removal.

(3) Position tubing (33) on trailer and connect to tees (34) and other components as taged during removal.

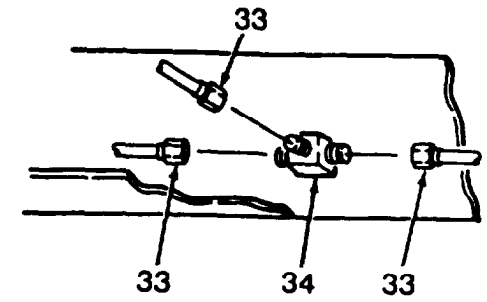
(4) Position loop clamps (31) around hoses and tubes and position on studs (32).

(5) Install nuts (30).

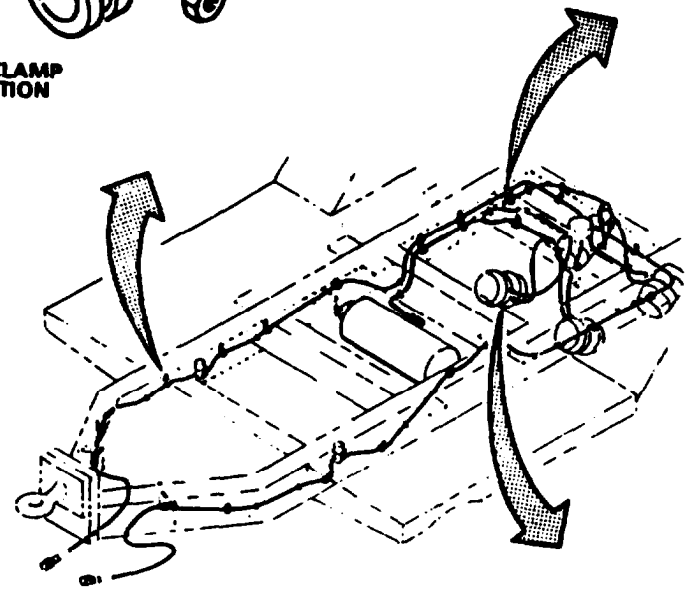
2-83. AIRBRAKE INSTALLATION REPLACE (WPES-10 AND H-9518-1) - continued.

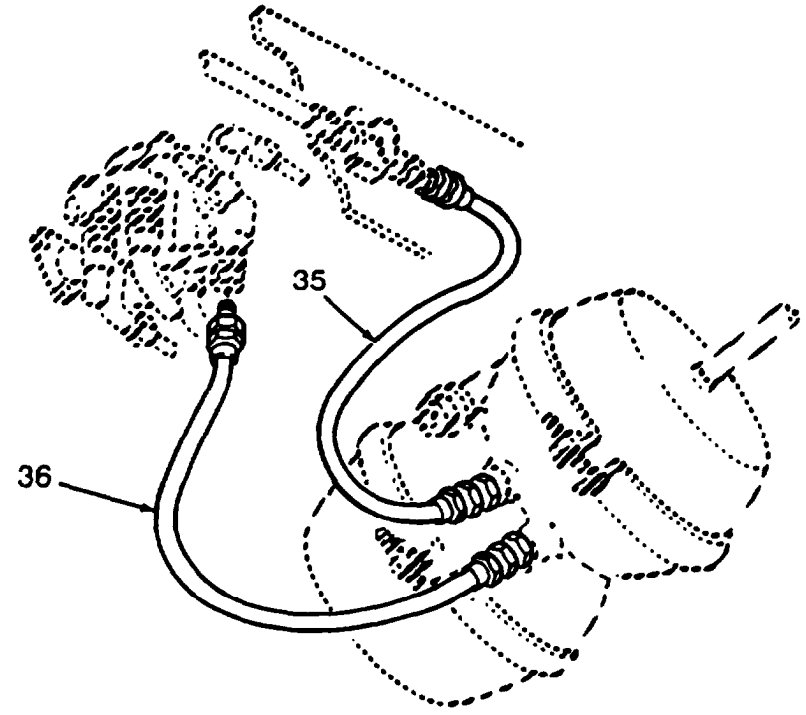


TYPICAL CLAMP INSTALLATION



TYPICAL TEE AND TUBING INSTALLATION





2-83. AIRBRAKE INSTALLATION REPLACE (MODELS WPES-10 AND H-9518-1) - continued.

(6) Install nipples (29 and 27) on elbow (28) and connect nipple (29) to reservoir (16).

(7) Instal adapters (25 and 24) on anchor tee (26).

(8) Install elbow (23) on anchor tee (26).

(9) Install anchor tee (26), two screws (22), and two nuts (2 1) on trailer frame (17).

(10) Connect hose (20) to adapter fitting (24), (11) Connect hose (19) to adapter fitting (25).

(12) Connect tubing (18) to elbow (23).

WARNING

Reservoir is heavy. To prevent injury to personnel and damage to the equipment, two people are required to position it on trailer frame.

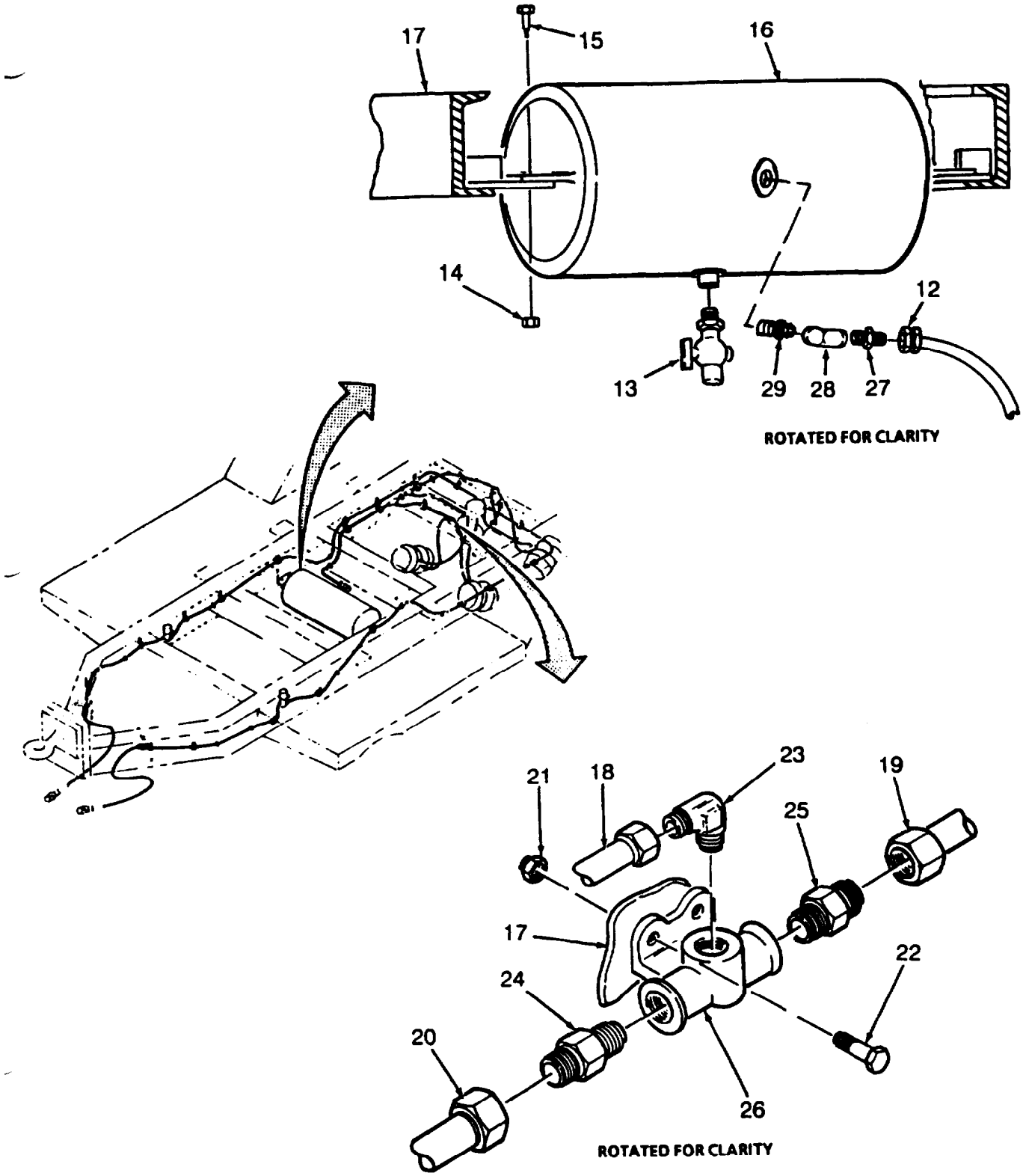
(13) Position reservoir (16) in trailer frame (17).

(14) Install four screws (15) and locknuts (14) on reservoir (16).

(15) Install draincock (13) on reservoir (16).

(16) Connect tube fitting (12) to nipple (27).

2-93. AIRBRAKE INSTALLATION REPLACE (WPES-10 AND H-9518-1) - continued.



2-83. AIRBRAKE INSTALLATION REPLACE (MODELS WPES-10 AND H-9518-1) - continued.

NOTE
Identification plate for roadside hose assembly pipe coupling is red. Identification plate for curbside pipe coupling is blue.

(17) Install identiftcation plate (10), pipe coupling body (9), lockwasher (8) and nut (7) on bracket (11).

(18) Install adapter (6) on pipe coupling body (9).

(19) Connect tubing (5) to adapter (6).

(20) Install adapters (3 an 4) on hose assembly (1),

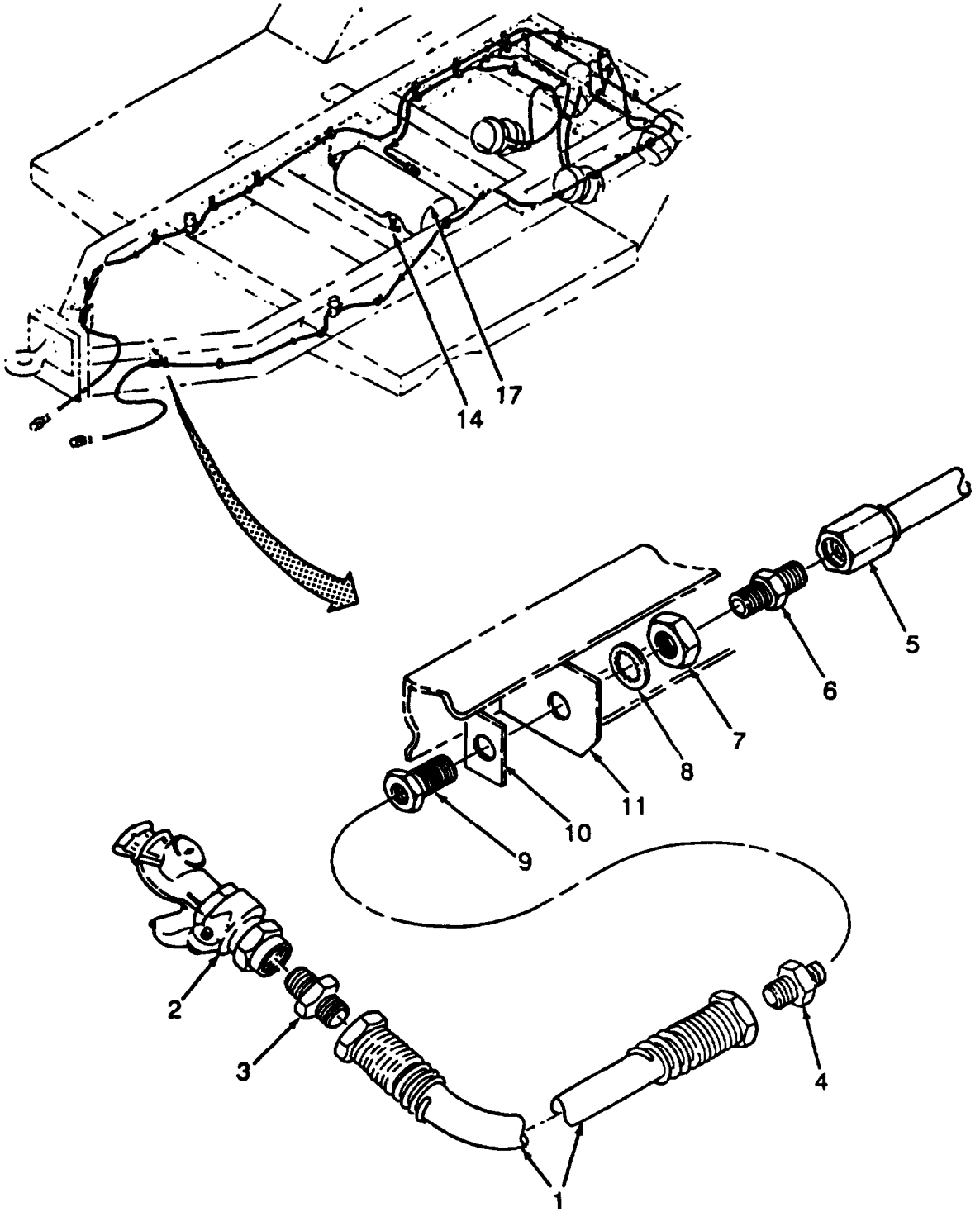
(21) Connect coupling (2) to adapter (3).

(22) Install airbrake hose assembly (1) on pipe coupling body (9).

(23) Close drain cock (14) on reservoir (17).

(24) Operate air brake system and check for leaks and proper operation (TM 10-4610-241-10).

2-83. AIRBRAKE INSTALLATION REPLACE (WPES-10 AND H-9518-1) - continued.



2-84. AIR CLEANER ASSEMBLY (BRAKES) REPLACE (WPES-10 AND H-9518-1).

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)
- Goggles (Appendix B, Section III, Item 3)

Material/Parts Required
- Tape, Anti-seize (Appendix C, Section II, Item 19)
- Detergent (Appendix C, Section II, Item 5)
- Rags, Wiping (Appendix C, Section II, Item 14)
- Gasket and Filter Element (TM 10-4610-241-24P)

Equipment Condition
Reference
- Power shut down (Generator Manual)
- Leveling Jacks extended (TM 10-4610-24l-10)
- Airbrake Hoses disconnected from Towing Vehicle (TM 10-4610-241-10).

General Safety Instructions

WARNING

Compressed air can blow dust into the eyes. Wear goggles and open drain cock slowly to avoid a sudden rush of air when releasing reservoir pressure.

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.

a. Removal.

(1) Turn drain cock (2) slowly to release air pressure from reservoir (1).

NOTE

Make sure that airflow from reservoir has stopped before closing dram cock (2).

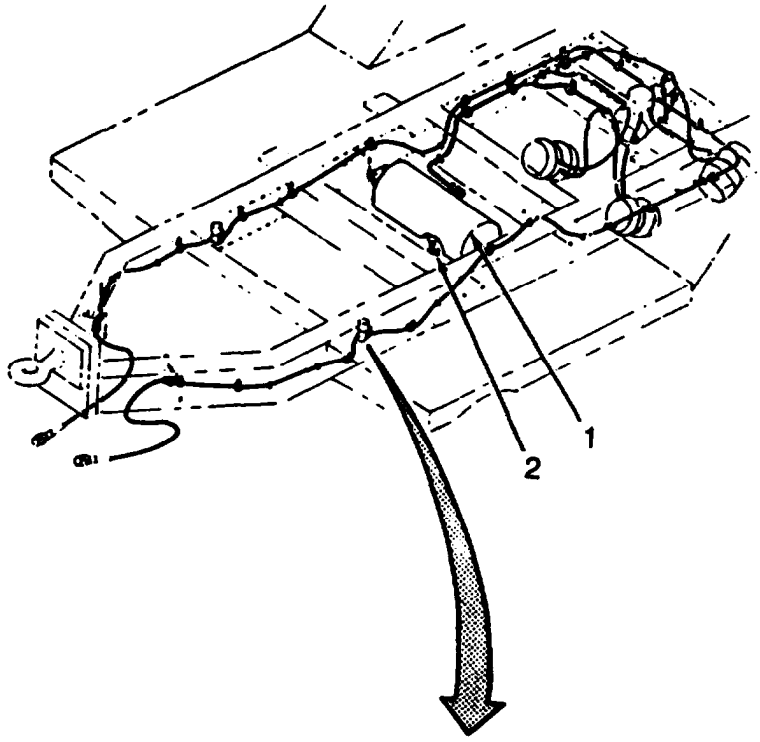
(2) Unscrew two tube assemblies (3 and 4) from air cleaner (9).

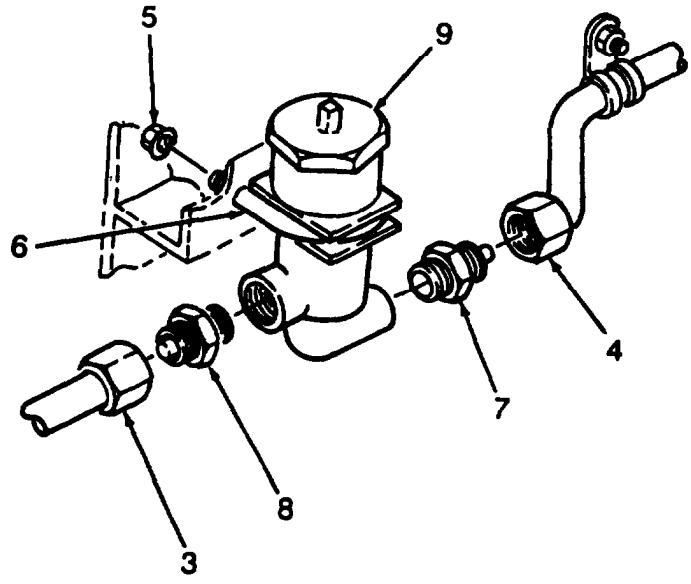
(3) Support air cleaner (9) and remove two nuts (5) and one U-bolt clamp (6).

(4) Remove air cleaner (9).

(5) Remove two adapters (7 and 8) from air cleaner (9).

2-84. AIR CLEANER ASSEMBLY (BRAKES) REPLACE WPES-10 AND H-9518-1) - continued.





b. Service.

(1) Disassembly.

(a) Remove pipe plug (10) from bushing adapter (11).

NOTE

Bushing adapter is under spring tension. Hold bushing adapter and housing while releasing pressure.

(b) Remove bushing adapter (1l), gasket (12). compression spring (13), spring tension washer (14), and filter element (15) from body (16).

(2) Cleaning.

(a) Using clean water and detergent, wash dirt and grease from all parts.

(b) Using clean water, rinse all parts. Dry with wiping rag.

(3) Inspection.

(a) Inspect spring (13) and spring tension washer (14) for cracks and deformity. Replace air cleaner assembly if damaged.

(b) Inspect pipe plug (10), bushing adapter (11) and housing (16) for cracks, deformity, or damaged threads.

(4) Repair.

(a) Replace filter element.

(b) Replace damaged components.

(5) Assembly.

(a) Position filter element (15), spring tension washer (14) and compression spring (13) in body (16).

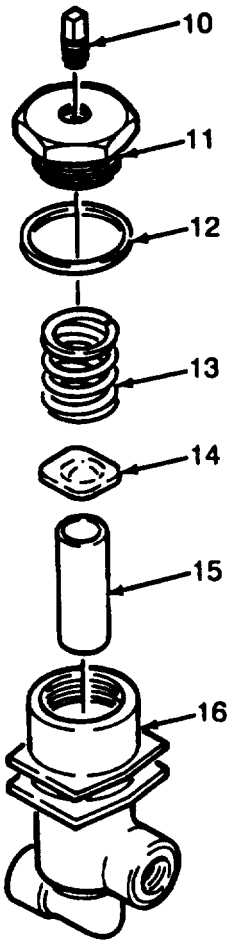
CAUTION

Compression spring causes resistance to installation of bushing adapter. Lack of attention while installing bushing adapter can cause thread damage. Install bushing adapter carefully.

(b) Install gasket (12) and bushing adapter (11) on body (16).

(c) Install pipe plug (10) on bushing adapter (11).

2-84. AIR CLEANER ASSEMBLY (BRAKES) REPLACE (WPES-10 AND H-9518-1) - continued.



2-84. AIR CLEANER ASSEMBLY (BRAKES) REPLACE (WPES-10 AND H-9518-1) - continued.

c. Installation

NOTE
Be sure to wrap tape in same direction as pipe thread.

(1) Apply anti-seize tape to male threads of adapters (8 and 7).

(2) Install two tube fittings (8 and 7) on air cleaner (9).

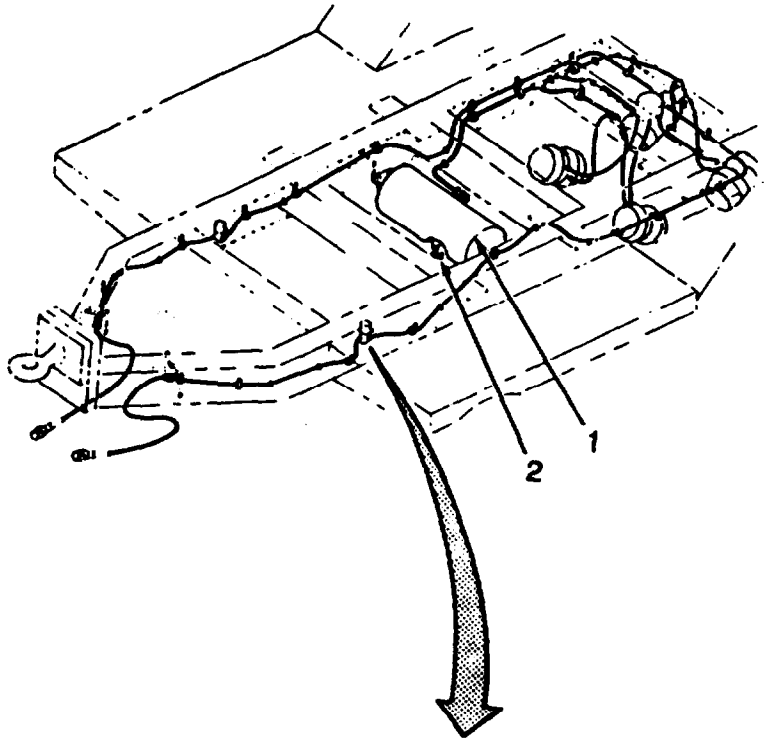
(3) Position air cleaner (9) on trailer frame and install U-bolt clamp (6) and two nuts (5).

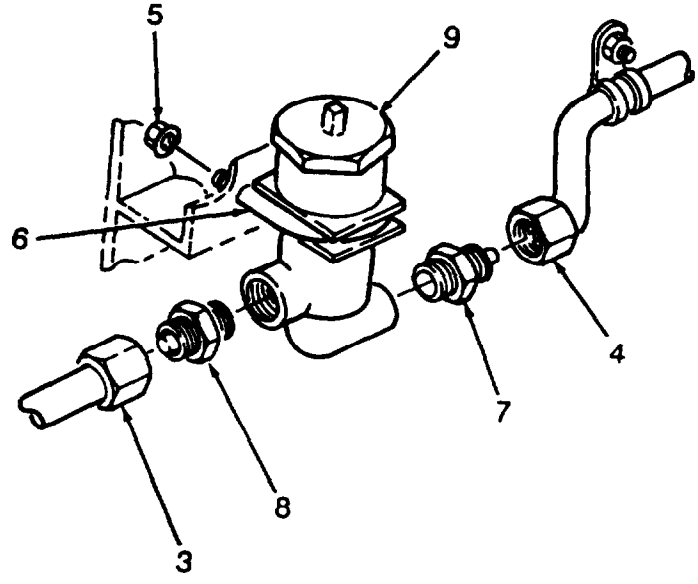
(4) Connect two tube assemblies (4 and 3) to air cleaner assembly (9).

(5) Close drain cock (2) on air cleaner (1).

(6) Operate airbrake system and check for leaks and proper operation (TM 10-4610-241-10).

2-84. AIR CLEANER ASSEMBLY (BRAKES) REPLACE (WPES-10 AND H-9518-1) - continued.





2-85. RELAY VALVE REPLACE (WPES-10 AND H-9518-1).

This task consists of: a. Removal b. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Goggles
Equipment Condition
Power shut down (Generator Manual)
Spare Tire removed from Unit (TM 10-4610-241-10).
General Safety Instructions

WARNING

Compressed air can be dangerous. Wear goggles when using air to repair tire.

a. Removal.

WARNING

Compressed air can blow dust into eyes. Wear goggles and open drain cock slowly to avoid a sudden rush of air when releasing reservoir pressure.

(1) Open drain cock (1) slowly to release air pressure from reservoir (2).

NOTE

- Ensure that airflow from reservoir has stopped before closing drain cock.
- Tagging hoses and tubes, noting their connection points will facilitate installation. Be sure to transfer tags to replacement parts before discarding defective parts or turning them in to supply.

(2) Tag and disconnect four hoses (3,4,5 and 6) from relay valve (17).

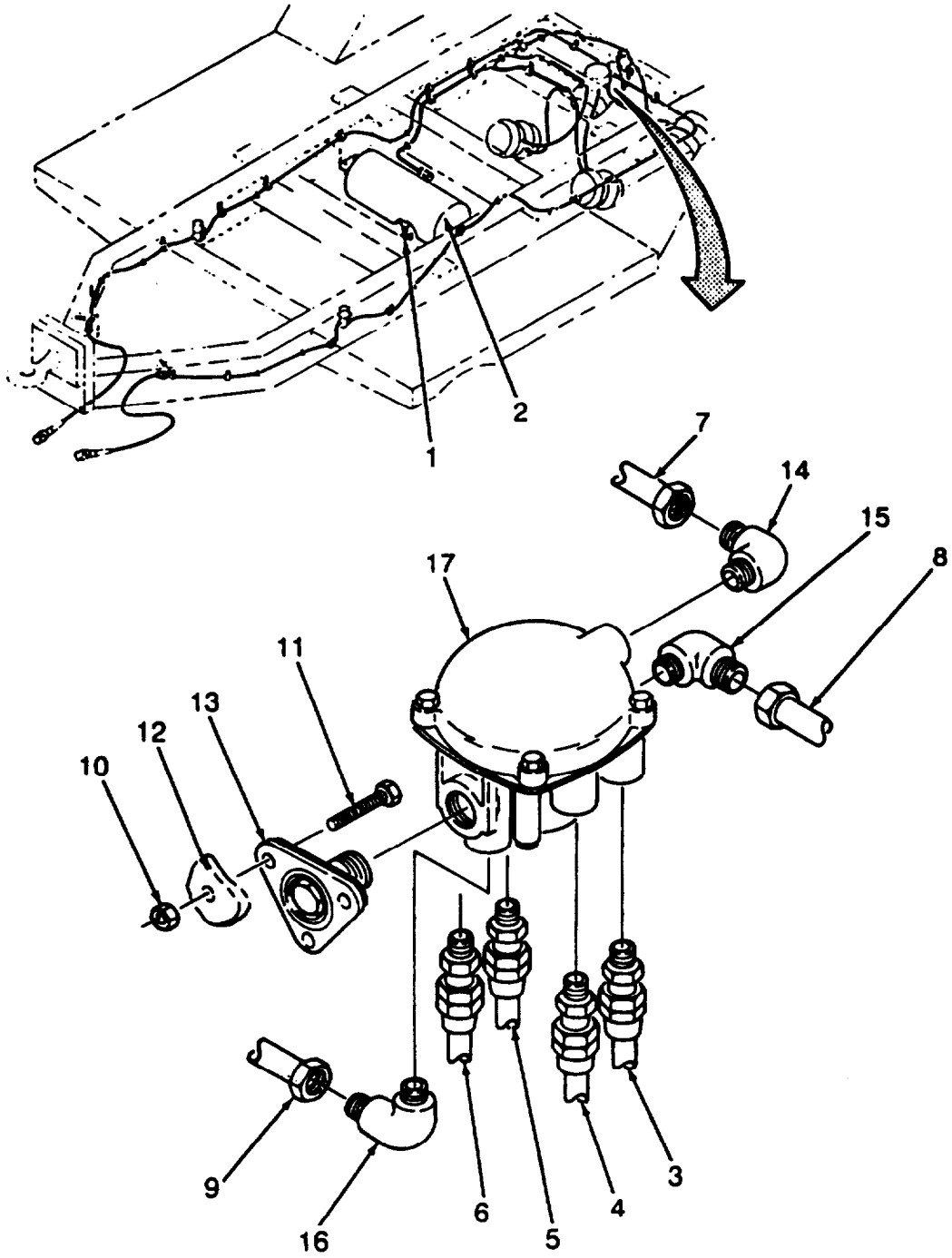
(3) Tag and disconnect three tubes (7,8, and 9).

(4) Removethree locknuts (10) and bolts (11). Lower relay valve (17) from frame (12).

(5) Remove adapter (13) from relay valve (17).

(6) Remove elbows (14, 15, and 16) from relay valve (17).

2-85. RELAY VALVE REPLACE WPES-10 AND H-9518-1) - continued.



ROTATED FOR CLARITY

2-86. RELAY VALVE REPLACE (WPES-10 AND H-9518-1) - continued.

b. Installation.

(1) Install three elbows (16, 15, and 14) on relav valve (17).

CAUTION

Using wrench on tube fittings threads will cause damage to threads. Use wrench only on wrenching surfaces.

NOTE

Bolts are too long to be inserted thru mounting holes after adapter is installed.

(2) Position three bolts (11) on bracket (13) and install bracket on airbrake relay valve (17).

(3) Position relay valve (17) on frame (12).

(4) Install three locknuts (10).

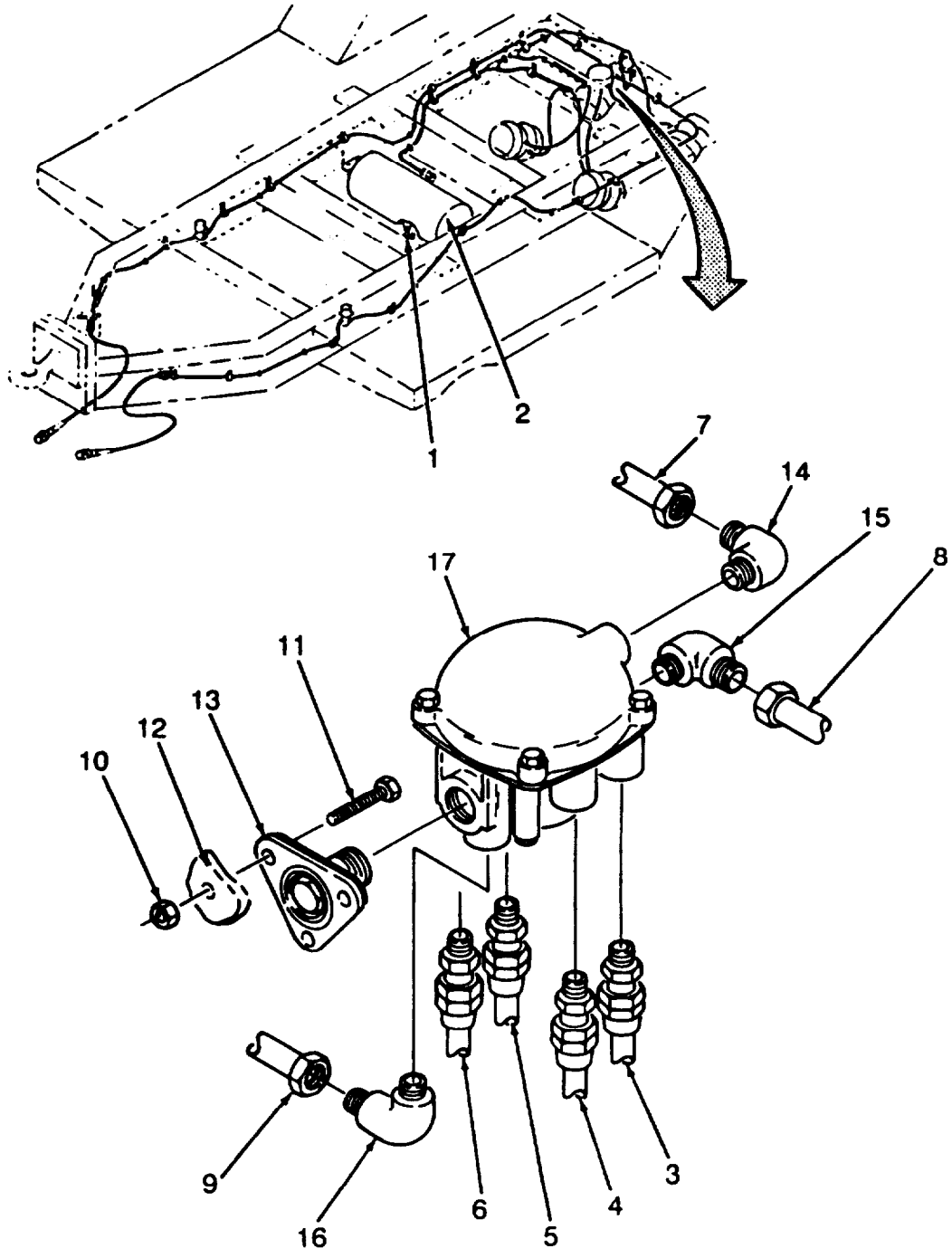
(5) Connect three tubes (9,8, and 7) to airbrake relay valve (17) as tagged during removal.

(6) Connect four hoses (6,5,4 and 3) to airbrake relay valve (17) as taged during removal.

(7) Close drain cock (1). Be sure it is fully closed.

(8) Operate airbrake system and check for leaks and proper operation (TM 10-4610-241-10).

2-96. RELAY VALVE REPLACE (WPES-10 AND H-9518-1) - continued.



ROTATED FOR CLARITY

2-86. WHEEL AND TIRE ASSEMBLY REPLACE (WPES-l0 AND H-9518-1).

This task consists of:	a. Disassembly	b. Cleaning	c. Inspection
	d. Repair	e. Assembly	

INITIAL SET-UP:

Tools Required
Refer to TM 9-2610-200-24 for Disassembly and Assembly.
Materials /Parts Required
Detergent (Appendix C, Section II, Item 5)
Rags, Wiping (Appendix C, Section II, Item 14)
Refer to TM 9-2610-200-24 for Disassembly and Assembly.
Equipment Condition
Tire removed from ROWPU (TM 10-4610-241-10).
General Safety Instructions

WARNING

Compressed air can be dangerous. Wear proper eye protection when using air to repair tire.

a. Disassembly.

Remove tire from wheel (TM 9-2610-200-24).

b. Cleaning.

Remove dirt and grease from all parts with water and detergent. Wipe off with clean rags.

c. Inspection.

(1) Inspect wheel (1) for cracks, dents, holes and warps and deformed lug bolt holes (2).

(2) Inspect tires (3) for cracks, holes, signs of chuncking, uneven wear or deterioration.

(3) Inspect air valves (4) for cracks, damaged threads and deterioration.

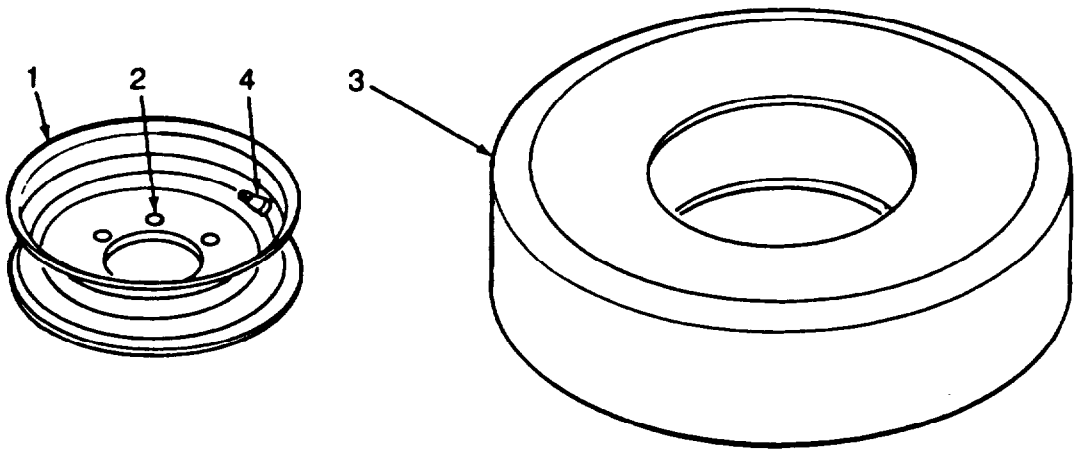
d. Repair.

Replace damaged or worn components.

e. Assembly.

Mount tire on wheel in accordance with TM 9-2610-200-24.

2-86. WHEEL AND TIRE ASSEMBLY REPLACE (WPES-10 AND H-9518-1) - continued.



2-87. AXLE ASSEMBLY (HUB AND DRUM) REPLACE (WPES-10 AND H-9518-1).

This task consists of:	a. Removal	b. Cleaning	c. Inspection
	d. Lubrication	e. Repair	f. Installation

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)
Material/Parts Required
Lockwashers and Tabwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Tire and Wheel Assembly removed (TM 10-46 10-241-10).
General Safety Instructions

WARNING
Lifting heavy equipment incorrectly can cause serious injury.

a. Removal.

(1) Remove six bolts (1), lockwashers (2), hubcap (3) and gasket (4).

(2) Bend tabs of tabwasher (6) off outer spindle nut (5).

(3) Using wheel bearing nut wrench, remove outer, Spindle nut (5).

(4) Remove tabwasher (6).

(5) Using wheel bearing nut wrench, remove inner spindle nut (7).

(6) Remove key washer (8).

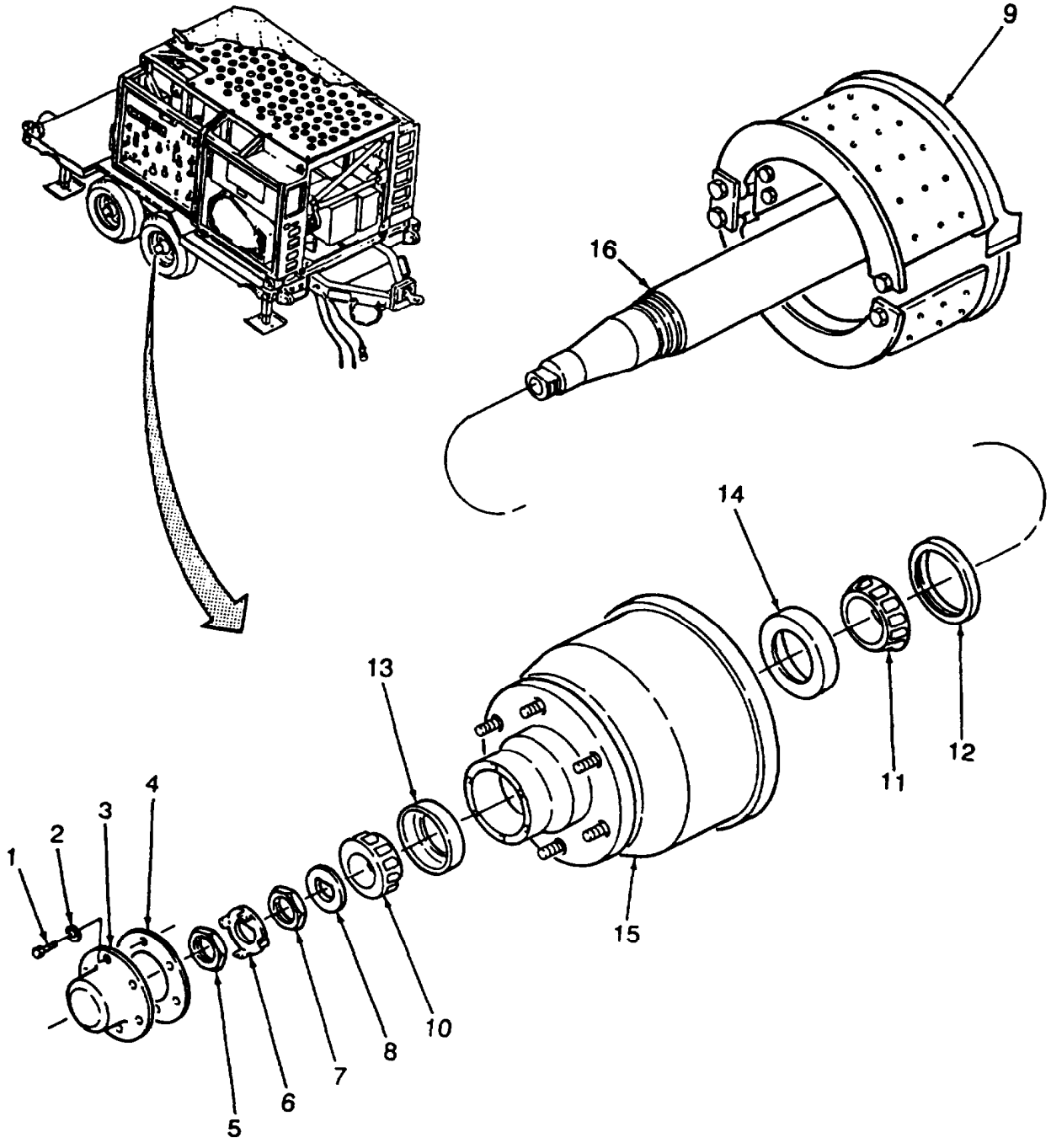
NOTE
- Bearing cups will remain in hub and wheel assembly when bearing cones are removed.
- Mark bearing cones and cups as inner or outer bearing cones and cups to prevent mismatching. Cones must be reinstalled on same cups from which removed or cones and cups must be replaced as a set.

(7) Remove hub and drum assembly (15) from spindle (16). Remove outer bearing cone (10) from hub (15).

2-87. AXLE ASSEMBLY (HUB AND DRUM) REPLACE (WPES-10 AND H-9518-1) - continued.

(8) Remove inner bearing cone (11) and seal (12).

(9) Using bearing cup puller, remove inner and outer bearing cups (14 and 13).



2-87. AXLE ASSEMBLY (HUB AND DRUM) REPLACE (WPES-10 AND H-9518-1) - continued.

b. Cleaning.

WARNING

Drycleaning solvent, P-D-680, Cl II, is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

(1) Using drycleaning solvent, clean bearing cones (10 and 12) and bearing cups (13 and 14) by wiping and scrubbing.

(2) If old grease in bearing cones and rollers is gummed or caked, soak cones in drycleaning solvent, then repeat step 1.

WARNING

Do not dry bearing cones 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.

(3) Rinse bearing cones (10 and 12) and bearing cups (13 and 14) in clean drycleaning solvent and allow to dry.

c. Inspection.

(1) Hold bearing cones (10 and 12) and slowly turn inner race. Check for rough spots and binding.

(2) Check that inner and outer races have no cracks, flaking, pitting, or long and deep scratches.

(3) Check that bearing cones have not overheated. Bearing cones turn blue where overheated.

(4) Check that bearing cups are not splintered or chipped.

d. Lubrication.

Pack bearings with grease. Refer to LO 10-4610-241-12.

2-87. AXLE ASSEMBLY (HUB AND DRUM) REPLACE (WPES-10 AND H-9518-1) - continued.

e. Repair.

NOTE
Bearings and bearing cups are a matched set. If either part of set is defective, replace both parts.

(1) Replace lockwashers and tab washers.

(2) Replace defective components.

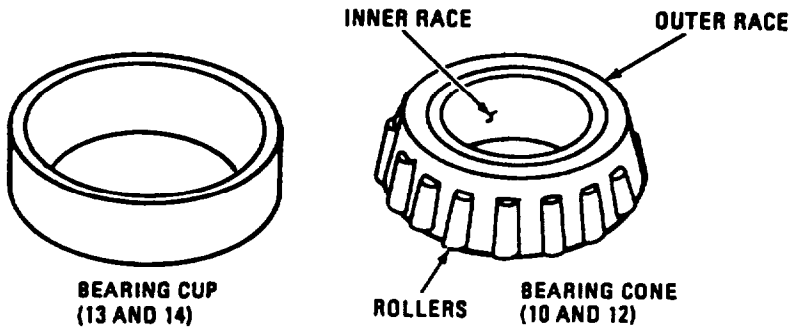
f. Installation.

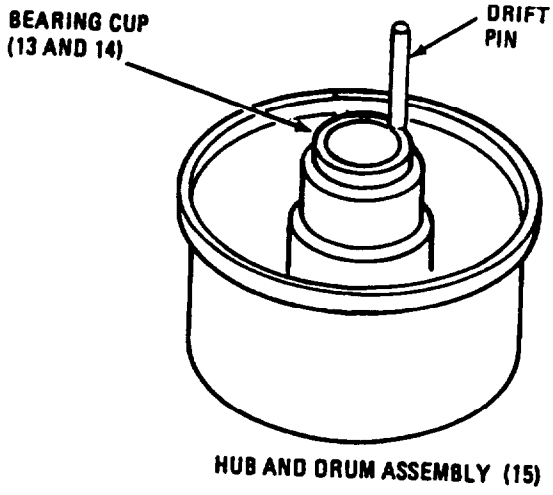
(1) Position inner bearing cup (14) on inner surface of hub and drum assembly (15).

(2) Position brass drift pin on top of inner bearing cup (14).

(3) Using hammer, tap brass drift pin. Move brass drift pin to another position on inner bearing cup, then tap again. Repeat until inner bearing cup is seated completely inside hub and drum assembly (15).

(4) Turn hub and drum assembly (15) over and repeat steps (1) thru (3) for outer bearing cup (13).





2-87. AXLE ASSEMBLY (HUB AND DRUM) REPLACE (WPES-10 AND H-9518-1) - contimed.

(5) Install inner bearing cone (11) and seal (12) on hub and drum assembly (15).

(6) Position hub and drum assembly (15) on spindle (16).

(7) Position outer bearing cone (10) in bearing cup (13).

(8) Install key washer (9) and inner spindle nut (7). Tighten inner spindle nut ringertight.

(9) Go to Adjust procedure below to complete installation.

f. Adjust.

(1) If removed, install wheel and tire assembly (TM 10-4610-241-10).

(2) Spin wheel and tire assembly and tighten inner spindle nut (7) until wheel starts to bind.

(3) Loosen inner spindle nut (7) one flat, or until wheel assembly doesn't bind.

(4) Put one hand on bottom and one hand on top of tire. Push with one hand and pull with other hand. Tire and wheel assembly should not move.

(5) If tire and wheel assembly moves, repeat steps (2) thru (4).

(6) Install tabwasher (6).

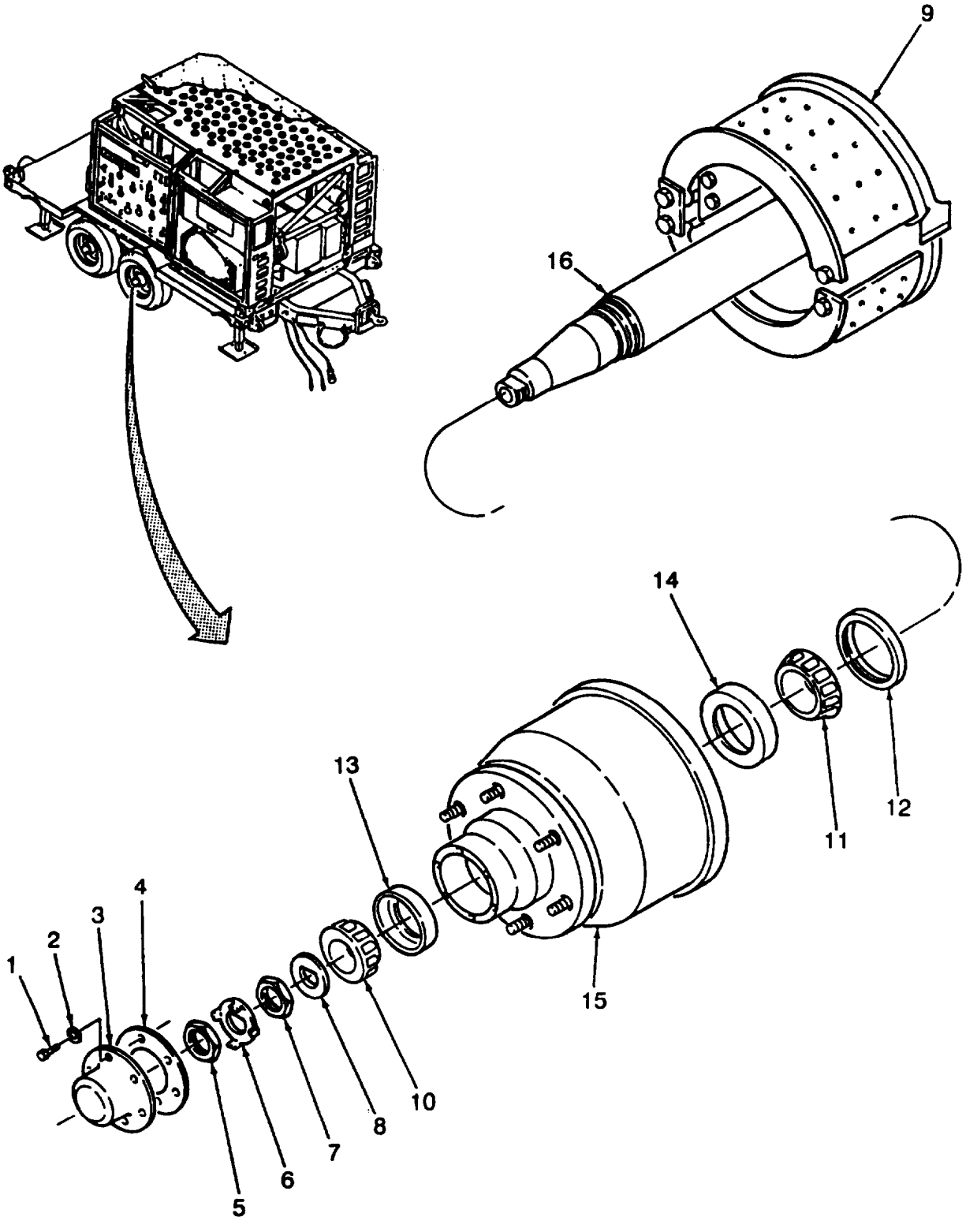
(7) Bend one tab of tabwasher (6) over one flat of inner spindle nut (7).

(8) Install outer spindle nut (5).

(9) Bend one tab of tabwasher (6) over one flat of outer spindle nut (5).

(10) Install gasket (4), hubcap (3), six lockwashers (2), and bolts (1).

2-87. AXLE ASSEMBLY (HUB AND DRUM) REPLACE (WPES-10 AND H-9518-1) - continued.



2-88. SERVICE BRAKE REPAIR (MODELS WPES-10 AND H-9518-1).

This task consists of:	a. Disassembly	b. Cleaning	c. Inspection
	d. Repair	e. Assembly	f. Adjust

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Jack, 10 Ton (Appendix B, Section III, Item 3)
Jack Stand, 10 Ton (Appendix B, Section III Item 3)
Personnel Required
Two
Equipment Condition
Reference
Hub and Drum Assembly removed (Paragraph 2-87).
General Safety Instructions

WARNING

Drycleaning solvent, P-D-680, C1 II, 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. Disassembly.

(1) Remove retaining rings (1), flat washers (2) and anchor pin links (3).

(2) Remove retract spring (4).

(3) Remove brake shoes (5 and 6) and link (7) from anchor pins (13).

(4) Remove roller retainers (8) and rollers (9).

(4) Remove retract spring pins (10).

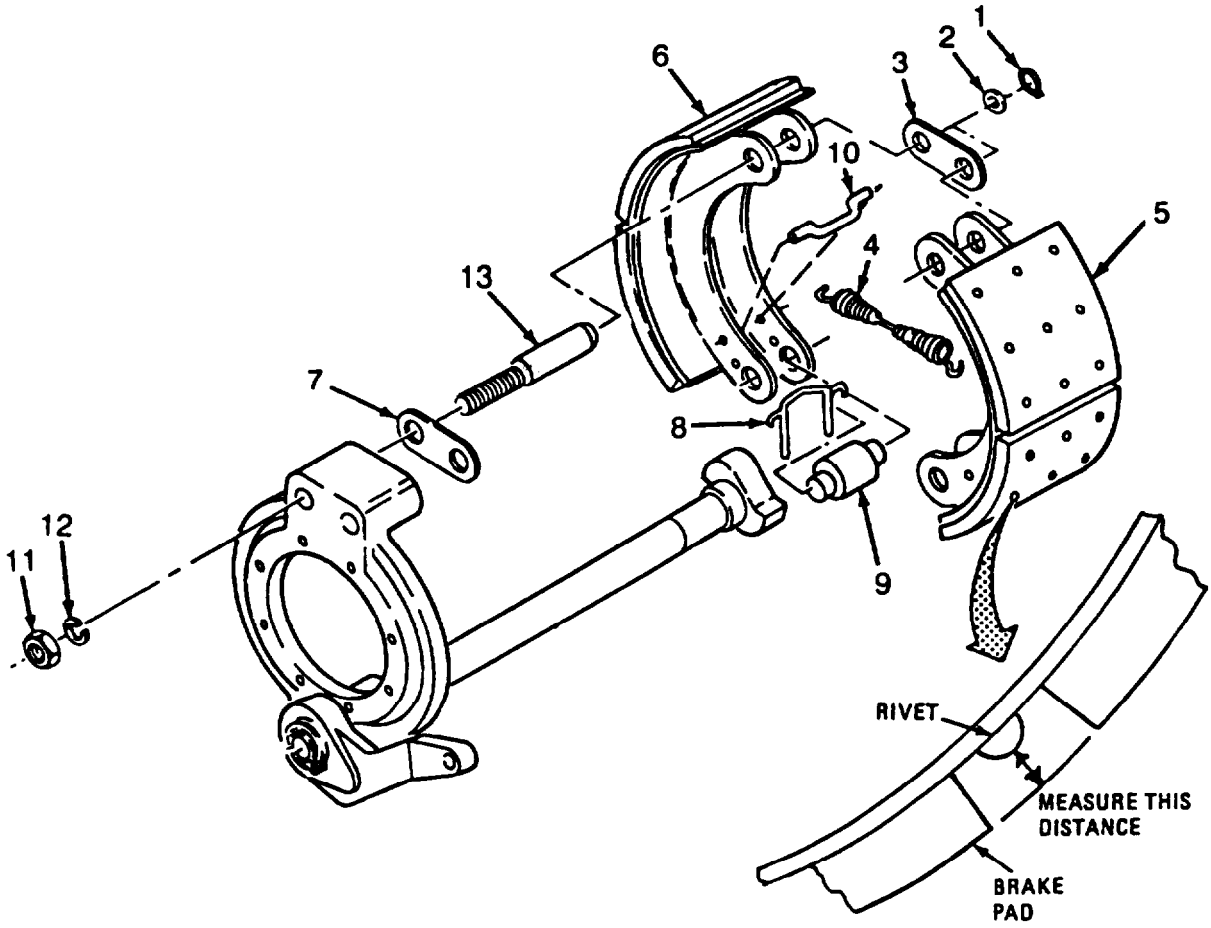
(5) As required, remove two nuts (11), lockwashers (12) and anchor pins (13).

b. Cleaning.

(1) Clean all metal parts, except brake pads with cleaning solvent and dry with rags.

(2) Dust off brake pads with a dust brush.

2-88. SERVICE BRAKE REPAIR (MODELS WPES-10 ANTI H-9518-10-1) - continued.



2-88. SERVICE BRAKE REPAIR (MODELS WPES-10 AND H-9518-1) - continued.

c. Inspection.

(1) Inspect brakeshoe pads for excessive or uneven wear. Measure distance between brake pad mounting rivets and outer surfaces of brake pads as illustrated.

(2) Inspect brake pads for presence of oil or grease.

(3) Inspect for weak, deformed or damaged springs.

(4) Inspect all other parts for obvious damage, stripped threads and deformity.

d. Repair.

NOTE
Always replace brakeshoes as a set.

(1) Replace brake shoes if measurement in Inspection procedure above is less then 1/8 inch or pads are contaminated with oil and grease.

(2) Replace damaged or excessively worn components.

e. Assembly

(1) If removed, install two anchor pins (13) with lockwashers (12) and nuts (11).

(2) Install one return spring retainer (10) on each brake shoe (5 and 6).

(3) Position roller (9) on each brake shoe (5 and 6) and secure with roller pins (8).

(4) Position anchor pin link (7) and brake shoes (5 and 6) on anchor pins (13).

(5) Install return spring (14), connecting ends to return spring pin (10) on each brakeshoe (5 and 6).

(6) Install hub and drum assembly (Paragraph 2-87).

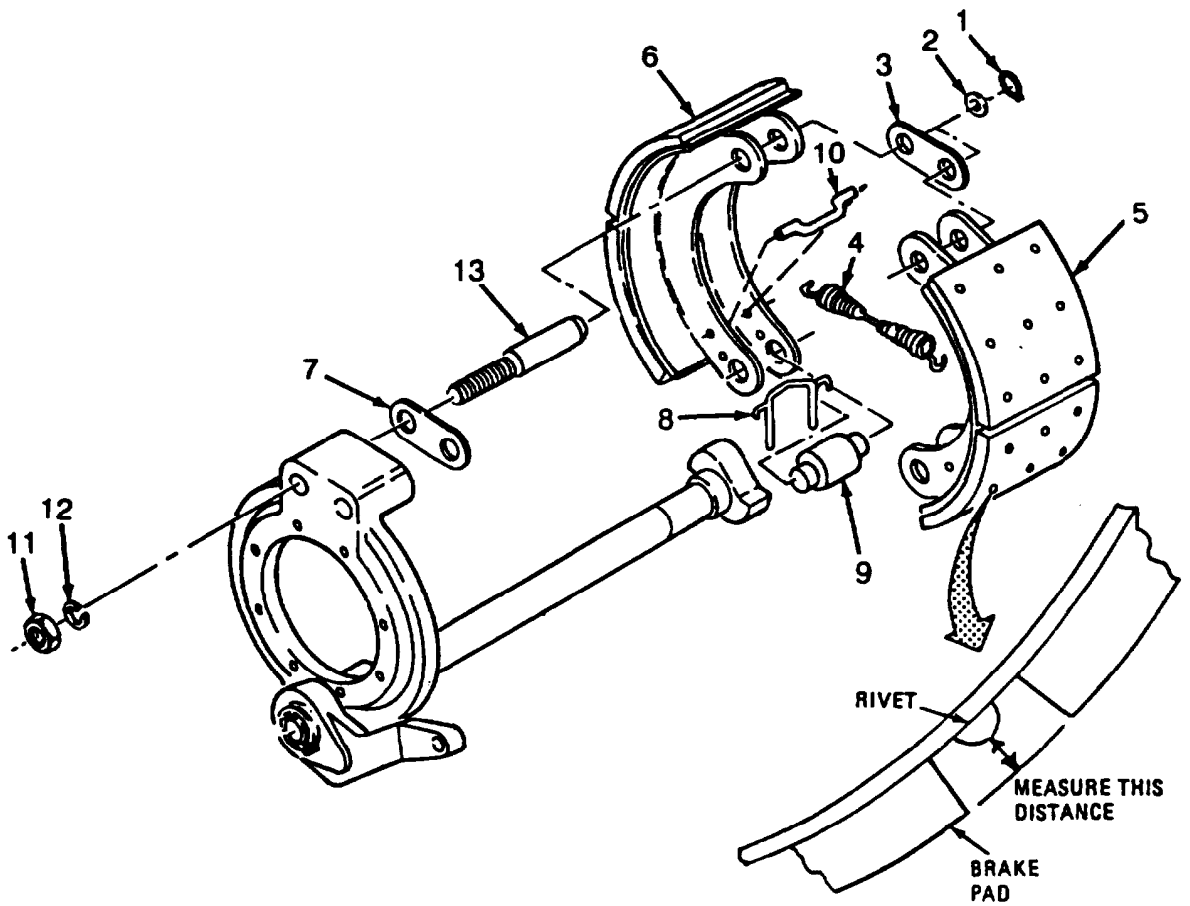
(7) Install tire and wheel assembly (TM 10-4610-241-10).

NOTE
If one set of brake shoes was replaced, brake shoes on other three wheels must be replaced also.

(8) As required, replace brake shoes on other wheels.

(9) Adjust brakes in accordance with Adjust procedure of this Paragraph.

2-88. SERVICE BRAKE REPAIR (MODELS WPES-10 AND H-9518-1) - continued.



2-88. SERVICE BRAKE REPAIR (MODELS WPES-10 AND H-9518-1) - continued.

f. Adjust.

NOTE
There are four service brakes on the trailer. Two per axle. Adjustment of one service brake is shown, the others are similar. If adjustment of one is required, adjust all four service brakes.

(1) Position 10 ton jacks at both ends of axle being serviced. Jack up axle evenly until wheels clear ground.

(2) Install jack stand at both ends of axle being serviced.

(3) Position socket wrench over adjusting bolt (15) and push against spring loaded keeper to engage bolt.

(4) Have assistant spin wheel and tire assembly (14) while performing steps 5 and 6 below.

(5) Keeping pressure against keeper (16), turn adjusting bolt (15) until brakes begin to drag.

(6) Slowly back off on adjusting bolt (15) until wheel starts to spin freely.

(7) Remove socket wrench from adjusting bolt (15). Make sure keeper (16) pops out and atines with top surface of adjusting bolt.

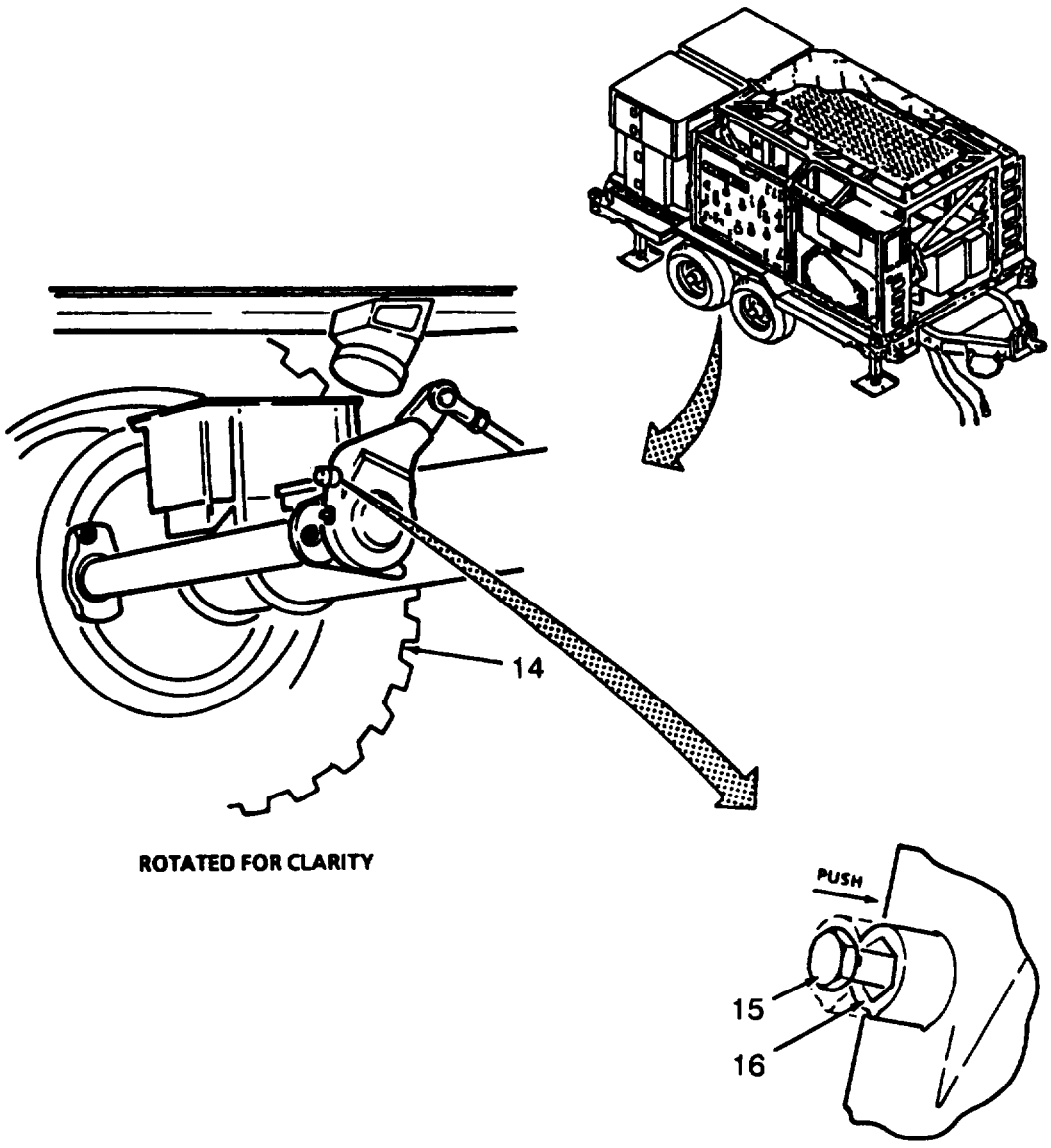
(8) Repeat steps 3 thru 7 for opposite tire and wheel assembly (14).

(9) Remove jack stand and lower unit.

(10) Remove jack from under axle.

(11) Repeat Adjust procedure for other axle.

2-88. SERVICE BRAKE REPAIR (MODELS WPES-10 AND H-9518-1) - continued.



2-88. AIR CHAMBER REPLACE (WPES-10 AND H-9518-1).

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

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Goggles (Appendix B, Section III, Item 4)
Material/Parts Required
Cotter Pins (TM 10-4610-241-24P)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Power shut down (Generator Manual)
Leveling Jacks extended and Wheels chocked (TM 10-4610-241-10).
General Safety Instructions

WARNING
Compressed air can blow dust into eyes. Wear goggles when releasing reservoir air pressure.

a. Removal.

WARNING
Compressed air can blow dust into eyes. Wear gogles and open drain cock slowly to avoid a sudden rush of air when releasing reservoir air pressure.

(1) Open drain cock (1) slowly to release air pressure from reservoir (2).

NOTE
- Insure that airflow from reservoir has stopped before closing drain cock.
- Tagging of hoses, noting their connection points, will facilitate installation. Be sure to transfer tags to replacement hoses, if hoses are to be discarded or turned in to Supply.

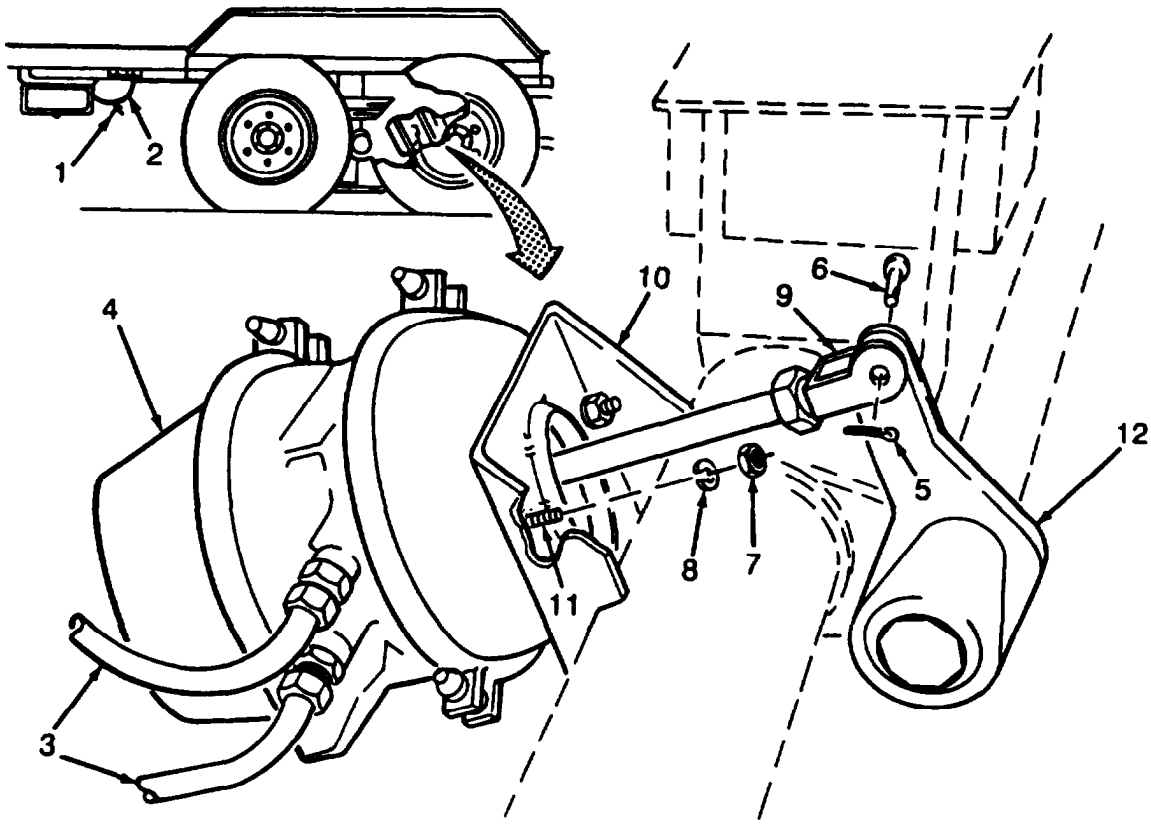
(2) Tag and disconnect two hoses (3) from air chamber (4).

(3) Remove cotter pin (5) and clevis pin (6).

(4) While supporting air chamber (4), remove two nuts (7) and lockwashers (8).

(5) Lower air chamber (4), guiding clevis (9) through bracket (10).

2-89. AIR CHAMBER REPLACE (MODELS WPES-10 AND H-9518-1) - continued.



2-89. AIR CHAMBER REPLACE (WPES-10 AND H-9518-1) - continued.

b. Installation.

(1) Guide clevis (9) and two mounting studs (11) through bracket (10) and position air chamber (4) against bracket. Make sure clevis (9) is positioned on slack adjuster (12) as shown.

(2) Install two lockwashers (8) and nuts (7).

(3) Install clevis pin (6) and cotter pin (5).

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.

(4) Install two hoses (3) as tagged during removal.

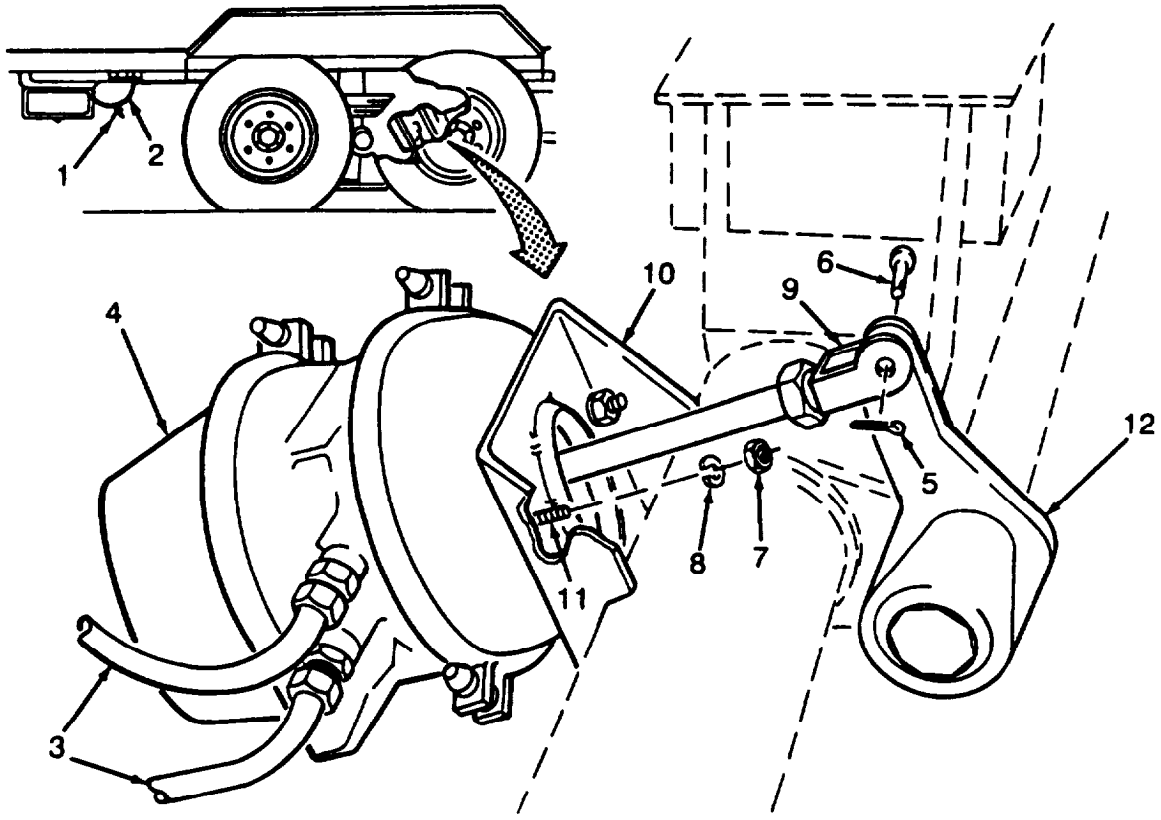
(5) Close drain cock (1) on air chamber (2).

(6) Adjust service brakes (Paragraph 2-88).

(7) Connect flatbed cargo trailer air hoses to towing vehicle (TM 10-4610-241-10).

(8) Operate air brake system and check for leaks and proper operation (TM 10-4610-241-10).

2-89. AIR CHAMBER REPLACE (MODELS WPES-10 AND H-9518-1) - continued.



b. Service.

WARNING

Towing ROWPU, even at low speed with brakes disabled could cause a serious accident.

NOTE

- This procedure is necessary when trailer is to be moved without a towing vehicle supplying air-pressure to release the brakes.
- To ensure combat readiness of vehicle, enable brakes as soon as short distance move, or other reason for disabling brakes, is completed.

(1) Disabling service brakes.

(a) Using a 10 ton jack and jack stand, raise tire and wheel assembly off the ground, high enough to permit turning (rotating) the tire and wheel assemblies.

(b) Remove nut (13), lockwasher (14) and stud (15) from stowage tube (16) on air chamber assembly (4).

(c) Remove cap (17) from bottom hole in air chamber assembly (4).

(d) Insert T of stud (15) into hole in bottom of air chamber (4). Push in and turn clockwise to engage internal mechanism.

(e) Install lockwasher (14) and nut (13). Tighten nut against air chamber assembly (4) until brake is disengaged (wheel turns freely). Do not overtighten.

(f) Repeat procedure for all other wheels and remove jack stand and jack.

(2) Enabling service brakes.

NOTE

This procedure must be performed when it is necessary to move the ROWPU with a towing vehicle, equipped with airbrakes and studs are installed in bottom of air chamber.

(a) Using A 10 ton jack and jack stand, raise wheel off the ground high enough to permit rotating the tire and wheel assemblies.

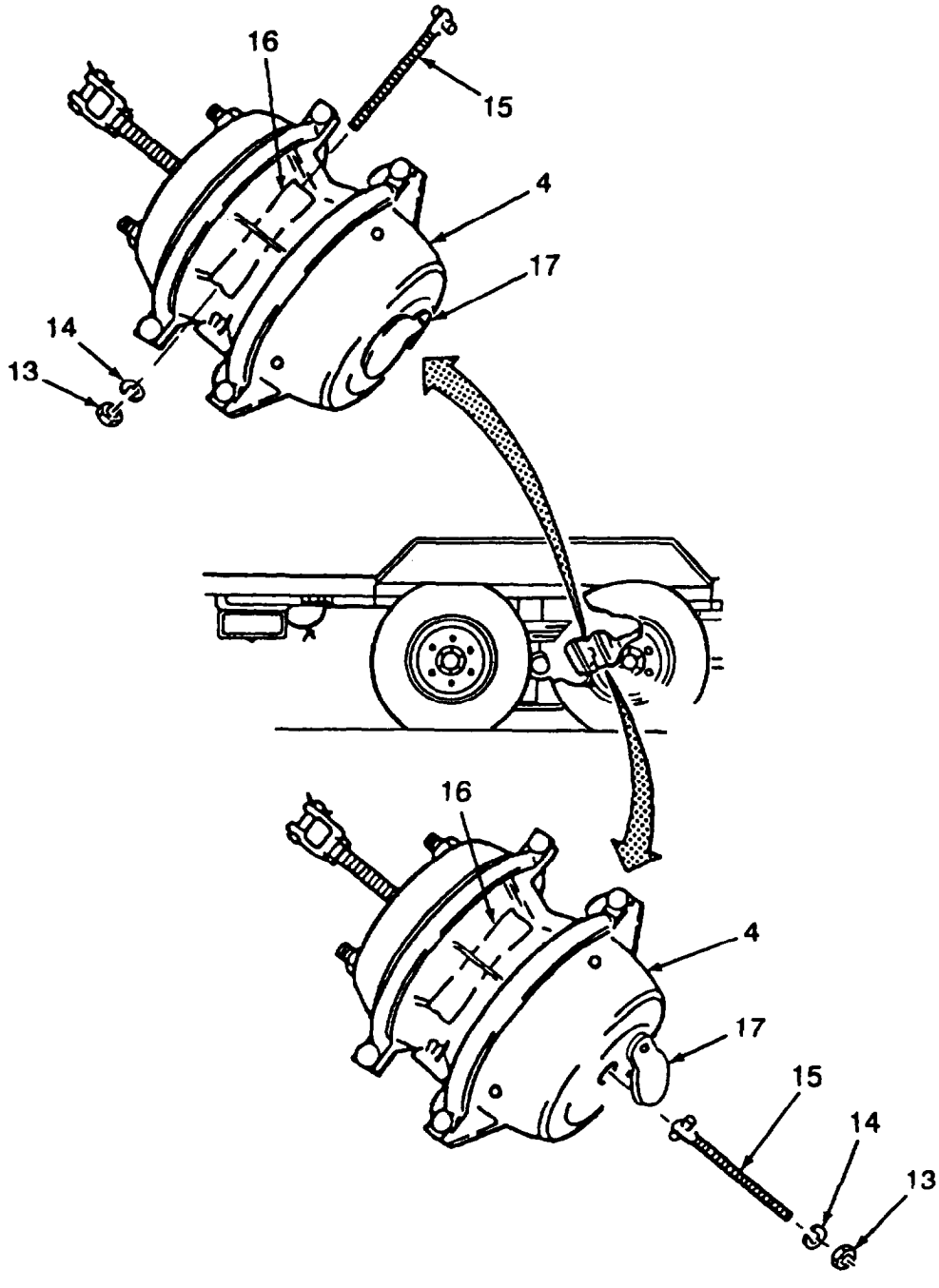
(b) Remove nut (13) and lockwasher (14) from stud (15).

(c) Turn stud (15) counterclockwise while pushing in to disengage it. Remove stud.

(d) Install stud (15) in stowage tube (16) with lockwasher (14) and nut (13).

(e) Turn wheel to make sure brake is locked and repeat procedure for all other wheels. Remove jack stand and jack

2-89. AIR CHAMBER REPLACE (MODELS WPES-10 AND H-9518-1) - continued.



Section VI. PREPARATION FOR STORAGE OR SHIPMENT

ALPHABETICAL INDEX

2-90. SECURITY PROCEDURES.

Refer to AR 190-11 or 190-13.

2-91. PREPARATION FOR MOVEMENT.

Refer to TM 10-4610-241-10 to prepare the ROWPU for movement.

2-92. 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 at 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 service and equipment serviceable criteria (ECS) evaluations should be completed, shortcomings and deficiencies should be corrected, and all modification work orders (MWOs) should be applied.

CAUTION

Store RO elements to prevent exposure to freezing temperatures or extreme heat.

c. Remove R.O. elements and end cap packing (TM 10-4610-241-10).

d. Attach tag to pressure vessels that reads “R.O. elements and end cap packing 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 Selection. 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-10/WPES-30/ H-9518-1/H-9518-3	FO-1
	- Models WPES-20/ H-9518-2	FO-3
Electrical Interconnecting Diagram	- Models WPES-10/WPES-30/ H-9518-1/H-9518-3	FO-2
	- Models WPES-20/H-9518-2	FO-4
Piping Schematic	- Models WPES-10/ H-9518-1	FO-5
	- Models WPES-20/WPES-30/H-9518-2/ H-9518-3	FO-6

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

Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ROWPU ASSEMBLY

1. ALL PUMPS INOPERABLE (Models WPES-10, H-9518-1, WPES-30 and H-9518-3).

WARNING

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

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.

Step2. Disconnect power cable at power input jack, J1 on junction box and check for 208 VAC, three phase power, between the following pins on cable connector P1:

A-B, A-C, B-C

If 208 VAC is not measured in all three tests, repair generator cable assembly. Refer to Paragraph 3-28.

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 of circuit B.

a. If continuity is absent through switch, S13 (switch ON), replace defective switch. Refer to Paragraph 3-49.

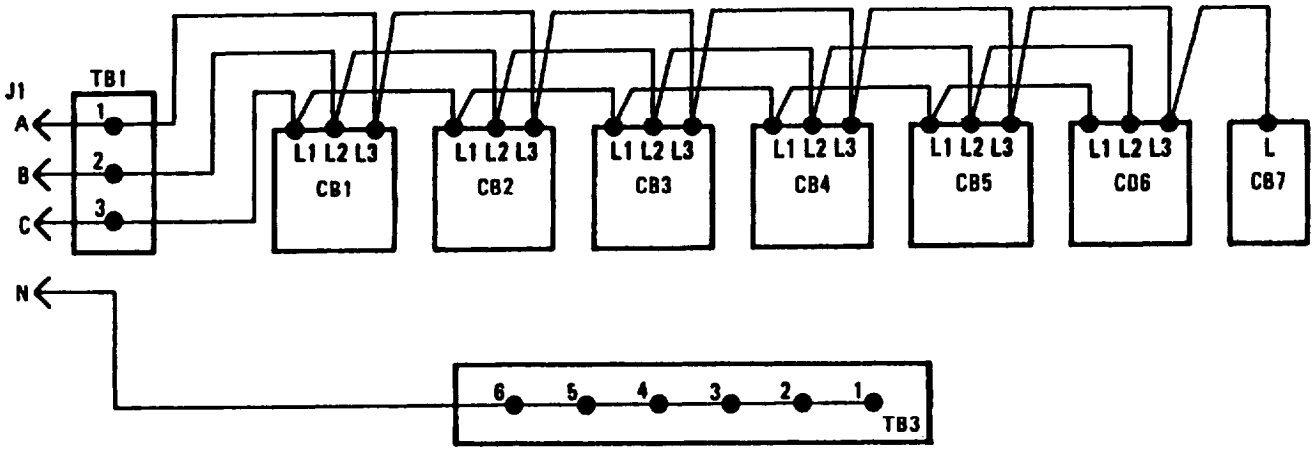
b. If continuity is absent through cable assembly, W62, repair cable assembly. Refer to Paragraph 3-27.

e. If continuity is absent through circuit breaker, CB9 (CB9 ON), replace CB9. Refer to Paragraph 3-53.

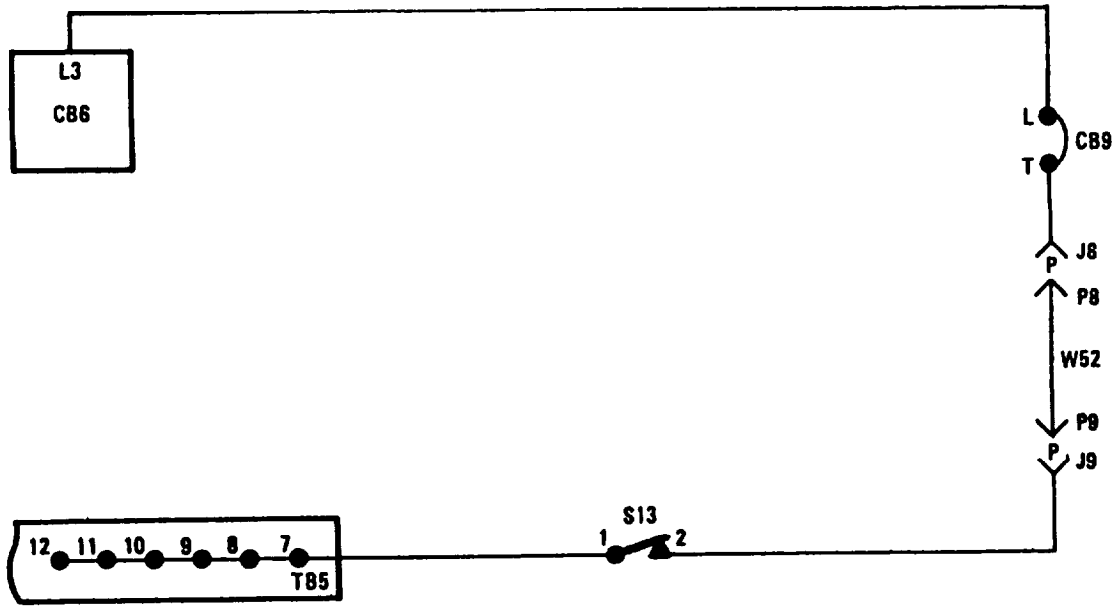
d. If continuity is absent in wiring, tighten loose connections or repair/replace defective wire.

Table 3-1. Direct Support Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ROWPU ASSEMBLY - continued



CIRCUIT A



CIRCUIT B

Table 3-1. Direct Support Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

2. ALL PUMPS INOPERABLE (Models WPES-20 and H-9518-2).

WARNING

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

Step 1. Check if 208 VAC, 3 phase power is supplied by generator. Refer to power source manual.

If 208 VAC, 3 phase power is not supplied, troubleshoot and repair power source.

Step 2. Perform a point-to-point continuity check.

a. If continuity is absent through switch S13, (switch ON), replace defective switch. Refer to Paragraph 3-49.

b. If continuity is absent through cable assembly, W52, repair cable assembly. Refer to Paragraph 3-27.

e. If continuity is absent through circuit breaker, CB9 (CB9 ON), replace CB9. Refer to Paragraph 3-53.

d. If continuity is absent in wiring, tighten loose connections or repair/replace defective wire.

Table 3-1. Direct Support Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ROWPU ASSEMBLY-continued

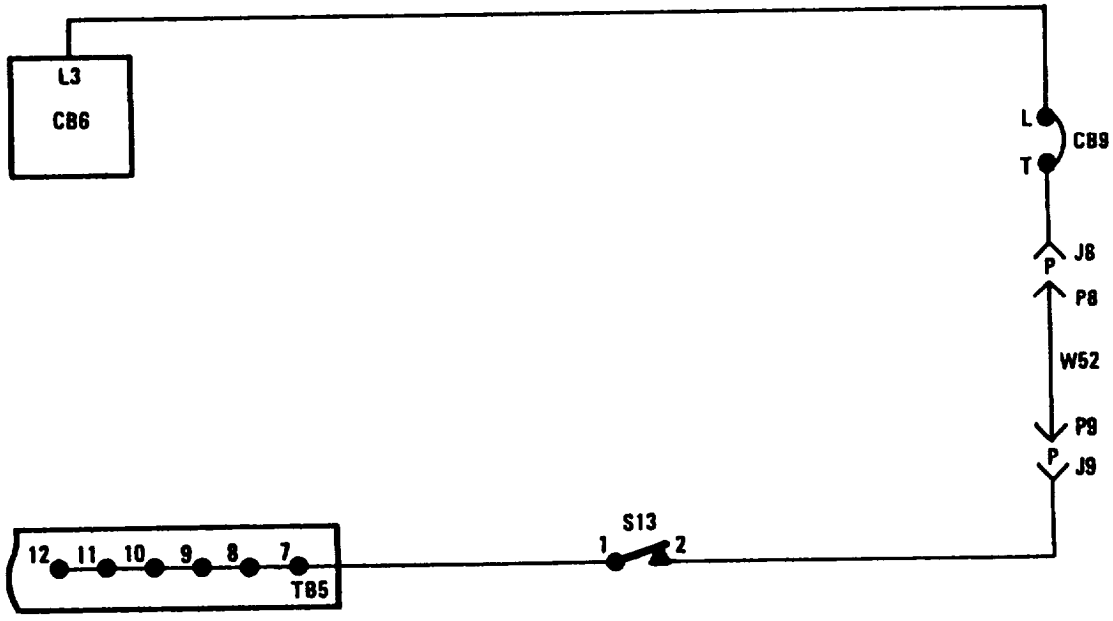


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

3. 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

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 2-73.

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 on Models WPES-20 and H-9518-2) between pins N (ground) and B.

If power is not available, repair generator cable assembly. Refer to Paragraph 3-28.

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 3-53.

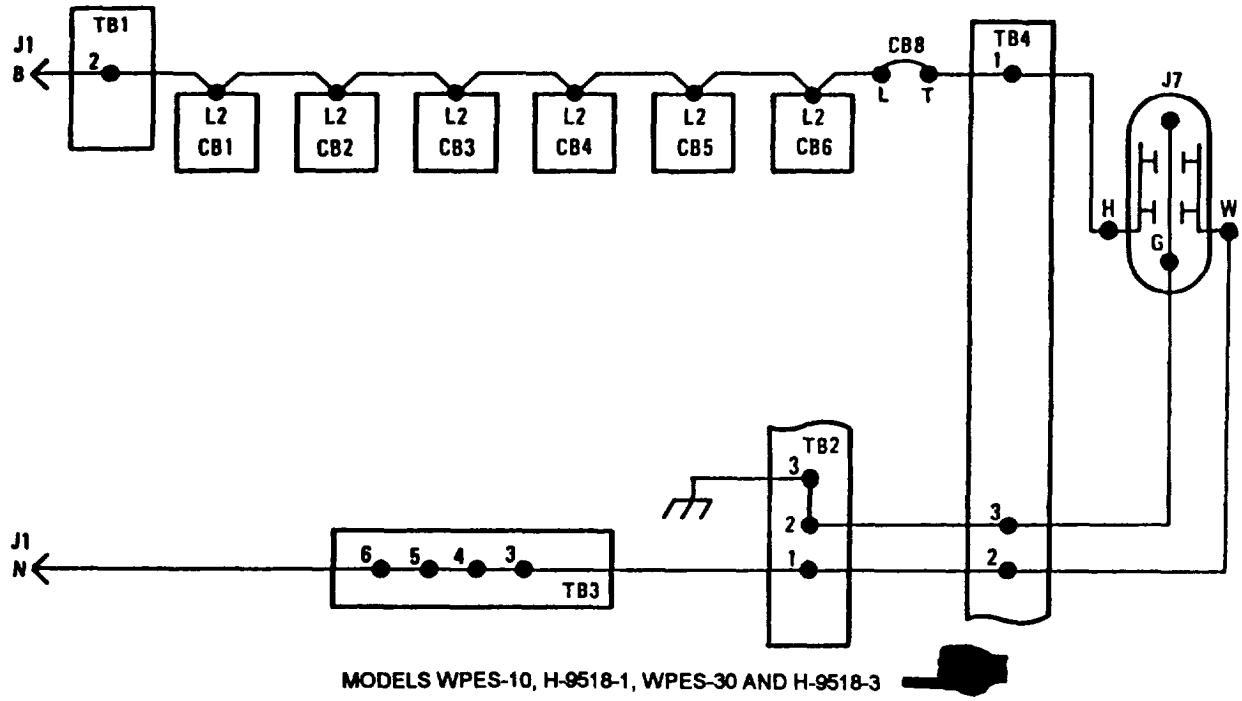
b. If continuity is absent between external connections of UTILITY OUTLET receptacle, J7 and corresponding outlet contacts, replace outlet assembly. Refer to Paragraph 2-73.

c. If continuity is absent in wiring, tighten loose connections or repair/replace defective wire.

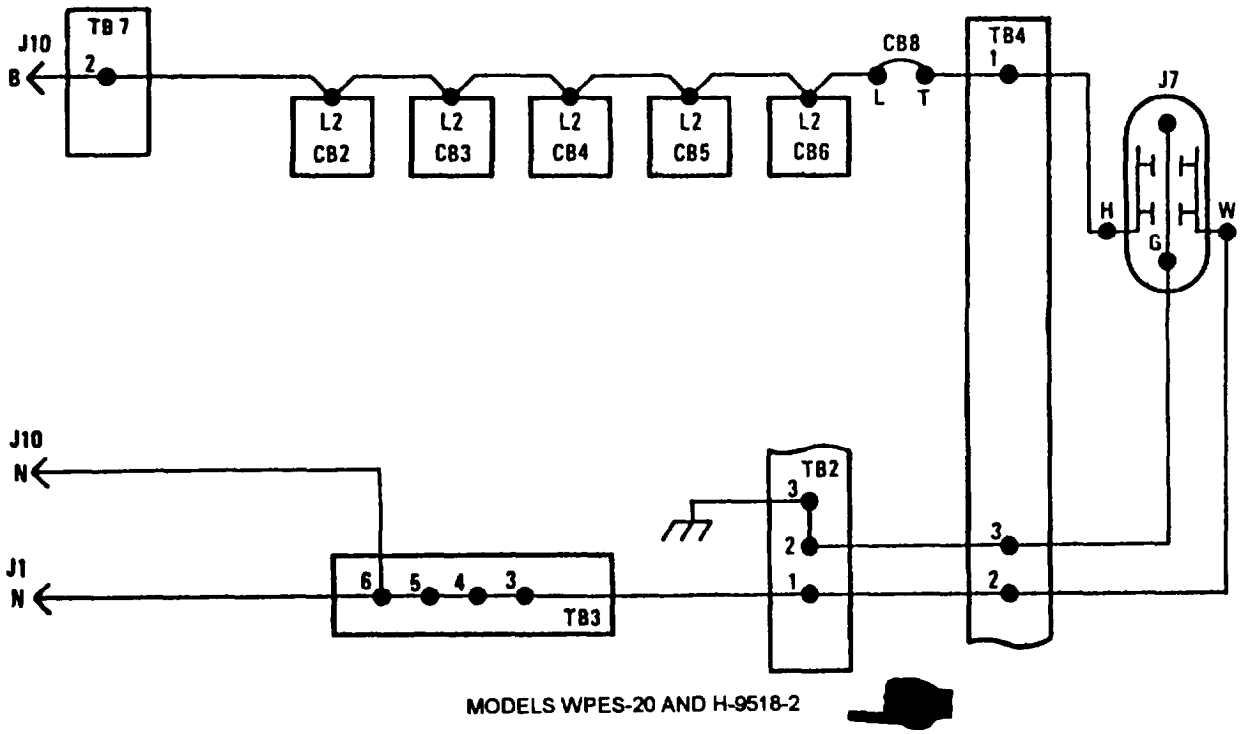
Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY- continued



MODELS WPES-10, H-9518-1, WPES-30 AND H-9518-3



MODELS WPES-20 AND H-9518-2

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

4. 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

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 inputjack, J1 (Models WPES-10, H-9518-1, WPES-30, and H-9518-3) or J10 (Models WPES-20 and H-9518-2) 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 generator cable assembly. Refer to Paragraph 3-28.

Step 4. Disassemble panel light assembly (Paragraph 2-74) and check for 115 VAC at terminals removed from light assembly.

If 115 VAC is measured, repair panel light assembly. Refer to Paragraph 2-74.

Step 5. Perform a point-to-point continuity test of light circuit from J1 (C) to DS10 (2) (Models WPES-10, H-9518-1, WPES-30, and H-9518-3) and from DS10 (1) to J1(N). On models WPES-20 and H-9518-2, check between J10(C) and DS10(2) and from DS10(1) to J10(N) and J1(N).

a. If light switch, S11 is open (in ON position), replace S11. Refer to Paragraph 3-49.

b. If cable assembly, W52 is open, repair it. Refer to Paragraph or 3-27.

d. If circuit breaker CB9 is open (CB9 ON) replace it. Refer to Paragraph 3-53.

c. If continuity is not measured through wiring, tighten loose connections or replace defective wire.

Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY- continued

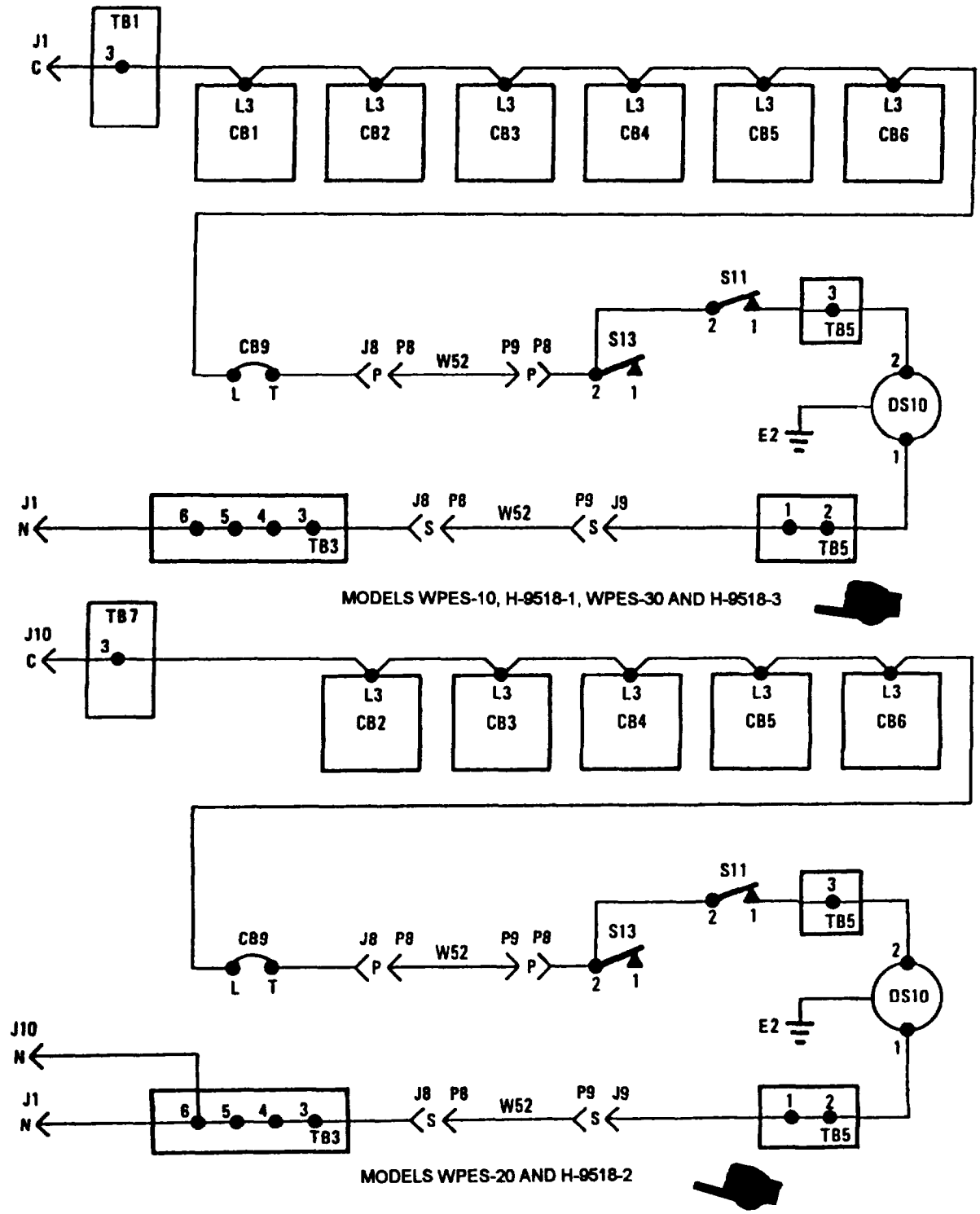


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

5. 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

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 3-53.

Step 4. Remove power at power source, reconnect open wire, disconnect wires connected to UTILITY OUTLET and check for continuity between power and ground contacts on outlet.

If continuity exists, replace utility outlet receptacle. Refer to Paragraph 2-73.

Step5. Check for bare/disconnected wiring in junction box.

Reattach loose wires or replace defective wire.

Table 3-1. Direct Support Troubleshooting

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ROWPU ASSEMBLY -continued

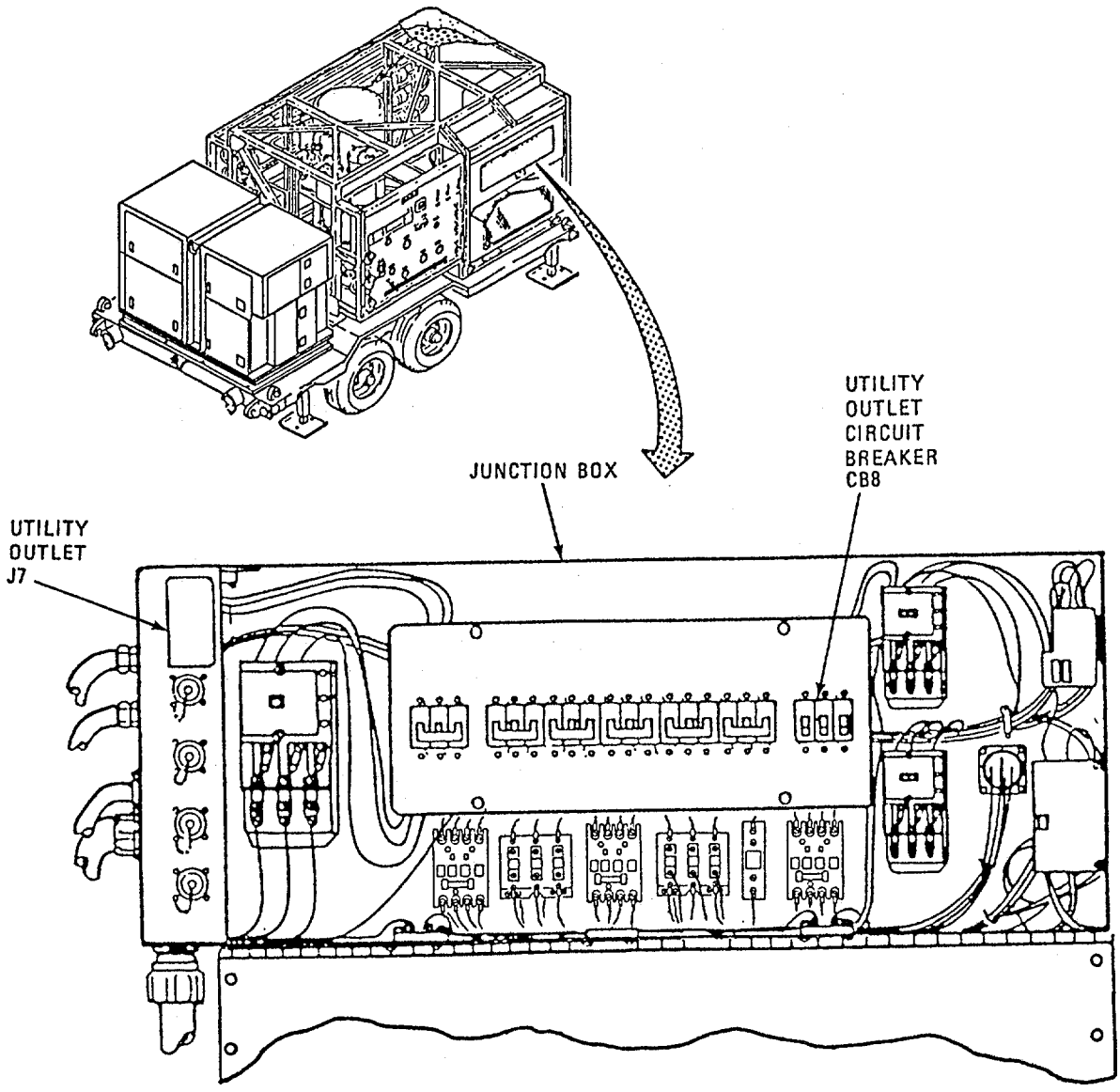


Table 3-1. Direct Support Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ROWPU ASSEMBLY -continued

6. TIMER CONT CIRCUIT BREAKER (CB9) TRIPS AND/OR 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment..

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 3-53.

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 3-27.

Step 5. Remove power at power source, reconnect cable assembly, W52 and disconnect cable assembly, W49 from timer cable. Apply power and attempt to reset circuit breaker.

If circuit breaker does not trip, repair timer assembly. Refer to Paragraph 3-47.

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. Repair or replace defective wire.

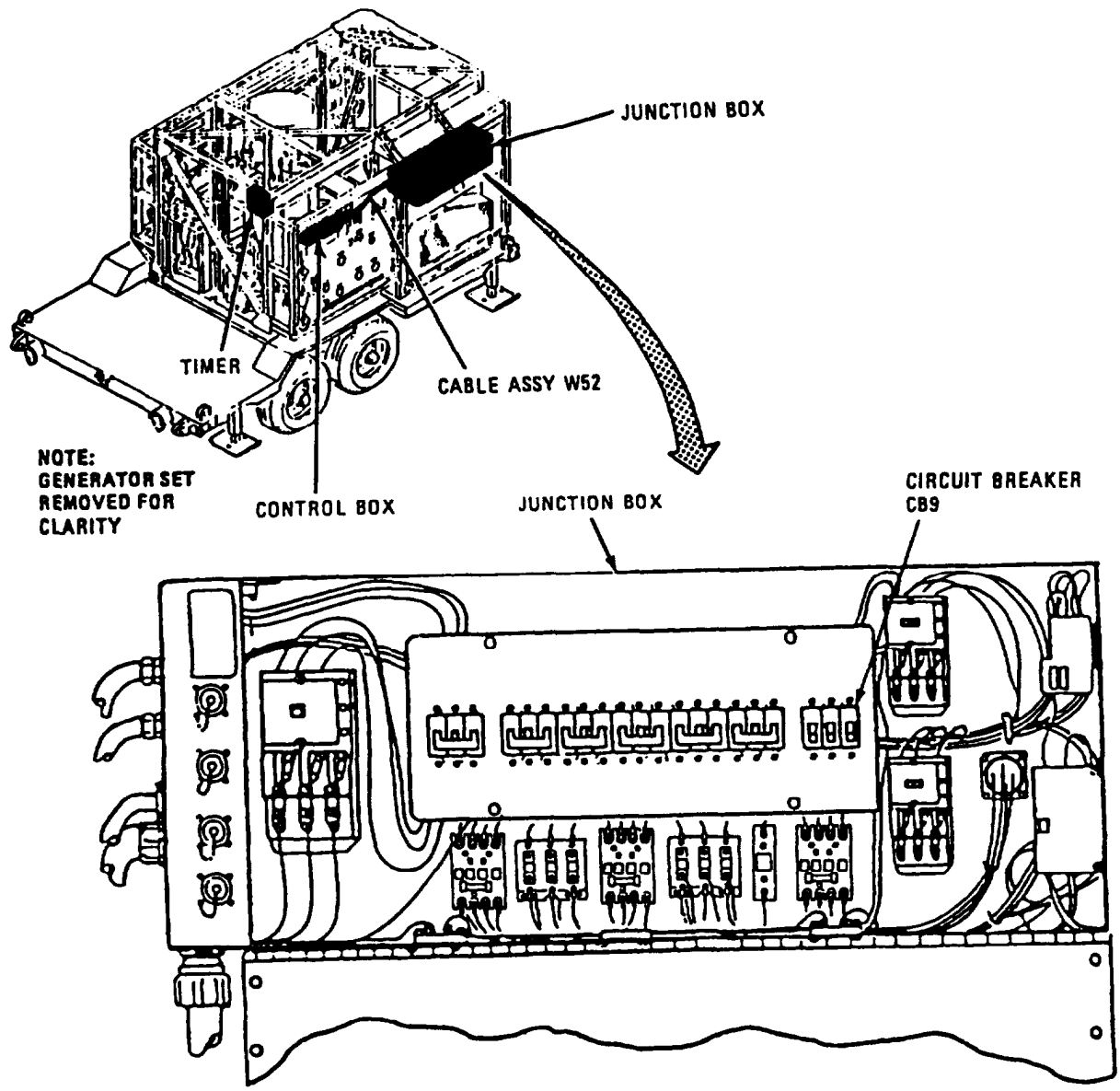


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

7. INOPERABLE DISSOLVED SOLIDS MONITOR SYSTEM (Models WPES-10, H-9518-1, WPES 30 and H-9518-3)

WARNING

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

Step 1. Remove cover from TDS monitor and check for blown/defective fuse and disconnected wires.

Replace fuse and/or reconnect cable assembly. Refer to Paragraph 3-20.

Step 2. Check for 115 VAC at TDS MONITOR POWER jack, J12.

If voltage is measured, go to step 4.

Step 3. Shut down 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 3-53.

b. If wiring is open, tighten connections and/or replace defective wire.

Step 4. Check for defective sensor as follows:

a. Disconnect sensor at product water pipe.

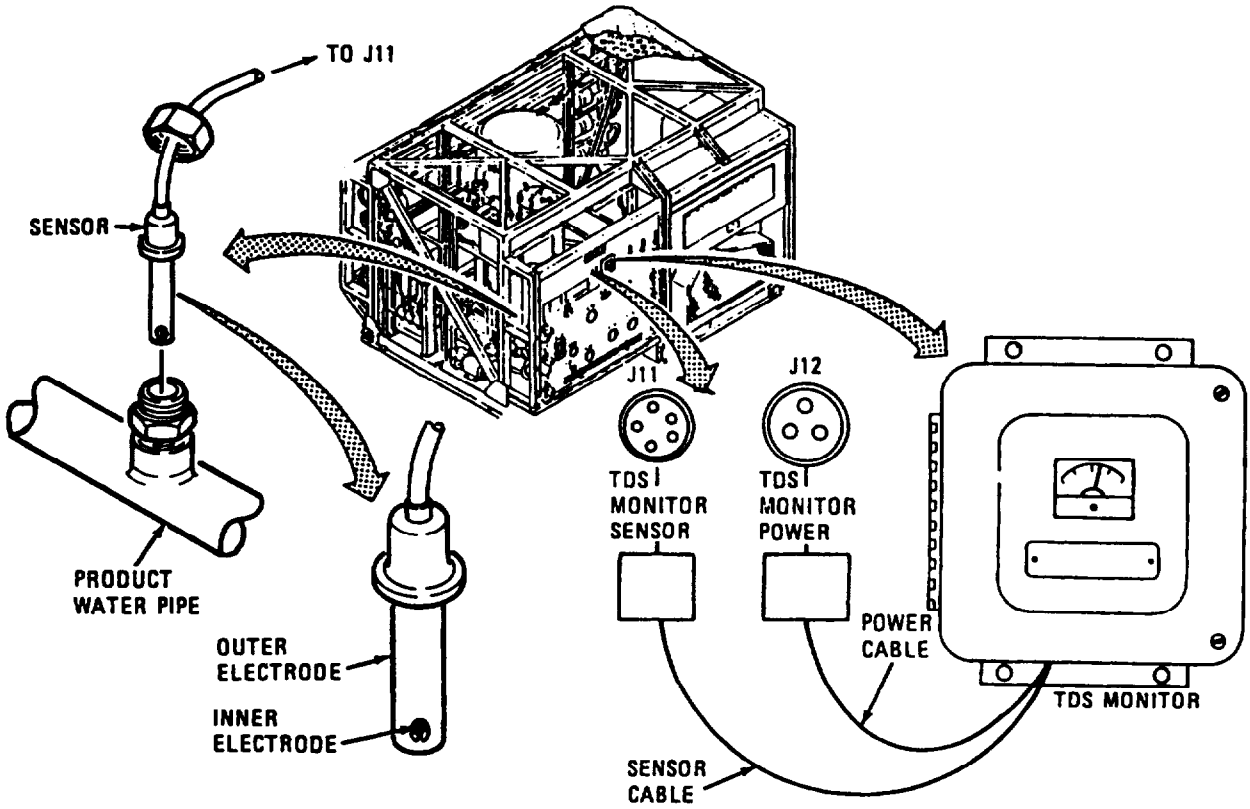
b. Check continuity as follows:

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

Repair defective TDS monitor cable assembly. Refer to Paragraph 3-36.

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 3-20.	



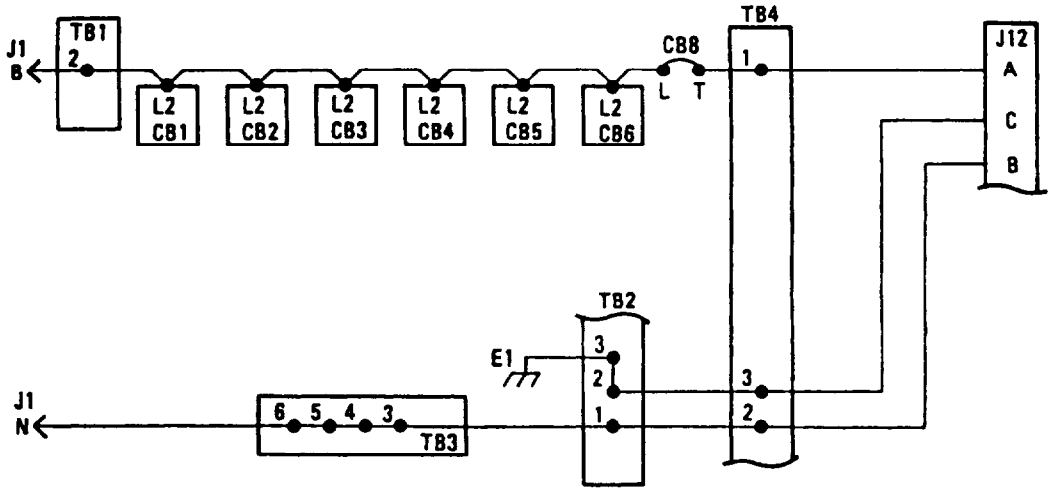


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ROWPU ASSEMBLY - continued

8. INOPERABLE DISSOLVED SOLIDS MONITOR SYSTEM (Models WPES-20 and H-9518-2)

WARNING

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

Step 1. Remove cover from TDS monitor and check for blow/defective fuse and disconnected wires.

Replace fuse and/or reconnect wire. Refer to Paragraph 3-20.

Step 2. Check for 115 VAC at TDS MONITOR POWER jack, 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 3-53.

b. If wiring is open, tighten connections and/or replace defective wire.

Step 4. Check for defective sensor as follows:

a. Disconnect sensor at product water 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 defective monitor cable assembly if any measurement is incorrect. Refer to Paragraph 3-36.

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 3-20.

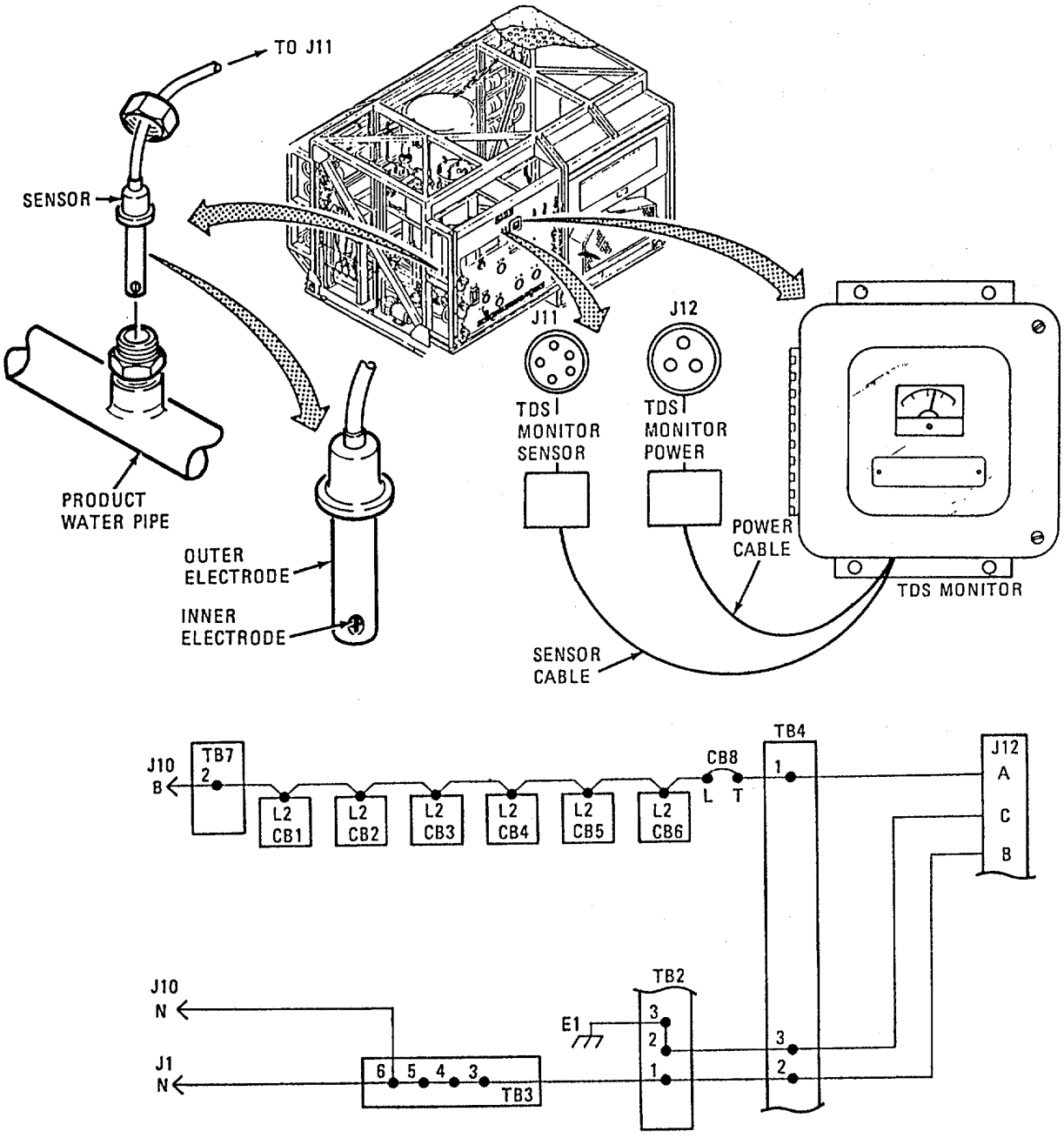


Table 3-1. Direct Support Troubleshooting- continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Check if circuit breaker CB6 and/or heater assembly are tripped. Heater assembly is tripped if resistance is felt when resetting it.

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. Shut down power source and perform a continuity test 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 heaters (Paragraph 3-61) and reset heater assembly.

b. If continuity is absent through circuit breaker CB6 (CB6 ON), replace CB6. Refer to Paragraph 3-53.

c. If continuity is absent through relay, K6 (see above note) replace motor starter. Refer to Paragraph 3-61.

d. If continuity is absent through wiring, tighten loose connections and/or replace defective wire.

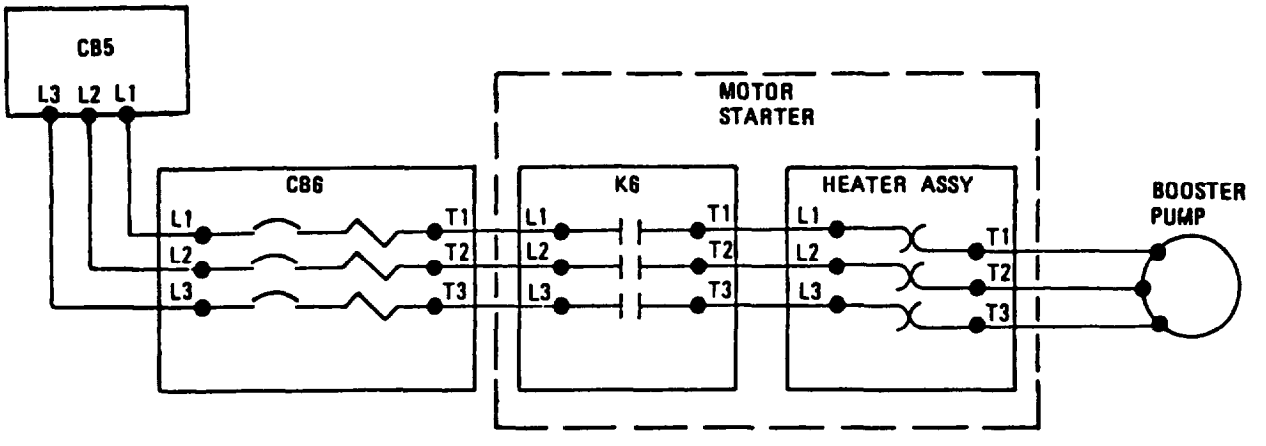


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment,

Step 6. Shut down power source and disconnect booster pump cable assembly. Check if continuity exists through pump cable assembly (Paragraph 3-34).

If continuity exists, repair centrifugal pump. Refer to Paragraph 3-37.

If continuity does not exist, repair pump cable assembly, Refer to Paragraph 3-34.

Step 7. Check for continuity/resistance of control circuits 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)	-	J9(I) and (J)
P9(J)	-	P8(J)
P9(I)	-	P8(I)
P9(P)	-	P8(P)
J8(I)	-	K6(A2) (See above note)
J8(J)	-	K6(3)
K6(A2)	-	K6(Al) (Required value is 450-600 ohms)
JI(N)	-	K6(Al)
J10(N)	-	K6(Al) Models WPES-20 and H-9518-2 only

a. If continuity does not exist through switches, S13 and S6 (switches ON), replace them. Refer to Paragraph 3-49.

b. If continuity does not exist thru circuit breaker CB9 (CB9 ON), replace CB9. Refer to Paragraph 3-53.

c. If continuity does not exist through heater assembly, replace defective heater (Paragraph 3-53) 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, repair cable assembly. Refer to Paragraph 3-27.

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 3-61.

f. If continuity is absent in wiring, tighten loose connections and/or replace defective wire.

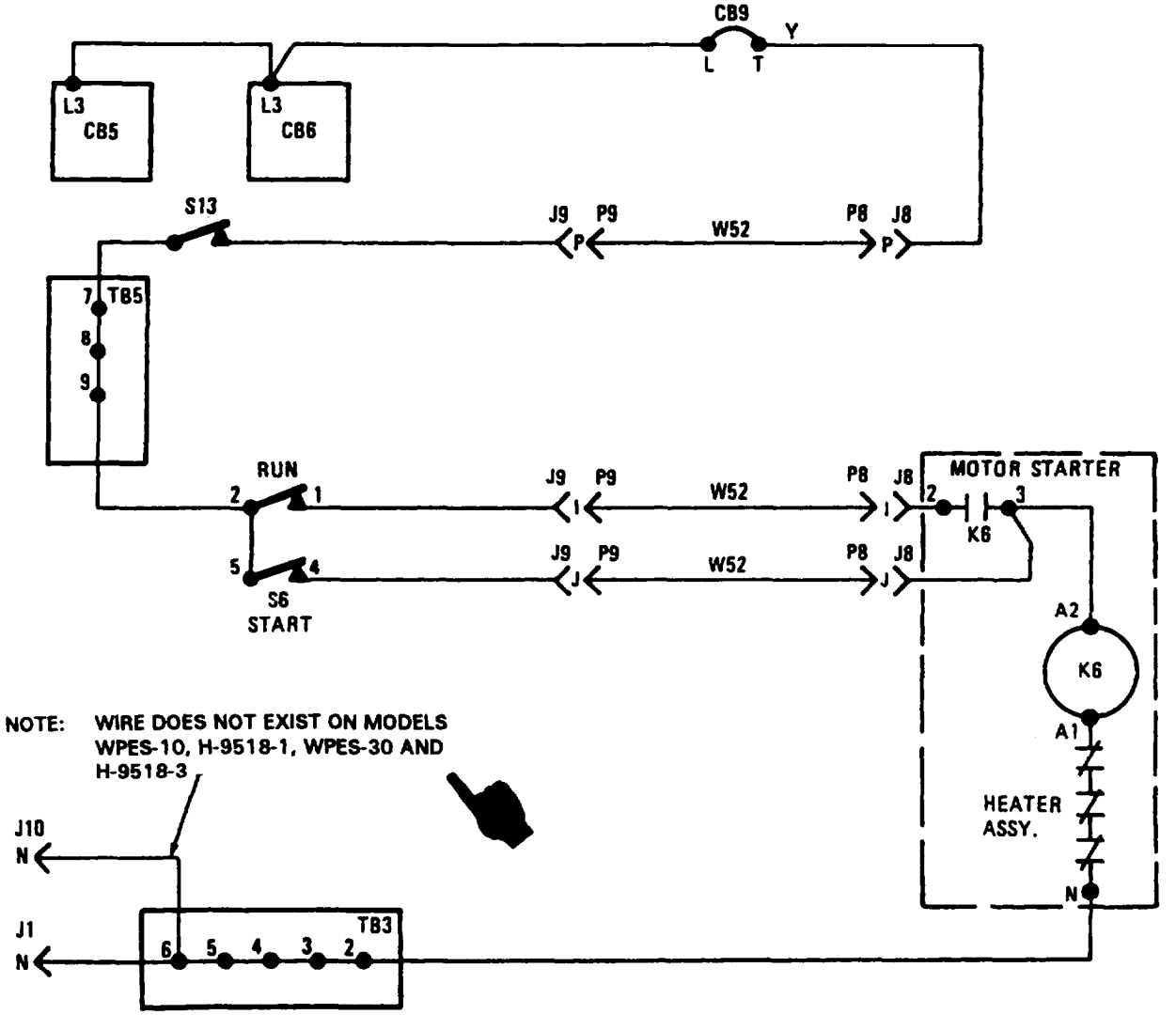


Table 3-1. Direct Support Troubleshooting-continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Remove power at power source, reset circuit breaker, CB6/heater assembly and disconnect wires on CB6 output terminals (T1, T2 and T3).

Step 2. Turn on power at power source and momentarily flip pump switch to START.

If circuit breaker CB6 trips, check for bare/disconnected wires in junction box and tighten loose connections or replace wire. If trouble persists, replace CB6 (Paragraph 3-53).

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 at power source and momentarily flip pump switch to START.

If heaters trip, check for defective heaters. Replace as necessary (Paragraph 3-61) and reset heater assembly. If trouble persists, replace motor starter (Paragraph 3-61).

Step 5. Remove power at power source and disconnect booster cable assembly at both ends (Paragraph 3-34).

Step 6. Check cable assembly for shorts (Paragraph 3-34).

a. If shorted, replace cable assembly. Refer to Paragraph 3-34.

b. If cable assembly is not shorted, repair centrifugal booster pump. Refer to Paragraph 3-37.

Table 3-1. Direct Support Troubleshooting- continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BOOSTER PUMP ASSEMBLY- continued

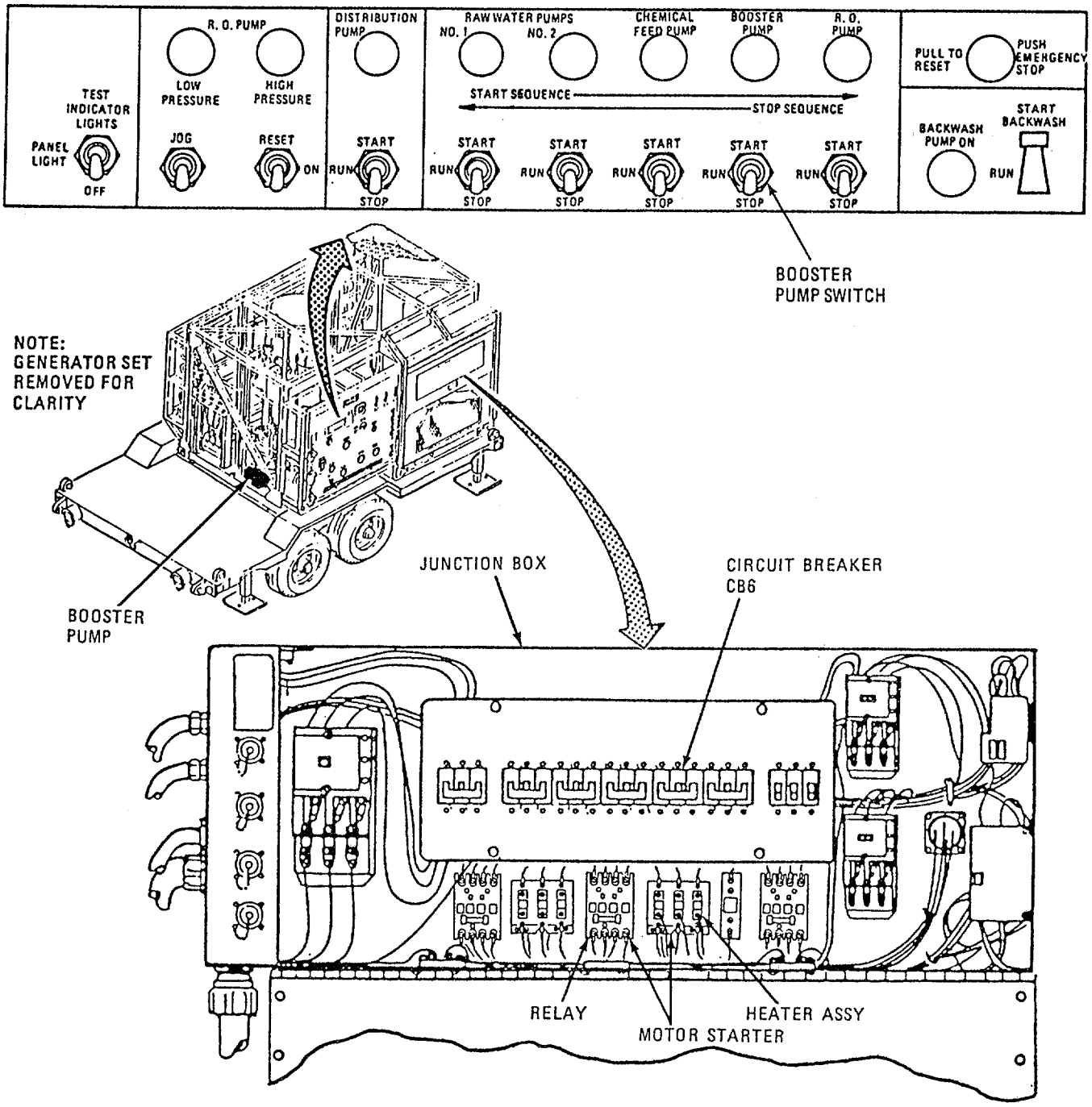


Table 3-1. Direct Support Troubleshooting- continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Check if circuit breaker CB5 and/or heater assembly are tripped. Heater assembly is tripped if resistance is felt when it is reset.

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 (Paragraph 3-61) and reset heater assembly.
b. If continuity is absent through K5 (see above note). replace motor starter. Refer to Paragraph 3-61.
c. If continuity is absent thru CB5 (CBS ON), replace CB5. Refer to Paragraph 3-53.
d. If continuity is absent through wires, tighten loose connections and/or replace defective wire.

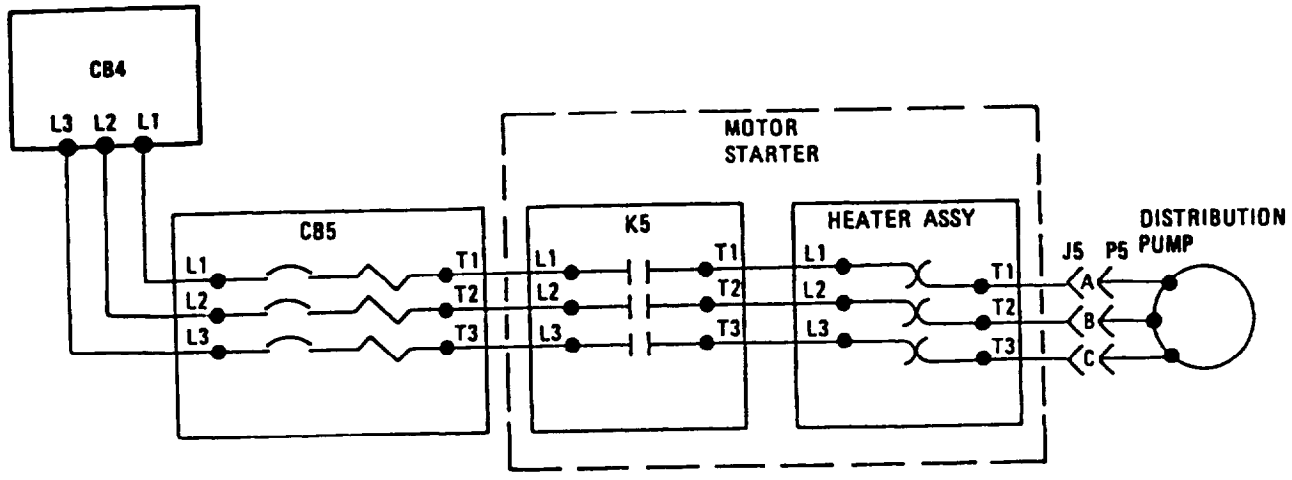


Table 3-1. Direct Support Troubleshooting-continued

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 rest, take proper measures to ensure safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 6. Remove power at power source, disconnect distribution pump cable and check if continuity exists through pump cable assembly (Paragraph 3-15).

a. If continuity exists through cable assembly, repair centrifugal pump. Refer to Paragraph 3-16.

b. If continuity does not exist, repair pump cable assembly. Refer to Paragraph 3-15.

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)
J1		K5(Al)
J10		K5(A1) Models WPES-20 and H-9518-2 only
K5(A2)		K5(Al) (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 3-49,

b. If continuity does not exist through circuit breaker CB9 (CB9 ON), replace CB9. Refer to Paragraph 3-53.

c. If continuity does not exist through heater assembly, replace defective heater (Paragraph 3-53) and reset heater assembly.

Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY- continued

d. If continuity is absent through cable assembly, W52 repair cable assembly. Refer to Paragraph 3-27.

e. If continuity does not exist through K6 contacts (2-3) and/or 450/600 Ohms is measured from A2-A1, replace motor starter. Refer to Paragraph 3-61.

f. If continuity is absent in wiring, tighten loose connections and/or replace defective wire.

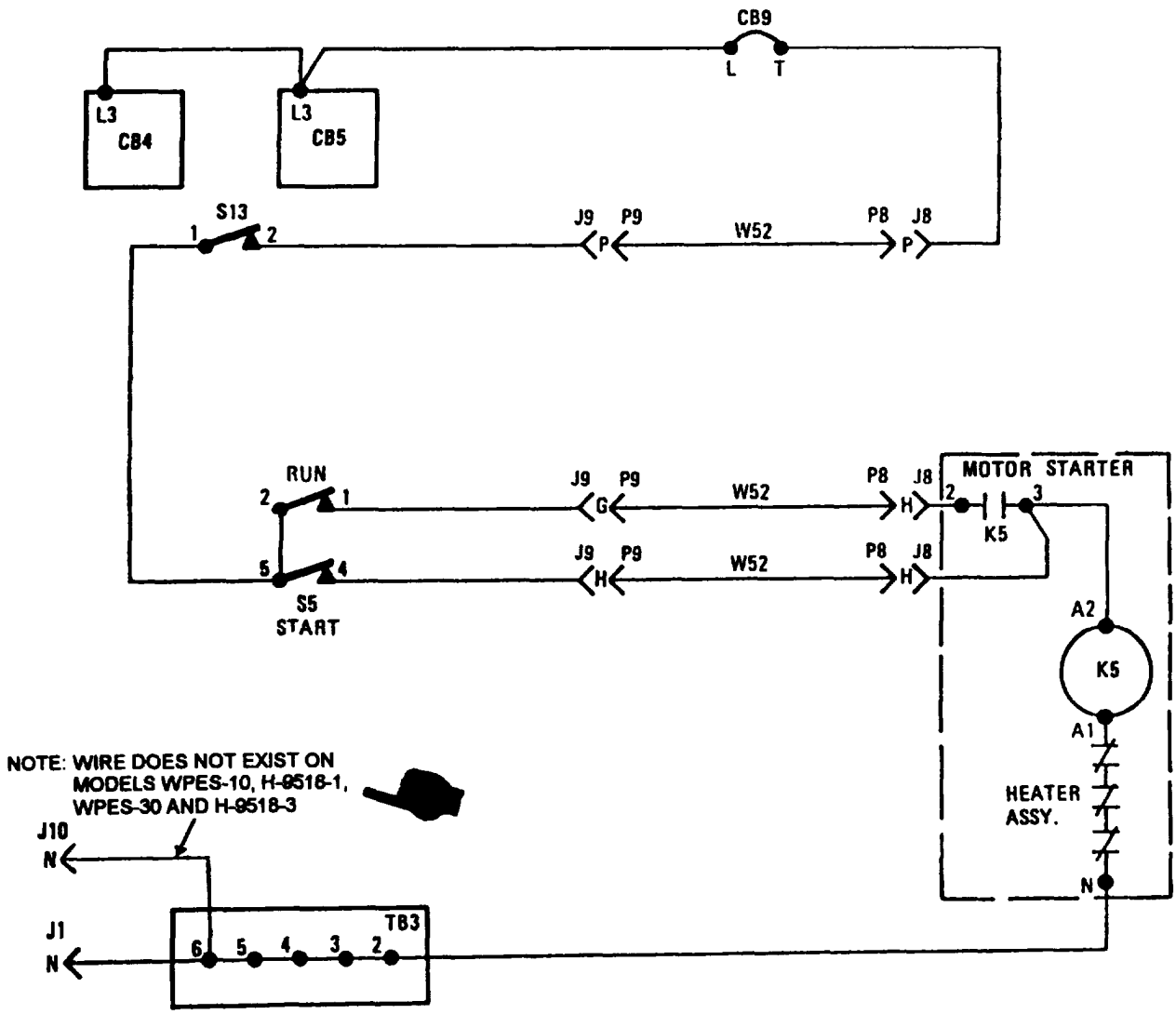


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

DISTRIBUTION PUMP ASSEMBLY- continued

2. DISTRIBUTION PUMP CIRCUIT BREAKER (CBS) 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Remove power at power source, reset circuit breaker (CBS) and/or heater assembly and disconnect wires on CB5 output terminals (T1, T2 and T3).

Step 2. Turn on power at power source and momentarily flip pump switch to START.

If circuit breaker CB5 trips, check for bare/disconnected wires injunction box. Tighten loose connections or replace defective wire. If trouble persists, replace CB5. Refer to Paragraph 3-53.

Step 3. Remove power at power source, reconnect wires to CB5 and disconnect distribution pump cable at junction box.

Step 4. Turn on power at power source and momentarily flip pump switch to START.

If heater assembly trips, check for detective heaters, replace as necessary (Paragraph 3-61) and reset heater assembly.

Step 5. Remove power at power source and disconnect cable assembly from distribution pump motor (Paragraph 3-15).

Step 6. Check pump cable assembly for shorts.

a. If a short is indicated, replace cable assembly. Refer to Paragraph 3-15.

b. If cable assembly is not shorted, repair pump assembly. Refer to Paragraph 3-16.

Table 3-1. Direct Support Troubleshooting- continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
DISTRIBUTION PUMP ASSEMBLY - continued

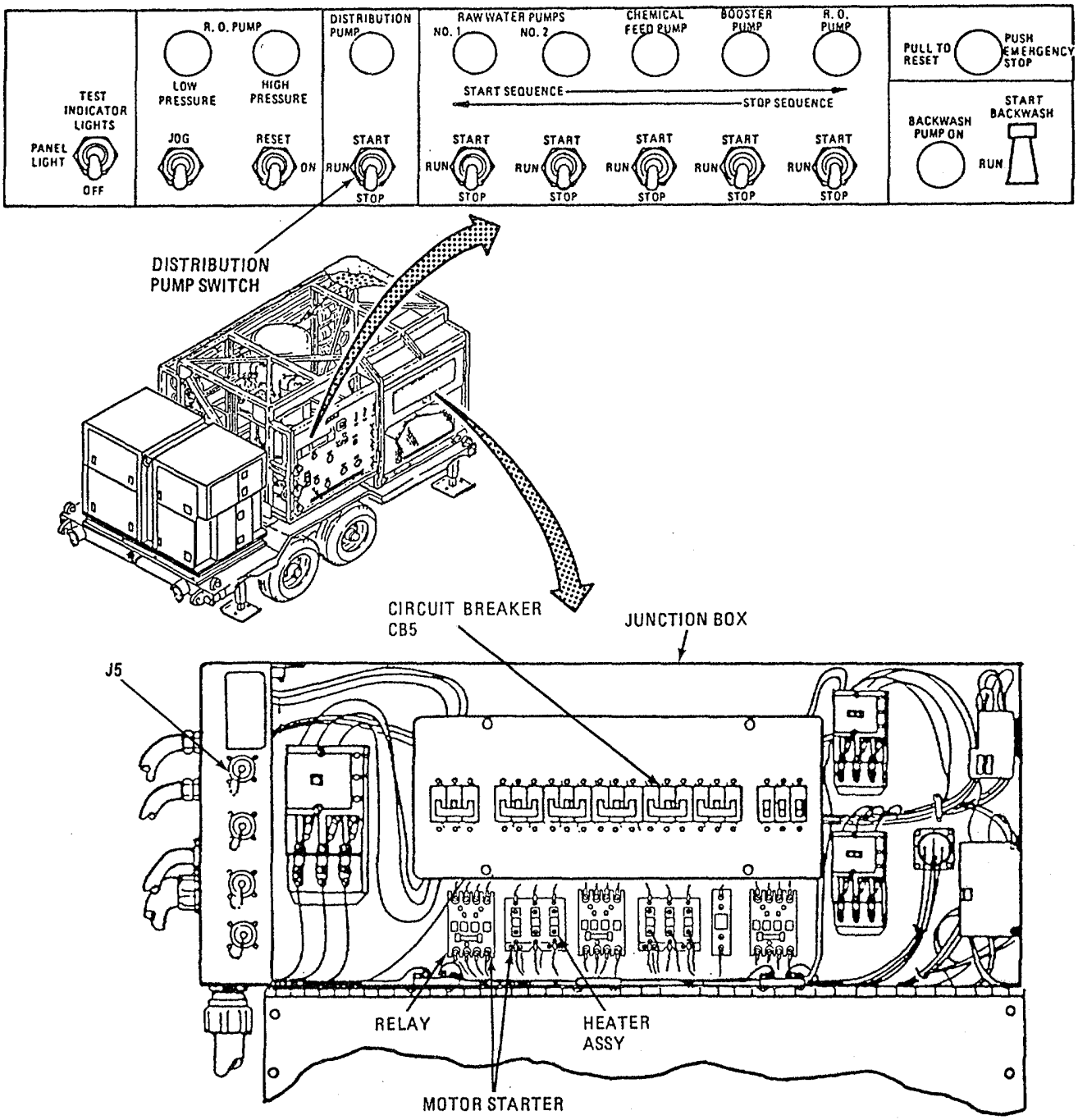


Table 3-1. Direct Support Troubleshooting- continued

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 K1 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. Refer to Paragraph 3-53.

b. If open is measured in wiring, tighten connections and/or replace defective wire.

c. If open, repair cable assembly, W52. Refer to Paragraph 3-27.

d. If continuity exists through entire circuit, replace defective light assembly. Refer to Paragraph 3-49.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CONTROL BOX ASSEMBLY

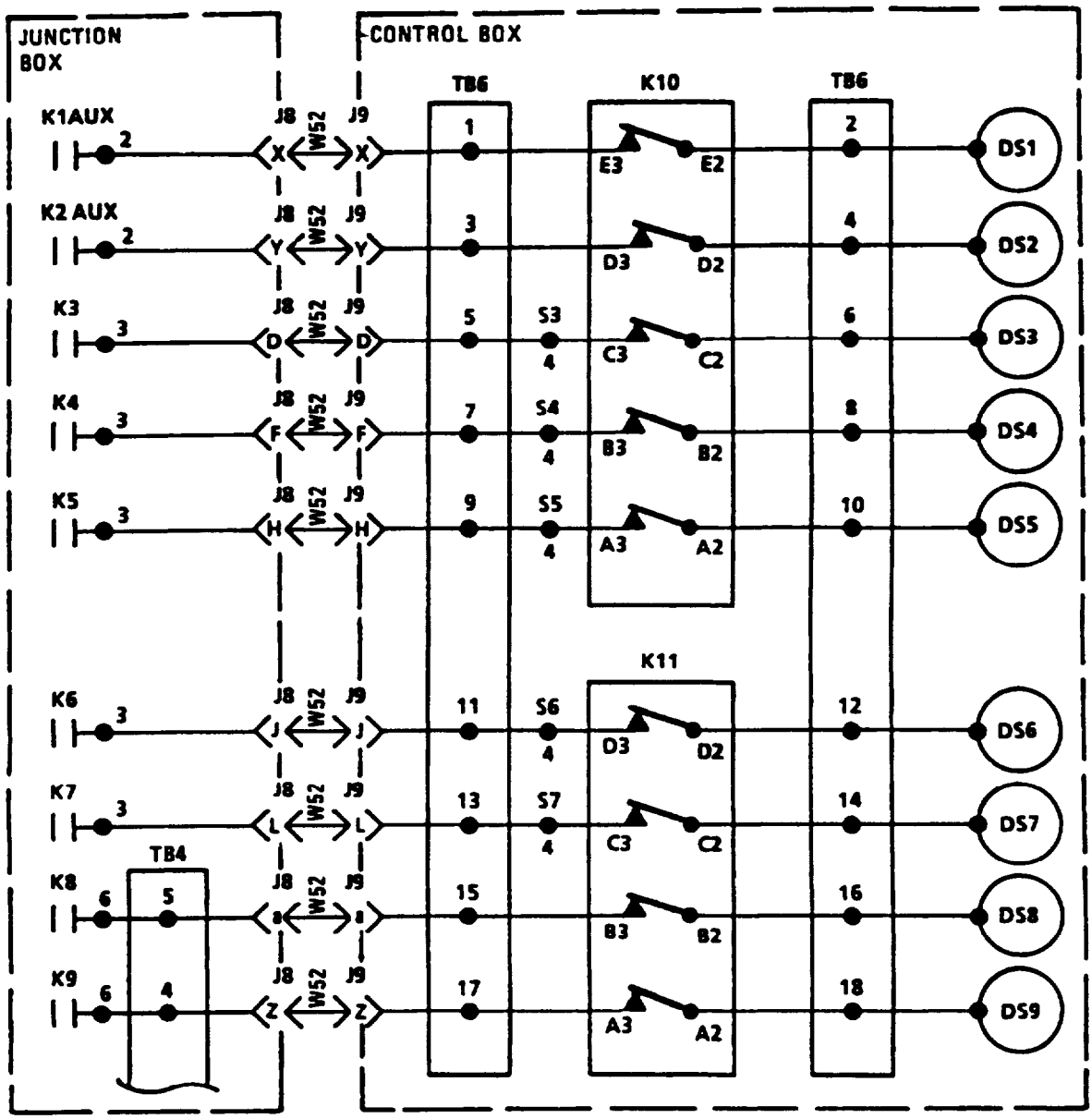


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

CONTROL BOX ASSEMBLY - continued

2. ROWPU FAILS LAMP TEST (Models WPES-10, H-9518-1, WPES-30 and H-9518-3).

Step 1. Refer to circuit diagram and perform a point-to-point continuity test of ground circuit. Pins Jl(N) to lights and Xl of relay coils.

If open, replace wires or repair cable assembly, W52. Refer to Paragraph 3-27.

Step 2. With S11 closed, perform point-to-point continuity test of power circuit from J1(C) to relay coils X2 and contacts A1, B1, C1, D1 and E1 (K10 only) of relays.

a. If circuit breaker, CB9 is open (CB9 ON), replace it. Refer to Paragraph 3-53.

b. If switch, S11 is open (switch ON), replace it. Refer to Paragraph 3-49.

c. If cable assembly, W52 is open, repair cable assembly. Refer to Paragraph 3-27.

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 3-49.

b. If DS6 through DS9 are inoperable, replace relay, K11. Refer to Paragraph 3-49.

Step 4. Perform continuity test between relays, K10, K11 as appropriate and defective light.

If wires are loose or defective, tighten loose wires or replace defective wires.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CONTROL BOX ASSEMBLY-continued

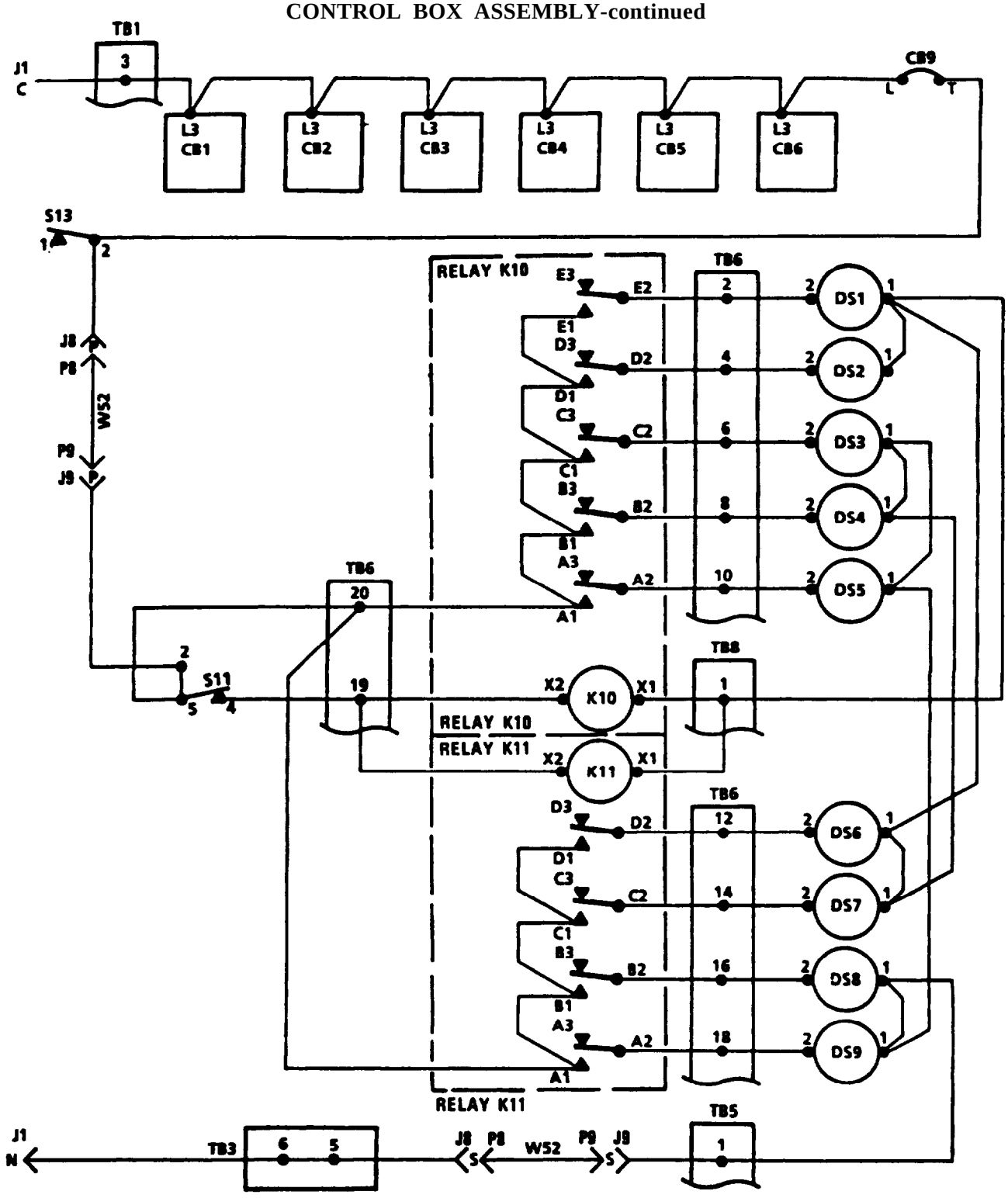


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

CONTROL BOX ASSEMBLY - continued

3. ROWPU FAILS LAMP TEST (Models WPES-20 and H-9518-2).

Step 1. Refer to circuit diagram and perform a point-to-point continuity test of ground circuit. Pins Jl and J10(N) to lights and X1 of relays.

If open, replace wires or cable assembly, W52. Refer to Paragraph 3-27.

Step 2. With S11 closed, perform point-to-point continuity test of power circuit from J10(C) to relay coils X2 and contacts A1, B1, C1, D1 and E1 (K10 only) of relays.

a. If circuit breaker, CB9 is open (CB9 ON), replace it. Refer to Paragraph 3-53.

b. If switch, S11 is open (switch ON), replace it. Refer to Paragraph 3-49.

c. If cable assembly, W52 is open, repair cable assembly. Refer to Paragraph 3-27.

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 3-49.

b. If DS6 through DS9 are inoperable, replace relay, K11. Refer to Paragraph 3-49.

Step4. Perform continuity test between relays, K10, K11 as appropriate and defective light. If wires are loose or defective, tighten loose wires or replace defective wires.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CONTROL BOX ASSEMBLY - continued

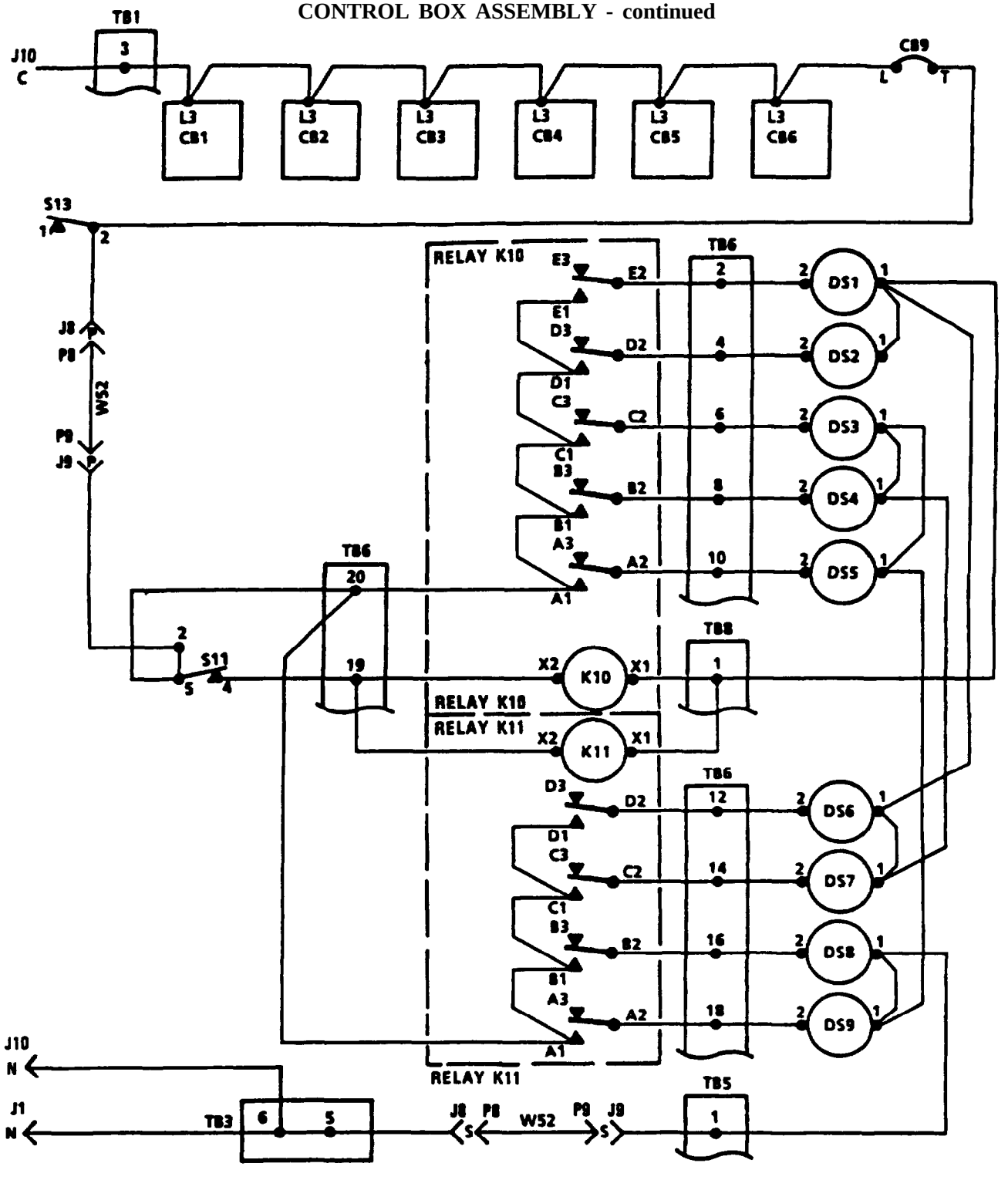


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

CHEMICAL FEED PUMP ASSEMBLY

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

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 assembly.

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 between TI and T4 on motor starter.

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	-	Tl on Heater
L2, K7	-	T4 on K7
J1(N)	-	L2
J10(N)	-	L2 (Models WPES-20 and H-9518-2)

a. If continuity is absent through heater assembly, replace defective heater (Paragraph 3-53) 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 3-61.

c. If continuity is absent through circuit breaker, CB7 (CB7 ON), replace CB7. Refer to Paragraph 3-53.

d. If continuity is absent in wiring, tighten loose connections and/or replace defective wire.

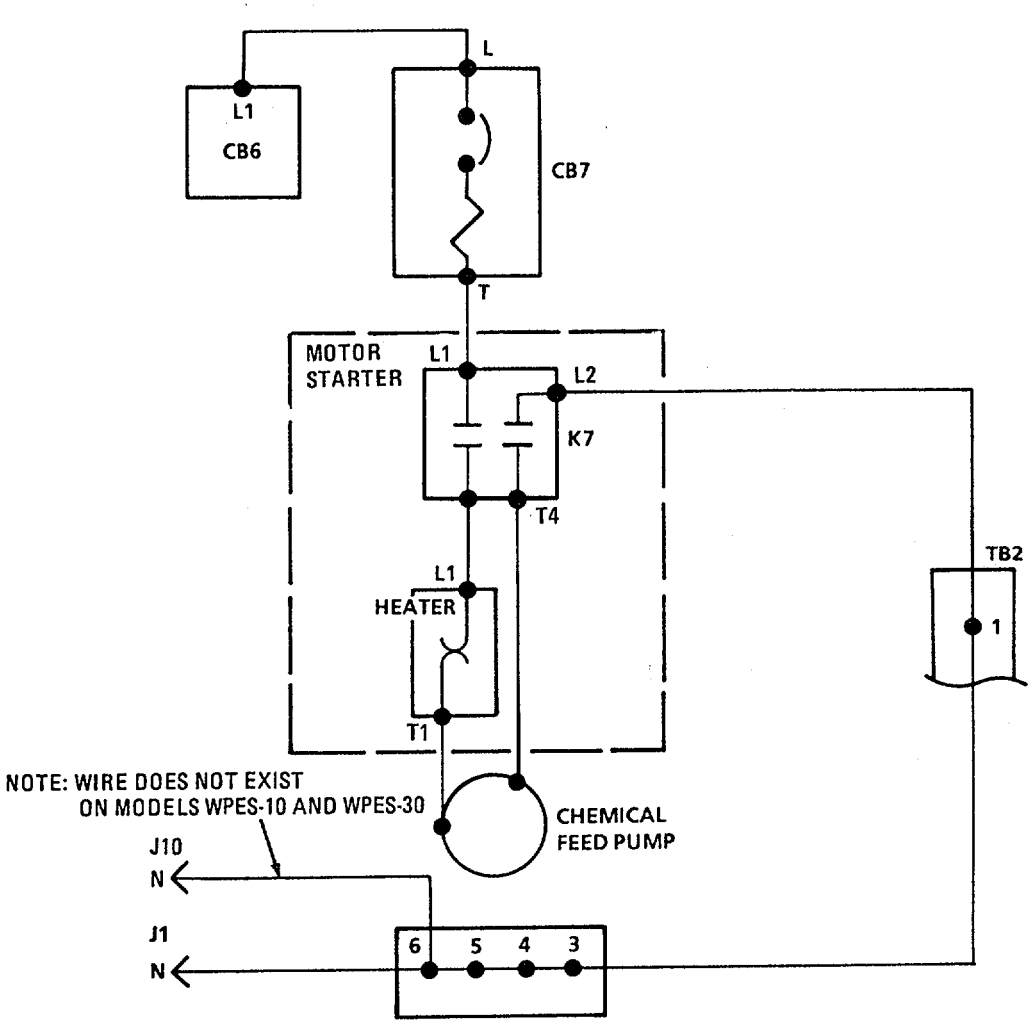


Table 3-1. Direct Support Troubleshooting- continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 6. Shut down power at power source and disconnect cable assembly at pump motor. Check if continuity exists through pump cable assembly.

a. If continuity exists, repair pump motor. Refer to Paragraph 3-39.

b. If continuity does not exist, repair cable assembly. Refer to Paragraph 3-29.

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(N)	-	K7(A1)
J10(N)	-	K7(A1)

a. If continuity does not exist through switches, S13 or S7 (switches ON), replace defective switch. Refer to Paragraph 3-49.

b. If continuity does not exist through CB9 (CB9 ON), replace CB9. Refer to Paragraph 3-53.

c. If continuity does not exist through heater assembly, replace heater (Paragraph 3-53) 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 3-27.

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 3-61.

f. If continuity does not exist through wires, tighten loose connections and/or replace defective wires.

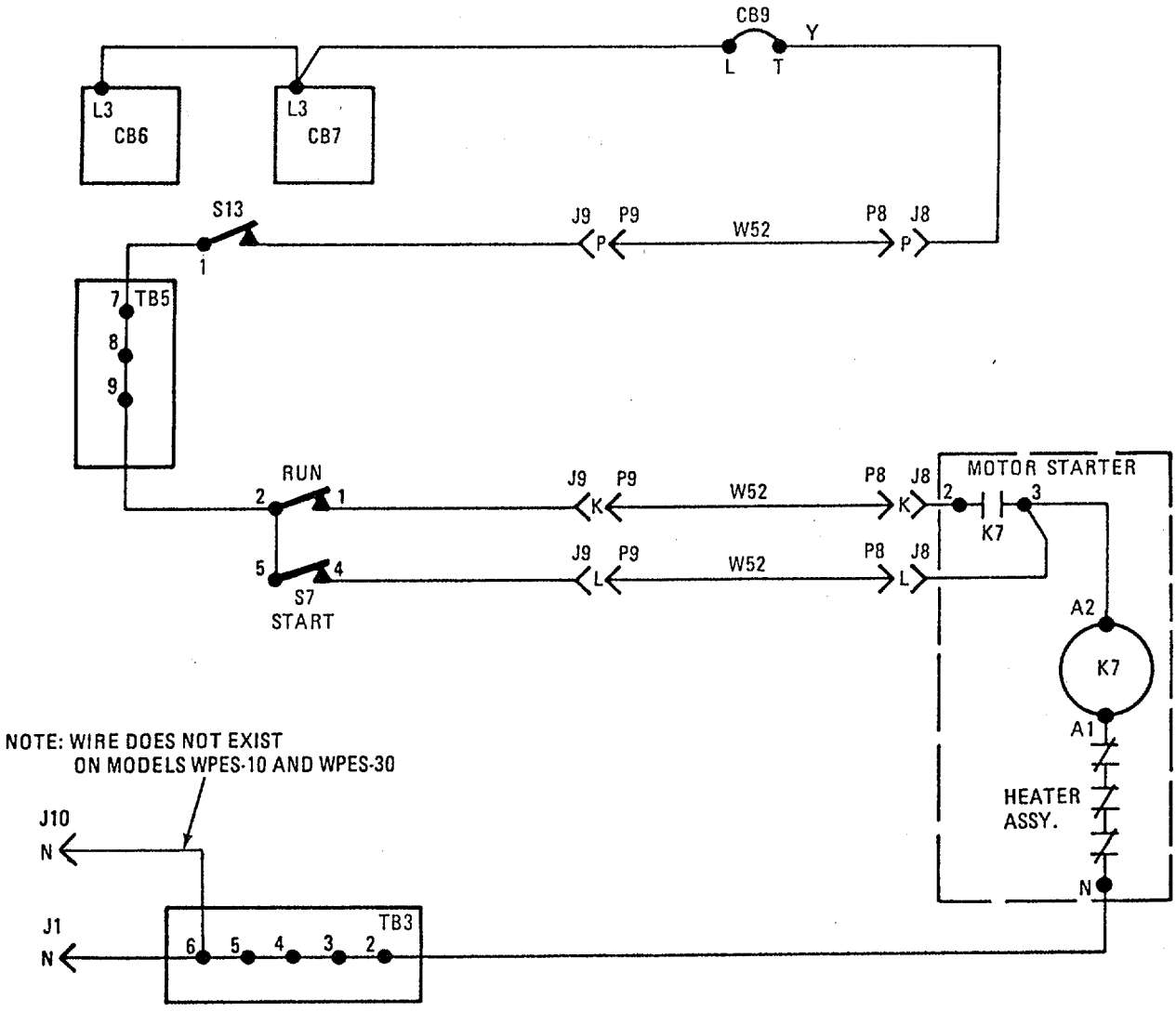


Table 3-1. Direct Support Troubleshooting- continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

CHEMICAL FEED PUMP - continued

2. CHEMICAL FEED PUMP CIRCUIT BREAKER (CB7) AND/OR 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Remove power at power source, reset CB7 and/or heater assembly, and disconnect wires on CB7 output terminal T.

Step 2. Turn on power at power source and flip pump switch momentarily to START.

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 3-53.

Step 3. Remove power at power source, reconnect wire and disconnect wires from motor starter at T1 and T4.

Step 4. Turn on power at power source and flip pump switch momentarily to START.

If heater assembly trips, check for defective heater, replace as necessary (Paragraph 3-61) and reset heater assembly.

Step 5. Remove power at power source and disconnect pump cable assembly (Paragraph 3-29).

Step 6. Check pump cable assembly for shorts (Paragraph 3-29).

a. If a short is indicated, replace cable assembly. Refer to Paragraph 3-29.

b. If pump cable is not defective, repair chemical feed pump motor. Refer to Paragraph 3-39.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CHEMICAL FEED PUMP-continued

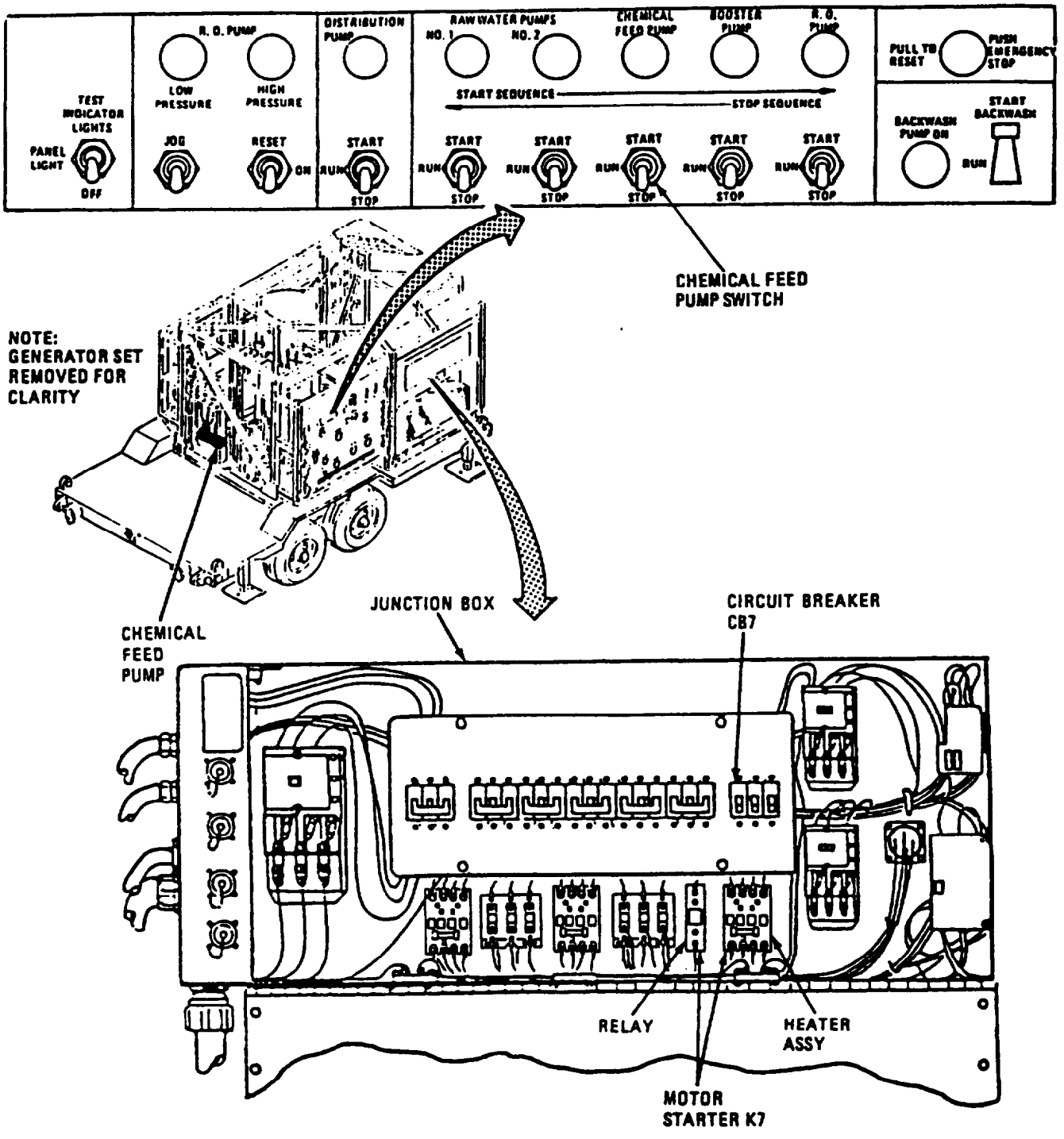


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY

1. REVERSE OSMOSIS (R.O.) PUMP STOPS AND/OR FAILS TO START (Models WPES-10, H-9518-1, WPES-30, and H-9518-3).

WARNING

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

Step 1. Check if circuit breaker CB1 and/or heater assembly are tripped. TRIPPED window will show white if tripped.

If circuit breaker or heater assembly is tripped, go to Malfunction 3, 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 1100 psi, replace high pressure switch, S10. Refer to Paragraph 2-58.

b. If DS9 is ON at operating pressure of 10 psi or above, replace low pressure switch, S9. Refer to Paragraph 2-57.

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. Shut down power at pump switch and disconnect R.O. pump cable at J6 (back of junction box). Momentarily flip pump switch to START and check for 208 VAC, three phase power at connector, J6

If voltage is measured in all three tests (A-B, A-C and B-C), go to step 7.

Table 3-1. Direct Support Troubleshooting- continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

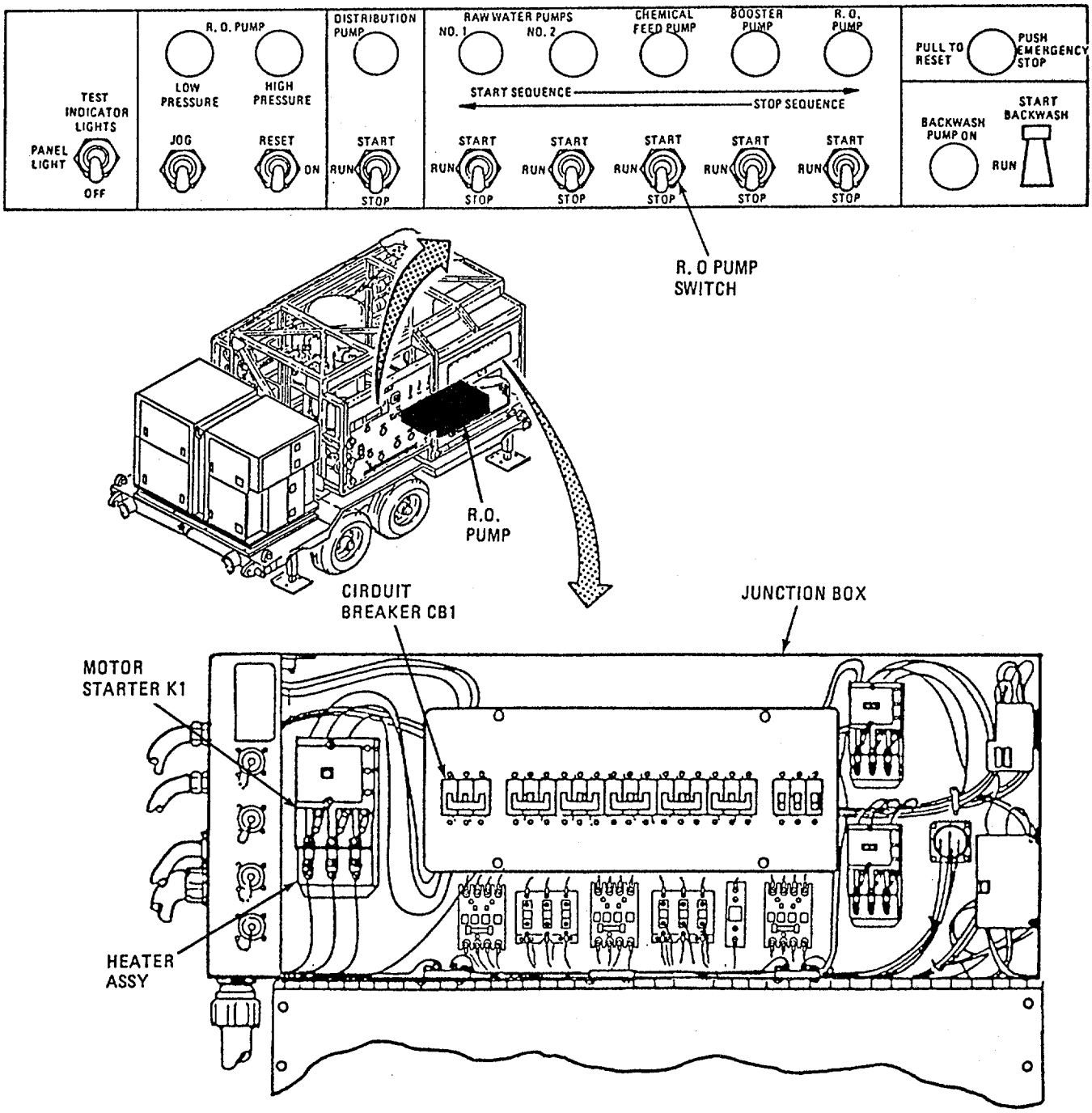


Table 3-1. Direct Support Troubleshooting- continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 6. Shut down power at generator and 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 3-61) and reset heater assembly.

b. If continuity is absent through CB1, replace CB1. Refer to Paragraph 3-53.

c. If continuity is absent through K1 (see above note) replace motor starter. Refer to Paragraph 3-61.

d. If continuity is absent through wires, tighten loose connections or' replace defective wire.

Table 3-1. Direct Support Troubleshooting- continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

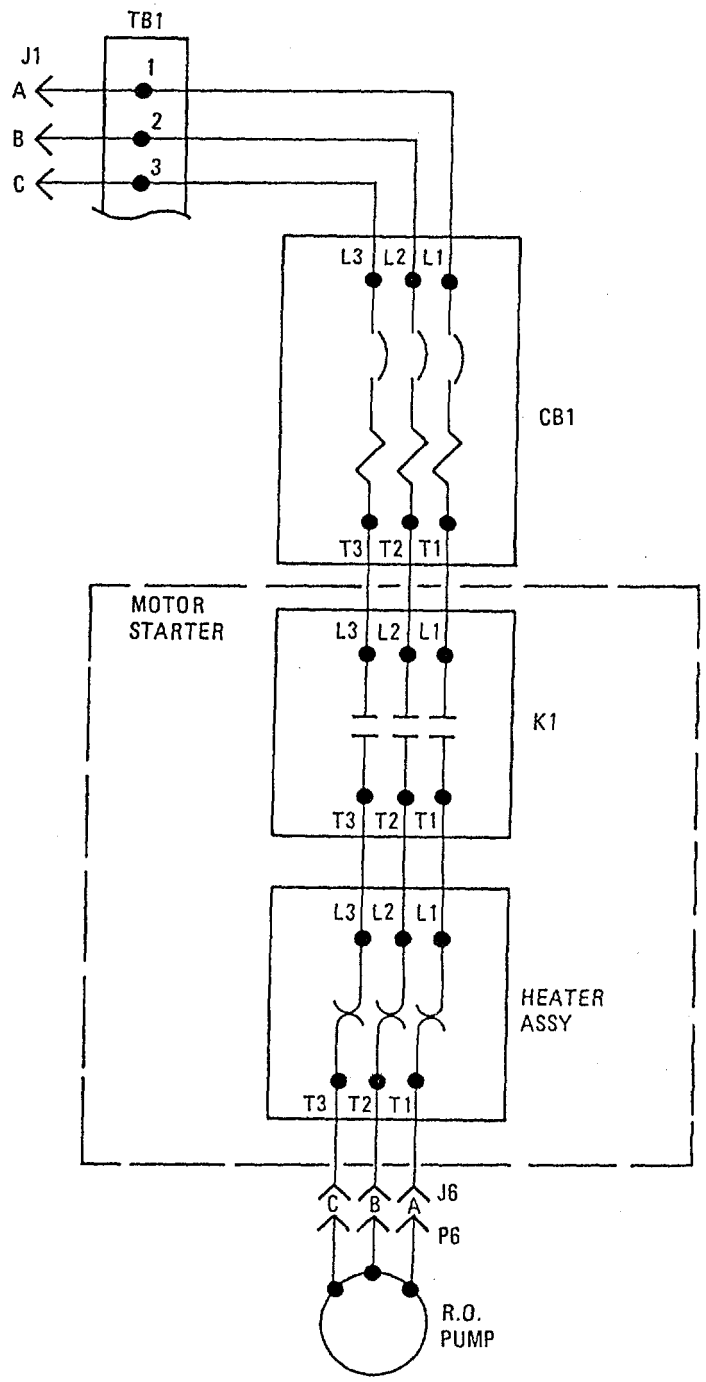


Table 3-1. Direct Support Troubleshooting- continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 7. Disconnect cable assembly at pump motor and check it for continuity (Paragraph 2-54).

a. If continuity does not exist, repair cable assembly. Refer to Paragraph 3-26.

b. If continuity exists, repair motor. Refer to Paragraph 3-43.

Step 8. Check for continuity of control circuits 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(C)	-	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)	-	K11(A1) (See note above)
J1(N)	-	K1(A2)
KI(A1)	-	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 3-49.

b. If continuity does not exist through CB9 (CB ON), replace it. Refer to Paragraph 3-53.

c. If continuity does not exist through heater assembly, replace heaters (Paragraph 3-61) and reset heater assembly.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

d. If continuity does not exist through K1 (contacts 2-3) with K1closed or 90-120 Ohms is not measured between A1 and A2, replace motor starter. Refer to Paragraph 3-61.

e. If continuity does not exist through cable assembly, W52, repair cable assembly. Refer to Paragraph 3-27.

f. If continuity does not exist through relays K8 or K9, replace defective relay. Refer to Paragraph 3-53.

g. If continuity does not exist through wires or cables, replace defective wire and/or tighten loose connections.

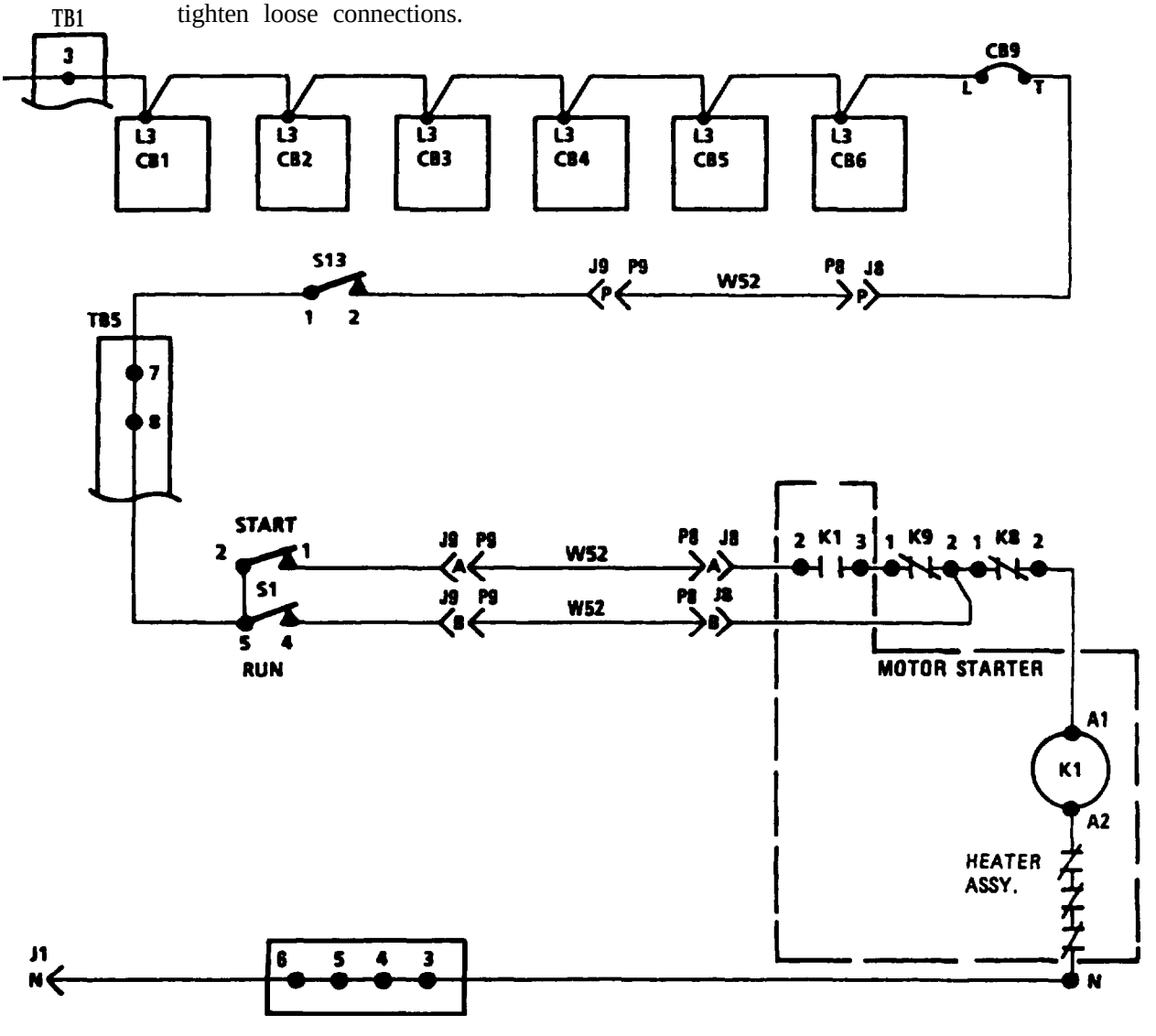


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

2. **REVERSE OSMOSIS (R.O.) PUMP STOPS AND/OR FAILS TO START (Models WPES-20 and H-9518-2).**

WARNING

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

Step 1. Check if circuit breaker CB 1 and/or heater assembly are tripped. TRIPPED window will show white if tripped.

If circuit breaker or heater assembly is tripped, go to Malfunction 3, 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 1100 psi, replace high pressure switch, S10. Refer to Paragraph 2-58.

b. If DS9 is ON at operating pressure of 10 psi or above, replace low pressure switch, S9. Refer to Paragraph 2-57.

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. Shut down power at pump switch and disconnect R.O. pump cable at J6 (back ofjunction box). Momentarily flip pump switch to START and check for 208 VAC, three phase power at connector, J6.

b. If voltage is measured in all three tests (A-B, A-C and B-C), go to step 7.

Table 3-1. Direct Support Troubleshooting- continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

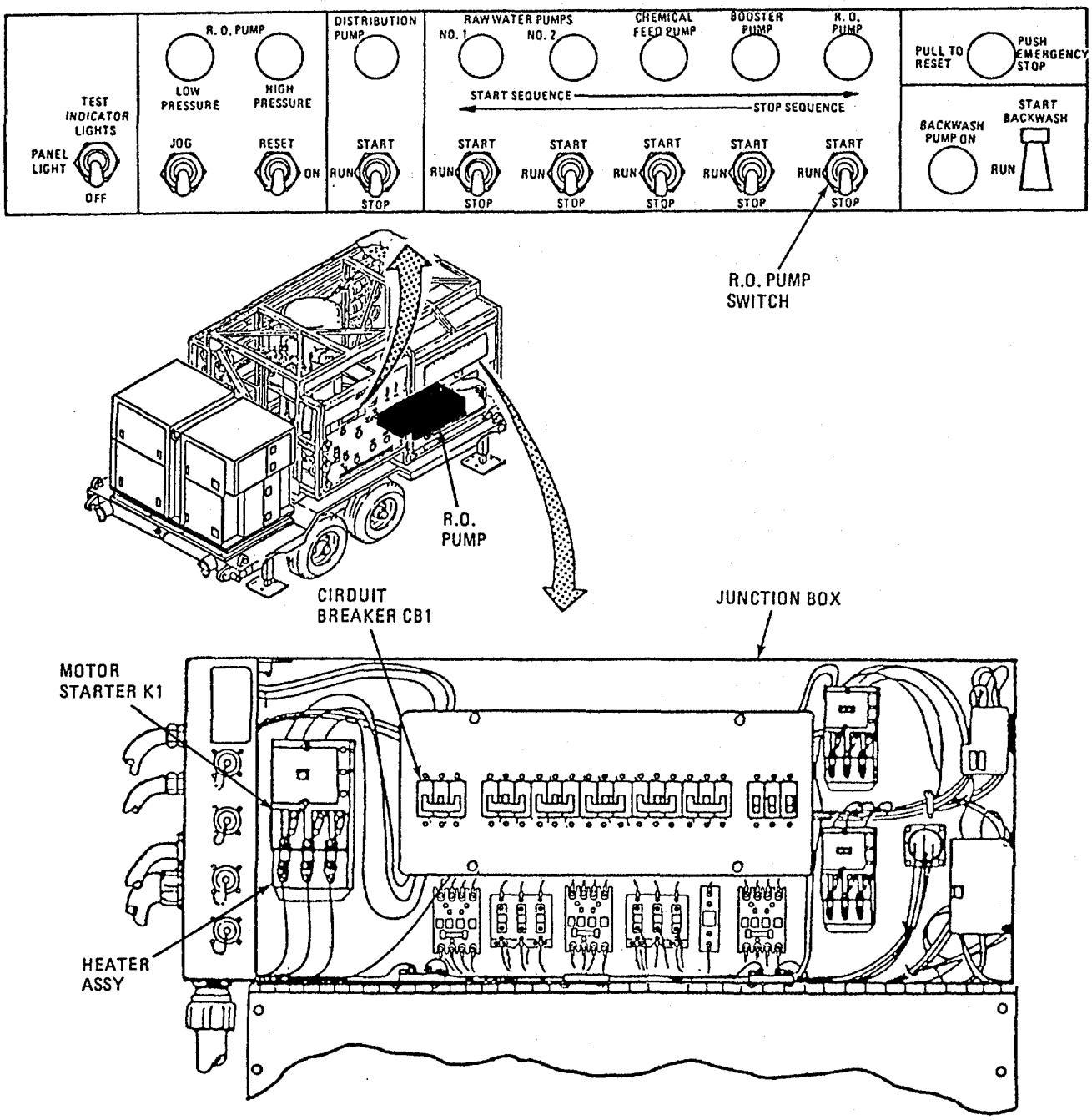


Table 3-1. Direct Support Troubleshooting- continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 6. Shut down power source and 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 3-61) and reset heater assembly.

b. If continuity is absent through CB1, replace CB1. Refer to Paragraph 3-53.

c. If continuity is absent through relay K1 (see above note) replace motor starter. Refer to Paragraph 3-61.

d. If continuity is absent through wires, tighten loose connections or replace defective wire.

Table 3-1. Direct Support Troubleshooting- continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

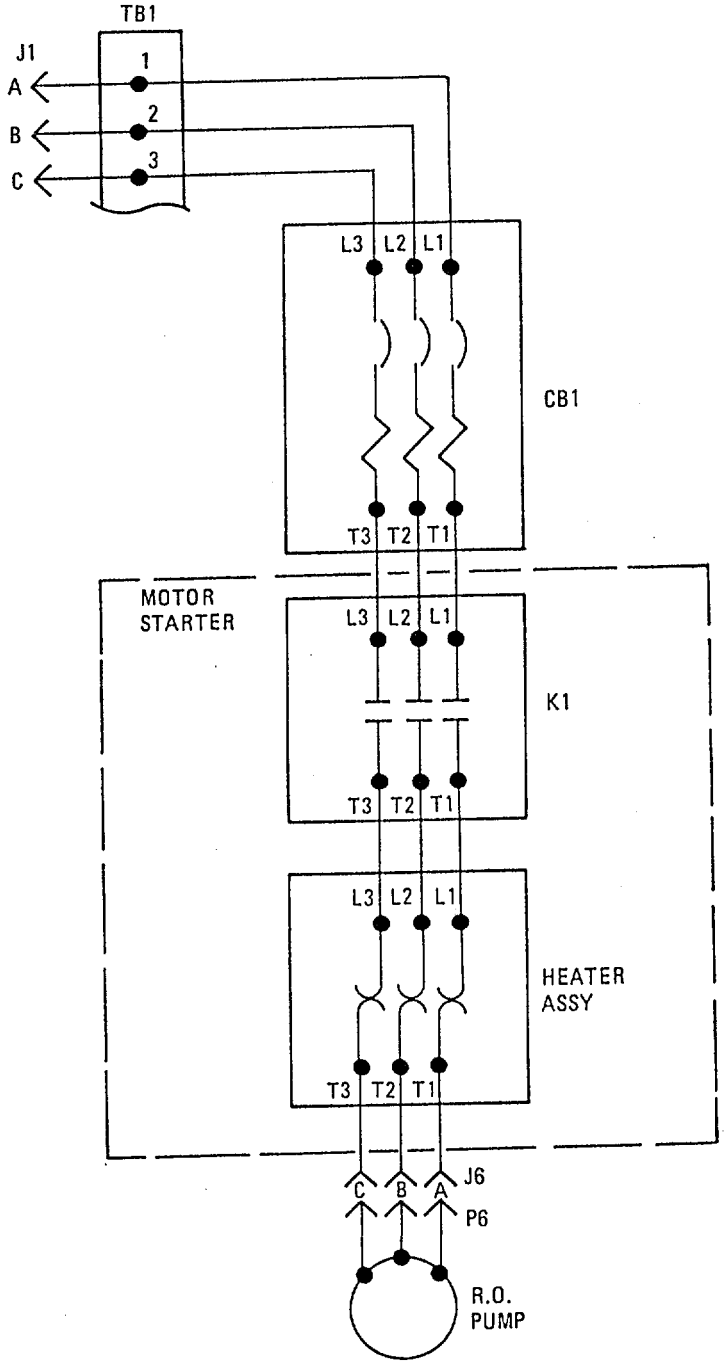


Table 3-1. Direct Support Troubleshooting- continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 7. Disconnect cable assembly at pump motor (Paragraph 2-54) and check it for continuity.

a. If continuity does not exist, repair cable assembly. Refer to Paragraph 3-26.

b. If continuity exists, repair motor. Refer to Paragraph 3-43.

Step 8. Check for continuity of control circuits 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.

J10(C)	-	J8(P)
J9(P)	-	J9(A) and(B)
(A)	-	P8(A)
P9(B)	-	P8(B)
P9(P)	-	P8(P)
J8(A)	-	K1(2)
J8(B)	-	K9(2)
K1(2)	-	K11(A1) (See note above)
J1(N)	-	K1(A2)
J10(N)	-	K1(A2)
K1(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 3-49.

b. If continuity does not exist through CB9 (CB ON), replace it. Refer to Paragraph 3-53.

c. If continuity does not exist through heater assembly, replace heaters (Paragraph 3-61) and reset heater assembly.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
REVERSE OSMOSIS (R.O) PUMP ASSEMBLY - continued

d. If continuity does not exist through K1 (contacts 2-3) with K1 closed or 90-120 Ohms is not measured between Al and A2, replace motor starter. Refer to Paragraph 3-61

e. If continuity does not exist through cable assembly, W52, repair cable assembly. Refer to Paragraph 3-27.

f. If continuity does not exist through relays K8 or K9, replace defective relay. Refer to Paragraph 3-53.

g. If continuity does not exist through wires or cables, replace defective wire and/or tighten loose connections.

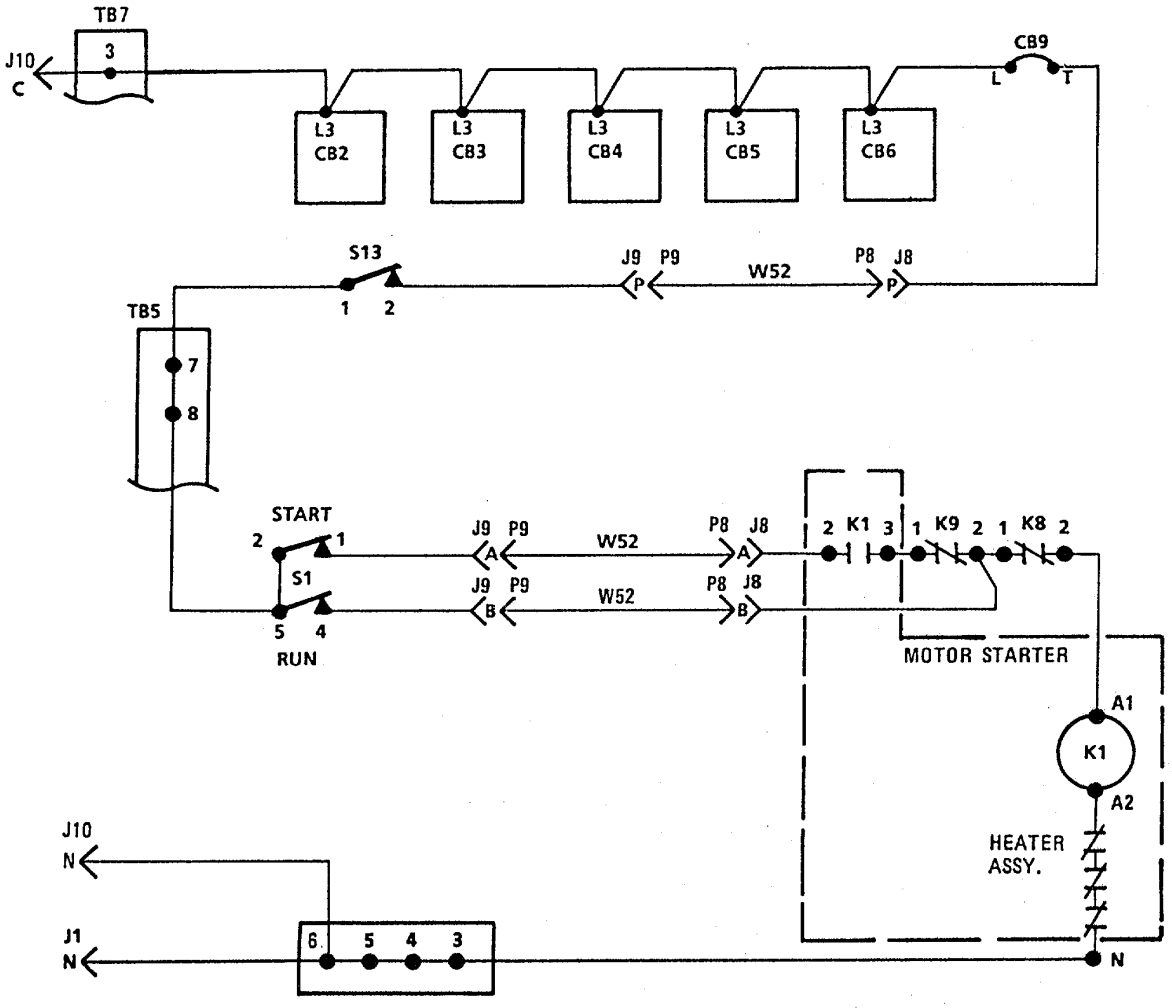


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
REVERSE OSMOSIS (R.O) PUMP ASSEMBLY - continued

3. REVERSE OSMOSIS (R.O.) PUMP CIRCUIT BREAKER (CB1) 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Remove power at power source, reset CBl/heater assembly and disconnect wires on CB1 output terminals (T1 , T2 and T3).

Step 2. Turn on power at power source and momentarily flip pump switch to START.

If circuit breaker trips, check for bare or disconnected wires between power source and CB1 and repair or replace it. If trouble persists, replace CB1. Refer to Paragraph 3-53.

Step 3. Remove power at power source, reconnect wires to circuit breaker and disconnect R.O. motor pump cable assembly at J6 (back of junction box).

Step 4. Turn on power at power source and momentarily flip pump switch to START.

If heater assembly trips, turn off power at power source and check for defective heaters. Replace as necessary (Paragraph 3-61). If trouble persists, replace motor starter. Refer to Paragraph 3-61.

Step 5. Disconnect cable assembly at R.O. pump motor and check it for shorts.

a. If shorted, repair power cable assembly. Refer to Paragraph 3-26.

b. If cable assembly is not shorted, repair pump motor. Refer to Paragraph 3-43.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

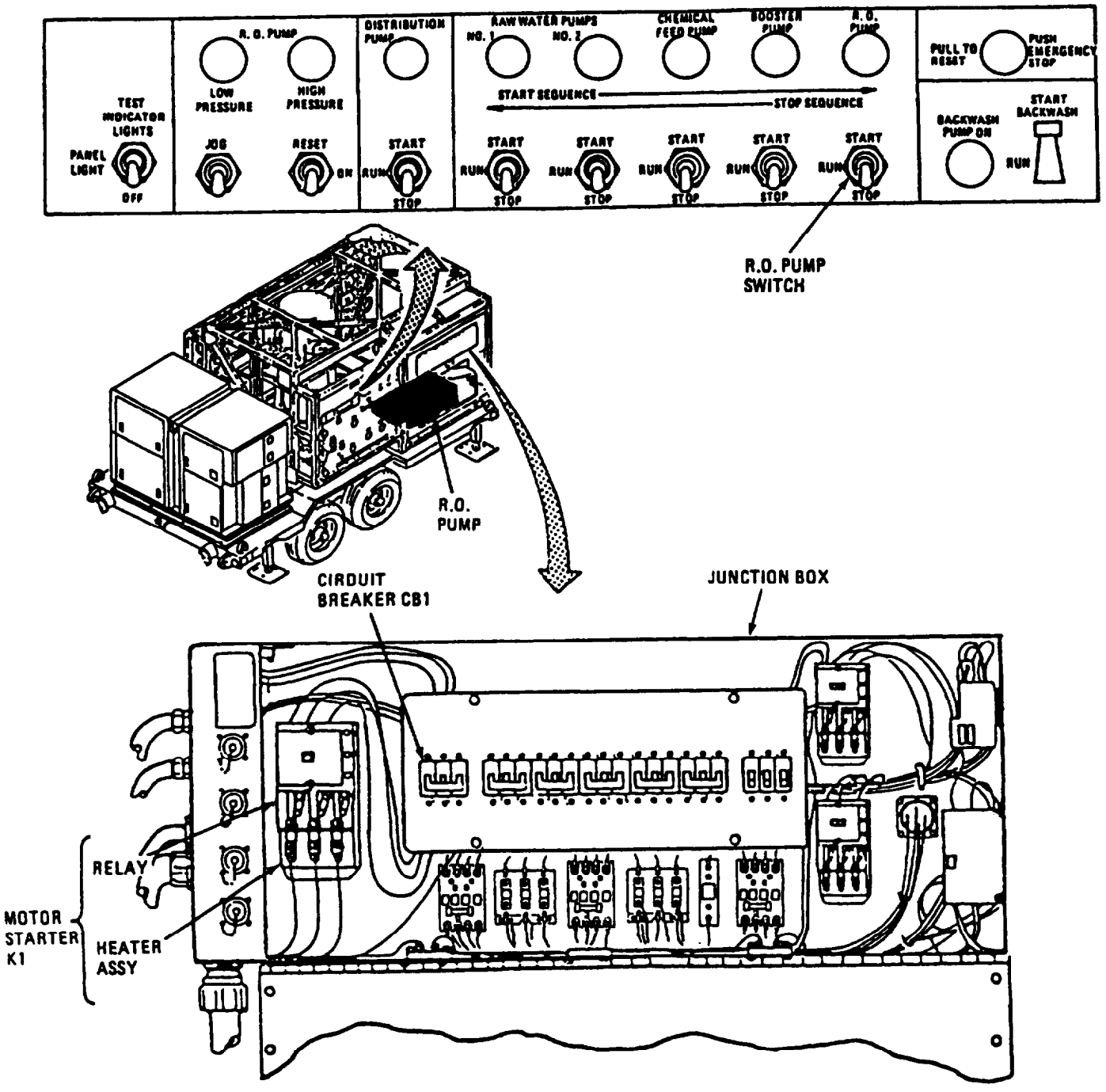


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

4. **UNABLE TO JOG REVERSE OSMOSIS (R.O.) PUMP (Models WPES-10, H-951&1, WPES-30 and H-9518-2).**

WARNING

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

Step 1. Check if circuit breaker, CB1 and/or heater assembly are tripped. TRIPPED window will show white if tripped.

If either one or both are tripped, go to Malfunction 3, R.O. 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. Turn off power at pump switch and disconnect pump cable at J6 (back of junction box). Check if 208 VAC, three phase power is available at J6 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. Turn off generator and check power circuit for continuity as follows. Make additional point-to-point continuity 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 CB1 is open (CB1 ON), replace CB1. Refer to Paragraph 3-53.

b. If K1 is open, replace motor starter. Refer to Paragraph 3-61.

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 3-61) and reset heater assembly.

d. If wires are open, replace defective wire and/or tighten loose connections.

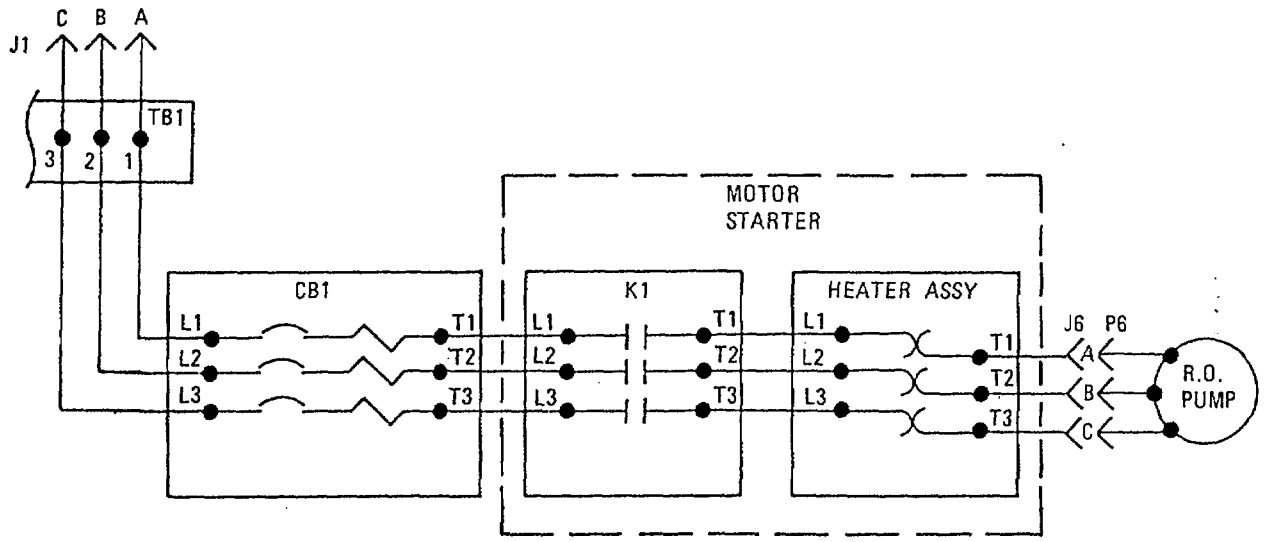


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
REVERSE OSMOSIS (R.O) PUMP ASSEMBLY - continued

Step 6. Disconnect pump cable assembly at pump motor and perform continuity check of R.O. cable assembly. Refer to Paragraph 3-26.

a. If cable assembly is open, repair it. Refer to Paragraph 3-26.

b. If cable assembly is not open, repair pump motor. Refer to Paragraph 3-43.

Step 7. Turn off power at generator and 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)
J9(M)	-	K1(A2)
K1(A1)	-	K1(A2) (90 - 120 Ohms)
J1(N)	-	KI(A1)

a. If switches, S13 or S12 are defective (switches ON), replace them. Refer to Paragraph 3-49.

b. If CB9 is open (CB9 ON), replace CB9. Refer to Paragraph 3-53.

c. If cable assembly, W52 is defective, repair it. Refer to Paragraph 3-27.

d. If relay K1 is open and/or 90-120 Ohms is not measured between Al and A2, replace motor starter. Refer to Paragraph 3-61.

e. If heater assembly is open, replace defective heaters (Paragraph 3-61) and reset heater assembly.

f. If wires are open, tighten loose connections or replace defective wire.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

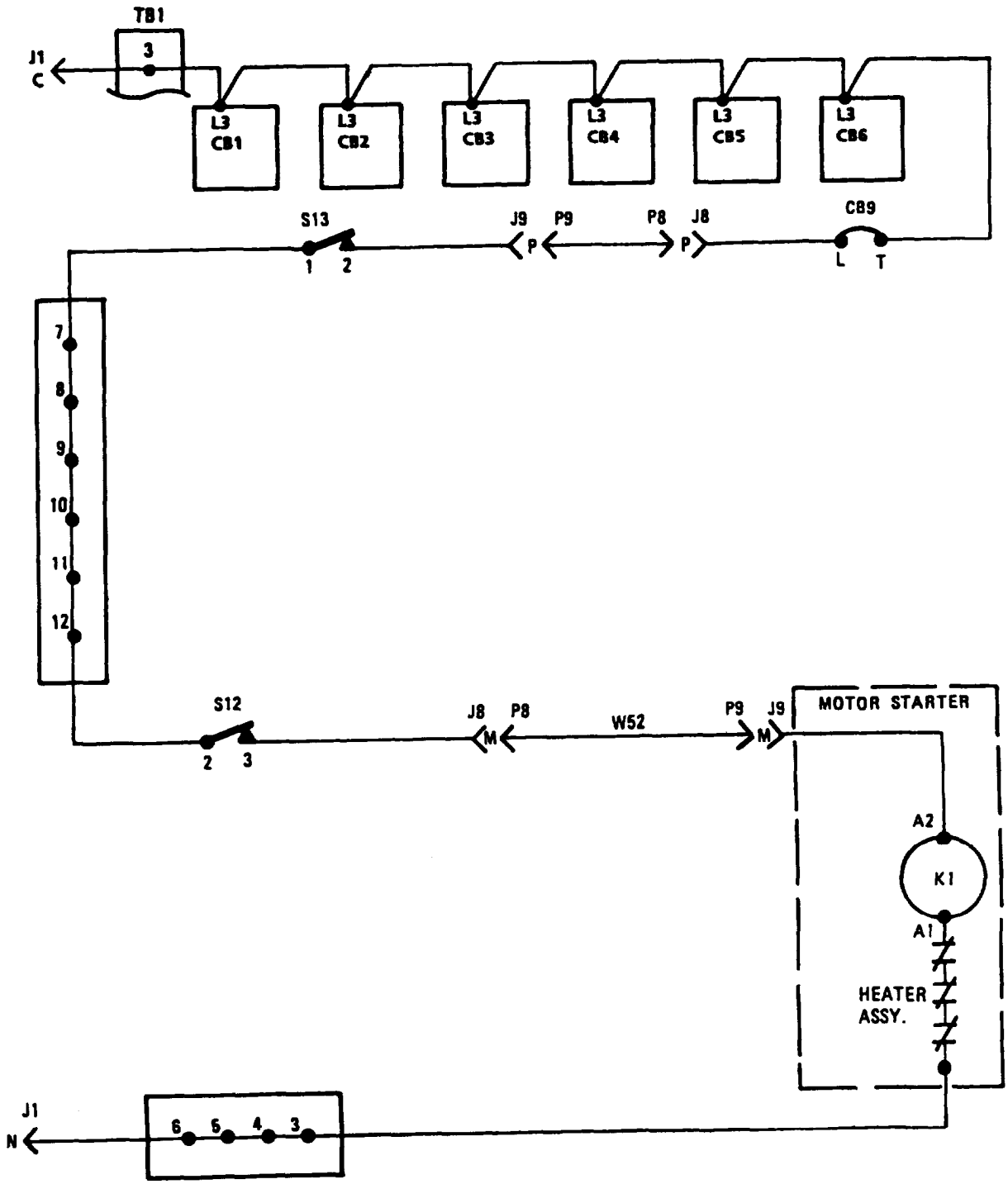


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

REVERSE OSMOSIS (R.O.) PUMP ASSEMBLY - continued

5. UNABLE TO JOG REVERSE OSMOSIS (R.O.) PUMP (Models WPES-20 and H-9518-2).

WARNING

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

Step 1. Check if circuit breaker, CB 1 and/or heater assembly are tripped. TRIPPED window will show white if tripped.

If either one or both are tripped, go to Malfunction 3, R.O. 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. Turn off power at pump switch and disconnect pump cable at J6 (back ofjunction box). Check if 208 VAC, three phase power is available at J6 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. Turn off power source and check power circuit for continuity as follows. Make additional point-to-point continuity 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 CB 1 is open (CB 1 ON), replace CB 1. Refer to Paragraph 3-53.

b. If K1 is open, replace motor starter. Refer to Paragraph 3-61.

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 3-61) and reset heater assembly.

d. If wires are open, replace defective wire and/or tighten loose connections.

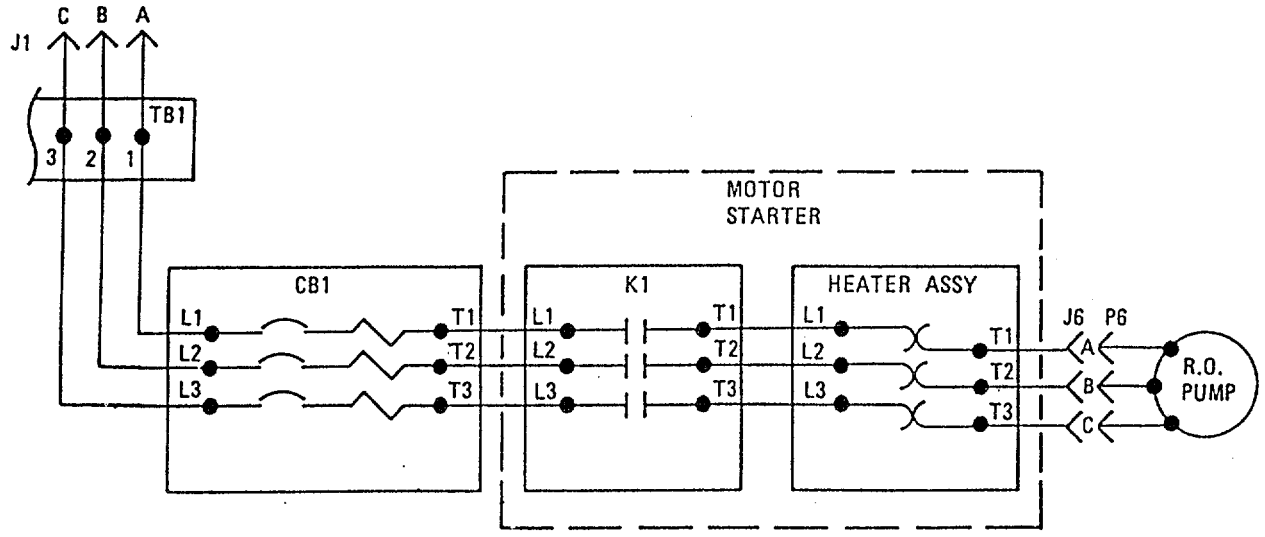


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
REVERSE OSMOSIS (R.O) PUMP ASSEMBLY - continued

Step 6. Disconnect pump cable assembly at pump motor and perform continuity check of R.O. pump motor cable assembly. Refer to Paragraph 3-26.

a. If pump motor cable assembly is open, repair it. Refer to Paragraph 3-26.

b. If pump motor cable is not defective, repair pump motor. Refer to Paragraph 3-43.

Step 7. Turn off power at power source and check jog circuit for continuity as follows: make additional point-to-point continuity checks as necessary to isolate faulty component.

J10(C)	-	P8(P)
J9(P)	-	J9(M)
P9(P)	-	P8(P)
P9(M)	-	P8(M)
J8(M)	-	K1(A2)
K1(A1)	-	K1(A2) (90 - 120Ohms)
J1O(N)	-	Kl(A1)
J1(N)	-	Kl(A1)

a. If switches, S13 or S12 are defective (switches ON), replace them. Refer to Paragraph 3-49.

b. If CB9 is open (CB9 ON), replace CB9. Refer to Paragraph 3-53.

c. If cable assembly, W52 is defective, repair it. Refer to Paragraph 3-27.

d. If relay K1 is open and/or 90-120 Ohms is not measured between Al and A2, replace motor starter. Refer to Paragraph 3-61.

e. If heater assembly is open, replace defective heaters (Paragraph 3-61) and reset heater assembly.

f. If wires are open, tighten loose connections or replace defective wire.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
REVERSE OSMOSIS (R.O) PUMP ASSEMBLY - continued

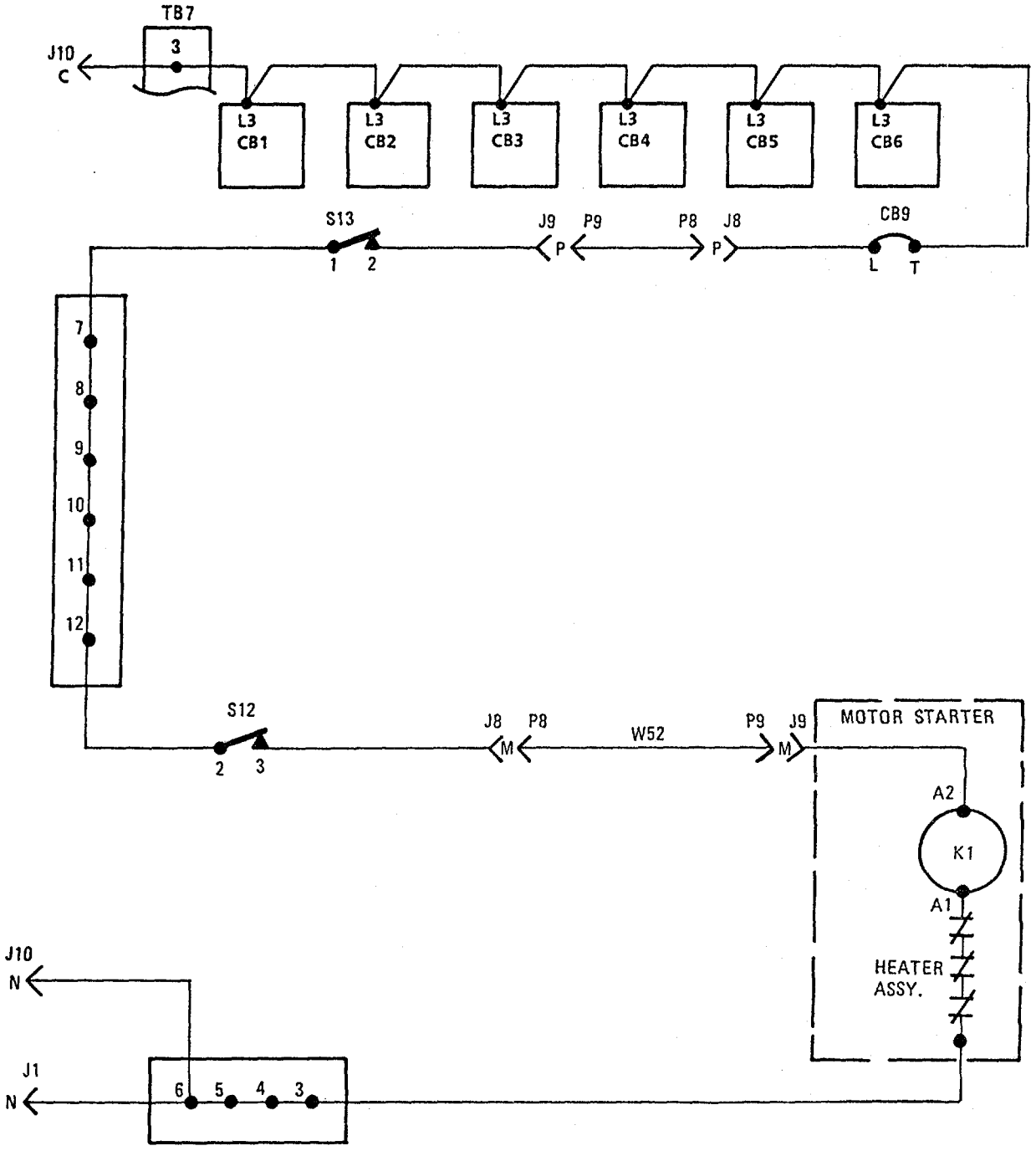


Table 3-1. Direct Support Troubleshooting - continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Check if circuit breaker CB3 and/or heater assembly are tripped. Heater assembly is tripped if resistance is felt when reset plunger is pushed in.

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 7.

Step 4. Turn off power off at pump switch and disconnect pump at junction box. Momentarily flip pump switch to START and check for three phase power at RAW WATER PUMP NO. 1 connector, J3.

If voltage is measured, go to step 6.

Step 5. Turn power off at power source and 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 3-61) and reset heater assembly.

b. If continuity is absent through relay K3 (see above note), replace motor starter. Refer to Paragraph 3-61.

c. If continuity is absent through CB3 (CB3 ON), replace CB3. Refer to Paragraph 3-53.

d. If continuity is absent through wires, tighten loose connections and/or replace defective wire.

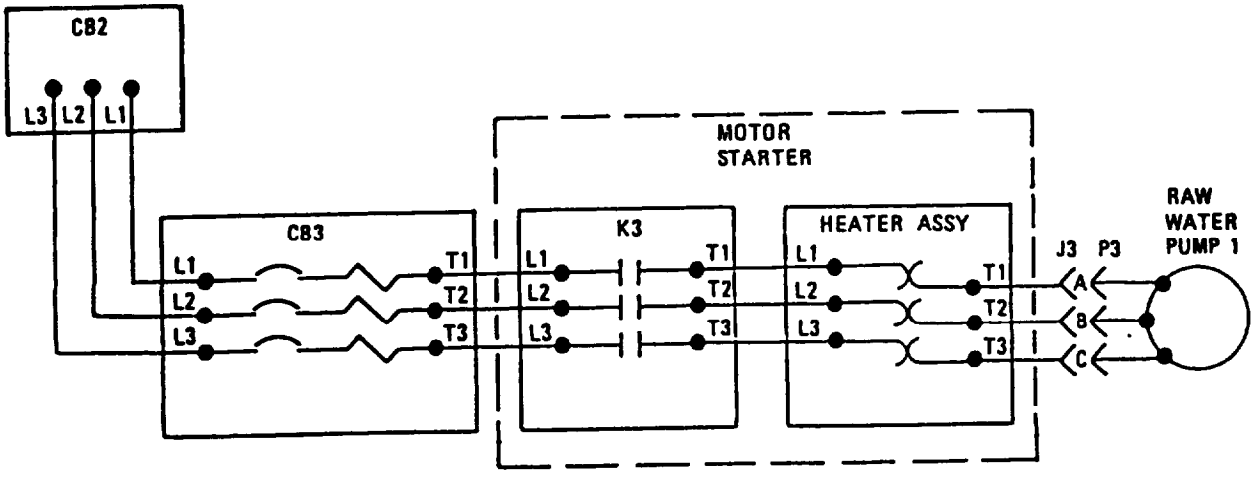


Table 3-1. Direct Support Troubleshooting-continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 6. Disconnect cable assembly at pump motor (Paragraph 2- 19) and check it for continuity.

a. If open, repair pump cable assembly. Refer to Paragraph 3-11.

b. If pump cable assembly is not open repair centrifugal pump. Refer to Paragraph 3-12.

Step 7. Disconnect power at power source and check for continuity through control circuit as follows. Make additional point-to-point continuity checks as necessary to find faulty 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) (90-120 ohms)
J1(N)	K3-(A1)
J10(N)	K3(A1) (Models WPES-20 and H-9518-2)

a. If switch S13 or S3 is open (switches ON) replace it. Refer to Paragraph 3-49.

b. If continuity does not exist through CB9 (CB9 ON), replace CB9. Refer to Paragraph 3-53.

c. If cable assembly, W52 is open, repair cable assembly. Refer to Paragraph 3-27.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 1

d. If continuity is not measured through heater assembly, replace defective heaters (Paragraph 3-53) and reset heater assembly.

e. If continuity does not exist through K3 contacts (2-3) and/or 90-120 Ohms is not measured from A2 to Al, replace motor starter. Refer to Paragraph 3-61.

f. If continuity is absent through wiring, tighten loose connections and/or replace defective wires.

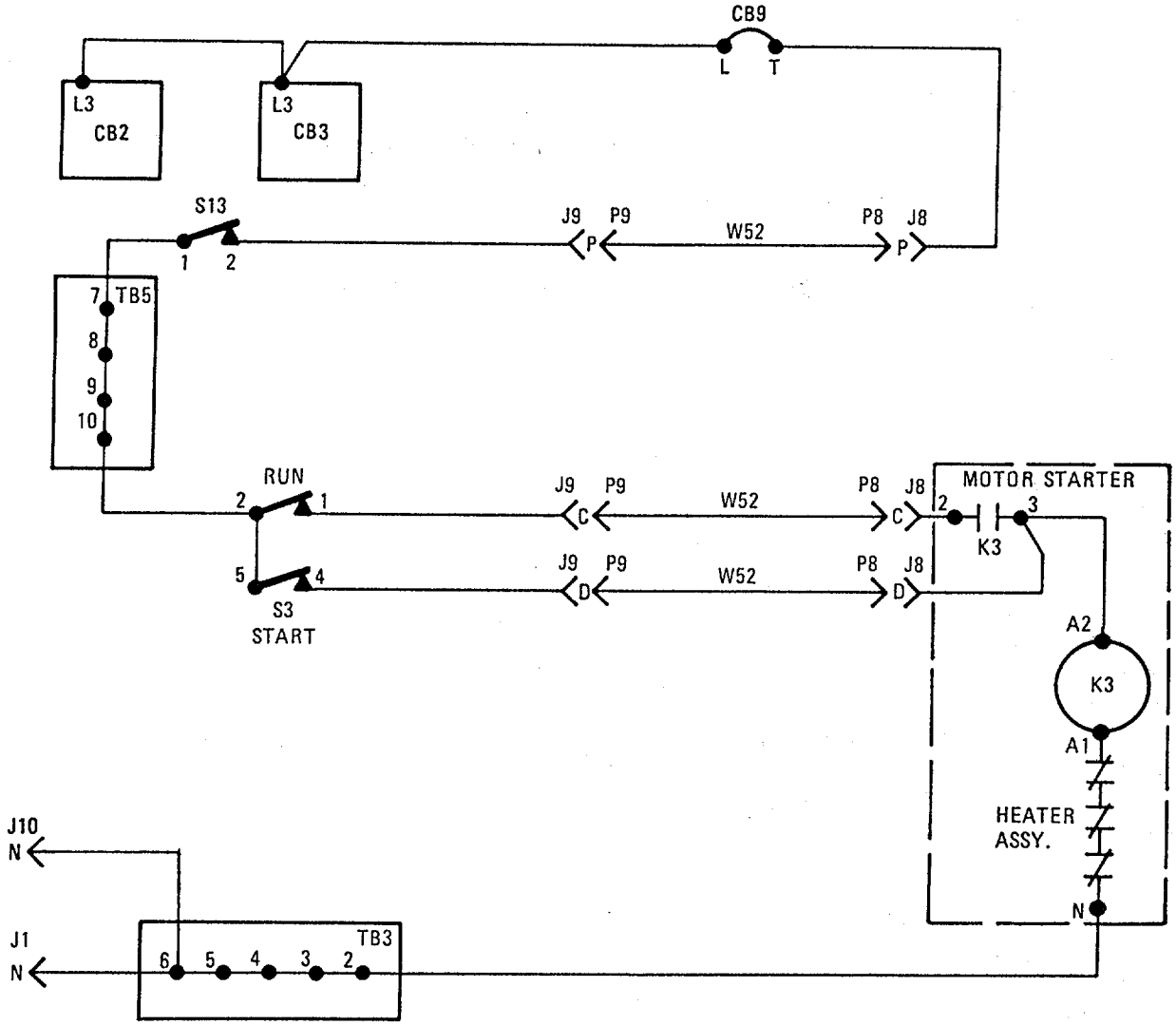


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 1

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Remove power at power source, reset CB3 and disconnect wires from T1, T2 and T3 of CB3.

Step 2. Turn on power at power source and momentarily flip pump switch to START.

If circuit breaker CB3 trips, check for bare/disconnected wires in junction box and tighten/replace them. If trouble persists, replace CB3. Refer to Paragraph 3-53.

Step 3. Remove power at power source, reconnect wires to CB3 and disconnect pump at junction box connector, J3.

Step 4. Turn on power at power source and momentarily flip pump switch to START.

If heater assembly is tripped (TRIPPED window will show white if tripped). Check for defective heaters, replace as necessary (Paragraph 3-53) and reset heater assembly.

Step 5. Remove power at power source.

Step 6. Disconnect cable assembly at raw water pump motor and check it for shorts (Paragraph 2-19).

a. If a short is indicated, repair cable assembly. Refer to Paragraph 3-11.

b. If pump cable assembly is not shorted, repair centrifugal pump. Refer to Paragraph 3-12.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 1

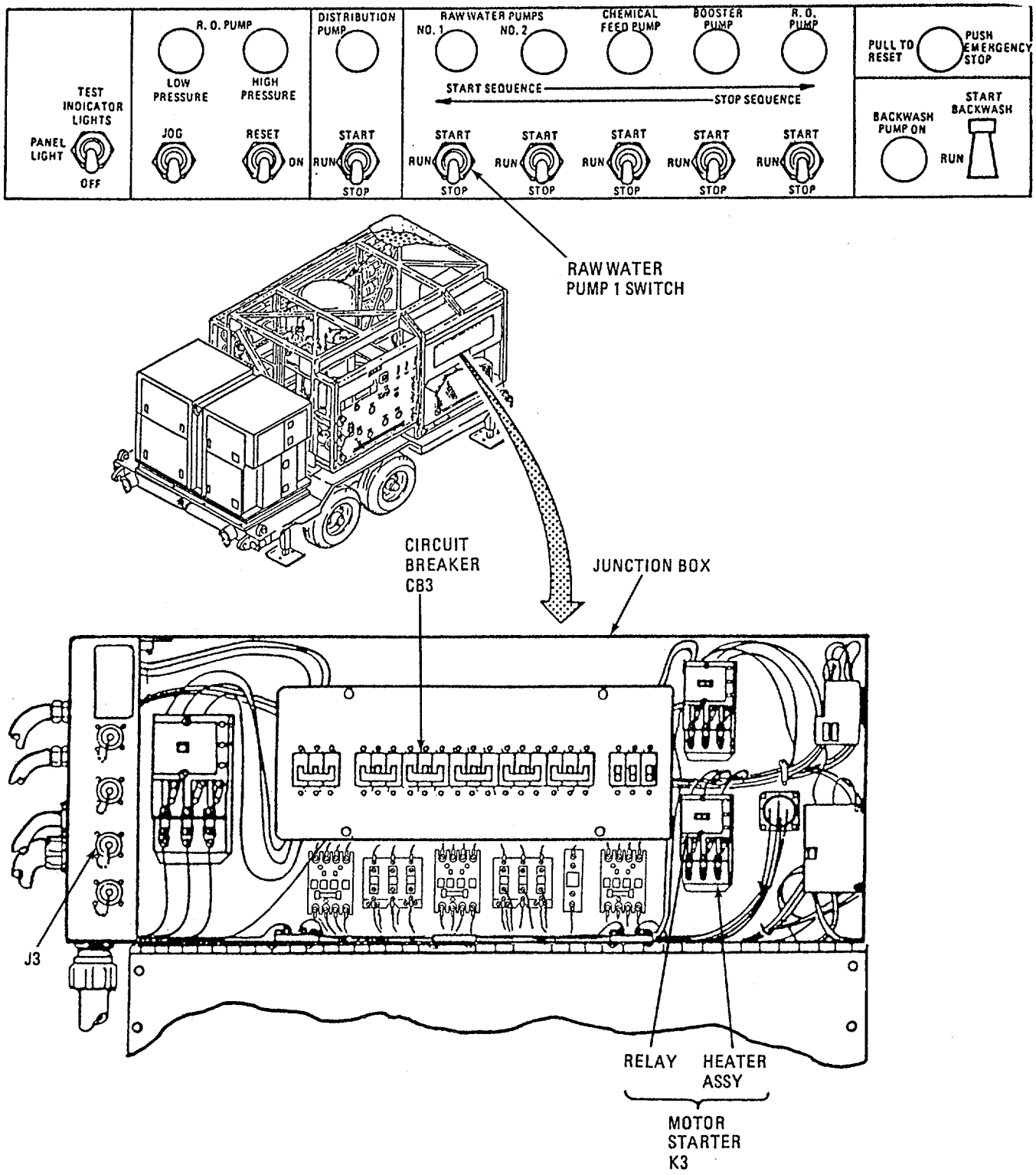


Table 3-1. Direct Support Troubleshooting - continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Check if circuit breaker CB4 and/or heater assembly are tripped. Heater assembly is tripped if resistance is felt when reset plunger is pushed in.

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 7.

Step 4. Turn off power at pump switch and disconnect pump at junction box. Momentarily flip pump switch to START and check for three phase power at RAW WATER PUMP NO. 2 connector, J4.

If voltage is measured, go to step 6.

Step 5. Turn power off at power source and 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.

L1, CB3	-	J4(A)
L2, CB3	-	J4(B)
L3, 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 3-61) and reset heater assembly,

b. If continuity is absent through K4 (see above note), replace motor starter. Refer to Paragraph 3-61.

c. If continuity is absent through CB4 (CB4 ON), replace CB4. Refer to Paragraph 3-53.

d. If continuity is absent through wires, tighten connections and/or replace defective wire.

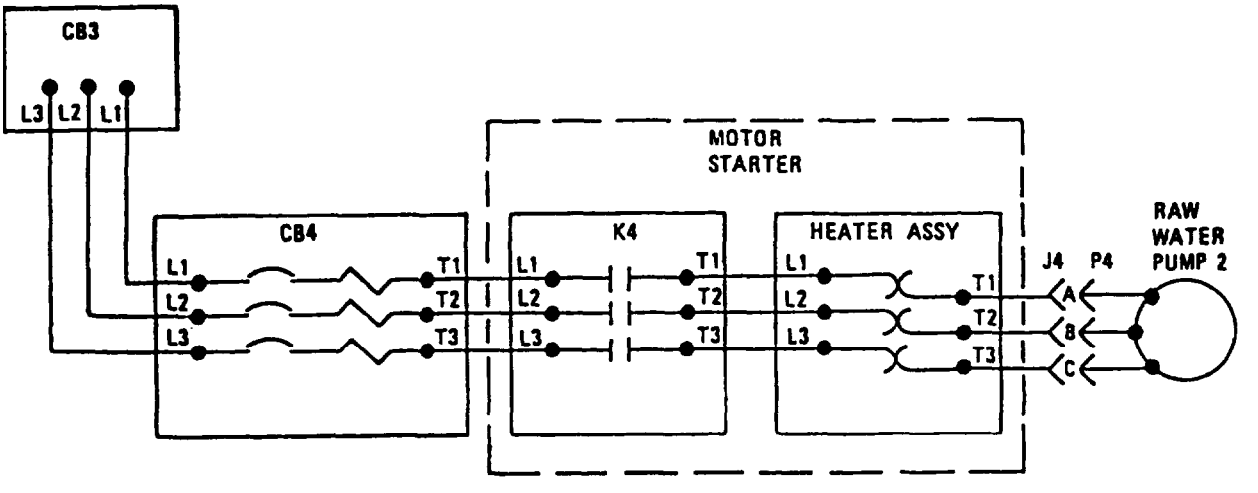


Table 3-1. Direct Support Troubleshooting-continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 6. Disconnect cable assembly at pump motor (Paragraph 2-19) and check it for continuity.

a. If open, repair pump cable assembly. Refer to Paragraph 3-11.

b. If pump cable is not defective, repair centrifugal pump. Refer to Paragraph 3-12.

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)
J1(N)	K4(A1)
J1(N)	K4(A1) (Models WPES-20 and H-9518-2)

a. If switch S13 or S4 is open (switches ON), replace it. Refer to Paragraph 3-49.

b. If continuity does not exist through CB9 (CB9 ON), replace CB9. Refer to Paragraph 3-53.

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 3-61.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

RAW WATER PUMP ASSEMBLY NO. 2

d. If continuity is not measured through heater assembly, replace defective heater (Paragraph 3-53) and reset heater assembly.

e. If continuity is absent through wires, tighten loose connections or replace defective wire.

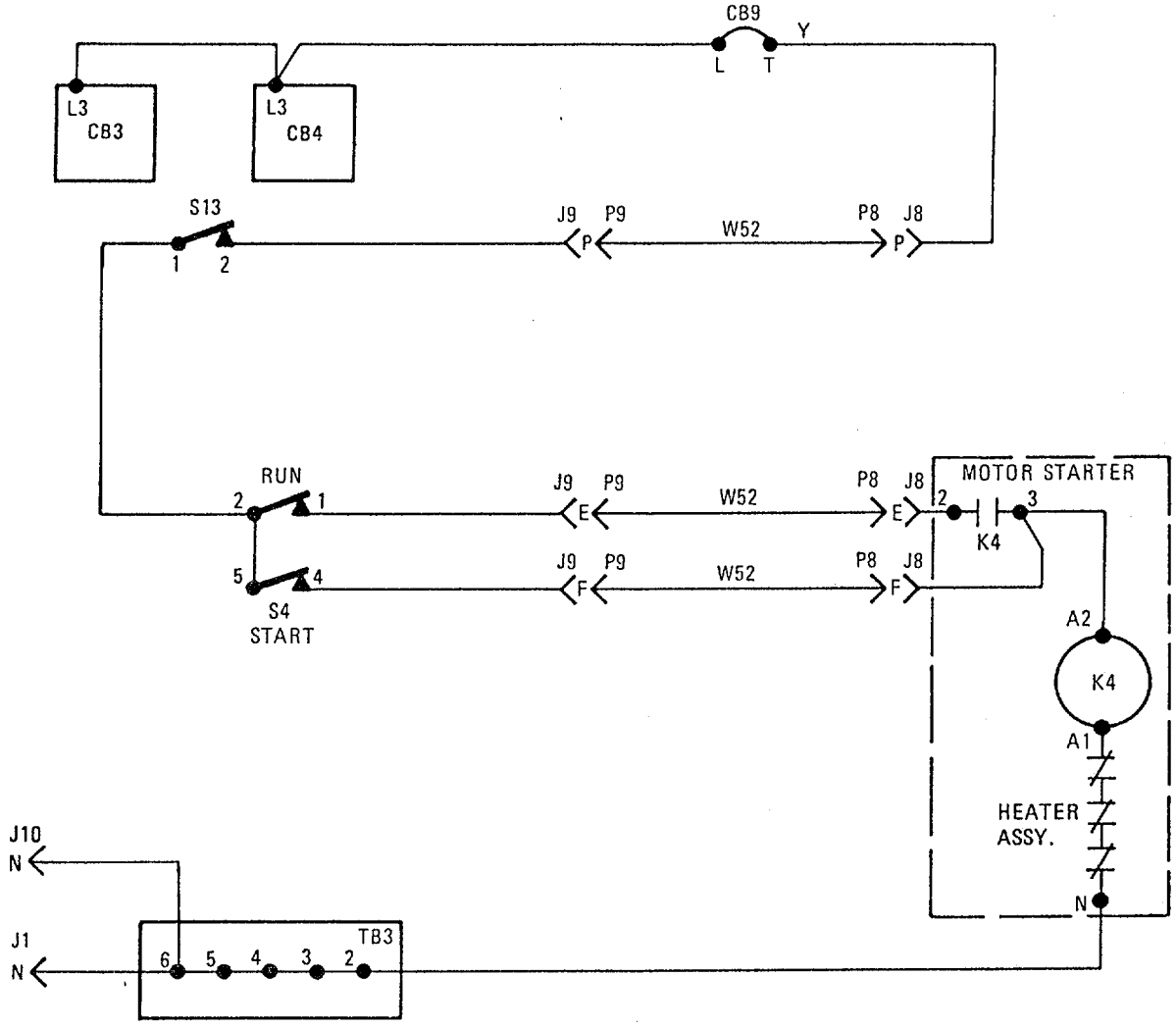


Table 3-1. Direct Support Troubleshooting - continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 1. Remove power at power source, reset CB4 and/or heater assembly and disconnect wires from T1, T2 and T3 of CB4.

Step 2. Turn on power at power source and momentarily flip pump switch to START.

If circuit breaker CB4 trips (TRIPPED window will show white if tripped), check for bare/disconnected wires in junction box and tighten/replace them. If trouble persists, replace CB4. Refer to Paragraph 3-53.

Step 3. Remove power at power source, reconnect wires to CB4 and disconnect pump at junction box, J4.

Step 4. Turn on power at power source and momentarily flip pump switch to START.

If heater assembly is tripped, check for defective heaters, replace as necessary (Paragraph 3-61) and reset heater assembly.

Step 5. Remove power at power source.

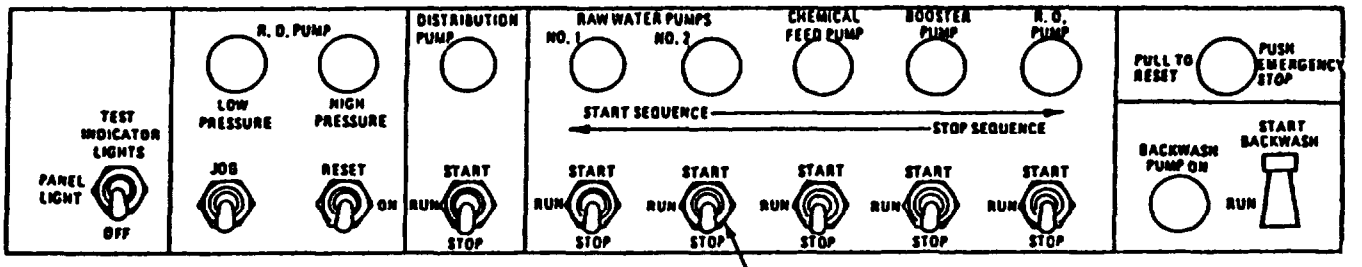
Step 6. Disconnect cable assembly at raw water pump motor (Paragraph 2-19) and check it for shorts.

a. If a short is indicated, repair cable assembly. Refer to Paragraph 3-'i1.

b. If cable assembly is not shorted, repair pump. Refer to Paragraph 3,-12

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
RAW WATER PUMP ASSEMBLY NO. 2 - continued



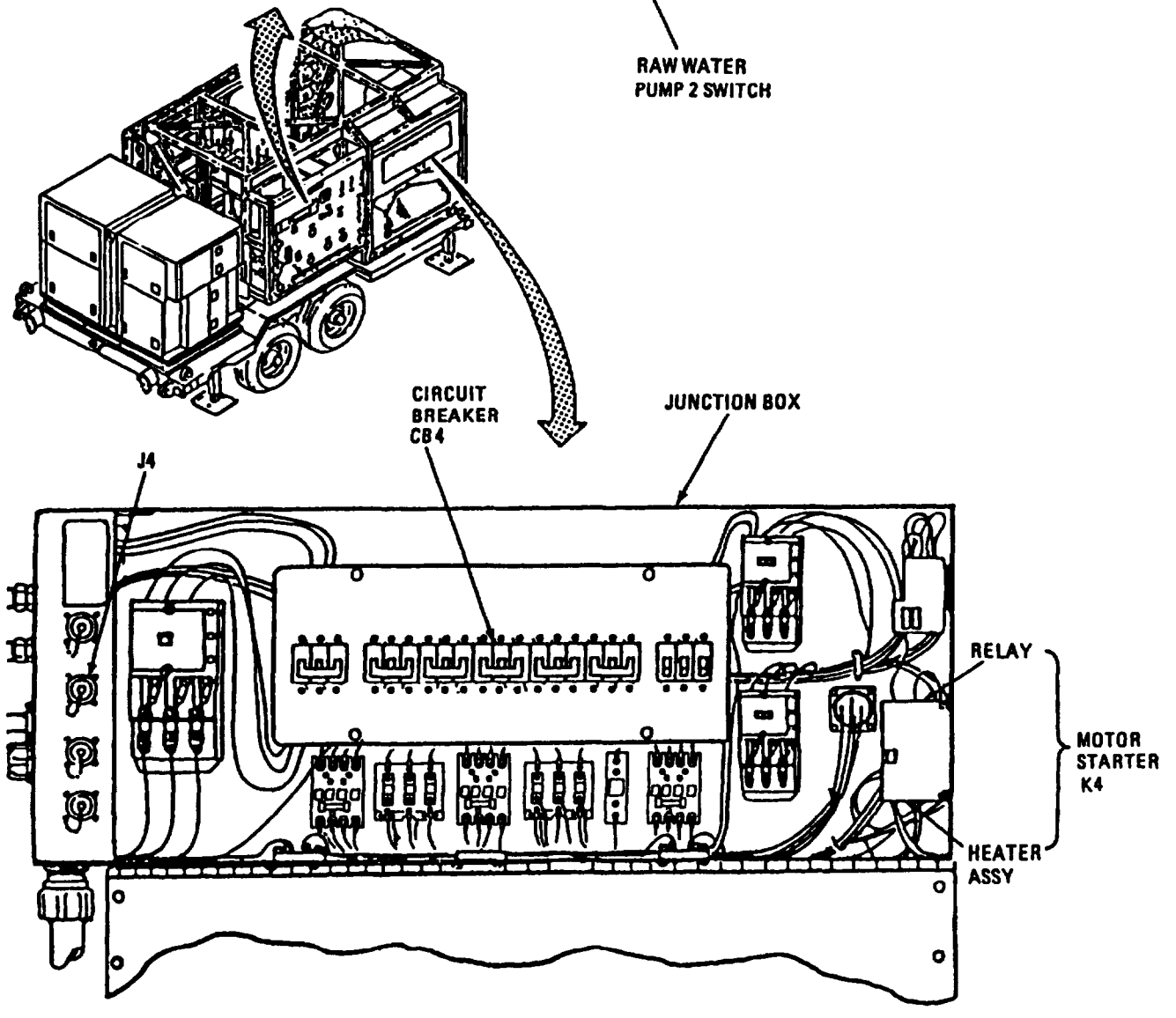


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY

1. BACKWASH PUMP STOPS AND/OR FAILS TO START (R.O. ELEMENT CLEANING - Models WPES-10, H-9518-1, WPES-30 and H-9518-3).

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.

Step 1. Check if circuit breaker CB2 and/or heater assembly are tripped. TRIPPED window will show white if tripped.

If circuit breaker or heater assembly is tripped, go to Malfunction 5, 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. Turn pump off at pump switch and disconnect backwash pump at junction box connector. Flip pump switch to START and release. 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. Turn power off at power source and perform a continuity check of power circuits 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	-	J2(C)
L2,CB1	-	J2(B)
L1,CB1	-	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 (Paragraph 3-53) and reset heater assembly.

b. If continuity is absent through CB2 (CB2 ON), replace CB2. Refer to Paragraph 3-53.

c. If continuity is absent through K2 (see above note), replace motor starter. Refer to Paragraph 3-61.

d. If continuity is absent through wires, tighten connections and/or replace defective wire.

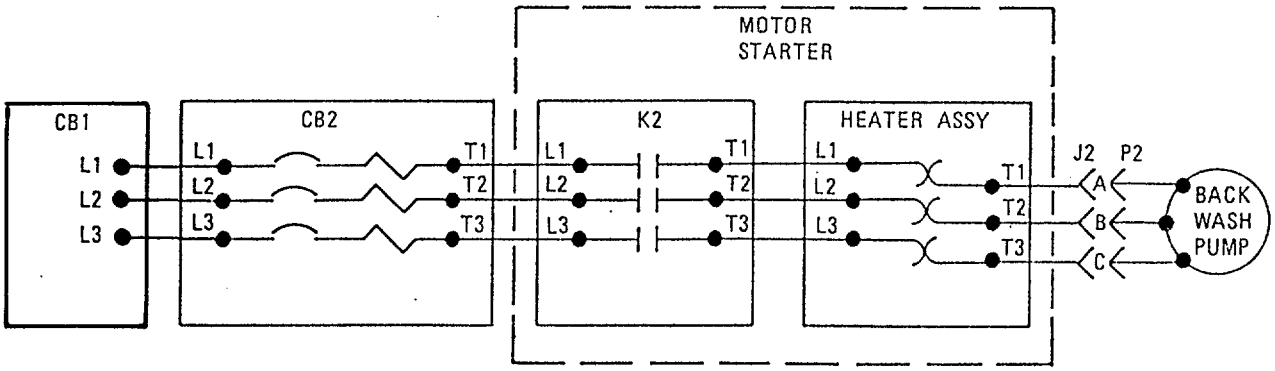


Table 3-1. Direct Support Troubleshooting - continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 6. Disconnect pump cable assembly at backwash pump motor and check it for continuity.

a. If continuity exists, repair centrifugal pump. Refer to Paragraph 3-8.

b. If continuity does not exist, repair pump cable assembly. Refer to Paragraph 3-7.

Step 7. Remove power at power source and check for continuity through control circuits 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.

CB1	-	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(N)	-	K2(A1)

a. If switch S13 or S3 is open (switches ON), replace it. Refer to Paragraph 3-49.

b. If continuity does not exist through CB9 (CB9 ON), replace CB9. 'Refer to Paragraph 3-53.

c. If continuity does not exist through heater assembly, replace defective heaters (Paragraph 3-61) 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 3-27.

e. If continuity does not exist through K2 contacts and/or 90-120 Ohms is not measured between A1 and A2, replace motors starter. Refer to Paragraph 3-61.

f. If wiring is defective, tighten loose connections and/or replace defective wire.

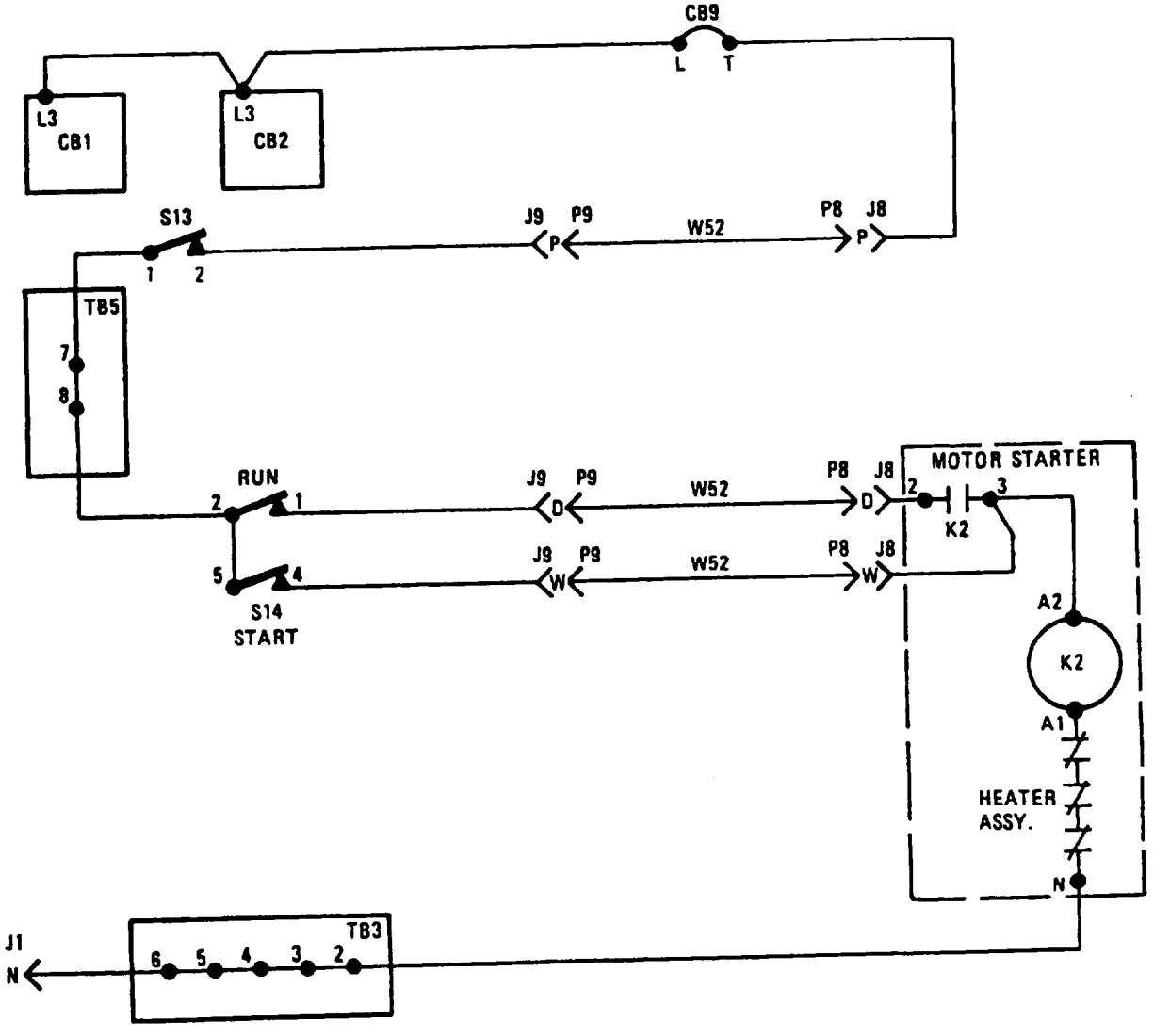


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY

2. **BACKWASH PUMP STOPS AND/OR FAILS TO START (R.O. ELEMENT CLEANING - Models WPES-20, and H-9518-1).**

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.

Step 1. Check if circuit breaker CB2 and/or heater assembly are tipped. TRIPPED window will show white if 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. Turn pump off at pump switch and disconnect backwash pump at junction box connector. Flip pump switch to START and release. 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. Turn power off at power source and perform a continuity check of power circuits 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.

J10(C)	-	J2 (C)
J10(B)	-	J2 (B)
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 heaters (Paragraph 3-61) and reset heater assembly.

b. If continuity is absent through CB2 (CB2 ON), replace CB2. Refer to Paragraph 3-53.

c. If continuity is absent through relay, K2 (see above note), replace motor starter. Refer to Paragraph 3-61.

d. If continuity is absent through wires, tighten connections and/or replace defective wire.

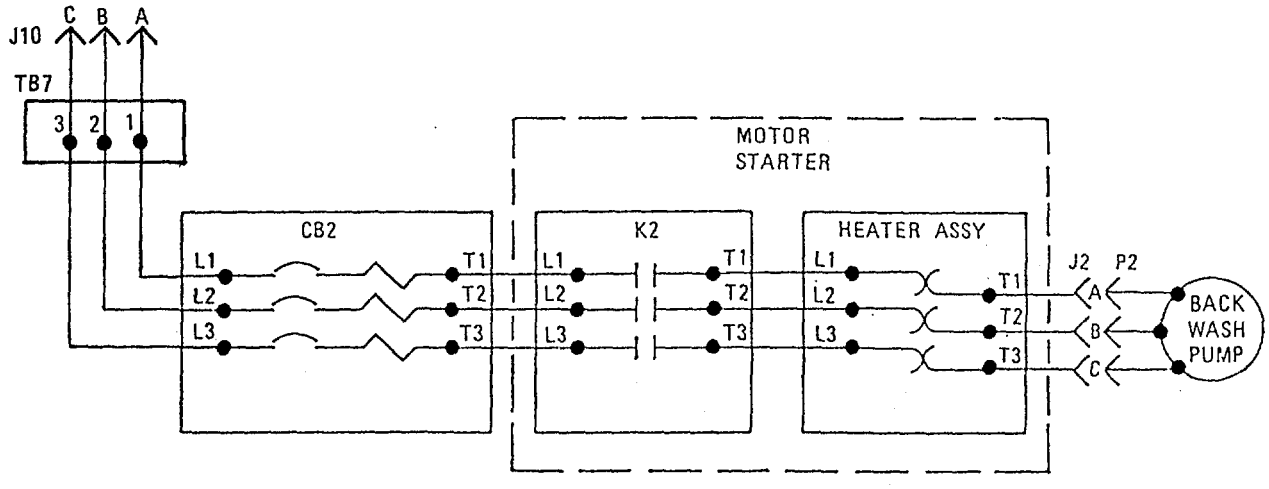


Table 3-1. Direct Support Troubleshooting - continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 6. Disconnect pump cable assembly at backwash pump motor (Paragraph 2-16) and check it for continuity.

a. If continuity exists, repair centrifugal pump. Refer to Paragraph 3-8.

b. If continuity does not exist, repair pump cable assembly. Refer to Paragraph 3-7.

Step 7. Remove power at power source and check for continuity through control circuits 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.

J10	-	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/J1O(N)	-	K2(A1)	

a. If switch S13 or S3 is open (switches ON), replace it. Refer to Paragraph 3-49.

b. If continuity does not exist through CB9 (CB9 ON), replace CB9. Refer to Paragraph 3-53.

c. If continuity does not exist through heater assembly, replace defective heaters (Paragraph 3-61) 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 3-27.

e. Ifcontinuity does not exist through K2 contacts and/or 90-120 Ohms is not measured between A1 and A2, replace motors starter. Refer to Paragraph 3-61.

f. If wiring is defective, tighten loose connections and/or replace defective wire.

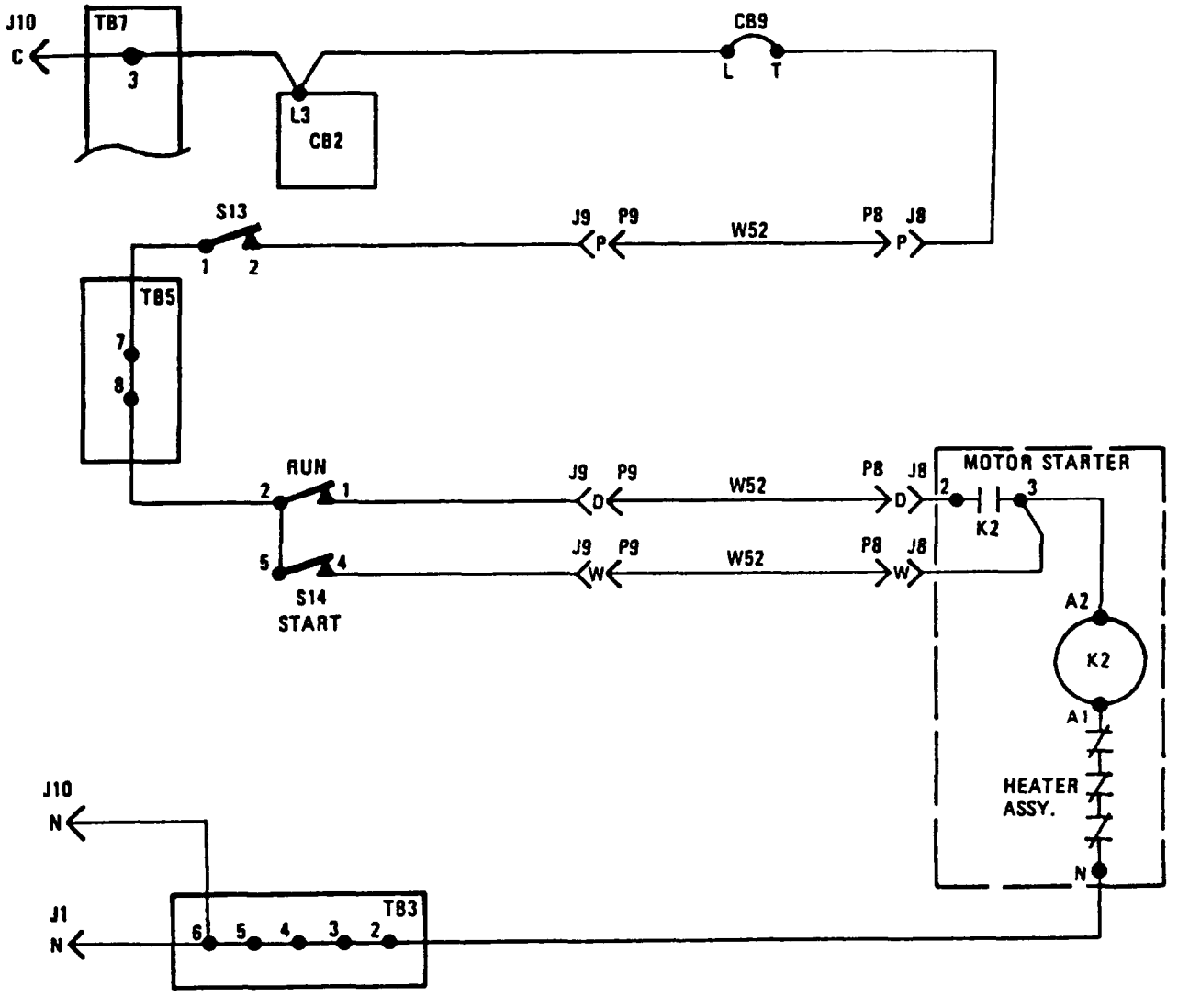


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY

3. **BACKWASH PUMP STOPS AND/OR FAILS TO START IN BACKWASH OPERATION - (Models WPES-10, H-9518-1, WPES-30 and H-9518-3).**

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.

Step 1. Check if circuit breaker CB2 and/or heater assembly are tripped. TRIPPED window will show white if tripped.

If circuit breaker or heater assembly is tripped, go to Malfunction 5, 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 K3 is on.

If relay is not on go to step 7.

Step 4. Turn pump off at pump switch and disconnect backwash pump at junction box connector. Flip pump switch to START and release. Check voltage at BACKWASH PUMP jack, J2.

If voltage is measured, go to step 6.

Step 5. Turn power off at generator and perform a continuity check of power circuits 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	-	J2(C)
L2,CB1	-	J2(B)
L1,CB1	-	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 (Paragraph 3-61) and reset heater assembly.

b. If continuity is absent through CB6 (CB6 ON), replace CB6. Refer to Paragraph 3-53.

c. If continuity is absent through K2, replace motor starter. Refer to Paragraph 3-61.

d. If continuity is absent through wiring, tighten connections and/or replace defective wire.

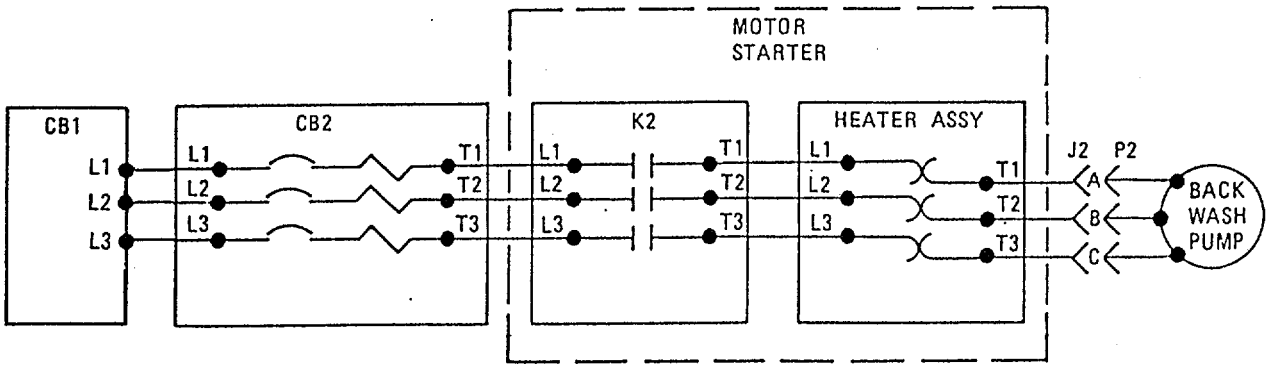


Table 3-1. Direct Support Troubleshooting - continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment

Step 6. Disconnect pump cable assembly at pump motor and check it for continuity.

a. If cable is open, repair cable assembly. Refer to Paragraph 3-7.

b. If cable is not open repair centrifugal pump. Refer to Paragraph 3-8.

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	-	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 (N)	-	A1
K1(Al)	-	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 3-49.

b. Replace CB6 (CB6 ON) if open. Refer to Paragraph 3-53.

c. Repair cable assembly, W52, if open. Refer to Paragraph 3-27.

d. Replace motor starter, if relay auxiliary contacts (3-4) on relay K2 are open and/or 90-120 Ohms is not measured between A1 and A2. Refer to Paragraph 3-61.

e. If continuity is absent through wiring, tighten loose connections and/or replace defective wire.

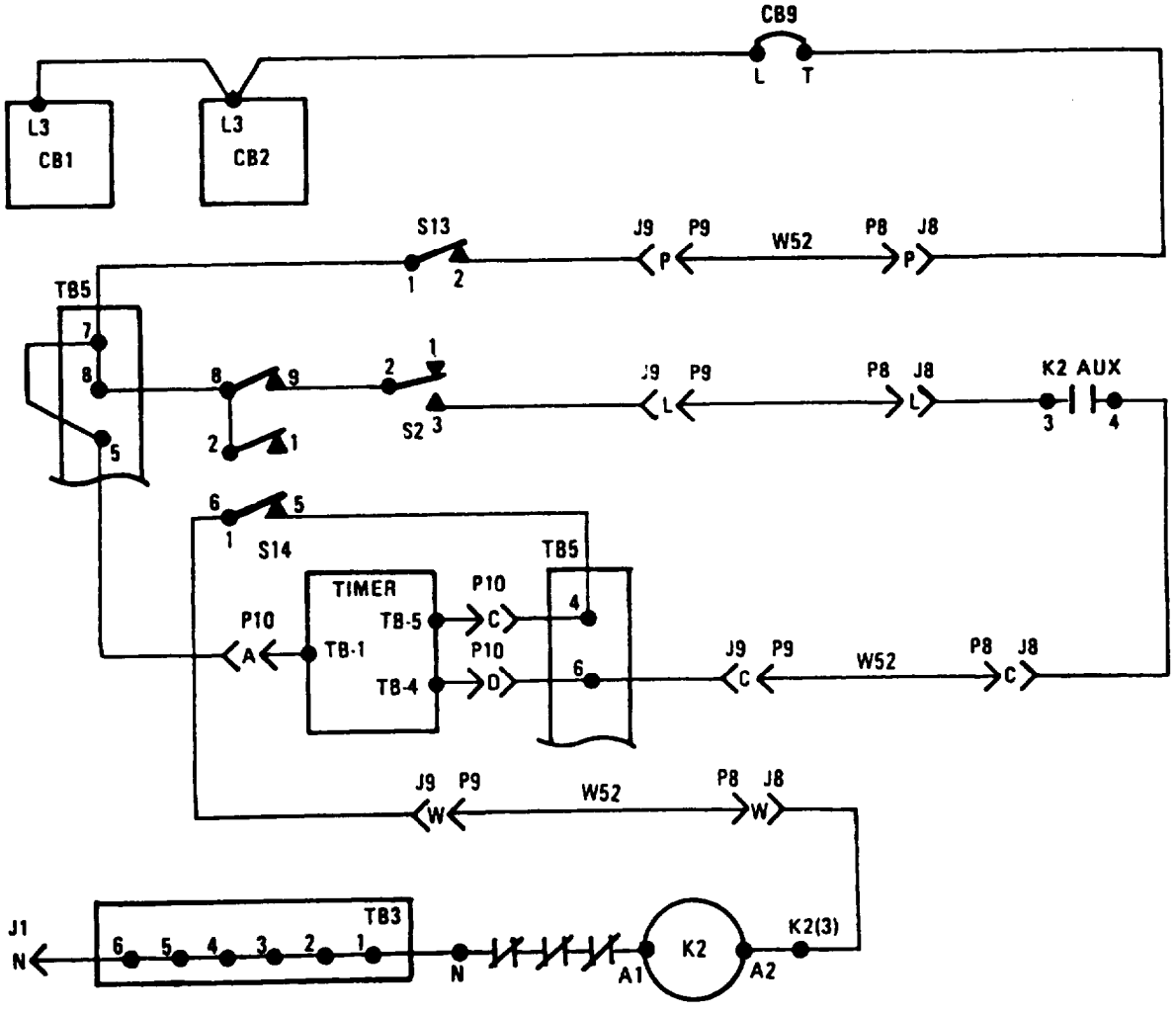


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY

4. **BACKWASH PUMP STOPS AND/OR FAILS TO START IN BACKWASH OPERATION - Models WPES-20, and H-9518-1).**

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.

Step 1. Check if circuit breaker CB2 and/or heater assembly are tripped. TRIPPED window will show white if tripped.

If circuit breaker or heater assembly is tripped, go to Malfunction 5, 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 K3 is on.

If relay is not on go to step 7.

Step 4. Turn pump off at pump switch and disconnect backwash pump at junction box connector. Flip pump switch to START and release. 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. Turn power off at generator and perform a continuity check of power circuits 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.

J10(C)	-	J2 (C)
J10(B)	-	J2 (B)
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 (Paragraph 3-61) and reset heater assembly.

b. If continuity is absent through CB6 (CB6 ON), replace CB6. Refer to Paragraph 3-53.

c. If continuity is absent through K2, replace motor starter. Refer to Paragraph 3-61.

d. If continuity is absent through wiring, tighten connections and/or replace defective wire.

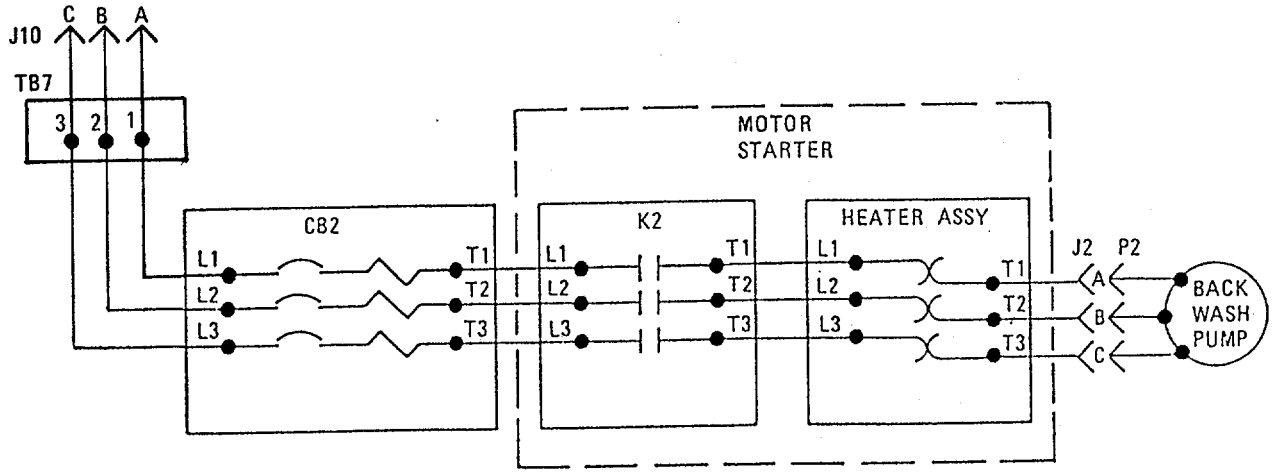


Table 3-1. Direct Support Troubleshooting - continued

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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

Step 6. Disconnect cable assembly from pump motor and check it for continuity (Paragraph 2-16).

a. If cable is open, repair cable assembly. Refer to Paragraph 3-7.

b. If cable is not open, repair centrifugal pump pump. Refer to Paragraph 3-8.

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.

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(N)	-	A1	
J1O(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 3-49.

b. Replace CB6 (CB6 ON) if open. Refer to Paragraph 3-53.

c. Repair cable assembly, W52, if open. Refer to Paragraph 3-27.

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 3-61.

e. If continuity is absent through wiring, tighten loose connections and/or replace defective wire.

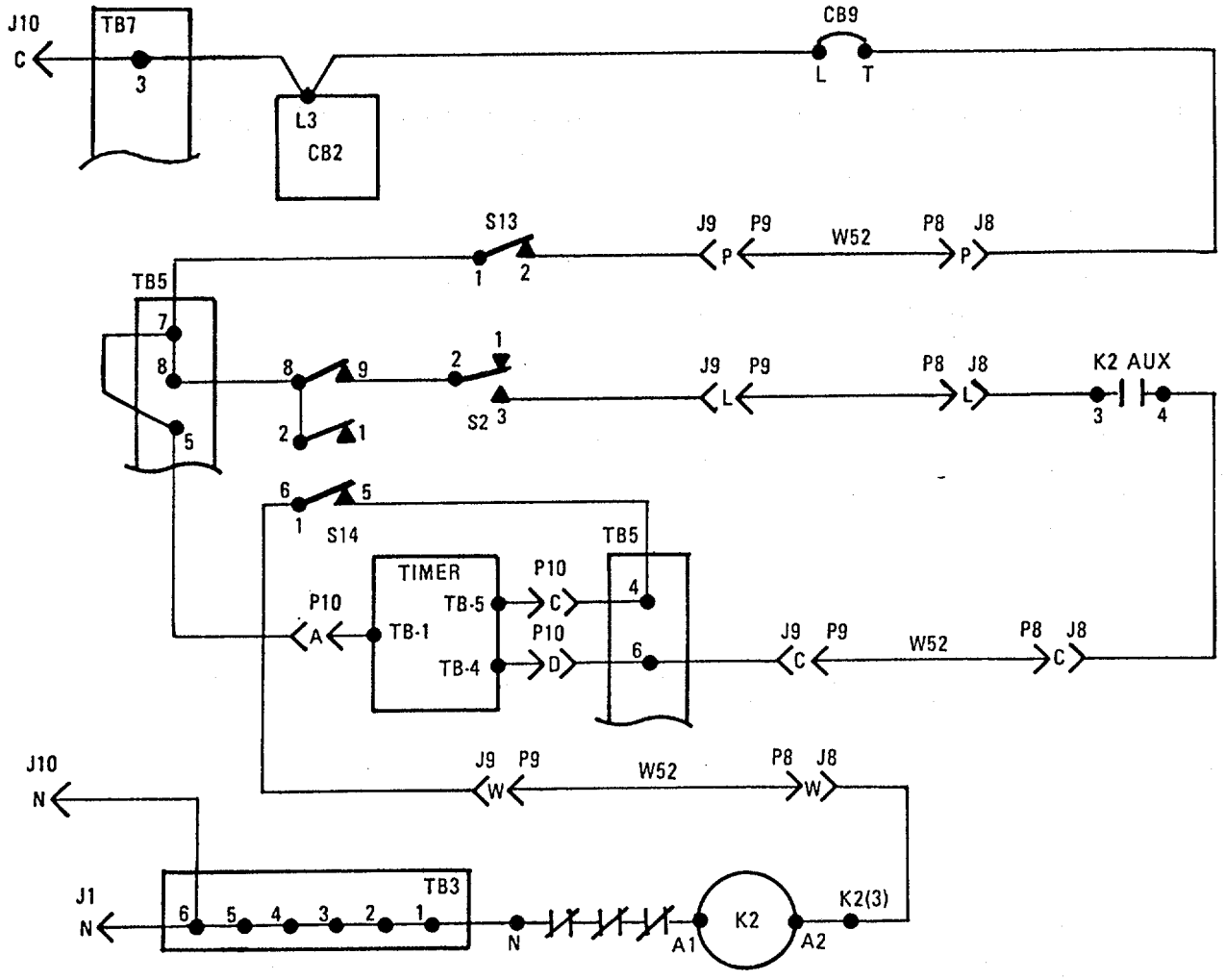


Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

BACKWASH PUMP ASSEMBLY - continued

5. 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 safety of personnel. Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment.

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 at power source and momentarily flip pump switch to START.

If circuit breaker CB2 trips (TRIPPED window shows white), check for loose/bare wires and tighten connections/replace defective wire. If trouble persists, replace circuit breaker. Refer to Paragraph 3-53.

Step 3. Remove power at power source; reconnect wires to CB2; if tripped, reset heater assembly; and disconnect pump cable at junction box connector.

Step 4. Turn on power at power source and momentarily flip pump switch to START.

If heater assembly is tripped, replace defective heater (Paragraph 3-61) and reset heater assembly. If trouble persists, replace motor starter.

Step 5. Disconnect pump cable at pump motor and check continuity of pump cable assembly (Paragraph 2-16).

a. If cable assembly is shorted, repair it. Refer to Paragraph 3-7.

b. If cable assembly is not shorted, repair pump assembly. Refer to Paragraph 3-8.

Table 3-1. Direct Support Troubleshooting - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
BACKWASH PUMP ASSEMBLY-continued

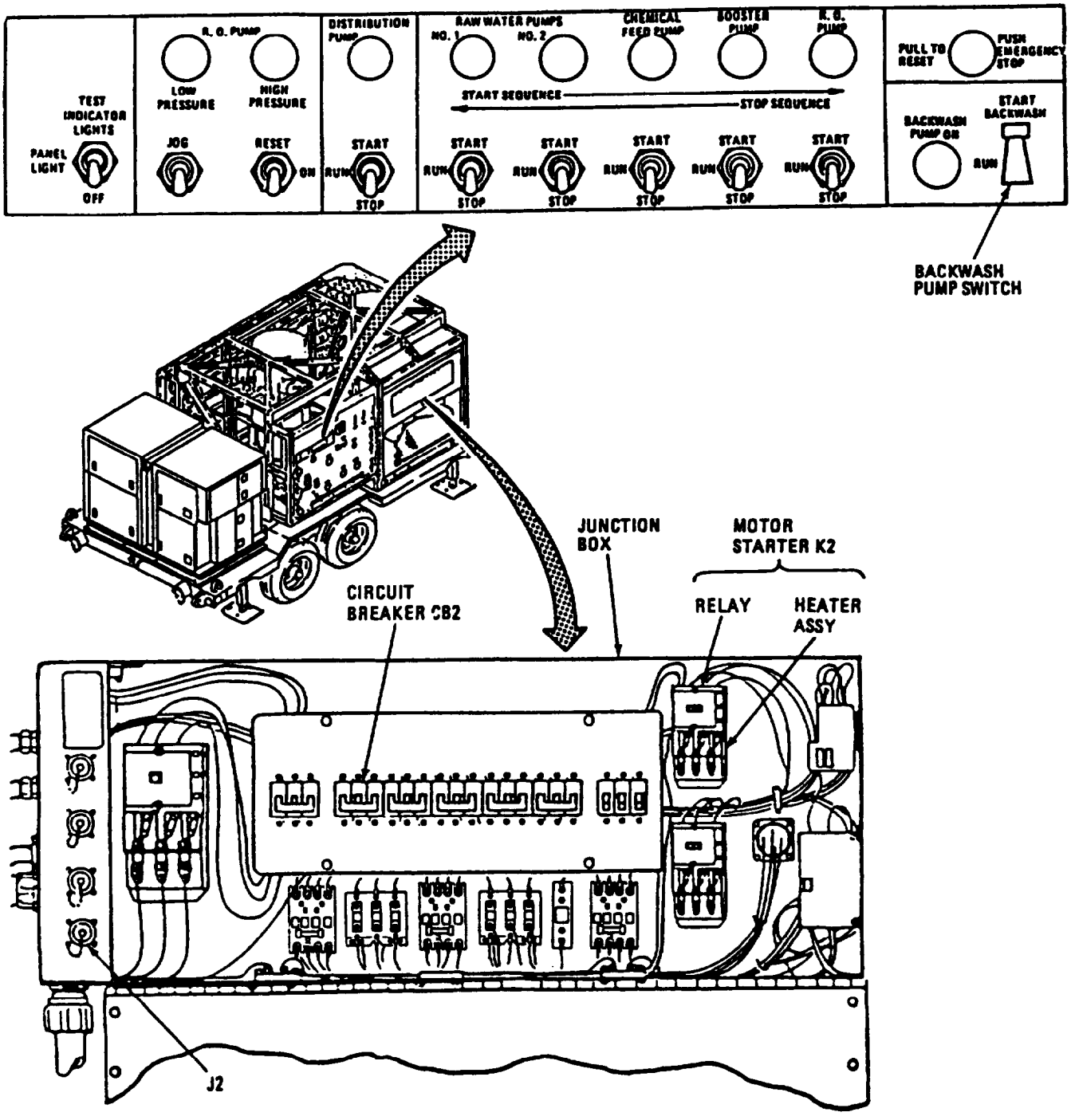


Table 3-1. Direct Support Troubleshooting-continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

FLATBED CARGO TRAILER

1. TRAILER VIBRATES, SAGS, LEANS OR SIDETRACKS (Models WPES-10 and H-9518-1)

Step 1. Check for sagging or broken spring leaves.

If spring leaves are worn or broken, replace both spring assemblies. Refer to Paragraph 3-67.

Step 2. Check for worn or broken trunnion brackets.

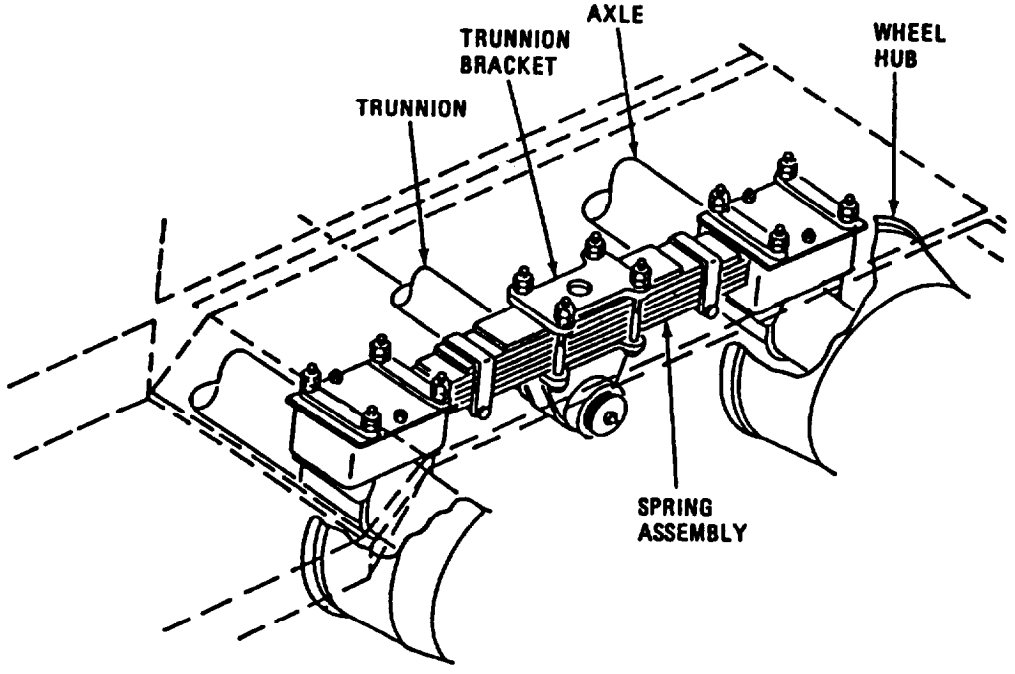
If trunnion brackets arc worn or broken, replace trunnion brackets. Refer to Paragraph 3-69.

Step 3. Check fix bent trunnion.

If trunnion axle is bent, replace trunnion axle. Refer to Paragraph 3-69.

Step 4. Check for bent axles.

If axles arc bent, replace bent or worn axles. Refer to Paragraph 3-68. If trouble persists, replace suspension assembly. Refer to Paragraph 3-65.



Section II. GENERAL MAINTENANCE

PROCEDURES

3-4. REPLACE RIVNUTS.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Portable Electric Drill (Appendix B, Section III, Item 3).
Rivnut Installation Tool (Appendix B, Section III, Item 3).
Drill Set (Appendix B, Section III, Item 3).
Materials/Parts Required
Rivnuts
Equipment Condition
Power shut down (Power Source Manual)

a. Removal

(1) Select drill bit approximately 20% smaller then outer diameter of head.

(2) Insert drill bit in electric drill.

CAUTION
Drilling deeper then thickness of head will enlarge mounting hole, making installation of replacement rivnut difficult.

(3) Drill into center of head, approximately as deep as thickness of head.

(4) Use chisel and hammer and knock off head.

(5) Punch out remainder of rivnut with drift pin.

b. Installation.

(1) Select installation tool to fit rivnut to be installed.

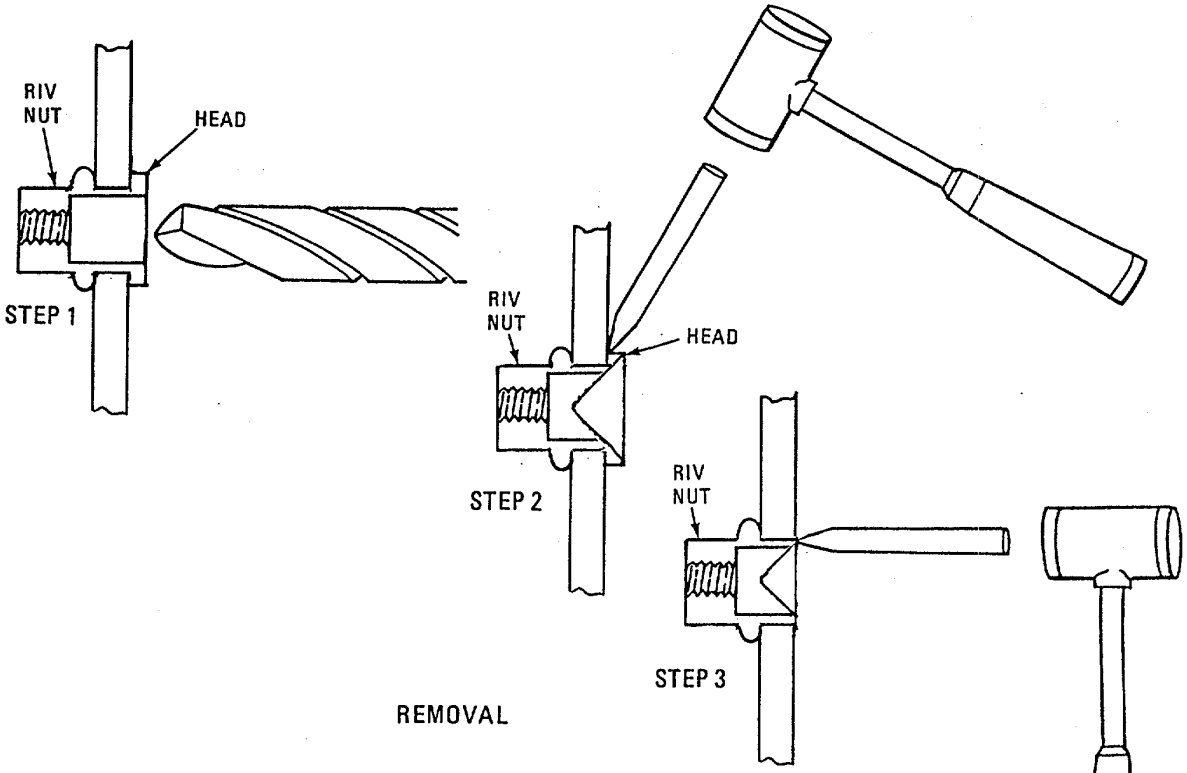
(2) Assemble installation tool, consisting of bit and housing.

3-4. REPLACE RIVNUTS - continued.

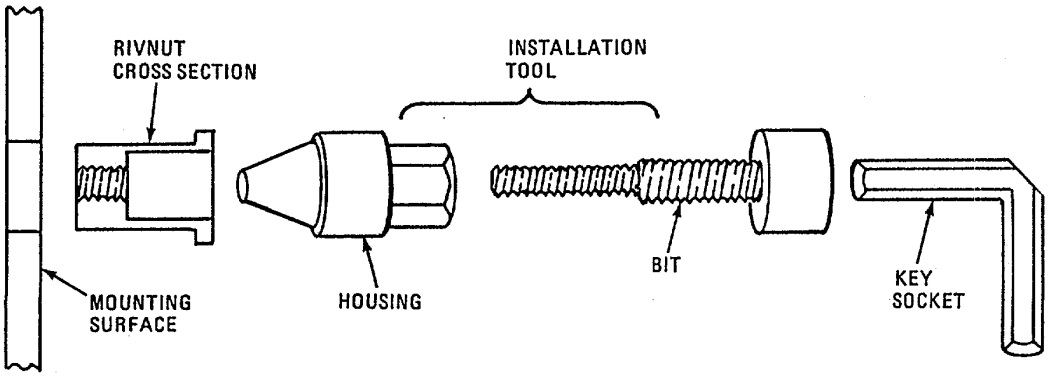
(3) Position rivnut on bit and insert into mounting hole.

(4) Press installation tool firmly against mounting surface and turn bit clockwise with a socket head screw key, while holding housing with a wrench until rivnut is firmly installed.

(5) Unscrew bit from installed rivnut.



REMOVAL



INSTALLATION

3-5. THREADED INSERTS AND HELCOILS.

This task consists of:
a. Remove Threaded Inserts
b. Install Helicoil Inserts
c. Remove Damaged Helicoil Inserts

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).
Goggles (Appendix B, Section III, Item 3).

Materials/Parts Required
Solvent, Drycleaning (Appendix C, Section II, Item 18).
Oil, Lubricating (Appendix, C, Section II, Item 13).
Rags, Wiping (Appendix C, Section II, Item 14).
Rivnuts (TM 10-4610-241-24P)

General Safety Instructions

WARNING

Using compressed air can be dangerous. Wear goggles while using compressed air.

a. Remove Threaded Inserts.

(1) Inspect all threaded parts for burrs and stripped or damaged threads.

NOTE

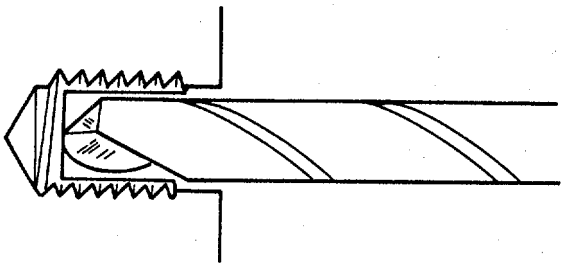
If possible, chase threads with used tap or die. New tap may cut oversize, while old die may cut undersize.

(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 helicoil inserts.

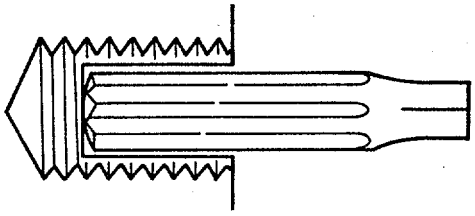
(3) Remove tight broken studs or screws as follows:

3-5. THREADED INSERTS AND HELICOILS - continued

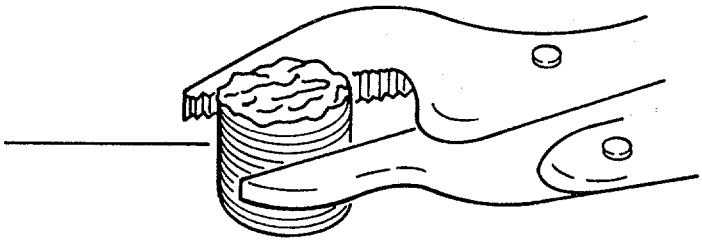
(a) Center punch broken stud or screw.



(b) Drill three quarters way deep into broken stud or screw using an appropriate size drill bit.



(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.

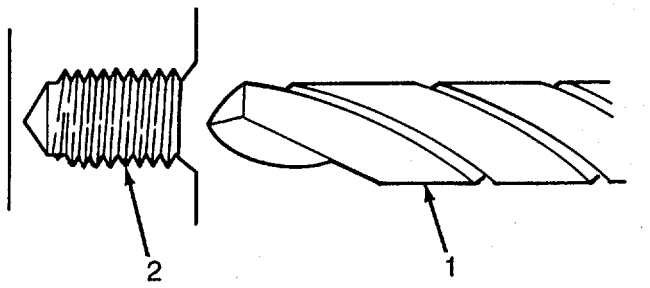
(5) Repair threads that are damaged and cannot be restored by installing a helical coil insert. The following gives standard procedures for installation of a helical insert and removal of a previously installed damaged one.

c. Install Helicoil Inserts.

NOTE

All sizes for tools and helicoils depend on original bolt size. Refer to repair kit.

3-5. THREADED INSERTS AND HELICOILS - continued.



(1) Using portable electric drill, vernier caliper, and step drill (1), bore out damaged threads

(2) to original depth.

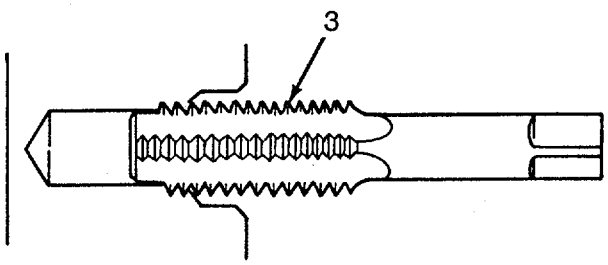
WARNING

Compressed air can blow dust into the eyes. Wear goggles. 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 (3), cut threads until tap bottoms.



WARNING

Compressed air can blow dust into the eyes. Wear goggles. 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, C1 II, is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

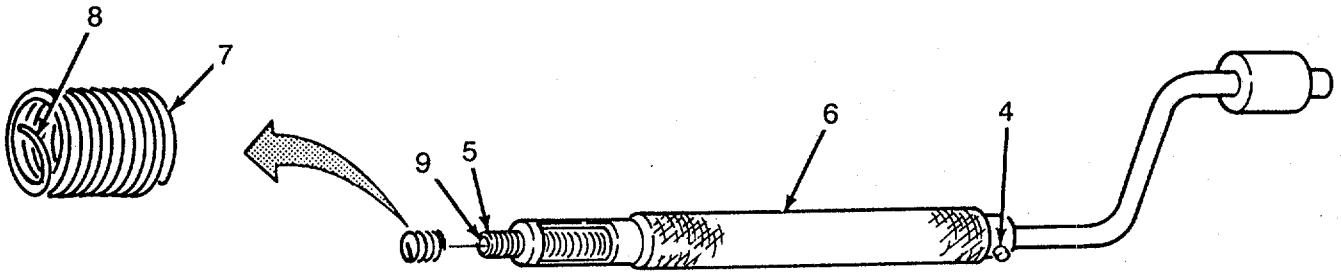
(6) Using wiping rag dampened with cleaning solvent, clean hole.

3-5. THREADED INSERTS AND HELICOILS - continued.

(7) Loosen setscrew (4).

(8) Turn handle until shaft (5) extends past tip of insertion tool (6) slightly longer than length of insert (7).

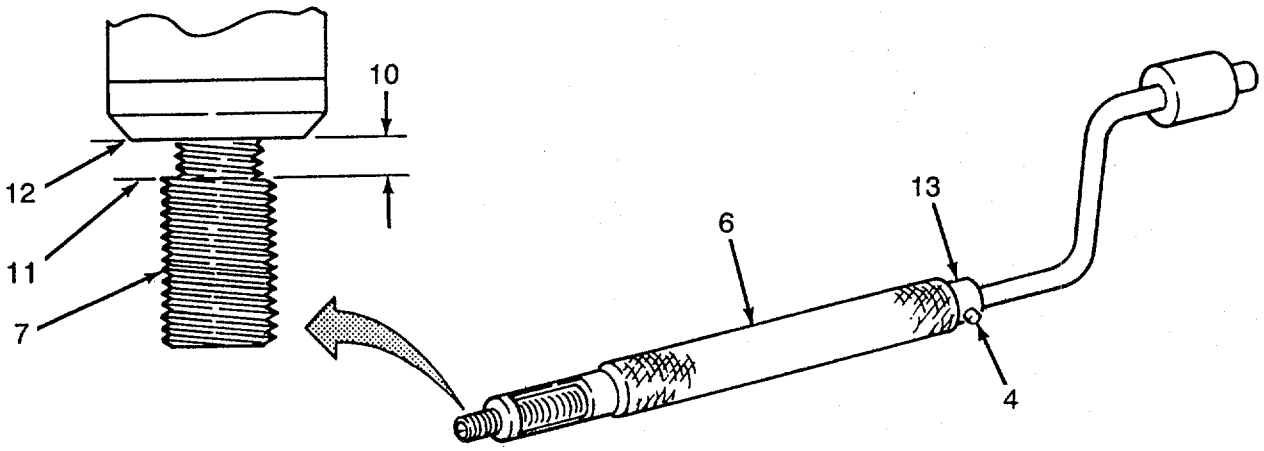
(9) Screw new insert (7) onto shaft until tang (8) of insert goes into shaft notch (9).



(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.

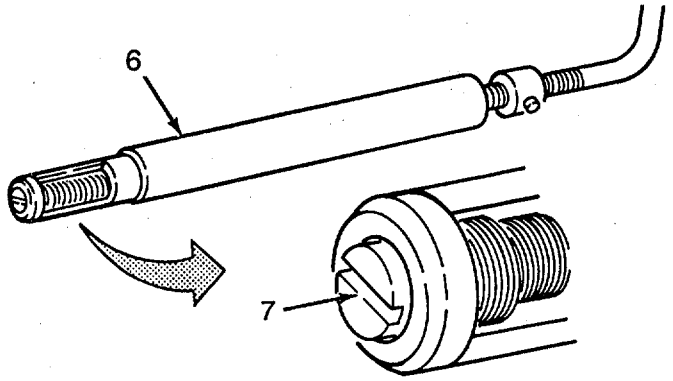
(11) Push down stop collar (13) until it contacts body of insertion tool (6).

(12) Tighten setscrew (4).



3-5. THREADED INSERTS AND HELICOILS - continued.

(13) Turn handle until tang of insert (7) is even with tip of insertion tool (6).

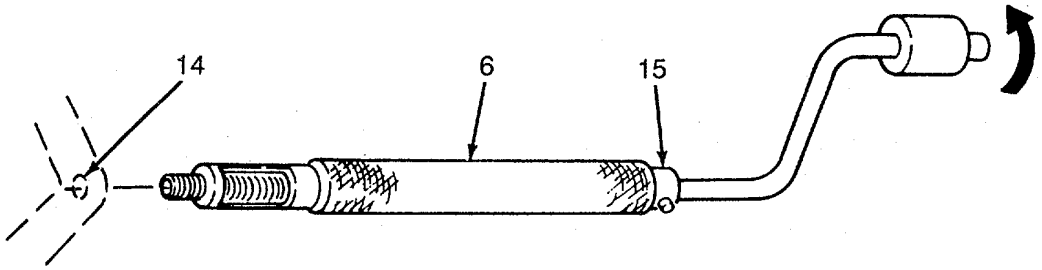


CAUTION

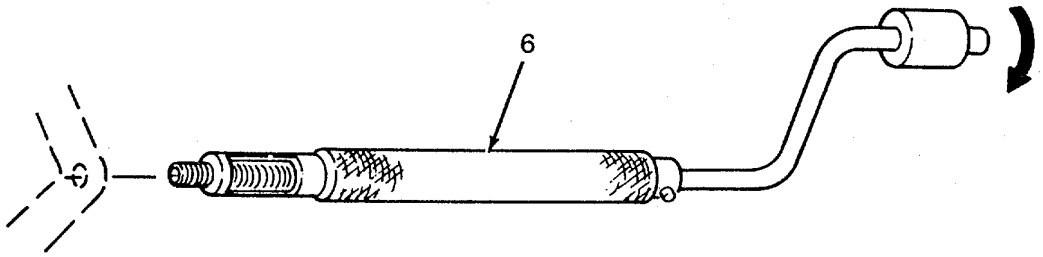
- Insertion tool must be straight and not allowed to wobble when installing insert. Equipment can be damaged.
- Do not force insert into tapped hole. Threads will be damaged.

(14) Put tip of insertion tool (6) against tapped hole (14) being sure that insertion tool is straight.

(15) Slowly turn handle of insertion tool (6) right until stop collar (15) contacts body of insertion tool.



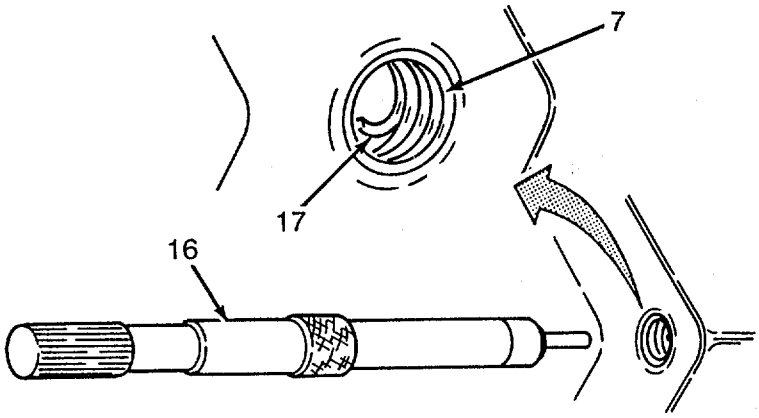
(16) Turn handle of insertion tool (6) to the left until insertion tool can be removed.



3-5. THREADED INSERTS AND HELICOILS - continued.

(17) Place tang breakoff tool (16) in tapped hole with installed insert.

(18) Push down end of breakoff tool (16) until tang (17) breaks off of insert (7).



d. Removing Damaged Helicoil Inserts.

CAUTION

Do not damage 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.

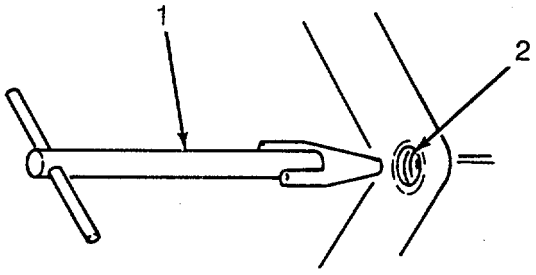
NOTE

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).



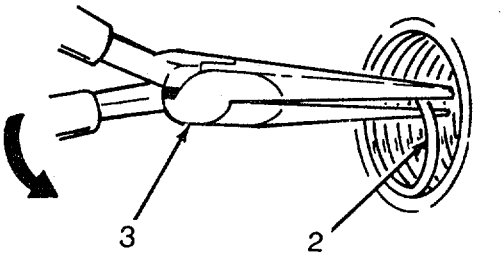
(4) Insert scribe (3) between end of insert (2) and tapped hole.

(5) Work end of insert (2) away from tapped hole and form a tang equal in length to diameter of insert.

3-5. THREADED INSERTS AND HELICOILS - continued.

(6) Using needle nose pliers (3), grasp tang (2).

(7) Turn insert (2) to the left until insert is out of tapped hole.



WARNING

Compressed air can blow dust into the eyes. Wear goggles. Do not exceed 30 psi (207 kPa) air pressure.

(8) Lubricate finishing tap (5) with lubricating oil.

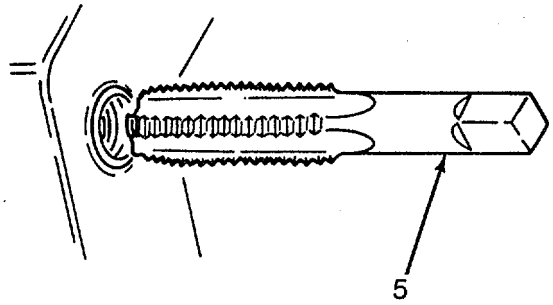
(9) Using finishing tap and tap handle, slowly thread tap in and out of tapped hole.

(10) Using compressed air, blow out dirt and any loose metal chips in tapped hole.

WARNING

Drycleaning solvent, P-D-680, C1 II, 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.

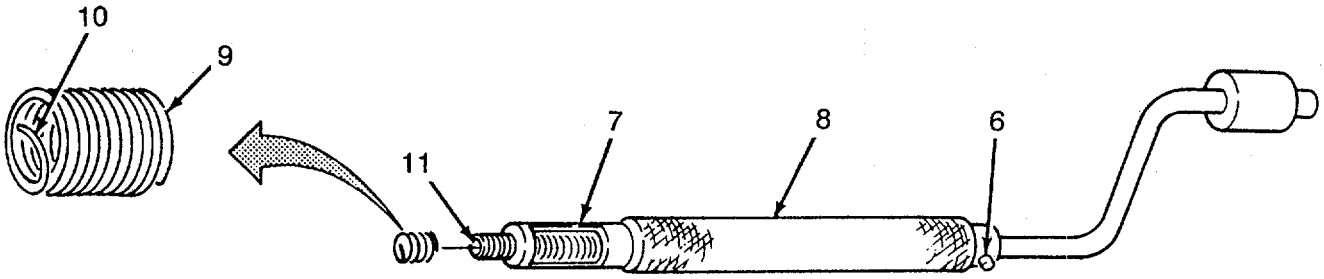


3-5. THREADED INSERTS AND HELICOILS- continued.

(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).

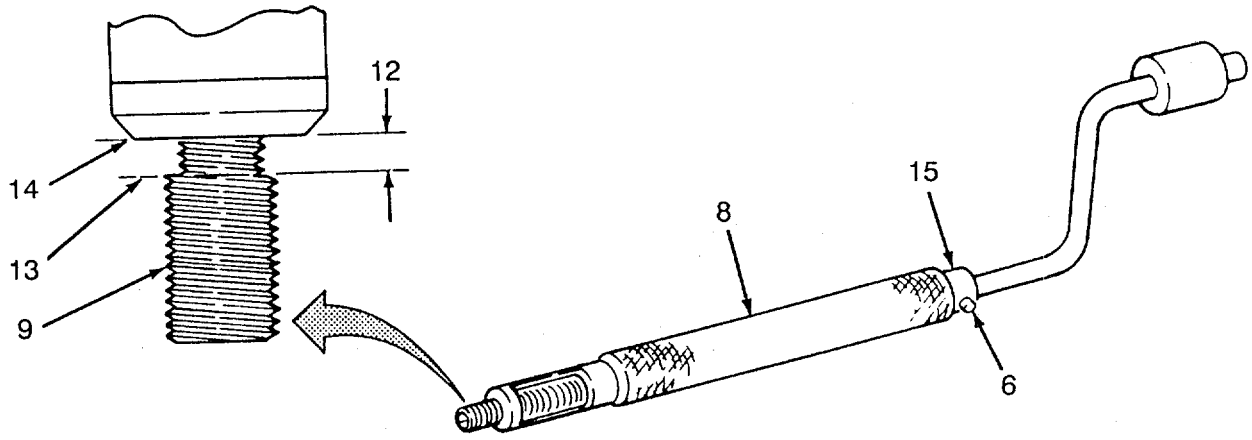
(14) Screw insert (9) onto shaft until tang (10) of insert goes into shaft notch (11).



(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.

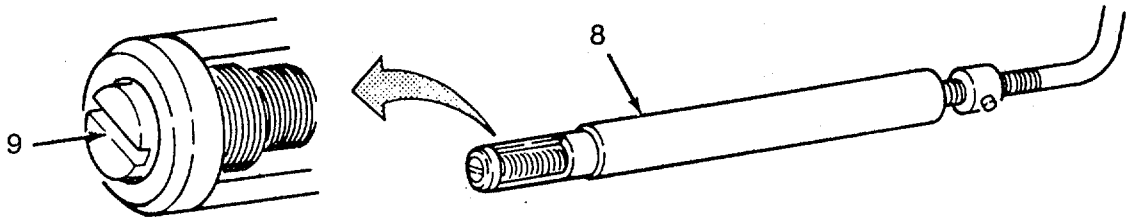
(16) Push down stop collar (15) until it contacts body of insertion tool (8).

(17) Tighten setscrew (6).



3-5. THREADED INSERTS AND HELICOILS - continued.

(18) Turn handle until tang of insert (9) is even with tip of insertion tool (8).



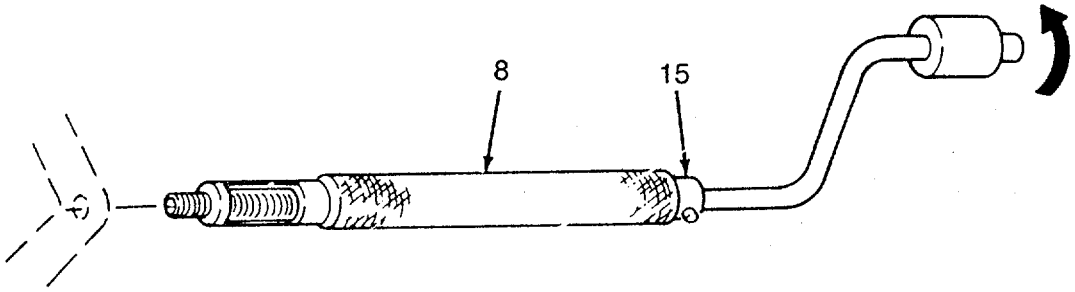
CAUTION

Insertion tool must be straight and not allowed to wobble when installing insert. Equipment can be damaged.

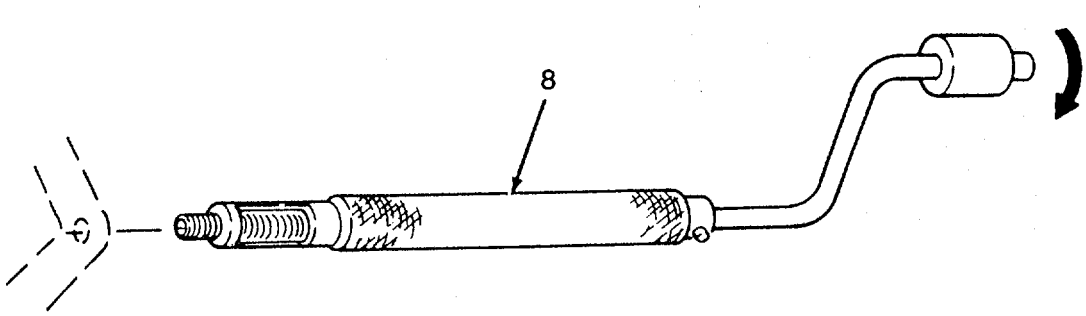
Do not force insert into tapped hole. Threads will be damaged.

(19) Put tip of insertion tool (8) against tapped hole being sure that insertion tool is straight.

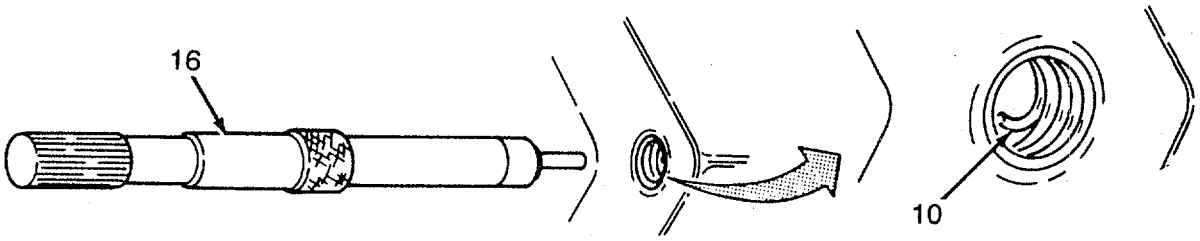
(20) Slowly turn handle of insertion tool right until stop collar (15) contacts body of insertion tool.



(21) Turn handle of insertion tool (8) to the left until insertion tool can be removed.



3-5. THREADED INSERTS AND HELICOILS - continued.



(22) Place tang breakoff tool (16) in tapped hole with installed insert.

(23) Push down end of breakoff tool (16) until tang (10) breaks off of insert.

3-6. WELDING

For welding procedures, refer to TM 9-237.

Section III. BACKWASH PUMP ASSEMBLY MAINTENANCE PROCEDURES

3-7. CABLE ASSEMBLY, W-42 (BACKWASH PUMP) REPAIR.

This task consists of:
a. Inspection
b. Disassembly
c. Repair
d. Assembly
e. Test

INITIAL SET-UP:

Tools Required
Refer to TM 43-0158/TO 1-1A-15 (Air Force).
Materials/Parts Required
Refer to TM 43-0158/TO 1-1A-15 (Air Force).
Equipment Condition
Reference
Cable Assembly removed (Paragraph 2-16).

a. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

b. Disassembly.

For disassembly procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

c. Repair.

For assembly procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

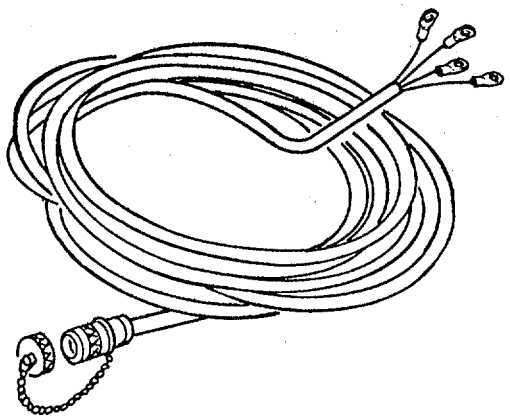
d. Assembly.

For repair procedures, refer TM 43-0158/TO 1-1A-15 (Air Force).

e. Test.

For test procedures, refer to Paragraph 2-16.

3-7. CABLE ASSEMBLY, W-42 (BACKWASH PUMP) REPAIR - continued.



3-8. CENTRIFUGAL PUMP (BACKWASH PUMP) REPAIR.

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 3)
- 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)
- Caliper Set, Micrometer (Appendix B, Section III, Item 3)

Materials/Parts Required
- Solvent, Drycleaning (Appendix C, Section II, Item 18)
- Detergent (Appendix C, Section II, Item 5)
- Compound, Locking (Appendix C, Section II, Item 4)
- Gaskets and Packing

Equipment Condition

Reference
- Centrifugal Pump Assembly removed (Paragraph 2-17).

General Safety Instructions

WARNING

Drycleaning solvent, P-D-680, C1 II, is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

3-8. CENTRIFUGAL PUMP (BACKWASH PUMP) REPAIR - continued.

a. Disassembly.

NOTE
- Seal assembly can be replaced with pump installed on frame.
- Mark position of long screws on adapter to facilitate installation.

(1) Remove four long and four short screws (1).

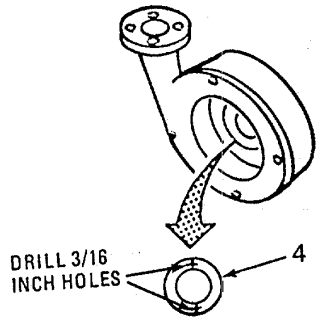
(2) Tap pump case (2) with a soft rubber mallet to break it loose from adapter (17) and remove case.

(3) Remove pump case gasket (3).

CAUTION

Because of tight fit of wear ring in housing, wear ring must be removed in pieces. Be sure to centerpunch drill point to ensure that drill does not bite into casing.

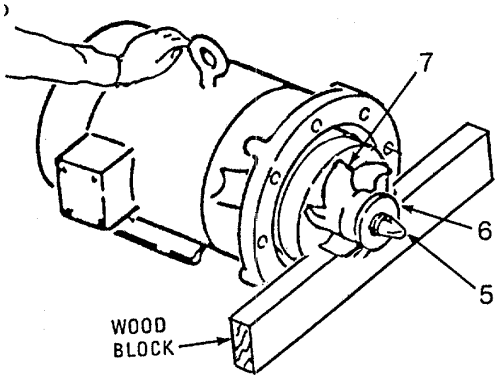
(4) If wear ring is to be replaced (see inspection criteria), center punch wear ring (4) exactly at midpoint between inner and outer edge.



(5) Position pump case (2) on drill press and drill two 3/16-inch (4.76 mm) holes in wear ring (4) to a depth of 3/4 in (19.05mm).

(6) Pry wear ring (4) out of case (2) in pieces.

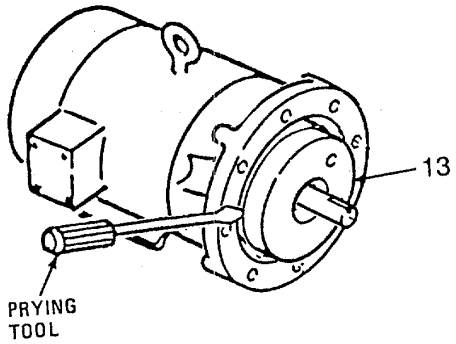
(7) Lay pump impeller (7) on a block of wood as illustrated and, applying downward pressure to keep impeller from moving, unscrew retaining screw (5). Remove retaining screw, seal washer (6) impeller (7) and key (8).



(8) Pry off washer (9) and remove spring (10), sleeve (11) and carbon disk (12).

NOTE
To remove cover (13), it may be necessary to pry it loose from adapter (17) using recesses of bolts (16) as prying points.

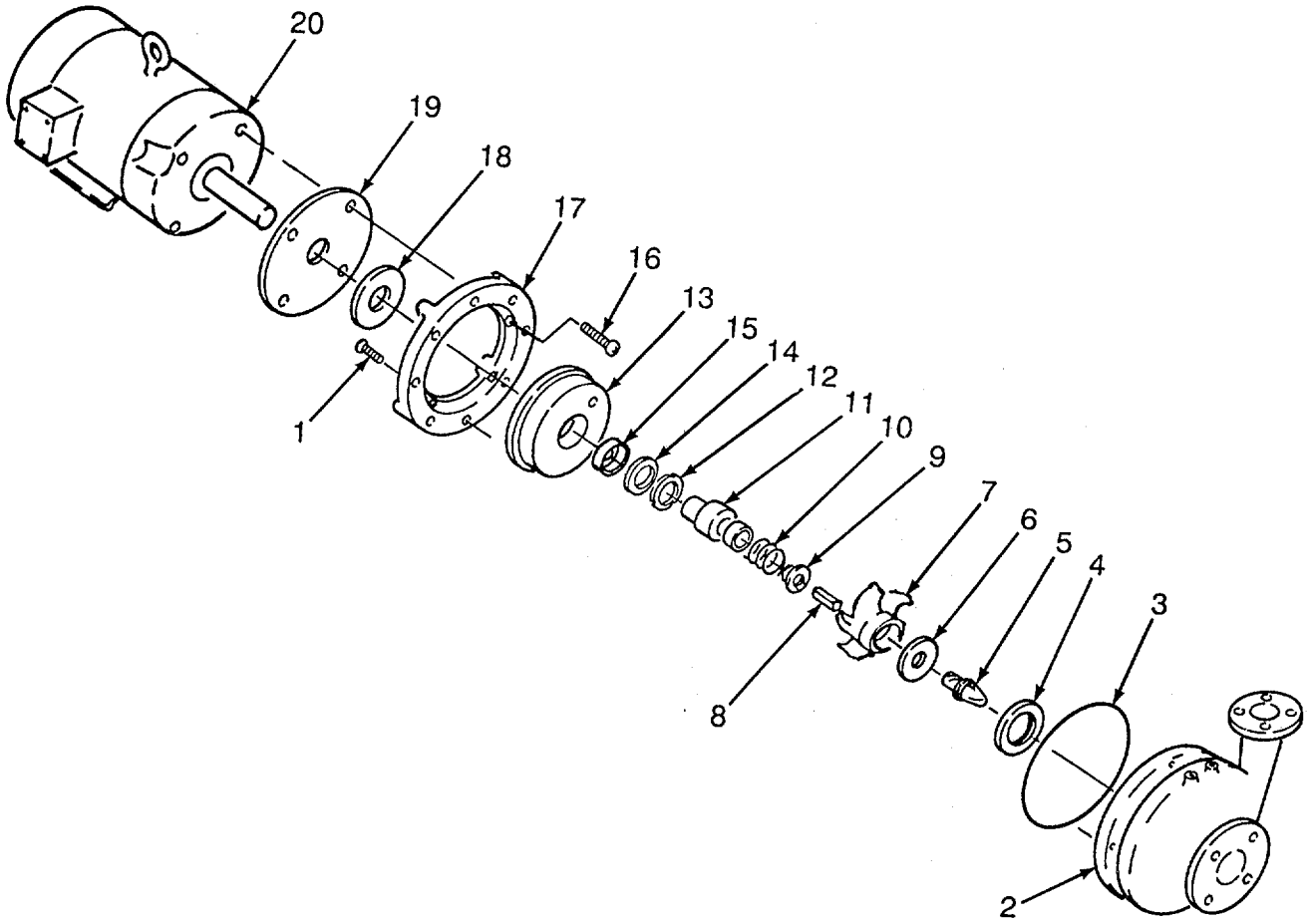
(9) With pump in horizontal position, tap cover (13) lightly with a rubber mallet and remove it; if necessary pry it loose with a prying tool (i.e. flat tip screwdriver).



3-8. CENTRIFUGAL PUMP (BACKWASH PUMP) REPAIR - continued.

(10) Remove rubber cup (15) and ceramic disk (14) from cover (13).

(11) Remove four screws (16), adapter (17), slinger (18) and splash plate (19) from pump motor (20).



3-8. CENTRIFUGAL PUMP (BACKWASH PUMP) REPAIR - continued.

b. Cleaning.

WARNING

Drycleaning solvent, P-D-680, C1 II, is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

(1) Using drycleaning solvent, remove dirt and grease accumulation from all parts.

(2) Using wire brush, clean rust and corrosion from pump case (2), adapter (17), splash ring (19) and cover (13). Clean all parts with soap and water.

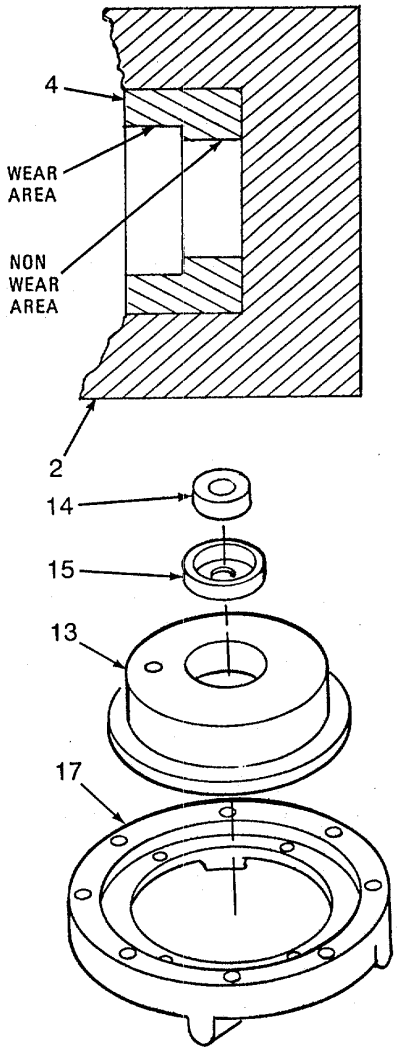
c. Inspection.

(1) Inspect pump case (2), impeller (7) and adapter (17) for cracks, damage, and excessive wear.

(2) With ring (4) in place, measure inside diameter of ring in the "wear area" and record.

(3) Measure inside diameter of wear ring (4) in "non-wear area" and record.

(4) Subtract smaller diameter from larger diameter. If result exceeds 0.022 inch, replace wear ring (4).



d. Repair.

(1) Replace lockwashers, seals, gaskets and preformed packing.

(2) Replace all damaged or excessively worn components.

e. Assembly.

(1) Position splash plate (19), slinger (18) and adapter (17) on shaft of motor (20) and install four screws (16).

CAUTION

Pump will leak if carbon disk is not installed correctly.

(2) Lubricate rubber cup (15) and install ceramic disk (14) in cup with smooth, flat surface pointing up, away from motor. Install disk and cup in cover (13).

(3) Position cover (13) on adapter (17).

3-8. CENTRIFUGAL PUMP (BACKWASH PUMP) REPAIR - continued.

CAUTION
Positioning of carbon disk is critical.

(4) Position carbon disk (12) on sleeve (11), flat side pointing toward motor when installed, and install sleeve (11), spring (10) and washer (9) in cover (13).

(5) Position key (8) on impeller (7). Slip impeller (7) on shaft of motor (20) and install seal washer (6) and impeller screw (5) hand tight.

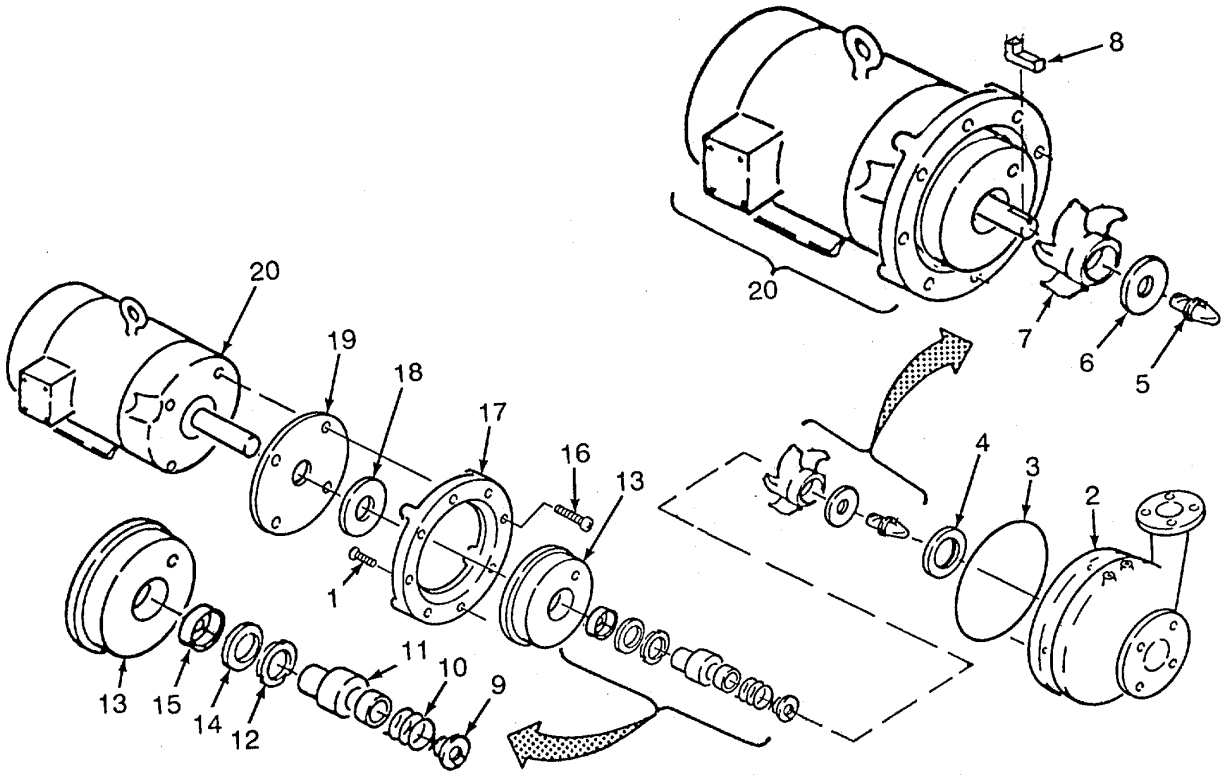
(6) Lay pump flat on a wooden block as in disassembly and tighten impeller screw (5), applying downward pressure on pump to keep impeller from turning.

CAUTION
Wear ring must be installed in exact alinement with seat in case. If incorrectly alined, pump case may be damaged.

(7) Position wear ring (4) in pump case (2). Using arbor press, press wear ring into pump case.

(8) Install pump case gasket (3) on case (2).

(9) Position pump case (2) on adapter (17) and install four long and four short screws (1) as marked at disassembly.



3-9. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) REPAIR.

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)
Materials/Parts Required
Grease, GAA (Appendix C, Section II, Item 9)
Lockwashers and Seals
Equipment Condition
Reference
Centrifugal Pump Motor removed (Paragraph 3-8)
General Safety Instructions

WARNING

- Drycleaning solvent, P-D-680, C1 II, 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. Disassembly.

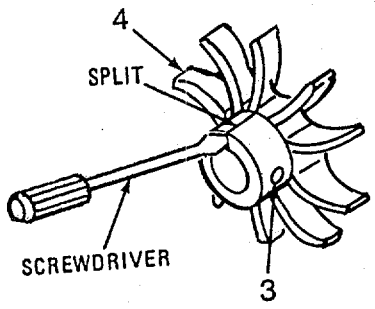
(1) Remove three screws (1) and fan cover (2).

(2) Loosen set screw (3).

CAUTION

Do not apply excessive force. Hub may break.

(3) Position a flat tip screw driver in split of fan hub and tap it lightly with a mallet. Split will enlarge and allow easy removal of hub from shaft.



(4) Remove fan (4) and key (5).

NOTE

Marking fan end housing (8), stator (18) and shaft end plate (11) will facilitate alinement during assembly. If any marked parts are to be replaced, be sure to transcribe marks to replacement parts before discarding defective parts, or turning them in to Supply.

3-9. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) REPAIR - continued.

(5) Scribe a line across junction of rotor (19) and end housing (8) and across junction of rotor (19) and shaft end plate (11).

(6) Remove four nuts (6) and four bolts (7).

(7) Tap fan end housing (8) with soft-faced mallet to break bond with stator assembly (19) and remove fan end housing.

(8) Remove wavy washer (9) from shaft of rotor (17).

CAUTION

Wiring inside stator assembly can be damaged by rotor shaft if rotor is not removed carefully.

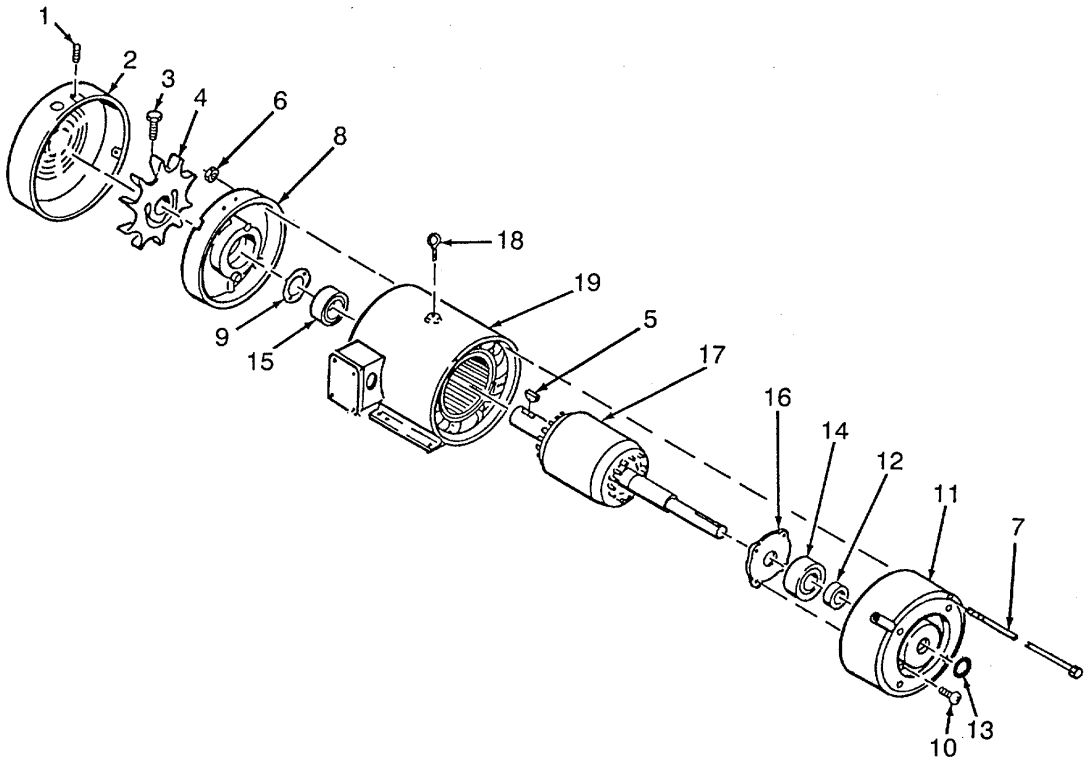
(9) Remove rotor (17) through pump end of stator assembly (19).

(10) Remove four screws (10) from bearing retainer plate (16) and remove shaft end plate (11).

(11) Remove seal (13) from shaft end plate (11) and sleeve (12) from shaft of rotor (17).

(12) Using arbor press, remove bearings (14 and 15) from shaft of rotor (17). Remove bearing retainer plate (16).

(13) Remove eye bolt (18).



3-9. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) REPAIR - continued.

b. Cleaning.

WARNING

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

(1) Scrape loose paint from fan cover (2), stator (19) and shaft end plate (11). Prime and paint as necessary.

(2) Using compressed air, blow dust and grit from stator assembly (19) and shaft of rotor (17). Wipe rotor shaft with clean wiping rag.

(3) Wipe bearings (14 and 15) with clean rag.

(4) Clean vent slots of fan cover (2) with compressed air and wipe with clean rag.

c. Inspection.

(1) Inspect leads and windings of stator assembly (19) for evidence of cracked or burned insulation.

(2) Inspect rotor (17) for chips and cracks.

(3) Inspect bearings (14 and 15) for wear.

(4) Inspect shaft end plate (11) and fan end housing (8) for cracks.

d. Repair.

Replace lockwashers and all damaged or excessively worn components.

e. Assembly.

(1) Install eyebolt (18).

(2) Position bearing retainer plate (16) on long shaft of rotor (17).

(3) Using arbor press, install bearings (14 and 15) and position seal (12) on long shaft of rotor (17). Install seal (13) in end plate (11).

(4) Position pump end plate (11) on long shaft of rotor (17) and secure end plate to retaining plate (16) with four screws (10).

CAUTION

Wiring inside stator can be damaged by rotor shaft if rotor is not installed carefully.

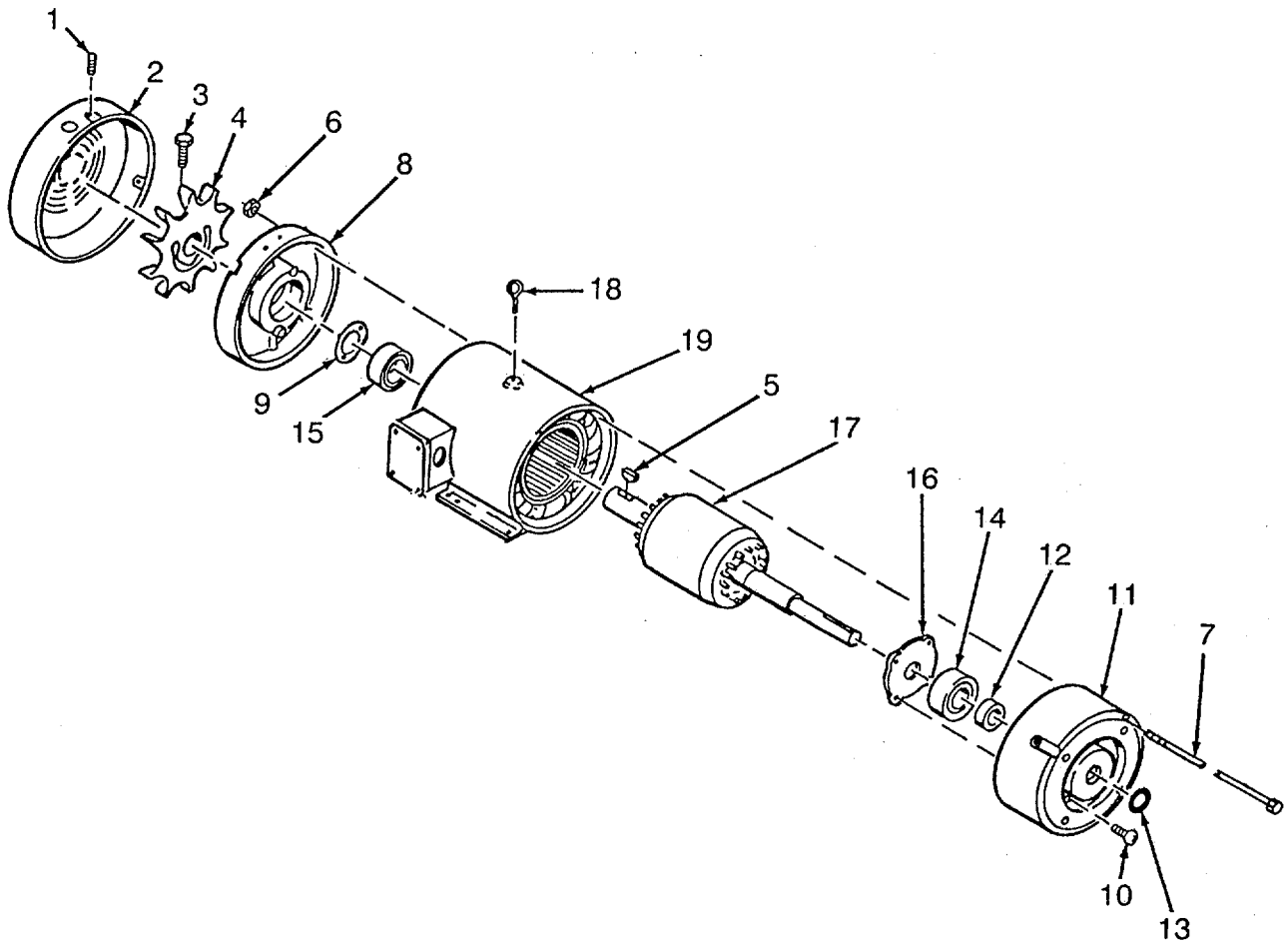
(5) Carefully position rotor (17) with attached end cover (11) in stator (19).

3-9. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) REPAIR - continued.

(6) Position wavy washer (9) on short shaft of rotor (17) and install end cover (8), bolts (7) and nuts (6) as marked during disassembly.

(7) Position key (5) on short shaft of rotor (17) and install fan (4). Secure fan with setscrew (3) in hub of fan.

(8) Install fan cover (2) and secure with screws (1).



3-9. CENTRIFUGAL PUMP MOTOR (BACKWASH PUMP) REPAIR - continued.

f. Test.

(1) Secure motor to test bench.

WARNING

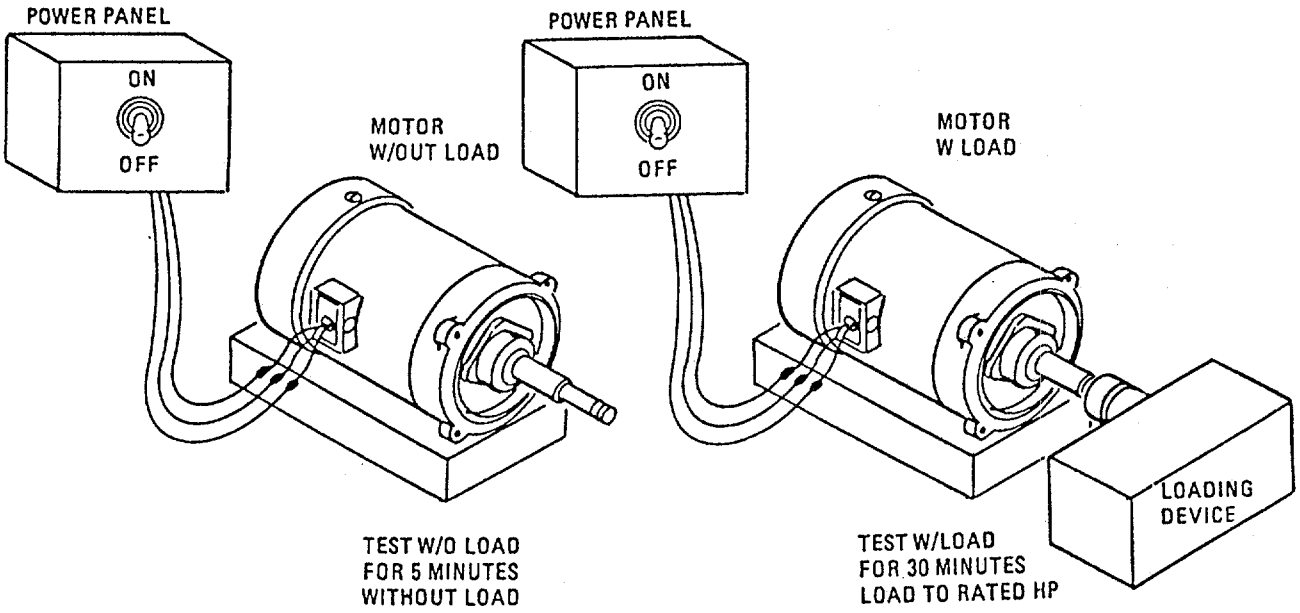
Electrical high voltage can cause serious injury or death. Always take proper measures to ensure personal safety.

(1) Connect motor wiring to test bench leads.

(2) Apply power and run motor with and without load.

(3) Check motor for excessive vibration and fast temperature rise.

(4) Disconnect motor from test bench leads.



3-10. BACKWASH PUMP FRAME, REPAIR.

This task consists of: Repair

INITIAL SET-UP:

Tools Required
Refer to TM 9-237
Refer to TM 43-0139
References
Refer to TM 9-237
Refer to TM 43-0139

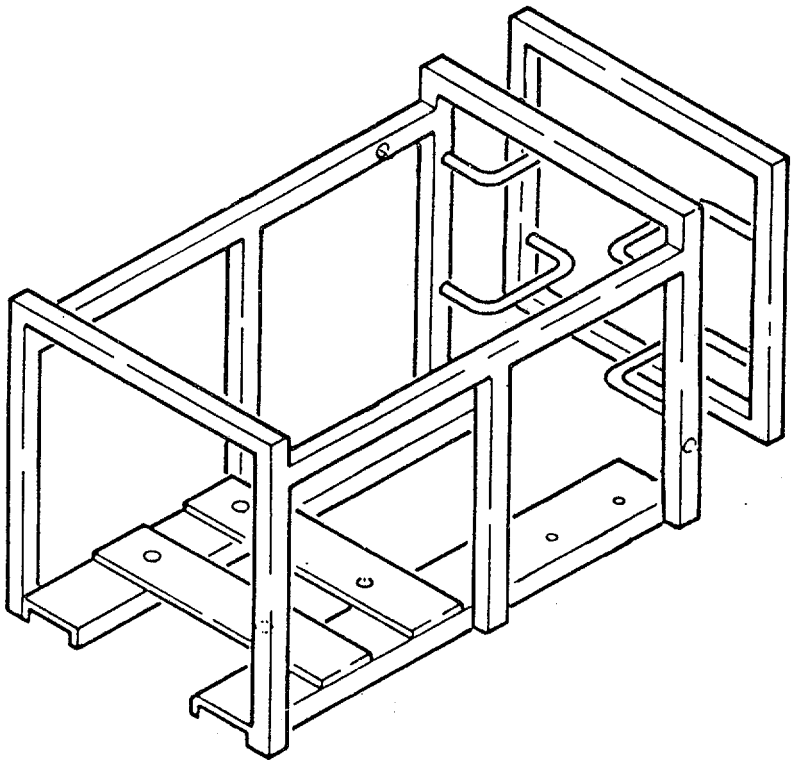
Repair.

(1) For removal and installation instructions, refer to Paragraph 2-17.

(2) Inspect for bent or broken frame components and cracked welds.

(3) Weld frame as required in accordance with TM 9-237.

(4) Paint frame in accordance with TM 43-0139.



Section IV. RAW WATER PUMP ASSEMBLY MAINTENANCE PROCEDURES

3-11. CABLE ASSEMBLY, W43/W44 (RAW WATER PUMP) REPAIR.

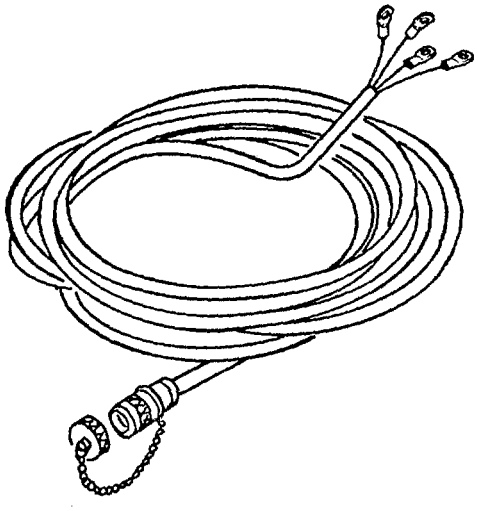
This task consists of:
a. Inspection
b. Disassembly
c. Repair
d. Assembly
e. Test

INITIAL SET-UP:

Tools Required
Refer to TM 43-0158/TO 1-lA-15(Air Force).
Materials/Parts Required
Refer to TM 43-0158/TO l-lA-15(Air Force).
Equipment Condition
Reference
Cable Assembly removed (Paragraph 2-19).

a. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-1A-15(Air Force).



b. Disassembly.

For disassembly procedures, refer to TM 43-0158/TO 1-1A-15(Air Force).

c. Repair

For repair procedures, refer to TM 43-0158/TO 1-1A-15(Air Force).

d. Assembly.

For assembly procedures, refer to TM 43-0158/TO 1- 1A-15(Air Force).

e. Test.

For test procedures, refer to Paragraph 2-19.

3-12. CENTRIFUGAL PUMP (RAW WATER PUMP) REPAIR.

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)
- Strap Wrench (Appendix B, Section III, Item 3)
- Goggles (Appendix B, Section III, Item 4)

Materials/Parts Required
- Solvent, Drycleaning (Appendix C, Section II, Item 18)
- Detergent (Appendix C, Section II, Item 5)
- Grease, Silicone (Appendix C, Section II, Item 10)
- Gaskets, Seals and Lockwashers (TM 10-4610-241-24P)

Equipment Condition
Reference
- Centrifugal Pump Assembly removed (Paragraph 2-20).

General Safety Instructions

WARNING

- Drycleaning solvent, P-D-680, C1 II, 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. Disassembly.

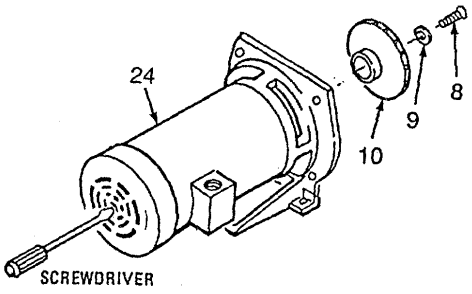
(1) Remove four screws (1) and lockwashers (2) and separate pump case (3) from adapter (20).

(2) Remove packing (6), diffuser (5), gasket (4), and dowel pins (7).

CAUTION

When inserting screwdriver into screwdriver slot on motor shaft use caution to prevent damage to motor fan.

(3) Insert a large blade flattip screwdriver in screwdriver slot on shaft of motor (24) to keep it from turning and remove screw (8) and washer (9). Unscrew impeller (10), using a strap wrench.



3-12. CENTRIFUGAL PUMP (RAW WATER PUMP) REPAIR - continued.

(4) Pry off rubber disk (11) and remove spring (12), sleeve (13) and carbon disk (14).

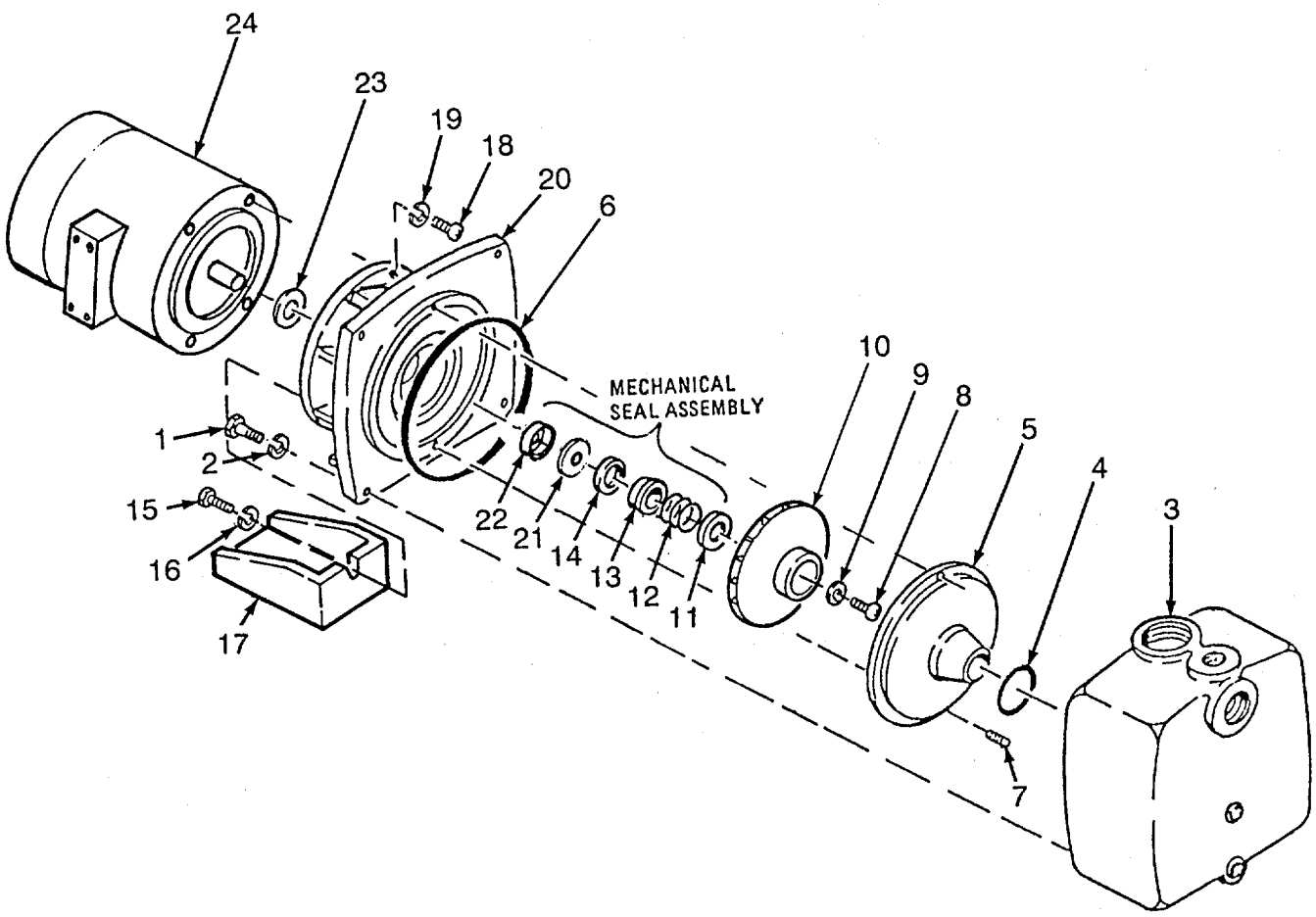
(5) Remove bolt (15), lockwasher (16) and bracket (17).

NOTE
Marking position of adapter on motor will facilitate reassembly.

(6) Scribe a line across motor (24) and adapter (20) junction and remove four screws (18) lockwashers (19) and adapter from motor.

(7) Remove slinger (23) from shaft of motor (24).

(8) Remove rubber cup (22) and ceramic disk (21), from adapter (20).



3-12. CENTRIFUGAL PUMP (RAW WATER PUMP) REPAIR - continued.

b. Cleaning.

WARNING

- Drycleaning solvent, P-D-680, C1 II, 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.

(1) Clean pump case (3) and adapter (20) with drycleaning solvent. Dry with compressed air.

(2) Using a stiff-bristled brush, remove rust and corrosion from pump case (3) and adapter (20).

(3) Wash all internal surfaces with clear water and detergent.

c. Inspection.

(1) Inspect attaching hardware for damage.

(2) Inspect impeller (10), diffuser (5), slinger (23), bracket (17), case (3), and adapter (20) for cracks and serviceability.

d. Repair.

(1) Replace all lockwashers, seals, gaskets and preformed packing.

(2) Replace defective components.

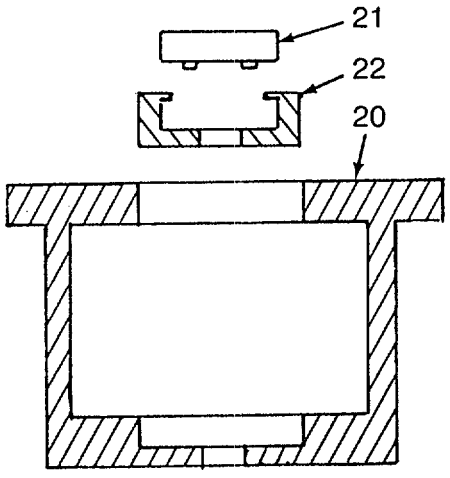
e. Assembly.

CAUTION

Incorrect installation of disks (21 and 14) will result in leaking pump. Be sure smooth, flat side of disk points away from motor when installed.

(1) Lubricate cup (22) and install ceramic disk (21) on cup. Position cup and disk in adapter (20).

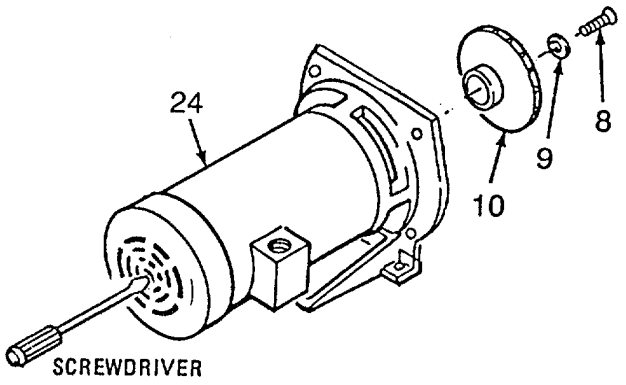
(2) Position slinger (23) on shaft of motor (24) and install adapter (20) with screws (18) and lockwashers (19).



3-12. CENTRIFUGAL PUMP (RAW WATER PUMP) REPAIR - continued.

(3) Position carbon disk (14) on sleeve (13) and position sleeve, spring (12) and washer (11) in adapter (20).

(3) Holding shaft of motor (24) with a screwdriver to keep it from turning, install impeller (8) by screwing it onto shaft tightly. Then install washer (9) and screw (8).

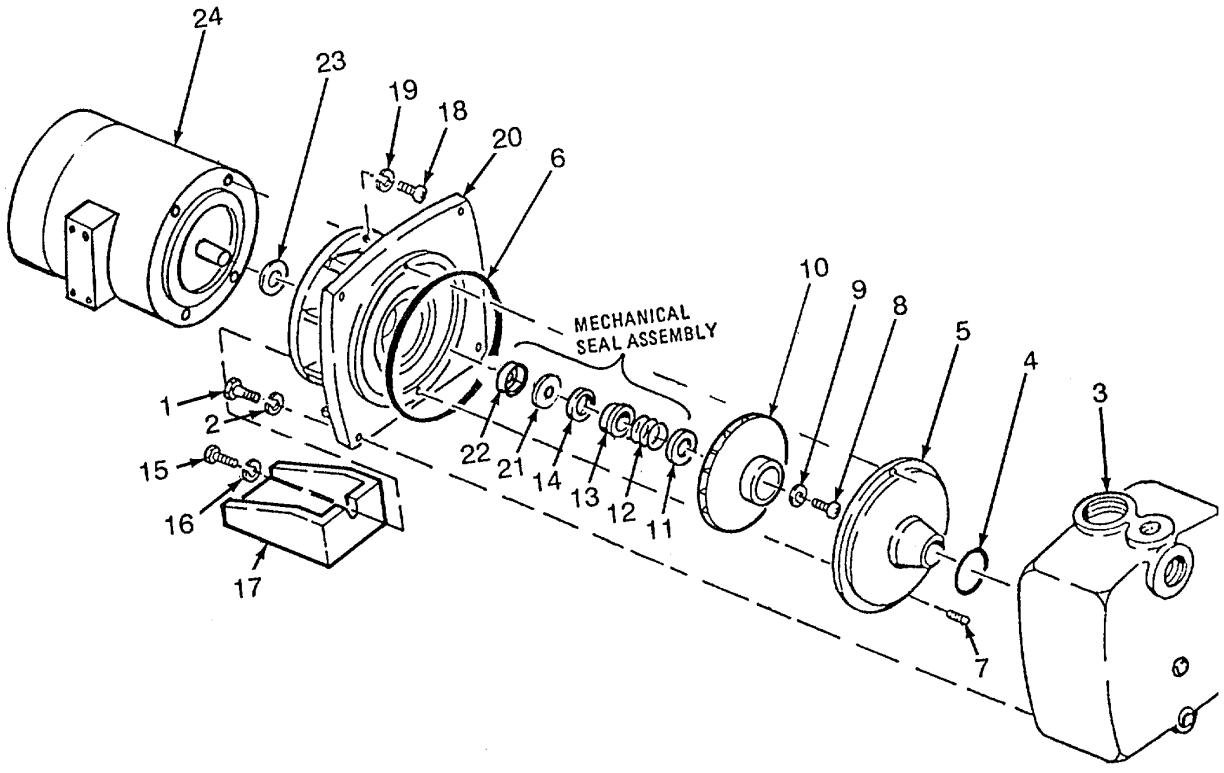


(4) Install bracket (17) with lockwashers (16) and bolts (15).

(5) Install dowel pins (7) and position diffuser (5) over dowel pins on adapter (20).

(6) Position gasket (6) on adapter (20) and gasket (4) on diffuser.

(7) Install pump case (3) and secure with four lockwashers (2) and screws (1).



3-13. CENTRIFUGAL PUMP MOTOR (RAW WATER PUMP) REPAIR.

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)
Socket Drive, 1/4 in (Appendix B, Section III, Item 3)
Socket Drive, 3/8 in (Appendix B, Section III, Item 3)
Two Jaw Pullers (Appendix B, Section III, Item 3)
Material/Parts Required
Grease, GAA (Appendix C, Section II, Item 9)
Wiping, Rags (Appendix C, Section II, Item 14)
Gasket C(TM 10-4610-241-24P)
Equipment Condition
Reference
Centrifugal Pump removed (Paragraph 2-20).
General Safety Instructions

WARNING

- Drycleaning solvent, P-D-680, C1I, 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. Disassembly.

(1) As required, remove two screws (1), conduit box cover (2) and gasket (3).

(2) As required remove two screws (4) and conduit box (5).

(3) Loosen four screws (6) and remove fan cover (7). Remove screws as required.

(4) Loosen set screw (8) and remove fan (9) from shaft of rotor (19), using a two -jaw puller.

NOTE
Marking relative position of fan end plate, stator assembly and pump end plate will assist in alinement during assembly. Be sure to transcribe markings to replacement parts before discarding defective parts or turning them in to Supply.

(5) Scribe a line across junction of fan end plate (7) and stator assembly (20), and across junction of pump end plate (15) and stator assembly.

3-13. CENTRIFUGAL PUMP MOTOR (RAW WATER PUMP) REPAIR - continued.

(6) Remove four through-bolts (10).

(7) Tap fan end plate (11) with soft-faced mallet to break bond with stator assembly (20) and remove fan end plate.

(8) Remove wavy washer (12) and flat washer (13) from shaft of rotor (19).

(9) Remove two screws (14).

(10) Tap pump end plate (15) with soft-faced mallet to break bond with stator assembly (20) and remove pump end plate (15).

CAUTION

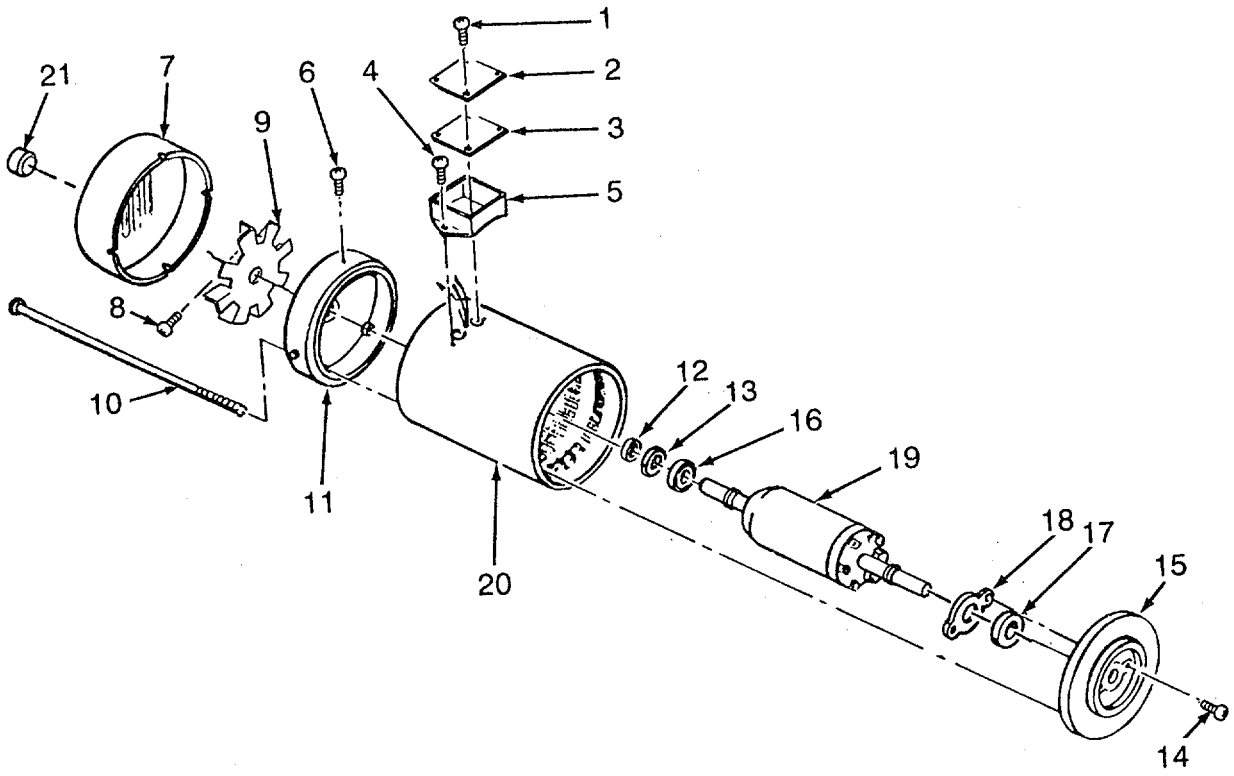
Stator wiring in stator assembly can be damaged by rotor or shaft if rotor is not removed carefully.

(11) Remove rotor (19) from stator assembly (20).

(12) Using arbor press, pull bearings (16 and 17) from shaft of rotor (19).

(13) Remove bearing retainer plate (18).

(14) Remove shaft cover (21).



3-13. CENTRIFUGAL PUMP MOTOR (RAW WATER PUMP) REPAIR - continued.

b. Cleaning.

(1) Scrape loose paint from stator assembly (20), fan cover (7) and end plates ((11 and 15).

WARNING

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

(2) Using compressed air, blow dust and grit from stator (20) and rotor assemblies (19). Wipe rotor assembly with clean rag.

(3) Clean vent slots of fan cover (7) with compressed air and wipe with clean rag.

(4) Wipe bearings (16 and 17) with clean rag.

c. Inspection.

(1) Inspect leads and windings of stator assembly (20) for evidence of cracked or burned insulation.

(2) Inspect rotor assembly (19) for loose or burned conducting bars.

(3) Inspect bearings (16 and 17) for freedom of rotation and worn/damaged seals.

(4) Inspect end plates (11 and 15) for cracks.

d. Repair.

(1) Replace damaged components.

(2) Replace gasket.

e. Assembly.

(1) Position bearing retaining plate (18) on shaft of rotor (19) and, using arbor press, install bearings (16 and 17).

CAUTION

Wiring inside stator assembly can be damaged by rotor or shaft if rotor is not installed carefully.

(2) Position rotor (19) in stator assembly (20).

(3) Position pump end plate (15) on shaft of rotor (19) and aline holes in retaining plate (18) with mounting holes in end plate.

(4) Install screws (14)

(5) Install flat washer (13) and wavy washer (12) on shaft of rotor (19).

(6) Position fan end plate (11) on shaft of rotor (19).

3-13. CENTRIFUGAL PUMP MOTOR (RAW WATER PUMP) REPAIR - continued.

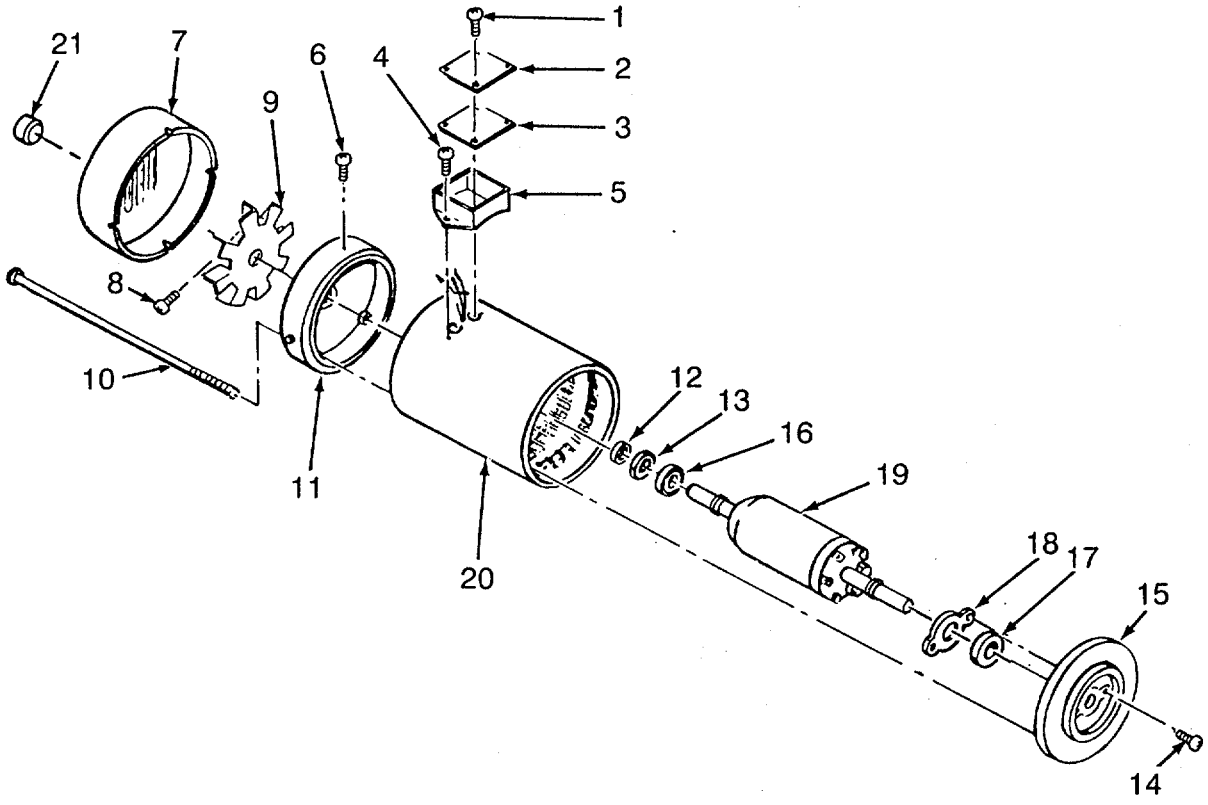
(7) Aline end plates (15 and 11) and stator assembly (20) as marked during disassembly. Install thru bolts (10).

(8) Position fan (9) on shaft of rotor (19) and tighten setscrew (8).

(9) Install fan cover (7) and secure with screws (6).

(10) If removed, position conduit box (5) on motor (20) and install two screws (4).

(11) If removed, position gasket (3) on conduit box cover (2) and install two screws (1).



3-13. CENTRIFUGAL PUMP MOTOR (RAW WATER PUMP) REPAIR - continued.

f. Test.

(1) Secure motor to test bench.

WARNING

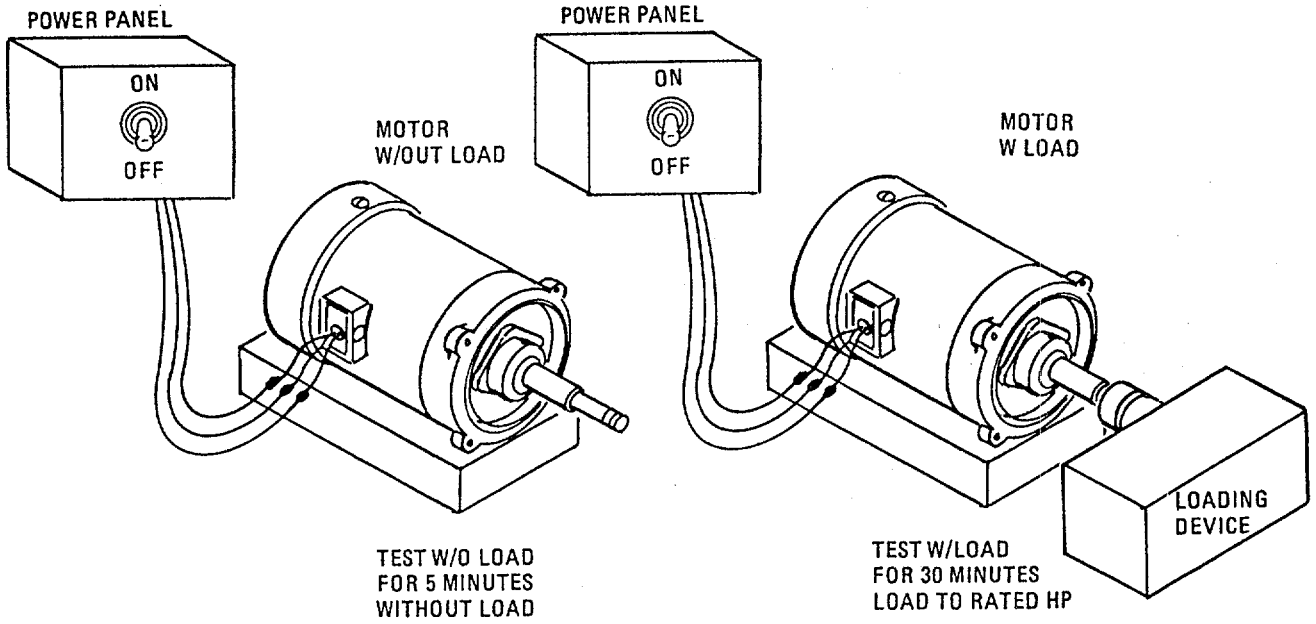
Electrical high voltage can cause serious injury or death. Always take proper measures to ensure personal safety.

(2) Connect motor wiring to test bench leads.

(3) Apply power and run motor with and without load.

(4) Check motor for excessive vibration and fast temperature rise.

(5) Disconnect motor from test bench leads.



3-14. RAW WATER PUMP FRAME REPAIR.

This task consists of: Repair

INITIAL SET-UP:

Tools Required
Refer to TM 9-237
Refer to TM 43-0139
References
Refer to TM 9-237
Refer to TM 43-0139

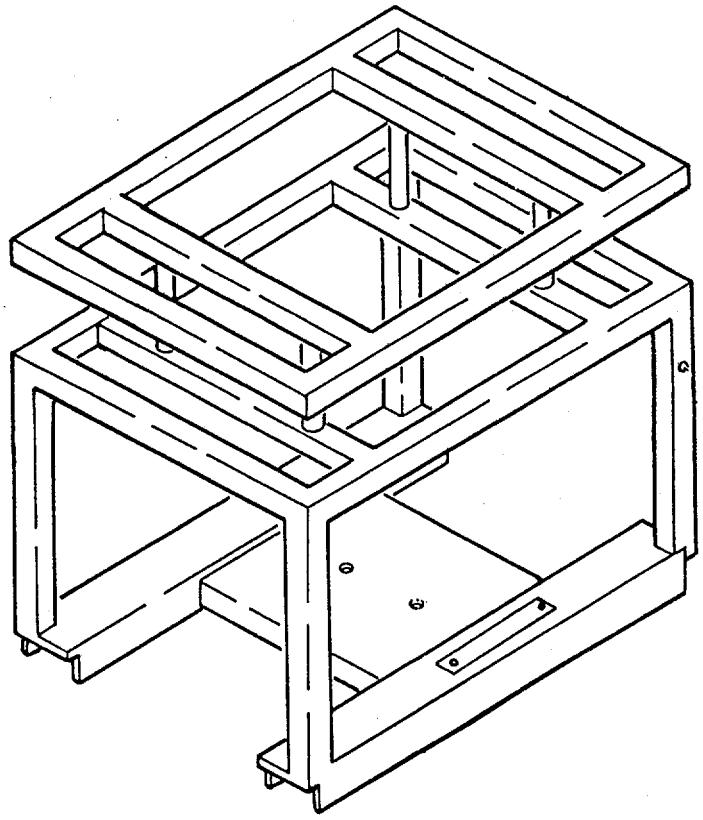
Repair.

(1) For removal and installation instructions, refer to Paragraph 2-20.

(2) Inspect for bent or broken frame components and cracked welds.

(3) Weld frame as required in accordance with TM 9-237.

(4) Paint frame in accordance with TM 43-0139.



Section V. DISTRIBUTION PUMP ASSEMBLIES MAINTENANCE PROCEDURES

3-15. CABLE ASSEMBLY, W45 (DISTRIBUTION PUMP)

This task consists of: a. Inspection b. Disassembly
c. Repair d. Assembly
e. Test

INITIAL SET-UP:

Tools Required
Per TM 43-0158/TO 1-1A-15(Air Force)
Material/Parts Required
Per TM 43-0158/TO 1-1A-15(Air Force)
Equipment Condition
Reference
Cable Assembly removed (Paragraph 2-21).

a. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-1A-15(Air Force).

b. Disassembly.

For disassembly procedures, refer to TM 43-0158/TO 1-1A-15(Air Force).

c. Repair.

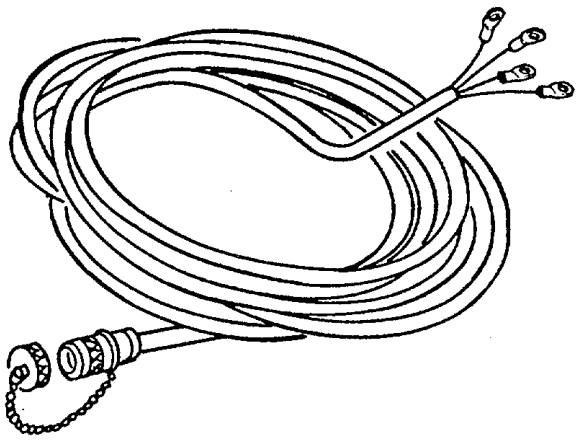
For repair procedures, refer to TM 43-0158/TO 1-1A-15(Air Force).

d. Assembly.

For assembly procedures, refer to TM 43-0158/TO 1-1A-15(Air Force).

E Test.

Test cable assembly in accordance with Paragraph 2-21.



3-16. CENTRIFUGAL PUMP (DISTRIBUTION PUMP) REPAIR.

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)
Goggles (Appendix B, Section III, Item 3)
Materials/Parts Required
Solvent, Drycleaning (Appendix C, Section II, Item 18)
Detergent (Appendix C, Section II, Item 5)
Grease, Silicone (Appendix C, Section II, Item 10)
Gaskets and Seals (TM 10-4610-241-24P)
Equipment Condition
Reference
Centrifugal Pump Assembly removed (Paragraph 2-22).
General Safety Instructions

WARNING

- Drycleaning solvent, P-D-680, C II, 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.

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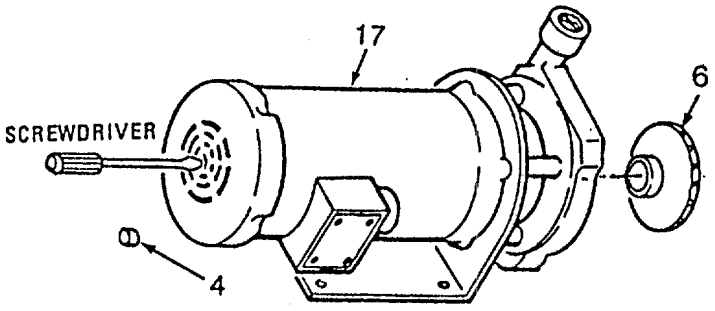
a. Disassembly.

(1) Remove four screws (1), cover (2), and gasket (3).

(2) Remove cap (4) and insert large blade, flat tip screwdriver in screwdriver slot of shaft (5).

(3) Holding shaft with screwdriver, to keep it from turning, unscrew and remove impeller (6) with a strap wrench.

(4) Remove rotating parts of mechanical seal assembly; rubber disk (7), spring (8), shaft (9) and carbon disk (10).



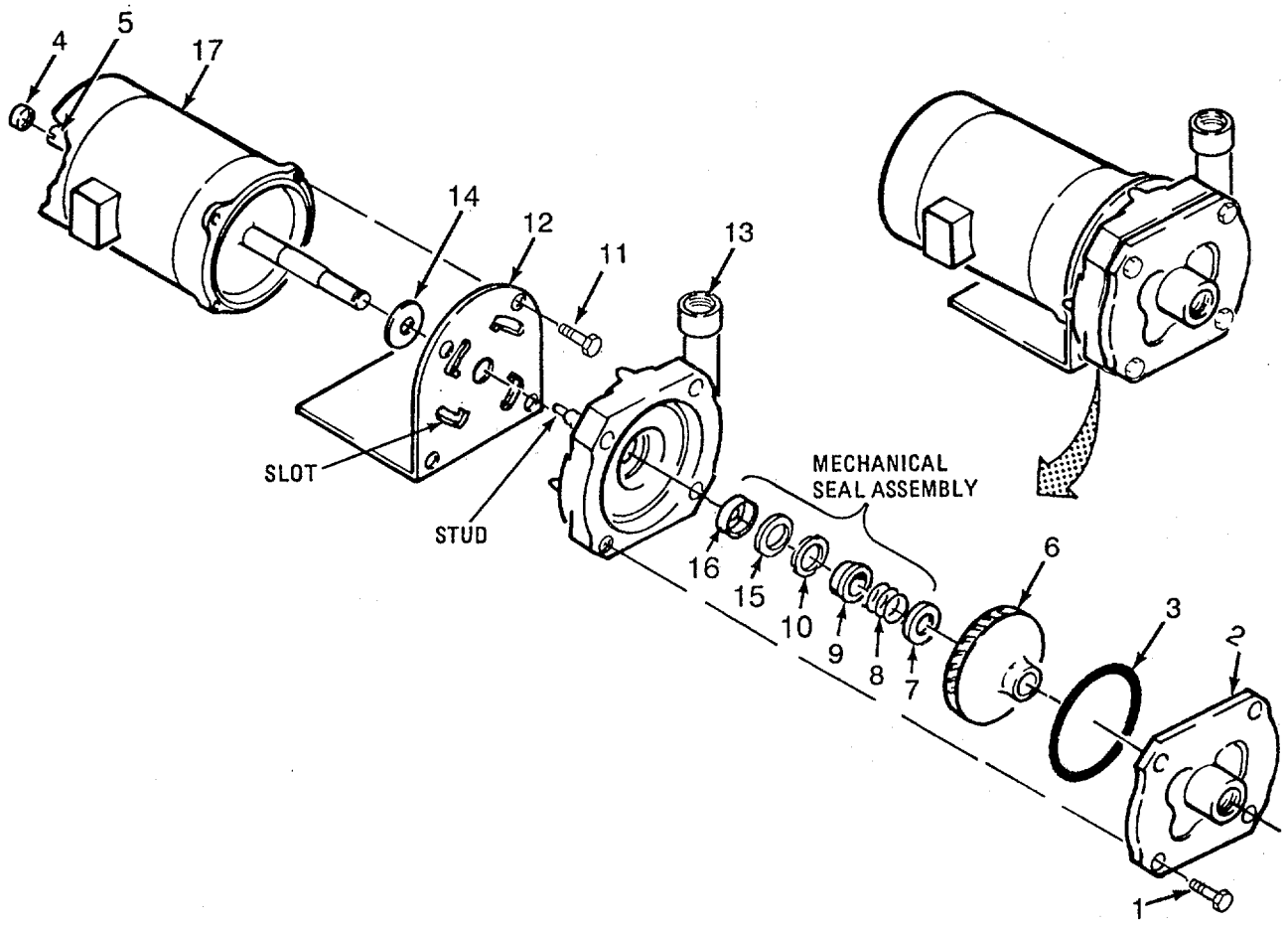
3-16. CENTRIFUGAL PUMP (DISTRIBUTION PUMP) REPAIR - continued.

(5) Remove four cap screws (11). Then remove bracket (12) and casing (13) as a unit.

(6) Holding bracket (12) stationary, turn casing counterclockwise (as viewed from pump side) and separate casing (13) from bracket (12).

(7) Remove slinger (14) from shaft of motor (17).

(8) Using drift pin, remove stationary parts of mechanical seal assembly; rubber cup (16) and ceramic disk (15) from casing (13).



3-16. CENTRIFUGAL PUMP (DISTRIBUTION PUMP) REPAIR - continued.

b. Cleaning.

WARNING

- Drycleaning solvent, P-D-680, Cl II, 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 (13), cover (2) and bracket (12).

b. Using wire brush, clean rust and corrosion from casing (13), cover (2) and bracket (12).

c. Using mild soap solution, wash impeller (6) and inside of casing (13).

c. Inspection.

(1) Inspect casing (13), impeller (6) and cover (2) for cracks and damage.

(2) Inspect mounting hardware for excessive wear and damage.

d. Repair.

Replace seals and packing. Replace other parts if unserviceable.

e. Assembly.

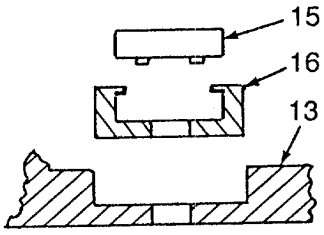
(1) Position slinger (14) on shaft of motor (17).

CAUTION

Ceramic disk must be installed in cup with smooth, flat surface pointing away from motor or pump will leak.

(2) Lubricate rubber cup (16) and install ceramic disk (15) in cup with smooth side up as shown.

(3) Install rubber cup (16) with disk (15) in casing (13).



NOTE

When pump casing is installed, outlet port must be pointing up and studs should be radically alined with mounting bolts (11).

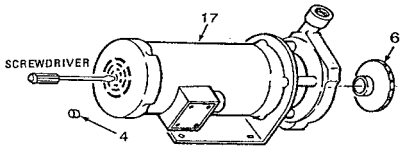
(4) Position studs of casing (13) in wide part of slots on bracket (12) and turn casing clockwise (as viewed from pump side) until studs and holes for screws (6) are radically alined.

3-16. CENTRIFUGAL PUMP (DISTRIBUTION PUMP) REPAIR - continued.

(5) Install bracket (12), with attached casing (13) on motor (17), using bolts (11).

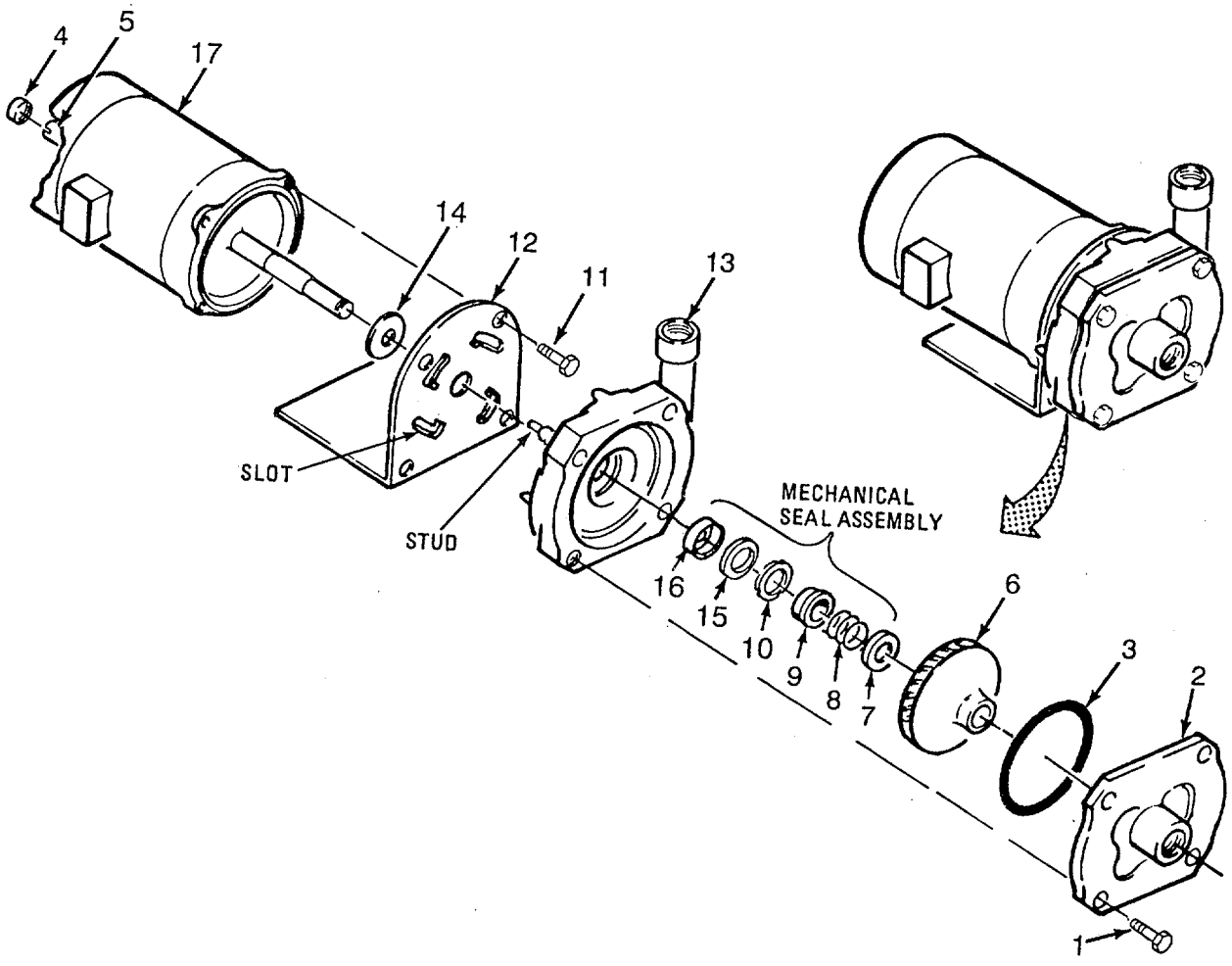
(6) Position rotating parts of seal assembly; disk (10), sleeve (9), spring (8) and rubber disk (7) on shaft of motor, making sure that smooth surface of disk (10) is in contact with disk

(7) Insert blade of screwdriver in screwdriver slot of shaft (5) to keep shaft from turning and install impeller (6). Use strap wrench to tighten.



(8) Position gasket (3) in cover (2) and install cover with four screws (1).

(9) Install cap (4) on motor shaft (5).



3-17. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) REPAIR.

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)
Goggles (Appendix B, Section III, Item 3)
Material/Parts Required
Grease, GAA (Appendix C, Section II, Item 9)
Rags, Wiping (Appendix C, Section II, Item 14)
Equipment Condition
Reference
Centrifugal Pump Motor removed (Paragraph 3-16).
General Safety Instructions

WARNING

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

a. Disassembly.

(1) Remove three screws (1) and fan cover (2).

(2) Remove screw and retainer (3), from fan (4).

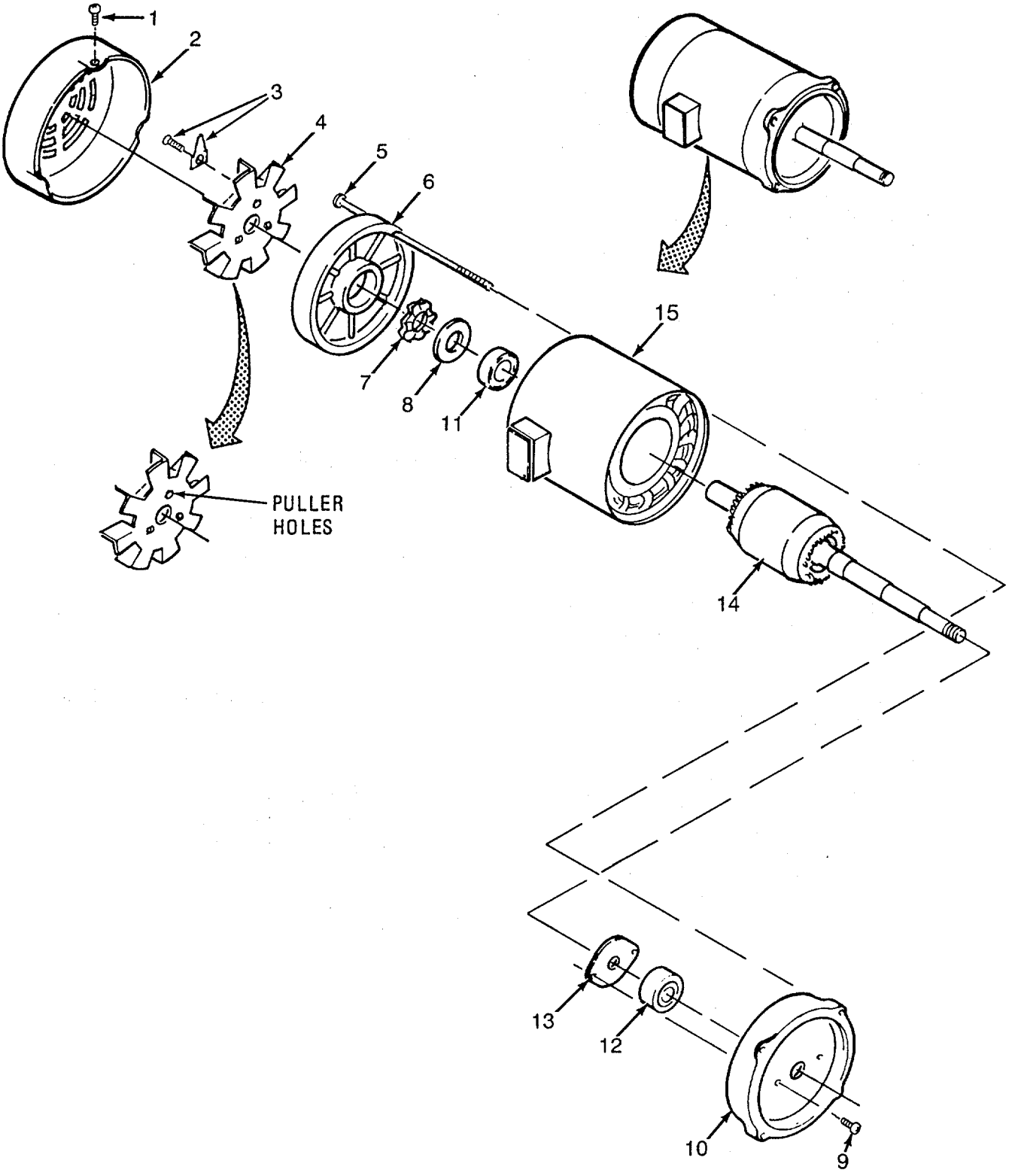
(3) Insert three screws (1) in puller holes of fan (4). Tighten screws evenly to pull fan from shaft of rotor (14)

NOTE

Marking relative position of fan end plate, case, and pump end plate will facilitate installation If marked parts are to be replaced be sure to transcribe markings to new parts before discarding defective parts or turning them in to Supply.

(4) Scribe a line across junctions of stator (15) and end plates (6 and 10).

3-17. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) REPAIR - continued.



3-17. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) REPAIR - continued.

(5) Remove four bolts (5).

(6) Tap plate (6) with soft-faced mallet to break bond with stator assembly (15) and remove plate.

(7) Remove wavy washer (7) and flat washer (8) from shaft of rotor assembly (14).

CAUTION

Wiring in stator assembly can be damaged by rotor assembly if it is not removed carefully. Guide rotor assembly carefully while removing it.

(8) Tap plate (10) with soft-faced mallet to break bond with stator assembly (14) and remove plate with rotor assembly (14) attached.

(9) Remove two screws (9) and plate (10).

(10) Using arbor press, remove bearing (11) from shaft of rotor assembly (14).

(11) Using arbor press, remove bearing (12) from shaft of rotor assembly (14).

(12) Remove retaining plate (13).

b. Cleaning.

WARNING

Compressed air can blow dust into the eyes. Wear goggles. Do not exceed 30 psi (207 kPa) air pressure.

(1) Using compressed air, blow dust and grit from stator assembly (15) and from rotor assembly (14). Wipe rotor assembly with clean rag.

(2) Clean vent slots on fan cover (2) with compressed air and wipe with clean rag.

(3) Wipe bearings (11 and 12) with clean rag.

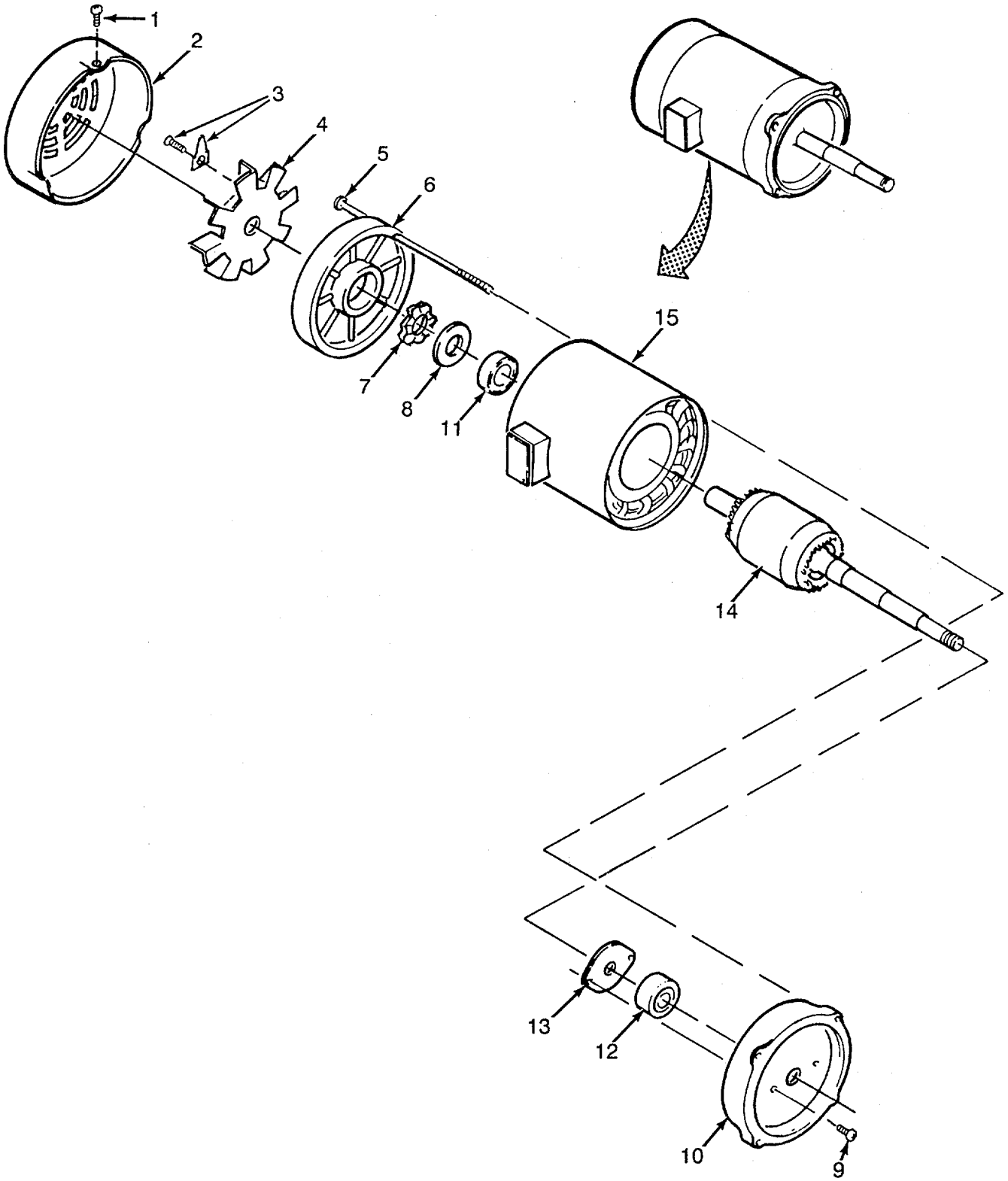
(4) Scrape loose paint from fan cover (2), stator assembly (15), and pump end plate (6 and 10).

c. Inspection.

(1) Inspect leads and windings of stator assembly (15) for evidence of cracked or burned insulation.

(2) Inspect stator assembly (15) for visible damage.

3-17. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) REPAIR - continued



3-17. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) REPAIR - continued.

(3) Inspect bearings (11 and 12) for freedom of rotation and damaged seals.

(4) Inspect end plates (6 and 10) for cracks.

d. Repair.

Replace defective components.

e. Assembly.

(1) Using arbor press, install bearing (11) on short shaft of rotor assembly (14).

(2) Install retaining plate (13) on long shaft of rotor assembly (14).

(3) Using arbor press, install bearing (12) on long shaft of rotor assembly (14).

(4) Position end plate (10) on long shaft of rotor assembly (14).

(5) Secure end plate (10) to retaining plate (13) with two screws (9).

CAUTION

Stator wiring can be damaged by rotor assembly if not installed carefully. Guide rotor assembly carefully while installing it.

(6) Insert rotor assembly (14) and attached parts in stator assembly (15).

(7) Position plate (10) on stator assembly (15). Aline marks on end plate, made during disassembly, with mark on stator assembly (15).

(8) Position thrust washer (7) and flat washer (8) on shaft of rotor assembly (14).

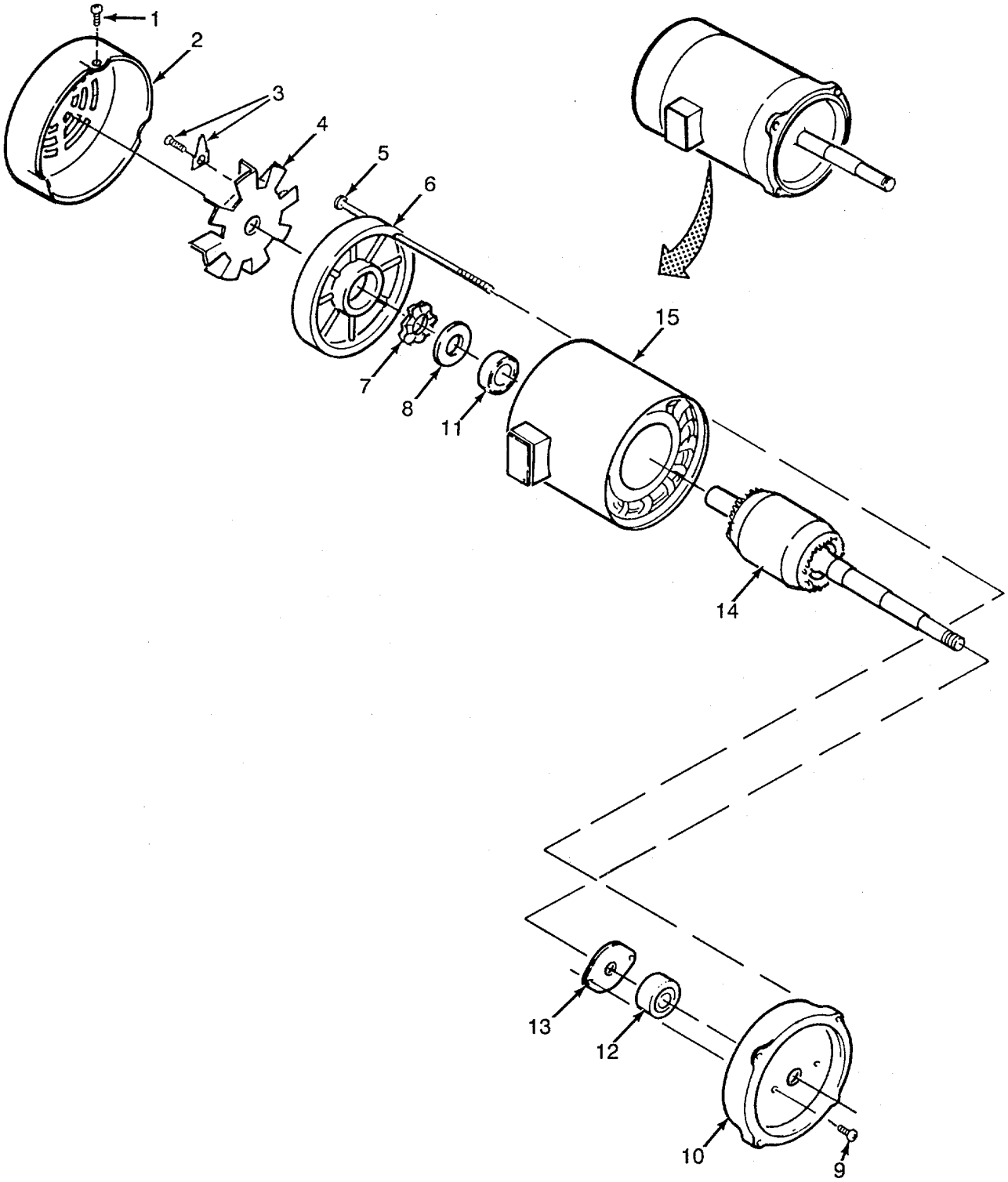
(9) Aline mark on end plate (6), made during disassembly, with mark on stator assembly (15).

(10) Install four bolts (5).

(11) Position fan (4) on short end of rotor (14) shaft and install retainer plate and screw (3) to secure fan (4).

(12) Install fan cover (2) and three screws (1).

3-17. CENTRIFUNGAL PUMP MOTOR (DISTRIBUTION PUMP) REPAIR - continued.



3-17. CENTRIFUGAL PUMP MOTOR (DISTRIBUTION PUMP) REPAIR - continued.

f. Test.

(1) Secure motor to test bench.

WARNING

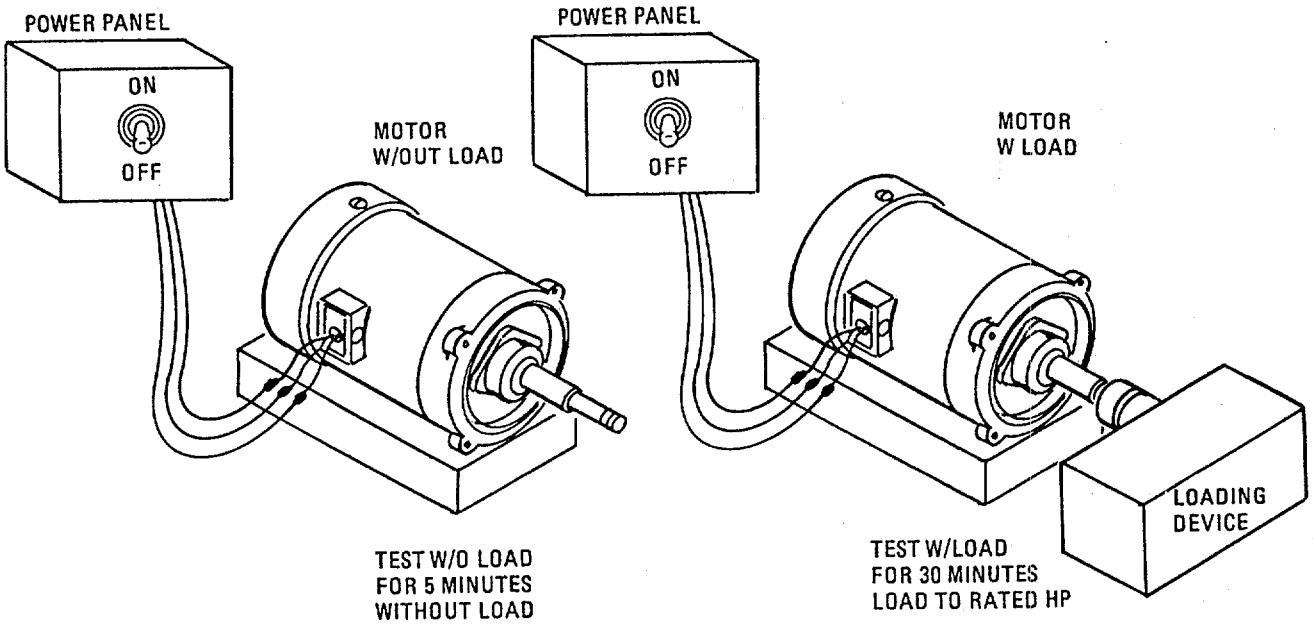
Electrical high voltages can cause serious injury or death. Always take proper measures to ensure personal safety.

(2) Connect motor wiring to test bench leads.

(3) Apply power and run motor with and without load.

(4) Check motor for excessive vibration and fast temperature rise.

(5) Disconnect motor from test bench leads.



3-18. DISTRIBUTION PUMP FRAME REPAIR.

This task consists of: Repair

INITIAL SET-UP:

Tools Required
Refer to TM 9-237.
Refer to TM 43-0139.
Material/Parts Required
Refer to TM 9-237.
Refer to TM 43-0139.
Equipment Condition
Reference
Frame removed (Paragraph 2-22).

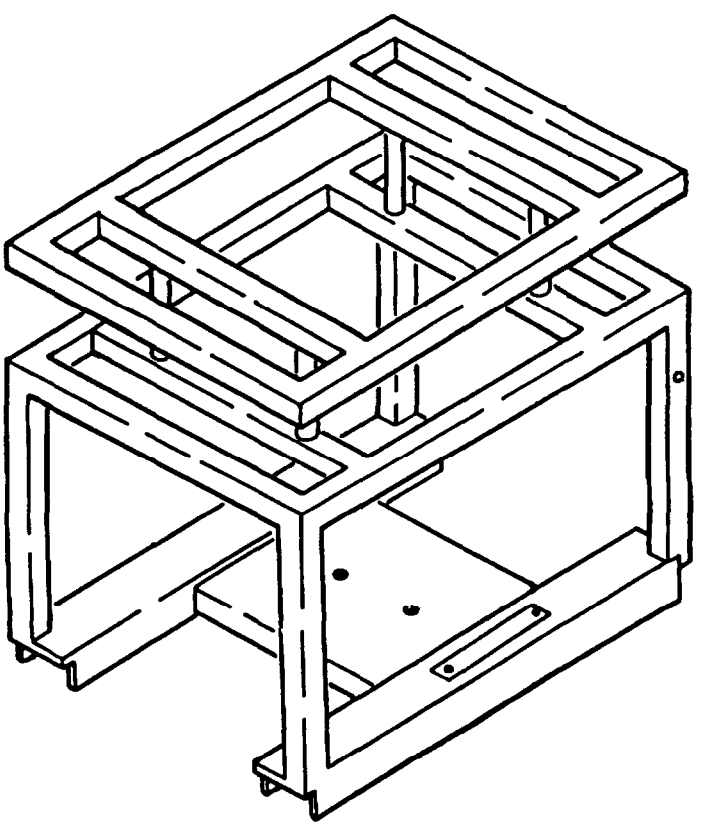
Repair.

(1) For removal and installation refer to Paragraph 2-22.

(2) Inspect for bent or broken frame components and cracked welds.

(3) Weld frame as required in accordance with TM 9-237.

(4) Paint frame in accordance with TM 43-0139.



Section VI. ROWPU ASSEMBLY MAINTENANCE PROCEDURES

3-19. CHEMICAL CANS AND FRAME REPAIR.

This task consists of: Repair

INITIAL SET-UP:

Tools Required
Refer to TMs 9-237 and 43-0139
Materials/Parts Required
Refer to TMs 9237 and 43-0139
Equipment Condition
Reference
Chemical Feed Stand removed (TM 10-4610-241-10).

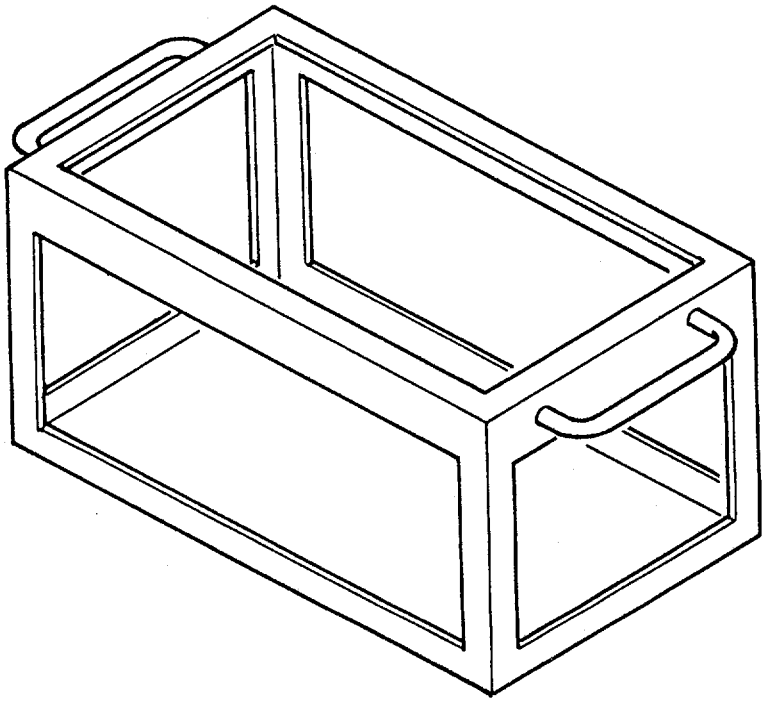
Repair.

(1) Inspect for bent or broken frame components and cracked welds.

(2) Weld frame as required in accordance with TM 9-327.

(3) Paint frame in accordance with TM 43-0139.

3-19. CHEMICAL CANS AND FRAME REPAIR.



3-20. TDS MONITOR REPAIR.

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).
Material/Parts Required
Seals and Packing
Equipment Condition
Reference
TDS Monitor removed from ROWPU (TM 10-4610-241-10).

a. Disassembly

(1) Loosen two captive screws (1) and open cover (2).

(2) Pull out four snap locks (3) and remove meter cover (4).

NOTE

Tagging wires, indicating their connection points will facilitate installation. Be sure to transfer tags to replacement cables before discarding unserviceable cables or turning them in to Supply.

(3) Tag wires going to terminal boards TB1 (5) and TB2 (6).

(4) Using small blade screwdriver, depress wire retainers (7) and disconnect wires of cable assembly (15) from terminal board TB1 (5).

(5) Using small blade screwdriver, depress wire retainers (8) and disconnect wires of wiring harness (23) from terminal board TB2 (6).

(6) Loosen nut (14) and pull cable assembly (15), seal ring (13), seal (12) and nut (14) from TDS monitor.

(7) Remove nut (9), adapter (10) and gasket (11) from TDS monitor.

(8) Remove seal (12), seal ring (13), and nut (14) from cable assembly (15).

(9) Loosen nut (21) and pull cable assembly (23), seal ring (20), seal (19) and nut from TDS monitor.

(10) Remove nut (16), adapter (17) and gasket (18) from TDS monitor.

3-20. TDS MONITOR REPAIR - continued. I

(11) Remove seal (19), seal ring (20) and nut (21) from cable assembly (23).

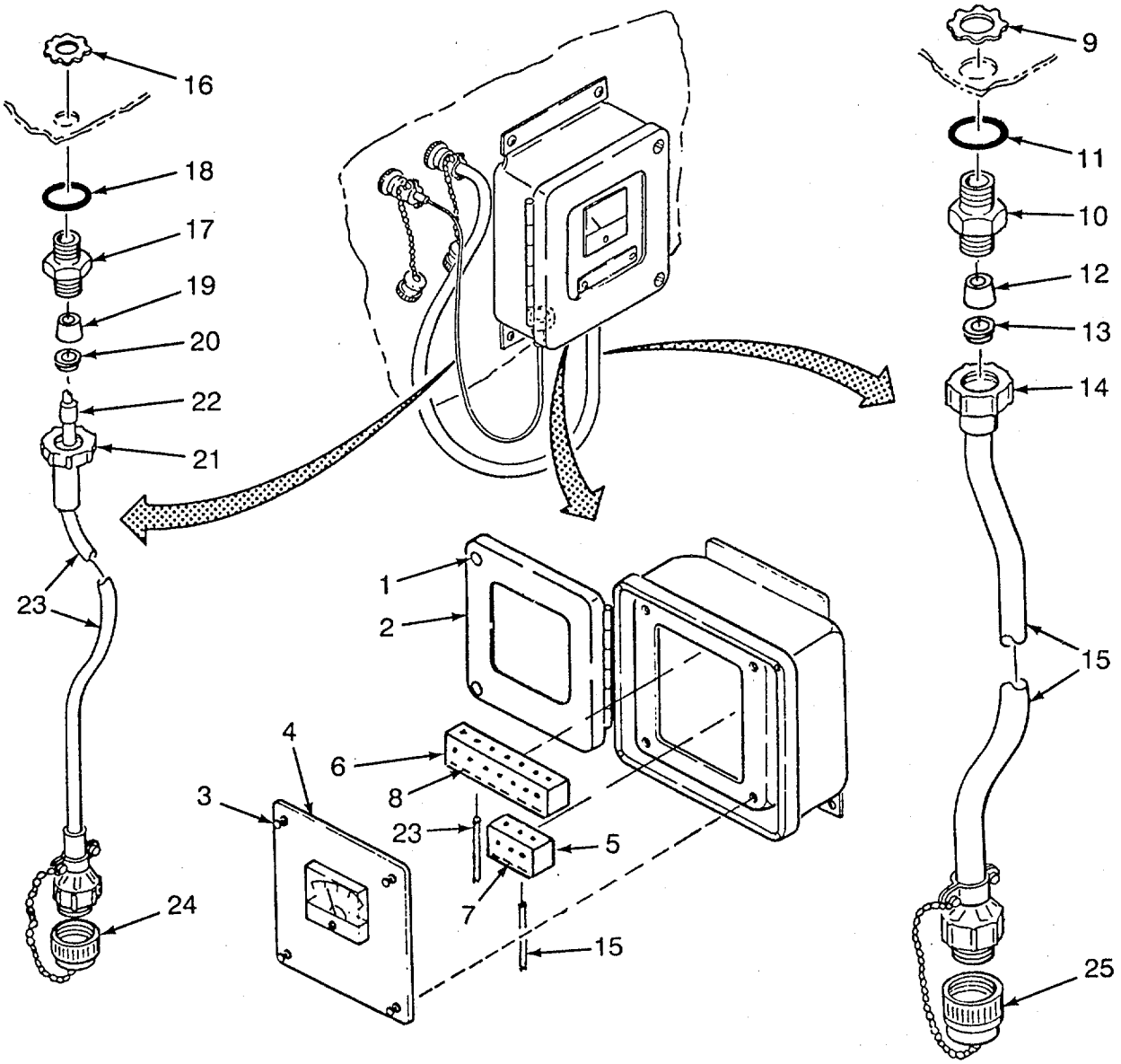
(12) Remove sleeve (22) from cable assembly (23).

(13) As required, remove caps (24 and 25). Refer to Paragraph 2-14.

b. Repair.

(1) Replace seals and packing.

(2) Replace defective components.



3-20. TDS MONITOR REPAIR - continued.

c. Assembly.

(1) Install gasket (18), adapter (17) and nut (16) on TDS monitor.

(2) Position sleeve (22) on cable assembly (23).

(3) Position nut (21), seal ring (20) and seal (19) on cable assembly (23).

(4) Route cable assembly thru adapter (17) and into TDS monitor.

(5) Making sure wire ends of cable assembly reach terminal board (6), slide sleeve (22) up to extend approximately 1/2 inch into TDS monitor, fit seal (19) into adapter (17), slide seal ring (20) and nut (21) up to adapter and screw nut onto adapter.

(6) Install gasket (11), adapter (10) and nut (9) on TDS monitor.

(7) Position nut (14), seal ring (13) and seal (12) on cable assembly (15).

(8) Route cable assembly (15) thru adapter (10) into TDS monitor.

(9) Making sure, wire ends of cable assembly (15) reach terminal board (5), fit seal (12) into adapter (10), slide seal ring (13) and grip nut (14) up to adapter and screw grip nut onto adapter.

NOTE

To insure correct operation of TDS monitor, be sure to connect wires as tagged. If tags are lost or illegible, connect cable (15) as follows:

Cable Assembly (15)	Connection Point
Black	TBI-1
White	TB1-2
Green	TB1-3

(10) Using small blade, flat tip screwdriver, depress wire retainers (7) on terminal board (15) and connect wires of cable as tagged during disassembly. If tags are lost or illegible use color code.

NOTE

To insure correct operation of TDS monitor, be sure to connect wires of cable assembly (23) as tagged. If tags are lost or illegible, connect wires as follows:

Cable Assembly (15)	Connection Point
Black	TB2-1
White	TB2-2
Red	TB2-3
Green	TB2-4
Bare	TB2-5

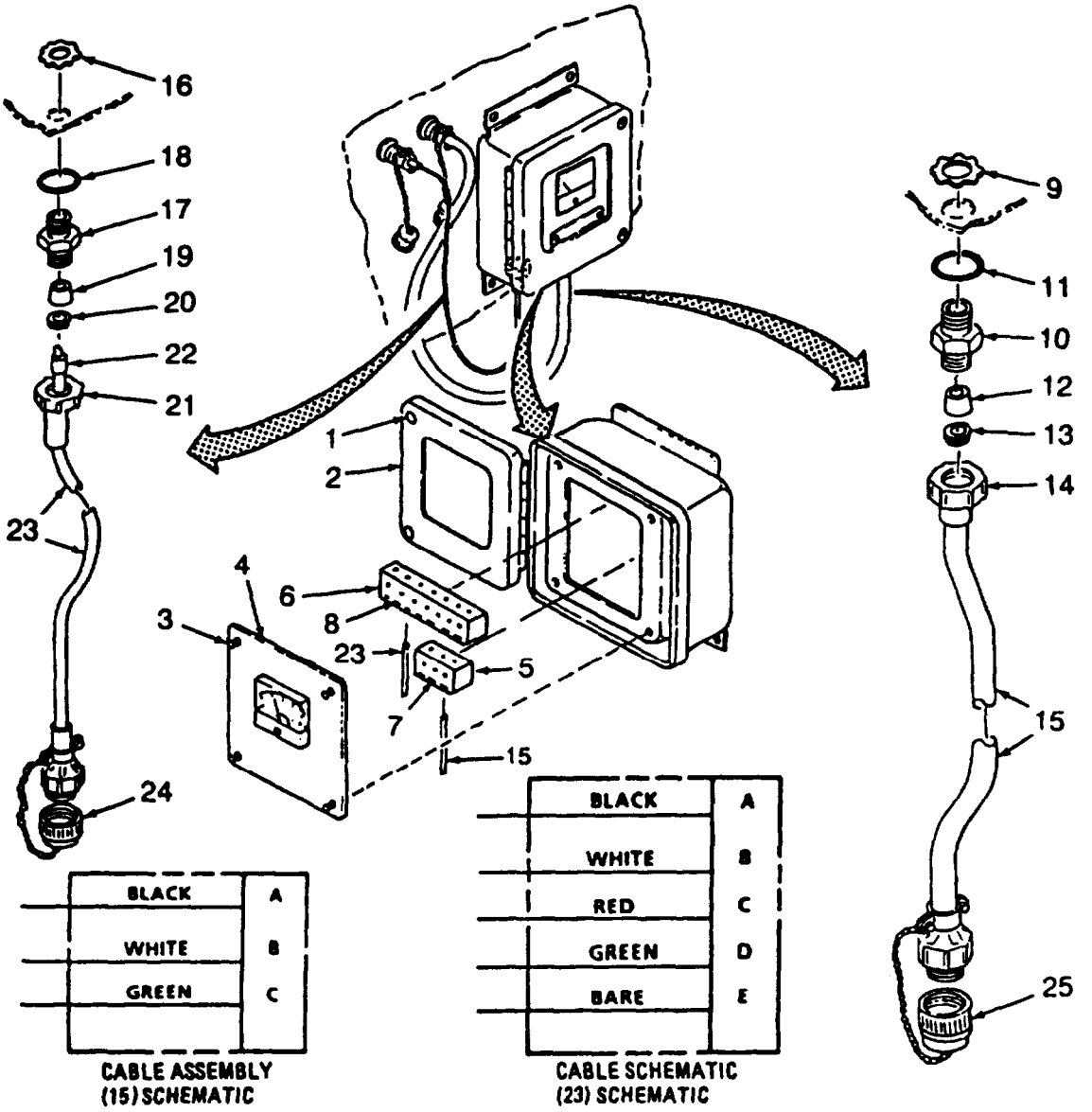
3-20. TDS MONITOR REPAIR - continued.

(11) Using small blade, flat tip screwdriver, depress wire retainers on TB2 (8) and connect wires of cable (23) to TB2 as tagged during disassembly. If tags are lost or illegible, use color code.

(12) If removed, install caps (25 and 24). Refer to Paragraph 2-14.

d. Test.

(1) Test is limited to calibration (Paragraph 2-26) and test of cable assemblies (15 and 23). Use cable schematic diagrams to test cables for continuity and shorts.



3-21. GENERATOR SET REPLACE (MODELS WPES-10 AND H-9518-1).

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)
Lifting Device with Sling (Appendix B, Section III, Item 3)
Chocks (Appendix B, Section III, Item 3) -
Guide Ropes
Personnel Required
Three
Material Parts Required
Lockwashers (TM 10-4610-241 -24P)
Equipment Condition
Reference
Generator shut down (Generator Manual).
Power Cable disconnected and removed from Generator (Paragraph 3-28).
Leveling Jacks extended (TM 10-4610-241-10).
General Safety Requirements

WARNING

- Weight of generator is 2850 pounds (1.5 tons approximately). To prevent injury to personnel and damage to equipment, use proper lifting equipment, rated at 5 tons 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 movement of equipment being lifted. Do not stand under or in a position where you could be pinned against another object. Watch your footing.

a. Removal.

(1) Place chocks (1) in front of forward, and behind rear wheels.

(2) Remove eight nuts (2) and eight lo&washers (3) from under-side of flatbed trailer (4).

3-21. GENERATOR SET REPLACE (MODELS WPES-10 AND H-9618-1) - continued.

(3) Remove eight bolts (6) and flatwashers (6) from topside of generator mounting plate (7).

WARNING

Weight of generator is 2850 pounds (1.5 tons approximately). To prevent injury to personnel and damage to equipment, use proper lifting equipment, rated at 10 tons or greater.

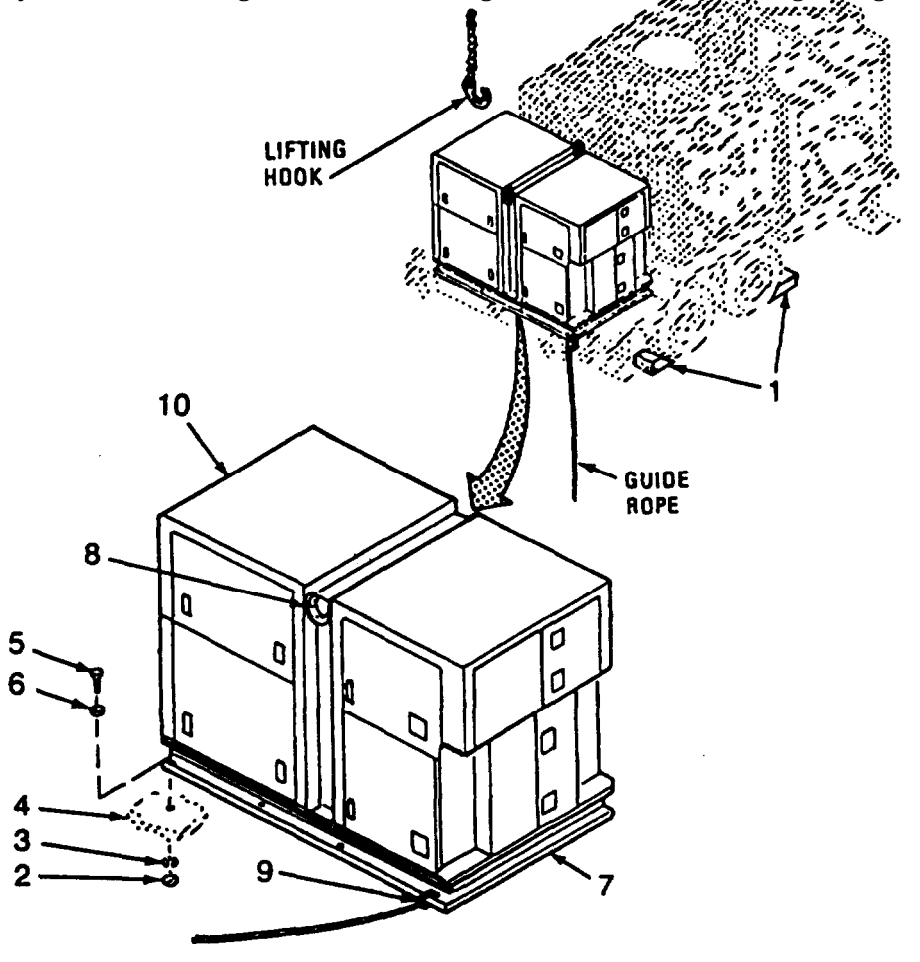
(4) Attach hook of lifting sling to lifting eyes (8), making sure hooks point inward as shown in illustration.

(5) Attach guide ropes to guide loops on side of generator (9).

WARNING

- Lack of attention or being in an improper position during lifting operations can result in serious injury or death. Pay close attention to movement of equipment being lifted. Do not stand under generator, or in a position where you could be pinned against another object. Watch your footing.
- Always use assistants during lifting operations. Use guide ropes to move and position hanging equipment.

(6) Lift generator (9) from flatbed trailer (4) and, using guide ropes to keep generator level and steady, move it to designated area. Lower generator and remove sling and guide ropes.



3-21. GENERATOR SET REPLACE (MODELS WPES-10 AND H-9518-1) - continued.

b. Installation.

(1) Attach hooks of lifting sling to lifting eyes (8) on generator (9), making sure hooks point inward as illustrated.

(2) Attach four guide ropes to four guide loops on side of generator (9).

WARNING

- Lack of attention or being in an improper position during lifting operations can result in serious injury or death. Pay close attention to movement of equipment being lifted. Do not stand under generator, or in a position where you could be pinned against another object. Watch your footing.
- Always use assistants during lifting operations. Use guide ropes to move and position hanging equipment.

(3) Lift generator (9) and position it over flatbed trailer (4), using guide ropes to keep it steady and level.

(4) Lower generator (9) as nearly as possible on generator mounting holes of trailer (4).

(5) If necessary, use drift pin to further aline generator mounting holes with mounting holes in trailer (4).

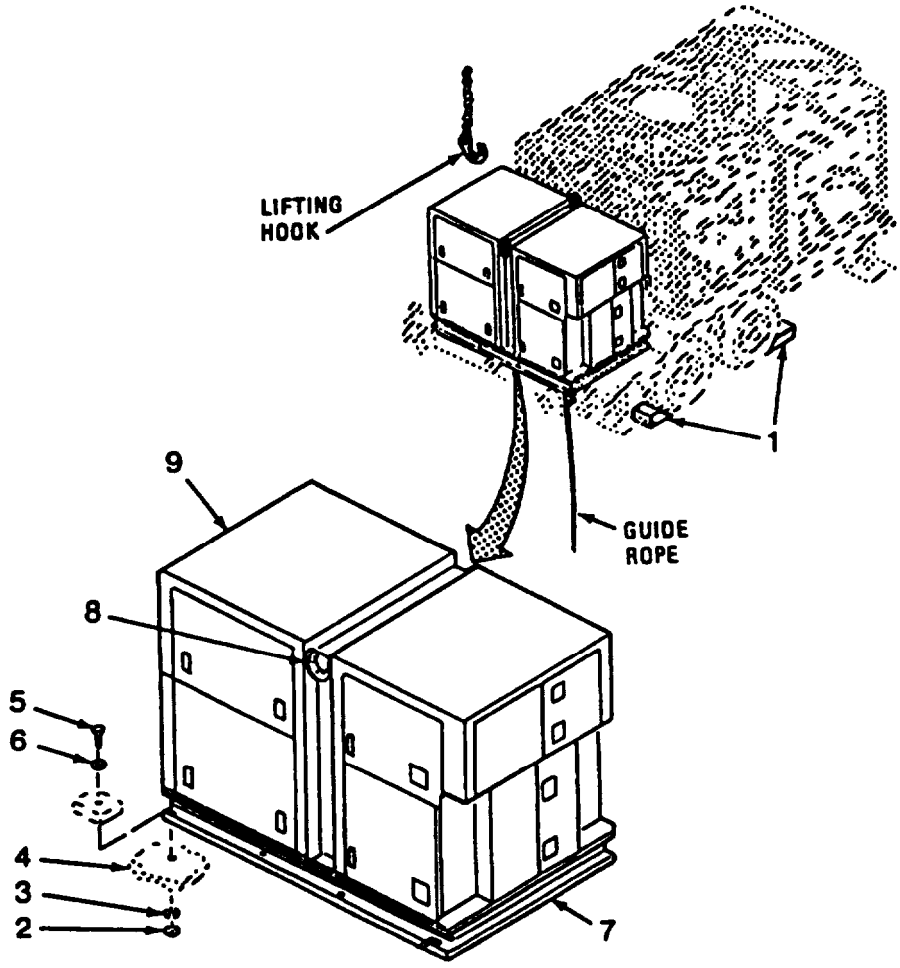
(6) Disconnect sling and guide ropes.

(7) Secure generator (9) to trailer (4) with eight flatwashers (6), bolts (5), lockwashers (3) and nuts (2).

(8) Remove chocks (1).

(9) Connect power cable (Paragraph 2-56).

3-21. GENERATOR SET REPLACE (MODELS WPES-10 AND H-9518-1)-continued.



3-22. ROWPU REPLACE (MODELS WPES-10 AND H-9518-1).

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 with Sling (Appendix B, Section III, Item 3)
- Chocks (Appendix B, Section III, Item 3)
- Guide Ropes

Personnel Required
- Four

Material Parts Required
- Compound, Locking (Appendix C, Section II, Item 4)
- Lockwashers (TM 10-4610-241-24P)

Equipment Condition
Reference
- ROWPU drained and all loose Accessories removed (TM 10-4610-241-10).
- Leveling Jacks extended (TM 10-4610-241-10).
- Generator removed (Paragraph 3-2 1).

General Safety Instructions

WARNING

- Weight of ROWPU is 11380 pounds (6 tons approximately). To prevent injury to personnel and damage to the equipment, use proper lifting equipment rated at 10 tons 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 movement of equipment being lifted. Do not stand under generator or in a position where you could be pinned against another object. Watch your footing.

a. Removal.

(1) Position chocks (1) in front of forward and behind rear wheels of trailer (9).

(2) Remove 16 bolts (2) lo&washers (3), and flatwashers (4) from bottom of trailer (9).

(3) Connect lifting sling (5) to four lifting eyes (6).

(4) Attach guide ropes (7) to guide loops on side, front and rear of ROWPU (8).

3-22. ROWPU REPLACE (MODELS WPES-10 AND H-9618-1) - continued.

WARNING

Weight of ROWPU is 11380 pounds (6 tons approximately). To prevent injury to personnel and damage to equipment, use proper lifting equipment rated at 10 tons or greater.

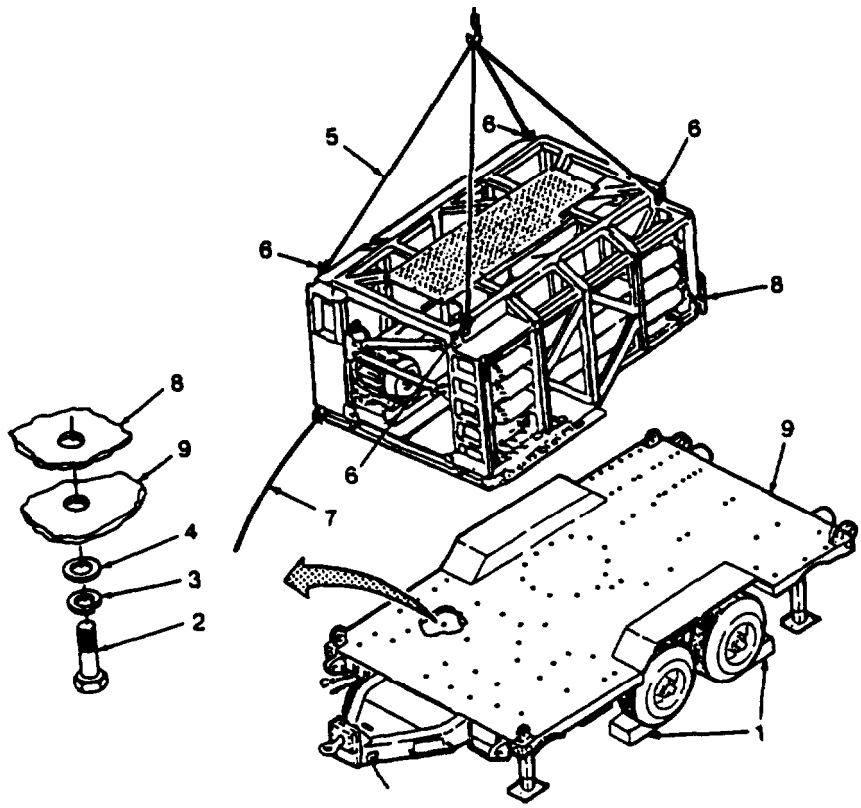
(5) Connect lifting sling (5) to lifting device.

WARNING

- Lack of attention or being in an improper position during lifting operations can result in serious injury or death. Pay close attention to movement of equipment being lifted. Do not stand under ROWPU or in a position where you could be pinned against another object. Watch your footing.
- Always use assistants during lifting operations. Use guide ropes to move and position hanging equipment.

(6) Lift ROWPU (8) from trailer (9) and, using guide ropes (7) to keep it level and steady, move it to designated area.

(7) Lower ROWPU (8) and disconnect lifting sling (5) and guide ropes (7) from ROWPU (8).



3-22. ROWPU REPLACE (MODELS WPES-10 AND H-9518-1) - continued.

b. Installation.

WARNING

Weight of ROWPU is 11380 pounds (6 tons approximately). To prevent injury to personnel and damage to the equipment, use proper lifting equipment rated at 10 tons or greater.

(1) Attach lifting sling (5) to lifting eyes (6) on ROWPU (8).

(2) Attach lifting sling (5) to lifting device.

(3) Attach guide ropes (7) to guide loops on ROWPU (8).

WARNING

- Lack of attention or being in an improper position during lifting operations can result in serious injury or death. Pay close attention to movement of equipment being lifted. Do not stand under ROWPU or in a position where you could be pinned against another object. Watch your footing.
- Always use assistants during lifting operations. Use guide ropes to move and position hanging equipment.

(4) Pick up ROWPU (8) and position over flatbed trailer (9), using guide ropes to keep it steady and level.

(5) Lower ROWPU (8) into position over trailer (9), making sure mounting holes in trailer aline with mounting holes on ROWPU as nearly as possible.

(6) If necessary use drift pins to further aline mounting holes.

(7) Apply locking compound to threads of 16 bolts (2).

(8) Install 16 flatwashers (4), lockwashers (3), and bolts (2) through bottom of trailer (9) and into frame of ROWPU (8)

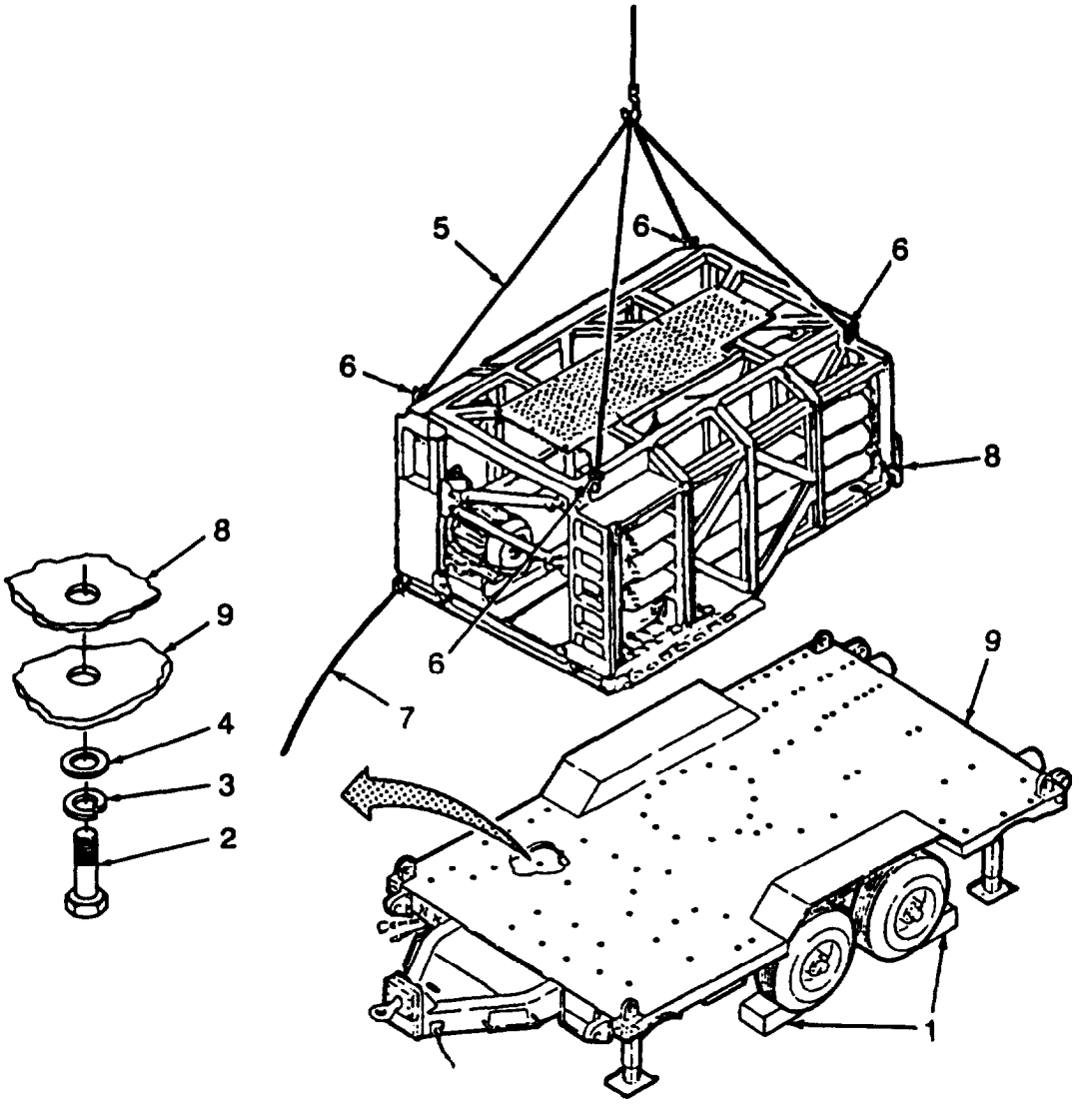
(9) Remove guide ropes (7) from ROWPU.

(10) Remove lifting device from hoisting sling (5).

(11) Remove hoisting sling (5) from lifting eyes (6).

(12) Remove chocks (1) and install generator (Paragraph 3-21).

3-22. ROWPU REPLACE (MODELS WPES-10 AND H-9518-1) - continued.



3-23. COVER REPAIR.

This task consists of a. ROWPU Frame Cover Repair b. Pump Cover Repair.

INITIAL SET-UP:

Tools Required
Refer to FM 43-3.
Material/Parts Required
Refer to FM 43-3.
Equipment Condition
Reference
Covers removed from Equipment (TM 10-4610-241-10).

a. ROWPU Frame Cover Repair.

(1) Sew patches on tears. Refer to FM 43-3.

(2) Sew loose rim strip or webbing straps. Refer to FM 43-3.

(3) Apply water-repellent solution. Refer to FM 43-3.

b. Pump Cover Repair.

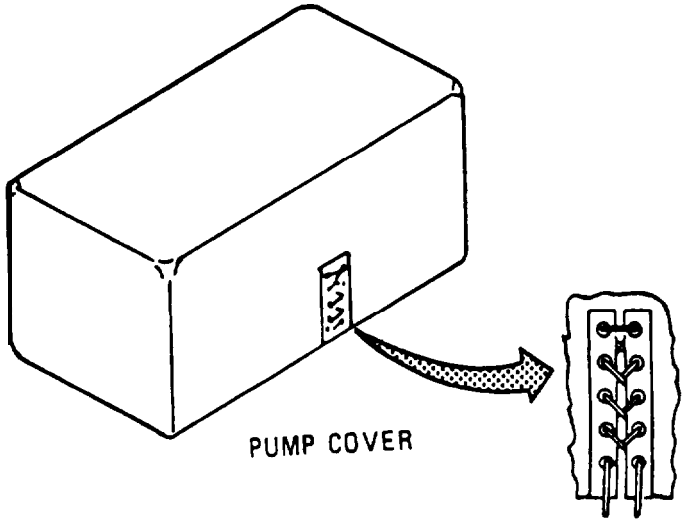
(1) Replace damaged or missing grommets. Refer to FM 43-3.

(2) Replace worn or frayed laces. Refer to FM 43-3.

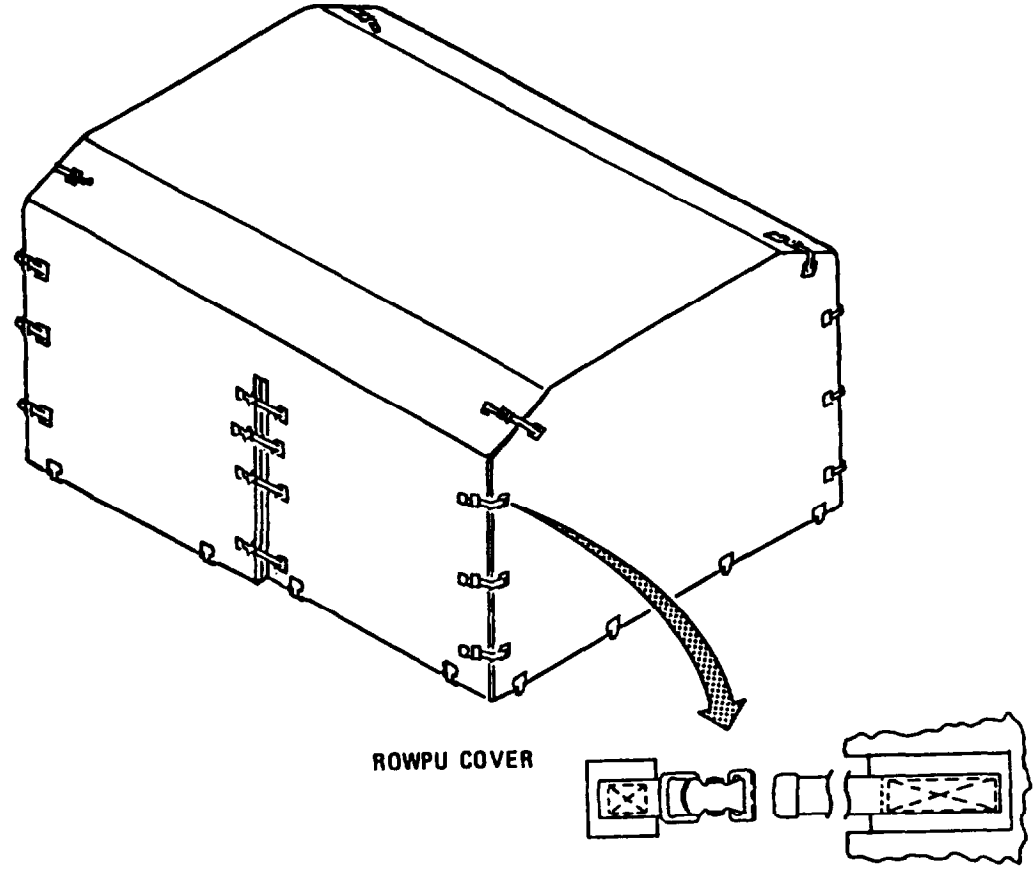
(3) Replace or repair inner felt lining. Refer to FM 43-3.

(4) Patch tears in cover. Refer to FM 43-3.

(5) Sew loose stitching. Refer to FM 43-3.



3-23. COVER REPAIR - continued.



Section VII. ELECTRICAL INSTALLATION MAINTENANCE PROCEDURES

3-24. CABLE ASSEMBLY W38 (GROUND CABLE) REPAIR

This task consists of:	a. Removal	b. Cleaning
	c. Inspection	d. Repair
	e. Installation	

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Refer to TM 43-0158/TO l-1A-15 (Air Force) for Tools required to inspect and repair Cable Assembly.

Materials/Parts Reauired

Rags, Wiping (Appendix C, Section II, Item 14)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to inspect and repair Cable Assembly.

Equipment Condition

Reference

Power shut down (Power Source Manual).

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

a. Removal.

(1) Remove nut (1), lockwasher (2), flatwashers (3), lockwasher (4) and screw (5), disconnecting cable assembly (9) from ROWPU frame.

(2) Remove nut (6), lockwasher (7), flatwashers (8) and cable assembly (9) from stud (10) at bottom of junction box.

b. Cleaning.

Clean cable assembly and mounting hardware with damp rags.

c. Inspection.

For inspection procedures of cable assembly, refer to TM 43-0158/TO 1-1 A-15 (Air Force).

3-24. CABLE ASSEMBLY, W38 (GROUND CABLE) REPAIR - continued.

d. Repair.

(1) Replace lockwashers and other components if unserviceable.

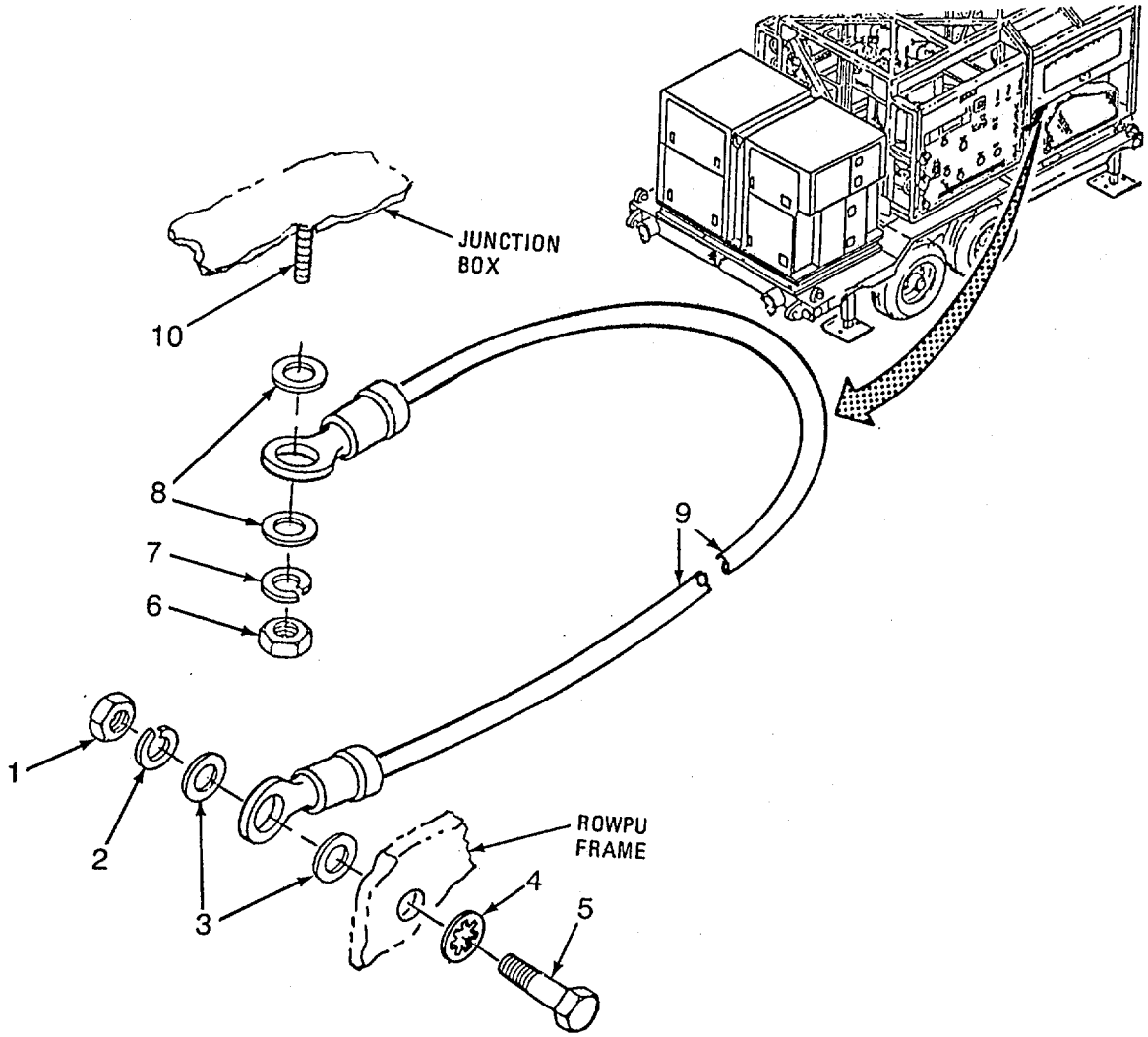
(2) For repair procedures of cable assembly, refer to TM 43-0158/TO 1-1A-15 (Air Force).

e. Installation.

(1) Position one flatwasher (8) and cable assembly (9) on stud (10) at bottom of junction box.

(2) Install second flatwasher (8), lockwasher (7) and nut (6).

(3) Position cable assembly on ROWPU frame and install lockwasher (4), screw (5), two flatwashers (3), lockwasher (2) and nut (1).



3-25. CABLE ASSEMBLY W48 (PANEL LIGHT) REPAIR.

This task consists of: a. Removal b. Cleaning c. Inspection. d. Test e. Repair f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Tools required to inspect and repair Cable Assembly.
Materials/Parts Required
Rags, Wiping (Appendix C, Section II, Item 14)
Lockwashers, Seals and Gaskets (TM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Materials required to inspect and repair Cable Assembly.
Equipment Condition
Reference
Power shut down (Power Source Manual).
Cable Assembly, W48 disconnected at Panel Light (Paragraph 2-74).
General Safety Instructions

WARNING

High voltages in this equipment can cause serious injury or death. Make sure that all power is removed before performing maintenance.

a. Removal.

(1) Remove 14 screws (1), lockwashers (2) and washers (3) and carefully open cover (4).

(2) Remove nut (5), lockwasher (6), flatwasher (7), ground wire lugs (8 and 9), lockwasher (10) and screw (11) from control panel (26).

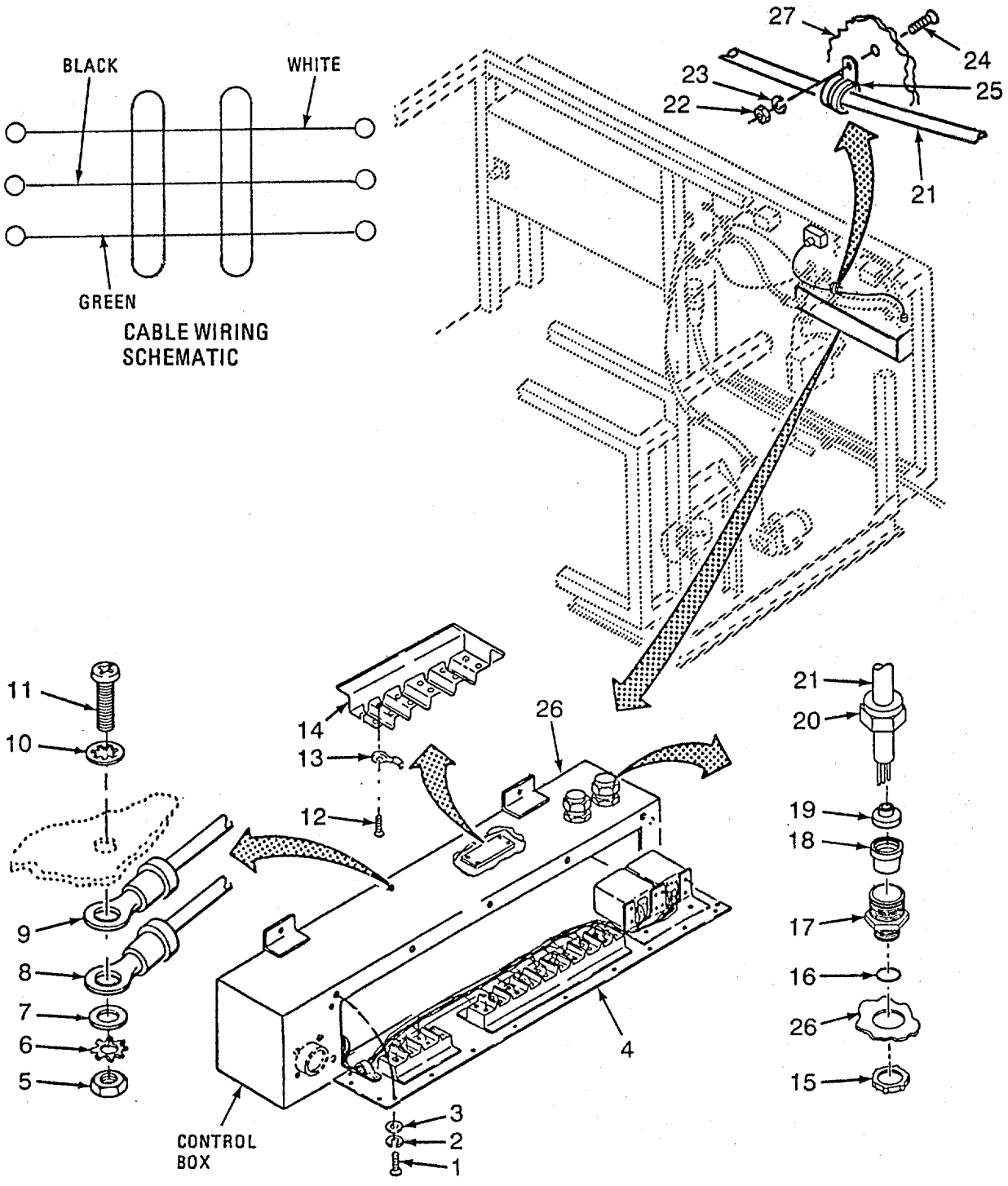
(3) Remove screw (12) from terminal board TB5 (14), contacts 2 and 3 and remove wire lugs (black wire - contact 2), and (white wire - contact 3) of cable assembly (21) from terminal board (14).

(4) Unscrew nut (15) from adapter (17) and remove cable assembly (21) with nut (20), seal ring (19), seal (18), adapter (17) and gasket (16) from control box (26).

(5) Remove gasket (16), adapter (17), seal (18), seal ring (19) and nut (20) from cable assembly (21).

(6) Remove nut (22), lockwasher (23), screw (24) and clamp (25), securing cable assembly (21) to control panel (27). Remove cable assembly from ROWPU.

3-25. CABLE ASSEMBLY, W48 (PANEL LIGHT) REPAIR - continued.



3-25. CABLE ASSEMBLY W48 (PANEL LIGHT) REPAIR - continued.

b. Cleaning.

Clean cable assembly and mounting hardware with damp rags.

c. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-lA-15 (Air Force).

d. Test.

Test cable assembly for continuity and shorts, using cable wiring schematic (opposite page) as a guide.

e. Repair.

(1) Replace lockwashers and other parts if unserviceable.

(2) For repair procedures of cable assembly, refer to TM 43-0158/TO 1-lA-15 (Air Force).

f. Installation.

(1) Position nut (20), seal ring (19), seal (18), adapter (17) and gasket (16) on cable assembly (21).

(2) Feed end of cable assembly (21) thru cutout at top of control box (26).

(3) Position nut (15) over end of cable assembly (21) in control box (26) and connect to adapter (17).

(4) Connect black wire of cable to terminal board, TB5 (14), contact 2, and white wire to contact 3. Secure wires with screws (12)

(5) Install screw (11), lockwasher (10), ground lug (9) of cable assembly (21) and ground lug (8) of filter control cable, washer (7), lockwasher (6) and nut (5).

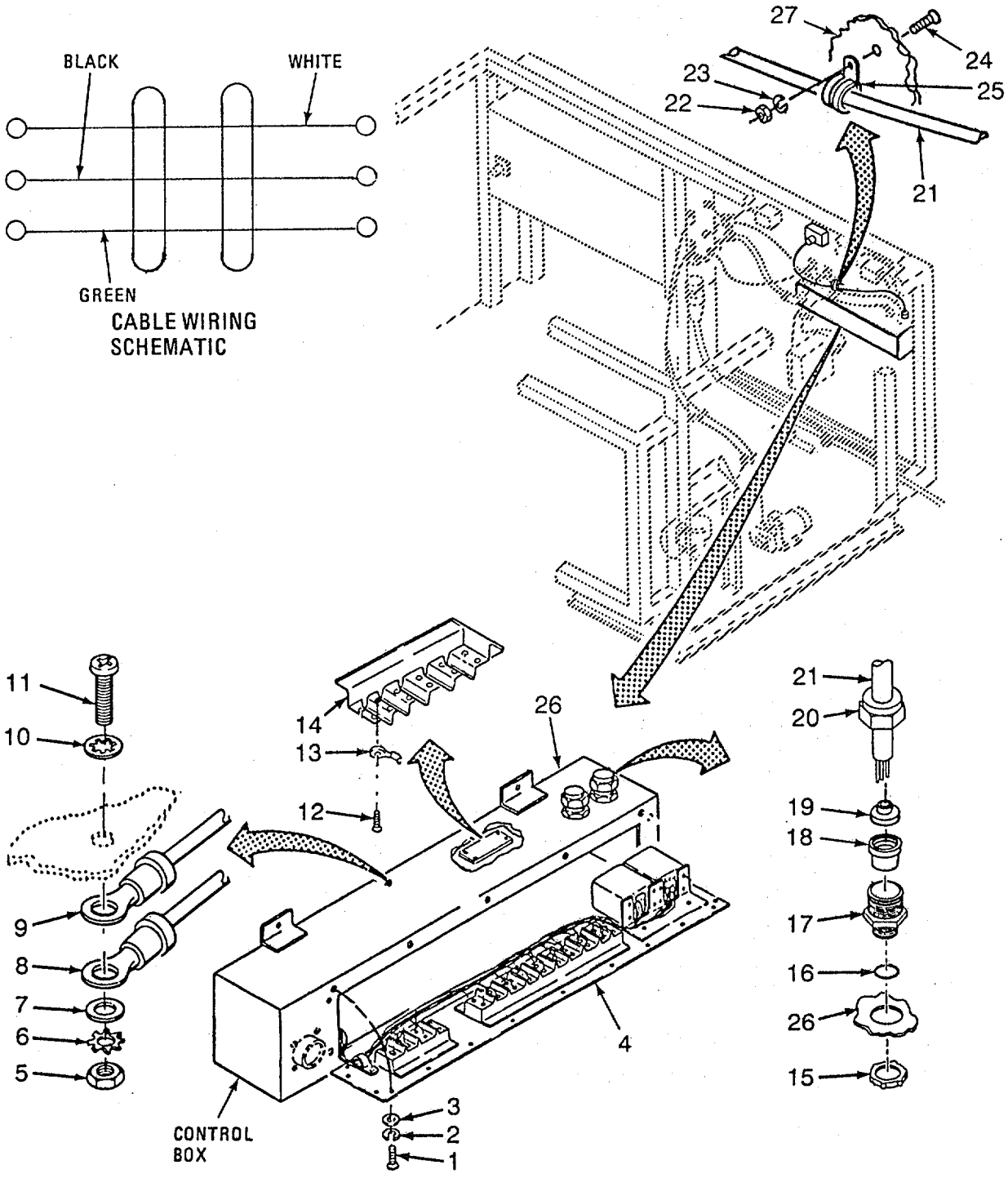
(6) Position seal (18) inside adapter (17) and seal ring (19) inside nut (20). Screw nut onto adapter, making sure that cable wires injunction box have enough slack to prevent tension on wires.

(7) Close box cover and install 14 flatwashers (3), lockwashers (2) and screws (1).

(8) Connect other end of cable assembly (21) to control panel light (Paragraph 2-74)

(9) Secure cable assembly (21) to back of control panel (27) with clamp (25), screw (24), lockwasher (23) and nut (22).

3-25. CABLE ASSEMBLY, W48(PANEL LIGHT) REPAIR - continued.



3-26. CABLE ASSEMBLY, W41 (R. O. PUMP) REPAIR.

This task consists of: a. Inspection b. Test
c. Repair

INITIAL SET-UP:

Tools Required
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Tools required to inspect and repair Cable Assembly.
Materials/Parts Required
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Materials required to inspect and repair Cable Assembly.
Equipment Condition
Reference
Cable Assembly W41 (R.O. Pump) removed (Paragraph 2-54).

a. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-lA-15 (Air Force).

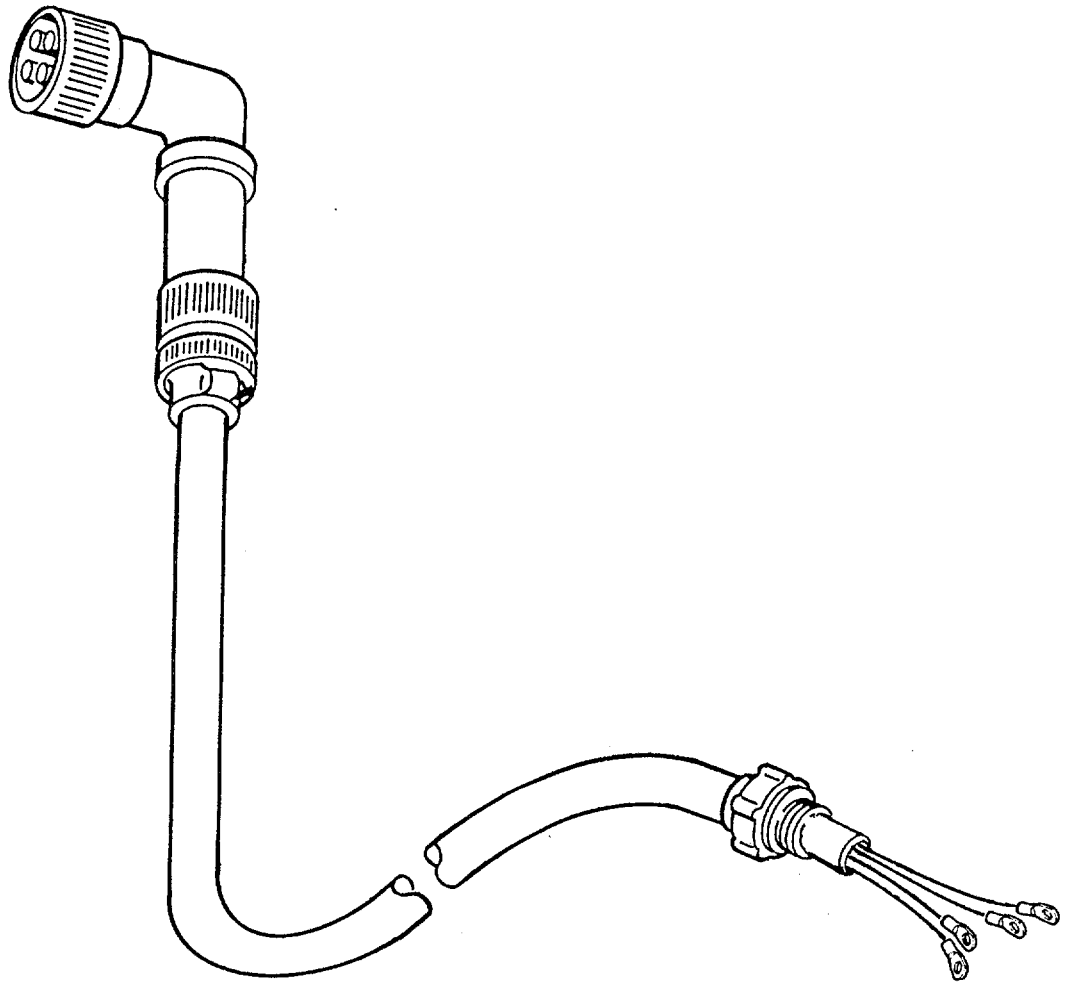
b. Test.

For test procedures, refer to Paragraph 2-54.

c. Repair.

For repair procedures, refer TM 43-0158/TO 1-lA-15 (Air Force).

3-26. CABLE ASSEMBLY, W41 (R.O. PUMP) REPAIR - continued.



3-27. CABLE ASSEMBLY W52 (JUNCTION BOX/CONTROL BOX) REPAIR.

This task consists of: a. Inspection. b. Test
c. Repair

INITIAL SET-UP:

Tools Required
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to inspect and repair Cable Assembly.
Materials/Parts Required
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Materials required to inspect and repair Cable Assembly.
Equipment Condition
Reference
Cable Assembly W52 (Junction Box) removed (Paragraph 2-55).

a. Inspection

For inspection procedures, refer to TM 43-0158/TO 1-lA-15 (Air Force).

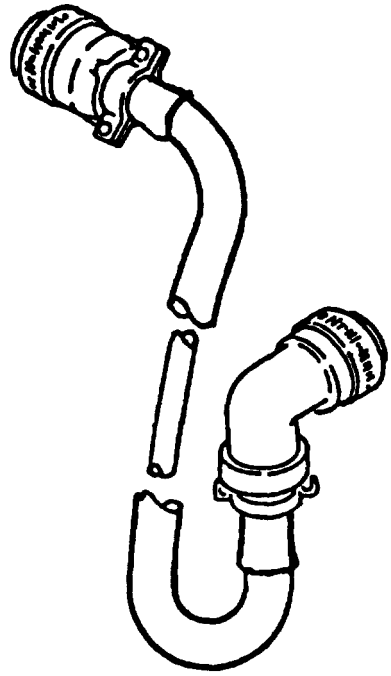
b. Test.

For test procedures, refer to Paragraph 2-55.

c. Repair.

For repair procedures, refer to TM 43-0158/TO 1-lA-15 (Air Force).

3-27. CABLE ASSEMBLY, W52 (JUNCTION BOX/CONTROL BOX) REPAIR - continued.



3-28. CABLE ASSEMBLY, W40 (GENERATOR) REPAIR (MODELS WPES-10 AND H-9518-1).

This task consists of: a. Inspection b. Test c. Repair

INITIAL SET-UP:

Tools Required

Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to inspect and repair Cable Assembly.

Materials/Parts Required

Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Material, required to inspect and repair Cable Assembly.

Equipment Condition

Reference

Cable Assembly W40 (Generator) removed (Paragraph 2-54).

a. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

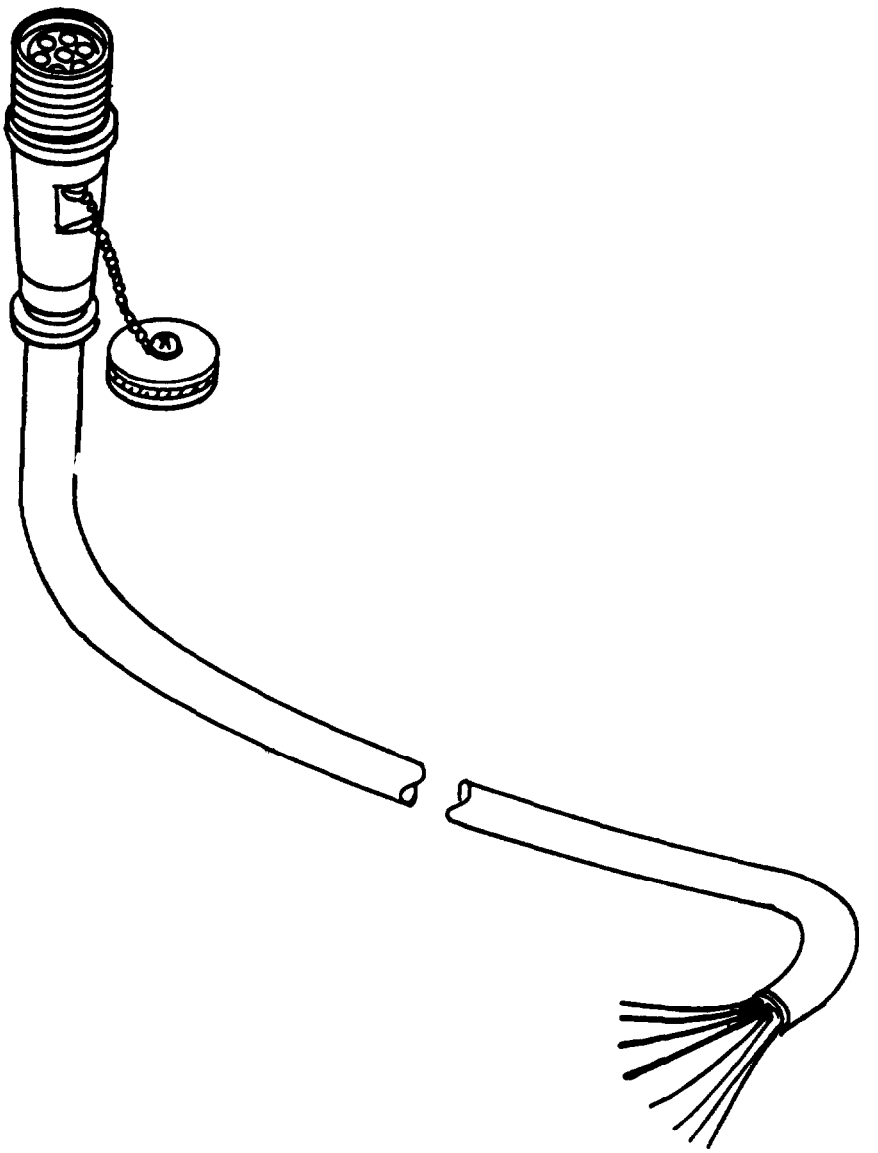
b. Test.

For test procedures, refer to Paragraph 2-54.

c. Repair.

For repair procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

3-28. CABLE ASSEMBLY W49 (GENERATOR) REPAIR (MODELS WPES-10 AND H-9518-1) continued.



3-29. CABLE ASSEMBLY, W50 (CHEMICAL FEED PUMP) REPAIR

This task consists of:
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to inspect and repair Cable Assembly.

Materials/Parts Required
Rags, Wiping (Appendix C, Section II, Item 14)
Lockwashers, Seals and Gaskets (TM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials required to inspect and repair Cable Assembly.

Equipment Condition
Reference
Power shut down (Power Source Manual).
Junction Box open (Paragraph 3-53).
Cable Assembly (W50) disconnected from Chemical Feed Pump (Paragraph 2-62).

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.

a. Removal.

(1) Remove screw (1) and lug (2) and disconnect wire (3) from T1 of motor controller K7 (4).

(2) Remove screw (5), washer (6) and wire (7) from T4 of motor controller (4).

(3) Remove screw (8), lockwasher (9) and ground wire (10) from contact 6 of terminal board, TB2 (11)

(4) Unscrew nut (12) from adapter (14).

(5) Carefully pull cable assembly (18) with nut (17), seal ring (16), seal (15), adapter (14) and gasket (13) from junction box (19).

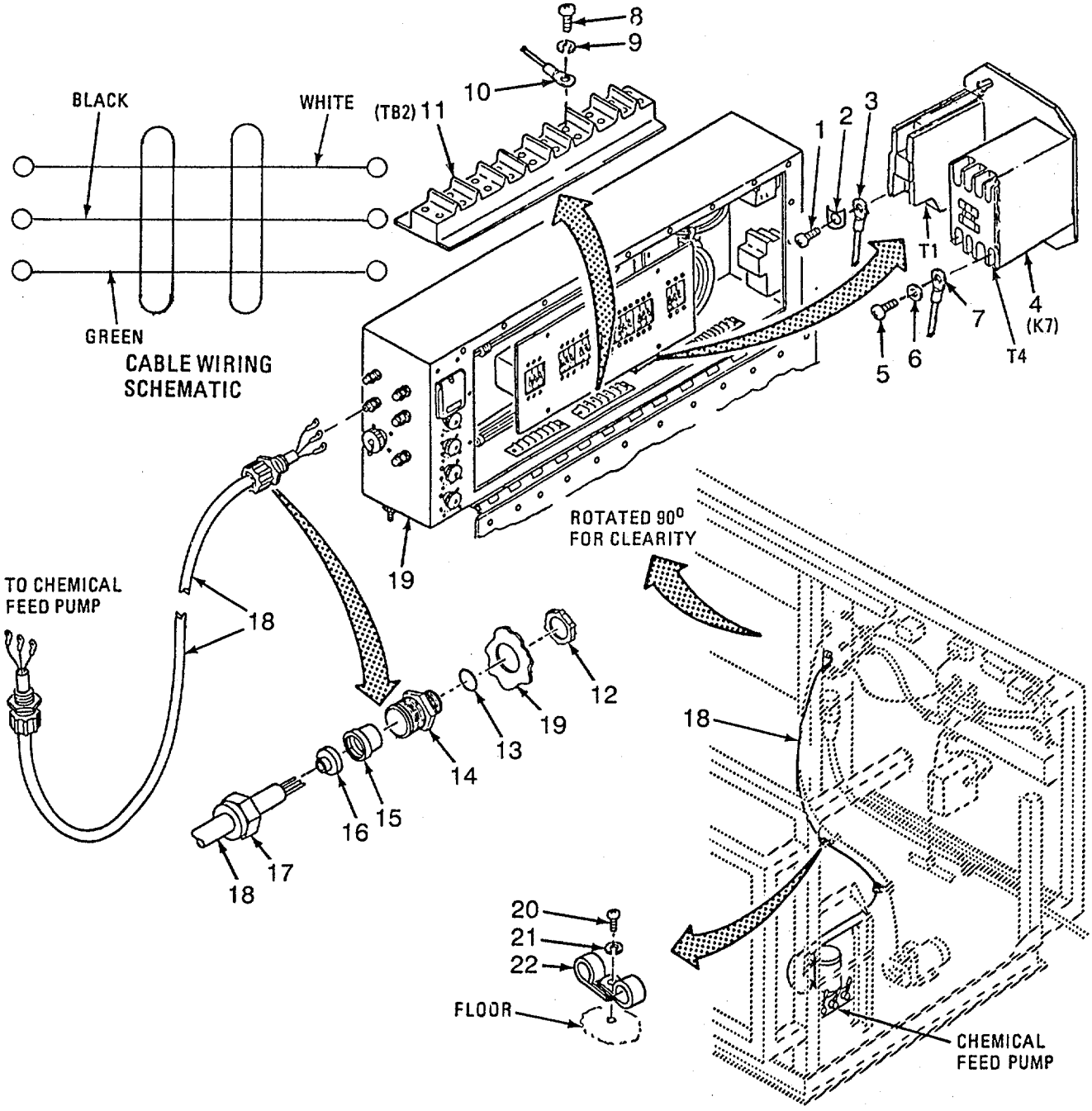
(6) Remove gasket (13), adapter (14), seal (15), seal ring (16) and nut (17) from cable assembly (18).

(7) Remove screws (20), lockwashers (21) and two clamps (22), securing cable assembly (18) to floor of ROWPU.

13-29. CABLE ASSEMBLY, W50 (CHEMICAL FEED PUMP) REPAIR - continued

(8) Cut any tiedown straps on wall and floor of junction box (19) that may prevent cable from being removed from junction box.

(9) Remove cable assembly (18) from ROWPU.



3-29. CABLE ASSEMBLY, W50 (CHEM FEED PUMP) REPAIR - continued.

b. Cleaning.

Clean cable assembly and mounting hardware with damp rags.

c. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-lA-15 (Air Force).

d. Test.

Test cable assembly for continuity and shorts, using cable wiring schematic (opposite page) as a guide.

e. Repair

(1) Replace lockwashers. Replace other parts if unserviceable.

(2) For repair procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

f. Installation.

(1) Position nut (17), seal ring (16), seal (15), adapter (14) and gasket (13) on cable assembly (18).

(2) Carefully feed wires of cable assembly (18) through cutout in wall of junction box (19) and pull thru until wire lugs reach motor controller K7 (4).

(3) Install nut (12) to secure adapter (14) to junction box (19).

(4) Connect cable wires as follows:

(a) Position white wire (7) on contact T4 of motor controller (4) and secure with washer (6) and screw (5).

(b) Position black wire (3) on contact T1 of motor controller (4) and secure with screw (1) and lug (2).

(c) Position ground wire (green) on terminal board TB2 (11), contact 6 and secure with screw (8) and lockwasher (9).

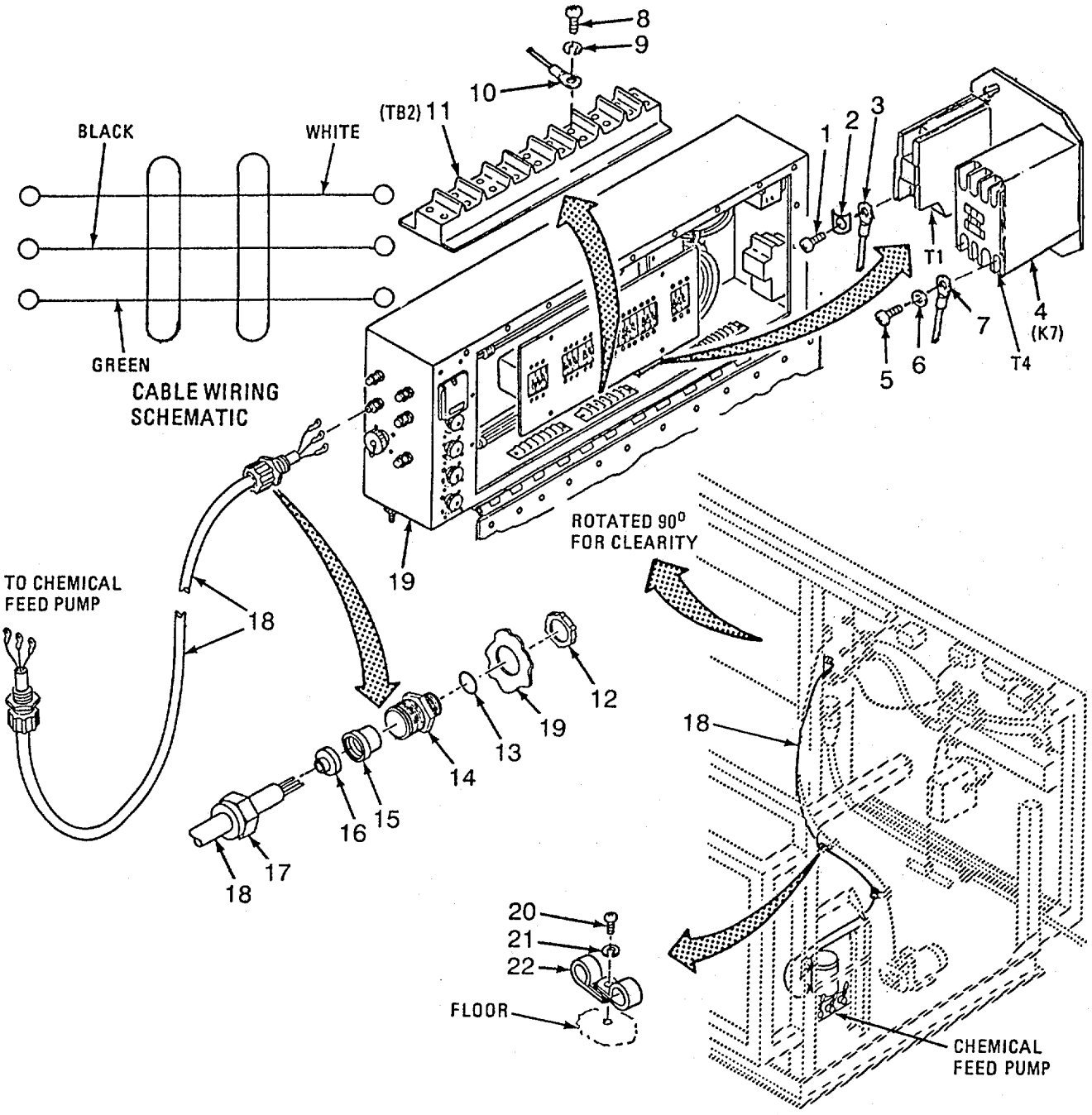
(5) Route wires of cable assembly (18) along-side existing wire bundles injunction box and use tiedown straps as necessary to secure to existing wiring.

(6) Position seal (15) inside adapter (14) and seal ring (16) inside nut (17). Screw nut onto adapter.

(7) Route cable assembly (18) down from junction box along-side booster cable to floor of ROWPU and install two clamps (22) lockwashers (21) and screws (20) to secure cable assembly to floor of ROWPU.

(8) Connect cable assembly (18) to chemical feed pump motor (Paragraph 2-62).

3-29. CABLE ASSEMBLY, W50 (CHEM FEED PUMP) REPAIR - continued.



3-30. CABLE ASSEMBLY, W56 (TDS POWER) REPAIR.

This task consists of:
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Tools required to inspect and repair Cable Assembly.

Materials/Parts Required
Rags, Wiping (Appendix C, Section II. Item 14)
Lockwashers, Seals and Gaskets (TM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Materials required to inspect and repair Cable Assembly.

Equipment Condition
Reference
Power shut down (Power Source Manual)
TDS Monitor disconnected from ROWPU (TM 10-4610-241-10).
Junction Box open (Paragraph 3-53).

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.

a. Removal.

(1) Remove screws (1) and disconnect three wire lugs (2) of cable cable assembly (10); black, white and green, from TB4 (3), contacts 1, 2 and 3.

(2) Unscrew nut (4) from adapter (6).

(3) Remove nut (4).

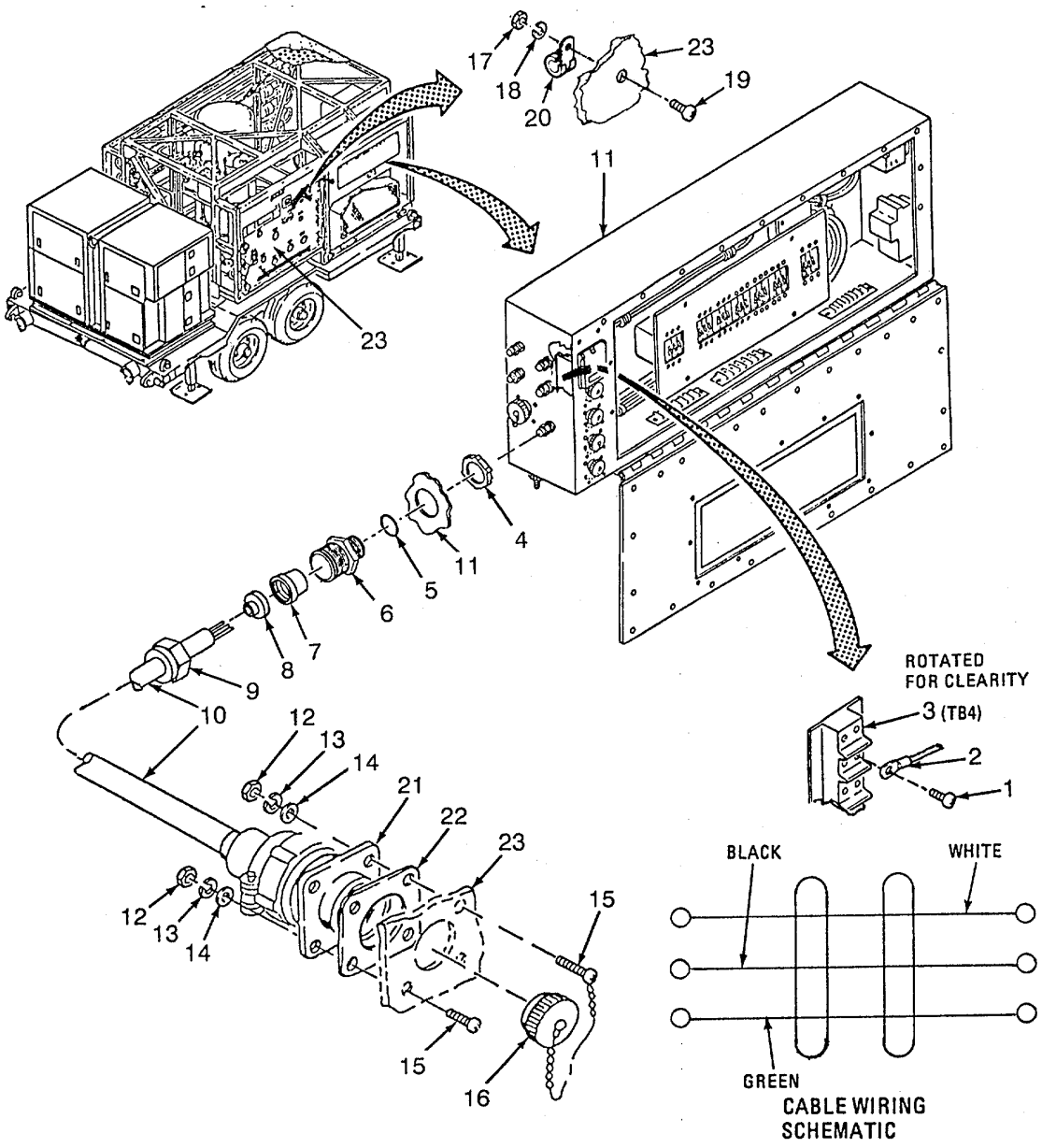
(4) Pull cable assembly (10) with nut (9), seal ring (8), seal (7), adapter (6) and gasket (5) from junction box (11).

3-30. CABLE ASSEMBLY W56 (TDS POWER) REPAIR - continued.

(5) Remove gasket (5), adapter (6), seal (7), seal ring (8) and nut (9) from cable assembly (10).

(6) Remove four nuts (12), lockwashers (13), washers (14), screws (15) and cap (16), securing cable jack (21) to control panel (23).

(7) Remove nut (17), lockwasher (18) screw (19), clamp (20) and cable assembly (10) from control panel (23).



3-30. CABLE ASSEMBLY, W56 (TDS POWER) REPAIR - continued.

b. Cleaning.

Clean cable assembly and mounting hardware with damp rags.

c. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Test cable assembly for continuity and shorts, using cable wiring schematic (opposite page) as a guide.

e. Repair.

1. Replace lockwashers and other parts if unserviceable.
2. For repair procedures, refer to TM 43-0158/TO 1-lA-15 (Air Force).

f. Installation.

(1) Position nut (9), seal ring (8), seal (7), adapter (6) and gasket (5) on cable assembly (10).

(2) Feed cable lugs (2) thru cutout in wall of junction box and pull thru to reach terminal board, TB4 (3).

(3) Install nut (4) to secure adapter (6) to junction box (11).

(4) Connect three wire lugs (2) to terminal board TB4 with screws (1) as follows:

Black Wire	TB4-1
White Wire	TB4-2
Green Wire	TB4-3

(5) Position seal (7) inside adapter (6) and seal ring (8) on inside of nut (9) and connect nut to adapter, making sure cable wires injunction box have enough slack to prevent tension on wires.

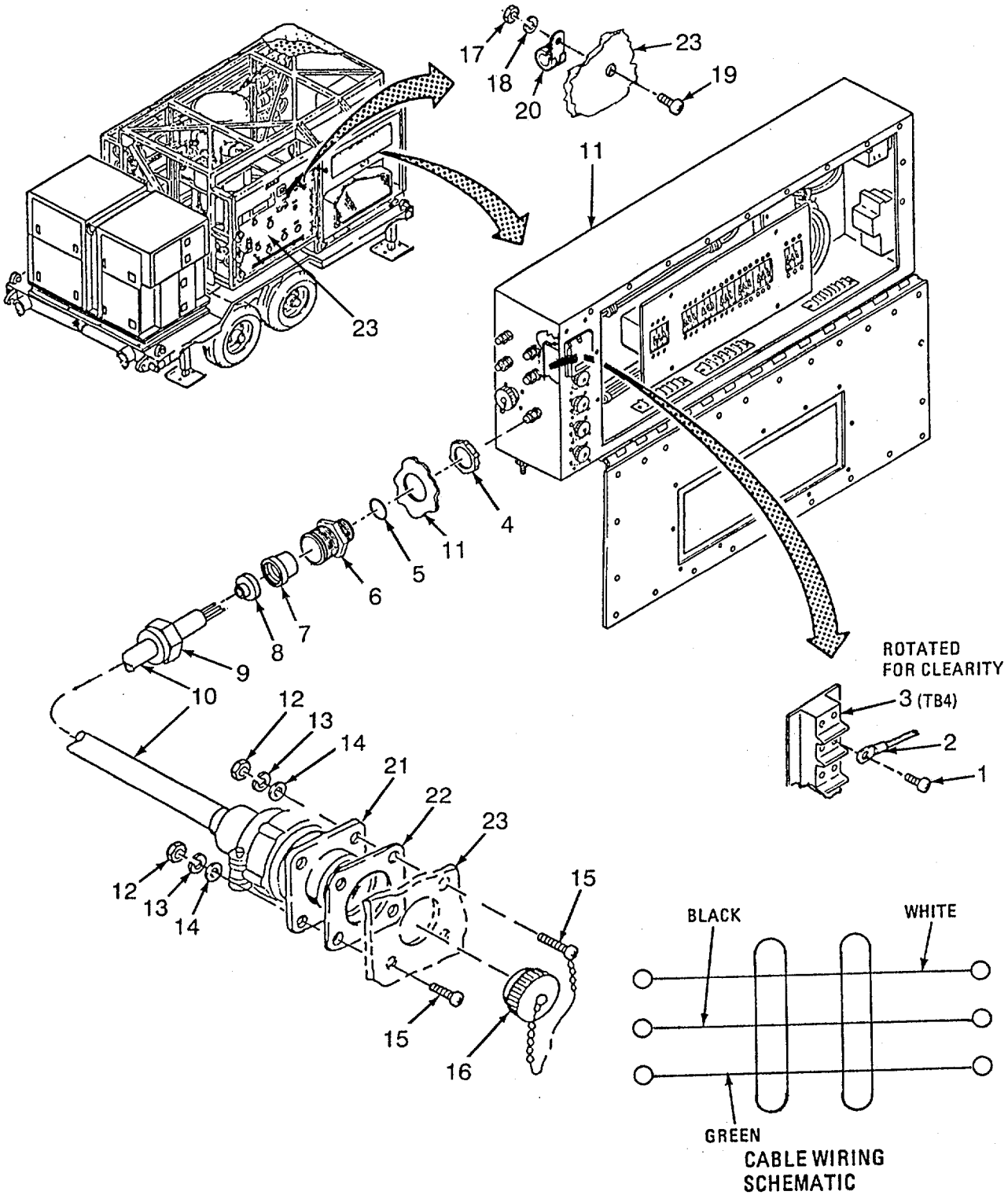
(6) Position gasket (22) on end of connector jack (21).

(7) From back side *of* control panel (23), position connector (21) in cutout on control panel (23).

(8) Install cable cap (16), four screws (15), washers (14), lockwashers (13) and nuts (12) to secure cable assembly to control panel (23).

(9) Secure cable assembly (10) to back of control panel (23) with clamp (20), screw (19), lockwasher (18) and nut (17).

3-31. CABLE ASSEMBLY, W56 (TDS POWER) REPAIR - continued.



3-31. CABLE ASSEMBLY, W46 (HIGH PRESSURE SWITCH) REPAIR - continued.

This task consists of:
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4).
Multimeter (Appendix B, Section III, Item 3).
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Tools required to inspect and repair Cable Assembly.

Materials/Parts Required
Rags, Wiping (Appendix C, Section II, Item 14).
Lockwashers, Seals and Gaskets (TM 10-4610-241-24P)
Tiedown Straps C(TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials required to inspect and repair Cable Assembly.

Equipment Condition
Reference
Power shut down (Power Source Manual).
Junction Box open (Paragraph 3-53)
Cable Assembly disconnected from High Pressure Switch (Paragraph 2-58).

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.

a. Removal.

(1) Remove screws (1), securing terminal lugs (2) to terminal board TB4 (3) at contacts 4 (black wire), 6 (white wire) and 7 (green wire).

(2) Remove nut (4).

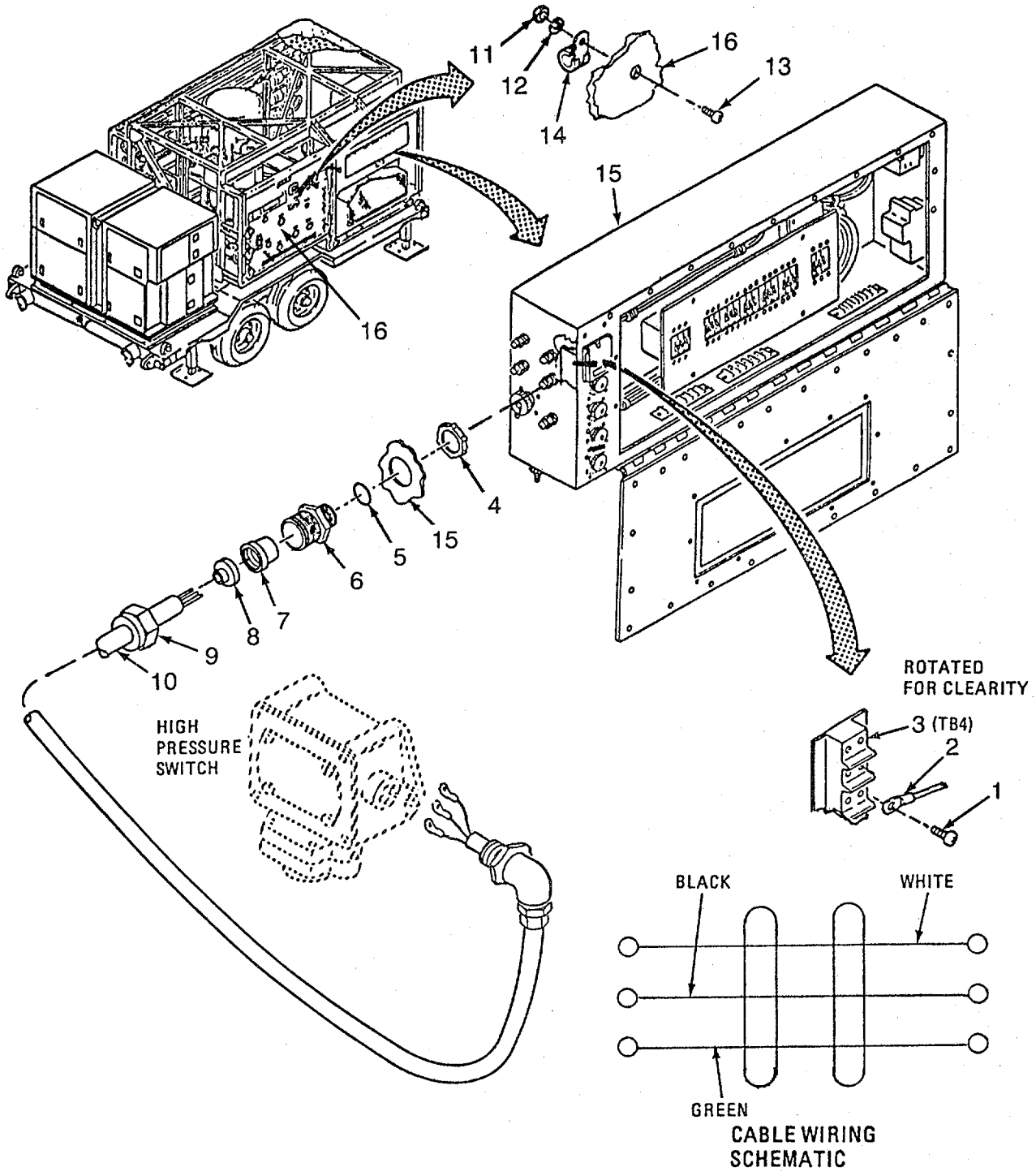
(3) Remove cable assembly (10) with nut (9), seal ring (8), seal (7), adapter (6) and gasket (5) from junction box (15).

(4) Remove gasket (5), adapter (6), seal (7), seal ring (8) and grip nut (9) from cable assembly.

(5) Remove nut (11), lockwasher (12) and clamp (14) from back of control panel (16).

(6) Remove cable assembly (10) from ROWPU.

3-31. CABLE ASSEMBLY, W46 (HIGH PRESSURE SWITCH) REPAIR - continued.



3-31. CABLE ASSEMBLY W46 (HIGH PRESSURE SWITCH) REPAIR -continued.

b. Cleaning.

Clean cable assembly and mounting hardware with damp rags.

c. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Check cable assembly for continuity and shorts, using cable wiring schematic (opposite page) as a guide.

e. Repair.

1. Replace lockwashers and other parts if unserviceable.
2. For repair procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

f. Installation.

(1) Position nut (9), seal ring (8), seal (7), adapter (6) and gasket (5) on cable assembly (10).

(2) Feed cable assembly (10) through cutout in wall of junction box (15).

(3) Install nut (4) to secure adapter (6) to wall of junction box (15).

(4) Using screw (1), connect lugs (2) of cable wires to terminal board, TB4 (3) as follows:

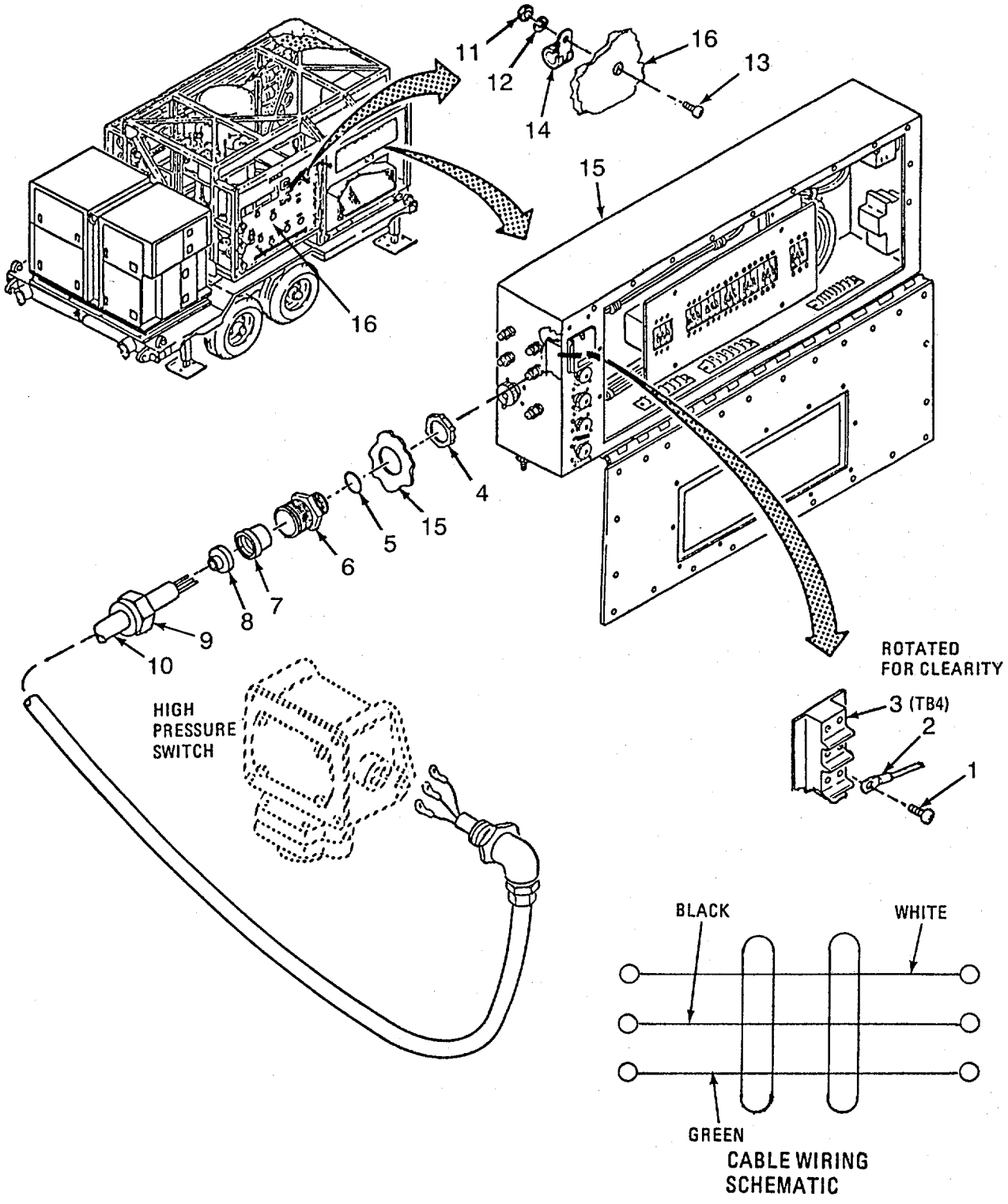
Black Wire	-	TB4-4
White Wire		TB4-6
Green Wire		TB4-7

(5) Position seal (7) on inside of adapter (6) and seal ring (8) on inside of nut (9) and connect nut to adapter.

(6) Route cable (10) to high pressure switch and secure to back side of control panel (15) with clamp (14), screw (13), lockwasher (12) and nut (11).

(7) Connect cable assembly to high pressure switch (Paragraph 2-58)

3-31. CABLE ASSEMBLY W46 (HIGH PRESSURE SWITCH) REPAIR -continued.



3-32. CABLE ASSEMBLY, W47 (LOW PRESSURE SWITCH) REPAIR.

This task consists of:
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Tools required to inspect and repair Cable Assembly.

Materials/Parts Required
Rags, Wiping (Appendix C, Section II, Item 14)
Lockwashers, Seals and Gaskets (TM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials required to inspect and repair Cable Assembly.

Equipment Condition
Reference
Power shut down (Power Source Manual)
Cable Assembly W47 disconnected from Low Pressure Switch (Paragraph 2-57).

General Safety Instructions

WARNING

High voltages in this equipment can cause serious injury or death. Make sure that all power is removed before performing maintenance.

a. Removal.

(1) Remove screws (1), securing terminal lugs (2) to terminal board TB4 (3) at contacts 5 (white wire), 6 (black wire) and 7 (green wire).

(2) Remove locknut (4).

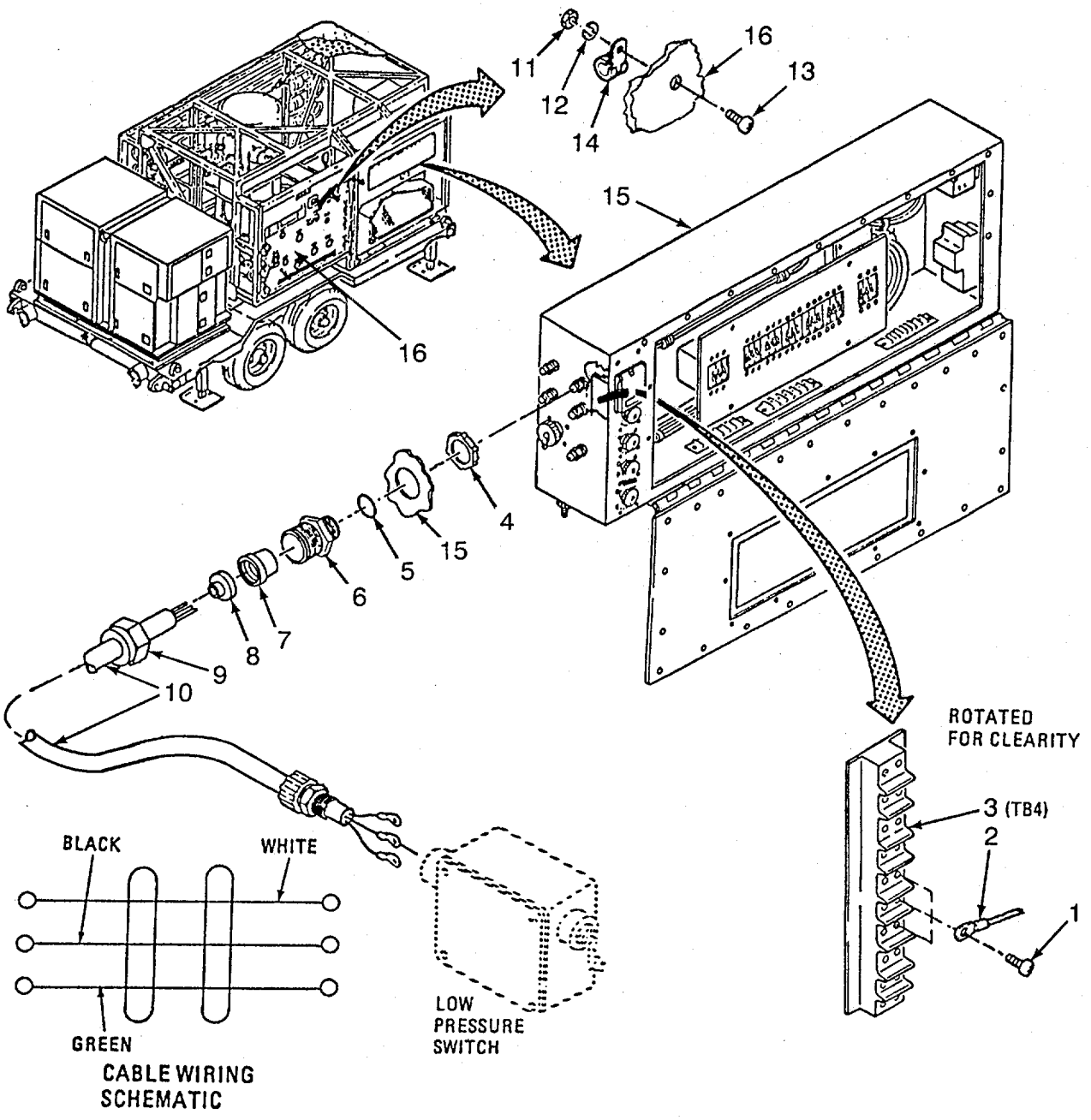
(3) Remove cable assembly (10) with nut (9), seal ring (8), seal (7), adapter (6) and gasket (5) from junction box (15).

(4) Remove gasket (5), adapter (6), seal (7) seal ring (8) and grip nut (9) from cable assembly (10).

(5) Remove nuts (11), lockwashers (12) and two clamps (14) from back of control panel (16).

(6) Remove cable assembly (10) from ROWPU.

3-32. CABLE ASSEMBLY, W47 (LOW PRESSURE SWITCH) REPAIR - continued



3-32. CABLE ASSEMBLY, W47 (LOW PRESSURE SWITCH) REPAIR - continued.

b. Cleaning.

Clean cable assembly and mounting hardware with damp rags.

c. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Check cable assembly for continuity and shorts, using cable wiring schematic (opposite page) as a guide.

e. Repair.

1. Replace lockwashers and other parts if unserviceable.
2. For repair procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

f. Installation.

(1) Position nut (9), seal ring (8), seal (7), adapter (6) and gasket (5) on low pressure switch.

(2) Feed low pressure switch cable assembly (10) through cutout in wall of junction box (15).

(3) Install nut (4) to secure adapter (6) to wall of junction box (15).

(4) Using screw (1), connect lugs (2) of cable assembly (10) to terminal board, TB4 (3) as follows:

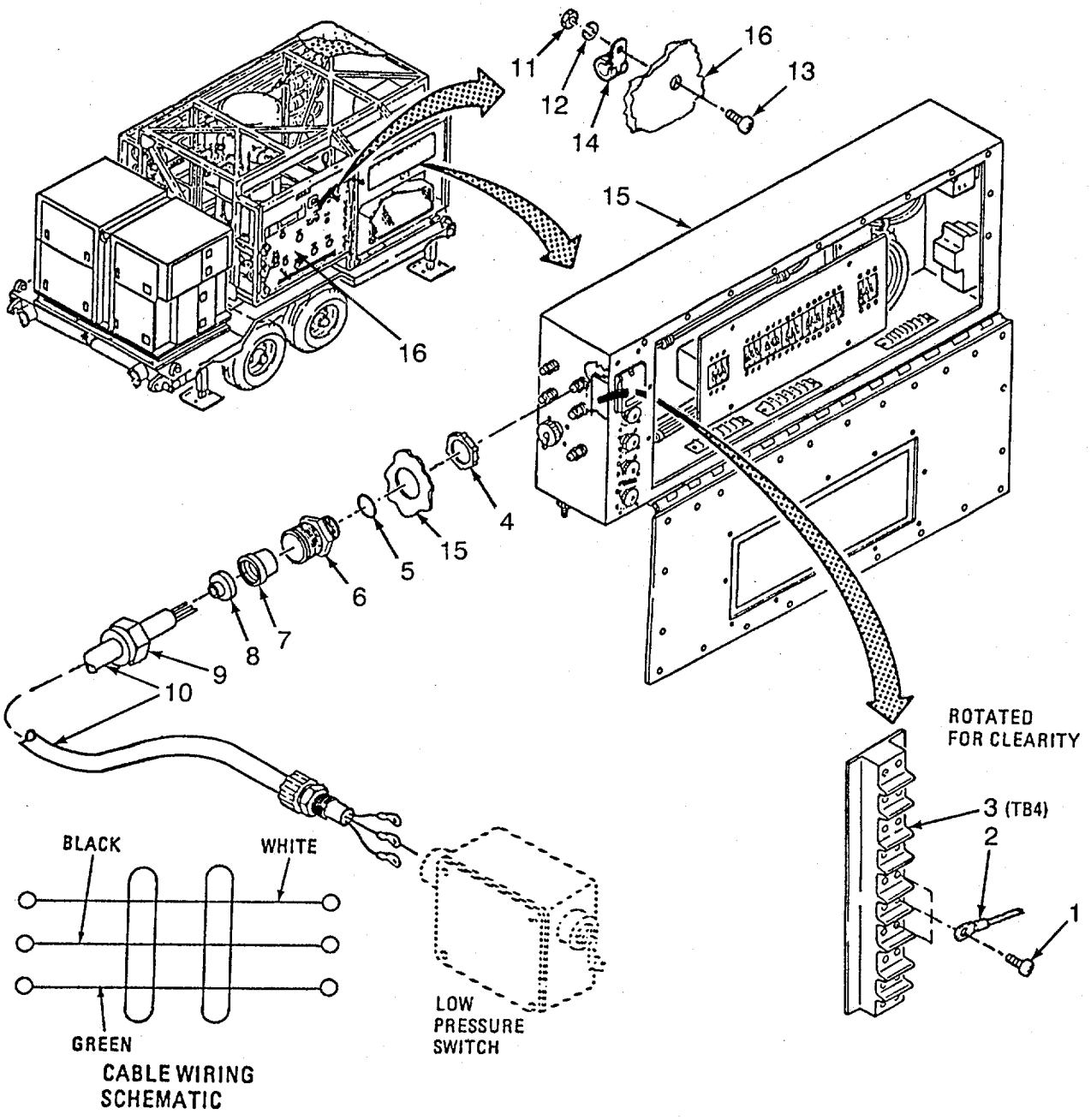
Black Wire	-	TB4-4
White Wire		TB4-6
Green Wire		TB4-7

(5) Position seal (7) on inside of adapter (6) and seal ring (8) on inside of nut (9) and connect nut to adapter.

(6) Route cable to low pressure switch and secure to control panel with two clamp (14), screw (13), lockwashers (12) and nuts (11).

(7) Connect cable assembly (10) to low pressure switch (Paragraph 2-57)

3-32. CABLE ASSEMBLY, W47 (LOW PRESSURE SWITCH) REPAIR - continued.



3-33. CABLE ASSEMBLY, W49 (FILTER CONTROL) REPAIR.

This task consists of:
a. Removal
b. Cleaning
c. Inspection
d. Test
e. 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)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to inspect and repair Cable Assembly.

Materials/Parts Required
Rags, Wiping 9 (Appendix C, Section II. Item 14)
Lockwashers, Seals and Gaskets (TM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials required to inspect and repair Cable Assembly.

Equipment Condition
Reference
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.

a. Removal.

(1) Remove 14 screws (1), lockwashers (2) and flat washers (3). Open control box cover (4).

(2) Remove screws (5) and five wire lugs (6) from terminal board, TB5 (7) at contacts 2 (white wire), 4 (red wire), 5 (blue wire) and 6 (green wire),

(3) Remove nut (8), lockwasher (9), flatwasher (10), wire lugs (11 and 12), lockwasher (14) and screw (13).

(4) Remove nut (15) and carefully pull cable assembly (21) with nut (20), seal ring (19), seal (18), adapter (17) and gasket (16) from control box (28).

(5) Unscrew nut (20) from adapter (17) and remove seal ring (16), adapter (17), seal (18), seal ring (19) and nut (20) from cable assembly (21).

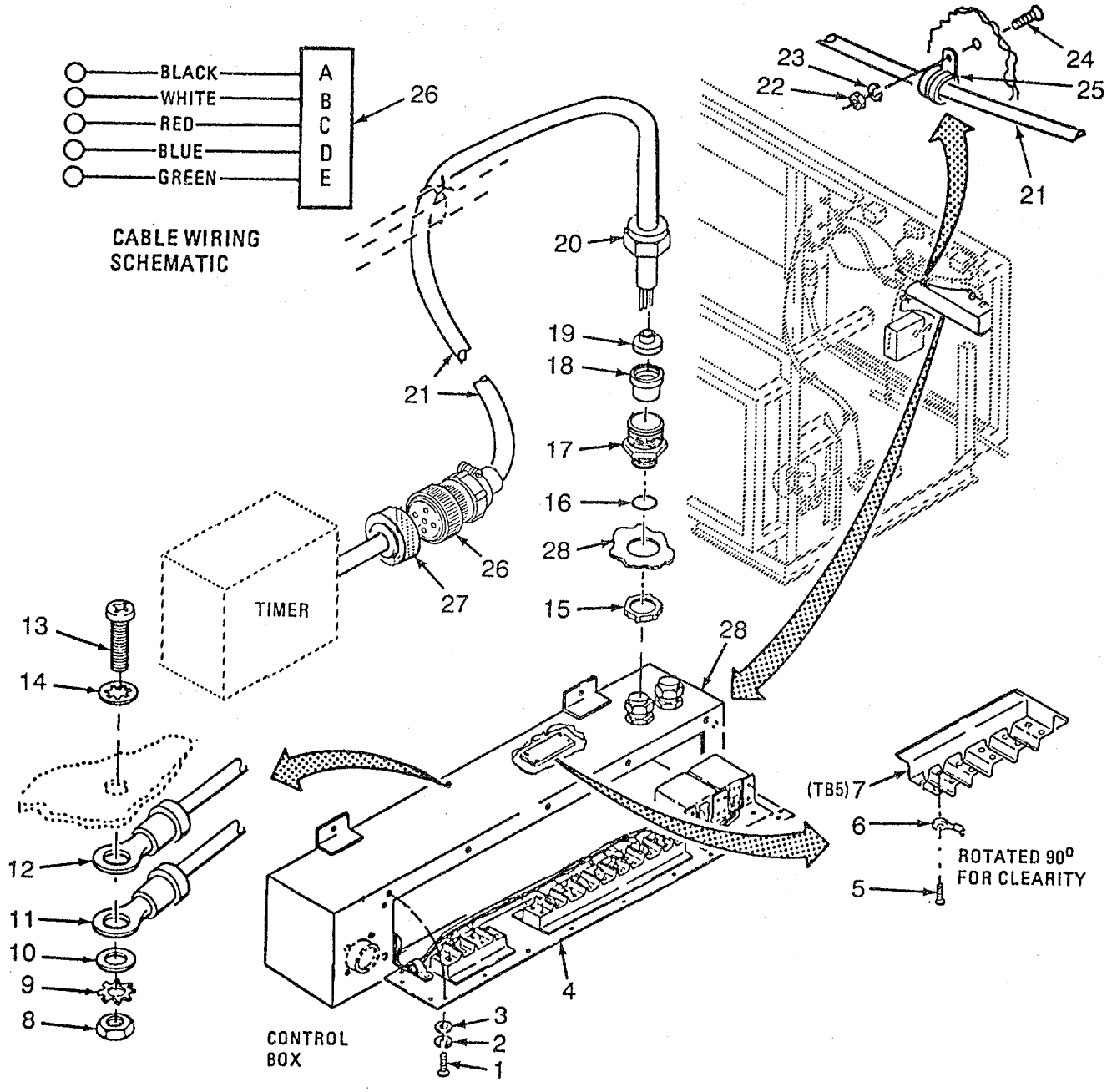
(6) Remove nut (22), lockwasher (23), screw (24) and clamp (25). Cut tie wraps, securing cable assembly to frame of ROWPU as necessary to remove cable assembly (21).

(7) Unscrew connector (26) from timer cable (27) and remove cable assembly (21) from ROWPU.

3-33. CABLE ASSEMBLY, W49 (FILTER CONTROL) REPAIR - continued. I

b. Cleaning.

Clean cable assembly and mounting hardware with damp rags.



3-33. CABLE ASSEMBLY, W49 (FILTER CONTROL) REPAIR - continued.

c. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Check cable assembly for continuity and shorts, using cable wiring schematic (opposite page) as a guide.

e. Repair.

(1) Replace lockwashers and other parts if unserviceable.

(2) For repair procedures, refer to TM 43-0158/TO 1-lA-15 (Air Force).

f. Installation.

(1) Install nut (20), seal ring (19), seal (18), adapter (17) and gasket (16) on cable assembly (21).

(2) Feed cable assembly (21) into control box thru cutout in top of box and pull wires thru to reach terminal board TB5 (7) and hole for screw (13).

(3) Install nut (15) to secure adapter (17) to control box (28)

(4) Using screws (5), install four lugs (6) of cable assembly (21) to terminal board TB5 (7) as follows:

White wire	-	TB5-2
Red wire	-	TB5-4
Blue wire	-	TB5-5
Green wire	-	TB5-6

(5) Install screw (13), lockwasher (14), ground lugs (11 and 12), flatwasher (10), lockwasher (9) and nut (8) to top of control box (28).

(6) Position seal (18) inside of adapter (17) and seal ring (19) inside of nut (20) and connect nut to adapter.

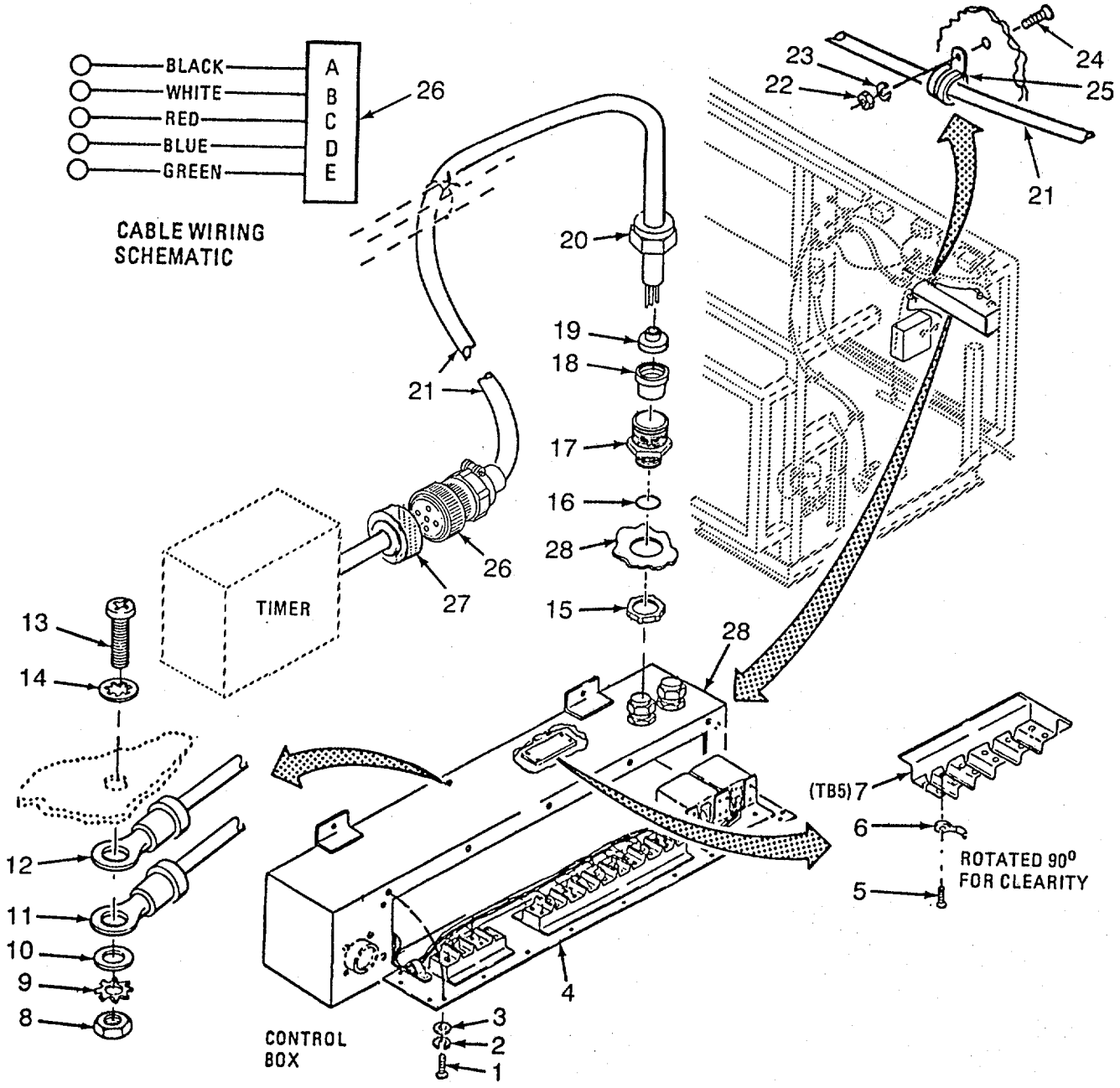
(7) Secure cable assembly (21) to back side of control panel with clamp (25), screw (24), lockwasher (23) and nut (22).

(8) Position control box cover (4) on control box (28) and install 14 screws (1), lockwashers (2) and flat washers (3).

(9) Route connector (26) to cable assembly (27) and connect to cable assembly (27).

(10) Secure loose hanging cable to frame with cable ties as required.

3-33. CABLE ASSEMBLY, W49 (FILTER CONTROL) REPAIR - continued.



3-34. CABLE ASSEMBLY, W51 (BOOSTER PUMP) REPAIR.

This task consists of:
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Tools required to inspect, test and repair Cable Assembly.

Materials/Parts Required
Rags, Wiping (Appendix C, Section II, Item 14)
Lockwashers, Seals and Gaskets (TM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Materials required to inspect and repair Cable Assembly.

Equipment Condition
Reference
Power shutdown (TM 5-4610-241-10).
Cable disconnected from Booster Pump Assembly (Paragraph 2-59).

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.

a. Removal.

(1) Remove two screws (1), lockwashers (2), and clamps (3), securing booster pump cable assembly (17) to ROWPU floor.

(2) Remove three screws (4), lugs (5) and wire lugs (6) from terminals T1. (black wire), T2 (white wire) and T3 (red wire) on heater assembly (7) of motor starter, K6.

(3) Remove screw (8) and ground wire (9) from contact 5 of terminal board T2B2 (10).

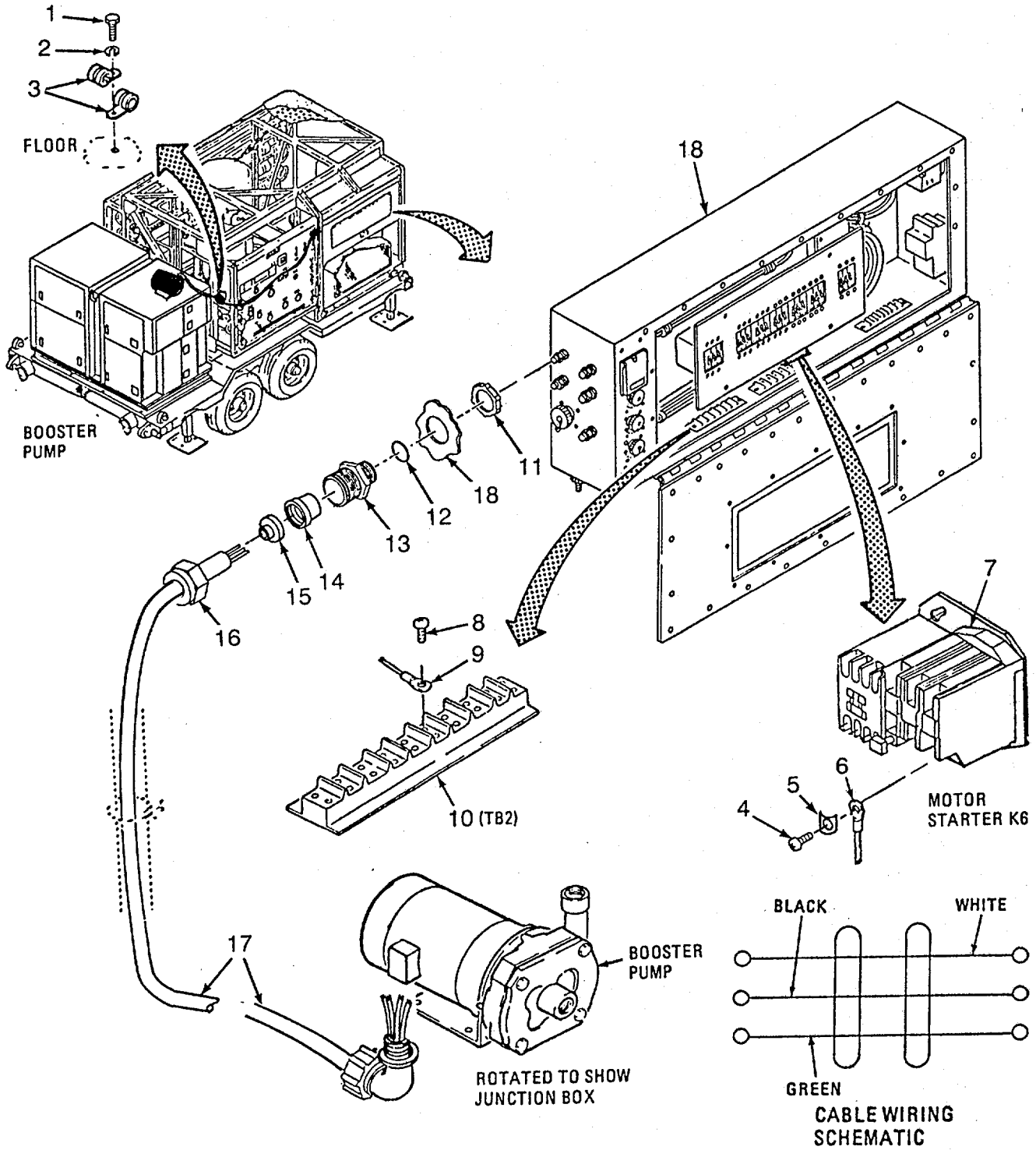
(4) Remove nut (11).

(5) Cut tie wraps on wire bundles injunction box (18) as necessary to remove cable assembly (17) from junction box.

3-34. CABLE ASSEMBLY, W51 (BOOSTER PUMP) REPAIR - continued

(6) Carefully pull cable assembly (17) with gasket (12), adapter (13), seal (14), seal ring (15) and nut (16) from junction box (18).

(7) Remove gasket (12), adapter (13), seal (14), seal ring (15) and nut (16) from cable assembly (17).



3-34. CABLE ASSEMBLY, W51 (BOOSTER PUMP) REPAIR - continued

b. Cleaning.

Clean cable assembly and mounting hardware with damp rags.

c. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Check cable assembly for continuity and shorts, using cable wiring schematic (opposite page) as a guide.

e. Repair

(1) Replace lockwashers and other parts if unserviceable.

(2) For repair procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

f. Installation.

(1) Position nut (16), seal ring (15), seal (14), adapter (13) and gasket (12) on cable assembly (17).

(2) Carefully feed wires of cable assembly (18) through cutout in wall of junction box (19) and pull thru to reach heater assembly (7) of K6 motor starter.

(3) Install nut (11) to secure adapter (13) to wall of junction box (18)

(4) Working inside junction box, position three wire lugs (6) of cable assembly on heater assembly (7). Using lugs (5) and screws (4) attach wires as follows:

Black wire	-	T1
White wire	-	T2
Red wire	-	T3

(5) Position wire lug (9) of green wire on contact 5 of terminal board TB2 (10) and secure with screw (8).

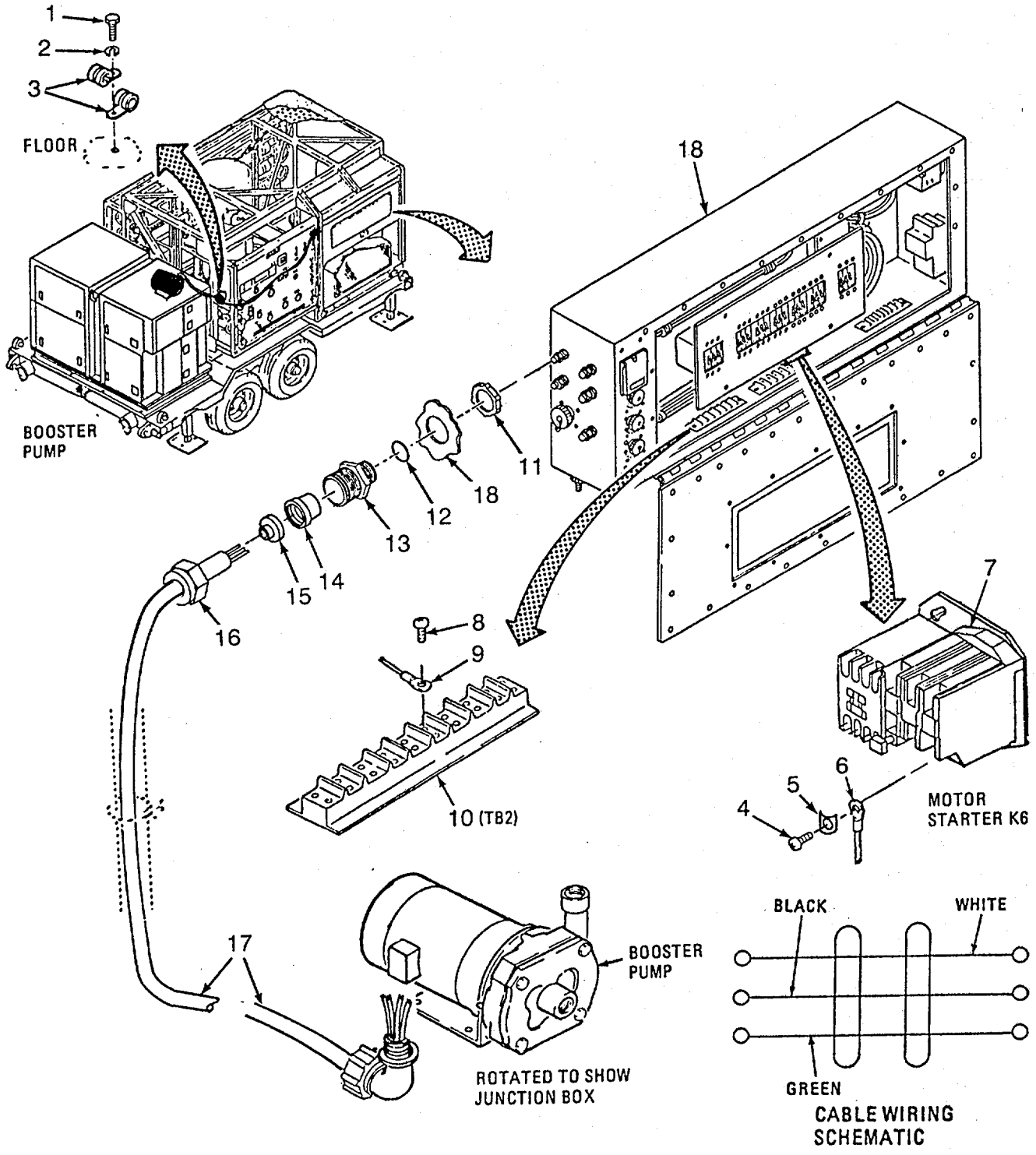
(6) Use tiedown straps as necessary to secure four sires of cable assembly (17) to wire bundle on bottom and left wall of junction box.

(7) Route cable assembly (17) along-side cable assembly of chemical feed pump and secure to floor of ROWPU with clamps (3)) lockwashers (2) and screws (1).

(8) Connect other end of cable to booster pump. Refer to (Paragraph 2-59).

(9) As necessary tie loose hanging cable to ROWPU frame with tiedown straps.

3-34. CABLE ASSEMBLY, W51 (BOOSTER PUMP) REPAIR - continued



3-35. CABLE ASSEMBLY, W53 (BACKWASH TIMER) REPAIR.

This task consists of: a. Inspection b. Test c. Repair

INITIAL SET-UP:

Tools Required
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Tools required to inspect and repair Cable Assembly.
Materials/Parts Required
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Materials required to inspect, test and repair Cable Assembly.
Equipment Condition
Reference
Power shut down (Power Source Manual).
Cable Assembly removed (Paragraph 2-68).

a. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-lA-15 (Air Force).

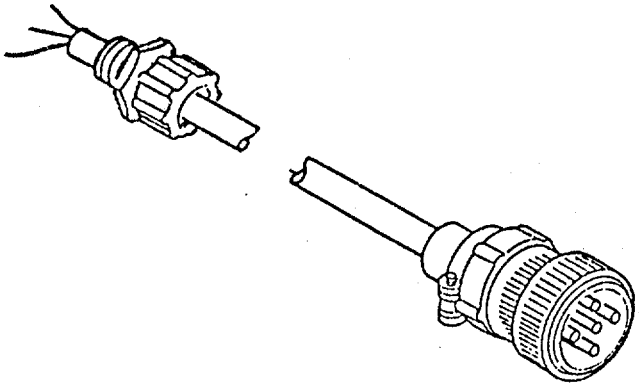
b. Test.

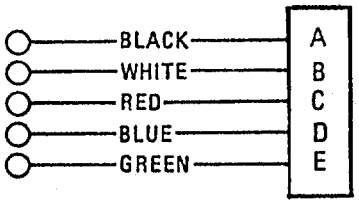
Test cable assembly for continuity and shorts using cable wiring schematic (opposite page) as a guide.

c. Repair.

For repair procedures, refer to TM 43-0158/TO 1-lA-15 (Air Force).

3-35. CABLE ASSEMBLY, W53 (BACKWASH TIMER) REPAIR.





CABLE WIRING SCHEMATIC

3-36. CABLE ASSEMBLY, W57 (DISSOLVED SOLIDS SENSOR) REPAIR.

This task consists of:
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Tools required to inspect and repair Cable Assembly.
Materials/Parts Required
Rags, Wiping (Appendix C, Section II, Item 14)
Lockwashers, Seals and Gaskets (TM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Materials required to inspect and repair Cable Assembly.
Equipment Condition
Reference
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.

a. Removal.

(1) Unscrew nut (1) and remove sensor (2) from product water pipe (3).

(2) Remove gasket (4) and packing (5) from sensor (2).

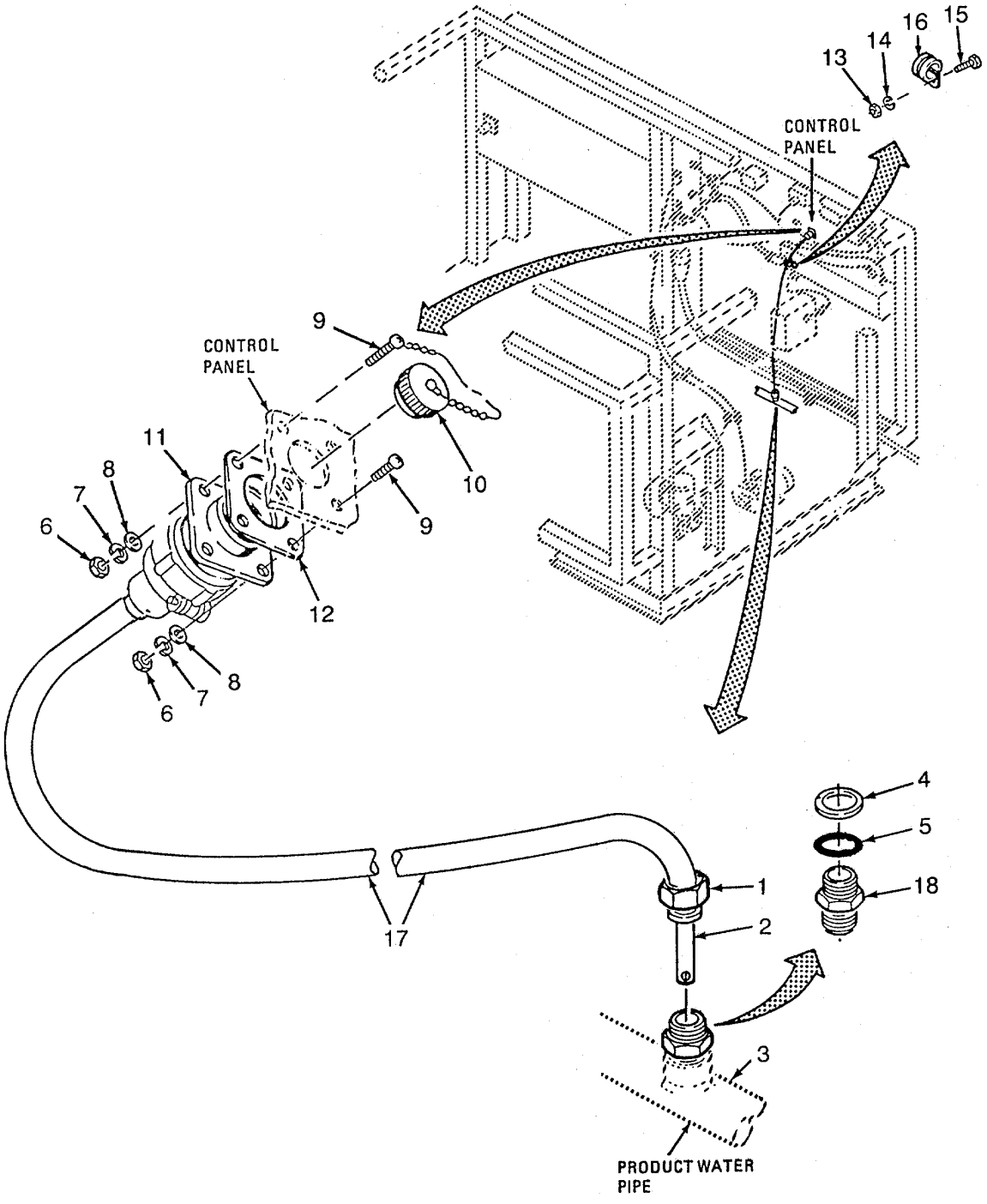
(3) Remove four nuts (6) lockwashers (7), washers (8), screws (9) and dust cap (10) from control panel. Unscrew cap (10) from cable assembly (17).

(4) Remove cable jack (11) from cutout in control panel and remove gasket (12) from jack.

(5) Remove nuts (13), lockwashers (14), screws (15) and two clamps (16), securing cable assembly (17) to control panel.

(6) As required, remove adapter (18) from pipe section (3)

3-36. CABLE ASSEMBLY, W57 (DISSOLVED SOLIDS SENSOR) REPAIR - continued



3-36 CABLE ASSEMBLY, W57 (DISSOLVED SOLIDS SENSOR) REPAIR - continued.

b. Cleaning.

Clean cable assembly and mounting hardware with damp rags.

c. Inspection.

For inspection procedures, refer to TM 43-0158/TO 1-1A-15 (Air Force).

d. Test

Check cable assembly as follows:

Check point A	Check point B	Required Value in Ohms
Pin B, J11	Outer Electrode	0.02
Pin A, J11	Inner Electrode	0.02
Pin C	Pin D	8 - 10K
Pin E	All other pins	Infinity

e. Repair.

1. Replace lockwashers and other parts if unserviceable.

2. For repair procedures, refer to TM 43-0158/TO 1-lA-15 (Air Force).

f. Installation.

(1) Position cable assembly (17) and gasket (12) on back of control panel and install dust cap (10) four screws (9), washers (8), lockwashers (7), nuts (6) and dust cap (10,).

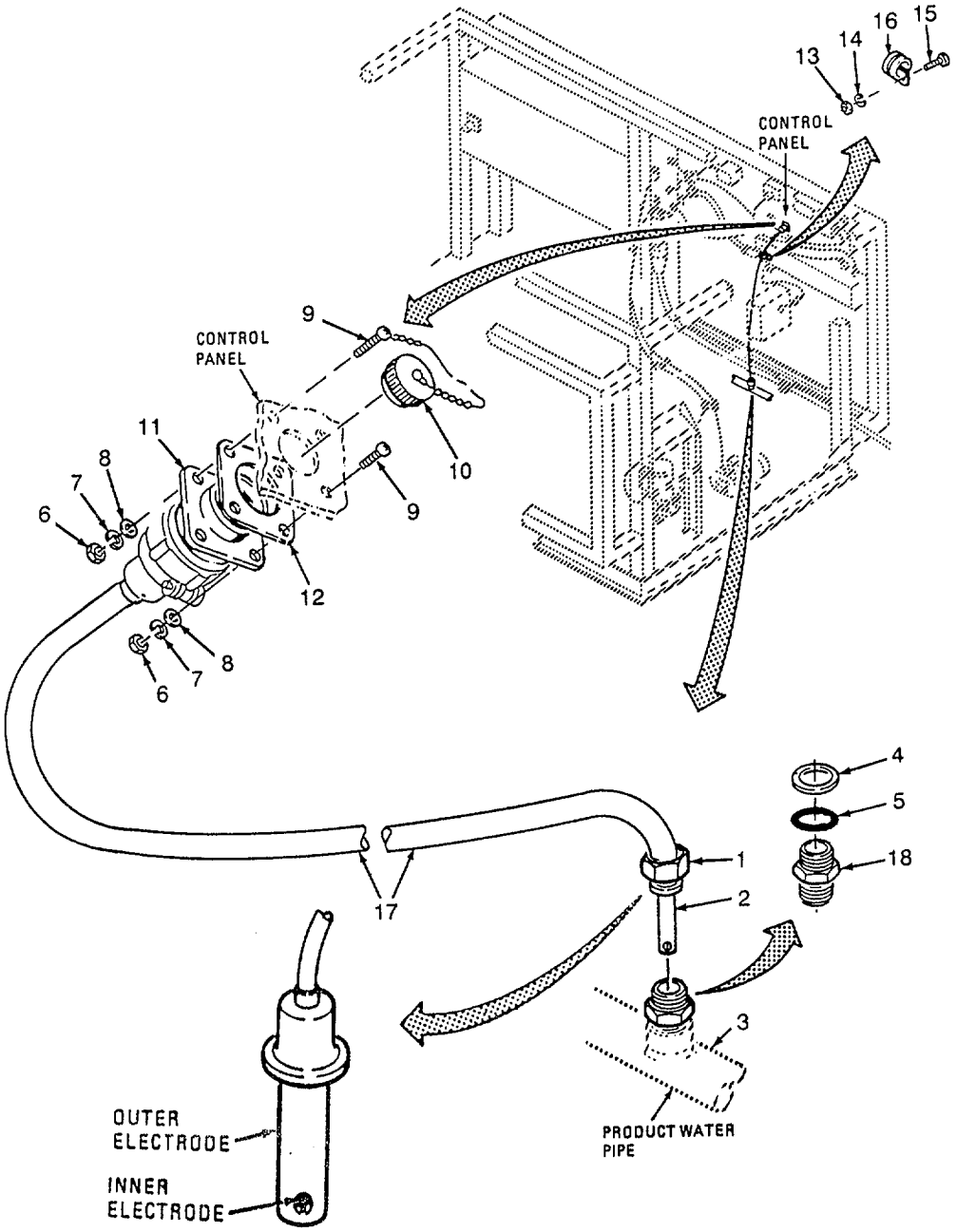
(2) Position two clamps (16) on back of control panel and secure with two screws (15), lockwashers (14) and nuts (13).

NOTE
Be sure to wrap tape in the direction of threads.

(3) If removed, install adapter (18) on pipe section (3).

(4) Position gasket (4) and packing (5) on sensor (2) and install sensor on adapter (18). Tighten nut (1).

3-36 CABLE ASSEMBLY, W57 (DISSOLVED SOLIDS SENSOR) REPAIR - continued.



Section VIII. BOOSTER PUMP ASSEMBLIES MAINTENANCE PROCEDURES

3-37. CENTRIFUGAL PUMP (BOOSTER PUMP) REPAIR.

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 18).
Detergent (Appendix C, Section II, Item 5).
Grease, Silicone (Appendix C, Section II, Item 10)
Seals, Packing and Gaskets (TM 10-4610-241-24P)
Equipment Condition
Reference
Centrifugal Pump Assembly removed (Paragraph 2-59).
General Safety Instructions

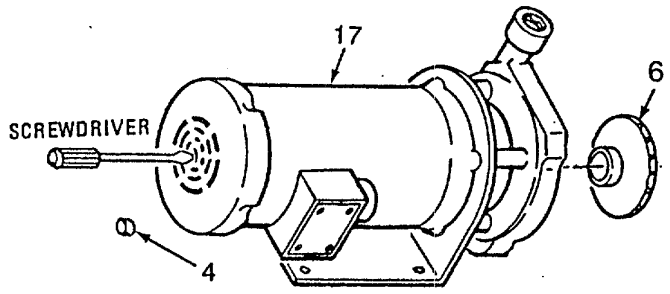
WARNING
Drycleaning solvent, P-D-680 CL II is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

a. Disassembly.

(1) Remove four screws (1), cover (2), and gasket (3).

(2) Remove cap (4) and insert large blade, flattip screwdriver in screwdriver slot of shaft (5).

(3) Holding shaft with screwdriver, to keep it from turning, unscrew and remove impeller (6) with a strap wrench



3-37. CENTRIFUGAL PUMP (BOOSTER PUMP) REPAIR - continued.

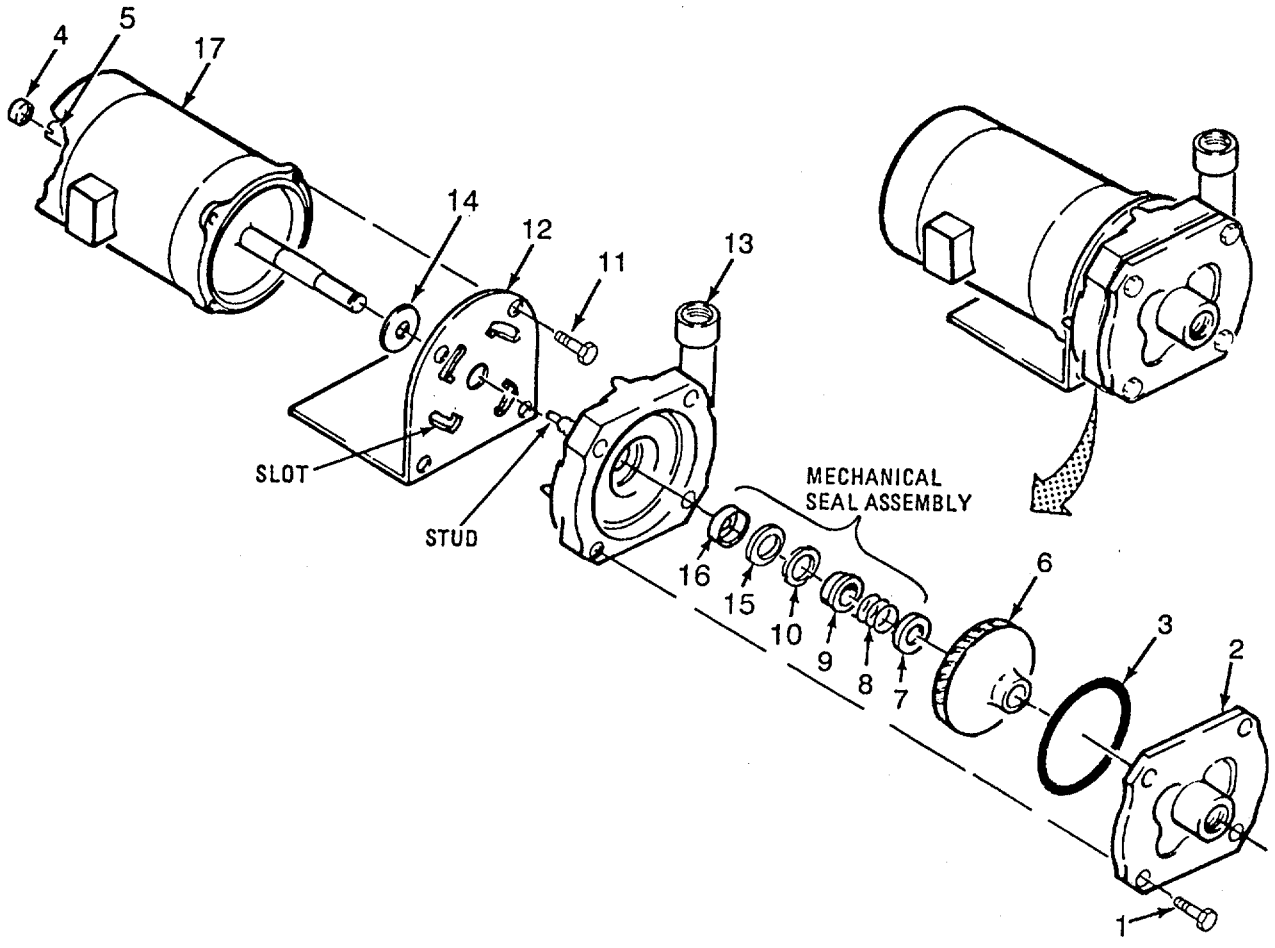
(4) Remove rotating parts of mechanical seal assembly; rubber disk (7), spring (8), sleeve (9) and carbon disk (10).

(5) Remove four cap screws (11), attaching bracket (12) to motor (17).

(6) Holding bracket (12), turn casing (13) counterclockwise (as viewed from pump side) and separate casing from bracket (12).

(7) Remove slinger (14) from shaft of electric motor (17).

(8) Using drift pin, remove stationary parts of mechanical seal assembly; rubber cup (16) and ceramic disk (15) from casing (13).



3-37. CENTRIFUGAL PUMP (BOOSTER PUMP) REPAIR - continued.

b. Cleaning.

WARNING

Drycleaning solvent, P-D-680, Cl II, 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 outside of casing (13), cover (2) and bracket (12).

b. Using wire brush, clean rust and corrosion from casing (13), cover (2) and bracket (12).

c. Using mild soap solution, wash impeller (6) and inside of casing (13).

c. Inspection.

(1) Inspect casing (13) and impeller (6) for cracks and damage.

(2) Inspect mounting hardware for excessive wear or other damage.

d. Repair.

Replace packing, seals and gaskets. Replace other components if unserviceable.

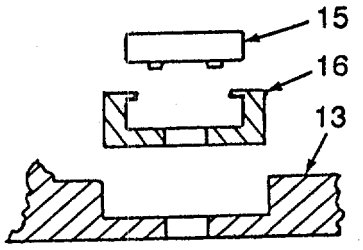
e. Assembly.

(1) Install slinger (14) on long shaft of motor (17).

CAUTION

Ceramic seal must be installed in cup with smooth, flat side pointing away from motor or pump will leak

(2) Lubricate rubber cup (16) and install ceramic disk (15) in cup with smooth side up. Install rubber cup (16) with disk (15) in casing (13).



NOTE

When pump casing is installed, outlet port must be pointing up and studs should be radially alined with mounting bolts (11).

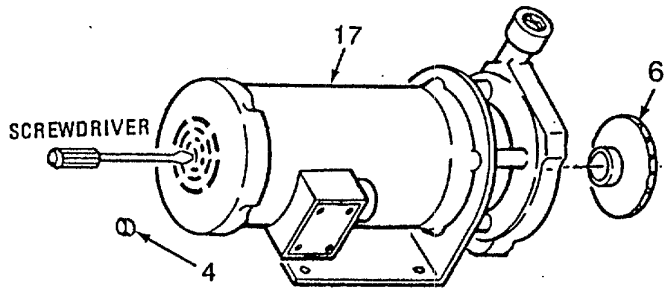
(3) Position studs of casing (13) in wide part of slots on bracket (12) and turn casing clockwise (as viewed from pump side) until studs and holes for screws (6.) are radially alined.

3-37. CENTRIFUGAL PUMP (BOOSTER PUMP) REPAIR - continued.

(4) Install bracket (12) with attached casing (13) on motor (17).

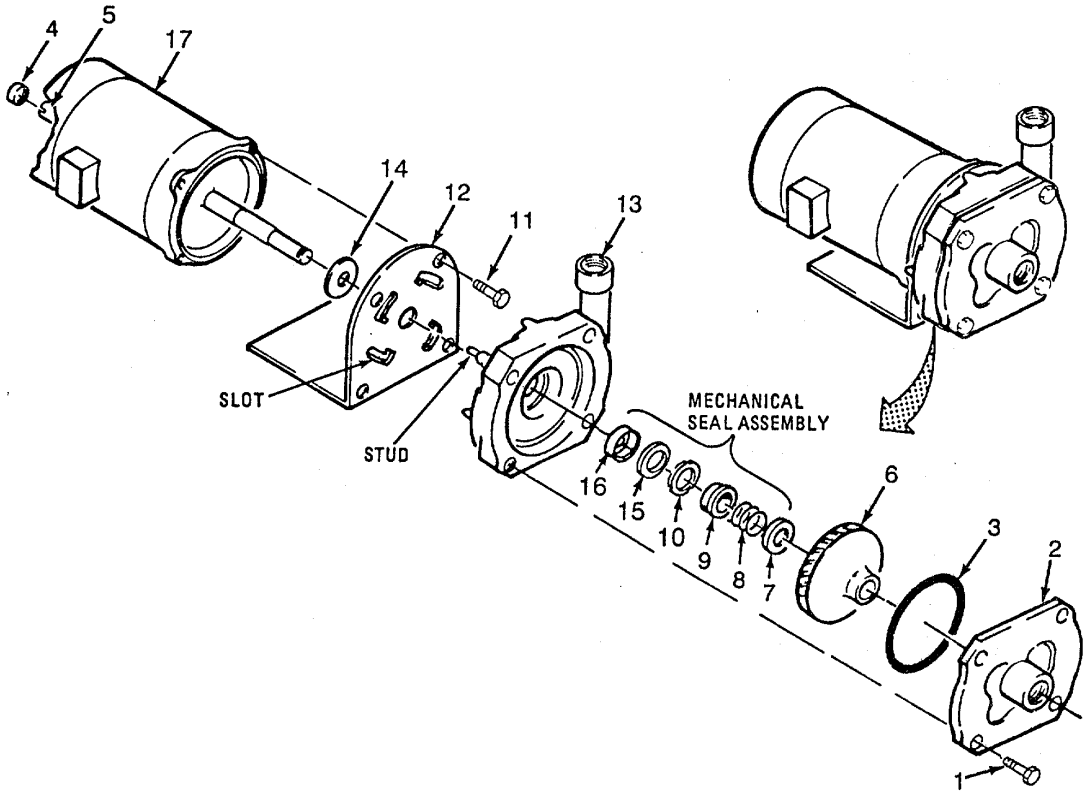
(5) Position rotating parts of seal assembly; disk (10), sleeve (9), spring (8) and rubber disk (7) on shaft of motor, making sure that smooth surface of disk (10) is in contact with disk (15) installed in casing.

(5) Insert blade of screwdriver in screwdriver slot of shaft (5) to keep shaft from turning and install impeller (6). Use strap wrench to tighten.



(6) Position gasket (3) in cover (2); install cover with four screws (1).

(7) Install cap (4) on motor shaft (5).



3-37. CENTRIFUGAL PUMP MOTOR (BOOSTER PUMP) REPAIR.

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)
Goggles (Appendix B, Section III, Item 3)
Material/Parts Required
Rags, Wiping (Appendix C, Section II, Item 14).
Equipment Condition
Reference
Centrifugal Pump Motor removed (Paragraph 3-36).
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.

a. Disassembly.

(1) Remove three screws (1) and fan cover (2).

(2) Remove screw and retainer (3) from fan (4).

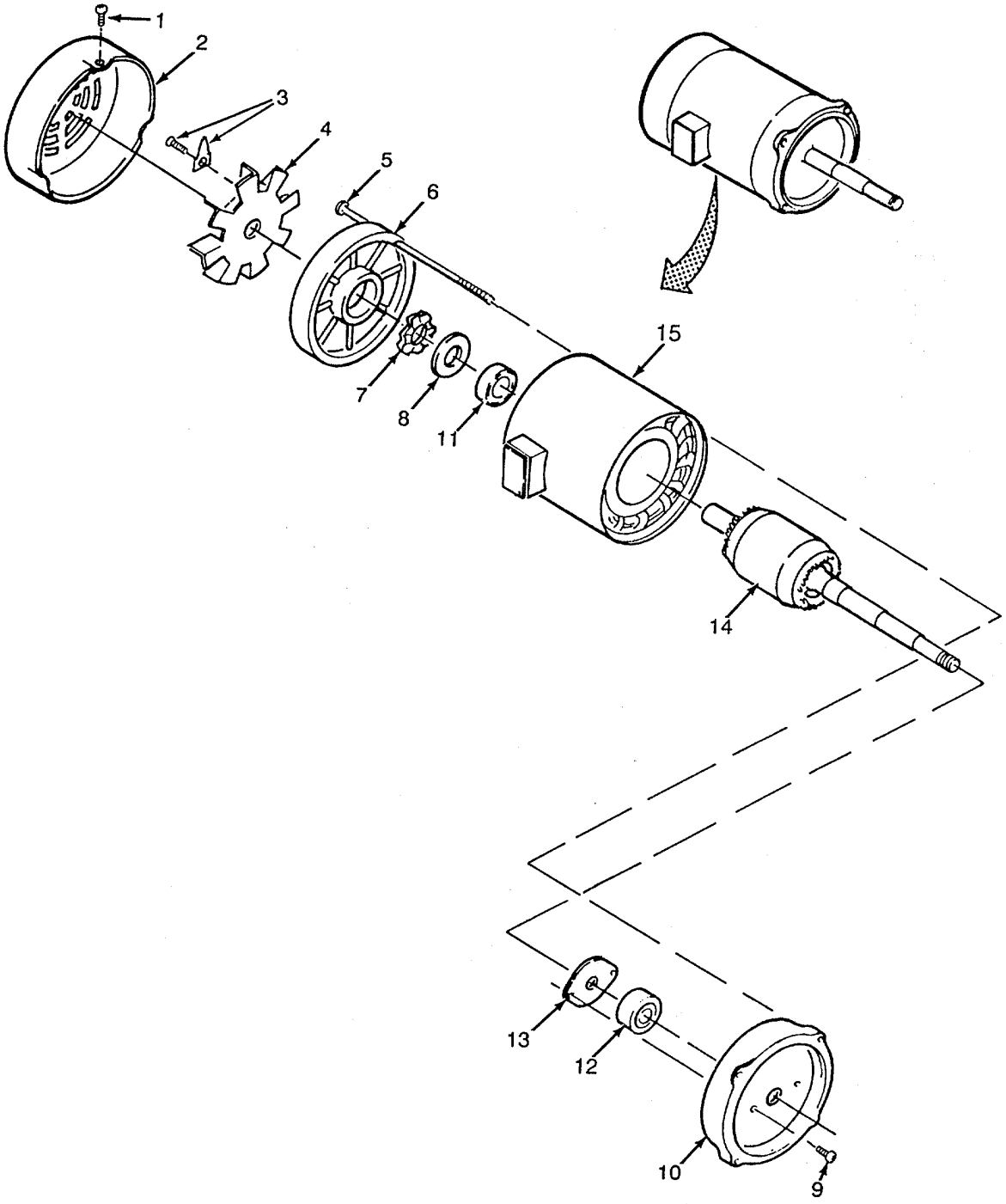
(3) Insert three screws (1) in puller holes of fan (4). Tighten screws evenly to pull fan from shaft of rotor (14)

NOTE

Marking relative positions of fan end plate, case, and pump end plate will assist in alinement during assembly. If marked parts are to be replaced, be sure to transcribe markings to new parts before discarding defective parts or turning them in to Supply.

(4) Scribe a line across junction of stator (15) and end plates (6 and 10).

3-37. CENTRIFUGAL PUMP MOTOR (BOOSTER PUMP) REPAIR - continued



3-38. CENTRIFUGAL PUMP MOTOR (BOOSTER PUMP) REPAIR - continued.

(5) Remove four bolts (5).

(6) Tap plate (6) with soft-faced mallet to break bond with stator assembly (15) and remove plate.

(7) Remove wavy washer (7) and washer (8) from shaft of rotor assembly (14).

CAUTION

Wiring in stator assembly can be damaged by rotor assembly if it is not removed carefully. Guide rotor assembly carefully while removing it.

(8) Tap plate (10) with soft-faced mallet to break bond with stator assembly (15) and remove plate with rotor assembly attached.

(9) Remove two screws (9) and plate (10).

(10) Using arbor press, remove bearing (11) from shaft of rotor assembly (14).

(11) Using arbor press, remove bearing (12) from shaft of rotor assembly (14).

(12) Remove retaining ring (13).

b. Cleaning.

WARNING

Compressed air can blow dust into the eyes. Wear goggles. Do not exceed 30 psi (207 kPa) air pressure.

(1) Using compressed air, blow dust and grit from stator assembly (15) and from rotor assembly (14). Wipe rotor assembly with clean rag.

(2) Clean fan cover (2) vent slots with compressed air and wipe with clean rag.

(3) Wipe bearings (11 and 12) with clean rag.

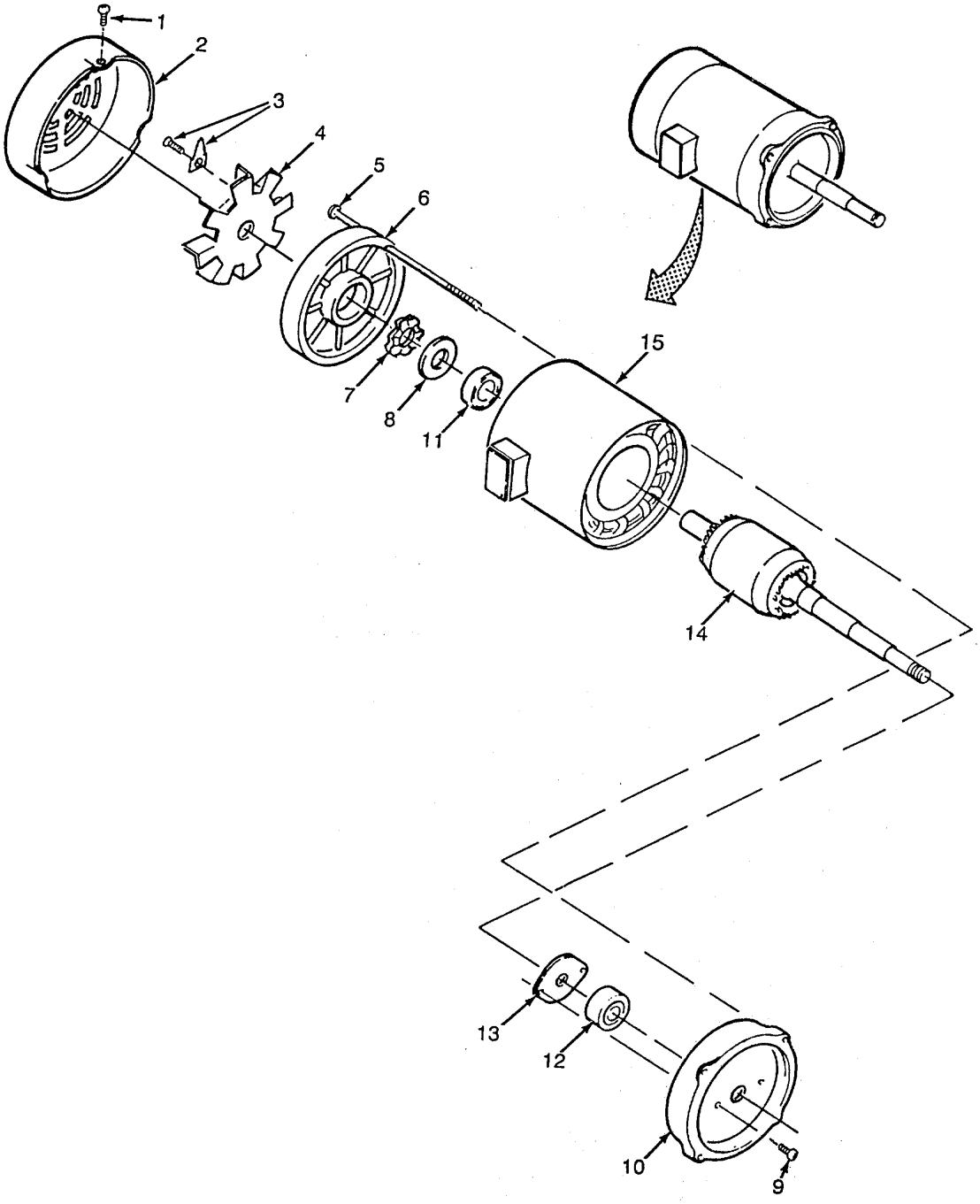
(4) Scrape loose paint from fan cover (2), stator assembly (15) and pump end plate (10).

c. Inspection.

(1) Inspect leads and windings of stator assembly (15) for evidence of cracked or burned insulation.

(2) Inspect stator assembly (15) for loose or burned conducting bars.

3-38. CENTRIFUGAL PUMP MOTOR (BOOSTER PUMP) REPAIR - continued.



3-38. CENTRIFUGAL PUMP MOTOR (BOOSTER PUMP) REPAIR - continued.

(3) Inspect bearings (11 and 12) for freedom of rotation and damaged seals.

(4) Inspect end plates (6 and 10) for cracks.

d. Repair.

Replace defective components.

e. Assembly.

(1) Using arbor press, install bearing (11) on short shaft of rotor assembly ('14).

(2) Install retaining ring (13) on long shaft of rotor assembly (14).

(3) Using arbor press, install bearing (12) on long shaft of rotor assembly (14).

(4) Position end plate (10) on long shaft of rotor assembly (14).

(5) Secure end plate (10) to retaining ring (13) with two screws (9).

CAUTION

Stator wiring can be damaged by rotor assembly if not installed carefully. Guide rotor assembly carefully while installing it.

(6) Insert rotor assembly (14) and attached parts in stator assembly (15).

(7) Position plate (10) on stator assembly (15). Aline marks on end plate (10), made during disassembly, with mark on stator assembly (14).

(8) Position thrust washer (7) and flat washer (8) on short shaft of stator assembly (14).

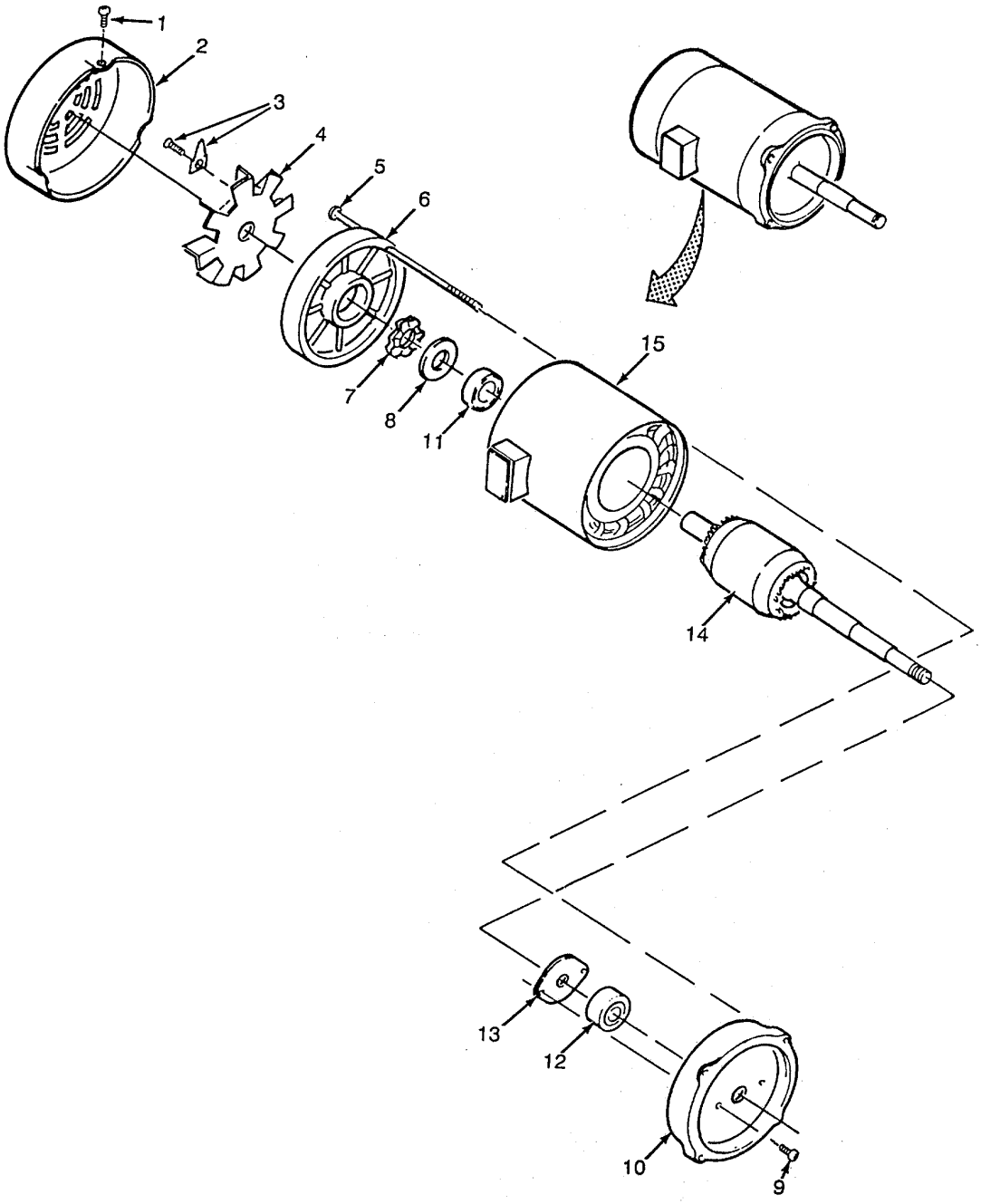
(9) Aline mark, made on end plate (6) during disassembly, with mark on stator assembly (15).

(10) Install four bolts (5).

(11) Install retainer and screw (3) to secure fan (4).

(12) Install fan cover (2) and three screws (1).

3-38. CENTRIFUGAL PUMP MOTOR (BOOSTER PUMP) REPAIR - continued.



3-38. CENTRIFUGAL PUMP MOTOR (BOOSTER PUMP) REPAIR - continued.

f. Test.

(1) Secure motor to test bench.

WARNING

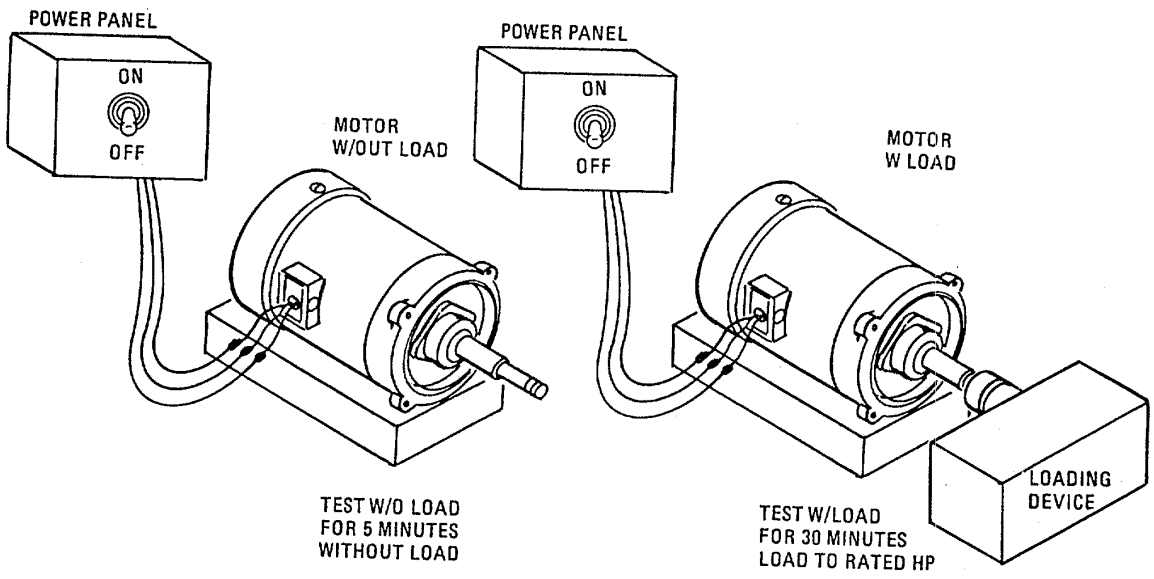
Electrical high voltages can cause serious injury or death. Always take proper measures to ensure personal safety.

(2) Connect motor wiring to test bench leads.

(3) Apply power and run motor with and without load.

(4) Check motor for excessive vibration and fast temperature rise.

(5) Disconnect motor from test bench leads.



Section IX. CHEMICAL FEED PUMP, CARTRIDGE FILTER AND R.O. PUMP ASSEMBLIES MAINTENANCE PROCEDURES

3-39. MOTOR (CHEMICAL FEED PUMP) REPAIR.)

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)
- Goggles (Appendix B, Section III, Item 3)

Materials/Parts Required
- Rags, Wiping (Appendix C, Section II, Item 14)
- Gaskets and Seals (TM 10-4610-241-24P)

Equipment Condition

Reference
- Chemical Feed Pump Motor removed (Paragraph 2-62).

3-39. MOTOR (CHEMICAL FEED PUMP) REPAIR - continued.

a. Disassembly.

NOTE
Marking position of end plates on stator assembly will facilitate installation. Be sure to transcribe markings to replacement parts before discarding defective parts or turning them in to Supply.

(1) Scribe a line across junctions of end plates (7 and 16) and stator assembly (24) and remove four bolts (1), flatwashers (2) and lockwashers (3).

(2) Tap end plate (7) with soft-faced mallet to break bond with stator assembly (24).

CAUTION
Stator assembly wiring is connected to stationary switch which is attached to end plate. To prevent damage to wiring, make sure stationary switch is disconnected before removing end plate.

(3) Carefully separate end plate (7) from stator assembly (24).

NOTE
Tagging wires, noting connection points will facilitate installation. Be sure to transfer tags to replacement parts before discarding defective parts or turning them in to Supply.

(4) Tag and disconnect wiring from stationary switch (5).

(5) Remove two screws (4), stationary switch (5) and gasket (6) from end plate (7).

(6) Remove load spring (8) and wavy washers (9) from end plate (7) or shaft of rotor (23).

(7) Remove four screws (10) and capacitor cover (11) from stator assembly (24).

WARNING
To prevent possible electrical shock, capacitor should be discharged to ground before disconnecting wires.

NOTE
Tagging wires, noting connection points will facilitate installation. Be sure to transfer tags to replacement parts before discarding defective parts or turning them in to Supply.

(8) Discharge capacitor and tag wiring, attached to capacitor. Disconnect wiring and remove capacitor (13) from stator assembly.

(9) Remove gaskets (12) from stator assembly (24).

(10) Remove two screws (14) and washers (15), securing end plate (16) to retainer plate (20).

(11) Tap end plate (16) with a soft-faced mallet to break bond with stator assembly (24) and remove plate. Remove lip seal (17) from from end plate (16).

3-39. MOTOR (CHEMICAL FEED PUMP) REPAIR - continued.

CAUTION

Stator assembly wiring can be damaged by rotor or rotor shaft if it is not removed carefully.

(12) Carefully pull rotor (23) out of stator assembly (24).

(13) Remove retaining ring (18) from shaft of rotor (23).

(14) Using arbor press, remove bearing (19) and retaining plate (20) from shaft of rotor (23).

(15) Remove bearing (21), using arbor press, from shaft of rotor (23).

NOTE

Do not attempt to remove centrifugal switch cutout (22) from motor shaft. This item cannot be replaced without damaging it and is not available in Supply. If switch cutout is defective, replace entire motor.

(16) A required, remove tape (25) from inside of capacitor cover (11).

3-39. MOTOR (CHEMICAL FEED PUMP) REPAIR - continued.

b. Cleaning.

WARNING

Compressed air can blow dust into the eyes. Wear goggles. Do not exceed 30 psi (207 kPa) air pressure.

(1) Remove loose paint from end plates (16 and 7) and stator assembly (24).

(2) Using compressed air, blow dust and grit from stator assembly (24) and rotor (23). Wipe rotor with wiping rag.

(3) Wipe dirt and grit from bearings (19 and 21) with wiping rag.

c. Inspection

(1) Inspect leads and windings of stator assembly (24) for evidence of cracked or burned insulation.

(2) Inspect stator assembly (24) for loose or burned conducting bars.

(3) Inspect bearings (19 and 21) for wear, binding and damaged seals.

(4) Inspect end plates (7) and (16) for cracks.

d. Repair.

(1) Replace all seals and gaskets.

(2) Replace entire motor if rotor (23) or switch cutout (22) is defective.

(3) Replace all other parts only if defective.

e. Assembly.

(1) If removed, install tape (25) in capacitor cover (11).

(2) Position retaining plate (20) and retaining ring (18) on shaft of rotor (23).

(3) Using arbor press, install bearings (21 and 19) on shaft of rotor (23).

(4) Install seal (17) in end plate (16).

CAUTION

Stator assembly wiring can be damaged by rotor or rotor shaft if rotor is not installed carefully.

(5) Carefully position rotor (23) in stator assembly (24).

(6) Position end plate (16) on stator assembly (24).

3-39. MOTOR (CHEMICAL FEED PUMP) REPAIR - continued .

(7) Install two screws (14) and washers (15) to secure end plate (16) to end plate retainer (20).

(8) Position capacitor cover gasket (12) on stator (24).

(9) Feed wires, marked T9 and T1 0, trough small hole in side of stator and connect to capacitor as marked during disassembly. If tags are lost or illegible, use information in illustration as a guide.

(10) Position capacitor (13) on side of stator and secure to stator with cover (11) and four screws (10).

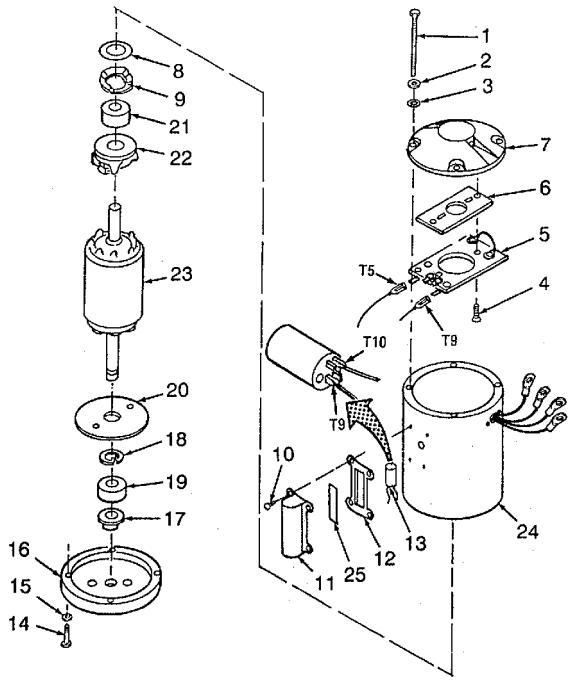
(11) Position wavy washer (9) and load spring (8) on shaft of rotor (23).

(12) Install gasket (6), stationary switch (5) and two screws (4) on end plate (7).

(13) Connect motor wires to stationary switch as tagged. If tags are lost or illegible, connect wires, marked T9 and T5 to stationary switch as indicated in illustration

(14) Making sure that all loose wire ends extend thru large round hole in stator, position end cover (7) and attached parts on stator (24).

(15) Aline end plates (16 and 7) with scribe lines, marked at disassembly, on stator and install four washers (3), lockwashers (2) and thru bolts (1).



3-39. MOTOR (CHEMICAL FEED PUMP) REPAIR- continued.

f. Test.

(1) Secure motor to test bench.

WARNING

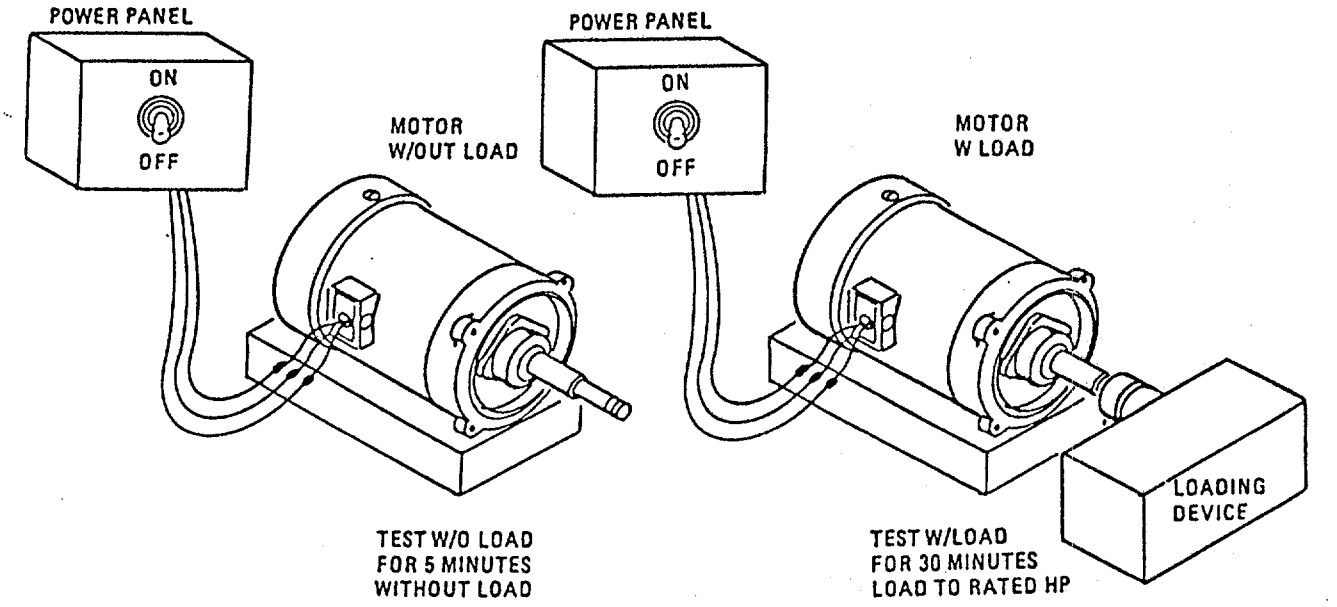
Electrical high voltages can cause serious injury or death. Always take proper measures to ensure personal safety.

(2) Connect motor wiring to test bench leads.

(3) Apply power and run motor with and without load.

(4) 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 and capacitor must be tested after disassembly.

(5) Disconnect motor from test bench leads.



3-40. STROKE ADJUSTMENT ASSEMBLY (CHEMICAL FEED PUMP) REPLACE.

This task consists of: a. Removal b. Installation

INITIAL SET-UP:

Tools Required
- General Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Tool Kit - 260246

Materials/Parts Required
- Solvent, Drycleaning (Appendix C, Section II, Item 18)
- Detergent (Appendix C, Section II, Item 5)
- Compound, Locking (Appendix C, Section II, Item 5)
- Gaskets and Packing (TM 10-4610-241-24P)
- Lockwashers (TM 10-4610-241-24P)

Equipment Condition
Reference
- Chemical Feed Pump removed (Paragraph 2-60).
- Chemical Feed Pump Electric Motor removed (Paragraph 2-62).
- Chemical Feed Pump Liquid Heads removed (Paragraph 2-61).

a. **Removal.**

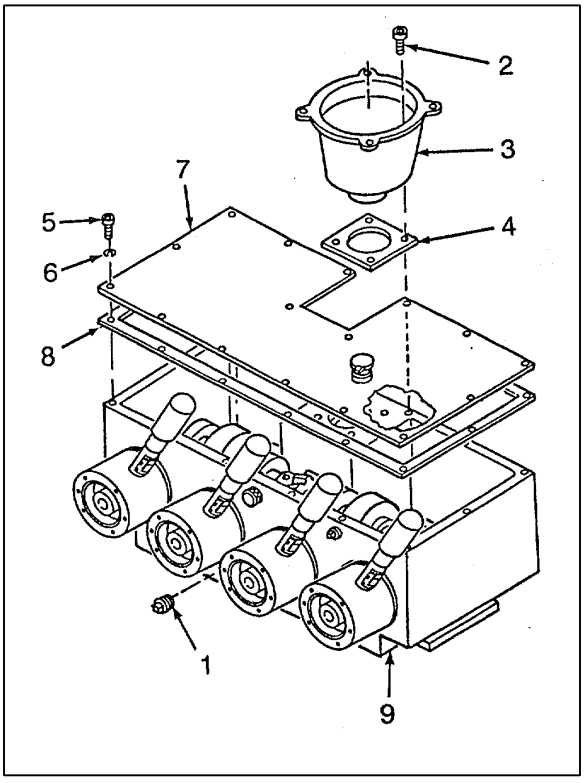
NOTE
There are four stroke adjustment assemblies on the chemical feed pump. All are removed in the same manner. One is shown, the others are similar.

(1) Remove plug (1) and drain oil from pump housing (9) (Paragraph 2-60).

(2) Remove four screws (2), drive housing (3) and gasket (4) from pump cover (7).

(3) Remove sixteen screws (5) and lockwashers (6).

(4) Remove cover (7) and gasket (8) from pump housing (9).



3-40. STROKE ADJUSTMENT ASSEMBLY (CHEMICAL FEED PUMP) REPLACE - continued

NOTE

Removal of screws (10) and lockwashers (11) is necessary only if extreme left or right adjustment assemblies are to be removed.

(5) Remove front screw (10) and lockwasher (11) from pillow block (12), behind adjustment assembly to be removed for clearance.

(6) Using tool kit (PN260246), consisting of three parts; bolt (14), nut (13) and bar (15), thread nut (13) half way up the bolt (14).

(7) Feed bolt (14) thru bar (15) and thread into end of push rod (24) until it bottoms.

(8) Rotate nut (13) counterclockwise until it touches bar (15).

(9) Using wrench, hold bolt (14) stationary and continue to rotate nut (13) clockwise. This will pull push rod (24) away from cam (23).

(10) Remove three screws (16), lockwashers (17), stroke adjustment assembly (19) (with tool kit in place) and gasket (18).

(11) Remove bolt (14), nut (13) and bar (15) from stroke adjustment assembly (19).

b. Installation.

(1) Using tool kit (PN260246), consisting of three parts; bolt (14), nut (13) and bar (15), thread nut (13) half way up the bolt. Feed bolt (14) thru bar (15) and thread into end of push rod (24) until it bottoms.

(2) Rotate nut (13) clockwise until bar (15) touches face of stroke adjustment assembly (19).

(3) Using wrench, hold bolt (14) stationary and continue to rotate nut (13) clockwise about 10 turns. This will pull pushrod into housing and permit easy installation of adjustment assembly on pump housing.

(4) Position gasket (18) and adjustment assembly (19) on pump housing and install three lockwashers (17) and screws (16).

(5) If removed, install lockwashers (11) and screws (10).

(6) Turn adjustment tubes (20) to set all adjustment assemblies (19) to 0 (zero) This will facilitate manual rotation of shaft (26).

(7) Turn shaft (26) by hand so that scribe mark (high point) on cam (23) of adjustment assembly being installed is centered on plunger (24).

(8) Making sure that adjustment assembly (19), being installed, is still set on "O" (zero) check gap between high point of cam (23) and plunger (24) with a feeler gage.

(9) If gap is 0.002, adjustment is correct, proceed to step (13).

3-40. STROKE ADJUSTMENT ASSEMBLY (CHEMICAL FEED PUMP) REPLACE - continued.

NOTE

Adjustment tube is easily damaged. Place a rag around it before positioning vise grip and do not overtighten vise grip.

(10) If gap is not 0.002, remove cap (25) and, holding tube (20) with vise grip, loosen locknut (21). Back locknut off several turns.

(11) Turn adjustment screw (22) as required until correct gap of 0.002 is obtained.

(12) When correct gap is obtained, tighten locknut (21) against tube (20) and install cap (25).

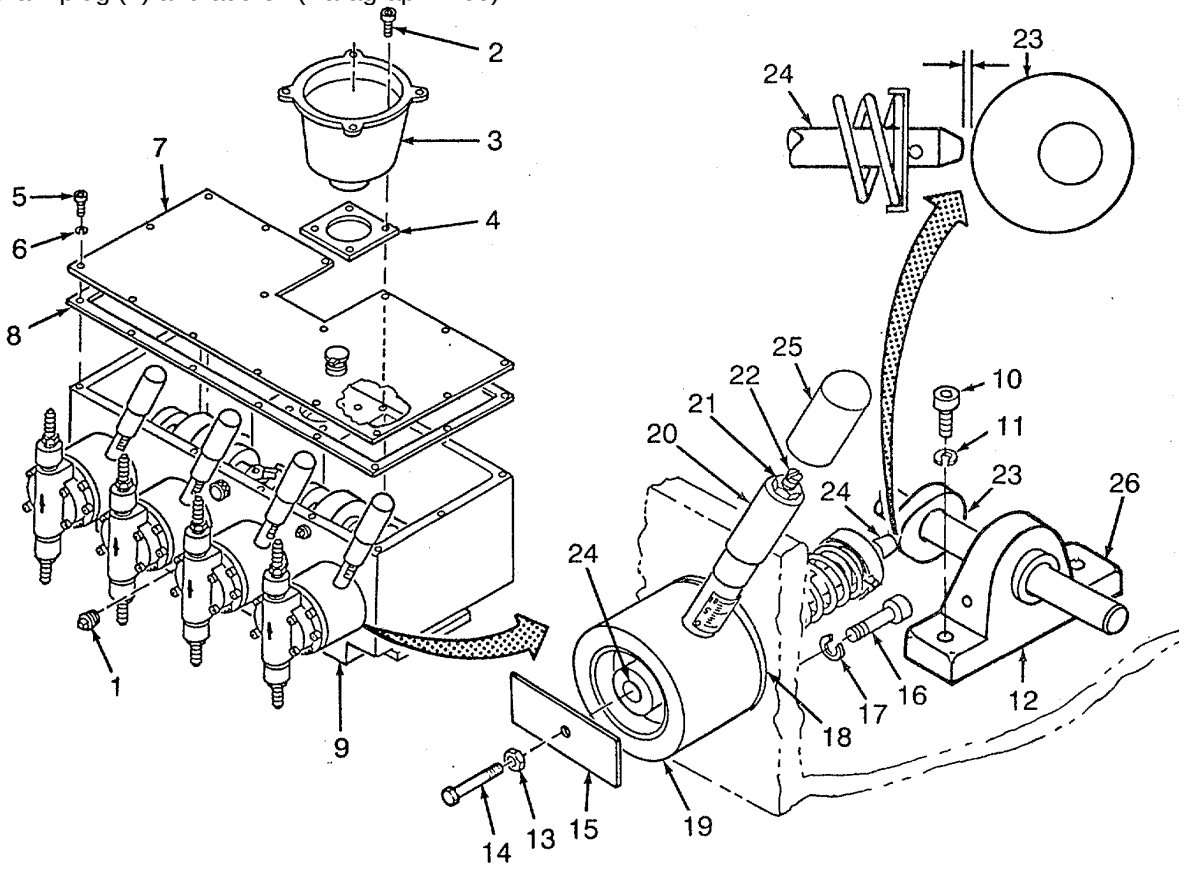
(13) Position gasket (8) and cover (7) on pump housing (9) and install 16 lockwashers (6) and screws (5).

NOTE

When replacing gaskets (4), install all gaskets in replacement set. If backlash is too tight (shaft is hard to turn), remove gaskets as required so that backlash is minimum, but shaft can be turned easily by hand.

(14) Position gaskets (4) and drive housing (3) on pump housing (9) and install four screws (2).

(15) Install drain plug (1) and add oil (Paragraph 2-60).



3-41. HOUSING AND DRIVE ASSEMBLY (CHEMICAL FEED PUMP) REPAIR.

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 18)
Detergent (Appendix C, Section II, Item 5)
Tape, Anti-seize (Appendix C, Section II, Item 19)
Equipment Condition
Reference
Chemical Feed Pump Stroke Adjustment Assemblies removed (Paragraph 3-40).
General Safety Instructions

WARNING

Drycleaning solvent, P-D-680, Cl II, 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. Disassembly.

(1) Remove plugs (1 and 2) and sight glass (3) from housing (29)

NOTE

Input shaft must be turned clockwise while pulling shaft from housing.

(2) While turning input shaft (12) pull shaft and attached parts from housing (29).

(3) Remove roller bearing cup (4) and roller bearing cone (5) from input shaft (12).

(4) Remove pin (6) from worm gear (7), using drift pin. Remove worm gear from shaft (12).

NOTE

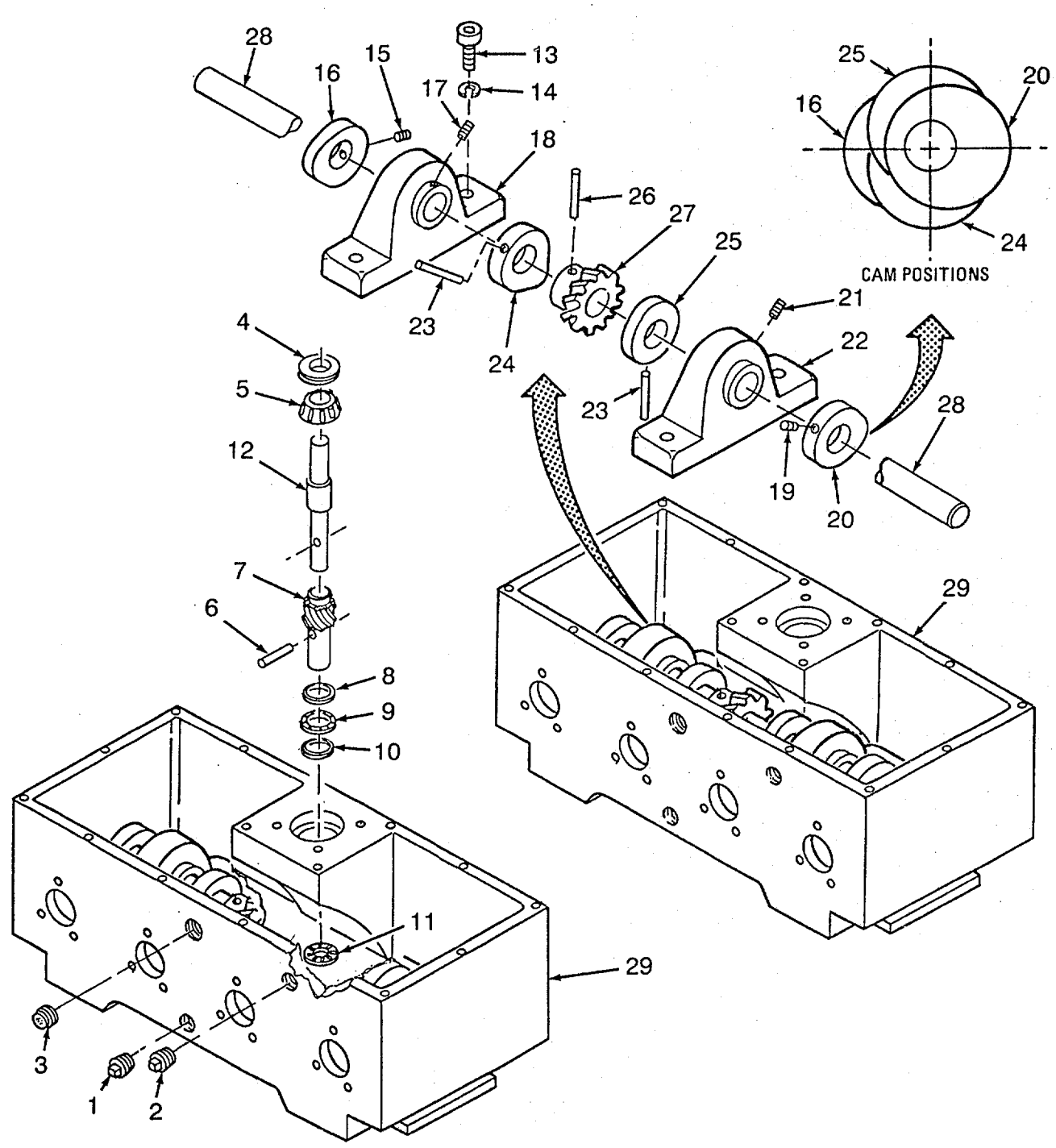
Components may stay with shaft during removal.

(5) Remove thrust bearing race (8), thrust bearing (9), race (10) and needle bearing (11) from hole in housing (29).

(6) Remove four screws (13), and lockwashers (14), securing pillow blocks (18 and 22) to housing (29).

(7) Loosen two setscrews (15) and slide cam (16) off shaft (28).

3-41. HOUSING AND DRIVE ASSEMBLY (CHEMICAL FEED PUMP) REPAIR - continued.



3-41. HOUSING AND DRIVE ASSEMBLY (CHEMICAL FEED PUMP) REPAIR -continued.

(8) Remove screws (13) and lockwashers (14) from pillow block (18).

NOTE

Setscrews (17 and 21) are located on inner race of pillow block bearing. Do not loosen setscrews on top of pillow block. These screws secure bearing to pillow block, a nonreparable item.

(9) Loosen setscrew (17) and slide pillow block (18) off shaft (28)

(10) Loosen two setscrews (19) and slide cam (20) from shaft (28).

(11) Lift cam shaft (28) from housing (29).

(12) Using drift pin or press, remove pins (23) and slide cams (24 and 25) from shaft (28).

(13) Using drift punch or press, remove pin (26) and slide worm gear (27) from shaft (28).

(14) Loosen setscrew (21) and remove shaft (28) from pillow block (22).

b. Cleaning.

WARNING

Drycleaning solvent, P-D-680, C1 II, 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 a soft-bristled brush and drycleaning solvent, clean all components of housing and drive assembly and wipe with rags.

c. Inspection.

(1) Inspect threaded components for stripped and damaged threads.

(2) Inspect housing (29) for cracks, corrosion, and stripped threads.

(3) Inspect bearings (5,11,and 9) for cracks, freedom of movement and wear.

(4) Inspect cams (16, 24,25 and 20) for deep scratches, nicks, and corrosion.

(5) Inspect worm gears (7 and 27) for cracked, damaged or missing teeth.

(6) Inspect for bent or cracked camshaft (28).

(7) Inspect bearings in pillow blocks (18 and 22) for cracks, freedom of movement and wear.

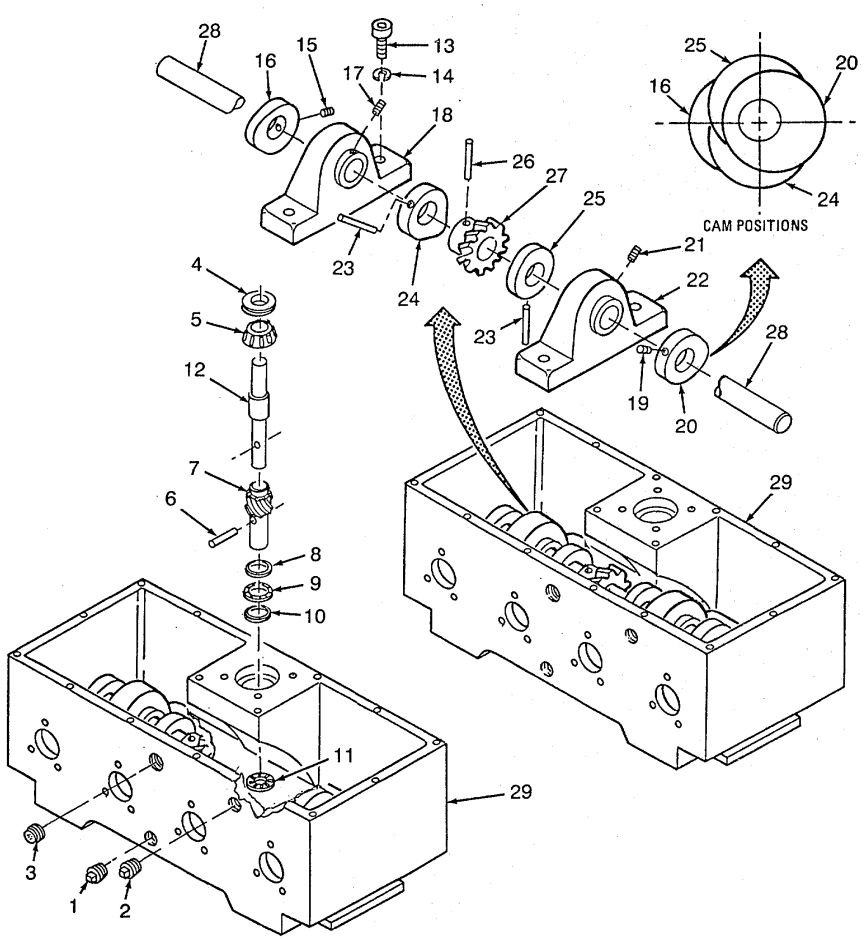
(8) Inspect input shaft (12) for cracks.

3-41 HOUSING AND DRIVE ASSEMBLY (CHEMICAL FEED PUMP) REPAIR - continued.

d. Repair.

(1) Replace lockwashers.

(2) Replace defective components.



3-41. HOUSING AND DRIVE ASSEMBLY (CHEMICAL FEED PUMP) REPAIR - continued.

e. Assembly.

(1) Install sight glass (3) in housing (29).

(2) Install two plugs (1 and 2) in housing (29).

(3) Install needle bearing (11) in housing (29).

(4) Position thrust bearing race (10), thrust bearing (9) and thrust bearing race (8) in housing (29).

(5) Press worm gear (7) onto shaft (12) and install pin (6).

(6) Position shaft (12) and worm gear (7) in housing (29). Turn to seat it.

(7) Install roller bearing (5) and cup (4) on shaft (12).

(8) Slide worm gear (27) onto shaft (28) and install pin (26). Gear teeth must be positioned in center of shaft.

(9) Slide cams (24 and 25) onto shaft (28) and install pins (23), making sure high points of cams face in opposite directions (180 degrees) as illustrated in cam positions diagram.

(10) Place shaft (28) and attached parts in housing (29).

(11) Slide pillow block (18) onto end of shaft (28). Do not tighten setscrews (17) at this time.

(12) Slide pillow block (22) onto other end of shaft (28). Do not tighten setscrews (21) at this time.

NOTE

Make sure outer cams (20 and 16) are 90 degrees out of phase with inner cams (24 and 25) when installed.

(13) Slide cam (20) onto end of shaft (28), but do not tighten setscrews (19).

(14) Slide cam (16) onto end of shaft (28), but do not tighten setscrews (15).

(15) Position pillow blocks (18 and 22) against back of housing (29), making sure gears (7 and 27) are meshed.

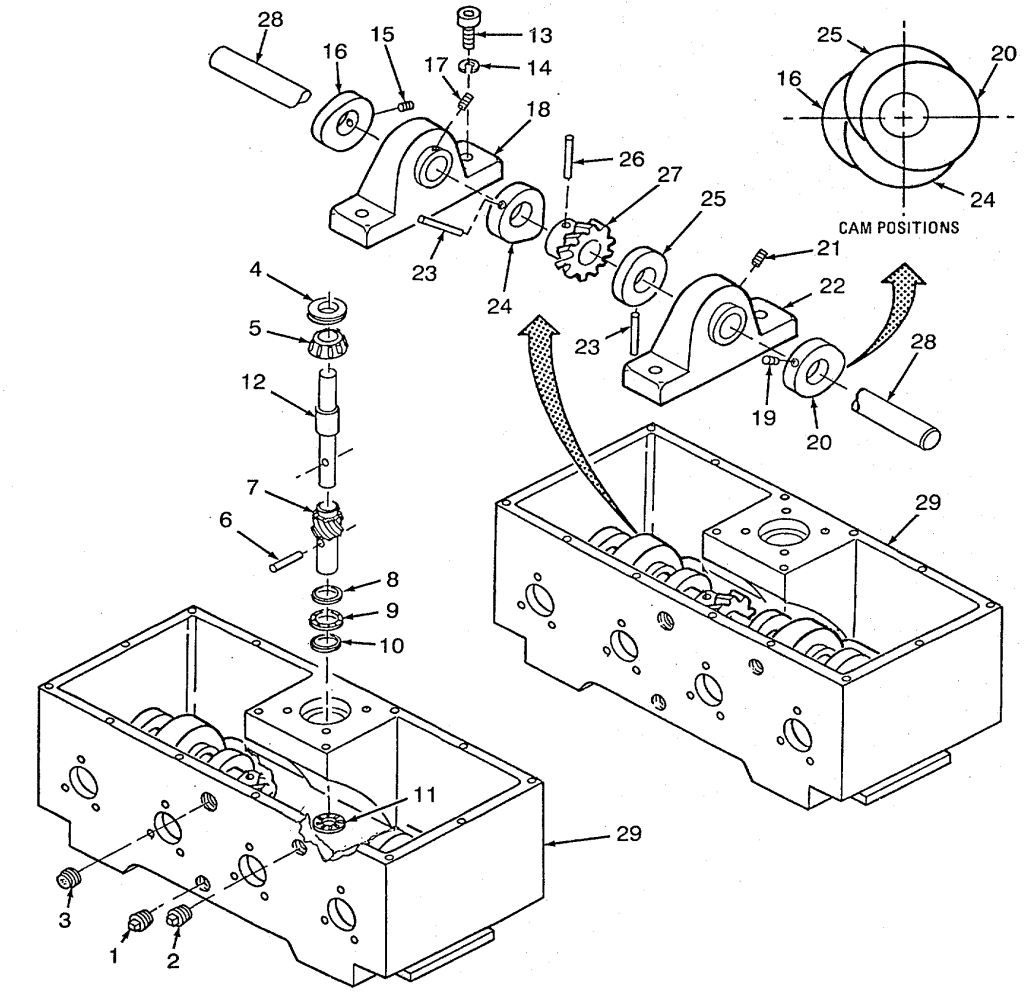
(16) Install lockwashers (14) and screws (13) in rear holes of pillow blocks (18 and 22).

(17) Install stroke adjustment assemblies (Paragraph 3-40).

3-41. HOUSING AND DRIVE ASSEMBLY (CHEMICAL FEED PUMP) REPAIR - continued.

(18) Position shaft (28) in pillow blocks (18 and 22) so that centerline of cams (24 and 25) are alined with their push rods on stroke adjustment assemblies.

(19) Tighten setscrews (17 and 21) on pillow blocks (18 and 22) to secure shaft to inner race of bearings in pillow block.



3-42. CARTRIDGE FILTER REPAIR.

This task consists of:	a. Removal	b. Cleaning
	c. Inspection	d. Repair
	e. Installation	

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 14).
Detergent (Appendix C, Section II, Item 5).
Grease, Silicone (Appendix C, Section II, Item 10).
Lockwashers (TM 10-4610-241-24P)
Personnel Required
Three
Equipment Condition
Filter Elements removed (TM 10-4610-241-10).
Cover removed (TM 10-4610-241-10).
Piping disconnected (Paragraph 2-63).
General Safety Instructions

WARNING

Cartridge filter is heavy/difficult to handle and requires a lifting device rated at one ton or greater.

a. Removal.

NOTE

Marking positions of filter shell (8) in relation to floor of ROWPU and elbow (1) in relation to shell (8) will facilitate installation. Be sure to transcribe marks to replacement parts before discarding or turning them in to Supply.

(1) Scribe a line across junction of skirt (7) and ROWPU floor.

(2) Tie a sling around filter shell (8) and attach to lifting device.

(3) Using lifting device and two assistants, carefully remove filter shell (8) from ROWPU.

(4) Scribe a line on shell (8), indicating the direction of the elbow. Remove elbow (1) from filter shell (8).

NOTE

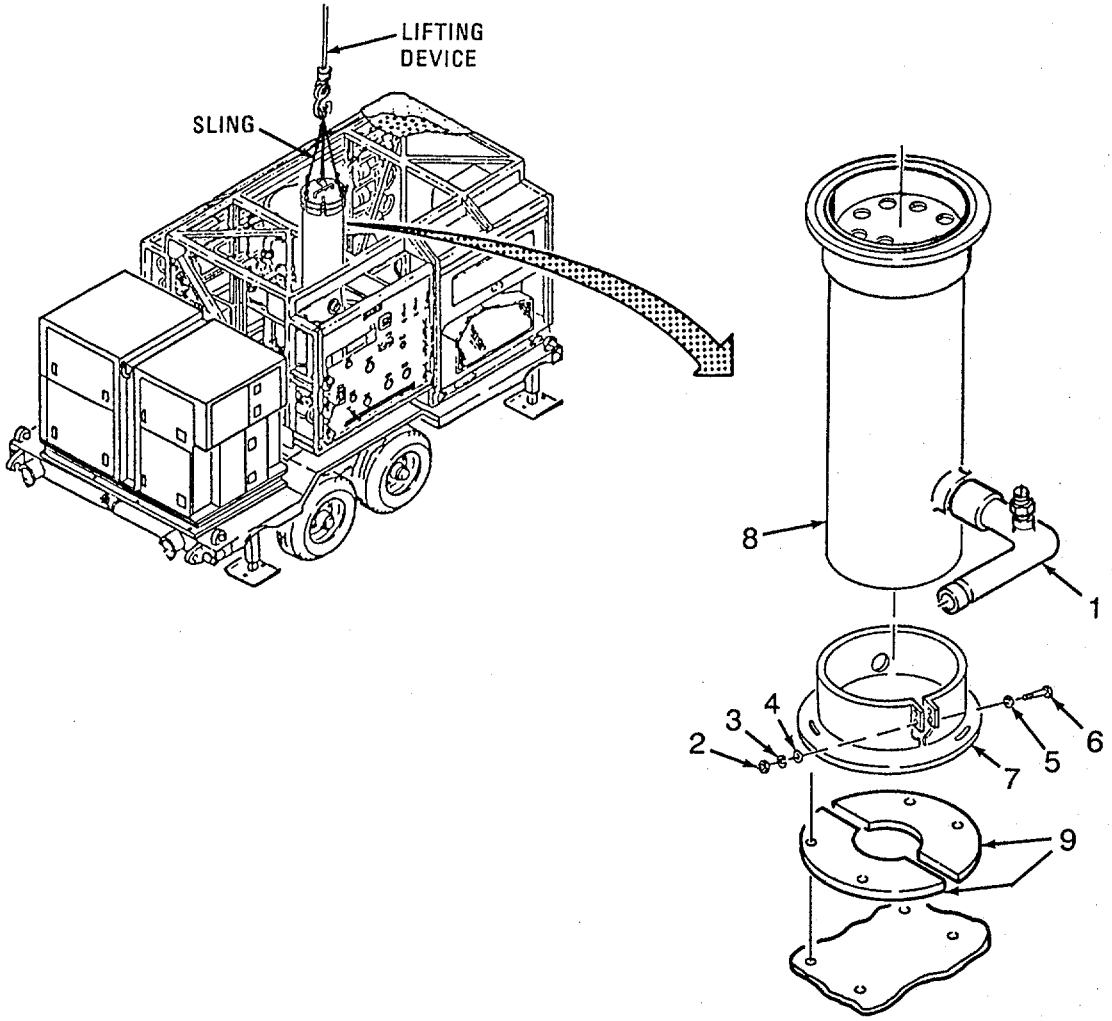
Marking position of skirt (7) in relation to shell (8) will facilitate installation. Be sure to transcribe marks to replacement parts before discarding or turning them in to Supply.

3-42. CARTRIDGE FILTER REPAIR-continued.

(5) Scribe a line across shell (8) and skirt (7) junction.

(6) Remove two nuts (2), lockwashers (3) flatwashers (4 and 5), screws (6) and skirt (7) from filter shell (8).

(7) Remove two isolator plates (9) from floor of ROWPU.



3-42. CARTRIDGE FILTER REPAIR-continued.

b. Cleaning.

(1) Using cleaning rags and mild soap solution, wash all components. Make sure packing seat on shell (8) is clear of dirt and loose particles.

(2) Rinse components with clean water and wipe dry with cleaning rags.

c. **Inspection.**

(1) Inspect skirt (7) for cracks, broken welds and corrosion.

(2) Inspect shell (8) for cracks and delamination of fiberglass material.

(3) Inspect isolator plates (9) for damage, deterioration and deformation.

d. Repair.

(1) Replace lockwashers.

(2) Replace defective components.

e. Installation.

(1) Position skirt (7) on shell (8) as marked during removal.

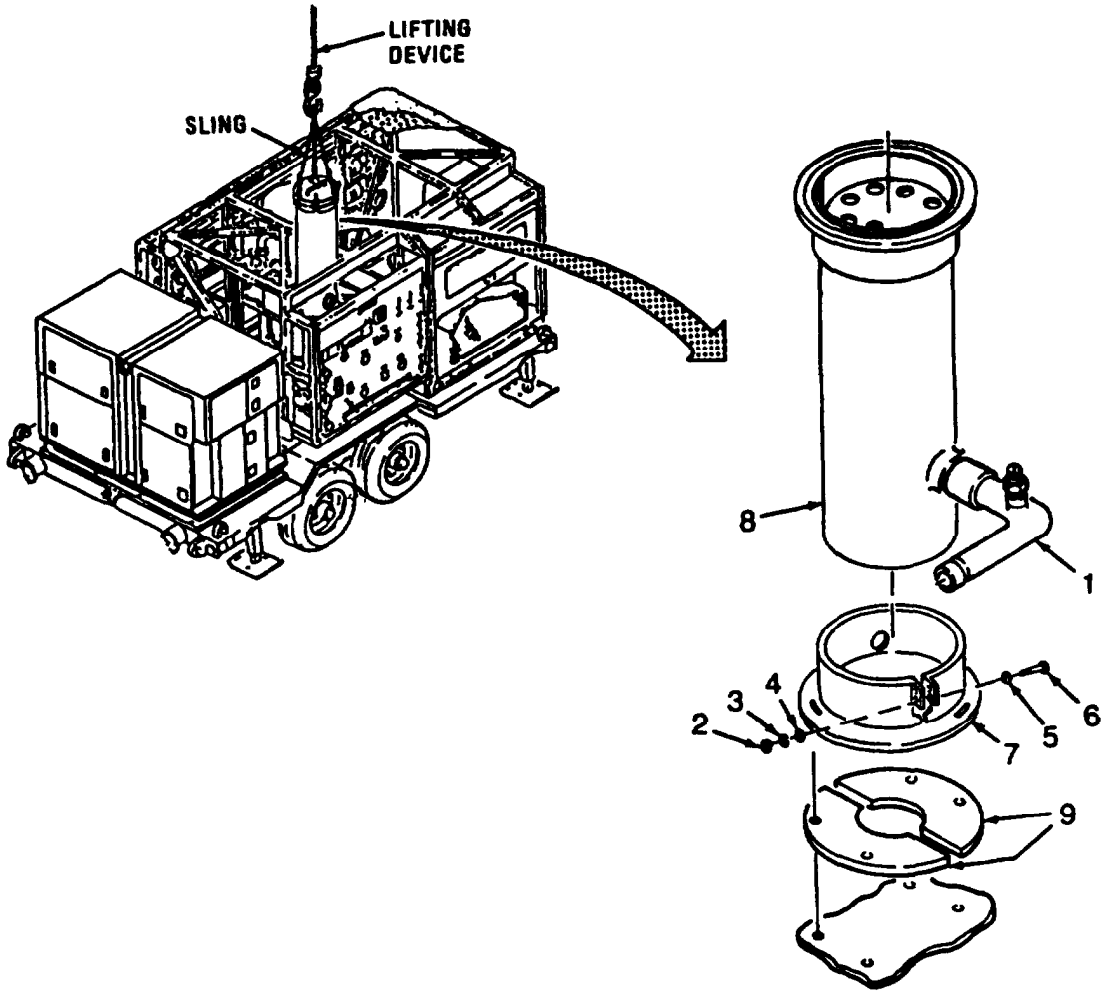
(2) Install flatwashers (5), screw (6), flatwashers (4), lockwashers (3) and nuts (2).

(3) Position two isolator plates (9) on floor of ROWPU.

(4) Using sling, lifting device and two assistants, position cartridge filter shell (8) on ROWPU floor and aline mounting holes.

(5) Refer to Paragraph 2-63 to complete installation of cartridge filter.

3-42. CARTRIDGE FILTER REPAIR- continued



3-43. ELECTRIC MOTOR (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20, AND WPES-30).

This task consists of:
a. Removal
b. Disassembly
c. Cleaning
d. Inspection
e. Repair
f. Assembly
g. Installation
h. Test

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Lifting Device (Appendix B, Section III, Item 3)
Goggles (Appendix B, Section III, Item 3)
Materials/Parts Required
Grease (Appendix C, Section II, Item 9)
Rags, Wiping (Appendix C, Section II, Item 14)
Lockwashers and Seals (TM 10-4610-241-24P)
Equipment Condition
Reference
Electrical Cable removed (Paragraph 2-54).
Sheave removed (Paragraph 2-66).
Personnel Required
Two
General Safety Instructions

WARNING

- Lifting heavy equipment incorrectly can cause serious injury.
- Using compressed air can be dangerous.

a. Removal.

(1) Remove four bolts (1) and lo&washers (2).

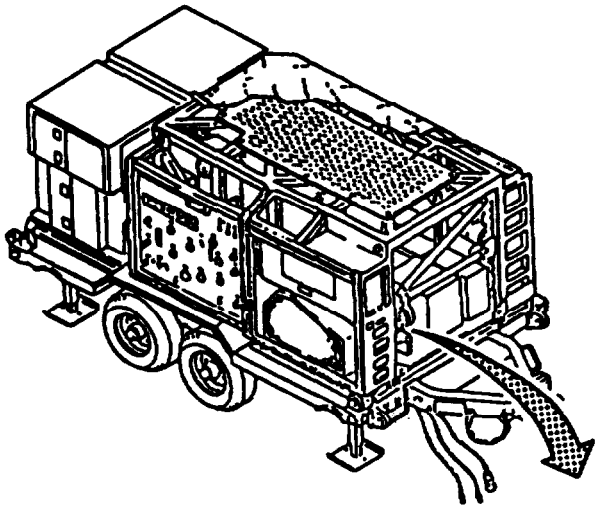
WARNING

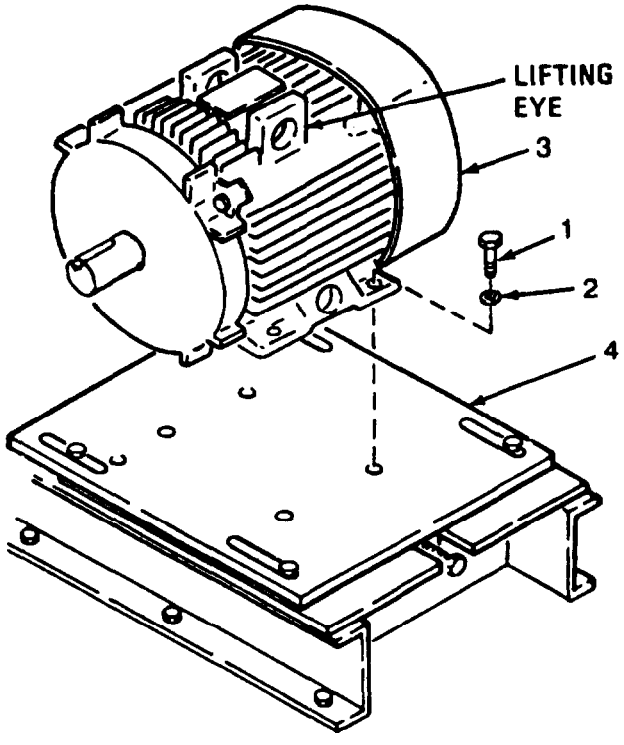
Weight of R.O. pump motor is 251 pounds. Attempting to move it without proper equipment could cause serious injury. Hoist motor with equipment rated at 1 ton or more.

(2) Attach lifting device to lifting eyes.

(3) Remove motor (3) from pump stand (4) and position on work bench.

3-43. ELECTRIC MOTOR (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.





3-43. ELECTRIC MOTOR (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

b. Disassembly.

(1) Remove four screws (5) and fan cover (6) from casing (20).

NOTE
Clamp (10), screws (9) and nuts (8) should not be removed from fan.

(2) Loosen three screws (7) and pull fan (9) with attached clamp (10) from shaft of rotor (14).

(3) Remove key (11) from shaft of rotor (14).

NOTE
Marking relative positions of casing and brackets will facilitate installation. Be sure to transcribe markings to replacement parts if defective parts are to be discarded or turned in to Supply.

(4) Scribe a line across junctions of casing (20) and brackets (13 and 16).

(5) Remove four bolts (12).

(6) Tap bracket (13) with soft-faced mallet to break bond with casing (20). Then remove bracket.

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,

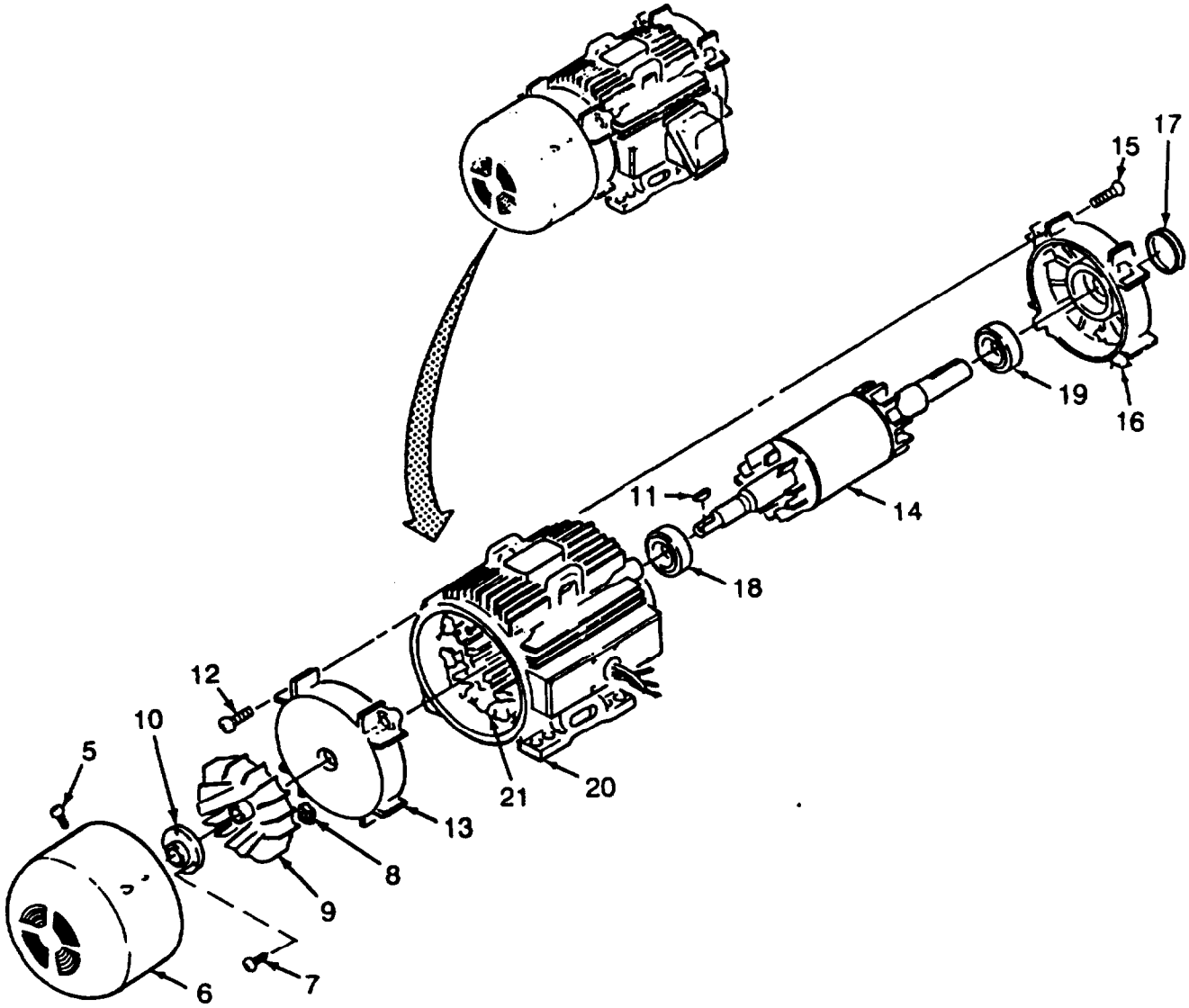
(7) Remove rotor (14) from fan side of stator (21).

(8) Remove four bolts (15).

(9) Tap bracket (16) with soft-faced mallet to break bond with casing (20), then remove bracket.

(10) Remove seal (17) from bracket (16).

3-43. ELECTRIC MOTOR (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.



3-43. ELECTRIC MOTOR (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

c. Cleaning.

WARNING

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

(1) Wipe rotor (14) with clean rags. Using compressed air, blow dust and grit from stator (21) and rotor (14).

(2) Clean fan cover (5) vent slots with compressed air and wipe with clean rags.

(3) Wipe off dirt and grease accumulation on bearings (18 and 19) with clean rags.

(4) Scrape loose paint from fan cover (5), motor casing (20), and brackets (13 and 16). Prime and paint as necessary.

d. Inspection.

(1) Inspect leads and windings of stator (2 1) for evidence of cracked or burned insulation.

(2) Inspect rotor (14) for loose or burned conducting bars.

(3) Inspect bearings (18 and 19) for wear, leaking seals and binding.

(4) Inspect brackets (13 and 16) for cracks and corrosion.

e. Repair.

(1) Replace seal.

(2) Replace defective components.

f. Assembly.

(1) Using arbor press, install bearings (18 and 19) on shaft of rotor (14).

WARNING

Rotor is heavy/difficult to handle. Use two people when installing rotor in stator assembly.

CAUTION

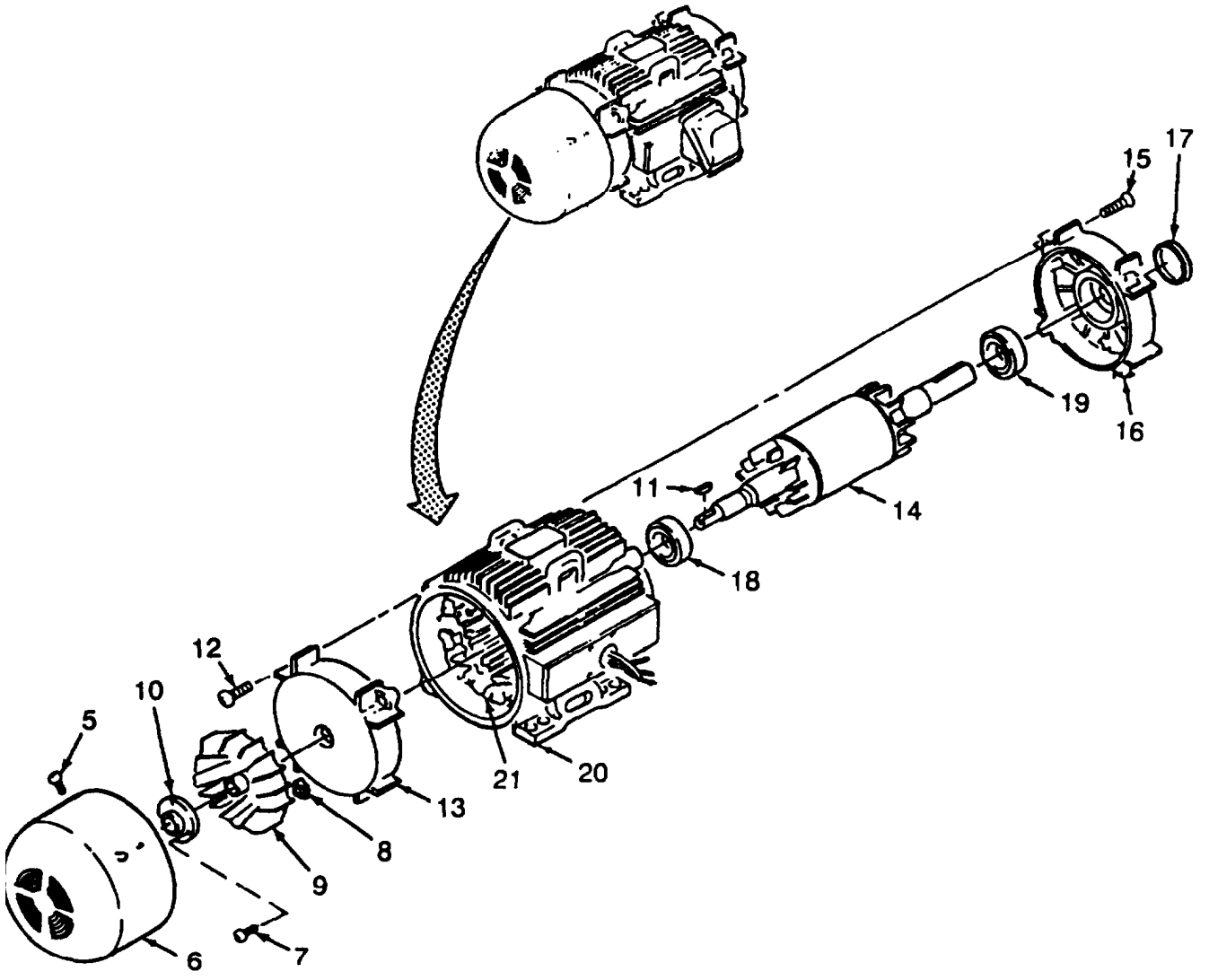
Stator assembly wiring inside motor casing can be damaged by rotor or rotor shaft if rotor is not installed carefully.

(2) Carefully position rotor inside stator (21).

(3) Install seal (17) in bracket (16).

(4) Slip bracket (16) over shaft of rotor (14) and aline with casing (20) as marked during disassembly.

3-43. ELECTRIC MOTOR (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) continued.



(5) Install four crews (15).

(6) Position bracket (13) over shaft of rotor (14) and aline bracket with casing (20) as marked during disassembly.

(7) Install four bolts (12).

(8) Position key (11) on shaft of rotor (14).

(9) Aline keyway in fan assembly (9) with key (11) on shaft of rotor (14) and push fan assembly onto shaft of rotor (14).

(10) Tighten three screws (7).

(11) Position fan cover (6) on bracket (13) and install four screws (5).

g . Test

(1) Secure motor to test bench.

WARNING

Electrical high voltage can cause serious injury or death. Always take proper measures to ensure personal safety.

(2) Connect motor wiring to test bench leads.

(3) Apply power and run motor with and without load.

(4) Check motor for excessive vibration and fast temperature rise.

(5) Disconnect motor from test bench leads.

h. Installation.

WARNING

Weight of R.O. pump motor is 251 pounds. Attempting to move it without proper equipment could cause serious injury. Hoist motor with equipment rated at 1 ton or more.

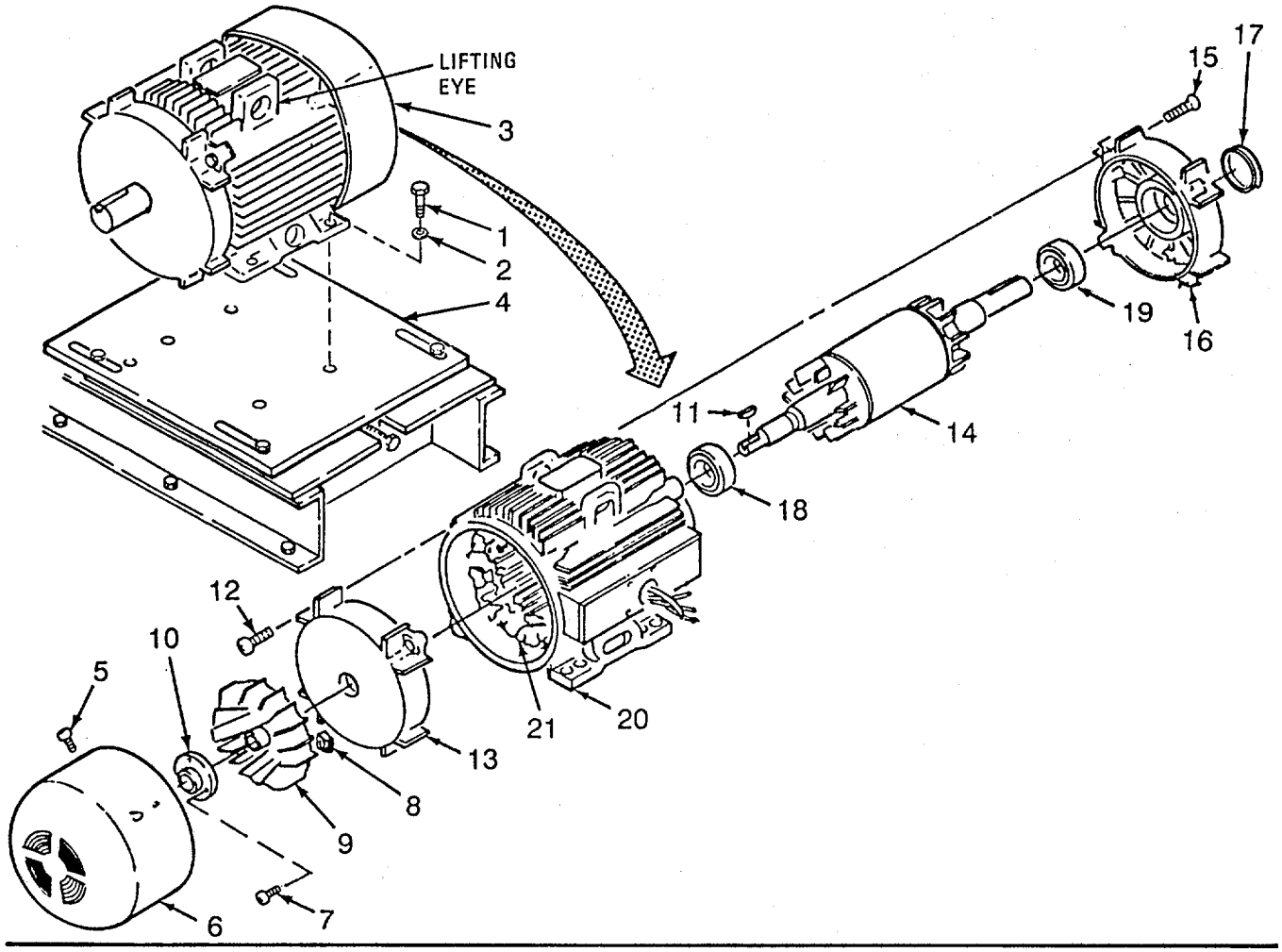
(1) Attach lifting device to lifting eyes on motor (3).

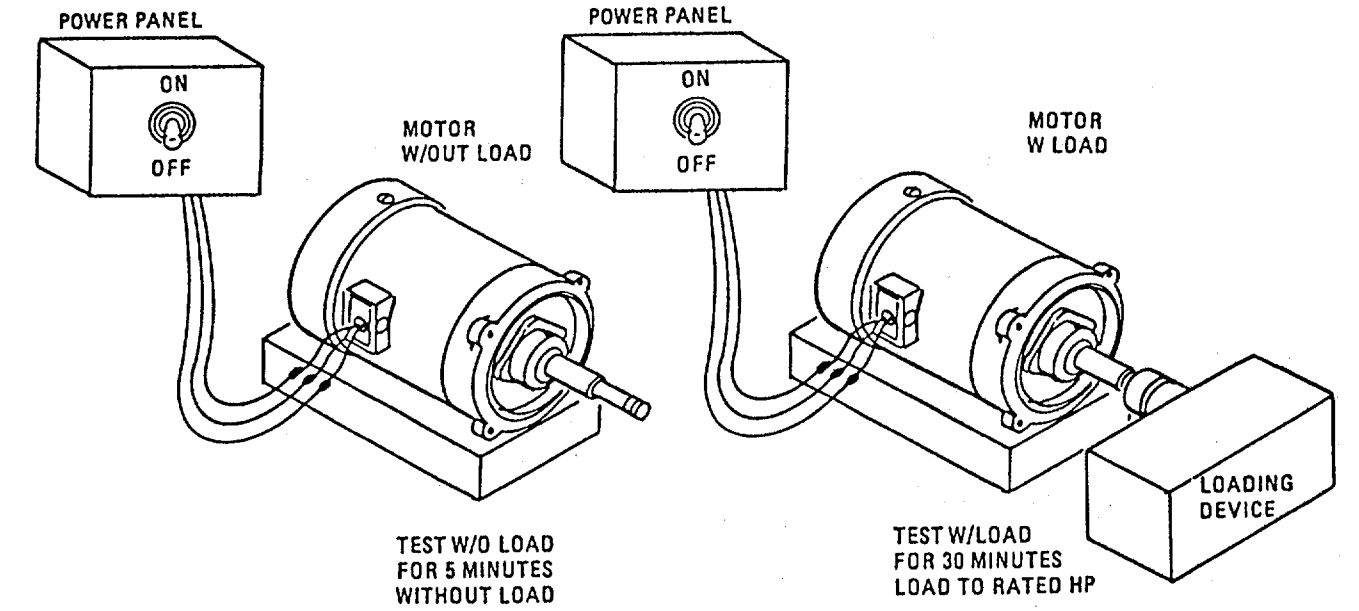
(2) Lift motor (3) and position on stand (4).

(3) Install four lockwashers (2) and bolts (1).

(4) Complete installation (Paragraph 2-66).

3-43. ELECTRIC MOTOR (R.O. PUMP) REPAIR - continued.





3-43.1 HIGH PRESSURE PUMP (R.O. PUMP) MOTOR REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3).

This task consists of: a. Removal b. Disassembly c. Cleaning d. Inspection e. Repair f. Assembly g. Installation h. Test

INITIAL SET-UP:

Tools Required
- Genera1 Mechanics Tool Kit (Appendix B, Section III, Item 4)
- Lifting Device (Appendix B, Section III, Item 3)
- Goggles (Appendix B, Section III, Item 3)
- Arbor Press (Appendix B, Section III, Item 3)
- Two Jaw Puller (Appendix B, Section III, Item 3)

Materials/Parts Required
- Grease (Appendix C, Section II, Item 9)
- Rags, Wiping (Appendix C, Section II, Item 14)
- Lockwashers and Slingers (TM 10-4610-241-24P)

Equipment Condition
Reference
- Electrical Cable removed (Paragraph 2-54)
- Pump Removed (Paragraph 3-44.1, Steps 1-7)

Personnel Required
- Two

General Safety Instructions

WARNING

- Lifting heavy equipment incorrectly can cause serious injury.
- Using compressed air can be dangerous.

a. Removal.

(1) Loosen two set screws (1) and remove coupling half (2) and key (3) from motor (4).

(2) Remove four bolts (5) and lockwashers (6).

WARNING

Weight of R.O. pump motor is 240 pounds. Attempting to move it without proper equipment could cause serious injury. Hoist motor with equipment rated at 1 ton or more.

(3) Attach lifting device to lifting eye (7).

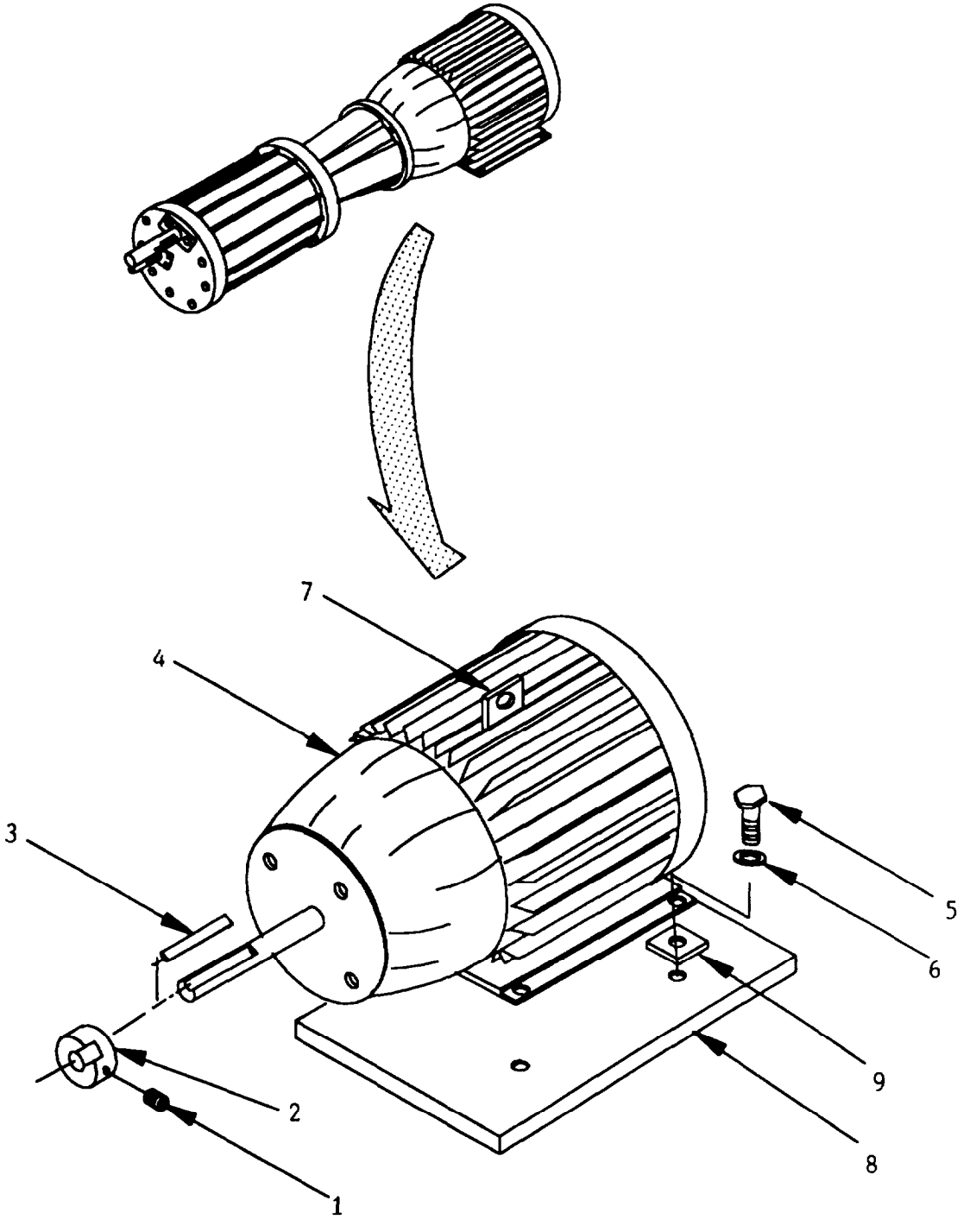
(4) Remove motor (4) from mounting plate (8) and position on work bench. Remove four pads (9) and save for remounting the motor.

b. Disassembly.

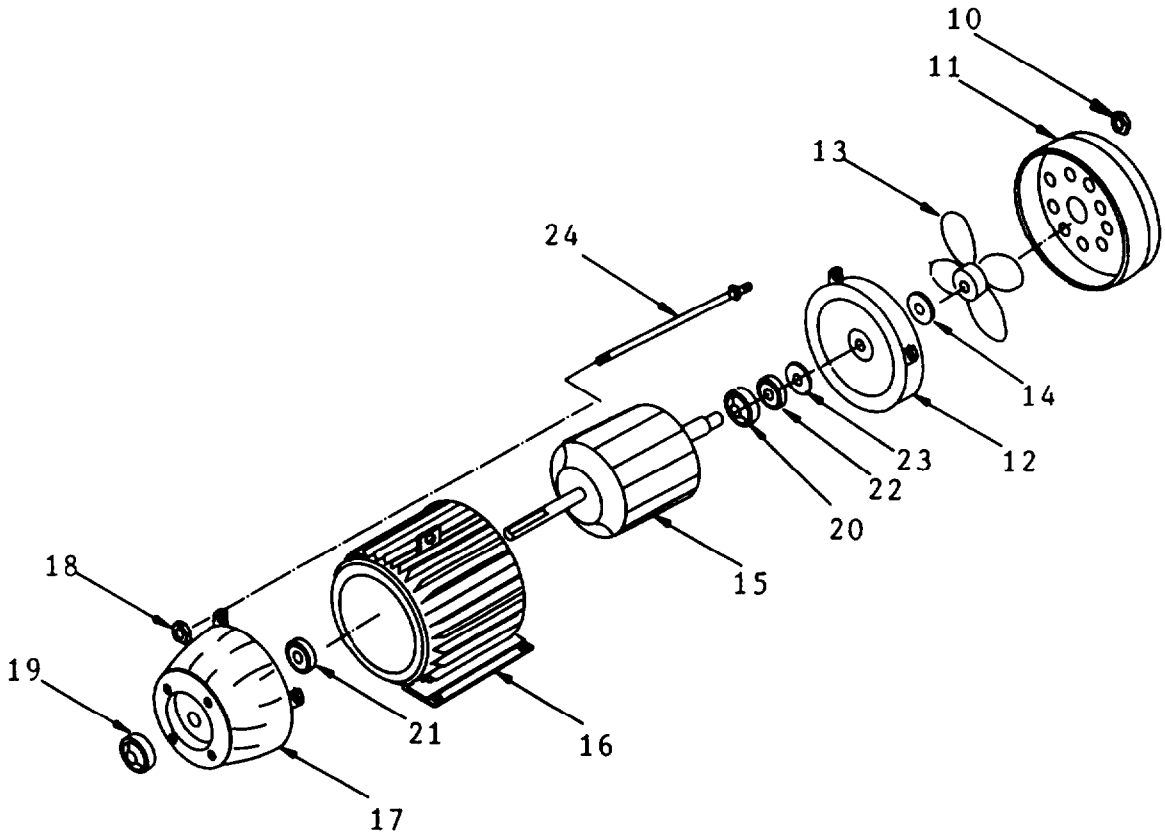
(1) Remove four nuts (10) and fan cover (11) from bracket (12).

(2) Pull fan (13) and deflector (14) from shaft of rotor (15).

3-43.1 HIGH PRESSURE PUMP (R.O. PUMP) MOTOR REPAIR (MODELS H-9519-1, H-9518-2, AND H-9518-3) - continued.



343.1 HIGH PRESSURE PUMP (RO. PUMP) MOTOR REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.



NOTE

Marking relative position of casing and brackets will facilitate installation. Be sure to transcribe markings to replacement parts if defective parts are to be discarded or turned in to Supply.

(3) Scribe a line across junctions of stator (16) and brackets (12 and 17).

(4) Remove four nuts (18).

(5) Tap bracket (12) with soft-faced mallet to break bond with stator (16). Remove bracket (12).

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.

(6) Remove rotor (15).

(7) Tap bracket (17) with soft-faced mallet to break bond with stator (16). Remove bracket.

(8) Remove slinger (19) from bracket (17).

3-43.1 HIGH PRESSURE PUMP (R.O. PUMP) MOTOR REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.

(9) Using arbor press, remove slinger (20), bearings (21 and 22) and spring washer (23) from shaft of rotor (15).

(10) Remove four studs (24) from stator (16).

C. Cleaning

WARNING

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

(1) Wipe rotor (15) with clean rags. Using compressed air, blow dust and grit from stator (16) and rotor (15).

(2) Clean fan cover (11) vent slots with compressed air and wipe with clean rags.

(3) Wipe off dirt and grease accumulation on bearings (21 and 22) with clean rags.

(4) Scrape loose paint from fan cover (11), motor stator (16) and brackets (12 and 17). Prime and paint as necessary.

d. Inspection.

(1) Inspect leads and windings of stator (16) for evidence of cracked or burned insulation. If cracked or burned, replace motor.

(2) Inspect rotor (15) for loose or burned conducting bars. If loose or burned, replace motor.

(3) Inspect bearings (21 and 22) for wear, leaking seals and binding.

(4) Inspect brackets (12 and 17) for cracks and corrosion.

e. Repair

(1) Replace slingers (19 and 20).

(2) Replace all defective components.

f. Assembly

(1) Using arbor press, install slinger (20) and bearings (21 and 22) on shaft of rotor (15).

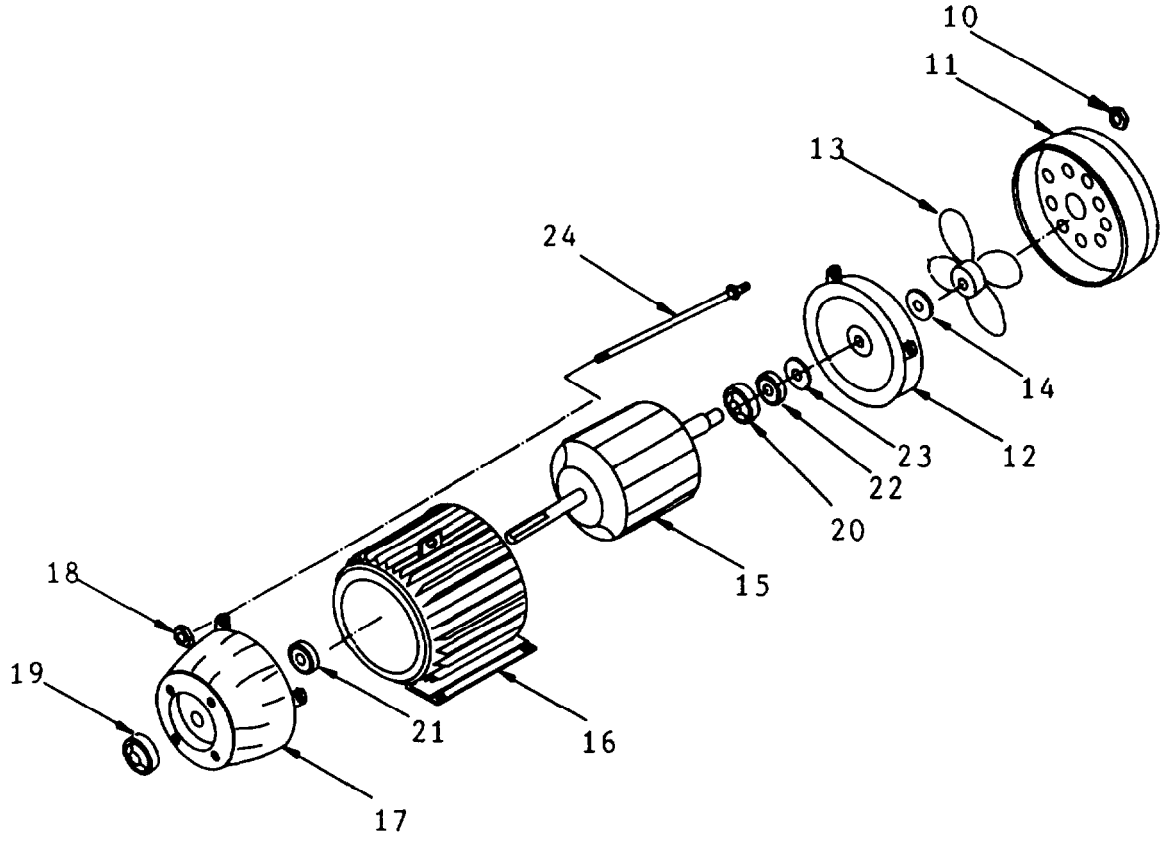
WARNING

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 installed carefully.

3-43.1 HIGH PRESSURE PUMP (R.O. PUMP) MOTOR REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.



(2) Carefully position rotor (15) inside stator (16).

(3) Install slinger (19) in bracket (17).

(4) Install four studs (24) into stator (16).

(5) Slip bracket (17) over shaft of rotor (15) and align with stator (16) as marked during disassembly.

(6) Position spring washer (23) on shaft of rotor (15).

(7) Position bracket (12) over shaft of rotor (15) and align bracket (12) with stator (16) as marked during disassembly.

(8) Install four nuts (18).

(9) Install deflector (14) on shaft of rotor (15).

(10) Align fan (13) on shaft of rotor (15) and push fan onto shaft of rotor.

(11) Position fan cover (11) on bracket (12) and install four nuts (10).

3-43.1 HIGH PRESSURE PUMP (R.O. PUMP) MOTOR REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.

g. Test.

(1) Secure motor to test bench.

WARNING

Electrical high voltage can cause serious injury or death. Always take proper measures to ensure personal safety.

(2) Connect motor wiring to test bench leads.

(3) Apply power and run motor with and without load.

(4) Check motor for excessive vibration and fast temperature rise.

(5) Disconnect motor from test bench leads.

h. Installation.

WARNING

Weight of R.O. pump motor is 240 pounds. Attempting to move it without proper equipment could cause serious injury. Hoist motor with equipment rated at 1 ton or more.

(1) Attach lifting device to lifting eye (7) on motor (4).

(2) Place four pads (9) on mounting plate (8).

(3) Lift motor (4) and position on mounting plate (8).

(4) Install four lo&washers (6) and bolts (5).

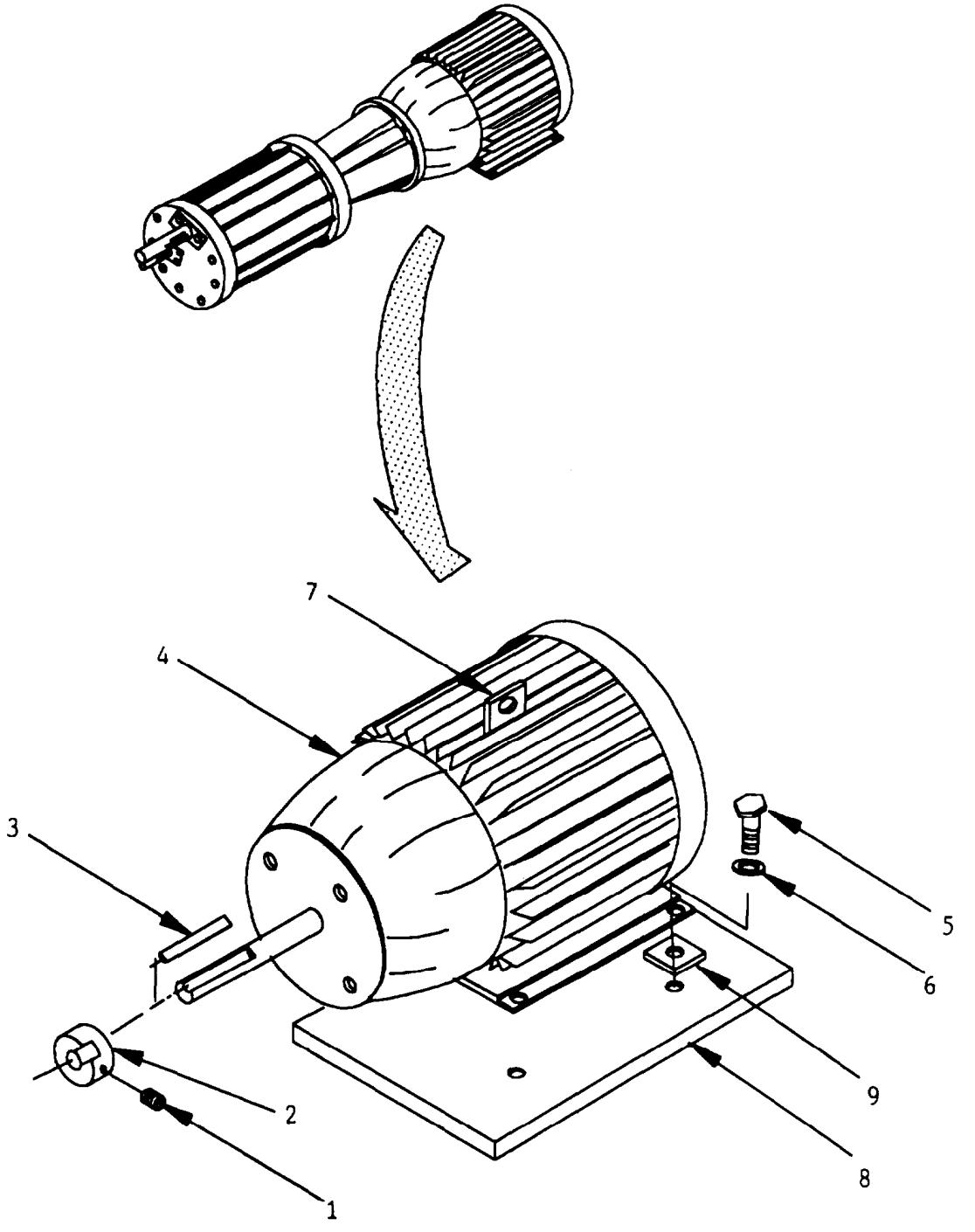
(5) Place key (3) on motor.

(6) Attach coupling half (2) to motor with two setscrews (1).

(7) Replace high pressure pump per Paragraph 3-44.1.

(8) Install electrical cable in accordance with Paragraph 2-54.

3-43.1 HIGH PRESSURE PUMP (R.O. PUMP) MOTOR REPAIR (MODELS H.9518-1, H-9518-2, AND H-9618-3) - continued.



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3-44. HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20, and WPES-30).

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, Wiping (Appendix C, Section II, Item 14)
Solvent, Drycleaning (Appendix C, Section II, Item 18)
Grease, Silicone (Appendix C, Section II, Item 10)
Lockwashers (TM 10-4610-241-24P)
Packing, Seals and Gaskets (TM 10-461-241-24P)
Personnel Required:
Two
Equipment Condition
Reference
Power shut down (Power Source Manual).
Oil drained from High Pressure Pump Assembly (Paragraph 2-67).
Water drained from ROWPU (TM 10-4610-241-10).
High Pressure Pump Sheave removed (Paragraph 2-66).
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.

a. Removal.

NOTE

High pressure pump, at the Direct Support level, can be repaired in place. See Disassembly and Assembly Procedures of this paragraph.

(1) Remove nuts (l), bolts (2) and clamps (3). Slide gaskets (4) onto adapters (5),

(2) Remove four nuts (6) and lo&washers (7).

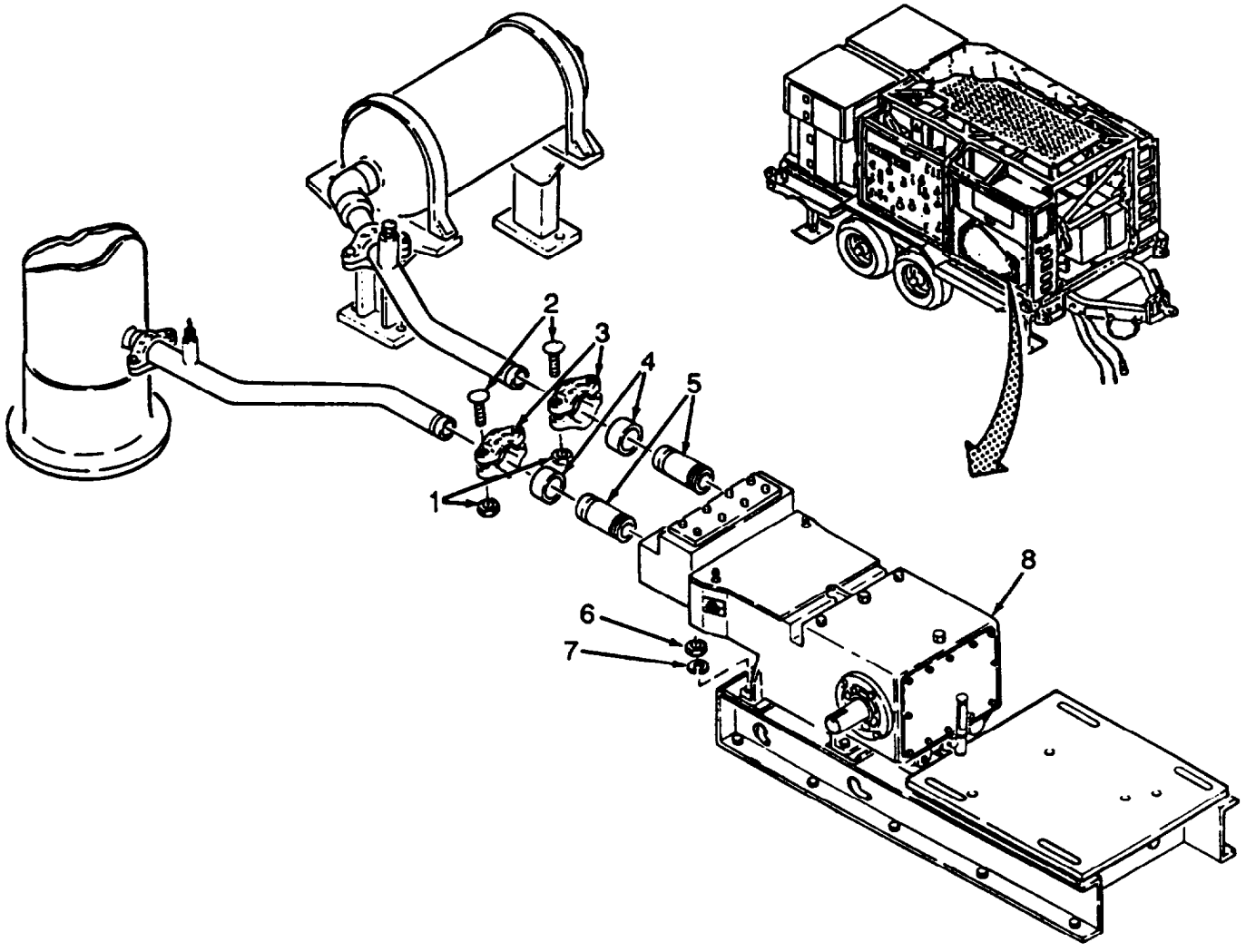
WARNING

Pump weighs 330 lbs and is difficult to lift. Use a lifting device rated at 0.5 ton or greater to remove.

(3) Remove pump assembly (8).

(4) Remove gaskets (4) and nipples (5) from pump assembly.

3-44. HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.



3-44. HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20, and WPES-30) - continued

b. Disassembly.

NOTE
If liquid head is to be disassembled in place (without first removing entire pump assembly), it is necessary to remove pipe sections between pump and cartridge filter and between pump and pulse dampener first.

(1) Remove two thumbscrews (9) and cover (10).

NOTE
Turning crankshaft will move crossheads in and out.

(2) Turn crankshaft (11) for best position of coupling nut (12) and, using two wrenches unscrew coupling nuts (12) on plungers (25) from crossheads (13).

(3) Using gland adjustment tool as illustrated, loosen gland nuts (26).

WARNING
Fluid cylinder is heavy/difftcult to handle and must be supported while it is being separated from power frame to prevent injury to personnel or damage to equipment.

(4) Remove two nuts (14) and carefully separate fluid cylinder (15) from power frame (44),

(5) Remove eight screws (16), cover (17), three caps (18) and packing (19).

(6) Remove cap screws (20), valve guides (21), springs (22) and disks (23) on all three channels.

(7) Using valve removal tool, remove valve seats (24) as illustrated.

WARNING
Plungers are coated with ceramic material that can brake or flake off if not handled carefully.

(8) Remove three plungers (25), gland nuts (26) and packing bushings (27).

(9) As required, remove retaining rings (28) and nuts (12) from plungers (25).

(10) Remove eight screws (29) and plate (30).

(11) Remove stuffing boxes (3 1) and packing (32).

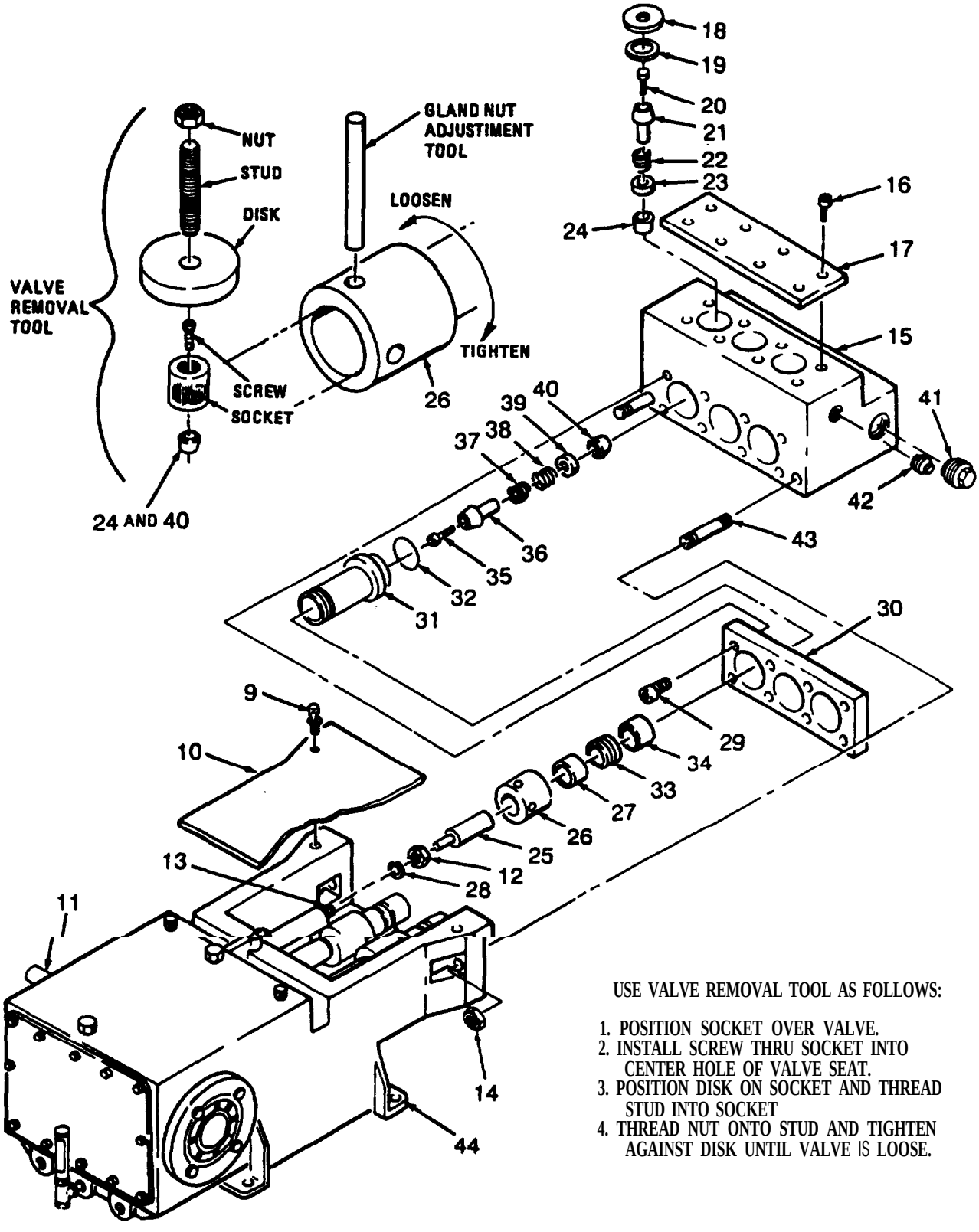
(12) Remove packing (33) and packing bushings (34) from stuffing boxes (3 1).

(13) Remove three capscrews (35), valve guides (36), springs (37 and 38) and discs (39).

(14) Remove valve seats (40), using valve seat removal tool as illustrated.

(15) If required, remove studs (43) and plugs (41 and 42).

3-44. HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.



USE VALVE REMOVAL TOOL AS FOLLOWS:

1. POSITION SOCKET OVER VALVE.
2. INSTALL SCREW THRU SOCKET INTO CENTER HOLE OF VALVE SEAT.
3. POSITION DISK ON SOCKET AND THREAD STUD INTO SOCKET
4. THREAD NUT ONTO STUD AND TIGHTEN AGAINST DISK UNTIL VALVE IS LOOSE.

3-44. HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20, AND WPES-30) - continued.

c. Cleaning.

WARNING

Dry cleaning solvent, PD-680, C1 II, is highly toxic and can ignite organic materials, nitrates, carbides and chlorates. Wear eye, skin and respiratory protection. Use in well-ventilated area.

(1) Clean large parts (power frame, fluid cylinder, etc.) with rags and cleaning solvent.

(2) Clean all small items (bearings, bolts, etc.) by dipping in cleaning solvent.

d. Inspection.

(1) Fluid Cylinder (15). Inspect cylinder for cracks, gouges, stripped threads and other visible damage.

(2) Valve Seats (24 and 40). Check valve seats for wear, scratches, stripped threads and other damage.

(3) Plungers (25). Check for cracks and chips in ceramic coating of plungers and damaged/stripped connecting nut or nut retainer.

(4) Miscellaneous hardware. Check all remaining hardware for cracks, damaged threads, excessive wear, corrosion, deformation and other damage making the item unserviceable.

e. Repair.

(1) Replace lockwashers, gaskets and preformed packing.

(2) Replace defective and excessively worn components.

f. Assembly.

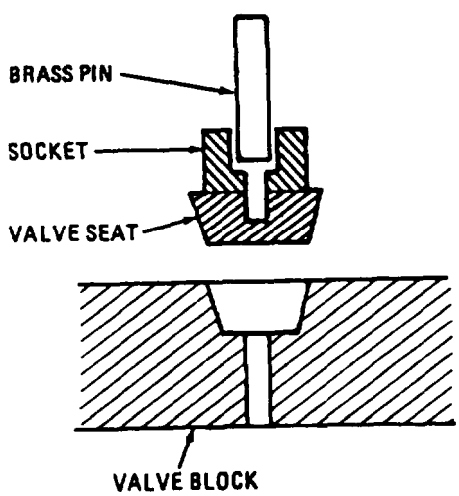
(1) Place fluid cylinder (15) on a clean work bench and install valve seats (24 and 40) as follows:

(a) Position valve seats (24 and 40) on top of valve seat bores.

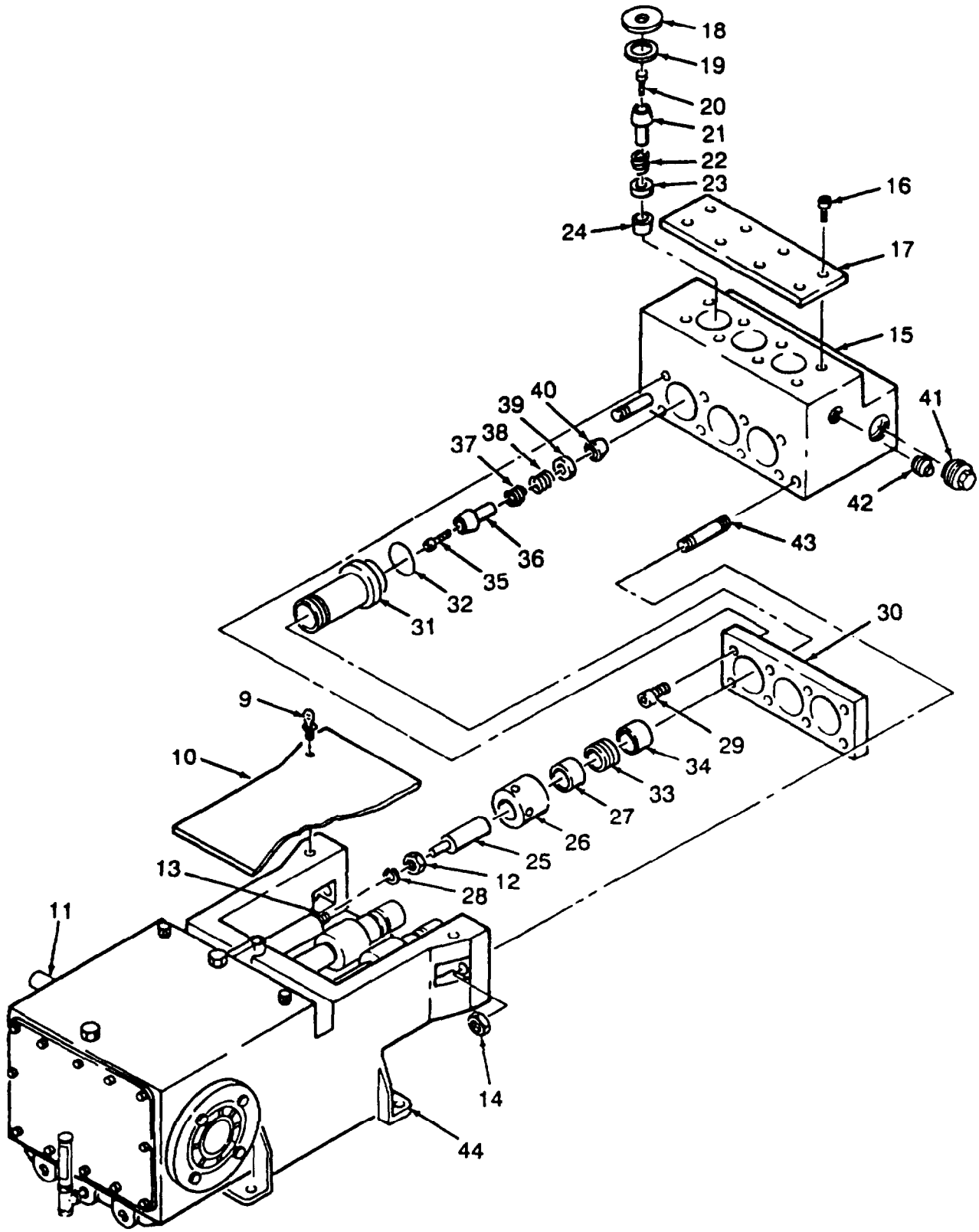
(b) Position a socket (slightly smaller then valve seat) on top of valve seat.

(c) Position a large diameter brass pin on inside surface of socket.

(d) Tap pin with hammer until valve seat is firmly lodged in valve block.



3-44. HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) continued.



3-44. HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

(2) Install disks (39), springs (38 and 37), putting smaller spring (37) inside larger spring (38), valve guides (36) and screws (35) on valve seats (40). Torque screws to 25 pound/foot.

(3) Install disks (23), springs (22), valve guides (21) and screws (20) on valve seats (24). Torque screws to 25 pounds/foot.

(4) Lubricate packing (19) and position on caps (18). Install caps (with packing), plate (17) and screws (16). Torque screws to 80 pounds/foot in sequence as illustrated.

(5) Lubricate preformed packing (32) and position on stuffing boxes (3 1).

(6) Install stuffing boxes (3 1) and plate (30) on fluid cylinder (15) and secure with eight screws (29). Torque screws to 40 pounds/foot in sequence as illustrated.

NOTE
Packing bushing (34) is smaller than packing bushing (27).

(7) Insert packing bushings (34), flat side in, two packings (33), concave side in, and packing bushings (27), flat side out, in stuffing boxes (3 1). Tap lightly with a soft mallet to insure proper seating.

WARNING
Plungers are coated with ceramic material that could brake or flake off if not handled carefully.

(8) Insert plungers (25) in stuffing boxes (31). Then install gland nuts (26) fingertight.

NOTE
Gland nut will be further tightened during installation of pump.

(9) If removed, install studs (43), plugs (42 and 41), nuts (12) and retainers (28).

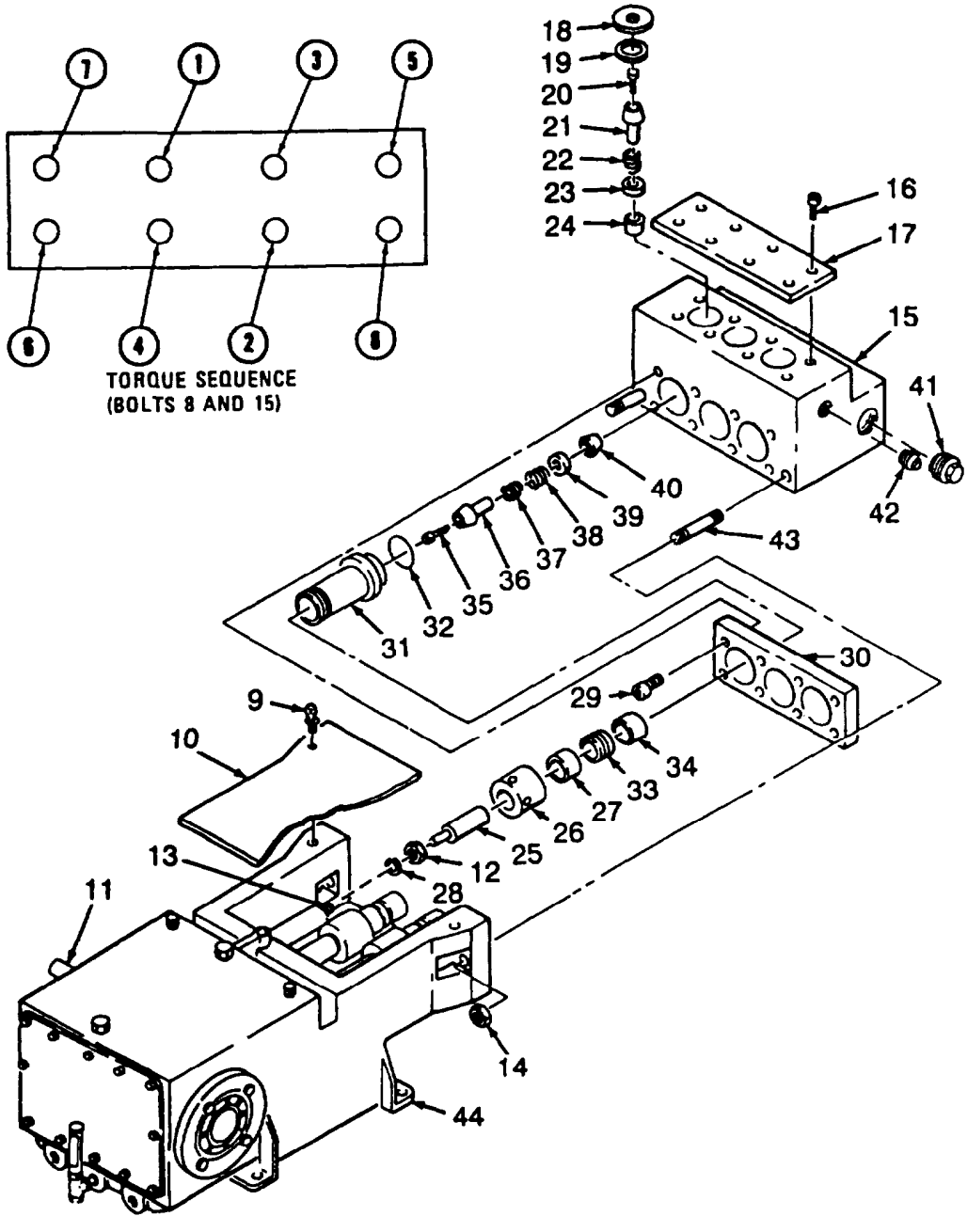
(10) Position fluid cylinder (15) on power frame (44) and install two nuts (14). Torque nuts to 130 pounds/foot.

NOTE
Rotating pump shaft will move crosshead in and out of power frame.

(11) Rotate crankshaft for best position of crossheads (13) and connect plungers (25) to crossheads with nuts (12). Torque nuts to 20 pounds/foot, holding crosshead with a wrench to keep it from turning.

(12) If liquid head was removed with pump in place, reconnect all water lines.

3-44. HIGH PRESSURE PUMP (R.O. PUMP) (MODELS WPES-10, WPES-20 AND WPES-30) - continued.



3-44. HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

g. **Installation.**

NOTE

Be sure to install teflon tape in same direction as threads.

(1) Wrap external threads of nipples (5) with antiseize tape and install nipples on pump assembly (8).

(2) Position gaskets (4) on adapters (5).

WARNING

Dry cleaning solvent, PD-680, C II, is highly toxic and can ignite organic materials, nitrates, carbides and chlorates. Wear eye, skin and respiratory protection. Use in well-ventilated area.

(3) Using cleaning solvent and rags, clean pump mounting surfaces.

WARNING

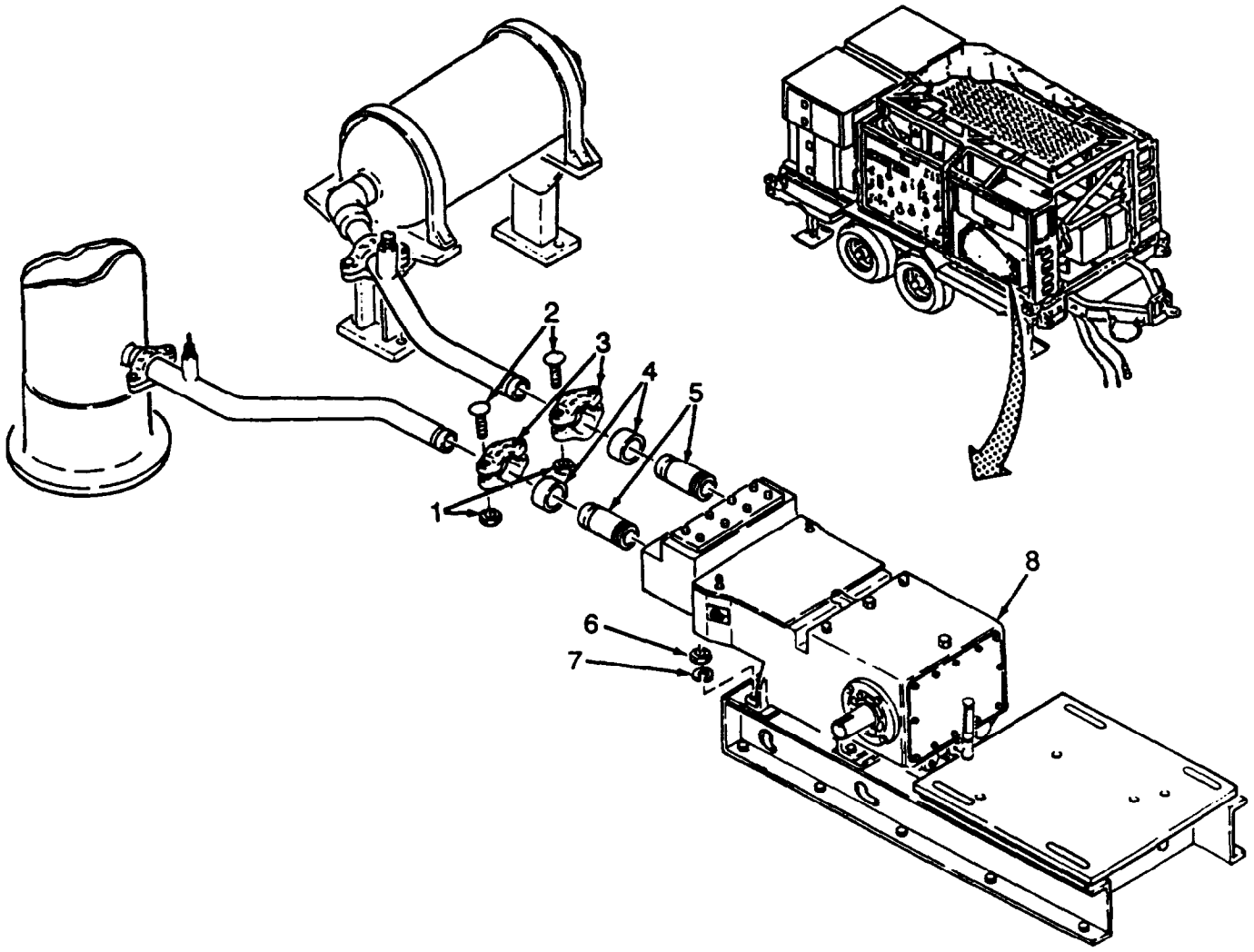
Pump weighs 330 lbs and is difficult to lift. Use a lifting device rated at 0.5 ton or greater to install.

(4) Using lifting device, position pump assembly (8) over studs of pump stand and secure with four nuts (6) and lockwashers (7).

(5) Position gaskets (4) over pipe junction and install clamps (3) with screws (2) and nuts (1).

(6) Operate ROWPU and check for proper operation and leaks in accordance with operators manual (TM 5-4610-241-10).

3-44. HIGH PRESSURE PUMP (R.O. pump) REPAIR (MODELS WPES-10, WPES-20 AND WES-30) continued.



3-44.1 HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3).

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
Rags, Wiping (Appendix C, Section II, Item 14)
Detergent (Appendix C, Section II, Item 5)
Tape, Anti-Seize (Appendix C, Section II, Item 19)
Lubricant, O-Ring (Appendix C, Section II, Item 11)
Lockwashers (TM 10-4610-241-24P)
O-Rings (TM 10-4610-241-24P)
Personnel Required
Two
Equipment Condition
Reference
Power Shut down (Power Source Manual)
Pump drained (TM 10-4610-241-10)
Electrical Cable removed (Paragraph 2-54)

a. Disassembly.

(1) Remove eight screws (1) and eight lockwashers (2) securing pump cover (3) to ROWPU. Remove pump cover.

(2) Remove the two screws (4), four flatwashers (5), two lockwashers (6) and two nuts (7) that secure the hose clamp (8) to the bracket (9). Remove the hose clamp.

(3) Remove bracket (9) from ROWPU frame by removing two screws (10), four flatwashers (11), two lockwashers (12) and two nuts (13).

(4) Remove low pressure hose (14) from cam-lock fitting (15) on the end of the pump (16).

(5) Hold the nipple (17) on the pump and turn the fitting of the high pressure hose (18) counterclockwise. Remove high pressure hose.

(6) Remove the drain line (19) from the pump (16) by pushing on the fitting collar while gently pulling on the tubing.

(7) Remove the four bolts (20) and the four washers (21) securing the pump assembly (16) to the motor (22).

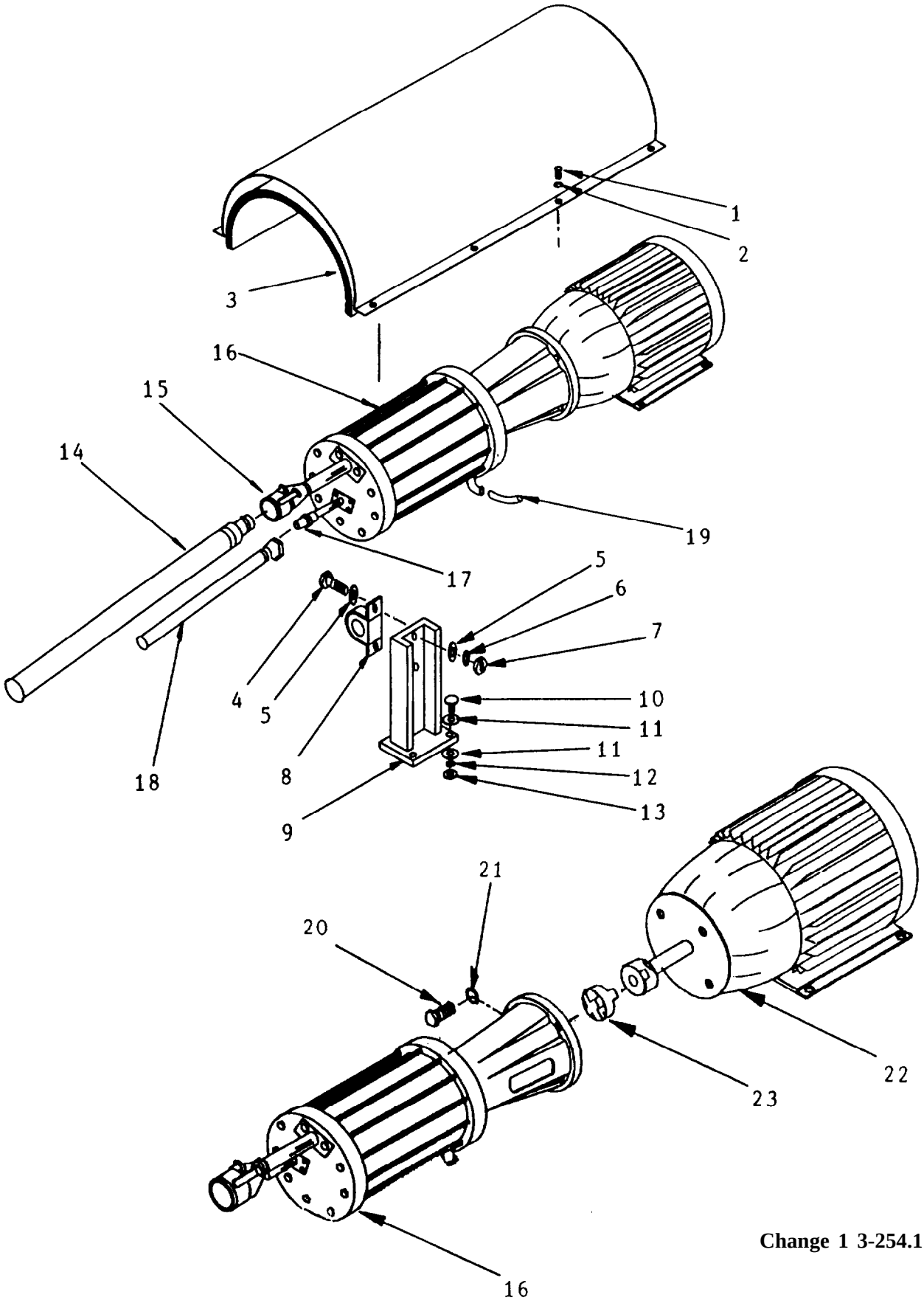
CAUTION

The pump assembly must be supported as it is removed from the motor due to its weight (60 lbs.). Two people are necessary.

NOTE

Be sure to retain the rubber coupling spider (23), as it might fall out during disassembly.

3-44.1 HIGH PRESSURE PUMP (RO. PUMP) REPAIR (MODELS H-9518-1, H-9518-2, AND



3-44.1 HIGH PRESSURE PUMP (RO. PUMP) REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.

(8) Place pump assembly (16) on bench or other flat, stable surface.

(9) Loosen one setscrew (24) and remove coupling half (25) and key (26) from pump shaft.

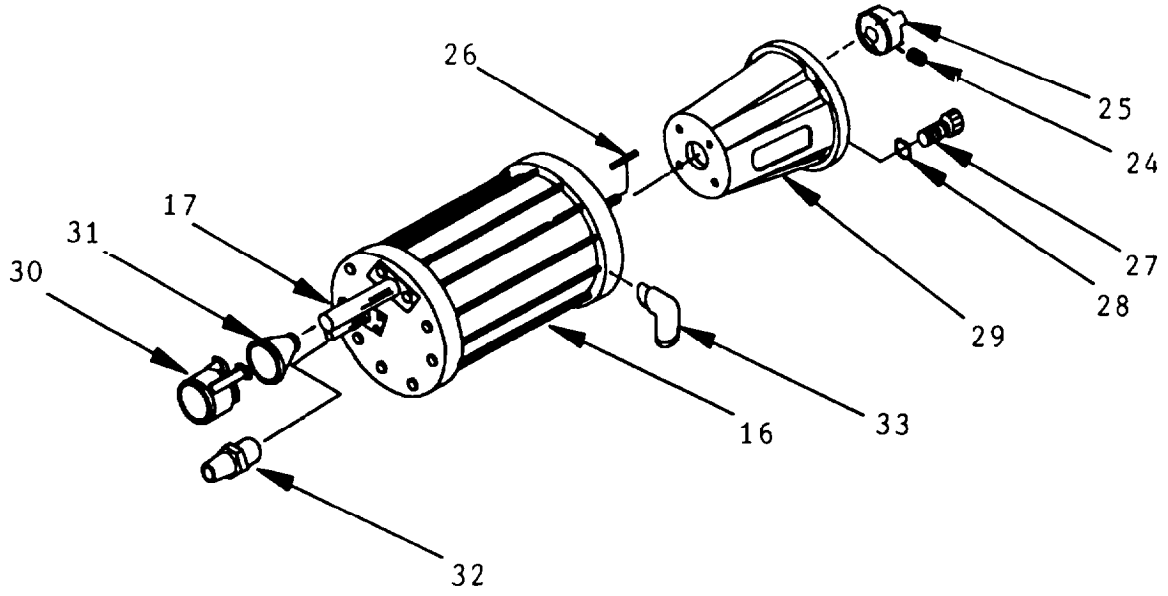
NOTE
Scribe a line on all components prior to removal to assist in installation.

(10) Remove four screws (27) and four lockwashers (28) and remove the adapter (29) from the pump (16).

(11) Remove cam-lock fitting (30) and reducer (31) from the inlet of the pump (16) by turning counterclockwise. It will be necessary to hold the nipple (17) while turning the components.

(12) Remove high pressure hose fitting (32) from the outlet of the pump (16) by turning counterclockwise. It will be necessary to hold the nipple (17) while turning the high pressure hose fitting (32).

(13) Remove drain line fitting (33) from side of the pump (16) by turning counterclockwise.



(14) Support pump (16) vertically with shaft end down on bench (support with wood blocks, etc.). Remove two screws (34), two lockwashers (35), and two flatwashers (36) which secure the plate (37) holding the inlet connection (38). Remove the plate (37).

NOTE
Be sure to retain split rings because they can fall out during disassembly.

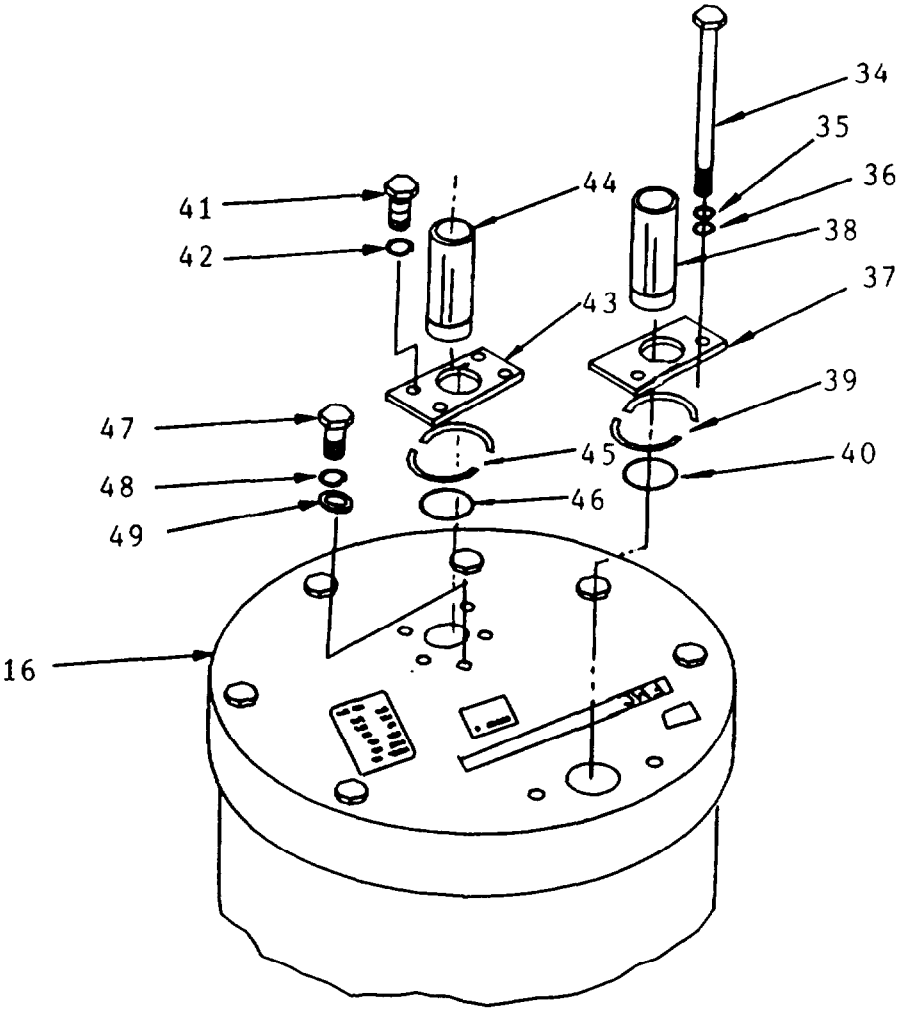
(15) By twisting and pulling, remove the inlet connector (38) and split ring (39) which are under the inlet connector plate (37).

(16) Remove the o-ring (40) from the inlet connector (38).

(17) Remove four bolts (41) and four lockwashers (42) which hold the outlet connector plate (43).

NOTE
Be sure to retain split rings because they can fall out during disassembly.

3-44.1 HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.



(18) By twisting and pulling, remove the outlet connector (44) and split ring (45) which are under the outlet connector plate (43).

(19) Remove the o-ring (46) from the outlet connector (44).

(20) Remove bolt (47), lockwasher (48) and flatwasher (49).

(21) Remove seven bolts (50), seven lockwashers (5 1) and seven flatwashers (52).

(22) Remove manifold assembly (53) from the top of the pump stack. Remove the three o-rings (54,55, and 56)

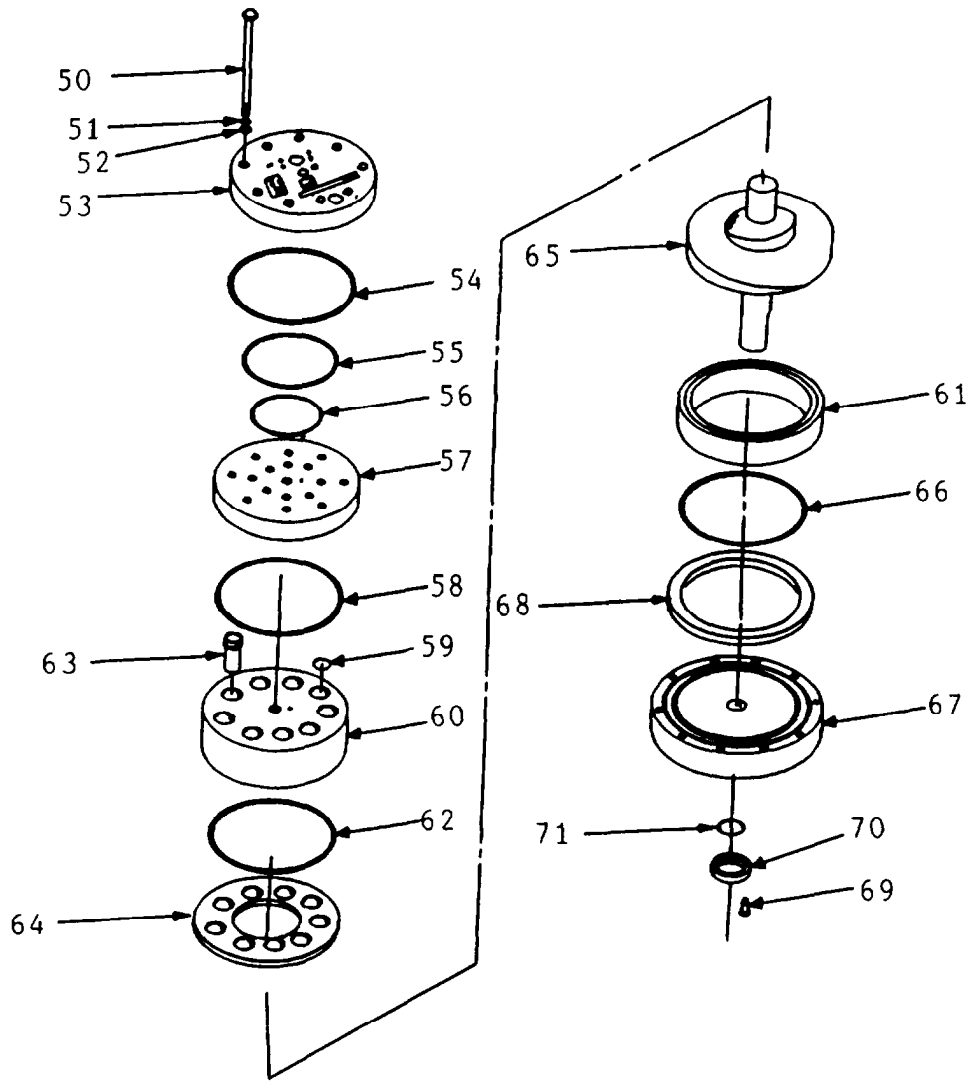
(23) Remove the valve housing (57) from the stack.

(24) Remove one large o-ring (58) and nine small o-rings (59) from top of body assembly (60).

(25) Remove body assembly (60) and cam spacer (61) together from stack.

(26) Tap cam spacer (6 I) gently to remove from body assembly (60). Remove o-ring (62).

3-44.1 HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.



(27) Push nine pistons (63) from body assembly (60).

(28) Remove piston cluster (64) from top of cam (65).

(29) Remove cam (65) by pulling straight up.

(30) Remove o-ring (66) from bearing plate assembly (67).

(31) Remove thrust cluster (68) from bearing plate assembly (67).

(32) Turn bearing plate assembly (67) over and remove four screws (69).

(33) Remove shaft seal (70) and o-ring (71).

3-44.1 HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.

b. Cleaning.

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

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

C. **Inspection.**

(1) Check piston assemblies (63) for signs of wear. If damaged at all, replace.

(2) Check valve housing assembly (57) to insure that all valves are operating.

(3) Inspect all remaining components for signs of damage, cracks, corrosion and deformation.

d. Repair.

(1) Replace lo&washers.

(2) Replace o-rings.

(3) Replace defective and excessively worn components.

e. Assembly

NOTE

It is important that all components are clean when they are assembled. Wipe all items with lint free materials and keep your work area clean.

CAUTION

Make sure that all components fit together properly. Do not use excessive force to assemble this pump. Serious pump damage will result.

(1) Wrap the threads of the inlet connector (38) and outlet connector (44) with anti-seize tape in a clockwise direction.

NOTE

Before installing any o-rings, make sure they are clean and coated with a light film of o-ring lubricant.

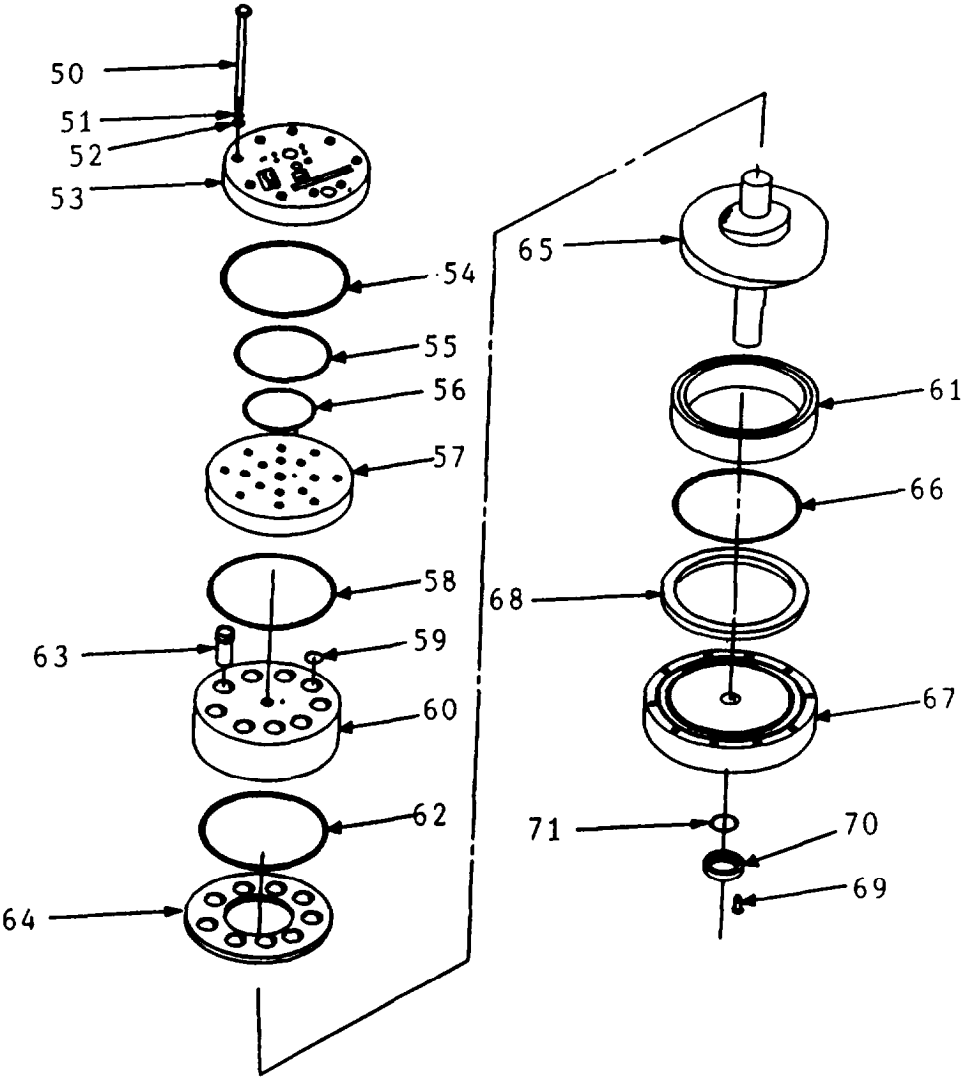
(2) Seat o-ring (71) in shaft seal (70) and install shaft seal on the bearing plate assembly (67). Secure with four screws (69).

(3) Turn over the bearing plate assembly (67) and install the thrust cluster (68). Make sure that the pin on the thrust cluster is in the hole in the bearing plate.

(4) Install o-ring (66) in groove on bearing plate assembly (67).

(5) Place cam spacer (61) onto bearing plate assembly (67). Make sure that the line previously drawn is aligned on both pieces.

3-44.1 HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.



(6) Slide cam (65) down and through bearing plate assembly (67). Make sure that the flat side of the cam is towards the bearing plate assembly (67).

(7) Place piston cluster (64) on cam (65). Make sure dished heads face upwards,

(8) Place o-ring (62) into the grove on the underside of the body assembly (60).

(9) Insert pistons (63) into body assembly (60). Insert them from the top with the rounded end first.

(10) Place the body assembly (60) with pistons (63) over the cam (65) and on to the cam spacer (61). As it is lowered, extend some of the pistons and make sure that they line up into the depressions on the piston cluster (64). After the items are together, gently turn the body assembly to align the locating line previously drawn.

3-44.1 HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.

(11) Place nine small o-rings (59) and one large o-ring (58) into the grooves on the body assembly (60).

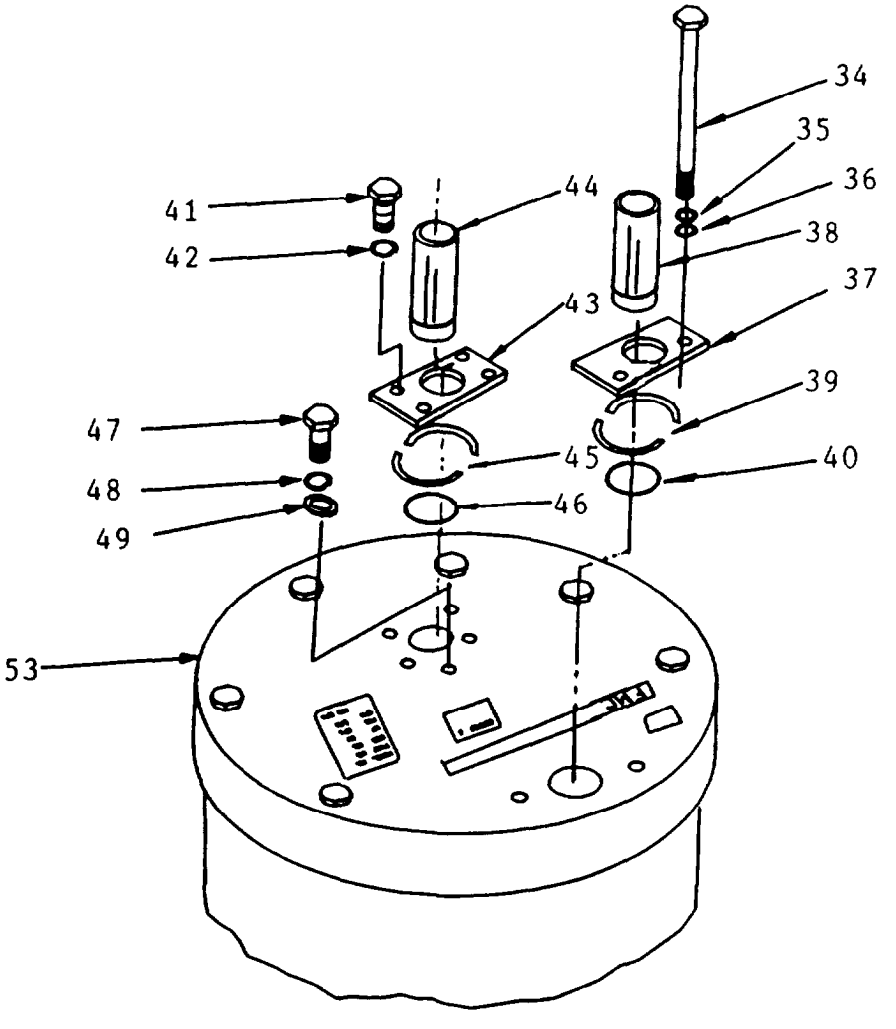
(12) Place three o-rings (54, 55, and 56) into the grooves on the underside of the manifold assembly (53).

(13) Place the valve housing (57) under the manifold assembly (53). Align marks and ensure that the o-rings are not pinched.

(14) Install center bolt (47) lo&washer (48) and flatwasher (49) through manifold assembly (53) and secure the valve housing (57).

(15) Install the manifold assembly (53) and valve housing (57) onto the top of the body assembly (60). Align marks.

(16) Install seven bolts (50), lockwashers (51), and flatwashers (52). Screw into bearing plate assembly (67). Tighten and make sure that all marks are aligned and no o-rings are pinched.



3-44.1 HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS H-9618-1, H-9518-2, AND H-9518-3) - continued.

(17) Place plate (43) onto the outlet connector (44). Install o-ring (46) onto the outlet connector (44).

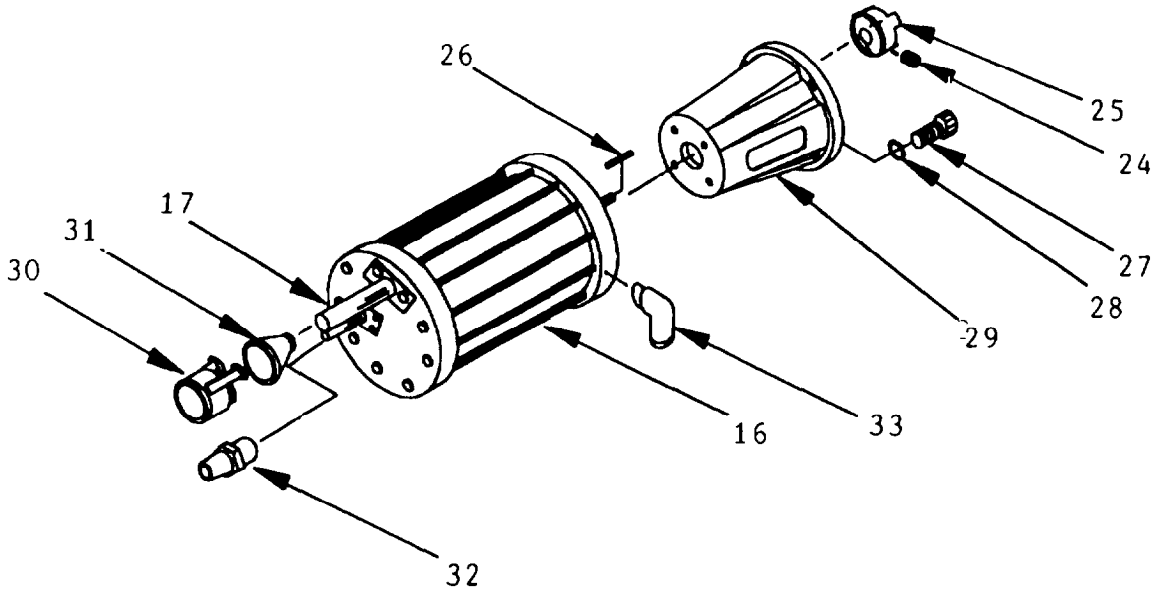
(18) Slide the outlet connector (44) into the manifold assembly (53). Insert the split ring (45) into the groove on the outlet connector (44) and push the plate (43) down.

(19) Secure the plate (43) with four bolts (41) and four lockwashers (42).

(20) Place plate (37) onto the inlet connector (38). Install o-ring (40) onto inlet connector (38).

(21) Slide the inlet connector (38) into the manifold assembly (53). Insert the split ring (39) into the groove on the outlet connector and push the plate (37) down.

(22) Secure the plate (37) with two screws (34), two lockwashers (35) and two flatwashers (36).



(23) Install drain fitting (33) on side of pump.

(24) Install high pressure hose fitting (32) on outlet nipple of the pump (16).

(25) Install the reducer (3 1) and cam-lock fitting (30) on the inlet nipple of the pump (16).

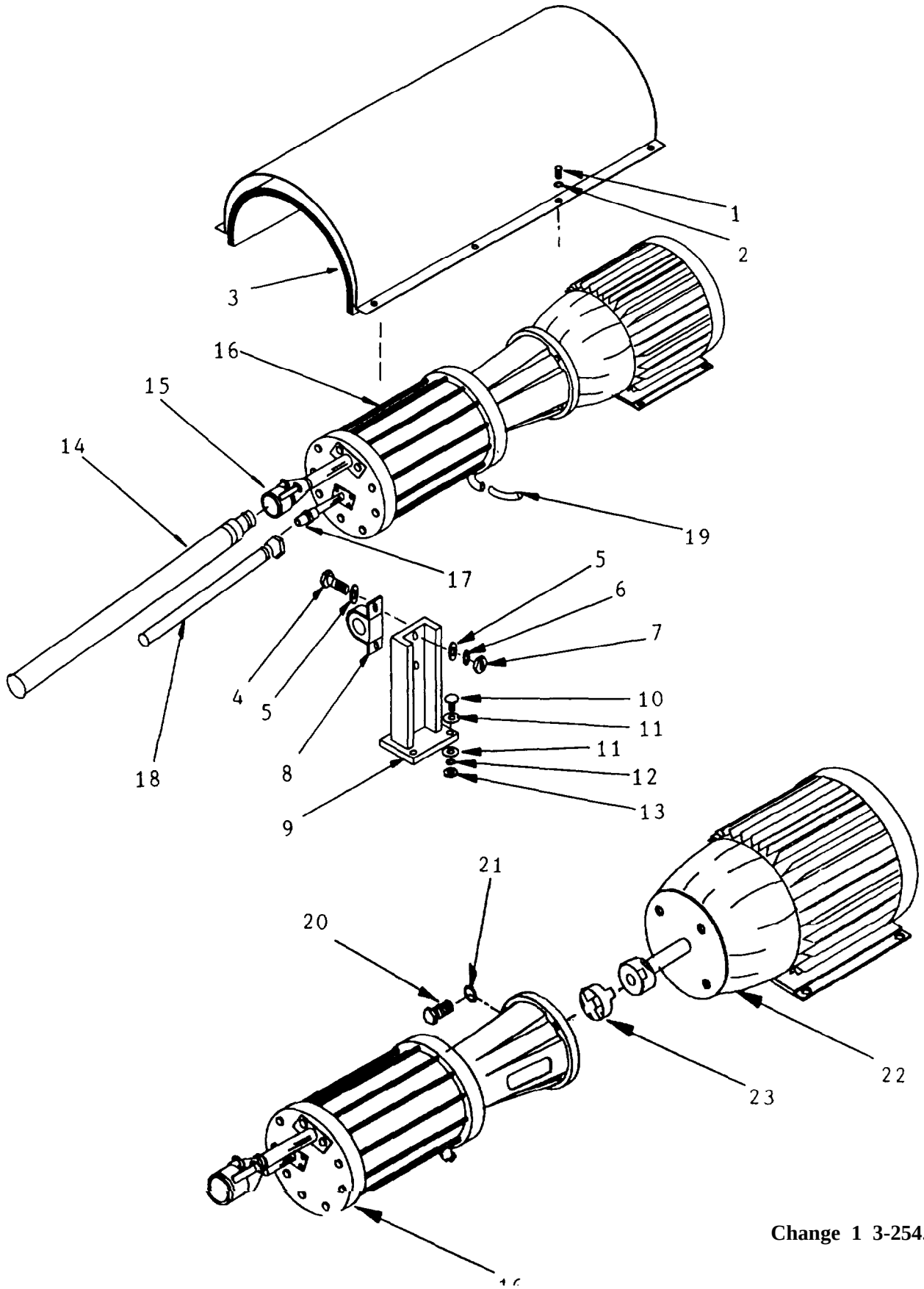
(26) Place adapter (29) on pump (16) and secure with four screws (27) and four lockwashers (28).

(27) Place coupling half (25) and key (26) on pump shaft. Secure with two setscrews (24).

CAUTION

The pump assembly must be supported as it is removed from the motor due to its weight (60 lbs.). Two people are necessary.

3-44.1 HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) - continued.



3-44.1 HIGH PRESSURE PUMP (R.O. PUMP) REPAIR (MODELS H-9518-1, H-9518-2, AND H-9518-3) continued.

(28) Using two people, slide the pump assembly (16) onto the motor (22). You must place the rubber spider (23) into the coupling half (25) as you slide it together. The pump will not seat fully unless the coupler is properly aligned.

(29) Secure the pump assembly (16) to the motor (22) using four bolts (20) and four washers (21).

(30) Install the drain line (19) into the pump (16) by inserting it gently. Pull gently to make sure it is seated.

(3 1) Install high pressure hose (18) and tighten the fitting. You must hold the pump nipple (17) to tighten it fully.

(32) Install low pressure hose (14) into cam-lock fitting (15) and close the fitting.

(33) Install bracket assembly (9) and secure with two screws (10), four flatwashers (11). two lo&washers (12) and two nuts (13).

(34) Install hose clamp (8) over low pressure nipple on pump (16) and secure the clamp to the bracket (9) with two screws (4), four flatwashers (5), two lockwashers (6) and two nuts (7).

(35) Install cover assembly (3) and secure with eight screws (1) and lo&washers (2).

(36) Operate and checks for leaks in accordance with TM 10-4610-241-10.

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3-45. PUMP AND MOTOR STAND REPAIR (MODELS WPES-10, WPES-20 AND WPES-30).

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 18).
Rags, Wiping (Appendix C, Section II, Items 14).
Equipment Condition
Reference
R.O. Pump removed (Paragraph 3-44).
Electric Motor removed (Paragraph 3-43).
General Safety Instructions

WARNING

- Drycleaning solvent, P-D-680, Cl II, is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.
- Stand is heavy/difficult to lift and could result in personnel injury if attempting to move manually. Use lifting device rated at 500 lbs or greater to lift.

a. Removal.

(1) Remove ten screws (1) and lockwashers (2).

(2) Using chain hoist, remove pump and motor stand (3) from ROWPU frame.

b. Disassembly.

(1) Remove four nuts (4), lockwashers (5) and two footing plates (6 and 7) from stand (3).

(2) Remove four nuts (18). lockwashers (9), flatwashers (11) and screws (10).

(3) Drive out pin (12) and remove washer (13) from screw (17).

(4) Remove plate (18) from stand (3).

(5) Remove washer (14), pin (15), screw (17) and nut (16).

3-48. PUMP AND MOTOR STAND REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) -continued.

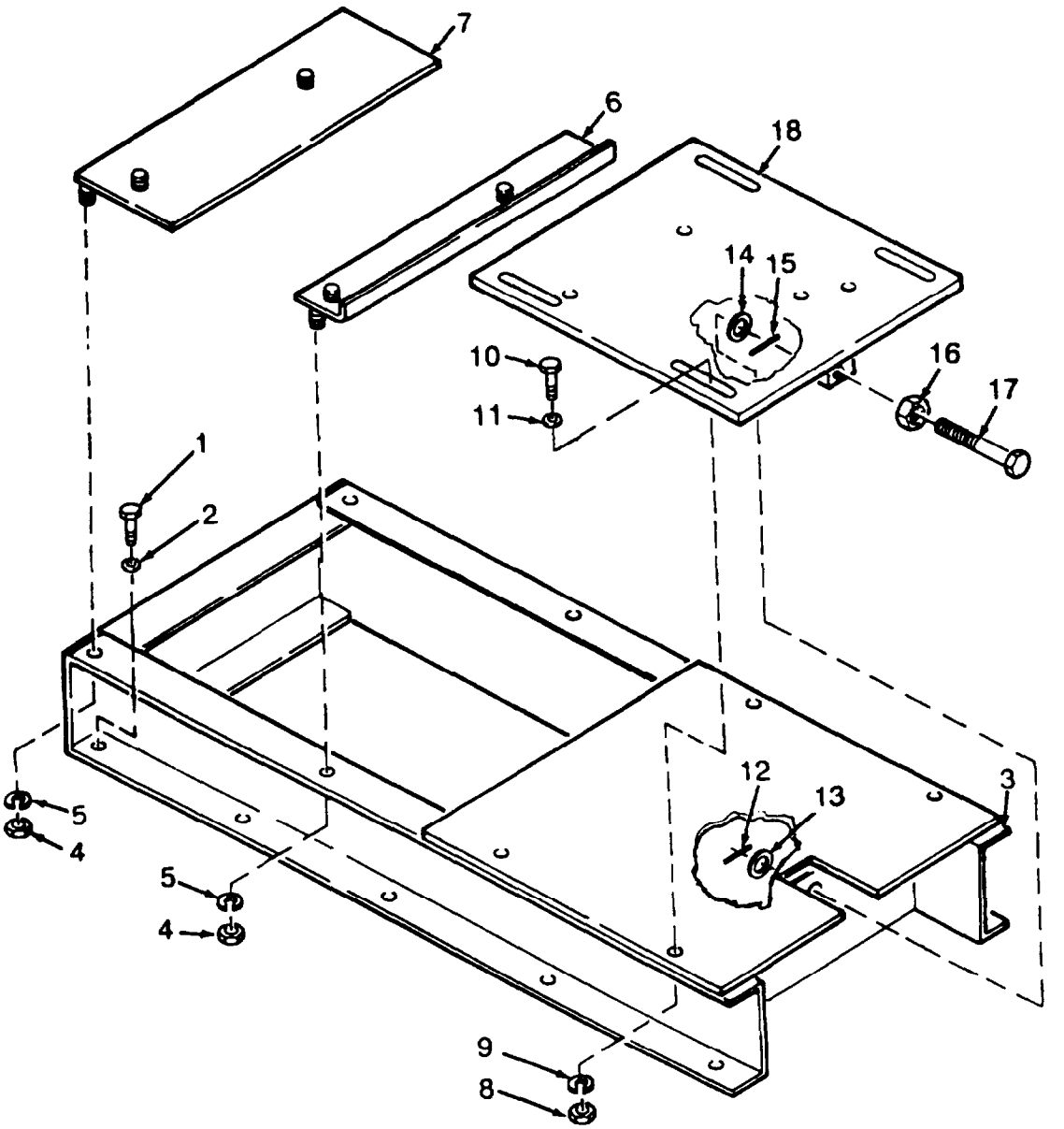
c. Cleaning.

WARNING

Drycleaning solvent, P-D-680, Cl II, is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

(1) Using drycleaning solvent, clean stand and components. Dry with wiping rag.

(2) Using wire brush, clean rust and corrosion from stand.



3-45. PUMP AND MOTOR STAND REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

d. **Inspection.**

(1) Inspect stand (3) for cracks and damage.

(2) Inspect mounting hardware for excessive wear and damage.

(3) Inspect footing plates (6 and 7) and mounting plate (18) for cracks and corrosion.

e. **Repair.**

(1) Replace defective components.

(2) Repair stand by welding as required (TM 9-237).

f. **Assembly.**

(1) Thread nut (16) about halfway up on bolt (17).

(2) Install bolt (17) on plate (18) to protrude about 2 inches.

(3) Install pin (15) and position washer (14) on end of bolt (17).

(4) Position plate (18) on stand (3) and push bolt (17) thru hole in stand.

(5) Install washer (I 3) and pin (1 2).

(6) Install four washers (11), bolts (10) lo&washers (9) and nuts (8).

(7) Install footing plates (6 and 7) with lo&washers (5) and nuts (4).

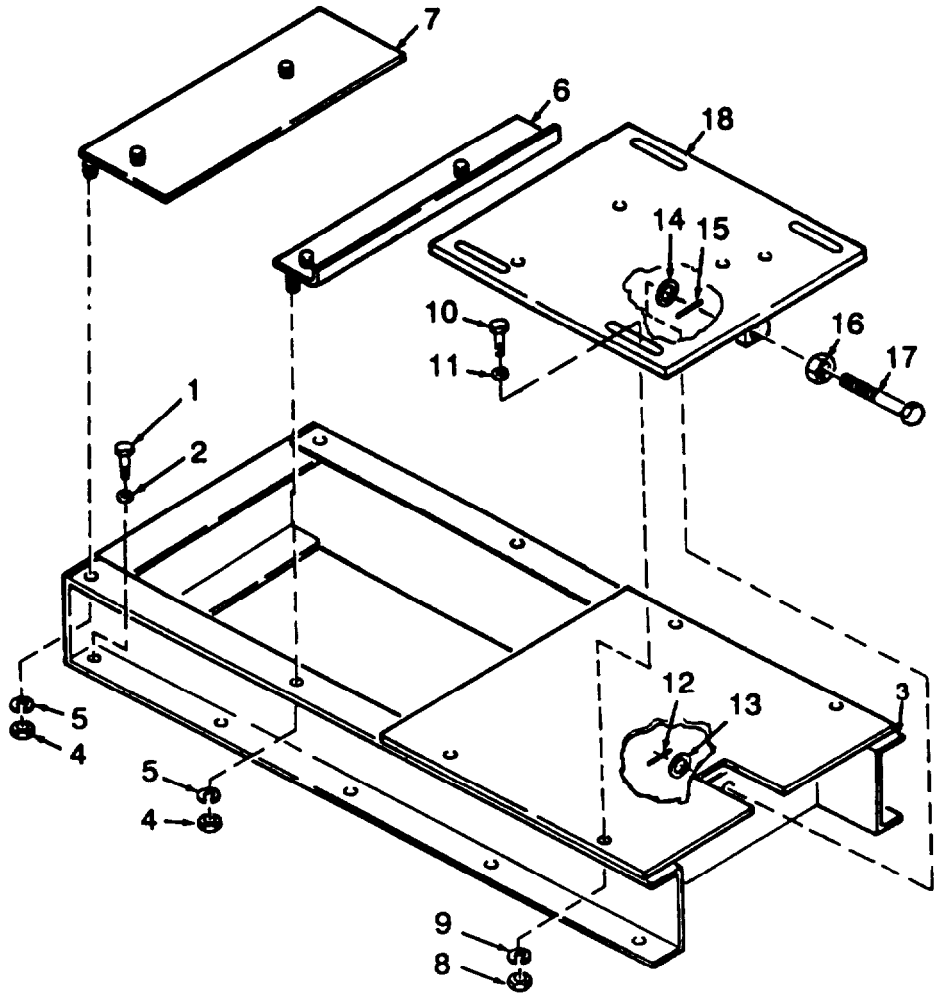
g. **Installation**

Stand is heavy/difficult to lift. Attempting to lift manually could result in injury. Use lifting device rated at 500 lbs or greater to lift.

(1) Using chain hoist, position stand (3) on ROWPU frame.

(2) Install ten lockwashers (2), and screws (1).

3-45. PUMP AND MOTOR STAND REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.



Section X. MULTIMEDIA FILTER ASSEMBLY MAINTENANCE PROCEDURES

3-46. MULTIMEDIA FILTER REPAIR.

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 Lifting Device with Sling
- Stiff-bristled Brush (Appendix B, Section III, Item 3).

Materials/Parts Required
- Detergent (Appendix C, Section II, Item 5).
- Gravel (Appendix C, Section II, Item 8).
- Garnet, coarse (Appendix C, Section II, Item 6).
- Garnet, rine (Appendix C, Section II, Item 7).
- Sand, Filter (Appendix C, Section II, Item 15).
- Anthracite (Appendix C, Section II, Item 3).
- Media, Plastic (Appendix C, Section II, Item 12).
- Gaskets and Lo&washers (TM 10-4610-241-24P)

Personnel Required
- Three

Equipment Condition

Reference
- Cover Plate removed (Paragraph 2-28).
- Control Valve removed (Paragraph 2-69).
- Timer removed (Paragraph 2-68).
- Piping and Fittings disconnected from Multimedia Filter (Paragraphs 2-29 thru 2-3 1).

General Safety Instructions

WARNING

Use care when lifting large, heavy objects with a lifting device. Lack of attention or being in an improper position during lifting operation can result in serious injury or death.

a. Removal.

(1) Remove four nuts (1), lockwashers (2), washers (3), screws (4) and bracket (5).

(2) Remove two nuts (6), lockwashers (7), flatwashers (8), eyebolts (9) and buckle (IO), securing filter to ROWPU frame.

(3) As required, seperate buckle into its component parts; hooks (1 I), nut (12) and shaft (13).

NOTE

Marking position of filter in relation to floor will facilitate installation.

3-46. MULTIMEDIA FILTER REPAIR-continued.

(4) Scribe a line across junction of filter flange (16) and floor of ROWPU. Remove 12 bolts (14) and lockwashers (15).

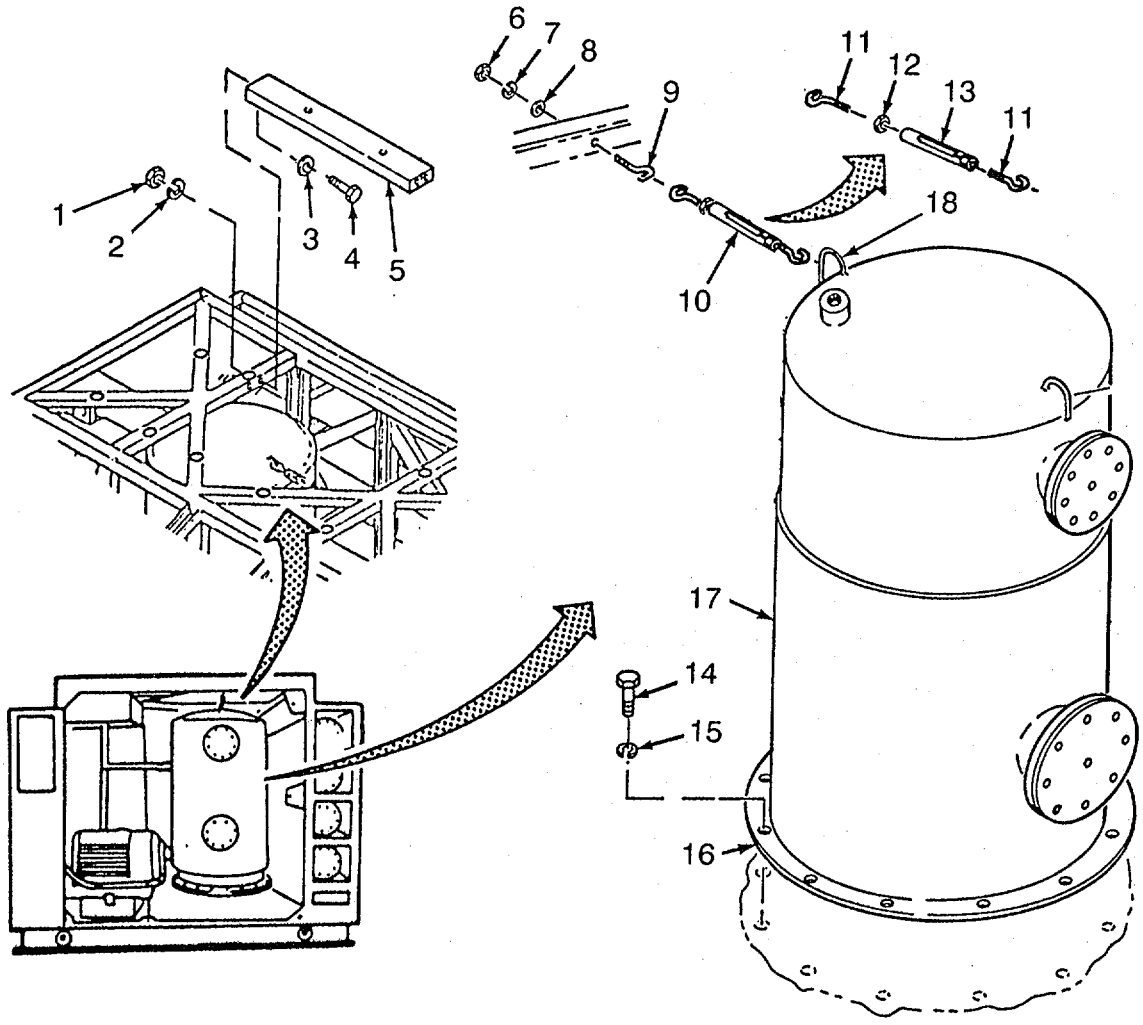
WARNING

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.

(5) Attach sling of lifting device to two lifting eyes (18) and carefully lift multimedia filter (17) through opening in top of ROWPU frame.



3-46. MULTIMEDIA FILTER REPAIR-continued.

b. Disassembly.

(1) Cover a 6-foot (1.83m) square area of the floor in front of lower flange cover with plastic sheet to catch filtration material.

(2) Remove eight nuts (19), screws (20), flange cover (21), and gasket (22) from top handhole (23).

WARNING

Weight of media is over 1000 pounds (454 kg). Remove flange cover carefully to avoid personal injury from flange cover movement.

(3) Remove twelve nuts (24), screws (25), flange cover (26), and gasket (27) from bottom handhole (23).

CAUTION

Be careful while removing filtration material not to damage screens and laterals with tools.

(4) Using a hand scoop, remove filtration material from multimedia filter (17).

c. Cleaning.

(1) Using soap solution and stiff-bristled brush, clean flange covers (21 and 26) and exterior surfaces of filter.

(2) Hose all filter material from laterals and screens.

(3) Flush filter tank with clean water and allow to drain. Turn filter sideways as necessary for complete drainage.

d. Inspection.

(1) Inspect inside and outside of multimedia filter (17) for cracks, evidence of leaks, damage, and excessive corrosion.

(2) Inspect flange covers (21 and 26) for excessive corrosion.

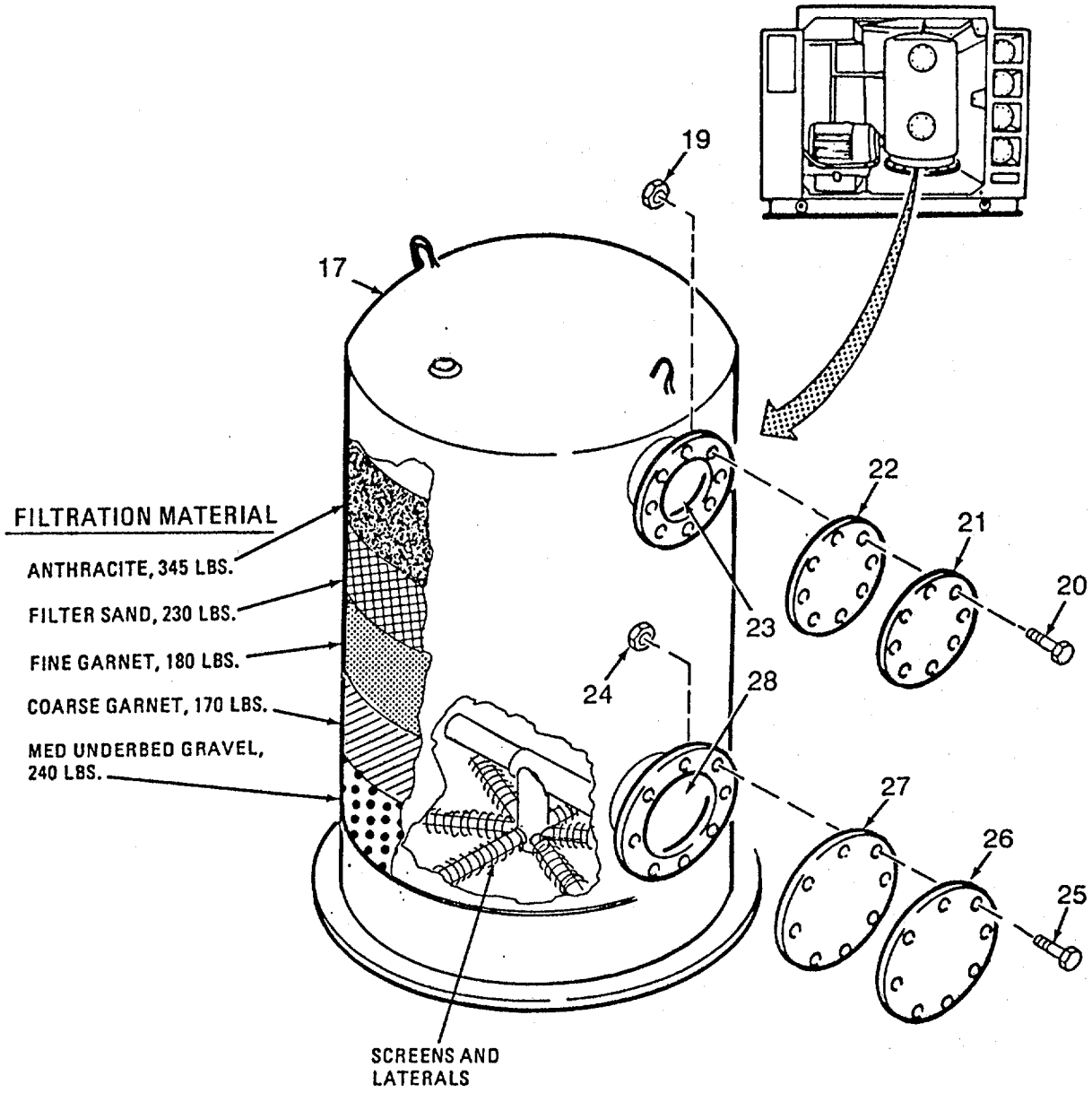
(3) Inspect screens on laterals for holes, distortion, corrosion and separation from laterals.

e. Repair.

(1) Replace gaskets.

(2) Replace all damaged and unserviceable components.

3-46. MULTIMEDIA FILTER REPAIR-continued.



3-46. MULTIMEDIA FILTER REPAIR-continued.

f. Assembly.

CAUTION

Pouring coarse gravel through upper handhole opening may damage filter lining.

(1) Place a total of 240 pounds (109 kg) of 1/4-inch medium underbed gravel in multimedia filter (17) through lower handhole opening (28).

(2) Use paddle or narrow board to level gravel.

(3) On lower handhole opening (28), install flange gasket (27), flange cover (26) and twelve bolts (25) and nuts (24).

NOTE

- Steps (4) thru (7) must be performed in the given sequence. After each addition of filter material the material must be leveled.
- Approximate levels of filtration material are indicated in illustration.

(4) Using hand scoop, load 170 pounds (77 kg) of No. 12 coarse garnet through upper handhole opening (23). Using paddle or narrow board level the added material.

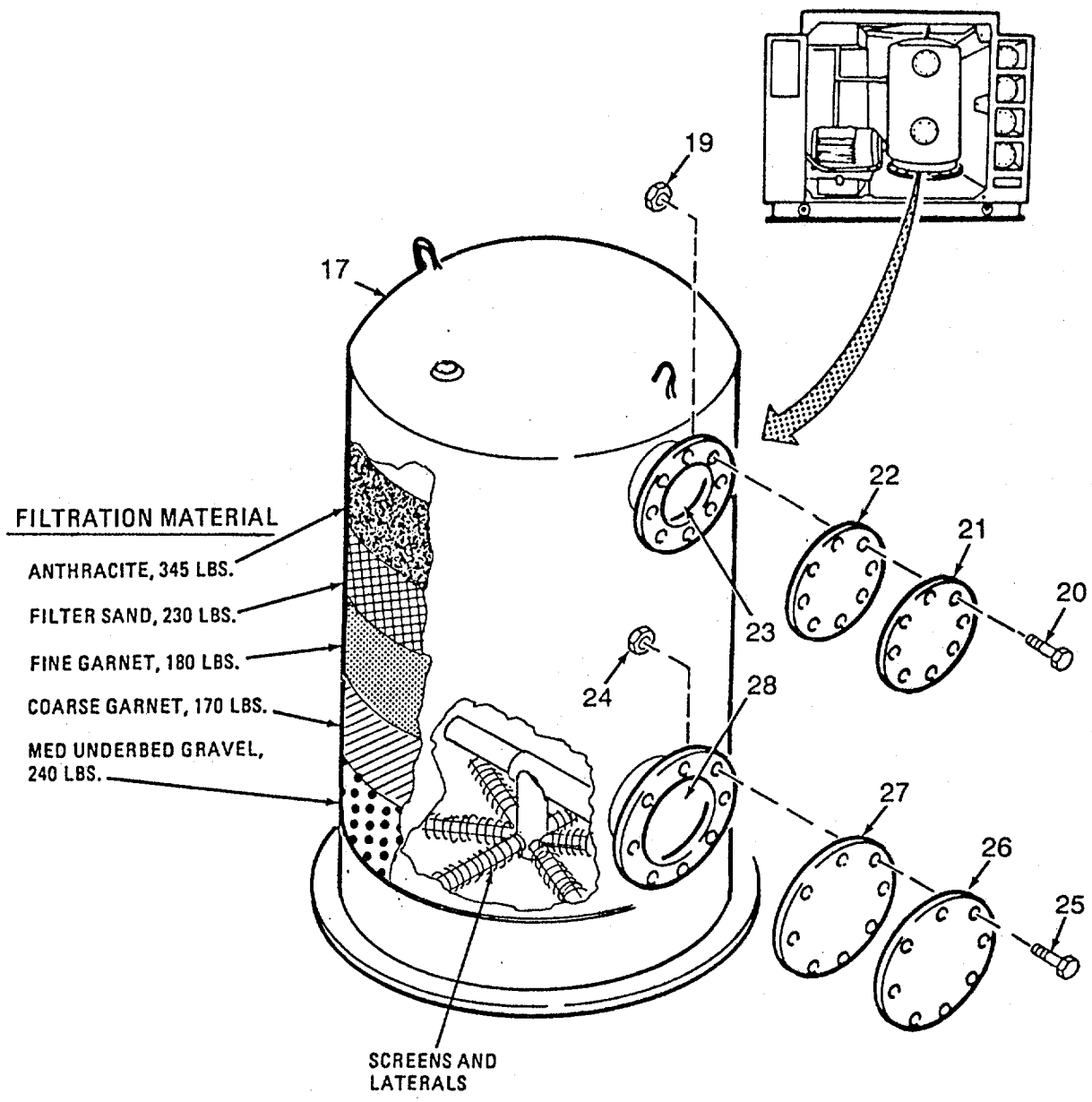
(5) Repeat step (4) for 180 pounds (82 kg) of No. 50 fine garnet.

(6) Repeat step (4) for 230 pounds (104 kg) of filter sand.

(7) Repeat step (4) for 345 pounds (156 kg) of No. 2 anthracite.

(8) On upper handhole opening (23), install gasket (22), flange cover (21), eight bolts (20) and nuts (19).

3-46. MULTIMEDIA FILTER REPAIR-continued.



3-46. MULTIMEDIA FILTER REPAIR-continued.

g. 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.

(1) Attach sling of lifting device to two lifting eyes (18) on multimedia filter (17) and carefully lift filter over opening in top of ROWPU frame.

NOTE

Ensure bolt holes line up on frame while lowering into position.

(2) Slowly lower multimedia filter (18) while two assistants on ROWPU guide it into position. Use scribe marks made at removal to insure that ports on filter aline with external piping.

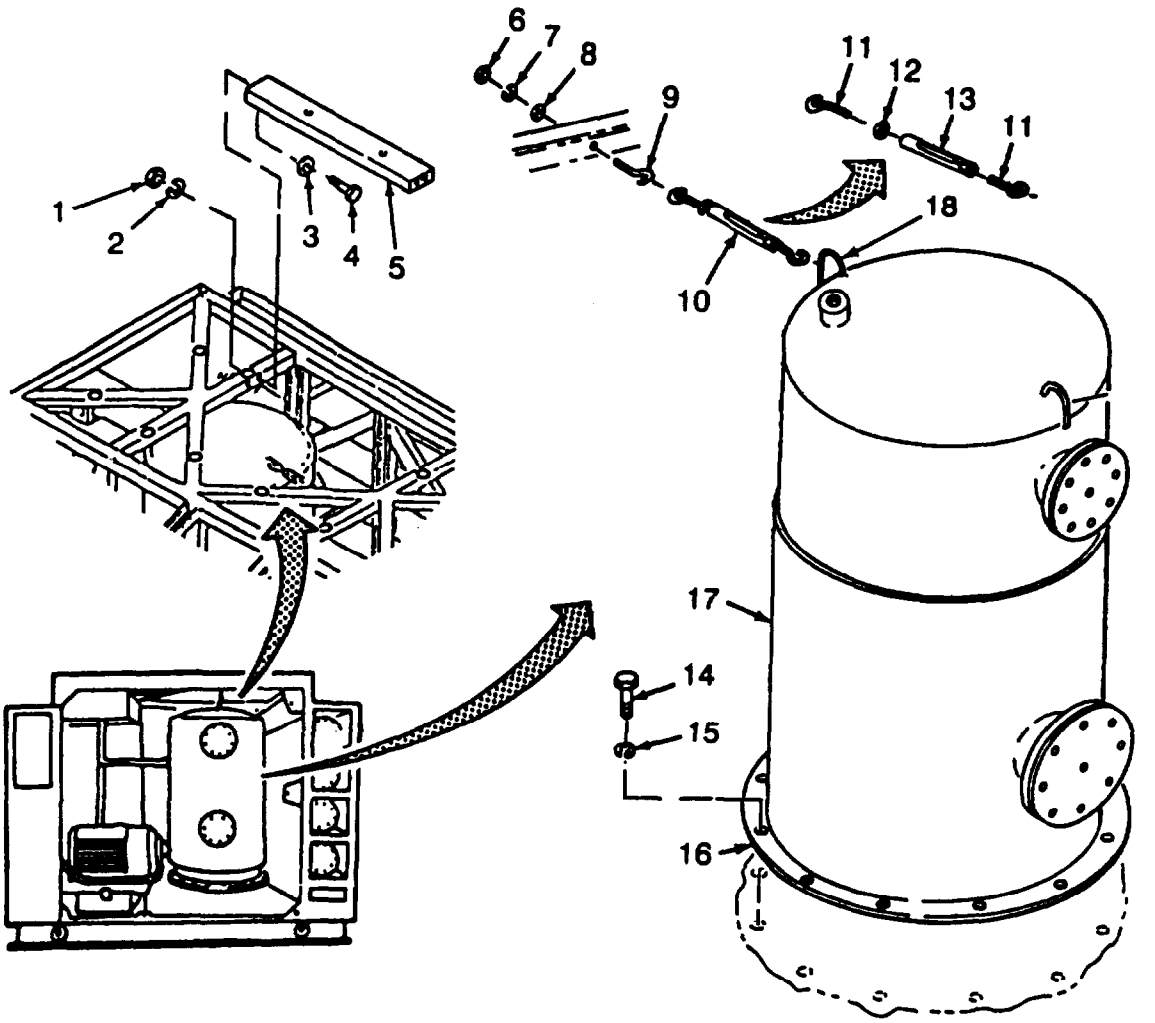
(3) Install 12 lockwashers (15), and bolts (14), securing filter to floor of ROWPU.

(4) If disassembled, assemble turnbuckle (10), consisting of nut (12), two hooks (11) and shaft (13).

(5) Remove lifting sling and install two turnbuckles (10) with eyebolts (9), washers (8), lockwashers (7) and nuts (6).

(6) Install bracket (5), using four screws (4), washers (3), lockwashers (2) and nuts (1).

3-43. MULTIMEDIA FILTER REPAIR-continued.



3-47. TIMER REPAIR (MODELS WPES-10, WPES-20 AND WPES-30).

This task consists of: a. Disassembly b. Cleaning c. Inspection d. Repair e. Test f. 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
Tape, Anti-seize (Appendix C, Section II, Item 19)
Rags, Wiping (Appendix C, Section II, Items 14)
Lockwashers (TM 10-4610-241-24P)
Equipment Condition
Reference
Timer removed (Paragraph 2-68).
General Safety Instructions

a. Disassembly.

(1) Position backwash timer (14) on workbench.

NOTE
Marking liquid ports on stager, indicating if they have a plug, elbow or strainer installed on them will facilitate reassembly. Be sure to transcribe this information to replacement stager before discarding or turning it in to Supply.

(2) Remove elbows (I), plugs (2), adapters (3) and inlet strainer (4) from bottom and side of stager (12).

(3) Remove four screws (9) and lo&washers (10).

NOTE
Tagging stager wires, indicating the terminal board contact to which they are connected, will faciliate installation. Be sure to transfer tags to replacement stager and/or wiring harness before discarding these items or turning them in to Supply.

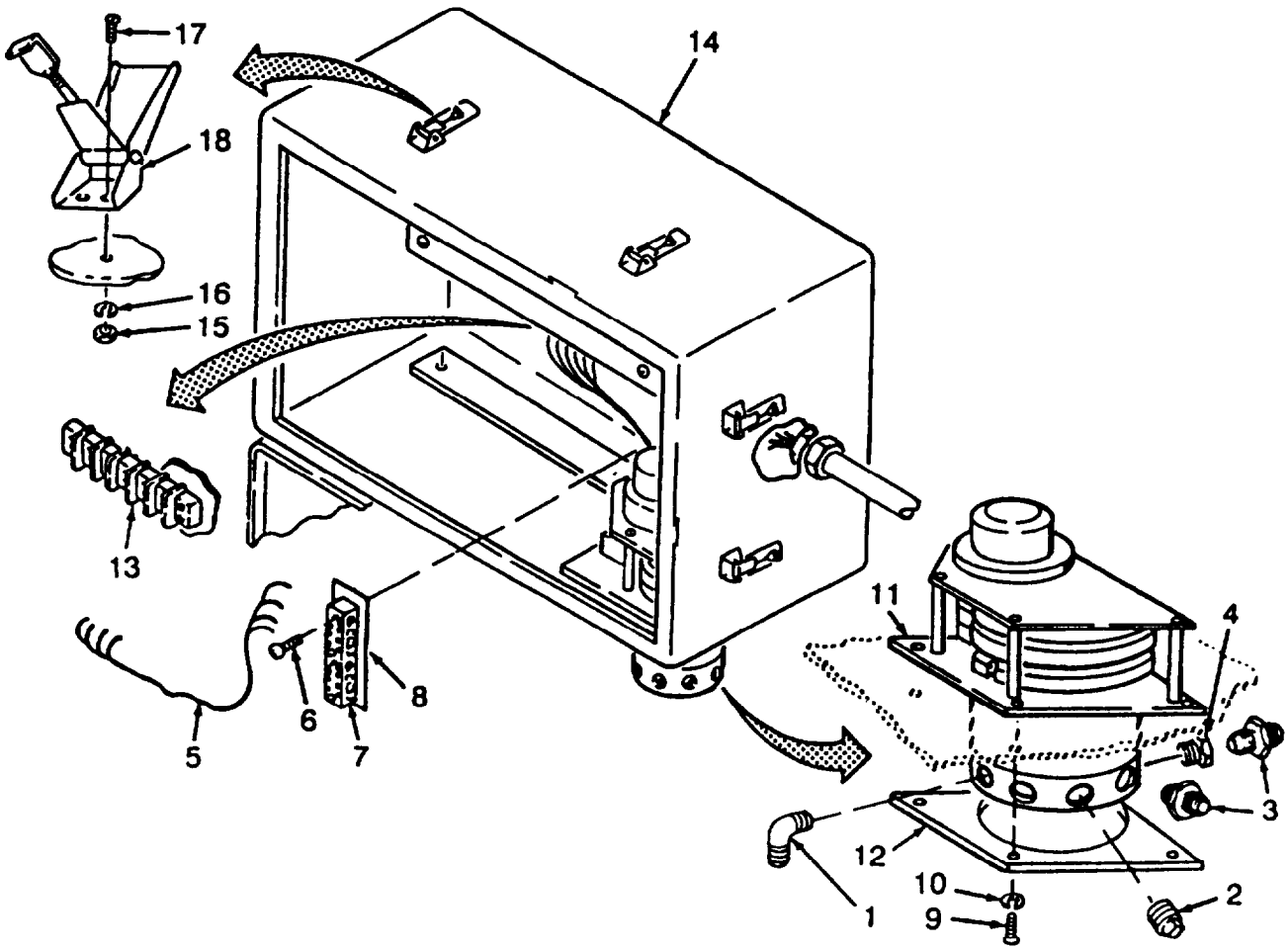
(4) Tag and disconnect stager wires from terminal board (13) and remove stager (12) and gasket (11).

3-47. TIMER REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

(5) Tag and disconnect wires of wiring harness (5) from terminal boards (7 and 13) and remove wiring harness.

(6) Remove two screws (6), terminal board (7) and information plate (8).

(7) Remove twelve nuts (15), lockwashers (16), screws (17) and latches (16).



3-47. TIMER REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

b. Cleaning

(1) Using a soft-bristled brush, clean electric contacts, cover, mounting hardware, and latches.

(2) Using dry cloth, clean box.

C. Inspection.

(1) Inspect terminal boards, and stager for breaks, overheating, and terminal damage.

(2) Inspect printed circuit board for cracks, breaks, overheating, and circuit damage.

(3) Inspect all tube fittings for stripped or damaged threads.

(4) Inspect timer box and cover for damage.

(5) Inspect wires for burned insulation, bare spots and other defects.

d. Repair.

Replace lo&washers, gaskets and damaged or unserviceable components.

e. Test.

This test is limited to stager assembly and is intended to test the electric motor, the three cam switches and the wiring of the stager assembly. Defects in any of these, except minor defects in wiring should result in replacement of the stager.

(1) Check wires for continuity.

CAUTION

Be sure to turn cams in direction of arrow. Any attempt to turn in opposite direction may damage stager.

NOTE

Cam has to be turned to change roller position

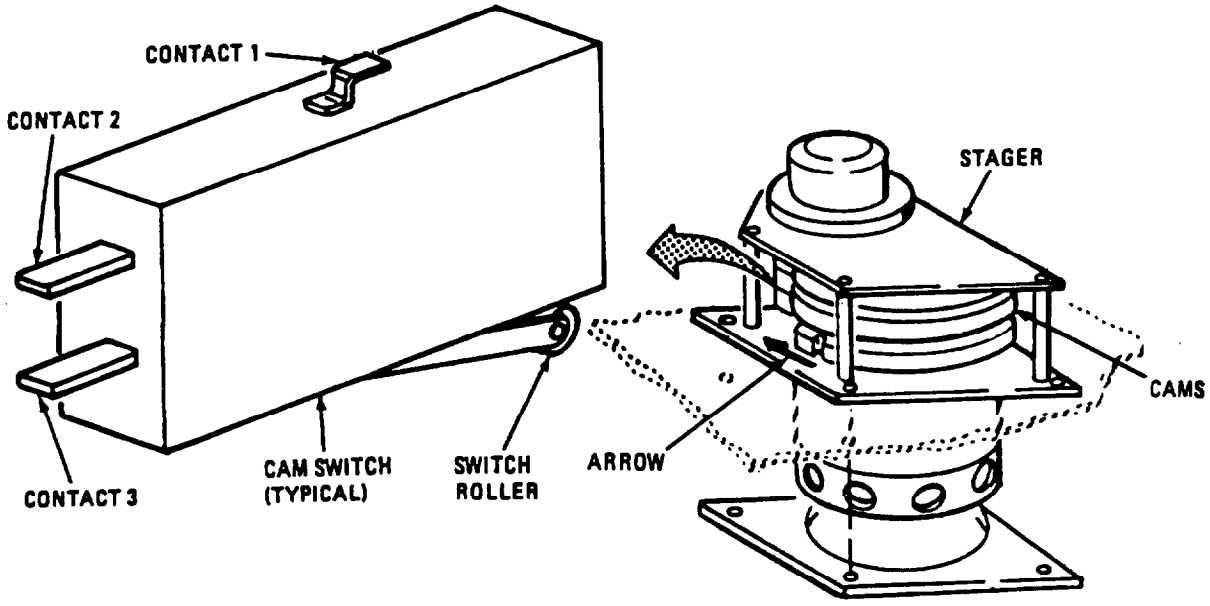
(2) Check if motor driven cams turn freely if turned by hand.

(3) Perform a continuity test through motor and switches as follows:

Item Checked	Contacts	Roller Position	Required Readings
Top Switch	1-2	Top of Cam	Continuity
	1-2	Cam Groove	open

3-47. TIMER REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

Item Checked	Contacts	Roller Position	Required Readings
Center Switch	1 - 2	Top of Cam	Continuity
	1 - 2	Cam Groove	Open
Bottom Switch	1 - 2	Top of Cam	Continuity
	1 - 2	Cam Groove	Open
	1 - 3	Top of Cam	Open
	1 - 3	Cam Groove	Continuity
Motor	Cont 1 (Top SW) - White Wire	N/A	800 - 1400 Ohms



3-47. TIMER REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

f. Assembly.

(1) Position latches (18) in place on timer (14) and install four screws (17), lockwashers (16) and nuts (15).

(2) Position gasket (12) and stager (11) in cutout on timer (14) and install four lockwashers (10) and screws (9).

NOTE

Be sure to connect stager wires as tagged. If tags are lost or illegible use color code as follows to connect stager wires to contacts of terminal board (13):

CONTACT	WIRE COLOR	CONTACT	WIRE COLOR
6	Blue	7	Purple
8	Orange	9	Red
10	Black	11	White

(3) Connect six wires of stager to terminal board (13) as tagged or use color code.

(4) Position information plate (8) and terminal board (7) and install two screws (6).

NOTE

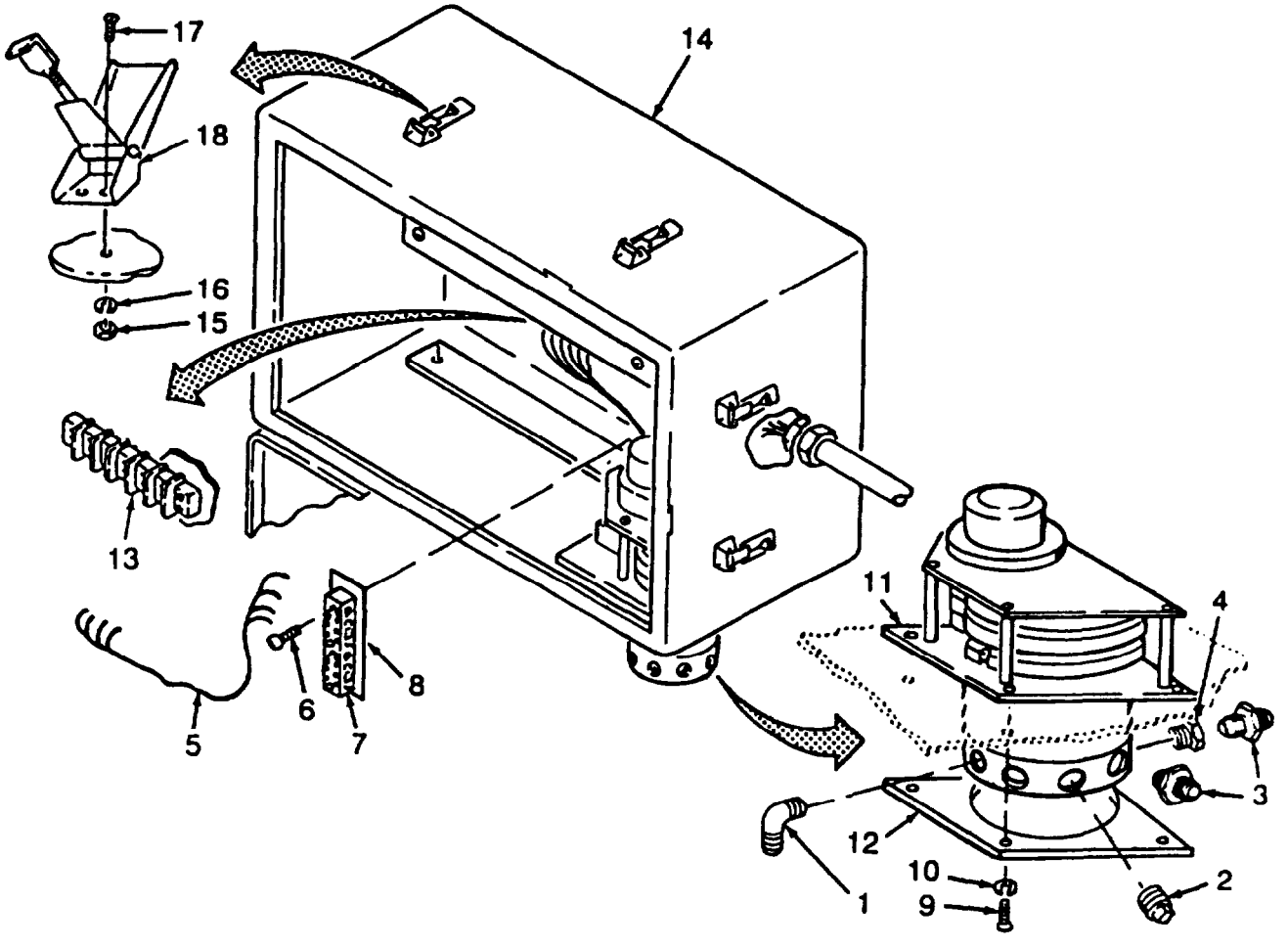
Be sure to connect wiring harness as tagged. If tags are lost or illegible use color code as follows to connect wires to contacts of terminal boards (13 and 7):

TB (13) CONTACT	WIRE COLOR	TB (7) CONTACT
2	Yellow	4
5	Red	5
12	White	2
13	Black	1
14	Green	3

(5) Install wiring harness (5) as tagged. If tags are lost or illegible use color code to connect to terminal boards (7 and 13).

(6) Install screen (4), adapters (3), plugs (2) and elbows (1) on stager (12) as marked during disassembly.

3-47. TIMER REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.



3-47.1 TIMER REPAIR (MODELS H-9518-1, H-9518-2, H-9518-3).

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)
Soldering Iron(Appendix B,Section III, Item 4)
Soft-Bristled Brush (Appendix B, Section III, Item 3)
Materials/Parts Required
Tape, Anti-seize (Appendix C, Section II, Item 19)
Rags, Wiping (Appendix C, Section II, Items 14)
Lockwashers (TM 10-4610-241 -24P)
Locknuts (TM 10-4610-241-24P)
Equipment Condition
Reference
Timer removed (Paragraph 2-68.1).

a. Disassembly.

(1) Position backwash timer (1) on workbench, remove four screws (2) and open cover.

NOTE
Marking liquid ports on stager, indicating if they have a plug, elbow or strainer installed on them will facilitate reassembly. Be sure to transcribe this information to replacement stager before discarding or turning it in to Supply.

(2) Remove 90 Deg. connector (3), inlet strainer (4), plug (5) and five connectors (6) from bottom and side of stager (7).

NOTE
Tagging stager wires, indicating the terminal assembly contact to which they are connected, will facilitate installation. Be sure to transfer tags to replacement stager and/or wiring harness before discarding these items or turning them in to Supply.

(3) Tag and disconnect stager wires from terminal assembly (8).

(4) Remove four screws (9), flat washers (10) and lock nuts (11).

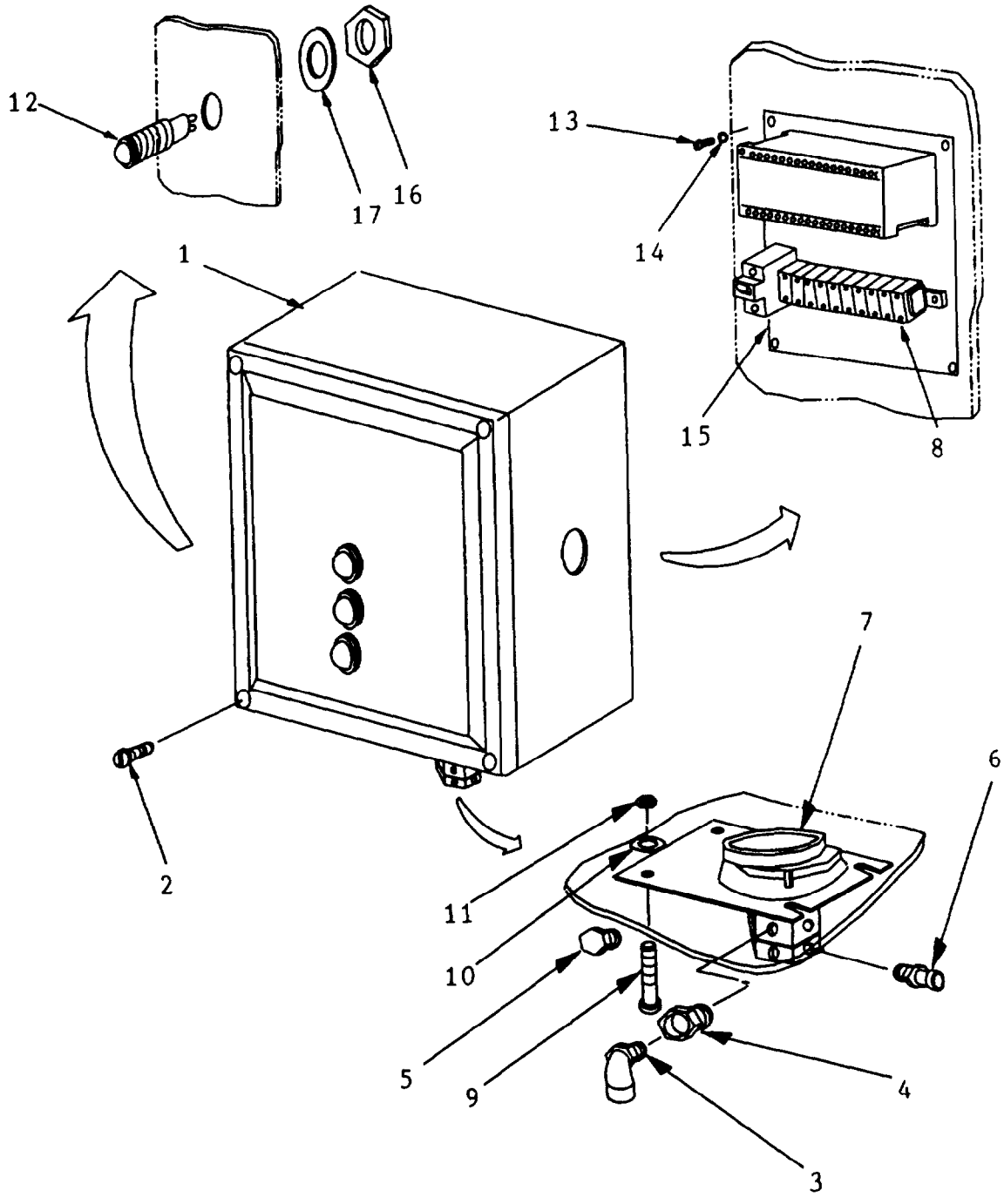
(5) Remove stager (7).

(6) Tag and remove the wires connecting the cover lights (12) to the terminal assembly (8).

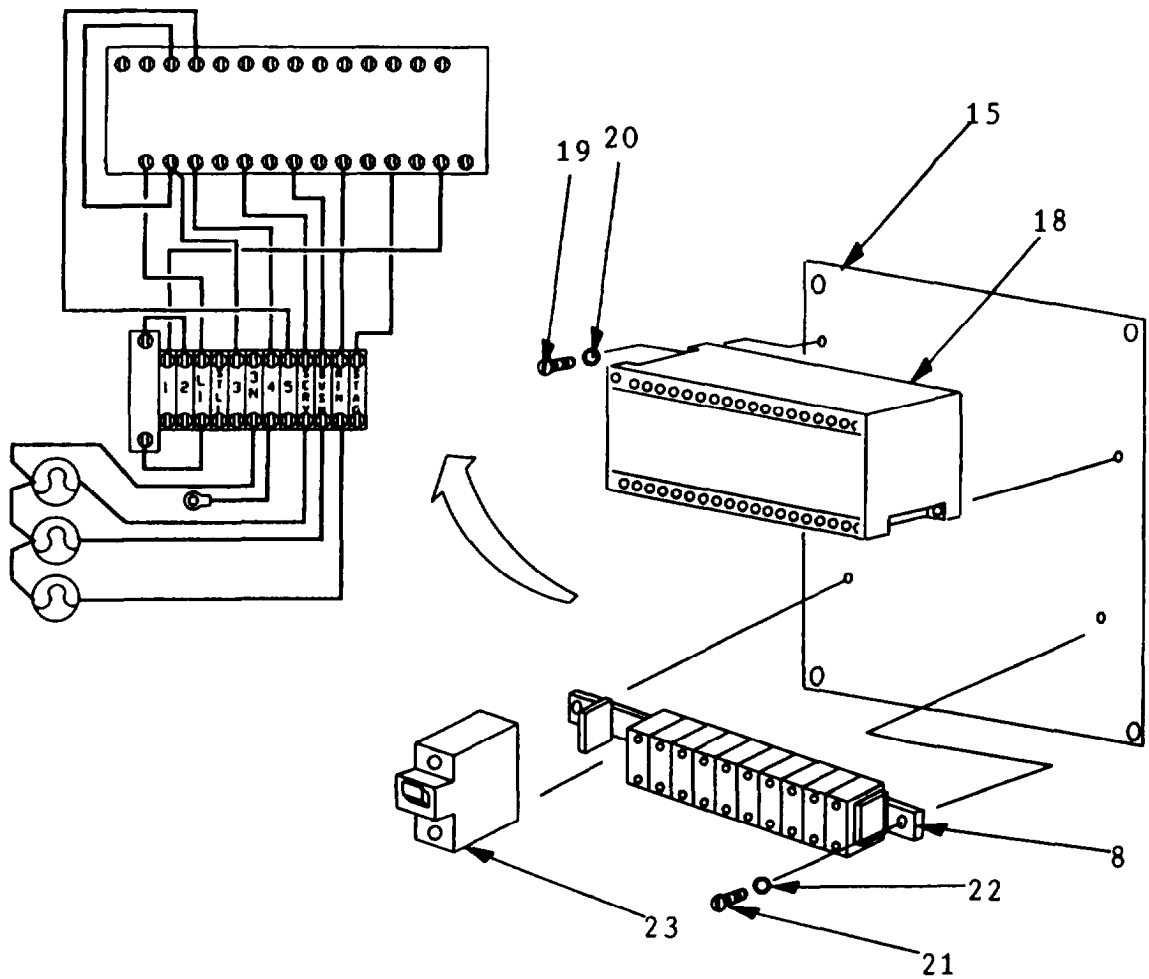
(7) Remove four screws (13) and four lockwashers (14) and remove back panel (15).

(8) Remove three cover lights (12) by desoldering the wires, removing nut (16) and lockwasher (17) and push through cover.

3-47.1 TIMER REPAIR (MODELS H-9518-1, H-9518-2, H-9518-3) - continued



3-47.1 TIMER REPAIR (MODELS H-9518-1, H-9518-2, H-9518-3) - continued.



(5) Install back panel (15) and secure with screws (13) and lockwashers (14).

(6) Install cover lights (12) and secure with lo&washer (17) and nut (16).

(7) Solder wires to cover lights and connect the cover light wires to terminal assembly (8) following tags,

(8) Install stager (7) and secure with screws (9). flat washers (10) and lock nuts (11).

(9) Connect stager wires to terminal assembly (8) following tags.

(10) Install inlet strainer (4) 90 Deg connector (3), plug (5) and five connectors (6) on stager (7) as marked during disassembly.

(11) Ensure stager indicates “3” on right side at red index mark. If not, rotate cam in direction of arrow until it seats in position “3”.

(12) Install timer according to Paragraph 2-68.1,

(13) Close cover and secure with four screws (2).

(14) Operate ROWPU according to TM 10-4610-241-10.

3-47.1 TIMER REPAIR (MODELS H-9518-1, H-9518-2, H-9518-3) -continued.

b. Cleaning.

(1) Using a soft-bristled brush, clean electric contacts, cover, mounting hardware, and latches.

(2) Using a dry cloth, clean box.

C. Inspection.

(1) Inspect terminal assembly and stager for breaks, overheating, and terminal damage.

(2) Inspect control unit for physical damage.

(3) Inspect all tube fittings for stripped or damaged threads.

(4) Inspect timer box and cover for damage.

(5) Inspect wires for burned insulation, bare spots and other defects.

d. Repair.

Replace lockwashers, locknuts and damaged or unserviceable components.

e. Assembly.

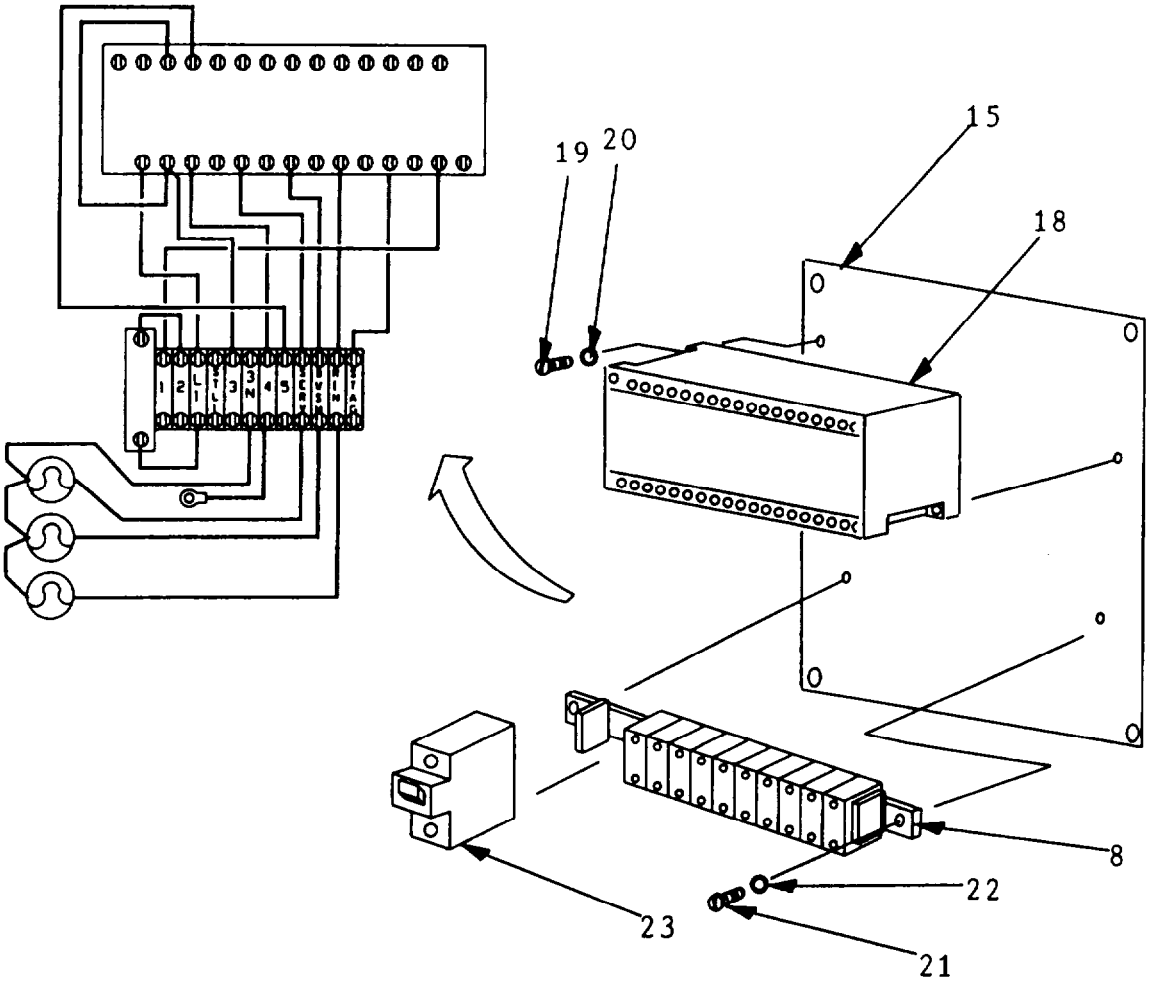
(1) Install circuit breaker (23) from terminal assembly (8) by pushing it in place.

(2) Install terminal assembly (8) on backpanel (15) and secure with screws (21) and lockwashers (22).

(3) Install control unit (18) on backpanel (15) and secure with screws (19) and lockwashers (20).

(4) Connect the wires from the control unit (18) to the terminal assembly (8) following tags.

3-47.1 TIMER REPAIR (MODELS H-9518-1, H-9518-2, H-9518-30 - continued.



(5) Install back panel (15) and secure with screws (13) and lockwashers (14).

(6) Install cover lights (12) and secure with lockwasher (17) and nut (16).

(7) Solder wires to cover lights and connect the cover light wires to terminal assembly (8) following tags.

(8) Install stager (7) and secure with screws (9), flat washers (10) and lock nuts (11).

(9) Connect stager wires to terminal assembly (8) following tags.

(10) Install inlet strainer (4) 90 Deg connector (3), plug (5) and five connectors (6) on stager (7) as marked during disassembly.

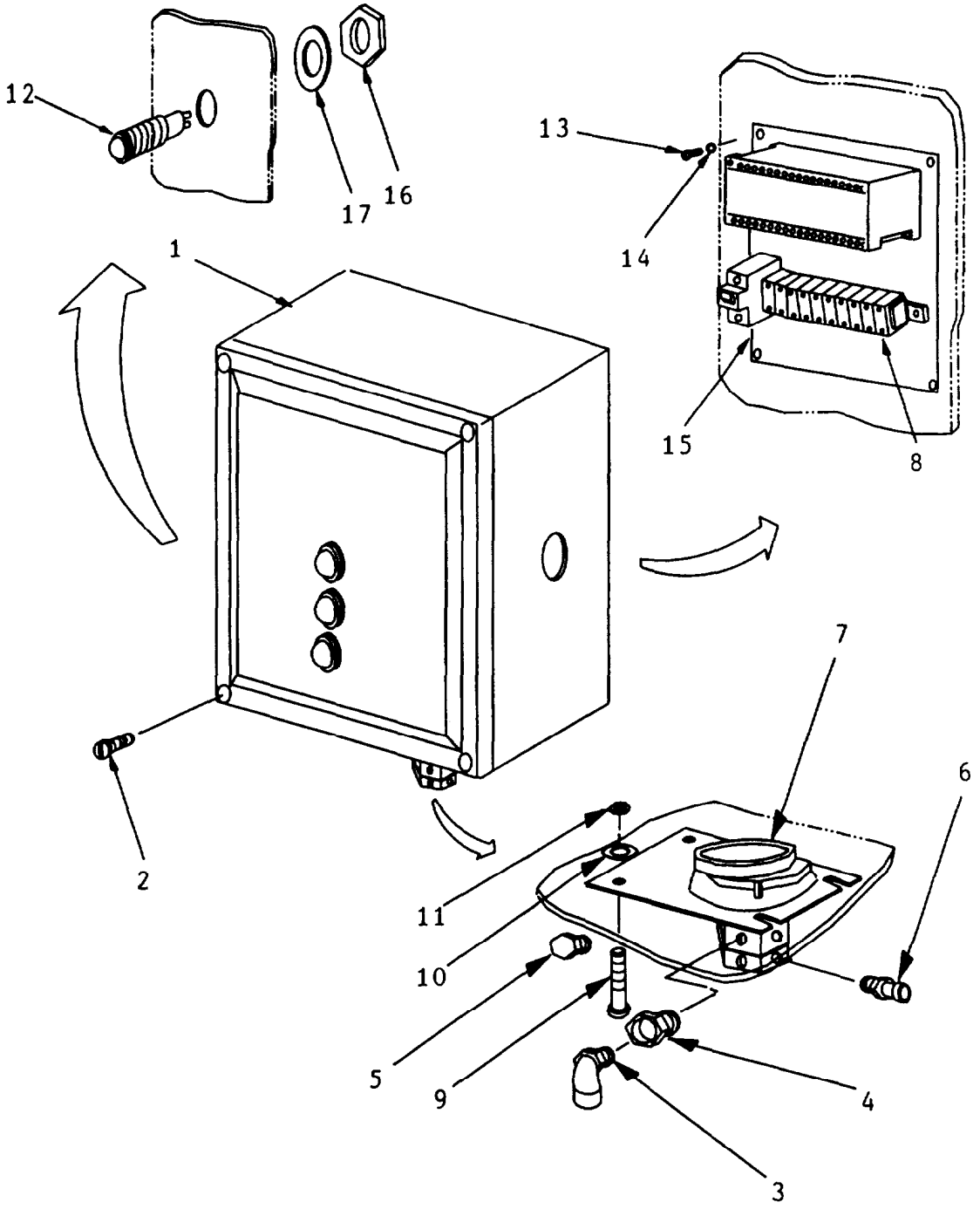
(11) Ensure stager indicates “3” on right side at red index mark. If not, rotate cam in direction of arrow until it seats in position “3”.

(12) Install timer according to Paragraph 2-68.1.

(13) Close cover and secure with four screws (2).

(14) Operate ROWPU according to TM 10-4610-241-10.

3-47.1 TIMER REPAIR (MODELS H-9518-1, H-9518-2, H-9518-3) - continued.



3-48. CONTROL VALVE REPAIR (MODELS WPES-10, WPES-20 AND WPES-30).

This task consists of: a. Disassembly b. Cleaning c. Inspection d. Repair e. Assembly

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix 8, Section III, Item 4)
Torque Wrench (Appendix B, Section 111, Item 3)
Gland Removal Tool (Appendix F)
Materials/Parts Required
Detergent (Appendix C, Section II, Item 5)
Gaskets and Packing (TM 10-4610-241-24P)
Equipment Condition
Reference
Multimedia Filter Control Valve removed (Paragraph 2-69).

a. Disassembly.

NOTE

- There are six cartridges in the multimedia filter control valve. All are disassembled the same. One is shown.
- Control valve can be repaired in place.

(1) Remove four screws (l), washers (2) and cartridge cap (3).

(2) Remove cartridge assembly (6 thru 19) from control assembly (20) as a unit.

(3) Using gland removal tool as illustrated, remove valve seat (4) and gasket (5).

(4) Remove packing (6) from bottom of diaphragm housing.

NOTE

It will be necessary to hold shaft (19) with a screwdriver, in the screwdriver slot at top of shaft, to loosen nuts (7 and 13).

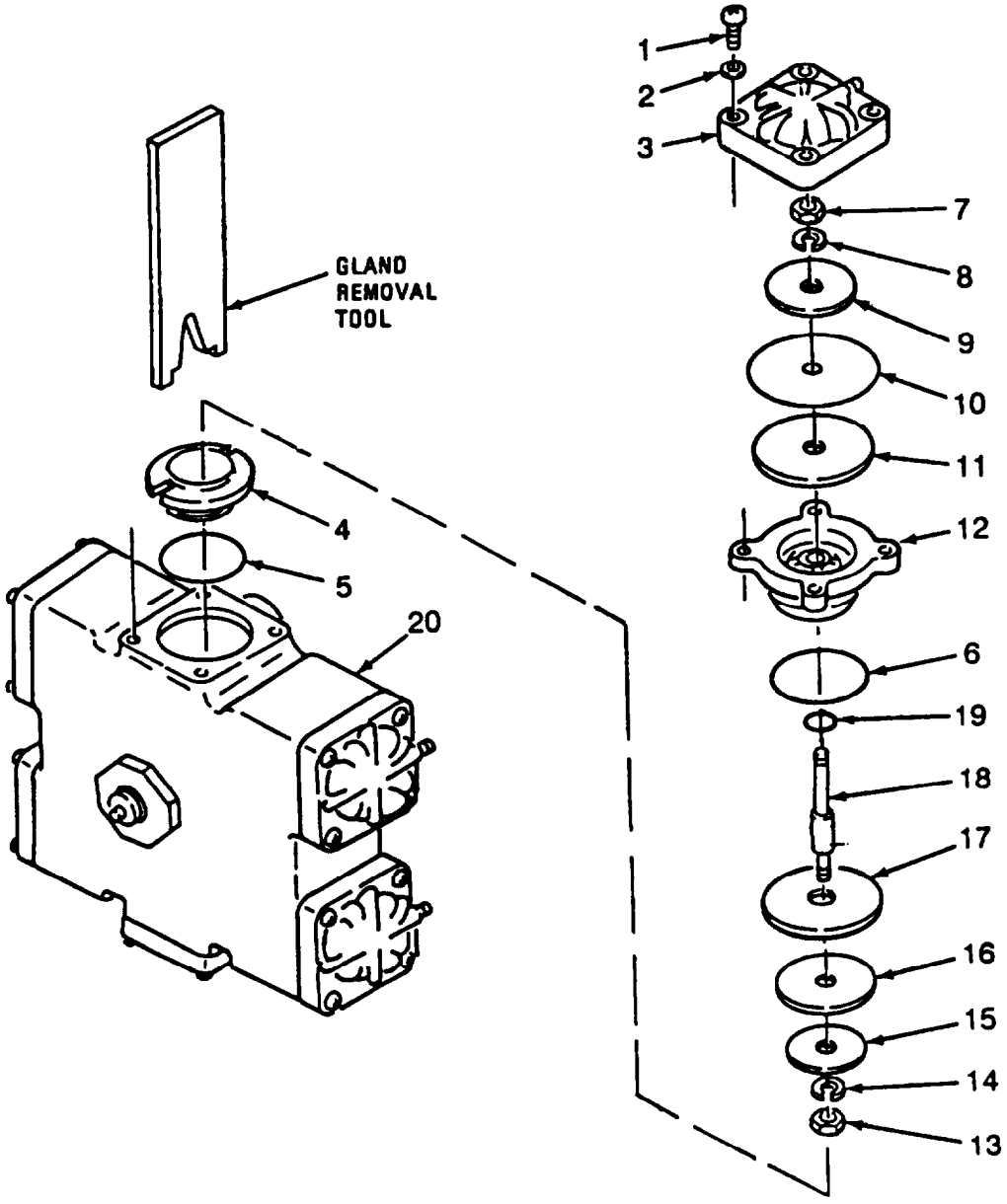
(5) Remove nut (7), lockwasher (8), washer (9) diaphragm (10) and diaphragm keeper (11) from diaphragm housing (12).

(6) Remove diaphragm housing (12) from shaft (18).

3-48. CONTROL VALVE REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

(7) Remove nut (13). lockwasher (14), washer (15), rubber washer (16) and keeper (17) from shaft (18).

(8) Remove packing (19) from diaphragm housing (12).



3-48. CONTROL VALVE REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued

b. Cleaning

(1) Thoroughly clean multimedia filter control valve metal parts using detergent and water.

(2) Allow parts to dry.

C. **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.

d. Repair.

Replace packing, lockwashers, diaphragms and damaged components.

e. Assembly.

NOTE

There are six cartridges in the multimedia filter control valve. All are assembled the same. One is shown.

(1) Position keeper (17), rubber washer 16), washer (15) and lockwasher (14) on shaft (19).

NOTE

It will be necessary to hold shaft (18) with a screwdriver, in the screwdriver slot at top of shaft, to tighten nuts (7 and 13).

(2) Install nut (13).

(3) Lubricate packing (19) and position it in diaphragm housing (12).

(4) Carefully position housing (12) on shaft (18).

(5) Position diaphragm keeper (11), diaphragm (10) washer (9), and lockwasher (8) on shaft (18).

(6) Install nut (7).

(7) Install packing (5) and valve seat (4) in control valve (20) and tighten valve seat with gland removal tool.

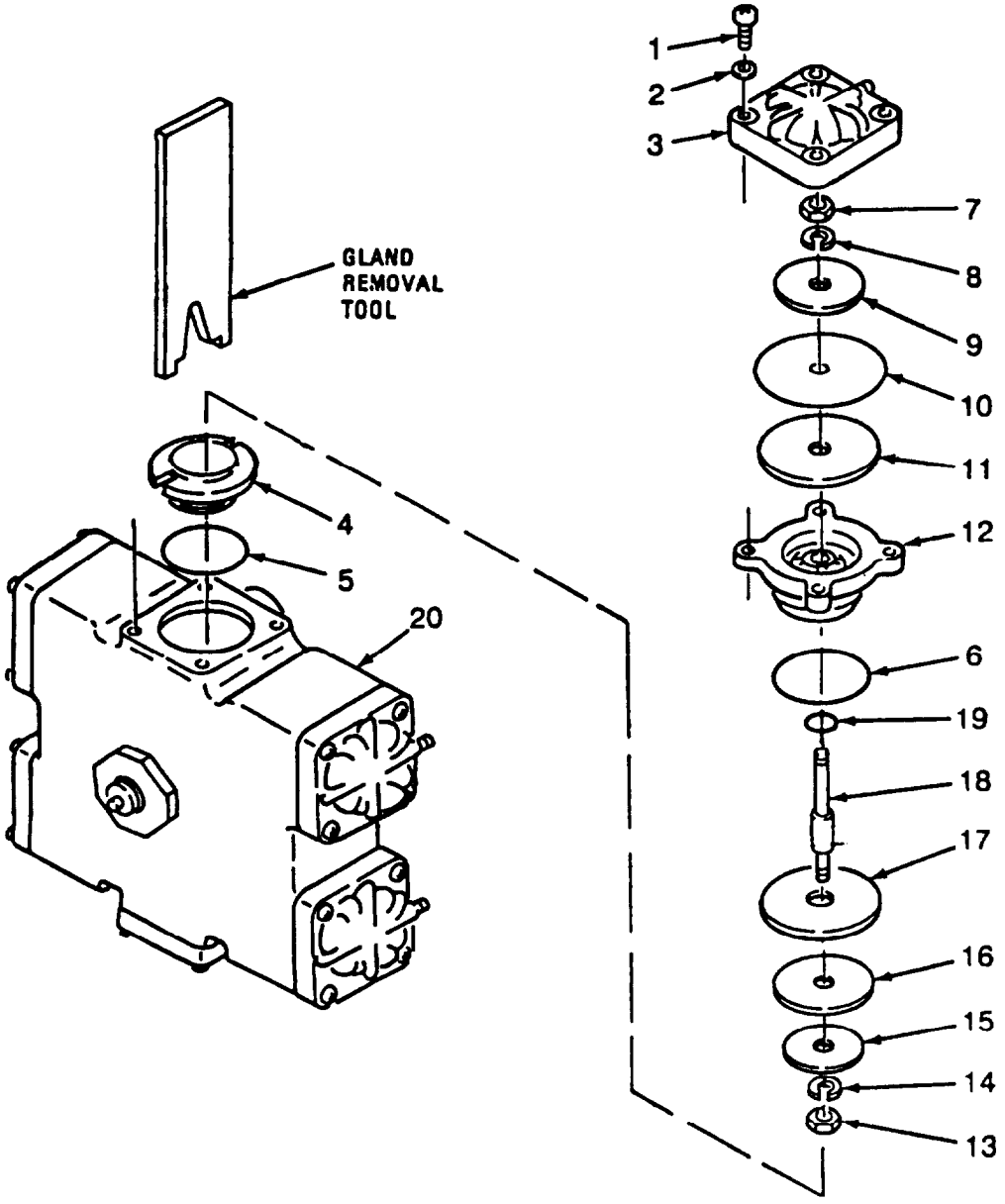
(8) Position packing (6) on diaphragm housing (12) and install diaphragm housing (with attached parts) in control valve (20).

3-48. CONTROL VALVE REPAIR (MODELS WPES-10, WPES-20 AND WPES-30) - continued.

CAUTION

Cartridge cap can be cracked if screws are overtightened. Do not exceed torque limits.

(9) Install cartridge cap (3), washers (2) and four screws (1). Torque screws to 65 pounds/inch.



Section XI. CONTROL BOX ASSEMBLY MAINTENANCE PROCEDURES

3-49. CONTROL BOX ASSEMBLY REPAIR.

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)
- Soldering Iron(Appendix B, Section III, Item 4)

Materials/Parts Required
- Detergent (Appendix C, Section II, Item 5)
- Rags, Wiping (Appendix C, Section II, Item 14)
- Solder (Appendix C, Section II, Item 17)
- Adhesive (Appendix C, Section II, Item 1)
- Gaskets and Packing (TM 10-4610-241-24P)
- Lockwashers (TM 10-4610-241-24P)
- Tiedown Straps C(TM 10-4610-241-24P)

Personnel Required
- Two

Equipment Condition

Reference
- Power shut down (Power Source Manual).
- Cable Assembly W48 disconnected(Paragraph 3-25).
- Cable Assembly W49 disconnected (Paragraph 3-33).
- Cable Assembly W52 disconnected (Paragraph 3-27).

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

a. Removal.

(1) Temporarily install back cover (6) with two or three screws (7) to facilitate removal.

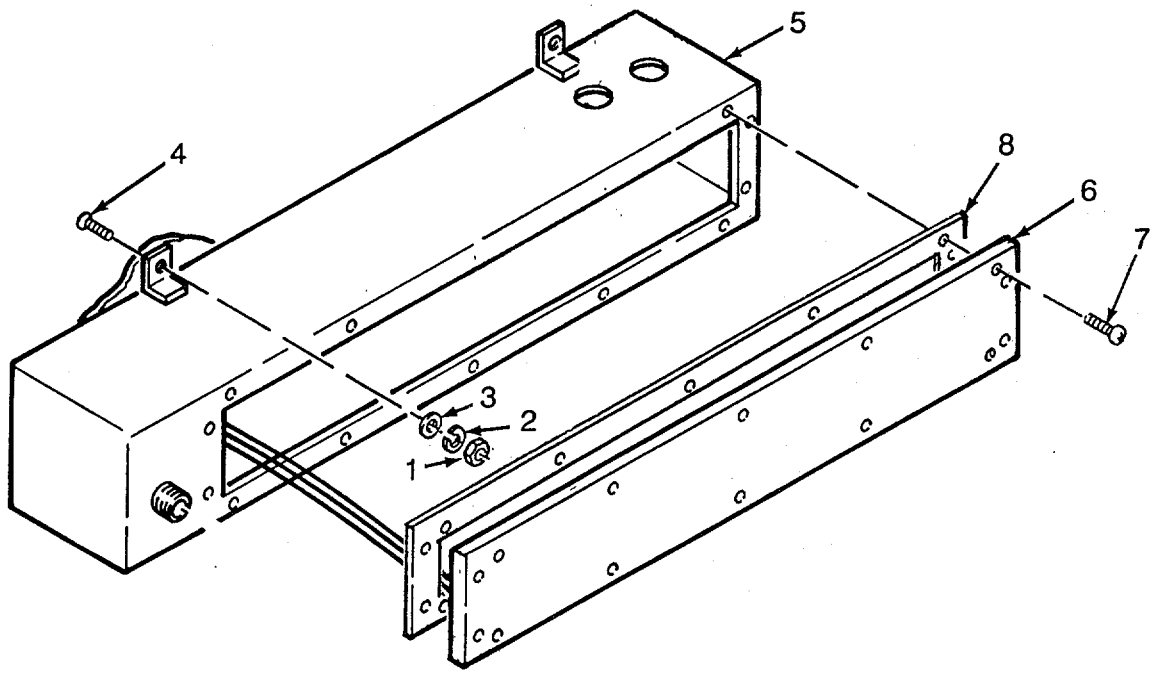
(2) Support control box assembly (5) and remove four nuts (1), lockwashers (2), flat washers (3) and screws (4).

(3) Remove control box assembly (5).

3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

(4) Remove screws (7) and cover (6) temporarily installed in step (1) above.

(5) As required, remove gasket (8).



3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

b. Disassembly.

(1) Toggle switches

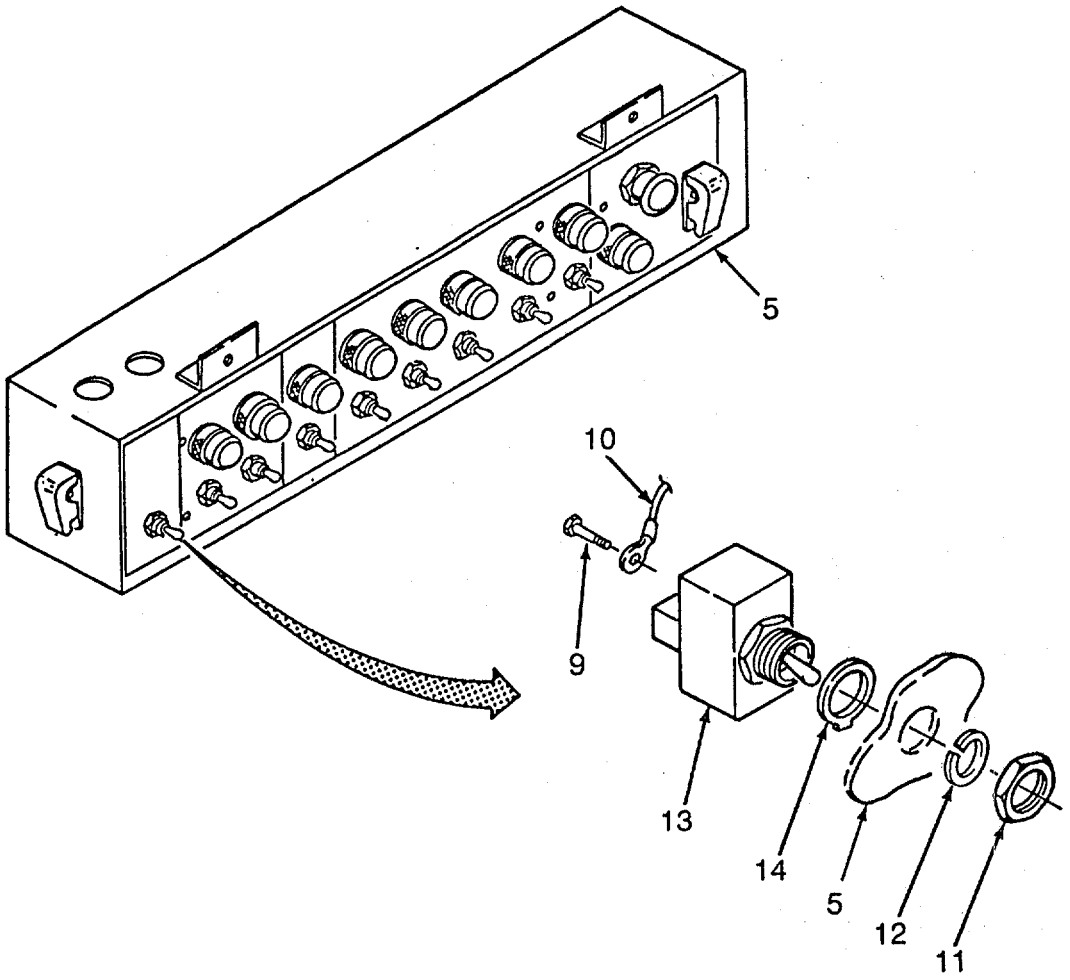
NOTE

- 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, indicating their connection points before removal. If tagged parts are to be turned in to Supply or discarded. Be sure to transfer tags to replacement parts.

(a) From inside control box assembly, remove screws (9) and disconnect wires (10).

(b) From front of control box assembly, remove mounting nut (11) and lockwasher (12).

(c) Remove switch body (13) and lockring (14).



3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

(2) Emergency stop switch.

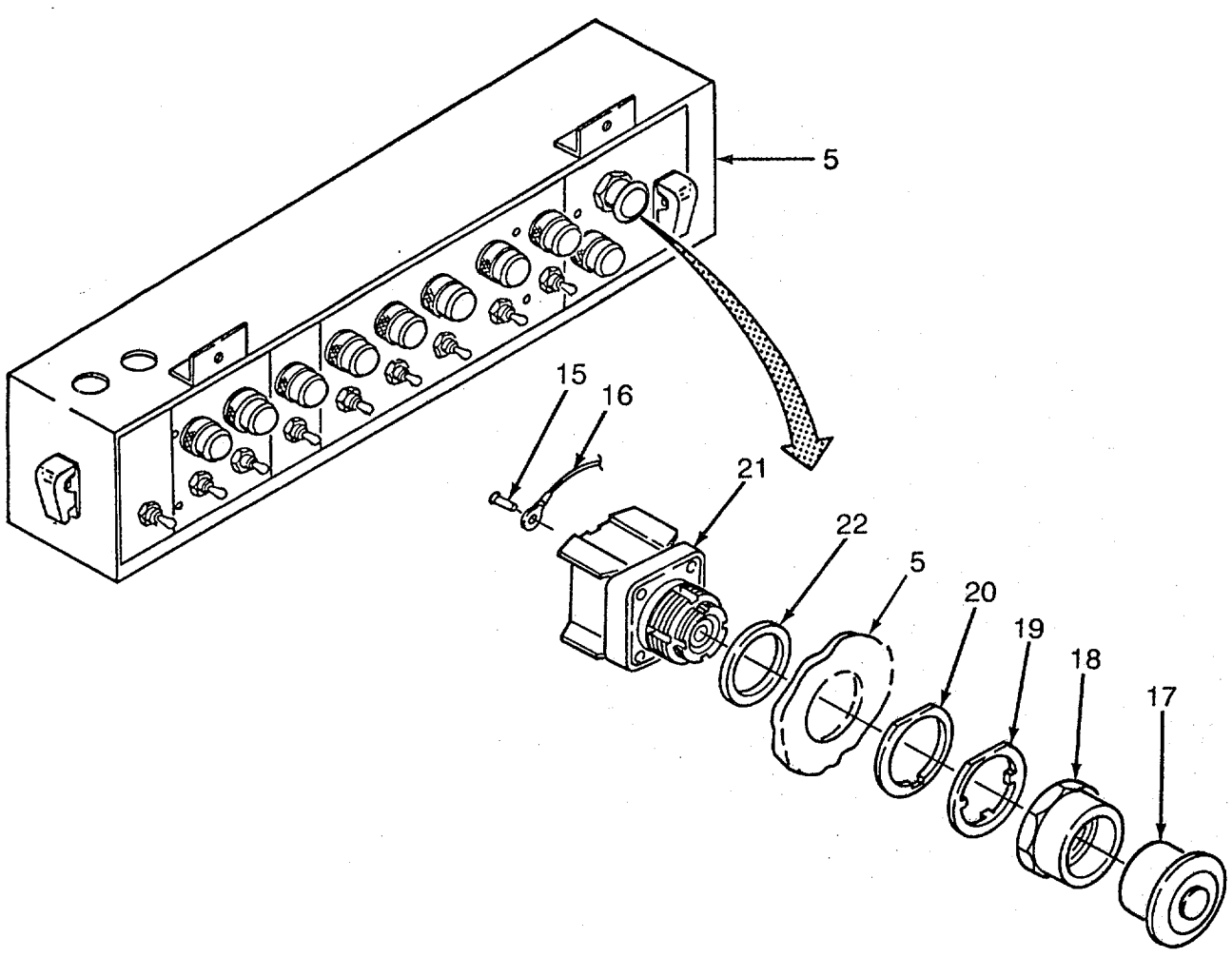
NOTE

Tag all wires, indicating their connection points before removal. If tagged parts are to be turned in to Supply or discarded, be sure to transfer tags to replacement parts.

(a) Loosen two screws (15) and tag and remove wires (16) from back of switch.

(b) Remove cap (17), locknut (18), keyway washer (19), and fiber washer (20) from switch body (21).

(c) Remove switch body (21) and rubber washer (22).



3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

(3) Indicator lampholders.

NOTE

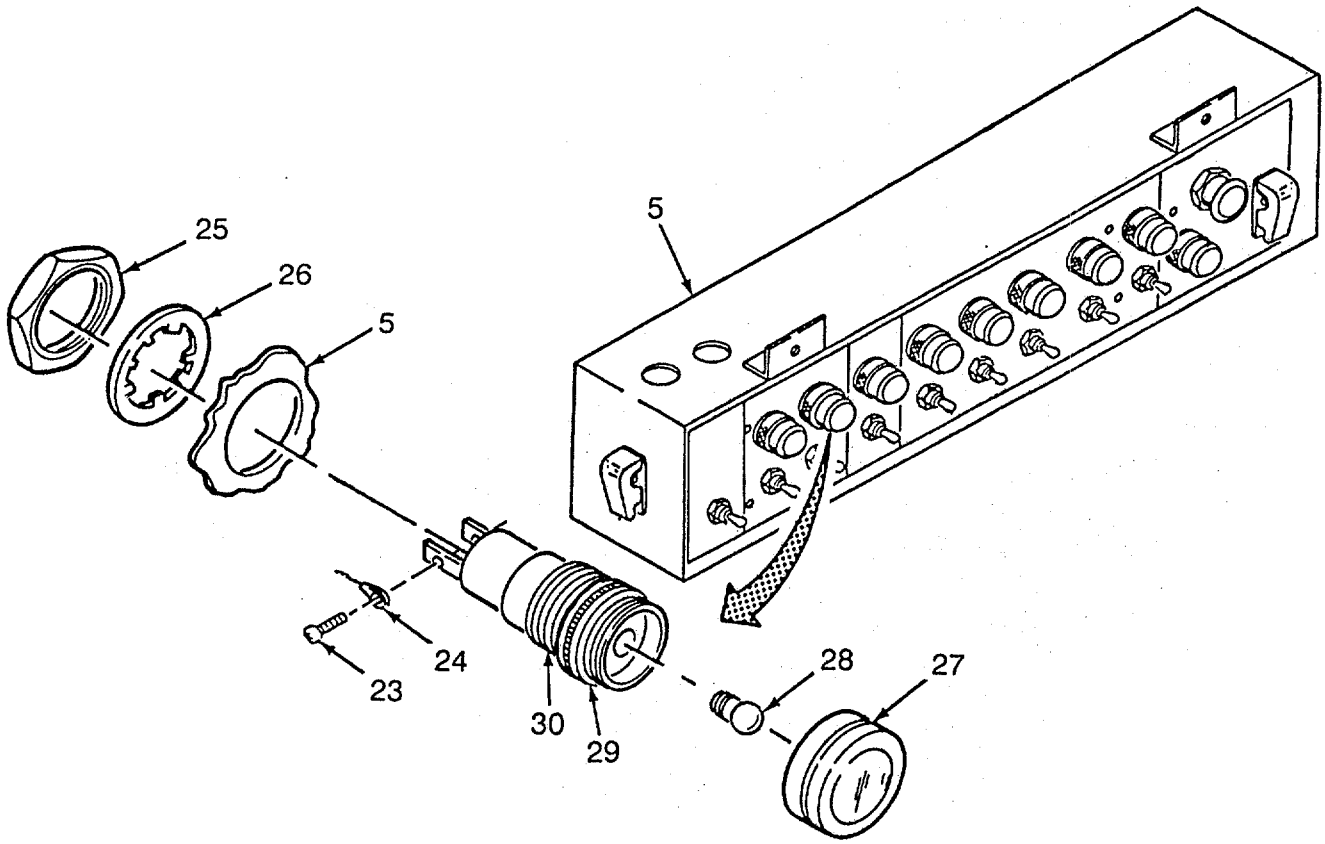
- There are nine lampholders. All are removed the same. One is shown.
- Tag all wires, indicating their connection points before removal. If tagged parts are to be turned in to Supply or discarded. Be sure to transfer tags to replacement parts.

(a) From inside control box assembly (5), remove two screws (23) and three wires (24) from lampholder (30).

(b) Remove nut (25) and lockwasher (26).

(c) Remove lampholder (30) from front of control box (5).

(d) Remove lens (27), bulb (28) and flange (29).



3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

(4) Terminal board.

NOTE

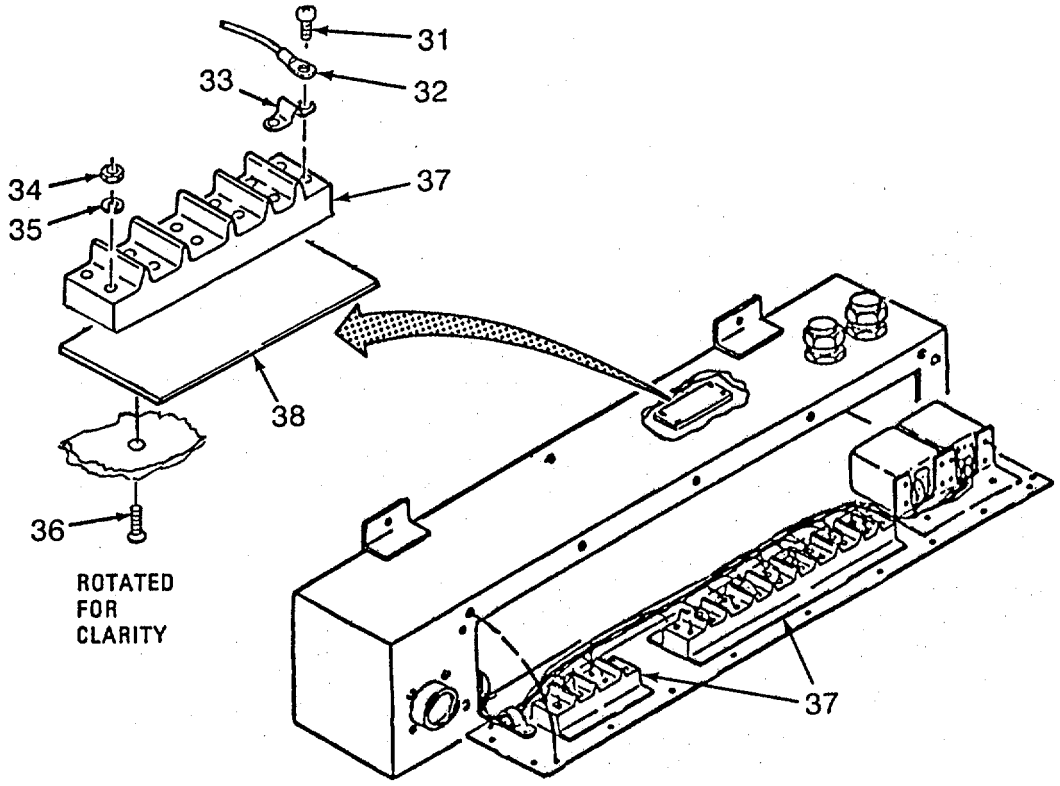
- Tag all wires and terminal links, indicating their connection points before removal. If tagged parts are to be turned in to Supply or discarded, be sure to transfer tags to replacement parts.
- There are three terminal boards in the control box. Removal of one is shown the others are removed in similar manner.

(a) Remove screws (31) and disconnect wires (32) from terminal board (37).

(b) Remove terminal link (33).

(c) At each end of terminal board (37), remove two nuts (34), lockwashers (35) and screws (36).

(d) Remove terminal board (37) and information plate (38).



3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

(5) Electrical relays K10 and K11.

NOTE

Tag all wires, indicating their connection points before removal. If tagged parts are to be turned in to Supply or discarded, be sure to transfer tags to replacement parts.

(a) Unsolder 11 wires (38) from relay K11 (43) and 13 wires from relay K10 (44).

(b) Remove eight nuts (41), lockwashers (42) and relays (43 and 44) from bracket (48).

(c) Remove two nuts (45), lockwashers (46), screws (47) and bracket (48).

(d) As required, remove insulation sleeving (39) from wires (38).

(6) Wiring harnesses.

Repair wiring harnesses in accordance with Paragraphs 3-49 (W1), 3-50 (W2) and 3-41 (W58).

c. Cleaning.

(1) Using soap solution, clean control box assembly (5) and control box cover (6). Wipe dry with clean rags.

(2) Clean attaching hardware with rags.

d. Inspection.

(1) Inspect control box assembly (5) and control box cover (6) for dents, cracks, and excessive corrosion.

(2) Inspect attaching hardware for damage and corrosion.

(3) Inspect relays (43 and 44) for burned contact points.

(4) Inspect terminal boards (37) for cracks, burned contacts and stripped threads.

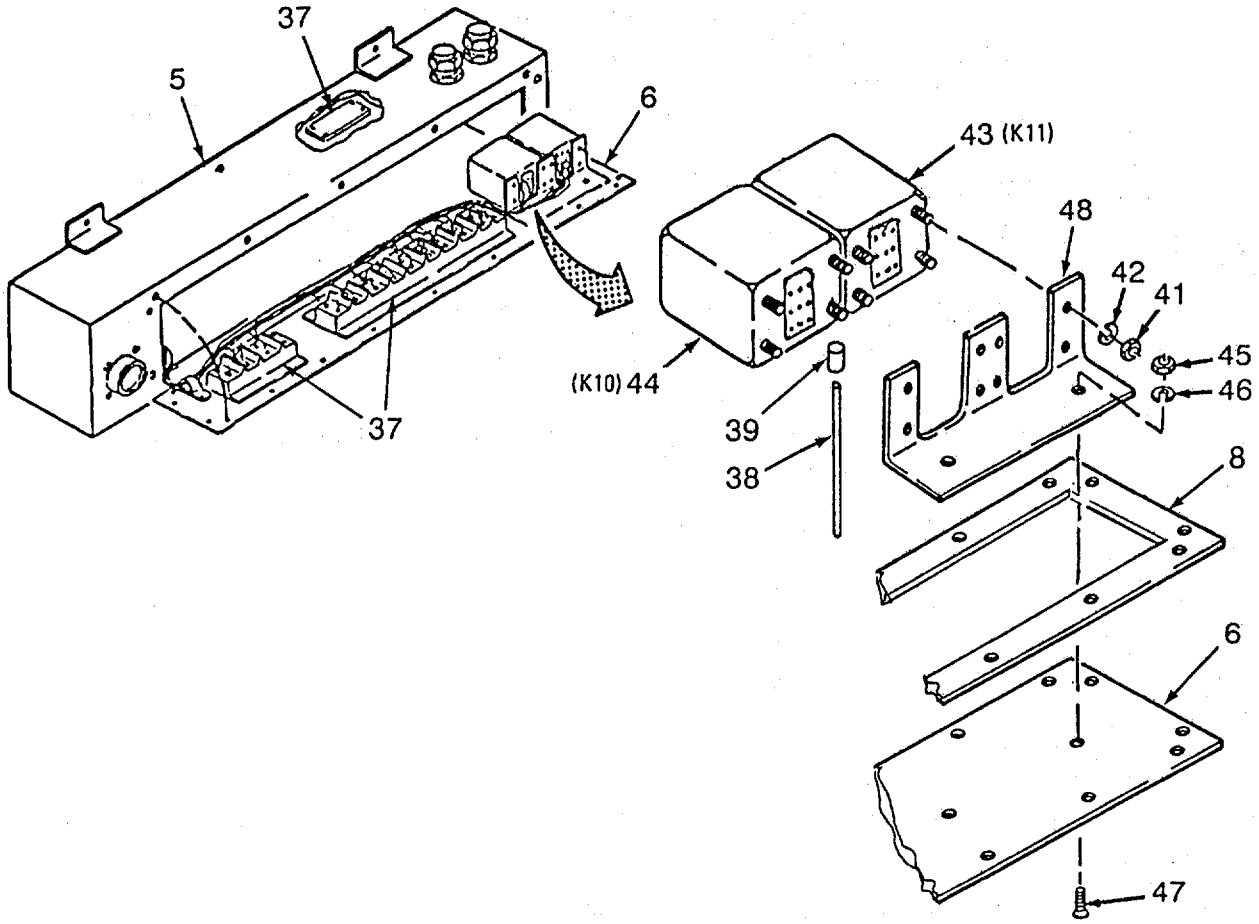
(5) Inspect switches for broken handles, cracks in body and burned contact points.

e. Repair.

(1) Replace lockwashers and gaskets.

(2) Replace defective components.

3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.



3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

f. Assembly.

(1) 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) Position lockring (14) and switch body (13) in cutout on control box (5).

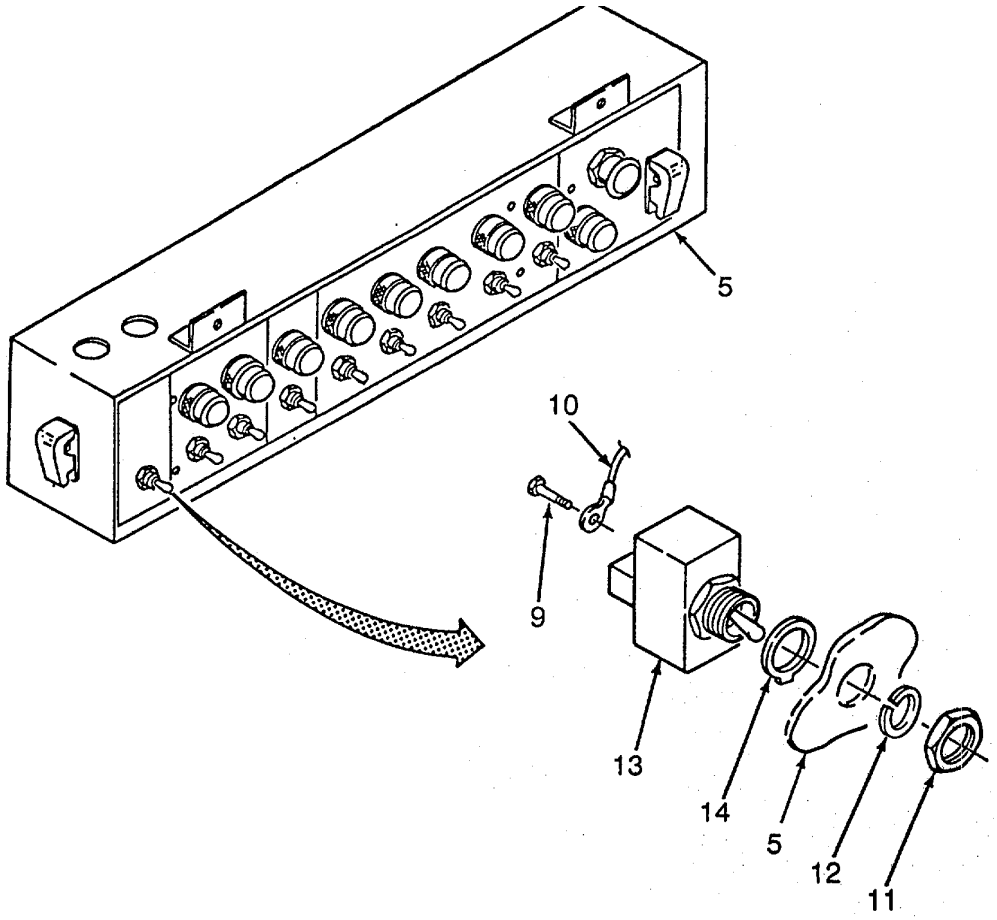
(b) Apply RTV sealant to lockring (14) to seal the switch.

(c) Install lockwasher (12) and mounting nut (11).

NOTE

Wire tags may be lost or become illegible. If this occurs, consult electrical interconnection diagrams, Appendix F, or information plate on door of junction box for connection information.

(d) Connect wires (10) as tagged, or use electrical interconnection diagram and secure with two screws (9).



3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

(2) Emergency stop switch.

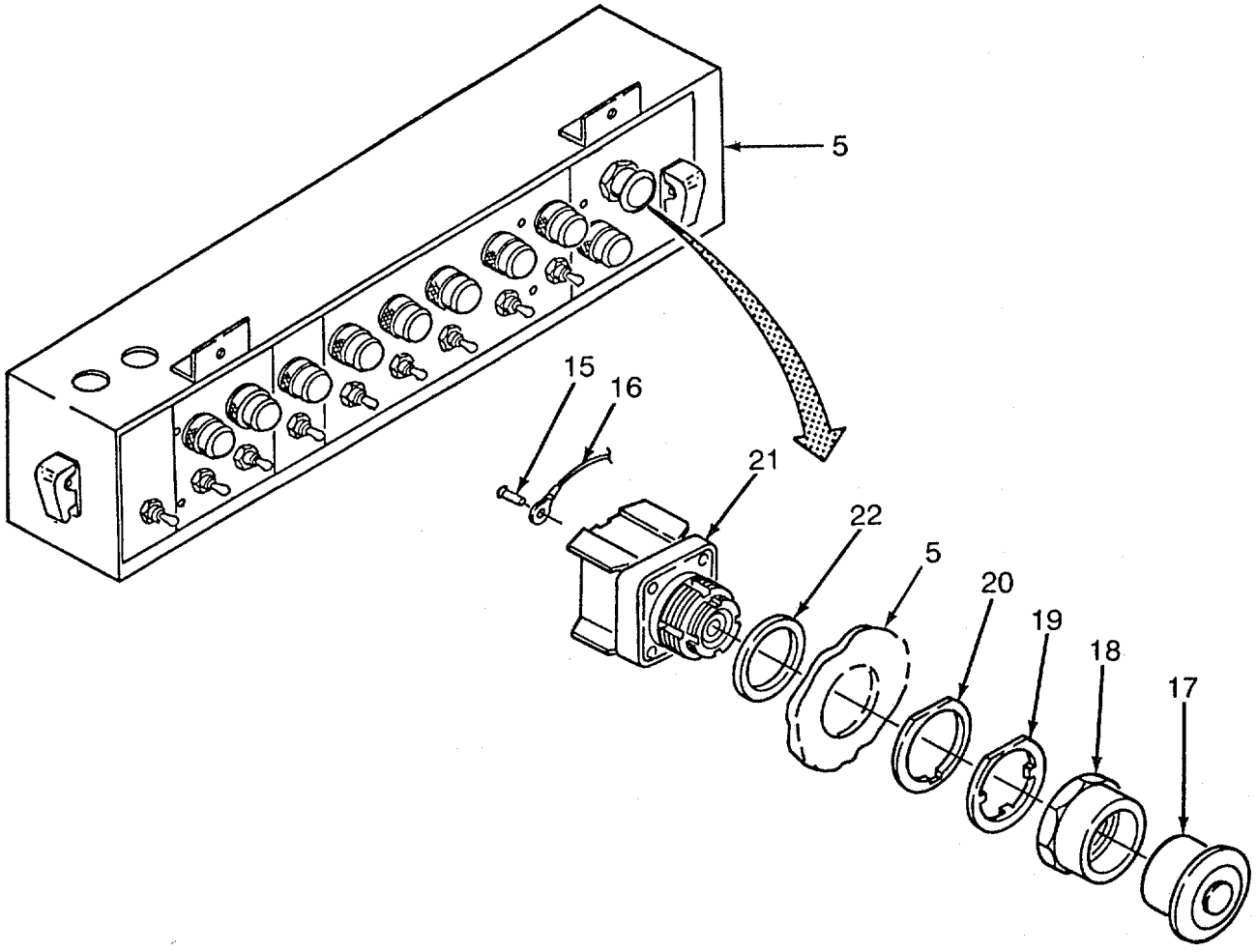
(a) Position rubber washer (22) and switch body (21) in cutout on control box assembly (5).

(b) Install fiber washer (20), keyway washer (19), locknut (18) and cap (17).

NOTE

Wire tags may be lost or become illegible. If this occurs, consult electrical interconnection diagram, Appendix F, or data plate on door of junction box for connection information.

(c) Install wires (16) as tagged, or use electrical interconnection diagram, and secure with two screws (15).



3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

(3) Indicator lampholders.

NOTE

There are nine lampholders. All are installed the same way. One is shown.

(a) Install bulb (28), flange (29) and lens (27). Allow about 1/8 inch between flange and lens when installed.

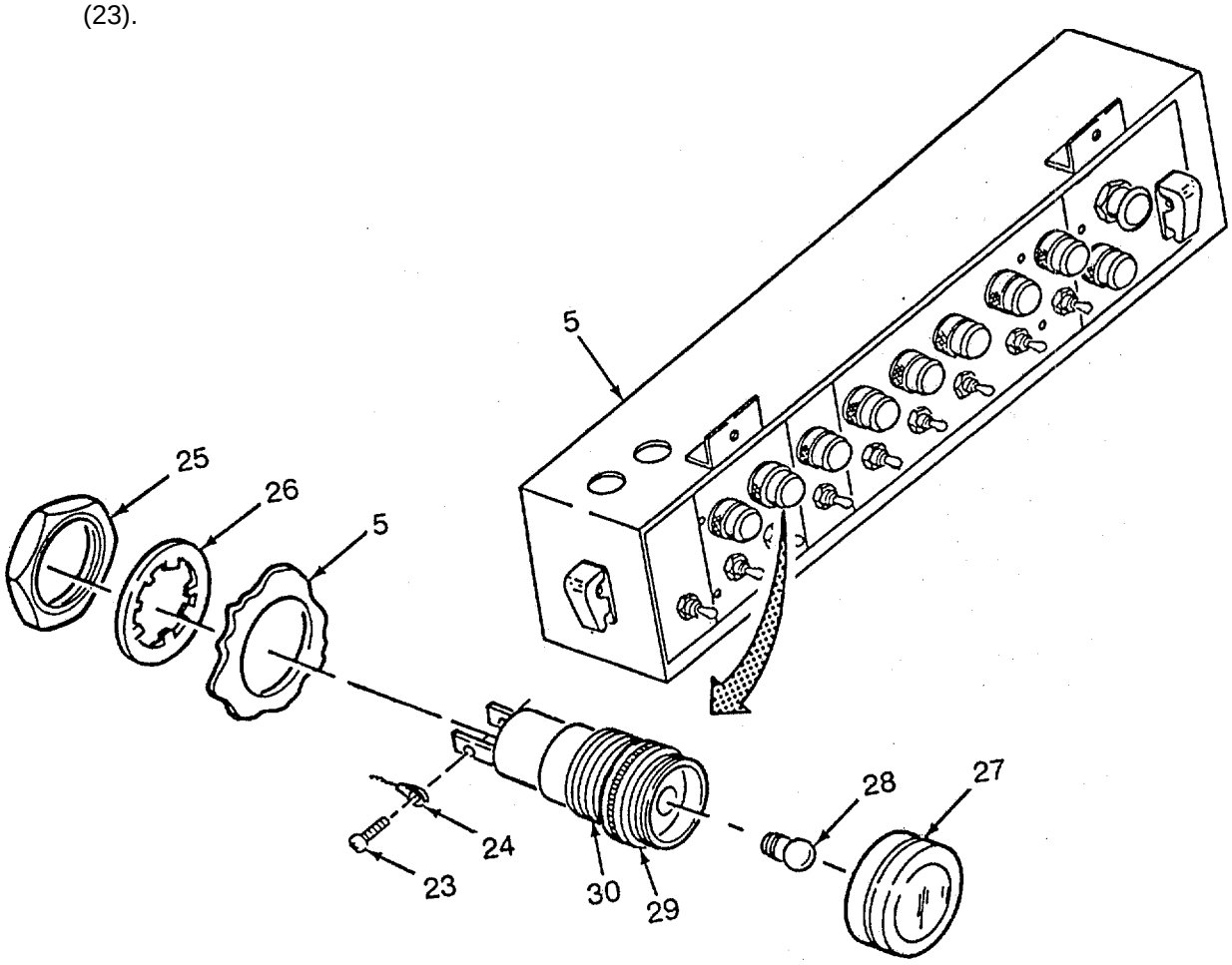
(b) From front of control box assembly (5), position lampholder (30) in cutout on control box (5).

(c) Install lockwasher (26) and nut (25).

NOTE

Wire tags may be lost or become illegible. If this occurs, consult electrical interconnection diagrams, Appendix F or data plate on door of junction box for connection information.

(d) Install three wires (23) as tagged, or use electrical interconnection diagrams, and secure with two screws (23).



3-288

3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

(4) Terminal Boards.

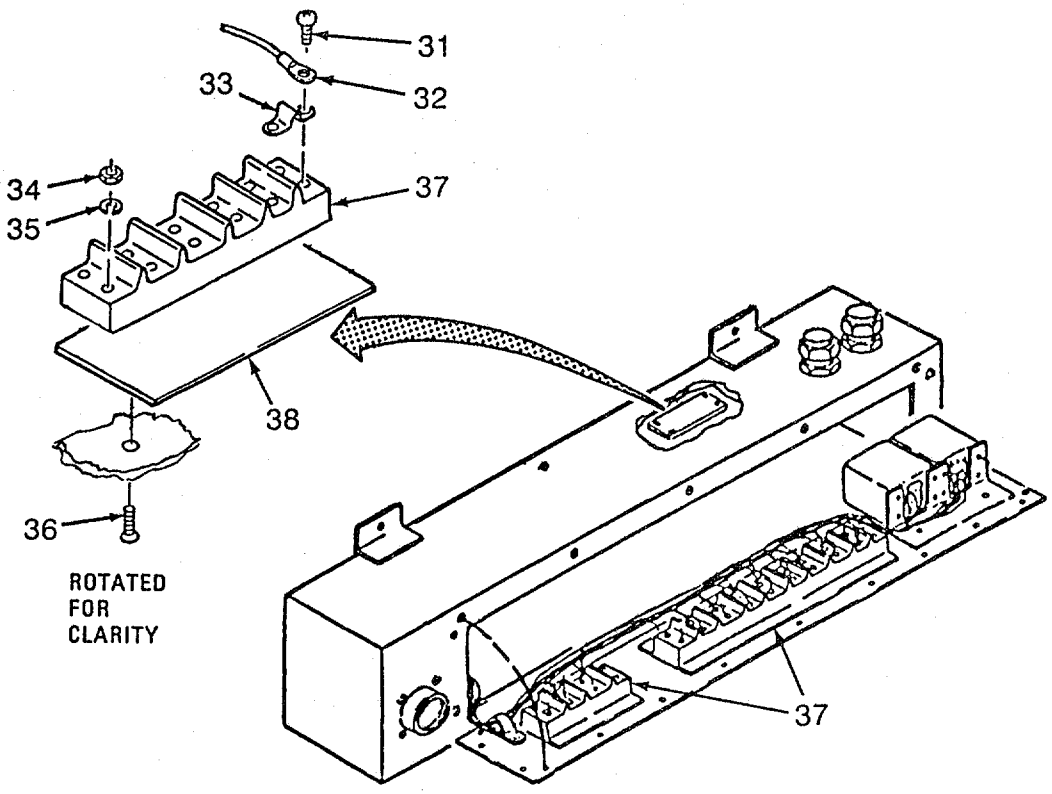
(a) Position information plate (38) and terminal board (37) in control box and aline mounting holes.

(b) At each end of terminal board (37), install two screws (36), lockwashers (35), and nuts (34).

NOTE

Wire tags may be lost or become illegible. If this occurs, consult electrical interconnection diagrams, Appendix F, or data plate on door of junction box for connection information.

(c) Position terminal links (33) and wires (32) as tagged or use electrical interconnection diagrams and install screws (31).



3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

(5) Electrical relays K10 and K11.

(a) Install sleeving (39) on wires (38) to be soldered to relays (44 and 43).

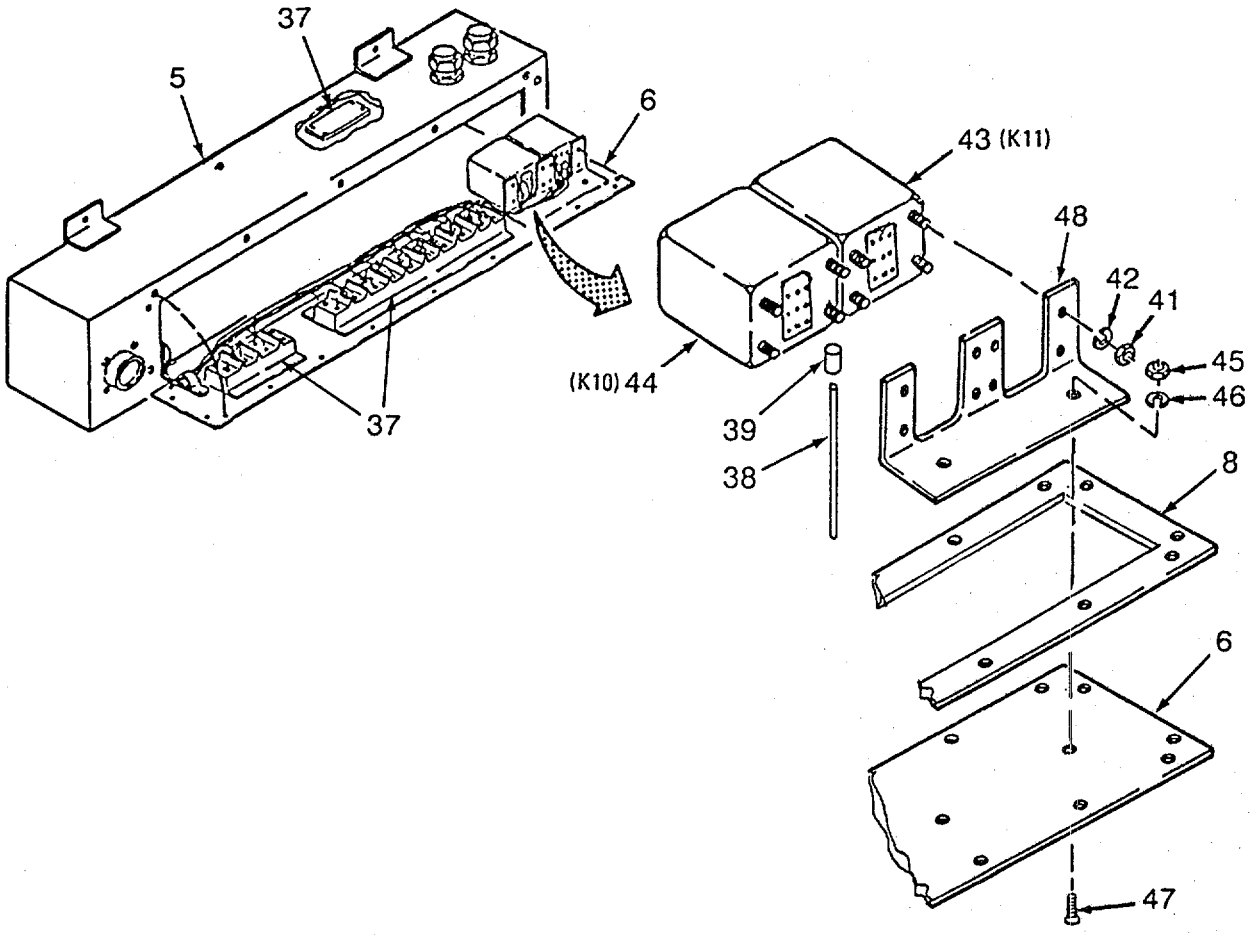
NOTE

Wire tags may be lost or become illegible. If this happens, consult electrical interconnection diagrams, Appendix F, or data plate on door of junction box for connection information.

(b) Solder wires (38) to pins on relays (44 and 43) as tagged or use electrical interconnection diagrams.

(c) Position relays (43 and 44) on bracket (48) and install four lockwashers (42) and nuts (41).

(d) Position bracket (48) on cover (6) and install two screws (47), lockwashers (46), and nuts (45).



3-49. CONTROL BOX ASSEMBLY REPAIR.-continued.

g. Installation.

WARNING

- High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before installing box.
- Control box assembly is heavy/difficult to handle. Two people are needed to lift it to prevent injury to personnel or damage to the equipment.

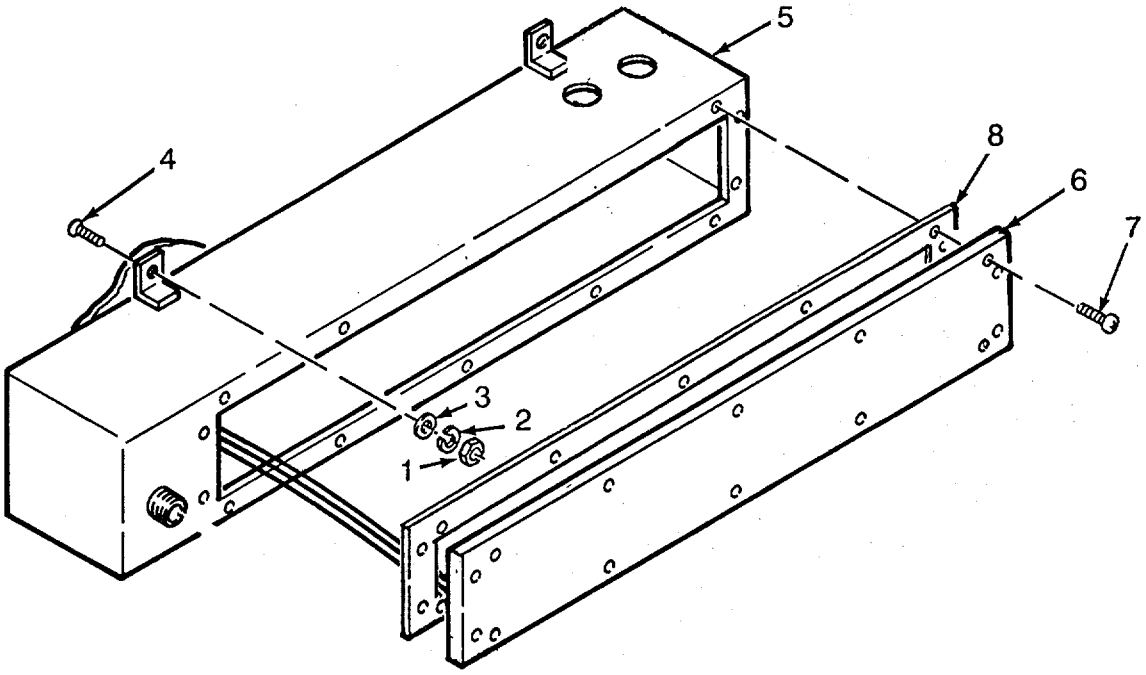
(1) Temporarily install cover (6) and secure with three or four screws (7) for ease of handling.

(2) Position control box assembly (5) in cutout on back of control panel.

(3) Support control box assembly (5) and install four screws (4), flatwashers (3), lockwashers (2), and nuts (1).

(4) Remove screws (7) and open control box (5).

(5) Install cable assemblies W48 (Paragraph 3-25), W49 (Paragraph 3-33) and W52 (Paragraph 3-27)



3-50. WIRING HARNESS, W REPAIR.

This task consists of:	a. Removal	b. Cleaning
	c. Inspection	d. Test
	e. Repair	f. Installation

INITIAL SET-UP:

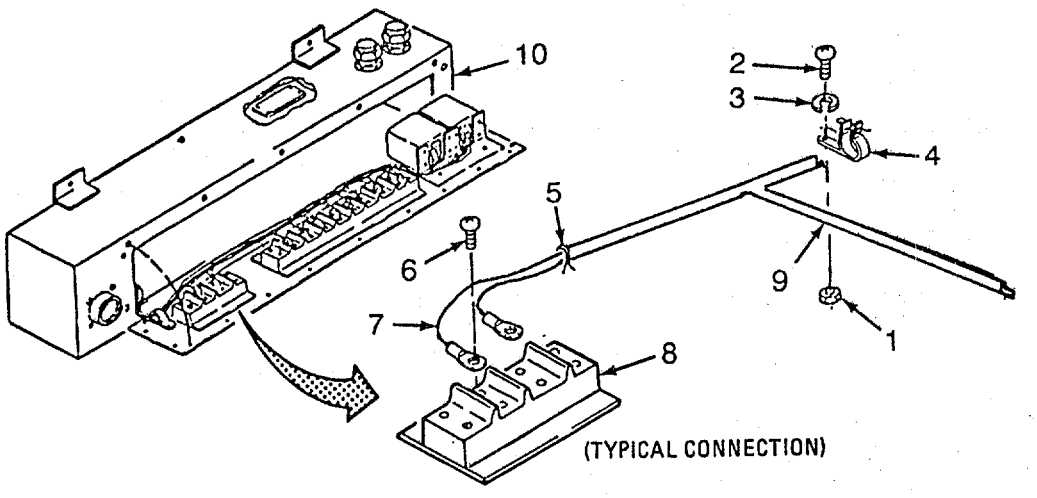
Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to repair Wiring Harness.
Material/Parts Required
Lockwashers (TM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials/Parts required to repair Wiring Harness.
Equipment Condition
Reference
Control Box Assembly removed (Paragraph 3-49).

a. Removal.

(1) Remove nuts (1), screws (2), lockwashers (3), clamps (4) and tiedown straps (5), securing cable to junction box and other wiring.

(2) Remove screws (6) and disconnect wires (7) from terminal boards (8), switches and lights injunction box. Refer to table, on opposite page for connection points.

(3) Remove wiring harness (9) from control box (10).



3-50. WIRING HARNESS, W REPAIR.-continued.

NOTE

Termination points are stamped on wires, and reference designator information (i.e. S-1, TB-1 etc.) is stamped on control box walls and cover, close to item it represents.

Termination Point A	Termination Point B	Termination Point A	Termination Point B
XDS5-2	TB6-10	TB5-3	S11-1
XDS3-2	TB6-6	XDS8-1	TB5-1
XDS4-2	TB6-8	XDS8-1	XDS9-1
XDS7-2	TB6-14	XDS5-1	XDS9-1
XDS6-2	TB6-12	XDS5-1	XDS3-1
XDS1-2	TB6-2	XDS3-1	XDS4-1
XDS2-2	TB6-4	XDS4-1	XDS7-1
XDS8-2	TB6-16	XDS7-1	XDS6-1
XDS9-2	TB6-18	XDS1-1	XDS6-1
XDS2-1	TB6-1	XDS1-1	XDS2-1
S11-5	TB6-20	S14-8	TB5-8
S11-4	TB6-19	TB5-5	TB5-7
S13-1	TB5-7	S3-4	TB6-5
S14-9	S2-2	S4-4	TB6-7
TB5-8	S1-5	S5-4	TB6-9
TB5-9	S6-5	S6-4	TB6-11
TB5-9	S7-5	S7-4	TB6-13
TB5-10	S3-5	S14-5	TB5-4
TB5-10	S4-5	S14-8	S14-2
S13-1	S5-5	S14-1	S14-6
TB5-11	S8-2		
TB5-12	S12-2		
S13-2	S11-2		

3-50. WIRING HARNESS, W REPAIR.-continued.

b. Cleaning.

Clean wiring harness with a damp rag.

c. Inspection.

Inspect wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Test wiring harness for continuity and shorts, using table on previous page as a guide.

e. Repair.

(1) Replace lockwashers.

(2) Replace all damaged and unserviceable components.

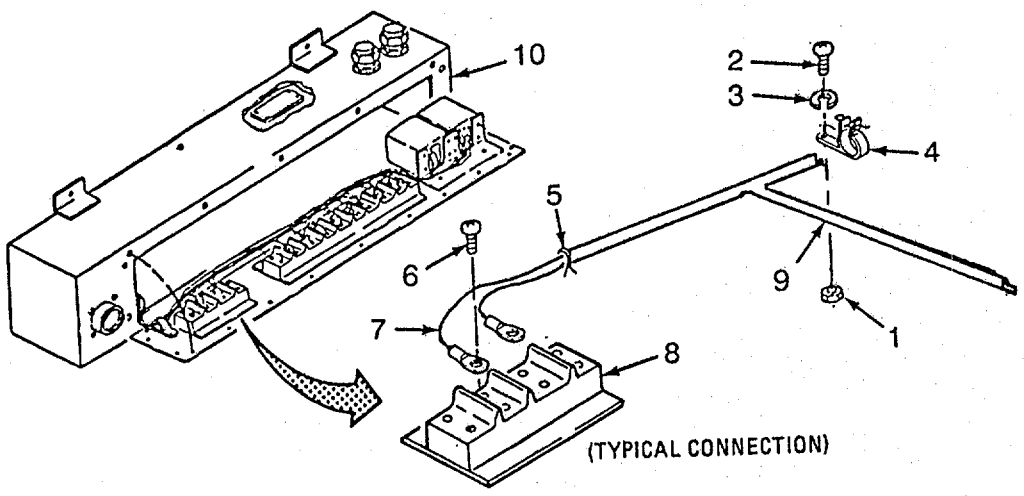
(3) Repair wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

f. Installation.

(1) Position wiring harness (9) in control box and connect wires (7) to switches, terminal boards (8) and indicator lights in accordance with information stamped on wires. Secure with screws (6)

(2) Install clamps (4) with screws (2), lockwashers (3) and nuts (1).

(3) Install tiedown straps (5) as required to secure harness to existing wiring.



3-51. WIRING HARNES, W2 REPAIR.

This task consists of:	a. Removal	b. Cleaning
	c. Inspection	d. Test
	e. Repair	f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to repair Wiring Harness.

Material/Parts Required
Lockwashers (TM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials/Parts required to repair Wiring Harness.

Equipment Condition
Reference
Control box removed from ROWPU (Paragraph 3-49).

a. Removal.

(1) Remove four nuts (1), lockwashers (2), flat washers (3), and screws (4).

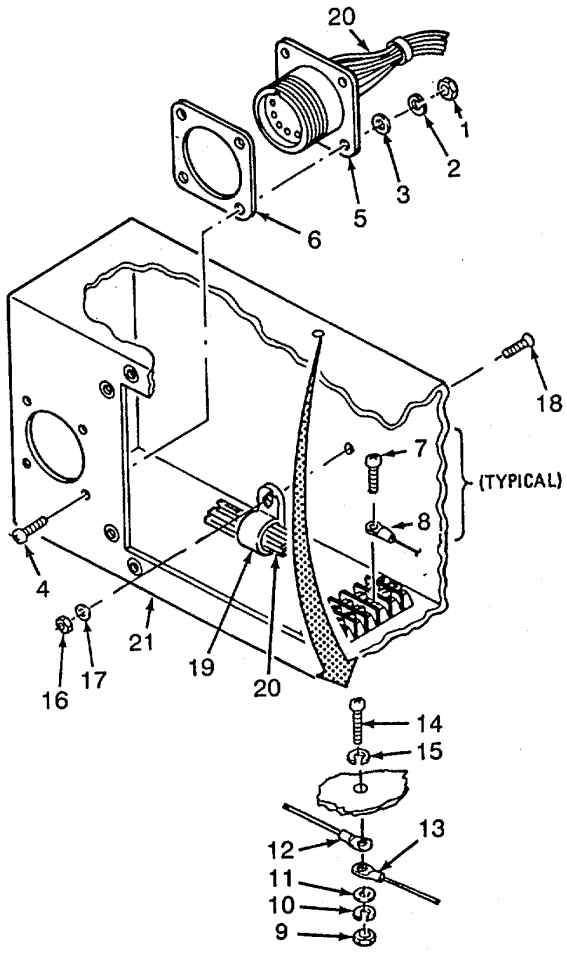
(2) Remove receptacle connector (5) and gasket (6) from control box (21).

(3) Disconnect wires (8) from switches and terminal boards etc (see table on opposite page) by removing or loosening screw (7).

(4) Remove ground lug (12) and ground wires (13) of wiring harness not removed by removing nut (9), lockwasher (10), flatwashers (11), lockwasher (15) and screw (14).

(5) Remove clamps (19) as necessary by removing nuts (16), lockwashers (17) and screws (18).

(6) Cut tiedown straps as necessary and carefully remove wiring harness (20) from control box (21).

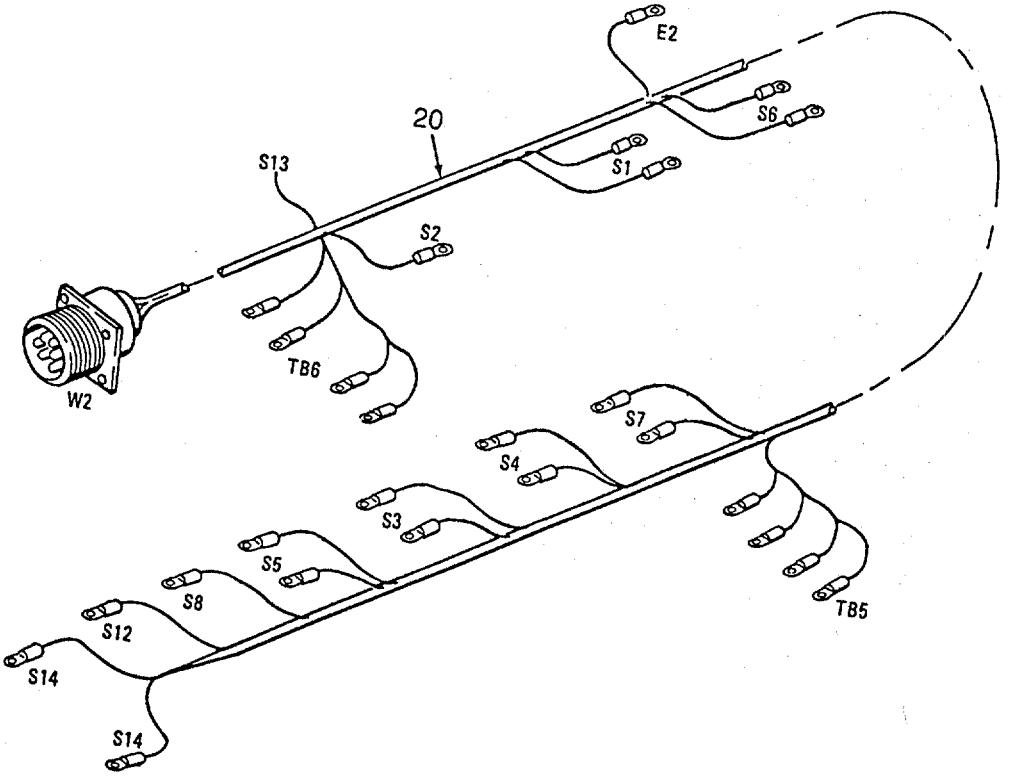


3-51. WIRING HARNES, W2 REPAIR-continued.

NOTE

Termination points B are stamped on wires, and reference designator information (i.e. S-1, TB-1 etc.) is stamped on control box walls and cover, close to item it represents.

Termination Point A	Termination Point B	Termination Point A	Termination Point B	Termination Point A	Termination Point B
J9-P	513-2	J9-H	S5-4	J9-Y	TB6-3
J9-R	TB5-7	J9-I	S6-1	J9-Z	TB6-17
J9-A	S1-1	J9-J	S6-4	J9-a	TB6-15
J9-B	S1-4	J9-K	S7-1	J9-S	TB5-1
J9-C	S3-1	J9-L	S7-4	J9-b	S2-3
J9-D	S3-4	J9-M	S12-3	J9-c	TB6-6
J9-E	S4-1	J9-N	S8-1	J9-d	S14-7
J9-F	S4-4	J9-W	S14-6	J9-e	TB5-4
J9-G	S5-1	J9-X	TB6-1	J9-T	E-2



3-51. WIRING HARNES, W2 REPAIR-continued.

b. Cleaning.

Clean Wiring harness with a damp rag.

c. Inspection.

Inspect wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Test wiring harness for continuity and shorts, using table on previous page as a guide.

e. Repair.

(1) Replace lockwashers.

(2) Replace all damaged and unserviceable components.

(3) Repair wiring harness in accordance with TM 43-0158/TO 1-lA-15 (Air Force).

f. Installation.

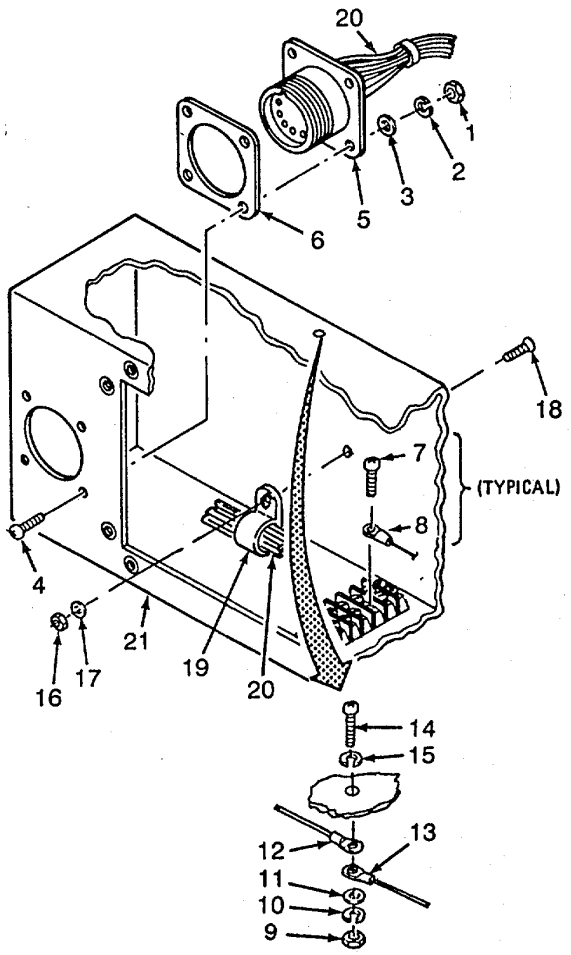
(1) Position gasket (6) and connector (5) of wiring harness (20) in cutout on control panel (21) and install four screws (4), washers (3) lockwashers (2) and nuts (1).

(2) Select wire, marked E2 on wiring harness (21) and secure to ceiling of control box along with other ground wires (13) with screw (14), lockwasher (15), flatwasher (11), lockwasher (10) and nut (9).

(3) Connect wires (8) to switches, lights and terminal boards in accordance with information stamped on wires and secure with screws (7).

(4) If removed, install clamps (19) and secure with screws (18), lockwashers (17) and nuts (16).

(5) Secure harness (20) to existing wiring with tiedown straps as required.



3-52. WIRING HARNESS, W58 REPAIR.

This task consists of:	a. Removal	b. Cleaning
	c. Inspection	d. Test
	e. Repair	f. Installation

INITIAL SET-UP:

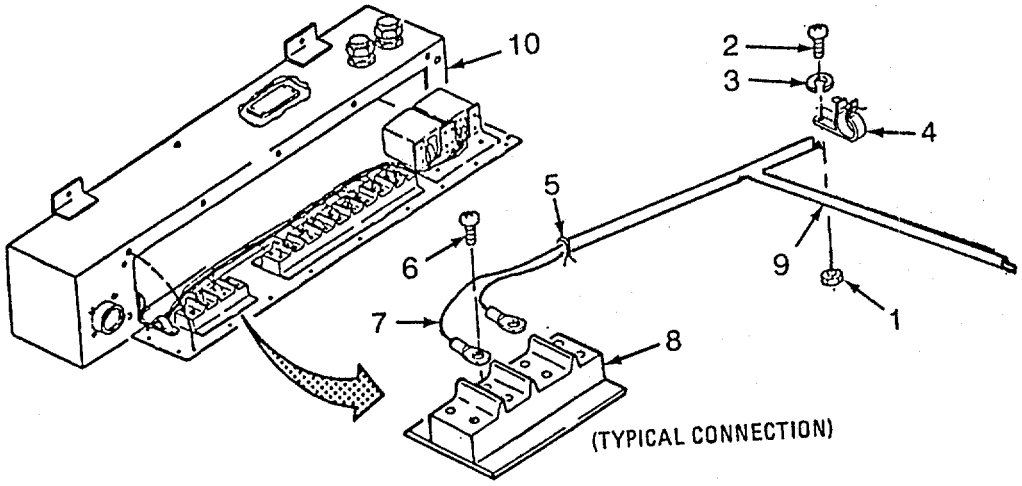
Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to repair Wiring Harness.
Material/Parts Required
Lockwashers (IM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for materials/parts required to repair Wiring Harness.
Equipment Condition
Reference
Control Box removed from ROWPU (Paragraph 3-49)

a. Removal.

(a) Remove nuts (1), screws (2), lockwashers (3), clamps (4) and tiedown straps (5), securing wiring harness (9) to junction box (10) and other wiring.

(b) Remove screws (6) and disconnect wires (7) from terminal boards (8), switches and lights injunction box. See table, on next page for connection points.

(c) Remove wiring harness (9) from control box (10).



3-52. WIRING HARNESS, W58 REPAIR-continued

NOTE

Termination points are stamped on wires, and reference designator information (i.e., S-1, TB-1, etc.) is stamped on control box walls and cover, close to item it represents.

Termination Point A	Termination Point B	Termination Point A	Termination Point B
K10-A1	TB6-20	K10-E3	TB6-1
K10-X2	TB6-19	K11-A1	TB6-20
K10-A2	TB6-10	K11-X2	TB6-19
K10-B2	TB6-8	K11-A2	TB6-18
K10-C2	TB6-6	K11-B2	TB6-16
K10-D2	TB6-4	K11-C2	TB6-14
K10-E2	TB6-2	K11-D2	TB6-12
K10-X1	TB8-1	K11-X1	TB8-1
K10-A3	TB6-9	K11-A3	TB6-17
K10-B3	TB6-7	K11-B3	TB6-15
K10-C3	TB6-5	K11-C3	TB6-13
K10-D3	TB6-3	K11-D3	TB6-11

3-52. WIRING HARNESS, W58 REPAIR- continued.

b. Cleaning.

Clean Wiring harness with a damp rag.

c. Inspection

Inspect wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Test wiring harness for continuity and shorts, using table on previous page as a guide.

e. Repair.

(1) Replace lockwashers.

(2) Replace all damaged and unserviceable components.

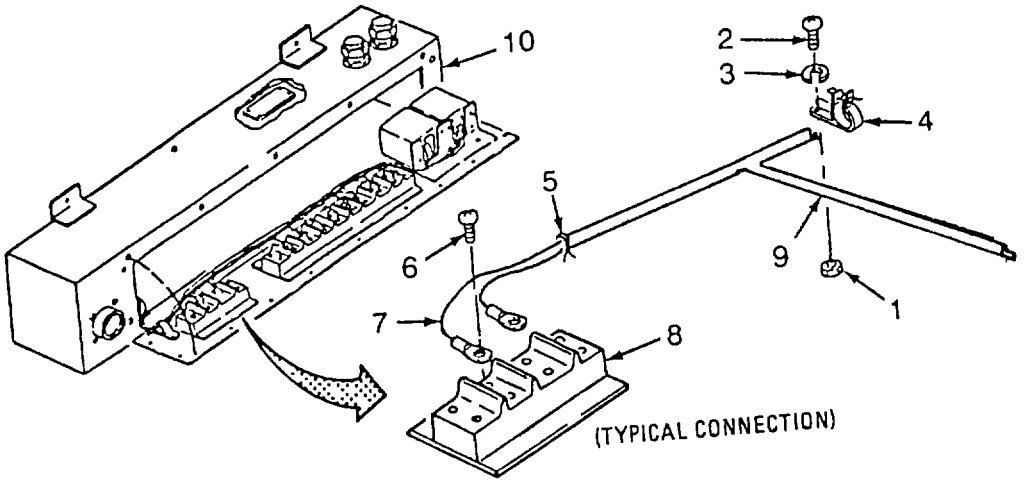
(3) Repair wiring harness in accordance with TM 43-0158/TO 1-lA-15 (Air Force).

c. Installation.

(1) Position wiring harness (9) in control box (10) and connect wires (7) to switches, terminal boards (8) and indicator lights with screws (6) in accordance with termination information stamped on wires.

(2) Install clamps (4) with screws (2), lockwashers (3) and nuts (1).

(3) Install tiedown straps (5) as required to secure harness to existing wiring.



Section XII. JUNCTION BOX ASSEMBLY MAINTENANCE PROCEDURES

3-53. JUNCTION BOX ASSEMBLY REPAIR.

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 6).
Rags, Wiping (Appendix C. Section II, Item 14).
Lockwashers (TM 10-4610-241-24P)
Personnel Required
Three
Equipment Condition
Reference
Power shut down (Power Source Manual)
Cable Assembly W38 (Ground cable) disconnected (Paragraph 3-24).
Cable Assembly W40 (Generator) disconnected (Paragraph 3-28).
Cable Assembly W41 (R.O. Pump) disconnected (Paragraph 3-26).
Cable Assembly W46 (Low Pressure Switch) disconnected (Paragraph 330).
Cable Assembly W47 (High Pressure Switch) disconnected (Paragraph 3-3 1).
Cable Assembly W50 (Chemical Feed Pump) disconnected (Paragraph 3-29).
Cable Assembly W51 (Booster Pump) disconnected (Paragraph 3-34).
Cable Assembly W52 Junction box (Control Panel/Junction Box) disconnected (Paragraph 3-27).
Cable Assembly W56 (TDS Monitor Power) disconnected (Paragraph 3-30).
Power Source Cables (WPES-20 and H-9518-2) disconnected.
General Safety Instructions

- High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before removing junction box.
- Lifting heavy/difficult to handle equipment incorrectly can cause serious injury.

a. Removal.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before removing junction box.

NOTE

Components of junction box can be replaced without removing junction box from ROWPU.

(1) Turn 13 rotary fasteners (1) counterclockwise and lower junction box cover (2)

3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.

(2) Remove four screws (3) and flat washers (4), securing circuit breaker plate (5) and insulator plate (6) to standoff(15).

WARNING

Care must be exercised when tilting plate to prevent damage to wiring and circuit breaker connectors.

(3) Tilt circuit breaker plate (5) forward to access mounting hardware.

(4) Remove three nuts (7), lockwashers (8) and screws (9).

(5) Position insulator plate (6) and circuit breaker plate (5) on standoffs (15) and install four screws (3) and flat washers (4).

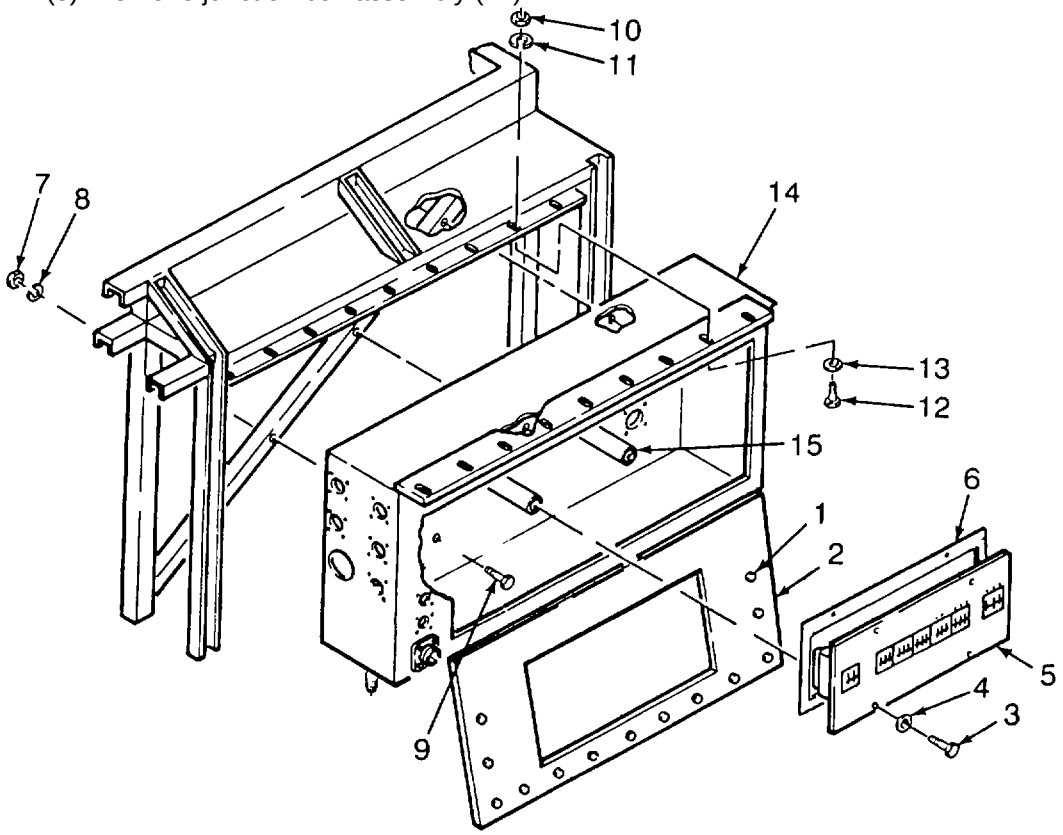
(6) Close junction box cover (2) and turn 13 rotary fasteners (1) clockwise.

WARNING

Junction box assembly is heavy/difficult to handle Three people are needed to support/lift it to prevent injury to personnel or damage to the equipment.

(7) Support junction box assembly (14) and remove nine nuts (10), lockwashers (11), flatwashers (13) and screws (12).

(8) Remove junction box assembly (14).



3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.

b. Disassembly.

(1) Circuit breakers, circuit breaker plate and standoffs.

NOTE

The following procedure applies to circuit breaker CB1. All other circuit breakers injunction box are removed in a similar manner.

(a) Turn 13 rotary fasteners (1) and open junction box cover (2).

(b) Remove four screws (3), flat washers (4) and circuit breaker plate (6) from standoffs (15).

(c) Tilt circuit breaker plate (6) forward to reach wires and attaching hardware.

NOTE

Tag all wires, indicating their connection points before removal from circuit breaker.

(d) Tag terminals (18 and 20) and remove nuts (16), flat washers (17), wire lugs (18), flatwashers (19) and spade terminals (20).

(e) Remove six screws (21), lockwashers (22), flat washers (23) and circuit breaker (24).

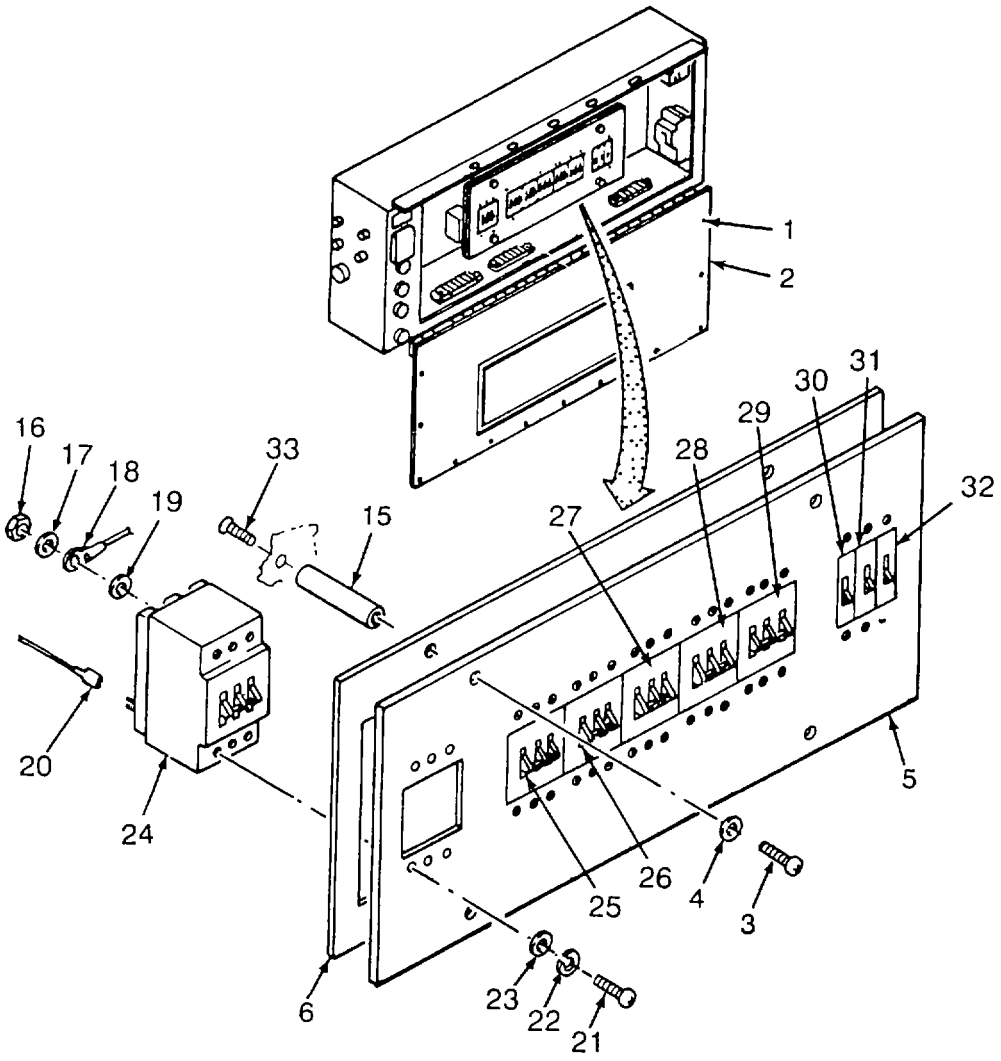
NOTE

To remove circuit breaker plate and insulator plate, it is necessary to remove all circuit breakers.

(f) Remove remaining circuit breakers (26 thru 32) from plate (5).

(g) Remove four screws (33) and standoffs (15).

3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.



3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.

(2) Control relays (low pressure [K8] and high pressure [K9] relays).

NOTE

There are two control relays in the electrical junction box assembly. Removal of K8 is shown, the other relay, K9, is removed in similar manner.

NOTE

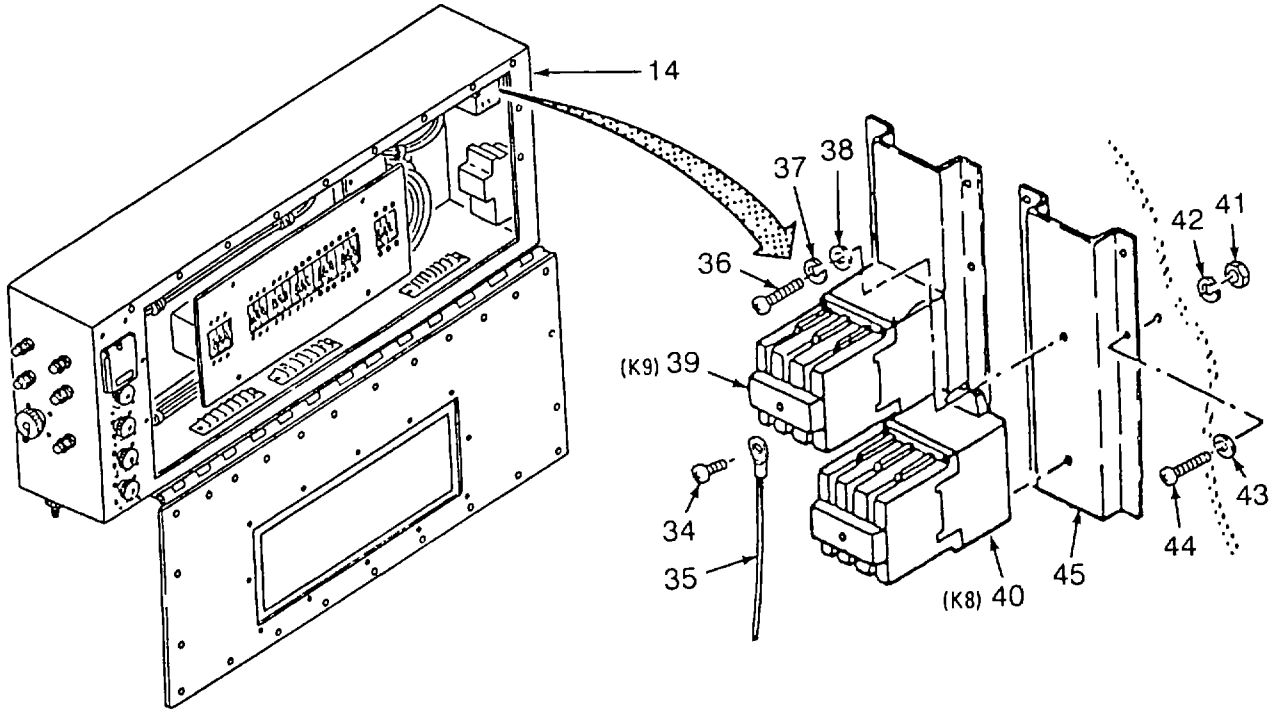
Tag all wires, indicating their connection points before removal from relays.

(a) Remove six screws (34) and eight wires (35) from control relay, K8 (40).

(b) Remove two screws (36), lockwashers (37), flatwashers (38) and control relay, K8 (40).

(c) Repeat procedure for relay, K9 (39).

(d) As required, remove nuts (41), lockwashers (42), flatwashers (43), screws (44) and bracket (45).



3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.

(3) Terminal boards and jumpers.

NOTE

- Junction box contains four terminal boards Removal of one, TB-2, is shown Others are removed In similar manner.
- Tagging wires and jumpers, indicating their connection points will facilitate Installation If marked parts are replaced, be sure to transfer tags to new parts before discarding defective parts or turning them in to Supply.

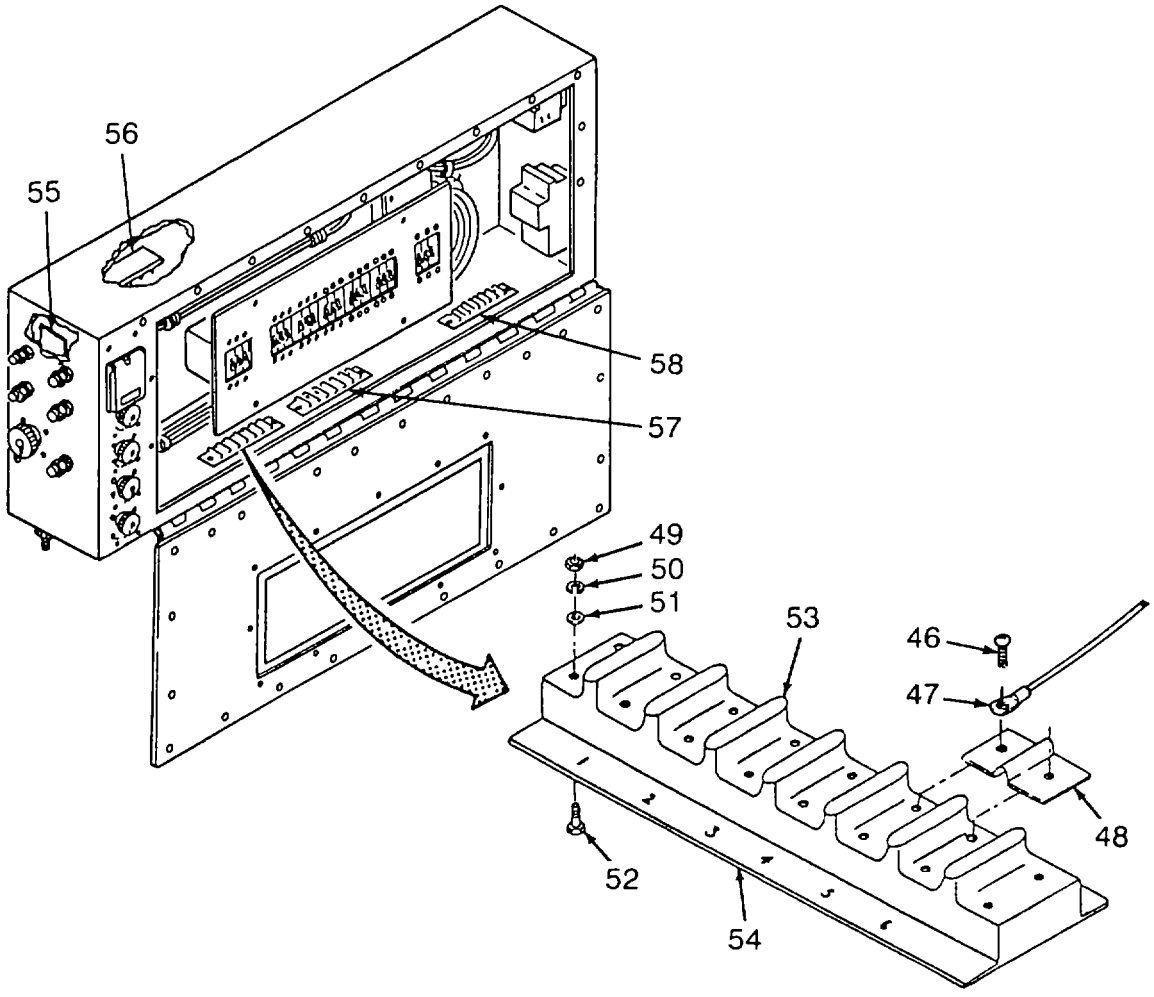
(a) Tag wire lugs (47) attached to terminal board (53) and remove screws (46).

(b) Remove wire lugs (47) and jumpers (48) from terminal board.

(c) Remove nuts (49), lockwashers (50) and flatwashers (51).

(d) Remove terminal board (53) and information plate (54).

(e) Remove terminal boards (55 thru 58) in like manner.



3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.

(4) Wiring harnesses.

Remove wiring harnesses, wire leads and receptacle connectors, refer to paragraph 3-54 thru 3-60.

(5) Motor starters.

To remove motor starters, refer to paragraph 3-61.

c. Cleaning.

Using soap solution, clean electrical junction box assembly Wipe dry with clean cloth.

d. Inspection.

(1) Inspect electrical junction box assembly and junction box cover for dents, cracks, and excessive corrosion.

(2) Inspect wires for burned, bare and cracked insulation.

(3) Inspect electrical components for cracks, burns and defective terminals.

(4) Inspect electrical connectors for bent and broken pins and damaged or worn shells.

e. Repair.

(1) Replace all lockwashers.

(2) Replace defective components.

3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.

f. Assembly.

(1) Circuit breakers, standoffs and circuit breaker plate.

NOTE

This procedure covers the installation of circuit breaker CB1. All other circuit breakers are installed in a similar manner.

(a) Install four standoffs (15) with screws (33)

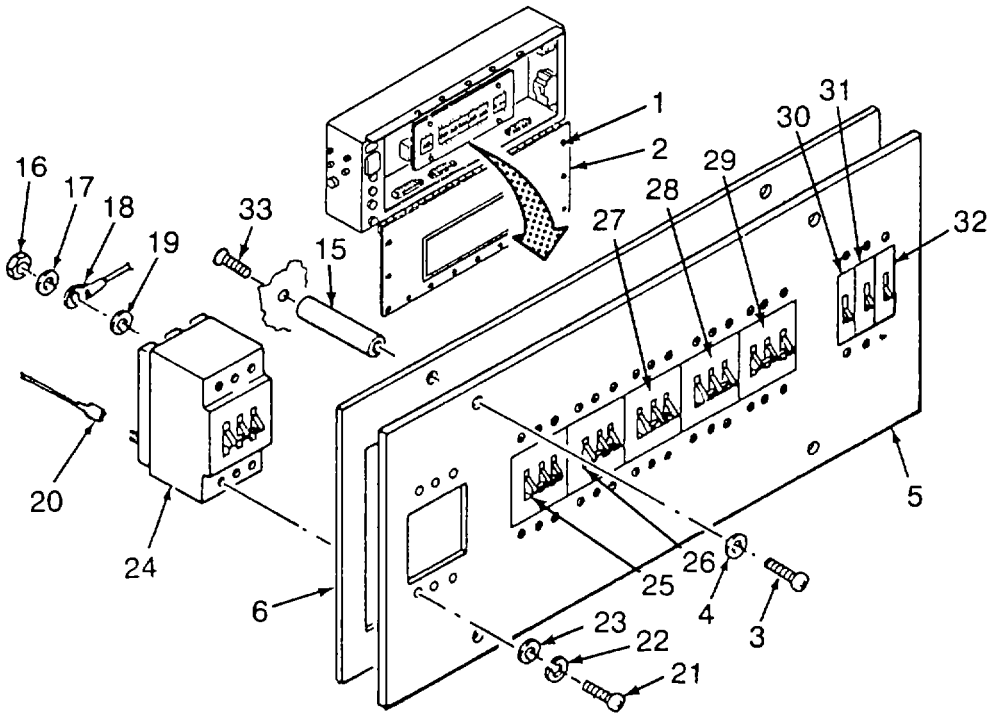
NOTE

Wire tags installed at removal may have fallen off or become illegible If this happens, check electrical interconnecting diagram, Appendix F or on back of junction box door for connection information.

(b) Install flatwashers (19), wire lugs (18) as tagged or in accordance with interconnecting diagram, lockwashers (17) and nuts (16).

(c) If required, connect spade terminals (20) as tagged or in accordance with interconnecting diagram.

(d) Position insulating plate (6) and circuit breaker plate (5) on studs (15) and install four lockwashers (4) and screws (3).



3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.

(2) Control relays.

NOTE

This procedure covers the installation of control relay, K8 The other relay, K9 is installed in similar manner.

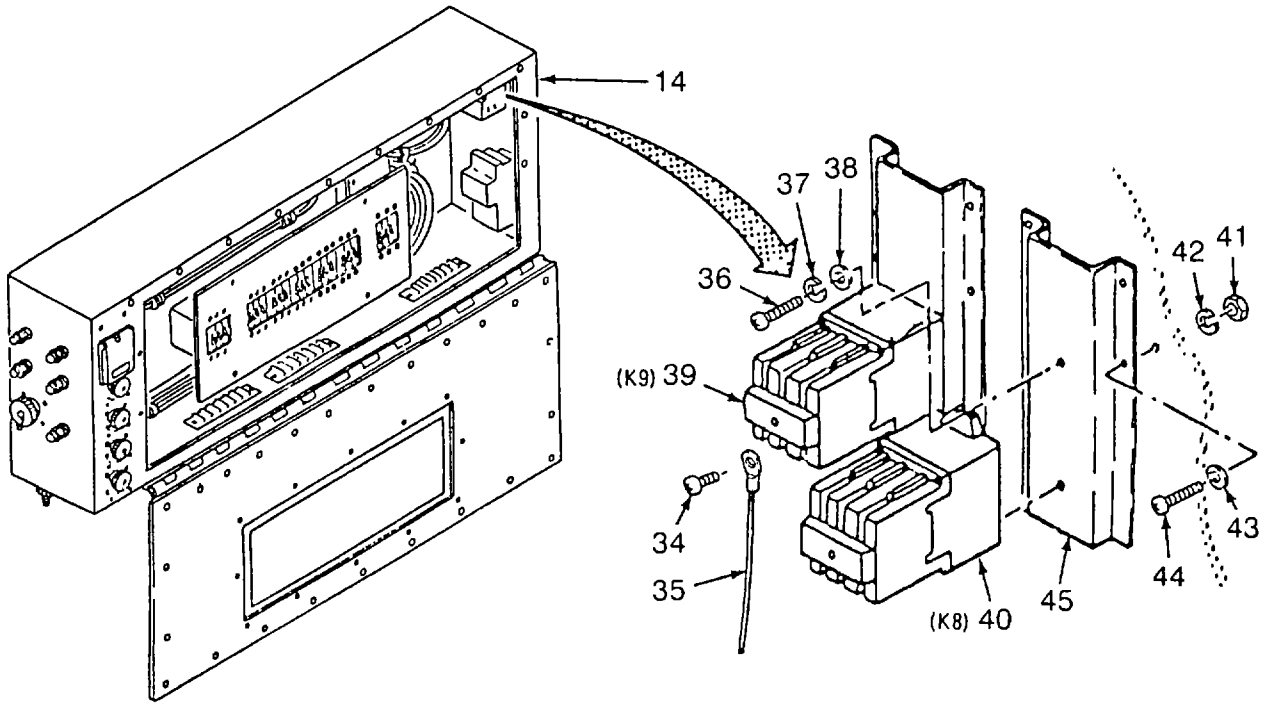
(a) Position bracket (45) on wall of junction box (14) and install screws (44), flatwashers (43), lockwashers (42) and nuts (41).

(b) Position control relay K8 (40) on bracket (45) and Install two flatwashers (38), lockwashers (37) and screws (36).

NOTE

Install wires as tagged If tags or missing or illegible, refer to electrical interconnection diagram in Appendix F of this manual or data plate on back of junction box door.

(c) Position eight wires (35) on relay K8 (40) as tagged during removal or use electrical interconnection diagram and install six screws (34).



3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.

(3) Terminal boards and jumpers.

NOTE

This procedure covers installation of TB2 Installation of other terminal boards is similar.

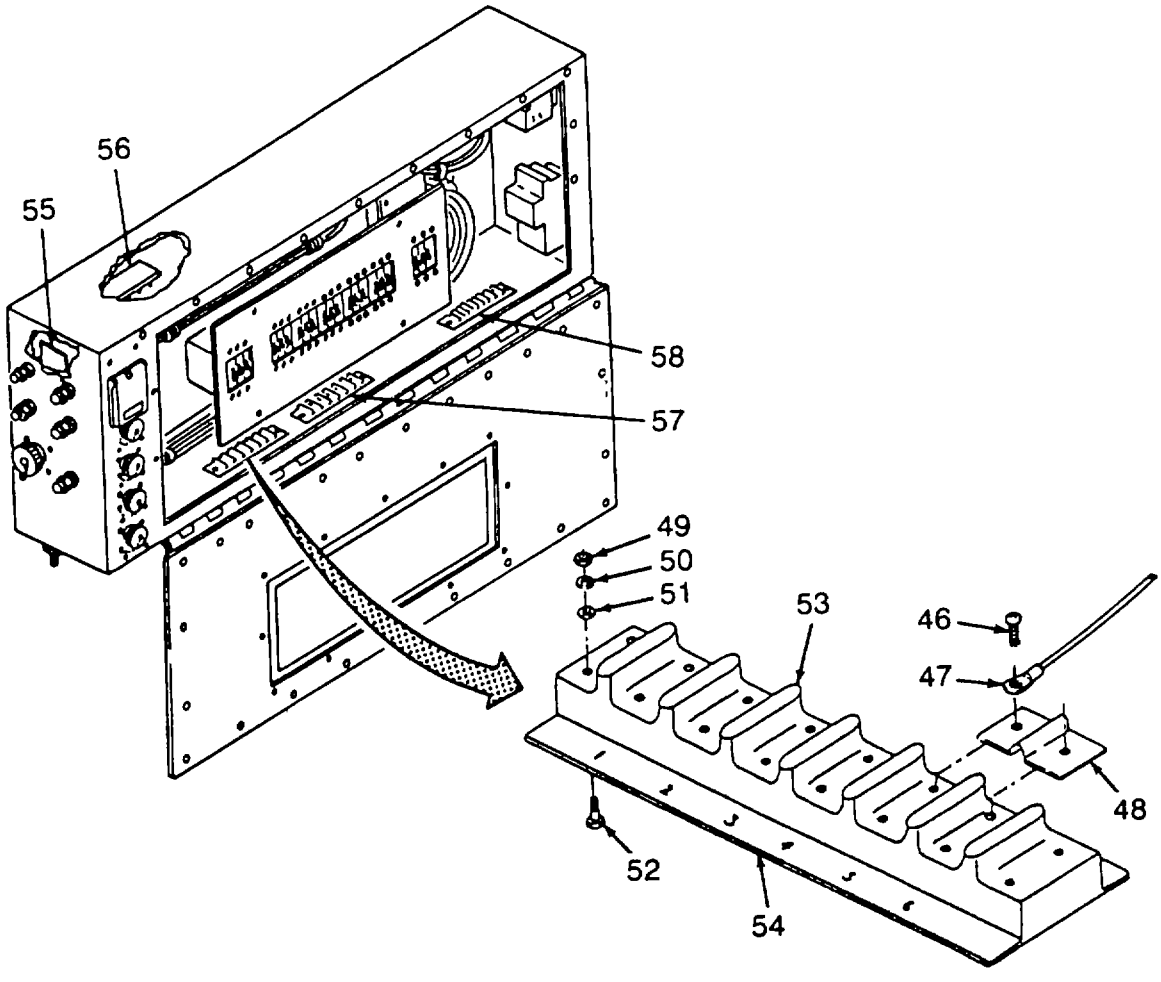
(a) Position information plate (54) and circuit board TB-2 (53) on junction box as indicated.

(b) Secure circuit board (52) to floor of junction box with screws (52), flatwashers (51), lockwashers (50) and nuts (49).

NOTE

Install wires as tagged If tags or missing or illegible, refer to electrical connection diagram in Appendix F of this manual or data plate on back of junction box door.

(c) Connect wires to terminal board as tagged during disassembly or use electrical connection diagram.



3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.

(4) Motor starters.

To install motor starters, refer to paragraph 3-61.

(5) Wiring harnesses.

To install wiring harnesses and wire leads, refer to paragraph 3-54 thru 3-60.

g. Installation.

WARNING

- High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.
- Junction box assembly is heavy/difficult to handle Three people are needed to lift it to prevent personal injury or damage to equipment.

(1) Support junction box assembly (14) on ROWPU and install nine screws (12), flatwashers (13), lockwashers (11) and nuts (10). Do not tighten nuts at this time.

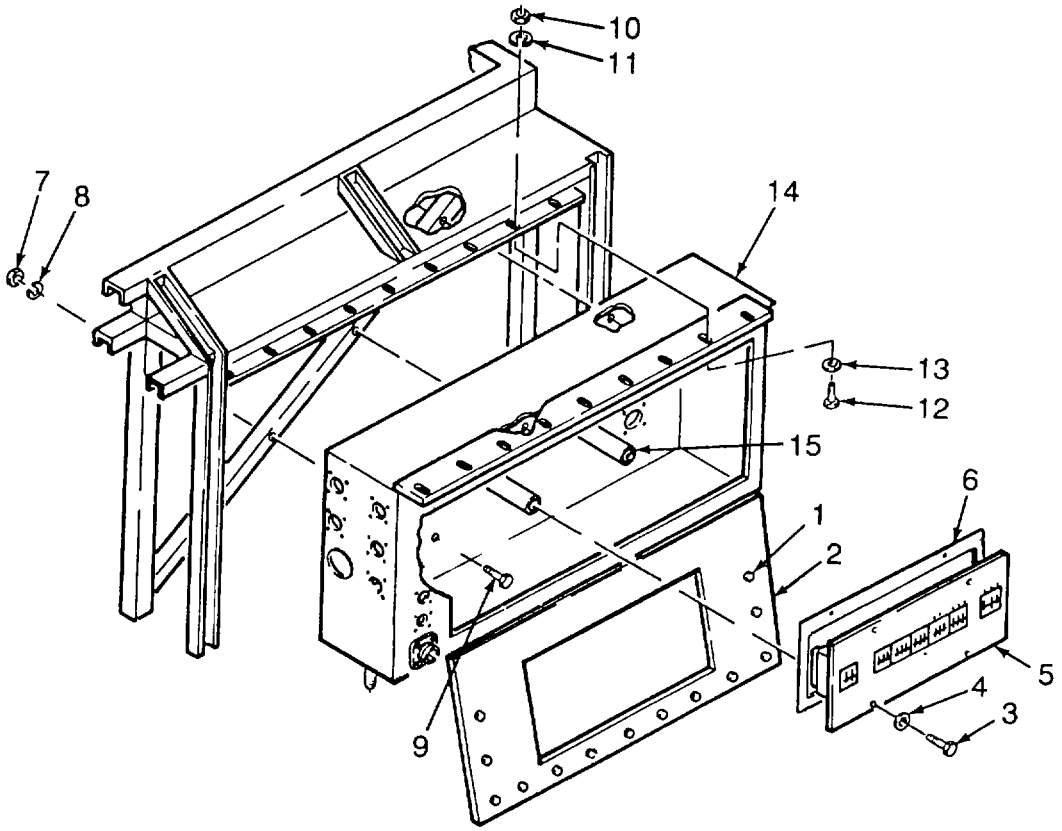
(2) Remove four screws (3) and flat washers (4) and tilt circuit breaker plate (6) forward.

(3) Aline junction box (14) with mounting holes in frame of ROWPU and install three screws (9), lockwashers (8) and nuts (7).

(4) Tighten nuts (10)

(5) Position circuit breaker plate (5) and insulator plate (6) on four standoffs (15) and install four screws (3) and flatwashers (4).

3-53. JUNCTION BOX ASSEMBLY REPAIR - continued.



3-54. WIRING HARNESS, W3 REPAIR.

This task consists of
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Tools required to repair Cable Assembly.
Material/Parts Required
Lockwashers (TM 10-4610-241-24P)
Tiedown straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials/Parts required to repair Cable Assembly.
Equipment Condition
Reference
Junction Box removed from ROWPU and Cover open (Paragraph 3-53).

a. Removal.

(1) Remove screws (1) and disconnect wire lugs (2) from termination points (table on opposite page).

(2) Cut tiedown straps (3), securing wiring harness (4) to clamps (9) and other wiring.

(3) Remove wiring harness (4) from junction box (10).

(4) As required, remove nuts (5), lockwashers (6), flatwashers (7) screws (8) and clamps (9).

b. Cleaning.

Clean wiring harness with a damp rag and allow to dry.

c. Inspection.

Inspect wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Check wiring harness for continuity and shorts using table (opposite page) as guidance.

e. Repair.

Repair wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

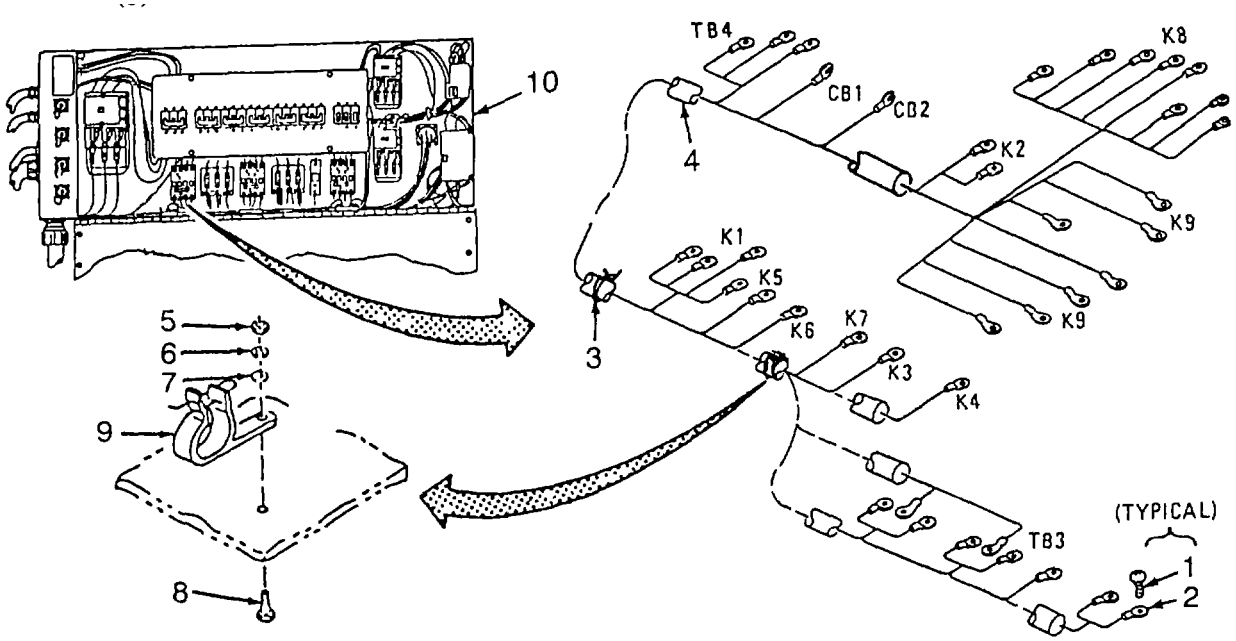
3-54. WIRING HARNESS, W3 REPAIR - continued.

f. Installation.

(1) Position wiring harness (4) injunction box (10) and connect wires (2) to terminal points, stamped on wires with screws (1).

(2) Tug wires inside clamps (9) and close clamps with tiedown straps (3) Install additional tiedown straps as required to secure harness to existing wiring.

(3) If removed, install clamps (9) with screws (8), flatwashers (7), lockwashers (6) and nuts (5).



Termination Point A	Termination Point B	Termination Point A	Termination Point B
TB4-6	K8-7	K8-6	TB4-5
K1-AUX-1	CB1-NO	K9-6	TB4-4
K1-3	K9-1	K9-6	K9-8
K9-2	K8-1	K8-7	K9-7
K8-2	K1-COIL	K1 (N)	TB3-3
K8-5	TB3-4	K2 (N)	TB3-1
K9-5	TB3-4	K3 (N)	TB3-1
K7-N	TB3-2	K4 (N)	TB3-1
K2-AUX-1	CB2-NO	K5 (N)	TB3-2
K6-N	TB3-2	K8-6	K8-8

3-55. WIRING HARNESS, W4 (JUNCTION BOX/CONTROL BOX) REPAIR.

This task consists of
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3).
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to repair Cable Assembly.
Material/Parts Required
Lockwashers (TM 10-4610-241-24P)
Tiedown straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials/Parts required to repair Cable Assembly.
Equipment Condition
Reference
Junction Box removed from ROWPU and Cover open (Paragraph 3-53)

a. Removal.

(1) Disconnect wires (2) by removing screws (1) at termination points B (table, opposite page).

(2) Remove four nuts (3), lockwashers (4), flatwashers (5), screws (6) and cap (7).

(3) Remove tiedown straps (8) as necessary to release harness (9) from clamps 15) and other wiring.

(4) Remove wiring harness (9) and gasket (10) from junction box (16).

(5) As required, remove nuts (11), lockwashers (12), flatwashers (13), screws (14) and clamps (15).

b. Cleaning.

Clean wiring harness with a damp rag and allow to dry.

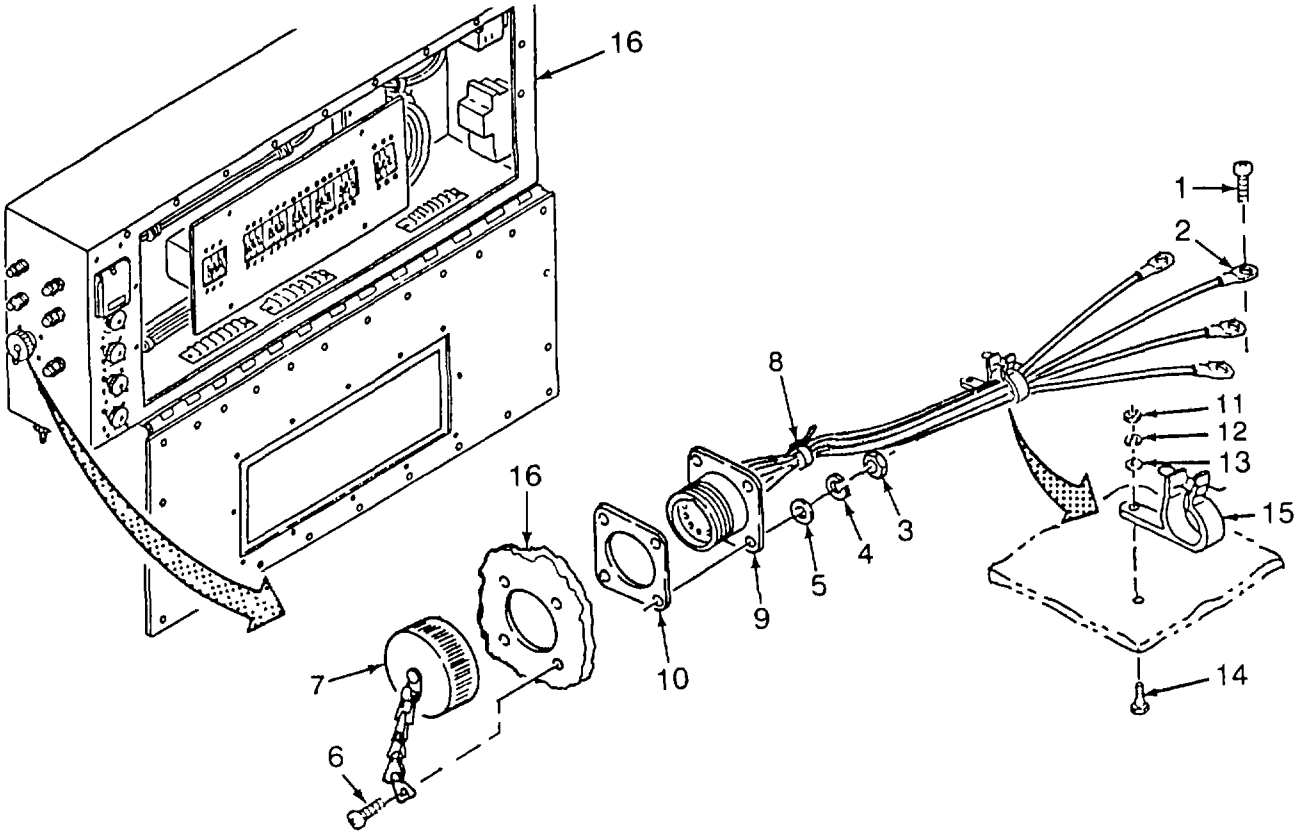
c. Inspection.

Inspect wiring harness in accordance with TM 43-0158/TO 1-lA-15 (Air Force).

d. Test.

Check wiring harness for continuity and shorts using table (opposite page) as guidance.

3-55. WIRING HARNESS, W4 (JUNCTION BOX/CONTROL BOX) REPAIR - continued.



Termination Point A	Termination Point B	Termination Point A	Termination Point B
CB9-T	J8-P	K1-COIL	J8-M
CB1-COM	J8-R	TB4-6	J8-h
K1-2	J8-A	K2-3	J8-W
K9-2	J8-B	K1-AUX-2	J8-X
K3-2	J8-C	K2-AUX-2	J8-Y
K3-3	J8-D	TB4-4	J8-Z
K4-2	J8-E	TB4-5	J8-a
K4-3	J8-F	TB3-5	J8-S
K5-2	J8-G	K2-AUX-3	J8-b
K5-3	J8-H	K2-AUX-4	J8-c
K6-2	J8-I	K2-2	J8-d
K6-3	J8-J	CB2-COM	J8-e
K7-2	J8-K	TB2-5	J8-T
K7-3	J8-L		

3-55. WIRING HARNESS, W4 (JUNCTION BOX/CONTROL BOX) REPAIR - continued.

e. Repair.

Repair wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

f. Installation.

(1) Position gasket (10) on wiring harness (9) and position wiring harness in cutout on junction box (16).

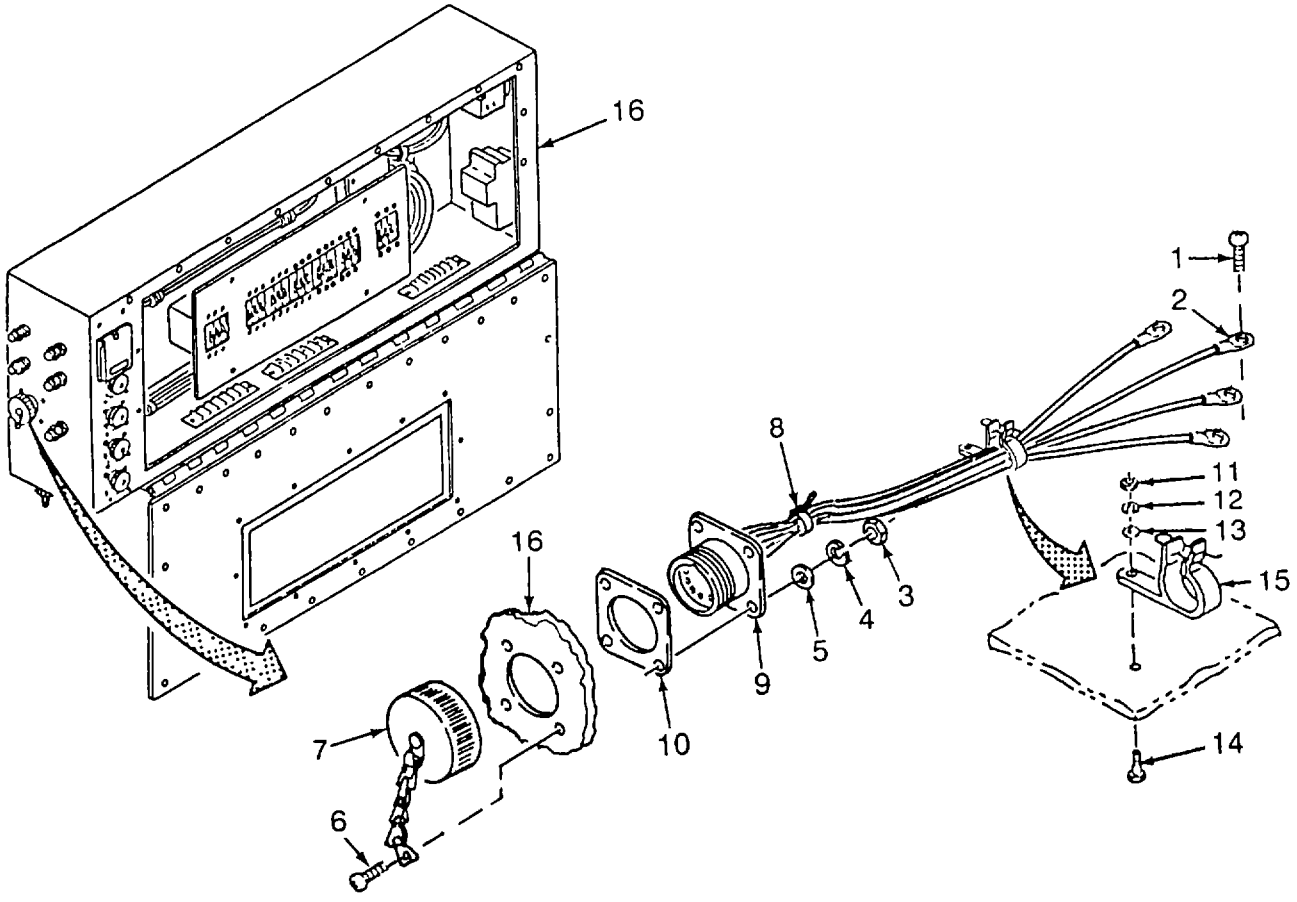
(2) Install cap (7), screws (6), flatwashers (5), lockwashers (4) and nuts (3), securing wiring harness (9) to junction box (16).

(3) Connect wires to components In junction box (16) in accordance with information stamped on wires.

(4) If removed, install cable clamps (15) with screws (14), flatwashers (13), lockwashers (12) and nuts (11).

(5) Tug wiring harness (9) inside clamps (15) and close clamps with tiedown straps (8).

(6) As required, secure wiring harness (9) to other harnesses with tiedown straps (8).



3-55. WIRING HARNESS, W4 (JUNCTION BOX/CONTROL BOX) REPAIR - continued.

Termination Point A	Termination Point B	Termination Point A	Termination Point B
CB9-T	J8-P	K1-COIL	J8-M
CB1-COM	J8-R	TB4-6	J8-h
K1-2	J8-A	K2-3	J8-W
K9-2	J8-B	K1-AUX-2	J8-X
K3-2	J8-C	K2-AUX-2	J8-Y
K3-3	J8-D	TB4-4	J8-Z
K4-2	J8-E	TB4-5	J8-a
K4-3	J8-F	TB3-5	J8-S
K5-2	J8-G	K2-AUX-3	J8-b
K5-3	J8-H	K2-AUX-4	J8-c
K6-2	J8-I	K2-2	J8-d
K6-3	J8-J	CB2-COM	J8-e
K7-2	J8-K	TB2-5	J8-T
K7-3	J8-L		

3-56. WIRING HARNESS, W5(GENERATOR) REPAIR.

This task consists of
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to repair Cable Assembly.
Material/Parts Required
Lockwashers and Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials/Parts required to repair Cable Assembly.
Equipment Condition
Reference
Junction Box removed from ROWPU and Cover open (Paragraph 3-53).

a. Removal.

(1) Disconnect wires (2) by removing screws (1) at termination points B (table, opposite page).

(2) Remove four nuts (3), lockwashers (4), flatwashers (5), screws (6) and cap (7).

(3) Remove tiedown straps (8) as necessary to release harness from clamps (15) and other wiring.

(4) Remove wiring harness (9) and gasket (10) from junction box (16).

(5) As required, remove nuts (11), lockwashers (12), flatwashers (13), screws (14) and clamps (15).

b. Cleaning.

Clean wiring harness with a damp rag and allow to dry.

c. Inspection.

Inspect wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Check wiring harness for continuity and shorts using table (opposite page) as guidance.

e. Repair.

Repair wiring harness in accordance with TM 43-0158/TO 1-IA-15 (Air Force).

3-56 WIRING HARNESS. W5 (GENERATOR) REPAIR- continued.

MODELS WPES - 20

Term Point A	Term Point B
J1-A	TB1-1
J1-B	TB1-2
J1-C	TB1-3
J1-N	TB3-6
J1-G	E-1

MODEL WPES - 10 AND 30

Term Point A	Term Point B
J1-A	TB1-1
J1-B	TB1-2
J1-C	TB1-3
J1-N	TB3-6
J1-G1	TB7-1
J1-G2	TB7-2
J1-G3	TB7-3
J1-G4	TB7-4

3-56. WIRING HARNESS, W5 (GENERATOR) REPAIR - continued.

f. Installation.

(1) Position gasket (10) on wiring harness (9) and position wiring harness in cutout on junction box (16).

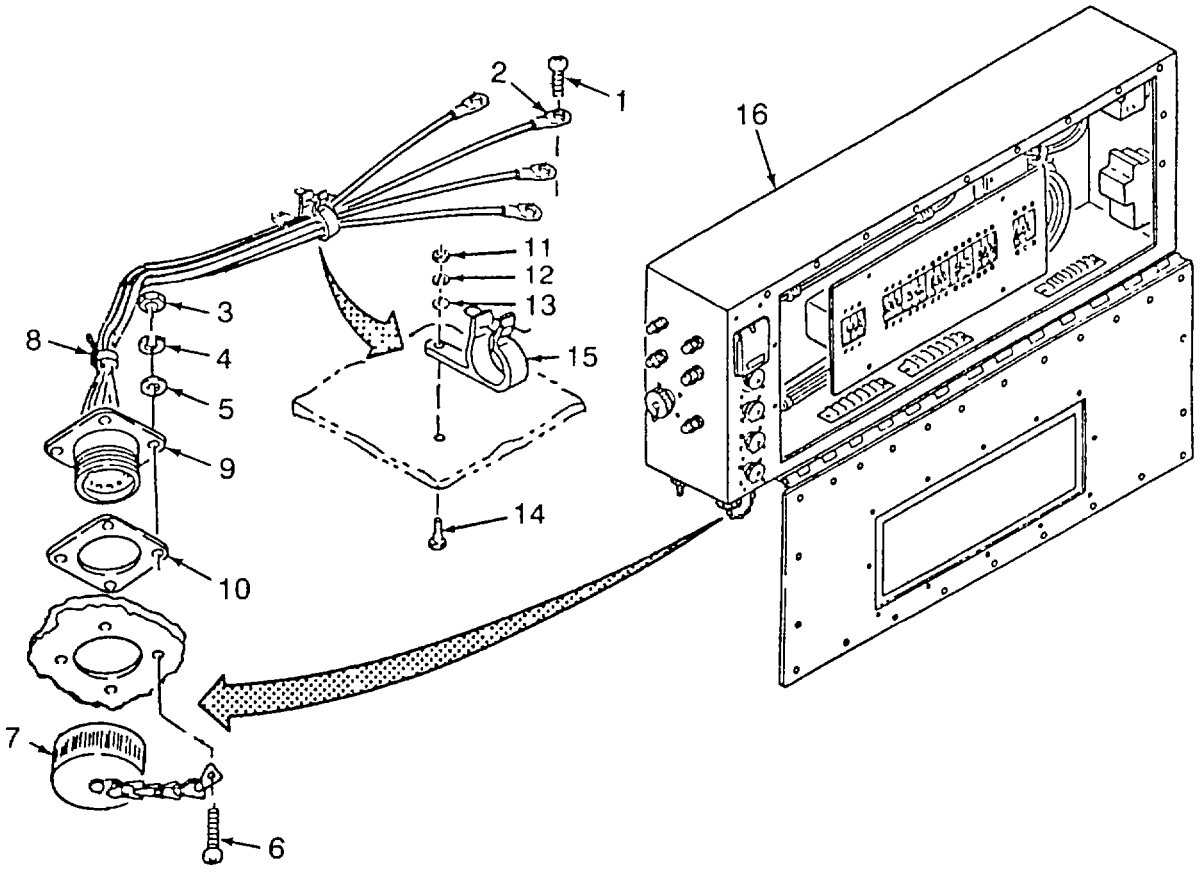
(2) Install cap (7), screws (6), flatwashers (5), lockwashers (4) and nuts (3), securing wiring harness (9) to junction box.

(3) Connect wires to components in unction box in accordance with information stamped on wires.

(4) If removed, install cable clamps (15) with screws (14), flatwashers (13), lockwashers (12) and nuts (11).

(5) Tug wiring harness (9) inside clamp (15) and close clamps (15) with tiedown straps.

(5) As required, secure wiring harness (9) to other harnesses with tiedown straps (8).



3-56. WIRING HARNESS, W5 (GENERATOR) REPAIR - continued.

MODELS WPES-20 AND H-9518-2

Term Point A	Term Point B
J1-A	TB1-1
J1-B	TB1-2
J1-C	TB1-3
J1-N	TB1-6
J1-G	E-1

MODELS WPES-10, H-9518-1, WPES-30 AND H-9518-3

Term Point A	Term Point B
J1-A	TB1-1
J1-B	TB1-2
J1-C	TB1-3
J1-N	TB3-6
J1-G1	TB7-1
J1-G2	TB7-2
J1-G3	TB7-3
J1-G4	TB7-4

3-57. WIRING HARNESS, W6, W7, W8, W9 (EXTERNAL PUMPS) REPAIR.

This task consists of:
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to repair Cable Assembly.
Material Parts Required
Lockwashers (TM 10-4610-241-24P)
Tiedown Straps (TM 10-4610-241 -24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials/Parts required to repair Cable Assembly.
Equipment Condition
Reference
Junction Box removed from ROWPU and Cover open (Paragraph 3-53).

a. Removal.

NOTE
This procedure covers removal of wiring harness W7. Wiring harnesses W6, W8 and W9 are removed in a similar manner.

(1) Disconnect wires (2) by removing screws (1) at termination points B (see table, opposite page).

(2) Remove four nuts (3), lockwashers (4), flatwashers (5) screws (6) and cap (7).

(3) Remove tiedown straps (8) as necessary to release harness (9) from clamps (15) and other wiring.

(4) Remove wiring harness (9) and gasket (10) from junction box (16).

(5) As required, remove nuts (11), lockwashers (12), flatwashers (13). screws (14) and clamps (15).

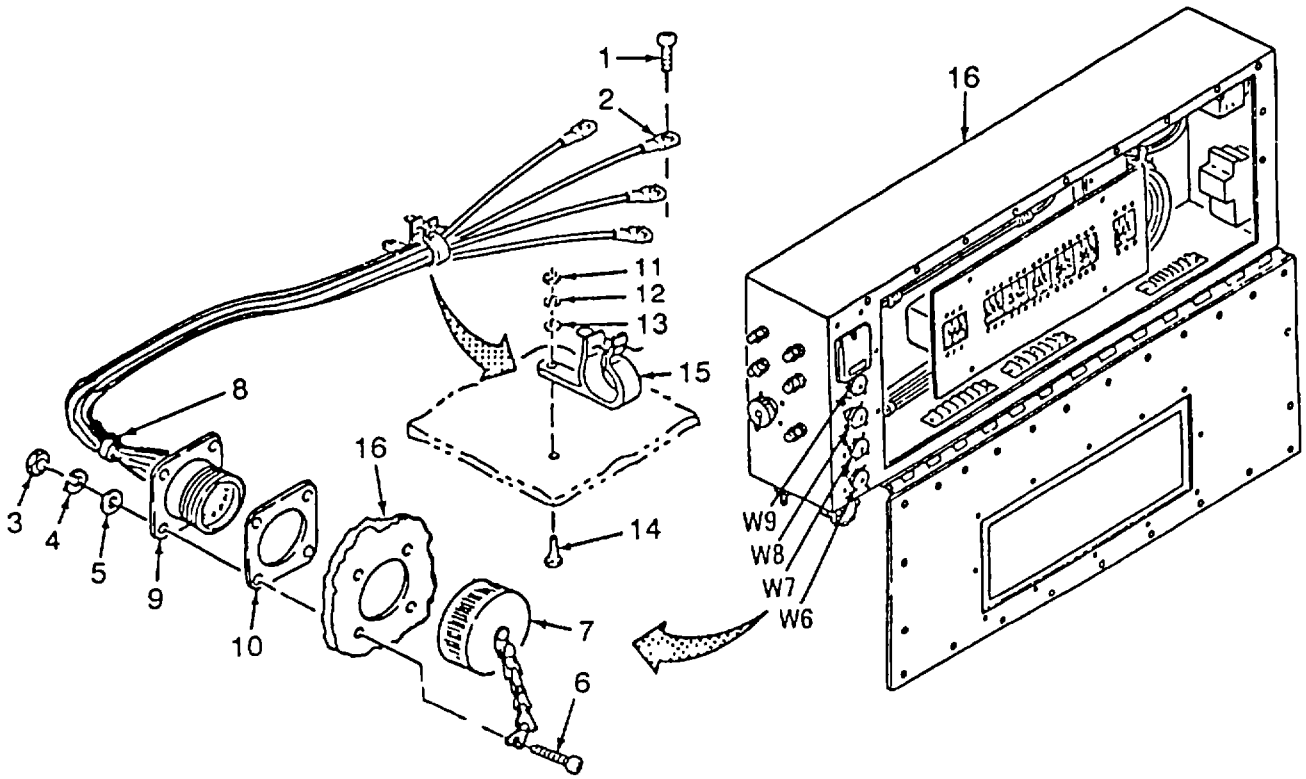
b. Cleaning.

Clean wiring harness with a damp rag and allow to dry.

c. Inspection.

Inspect wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

3-57. WIRING HARNESS W6, W7, W8, W9 (EXTERNAL PUMPS) REPAIR.- continued



Wiring Harness W6

Term Point A	Term Point B
J2-A	K2-T1
J2-B	K2-T2
J2-C	K2-T3
J2-D	TB2-3

Wiring Harness W7

Term Point A	Term Point B
J3-A	K3-T1
J3-B	K3-T2
J3-C	K3-T3
J3-D	TB2-4

Wiring Harness W8

Term Point A	Term Point B
J4-A	K4-T1
J4-B	K4-T2
J4-C	K4-T3
J4-D	TB2-4

Wiring Harness W9

Term Point A	Term Point B
J5-A	K5-T1
J5-B	K5-T2
J5-C	K5-T3
J5-D	TB2-2

3-57. WIRING HARNESSES W6, W7, W8 AND W9 (EXTERNAL PUMPS) REPAIR-continued.

d. Test

Check wiring harness for continuity and shorts using table (opposite page) as guidance.

e. Repair.

Repair cable assembly in accordance with TM 43-0158T0O 1-1A-15 (Air Force).

f. Installation.

(1) Position gasket (10) on wiring harness (9) and position wiring harness in cutout on junction box (16).

(2) Install cap (7), screws (6), flatwashers (5), lockwashers (4) and nuts (3), securing wiring harness (9) to junction box (16).

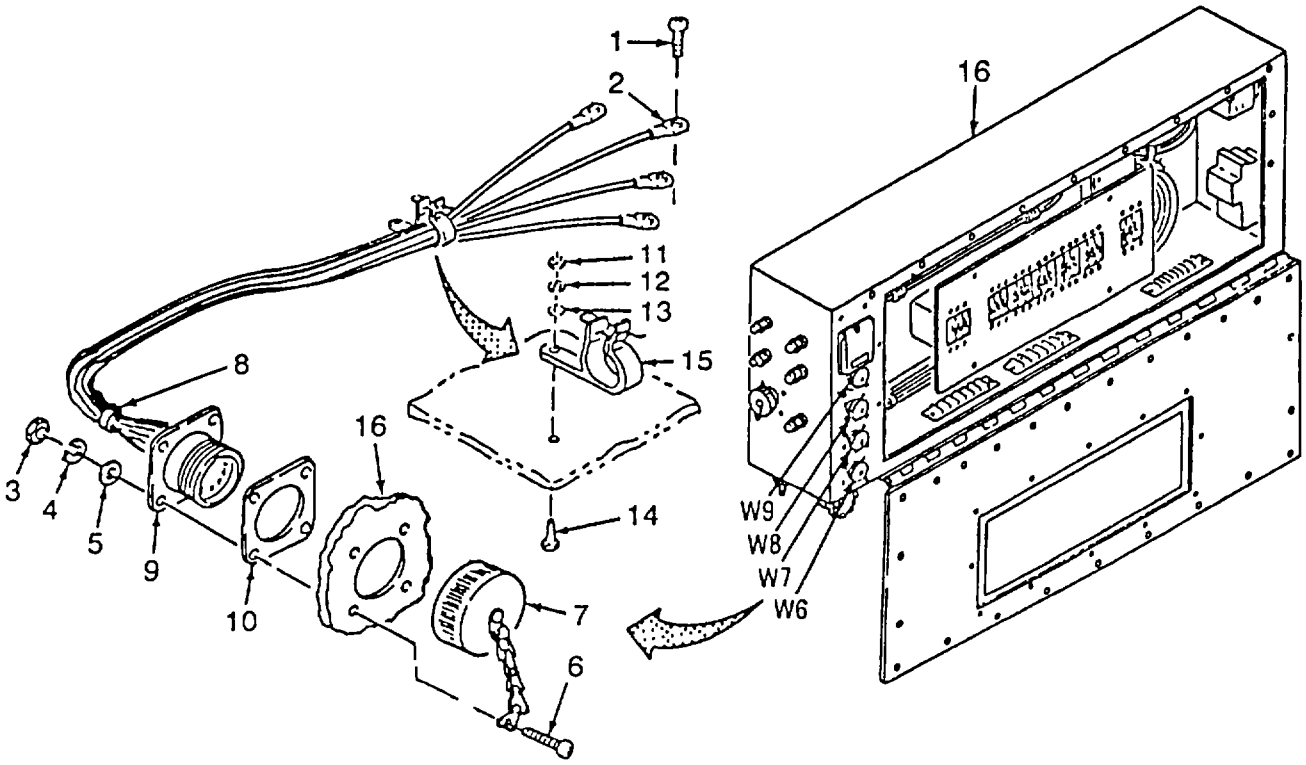
(3) Connect wires to components in junction box in accordance with information stamped on wires.

(4) If removed, install cable clamps (15) with screws (14), flatwashers (13), lockwashers (12) and nuts (11).

(5) Tug wiring harness (9) inside clamp (15) and close clamps with tiedown straps (8).

(5) As required, secure wiring harness (9) to other harnesses with tiedown straps (8).

3-57. WIRING HARNESSES, W6, W7, W8 AND W9 (EXTERNAL PUMPS) REPAIR -continued.



Wiring Harness W6

Term Point A	Term Point B
J2-A	K2-T1
J2-B	K2-T2
J2-C	K2-T3
J2-D	TB2-3

Wiring Harness W7

Term Point A	Term Point B
J3-A	K3-T1
J3-B	K3-T2
J3-C	K3-T3
J3-D	TB2-4

Wiring Harness W8

Term Point A	Term Point B
J4-A	K4-T1
J4-B	K4-T2
J4-C	K4-T3
J4-D	TB2-4

Wiring Harness W9

Term Point A	Term Point B
J5-A	K5-T1
J5-B	K5-T2
J5-C	K5-T3
J5-D	TB2-2

3-58. WIRING HARNESS, W10 (RO PUMP MOTOR) REPAIR.

This task consists of
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to repair Cable Assembly.
Material/Parts Required
Lockwashers and Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials/Parts required to repair Cable Assembly.
Equipment Condition
Reference
Junction Box removed from ROWPU and Cover open (Paragraph 3-53)

a. Removal.

(1) Disconnect wires (2) by removing screws (1) at termination points B (see table, opposite page).

(2) Remove four nuts (3), lockwashers (4), flatwashers (5), screws (6) and cap (7).

(3) Remove tiedown straps (8) as necessary to release harness (9) from clamps (15) and other wiring.

(4) Remove wiring harness (9) and gasket (10) from junction box (16).

(5) As required, remove nuts (11), lockwashers (12), flatwashers (13), screws (14) and clamps (15).

b. Cleaning.

Clean wiring harness with a damp rag and allow to dry.

c. Inspection.

Inspect wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Check wiring harness for continuity and shorts using table (opposite page) as guidance.

3-58. WIRING HARNESS, W10 (RO PUMP MOTOR) REPAIR - continued.

e. Repair.

Repair wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

f. Installation.

(1) Position gasket (10) on wiring harness (9).

(2) Position wiring harness (9) in cutout on junction box and install cap (7), screws (6), flatwashers (5), lockwashers (4) and nuts (3).

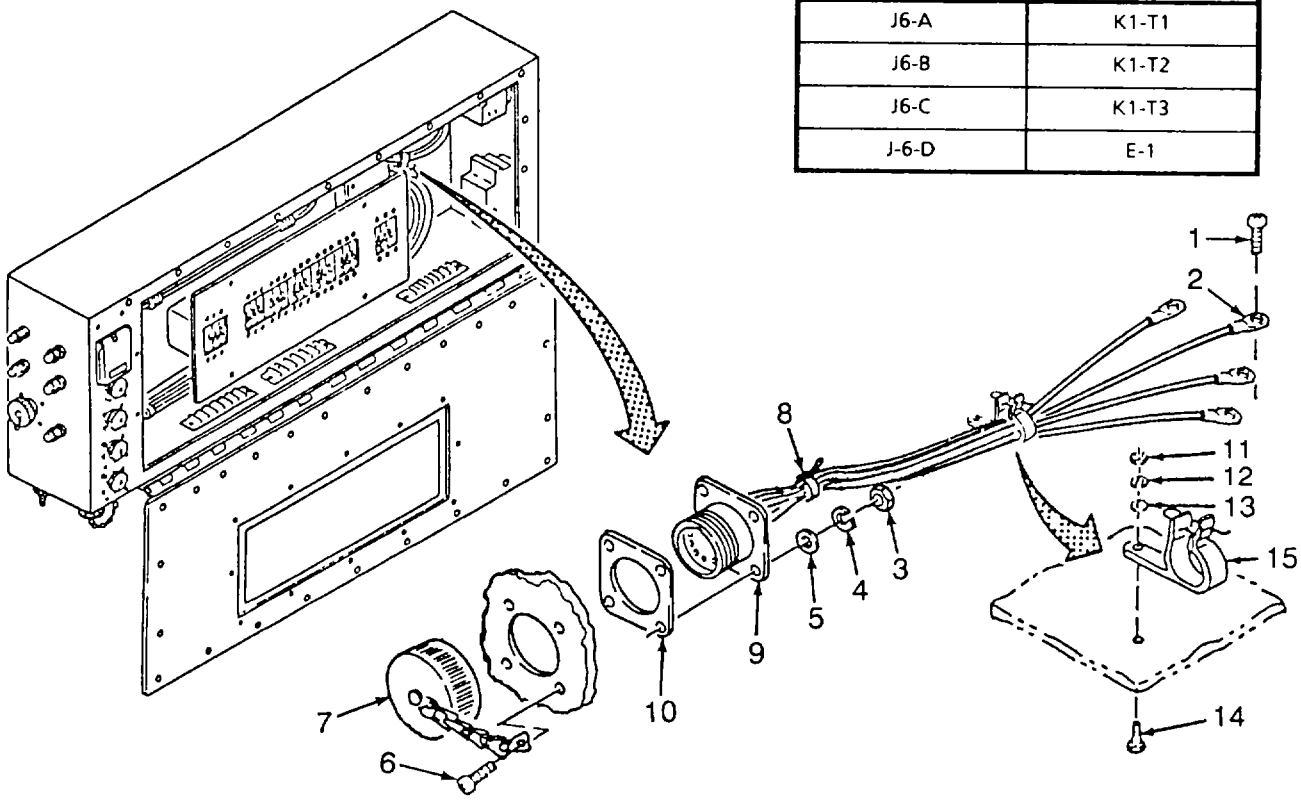
(3) Connect wires to components in junction box in accordance with information stamped on wires.

(4) If removed, Install cable clamps (15) with screws (14), flatwashers (13), lockwashers (12) and nuts (11).

(5) Tug wiring harness (9) inside clamp (15) and close clamps with tiedown straps (8).

(6) As required, secure wiring harness (9) to other wiring with tiedown straps (8).

Term Point A	Term Point B
J6-A	K1-T1
J6-B	K1-T2
J6-C	K1-T3
J-6-D	E-1



3-59. WIRING HARNESS, W39 REPAIR.

This task consists of
a. Removal
b. Cleaning
c. Inspection
d. Test
e. Repair
f. Installation

INITIAL SET-UP:

Tools Required
General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-lA-15 (Air Force) for Tools required to repair Cable Assembly.
Material/Parts Required
Lockwashers and Tiedown Straps (TM 10-4610-241-24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials/Parts required to repair Cable Assembly.
Equipment Condition
Reference
Junction Box removed from ROWPU and Cover open (Paragraph 3-53)

a. Removal.

(1) Remove screws (1), and disconnect terminals (2) from termination points A and B (see table opposite page).

(2) Remove tiedown straps (3), securing wiring harness (4) to clamps (9) and other wiring.

(3) Remove wiring harness (4).

(4) As required, remove nut (5), lockwasher (6), flatwasher (7), screws (8) and clamps (9).

b. Cleaning.

Clean wiring harness with a damp rag and allow to dry.

c. Inspection.

Inspect wiring harness In accordance with TM 43-0158/TO 1-lA-15 (Air Force).

d. Test.

Check wiring harness for continuity and shorts using table (opposite page) as guidance.

e. Repair.

Repair wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

3-59. WIRING HARNESS, W39 REPAIR - continued.

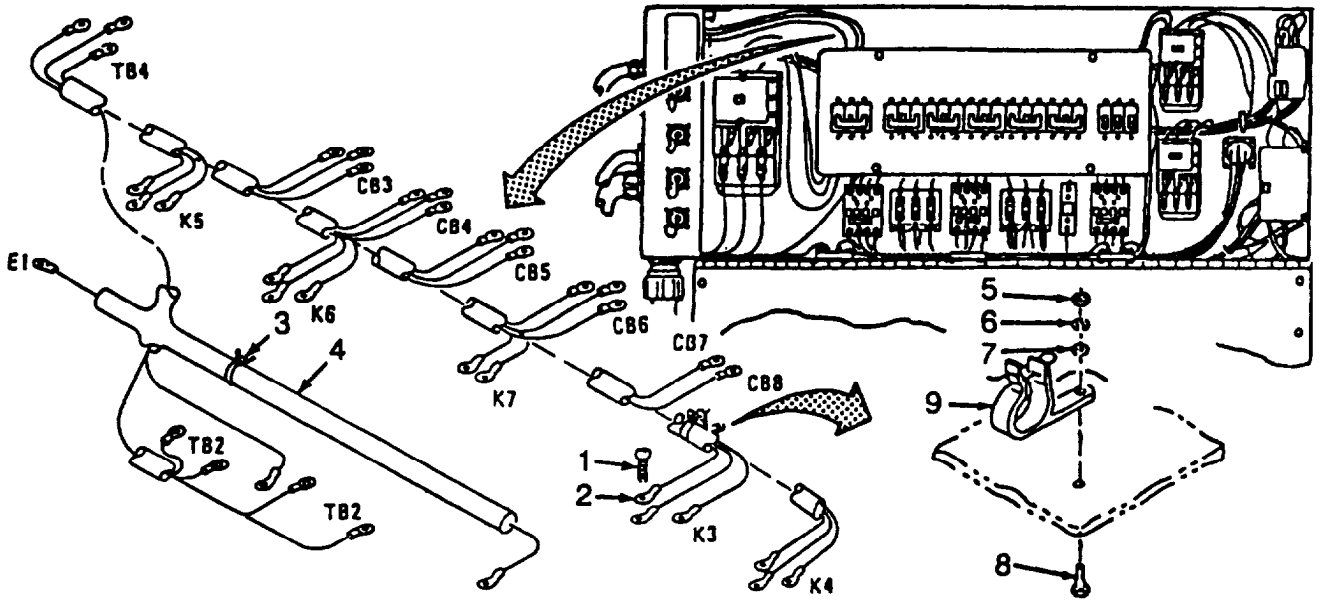
f. Installation

(1) Position wiring harness on inside ofjunction box.

(2) Connect wires (2) with screws (1) in accordance with information stamped on wires.

(3) Tug wires into cable clamps (9) and install tiedown straps (3) to close clamps. Install additional tiedown straps, securing wiring harness to other wiring as required.

(3) If removed install clamps (9) with screws (8), flatwashers (7). lockwasher (6) and nuts (5).



Term Point A	Term Point B	Term Point B	Term Point A
E-1	TB2-3	CB4-T2	K4-L2
TB2-1	TB4-2	CB4-T3	K4-L3
TB2-2	TB4-3	CB7-T	K7-L1
CB8-T	TB4-1	CB5-T1	K5-L1
TB2-1	TB3-3	CB5-T2	K5-L2
TB2-1	K7-L2	CB5-T3	K5-L3
CB3-T1	K3-L1	CB6-T1	K6-L1
CB3-T2	K3-L2	CB6-T2	K6-L2
CB3-T3	K3-L3	CB6-T3	K6-L3
CB4-T1	K4-L1		

3-60. WIRING HARNESS, W40 REPAIR (MODELS WPES-20 and H-9518-2).

This task consists of: a. Removal b. Cleaning c. Inspection d. Test e. Repair f. Installation

INITIAL SET-UP:

Tools Required

General Mechanics Tool Kit (Appendix B, Section III, Item 4)
Multimeter (Appendix B, Section III, Item 3)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Tools required to repair Cable Assembly.

Material/Parts Required

Lo&washers and Tiedown Straps (TM 10-410-241 -24P)
Refer to TM 43-0158/TO 1-1A-15 (Air Force) for Materials/Parts required to repair Cable Assembly

Equipment Condition

Reference
Junction Box removed from ROWPU and Cover open (Paragraph 3-53).

a. Removal.

(1) Disconnect wires (2) by removing screws (1) at termination points A (table, opposite page).

(2) Remove four nuts (3), lockwashers (4), natwashers (5) screws (6) and cap (7).

(3) Remove tiedown straps (8) as necessary to release harness (9) from clamps (15) and other wiring.

(4) Remove wiring harness (9) and gasket (10) fromjunction box (16).

(5) As required, remove nuts (11), lo&washers (12), flatwashers (13), screws (14) and clamps (15).

b. Cleaning.

Clean wiring harness with a damp rag and allow to dry.

c. Inspection.

Inspect wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

d. Test.

Check wiring harness for continuity and shorts using table (opposite page) as guidance.

3-60. WIRING HARNESS, W40 REPAIR (MODELS WPES-20 AND H-9518-2) - continued.

a. Repair.

Repair wiring harness in accordance with TM 43-0158/TO 1-1A-15 (Air Force).

d. Installation.

(1) Position gasket (10) on wiring harness (9).

(2) Position wiring harness (9) in cutout on junction box (16) and install cap (7), screws (6), flatwashers (5), lockwashers (4) and nuts (3).

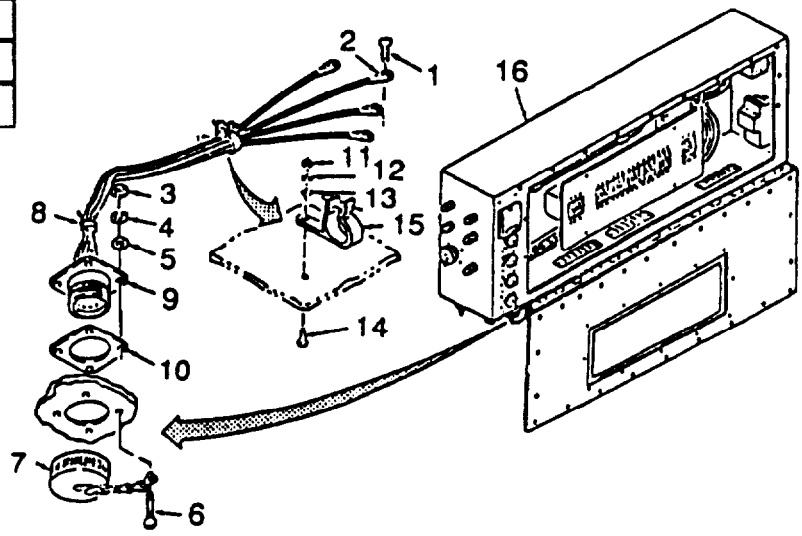
(3) Connect wires to components in junction box in accordance with information stamped on wires.

(4) If removed, install cable clamps (15) with screws (14), flatwashers (13), lockwashers (12) and nuts (11).

(5) Tug wiring harness (9) inside clamp (15) and close clamps with tiedown straps (8).

(6) As required, secure wiring harness (13) to other harnesses with tiedown straps (8)

Term Point A	Term Point B
J10-A	TB7-1
J10-B	TB7-2
J10-C	TB7-3
J10-N	TB7-6
J10-G	E-1



3-61. MOTOR STARTERS REPAIR.

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).
Material/Parts Required
Lo&washers (TM 10-4610-241 -24P)
Equipment Condition
Reference
Junction Box removed from ROWPU and Cover open (Paragraph 3-53)
General safety instructions

WARNING

If motor starters are to be replaced with junction box installed on ROWPU, be sure to shut down ROWPU and generator to prevent injury and possible death from electric shock.

a. Removal.

(1) Motor starter K1

NOTE

Motor starter can be replaced and repaired with junction box installed on ROWPU. Repairs are limited to replacement of heaters and jumper wires.

(a) Loosen six screws (1) and remove wires (2) from bottom and top of motor starter at T1 thru T3 and L1 thru L3.

(b) Remove screw (3), square washer (4) and wire (5) from normally open contacts (right side set of contacts, top contact).

(c) Remove screw (6), square washers (7) and wire (8) from normally open contacts (right side set of contacts, bottom contact).

(4) Remove screw (9), square washer (10) and wires (11 and 12) from coil contacts (right side contact).

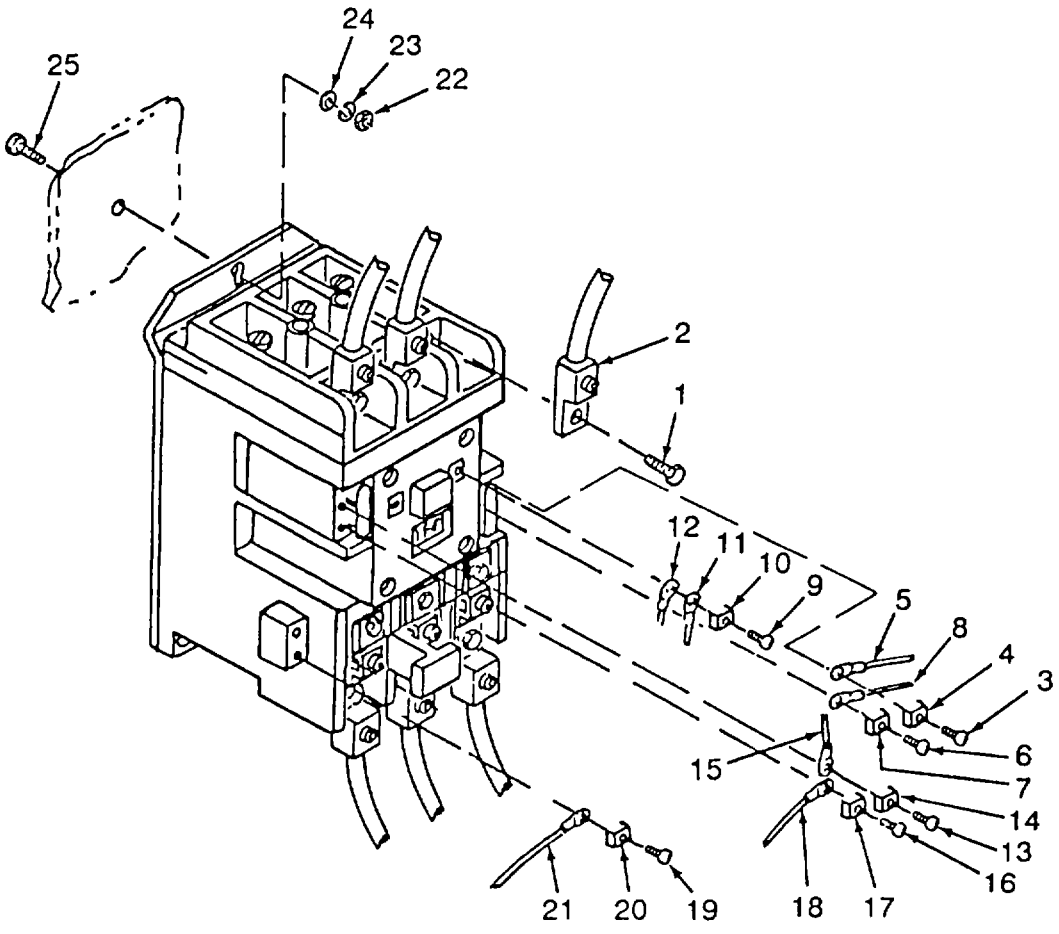
(e) Remove screw (13), square washer (14) and wire (15) from contact 3 (left top set of normally open contacts)

3-61. MOTOR STARTERS REPAIR- continued.

(f) Remove screw (16), square washer (17) and wire (18) from contact 2 (left top set of normally open contacts).

(g) Remove screw (19), square washer (20) and wire (21) from contact normally closed contacts (bottom left set of contacts, bottom contact).

(h) Remove four nuts (22), lockwashers (23), flatwasher (24), screws (25) and motor starter.



3-61. MOTOR STARTERS REPAIR- continued.

(2) Motor Starters K2, K3 and K4

WARNING

If motor starters are to be replaced with junction box installed on ROWPU, be sure to shut down ROWPU and generator to prevent possible injury and/or death from electric shock.

NOTE

- Motor starters can be replaced and repaired with junction box installed on ROWPU Repairs are limited to replacement of heaters and jumper wires.
- This procedure covers removal of motor starter K2 Motor starters K3 and K4 are removed in similar manner.

(a) Remove six screws (1), lugs (2) and wire lugs (3) from bottom and top of motor starter at T1 thru T3 and L1 thru L3.

(b) Remove screw (4), square washer (5) and wires (6 and 7) from contact 3 of normally open contacts (top left set of contacts).

(c) Remove screw (8), square washer (9) and wire (10) from contact, marked NC (bottom left set of contacts).

(d) Remove screw (11), square washer (12) and wire (13) from contact 2 of normally open contacts (top left set of contacts).

(e) Remove screw (14), square washer (15) and wire (16) from top contact of normally closed contacts.

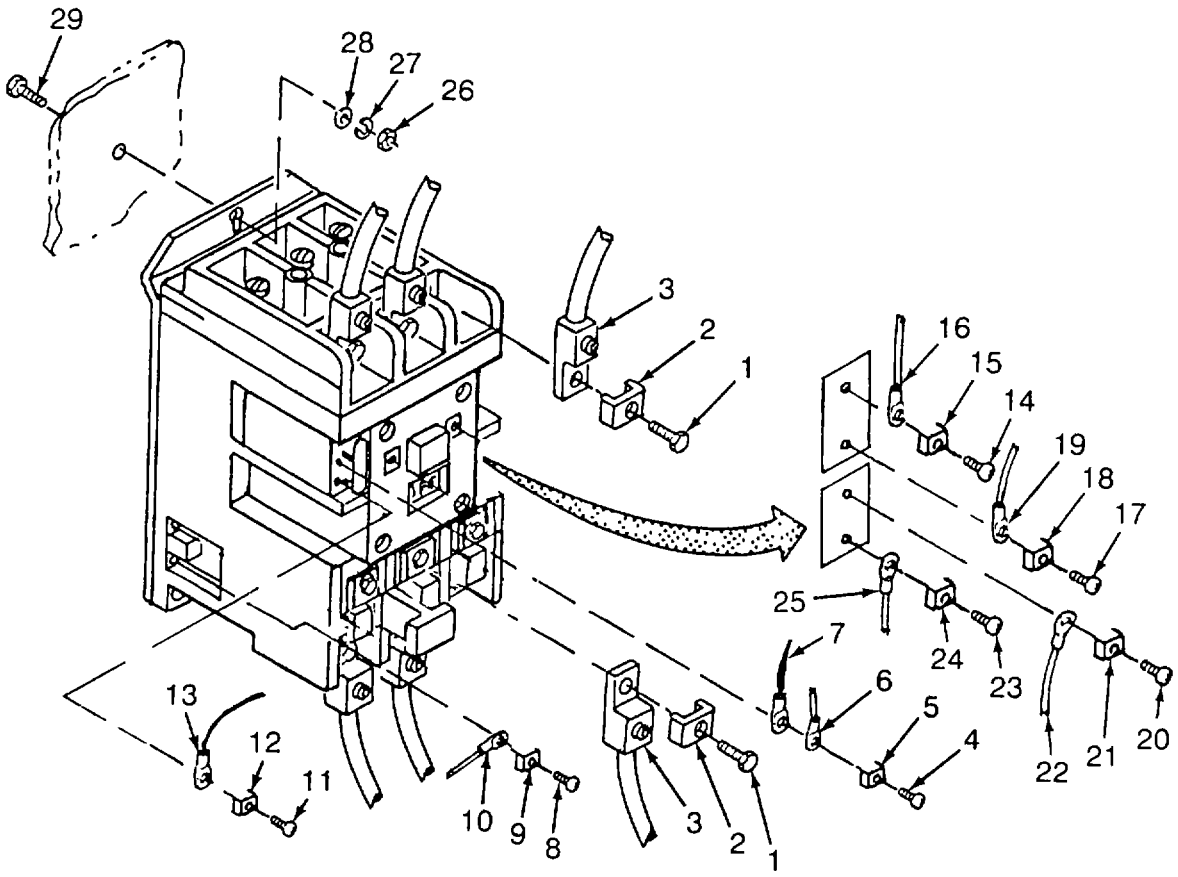
(f) Remove screw (17), square washer (18) and wire (19) from bottom contact of normally closed contacts.

(g) Remove screw (20), square washer (21) and wire (22) from top contact of normally open contacts.

(h) Remove screw (23), square washer (24) and wire (25) from bottom contact of normally open contacts.

(i) Remove four nuts (26), lockwashers (27), flatwasher (28) and motor starter from junction box.

3-61. MOTOR STARTERS REPAIR - continued.



3-61. MOTOR STARTERS REPAIR- continued.

(3) Motor starters K5 thru K7.

WARNING

High voltages in this equipment can cause serious injury or death. If motor starters are to be removed with junction box in place be certain that all power is removed before performing this procedure.

NOTE

- Motor starters can be replaced and repaired with junction box installed on ROWPU Repair is lmlted to replacement of heaters and jumper wires.
- This procedure describes removal of motor starter K5 Motor starters K6 and K7 are removed in similar manner.
- To remove motor controllers K5 thru K7, it may be necessary to remove circuit breaker plate for access Refer to Paragraph 3-53.

(a) Remove three screws (1), square washers (2) and wires (3) from terminals L1 thru L3.

(b) Remove three screws (4), square washers (5) and wires (6) from terminals T1 thru T3 of heater assembly.

(c) Remove screw (7), square washers (8) and one white wire (9) and one red wire (10) from bottom coil contact of relay.

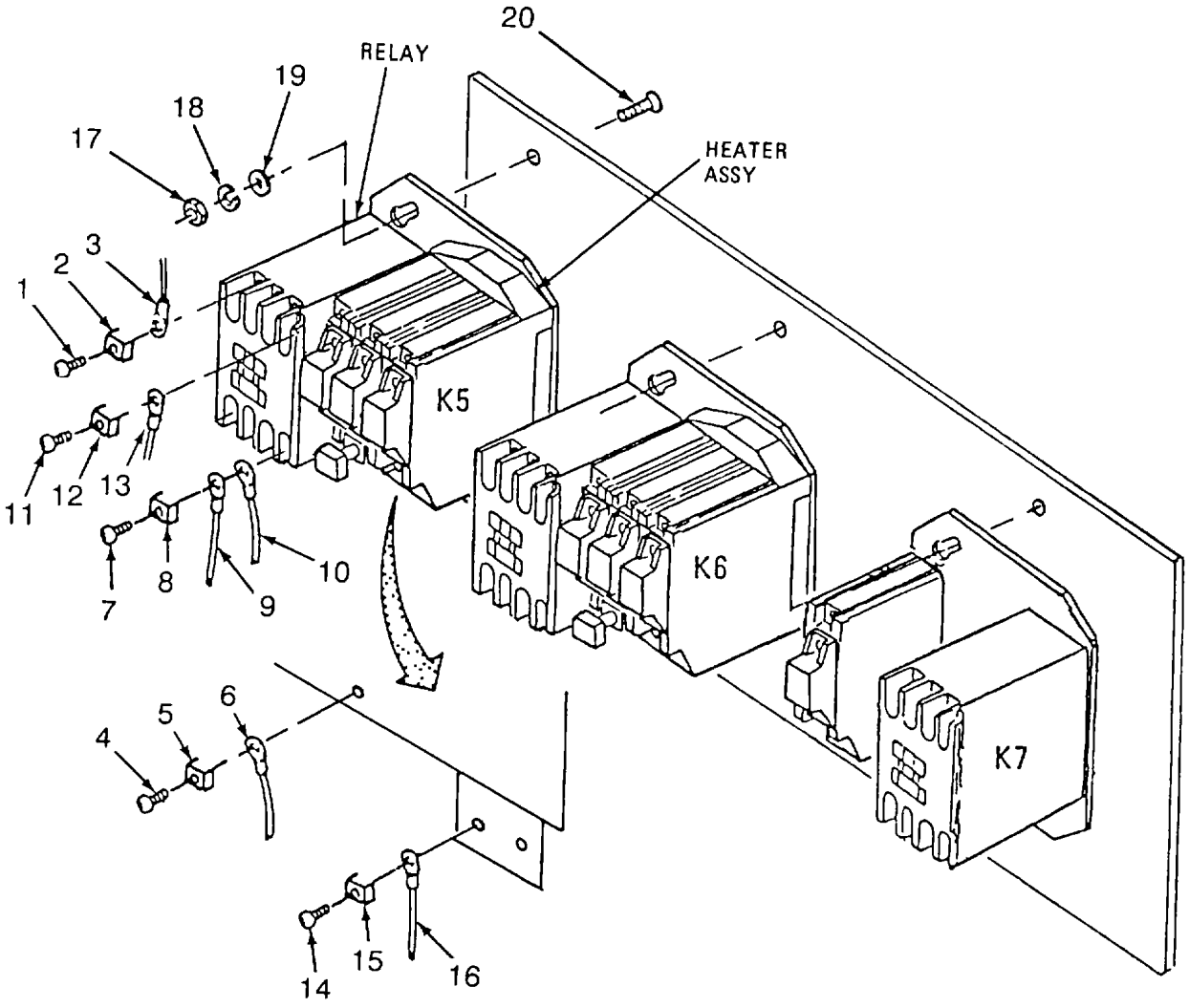
(d) Remove screw (11), square washers (12) and wire (13) from top coil contacts of relay.

(e) Remove screw (14), square washer (15) and white wire (16) from normally closed contacts of heater assembly.

(f) Support motor starter and remove nuts (17), lockwashers (18), flatwashers (19) and screws (20).

(g) Remove motor starters from junction box

3-61. MOTOR STARTERS REPAIR - continued.



3-61. MOTOR STARTERS REPAIR - continued.

b. Cleaning.

WARNING

Drycleaning solvent, P-D-680, C1 II, is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

(1) Remove dirt, dust and contaminants from metal and plastic parts.

(2) Using fine sand paper, remove dirt, carbon, and dust from electrical contacts.

c. Inspection.

(1) Inspect plastic parts for cracks, fractures, or chipped edges.

(2) Inspect heater elements for cracks and signs of burns.

(3) Inspect overload relay for overheating, fractures and breaks.

(4) Inspect reset lever for freedom of movement.

(5) Inspect mounting bracket for damage.

(6) Inspect all hardware for damaged heads or threads.

d. Repair.

NOTE

Repair of motor starters is limited to replacement of Jumper wires and heaters.

(1) Motor Starter K1.

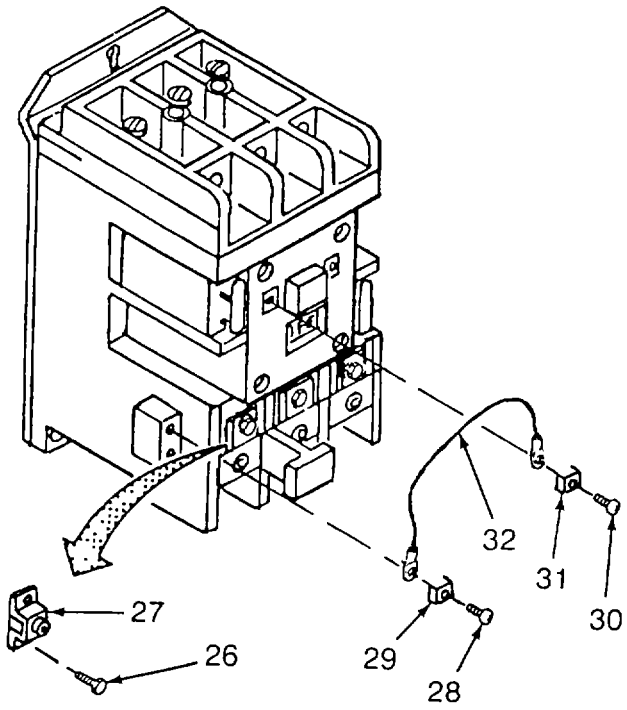
(a) Remove six screws (26) and three heaters (27).

(b) Remove screw (28), square washer (29), screw (30), square washer (31) and red jumper wire (32).

(c) Position red jumper wire on motor starter as indicated and install square washers (29 and 31) and screws (30 and 28).

(d) Install heaters (27) with two screws (26) each.

3-61. MOTOR STARTERS REPAIR - continued.



3-61. MOTOR STARTERS REPAIR - continued.

(2) Motor starters, K2, K3 and K4.

(1) Remove screw (35), square washer (36) and jumper wire (34) from coil contacts of relay (right side).

(2) Remove screws (30), square washer (31) and wire (34) from normally closed contacts (top contact, bottom left side).

(3) Remove screw (32), square washer (33) and wire (7) from coil contacts (left side).

(4) Remove six screws (37) and three heaters (38) from heater assembly.

(5) Install three heaters (38) on heater assembly with two screws (37) each.

(6) Position red jumper wire (34) on top contact of normally closed contact (left side, bottom) and install with screw (30) and square washer (31).

(7) Position red jumper wire (34) on coil contact (right side contact) and install with screw (35) and square washer (36).

(8) Position short red jumper wire on left contact of coil contacts and install with screw (32 and square washer (33).

(3) Motor starter K5, K6 and K7.

(1) Remove six screws (20) and three heaters (21).

(2) Remove six screws (22), square washers (23) and three wires (24) from top contacts of heater assembly and bottom contacts of relay.

(3) Remove screw (25), square washer (26) and wire (27) from normally closed contacts of heater assembly (right contact).

(4) Remove screw (28), square washer(29) and red wire (27) from contacts in back of relay.

(5) Remove wire (10), disconnected in removal procedure by removing screw (31) and square washer (30).

(6) Position red jumper wire (10) on back of relay and Install square washer (30) and screw (31).

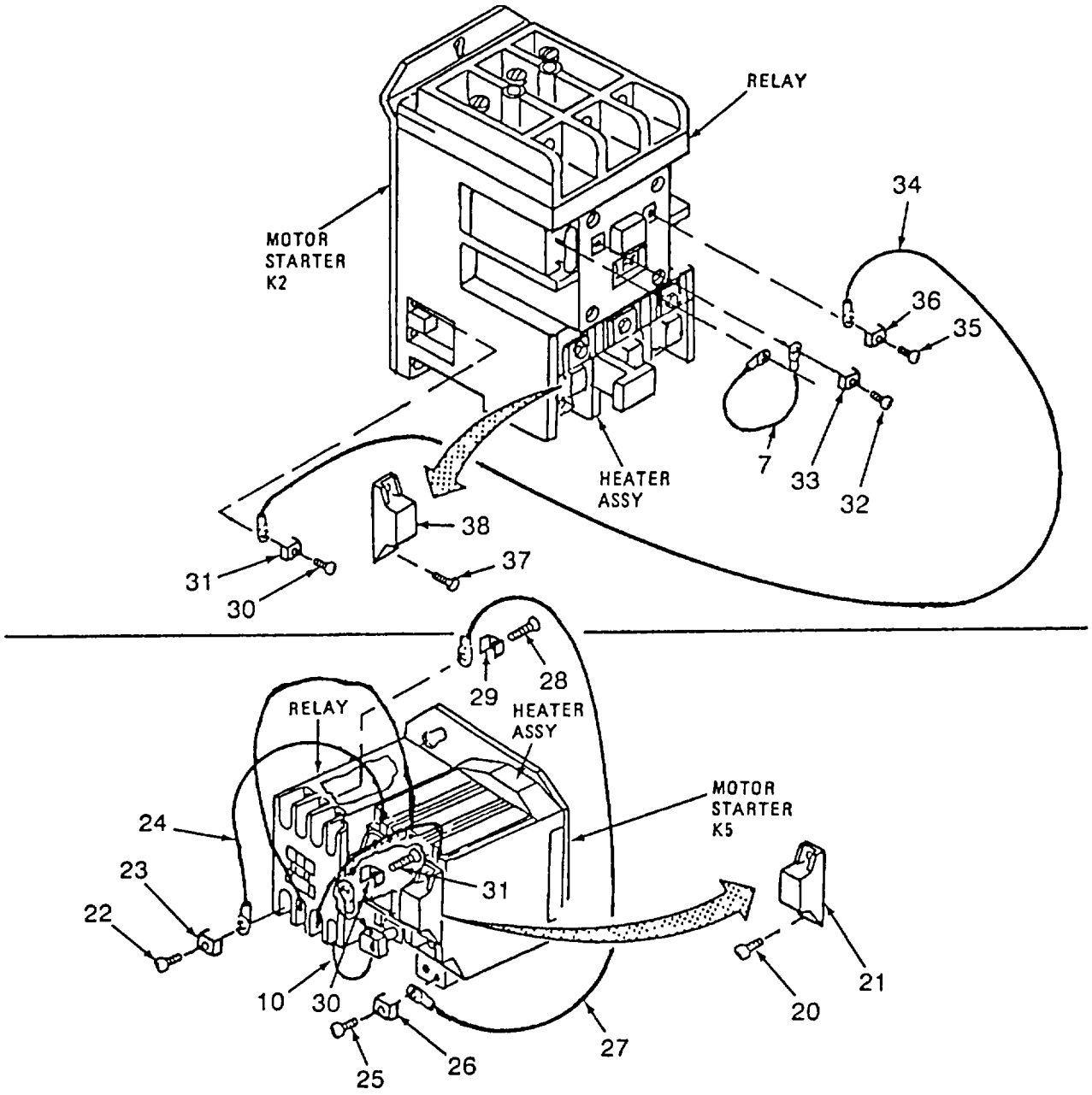
(7) Position lug of red wire (27) on back of relay and install square washer (29) and screw (28).

(8) Position lug of wire (27) on normally closed contacts (right contact) and install with square washer (26) and screw (25).

3-61. MOTOR STARTERS REPAIR - continued.

(9) Install three black wires (24) with screws (22) and square washer (23) as indicated in illustration.

(10) Install heaters (21) with two screws (20) each.



3-61. MOTOR STARTERS REPAIR - continued.

e. Installation.

(1) Motor starter K1

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before installing motor starter K1.

NOTE

Be sure to connect all wires as marked. White wires have markings (termination points) stamped on wire by manufacturer. Red wires are not marked, and must be installed as described.

(a) Position motor starter injunction box and install with four screws (25), flatwashers (24), lockwashers (23) and nuts (22).

(b) Position wire (21), marked KI (N) on contact marked NC (bottom left) and install square washer (20) and screw (19)

(c) Position wire (18), marked K1, 2 on contact 2 of motor starter (top left set of contacts) and secure with square washer (17) and screw (16).

(d) Position wire (15), marked K1, 1 on contact 1 of motor starter (top left set of contacts) and secure with square washer (14) and screw (13).

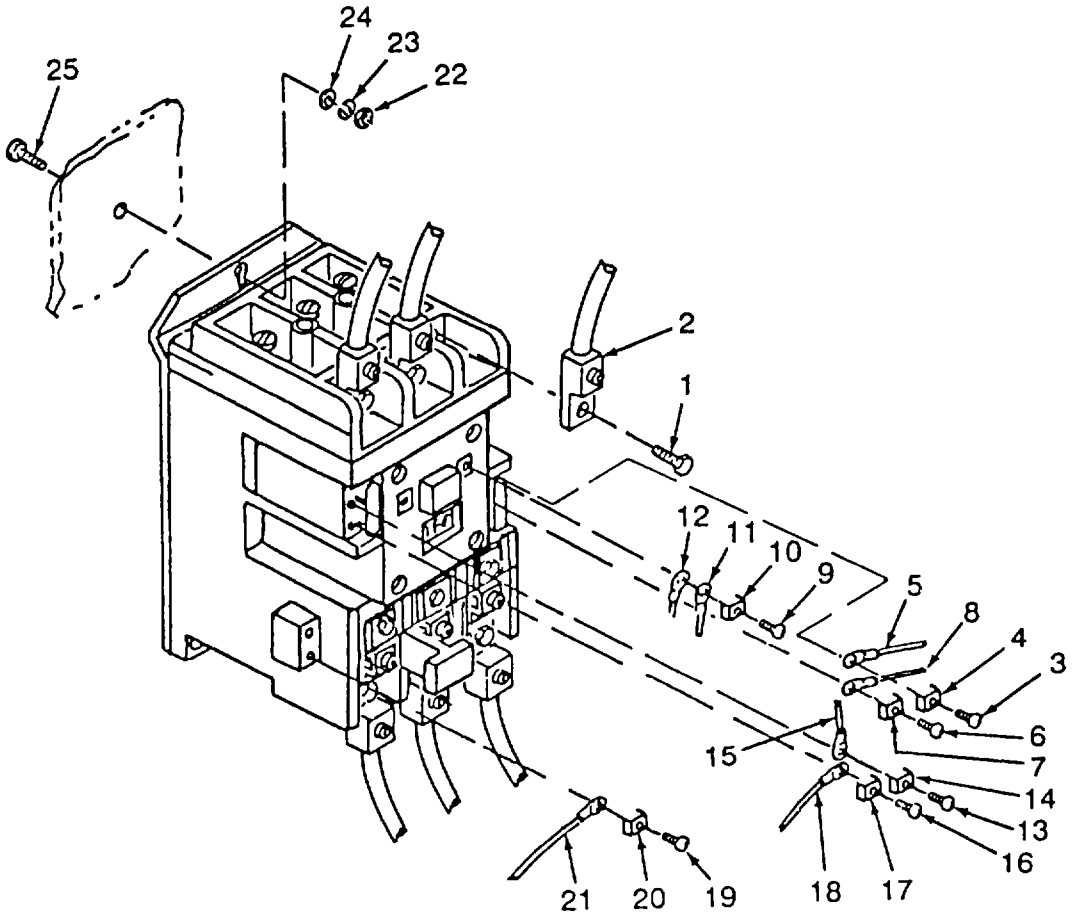
(e) Position wires (11 and 12) marked K1, 1, COIL on coil contact of motor starter (center set of contacts, right contact) and secure with square washer (10) and screw (9).

(f) Position wire (8) marked AUX 1 on unmarked auxiliary contact 1 (bottom contact of auxiliary contacts to the right of motor starter) and secure with square washer (7) and screw (6)

(g) Position wire (5) marked AUX 2 on unmarked auxiliary contact 2 (top contact of auxiliary contact to the right of motor starter) and secure with square washer (4) and screw (3).

(h) Position large diameter wires (2) marked L1 thru L3 and T1 thru T3 on contacts marked L1 thru L3 and T1 thru T3 on motor starter and secure with one screw (1) each.

3-61. MOTOR STARTERS REPAIR - continued.



3-61. MOTOR STARTERS REPAIR - continued.

(2) Motor starter K2 thru K4.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing maintenance.

NOTE

- Motor starters can be replaced with junction box installed on ROWPU.
- This procedure covers installation of K2 Installation of K3 and K4 is similar.
- Be sure to connect all wires as marked. White wires have markings (termination points) stamped on wires by manufacturer. Red wires are not marked and must be installed as described.

(a) Position motor starter injunction box and Install with two screws (29), washers (28), lockwashers (27) and nuts (26).

(b) Position wire (25) (marked K2-AUX 1) on normally open contact set(bottom contact) and secure with square washer (24) and screw (23).

(c) Position wire (22) (marked K2-AUX 2) on normally open contact set (top contact) and secure with square washer (21) and screw (20).

(d) Position wire (19) (marked K2-AUX 3) on normally closed contact set (bottom contact) and secure with square washer (18) and screw (17)

(d) Position wire (16) (marked K2-AUX 4) on normally closed contact set (top contact) and secure with square washer (15) and screw (16).

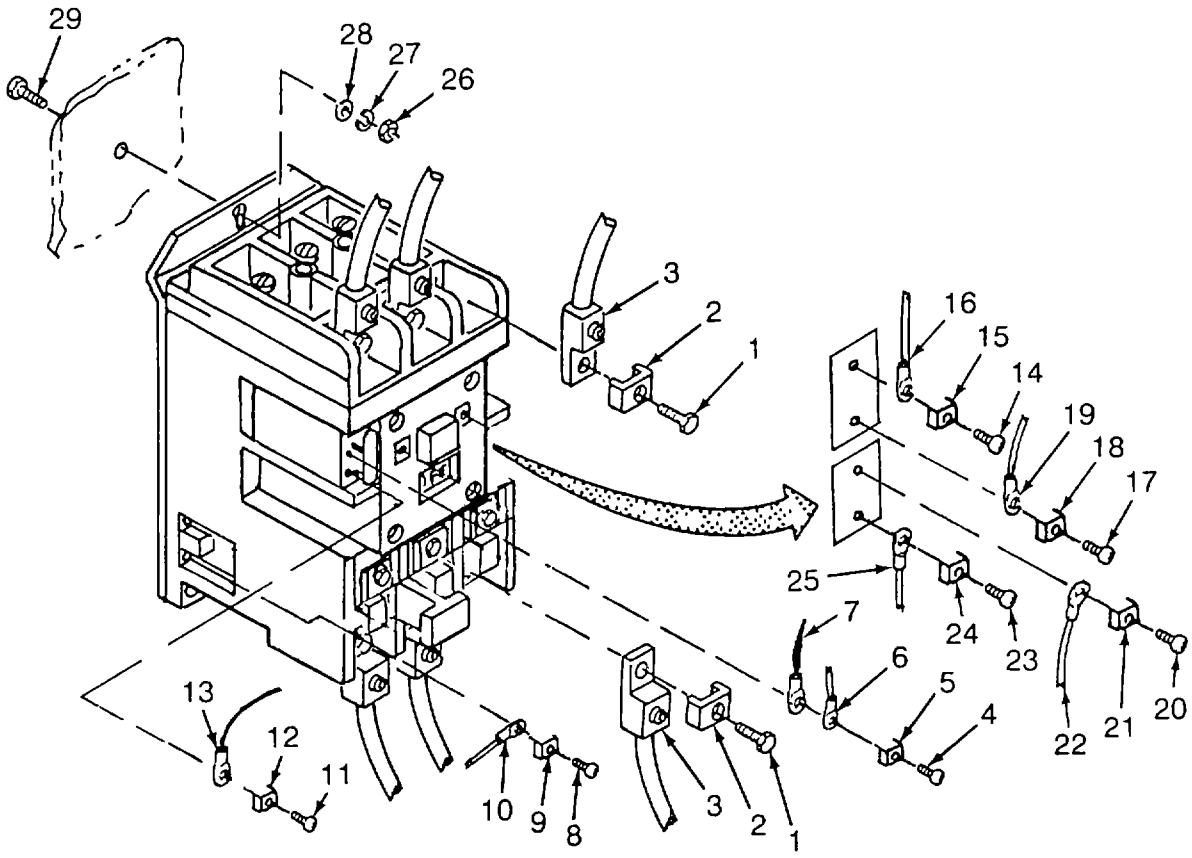
(d) Position wire (13) (marked K2-2) on normally open contact set (top contact) and secure with square washer (12) and screw (11).

(d) Position wire (10) (marked K2-N) on normally closed contact set (bottom contact) and secure with square washer (9) and screw (8).

(d) Position wires (7 and 6) marked K2-3 (red wire has no marking) on normally open contact set (top contact)and secure with square washer (5) and screw (4).

(e) Connect wires (3) to L1 thru L3 and T1 thru T3 contacts as marked and install with lugs (2) and screws (1).

3-61. MOTOR STARTERS REPAIR - continued.



3-61. MOTOR STARTERS REPAIR - continued.

(3) Motor starters K5 thru K7.

WARNING

High voltages in this equipment can cause serious injury or death. Be certain that all power is removed before performing this task, if motor controllers are installed with junction box in place.

NOTE

- Motor starters can be replaced with junction box installed on ROWPU.
- This procedure covers installation of motor controller K5, installation of motor controllers K6 and K7 is similar.
- Be sure to connect all wires as marked. White wires have markings (termination points) stamped on wire by manufacturer. Red and black wires have no markings and must be installed as described.

(a) Position motor starter injunction box and secure with four screws (17), flatwashers (19), lockwashers (18) and nuts (17).

(b) Position wire (16), marked K5 N on normally closed contacts (left contact) and secure with square washer (15) and screw (14).

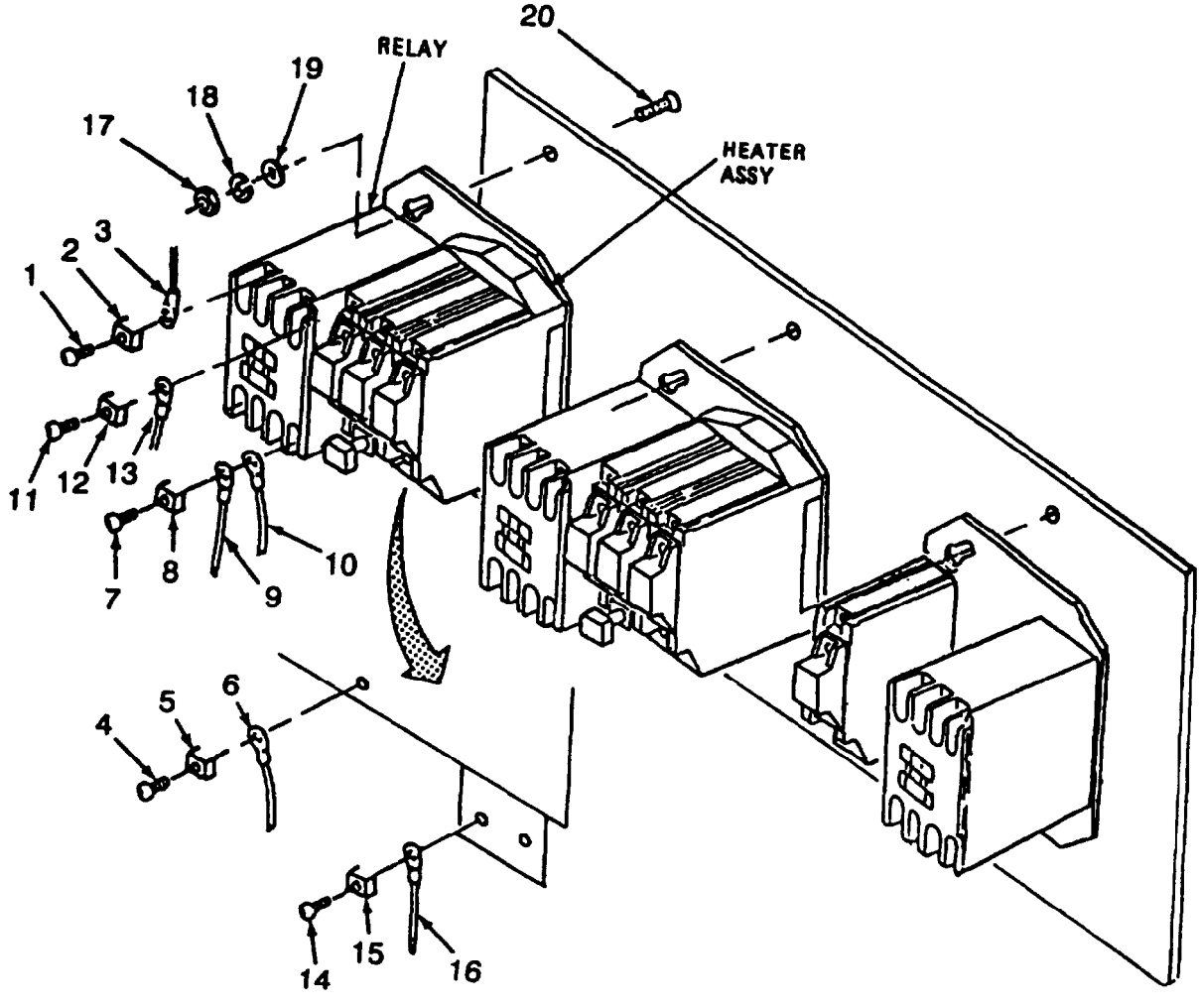
(c) Position wire (13), marked K5-2 on top coil contact and secure with square washer (12) and screw (11).

(d) Position wires (10 and 9), marked K5-3 (red wire has no markings) on bottom coil contact and secure with square washer (8) and screw (7).

(e) Position wires (6), marked T1 thru T3 on heater assembly as marked and install square washers (5) and screws (4).

(f) Position wires (3), marked L1 thru L3 on heater assembly as marked and install square washers (2) and screws (1).

3-61. MOTOR STARTERS REPAIR - continued.



Section XIII. TRAILER MAINTENANCE PROCEDURES

3-62. TRAILER CABLE ASSEMBLY REPAIR (MODELS WPES-10 AND H-9518-1).

This task consists of: a. Inspection b. Repair c. Test

INITIAL SET-UP:

Tools Required
Refer to TM 5-0148/TO 1-1A-15 (Air Force)
Materials/Parts Required
Refer to TM 5-0148/TO 1-1A-15 (Air Force)
Equipment Condition
Reference
Cable Assembly removed (Paragraph 2-81).

a. Inspection.

For inspection procedures, refer to TM 5-0148/TO 1-1A-15 (Air Force).

b. Repair.

For repair procedures, refer to TM 5-0148/TO 1-1A-15 (Air Force).

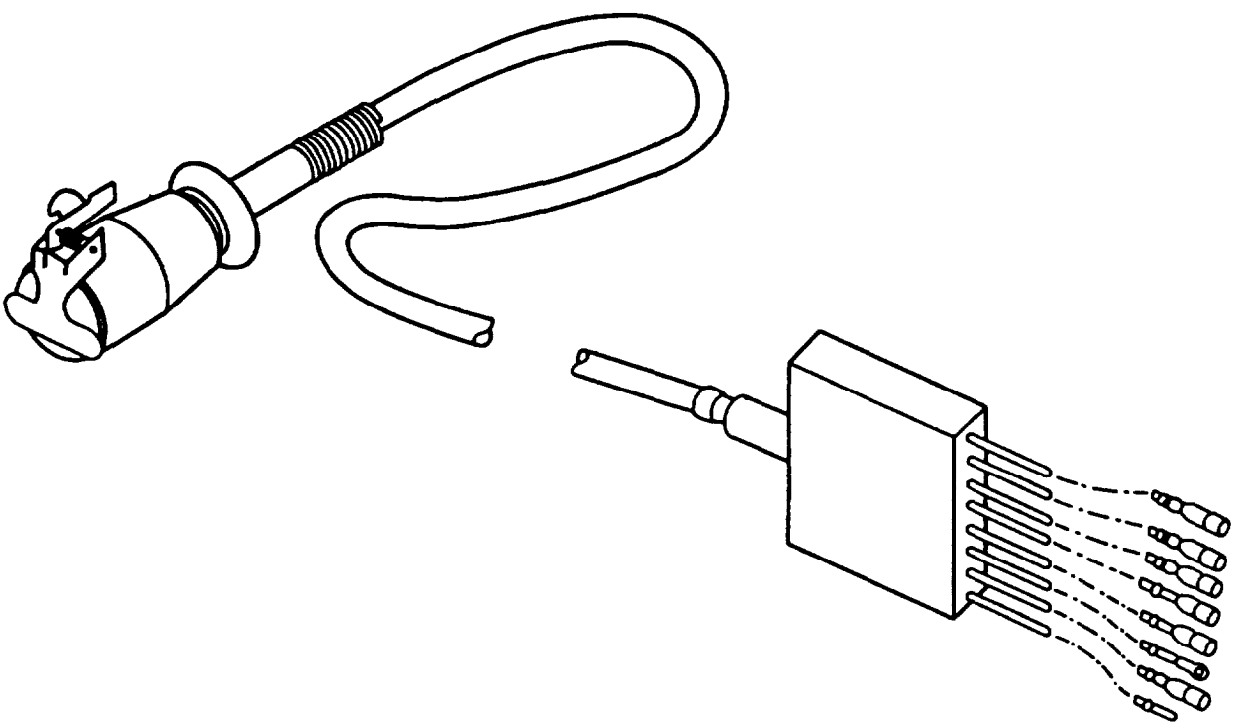
c. Test.

For test procedures, refer to TM 5-0148/TO 1-1A-15 (Air Force).

3-62. TRAILER CABLE ASSEMBLY REPAIR (MODELS WPES-10 and H-9516-10) - continued.

c. Test

For test procedures, refer to Paragraph 2-81.



3-63. WIRING HARNESS (TRAILER) REPAIR (MODELS WPES-10 AND H-9518-1).

This task consists of: a. Inspection b. Test

INITIAL SET-UP:

Tools Required
Refer to TM 5-0148/TO 1-1A-15 (Air Force)
Materials/Parts Required
Refer to TM 5-0148/TO 1-1A-15 (Air Force)
Equipment Condition
Reference
Cable Assembly removed (Paragraph 2-82).

a. Inspection

For inspection procedures, refer to TM 5-0148/TO 1-1A-15 (Air Force).

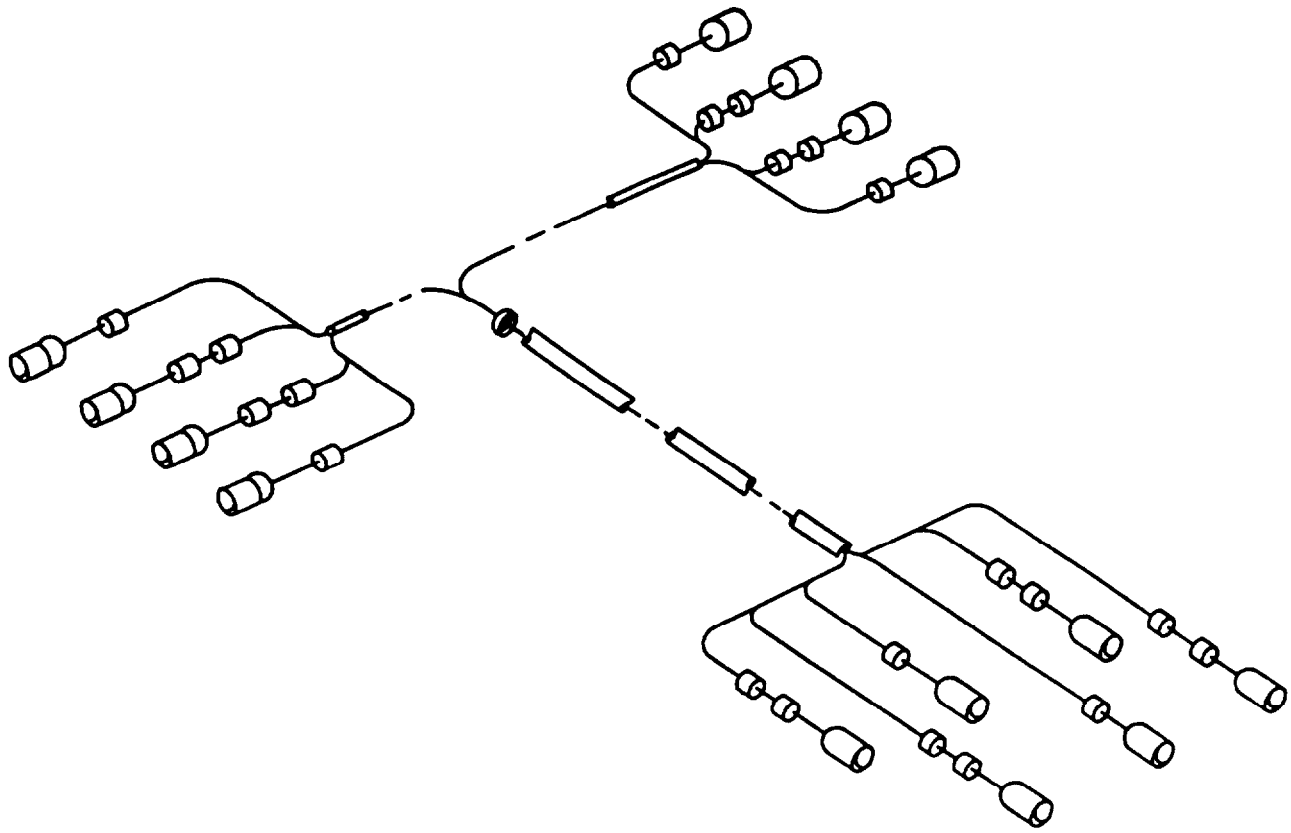
b. Repair.

For repair procedures, refer to TM 5-0148/TO 1-1A-15 (Air Force).

c. Test

For test procedures, refer to Paragraph 2-82

3-63. WIRING HARNESS (TRAILER) REPAIR (MODELS WPES-10 and H-95181) - continued.



3-64. RELAY VALVE REPAIR (MODELS WPES-10 AND H-9518-1).

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 5)
Rags, Wiping (Appendix C, Section II, Item 14)
Diaphragm (TM 10-4610-241-24P)
Packing (TM l0-4610-241-24P)
Equipment Condition
Relay Valve removed (Paragraph 2-85).

a. Disassembly.

(1) Remove screw (1), diaphragm washer (2), and exhaust diaphragm (3).

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.

(2) Remove three cap screws (4), spacers (5), and exhaust cover (6).

(3) Remove packing (7 and 8) from exhaust cover (6).

(4) Remove emergency spring (9), piston and valve assembly (10) and packing (11).

(5) Remove retaining ring (12) and inlet and exhaust valve assembly (13) from emergency piston (19).

(6) Remove valve guide (14), packing (15), valve spring (16) and valve retainer (17) from inlet and exhaust valve (18).

(7) Remove packing (15) from valve guide (14).

(8) Remove compression spring (20) and check valve ball (21).

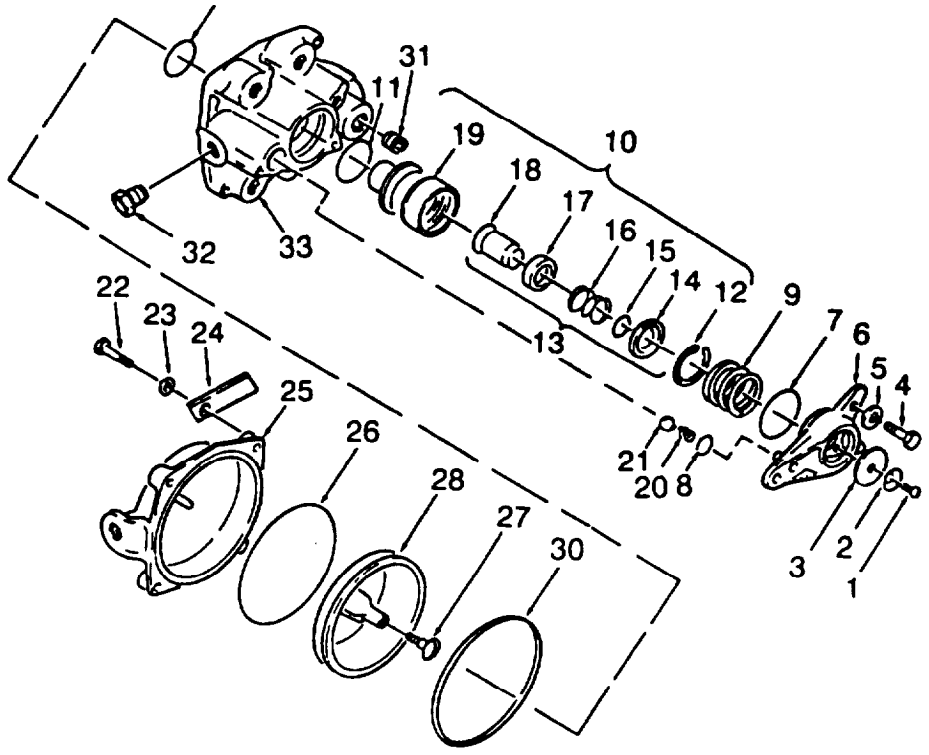
3-64. RELAY VALVE REPAIR (MODELS WPES-10 and H-9518-1) - continued.

(9) Remove four cap screws (22), flat washers (23), part number plate (24), cover (25) and sealing ring (26).

(10) Remove exhaust valve seat (27).

(11) Remove piston assembly (28) and preformed packing (29 and 30).

(12) Remove adapter (31) and filter (32) from body (33).



b. Cleaning.

(1) Using mild soapy water, wash all parts.

(2) Using clean, lint-free rags, wipe all parts dry.

c. Inspection.

(1) Inspect springs (9, 16 and 20) for deformity and damage.

(2) Inspect exhaust diaphragm (3), relay piston (19), exhaust cover (6), body (33), cover (25), adapter and inlet and exhaust valve (18) for corrosion, cracks, excessive wear, or damaged threads.

d. Repair.

Replace seals and gaskets and defective components as required.

3-64. RELAY VALVE REPAIR (MODELS WPES-10 AND H-9518-1) - continued.

e. Assembly.

(1) Install adapter (3 1) and filter (32) in body (33).

(2) Install preformed packing (30) on piston assembly (28) and packing (29) in body (33).

(3) Position piston assembly (28) in cover (25).

(4) Install exhaust valve seat (27).

(5) Install sealing ring (26) in body (33) and install cover (25), part number plate (24), flat washer (23), and screws (22) on body (33).

(6) Position check valve ball (21) and compression spring (20) in body (33).

(7) Install preformed packing (15) in valve guide (14).

(8) Install preformed packing (7) in emergency piston (19).

(9) Install valve retainer (17), valve spring (16) and valve guide (14) on inlet and exhaust valve (18).

(10) Position inlet and exhaust valve assembly (13) in emergency piston (19) and install retaining ring (12).

(11) Position preformed packing (11). piston and valve assembly (10), and emergency spring (9) in body (33).

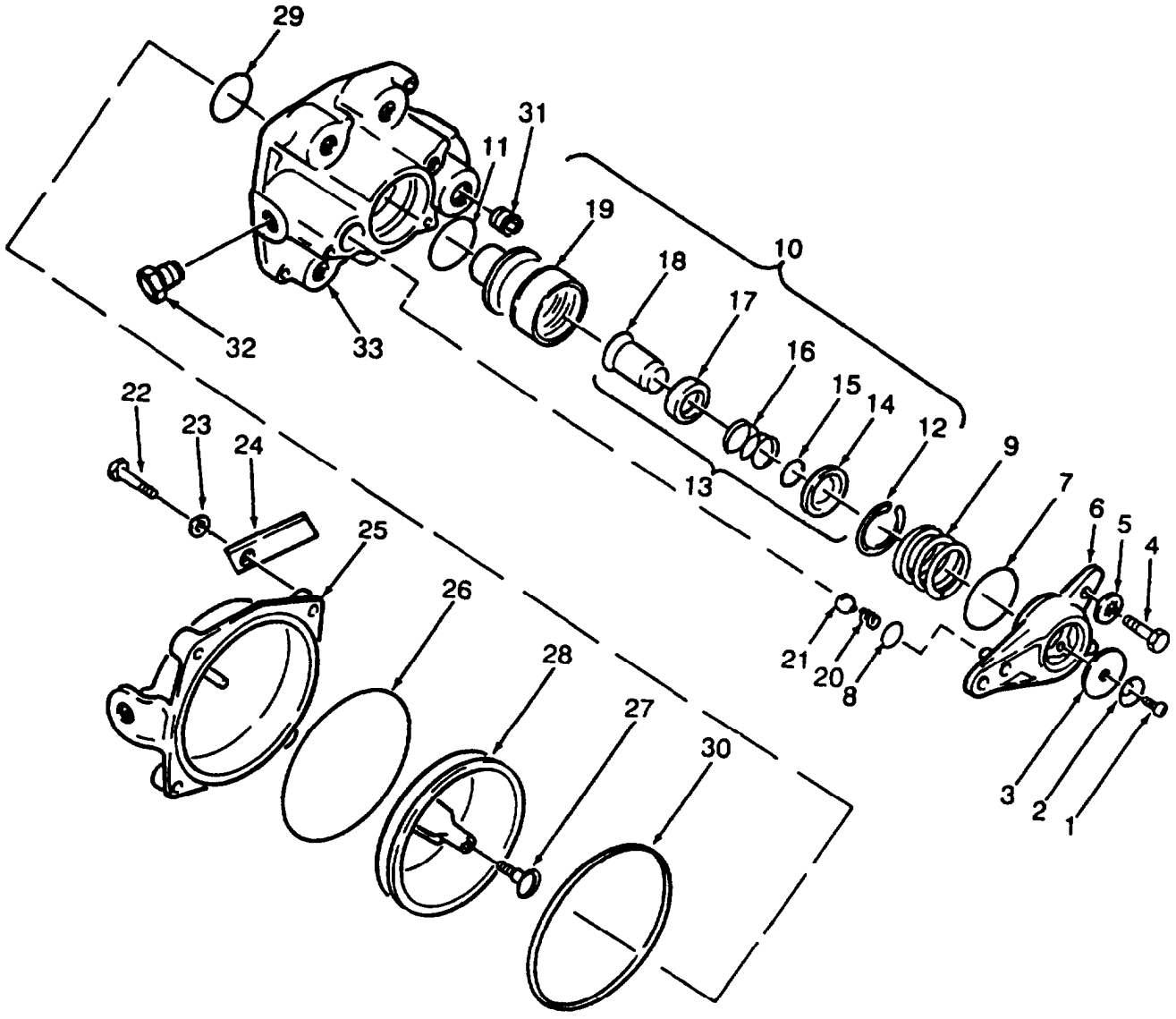
(12) Install preformed packing (7 and 8) on exhaust cover (6).

(13) Position exhaust cover (6) on emergency spring (9) and compression spring (20).

(14) Push exhaust cover (6) down and install washers (5) and cap screws (4).

(15) Position exhaust diaphragm (3) and diaphragm washer (2) in exhaust cover (6) and install screw (1).

3-64. RELAY VALVE REPAIR (MODELS WPES-10 and H-9518-1) - continued.



3-65. SUSPENSION ASSEMBLY REPLACE (MODELS WPES-10 AND H-9518-1).

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)
1-3116 Wrench (Appendix B, Section III, Item 3).
Towing Vehicle Equipped with Airbrakes Goggles (Appendix B, Section III, Item 3)
Material/Parts Required
Lockwasher (TM 10-4610-241-24P)
Personnel Required
Three
Equipment Condition
Reference
Generator removed (Paragraph 3-2 1).
ROWPU removed (Paragraph 3-22).
General Safety Instructions

WARNING

- Compressed air in airbrake system can be dangerous.
- Moving heavy equipment incorrectly can cause serious injury.
- Trailer is heavy/difficult to lift and requires use of a lifting device and guide ropes.

a. 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.

(1) Turn drain cock T-handle (1) slowly counterclockwise to release air pressure from reservoir.

NOTE

Tagging air lines, indicating their connection points will facilitate installation. Be sure to transfer tags to replacement air lines if lines are replaced.

(2) Tag eight air lines (2).

(3) Unscrew nut (3) and disconnect eight air lines (2) from four air chamber assemblies (4).

3-65. SUSPENSION ASSEMBLY REPLACE (MODELS WPES-10 and H-9518-1) - continued.

(4) Remove four nuts (5), lockwashers (6), and bolts (7).

(5) Remove trunnion clamp (8) from trunnion mount (10).

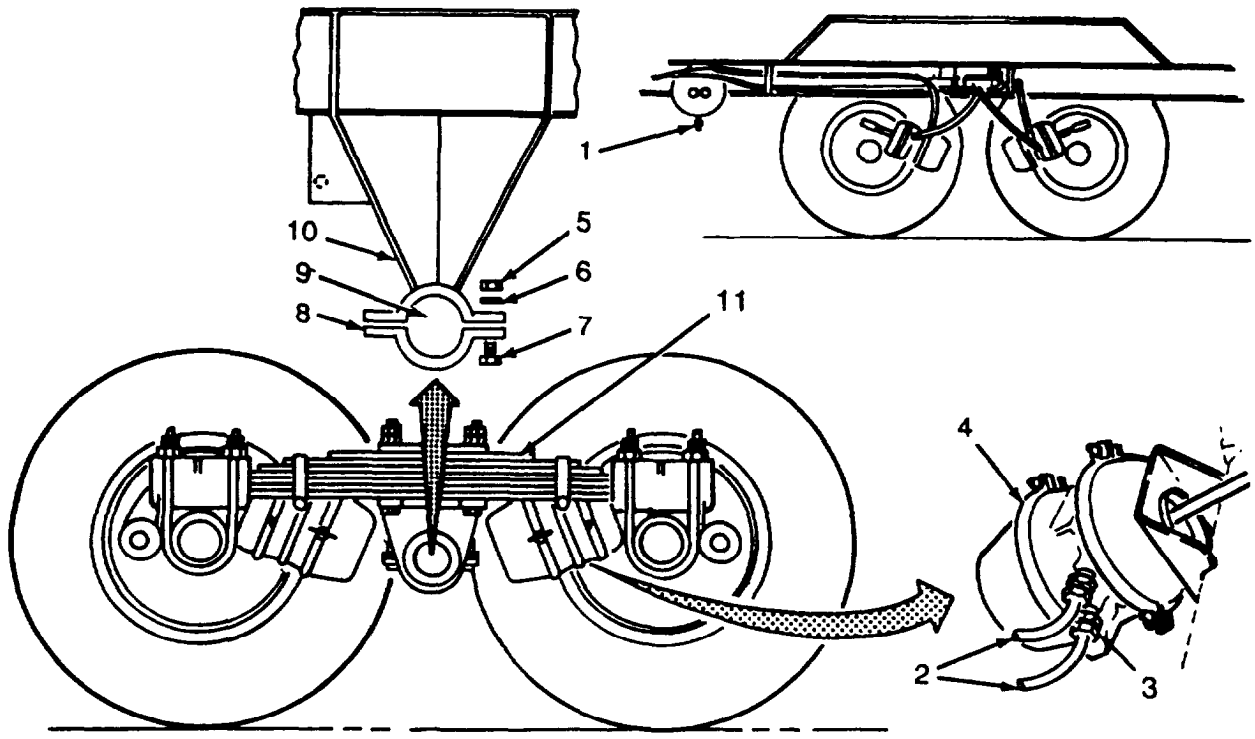
(6) Repeat steps (4) and (5) for trunnion clamp on opposite side.

(7) Using lifting device and guide lines, raise flatbed cargo trailer clear of suspension assembly (11).

WARNING

Suspension assembly is heavy. Two people are needed to move it to prevent personal injury or damage to the equipment.

(8) Roll suspension assembly (11) from under flatbed cargo trailer.



3-65. SUSPENSION ASSEMBLY REPLACE (MODELS WPES-10 AND H-9518-1) - continued.

b. Installation.

(1) Using lifting device, raise flatbed cargo trailer high enough to permit rolling of suspension assembly under it.

WARNING

Suspension assembly is heavy. Three people are needed to roll it to prevent personal injury.

(2) Roll suspension assembly (11) into position under flatbed cargo trailer.

(3) Lower flatbed cargo trailer until trunnion mount (10) rests on trunnion axle (9).

(4) Place trunnion clamp (8) in position under trunnion mount (10) and around trunnion axle (9) with mounting holes alined.

(5) Install four bolts (7), lockwashers (6), and nuts (5).

(6) Repeat steps (4 and 5) for trunnion clamp on opposite side.

(7) Connect eight air lines (2) to four air chamber assemblies (4), as tagged during removal, and tighten nuts (5).

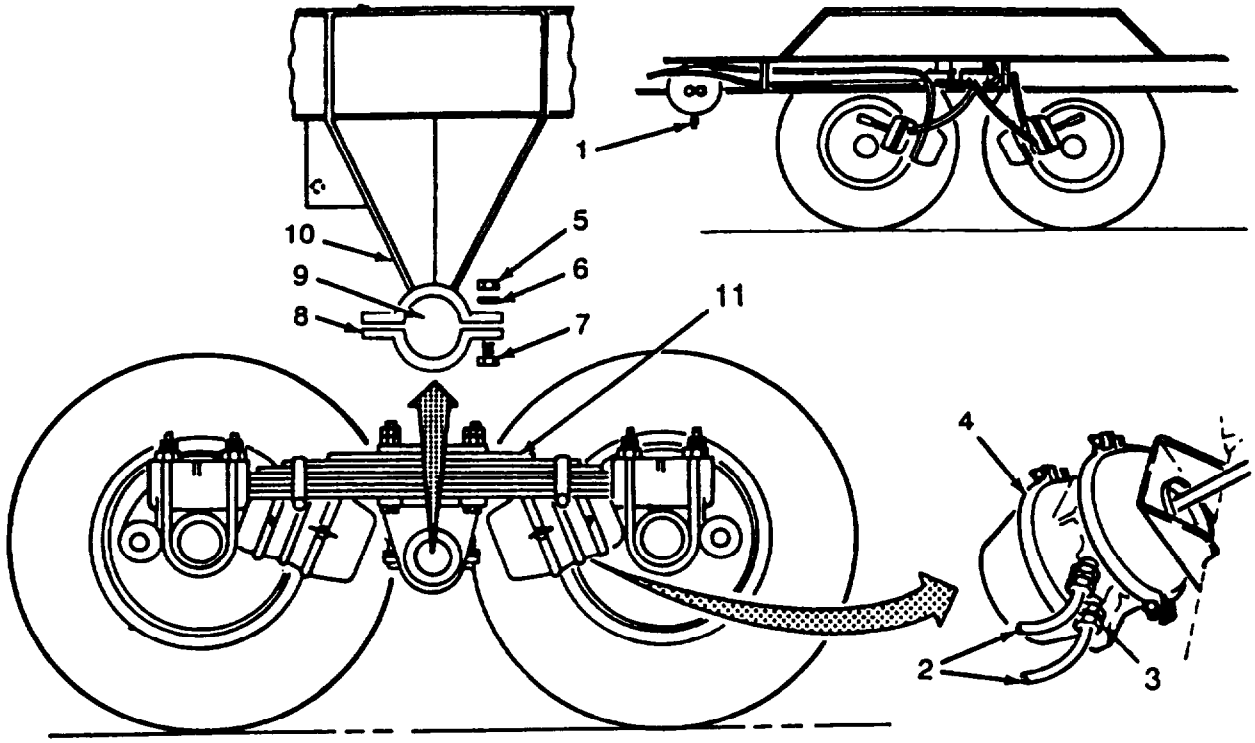
(8) Turn drain cock T-handle (1) clockwise to close drain cock.

(9) Connect air hoses to towing vehicle (TM 10-4610-241-10).

(10) Start engine of towing vehicle and wait for towing vehicle air compressor to fully charge flatbed cargo trailer brake system (TM 10-4610-241-10 and towing vehicle manual).

(11) Connect trailer to towing vehicle and check for proper operation of brake system.

3-65. SUSPENSION ASSEMBLY REPLACE (MODELS WPES-10 and H-9518-1) - continued.



3-66. BRAKE ASSEMBLY REPAIR (MODELS WPES-10 AND H-9518-1).

This task consists of: a. Removal b. Cleaning c. Inspection d. Repair e. 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)
- Grease Gun (Appendix B, Section III, Item 3)

Materials/Parts Required
- Solvent, Drycleaning (Appendix C, Section II, Item 18)
- Grease, GAA (Appendix C, Section II, Item 9)
- Rags, Wiping (Appendix C, Section II, Items 14)
- Lo&washers (TM 10-4610-241 -24P)
- Seals and Preformed Packing (TM 10-4610-241-24P)

Equipment Condition
- Brake Shoes removed (Paragraph 2-88).

General Safety Instructions

WARNING

- Using drycleaning solvent incorrectly can cause injury or even death.
- Using compressed air can be dangerous.

a. Removal.

(1) Remove cotter pm (1) and clevis pin (2) to disconnect clevis (3).

(2) Remove snapring (4) and slack adjuster (5) from camshaft (23).

(3) Remove four nuts (6), lockwashers (7) and screws (8).

(4) Remove housing half (9), packing (10) and bushing (11)

(5) Remove eight nuts (12), lockwashers (13) and bolts (14).

CAUTION

Pull camshaft straight out from trailer. Any vertical or side-to-side movement can cause damage to splined end of camshaft.

(6) Pull camshaft (23) and attached parts out of mounting plate (28).

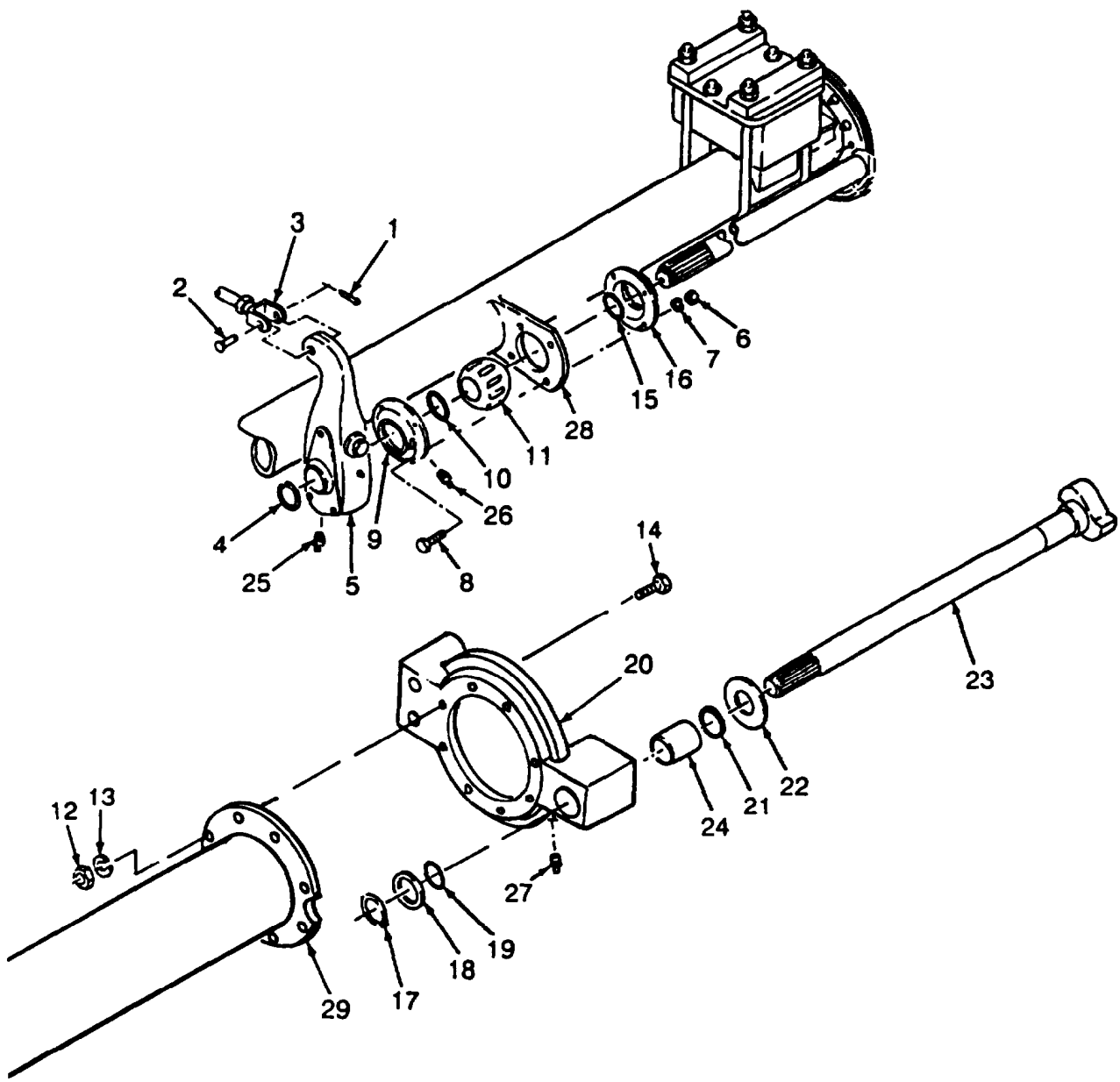
(7) Remove seal (15), housing half (16), snapring (17). spacer (18) and seal (19).

(8) Remove spider (20), seal (21) and washer (22) from camshaft (23).

(9) Tap out bushing (24) using a brass drift pm.

(10) Remove grease fittings (25, 26 and 27).

3-66. BRAKE ASSEMBLY REPAIR (MODELS WPES-10 and H-9518-1) - continued.



3-66. BRAKE ASSEMBLY REPAIR (MODELS WPES-10 AND H-9518-1) - continued.

b. Cleaning.

(1) Using rags, wipe solidified grease off all parts.

WARNING

Drycleaning solvent, P-D-680, Cl II, is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

(2) Soak spider (20), slack adjuster (5), and other parts with solidified grease, in drycleaning solvent for 1 hour.

(3) Using stiff-bristled brush, scrub grease off all parts.

(4) 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.

(5) Blow compressed air into hole for grease fittings on spider (20), slack adjuster (5) and housing half (9).

c. Inspection.

(1) Check shaft (23) for cracks, damaged or worn splines.

(2) Check slack adjuster (5) for cracks, damaged spline and stopped-up grease passage.

(3) Check mounting plate (28) for distortion and cracked welding seams where it is attached to axle (29).

(4) Check housing halves (16 and (9) for cracks, dents, stopped-up grease passage and other visible damage.

(5) Check spider (20) for cracks, distortion and stopped-up grease passage.

(6) Check bushing (11) for binding, loose, damaged or worn rollers.

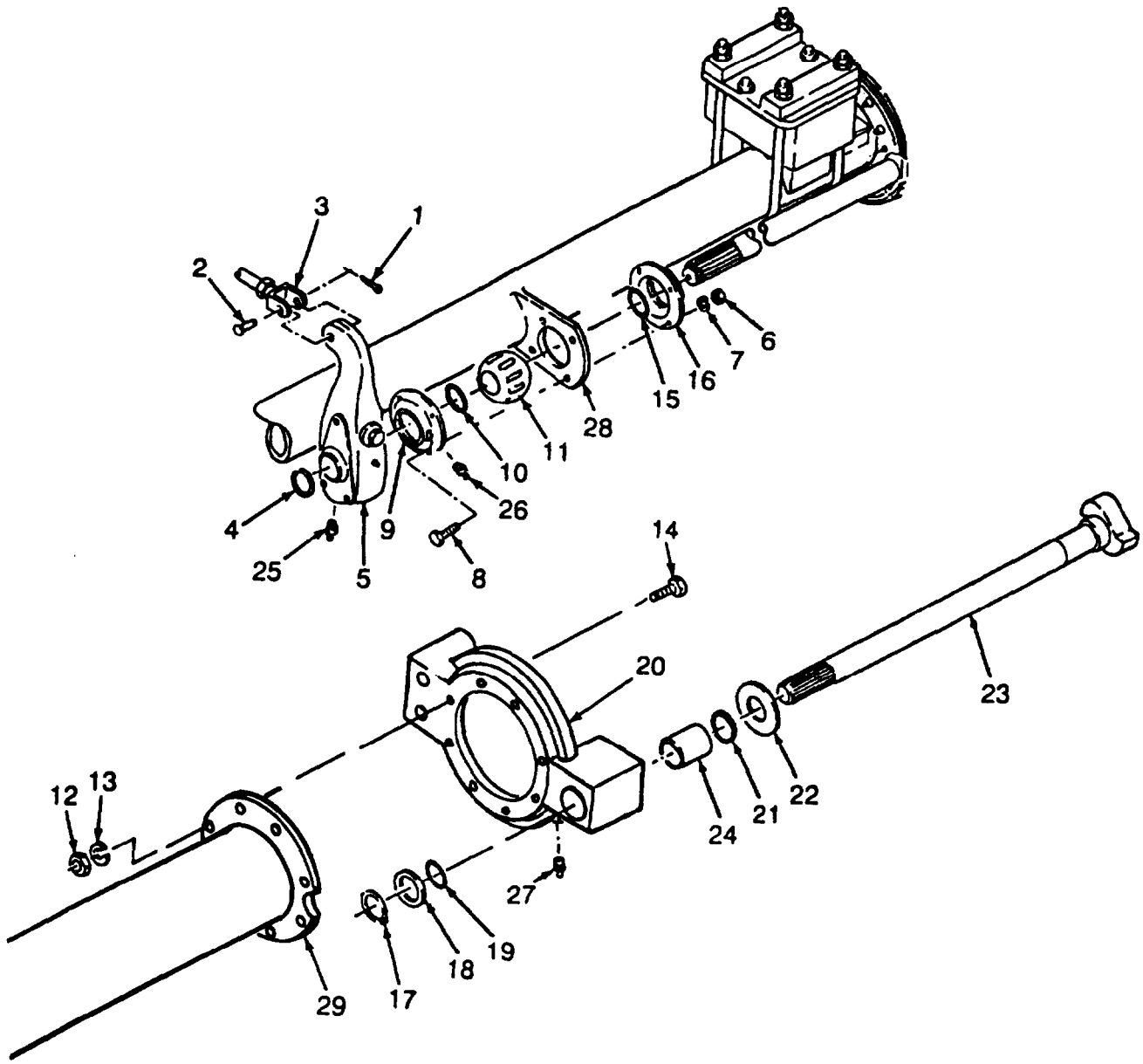
(7) Check all other parts for stripped threads, cracks, wear and deterioration.

d. Repair.

(1) Replace all lockwashers, seals and preformed packing.

(2) Replace damaged, worn and otherwise unserviceable parts.

3-66. BRAKE ASSEMBLY REPAIR (MODELS WPES-10 and H-9518-1) - continued.



3-66. BRAKE ASSEMBLY REPAIR (MODELS WPES-10 AND H-9518-1) - continued.

e. Installation.

(1) Using brass drift pin, tap spider bushing (24) into spider (20).

(2) Position spider (20) on flange of axle (29) and install with eight screws (14), lockwashers (13) and nuts (12).

CAUTION

Push camshaft straight in. Any vertical or side-to-side movement can cause damage to splines.

(3) Position washer (22) and packing (21) on shaft (23) and feed shaft thru bushing (24) in spider (20).

(4) Position seal (19), spacer (18), snapring (17), housing half (16) and preformed packing (15) on camshaft (23).

(5) Feed camshaft (23) thru mounting plate (28).

(6) Position seal (19) and spacer (18) on spider (20) and install snapring (17).

(7) Position bushing (11), packing (10) and housing half (9) on camshaft (23).

(8) Aline mounting holes in housing halves (9 and 16) with holes in mounting plate (27) and install four screws (8), lockwashers (7) and nuts (6).

(9) Install slack adjuster (5) and secure with snapring (4).

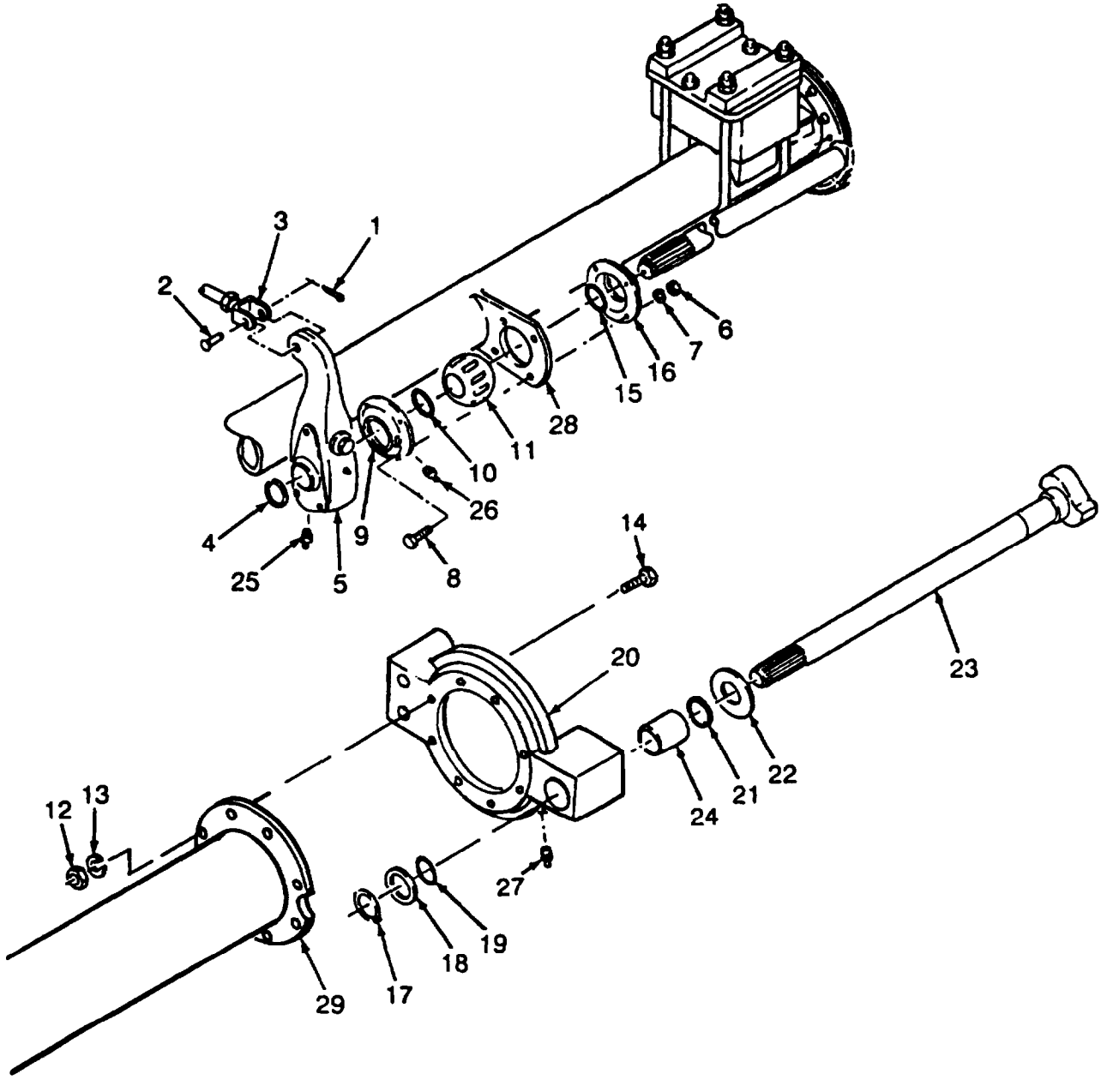
(10) Install grease fittings (25.26 and 27).

(11) Using grease gun, lubricate spider (20), slack adjuster (5) and bushing (11) in accordance with LO 10-4610-241-12.

(12) Connect clevis (3) to slack adjuster with pin (2) and cotter pin (1).

(13) Adjust brakes in accordance with Paragraph 2-88.

3-66. BRAKE ASSEMBLY REPAIR (MODELS WPES-10 AND H-9518-1) - continued



3-67. SPRING ASSEMBLY REPAIR (MODELS WPES-10 AND H-9518-1).

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 18).
Oil, Lubricating (Appendix C, Section II, Item 13).
Personnel Required
Two
Equipment Condition
Suspension Assembly removed (Paragraph 3-65).
Tire and Wheel Assemblies removed (TM 10-4610-241-10).
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.

a. Removal.

(1) Jack up side of suspension assembly on which spring repairs are to be performed.

(2) Place a jack stand under trunnion for support.

(3) Remove eight backing nuts (1), eight retaining nuts (2) and four U-bolts (3).

(4) Remove two nuts (4) and lo&washers (5).

(5) Remove spring cover (6) and top plate (7).

(4) Remove four backing nuts (8), retaining nuts (9), bolts (10) and trunnion bracket plate

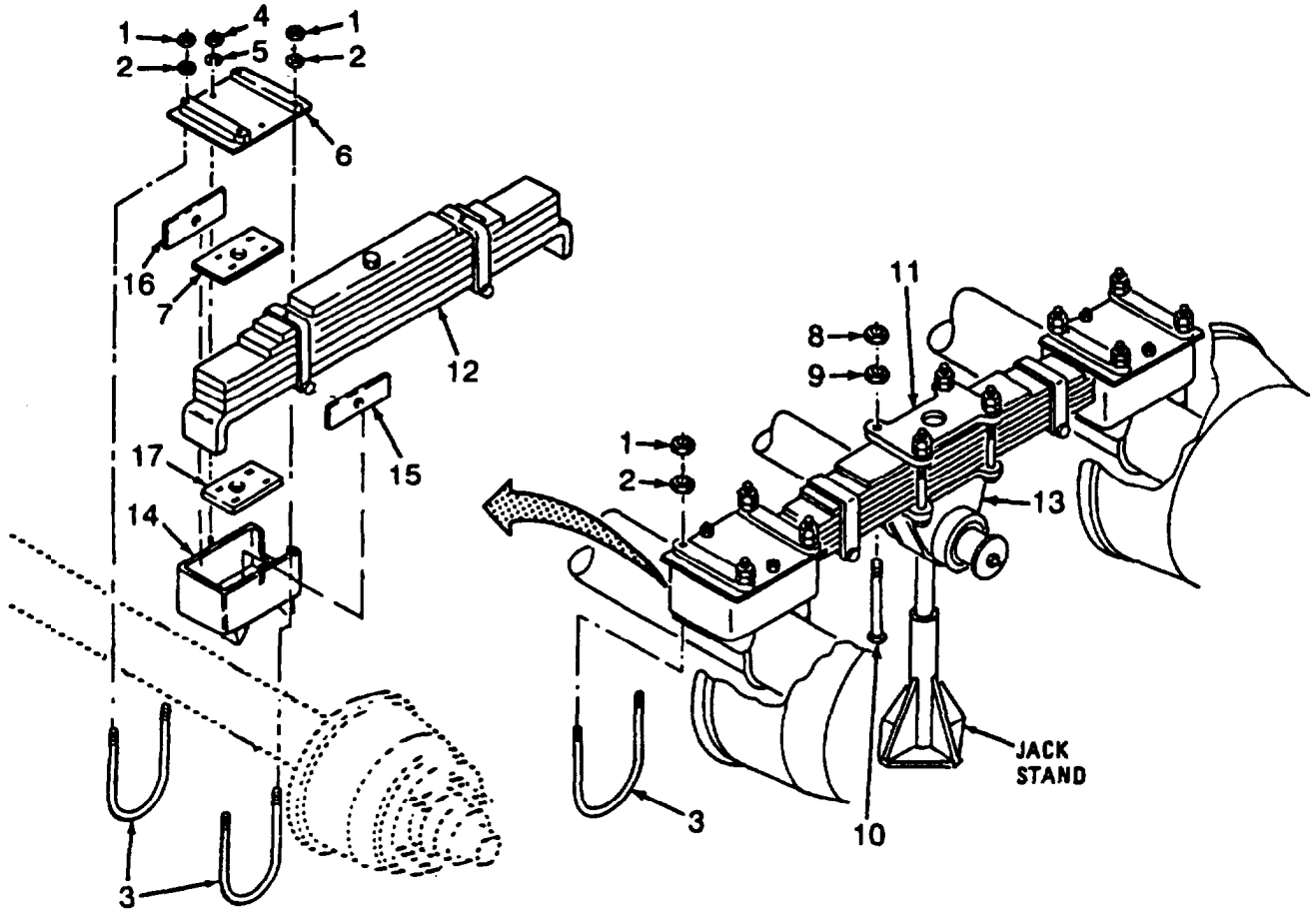
3-67. SPRING ASSEMBLY REPAIR (MODELS WPES-10 and H-9618-1) - continued.

WARNING

Spring assembly is heavy. To prevent injury, use two people to lift.

(5) Lift spring assembly (12) off trunnion bracket (13) and out of spring boxes (14).

(6) Remove two side plates (15 and 16) and bottom plate (17) from each box (14).



3-67. SPRING ASSEMBLY REPAIR (MODELS WPES-10 AND H-9518-1) - continued.

b. Disassembly.

(1) Place spring assembly (12) on workbench.

(2) Remove two nuts (18), two bolts (19), two spacer tubes (20), and two angle bars (2 1).

(3) Remove nut (22) and bolt (23).

(4) Separate spring bars (24).

c. Cleaning.

WARNING

Dry cleaning solvent, P-D-680, Cl II, is highly toxic and can ignite organic materials, nitrates, carbides, and chlorates. Wear eye, skin, and respiratory protection. Use in a well-ventilated area.

(1) Clean all parts with a wire brush.

(2) Soak all parts in dry cleaning solvent and let air dry.

d. Inspection.

(1) Inspect spring assembly (12) for distortion, damage such as cracks, thread damage (bolts/nuts), excessive rust, and missing parts.

(2) Inspect angle bars (21) for distortion, cracks and missing center pins.

(3) Inspect for broken and distorted spring bars (24).

e. Repair.

(1) Replace lockwashers.

(2) Replace defective components.

f. Assembly.

(1) Clean all spring assembly parts thoroughly and coat with light oil.

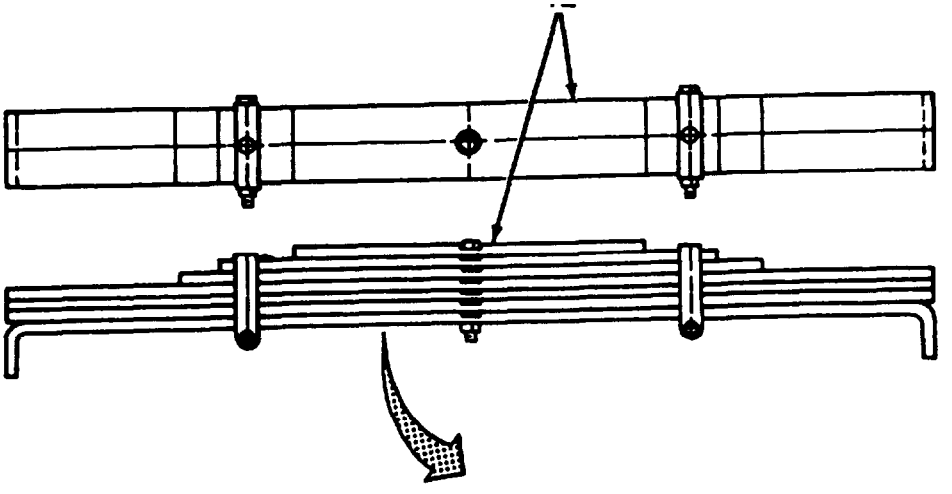
(2) Position spring bars (24) as illustrated and aline center holes.

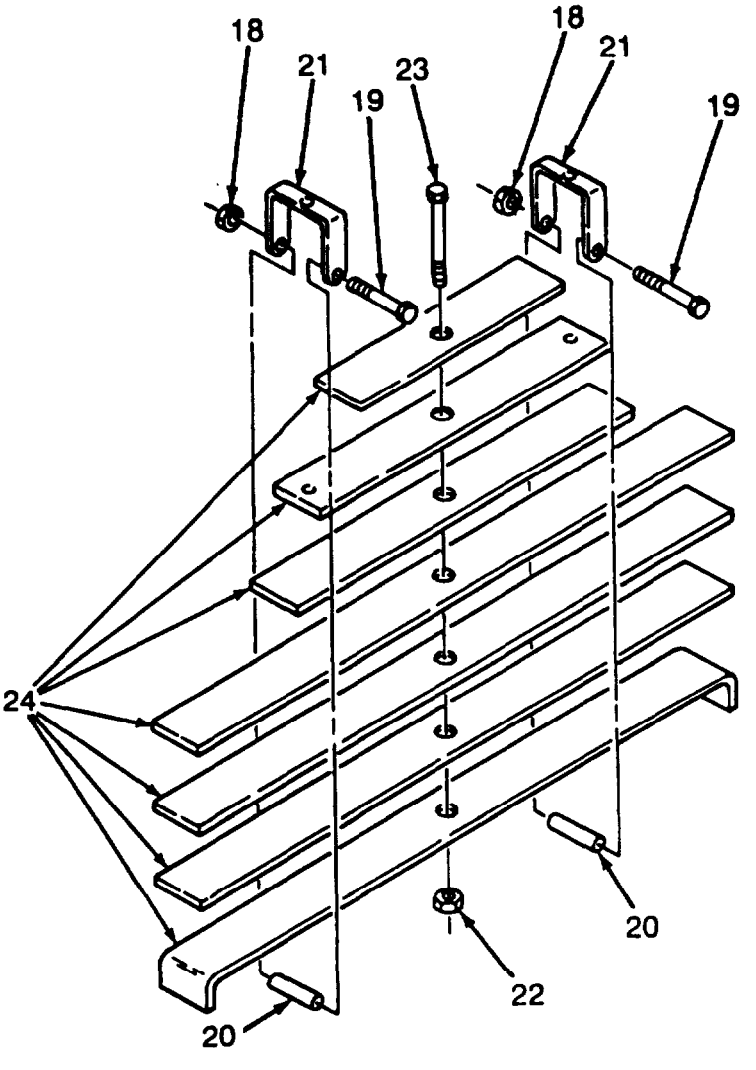
(3) Install bolt (23) and nut (22).

(4) Position two angle bars (21), making sure pins in angle bars are inserted in holes of second bar from the top.

(5) Install two spacer tubes (20), two bolts (19), and two nuts (18).

3-67. SPRING ASSEMBLY REPAIR (MODELS WPES-10 AND H-9518-1) - continued.





3-67. SPRING ASSEMBLY REPAIR (MODELS WPES-10 AND H-9518-1) - continued.

e. Installation.

WARNING

Spring assembly is heavy and difficult to handle. To prevent injury, use two people to lift it.

(1) Place bottom plate (17) in each of two boxes (14).

(2) Lift and position spring assembly (12) in boxes (14).

(3) Position side plates (15 and 16) and top plate (17) in each box (14) as illustrated.

(4) Position spring covers (6) on boxes (14) and install two lockwashers (5) and nuts (4) on each box (14).

(5) Install four U-bolts (3) with two nuts (2) and backup nuts (1).

(6) Position trunnion brackets (13) at bottom of spring assembly (12).

(7) Position plate (11) on top of spring assembly (12) with hole in center of plate aligned with nut and bolt, protruding thru top center of spring assembly.

(8) Aline trunnion bracket (13) with mounting holes in plate (11) and install four retaining nuts (9).

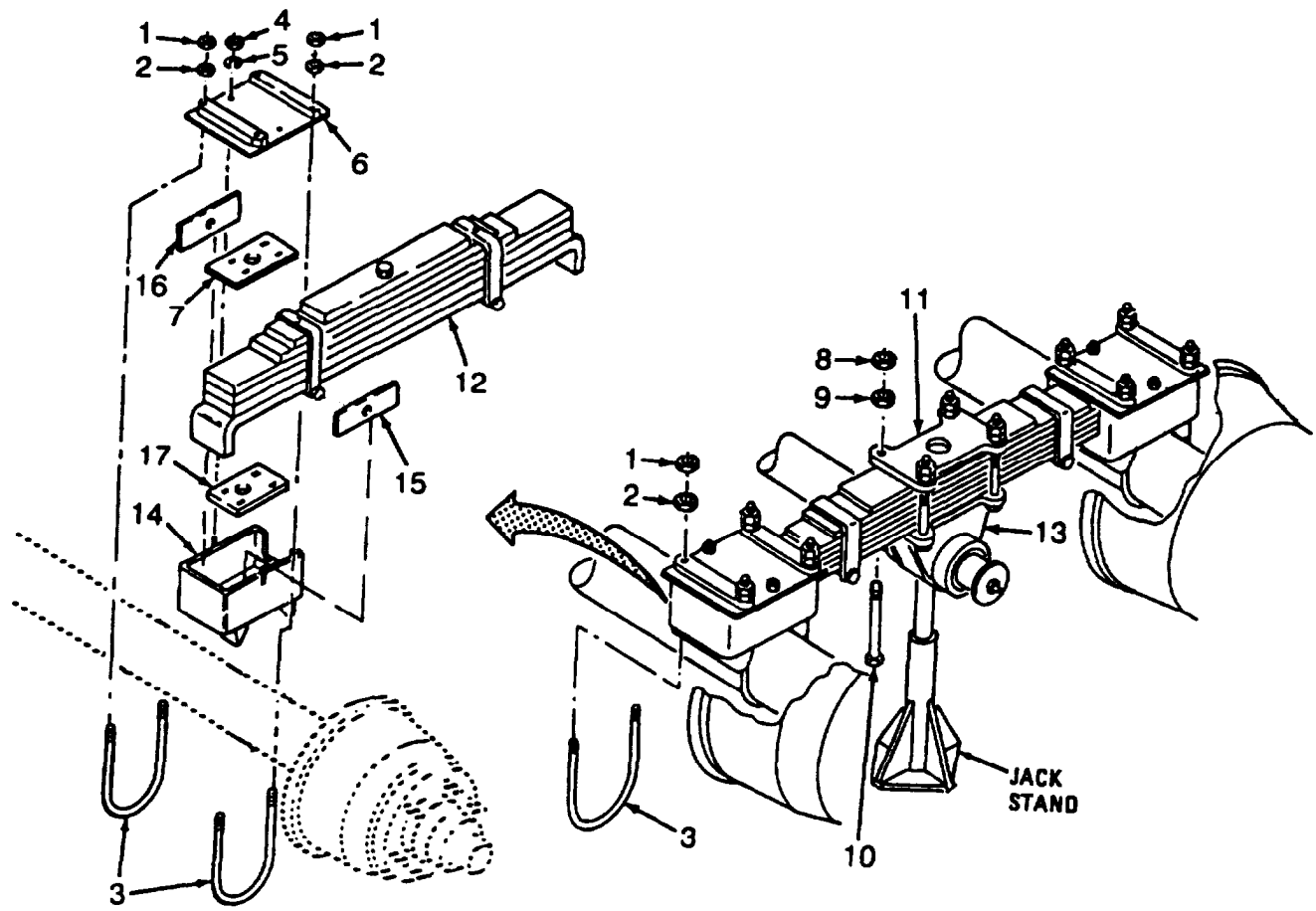
(9) Torque retaining nuts (9) to 85 -105 pounds/foot and install eight backing nuts (8) against them.

(10) Install tire and wheel assembly (TM 10-4610-241-10).

(11) Removed jack stand.

(12) Install suspension assembly on trailer (Paragraph 3-65).

3-67. SPRING ASSEMBLY REPAIR (MODELS WPES-10 and H-9518-1) - continued.



3-68. AXLE ASSEMBLY REPLACE (MODELS WPES-10 AND H-9518-1).

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
Lo&washers (TM 10-4610-241-24P)
Personnel Required
Two
Equipment Condition
Hub and Drum Assemblies removed (Paragraph 2-87).
Air Chambers removed (Paragraph 2-89).
General Safety Requirements

WARNING
Lifting heavy equipment incorrectly can cause serious injury. See general warning page.

a. Removal.

(1) Using two hydraulic or screw-type jacks, support axle (13), to be removed, at both ends and position jackstands under each trunnion bracket.

(2) Remove eight backing nuts (1), retaining nuts (2), and four U-bolts (3).

(3) Remove four nuts (4), lockwashers (5), and two covers (6).

(4) Remove top spacer (7) from box (8).

WARNING
Axle is heavy. Two people are needed to lift it to prevent injury to personnel and/or damage to the equipment.

(5) Lower jacks, supporting axle assembly, evenly and remove axle from jacks.

(6) As required remove side plates (9 and 10) and bottom plate (11) from spring box (8).

b. Installation

WARNING
Axle is heavy. Two people are needed to lift it to prevent injury to personnel and/or damage to equipment.

3-68. AXLE ASSEMBLY REPLACE (MODELS WPES-10 and H-9518-1) - continued.

(1) Place axle (13) in position underneath flatbed cargo trailer with hydraulic or screw-type jacks supporting each end of axle (13).

(2) Ifremoved, position bottom spacer (11) in spring box (8).

(3) Raising both jacks evenly, position springs (12) in spring boxes (8) and on top of bottom plates (11).

(4) Position side plates (9 and 10) between springs and sides of spring boxes (8) and top plate (7) on top of spring assemblies (12) in spring boxes (8).

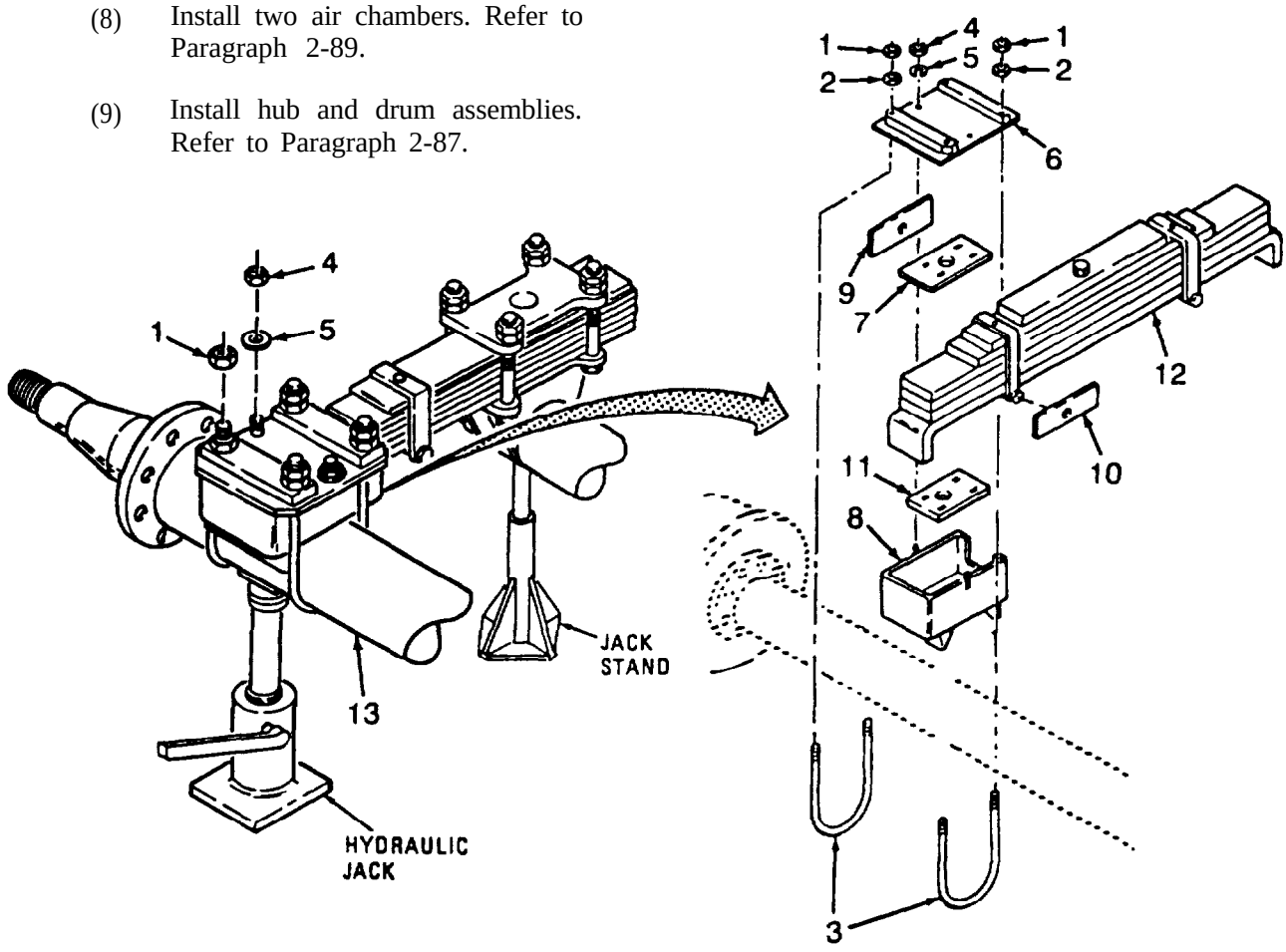
(5) Install covers (6), lockwashers (5), and nuts (4).

(6) Install U-bolts (3) around axle (13) and through cover (6) and secure with retaining nuts (2).

(7) Torque retaining nuts (2) to 85-105 pounds/foot and install eight backing nuts (1) against them.

(8) Install two air chambers. Refer to Paragraph 2-89.

(9) Install hub and drum assemblies. Refer to Paragraph 2-87.



3.69 TRUNNION REPLACE - (MODELS WPES-10 AND H-9518-1).

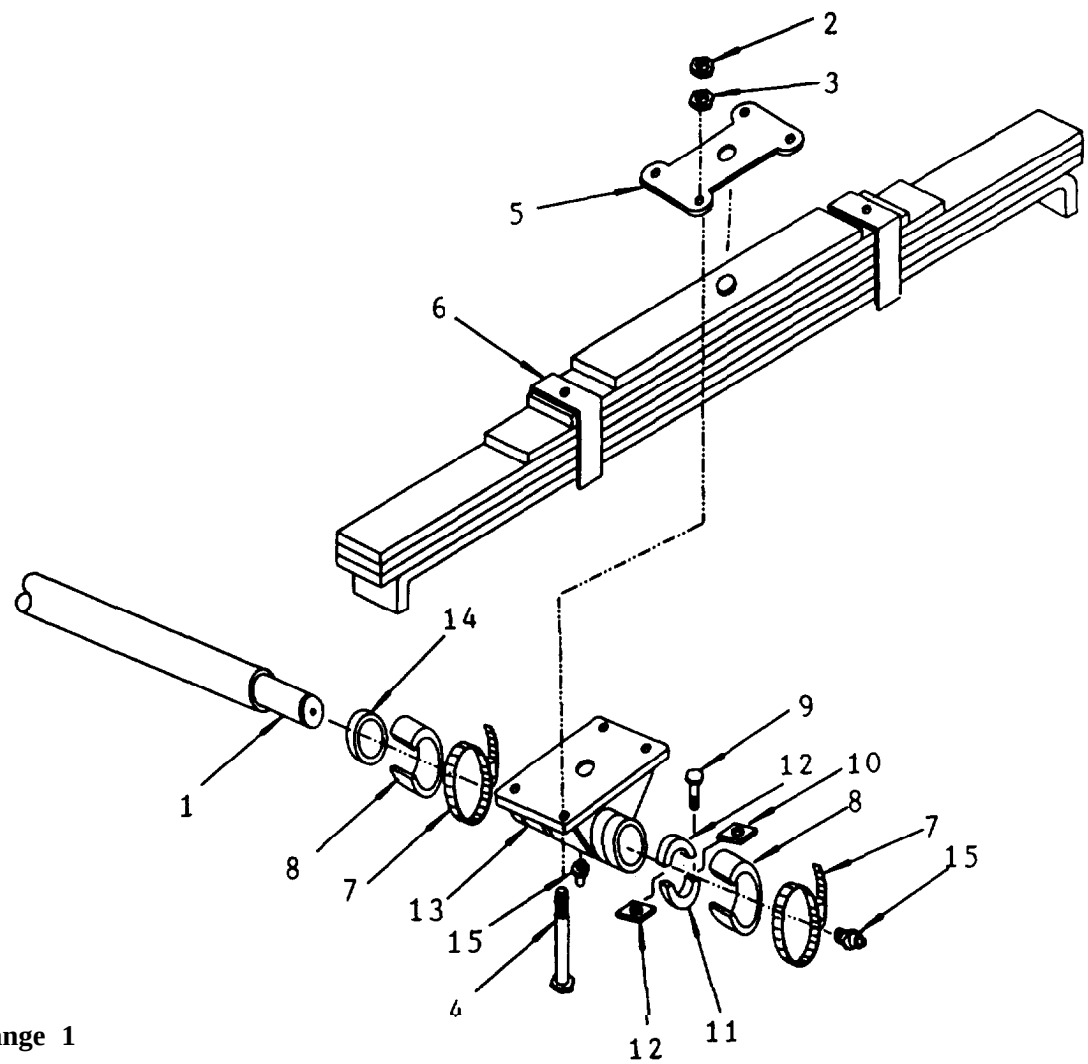
This task consists of a. Removal b. Installation

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
Lockwashers (TM 10-4610-241-24P)
Personnel Required
Two
Equipment Condition
Both Hub and Drum Assemblies removed from Axle (Paragraph 2-87).
Both Air Chambers removed from Axle (Paragraph 2-89).
General Safety Requirements

WARNING

Lifting heavy equipment incorrectly can cause serious injury. See general warning page.



3-69 TRUNNION REPLACE- (MODELS WPES-10 AND H-9518-1) - continued.

a. Removal.

(1) Using two hydraulic or screw-type jacks, support trunnion (1) at both ends.

WARNING

Trunnion is heavy and difficult to move. Two people are needed to lift it to prevent personal injury or damage to the equipment.

(2) Remove eight backup nuts (2), retaining nuts (3), screws (4) and two plates (5), attaching trunnion to springs (6).

(3) Lower hydraulic jacks and remove trunnion (1) with attached parts from jacks.

(4) Loosen four hose clamps (7) and remove four grease seals (8).

(5) Remove two screws (9), clamps (10 and 11) and two seals (12) from end of trunnion (1).

(6) Remove trunnion supports (13).

(7) Remove spacers (14).

(8) Remove grease fittings (15) from ends and underside of trunnion (1).

b. Installation.

WARNING

Trunnion is heavy. Two people are needed to lift it to prevent personal injury or damage to equipment.

(1) Position spacers (14) and trunnion supports (13) on both ends of trunnion (1).

(2) Position two jacks under trailer and lay trunnion on top of jacks.

(3) Raise jacks, while alining trunnion supports (13) with trunnion mounting surfaces (bottom center of spring assemblies (6).

(4) Position plates (5) on top of springs (6) as illustrated. Aline mounting holes.

(5) Install four screws (4) and retaining nuts (3) on each side.

(6) Torque retaining nuts (3) to 85-105 pounds/foot and install eight backing nuts (2) against them.

(7) Install clamps (10 and 11) and two seals (12) securing with screws (9) on both ends.

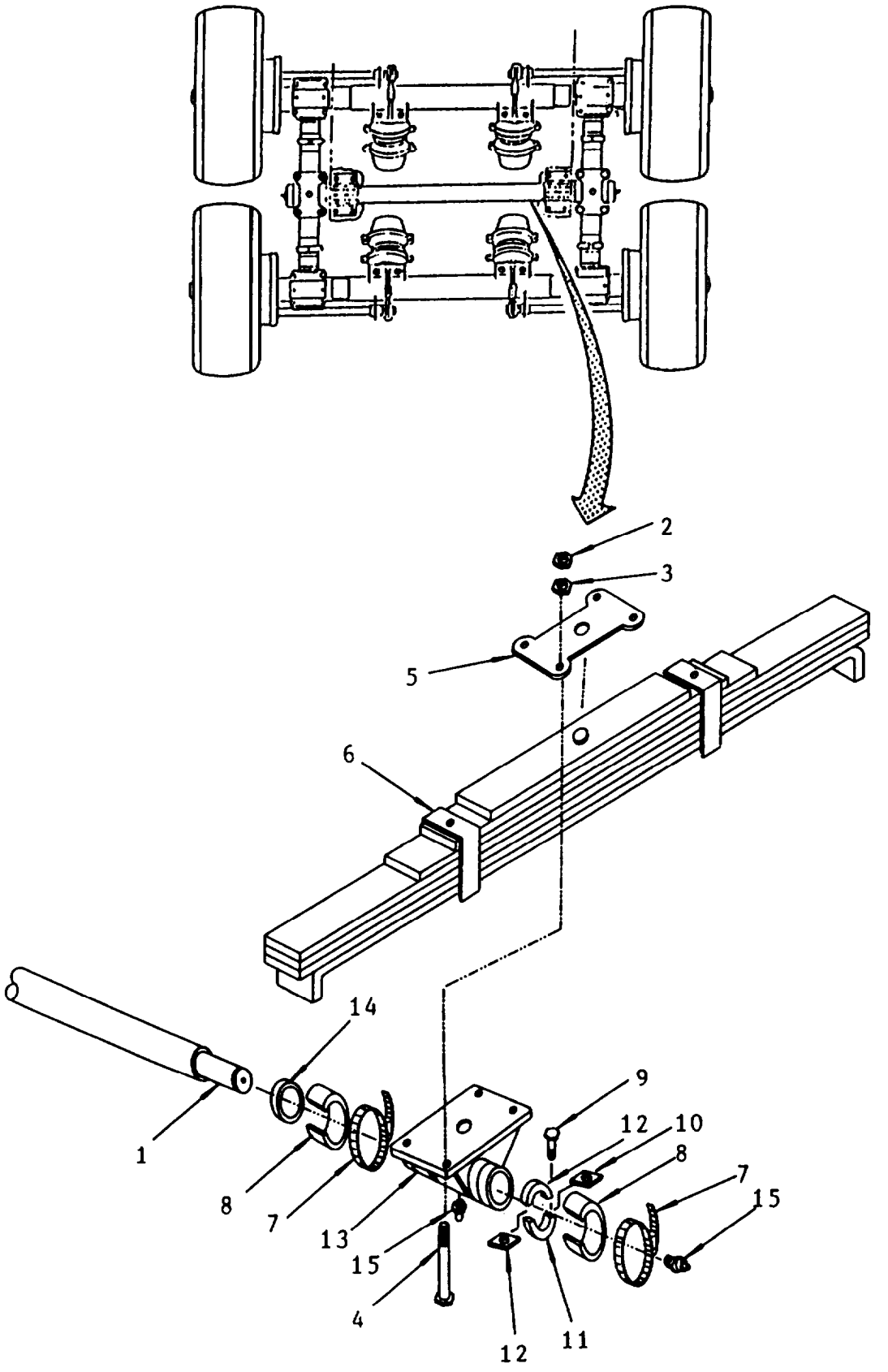
(8) Install two grease fittings (15) on ends and underside of trunnion.

(9) Wrap grease seal (8) over clamp halves (10 and 11) and spacer (14) and secure with hose clamps (7).

(10) Lubricate trunnion in accordance with LO 10-4610-241-10.

(11) Install two hub and drum assemblies. Refer to Paragraph 2-87.

3-69 TRUNNION REPLACE - (MODELS WPES-10 AND H-9518-1) - continued.



CHAPTER 4

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

4-1 GENERAL

This section contains procedures formaintaining components that are the responsibility of General Support Maintenance.

4-2. R.O. PUMP ASSEMBLY POWER END REPAIR (MODELS WPES-10, WPES-20 and WPES-30

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 18)
- Rags (Appendix C, Section II, Item 14)
- Packing, Seals and Gaskets (TM 10-4610-241-24P)

References
- R.O. Pomp Wet End removed (Paragraph 3-22).
- Oil drained from Crankcase (Paragraph 2-67).

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 REPAIR (MODELS WPES-10, WPES20, and WPES-30) - continued.

a. Disassembly.

(1) Remove crosshead stub deflectors (1).

(2) Remove bolts (2), stub seal caps (3), seals (4) (two per cap) and gasket (5).

(3) Remove crankcase cover screws (6), crankcase cover (7) and gasket (8).

NOTE
Caps are pre-marked 1,2 and 3 to correspond with like marks on connecting rod.

(4) Disconnect connecting rods (26) from crankshaft (24) by removing the connecting rod bolts (9), caps (10) and bearings (11). Push rods and crossheads (27) as far as possible into the frame (30) for clearance.

NOTE
Keep shims, if used, together with respective end cap for reassembly. If original crankshaft and/or bearings are to be reinstalled, shims should provide correct end play. If these components were replaced, end play adjustment may be required during assembly.

(5) Remove bolts (12), end cap (13) and shims (14).

(4) Remove bolt (15), end cap (16) and shims (17).

(7) Remove seals (18 and 19).

NOTE
Mark case in relation to crankshaft to ensure proper installation

(8) Remove bearing cup (21), crankshaft (24) and bearings (22 and 23) from pulley end of frame (30) as a unit.

(9) Remove bearing cups (20 and 21).

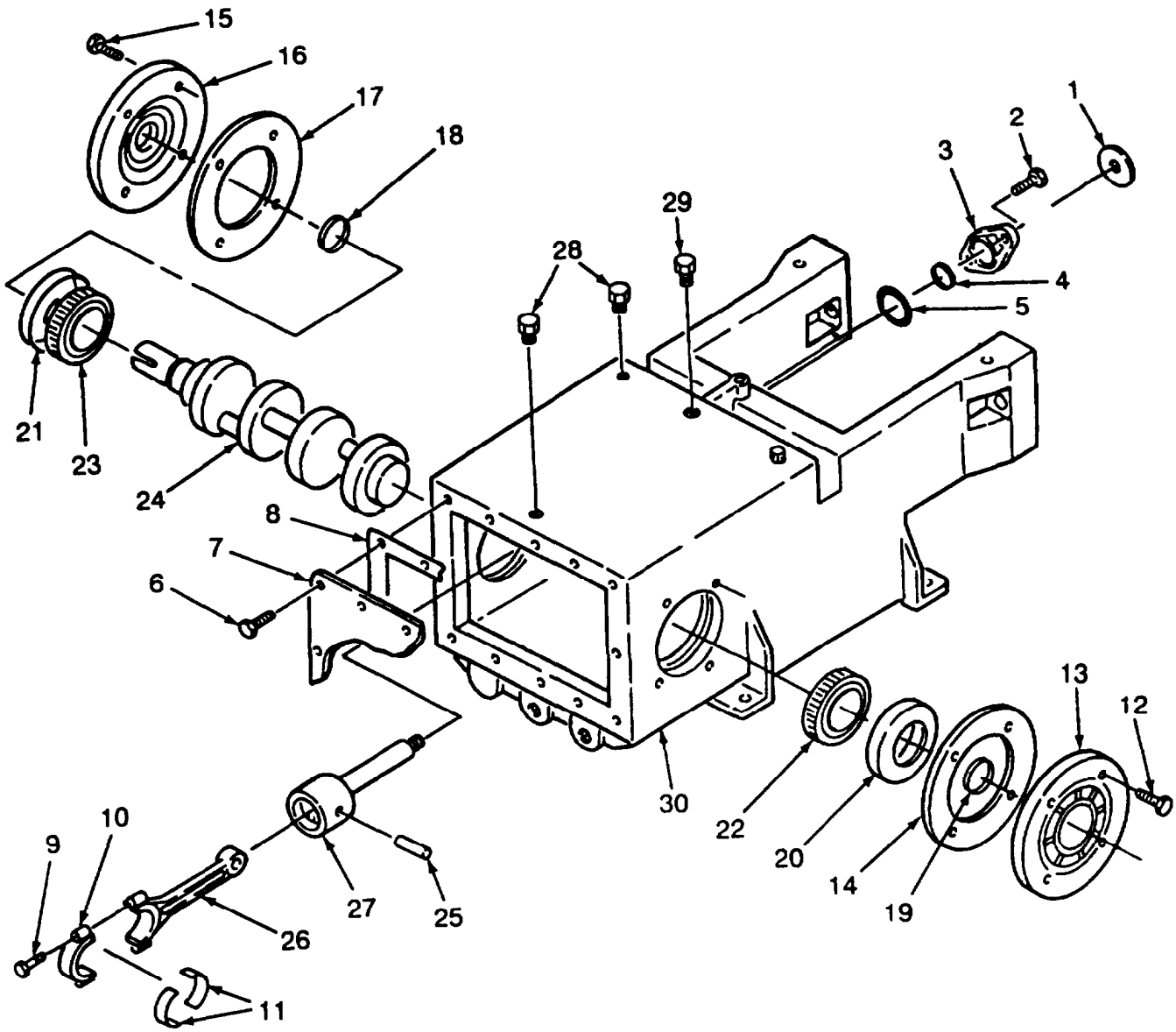
NOTE
To remove bearing cones, use an arbor press or heat cones to 300° F at inner race.

(10) Remove bearing cones (22 and 23).

(11) Remove crossheads (27) and separate from connecting rods (26) by removing crosshead pins (25).

(12) Remove plugs (28) and crankshaft breather (29).

4-2. R.O. PUMP ASSEMBLY POWER END REPAIR (MODELS WPES-10, WPES-20 and WPES-30) - continued.



4-2. R.O. PUMP ASSEMBLY POWER END REPAIR (MODELS WPES-10, WPES-20, and WPES-30) - continued.

b. Cleaning

WARNING

Dry cleaning solvent, PD-680, CL II, 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.

c. Inspection

(1) Power Frame (30). Inspect frame for excessive wear, cracks, stripped threads and scratched or scored bearing surfaces, particularily in the crosshead bores. 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) excceeds 0.009 inch, power frame should be replaced.

(2) Crossheads (27). 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 inch, crosshead should be replaced.

(3) Connecting Rods (26). Check rods for cracks, deformation and excessive wear. Replace if unserviceable.

(4) Crankshaft (24) and Connecting Rod Bearings (24). Check for worn journals and damaged/ worn bearings. If journals are rough, crankshaft should be replaced.

(5) Miscellaneous Hardware. Check all remaining hardware for cracks, damaged threads, excessiver wear, corrosion, deformation and other damage, making the item unserviceable. Replace unserviceable hardware.

d. Repair

(1) Replace all seals.

(2) Replace defective components.

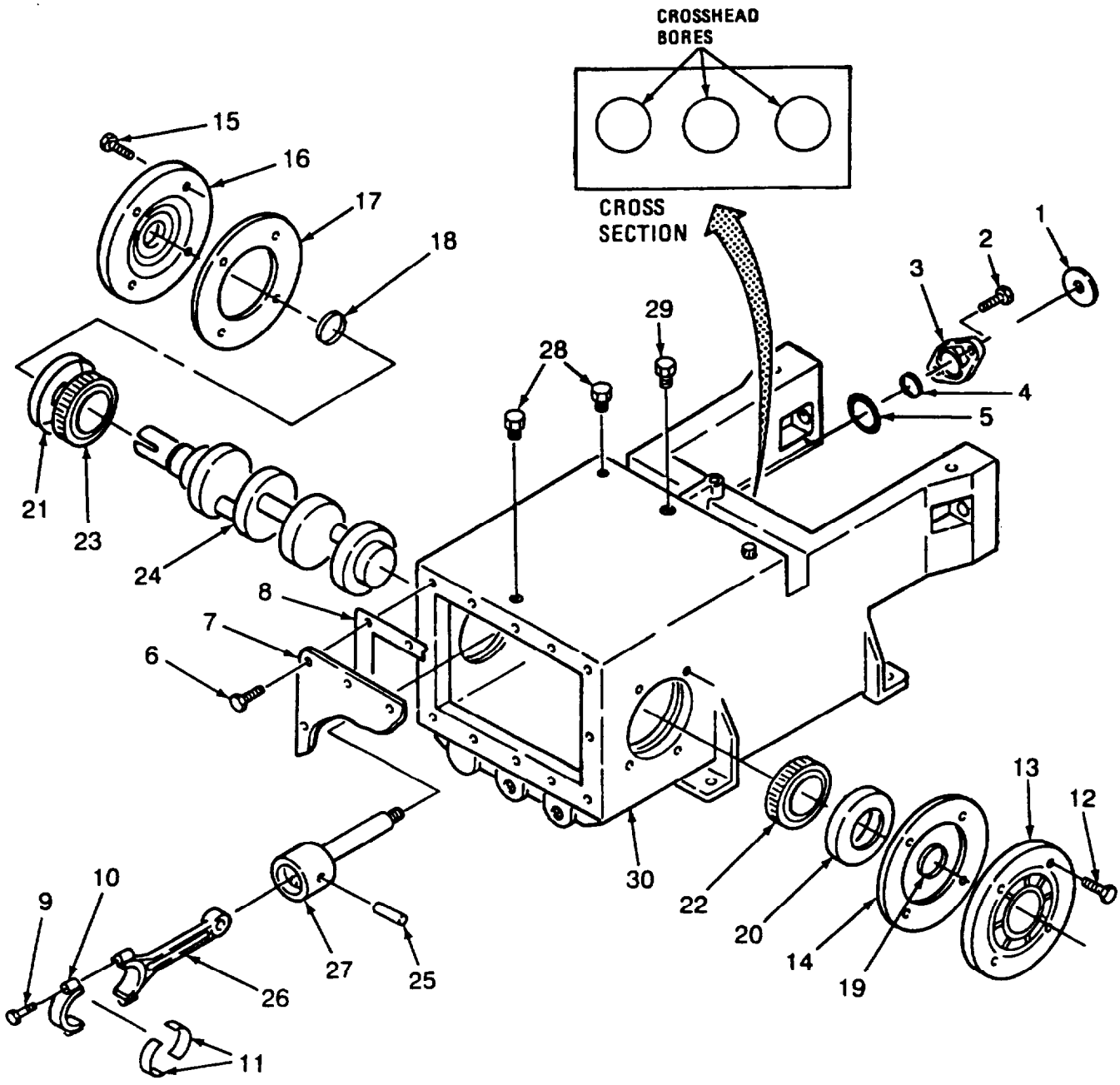
e. Assembly

(1) Install bearings (11), bearing caps (10) as marked and screws (9). Torque screws to 20 pounds/foot.

(2) Connect crossheads (27) to connecting rods (26), using pins (25).

(3) Place power frame (30) on a clean work bench.

4-2. R.O. PUMP ASSEMBLY POWER END REPAIR (MODELS WPES-10, WPES-20 and WPES-30) - continued.



4-2. R.O. PUMP ASSEMBLY POWER END REPAIR (MODELS WPES-10, WPES-20, and WPES-30) - continued.

(4) Insert crossheads (27) in power frame (30).

NOTE
To install bearing cones, use an arbor press or heat cones to 300° F at inner race.

(5) Install bearing cones (22 and 23) on crankshaft (24) and position crankshaft in power frame (30) as marked.

(6) Install bearing cups (21 and 22) in power frame (30).

(7) Install seals (18 and 19) on end caps (13 and 16), tapping seal lightly with a soft mallet.

NOTE
Shims are provided in thicknesses of 0.005, 0.007 and 0.020 inch. For best results a 0.005 and a 0.020 inch 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.

(8) Install shims (17 and 14), end caps (16 and 13) and screws (12 and 15). Check/adjust end play as follows:

(a) Install a dial gage as indicated.

(b) Push crankshaft (24) all the way to one side and zero dial gage.

(c) Push crankshaft (24) to other side and note end play on dial gage.

(d) If necessary, add or remove shims (14 and 17) for correct end play of 0.001 to 0.003 inch.

NOTE
When shimming is correct, connecting rods and pin bearings of connecting rods should be positioned near center of crosshead walls and should not touch walls.

(e) Check if connecting rod pin bearings and/or connecting rods (26) touch inside wall of crosshead (27).

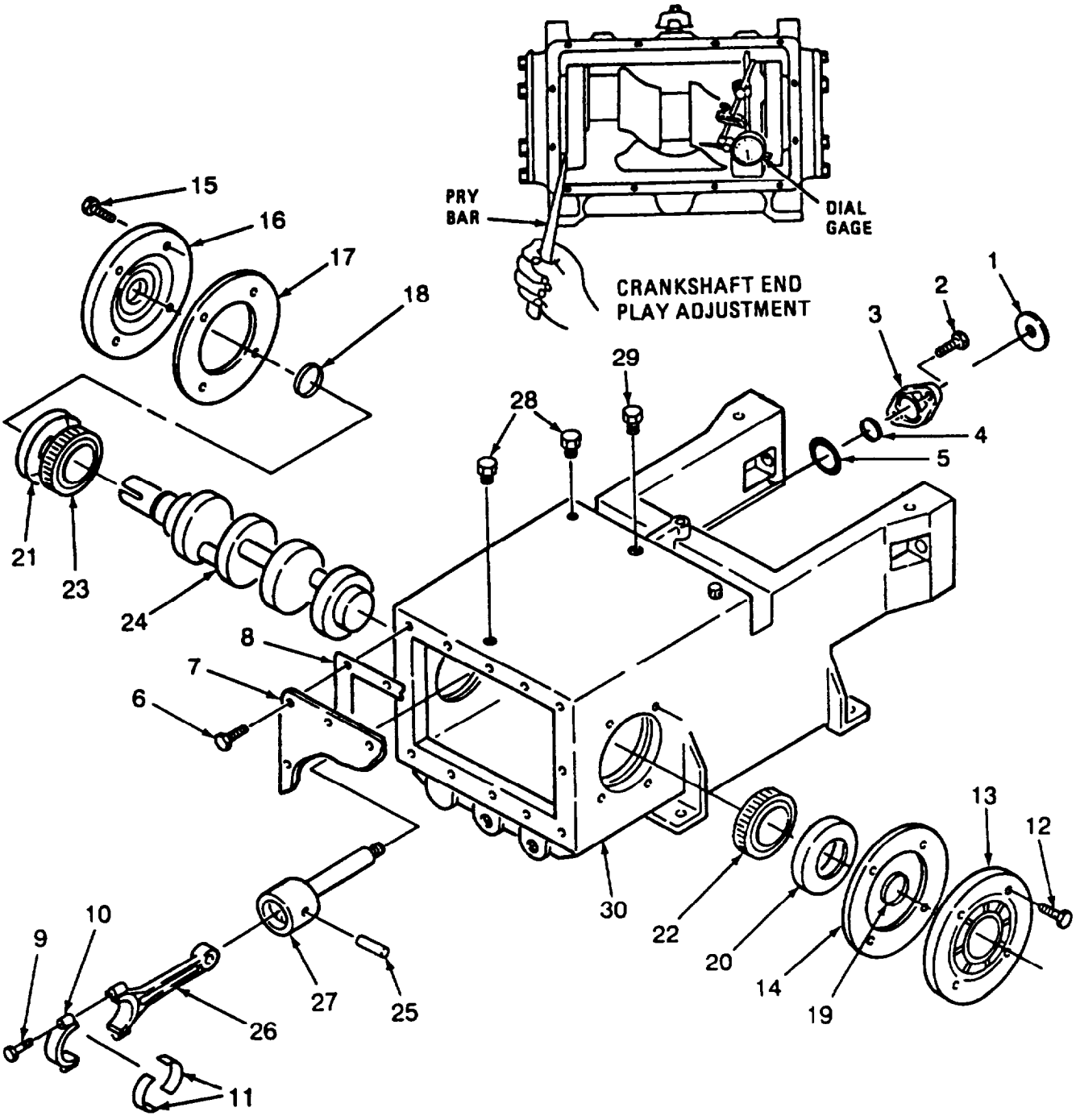
(f) As necessary, transfer shims (16 and 14) from one side to the other to ensure that pin bearings are positioned properly and do not touch inside of crosshead openings.

(g) When adjustment is complete, torque screws (12 and 15) to 20 pounds/foot.

4-2. R.O. PUMP ASSEMBLY POWER EN-D REPAIR (MODELS WPES-10, WPES-20 and WPES-30) - continued.

h Install gasket (8) and cover (7) with screws (6). Torque screws to 16 lbs ft.

i. If removed, install plug (28), and breather (29).



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

General Shop Practice Requirements for the Repair and Test of Electronic Equipment ..... TM 43-0158

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 Models WPES-10 and H-9518-1, and Skid Mounted Models WPES-20, H-9518-2, WPES-30 and H-9518-3 ..... LO 10-4610-241-12
TO 40W4-13-51

Metal Body Repair and Related Operations ..... TM 9-450

A-3. TECHNICAL MANUALS - continued.

Operators's Manual; Water Purification Unit, Reverse Osmosis, 600 GPH Trailer Mounted, Flatbed Cargo, 5 Ton 4 Wheel Tandem ROWPU Models WPES-10 and H-9518-1 and Skid Mounted Models WPES-20, H-9518-2, WPES-30 and H-9518-3 ..... TM 10-4610-241-10
TO 40W4-13-41

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 5-5430-225-12&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

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, 4 Wheel Tandem Models WPES-10 and H-9518-1, and Skid Mounted Models WPES-20, H-9518-2, WPES-30 and H-9518-3 ..... TM 10-4610-241-24P
TM 40W4-13-44

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 Maintenance Instructions for Support Equipment ..... TO 1-lA-15

General Repair for Canvas and Webbing ..... FM 43-3

Index of Authorized Publications SL-1-2

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) ..... TB 10-4610-241-24

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL.

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 IV 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 of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly). In a manner to allow the proper functioning of an equipment or system.

H Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3rd position code of the SMR code.

I Repair. The application of maintenance services, 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
0 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 TMI)E, and special tools, special TMI)E, 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	MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) REMARKS
			UNIT		DS/GS		DEPOT		
			C	O	F	H	D		
00	600 GPH ROWPU TYPES 1, II, AND III								
01	STORAGE CHEST	INSPECT 01							
		REPLACE		0 1					
		REPAIR		1.0				4	
02	BACKWASHI PUMP ASSY	INSPECT	0.8						
		SERVICE	0.5						
		REPLACE		0.2				4	
		REPAIR		2.5	5.0				
0201	•CABLE ASSY(W42)	INSPECT	0.2						
		TEST		0.3				3	
		REPLACE		0.5				4	
		REPAIR	2.0					3, 4	
0202	•STRAINER (ASSY)	INSPECT	0.2						
		SERVICE	0.5						
		REPLACE		1.0				4	
		REPAIR		0.5				4	
0203	••CENTRIFUGAL PUMP(ASSY)	INSPECT	0.2						
		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	
0204	•BACK WASH PUMP FRAME	INSPECT	0.2						
		REPLACE		0.2				4	
		REPAIR			1.5			6	
03	RAW WATER PUMP ASSY	INSPECT	0.5						
		REPLACE		0.2					
		REPAIR		1.7	4.5			4	
0301	•CABLE ASSY	INSPECT	0.2						
		TEST		0.5				3	
		REPLACE		0.5				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		
0302	• CENTRIFUGAL PUMP (ASSY)	INSPECT	0.2						
		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	
0303	• PUMP FRAME	INSPECT	0.1						
		REPLACE		0.2					
		REPAIR			1.5			6	
04	DISTRIBUTION PUMP ASSY	INSPECT	0.5						
		REPLACE		0.2					
		REPAIR		1.7	4.5			3,4	
0401	• CABLE ASSY	INSPECT	0.1						
		TEST		0.5				3	
		REPLACE		0.5				4	
		REPAIR			2.0			3,4	
0402	• CENTRIFUGAL PUMP (ASSY)	INSPECT	0.2						
		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	
0403	• PUMP FRAME	INSPECT	0.1						
		REPLACE		0.2					
		REPAIR			2.0			6	
05	• HOSE ASSEMBLIES	INSPECT	0.4						
		REPLACE		0.4					K
		REPAIR		0.5					
16	GATE VALVES AND FITTINGS	INSPECT	0.1						
		REPLACE		0.5				4	
		REPAIR		0.7				4	K
0601	**• OCEAN INTAKE STRUCTURE** (Models H-9518-1, H-9518-2, and H-9518-3)	INSPECT	0.1						
		REPLACE		0.6				4	
		REPAIR		0.8				4	
07	CHEMICAL CANS AND FRAME	INSPECT	0.1						
		REPLACE		0.2				4	L
		REPAIR		1.0	2.0			4,6	
08	DEIONIZATION CARTRIDGES	INSPECT	0.1						
		REPLACE	0.2					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		
09	TDS MONITOR	INSPECT	0.1						
		ADJUST		1.0				3,4	
		REPLACE		0.2					
		REPAIR			2.0			3,4	M
10	WATERTANK	INSPECT	0.1						N
		REPLACE		0.3					
11	GENERATOR SET	INSPECT	0.2						O
		REPLACE			1.0				
12	600 GPH ROWPU SKID (ARMY ONLY)	INSPECT	0.2						
		REPLACE			2.0			3,4	
1201	• COVER (CANVAS)	INSPECT	0.2						
		REPLACE		0.5					
		REPAIR			2.0				
1202	• COVER PLATE	INSPECT	0.2						
		REPLACE		0.5				4	
1203	• PIPING INSTALLATION								
	• • GROOVED PIPE (PIPE SECTIONS, CLAMPS, FITTINGS, ETC.)	INSPECT	0.5						
		REPLACE		1.0				4	
	• • RUPTURE DISK (Models WPES-10, WPES-20, and WPES-30 only)	INSPECT		0.2					
		REPLACE		0.2				3	
		REPAIR		0.2					
	• • THREADED PIPE (PIPE SECTIONS, ELBOWS, FITTINGS, ETC.)	INSPECT	0.1						
		REPLACE		1.2				4	
	• • TUBING (TUBE SECTIONS, ELBOWS, FITTIGS, ETC.)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • GATE VALVE (VENT VESSELS)	INSPECT	0.1						
		REPLACE		0.5				4	
		REPAIR		0.5				4	A
	• • FLOW METER (RAW WATER)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • FLOW METER (PRODUCT WATER FLOW)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • WATER METER (FLOW RATE 1NDICATOR)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • CHECK VALVE (PRODUCT WATER)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • BALL VALVE (VENT)	INSPECT	0.1						
		REPLACE		0.5				4	

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL UNIT C	UNIT O	DS F	GS H	DEPOT D	(5) TOOLS& EQUIP.	(6) RE-MARKS
	DIFF PRESSURE GAGE	INSPECT	0.1						
		REPLACE		1.0				4	
	• • FLOWMETER (BRINE WATER)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • NEEDLE VALVE (PRODUCT WATER REGULATING)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • DIFF PRESS GAGE (R.O. VESSELS)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • 2-WAY VALVE (ON-OFF)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • BALL VALVE (DRAIN)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • 3-WAY BALL VALVE (BACKWASH)	INSPECT	0.1						
		REPLACE		1.0				4	
		REPAIR		1.5				4	B
	• • CHECK VALVE (BACK\WASH)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • VACUUM BREAKER	INSPECT	0.1						
		REPLACE		1.0				4	
	• • DIFF. PRESS. GAGE (MULTI-MEDIA FILTER)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • FLOWMETER (BACKWASH)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • PRESSURE GAGE (R.O.)	INSPECT	0.1						
		REPLACE		1.0				4	
	• • RELIEF VALVE	INSPECT	0.1						
		REPLACE		0.5				4	
	• • ELLIPTIC VALVE	INSPECT	0.1						
		REPLACE		1.0				4	
	• • 3-WAY BALL VALVE (CHEMICAL FEED)	INSPECT	0.1						
		REPLACE		0.5				4	
1204	• ELECTRICAL INSTALLATION								
	• • CABLE ASSEMBLY, W41 (R.O. PUMP)	INSPECT	0.1						
		TEST		1.0				3	
		REPLACE		0.5				4	
		REPAIR			2.0			3,4	
	• • CABLE ASSEMBLY W52 (JUNCTION BOX)	INSPECT	0.1						
		TEST		1.0				3	
		REPLACE		0.5				4	
		REPAIR			3.0			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		
	• • CABLE ASSEMBLY W40 (GENERATOR) (ARMY/MC ONLY)	INSPECT	0.1						
		TEST		0.5				3	
		REPLACE		0.5				4	
		REPAIR			2.5			3,4	
	• • ELECTRICAL CABLE W50 (CHEM FEED PUMP)	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	• • CABLE ASSEMBLY W56 (TDS MONITOR)	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.0			3,4	
	• • ELECTRICAL CABLE W47	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			1.5			4	
		REPAIR			1.0			3,4	
	• • CABLE ASSEMBLY W49 (FILTER CONTROL)	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.0			3,4	
	• • ELECTRICAL CABLE W51 (BOOSTER PUMP)	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			1.5			4	
		REPAIR			1.0			3,4	
	• • ELECTRICAL CABLE W48	INSPECT	0.1		0.5				
		TEST			1.5			3	
		REPLACE			1.0			4	
		REPAIR						3,4	
	• • CABLE ASSEMBLY W53 (BACKWASH TIMER)	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.0			3,4	
	• • CABLE ASSY W57 (DISSOLVED SOLIDS SENSOR)	INSPECT	0.1						
		TEST			0.5			3	
		REPLACE			0.5			4	
		REPAIR			1.0			3,4	
1205	• HIGH PRESSURE SWITCH	INSPECT	0.1						
		REPLACE		1.0				4	
1206	• LOW PRESSURE SWITCH	INSPECT	0.1						
		REPLACE		1.0				4	
1207	• CENTRIFUGAL PUMP (BOOSTER)	INSPECT	0.1						
		REPLACE		1.0				4	
		REPAIR			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		
	• • PUMP	REPLACE			1.0			4	
		REPAIR			1.5			4	
	• • MOTOR	REPLACE			1.0			4	
		REPAIR			1.5			3,4	
1208	• CHEMICAL FEED PUMP	INSPECT	0.2						
		SERVICE	0.5	1.0				4	
		REPLACE		1.5				4	
		REPAIR		1.0	2.5			3,4	
	• • LIQUID HEAD	REPLACE		0.5				4	
		REPAIR		0.7				4	
	• • MOTOR	REPLACE		0.5				4	
		REPAIR			1.0			4	
	• • STROKE ADJUSTMENT ASSY	REPLACE			0.5			4	
		REPAIR			1.0			4,8	
	• • HOUSING AND DRIVE ASSY	REPLACE			1.0			4	
		REPAIR			1.5			3,4	
1209	• CARTRIDGE FILTER	INSPECT	0.2						
		REPLACE			1.5			4	C
		REPAIR		2.0	3.0			4	
1210	• R.O. PUMP ASSEMBLY (Models WPES-10, WPES-20, and WPES-30 only)	INSPECT	0.4						
		ADJUST		0.5				4	
		SERVICE	0.5	1.0				4	
		REPLACE			4.0			2,3,4	J
		REPAIR		2.0		12		5	
	• R.O. PUMP ASSEMBLY (Models H-9518-1, H-9518-2, and H-9518-3 only)	INSPECT	0.6						
		SERVICE	1.0	1.5				4	
		REPLACE			5.0			4	
		REPAIR			6.0			4	
	• • FLUID PRESSURE DAMPENER (Models WPES-10, WPES-20. and WPES-30 only)	INSPECT	0.1						
		REPLACE		0.5				4	
	• • BELT GUARD (Models WPES-10, WPES-20, and WPES30 only)	INSPECT	0.5						
		REPLACE		0.5				4	
	• • V-BELTS (Models WPES-10. WPES-20, and WPES-30 only)	INSPECT	0.2						
		REPLACE		1.0				4	
	• • ELECTRIC MOTOR (Models WPES-10, WPES-20, and WPES-30 only)	INSPECT	0.2						
		SERVICE		1.5					
		REPLACE			2.0			3,4	
		REPAIR		0.5	3.0			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		
	•• ELECTRIC MOTOR (Models H-9518-1, H-9518-2, and H-9518-3 only)	INSPECT	0.2						
		SERVICE		1.5					
		REPLACE			2.0			3,4	
		REPAIR		0.5	3.0			3,4	
	•• HIGH PRESSURE PUMP (Models WPES-10, WPES-20, and WPES-30 only)	INSPECT	0.2						
		SERVICE	0.5					4	
		REPLACE			2.0			3,4	
		REPAIR		1.0	2.0	6.0		2,3,4,5	D
	•• HIGH PRESSURE PUMP (Models H-9518-1, H-9518-2, and H-9518-3 only)	INSPECT	0.2						
		SERVICE	1.0					4	
		REPLACE			2.0			3,4	
		REPAIR			4.0			3,4	
	••• FLUID END (Models WPES-10. WES-20, and WPES-30 only)	REPLACE			1.0				
		REPAIR			2.0				
	••• POWER END (Models WPES-10, WPES-20, and WPES-30 only)	REPLACE			2.0			3,4	
		REPAIR				6.0		3,4	
	•• PUMP AND MOTOR STAND (Models WPES-10, WPES-20, and WPES-30 only)	INSPECT	0.2						
		REPLACE			1.5			3,4	
		REPAIR			2.0			3,4	
1211	• MULTIMEDIA FILTER	INSPECT	0.4						
		REPLACE			2.0			3,4	
		REPAIR		0.5	4.0			1,3,4	
	•• TIMER (Models WPES-10, WPES-20, and WPES-30 only)	INSPECT	0.2						
		REPLACE		1.0				4	
		REPAIR			1.2			4	
	•• TIMER (Models H-9518-1, H-9518-2, and H-9518-3 only)	INSPECT	0.2						
		REPLACE		1.0				4	
		REPAIR			1.2			4	
	•• CONTROL VALVE (Models WPES-10, WPES-20, and WPES-30 only)	INSPECT	0.2						
		REPLACE		1.0				4	
		REPAIR			1.5			4	
	•• 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	
1212	• R.O. PRESSURE TUBES	INSPECT	0.4						
		SERVICE	1.0					4	
		REPLACE		2.0				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		
1213	• CONTROL BOX ASSEMBLY	INSPECT	0.2	0.2					
		REPLACE	0.2		4.0			4	F
		REPAIR		0.5	6.0			3,4	
	•• WIRING HARNESS W1	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.0			3,4	
	•• WIRING HARNESS W2	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.0			3,4	
	•• WIRING HARNESS W54	TEST	0.3					3	
		REPLACE			3.0			4	
		REPAIR		2.5	6.0			3,4	
1214	• JUNCTION BOX ASSEMBLY	INSPECT	0.2						
		REPLACE			3.0			4	
		REPAIR		2.5	6.0			3,4	G
	•• COYER	INSPECT	0.2	0.5					
		REPLACE		0.5				4	
		REPAIR		1.5				4	
	•• WIRING HARNESS W3	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	•• WIRING HARNESS W4	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	•• WIRING HARNESS W5 (GENERATOR)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	•• WIRING HARNESS W6 (BACKWASH PUM)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	•• WIRING HARNESS W9 (DISTRIBUTION PUMP)	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	•• WIRING HARNESS W10	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	•• WIRING HARNESS W 39	TEST			0.5			3	
		REPLACE			1.0			4	
		REPAIR			1.5			3,4	
	•• MOTOR STARTERS	REPLACE			1.0			4	
		REPAIR			0.5			4	H

(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		
1215	• LIGHT ASSEMBLY (PANEL)	INSPECT	0.2	0.5					
		REPLACE		1.0				4	
		REPAIR	0.2	0.5				4	
1216	• STORAGE BOX (CARTRIDGE FILTERS)	INSPECT	0.2						
		REPLACE		0.5				4	
		REPAIR		0.5	2.0			6	
1217	• FRAME	INSPECT	0.5						I
		REPAIR		2.0	4.0			4,6	
13	FLAT BED CARGO TRAILER	INSPECT	0.5						
		SERVICE		0.5				4	
		REPLACE			3.0			3,4	
		REPAIR		1.5	8.0			3,4	
1301	• JACK ASSEMBLY	INSPECT	0.2						
		REPLACE		1.5				4	
1302	• ELECTRICAL INSTALLATION	INSPECT	0.5						
		REPLACE		2.5				4	
		REPAIR		0.5	2.5			3,4	
	•• LIGHT ASSY	INSPECT	0.1						
		REPAIR		0.5				4	
	•• TRAILER CABLE ASSY	INSPECT	0.2						
		TEST		1.0				4	
		REPLACE		1.0				3,4	
		REPAIR			1.5				
	•• WIRING HARNESS	INSPECT	0.2						
		REPLACE		1.5				4	
		REPAIR			1.0			3,4	
1303	• AIR BRAKE INSTALLATION	INSPECT	0.2						
		REPLACE		2.0				4	
		REPAIR			1.5			3,4	
	•• AIR CLEANER ASSY	INSPECT	0.1						
		SERVICE		.05				4	
		REPLACE		0.5				4	
	•• RELAY VALVE	INSPECT	0.2						
		REPLACE		1.0				4	
		REPAIR			1.5			4	
1304	• SUSPENSION ASSY	INSPECT	0.6						
		SERVICE		1.5				3,4	
		ADJUST		1.0				3,4	
		REPLACE			3.0			3,4	
		REPAIR			10.5			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		
	•• BRAKE ASSY	INSPECT	0.2						
		SERVICE		0.5					P
		REPAIR		1.0	2.0			3,4	
	•• SPRING ASSY	INSPECT	0.2						
		REPAIR			3.0			3,4	
	•• AXLE ASSY	INSPECT	0.2						
		SERVICE		1.5				4	
		REPAIR			1.5			3,4	
1305	• FRAME	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. Diameter	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-A74
4	O	Tool Kit, General Mechanics	5180-00-177-7033	SC 5180-90-N26
5	F	Tool, Gland Adjusting (61748) 003	5120-01-397-4406	
6	F	Welding Shop, Trailer Mounted	3431-01-090-1231	SC3431-95-CL-A04
7	F	Shop Equipment, Automotive	4910-00-754-0705	SC-4910-95-A31
8	F	Tool Kit, Adjustment (41083) 260246		

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	Unit repair limited to replacement of stem packing and handle.
B	Unit repair limit to replacement of o-rings.
C	Unit repair limited to replacement of cover. filter tubes, seats, springs, and o-rings.
D	Unit repair limited to replacement of sight gage, drain hose, drain valve and clamps.
E	Unit will replace internal diaphragm components.
F	Unit repair limited to replacement of lamps.
G	Unit 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	Unit level repair limited to replacement of straps, bracket, and related hardware.
J	Unit repair limited to replacement of motor and pump sheaves.
K	Unit repair limited to replacement of gaskets, caps, and chains.
L	Direct Support repair limited to welding of frame.
M	Repair limited to replacement of electrical cables.

REFERENCE CODE	REMARKS
N	For repair of water tank refer to TM5-5430-227-12&P
0	For repair of generator set refer to TM5-6115-465-12
P	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 (Appendix 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	F	4925-01-241-5013	Compound, locking (81349) MIL-S-46163	OZ
5	O	7930-00-282-9699	Detergent, GP, Liq, WS, A (81349) MIL-D-16791	GL
6	O		Garnet, No 12 (71726) 1633-16	EA
7	O		Garnet, No 50 fine (71726) 1630-16	EA
8	O		Gravel, 1/4-inch (71726) 1621-16	EA
9	O	9150-00-190-0904	Grease, automotive and artillery, GAA (81349) MIL-G-10924	EA
10	O	9150-01-161-4600	Grease, silicone (71984) DC-18	TB
11	O	9150-01-132-8871	Lubricant, O-Ring, Silicone Base Moisture Resistant, - 65°F to 400°F, 2 Oz Tube (02697) 884-2	EA
12	O		Media, plastic (71726) 1631-16	EA
13	O		Oil, lubricating, multipurpose	GL
14	O	7920-00-205-1711	Rags, wiping (58536) A-A-531	LB
15	O		Sand, filter (71726) 1632-16	EA

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Item Number	Category	National Stock Number	Description	U/M
16	O		Sandpaper, No 00	EA
17	F	3439-00-003-8602	Solder, lead-tin alloy (81349) QQ-S-571	LB
18	F	6850-00-110-4498	Solvent, drycleaning (81349) PD-680, Type II	PT
19	O	8030-00-889-3534	Tape, antiseize, roll (81349) MIL-T-27730	EA
20	O	5970-00-147-5674	Tape, electrical roll (81349) MIL-I-24391	EA
21	O		Tape, nomex, roll	EA
22	O		Tape, Packaging PPP-T--66TYICL2-337	EA
23	O		Tape, Packaging PPP-T--66TYICL2-338	EA
24	O		Tape, Packaging PPP-T--66TYICL2-339	EA
25	O		Tape, Packaging PPP-T--66TYICI, 2-340	EA
26	O		Tape, Packaging PPP-T--66TYIC L2-341	EA
27	O	4020-00-138-7042	Twine, ball (81349) MIL-T-713	EA

APPENDIX D

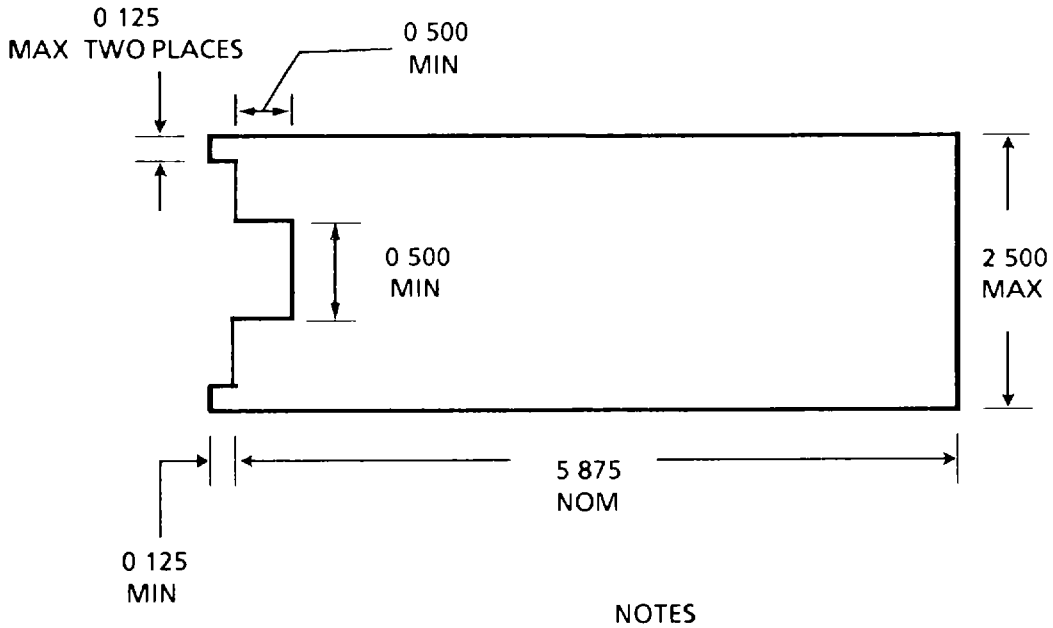
ILLUSTRATED LIST OF MANUFACTURED ITEMS

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
Part Name Gland Removal Tool

D-2. MANUFACTURED ITEMS PART NUMBER INDEX.



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

TORQUE LIMITS

FASTENER	TYPE	MIN TENSILE STRNGN	MATERIAL	BODY SIZE OR OUTSIDE DIAMETER OF FASTENER													
				7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/4	2 1/2	2 3/4	3
	SAE 0-1-2	74 000 PSI	LOW CARBON STEEL	206	310	480	675	900	1100	1470	1900	2360	2750	3450	4400	7350	9500
	SAE 3	100 000 PSI	MEDIUM CARBON STEEL	372	551	872	1211	1624	1943	2660	3463	4695	5427	7226	8049	13450	17548
	SAE 5	120 000 PSI	MEDIUM CARBON HEAT TREAT STEEL	382	587	794	1105	1500	1775	2425	3150	4200	4550	6550	7175	13000	16000
	SAE 6	133 000 PSI	MEDIUM CARBON STEEL QUENCHED TEMPERED	550	825	1304	1815	2434	2913	3985	5189	6980	7491	10825	14983	20151	26286
	SAE 7	133 000 PSI	MEDIUM CARBON ALLOY STEEL	570	840	1325	1825	2500	3000	4000	5300	7000	7500	11000	15500	21000	27000
	SAE 8	150 000 PSI	MEDIUM CARBON ALLOY STEEL	600	900	1430	1975	2650	3200	4400	5650	7600	8200	12000	17000	23000	29000
	SOCKET HEAD CAP SCREW	160 000 PSI	HIGH CARBON CASE HARDENED STEEL	640	970	1520	2130	2850	3450	4700	6100	8200	8800	13000	18000	24000	31000
	SOCKET SET SCREW	212,000 PSI	HIGH CARBON CASE HARDENED STEEL														
	MACHINE SCREW YELLOW BRASS	60 000 PSI	COPPER (CU) 63% ZINC (ZU) 37%	160	215	325	400		595								
	SILICONE BRONZE TYPE "B"	70 000 PSI	COPPER (CU) 96% ZINC (ZNI) 2% SILICON (SI) 2%	180	250	365	450		655								

There is no difference in the above chart between the torque figures for fine or coarse threads. The torque figures for a finely-threaded fastener as compared to a coarsely-threaded fastener of the same diameter may be slightly higher but hardly worth mentioning.

TORQUE LIMITS - continued

FASTENER	TYPE	MIN TENSILE STRNGN	MATERIAL	BODY SIZE OR OUTSIDE DIAMETER OF FASTENER													
				2	3	4	5	6	8	10	1/4	1/10	1/8	1/16	1/2	5/16	3/8	3/4
	SAE 0-1-2	74 000 PSI	LOW CARBON STEEL								6	12	20	32	47	69	96	155
	SAE 3	100,000 PSI	MEDIUM CARBON STEEL								9	17	30	47	69	103	145	234
	SAE 5	120 000 PSI	MEDIUM CARBON HEAT TREAT STEEL								10	19	33	54	78	114	154	257
	SAE 6	133 000 PSI	MEDIUM CARBON STEEL QUENCHED TEMPERED								12 5	24	43	69	106	150	209	350
	SAE 7	133 000 PSI	MEDIUM CARBON ALLOY STEEL								13	25	44	71	110	154	215	360
	SAE 8	150,000 PSI	MEDIUM CARBON ALLOY STEEL								14	29	47	78	119	169	230	380
	SOCKET HEAD CAP SCREW	160 000 PSI	HIGH CARBON CASE HARDENED STEEL	TORQUE VALUES All figures are foot-pounds except those marked with an asterisk (*) which are inch-pounds							16	33	54	84	125	180	250	400
	SOCKET SET SCREW	212 000 PSI	HIGH CARBON CASE HARDENED STEEL					9*	16*	30*	70*	140*	18	29	43	63	100	146
	MACHINE SCREW YELLOW BRASS	60 000 PSI	COPPER (CU) 63% ZINC (ZU) 37%	2*	3 3*	4 4*	6 4*	8*	16*	20*	65*	110*	17	27	37	49	78	104
	SILICONE BRONZE TYPE "B"	70 000 PSI	COPPER (CU) 96% ZINC (ZNI) 2% SILICON (SI) 2%	2 3*	3 7*	4 9*	7 2*	10*	19*	22*	70*	125*	20	30	41	53	88	117

There is no difference in the above chart between the torque figures for fine or coarse threads The torque figures for a finely-threaded fastener as compared to a coarse-ly-threaded fastener of the same diameter may be slightly higher but hardly worth mentioning

APPENDIX F

SCHEMATICS AND WIRING DIAGRAMS

F-1. GENERAL.

This Appendix contains flow diagrams and piping and electrical schematics for all three models of the ROWPU covered In this manual The diagrams and schematics are provided to aid maintenance personnel at Unit, Direct Support, and General Support maintenance organizations in isolating and identifying system and component malfunctions

F-2. SCHEMATICS.

When referencing schematics In this Appendix, be sure to use the diagram applicable to your model ROWPU Each illustration is identified with the model(s) covered in the schematic or diagram Illustrations that do not have specific models identified, apply to all units.

GLOSSARY

Section I. ABBREVIATIONS

R O ..... Reverse Osmosis
ROWPU..... Reverse Osmosis Water Purification Unit

Section II. DEFINITION OF Unusual, TERMS

There are no unusual terms in this manual

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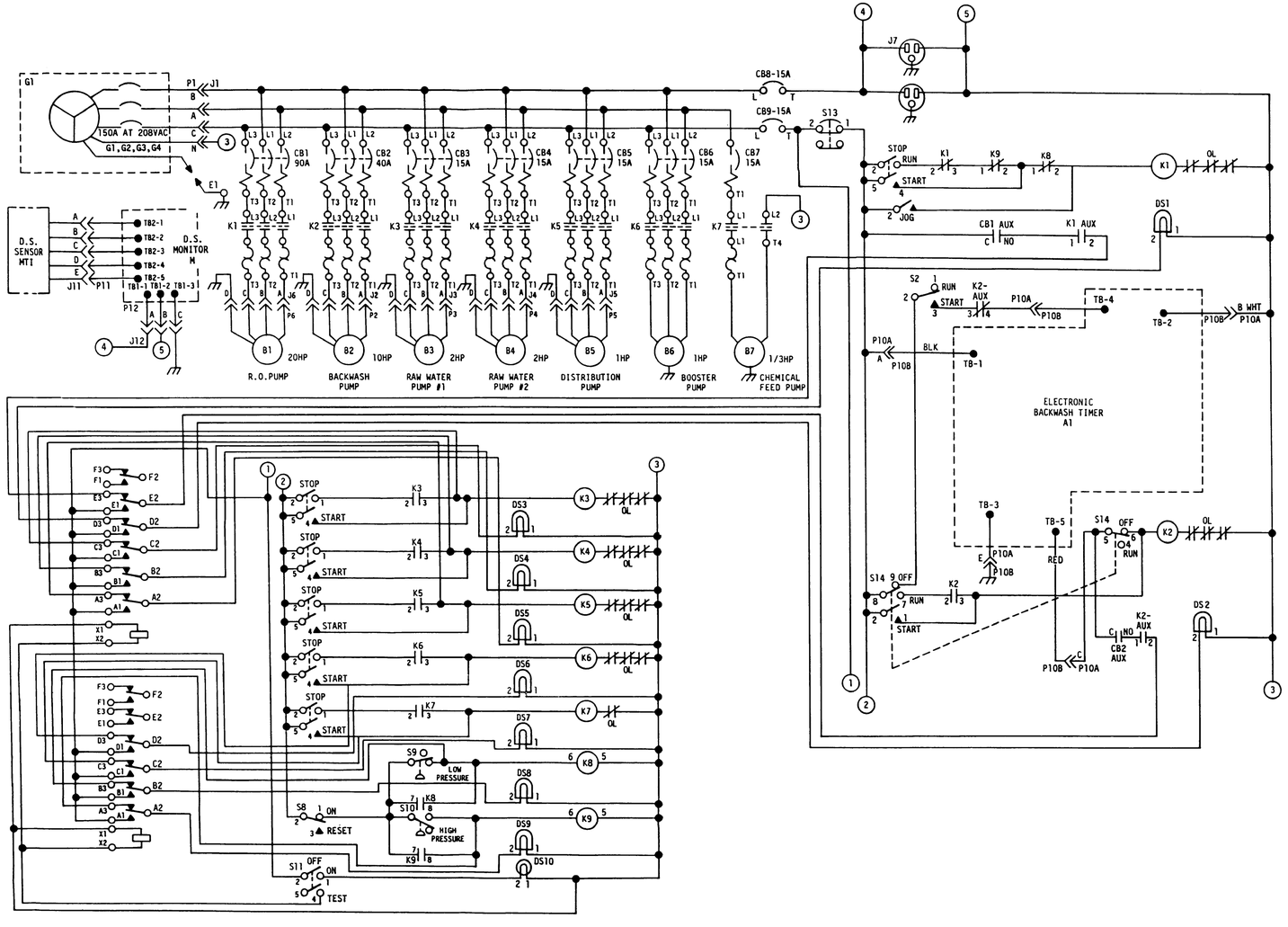


Figure F0-1. Electrical Schematic (Models WPES-10, H-9518-1, WPES-30 and H-9518-3)

COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
A1	13222E5328	MULTIMEDIA FILTER CONTROL ASSEMBLY (WPES-10 and WPES-30)
A1	13229E0370	MULTIMEDIA FILTER CONTROL ASSEMBLY (H-9518-1 and H-9518-3)
B1	13222E5267	MOTOR R.O. PUMP (WPES-10 AND WPES-30)
B1	13229E0099	MOTOR R.O. PUMP (H-9518-1 and H-9518-3)
B2	13222E5262	MOTOR, BACKWASH PUMP
B3	13222E5338	MOTOR, RAW WATER PUMP NO. 1
B4	13222E5338	MOTOR, RAW WATER PUMP NO. 2
B5	13222E5337	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	MS15567-2	INDICATING LAMP, POWER "ON"
DS10	W-1-101/77	ILLUMINATING LAMP, CONTROL PANEL
G1	6115-00-077-8600	GENERATOR, ELECTRIC, DIESEL DRIVEN
J1	MS90558C44413P	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
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	13227E5591	RELAY, MAGNETIC
K9	13227E5591	RELAY, MAGNETIC
P1	MS90557C44413S	CONNECTOR
P2	MS106F24-22P	CONNECTOR
P3, P4, P5	MS3106F18-11P	CONNECTOR
P6	MS3108R36-5P	CONNECTOR
P8	MS3106F32-7P	CONNECTOR
P9	MS3108R32-7S	CONNECTOR
P10A	MS3106F18-11S	CONNECTOR
P10B	MS3101F18-11P	CONNECTOR
S1, S3-S7, S11	MS27407-5	SWITCH, TOGGLE, TWO POLE, 3 POSITION (SEE NOTE 1)
S2, S8, S12	MS24523-32	SWITCH, TOGGLE, ONE POLE
S9	13228E8302	SWITCH, LOW PRESSURE
S10	13228E8303	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
K10, K11	M5757/16-005	RELAY, ELECTRIC, HERMETICALLY SEALED, 6 PDT, 5A

COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
A1	13222E5328	MULTIMEDIA FILTER CONTROL ASSEMBLY (WPES-10 and WPES-30)
A1	13229E0370	MULTIMEDIA FILTER CONTROL ASSEMBLY (H-9518-1 and H-9518-3)
B1	13222E5267	MOTOR, R.O. PUMP (WPES-10 and WPES-30)
B1	13229E0099	MOTOR, R.O. PUMP (H-9518-1 and H-9518-3)
B2	13222E5262	MOTOR, BACKWASH PUMP
B3, B4	13222E5338	MOTOR, RAW WATER PUMPS
B5	13222E5337	MOTOR, DISTRIBUTION PUMP
B6	13222E5337	MOTOR, BOOSTER PUMP
B7	13226E8326	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 13222E5300
E2	----------	STUD, PART OF CONTROL BOX ASSEMBLY 13222E5340
E3	----------	STUD, PART OF ELECTRICAL INSTALLATION 13222E5305
G1	6115-00-077-8600	GENERATOR SET, 30 KW, 208 VAC
J1	MS90558C44413P	CONNECTOR, RECEPTACLE, PART OF 13227E9243
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
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
P1	MS90557C44413S	CONNECTOR, PLUG, PART OF 13227E9244
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	MS3108R36-5P	CONNECTOR, PLUG, PART OF 13222E5311-4
P8	MS3106F32-7P	CONNECTOR, PLUG, PART OF 13222E5288
P9	MS3108R32-7S	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-S7, S11	MS27407-5	SWITCH, TOGGLE, DP, (ON-ON-MOM, ON)
S2, S8, S12	MS24523-32	SWITCH, TOGGLE, SP, (NONE-ON-MOM, ON)
S9	13228E8302	SWITCH, LOW PRESSURE
S10	13228E8303	SWITCH, HIGH PRESSURE
S13	13222E5313	SWITCH, PUSH-PULL
S14	MS27406-2	SWITCH, TOGGLE, FOUR POLE, (ON-ON-MOM, ON)
TB1	13222E5316-1	TERMINAL BOARD
TB2 AND 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	13227E9243	WIRING HARNESS, JUNCTION BOX
W6	13222E5298-2	WIRING HARNESS, JUNCTION BOX
W54	13221E8326-3	CABLE ASSEMBLY
W55	13221E8326-4	CABLE ASSEMBLY
W56	13221E8326-5	CABLE ASSEMBLY
W57	13227E7584	CABLE ASSEMBLY
W58	13226E8340	WIRING HARNESS, CONTROL BOX
W59	13222E5297-29	LEAD, ELECTRICAL
W60	13222E5297-30	LEAD, ELECTRICAL

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	13222E5297-1	LEAD, ELECTRICAL
W12	13222E5297-2	LEAD, ELECTRICAL
W13	13222E5297-3	LEAD, ELECTRICAL
W14	13222E5297-4	LEAD, ELECTRICAL
W15	13222E5297-5	LEAD, ELECTRICAL
W16	13222E5297-6	LEAD, ELECTRICAL
W17	13222E5297-7	LEAD, ELECTRICAL
W18	13222E5297-8	LEAD, ELECTRICAL
W19	13222E5297-9	LEAD, ELECTRICAL
W20	13222E5297-10	LEAD, ELECTRICAL
W21	13222E5297-11	LEAD, ELECTRICAL
W22	13222E5297-12	LEAD, ELECTRICAL
W23	13222E5297-13	LEAD, ELECTRICAL
W24	13222E5297-14	LEAD, ELECTRICAL
W25	13222E5297-15	LEAD, ELECTRICAL
W26	13222E5297-16	LEAD, ELECTRICAL
W27	13222E5297-17	LEAD, ELECTRICAL
W28	13222E5297-18	LEAD, ELECTRICAL
W29	13222E5297-19	LEAD, ELECTRICAL
W30	13222E5297-20	LEAD, ELECTRICAL
W31	13222E5297-21	LEAD, ELECTRICAL
W32	13222E5297-22	LEAD, ELECTRICAL
W33	13222E5297-23	LEAD, ELECTRICAL
W34	13222E5297-24	LEAD, ELECTRICAL
W35	13222E5297-25	LEAD, ELECTRICAL
W36	13222E5297-26	LEAD, ELECTRICAL
W37	13222E5297-27	LEAD, ELECTRICAL
W38	13222E5297-28	LEAD, ELECTRICAL
W39	13222E5309	WIRING HARNESS
W40	13227E9244	CABLE ASSEMBLY
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	13222E5288	CABLE ASSEMBLY
W53	13221E8326-2	CABLE ASSEMBLY
XDS1 THRU XDS9	13227E9239	LAMPHOLDER, DIMMER TYPE
XDS10	13222E5271	LIGHT, PANEL
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
K10, K11	M5757/16-005	RELAY, ELECTRICAL, DISC, 6PDT, 5A
TB6	MIL-T-55164/2-38TB-20	TERMINAL BOARD
TB4	MIL-T-55164/2-38TB-7	TERMINAL BOARD
TB7	MIL-T-55164/2-38TB-4	TERMINAL BOARD
TB8	MIL-T-55164/2-38TB-2	TERMINAL BOARD
W61	13222E5297-31	LEAD, ELECTRICAL
W62	13222E5297-32	LEAD, ELECTRICAL
W63	13222E5297-33	LEAD, ELECTRICAL

Figure F0-2. Electrical Interconnection Diagram (Models WPES-10, H-9518-1, WPES-30 and H-9518-3) (Sheet 1 of 3)

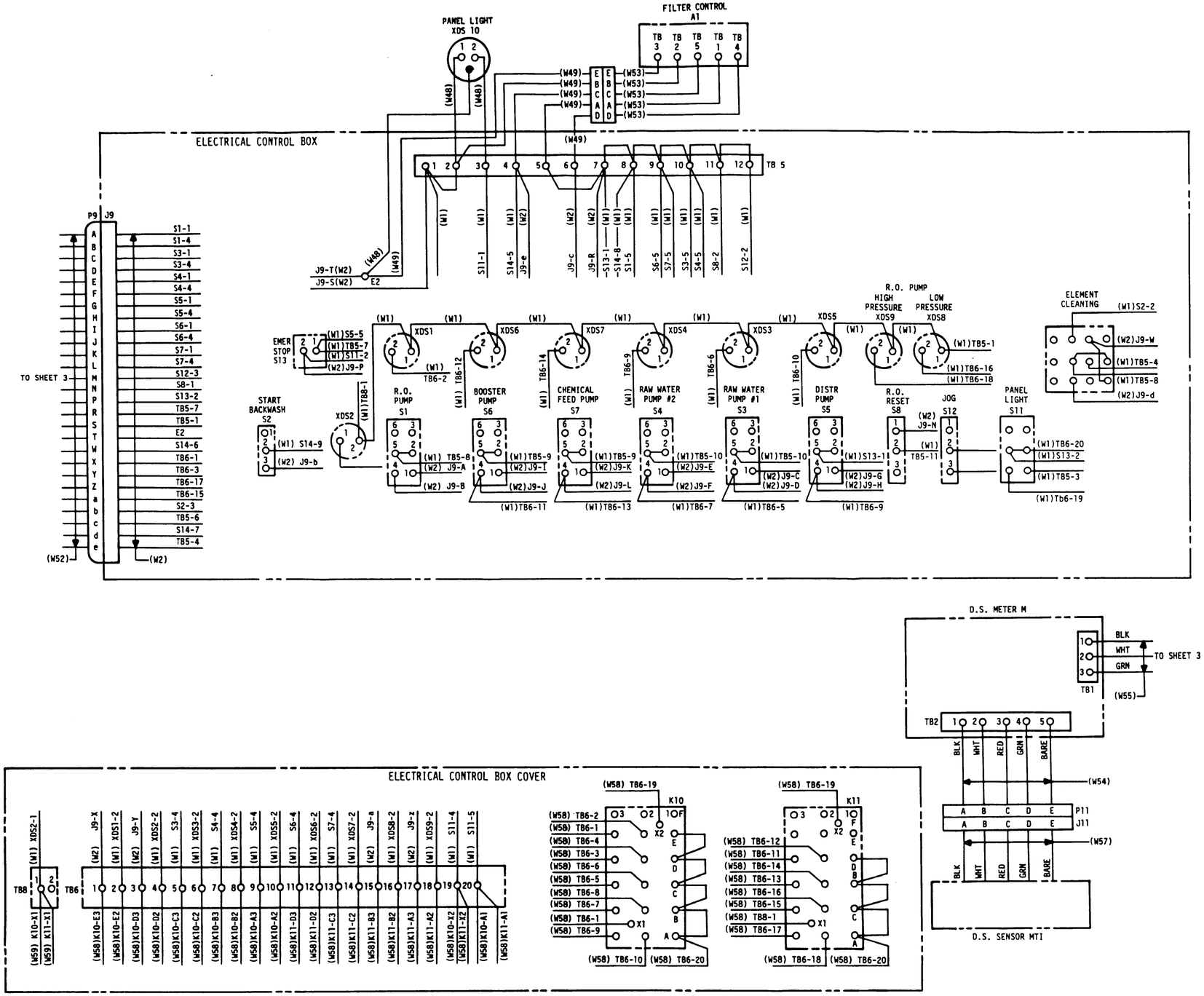


Figure F0-2. Electrical Interconnection Diagram (Models WPES-10, H-9518-1, WPES-30 and H-9518-3) (Sheet 2 of 3)

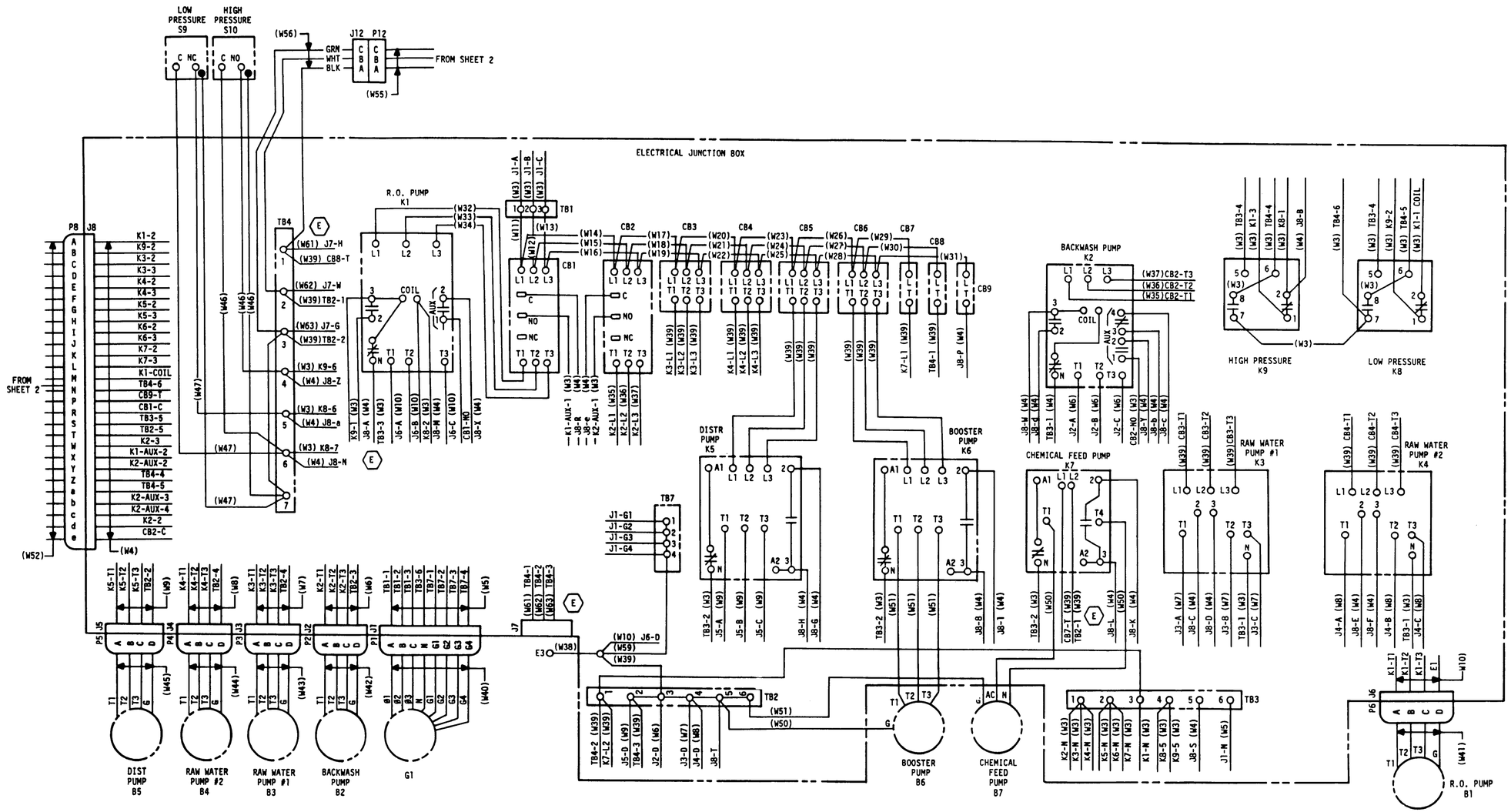
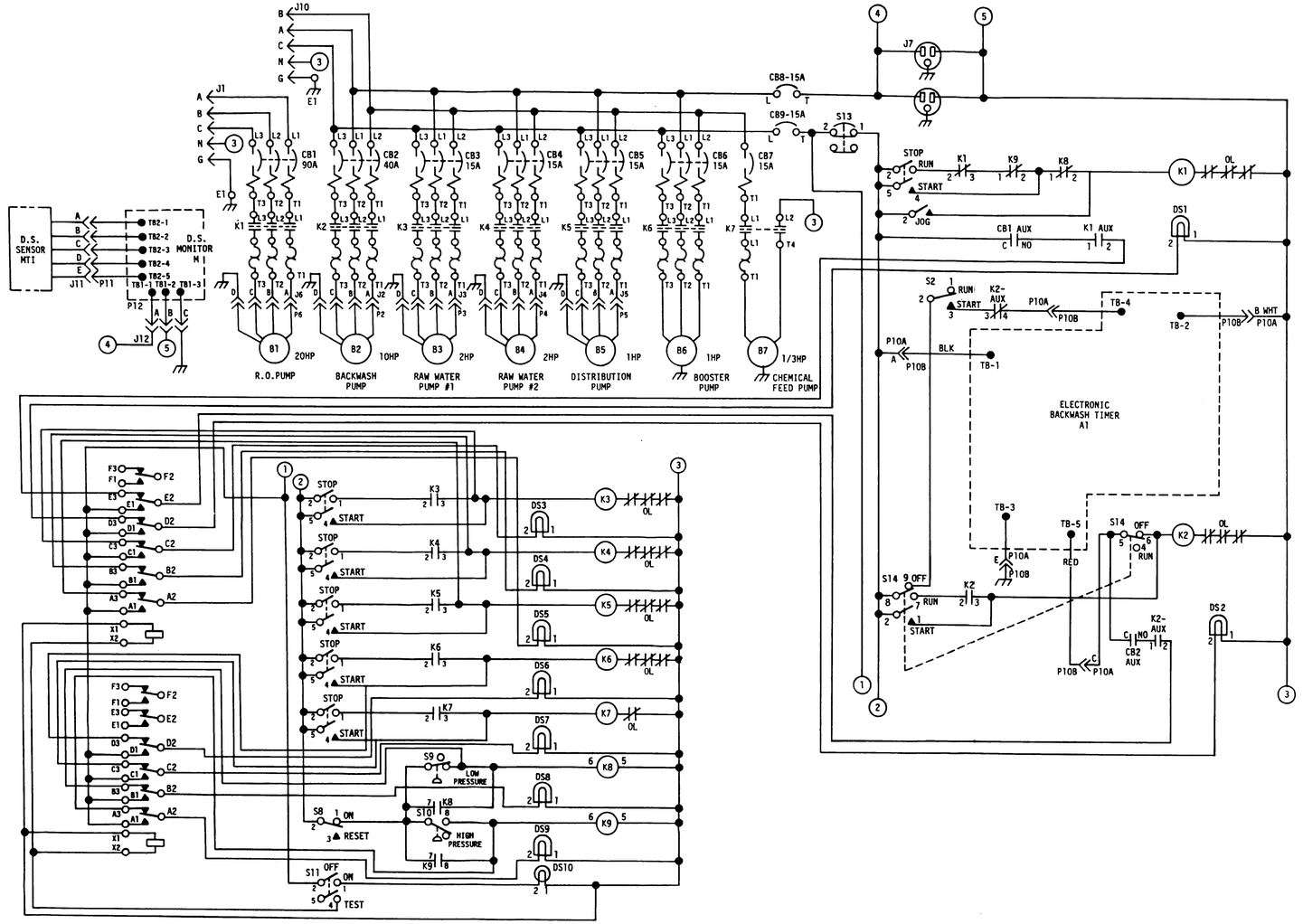


Figure F0-2. Electrical Interconnection Diagram (Models WPES-10, H-9518-1, WPES-30 and H-9518-3) (Sheet 3 of 3)



COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
A1	13222E5328	MULTIMEDIA FILTER CONTROL ASSEMBLY (WPES-20)
A1	13229E0370	MULTIMEDIA FILTER CONTROL ASSEMBLY (H-9518-2)
B1	13222E5267	MOTOR R.O. PUMP (WPES-20)
B1	13229E0099	MOTOR R.O. PUMP (H-9518-2)
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	MS15567-2	INDICATING LAMP, POWER "ON"
DS10	W-L-101/77	ILLUMINATING LAMP, CONTROL PANEL
G1	6115-00-077-8600	GENERATOR, ELECTRIC, DIESEL DRIVEN
J1	MS90558C44413P	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	13227E5591	RELAY, MAGNETIC
K9	13214E0749	RELAY, MAGNETIC
K10, K11	M5757/16-005	RELAY, ELECTRIC, HERMETICALLY SEALED, 6 PDT, 5A
P2	MS106F24-22P	CONNECTOR
P3, P4, P5	MS3106F18-11P	CONNECTOR
P6	MS3108R36-5P	CONNECTOR
P8	MS3106F32-7P	CONNECTOR
P9	MS3108R32-7S	CONNECTOR
P10A	MS3106F18-11S	CONNECTOR
P10B	MS3101F18-11P	CONNECTOR
S1, S3-S7, S11	MS27407-5	SWITCH, TOGGLE, TWO POLE, 3 POSITION (SEE NOTE 1)
S2, S8, S12	MS24523-32	SWITCH, TOGGLE, ONE POLE
S9	13228E8302	SWITCH, LOW PRESSURE
S10	13228E8303	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

Figure F0-3. Electrical Schematic (Models WPES-20 and H-9518-2)

COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
A1	13222E5328	MULTIMEDIA FILTER CONTROL ASSEMBLY (WPES-20)
A1	13229E0370	MULTIMEDIA FILTER CONTROL ASSEMBLY (H-9518-2)
B1	13222E5267	MOTOR, R.O. PUMP (WPES-20)
B1	13229E0099	MOTOR, R.O. PUMP (H-9518-2)
B2	13222E5262	MOTOR, BACKWASH PUMP
B3, B4	13222E5338	MOTOR, RAW WATER PUMPS
B5	13222E5337	MOTOR, DISTRIBUTION PUMP
B6	13222E5337	MOTOR, BOOSTER PUMP
B7	13226E8326	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	MS3108R36-5P	CONNECTOR, PLUG, PART OF 13222E5311-4
P8	MS3106F32-7P	CONNECTOR, PLUG, PART OF 13222E5288
P9	MS3108R32-7S	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-S7, S11	MS27407-5	SWITCH, TOGGLE, DP, (ON-ON-MOM, ON)
S2, S8, S12	MS24523-32	SWITCH, TOGGLE, SP, (NONE-ON-MOM, ON)
S9	13228E8302	SWITCH, LOW PRESSURE
S10	13228E8303	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	13222E5237	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
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	13222E5297-1	LEAD, ELECTRICAL
W12	13222E5297-2	LEAD, ELECTRICAL
W13	13222E5297-3	LEAD, ELECTRICAL
W14	13222E5297-4	LEAD, ELECTRICAL
W15	13222E5297-5	LEAD, ELECTRICAL

COMPONENT REFERENCE LIST		
ELECTRICAL REFERENCE DESIGNATION	NSN AND PART NO.	DESCRIPTION
W16	13222E5297-6	LEAD, ELECTRICAL
W17	13222E5297-7	LEAD, ELECTRICAL
W18	13222E5297-8	LEAD, ELECTRICAL
W19	13222E5297-9	LEAD, ELECTRICAL
W20	13222E5297-10	LEAD, ELECTRICAL
W21	13222E5297-11	LEAD, ELECTRICAL
W22	13222E5297-12	LEAD, ELECTRICAL
W23	13222E5297-13	LEAD, ELECTRICAL
W24	13222E5297-14	LEAD, ELECTRICAL
W25	13222E5297-15	LEAD, ELECTRICAL
W26	13222E5297-16	LEAD, ELECTRICAL
W27	13222E5297-17	LEAD, ELECTRICAL
W28	13222E5297-18	LEAD, ELECTRICAL
W29	13222E5297-19	LEAD, ELECTRICAL
W30	13222E5297-20	LEAD, ELECTRICAL
W31	13222E5297-21	LEAD, ELECTRICAL
W32	13222E5297-22	LEAD, ELECTRICAL
W33	13222E5297-23	LEAD, ELECTRICAL
W34	13222E5297-24	LEAD, ELECTRICAL
W35	13222E5297-25	LEAD, ELECTRICAL
W36	13222E5297-26	LEAD, ELECTRICAL
W37	13222E5297-27	LEAD, ELECTRICAL
W38	13222E5297-28	LEAD, ELECTRICAL
W39	13222E5309	WIRING HARNESS
W40	13227E9244	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	13222E5288	CABLE ASSEMBLY
W53	13221E8326-2	CABLE ASSEMBLY
XDS1 THRU XDS9	13227E9239	LAMPHOLDER, DIMMER TYPE
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-10P	CONNECTOR, PLUG, PART OF 13221E8326-4
TB4	MIL-T-55164/2-38TB-7	TERMINAL BOARD
TB6	MIL-T-55154/2-38TB-20	TERMINAL BOARD
TB8	MIL-T-55164/2-38TB-2	TERMINAL BOARD
W54	13221E8326-3	CABLE ASSEMBLY
W55	13221E8326-4	CABLE ASSEMBLY
W56	13221E8326-5	CABLE ASSEMBLY
W57	13227E7584	CABLE ASSEMBLY
W58	13226E8340	WIRING HARNESS, CONTROL BOX
W59	13222E5297-29	LEAD, ELECTRICAL
K10, K11	M5757/16-005	RELAY, ELECTRICAL, HSC, 6PDT, 5A
W61	13222E5297-31	LEAD, ELECTRICAL
W62	13222E5297-32	LEAD, ELECTRICAL
W63	13222E5297-33	LEAD, ELECTRICAL

Figure F0-4. Electrical Interconnection Diagram (Models WPES-20 and H-9518-2) (Sheet 1 of 3)

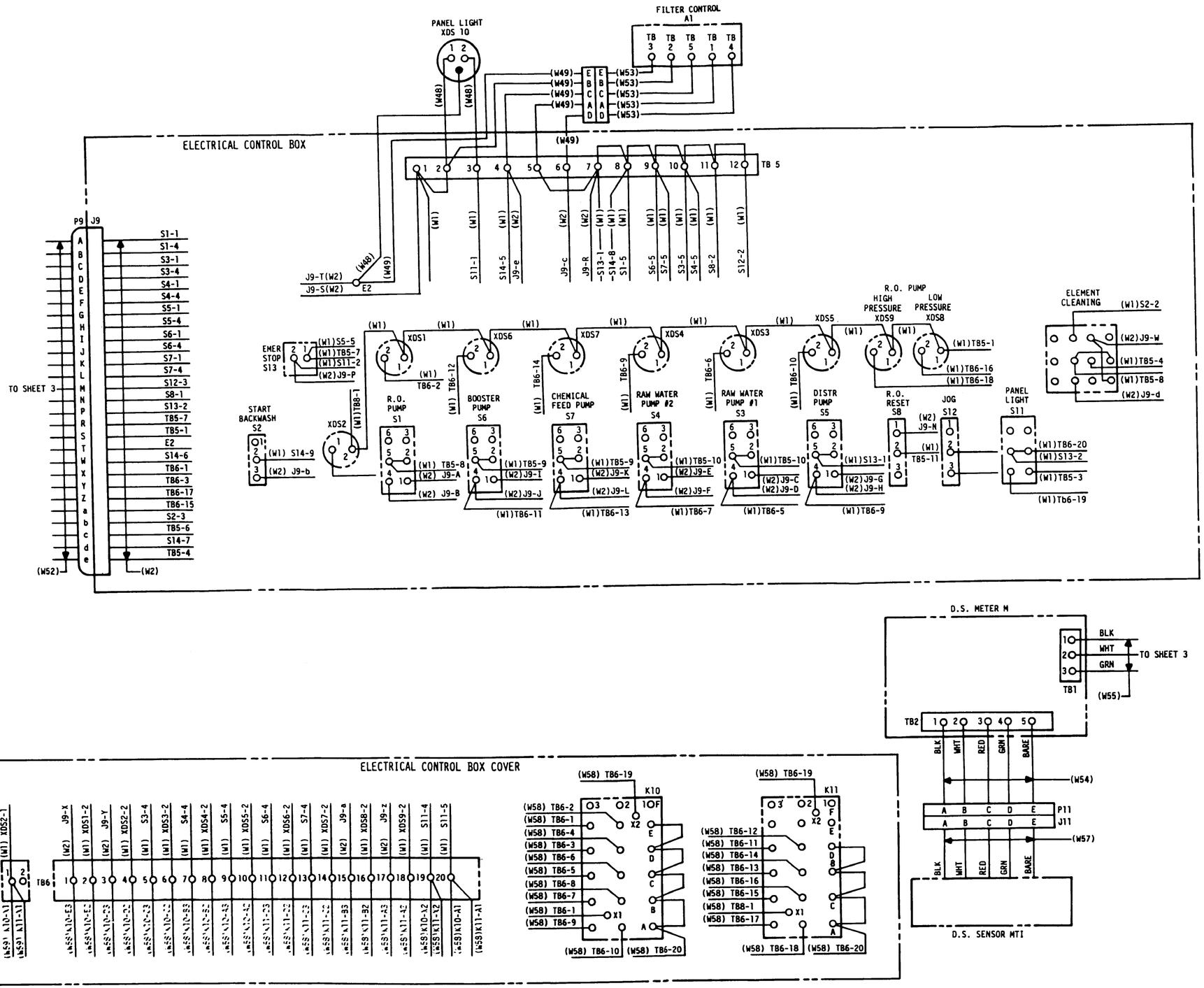


Figure F0-4. Electrical Interconnection Diagram (Models WPES-20 and H-9518-2) (Sheet 2 of 3)

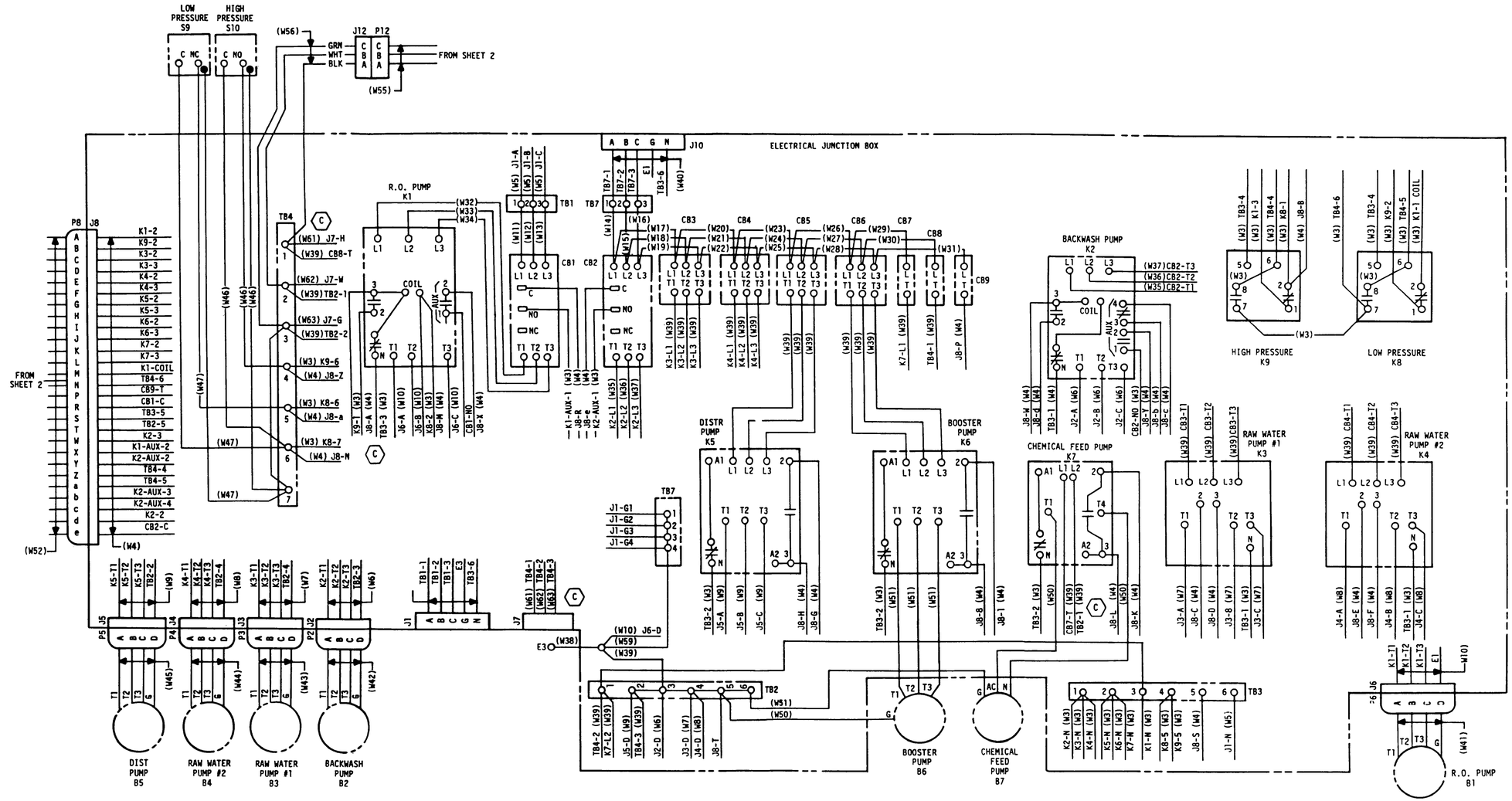
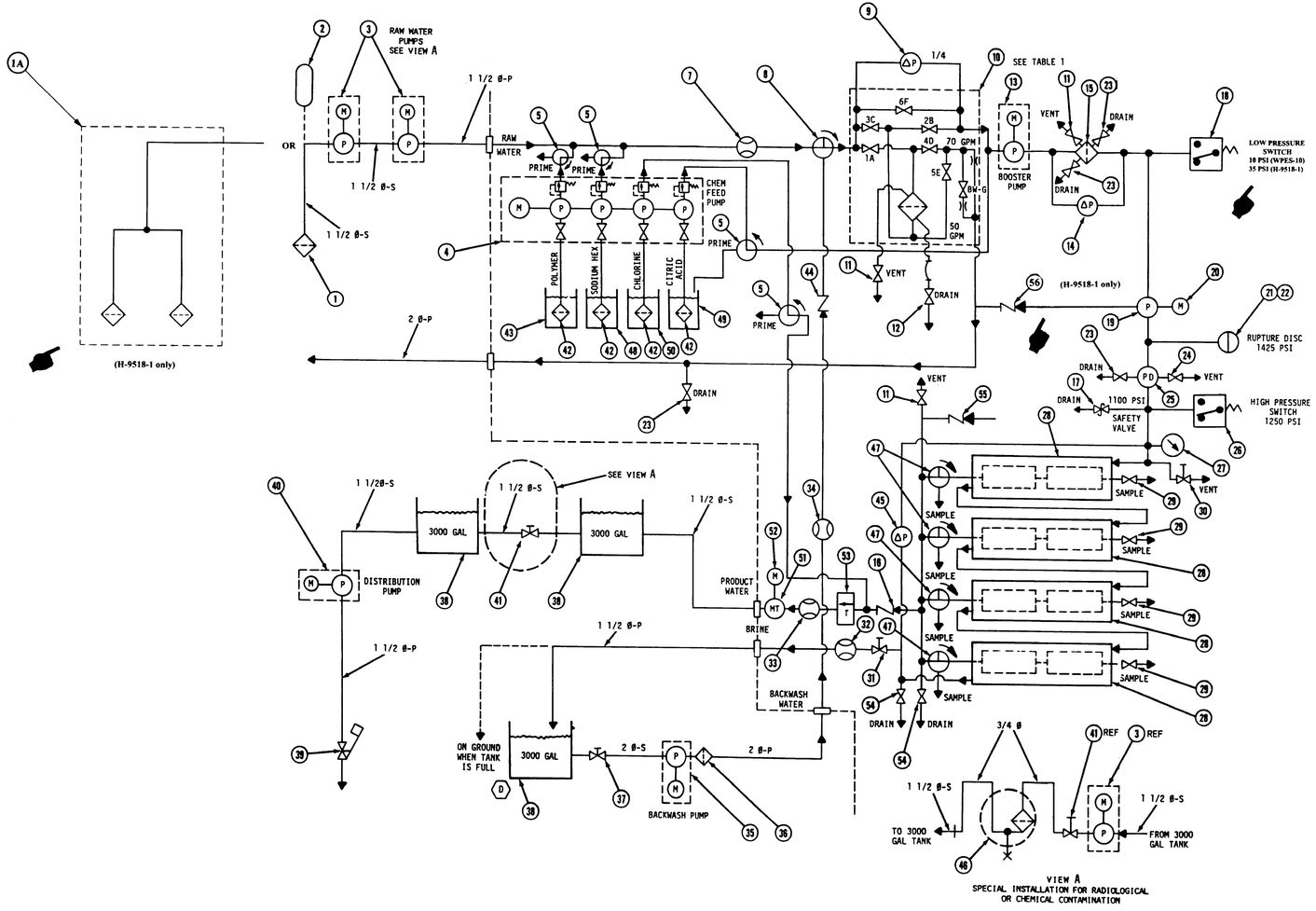


Figure F0-4. Electrical Interconnection Diagram (Models WPES-20 and H-9518-2) (Sheet 3 of 3)



COMPONENT REFERENCE LIST			
FIND NO.	QTY REQD	PART OR IDENTIFYING NO.	DESCRIPTION
1	1	13228E8307	STRAINER SUCTION HOSE, MIL-S-12165, TYPE II
1A	1	13229E0510	OCEAN WATER INTAKE STRUCTURE (H-9518-1)
2	1	NSN 4610-00-066-2478	FLOAT, FIGURE 4, MIL-W-52482
3	2	13222E5338	PUMP, CENTRIFUGAL, SELF PRIMING EMD
4	1	13226E8326	PUMP, CHEMICAL FEED
5	4	13222E2576	VALVE, VALL, 3-WAY
6		DELETED	
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 (WPES-10)
10	1	13229E0370	FILTER, MULTI-MEDIA (H-9518-1)
11	3	13221E8271-4	VALVE, BALL
12	1	13221E8271-6	VALVE, BALL
13	1	13222E5337	PUMP, CENTRIFUGAL, EMD
14	1	13222E5329-4	GAGE, DIFFERENTIAL PRESSURE
15	1	13226E8333	FILTER, CARTRIDGE
16	1	13228E8300	VALVE, CHECK
17	1	13222E5238	VALVE, RELIEF
18	1	13228E8302	SWITCH, LOW PRESSURE
19	1	13229E5635	PUMP, HIGH PRESSURE (WPES-10)
19	1	13229E0013	PUMP, HIGH PRESSURE (H-9518-1)
20	1	13222E5267	MOTOR, ELECTRIC (WPES-10)
20	1	13229E0099	MOTOR, ELECTRIC (H-9518-1)
21	1	13228E8304	HOLDER, RUPTURE DISC (WPES-10)
22	1	13228E8304	RUPTURE DISC (WPES-10)
23	4	13221E8271-5	VALVE, BALL
24	1	13221E8271-7	VALVE, BALL
25	1	13222E5249	DAMPENER, FLUID PRESSURE (WPES-10)
26	1	13228E8303	SWITCH, HIGH PRESSURE
27	1	13221E8340	GAUGE, PRESSURE
28	4	13223E5320	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, EMD
36	1	13223E5253	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	13222E5625	PUMP, CENTRIFUGAL, EMD
41	1	13222E5319-7	VALVE, GATE
42	4	13226E8328	STRAINER, PUMP
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	13226E7982-4	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
56	1	13229E0137	CHECK VALVE (H-9518-1)

TABLE I
SEQUENCE OF OPERATIONS IN ITEM 10

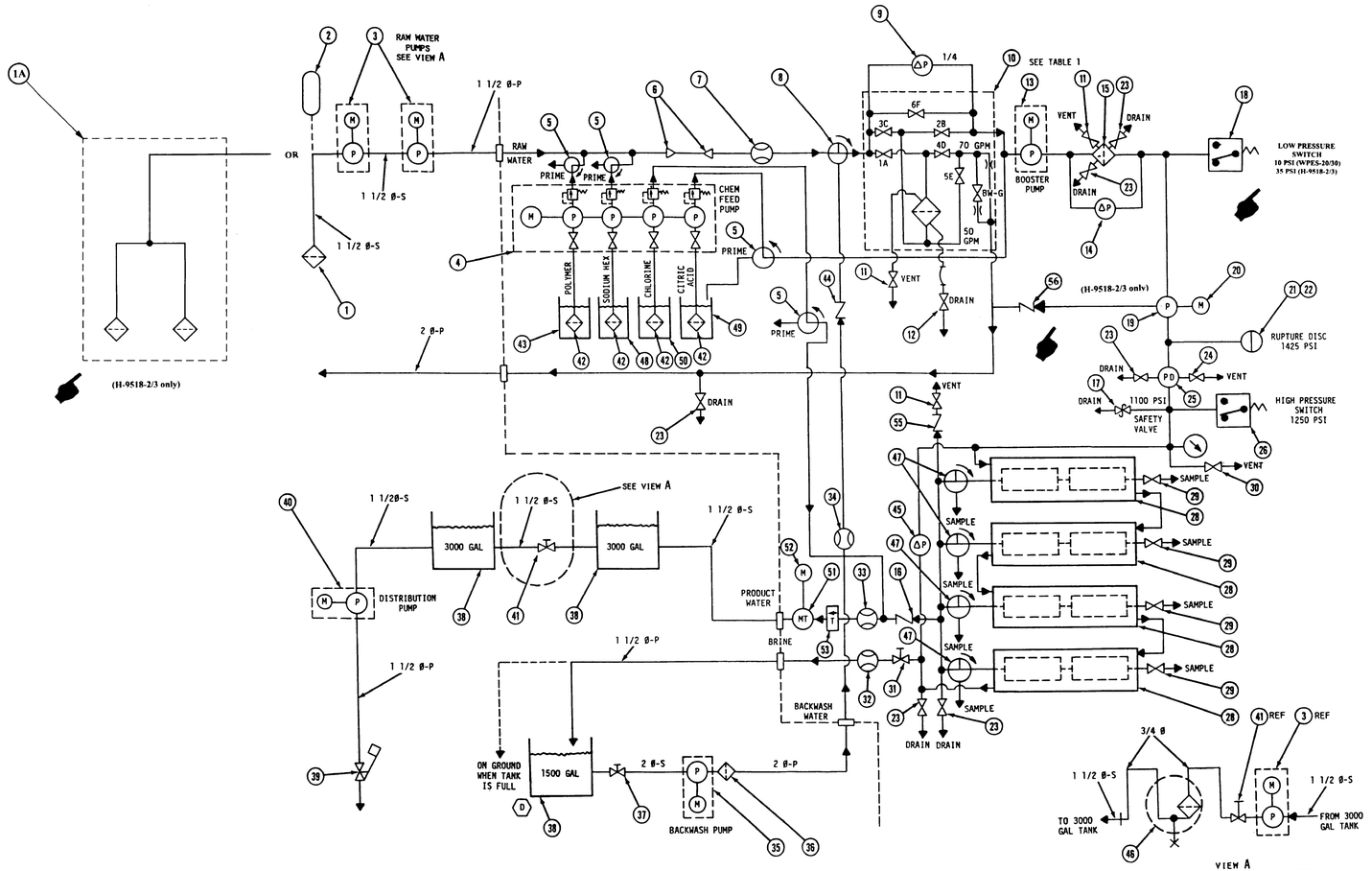
FUNCTION	1A	2B	3C	4D	5E	6F	BW-G
SERVICE	O	O	X	X	X	X	X
BACKWASH 2-3 MINUTES	X	X	O	O	X	X	X
BACKWASH 6-7 MINUTES	X	X	O	O	X	X	O
BACKWASH 2-3 MINUTES	X	X	O	O	X	X	X
OFF	X	X	X	X	O	X	X
PURGE	O	X	X	X	O	X	X

(WPES-10 only)

LEGEND
P = PRESSURE HOSE
S = SUCTION HOSE

O = VALVE OPEN
X = VALVE CLOSED

Figure F0-5. Piping Schematic (Models WPES-10 and H-9518-1)



COMPONENT REFERENCE LIST

FIND NO.	QTY REQD	PART OR IDENTIFYING NO.	DESCRIPTION
1	1	13228E8307	STRAINER SUCTION HOSE, MIL-S-12165, TYPE II
1A	1	13229E0510	OCEAN WATER INTAKE STRUCTURE (H-9518-2 and H-9518-3)
2	1	NSN 4610-00-066-2478	FLOAT, FIGURE 4, MIL-W-52482
3	2	13222E5338	PUMP, CENTRIFUGAL, SELF PRIMING EMD
4	1	13226E8326	PUMP, CHEMICAL FEED
5	4	13222E2576	VALVE, VALL, 3-WAY
6		DELETED	
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 (WPES-20 and WPES-30)
10	1	13229E0370	FILTER, MULTI-MEDIA (H-9518-2 and H-9518-3)
11	3	13221E8271-4	VALVE, BALL
12	1	13221E8271-6	VALVE, BALL
13	1	13222E5337	PUMP, CENTRIFUGAL, EMD
14	1	13222E5329-4	GAGE, DIFFERENTIAL PRESSURE
15	1	13226E8333	FILTER, CARTRIDGE
16	1	13228E8300	VALVE, CHECK
17	1	13222E5238	VALVE, RELIEF
18	1	13228E8302	SWITCH, LOW PRESSURE
19	1	13229E5635	PUMP, HIGH PRESSURE (WPES-20 and WPES-30)
19	1	13229E0013	PUMP, HIGH PRESSURE (H-9518-2 and H-9518-3)
20	1	13222E5267	MOTOR, ELECTRIC (WPES-20 and WPES-30)
20	1	13229E0099	MOTOR, ELECTRIC (H-9518-2 and H-9518-3)
21	1	13228E8304	HOLDER, RUPTURE DISC (WPES-20 and WPES-30)
22	1	13228E8304	RUPTURE DISC (WPES-20 and WPES-30)
23	6	13221E8271-5	VALVE, BALL
24	1	13221E8271-7	VALVE, BALL
25	1	13222E5249	DAMPENER, FLUID PRESSURE (WPES-20 and WPES-30)
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, EMD
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	13222E5337	PUMP, CENTRIFUGAL, EMD
41	1	13222E5319-7	VALVE, GATE
42	4	13226E8328	STRAINER, PUMP
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	13226E7982-4	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		DELETED	
55	1	13227E9238	VACUUM BREAKER
56	1	13229E0137	CHECK VALVE (H-9518-2 and H-9518-3)

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

(WPES-20/30 only)

LEGEND
P = PRESSURE HOSE
S = SUCTION HOSE

O = VALVE OPEN
X = VALVE CLOSED

Figure F0-6. Piping Schematic (Models WPES-20, H-9518-2, WPES-30 and H-9518-3)

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6	2-1 a		
B1		4-3	
125	line 20		

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

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Clange the manual to show 4 Cylende

c ... figure 4-3 is ... a bolt. In key ... 4-3, item 16 is called ... rim - Please correct ... on the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

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JOHN DOE

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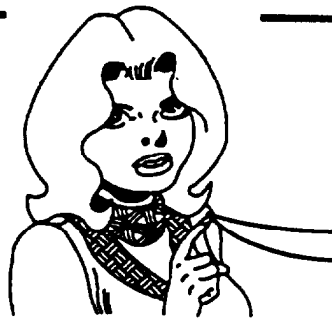

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1. ***From:*** Joe Smith
2. *Unit:* home
3. ***Address:*** 4300 Park
4. ***City:*** Hometown
5. ***St:*** MO
6. ***Zip:*** 77777
7. ***Date Sent:*** 19-OCT-93
8. ***Pub no:*** 55-2840-229-23
9. ***Pub Title:*** TM
10. ***Publication Date:*** 04-JUL-85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

This is the text for the problem below line 27.

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inches
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Liquid Measure

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

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

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. ft.
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
pounds-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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