ARMY
MARINE CORPS

***TM 10-4610-215-24**
TM 08580A-24/2

TECHNICAL MANUAL

UNIT
DIRECT SUPPORT AND
GENERAL SUPPORT
MAINTENANCE MANUAL

WATER PURIFICATION UNIT,
REVERSE OSMOSIS,
600 GPH TRAILER MOUNTED,
FLATBED CARGO
5 TON 4 WHEEL TANDEM
MODEL ROWPU 600-1
(EIC-ZII)
(4610-01-093-2380)
AND
600 GPH SKID MOUNTED
MODEL ROWPU 600-3
(4610-01-113-8651)

Approved for public release:
distribution is unlimited.

*Supersedes TM 5-4610-215-24, 15 JUNE 1987

HEADQUARTERS, DEPARTMENT OF THE ARMY
HEADQUARTERS, US. MARINE CORPS

27 MARCH 1992

CHANGE

NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY AND
HEADQUARTERS U.S. MARINE CORP
WASHINGTON, D.C., 28 May 1993

Unit, Direct Support and General Support Maintenance Manual

WATER PURIFICATION UNIT, REVERSE OSMOSIS, 600 GPH TRAILER MOUNTED, FLATBED CARGO 5 TON 4 WHEEL TANDEM MODEL ROWPU 600-1 (EIC-ZII) (4610-01-093-2380) AND 600 GPH SKID MOUNTED MODEL ROWPU 600-3 (4610-01–11-651)

TM 10-4610-215-24/TM 08580A-24/2, 27 March 1992, 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
2–7 and 2-8	2–7 and 2-8
2–1 15 and 2–116	2-115 and 2-116

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

TM 10-4610-215-25
TM-08580A-24/2
C 1

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To be distributed in accordance with DA Form 12-25-E, block no. 5411, requirements for TM 10-4610-215-24.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment, or other ignition sources. Always wear protective clothing and eyewear.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in troubleshooting require power to be connected. Always take proper measures to ensure personal safety.

WARNING

ROWPU piping and equipment can contain extremely high 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

To avoid possible personal injury or damage to the ROWPU system, TURN ALL PUMPS OFF and let water pressure drop.

WARNING

High-pressure water released from the high-pressure relief valve can cause severe injury. Take proper safety measures to protect personnel.

WARNING

To prevent the trailer from rolling or sliding, use blocks under the wheels on the opposite side of the trailer from which it is being raised.

WARNING

Tire and wheel assembly weight is 122 pounds (55.39 kg). Injury can occur if caution is not used when removing from hub. Place block or lug wrench under tire before removing wheel and tire to prevent injury to personnel.

WARNING

To avoid injury, be sure all air has been released from tire before removing it from wheel assembly.

WARNING

Tire and wheel assembly weight is 122 pounds (55.39 kg). Injury can occur if caution is not used when replacing on hub.

WARNING

Tire and wheel assembly and hub and drum assembly weight as a unit is 226 pounds (102.60 kg). Injury can occur if caution is not used when removing from axle assembly.

WARNING

Weight of backwash pump is 195 pounds (88.5 kg). Attempting to move it without proper equipment could cause serious injury. Lift motor with equipment rated at one ton (0.91 tonne) or greater.

WARNING

Weight of R.O. pump is 658 pounds (298 kg). Attempting to move it without proper equipment could cause serious injury. Use equipment rated at 1 ton (0.91 tonne) or more to move R.O. pump.

WARNING

Objects blown by compressed air can cause serious injury. Always wear protective goggles when using compressed air.

WARNING

Solvent blown off or thrown off bearings can cause eye injury. Do not spin ball bearings after washing.

WARNING

When relief valve trips, it shoots out a high-pressure jet of water which could cause physical injury to personnel. During test, aim output port away from personnel.

WARNING

To prevent serious injury, be sure lifting straps and eyes are secure and in good condition before lifting the trailer frame. Ensure that all personnel stand clear during lifting operations.

WARNING

Contact with dry ice or objects that have been packed in dry ice can cause severe burns. Always wear proper protective gloves when using dry ice.

CAUTION

Rough handling and/or misuse of ROWPU can result in damage to equipment or equipment failure.

CAUTION

Prolonged drying of the ROWPU filter can render the unit unserviceable.

TECHNICAL MANUAL

No. 10-4610-215-24

HEADQUARTERS, DEPARTMENT OF THE ARMY AND
HEADQUARTERS, U. S . MARINE CORPS
WASHINGTON, D.C., 27 MARCH 1992

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL WATER PURIFICATION UNIT REVERSE OSMOSIS, 600 GPH, TRAILER-MOUNTED, FLATBED CARGO, 5-TON, 4 WHEEL TANDEM, MODEL ROWPU 600-1, (EIC-ZII) NSN 4610-01-093-2380 (U.S. ARMY) AND WATER PURIFICATION UNIT. REVERSE OSMOSIS, 600 GPH, SKID-MOUNTED MODEL ROWPU 600-3 NSN 4610-01-113-8651 (U.S. MARINE CORPS)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual, direct to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR -MMTS, 4300 Goodfellow Boulevard, Saint Louis MO 63120-1798. A reply will be furnished directly to you. Marine Corps users submit NAVMC Form 10722 to: Commanding General, Marine Corps Logistics Base (Code 850), Albany Georgia, 31704-5000. A reply will be furnished directly to you.

Approved for public release;
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CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. **SCOPE.**

Type of Manual: Unit, Direct Support, General Support Maintenance, Model Number, and Equipment Name:

ARMY MODEL ROWPU 600-1
600 GPH ROWPU TRAILER MOUNTED (Figure 1–1)
MARINE CORPS MODEL ROWPU 600-3
600 GPH ROWPU SKID MOUNTED (Figure 1 –2)

Purpose of Equipment: The ROWPU purifies up to 600 gallons (2,270 liters) of drinking water per hour from impure water, even seawater.

1-2. **MAINTENANCE FORMS, RECORDS, AND REPORTS.** Department of the ARMY forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738–750. The Army Maintenance Management Systems (TAMMS). USMC personnel refer to TM 4700–1 5/1 for equipment records and forms procedures.

1–3. **DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.**

a General. When capture or abandonment Of the 600-GPH (2,270-LPH) ROWPU IS Imminent, the responsible unit commander must make the decision to either destroy the equipment or render it inoperative Based on this decision, orders are issued that cover the desired extent of destruction. Whatever method of demolition is used, it is essential to destroy all vital parts of the equipment and all corresponding repair parts.

b. Demolition by Mechanical Means. Cut all hoses and flexible lines such as raw water pump hose, filter hose. and chemical feed lines. Cut electrical wires, puncture tires, smash control panel lights, switches, gages and timer.

c. Scattering and Concealment. Remove wheels (army), valves, and timer. Dismantle pumps, Scatter these parts in dense foliage, bury them in dirt or sand, or throw them into a lake, stream, well, or any other body of water.

d. Burning. Disconnect all hoses and any other flammable material from the unit and stack around the water tank and pumps. Soak these items with gasoline, oil, or diesel fuel and set afire.

e. Submersion. Submerge trailer pumps, gages, fittings, and removable parts in a body of water to provide concealment and water damage. Saltwater does greater damage to metal parts than freshwater.

1-4 **PREPARATION FOR STORAGE OR SHIPMENT.** Requirements for preparation for storage or shipment, including administrative storage, are covered in Section Vl, Chapter 2, Maintenance Instructions.

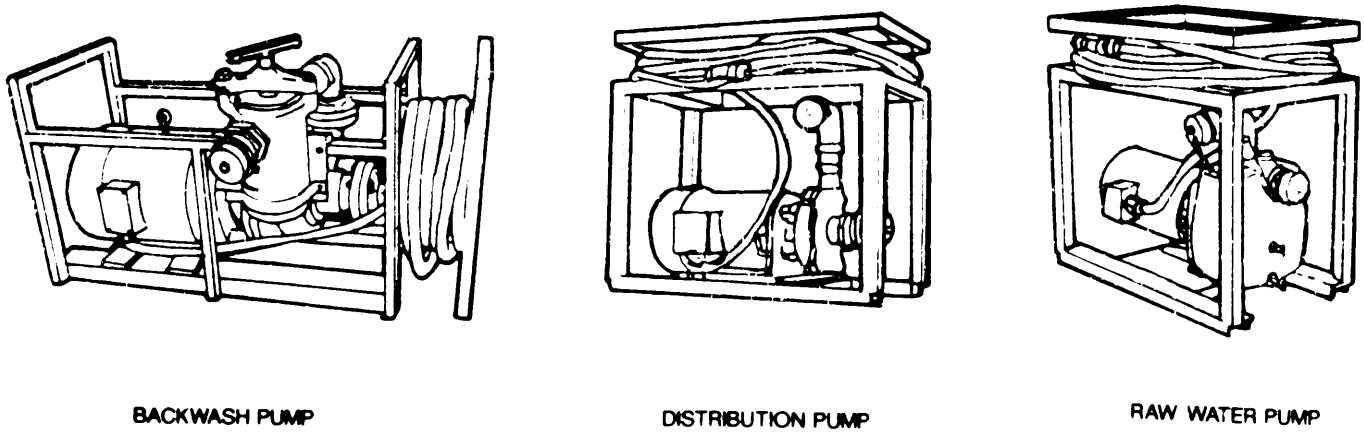
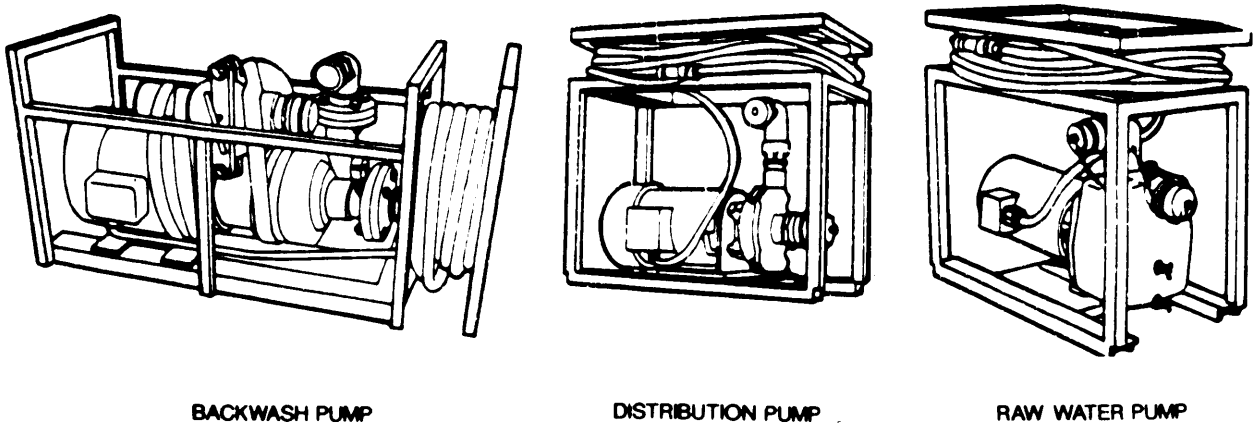
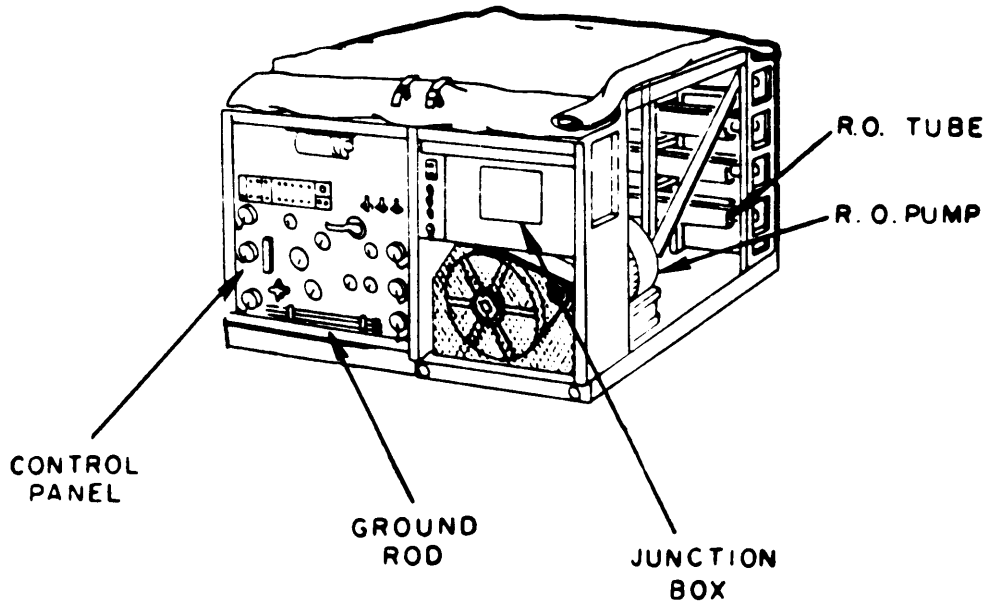
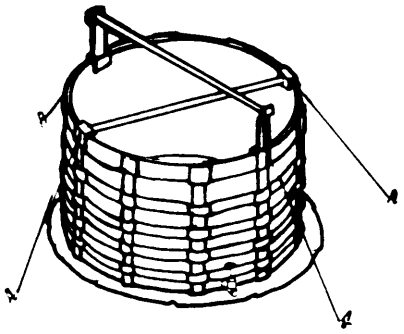


Figure 1-1. Reverse Osmosis Water Purification Unit (ROWPU) (ARMY)







Water Tank (Typical)

Figure 1-2. Reverse Osmosis Water Purification Unit (ROWPU) (USMC)

1-5. **NOMENCLATURE CROSS-REFERENCE LIST.** This listing includes nomenclature cross–references used

Common Name	Offical Nomenclature
600-GPH ROWPU	600 Gallons-per-Hour Reverse Osmosis Water Purification Unit
R.O. Vessel	Reverse Osmosis Pressure Tube
R.O. Pump	Reverse Osmosis Pump Assembly
Booster Pump	Pump, Centrifugal, Assembly
Cartridge Filter	Cartridge Filter Assembly
Multimedia Filter	Multimedia Filter Assembly
R.O. Element	Reverse Osmosis Element
Pulse Dampener	Fluid Pressure Dampener
Spanner Wrench	Wheatly Pump Spanner Wrench
Raw Water Pump	Pump, Centrifugal, Assembly
Distribution Pump	Pump, Centrifugal, Assembly
Backwash Pump	Pump, Centrifugal, Assembly

1-6. **REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).** EIRs can and must be submitted by anyone who is aware of an unsatisfactory condition with the equipment design or use. It is not necessary to show a new design or list a better way to perform a procedure, simply tell why the design is unfavorable or why a procedure is difficult. EIRs may be submitted on SF 368 (Quality Deficiency Report). Mail directly to: Commander, U. S. ARMY Troop Support Command, ATTN: AMSTR-MOF, 4300 Goodfellow Boulevard, St. Louis, MO 63120-1798. A reply will be furnished to you. USMC submit EIRs in accordance with MCO 1650.17.

Section II. EQUIPMENT DESCRIPTION AND DATA

1–7. **EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.**

CHARACTERISTICS

- Provides Up to 600 GPH (2,270 LPH) of highly purified drinking water.

Ž (ARMY) Trailer mounted for mobility.

Ž (ARMY) Self-contained, carries own power supply.

Ž (USMC) Skid mounted 4 pocket

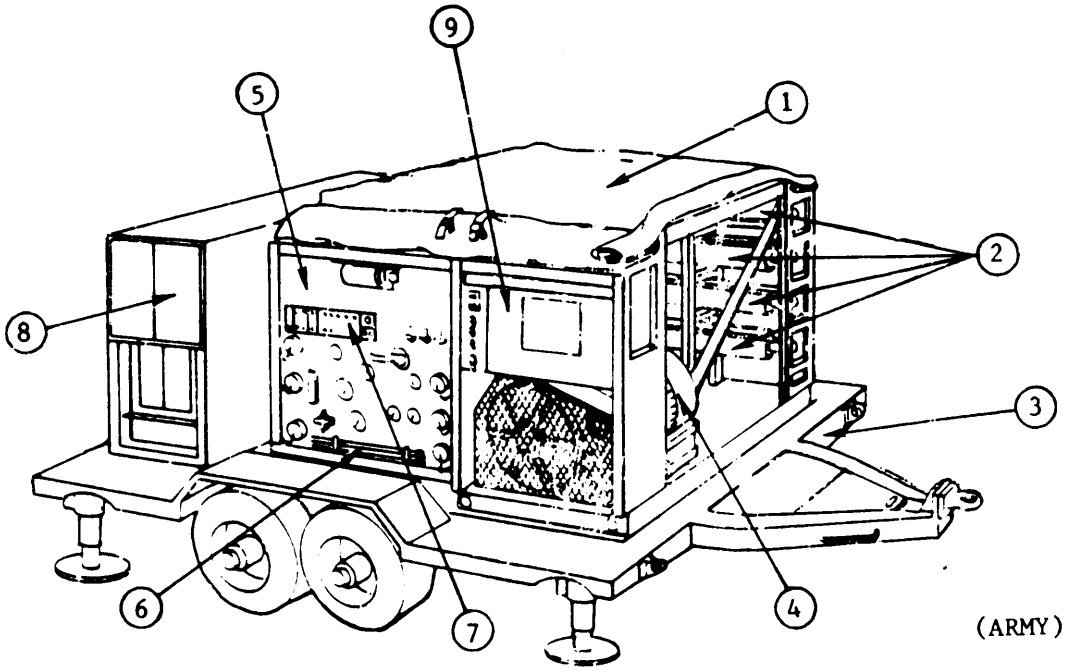
CAPABILITIES AND FEATURES

Ž Can purify water that has any combination of nuclear biological, chemical or sodium contaminants.

Ž Independent operation carries power supply (ARMY)

Ž Sufficient supplies for thirty (30) days of operation.

- Easy maintenance.
- Fast self-cleaning allows minimum interruption of duty operation.
- Simple operation.



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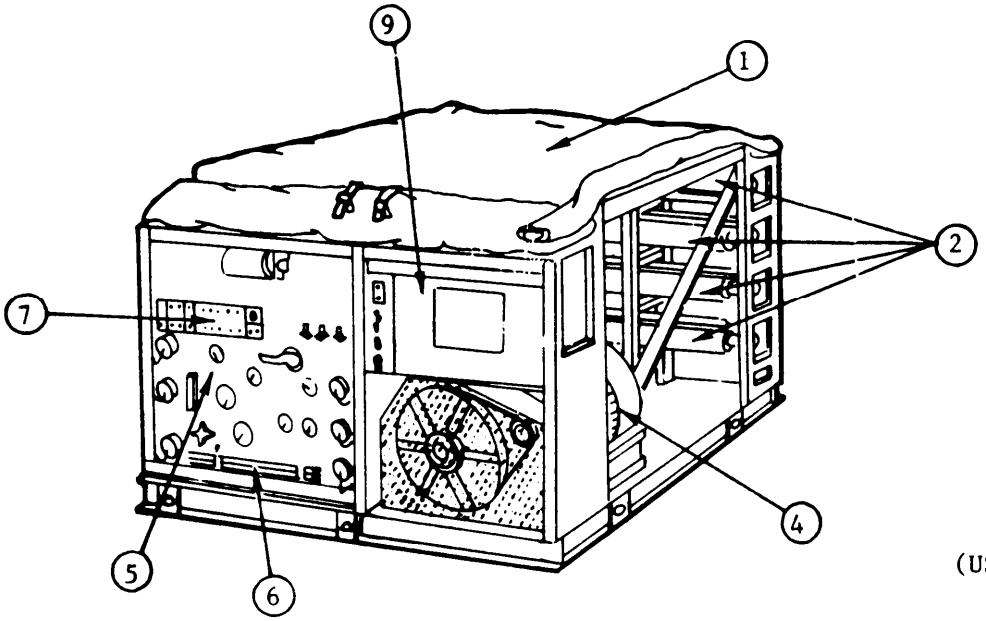


(USMC)

Figure 1–3. ROWPU External View

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS OF ROWPU.

a. General. This paragraph describes the location of the major parts of the ROWPU as they are seen on the unit. It also gives a brief description of the function of each item.

b. External View. (Figure 1–3) shows the ROWPU with the canvas cover rolled back.

(1) The CANVAS COVER (1) protects the ROWPU from weather and dirt during transportation and when the ROWPU is not in use. During normal operations it is rolled up as in (figure 1–3).

(2) The four R.O. VESSELS (2) contain the high-pressure elements which are the last step in purifying raw water. The R.O. elements remove compounds, called dissolved solids, that cannot be taken out by other filters.

(3) (ARMY). The TRANSPORTATION TRAILER (3) carries the ROWPU, its power generator, and all items necessary for operation. The trailer is 18 feet (5.5 meters) long, by 8 feet (2.4 meters) high, by 8 feet (2.4 meters) wide. The trailer with the ROWPU and generator weighs about 8.5 tons (7.7 tonnes).

(4) The R.O. PUMP and MOTOR ASSEMBLY (4) are located behind a protective shroud (screen). The R.O. pump forces water under high pressure through the R.O. vessels.

(5) The CONTROL PANEL (5) has most of the hose connections, valves, gages, switches, and meters necessary for running the ROWPU.

(6) The three sections of the GROUND ROD (6) are driven into the ground and attached to a ground lug on the ROWPU frame to keep operators from getting electric shocks.

(7) The CONTROL BOX ASSEMBLY (7) is located on the control panel. It consists of toggle switches that control the panel lights, all pumps, and the pump indicator lamps.

(8) (ARMY). The GENERATOR SET (8) is a diesel generator that provides power to the ROWPU.

(9) The JUNCTION BOX ASSEMBLY (9) contains circuit breakers, overload heaters, motor starters, etc.

c. Internal View. (Figure 1-4) shows the ROWPU with the canvas cover removed to show the inside.

(1) The MULTIMEDIA FILTER (1) is a large tank that removes large particles from the raw water.

(2) The R.O. elements (2) (inside R.O. vessels) remove dissolved solids from the raw filtered water.

(3) The R.O. pump (3) (shown in dotted lines behind the control panel) forces filtered water under high pressure through R.O. elements.

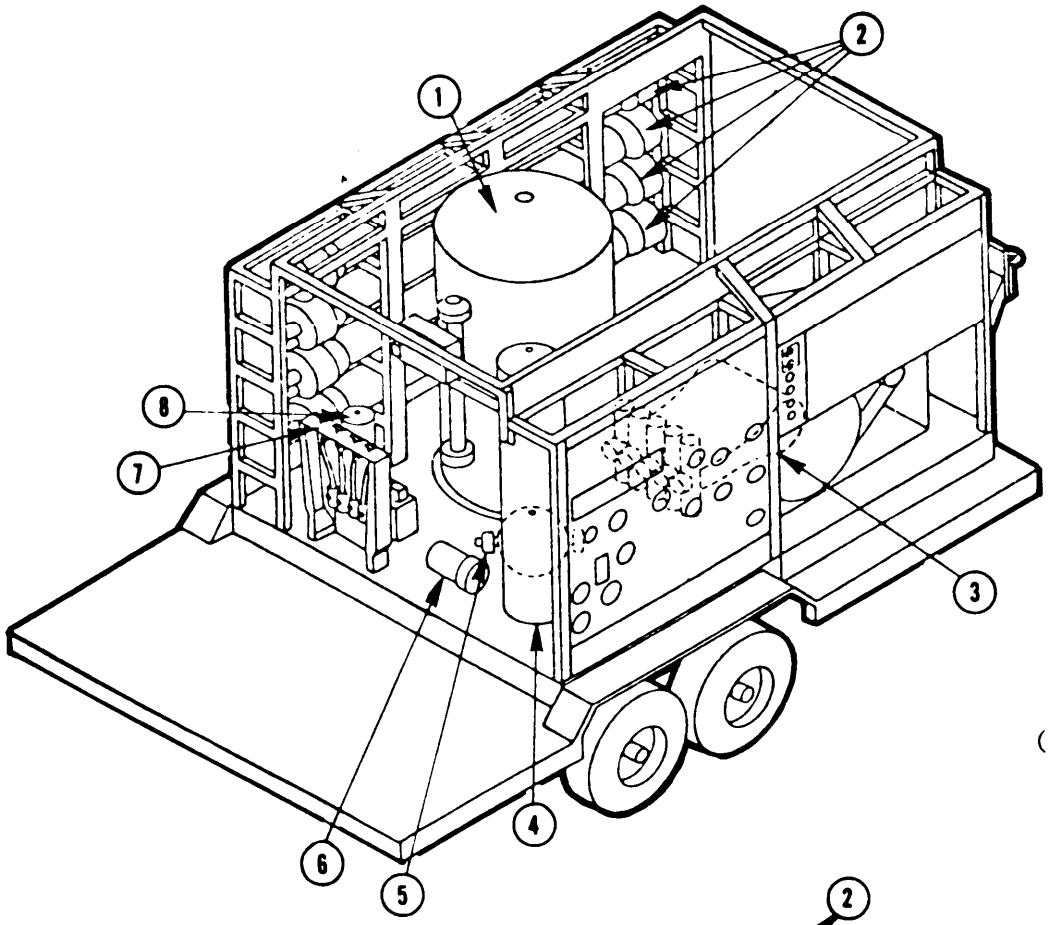
(4) The CARTRIDGE FILTER (4) is the second stage of the water purification process. The cartridge filter removes very small particles from the water coming out of the multimedia filter.

(5) The PULSE DAMPENER (5) (shown in dotted lines behind the cartridge filter) is a ball-shaped metal tank that is only partially filled with water. The pulse dampener reduces pulses in water flow caused by the pistons of the R.O. pump.

(6) The BOOSTER PUMP (6) promotes water flow from the multimedia filter through the cartridge filter.

(7) The CHEMICAL FEED PUMP (7) supplies four chemicals to different stages of the purification process.

(8) The CHEMICAL FEED PUMP MOTOR (8) drives the chemical feed pump.



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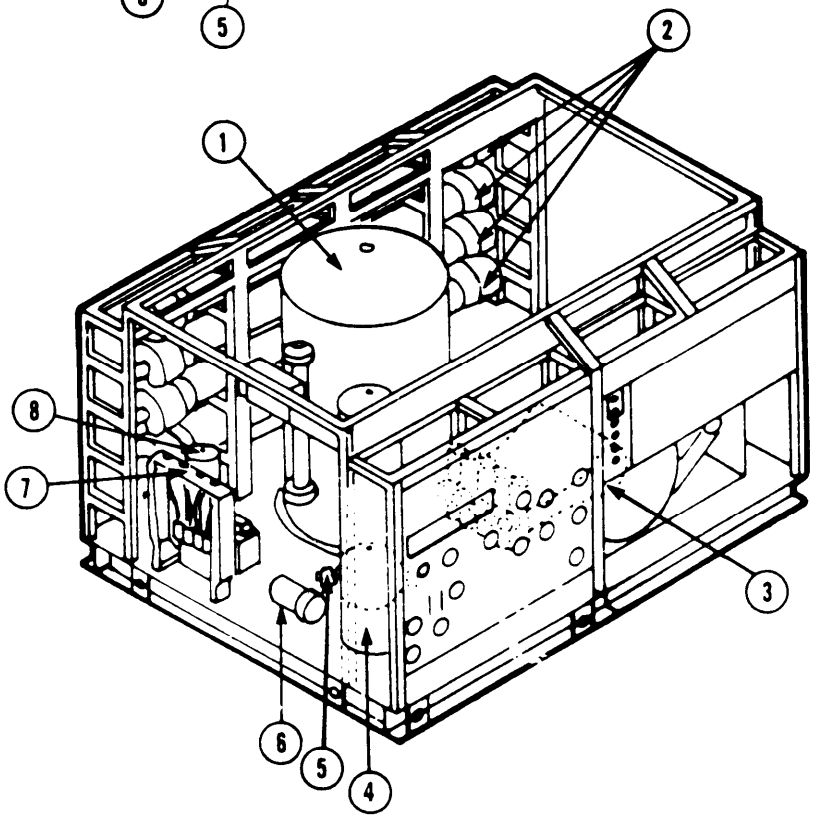


(USMC)

Figure 1-4. ROWPU Internal View

1–9. **(ARMY) FLATBED CARGO TRAILER AND FRAME.** The flatbed cargo trailer and frame is designed to provide a mobile platform for the 600 GPH Water Purification Unit. The unit is capable of being transported by road, rail, or air including helicopter. The trailer, when being transported by road, is towed by a towing vehicle through a lunette/pintle hookup. The trailer has four leveling jacks with swivels, one on each com ner, and is equipped with a spare wheel and tire carrier. The trailer incorporates service brakes which are air-actuated and operated from the towing vehicle through an integral set of hoses. The trailer brake system also includes emergency and automatic parking brake functions that are activated when the air hoses are disconnected from the towing vehicle. An air tank is installed for the purpose of reserving air for this system when the trailer is disconnected from the towing vehicle. A 24-volt electrical system consisting of one composite blackout–stoplight assembly, and two stoplight–tail light assemblies is installed on the trailer. Power is supplied through a cable connected to the electrical system of the towing vehicle. The trailer suspension consists of two axles in tandem, supported on leaf springs attached to an axle trunnion. The all-steel frame has one vertical parachute attachment/sling lifting eye on each corner, and one horizontal air-drop platform/transport tie-down on each corner; as well as having four (4) air-drop platform tie-down rings attached to each of the two main beams exposed on the trailers underside. The frame houses the 600 GPH Water Purification Unit and and is capable of being separated from the trailer and transported or air lifted as an independent unit.

Figures 1–5 and 1-6 show the location of the trailer's major components. The front view shows the location of the adjustable Lunette, lubrication plate, the safety step, air brake hoses, electrical cable, a front view of the frame, the front leveling jack, swivel assembly, the vehicle identification plate, and the safety chain assembly. The rear view shows the location of the stoplight-tail light assemblies, the blackout stoplight assemblies, spare tire carrier, a rear view of the frame, suspension assembly, wheel assembly, air brake assembly, and rear leveling jack.

The USMC ROWPU is skid mounted but the frame is the same as shown in figures 1–5 and 1-6.

1-10. **OUTLYING PUMPS.**

a. General. The ROWPU has four pumps (figure 1–7). These pumps are mounted On welded frames that protect them during transportation on the ROWPU. The frames also serve as operating bases for the pumps and provide storage space for the power cables.

b. Raw Water Pumps. Each ROWPU has two identical raw water pumps. These pumps remove raw water from a source and supply it to the ROWPU.

c. Backwash Pump. The backwash pump is used to pump water from the brine water tank upwards through the multimedia fitter. This process flushes out the particles that collect in the multimedia filter during normal operation.

d. Distribution Pump. The distribution pump delivers drinkable water from the product water storage tanks to the users.

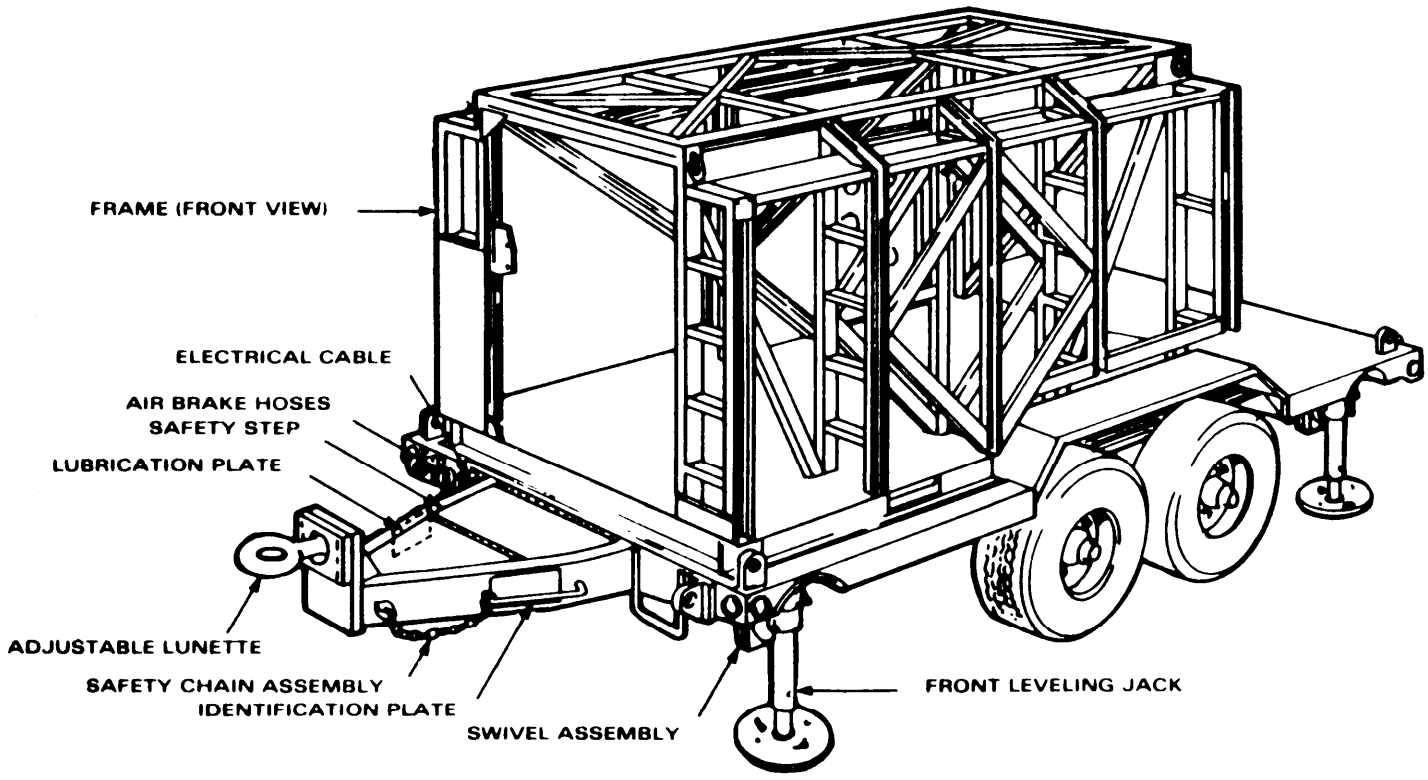


Figure 1–5. Major Components ROWPU (Front View) (ARMY)

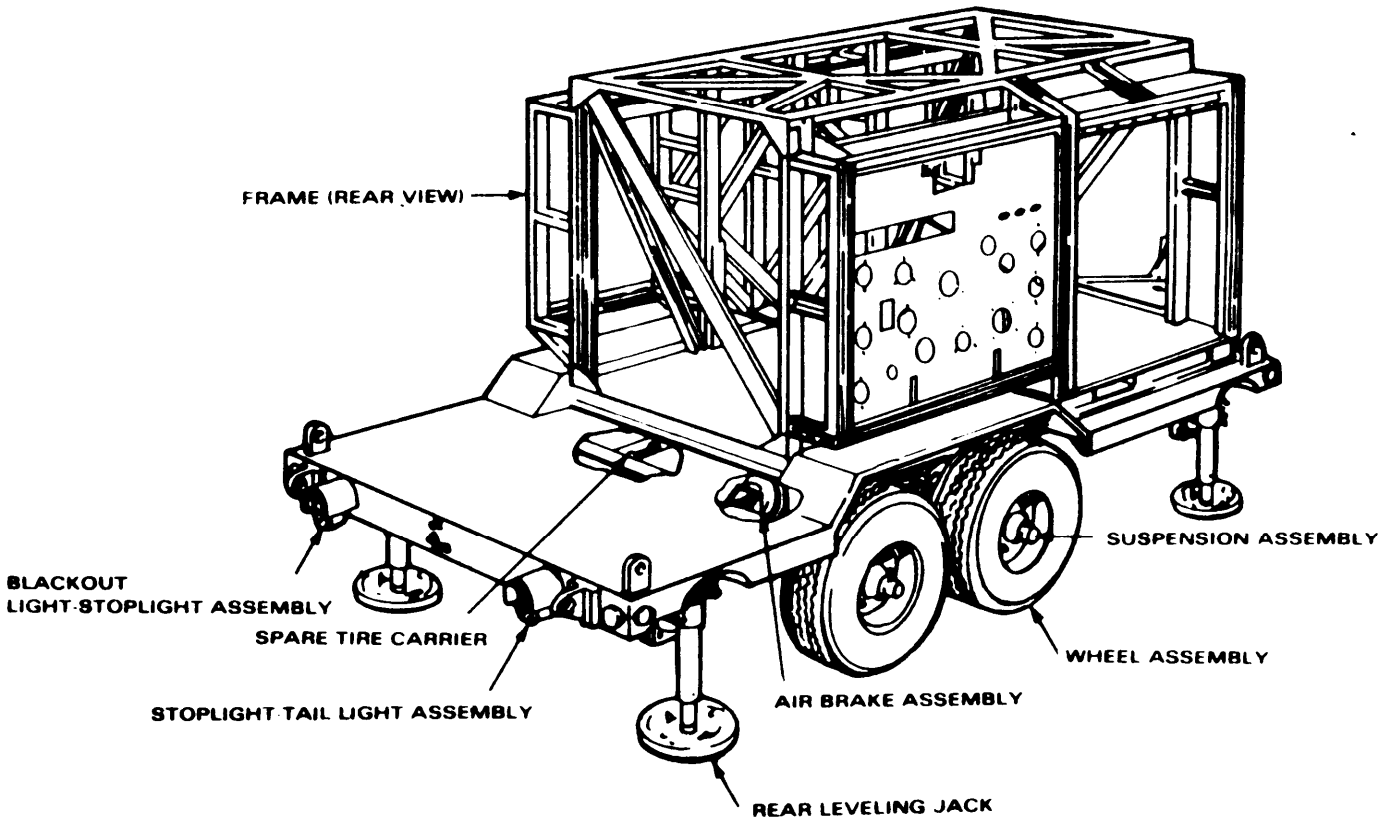
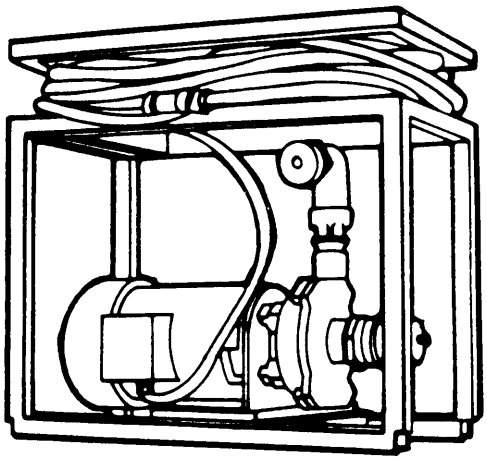
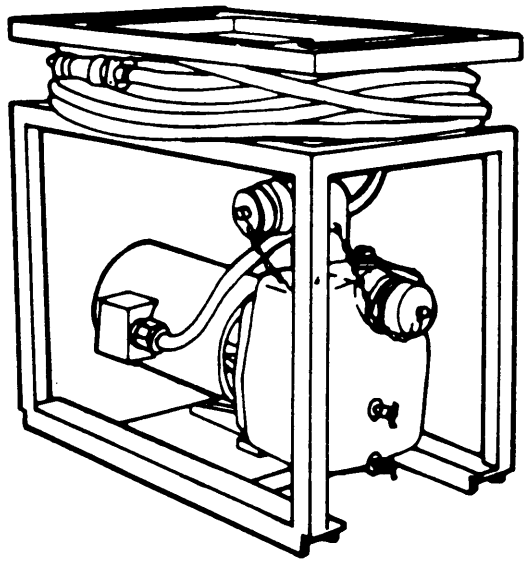


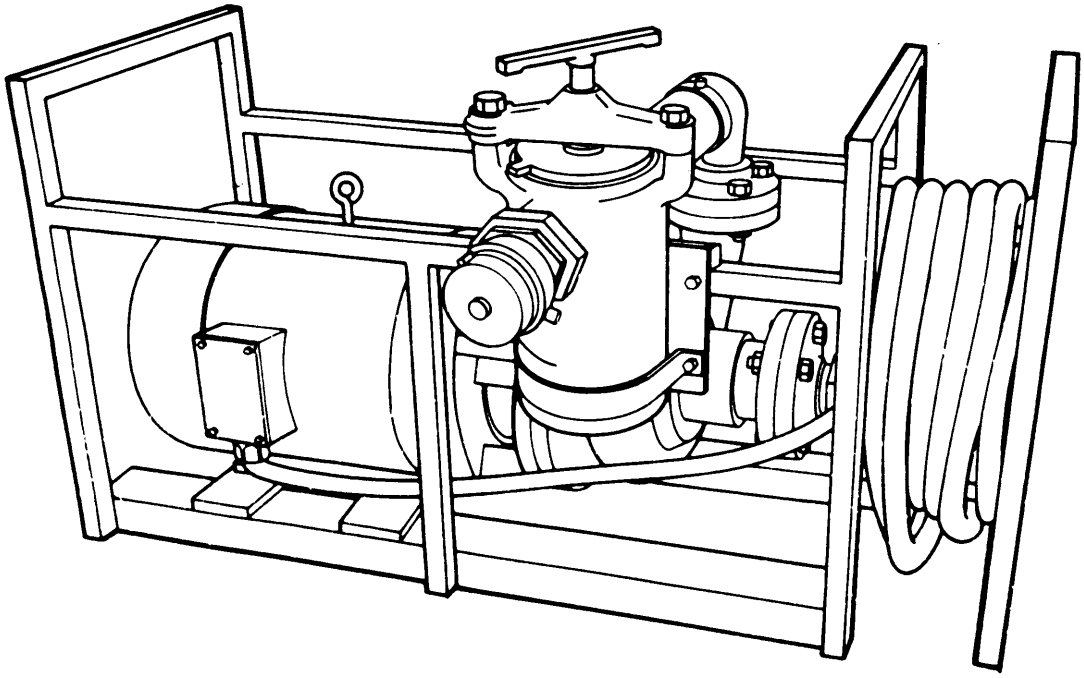
Figure 1-6. Major Components ROWPU (Rear View) (ARMY)



DISTRIBUTION PUMP



RAW WATER PUMP (TWO REQUIRED)



BACKWASH PUMP

Figure 1–7. Outlying Pumps

1-11. STORAGE BOXES.

a. General. The ROWPU has two accessory storage boxes (figure 1-8). These carry the chemicals, plastic hoses, tools, and other items necessary to run the ROWPU.

NOTE

There are two storage boxes. They are numbered Storage Box No. 2 and No. 3.

b. Storage Box No. 2. (Figure 1-9) is the loading plan. In general, this box contains those items which do not come in contact with chemicals.

c. Storage Box No. 3. (Figure 1-10) is the loading plan. In general, this box contains chemicals used during the operation of the ROWPU.

1-12. EQUIPMENT DATA.

Power requirements (overall):	
Power	30 Kw
Voltage	120 (single phase) 208-240/416 Vac 3 phase
Frequency	60 Hz
Current	104 amp (max)
Size (overall):	Trailer Mounted (ARMY)
Length	230 in (595 cm)
Width	96 in (244 cm)
Height	97 in (246 cm)
Weight	16,975 lbs (7,700 Kg)
ROWPU size:	Skid Mounted (USMC)
Length	114.5 in (290.83 cm)
Width	83.0 in (210.82 cm)
Height	67.0 in (170.18 cm)
Weight	7,300 lbs. (3,318 Kg)
R.O. Pump Motor:	
Voltage	208-240/416 Vac 3 phase
Current	56.3 amp
Horsepower	20 hp
Frequency	60 Hz
Speed	1175 rpm
Duty	Continuous
R.O. Pump:	
Oil Capacity	2 U.S. gallons (7.16 liters)
Type	Positive displacement
Pumping Capacity	50 gpm (193 lpm) @ 980 psi (69 kg/cm2) head
Drive	V-belt
Speed	500 rpm max.
Backwash Pump Motor:	
Voltage	208-230/460 Vac, 3 phase
Current	26.5-24/12 amp
Horsepower	10 hp
Frequency	60 Hz
speed	3450 rpm
Duty	Continuous

Backwash Pump:	
Type	Centrifugal
Capacity	120 gpm (454 Ipm) @ 70 psig (4.9 kg/cm^{2}g)
Drive	Electric motor driven (emd)
Speed	3500 rpm
Raw Water Pump Motor (2 each):	
Voltage	208–230/460 Vat, 3 Phase
Current	5.8–5.3/2.65 amp
Horsepower	2 hp
Frequency	60 Hz
Speed	3450 rpm
Duty	Continuous
Raw Water Pump (2 each):	
Type	Centrifugal, self–priming
Capacity	30 gpm (114 lpm) @ 105 ft (32 m) head
Drive	Electric motor driven (emd)
Speed	3500 rpm
Distribution/Booster Pump Motors:	
Voltage	208–230/460 Vat, 3 Phase
Current	3.4–3.2/1.6 amp
Horsepower	1
Frequency	60 Hz
Speed	3450 rpm
Duty	Continuous
Distribution/Booster Pump:	
Type	Centrifugal
Capacity	30 gpm (114 Ipm) @ 50 ft (15 m) head
Drive	Electric motor driven (emd)
Speed	3500 rpm
Chemical Feed Pump Motor:	
Voltage	115/230 Vat, single phase
Current	6.2/3.1 amp (ARMY) 4.8/2.4 amp (USMC)
Horsepower	1/3 hp
Frequency	60 Hz
Speed	1725 rpm
Duty	Continuous
Chemical Feed Pump:	
Capacity	3.7 gal/hr (14 liters/hr)
Drive	Electric motor driven (emd)
Multimedia Filter:	
Flow rate	6.5 gpm/ft^2(265 lpm/m^2)
Backwash flow rate	70 to 120 gpm (265 to 454 Ipm)
Pressure drop	5 psid (nominal) (0.35 kg/cm^{2}d)
Cartridge Filter:	
Cartridge	8 cartridge tubes
Length	40 in (1016.0 mm)
Flow rate	35 gpm (132.5 Ipm)
Pressure drop	2 to 35 psig (0.14 to 2.46 kg/cm^{2}d)

Trailer and Frame: (ARMY)

Dimensions and Weights (without ROWPU):	
Length	19.01 ft (5.8 m)
Width	8.00 ft (2.44 m)
Height (to top of wheel cover)	3.18 ft (0.97 m)
Weight	5595 lbs (2540 kg)
Height to Iunette	2.42 ft. to 2.92 ft. (0.74 m to 0.89 m)
Maximum towing speed	50 mph (80 kmph)
Tire pressure	75 psi (5.27 kg/cm2)
Voltage	24 vdc

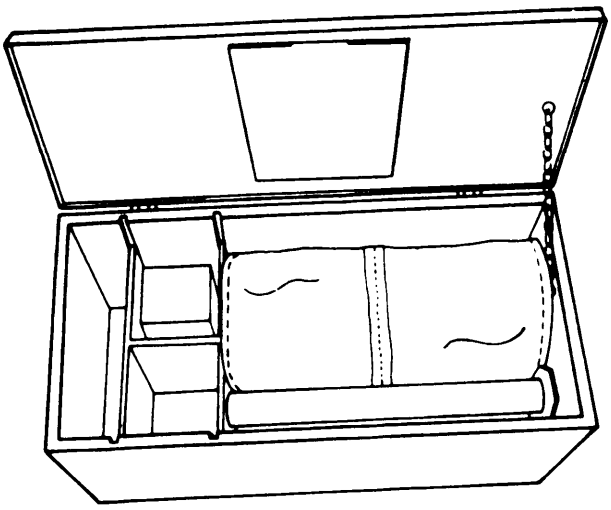
1–1 3. **PIPING IDENTIFICATION.** The ROWPU piping is identified according to function by the following colors:

Function	Color
Raw water	Black Band
Backwash waste	Red band
Filtered water	Yellow band
Product water	Blue band
Brine discharge	Purple band
Brine piping on R.O. vessels	Purple band

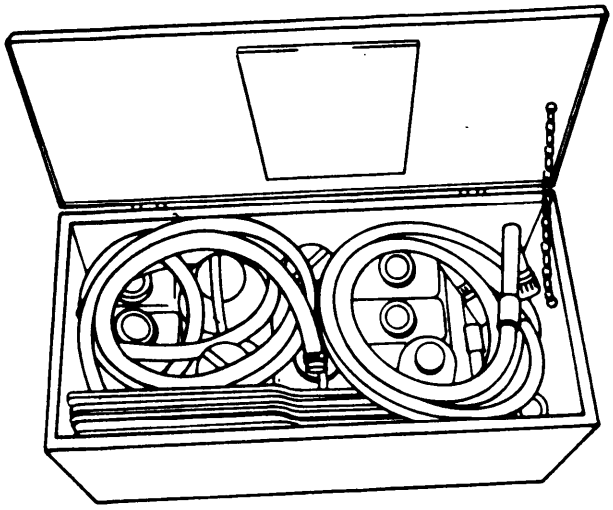
1–14. **PIPING/WIRING.** The ROWPU piping diagram is shown in (figure 1–11), the electrical schematic in (figure 1–1 2), and the electrical interconnection diagram in (figure 1–13).

NOTE

The FIND No. column refers to callouts on (figure 1–11, sheets 2 through 7).



STORAGE BOX NO. 2



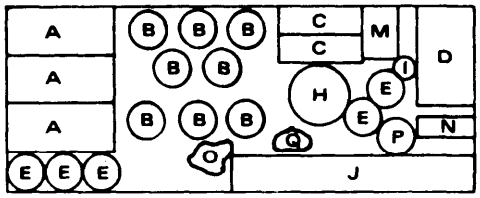
STORAGE BOX NO. 3

Figure 1 –8. Storage Boxes

QTY	UNIT	ARTICLE	COMP
1	EA	METER, DISSOLVED SOLIDS	D
9	EA	INDICATOR, LAMPS, 6S6	F
1	EA	EXTRACTOR LAMP	D
1	EA	EXTRACTOR LIGHT, 50FT CORD	B
1	EA	BULB, INCANDESCENT, 100 W	F
1	EA	THERMOMETER, 0–220°F	F
1	EA	STRAINER, SUCTION HOSE	A
3	EA	GRADUATED BEAKER, 250 ML	D
1	ROLL	TAPE, ANTI–SEIZE	D
1	EA	MEASURE, SODIUM HEX, 0.1 LB	F
1	EA	MEASURE, POLYELECTROLYTE, 107 ML	F
1	EA	MEASURE, CAL, HYPOCHLORITE, 0.05 LB	F
1	EA	FLASHLIGHT	F
1	EA	HANDLE, SOCKET WRENCH, RACHET	B
1	EA	ADAPTER, 2 NPT EXT X 2 NPSH EXT	C
1	EA	TOOL CASE WITH CONTENTS	E
1	EA	SCREWDRIVER, 2 PHILLIPS	E
1	EA	SCREWDRIVER, 6"	E
1	EA	SCREWDRIVER, STUBBY	E
1	EA	PLIERS, 6"	E
1	EA	WRENCH, PLIER	E
1	EA	WRENCH ADJUSTABLE, 6"	E
1	EA	WRENCH ADJUSTABLE, 12"	E
2	EA	WRENCH, PIPE, ALUMINUM, 18"	E
1	EA	BALL PEEN HAMMER 24OZ	E
1	EA	SPANNER WRENCH, UNIV. HOSE	E
1	EA	SPANNER WRENCH, WHEATLEY PUMP	E
1	EA	KEY, WRENCH, SOCKET HEADSCREW, 5MM	E
1	EA	ADAPTER, SWIVEL, 2 NPSH EXT X1–1/2 NPSH INT	C
2	EA	ADAPTER, 1–1/2 NPT EXT X1–1/2 NPSH INT	C
2	EA	ADAPTER, 1–1/2 NPSH EXT X 2 NPSH INT	C
1	BOX	BATTERY, 9 VOLT, 2 TERMINALS	F
1	EA	NOZZLE, PISTOL–GRIP, 1–1/2 NPT	B
1	EA	VALVE, GATE, 1–1/2 NPT	B
3	EA	ROPE, MANILA, 1/2 IN X 36"L	B
1	EA	VALVE, GATE, 2–11 1/2 NPT	C
1	EA	CASE, MAINTENANCE AND OPERATIONAL MAN	A
1	EA	ADAPTER SWIVEL, 2 NPT EXT X 2 NPSH INT	C
1	EA	ADAPTER STRAIGHT, 1–1/2 NPTEXT X1–1/2NPSH EXT	C
3	EA	LUBRICANT, O'RING	F
1	EA	PULLER, VALVE SEAT	B
1	EA	EXTENSION, SOCKET WRENCH	B
1	EA	HANDLE, SOCKET WRENCH, BRACE	B
1	EA	MALLET, RUBBER	B
8	EA	MACHINE SCREW. HEX HD	C
7	EA	SOCKET, WRENCH, 1/2 – 15/16	B
1	EA	WRENCH BOX AND OPEN END, 1–1/2"	E
1	SET	WRENCH SET, COMB.,BOX AND OPEN END	E
1	EA	WRENCH, PIPE – STRAP	B
6	EA	PLUG PIPE, 1/2 NPT	C
1	EA	PLUG, PIPE, 3/4 NPT	C

Figure 1-9. Storage Box No. 2 (Loading Plan)

LOADING PLAN
STORAGE BOX - ACCESSORIES

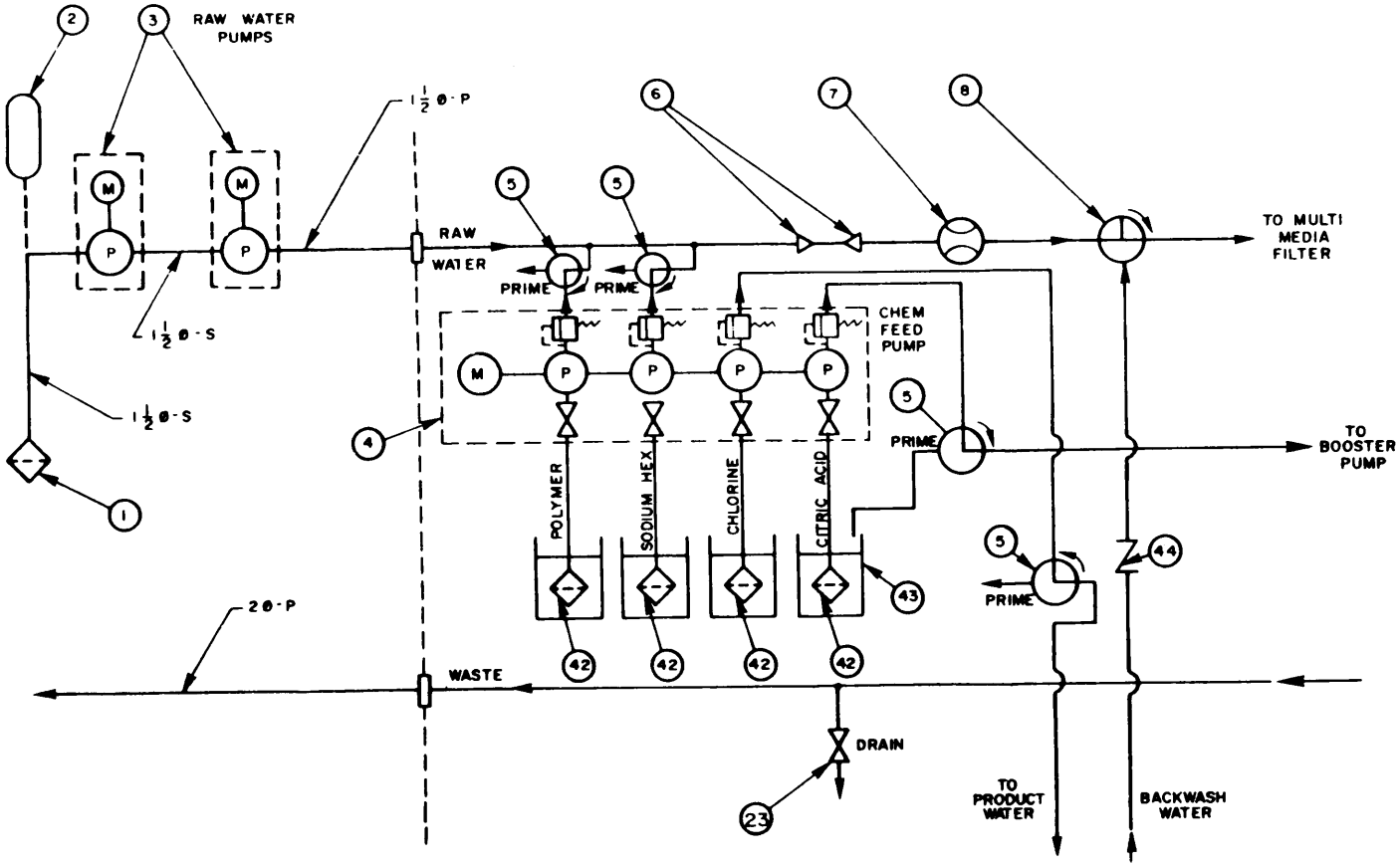


QTY	UNIT	ARTICLE	LOC
3	EA	POLYMER, 2.5 LB EA	A
8	EA	RO ELEMENT END CONNECTION AND O-RINGS	B
2	EA	SODIUM HEX, 2.0 LB EA	C
1	EA	COLOR COMPARATOR	D
5	EA	CITRIC ACID, ¾ LB EA	E
1	EA	SOLUTION, WIDE RANGE ph, 16oz	H
1	EA	GRADUATED PLASTIC CYLINDER, 100ml	I
5	EA	PADDLE, WOOD	J
1	EA	TRITON X 100 MEMBRANE CLEANING SOLUTION 2 LB PLASTIC BOTTLE	M
1	EA	CHLORINE, PALIN, DPD, 100 TABLETS	N
1	EA	TURBIDITY TUBE	O
1	EA	TOOL CASE WITH CONTENTS	E
1	EA	COUPLING PIPE, CORROSION RESISTANT	P
2	EA	BUSHING PIPE SHOULDER	P
4	EA	ADAPTER, POLYETHYLENE PIPE TO HOSE	P
4	EA	CLAMP, HOSE, LOW PRESSURE	P
2	EA	REDUCER ADAPTER, ½ NPT EXT X ¾ NPT INT	P
2	EA	TUBING, FLEXIBLE, REINF 80.00 IN LONG	Q

Figure 1–10. Storage Box No. 3 (Loading Plan)

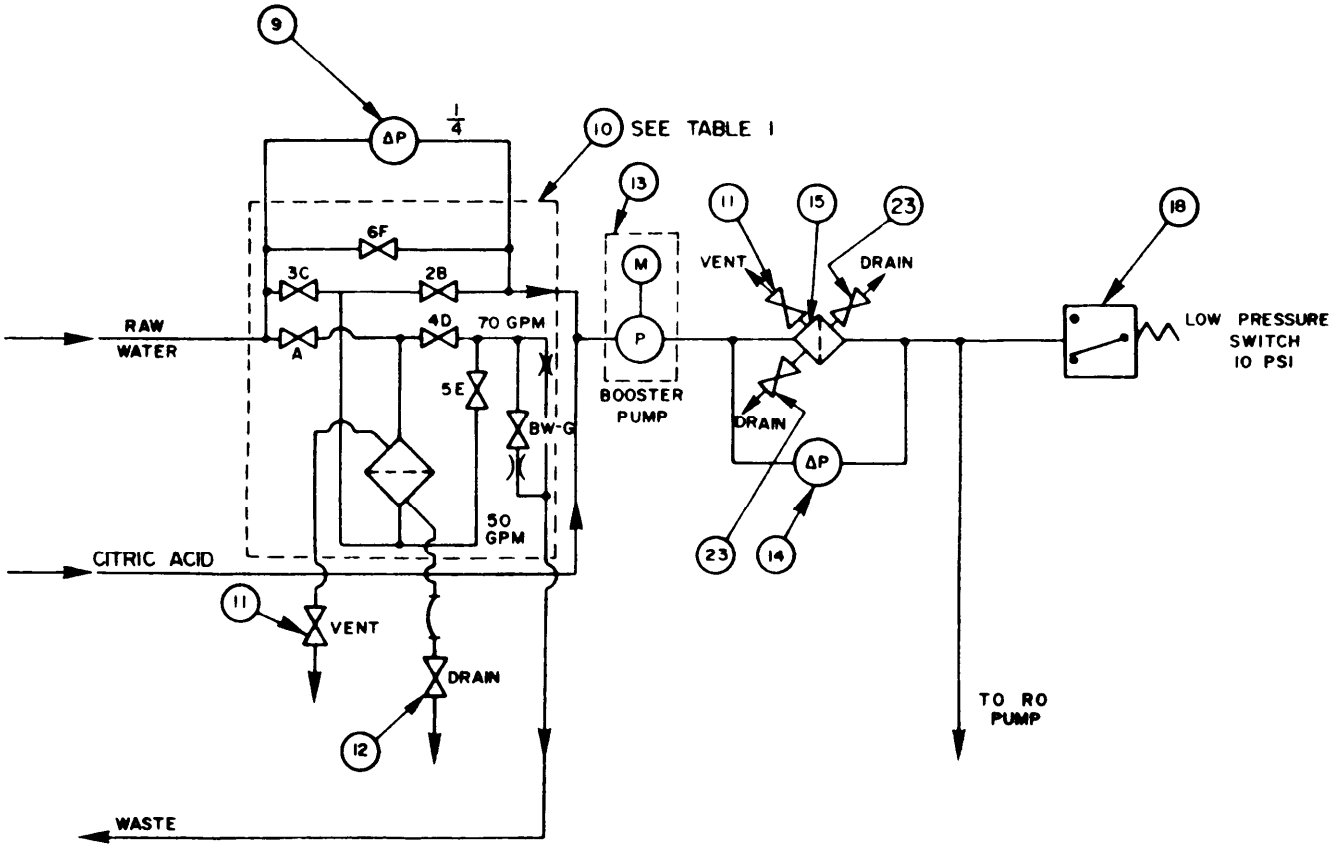
COMPONENT REFERENCE LIST			
FIND NO	QTY REQD	PART OR IDENTIFYING NO.	DESCRIPTION
1	1	NSN 4730-00-684-4296	STRAINER SUCTION HOSE, MIL-S12165, TYPE
2	1	NSN 4610-00-066-2472	FLOAT, FIGURE 4 MIL-M-52482
3	2		PUMP, CENTRIFUGAL, SELF-PRIMING EMD
4	1		PUMP, CHEMICAL FEED
5	4		VALVE BALL, 3-WAY
6	2		REDUCER BUSHING, (CPVC) SOCKET TYPE, SCHED 80
7	1		FLOWMETER
8	1		VALVE, BALL, 3-WAY
9	1		GAGE, DIFFERENTIAL PRESSURE
10	1		FILTER, MULTIMEDIA
11	3		VALVE, BALL
12	1		VALVE, BALL
13	1		PUMP, CENTRIFUGAL, EMD
14	1		GAGE, DIFFERENTIAL PRESSURE
15	1		FILTER, CARTRIDGE
16	6		VALVE, CHECK
17	1		VALVE, RELIEF
18	1		SWITCH, LOW PRESSURE
19	1		PUMP, HIGH PRESSURE
20	1		MOTOR, ELECTRIC
21	1		HOLDER, RUPTURE DISC
22	1		RUPTURE DISC
23	6		VALVE, BALL
24	1		VALVE, BALL
25	1		DAMPENER, FLUID PRESSURE
26	1		SWITCH, HIGH PRESSURE
27	1		GAGE, PRESSURE
28	4		PRESSURE TUBE, REVERSE OSMOSIS
29	4		VALVE, 2 WAY, ON—OFF
30	1		VALVE, GATE
31	1		VALVE, NEEDLE
32	1		FLOWMETER
33	1		FLOWMETER
34	1		FLOWMETER
35	1		PUMP, CENTRIFUGAL,EMD
36	1		STRAINER, SINGLE
37	1		VALVE, GATE
38	3		TANK ASSEMBLY, FABRIC, COLLAPSIBLE,WATER,
			NYLON RUBBER COAT CAPACITY: 1500 GALLONS
39	1		NOZZLE
40	1		PUMP, CENTRIFUGAL, EMD
41	1		VALVE, GATE
42	4		STRAINER TRANSLUCENT PVC, THREADED
43	4		PAIL, UTILITY (ARMY), CAN ASSEMBLY (M.C.)
44	1		VALVE, CHECK
45	1		GAGE, DIFFERENTIAL PRESSURE
46	1		CARTRIDGE, DEIONIZATION PURIFICATION
47	4		ELLIPTIC VALVE, 2 POSITION, 3 WAY

Figure 1-11. Piping Diagram (Sheet 1 of 7)



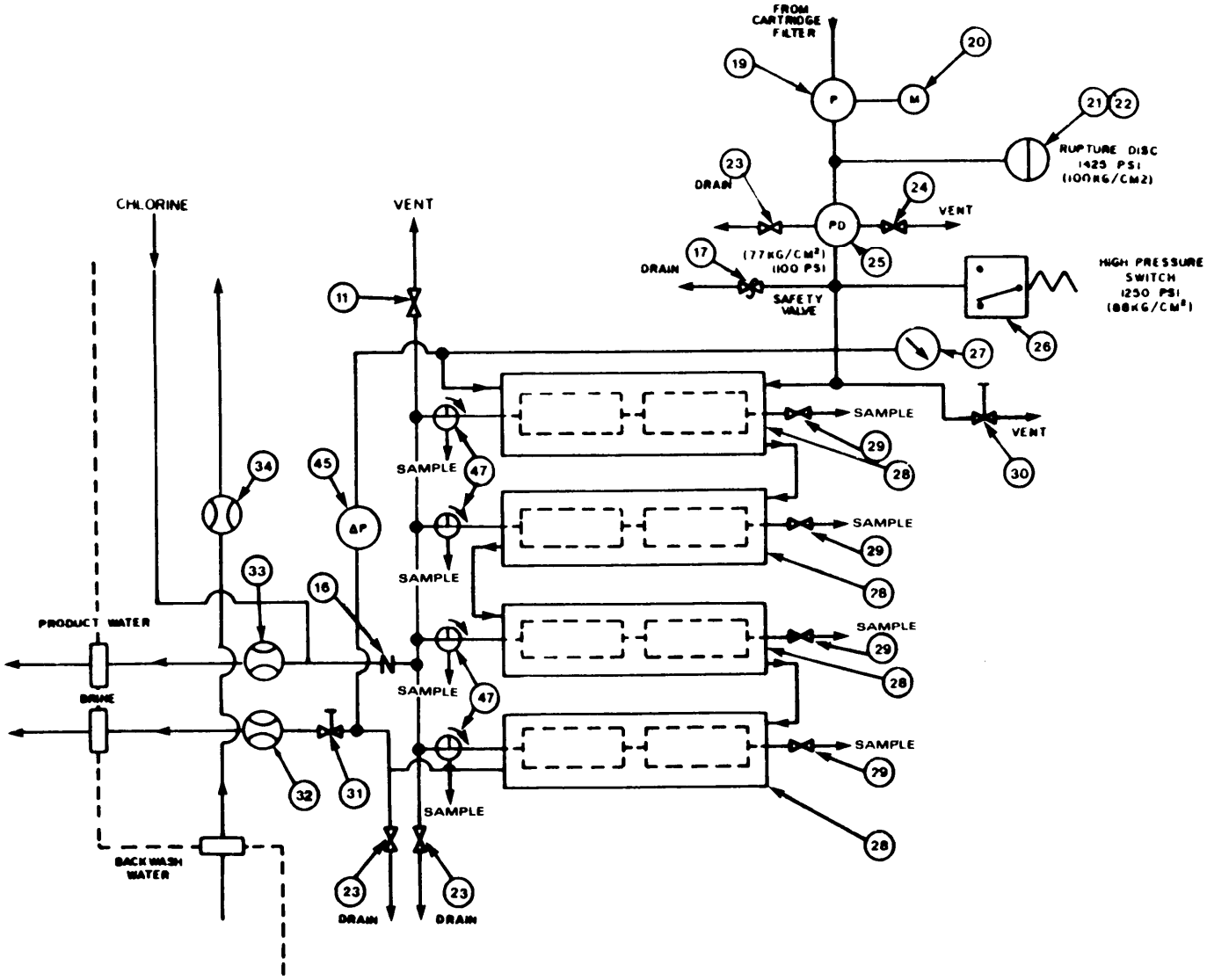
P = PRESSURE HOSE
S = SUCTION HOSE

Figure 1-11. Piping Diagram (Sheet 2 of 7)



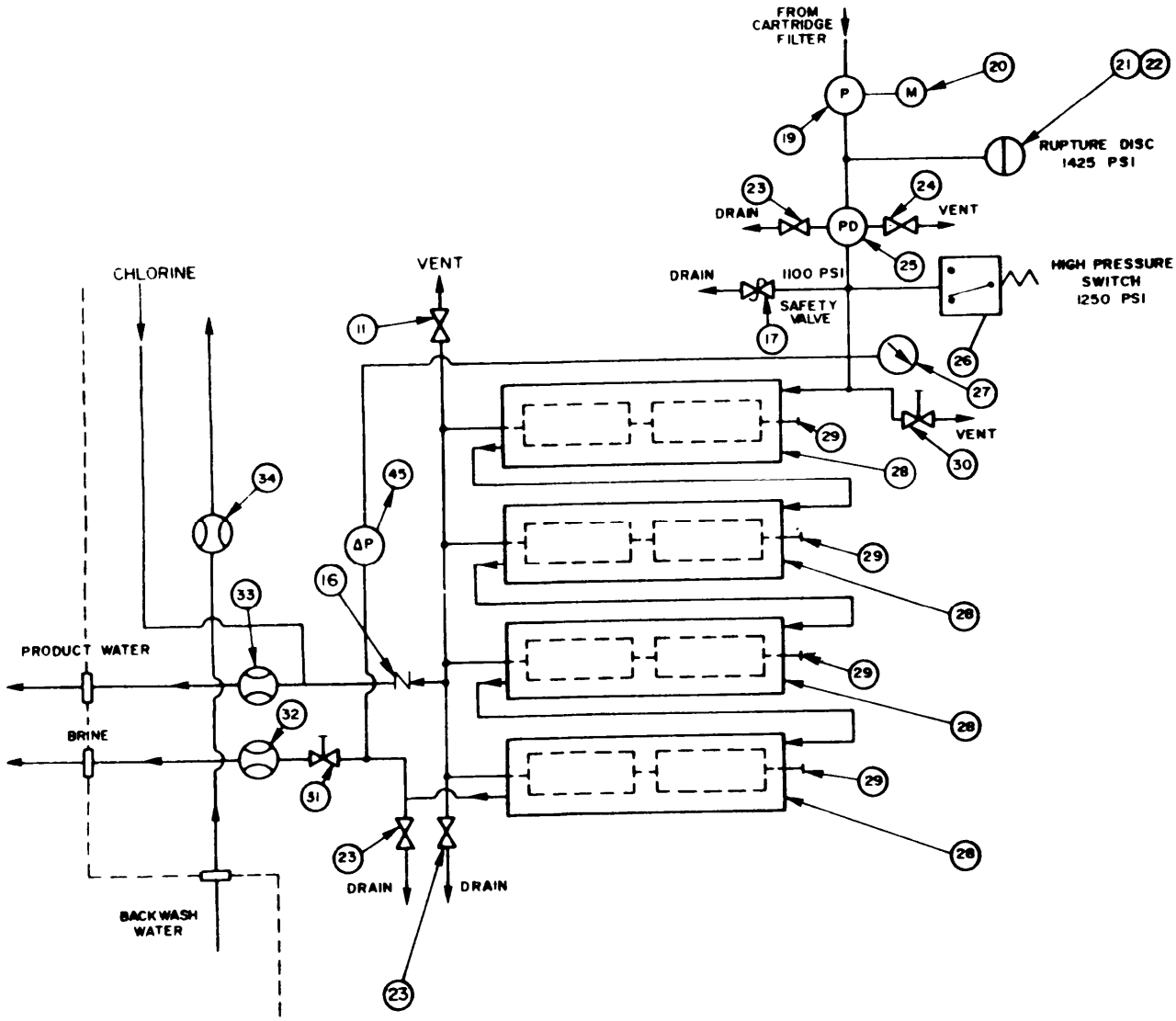
P = PRESSURE HOSE
S = SUCTION HOSE

Figure 1-11. Piping Diagram (Sheet 3 of 7)



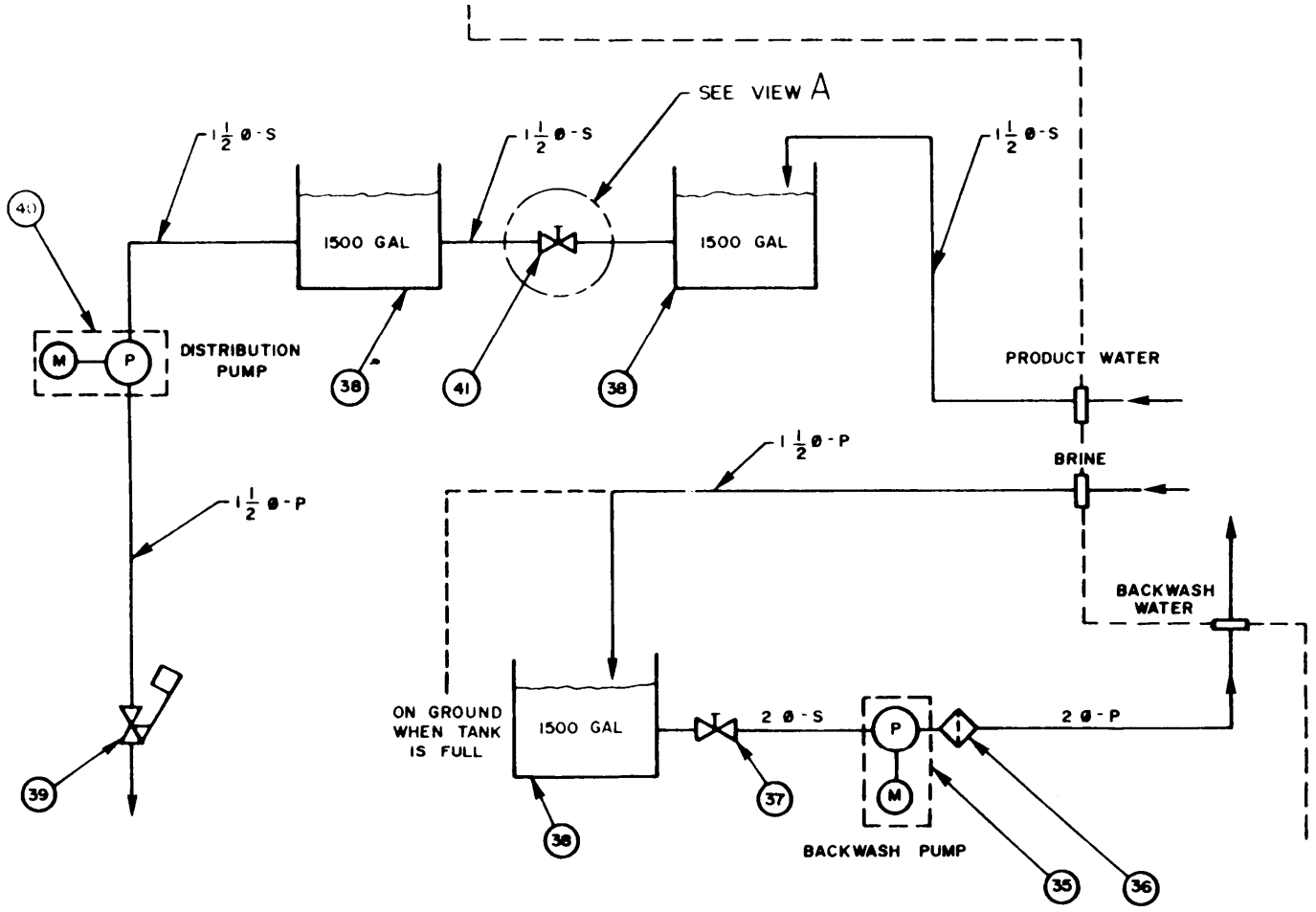
P = PRESSURE HOSE
S = SUCTION HOSE

Figure 1-11. Piping Diagram (Sheet 4 of 7) (USMC)



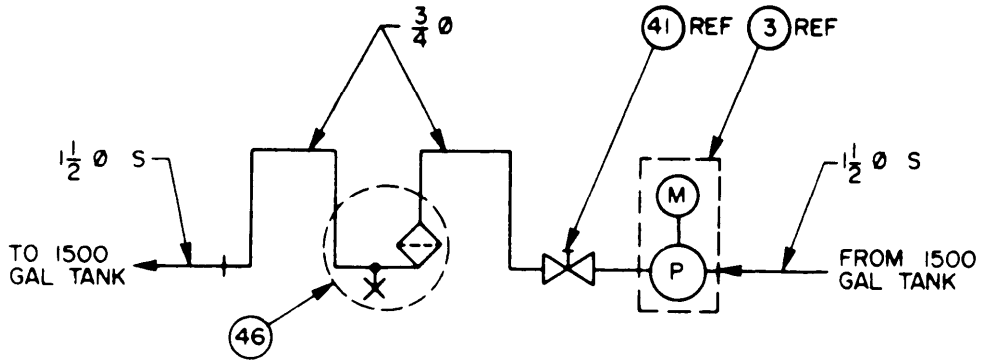
P = PRESSURE HOSE
S = SUCTION HOSE

Figure 1-11. Piping Diagram (Sheet 5 of 7) (ARMY)



P = PRESSURE HOSE
S = SUCTION HOSE

Figure 1-11. Piping Diagram (Sheet 6 of 7)



VIEW A

SPECIAL INSTALLATION FOR RADIOLOGICAL OR CHEMICAL CONTAMINATION

TABLE 1
SEQUENCE OF OPERATIONS IN ITEM 10

FUNCTION	1A	2B	3C	4D	5E	6F	BW–G
SERVICE	O	O	X	X	X	X	X
BACKWASH 2–3 MINUTES	X	X	O	O	X	X	X
BACKWASH 6–7 MINUTES	X	X	O	O	X	X	O
BACKWASH 2–3 MINUTES	X	X	O	O	X	X	X
OFF	X	X	X	X	O	X	X
PURGE	O	X	X	X	O	X	X

O = VALVE OPEN
X = VALVE CLOSED

Figure 1-11. Piping Diagram (Sheet 7 of 7)

COMPONENT REFERENCE LIST		
ELECTICAL REFERENCE DESIGNATION	PART OR IDENTIFYING NO.	DESCRIPTION
A1		MULTIMEDIA FILTER CONTROL ASSEMBLY
B1		MOTOR R.O. PUMP
B2		MOTOR BACKWASH PUMP
B3		MOTOR, RAW WATER PUMP NO. 1
B4		MOTOR, RAW WATER PUMP NO. 2
B5		MOTOR, DISTRIBUTION PUMP
B6		MOTOR, BOOSTER PUMP
B7		MOTOR, CHEMICAL FEED PUMP
CB1		CIRCUIT BREAKER R.O. PUMP MOTOR
CB2		CIRCUIT BREAKER BACKWASH PUMP MOTOR
CB3		CIRCUIT BREAKER, RAW WATER NO. 1 PUMP MOTOR
CB4		CIRCUIT BREAKER, RAW WATER NO. 2 PUMP MOTOR
CB5		CIRCUIT BREAKER DISTRIBUTION PUMP MOTOR
CB6		CIRCUIT BREAKER BOOSTER PUMP MOTOR
CB7		CIRCUIT BREAKER, CHEMICAL FEED PUMP MOTOR
CB8		CIRCUIT BREAKER, UTILITY OUTLET
CB9		CIRCUIT BREAKER, CONTROL
DS1THRU DS9		INDICATING LAMP, POWER ON
DS10		ILLUMINATING LAMP, CONTROL PANEL
G1		GENERATOR, ELECTRIC, DIESEL DRIVEN
J1		CONNECTOR
J2		CONNECTOR
J3, J4, J5		CONNECTOR
J6		CONNECTOR
J7		CIRCUIT INTERRUPTER, GROUND FAULT
J8		CONNECTOR
J9		CONNECTOR
K1		MOTOR STARTER, ELECTRIC, 3 PHASE, MAGNETIC
K2		MOTOR STARTER, ELECTRIC, 3 PHASE, MAGNETIC
K3, K4		MOTOR STARTER, ELECTRIC, 3 PHASE, MAGNETIC
K5, K6		MOTOR STARTER, ELECTRIC, 3 PHASE, MAGNETIC
K7		MOTOR STARTER, ELECTRIC, SINGLE PHASE
K8		RELAY, MAGNETIC
K9		RELAY, MAGNETIC
P1		CONNECTOR
P2		CONNECTOR
P3, P4, P5		CONNECTOR
P6		CONNECTOR
P8		CONNECTOR
P9		CONNECTOR
P10A		CONNECTOR
P10B		CONNECTOR
S1, S3 THRU S7		SWITCH, TOGGLE, TWO POLE, 3 POSITION (SEE NOTE 1)
S2, S8, S12		SWITCH,TOGGLE, ONE POLE
S9		SWITCH LOW PRESSURE
S10		SWITCH, HIGH PRESSURE
S11		SWITCH, TOGGLE, ONE POLE, 2 POSITION
S13		SWITCH, PUSH-PULL
S14		SWITCH TOGGLE, FOUR POLE, 3 POSITION (SEE NOTES 1 AND 2)

Figure 1-12. Schematic Diagram (Sheet 1 of 5)

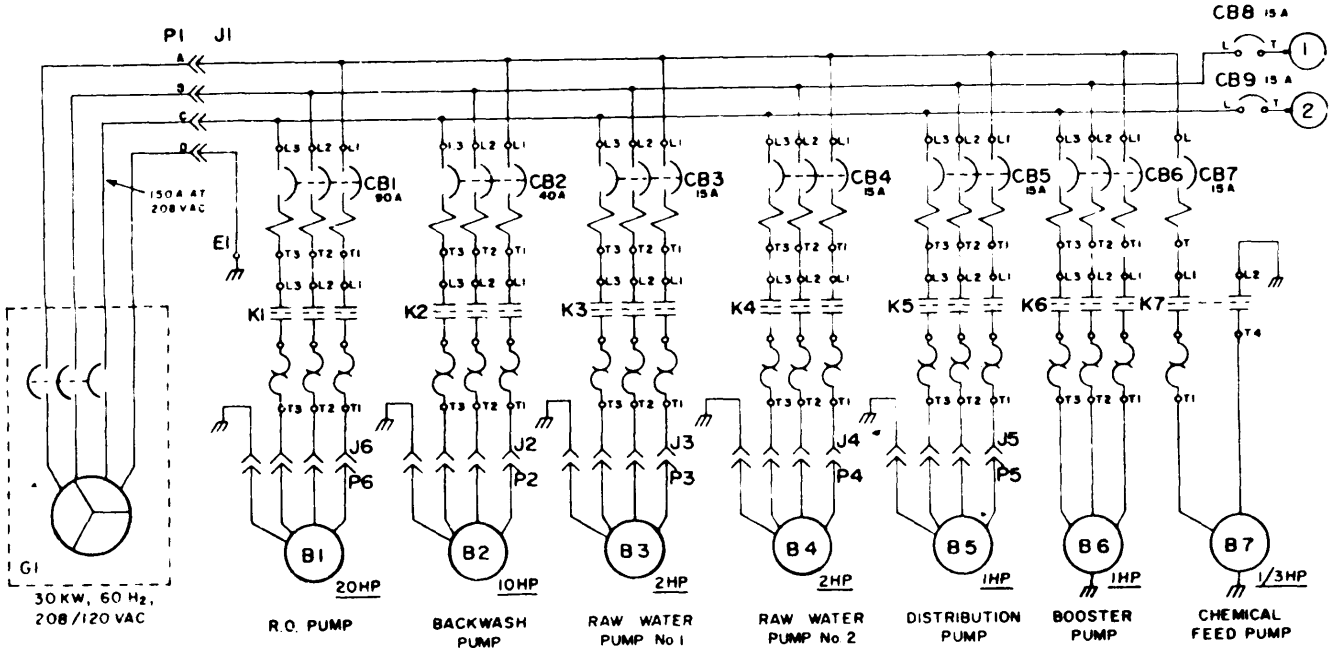


Figure 1–12. Schematic Diagram (Sheet 2 of 5)

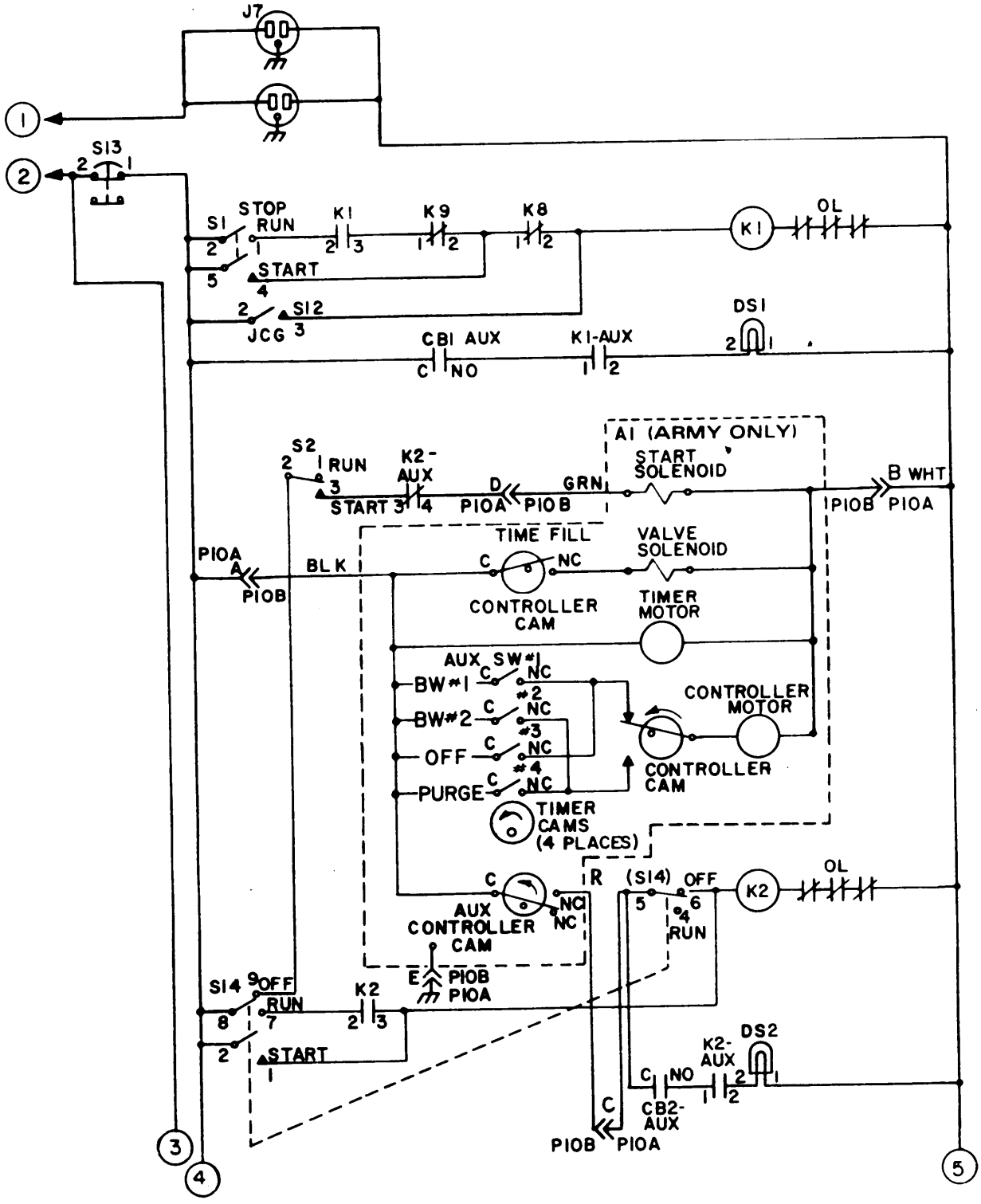


Figure 1-12. Schematic Diagram, Mechanical Timer (ARMY) (Sheet 3 of 5)

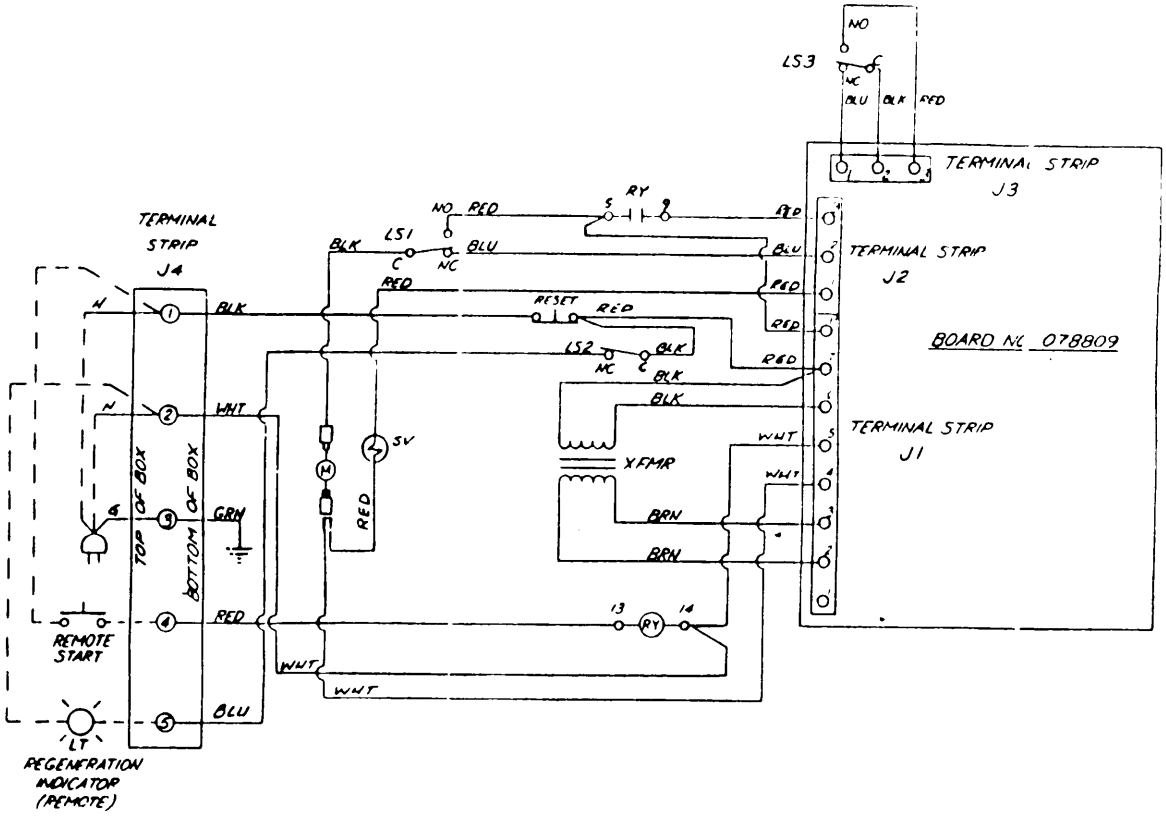


Figure 1–1 2. Schematic Diagram, Solid State Timer (USMC) (Sheet 4 of 5)

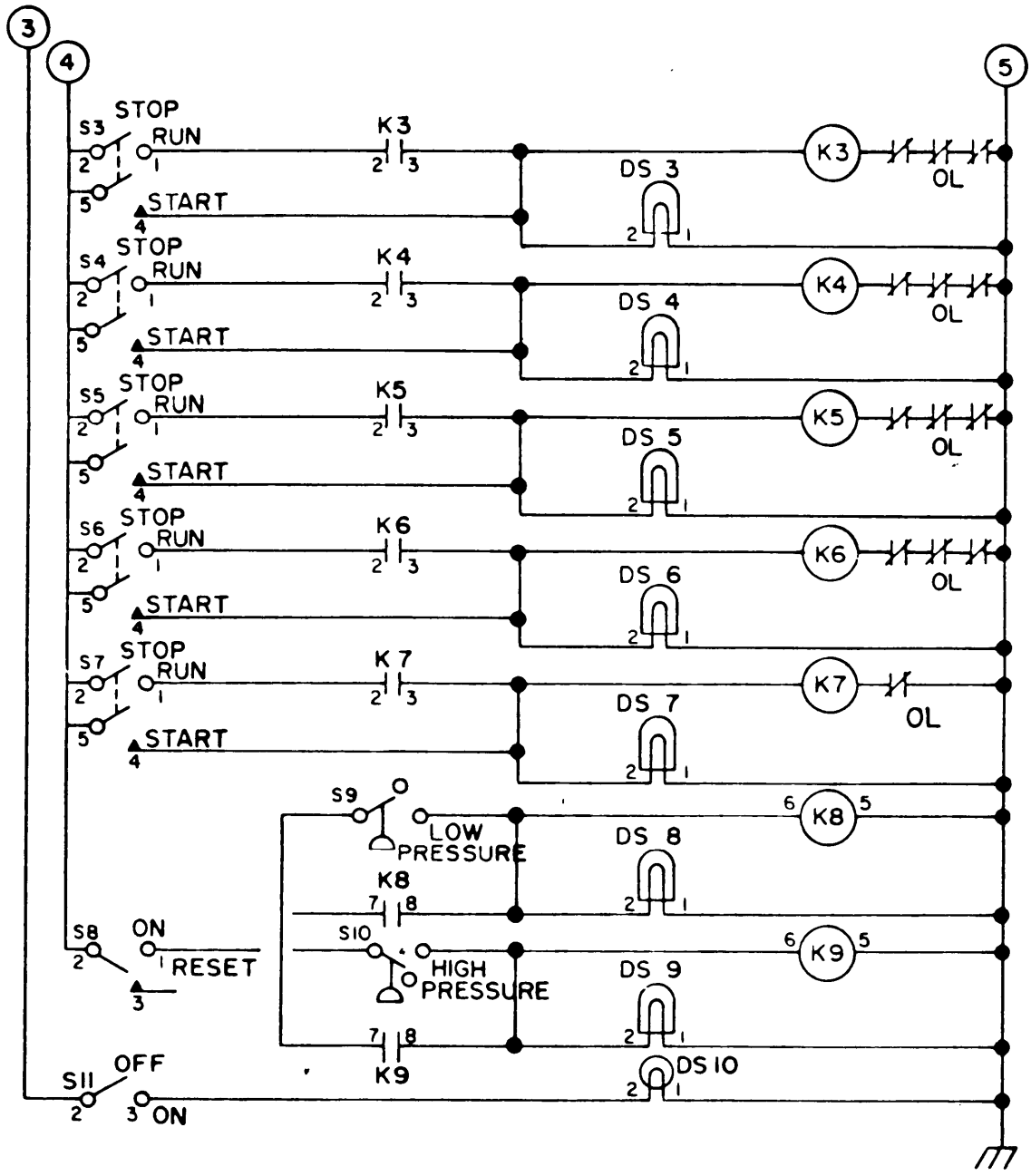


Figure 1-12. Schematic Diagram (Sheet 5 of 5)

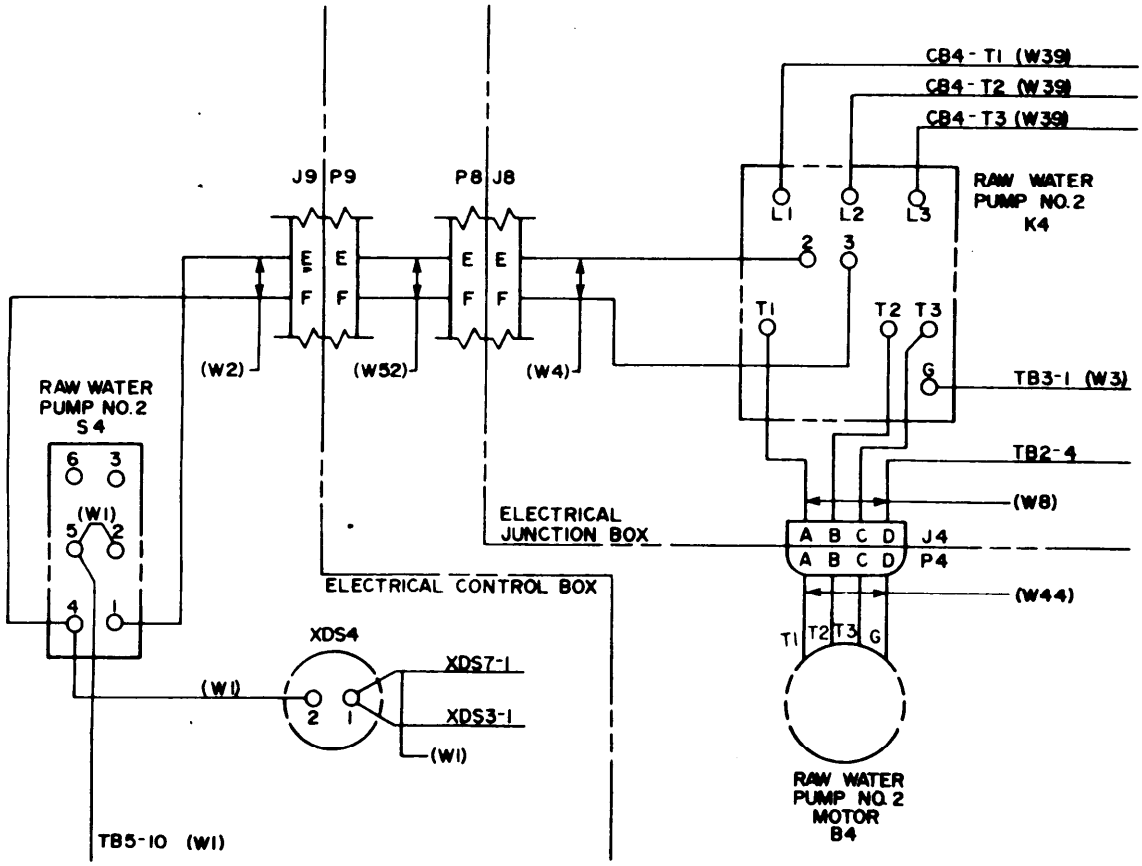


Figure 1-13. Interconnection Diagram (Sheet 1 of 13)

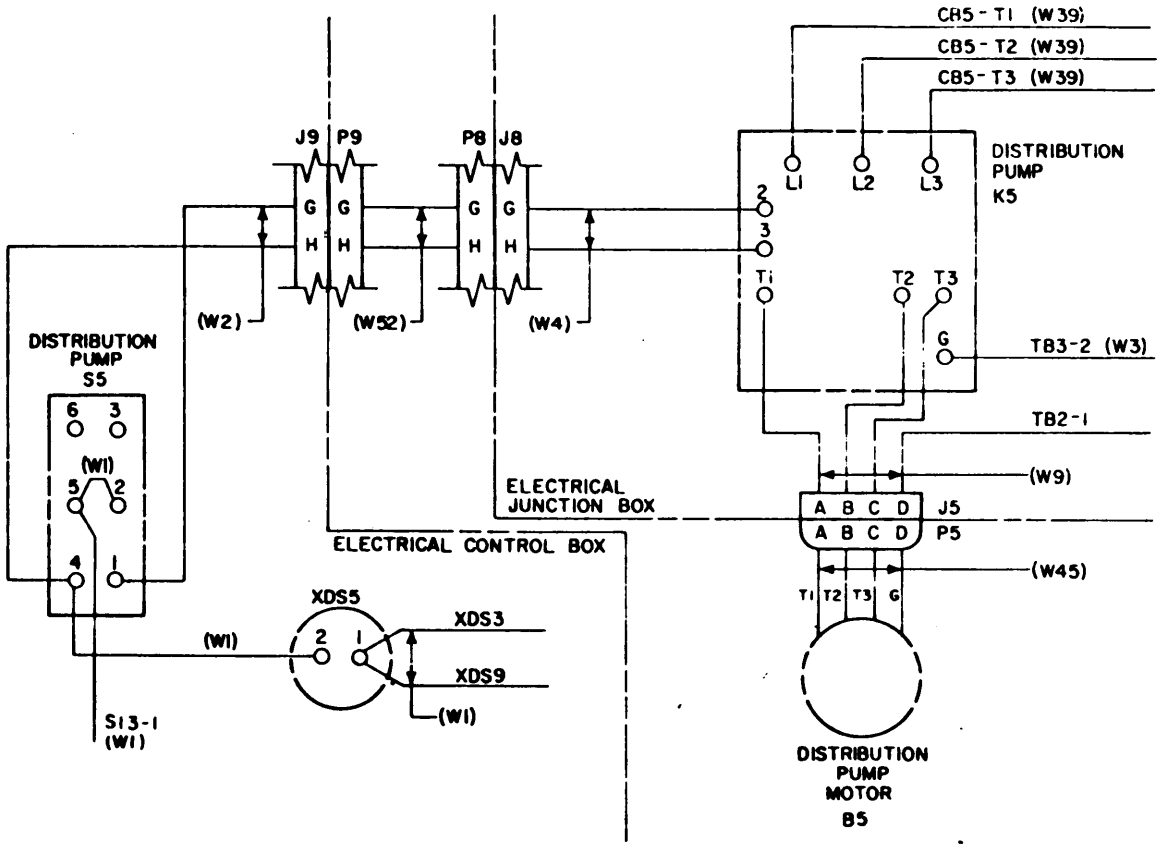


Figure 1-13. Interconnection Diagram (Sheet 2 of 13)

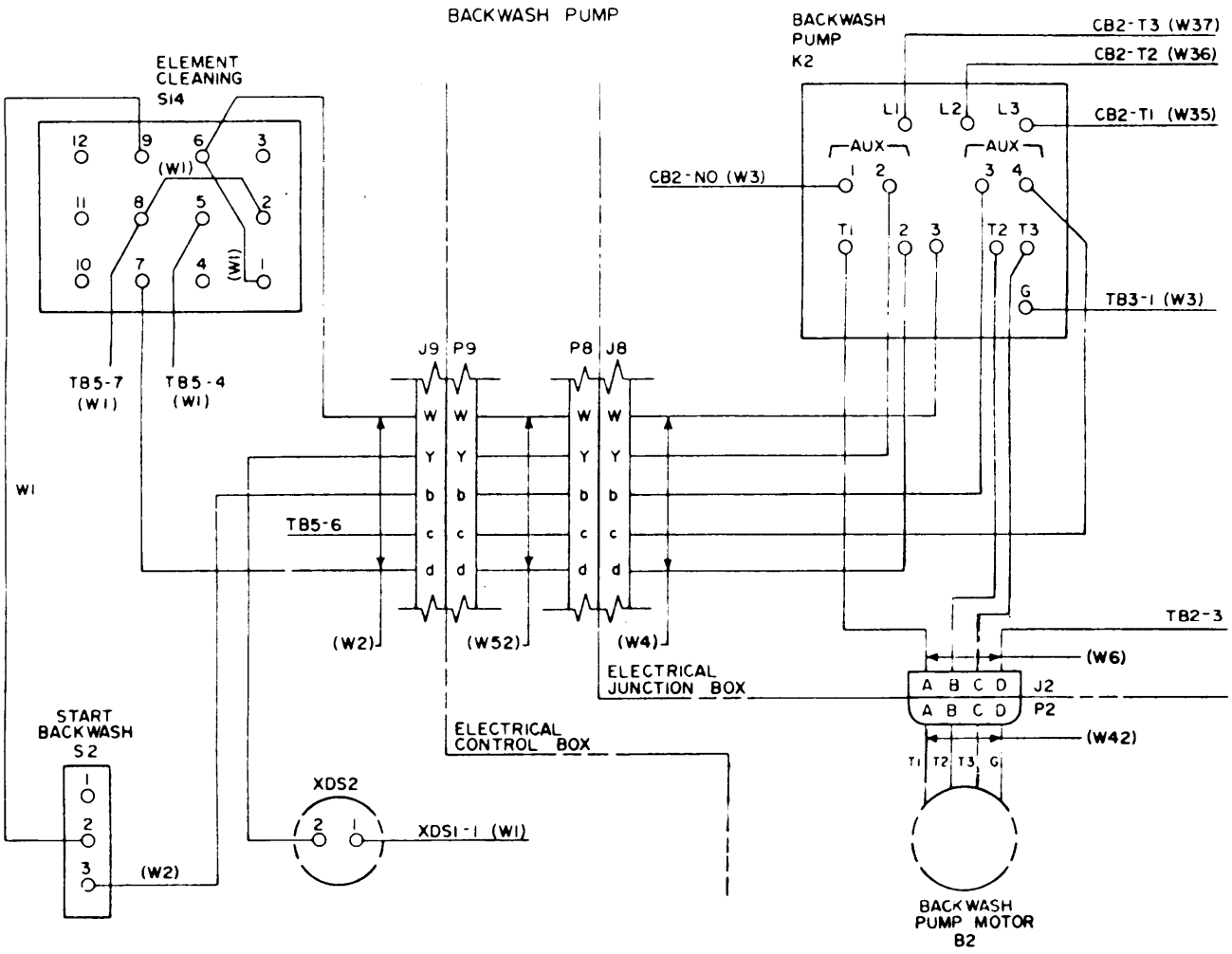


Figure 1 –13. Interconnection Diagram (Sheet 3 of 13)

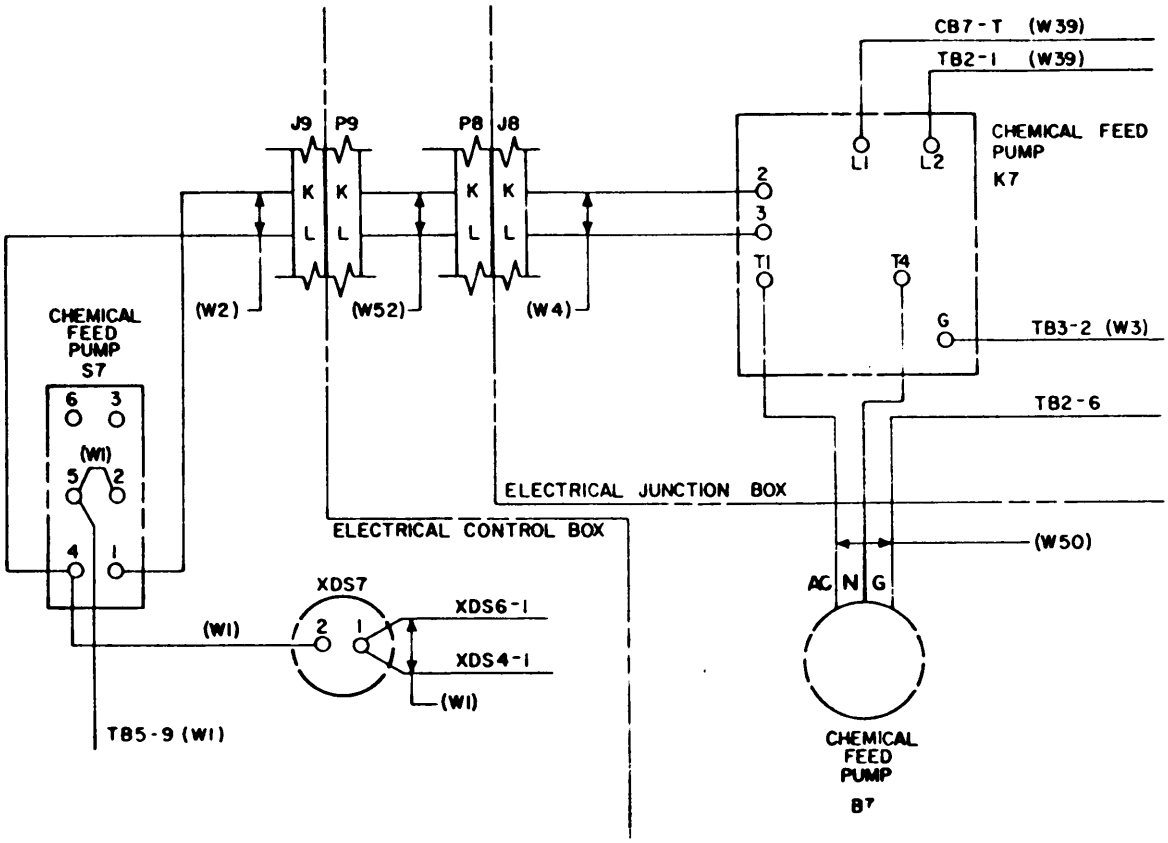


Figure 1-13. Interconnection Diagram (Sheet 4 of 13)

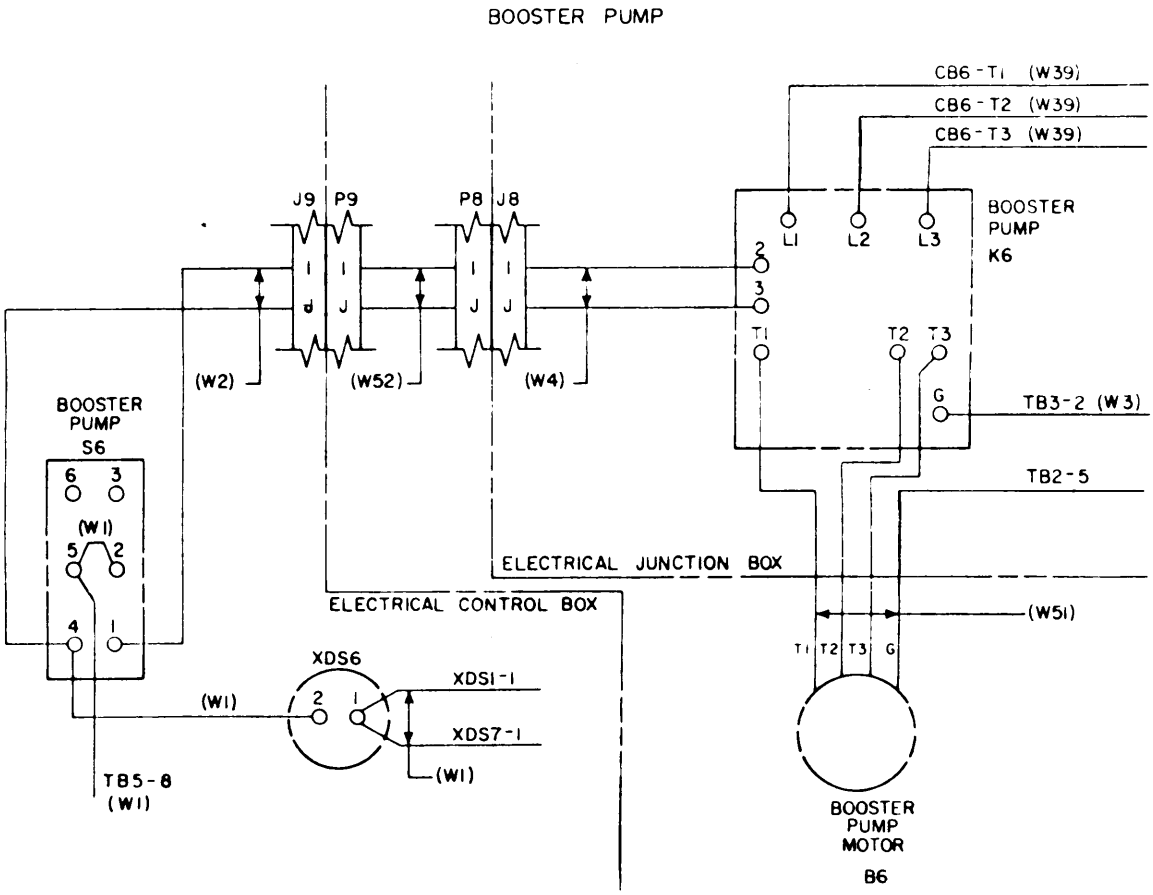


FIgure 1-13. Interconnection Diagram (Sheet 5 of 13)

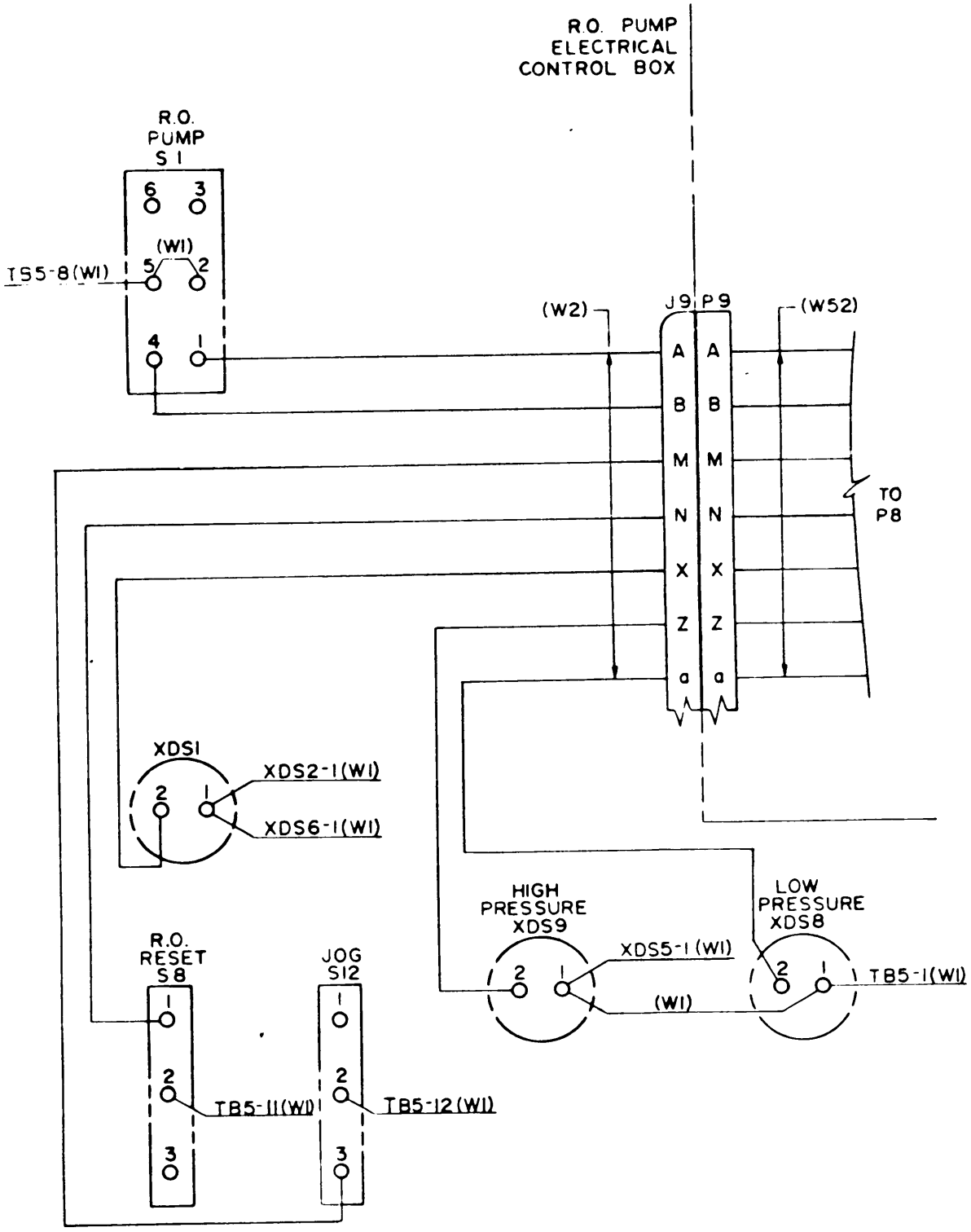


Figure 1-13. Interconnection Diagram (Sheet 6 of 13)

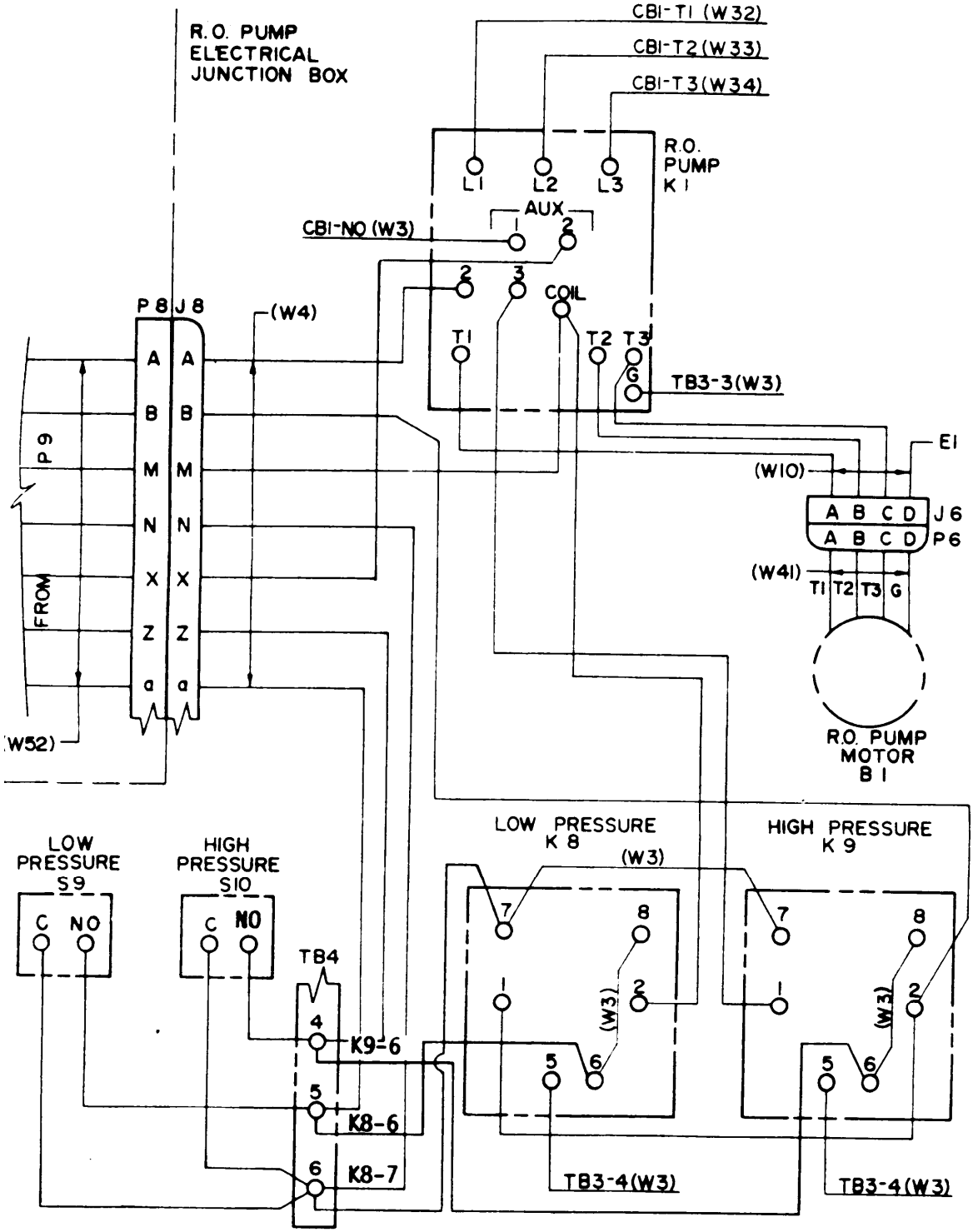


Figure 1-13. Interconnection Diagram (Sheet 7 of 13) (USMC)

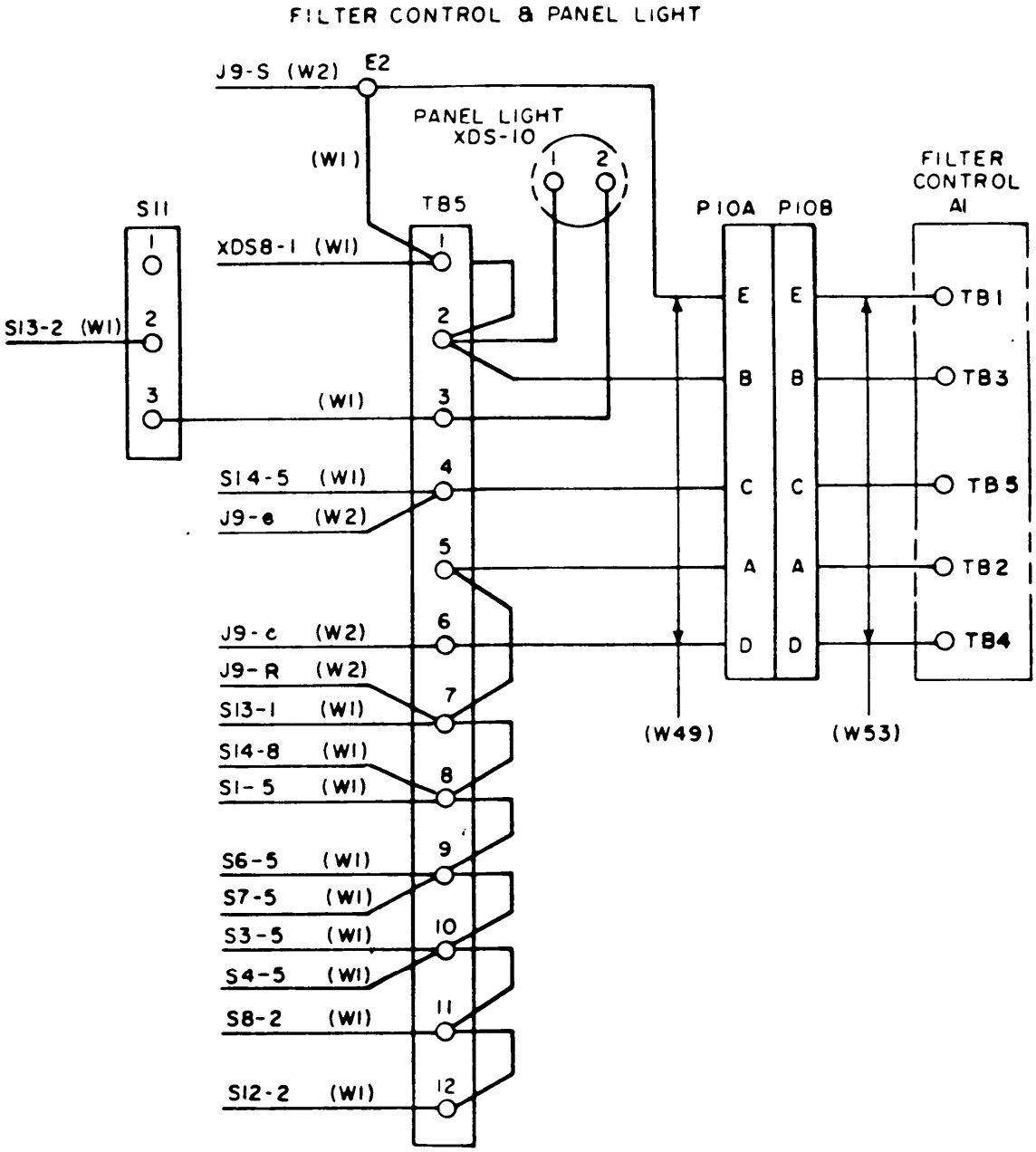


Figure 1–13. Interconnection Diagram (Sheet 8 of 13)

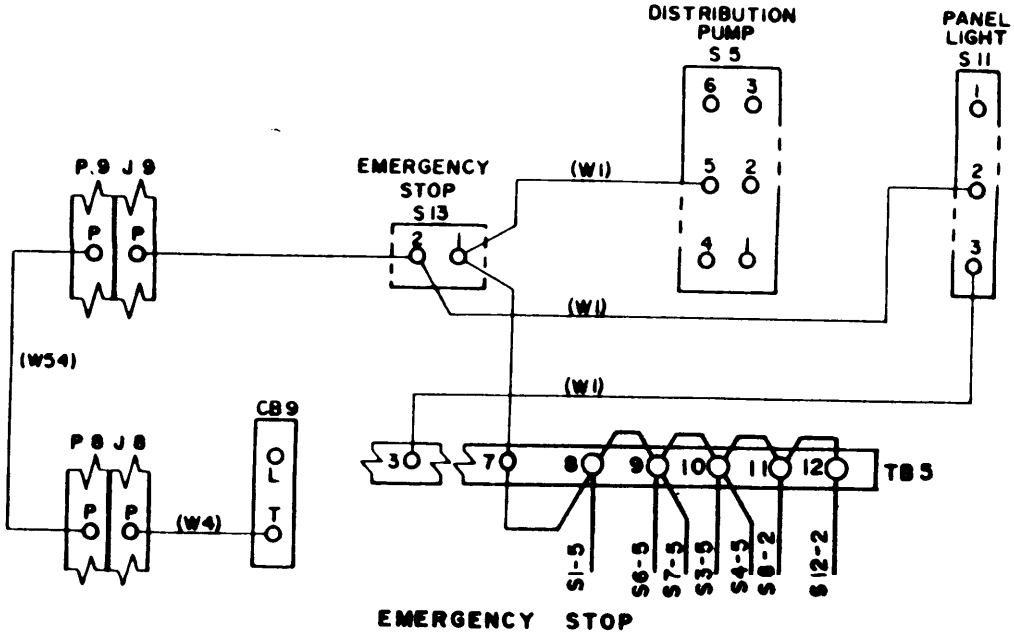


Figure 1-13. Interconnection Diagram (Sheet 9 of 13)

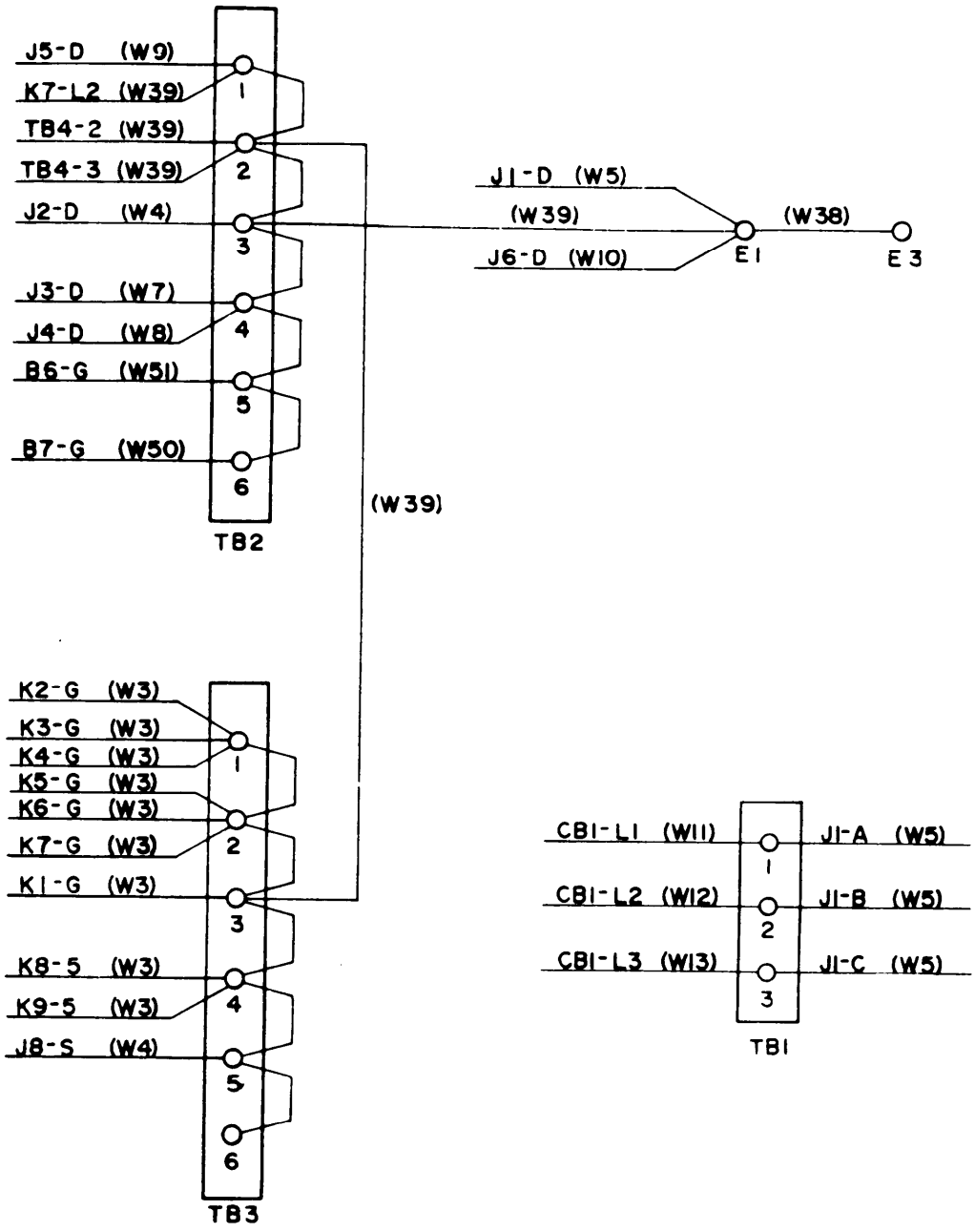


Figure 1-13. Interconnection Diagram (Sheet 10 of 13)

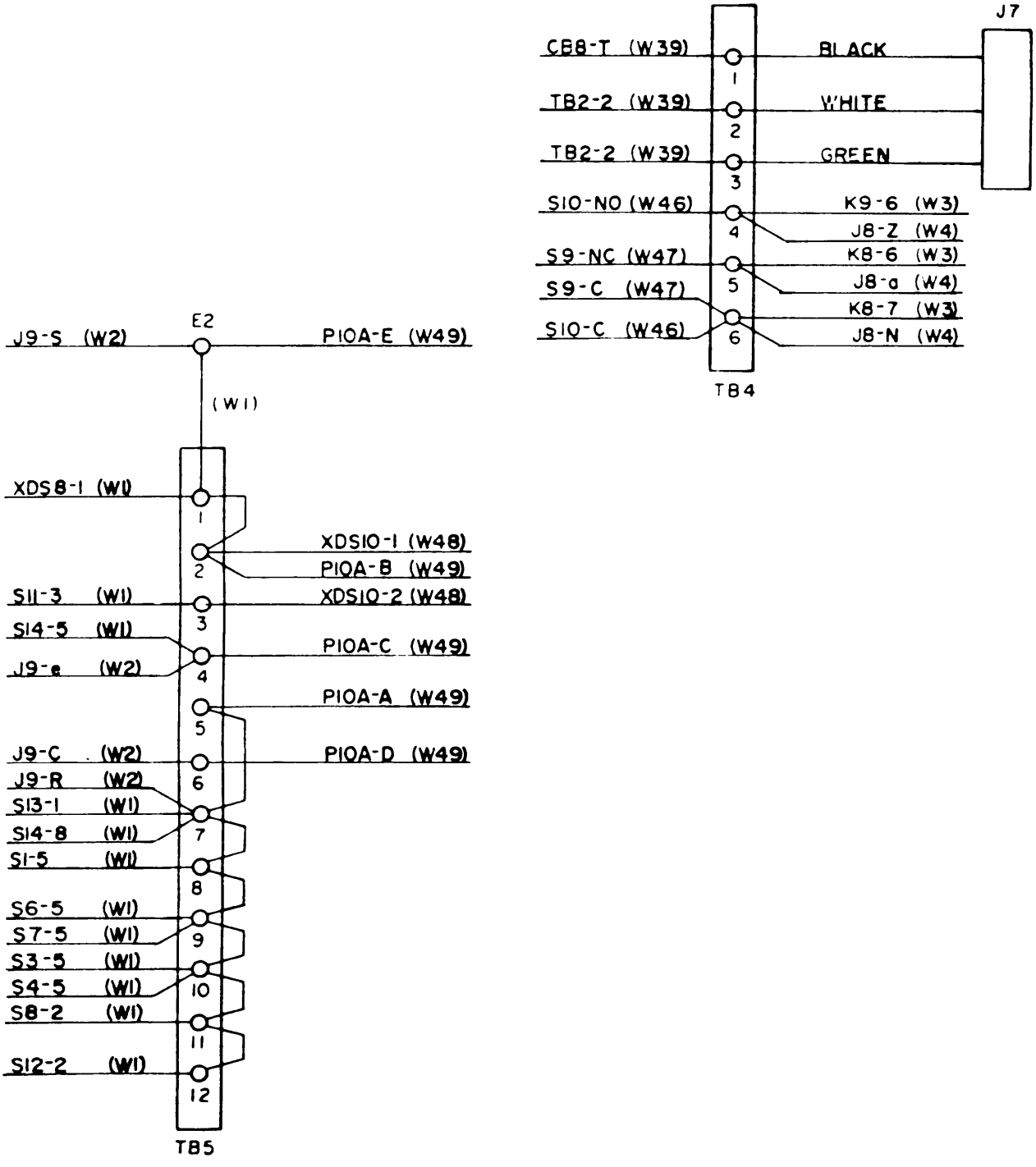


Figure 1-13. Interconnection Diagram (Sheet 11 of 13)

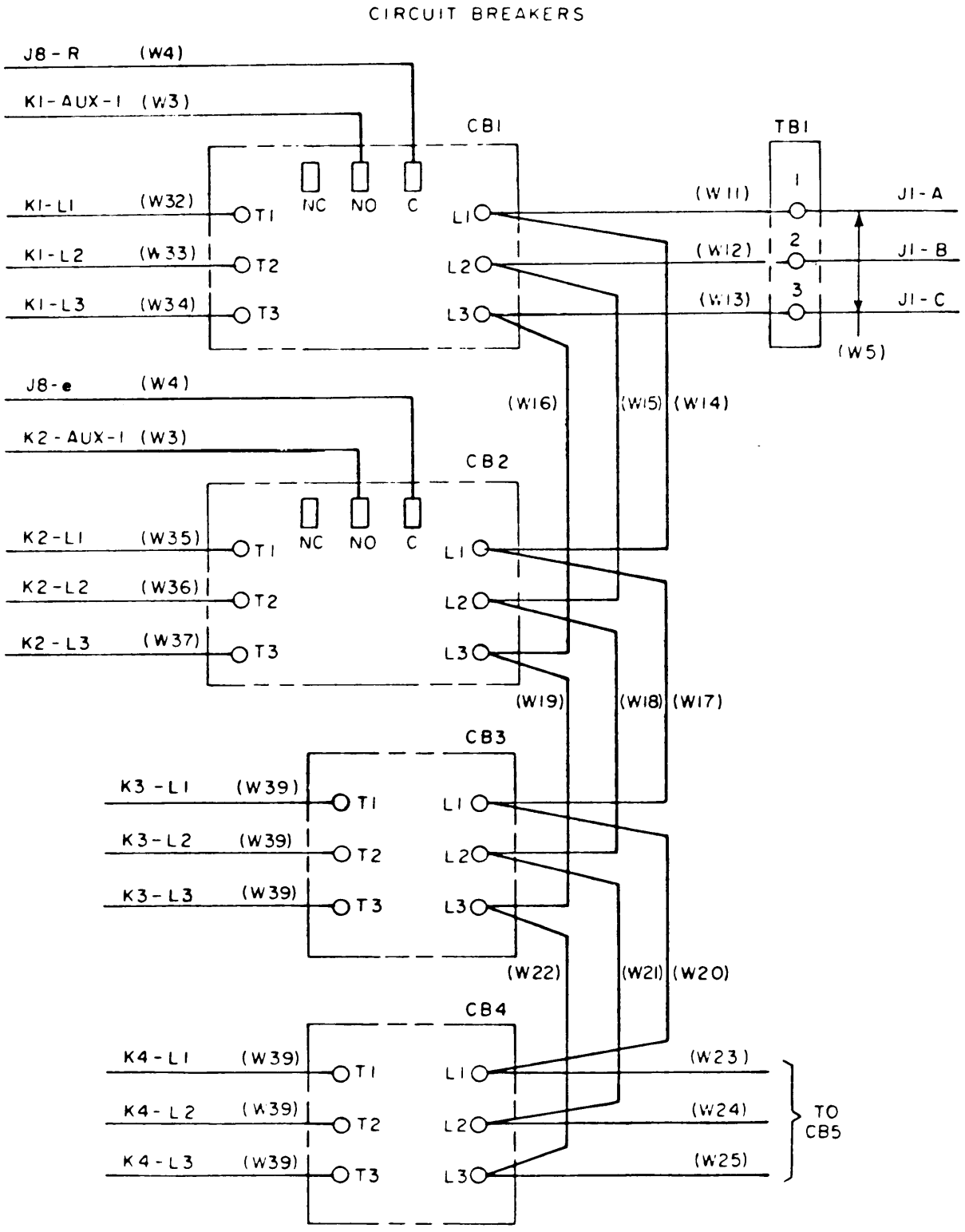


Figure 1-13. Interconnection Diagram (Sheet 12 of 13)

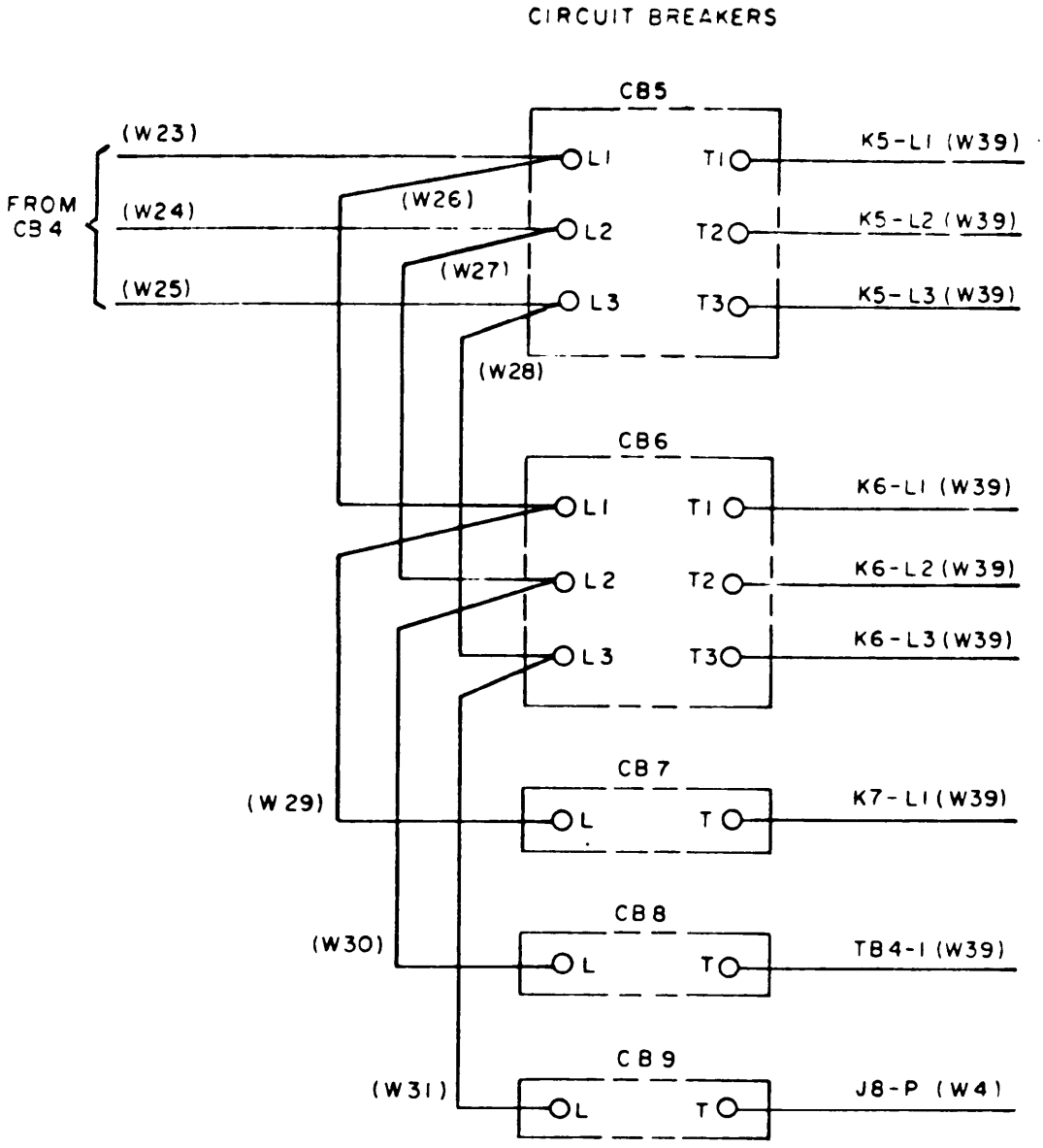


Figure 1-13. Interconnection Diagram (Sheet 13 of 13)

CHAPTER 2

UNIT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

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 AND EQUIPMENT.** Refer to TM 10-4610-215-24P (ARMY), SL-4-08580A (USMC).

2-3. **TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE).** At the unit maintenance level, no TMDE is required.

2-4. **SUPPORT EQUIPMENT.** The major support equipment needed to maintain the ROWPU is the wrecker assigned to unit maintenance.

2-5. **REPAIR PARTS.** Repair parts are listed and illustrated in the Repair Parts and Special Tools List (TM 10-4610–21 5–24P/SL-4-08580A) covering unit maintenance for this equipment.

Section II SERVICE UPON RECEIPT

This section provides the information needed for the unit maintenance technician to ensure that the equipment is properly unpacked, inspected, serviced, and operationally tested before it is put into normal use.

2-6. **HOISTING.** For hoisting instructions refer to FM 10-558/T.O. 13C7–7-61.

2–7. **CHECKING EQUIPMENT.**

a. inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report. USMC personnel refer to MCO 4430.3.

b. 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. USMC personnel refer to TM 4700-15/1.

c. Perform preventive maintenance checks and services as directed in TM 10-4610-215-10 (Army)/TM 08580A-10/1 (USMC).

2-8. **REPROCESSING UNPACKED EQUIPMENT.** (Figure 2–1)

WARNING

Drycleaning solvent Fed. Spec. P–D-680 is potentially dangerous, Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment, or other ignition sources. Always wear protective clothing and eyewear.

a. Remove all preservative coatings and grease from all bare metal surfaces. Bare metal is exposed on the R.O. motor (1) and R.O. pump (2) shafts, the grooves (3) to the R.O. pump/motor assembly sheaves, hose couplings (4), and the hose connections on the ROWPU exterior pumps (5).

b. Drain shipping fluid from R.O. pump crankcase.

2-9. **INSTALLATION.**

a. Lubricate in accordance with LO 10-4610-215–12/L1 08580A–12.

b. Check R.O. pump connections. Tighten as necessary.

c. Install R.O. elements in accordance with TM 10--4610-215-10/TM 08580A–10/1.

2-10. **TOOLS, TEST EQUIPMENT, AND MATERIAL REQUIRED FOR INSTALLATION.**

All tools required for setting up the ROWPU for normal operation come with the unit. Refer to TM 10-4610-215–10 (ARMY)/TM 08580A–1 0/1 (USMC) for instructions.

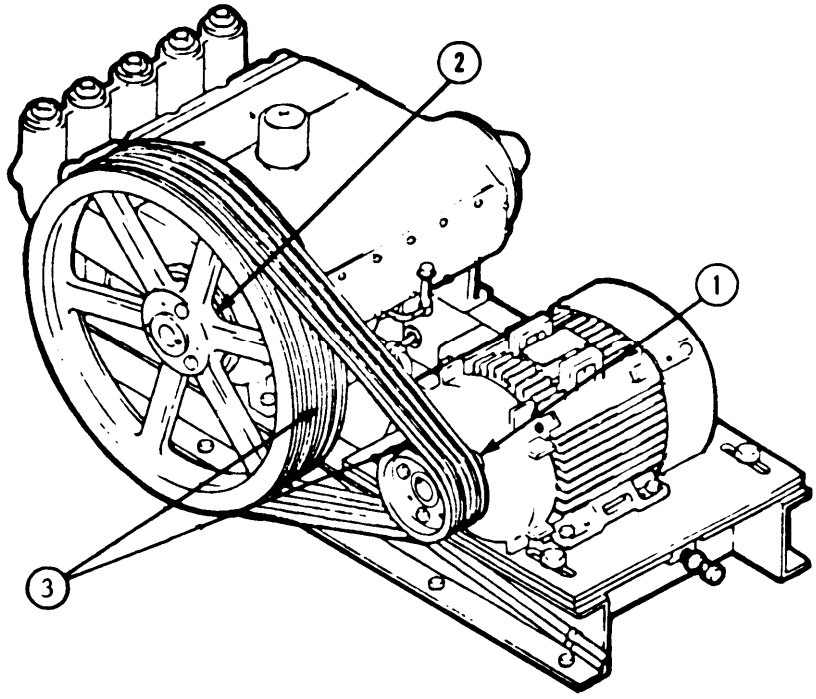
2-11. **SITING AND SHELTER REQUIREMENTS.**

a. 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.

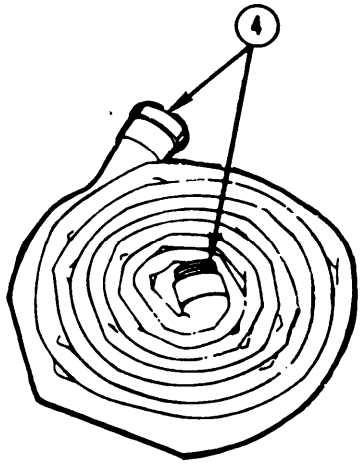
b. For siting and shelter during routine operation, refer to TM 10-4610-21 5–10 (ARMY) /TM 08580A-10/1 (USMC).

CAUTION

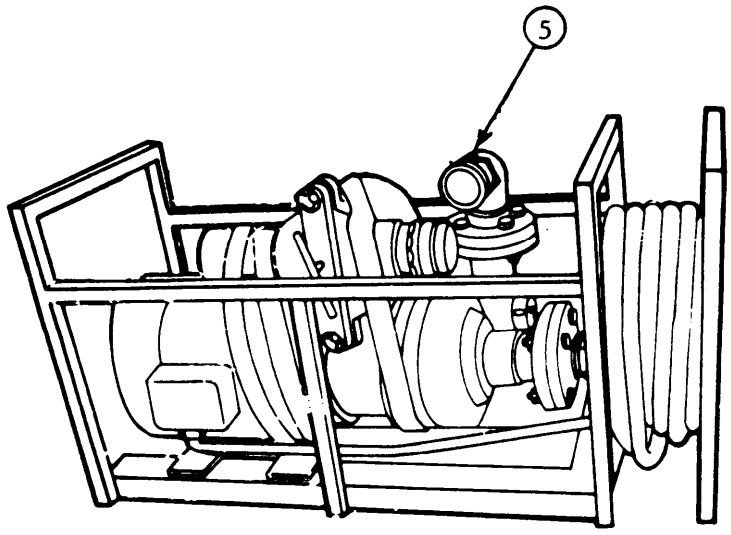
When setting up the ROWPU for a test, an impure water source must be used. Use of chlorinated water will damage the R.O. elements.



R.O. PUMP/MOTOR ASSEMBLY



HOSE/COUPLING
ASSEMBLY



TYPICAL MOTOR/PUMP
ASSEMBLY

Figure 2–1 Removal of Preservative Coatings

2-12. **ASSEMBLY OF EQUIPMENT.** No assembly is required.

2-13. **INSTALLATION INSTRUCTIONS.** Refer to TM 10-4610-21 5–10TM 08580A–10/1 for installation instructions.

CAUTION

When setting up the ROWPU for a test, an impure water source must be used. Use of chlorinated water will damage the R.O. elements.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Unit Maintenance is responsible for ensuring that the ROWPU remains fit for continuous operation by performing the checks and services necessary to correct the troubles recorded by the operator on DA Form 2404, Equipment Inspection and Maintenance Worksheet. USMC personnel prepare forms as prescribed by TM 4700–15/1. Table 2–1 lists and describes these checks and services.

NOTE

For PMCS to the generator and engine, refer to TM 5–61 15–321–15.

2-14. **MONTHLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES.**The following is an explanation of the columns in table 2–1.

a. Item Number Column. The item numbers column lists checks and services in the order the items appear on the MAC. These numbers are the source of item numbers for the TM Number Column on DA Form 2404, Equipment Inspection Maintenance Worksheet in recording results of PMCS. USMC personnel use NAVMC 10524 form.

b. Item-to-be-Inspected Column. This column gives the common name for the item to be inspected.

c. Procedures Column. This column contains a brief description of the procedures by which the check or service is performed.

Table 2–1 Unit Maintenance Checks and Services Monthly Schedule

Item No.	Item to be Inspected	Procedures
1	Trailer Tires	Check for proper inflation, 75 psi (5.27 kg/crop).
2	Backwash Pump	Check pump frame assembly for bent rails, broken welds, or missing hardware, and schedule for repair. Inspect power cable for cracked insulation and damaged cable plug. Replace if needed. Check pump strainer assembly for cracks or damage. Remove fittings from strainer. If damaged, replace.
3	Distribution Pump	Check pump frame assembly for bent rails, broken welds, or missing hardware, and schedule for repair or replacement. If cable shows severe cracks, or plugs have bent pins, cracked or broken shells, replace plugs or entire cable.
4	Raw Water Pump	Check pump frame assembly for bent rails, broken welds, or missing hardware, and schedule for repair or replacement. If cable shows severe cracks, or plugs have bent pins, cracked or broken shells, replace plugs or entire cable.
5	Valves	Check valves for cracks, leaks, and ease of operation. Replace bad valves and send damaged valves to be repaired.
6	Storage Box	Check storage boxes for serviceable condition. If hinges, lids, or hardware are bad, schedule them for repair or replacement. If boxes need preservation painting, schedule for repair.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

Table 2-1 Unit Maintenance Checks and Services Monthly Schedule (CONTINUED)

Item No.	Item to be Inspected	Procedures
7	Motor Starting and Protective Devices	Inspect motor starters for loose mounting screws, pitted and corroded electrical terminal connections, loose terminal screws, damaged or broken wiring, and dirt or foreign matter. Tighten loose screws. Remove dirt and remains of corrosion. Replace defective or damaged wires.
8	Pulleys	Check pulleys for damage. Refer to item (15) in this table.
9	Electric Controls	Test electrical controls and switches to be sure they turn equipment ON and OFF. If any control or switch is bad, schedule it for replacement.
10	Signaling Devices	Test nonoperational pilot lamp and lamp holders, and schedule for replacement.
		WARNING Drycleaning solvent Fed. Spec. P–D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment, or other ignition sources. Always wear protective clothing and eyewear.
11	Power Receptacles	Check power receptacles and plugs for signs of corrosion. Clean the pins with solvent P–D-680. Replace badly pitted or corroded pins.
		WARNING ELECTRICAL HIGH VOLTAGE Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.
12	Wiring Fittings Ground Rod	Check control panel wiring for clean and solid connections. Check cable plugs and plug pins for damage. Ensure that ground rod is making a solid electrical connection. Use an ohmmeter to check each electrical or ground connection.
13	R.O. Pump Crankcase	Inspect for leaks. Check sight gage (figure 4–1, item 2) for breaks or cracks. Check that filter cover fits tightly and that breather is not clogged. Check that drain is closed. Look for traces of water in sight gage and in filter opening. Tighten fittings if leaking.

Table 2-1 Unit Maintenance Checks and Services Monthly Schedule (CONTINUED)

Item No.	Item to be Inspected	Procedures
14	Control Pane Gages and Fittings	If any flowmeter or pressure gage is inoperative, schedule for repair or replacement. Ensure that connections are tight, valve handles can be operated, and vents are operative before repairing or replacing.
15	R.O. Pump Drive	Inspect pulleys for wear and damage. If pulley is bent or worn, replace. Straighten dents in belt guard, repair as needed, and replace guard if damaged beyond economical repair.
		NOTE Clean and treat pump motor connectors and wiring with approved corrosion control substance after every 1000 hours of operation.
16	Chemical Feed Pump Motor	Remove motor top cover plate and conduit box covers; clean and treat wiring and connectors with approved corrosion control substance.

2-15. **QUARTERLY, SEMI-ANNUAL, AND ANNUAL PREVENTIVE MAINTENANCE SERVICES.**

There are no quarterly or annual preventive maintenance services for this equipment at the unit maintenance level.

Section IV. TROUBLESHOOTING

2-16. **TROUBLESHOOTING,** Table 2-2 (Trailer) and Table 2–3 (ROWPU).

This section contains those malfunction checks and corrective actions which isolate defects which can be corrected by performance allocated to unit maintenance by the Maintenance Allocation Chart (MAC). Refer to table 2–2.

Table 2–2. **Troubleshooting (Trailer) (ARMY)**

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ELECTRICAL SYSTEM
1. LIGHTS DON'T WORK
Step 1. Manually check trailer cable for proper connection to receptacle on towing vehicle.
Connect cable properly.
Step 2. With cable connected to towing vehicle, visually check both receptacle on towing vehicle and plug on cable to be sure all contacts are free of dirt, oil, and other contaminants. Check for defective plug.
a. Clean all connectors to remove corrosion and contaminants.
b. Replace defective plug.
Step 3. Visually and manually check electrical cable and wiring harness for loose or corroded connections, damaged cable, or wiring harness.
a. Tighten loose connections.
b. Clean corroded connections.
c. Replace wiring harness.
d. Repair or replace damaged cable.
Step 4. Visually check ground connection at receptacle and check ground wire on towing vehicle.
If ground wire is loose or making poor contact, reposition wire and tighten connections.
Step 5. Visually check all lamps for illumination.
Remove and replace lamps that do not illuminate.

Table 2-2. **Troubleshooting (Trailer) (ARMY) CONTINUED**

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ELECTRICAL SYSTEM – continued
2. **LIGHTS OPERATE INTERMITTENTLY.**
Step 1. Visually and manually check cable assembly connectors and towing vehicle mating receptacle connections for proper contact.
Tighten all connectors to ensure proper contact.
Step 2. Visually check all contacts for contaminants such as oil, water, dirt, and corrosion.
Clean all connectors to remove corrosion and contaminants.
Step 3. Visually check entire cable assembly and wiring harness for partially severed cable or harness.
a. Repair or replace damaged cable.
b. Replace damaged wiring harness.
Step 4. Check that ground wires on trailer and towing vehicle are making proper contact.
Clean ground wire connections and secure tightly as necessary.
3. **LIGHTS ARE DIM.**
Step 1. Check trailer cable to be sure there are no damaged or broken wires or corrosion on contacts. Check ground wire both on the trailer and on the towing vehicle.
a. Repair or replace damaged cable.
b. If cable is not damaged, clean all contacts to remove contaminants.
c. Clean and tighten ground connections.
Step 2. Check that correct lamps are installed, and securely seated in their sockets.
Replace composite light assembly.
4. **WRONG LIGHT GOES ON.**
Check the cable assembly coding and voltages.
a. Check voltage of cable assembly.
b. If 24–vdc is not present, repair or replace cable assembly.

Table 2-2. **Troubleshooting (Trailer) (ARMY) CONTINUED**

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
BRAKES
1. **AIR BRAKE SYSTEM INOPERATIVE.**
Step 1. Inspect air line hookup to be sure lines are not crossed.
Disconnect air lines and reconnect correctly.
Step 2. Listen for escaping air, and locate defective line or fixture.
Report to direct support maintenance.
Step 3. Check the air system of the towing vehicle for leaks or lack of pressure.
If found, report to direct support maintenance for the towing vehicle.
2. BREAKS REMAIN LOCKED.
Step 1. Check for the cause of the lack of air pressure.
Report to direct support maintenance.
Step 2. Check the operation of the emergency/relay valve.
Report to direct support maintenance.
Step 3. Check to see if the compression springs have locked the brakes.
Locate and correct the cause of the loss of air pressure, then refer to Operator's Manual, TM 10-4610-21 5–10, for instructions for resetting a locked spring brake. Reset locked brakes as required.
Step 4. Check the operation of the air chamber assembly.
Report to direct support maintenance.
3. BRAKES ON ONE SIDE ENGAGE BEFORE THOSE ON THE OTHER SIDE.
Step 1. Check the movement of the slack adjusters to see if they are out of adjustment.
Report to direct support maintenance.
Step 2. Check the brake camshaft movement to see if there is any restriction on movement.
Report to direct support maintenance.

Table 2-2. Troubleshooting (Trailer) (ARMY) CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
BRAKES – continued
4. BRAKES SLIP. Step 1. Check brake adjustment, and inspect for defective brake assembly parts. Report to direct support maintenance. Step 2. Visually inspect for worn brake lining or defective brake shoes. Report to direct support maintenance.
WHEEL AND TRACKS
1. **FLAT TIRE.** Check each tire separately for slow leak or possible flat by tapping with tire iron or hammer. Repair or replace tire.
2. **TRAILER LEANS.** Visually inspect for broken or damaged springs. Refer to direct support maintenance.
3. **TRAILER SAGS.** Visually inspect for broken or damaged axle. Refer to direct support maintenance.
4. WHEEL WOBBLES. Visually and manually check the wheel bearing adjustment. Refer to direct support maintenance.

Table 2-2. Troubleshooting (Trailer) (ARMY) CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
FRAME
1. FRAME WILL NOT SUPPORT ROWPU.
Visually inspect for broken frame.
Refer to next highest level of maintenance.
2. LUNETTE LOOSE.
Visually inspect for broken screws or damaged lunette.
Replace Lunette.
3. LEVELING JACKS WILL NOT RAISE OR LOWER.
Visually inspect for dirt or corrosion that may be jamming the jack; check for damaged jack.
a. Clean as required.
b. Replace jack.
c. Notify next highest level of maintenance for repair of jack.

Table 2-3. **Troubleshooting (ROWPU)**

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PUMP MOTORS

1. ELECTRIC MOTOR DRIVEN PUMP FAILS TO RUN.

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in troubleshooting require power to be connected. Always take proper measures to ensure personal safety.

ROWPU piping and equipment can contain extremely high 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.

CAUTION

Make sure power is disconnected from junction box in order to prevent damage to equipment.

NOTE

Continuity and tests for shorts shall be done with power disconnected from the generator to the junction box.

Step 1. Visually inspect motor/pump assembly for damage which may prevent it from working.

Step 2. Remove fan cover and fan from motor. Using a strap wrench on rotor shaft, rotate rotor to determine if motor/pump is frozen due to mechanical failure or jammed impeller.

a. If motor/pump is frozen and will not turn, replace motor/pump assembly.

b. If motor/pump rotates freely, perform continuity and short tests.

Step 3. Open conduit box on pump motor.

Step 4. Inspect contacts and wires for burned, cracked, or loose connections.

NOTE

Tag and mark each wire for ease of reassembly.

Step 5. Disconnect cable wires from motor.

Step 6. Using a multimeter, check motor wiring for shorts or opens.

a. If short or open exists in motor wiring, replace motor assembly.

b. If no short or open is found, continue with electrical checks.

NOTE

For on–board pump motors, go to Step 8.

Table 2-3. **Troubleshooting (ROWPU) CONTINUED**

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PUMP/MOTORS - continued

1. ELECTRIC MOTOR DRIVEN PUMP FAILS TO RUN. - continued

Step 7. Perform continuity and short test on cable between motor conduits box and plug on junction box.

a. If short or open is found, check plug contacts for loose or broken wires.

b. If beyond economical repair, replace cable.

c. If cable is good, continue with electrical checks.

Step 8. Open junction box cover, perform continuity and short checks between pump receptacle and motor starter terminals T1, T2, and T3. (Refer to schematic, figure 1 –1 2.)

a. If short or open is found, check receptacle contacts and electrical connections for loose, broken wires, or contacts. Repair or replace.

b. If wiring and connections are good, continue with electrical checks.

Step 9. Perform continuity check on motor starter overload relays.

NOTE

Motor starters have from one to three overload relays each. Input and output terminals are normally closed.

If an open is found, heater may need replacing.

Step 10. Depress RESET button and retest.

a. If open remains, replace heater element and retest.

b. If open cannot be repaired, replace motor starter.

c. If all overload relays are good, continue with electrical check,

Step 11. Perform continuity and short test on motor starter between input and output terminals L1, L2, and L3. (Refer to schematic, figure 1-12.)

NOTE

All tests should show an open.

a. If any short is found, replace motor starter.

b. If all tests read open, continue with electrical test.

Step 12. Manually hoId movable contact assembly of motor starter in the closed position (from bottom of motor starter).

Table 2-3. **Troubleshooting (ROWPU) CONTINUED**

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PUMP/MOTORS – continued

1. ELECTRIC MOTOR DRIVEN PUMP FAILS TO RUN. – continued

Step 13. Retest contacts L1, L2, and L3.

NOTE

Input and output contact terminals should read a short. No shorts should be present between L1, L2, and L3.

a. If short is found between L1, L2, and L3, replace motor starter.

b. If open is found between input and output contacts, replace motor starter.

c. If all tests are good, continue with electrical checks.

WARNING

Before performing step 14, be sure that corresponding circuit breaker is in the OFF position. (Refer to schematic, figure 1-12.)

Step 14. Perform continuity and short check between motor starter input terminals L1, L2, and L3, and output side of circuit breaker. (Refer to schematic, figure 1–1 2.)

a. If short or open is found, check each wire and contact for loose or broken connections. Repair or replace.

b. Remove all wires from circuit breaker.

c. If wires and contacts are good, continue with electrical checks.

Step 15. With all wires removed from circuit breaker, perform continuity and short check.

a. In OFF position, contacts should read open. If not, replace the circuit breaker.

b. In ON position, contacts should read closed. If not, replace the circuit breaker.

c. If circuit breaker is good, continue with electrical checks.

Step 16. Perform continuity and short check between motor starter operating coil and start/stop switch.

a. If continuity does not check normal, check each wire and contact for loose or broken connections. Repair or replace.

b. If everything reads normal, continue with electrical checks.

Table 2-3. **Troubleshooting (ROWPU) CONTINUED**

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PUMP/MOTORS – continued

1. ELECTRIC MOTOR DRIVEN PUMP FAILS TO RUN. – continued

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

NOTE

To accomplish step 19 will require power to be connected and a minimum of two personnel.

Step 17. Reinstall previously disconnected wiring/cable.

Step 18. Connect power to junction box.

Step 19. Switch all circuit breakers one at a time to the ON position.

Step 20. While observing the motor starter, momentarily hold start/stop switch in the START position.

a. Operating coil should actuate movable contact assembly of all motor starters.

b. If operating coil fails to actuate, replace the defective motor starter.

c. If actuating coil operates, continue electrical tests.

Step 21. Inside conduit box of pump motor, identify three power wires (A, B, and C). Holding start/stop switch in the START position, check for approximately 104 Vac between phase A and B, B and C, and A and C. (Refer to schematic, figure 1–12)

a. Replace conduit box covers.

b. Test pump assembly for full operation.

2. PUMP MOTOR CIRCUIT-BREAKER TRIPS AND WILL NOT RESET.

Step 1. Press RESET buttons on motor starter.

Step 2. Reset circuit breaker.

If circuit breaker trips, repair or replace.

Step 3. Test pump motor for proper operation.

If circuit breaker trips, perform continuity and short tests in accordance with item 1, table 2-3.

Table 2-3. **Troubleshooting (ROWPU) CONTINUED**

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PUMP/MOTORS – continued

Step 3. Test pump motor for proper operation.

If circuit breaker trips, perform continuity and short tests in accordance with item 1, table 2-3.

3. PUMP MOTOR BURNED OUT.

Step 1. Remove main power cable to junction box.

Step 2. Remove conduit box cover and from inside conduit box of pump motor disconnect cable wires from motor leads. (Refer to schematic, figure 1-12.)

Step 3. Check motor leads for continuity.

a. If short or open is found, replace pump/motor assembly.

b. Reconnect cable leads and replace conduit box cover.

Step 4. Perform operational tests.

4. INDICATOR LAMP GOES OFF BUT MACHINERY CONTINUES TO WORK NORMALLY.

Step 1. Remove lens cover and check bulb for loose contact, If necessary, use lamp puller to tighten the lamp.

Step 2. Using lamp puller, remove bulb and check for burned out filament. Replace bulb and lamp cover.

Step 3. If new bulb fails to function, refer to next higher level of maintenance.

5. TOGGLE SWITCH DOES NOT WORK.

Step 1. Remove main power cable to junction box.

Step 2. Remove back cover of the control box.

Step 3. Check for loose or broken connections and broken or frayed wires and shorts.

Step 4. Remove all wires from switch terminals.

Step 5. Using the multimeter, check all positions of switch for continuity or shorts at switch terminals. (Refer to schematic, figure 1-12.)

If open or short is found, replace switch.

Step 6. Perform continuity and short test from switch terminals to all functional components in this circuit.

Repair or replace all damaged connections and wires.

Step 7. Replace cover, reconnect power, and perform operational tests.

Table 2-3. **Troubleshooting (ROWPU) CONTINUED**

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PUMP/MOTORS – continued

6. UTILITY RECEPTACLE INOPERATIVE.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

Step 1. Make sure circuit breaker (CB8, UTIL CONT) is ON.

Step 2. Press RESET button of utility receptacle.

NOTE

Use multimeter to check two utility plug receptacles or plug in a remote accessory.

Step 3. Press TEST button of utility receptacle.

If power is not present, turn off ROWPU and remove power from junction box.

NOTE

Continuity tests are performed with power OFF.

Step 4. Inspect all connections to utility receptacle for loose or broken contacts.

Repair or replace damaged wires and contacts.

Step 5. Inspect utility receptacle for cracks, chips, or loose parts.

Replace damaged utility receptacle.

Step 6. Perform continuity check from utility receptacle to CB8. (Refer to schematic, figure 1-12.)

Repair or replace any damaged wire or contact.

Step 7. Replace power cable and perform operational test.

7. UTILITY RECEPTACLE CIRCUIT BREAKER TRIPS REPEATEDLY. OR TRIPS AND WILL NOT RESET.

Step 1. Plug a different piece of equipment into the utility receptacle. If circuit breaker does not trip, fault is not in utility receptacle.

Step 2. Perform tests in accordance with item 6, table 2–3.

Table 2-3. **TROUBLESHOOTING (ROWPU) CONTINUED**

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

PUMP/MOTORS – continued

8. CONTROL CIRCUIT BREAKER TRIPS AND WILL NOT RESET, OR TRIPS MORE THAN ONCE.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

Step 1. Set all toggle switches on control box to OFF position. Reset all circuit breakers.

If circuit breaker will not reset, replace circuit breaker.

Step 2. Isolate faulty circuit by turning switches to ON, one at a time for one minute.

a. If circuit breaker does not trip, return switch to OFF and go to next switch.

b. If circuit breaker trips and is in one of the pump circuits, repair or replace in accordance with item 1, table 2–3.

c. If circuit breaker for CB8 UTIL OUT trips, repair or replace in accordance with item 6, table 2–3.

9. R.O. PUMP DRIVE BELTS ARE FRAYED AFTER SHORT USE OR BREAK FREQUENTLY.

CAUTION

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

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

a. File burrs and sharp edges, and smooth with emery cloth.

b. If damage cannot be repaired, replace sheave.

Step 2. Check sheave alignment.

If out of alignment, correct in accordance with paragraphs 2–50 and 2–77.

Step 3. Adjust belt tension in accordance with paragraph 2–76.

10. HIGH–PRESSURE LAMP WILL NOT GO OFF.

WARNING

To avoid possible personaI injury or damage to the ROWPU system, TURN ALL PUMPS OFF and let water pressure drop.

Step 1. Open and close RESET switch several times.

Step 2. Locate high–pressure switch on the rear of the control panel plate.

Table 2–3. **Troubleshooting (ROWPU) CONTINUED**

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PUMP/MOTORS – continued

10. HIGH-PRESSURE LAMP WILL NOT GO OFF. – continued

Step 3. Remove cover plate of high-pressure switch.

Step 4. Using the multimeter, check for 120 Vac from ground and normally open and normally closed switch terminals. (Refer to schematic, figure 1–1 2.)

a. If power is on the normally OPEN contact, replace high–pressure switch unit.

b. If no power is found on the common contact, check for loose or broken wires and contacts. Repair or replace damaged wiring.

Step 5. Check high-pressure solenoid.

NOTE

Solenoid should not be actuated.

a. If solenoid is actuated, check for shorts in wiring or connections. Repair or replace wiring.

b. If solenoid is still actuated, check for shorted solenoid contacts. Replace solenoid.

11. HIGH–PRESSURE RELIEF VALVE OPENS REPEATEDLY.

WARNING

High–pressure water released from the high–pressure relief valve can cause severe injury. Take proper safety measures to protect personnel.

Step 1. Start ROWPU system.

Step 2. Increase pressure (R. O. PRESSURE psi gage) by closing the product water control valve.

Step 3. Record pressure at which high–pressure relief valve opens. Repeat three times.

NOTE

Relief valve should open above 1100 psig.

Step 4. Drain and vent system to reduce R.O. vessel pressure to zero psig (zero kg/cm^2).

Step 5. Temporarily install an R.O. PRESSURE psi gage of known accuracy by removing pressure tube from existing gage and connecting to new gage.

Step 6. Repeat steps 1 through 3.

If the reading between the two gauges is less than 2%, adjust high pressure valve to open at 1100 psig. If the reading is more than 2% or the valve cannot be adjusted to 1100 psig, replace the valve.

Table 2-3. **Troubleshooting (ROWPU) CONTINUED**

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

PUMP/MOTORS - continued

12. RUPTURE DISC POPS

NOTE

Under high-pressure conditions, the high-pressure relief valve should open first. The high-pressure switch should then stop R.O. motor operation. The rupture disc is the final safety device.

Step 1. Replace the rupture disc and rupture disc holder.

Step 2. Test high-pressure switch in accordance with item 10, table 2-3.

Step 3. Test high-pressure relief valve in accordance with item 11, table 2–3.

13. HIGH PRESSURE PUMP KNOCKS EXCESSIVELY.

If the following symptoms occur simultaneously, the valves maybe unseated.

a. Loud knocking noise.

b. Wildly fluctuating gages.

c. Pulsating and vibration of entire ROWPU.

d. Decrease in water flow pressure.

Notify direct support maintenance.

Section V. UNIT MAINTENANCE PROCEDURES

2-17. TRAILER COMPOSITE TAIL, STOP, TURN AND MARKER LIGHT ASSEMBLY (Figure 2–2) (ARMY)

a. Removal

(1) Disconnect wiring harness (1) from light assembly connectors (2).

(2) Remove screws (3) and lock washers (4) securing light assembly (5) to trailer frame (6), then remove the light assembly (5) and grommet (7).

b. Installation

(1) Position new light assembly (5) to trailer frame (6) and install grommet (7), then install lock washers (4) and screws (3) to secure light assembly (5) to trailer frame (6).

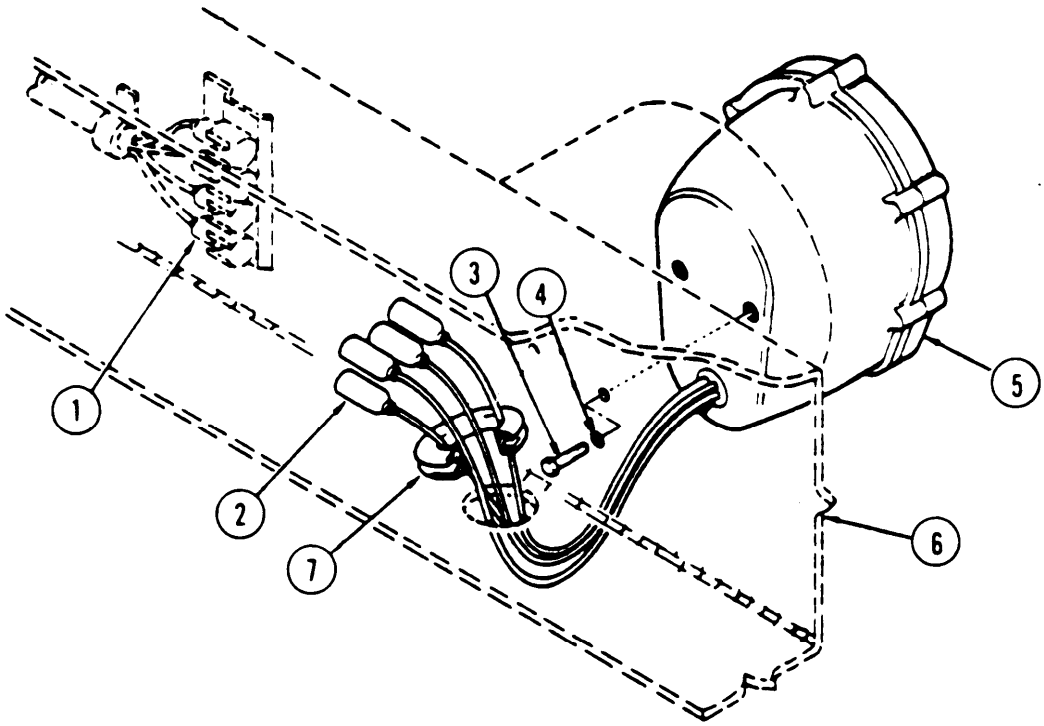


Figure 2-2. Trailer Composite Tail, Stop, Turn, and Marker Light Assembly (ARMY)

(2) Connect wiring harness (1) to light assembly connectors (2).

c. Repair.

(1) Remove light assembly door.

(2) Remove and install lamps that do not illuminate.

(3) Install light assembly door.

2-18. **TRAILER WIRING HARNESS ASSEMBLY. (Figure 2–3) (ARMY)**

a. Removal.

(1) Disconnect harness assembly (1) from cable assembly (2) and composite light assembly connectors (3).

(2) Remove nuts (4), washers (5) and screws (6) securing clamps (7) and (8) to trailer frame (9).

(3) Remove clamps (7) and (8) from harness assembly (1).

(4) Remove harness assembly (1) and grommets (10) from trailer frame (9).

(5) Inspect clips (11) and (12). If damaged, remove from trailer frame (9) by removing nuts (13), washers (14) and screws (15).

b. Installation

(1) If clips (11) and (12) were removed, position new clips to trailer frame (9) and install screws (15), washers (14), and nuts (13) to secure clips to trailer frame.

(2) Position new harness assembly (1) into trailer frame (9).

(3) Install new grommets (10) and connect harness assembly (1) to cable assembly (2) and composite light assembly connectors (3).

(4) Place new clamps (7) and (8) on harness assembly (1).

(5) Install screws (6), washers (5) and nuts (4) to secure clamps (7) and (8) to trailer frame (9).

2-19. **TRAILER SPRING TENSION CLIP. (Figure 2-4) (ARMY)**

a. Removal. Remove nut (1), washer (2) and screw (3) securing spring tension clip (4) to trailer frame (5).

b. Installation. Position new spring tension clip (4) to trailer frame (5). Secure with screw (3), washer (2) and nut (1).

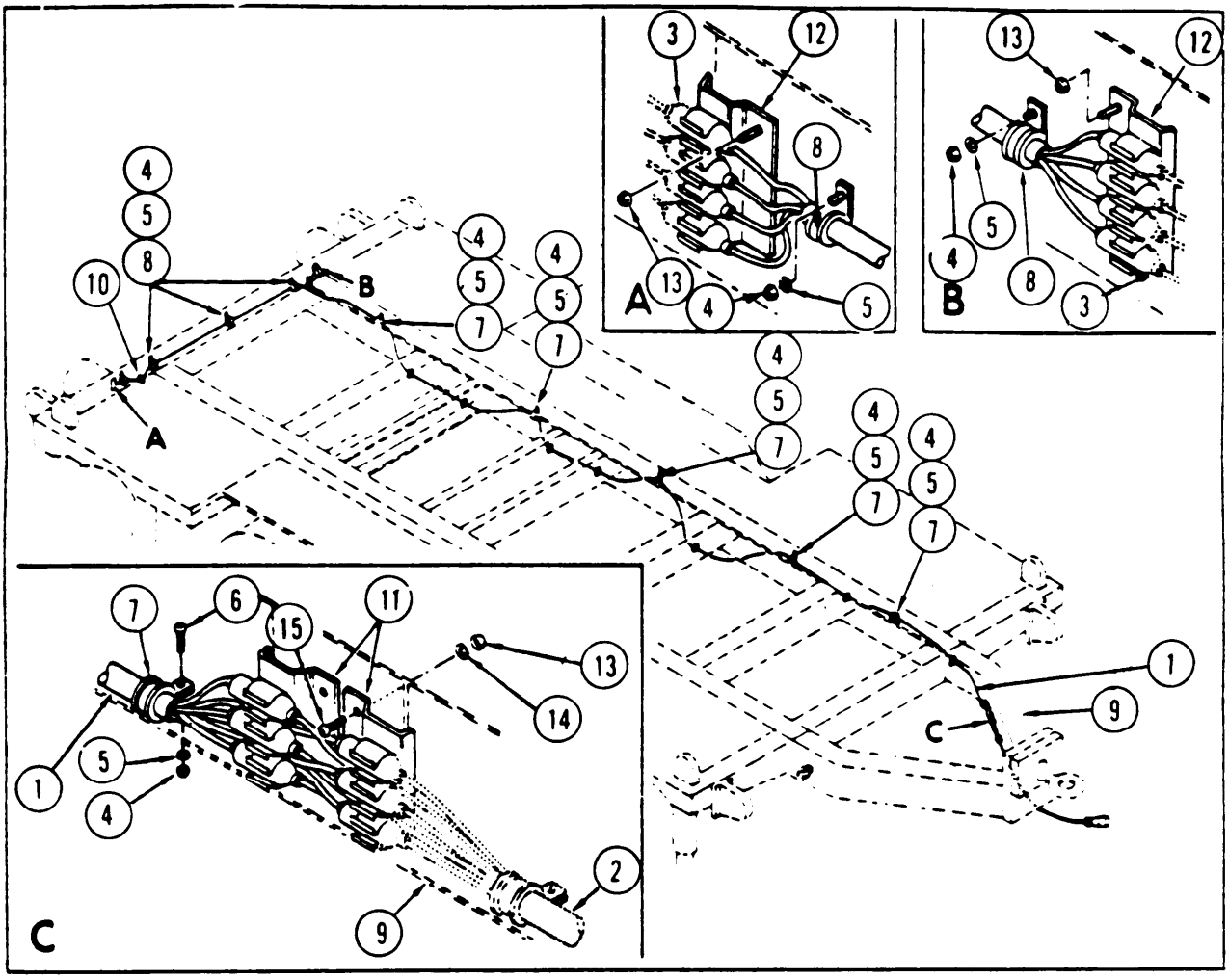


Figure 2-3. Trailer Wiring Harness Assembly (ARMY)

2-20. **TRAILER CABLE ASSEMBLY. (ARMY)**

a. Removal. (Figure 2–5)

(1) Disconnect cable assembly (1) from harness assembly (2).

(2) Remove nut (3), washer (4) and screw (5) securing ground wire to clip (6).

(3) Remove nut (7), washer (8) and screw (9).

(4) Remove clamp (10) and cable assembly (1), then remove clamp from cable assembly.

(5) Inspect clips (6) and (12). If damaged, remove remaining nuts (13), washers (14) and screws (15) securing clips (6) and (12) to trailer frame (11).

b. Disassembly. (Figure 2–6)

(1) Remove connector (1) from cable (2), then remove adapter (3) and spring (4).

(2) Remove connector (5) and terminal lug (6) from cable (7) . If marker bands are damaged, remove bands (8) and (9) .

c. Inspection.

(1) Inspect connector for loose or damaged pins. Replace if defective.

(2) Inspect connector covers for damage. Replace connector if damaged.

(3) Inspect cable for cracks, cuts, abrasions and loose ends. Replace if damaged.

(4) Check individual wires for loose solder connections at terminal lugs and connectors. Repair solder connections and replace terminal lugs and connectors if damaged.

d. Testing. Using wiring diagram in (figure 2–7), check individual wires for continuity, If continuity is not indicated, check solder connections and replace all damaged wires.

e. Repair. Wwhen repairing solder joints wire Connections must be made mechanically sound before they are soldered; solder alone does not provide sufficient strength to prevent breakage. Surfaces of connections to be soldered must be clean and bright. Solder shall be lead–tin solder conforming to Specification QQ–S–571. Wires should always be heated to the point at which the solder will melt completely and flow into all parts of the joint. Excessive buildup of solder globs on the joint should be avoided or removed.

f. Assembly (Figure 2-6

(1) If marker bands (8) and (9) were removed, install new bands on cables (7) and (2).

(2) Install terminal lugs (6) and connectors (5) or cables (7).

(3) Install spring (4) and adapter (3) on cable (2), then install connector (1).

g. Installation. (Figure 2-5)

(1) If clips (6) and (12) were removed, position new clips to trailer frame (11) and install only screws (1 5), washers (14), and nuts (13) to secure clips to trailer frame.

(2) Place clamp (10) on cable assembly (1), then position cable and clamp to trailer frame (11).

(3) Secure clamp (10) to trailer frame (11) with screw (9), washer (8), and nut (7).

(4) Connect ground wire to clip (6) with screw (5), washer (4), and nut (3).

(5) Connect cable assembly (1) to harness assembly.

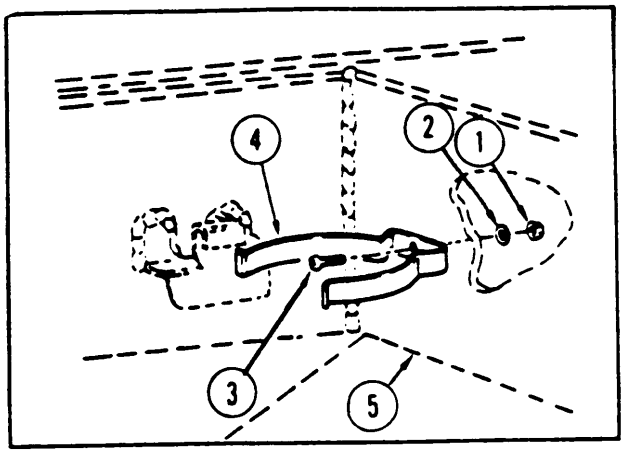


Figure 2--4. Trailer Spring Tension Clip (ARMY)

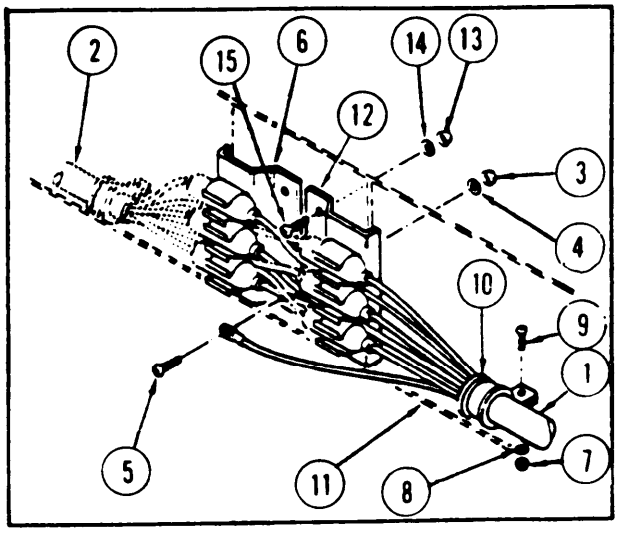


Figure 2-5. Trailer Cable Assembly (ARMY)

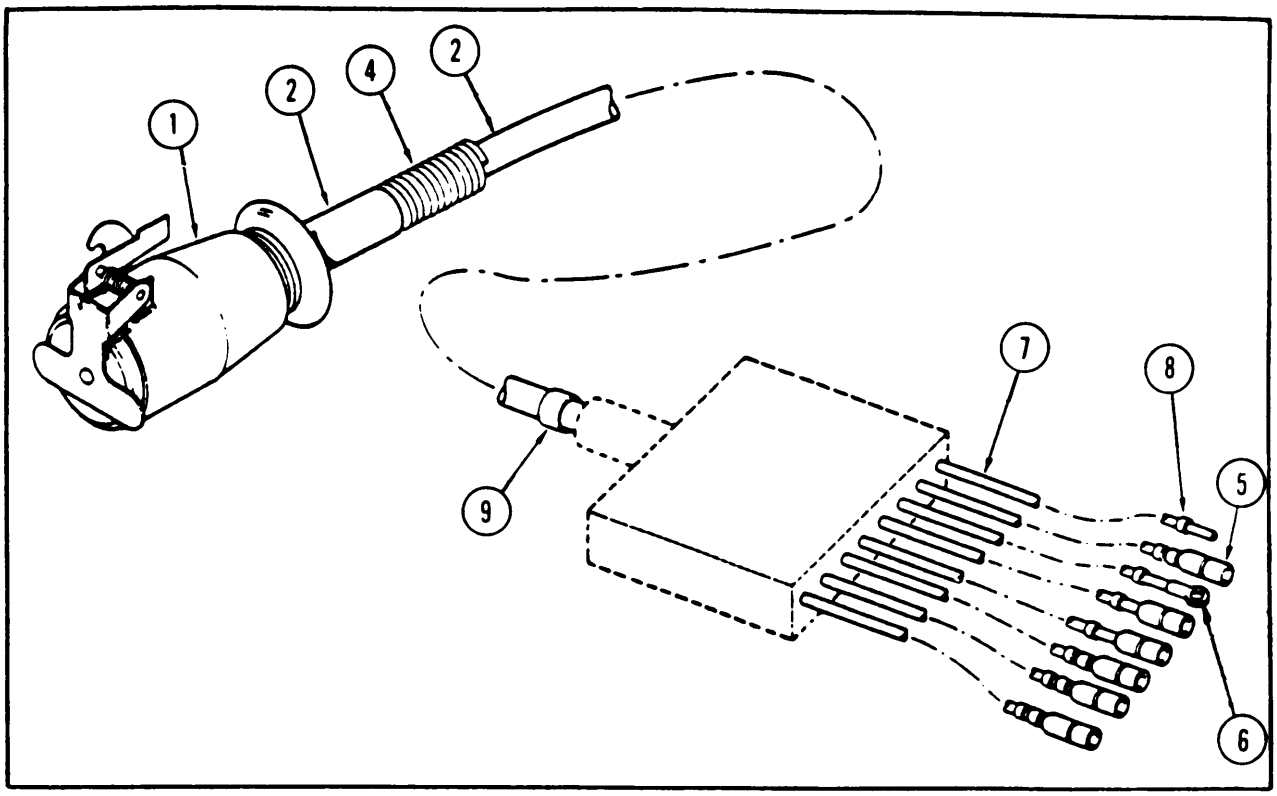


Figure 2-6. Trailer Cable (ARMY)

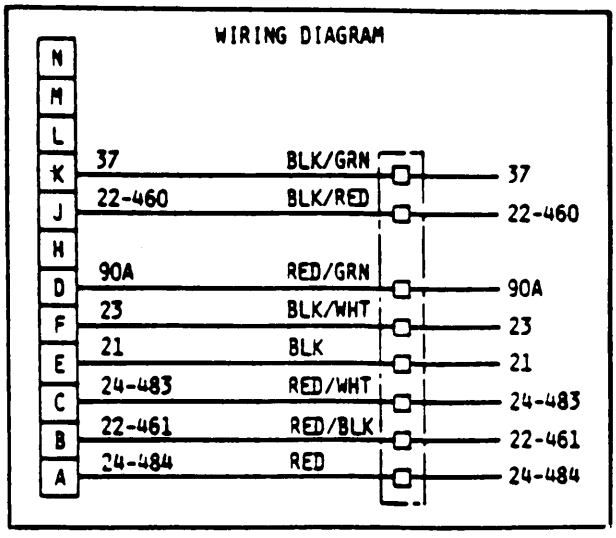


Figure 2–7. Trailer Cable, Wiring Diagram (ARMY)

2-21. TRAILER WHEEL ASSEMBLY (Figure 2-8) (ARMY)

a. Repair.

(1) Use the tubeless tire repair kit to repair small punctures in tires.

(2) Refer to TM 9-2610-200-20 for repair of tires that cannot be repaired using the tubeless tire repair kit.

b. Removal.

WARNING

To avoid injury to personnel tire removal should ONLY be done on solid ground, i.e., concrete or asphalt surfaces or hard ground or floors or similar hard surfaces.

To prevent the trailer from rolling or sliding use blocks under the tires.

(1) If the front (trailer hitch) tire is being changed, block both rear (generator end) tires. If the rear (generator end) tire is being changed, block both front (trailer hitch end) tires.

(2) Using a standard lug nut wrench and handle, available from a towing vehicle, loosen lug nuts (6).

NOTE

Do not remove nuts (6) at this time

(3) If the front (trailer hitch end) tire is being changed, rotate both front jack assemblies to the vertical pos!tion. If the rear (generator end) tire is being changed, rotate both rear jack assemblies to the vertical position.

(4) For each jack assembly, remove safety pin (1) and crank handle (2) from rear of jack support bracket (3).

NOTE

The jacks should be lowered at the same time at the same speed.

(5) For each jack, install crank handle (2) clockwise to lower jack pad (5).

(6) Continue to lower both jack pads (5) until the pads are firmly on the ground and the wheels are clear of the floor or ground.

WARNING

Tire and wheel assembly weight is 122 pounds (55. 39 kg). Injury can occur if caution is not used when removing from hub.

Place block or lug wrench under tire before removing wheel and tire to prevent injury to personnel.

(7) Carefully remove tire and wheel assembly (7) from hub (8).

c. Disassembly. (Figure 2–9)

WARNING

To avoid injury, be sure all air has been released from tire before removing it from wheel assembly.

(1) Using proper tire removal tools, remove tire (1) from wheel assembly (2).

(2) To remove valve and valve spud valve (3), remove nut (4) and washers (5) and (6). Pull valve and valve spud valve (3) out of wheel assembly (2).

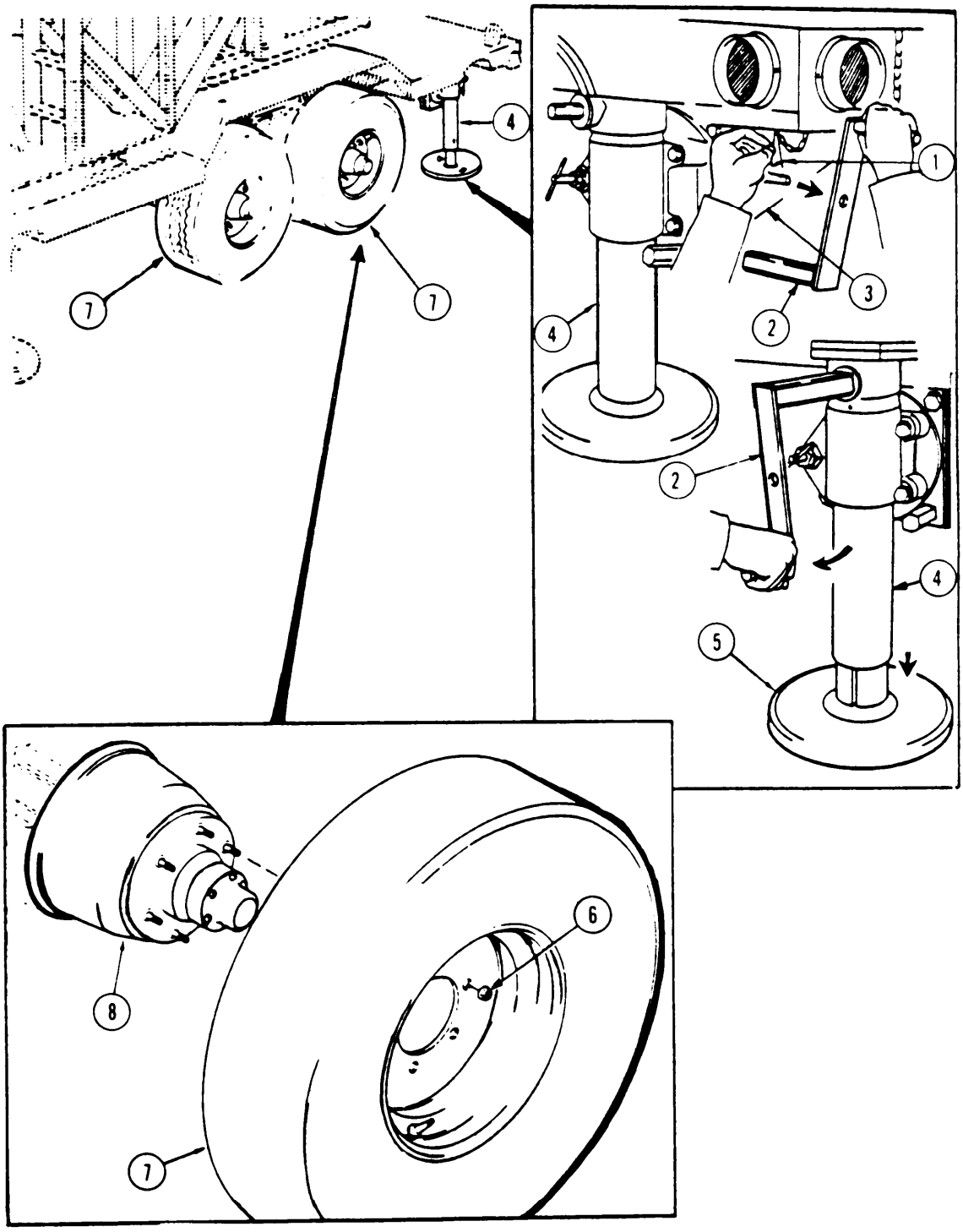


Figure 2–8. Trailer Wheel Assembly (ARMY)

d. Inspection.

(1) Inspect tire for cuts, cracks, or uneven wear. Measure tread depth using tread gage at three equally spaced points on tire (should be more than 1/8 in.). Replace if damaged or badly worn. Repair tires as required.

(2) Inspect wheel for bends or cracks. Replace, if damaged.

(3) Inspect valve stem for cracks or loose or damaged valve. Replace valve stem or valve, if cracked or damaged.

e. Assembly. (Figure 2–9)

(1) Install new valve and valve spud valve (3) in wheel assembly (2), then install washers (6) and (5) and nut (4) over valve and valve spud valve (3).

(2) Using proper tire replacement tools, replace tire (1) on wheel assembly (2). Fill tire with proper amount of air, 75 psi (5.27 kg/cm^2).

f. Installation. (Figure 2-8)

(1) Trailer must be in raised position.

WARNING

Tire and wheel assembly weight is 122 pounds (55.39 kg). Injury can occur if caution is not used when replacing on hub.

(2) Carefully position tire and wheel assembly (7) on hub (8).

CAUTION

Right–hand threaded lug nuts are to be installed on the curb side hubs and left-hand threaded lug nuts are installed on the road side hubs. Thread rotation is marked on the stud. Be sure left–hand threaded nuts are placed on studs marked with an L and right–hand threaded nuts are placed on studs marked with an R.

(3) Install lug nuts (6) and tighten finger tight.

(4) Using a standard lug nut wrench and handle available from a towing vehicle, tighten lug nuts (6) in order shown on (figure 2–10), until snug.

NOTE

Lug nuts will not be fully tightened at this time.

(5) Slowly turn both crank handles (2) counterclockwise to raise jack pads (5). This will lower the trailer.

(6) Continue to lower trailer until wheels are securely on the ground or floor.

(7) Using the lug nut wrench and handle, securely tighten lug nuts (6) in order shown on (figure 2-10).

(8) Continue to turn both crank handles (2) in a counterclockwise direction until jack pads (5) both are fully raised.

(9) Remove both crank handles (2) from jack units (4) and replace crank handles on rear of jack support brackets (3). Secure with safety pins (1).

(10) Refer to TM 10-4610-215-10 and rotate jack assemblies to the horizontal position.

CAUTION

Prior to moving trailer, be sure to remove chocks placed under the wheels.

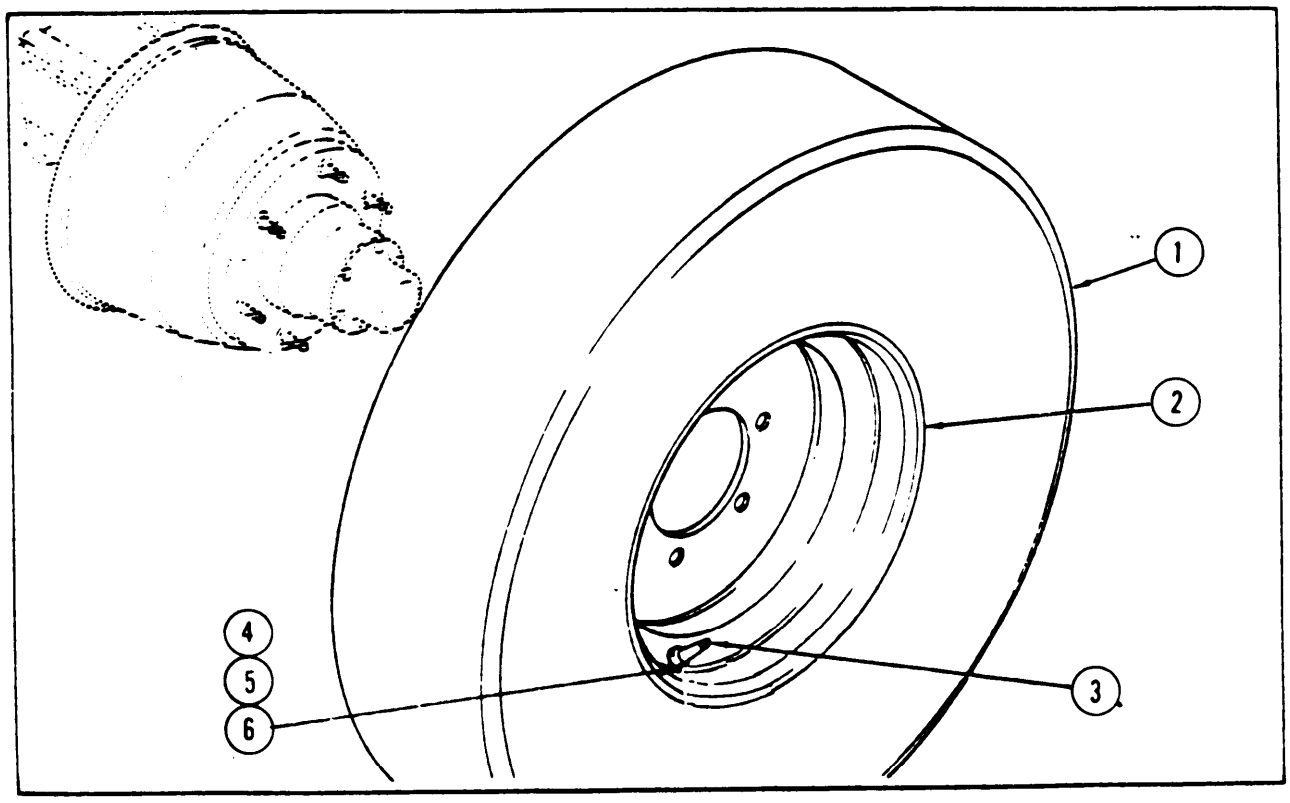


Figure 2-9. Trailer Wheel (ARMY)

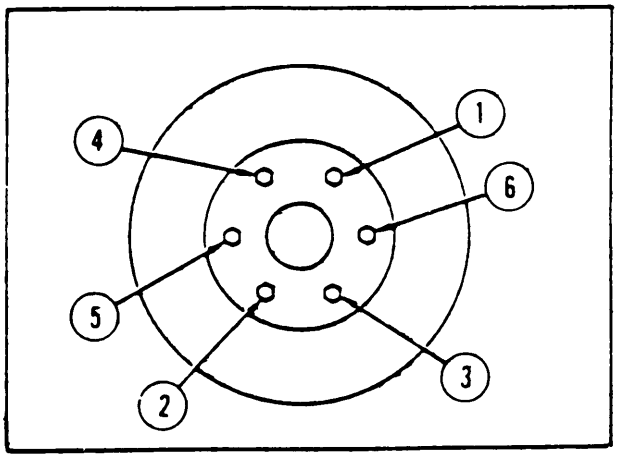


Figure 2-10. Trailer Lug Nut Tightening Sequence (ARMY)

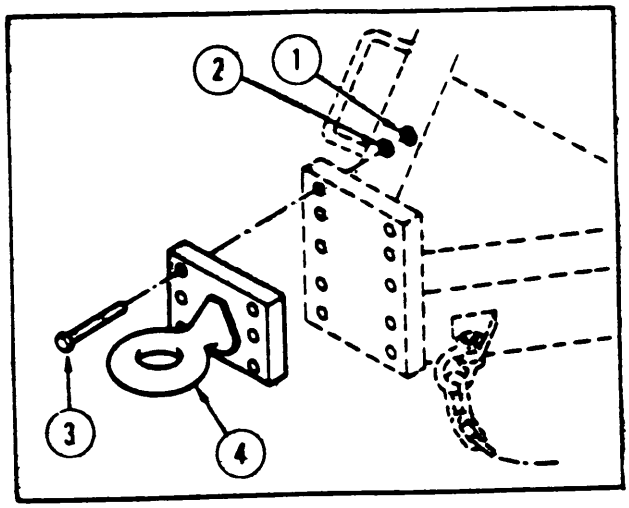


Figure 2-11. Trailer Lunette (ARMY)

2-22. **TRAILER LUNETTE.** (Figure 2-11) (ARMY)

a. Removal. Remove nuts (1), washers (2), screws (3), and Lunette (4).

b. Installation. Position Lunette (4) in place on trailer and install screws (3), washers (2) and nuts (1).

2-23. **TRAILER LEVELING JACKS.** (Figure 2-1 2) (ARMY)

a. Removal.

(1) Remove spring pin housing (1) and washer (2) from swivel assembly base (3).

(2) Remove screws (4) and washers (5) attaching cap (6) to swivel assembly base (3) then remove jack assembly (7).

b. Installation.

(1) Position jack assembly (7) in swivel assembly base (3).

(2) Position cap (6) and attach using washers (5) and screws (4).

(3) Install washer (2) and screw spring pin housing (1) into swivel assembly base (3).

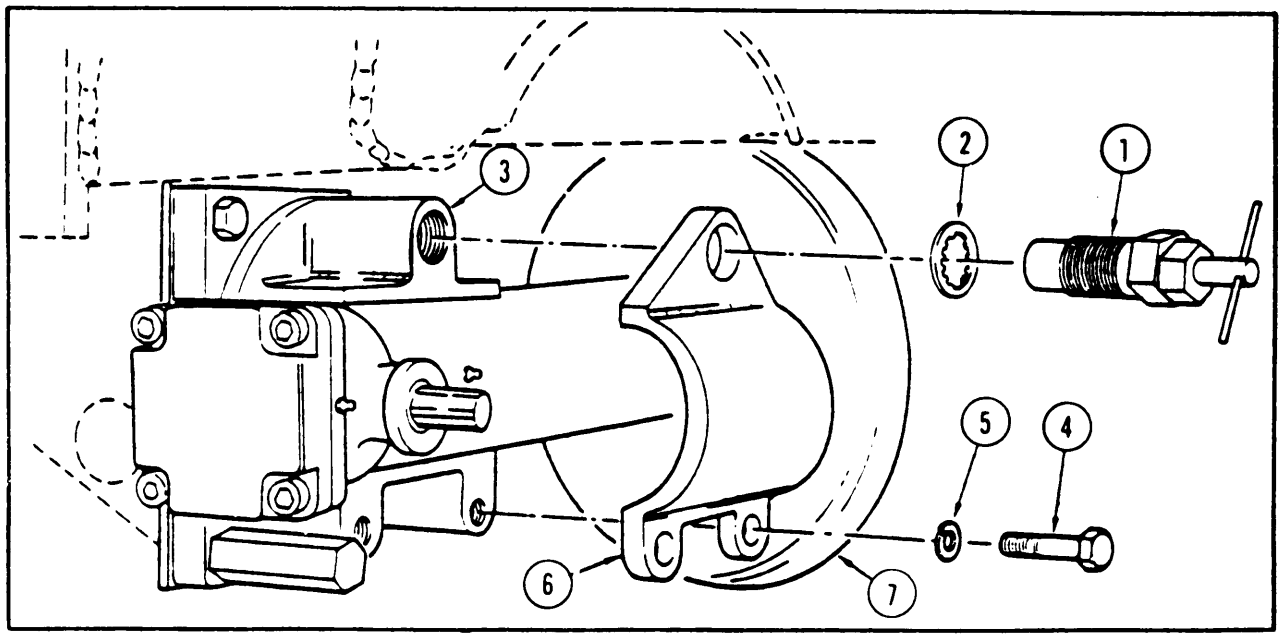


Figure 2-12. Trailer Leveling Jack (ARMY)

2–24. **TRAILER REFLECTORS.** (Figure 2-13) (ARMY)

a. Removal. Remove screws (1) and reflector (2).

b. Installation. Position reflector (2) on trailer frame and install screws (1).

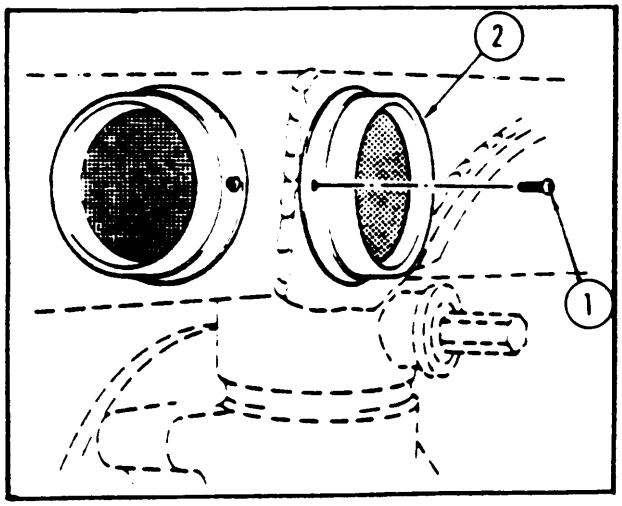


Figure 2-13. Trailer Reflectors (ARMY)

2-25. **TRAILER SPARE TIRE.** (Figure 2-1 4) (ARMY)

a. Removal.

(1) To remove spare tire and wheel assembly (7), use standard lug nut wrench and handle available from a towing vehicle and remove nuts (1).

(2) Position one of the crank handles installed on the rear of the jack support bracket (refer to paragraph 2-21, step 2, Removal of Crank Handle) on ratchet shaft (2).

CAUTION

Tire and wheel assembly weight is 122 pounds (55.39 kg). Caution must be used when releasing pawl to prevent weight of tire and wheel assembly from spinning crank handle.

(3) While holding crank handle (3) carefully push down on pawl (4).

(4) While holding pawl (4) down, slowly lower spare tire until it rests on ground or floor.

(5) Continue to turn crank handle (3) until all of cable (5) is expelled from spool (6).

WARNING

Tire and wheel assembly weight is 122 pounds (55.39 kg). Injury can occur if caution is not used when moving or lifting.

(6) Carefully pull spare tire and wheel assembly (7) from under trailer.

(7) Carefully lift spare tire and wheel assembly (7) to upright position, then tilt tire carrier support (8) and place through spare tire and wheel assembly (7). Roll spare tire and wheel assembly clear.

b. Installation

WARNING

Tire and wheel assembly weight is 122 pounds (55.39 kg). Injury can occur if caution is not used when moving or lifting.

(1) Carefully roll spare tire and wheel assembly (7) into position alongside trailer.

(2) Tilt tire carrier support (8) and place through spare tire and wheel assembly (7) from inside out.

(3) Position tire carrier support (8) so that the two bars align with two stud holes in the wheel.

(4) Position crank handle (3) on ratchet shaft (2) and take up slack in cable (5).

(5) While ensuring that cable (5) stays tight and tire carrier support (8) retains the correct position, lay spare tire and wheel assembly (7) upside down, on ground or floor.

(6) Carefully turn crank handle (3) clockwise and raise spare tire and wheel assembly, positioning it so that two stud holes in the wheel align with the two studs (9) of the spare tire mounting bracket.

(7) Be sure pawl (4) catches on ratchet shaft (2), then install nuts (1) and tighten using standard lug nut wrench and handle.

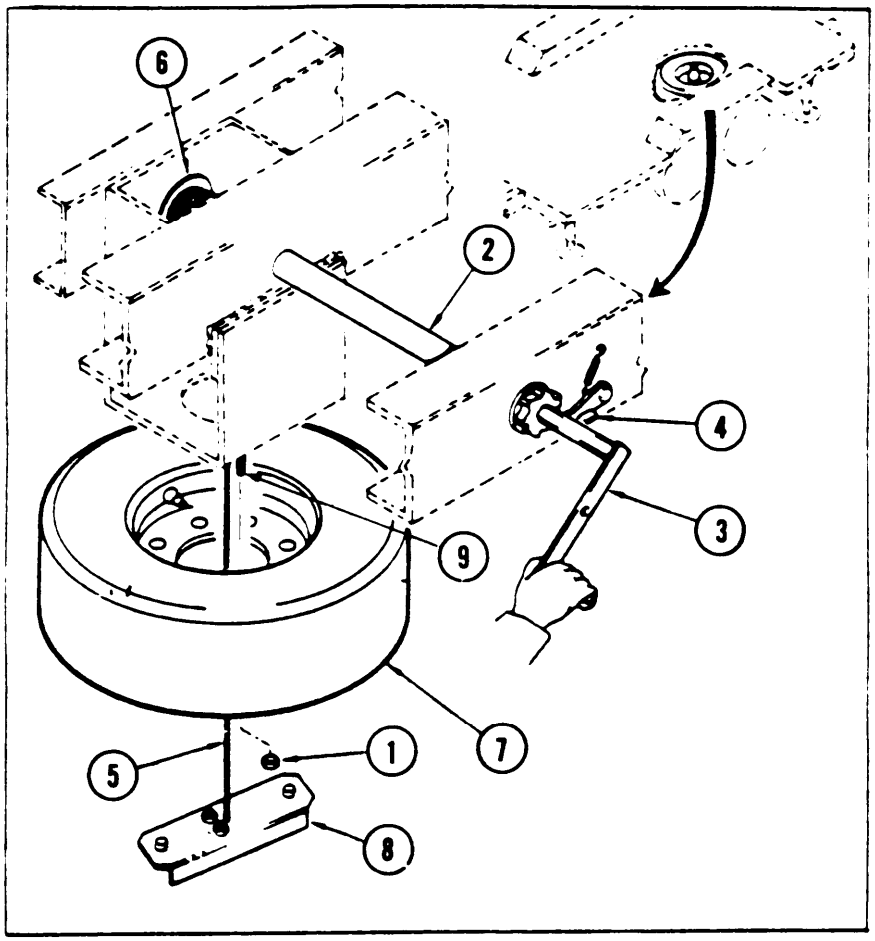


Figure 2-14. Trailer Spare Tire (ARMY)

2-26. **TRAILER SPARE TIRE CARRIER.** (Figure 2-1 5) (ARMY)

a. Removal.

(1) Refer to paragraph 2-25 to remove the spare tire and wheel assembly.

(2) Remove nuts (1) and U-bolt clamp (2) securing cable (3).

(3) Remove U-bolt plate (4) and tire carrier support (5).

(4) Remove nuts (6) and U-bolt clamp (7) securing cable (3) to ratchet shaft (8), then remove cable (3).

(5) Remove cotter pins (9) and (10) and washer (11), then slowly pull ratchet shaft (8) from trailer frame (12) and spool (13). Remove washer (14).

(6) Disconnect extension spring (15) from pawl (16), then remove pawl (16) by removing nut (17), screw (18), and washer (19).

b. Inspection. Inspect cable for badly frayed areas or kinks. If cable is damaged, replace.

c. Installation.

(1) Install washer (14) on ratchet shaft (8), then insert ratchet shaft (8) through outside portion of trailer frame (12).

(2) Align spool (13) with ratchet shaft (8), then continue inserting ratchet shaft (8) through spool (13) and inside portion of trailer frame (12).

(3) Align cotter pin spool (13) with cotter pin hole in ratchet shaft (9). Insert cotter pin (1 O).

(4) Install washer (11) on end of ratchet shaft (8) and insert cotter pin (9).

NOTE

Washer (11) may be omitted if cotter pin (9) will not assemble into ratchet shaft (8) due to tolerance stack–up.

(5) Insert end of cable (3) through hole in spool (13) and position over ratchet shaft (8).

(6) Secure cable (3) to ratchet shaft (8) using U–bolt clamp (7) and nuts (6). Rotate shaft to take up cable slack.

(7) Insert the other end of cable (3) through hole in tire carrier support (5).

(8) Secure cable (3) to tire carrier support (5) using U–bolt plate (4), U-bolt clamp (2) and nuts (1).

(9) Position pawl (16) to trailer frame (12), then secure with screw (18), washer (19) and nut (17). Attach extension spring (15) to pawl (16) .

(10) Refer to paragraph 2-25 and replace the spare tire and wheel assembly.

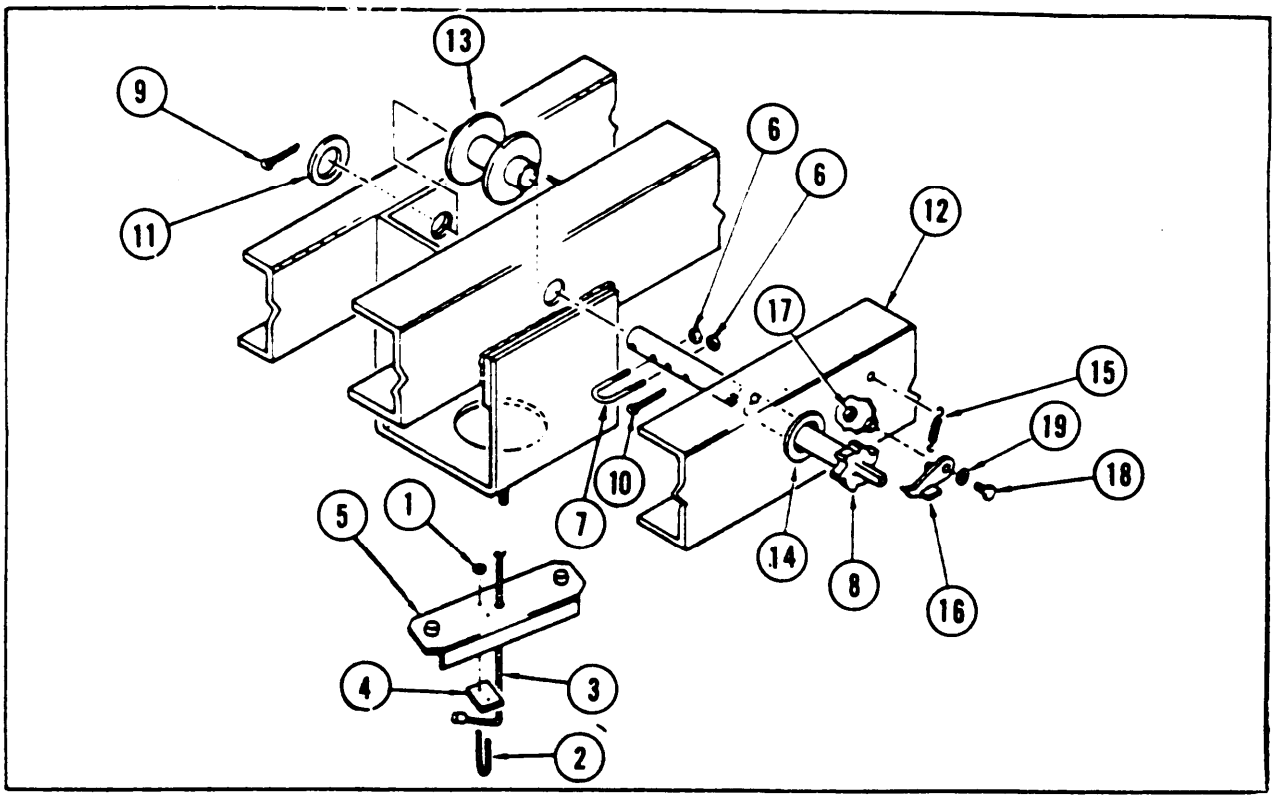


Figure 2-15. Trailer Spare Tire Carrier (ARMY)

2-27. **TRAILER SAFETY CHAIN ASSEMBLY.** (Figure 2-1 6) (ARMY)

a. Removal. Remove nut (1), screw (2) and chain and latch shackle (3) securing chain assembly (4) to trailer frame (5). Remove chain assembly (4).

b. Disassembly. (Figure 2-17) Remove connecting chain links (1) and hook (2) from welded chain (3).

c. Inspection. Inspect chain for broken or damaged links. Check for bent or damaged hook. Replace chain if main links are damaged. Replace connecting links or hooks, if damaged.

d. Assembly. (Figure 2-17) Install hook (2) and connecting chain links (1) on welded chain (3).

e. Installation. (Figure 2–16)

(1) Install chain and latch shackle (3) in chain assembly (4).

(2) Position chain and latch shackle and chain assembly to trailer frame (5).

(3) Install screw (2) and nut (1) through pad on trailer frame (5) and chain and latch shackle (3) to secure chain assembly (4). Place hook over bar on trailer frame (5).

2-28. **TRAILER LUBRICATION FITTINGS.**(Figure 2-1 8) (ARMY)

a. Removal. Removal of lubrication fittings consists only of screwing the fitting out of the component in which it is installed. Refer to figure 2–18 for location of lubrication fittings.

b. Inspection. Inspect lubrication fitting for plugged lubrication passage and for damage to end of fitting. Replace any plugged or damaged lubrication fitting.

c. Installation. Install lubrication fitting by screwing fitting into component requiring lubrication. Refer to figure 2–1 8 for location of lubrication fittings. Refer to Lubrication Order, LO 10-461 0–215–12/Ll–08580A–1 2, and lubricate component.

2-29. **TRAILER DATA PLATES.** (Figure 2–1 9) (ARMY)

a. Removal. Remove drive screws (1) securing data plates (2) and (3) to trailer frame (4).

b. Inspection. Inspect data plates for clarity. If any part of the information contained on data plates is not clear, replace data plate.

c. Installation. Position data plates (2) and (3) to trailer frame (4) and install drive screws (1).

2-30. **TRAILER SERVICE BRAKES ASSEMBLY.** (Figure 2-20) (ARMY)

NOTE

To remove only the brake shoes, perform steps a (1) through (8) and c (2), (6), (7) and (8).

To replace, perform only steps d (5) through (10), d (15) and e (7) through (17).

a. Removal.

(1) Refer to paragraph 2-21, for procedure covering the jacking-up of the flatbed cargo trailer.

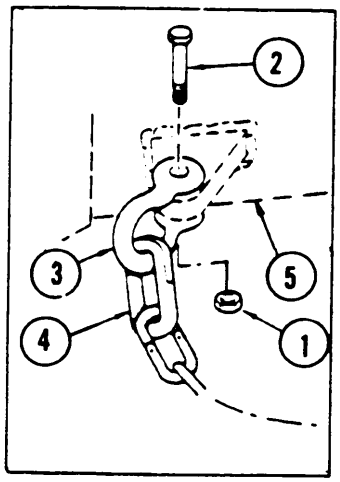


Figure 2-16. Trailer Safety Chain Assembly (ARMY)

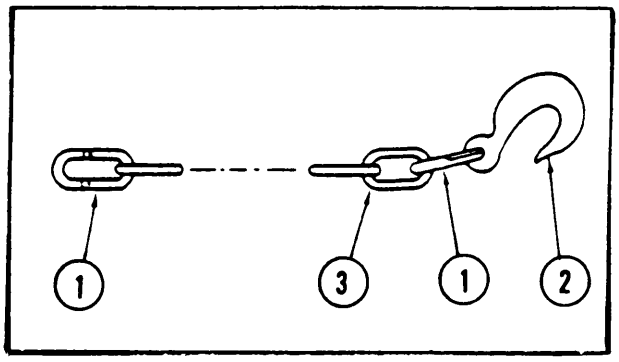


Figure 2-17. Trailer Safety Chain and Hook Assembly (ARMY)

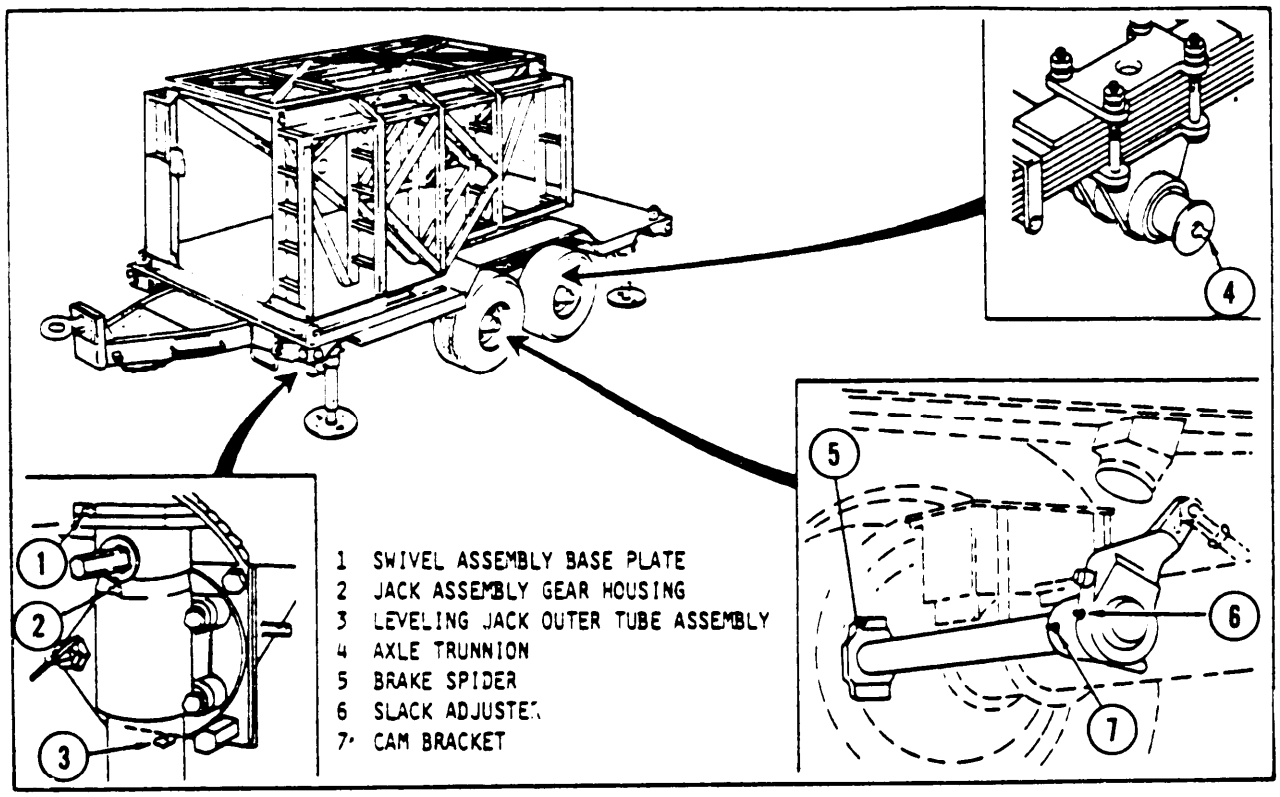


Figure 2–18. Trailer Lubrication Fittings (ARMY)

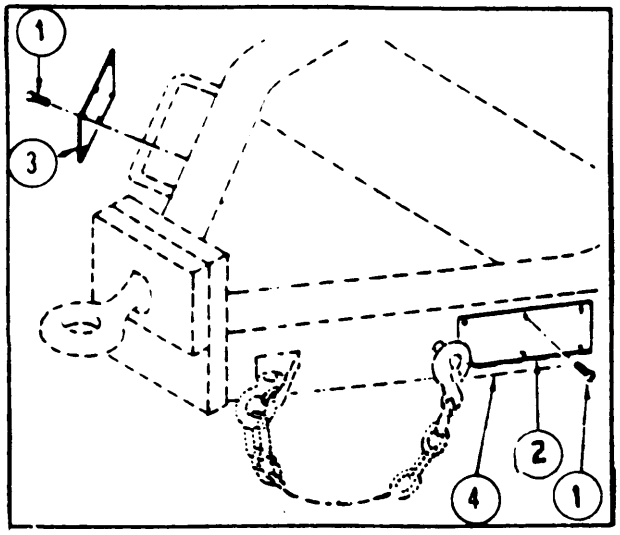


Figure 2-19. Trailer Data Plates (ARMY)

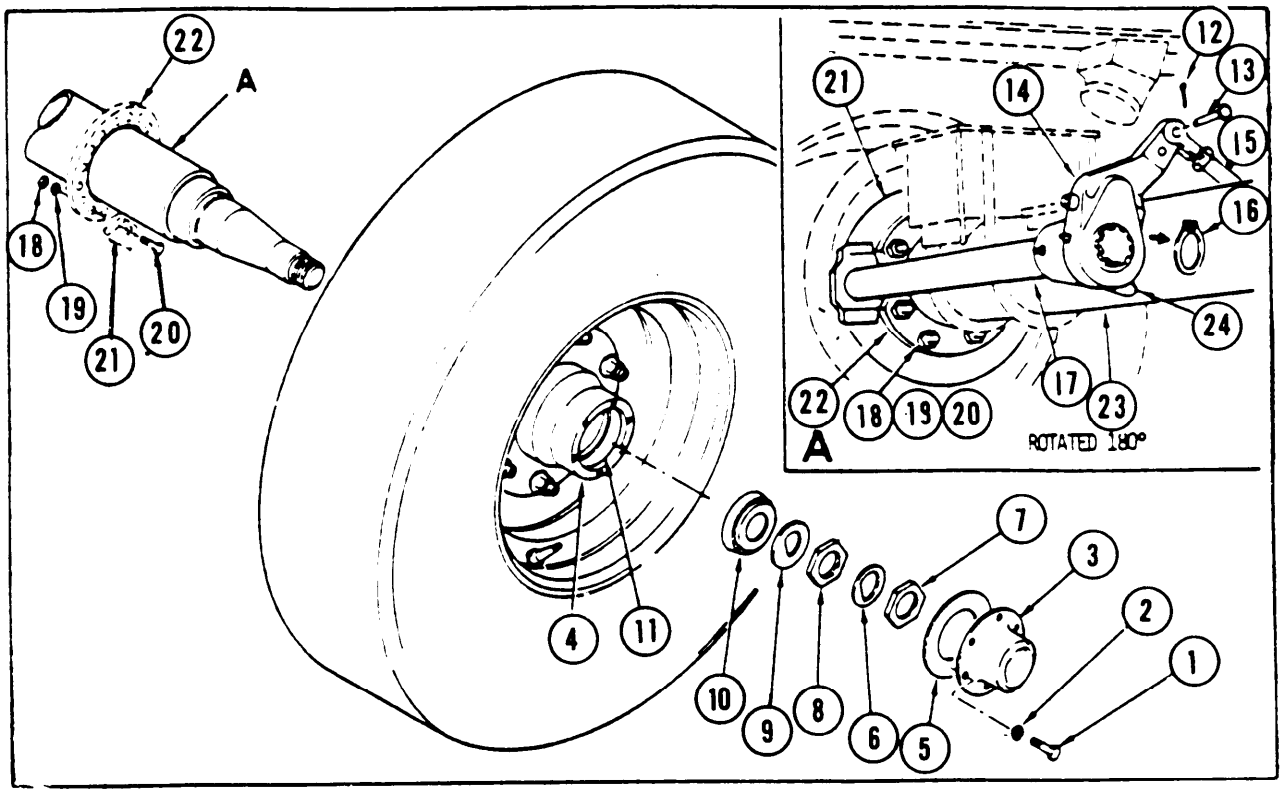


Figure 2-20. Trailer Service Brakes Assembly (ARMY)

(2) Remove bolts (1) and washers (2) securing hub cap (3) to hub (4). Remove hub cap (3) and hub cap gasket (5).

(3) Bend tab of spindle tongue washer (6) to allow removal of outer spindle nut (7).

(4) Using spindle nut wrench and handle, available from a towing vehicle, remove outer spindle nut (7). Remove spindle tongue washer (6).

(5) Using the spindle nut wrench and handle, remove inner spindle nut (8), then remove spindle lock washer (9).

CAUTION

Wheel assembly may tend to tilt upon removal of outer bearing cone.

(6) Carefully remove outer bearing cone (10), outer bearing cup (11) will remain in hub.

WARNING

Tire and wheel assembly and hub and drum assembly weight as a unit is 226 pounds (102.60 kg). Injury can occur if caution is not used when removing from axle assembly.

CAUTION

Inner bearing cone will remain inside the hub during removal of the tire and wheel assembly and hub and drum assembly unit. Caution must be taken to prevent damage to inner bearing cone and spindle during removal.

(7) Carefully remove tire and wheel assembly and hub and drum assembly as a single unit.

(8) Remove cotter pin (12) and clevis pin (13) connecting slack adjuster (14) to air chamber assembly (15).

(9) Remove lock ring (16) from end of cam shaft (17), then slide slack adjuster (14) from spined portion of cam shaft (17).

(10) Remove nuts (18), washers (19) and bolts (20) securing service brake assembly (21) to brake flange (22).

(11) Pull service brake assembly (21) off over axle assembly (23) and out of cam bracket assembly (24).

b. Disassembly. Figure 2-21

(1) Place service brake assembly on adequate workbench.

(2) Using standard brake spring tool, carefully remove retract spring (1) from retract spring pins (2).

(3) Remove retract spring pins (2) from brake shoes (3).

(4) Remove brake roller retaining rings (4) securing brake roller pins (5) in brake shoes (3).

(5) Remove brake roller pins (5) and brake rollers (6) from brake shoes (3).

(6) Remove anchor pin nuts (7), anchor pin lock washers (8), anchor pin locks (9), anchor pins (10) and anchor pin links (11) securing brake shoes (3) to brake spider (12).

(7) Brake shoes (3) and brake linings (13) can now be removed as a single unit.

(8) If brake linings (13) are to be removed from brake shoes (3), remove rivets (14).

(9) Remove cam shaft lock ring (15) and cam shaft spacer washer (16).

(10) Pull cam shaft (17) out of brake spider (12). Remove cam shaft retainer washer (18).

(11) Remove spider seals (19) and spider bushing (20) from brake spider (12).

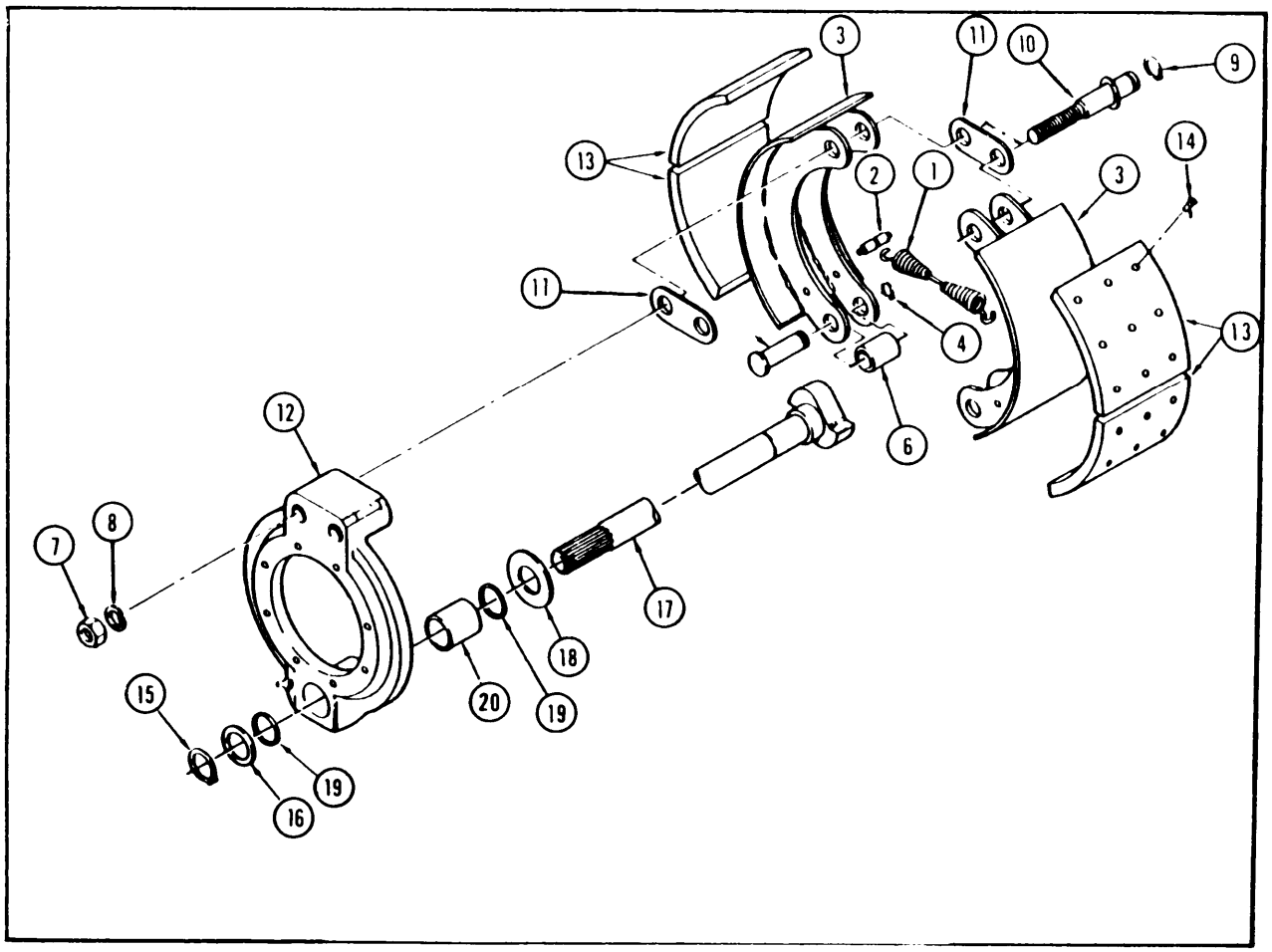


Figure 2-21. Trailer Service Brake (ARMY)

c. Inspection.

(1) Inspect wear on brake linings. If brake lining has worn close to rivet heads or if brake lining wear is uneven, replace brake linings.

(2) Inspect brake linings for oil or grease. If present, replace brake linings.

(3) Inspect cam shaft for wear or damage. If badly worn or damaged, replace cam shaft.

d. Assembly. (Figure 2-21).

CAUTION

To avoid contamination, assembly should be performed on a clean workbench, free of dirt and oils.

(1) Install spider bushing (20) and spider seals (19) in brake spider (12).

(2) Place cam shaft retainer washer (18) on cam shaft (17) and insert cam shaft (17) into brake spider (12) through spider bushing (20).

NOTE

Be sure that lock ring groove on cam shaft is clear of break spider and that there is sufficient space available for the cam shaft spacer washer.

(3) Install cam shaft spacer washer (16) over end of cam shaft (17) and against brake spider (12).

(4) Install cam shaft lock ring (15) in groove on cam shaft (17).

(5) If brake linings (13) were removed from brake shoes (3), install new brake linings (13) to brake shoes (3) with rivets (14).

(6) Position one side of brake linings (13) and brake shoes (3), as a single unit, and one anchor pin link (11) to brake spider (12).

(7) Place remaining anchor pin link (11) in position, align all holes and insert one anchor pin (10) through anchor pin links (11), brake shoe (3), and brake spider (12),

(8) Install one anchor pin lock (9); install, finger tight, one anchor pinlock washer (8) and one anchor pin nut (7)$_0$

(9) Place remaining brake lining (13) and brake shoe (3), as a single unit, into position between anchor pin links (11).

(10) Align all holes and insert remaining anchor pin (10) through anchor pin links (11), brake shoes (3) and brake spider (12).

(11) Install remaining anchor pin lock (9), anchor pin lock washer (8) and anchor pin nut (7).

(12) Securely tighten all anchor pin nuts (7).

(13) Position brake rollers (6) in brake shoes (3) and install brake roller pins (5) and brake roller retaining rings (4).

(14) Position brake shoes (3) so that brake rollers (6) rest firmly on cam of cam shaft (17).

(15) Install retract spring pins (2) in brake shoes (3).

(16) Using standard brake spring tool, carefully install retract spring (1) over retract spring pins (2).

e. Lubrication. Refer to Lubrication Order, LO 104610-21 5–12.

f. Installation. (Figure 2-20)

(1) Trailer should be in raised position. If it was lowered after removal of service brake assembly, refer to paragraph 2–21, and raise the flatbed cargo trailer.

(2) Carefully slip service brake assembly (21) over axle assembly (23). Align cam shaft (17) so that it fits through cam shaft bracket assembly (24).

(3) Align holes in brake spider with holes in brake flange (22) and install bolts (20), washers (19) and nuts (18), then tighten securely.

(4) Align splines of slack adjuster (14) with splines of cam shaft (17) and at the same time position slack adjuster (14) so that when installed it will connect to air chamber assembly (15).

(5) Install slack adjuster (14) on cam shaft (17) and install lock ring (16) in groove on cam shaft (17) to secure slack adjuster.

(6) Place end of slack adjuster (14) in clevis of air chamber assembly (15) and install clevis pin (13) and cotter pin (12).

(7) Visually check that grease retainer assembly, inner bearing cone, and inner bearing cap are installed in the hub assembly, If these items have been removed, refer to paragraph 3-41, and install them.

WARNING

Tire and wheel assembly and hub and drum assembly weight as a unit is 226 pounds (102.60 kg). Injury can occur if caution is not used when installing on axle assembly.

CAUTION

Inner bearing cone remains inside the hub during removal of the tire and wheel assembly and hub and drum assembly unit. Caution must be taken to prevent damage to inner bearing cone and spindle during installation.

(8) Carefully position, as a single unit, tire and wheel assembly and hub and drum assembly over end of spindle and slide into position.

(9) Pack wheel bearings in accordance with Lubrication Order, LO 10-4610-215-12. Then, install outer bearing cone (10).

NOTE

Difficulty in installing the outer bearing cone may be present; if so, slightly push on top of tire and wheel assembly, tilting it back and forth until bearing cone slips into position.

(10) Install spindle lock washer (9) and inner spindle nut (8), finger tight.

CAUTION

Do not overtighten spindle nut, doing so can cause heating, accelerated wear, and bearing failure.

(11) Using the spindle nut wrench and handle and while turning wheel, tighten inner spindle nut (8) until tight and wheel can no longer be turned, then back off inner spindle nut (8) until wheel turns freely.

(12) Install spindle tongue washer (6) and outer spindle nut (7). Secure using spindle nut wrench and handle.

(13) Bend tab of spindle tongue washer (6) down to lock outer spindle nut (7).

(14) Check wheel for wobble by holding the wheel at two opposite points on line with the center. Push at one point and pull at the other (both forces in line with the centerline of the axle).

(15) Counter-check wheel bearing looseness visually by manually trying to pull the wheel off the axle, then immediately reversing the action by pushing the wheel further onto the axle.

(16) Position hub cap gasket (5) and hub cap (3) to hub (4), then install washers (2) and bolts (1).

(17) Refer to paragraph 2-21, for procedure covering the lowering of the flatbed cargo trailer and lower trailer.

2-31. TRAILER AIR HOSE ASSEMBLY. (ARMY)

a. Removal. (Figure 2–22) Remove hose assembly (1) from anchor coupling (2).

b. Disassembly. (Figure 2–23)

(1) Remove automotive coupling (1) from adapter (2).

(2) Remove adapters (2) and (3) from air hose (4).

c. Inspection.

(1) Inspect air hose for cracks. If cracks are present, replace hose.

(2) Inspect automotive coupling for damage. If coupling is damaged, replace.

d. Assembly. (Figure 2–23)

(1) Install adapters (2) and (3) in air hose (4).

(2) Install automotive coupling (1) in air hose (4).

e. Installation. (Figure 2–22) Install hose assembly (1) in anchor coupling (2).

2-32. TRAILER ANCHOR COUPLING. (Figure 2-24) (ARMY)

a. Removal.

(1) Disconnect air hose assembly (1) from anchor coupling body (2).

(2) Disconnect tubing (3) from anchor coupling body (2).

NOTE

Removal of anchor coupling from trailer frame will necessitate disassembly of the anchor coupling.

(3) Remove nut (4) and washer (5) from anchor coupling body (2), then remove anchor coupling body (2) from trailer frame (6).

b. Installation.

(1) Insert anchor coupling body (2) through trailer frame (6).

(2) Install washer (5) and nut (4) to secure anchor coupling body (2).

(3) Connect tubing (3) to anchor coupling body (2).

(4) Connect air hose assembly (1) to anchor coupling body (2).

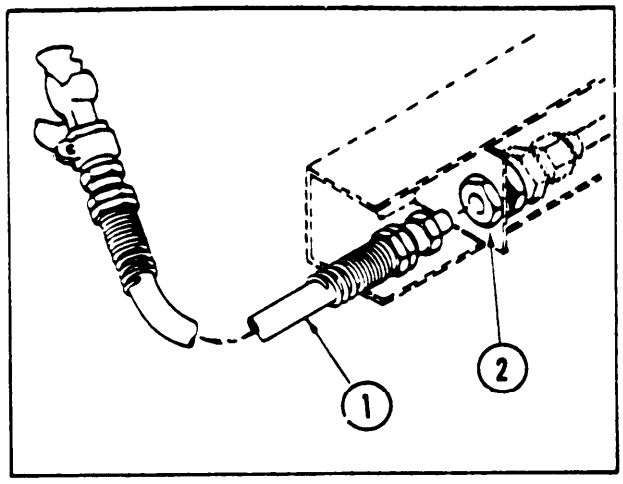


Figure 2-22. Trailer Air Hose Assembly (ARMY)

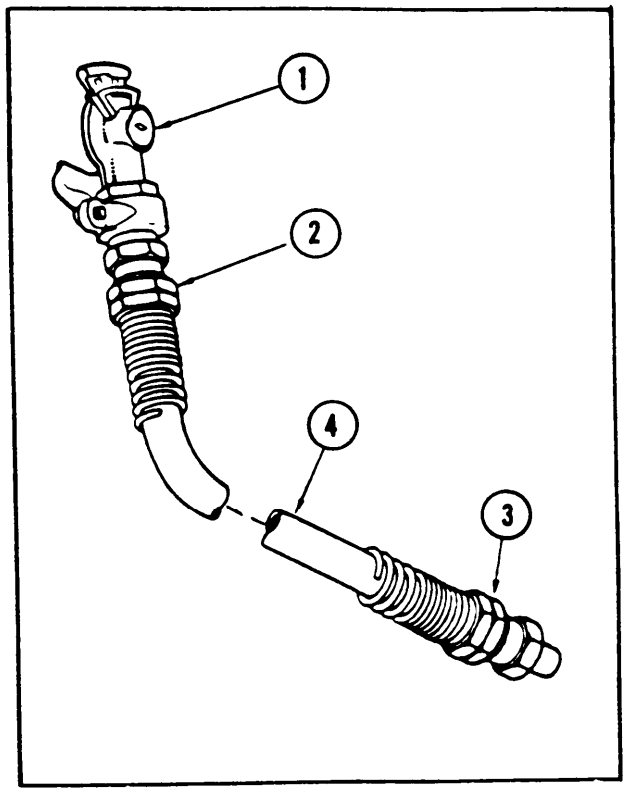


Figure 2-23. Trailer Air Hose (ARMY)

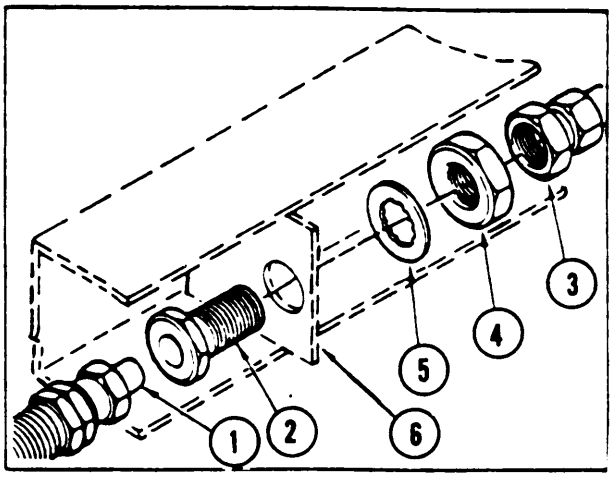


Figure 2-24. Trailer Anchor Coupling (ARMY)

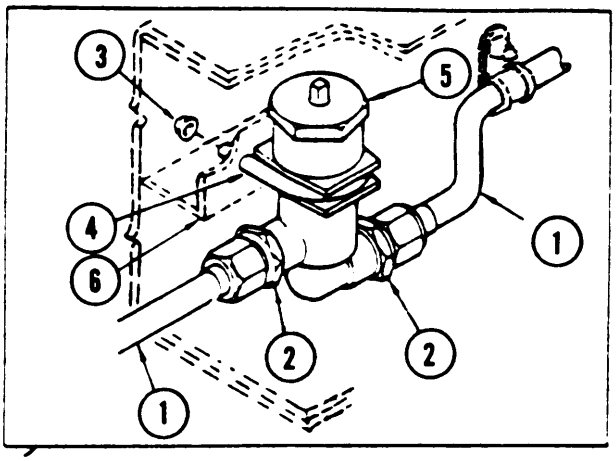


Figure 2-25, Trailer Air Cleaner Assembly (ARMY)

2-33. TRAILER AIR CLEANER ASSEMBLY. (Figure 2–25) (ARMY)

NOTE

To remove the filter element, perform steps b (3) and b (4). To replace, perform steps d (1) and d (2).

a. Removal. (Figure 2–25)

(1) Disconnect tubing (1) and remove fittings (2).

(2) Remove nuts (3) and U-bolt clamp (4) securing air cleaner assembly (5) to trailer frame (6).

b. Disassembly. (Figure 2–26)

(1) Place air cleaner assembly on clean dry workbench.

(2) Remove pipe plug (1) from bushing adapter (2).

(3) Remove bushing adapter (2) and gasket (3).

(4) Remove spring (4), washer (5) and element (6) from housing (7).

c. Inspection.

(1) Inspect element for dirt or damage. If element is dirty or damaged, replace it.

(2) Inspect housing for cracks or damaged threads. If housing contains cracks or threads are damaged, replace housing.

d. Assembly. (Figure 2-26)

(1) Install element (6), washer (5) and spring (4) in housing (7).

(2) Install gasket (3) on bushing adapter (2), then install bushing adapter (2) and gasket (3), as a single unit, in housing (7).

(3) Install pipe plug (1) in bushing adapter (2).

e. Installation. (Figure 2-25)

(1) Position air cleaner assembly (5), with pipe plug up and tube connections down, to trailer frame (6).

(2) Install U-bolt clamp (4) and nuts (3) to secure air cleaner assembly (5) to trailer frame (6).

(3) Install fittings (2), then connect tubing (1) to both sides of air cleaner assembly (5).

2-34. TRAILER AIR BRAKE HOSE ASSEMBLIES. (ARMY)

a. Removal. (Figure 2–27) Disconnect air brake hose assemblies (1) from relay valve (2), air chamber assemblies (3), and anchor tees (4).

b. Disassembly. (Figure 2–28) Remove hose fittings (1) from hose (2).

c. Inspection. Inspect hose for cracks or damaged threads. If any cracks are present, or if threads are damaged, replace hose.

d. Assembly. (Figure 2–28) Install hose fittings (1) in hose (2).

e. Inspection. (Figure 2-27) Attach hose assemblies (1) to relay valve (2), air chamber assemblies (3), and anchor tees (4) as indicated in (figure 2–27).

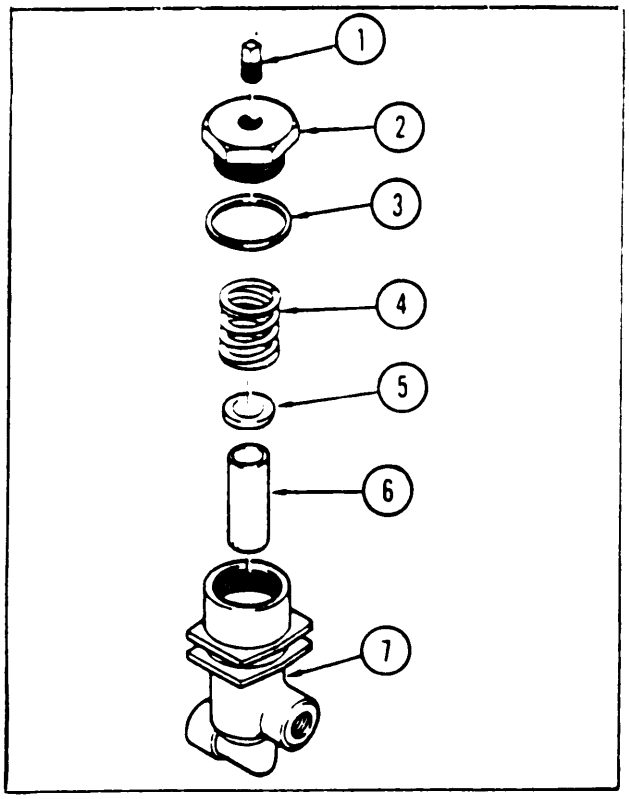


Figure 2-26. Trailer Air Cleaner (ARMY)

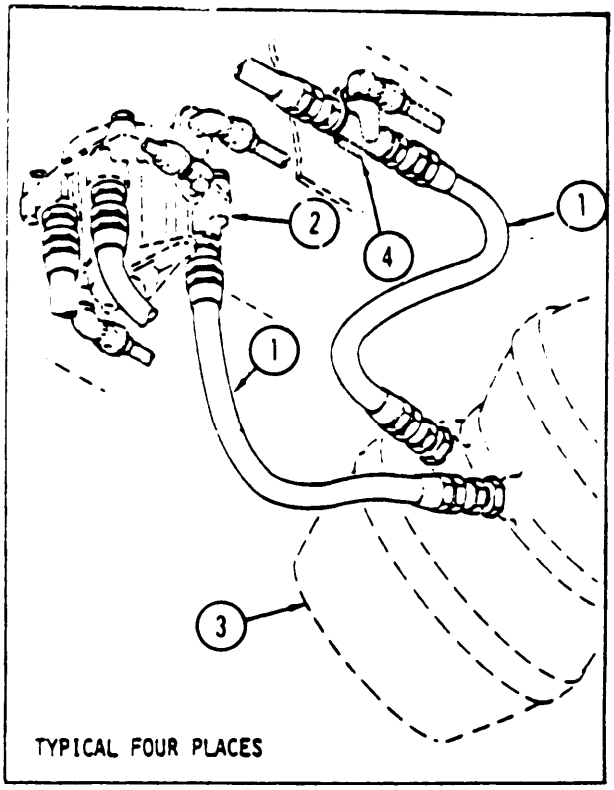


Figure 2-27. Trailer Air Brake Hose Assemblies (ARMY)

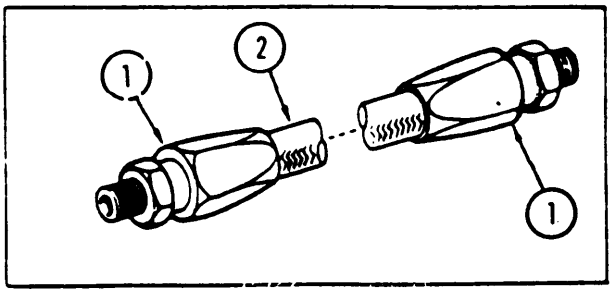


Figure 2-28. Trailer Air Brake Hose (ARMY)

2-35. TRAILER AIR RESERVOIR ASSEMBLY. (Figure 2-29) (ARMY)

a. Removal.

(1) Disconnect tubing (1) from tube fitting (2).

(2) Remove nuts (3) and screws (4) attaching reservoir (5) to trailer frame (6).

(3) Remove reservoir (5), tube fitting (1), nipple (2), elbow (3), and drain cock (4) from trailer frame (6) as a single unit.

b. Disassembly. (Figure 2–30) If reservoir is to be replaced with a new one, remove tube fitting (1), nipple (2), elbow (3), and drain cock (4) from reservoir (5).

c. Inspection. Inspect reservoir for dents or other damage. If reservoir is seriously dented or damaged, replace it.

d. Assembly. (Figure 2–30) If a new reservoir is to be installed, install elbow (3), nipple (2), tube fitting (1), and drain cock (4) in reservoir (5).

e. Installation. (Figure 2–29)

(1) Position reservoir (5), tube fitting (1), nipple (2), elbow (3), and drain cock (4), as a single unit, to trailer frame (6) .

(2) Install screws (4) and nuts (3) to attach reservoir (5).

(3) Connect tubing (1) to tube fitting (2).

2-36. TRAILER AIR BRAKE SYSTEM TUBING. (Figure 2–31) (ARMY)

a. Removal.

(1) To remove the sections of tubing between the anchor couplings and the air cleaner assemblies, perform the following:

(a) Remove nuts (1) and clamps (2) securing tubing (3) to trailer frame (4).

(b) Disconnect tubing (3) from anchor couplings (5) and air cleaner assemblies (6) by removing nuts (7) and sleeves (8).

(c) Remove tubing (3), grommets (9), and conduit (10) from trailer frame (4).

(d) Remove grommets (9) and conduit (1) from tubing (3).

(2) To remove the sections of tubing between the air cleaner assemblies and the relay valve (figure 2-32), perform the following:

(a) Remove nuts (1) and clamps (2) securing tubing (3) to trailer frame (4).

(b) Disconnect tubing (3) from air cleaner assemblies (5) and relay valve (6) by removing nuts (7) and sleeves (8).

(c) Remove tubing (3), grommets (9), and conduit (10) from trailer frame (4).

(d) Remove grommets (9) and conduit (10) from tubing (3).

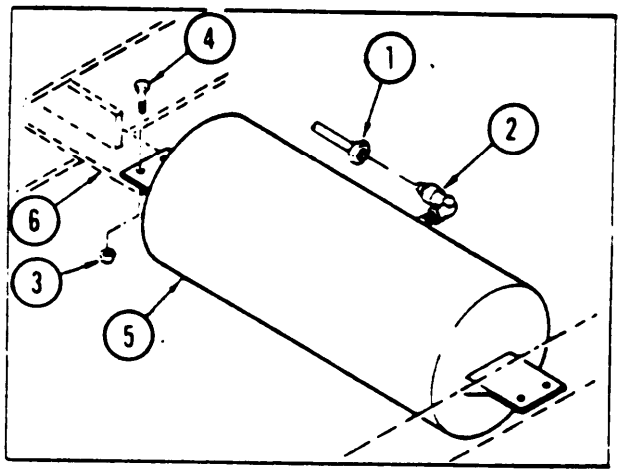


Figure 2-29. Trailer Air Brake Air Reservoir Assembly (ARMY)

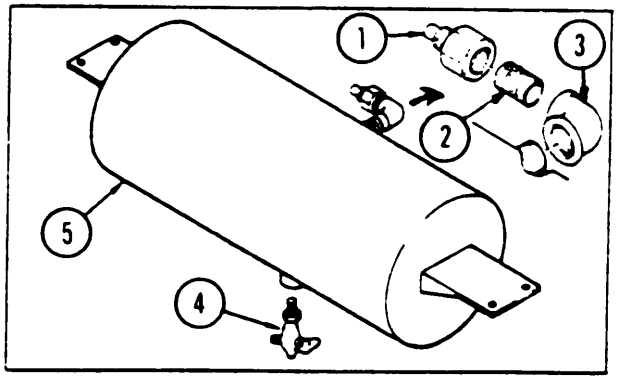


Figure 2–30. Trailer Air Brake Reservoir (ARMY)

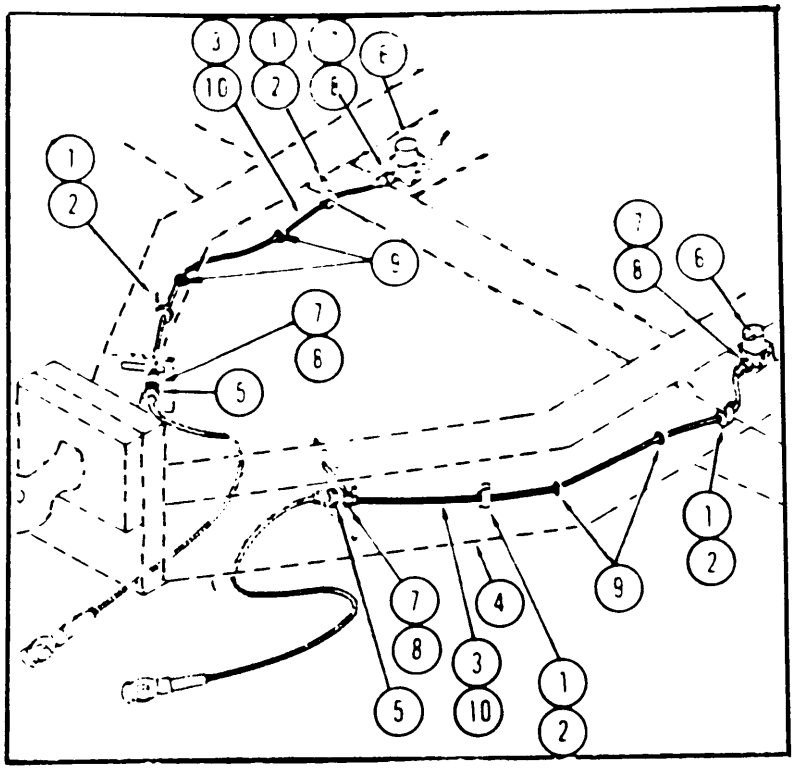


Figure 2–31. Trailer Air Brake Tubing Sections Between Anchor Couplings and Air Chambers Assemblies (ARMY)

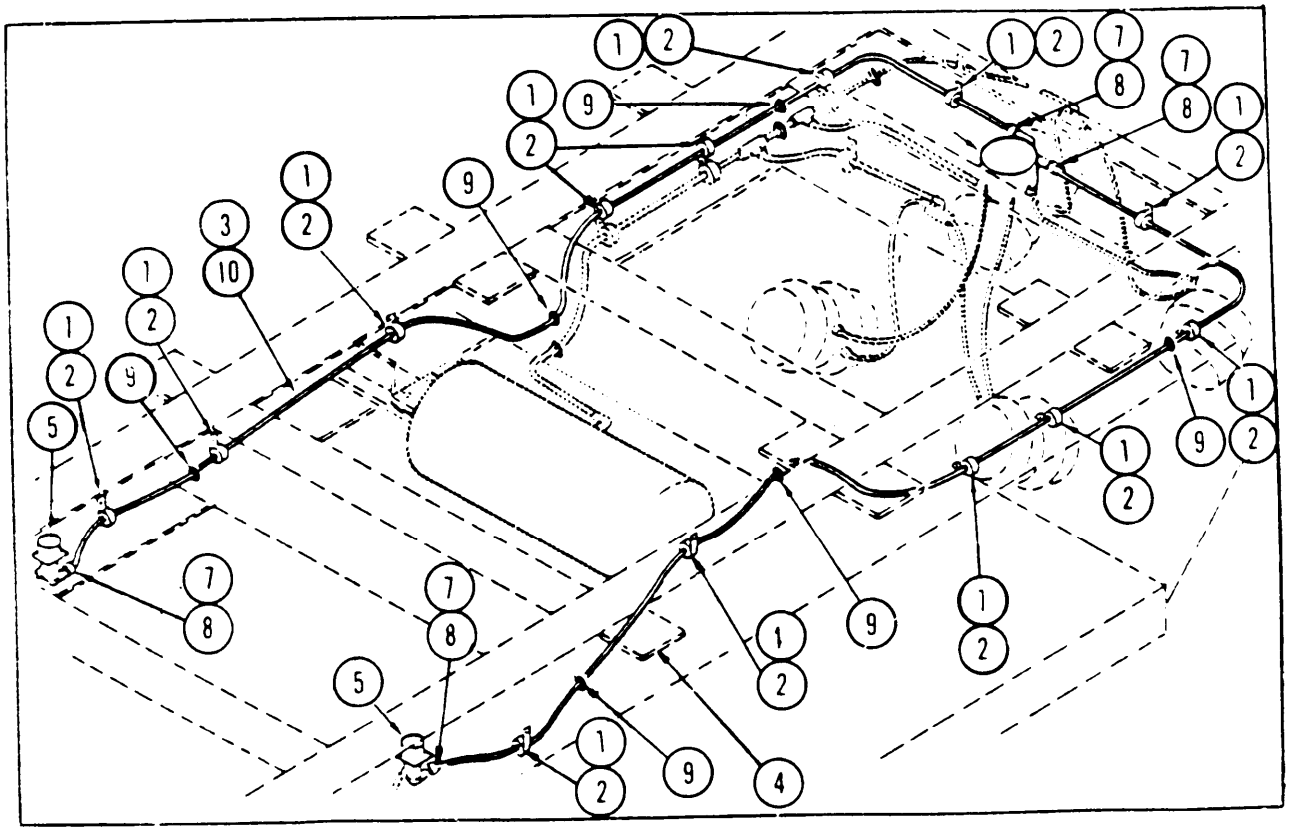


Figure 2–32. Trailer Air Brake Tubing Sections Between Air Cleaner Assemblies and Relay Valve (ARMY)

(3) To remove reservoir to air chamber assemblies tubing (figure 2-33), perform the following:

(a) Remove nuts (1) and clamps (2) securing tubing sections (3), (4), and (5) to trailer frame (6).

(b) Disconnect tubing section (3) from reservoir (7) and tee (8) by removing nuts (9) and sleeves (10)

(c) Disconnect tubing sections (4) and (5) from tees (8) and (11) and anchor tees (12) by removing nuts (13) and sleeves (14), then remove tubing section (4).

(d) Disconnect tubing section (15) from tees (8) and (11) by removing nuts (16) and sleeves (17), then remove tee (8).

(e) Disconnect tubing section (18) from tee (11) and relay valve (19) by removing nuts (20) and sleeves (21), then remove tubing section (18) and tee (11).

(f) Remove tubing sections (3), (5) and (15) and grommets (22) from trailer frame (6).

(g) Remove grommets (22) from tubing sections (3), (5), and (15) .

(h) Remove conduit (23) from tubing sections (3), (4), (5), (15), and (18).

b. Inspection. Inspect all tubing for bends or cracks. Replace tubing, if bends or cracks are found.

c. Installation.

(1) To install reservoir to air chamber assemblies tubing (figure 2-33), perform the following:

(a) Install conduit (23) on tubing sections (3), (4), (5), (15), and (18).

(b) Install grommets (22) on tubing sections (3), (5), and (15).

(c) Position tubing sections (3), (5), and (15) and grommets (22) in trailer frame (6).

(d) Install tee (11) on tubing section (18) using nut (20) and sleeve (21). Connect opposite end of tubing section (18) to relay valve (19) using nut (20) and sleeve (21).

(e) Connect tubing section (15) to tee (11) using nut (16) and sleeve (17).

(f) Install tee (8) on tubing section (15) with nut (16) and sleeve (17).

(g) position tubing sections (4) and (5) between tees (8) and (11) and anchor tees (12), then connect using nuts (13) and sleeves (14).

(h) Position tubing section (3) between reservoir (7) and tee (8), then connect using nuts (9) and sleeves (10).

(i) Install clamps (2) on tubing sections (3), (4) and (5) and secure to trailer frame (6) with nuts (1).

(2) To install the sections of tubing between the air cleaner assemblies and the relay valve (figure 2-32), perform the following:

(a) Install conduit (10) on tubing (3), then install grommets (9) on tubing (3).

(b) Position tubing (3) and grommets (9) in trailer frame (4).

(c) Connect tubing (3) to air cleaner assemblies (5) and relay valve (6) with nuts (7) and sleeves (8).

(d) Install clamps (2) on tubing (3) and secure to trailer frame (4) with nuts (1).

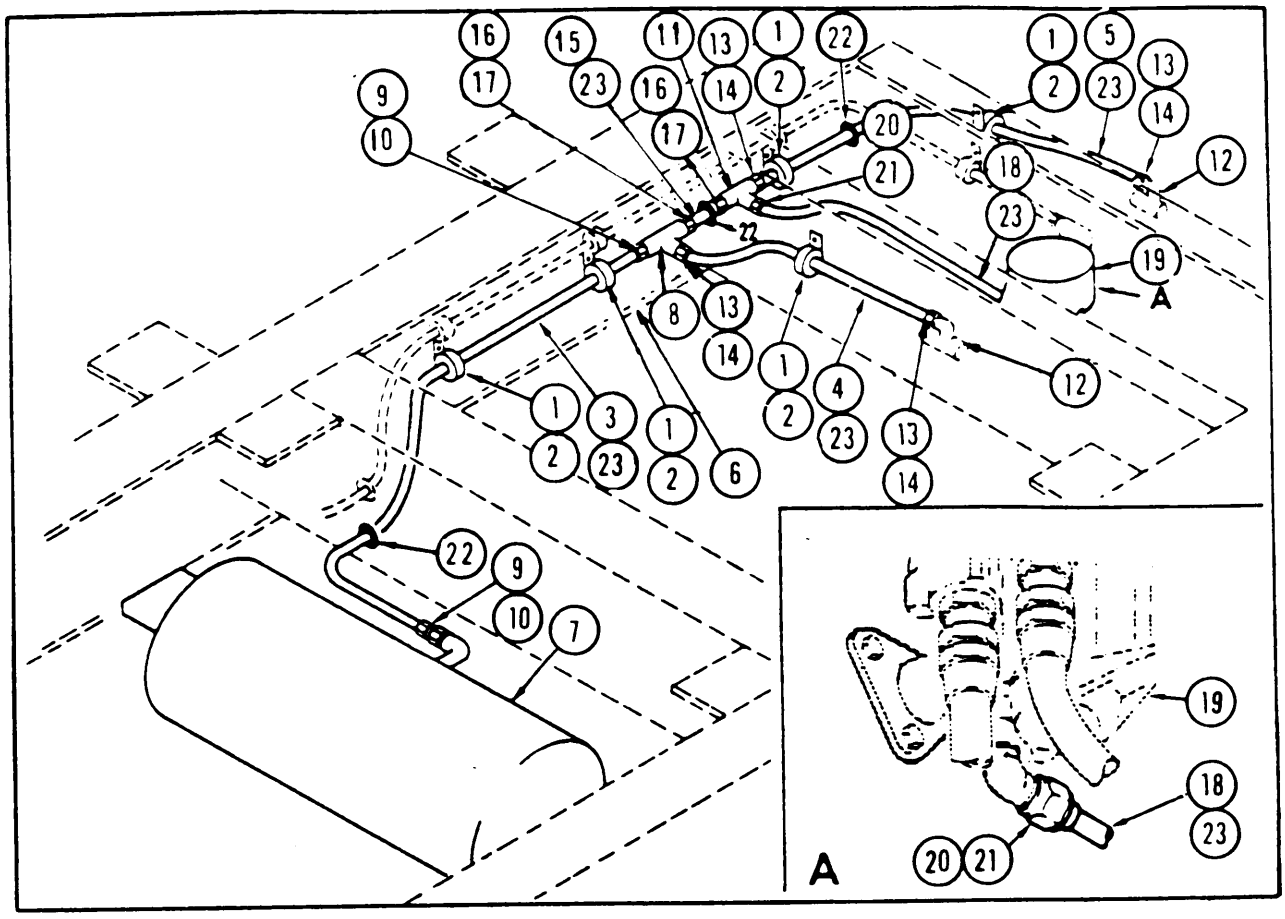


Figure 2-33. Trailer Air Brake Tubing Sections Between Air Reservoir and Air Chambers Assemblies (ARMY)

(3) To install the sections of tubing between the anchor couplings and the air cleaner assemblies (figure 2–31), perform the following:

(a) Install conduit (10) on tubing (3), then install grommets (9) on tubing (3).

(b) Position tubing (3) and grommets (9) in trailer frame (4).

(c) Connect tubing (3) to anchor couplings (5) and air cleaner assemblies (6) with nuts (7) and sleeves (8).

(d) Install clamps (2) on tubing (3) and secure to trailer frame (4) with nuts (1).

2-37. TRAILER ANCHOR TEE. (Figure 2-34) (ARMY)

a. Removal.

(1) Disconnect tubing (1).

(2) Remove elbow (2).

(3) Remove hose coupling nuts (3) and (4).

(4) Remove adapter fittings (5).

(5) Remove nuts (6) and bolts (7) securing anchor tee (8) to trailer frame (9).

b. Inspection. Inspect anchor tee for cracks or damaged threads. Replace anchor tee, if cracks or damaged threads are present.

c. Installation.

(1) Position anchor tee (8) to trailer frame (9) and attach with bolts (7) and nuts (6).

(2) Install adapter fittings (5) in anchor tee (8).

(3) install hose coupling nuts (3) and (4) to fittings (5).

(4) Install elbow (2) on anchor tee (8).

(5) Connect tubing (1) elbow (2).

2-38. TRAILER EMERGENCY IDENTIFICATION PLATE. (Figure 2-35) (ARMY)

a. Removal. Remove emergency identification plate (1) from frame brace (2).

b. Installation. Install emergency identification plate (1) on frame brace (2).

2-39. TRAILER BRAKE RELAY VALVE AND ADAPTER. (Figure 2–36) (ARMY)

a. Removal.

(1) Disconnect hose assemblies (1) from relay valve (2).

(2) Disconnect tubing (3) from relay valve (2) by removing nuts (4) and sleeves (5). Remove elbows (6).

(3) Remove relay valve (2) from valve adapter (7).

(4) Remove nuts (8) and screws (9) securing valve adapter (7) to trailer frame (10). Remove plug (11) from valve adapter (7).

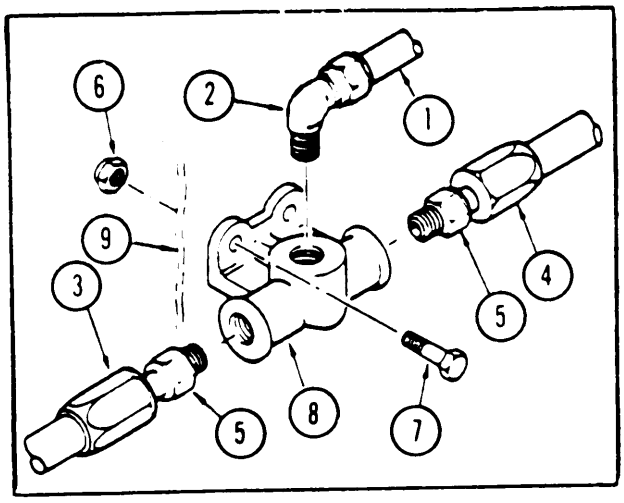


Figure 2-34. Trailer Anchor Tee (ARMY)

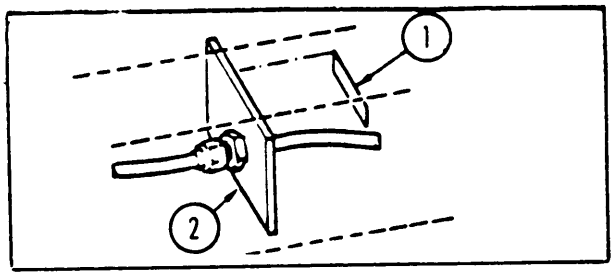


Figure 2–35. Trailer Emergency Identification Plate (ARMY)

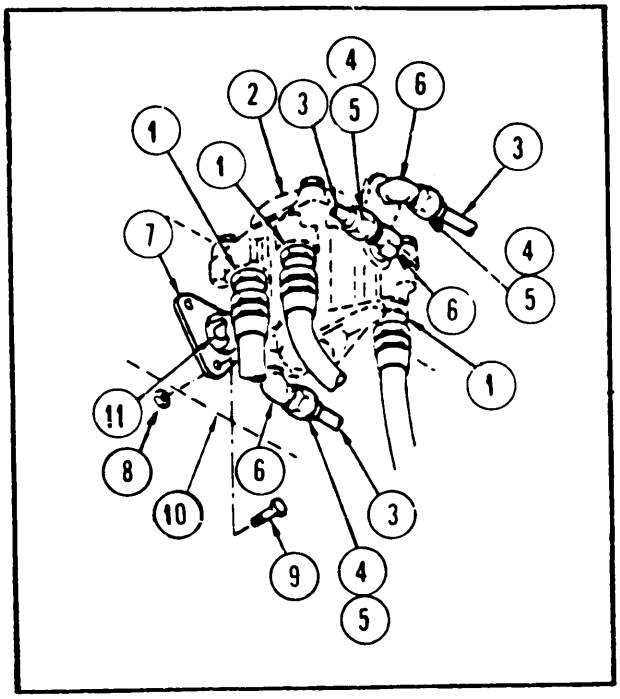


Figure 2-36. Trailer Relay Valve and Adapter Assembly (ARMY)

b. Disassembly. (Figure 2–37)

(1) Place relay valve on a clean dry workbench.

(2) Remove screw (1), diaphragm washer (2), and diaphragm (3).

CAUTION

Spring loaded under cover. Keep pressure on cover during removal to prevent possible loss of parts.

(3) Remove screws (4), washers (5), and exhaust cover (6).

(4) Remove O-rings (7) and (8) from exhaust cover (6).

(5) Remove emergency spring (9), then remove the emergency piston and valve assembly.

(6) Remove O-ring (10), spring (11), and ball (12) .

(7) With emergency piston and valve assembly placed on workbench, remove retaining ring (13) and remove the inlet and exhaust valve assembly from emergency piston (14).

(8) Remove retaining ring (15), valve guide (16), O-rings (17) and (18), valve spring (19) and valve retainer (20) from inlet and exhaust valve (21).

(9) Turn valve body over and remove screws (22) and washers (23).

(10) Remove cover (24) and O-ring (25).

(11) Remove relay piston assembly, then remove exhaust valve seat (26) from relay piston (27).

(12) Remove piston return spring (28) and sealing ring (29).

(13) Remove filter (30) from body (31).

c. Inspection.

(1) Inspect all springs for damage. If spring damage is present, replace spring.

(2) Inspect exhaust diaphragm for corrosion, nicks, and other damage. If corrosion, nicks, or other damage exists, replace exhaust diaphragm.

(3) Inspect relay piston for wear or corrosion. If badly worn or corroded, replace relay piston.

(4) Inspect filter for dirt, corrosion, or damage. If filter contains dirt, corrosion or is damaged, replace filter.

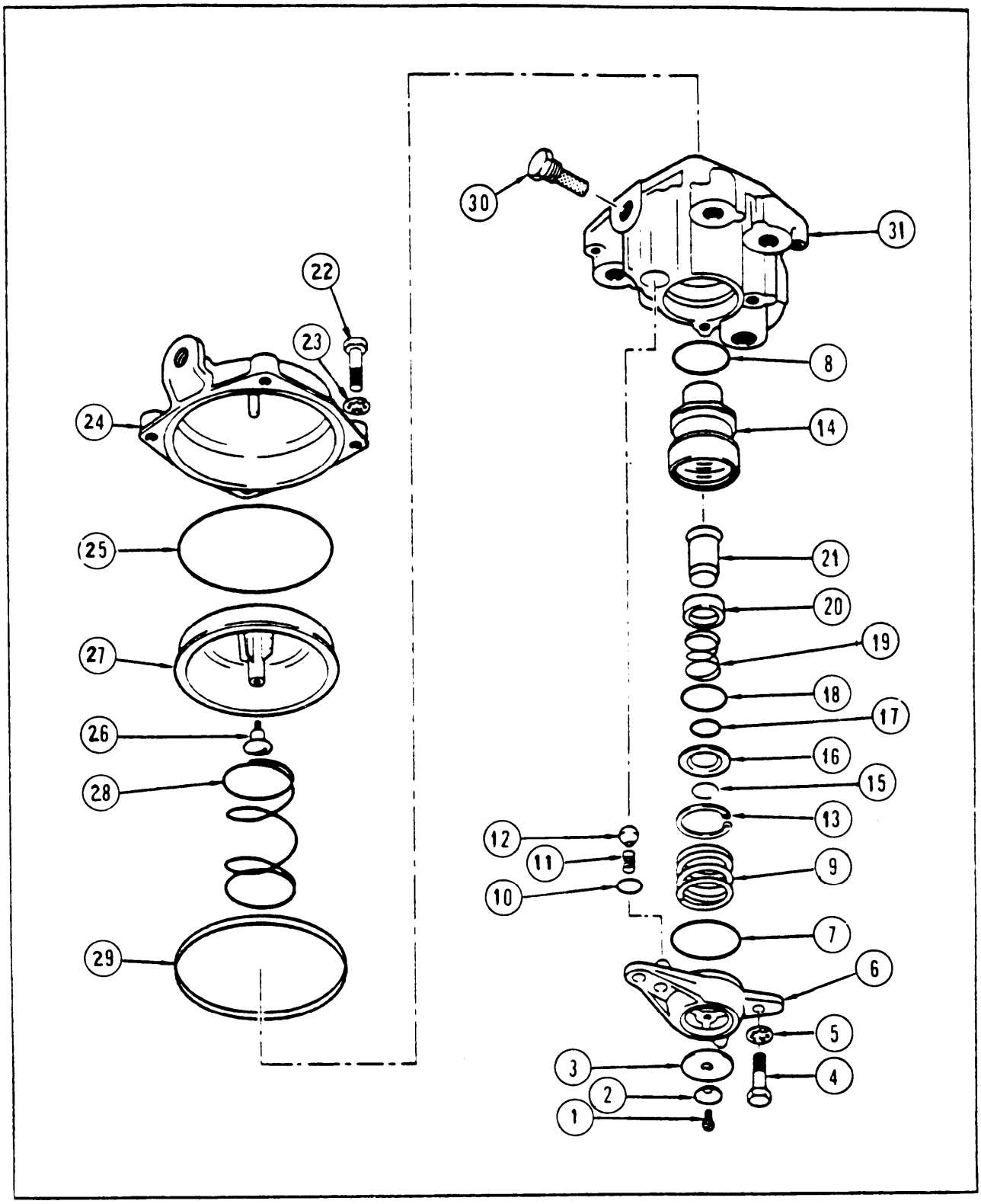


Figure 2-37. Trailer Brake Relay Valve and Adapter (ARMY)

d. Assembly. (Figure 2-37)

(1) Place relay valve body, with large opening up, on clean dry workbench.

(2) Install filter (30) in body (31).

(3) Install sealing ring (29) and piston return spring (28) in body (31).

(4) Assemble relay piston assembly by installing exhaust valve seat (26) in relay piston (27).

(5) Install relay piston assembly over piston return spring (28) and into body (31).

(6) Install O–ring (25), then position cover (24) to body (31) and secure with washers (23) and screws (22).

(7) Turn valve body over and install O-ring (10), spring (11), and ball (12) in body (31).

(8) Assemble inlet and exhaust valve assembly by installing valve retainer (20), valve spring (19), 0–rings (18) and (17), and valve guide (16) on inlet and exhaust valve (21), then install retaining ring (15) to secure.

(9) Install the inlet and exhaust valve assembly in emergency piston (14), then install retaining ring (13) to secure.

(10) Install emergency spring (9).

(11) Place O-rings (7) and (8) on exhaust cover (6).

(12) Position exhaust cover (6) on body (31) and install washers (5) and screws (4).

(13) Install diaphragm (3), diaphragm washer (2), and screw (1).

e. Installation. (Figure 2-36)

(1) Install plug (11) in valve adapter (7).

(2) Position valve adapter (7) to trailer frame (1 O) and attach with screws (9) and nuts (8).

(3) Install relay valve (2) in valve adapter (7).

(4) Install elbows (6) in relay valve (2), then connect tubing (3) to relay valve (2) with nuts (4) and sleeves (5).

(5) Connect hose assemblies (1) to relay valve (2).

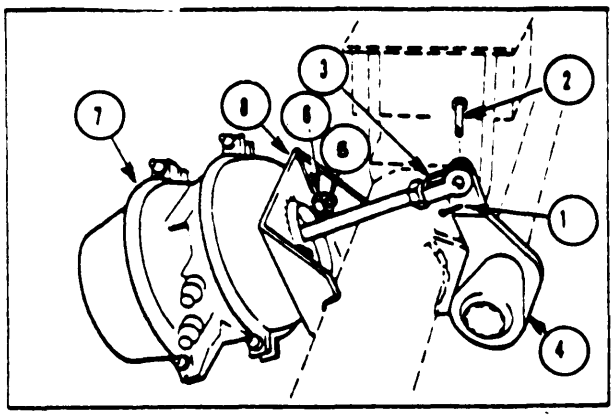


Figure 2-38. Trailer Brake Air Chamber Assembly (ARMY)

2-40. TRAILER BRAKE AIR CHAMBER ASSEMBLY. (Figure 2-38) (ARMY)

a. Removal.

(1) Remove cotter pin (1) and clevis pin (2) attaching air chamber assembly clevis (3) to slack adjuster (4).

(2) Remove nuts (5) and washers (6) attaching air chamber assembly (7) to air chamber bracket (8).

b. Installation. (Figure 2–38)

(1) Position air chamber assembly (7) to air chamber bracket (8).

(2) Install washers (6) and nuts (5).

(3) Align air chamber assembly clevis (3) with slack adjuster (4) and install clevis pin (2). Install cotter pin (1) to secure clevis pin (2).

c. Adjustment

(1) Check the travel of the air chamber assembly push rod assembly when brakes are applied.

(2) Push rod assembly travel must be kept at a minimum without brakes dragging.

NOTE

All brake adjustments must be made with the wheels jacked up.

(3) If slack is present or push rod travel is extensive, adjust slack adjuster at adjusting screw located on the slack adjuster.

2-41. BACKWASH PUMP ASSEMBLY. (Figure 2–39)

a. General. The backwash pump assembly consists of a welded frame holding the backwash pump, power cable, and strainer. This paragraph describes removal, cleaning, inspection, and installation of the power cable assembly, strainer, and backwash pump assembly.

b. Power Cable Assembly Removal.

WARNING

ELECTRICAL HIGH VOLTAGE

High–voltage electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Remove four screws (1) from conduit box cover (2), conduit box cover gasket (3) and conduit box (15).

(2) Remove conduit box cover (2) and gasket (3) from conduit box (15).

(3) Pull wires out far enough to expose taped ends and cut twine (4) that binds wires.

(4) Remove tape (5) from ends of power cable wires only.

NOTE

Mark each set of wires for ease of reassembly later.

(5) Remove nut (6), lockwasher (7), and flat washer (8) from screw (10) on each set of wires.

(6) Remove screw (10) from wire lugs (9) on each set of wires.

(7) Remove bolt (11) from conduit box (15) and from ground wire (12).

(8) Remove bolt (11) from ground wire (12).

(9) From inside conduit box (15), remove cable grip nut (13) from cable grip (14) and slide it off wires.

(10) Remove remainder of cable grip (14) and cable assembly from conduit box (1 5).

NOTE

Be sure O–ring remains with the cable grip.

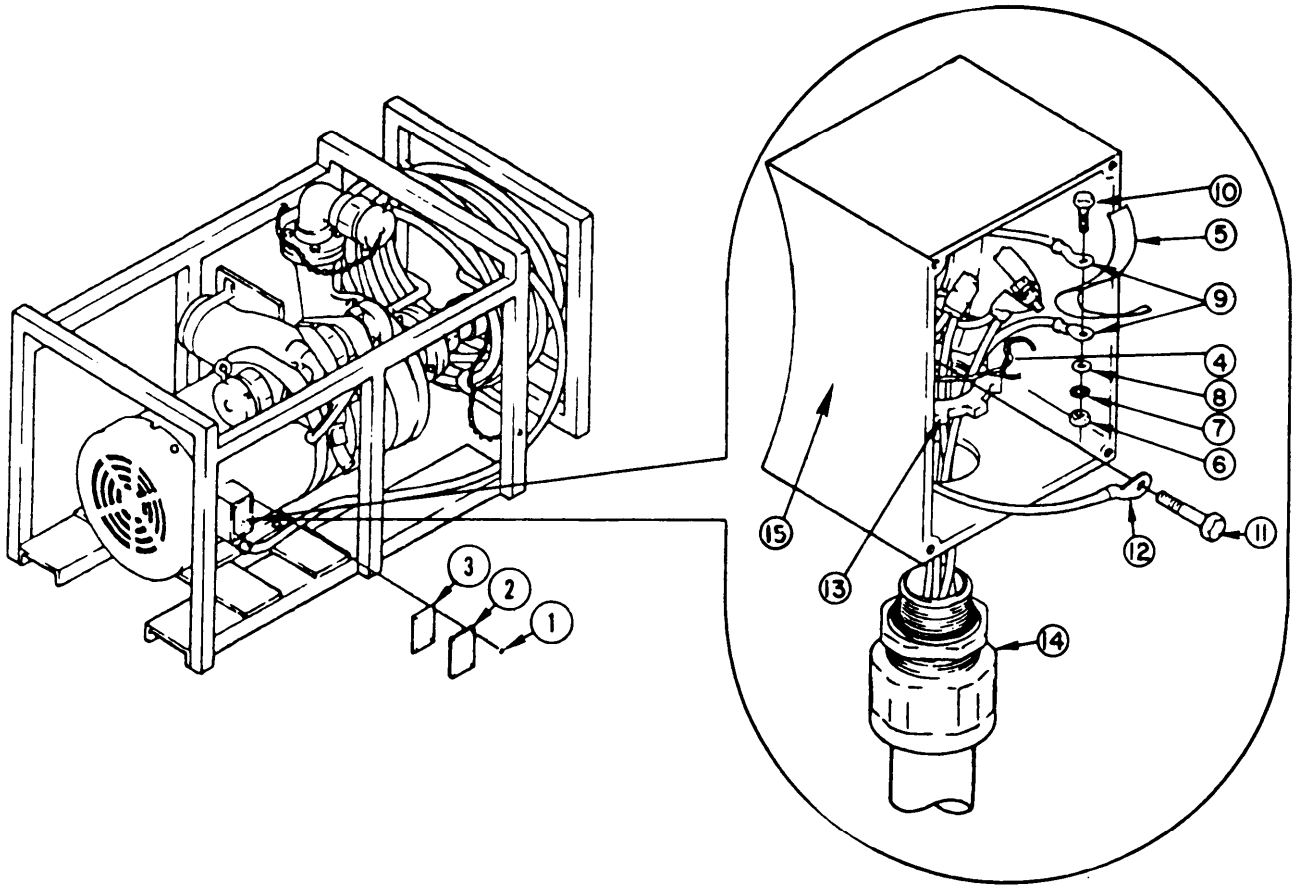


Figure 2–39. Backwash Pump Power Cable

c. Backwash Pump Removal From Frame. (Figure 2-40)

(1) If motor is to be replaced, refer to paragraph 2-41 b. If not, unwrap power cable and move bulk of power cable out of the way to remove backwash pump from frame (figure 2-40).

(2) Remove two self-locking nuts (1), two flat washers (2), and two cap chains (3) from screws (4).

(3) Remove two screws (4) from frame (22).

NOTE

If strainer (6) is mounted on backwash pump frame (22), perform step (4), if mounted on backwash pump (21), perform step (5).

(4) Remove nuts (23), lockwasher (24), washers (25), and bolt (26) attaching strainer (6) to frame (22).

(5) Remove two packing straps (5) and strainer (6) from backwash pump (21).

(6) Remove four bolts (19) and four lockwashers (20) from backwash pump (21) and frame (22).

NOTE

If necessary to remove suction flange (11) and discharge flange (17), perform steps (7) to (12).

(7) Remove four nuts (7), four lockwashers (8), and four flat washers (9) from bolts (10).

(8) Remove four bolts (10) and four flat washers (9) from suction flange assembly (11).

(9) Remove suction flange assembly (11) and gasket (12) from pump (21).

(10) Remove four nuts (13), four lockwashers (14), and four flat washers (15) from bolts (16).

(11) Remove four bolts (16) and four flat washers (15) from backwash pump (21) and discharge flange assembly (17).

(12) Remove discharge flange assembly (17) and gasket (18) from backwash pump (21).

WARNING

Weight of backwash pump is 195 pounds (88.5 kg). Attempting to move it without proper equipment could cause serious injury. Lift motor with equipment rated at one ton (0.91 tonne) or greater.

(13) Using proper equipment, remove backwash pump (21) from frame (22).

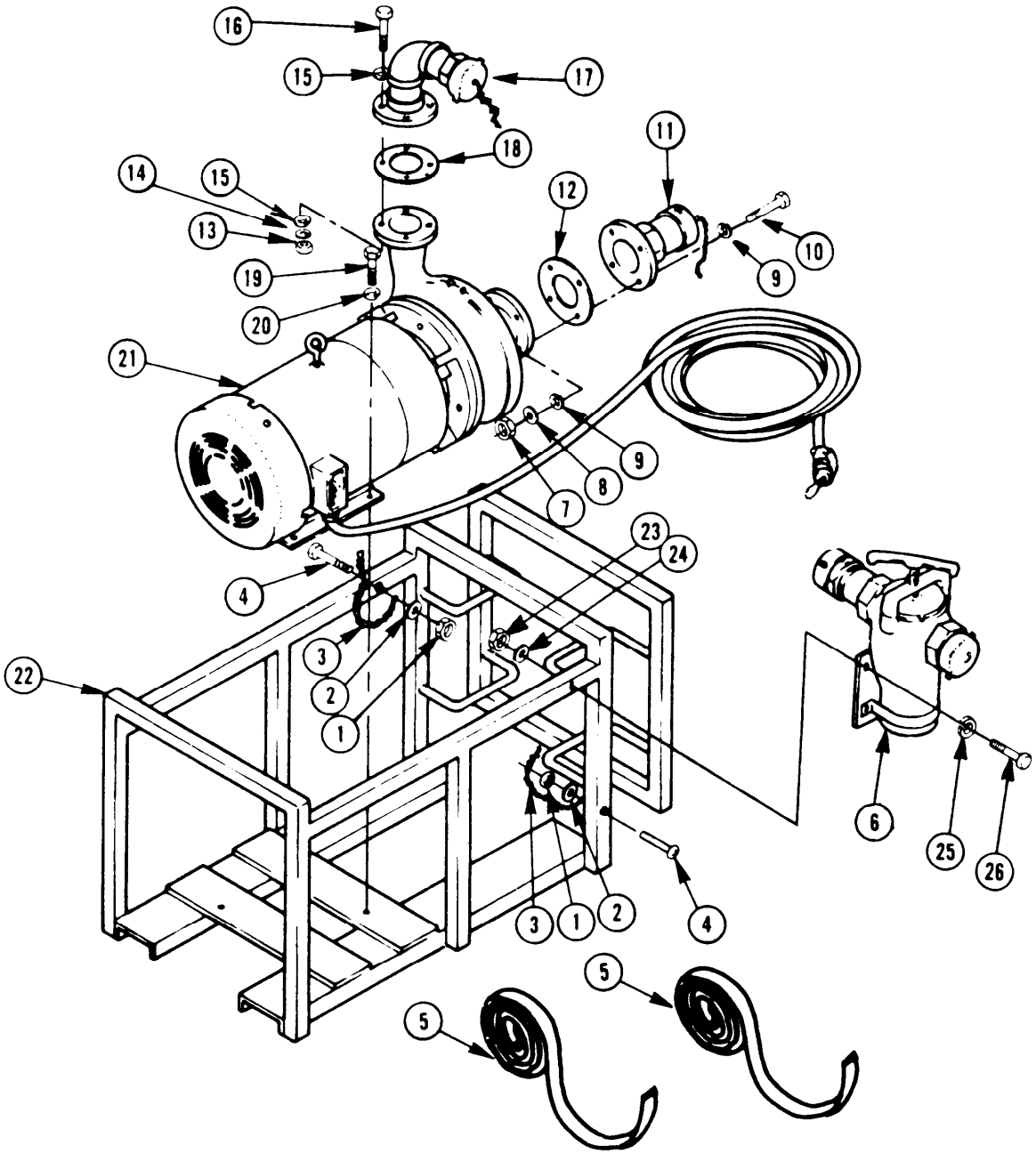


Figure 2-40. Backwash Pump Assembly

d. Cleaning.

WARNING

Drycleaning solvent P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact, Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Clean pump motor and pump with cleaning solvent Fed. Spec. P-D-680, then air dry.

(2) Clean threads on hardware, nipples, and hose connections.

(3) Wipe cable and cable terminals with cleaning solvent Fed. Spec. P-D-680.

e. Inspection.

(1) Check cable for breaks in insulation and rubber cover.

(2) Check cable ends for bare wire between insulation and terminals and for damaged plugs and terminals.

(3) Check motor fan cover for dirt, dents, and peeling paint.

(4) Inspect pump frame for broken welds, bends, and damaged paint.

(5) Check mounting hardware for bent bolt shanks, rust, and damaged threads.

(6) Check for missing pump inlet and outlet port caps.

(7) Check for broken, missing, or damaged cap retainer chains.

(8) Inspect conduit box cover gasket for tears.

f. Repair or Replace Pump Assembly.

(1) If existing wire lengths permit, wire terminals may be replaced or faulty wire ends removed; otherwise, replace cable.

(2) Motor fan cover may have dents removed to prevent interference with fan. If damage is severe or large cracks are present, replace cover.

(3) Pump frame may be rewelded and frame members straightened or replaced.

(4) Replace all damaged screws, nuts, bolts, and washers.

(5) Repair damaged suction and discharge flange assemblies, (refer to paragraph 2-74).

(6) Replace all gaskets and O-rings.

(7) Replace damaged or worn strainer straps.

(8) Replace damaged or unserviceable backwash pump.

(9) Send damaged or unserviceable pump assemblies to Direct Support Maintenance for repair.

(10) Repair strainer assembly in accordance with paragraphs 2-41i through 2-41n.

g. Pump Installation. (Figure 2-40)

WARNING

Weight of backwash pump is 195 pounds (88.5 kg). Attempting to move it without proper equipment could cause serious injury. Lift pump assembly into frame with equipment rated at one ton (0.91 tonne) or greater.

(1) Place backwash pump (21) into frame (22).

(2) Install four bolts (19) and four lockwashers (20) into backwash pump (21) and frame (22).

NOTE

If discharge flange (17) and suction flange (11) were not previously removed, proceed to step (6).

(3) Hold discharge flange (17) and new gasket (18) in place and insert four bolts (16) and four flat washers (15) into discharge flange (17), new gasket (18), and backwash pump (21).

(4) Install four flat washers (15), four lockwashers (14), and four nuts (13) on bolts (16).

(5) Hold suction flange (11) and new gasket (12) in place and install four flat washers (9) and four bolts (10) into suction flange (11), new gasket (12), and backwash pump (21).

NOTE

To mount strainer (6) on backwash pump frame (22) perform step (6). To mount strainer on backwash pump (21), perform step (7).

(6) Install strainer (6) using bolt (26), washer (25), lockwasher (24), and nut (23), on backwash pump frame (22).

(7) Mount strainer (6) on backwash pump (21) using two packing straps (5).

(8) Install two screws (4) into frame (22).

(9) Install two cap chains (3), two flat washers (2), and two self-locking nuts (1) onto screws (4).

h. Power Cable Assembly Installation. (Figure 2–39)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Slip cable grip (14) over cable.

(2) Insert tagged wires through hole in conduit box (15).

(3) From inside conduit box (15), slip cable grip nut (13) over wires and mount cable grip (14) to conduit box (15).

(4) Slip ground wire lug (12) on bolt (11).

(5) Install bolt (11) and ground wire (12) into conduit box (15) and motor.

(6) Slip three sets of wire lugs (9) over three screws (10) (in pairs) and remove tags.

(7) Install flat washer (8), lockwasher (7), and nut (6) on screw (10) on wire lugs (9).

(8) Wrap each set of wire lugs with tape (5) and tie wires into bundle using lacing cord (4).

(9) Carefully insert wire bundle into conduit box (15).

(10) Install four screws (1), conduit box cover (2), and new gasket (3) to conduit box (15).

i. Backwash Pump Strainer. (Figure 2-41)

NOTE

The backwash pump strainer is attached to the output of the backwash pump. It functions as an extra filter for the brine water during backwash and element cleaning operations. It is towed using two straps to mount it to the backwash pump assembly in figure 2-40.

j. To remove strainer from backwash pump assembly, perform paragraph 2-41 c, step (4) or (5) as applicable.

k. Strainer Disassembly. (Figure 2-41)

(1) Remove two nuts (1) and two lockwashers (2) from screw (3).

(2) Remove two screws (3) and two flat washers (4) from strap (5) and mounting plate (6).

(3) Remove strap (5) and mounting plate (6) from strainer body (20).

(4) Cut wire (9) and remove cap (7) from adapter (8).

(5) Remove adapter (8) from pipe (10).

(6) Remove pipe (10) from strainer body (20).

(7) Remove cap (11) from adapter (12).

(8) Remove adapter (12) from strainer body (20).

(9) Loosen T-handle (15) to release pressure on strainer cap (17).

(10) Remove two bolts (14) and yoke (16) with T-handle (15) from strainer body (20).

(11) Using the two ears on the strainer cap (17), twist the cap back and forth until it loosens.

(12) Remove cap (17) and O-ring (18) from strainer body (20).

(13) Remove strainer basket (19) and remove from strainer body (20).

(14) Remove drain plug (21) from bottom of strainer body (20).

l. Cleaning Strainer.

(1) Flush strainer screen and strainer housing with product water to remove foreign matter.

(2) Clean strainer screen, housing, and all parts with a stiff brush and a mild soap solution.

NOTE

Make sure all holes in strainer are open.

(3) Remove dirt and contaminants from all threads and fittings.

(4) Clean gasket mounting surfaces.

(5) Rinse with product water and allow to air dry.

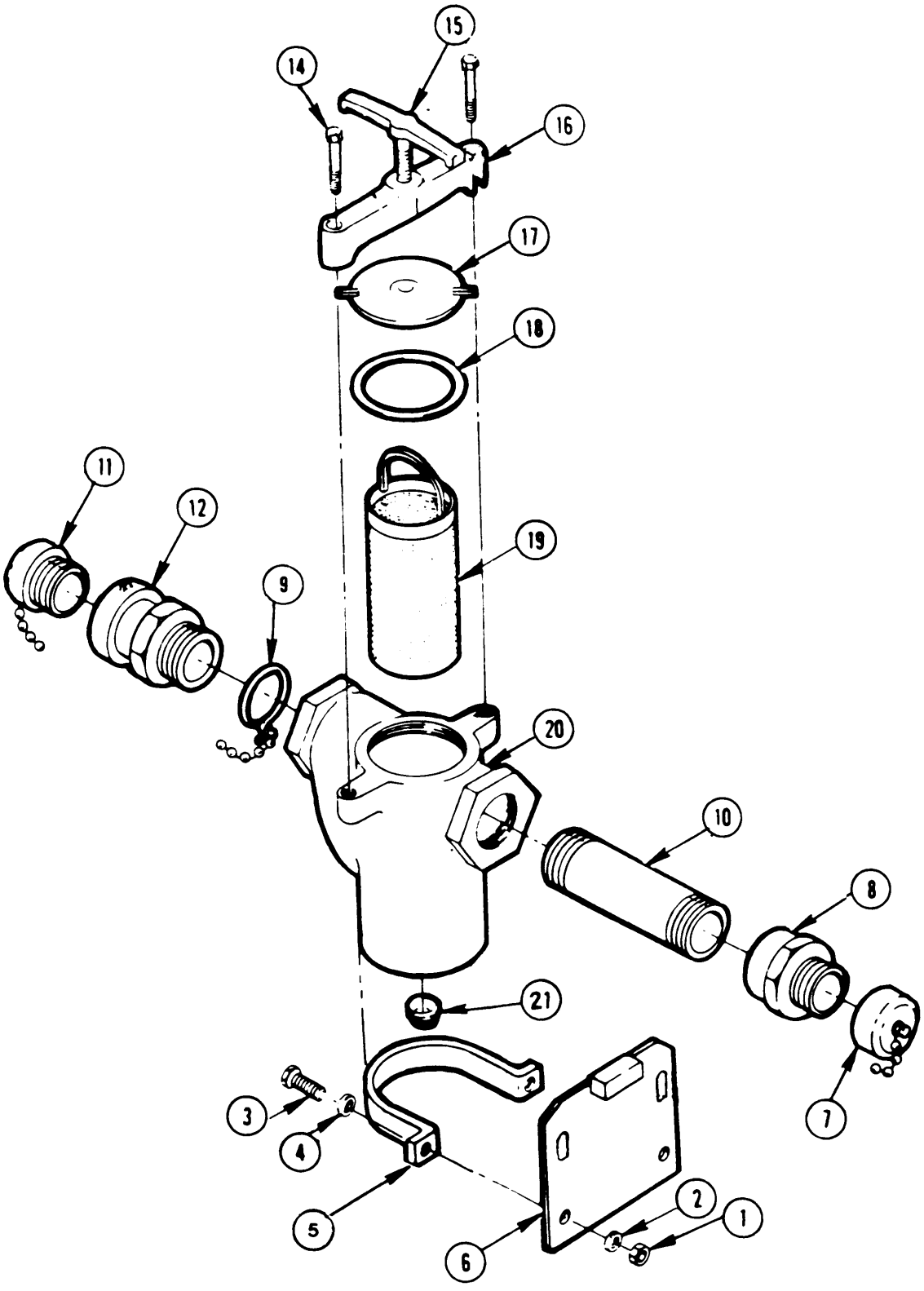


Figure 2-41. Backwash Pump Strainer

m. Strainer Inspection.

(1) Inspect strainer for tears, holes, and small dents.

(2) Inspect all threads for damage or stripping.

(3) Inspect strainer body for cracks, fractures, and holes.

(4) Check for bent or damaged mounting plate and bracket.

(5) Inspect O–ring for cracking, splits, or tears.

(6) Inspect all hardware for stripped or damaged heads.

n. Strainer Repair or Replace.

(1) Small tears or holes maybe welded.

(2) Large tears or holes maybe repaired by welding a patch on inside of strainer. Maximum patch size will not exceed 1 1/2 X 1 1/2 inches. Small dents need not be repaired.

(3) Threads may be recut or retapped.

(4) Strainer body may be welded.

(5) Mounting plate and strap may be welded or flattened to remove dents or fractures.

(6) Replace all O-rings and gaskets.

(7) Replace all damaged nuts, screws, and washers.

(8) Repaint in accordance with Standard Operating Procedures.

o. Strainer Reassemble.

(1) Install drain plug (21) in bottom of strainer body (20).

(2) Lower strainer basket (19) into strainer body (20) and hold handle down.

(3) Install new O-ring (18) and cap (17) onto the strainer body (20).

(4) Install two bolts (14), finger-tight, through yoke (16) into strainer body (20).

(5) Swing yoke (16) into center of strainer body (19) over cap (17) and tighten two bolts (14).

(6) Tighten T-handle (15) to apply pressure on cap (17).

(7) Install adapter (12) into strainer body (20).

(8) Install cap (11) on adapter (12).

(9) Secure cap chain with brass wire (9).

(10) Install pipe (10) into strainer body (20).

(11) Install adapter (8) onto pipe (10).

(12) Install cap (7) onto adapter (8).

(13) Install strap (5) around strainer body (20) to mounting plate (6) loosely, using two screws (3), two flat washers (4), two lockwashers (2), and two nuts (1).

(14) Tighten strap (5).

p. Install Strainer. (Figure 2-40)

To install strainer to backwash pump assembly, perform paragraph 2--41 g, step (6) or (7) as applicable.

2-42. DISTRIBUTION PUMP ASSEMBLY.

a. General. The distribution pump is used to transfer purified drinking water from storage tanks to the user's containers. The distribution pump and spacer plate are bolted to a frame assembly. This paragraph describes the removal, cleaning, inspection, and installation of the power cable assembly and distribution pump.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

b. Power Cable Assembly Removal. (Figure 2-42)

(1) Remove four screws (1) from conduit box cover (2), conduit cover gasket (3), and conduit box (13).

(2) Remove conduit box cover (2) and gasket (3) from conduit box (13).

(3) Pull wires out far enough to expose taped ends and cut twine (4) that holds bundles together.

(4) Remove tape (5) from ends of three sets of wires.

NOTE

Mark each set of wires for ease of reassembly later.

(5) Remove nut (6), lockwasher (7), and flat washers (8) from screw (10) on each set of wires.

(6) Remove all wire lugs (9) from screw (10) on each set of wires.

NOTE

Cable may be located on top or bottom of conduit box.

(7) From inside conduit box (13), remove cable grip nut (10) from cable grip (12) and slide it off wires.

(8) Remove remainder of cable grip (12) and cable assembly from conduit box.

NOTE

Be sure O–ring remains with the cable grip.

c. Distribution Pump Removal from Frame. (Figure 2-43)

(1) If motor is to be replaced, refer to paragraph 2-42b. If not, unwrap power cable and move bulk of power cable out of the way for this operation.

(2) Remove locknut (1) and flat washer (2) from screw (4).

(3) Remove top cap chains (3) from screw (4).

(4) Remove screw (4) from frame (10).

NOTE

Tilt assembly for hardware access.

(5) Remove four nuts (5) and four lockwashers (6) from bolts (7).

(6) Remove four bolts (7) from frame (10), spacer plate (9), and pump (8).

(7) Remove pump (8) from spacer plate (9) and out of frame (10).

(8) Remove spacer plate (9) from frame (10).

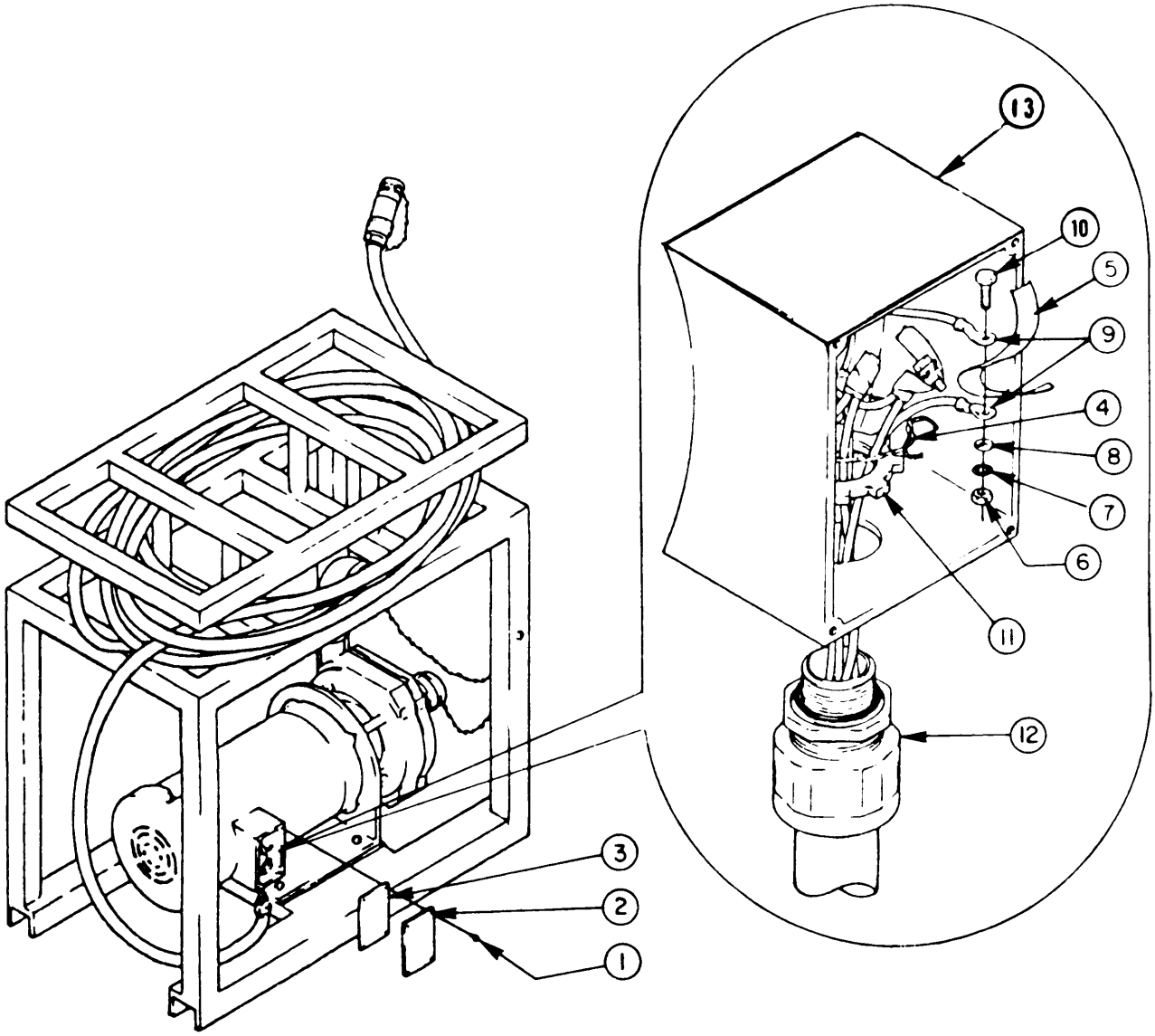


Figure 2–42. Distribution Pump Power Cable

d. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Clean pump motor and pump with cleaning solvent Fed. Spec. P–D-680, then allow to air dry.

(2) Clean spacer plate and prepare for repainting, if necessary.

(3) Clean motor, cable, and pump frame with steel brush or mild soap, as needed.

(4) Clean threads on hardware nipples and hose connections.

(5) Wipe cable and cable terminals with cleaning solvent Fed. Spec. P-D-680.

e. Inspection.

(1) Check cable for breaks in insulation and rubber cover.

(2) Check cable ends for bare wire between insulation and terminals and for damaged plugs.

(3) Check motor fan cover for dirt, dents, and peeling paint.

(4) Inspect pump frame for broken welds, bends, and damaged paint.

(5) Check mounting hardware for bent bolt shanks, rust, and damaged threads.

(6) Check for missing pump inlet and outlet port caps.

(7) Check for broken, missing, or damaged cap retainer chains.

(8) Inspect conduit box cover gasket for tears. Replace gasket, if damaged.

f. Repair or Replace.

(1) Replace all damaged or worn electrical cables.

(2) Motor fan cover may have dents removed to prevent interference with fan. If damage is severe or large cracks are present, replace cover.

(3) Pump frame may be rewelded and frame members straightened or replaced.

(4) Replace all damaged screws, nuts, bolts, and washers.

(5) Replace all damaged pipe and pipe fittings.

(6) Replace all gaskets and O–rings.

(7) Repaint in accordance with Standard Operating Procedures.

(8) Replace damaged or unserviceable distribution pump.

(9) Send damaged or unserviceable pump to Direct Support Maintenance for repair.

g. Pump installation.

(1) Place spacer plate (9) (figure 2-43) in frame (10) and align four mounting holes.

(2) Place pump (8) in frame (10) and align four mounting holes of pump (8), spacer plate (9), and frame (10).

(3) Insert four bolts (7) into pump (8), spacer plate (9), and frame (10).

(4) Install four lockwashers (6) and four nuts (5) on bolts (7).

(5) Insert screw (4) into frame (10).

(6) Install two cap chains (3), flat washer (2), and nut (1) on screw (4).

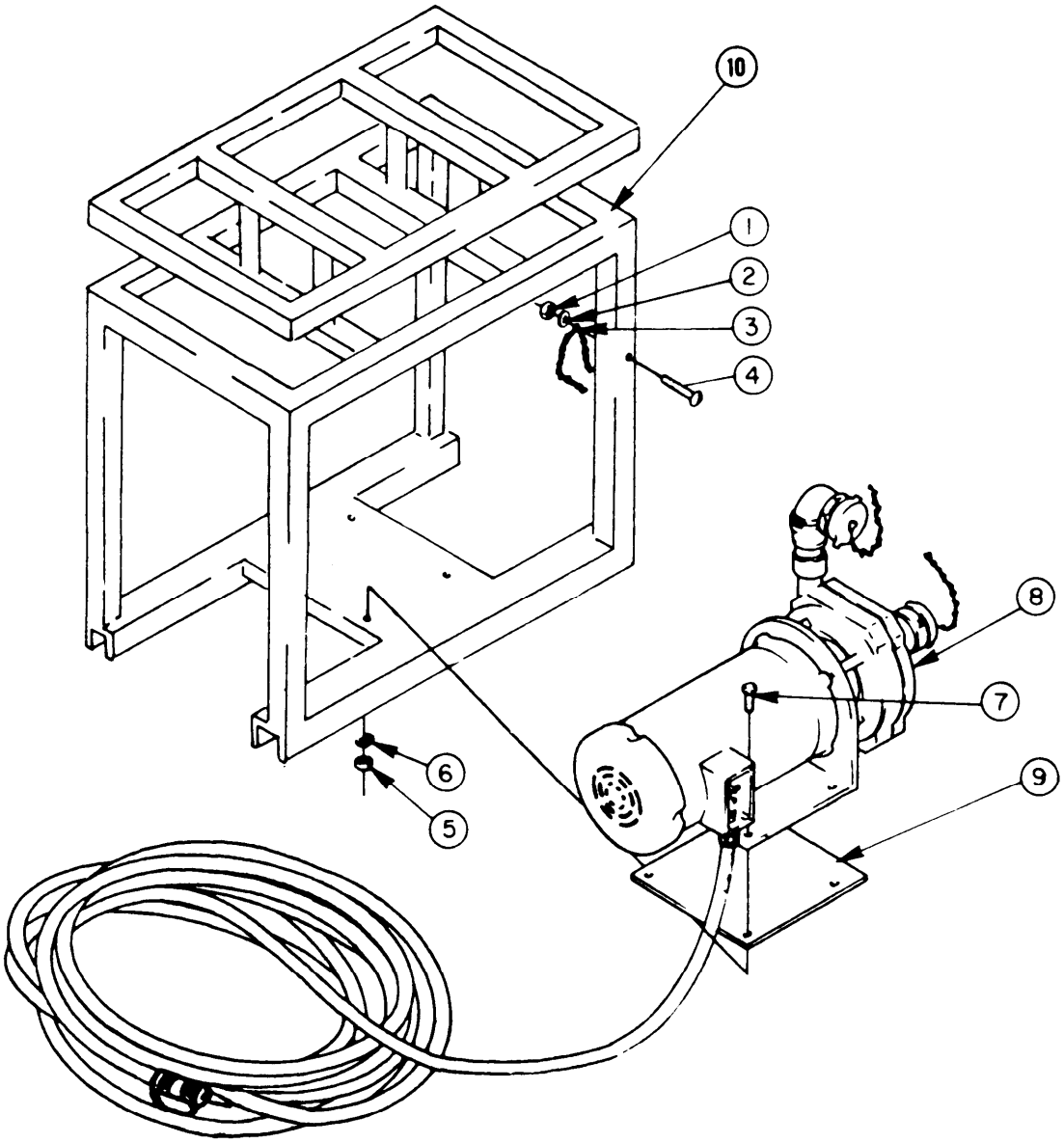


Figure 2–43. Distribution Pump Assembly

h. Power Cable Assembly Installation. (Figure 2-42)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Slip cable grip (12) over cable.

(2) Insert tagged wires through hole in conduit box (13).

(3) From inside of conduit box (13), slip cable grip nut (11) over wires and mount cable grip (12) to conduit box (13).

(4) Slip tagged wire lugs (9) over three screws (10) in three pairs and remove tags.

(5) Install flat washer (8), lockwasher (7), and nut (6) onto screw (10) of wire sets.

(6) Wrap each set of wire lugs including screw and hardware with tape (5).

(7) Tie wires into bundle with lacing cord (4).

(8) Carefully insert wire bundle into conduit box (13).

(9) Hold conduit box cover (2) and new gasket (3) in place.

(10) Install four screws (1) through conduit box cover (2), gasket (3), and conduit box (13).

2-43. RAW WATER PUMP ASSEMBLY

a. General. The raw water pumps provide water from the source and supplies it to the ROWPU for purification. This paragraph describes removal of the power cable assembly from the motor, removal of the pump from the frame, cleaning, inspection, and installation of the raw water pump assembly.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

b. Power Cable Assembly Removal, (Figure 2-44)

(1) Remove two screws (1) from conduit box (14) and conduit box cover (2).

(2) Remove conduit box cover (2) from conduit box (14).

(3) Pull wires out far enough to expose taped ends.

(4) Cut twine (3) that holds bundles together.

(5) Remove tape (4) from ends of each set of wires.

NOTE

Mark each set of wires for ease of reassembly later.

(6) Remove nut (5), lockwasher (6), and flat washer (7) from screw (9) on each set of wires.

(7) Remove all wire lugs (8) from screw (9) on each set of wires.

(8) Remove grounding screw (10) from inside of conduit box (14).

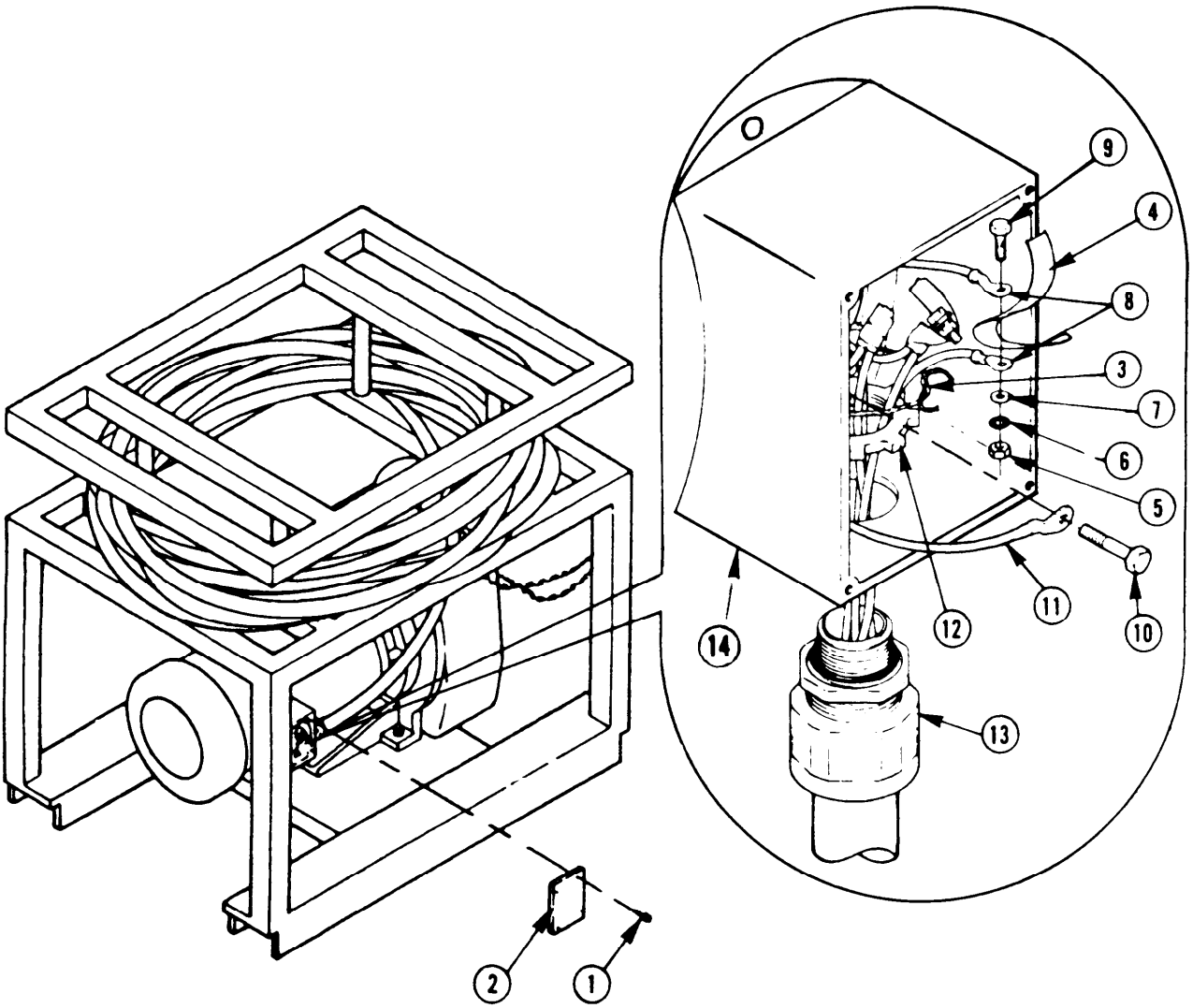


Figure 2-44. Raw Water Pump Power Cable

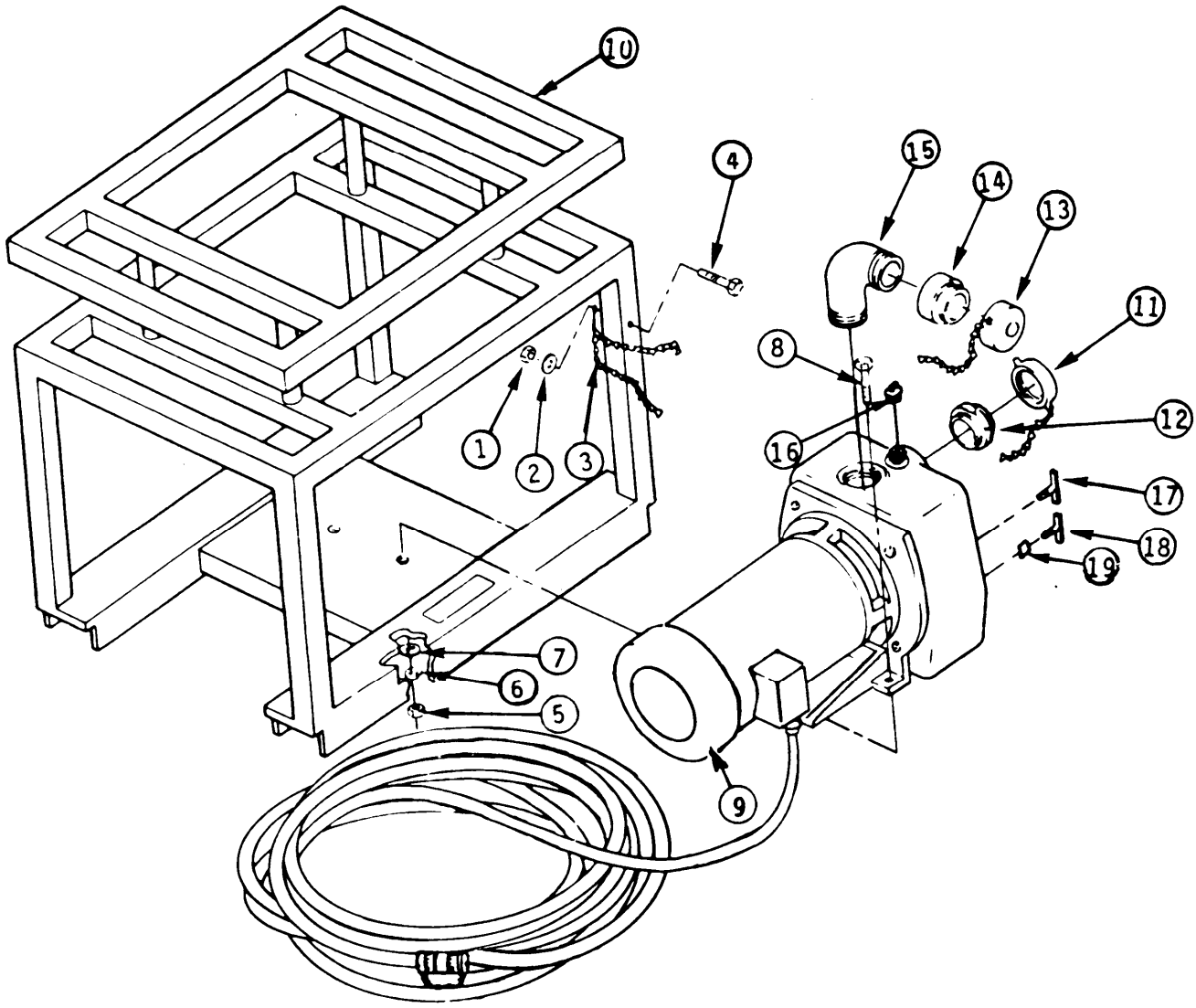


Figure 2-45. Raw Water Pump Assembly

(9) Remove ground lug (11) from grounding screw (10).

(10) From inside conduit box (14), remove cable grip nut (12) from cable grip (13) and slide it off wires.

NOTE

Be sure O–ring remains with cable grip.

(11) Remove remainder of cable grip (13) and cable assembly from conduit box (14).

c. Raw Water Pump Removal from Frame. (Figure 2-45)

(1) If motor is to be replaced, perform step (b), this paragraph. If not, unwrap power cable and move bulk of power cable out of the way for this operation.

(2) Remove self-locking nut (1), flat washer (2), and two cap chains (3) from screw (4).

(3) Remove screws (4) from frame (10).

NOTE

Tilt assembly for hardware access.

(4) Remove two nuts (5), two lockwashers (6), and two flat washers (7) from bolts (8).

(5) Remove two bolts (8) from frame (10) and pump (9).

(6) Remove pump (9) from frame (10).

NOTE

Perform steps (7) through (14) only if replacing pump assembly and retain removed items for the new pump.

(7) Remove hose cap (11) from adapter (12).

(8) Remove adapter (12) from pump (9).

(9) Remove hose cap (13) from adapter (14).

(10) Remove adapter (14) from elbow (15).

(11) Remove elbow (15) from pump (9).

(12) Remove priming plug (16) from pump (9).

(13) Remove two petcocks (17) and (18) from pump (9).

(14) Remove reducer (19) from pump (9).

d. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Clean pump motor and pump with cleaning solvent Fed. Spec. P-D-680, then air dry.

(2) Clean motor-cable-pump frame with steel brush or mild soap and brush, as needed. Prepare for repainting, if necessary.

(3) Clean threads on hardware, nipples, and hose connections.

(4) Wipe cable and cable terminals with cleaning solvent Fed. Spec. P-D 680.

e. Inspection.

(1) Check cable for breaks in insulation and rubber cover.

(2) Check cable ends for bare wire between insulation and terminals and for damaged plugs and terminals.

(3) Check motor fan cover for dirt, dents, and peeling paint.

(4) Inspect pump frame for broken welds, bends, and damaged paint.

(5) Check mounting hardware for bent bolt shanks, rust, and damaged threads.

(6) Check for missing pump inlet and outlet port caps.

(7) Check for broken, missing, or damaged cap retainer chains.

f. Repair or Replace.

(1) Replace all damaged or worn electrical cables.

(2) Motor fan cover may have dents removed to prevent interference with fan. If damage is severe or large cracks are present, replace cover.

(3) Pump frame may be rewelded and frame members straightened or replaced.

(4) Replace all damaged screws, nuts, bolts, and washers

(5) Replace all damaged pipe and pipe fittings.

(6) Replace all gaskets and O–rings.

(7) Replace all broken, damaged, or broken port cap retainer chains and port caps.

(8) Replace damaged unrepairable pump motor fan cover.

(9) Replace damaged or unserviceable raw water pump.

g. Pump Installation. (Figure 2-45)

(1) Install reducer (19) in pump (9).

(2) Install two petcocks (17) and (18) in pump (9).

(3) Install priming plug (16) in pump (9).

(4) Install elbow (15) in pump (9).

(5) Install adapter (14) in elbow (15).

(6) Install hose cap (13) in adapter (14).

(7) Install adapter (12) in pump (9).

(8) Install hose cap (11) in adapter (12).

(9) Place pump (9) in frame (10) and align mounting holes.

(10) Insert two bolts (8) in pump (9) and frame (10).

(11) Install two flat washers (7), two lockwashers (6), and two nuts (5) on bolts (8).

(12) Insert screw (4) in frame (10).

(13) Install two cap chains (3), flat washer (2), and self-locking nut (1) to screw (4).

h. Power Cable Assemblv Installation. (Figure 2-44)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Slip cable grip (13) over cable.

(2) Insert tagged wires through hole in conduit box (14).

(3) From inside conduit box (14), slip cable grip nut (12) over wires and mount cable grip (13) to conduit box (14).

(4) Slip ground wire lug (11) on screw (10).

(5) Install screw (10) and ground wire (11) into conduit box (14).

(6) Slip tagged wire lugs (8) over three screws (9) in three sets and remove tags.

(7) Install fiat washer (7), lockwasher (6), and nut (5) on screw (9) of wire sets and remove tags.

(8) Wrap each pair of wire lugs, including screws and hardware, with tape (4) and tie wires into bundles using lacing cord (3).

(9) Carefully insert wire bundles into conduit box (14).

(10) Hold conduit box cover (2) in place.

(11) Install two screws (1) into conduit box cover (2) and conduit box (14).

244. R.O. PUMP ASSEMBLY.

a. General. The R.O. pump assembly stand is the raised platform that supports the R.O. pump and R.O. pump motor. This assembly consists of the stand, the R.O. pump motor mounting plate, the belt adjustment bolt, and two flexible hoses that drain water and oil from the R.O. pump. This paragraph describes removal, cleaning, inspection, and installation of the R.O. pump assembly stand.

b. Removal of R.O. Pump Assembly from R.O. Pump Assembly Stand.

(1) Remove R.O. pump belt shroud in accordance with paragraph 2-75.

(2) Remove R.O. pump belts in accordance with paragraph 2-76.

(3) Remove R.O. pump pulley sheave in accordance with paragraph 2-77.

(4) Remove R.O. pump motor in accordance with paragraph 2-47.

(5) Remove R.O. pump assembly in accordance with paragraph 2-73.

WARNING

ROWPU piping and equipment can contain extremely high 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.

c. R.O. Pump Assembly Stand Disassembly. (Figure 2-46)

(1) Remove hose clamps (1) from water hose drain (5) and oil drain hose (7).

NOTE

Perform steps (2) to (12) only if replacing water hose, oil hose, or entire R.O. pump assembly stand. Otherwise, go to step (13).

(2) Remove three screws (2) and three lockwashers (3) from clamps (4) securing water hose (5) and oil hose (7) to stand (11).

(3) Remove three clamps (4) from water hose (5) and two clamps from oil hose (7).

(4) Pull water hose (5) through hole and remove from stand (11).

(5) Remove protective grommet (6) from stand (11).

(6) Pull oil hose (7) through hole and remove from stand (11).

(7) Remove protective grommet (8) from hole in stand (11).

(8) Remove ten bolts (9) and ten lockwashers (10) from ROWPU frame and stand (11).

(9) Remove stand (11) from ROWPU frame.

(10) Place stand on its side and remove grooved pin (12) and flat washer (13) from adjustment bolt (20).

(11) Return stand to upright position.

(12) Remove four bolts (14), four flat washers (15), and four lockwashers (16) from stand (11) and R.O. pump motor mounting plate (17).

(13) Remove R.O. pump motor mounting plate (17), with adjustment bolt (20) attached, from stand (11).

NOTE

Perform remaining steps only if replacing R.O. pump motor mounting plate or adjustment bolt.

(14) Remove flat washer (18) and grooved pin (19) from adjustment bolt (20).

(15) Remove adjustment bolt (20) from R.O. pump motor mounting plate (17).

(16) Remove nut (21) from adjustment bolt (20).

d. Cleaning.

(1) Wash stand and R.O. pump motor mounting plate with soap solution and stiff brush.

(2) Remove rust and flaking paint from stand and R.O. pump motor mounting plate with a wire brush. Prepare for repainting, as needed.

(3) Clean flexible hoses with mild soap solution and rag.

(4) Remove dirt and rust from bolts, nuts, screws, lockwashers, flat washers, and pins.

e. Inspection.

(1) Inspect stand and R.O. pump motor mounting plate for cracks, broken welds, and stripped threads in bolt holes.

(2) Inspect hose clamps for rust and stripped threads.

(3) Inspect water hose and oil hose for cuts and cracks.

(4) Inspect grommets for cracks or dry rot.

(5) Inspect screws and bolts for stripped heads and threads and bent or broken shanks.

(6) Inspect nuts for stripped threads.

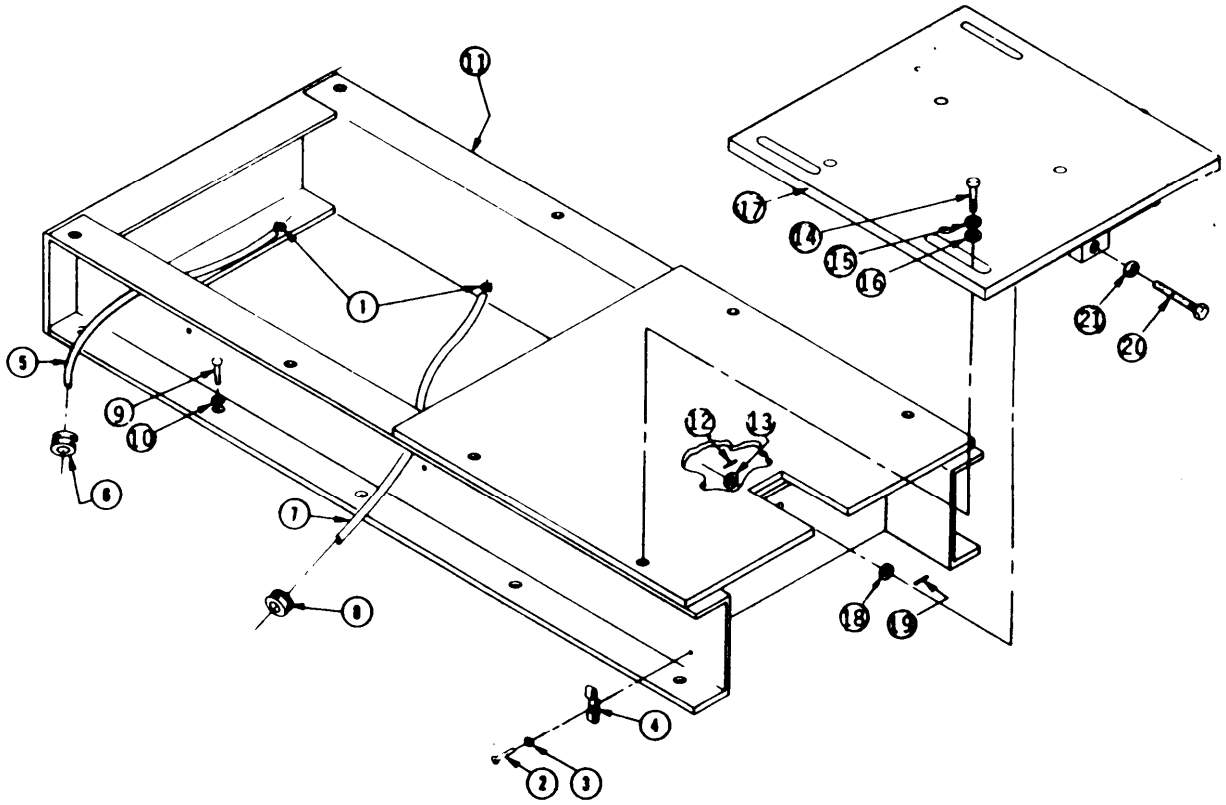


Figure 2–46. R.O. Pump Assembly Stand

f. Repair or Replace.

(1) Replace all hose clamps.

(2) Replace damaged water or oil hoses.

(3) Replace damaged grommets and O-rings,

(4) Replace all damaged screws, nuts, bolts, and washers.

(5) Threaded inserts may be removed, retaped, and replaced. Severely damaged inserts maybe removed, the tapped hole welded closed, and a new insert installed.

(6) Repaint, as needed, in accordance with Standard Operating Procedures.

g. Installation. (Figure 2-46)

(1) Install nut (21) on adjusting bolt (20).

(2) Seat nut (21) at end of threaded portion of bolt (20).

(3) Install adjusting bolt (20) with nut (21) in R.O. pump motor mounting plate (17).

(4) Install flat washer (18) and groove pin (19) in adjusting bolt (20).

(5) Place R.O. pump motor mounting plate (17) with adjusting bolt (20) attached on stand (11).

(6) Align mounting holes in mounting plate (17) with stand (11) mounting holes.

(7) Install four bolts (1 4), four flat washers (15), and four lockwashers (16) into R.O. pump motor mounting plate (17) and stand (11).

(8) Install flat washer (13) and groove pin (12) into adjusting bolt (20).

(9) Place stand (11) on ROWPU frame and align mounting holes.

(10) Install ten bolts (9) and ten lockwashers (10) into R.O. pump mounting stand (11) and ROWPU frame.

(11) Install protective grommet (8) in hole in stand (11).

(12) Slip oil drain hose (7) through hole in grommet (8).

(13) Pull approximately two feet of oil drain hose (7) through grommet (8).

(14) Install protective grommet (6) in hole in stand (11).

(15) Slip water drain hose (5) through hole in grommet (6).

(16) Pull approximately two feet of water drain hose (5) through grommet (6).

(17) Install three clamps (4) on water drain hose (5) and two clamps (4) on oil drain hose (7).

(18) Install three screws (2) and three lockwashers (3) on clamps (4) and secure water hose (5) and oil hose (7) to stand (11).

(19) Install two hose clamps (1) on water drain hose (5) and oil drain hose (7).

h. R.O. Pump Assembly Installation.

(1) Install R.O. pump assembly in accordance with paragraph 2-73.

(2) Install R.O. pump motor in accordance with paragraph 2-47.

(3) Install R.O. pump pulley sheave in accordance with paragraph 2-77.

(4) Install R.O. pump belts in accordance with paragraph 2-76.

(5) Install R.O. pump belt shroud in accordance with paragraph 2-75.

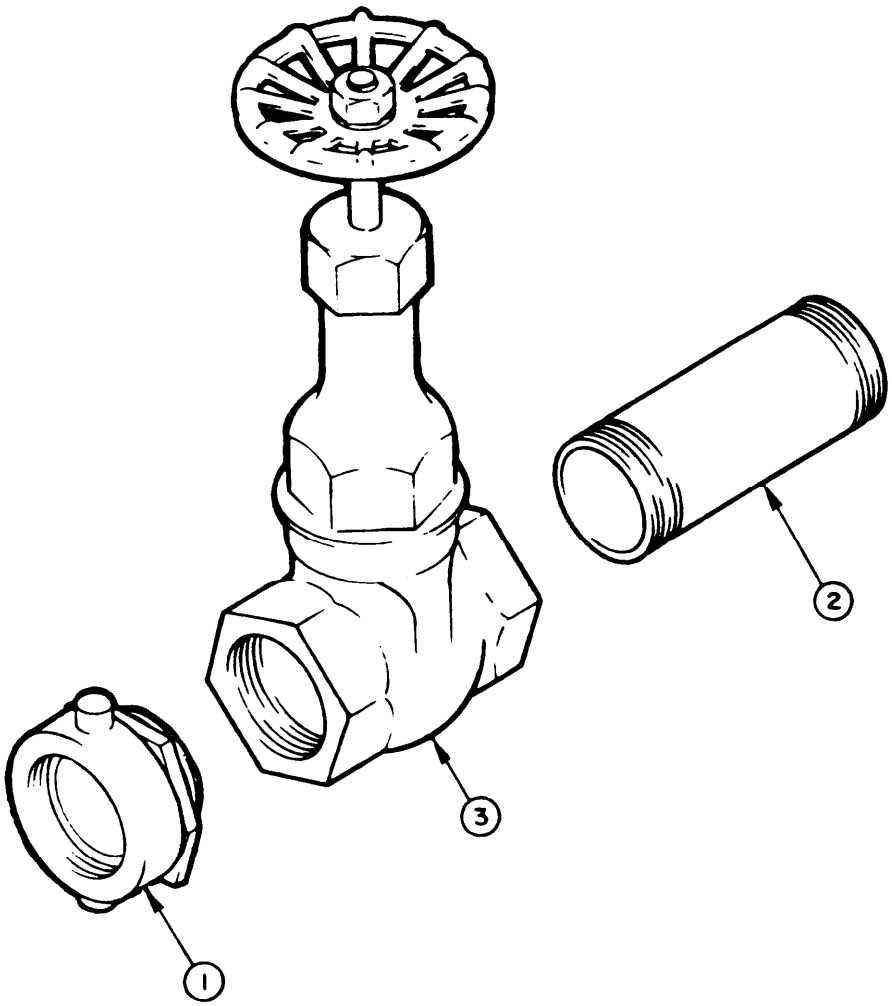


Figure 247. Gate Valve

2-45. GATE VALVE.

a. General. There are two gate valves associated with the ROWPU. One is used With the brine tank and the other is used with the product water tank. This paragraph describes the disassembly, cleaning, inspection, replacement, and reassembly. Adapters (1) and nipples (2) are stored in Box No. 2.

b. Disassembly. (Figure 2-47)

(1) Remove swivel adapter (1) from valve (3).

(2) Remove nipple (2) from valve (3).

c. Cleaning.

(1) Remove dirt.

(2) Clean all threads.

d. Inspection.

(1) Inspect hardware for cracks or breaks. If unserviceable, replace.

(2) Inspect threads for damage. If threads are damaged beyond repair, replace.

e. Repair or Redate.

(1) Replace damaged or unserviceable valve.

f. Installation. (Figure 2-47)

(1) Install nipple (2) in valve (3).

(2) Install swivel adapter (1) in valve (3).

2-46 STORAGE BOX

a. General. The storage box is located in the upper part of the ROWPU frame directly over the R.O. high–pressure pump. It is used to store packaged filter elements for the cartridge filter. This paragraph describes how to remove, clean, inspect, repair, or replace and install the storage box.

b. Removal. (Figure 2--48)

(1) Remove nine nuts (1), nine lock washers (2), two flat washers (11), eight screws (3), and one screw (6).

(2) Remove storage box (4) from frame.

c. Cleaning.

(1) Clean all surfaces with brush and soap solution.

(2) Clean mounting surfaces of frame.

(3) Clean all hardware.

(4) Remove loose paint, rust, and corrosion.

d. Inspection.

(1) Inspect storage box for dents, cracks, or holes.

(2) Check hinge (8) for easy operation.

(3) Check panel latches for damage and proper operation.

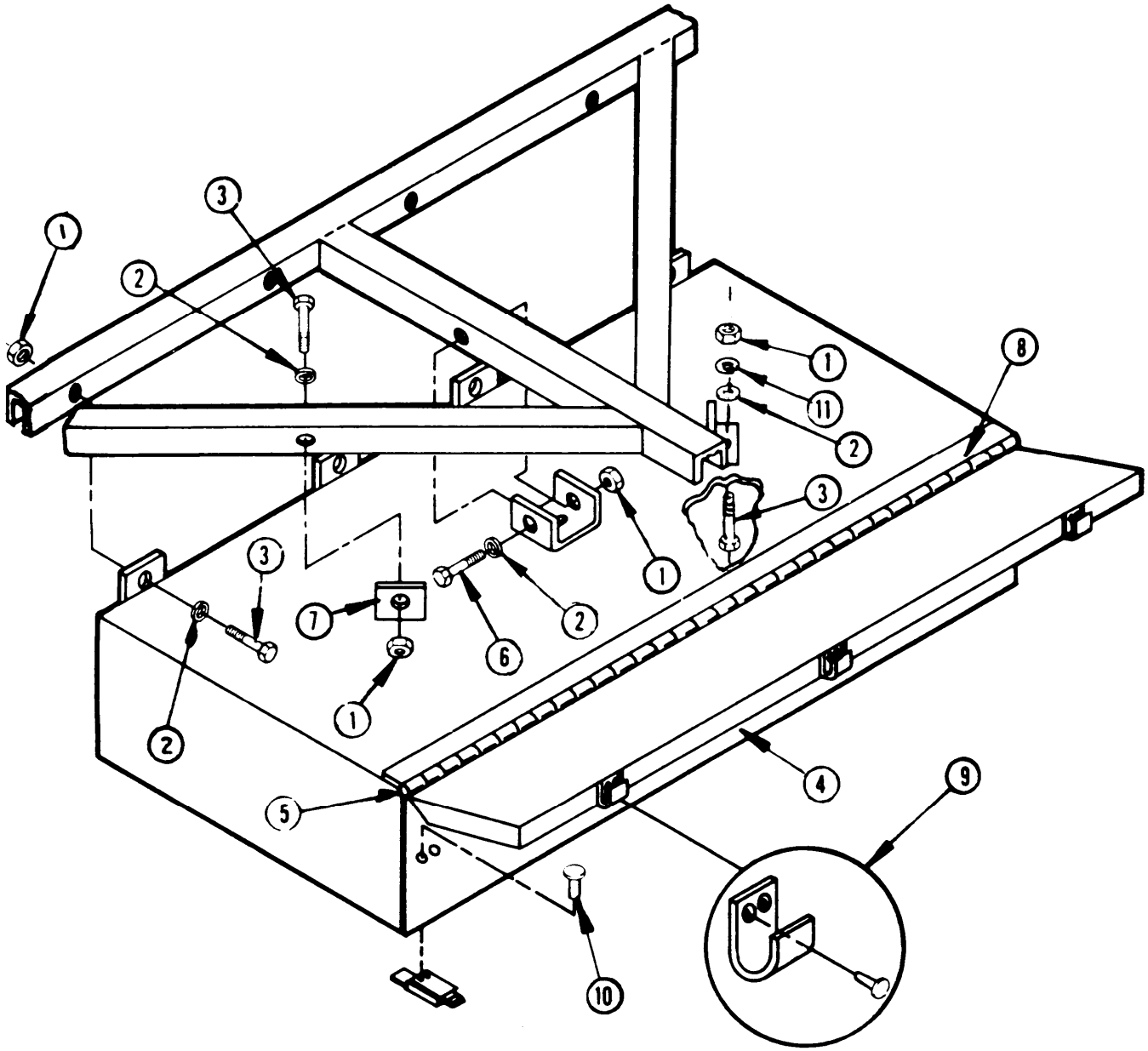


Figure 2–48. Storage Box

e. Repair or Replace.

(1) Small dents may be hammered flat.

(2) Small cracks and holes may be welded for repair.

(3) Hinge pin (5) may be reworked, if possible; otherwise, replace.

(4) Door can be removed or disassembled from box by removing pin (5).

(5) Remove and discard bracket (7), if damaged.

(6) Replace all damaged panel latches (9) by drilling out rivets (10).

NOTE

If damage is severe, replace entire storage box assembly.

f. Testing.

(1) Check hinges for free movement.

(2) Check panel latches for positive latching.

(3) Check alignment of front cover.

g. Installation. (Figure 2--48).

(1) Install two brackets (7) to storage box (4).

(2) Hold storage box (4) in position on ROWPU frame and align mounting holes.

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

(4) Install four remaining screws (3), one screw (6), five lockwashers (2), and five nuts (1).

2-47. R.O. PUMP MOTOR

a. General. The R.O. pump motor is a 20–horsepower motor that drives the R.O. pump. This paragraph describes removal and installation of the R.O. pump motor.

b. Removal. (Figure 2-49)

(1) Remove R.O. pump belt shroud in accordance with paragraph 2-75.

(2) Remove R.O. pump belts in accordance with paragraph 2-76.

(3) Remove R.O. pump motor sheave assembly in accordance with paragraph 2-77.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(4) Remove two cable clamps that secure power cable to motor plate.

(5) Remove four screws (1) and four toothed lockwashers (2) from conduit box gasket (4), conduit box cover (3), and conduit box (22).

(6) Remove conduit box cover (3) and gasket (4) from conduit box (22).

(7) Pull wires out far enough to expose taped ends.

(8) Cut twine (5) that holds bundles together.

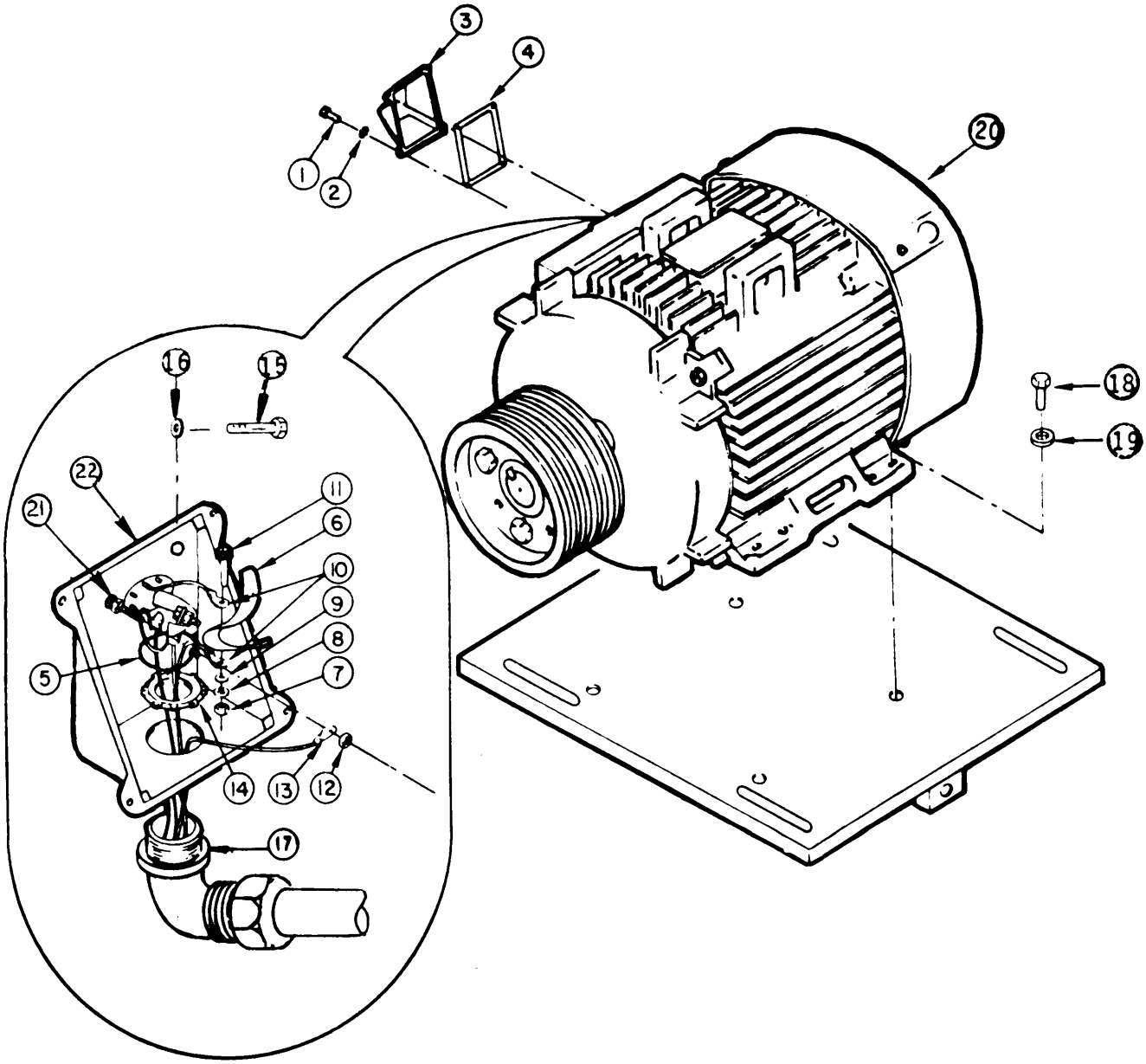


Figure 2-49. R.O. Pump Motor

(9) Remove tape (6) from each bundle of wires.

NOTE

Mark each set of wires for ease of reassembly.

(10) Remove nut (7), lockwasher (8), and flat washer (9) from screw (11) on each set of wires.

(11) Remove all wire lugs (10) from screw (11) on each set of wires.

(12) Remove nut (12) and grounding lug (13) from grounding stud (21).

(13) Remove three bolts (15) and washers (16) from conduit box (22).

(14) From inside conduit box (22), remove cable grip nut (14) from cable grip (17) and slide cable grip nut (14) off wires.

(15) Slide the conduit box (22) over motor leads and remove the conduit box (22).

(16) Remove cable grip (17) and cable assembly from conduit box (22).

(17) Remove four bolts (18) and four lockwashers (19) from R.O. pump stand assembly and R.O. pump motor (20).

WARNING

Weight of R.O. pump is 251 pounds (1 12.95 kilograms). Attempting to move it without proper equipment could cause serious injury. Hoist motor with equipment rated at one ton (0.91 tonne) or greater.

(18) With proper equipment, remove R.O. pump motor (20) from R.O. pump stand assembly.

NOTE

If motor is to be sent to DS/1 Maintenance for repair, replace nut (12) on grounding stud (21), and replace gasket (4) and conduit box cover (3) on conduit box (22) with four screws (1) and lockwashers (2). Retain power cable assembly and cable grip for reuse.

c. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P–D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Clean motor with cleaning solvent Fed. Spec. P-D-680 and a steel brush.

(2) Remove rust and loose paint from motor.

(3) Prepare for repainting, if necessary.

(4) Remove dirt and rust from screw and bolt threads.

(5) Wipe power cable and cable terminals with cleaning solvent P-D-680.

d. Inspection.

(1) Inspect motor for damage to case.

(2) Inspect cable for breaks in insulation and rubber cover.

(3) Check cable ends for bare wire, damaged plugs, and terminals.

(4) Check screws and bolts for stripped heads and threads. Check for bent or broken shanks.

e. Repair or Redate.

(1) Replace damaged or unserviceable pump motor.

(2) Send damaged or unserviceable pump motor to Direct Support Maintenance for repair.

(3) Replace damaged or worn cables and cable hardware.

WARNING

Weight of R.O. pump is 251 pounds (1 12.95 kilograms). Attempting to move it without proper equipment could cause serious injury. Lift motor with equipment rated at one ton (0.91 tonne) or greater.

f. Installation. (Figure 2-49).

(1) With proper equipment, place R.O. pump motor (20) onto R.0, pump assembly stand.

(2) Install four lockwashers (19) and four bolts (18) into R.O. pump motor (20) and R.O. pump assembly stand.

NOTE

If conduit box cover is in place, remove four screws (1), four lockwashers (2), conduit box cover (3), and gasket (4) from conduit box (22).

(3) If previously removed, slip cable grip (17) over cable.

(4) Insert motor leads through hole in conduit box (22).

(5) Install conduit box (22) with bolts (15) and lockwashers (16).

(6) Install ground wire lug (13) on grounding stud (21) in conduit box (22).

(7) Install nut (12) on grounding stud (21).

(8) Slip tagged wire lugs (10) over screws (11) on each set of wires.

(9) Install flat washer (9), lockwasher (8), and nut (7) on screw (11) for each set of wires.

(10) Remove tags from wires.

(11) Wrap each screw and lug assembly with tape (6).

(12) Using lacing cord, tie taped wires into bundle.

(13) Carefully install wire bundle into the conduit box (22).

(14) Hold conduit box cover (3) and new gasket (4) in place.

(15) Install four lockwashers (2) and four screws (1) through conduit box cover (3) and gasket (4) into motor (20).

(16) Install R.O. pump motor sheave assembly in accordance with paragraph 2–77.

(17) Install R.O. pump belts in accordance with paragraph 2–76.

(18) Install R.O. pump belt shroud in accordance with paragraph 2–75.

2-48. CHEMICAL FEED PUMP MOTOR.

a. General. This Paragraph describes the removal, cleaning, inspection, and Installation of the chemical feed pump motor.

b. Chemical Feed Pump Motor Removal from Pump. (Figure 2-50)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Remove two screws (1) (ARMY), four screws (1) (USMC) from conduit box cover (2) and conduit box (19).

(2) Remove conduit box cover (2) from conduit box (19).

(3) Pull wires out far enough to expose taped ends and cut twine (3) that holds bundles together.

(4) Remove tape (4) from ends of each set of wires.

NOTE

Mark each set of wires for ease of reassembly later.

(5) Remove nut (5), lockwasher (6), and flat washer (7) from screw (9) on each set of wires.

(6) Remove all wire lugs (8) from screw (9) on each set of wires.

(7) Remove ground screw (10) from conduit box (19).

(8) Remove wire lug (11) from ground screw (10).

(9) From inside conduit box (19), remove cable grip nut (12) from cable grip (13) and slide cable grip nut (12) off wires.

(10) Remove remainder of cable grip (13) and cable assembly from conduit box (19).

(11) Remove four bolts (14) and four lockwashers (15) from under pump motor (16) and pump.

(12) Remove pump motor (16) from pump.

(13) Loosen setscrew (20) in shaft-to-pump coupler (17).

(14) Remove shaft-to-pump coupler (17) and plastic coupling insert (18) from pump motor (16).

NOTE

If motor is to be sent to Direct Support Maintenance for repair, replace grounding screw in conduit box. Also replace conduit box cover on conduit box and secure with two screws.

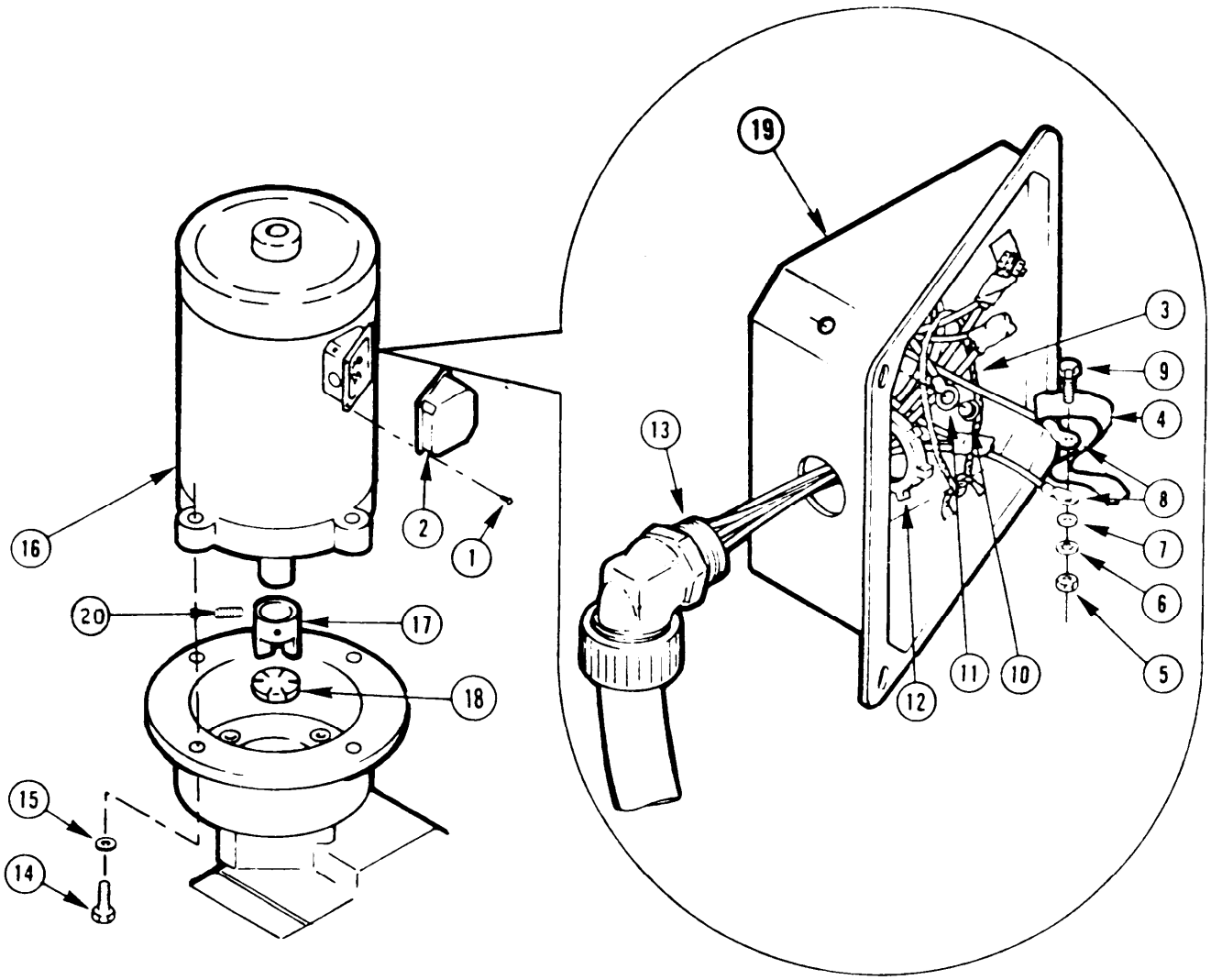


Figure 2-50. Chemical Feed Pump Motor (Typical)

c. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P–D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Wash motor with cleaning solvent Fed. Spec. P-D-680.

(2) Remove rust and loose paint from motor. Prepare for repainting, if needed.

(3) Clean rust from bolt threads.

(4) Wipe cable terminals with cleaning solvent Fed. Spec. P-D-680.

d. Inspection.

(1) Check motor case for damage. Send to Direct Support Maintenance for repairs.

(2) Check power cable for damaged insulation.

(3) Check cable end for bare wire and damaged terminals.

(4) Inspect mounting bolts for stripped threads and bent or broken shanks.

e. Repair or Replace.

(1) Replace damaged or unserviceable pump motor.

(2) Send damaged or unserviceable pump motor to Direct Support Maintenance for repair.

(3) Replace damaged or worn cables and cable hardware.

(4) Repaint in accordance with Standard Operating Procedures.

f. Installation. (Figure 2-50)

(1) Slip shaft-to-pump coupler (10) over motor shaft.

(2) Tighten setscrew (20) in shaft-to-pump coupler (17).

(3) Insert plastic coupling insert (18) into pump coupling.

(4) Place pump motor (16) into pump and align mounting holes in pump and pump motor (16).

(5) Install four lockwashers (15) and four bolts (14) into pump and pump motor (16).

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

NOTE

If conduit box (19) is in place, remove screws (1) and conduit box cover (2).

(6) Slip cable grip (13) over cable.

(7) Insert tagged wires through hole in conduit box (19).

(8) From inside conduit box (19), slip cable grip nut (12) over wires and mount cable grip to conduit box (22).

(9) Install ground wire lug (11) with ground screw (10).

(10) Slip tagged wire lugs (8) over screws (9) on each set of wires.

(11) Install flat washer (7), lockwasher (6), and nut (5) on screw (9) for each set of wires.

(12) Remove tags.

(13) Wrap each screw and wire lug assembly with tape (4).

(14) Using lacing cord (3), tie wires into bundle.

(15) Carefully insert wire bundles into back of conduit box (19).

(16) Hold conduit box cover (2) in place.

(17) Install screws (1) into conduit box cover (2) and conduit box (19).

2-49. BOOSTER PUMP ASSEMBLY.

a. General. The booster pump assembly increases the pressure of the water from the multimedia filter to the cartridge filter. This paragraph describes removal, cleaning, inspection, and installation of the booster pump assembly.

b. Removal. (Figure 2–51)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Trace power cable back to clamp (23) located next to multimedia filter.

(2) Remove screw (1) and flat washer (2) from clamp (23) and ROWPU frame (22).

(3) Unscrew pipe union (3) to pump (20).

(4) Loosen two hose clamps (5) enough to slide down hose (4).

(5) Disconnect hose (4) from pump (20).

(6) Remove two hose clamps (5) from hose (4).

(7) Remove four bolts (6) and four lockwashers (7) from ROWPU frame (22), spacer plate (21), and booster pump (20).

CAUTION

Do not pull on power cable. It will damage the wiring.

(8) Carefully turn pump (20) on its side to reach conduit box (24).

(9) Remove four screws (8) from conduit box cover (9), cover gasket (10), and conduit box (24).

(10) Remove conduit box cover (9) and cover gasket (10) from conduit box (24).

(11) Pull wires out far enough to expose taped ends and cut twine (11) that holds bundles together.

(12) Remove tape (12) from ends of each set of wires.

NOTE

Mark each set of wires for ease of reassembly later.

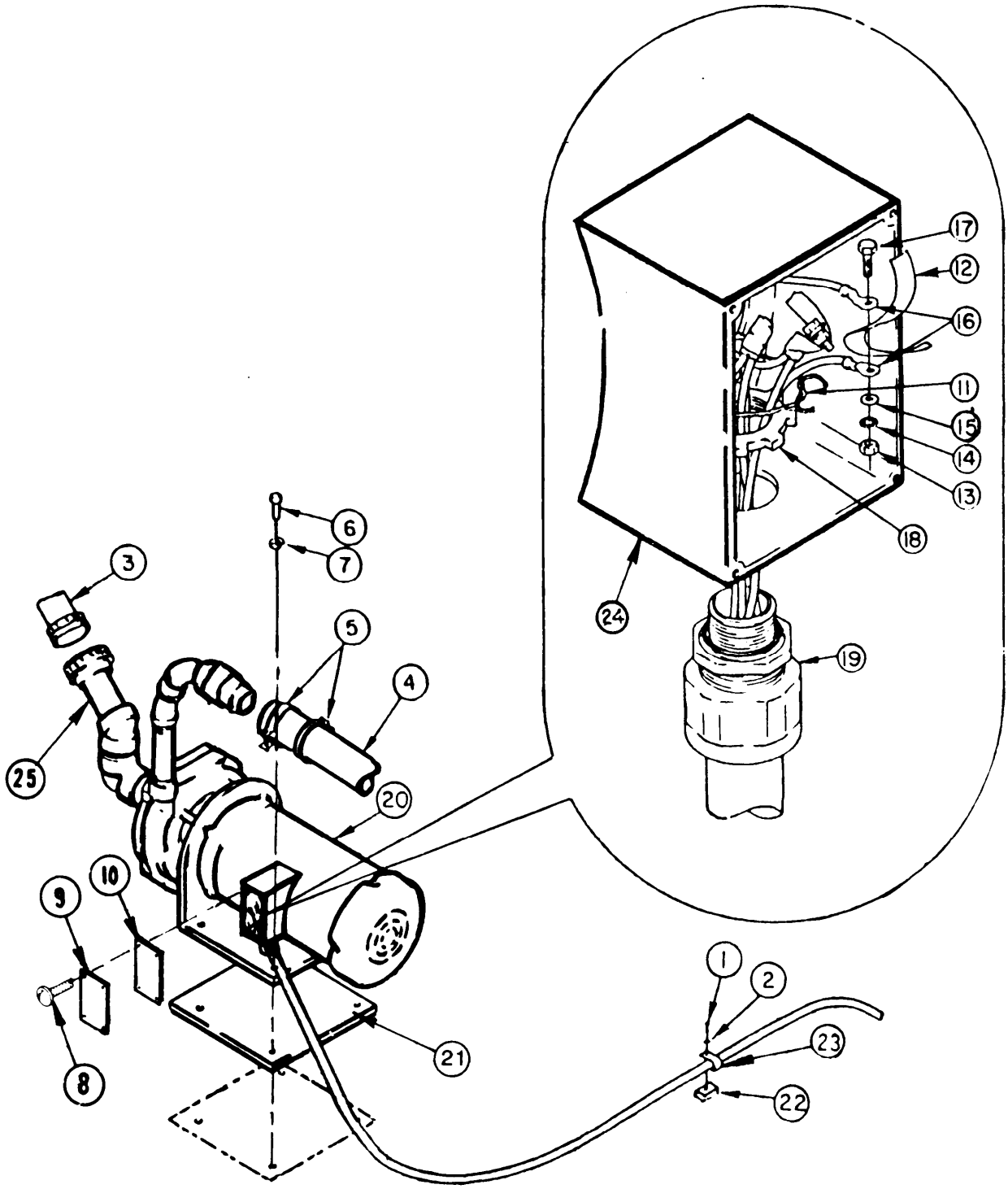


Figure 2-51. Booster Pump Assembly

(13) Remove nut (13), lockwasher (14), and flat washer (15) from screw (17) on each set of wires.

(14) Remove all wire lugs (16) from screw (17) on each set of wires.

(15) From inside conduit box (24), remove cable grip nut (18) from cable grip (19) and slide cable grip nut (18) off wires.

(16) Remove remainder of cable grip (19) and cable assembly from conduit box (24).

(17) Remove pump (20) from spacer plate (21).

(18) Remove spacer plate (21) from ROWPU frame (22).

(19) Remove input pipe (25) from pump (20).

c. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Wash booster pump assembly with cleaning solvent Fed. Spec. P-D-680.

(2) Allow to dry.

(3) Remove rust and loose paint from booster pump assembly and mounting plate. Prepare for painting, if needed.

(4) Remove dirt and rust from screws, bolts, and washers.

(5) Wipe power cable and terminals with cleaning solvent Fed. Spec. P-D-680.

d. Inspection.

(1) Check booster pump assembly for damage.

(2) Discard flexible hose.

(3) Discard hose clamps.

(4) Check power cable for cracked insulation, bare wires, and broken or missing terminals.

(5) Inspect screws and bolts for stripped heads and threads and damaged shanks.

e. Repair or Replace.

(1) Replace damaged or worn flexible hose.

(2) Replace all hose clamps and gaskets.

(3) Replace damaged or worn electrical cable.

(4) Replace all damaged screws, nuts, bolts, and washers.

(5) Replace damaged or unserviceable booster pump.

(6) Send damaged booster pump to Direct Support Maintenance for repair.

(7) Spacer plate may be welded for repair. If severely damaged, replace.

f. Installation. (Figure 2-51)

(1) Install input pipe (25) in booster pump (20).

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(2) Place booster pump approximately in its mounting loation and carefully turn it on its side to expose conduit box (24).

NOTE

If conduit box cover is in place, remove four screws (8), (figure 2-51), conduit box cover (9), and gasket (10) from conduit box (24).

(3) Slip cable grip (19) over cable.

(4) Insert tagged wires through hole in conduit box (24).

(5) From inside conduit box (24), slip cable grip nut (18) over wires and mount cable grip (19) to conduit box (24).

(6) Slip tagged wire lugs (16) over screws (17) on each set of wires.

(7) Install flat washer (15), lockwasher (14), and nut (13) on screw (17) for each set of wires.

(8) Remove tags.

(9) Wrap each screw and wire lug assembly with tape (12).

(10) Using twine (11), tie wires into bundle.

(11) Carefully compress wire bundle into back of conduit box (24).

(12) Hold conduit box cover (9) and gasket (10) in place.

(13) Install four screws (8) into conduit box cover (9), cover gasket (10), and conduit box (24).

(14) Place spacer plate (21) in its mounting location on the ROWPU frame (22).

(15) Place booster pump (20) in its mounting position on the spacer plate (21).

(16) Align mounting holes in ROWPU frame (22), spacer plate (21), and booster pump (20).

(17) Install four bolts (6) and four lockwashers (7) in booster pump (20), spacer plate (21), and frame (22).

NOTE

Do not tighten mounting bolts yet.

(18) Slip two hose clamps (5) over hose (4).

(19) Connect hose (4) to pump (20).

(20) Slide hose clamp (5) over output pipe of booster pump and tighten.

(21) Install pipe unit (3) to input pipe (25) of booster pump (20).

(22) Tighten four mounting bolts (6).

(23) Install cable clamp to frame (22) using screw (1) and flat washer (2).

2-50. R.O. PUMP MOTOR SHEAVE ASSEMBLY.

a. General. The R.O. pump motor sheave holds the five V–belts that transmit power to the R.O. Pump. This paragraph describes removal, inspection, cleaning, and installation of the pump motor sheave.

b. Removal. (Figure 2-52)

(1) Remove R.O. pump belt shroud in accordance with paragraph 2-75.

(2) Remove R.O. pump belts in accordance with paragraph 2-76.

(3) Remove three bolts (2) and three lockwashers (3) from hub (1) and sheave (4).

(4) Remove pump motor sheave (4) from hub (1).

(5) Loosen, but do not remove, setscrew in hub (1).

(6) Using puller, remove hub (1) from pump motor shaft (6).

(7) Remove shaft key (5) from pump motor shaft (6).

c. Cleaning.

(1) Remove grease and dirt from sheave, hub, and hardware.

(2) Remove rust and corrosion from the entire R.O. pump motor sheave assembly.

d. Inspectoion.

(1) Inspect sheave for cracks, dents, excessive wear by belts, or other damage.

(2) Inspect hub for cracks, stripped thread holes, or other damage.

(3) Inspect bolt heads and threads.

(4) Inspect lockwashers for offset ends.

e. Repair or Replace.

(1) Replace damaged pump motor sheave.

(2) Replace damaged or worn hub.

(3) Replace all damaged screws, nuts, bolts, and washers.

f. Installation. (Figure 2-52 and Figure 2–53)

(1) Insert shaft key (5) into keyway of pump motor shaft (6). Align with front of shaft (figure 2-53).

(2) Place sheave (4) on hub (1) and attach with three lockwashers (3) and three bolts (2).

(3) Press hub (1) (figure 2-52) onto shaft (6) and align motor sheave with pump sheave within 0.06 inch (1 .52 mm) with a straight edge (figure 2-53).

(4) Tighten setscrew on hub (1) into key.

(5) Replace drive belts in accordance with paragraph 2-76.

(6) Recheck alignment of both sheaves.

(7) Replace R.O. pump belt shroud in accordance with paragraph 2-75.

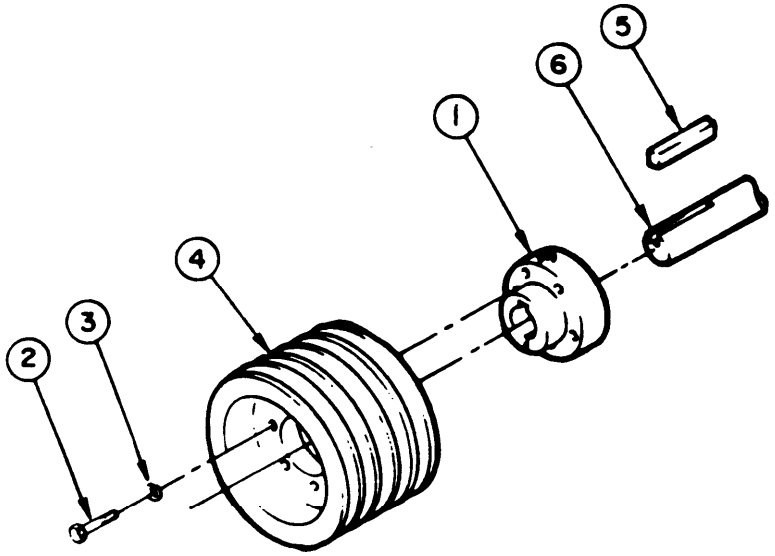


Figure 2–52. R.O. Pump Motor Sheave Assembly

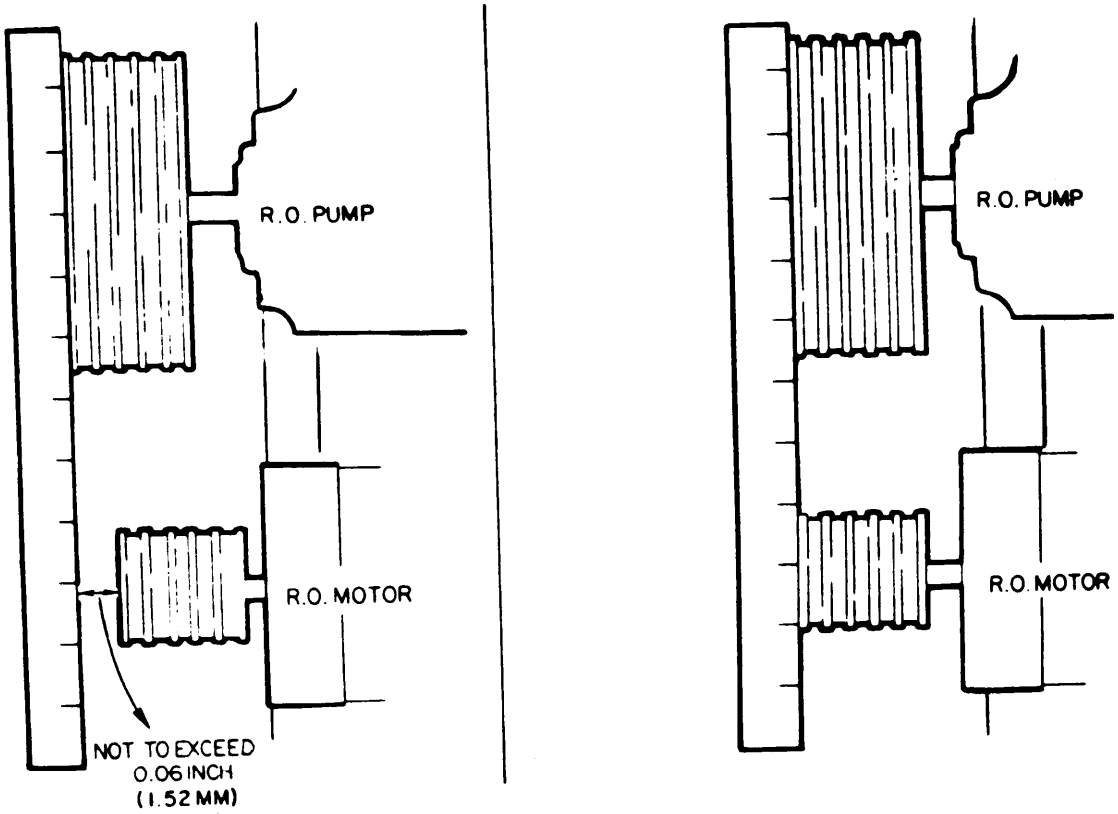


Figure 2–53. R.O. Pump Motor Sheave

2-51. CONTROL BOX ASSEMBLY.

a. General. The control box assembly houses the switches, indicator lamps, and warning lamps needed to run the ROWPU. It is located on the upper left of the control panel. This paragraph describes removal of the control box assembly from the control panel, disassembly, repair, inspection, cleaning, reassembly, and installation.

b. Removal. (Figure 2-54)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Disconnect power cable (1) from control box assembly (6).

(2) Disconnect backwash timer control connector (2) from control box assembly connector (18).

(3) Disconnect panel light cable (19) from panel light in accordance with paragraph 2-66.

(4) Remove four nuts (3) and four lockwashers (4) from four bolts (5) that secure control panel.

(5) Remove control box assembly (6) from control panel.

c. Disassembly. (Figure 2–54)

(1) Remove fourteen screws (7), fourteen lockwashers (8), and fourteen flat washers (9) from control box assembly and cover (10).

(2) Remove cover (10) and gasket (11) from control box assembly. Discard gasket (11).

NOTE

Identify and tag each cable and wire before disconnecting. Remove tags after wires are reconnected and checked.

(3) Disconnect and remove terminal blocks in accordance with paragraph 2-62.

(4) Disconnect and remove all toggle switches in accordance with paragraph 2-58.

(5) Disconnect and remove all indicator lamps and lamp holders in accordance with paragraph 2-59.

(6) Disconnect and remove EMERGENCY STOP switch in accordance with paragraph 2-58.

(7) Remove nut (12), lockwasher (13), and electrical flat washer (14) from grounding screw (17).

(8) Remove wire lugs (15) and toothed lockwasher (16) from grounding screw (17).

(9) Remove grounding screw (17) from control box assembly (6).

(10) Remove power cable receptacle from control box assembly (6) in accordance with paragraph 2-60.

(11) Remove all cable clamps and wiring harnesses from control box assembly (6) in accordance with paragraph 2-65.

(12) Remove backwash timer cable (18) and panel light cable (19) from control box assembly (6) in accordance with paragraphs 2–56 and 2–66.

d. Cleaning.

(1) Wash control box assembly with soap and water solution using a stiff brush. Prepare for repainting, if needed.

(2) Remove dirt and rust from threads of screws and nuts.

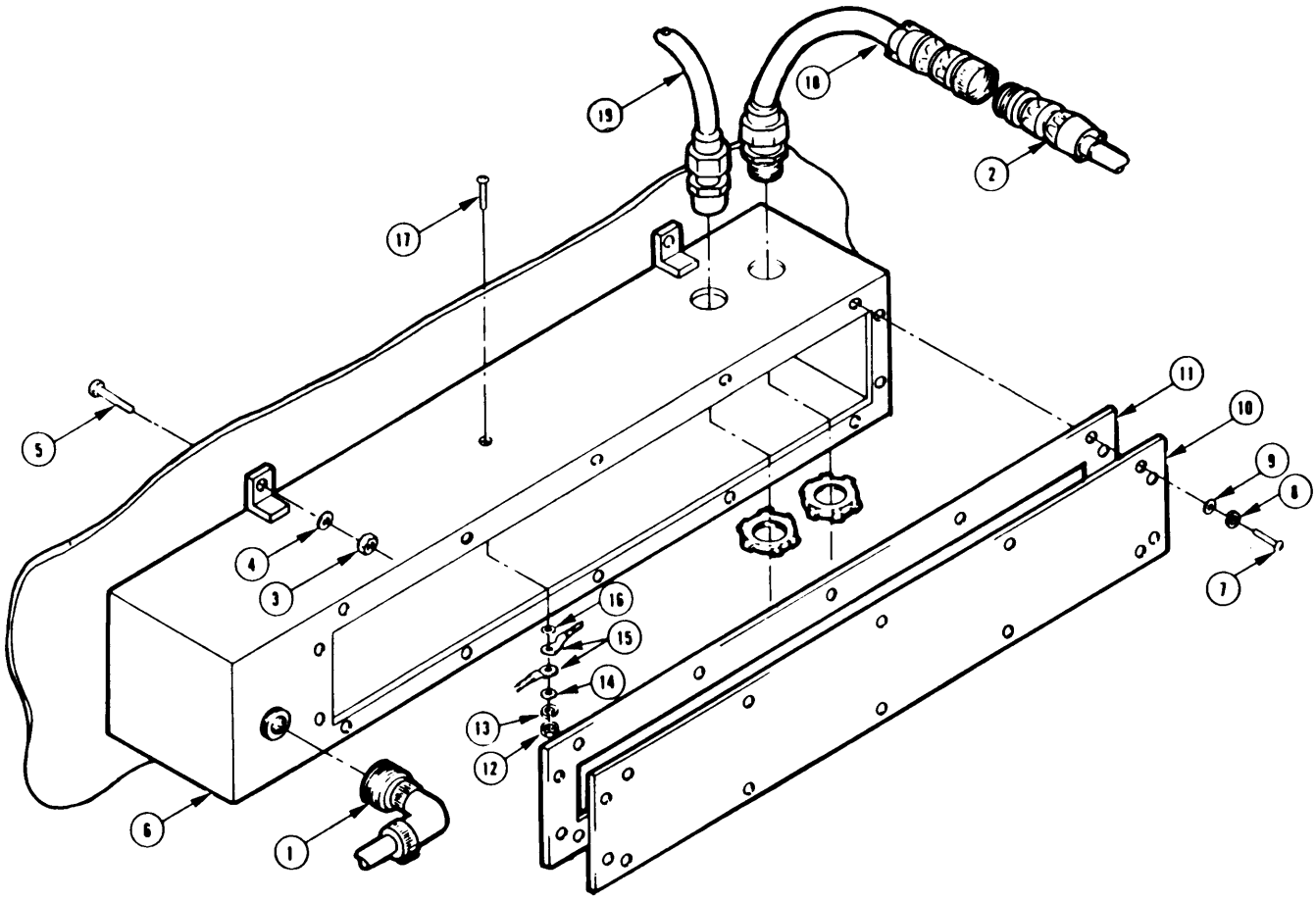


Figure 2–54. Control Box Assembly

e. Inspection.

(1) Inspect control box assembly and cover for cracks and dents.

(2) Inspect control box assembly for broken welds.

(3) Discard cover gasket.

(4) Inspect screws and bolts for stripped heads and threads and for bent or broken shanks.

(5) Inspect nuts for stripped threads.

f. Repair or Replace.

(1) Repair broken welds.

(2) Replace all cover gaskets.

(3) Replace control box assembly, if badly damaged.

(4) Repaint in accordance with Standard Operating Procedures.

g. Reassemble.

(1) Install backwash timer cable (18) and panel light cable (19) in control box assembly (6) in accordance with paragraphs 2–56 and 2-66.

(2) Install all cable clamps and wire harnesses in control box assembly in accordance with paragraph 2-65.

(3) Install power cable receptacle in control box assembly (6) in accordance with paragraph 2-60.

(4) Install grounding screw (17) in control box (6).

(5) Install toothed lockwasher (16) and wire lugs (15) on grounding screw (17).

(6) Install electrical flatwasher (14), lockwasher (13), and nut (12) on grounding screw (17).

(7) Install and connect EMERGENCY STOP switch in accordance with paragraph 2-58.

(8) Install and connect all indicator lampholders and lamps in accordance with paragraph 2-59.

(9) Install and connect all toggle switches in accordance with paragraph 2-58.

(10) Install and connect all terminal blocks in accordance with paragraph 2-62.

NOTE

Remove all identifying tags after wires are reconnected and checked.

(11) Apply RTV sealant to both sides of gasket (11).

NOTE

Ensure that RTV sealant forms a complete seal around entire edge of the control box cover (10).

(12) Install gasket (11) and cover (10) on control box assembly (6) using fourteen flatwashers (9), fourteen lockwashers (8), and fourteen screws (7).

h. Installation. (Figure 2–54)

(1) Hold control box assembly (6) in place.

(2) Insert four bolts (5) into control panel and control box assembly (6).

(3) Install four lockwashers (4) and four nuts (3) on bolts (5).

(4) Connect panel light cable (19) from panel light in accordance with paragraph 2-66.

(5) Connect backwash timer control connector (2) to control box assembly connector (18).

(6) Connect power cable (1) to control box assembly (6).

2-52. MOTOR STARTERS, TEST AND REPLACE

a. General. Inside the ROWPU junction box assembly, there are seven electrical motor starters — one for each pump motor. Because of the different sizes of the motors, there are four different motor starters; all except the chemical feed pump motor starters are tested and replaced in the same way. These differences will be noted. This paragraph describes testing and replacement of a typical motor starter.

b. Testing.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Visually inspect contacts for severely burned, pitted, or corroded contacts.

(2) Start pump motor. Refer to TM 10-4610-215-10/TM 08580A-10/1 and schematic, (figure 1-12, sheet 5 of 5).

(3) Touch or clip ground terminal of multimeter to ground lug on the junction box assembly.

(4) Touch or clip the other lead to points T1, T2, and T3 on the motor starter. Meter should read 115 ± 5 Vac at all points.

NOTE

The chemical feed pump motor starter has only two test points, T1 and T4.

c. Motor Starter Removal. (Figure 2–55)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Disconnect and remove all external wires from motor starter (5).

(2) Remove three nuts (1), three lockwashers (2), and three flat washers (3) from three screws (4).

(3) Remove three screws (4) from motor starter (5) and junction box assembly.

(4) Remove motor starter (5) from junction box assembly.

d. Repair or Replace.

(1) Replace damaged or worn electrical wires.

(2) Replace all damaged nuts, bolts, screws, and washers.

(3) Replace damaged or unserviceable motor starter.

(4) Send damaged motor starter to Direct Support Maintenance for repair.

e. Installation. (Figure 2–55)

(1) Hold motor starter (5) in place.

(2) Insert three screws (4) in junction box assembly and motor starter (5).

(3) Install three flat washers (3), three lockwashers (2), and three nuts (1) on screws (4).

(4) Connect all external wires to motor starter (5).

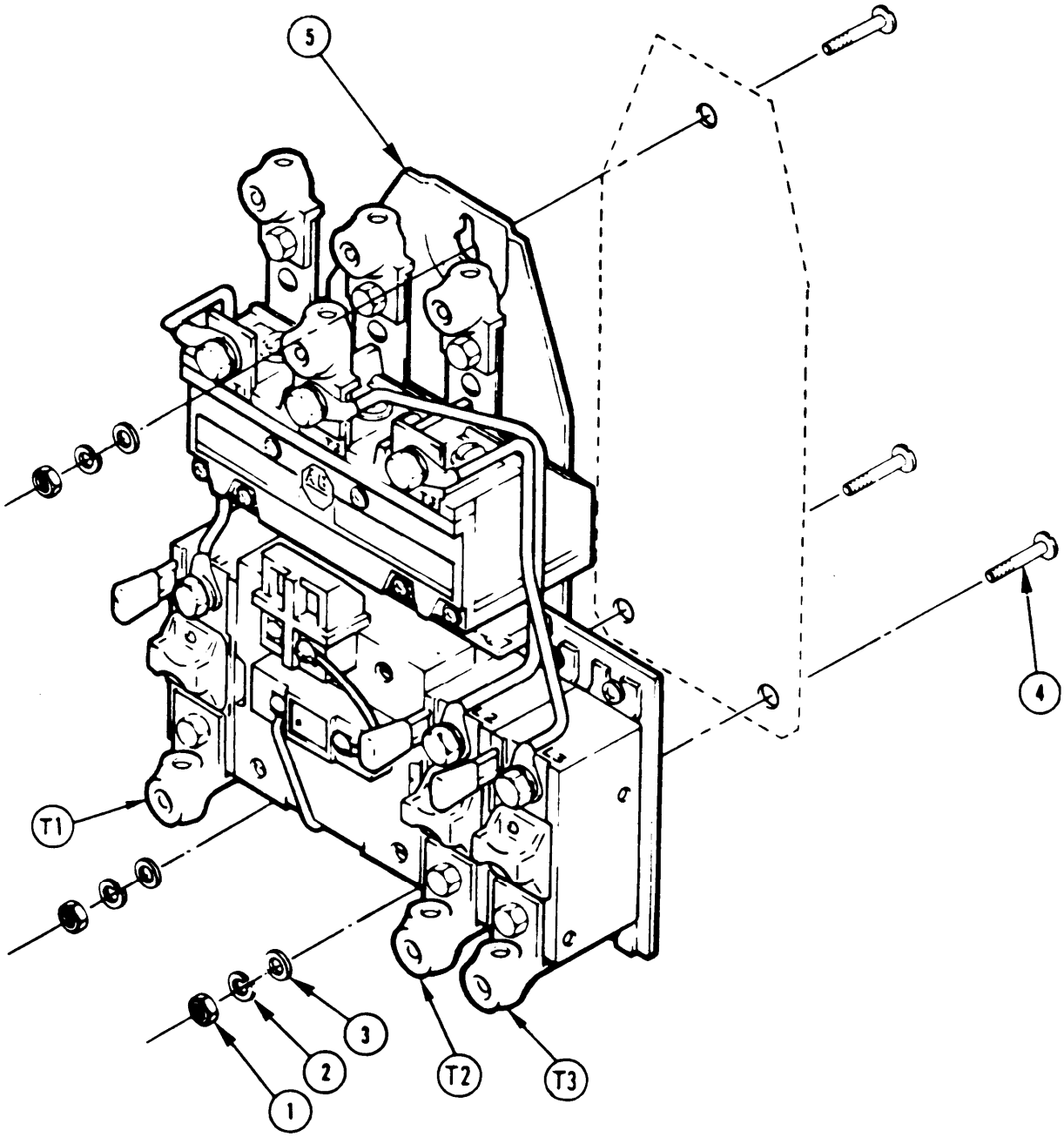


Figure 2-55. Motor Starter (Typical)

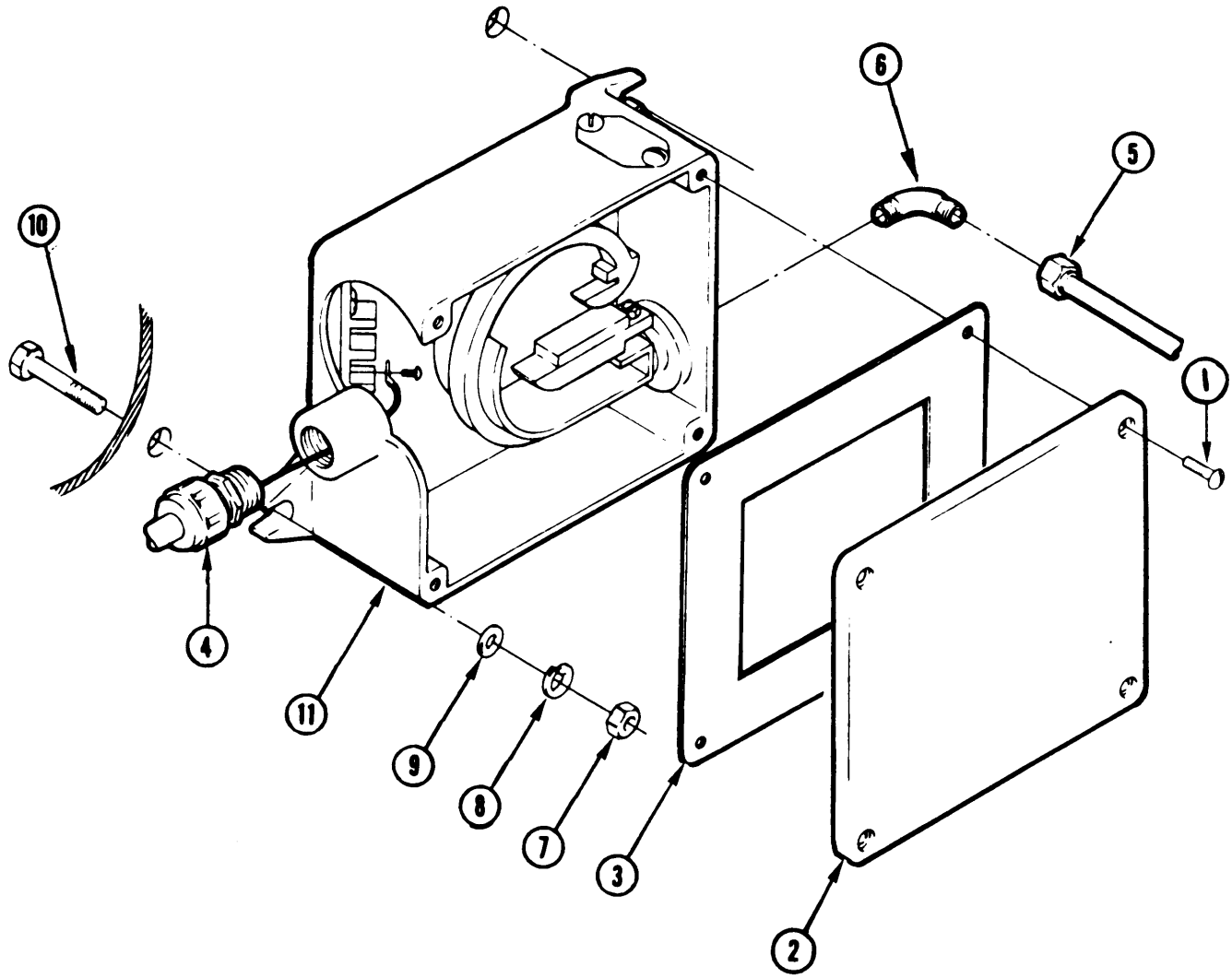


Figure 2–56. High–Pressure Switch

2-53. HIGH- AND LOW-PRESSURE SWITCH.

a. General. The ROWPU is equipped with two switches that will shut off the unit when operating pressures reach certain limits. The high–pressure switch shuts off power to the unit when the pump discharge pressure reaches 1250 pounds per square inch (psi) (88 kg/cm^2). It also turns on the R.O. PUMP HIGH–PRESSURE warning lamp. This switch is mounted on the back of the control panel at the upper right side.

The low-pressure switch cuts off power to the unit when the pump suction pressure drops below 10 psi (0.7 kg/crop), and turns on the R.O. PUMP LOW–PRESSURE warning lamp. This switch is mounted on the back of the control panel at the upper left. This paragraph describes removal, inspection, cleaning, repair, and installation of the high–pressure and low–pressure switches.

b. Removal of High–pressure Switch. (Figure 2–56)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

ROWPU piping and equipment can contain extremely high 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.

(1) Open VENT VESSELS valve and VENT PULSE DAMPENER valve.

(2) Remove four screws (1) from high–pressure switch (11), gasket (3), and cover (2).

(3) Remove cover (2) and gasket (3) from high-pressure switch (11).

(4) Remove sealing grip (4) from high-pressure switch (11) in accordance with paragraph 2-63.

(5) Unscrew coupling nut and disconnect pressure tube (5) from elbow (6).

(6) Remove elbow (6) from high–pressure switch (11).

(7) Remove two nuts (7), two lockwashers (8), and two flat washers (9) from screw (10).

(8) Remove two screws (10) from high-pressure switch (11) and control panel.

(9) Remove high–pressure switch (11) from control panel.

c. Removal of Low–Pressure Switch. (Figure 2–57)

(1) Open VENT CARTRIDGE FILTER valve.

(2) Remove four screws (1) and four lockwashers (2) from low-pressure switch (11), gasket (4), and cover (3).

(3) Remove cover (3) and gasket (4) from low-pressure switch (11).

(4) Remove two screws (12) from terminal lugs (13) and switch (14).

(5) Remove sealing grip (5) from low-pressure switch (11) in accordance with paragraph 2-63.

(6) Unscrew coupling nut and disconnect pressure tube (6) from elbow (7).

(7) Remove elbow (7) from low-pressure switch (11).

(8) Remove two nuts (8) and two lockwashers (9) from screw (10).

(9) Remove two screws (10) from low-pressure switch 11) and control panel.

(10) Remove low-pressure switch (11) from control panel.

d. Inspection.

NOTE

Although switches are different, inspection is the same for both.

(1) Inspect switch for damage.

(2) Inspect pressure tube for cracks.

(3) Inspect power cables for cracked insulation, bare wires, and damaged wire lugs.

(4) Inspect coupling nut and mounting hardware for stripped heads and threads and bent or broken shanks.

e. Cleaning. Clean dirt and rust from mounting hardware and coupling nut.

f. Repair or Replace.

(1) Replace all gaskets.

(2) Replace damaged or unserviceable pressure tube assembly.

(3) Replace damaged or unserviceable pressure switch assembly.

(4) Send damaged switch to Direct Support Maintenance for repair.

(5) Replace damaged or worn electrical power cables.

(6) Replace all damaged screws, bolts, nuts, and washers.

g. Installation of High-Pressure switch. (Figure 2-56)

(1) Hold high–pressure switch (11) in place on control panel.

(2) Insert two screws (10) through control panel into high–pressure switch (11).

(3) Install two flat washers (9), two lockwashers (8), and two nuts (7) on screws (10).

(4) Install elbow (6) in high-pressure switch (11).

(5) Connect pressure-tube coupling nut (5) to elbow (6).

(6) Install sealing grip (4) into high–pressure switch (11) in accordance with paragraph 2–63.

(7) Hold cover (2) and gasket (3) in place on high-pressure switch (11).

(8) Install four screws (1) into cover (2), gasket (3), and high–pressure switch (11).

h. Installation of Low–Pressure Switch. (figure 2-57)

(1) Hold low–pressure switch (11) in place on control panel.

(2) Insert two screws (10) through control panel into low-pressure switch (11).

(3) Install two lockwashers (9) and two nuts (8) on screws (10).

(4) Install elbow (7) to low-pressure switch (11).

(5) Connect pressure tube coupling (6) to elbow (7).

(6) Install sealing grip (5) in low–pressure switch (11) in accordance with paragraph 2-63.

(7) Install two screws (12) into terminal lugs (13) and switch (14).

(8) Hold cover (3) and gasket (4) in place.

(9) Install four screws (1) and four lockwashers (2) into cover (3), gasket (4), and low–pressure switch (11).

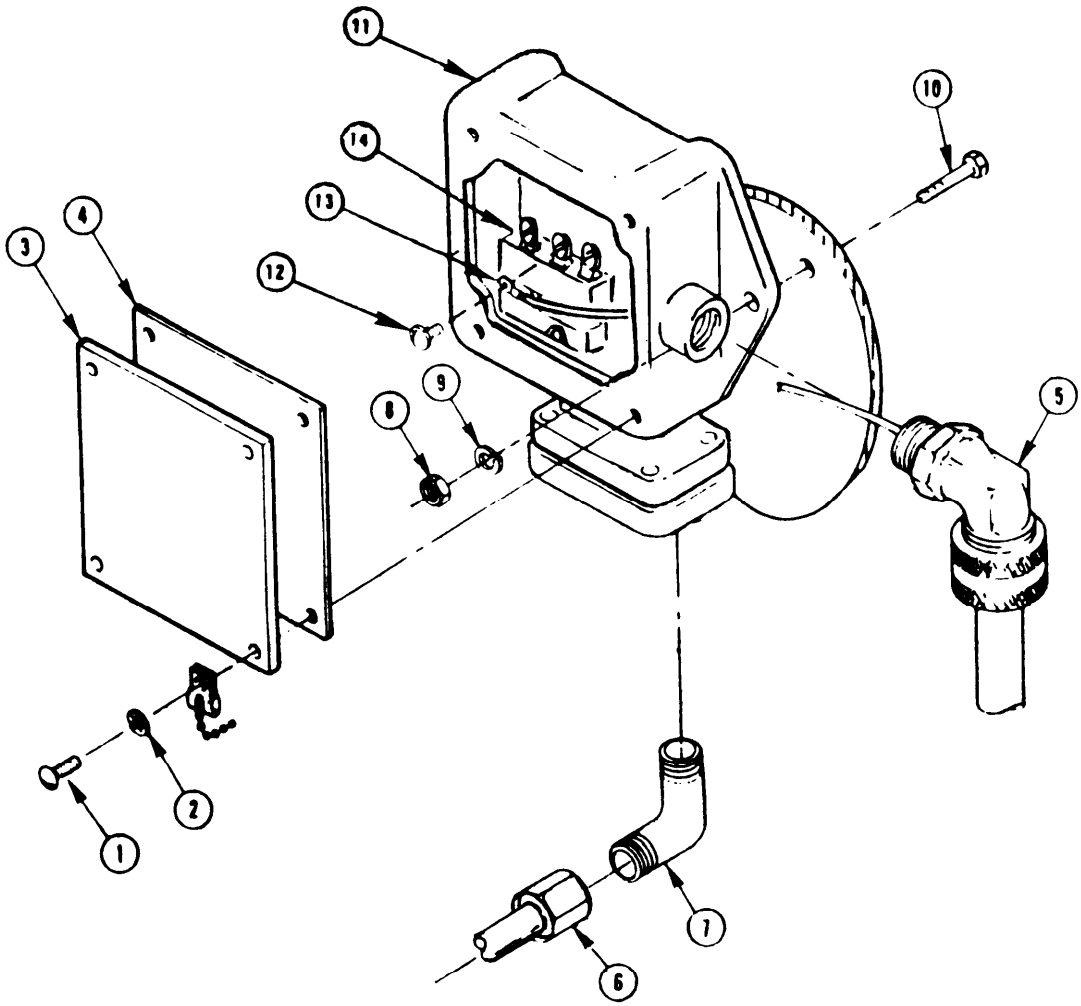


Figure 2–57. Low–Pressure Switch

2-54. HIGH- LOW-PRESSURE SOLENOIDS.

a. General. The high- and -low pressure solenoids are identical parts that are the electrical Connections between the R.O. pump motor starter and the high- and low-pressure switches. They are located in the junction box on the top right side. This paragraph describes removal, testing, repair, and installation of the high- and low-pressure solenoids.

b. Removal. (Fgure 2-58)

(1) Disconnect and remove all wires from solenoid (3).

(2) Remove three screws (1), three lockwashers (2), and solenoid (3) from bracket (8).

(3) Remove solenoid (3) from bracket (8).

(4) Remove four nuts (4), four lockwashers (5), and four flatwashers (6) from four screws (7).

(5) Remove four screws (7) and bracket (8).

c. Testing. (Refer to Schematic, Figure 1-12)

(1) Inspect contacts for burned spots, pitting, or corrosion.

(2) At a work bench, with no power connected, touch the probes of an ohmmeter to pins (1) and (2). Ohmmeter should read zero.

(3) Touch probes to pins (7) and (8). Ohmmeter should read OPEN.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(4) Connect 115 Vac power at pins (5) and (6). You should hear the relay click.

(5) Touch ohmmeter probes to pins (1) and (2). Ohmmeter should read OPEN.

(6) Touch ohmmeter probes to pins (7) and (8). Ohmmeter should read zero.

(7) Remove 115 Vac power from pins (5) and (6).

d. Repair or Replace.

(1) Replace all damaged or worn electrical wires.

(2) Replace all damaged nuts, bolts, screws, and washers.

(3) Replace damaged or unserviceable solenoid assembly.

(4) Replace damaged bracket.

(5) Send damaged solenoid to Direct Support Maintenance for repair.

e. Installation. (Figure 2-58)

(1) Install four screws (7) on bracket (8).

(2) Install four flatwashers (6), four lowashers (5), and four nuts (4) on screws (7).

(3) Hold solenoid (3) in place on bracket (8).

(4) Install three screws (1), three lockwashers (2), and solenoid (3) on bracket (8).

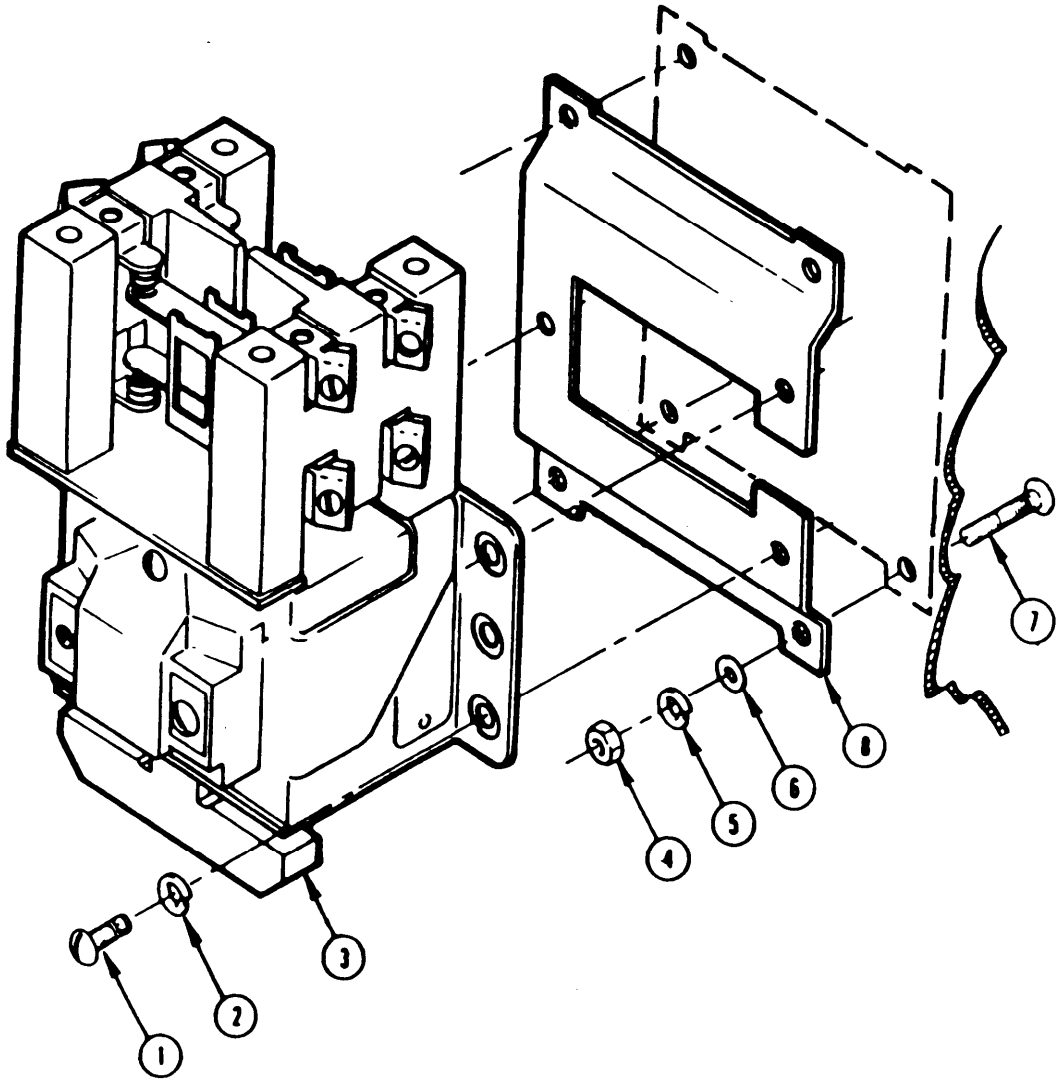


Figure 2–58. Solenoid (Typical)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(5) Connect all wires to solenoid.

2-55. CIRCUIT BREAKERS.

a. General. The circuit breakers are used to protect the ROWPU electrical components from too much current. The unit has six 208 Vat, 15A circuit breakers and three 120 Vat, 15A circuit breakers. This paragraph describes removal, testing, inspection, and installation of the circuit breakers.

b. Removal. (Figure 2–59)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Release thirteen snap screws and open junction box assembly cover.

(2) Remove four screws (1) and four flat washers (2) from stand-offs and circuit breaker plate.

CAUTION

Pulling on wires can damage wires and terminals. Take care when moving circuit breaker panel.

(3) Carefully tilt circuit breaker plate forward to reach wires.

NOTE

Identify and tag all wires before disconnecting them. Remove wire tags after circuit breaker is installed and checked.

(4) Remove six nuts (3), six flat washers (4), all wire lugs (5), and six more flat washers (4) from 208 Vac circuit breaker. Remove all wires from circuit breakers (9) on the R.O. and backwash pump circuit breakers, and remove two plug–in wires (11) from spade lugs (10).

NOTE

Small (120 Vat) circuit breakers have only two nuts, two wire lugs, and four flat washers.

(5) Tilt circuit breaker plate back upright.

(6) Remove six screws (6), six lockwashers (7), and six flat washers (8) from circuit breaker plate.

NOTE

Small (120 Vat) circuit breakers are mounted on the circuit breaker plate with only two screws, two lockwashers, and two flat washers.

(7) Remove circuit breaker (9) from circuit breaker plate.

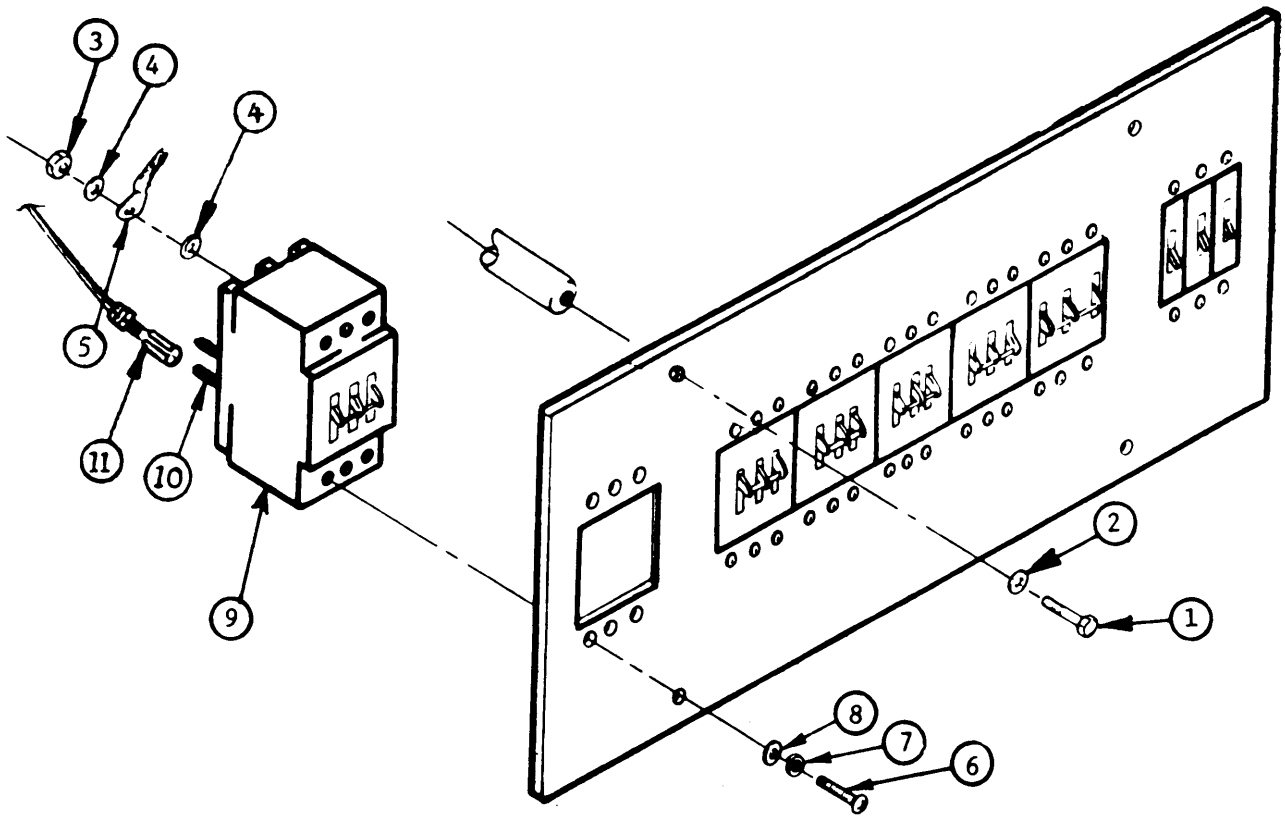


Figure 2–59. Circuit Breaker

c. Testing

(1) Inspect circuit breaker for cracked or broken casing or broken terminals.

(2) With circuit breaker in the ON position, touch ohmmeter probes between L1 and T1, L2 and T2, and L3 and T3. (Refer to schematic, figure 1–1 2.)

(3) Ohmmeter should read zero on each pair.

(4) Switch circuit breaker to OFF position.

(5) Touch ohmmeter probes between L1 and T1, L2 and T2, and L3 and T3.

(6) Ohmmeter should read OPEN on each pair.

d. Repair or Replace.

(1) Replace all damaged nuts, bolts, screws, and washers.

(2) Replace all damaged or worn electrical wires.

(3) Replace damaged or unserviceable circuit breakers.

e. Installation.

CAUTION

Pulling on wires can damage wires and terminals. Take care when moving circuit breaker panel.

(1) Carefully tilt circuit breaker panel forward to reach back of panel.

(2) Hold circuit breaker (9) in place on circuit breaker panel.

(3) Install six screws (6), six lockwashers (7), and six flat washers (8) through circuit breaker panel into circuit breaker (9).

NOTE

Small circuit breakers (120 Vat) are mounted to circuit breaker panel with two screws, two lockwashers and two flat washers.

(4) Install six flat washers (4), all wire lugs (5), six more flat washers (4), and six nuts (3) to 208 Vac circuit breaker. Install the wires on the circuit breakers (9) for R.O. pump and backwash pump circuit breakers and install plug–in wires (11) on spade lugs (10).

NOTE

Small circuit breakers (120 Vat) have only two nuts, two tagged wire lugs, and four flat washers.

(5) Tilt circuit breaker panel back into its normal position.

(6) Install four screws (1) and four flat washers (2) through circuit breaker panel into stand-offs.

(7) Switch all circuit breakers to OFF position.

(8) Close junction box assembly cover and reinstall thirteen snap-screws.

2-56. BACKWASH TIMER.

a. General. The backwash timer is used to automatically control the backwash operation. It is mounted on a bracket that is attached to the multimedia filter. This paragraph describes removal, cleaning, inspection, repair, and installation of the backwash timer.

b. Removal. (Figure 2-60)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Disconnect control box connector (1) from backwash timer power connector (2).

(2) Remove backwash timer power cable (7) from backwash timer in accordance with paragraph 2-64.

CAUTION

Improper connection of pressure hoses to backwash timer will damage the timer. Label all hoses before disconnecting them and check carefully before reconnecting them.

NOTE

All water line connections for the backwash timer must be properly tagged before disconnection.

(3) Unscrew eleven coupling nuts (3) and disconnect eleven associated hoses from backwash timer.

(4) Remove two screws (4) and two lockwashers (5) from backwash timer (6) and mounting bracket (8).

(5) Open timer box cover and remove bracket (8).

(6) Remove backwash timer (6).

c. Inspection.

(1) Inspect backwash timer for damage.

(2) Inspect power cable for cracked insulation, bare wires, and missing or broken terminal lugs.

(3) Inspect pressure hoses for cracks.

(4) Inspect mounting screws, coupling nuts, tees, and elbows for stripped threads.

d. Repair or Replace.

(1) Replace damaged or worn control box cable assembly.

(2) Replace damaged or worn power cable assembly.

(3) Replace damaged or worn hoses or tube assemblies.

(4) Replace all damaged nuts, bolts, screws, and washers.

(5) Replace damaged or unserviceable pipe fittings.

(6) Replace damaged or unserviceable backwash timer assembly.

(7) Send all damaged or unserviceable component assemblies to Direct Support Maintenance for repair.

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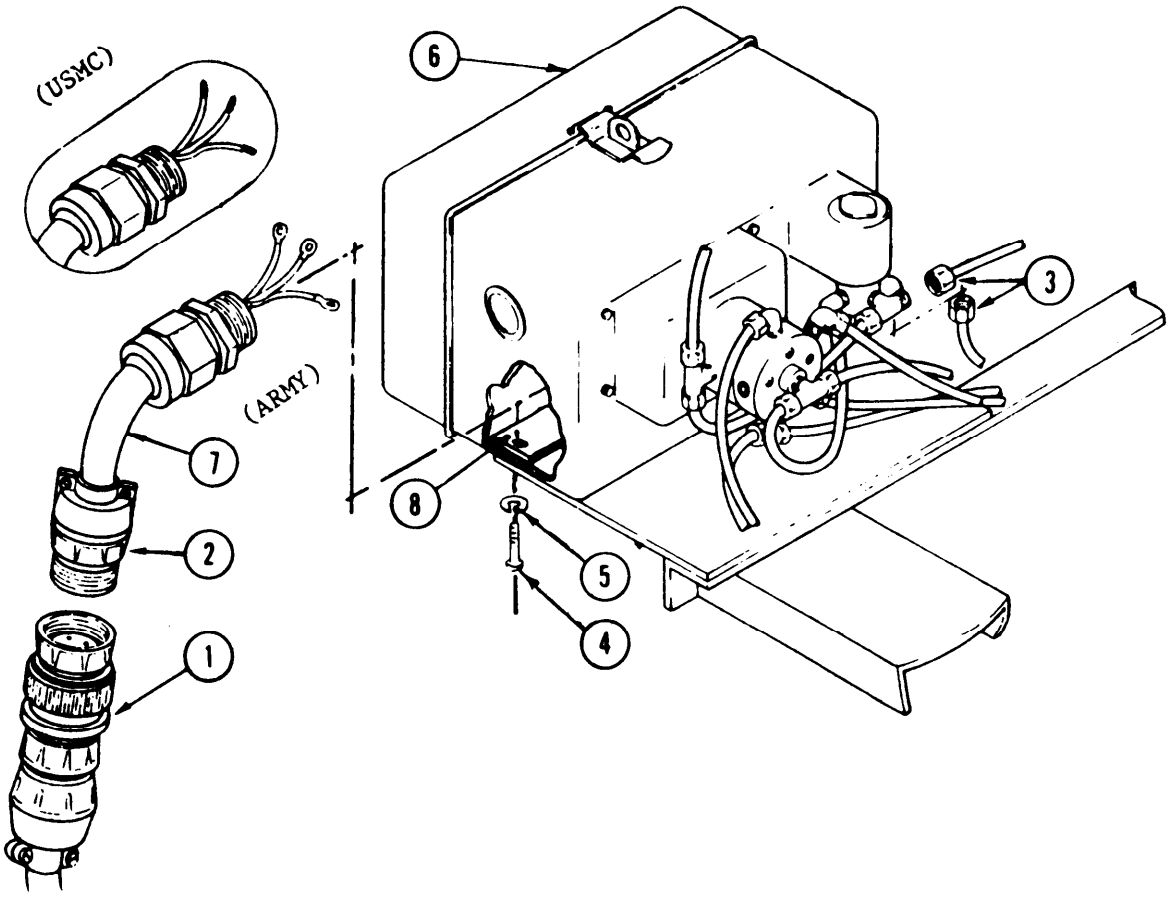


Figure 2–60. Backwash Timer

e. Installation.

(1) Hold backwash timer in place on its mounting plate.

(2) Open timer box and align mounting bracket (8).

(3) Install two screws (4) and two lockwashers (5) through mounting plate into backwash timer mounting bracket (8).

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(4) Connect thirteen hose coupling nuts (3). (Figure 2–60)

(5) install backwash timer cable (7) to backwash timer in accordance with paragraph 2–63.

(6) Connect control box connector (1) to backwash timer power connector (2).

2–57 JUNCTION BOX ASSEMBLY

a. General. The junction box assembly is bolted to the ROWPU frame above the R.O. pump assembly. It is secured by three bolts to the diagonal side member and by nine bolts to the top beam. This paragraph describes removal, cleaning, inspection, repair, and installation of the junction box assembly.

b. Removal of Junction Box Assembly.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

NOTE

Before doing maintenance on junction box assembly, disconnect the ground wire and all pump motor wiring from the junction box assembly.

Identify and tag each cable and wire before disconnecting it. Remove tags after wire or cable is reconnected and checked.

(1) Release thirteen snap-screws and open junction box assembly.

(2) Remove four bolts (1) (figure 2-61) and four flat washers (2) from junction box assembly and circuit breaker plate (3).

CAUTION

Pulling on wires can damage wires and connections. Take care not to damage circuit breakers and wiring harnesses.

(3) Tilt circuit breaker panel forward enough to reach wires.

(4) Remove terminal lug nuts on each circuit breaker and disconnect wires in accordance with paragraph 2–55b.

(5) Remove circuit breaker plate (3) and circuit breakers from junction box assembly.

(6) Remove motor starters from junction box assembly in accordance with paragraph 2-52.

(7) Remove high- and low-pressure solenoids in accordance with paragraph 2-54.

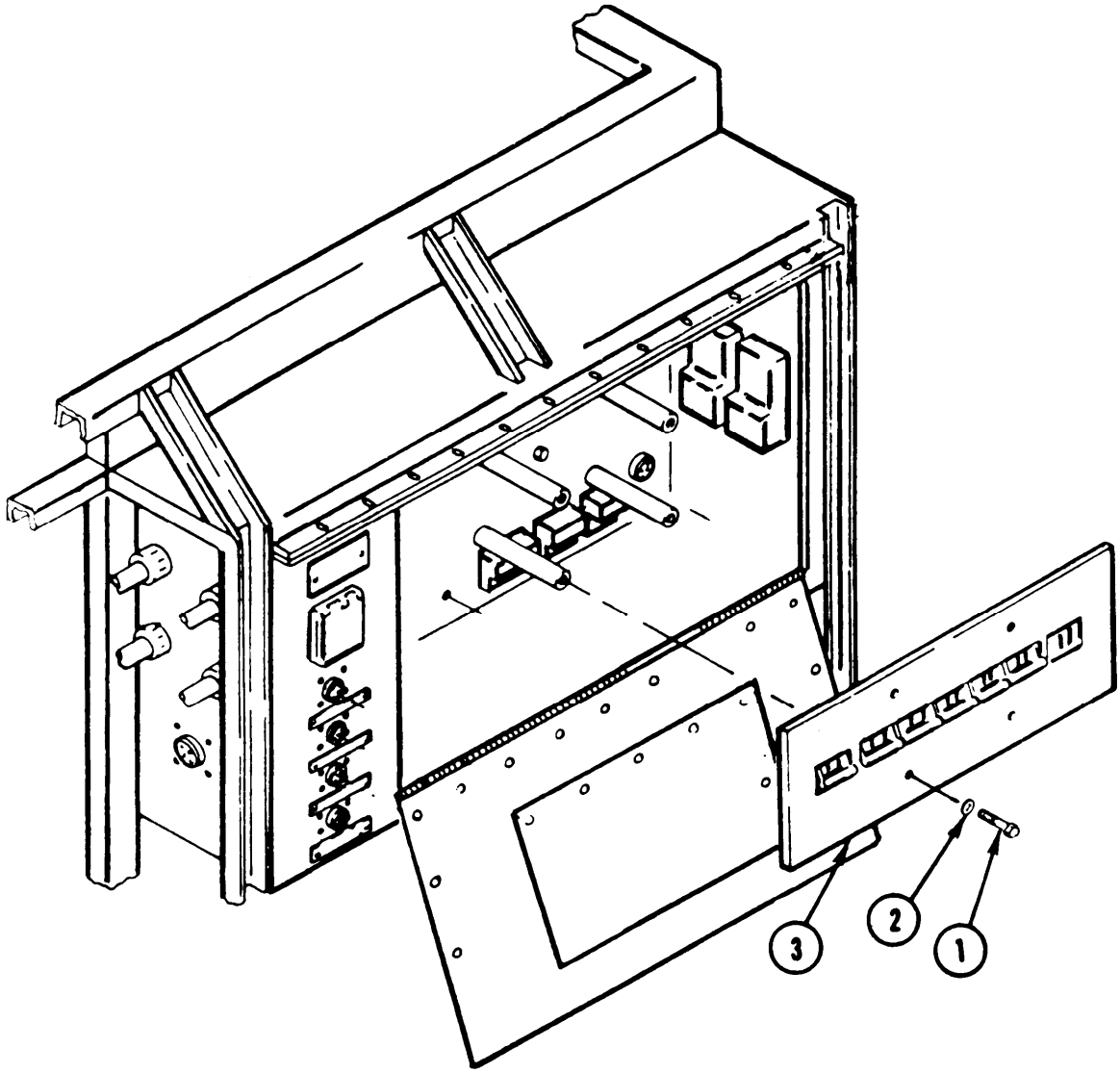


Figure 2–61. Circuit Breaker Plate

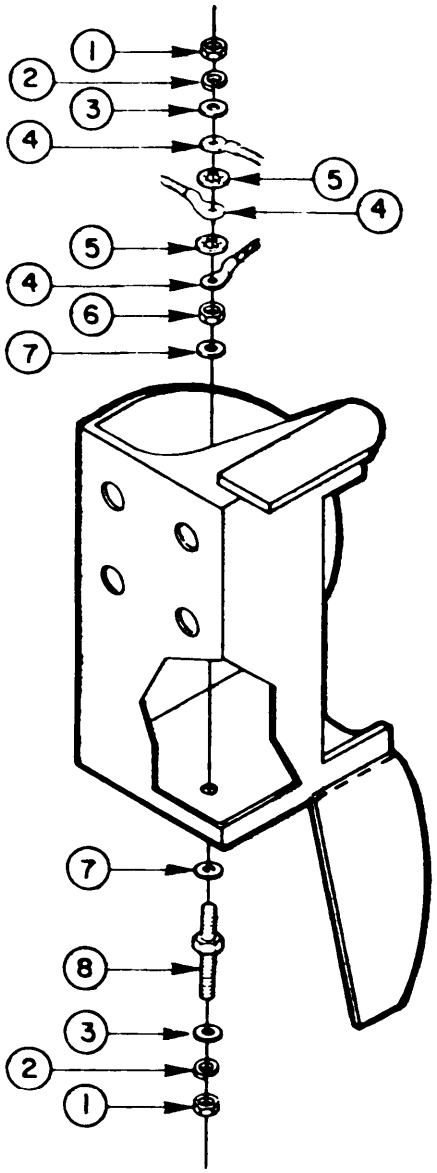


Figure 2-62. Ground Lug

(8) Remove terminal blocks from junction box assembly in accordance with paragraph 2-62.

(9) Remove cable clamps and internal wiring harnesses in accordance with paragraph 2-65.

(10) Remove receptacles for generator, control panel, R.O. pump, backwash pump, distribution pump, and two raw water pumps in accordance with paragraph 2–60.

(11) Remove power receptacle (J7) in accordance with paragraph 2-61.

(12) Remove two nuts (1), (figure 2-62), two lockwashers (2), and two flat washers (3) from grounding stud (8).

(13) Remove wire lugs (4) and separating flat washers (5) from grounding stud (8).

(14) Remove nut (6) and flat washer (7) from grounding stud (8).

(15) Remove grounding stud (8) from junction box assembly.

(16) Remove cable grip nut (1) from four cable grips (2). (Refer to figure 2-63.)

(17) Remove four cable grips (2) and cables from junction box assembly.

(18) Remove nine nuts (3) and nine lockwashers (4) from bolts (5) that secure junction box assembly (9) to top beam.

(19) Remove nine bolts (5) from junction box assembly (9) and beam.

(20) Support junction box assembly and remove three nuts (6) and three lockwashers (7) from bolts (8) securing junction box assembly to diagonal frame member.

(21) Remove three bolts (8) from diagonal and junction box assembly (9).

(22) Remove junction box assembly (9) from frame.

c. Cleaning.

(1) Remove dirt and dust from inside junction box.

(2) Wash junction box inside and outside with mild soapy water using a stiff brush.

(3) Prepare for repainting, if needed.

(4) Clean bolt and stud threads.

d. Inspection.

(1) Check junction box for dents, cracks, or broken welds.

(2) Check mounting hardware for bent bolt shanks, rust, and damaged threads.

(3) Before reinstalling, check junction box assembly components for damage.

e. Repair or Replace.

(1) Replace all damaged nuts, bolts, screws, and washers.

(2) Replace damaged or worn electrical wires.

(3) Dents and scratches may be reworked and removed.

(4) Cracks and broken welds may be rewelded.

(5) Replace badly damaged circuit breaker plate or junction box assembly.

(6) Repaint, as needed, in accordance with Standard Operating Procedures.

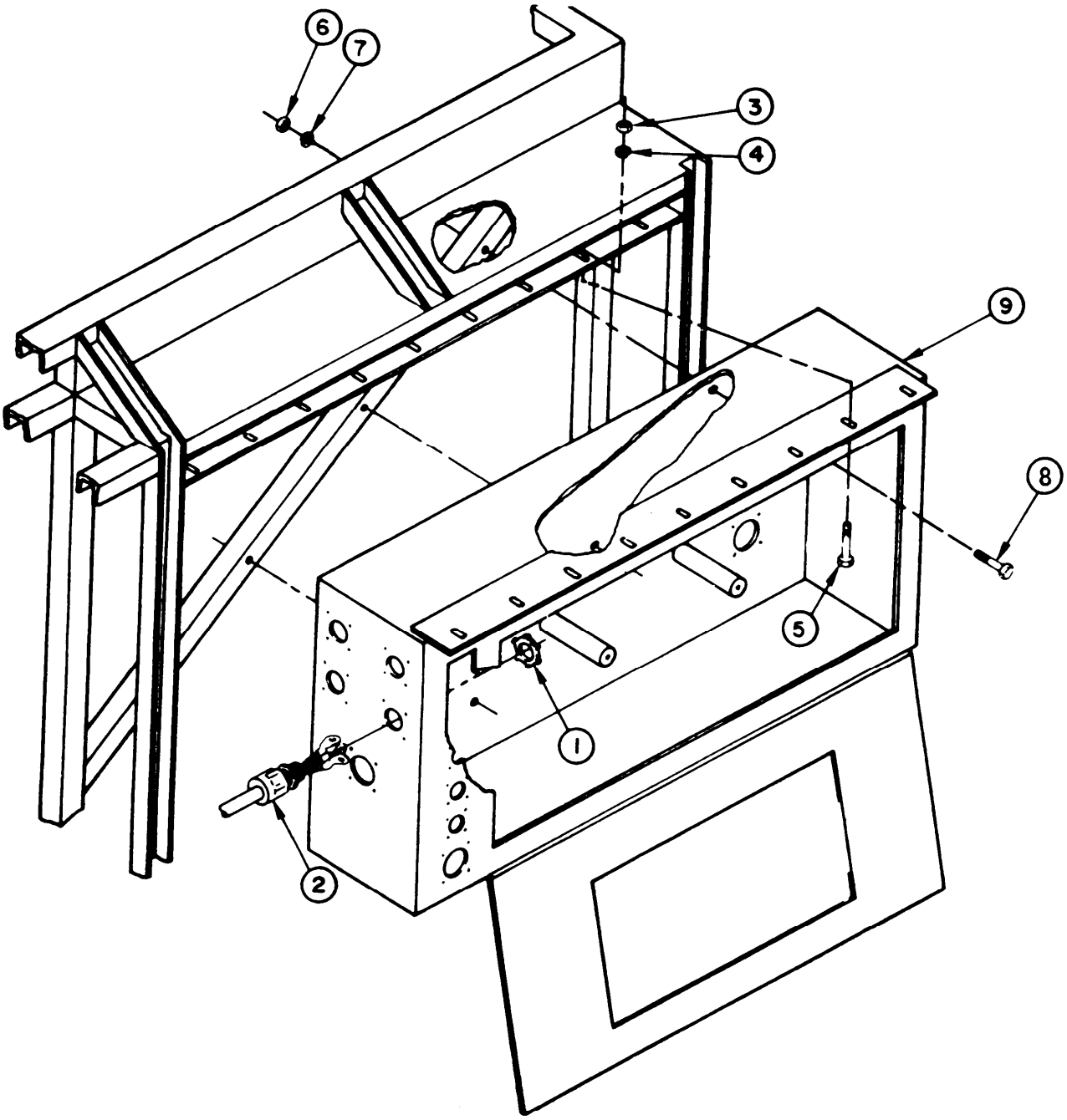


Figure 2-63. Junction Box Assembly

f. Installation.

(1) Install Junction Box. (Figure 2-63)

(a) Hold junction box in place against ROWPU frame.

(b) Insert three bolts (8) through junction box (9) and diagonal frame member.

(c) Install three lockwashers (7) and three nuts (6) on bolts (8), finger tight.

NOTE

Do not tighten bolts yet.

(d) Install nine bolts (5), nine lockwashers (4) and nine nuts (3), finger tight, through top of junction box and top frame beam.

(e) Tighten all nuts (3) and (6).

(f) Slip four cable grips (2) over four cables.

(g) Insert wires through holes in junction box assembly.

(h) From inside junction box assembly, slip four cable grip nuts (1) over wires and mount four cable grips (2) to junction box assembly.

(2) Install Ground Lug. (Figure 2-62)

(a) Slip flat washer (7) over grounding stud (8).

(b) Insert grounding stud (8) into mounting hole in junction box assembly.

(c) Install flat washer (7) and nut (6) on grounding stud (8).

(d) Install wire lugs (4) and separating flat washers (5) on grounding stud (8).

(e) Install two flat washers (3), two lockwashers (2), and two nuts (1) on grounding stud (8).

(3) Reassemble Junction Box Assembly.

(a) Install power receptacle (J7) in accordance with paragraph 2-61.

(b) Install receptacles for generator, control panel, R.O. pump, backwash pump, distribution pump, and two raw water pumps in accordance with paragraph 2–60.

(c) Install cable clamps and internal wiring harnesses in accordance with paragraph 2-85.

(d) Install terminal blocks in junction box in accordance with paragraph 2-62.

(e) Install high and low-pressure solenoids in accordance with paragraph 2-54.

(9 Install motor starters in junction box in accordance with paragraph 2-52.

(g) Install circuit breaker panel and circuit breakers in accordance with paragraph 2-55.

2-58. TOGGLE SWITCHES.

a. General. Eleven toggle switches control the various electrical components of the ROWPU. Ten are On the front of the control box assembly and one R.O. ELEMENT CLEANING is on the left side of the control box assembly. This paragraph describes removal, cleaning, inspection, and installation of the toggle switches.

b. Removal of Toggle Switch. (Figure 2–64)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

NOTE

Switches may have a different number of wires, depending on use. Steps for removal, however, do not change.

(1) From inside control box assembly or switch housing, remove screws (1) and wires (2) from switch (6). (Refer to schematic, figure 1-12.)

(2) From front of control box assembly or switch housing, remove mounting nut (3) and lockwasher (4) from switch (6).

(3) Remove switch (6) from inside control box assembly or switch housing.

(4) Remove locking ring (5) from switch (6).

c. Removal, Emergency Stop Switch. (Figure 2–65)

(1) Unscrew and remove knob (1) and locking nut (2) from switch (5).

(2) Remove switch (5) from control box panel.

(3) Remove fiber washer (3), keyway washer (4), and rubber washer (6) from switch body (5).

(4) Remove screw (7) and wires (8) from switch terminal and mark each wire for installation.

d. Cleaning.

(1) Remove dirt and corrosion from switch.

(2) Remove dirt and rust from threads of screws, nuts, and locking rings.

e. Inspection.

(1) Inspect switch for damage.

(2) Inspect wires for broken insulation or bare wires.

(3) Inspect threads and heads of screws.

(4) Remove all wires from switch to be inspected.

(5) Perform continuity test on switch and wires with a multimeter.

(6) Test all switch positions for shorts, opens, and high resistance

f. Repair or Replace.

(1) Replace all damaged screws, nuts, bolts, and washers.

(2) Replace all damaged or worn electrical wires.

(3) Replace damaged or unserviceable toggle switch assemblies.

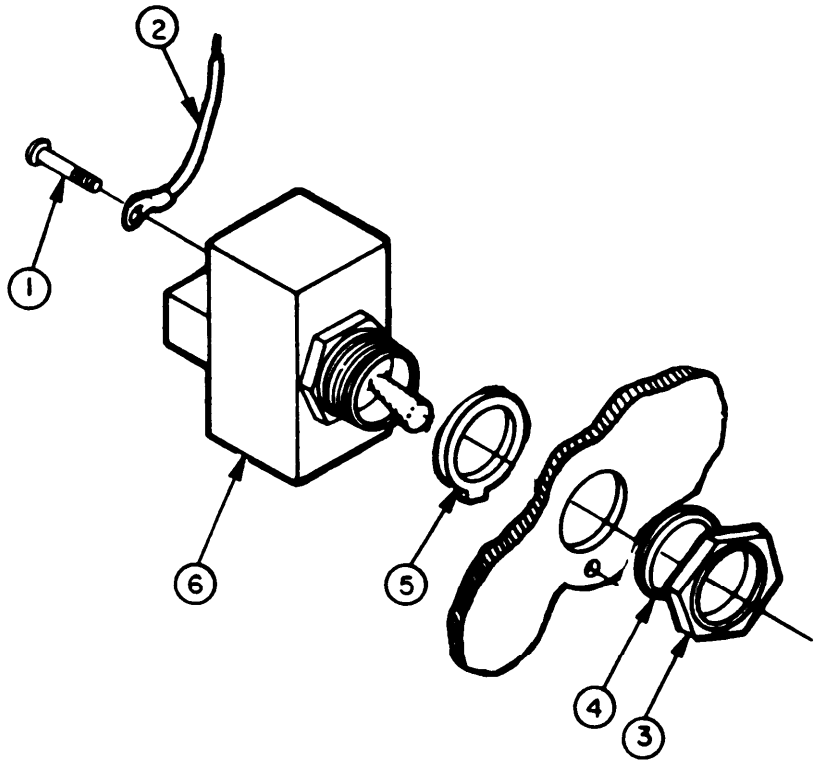


Figure 2-64. Toggle Switch

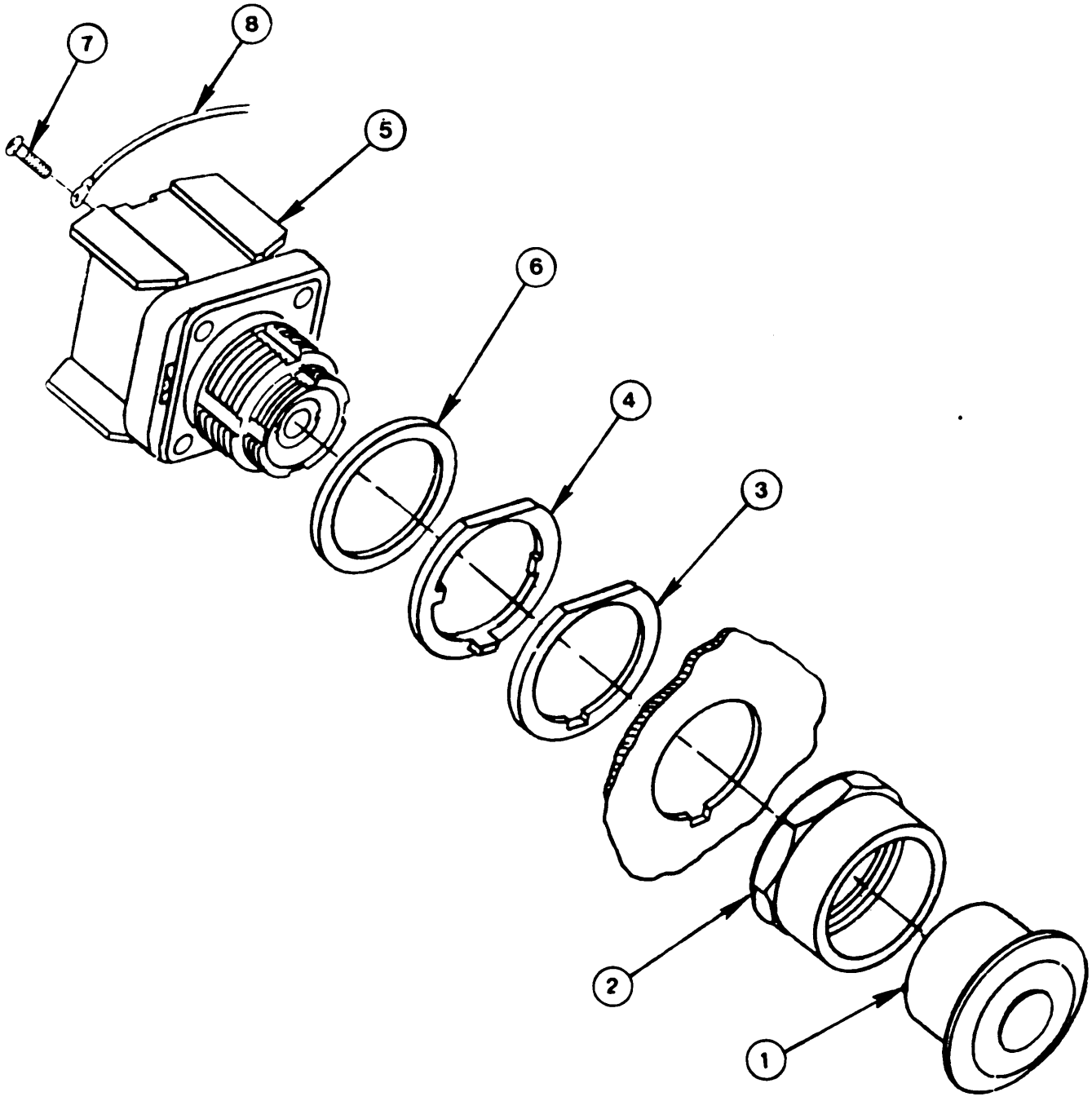


Figure 2–65. Emergency Stop Switch

g. Installation, Toggle Switch. (Figure 2-64)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

NOTE

Switches may have a different number of wires to connect, but installation is the same.

(1) Install locking ring (5) on switch (6).

(2) From inside control box assembly, insert switch (6) and locking ring (5) through mounting hole with anti–rotation key/slot on the bottom (figure 2-64).

NOTE

Seal around mounting hole with silicon adhesive, RTV, Type I.

(3) From the front of the control panel, install lockwasher (4) and mounting nut (3) to switch (6).

(4) From back of switch (6), connect all tagged wires (2) using screw (1).

h. Installation. Emergency Stop Switch. (Figure 2-65)

(1) Install rubber washer (6), keyway washer (4), and fiber washer (3) on switch body (5).

(2) Insert switch body (5) into panel.

(3) Attach wires (8) using screws (7).

(4) Install locking nut (2) and knob (1) on switch (5) and tighten.

2–59. INDICATOR LAMPHOLDERS.

a. General. The indicator lampholders contain the lamps that indicate pump operation, high pressure low pressure, and backwash operation. There are ten lampholders mounted on the control box assembly. The lens housing is equipped with a blackout dimmer. Unless otherwise instructed, the dimmer should remain in the open position. This paragraph describes removal, inspection, cleaning, and installation of the lampholders.

b. Removal. (Figure 2-66)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Remove lens assembly (1) from lampholder (9).

(2) Remove rubber gasket (2) from lampholder (9). Discard rubber gasket (2).

(3) Using the bulb puller, remove bulb (3) from lampholder (9).

(4) Remove knurl nut (4) and rubber gasket (2) from lampholder (9). Discard rubber gasket (2).

(5) From inside the control box assembly, remove two screws (5) and three wire lugs (6) from lampholder (9).

(6) Remove nut (7) and lockwasher (8) from lampholder.

(7) Remove lampholder (9) from front of control box assembly.

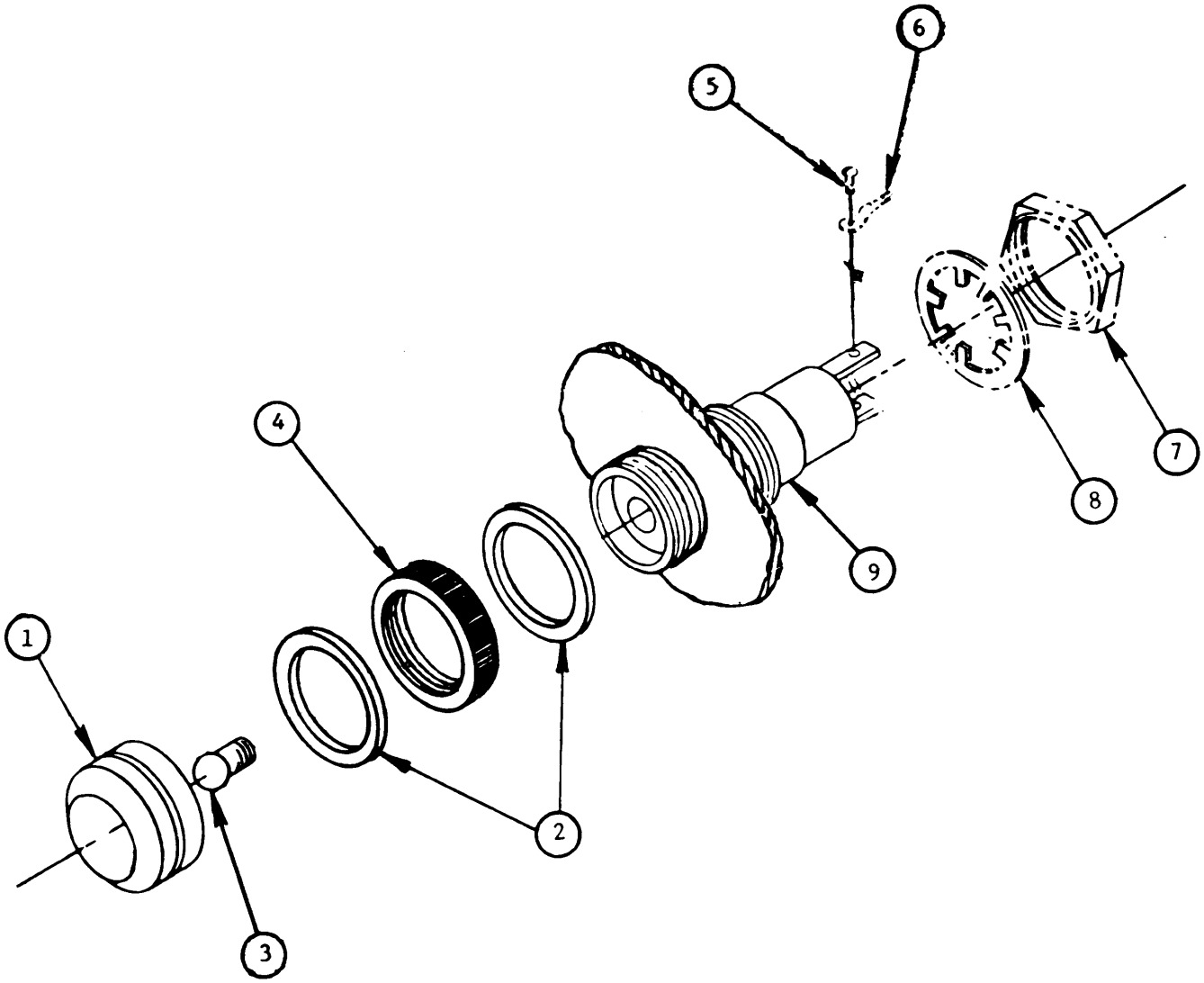


Figure 2-66. Indicator Lampholder

c. Cleaning.

(1) Wash lens with mild soap solution and soft cloth.

(2) Remove dirt and rust.

d. Inspection.

(1) Inspect lampholder for cracked or broken lens, damage to body, and broken terminals.

(2) Inspect wires for cracked insulation, bare wire, and broken or missing wire lugs.

(3) Using the multimeter, test lampholder contacts for continuity with lamp base. (Refer to schematic, figure 1–12.)

(4) Test lampholder contacts for opens, shorts, or high resistance.

e. Repair or Replace.

(1) Replace all damaged screws, nuts, bolts, and washers.

(2) Replace all damaged or worn electrical wires.

(3) Replace rubber gaskets and burned-out bulbs.

(4) Replace damaged or unserviceable indicator lampholder assemblies.

f. Installation. (Figure 2-66)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) From front of control box assembly, insert lampholder (9) into mounting hole.

(2) Install lockwasher (8) and nut (7) on lampholder (9).

(3) From rear of lampholder (9) connect three wire lugs (6) using two screws (5).

(4) Install bulb (3) in lampholder (9).

(5) Slide replacement rubber gasket (2), knurled nut (4), and another gasket (2) over threads of lampholder (9) and seat on shoulder.

(6) Install lens (1) on lampholder (9).

NOTE

Check and rotate the lens so that the dimmer is in the OPEN position.

2-60. POWER RECEPTACLES (J1 THROUGH J6, J8, J9).

a. General. Power receptacles are the points at which power cables are connected. Seven of them are on the junction box assembly and one is on the control box assembly. Because they connect to different pieces of equipment, there are several different kinds of receptacles, but all of them are removed and serviced in the same manner. This paragraph describes removal, inspection, repair, and installation of a typical power receptacle.

b. Removal. (Figure 2--67)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

NOTE

Identify and tag all wires before disconnecting. Remove tags after wires are reconnected and tested.

(1) Disconnect the receptacle wiring harness (7) from all other points in the junction box assembly or control box assembly.

(2) Remove four nuts (1), four lockwashers (2), and four flat washers (3) from four screws (4).

(3) Remove four screws (4) from receptacle (5) and control box assembly or junction box assembly.

(4) Remove receptacle (5) with wiring harness (7) attached from control box assembly or junction box assembly.

(5) Remove gasket (6) from receptacle (5). Discard gasket (6).

NOTE

Perform step (6) only if replacing wire harness of receptacle.

(6) Unsolder wiring harness (7) from receptacle (5).

c. Inspection.

(1) Inspect receptacle for cracks and stripped or damaged threads that will prevent plug from coupling.

(2) Inspect for broken soldered connections.

(3) Inspect wiring harness for cracked insulation, bare wires, and missing wire lugs.

d. Repair or Replace.

(1) Replace all damaged screws, nuts, bolts, and washers.

(2) Replace all damaged or worn electrical wires.

(3) Replace damaged power receptacles.

(4) Replace damaged or worn wiring harness assemblies.

(5) Solder loose wire connections to new power receptacle.

e. Installation. (Figure 2-67)

(1) If needed, solder wires from harness (7) to receptacle (5).

(2) Install replacement gasket (6) on front of receptacle (5).

(3) From rear of mounting panel, insert receptacle (5) with harness (7) attached, into mounting hole in panel with large polarizing key at top.

(4) Insert four screws (4) through mounting panel, gasket (6), and receptacle (5).

(5) Install four flat washers (3), four lockwashers (2), and four nuts (1) to screw (4).

(6) If needed, reconnect wires in harness (7) to all other points in the junction box assembly or the control box assembly in accordance with paragraph 2-51.

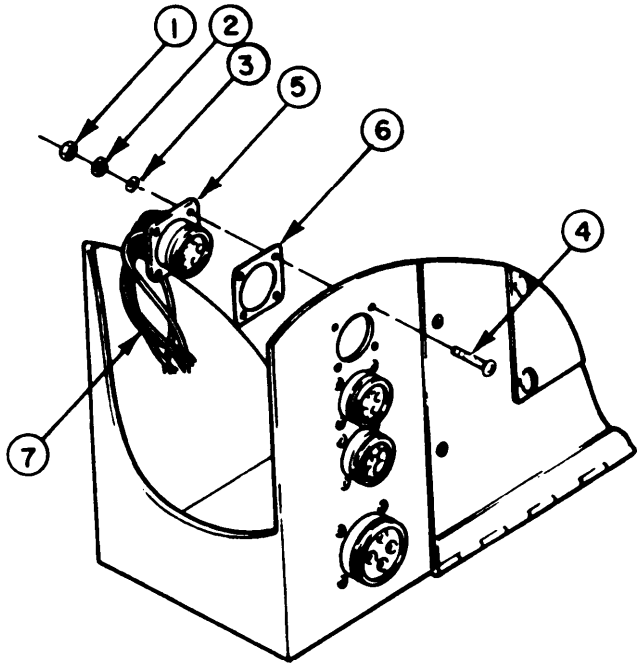


Figure 2-67. Power Receptacle (J1 thru J6, J8, J9)

2-61. POWER RECEPTACLE (PLUG-IN) (J7).

a. General. Power receptacle J7 is a plug-in for utility lights and other equipment that has a two/three prong plug. It is located on the top left corner of the junction box assembly. The receptacle is protected with a ground fault interrupter that cuts off power to the receptacle if the equipment plugged into it is improperly grounded. This paragraph describes testing, removal, inspection, cleaning, and installation of power receptacle J7.

b. Testing. (Figure 2-68)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Plug the utility light into one outlet of the receptacle and turn on the light.

(2) Push the test button (marked T) on the receptacle. The reset button (marked R) should pop out and the utility light should go off. If this does not happen, replace the receptacle.

(3) Push in the reset (R) button. It should stay in and the light should come on. If this does not happen, replace the receptacle.

c. Removal.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Remove two nuts (1) and two lockwashers (2) from screws (3).

(2) Remove two screws (3) from receptacle (11), mounting panel (12), and cover (4).

(3) Remove cover (4) and gasket (5) from mounting panel (12).

(4) Remove four nuts (6), four lockwashers (7), and four flat washers (8) from screw (9).

(5) Remove four screws (9) from receptacle (11) and mounting panel (12).

(6) Carefully turn receptacle to reach wires.

(7) Disconnect and remove three wires (10).

(8) Remove receptacle (11) from mounting panel (12).

d. Cleaning.

(1) Remove dirt from receptacle and cover.

(2) Remove rust from cover and mounting hardware.

e. Inspection.

(1) Inspect receptacle for damage.

(2) Inspect cover and gasket for damage.

(3) Inspect nuts and screws for damaged heads and threads. Inspect screws for bent or broken shanks.

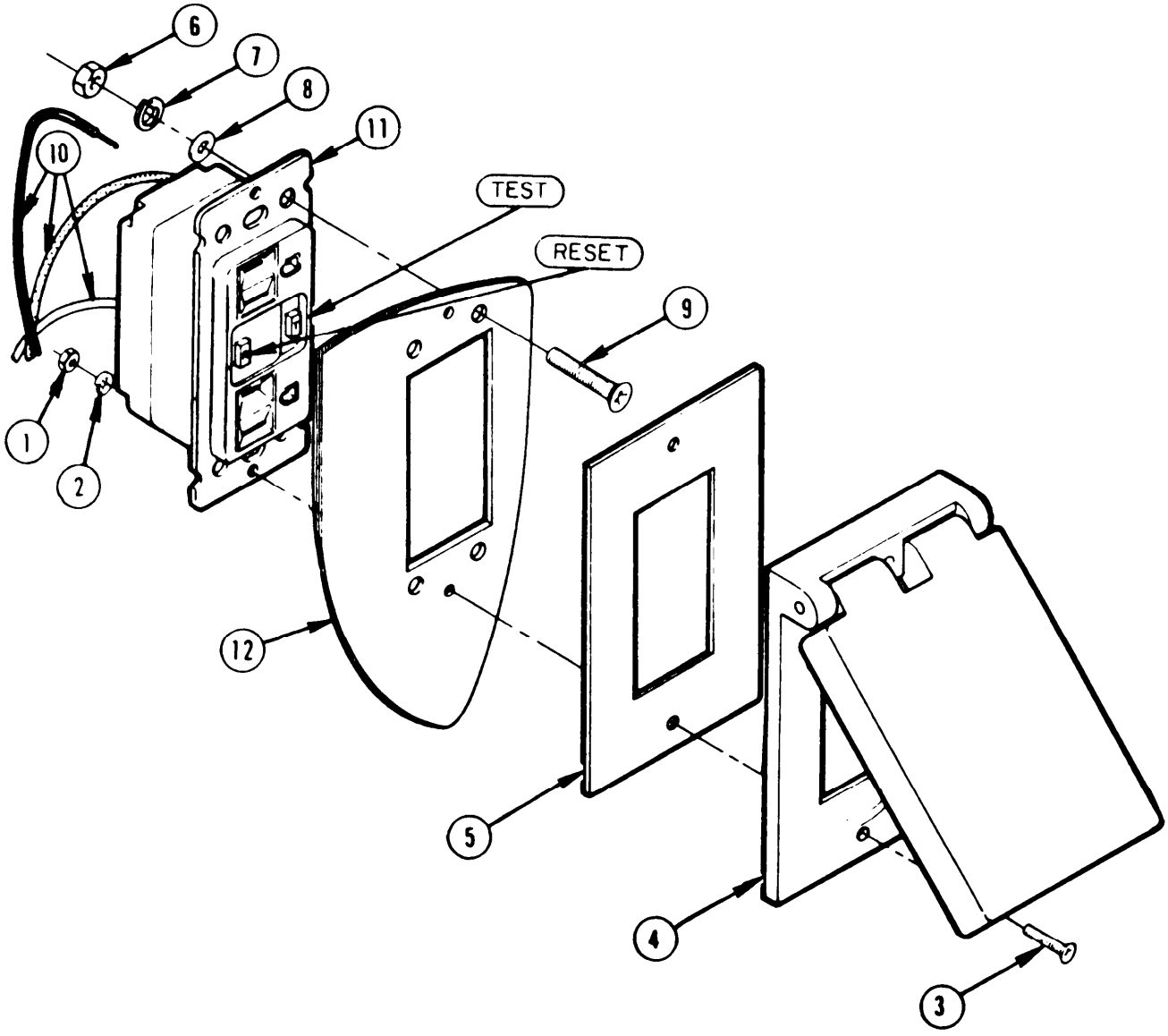


Figure 2 68. Power Receptacle (J7)

f. Repair or Replace.

(1) Replace all damaged nuts, bolts, screws, and washers.

(2) Replace gasket.

(3) Replace damaged or worn electrical wires.

(4) Replace damaged power receptacle cover.

(5) Replace damaged or unserviceable power receptacle assembly.

(6) Send unusable parts and components to Direct Support Maintenance for repair.

g. Installation. (Figure 2-68)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Connect three tagged wires (10) to rear of power receptacle (11).

(2) Carefully hold receptacle (11) in mounting hole of mounting panel (12) with test button (T) on right–hand side.

(3) Insert four screws (9) through mounting panel (12) and receptacle (11).

(4) Install four flat washers (8), four lockwashers (7), and four nuts (6) on screw (9).

(5) Insert two screws (3) through cover (4), replacement gasket (5), mounting panel (12), and receptacle (11).

(6) Install two lockwashers (2) and two nuts (1) on screws (3).

2-62. TERMINAL BLOCKS.

a. General. Removable terminal blocks are used in two places on the ROWPU. In the junction box assembly, they distribute power from the generator set to the junction box assembly components. In the control box assembly, they are the connection between the junction box assembly and the switches of the control box assembly. This paragraph describes removal, inspection, and installation of the terminal blocks.

b. Removal. (Figure 2-69)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power IS removed before performing maintenance on electrical equipment.

(1) Remove all screws (1) that hold wire lugs (2) to terminal block (7). (Refer to schematic, figure 1-12.)

(2) Remove wire lugs (2) from terminal block (7).

(3) Remove four nuts (3), four lockwashers (4), and four flat washers (5) from screw (6).

(4) Remove screw (6) from terminal block (7) and junction box assembly or control box assembly.

(5) Remove terminal block (7) from junction box assembly or control box assembly.

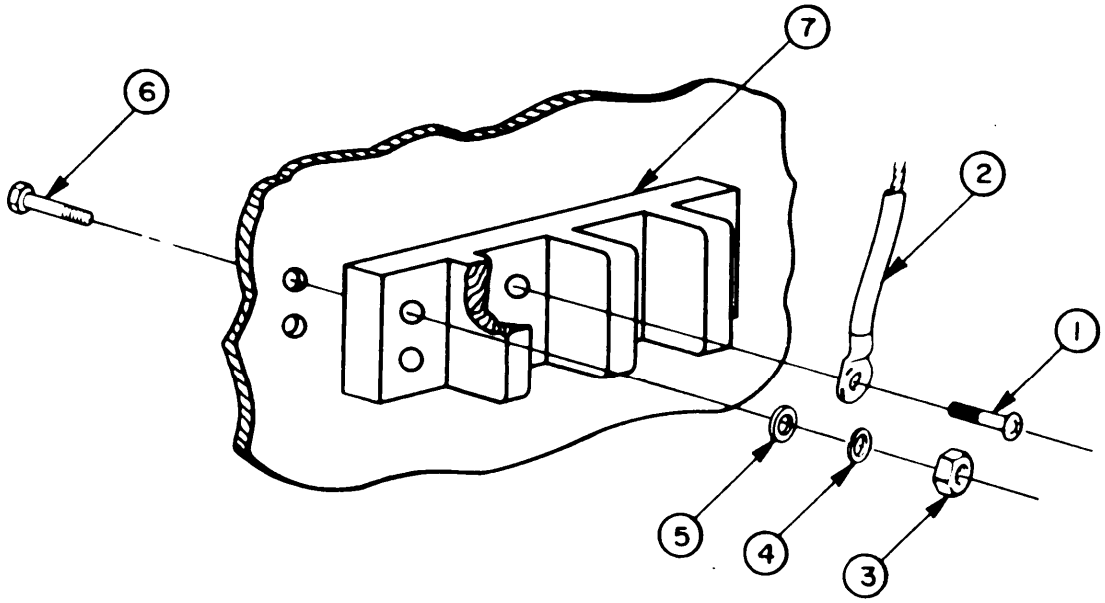


Figure 2-69. Terminal Block (Typical)

c. Inspection.

(1) Inspect terminal blocks for cracks, breaks, and signs of burning.

(2) Inspect screws and nuts for damaged heads and threads.

d. Repair or Replace.

(1) Replace all damaged screws, nuts, or washers.

(2) Replace damaged or worn electrical wires.

(3) Replace damaged or burned terminal block.

e. Installation. (Figure 2-69)

(1) Hold terminal block (7) in mounting position.

(2) Insert four screws (6) through mounting panel and terminal block (7).

(3) Install four flat washers (5), four lockwashers (4), and four nuts (3) on screw (6).

(4) Install terminal screws (1) with wire lugs (2) attached.

2-63. ONBOARD (ROWPU) POWER CABLES AND SEALING GRIPS.

a. General. All cables on board the ROWPU have cable connectors on at least one end. This paragraph describes removal and reassembly of a typical cable and sealing grip.

b. Removal. (Figure 2-70)

(1) Shut off primary power and apply tags to all wires for later ease of reassembly.

(2) Open junction, control, or conduit box as applicable, depending on unit to be repaired. Disconnect all wires of the power cable.

(3) Unscrew compression nut (2) from cable grip nut (4) and slide compression nut (2) up power cable (1).

(4) Gently pull power cable (1) out until compression fitting (3) pulls free of cable grip nut (4) and remove remaining cable.

(5) Remove retaining nut (6) from cable grip nut (4).

(6) Remove O-ring (5) from cable grip nut (4). Discard O-ring (5).

(7) Remove compression fitting (3) from power cable (1).

(8) Remove compression nut (2) from power cable (1).

c. Reassembly.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Slide compression nut (2) and compression fitting (3) down power cable (1).

(2) Install O-ring (5) on cable grip nut (4) and position cable grip nut (4) through electrical panel.

(3) Install and tighten retaining nut (6) on cable grip nut (4).

(4) Insert cable (1) through cable grip nut (4).

(5) Connect all tagged wires of the power cable.

(6) Remove tags.

(7) Tighten compression nut (2) to cable grip nut (4).

NOTE

If cable is to be removed or replaced, other end of cable must also be released. Check type of connection. If it is not a sealing grip, remove according to paragraph 2–66.

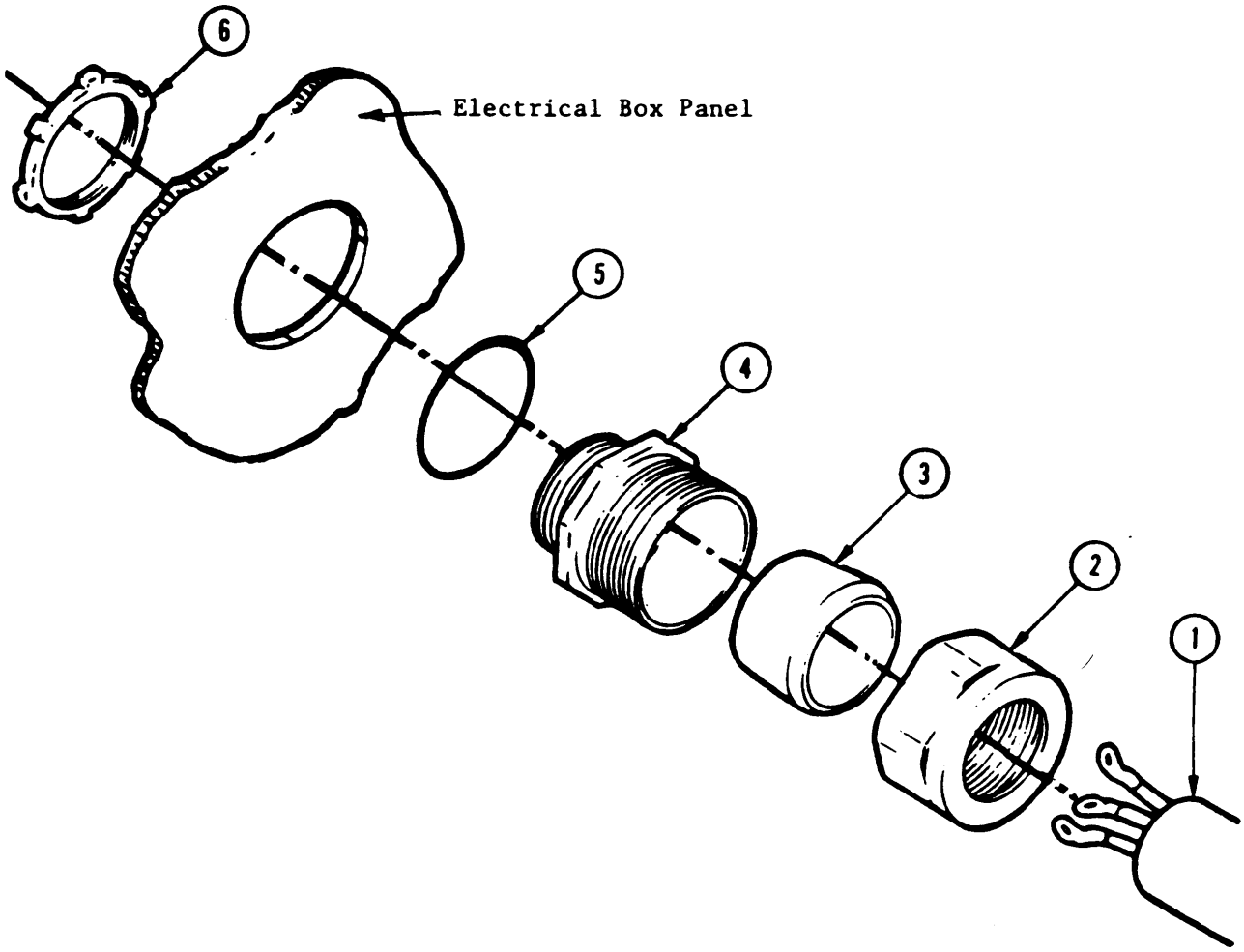


Figure 2–70. Onboard Cable Sealing Grip

2-64. ONBOARD (ROWPU POWER CONNECTORS).

a. General. Four onboard power cables on the ROWPU use female connectors that join with male receptacles. This paragraph describes removal, disassembly, cleaning, repair, replacement, and reassembly of onboard power connectors.

b. Removal. (Figure 2-71)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Unscrew knurled retainer nut (8) from receptacle installed in junction box or attached to another piece of cable, such as the cable between the timer and the top of the control box assembly.

CAUTION

Pulling on cable when trying to separate a connector from a receptacle may damage either cable or plug or both. Take care not to damage cable or plug.

(2) Grip connector firmly and gently wiggle it, while pulling at the same time and remove.

(3) Remove two screws (1) and lockwashers (2).

(4) Remove two cable clamps (3).

(5) Hold connector shell (10) with one hand and socket body (6) with the other hand.

(6) Unscrew connector shell (10) from socket body (6) and slip connector shell (10) back onto the power cable.

(7) Slip plastic insulating bushing (9) back onto the cable.

(8) Slide knurled retainer nut (8) back over neoprene bushing (7) and back onto the cable.

(9) Remove O–ring seal (4) from front of socket body. Discard O–ring (4).

(10) Push neoprene bushing (7) as far back on individual leads as the cable insulation permits.

(11) Tag leads and with soldering iron, heat each of four sockets (13) and pull out individual cable leads (5) from back of socket body (6).

(12) Remove socket body (6).

(13) Pull the neoprene bushing (7) from the four cable leads (5). Discard neoprene bushing (7).

(14) Pull knurled retainer nut (8) from cable, followed by plastic insulating bushing (9) and connector shell (10). Discard plastic insulating bushing (9).

(15) Remove (if applicable) chain retaining screw (11) and lockwasher (12) from connector shell (10).

NOTE

If cable to be replaced has a sealing grip on the opposite end, refer to paragraph 2–63 for breakdown and removal.

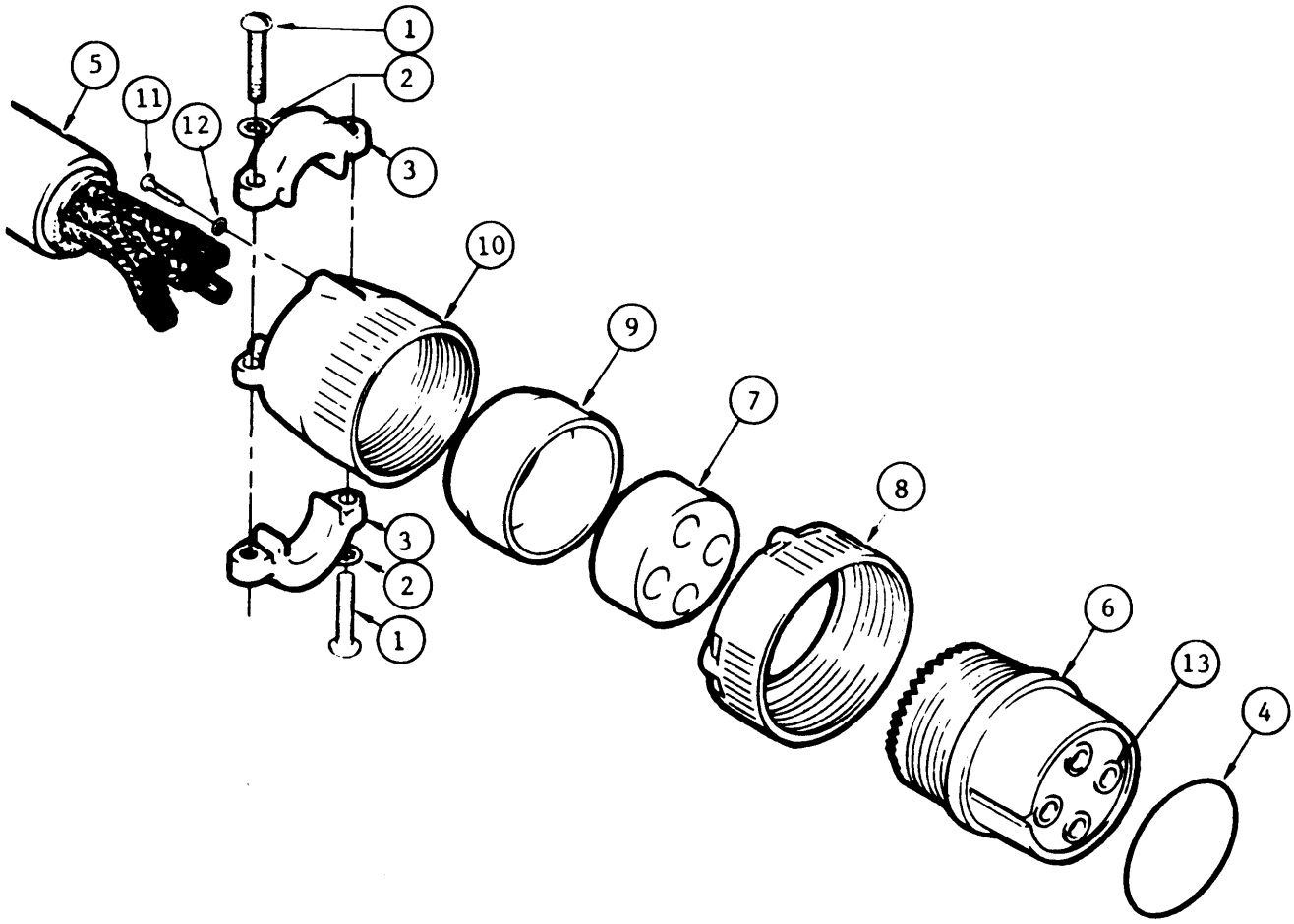


Figure 2-71. Onboard Power Connector (Typical)

c. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Remove corrosion from metal parts of the connector assembly.

(2) Clean dirt and corrosion from threads on connector parts and screws with cleaning solvent Fed. Spec. P-D-680.

d. Repair or Replace.

(1) Check disassembled connector for broken shell, plug, pins, and insulating bushing. Replace damaged part with new component.

(2) Replace screws, retainer nut, shell, and bottom part of holding bracket, if threads are damaged.

(3) Replace all O-rings.

(4) Replace plastic insulating bushing.

(5) Replace neoprene bushing.

(6) Replace cable, if necessary.

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

e. Reassembly. (Figure 2–71)

(1) Insert cable (5) through connector shell (10).

(2) Slide connector shell (10) down cable (5).

(3) Insert cable (5) through replacement plastic insulating bushing (9).

(4) Slide plastic insulating bushing (9) down cable (5).

(5) Slide knurled retainer nut (8) over cable (5).

(6) Insert each tagged lead of cable (5) through a hole in the neoprene bushing (7).

(7) Slide neoprene bushing (7) down leads as far as possible.

(8) With soldering iron, solder each tagged lead to its proper contact.

(9) Remove tags from leads.

(10) Slide neoprene bushing (7) over leads and soldered joints of contacts.

(11) Slide insulating bushing (9), retainer nut (8), and connector shell (10) up cable (5) and screw connector shell (10) to socket body (6).

(12) Locate two cable clamps (3) over connector shell (10) and cable (5).

(13) Install two screws (1) and two lockwashers (2) in cable clamps (3).

(14) Install replacement O-ring (4) over socket body (6).

(15) If applicable, install chain retaining screw (11) and lockwasher (12) to connector shell (10).

NOTE

If cable has a sealing grip at the other end, refer to paragraph 2-63 for installation of cable grip.

2-65. CLAMPS, CABLE/WIRE HARNESS

a. General. On the ROWPU, three types of clamps are used to Secure wires and cables to the surrounding assemblies. There are three different kinds of clamps, one kind in the junction box assembly, a second in the control box assembly, and a third securing cables to the ROWPU frame. This paragraph describes removal, inspection, and installation of each type of clamp.

b. Junction Box, Wire Harness/Cab e, Clamp. (Figure 2-72)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Disconnect terminals of wire harness (2) from all junction box assembly components except power receptacles.

(2) Cut and remove tiedown strap (1) on each cable clamp (6) through which the wire harness runs.

(3) If necessary, remove power receptacle from junction box assembly in accordance with paragraphs 2-60 or 2–61.

(4) Remove wire harness (2) from cable clamp (6).

NOTE

Go on to steps (5) through (7) only if replacing the cable clamps or junction box assembly.

(5) Remove one nut (3), one lockwasher (4), and one flat washer (5) from screw (7).

(6) Remove cable clamp (6) from screw (7).

(7) Remove screw (7) from junction box assembly.

c. Control Box Assembly, Wire Harness/Cable, Clamp Removal. (Figure 2-73)

(1) Disconnect terminals of wire harness (4) from all control box assembly components except power receptacle.

(2) On each clamp through which the wire harness runs, remove one nut (1) and one lockwasher (2) from screw (3).

(3) Remove screw (3) from cable clamp (5) and control box assembly.

(4) If necessary, remove power receptacle in accordance with paragraph 2-61.

(5) Remove wire harness (4) from control box assembly.

(6) Unsnap and remove cable clamp (5) from wire harness (4).

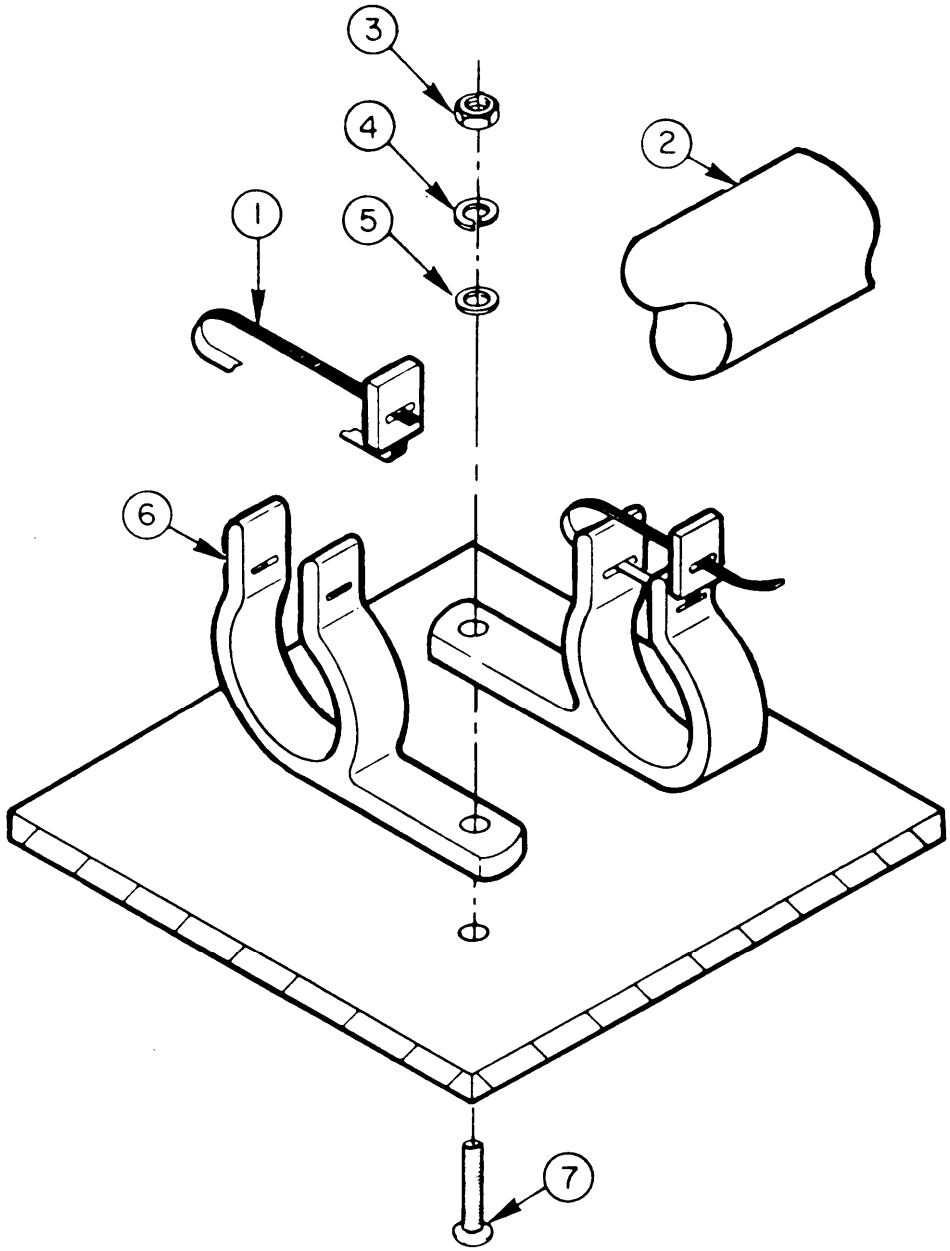


Figure 2–72. Junction Box, Wire Harness/Cable, Clamp

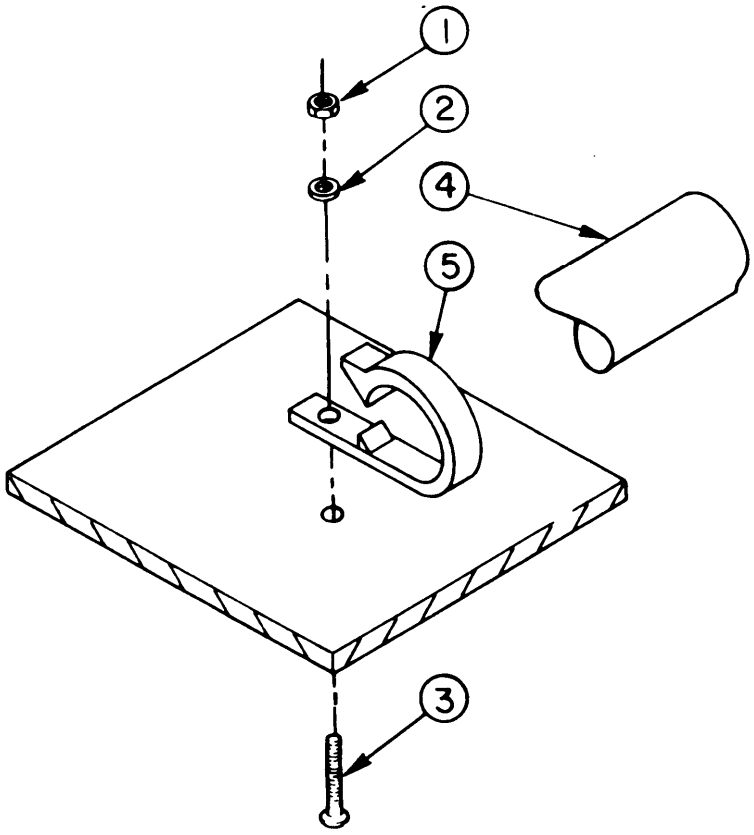


Figure 2–73. Control Box Assembly, Wire Harness/Cable, Clamp

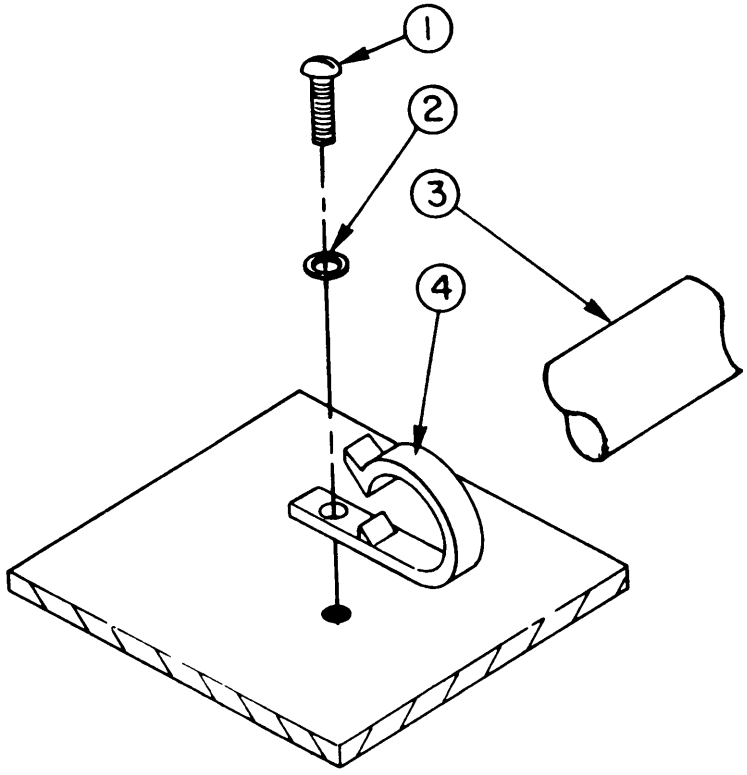


Figure 2–74. ROWPU Frame, Wire Harness/Cable, Clamp

d. ROWPU Frame, Wire Harness/Cable, Clamp Removal. (Figure 2-74)

(1) Disconnect cable (3) from junction box assembly in accordance with paragraph 2-64

(2) Disconnect cable from pump motor in accordance with appropriate paragraph.

(3) On each clamp through which the cable runs, remove one screw (1) and one lockwasher (2) from ROWPU frame and clamp (4).

(4) Remove cable (3) from ROWPU.

(5) Remove cable clamp (4) from cable (3).

e. Inspection.

(1) Inspect wire harness for cracked insulation, bare wires, and broken or missing terminal lugs.

(2) Inspect cable clamps for damage.

(3) Inspect screws and nuts for stripped heads and threads.

f. Repair or Replace.

(1) Replace all damaged nuts, bolts, screws, and washers.

(2) Replace used cable clamps.

(3) Replace damaged or worn electrical wires or wire harness assembly.

h. Installation, Junction Box Assembly, Wire Harness/Cable, Clamps. (Figure 2-72)

NOTE

Use new tiedown straps when installing the clamps. (Figure 2-72).

(1) Insert screw (7) in junction box assembly.

(2) Install cable clamps (6) on screws (7).

(3) Install flat washer (5), lockwasher (4), and nut (3).

(4) Lay wire harness (2) in cable clamp (6).

(5) Install tiedown strap (1) in each cable clamp (6) and tighten.

(6) If necessary, install power receptacle into junction box assembly in accordance with paragraphs 2-60 or 2–61.

(7) Connect all tagged wire terminals of wire harness (2) to all junction box assembly components except power receptacles.

h. Installation, Control Box Assembly, Wire Harness/Cable, Clamps. (Figure 2-73)

(1) Snap cable clamp (5) over wire harness (4) approximately at mounting location.

(2) Place wire harness (4) in control box assembly approximately in its mounting location.

(3) Slide cable clamp (5) along wire harness to its mounting hole.

(4) Insert screw (3) through mounting panel and cable clamp (5).

(5) Install lockwasher (2) and nut (1), finger-tight, on screw (3).

(6) Repeat steps (1) through (5) for each cable clamp.

(7) Connect terminals of wire harness (4) to all control box assembly components except power receptacle.

(8) If necessary, install power receptacle in accordance with paragraph 2-60.

(9) Press wire harness into its final position and tighten all cable clamp nuts (1).

i. Installation, ROWPU Frame. Wire Harness/Cable, Clamps. (Figure 2-74)

(1) Place wire harness (3) in ROWPU frame approximately in its final location.

(2) Connect wire harness (3) to each pump motor in accordance with appropriate paragraph.

(3) Connect wire harness (3) to junction box assembly in accordance with paragraph 2-63.

(4) Snap each cable clamp (4) over wire harness (3) to each mounting hole location.

(5) Install lockwasher (2) and screw (1) in each cable clamp (4).

2-66. PANEL LIGHT ASSEMBLY.

a. General. The panel light assembly illuminates the control panel of the ROWPU for night operation. This paragraph describes removal, cleaning, inspection, repair, and installation of the panel light assembly.

b. Removal. (Figure 2–75)

WARNING

ELECTRICAL HIGH VOLTAGE

Electricity can cause serious injury or death. Be certain that all power is removed before performing maintenance on electrical equipment.

(1) Pull out the panel light bracket (28) so the panel light is exposed.

(2) Loosen setscrew in guard (1).

(3) Remove guard (1) from fixture body ring (13).

(4) Remove two screws (2) from brackets (3) and reflector (4).

(5) Remove two brackets (3) and reflector (4) from guard (1).

(6) Remove light globe (5) from fixture body ring (13).

(7) Remove light bulb (6) from socket (11).

NOTE

If signs of moisture are visible inside the globe when it is removed, replace the gasket.

(8) Remove gasket (7) from fixture body (13).

(9) Remove two screws (8) from fixture body (13).

(10) Pull socket (11) out of fixture body (13) enough to expose wires.

(11) Remove screws (9) from backside of socket (11) to free wire lugs (10).

(12) Remove socket (11) from fixture body (13).

(13) Remove two screws (12) from fixture body (13).

(14) Remove fixture body (13) from adapter ring (16).

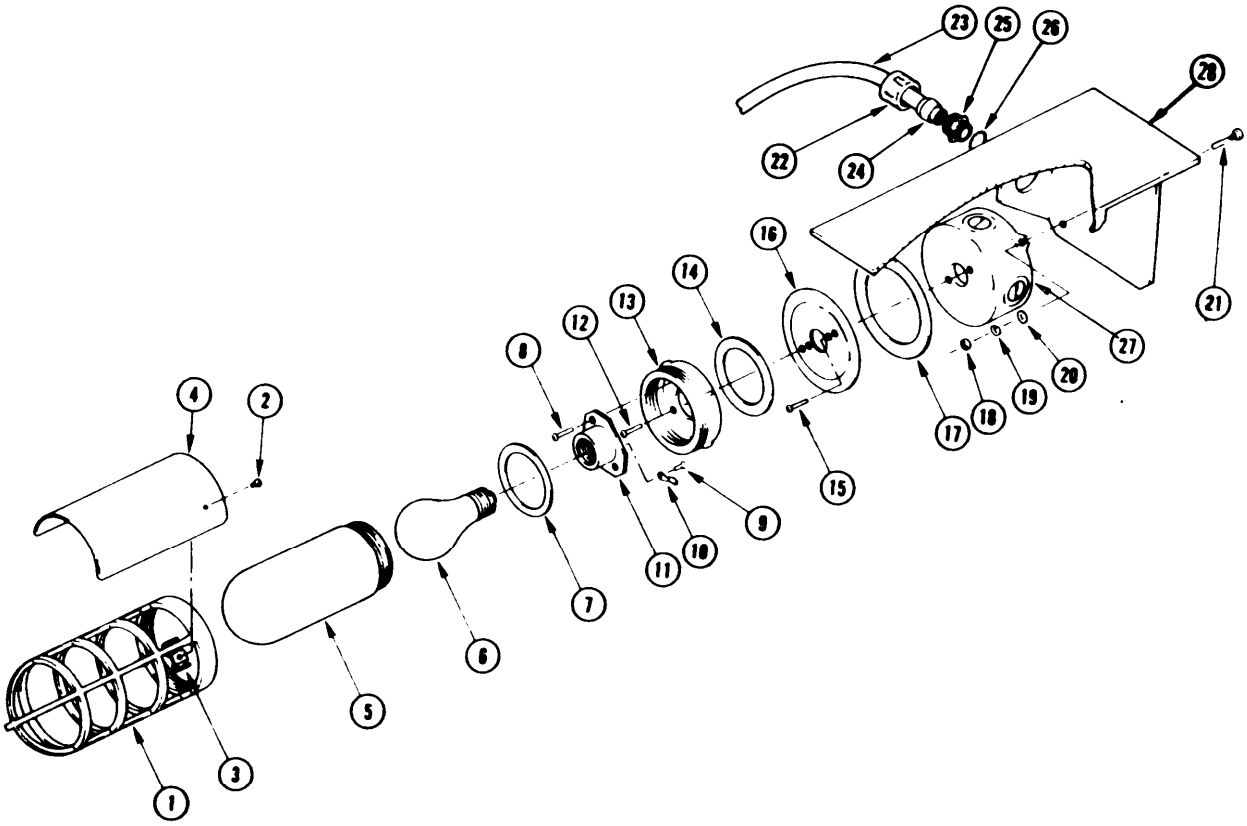


Figure 2–75. Panel Light Assembly

(15) Remove gasket (14) from adapter ring (16).

(16) Remove two screws (15) from adapter ring (16).

(17) Remove adapter ring (16) from splice box (27).

(18) Remove gasket (17) from splice box (27).

(19) Remove two nuts (18), two lockwashers (19), and two flat washers (20) from two bolts (21) holding splice box (27) to bracket (28).

(20) Remove two bolts (21) from splice box (27) and bracket (28).

(21) Pull splice box (27) away from bracket (28) enough to expose cable grip assembly, unscrew compression nut (22), and slide up cable (23).

(22) Remove cable (23) with compression nut (22) and compression fixture (24) from splice box (27).

(23) Remove cable grip nut (25) from splice box (27).

(24) Remove O-ring (26) from cable grip nut (25). Discard O-ring (26).

(25) Remove splice box (27) from bracket (28).

c. Cleaning. Wipe exterior of panel light assembly with a clean cloth.

d. Inspection.

(1) Check that light bulb is not burned out.

(2) Inspect threads of guard, fixture body, adapter ring, and splice box.

(3) Inspect globe for cracks.

(4) Check interior of globe and fixture body for signs of moisture. If there is dirt or moisture inside the globe, it is a sign that the gaskets are damaged and must be replaced.

(5) Discard all gaskets.

(6) Inspect ceramic socket for chips or cracks.

(7) Inspect hardware for damage or corrosion.

(8) Inspect electrical contacts for corrosion.

e. Repair or Redate.

(1) Replace bulb, if necessary.

(2) Replace all O–rings, gaskets, and damaged hardware.

(3) Replace ceramic sockets if unserviceable.

(4) Replace globe, if cracked.

f. Installation. (Figure 2-75)

(1) Slide compression nut (22) down cable (23).

(2) Slide compression fixture (24) down cable (23).

(3) Install cable grip nut (25) and O-ring (26) in splice box (27).

(4) Pull wire through cable grip nut (25) and feed through hole in splice box (27).

(5) Slide compression fixture (24) and compression nut (22) up cable (23) to cable grip nut (25).

(6) Connect compression nut (22) to cable grip nut (25).

(7) Hold splice box (27) in place.

(8) Insert two screws (21) through mounting bracket (28) and splice box (27).

(9) Install two flat washers (20), two lockwashers (19), and two nuts (18) on screw (21).

(10) Feed wires through gasket (17) and adapter ring (16).

(11) install adapter ring (16) and gasket (17) to splice box (27) with two screws (15).

(12) Feed wires through gasket (14) and fixture body (13).

(13) install gasket (14) and fixture body (13) to adapter ring (16) with two screws (12).

(14) Connect wire terminal lugs (10) to socket (11) with screws (9).

(15) Carefully compress wires into fixture body (13) and install socket (11) in fixture body (13) with two screws (8).

(16) Install light bulb (6) in socket (11).

(17) Install gasket (7) into fixture body (13).

(18) Install light globe (5) on fixture body (13).

(19) install reflector (4) on guard with two screws (2).

(20) install guard (1) on fixture body (13) and tighten setscrew in guard(l),

2-67, R.O. PRESSURE GAGE (psig).

a. General. The R.O. PRESSURE psi gage is used to show head pressure at the R.O. pump from 0 to 1500 psi (0 to 10,000 kpa). The gage IS secured to the control panel by a U–bracket, two nuts, and two washers. This paragraph covers removal, cleaning, inspection, replacement, and installation of the R.O. PRESSURE psi gage.

NOTE

Visible liquid in gage is normal condition.

b. Removal. (Figure 2-76)

WARNING

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

(1) Disconnect tubing nut (1) from back of gage.

(2) Remove two nuts (2) and two lockwashers (3) from gage-mounting studs.

(3) Remove U-bracket (4).

(4) Remove gage (5) from front of control panel (6).

(5) Remove elbow (7) from gage (5).

c. Cleaning.

(1) Remove dirt from meter cutout on control panel.

(2) Remove pitted and corroded material from the gage bracket.

(3) Remove dirt and corrosion from the threads of the nuts and the tube connector.

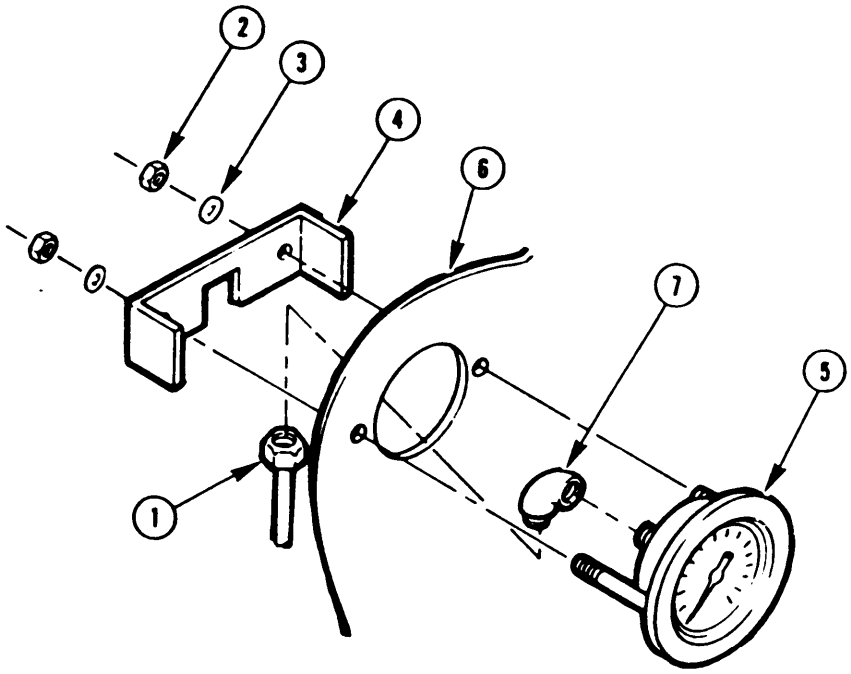


Figure 2–76. Gage psig (Typical)

d. Inspection

(1) Inspect gage (5) for damage.

(2) Inspect threads of studs, nuts, and tube connections for damage.

(3) Inspect pipe fitting, nuts, and washers for possible damage.

e. Repair or Replace.

(1) Replace damaged tube assembly or pipe fitting.

(2) Replace damaged U-bracket (4).

(3) Replace damaged or unserviceable pressure gage (5).

(4) Send damaged pressure gage to Direct Support Maintenance.

(5) Replace damaged nuts, bolts, screws, and washers.

f. Installation. (Figure 2-76)

(1) Install elbow (7) in gage (5).

(2) Insert gage (5) in mounting hole in panel (6).

(3) Slip U-bracket (4) over mounting studs of gage (5).

(4) Install two lockwashers (3) and two nuts (2) on gage mounting studs.

(5) Connect pressure tube coupling nut (1) to elbow (7).

(6) Test pressure tube fitting for leaks.

2-68. R.O. VESSELS, CARTRIDGE FILTER, AND MULTIMEDIA FILTER GAGES (psid).

a. General. The R.O. VESSELS gage shows the difference in pressure between the input and output of the R.O. vessels. The gage is secured to the control panel by three screws, three flat washers, three lockwashers, and three nuts. This paragraph covers removal, cleaning, inspection, replacement, and installation of gages.

b. Removal. (Figure 2-77)

WARNING

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

(1) Remove both tubing nuts (1) from 90° elbow (5).

(2) Remove three nuts (2) and three lockwashers (3) from three screws (4).

(3) Remove three screws (4).

(4) Remove two 90° piping elbows (5) from meter.

(5) Remove gage (6) from front of control panel (7).

c. Cleaning.

(1) Remove dirt from meter cutout in panel.

(2) Remove dirt and corrosion from the threads of the screws, nuts, and fittings.

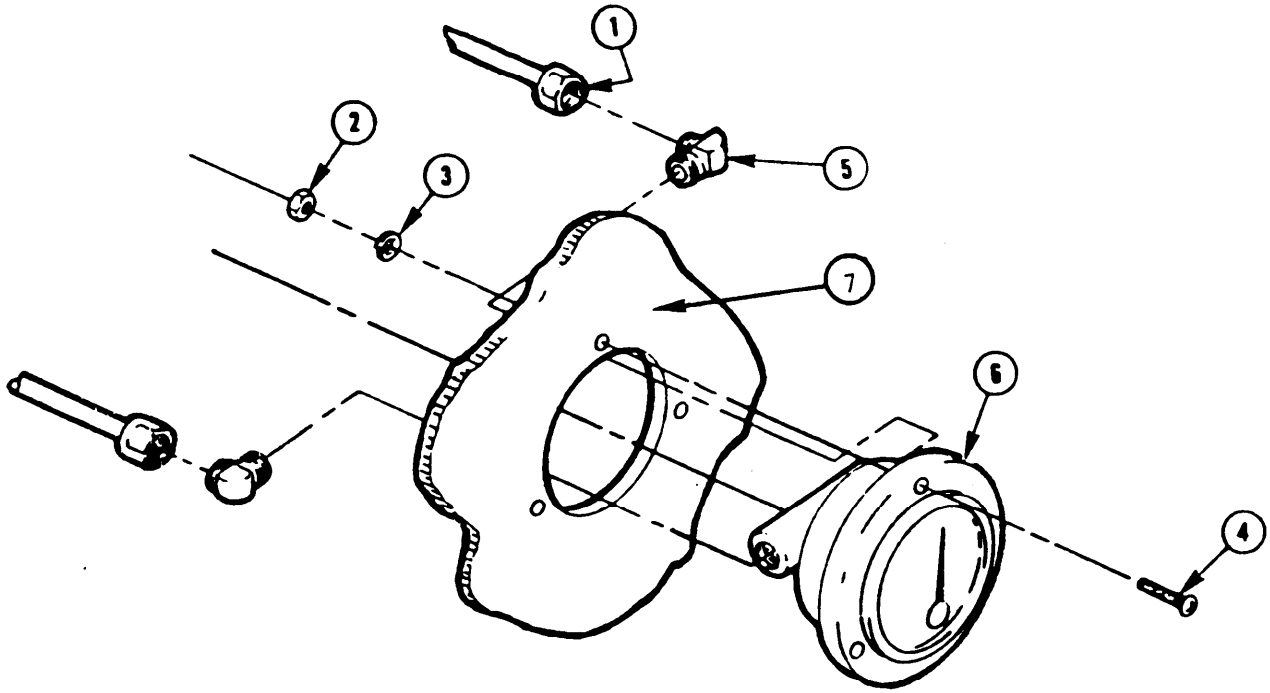


Figure 2-77. Gage psid (Typical)

d. Inspection

(1) Inspect gage and glass for damage.

(2) Inspect threads of screws, nuts, elbow fittings, and tube coupling nuts.

(3) Inspect wrench seats on fittings and hardware.

(4) Check screw stems for breaks and bends.

(5) Check lockwashers for compression.

e. Repair or Replace.

(1) Replace damaged tube assembly or pipe fittings.

(2) Replace damaged or unserviceable pressure gage.

(3) Send damaged pressure gage and replaced parts to Direct Support Maintenance.

(4) Replace damaged nuts, bolts, screws, and washers.

f. Installation. (Figure 2–77)

(1) Insert gage (6) in mounting hole in panel (7).

(2) Insert three screws (4) through gage (6) and panel.

(3) Install three lockwashers (3) and three nuts (2) on screw (4).

(4) Install two 90° piping elbows (5) on gage (6).

(5) Connect two pressure-tube coupling nuts (1) on 90° piping elbow (5).

(6) Test pressure-tube fittings for leaks.

2-69. RAW WATER, BACKWASH WATER, AND BRINE WATER FLOWMETERS.

a. General. The flowmeters show the number of gallons per minute of water flowing through the meters. They are installed in the water lines and are mounted on the control panel. This paragraph covers removal, cleaning, inspection, replacement, and installation of the flowmeters.

b. Removal. (Figure 2-78) (ARMY)

(1) Loosen two unions (4) without removing the two meter coupling nuts or separating the unions.

(2) Remove four nuts (1) and four lockwashers (2).

(3) Remove mounting bracket (3).

(4) Separate two unions (4).

(5) Remove meter (5) with one half of each union (4), nipple (8), and associated piping (9) still attached, to opposite ends of the meter.

(6) Remove meter mounting block (6) from control panel.

(7) Pull four mounting screws (7) out of control panel (10).

(8) Remove nipple (8) with one half of union from left side of meter.

(9) Remove piping (9) from right side of meter.

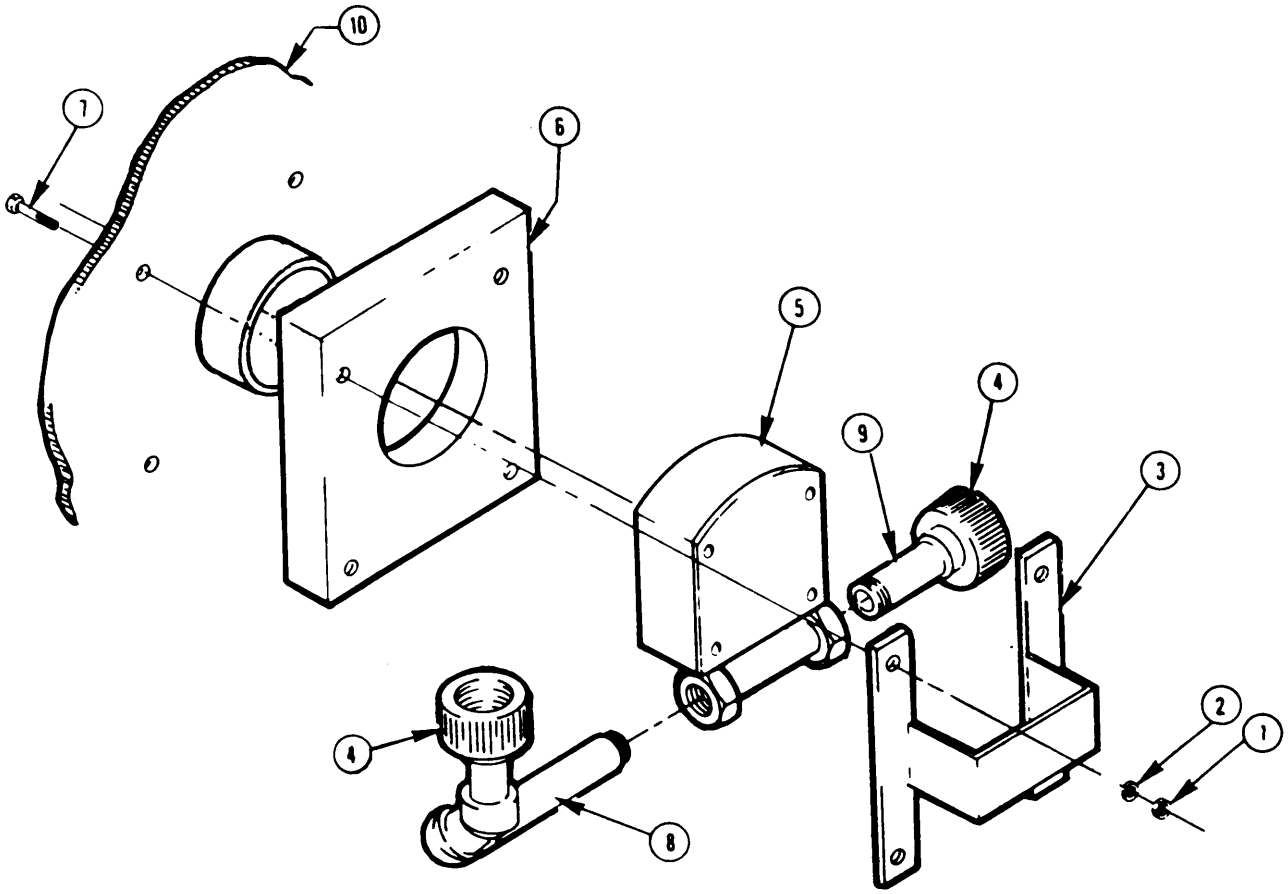


Figure 2-78. Raw Water, Backwash Water, and Brine Water Flowmeter (ARMY)

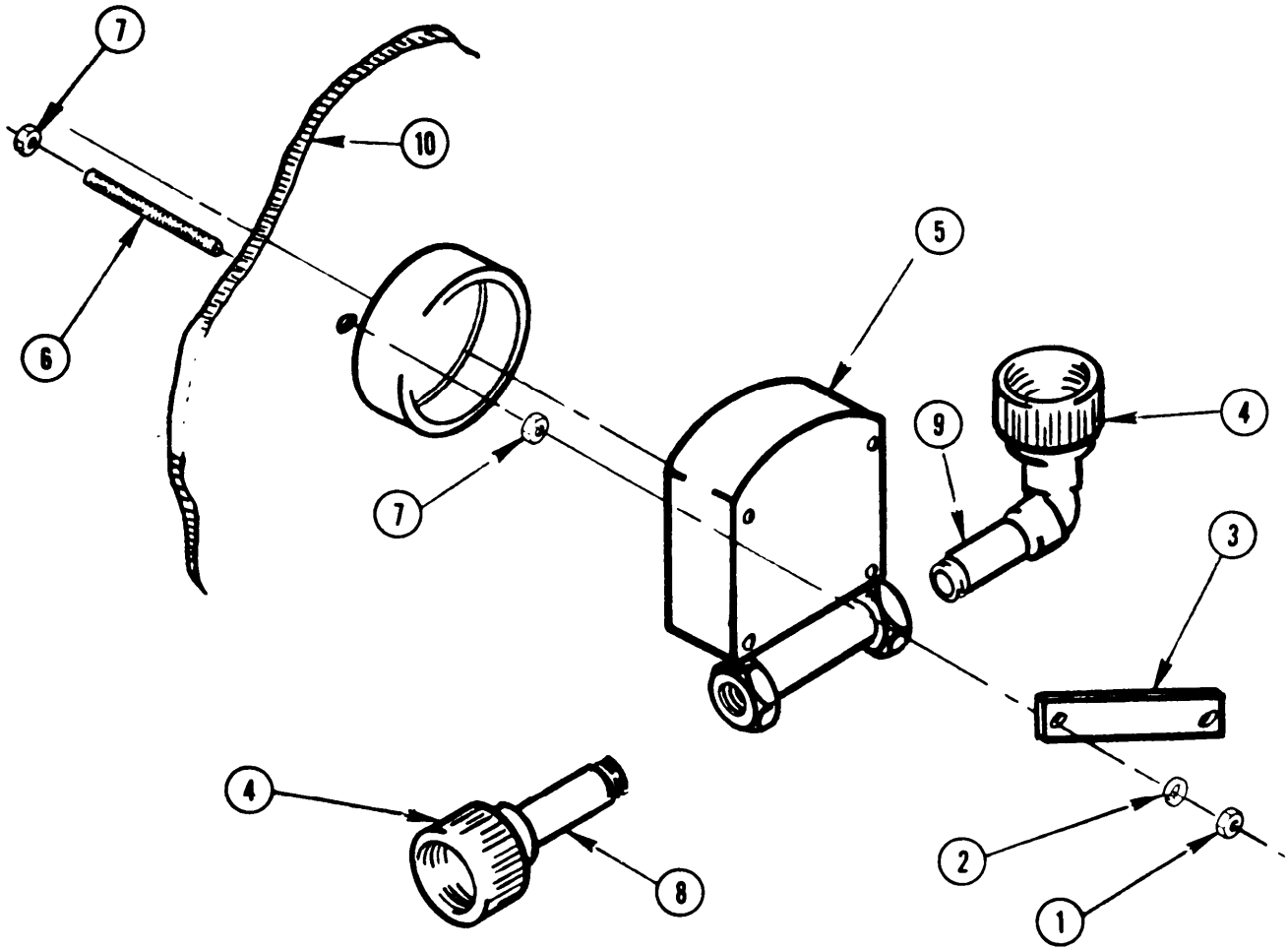


Figure 2-79. Raw Water, Backwash Water, and Brine Water Flowmeter (USMC)

c. Removal. (Figure 2-79) (USMC)

(1) Loosen two unions (4) without removing the two meter coupling nuts or separating the unions.

(2) Remove nuts (1), lockwashers (2), and mounting bracket (3).

(3) Separate the unions (4).

(4) Remove the meter (5) with union (4), nipple (8), and piping (9) still attached.

(5) Do not remove stud (6) or nuts (7) from panel (10).

(6) Remove nipple (8) and piping (9) from meter.

d. Cleaning.

(1) Remove dirt from mounting bracket, flowmeter, mounting block, and control panel.

(2) Remove pitting, corrosion, and fungus from the flowmeter mounting bracket and mounting block.

(3) Remove dirt and corrosion from the threads of the screws, nuts, and pipe unions.

e. Inspection.

(1) Inspect the flowmeter glass, metering venturi, and coupling nuts for damage.

(2) Inspect threads of screws, nuts, and pipe unions for damage.

(3) Inspect wrench seats on unions and meter couplers.

(4) Check broken and bent screw stems.

(5) Check lockwashers for compression.

f. Repair or Replace.

(1) Replace damaged nuts, bolts, screws, and washers.

(2) Replace damaged tube assemblies and pipe fittings.

(3) Replace or straighten damaged or bent mounting bracket.

(4) Replace damaged or unserviceable flowmeter.

(5) Send damaged flowmeters to Direct Support Maintenance.

g. Installation. (Figure 2-78) (ARMY)

NOTE

Pipe unions are not tightened until meter is installed. Apply Teflon tape to pipe threads before making connections.

(1) Install pipe assembly (9) to meter (5).

(2) Install nipple (8) to meter (5).

(3) Locate mounting block (6), meter (5), and mounting bracket (3) on panel (10).

(4) Insert four screws (7) through panel (10), mounting block (6), meter (5), and mounting bracket (3) .

(5) Install four lockwashers (2) and four nuts (1) to mounting screws (7) finger–tight.

(6) Connect two pipe unions (4) to ROWPU piping.

(7) Tighten four mounting nuts (1).

(8) Check all pipe fittings for leaks.

h. Installation. (Figure 2-79) (USMC)

NOTE

Pipe unions are not tightened until meter is installed. Apply Teflon tape to pipe threads before making connections.

(1) Install nipple (8) and piping (9) on meter (5).

(2) Position meter (5) with unions (4), nipple (8), and piping (9) on rear of panel (10).

(3) Attach unions (4), but do not tighten.

(4) Slide bracket (3) over stud (6) and secure using nuts (1) and lockwashers (2).

(5) Tighten unions (4).

2-70. PRODUCT WATER FLOWMETER.

a. General. The PRODUCT WATER flowmeter is a variable area type of meter, consisting of a float free to move in a tapered tube. This paragraph describes the removal, cleaning, inspection, and installation of the product water flowmeter.

b. Removal. (Figure 2-80)

(1) Unscrew and disconnect union (1).

(2) Remove two nuts (2), two lockwashers (3), and two oversized washers (4) from two bolts (5)

(3) Remove two bolts (5) from clamp and control panel.

(4) Unscrew and remove cap (6) from product water pipe and let it hang for reassembly later.

(5) Remove four nuts (7) and four lockwashers (8) from four bolts (9).

(6) Remove product water flowmeter (10) from control panel, complete with input and output pipes, and remove four bolts (9).

(7) Remove four screws (11) and four lockwashers (12) from PRODUCT WATER flowmeter (10) and bracket (13).

(8) Remove bracket (13) from flowmeter (10).

(9) Unscrew and remove pipe assemblies (14) and (15) from flowmeter (10).

c. Cleaning.

(1) Remove dirt accumulated between pipe mounting bracket and panel cutout.

(2) Clean corrosion and pitting from mounting bracket and control panel area covered by flowmeter when mounted.

(3) Remove rust from unions, mounting hardware, bolts, nuts, and their threads.

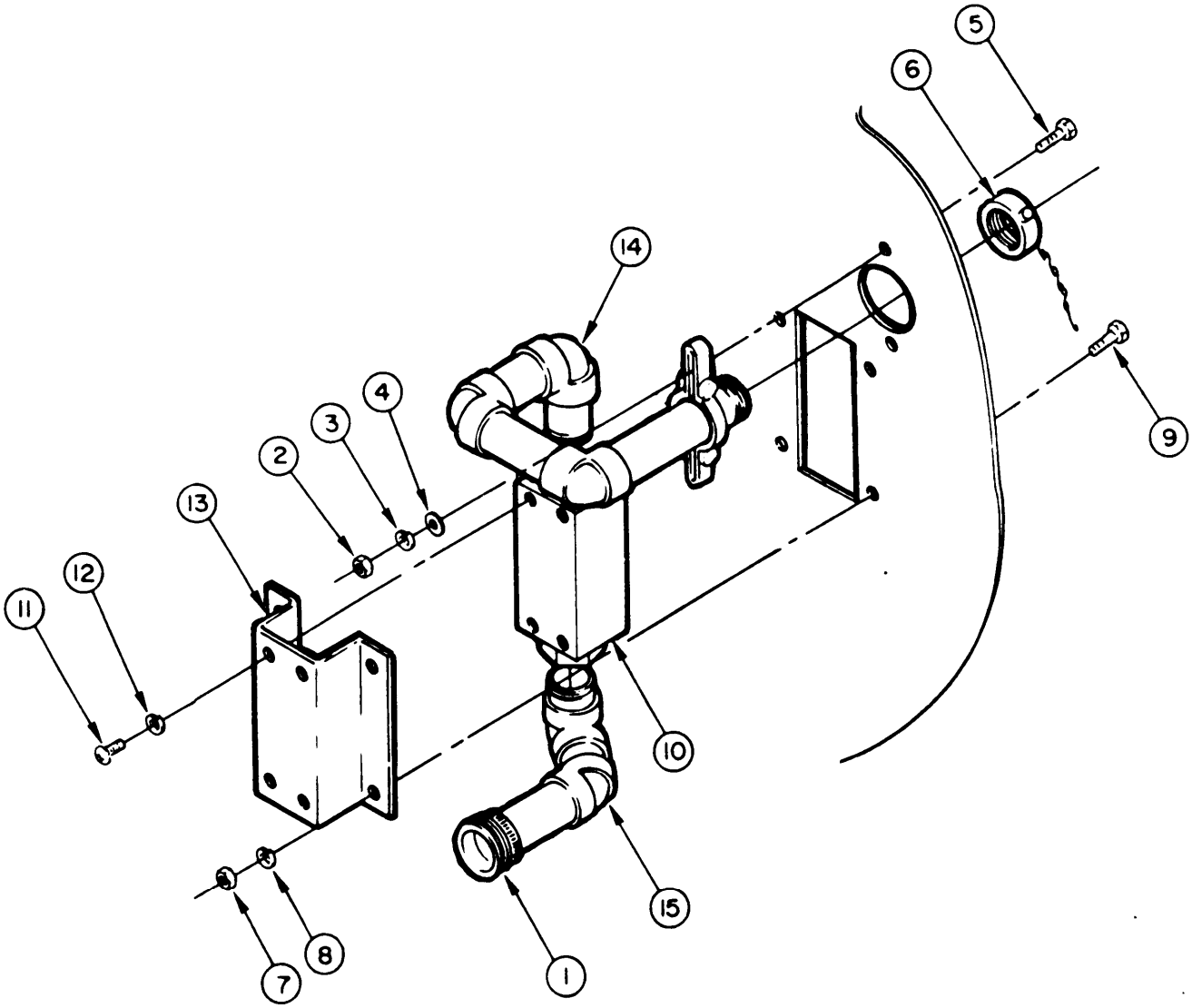
(4) Remove dirt and corrosion from PVC pipe threads that screw into flowmeter.

d. Inspection.

(1) Inspect flowmeter for free-moving float, cracked or broken glass, and damaged input or output pipe threads.

(2) Inspect mounting hardware for damaged threads, bent bolt shanks, and damaged heads.

(3) Inspect coupling union for damaged flanges, mating parts, and coupling nuts.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e. Repair or Replace.

(1) Replace damaged nuts, bolts, screws, and washers.

(2) Replace damaged tube assemblies and pipe fittings.

(3) Replace or straighten damaged or bent mounting bracket.

(4) Replace damaged or unserviceable flowmeter.

(5) Send damaged flowmeter and all replaced parts to Direct Support Maintenance.

f. Installation. (Figure 2-80)

NOTE

Pipe unions are not tightened until meter is installed. Apply Teflon tape to pipe threads before making connections.

(1) Install pipe assembly (14) to flowmeter (10).

(2) Install pipe assembly (15) to flowmeter (10).

(3) Install bracket (13) to flowmeter (10) with four lockwashers (12) and four screws (11).

(4) Install flowmeter assembly to control panel with four bolts (9), four lockwashers (8), and nuts (7).

(5) Connect pipe union (1) to frame piping.

(6) Insert two bolts (5) through control panel and pipe assembly strap.

(7) Install two oversize washers (4), two lockwashers (3), and two nuts (2) on bolts (5).

(8) Tighten four bolts (9).

(9) Tighten two bolts (5).

(10) Install hose cap (6) to pipe assembly (14).

(11) Check all pipe fittings for leaks.

2-71. CHEMICAL FEED PUMP ASSEMBLY.

a. General. The chemical feed pump injects four kinds of chemicals into the water flowing through the ROWPU to help purify the water. This paragraph describes the removal, cleaning, inspection, and installation of the chemical feed pump.

b. Removal. (Figure 2-81) (ARMY)

(1) Remove the chemical feed pump motor (1) in accordance with paragraph 248.

(2) Loosen eight hose clamps (3) and pull plastic tubing (2) off the nipples of the pump (7).

(3) Remove and discard hose clamps (3).

(4) Remove four nuts (4) and four lockwashers (5) from bolts (6).

(5) Remove four bolts (6) from stand (8) and pump (7).

(6) Remove the pump (7) from the stand (8).

c. Removal. (Figure 2–82) (USMC)

(1) Remove the chemical feed pump motor (1) in accordance with paragraph 2-48.

(2) Loosen clamp (4).

(3) Unscrew four nuts (2) and remove priming hoses (3) from top of feed pump heads (13).

(4) Unscrew four nuts (2) and remove discharge hoses (5) from bottom of feed pump heads (13).

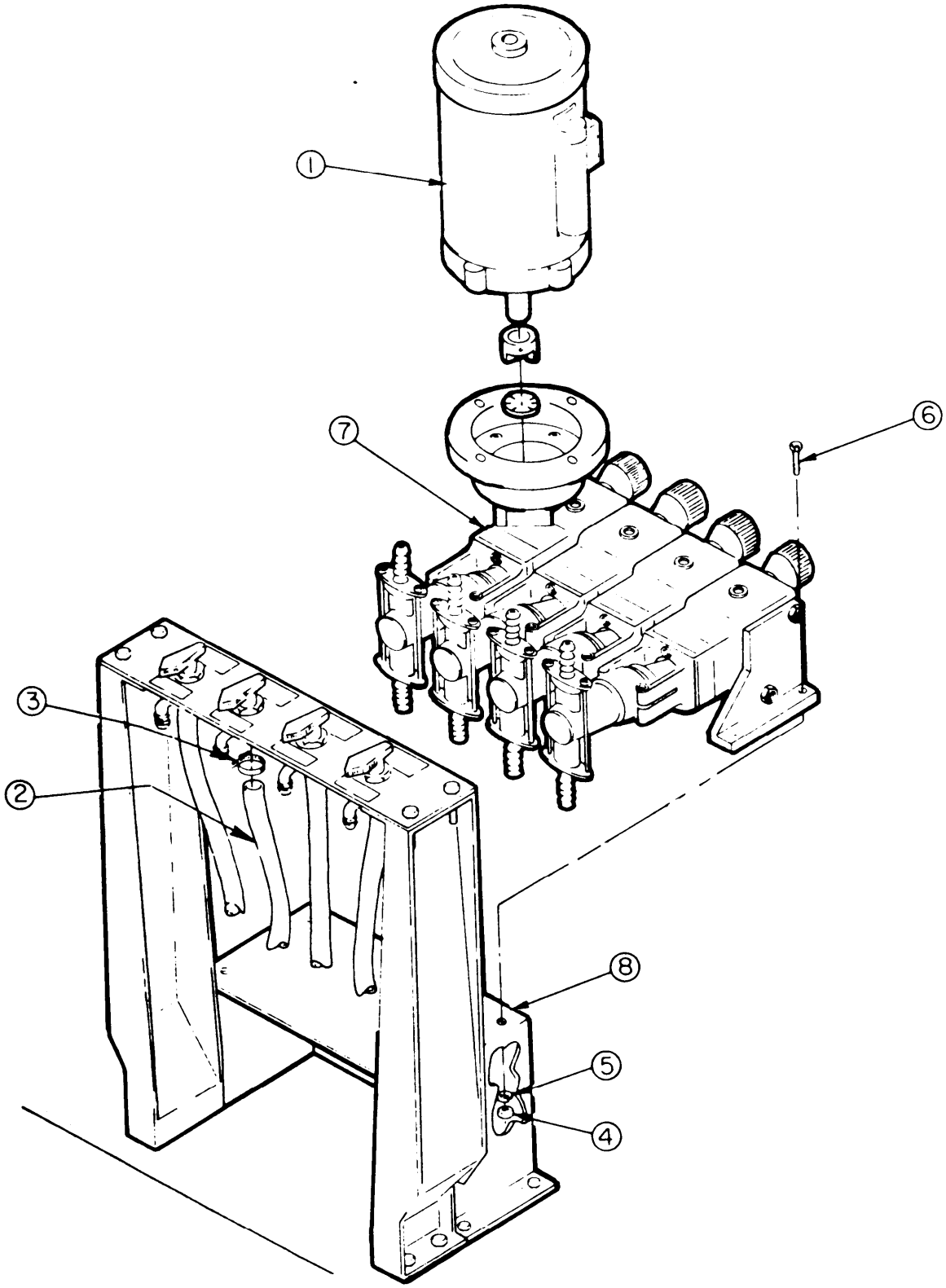


Figure 2-81. Chemical Feed Pump Assembly (ARMY)

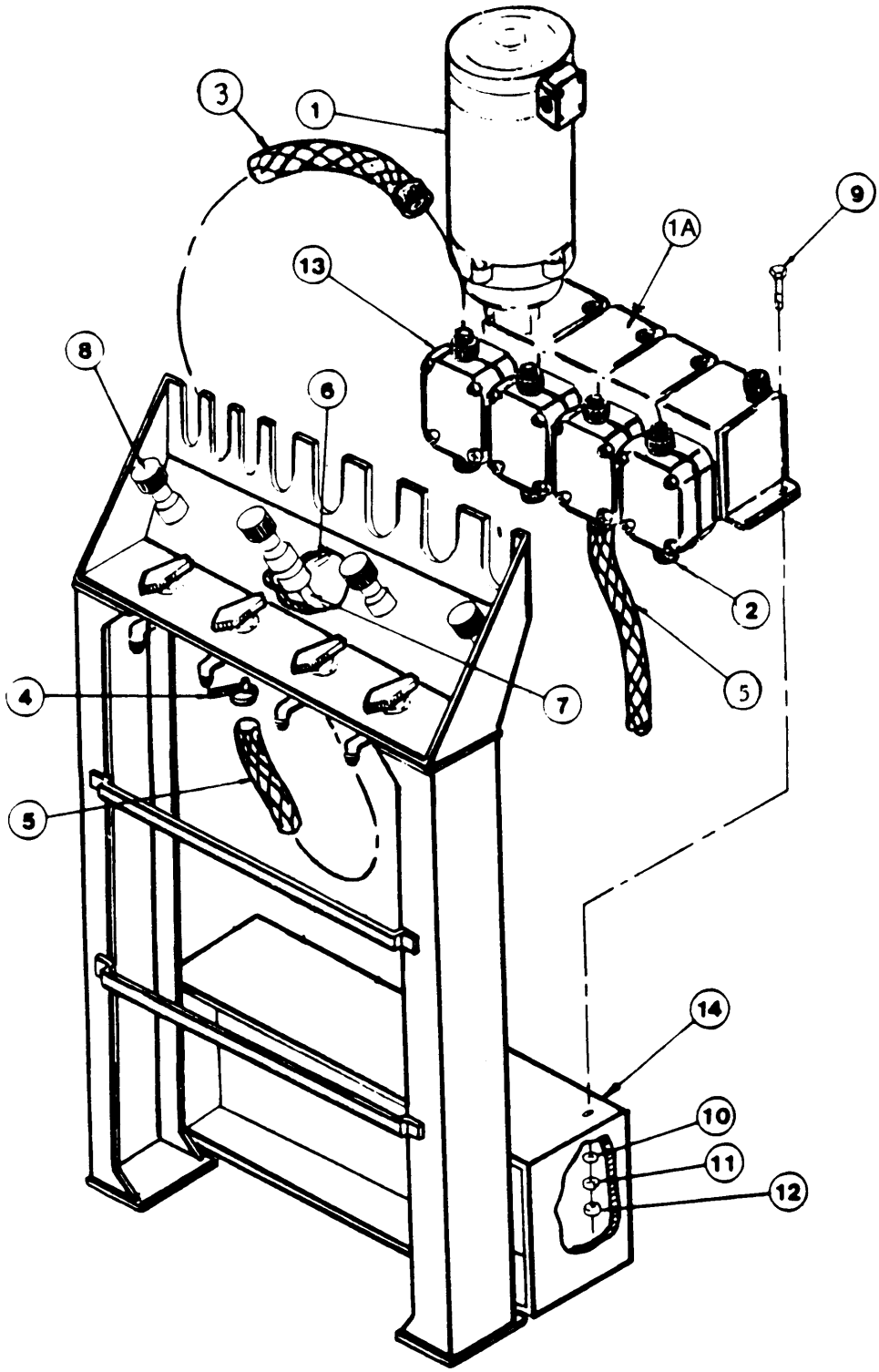


Figure 2-82. Chemical Feed Pump Assembly (USMC)

NOTE

Mark down micrometer settings. Adjust the four micrometer heads fully clockwise to 0.

(5) Loosen Allen screw (6) and remove the four manual stroke adjustment cables (7) from the micrometer heads (8).

(6) Remove bolts (9), washers (10), lockwashers (11), and nuts (12) from pump stand (14) and remove pump assembly.

d. Cleaning.

(1) Clean dirt or rust from mounting stand.

(2) Prepare for painting, if needed.

(3) Clean dirt and corrosion from bolts, nuts, washers, and hose clamps.

e. Inspection.

(1) Inspect hardware, screws, bolts, and nuts for stripped threads, bent shanks, and damaged heads.

(2) Discard used hose clamps. (ARMY)

(3) Discard used plastic tubing. (ARMY)

(4) Inspect motor for dents, damaged shaft, or overheating.

(5) Inspect drive coupling (both halves) for chipped, broken, or missing teeth.

(6) Inspect pump heads for cracks, fractures, or missing parts.

(7) Inspect mounting stand for dents, cracks, or missing hardware.

(8) Inspect valve assembly for damage to mounting panel and valves.

f. Repair or Replace.

(1) Replace damaged nuts, bolts, screws, and washers.

(2) Replace plastic tubing and hose clamps.

(3) Replace damaged or unserviceable electric chemical feed pump motor.

(4) Replace damaged or worn drive coupling or pump head assembly.

(5) Replace damaged or unrepairable pump mounting stand assembly.

(6) Replace damaged or unserviceable chemical feed pump valve assembly.

(7) Send damaged or unserviceable components to Direct Support Maintenance.

g. Installation. (Figure 2-81) (ARMY)

(1) Place pump (7) on stand (8) and align mounting holes.

(2) Insert four bolts (6) through chemical-feed pump (7) and stand (8).

(3) Install four lockwashers (5) and four nuts (4) on bolts (6).

(4) Slide eight new hose clamps (3) over four hoses (2).

(5) Slide top of four new plastic tubes (2) over four nipples of pump (7).

(6) Tighten four hose clamps (3) over tube and nipple.

(7) Install the chemical feed pump motor (1) in accordance with paragraph 2-48.

h. Installation. (Figure 2-82) (USMC)

(1) Position pump assembly (1A) on pump stand (14) and secure using bolts (9), washers (10), lockwashers (11), and nuts (12).

NOTE

Check that all micrometers are set at "0" (zero).

(2) Attach the four manual stroke adjustment cables (7) to the micrometer heads (8) and tighten Allen screws (6).

NOTE

Adjust the micrometer back to settings marked down prior to removal of cables (7).

(3) Screw on four nuts (2) and discharge hoses (5) on bottom of feed pump heads (13) and tighten the four clamps (4).

(4) Install the four priming hoses (3) on top of feed pump heads (13) and tighten the four nuts (2).

(5) Install the chemical feed pump motor (1) in accordance with paragraph 2-48.

2-72. R.O. VESSEL ASSEMBLY.

a. General. The R.O. vessel assembly consists of four pressure vessels which remove dissolved solids, including salt, from water. Each vessel is a tube made of spiral-wound fiberglass, with removable end caps at either end. Each vessel contains two R.O. elements inserted end-to-end inside the tube. This paragraph describes the removal, cleaning, inspection, and installation of the R.O. vessel.

b. R.O. Vessel Piping Removal. (ARMY) (Figure 2-83)

WARNING

R.O. vessels contain extremely high pressure during operation If this pressure is not relieved before working on vessels, the tubes can explode and cause serious injury or death. Be sure to open all drains and vents before beginning disassembly of R.O. vessels.

CAUTION

Backwash ROWPU before removing R.O elements. Refer to Operators Manual TM 10-4610-215-10/TM 08580A-10/1 for cleaning and removal instructions. R.O. elements will be stored clean.

(1) Open all vents and drains of R.O. vessel and make sure R.O. vessels are completely drained.

(2) On output end of R.O. vessel, loosen hose clamp (2) and remove plastic tube (1) from R.O. vessel (9).

(3) Remove hose clamp (2) from plastic tube (1). Discard hose clamp (2) and plastic tube (1).

(4) Remove two nuts (3) from bolts (4).

(5) Remove two bolts (4) from pipe clamp (5).

(6) Remove two sections of pipe clamp (5) and rubber grommet (8) from pipe (7).

(7) Remove pipe (7) and coupling (6) from R.O. vessel (9).

(8) Repeat steps (3) through (7) to remove pipe on input end of R.O. vessel.

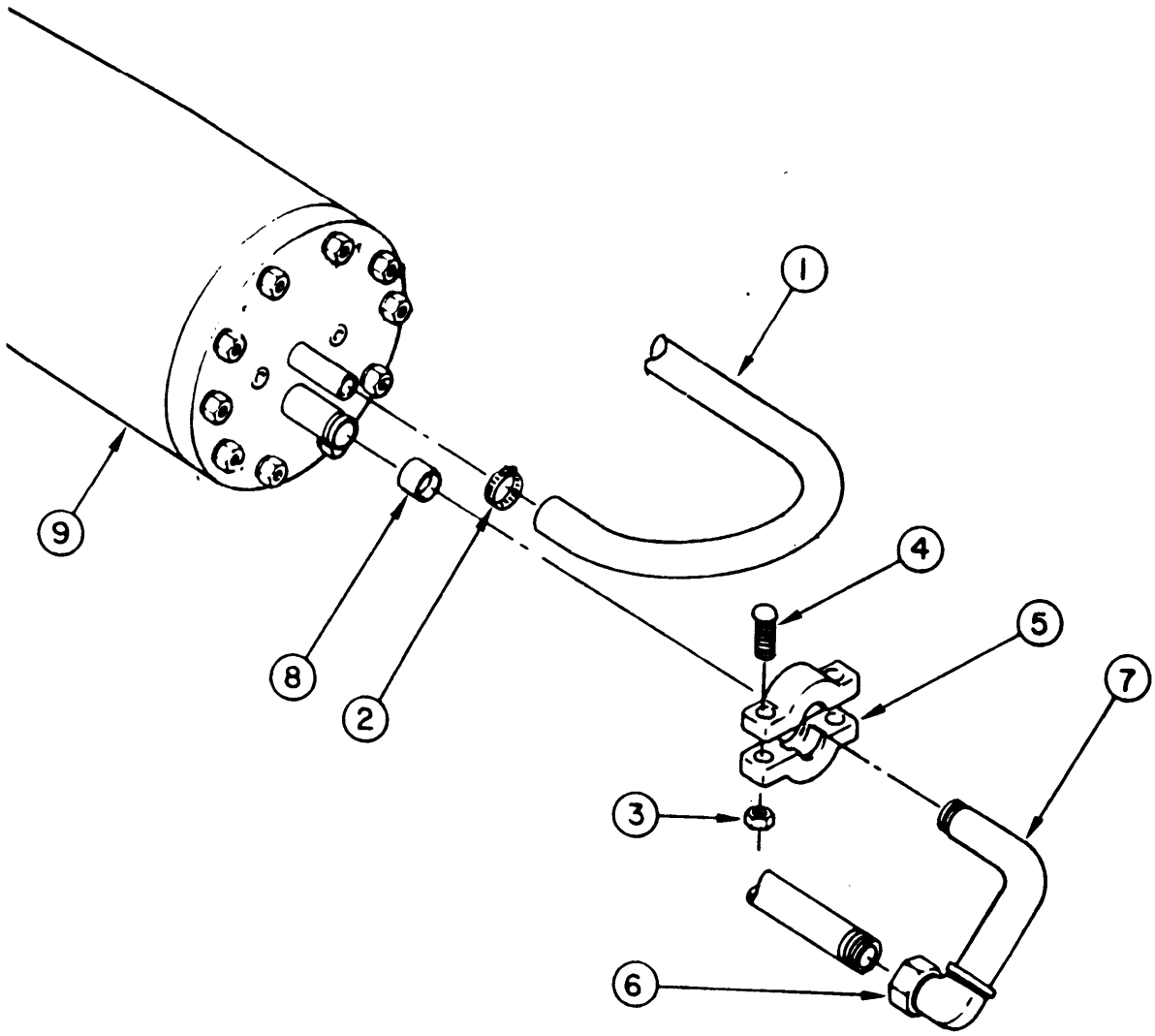


Figure 2-83. R.O. Vessel Piping (ARMY)

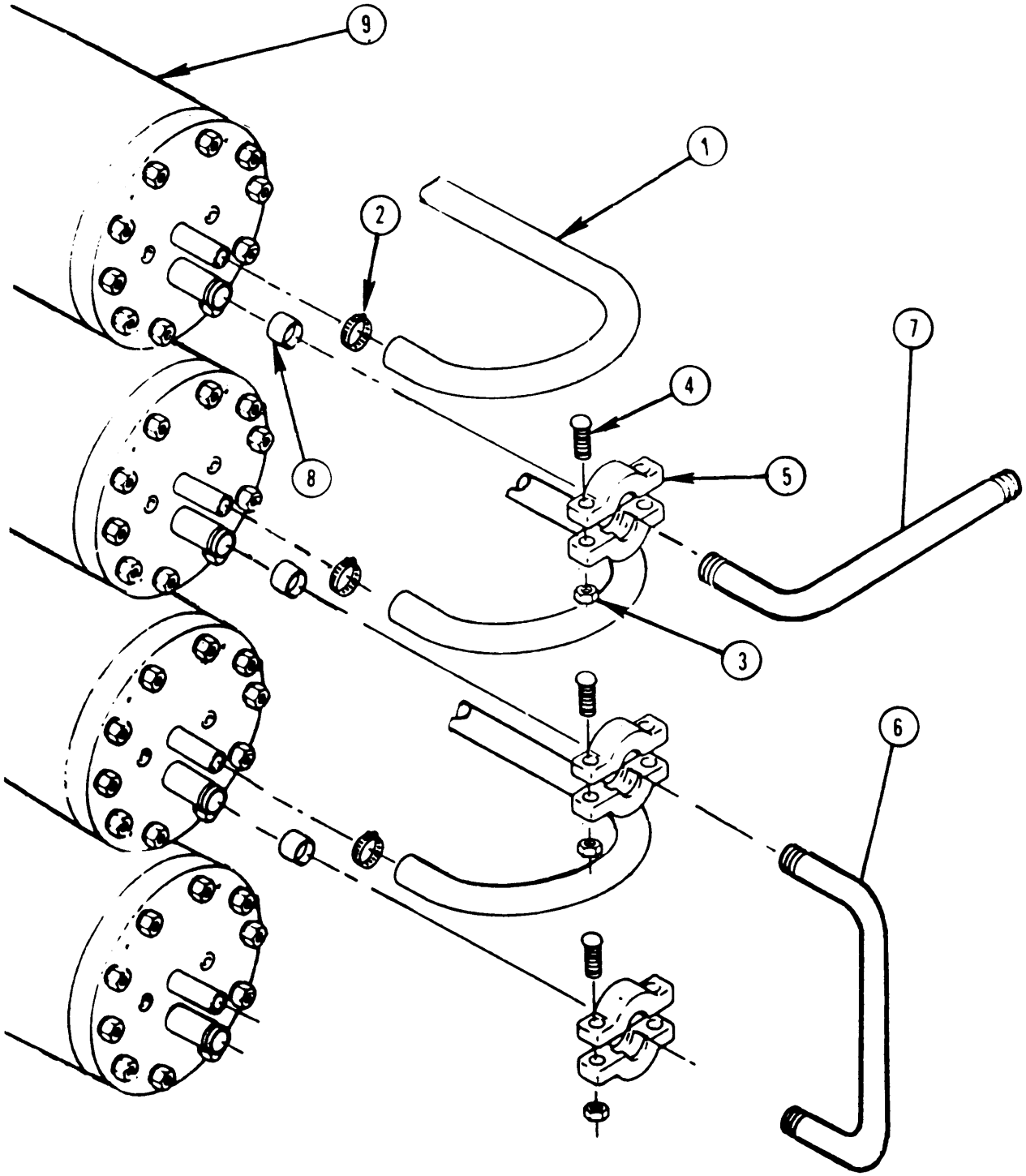


Figure 2-84. R.O. Vessel Piping (USMC)

c. R.O. Vessel Piping Removal. (Figure 2-84) (USMC)

(1) Open all vents and drains of R.O. vessel and make sure R.O. vessels are completely drained.

(2) On output end of R.O. vessel, loosen hose clamp (2) and remove plastic tube (1) from R.O. vessel (9). Discard hose clamp (2).

(3) Remove two nuts (3) from bolts (4).

(4) Remove two bolts (4) from pipe clamp (5).

(5) Remove two sections of pipe clamp (5) and rubber grommet (8) from coupling (7).

(6) From middle two pressure vessels, repeat steps (2), (3), and (4).

(7) Remove two sections of pipe clamp (5) and rubber grommet (8) from coupling (6).

(8) Remove coupling (6) from R.O. vessel (9).

(9) Repeat steps (3) through (7) to remove pipe on input end of R.O. vessel.

d. R.O. Vessel Removal. (Figure 2-85)

(1) Remove four nuts (1) and four lockwashers (2) from four bolts (3) at both ends.

(2) Remove four bolts (3) from brackets (4) at both ends.

(3) Remove bracket (4) from R.O. vessel (5) and ROWPU frame channel (6).

(4) Remove R.O. vessel (5) from ROWPU frame channel (6).

NOTE

Remove R.O. vessels from the front of the ROWPU frame.

For ease of installation of end cap, mark the position of the end cap on the vessel.

e. R.O. Vessel End Assembly Removal. (Figure 2-86) (ARMY)

(1) Remove ten nuts (1) and ten lockwashers (2) from R.O. vessel studs (3).

(2) Remove end cap assembly from R.O. pressure vessel (3).

(3) Unscrew Allen screws (7) from end plug (8) and end plate (9). Separate end plug (8) and end plate (9).

(4) Remove spring clip (10) and O-ring (11) from feed port (12).

(5) Remove feed port (12) from end plate (9).

(6) Remove spring clip (5) from product water tube (6).

(7) Remove product water tube (6) from end plug (8).

(8) Remove O-ring (17) from end plug (8).

(9) Remove O-ring (4) from product water tube (6).

(10) Remove end connector (14) from product water tube (6).

NOTE

There are two O–rings (one red and one yellow) inside end connector. Red faces end cap and yellow the elements. Make sure orientation is correct.

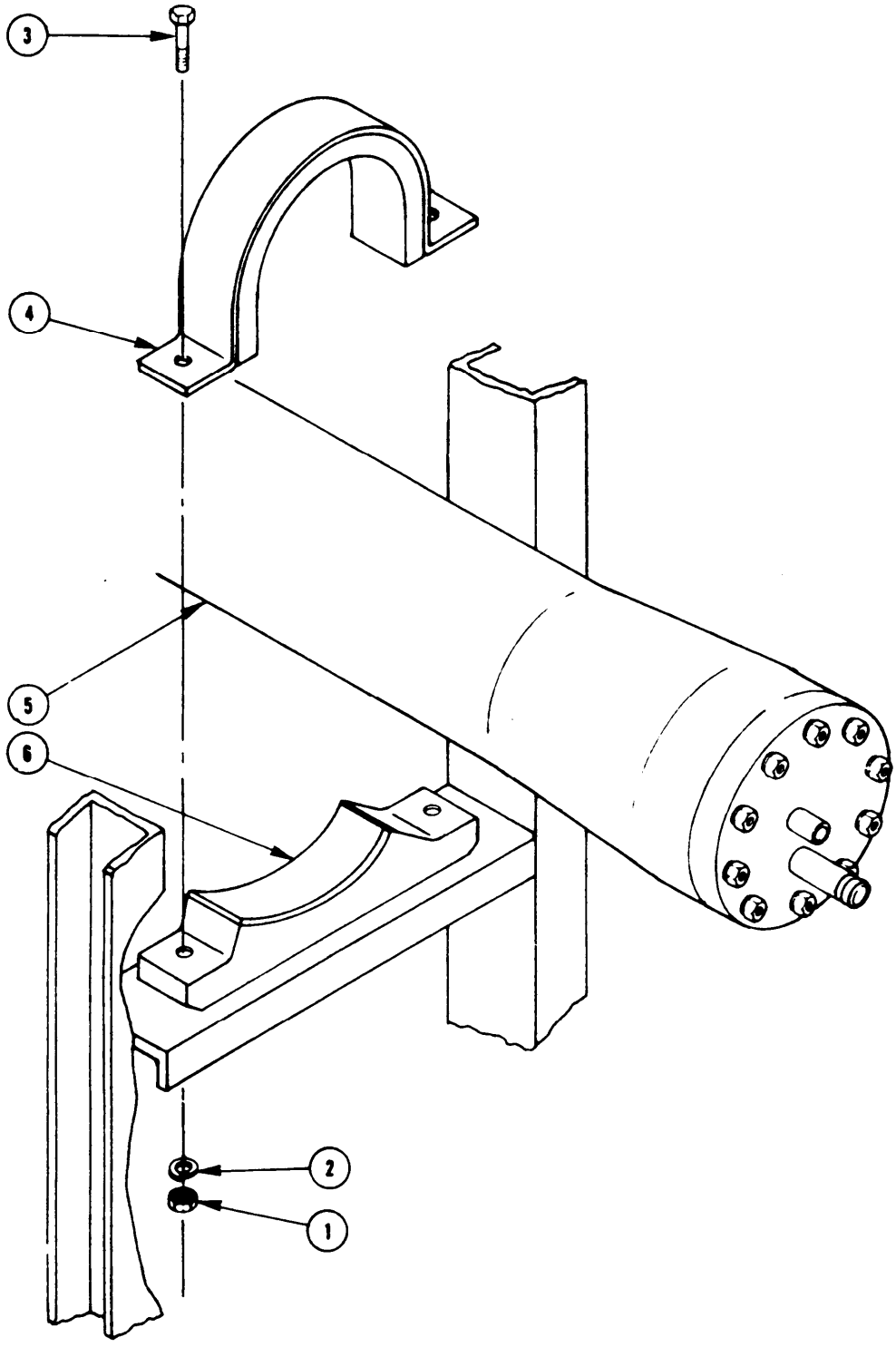


Figure 2–85. R.O. Vessel

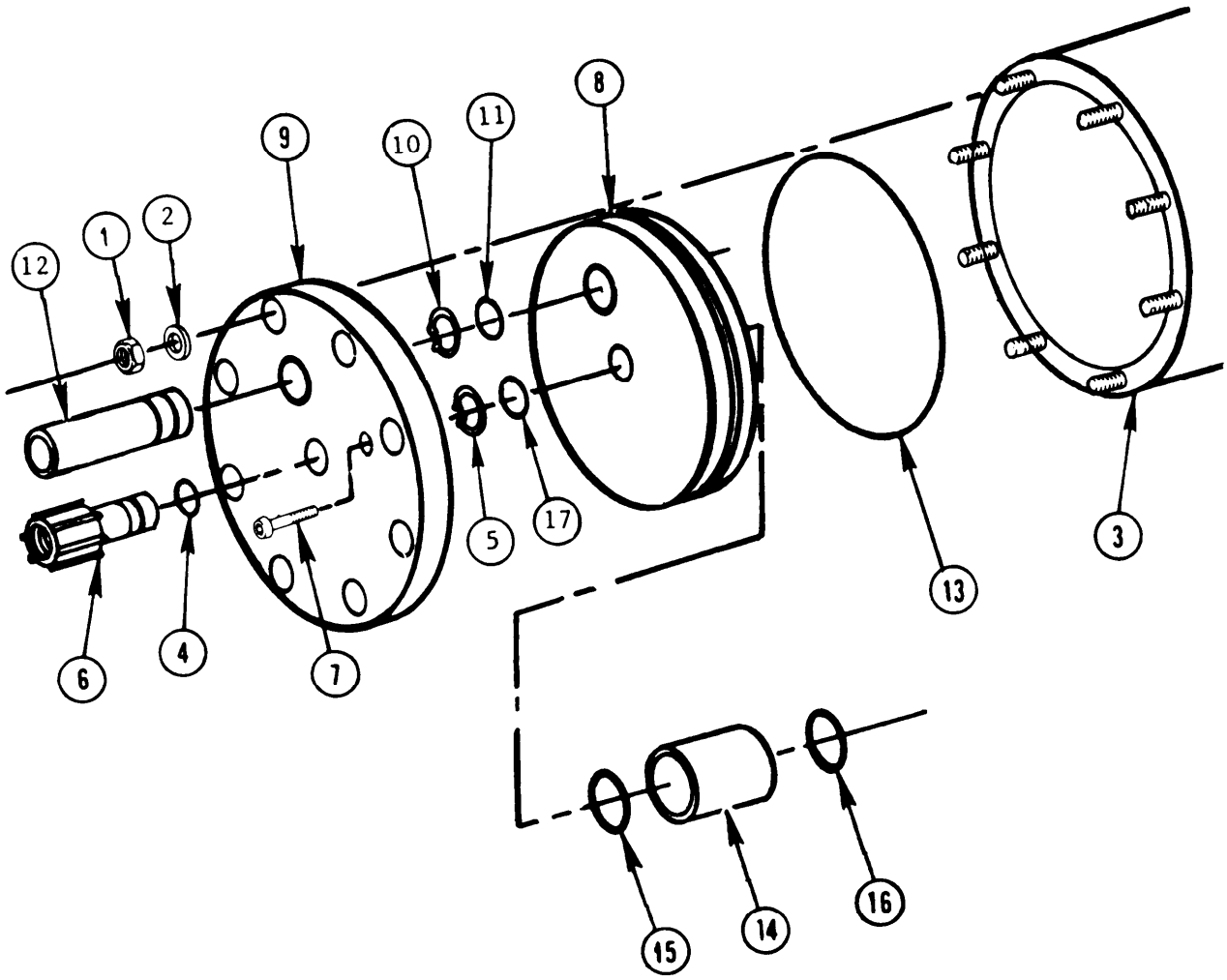


Figure 2-86. R.O. Vessel End Cap (ARMY)

(11) Remove red O-ring (15) and yellow O-ring (16) from end connector (14).

(12) Remove O-ring (13) from end plug (8).

NOTE

For ease of installation of end cap, mark the position of the end cap on the vessel.

f. R.O. Vessel End Cap Removal, (Figure 2-87) (USMC)

(1) Remove ten nuts (1) and lockwashers (2) from R.O. vessel studs (3).

(2) Unscrew and remove hose adapter (4) and spring clip (5) from product water tube (6).

(3) Unscrew Allen screws (7) from end plug (8) and end plate (9). Separate end plug (8) and end plate (9).

(4) Remove spring clip (10) and O-ring (11) from feed port (12).

(5) Remove feed port (12) from end plate (9).

(6) Remove O-ring (13) from product water tube (6).

(7) Remove product water tube (6) from end plug (8).

(8) Remove end connector (14) from product water tube (6).

NOTE

There are two O–rings (one red and one yellow) inside end connector. Red faces end cap and yellow the elements. Make sure orientation is correct.

(9) Remove red O-ring (15) and yellow O-ring (16) from end connector (14).

(1 O) Remove O-ring (17) from end plug (8).

g. Cleaning

(1) Remove dirt from between brackets and frame.

(2) Remove pitted and corroded material from R.O. vessel, if R.O. vessel is to be reinstalled.

(3) Remove dirt, rust, and corrosion from the threads of bolts and nuts.

h. Inspection.

(1) Inspect R.O. vessel for damage.

(2) Inspect threads of bolts and nuts for damage.

(3) Inspect bolts for broken or bent shanks.

i. Repair or Replace.

(1) Replace damaged nuts, bolts, screws, and washers

(2) Replace used plastic tube and hose clamps.

(3) Replace spring locks and O-rings.

(4) Replace damaged pipe, pipe fittings, and pipe clamps.

(5) Replace damaged R.O. vessel brackets.

(6) Replace damaged or unserviceable R.O. vessel.

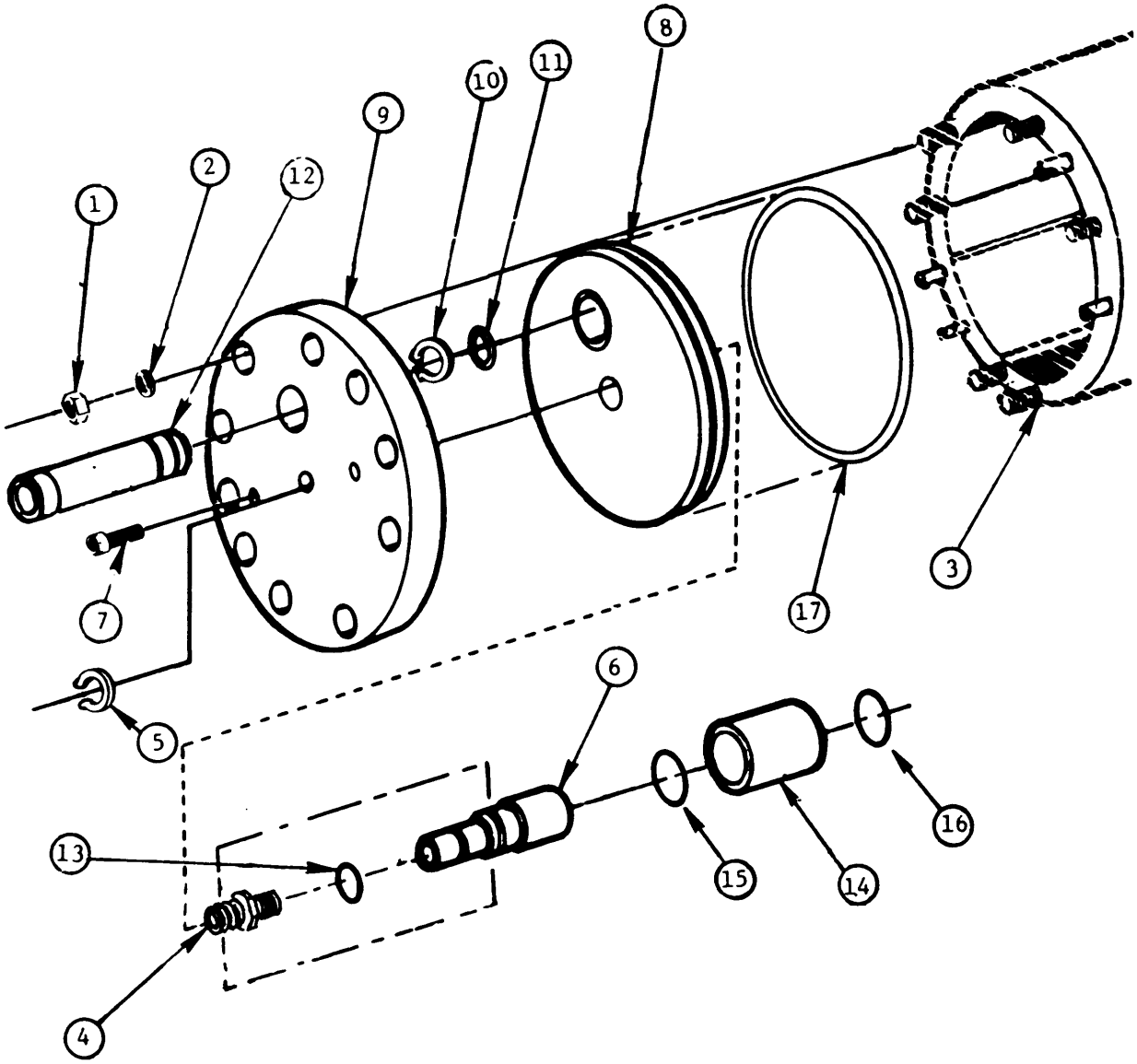


Figure 2-87. R.O. Vessel End Cap (USMC)

j. R.O. Vessel Installation. (Figure 2-85)

NOTE

Pipe unions are not tightened until elements are installed. Apply Teflon tape to pipe threads before making connections.

(1) Slide R.O. vessel (5) into ROWPU frame from front side and seat in frame channel (6).

(2) Locate two brackets (4) on R.O. vessel (5) and ROWPU frame channel (6).

(3) Insert four bolts (3) into two brackets (4) and frame channel (6).

(4) Install four lockwashers (2) and four nuts (1) on bolts (3).

k. R.O. Vessel Piping Installation. (Figure 2-83) (ARMY)

(1) Install coupling (6) and install pipe assembly (7) to R.O. vessel (9).

(2) Place two sections of pipe clamps (5) and slide rubber grommet (8) over pipe joint of pipe assembly (7) and R.O. vessel (9).

(3) Insert two bolts (4) through pipe clamp (5).

(4) Install two nuts (3) on bolts (4).

NOTE

Repeat steps (1) through (4) to install pipe on opposite end of R.O. vessel.

(5) Slide hose clamp (2) over plastic tubing (1).

(6) Slide hose (1) over pipe on R.O. vessel (9).

(7) Tighten clamp (2) over pipe on R.O. vessel (9).

(8) Tighten two nuts (3).

(9) Check all fittings for leaks.

l. R.O. Vessel Piping Installation. (Figure 2–84) (USMC)

(1) Place two sections of pipe clamps (5) and slide rubber grommet (8) over coupling (7) and R.O. vessel (9).

(2) Insert two bolts (4) through pipe clamp (5).

(3) Install two nuts (3) on bolts (4).

(4) Place two sections of pipe clamp (5) with rubber grommet (8) over coupling (6) on middle two pressure vessels (9).

(5) Insert two bolts through pipe clamps (5).

(6) Install two nuts (3) on bolts (4).

NOTE

Repeat step (1) through (6) to install pipe to opposite end of pressure vessel.

(7) Slide hose clamps (2) over plastic tubing (1).

(8) Slide plastic tubing (1) over hose adapter on R.O. vessels (9).

(9) Tighten clamps (2) over hose adapter on R.O. vessels (9).

(10) Tighten two nuts (3).

(11) Check all fittings for leaks.

m. R.O. Vessel End Cap Assembly Installation. (Figure 2–86) (ARMY)

(1) Install O–ring (4) to product water tube (6).

(2) Install O–ring (17) on end plug (8).

(3) Insert product water tube (6) through end plug (8).

(4) Install spring clip (5) on product water tube (6).

(5) Insert feed port (12) through end plate (9) and install spring clip (10).

(6) Install O-ring (11) in slot on end plug (8).

(7) Put together end plug (8) and end plate (9) and secure using Allen screws (7).

(8) Install O-ring (13) on end plug (8).

NOTE

There are two O–rings (one red and one yellow) inside end connector. Red faces end cap and yellow the elements. Make sure orientation is correct.

(9) Install red O–ring (15) and yellow O-ring (16) in end connector (14).

(1 O) Install end connector (14) on product water tube (6).

(11) Align end cap as previously marked and install end plate (9) on studs (3) and secure using ten lockwashers (2) and ten nuts (1).

n. R.O. Vessel End Cap Assembly Installation. (Figure 2-87) (USMC)

(1) Install O-ring (17) on end plug (8).

NOTE

There are two O–rings (one red and one yellow) inside end connector (14). Red faces end cap and yellow faces the elements. Make sure the end connector is installed correctly.

(2) Install red O-ring (15) and yellow O-ring (16) in end connector (14).

(3) Install end connector (14) on product water tube (6).

(4) Insert product water tube (6) through end plug (8).

(5) Install O-ring (13) on product water tube (6).

(6) Insert feed port (12) through end plate (9) and install spring clip (10).

(7) Install O-ring (11) in slot on feed part (1 2).

(8) Put together end plug (8) and end plate (9) and secure using Allen screws (7).

(9) Install spring clip (5) on product water tube (6).

(10) Screw hose adapter (4) on product water tube (6) using Teflon tape.

(11) Align end cap with previously marked markings and install end plate (9) on studs (3) and secure using ten lockwashers (2) and ten nuts (1).

2-73. R.O. PUMP ASSEMBLY. (Figure 2-88)

a. General. The R.O. pump assembly supplies water under high pressure to the R.O. elements. This paragraph describes removal, inspection, cleaning, and installation of the R.O. pump assembly.

b Removal.

(1) Remove R.O. pump belt shroud in accordance with paragraph 2–75.

(2) Remove R.O. pump belts in accordance with paragraph 2–76.

(3) Remove R.O. pump pulley sheave in accordance with paragraph 2–77.

NOTE

Drain oil from R.O. pump.

WARNING

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

(4) Unscrew union on rupture disc piping assembly (1) between R.O. pump (8) and pulse dampener.

(5) Remove rupture disc piping assembly (1) from R.O. pump (8).

(6) Loosen two hose clamps on flexible suction hose (2). Discard hose clamps.

(7) Disconnect suction hose (2) from R.O. pump (8).

(8) Loosen hose clamp on flexible oil drain hose (3). Discard hose clamp.

(9) Disconnect oil drain hose (3) from R.O. pump oil drain valve (10).

(10) Loosen hose clamp on flexible water drain hose (4) on drain reducer (9). Discard hose clamp.

(11) Disconnect water drain hose (4) from drain reducer (9).

(12) Remove four nuts (5) and four lockwashers (6) from bolts (7).

(13) Remove four bolts (7) from R.O. pump stand and R.O. pump (8).

WARNING

Weight of R.O. pump is 658 pounds (298 kg). Attempting to move it without proper equipment could cause serious injury. Use equipment rated at 1 ton (0.91 tonne) or more to move R.O. pump.

(14) Remove R.O. pump (8) from R.O. pump stand.

(15) Remove water drain reducer assembly (9) from R.O. pump (8).

c. Cleaning.

(1) Wash R.O. pump using a strong soap solution and a stiff brush.

(2) Remove rust and loose paint.

(3) Prepare for painting, if necessary.

(4) Remove rust from nuts, screws, and washers.

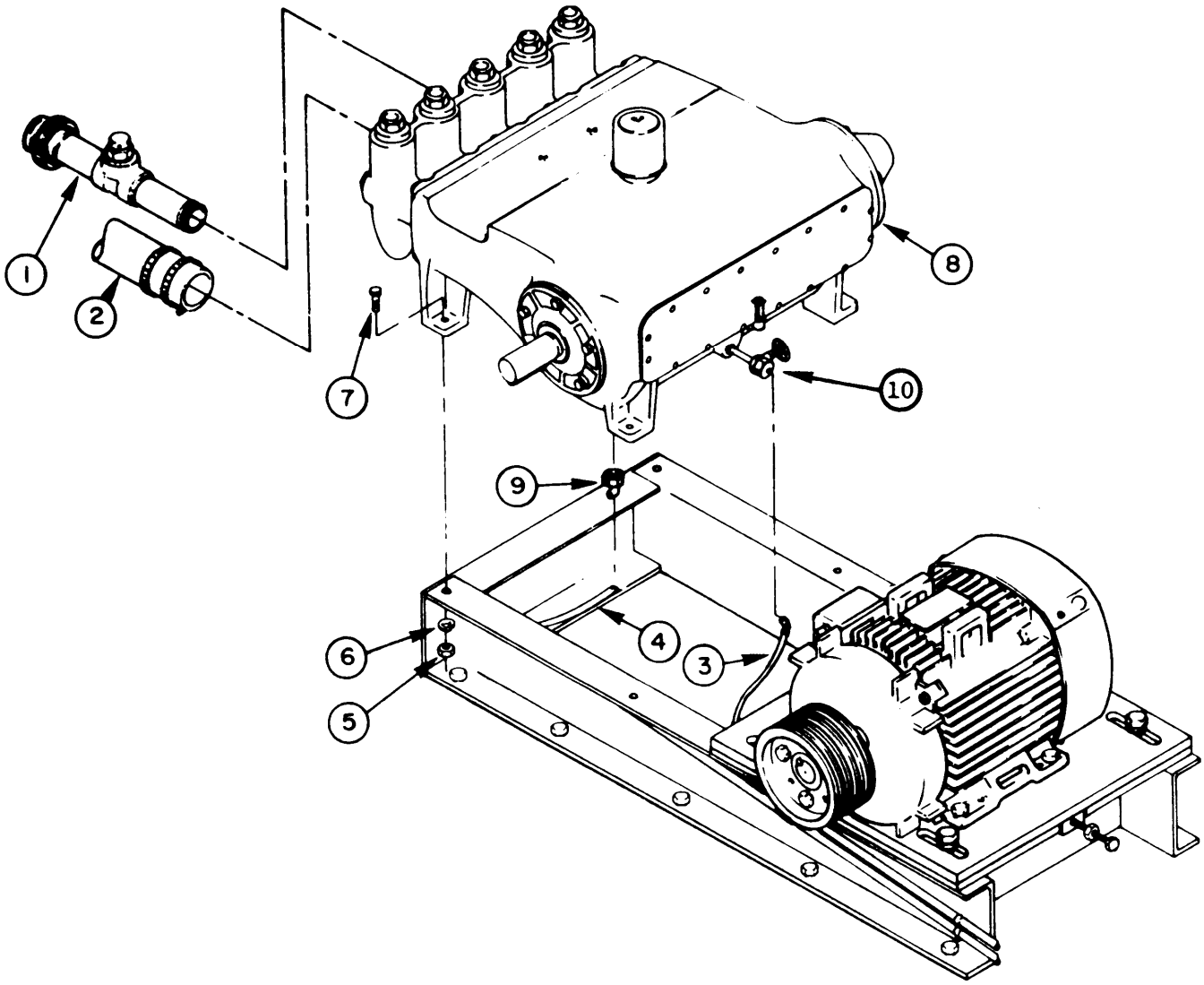


Figure 2-88. R.O. Pump Assembly

d. Inspection.

(1) Inspect R.O. pump for damage.

(2) Discard flexible hoses.

(3) Discard hose clamps.

(4) Inspect screws and nuts for stripped heads and threads.

e. Repair or Replace.

(1) Replace damaged nuts, bolts, screws, and washers.

(2) Replace flexible hoses and hose clamps.

(3) Replace damaged oil drain valve and pipe fittings.

(4) Replace damaged or unserviceable R.O. pump assembly.

(5) Repair R.O. pump suction/discharge assembly in accordance with paragraph 4-3.

(6) Repaint and install R.O. pump assembly in accordance with Standard Operating Procedures.

f. Installation. (Figure 2–88)

WARNING

Weight of R.O. pump is 658 pounds (298 kg). Attempting to move it without proper equipment could cause serious injury. Use equipment rated at 1 ton (0.91 tonne) or more to move R.O. pump.

(1) Install water drain reducer assembly (9) on R.O. pump (8).

(2) Place R.O. pump (8) on stand and align mounting holes.

(3) Insert four bolts (7) through R.O. pump (8) and stand.

(4) Install four lockwashers (6) and four nuts (5) on bolts (7).

(5) Install new hose clamp on water drain hose (4) and connect water drain hose (4) to water drain reducer assembly (9).

(6) Install new hose clamp on oil drain hose (3) and install oil drain hose (3) to oil drain valve (10).

(7) Install two new clamps on suction hose (2) and connect suction hose (2) to R.O. pump (8).

(8) Install rupture disc piping assembly (1) to R.O. pump (8) using thread sealant and Teflon tape

(9) Connect union on rupture disc piping assembly (1) between R.O. pump and pulse dampener.

(10) Fill R.O. pump with oil. Refer to LO 10-4610-215-12 (ARMY)/LI-08580A-12 (USMC).

(11) Install R.O. pump pulley sheave in accordance with paragraph 2-77.

(12) Install R.O. pump belts in accordance with paragraph 2-76.

(13) Install R.O. pump belt shroud in accordance with paragraph 2-75.

(14) Perform operational test and check all fittings for leaks.

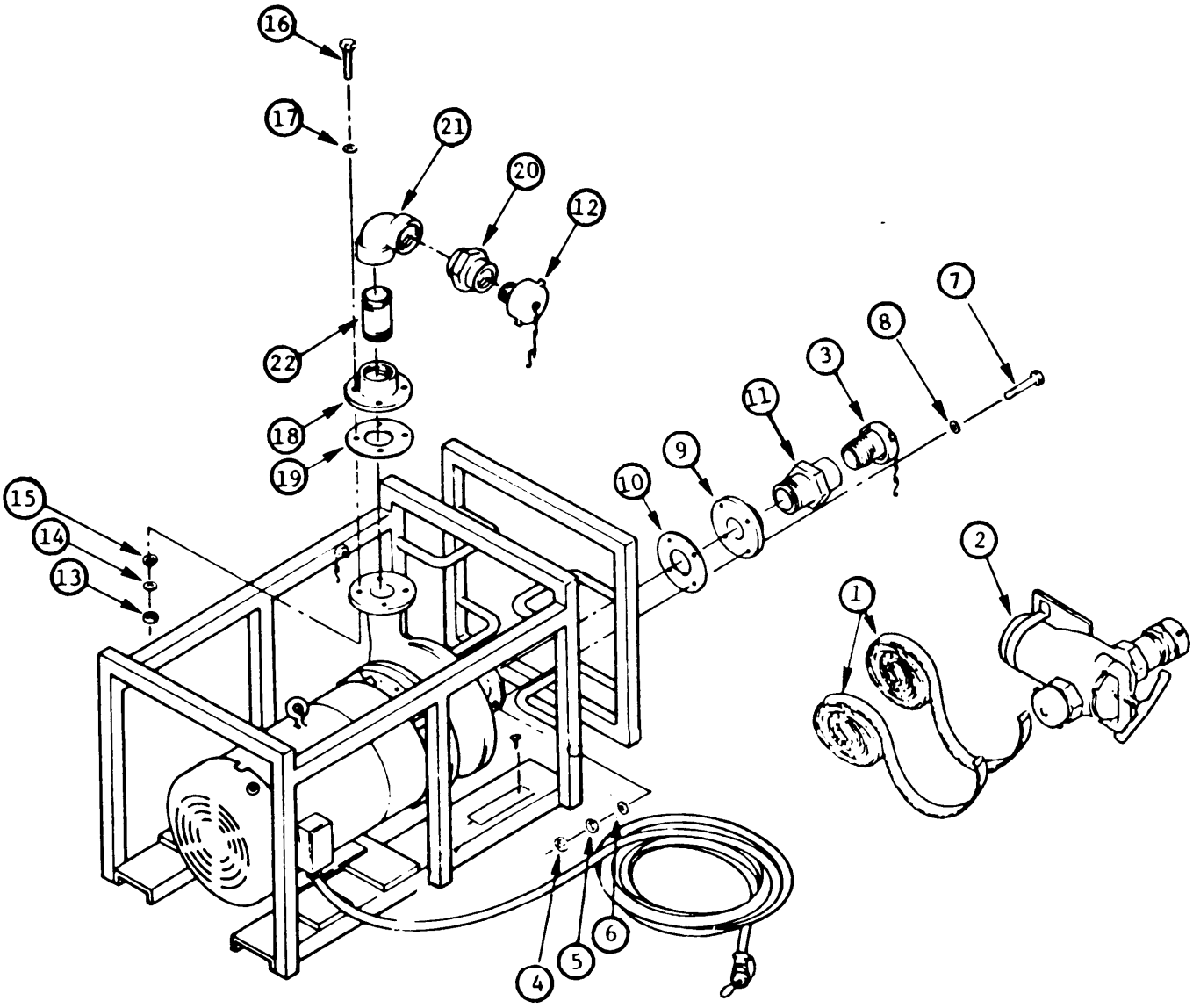


Figure 2–89. Backwash Pump Suction and Discharge Assembly

2-74. BACKWASH PUMP SUCTION AND DISCHARGE ASSEMBLIES.

a. General. The suction and discharge assemblies on the backwash pump are the pipes to which the input hose and backwash strainer attach. This paragraph describes removal, cleaning, inspection, repair, and installation of the suction and discharge assemblies.

b. Removal. (Figure 2-89)

(1) If necessary, remove two straps (1) and backwash strainer (2) from backwash pump.

(2) Unscrew hose plug (3) and let it hang.

(3) Remove four nuts (4), four lockwashers (5), and four flat washers (6) from bolts (7).

(4) Remove four bolts (7) and four flat washers (8) from backwash pump and flange (9).

(5) Remove flange (9) and gasket (10) from backwash pump and discard gasket.

(6) Remove adapter (11) from flange (9).

(7) Unscrew hose plug (12) and let it hang.

(8) Remove four nuts (13), four lockwashers (14), and four flat washers (15) from bolts (16).

(9) Remove four bolts (16) and four flat washers (17) from backwash pump and flange (18).

(10) Remove flange (18) and gasket (19) from backwash pump. Discard gasket (19).

(11) Remove adapter (20) from elbow (21).

(12) Remove elbow (21) from nipple (22).

(13) Remove nipple (22) from flange (18).

c. Cleaning.

(1) Remove dirt and rust from flanges, nipples, and adapters.

(2) Remove dirt and rust from bolts, nuts, and washers.

d. Inspection.

(1) Inspect flanges, nipples, and adapters for damaged threads.

(2) Inspect bolts and nuts for stripped heads and threads.

e. Repair or Replace.

(1) Replace damaged nuts, bolts, screws, and washers.

(2) Replace damaged flanges, nipples, adapters, and pipe fittings.

(3) Replace all gaskets.

(4) Repair backwash pump assembly and backwash strainer in accordance with paragraph 2-41.

(5) Repaint and reinstall pump assembly in accordance with Standard Operating Procedures.

f. Installation. (Figure 2–89)

NOTE

Apply Teflon tape to pipe threads before making connections.

(1) Install nipple (22) to flange (18).

(2) Install elbow (21) to nipple (22).

(3) Install adapter (20) to elbow (21).

(4) Position flange (18) and new gasket (19) on backwash pump,

(5) Align mounting holes.

(6) Insert four bolts (16) and four flat washers (17) through flange (18), gasket (19), and backwash pump.

(7) Install four flat washers (15), four lockwashers (14), and four nuts (13) to bolts (16).

(8) Screw in hose plug (12) to adapter (20).

(9) Install adapter (11) to flange (9).

(10) Position flange (9) and new gasket (10) on backwash pump.

(11) Insert four bolts (7) and four flat washers (8) through flange (9), gasket (10), and backwash pump.

(12) Install four flat washers (6), four lockwashers (5), and four nuts (4) on bolts (7).

(13) Screw in hose plug (3) on adapter (11).

(14) If necessary, mount backwash strainer (2) on backwash pump with two straps (1).

(15) Perform operational check.

2-75. R.O. PUMP BELT SHROUD.

a. General. The belt shroud fits over the R.O. pump belts to keep clothes, hands, straps, etc. from getting caught in the spinning belts or pulley. This paragraph describes the removal, cleaning, inspection, repair, and installation of the belt shroud.

b. Removal. (Figure 2-90)

(1) Remove four screws (1) and four lockwashers (2) from belt shroud (6) and belt guard (3). Remove belt guard (3).

(2) Remove six bolts (4) and six lockwashers (5) from ROWPU frame, belt shroud (6), and two clamps (7).

(3) Remove belt shroud (6).

NOTE

The two bolts on the ends of the belt shroud also secure clamps for the VENT CARTRIDGE FILTER, VENT MULTIMEDIA FILTER, AND VENT PULSE DAMPENER tube.

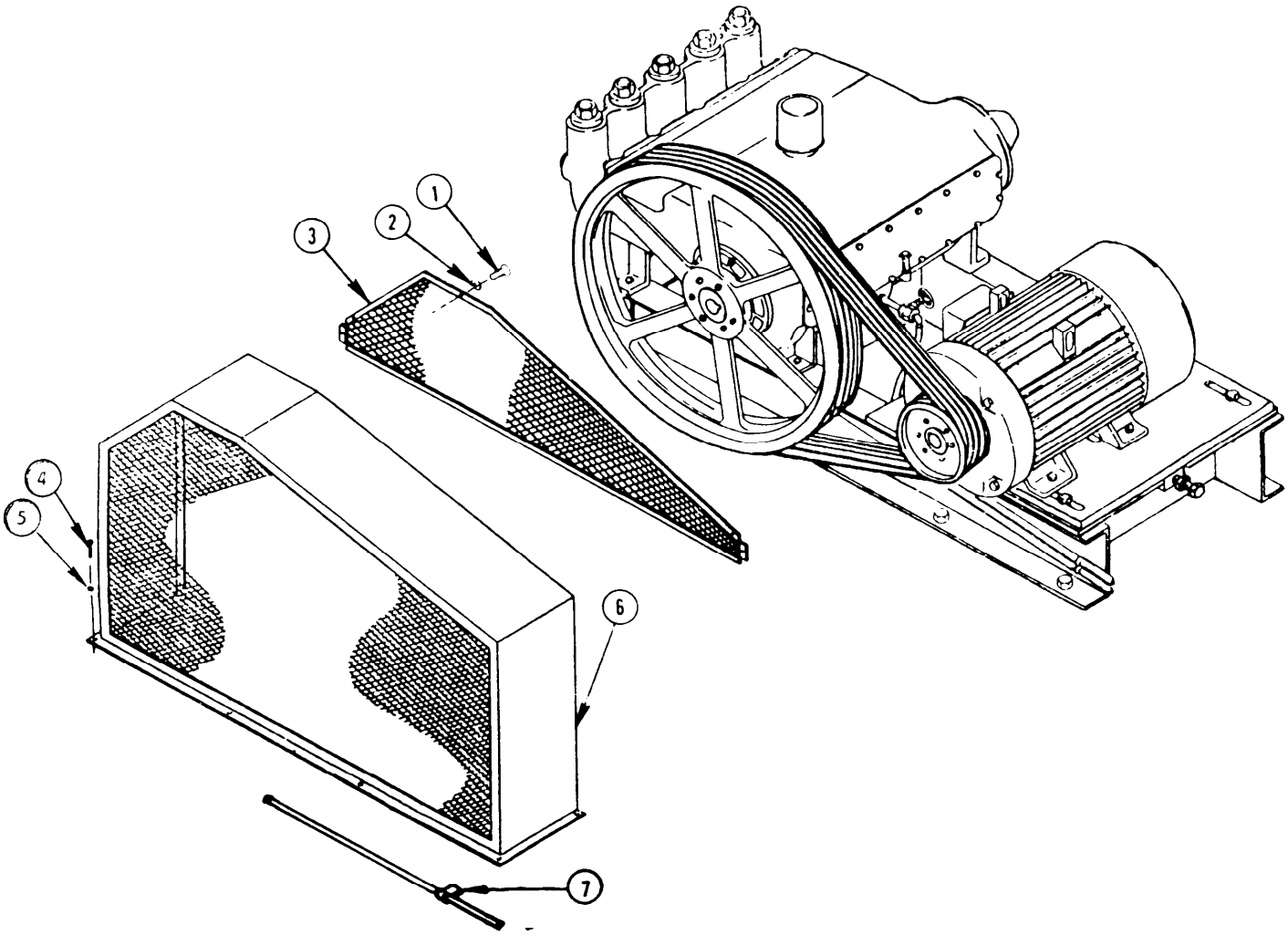


Figure 2–90. Belt Shroud

c. Cleaning.

(1) Clean dirt or rust from ROWPU floor that may have collected behind belt shroud.

(2) Prepare for painting, if needed.

(3) Clean dirt and corrosion from screen frame of belt guard and belt shroud.

(4) Prepare for painting, if necessary.

(5) Clean dirt and corrosion from bolts, screws, and washers.

d. Inspection.

(1) Inspect hardware for damage or corrosion.

(2) Inspect tack welds which hold screen on belt shroud and guard frames. Mark loose or missing welds for repair.

(3) Inspect belt shroud and guard for dents.

e. Repair or Replace.

(1) Tack weld any places where screen has come loose from belt shroud or guard frame.

(2) Hammer out small dents in frame or screen.

(3) Spot paint where needed.

(4) Replace damaged nuts, bolts, screws, and washers.

(5) Replace damaged or unrepairable belt guard or belt shroud.

(6) Send unrepairable belt guard and/or belt shroud to Direct Support Maintenance.

f. Installation. (Figure 2-90)

(1) Position belt shroud (6) on ROWPU frame.

(2) Install six bolts (4), six lockwashers (5), and two clamps (7) through belt shroud (6) and ROWPU frame.

NOTE

The two bolts across the front of the belt shroud also secure clamps for vent lines.

(3) Install belt guard (3) to shroud (6) with four screws (1) and four lockwashers (2).

2-76. R.O. PUMP BELTS.

a. General. The five R.O. pump belts transmit power from the R.O. pump motor to the R.O. pump. This paragraph describes removal, inspection, and replacement of the R.O. pump belts.

b. Removal. (Figure 2-91)

(1) Remove R.O. pump belt shroud in accordance with paragraph 2-75.

(2) Remove power cable clamps (1) from motor base plate.

(3) Loosen, but do not remove, four bolts (2) holding motor mounting plate to R.O. pump assembly stand.

(4) Loosen locknut (3) on adjustment bolt (4).

(5) Turn adjustment bolt counterclockwise. This will move the R.O. pump motor toward the R.O. pump. Continue turning until belts are loose and then remove five belts (5) from the sheave.

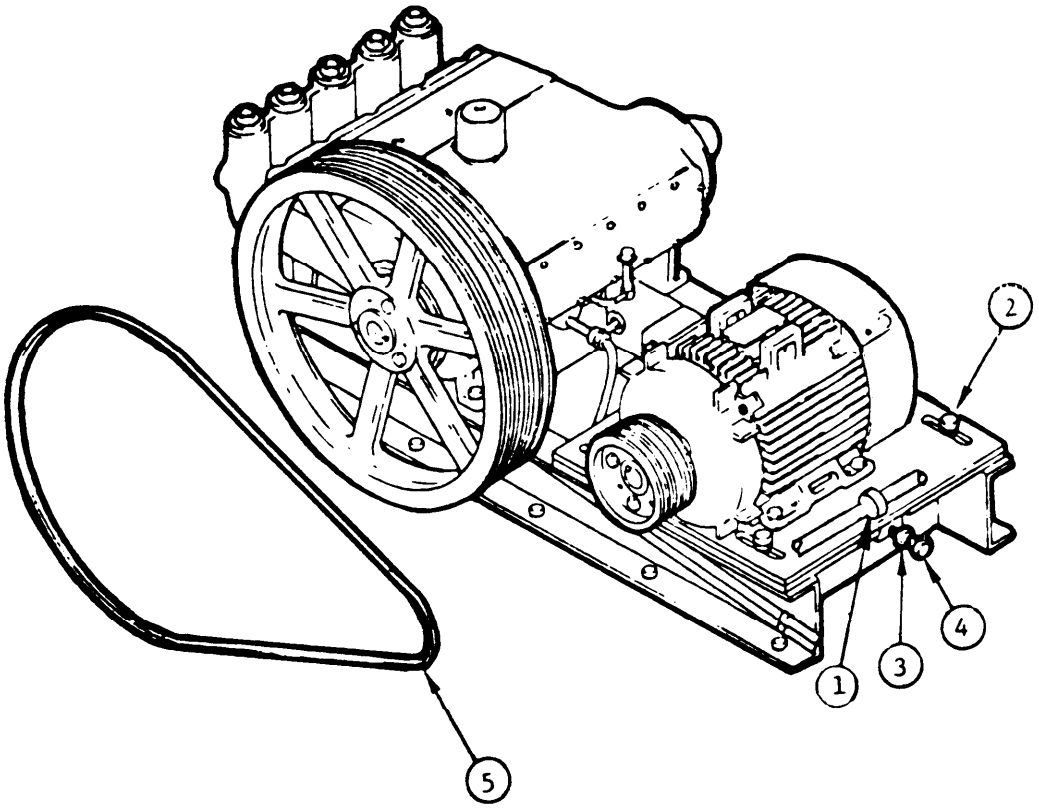


Figure 2–91. R.O. Pump Belt

c. Inspection.

(1) Inspect belts for excessive wear, cracks, and dry rot.

(2) If any belt is damaged, replace all five belts.

d. Replacement. (Figure 2–91)

NOTE

Replace belts only in complete sets of five. Do not replace one belt or use a mismatched set.

(1) Install five new belts (5) on sheaves.

(2) Turn adjustment bolt (4) clockwise until tension on belts allows a deflection of one-half inch (1.3 cm) midway between sheaves.

(3) Tighten lock nut (3) on adjustment bolt (4).

(4) Tighten four bolts (2).

(5) Install power cable and clamp (1) to base plate.

(6) Install R.O. pump belt shroud in accordance with paragraph 2-75.

2-77. R.O. PUMP PULLEY. (SHEAVE)

a. General. The R.O. pump sheave holds the five V–belts that transfer power from the R.O. pump motor to the R.O. pump. This paragraph describes removal, inspection, cleaning, and installation of the pump sheave.

b. Removal. (Figure 2-92)

(1) Remove drive belt shroud and drive belts in accordance with paragraphs 2-75 and 2-76.

NOTE

After removal of shroud using a straight edge note the approximate position of motor and pump (sheaves).

(2) Loosen, but do not remove, setscrew in hub (1).

(3) Remove three bolts (2) and three lockwashers (3) from hub (1) and sheave (4).

(4) Remove pump sheave (4) from hub (1).

(5) Using puller, remove hub (1) from pump shaft (6).

(6) Remove shaft key (5) from shaft (6).

c. Cleaning.

(1) Remove dirt and peeling paint from sheave.

(2) Remove rust and corrosion from hub, sheave, and assembly hardware.

d. Inspection.

(1) Inspect sheave for cracks or other damage.

(2) Inspect hub for cracks or other damage.

(3) Inspect bolt heads and threads.

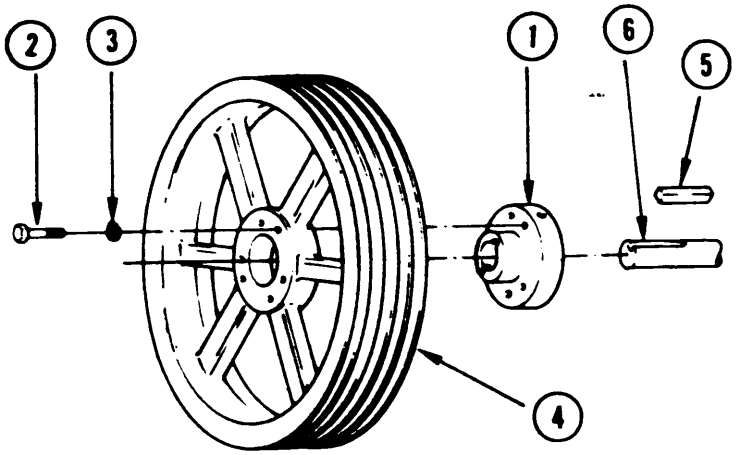


Figure 2-92. R.O. Pump Pulley (Sheave)

e. Repair or Replace.

(1) Replace damaged nuts, bolts, screws, and washers.

(2) Replace cracked or damaged hub.

(3) Replace cracked or damaged sheave.

(4) Replace damaged shaft key.

(5) Repaint in accordance with Standard Operating Procedures.

(6) Send all replaced parts to Direct Support Maintenance.

f. Installation. (Figure 2-92)

(1) Insert shaft key (5) into shaft keyway (6).

(2) Align and press hub (1) onto R.O. pump shaft (6).

(3) Tighten setscrew on hub (1).

(4) Place sheave (4) onto hub (1) and attach with three lockwashers (3) and three bolts (2).

(5) Use a straight edge to check that outer edge of motor sheave is aligned approximately even with the pump sheave (refer to figure 2-53).

(6) Replace drive belts in accordance with paragraph 2-76. Tighten drive belts.

NOTE

Recheck the alignment of both sheaves with a straight edge.

(7) Replace the shroud in accordance with paragraph 2-75.

2-78. AUTOMATIC PRESSURE RELIEF VALVE.

a. General. The automatic pressure relief valve is a safety valve located on the piping between the pulse dampener and the R.O. vessels. It discharges water when the R.O. pressure reaches 1100 psi (77 kg/cm^2). This paragraph describes the removal, cleaning, inspection, repair, and installation of the automatic pressure relief valve.

b. Removal. (Figure 2-93)

WARNING

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

(1) Unscrew the discharge pipe coupling nut (1) from the adapter (5).

(2) Remove plug (2) from the relief valve (3).

(3) Remove adapter (5) from elbow (6).

(4) Remove relief valve (3) from reducing adapter (4).

(5) Remove reducing adapter (4) from pipe tee (7).

(6) Remove elbow (6) from automatic pressure relief valve (3).

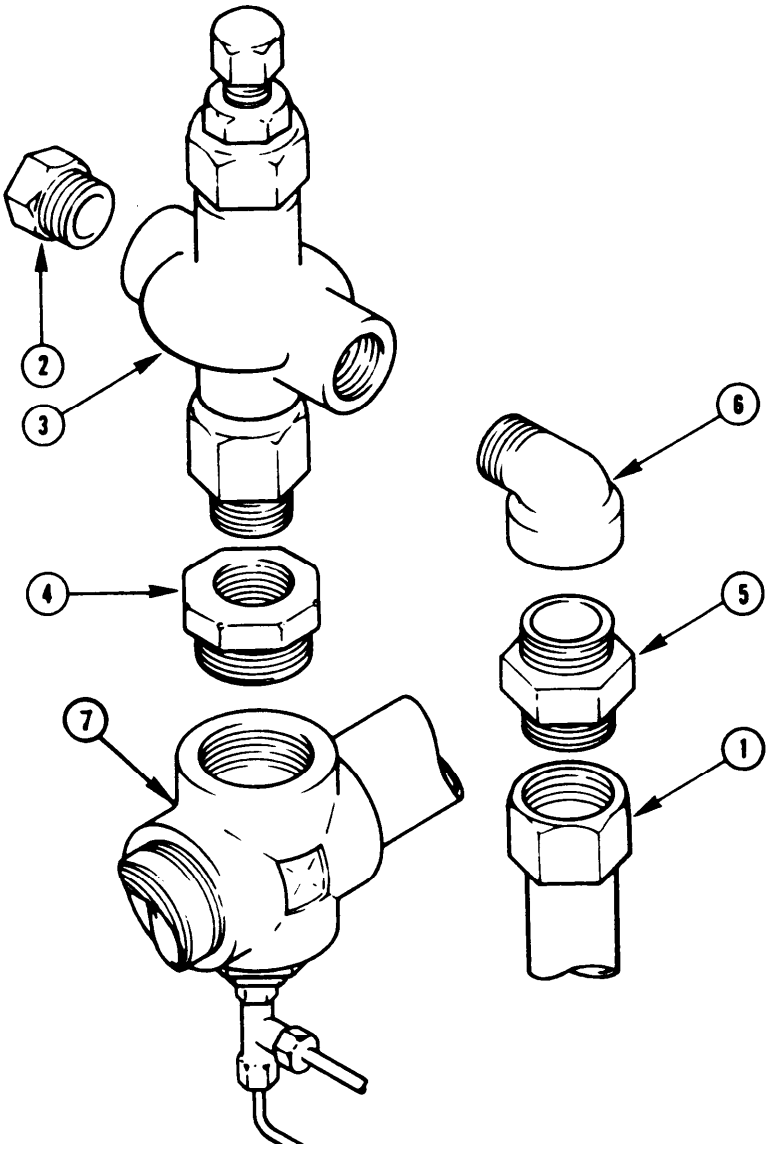


Figure 2–93. Automatic Pressure Relief Valve

c. Cleaning. Remove dirt and rust from discharge pipe, plug, and adapter.

d. Inspection. Inspect discharge pipe, plug, and adapter for stripped or damaged threads.

e. Replace.

(1) Replace damaged or unserviceable discharge tube, plug, reducing adapter, and pipe fittings.

(2) Replace damaged or unserviceable automatic pressure relief valve assembly.

f. Installation. (Figure 2-93)

NOTE

Pipe unions are not tightened until relief valve is installed. Apply Teflon tape to pipe threads before making connections.

(1) Install reducing adapter (4) in pipe tee (7).

(2) Install relief valve (3) in reducing adapter (4).

(3) Install elbow (6) on automatic pressure relief valve (3).

(4) Install adapter (5) in elbow (6).

(5) Install plug (2) in relief valve (3).

(6) Connect discharge pipe coupling nut (1) to adapter (5).

(7) Perform operational check.

2-79. RUPTURE DISC ASSEMBLY.

a. General. The rupture disc assembly IS a safety device which prevents progressive pressure buildup in the R.O. vessels. It is located between the R.O. pump and the pulse dampener. The rupture disc opens (ruptures) at 1425 psi (100 kg/cm^2). This paragraph describes removal, cleaning, inspection, repair, and installation of the rupture disc assembly.

b. Removal. (Figure 2-94)

WARNING

ROWPU piping and equipment can contain extremely high 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.

(1) Remove rupture disc assembly (6) from bushing (5).

(2) Remove bushing (5) from pipe.

(3) Unscrew cap (1) from body (2).

(4) Remove spacer (3) and rupture disc (4) from body (2).

c. Cleaning.

(1) Clean pipe and surrounding area with brush and soap solution.

(2) Clean all parts of rupture disc assembly.

(3) Clean all threads.

(4) Particular attention should be paid to rupture disc and rupture disc seating surface.

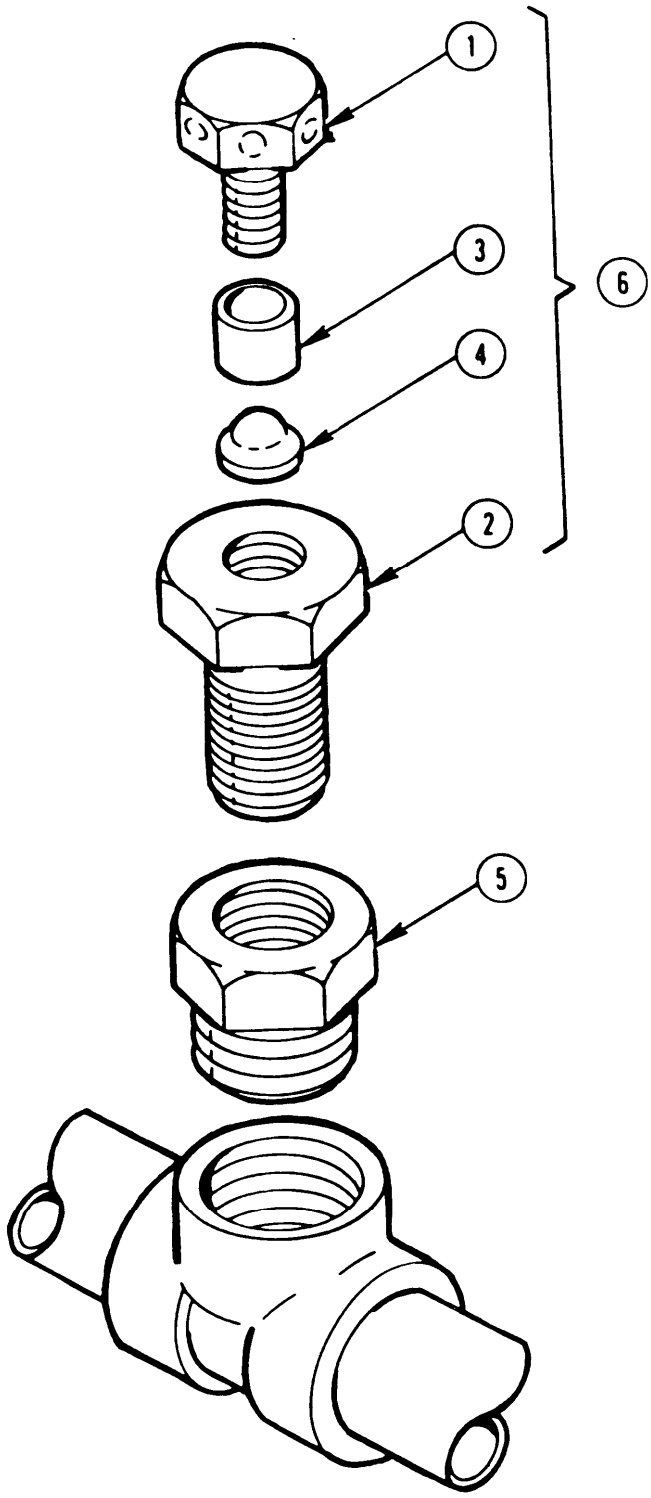


Figure 2-94. Rupture Disc Assembly

d. Inspection.

(1) Check pipe threads for damage or corrosion.

(2) Check all threads of rupture disc assembly.

(3) Check for stripped or damaged head on cap.

(4) Check for dirty or clogged vent holes in cap.

(5) Check rupture disc for cracks, dents, or deep scratches.

(6) Check spacer for bending, cracks, or deformation.

e. Repair or Replace.

(1) Replace damaged cap.

(2) Replace damaged bushing.

(3) Replace damaged body.

(4) Replace damaged or broken rupture disc.

(5) Replace damaged spacer.

f. Installation. (Figure 2–94)

NOTE

Apply thread sealant or Teflon tape to pipe threads before making connections.

(1) Install rupture disc (4) and spacer (3) in body (2).

(2) Install cap (1) in body (2).

(3) Install bushing (5) in pipe.

(4) Install rupture disc assembly (6) in bushing (5).

2-80. PULSE DAMPENER.

a. General. The pulse dampener is located between the R.O. pump and the R.O. vessels. It is used to eliminate water pressure pulsing from the R.O. pump, thus allowing steady water pressure to the R.O. vessels. This paragraph describes removal, cleaning, inspection, repair, and installation of the pulse dampener.

b. Removal. (Figure 2-95)

WARNING

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

(1) Unscrew three pipe unions (1) (ARMY), two pipe unions (1) (USMC), and one pipe union (14) (USMC), on pipes from R.O. pump to R.O. vessels and to vent vessels valve.

(2) Remove automatic pressure relief valve (2) in accordance with paragraph 2-78.

(3) (USMC) Remove union (14) with pipe assembly (15).

(4) Remove pipe assembly (3) from pipe assembly (12) that connects to pulse dampener (11).

(5) Unscrew coupling nut and disconnect drain (4) from piping assembly (12) under automatic pressure relief valve.

(6) Unscrew and disconnect two coupling nuts (5) from two adapters (16).

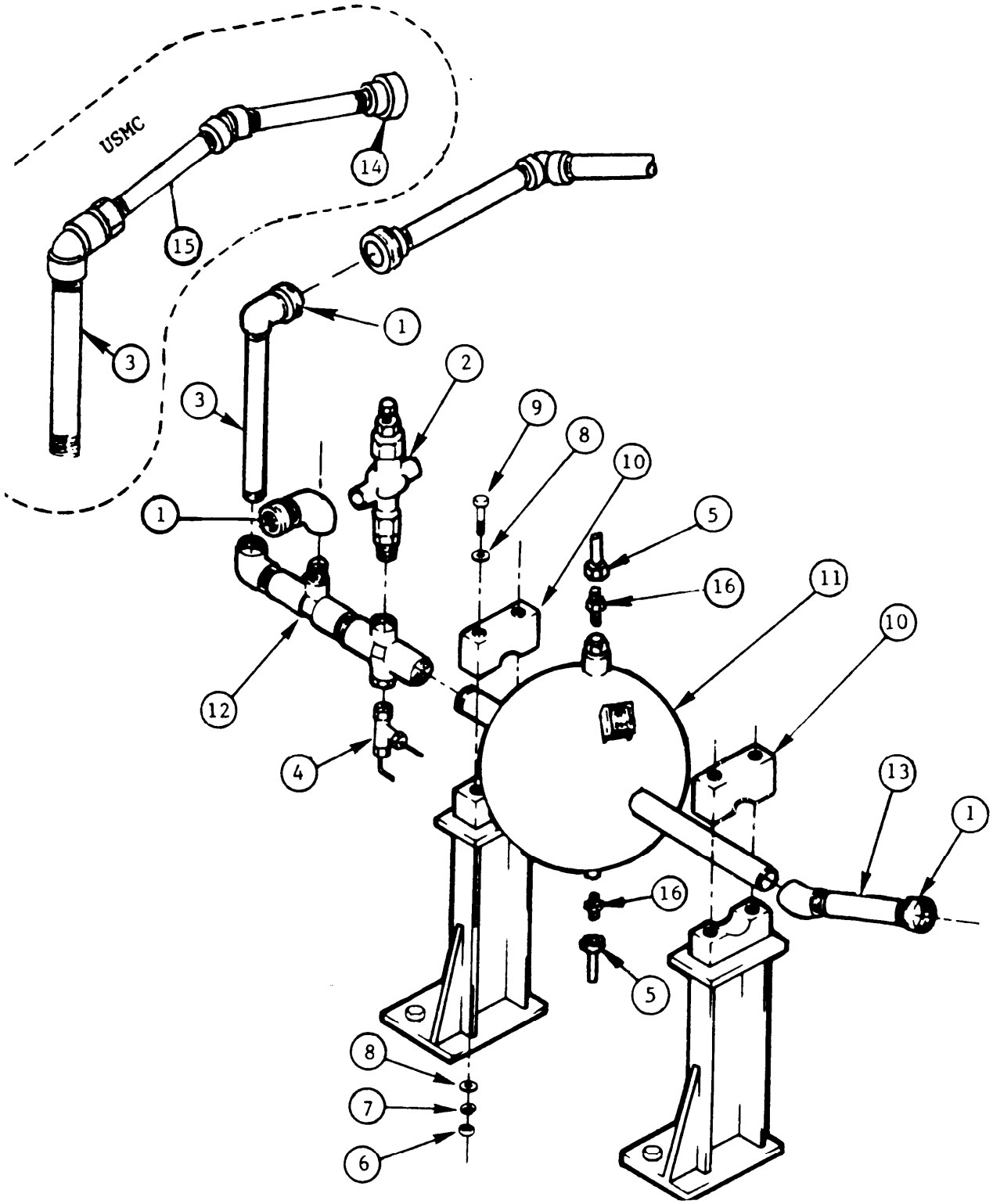


Figure 2–95. Pulse Dampener

(7) Remove two adapters (16) from pulse dampener (11).

(8) Remove four nuts (6), four lockwashers (7), and four flat washers (8) from bolts (9).

(9) Remove four bolts (9) and four more flat washers (8) from stand clamps (10).

(10) Remove top half of two clamps (10).

(11) Remove pulse dampener (11) from ROWPU frame.

(12) Remove discharge pipe assembly (12) from pulse dampener (11).

(13) Remove intake pipe assembly (13) from pulse dampener (11).

c. Cleaning.

(1) Remove dirt and rust from pipe assemblies and pipe unions.

(2) Remove dirt and rust from clamps, nuts, screws, and washers.

d. Inspection.

(1) Inspect piping for cracks and excessive rusting.

(2) Inspect pipe unions for stripped or damaged threads.

(3) Inspect coupling nut for stripped or damaged threads.

(4) Inspect nuts and screws for stripped heads and threads.

(5) Inspect screws for bent or broken shanks.

e. Repair or Replace.

(1) Replace all damaged nuts, bolts, screws, and washers.

(2) Replace damaged pipe, pipe fittings, pipe assemblies, and tube assemblies.

(3) Replace damaged or unserviceable pulse dampener assembly.

(4) Repair automatic pressure relief valve in accordance with paragraph 2-78.

(5) Send damaged pulse dampener assembly to Direct Support Maintenance.

(6) Repaint, as needed, in accordance with Standard Operating Procedures.

f. Installation. (Figure 2-95)

NOTE

All pipe threads are to be assembled with thread sealant or Teflon tape.

(1) Install intake pipe assembly (13) to pulse dampener (11).

(2) Install discharge pipe assembly (12) to pulse dampener (11).

(3) Place pulse dampener (11) on two stands mounted to ROWPU frame.

(4) Place top half of two clamps (10) over piping of pulse dampener (11).

(5) Insert four bolts (9) and four flat washers (8) into two clamps (10).

(6) Install, but do not tighten, four flat washers (8), four lockwashers (7), and four nuts (6) on four bolts (9).

(7) Instail two adapters (16) to top and bottom of pulse dampener (11).

(8) Connect vent and drain line coupling nuts (5) to two adapters (16) at top and bottom of pulse dampener (11).

(9) Connect coupling nut (4) to piping assembly (12) under automatic relief valve (2).

(10) Install pipe assembly (3) to pipe assembly (12).

(11) (USMC) Install union (14) with pipe assembly (15).

(12) Install automatic pressure relief valve (2).

(13) Connect three pipe unions (1) to frame piping.

(14) Tighten four nuts (6).

(15) Perform operational test and check all fittings for leaks.

2-81. DRAIN VALVES.

a. General. The drain valves have two purposes. They allow water to run out of the pipes and filters of the ROWPU after the unit has been shut down, and they enable the operator to draw water samples while the unit is working. This paragraph describes how to remove, clean, inspect, and install the drain valves.

b. Removal. (Figures 2-96 (ARMY) and 2-97 (USMC))

WARNING

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

(1) Remove coupling nut (1) from adapter on valve (4).

(2) (ARMY) Remove two screws (2) and two lockwashers (3) from retaining strap (5) and valve (4).

(3) (ARMY) Remove two screws (6) and two lockwashers (7) from retaining strap (5).

(4) (ARMY) Remove retaining strap (5) and valve (4) from frame.

(5) (USMC) Remove two screws (3), two lockwashers (2), and valves (4) from frame.

c. Cleaning.

(1) Remove dirt.

(2) Remove pitted and corroded material.

(3) Clean dirt and corrosion from bolts, screws, washers, pipe, and retaining strap.

(4) Remove burrs on pipe flare with steel wool.

d. Inspection.

(1) Inspect nut, screw, and bolt threads for damage.

(2) Check for bent or broken bolt stems.

(3) Check retaining strap for damage.

(4) Check flared pipe end for damage.

e. Repair or Replace.

(1) Replace damaged nuts, bolts, screws, and washers.

(2) Replace damaged or unserviceable retaining strap.

(3) Replace damaged pipe fittings and tube assembly.

(4) Replace damaged or unserviceable drain valve assembly.

(5) Send unserviceable drain valve assembly to Direct Support Maintenance.

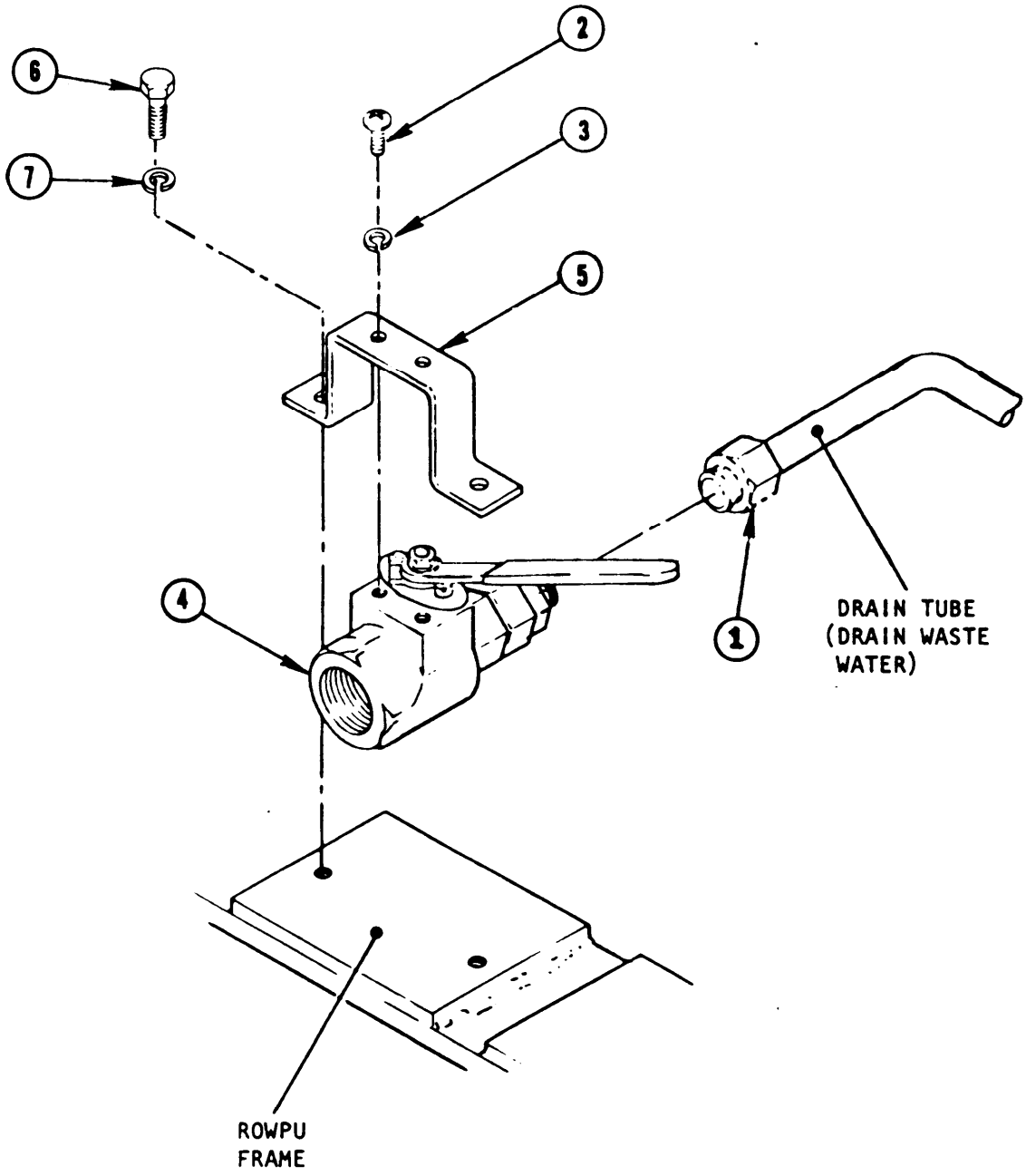


Figure 2-96. Drain Valve (ARMY)

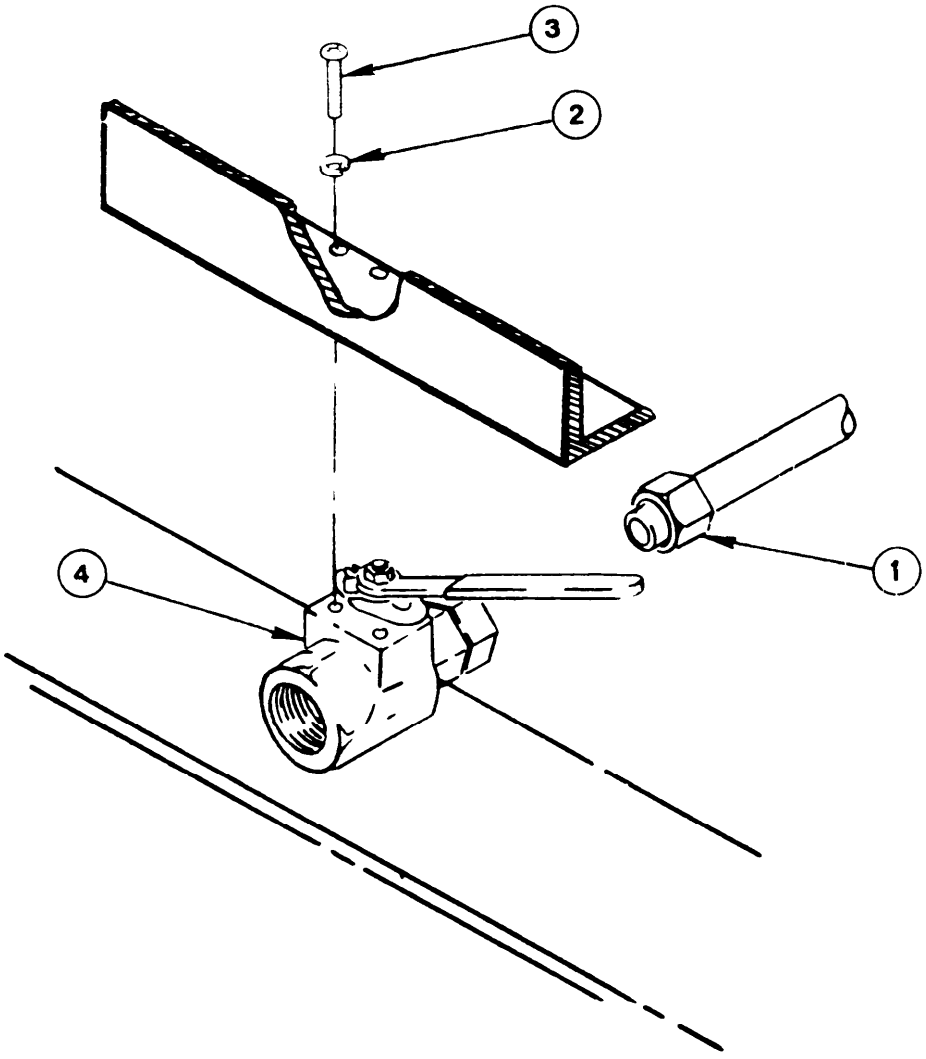


Figure 2-97. Drain Valve (USMC)

f. Installation. (Figure 2-96 and 2-97)

NOTE

All pipe threads are to be assembled with thread sealant and Teflon tape.

(1) (ARMY) (Figure 2-96) Install retaining strap (5) and valve (4) to the frame using two lockwashers (7) and two screws (6).

(2) (ARMY) (Figure 2-96) Secure valve (4) to retaining strap (5) using two lockwashers (7) and two screws (6).

(3) (USMC) (Figure 2-97) Install valve (4) to ROWPU frame with two screws (3) and two lockwashers (2).

(4) Connect coupling nut (1) to valve (4).

(5) Perform operational check and check all fittings for leaks.

2-82. COMMON FITTINGS AND LINES. (Figure 2–98)

a. General. The ROWPU has many pipes and fittings which are not normally removed. This paragraph describes removal, repair, and installation of two typical pieces of piping.

b. Removal of Pipe Typical.

WARNING

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

(1) Identify section of piping which is damaged or marked for removal.

(2) Trace pipe section to pipe unions at either end of section to be removed.

(3) Remove four nuts (1) and four lockwashers (2) and from four bolts (4).

(4) Remove four bolts (4) and four flat washers (3) from stand clamps (5).

(5) Remove top half of two clamps (5).

(6) Unscrew pipe unions at either end of section to be removed.

(7) Remove pipe (6) from ROWPU.

NOTE

PVC pipes are bonded with cement which forms a permanent bond. Use care in determining length required. Position pipes on unit and apply cement upon installation. Do not attempt to cement pipes and fittings together without positioning them on the unit.

c. Repair of Piping (PVC or Steel) (Typical.)

(1) If damaged pipe is PVC, reconstruct entire length of pipe between the two unions with new sections and elbows.

(2) If damaged pipe is steel, remove the damaged pipe from elbows and replace.

(3) Replace all damaged nuts, bolts, screws, and washers.

(4) Repaint, as required, in accordance with Standard Operating Procedures.

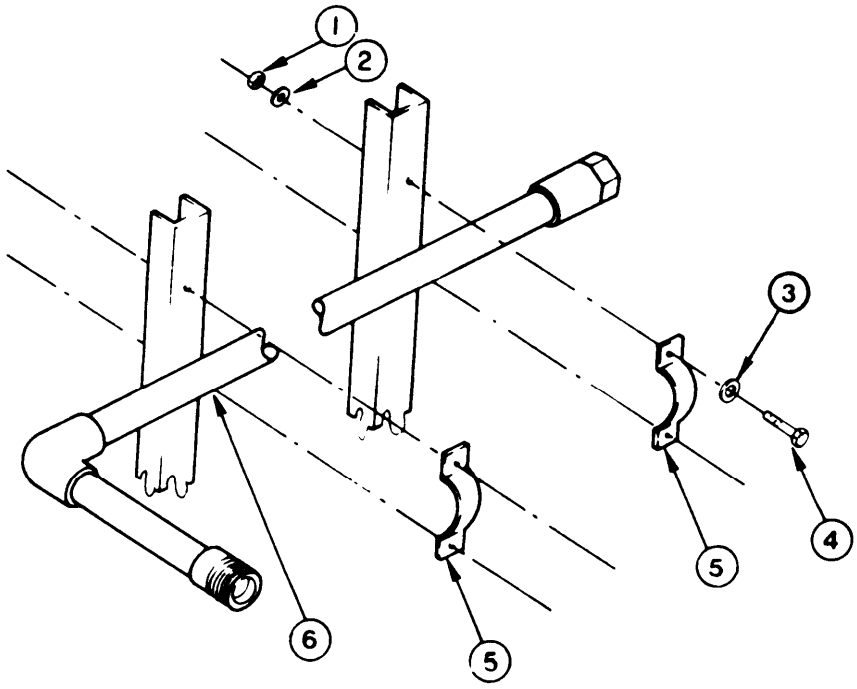


Figure 2-98. Pipe (Typical)

d. Installation. (Figure 2-98)

NOTE

All pipe threads are to be assembled using thread sealant or Teflon tape.

(1) Hold pipe assembly (6) in place on ROWPU.

(2) Locate two clamps (5) and insert four bolts (4) and four flatwashers (3) through clamp (5) and ROWPU frame member.

(3) Install, but do not tighten, four lockwashers (2) and four nuts (1) to bolts (3).

(4) Connect pipe unions at both ends of installed pipe assembly.

(5) Tighten four nuts (1).

(6) Check all fittings for leaks.

e. Removal of Drain Pipe (Typical). (Figure 2–99)

(1) Unscrew coupling nut (2) to remove pipe (8) from drain valve (1).

(2) Unscrew coupling nut (3) by same method.

(3) Remove two nuts (4) and two lockwashers (5) from bolts (6) on tube support (7).

(4) Remove two bolts (6) from tube support (7).

(5) Open tube support (7) and remove pipe (8).

(6) Reassemble tube support (7) with other pipes in original positions.

(7) Repeat steps (4) through (6) for each tube support holding the pipes (8).

(8) Remove pipe (8) from ROWPU.

f. Inspection of Drain Pipe. Typical.

(1) Inspect threads on drain valve and fixture at other end of pipe for damage or corrosion.

(2) Check tube supports to make sure pipes remaining in the supports are properly positioned.

(3) Check for damage or corrosion of supports.

g. Repair or Replace.

(1) Replace all damaged nuts, bolts, screws, and washers.

(2) Replace all damaged pipe fittings.

(3) Replace all damaged pipe support clamps and tube supports.

(4) Repair drain valve assembly in accordance with paragraph 2-81.

(5) Repaint, as needed, in accordance with Standard Operating Procedures.

NOTE

Apply thread sealing or Teflon tape on threads.

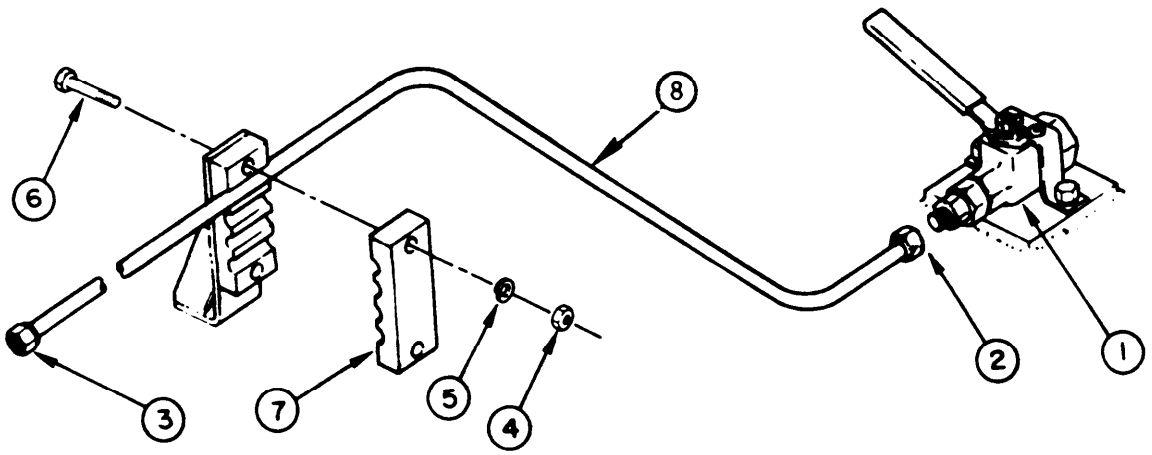


Figure 2-99. Drain Lines (Typical)

h. Installation of Drain Pipe. (Typical. (Figure 2–99)

(1) Place pipe assembly (8) in approximate position in ROWPU frame.

(2) Locate tube support (7) over tubes.

(3) Insert bolt (6) through tube support (7).

(4) Install, but do not tighten, two lockwashers (5) and two nuts (4).

(5) Repeat steps (1) through (4) for each tube and tube clamp.

(6) Connect coupling and tighten nut (2) to valve (1).

(7) Connect coupling and tighten nut (3) to ROWPU–applicable component.

(8) Tighten all nuts (4) on tube support (7).

(9) Perform operational test and check all fittings for leaks.

Section V1. STORAGE OR SHIPMENT

2-83. 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 in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period appropriate maintenance records will be kept.

b. Before placing equipment in administrative storage, current maintenance services and equipment serviceable criteria (ESC) evaluations should be completed, shortcomings and deficiencies should be corrected, and all modification work orders (MWO'S) should be applied.

c. Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.

2-84. PREPARATION FOR STORAGE OR SHIPMENT. Prepare ROWPU for storage or shipment as directed in paragraph 2-31 of Operator's Manual, TM 10-4610-215-10 (ARMY) and TM 08580A-10/1 (USMC).

CHAPTER 3

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

3-1. COMMON TOOLS AND EQUIPMENT. For authorized common tools and equipment, refer to the Additional Authorization List, Appendix D.

3-2. SPECIAL TOOLS AND SUPPORT EQUIPMENT. The only special tool required is a deadweight gage tester, (refer to Appendix B, Section Ill).

3-3. TEST, MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE). For authorized TMDE refer to the MTOE applicable to your unit.

3-4. REPAIR PARTS. Repair parts and equipment are listed in the Repair Parts and Special Tools List (RPSTL) for the ROWPU. (ARMY) Refer to TM 10-4610–215-24P USMC personnel refer to SL-4-08580A.

Section II. TROUBLESHOOTING

3-5. DIRECT SUPPORT MAINTENANCE TROUBLESHOOTING. This paragraph provides information for locating and correcting problems at the direct support level. Table 3-1 lists troubles for each item or group of items, followed by a series of tests or inspections and corrective actions. This table cannot list all troubles that may occur, nor list all possible tests and corrective actions. If a problem is not listed, or is not corrected by the listed actions, notify your supervisor.

Table 3-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
CENTRIFUGAL WATER PUMPS	
1. REDUCED WATER FLOW, MOTOR RUNS NORMALLY.	
Step 1. Check for clogged or damaged impeller or broken motor shaft. Remove fan cover and fan. Using a strap wrench, turn rotor shaft If shaft is hard to turn, is loose, or is excessively noisy, refer to applicable motor assembly.	
Step 2. Check for leaks around pump casing.	Replace gasket.
Step 3. Check for leakage from back of pump.	Replace mechanical seal.
Step 4. Inspect parts of mechanical seal for damage.	Replace entire mechanical seal if any part is damaged.
Step 5. Check for leaks from suction or discharge assemblies.	Replace gaskets.
PUMP MOTOR (EXCEPT CHEMICAL FEED MOTOR)	
1. CENTRIFUGAL PUMP MOTOR WILL NOT START OR OVERHEATS REPEATEDLY.	
Step 1. Remove fan cover and fan. Using a strap wrench, turn the shaft. If shaft is hard to turn, is loose, or is excessively noisy, disassemble and inspect pump motor assembly in accordance with appropriate paragraph.	
Step 2. Check motor case wiring for burned or broken wires. Use an ohmmeter to test for short circuits.	Forward damaged motor to next higher level of maintenance for repair.

Table 3-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CHEMICAL FEED PUMP
1. MOTOR RUNS. ONE OR MORE PUMP HEADS WILL NOT DELIVER CHEMICAL.
Step 1. Check adjustment valves and pump body for clogging.
Clean openings.
Step 2. Check prime/run valves for clogging or damage.
Clean valves or replace damaged valves.
Step 3. Check piston rod movement. (ARMY)
a. Clean piston rod or replace packing.
b. Replace broken spring. Check and secure connection on the drive shaft.
Step 4. Check diaphragm. (USMC)
Replace damaged or ruptured diaphragm.
2. MOTOR RUNS. ALL PUMPS FAIL TO OPERATE.
Step 1. Check for loose or broken drive coupling.
a. Tighten drive coupling setscrew.
b. Replace broken coupling.
Step 2. Check for broken or damaged worm gear or worm wheel.
Replace broken worm gear or worm wheel.
3. FLOW RATE CANNOT BE ADJUSTED.
Step 1. Check spindle for binding.
Clean spindle or replace if damaged.
Step 2. Check for broken or defective spring.
Replace if necessary.

Table 3-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CHEMICAL FEED PUMP MOTOR
1. MOTOR WILL NOT START, OR OVERHEATS REPEATEDLY.
Step 1. Check for sticking or binding of worm gear or worm wheel.
a. Clean and lubricate binding parts.
b. Replace damaged parts.
Step 2. Check for loose connections or broken wires to capacitor.
a. Tighten connections.
b. If wires are damaged, send motor to next higher level of maintenance.
Step 3. Inspect for seized bearings or damage to centrifugal mechanism.
a. Remove motor from flange mounting.
b. Using a strap wrench, turn rotor shaft.
c. If shaft is hard to turn, is loose, or is excessively noisy, disassemble and inspect in accordance with paragraph 3–13.
Step 4. Inspect for loose wire connections to stationary switch.
a. Inspect for broken stationary switch.
b. Tighten connections.
c. Replace damaged stationary switch.
Step 5. Inspect motor casing wiring for damage.
a. Test for short circuits.
b. If wiring is faulty, send motor casing to next higher level of maintenance for repair.

Table 3-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

R.O. PUMP

1. LOSS OF PRESSURE OR VOLUME, ERRATIC POUNDING IN FLUID END ASSEMBLY.

Step 1. Check for leaks in suction line.

a. Tighten fittings.

b. Replace damaged pipe.

WARNING

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

Step 2. Check for slightly opened or leaking relief valve.

a. Close relief valve.

b. Replace if damaged.

Step 3. Check for foreign matter holding valves open

Clean valves.

Step 4. Check for broken valve springs or worn valves.

Replace damaged parts.

2. CONSISTENT KNOCK.

NOTE

High-speed pumps will have valve noise even when new. Check valve noise only if erratic. See malfunctions 1 and 3.

Step 1. Check to see if plunger is loose from crosshead,

Tighten onto crosshead or replace if damaged.

Step 2. Check for worn or loose main bearings, bearing cones, or bearing cups.

Replace damaged parts.

Table 3-1. Troubleshooting.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

R.O. PUMP – Continued

3. ERRATIC KNOCK OR INCONSISTENT PRESSURE.

Step 1. Check for pump sucking air through relief valve.

Tighten or replace relief valve.

Step 2. Check for broken valve spring, worn disc, or worn valve seat.

Replace damaged parts.

4. EXCESSIVE PACKING FAILURE.

Step 1. Check to be sure packing is installed properly.

Replace packing.

Step 2. Check for nicks and burrs on plunger.

a. Buff off minor burrs and nicks.

b. Replace plunger if damaged.

HIGH PRESSURE SWITCH

1. SWITCH WILL NOT ACTUATE (CUT OFF) AT 1250 psig (88 kg/cm^{2}g

Apply pressure to switch and check actuation point with accurate gage.

Step 1. Check for proper setting of adjustment screw. Setting should be 1250 psig (88 kg/cm^{2}g).

a. Connect test light to N.O. (normally open) and common terminals. Lamp should not light at zero pressure.

b. Raise pressure and check the point at which lamp lights. This is the set point. There is a mark on the switch cover that shows where the set point is.

c. Drop pressure to zero. Raise or lower setting by turning adjusting screw. Make adjustments of less than one-quarter of a turn of the screw.

d. Repeat steps (b) and (c) until desired set point is reached.

e. Raise pressure 1250 psig (88 kg/cm^{2}g) and observe test light. The lamp should go on at 1250 psig (88 kg/cm^{2}g)

Table 3-1. Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
HIGH PRESSURE SWITCH – Continued
1. SWITCH WILL NOT ACTUATE (CUT OFF) AT 1250 psig (88 kg/cm^{2}g- Continued
Step 2. Using test lamp, check for switch actuation.
a. Adjust switch or bracket and tighten screw.
b. Replace defective sensing element assembly.
Step 3. Check to see that pressure sensing element is actuating switch.
Replace defective sensing element assembly.
2. SWITCH ACTUATES AT PRESSURE BELOW 1250 psig (88 kg/cm^{2}g).
Step 1. Refer to high-pressure switch malfunction 1, step 1.
LOW-PRESSURE SWITCH
1. SWITCH WILL NOT ACTUATE AT 10 psig (0.7 kg/cm^{2}g).
Step 1. Apply pressure to switch and check actuation point with accurate gage and test light.
Step 2. Verify that adjustment screw is properly set to 10 psig (0.7 kg/cm^{2}g).
a. Connect test light to N.O. and common terminals. Lamp should light at zero pressure.
b. Raise pressure until lamp goes off. Lamp should go off at proof (10 psig) (0.7 kg/cm^{2}g pressure.
c. Slowly decrease pressure until lamp lights. This is the set point.
d. Drop pressure to zero. Raise or lower setting adjustment screw in steps of not more than one-quarter turn each step.
e. Repeat steps (b) and (c) until desired set point is reached.
f. Raise pressure to maximum, then decrease to 10 psig (0.7 kg/cm^{2}g).
Step 3. Using test lamp, check for switch actuations.
a. Adjust switch bracket and tighten screw.
b. Replace defective sensing element assembly.
Step 4. Check to see that diaphragm is actuating switch.
Replace diaphragm.

Table 3-1. Troubleshooting.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

SOLID STATE BACKWASH TIMER

1. FILTER CONTROL DOES NOT RETURN TO SERVICE.

Step 1. Check for 115 Vac across terminals 1 and 2 of J4 (Refer to fig. 1-12).

Step 2. With power disconnected check continuity across reset switch.

If open, replace reset switch.

Step 3. Check circuit breaker.

a. If tripped, correct.

b. Press reset button.

Step 4. Check timer motor for rotation.

If motor does not start, replace.

2. FILTER CONTROL CYCLES.

Step 1. Check setting on time switches.

Step 2. With power off, check for continuity across C and N.O. positions of homing limit switch with cam in the service position.

3. FILTER CONTROL DOES NOT START WHEN SWITCH IS ACTIVATED.

Step 1. Check wiring.

Step 2. Check that remote switch is functional.

If not, replace.

Step 3. Check that power is properly connected.

Section III. DIRECT SUPPORT MAINTENANCE PROCEDURES

3-6. ROWPU FRAME COVER

a. General. The ROWPU frame cover protects the ROWPU from the environment while in storage and during transportation. This paragraph describes inspection and repair of the ROWPU frame cover.

b. Inspection. (Figure 3-1)

(1) Spread the cover flat on a clean surface with the outside up.

(2) Check that the rim strip around the edge or the cover is not coming unstitched.

(3) Check webbing straps for end clips.

(4) Check spring buckles.

(5) Check that all straps are securely sewn to cover. Mark loose stitching for repair.

(6) Check cover for tears. Mark for repair.

(7) Turn cover over. Check buckles on underside for serviceability.

c. Repair.

(1) Sew patches on tears.

(2) Sew loose rim strip or webbing straps.

(3) Apply water-repellent solution.

3-7. PUMP COVER. (Figure 3–2)

a. General. Each of the four outlying pumps has a cover. This paragraph describes inspection and repair of the covers.

b. Inspection.

(1) Lay out the cover on a clean surface.

(2) Inspect outside cover and inner felt lining for tears, loose stitches, or wear.

(3) Inspect laces for wear.

(4) Check for missing or damaged grommets.

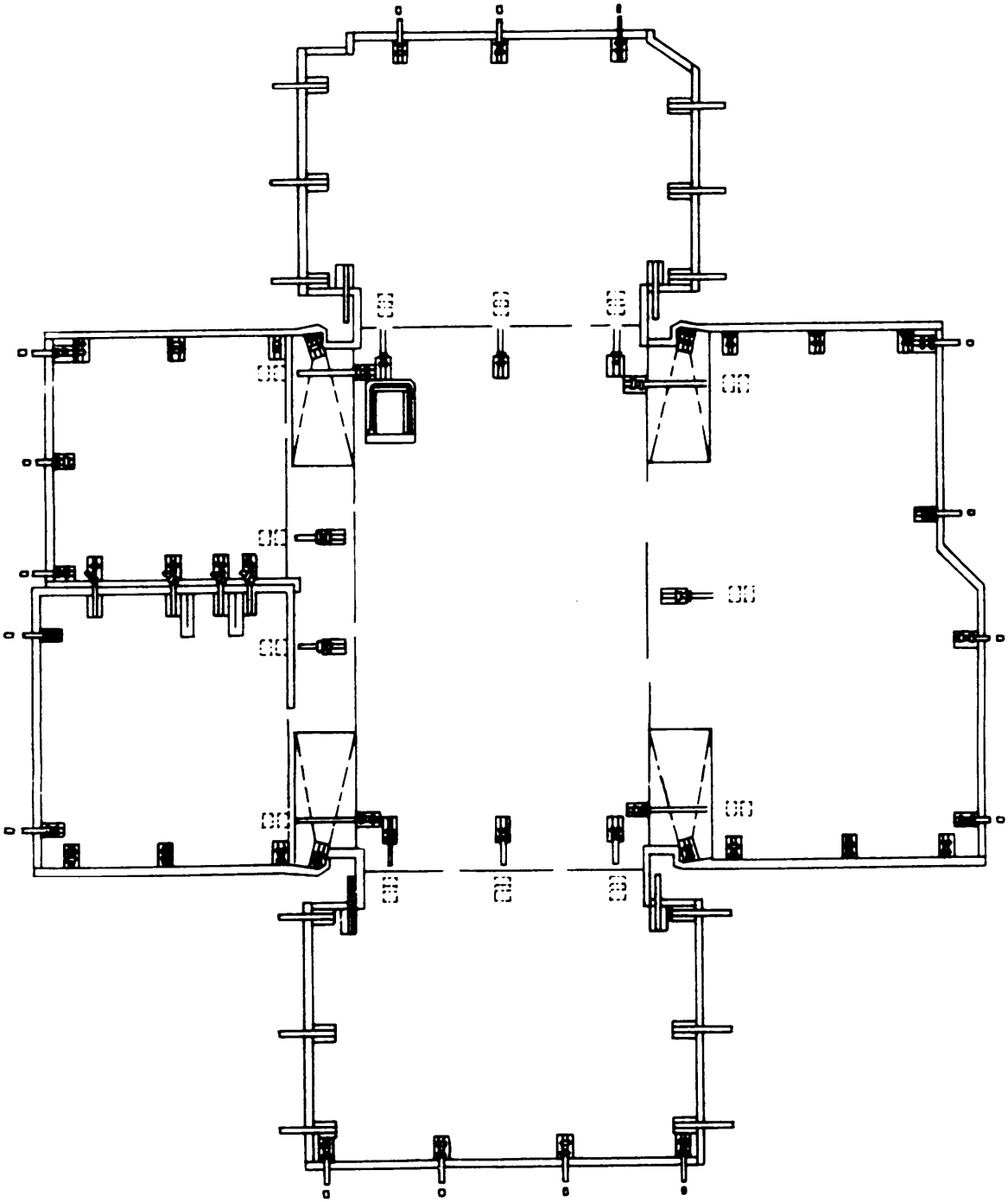


Figure 3–1. ROWPU Frame Cover Repair

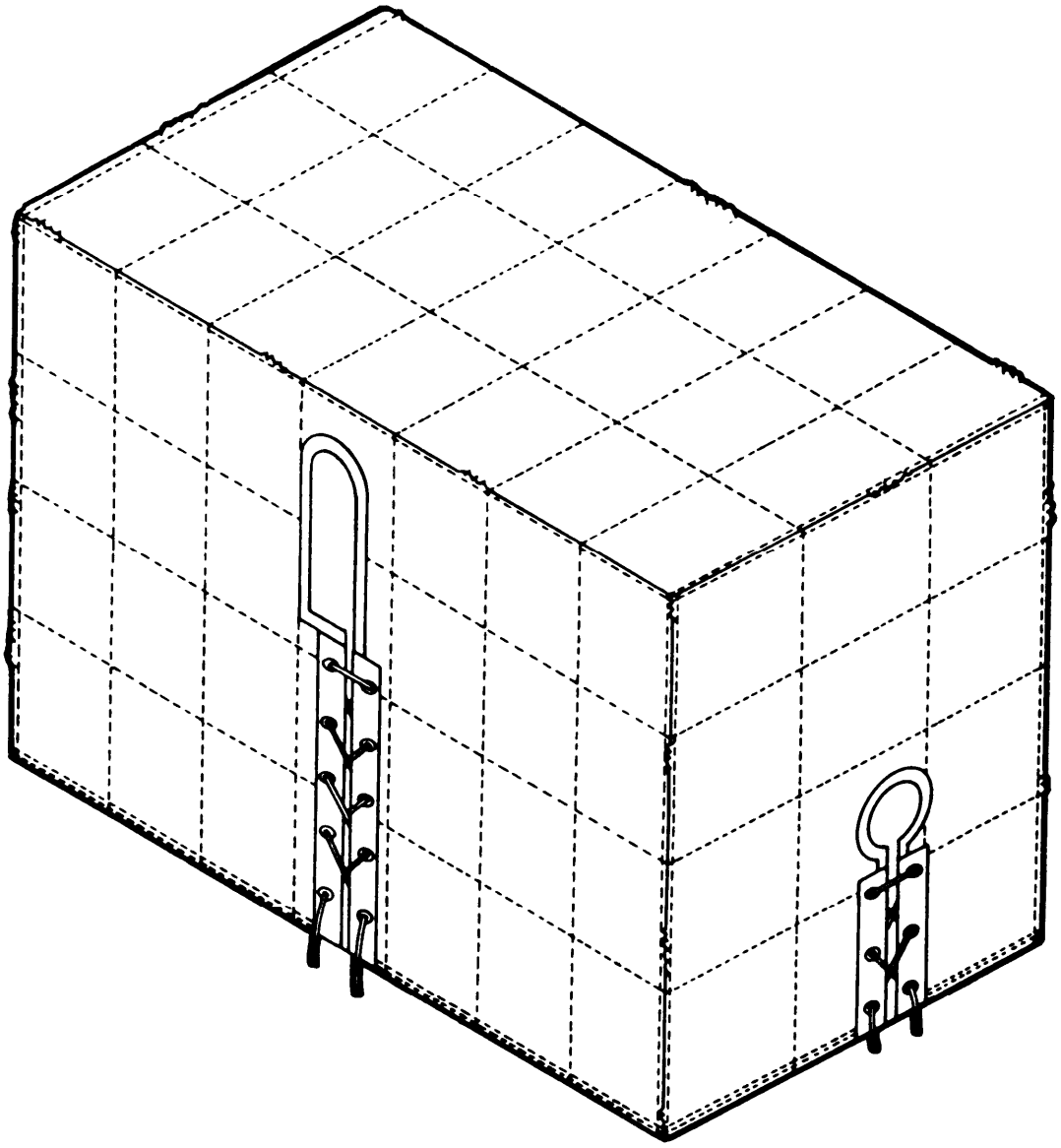


Figure 3-2. Pump Cover Repair

c. Repair.

(1) Replace damaged or missing grommets.

(2) Replace worn or frayed laces.

(3) Replace or repair inner felt lining.

(4) Patch tears in cover.

(5) Sew loose stitching.

3-8. LADDER. (Figure 3-3) (ARMY)

a. General. The ladder is made of welded steel bars. This paragraph describes the cleaning, inspection, and repair of the ladder.

b. Cleaning.

(1) Remove dirt.

(2) Remove grease and corrosion from ladder.

c. Inspect. Inspect ladder for breaks or bends.

d. Repair.

(1) Weld ladder where necessary.

(2) Straighten bends.

(3) Repaint as necessary in accordance with Standard Operating Procedures.

(4) Replace unserviceable ladder.

3-9 DATA AND INSTRUCTION PLATES. (Figure 3-4)

a. General. Data and instruction plates give key information about what the equipment is, what It does, how to use it, and how to care for it. The plates are made of aluminum. The plates are fastened to the equipment with screws or rivets. This paragraph describes typical removal, cleaning, inspection, and replacement of plates.

b. Removal.

Remove four screws or rivets (1) (figure 3-4) at corners of plate (2).

c. Cleaning.

(1) Clean dirt and corrosion from the surface of the equipment where the new data or instruction plate is to be installed. Use sandpaper or solvent or both. Dry the surface. Paint, if necessary, and let the paint dry.

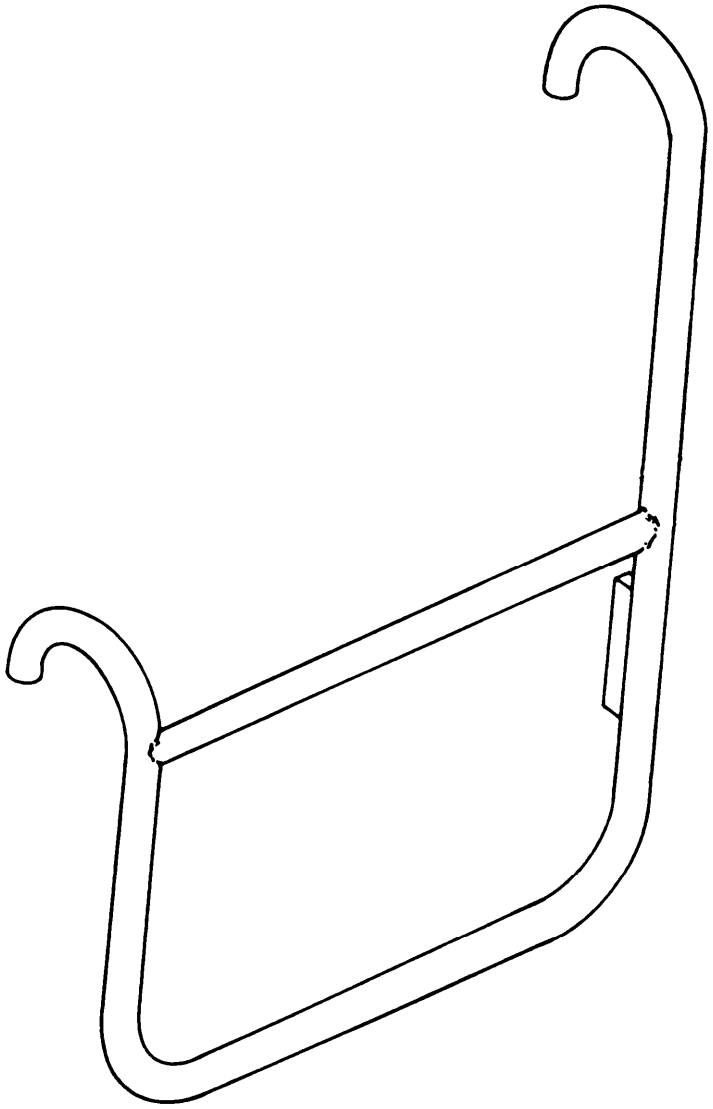


Figure 3-3. Trailer Ladder (ARMY)

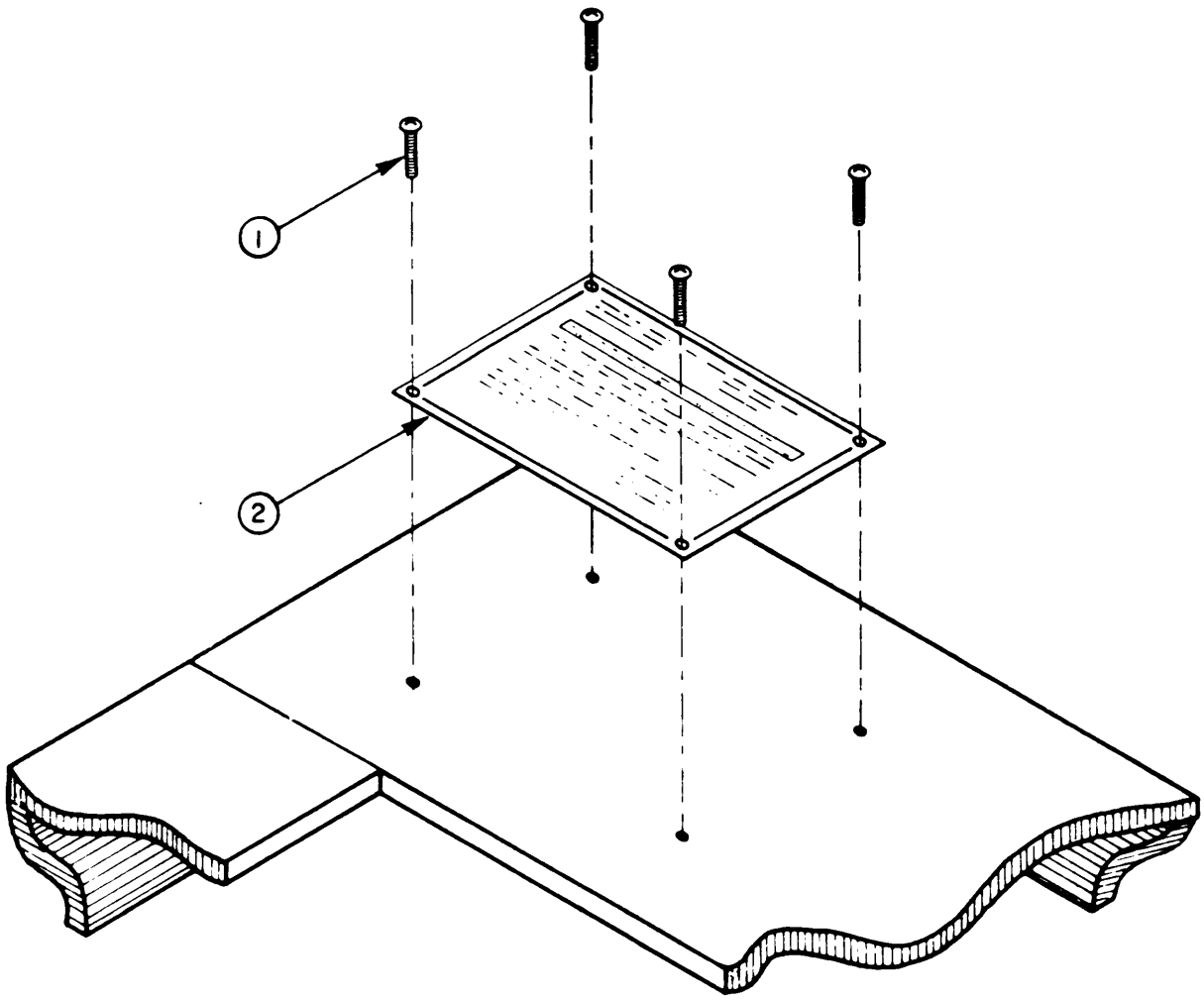


Figure 3-4. Data and Instruction Plates (Typical)

d. Inspection.

(1) Inspect the threads and heads of the screws for damage.

(2) Inspect for broken and bent screws. Replace if damaged.

e. Replacement.

(1) Press the new plate evenly onto the mounting surface, making sure that the screw holes in the plate align with the screw holes in the equipment.

(2) Install the mounting screws or rivets. (Refer to figure 34 Data and Instruction Plates (Typical)).

3-10. DISTRIBUTION/BOOSTER PUMP MOTOR ASSEMBLY. (Figure 3-5)

a. General. This paragraph describes the disassembly, cleaning, inspection, component test, repair, assembly, and operational test of the distribution or booster pump motors.

b. Motor Dissembly.

(1) If necessary, see paragraph 2-42 to remove distribution pump from frame and/or to remove power cable.

(2) If necessary, see paragraph 2-49 to remove booster pump from ROWPU frame.

WARNING

Objects blown by compressed air can cause serious injury. Always wear protective goggles when using compressed air.

(3) Before moving motor into work area, blow dirt out of ventilation louvers,

WARNING

Drycleaning solvent Fed. Spec. P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(4) Clean motor using a stiff brush and cleaning solvent Fed. Spec. P-D-680.

(5) Allow to air dry.

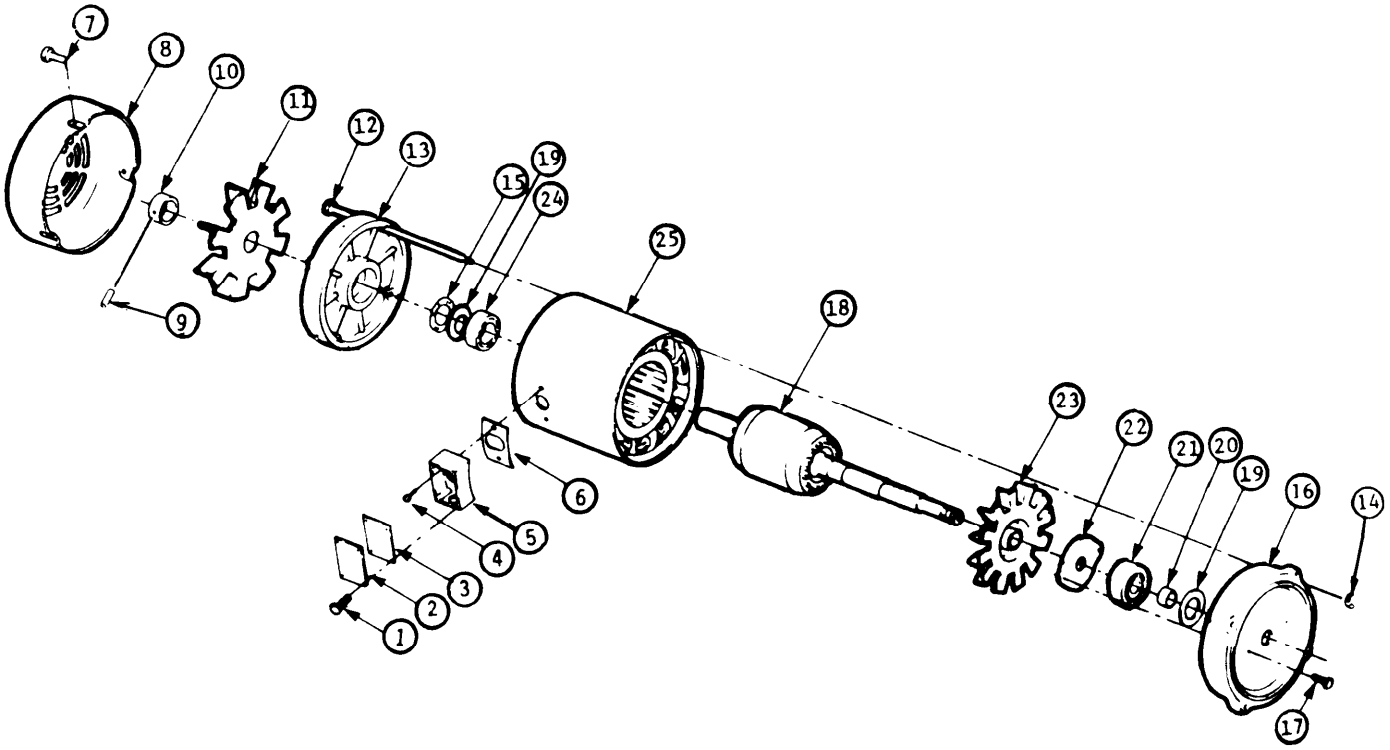


Figure 3–5. Distribution/Booster Pump Motor Assemblies

(6) Move motor into shop.

(7) Remove pump from motor in accordance with paragraphs 3-34 or 3-36.

(8) Remove four screws (1) from conduit box (5) (figure 3-5) gasket (3), and conduit box cover (2) and discard gasket (3).

(9) Remove three bolts (4) from motor casing (25), gasket (6), and conduit box (5) and discard gasket (6).

(10) Remove three screws (7) from fan-end plate (13) and fan cover (8).

(11) Remove fan cover (8) from fan-end plate (13).

(12) Loosen set screw (9) on fan-locking hub (10) and remove fan-locking hub (10) from rotor shaft (18).

(13) Remove fan (11) from rotor shaft (18).

NOTE

Mark fan-end plate, pump-end plate, and motor casing with matching pump pricks to assure proper alignment during reassembly.

(14) Remove four through-bolts (12) and nuts (14) from pump-end plate (16) and fan-end plate (13).

(15) Remove fan-end plate (13) from motor casing (25).

(16) Remove wavy washer (15) and shim (19) from rotor shaft (18).

(17) Using a bearing puller/press, remove fan end bearing (24) from rotor shaft (18).

CAUTION

Motor casing wiring can be snagged or broken by rotor shaft. Take care not to damage wires when removing pum-end plate and rotor shaft.

(18) Remove pump-end plate (16), with rotor shaft (18) attached, from motor casing (25).

(19) Remove two screws (17) from bearing retainer plate (22) and pump-end plate (16).

(20) Remove rotor shaft (18) from pump-end plate (16).

(21) Remove shim (19) from rotor shaft (18).

CAUTION

If rotor shaft is damaged it will not balance properly. Take care not to bend rotor shaft when pulling bearing lock–ring.

(22) Use a bearing puller/press to remove bearing lock ring (20) from rotor shaft (18).

(23) Use a bearing puller/press to remove pump-end bearing (21) from rotor shaft (18).

(24) Remove bearing cover plate (22) from rotor shaft (18).

(25) Remove internal fan (23) by pressing it off rotor shaft (18).

c. Cleaning.

WARNING

Objects blown by compressed air can cause serious eye injury. Always wear protective goggles when using compressed air.

(1) Blow out dirt inside motor casing with compressed air.

WARNING

Drycleaning solvent Fed. Spec. P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(2) Clean dust and dirt from fins, rotor fins, inside fan cover, and both end plates with cleaning solvent Fed. Spec. P-D–680, and air dry.

(3) Blow out any remaining dust and dirt.

(4) Wash non-electrical metal components, including bearings, with cleaning solvent Fed. Spec. P-D-680.

(5) Air dry parts.

(6) Wrap dry bearings in a soft, clean, lint-free cloth.

d. Inspection.

(1) Check metal parts for signs of wear, particularly cooling fans and rotor shaft.

(2) In motor casing, check coils and leads for damage to insulation and wire. Check for signs of overheated coils, deteriorated coil end bindings and lashings, and missing or broken coil retainer strips.

(3) Check ball bearings for flat spots or lateral play.

(4) Inspect wavy washer for damage.

e. Component Test

(1) Using the ohmmeter on the multimeter, perform resistance, short, and ground checks on motor casing coils.

(2) If coils do not test properly, send motor casing to General Support Maintenance for disposition.

(3) If coils are functional and no damage was noted on bearings or fans, send rotor shaft to next higher level of maintenance for test and repair.

f. Repair and Replace

(1) Replace all gaskets, seals, and O-rings.

(2) Replace all damaged nuts, bolts, screws, washers, shaft keys, Woodruff keys, and wavy washers.

(3) Replace damaged, worn, or unserviceable ball bearing assemblies.

(4) Deburr rotor shaft and remove any spot-weld residue by buffing with fine emery cloth.

(5) Straighten bent or dented cooling fan blades, fan cover, and ventilation louvers.

(6) Replace damaged, unrepairable, or unserviceable motor casing assembly.

(7) Repack serviceable clean bearings with fresh bearing grease before installing.

g. Assembly.

(1) Press fan-end bearing (24) (figure 3-5) on rotor shaft (18).

(2) Press internal fan (23) on rotor shaft (18).

(3) Slide bearing cover plate (22) on rotor shaft (18).

(4) Press pump-end bearing (21) on rotor shaft (18).

(5) Press bearing-lock ring (20) on rotor shaft (18).

(6) Install shim (19) on rotor shaft (18).

(7) Carefully install rotor shaft (18) in pump-end plate (16).

(8) install two screws (17) through pump-end plate (16) and bearing cover plate (22).

CAUTION

Motor casing wiring can be snagged or broken by rotor shaft. Take care not to damage wires when installing pump–end plate and rotor shaft assembly.

(9) Carefully install pump-end plate (16) with rotor shaft (18) attached, into motor casing (25).

(10) Slide shim (19) and wavy washer (15) on rotor shaft (18).

(11) Carefully install fan-end plate (13) on motor casing (25).

NOTE

Align pre–punched indexing marks on fan–end plate, motor casing, and pump–end plate to assure proper alignment.

(12) Install four long bolts (12) through fan–end plate (13), motor casing (25), pump–end plate (16), and nuts (14).

(13) Slide fan (11) on rotor shaft (18).

(14) Slide fan-locking hub (10) on fan (11) and rotor shaft (18) and tighten setscrew (9) in hub (10).

(15) Install fan cover (8) on fan-end plate (13).

(16) Install three screws (7) through fan cover (8) and fan-end plate (13).

(17) Slide casing wires through new gasket (6) and conduit box (5).

(18) Align the three mounting holes and install three bolts (4) through conduit box (5), gasket (6), and motor casing (25).

(19) Hold conduit box cover (2) and new gasket (3) in place on conduit box (5) and align four mounting holes.

(20) Install four screws (1) through conduit box cover (2) and gasket (3) on the conduit box (5).

(21) Install pump on motor in accordance with paragraph 3-35.

h. Test.

(1) Secure motor to test bench.

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(2) Connect motor wiring in correct phase to bench test leads for proper voltage.

(3) Connect power and run motor with and without bad.

(4) Check motor for abnormal sounds, excessive vibration, or fast temperature rise.

(5) Disconnect motor from test bench leads.

3-11. R.O. PUMP MOTOR ASSEMBLY. (Figure 3-6)

a. General. This paragraph describes the disassembly, cleaning, inspection, component test, repair, reassembly, and bench test of the R.O. pump motor.

b. Motor Disassembly.

(1) If necessary, remove R.O. pump motor from ROWPU in accordance with paragraph 2-7.

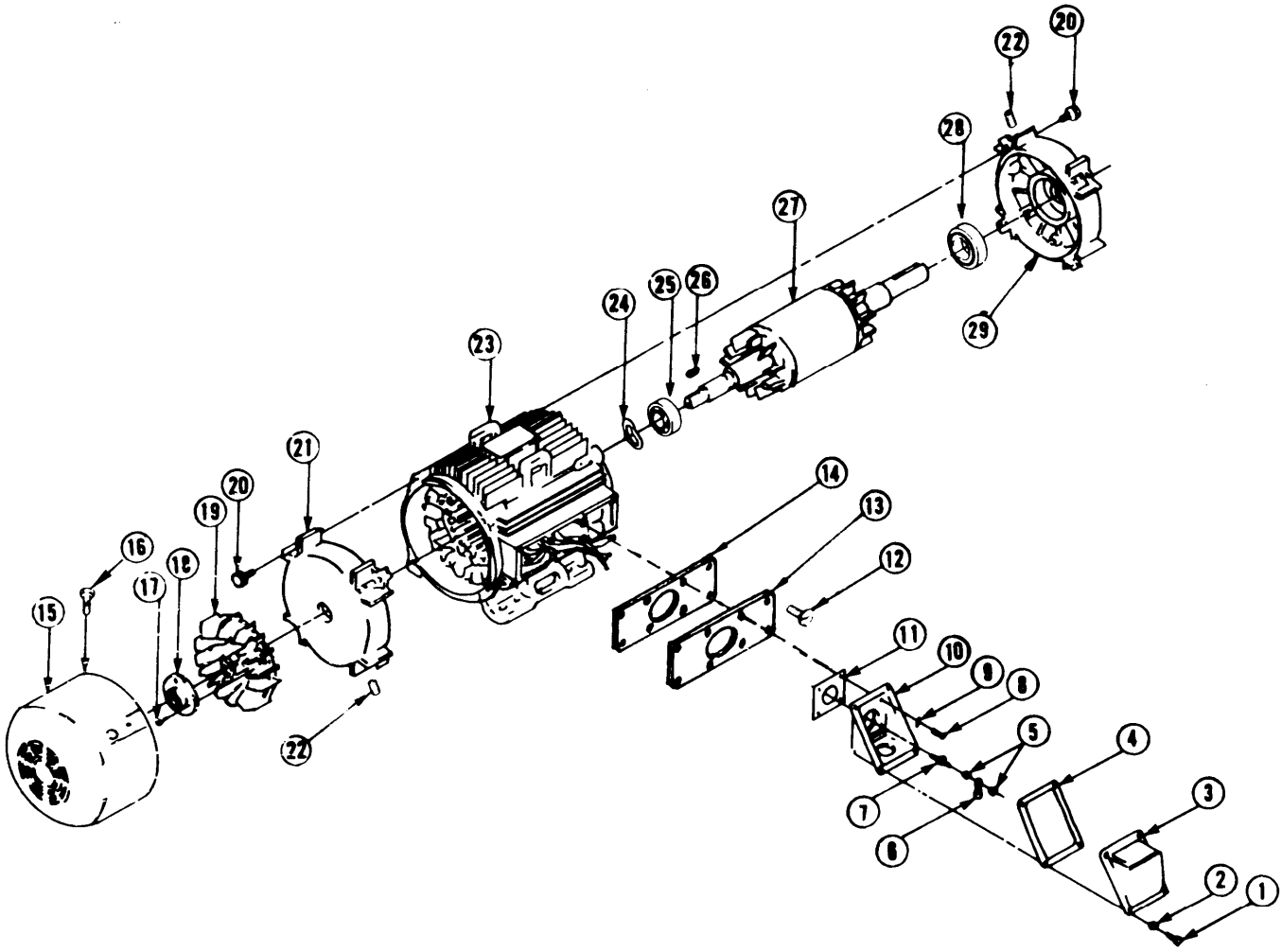


Figure 3-6. R.O. Pump Motor Assembly

WARNING

Objects blown by compressed air can cause serious eye injury. Always wear protective goggles when using compressed air.

(2) Before moving motor into work area, blow dirt out of external cooling fins on the motor casing and out of ventilation louvers of fan cover with compressed air.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective cbthing and eyewear.

(3) Clean motor using a stiff brush and cleaning solvent Fed. Spec. P-D-680.

(4) Allow to air dry.

WARNING

Weight of R.O. pump motor is 251 pounds (114 kg). Attempting to move it without proper equipment could cause serious injury. Use equipment rated at 1 ton (0.91 tonne) or more to move R.O. pump motor.

(5) Move motor into workshop.

(6) Remove pump from motor in accordance with paragraph 2-47.

(7) Remove four screws (1) (figure 3-6) and four lockwashers (2) from conduit box (10), gasket (4), and conduit box cover (3).

(8) Remove conduit box cover (3) and gasket (4) from conduit box (10). Discard gasket (4).

(9) Remove nut (5), ground lug (6), and second nut (5) from grounding stud (7).

(10) Remove grounding stud (7) from motor casing (27) and conduit box (10).

(11) Remove three screws (8) and three lockwashers (9) from lead cover (13), and conduit box (10).

(12) Remove conduit box (10) and gasket (11) from lead cover (13). Discard gasket (11).

(13) Remove four screws (12) from motor casing (23), gasket (14), and lead cover (13). Discard gasket (14).

(14) Remove four screws (16) from fan-end plate (21) and fan cover (15).

(15) Remove fan cover (15) from fan-end plate (21).

(16) Remove three screws (17) and holding clamp (18) from split hub of fan (19).

(17) Remove fan (19) from rotor shaft (27).

(18) Remove Woodruff key (26) from rotor shaft (27).

NOTE

Mark fan-end plate, pump-end plate, and motor casing with matching punch pricks to assist alignment during assembly.

(19) Remove four bolts (20) from motor casing (23) and pump-end plate (29).

(20) Remove two grease plugs (22) from fan-end plate (21) and pump-end plate (29).

(21) Strike pump-end plate (29) with a soft–faced mallet to break bond with motor casing and remove from motor casing (23).

CAUTION

Motor casing wiring can be snagged or broken by rotor shaft. Take care not to damage wires when removing rotor shaft.

(22) Remove rotor shaft (27) from motor casing (23).

(23) Remove wavy washer (24) from fan-end of rotor shaft (27).

(24) Using a bearing puller/press, remove ball bearings (25) and (28) from rotor shaft (27).

(25) Remove four bolts (20) from motor casing (23) and fan-end plate (21).

(26) Tap fan-end plate (21) with a soft-headed mallet to break its bond and remove fan-end plate (21) from motor casing (23).

c. Cleaning.

WARNING

Objects blown by compressed air can cause serious eye injury. Always west protective goggles when using compressed air.

(1) Blow out dirt inside motor casing with compressed air.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(2) Clean dust and dirt from fan fins, rotor fins, inside fan cover, and both end plates with cleaning solvent Fed. Spec. P-D-680 and air dry.

(3) Blow out any remaining dust and dirt.

(4) Clean non-electrical metal components, including bearings, with cleaning solvent Fed. Spec. P-D-680.

(5) Air dry parts.

(6) Wrap dry bearings in a soft, clean, lint free cloth.

d. Inspection.

(1) Check metal parts, particularly cooling fans and rotor shaft, for signs of wear.

(2) Record damage for later repair.

(3) Inspect motor casing, coils, and leads for damage to insulation and wires. Check for signs of overheated coils, deteriorated coil end bindings and lashings, and missing or broken coil retainer strips.

(4) Check ball bearings for flat spots or lateral play.

(5) Inspect wavy washer for damage.

e. Component Tests.

(1) Using an ohmmeter, perform resistance, short, and ground checks on motor casing coils. (Refer to schematic, figure 1 –1 2.)

(2) If coils do not test properly, send motor casing to next higher level of maintenance.

f. Repair or Replace.

(1) Replace all gaskets, seals, and O-rings.

(2) Replace ail damaged nuts, bolts, screws, washers, shaft keys, Woodruff keys, and wavy washers.

(3) Replace damaged, worn, or unserviceable ball bearing assemblies

(4) Repack serviceable clean bearings with fresh bearing grease before installation.

(5) Deburr rotor shaft and remove any residue by buffing with fine emery cloth.

(6) Straighten bent or dented cooling fan blades and ventilation louvers.

(7) Replace damaged, unrepairable, or unserviceable motor casing assembly.

(8) Send all unserviceable, unrepairable, or damaged motor assemblies to next higher level of maintenance.

(9) Repaint, as needed, in accordance with Standard Operating Procedures.

g. Reassembly. (Figure 3-6)

(1) Align prepunched indexing marks on motor casing (23) (figure 3-6) and fan-end plate (21).

(2) Install fan-end plate (21) to motor casing (23) with four bolts (20).

(3) Press ball bearing (25) on rotor shaft (27).

(4) Press ball bearing (28) on rotor shaft (27).

(5) Slide wavy washer (24) on rotor shaft (27).

CAUTION

Motor casing wiring can be snagged or broken by rotor shaft.
Take care not to damage wires when installing rotor shaft.

(6) Install rotor shaft (27) in motor casing (23) and fan-end plate (21).

(7) Align prepunched indexing marks on motor casing (23) and pump-end plate (29).

(8) Install pump-end plate (29) in motor casing (23) with four bolts (20).

(9) Install two grease plugs (22) on fan-end plate (21) and pump-end plate (29).

(10) Install Woodruff key (26) on rotor shaft (27).

(11) Install fan (19) on rotor shaft (27).

(12) Install holding clamp (18) over split hub of fan (19) and install three screws (17).

(13) Install fan cover (15) on fan-end plate (21).

(14) Install four screws (16) through fan cover (15) and far-end plate (21).

(15) Align lead cover (13) and new gasket (14) on motor casing (23).

(16) Install four screws (12) through lead cover (13), new gasket (14), and motor casing (23).

(17) Align conduit box (10) and new gasket (11) in place on lead cover (13).

(18) Install three screws (8) and three lockwashers (9) through conduit box (10), gasket (11), and lead cover (13).

(19) Install grounding stud (7) through conduit box (10) and lead cover (13).

(20) Install nut (5), ground lug (6), and second nut (5) on grounding stud (7).

(21) Align conduit box cover (3) and new gasket (4) in place on conduit box (10).

(22) Install four screws (1) and four lockwashers (2) through conduit box cover (3), gasket (4), and conduit box (10).

(23) Install pump on motor. (Refer to paragraph 4-2.)

WARNING

Weight of R.O. pump motor is 251 pounds (114 kg). Attempting to move it without proper equipment could cause serious injury. Use equipment rated at 1 ton (0.91 tonne) or more to move R.O. pump motor.

h. Test.

(1) Secure motor to test bench.

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(2) Connect motor wiring to test bench leads.

(3) Connect 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.

3-12. R.O. PUMP SUCTION/DISCHARGE ASSEMBLY. (Figure 3–7)

a. General. The suction/discharge assembly Of the R.O. pump is the section through which the water IS pumped. When the valve seats or packing in this assembly become worn, the pump will no longer function properly and the damaged parts must be replaced. This paragraph describes removal, disassembly, inspection, cleaning, reassembly, and installation of the suction/discharge assembly.

b. Removal.

(1) Remove R.O. pump from R.O. pump stand in accordance with paragraph 2-73.

WARNING

ROWPU piping and equipment can contain extremely high 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.

Weight of R.O. pump is 658 pounds (298 kg). Attempting to move it without proper equipment could cause serious injury. Use equipment rated at 1 ton (0.91 tonne) or more to move R.O. pump.

(2) Remove eight nuts (1) from suction/discharge assembly (2).

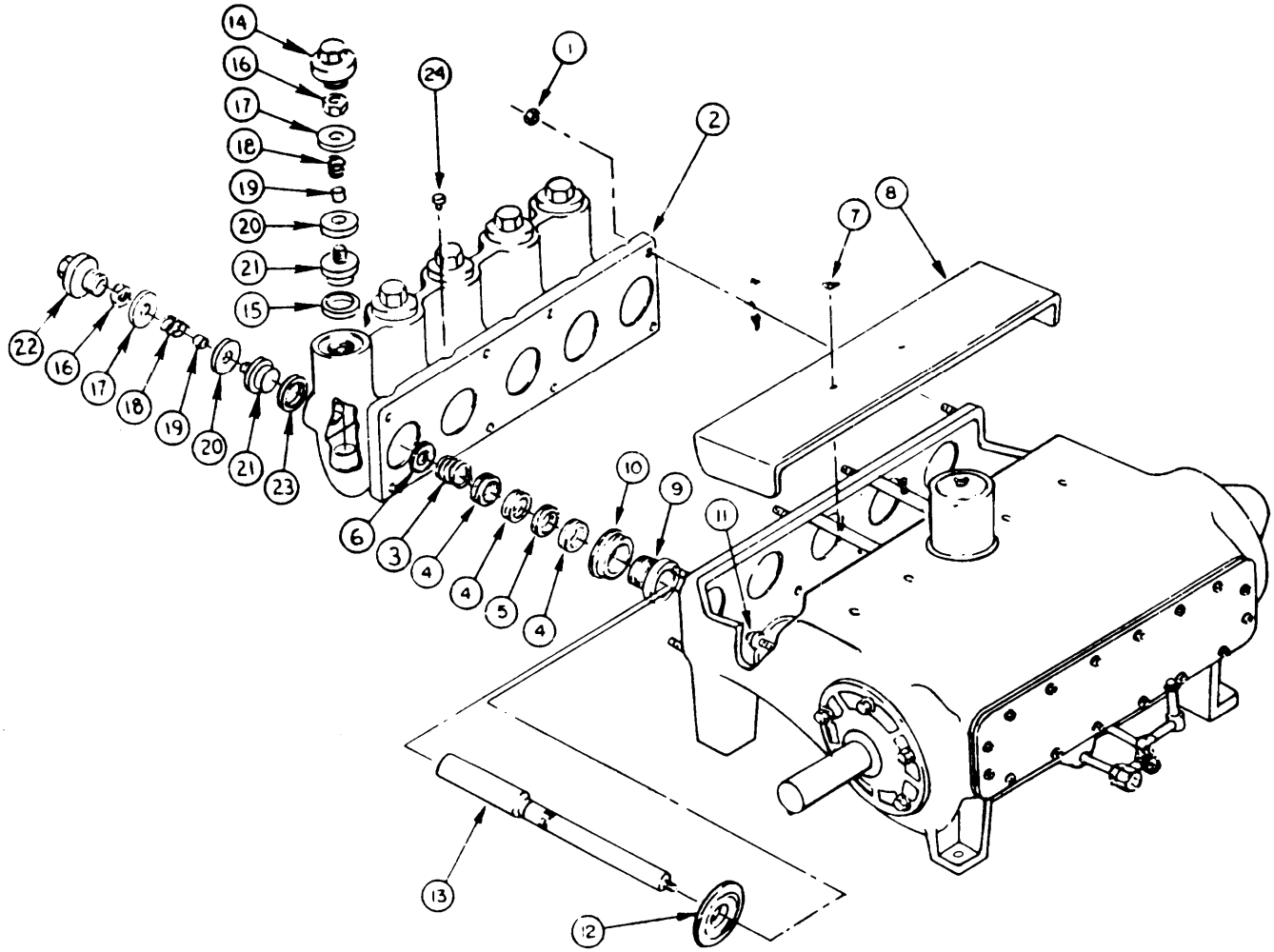


Figure 3-7. R.O. Pump Suction/Discharge Assembly

(3) Remove two wingnuts (7) securing barrel cover (8) from studs, then loosen, but do not remove, two nuts (11) securing wiper box gland.

(4) Remove suction/discharge assembly (2) from R.O. pump power frame.

CAUTION

Any nicks on the main plunger body will cause prompt and frequent packing failure. Apply wrench only to knurled surface of plunger; handle plunger carefully.

(5) Push rubber baffle disc (12) off knurled surface and carefully unscrew plunger (13) from crosshead using a wrench on the knurled surface of the plunger.

(6) Slide baffle disc (12) from plunger (13) and remove plunger (13) from pump power frame.

(7) Unscrew and remove gland nut (9) and power frame adapter (10).

NOTE

Each packing unit consists of a ring with a top and bottom adapter. These parts may separate during disassembly.

(8) Remove one packing ring (4), lantern ring (5), two more packing rings (4), spring (3), and one throat bushing (6) from each cylinder bore on suction/discharge assembly. Discard packing rings (4).

c. Disassembly for Repair. (Figure 3-7)

(1) Remove five valve covers (14) and five valve cover gaskets (15) from suction/discharge assembly (2). Discard valve cover gaskets (15).

(2) Remove five nuts (16), five retainers (17), five springs (18) five sleeves (19), and five discs (20) from five seats (21).

(3) With the valve seat puller, remove five valve seats (21) from suction/discharge assembly (2).

(4) Remove five cylinder heads (22) and five cylinder head gaskets (23) from suction/discharge assembly (2). Discard cylinder head gaskets (23).

(5) Repeat Steps (2) and (3) to remove five suction valve assemblies. Parts can be removed from the suction/discharge assembly (2) through the cylinder head opening.

(6) Remove five plugs (24) from suction/discharge assembly (2).

d. Cleaning.

WARNING

Objects blown by compressed air can cause severe eye injury. Always wear protective goggles when using compressed air.

(1) Wash suction/discharge assembly inside and outside with strong soap solution.

(2) Rinse with clean water and dry with compressed air.

(3) Prepare for painting, if necessary.

(4) Wipe tapered area of suction/discharge assembly that will hold valve seats with clean solvent.

(5) Wipe plungers with clean solvent on a fine emery cloth.

(6) Remove rust and loose paint from valve covers and cylinder heads.

e. Inspection.

(1) Inspect suction/discharge casing for damage.

(2) Inspect valve cover and cylinder head for damage.

(3) Inspect valve assemblies for broken or excessively worn valve seats or discs, broken springs, and bent or broken retainers.

(4) Inspect mounting nuts for stripped heads or threads.

(5) Inspect visible portion of R.O. pump power frame.

f. Repair or Replace.

(1) Replace damaged nuts, bolts, screws, washers, and wingnuts.

(2) Replace damaged valve covers and cylinder heads.

(3) Replace all packing rings, gaskets, O-rings, and rubber baffle discs.

(4) Replace damaged or unserviceable lantern rings, throat bushings, barrel cover, power frame adapters, gland nuts, plungers, retainers, springs, valve discs, valve seats, and plugs.

g. Reassembly. (Figure 3-7)

(1) Clean tapered area of valve seat.

(2) Place suction valve seat (21) into position in suction/discharge assembly (2). Cover with an old valve disc (20).

CAUTION

A broken or distorted valve seat will cause the pump to malfunction. Never install remaining valve parts before driving valve seat into place.

(3) Place valve seat installer on old valve disc (20). Drive valve seat (21) into place with a hammer.

(4) Remove old valve disc (20) and discard.

(5) Install new valve disc (20), sleeve (19), spring (18), retainer (17), and nut (16).

(6) Repeat steps (1) through (5) to install four more suction valves and five discharge valves.

(7) Install five new valve cover gaskets (15) and five valve covers (14).

h. Installation.

(1) Place five power frame adapters (10) into power frame.

(2) Place suction/discharge valve assembly (2) onto studs on pump power frame and secure with eight nuts (1).

(3) From inside pump power frame, insert one throat bushing (6), one spring (3), two packing units (4), one lantern ring (5), and one more packing unit (4) into each cylinder bore. Install packing units so that lips of each seal ring point toward the cylinder head.

(4) Screw the five gland nuts (9) into place behind packing until hand tight.

(5) Insert plunger (13) from cylinder head opening through packing and baffle disc (12) and screw onto crossheads. Tighten with a pipe wrench on the knurled section of the plunger.

(6) Tighten two nuts (11) on wiper box gland.

(7) Tighten gland nut (9) with a spanner wrench.

(8) Replace barrel cover (8) on pump power frame and secure with two wing nuts (7)

(9) Install five cylinder head gaskets (23) and cylinder heads (22).

(10) Install five plugs (24) on suction/discharge assembly (2).

(11) Install R.O. pump onto R.O. pump stand in accordance with paragraph 2-73.

(12) Run R.O. pump for 1 hour.

(13) Retighten five gland nuts (9).

3-13. BACKWASH PUMP MOTOR ASSEMBLY.

a. General. This paragraph describes the disassembly cleaning, inspection, component tests, repair, reassembly, and operational testing of the backwash pump motor.

b. Motor assembly. (Figure 3-8)

(1) If necessary, see paragraph 2-41 to remove backwash pump from frame and/or to remove power cable.

WARNING

Objects blown by compressed air can cause serious eye injury.
Always wear protective goggles when using compressed air.

(2) Before moving motor into work area, blow dirt out of ventilation louvers.

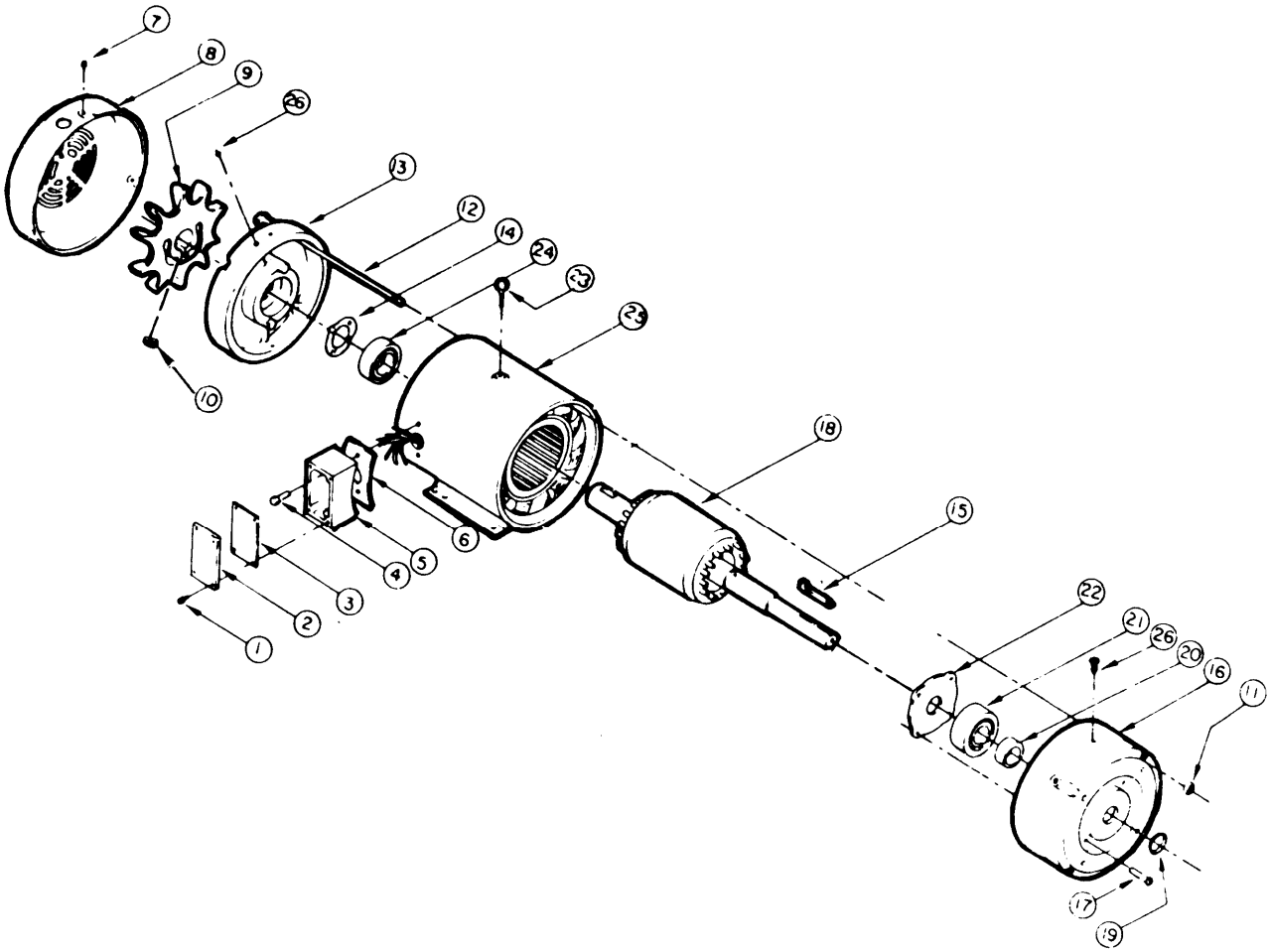


Figure 3-8. Backwash Pump Motor

WARNING

Drycleaning solvent Fed. Spec. P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(3) Clean motor using a stiff brush and cleaning solvent Fed. Spec. P-D-80.

(4) Allow to air dry.

WARNING

Weight of backwash pump is 195 pounds (88 kg.) Attempting to move it without proper equipment could cause serious injury. Use equipment rated at 1 ton (0.91 tonne) or more to move backwash pump.

(5) Move motor into shop.

(6) Remove pump from motor in accordance with paragraph 2-41.

(7) Remove four screws (1) from conduit box (5), gasket (3), and conduit box cover (2).

(8) Remove conduit box cover (2) and gasket (3) from conduit box (5). Discard gasket (3).

(9) Remove two bolts (4) from motor casing (25), gasket (6), and conduit box (5)

(10) Remove conduit box (5) and gasket (6) from motor casing (25). Discard gasket (6).

(11) Remove three screws (7) from fan-end plate (13) and cover (8).

(12) Remove fan cover (8) from fan-end plate (13).

(13) Loosen, but do not remove, clamp bolt (10) in hub of cooling fan (9).

(14) Spread clamp and remove cooling fan (9) from rotor shaft (18).

(15) Remove four nuts (11) from through-bolts (12).

(16) Remove four through-bolts (12) from pump-end plate (16), motor casing (25) and fan-end plate (13).

NOTE

Mark fan-end plate, pump-end plate, and motor casing with matching punch pricks for ease of reassembly.

(17) Strike fan-end plate with a soft-face mallet to break its bond. Remove fan-end plate (13) from motor casing (25).

(18) Remove wavy washer (14) from rotor shaft (18).

(19) Use bearing press/puller and remove bearing (24) from rotor shaft (18).

(20) If still in place from pump removal, remove shaft key (15) from rotor shaft (18).

CAUTION

If rotor shaft is damaged it will not balance properly. Take care not to bend rotor shaft when removing from motor casing.

(21) Remove pump end plate (16) with rotor shaft (18) attached, from motor casing (25).

(22) Remove four screws (17) from bearing cover plate (22) and pump-end plate (16).

(23) Remove rotor shaft (18) from pump-end plate (16).

(24) Remove seal (19) from pump-end plate (16). Discard seal (19).

CAUTION

If rotor shaft is damaged it will not balance properly. Take care not to bend rotor shaft when removing bearing lock ring.

(25) Use bearing press/puller to remove bearing lock ring (20) from rotor shaft (18).

(26) With a bearing press/puller, remove pump-end bearing (21) from rotor shaft (18).

(27) Remove bearing cover plate (22) from rotor shaft (18).

(28) If necessary, remove grease fittings (26) from fan-end plate (13) and pump-end plate (16).

(29) If necessary, remove eye bolt (23) from motor casing (25).

c. Cleaning.

WARNING

Objects blown by compressed air can cause serious eye injury. Always wear protective goggles when using compressed air.

(1) Blow out dirt inside motor casing with compressed air.

WARNING

Drycleaning solvent Fed. Spec. P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(2) Clean dust and dirt from fan fins, rotor fans, inside fan cover, and both end plates with cleaning solvent Fed. Spec. P–D-680 and air dry.

WARNING

Objects blown by compressed air can cause serious eye injury. Always wear protective goggles when using compressed air.

(3) Blow out any remaining dust and dirt.

(4) Clean non-electrical metal components, including bearings, with cleaning solvent Fed. Spec. P-D-680.

WARNING

Solvent blown off or thrown off bearings can cause eye injury. Do not spin ball bearings after washing.

(5) Air dry parts.

(6) Wrap dry bearings in a soft, clean, lintless cloth.

d. Inspection.

(1) Check metal parts, particularly cooling fan and rotor shaft, for signs of wear.

(2) Record damage for later repair.

(3) Check motor casing coils and leads for damage to insulation and wires. Check for signs of overheated coils, deteriorated coil end bindings and lashings, and missing or broken coil retainer strips.

(4) Check ball bearings for flat spots or lateral play.

(5) Inspect wavy washer for damage.

e. Component Tests.

(1) Using an ohmmeter, make resistance, short, and ground checks on motor casing coils. (Refer to schematic, figure 1-1 2.)

(2) If coils do not test properly, send motor to next higher level of maintenance.

f. Repair or Replace.

(1) Replace all used gaskets, seals, and O-rings.

(2) Replace all damaged nuts, bolts, screws, washers, shaft keys, Woodruff keys, and wavy washers.

(3) Replace damaged, worn, or unserviceable ball bearing assemblies.

(4) Repack serviceable clean bearings with fresh bearing grease.

(5) Deburr rotor shaft and remove any residue by buffing with fine emery cloth.

(6) Straighten bent or dented cooling fan blades and ventilation louvers.

(7) Replace damaged, unrepairable, or unserviceable motor casing assembly.

(8) Send unserviceable backwash pump motor assembly to next higher level of maintenance.

(9) Repaint, as needed, in accordance with Standard Operating Procedures.

g. Reassembly. (Figure 3-8

(1) If necessary, install eyebolt (23) in motor casing (25).

(2) If necessary, install two grease fittings (26) in fan-end plate (13) and pump-end plate (16).

(3) Press fan-end bearing (24) on rotor shaft (18).

(4) Slide bearing cover plate (22) on rotor shaft (18).

(5) Press pump-end bearings (21) on rotor shaft (18).

(6) Install bearing-lock ring (20) on rotor shaft (18).

(7) Install new seal (19) in pump-end plate (16).

(8) Install rotor shaft (18) in pump-end plate (16).

(9) Install four screws (17) through pump-end plate (16) and bearing cover plate (22).

CAUTION

Motor casing wiring can be snagged or broken by rotor shaft. Take care not to damage wires when installing pump--end plate and rotor shaft.

(10) Align prepunched indexing marks on pump-end plate (16) and motor casing (25).

(11) Install pump-end plate (16) with rotor (18) attached, in motor casing (25).

(12) Install wavy washer (14) on rotor shaft (18).

(13) Align prepunched indexing marks on fan-end plate (13) and motor casing (25).

(14) Insert four through bolts (12) through fan-end plate (13), motor casing (25), and pump-end plate (16) and install four nuts (11).

(15) Spread clamp of cooling fan (9) and slide over rotor shaft (18).

(16) Tighten clamp bolt (10) on hub of cooling fan (9).

(17) Install fan cover (8) on fan-end plate (13).

(18) Install three screws (7) through fan cover (8) and fan-end plate (13).

(19) Install shaft key (15), if previously removed, in rotor shaft (18).

NOTE

Secure shaft key in place with tape, wire, or similar method to avoid loss.

(20) Hold conduit box (5) and gasket (6) in place on motor casing (25) and align two mounting holes.

(21) Install two bolts (4) through conduit box (5) and gasket (6) into motor casing (25).

(22) Hold conduit box cover (2) and gasket (3) in place on conduit box (5).

(23) Install four screws (1) through conduit box cover (2), gasket (3), and conduit box (5).

h. Test.

(1) Secure motor to test bench.

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(2) Connect motor wiring to test bench leads.

(3) Connect 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. CHEMICAL FEED PUMP MOTOR ASSEMBLY.

a. General. This Paragraph describes the disassembly, cleaning, inspection, component test, repair, reassembly, and bench test of the chemical feed pump motor.

b. Motor Disassembly. (Figure 3-9) (ARMY)

(1) If necessary to disassemble motor, refer to paragraph 2-48 to remove motor from chemical feed pump.

WARNING

Objects blown by compressed air can cause serious eye injury. Always wear protective goggles when using compressed air.

(2) Before moving motor into work area, blow dirt out of ventilation louvers.

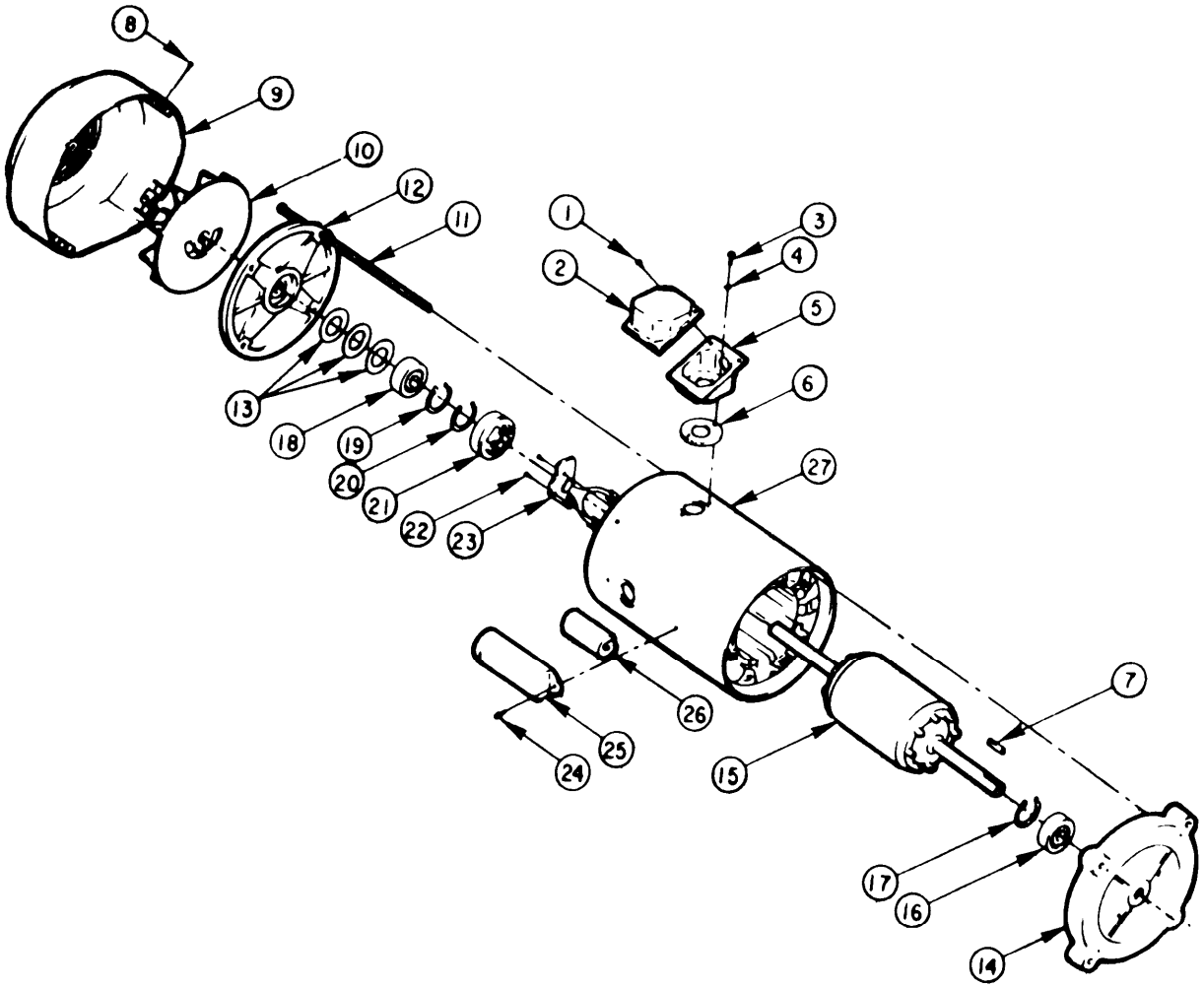


Figure 3-9. Chemical Feed Pump Motor Assembly (Army)

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(3) Clean motor using a stiff brush and drycleaning solvent Fed. Spec. P-D-680.

(4) Allow to air dry.

(5) Move motor to work area.

(6) Remove two screws (1) from conduit box (5) and conduit box cover (2).

(7) Remove conduit box cover (2) from conduit box (5).

(8) Remove two screws (3) and two lockwashers (4) from motor casing (27), gasket (6), and conduit box (5).

(9) Remove conduit box (5) and gasket (6) from motor casing (27). Discard gasket (6).

(10) Remove shaft key (7) from rotor shaft (15).

(11) Remove four screws (8) from motor casing (27) and fan cover (9).

(12) Remove fan cover (9) from motor casing (27).

(13) Loosen, but do not remove, clamp screw on fan (10) and remove fan (10) from rotor shaft (15).

NOTE

Mark fan-end plate, pump-end plate, and motor casing with matching punch pricks for ease of reassembly.

(14) Remove four through-bolts (11) from pump-end plate (14), motor casing (27), and fan-end plate (12).

(15) Remove fan-end plate (12) from motor casing (27).

(16) Remove three spacers (13) from fan-end plate (12) on rotor shaft (15).

end plate (12). Discard seal (19).

(17) Remove pump-end plate (14) from rotor shaft (15).

CAUTION

Motor casing wiring can be snagged or broken by rotor shaft.
Take care not to damage wires when removing rotor shaft.

(18) Remove rotor shaft (15) from motor casing (27).

(19) Using a bearing press/puller, remove pump-end bearings (16) from rotor shaft (15).

(20) Remove bearing snap ring (17) from rotor shaft (15).

(21) Using a bearing press/puller, remove fan-end bearings (18) from rotor shaft (15).

(22) Remove bearing snap ring (19) and snap ring (20) in front of centrifugal mechanism (21) from rotor shaft (15).

(23) Remove centrifugal mechanism (21) from rotor shaft (15).

(24) Remove two screws (22) from inside motor casing (27) and stationary switch (23).

(25) Disconnect two wire clips from stationary switch (23) and remove stationary switch (23) from motor casing (27).

(26) Remove two screws (24) from motor casing (27) and capacitor cover (25).

(27) Remove capacitor cover (25) from motor casing (27).

(28) Disconnect two wire clips from capacitor (26) and remove capacitor (26) from motor casing (27).

c. Motor Disassembly. (Figure 3–10) (USMC)

(1) To remove motor from pump assembly refer to paragraph 2-48.

WARNING

Objects blown by compressed air can cause serious eye injury
Always wear protective goggles when using compressed air.

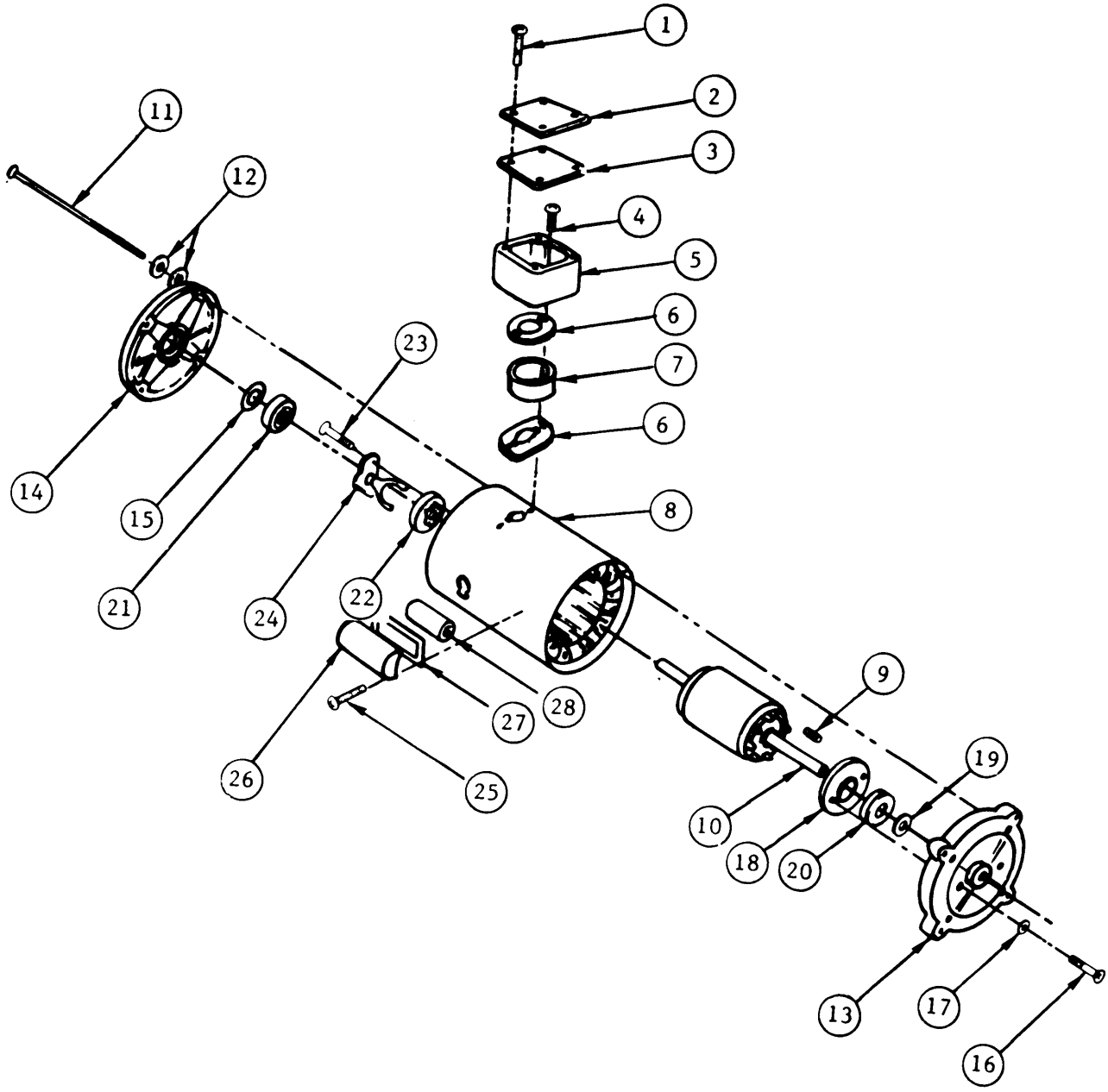


Figure 3-10. Chemical Feed Pump Motor Assembly (USMC)

(2) Before moving motor to work area, blow dirt off motor.

WARNING

Drycleanlng solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(3) Clean motor using a stiff brush and solvent Fed. Spec. P-D-680.

(4) Allow to air dry.

(5) Move motor to work area.

(6) Remove four screws (1) from conduit box (5), gasket (3), and conduit box cover (2).

(7) Remove conduit box cover (2) and gasket (3) from conduit box (5). Discard gasket (3).

(8) Remove two screws (4) from motor casing (8), gaskets (6), spacer (7), and conduit box (5).

(9) Remove conduit box (5), gaskets (6), and spacer (7) from motor casing (8). Discard gaskets (6).

(10) Remove shaft key (9) from rotor shaft (10).

NOTE

Mark front–end plate, pump-end plate, and motor casing with matching punch pricks for ease of reassembly.

(11) Remove four through-bolts (11) and eight washers (12) from pump-end plate (13), motor casing (8), and front–end plate (14).

(12) Remove front-end plate (14) from motor casing (8).

(13) Remove spacer (15) from front-end plate (14) or rotor shaft (10).

CAUTION

Motor casing wiring can be snagged or broken by rotor shaft.
Take care not to damage wires when removing rotor shaft.

(14) Remove pump-end plate (13) with rotor shaft (10) attached, from motor casing (8).

(15) Remove two screws (16) and two washers (17) from bearing retainer plate (18) and pump-end plate (13).

(16) Remove pump-end plate (13) from rotor shaft (10).

(17) Remove shaft seal (19) from rotor shaft (10).

(18) Use a bearing puller/press to remove bearing (20) from rotor shaft (10).

(19) Remove bearing retainer plate (18) from rotor shaft (10).

(20) Use a bearing puller/press to remove front-end bearing (21) from rotor shaft (10).

(21) Remove centrifugal mechanism (22) from rotor shaft (10).

(22) Remove two screws (23) from motor casing (8) and stationary switch (24).

(23) Disconnect two wire clips from stationary switch (24) and remove switch (24) from motor casing (8).

(24) Remove two screws (25) from motor casing (8), gasket (27), and capacitor cover (26).

(25) Remove capacitor cover (26) and gasket (27) from motor casing (8). Discard gasket (27).

(26) Disconnect two wire clips from capacitor (28) and remove capacitor (28) from motor casing (8).

d Cleaning.

WARNING

Objects blown by compressed air can cause serious injury.
Always wear protective goggles when using compressed air.

(1) Blow out dirt inside motor casing with compressed air.

WARNING

Drycleaning solvent Fed. Spec. P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(2) Clean loose dust and dirt from fan fins, rotor fins, inside fan cover, and both end plates with cleaning solvent Fed. Spec. P–D–680 and air dry.

(3) Blow out any remaining dust and dirt.

(4) Clean non-electrical metal components, including bearings, with cleaning solvent Fed. Spec. P-D-680.

(5) Air dry parts.

(6) Wrap dry bearings in a soft, clean, lintless cloth.

e. Inspection.

(1) Check metal parts, particularly cooling fans and rotor shaft, for signs of wear.

(2) Record damage for later repair.

(3) Check motor casing coils and leads for damage to insulation and wires. Check for signs of overheated coils, deteriorated coil–end bindings and lashings, and missing or broken coil retainer strips.

(4) Check ball bearings for flat spots or lateral play.

(5) Inspect centrifugal mechanism for broken parts or excessive wear.

(6) Inspect stationary switch for damage, particularly burned or pitted contacts.

f. Component Tests.

(1) Using a multimeter, make short and ground checks on motor casing coils. (Refer to schematic, figure 1-12.)

(2) If coils do not test properly, send motor casing to next higher level of maintenance.

(3) If coils are functional and no damage was noted on bearings or fans, send rotor shaft to next higher level of maintenance for disposition.

(4) Test capacitor using a multimeter. Isolate capacitor and discharge it by shorting across its terminals. Connect test probes across capacitor terminals with meter set at its highest resistance range. If there is no indication, the capacitor has an open, if there is a steady near–zero reading, the capacitor has a short, and if the needle flicks to a near-zero reading, then slowly moves to a near-infinity reading, the capacitor is good. Verify this indication several times as it happens very quickly.

g. Repair or Replace.

(1) Replace all gaskets, seals, and Wrings.

(2) Replace all damaged nuts, bolts, screws, washers, shaft keys, Woodruff keys, and wavy washers.

(3) Replace capacitor, if unserviceable.

(4) Replace damaged, worn, or unserviceable ball bearing assemblies.

(5) Repack serviceable clean bearings with fresh bearing grease.

(6) Deburr rotor shaft and remove any spot-weld residue by buffing with fine emery cloth.

(7) Straighten bent or dented cooling fan blades and ventilation louvers.

(8) Replace damaged, unrepairable, or unserviceable motor casing assembly.

(9) Send all unserviceable components of chemical feed pump motor assembly to next higher level of maintenance.

h. Reassembly. (Figure 3-9) (ARMY)

(1) Connect two wire clips of capacitor (26) and install capacitor (26) on motor casing (27).

(2) Hold capacitor cover (25) in place on motor casing (27).

(3) Install two screws (24) through capacitor cover (25) and motor casing (27).

(4) Connect two wire clips to stationary switch (23) and hold stationary switch (23) in place in motor casing (27).

(5) Install two screws (22) through stationary switch (23) and motor casing (27).

(6) Install centrifugal mechanism (21) on rotor shaft (15).

(7) Install bearing snap ring (19) and snap ring (20) on rotor shaft (15) in front of centrifugal mechanism (21).

(8) Press fan-end bearings (18) on rotor shaft (15).

(9) Install bearing-snap ring (17) on rotor shaft (15).

(10) Press pump–end bearing (16) on rotor shaft (15).

(11) Install rotor (15) in pump-end plate (14).

CAUTION

Motor casing wiring can be snagged or broken by rotor shaft. Take care not to damage wires when installing rotor shaft.

(12) Align prepunched indexing marks on pump-end plate (14) and motor casing (27)

(13) Install rotor (15) with pump-end plate (14) attached, in motor casing (27).

(14) Install three spacers (13) in fan-end plate (12).

(15) Align prepunched indexing marks on fan–end plate (12) and motor casing (27).

(16) Install fan–end plate (12) on motor casing (27).

(17) Install four through bolts (11) through fan–end plate (12), motor casing (27), and pump-end plate (14).

(18) Slide fan (10) over rotor shaft (15).

(19) Tighten clamp screw on fan (10).

(20) Slide fan cover (9) over motor casing (27).

(21) Install four screws (8) through fan cover (9) and motor casing (27).

(22) Install shaft key (7) in rotor shaft (15).

NOTE

Secure shaft key in position with tape, wire, or similar method to avoid loss.

(23) Hold conduit box (5) and new gasket (6) in place on motor casing (27) and align two mounting holes.

(24) Install two screws (3) and two lockwashers (4) through conduit box (5) and motor casing (27).

(25) Hold conduit box cover (2) in place on conduit box (5) and align two mounting holes.

(26) Install two screws (1) through conduit box cover (2) and conduit box (5).

i. Reassembly. (Figure 3-10) (USMC)

(1) Connect two wire clips of capacitor (28) and install capacitor (28) on motor casing (8).

(2) Hold gasket (27) and capacitor cover (26) in place on motor casing (8).

(3) Install two screws (25) through capacitor cover (26), gasket (27), and motor casing (8).

(4) Connect two wire clips to stationary switch (24) and hold stationary switch (24) in place on motor casing (8).

(5) Install two screws (23) through stationary switch (24) and motor casing (8).

(6) Install centrifugal mechanism (22) on rotor shaft (10).

(7) Press front-end bearing (21) on rotor shaft (10).

(8) Install bearing retainer plate (18) on rotor shaft (10).

(9) Press pump-end bearing (20) on rotor shaft (10).

(10) Install shaft seal (19) on rotor shaft (10).

(11) Install pum-end plate (13) on rotor shaft (10).

(12) Install two screws (16) through two washers (17), pump-end plate (13), and bearing retainer plate (18).

CAUTION

Motor casing wiring can be snagged or broken by rotor shaft.
Take care not to damage wires when installing rotor shaft.

(13) Align prepunched indexing marks on pum-end plate (13) and motor casing (8).

(14) Install rotor shaft (10) with pump-end plate (13) attached, in motor casing (8).

(15) Install spacer (15) on front-end plate (14).

(16) Align prepunched indexing marks on front-end plate (14) and motor casing (8).

(17) Install front-end plate (14) on motor casing (8).

(18) Install four through-bolts (11) through eight washers (1 2), front-end plate (14), motor casing (8). and pump-end plate (13).

(19) Install shaft key (9) on rotor shaft (10).

NOTE

Secure shaft key in position with tape, wire, or similar method to avoid loss.

(20) Hold conduit box (5), new gaskets (6), and spacer (7) in place on motor casing (8).

(21) Install two screws (4) through conduit box (5), gaskets (6), spacer (7), and motor casing (8).

(22) Hold conduit box cover (2) and new gasket (3) in place over conduit box (5)

(23) Install four screws (1) through conduit box cover (2), gasket (3), and conduit box (5).

j. Test.

(1) Secure motor to test bench.

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(2) Connect motor wiring to test bench leads.

(3) Connect power and run motor with and without load.

(4) Check motor for abnormal sounds, excessive vibration, and fast temperature rise.

(5) Disconnect motor from test bench leads.

(6) If unserviceable, repeat repair procedure.

3-15. RAW WATER PUMP MOTOR ASSEMBLY. (Figure 3-11)

a. General. This paragraph describes disassembly, inspection, cleaning, testing, repairing, and reassembly of the raw water pump motor.

b. Disassembly.

(1) If necessary, see paragraph 2-43 to remove raw water pump from frame.

WARNING

Objects blown by compressed air can cause serious eye injury. Always wear protective goggles when using compressed air.

(2) Before moving pump into work area, blow dirt out of motor and out of fan cover louvers.

WARNING

Dry cleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(3) Clean pump using a stiff brush and drycleaning solvent Fed. Spec. P-D-680.

(4) Allow to air dry.

(5) Move motor into work area.

(6) Remove two screws (1) from conduit box (4) and conduit box cover (2).

(7) Remove conduit box cover (2) from conduit (4).

(8) Remove two screws (3) from motor casing (18) and conduit box (4).

(9) Remove conduit box (4) from motor casing (18).

(10) Loosen four screws (5) from fan-end plate (9) and fan cover (6).

(11) Remove fan cover (6) from fan-end plate (9).

(12) Loosen setscrew (19) in hub of fan (7) and remove fan (7) from rotor shaft (14).

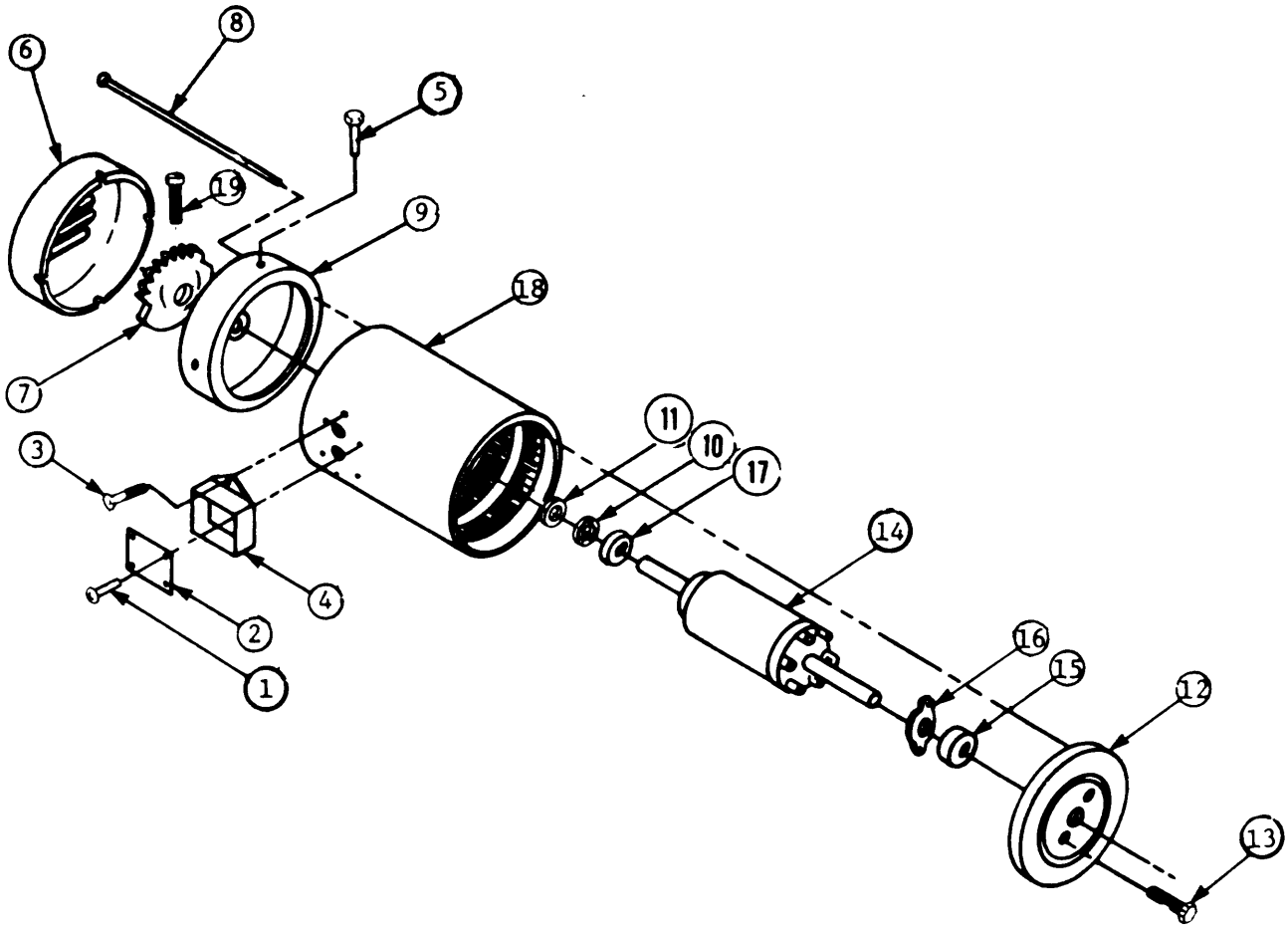


Figure 3-11. Raw Water Pump Motor Assembly

NOTE

Mark fan-end plate, pump-end plate, and motor casing with matching punch pricks to assure proper alignment during assembly.

(13) Remove four through-bolts (8) from pump-end plate (12), motor casing (18), and fan-end plate (9).

(14) Strike fan-end plate (9) with a soft-faced mallet to break its bond to the motor casing (1 8). Remove fan-end plate (9) from motor casing (18).

(15) Remove wavy washer (10) and flat washer (11) from shaft (14).

CAUTION

Motor casing wiring can be snagged or broken on rotor shaft. Take care not to damage wiring when removing rotor shaft.

(16) Strike pump-end plate (12) with a soft-faced mallet to break its bond to the motor casing (18). Remove pump-end plate (12) with rotor shaft (14) attached, from motor casing (18).

(17) Remove two screws (13) from bearing retainer (16) and pump-end plate (12).

(18) Remove rotor shaft (14) from pump-end plate (12).

(19) Using a bearing press/puller, remove pump-end bearing (15) from rotor shaft (14).

(20) Remove bearing retainer (16) from rotor shaft (14).

(21) Using a bearing press/puller, remove fan-end bearing (17) from rotor shaft (14).

c. Cleaning.

WARNING

Objects blown by compressed air can cause serious eye injury. Always wear protective goggles when using compressed air.

(1) Blow out dirt inside motor casing with compressed air.

WARNING

Drycleaning solvent Fed. Spec. P-D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(2) Clean dust and dirt from fan fins, rotor fins, inside fan cover, and both end plates with solvent Fed. Spec. P-D-680, and air dry.

(3) Blow out any remaining dust and dirt.

(4) Clean non-electrical metal components with solvent Fed. Spec. P-D-680.

(5) Air dry all parts

d. Inspection.

(1) Check metal parts, particularly cooling fan and rotor shaft, for signs of wear.

(2) Record damage for later repair.

(3) In motor casing, check coils and leads for damage to insulation and wires. Check for signs of overheated coils, deteriorated coil end bindings, and missing or broken coil retainer strips.

(4) Check ball bearings for flat spots or lateral play.

(5) Inspect wavy washer for damage.

e. Component Tests.

(1) Using multimeter set to resistance scale, make resistance, short, and ground checks on motor casing coils. (Refer to schematic, figure 1–1 2.)

(2) If coils do not test properly, send motor to next higher level of maintenance.

f. Repair or Replace.

(1) Replace all gaskets, seals, and O-rings.

(2) Replace all damaged nuts, bolts, screws, washers, and wavy washers.

(3) Replace damaged, worn, or unserviceable ball bearing assemblies.

(4) Deburr rotor shaft and remove any residue by buffing with fine emery cloth.

(5) Straighten bent or dented cooling fan blades and ventilation louvers.

(6) Replace damaged, unrepairable, or unserviceable motor casing assembly.

(7) Send unserviceable raw water pump motor assembly to next higher level of maintenance.

g. Reassembly. (Figure 3-11)

(1) Press fan-end bearing (17) on rotor shaft (14).

(2) Slide bearing retainer (16) over rotor shaft (14).

(3) Press pump-end bearing (15) on rotor shaft (14).

(4) Insert rotor shaft (14) on pump-end plate (12).

(5) Install two screws (13) through pump-end plate (12) and bearing retainer (16).

CAUTION

Motor casing wiring can be snagged or broken on rotor shaft.
Take care not to damage wiring when installing rotor shaft.

(6) Align prepunched indexing marks on pump-end plate (12) and motor casing (18).

(7) Install shaft (14) with pump-end plate (12) attached in motor casing (18).

(8) Install flat washer (11) and wavy washer (10) in fan-end plate (9).

(9) Align prepunched indexing marks on fan-end plate (9) and motor casing (18).

(10) Install fan-end plate (9) on rotor shaft (14).

(11) Install four through bolts (8) through fan-end plate (9), motor casing (18), and pump-end plate (12).

(12) Slide fan (7) over rotor shaft (14).

(13) Tighten setscrew (19) in hub of fan (7).

(14) Slip fan cover (6) over fan-end plate (9).

(15) Tighten four screws (5) on fan cover (6) and fan-end plate (9).

(16) Align conduit box (4) in place on motor casing (18) with two mounting holes.

(17) Install two screws (3) through conduit box (4) and motor casing (18).

(18) Hold conduit box cover (2) in place on conduit box (4).

(19) Install two screws (1) through conduit box cover (2) and conduit box (4).

h. Test.

(1) Secure motor to the test bench.

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(2) Connect motor wiring to test bench leads.

(3) Connect power and run motor with and without load.

(4) Check motor for excessive vibration and fast temperature rise.

(5) Disconnect from motor test bench leads.

3-16. MOTOR STARTER, 1 HP AND 1/3 HP.

a General. The motor starters protect the electric motors from overheating, shorts, and overloads. Overload relays are part of the motor starter and will remove power from the pump motors in case of a malfunction. This paragraph covers the disassembly, cleaning, inspection, repair, reassembly, and test of the two smallest motor starters.

b. Removal. If necessary, remove the motor starter from the junction box in accordance with paragraph 2–52. (Refer to schematic, figure 1-12.)

c. Dissassembly. (Figure 3-12) (Refer to Schematic, Figure 1-12)

NOTE

The two motor starters described in this paragraph are similar, except that the 1/3 hp model has only one overload relay; however, disassembly procedures are identical.

Identify and tag all wires before disconnecting them for ease of reassembly later.

(1) Remove wires (1) from operating coil (2) and overload relay (3).

(2) Remove wires (4) from overload relay (3) and contacts of stationary contact assembly (5).

(3) If applicable, remove wires (6) from overload relays (7) and (8).

(4) Remove two screws (9) from bus bar (10) and operating coil (2).

(5) Remove bus bar (10) from operating coil (2).

(6) Loosen captive screw (11) in base of operating coil (2).

(7) Carefully remove operating coil (2) with movable contact support assembly (12) attached, from base (13).

(8) Slide movable contact support assembly (12) off of the operating coil (2).

(9) Remove yoke (14) from operating coil (2).

(10) Slide armature (15) out of slot in operating coil (2).

(11) Remove two bolts (16) from stationary contact block assembly (5) and base (13).

(12) Remove stationary contact block assembly (5) from base (13).

(13) Remove movable contact (17) and spring (18) from movable contact support assembly (12).

(14) Remove two screws (19) from overload relay mounting bracket (20) and base (13).

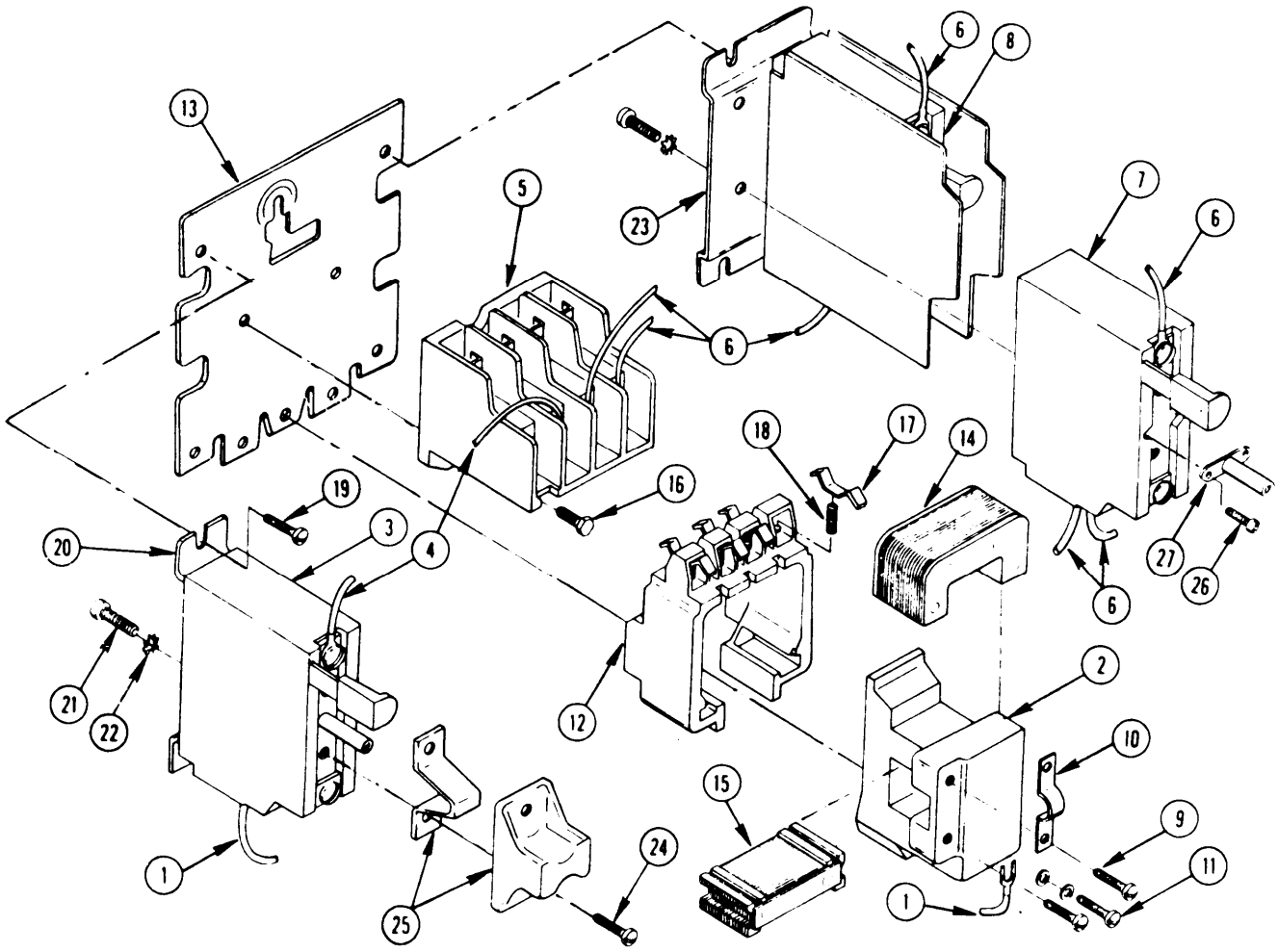


Figure 3-12 Motor starter, 1 HP and 1/3 HP

(15) Remove overload relay (3) with mounting bracket (20) attached, from base (13).

(16) Remove two screws (21) and two lockwashers (22) from mounting bracket (20) and overload relay (3).

(17) Remove mounting bracket (20) from overload relay (3).

(18) If applicable, repeat steps (14) thru (17) for the two additional overload relays (7) and (8) and mounting bracket (23).

(19) Remove two screws (24) from heating element (25) and overload relay (3).

(20) Remove two screws (26) from spindle (27) and overload relay (7).

(21) Remove spindle (27) from overload relay (7).

d. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Using a soft brush and cleaning solvent Fed. Spec. P-D-680, remove all dirt, dust, and contaminants from all metal and plastic parts.

(2) Remove dirt, carbon, and dust from electrical contacts.

(3) Remove contaminants from threads.

(4) Allow parts to air dry.

e. Inspection.

(1) Inspect plastic parts for cracks, fractures, or chipped edges.

(2) Inspect electrical contacts for pits or burning.

(3) Inspect contact springs for broken or deformed coils.

(4) Inspect heater element for burning.

(5) Inspect all hardware for damaged or stripped threads or heads.

(6) Inspect base and overload relay mounting bracket for fractures or bent surfaces.

(7) Inspect overload relay body for cracks, fractures, or chips.

(8) Inspect reset lever for free movement.

(9) Inspect contact areas for burning or cracks.

f. Repair or Redate.

(1) Replace all damaged nuts, bolts, screws, and washers.

CAUTION

If heater element has been burned out, replace entire overload relay including a new heater element.

(2) Replace damaged or unserviceable overload relays.

(3) Repair, straighten, rework, or replace mounting brackets with minor dents, bends, or breaks.

g. Reassembly. (Figure 3-12)

(1) Position spindle (27) of overload relay (7) and install with two screws (26).

(2) Position heating element (25) on overload relay (3) and install with two screws (24).

(3) Position mounting bracket (20) on overload relay (3) and install with two screws (21) and two lockwashers (22).

(4) Position mounting bracket (20), with overload relay (3) attached, on base (13) and install with two screws (19).

(5) If applicable, repeat steps (1) thru (4) for the two additional overload relays (7) and (8) and mounting bracket (23).

(6) Position stationary contact block assembly (5) on base (13) and install with two bolts (16)

(7) Install movable contacts (17) and springs (18) into movable contact support assembly (12).

CAUTION

To avoid damage, make sure spring is properly positioned on locating pin and tangs on contact.

(8) Slide armature (15) into slot in operating coil (2).

NOTE

Armature is polarized. Make sure slots in side of armature are positioned properly to lineup with plastic guides on movable contact support assembly.

(9) Position yoke (14) on of operating coil (2).

(10) Carefully slide operating coil (2), with yoke (14) and armature (15) installed, into movable contact support assembly (12).

(11) Holding movable contact support assembly (12) and operating coil assembly (2) together, install into stationary contact assembly (5) and base (13).

CAUTION

In order to prevent damage, be careful not to knock movable contacts and springs out of position when assembling movable contact assembly.

(12) Install and tighten captive screw (11) into base (13).

(13) Position bus bar (10) over terminal of operating coil (2) and contact on stationary contact block assembly (5) and install with two screws (9).

NOTE

Remove identification tags from wires as wires are reinstalled.

(14) If applicable, install wires (6) to overload relays (7) and (8).

(15) install wire (4) to overload relay (3) and stationary contact block assembly (5).

(16) Install wires (1) to operating coil (2) and overload relay (3).

h. Test. (Refer to Schematic, Figure 1-12)

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(1) Using the multimeter, check between upper and lower contacts of the stationary contact block assembly. It should read open.

(2) Check across contacts of overload relay. It should indicate a short. If reading is still open, replace overload relay.

(3) Manually depress movable contact assembly into stationary contact assembly and hold in position.

(4) Check between upper and lower contacts of stationary contact assembly. It should indicate a short condition.

(5) Release movable contact assembly.

(6) Apply 110 Vat, 60 Hz across the terminals of the operating coil.

(7) Movable contacts should actuate and be held in position in stationary contact block assembly.

(8) Remove power from operating coil.

3–17. MOTOR STARTER, 20 HP, 10 HP, AND 2 HP.

a. General. The motor starters protect the electric motors from overheating, shorts! and overloading overload relays are part of the motor starters and will remove power from the pump motors in case of a malfunction. This paragraph covers the disassembly, cleaning, inspection, repair, reassembly, and testing of the three larger motor starters.

b. Removal. If necessary, remove the motor starter from the junction box in accordance with paragraph 2-52.

c. Disassemble. (Figure 3–13) (Refer to Schematic, Figure 1–12)

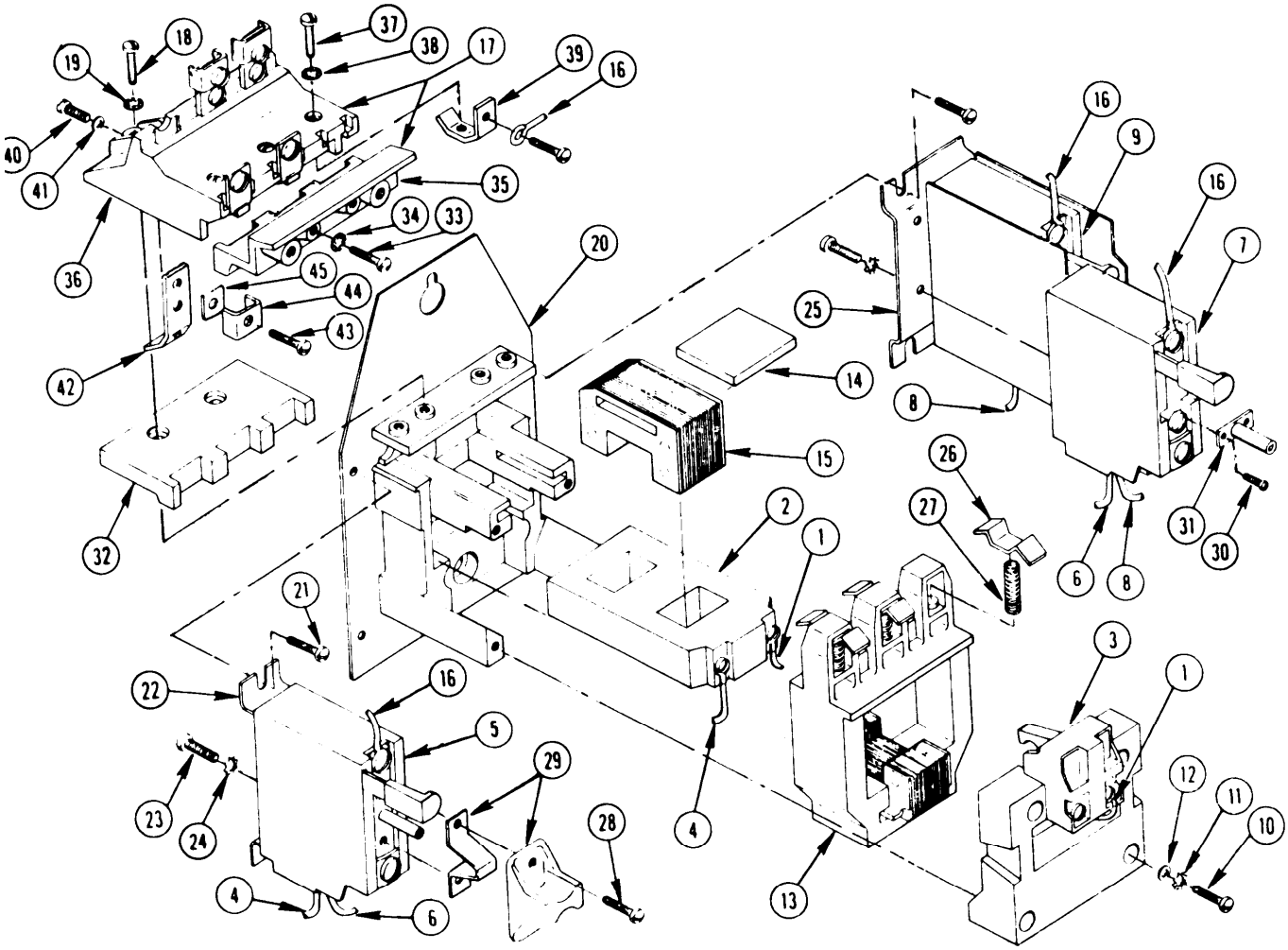


Figure 3-13. Motor Starter, 20 HP, 10 HP, and 2 HP

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

NOTE

The three motor starters described in this paragraph are of three different sizes, however, disassembly procedures are identical.

Identify and tag all wires before disconnecting them for ease of reassembly later.

(1) Remove wires (1) from operating coil (2) and auxiliary switch on cap (3).

(2) Remove wire (4) from other side of operating coil (2) and overload relay T1 (5).

(3) Remove wire (6) from overload relay T1 (5) and overload relay T2 (7).

(4) Remove wire (8) from overload relay T2 (7) and overload relay T3 (9).

(5) Remove four screws (10), four lockwashers (11), and four flat washers (12) from cap (3)

(6) Carefully lift cap (3), with operating coil (2) attached, off movable contact assembly (13).

(7) Using both thumbs, press top of operating coil (2) and remove through bottom of cap (3).

(8) Remove guide (14) from yoke (15).

(9) Remove yoke (15) from operating coil (2).

(10) Remove three solid bus wires (16) from contacts of three overload relays and terminals L1, L2, and L3 of stationary contact assembly (17).

(11) Remove two screws (18) and two lockwashers (19) from stationary contact assembly (17) and insulator block (32).

(12) Remove stationary contact assembly (17) and insulator block (37) from base assembly (20).

(13) Remove movable contact assembly (13) from base (20).

(14) Remove two screws (21) from mounting bracket (22) of overload relay T1 (5).

(15) Remove overload relay T1 (5) with mounting bracket (22) attached, from base (20).

(16) Remove two screws (23) and two lockwashers (24) from mounting bracket (22) and overload relay T1 (5).

(17) Repeat steps (14) thru (16) to remove overload relays T2 (7) and T3 (9) from mounting bracket (25).

(18) Remove movable contacts (26) and spring (27) from movable contact assembly (13).

(19) Remove two screws (28) from heater element (29) and overload relays (5).

(20) Remove heater element (29) from overload relays (5).

(21) Remove two screws (30) from spindle (31) and overload relays (7) and (9).

(22) Remove spindle (31) from overload relays (7).

(23) Remove two screws (33) and two lockwashers (34) from contact cover (35) and stationary contact block (36).

(24) Remove screw (37) and lockwasher (38) from stationary contact block (36) and upper contact (39).

(25) Remove screw (43), clamp (44), and spacer (45) from lower contact (42).

(26) Remove screw (40) and lockwasher (41) from stationary contact block (36) and lower contact (42).

d. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Using a soft brush and solvent Fed. Spec. P-D-680, remove all dirt, dust, and contaminants from all metal and plastic parts.

(2) Remove dirt, carbon, and dust from electrical contacts.

(3) Remove contaminants from threads.

(4) Allow parts to air dry.

e. Inspection.

(1) Inspect plastic parts for cracks, fractures, or chipped edges.

(2) Inspect electrical contacts for pits or burning.

(3) Inspect contact springs for broken or deformed coils.

(4) Inspect heater element for burning.

(5) Inspect all hardware for damaged or stripped threads or heads.

(6) Inspect base and overload relay mounting brackets for fractures or bent surfaces.

(7) Inspect overload relay body for cracks, fractures, or chips,

(8) Inspect reset lever for free movement.

(9) Inspect contact areas for burning or cracks.

f. Repair or Replace.

(1) Replace all damaged nuts, bolts, screws, and washers.

CAUTION

If heater element has been burned out, replace entire overload relay including new heater element.

(2) Replace damaged or unserviceable overload relays.

(3) Repair, straighten, rework, or replace mounting brackets with minor dents, bends, or breaks.

g. Reassembly. (Figure 3-13)

(1) Position three lower contacts (42) in stationary contact block (36) and install screw (40) and lockwasher (41) through lower contact (42) and stationary contact block (36).

(2) Install screw (43), clamp (44), and spacer (45) into three lower contacts (42).

(3) Position three upper contacts (39) in stationary contact block (36), and install screw (37) and lockwasher (38) through contact (39) and stationary contact block (36).

(4) Position contact cover (35) on stationary contact block (36) and install two screws (33) and lockwashers (34).

(5) Position spindle (31) in overload relays (7) and (9) and install with two screws (30).

(6) Position heater element (29) on overload relays (5) and install with two screws (28).

(7) Install movable contacts (26) and springs (27) into movable contact assembly (13).

CAUTION

To prevent damage, make sure spring is properly positioned on locating pin and tangs on contact.

(8) Install mounting bracket (22) onto overload relay T1 (5) using two screws (23) and lockvvashers (24).

(9) Install mounting bracket (22) with overload relay T1 (5) attached, to base (20), using two screws (21).

(10) Repeat steps (8) and (9) to install overload relays T2 (7) and T3 (9) and mounting bracket (25) to base (20).

(11) Install movable contact assembly (13) into base (20).

(12) Position stationary contact assembly (17) and insulator block (32) into base (20) and over contacts (26) of movable contact assembly (13).

CAUTION

In order to prevent damage, be careful not to knock movable contacts and springs out of position when assembling stationary contact assembly.

(13) Install two screws (18) and two lockwashers (19) through stationary contact assembly (17), insulator block (32), and base (20).

(14) Install solid bus wires (16) between terminals of overload relays and stationary contact assembly L1-T1, L2-T2, L3-T3 (refer to schematic, figure 1–12).

(15) Slide yoke (15) into operating coil (2).

(16) Slide guide (14) into slot in yoke (15).

(17) Press operating coil assembly (2) into bottom of cap (3) and seat firmly.

(18) Slide cap assembly (3) with operating coil assembly (2) attached, into top of base (20) and movable contact assembly (13).

NOTE

Cap assembly may have to be gently moved from side to side to allow guide (14) to slip into guide slots.

(19) Seat cap (3) firmly onto top of base (20) mounting surfaces.

(20) Install four screws (10), four lockwashers (11), and four flat washers (12) through cap (3) and base (20).

NOTE

Remove identification tags from wires as wires are reinstalled.

(21) Install wire (8) to overload relay T3 (9) and overload relay T2 (7).

(22) Install wire (6) to overload relay T2 (7) and overload relay T1 (5).

(23) Install wire (4) from overload relay T1 (5) to operating coil (2).

(24) Install wire (1) from other side of operating coil to auxiliary switch on cap (3).

h. Test. (Refer to Schematic, Figure 1–12)

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(1) Using the multimeter, check between upper and lower contacts of stationary contact assembly. It should read open.

(2) Check across contacts of overload relay. It should read short. If reading is open, depress RESET lever. If reading is still open, replace overload relay.

(3) Check between terminals (2) and (3) of auxiliary switch. It should read open.

(4) Manually depress movable contact assembly into stationary contact assembly and hold in position.

(5) Check between upper and lower contacts of stationary contact assembly. It should read short.

(6) Check between terminals (2) and (3) of auxiliary switch. It should read short.

(7) Release movable contact assembly.

(8) Apply 110 Vat, 60 Hz across the terminals of the operating coil.

(9) Movable contacts should actuate and be held in position in stationary contact block assembly.

(10) Remove power from operating coil.

3-18. HIGH-PRESSURE SWITCH.

a. General. This paragraph describes the disassembly, repair, test, and calibration of the high-pressure switch assembly.

b. Removal. If necessary, remove the high-pressure switch assembly from the junction box in accordance with paragraph 2-53.

c. Dissassembly. (Figure 3-14)

WARNING

ROWPU piping and equipment can contain extremely high 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.

NOTE

Prior to disassembly, clean all external surfaces with a soft brush and a mild soap solution. Rinse with clean water and allow to dry.

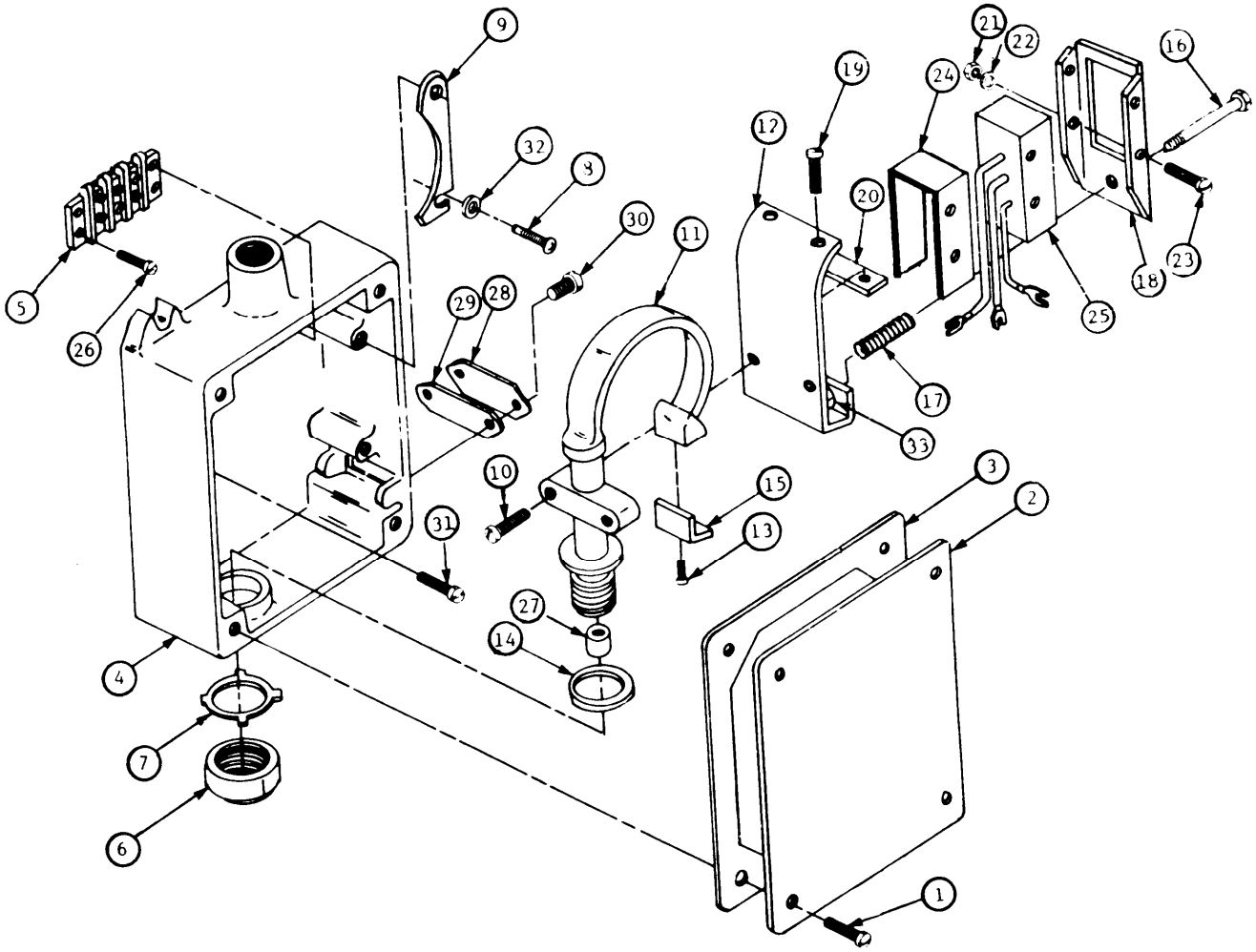


Figure 3–1 4. High–Pressure Switch

(1) Remove four screws (1) from front panel (2), gasket (3), and switch case (4).

(2) Remove cover (2) and gasket (3) from switch case (4). Discard gasket (3).

(3) Disconnect and tag three wires from terminal block (5).

(4) Straighten tangs of lockwasher (7) and unscrew socket nut (6) from bourdon tube assembly (11).

(5) Remove socket nut (6) and lockwasher (7) from bourdon tube assembly.

(6) Remove two screws (8) and washers (32) from stop plate (9) from switch case (4).

(7) Remove stop plate (9) from switch case (4).

(8) Carefully lift bourdon tube assembly (11) out of mounting hole and remove from switch case (4).

(9) Remove socket gasket (14) from bourdon tube assembly (11). Discard gasket (14).

(10) Remove two screws (10) from bourdon tube (11) and bracket (12).

(11) Remove bracket (12) and switch assembly (25) from bourdon tube assembly (11).

(12) Remove two screws (13) from contact bracket (15) and bourdon tube assembly (11).

(13) Remove adjusting screw (16), spring (17), and nut (33) from switch bracket (18) and bracket (12).

(14) Remove two screws (19) from top of bracket (12) and bracket clamp (20).

(15) Remove bracket clamp (20) and limit switch assembly (25) from bracket (12).

(16) Remove two nuts (21) and two lockwashers (22) from screws (23).

(17) Remove two screws (23) from switch assembly (25).

(18) Remove switch insulator (24) and switch (25) from switch bracket (18).

(19) Remove two screws (26) from terminal block (5) and switch case (4).

(20) Remove terminal block (5) from switch case (4).

(21) Remove surge dampener (27) from bourdon tube assembly (11).

(22) Remove two screws (30) from adjustment cover (28), cover gasket (29), and switch case (4).

(23) Remove adjustment cover (28) and gasket (29) from switch case (4). Discard gasket (29).

(24) If necessary, remove ground screw (31) from switch case (4).

d. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P–D–680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Clean all parts with a soft brush and solvent Fed. Spec. P-D-680.

(2) Clean all threads to remove contaminants.

(3) Clean all mounting surfaces for gaskets seating.

(4) Allow to air dry.

e. Inspection.

(1) Inspect switch case for cracks or fractures.

(2) Check all threads in switch case for damage.

(3) Check all screws and bolts for stripped threads or damaged heads.

(4) Check terminal block for chips, cracks, or missing hardware.

(5) Check bourdon tube for cracks or fractures.

(6) Discard all used gaskets.

(7) Check switch for cracks, fractures, and burned or brittle wiring.

f. Repair or Replace.

(1) Replace all gaskets, O-rings, and seals.

(2) Replace all damaged nuts, bolts, screws, and washers.

(3) Replace damaged, unrepairable, or unserviceable switch case, terminal block, bourdon tube, or switch assembly.

(4) Replace high-pressure switch assemblies that are damaged beyond repair.

g. Reassembly. (Figure 3-14)

(1) Hold cover (28) and gasket (29) in place and align mounting holes.

(2) Install two screws (30) through cover (28), gasket (29), and switch case (4).

(3) Install surge dampener (27) in bourdon tube (11).

(4) Hold terminal block (5) in place on switch case (4) and align mounting holes.

(5) Install two screws (26) through terminal block (5) and switch case (4).

(6) Install ground screw (31) in switch case (4).

(7) Hold insulator (24), switch (25), and switch bracket (18) in place and align mounting holes.

(8) Install two screws (23) in switch bracket (1 8), switch (25), and insulator (24).

(9) Install two lockwashers (22) and two nuts (21) on screws (23).

(10) Hold bracket clamp (20) and switch assembly (25) in place on bracket (12) and align mounting holes.

(11) Install two screws (19) in top of bracket (12) and bracket clamp (20).

(12) Install adjusting screw (16) through switch bracket (18), spring (17), bracket (12), and nut (33). Adjust to actuate switch.

(13) Hold contact bracket (15) in place on bourdon tube (11) and align mounting holes.

(14) Install two screws (13) in contact bracket (15) and bourdon tube (11).

(15) Place switch assembly (25) into bourdon tube assembly (11) and align mounting holes.

(16) Install two screws (10) through bourdon tube assembly (11) and switch assembly (25).

(17) Install socket gasket (14) on bourdon tube assembly (1 1).

(18) From inside switch case (4), carefully install bourdon tube assembly (11) into switch case mounting hole.

(19) Install lockwasher (7) and socket nut (6) on bourdon tube assembly (11). Bend four tangs on lockwasher (7).

(20) Hold stop plate (9) in place on switch case (4) and align mounting holes.

(21) Install two screws (8) and washer (32) through stop plate (9) and switch case (4).

(22) Connect three wires to terminal block (5).

(23) Adjust stop plate (9) to prevent overtravel of bourdon tube assembly (11).

(24) Hold cover (2) and gasket (3) in place on switch case (4) and align mounting holes.

(25) Install four screws (1) through cover (2), gasket (3), and switch case (4).

h. Test.

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(1) Using a deadweight gage tester with an accuracy of 1/1 O of 1 %, connect the high-pressure switch in accordance with (figure 3–1 4).

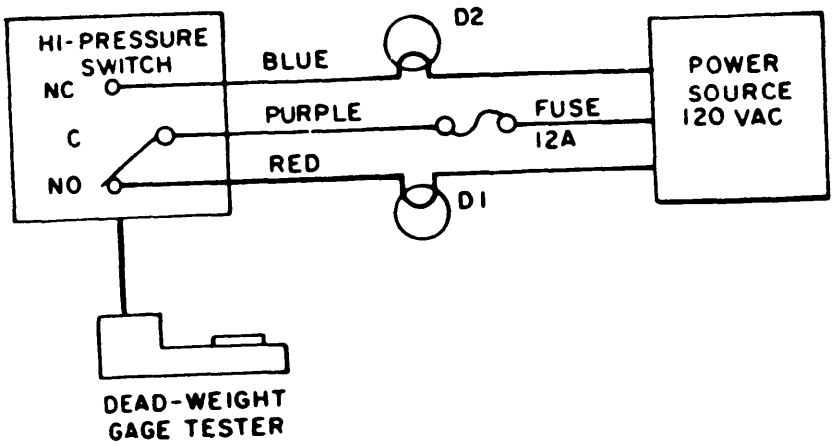
(2) Apply 120 Vac to high-pressure switch. Indicator light D1 should be on, D2 should be off.

(3) Add weight to gage tester equal to 1262 psi (88. 73 kg/cm^2).

NOTE

High–pressure switch will actuate between 1237 psi (86.97 kg/cm^2) and 1262 psi (88.73 kg/cm^2).

(4) Switch should actuate. Indicator light D1 should be off, D2 should be on



NOTE

In zero-pressure condition, switch is actuated. When preset pressure is exceeded, switch is released.

Figure 3-15. High-Pressure Switch Test

(5) If switch has actuated, reduce weight on gage tester to equal 1237 psi (86.97 kg/cm^2).

(6) Switch should return to pretest state. Indicator light D1 should be on, D2 should be off.

(7) If switch does not return to pretest state, calibrate switch.

i. Calibration.

(1) If necessary, remove adjusting screw access cover.

(2) Add weight to gage tester equal to 1250 psi (87.89 kg/cm^2),

(3) If indicating light D1 is off, and D2 is on, turn adjusting screw counterclockwise until D1 is on and D2 is off.

(4) If indicating light D1 is on, and D2 is off, turn adjusting screw clockwise until D1 is out and D2 is on.

NOTE

To actuate switch at higher pressure, turn adjusting screw counterclockwise. To actuate switch at lower pressure, turn adjusting screw clockwise. Switch should actuate at 1250 psi +1% (87.89 kg/cm^2 ±1%).

(5) Cycle high-pressure switch two times per steps (2) thru (8).

(6) Replace access cover and gasket.

(7) Remove switch from test set-up.

3–19. LOW–PRESSURE SWITCH.

a. General. This paragraph describes the disassembly, cleaning, inspection, repair, reassembly, test, and calibration of the low–pressure switch assembly.

b. Removal. If necessary, remove the low-pressure switch assembly from the junction box in accordance with paragraph 2-53.

c. Disassembly. (Figure 3-16)

NOTE

Prior to disassembly, clean all external surfaces with a soft brush and a mild soap solution. Rinse with product water and allow to air dry.

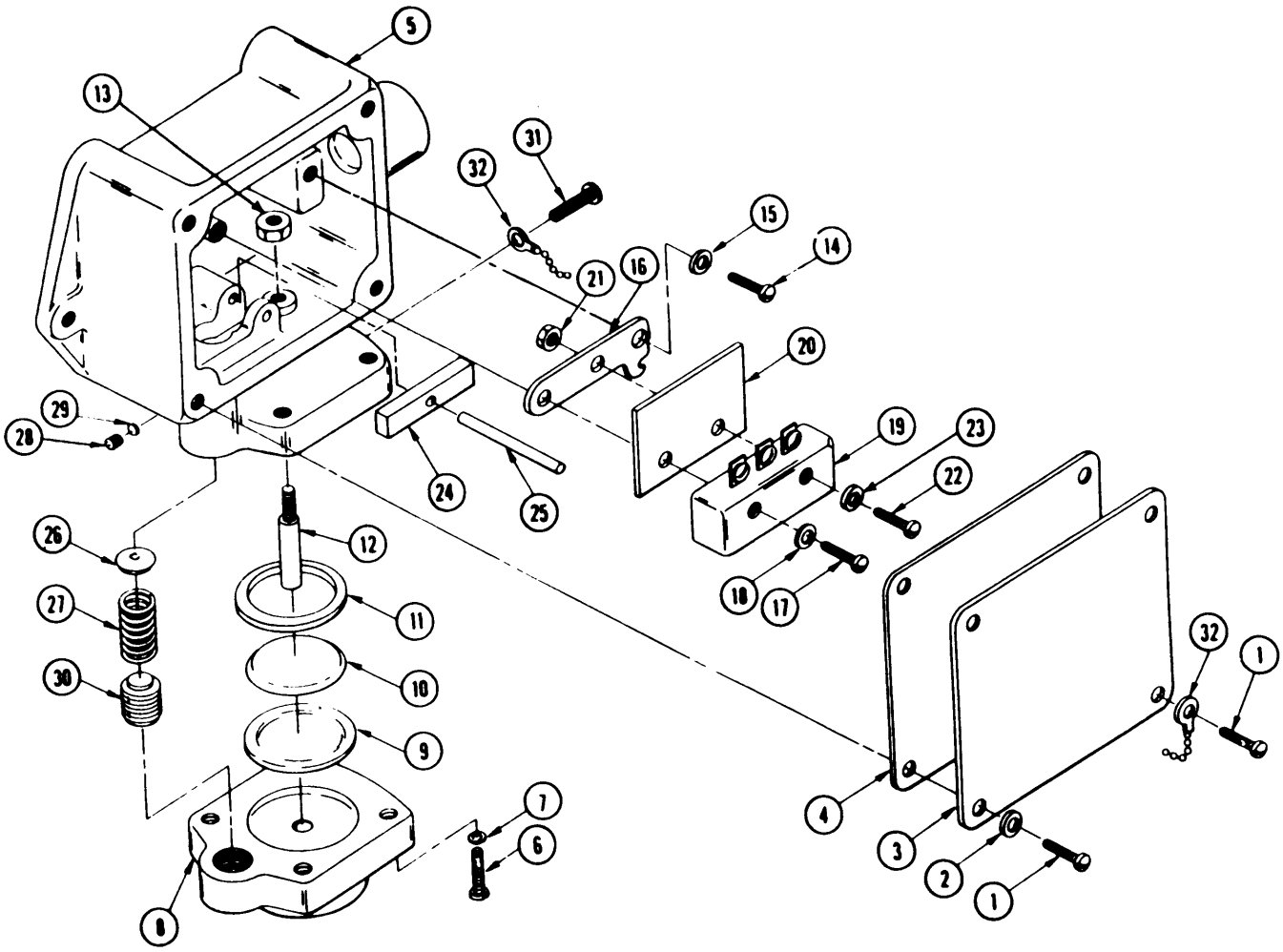


Figure 3-16. Low–Pressure Switch

(1) Remove four screws (1) and four lockwashers (2) from cover (3), gasket (4), and switch case (5),

(2) Remove cover (3) and gasket (4) from switch body (5). Discard gasket,

(3) Turn switch assembly upside-down.

(4) Remove four bolts (6) and four lockwashers (7) from lower end fitting (8) and switch case (5).

(5) Remove lower end fitting (8) from switch case (5).

(6) Carefully remove spacer (11), pressure plate (1 O), and diaphragm (9) from switch case (5).

(7) Remove piston nut (13) and piston (12) through bottom of switch case (5).

(8) Turn switch over to operating position.

(9) Remove screw (14) and lockwasher (15) from adjustment plate (16) and switch case (5).

(10) Remove screw (17) and lockwasher (18) from switch (19), insulator (20), adjustment plate (16), and switch case (5).

(11) Remove switch (19) with insulator (20) and adjustment plate (16) attached.

(12) Remove nut (21) from screw (22) and washer (23).

(13) Remove screw (22) and washer (23) from switch (19), insulator (20), and adjustment plate (16).

CAUTION

After lever pin is removed, the pressure on spring and retainer will be relieved. Take care not to lose spring or retainer,

(14) Depress lever (24) with finger and carefully remove lever pin (25) from switch case (5).

(15) Remove lever (24) from switch case (5).

(16) Carefully remove retainer (26) and spring (27) from switch case (5).

(17) Remove setscrew (28) and soft copper slug (29) from switch case (5).

NOTE

If soft copper slug does not fall out, remove at step (19).

(18) Unscrew adjustment plug (30) and remove from switch case (5).

(19) If soft copper slug has not been removed, push small pin into tapped hole of setscrew in order to push slug into adjustment plug hole. Allow slug to drop out of bottom of switch case.

(20) Remove drive screw (31) and cover retainer chain (32) from switch case (5).

d. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Clean all parts with soft brush and cleaning solvent Fed. Spec. P-D-680.

(2) Clean all threads to remove all contaminants.

(3) Clean all surfaces for mounting diaphragm and gaskets.

(4) Particular attention should be given to piston, piston cylinder bore, and lower end fitting diaphragm cavity.

(5) Allow to air dry.

e. Inspection.

(1) Inspect switch case for cracks or fractures.

(2) Check all threads in switch case for damage.

(3) Check piston cylinder bore for chips, scratches, or cracks.

(4) Inspect piston for chips, scratches, and free movement in bore.

(5) Inspect diaphragm for tears, cracking, or holes.

(6) Check all hardware, screws, bolts, and nuts for damage, stripped threads, or stripped heads.

(7) Check lever pin mounting holes in lever and switch case for out-of-roundness.

(8) Check adjustment plate for flatness, cracks, or bent adjusting tang.

(9) Check lever for cracks or fractures.

(10) Check switch assembly for cracks, fractures, burned, or broken contacts.

f. Repair or Replace.

(1) Replace all gaskets, O-rings, and seals.

(2) Replace all damaged nuts, bolts, screws, and washers.

(3) Replace all broken, fractured, unusable, or unserviceable switch cases, piston cylinders, pistons, and diaphragms.

(4) Replace all unserviceable switch assemblies, switch levers, adjustment plates, and lever pins.

(5) Replace low-pressure switch assemblies that are beyond repair or are unserviceable.

g. Reassembly. (Figure 3–16)

(1) Partially install adjustment plug (30) in switch case (5).

(2) From inside of switch case, install spring (27) and retainer (26).

(3) Hold lever (24) in place in switch case (5) and align mounting hole.

(4) Install lever pin (25) and lever (24) in switch case (5).

(5) Insert screw (22) and washer (23) through switch (1 9), Insulator (20), and adjustment plate 16). Align second mounting hole.

(6) Install nut (21) on screw (22).

(7) Hold switch (19) with insulator (20) and adjustment plate (16) attached in place in switch case (5) and align mounting holes.

(8) Install, but do not tighten. screw (17) and lockwasher (18) through switch (19), insulator (20), adjustment plate (1 6), and switch case (5).

(9) Install, but do not tighten, screw (14) and lockwasher (15) through adjustment plate (21) and switch case (5).

(10) Turn switch assembly upside-down.

(11) Insert piston (12) through bottom of switch case (5).

(12) Install piston nut (13) on piston (12).

(13) Turn switch assembly over to operating position.

(14) Carefully place diaphragm (9) in cavity of lower end fitting (8).

(15) Locate pressure plate (10) and spacer (11) on diaphragm (9).

(16) Carefully place lower end fitting (8), with diaphragm (9), spacer (11), and pressure plate (10) in place, on switch case (5) against piston (12). Locate four mounting holes.

(17) Install four bolts (6) and four lockwashers (7) through lower end fitting (8) and switch case (5).

(18) By adjusting the piston nut (13), the adjustment plug (30), and the adjustment plate (26), position the lever (24) touching the actuating plunger (2) of the switch (19) with no gap or play.

(19) When the relationship of the lever and switch has been fixed, tighten screw (17) and screw (14).

(20) Install setscrew (28) and soft copper slug (29) against adjusting plug (30).

(21) Hold cover (3) and (4) in place on the switch case (5) and align mounting holes.

(22) Install four screws (1) and four lockwashers (2) through cover (3), gasket (4), and switch case (5).

(23) Install cover retainer chain (32) with drive screw (31) into switch case (5).

h. Test.

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(1) Using a dead-weight gage tester with an accuracy of 1/10 of 1%, connect low-pressure switch in accordance with (figure 3-16).

(2) Apply 120 Vac to low-pressure switch. Indicator light D1 should be off, D2 should be on.

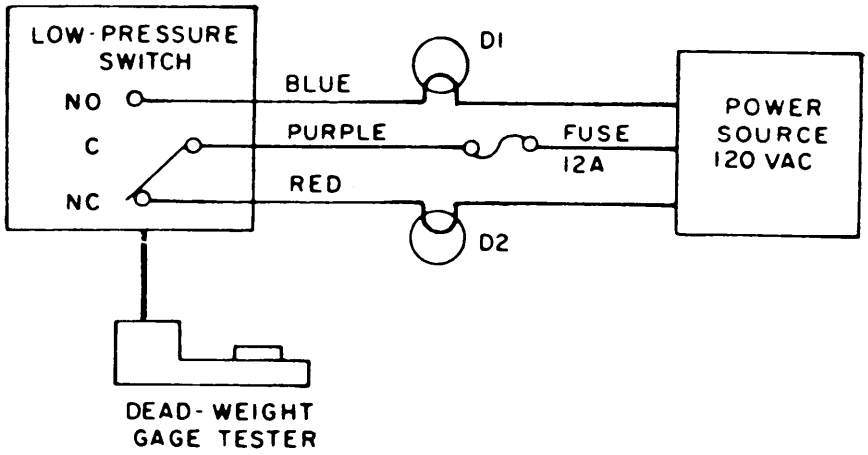


Figure 3–1 7. Low–Pressure Switch Test

(3) Add weight to gage tester equal to 11 psi (0.77 kg/cm^2).

NOTE

Low-pressure switch will actuate between 9 and 11 psi (0.63 and 0.77 kg/cm^2).

(4) Switch should actuate. Indicator light D1 should be on and D2 should be off.

(5) If indicator light D2 remains on, calibrate switch.

(6) If switch has actuated, reduce weight on gage tester equal to 9 psi (0.63 kg/cm^2).

(7) Switch should return to pretest state. Indicator light D1 should be off, D2 should be on.

(8) If switch does not return to pretest state, calibrate switch.

i. Calibration.

(1) Loosen setscrew locking adjusting plug.

(2) Add weight to gage tester equal to 10 psi (0.7 kg/cm^2).

(3) If indicator light D2 is on and D1 is off, turn adjusting plug counterclockwise until D2 is off and D1 is on.

NOTE

To actuate switch at a higher pressure, turn adjusting plug clockwise. To actuate switch at a lower pressure, turn adjusting plug counterclockwise.

(4) If indicator light D2 is off and D1 is on, turn adjusting plug clockwise until D2 is on and D1 is off.

NOTE

If proper calibration cannot be obtained within limits of adjusting plug movement, it maybe necessary to adjust the position of the actuating switch itself.

(5) Loosen adjusting plug (counterclockwise), but do not remove.

(6) Remove cover and gasket.

(7) Loosen two screws holding adjustment plate.

(8) Using a blade screwdriver in slot of adjusting plate, move limit switch to desired position and tighten two screws.

(9) Replace cover and new gasket.

(10) Repeat steps (2) through (4).

(11) When low-pressure switch has been calibrated, tighten locking setscrew and repeat tests (paragraph h.) twice to assure accuracy.

(12) Remove low-pressure switch from test setup.

3-20. BACKWASH TIMER. (MECHANICAL)

a. General. The backwash timer automatically starts and ends the different stages of the backwash cycle of the multimedia filter. The timer provides the capacity to begin the backwash cycle at a preset time of day. This paragraph describes the disassembly, cleaning, inspection, repair, reassembly, testing, and adjustment of presetting dial on the backwash timer.

b. Removal. If necessary, remove the backwash timer assembly from the multimedia filter assembly in accordance with paragraph 2–56.

c. Timer Mechanism Disassembly. (Figure 3–18, Sheet 1 of 2)

CAUTION

The backwash timer is a delicate piece of equipment. It can be damaged if dirt or grease gets into the mechanism. Before beginning disassembly of timer assembly, make sure work space is clean and uncluttered. Clean timer assembly before taking it apart.

NOTE

Identify and tag all wires before disconnecting them for ease of reassembly later.

(1) Open timer case (l), (figure 3-18, sheet 1 of 2), lift latch (2), and remove timer mechanism assembly (17) from timer case (1).

(2) Identify, tag, and disconnect electrical wires from terminal block (1 5), micro switch (5), four micro switches (8), timer motor (25), and timer controller assembly.

(3) Remove two screws (7), two washers (6), two insulators (4), and micro switch (5), from switch base plate assembly (3).

(4) Remove two nuts (10) and two washers (11) from two screws (12) through four micro switches (8)

(5) Remove four switches (8) and five insulators (9) from two screws (12) and switch base plate assembly (3).

(6) Remove spring (35) and two nuts (13) from two screws (14) through switch base plate assembly (3), timer mechanism assembly (17), and cover (34).

(7) Remove two screws (14), switch base plate assembly (3), timer mechanism (17), and cover (34),

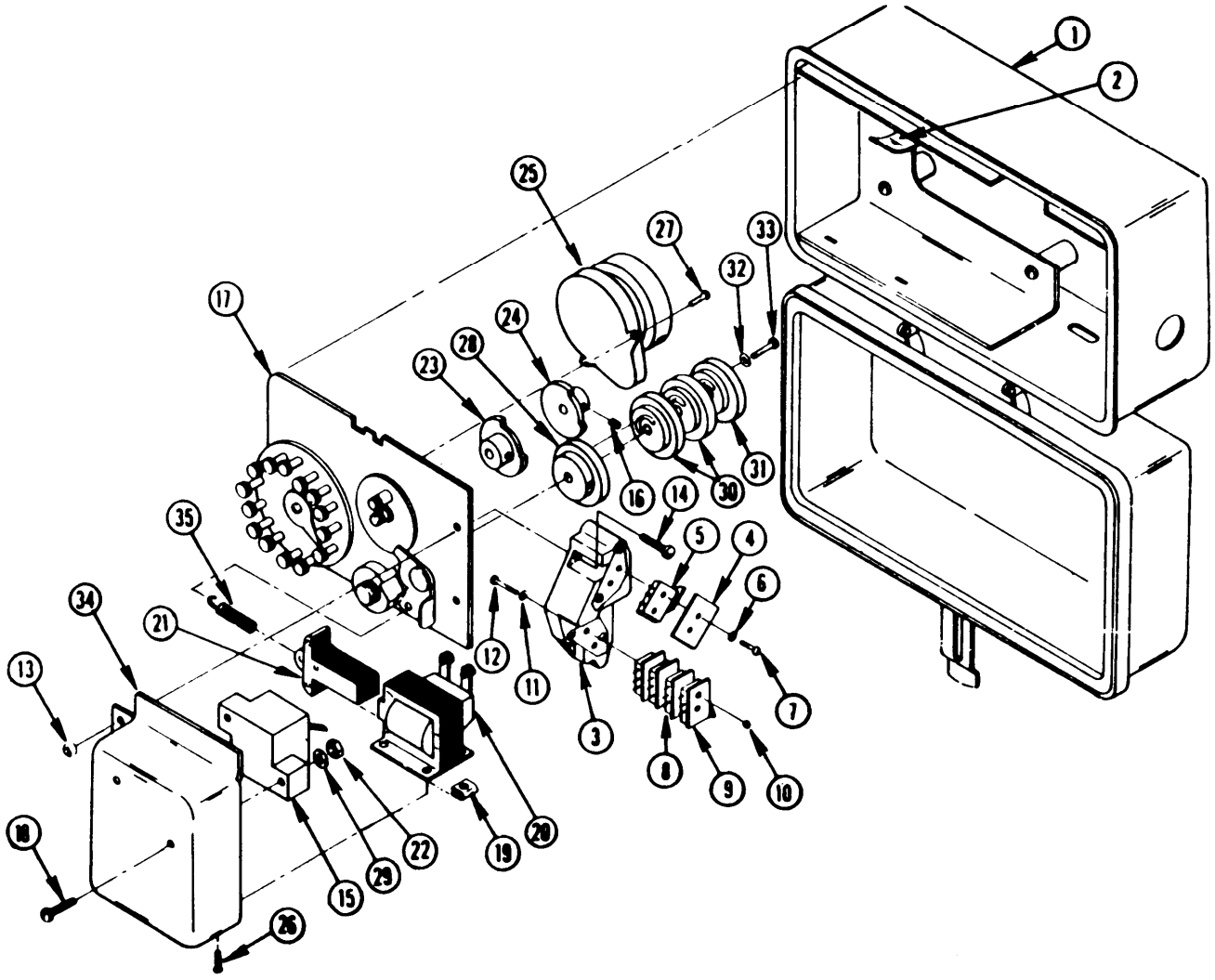


Figure 3-18. Backwash Timer (Mechanical) (Sheet 1 of 2)

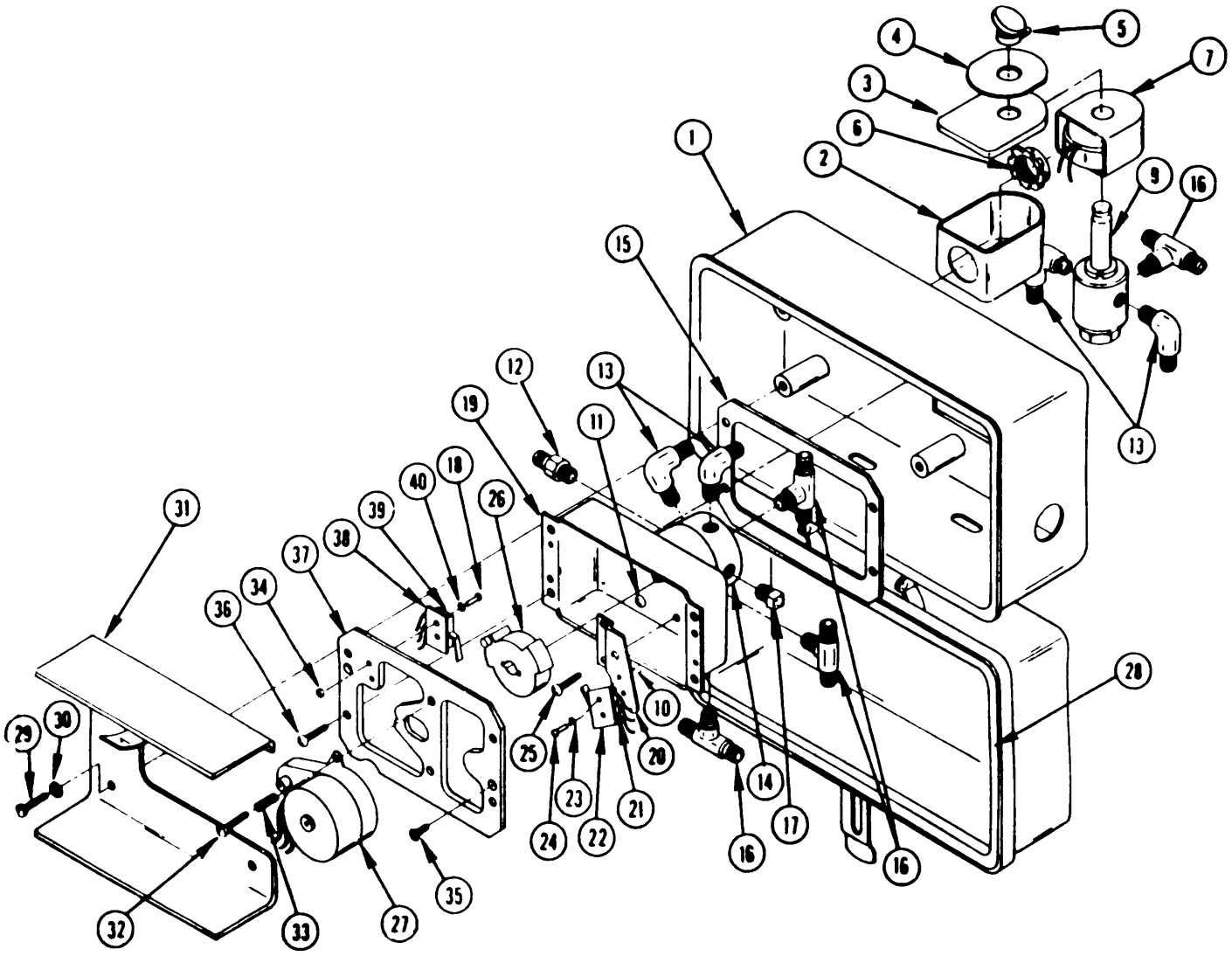


Figure 3-18. Backwash Timer (Mechanical) (Sheet 2 of 2)

(8) Remove two nuts (22) and two washers (29) from two screws (18) through terminal block (15).

(9) Remove two screws (18) and terminal block (15) from cover (34).

(10) Remove two screws (27) and timer motor assembly (25) from timer mechanism assembly (17).

NOTE

Mark six cams and timer mechanism plate to assure proper alignment during reassembly.

(11) Loosen, but do not remove, three setscrews (1 6).

(12) Remove lower fill cam (23) and upper fill cam (24) from timer mechanism assembly (17).

(13) Remove screw (33) and washer (32) from three cams (31), (30), and (28).

(14) Remove upper timer cam (31) two center cams (30), and decal-cam assembly (28) from timer mechanism (17).

(15) Remove four screws (26), four locknuts (19), timer mechanism plunger (21), and timer mechanism assembly (20) from cover (34).

d. Timer Controller Disassembly.

(1) Remove three screws (29) (figure 3-18, sheet 2 of 2), three lockwashers (30), and bracket (31) from case assembly (1).

(2) Remove two screws (32) two compression springs (33), and pilot valve motor assembly (27) from case assembly (l).

(3) Remove plastic lock cap (5), nameplate (4), cover (3), and solenoid valve assembly (9).

(4) Remove two elbows (13) and tee (16) from solenoid valve assembly (9).

(5) Remove electrical locknut (6) solenoid cover (2), and solenoid control switch (7) from case assembly (1).

(6) Remove four screws (36), gasket (15), and controller assembly (19) from case assembly (1).

(7) Remove two screws (35) and plate (37) from controller assembly case (19).

(8) Remove two nuts (34) from two screws (18) through micro switch (39).

(9) Remove two screws (18), two washers (40), micro switch (39), and insulator (38) from plate (37).

(10) Remove two nuts (10) from two screws (24) through micro switch (21).

(11) Remove two screws (24), two washers (23), two insulators (22), and micro switch (21) from switch bracket (20).

(12) Remove two screws (25) and switch bracket (20) from controller assembly case (19) and pilot valve assembly (14).

(13) Remove white controller cam (26) from pilot valve assembly (14).

(14) Remove three screws (11) and pilot valve assembly (14) from controller assembly case (19).

(15) Remove fitting (12), two elbows (13), three tees (16), and plug (17) from pilot valve assembly (14).

(16) Remove seal strip (28) from case assembly cover (1).

e. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Using a soft brush and cleaning solvent Fed. Spec. P-D-680, remove all dirt, dust, and contaminants from all metal and plastic parts.

(2) Remove all dirt, carbon, and dust from electrical contacts.

(3) Remove all contaminants from all threads.

(4) Allow parts to air dry.

f. Inspection.

(1) Inspect plastic parts for cracks, fractures, or chipped edges.

(2) Inspect micro switches for ease of operation.

(3) Inspect timer motor for breaks and fractures.

(4) Inspect pilot valve motor for signs of damage, cracks, breaks, and fractures.

(5) Inspect all cams for pits, wear, breaks, and damage.

(6) Inspect timer mechanism for breaks, damage, and wear.

(7) Inspect terminal block for breaks and damage.

(8) Inspect switch base plate assembly for breaks, damage, wear, and fractures.

(9) Inspect all switch insulators for breaks and fractures.

(10) Inspect compression springs for compression weakness, breaks, and fractures.

(11) Inspect solenoid valve for breaks, wear, and fractures.

(12) Inspect all hardware for damage, stripped threads, or heads.

(13) Inspect all pipe fittings for damaged or stripped threads.

g. Repair or Replace

(1) Replace all gaskets, seals, and O-rings.

(2) Replace all damaged nuts, hits, screws, and washers.

(3) Repair or replace damaged timer case.

(4) Repair or replace damaged or unserviceable timer mechanism.

(5) Replace unserviceable timer motor.

(6) Replace unserviceable or unrepairable pilot valve motor.

(7) Replace unserviceable or unrepairable controller assembly.

(8) Replace all damaged or unserviceable micro switches.

(9) Replace damaged terminal block.

(10) Replace all damaged, unserviceable, or unrepairable cams.

(11) Repair, straighten, or replace damaged switch bracket assembly.

(12) Replace all damaged, cracked, or bent switch insulators

(13) Repair or replace damaged switch base plate.

(14) Replace unserviceable solenoid valve.

(15) Replace all damaged pipe fittings.

(16) Send all replaced component parts to next higher level of maintenance for disposition.

h. Timer Controller Reassembly.

(1) Install fitting (12) (figure 3-18, sheet 2 of 2), plug 17), three tees (16), and two elbows (13) into pilot valve assembly (14).

(2) Install pilot valve assembly (14) with three screws (11) in controller assembly case (19).

(3) Install cam (26) on pilot valve assembly (14).

(4) Install switch bracket (20) with two screws (25) through bracket and into pilot valve assembly (14).

(5) Install micro switch (21) and two insulators (22) on switch bracket (20), using two washers (23), two screws (24), and two nuts (10).

(6) Install insulator (38), micro switch (39) on plate (37), using two washers (40), two screws (18), and two nuts (34).

(7) Install plate (37) on controller assembly case (19) with two screws (35).

(8) Install controller assembly case (19) and new gasket (15) in case (1) with four screws (36).

(9) Install solenoid control switch (7), solenoid cover (2), and electrical locknut (6) on case assembly (1).

(10) Install two elbows (13) and tee (16) on solenoid valve assembly (9).

(11) Install solenoid valve assembly (9), cover (3), nameplate (4), and plastic lock cap (5).

(12) Install pilot valve motor assembly (27), two compression springs (33), and two screws (32) on case assembly (1).

(13) Install bracket (31), three lockwashers (30), and three screws (29) on case assembly (1).

(14) Install seal strip (28) on case cover (1).

i. Timer Mechanism Reassembly.

(1) Install decal-cam assembly (28) (figure 3-18, sheet 1 of 2), two center cams (30), and upper timer cam (31) on timer mechanism (17).

NOTE

Align pre-punched indexing marks on cam and timer mechanism to assure alignment during reassembly.

(2) Tighten setscrew (16).

(3) Install washer (32) and screw (33) through cams.

(4) Install upper fill cam (23) and lower fill cam (24) on timer mechanism (17).

(5) Tighten two setscrews (16).

(6) Install timer motor assembly (25) with two screws (27) on timer mechanism assembly (17).

(7) Install timer mechanism assembly (20), timer mechanism plunger (21), four locknuts (19), and four screws (26) in cover (34).

(8) Install terminal block (15) with two washers (29), two screws (18), and two nuts (22) in cover (34).

(9) Install switch base plate assembly (3) on timer mechanism assembly (17) and cover (34) using two screws (14) and two nuts (13).

(10) Install five insulators (9) and four switches (8) on two screws (12) on switch base plate assembly (3) using two washers (11) and two nuts (10).

(11) Install two insulators (4) one switch (5), two washers (6), and two screws (7) on switch base plate assembly (3).

(12) Install spring (35).

(13) Reconnect electrical wires in accordance with schematic (figure 3-19)

(14) Install timer mechanism assembly (17) in timer case (l).

j. Test and Adjustment

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(1) Secure backwash timer to test bench.

(2) Connect pipe fittings to test fixture in accordance with proper inlet/outlet functions.

(3) Connect timer wiring in correct phase to bench test leads of proper voltage.

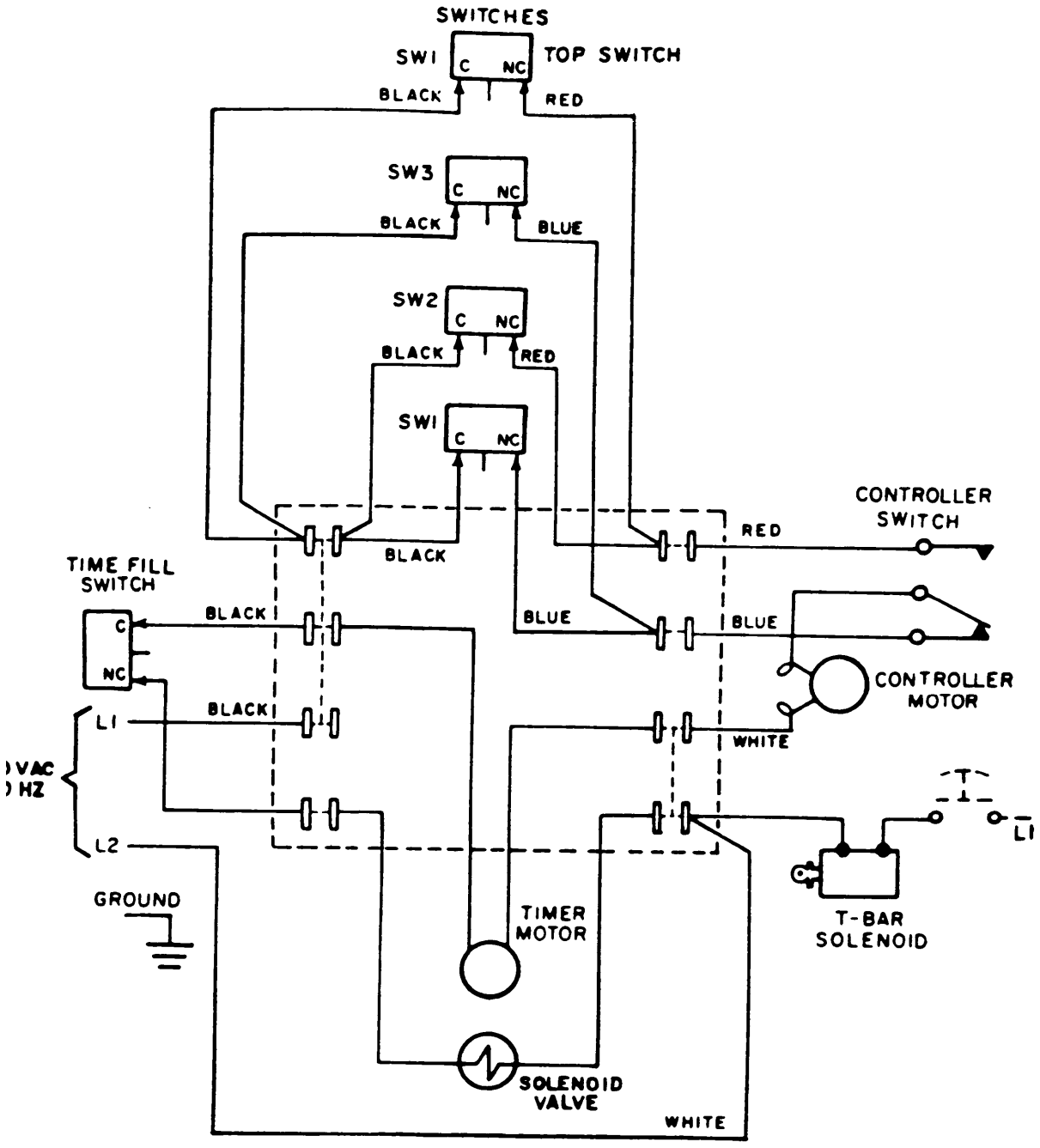


Figure 3–1 9. Backwash Timer Schematic (Mechanical)

(4) Open test fixture valves to provide water supply to timer pipe fittings.

(5) With electrical power off, and timer mechanism removed from case, rotate white pilot valve cam (1) (figure 3-20, sheet 1 of 2) in a counterclockwise direction to the backwash position (BW). Test fixture indicates water clear and free of air at the drain.

(6) Rotate white pilot valve cam (1) counterclockwise to slow rinse (BR) position. Test fixture indication will be rinse water flowing.

(7) Rotate white pilot valve cam (1) counterclockwise to service (SR) position. Test fixture indication will be drain stopping.

(8) Replace timer mechanism in case.

(9) Turn electrical power on.

(10) Set timer to regenerate at 2:00 A.M. and observe the following cycles:

k. Time of Day Adjustment. Rotate calendar dial (4) (figure 3-20, sheet 2 of 2) counterclockwise until black pointer (3) indicates correct time of day.

l.. Reconditioning Frequency Adjustment.

(1) Screw down dial pin (2) (figure 3-20, sheet 2 of 2) corresponding to day backwash is desired.

(2) Screw all other pins (2) to UP position.

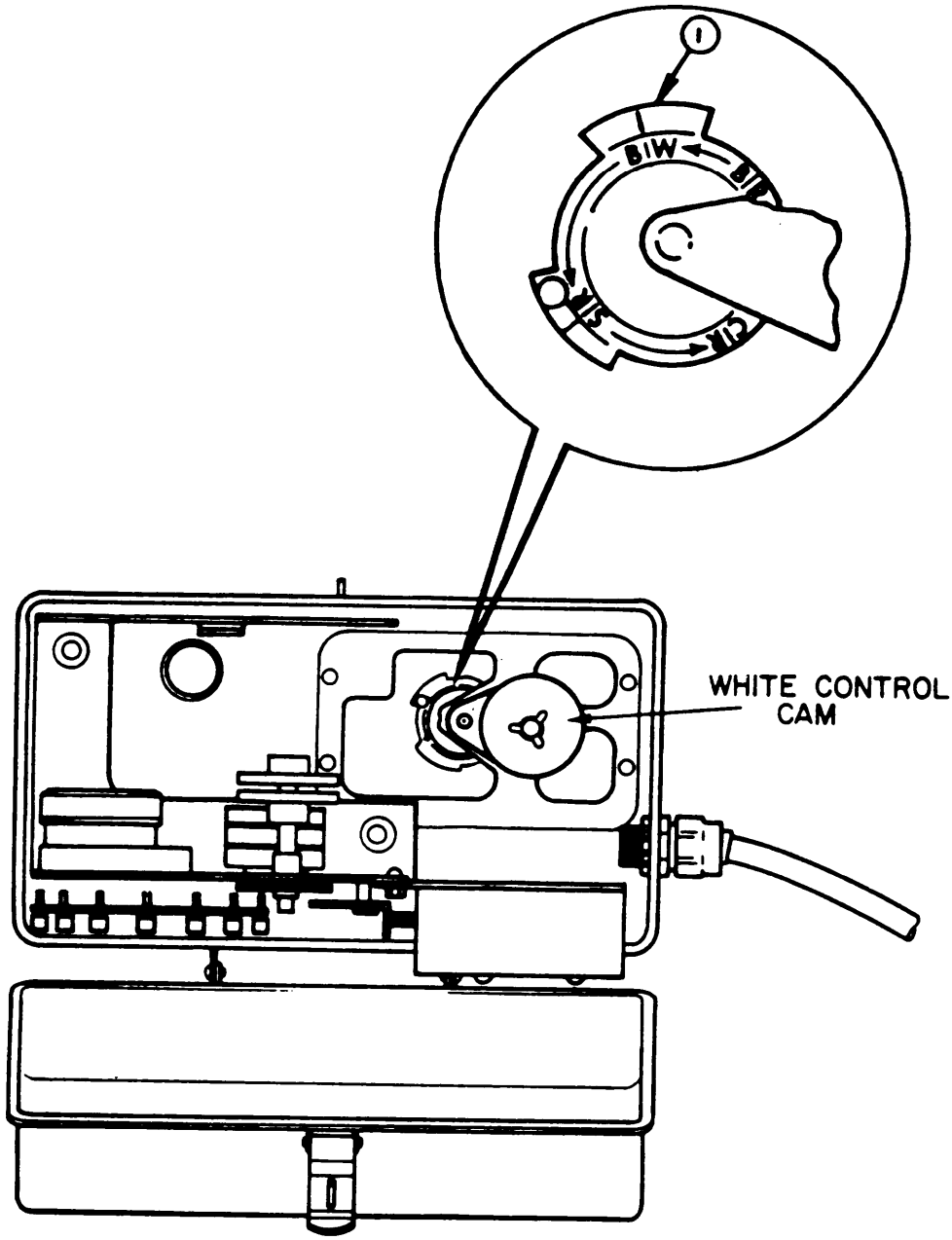
m. Time of Reconditioning Adjustment.

(1) Loosen two screws (1) (figure 3-20, sheet 2 of 2) in face of calendar dial.

(2) Position calendar dial (4) so that mark at each pin points to desired time of backwash.

(3) Tighten two screws (1).

(4) Rotate calendar dial (4) counterclockwise until black pointer indicates correct time of day.



Backwash	2 to 3	minutes
Second Backwash	6 to 71/2	minutes
Backwash	2 to 3	minutes
Off	2 to 3	minutes
Purge	2 to 3	minutes
Total	14	minutes

Figure 3–20. Backwash Timer Adjustment (Sheet 1 of 2)

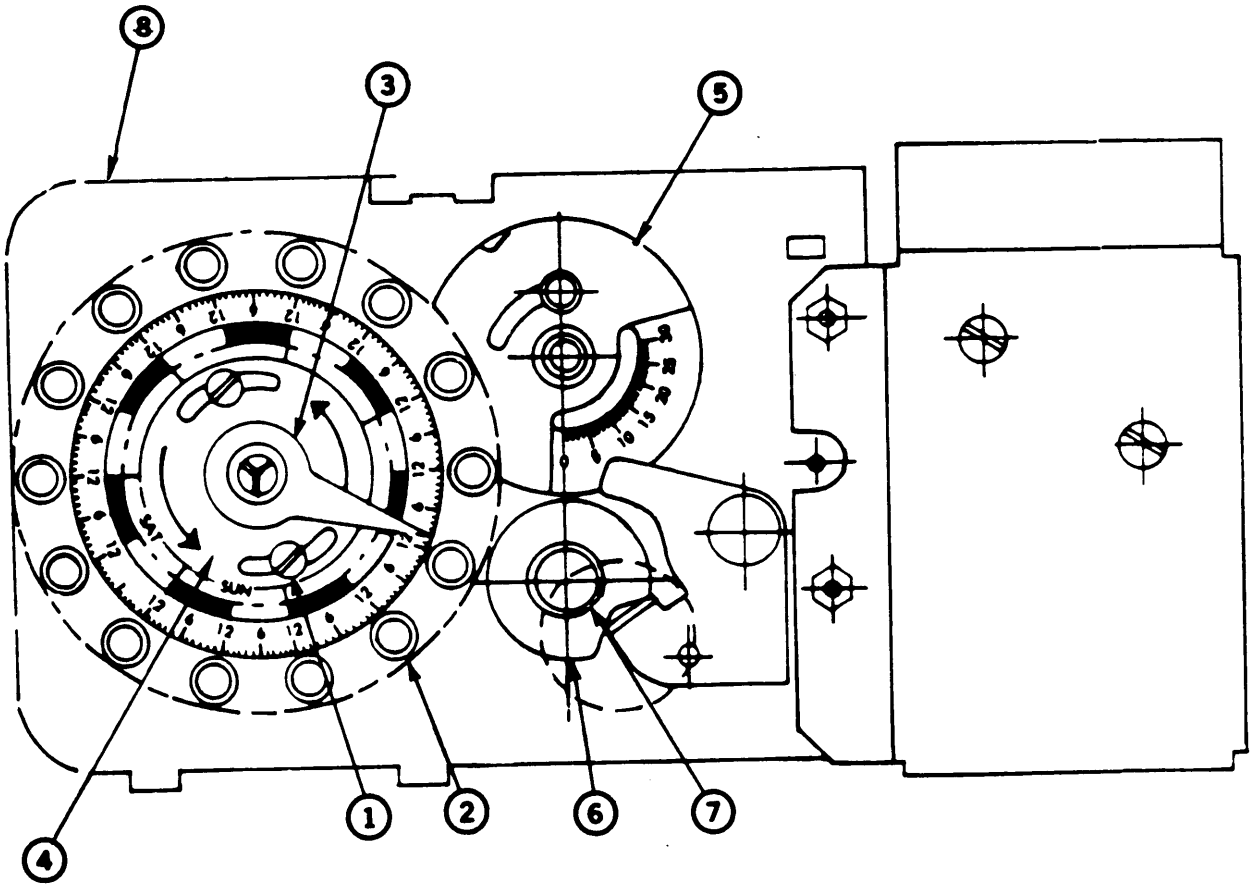


Figure 3-20. Backwash Timer Adjustment (Sheet 2 of 2)

n. Reconditioning Cycle Length Adjustment.

WARNING

ELECTRICAL HIGH VOLTAGE

Electrical high voltage can cause serious injury or death. Some tests performed in testing require power to be connected. Always take proper measures to ensure personal safety.

(1) Depress latch (2) figure 3-18, sheet 1 of 2) and remove timer mechanism (17) from timer case (1).

(2) Loosen setscrew (33), but do not remove.

(3) Position black cam (28) to read 0 minutes.

(4) Position second cam (30) the desired minutes away from 0 minutes.

(5) Position brine refill dial (5) (figure 3–20, sheet 2 of 2) to desired time for second backwash cycle.

(6) Position third cam (30) (figure 3–1 8, sheet 1 of 2) to desired time for the OFF cycle.

(7) Position fourth cam (31) to desired time for purge cycle.

(8) Tighten cam setscrew (33) when all adjustments have been made.

(9) Rotate extra reconditioning knob (7) (figure 3–20, sheet 2 of 2) to IDLE position.

(10) Position pilot valve controller cam (1) (figure 3–20, sheet 1 of 2) to the service (SR) position.

(11) Install timer mechanism (8) (figure 3–20, sheet 2 of 2) in case.

(12) Run tests required to assure proper adjustments have been made.

3-21. BACKWASH TIMER (SOLID STATE).

a. General. The backwash timer automatically starts and ends the different stages of the backwash cycle of the multimedia filter. Each stage of the cycle time can be adjusted to suit a wide range of water types and operating conditions. This paragraph describes the disassembly, cleaning, inspection, repair, and reassembly of the solid state timer. Refer to (figure 3–21) for schematic.

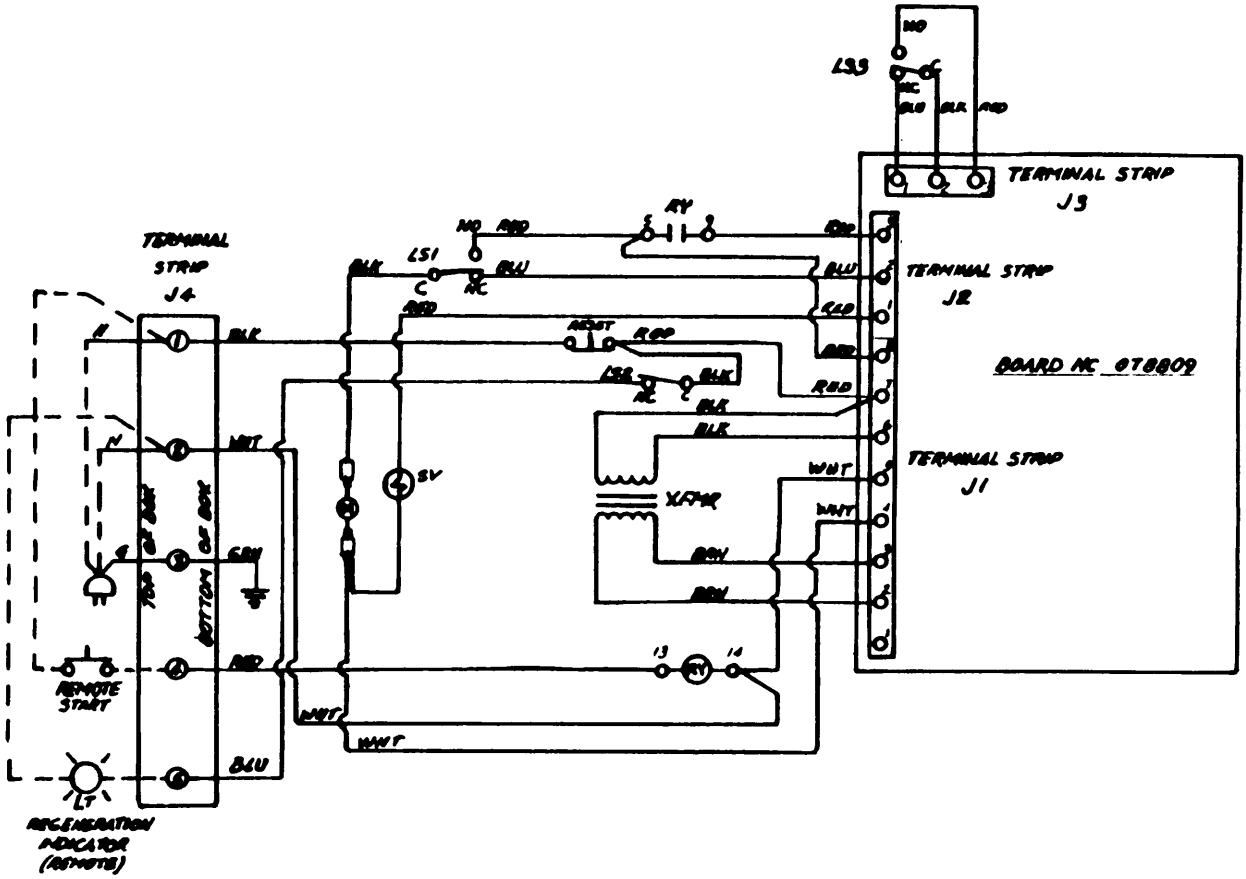


Figure 3-21. Backwash Timer (Schematic) (USMC)

b. Removal. Remove the backwash timer assembly as described in paragraph 2-56.

CAUTION

The backwash timer is a delicate piece of equipment. Dirt or grease can damage the unit. Make sure work space is clean and uncluttered.

c. Sub–Plate Components Disassemble. (Figure 3–22)

(1) Open timer cover.

(2) Using Allen wrench, loosen get screw (1). Remove indicator knob (2).

(3) Remove four panel retaining screws (3) and fold out sub-plate (4).

(4) Remove retainer nut (5) and remove reset switch (6) from sub-plate (4).

(5) Remove retainer nut (5) from switch (6).

d. Printed Circuit Board and Timer Motor Disassembly. (Figure 3-23)

(1) Identify, tag, and disconnect electrical wires (1) from terminal strips (2) and (3) in timer box (4).

(2) Remove five screws (5) and printed circuit board (6) from timer box (4).

(3) Remove two screws (7), two compression springs (8) and timer motor (9) from timer box (4).

(4) Remove four screws (10), ground lug (11), two screws (12), and plate (13) from timer box (4).

(5) Remove two nuts (14), two screws (15), two washers (16), and micro switch (17) from plate (13).

(6) Remove two nuts (18), two screws (19), two washers (20), two insulators (21), and micro switch (22) from bracket (23).

(7) Remove two screws (24) and bracket (23) from timer box (4).

(8) Remove white controller cam (25) from timer box (4).

(9) Remove gasket (26) from around edge of timer box (4). Discard gasket (26).

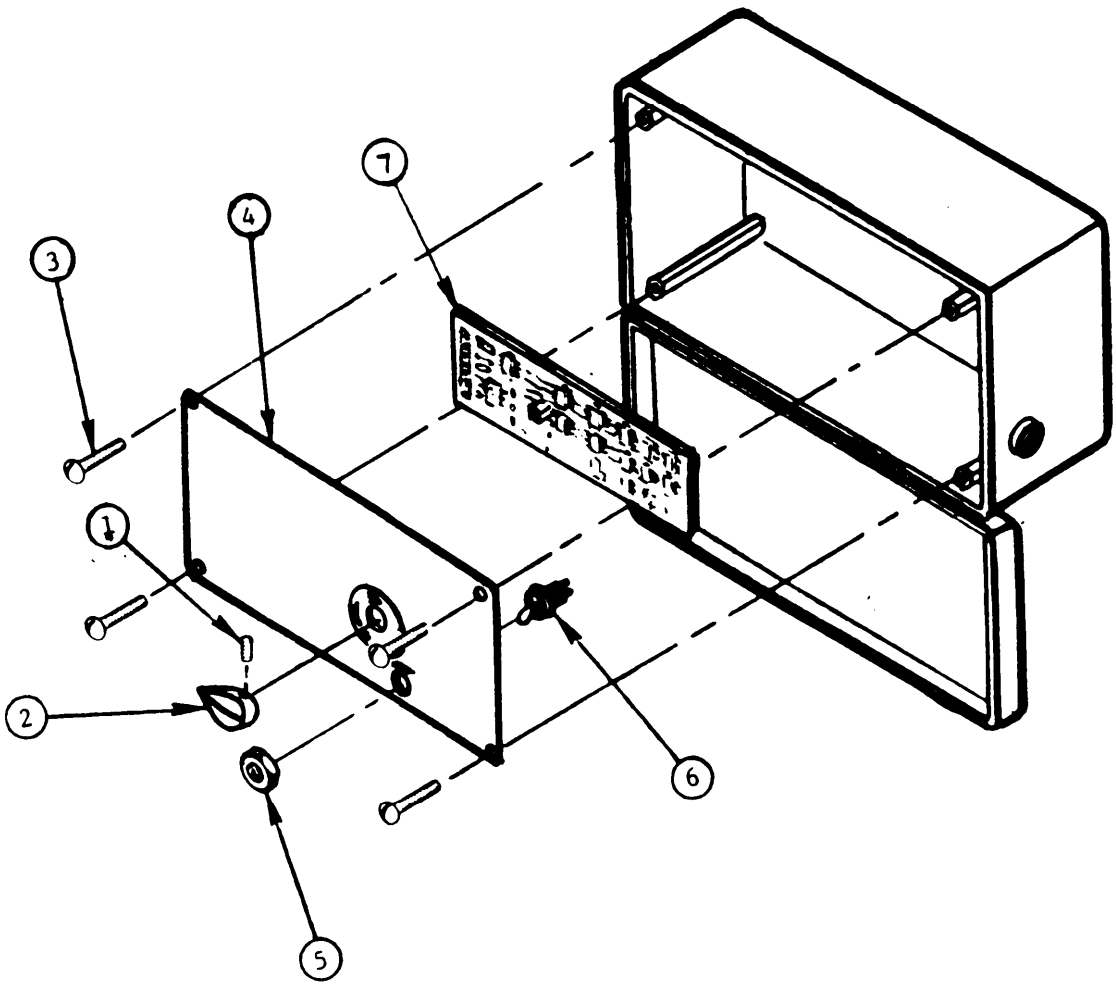


Figure 3-22. Backwash Timer (Electronic) Sub-Plate Components (USMC)

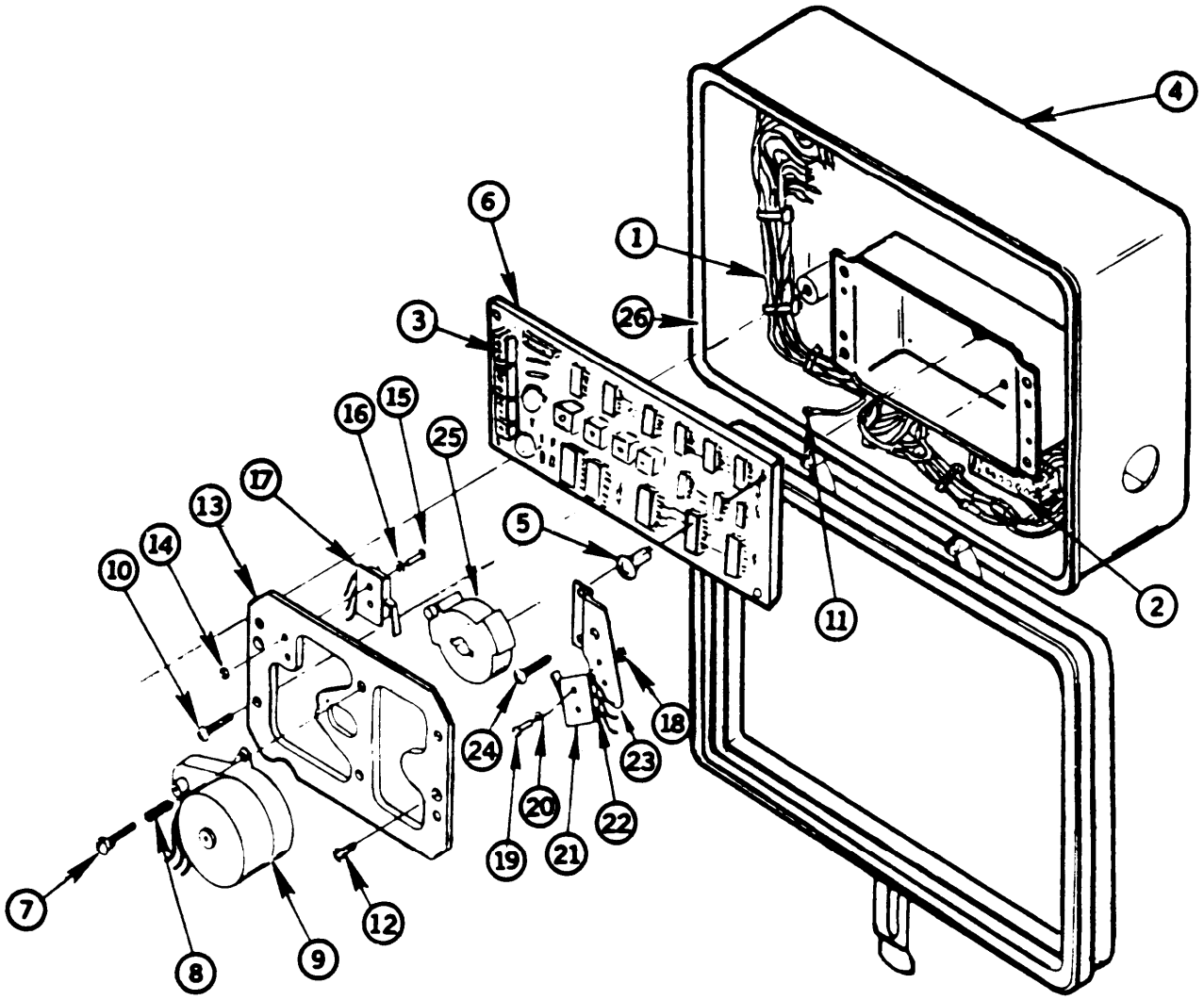


Figure 3-23. Backwash Timer Printed Circuit Board and Timer Motor (Electronic)

e. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Using a soft brush and cleaning solvent Fed. Spec. P-D-680 remove all dirt, dust, and contaminants from all metal and plastic parts.

(2) Remove all dirt, carbon, and dust from electrical contacts.

(3) Remove all contaminants from all threads.

(4) Allow parts to air dry.

f. Inspection.

(1) Inspect plastic parts for cracks, fractures, or chipped edges.

(2) Inspect terminal strips for breaks and damage.

(3) Inspect micro switches for ease of operation.

(4) Inspect cam for pits, wear, breaks, and damage.

(5) Inspect compression springs for weakness, breaks, and fractures.

(6) Inspect all hardware for damage, stripped threads, or heads.

(7) Inspect all pipe fittings for damaged or stripped threads.

g. Repair or Replace

(1) Replace all gaskets, seals, and O-rings.

(2) Replace all damaged nuts, bolts, screws, and washers.

(3) Repair or replace damaged timer case.

(4) Replace damaged terminal block.

(5) Replace damaged P.C. board.

(6) Replace unserviceable timer motor.

(7) Replace damaged or unserviceable micro switches.

(8) Replace damaged cam.

(9) Replace all damaged, cracked, or bent switch insulators.

(10) Replace all damaged pipe fittings.

h. Printed Circuit Board and Timer Motor Reassembly. (Figure 3–23)

(1) Install new gasket (26) around edge of timer box (4).

(2) Install white controller cam (25) in timer box (4).

(3) Install bracket (23) in timer box (4) using two screws (24),

(4) install micro switch (22) and two insulators (21) on bracket (23) using two washers (20), two screws (19), and two nuts (18).

(5) Install micro switch (17) on plate (13) using two washers (16), two screws (15), and two nuts (14),

(6) Install plate (13) in timer box (4) using two screws (12).

(7) Install ground lug (11) and four screws (10).

(8) Install timer motor (9) and two compression springs (8) in timer box (4) using two screws (7).

(9) Install printed circuit board (6) in timer box (4) using five screws (5).

(10) Connect electrical wires (1) to terminal strips (2) and (3) in accordance with schematic (figure 3-21),

(11) Check wiring and remove tags.

i. Sub-Plate Components Reassembly. (Figure 3–22)

(1) Check that printed circuit board (7) is installed.

(2) Install switch (6) on sub-plate (4) using nut (5).

(3) Install sub-plate (4) using four screws (3).

(4) Using an Allen wrench, install indicator knob (2) with setscrew (1).

(5) Close timer box cover.

3-22. R.O. PRESSURE GAGE (psig).

a. General. To verify serviceability or detect mechanical failure, test the R.O. PRESSURE psi gage. This paragraph describes the inspection, cleaning, and tests to determine serviceability and accuracy of the gage.

b. Removal. If necessary, remove R.O. pressure psi gage in accordance with paragraph 2-67.

c. Cleaning.

(1) Clean gage crystal.

(2) Clean pipe connector threads.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(3) Clean gage assembly with cleaning solvent Fed. Spec. P-D-680.

d. Inspection.

(1) Inspect exterior coating and case metal for signs of corrosion resulting from spray of water containing salts and other chemicals.

(2) Inspect for leaks in shock-absorbing integrity.

(3) Inspect for watertight integrity.

(4) Inspect connections to pressure system, particularly threaded connections, machined socket, and flared ends.

e. Pressure Test.

(1) Using a dead-weight gage tester (accurate to 1/10 of 1%), test gage at 300,600,900, 1200, and 1500 psi (21 .09,42 .18,63.28,84.37, and 105.47 kg/cm2).

(2) Tolerance of readings shall be:

Known Weight	Tolerance	Acceptance Range
300 psi (21 .09 kg/cm^2)	1%	297–303 psi (20.87–21.3 kg/cm^2)
600 psi (42. 18 kg/cm^2)	2%	588–612 psi (41.34–43.02 kg/cm^2)
900 psi (63.27 kg/cm^2)	2%	882–91 8 psi (62.0–64.54 kg/cm^2)
1200 psi (84.36 kg/cm^2)	1%	1188–1212 psi (83.51–85.20 kg/cm^2)
1500 psi (1 05.45 kg/cm^2)	1%	1485–1515 psi (104.4–106.50 kg/cm^2)

(3) Test shall be accurate between 0° to 150°F (18° to 65.5 C).

(4) If gage does not meet accuracy test, replace gage.

f. Repair or Replace.

(1) Reseal crystal into case, if loose.

(2) Conduct a corrosion control program when coating shows signs of pitting in the form of deep cavities of small diameter (either localized or over large areas), peeling of the case coatings, cracks, abrasions, or chemical deterioration where dissimilar metals meet (particularly where gage metal meets mounting hardware or pipes).

(3) Tighten loose connections to pressure system.

(4) Replace damaged, unrepairable, or unserviceable gage assembly.

3-23. R.O. VESSELS GAGE.

a. General. Gages must be tested periodically for accuracy. The R.O. VESSELS gage shows the pounds per square inch pressure drop between the input and the output of the R.O. vessels. The gage helps to determine when R.O. elements need changing. This paragraph covers cleaning, inspection, and testing of the R.O. VESSELS gage.

b. Removal. If necessary, remove R.O. vessels gage assembly in accordance with paragraph 2–68.

c. Cleaning.

(1) Clean threads of the coupling nuts.

(2) Clean gage crystal on outside with a mixture of water, a few drops of vinegar, and a few drops of liquid soap.

(3) Flush the inside of the gage by filling, soaking, draining, and drying the bourdon tube.

NOTE

Use cleaning compound that meets MIL-C-81302.

d. Inspection.

(1) Inspect connection points to pressure system, particularly welds, threaded connections, and machined socket and flared ends.

(2) Inspect extent of corrosion damage to both case metal and exterior coatings.

(3) Inspect for physical abrasions.

(4) Inspect for galvanic action where gage touched mountings and piping.

e. Testing.

(1) Attach “input” side of pressure gage to dead-eight gage tester shown in (figure 3-24).

(2) Close valve “A”.

(3) Open valve “B”.

(4) Add weight equal to differential pressure from 0 to 150 psid (0-10.55 kg/cm2d) in increments of 10 psid (0.7 kg/cm2d).

(5) Gage reading will be within ± 2% on increasing dial readings.

NOTE

At each pressure, leave setting for two minutes to verify gage seal. Reading will remain unchanged.

(6) Remove weight.

(7) Open valve “A”.

(8) Close valve “B”.

WARNING

High pressure can cause serious injury or death. Take proper safety precautions in case of unit failure during the high pressure tests.

(9) Add weight equal to 5000 psi (351.54 kg/cm2).

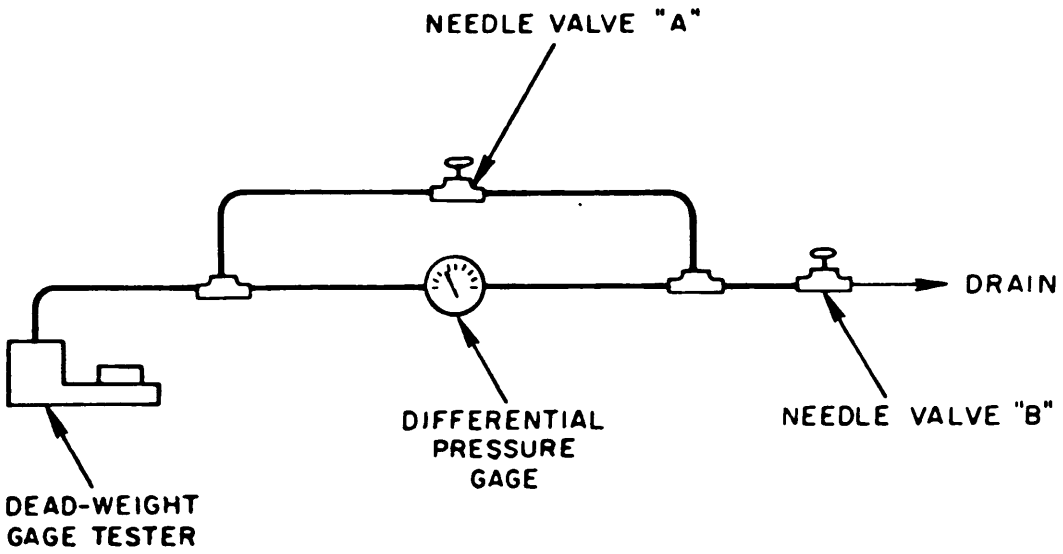


Figure 3–24. Differential Pressure Gage Tester

(10) Close valve "A".

(11) Slowly open valve "B" until pressure-differential gage reads 150 psid (10.55 kg/cm2d).

(12) Close valve "B".

(13) Leave setting for five minutes to verify gage seal. Reading will remain unchanged.

(14) Slowly open valve "A" until gage returns to 0 psi.

(15) Remove weights.

(16) Open valve "B".

(17) Remove gage from tester.

f. Repair or Replace.

(1) Reseal crystal into case, if loose.

(2) Conduct a corrosion control program when coating shows signs of pitting in the form of deep cavities of small diameter (either localized or over large areas), peeling of the case coatings, cracks, abrasions, or chemical deterioration where dissimilar metals meet (particularly where gage metal meets mounting hardware or pipes).

(3) Tighten loose connections to pressure systems.

(4) Replace damaged, unrepairable, or unserviceable gage assembly.

3-24. CARTRIDGE FILTER GAGE.

a. General. To verify serviceability or detect mechanical failure, test the CARTRIDGE FILTER gage by nondestructive testing methods. This paragraph describes the inspection, cleaning, and tests to determine serviceability and accuracy of the gage.

b. Removal. If necessary, remove cartridge filter gage assembly in accordance with paragraph 2-68.

c. Inspection.

(1) Inspect exterior coatings and case metal for signs of corrosion resulting from spray of water containing salts and other chemicals.

(2) Inspect for watertight integrity.

(3) Inspect connections to pressure system, particularly threaded connections and machined socket and flared ends.

d. Cleaning.

(1) Clean pipe connector threads.

(2) Clean gage crystal.

e. Pressure Test. Make a pressure test using a suitable means of producing adequate and accurate pressure.

f. Accuracy Test.

(1) Test gage for accuracy before and after pressure test to determine whether there has been any distortion in the bourdon tube that could affect gage registration.

(2) Make the test for accuracy of gage registration by placing the gage in a test fixture.

(3) Apply zero, full-scale, and midscale pressures, then check gage registration.

(4) If gage registration conforms to step (3), return gage to service.

g. Repair or Replace.

(1) Reseal crystal into case, if loose.

(2) Conduct a corrosion control program when coating shows signs of pitting in the form of deep cavities of small diameter (either localized or over large areas), peeling of the case coatings, cracks, abrasions, or chemical deterioration where dissimilar metals meet (particularly where gage meets mounting hardware or pipes).

(3) Tighten loose connections to pressure system.

(4) Replace damaged, unrepairable, or unserviceable gage assembly.

(5) Send unusable cartridge filter gage assembly to next higher level of maintenance.

h. Packaging for Reissue.

(1) Tag tested serviceable gage assembly for identification.

(2) Seal gage assembly in a polyethylene bag.

(3) Package gage assembly for reissue to Unit Maintenance.

3-25. MULTIMEDIA FILTER GAGE.

a. General. To verify serviceability or detect mechanical failure, MULTIMEDIA FILTER gage is tested by nondestructive testing methods. This paragraph describes the inspection, cleaning, and tests to determine serviceability and accuracy of the gage.

b. Removal. If necessary, remove multimedia filter gage assembly in accordance with paragraph 2-68.

c. Inspection.

(1) Inspect exterior coatings and case metal for signs of corrosion resulting from spray of water containing salts and other chemicals.

(2) Inspect for watertight integrity.

(3) Inspect connections to pressure system, particularly threaded connections, machined sockets, and flared ends.

d. Cleaning.

(1) Clean pipe connector threads.

(2) Clean gage crystal.

e. Pressure Test. Make a pressure test using a suitable means of producing adequate and accurate pressure.

f. Accuracy Test.

(1) Test gage for accuracy before and after pressure test to determine whether there has been any distortion in the bourdon tube that could affect gage registration.

(2) Make the test for accuracy of the gage registration by placing the gage in a test fixture.

(3) Apply zero, full-scale, and midscale pressures and check gage registration.

(4) If gage registration conforms to step (3) above, return gage to service.

g. Repair or Replace.

(1) Reseal crystal into case, if loose.

(2) Conduct a corrosion control program when coating shows signs of pitting in the form of deep cavities of small diameter (either localized or over large areas), peeling of the case coatings, cracks, abrasions, or chemical deter-oration where dissimilar metals meet (particularly where gage metal meets mounting hardware or pipes).

(3) Tighten loose connections to pressure system.

(4) Replace damaged, unrepairable, or unserviceable gage assembly.

(5) Send unusable multimedia fitter gage assembly to next higher level of maintenance for disposition.

3-26. RAW WATER FLOWMETER.

a. General. The RAW WATER FLOWMETER shows the rate which raw water is entering the ROWPU. This paragraph describes test and inspection of the RAW WATER FLOWMETER.

b. Removal. If necessary, remove raw water flowmeter assembly in accordance with paragraph 2-69.

c. Test.

CAUTION.

Be sure to attach water source to inlet port of meter, which is marked IN. Running water backwards, into the outlet port, can damage meter.

NOTE

Pipe leading to meter inlet (IN) for test must be straight for at least 20 inches (50 cm) before entering meter. Otherwise, test will not be accurate.

(1) Attach inlet port of meter to a straight pipe at least 20 inches (50 cm) long, leading to a metered water source. The source must have an output range of 5 to 40 gpm (19 to 151 lpm).

NOTE

If no metered source is available, run the source into a graduated tank for 1 minute to determine exact flow rate.

(2) Run water through meter at rate of 5 gpm (19 lpm). If meter reading varies from flow rate by more than 0.15 gpm (0.6 lpm), discard meter.

(3) Run water through meter at rate of 20 gpm (76 lpm). If meter reading varies from flow rate by more than 0.60 gpm (2.3 lpm), discard meter.

(4) Run water through meter at rate of 35 gpm (132 lpm). If meter reading varies from flow rate by more than 1 gpm (3.8 lpm), discard meter.

d. Inspection.

(1) Inspect dial crystal for cracks or scratches.

(2) Inspect dial face for legibility. Make sure needle can move freely.

(3) During test, check meter body and dial for leaks.

e. Repair or Replace.

(1) Replace damaged, unrepairable, or unserviceable flowmeter assembly.

(2) Send replaced unusable raw water flowmeter assembly to next higher level of maintenance.

3-27. PRODUCT WATER FLOWMETER.

a. General. The PRODUCT WATER FLOWMETER shows the rate of flow of product Water purified by the ROWPU. The meter has no external adjustments. This paragraph describes test and inspection of the PRODUCT WATER FLOWMETER.

b. Removal. If necessary, remove product water flowmeter assembly in accordance with paragraph 2-70.

c. Test.

CAUTION

Be sure to attach water source to inlet port of meter, which is marked IN. Running water backwards into the outlet port can damage meter.

(1) Attach inlet port to water source with flow rate between 5 and 24 gpm (19 and 91 Ipm). Attach outlet port to pipe leading to graduated 55-gallon (208 liter) drum.

(2) Run water through meter and into drum at a constant rate for 1 minute. Compare rate of flow shown by meter with amount of water in drum. Amount shall not differ from meter reading by more than 1 quart (0.95 liter) per 5 gallons (19 liters).

(3) Repeat test three times. Compare the results.

d. Inspection.

(1) During test, inspect meter for leaks.

(2) Inspect glass meter tube for cracks.

(3) Inspect pipe threads and frame for damage.

e. Repair or Replce.

(1) Replace damaged, unrepairable, or unserviceable flowmeter assembly.

(2) Send replaced unusable product water flowmeter assembly to next higher level of maintenance.

3-28. BACKWASH WATER FLOWMETER.

a. General. The BACKWASH WATER FLOWMETER shows the rate of brine water flow into the multimedia filter during the backwash operation. This paragraph describes test and inspection of the BACKWASH WATER FLOWMETER.

b. Removal. If necessary, remove backwash water flowmeter assembly in accordance with paragraph 2-69.

c. Test.

CAUTION

Be sure to attach water source to inlet port of meter, which is marked IN. Running water backwards into the outlet port can damage meter.

NOTE

Pipe leading to meter inlet (IN) for test must be straight for at least 20 inches (50 cm) before entering meter. Otherwise, test will not be accurate.

(1) Attach inlet port of a meter to a straight pipe, at least 20 inches (50 cm) long, leading to a metered source. The source must have an output range of 20 to 150 gpm (76 to 568 lpm).

NOTE

If no metered source is available, run the source into a graduated tank for 1 minute to determine exact flow rate.

(2) Run water through meter at a rate of 25 gpm (95 lpm). If meter reading varies from flow rate by more than 0.75 gpm (2.8 lpm), discard meter.

(3) Run water through meter at a rate of 80 gpm (303 lpm). If meter reading varies from flow rate by more than 2.4 gpm (9.1 lpm), discard meter.

(4) Run water through meter at a rate of 140 gpm (530 Ipm). If meter reading varies from flow rate by more than 4.2 gpm (16 Ipm), discard meter.

d. Inspection.

(1) Inspect dial crystal for cracks or scratches.

(2) Inspect dial face for legibility. Make sure needle can move freely.

(3) During test, check meter body and dial for leaks.

e. Repair or Replace.

(1) Replace damaged, unrepairable, or unserviceable flowmeter assembly.

(2) Send replaced backwash water flowmeter assembly to next higher level of maintenance.

f. Packaging for Reissue.

(1) Tag tested serviceable flowmeter assembly for identification.

(2) Seal flowmeter assembly in a polyethylene bag.

(3) Package flowmeter assembly for reissue to Unit Maintenance.

3-29. BRINE WATER FLOWMETER.

a. General. The BRINE WATER FLOWMETER shows the rate at which brine water is flowing out of the R.O. vessels. This paragraph describes test and inspection of the BRINE WATER FLOWMETER.

b. Removal. If necessary, remove brine water flowmeter assembly in accordance with paragraph 2–69.

c. Test.

CAUTION

Be sure to attach water source to inlet port of meter, which is marked IN. Running water backwards into the outlet port can damage meter.

NOTE

Pipe leading to meter inlet (IN) for test must be straight for at least 20 inches (50 cm) before entering meter. Othenwise, test will not be accurate.

(1) Attach inlet port of meter to a straight pipe, at least 20 inches (50 cm) long, leading to a metered water source. The source must have an output range of 5 to 40 gpm (19 to 151 Ipm).

NOTE

If no metered source IS available, run the source into a graduated tank for 1 minute to determine exact flow rate.

(2) Run water through meter at a rate of 5 gpm (19 Ipm) . If meter reading varies from flow rate by more than 0.15 gpm (0.6 Ipm), discard meter.

(3) Run water through meter at a rate of 20 gpm (76 Ipm). If meter reading varies from flow rate by more than 0.60 gpm (2.3 Ipm), discard meter.

(4) Run water through meter at a rate of 35 gpm (132 Ipm). If meter reading varies from flow rate by more than 1 gpm (3.8 Ipm), discard meter.

d. Inspection.

(1) Inspect dial crystal for cracks or scratches.

(2) Inspect dial face for legibility. Make sure needle can move freely.

(3) During test, check meter body and dial for leaks.

e. Repair or Replace.

(1) Replace damaged or unserviceable flowmeter assembly.

(2) Send replaced unusable brine water flowmeter assembly to next higher level of maintenance.

f. Packaging for Reissue.

(1) Tag tested serviceable flowmeter assembly for identification.

(2) Seal flowmeter assembly in a polyethylene bag.

(3) Package flowmeter assembly for reissue to Unit Maintenance.

3-30. CHEMICAL FEED PUMP BLOCK/HEAD ASSEMBLY.

a. General. The chemical feed pump injects four different chemicals into the ROWPU water system to help purify the water. The pump can be disassembled into four separate block/head assemblies. This paragraph describes removal, cleaning, inspection, and installation of a block/head assembly.

b. Removal.

(1) If necessary, remove motor from pump in accordance with paragraph 2-48 and remove pump assembly from stand in accordance with paragraph 2–71.

CAUTION

The chemical feed pump is a delicate piece of equipment. It can be damaged if dirt or grease gets into the mechanism. Before beginning disassembly of pump block, make sure work space is clean and uncluttered. Clean exterior of pump thoroughly before taking it apart.

NOTE

Pump blocks are filled with lubricating oil which may spill out of tie-rod holes. Depending on shop conditions, you may remove lubrication by opening screw plug on top of each block and pouring out oil.

(2) Remove two nuts (1) (figure 3-25) (ARMY) from tie rods holding assembly together.

(3) Remove three nuts (1) (figure 3-26) (USMC) from tie rods holding assembly together.

(4) Remove end plate (2) and gaskets (3) from tie rods (5). Discard gaskets (3).

(5) Slide pump block/head assemblies (4) and gaskets (3) off tie rods (5), one at a time.

c. Cleaning.

(1) Clean tie rods, their threads, and threads on nuts holding end plate.

(2) Clean gasket seats before replacing a bad unit with a serviceable one.

(3) Remove chemical corrosion, pitting, and discoloration on each pump unit.

(4) Clean chemical tube couplers on all pump units.

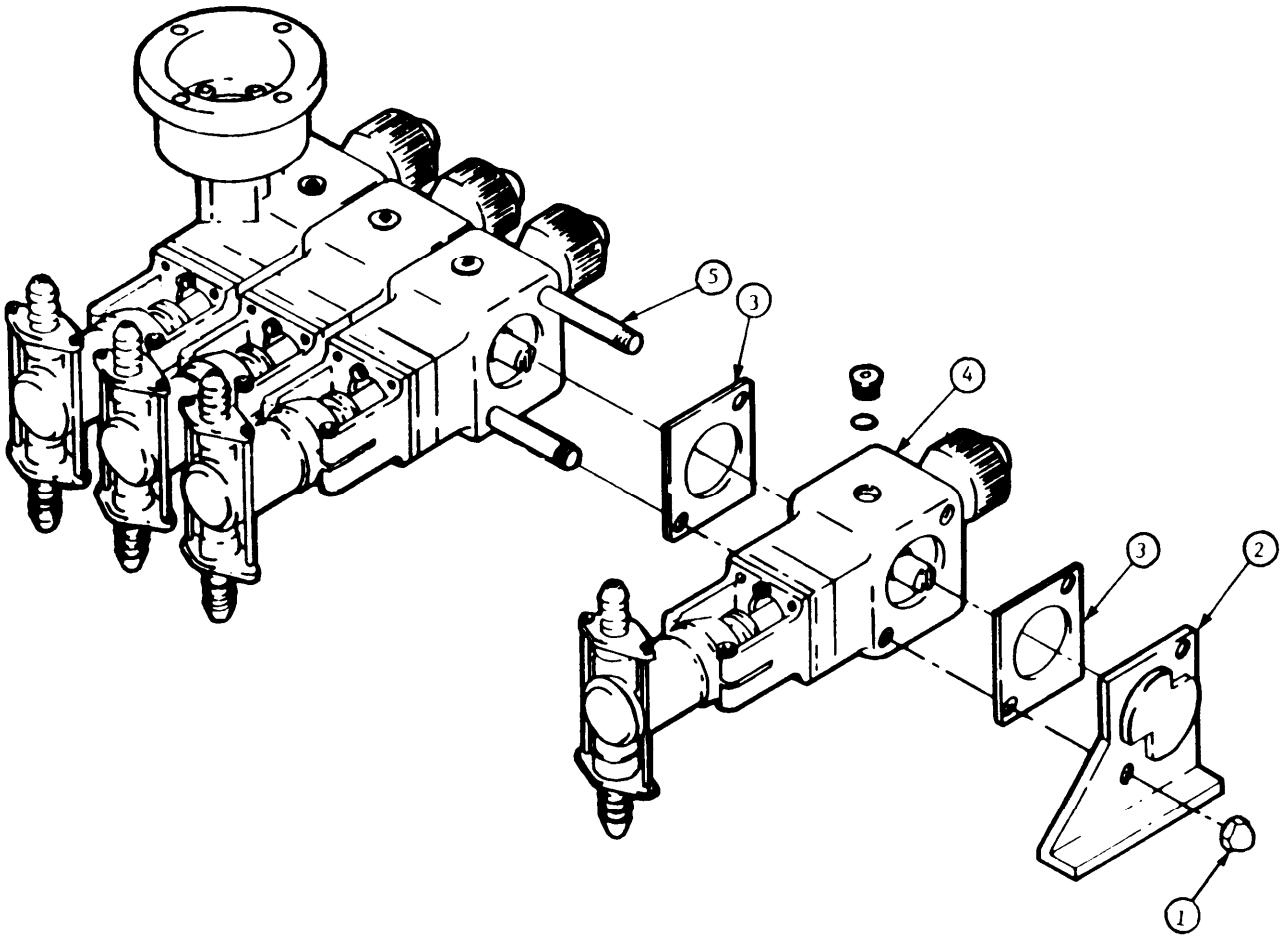


Figure 3-25. Chemical Feed Pump Block/Head Assembly (ARMY)

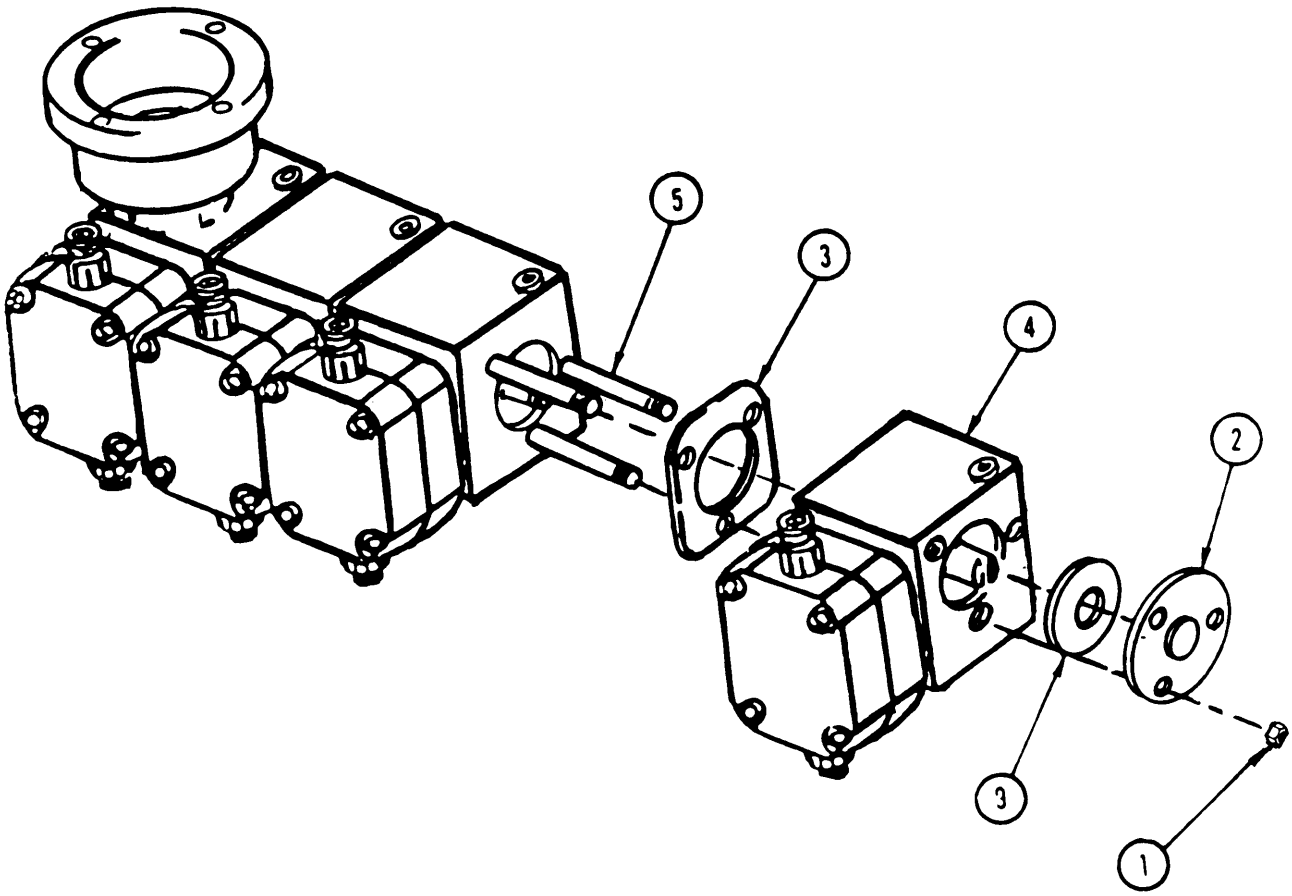


Figure 3-26. Chemical Feed Pump Block/Head Assembly (USMC)

d. Inspection.

(1) Inspect the replacement chemical pump block/head assembly for proper factory mounting and assembly.

(2) Inspect chemical feed adjustment knob to ensure that replacement pump can be adjusted readily to dial settings between 0 and 10. (ARMY).

(3) Inspect in and cut rubbing connectors to ensure they are not crimped, bent, or broken.

(4) Inspect gasket seats on both sides of replacement assembly.

e. Repair or Replace.

(1) Replace all gaskets.

(2) Replace damaged or unserviceable nuts.

(3) Straighten or replace bent or damaged end plates.

(4) Straighten or replace bent or damaged tie rods.

(5) Polish pitted or scratched gasket seats with very fine emery cloth.

(6) Repair, clean, and inspect feed pump block assembly in accordance with paragraph 3-30. (ARMY)

(7) Repair, clean, and inspect feed pump head assembly in accordance with paragraph 3-31. (USMC)

(8) Repair, clean, and inspect feed pump stroke adjustment control in accordance with paragraph 3–32.

f. Reassemblv.

CAUTION

The chemical feed pump is a delicate piece of equipment. It can be damaged if dirt or grease gets into the mechanism. Before beginning reassembly of pump block, make sure work space is clean and uncluttered. Clean component parts thoroughly before installation.

(1) Install pump block/head assemblies (4) (figures 3-25 and 3-26) and gaskets (3) on tie rods (5). Install one assembly at a time.

(2) Install end plate (2) and gasket (3) on tie rods (5).

(3) Install two nuts (1) on ends of tie rods (5) (figure 3-25) (ARMY).

(4) Install three nuts (1) on ends of tie rods (5) (figure 3-26) (USMC).

g. Installation.

CAUTION

The chemical feed block/head assembly is a delicate piece of equipment. It can be damaged if dirt or grease gets into the mechanism. Make sure work area is clean during installation.

NOTE

Pump blocks are filled with lubricating oil which may leak out of tie-rod holes during installation.

(1) Check each block/head for oil level. Fill with lubricating oil, if necessary.

(2) Install block/head assembly to stand in accordance with paragraph 2-71.

(3) Install chemical feed pump motor in accordance with paragraph 2-46 and paragraph 3-14.

3-31. CHEMICAL FEED PUMP BLOCK ASSEMBLY.

a. General. The pump block assembly houses the components that drive and control the workings of the chemical feed pump. This paragraph describes the disassembly, cleaning, inspection, and installation of the chemical feed pump block assembly.

b. Disassembly of Drive Gear Casing. (Figure 3-27) (ARMY)

CAUTION

The chemical feed block/head assembly is a delicate piece of equipment. It can be damaged if dirt or grease gets into the mechanism. Make sure work area is clean.

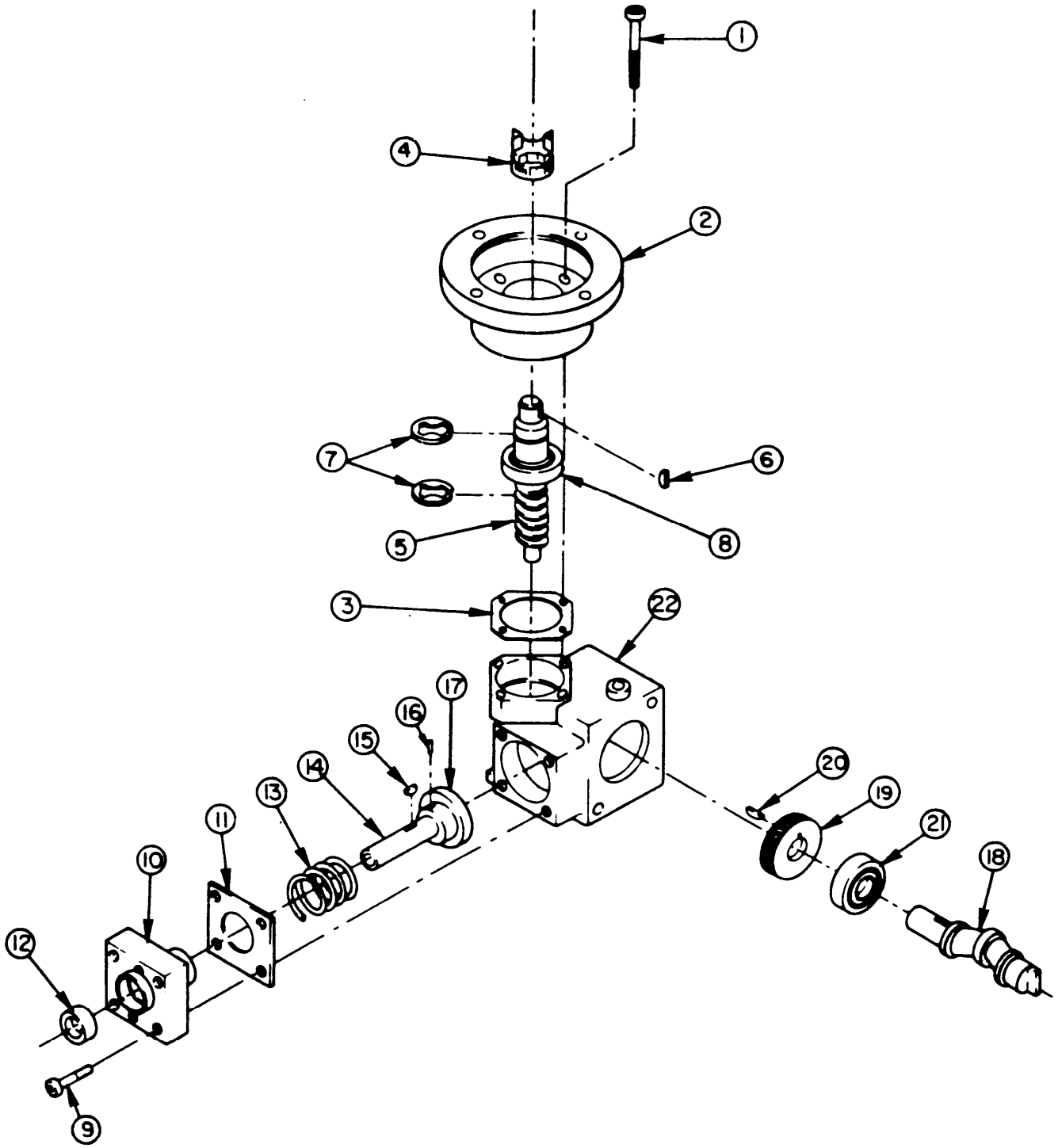


Figure 3-27. Chemical Feed Pump Block Assembly (ARMY)

(1) Remove pump motor from pump assembly in accordance with paragraph 2-48.

(2) Remove pump block/head assembly in accordance with paragraph 3-30.

(3) Remove pump head assembly from pump block in accordance with paragraph 3-30c., steps (1) through (9).

NOTE

Wrap pump head assembly parts in a clean lint–free cloth.

(4) Remove feed pump stroke adjustment control in accordance with paragraph 3-33.

(5) Remove four bolts (1) from pump block (22) and motor mounting flange (2).

(6) Remove mounting flange (2) and gasket (3) from pump block (22). Discard gasket (3).

(7) Remove drive coupling (4) from pump block (22).

(8) Turn worm gear (5) counterclockwise and remove from pump block (22).

(9) Remove Woodruff key (6) and two C-clips (7) from worm gear (5).

(10) Remove upper ball bearing (8) from worm gear (5).

(11) Remove four hollow screws (9) from pump block (22) and guide bushing (10).

(12) Remove guide bushing (10) and gasket (11) from pump block (22). Discard gasket (11).

(13) Remove radial seal ring (12) from guide bushing (10). Discard seal ring (12).

(14) Remove pump rod spring (13) from pump rod (14).

(15) Remove pump rod (14) from pump block (22).

(16) Remove Woodruff key (15) from pump rod (14).

(17) Drive out flange pin (16) from pump rod (14) and stopping flange (17).

(18) Remove stopping flange (17) from pump rod (14).

(19) Remove crankshaft (18) from pump block (22).

(20) Remove worm wheel (19) from crankshaft (18).

(21) Remove Woodruff key (20) from crankshaft (18).

(22) Remove bearing (21) from crankshaft (18).

c. Disassembly of Drive Gear Casing. (Figure 3-28) (USMC)

CAUTION

The chemical feed block/head assembly is a delicate piece of equipment. It can be damaged if dirt or grease gets into the mechanism. Make sure work area is clean.

(1) Remove pump motor from pump assembly in accordance with paragraph 2-48.

(2) Remove pump block head assembly in accordance with paragraph 3-30.

(3) Remove pump head assembly in accordance with paragraph 3-32.

NOTE

Wrap pump head assembly in a clean lint free cloth.

(4) Remove feed pump stroke control in accordance with paragraph 3-33.

(5) Turn worm gear (4) counterclockwise and remove from pump block (3).

(6) Remove C-clips (5) and (6) from worm gear (4).

(7) Remove ball bearing (7) from worm gear (4).

(8) Remove diaphragm (8), push plate (9), and splash protection plate (10).

(9) Remove diaphragm drive (11) and gasket (12).

(10) Remove spring (13), C-clip (14), grooved ring (15), and Woodruff key (16) from thrust rod (17).

(11) Remove eccentric shaft (18) from pump block (3).

(12) Remove worm wheel (19) and Woodruff key (20) from shaft (18).

(13) Remove ball bearing (21) from shaft (18).

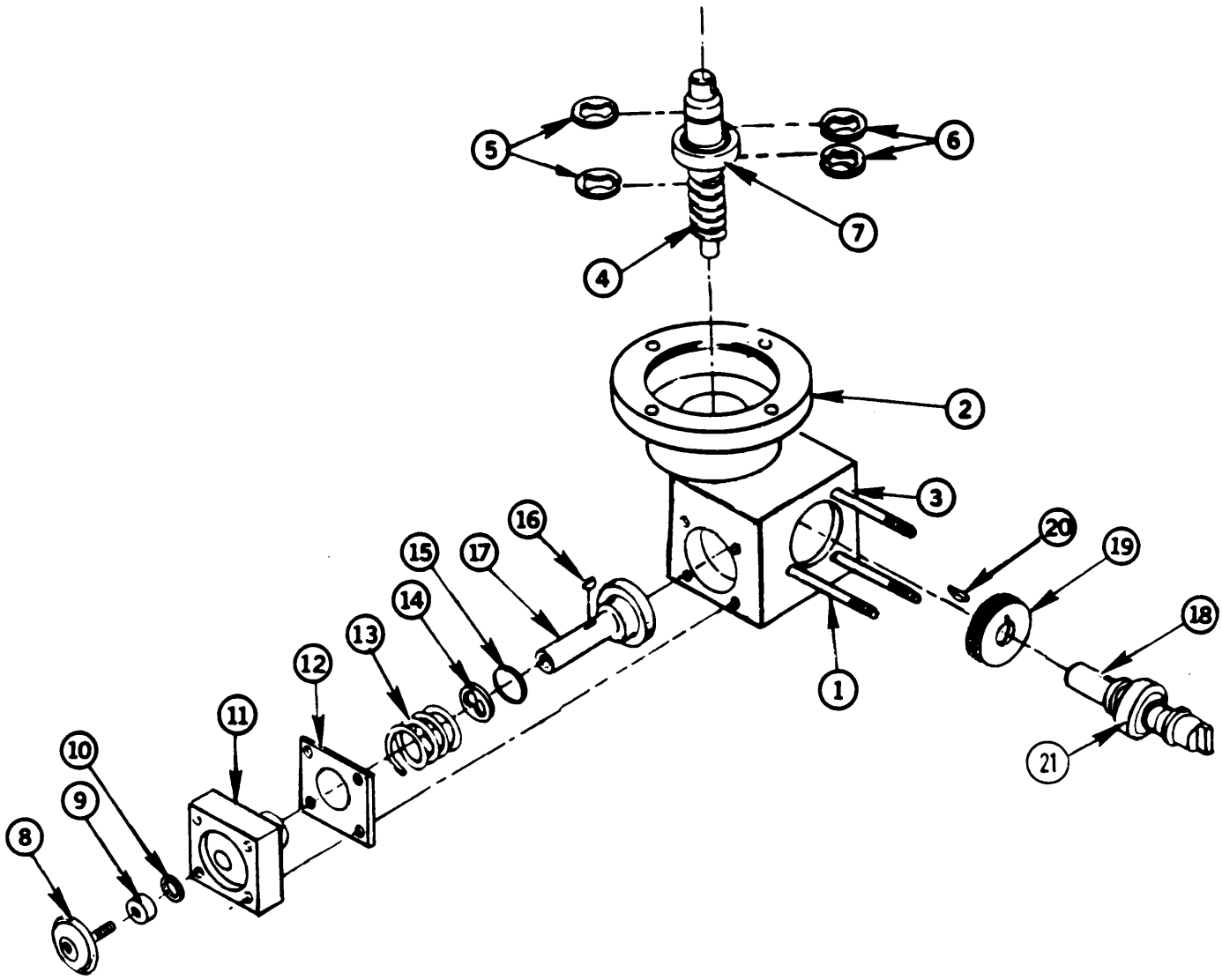


Figure 3-28. Chemical Feed Pump Block Assembly (USMC)

d. Cleaning.

(1) Clean corrosion from mounting screws and external parts.

(2) Clean lubricant out of drive gear casing and pump blocks.

WARNING

Drycleaning solvent Fed. Spec. P–D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(3) Soak parts and casings in cleaning solvent Fed. Spec. P-D-680. Use brush to remove accumulated grease and dirt out of crevices.

(4) Soak ball bearing assemblies in cleaning solvent Fed. Spec. P-D-680.

(5) Wash ball bearing assemblies in cleaning solvent Fed. Spec. P-D–680 carefully removing all dirt, grease, corrosion, and chemicals.

e. Inspection.

(1) Inspect drive gear casing (pump block) assembly for cracks or breaks.

(2) Inspect drive coupling for broken, worn, or missing teeth.

(3) Inspect worm gear for broken, worn, or missing teeth.

(4) Inspect upper ball bearing for wear and excessive play.

(5) Inspect pump block for cracks, fractures, or chipping.

(6) Inspect worm wheel for broken, worn, or missing teeth.

(7) Inspect ball bearing for wear or excessive play.

(8) Inspect crankshaft cam lobe for wear, nicks, scratches, or fractures.

(9) Inspect Woodruff keys and mounting slots for wear, chips, or fractures.

(10) Inspect stopping flange for wear, chips, or fractures.

(11) Inspect hardware, screws, bolts, or nuts for stripped threads, bent shanks, or damaged heads.

f. Repair or Replace

(1) Replace all damaged nuts, bolts, hollow screws, C-clips, Woodruff keys, flange pins, and washers.

(2) Replace all gaskets, O-rings, and seals.

(3) Replace damaged or worn drive coupling halves.

(4) Replace worn or damaged worm gear and worm wheel.

(5) Replace worn, damaged, or unserviceable ball bearing assemblies.

(6) Pack usable ball bearings in clean bearing grease.

(7) Replace damaged, weak, fractured, or worn pump rod springs.

(8) Replace damaged, worn, or unserviceable motor mounting flanges, stopping flanges, pump rods, and guide bushings.

(9) Remove small scratches from crankshaft with fine emery cloth.

(10) Replace damaged, bent, or unserviceable crankshaft.

(11) Repair pump block/head assembly in accordance with paragraph 3-30.

(12) Repair pump head assembly in accordance with paragraph 3-32.

(13) Repair feed pump stroke adjustment control in accordance with paragraph 3-33.

g. Installation. (Figure 3-27) (ARMY)

(1) Press bearing (21) on crankshaft (18).

(2) Install Woodruff key (20) on crankshaft (18).

(3) Install worm wheel (19) on crankshaft (18).

(4) Install crankshaft (18) in pump block (22).

(5) Slip stopping flange (17) over pump rod (14) and align pin hole.

(6) Install pin (16) through stopping flange (17) and pump rod (14).

(7) Install Woodruff key (15) in pump rod (14).

(8) Install pump rod (14) with stopping flange (17) attached, in pump block (22).

(9) Slip pump rod spring (13) over pump rod (14).

(10) Slide new radial seal ring (12) into guide bushing (10).

(11) Install gasket (11) and guide bushing (10) with radial seal ring (12) and attach into pump block (22)

(12) Install four hollow screws (9) through guide bushing (10), gasket (11), and pump block (22).

(13) Snap lower C-clip (7) on worm gear (5).

(14) Press upper ball bearing (8) on worm gear (5).

(15) Snap top C-clip (7) on worm gear (5).

(16) Install Woodruff key (6) in worm gear (5).

(17) Turn worm gear (5) clockwise to install in pump block (22).

(18) Install coupling (4) in pump block (22).

(19) Hold motor mounting flange (2) and new gasket (3) in place on pump block (22) and align mounting holes.

(20) Install four bolts (1) through motor mounting flange (2), gasket (3), and pump block (22).

(21) Install feed pump stroke adjustment control in accordance with paragraph 3-33

(22) Install pump head assembly to pump block in accordance with paragraph 3-32.

(23) Install pump block/head assembly in accordance with paragraph 3-30.

(24) Install pump head assembly in accordance with paragraph 3-32.

(25) Install pump motor to pump assembly in accordance with paragraph 2-48.

h. Installation. (Figure 3-28) (USMC)

(1) Install ball bearing (21) on shaft (18)

(2) Install Woodruff key (20) and worm wheel (19) on shaft (1 8).

(3) Install shaft (18) into pump block (3).

(4) Install Woodruff key (16), grooved ring (15), C-clip (14), and spring (13) on thrust rod (17) and position in pump block (3).

(5) Install gasket (12) and diaphragm drive (11) on pump block (3).

(6) Install push plate (9) and splash protection plate (10) on diaphragm (8) and screw into thrust rod (17),

(7) Install ball bearing (7) on worm gear (4).

(8) Install C-clips (5) and (6) on worm gear (4) and screw worm gear clockwise into pump block (3).

(9) Install feed pump stroke control in accordance with paragraph 3-33.

(10) Install pump head assembly in accordance with paragraph 3-32.

(11) Install pump block head assembly in accordance with paragraph 3-30.

(12) Install pump motor in accordance with paragraph 2-48.

3-32. CHEMICAL FEED PUMP HEAD ASSEMBLY.

a. General. The chemical feed pump head assembly feeds measured amounts of chemicals into the ROWPU water system. This paragraph describes disassembly, inspection, cleaning, and reassembly of the chemical feed pump head assembly.

b. Removal. Remove pump block assembly in accordance with paragraph 3-30.

c. Disassembly. (Figure 3-29) (ARMY)

(1) Loosen gland nut (9) to relieve pressure on plunger (7).

(2) Loosen, but do not remove, yoke screw (1) and spread yoke-type holder (4) gently.

CAUTION

Nicks or scratches on the plunger will cause frequent packing failure. Take care not to damage plunger.

(3) Grasp pump body (2) and remove from plunger (7) by pulling straight away from the holder (4).

(4) Using a socket head, remove two screws (3) from pump holder (4) (center holes, top and bottom).

(5) Remove holder (4) from pump block (27).

(6) Unscrew bushing screw (5) and remove from pump rod with plunger (7) attached.

NOTE

Split ring (6) may drop off when removing plunger. Take care not to lose parts.

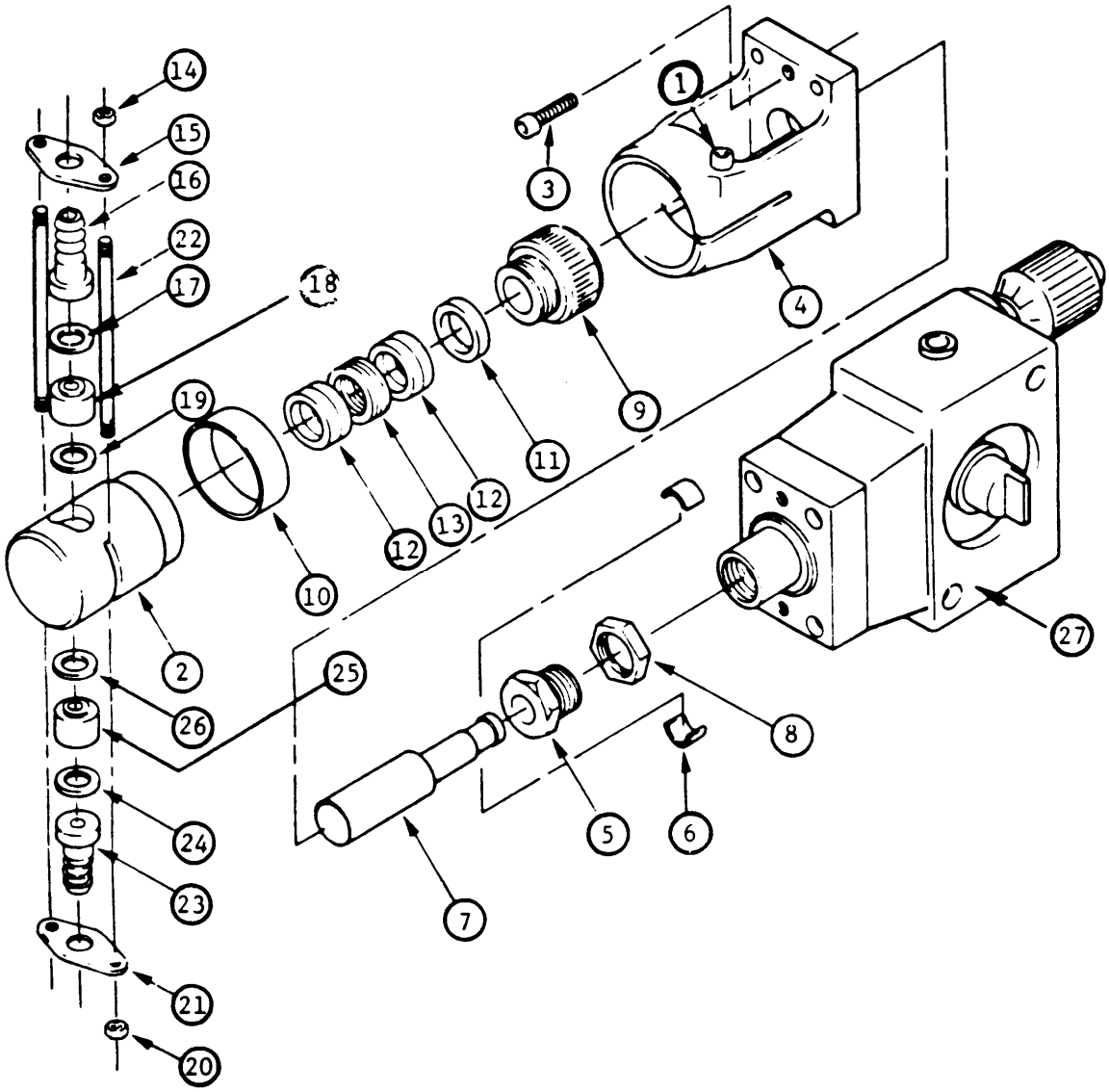


Figure 3-29. Chemical Feed Pump Head Assembly (ARMY)

(7) Remove split ring (6) from plunger (7).

(8) Remove plunger (7) from bushing screw (5).

(9) Remove adjusting nut (8) from bushing screw (5).

(10) Remove gland nut (9) from pump body (2).

(11) Remove holder bushing (10) from pump body (2).

(12) From inside pump body (2), remove gland sleeve (11), two bushing guides (12), four packing rings (13), and two more bushing guides (12). Discard packing rings (13).

(13) Hold studs (22) in place against pump body (2) and remove two nuts (14) from studs (22).

(14) Remove flange (15) from studs (22) and valve carrier (16).

(15) Remove valve carrier (16) and seal ring (17) from ball valve (18). Discard seal ring (17).

(16) Remove ball valve (18) and seal ring (19) from pump body (2). Discard seal ring (19).

NOTE

Note the position of ball valve (18) (up or down).

(17) Turn pump body over and remove two nuts (20) from studs (22).

(18) Remove flange (21) from studs (22) and valve carrier (23).

(19) Remove studs (22) from pump body (2).

(20) Remove valve carrier (23) and seal ring (24) from ball valve (25). Discard seal ring (24).

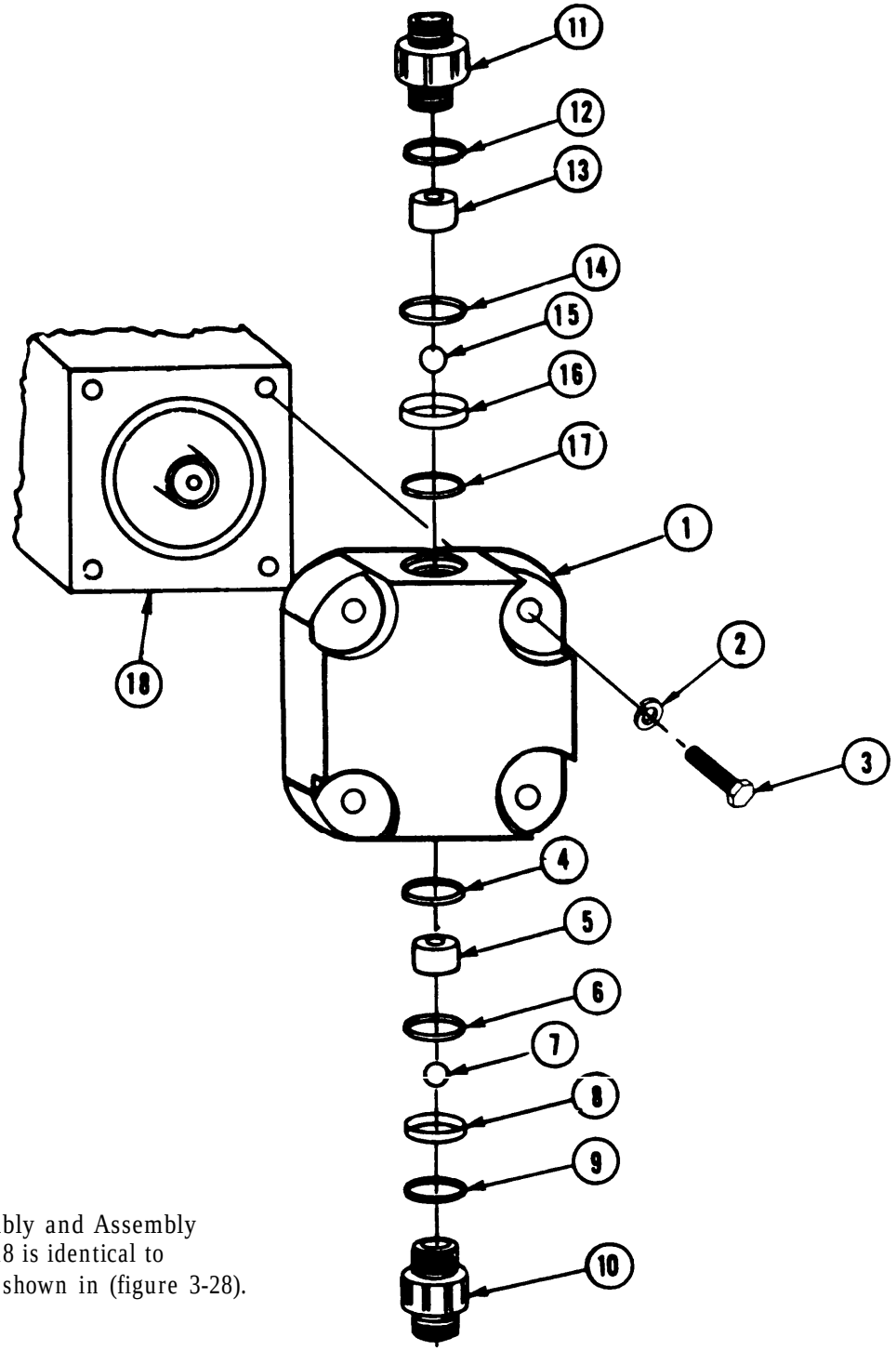
(21) Remove ball valve (5) and seal ring (26) from pump body (2). Discard seal ring (26).

NOTE

Note position of ball valve (up or down).

d. Disassembly. (Figure 3-30) (USMC)

(1) Remove pump block assembly in accordance with paragraph 3-30.



NOTE

Disassembly and Assembly for Item 18 is identical to breakout shown in (figure 3-28).

Figure 3-30. Chemical Feed Pump Head Assembly (USMC)

CAUTION

Improper assembly will cause equipment failure. Mark head assembly top and bottom and observe carefully the parts placement for ease of reassembly.

(2) Remove four screws (3), washers (2), and separate head assembly (1) from pump block (18).

(3) Unscrew valve carrier (7) and remove from head assembly (1).

(4) Remove O-ring (12), valve guide (13), 0-ring (14), ball (15), valve seat (16), and O-ring (17) from head assembly (1).

(5) Unscrew valve carrier (10) and remove from head assembly (1).

(6) Remove O-ring (9), valve seat (8), ball (7), O-ring (6), valve guide (5), and O-ring (4) from head assembly (1).

e. Cleaning.

(1) Soak internal pump parts in a solution of baking soda and water. Rinse thoroughly and allow to air dry.

(2) Use a soft bristle brush to clean out pump body.

(3) Clean valves and valve carriers.

(4) Clean seats for seal rings, making sure no chemical residue has collected.

(5) Wash plunger and holder with a mild soap solution. Rinse thoroughly. Air dry.

f. Inspection.

(1) Inspect seal rings for tears and cracks.

(2) Inspect ball valves for damage. Make sure ball moves freely.

(3) Inspect valve carriers for excessive wear or cracks.

(4) Inspect gland sleeve and bushing guides for excessive wear.

(5) Inspect plunger for nicks and scratches.

g. Repair or Replace.

(1) Replace all gaskets, O-rings, packing rings, and seal rings.

(2) Replace all damaged or unserviceable nuts, bolts, studs, screws, adjusting nuts, bushing screws, and washers.

(3) Replace damaged, bent or unrepairable plungers, valve carriers, gland nuts, pump bodies, holder bushings, split rings, and ball valves.

(4) Repair pump stroke adjustment control assembly in accordance with paragraph 3-33.

h. Reassembly. (Figure 2–29 (ARMY)

(1) Insert seal ring (26) and ball valve (25) in pump body (2).

(2) Insert seal ring (24) and valve carrier (23) in ball valve (25).

(3) Insert studs (22) in pump body (2).

(4) Hold studs (22) in place against pump body (2) and insert flange (21) on studs (22) and valve carrier (23).

(5) Install two nuts (20) on studs (22).

(6) Turn pump body over.

(7) Insert seal ring (19) and ball valve (18) in pump body (2).

(8) Insert seal ring (17) and valve carrier (16) in ball valve (18).

(9) Hold studs (22) in place against pump body (2) and insert flange (15) on studs (22) and valve carrier (16).

(10) Install two nuts (14) on studs (22).

(11) Insert two bushing guides (12) and gland sleeve (11) into pump body (2).

(12) Slip holder bushing (10) over pump body (2).

(13) Loosely install gland nut (9) into pump body (2).

(14) Install adjusting nut (8) on bushing screw (5).

(15) Place two split rings (6) on plunger (7).

(16) Slide plunger (7) and split rings (6) into bushing screw (5).

(17) Install bushing screw (5) with plunger attached, into pump rod.

NOTE

Leave 0.002 inch (0.051 mm) play between adjusting nut and pump rod.

(18) Hold holder (4) in place on pump block and align two mounting holes.

(19) Install two screws (3) through top and bottom center hole of holder (4) and pump block (27).

(20) Slide pump body (2) straight over plunger (7) and seat into yoke-type holder (4).

(21) Tighten yoke screw (1).

(22) Tighten gland nut (9) to seal against plunger (7).

(23) Install pump block assembly in accordance with paragraph 3-31.

i. Reassembly. (Figure 3-30) (USMC)

CAUTION

Improper assembly will cause equipment failure. Ensure that extreme care is taken during reassembly. Observe piece parts as related to top and bottom of head assembly.

(1) Install O-ring (4), valve guide (5), O-ring (6), ball (7), valve seat (8), and Wing (9) on valve carrier (10).

(2) Carefully *screw* valve carrier (10) into head assembly (l).

(3) Install O-ring (12), valve guide (13), O-ring (14), ball (15), valve seat (16), and O-ring (17) on valve carrier (11).

(4) Carefully screw valve carrier (11) into head assembly (1).

(5) Secure head assembly (1) to pump block (18) using washers (2) and screws (3).

(6) Install block/head assembly in accordance with paragraph 3-30.

3-33. CHEMICAL FEED PUMP STROKE ADJUSTMENT CONTROL.

a. General. The chemical feed pump stroke adjustment control regulates movement Of the Plunger which, in turn, move the desired amount of chemicals into the ROWPU water being purified. This paragraph describes removal of these controls for repair, or replacement, and installation.

b. Removal. Remove pump head assembly in accordance with paragraph 3-32.

c. Disassembly. (Figure 3-31) (ARMY)

(1) Remove protective cap (1) from nut (2),

(2) Remove nut (2) from adjusting spindle (10).

(3) Remove adjustment wheel (3) from adjusting spindle (10).

(4) Remove washer (4) and O-ring (5) from shaft of adjusting spindle (10). Discard O-ring (5).

(5) Remove three hollow-head mounting screws (6) holding flange (7) to pump drive unit.

(6) Remove flange (7) from drive unit.

(7) Remove seal ring (8) from hub of flange (7). Discard seal ring (8).

(8) Remove gasket (9) from flange (7). Discard gasket (9).

(9) Pull adjusting spindle (10) out of flange (7).

d. Cleaning. (ARMY)

(1) Clean threads on nut (2) and three screws (6).

(2) Clean seizing cement from threads on adjusting spindle (10).

(3) Clean Inside of adjustment wheel (3) and flange (7).

(4) Clean gasket seat face of flange (7).

(5) Polish flange mating portion of adjustment spindle (10).

e. Disassembly. (Figure 3-32) (USMC)

CAUTION

The adjusting wheel (vernier) is a delicate piece of equipment. Improper calibration or operation can result in an unusable water supply. Make sure work area is clean. Dirt or grease will damage the mechanism.

(1) Loosen grub screw (11) from shaft assembly coupler (12).

(2) Remove three screws (13) and washers (20) from flange (9) and frame assembly (10).

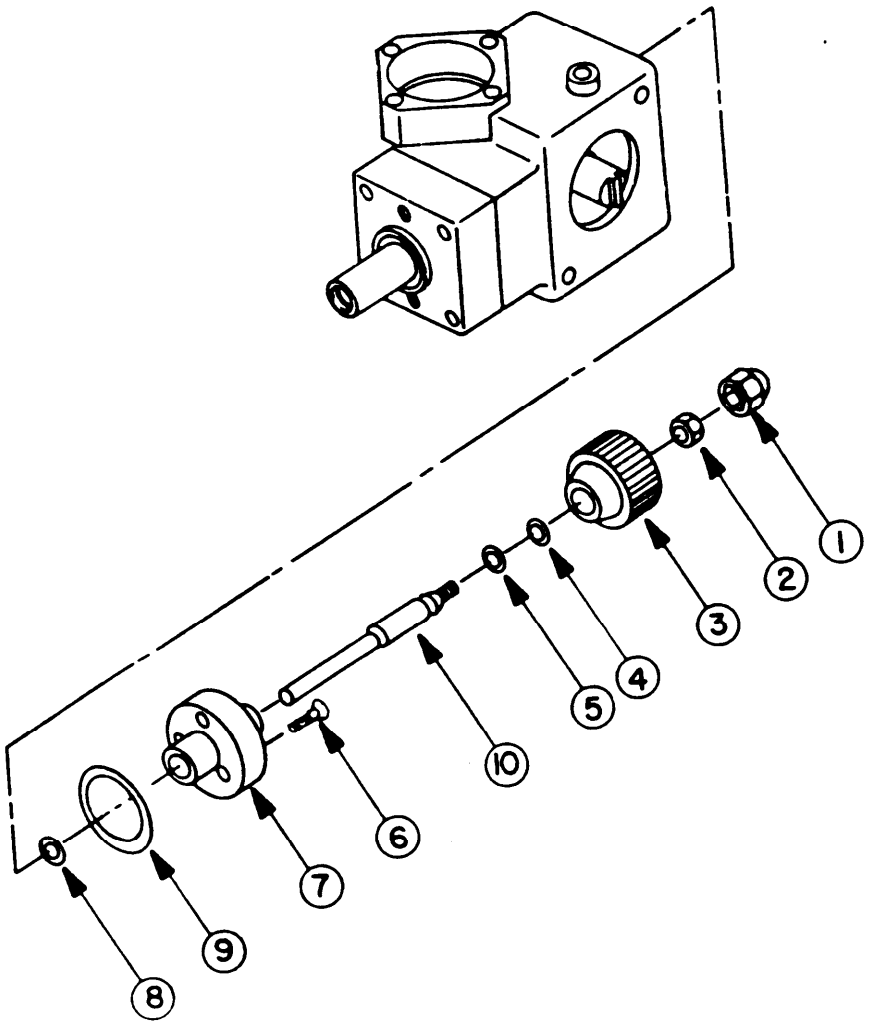


Figure 3-31. Chemical Feed Pump Stroke Adjustment Control (ARMY)

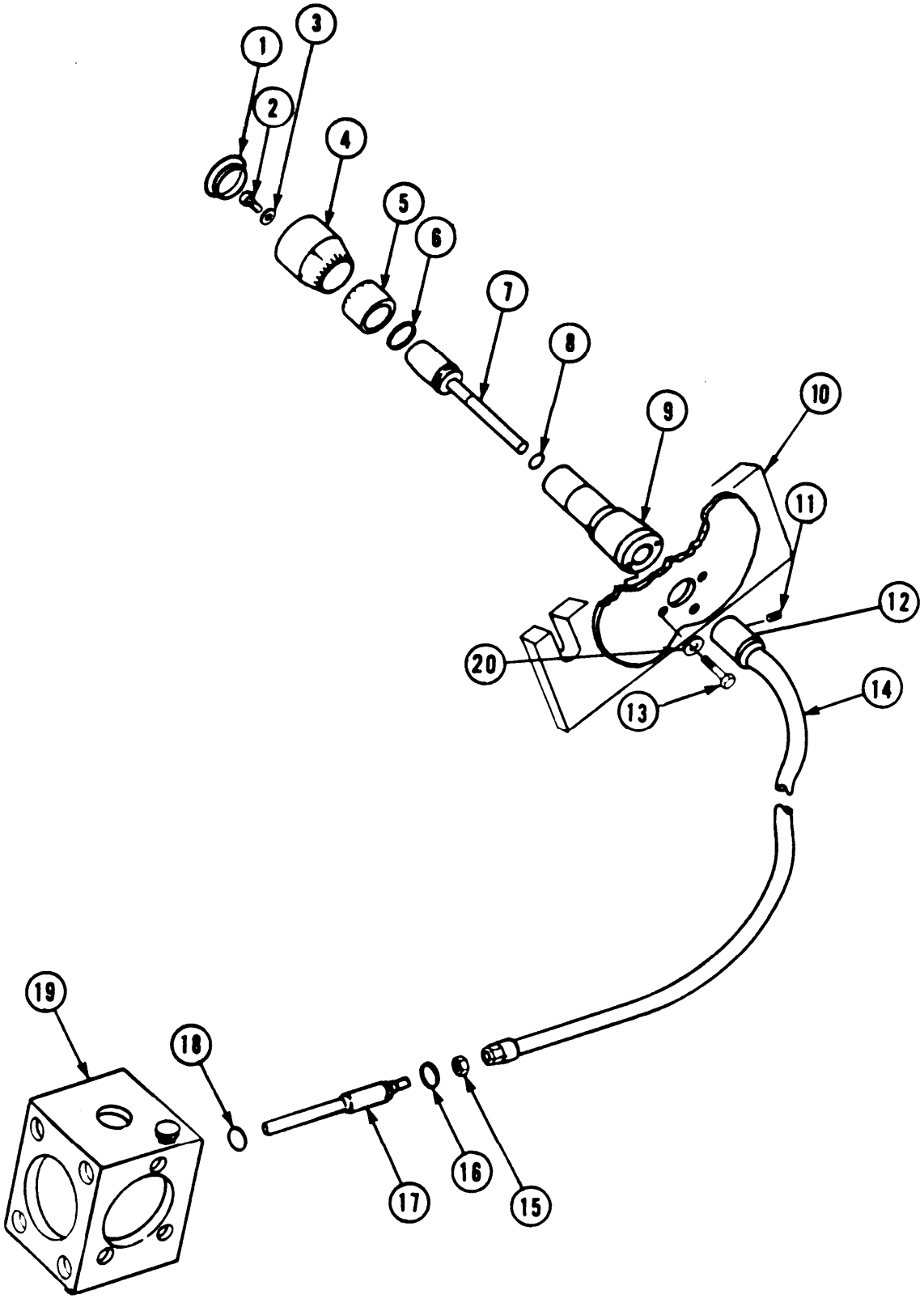


Figure 3-32. Chemical Feed Pump Stroke Adjustment Control (USMC)

(3) Slide flange (9) with adjusting wheel assembly out of frame assembly (10).

NOTE

Lay out disassembled parts on a clean lint free cloth.

(4) Pop loose cover (1) from adjusting wheel (4).

(5) Remove Alien screw (2) and washer (3) from adjusting wheel (4).

(6) Remove scale collar (5), O-ring (6), adjusting spindle (7), and O-ring (8) from flange (9).

(7) Unscrew shaft assembly (14) from adjusting spindle (17).

(8) Remove nut (15) and seal ring (16) from adjusting spindle (17).

(9) Remove adjusting spindle (17) and O-ring (18) from pump body (19).

f. Cleaning.

WARNING

Drycleaning solvent Fed. Spec. P–D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(1) Clean adjusting wheel (4), collar (5), spindles (7) and (17), shaft (14), flange (9), and other hardware with cleaning solvent Fed. Spec. P–D-680.

(2) Clean threads on screws and nuts.

(3) Polish mating portions of adjustment spindles (7) and (17).

g. Inspection.

(1) Inspect protective cap for cracks or fractures.

(2) Inspect hardware, screws, and nuts for stripped or damaged threads or stripped heads.

(3) Discard O-rings, seal ring, and gasket.

(4) Inspect adjustment wheel for cracks, burrs, or damage.

(5) Inspect adjusting spindle for stripped or damaged threads or a bent shaft.

h. Repair or Replace.

(1) Replace all gaskets, O-rings, and seal rings.

(2) Replace all damaged screws, nuts, nut caps, and washers.

(3) Recut threads of adjusting spindle or replace if badly damaged, bent, or unrepairable.

(4) Replace damaged or unusable flange.

(5) Remove burrs from adjustment wheel with file or emery cloth.

(6) Replace adjustment wheel if badly damaged and unrepairable.

i. Installation. (Figure 3-31) (ARMY)

(1) Slide adjusting spindle (10) through flange (7).

(2) Place gasket (9) on flange (7).

(3) Install seal ring (8) on hub or flange (7).

(4) Hold gasket (9) and flange (7) in place on pump drive unit and align mounting holes.

(5) Install three screws (6) through flange (7), gasket (9), and pump drive unit.

(6) Install washer (4) and O-ring (5) on shaft of adjusting spindle (10).

(7) Insert adjustment wheel (3) on adjusting spindle (10).

(8) Install nut (2) on adjustment spindle (10).

(9) Install protective cap (1) on nut (2).

(10) Install pump head assembly in accordance with paragraph 3-32.

j. Reassembly. (Figure 3-32) (USMC)

CAUTION

The adjusting wheel (vernier) is a delicate piece of equipment. Improper calibration or operation can result in an unusable water supply. Make sure work area is clean. Dirt or grease will damage the mechanism.

(1) Install O-ring (18) on spindle (17) and position in pump body (19).

(2) Install seal ring (16) and nut (15) on spindle (17).

(3) Install shaft assembly (14) on spindle (17) and lock together using nut (15).

(4) Install O-ring (8) on adjusting spindle (7).

(5) Install O-ring (6), scale collar (5), adjusting wheel (4), and washer (3) on adjusting spindle (7) using Allen screw (2).

(6) Install cover (1) on adjusting wheel (4).

(7) Position flange (9) and shaft assembly coupler (12) on frame assembly (10).

(8) Install adjusting wheel assembly with flange (9) into shaft assembly coupler (12) and secure using grub screw (11).

(9) Attach assembly to frame (10) using washers (20) and three screws (13).

k. Packaging.

(1) Package reassembled unit in polyethylene bag to keep dust and moisture out of drive gear casing/pump block and pump head while working on other components of chemical feed pump block/head assembly.

(2) Unit will be packaged for reissue to Unit Maintenance when it is reassembled with other components in accordance with Standard Operating Procedures.

3-34. CHEMICAL FEED PUMP FRAME AND VALVE ASSEMBLY.

a. General. The four priming valves of the chemical feed pumps are located on an inverted U-bracket frame which bolts to the floor of the ROWPU. This paragraph describes removal, cleaning, inspection, and installation of the valve and frame assembly.

b. Removal. (Figure 3-33) (ARMY)

(1) If necessary, remove the chemical feed pump motor in accordance with paragraph 2-48 and the chemical feed pump assembly in accordance with paragraph 2-71.

(2) Loosen twelve hose clamps (2) holding plastic tubes (1) to valves (10).

(3) Remove twelve plastic tubes (1) and twelve hose clamps (2) from valves (10).

(4) Remove four nuts (3) and four lockwashers (4) from bolts (5).

(5) Remove four bolts (5) and lift off valve mounting panel (6) from two vertical supports (13).

(6) Loosen four setscrews (7) from four handles (8).

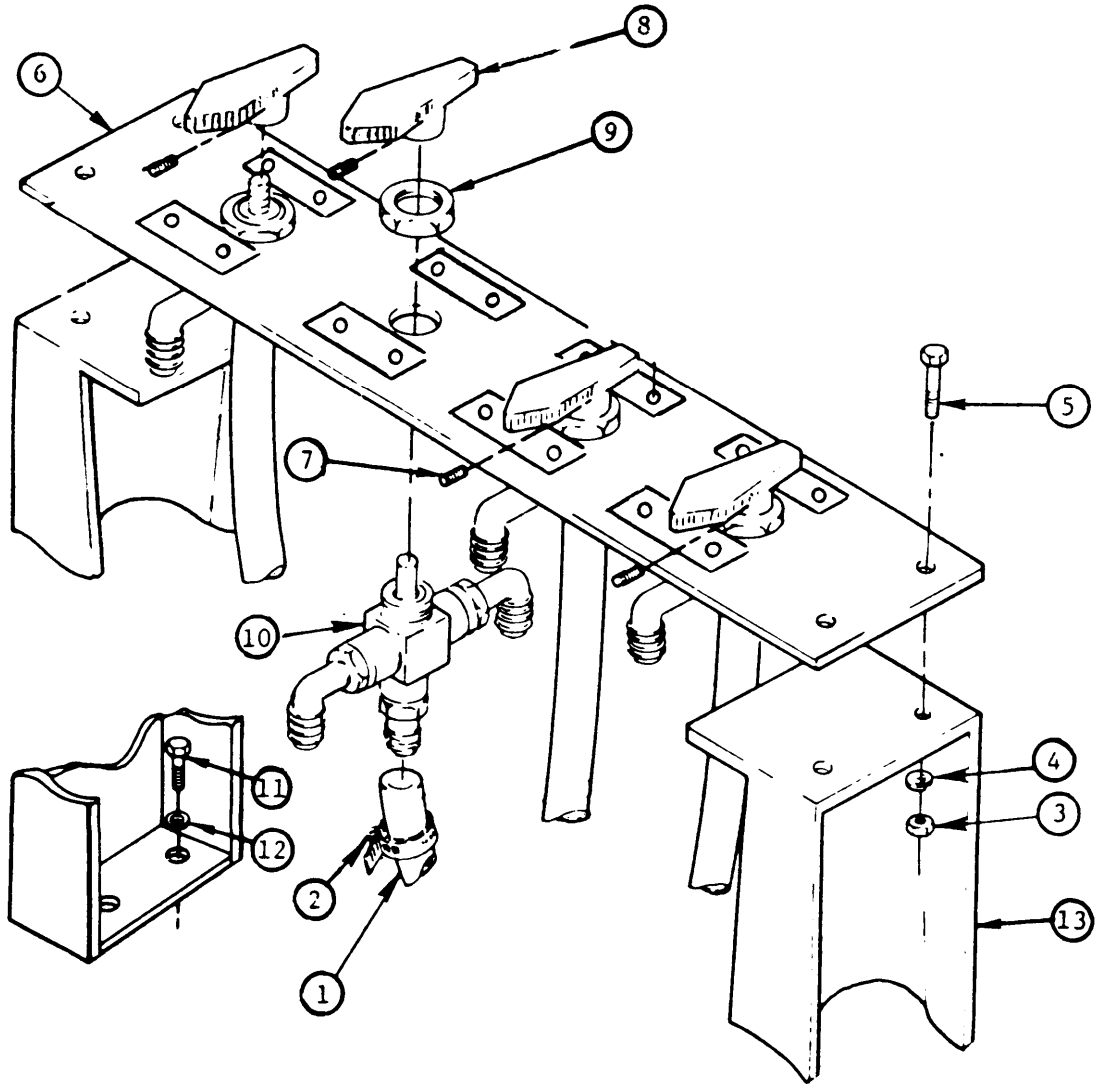


Figure 3-33. Chemical Feed Pump Frame and Valve Assembly (ARMY)

(7) Remove four handles (8).

(8) Remove four panel nuts (9), one from each valve, and remove valve assembly (10) from panel.

(9) Remove four bolts (11) and four lockwashers (12) from base of two vertical supports (13) for chemical feed pump valves as shown in (figure 3-33).

(10) Remove two vertical supports (13).

c. Removal. (Figure 3-34) (USMC)

NOTE

Tag all plastic hoses before removal.

(1) Loosen twelve hose clamps (2) and remove hoses (1) from valves (10).

NOTE

Set control knobs to zero (0).

(2) Loosen setscrew (17) on control cable (18) and remove control cable (18) from control knobs (5).

(3) Remove three screws (3) and washers (4) from each of the control knobs (5) and remove from frame (6).

(4) Remove setscrews (7) from handles (8) and remove handles (8) from valves (10).

(5) Remove panel nuts (9) and valves (10) from frame (6).

(6) Remove nuts (12), washers (14), and screws (13) from vertical supports (11) and remove upper frame (6).

(7) Remove bolts (15) and lockwashers (16) from vertical supports (11).

(8) Remove vertical supports (11).

d. Cleaning.

(1) Clean threads of nuts and bolts, and apply a light coat of preservative spray oil.

(2) Wash valve mounting panel and two vertical supports with brush and mild detergent.

(3) Wash valve handles and serviceable valves in a mild detergent solution.

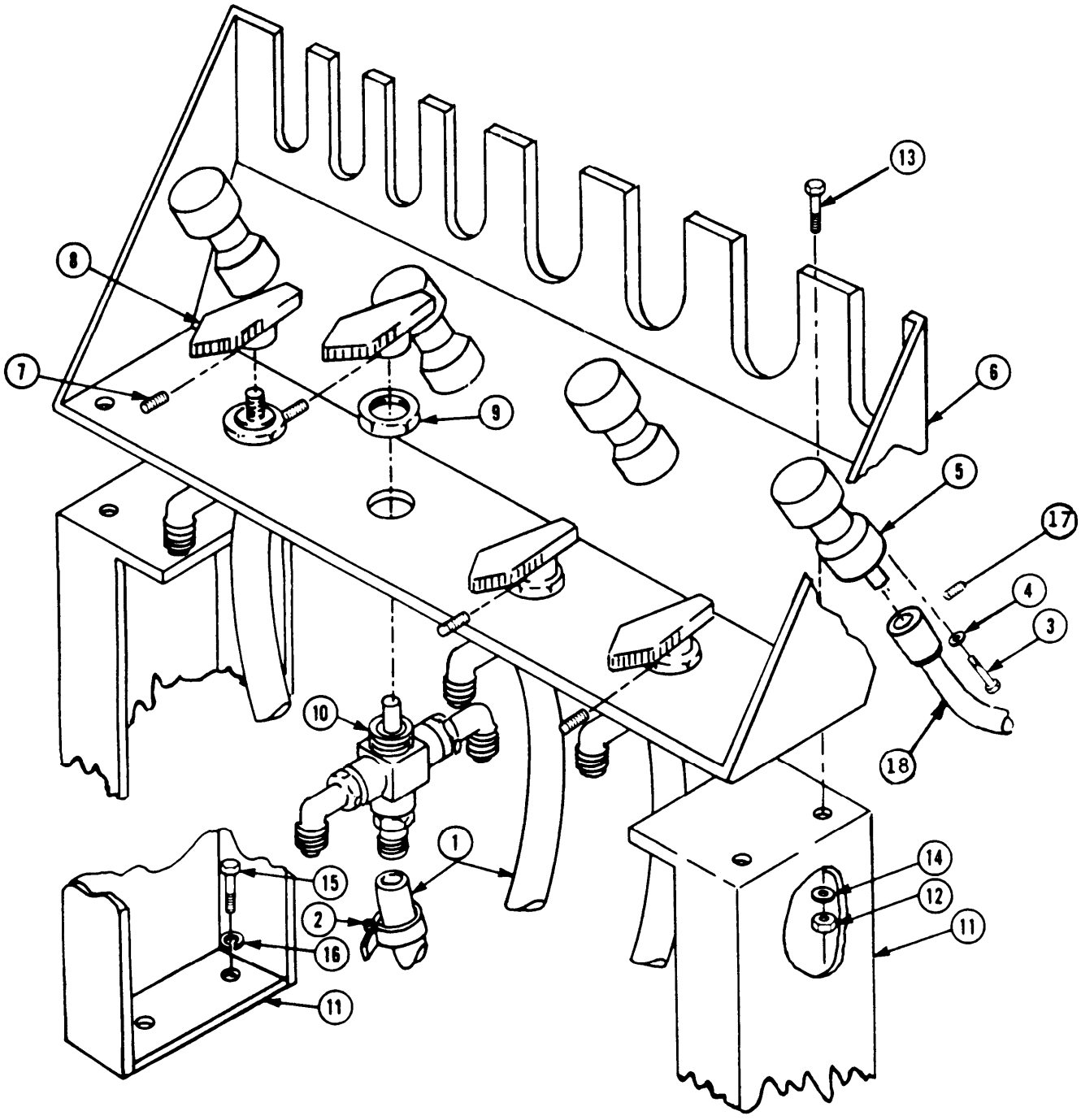


Figure 3-34. Chemical Feed Pump Frame and Valve Assembly (USMC)

(4) Rinse in clean water.

(5) Allow to air dry.

e. Inspection.

(1) Inspect valve mounting panel (upper frame) and two vertical supports for dents, cracks, fractures, or broken welds.

(2) Inspect operation of valves.

(3) Inspect hose nipples for cracks, chips, or breaks.

(4) Inspect valve handles for chips or cracks.

(4) Inspect hardware, screws, bolts, and nuts for stripped threads or heads.

f. Repair or Replace

(1) Replace all hose clamps and plastic tubes.

(2) Replace all damaged nuts, bolts, screws, washers, lockwashers, and setscrews.

(3) Repair, weld, straighten, or replace damaged valve mounting panel (upper frame) and vertical supports.

(4) Replace damaged or unserviceable valve assemblies, valve handles, and valve panel nuts.

(5) Send all removed unserviceable valve assemblies and component parts to next higher level of maintenance for disposition.

(6) Repaint in accordance with Standard Operating Procedures.

g. Installation. (Figure 3-33) (ARMY)

(1) Hold two vertical supports (13) in mounting location or ROWPU frame and align mounting holes.

(2) Install four bolts (11) and four lockwashers (12).

(3) Insert each of four valves (10) through bottom of mounting panel (6) and install four mounting nuts (9).

(4) Slip four handles (8) over valves (10).

(5) Tighten setscrew (7) on each handle (8).

(6) Place valve mounting panel (6) on top of two supports (13) and align mounting holes.

(7) Insert four bolts (5) through valve mounting panel (6) and two supports (1 3).

(8) Install four lockwashers (4) and four nuts (3) on bolts (5).

(9) Install twelve marked plastic tubes (1) and twelve hose clamps (2) on nipples of valves (10).

h. Installation. (Figure 3-34) (USMC)

(1) Attach vertical supports (11) to ROWPU frame using bolts (15) and lockwashers (16).

(2) Position upper frame (6) on vertical supports and install using screws (13), washers (14), and nuts (12).

(3) Position valves (10) on upper frame (6) and secure using panel nuts (9).

(4) Install handles (8) on valves (10) using setscrews (7).

NOTE

Check that knobs are set at zero (0) before installing control knobs.

(5) Install control knobs (5) on upper frame (6) using screws (3) and washers (4).

(6) Attach control cables (18) to control knobs (5) with set screws (17).

(7) Attach twelve marked hoses (1) to valves (10) and secure using hose clamps (2).

(8) Remove tags.

3–35. RAW WATER PUMP.

a. General. This paragraph describes removal, inspection, cleaning, and reassembly of the raw water pump.

b. Removal. (Figure 3-35)

(1) If necessary, see paragraph 2-43 to remove raw water pump from frame.

WARNING

Objects blown by compressed air can cause serious eye injury. Always wear protective goggles when using compressed air.

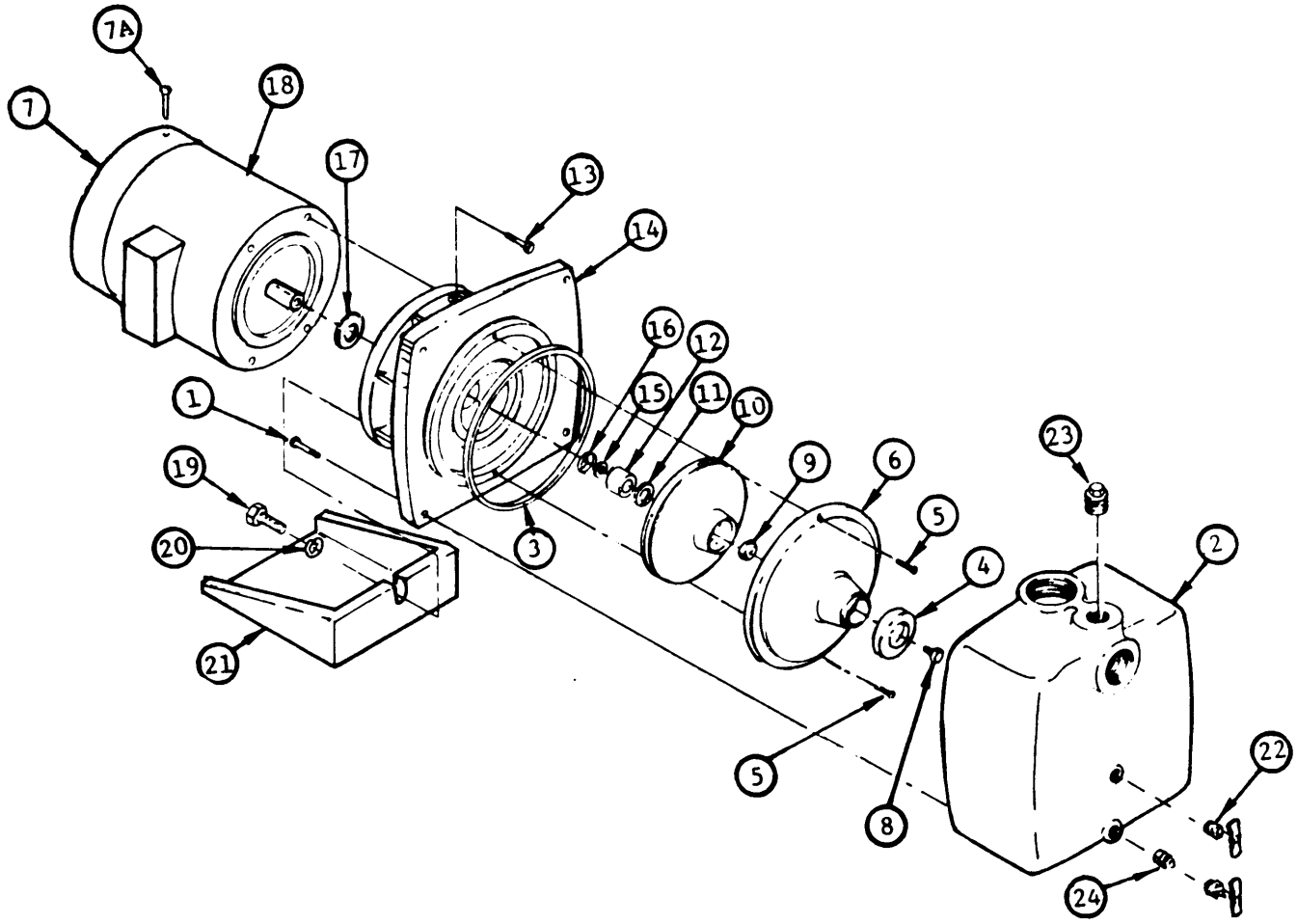


Figure 3-35. Raw Water Pump

(2) Before moving pump into work area, blow dirt off pump frame, adapter, and mounting plate.

(3) Wash pump using a stiff brush and a mild soap solution.

(4) Rinse pump with a fine water spray and allow to air dry.

(5) Drain pump.

(6) Move pump into work area.

(7) Remove four bolts (1) from pump frame (14) and pump case (2)

(8) Remove pump case (2) and gasket (3) from pump frame (14). Discard gasket (3).

(9) Remove suction sleeve (4) from diffuser (6).

(10) Remove two screws (5) from pump frame (14) and diffuser (6).

(11) Remove diffuser (6) from pump frame (14).

(12) Loosen four screws (7A) holding fan cover (7) to motor (18) and remove fan cover (7).

(13) Use a screwdriver on the slot provided in the fan end to brace shaft of motor (18) and remove lock bolt (8) and washer (9) from shaft of motor (18).

(14) Unscrew impeller (10) and remove from shaft of motor (18).

(15) Remove washer (11) from shaft of motor (18)

(16) Remove mechanical seal (12) from shaft of motor (18). Discard mechanical seal (12).

(17) Remove four bolts (13) from motor (18) and pump frame (14).

(18) Remove pump frame (14) from motor (18).

(19) Remove stationary seat (15) and stationary seat gasket (16) from pump frame (14). Discard stationary seat (15) and stationary seat gasket (16).

NOTE

Stationary seat and stationary seat gasket are part of the mechanical seal. Replace entire mechanical seal during reassembly.

(20) Remove slinger (17) from shaft of motor (18). Discard slinger (17).

(21) If replacing pump frame or stand, remove one bolt (19) and one lockwasher (20) from pump frame (14) and stand (21).

(22) Remove stand (21) from pump frame (14).

(23) if replacing pump casing or petcocks remove two petcocks (22) and adapter (24) from pump casing (2).

(24) If replacing pump casing or priming plug, remove priming plug (23) from pump casing (2).

c. Cleaning.

(1) Wash metal parts in a mild soap solution.

(2) Rinse in clean water.

(3) Allow to air dry.

(4) Clean rust and corrosion from threads of assembly hardware, inlet and outlet ports, priming plugs, and petcocks.

d. Inspection.

(1) Check suction sleeve for cracks and excessive wear.

(2) Inspect priming plug for stripped heads and threads.

(3) Inspect petcocks for stripped threads and broken handles.

(4) Inspect bolts and screws for damaged heads and threads. Check for broken or bent shanks.

(5) Inspect pump impeller for dented or broken blades.

e. Repair or Replace.

(1) Replace used gaskets, stationary seat gaskets, mechanical seals, stationary seats, O-rings, slingers, and seals.

(2) Replace damaged nuts, bolts, screws, lock bolt, washers, and lockwashers.

(3) Replace damaged or worn suction sleeve, diffuser, and fan cover.

(4) Replace damaged priming plug and petcocks, if threads cannot be recut.

(5) Retap threads on pump frame, pump stand, and pump case, or replace component part, if badly damaged.

(6) Replace unrepairable pump impeller.

(7) Repair motor assembly in accordance with paragraph 3-15.

(8) Send unrepairable pump to next higher level of maintenance.

f. Reassembly. (Figure 3-35)

(1) Install priming plug (23) in pump casing (2).

(2) Install two petcocks (22) and adapter (24) in pump casing (2).

(3) Place pump frame (14) in stand (21) and install lockwasher (20) and bolt (19) in pump frame (14).

(4) Slide new slinger (17) over shaft of motor (18).

NOTE

Stationary seat and stationary seat gasket are part of the mechanical seal. Replace entire mechanical seal during reassembly.

(5) On shaft of motor (18), install stationary seat gasket (16) and stationary seat (15).

(6) Place motor (18) in pump frame (14) and align mounting holes.

(7) Install four bolts (13) through pump frame (14) and motor (18).

(8) Slide new mechanical seal (12) over shaft of motor (18).

(9) Slide washer (1 1) over shaft of motor (18).

NOTE

Use a screwdriver in the slot provided in the fan end to hold the motor shaft while assembling impeller and nut.

(10) Install washer (9) and lockbolt (8) on shaft of motor (18).

(11) Install impeller (10) on shaft of motor (18).

(12) Install fan cover (7) with four screws (7A) to motor (18).

(13) Hold diffuser (6) in place on pump frame (14) and align mounting holes.

(14) Install two screws (5) through diffuser (6) and pump frame (14).

(15) Install suction sleeve (4) to diffuser (6).

(16) Hold pump case (2) and new gasket (3) in place on pump frame (14) and align four mounting holes.

(17) Install four bolts (1) through pump frame (14). and pump case (2).

g. Packaging for Reissue.

(1) Tag repaired serviceable pump assembly for identification.

(2) Package pump assembly for reissue to Unit Maintenance.

3-36. BOOSTER/DISTRIBUTION PUMP.

a. General. This paragraph describes disassembly, Cleaning inspection, repair, and reassembly Of the booster/distribution pump.

b. Disassembly. (Figure 3-36)

(1) If necessary, see paragraph 2-49 to remove booster pump from ROWPU frame or paragraph 2-42 for removal of distribution pump.

WARNING

Objects blown by compressed air can cause serious eye injury. Atways wear protective goggles when using compressed air.

(2) Before moving pump into work area, blow dirt off pump frame and adapter.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(3) Clean pump using a stiff brush and cleaning solvent Fed. Spec. P-D-680.

(4) Allow to air dry.

(5) Move pump into work area.

(6) Remove four bolts (1) from pump casing (12) and suction cover (2).

(7) Remove suction cover (2) and gasket (3) from pump casing (12). Discard gasket (3).

(8) Remove three screws (4) from motor (16) and fan cover (5).

(9) Remove fan cover (5) from motor (16).

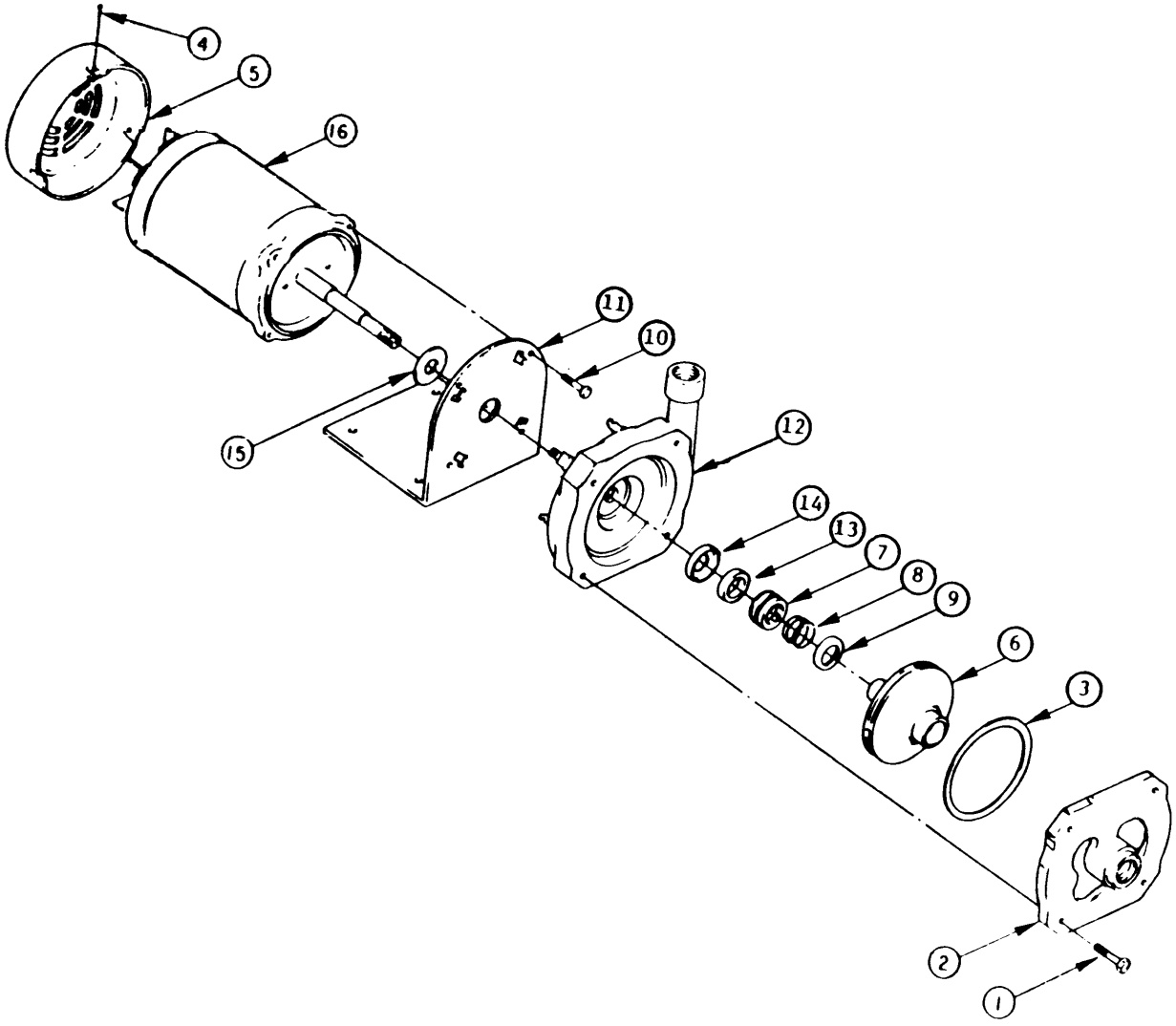


Figure 3–36. Booster Pump/Distribution Pump

NOTE

Removal of impeller may require that center of impeller be heated to 350°F (177C) to free factory-applied thread-locking compound. A strap wrench is recommended to avoid marring impeller. Otherwise, smooth out wrench marks before reusing impeller.

(10) Place a large-blade screwdriver in slot on fan end of motor shaft to brace shaft. Using a strap wrench, unscrew impeller (6) and remove from shaft of motor (16).

(11) Remove spring (8) and spring retainer (9) from impeller (6).

(12) Remove mechanical seal (7) from impeller (6). Discard seal.

(13) Loosen four bolts (10) from bracket (11) and motor (16).

(14) Twist and remove pump casing (12) from bracket (11).

(15) Remove bracket (11) and pump casing (12) from shaft of motor (16).

(16) Remove stationary seat (13) and stationary seat gasket (14) from pump casing (12). Discard stationary seat (13) and seat gasket (14).

NOTE

Stationary seat and stationary seat gasket are parts of the mechanical seal. Replace entire mechanical seal during reassembly.

(17) Remove slinger (15) from shaft of motor (16). Discard slinger (15).

c. Cleaning.

(1) Wash metal parts using a stiff brush and a mild soap solution.

(2) Allow to air dry.

(3) Remove rust and loose paint from bracket and outside of pump casing and suction cover. Prepare for repainting, if needed.

d. Inspection.

(1) Inspect spring and spring retainer.

(2) Inspect pump impeller for dented or broken blades.

(3) Inspect suction cover and pump casing for damage, particularly stripped threads on suction and discharge ports.

e. Repair or Replace.

(1) Replace all gaskets, Wings, mechanical seal, stationary seat, stationary seat gasket, and pump slinger.

(2) Replace all damaged nuts, bolts, screws, and washers.

(3) Replace all damaged, fractured, or worn springs and spring retainers.

(4) Repair pump bracket by welding cracks and fractures, or replace bracket if badly damaged.

(5) Retap threads in suction cover, pump casing, and motor assembly, or replace component part if badly damaged.

(6) Replace unrepairable pump impeller.

(7) Repair pump motor assembly in accordance with paragraph 3-10.

(8) Send unrepairable pump assembly and all replaced component parts to next higher level of maintenance for disposition.

f. Reassembly. (Figure 3–36)

(1) Install new slinger (15) on shaft of motor (16).

NOTE

Stationary seat and stationary seat gasket are parts of the mechanical seal, replace entire mechanical seal during reassembly.

(2) Install new stationary seat gasket (14) and new stationary seat (13) in pump casing (12).

(3) Insert and twist pump casing (12) into bracket (11).

(4) Install four bolts (10) through bracket (11) and motor (16).

(5) Insert shaft of motor (16) through pump casing (12) and bracket (11) and align mounting holes and tighten bolts (10).

(6) Install new mechanical seal (7), spring (8), and spring retainer (9) on impeller (6).

NOTE

Install impeller with thread-locking compound.

(8) Place a large-blade screwdriver in slot on fan end of motor shaft to brace shaft. Using a strap wrench, screw impeller (6) onto shaft of motor (16).

(9) Slip fan cover (5) on motor (16) and align mounting holes.

(10) Install three screws (4) through fan cover (5) and motor (16).

(11) Hold suction cover (2) and new gasket (3) in place on pump casing (12) and align mounting holes.

(12) Install four bolts (1) through suction cover (2) and pump casing (12).

(13) Tighten bolt evenly and torque to 19±2 ft. lbs. to prevent water leakage.

3-37. BACKWASH PUMP.

a. General. This paragraph describes the disassembly, cleaning, inspection, repair, and reassembly of the backwash pump.

b. Disassembly. (Figure 3-37)

WARNING

Weight of backwash pump is 195 pounds (88 kg). Attempting to move it without proper equipment could cause serious injury. Lift motor with equipment rated at one ton (0.91 tonne) or greater.

(1) If necessary, see paragraph 2-41 to remove backwash pump from frame.

WARNING

Objects blown by compressed air can cause serious eye injury. Always wear protective goggles when using compressed air.

(2) Before moving pump into work area, blow dirt off pump frame and adapter.

WARNING

Drycleaning solvent Fed. Spec. P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

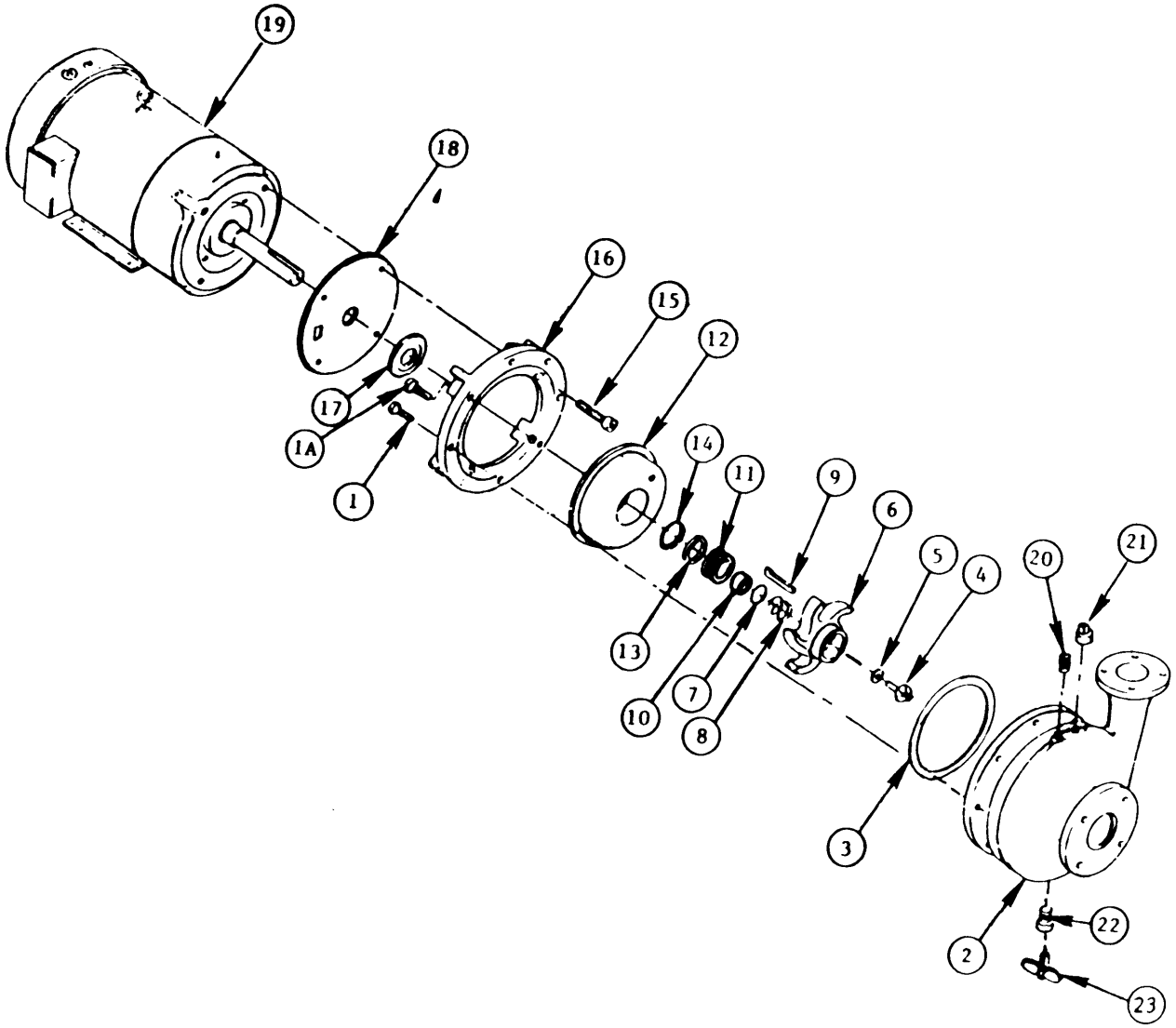


Figure 3-37. Backwash Pump

(3) Clean pump using a stiff brush and cleaning solvent Fed. Spec. P-D-10.

(4) Allow to air dry.

(5) Move pump into work area.

NOTE

Note location of long bolts (1A) for reassembly later.

(6) Remove eight bolts (four long (1A) and four short (1)) from pump casing (2) and adapter (16).

(7) Remove pump casing (2) from adapter (16).

(8) Remove gasket (3) from inside pump casing (2). Discard gasket (3).

(9) Remove impeller bolt (4) and gasket (5) from shaft of motor (19). Discard gasket (5).

(10) Using a puller, remove impeller (6) from shaft of motor (19).

(11) Remove mechanical seal O-ring (7) from back of impeller (6). Discard O-ring (7).

(12) Remove mechanical seal spring (8) from shaft sleeve (10).

(13) Remove shaft key (9) from shaft of motor (19).

(14) Slide shaft sleeve (10) with mechanical seal (11) attached, from shaft of motor (19).

(15) Remove mechanical seal (11) from shaft sleeve (10). Discard mechanical seal (11).

(16) Strike adapter cover (12) with a soft-faced mallet and remove from adapter (1 6).

NOTE

Stationary seat and stationary seat gasket are part of the mechanical seal. Replace entire mechanical seal during reassembly.

(17) Remove stationary seat (13) and stationary seat gasket (14) from inside adapter cover (12). Discard stationary seat (13) and seat gasket (14).

(18) Remove four sockethead bolts (15) from motor (19) and adapter (16).

(19) Remove adapter (16) from motor (19).

(20) Remove slinger (17) from shaft of motor (19). Discard slinger (17).

(21) Remove splash plate (18) from shaft of motor (19).

(22) If replacing pump casing (2) or priming plugs (20), remove two priming plugs (20) and (21) from pump casing (2).

(23) If replacing pump casing (2), remove adapter (22) and petcock (23) from casing (2).

c. Cleaning.

(1) Wash metal parts using a stiff brush and a mild soap solution. Rinse with clean water. Allow to air dry.

(2) Remove rust and loose paint from pump casing and adapter. Prepare for repainting, if necessary.

(3) Remove rust and corrosion from bolts.

d. Inspection.

(1) Inspect spring for strength and damage.

(2) Inspect pump impeller for dented or broken blades.

(3) Inspect priming plugs for stripped heads and threads.

(4) Inspect pump casing and cover for cuts, scratches, and damage.

(5) Inspect pump motor in accordance with paragraph 3-13.

e. Repair or Replace

(1) Replace all gaskets, O-rings, slinger, and soft parts.

(2) Replace all damaged nuts, bolts, screws, washers, shaft keys, impeller bolt, and shaft sleeve.

(3) Retap threads in pump casing or adapter, recut priming plug threads, or replace damaged and unrepairable component parts.

(4) Replace damaged or fractured spring.

(5) Replace unrepairable pump impeller.

(6) Repair or replace damaged adapter, adapter cover, and splash plate.

(7) Repair pump motor in accordance with paragraph 3-13.

f. Reassembly. (Figure 3-37)

(1) Install two priming plugs (20) and (21), adapter (22), and petcock (23) in pump casing (2).

(2) Hold splash plate (18), slinger (17), and adapter (16) in place on motor (19) and align mounting holes.

(3) Install four bolts (15) through adapter (16), splash plate (18), and motor (19).

NOTE

Stationary seat and stationary seat gasket are part of the mechanical seal. Replace entire mechanical seal during reassembly.

(4) Install stationary seat (13) and stationary seat gasket (14) from inside cover (12).

(5) Install cover (12) on adapter (16).

(6) Install mechanical seal (11) on shaft sleeve (10).

(7) Slide shaft sleeve (10) on shaft of motor (19).

(8) Install shaft key (9) on shaft of motor (19).

(9) Install mechanical seal spring (8) on shaft sleeve (10).

(10) Install mechanical seal O-ring (7) on back of impeller (6).

(11) Place impeller (6) on shaft of motor (19).

(12) Install impeller bolt (4) with impeller bolt gasket (5) on shaft of motor (19).

(13) Place gasket (3) inside pump casing (2).

(14) Hold pump casing (2) in place on adapter (16) and align mounting holes.

(15) Install eight bolts, (four long (1A) and four short (1)) through adapter (16) and pump casing (2).

3-38. MULTIMEDIA FILTER ASSEMBLY.

a. General. This paragraph describes the removal, disassembly, cleaning, inspection, repair, assembly) installation, and sanitization of the multimedia fitter assembly.

b. Removal Backwash Timer. Disconnect timer power cable and remove backwash timer in accordance with paragraph 2-56.

c Removal, Multimedia Filter Assembly. (Figure 3–38)

WARNING

ROWPU piping and equipment can contain extremely high 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.

NOTE

Removal of the multimedia filter assembly requires the use of a 5–ton (4.54 tonnes) crane.

(ARMY) A section of the frame structure directly above the multimedia filter assembly must be removed to provide clearance. Cut channel approximately two inches (5.1 centimeters) from existing welds, and remove from ROWPU frame. Do not discard removed section. It will be rewelded in place after installation of new or rebuilt multimedia filter assembly.

(1) Disconnect three couplings (2) and move vent lines out of the way.

(2) Disconnect coupling (3) and move drain line out of the way.

(3) Plug vent and drain ports.

(4) Disconnect three unions (4) from inlet, outlet, and waste drain ports.

NOTE

Secure O–rings on unions.

(5) Loosen two turnbuckles (5) and remove them from the tank lifting hook eyebolts.

(6) Remove twelve bolts (6) and twelve lockwashers (7) from ROWPU frame and mounting flange (8) of multimedia filter tank (1).

(7) Remove two bolts (9), lockwashers (10), and nuts (11) from frame structure (12).

(8) Attach two crane hooks to the lifting hook eyebolts and carefully hoist filter (1) through opening in top of ROWPU frame.

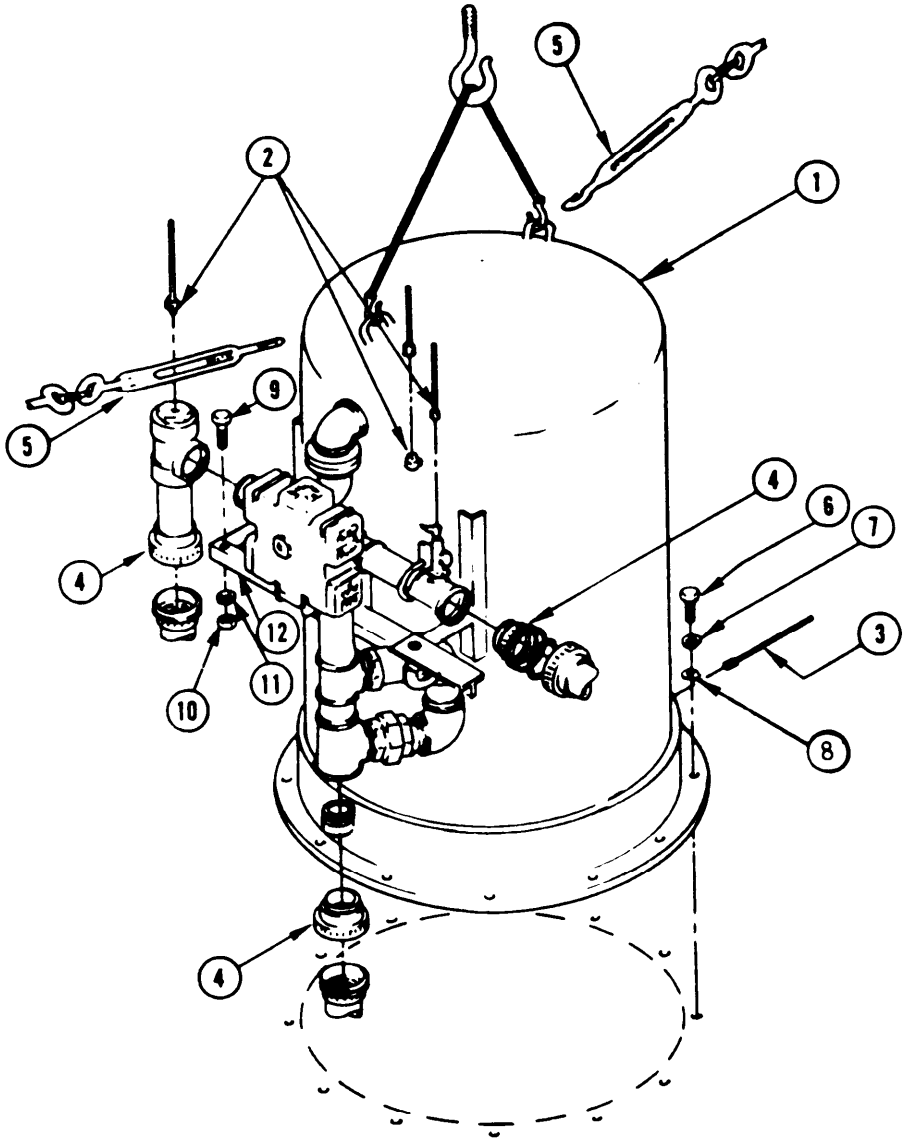


Figure 3-38. Multimedia Filter Assembly

d. Removal, Control Valve Assembly. and Piping. (Figure 3-39)

(1) Remove two nuts (1) and two lockwashers (11) from control valve clamps (2).

(2) Remove two clamps (2) from control valve assembly (13).

(3) Remove two locknuts (12) from two clamps (2).

(4) Remove two nuts (3) and two lockwashers (4) from U-clamps (5).

(5) Remove U-clamp (5) from control valve assembly (13).

(6) Remove four nuts (6) and four lockwashers (7) from four bolts (8).

(7) Remove four bolts (8) from gasket (7) and flange (15) of control valve assembly (13).

(8) Remove and discard gasket (7) from between flange (15).

(9) Remove four nuts (9) from four bolts (10).

(10) Remove four bolts (10) from gasket (14) and flange (16) of control valve assembly (13).

(11) Remove and discard gasket (14) from between flange (16).

(12) Remove control valve assembly with piping attached, from multimedia filter assembly.

e. Disassemble, Multimedia Control Valve Piping Assembly. (Figure 3-40)

(1) Loosen union (1) and remove pipe section consisting of half union (1), nipple (2), elbow (3), and flow control (4) .

(2) Remove half union (1) from nipple (2).

(3) Remove nipple (2) from elbow (3).

(4) Remove flow control (4) from elbow (3),

(5) Remove pipe section consisting of diaphragm valve (5), nipple (6), and elbow (7).

(6) Remove elbow (7) from nipple (6).

(7) Remove nipple (6) from diaphragm valve (5).

(8) Remove pipe section consisting of pipe (8), tee (9), flow control (10), and tee (11) from valve assembly (31).

(9) Remove pipe (8) from tee (9).

(10) Remove tee (11) from flow control (10).

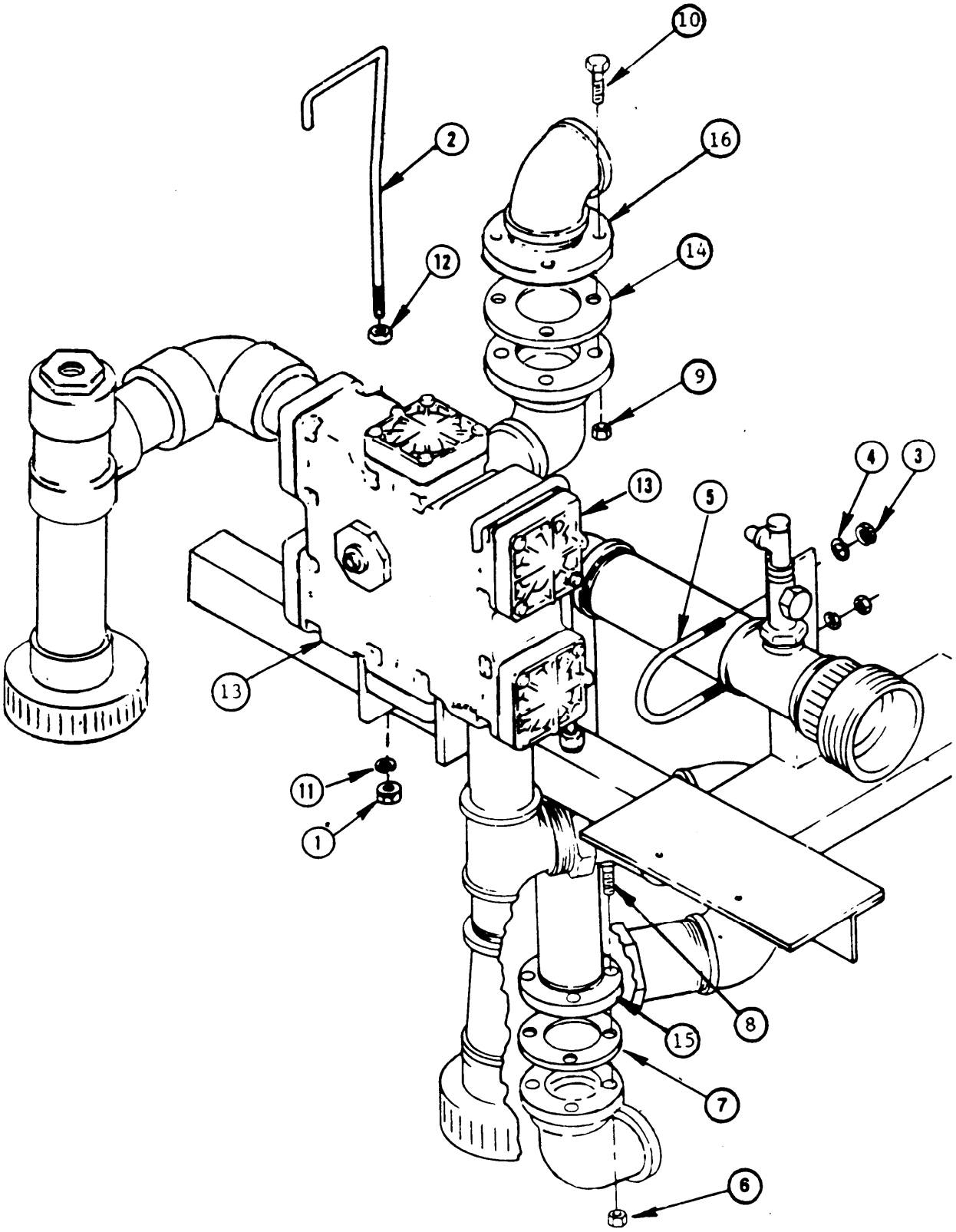


Figure 3-39. Multimedia Filter Control Valve Piping Assembly

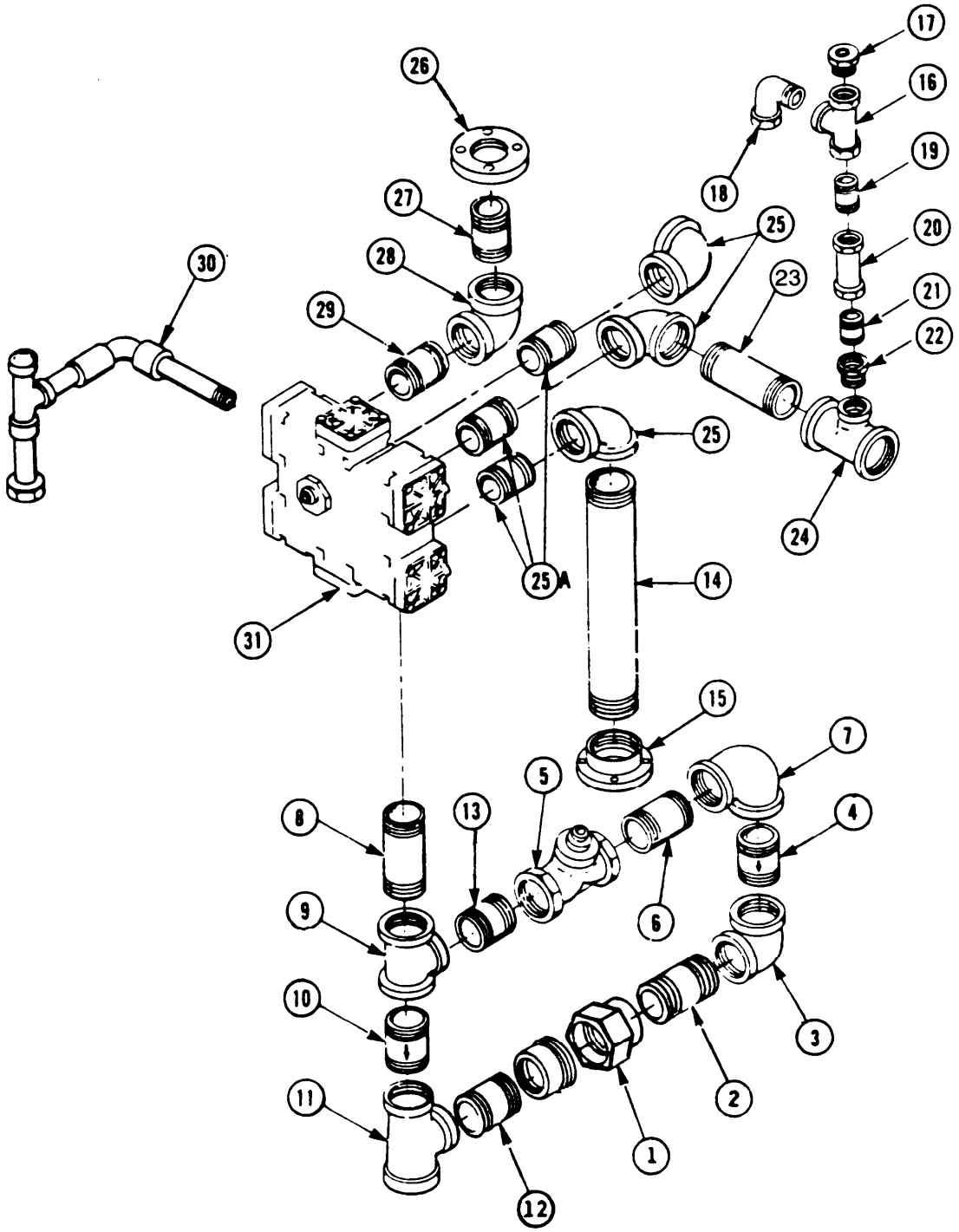


Figure 3–40. Multimedia Filter Control Valve Piping Assembly

(11) Remove nipple (12) from tee (11) and half union (1).

(12) Remove flow control (10) from tee (9).

(13) Remove nipple (13) from tee (9) and diaphragm valve (5).

(14) Remove pipe (14) with flange (15) attached, from elbow (25).

(15) Remove flange (15) from pipe (14).

(16) Remove tee (16) with adapter (17) , elbow (18), and nipple (19) attached, from strainer (20).

(17) Remove strainer (20) with nipple (21) attached, from bushing (22).

(18) Remove nipple (19) from tee (16)

(19) Remove adapter (17) from tee (16).

(20) Remove elbow (18) from tee (16).

(21) Remove nipple (21) from strainer (20).

(22) Remove pipe (23) with attached tee (24), bushing (22), and elbow (25),

(23) Remove bushing (22) from tee (24).

(24) Remove three elbows (25) and nipples (25A) from valve assembly (31).

(25) Remove flange (26) from nipple (27) and nipple (27) from elbow (28).

(26) Remove elbow (28) from nipple (29) and remove nipple (29) from valve assembly (31).

(27) Remove pipe assembly (30) from valve assembly (31).

f. Disassembly, Multimedia Filter Control Valve Assembly. (Figure 3-41)

NOTE

Procedure for cartridge removal is typical for six valves on the control valve assembly.

(1) Remove four screws (1) from cap (2) and valve body (3).

(2) Remove cap (2) from valve body (3).

(3) Lift out cartridge assembly (4) from valve body (3).

(4) Remove cartridge gasket (5) from valve body (3). Discard cartridge gasket (5).

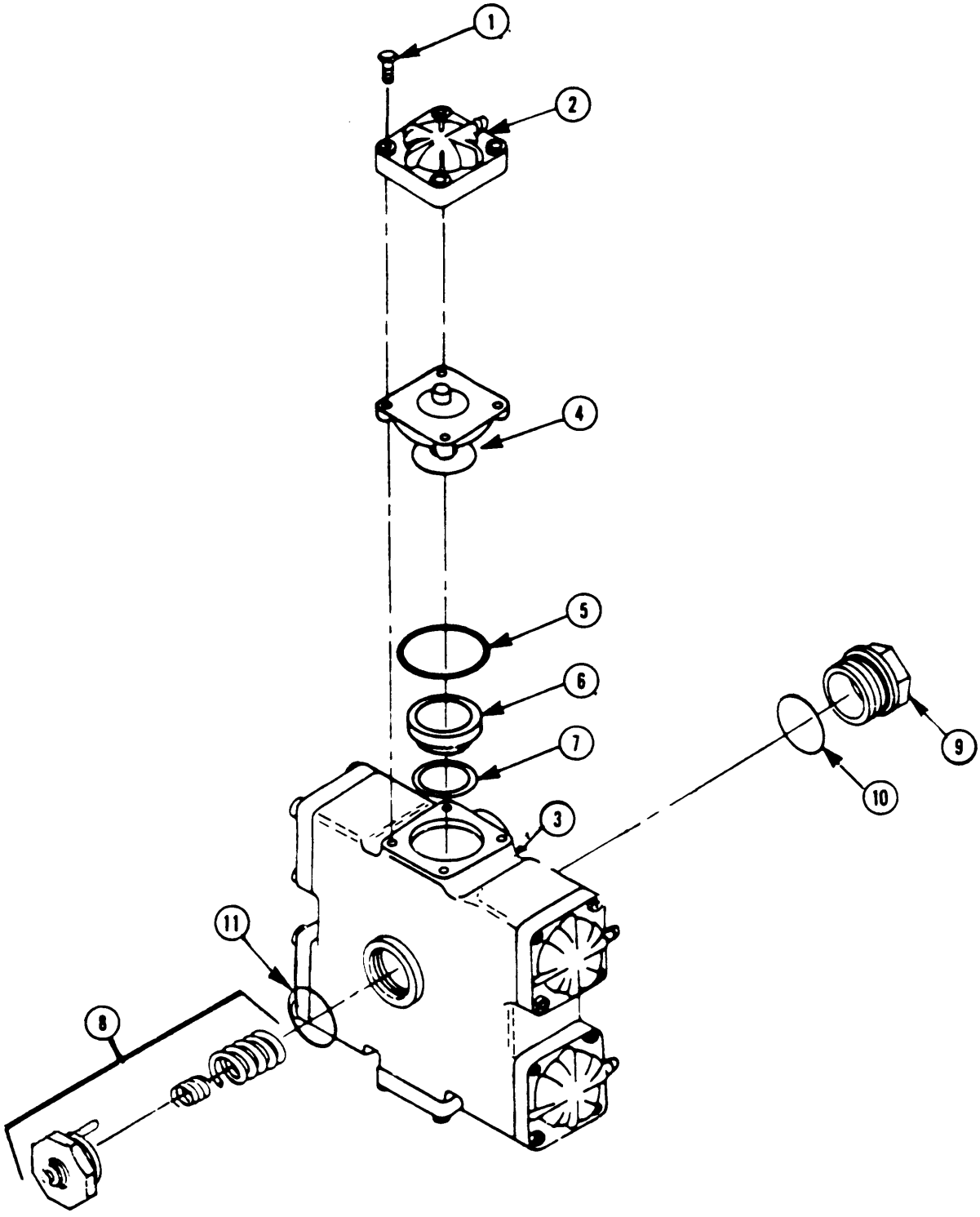


Figure 3-41. Multimedia Filter Control Valve Assembly

(5) Lift out seat (6) and seat gasket (7) from valve body (3). Discard seat gasket (7).

(6) Unscrew and remove all parts to cap assembly (8) and O-ring (11) from valve body (3). Discard O-ring (11).

(7) Unscrew and remove pipe plug (9) and O-ring (10) from valve body (3). Discard O-ring (10).

g. Disassembly, Multimedia Filter Diaphragm Valve. (Figure 3-42)

(1) Remove four screws (1) from cap (2) and valve body (3).

(2) Remove cap (2) from body (3).

(3) Using a screwdriver to hold the shaft (4), remove nut (5) from shaft (4).

(4) Remove gasket (18) from shaft (4) and discard gasket (18).

(5) Remove upper and lower plate and diaphragm (7) from shaft (4). Discard diaphragm (7).

(6) Remove the other gasket (18) from shaft (4) and discard gasket (18).

(7) Remove O-ring retainer (8) and large O-ring (9) from shaft (4) and body (3). Discard O-ring (9).

(8) Remove small O-ring (10) from inside bore of O-ring retainer (8). Discard O-ring (10).

(9) Lift out shaft (4), with gasket (18), disc retainer (11), disc (12), disc plate (19), lockwasher (14), and nut (13) attached, from valve body (3).

(10) Using a screwdriver to hold the shaft (4), remove nut (13) and lockwasher (14) from shaft (4).

(11) Remove disc plate (19), disc (12), disc retainer (11), and gasket (18) from shaft. Discard gasket (18).

(12) Remove large O-ring (16) and lower seat (15) from valve body (3). Discard O-ring (16).

(13) Remove elbow (17) from cap (2).

h. Removal, Multimedia Filter Hand-Hole Cover, Underbedding And Media. (Fgure 3-43)

(1) Remove eight nuts (1), top hand-hole cover (2), and gasket (4) from multimedia filter tank (7). Discard gasket (4).

(2) Remove nut (6) and zinc anode (5) from mounting stud (3) of hand-hole cover (2).

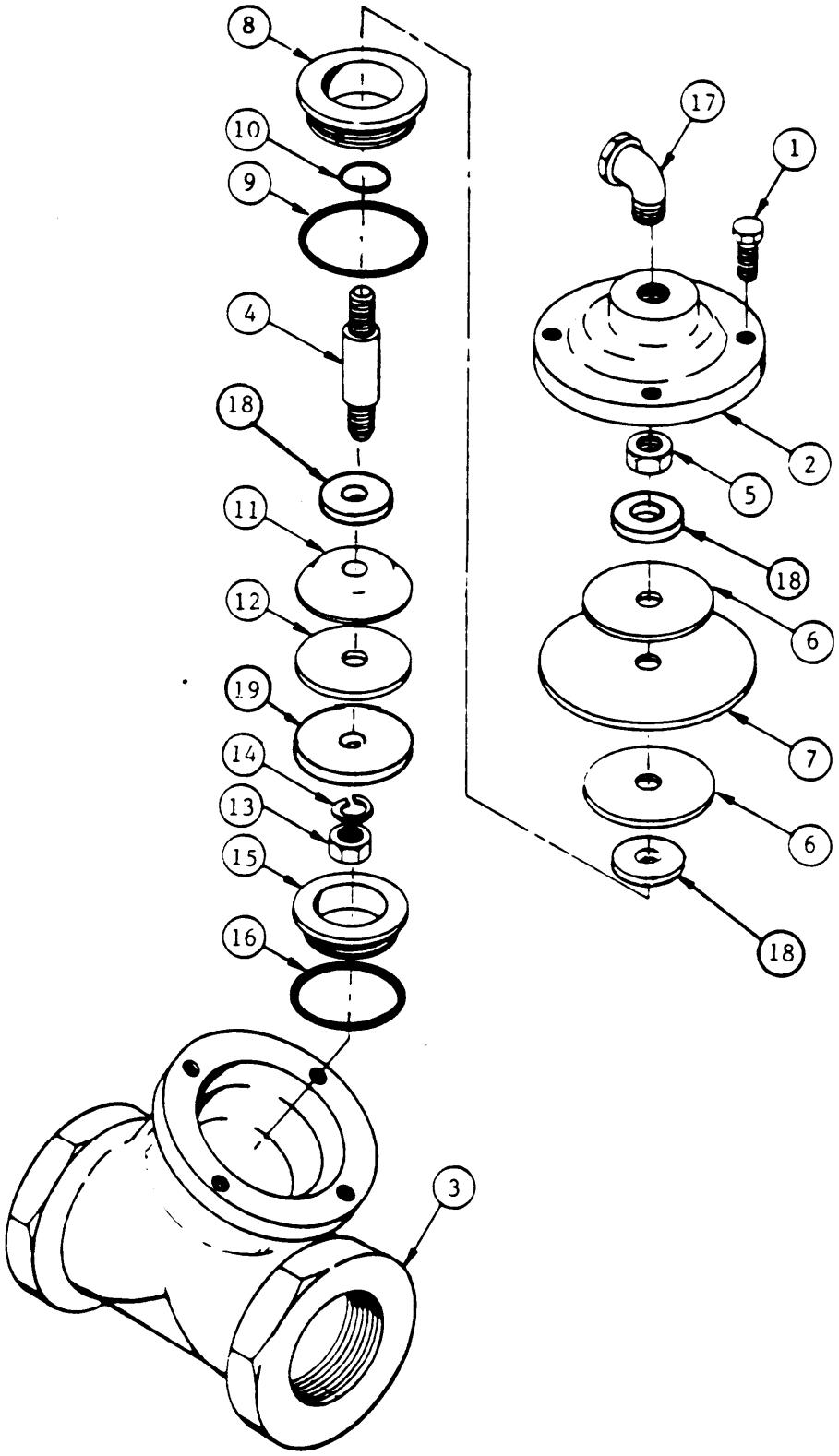


Figure 3–42. Multimedia Filter Diaphragm Valve

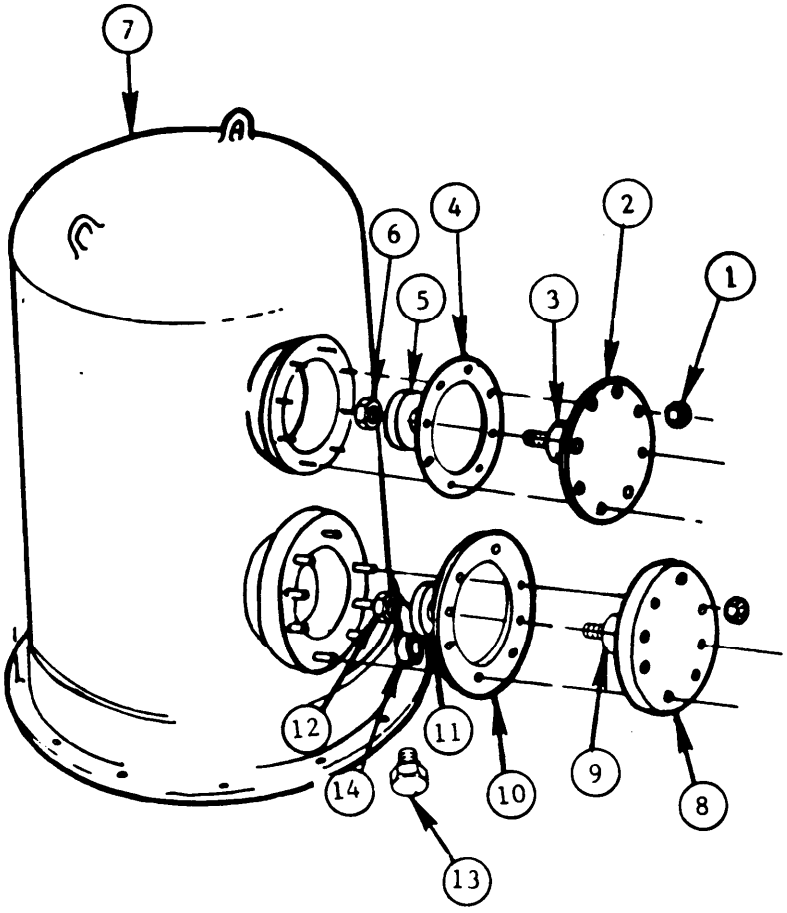


Figure 3-43. Multimedia Filter Assembly Hand-Hole Cover

(3) Remove eight nuts (1), bottom hand-hole cover (8), and gasket (10) from filter tank (7). Discard gasket (10).

(4) Remove nut (12) and zinc anode (11) from mounting stud (9) of hand-hole cover (8).

(5) Remove plug (13) from drain port (14).

(6) Completely remove media and underbedding through top and bottom hand-holes.

i. Removal, Multimedia Filter Internals. (Figures 3-44)

(1) Through the top hand-hole of multimedia filter, remove three nuts (1), screws (2), and washers (3) from two clamps (4) and (5) (figure 3-44; sheet 1 of 2).

(2) Remove two clamps (4) and (5) from inlet pipe assembly (6) and vent pipe assembly (7).

(3) Unscrew union (8) and remove vent pipe assembly (7) with elbow (14), nipple (13), and strainer (12) attached.

(4) Remove strainer (12), nipple (13), elbow (14), and union (8) from vent pipe assembly (7).

(5) Remove nipple (9) from coupling (10).

(6) Remove inlet pipe assembly (6) from coupling (11) with elbow (16) and nipple (15) attached.

(7) Remove nipple (15) and elbow (16) from inlet pipe assembly (6).

(8) Through bottom hand-hole of multimedia filter, remove two nuts (1) from U-bolt (2) (figure 3-44, sheet 2 of 2).

(9) Remove U-bolt (2).

(10) Carefully remove eight laterals (3) from hub (4).

(11) Remove nipple (5) with hub (4) attached, from tee (6).

(12) Remove nipple (5) from hub (4).

(13) Remove pipe assembly (7) from coupling (8) with tee (6), nipple (9), and cap (10) attached.

(14) Remove cap (10), nipple (9), and tee (6) from pipe assembly (7).

(15) Remove strainer (12) from nipple (11).

j. Cleaning.

(1) Clean all parts with a brush and a mild soap solution.

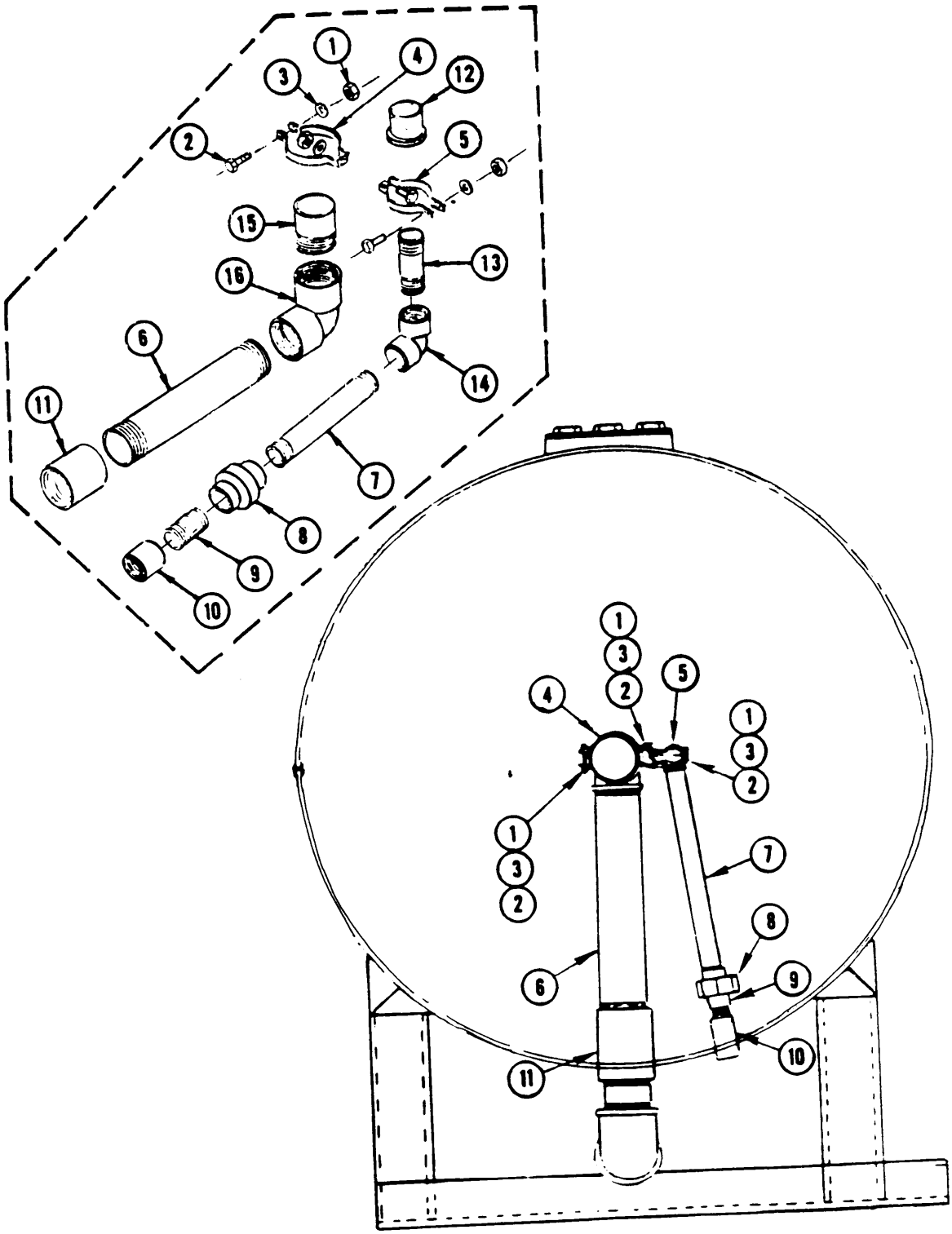


Figure 3-44. Multimedia Filter Internals (Sheet 1 of 2)

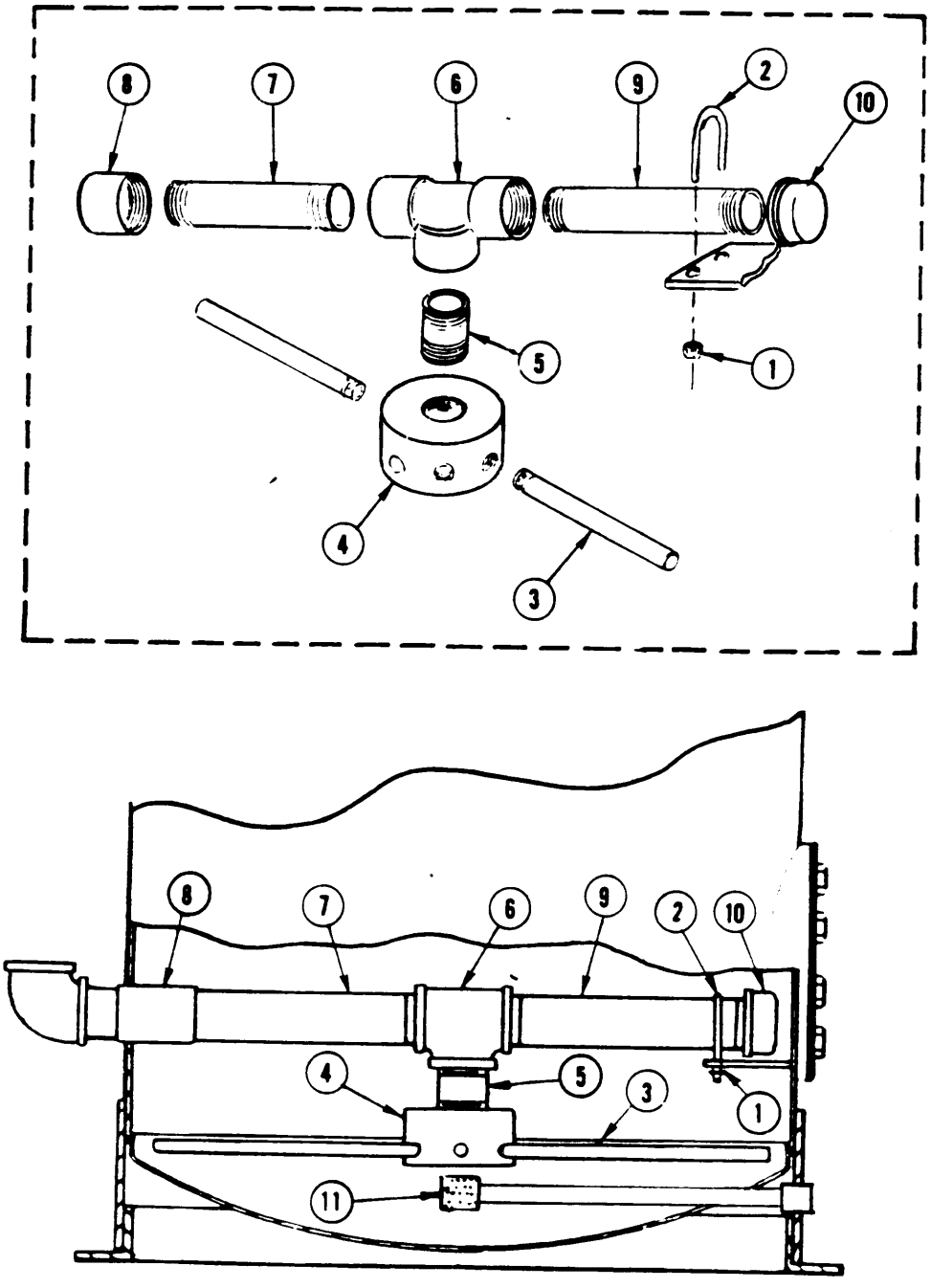


Figure 3-44. Multimedia Filter Internals (Sheet 2 of 2)

(2) Remove all dirt, rust, loose paint, and corrosion.

(3) Remove all dirt and corrosion from threads.

(4) Clean flanges and all mating surfaces.

(5) Clean mounting surfaces of all O-rings.

(6) Clean underside of multimedia filter tank.

(7) Clean mounting surface of ROWPU floor where multimedia filter assembly is mounted.

(8) Flush out inside of multimedia filter tank with water.

k. Inspection.

(1) Inspect tank for damaged mounting holes in flange.

(2) Inspect tank for cracks, fractures, or holes.

(3) Check lifting eyes for breaks, cracks, or fractures.

(4) Check vent and drain fittings for damage or stripped threads.

(5) Check pipe fittings for damage or stripped threads.

(6) Inspect all pipe and pipe fittings for broken, cracked, or fractured sections.

(7) Inspect all pipes and fittings for damaged or stripped threads.

(8) Discard all O-rings, gaskets, and diaphragms.

(9) Inspect all mating gasket and flange surfaces for scratches, cracks, or fractures.

(10) Inspect plastic caps of control valve assembly for cracks, chips, or damage.

(11) Inspect control valve assembly for dirt, corrosion, or damaged parts.

(12) Inspect turnbuckles for stripped threads and fractures.

(13) Inspect welded piping support brackets for cracked or fractured welds or bent or broken members.

(14) Inspect all hardware for stripped or damaged threads or heads.

(15) Inspect zinc anodes for excessive wear.

l. Repair or Replace.

(1) Replace all gaskets, O-rings, diaphragms, and soft material parts.

(2) Repair by welding, cracks, fractures, and holes in tanks.

(3) Replace and weld cracked, broken, fractured, or missing lifting eyes.

(4) Replace all damaged nuts, bolts, screws, washers, and other hardware.

(5) Recut or retap damaged threads on fittings and fitting connections.

(6) Replace all damaged vent lines, drain lines, pressure lines, pipes, and pipe fittings.

(7) Buff small nicks and scratches out of seating surfaces of O-rings and gaskets with fine emery cloth.

(8) Replace plastic control valve caps.

(9) Replace damaged cartridge assembly of control valve assembly.

(10) Replace damaged, unserviceable, and unrepairable turnbuckles.

(11) Repair support brackets by replacing, rewelding, and straightening.

(12) Replace plastic strainers.

(13) Replace excessively worn zinc anodes.

m. Install, Multimedia Filter Internals.

(1) Through bottom hand-hole of multimedia filter (figure 3-44, sheet 2 of 2), install strainer (11) on nipple (12) .

(2) Install tee (6) on pipe assembly (7), nipple (9) and cap (10) on nipple (9).

(3) Install pipe assembly (7) in coupling (8).

(4) Install hub (4) to nipple (5).

(5) Install nipple (5) in tee (6).

(6) Carefully install eight laterals (3) on hub (4).

(7) Install U-bolt (2) over nipple (9) and two nuts (1) on U-bolt (2).

(8) Through the top hand-hole of multimedia fitter (figure 344, sheet 1 of 2), install nipple (9) in coupling (10) .

(9) Install elbow (14) on vent pipe assembly (7), nipple (13) in elbow (14), and strainer (12) on nipple (13).

(10) Install union (8) to vent pipe assembly (7).

(11) Screw union (8) to nipple (9).

(12) Install nipple (15) and inlet pipe assembly (6) in elbow (16) .

(13) Install inlet pipe assembly (6) in coupling (11).

(14) Attach two clamps (4) and (5) to inlet pipe assembly nipple (15) and vent pipe assembly nipple (13).

(15) Secure clamps (4) and (5) with three screws (2), washers (3), and nuts (1).

n. Install, Multimedia Filter Underbedding and Media, (Figures 3-43 and 3-45)

(1) Install plug (13) (figure 3-43) in drain port (14).

(2) Through the bottom hand-hole, install underbidding in the following sequence (figure 3- 45):

(a) Evenly spread 250 lbs (Cullsan Medium) underbedding at bottom of multimedia filter tank.

(b) Evenly spread 175 lbs (Cullsan G-12) underbedding in multimedia filter tank.

(3) Install zinc anode (11) and nut (12) on mounting stud (9) of hand-hole cover (8).

(4) Install new gasket (10) (figure 34-3), bottom hand-hole cover (8), and eight nuts (1) on multimedia filter tank (7).

(5) Through the top hand-hole, install filter media in the following sequence (figure 3-45):

(a) Evenly spread 175 lbs (Cullsan G-50) filter media in multimedia filter tank.

(b) Evenly spread 225 lbs (Cullsan A) filter media in multimedia filter tank.

(c) Evenly spread 350 lbs (Cullcite) filter media in multimedia filter tank.

(d) Evenly spread 55 lbs (Cullsan P) filter media in multimedia tank.

(6) Install zinc anode (5) and nut (6) on mounting stud (3) of hand-hole cover (2).

(7) Install new gasket (4) (figure 3-43), top hand-hole cover (2), and eight nuts (1) on multimedia filter tank (7).

o. Reassembly, Multimedia Filter Diaphragm Valve. (Figure 3-42)

(1) Install lower seat (15) and large O-ring (16) into valve body (3).

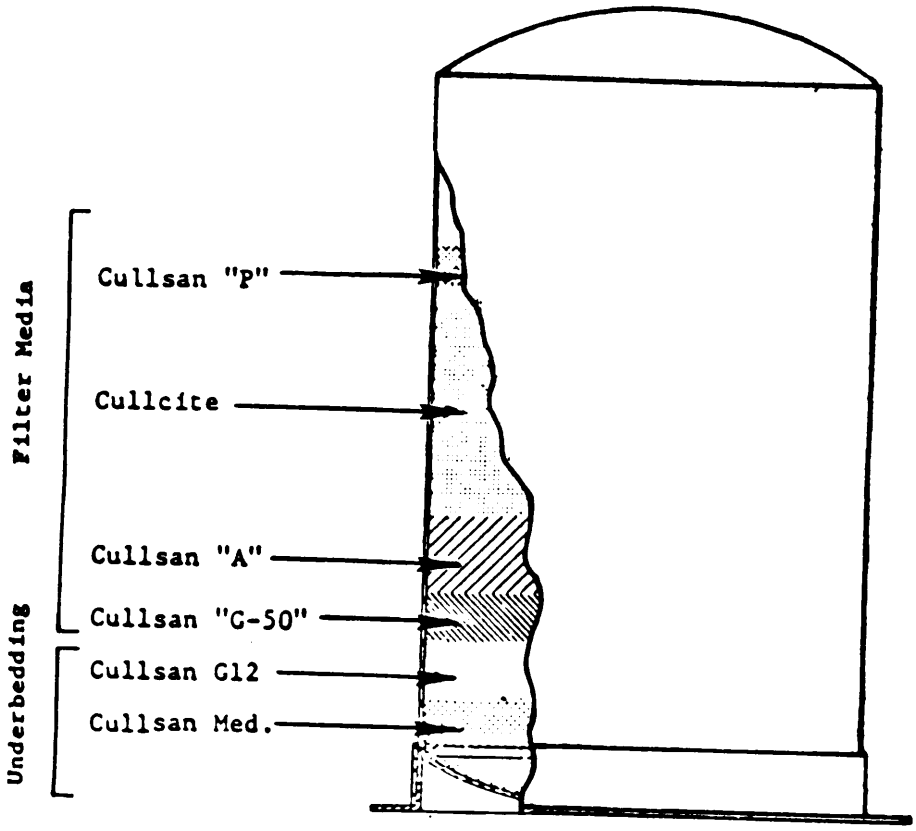


Figure 3-45. Multimedia Filter Underbedding and Media

(2) Install new gasket (18), disc retainer (11), disc (12), and disc plate (19) onto shaft (4).

(3) Using a screwdriver to hold shaft (4), install lockwasher (14) and nut (13) onto shaft (4)

(4) Install small O-ring (10) into O-ring retainer (8).

(5) Slide O-ring retainer (8) with large O-ring (9) over shaft (4).

(6) Carefully lower shaft (4) with O-ring retainer (8) attached, into valve body (3).

(7) Slide gasket (18), lower plate (6), diaphragm (7), upper plate (6), and gasket (18) onto shaft (4).

(8) Position diaphragm (7) on mounting flange of valve body (3).

(9) Using a screwdriver to hold shaft (4), install nut (5) onto shaft (4).

NOTE

Make sure diaphragm is seated flat, with no folds or wrinkles. Make sure no foreign matter is trapped on diaphragm or mating surfaces.

(10) Carefully position cap (2) over diaphragm (7) and align mounting holes.

(11) Install four screws (1) through cap (2) and valve body (3).

(12) Install elbow (17) into cap (2).

p. Reassembly, Multimedia Filter Control Valve Assembly. (Figure 3-41)

NOTE

Procedures for reassembly of cartridge assembly is typical for six valves on the control valve assembly.

(1) Install O-ring (10) and pipe plug (9) into valve body (3).

(2) Install O-ring (11) and all parts to cap assembly (8) into valve body (3).

(3) Install seat gasket (7) and seat (6) into valve body (3).

(4) Install cartridge gasket (5) into valve body (3).

(5) Position cartridge assembly (4) into valve body (3) and align mounting holes.

(6) Position cap (2) over cartridge assembly (4) and align mounting holes.

CAUTION

To prevent damage to valve caps, torque screws to a maximum of 30 inch–lbs.

(7) Install four screws (1) through cap (2), cartridge assembly (4), and valve body (3).

q. Reassembly, Multimedia Filter Control Valve Piping Assembly. (Figure 3-40)

(1) Install pipe assembly (30) onto valve assembly (31).

(2) Install nipple (29) and elbow (28) into valve assembly (31).

(3) Install nipple (27) and flange (26) into elbow (28).

(4) Install three nipples (25A) and elbows (25) into valve assembly (31).

(5) Install pipe (23) into elbow (25).

(6) Install tee (24) onto pipe (23).

(7) Install bushing (22) in tee (24).

(8) Install nipple (21) in bushing (22) and strainer (20) onto nipple (21).

(9) Install nipple (19) in strainer (20) and tee (16) on nipple (19).

(10) Install adapter (17) into tee (16).

(11) Install elbow (18) into tee (16).

(12) Install pipe (14) in elbow (25) and flange (15) onto pipe (14).

(13) Install nipple (8) on control valve assembly (31) and tee (9) on nipple (8).

(14) Install flow control (10) in tee (9)

(15) Install nipple (13) in tee (9).

(16) Install tee (11) onto flow control (10).

(17) Install nipple (12) in tee (11) and half union (1) onto nipple (12).

(18) Install diaphragm valve (5) onto nipple (13).

(19) Install nipple (6) in diaphragm valve (5).

(20) Install elbow (7) onto nipple (6).

(21) Install flow control (4) in elbow (7).

(22) Install elbow (3) onto flow control (4).

(23) Install nipple (2) in elbow (3).

(24) Install half union (1) onto nipple (2).

(25) Connect both halves of union (1).

r. Install, Control valve Assembly, and Piping. (Figure 3-39).

(1) Position control valve assembly with piping attached. onto support structure of multimedia filter assembly, and align mounting holes on top and bottom control valve assembly pipe flanges. Check that new gaskets are in place.

(2) Insert four bolts (10) through new gasket (14) and top pipe flange (16) of control valve assembly (13).

(3) Install, but do not tighten, four nuts (9) on four bolts (10).

(4) Insert four bolts (8) through new gasket (7) and bottom pipe flange (15) of control valve assembly (13).

(5) Install, but do not tighten, four nuts (6) on four bolts (8).

(6) Install U-clamp (5) into mounting bracket and over pipe of control valve assembly (13).

(7) Install, but do not tighten, two lockwashers (4) and two nuts (3) on U-clamp (5).

(8) Install two lock nuts (12) on two clamps (2).

(9) Position two clamps (2) and nuts (12) into mounting bracket.

(10) Install, but do not tighten, two lockwashers (11) and two nuts (12) on two clamps (2).

(11) Adjust and tighten nuts (1) and (12) to secure control valve assembly (13) to multimedia filter assembly.

(12) Tighten nuts (3), (6), and (9), adjusting piping of control valve assembly (13), as necessary.

s. Installation, Multimedia Filter Assembly. (Figure 3–38)

CAUTION

Installation of the multimedia filter assembly requires the use of a 5–ton (4.54 tonnes) crane to prevent damage.

(1) Attach two crane hooks to the lifting eyebolts and carefully hoist filter assembly (1) through opening in top of ROWPU frame.

(2) Lower filter assembly (1) to ROWPU floor and align mounting holes.

(3) Install, but do not tighten, twelve bolts (6) and twelve lockwashers (7) through filter assembly mounting flange (8) and ROWPU frame.

(4) Install two bolts (9), lockwashers (10), and nuts (11) on frame structure (12).

CAUTION

Be sure that O–rings are properly seated in the union (4) before connecting it.

(5) Connect three unions (4) to inlet, outlet, and waste drain ports.

(6) Remove crane hooks and crane.

(7) Install, but do not tighten, two stabilizers (5) to lifting eyebolts and ROWPU frame.

(8) Tighten twelve bolts (6) of filter tank mounting flange.

(9) Tighten all mounting hardware, mounting control valve assembly, and piping to mounting bracket of filter tank.

(10) Tighten two stabilizers (5) from filter tank to ROWPU frame.

(11) Remove plug and connect coupling (3) of drain line to filter tank.

(12) Remove plug and connect couplings (2) of vent line in filter tank.

(13) (ARMY) Replace channel section in ROWPU frame by welding in place, using 1/4 inch (0.64-centimeter) thick aluminum doublers on inside of channel. Doublers will be a minimum of two inches (5.1 centimeters) long.

t. Installation, Backwash Timer.

(1) Reinstall backwash timer in accordance with paragraph 2-56

(2) Connect power plug.

u. Sanitization.

NOTE

The multimedia fitter assembly must be sanitized after control valve assembly has been replaced.

(1) Follow startup procedures for normal operation of ROWPU.

(2) Remove eight nuts (1), top hand-hole cover (2), and gasket (4) from filter tank (figure 3-43) .

(3) Close multimedia filter drain valve as identified at drain valves location.

(4) Pour 36 ounces (1.02 kilograms) of 51/4-percent chlorine solution over surface of filter bed.

(5) Replace gasket (4), top hand-hole cover (2), and eight nuts (1) on filter tank.

(6) (ARMY) Open backwash timer and lower timer panel to expose cam assembly (figure 3-46). (USMC) Set switch to SERVICE position.

NOTE

Test for chlorine levels using the Color Comparator kit. For instructions, refer to Operator's Manual (TM 10-4610-215-10 (ARMY) /TM 08580A-10/1 (USMC).

(7) (ARMY) Rotate white controller cam counterclockwise to slow rinse (B/R) position. (ARMY and USMC) Allow filter to rinse until chlorine solution can be detected flowing out of waste drain.

(8) Continue slow rinse an additional 20 minutes.

(9) (ARMY) Rotate white controller cam counterclockwise to purge (CR) position. (USMC) Set switch to CR position. Rinse until no chlorine residual can be detected in drain water.

(10) (ARMY) Rotate white controller cam counterclockwise to service (SR) position. (USMC) Set switch to SERVICE position.

(11) Close timer panel and backwash timer cover.

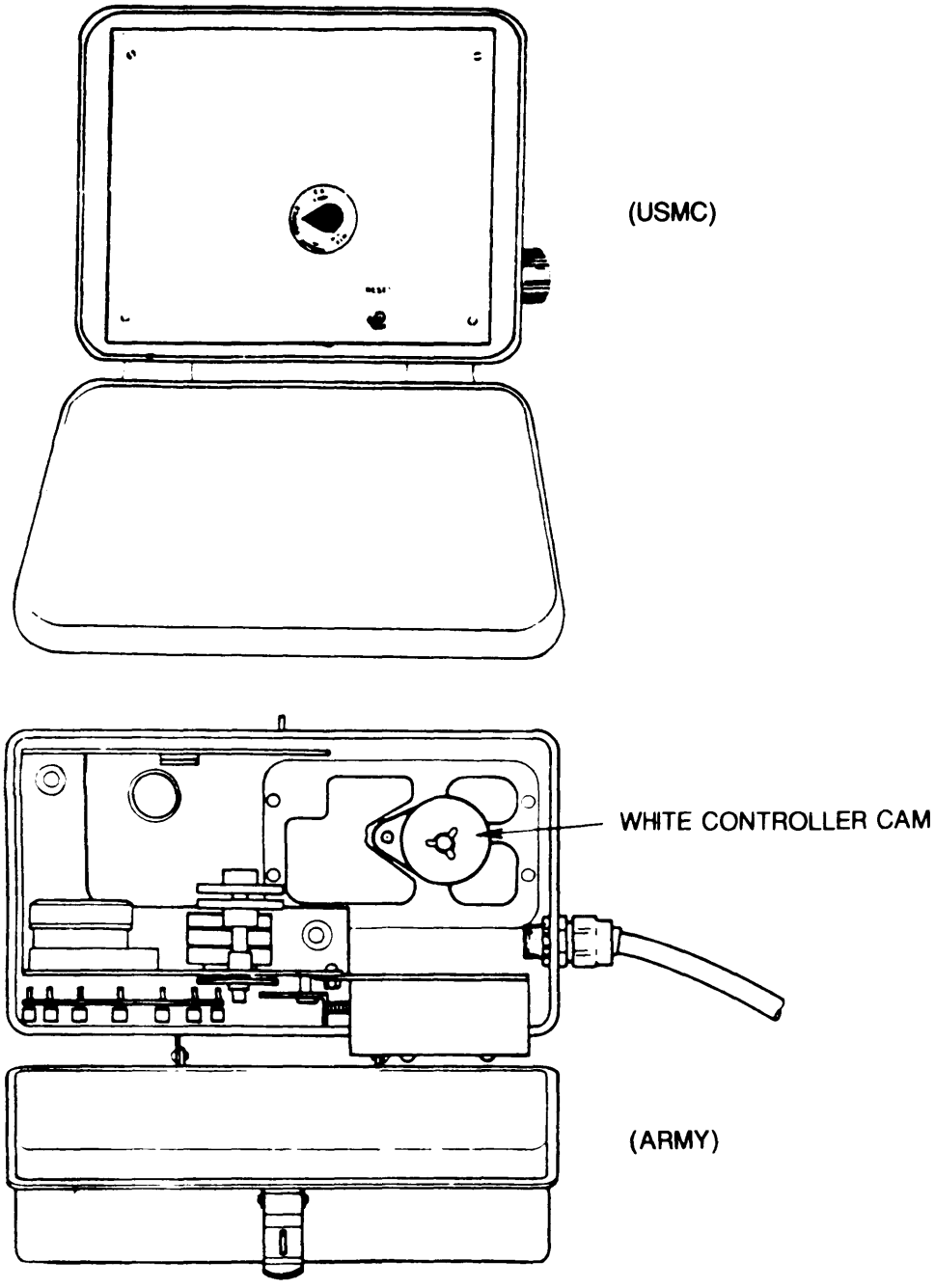


Figure 3-46. Multimedia Filter Timer Cam Assembly

3-39. HIGH-PRESSURE RELIEF VALVE. (Figure 3-47)

a. General. The high-pressure relief valve provides safety release if pressure produced by the R.O. pump rises above 1100 psi (77.33 g/cm2), as read on the R.O. pressure psi gage. The R.O. pump normally produces about 900 psi (63.27 kg/cm2). This paragraph describes testing and servicing of the high-pressure relief valve.

b. Testing and Adjustment.

WARNING

When relief valve trips, it shoots out a high-pressure jet of water which could cause physical injury to personnel. During test, aim output port away from personnel.

(1) Attach valve port (8) to metered high-pressure water source.

(2) Increase pressure gradually. Valve should open at 1100 ± 25 psi (77.33 ± 1.76 kg/cm2).

(3) If valve fails to open between 1075 and 1125 psi (75.57 and 79.09 cm2), adjust valve:

(a) Loosen locknut (2).

(b) To raise activation pressure, turn adjusting screw (1) clockwise.

(c) To lower activation pressure, turn adjusting screw (1) counterclockwise.

(d) After adjustment, tighten locknut (2).

(4) Reduce pressure and repeat test two more times.

(5) If valve cannot be adjusted to specified pressure range, return valve to next higher level of maintenance.

(6) At end of test, check weep-hole (7) for moisture. If water has seeped through weep-hole, change O-ring (6), as described in subparagraph c. below.

c. Servicing. (Figure 3-47)

(1) Disconnect valve from water source.

(2) Loosen locknut (2). Remove adjusting screw (1) with locknut (2) from valve cap (3).

(3) Remove valve cap (3) from valve.

(4) Remove keeper (4) with disc springs (5) from valve.

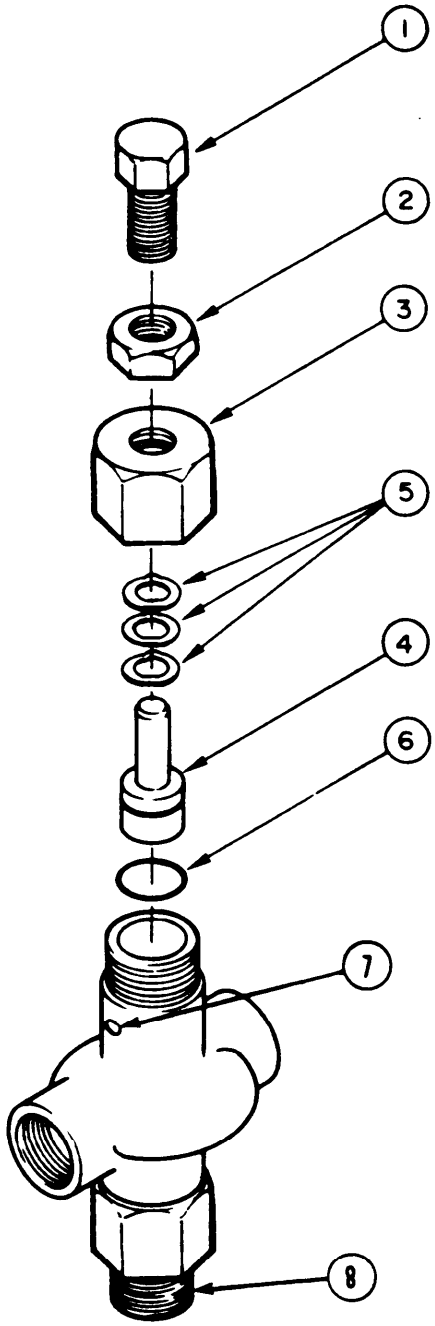


Figure 3-47. High–Pressure Relief Valve

(5) Remove O-ring (6) from keeper (4) and replace O-ring (6).

(6) Reassemble valve.

(7) Repeat test and adjustment of valves in accordance with subparagraph b.

3-40. CARTRIDGE FILTER ASSEMBLY.

a. General. The cartridge filter provides an additional stage of filtration between the multimedia filter and the R.O. vessels. This paragraph describes removal, inspection, repair, and installation of the cartridge filter assembly.

b. Remove. (Figure 3-48)

WARNING

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

NOTE

Ensure that filter tank is completely drained of water before beginning removal.

(1) Remove pipe cap (1) (figure 3-48, sheet 1 of 2) from vent vessels pipe.

(2) Remove two nuts (2), two lockwashers (3), and two large flat washers (4) from two bolts (5).

(3) Remove two bolts (5) from bracket and ROWPU frame.

(4) Have one person support pipe section (7) and unscrew union (6).

(5) Remove pipe section (7).

(6) Unscrew two unions (8) on product water pipe and remove pipe section (9) from ROWPU.

(7) Unscrew coupling nut (10) and disconnect from inlet pipe (13).

(8) Loosen two hose clamps (12) and remove flexible hose (11) from inlet pipe (13).

(9) Remove hose clamps (12) from flexible hose (11).

(10) Remove inlet pipe (13) from cartridge filter (31).

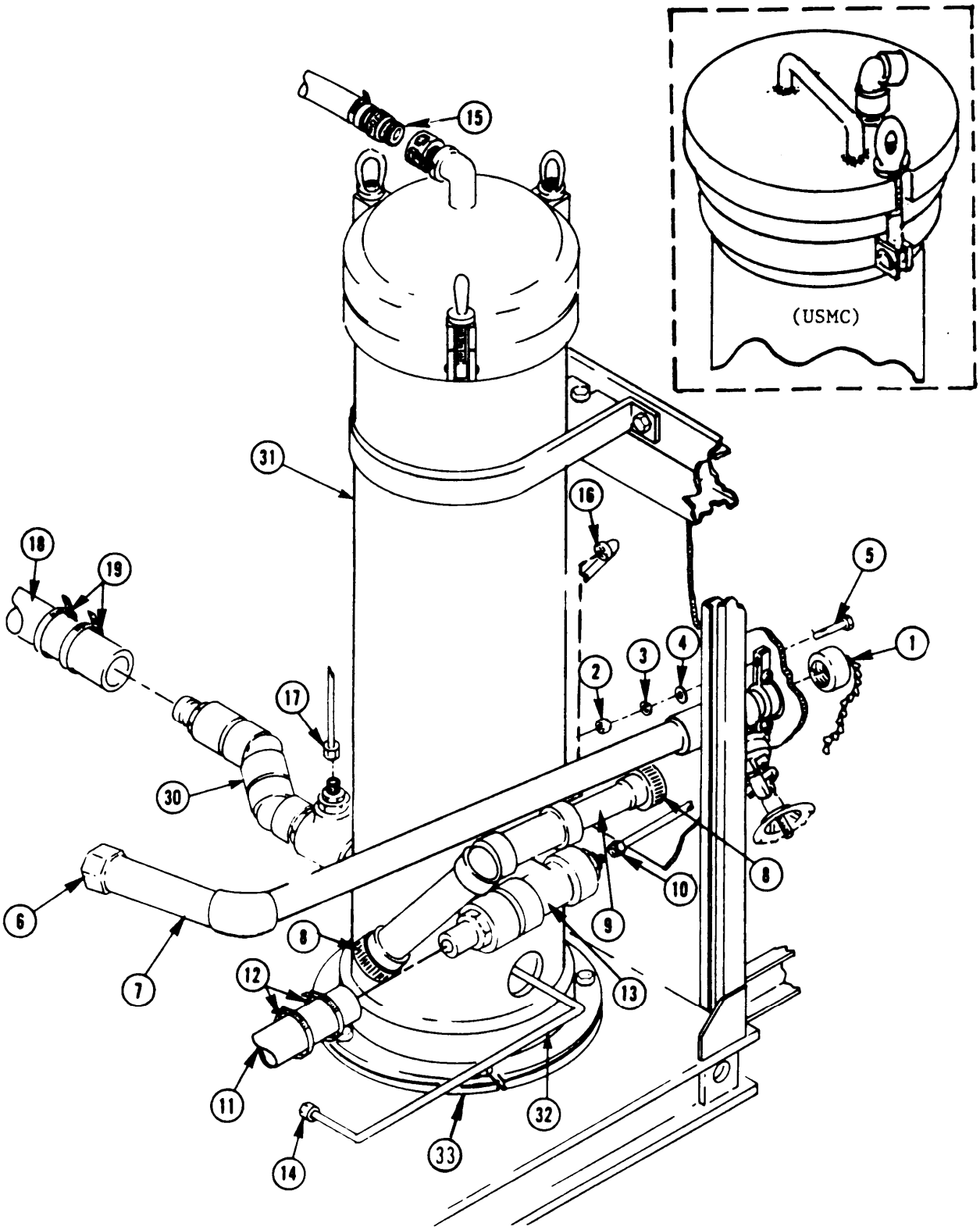


Figure 3-48. Cartridge Filter Assembly (Typical) (Sheet 1 of 2)

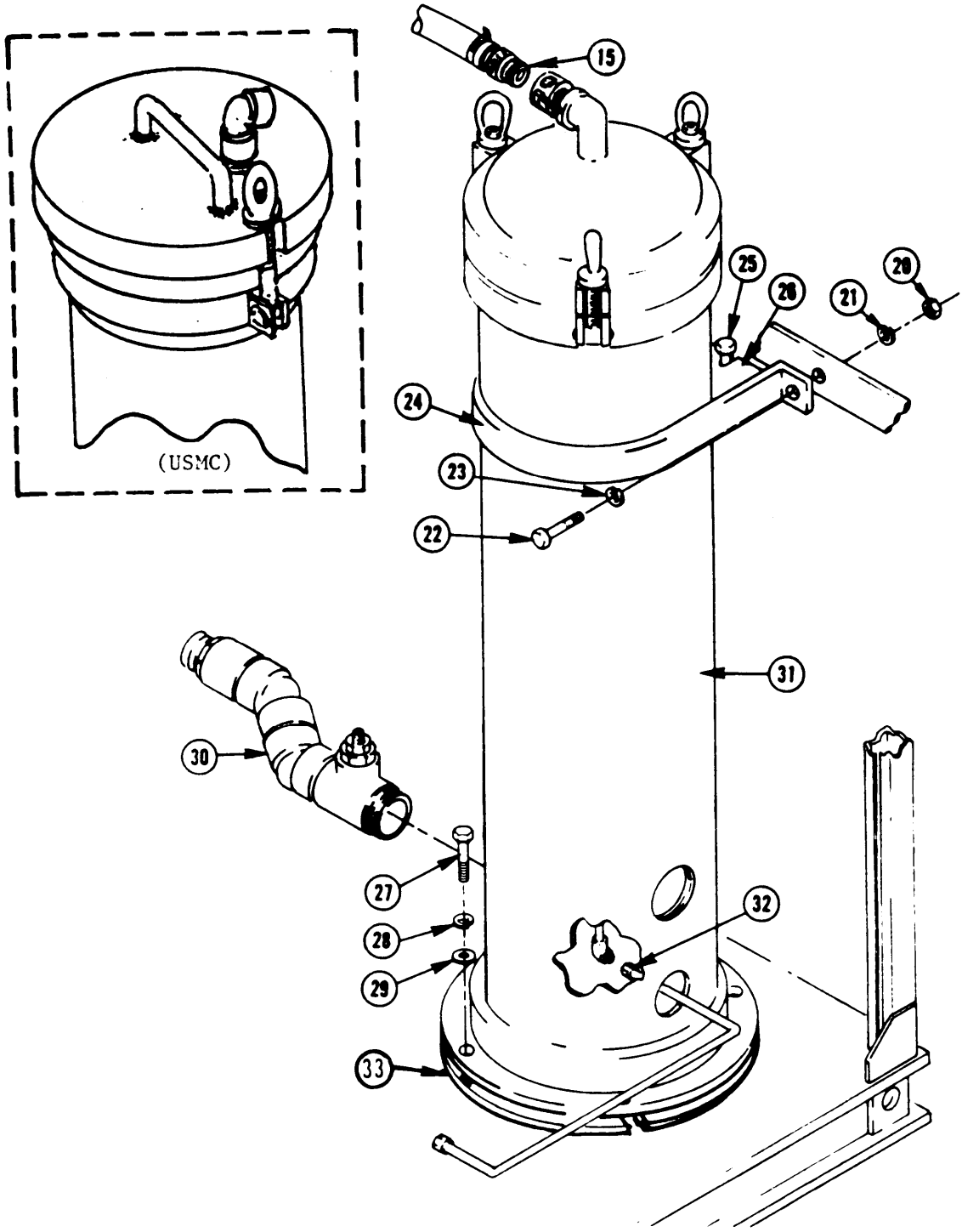


Figure 3-48. Cartridge Filter Assembly (Typical) (Sheet 2 of 2)

(11) Unscrew coupling (14) on drain tube (32).

(12) Release quick disconnect to remove flexible tube (15) from cartridge filter (31).

(13) Unscrew coupling (16) from cartridge filter (31).

(14) Unscrew coupling (17) from outlet pipe (30).

(15) Loosen two hose clamps (19) and remove flexible hose (18) from outlet pipe (30).

(16) Remove two hose clamps (19) from flexible hose (18).

(17) Remove two nuts (20) (figure 3-48, sheet 2 of 2) and two lockwashers (21) from two bolts (22).

(18) Remove two bolts (22) and two flat washers (23) from ROWPU frame and clamp (24).

(19) Remove tank clamp (24) from ROWPU frame and cartridge filter (31).

(20) Loosen two bolts (25) on bracket (26) and push bracket (26) away from cartridge filter (31).

(21) Remove four bolts (27), four lockwashers (28), four nylon flat washers (29), and isolators (33) from ROWPU frame and cartridge filter (31).

CAUTION

Removal of cartridge filter assembly requires the use of a crane rated at 1 ton (0.91 tonne) or greater in order to prevent damage to equipment.

(22) Attach three crane hooks to lifting eyebolts of cartridge filter.

(23) Using a crane, lift cartridge filter (31) just clear of ROWPU floor. Rotate cartridge filter (31) clockwise enough to gain clearance between outlet pipe (30) and pulse dampener stand.

(24) Remove outlet pipe (30) and drain tube (32) from cartridge filter (31).

(25) Remove cartridge fitter (31) from ROWPU.

c. Cleaning.

(1) Clean dirt and corrosion from ROWPU frame behind or under cartridge filter location.

(2) Clean dirt and corrosion from pipe fittings, pipes, and hardware.

d. Inspection.

(1) Inspect tank for damaged mounting holes in flange.

(2) Inspect tank for cracks, fractures, and holes.

(3) Inspect lifting lugs for breaks, cracks, or fractures.

(4) inspect all pipes, pipe fittings, and tube assemblies for cracks, bends, stripped threads, and fractures.

(5) Inspect pipe cap and connecting chain for breaks and serviceability.

(6) Inspect all hardware for stripped threads, damaged heads, and bent shanks.

e. Repair or Replace.

(1) Replace all damaged nuts, bolts, screws, washers, and other hardware.

(2) Replace all used hose clamps and flexible pipe.

(3) Replace all damaged, fractured, or unserviceable pipe fittings, tube assemblies, and pipe.

(4) Repair by straightening, or replace all tank brackets and braces and clamps.

(5) Replace damaged, unrepairable, or unserviceable cartridge fitter assembly.

f. Installation. (Figures 3-46)

CAUTION

Installation of cartridge fitter requires the use of a 1-ton (0.907 tonne) crane in order to prevent damage.

(1) Attach three crane hooks to lifting eyes of cartridge filter and hoist into ROWPU frame.

NOTE

Cartridge filter must be slightly rotated to clear outlet pipe and pulse dampener.

(2) Lower cartridge filter until just above floor of frame.

(3) Reach underneath to connect coupling on drain tube (32) (figure 3-48 sheet 2 of 2) to cartridge filter (31).

(4) Position isolator (33) on frame floor aligning with mounting holes.

(5) Lower cartridge filter (31) to frame floor and align mounting holes.

(6) Install outlet pipe assembly (30) to cartridge filter (31).

(7) Wrap thread of four bolts with Teflon tape.

(8) Install four bolts (27), four lockwashers (28), and four nylon flat washers (29) through cartridge filter mounting flange (31) and floor of ROWPU frame.

(9) Slide bracket (26) against cartridge filter (31) and tighten two bolts (25).

(10) Hold clamp (24) in place against cartridge filter (31) and ROWPU frame and align mounting holes.

(11) Insert two bolts (22) and two flat washers (23) through clamp (24) and ROWPU frame.

(12) Install two nuts (20) and two lockwashers (21) on bolts (22).

(13) Install flexible hose (18) (figure 3-48, sheet 1 of 2) on outlet pipe assembly (30) and tighten two hose clamps (19).

(14) Connect tube coupling (17) to outlet pipe (30).

(15) Connect tube coupling (16) to cartridge filter (31).

(16) Connect quick-disconnect coupling (15) to top of cartridge filter (31).

(17) Connect tube coupling (14) to frame tubing.

(18) Install inlet pipe assembly (13) to cartridge filter (31).

(19) Install flexible hose (11) and hose clamps (12) to inlet pipe assembly (13).

(20) Tighten two hose clamps (12).

NOTE

Ensure that O–rings are in place on unions before connecting.

(21) Connect tube coupling (10) to inlet pipe assembly (13).

(22) install product water pipe assembly (9) by connecting two pipe unions (8).

(23) Support pipe assembly (7) and connect pipe union (6) to pipe assembly (7).

(24) Insert two bolts (5) through control panel and pipe straps on pipe assembly (7).

(25) Install two large flat washers (4), two lockwashers (3) and two nuts (2) on bolts (5).

(26) Install pipe cap (1) on pipe assembly (7).

3-41. TRAILER BRAKE AIR CHAMBER ASSEMBLY (ARMY)

a. General. The trailer brake air chamber assembly provides the necessary force for locking and unlocking the trailer brakes. This chapter describes the removal, disassembly, inspection, and assembly of the trailer brake air chamber assembly.

b. Removal. Refer to paragraph 2-40 to remove air chamber assembly.

c. Disassembly.

(1) Place air chamber assembly on clean dry work bench.

(2) Cage air chamber compression spring (11) (figure 3-49) as shown in figure 3-50.

CAUTION

Use care in removing clamps to prevent injury to personnel or damage to equipment from springs.

(3) Remove clevis (1) (figure 3-49) and nut (2).

(4) Remove clamp (3), diaphragm (4), push rod (5), return spring (6), and housing (7).

(5) Remove clamp (8) . Slowly turn nut (4) (figure 3-50) counterclockwise to release tension on spring (11) (figure 3-49) and remove stud (6) (figure 3-50).

(6) Remove diaphragm (9) (figure 3-49), pressure plate (10), compression spring (11), and chamber (12).

(7) Remove screws (13), plates (14), return spring (15), adapter push rod (16), and O-ring (17) from adapter (18).

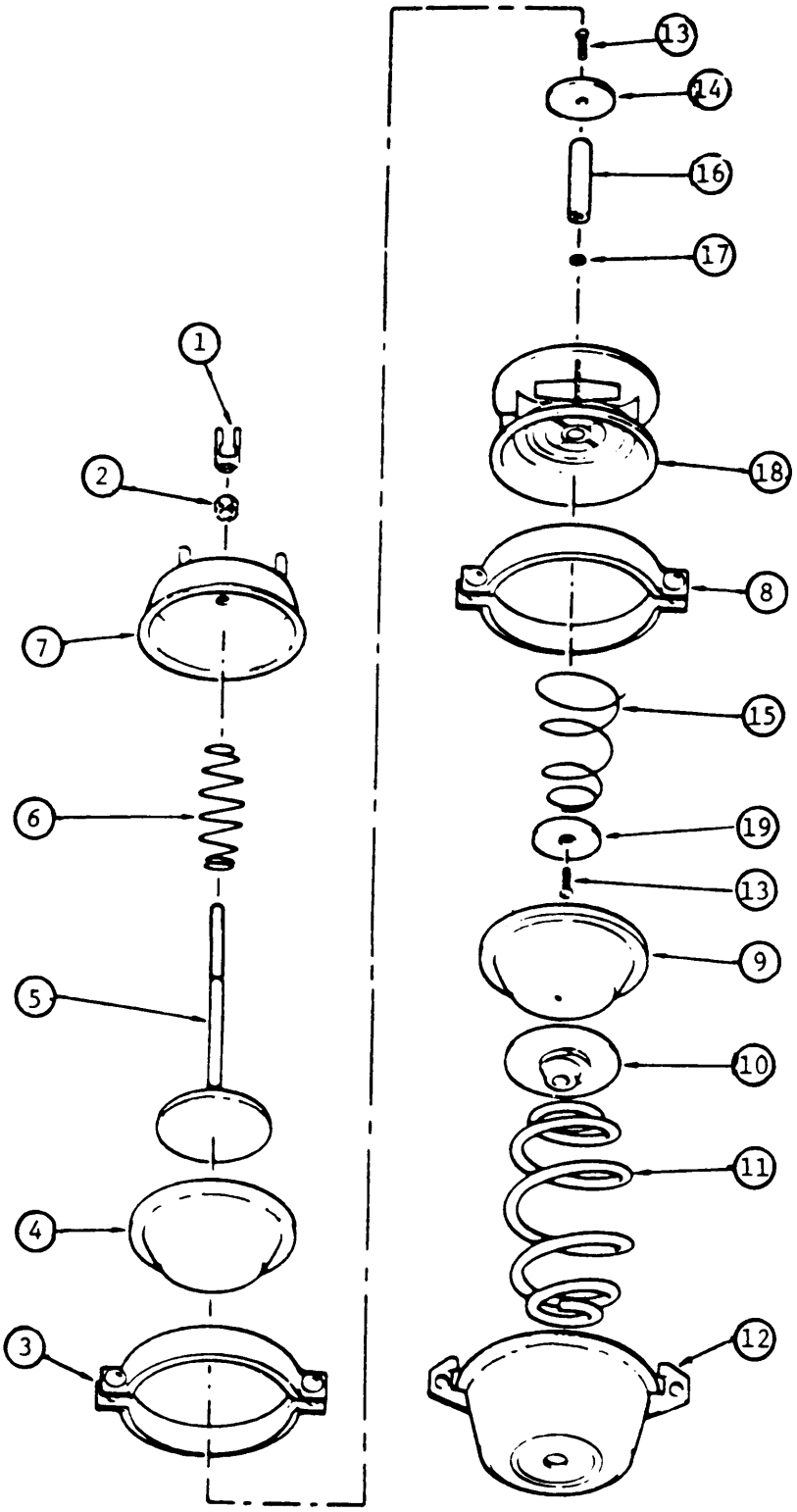
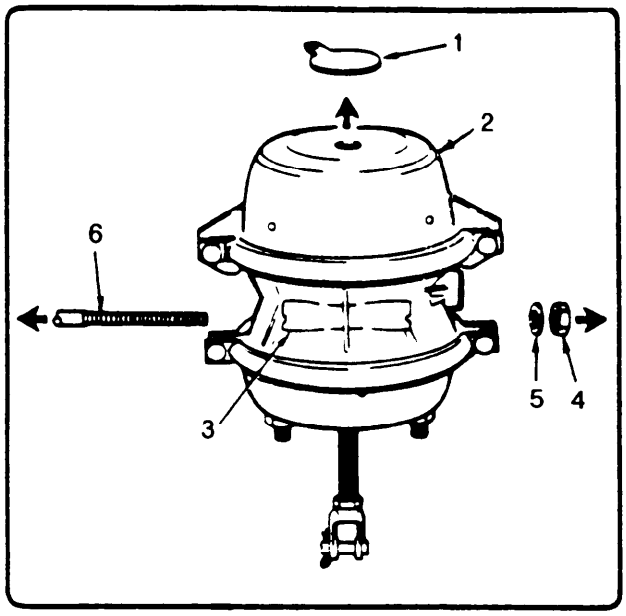
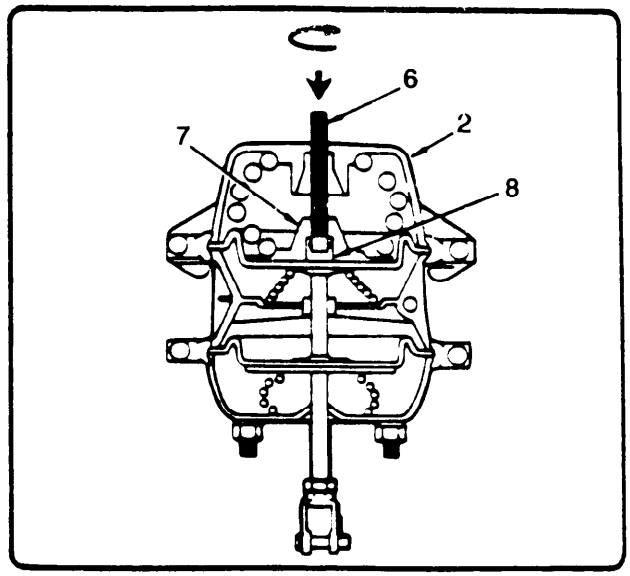


Figure 3-49. Trailer Brake Air Chamber Assembly (ARMY)



1. REMOVE DUST CAP (1) FROM TOP OF SPRING CHAMBER (2). REMOVE RELEASE STUD ASSEMBLY FROM SIDE SLEEVE (3) BY REMOVING RELEASE STUD NUT (4) AND WASHER (5) FROM RELEASE STUD (6) AND SLIDING RELEASE STUD OUT OF SLEEVE.



2. INSERT RELEASE STUD (6) THROUGH OPENING (WHEN DUST CAP WAS REMOVED) OF SPRING CHAMBER (2). AND INTO THE PRESSURE PLATE (7) TURN RELEASE STUD (6) 1/4 TURN (CLOCKWISE) IN-TO PRESSURE PLATE (7) TO SECURE CROSSPIN (8) IN CROSSPIN AREA OF PRESSURE PLATE (7). THEN LOCK RELEASE STUD INTO MANUAL RELEASE POSITION .

3 PLACE PREVIOUSLY REMOVED RELEASE STUD WASHER (5) AND NUT (4) ON RELEASE STUD (6) AND HAND TIGHTEN THE NUT ONTO RELEASE STUD

Figure 3-49. Trailer Brake Caging Air Chamber Compression Spring (ARMY)

d. Inspection.

(1) Inspect diaphragms for damage and wear. Replace worn or damaged diaphragms.

(2) Inspect compression and return springs for damage or wear. Replace worn or damaged springs.

(3) Inspect clamps for cracks or damage. Replace any damaged or broken clamps.

e. Assembly. (Figure 3–49).

(1) Install O-ring (17), adapter push rod (16), return spring (15), and plates (14) in adapter (18).

(2) Install screws (13).

(3) Install diaphragm (9), pressure plate (10), compression spring (11), and chamber (12). Secure to adapter (18) with clamp assembly (8).

(4) Lightly tap clamp assembly (8) to ensure proper seating.

(5) Install diaphragm (4), push rod assembly (5), return spring (6), and housing assembly (7). Secure to adapter (18) with clamp assembly (3).

(6) Lightly tap clamp assembly (3) to ensure proper seating.

(7) Install nut (2) and clevis assembly (1)

3-42. TRAILER SUSPENSION ASSEMBLY. (Figure 3–51) (ARMY)

a. General. The trailer suspension assembly provides the necessary support for the trailer on its axles. This chapter describes the removal, disassembly, inspection, assembly and installation of the trailer suspension assembly.

b. Removal.

(1) Attach a sling to four lifting eyes of trailer frame and hook to portable crane or forklift

(2) Place blocks under wheels to prevent rolling of suspension assembly.

(3) Remove nuts (1), washers (2), screws (3), and trunnion clamp (4) attaching suspension assembly (5) to trailer frame (6).

WARNING

To prevent serious injury, be sure lifting straps and eyes are secure and in good condition before lifting the trailer frame. Ensure that all personnel stand clear during lifting operations.

(4) Carefully lift trailer frame (6) clear of suspension assembly (5).

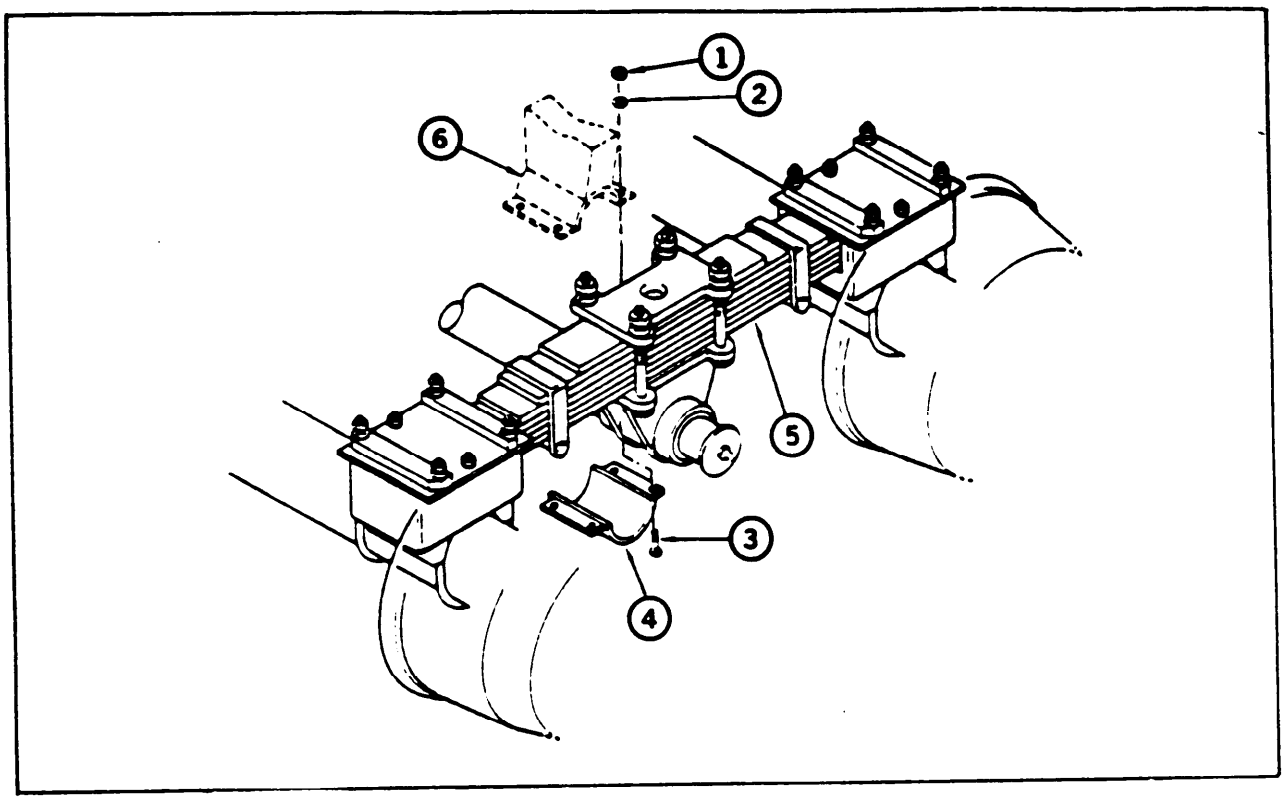


Figure 3-51. Trailer Suspension Assembly (ARMY)

c. Inspection.

(1) Inspect axle assembly for cracks. If cracks are present, replace axle assembly.

(2) Inspect axle spindle for thread damage. If thread damage is present, replace spindle.

(3) Inspect springs for breaks. If breaks are present in springs, replace broken spring.

(4) Inspect all U-bolt clamps, trunnion brackets, and axle trunnion for cracks or other damage. Replace any item containing breaks, cracks, or other damage.

d. Disassembly.

(1) To remove spring assembly (figure 3-52), perform the following:

(a) Remove nuts (l), washers (2), and U-bolts (3).

(b) Remove nuts (4) and (5), bolts (6), and trunnion bracket plate (7). Axle trunnion (8) will now fall free of spring assemblies (9).

(c) Shackle boxes are still installed on spring assemblies (9). In order to remove them, perform the following:

1. Remove nuts (10) and washers (11).

2. Separate shackle box cover (12) and shackle box (13). This will then free spring assembly (9), top spacer (14), side spacers (15), and bottom spacers (16).

(2) Remove screws (17), clamps (18), and (19), and trunnion bracket (20) from axle trunnion (8). Remove spacer ring (21).

(3) To disassemble the spring assembly (figure 3-53), perform the following:

(a) Remove nuts (1), screws (2), spacer tubings (3), and angle bars (4). Remove rivets (5) if damaged.

(b) Remove nut (6) and screw (7), then separate bars (8) through (14).

(4) Using a standard lug nut wrench and handle available from a towing vehicle, loosen lug nuts (22) (figure 3-55).

NOTE

Do not remove lug nuts (22) at this time.

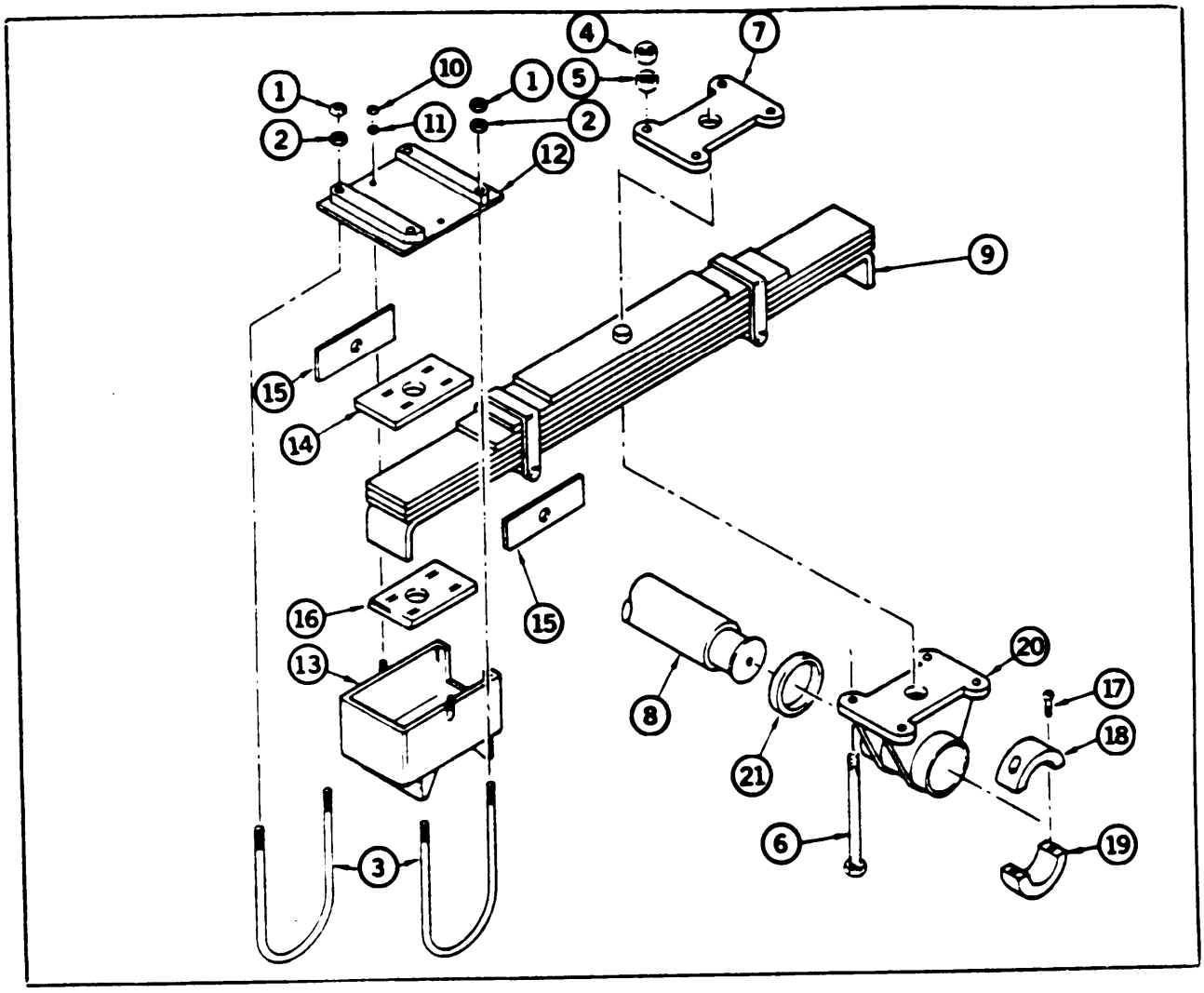


Figure 3–52. Trailer Suspension (ARMY)

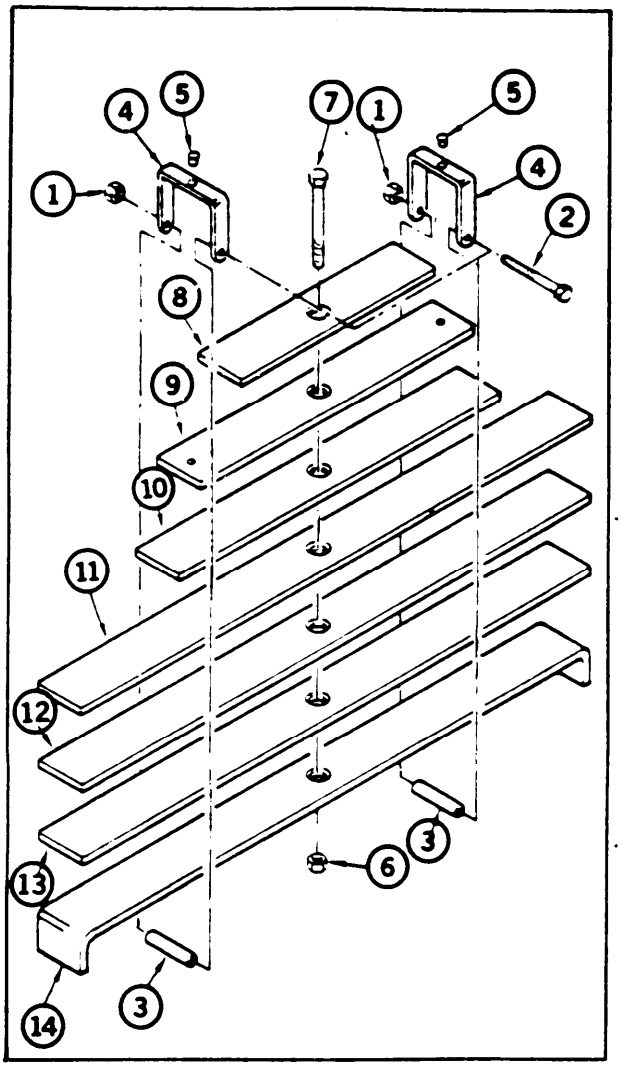


Figure 3-53. Trailer Spring Assembly (ARMY)

(5) When all lug nuts (22) are loose, using a forklift, raise axle assembly (23) until wheels are clear of ground or floor.

WARNING

Tire and wheel assembly weight is 122 lbs. Injury can occur if caution is not used when removing from hub.

(6) Carefully remove tire and wheel assembly (24) from hub and drum assembly.

(7) Remove bolts (25) and washers (26) securing hub cap (27) to hub (28). Remove hub cap (27) and hub cap gasket (29).

(8) Bend tab of spindle tongue washer (30) up to allow removal of outer spindle nut (31).

(9) Using spindle nut wrench and handle available from a towing vehicle, remove outer spindle nut (31). Remove spindle tongue washer (30).

(10) Using the spindle nut wrench and handle, remove inner spindle nut (32), then remove spindle lock washer (33).

(11) Carefully remove outer bearing cone (34); outer bearing cup (35) will remain in hub.

(12) Carefully remove hub and drum assembly as a single unit.

(13) To disassemble the hub and drum assembly (figure 3-54), perform the following:

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

(b) Separate hub (4) and brake drum (5).

(c) Remove grease retainer assembly (6). It can be separated into ring (7) and seal (8).

(d) Remove inner bearing cone (9) and cups (10).

(14) To disassemble the axle bar assembly, which is welded, separate spindle (36) (figure 3–55) from tube (37) .

e. Assembly.

(1) If new spindle is to be installed, weld spindle (36) (figure 3-55) to tube (37).

(2) To assemble the hub and drum assembly (figure 3-54), perform the following:

(a) If grease retainer assembly was separated, install seal (8) in ring (7).

(b) Install bearing cups (10) in hub (4), then pack inner bearing cone (9) in accordance with Lubrication Order, LO 10-4610-215-12, and install inner bearing cone (9) and grease retainer assembly

CAUTION

Thread rotation is marked on the stud. Be sure all studs marked with an L are installed in one hub and all studs marked with an R are installed in the other hub.

(c) Align hub (4) and brake drum (5) and install studs (3), washers (2), and nuts (1).

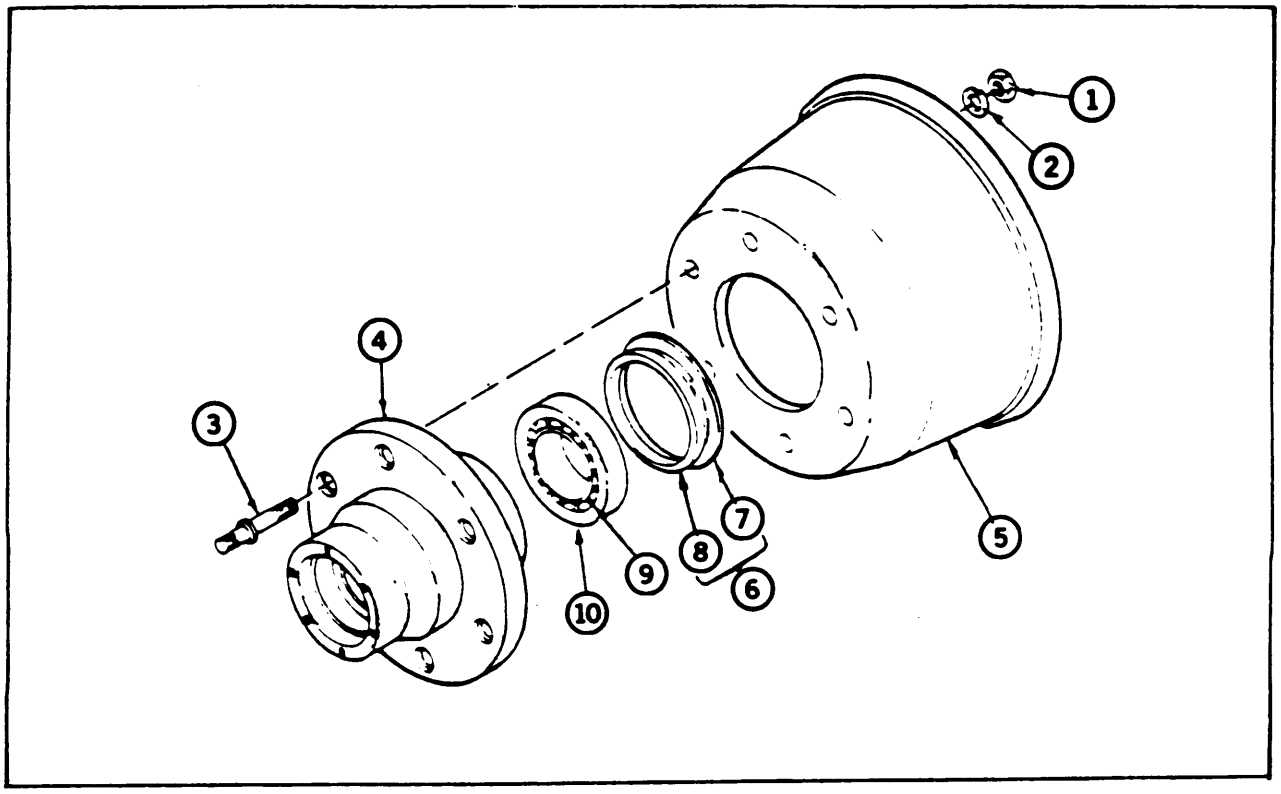


Figure 3-54. Trailer Hub and Drum Assembly (ARMY)

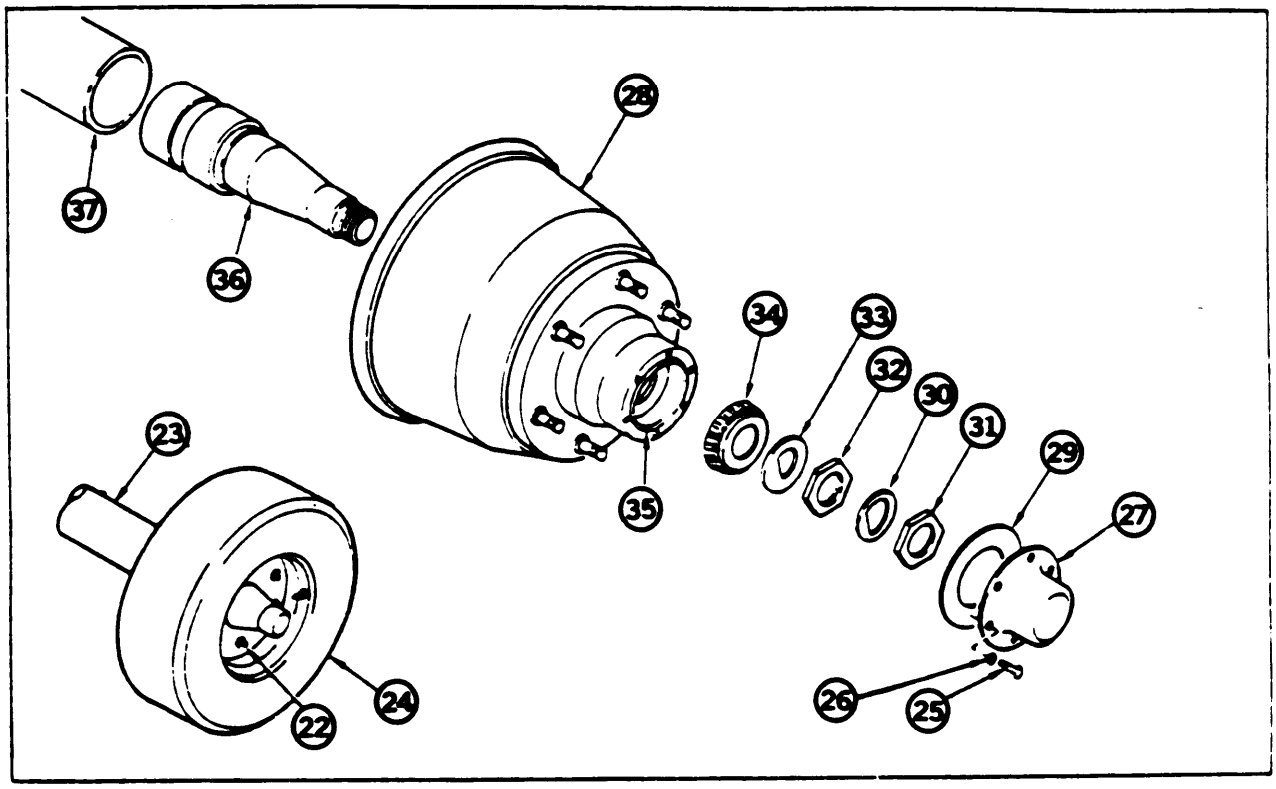


Figure 3-55. Trailer Axle Bar Assembly

(3) Carefully position, as a single unit, hub and drum assembly over end of spindle (36) (figure 3-55) and slide into position.

(4) Pack outer bearing cone (34) in accordance with Lubrication Order, LO 10-4610-215-12, then install outer bearing cone (34)

NOTE

Difficulty in installing the outer bearing cone may be present, if so, slightly push on top of hub, tilting it back and forth until bearing cone slips into place.

(5) Install spindle lock washer (33) and inner spindle nut (32) finger– tight.

CAUTION

Do not over tighten inner spindle nut; doing so can cause heating, accelerated wear, and bearing failure.

(6) Using the spindle nut wrench and handle, and while turning hub and drum assembly, tighten inner spindle nut (32) until tight, and hub and drum assembly can no longer be turned. Then back off inner spindle nut (32) until hub and drum assembly turns freely.

(7) Install spindle tongue washer (30) and outer spindle nut (31). Secure using spindle nut wrench and handle.

(8) Bend tab of spindle tongue washer (30) down to lock outer spindle nut (31).

WARNING

Tire and wheel assembly weight is 122 pounds (55.39 kg). Injury can occur if caution is not used when replacing on hub.

(9) Carefully position tire and wheel assembly (24) on hub and drum assembly.

CAUTION

Right hand threaded lug nuts are to be installed on the curb side hubs and left hand threaded lug nuts are installed on the road side hubs. Thread rotation is marked on the stud; be sure left hand threaded nuts are placed on studs marked with an L and right hand threaded nuts are placed on studs marked with an R.

(10) Install lug nuts (22) and tighten finger tight.

(11) Using a standard lug nut wrench and handle available from a towing vehicle, tighten lug nuts (22) until snug.

NOTE

Lug nuts will not be fully tightened at this time.

(12) Lower axle assembly (23) until wheels are secure on ground or floor.

(13) Using the lug nut wrench and handle, securely tighten lug nuts (22).

(14) Raise assembly clear of ground or floor and check wheel for wobble by holding the wheel at two opposite points, on line with the center. Push at one point and pull at the other, (both forces in line with the centerline of the axle.)

(15) Countercheck wheel bearing looseness visually by manually trying to pull the wheel off the axle, then immediately reversing the action by pushing the wheel further into the hub.

(16) Position hub cap gasket (29) and hub cap (27) to hub (28), then install washers (26) and bolts (25).

(17) Lower complete assembly to ground or floor.

(18) To assemble the spring assembly (figure 3-53), perform the following:

(a) Assemble bars (8) through (14) using screw (7) and nut (6).

(b) If removed, install new rivet (5) in angle bars (4).

(c) Position angle bars (4) over spring stacks and install spacer tubings (3), screws (2), and nuts (1).

(19) Install spacer ring (21) (figure 3-52) and position trunnion bracket (20) on axle trunnion (8), then install clamps (18) and (19) and screws (17) .

(20) To install spring assembly (figure 3-52), perform the following:

(a) Install bottom spacers (16) in shackle box (13) .

(b) Position spring assembly (9) in shackle box (13).

(c) Install side spacers (15) and top spacer (14).

(d) Position shackle box cover (12) on shackle box (13) and install washers (11) and nuts (1 O).

(e) Position spring assemblies (9) on axle trunnion (8).

(f) Install trunnion bracket plate (7) using bolts (6) and nuts (4) and (5).

(9) Install U-bolts (3), washers (2), and nuts (1) .

f. Installation. (Figure 3-51).

(1) Attach a sling to four lifting eyes of trailer frame and hook to portable crane or forklift.

WARNING

To prevent serious injury, be sure lifting straps and eyes are secure and in good condition before lifting the trailer frame. Ensure that all personnel stand clear during lifting operations.

(2) Carefully lift trailer frame (6) over suspension assembly (5) and lower into position.

(3) Position trunnion clamp (4) to suspension assembly (5) and trailer frame (6), then install screws (3), washers (2), and nuts (1). Torque to 80-105 foot-pounds (11.04-14.49 mkg).

3-43. TRAILER FRAME. (Figure 3-56) (ARMY)

a. General. The trailer frame is used to mount the ROWPU (ARMY). This chapter describes the repair and replacement of the trailer frame hardware.

b. Repair.

(1) Straighten all bent, twisted, or dented members using conventional repair methods.

(2) Repair and reweld all cracked and broken welds.

c. Replace. Should replacement of trailer frame be necessary, the following should be performed:

(1) Remove nuts (l), washers (2), and bumper stops (3).

(2) Remove retaining pin (4) and straight pin (5).

(3) Remove nuts (6), (7), and (8) and screws (9) and (10).

(4) Remove dummy couplers (11) and continuous hinges (12) and (13).

(5) Install continuous hinges (13) and (12) on new frame.

(6) Install screws (9) and (10) and nuts (6), (7), and (8) on new frame.

(7) Install pin (4) and straight pin (5) on new frame.

(8) Install bumper stops (3), washers (2), and nuts (1) on new frame.

3-44. TRAILER LEVELING JACKS. (Figure 3-57) (ARMY)

a. General. The trailer leveling jacks are mounted to the trailer and are used to support and level the trailer when it is not being towed. This chapter describes the removal, disassembly, assembly, and installation of the trailer leveling jacks.

b. Removal. Refer to paragraph 2-23 for removal of leveling jacks.

c. Dissassembly.

(1) Remove screws (1) and gear housing cover (2).

(2) Remove bearing (3).

(3) Remove grooved pin (4), spring pin (5), latch (6), spring (7), bushing (8), thrust washer (9), and pinion (10) as a single unit.

(4) Remove spring pin (11), gear (12), and thrust collar (13) from screw (14)

(5) Remove screw (14) and spring pin (15).

(6) Remove screws (16), cover (17), key (18), and seal (19).

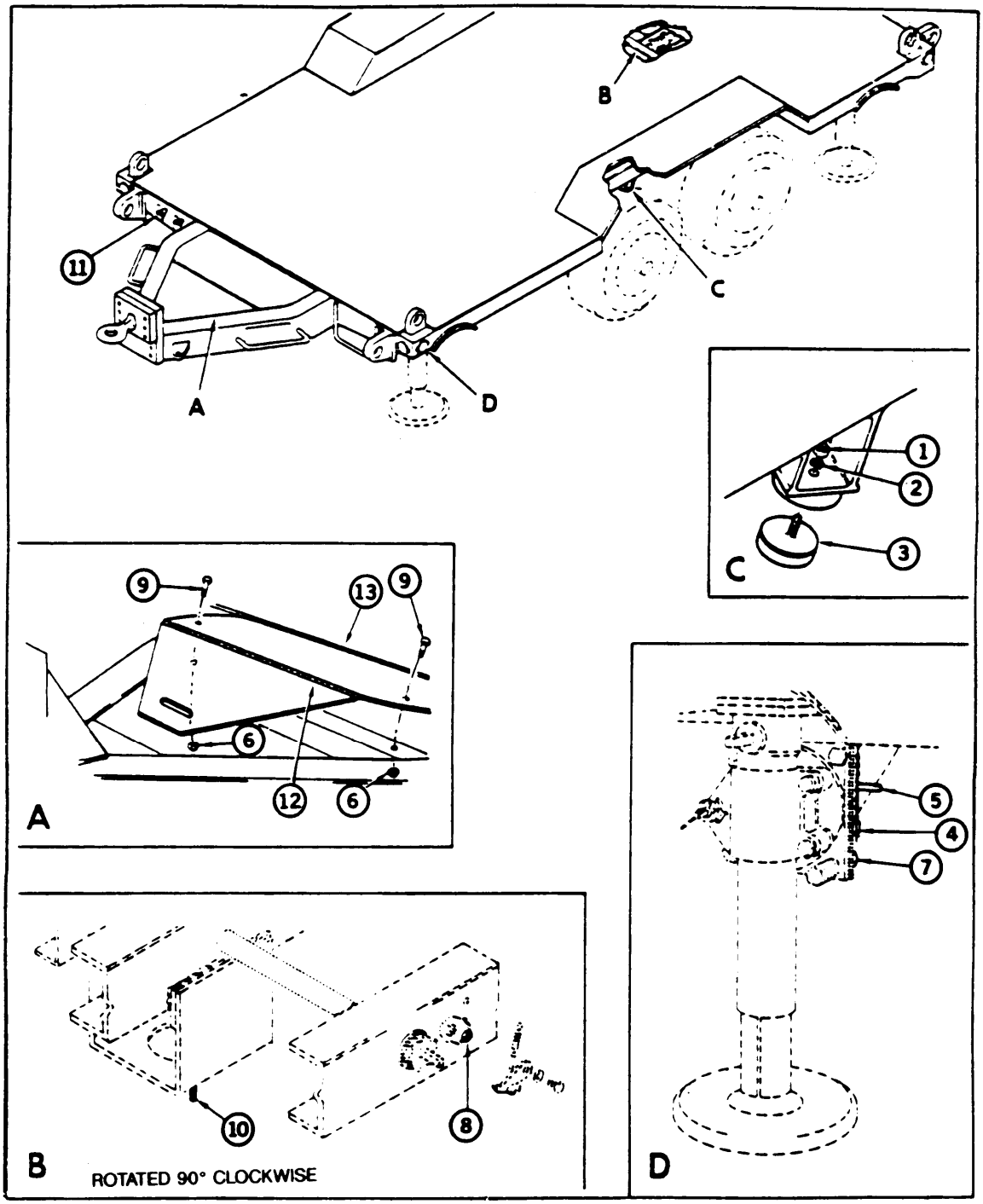


Figure 3-56. Trailer Frame, Repair (ARMY)

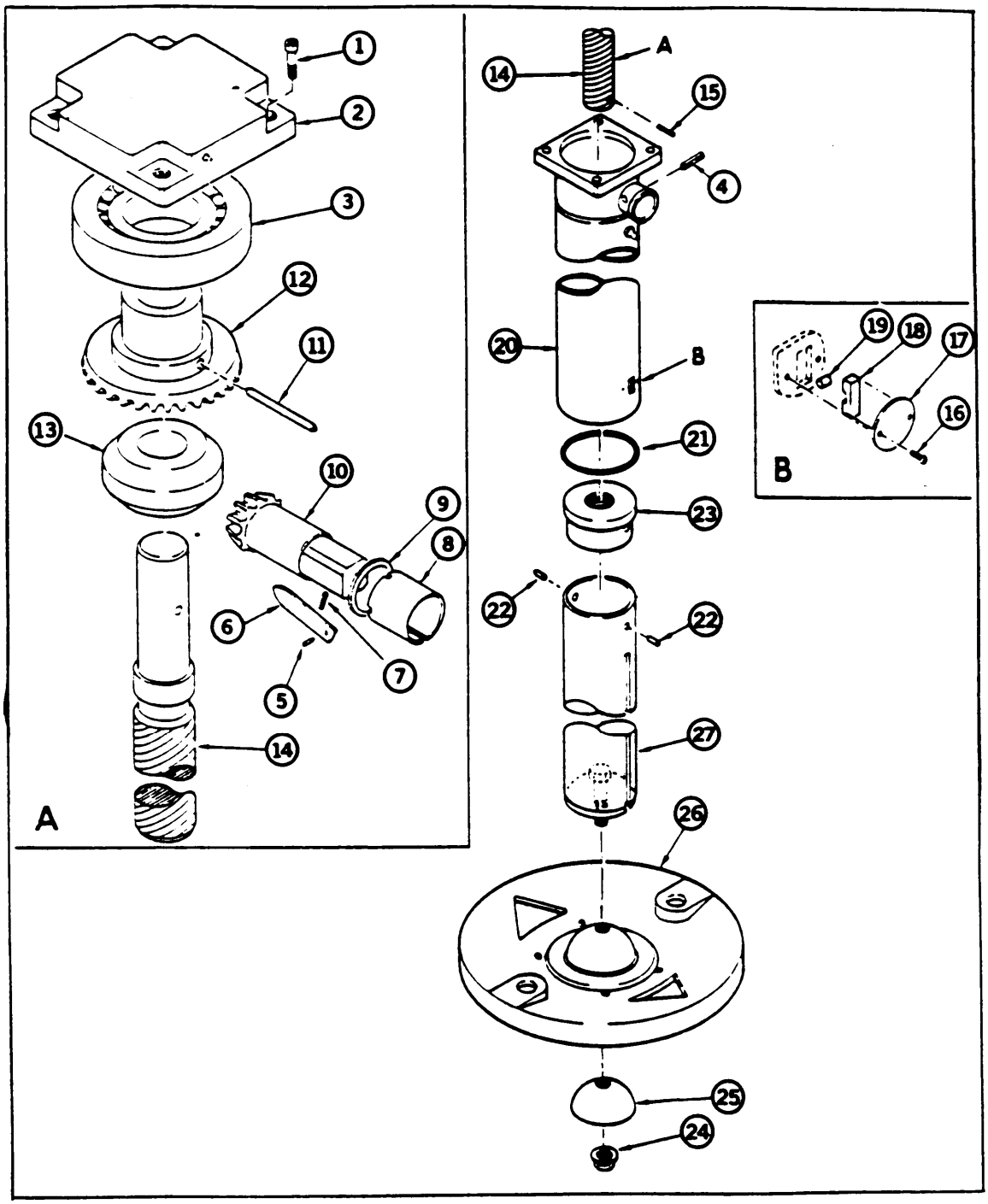


Figure 3-57. Trailer Leveling Jacks (ARMY)

(7) Remove outer tube assembly (20).

(8) Remove seal (21) from outer tube assembly (20).

(9) Remove spring pins (22) and nut (23).

(10) Remove nut (24), ground pad cup (25), and ground pad (26) from inner tube (27).

d. Assembly.

(1) Position ground bad (26) to inner tube (27) and install ground pad cup (25) and nut (24).

(2) Install nut (23) and spring pins (22).

(3) Install seal (21) in outer tube assembly (20).

(4) Position outer tube assembly (20) over inner tube (27).

(5) Install seal (19), key (18), cover (17), and screws (16).

(6) Install spring pin (15) and screw (14).

(7) Place thrust collar (13) and gear (12) on screw (14). Install spring pin (11).

(8) Install pinion (10), thrust washer (9), and bushing (8), pushing pinion (10) into thrust collar (13) with bushing (8).

(9) Make four revolutions of pinion (10) to ensure that there is no binding or interferences.

(10) Align hole in bushing (8) with hole in outer tube assembly (20) and install grooved pin (4).

(11) Install spring (7), latch (6), and spring pin (5).

(12) Install bearing (3).

(13) Position gear housing cover (2) on outer tube assembly (20) and install screws (1).

e. Installation. Refer to paragraph 2-23 for installation of leveling jacks.

3-44. TRAILER SWIVEL ASSEMBLIES. (ARMY)

a. General. The trailer swivel assemblies secures the leveling jacks and allows them to move in a vertical or horizontal position. This chapter describes the removal, disassembly, inspection, assembly, and installation of the trailer swivel assemblies.

b. Removal. (Figure 3-58).

(1) Refer to paragraph 2-23 and remove leveling jack assembly.

(2) Remove screws (1) and jack stop stud (2) attaching swivel assembly (3) to trailer frame and remove gasket (4).

c. Dissassembly. (Figure 3-59)

(1) Place swivel assembly on a clean dry workbench.

(2) Remove spring pin (1), then unscrew pin housing (2) and remove packing (3).

(3) Remove spring pin (4), pin sleeve (5), and spring (6).

(4) Remove pin (7) and packing (8) from spring pin housing (9).

(5) Remove spring pin housing (9), washer (10), and gasket (11).

(6) Remove screws (12) and lock washers (13) and remove cap (14).

(7) Turn swivel assembly over a workbench and remove screws (15) and lock washer (16).

(8) Remove plate (17) and shims (18) through (21) from base plate (22).

(9) Separate base plate (22) and base (23), and remove packing (24).

d. Inspection.

(1) Inspect pin (7) for cracks or damage. If cracks or damage are visible, replace pin.

(2) Inspect base plate and base for signs of wear. Replace worn part.

e. Assembly (Figure 3-59).

(1) Perform assembly of swivel assembly on a clean dry workbench.

(2) Install packing (24) in baseplate (22) and position base (23).

(3) Position cap (14) on base (23) and install lock washers (13) and screws (1 2), finger tight.

(4) Install packing (8) and pin (7) in spring pin housing (9) and place spring (6) over end of pin (7).

(5) Position pin sleeve (5) on pin (7). Align holes and install spring pin (4).

(6) Install packing (3) in pin housing (2), then screw pin housing (2) into spring pin housing (9).

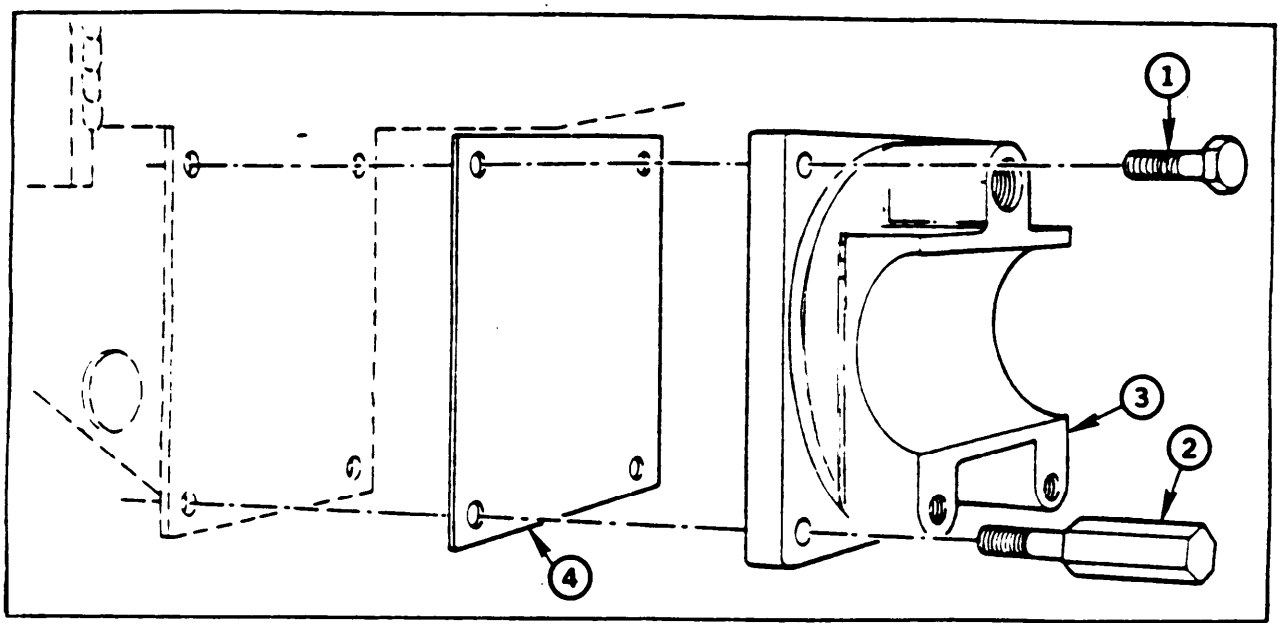


Figure 3-58. Trailer Swivel Assembly (ARMY)

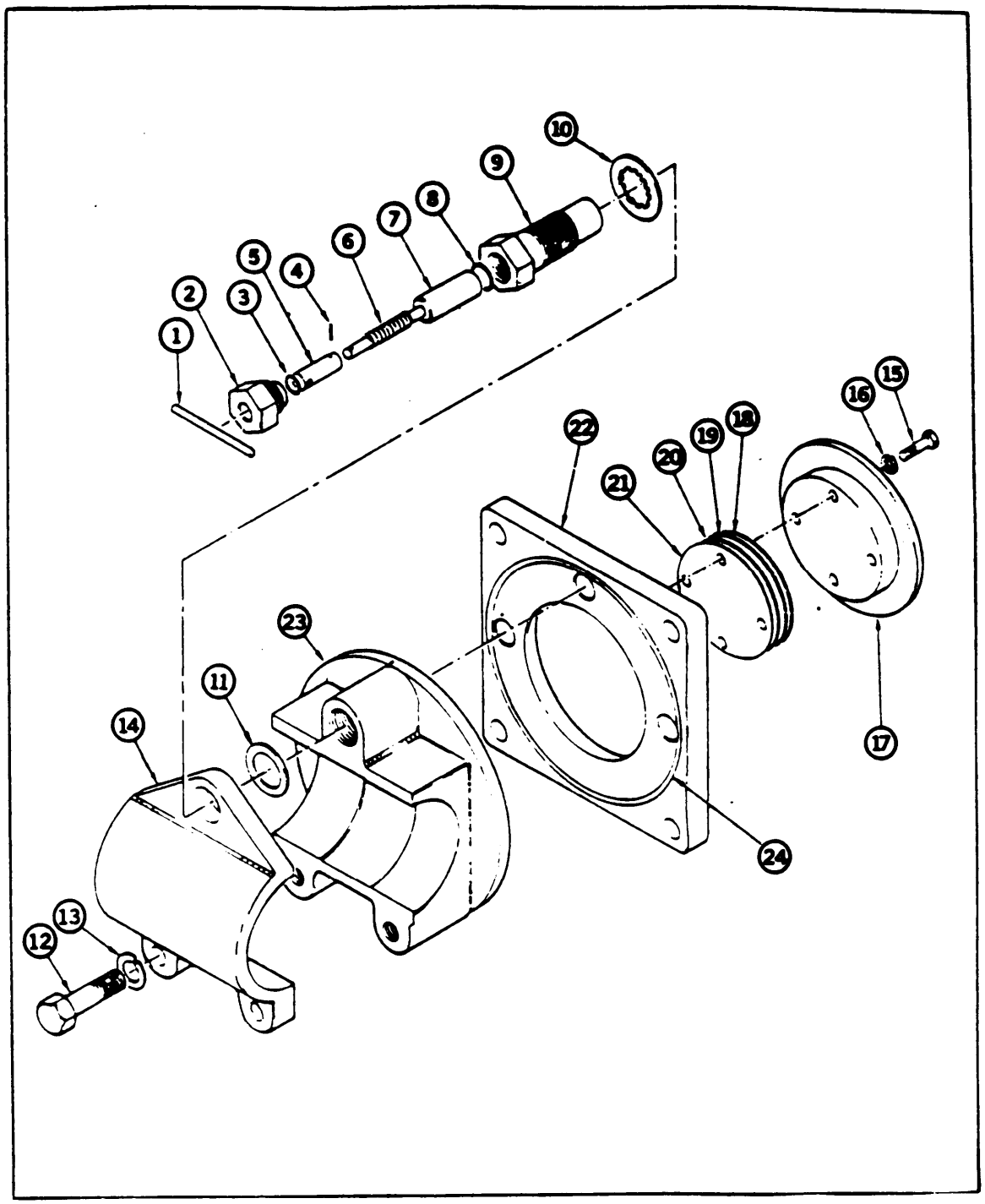


Figure 3-59. Trailer Swivel (ARMY)

(7) Install spring pin (1), then position washer (10) on assembled pin assembly and gasket (11) between cap (14) and base (23).

(8) Install assembled pin assembly through cap (14) and gasket (11) and into base (23).

(9) Securely tighten screws (12) previously installed.

NOTE

The following steps may require assembly, disassembly and reassembly because shims are to be added as required to assure assembly will swivel and lock into position.

(10) Install shims (18) through (21) as required. Shim thicknesses are: red .0020, tan .0040, natural .0075, and brown .0100.

(11) Aligning screw holes, position plate (17) to base plate (22) and install lock washers (16) and screws (15).

(12) Check to be sure assembly will swivel and lock into position. If not, repeat steps (10) and (11), but remove shims as required. Continue the procedure until assembly will swivel and lock into position.

(13) Lubricate in accordance with Lubrication Order, LO 10-4610-215-12.

f. Installation. (Figure 3-58)

(1) Position swivel assembly (3) and gasket (4) to trailer frame.

(2) Install screws (1) and jack stop stud (2), torque screws (1) and jack stop stud (2) to 45-55 ft. lbs.

(3) Refer to paragraph 2-23 and install leveling jack assembly.

3-46. ROWPU FRAME. (Figure 3-60)

a. General. The various components of the ROWPU are mounted to the ROWPU frame. This chapter describes repair of the frame and the removal and installation of the ROWPU frame (ARMY) from the trailer

b. Repair.

(1) Straighten all bent, twisted, or dented frame members using conventional repair methods

(2) Repair and reweld all cracked and broken welds.

(3) Remove inserts (1) through (9) from frame assembly (figure 3-60).

(4) Remove nuts (10) through (12) from frame assembly.

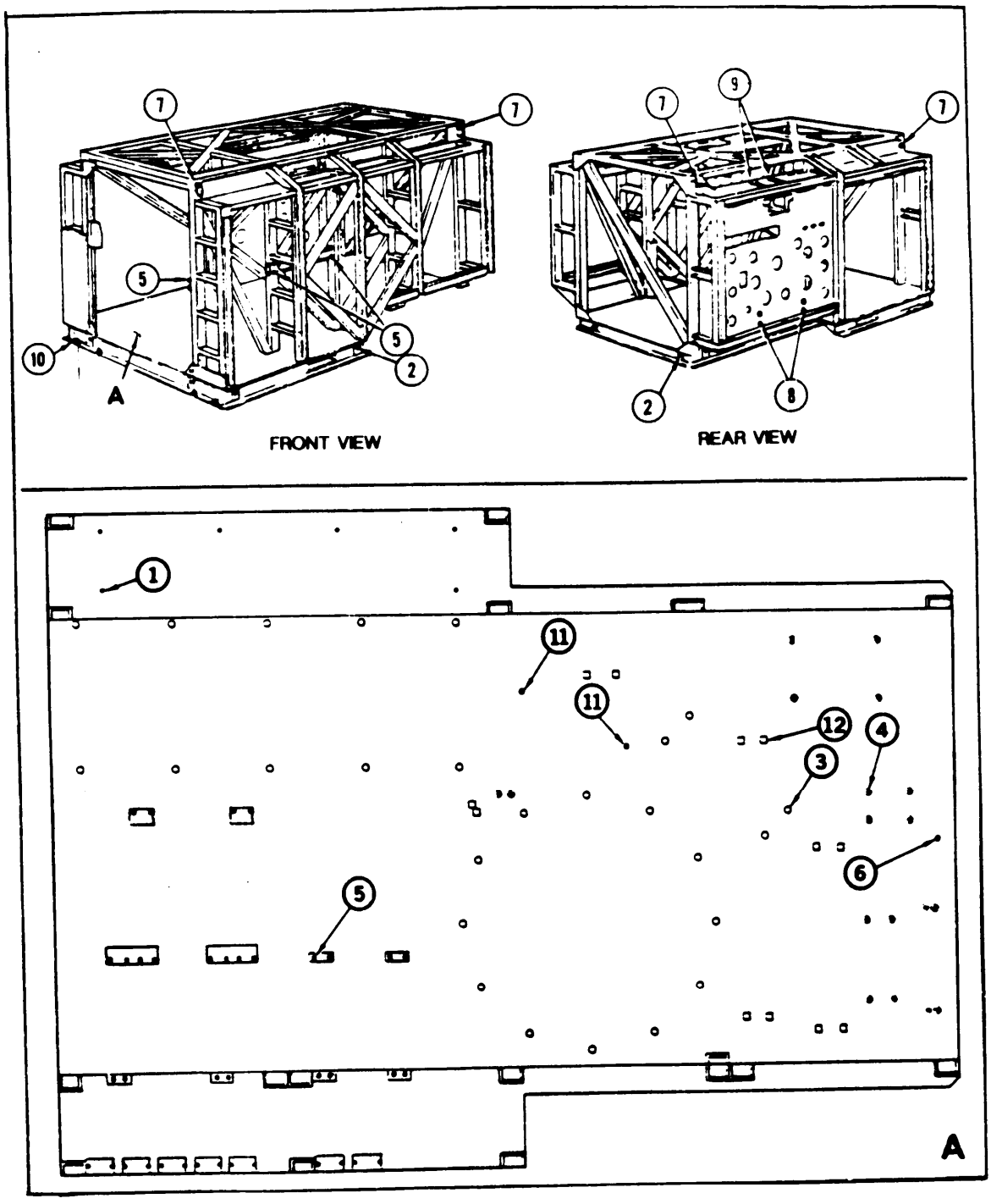


Figure 3-60. ROWPU Frame, Repair

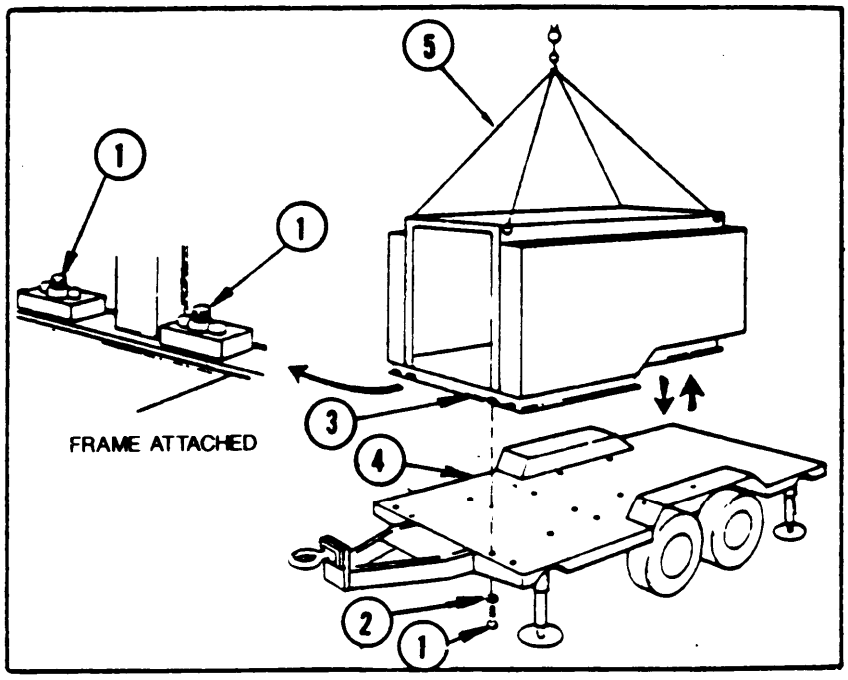


Figure 3-61. ROWPU Frame (ARMY)

(5) Install new inserts (1) through (9) and nuts (10) through (12).

c. Removal. (Figure 3-61)

(1) Drain all filter tanks and pressure vessels.

(2) Remove all portable items from frame.

(3) Remove all installed items on frame.

(4) Remove sixteen bolts (1) (figure 3-61) and washers (2) securing frame (3) to bed of trailer (4). (ARMY)

(5) Attach sling to frame lifting rings. Using crane, lift frame (3) from trailer (4).

d. Installation.

(1) Attach sling to frame lifting rings as shown in (figure 3-61). Using crane, lift frame (3) and install on trailer (4). (ARMY)

(2) Secure frame to trailer with sixteen bolts (1) and sixteen washers (2).

(3) Install all removed items.

CHAPTER 4

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

4-1. GENERAL. Repair parts are listed and illustrated in TM 10-4610-215-24P (ARMY). USMC users refer to SL-4-08580A. No special tools are required for general support of the ROWPU.

Section II. GENERAL SUPPORT (INTERMEDIATE) MAINTENANCE PROCEDURES

4-2 R.O. PUMP.

a. General. This paragraph describes disassembly, cleaning, inspection, repair, and reassembly of the R.O. pump.

b. Dissassembly.

WARNING

Weight of R.O. pump is 251 pounds (114 kg). Attempting to move it without proper equipment could cause serious injury. Lift motor with equipment rated at one ton (0.91 tonne) or greater.

(1) If necessary, remove R.O. pump from ROWPU frame in accordance with paragraph 2–73.

(2) Before moving pump into work area, wash entire pump with a stiff brush and a mild soap solution.

(3) Rinse with a fine spray of water and allow to air dry.

(4) Move pump into work area.

(5) Remove suction/discharge assembly from pump power frame in accordance with paragraph 4–3.

(6) Remove air breather (1) (figure 4-1) from pump power frame (38).

(7) Remove oil sight gage (2) from pump power frame (38).

(8) Remove oil drain valve (3) from pump power frame (38).

(9) On each of five wiper boxes, remove two nuts (4) from studs (10).

(10) Remove gland (5) from studs (10).

(11) Remove follower (6) from wiper box (7).

(12) Remove wiper box (7) from pump power frame (38).

(13) Remove packing (8) from wiper box (7). Discard packing (8).

(14) Remove seal (9) from wiper box (7). Discard seal (9).

(15) Remove two studs (10) from pump power frame (38).

(16) Remove sixteen capscrews (11) from power frame (38), gasket (13), and crankcase cover (12).

(17) Remove crankcase cover (12) and gasket (13) from power frame (38). Discard gasket (13).

(18) On each of five connecting rods, remove two bolts (14) and two lockwashers (15) from connecting rod (32) and connecting rod cap (16).

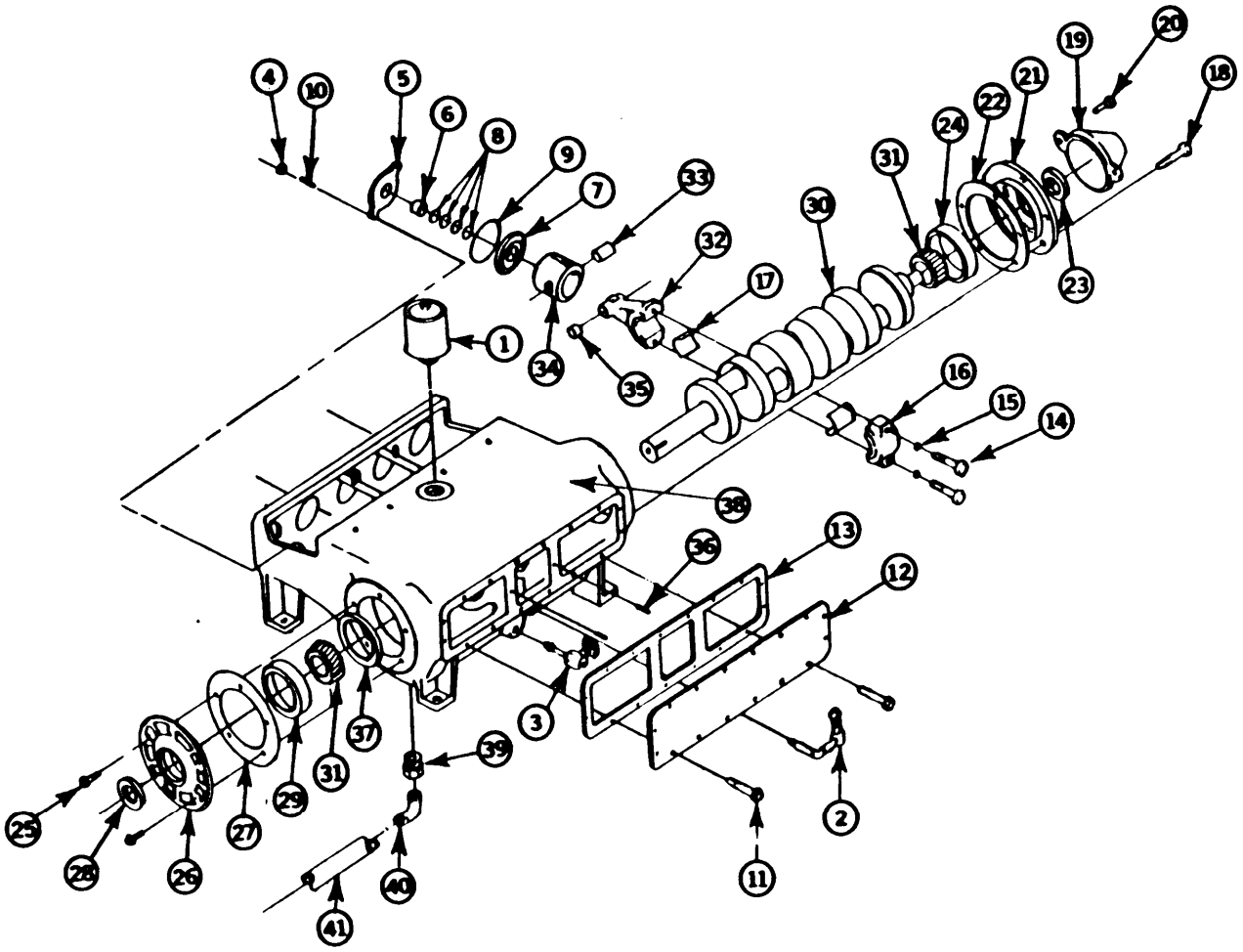


Figure 4-1. R. O. Pump

CAUTION

As each connecting rod cap and shell bearing is removed, mark the top to ensure proper reassembly.

(19) Remove connecting rod cap (16) and half of shell bearings (17) from crankshaft (30).

(20) Push remainder of connecting rods forward out of way of crankshaft.

(21) Remove two capscrews (20) from power frame (38), shim gasket (22), bearing housing (21), and extension guard (19).

(22) Remove extension guard (19) from bearing housing (21).

(23) Remove three capscrews (18) from power frame (38), shim gasket (22) and bearing housing (21).

(24) Remove bearing housing (21) and shim gasket(s) (22) from power frame (38). Discard shim gaskets (22).

(25) Remove oil seal (23) from bearing housing (21). Discard seal (23).

(26) Using a puller, remove bearing cup (24) from bearing housing (21).

NOTE

Replacement hearings are sealed bearings and do not consist of cone and cup bearings.

(27) Remove five capscrews (25) from power frame (38) and bearing housing (26).

(28) Remove bearing housing (26) and shim gasket(s) (27) from power frame (38). Discard gaskets (27).

(29) Remove oil seal (28) from bearing housing (26). Discard oil seal (28).

(30) Using a puller, remove bearing cup (29) from bearing housing (26).

(31) Remove two setscrews (36) from power frame (38).

(32) Remove crankshaft (30) from power frame (38).

(33) Using a puller, remove two cone bearing assemblies (31) from crankshaft (30).

(34) As each connecting rod is removed, mark the top to assure proper assembly.

(35) Remove connecting rods (32) from power frame (38).

(36) Remove remainder of shell bearings (17) from connecting rods (32).

(37) Press wrist pins (33) out of crossheads (34) and connecting rods (32).

(38) Remove crossheads (34) from connecting rods (32).

(39) Press bushings (35) out of connecting rods (32). Discard bushings (35).

(40) Using a puller, remove two main bearings (37) from power frame (38).

(41) Remove rubber hose (41) from elbow (40).

(42) Unscrew elbow (40) from reducer bushing (39).

(43) Remove reducer (39) from power frame (38).

c. Cleaning.

(1) Use a sharp scribe to loosen accumulated grit around hubs on crankshaft.

WARNING

Drycleaning solvent P-D-680 is potentially dangerous. Avoid repeated and prolonged breathing of vapors and skin contact. Do not use near open flame, arcing equipment or other ignition sources. Always wear protective clothing and eyewear.

(2) Wash metallic parts including air breather bearings, crankshaft, and inside of power frame with cleaning solvent Fed. Spec. P-D-680.

(3) Rinse with cleaning solvent Fed. Spec. P-D-680 and allow to air dry.

(4) Wrap bearings in clean, lint-free cloth.

(5) Remove rust and loose paint from pump exterior. Prepare for repainting, if necessary.

(6) Remove rust and corrosion from nuts, screws, bolts, and studs.

d. Inspection.

(1) Inspect parts of suction/discharge assembly in accordance with paragraph 4-3.

(2) Inspect power frame for damage.

(3) Inspect crankshaft for scratches, pitting, and excessive wear.

(4) Inspect crossheads, wrist pins, glands, followers, and wiper boxes for damages and excessive wear.

(5) Inspect cone bearing assemblies, shell bearings, and main bearing for deformation, pitting, and excessive wear.

(6) Inspect connecting rods and connecting rod caps for damage, particularly pitting around shell bearing housing, and for stripped threads in bolt holes.

(7) Inspect screws and bolts for bent and broken shanks.

(8) Inspect nuts, screws, bolts, and studs for stripped heads and threads.

e. Repair or Replace.

(1) Replace all gaskets, seals, O-rings, packing, and rubber or fiber parts.

(2) Replace all damaged nuts, bolts, screws washers, lockwashers, setscrews, pins, shims, and studs.

(3) Replace damaged or unserviceable connecting rods, connecting rod caps, connecting rod shell bearings, bushings, wrist pins, and crossheads.

(4) Replace damaged, worn, or unserviceable main bearings, cone bearing assemblies, bearing housing, shim gaskets, bearing cups, and extension guard.

(5) Buff minor scratches in crankshaft with fine emery cloth.

(6) Replace damaged, worn, or unserviceable crankshaft.

(7) Replace damaged or unserviceable pump power frame, crankshaft cover, oil sight gage, oil drain valve, pipe fittings, and air breather cap.

(8) Repaint R.O. pump assembly in accordance with Standard Operating Procedures.

f. Reassembly.

WARNING

Contact with dry ice or objects that have been packed in dry ice can cause severe bums. Always wear proper protective gloves when using dry ice.

(1) Pack two main bearings (37) (figure 4-1) in dry ice for about 20 minutes.

(2) Place main bearings (37) into proper position in power frame (38) and secure with setscrews (36).

(3) Press new bushing (35) into connecting rod (32).

NOTE

If a new bushing does not fit tightly into connecting rod, replace the connecting rod.

(4) Ream the bushing after pressing it into the connecting rod until it fits wrist pin (33) snugly but does not bind.

(5) Place crossheads (34) onto connecting rods (32). Be sure the oil hole in bushing area of connecting rod is toward the oil groove in the crosshead.

(6) Press wrist pins (33) into crossheads (34) and connecting rods (32).

(7) Install connecting rods (32) into power frame (38) being certain that oil groove on crosshead is at the top.

NOTE

New replacement bearings are sealed. If a hydraulic press is available, install bearing cones and bearing cups using steps (8) and (9) and then goon to step (14). Otherwise, skip to step (10).

(8) Press two bearing cones (31) onto position on crankshaft (30).

(9) Press two bearing cups (24) and (29) into bearing housing (21) and (26).

(10) Heat bearing cones (31) in hot oil at 300°F (150°C) for 20 minutes.

(11) Place bearing cones (31) onto crankshaft (30) and drive into position using pipe sleeve and hammer.

(12) Pack bearing cups (24) and (29) in dry ice for 20 minutes.

(13) Drop bearing cups into bearing housings (21) and (26) and let stand until they return to room temperature.

(14) Check bearing cups for slippage or rotation in bearing housing. If there is slippage or rotation, replace bearing housing.

(15) Install new oil seals (23) and (28) into bearing housings (21) and (26).

(16) Using a new 1/64-inch (0.4 mm) shim gasket, install shim gasket (22) and bearing housing (21) onto power frame (38). Secure with two capscrews (20) finger tight.

(17) Install extension guard (19) onto bearing housing (21) and secure with three capscrews (18) finger tight.

(18) Torque capscrews (18) and (20) in a cross pattern to (195) ft-lbs (259 cm-kgs).

(19) Install crankshaft (30) into power frame (38).

(20) Install new shim gasket (27) and bearing housing (26) on power frame (38). Secure with five capscrews (25) finger tight.

(21) Torque capscrews (25) in a cross pattern to (195) ft-lbs (259 cm-kgs).

NOTE

Adjustment of bearings is accomplished by using varying thicknesses of shim gaskets. Adjustment is correct when the capscrews have been tightened and only the slightest drag is noticeable when the crankshaft is rotated. If necessary, two or more shim gaskets can be used on each end of the crankshaft to obtain this adjustment.

(22) install shell bearing halves (17) on connecting rod (32) and connecting rod cap (16).

NOTE

Check previous markings and install connecting rod caps right side up.

(23) Secure connecting rod caps (16) to connecting rods (32) around crankshaft with two lockwashers (15) and two bolts (14).

(24) Torque bolts (14) between 18 to 24 ft-lbs (250 to 332 cm-kg).

(25) Place new gasket (13) and crankcase cover (12) on power frame and secure with sixteen capscrews (11).

(26) Install studs (10) into power frame (38).

(27) Place seal (9) on wiper box (7).

(28) Install wiper box (7) into power frame (38).

(29) Install packing (8) into wiper box (7) with the lips of the packing rings turned toward the crossheads.

(30) Install follower (6) into wiper box (7).

(31) Install gland (5) onto studs (10) and secure with nuts (4).

(32) Install oil drain valve assembly (3), sight gage (2), and air breather (1) on power frame (38).

(33) Install reducer bushing (39) and elbow (40) onto power frame (38) and slip rubber hose (41) onto elbow (40).

(34) Reassemble suction/discharge assembly onto power frame in accordance with paragraph 4-3.

(35) Fill crankcase with oil.

4-3. R.O. PUMP SUCTION/DISCHARGE ASSEMBLY. (Figure 4-2)

a. General. The suction/discharge assembly of the R.O. pump is the section through which the water is pumped. When the valve seats or packing in this assembly become worn, the pump will no longer function property and the damaged parts must be replaced. This paragraph describes removal, disassembly, inspection, cleaning, reassembly, and installation of the suction/discharge assembly.

b. Removal.

(1) Remove R.O. pump from R.O. pump stand in accordance with paragraph 2-73.

WARNING

ROWPU piping and equipment can contain extremely high 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.

Weight of R.O. pump is 658 pounds (298 kg). Attempting to move it without proper equipment could cause serious injury. Use equipment rated at 1 ton (0.91 tonne) or more to move R.O. pump.

(2) Remove eight nuts (1) from suction/discharge assembly (2).

(3) Remove two wingnuts (7) securing barrel cover (8) from studs, then loosen, but do not remove, two nuts (11) securing wiper box gland.

(4) Remove suction/discharge assembly (2) from R.O. pump power frame.

CAUTION

Any nicks on the main plunger body will cause prompt and frequent packing failure. Apply wrench only to knurled surface of plunger; handle plunger carefully.

(5) Push rubber baffle disc (12) off knurled surface and carefully unscrew plunger (13) from crosshead using a wrench on the knurled surface of the plunger.

(6) Slide baffle disc (12) from plunger (13) and remove plunger (13) from pump power frame.

(7) Unscrew and remove gland nut (9) and power frame adapter (10).

NOTE

Each packing unit consists of a ring with a top and bottom adapter. These parts may separate during disassembly.

(8) Remove one packing ring (4), lantern ring (5), two more packing rings (4), spring (3), and one throat bushing (6) from each cylinder bore on suction/discharge assembly. Discard packing rings (4).

c. Dissassembly for Repair. (Figure 4-2)

(1) Remove five valve covers (14) and five valve cover gaskets (15) from suction/discharge assembly (2). Discard valve cover gaskets (15).

(2) Remove five nuts (16), five retainers (17), five springs (18), five sleeves (19), and five discs (20) from five seats (21).

(3) With the valve seat puller, remove five valve seats (21) from suction/discharge assembly (2).

(4) Remove five cylinder heads (22) and five cylinder head gaskets (23) from suction/discharge assembly (2). Discard cylinder head gaskets (23).

(5) Repeat steps (2) and (3) to remove five suction valve assemblies. Parts can be removed from the suction/discharge assembly (2) through the cylinder head opening.

(6) Remove five plugs (24) from suction/discharge assembly (2).

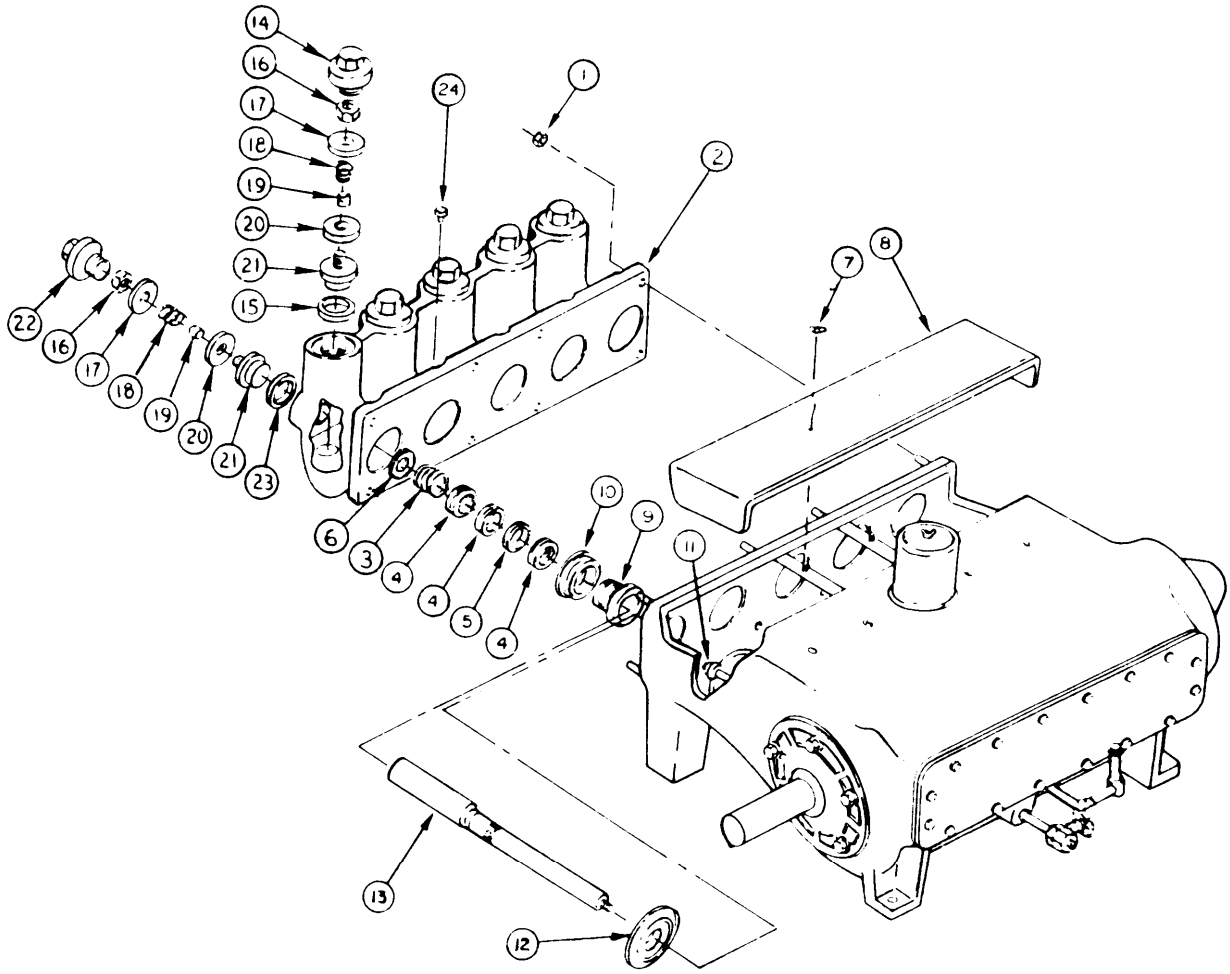


Figure 4-2. R. O. Pump Suction/Discharge Assembly

d. Cleaning.

WARNING

Objects blown by compressed air can cause severe eye injury. Always wear protective goggles when using compressed air.

(1) Wash suction/discharge assembly inside and outside with strong soap solution.

(2) Rinse with clean water and dry with compressed air.

(3) Prepare for painting, if necessary.

(4) Wipe tapered area of suction/discharge assembly that will hold valve seats with clean solvent.

(5) Wipe plungers with dean solvent on a fine emery cloth.

(6) Remove rust and hose paint from valve covers and cylinder heads.

e. Inspection.

(1) Inspect suction/discharge casing for damage.

(2) Inspect valve cover and cylinder head for damage.

(3) Inspect valve assemblies for broken or excessively worn valve seats or discs, broken springs, and bent or broken retainers.

(4) Inspect mounting nuts for stripped heads or threads.

(5) Inspect visible portion of R.O. pump power frame.

f. Repair and Replace.

(1) Replace damaged nuts, bolts, screws, washers, and wingnuts.

(2) Replace damaged valve covers and cylinder heads.

(3) Replace all packing rings, gaskets, O-rings, and rubber baffle discs.

(4) Replace damaged or unserviceable lantern rings, throat bushings, barrel cover, power frame adapters, gland nuts, plungers, retainers, springs, valve discs, valve seats, and plugs.

g. Reassembly. (Figure 4-2)

(1) Clean tapered area of valve seat.

(2) Place suction valve seat (21) into position in suction/discharge assembly (2). Cover with an old valve disc (20).

CAUTION

A broken or distorted valve seat will cause the pump to malfunction. Never install remaining valve pads before driving valve seat into place.

(3) Place valve seat installer on old valve disc (20). Drive valve seat (21) into place with a hammer.

(4) Remove old valve disc (20) and discard.

(5) Install new valve disc (20), sleeve (19), spring (18), retainer (17), and nut (16).

(6) Repeat steps (1) through (5) to install four more suction valves and five discharge valves.

(7) Install five new valve cover gaskets (15) and five valve covers (14).

h. Installation.

(1) Place five power frame adapters (10) into power frame.

(2) Place suction/discharge valve assembly (2) onto studs on pump power frame and secure with eight nuts (1).

(3) From inside pump power frame, insert one throat bushing (6), one spring (3), two packing units (4), one lantern ring (5), and one more packing unit (4) into each cylinder bore. Install packing units so that lips of each seal ring point toward the cylinder head.

(4) Screw the five gland nuts (9) into place behind packing until hand tight.

(5) Insert plunger (13) from cylinder head opening through packing and baffle disc (12) and screw onto crossheads. Tighten with a pipe wrench on the knurled section of the plunger.

(6) Tighten two nuts (11) on wiper box gland.

(7) Tighten gland nut (9) with a spanner wrench.

(8) Replace barrel cover (8) on pump power frame and secure with two wing nuts (7).

(9) Install five cylinder head gaskets (23) and cylinder heads (22).

(10) Install five plugs (24) on suction/discharge assembly (2).

(11) Install R.O. pump onto R.O. pump stand in accordance with paragraph 2-73.

(12) Run R.O. pump for 1 hour.

(13) Retighten five gland nuts (9).

APPENDIX A

REFERENCES

A-1 SCOPE.

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

A-2. FORMS.

Packing improvement Report. . . . . DA Form 6
Equipment inspection and Maintenance Work Sheet . . . . . DA Form 2404
Quality Deficiency Report SF-368
Recommended Changes to Publications and Blank Forms . . . . . DA Form 2028
Recommended Changes to DA Publications . . . . . DA Form 2028-2
Recommended Changes to Technical Publications (USMC) . . . . . NAVMC 10772

A-3. TECHNICAL MANUALS.

Preservation, Packaging, and Packing of
Military Supplies and Equipment . . . . . TM 38-230

The Army Maintenance Management System (ARMY) . . . . . DA Pam 738-750

Equipment Records Procedures (USMC) . . . . . TM 4700-15/1

Operator, Organizational, Direct Support
General Support, and Depot Maintenance
Manual, Generator Set, Diesel Engine,
30 KW, 60 Cycle, AC, 120/208 V, 240/416 V,
3 Phase, Precise Power, Winterized,
Portable, Skid Mounted (HOL-GAR Model
CE-301-AC/WK1), NSN 6115-00-118-1240 (ARMY) . . . . . TM 5-6115-465-12

Operator's Manual . . . . . TM 10-4610-215-10
TM 08580A-10/1

Lubrication Order . . . . . LO 10-4610-215-12
LI–08580A-12

Repair Parts and Special Tools List . . . . . TM 10-4610-215-24P
SL4-08580A

A-4.MISCELLANEOUS.

First Aid Manual . . . . . FM 21–11

Quality Deficiency Report (USMC). . . . . MCO 4855.10

Military Incentive Awards Program (USMC) MC01650.17

Packaging Improvement and Shipping
Discrepancy Reports . . . . . .AR 746-10

Security Procedures . . . . . AR 190-11, AR 190-13

Water Purification Equipment Set . . . . . SC 4610-97-CL-E16

APPENDEX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. General.

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

b. The Maintenance Allocation Chart (MAC) in Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II.

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

B–2. MAINTENANCE FUNCTIONS. Maintenance functions will be limited to and defined as follows:

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

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

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

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

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

f. Replace. The act of substituting a serviceable like–type part, subassembly, or module for an unserviceable counterpart.

g. Repair. The application of maintenance services or other maintenance actions to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

h. Overhaul. That maintenance effort (services/actions) necessary to restore an item to a Completely serviceable/operational condition as prescribed by maintenance standards, i.e., Depot Maintenance Work Requirement, in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the ARMY. Overhaul does not normally return an item to like–new condition.

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

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

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

c. Column 3, Maintenance Function. Column 3 lists the function to be performed on the item listed in Column 2. (For 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 in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate 'Work time" figures will be shown for each level. The number of man-hours specified by the "work time" figures will be shown for each level. The number of man–hours specified by the "work time" figure represents the average time required to restore an item (assembly, subassembly, component, module end time, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC. The symbol designations for the various maintenance levels are as follows:

c ..... Operator or Crew

O ..... Unit Maintenance

F ..... Direct Support Maintenance

H ..... General Support Maintenance

D ..... Depot Maintenance

e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, Test, Measurement, and Diagnostic Equipment (TMDE), and support equipment required to perform the designated function.

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

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

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 Category. 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 (NSN) of the tool or TMDE.

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 Section II, column 6.

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

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(50 Tools and Equipment	(60 Remarks
01	ELECTRICAL SYSTEM, TRAILER (ARMY)								
	all lights	Inspect	0.1						
		Repair	0.3					01, 02,03	
		Replace	0.1					01	
	Hull or Chassis Wiring Harness and Connections	Inspect	0.2						
		Repair		1.5				01, 02, 03	
		Replace		0.3					
02	REAR AXLE (ARMY)								
	Tandem Axle	Inspect	0.2						
		Repair		3.0				01	
		Replace		4.0				01	
03	BRAKES (ARMY)								
	Service Brakes	Inspect	0.1						
		Repair		3.0				01	
		Replace		4.0				01	
	Air Brake System	Inspect	0.2						
		Repair		2.0				01	
		Replace		4.0				01	
	Trailer Brake Connections and Control	Inspect	0.2						
		Repair		0.1				01	
		Replace		1.0				01	
04	WHEELS (ARMY)								
	Suspension Assembly	Inspect	0.5						
		Repair		2.0				01	
		Replace			4.0			01	
	Wheel Assembly	Inspect	0.2						
		Service		1.0					
		Repair		2.0				01	
		Replace		2.0				01	
	Tires	Inspect	0.2						
		Repair		1.0				01, 05	A
		Replace		2.0				01	

Section II. MAINTENANCE ALLOCATION CHART (Continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
05	FRAME, TOWING ATTACHMENTS, DRAWBARS								
	Frame Assembly	Inspect	0.2						
		Repair			3.0			01	
		Replace			20.0			01	B
	Pintle and Towing Attachments Lunette	Inspect	0.1						
		Replace		2.0				01	
	Leveling Jacks	Inspect	0.2						
		Service	0.5						
		Repair			0.5			01	
		Replace		1.0				01	
06	SPRINGS								
	Springs	Inspect	0.1						
		Replace			2.0			01	
07	BODY, CHASSIS AND HULL ACCESSORY ITEMS								
	Canvas, Rubber, or Plastic Items								
	Frame Cover	Inspect	0.2						
		Repair			2.0			06	D
		Replace	0.5						
	Pump Covers	Inspect	0.1						
		Repair			2.0			06	D
		Replace	0.1						
	Hold down Straps	Inspect	0.1						
		Replace	0.3						
	Storage Box	Inspect	0.1						
		Repair		1.0				01	
		Replace		1.0				01	
	Data Plates and Instruction Holders	Inspect	0.1						
		Replace				0.5		01	

Section II. MAINTENANCE ALLOCATION CHART (Continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
08	PUMPS								
	Pump, Backwash Pump	Inspect	0.2						
		Repair		2.0				01	
		Replace		3.0					
	Electric Motor, Backwash Pump	Inspect	0.2						
		Repair			3.0			01, 02, 03	
		Replace		2.0				01	
	Pump, Distribution Pump	Inspect	0.2						
		Repair		2.0				01	
		Replace		3.0				01	
	Electric Motor, Distribution Pump	Inspect	0.2						
		Repair			3.0			01, 02, 03	
		Replace		2.0				01	
	Pump, Raw Water Pump	Inspect	0.2						
		Repair		2.0				01	
		Replace		3.0				01	
	Electric Motor Raw Water Pump	Inspect	0.2						
		Repair			3.0			01, 02, 03	
		Replace		2.0					
	Pump, Reverse Osmosis Pump	Inspect	0.2						
		Repair			0.2	0.8		01, 07	
		Replace			1.0			01	
	Electric Motor, R.O. Pump	Inspect	0.2						
		Repair			3.0			01, 02, 03	
		Replace		1.5					
	Belts, R.O. Pump	Inspect	0.2						
		Replace	1.0					01	
	Pump, Booster Pump	Inspect	0.2						
		Repair		2.0					A
		Replace		3.0					
	Electric Motor, Booster Pump	Inspect	0.2						
		Repair			3.0				A,B,C
		Replace		2.0					
	Pump, Chemical Feed Pump	Inspect	0.2						
		Repair		2.0					A
		Replace		1.0					A
	Electric Motor Chemical Feed Pump	Inspect	0.2						
		Repair				3.0			A,B,C
		Replace	1.0						

Section II. MAINTENANCE ALLOCATION CHART (Continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
09	ELECTRICAL EQUIPMENT								
	Electric Controls and Control Panel	Inspect	0.2						
		Repair		1.0				01,02,03	
		Replace			8.0			01	
	Starting and Protective Devices, High & Low Pressure Solenoids	Inspect	0.3						
		Test			0.2			03	
		Replace	0.5					01	
	High & Low Pressure Switch	Repair			1.0			01, 02, 03	
	Backwash Timer	Inspect	0.1						
		Repair				2.5		01	
		Replace		1.0				01	
	Power Receptacles	Inspect	0.1						
		Repair		0.2				01,02	
		Replace		0.3				01	
10	GAGES (NON–ELECTRICAL)								
	Gages, Mounting, Lines, and Fittings	Inspect	0.1						
		Replace		0.3				01	
	Flowmeters	Inspect	0.1						
		Test			0.2				
		Replace		0.3					
11	REVERSE OSMOSIS VESSEL, FILTERS, & RELATED PARTS								
	Vessel, Reverse Osmosis	Inspect	0.2						
		Repair		3.0				01, 07	
		Replace		3.0				01	
	Multimedla Filter Assembly	Inspect	1.0						
		Clean	0.1						
		Replace			2.0			01	
		Repair			1.5			01	
	Hand Hole Gasket	Replace	1.0					01	

Section II. MAINTENANCE ALLOCATION CHART (Continued)

(1) Group Number	(2) Component/ Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
11	REVERSE OSMOSIS VESSEL, FILTERS, & RELATED PARTS (cont).								
	Strainer Assembly	Inspect	0.1						
	Chemical Feed Pump	Service	0.5					01	
		Replace	0.1					01	
	Rupture Disc	Inspect	0.1						
	Assembly	Repair	0.5					01	C
		Replace		0.4				01	
	Relief Valve	Inspect	0.1						
	High Pressure	Test			0.2			01	
		Replace		0.5					
12	CANISTERS AND ELEMENTS								
	Cartridge Filter	Inspect	0.5						
	Assembly	Replace			1.5			01	
	Filter Cartridge	Inspect	0.5						
		Replace	1.0					01	
	VaIves, Lines	Inspect	0.2						
	Fittings	Repair		0.5				01	
		Replace		0.4				01	
	Gasket	Inspect	0.5						
		Replace		0.5				01	

Section III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

Reference code (1)	Maintenance category (2)	Nomenclature (3)	National/NATO stock number (4)	PN Tool number (5)
01	C	Tool Kit, General Mechanics Automotive. SC 5180 90-CL-N26 (1 ea.)	5180-0-177-7033	
02	C	Kit, Soldering Gun, 115V, 6 Hz, Complete with solder and carrying case	3439-00-930-1638	
03	C	Muitimeter, 0 to 5000V	6625-00-998-6084	
04	C	WrenCh, Pipe, Adjustable Jaw, 18 inChes long	5120-00-277-1479	
05	C	Repair Kit, Tubeless Tire	4910-00-922-6921	
06	C	Repair Kit, Tentage	8340-00-262-5767	
07	C	Puller, Reverse Osmosis Element	13221E8330 (97403)	
08	0	Sling Assembly, ROWPU 600-GPH, Trailer Mounted (ARMY)	1322E7180 (97403)	
09	F	Dead-Weight Gage Tester (28066)	1305D-20	

Section IV. REMARKS

Maintenance Allocation Chart

Reference Code	Remarks/Notes
A	Repair is restricted to the application of Repair Kit, Tubeless Tire, NSN 4910-00-922-6921.
B	Repair is restricted to welding
C	Repair is restricted to replacement of the hold-down ring and disc.
D	Repair is restricted to the application of Repair Kit, Tentage, NSN 8340-00-262-5767.
E	Belts must be replaced as matched set only.

APPENDIX C

TORQUE LIMITS

THREAD SIZE	TORQUE FT–LB	(M-KG)	FT-LB NOM.	(M-KG)
No. 4-40	0.67	(0.092)		
No. 4-48	0.67	(0.092)		
.164-32	0.38	(0.052)		
.164-36	0.58	(0.081)		
.190-32	0.67	(0.092)		
.190-24	0.79	(0.109)		
.375	0.92	(0.127)		
No. 6-32	1.25	(0.173)		
No. 8-32	2.50	(0.35)		
No. 10-24	5.03	(0.81)		
1/4–20	7-9	(1 .0-1 .2)	9-2	(1 .2-1 .7)
1/4–28	8-10	(1.1-1.4)	11-4	(1.5-1.9)
5/16-18	13-17	(1.8-2.4)	18-23	(2.5-3.2)
5/16-24	15-19	(2.1-2.6)	20-26	(2.8-3.6)
3/8–16	30-35	(4.1-4.8)	41-47	(5.7-6.5)
3/8–24	35-39	(4.8-5.4)	47-53	(6.5-7.3)
7/16-14	46-50	(6.4-6.9)	62-68	(8.6-9.4)
7/16-20	55-61	(7.6-8.4)	75-83	(10.4-11.5)
1/2–13	71-75	(9.8-10.4)	96-102	(13.3-14.1)
1/2–20	83-93	(1 1.5-1 2.9)	113-126	(1 5.6-1 7.4)
9/16-12	90-110	(12.4-15.2)	122-149	(16.7-20.6)
9/16-18	107-120	(14.8-16.6)	145-163	(20.0-22.5)
5/8-11	137-150	(18.9-20.7)	186-203	(25.7-28.1)
5/8-18	168-180	(23.2-24.9)	228-244	(31 .5-33 .7)
3/4-10	240-260	(33.2-35.9)	325-353	(44.9-48.8)
3/4-16	290-300	(40.1-41.5)	393-407	(54.3-56.3)
7/8-9	400-420	(55.3-58. 1)	542-569	(74.9-78.7)
7/8-14	475485	(65.7-67.1)	644-658	(89.0- 91 .0)
1-8	589-590	(80.2-81.6)	786-800	(108.7-110.6)
1–14	685-595	(94.0-96.1)	929-942	(128.4-130.2)

NOTES:

1. Applicable to UNC, NC, UNF, and NF threads, Class 2 and 3 fit.

2. Stud grade marking identical to that for hexagon deadbolts. Symbols appear on nut end of stud.

3. Nut grade marking is applied to the top face of the nut. Grade 1 and 2, no markings, Grade 5, three raised dashes, Grade 8, six raised dashes.

4. Applicable to plated and nonplated fasteners – no special lubrication.

GLOSSARY

Section I. ABBREVIATIONS

Ac	Alternating Current
A	Ampere
BW	Backwash (position on backwash timer)
C	Contact
CBR	Chemical–biological–radiological
cm–kg	Centimeter–kilogram
CR	Purge (position on backwash timer)
DS/I	Direct Support/Intermediate
DTM	Draft Technical Manual
EIR	Equipment improvement Recommendation
fig	Figure
FM	Field Manual
f t.	Foot
gal	Gallon
gpm	Gallons per minute
GS	General Support
in	Inch
ID	Inside diameter (or) Identification
kg/Cm^2	Kilograms per square centimeter
kg/cm^{2}d	Kilograms per square centimeter, differential
kg/cm^{2}g	Kilograms per square centimeter, gage
kW	Kilowatt (1000 watts)
Ipm	Liters per minute
MAC	Maintenance Allocation Chart
m–kg	Meter–kilograms
ml	Milliliter
N.C.	Normally Closed
N.O.	Normally Open
No	Number
Nom	Nominal

GLOSSARY (continued)

Section I. ABBREVIATIONS

PMCS	Preventive Maintenance Checks and Services
psi	Pounds per square inch
paid	Pounds per square inch, differential
psig	Pounds per square inch,gage
PVC	Polyvinyl chlorine
R.O.	Reverse osmosis
ROWPU	Reverse Osmosis Water Purification Unit
RPSTL	Repair Parts and Special Tools List
RTV	Room Temperature Vulcanized
S	A built-in internal standard
SF	Standard form
SR	Service (position on backwash timer)
TBS	To resupplied
TDS	Total dissolved solids
TM	Technical Manual
USMC	United States Marine Corps
Vat	Volts, alternating current
Vdc	Volts, direct current

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By Order of the Secretaries of the Army and Navy (Including the Marine Corps):

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DISTRIBUTION:

To be distributed in accordance with DA Form 12–25E, (qty rqr block no. 2015).
DA Form 12–25A, (qty rqr block no. 2015 and 2016).

*U.S. GOVERNMENT PRINTING OFFICE: 1992 - 654-028/60103

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 10–4610–215–24	27 MARCH 1992	WATER PURIFICATION UNIT

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Change the Manual to show 4 Cylenders.
B1		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please Correct one or the Other.
125	line 20			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

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

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

Square Measure

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

Cubic Measure

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

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C