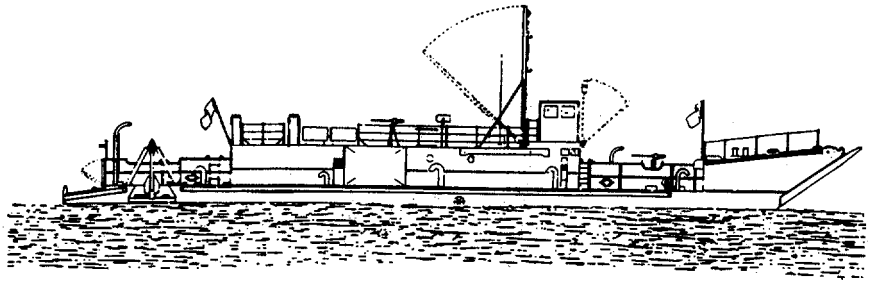
TECHNICAL MANUAL
OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

OPERATOR MAINTENANCE INSTRUCTIONS FOR AUXILIARY EQUIPMENT

LANDING CRAFT UTILITY
LCU 1667-1670
NSN 1905-01-168-5764



This manual supersedes TM 55-1905-219-14-9, 31 July 1980

HEADQUARTERS, DEPARTMENT OF THE ARMY
9 OCTOBER 1984

CHANGE

NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C. , 17 MARCH 1992

Operator's, Organizational
Direct Support and General Support
Maintenance Manual

LANDING CRAFT UTILITY
LCU 1667-1670
NSN 1905-01-168-5764

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TM 55-1905-219-14-9, 9 October 1984, 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
4-965/4-966	4-965/4-966
4-979 and 4-980	4-979 and 4-980
4-1013and 4-1014	4-1013 and 4-1014
4-1027 through 4-1081/4-1082	4-1027 through 4-1082
----	4-1082.1 through 4-1082.3/4-1082.4
4-1115 through 4-1138	4-1115 through 4-1138
4-1139 through 4-1148	----
4-1247 through 4-1254/4-1255	4-1247 through 4-1255
4-1279 through 4-1282	4-1279 through 4-1282
4-1293 through 4-1296	4-1293 through 4-1296
4-1307 and 4-1308	4-1307 and 4-1308
----	4-1308.1 through 4-1308.5/4-1308.6
4-1315and4-1316	4-1315and4-1316
----	4-1316.1 through 4-1316.11/4-1316.12
4-1403 and 4-1404	4-1403 and 4-1404
4-1407 through 4-1410	4-1407 through 4-1410
----	4-1438.1 through 4-1438.16
4-1439 through 4-1442	4-1439 through 4-1442
4-1445 through 4-1450	4-1445 through 4-1450
4-1461 through 4-1491/4-1492	4-1461 through 4-1492
----	4-1492.1 through 4-1492.9/4-1492.10
Index 1 and Index 2	Index 1 and Index 2
Index 5/6	Index 5/6
----	FP 15/16

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

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
00738

DISTRIBUTION:

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WARNING

DEATH

OR SEVERE INJURY MAY RESULT IF PERSONNEL FAIL TO OBSERVE THE GENERAL SAFETY PRECAUTIONS BELOW, AND THE SPECIFIC PRECAUTIONS CONTAINED IN THE TEXT.

- Wear safety glasses, safety shoes, and a hard hat to provide adequate protection.
- Death or severe injury may result if personnel fail to use a lifting device that is adequate for the item to be lifted.
- Ear protection must be worn when engines or machinery are in operation.
- Use care when using power tools.
- If cleaning agents are used, be sure area is adequately ventilated, and use protective gloves and goggles, or face shield and apron.
- Acids can cause serious burns or blindness. Avoid contact with eyes, skin, or clothing. Do not breathe vapors. Wear rubber gloves, goggles, and a rubber apron when handling them. When diluting acids, do not add water to acid; the acid must be added to the mixture slowly and with constant mixing. In case of contact with acid, flush the affected area with plenty of water and obtain medical aid immediately.
- Use the recommended air pressure when using compressed air to clean components. Too much air pressure can rupture, or in some way damage a component and create a hazardous situation that can lead to personal injury.
- Before attempting to remove any compressed air system 1ines or components, relieve air pressure from system. Failure to do so may result in injury or possible death to maintenance personnel.
- Fuel oil and other petroleum products are highly volatile in extreme heat. To minimize the possibility of explosion, wipe up all spills at once, see that fuel lines and valves are not leaking and pump bilges regularly.

WARNING

- When refueling, shut down the electrical system of the LARC. Observe the no smoking rule. Do not permit anyone to operate tools or equipment which may produce sparks near the refueling operation. Sparks or fire may ignite the diesel fuel and produce an explosion.

- Before disconnecting a line in the hydraulic system, bleed the pressure from that portion of the line. Failure to do so may result in injury or possible death to maintenance personnel.

- When working inside the hydraulic oil supply tank, a portable-type circulating blower should be used to prevent vapor accumulation. For extended work periods inside the tank, an air line tube respirator should be worn. Station an observer outside tank in case worker is overcome by fumes .

- When cutting with a torch, or when welding, always station fire watches, ready with fire extinguishers, in the vicinity on both sides of the plate that is being cut or welded.

- Prior to cutting or welding on the ramp, remove drain plugs on both sides of the ramp and check if ramp interior is primer coated. If primer coated, flush thoroughly with steam, carbon dioxide, or water. Do not reinstall drain plugs until the cutting and/or welding operation is completed. Failure to take this precaution may result in explosion of accumulated primer vapors.

- Ramp hinge pins must be replaced one at a time, allowing three remaining pins to support ramp. Removal of two or more hinge pins may result in the weight of the ramp misaligning the remaining hinges, resulting in damage to ramp and possible injury or death to maintenance personnel.

- Use extreme care when near rotating fans, belts, and pulleys.

- During any removal, disassembly, assembly, or installation of an electrical device, make sure all electrical power is disconnected and tagged. (Circuit breaker in the OFF position and tagged).

WARNING

- Personnel should know the location and operation of all equipment for emergency use.
- Before attempting to operate any equipment, read the instructions completely. Then, return to the appropriate section and follow the instructions.
- If the Halon Fire System is activated (horn sounds), leave the compartment immediately. Check that no one is left, and then close and dog the hatch .
- Use extreme care when handling gasoline for the Salvage Pump.
- Store all flammable material in the Flammable Storage Compartment.
- HIGH VOLTAGE is used in the operation of this equipment.
- DEATH ON CONTACT may result if personnel fail to observe safety precautions.
- Never work on electrical equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.
- Whenever possible, the input power supply to the equipment must be shut off before beginning work on the equipment. When working inside the equipment, after power has been turned off, always ground every part before touching it.
- Do not be misled by the term "low voltage". Potentials as low as 50 volts may cause death under adverse conditions.
- Sewage is an inclusive term generally applied to the mixture of all liquid domestic wastes, especially human body wastes. The character of sewage changes from place to place but it always contains very large numbers of bacteria - hundreds of millions per milliliter - some of which can cause dangerous illness in man. Typhoid and polio viruses are two examples.

- The ingress of these bacteria to the human body is through the mouth or ,open sores. It is important therefore to observe certain elementary precautions.

  - a. No food or drink of any nature should be taken into sewage handling areas.

  - b. Personnel with open cuts or sores should not work on sewage handling equipment.
  -
  - c. Any sewage spill should be dealt with immediately, before it dries; by washing down with water and a good quality, non-scented disinfectant. Liquid soaps or scented disinfectants should not be used since they only serve to disguise improper clean-up.
  -
  - d. All personnel should be encouraged to wash their hands on exit from a sewage handling area or after being in contact with sewage handling equipment.

REFRIGERANT-12.

- Refrigerant-12 is practically odorless and non-toxic. It is not necessary to wear a gas mask when servicing equipment in which it is contained unless the conditions necessary for the decomposition of R-12 to phosgene gas exist.

- Never use a torch or attempt a repair on a line containing R-12 until it is certain that all gas has been pumped out of the section of pipe to be repaired, the area is well ventilated and the line has been valved off. Refrigerant-12 in contact with an open flame of high temperature (about 1,000°F (557. 8°C)) decomposes into phosgene, a highly toxic gas.

- Always wear goggles when handling R-12, or servicing equipment in which it is contained, to avoid the possibility of liquid refrigerant coming in contact with the eyes.

- If liquid R-12 accidentally comes in contact with the eyes, fake person suffering the injury to the medical officer at once. Do not rub or irritate the eyes and give the following first aid treatment immediately:

WARNING

- a. Introduce drops of sterile mineral oil into the eyes as an irrigant.
- b. If irritation continues at all, wash the eyes with a weak boric acid solution, or a sterile salt solution not to exceed 2% sodium chloride.

- Should liquid R-12 come in contact with the skin, treat the injury the same as though the skin had been frost bitten or frozen.
- Do not work in a closed space where R-12 may be leaking unless adequate ventilation is provided.
- Should a person be overcome in a space which lacks oxygen because of high concentrations of R-12 being present, treat such person the same as for suffocation, i. e., through artificial respiration.

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TECHNICAL MANUAL

NO. 55-1905-219-14-9

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C. , 9 October 1984

Operator's, Organizational Direct Support and General Support Maintenance Manual LANDING CRAFT UTILITY LCU 1671-1679 NSN 1905-01-009-1056

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake 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-MPS, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished directly to you.

TABLE OF CONTENTS

CHAPTER 4
OPERATOR MAINTENANCE INSTRUCTIONS FOR AUXILIARY EQUIPMENT (CONTINUED)

SECTION IV. TROUBLESHOOTING - SYMPTOM INDEX (con't)

4-34. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

a. General.

(1) Thermal expansion valve troubles can usually be traced to dirt or moisture collecting at the valve seat and orifice. Dirt will get between the valve seat and stem, or moisture will freeze at the valve port, and prevent the passage of refrigerant. External frost on the inlet side of the valve indicates an obstruction and the need for cleaning.

(2) To clean, inspect, or repair a thermal expansion valve, pump down the strainer and controls as explained in paragraph b and disassemble the valve.

(3) A new power or cage assembly, or both, can be installed without removing the valve body flange from the line.

NOTE

In an emergency, expansion valve freeze up may be avoided by adding to system not more than 1 cc of anhydrous methyl alcohol per pound of refrigerant charge.

b. Pumping Down.

To replace the thermal expansion valve, proceed as follows:

(1) Close the cut-out valve on the inlet side of the strainer, and operate system to pump down.

(2) As the pressure is reduced, the strainer will become cold and then begin to warm up as soon as liquid refrigerant has been removed.

(3) Close the cut-out valve on the outlet side.

(4) Disassemble valve.

(5) Remove thermal expansion valve in accordance with standard soldering methods. Be careful to retain all the solder in the connections. Refer to paragraph 4-35.6 for soldering procedures.

4-34. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued)

(6) Plug openings to exclude air moisture.

(7) Install and reassemble thermal expansion valve.

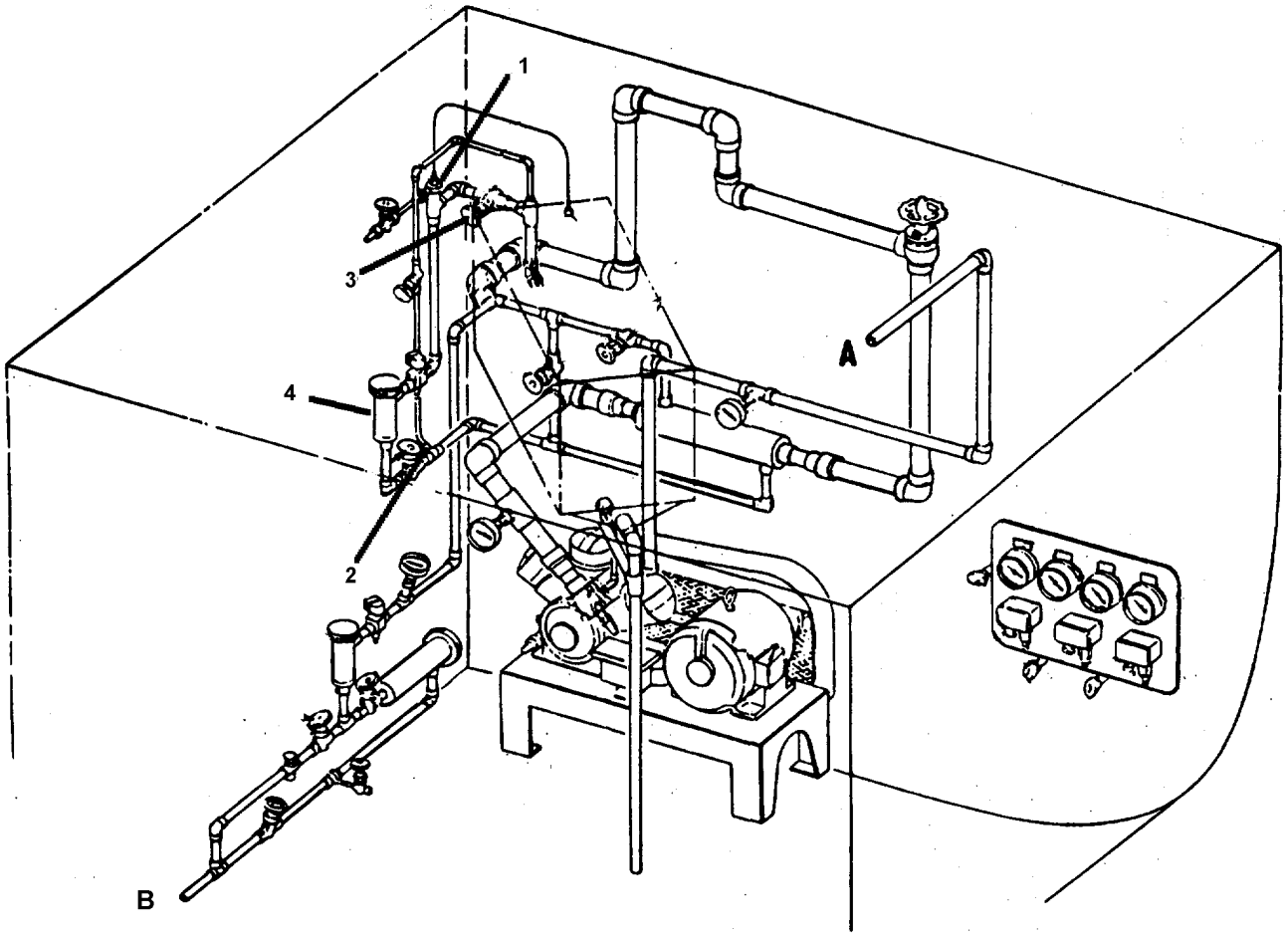
(8) Loosen strainer cover.

(9) Open cut-out valves on both sides of strainer one at a time.

(10) Quickly tighten strainer cover.

(11) Open cut-out valves.

(12) Resume normal operation.



1. Thermal expansion valve
2. Inlet cut-out valve
3. Outlet cut-out valve
4. Strainer

4-34. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

This task covers:

a. Inspection **b. Repair**
c. Removal/Installation **d. Adjustment**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

Gasket kit Y13455-1

Personnel Required

1

References

Paragraph	
4-28r	Leak Detection
4-35.6	Tubing Maintenance

Equipment Condition Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe safety precautions in paragraph 4-28d .

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Thermal expansion valve	a. Valve	1. Inspect for breaks, cracks and signs of damage.	
		2. Inspect for leaks.	
		3. Inspect for frost.	The valve is obstructed and requires a cleaning.
	b. Bulb	1. Inspect for bends and signs of damage.	
		2. Inspect for proper installation.	

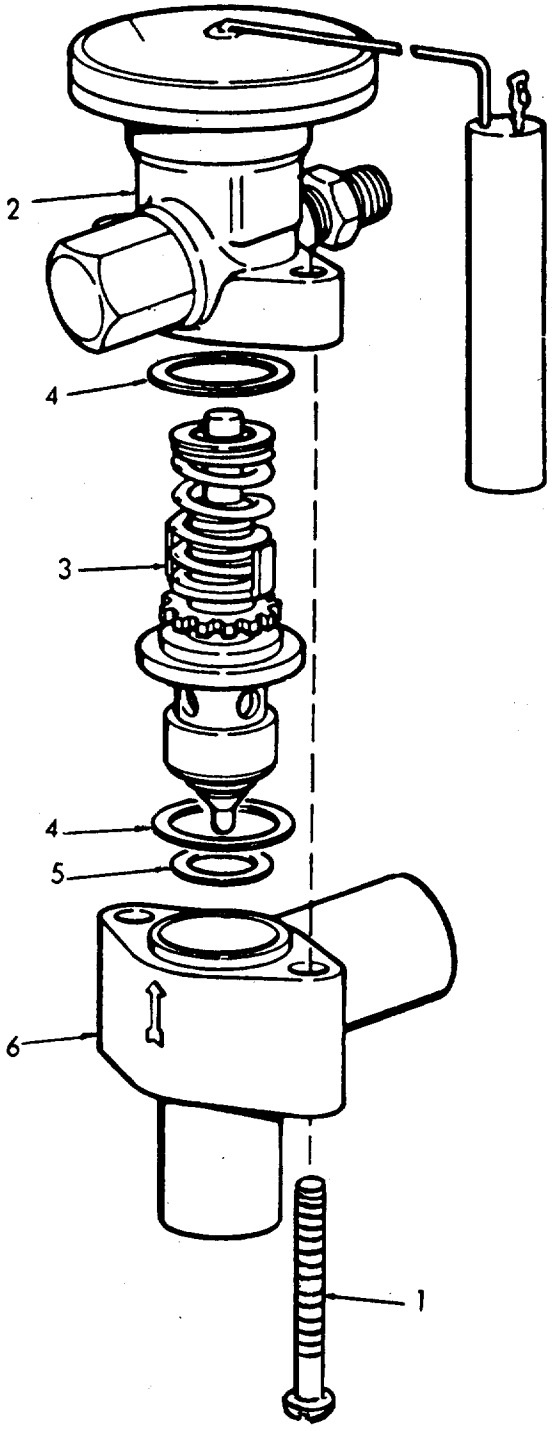
4-34. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2.	a. Screws (1)	Remove.	
	b. Power assembly (2) and bulb	Remove.	Use care not to damage bulb and tubing.
	c. Cage assembly (3) and gaskets (4 and 5)	Remove.	Discard gaskets.
	d. Cage assembly (3) and gaskets (4 and 5)	Assemble in body (6)	Use new gaskets.
	e. Power assembly (2) and bulb	1. Install power assembly.	a. The two lugs on the cage assembly fit into the grooves provided for them in the power assembly. b. The gear wheel on the cage assembly meshes with the adjusting stem gear inside the power assembly. c. Do not force the valve together.

4-34. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-34. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
			d. Make the cage fit properly before tightening body flange.
	f. Screws (1)	2. Install bulb Install	
REMOVAL/INSTALLATION			
3.		Remove valve in accordance with procedure in paragraph 4-34b .	

NOTE

Be sure to install the thermal expansion valve so that the flow of refrigerant is in the direction indicated by the arrow on valve body.

ADJUSTMENT

4.

a. The thermal expansion valves are factory set to maintain the suction gas leaving evaporator at 8° to -10°F (13.3 to -23.3°C) superheat.

b. To adjust superheat setting remove seal cap on side of valve and turn adjusting stem. Turning stem to right decreases refrigerant flow and raises superheat.

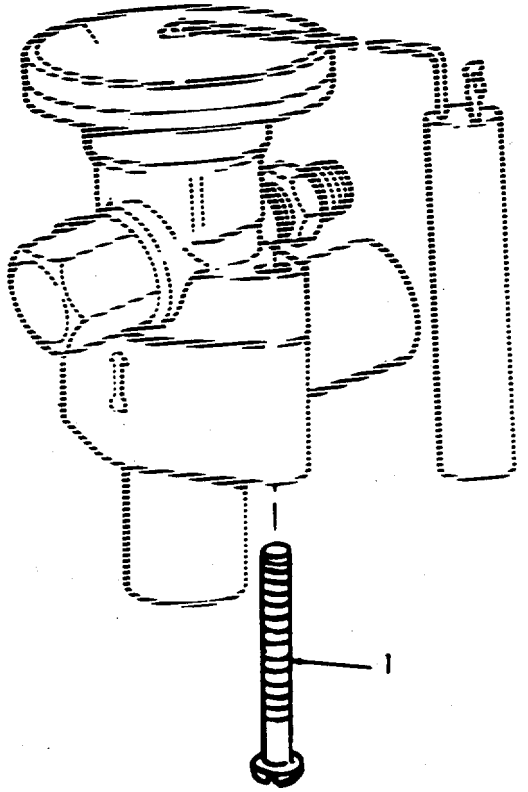
c. Turning stem to left increases refrigerant flow and lowers superheat. Two turns of stem will change superheat about 1°F (-17.2°C). Adjust two turns at a time.

d. Adjust each expansion valve separately and wait between adjustments to observe results. Always tighten any loose connections and replace seal cap after adjustments.

4-34. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-951

4-35. MISCELLANEOUS VALVES AND HEADERS - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS

a. Pumping down to replace liquid solenoid valve proceed as follows:

(1) Close the cut-out valve on inlet side of strainer, and operate system to pump down.

(2) As the pressure is reduced, the strainer will become cold and then begin to warm up as soon as liquid refrigerant has been removed.

(3) Close the cut-out valve on the outlet side (downstream of thermal expansion valve).

(4) Remove liquid line solenoid in accordance with standard soldering methods.

(5) Plug openings to exclude air and moisture.

(6) Install liquid line solenoid.

(7) Loosen strainer cover.

(8) Open cut-out valves on both sides of strainer one at a time and allow a small quantity of refrigerant to blow the air out of the line.

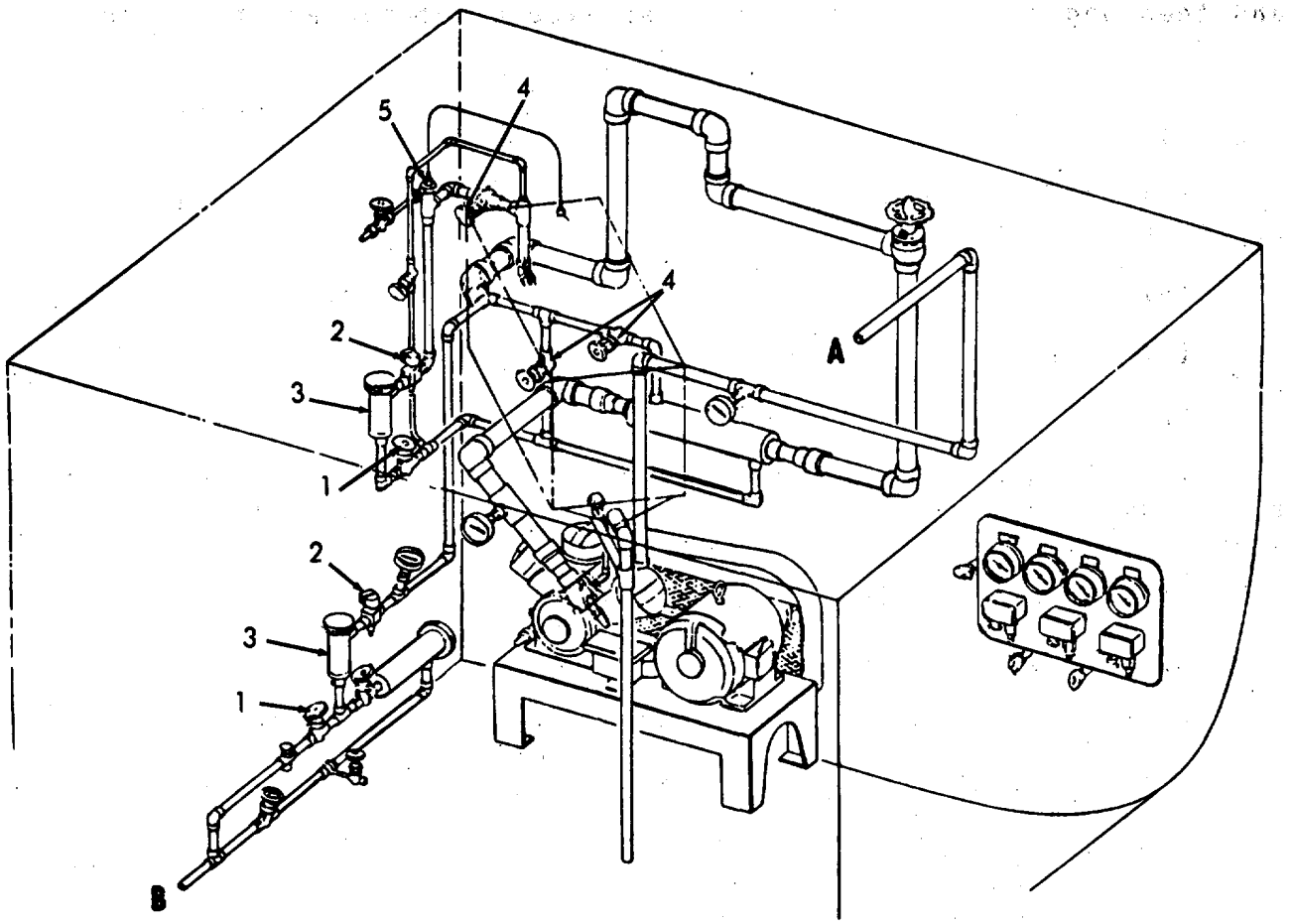
(9) Quickly tighten strainer cover.

(10) Open cut-out valves.

(11) Resume normal operation.

b. The following is an index to the maintenance procedures:

4-35. MISCELLANEOUS VALVES AND HEADERS - MAINTENANCE INSTRUCTIONS (Continued).



1. Inlet cut-out valves
2. Liquid solenoid valves
3. Strainer
4. Outlet cut-out valves
5. Thermal expansion valve

4-35. 1 LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Repair** **c. Removal and Installation**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

Gasket kit 4810-01-046-8558

Personnel Required

1

References

Paragraph	
4-28r	Leak Detection
4-35.6	Tubing Maintenance
4-35.7	Valve Maintenance

Equipment

Condition	Condition Description
	NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe safety precautions in paragraph 4-28d and observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Liquid solenoid valve	a. Wiring	Inspect for breaks, cracks and signs of damage.	
	b. Tubing	Inspect for breaks, cracks and leaking.	
	c. Solenoid	1. Inspect for a clicking noise.	Indicates a defective coil.
		2. Inspect for signs of damage.	

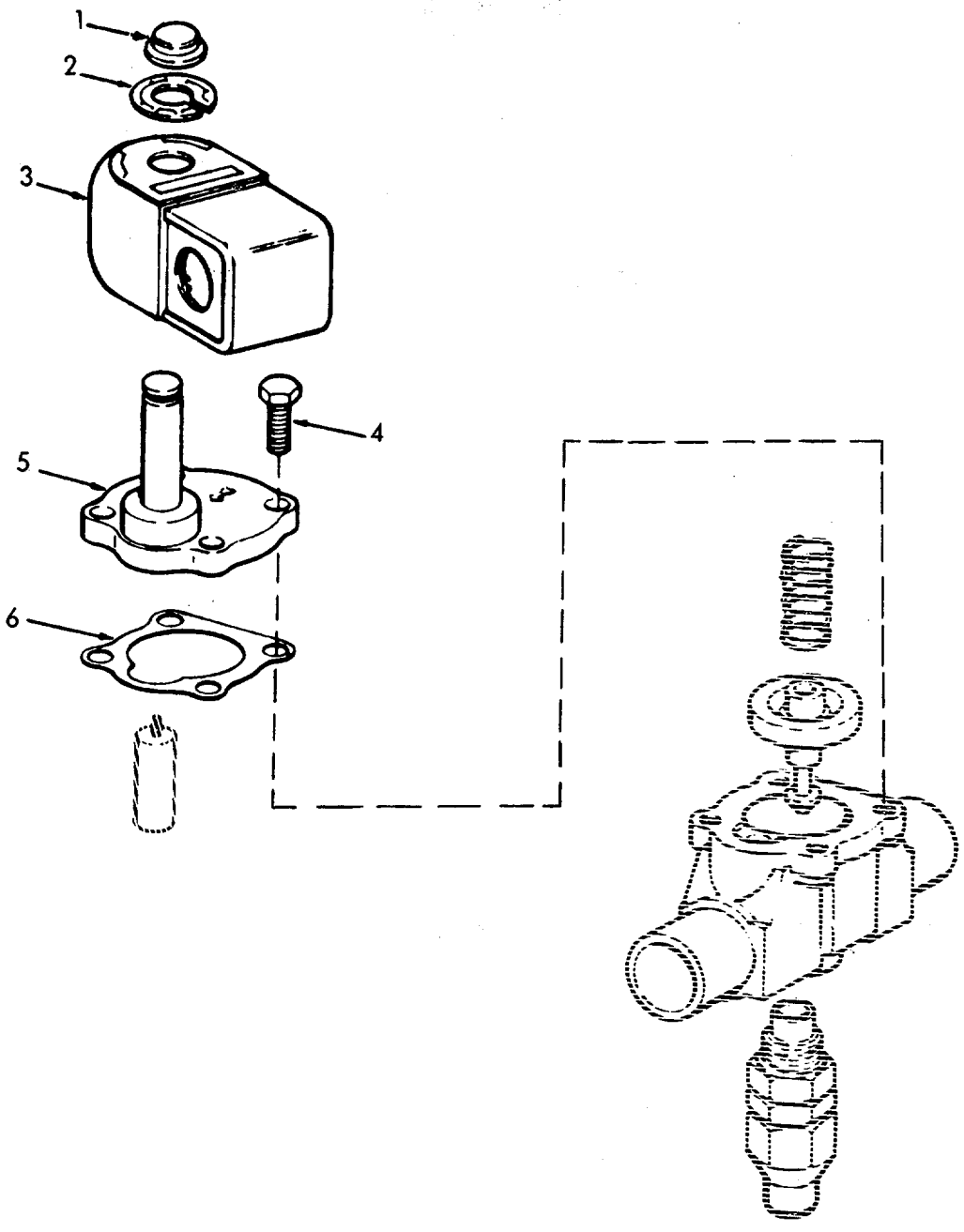
4-35.1. LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
		WARNING	
		To prevent accidental shock and possible injury, tag and place circuit breaker in the OFF position.	
2. Coil	a. Wiring.	Tag and disconnect.	
	b. Retainer (1) and voltage plate (2)	Remove.	
	c. Coil assembly (3)	Replace.	
	d. Voltage plate (2) and retainer (1)	Install.	
	e. Wiring	Reconnect, remove tags.	
3. Valve			
		NOTE	
		Pump down strainer and controls as described in paragraph 4-35a .	
	a. Screws (4)	Remove.	
	b. Enclos-ing tube assembly (5) and gasket (6)	Remove.	Discard gasket.

4-35.1. LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

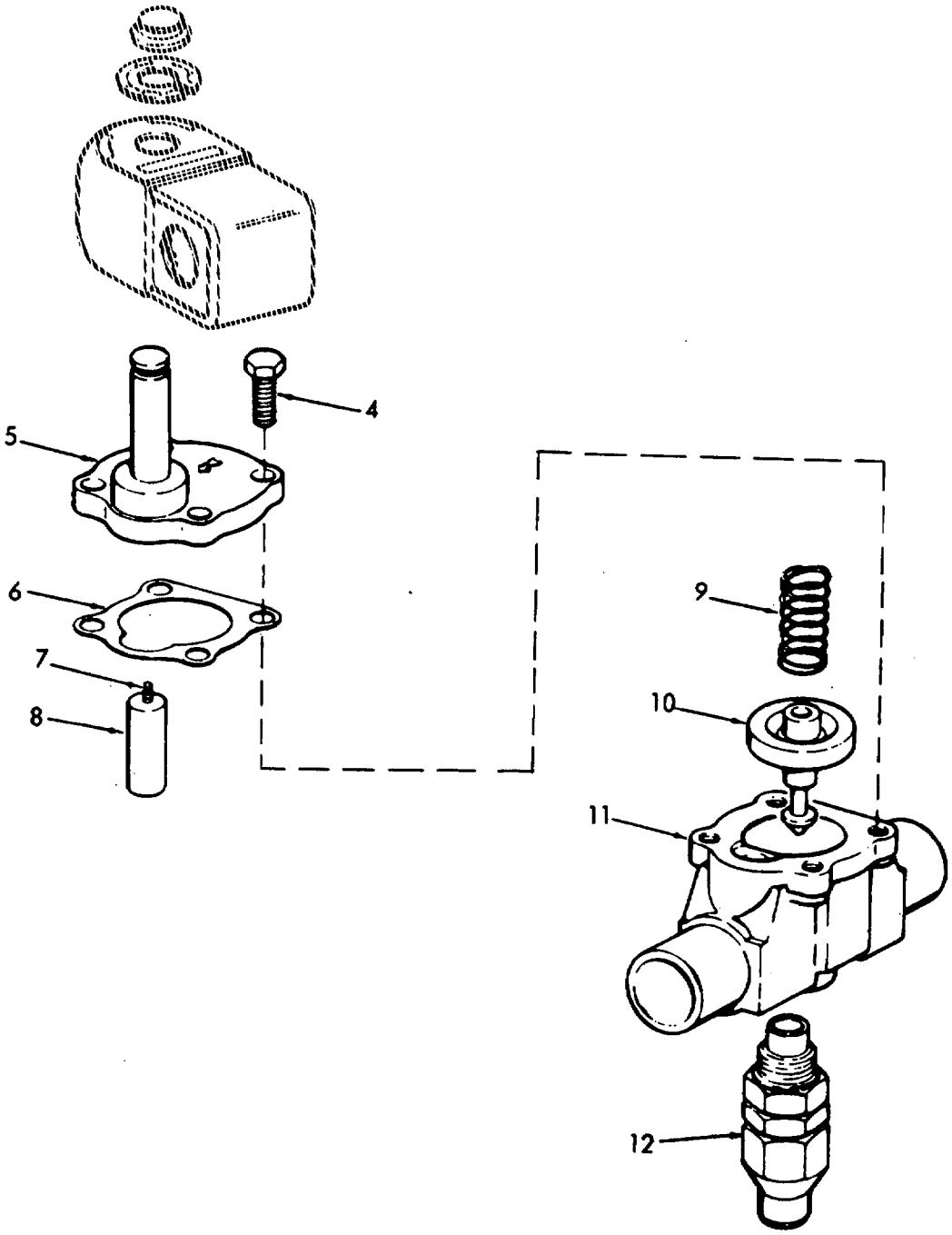


4-35. 1. LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	c. Plunger spring (7), plunger (8), spring (9), and piston (10)	Remove.	Discard.
	d. Valve body (11) and manual stem assembly (12)	Disassemble.	
	e. All remaining parts	1. Inspect. 2. Clean	
	f. Manual stem assembly (12) and valve body (11)	Reassemble.	
	g. Piston (10), spring (9), plunger (8), and plunger spring (7)	Install.	Use new parts.
	h. Gasket (6) enclosing tube (5), and screws (4)	Reassemble.	Use new gasket.

4-35.1. LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	i. Coil	Install.	Refer to step 2.



4-35.2. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

This task covers:

a. Inspection **b. Repair** **c. Replace**

INITIAL SETUP:

Test Equipment

NONE

References

Paragraph	
4-28r	Leak Detection
4-35.6	Tubing Maintenance
4-35.7	Valve Maintenance

Special Tools

NONE

Equipment Condition Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

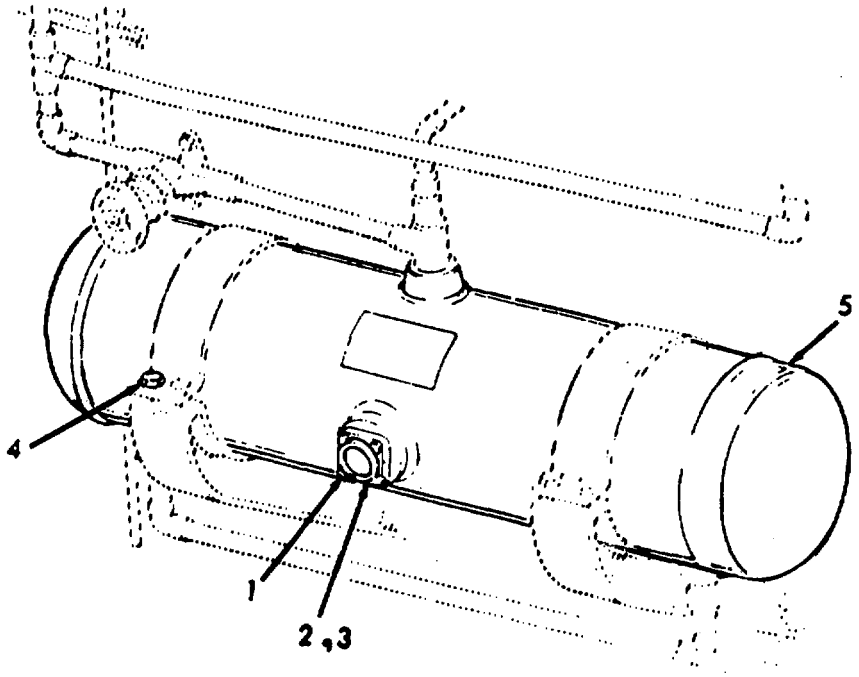
General Safety Instructions

Observe safety precautions in paragraph 4-28d .

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Receiver	a. Tubing	Inspect for breaks, cracks, dents, and leaks.	
	b. Sight glass	Inspect for leaks and signs of damage.	
	c. Receiver	Inspect for breaks, cracks, dents, and leaks.	
REPAIR			
2. Sight glass	a. Screws (1)	Remove.	
	b. Sight glass (2) and gasket (3)	Replace.	

4-35.2. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
	c. Screws (1)	Install.	
REPLACE			
3. Receiver	a. Screws (4)	Remove.	
	b. Tubing	1. Unsolder.	Refer to paragraph 4-35.6 for procedure.
		2. Move.	
	c. Receiver (5)	Replace.	
	d. Tubing	Reconnect.	
	e. Screws (4)	Install.	



4-961

4-35.3. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

The heat interchanger is a shell and tube heat exchanger connected in the main suction and liquid lines near the compressor. Within the interchanger, the cold suction gas is used to cool the warm liquid refrigerant. This results in greater system capacity and efficiency. A liquid line bypass valve is usually provided to isolate the interchanger should either: (a) a liquid leak develop into the suction line, or (b) the compressor discharge gas temperature rises above 240°F (115. 6°C).

This task covers:

a. Inspection **b. Replace**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References

Paragraph	
4-28r	Leak Detection
4-35.6	Tubing Maintenance

Equipment
Condition Condition Description
NONE

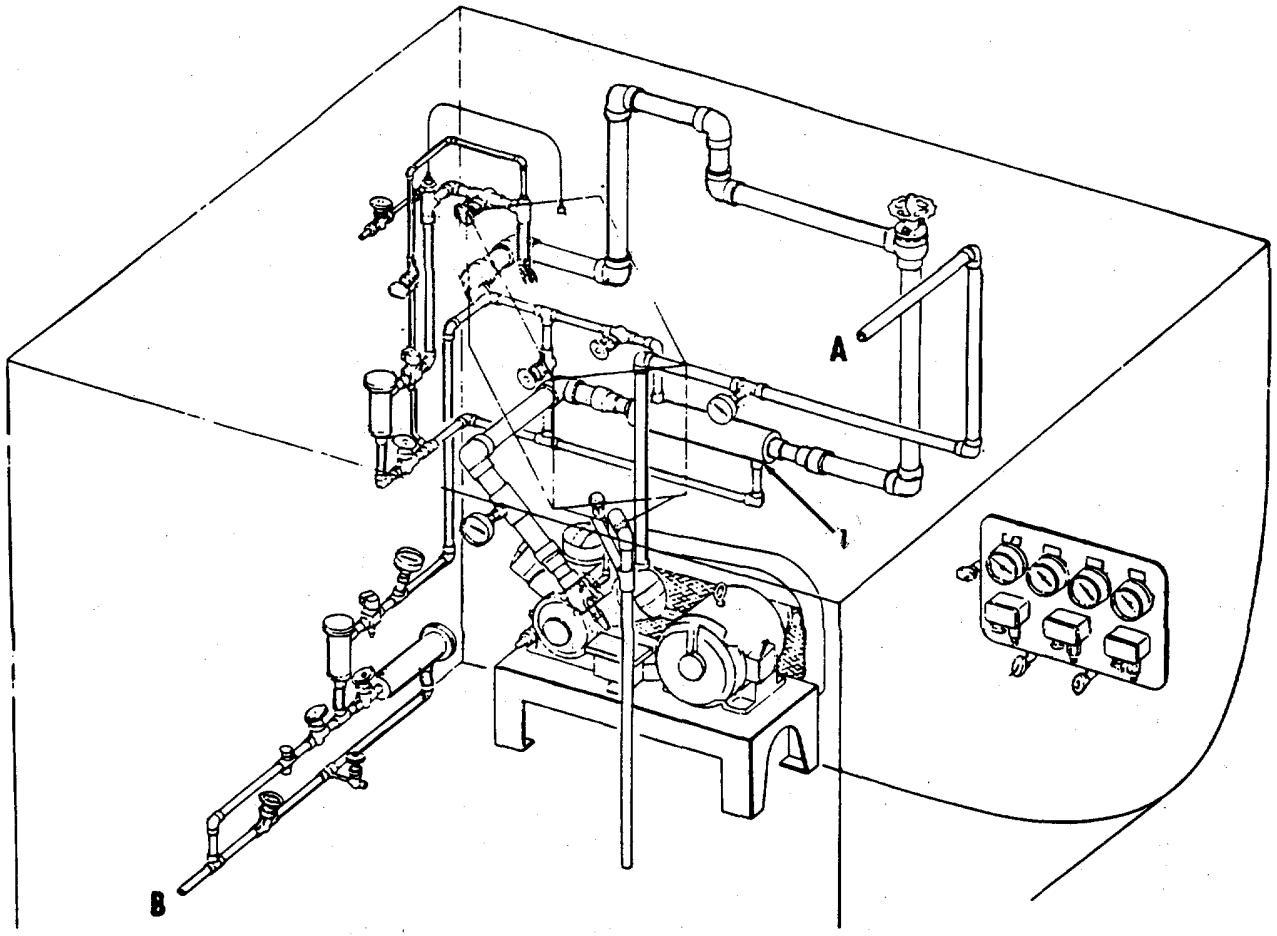
Special Environmental Conditions
NONE

General Safety Instructions
Observe safety precautions in paragraph 4-28d .

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Heat inter-changer (1)	a. Tubing	Inspect for breaks, cracks, dents, and leaks.	
	b. Heat inter-changer	Inspect for breaks, cracks, dents, and leaks.	

4-35.3. HEAT INTERCHANGER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
2.	Tubing	1. Unsolder. 2. Remove. 3. Reconnect.	In accordance with standard procedures and refer to paragraph 4-35.6 .



4-35.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS

a. The water regulating valve automatically controls the sea water flow through the condenser to maintain a relatively constant condensing pressure and temperature. The water regulating valve is actuated by the refrigerant head pressure in the condenser and must be adjusted so as to maintain the required condensing pressure and to shut off water flow when the compressor is stopped. The water regulating valve is located in the condenser water outlet line.

b. Adjust the condenser water regulating valve to maintain a discharge pressure of 90 to 125 psig (620.6 to 861.9 kPa).

c. With the system under normal operation, feel the liquid lines up to the expansion valves. If the expansion valves are hissing loudly or the liquid lines is cold where it leaves the solenoid valve or strainer, there is inadequate subcooling or restricted liquid refrigerant flow. Check head pressure and adjust the water regulating valve as required. If the valve setting is correct, check for obstructions in the liquid line (such as a clogged strainer). Clean or repair obstructed parts.

d. Refrigerant head pressure from condenser is applied to bellows assembly. When refrigerant head pressure increases, the bellows plate is compressed forcing the bellow push rod upward, moving the valve seat in the opening direction and allowing increased water flow through condenser. As the valve unseats, pressure is exerted upward through valve disc, valve disc holder, guide post and valve center assembly screw to compress range spring.

e. Increase water flow through condenser reduces head pressure. When head pressure decreases, the range spring expands moving the valve seat in the closing direction and reducing water flow.

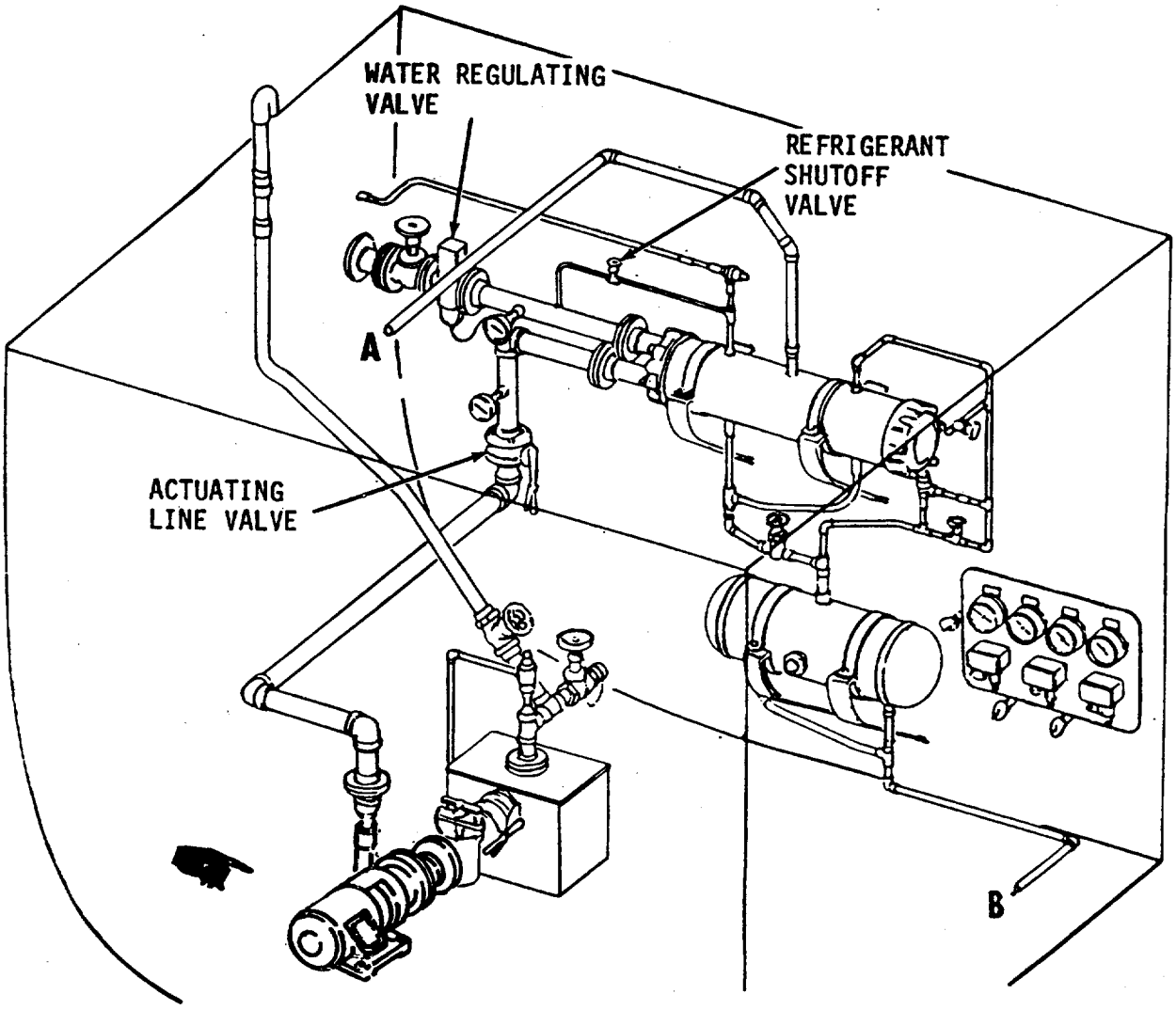
NOTE

If compressor operates in high ambient temperatures, gas pressure may at times remain high enough to cause valve to partly open when compressor is idle. In such a case, raise opening of valve just enough to cause valve to close during compressor stand-by periods.

f. It is not necessary to disconnect the valve to perform service or repair.

4-35.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS



4-35.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

This task covers:

a. Inspection
b. Service
c. Replace
d. Adjustment

INITIAL SETUP:

Test Equipment

NONE

References

Paragraph	
4-28e(5)	Pump Down
4-28r	Leak Detection

Special Tools

NONE

Equipment Condition: Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

Observe safety precautions in paragraph 4-28d.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Water regulating valve	a. Tubing cracks, dents, and leaking.	Inspect for breaks,	
	b. Valve	Inspect for breaks, cracks, and leaks.	
	c. Wiring	Inspect for breaks, cracks, and bad wiring.	
SERVICE			
2.	a. Actuating line valve	Make sure valve is closed.	Move lever.

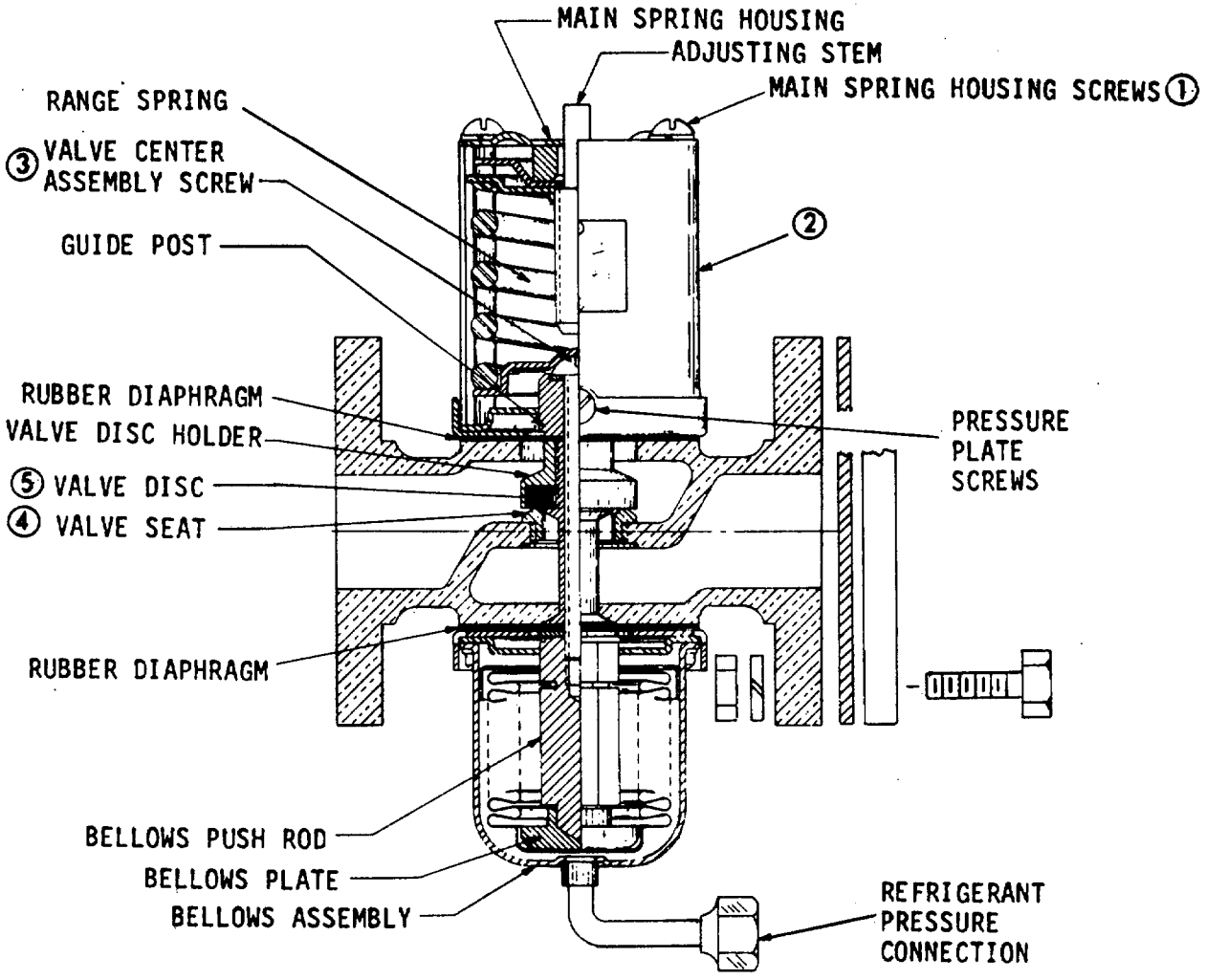
4-35.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
SERVICE (Cont)			
	b. Four round headed screws (1)	Remove.	
		CAUTION	
	Do not remove pressure plate screws on side of housing. Complete housing assembly is removed as one unit, thus valve adjustment is not changed.		
	c. Valve assembly (2)	Remove.	
	d. Valve center assembly screw (3)	Remove.	Valve seat and rubber valve disc, after long periods of operation, may become worn or pitted, preventing valve from closing completely during compressor stand-by periods. Inspect and replace if worn.
	e. Valve seat (4), and valve disc (5)	Inspect.	

4-35.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

SERVICE (Cont)



4-969

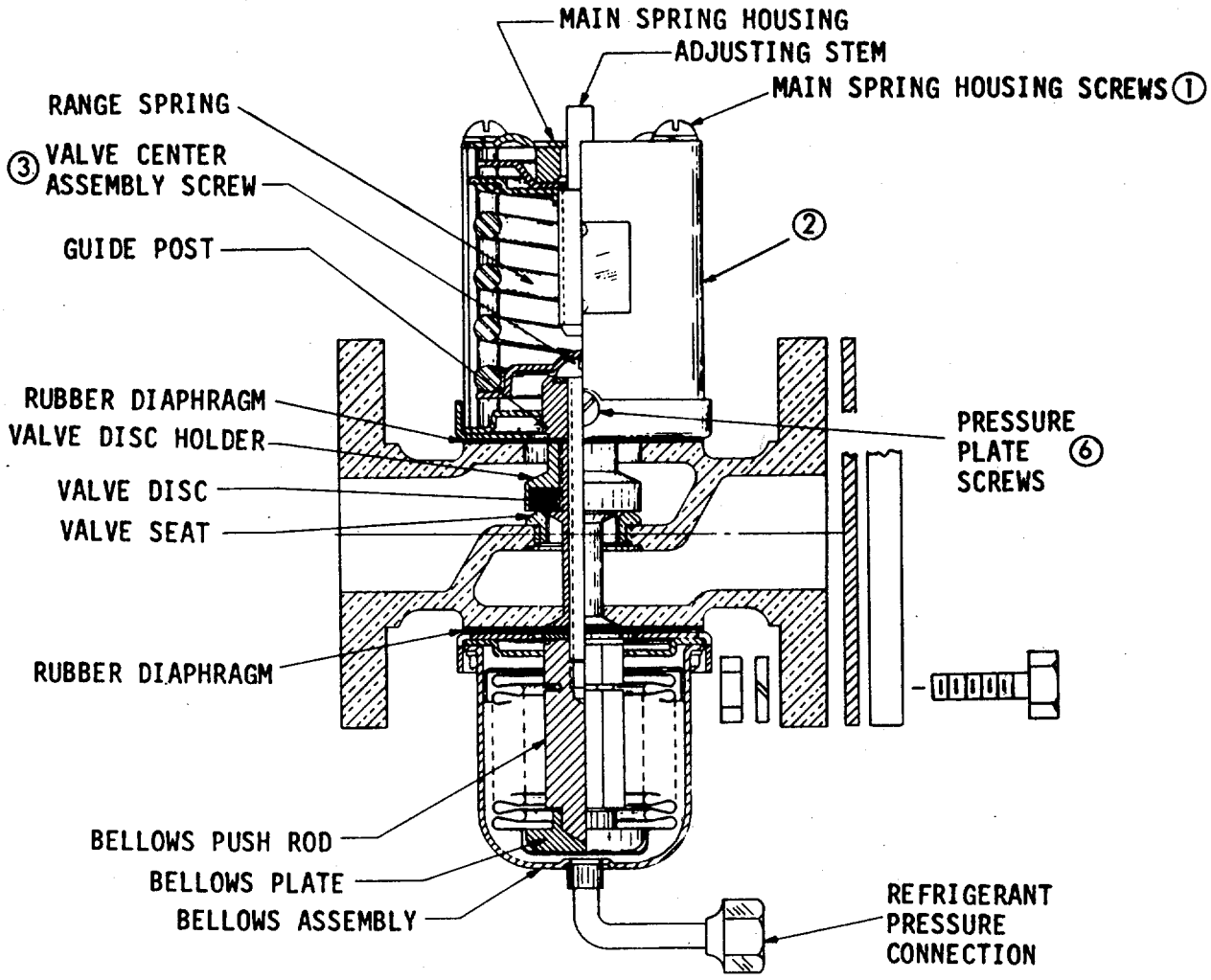
4-35.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
SERVICE (Cont)			
		WARNING	
		If necessary to disassemble spring housing unit, first release all tension on main spring. Turn adjusting stem clockwise.	
	f. Pressure plate screws (6)	Remove.	
	g. Spring housing	Disassemble.	
	h. All parts	Inspect and clean.	
	i. Spring housing and pressure pl ate screws (6)	Reassemble.	
	j. Valve center assembly screw (3)	Install.	
	k. Valve assembly (2) and screws (1)	Install.	
		NOTE	
		Drainage of valve is not necessary during stand-by periods. Rubber diaphragms compensate for any expansion within valve body if freezing occurs. Valve may be flushed manually by inserting a screw driver or similar tool under main spring and lifting it upward (away from valve body).	

4-35.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

SERVICE (Cont)



4-970

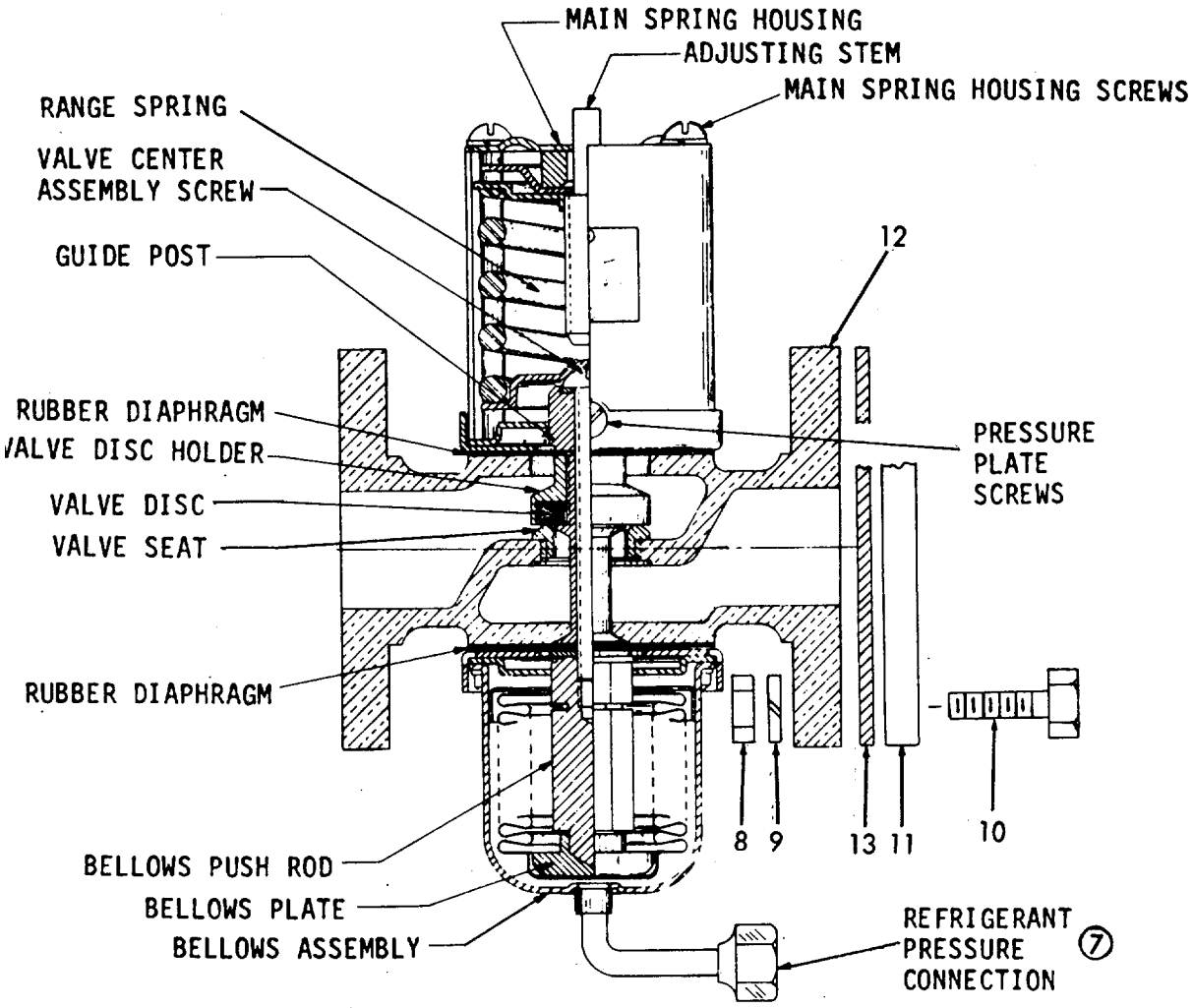
4-35.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
3.	a. Refrigerant pressure connection (7)	1. Shut off supply to valve. 2. Disconnect.	
	b. Nuts (8), lockwashers (9), and screws (10)	Remove.	
	c. Flanges (11)	Separate.	
	d. Valve (12) and gaskets (13)	Remove.	Discard gaskets.
	e. Valve (12), gaskets (13), flanges screws (10), lockwashers (9), and nuts (8)	Reassemble.	Use new gaskets.
	f. Refrigerant pressure connection (7)	1. Reconnect. 2. Turn on supply valve.	

4-35.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



4-973

4-35.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
ADJUSTMENT			
4.		The opening point of the valve can be adjusted by turning the adjusting stem. To raise valve opening point, turn adjusting stem counterclockwise. To lower valve opening point, turn adjusting stem clock- wise. Closing point of valve is about 3 to 7 psi (20.7 to 48.3 kPa) below opening point and is non-adjustable. Adjust valve to maintain a refrigerant head pressure of 90 to 125 psig (620.5 to 861.9 kPa).	

4-35.5. THERMOMETERS - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Replace**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
Paragraph
4-35.6 Tubing Maintenance

Equipment
Condition Condition Description
NONE

Special Environmental Conditions
NONE

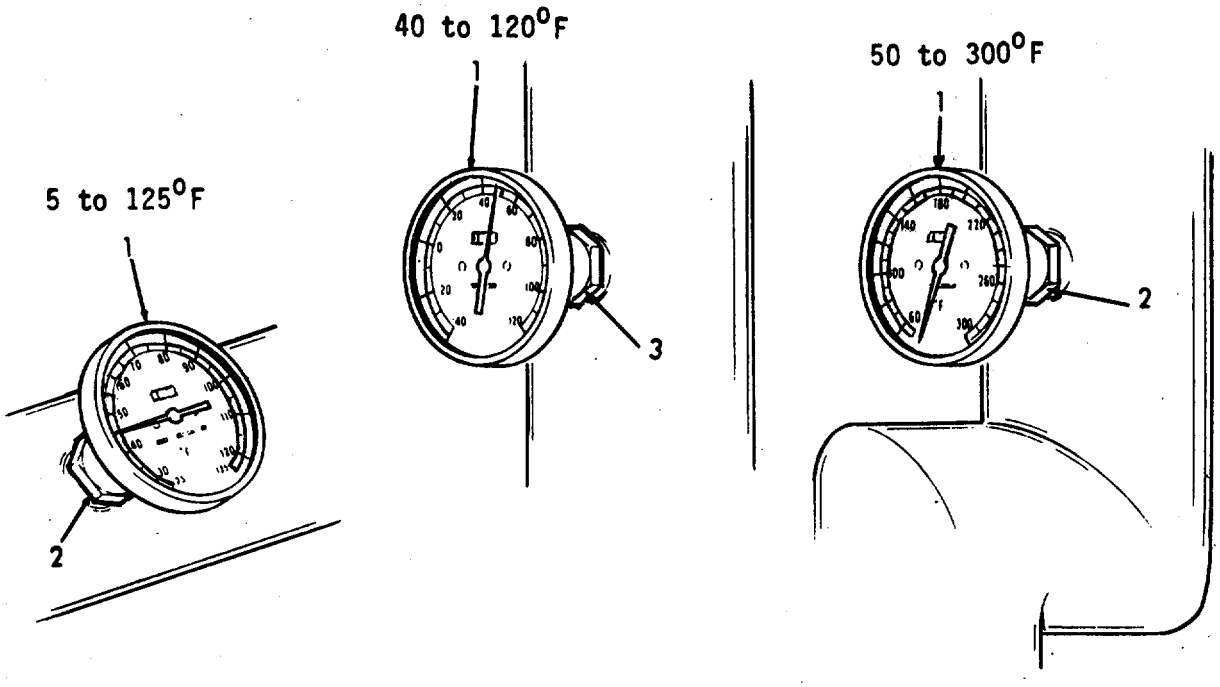
General Safety Instructions
Observe safety precautions in paragraph 4-28 d .

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Thermo-meters	a. Tubing	Inspect for breaks, cracks, and leaks.	
	b. Thermo-meter	Inspect for broken glass, and inaccurate readings.	
REPLACE			
2.	a. Thermo-meter (1)	Unscrew from socket (2).	Use two wrenches.
	b. Thermo-meter (1)	Replace.	

4-35.5. THERMOMETERS - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



4-35.6. REFRIGERANT TUBING - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

a. Repair refrigerant piping as follows:

b. Use a solder having a melting point of approximately 1160° F (626.7°C) and a flow point of 1175°F (635.0°C).

c. The refrigerant system must be clean before the compressor is connected to it. Refrigerant-12 and related refrigerants are excellent cleaners and will carry dirt through the system to the compressor.

d. Refrigeration piping is usually shipped clean, deoxidized, dehydrated, and sealed by the mill that produced it. Keep it as near this condition as possible, and seal the ends of the tubing that is left.

e. When tubing or pipe in questionable condition must be used, clean it. Blow out each length of pipe or tubing with a blast of dry air, then draw a cloth swab back and forth in the tube until it is clean and shiny. The swab should be tight enough to clean the tube without binding. Do not use waste or other linty material.

f. If a dark discoloration is found in copper tubing, pull a swab of 00 steel wool through the tube with a wire until the inside is bright and clean. After that remove any dirt, grease, or steel wool particles by pulling a lintless cloth swab saturated with compressor oil through the tube.

g. Steel and iron pipe may have dirt or scale to be cleaned out. Remember, sand particles from cores used to make pipe bends may still be present in the bends.

h. If copper tubing is brazed or soldered in the presence of air, a scaly black oxide forms on the tube. If the oxide is left inside the tube, the refrigerant flakes it off and carries it into the compressor. Oxidation can be prevented by filling the tube with a stable gas such as nitrogen. A small amount of gas flowing through the tubing will assure a neutral atmosphere while the work is being done.

i. When soldering or brazing parts that have been in an operating system, blow them out and clean off the oil film. This prevents a carbon deposit from forming in the tubing when it is heated.

j. Avoid getting dirt in the system. When preparing piping and fittings for installation, keep filings or cuttings from entering the pipe. Small particles of copper must be kept out or removed since finely divided copper may pass through the suction strainer and collect in the compressor crankcase lubricating oil. There, together with small quantities of air and moisture, copper particles may promote oil gummings and sludging and often, through chemical reaction, cause derangement of the system. Cut tubing square and remove

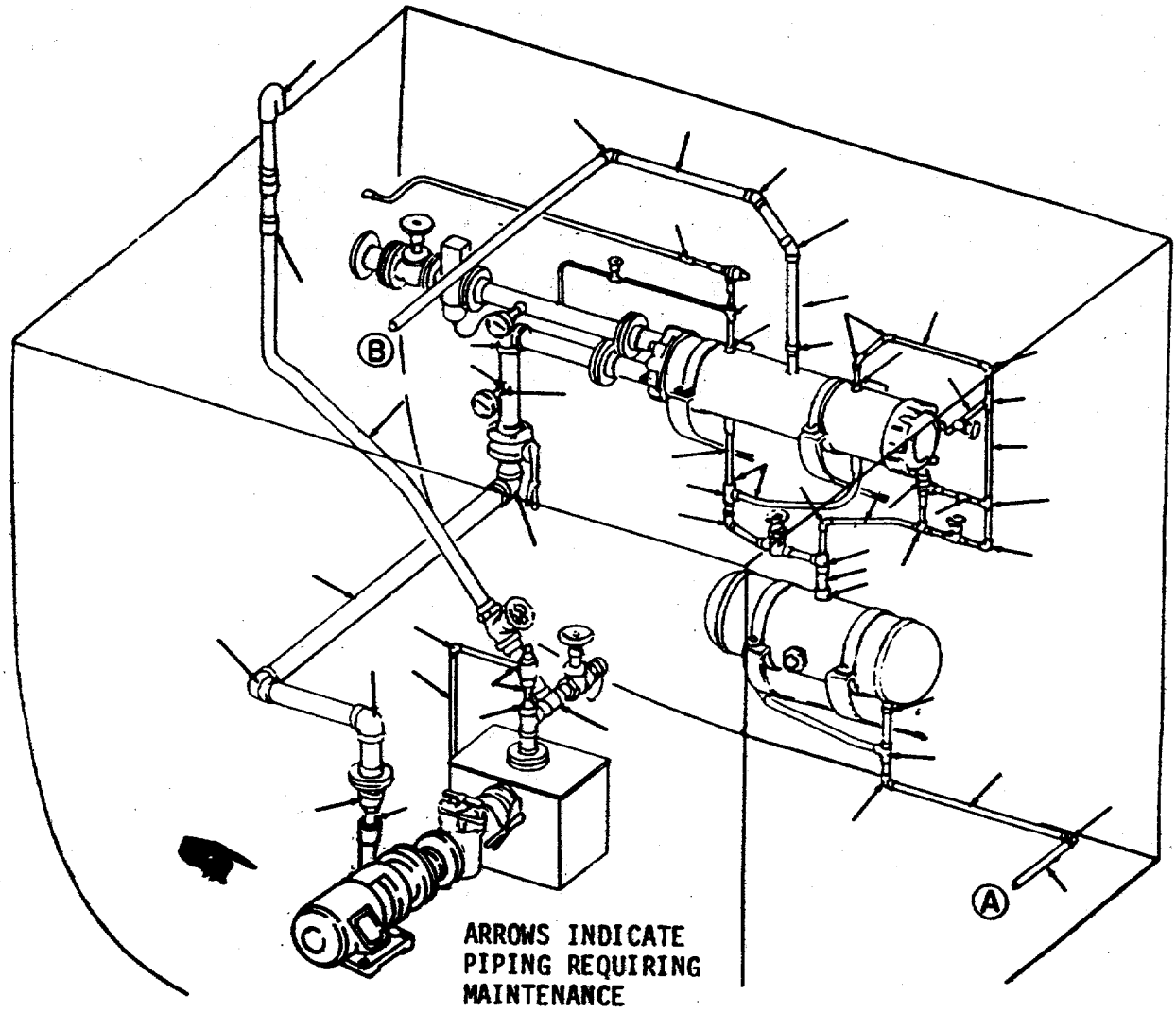
all burrs and dents to avoid internal restrictions and to permit proper fit with companion fittings. If tubing is cut with a hack saw, use a fine-tooth blade, preferably 32-teeth per inch.

k. When making soldered or brazed joints, brighten up the ends of the tubing or pipe with a wire brush or crocus cloth to make a good bond. Do not use sandpaper, emery cloth, or steel wool for this cleansing since this material may enter the system and cause derangement.

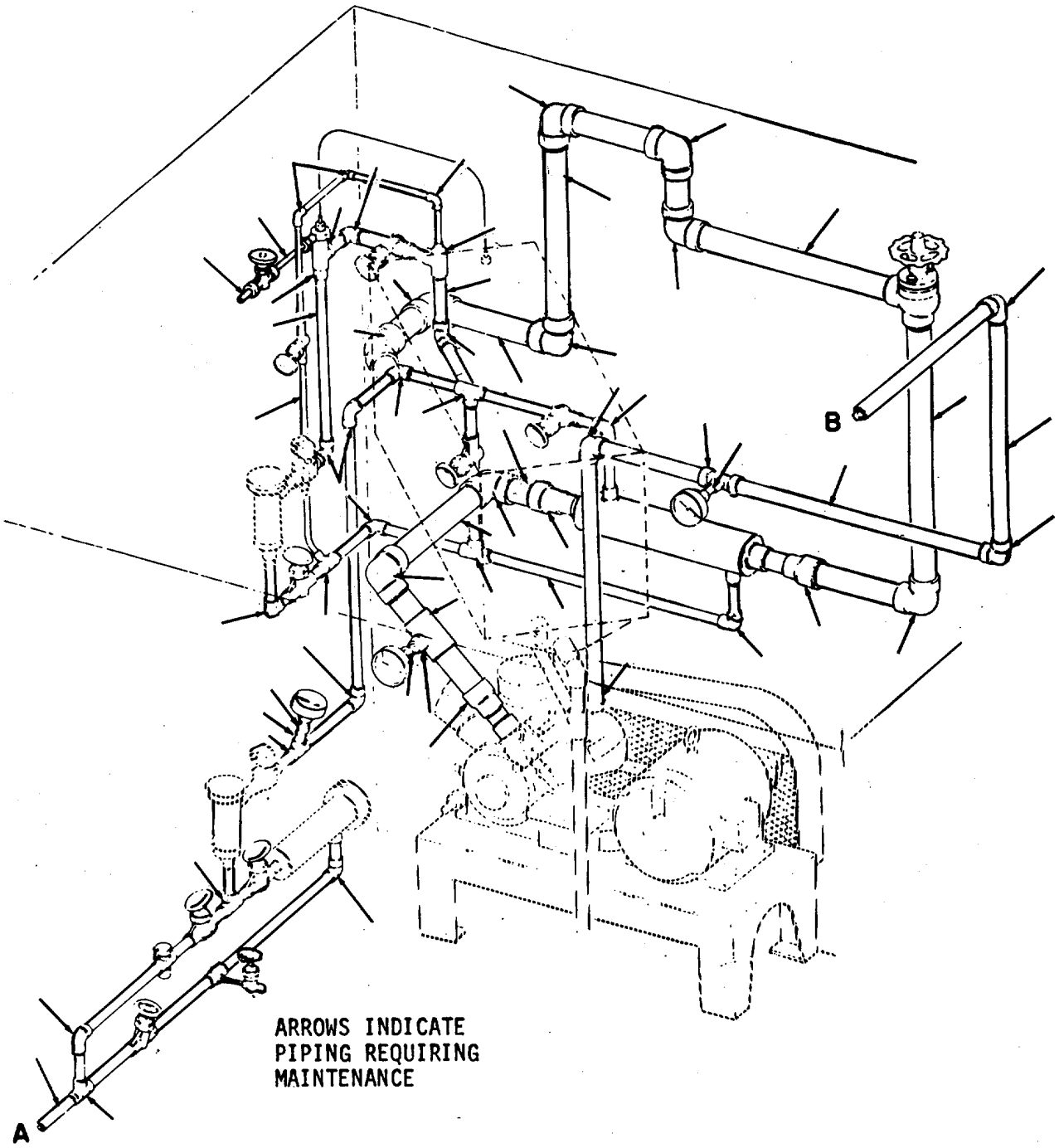
l. Never use acid for soldering and be sure to use a flux whose residual substance will not form an acid. Use flux sparingly so that residues will not enter the system. Remember, any foreign matter entering the system eventually will be washed back to the compressor and cause damage. The danger of admitting excessive flux as well as solder or brazing alloy is accentuated if fittings and tubing are improperly fitted because of distortion in preparation.

m. The piping requiring maintenance is shown in the following figures:

4-35.6. REFRIGERANT TUBING - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).



4-35.6. REFRIGERANT TUBING - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (CONT).



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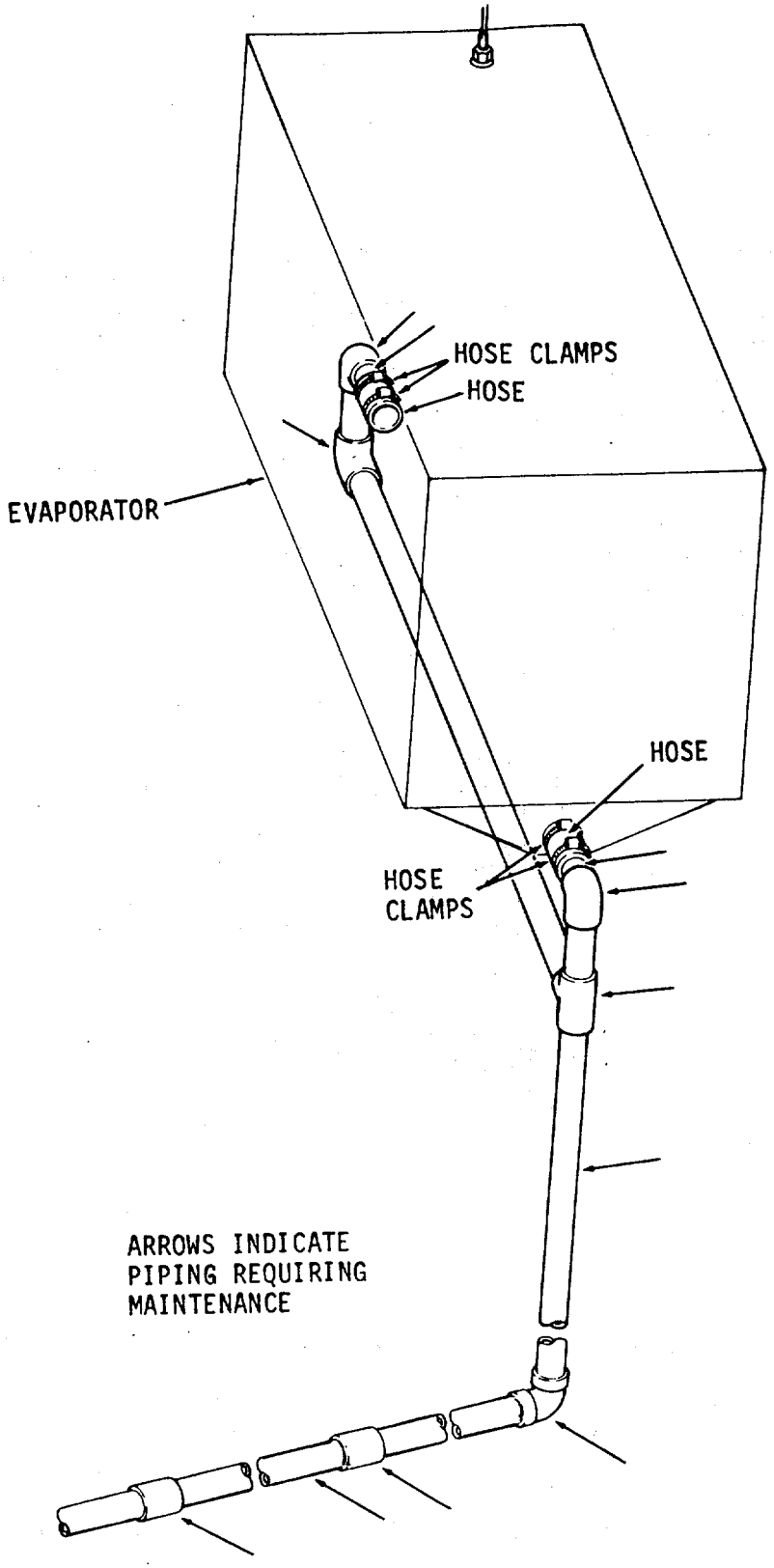
4-35.6. REFRIGERANT TUBING - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.



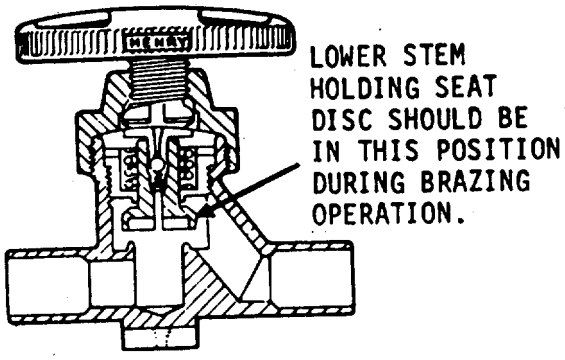
4-35.7. PACKLESS VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

a. Take packless valves apart only if inspection or replacement of internal parts is necessary. When reassembling valve, before inserting diaphragms in bonnet, be sure handwheel is in wide open position. Turn handwheel countercockwise until stem backseats. If handwheel is in closed position, diaphragms will not anchor properly in bonnet and proper seal wi1l not be established when assembling bonnet to body.

b. The packless valve diaphragm and composition seat disc in lower stem can be damaged by excessive heat. To protect the internal parts of the valve, the installation and brazing instructions given below must be carefully carried out. Time is a very important factor: the time that heat is being applied must be a matter of seconds, not minutes.

(1) Open valve wide. Turn handwheel counterclockwise until stem backseats.

(2) Turn handwheel back about 1/4-turn. This will move lower stem holding seat disc to position shown. This minimizes danger of heat being transferred to valve seat.



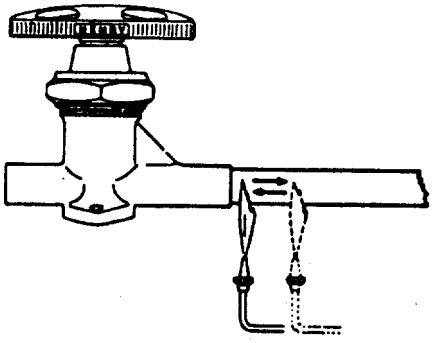
(3) Thoroughly clean end of tubing and socket connection on valve body.

(4) Apply a thin coat of properly mixed, high quality, noncorrosive flux to end of tubing and valve body socket.

(5) Insert tubing into valve socket until it is tightly seated against shoulder.

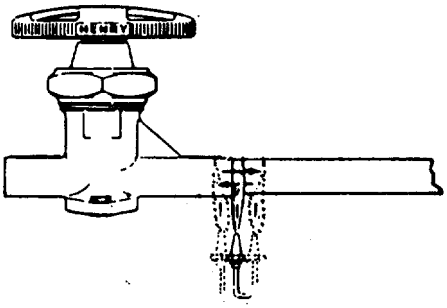
4-35.7. PACKLESS VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

(6) Preheat tubing by applying the torch in a sweeping, fanning motion. Heat about 2 inch of tubing beyond valve port.

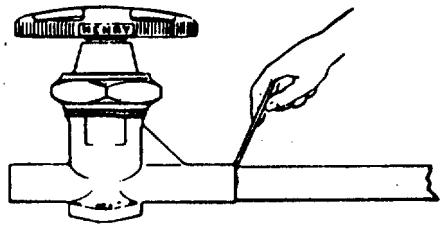


(7) After preheating, gradually fan torch flame toward valve port.

(8) Quickly fan flame around end of valve port which will heat valve port and tubing to desired temperature.



(9) After flux has melted, touch joint with brazing alloy wire. If hot enough, the wire will melt, flow and seal the joint.



(10) After brazing alloy has been applied, quickly apply wet cloth over body and brazed joint.

4-35.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection
b. Removal
c. Repair
d. Installation

INITIAL SETUP:

Test Equipment	References
NONE	NONE
Special Tools	**Equipment Condition** / **Condition Description**
NONE	NONE
Material/Parts	**Special Environmental Conditions**
NONE	NONE
Personnel Required	**General Safety Instructions**
1	Observe WARNING.

LOCATION	ITEM	ACTION	REMARKS

WARNING

To prevent accidental shock and possible injury, tag and place circuit breaker in the OFF position.

INSPECTION

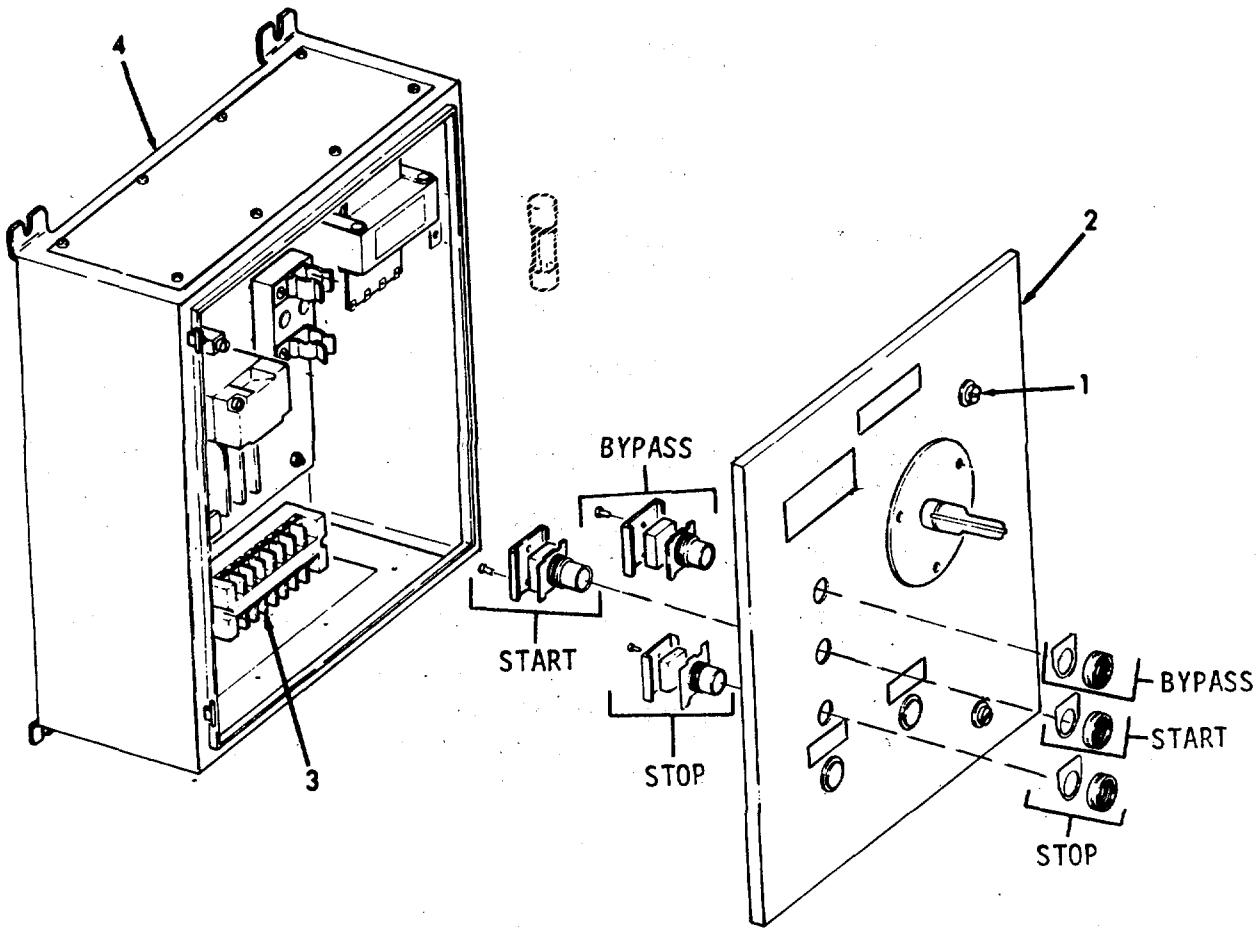
1. Controller (external)	a. Enclosure	1. Inspect for breaks, cracks, dents and bending. 2. Insure all mounting hardware is tight.	

4-35.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	b. Wiring and damage.	Inspect for wear, fraying,	
	c. Switches failure or improper operation.	Inspect for signs of	
2. Controller	a. Contactors, relays, and starters	1. Inspect for worn contact tip material.	
		2. Inspect for cleanliness.	
		3. Insure all mounting hardware is tight.	
	b. Wiring	1. Inspect for wear, fraying and damage.	
		2. Insure all terminals are tight.	
	c. Switches	1. Inspect for signs of failure.	
		2. Insure all mounting hardware is tight.	
	d. Fuses and fuse blocks	1. Inspect for defective components.	
		2. Insure all mounting hardware is tight.	
	e. Terminal block.	1. Inspect for breaks, and cracks.	
		2. Insure all mounting hardware is tight.	

4-35.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REMOVAL			
3. Controller	a. Captive screws (1)	Rotate counterclockswise to loosen.	
	b. Door (2)	Swing open.	
	c. Wiring	Tag and disconnect from terminal block.(3)	Refer to schematic at the end of this paragraph;
	d. Controller (4)	Remove from bulkhead.	



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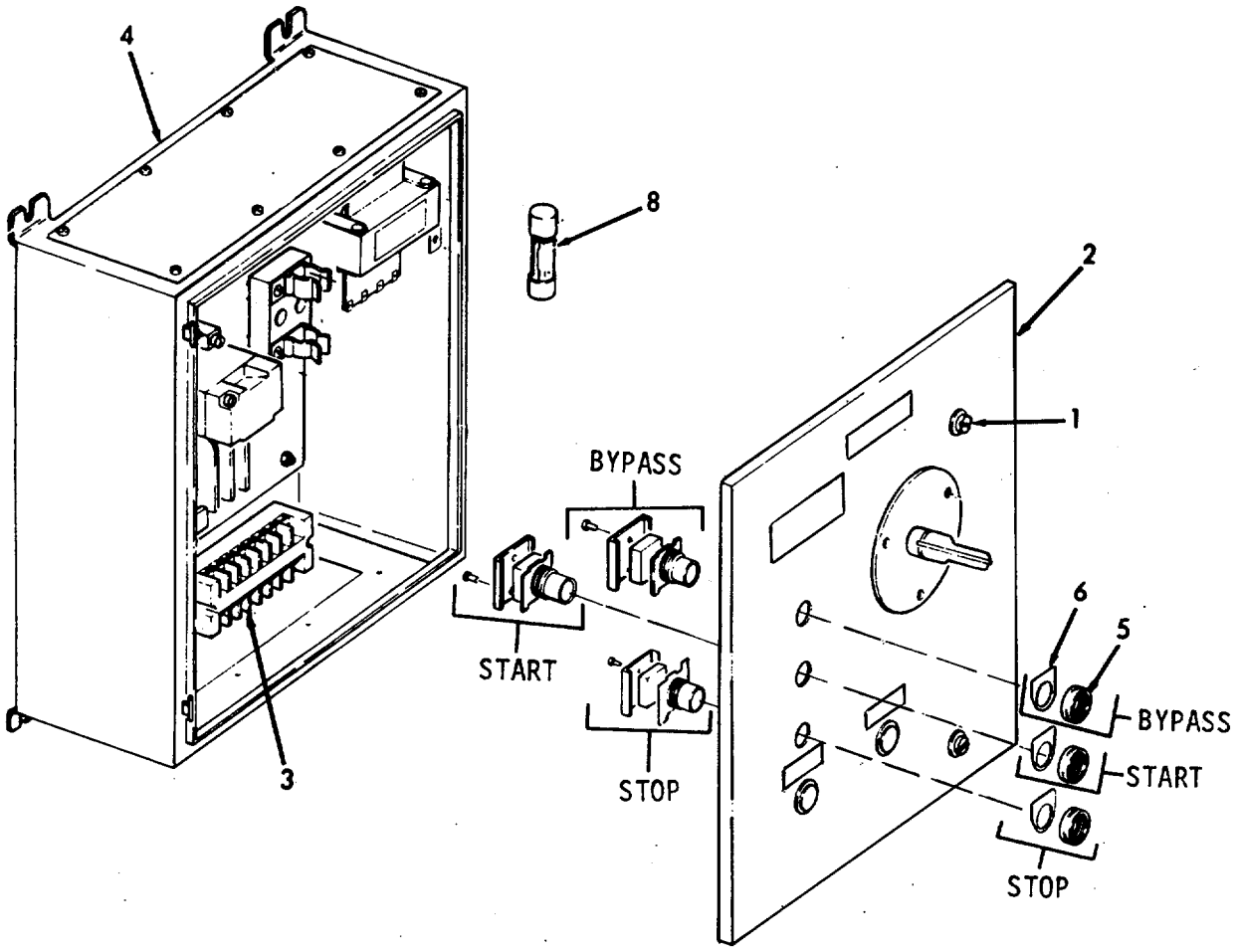
4-35.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
4. Pushbutton	a. Wiring switches	Tag and disconnect.	
	b. Retaining nut (5)	Unscrew and remove.	
	c. Identification plate (6), and switch (7)	Remove.	
	d. Switch (7), identification plate (6), and retaining nut (5)	Install.	
	e. Wiring tags.	Reconnect and remove	
5. Fuses	Fuses (8)	Remove and replace.	
INSTALLATION			
6. Controller	a. Controller (4)	Install on bulkhead.	
	b. Wiring	Reconnect to terminal block (3).	Refer to schematic at the end of this paragraph.
	c. Door (2) and captive screws (1)	Swing closed and rotate screws clockwise.	

4-35.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS

INSTALLATION (Cont)



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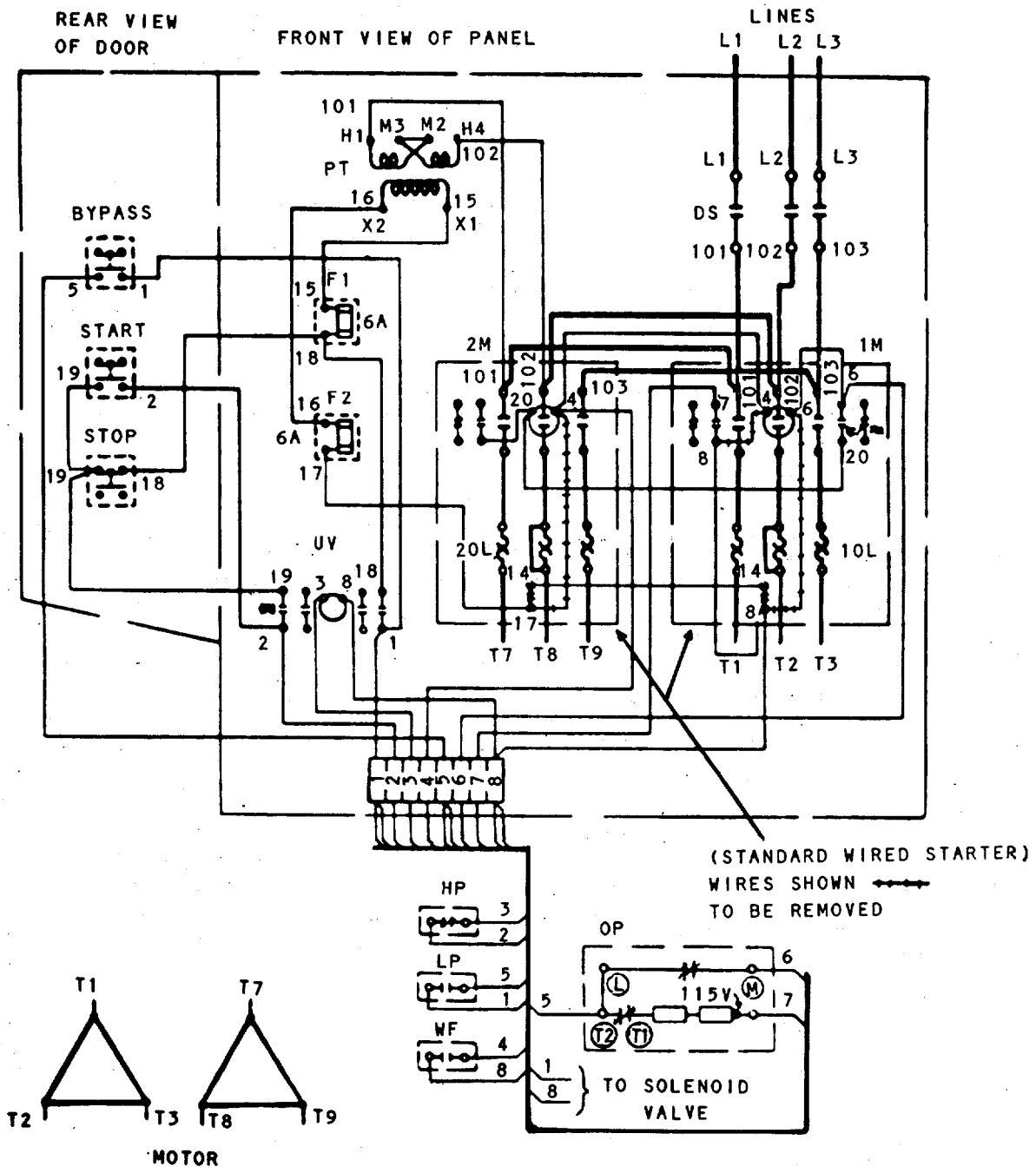
4-35.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS



4-35.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

DESCRIPTION OF OPERATION

THE WATER FAILURE SWITCH (WF) MUST FIRST BE CLOSED FOR MOTOR OPERATION.

PRESSING THE START BUTTON ENERGIZES RELAY UV WHICH MAINTAINS ITSELF THROUGH ITS OWN NORMALLY OPEN CONTACTS. ANOTHER UV NORMALLY OPEN CONTACT CLOSES TO ENERGIZE IN THROUGH LP AND OP. IN CONTACTS CLOSE TO CONNECT ONE MOTOR WINDING ACROSS THE LINE. AFTER A TIME INTERVAL, INT WILL CLOSE TO ENERGIZE 2M TO CONNECT OTHER MOTOR WINDING ACROSS THE LINE.

AFTER A TIME INTERVAL, INT WILL CLOSE TO ENERGIZE 2M TO CONNECT OTHER MOTOR WINDING ACROSS THE LINE.

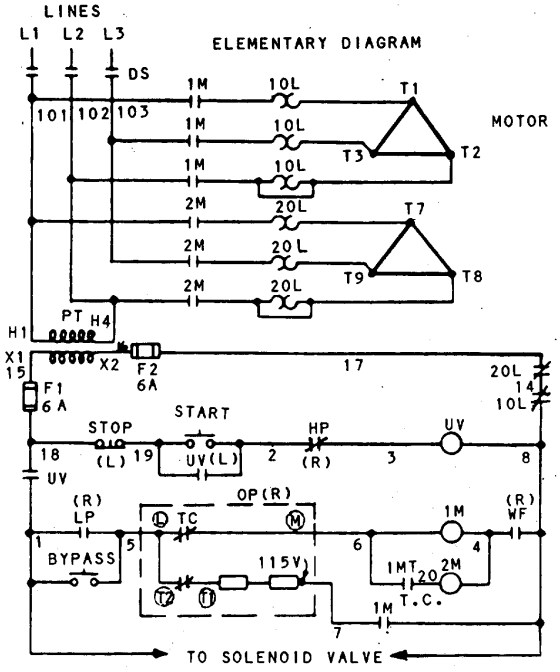
AFTER A SET TIME, IF THE MOTOR HAS NOT DEVELOPED SUFFICIENT OIL PRESSURE. THE REMOTE OP SWITCH WILL FUNCTION TO DE-ENERGIZE "MN DISCONNECTING THE MOTOR.

HIGH PRESSURE WILL CAUSE HP CONTACTS TO OPEN STOPPING THE MOTOR. TO RESTART, WHEN NORMAL PRESSURE HAS BEEN RESTORED, PRESS THE START BUTTON.

THE MOTOR, ONCE STARTED, WILL CYCLE ON AND OFF AS LP OR WF CONTACTS CLOSE AND OPEN. TO STOP THE MOTOR, PRESS THE STOP BUTTON, THE LP CONTACT MAY BE BYPASSED BY HOLDING DOWN THE LP BYPASS BUTTON.

A LOW VOLTAGE CONDITION WILL CAUSE THE CONTROL TO BE DE-ENERGIZED STOPPING THE MOTOR. TO RESTART, WHEN NORMAL VOLTAGE HAS BEEN RESTORED. IT IS NECESSARY TO AGAIN PRESS THE START BUTTON. (LOW VOLTAGE PROTECTION).

AN OVERLOAD WILL CAUSE OL NORMALLY CLOSED CONTACTS TO OPEN STOPPING THE MOTOR. TO RESTART, PRESS THE STOP-RESET BUTTON AND THEN THE START BUTTON.



(L) - LOCAL
(R) - REMOTE
(HP) - HIGH PRESSURE SWITCH
(LP) - LOW PRESSURE SWICH
(WF) - WATER FAILURE SWITCH
(OP) - LOW OIL PRESSURE SAFETY SWITCH WITH TIMER

4-36. COMMISSARY SPACE EQUIPMENT - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

The following is a index to the maintenance procedures.

4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection
b. Service
c. Repair

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition Condition Description

Para

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in procedure.

4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
		WARNING In order to prevent shock and possible injury, remove power cord from the source of electrical power.	
INSPECTION			
1. Refrigerator/ Freezer	a. Wiring	Inspect for breaks, cracks, and signs of wear.	
	b. Cabinet	Inspect for signs of damage.	
2. Refrigerator	a. Operation	1. Inspect for temperature between 37°F (2.8°C) and 43°F (6.1°C). 2. Inspect for signs of abnormal operation.	
	b. Internal	Inspect for cleanliness.	
3. Freezer	a. Operational.	1. Inspect for a temperature between 0°F (-17.8°C) and 5°F (-15.0°C). 2. Inspect for signs of abnormal operation.	
	b. Internal	Inspect for cleanliness.	

4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
SERVICE I			
		CAUTION	
		Do not use strong soap, abrasive or steel wool when cleaning. The surface finishes will be damaged.	
4. Refrig-erator/ Freezer	a. Exterior Clean.		Use a soft cloth moistened with a solution of baking soda or borax and hot water. Wipe dry.
	b. Interior Clean.	Use a soft	cloth moistened with a weak bak-ing soda solu-tion. Wipe dry.
		CAUTION	
		When cleaning frost from a freezer do not use a sharp pointed scraping device such as a knife, or ice pick.	
	c. Freezer	1. Remove frost bui1d up.	Turn freezer off, open door, and use fan.
		2. Defrost.	a. Remove all frozen foods. b. Turn off power to freezer, allow frost to melt.

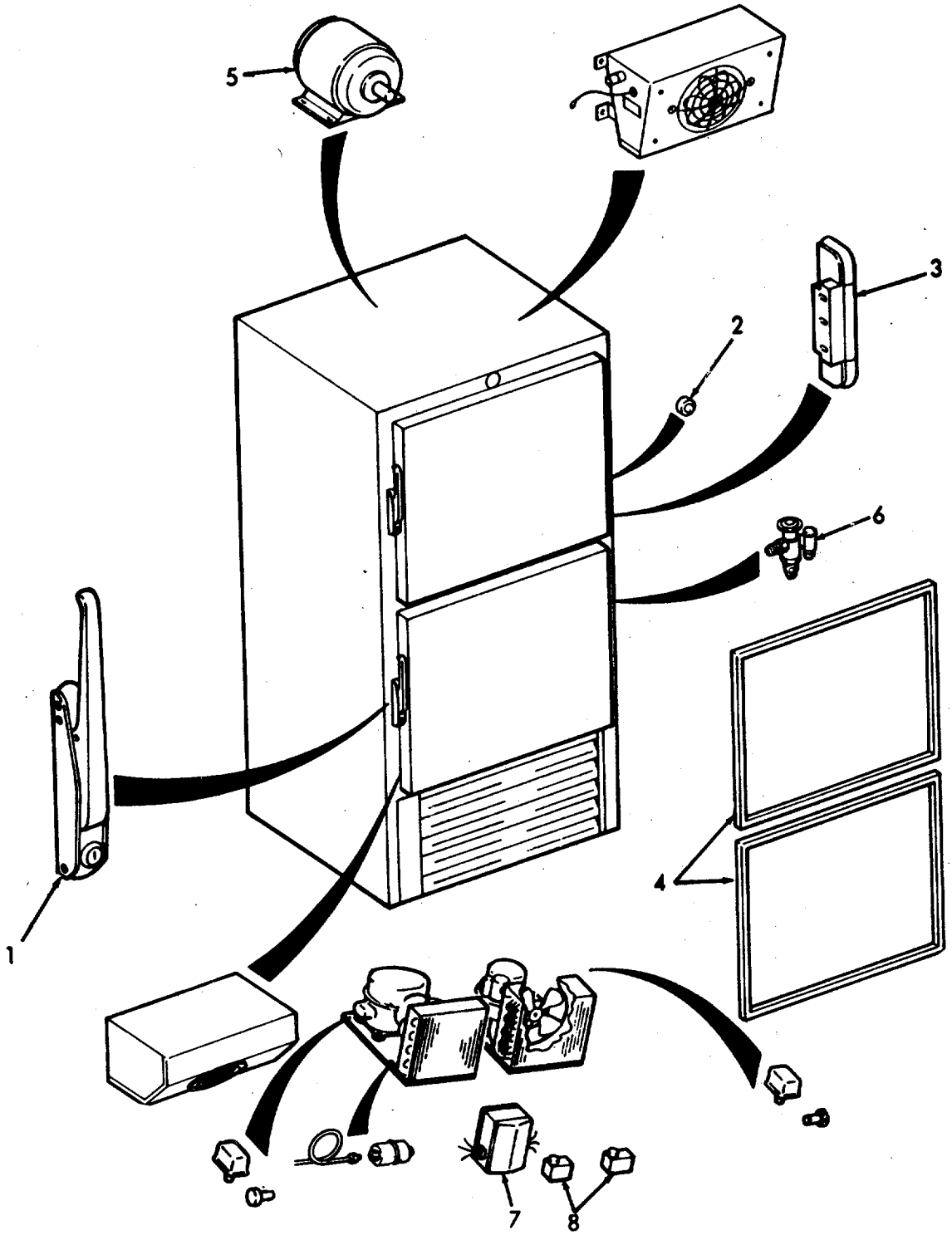
4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
SERVICE (Cont)			
	c. Wipe interior completely dry before starting freezer.		
REPAIR			
5. Refrigerator/ freezer	a. Door latch (1)	Replace.	As required.
	b. Door switch (2)	Replace.	As required.
	c. Door hinge (3)	Replace.	As required.
	d. Door gasket (4)	Replace.	As required.
	e. Blower fan motor (5)	Replace.	As required.
	f. Expansion valve (6)	Replace.	As required.
	g. Defrost timer (7)	Replace.	As required.
	h. Temperature control (8)	Replace.	As required.

4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



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4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	i. Pressure control (9)	Replace or repair.	As required.
6. Evaporators (10 and 11)	The evaporators are a forced air circulation coil and fan. The coil is installed facing the rear of the refrigerator or freezer, so the suction fan constantly pulls warmer air over the coil and recirculates the air in an undisturbed cycle. The fan has a 1/20 hp 115v motor.		
7. Overload protector (12 and 13)			

WARNING

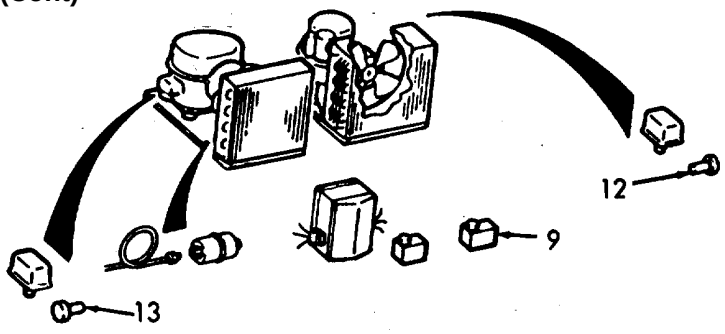
Before replacing overload protector, disconnect the power supply to the unit. Remove leads from terminals, remove protector, install new .(like) protector and reconnect leads.

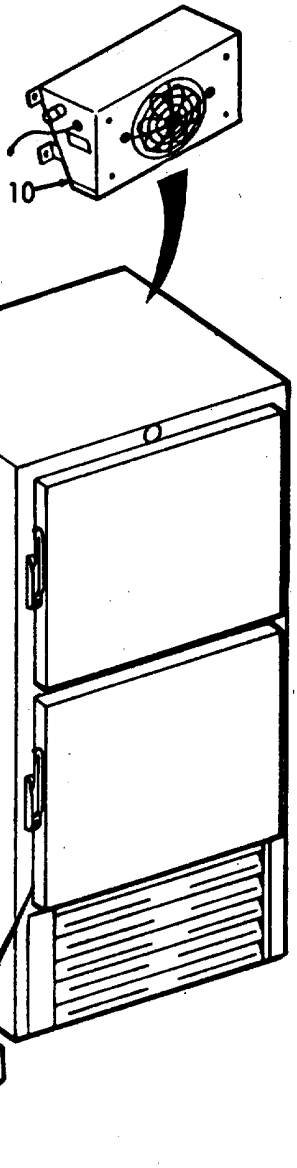
The overload protector, and the starting relay, are attached to a bracket which is welded to the compressor shell, with a metal cover. The motor overload protector is a small round plastic casing which has a heater coil (A) and a bi-metallic metal strip (B) inside. The heater coil is designed to carry normal start and run current. If the current increases abnormally for any reason, then the heater coil gives off excessive heat, which in turn, causes the bi-metallic disc to snap open, which breaks the electrical circuit and the motor stops. Also, if the compressor shell gets too hot, the bi-metallic disc snaps open, breaking the circuit, stop- ping the motor and protecting the motor from excessive heat and/or current. When the temperature cools down, the bi-metallic disc snaps closed, and starts the motor. If the motor overload protector fails to operate properly, it must be replaced.

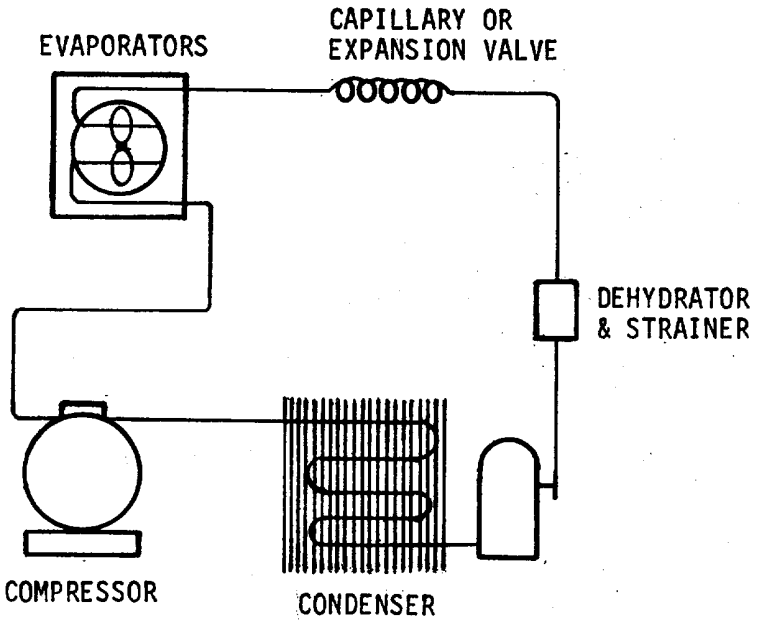
4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

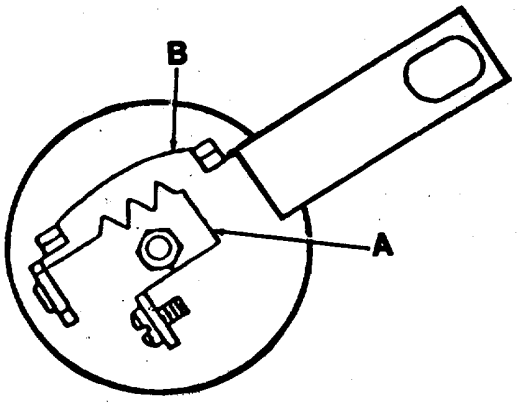
REPAIR (Cont)







SCHEMATIC REFRIGERATION DIAGRAM



4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

8.	Relay (14 and 15)	The relay has a magnetic coil which activates a movable contact, and completes the circuit through the starting winding in the motor. When the motor reaches a pre-determined speed, the magnetic coil releases the movable contact, which disconnects the motor starting windings from the electrical circuit. The motor running windings remain in the circuit at all times.
9.	Condensing motors (16 and 17)	The condensing motors are hermetic sealed in a air tight welded dome. The pistons are partially submerged in oil, therefore no parts require lubrication. If condensing motors do not operate, replace with new units .
10.	Capillary (18)	The capillary acts as the liquid line and metering device. The capillary meters refrigerant into the evaporator from the condensing motor. The capillary is a seamless copper tubing soldered to the suction line for approximately 18 inches and acts as a heat interchanger. The heat interchanger pre-cools the refrigerant going to the evaporator and warms the refrigerant going back to the compressor, the capillary serves a dual purpose. The capillary length and bore are adjusted to pass the required amount of liquid under the normal differences of operating pressures.
11.	Dehydrator and strainer (19)	

CAUTION

The dehydrator MUST be replaced if refrigerant lines are disconnected for servicing. The silicon-gel, when exposed, absorbs a maximum amount of moisture.

a. The dehydrator and strainer (19) are attached to the capillary (18).

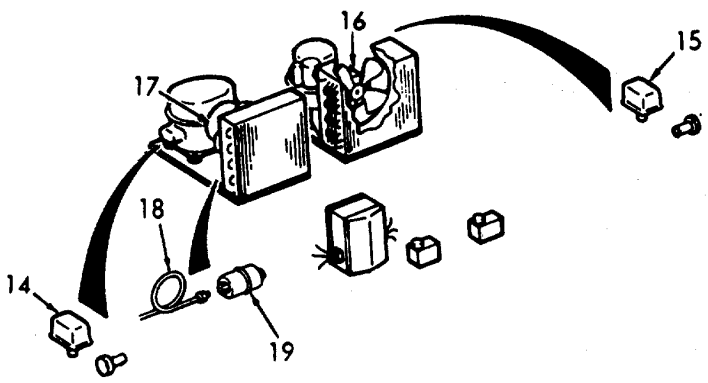
b. The purpose of the strainer is to keep the refrigerant clean of dirt and particles that may be in the system. When repairing the refrigerant lines, and the lines are disconnected replace the strainer.

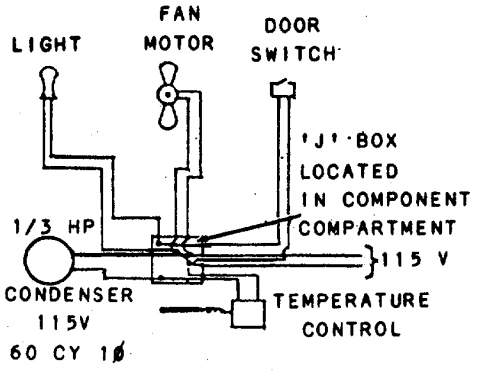
4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

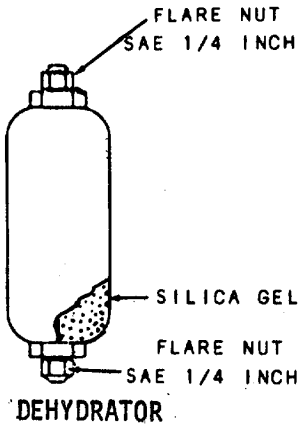
REPAIR (Cont)

c. The purpose of the dehydrator is to keep moisture out of the refrigerant circuit. The dehydrator is flare connected to replace easily. The dehydrator is 7 cu. in. and contains a silica-gel moisture absorbing chemical. Whenever the refrigerant lines are disconnected for servicing, discard old (used) and replace with a new dehydrator.

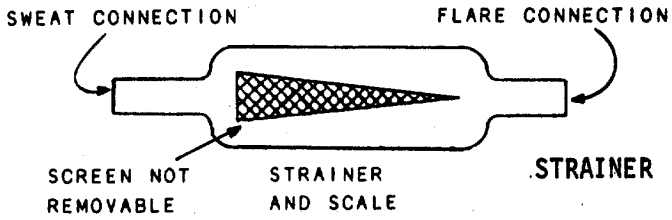




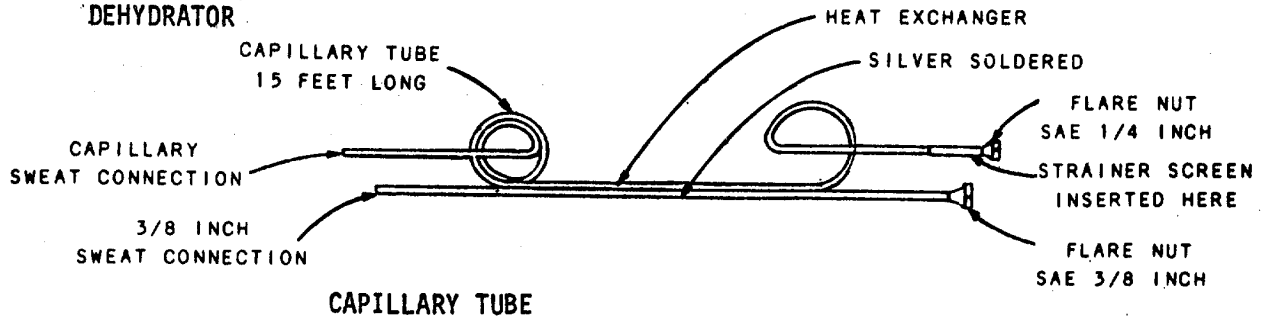
SCHEMATIC WIRING DIAGRAM FOR REFRIGERATOR



DEHYDRATOR



STRAINER



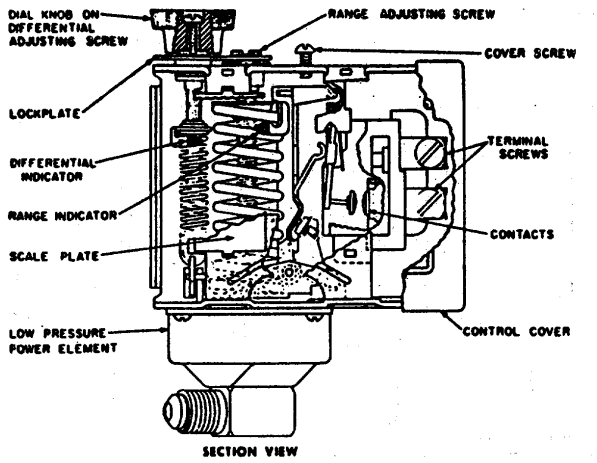
CAPILLARY TUBE

4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

12. Control



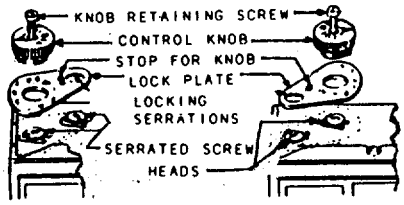
OPERATION: The control is a S.P.S.T. snap acting toggle switch that automatically cycles to CLOSE the circuit on rise and OPEN the circuit on drop of pressure within the refrigeration system.

RANGE ADJUSTMENT: With the dial knob on the Range adjustment screw, turn it counter clockwise to raise, or clockwise to lower both the "cut-out" points TOGETHER, according to the graduations on the visible scale plate.

To Reset Controls - (Note the position of the indicators on the scale plate before making an adjustment). "CUT-OUT is CUT-IN less DIFFERENTIAL" is on the scale plate. Use the Range Screw to adjust the "cut-in" point, then use the Differential Screw to change the "cut-out" setting.

DIFFERENTIAL ADJUSTMENT: The control dial knob is generally furnished on the Differential Screw, which directly changes the "cut-out" point ONLY by turning the knob counter clockwise to decease, or clockwise to increase the differential on the scale plate.

TEMINALS: Front Access screw type terminals are on General Application "010" pressure controls, as illustrated.



INTERCHANGING CONTROL KNOB

OVER DIFFERENTIAL SCREW

Assemble to this position when control knob is to be used for decreasing or increasing the differential to change "cut-out", ONLY.

NOTE

Adjustment Screws are slotted for screw drive use.

OVER RANGE SCREW

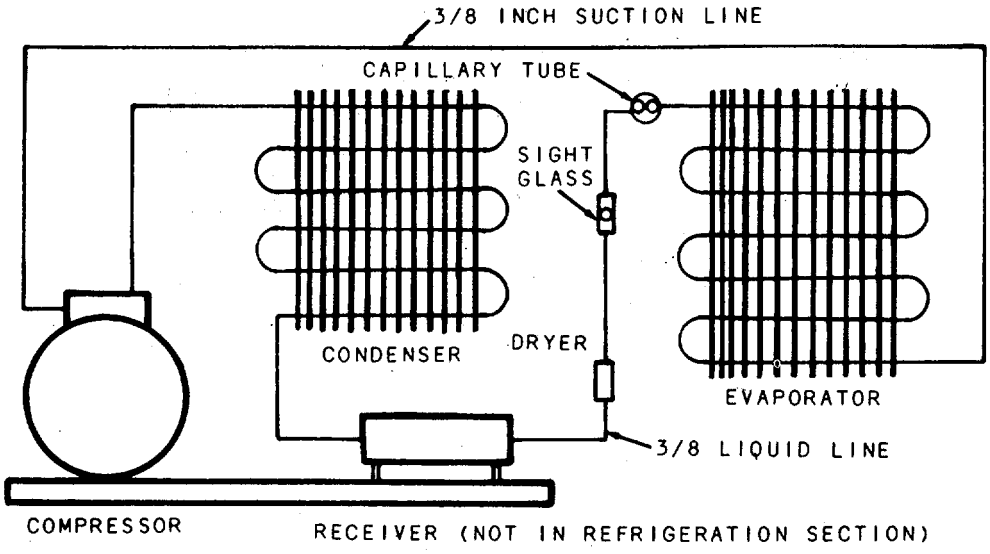
Assemble to this position when control knob is to be used to change both the "cut-out" and "cut-in" settings together.

This adjustment does NOT change the differential of the control.

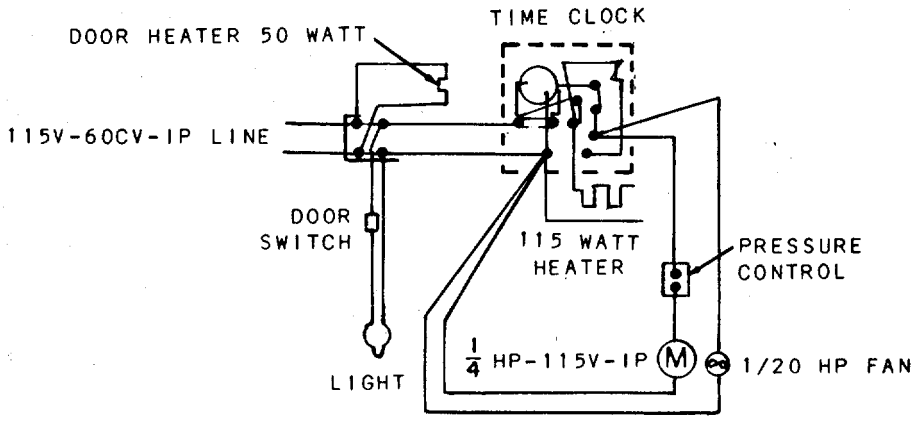
4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)|



TYPICAL
REFRIGERATION SCHEMATIC

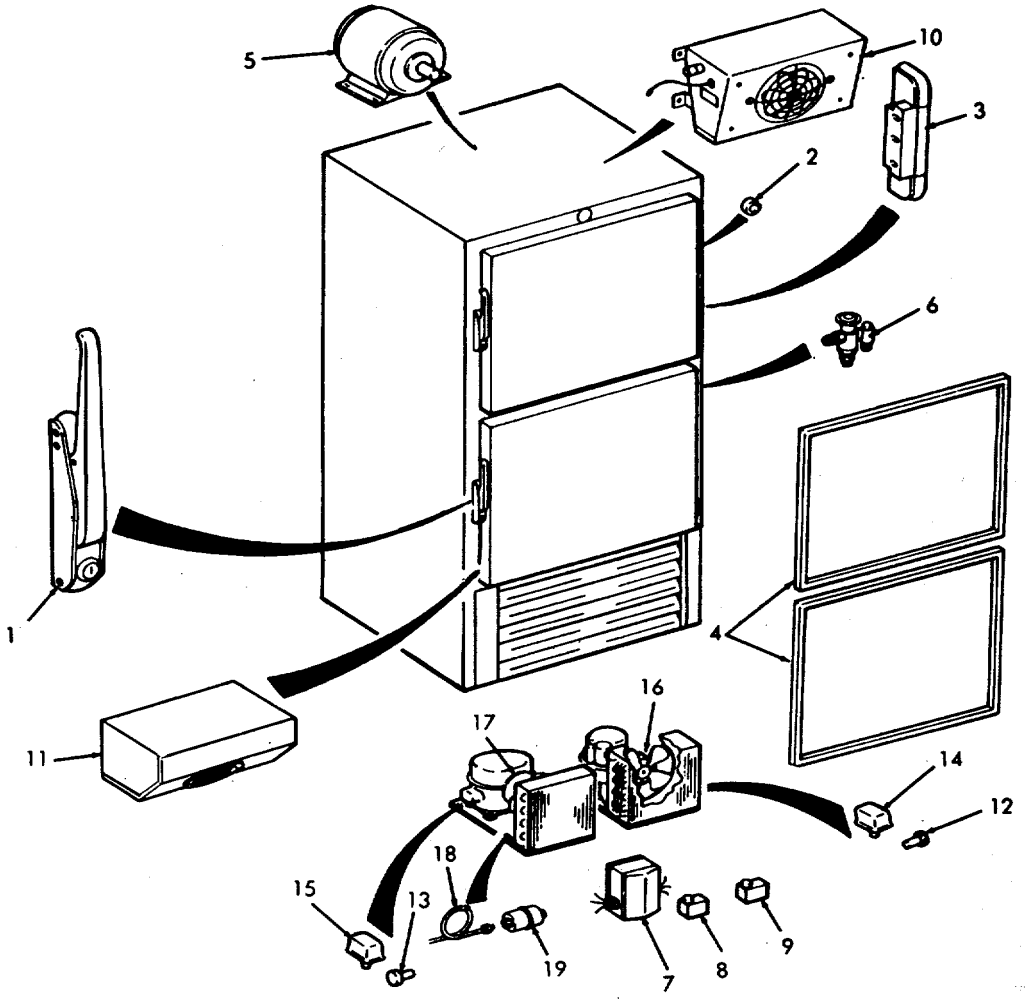


FREEZER
SCHEMATIC WIRING DIAGRAM

4-37. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)|



1. Door latch
2. Door Switch
3. Door hinge
4. Door gasket
5. Blower fan motor
6. Expansion valve
7. Defrost timer
8. Temperature control
9. Pressure control
10. Evaporator
11. Evaporator
12. Overload protector
13. Overload protector
14. Relay
15. Relay
16. Condensing motor
17. Condensing motor
18. Capillary
19. Dehydrator and strainer

4-38. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection
b. Service
c. Repair
d. Adjustment

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

In order to prevent shock and possible injury, disconnect drinking fountain from the source of electrical power.

INSPECTION

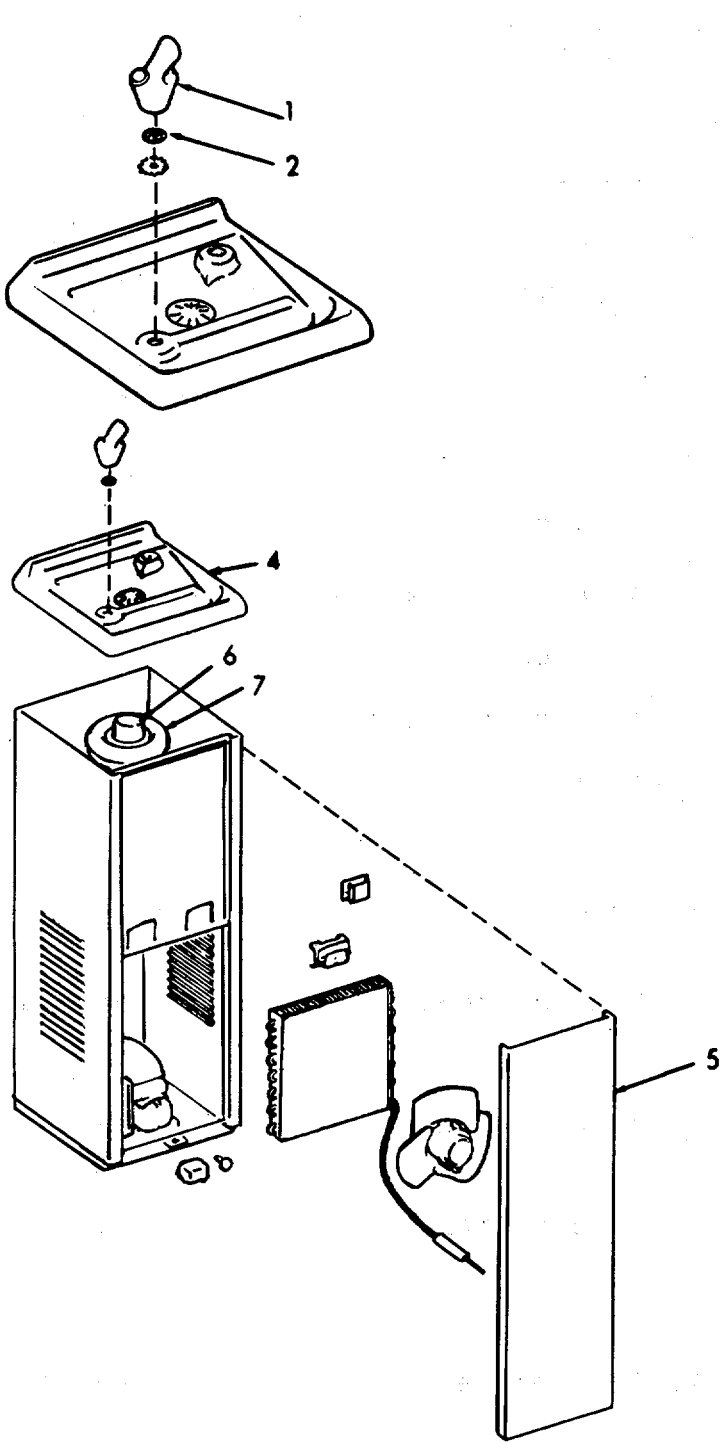
1. Drinking fountain	a. Wiring	1. Inspect for breaks, cracks, and worn insulation.	
		2. Inspect connector for damage.	
	b. Water supply	Inspect for proper flow.	

4-38. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Cont).

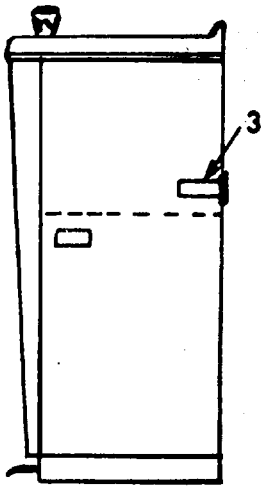
LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	c. Drains	Inspect for signs of poor drainage.	
SERVICE			
2. Water outlet	Bubbler (1) and wire mesh strainer (2)	1. Remove. 2. Clean. 3. Install	 Use a brush to clean wire mesh strainer.
3. Water inlet	Strainer (3)	Clean.	Every three rnonths.
REPAIR			
		NOTE Make sure the-incoming source of water is shut off.	
4. Drinking fountain	a. Bubbler (1)	1. Unscrew.	
		2. Replace or repair.	If necessary.
	b. Wire mesh strainer (2)	Replace.	If necessary.
	c. Strainer (3)	Replace.	If necessary.
	d. Stainless steel top (4)	Replace or repair.	If necessary.
	e. Front panel (5)	Replace or repair.	If necessary.
	f. Pre-cooler assembly (6)	Replace or repair.	If necessary.
	g. Evapora-tor (7)	Replace or repair.	If necessary.

4-38. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			



WATER STRAINER LOCATION



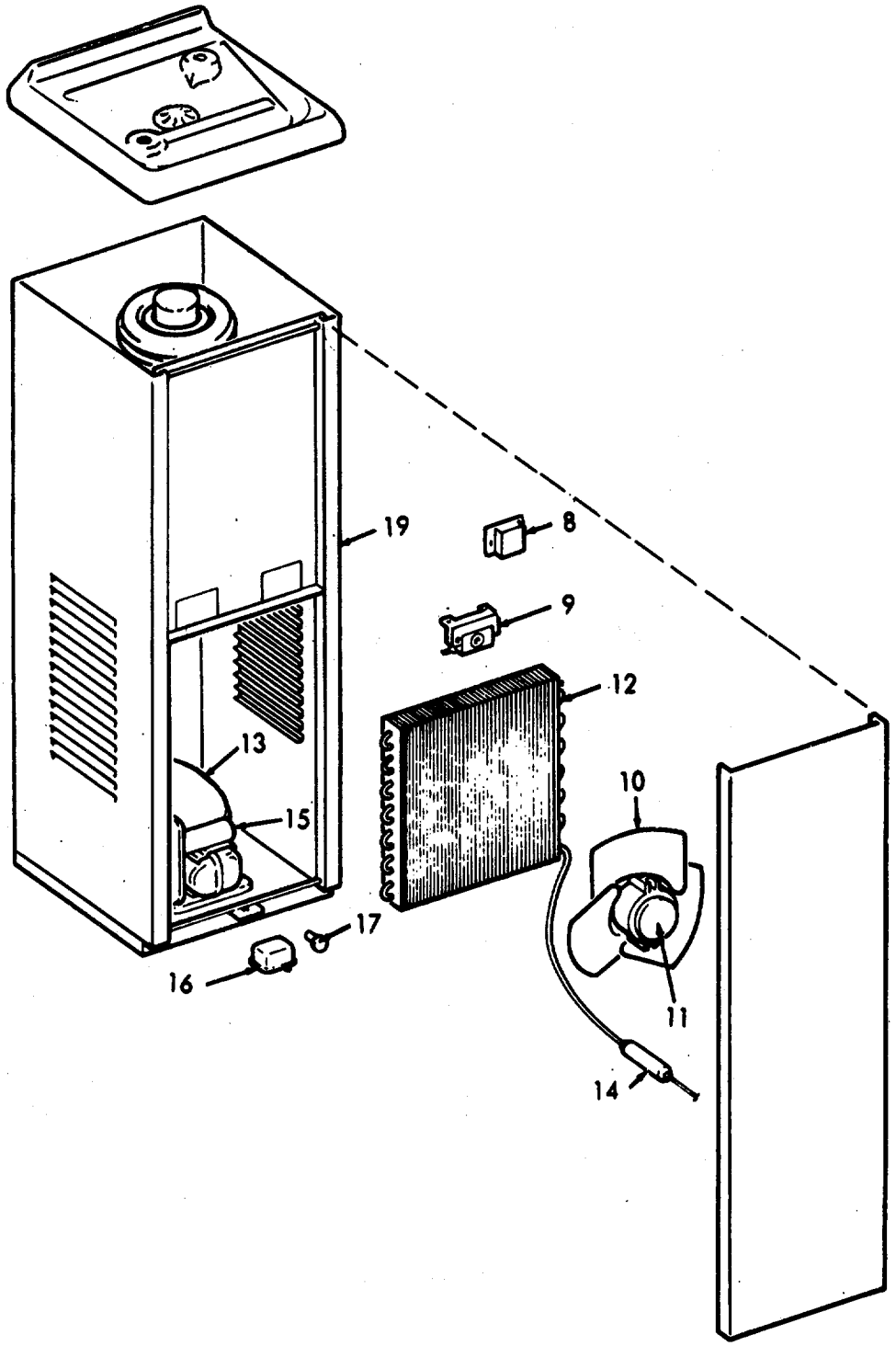
4-38. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	h. Thermo-stat (8)	Replace.	If necessary.
	i. Thermo-stat (9)	Replace.	a. If necessary. b. Use A15979 as alternate thermostat for thermo-stat A16241.
	j. Fan blade (10)	Replace or repair.	If necessary.
	k. Fan motor (11)	Replace or repair.	If necessary.
	l. Condenser assembly (12)	Replace or repair.	If necessary.
	m. Compres-sor (13)	Replace or repair.	If necessary.
	n. Capillary tube (14)	Replace.	If necessary.
	o. Start capacitor (15)	Replace.	If necessary.
	p. Start relay (16)	Replace.	a. If necessary. b. Use 82419 as alternate relay for start relay 82627.
	q. Overload switch (17)	Replace.	If necessary.
	r. 12 inch cabinet (19)	Replace or repair.	If necessary.

4-38. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Cont).

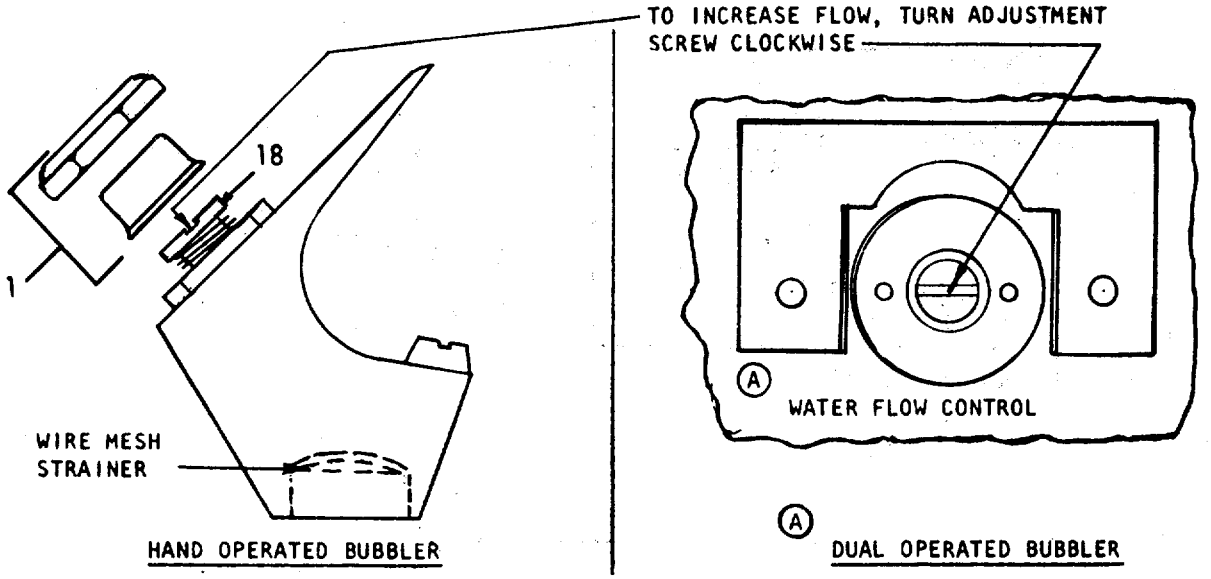
LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



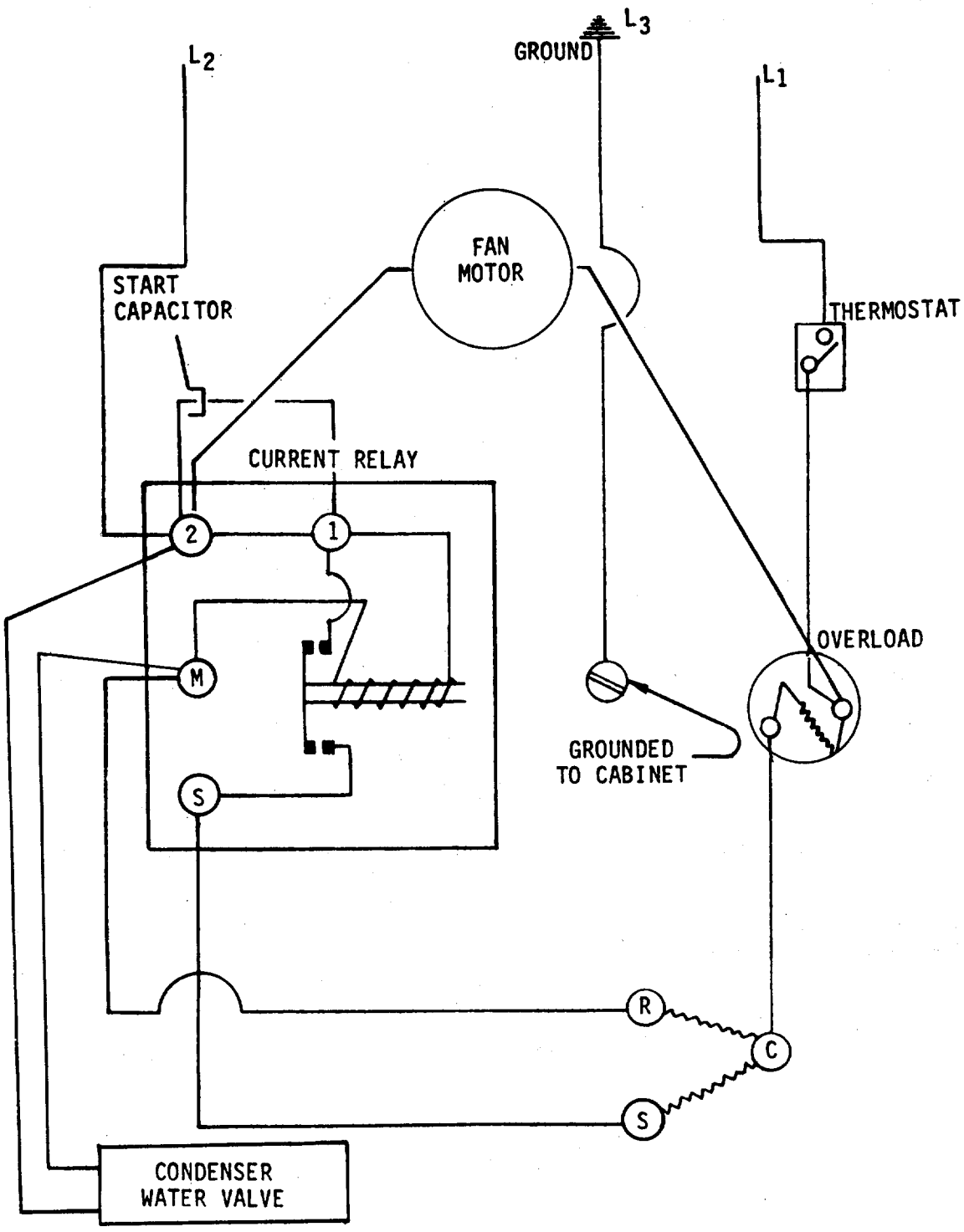
4-38. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
ADJUSTMENT			
5. Bubbler	a. Bubbler (1)	Remove.	
	b. Adjusting screw (18)	Adjust.	Turn adjusting screw clockwise to increase stream or counterclock-wise to decrease stream.
	c. Bubbler (1)	Install.	



4-38. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS



4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

This task covers:

a. Inspection **c. Adjustment** **e. Repair**
b. Service **d. Removal** **f. Installation**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

2

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

In order to prevent shock and possible injury, disconnect milk dispenser from the source of electrical power.

INSPECTION

1. Milk dispenser	a. Wiring	Inspect for breaks, cracks, or wear.	
	b. Dispensing mechanism	1. Inspect for cleanliness .	
		2. Inspect for proper operation.	

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	c. Cabinet	1. Inspect for dents and defective seals.	
		2. Inspect for proper closing of door.	
SERVICE			

CAUTION

When using stainless steel wool or abrasive cleaning powders, rub in the direction of the polishing lines in the stainless steel, not across them, to avoid scratching the surfaces. Never use ordinary steel wool.

2. Periodically clean the external surfaces of the bulk milk dispenser to maintain the unit in a sanitary condition. Wash the stainless steel surfaces with a soap-water solution and rinse with clear water. If the water is hard, dry the surfaces with a soft cloth to prevent water spotting. Remove stubborn stains with stainless steel wool or cleaning powder. Remove screen from bottom rear of unit and clean with soap water solution. Remove any restrictions from chimney (air duct panel). Remove air duct panel. (Refer to Direct Support Maintenance). Clean dust and other foreign materials from condenser.

ADJUSTMENTS

3. Temperature indicator: If temperature indicator readings do not remain in the green safety zone of 32° to 44°F during normal operation, an adjustment is probably required. Proceed as follows:

a. Remove temperature indicator and pry off flange ring.

b. Compare reading of temperature indicator against one of known accuracy. Place test thermometer in milk can compartment for 30 minutes minimum; compare readings. If temperatures do not coincide, turn recalibrator screw on dial face

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS (Cont)

in opposite direction in which indicating hand is to be moved until hand stands at proper position.

c. Make this adjustment only after the cabinet temperature is 35 to 38ºF.

d. Replace flange ring and temperature indicator.

NOTE

Blue area of temperature indicator is FREEZE ZONE (below 32°F); green area is SAFE ZONE (32°F to 44°F in increments of 2°); red area is DANGER ZONE (above 44°F).

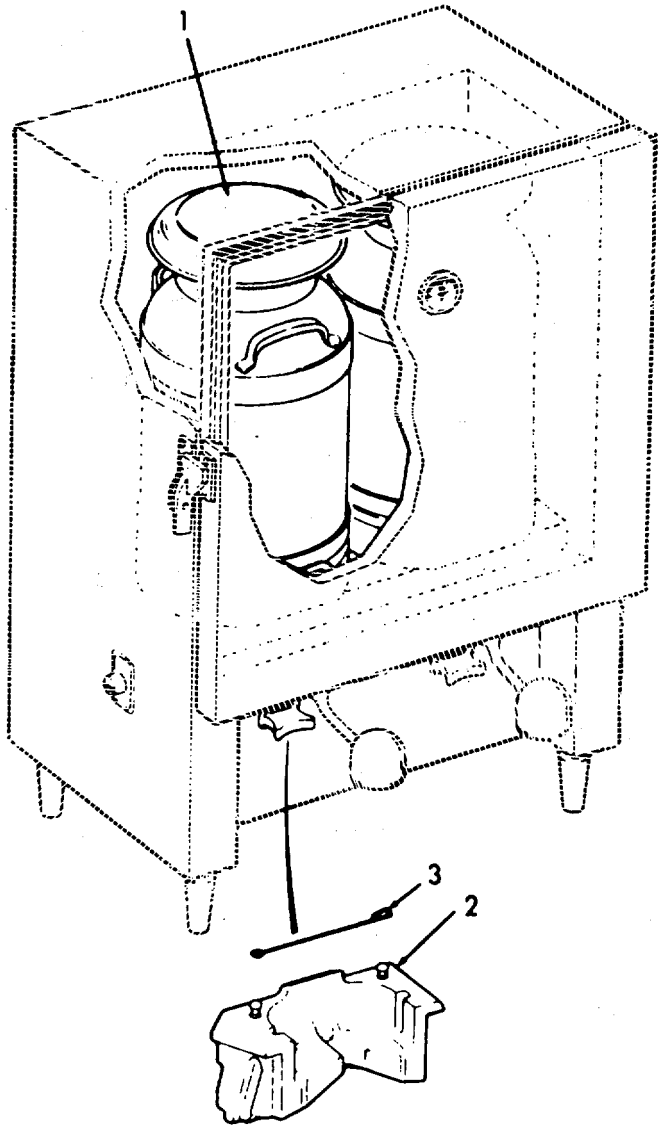
REMOVAL

4.	Milk dispenser	a. Power cord	Remove from source of electrical power.
		b. Milk can	Empty into sanitary container.
		c. Door	Open.
		d. Milk can (1)	Remove.
		e. Dispensing tube (2) and well valve 13)	Remove and disconnect.
		f. Mounting bolts	Remove.
		g. Milk dispenser	Remove.

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

REMOVAL (Cont)



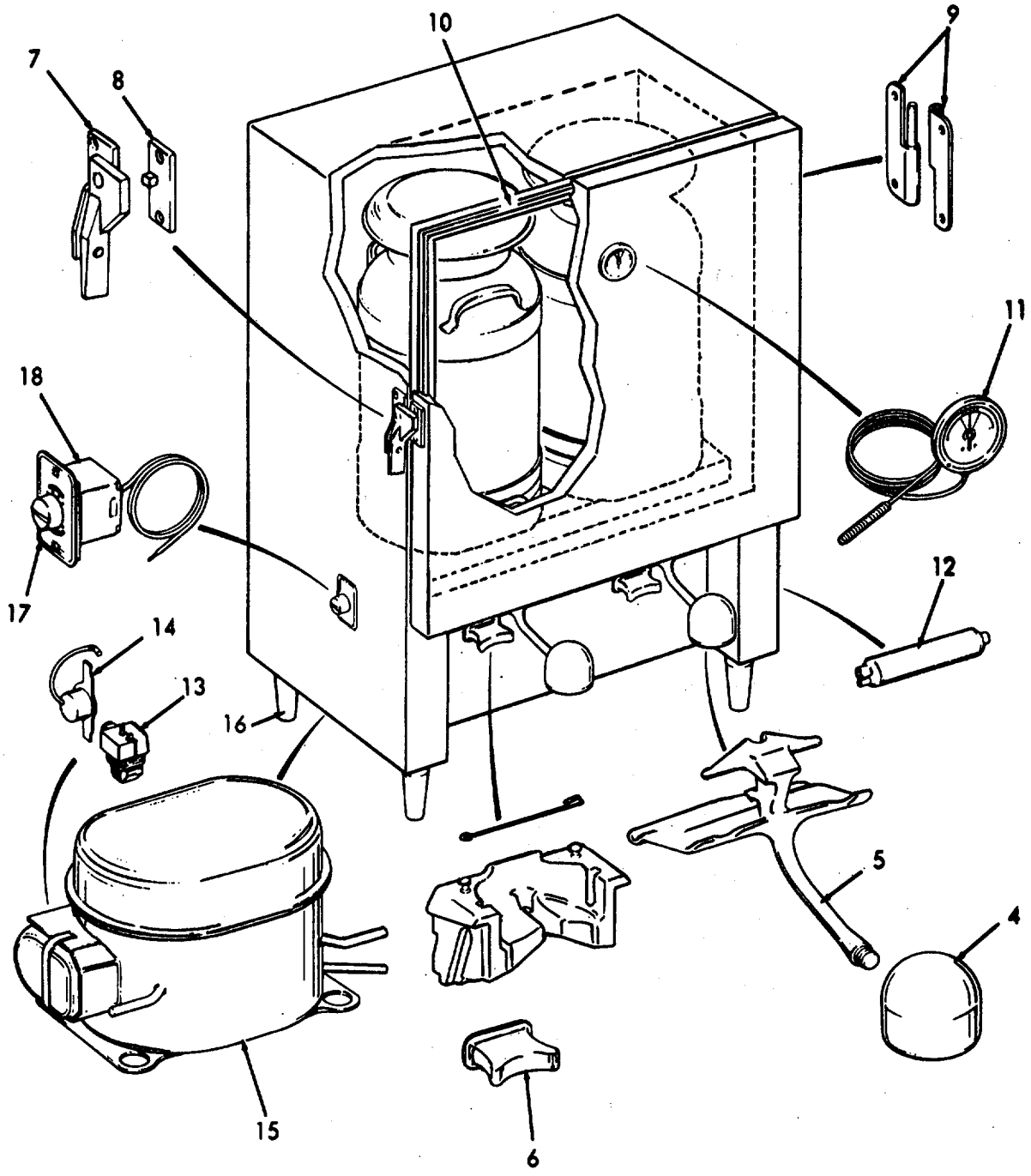
4-1015

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
5. Complete valve assembly	a. Zinc weight ball (4)	Unscrew from manual valve arm (5) and replace.	If necessary.
	b. Manual valve arm (5)	Replace.	If necessary.
	c. Glass locator (6)	Replace.	If necessary.
6. Door assembly	a. Door lock assembly (7)	1. Open and support door. 2. Replace.	 If necessary.
	b. Door strike plate (8)	Replace.	If necessary.
	c. Hinge peg assembly (9)	Replace.	If necessary.
	d. Gray door gasket (10)	Replace.	If necessary.
	e. Tempera-ture indicator (11)	Replace.	If necessary.
7. Milk dispenser cabinet	a. Dryer dehydra-tor (12)	Replace.	If necessary.
	b. Starting relay (13)	Replace.	If necessary.
	c. Overload protector (14)	Replace.	If necessary.
	d. Compres-sor (14)	Replace.	If necessary.

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			



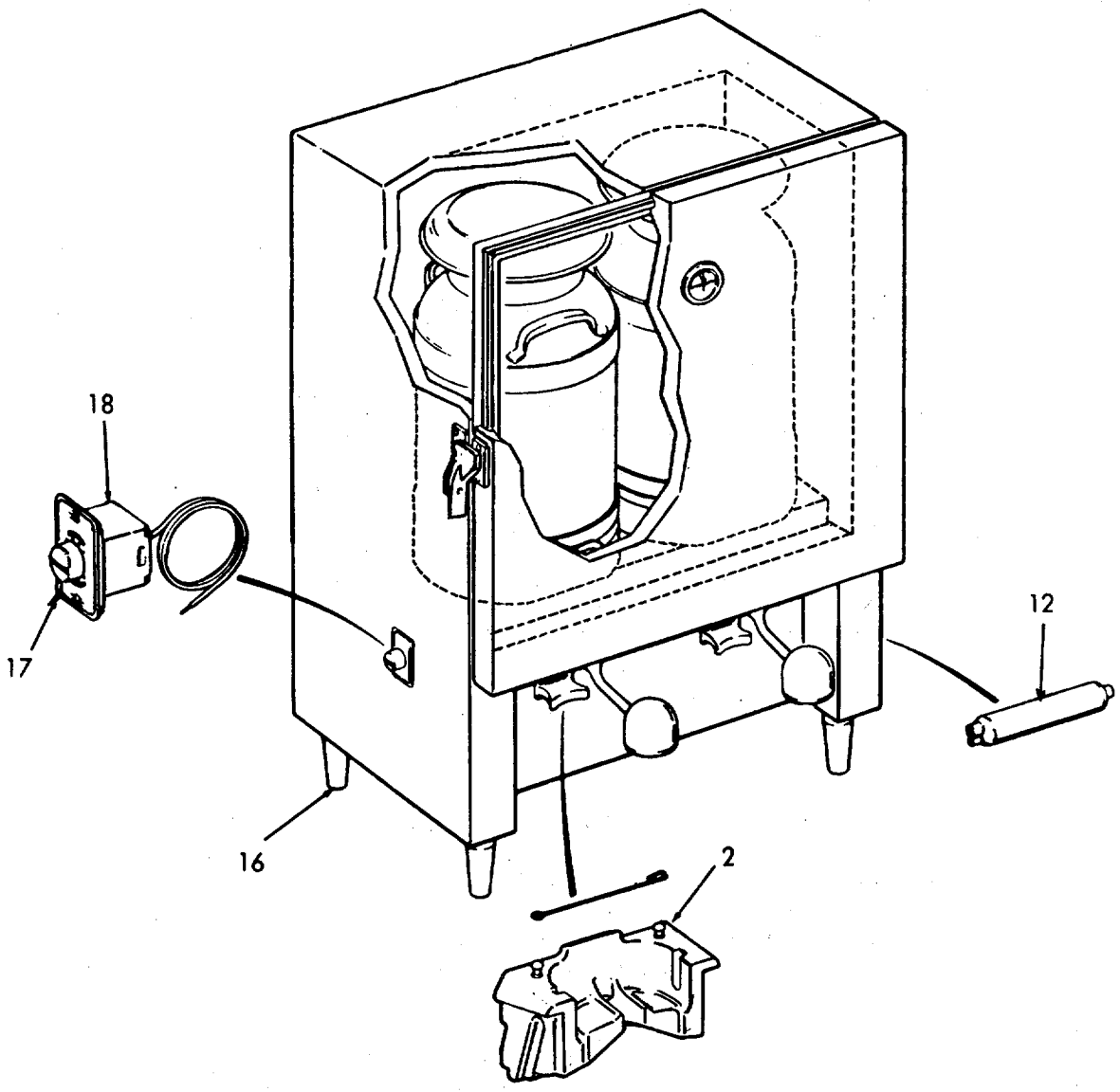
4-1017

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	e. 4 inch cabinet legs (16)	Replace.	If necessary.
8. Temperature control	a. Temperature control knob (17)	Remove.	
	b. Temperature control (18)	1. Remove screws from temperature control mounting.	
		2. Remove temperature control (18).	
		3. Disengage slip on control leads.	Gently pull downward.
	c. Sensing element	1. Remove carefully from bottom of dispenser and evaporator (12) through tube well (2).	
		2. Carefully pull down.	
	d. Sensing element	1. Carefully feed sensing element from the evaporator (12) through the tube well (2).	
		2. Up from the dispenser bottom to the temperature control (18).	
	e. Temperature control (18)	1. Gently insert slip on control leads.	
		2. Install temperature control (18).	
		3. Install screws to temperature control mounting.	

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	f. Temperature control knob (17)	Install.	

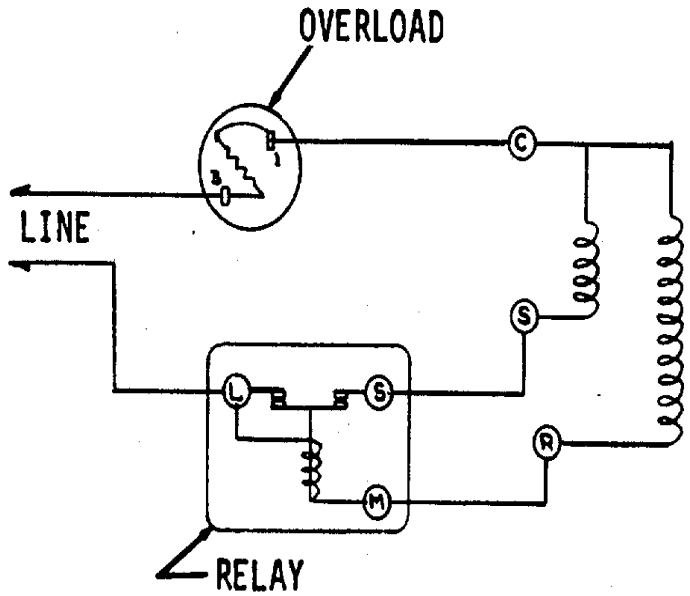


4-1019

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (Cont)			
9. Milk Dispenser	a. Milk dispenser, and mounting bolts.	Install.	
	b. Power cord	Install.	

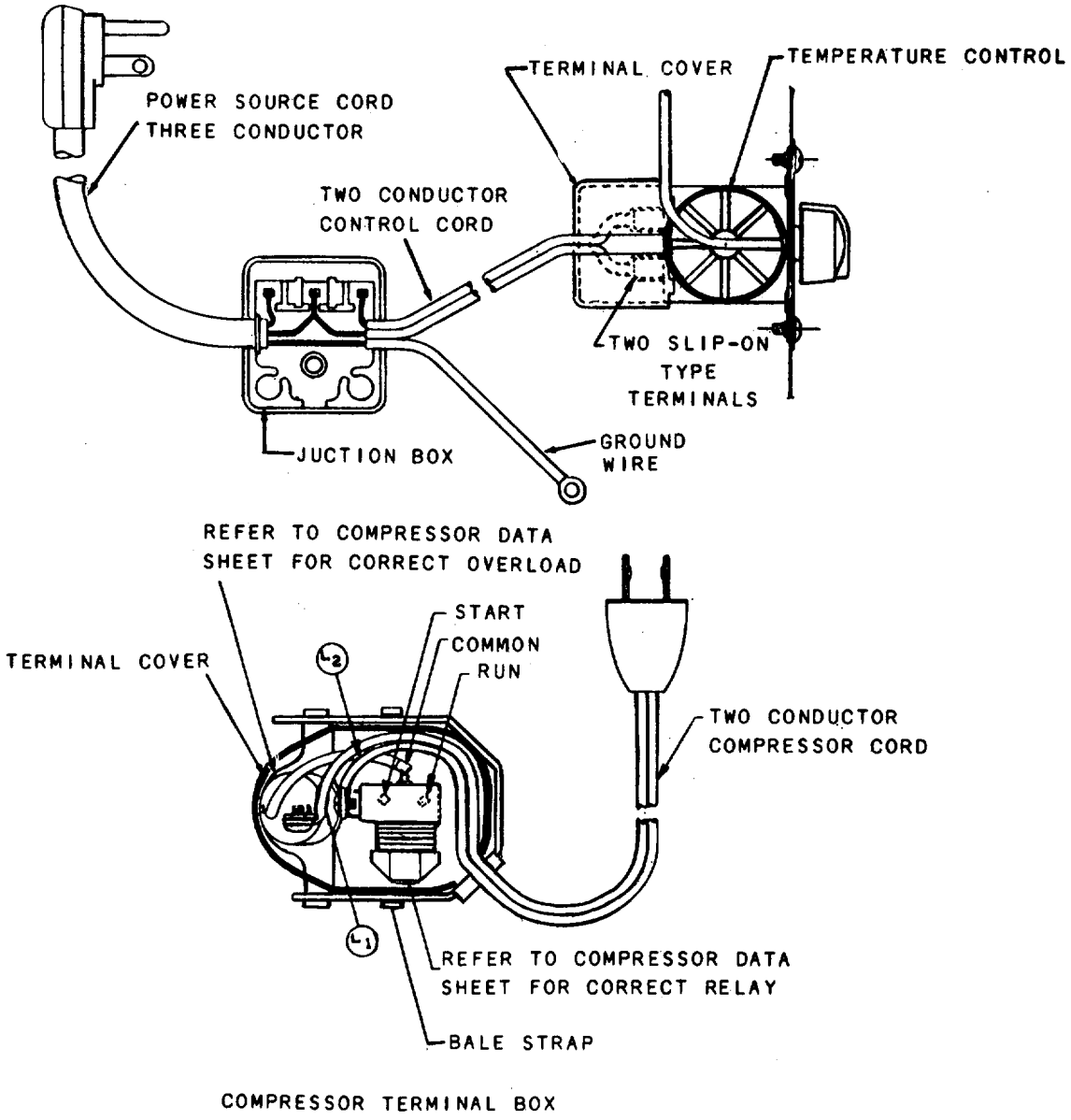
CHECKING ELECTRICAL SYSTEM



COMPRESSOR SCHEMATIC WIRING DIAGRAM

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS



COMPRESSOR TERMINAL BOX

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

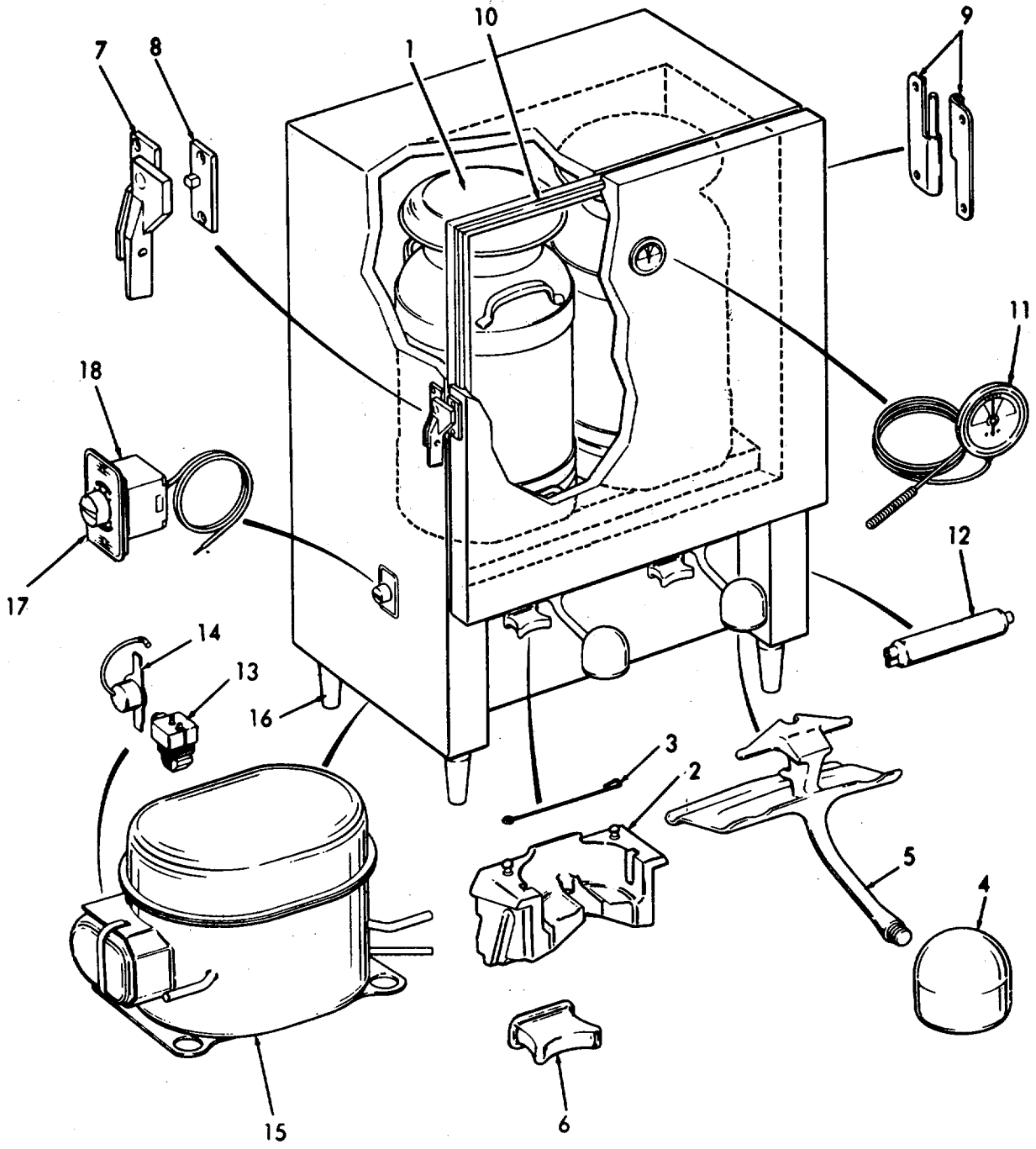
LOCATION	ITEM	ACTION	REMARKS

Milk Dispenser Legend

1. Milk can
2. Dispensing tube
3. Well valve
4. Zinc weight ball
5. Manual valve arm
6. Glass locator
7. Door lock assembly
8. Door strike panel
9. Hinge peg assembly
10. Gray door gasket
11. Temperature indicator
12. Dryer dehydrator
13. Starting relay
14. Overload protector
15. Compressor
16. 4 inch cabinet legs
17. Temperature control knob
18. Temperature control

4-39. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS



4-40. COFFEE MAKER - MAINTENANCE INSTRUCTIONS (Cont).

This task covers:

a. Inspection **b. Replace** **c. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

In order to prevent shock and possible injury, disconnect coffee maker from the source of electrical power.

INSPECTION

1.	Coffee maker	a. Wiring	Inspect for breaks, cracks, and signs of wear.
		b. Heating element	Inspect for proper. operation.

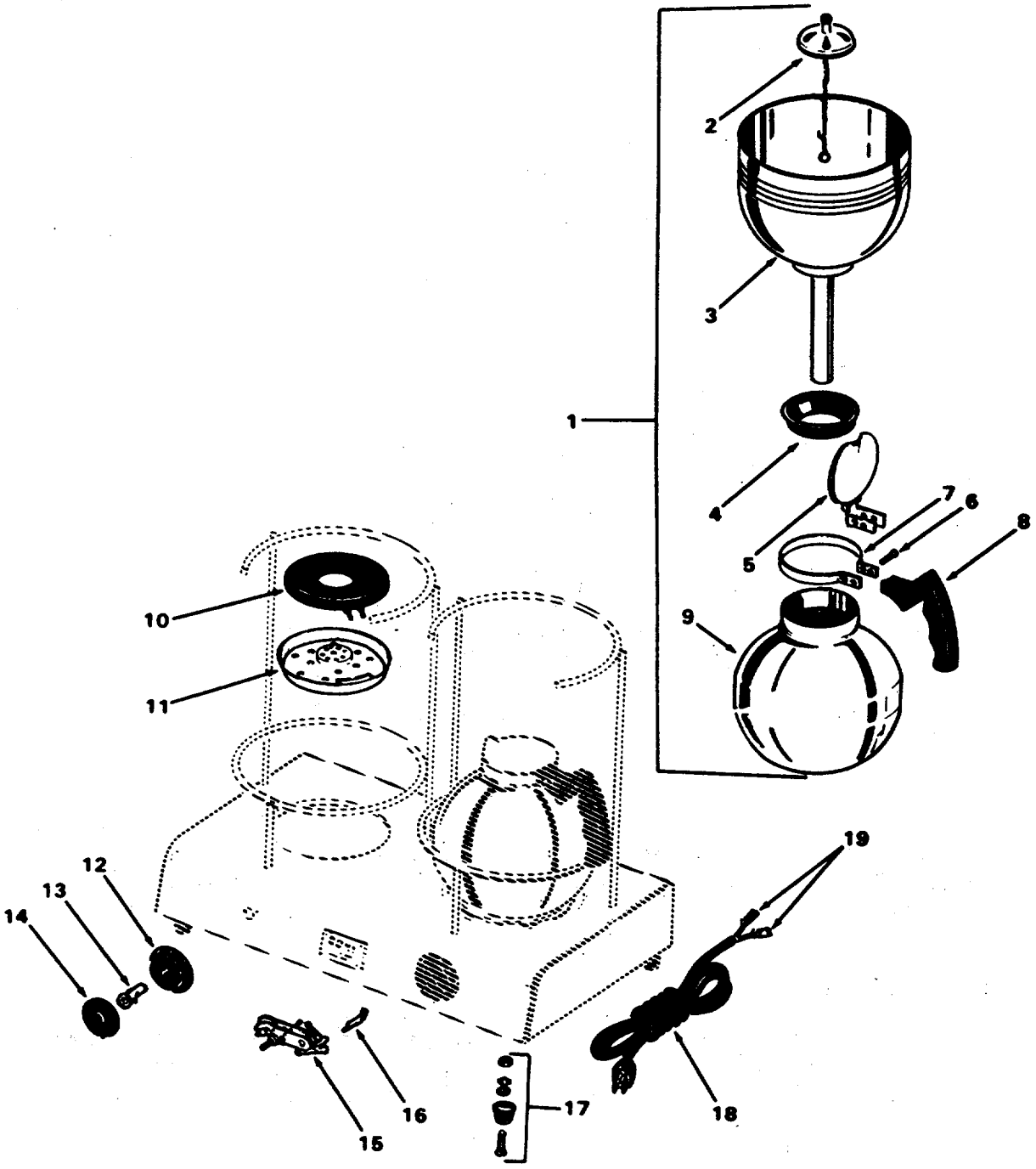
4-40. COFFEE MAKER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
2.	Electric cord set	Remove.	
REPAIR			
3.		Repair electric coffee maker using the following parts identification.	

1 Stainless steel vacuum brewer
2 Stainless steel filter
3 Upper bowl
4 Rubber bushing
5 Lower bowl cover and hinge
6 Setscrew for clamp
7 Handle clamp
8 Lower bowl handle
9 Lower bowl
10 120V 535W Closed element
11 Closed element shell
12 Clips with escutcheon
13 Escutcheon fastener
14 Pointer knob
15 Variable heat switch
16 Push-on clip adapter
17 Foot assembly
18 Cord set
19 Push-on female connector

4-40. COFFEE MAKER - MAINTENANCE INSTRUCTIONS (Cont).

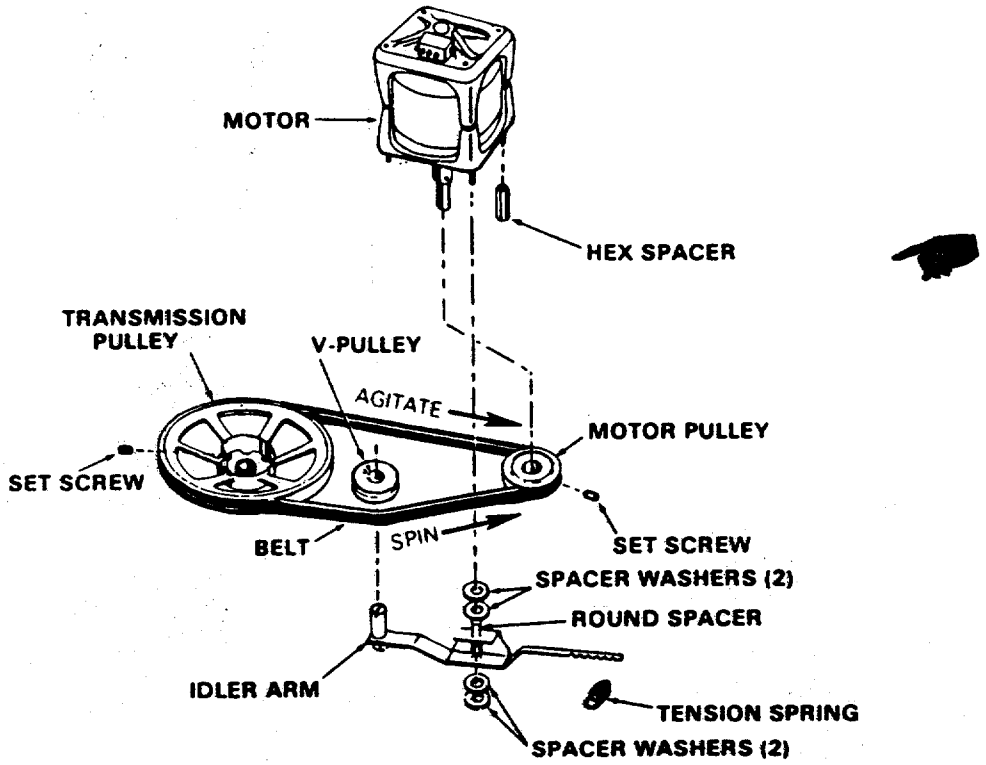
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			



4-41. WASHER/DRYER - MAINTENANCE INSTRUCTIONS.

a. Washer Operation (Slipping Belt Clutch Mechanism).

The drive system consists of a transmission, idler arm clutch assembly, drive belt and motor.

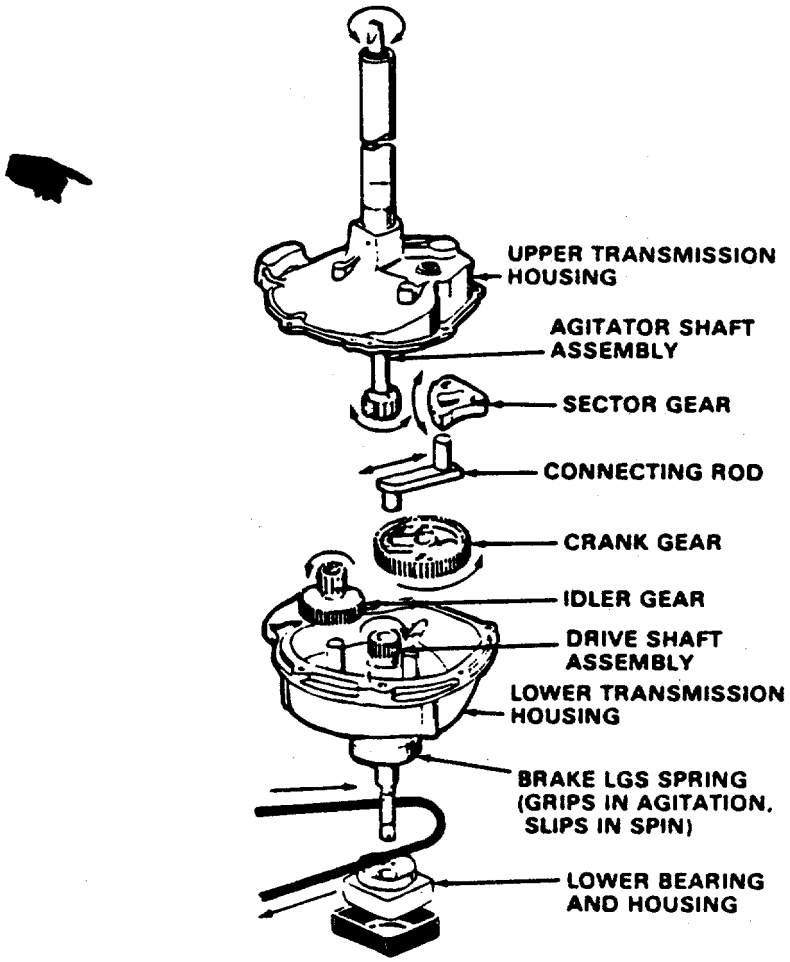


Spin and agitation are accomplished by reversing motor operation. Proper operation of the drive mechanism is dependent on correct calibration of the idler arm tension spring.

(1) Agitation.

(a) The belt drives a pulley which rotates the drive shaft assembly clockwise as indicated by arrow. The speed (rpm) is reduced through the idler gear to the crank gear. The connecting rod moves the sector gear back and forth for agitation stroke. The brake * LGS spring grips the transmission to prevent gear case and spin tub from moving with agitator.

4-41. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).



(b) The drive system provides positive drive in agitation. The direction of pull is from pulley to pulley. This causes the belt to ride tight in the pulleys.

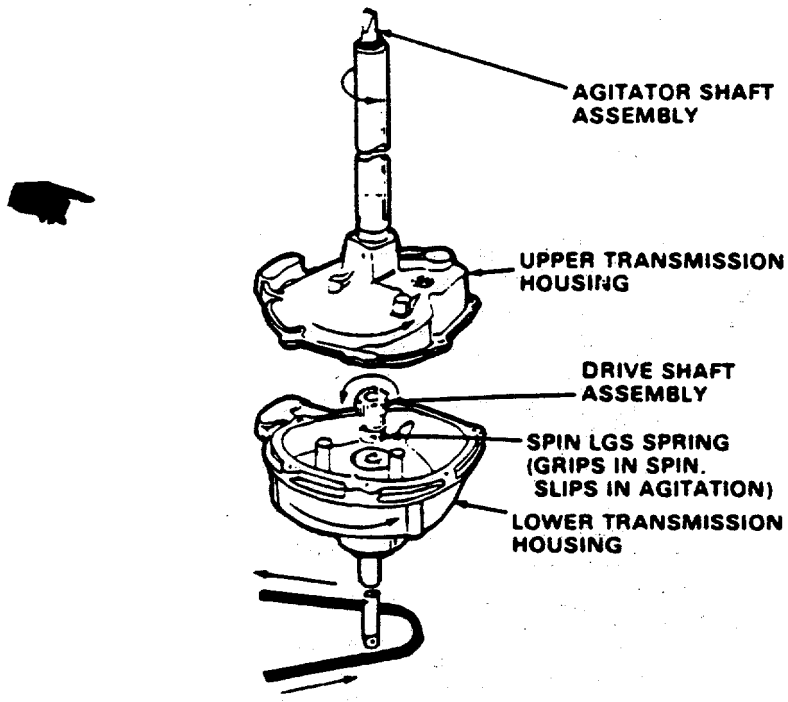
NOTE

The spin tub will rotate slightly during agitation.

(2) Spin Operation.

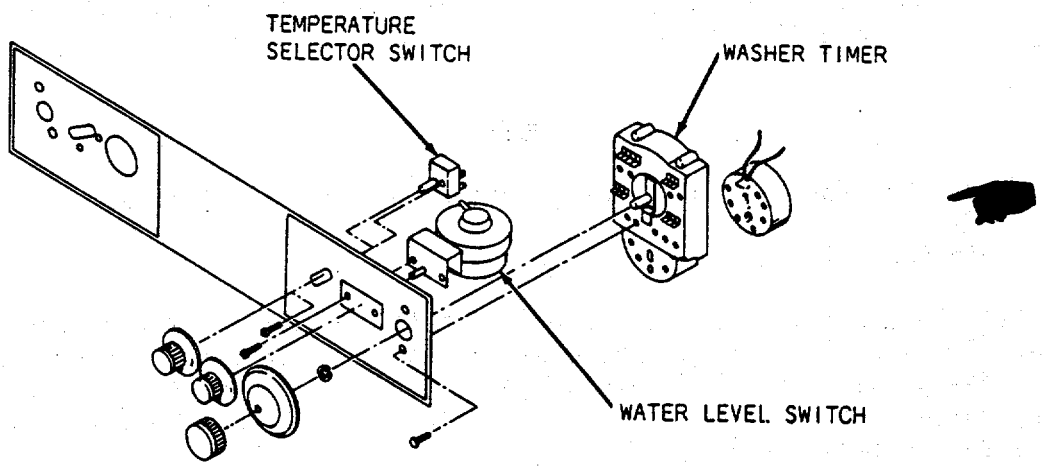
(a) To accomplish spin, the drive shaft assembly is turned counter- clockwise. The spin LGS spring, which slips easily in agitation (clockwise rotation), now grips drive shaft pinion gear. This turns entire gear case counter- clockwise, which in turn drives the basket. The large brake LGS spring offers no resistance to counter-clockwise rotation.

4- 41. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).



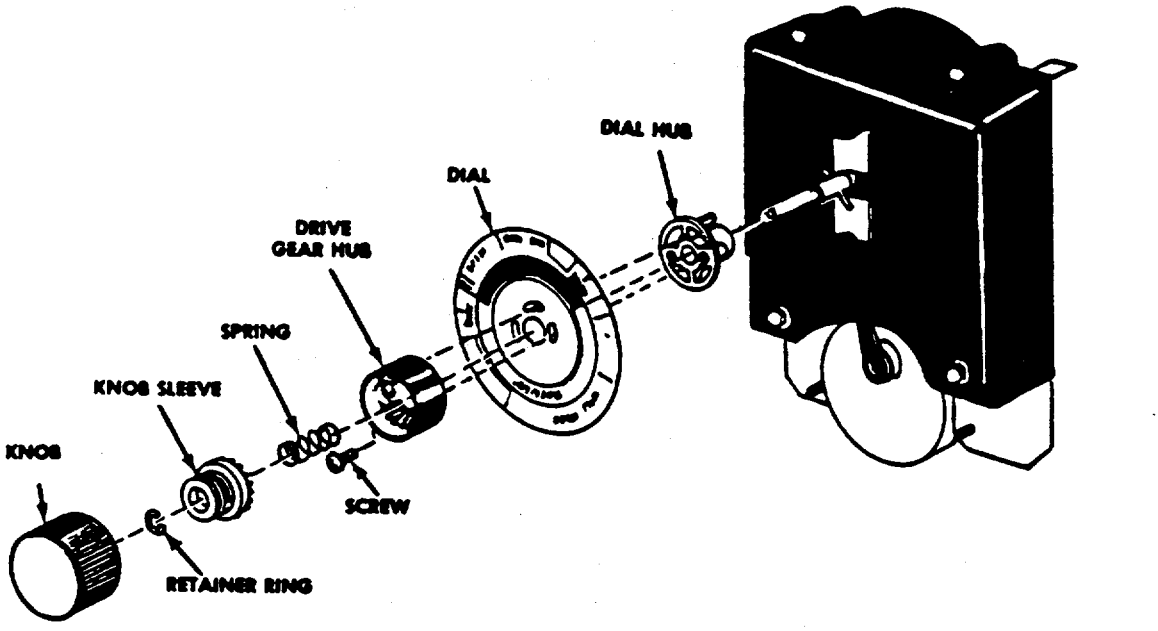
(b) In spin, the direction of pull is across the spring loaded idler arm roller. The idler arm senses the load and controls belt tension to provide a gradual increase in speed as water is extracted.

(3) Washer Controls. There are three washer controls, all mounted to the right of the trimplate on the dryer.



4-41. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).

(a) Timer. The washer timer is the electric control that is set by the user to select the sequence of operation of the washer unit. It consists of a motor, an escapement and a switching mechanism. The timer motor drives the escapement through gear reductions. The escapement, in turn, controls the time interval between timer advances and drives the switching mechanism. The switch mechanism consists of a notched cam that makes and breaks movable contacts as it rotates in operation. This movement controls the operation the washing cycle.



(b) Water Level Switch. The water level switch is a pressure activated switch. The various water levels are calibrated and sealed by the manufacturer. No adjustment should be made in the field.

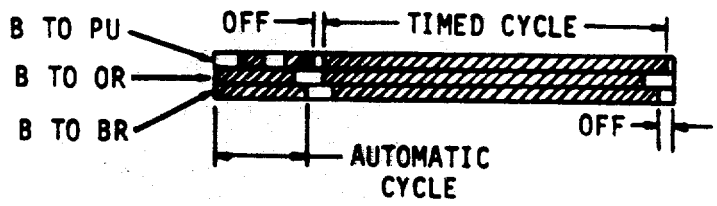
(c) Temperative Selector Switch. This control is used to select the desired water temperature for washing.

4-41. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).

b. Dryer Operation.

(1) Dryer timer.

(a) The timer is the electrical control which determines. how long the dryer will run before automatic shutoff at the end of the cycle. On timed cycle settings the timer motor will advance the internal cams opening the contacts as indicated on the bar chart.



BAR CHART TO LEFT REPRESENTS ONE COMPLETE REVOLUTION OF TIMER SHAFT.

SHADED PORTION OF BAR CHART INDICATES THE PROPORTIONAL TIMES THAT INTERNAL TIMER CONTACTS ARE CLOSED.

(b) During Automatic cycle operation the Purple terminal con- tact is not closed continuously but alternates with open and closed segments as noted on the bar chart. During the periods of operation, with the Purple or timer motor operating contact open, current for timer motor advance is from contact No. 2 of the temperature control thermostat. This contact is closed only when the drum air temperature requirement has been satisfied and the control thermostat contacts have been transferred from No. 3 to No. 2.

(c) Should the timer motor fail to advance the timer during automatic cycle settings and advance normally during timed cycle settings because of limit switch cycling the product and its installation should be checked for the fo1lowing possible causes:

1 Restricted lint screen.

2 Excessive duct length or reduced diameter.

3 Stuck closed exhaust duct hood.

4 Overloaded drum.

(d) The dryer timer has an automatic and timed cycle. The last five minutes of both cycles are cool down.

4-41. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).

(2) Heat control thermostat.

(a) The heat control thermostat located on the blower housing is a bi-metal disc snap action type. The temperature of the air passing across the switch causes the bi-metal disc to distort, from concave to convex or convex to concave, according to temperature rise or fall, opening or closing the internal contacts. The switch is of a single pole double throw type, opening the contacts between terminals 1 and 3 and closing contacts between 1 and 2 on temperature rise. On temperature fall contacts between terminals 1 and 2 open and contacts between 1 and 3 close.

(b) The thermostat incorporates an internal biasing heater that is used to change the air temperature required to warp the bi-metal disc that operates the internal contacts. The heat produced internally by the disc heater reduces the temperature intensity requirement of the circulating air by approximately 15 degrees.

(c) The internal disc heater enables the same thermostat to be used to control the product air temperatures at two different temperatures depending on whether the biasing or disc heater is' energized or not by the heat selector switch contact 2.

NOTE

One end of the 240 (208) volt biasing heater is connected internally to terminal 3 and is therefore energized only when the thermostat contact is closed to energize the heating element on Delicate cycles. This results in a reduced thermostat differential as well as reduced operating temperature on the Delicate setting .

(3) Fabric selector switch. A rotary type switch that is set by the user to select the proper temperature for the clothes load being dried. Contacts within the switch determine the flow of current to different segments of the dryer heater. The selection of delicate results in lower air temperature during the drying cycle provided the preset time setting is not too long for the load being dried.

(4) Safety thermal fuse. A heat operated thermal fuse is located in the blower housing as additional protection against over- heating of the circulating air. If the air temperature rises to the melting point of the fuse link, the dryer motor circuit is thus broken, resulting in shut down of the motor and disconnecting the heater circuit through the motor speed switch contacts. This thermal fuse is located next to the heat control thermostat.

4-41. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).

NOTE

When a fuse link is found to have an open circuit it is recommended that the temperature control thermostat be replaced along with the fuse link. This recommendation is made because a relationship between open fuse links and intermittent abnormal temperature control thermostat operation was found. Thermostats have been observed to operate between normal cutin and cutout temperatures for a number of cycles, then remain closed to allow a higher than normal temperature to be reached. This may occur at varying intervals causing the fuse link to become opened. Whenever a fuse link is found open the heater element should be checked for a grounded condition.

(5) Safety limiter thermostat. A second "snap" action thermostatic switch provides a back-up to the heat control thermostat. This thermostat is located in the back panel near the heating element and operates in the same manner as the heat control thermostat. This provides the drying system with protection in the event of blocked exhaust, clogged lint screen, an overloaded drum, etc.

(6) Pushbutton starting switch and dryer door.

(a) The pushbutton starting switch and dryer door switch are single pole single throw switches riveted to a common mounting bracket

(b) The start push button. when depressed closes a circuit to the motor running and starting windings. The button must be held in until the motor comes up to operating speed, approximately one second, at which time the single-pole, double-throw, motor governor operated switch, changes contacts and a1lows the motor to run without the start button.

(c) The dryer door switch actuating arm extends through a slot in the front panel in the dryer door opening. When its contacts are held closed by the dryer door it maintains a circuit to the dryer motor.

(7) Cycle end buzzer.

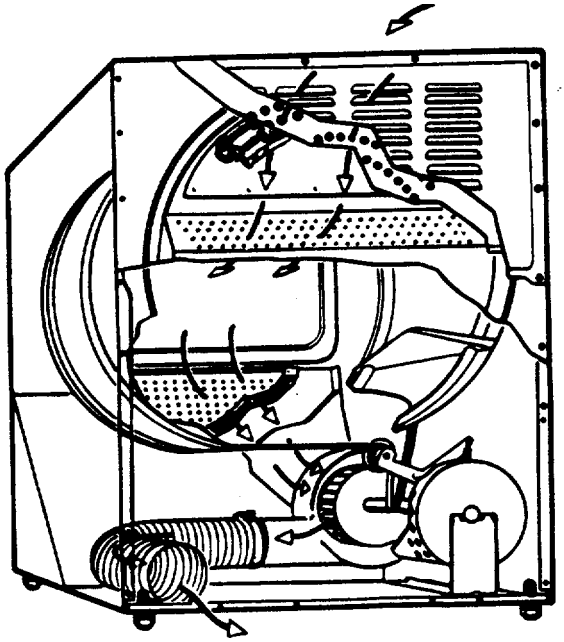
(a) The cycle end buzzer sounds for approximately 1 second at the end of either cycle indicating to the user that the clothing should be removed from the dryer at that time, to avoid wrinkling. Cycle end buzzer operation is as follows'

4-41. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).

(b) During dryer motor operation the circuit to the motor windings is from the Black terminal block, through the timer contacts, Black to Brown, through the dryer door switch contacts, through the thermal fuse, through the double throw governor operated motor switch contacts, the dryer motor main winding, motor overload to the grounded or White terminal block connection. The buzzer coil is in effect connected across the Black to Brown timer contact. The timer contact when closed maintains a no resistance circuit to the dryer motor and no current flow through the buzzer coil. As the timer cams open the Black to Brown contact at the end of the cycle, the buzzer coil carries the circuit to the dryer motor through the door switch, the thermal fuse, the governor operated motor switch, etc., to the White terminal block connection. The power to the motor windings through the buzzer coil is not enough to maintain motor operation and the motor stops. During the period of time that the motor switch remains closed to the Brown motor terminal, the buzzer will sound. The period of time that the buzzer is operating is determined by the motor's rate of deceleration.

(8) Dryer air circulation system.

(a) The laundry center drying system utilizes an efficient air circulation system. Air enters the drum through openings located in the stationary rear panel after it has passed over the heating element, also located in the rear panel of the dryer. The heated air passes through the circulating clothes that are being tumbled by the rotation of the drum cylinder. The moisture-laden air then passes through the perforated front panel of the lint screen compartment and through the lint screen filter. Lint is filtered out of the air and the moist air then passes into the duct and on to the blower housing. This air is then blown through the blower housing outlet, through the flexible duct to be discharged through the exhaust opening.



4-41. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).

b. The efficiency of the air circulation system depends on proper sealing of the drum at its front and rear felt seals and proper placement of all dryer exterior panels. These include top panel, sides and rear panels, access panel and vent cover panel. The lint screen must be in place when dryer is in operation. It should be cleaned with every load to maintain drying efficiency and should be replaced should it become damaged.

c. The following is an index to the maintenance instructions:

4-40. COFFEE MAKER - MAINTENANCE INSTRUCTIONS (Cont).

This task covers:

a. Inspection
b. Repair
c. Removal
d. Installation

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in procedure.

4-41.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS

WARNING

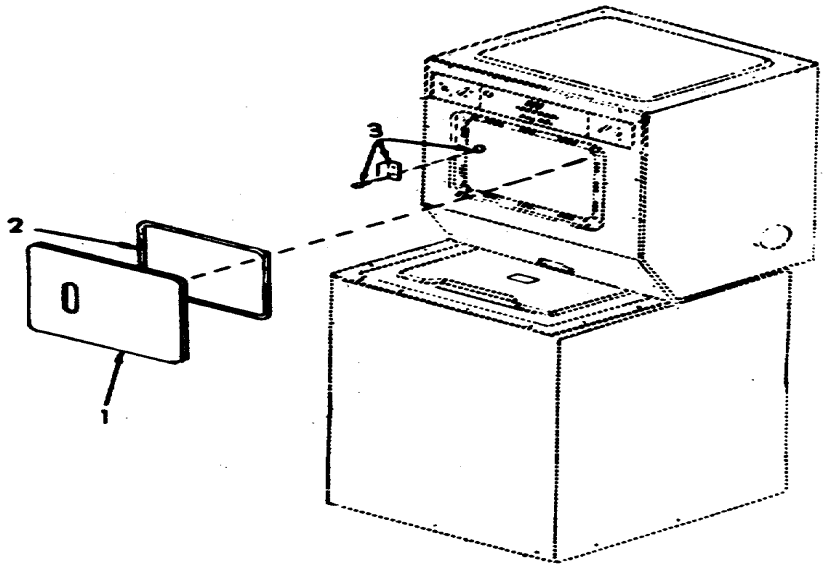
In order to prevent injury, tag and place the circuit breaker in the OFF position.

INSPECTION

1.	Dryer	a. Door seal	Inspect for breaks, cracks and leaking air.
		b. Door latch	Inspect for proper closure.

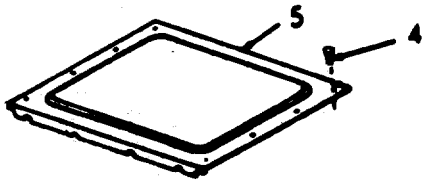
REPAIR

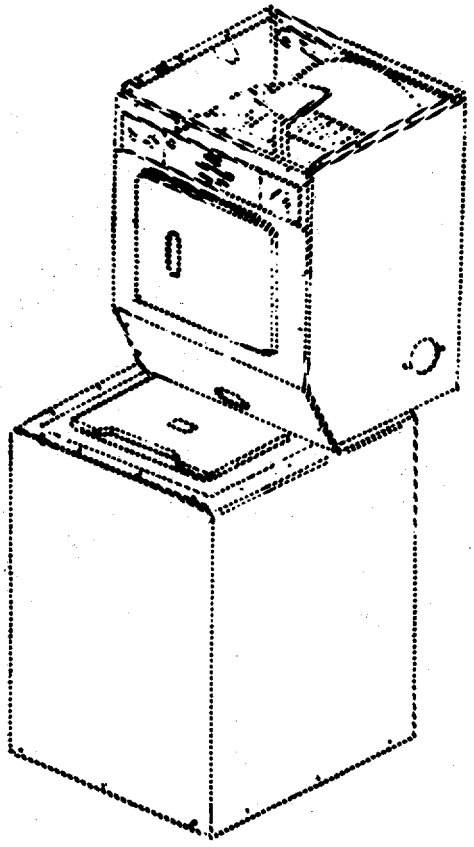
2.	Door seal	a. Door (1)	Open.
		b. Door seal (2)	Replace.
		c. Door (1)	Close.
3.	Door latch	Nuts, screws and latch (3)	Replace.



4-41.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REMOVAL			
4. Dryer top	a. Screws (4)	Remove.	
	b. Dryer top (5)	Remove.	





4-41.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

REMOVAL(Cont)

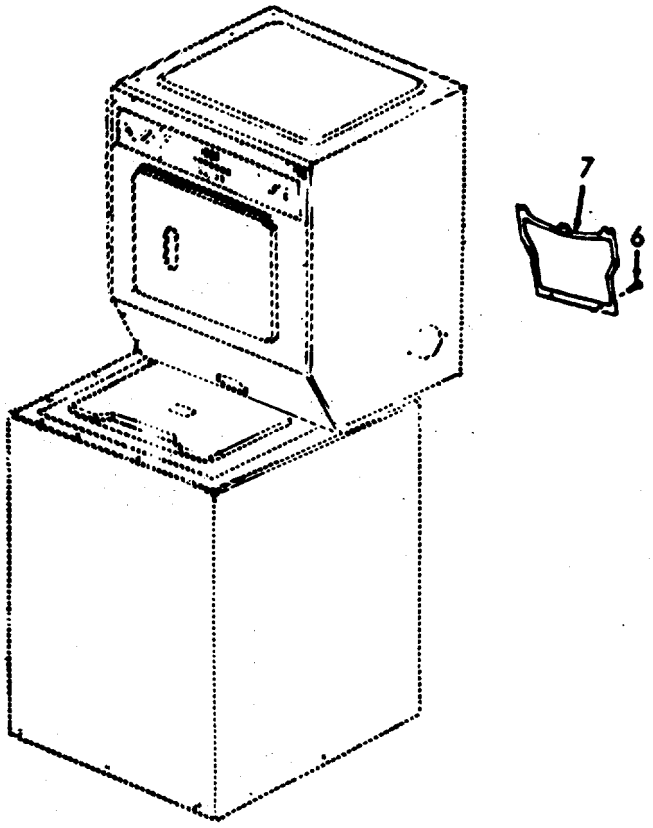
5. Access panel

NOTE

Remove this panel for access to water level safety switch, thermal fuse, and drive belt. (Refer to paragraph 4-42.3 for maintenance instructions.)

a. Screws (6) — Remove.

b. Access panel (7) — Remove.



4-41.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

REMOVAL

6. Washer rear panel access

NOTE

Remove this panel for access to dryer drive motor mounting (refer to paragraph 4-42.3), and washer mechanism (refer to paragraph 4-42.2) for maintenance instructions.

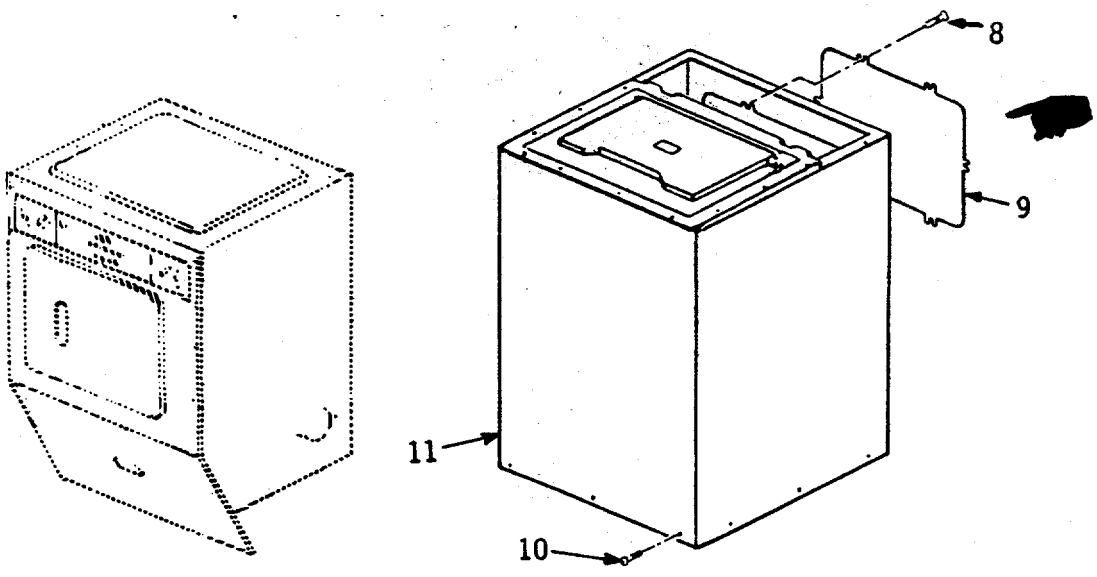
a.	Screws (8)	Remove.
b.	Panel (9)	Remove.

7. Washer front panel

NOTE

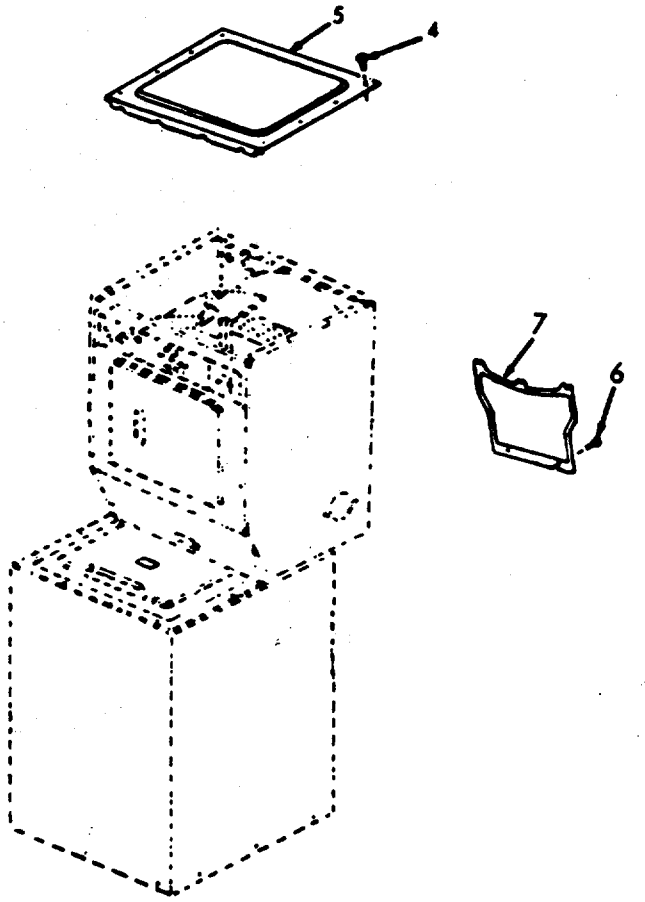
Remove for access to washer mechanism (refer to paragraph 4-42.2) for maintenance instruction.

a.	Screws (10)	Remove.
b.	Washer front panel (11)	Slide off.



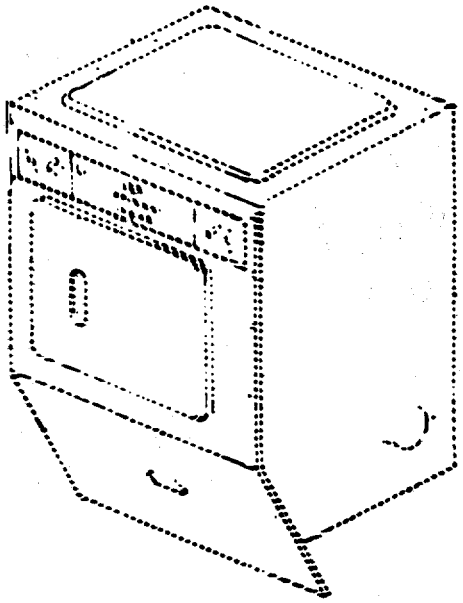
4-41.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Cont).

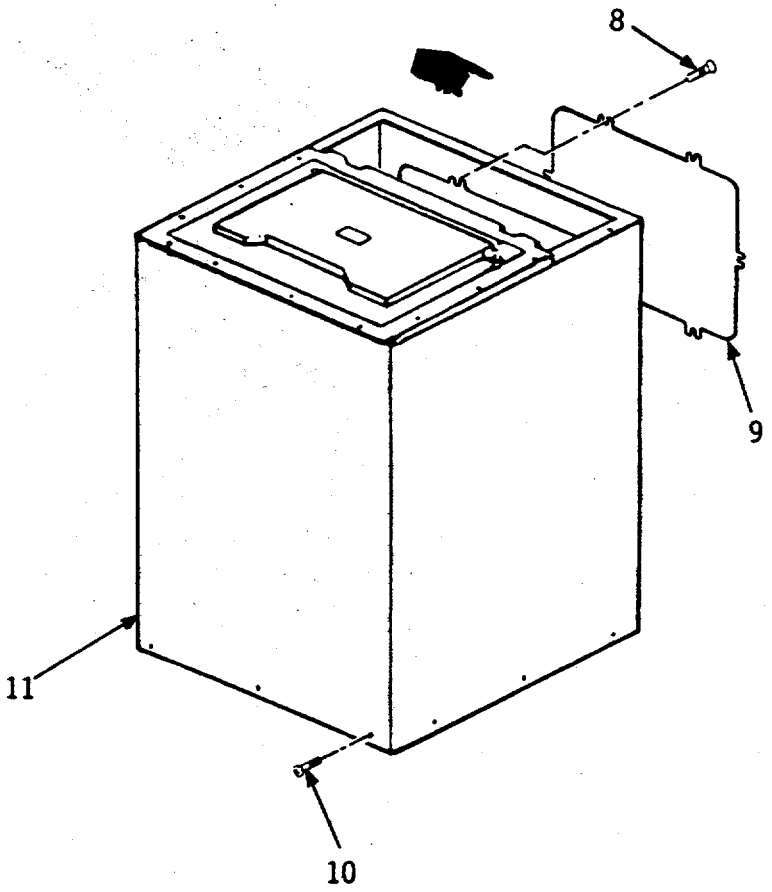
LOCATION	ITEM	ACTION	REMARKS
INSTALLATION			
8. Dryer top	a. Top (5)	Install.	
	b. Screws (4)	Install.	
9. Access Panel	a. Access panel (7)	Install.	
	b. Screws (6)	Install.	



4-41.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (Cont)			
10. Washer rear access panel	a. Panel (9)	Instal1.	
	b. Screws (8)	Install.	
11. Washer front panel	a. Front panel (11)	Relocate.	
	b. Screws (10)	Install.	





4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS

This task covers:

a. Inspection **c. Repair**
b. Service **d. Adjustment**

INITIAL SETUP:

Test Equipment

Special Tools

Spring compression tool
Torque wrench
Tub support puller

Material/Parts

Belts
Gaskets
Seals

Personnel Required
1

References

Paragraph	
4-41a	Operation of slipping belt clutch mechanism.

Equipment

Condition	Condition Description
Paragraph	
4-41.1	Exterior Cabinet removal

Special Environmental Conditions

NONE

General Safety Instructions
Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING
In order to prevent injury, tag and place the circuit breaker in the OFF position.

INSPECTION

1.	Washer	a. Tub	Inspection for leaking seals.
		b. Belts	Inspect for wear, stretching, and fraying.

4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS

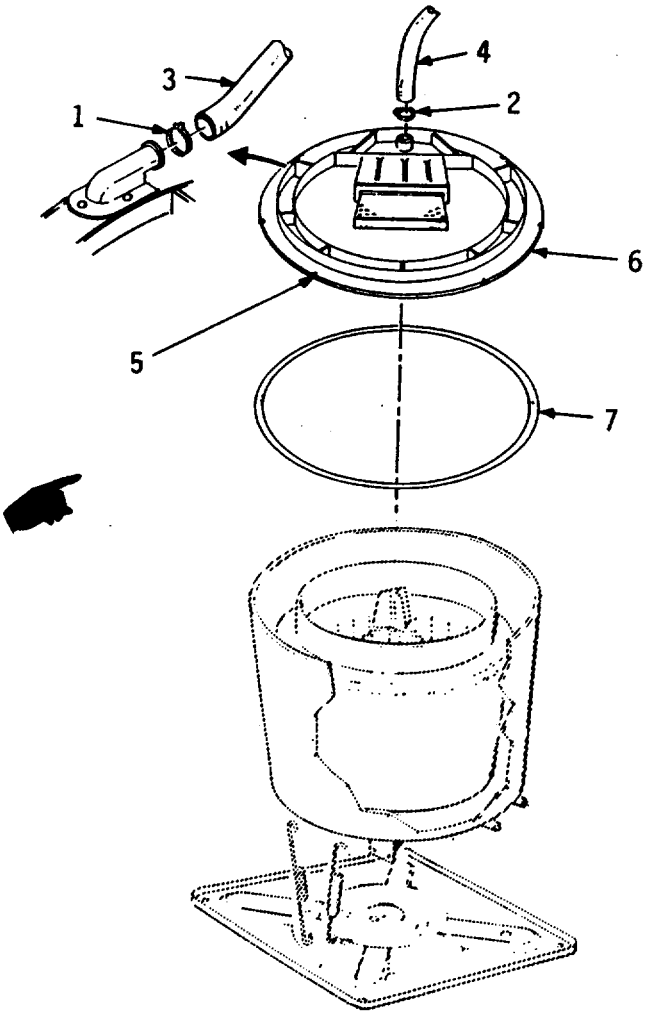
LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	c. Agitation	Inspect for proper operation.	Refer to agitation instructions in paragraph 4-41a .
	d. Water level	Inspect for high water level.	
SERVICE			
2.	Tub	Clean inside of tub	
REPAIR			
	WARNING		
	Disconnect unit from electrical source before proceeding with maintenance.		
3. Splash Tub cover	a. Hose clamps (1 and 2)	Loosen	
	b. Hoses (3 and 4)	Remove water inlet hose (3) and recirculation hoses (4).	
	c. Spring clips (5)	Remove eight places.	
	d. Splash tub cover (6)	Remove.	

4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

e.	Seal (7)	Remove.
f.	Seal (7)	Install.
g.	Splash tub cover (6)	Install.
h.	Spring clips (5)	Install eight places.
i.	Hoses (3 and 4) and hose clamps (1 and 2)	Reinstall.

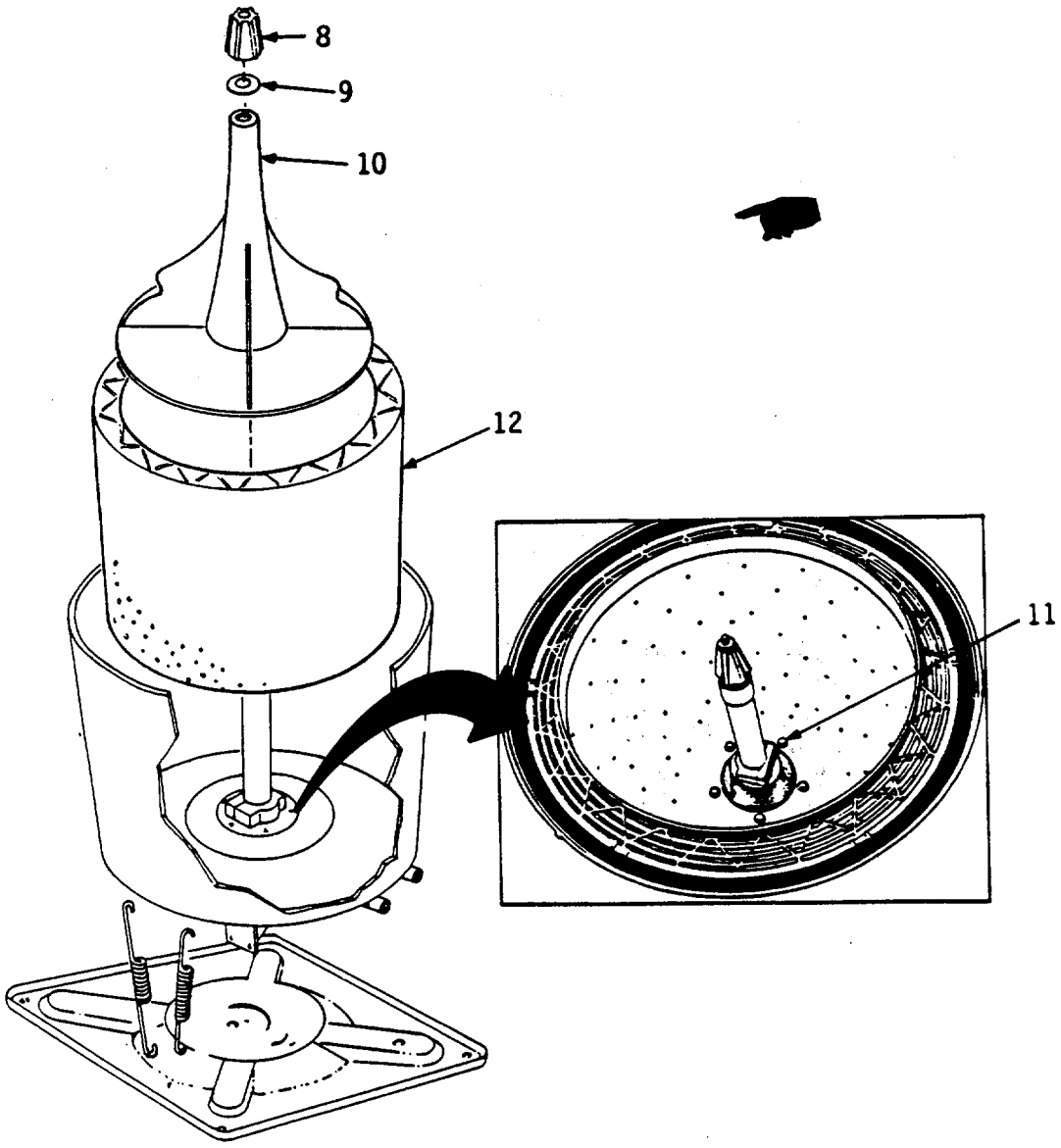


4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
4. Spin tub	a. Splash Tub cover	Remove.	Refer to step 3
	b. Agitator cap (8) washer (9) and agitator (10)	Remove.	
	c. Mounting screws (11)	Remove five places.	
	d. Spin tub (12)	1. Remove. 2. Install.	
	e. Mounting screws (11)	Install.	

4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
	f. Agitator (10) washer (9) and agitator cap (8)	Install.	
	g. Splash tub Cover	Install.	Refer to step 3.

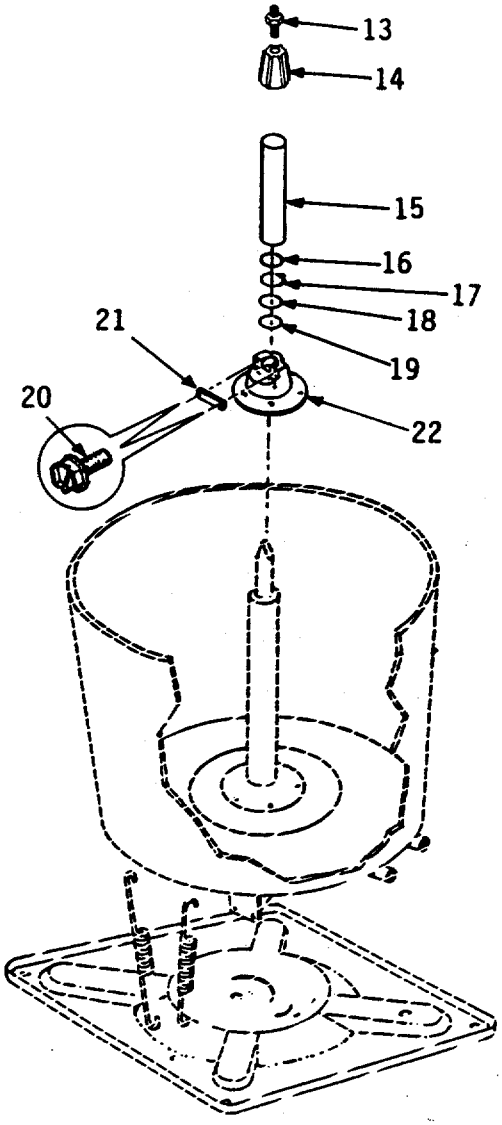


4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
5. Trunnion	a. Splash tub cover.	Remove.	Refer to step 3.
	b. Spin tub	Remove.	Refer to step 4.
	c. Stud bolt (13) drive block (14) and vinyl sleeve (15)	Remove.	
	d. Upper lip seal (16), retaining ring (17), spacer washer (18,) and thrust washer (19)	Remove.	
	e. Screw (20)	Loosen to free lockplate (21).	
	f. Trunnion (22)	1. Remove. 2. Install.	
	g. Screws (20) and lockplate (21)	Install.	
	h. Upper lip seal (16), retaining ring (17), spacer washer (18) and thrust washer (19)	Install.	

4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

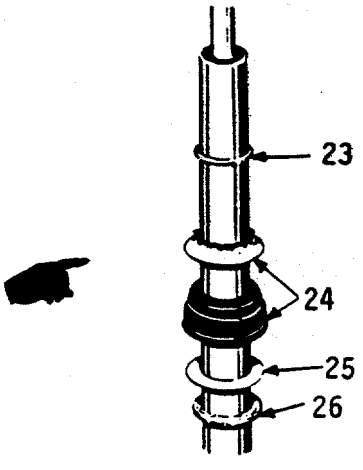
LOCATION	ITEM	ACTION	REMARKS
REPAIR			



i.	Vinyl Sleeve (15), drive block (14), and stud bolt (13)	Install.	
j.	Spin tub	Install.	Refer to step 4.
k.	Splash tub cover	Install.	Refer to step 3.

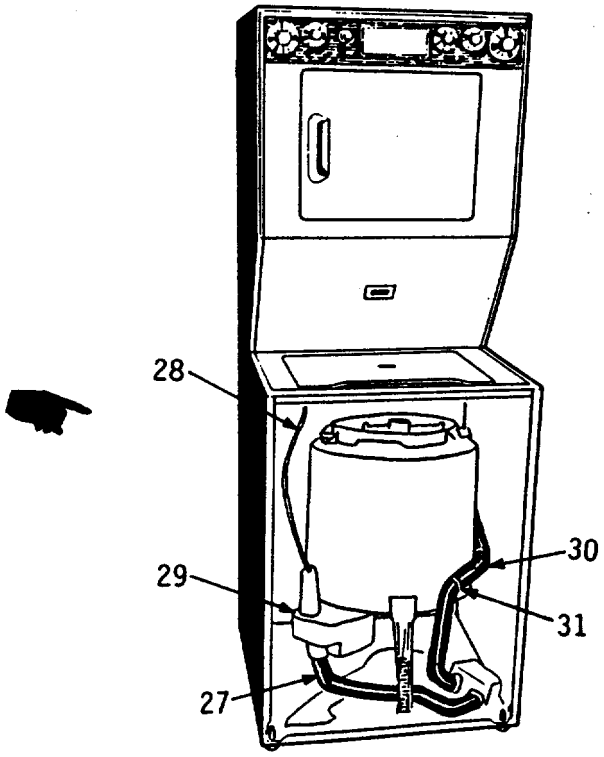
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
6. Seal assembly	a. Splash tub cover	Remove.	Refer to step 3.
	b. Spin tub	Remove.	Refer to step 4.
	c. Trunnion	Remove.	Refer to step 5.
	d. Retaining ring (23)	Remove.	
	e. Seal assembly (24)	Pull up and remove.	
	f. Slinger (25) and felt washer (26)	1. Remove.	
		2. Install.	
	g. Seal assembly (24)	Install.	
	h. Retaining	Install.	
	i. Trunnion	Install.	Refer to step 5.
	j. Spin tub	Install.	Refer to step 4.
	k. Splash tub cover	Install	Refer to step 3.



4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
7. Splash Tub	a. Splash tub cover, spin tub, trunnion and seal assembly	Remove.	Refer to step 3,4,5, and 6 respectively.
	b. Front panel	Remove.	Refer to paragraph 4-41.1 .
	c. Hoses (27 and 28)	Remove from bottom trap (29)	
	d. Rear access panel	Remove.	Refer to paragraph 4-41.1 .
	e. Drain hose (30)	Remove from coupler inside of cabinet.	
	f. Drain hose retaining clamps (31)	Remove.	



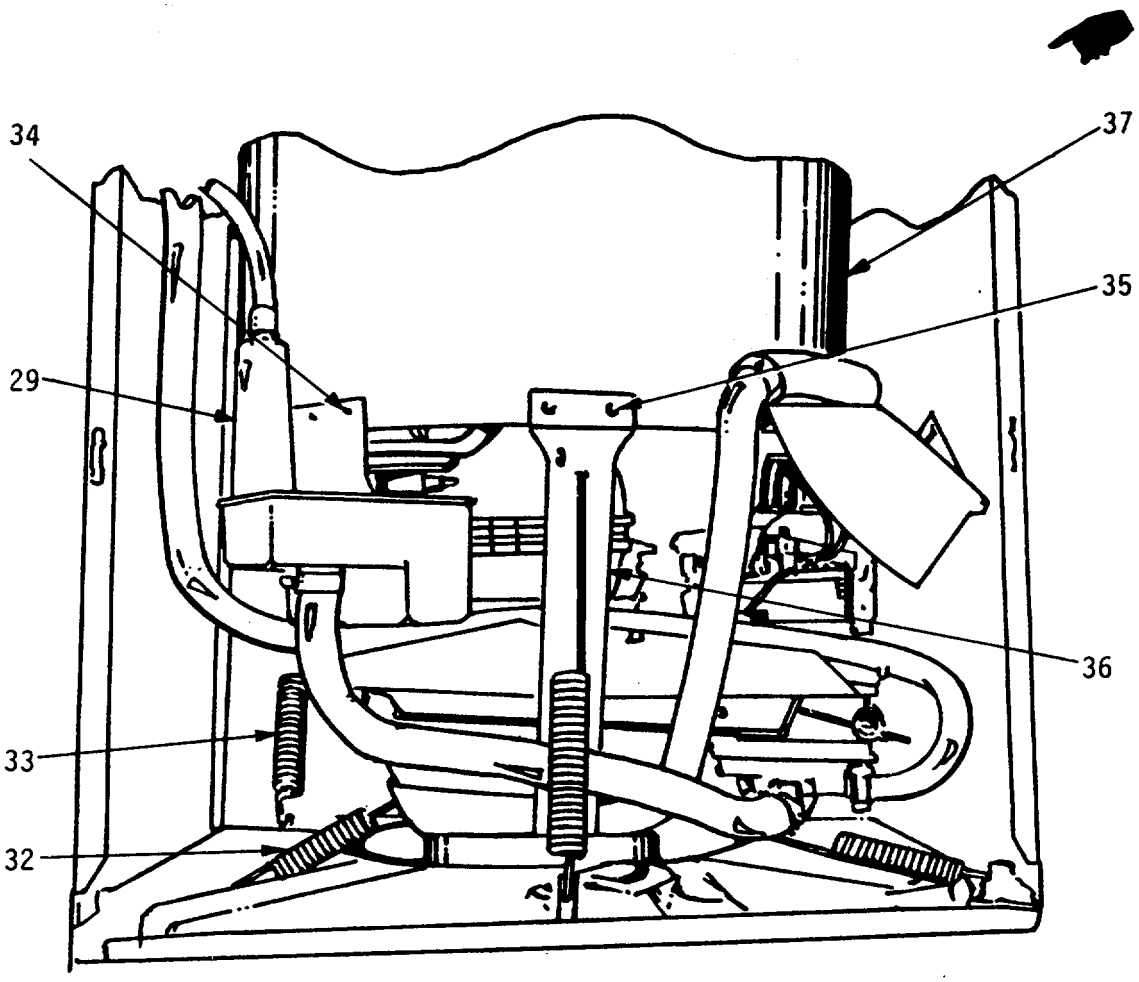
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	g. Vertical and horizontal springs (32 and 33)	Disconnect.	
	h. Splash tub and mechanism	Remove through front of cabinet.	
	i. Screws (34 and 35)	Remove from leg (36) and bottom trap (29)	
	j. Splash tub (37)	Remove.	
	k. Splash tub (37)	Replace.	
	l. Screws (34 and 35)	Install to secure bottom trap (29) and leg (36) to splash tub (37)	
	m. Splash tub and mechanism	Install in cabinet.	
	n. Vertical and horizontal springs (32 and 33)	Install.	

4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



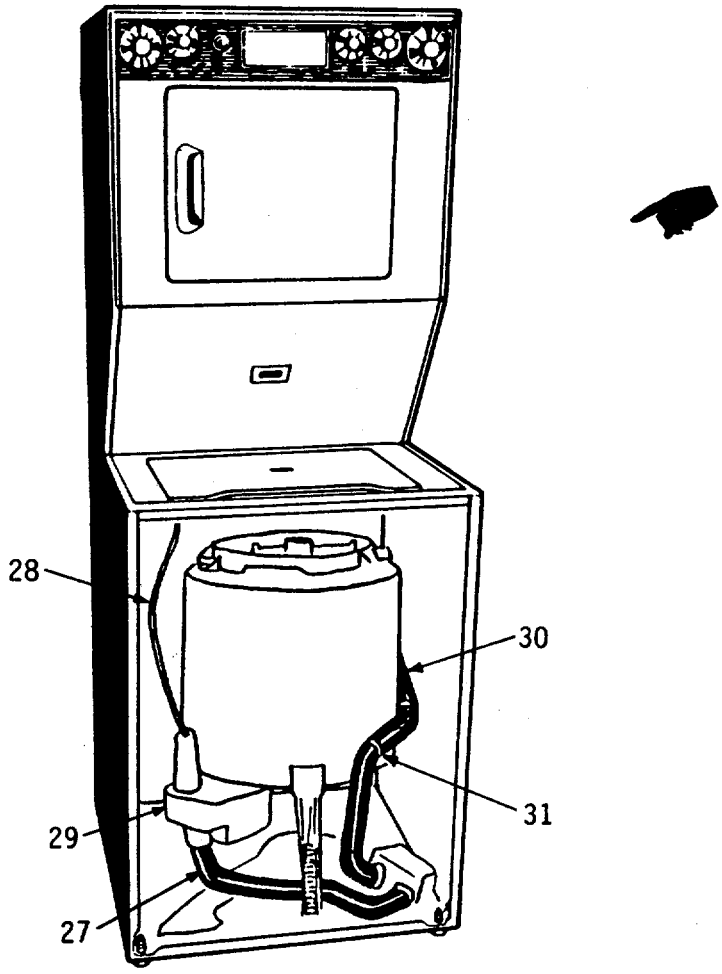
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	o. Drain hose (30) and retaining clamps (31)	Install.	
	p. Rear access panel	Install.	Refer to paragraph 4-41.1 .
	q. Hoses (27 and 28)	Install.	
	r. Front panel (30) and retaining	Install.	Refer to paragraph 4-41.1. .
	s. Seal, assembly, trunnion, spin tub and splash tub cover	Install.	Refer to steps 6,5,4 and 3 respectively.

4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



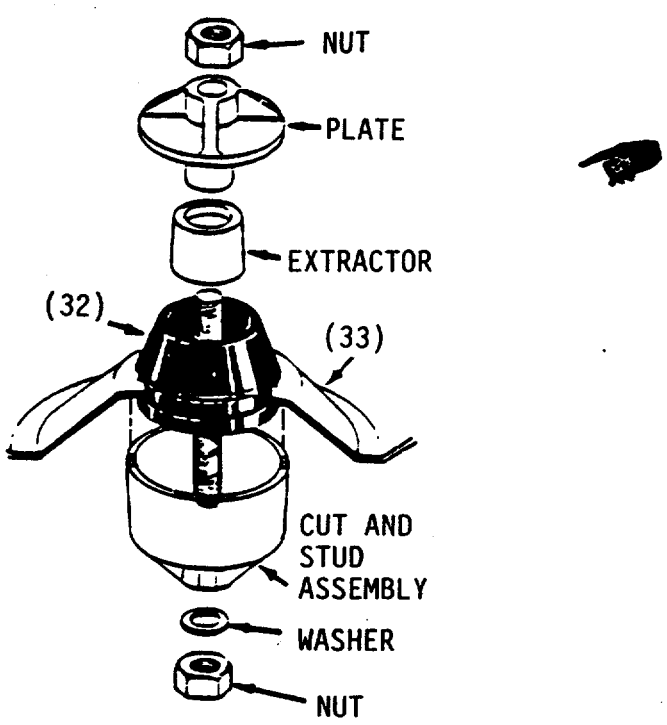
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
8. Bearing Housing		**NOTE** The bearing assembly is pressed into the bottom of the splash tub. Remove for replacement when changing the splash tub.	
	a. Bearing housing (32)	1. Apply liquid detergent at the flange area of the splash tub. 2. Fit tub bearing tool through bearing (32) and tub bottom (33) 3. Use a 12 inch crescent wrench and turn top nut until bearing and housing assembly (32) is free. 4. Disengage tub bearing tool.	

4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

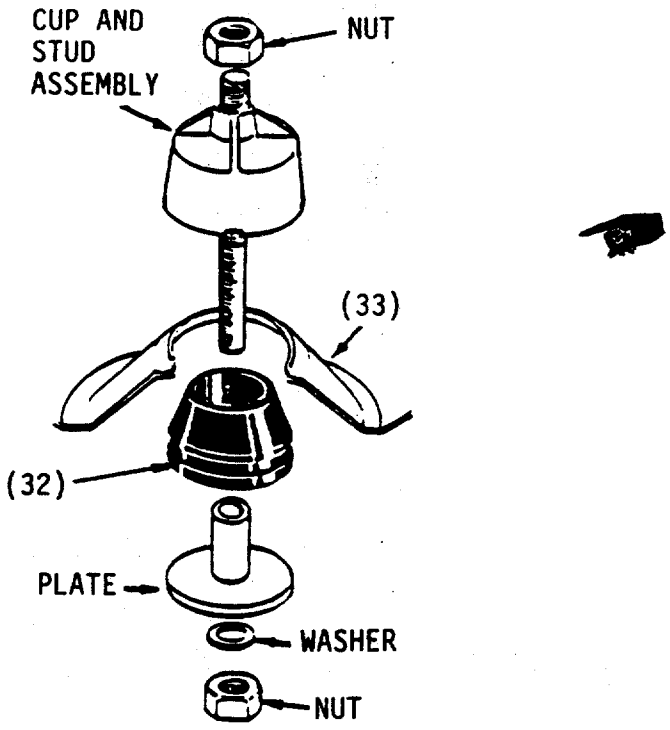


NOTE

In the event the transmission spin shaft becomes scored due to a worn tub bearing, an oversize bearing kit is available which eliminates the necessity of removing the upper housing and spin shaft assembly.

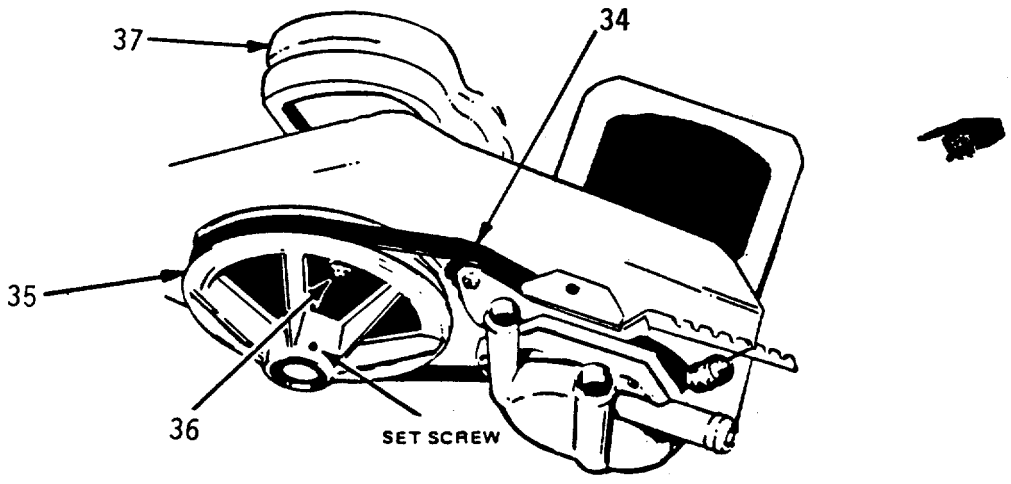
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	b. Bearing housing (32) outside of bearing housing assembly and install into bottom of splash tub 9.	1. Apply liquid detergent to	
		2. Fit tool through bearing (32) and tub bottom (33).	
		3. Use a 12 inch crescent wrench and turn top nut until bearing and housing assembly is in place in the splash tub.	



4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
9. Transmission	a. Splash tub	Remove.	Refer to step 7.
	b. Belt drive (34)	Remove.	
	c. Transmission pu1ley (35)	Remove.	
	d. Transmission hold down bolts (36)	Remove.	
	e. Transmission (37)	Remove.	



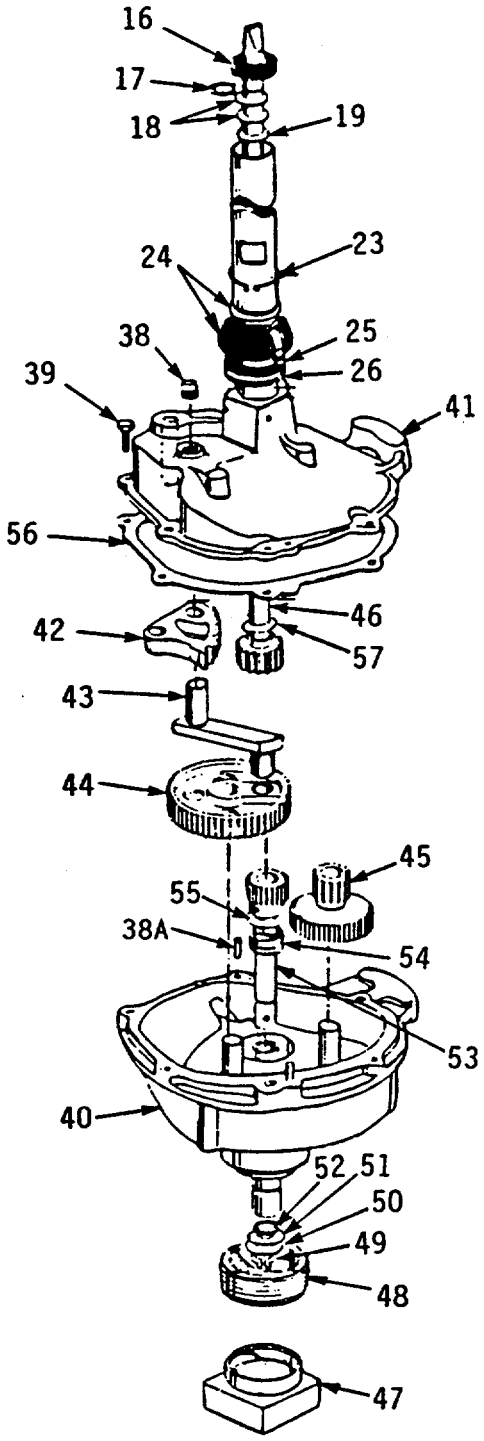
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
	NOTE		
During a transmission repair, carefully examine each component for wear, scoring or other damage. Replace al1 damaged parts, including gaskets and seals.			
	f. Pipe plug (38)	Remove and drain oil.	
	g. Screws (39)	Remove from six places	
	h. Lower housing assembly (40) and upper housing assembly (41)	Separate.	Do not remove dowel pins (38A).
	i. Sector gear (42), connecting rod (43), crank gear (44) and idler gear (45)	Remove.	
	NOTE		
The sector and crank gears are subject to improper positioning during reassembly. Observe the position of the sector gear.			
	j. Upper lip seal (16) retaining ring (17), spacer washer (18) and thrust washer (19)	Remove.	
	k. Snap ring (23), seal assembly (24), slinger (25), and felt washer (26)	Remove.	

4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



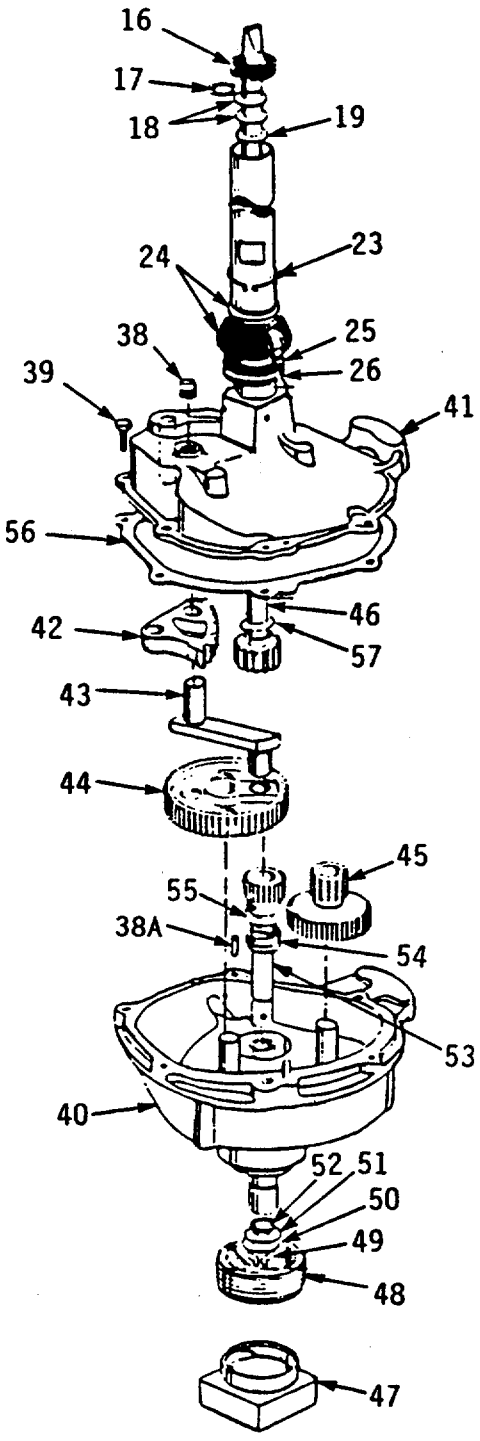
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	l. Agitator shaft assembly (46)	Pull-down and out.	
	m. Lower bearing housing (47) and large LGS spring (48)	Remove.	
	n. Snap ring (49), spacer washer (50), thrust washer (51) and lower lip seal (52)	Remove.	
	o. Lower shaft assembly (53)	Pull up and out. Turn clockwise to disengage small LGS spring (54).	
	p. Thrust washer (55), gasket (56) and spacer washer (57)	Remove and replace.	
	q. Agitator shaft assembly (46)	Install in upper housing assembly (41).	
	r. Felt washer (26), slinger (25), seal assembly (24) and snap ring (23)	Install.	
	s. Thrust washer (19), spacer washer (18), retaining ring (17) and upper lip seal (16)	Install.	

4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Continued).



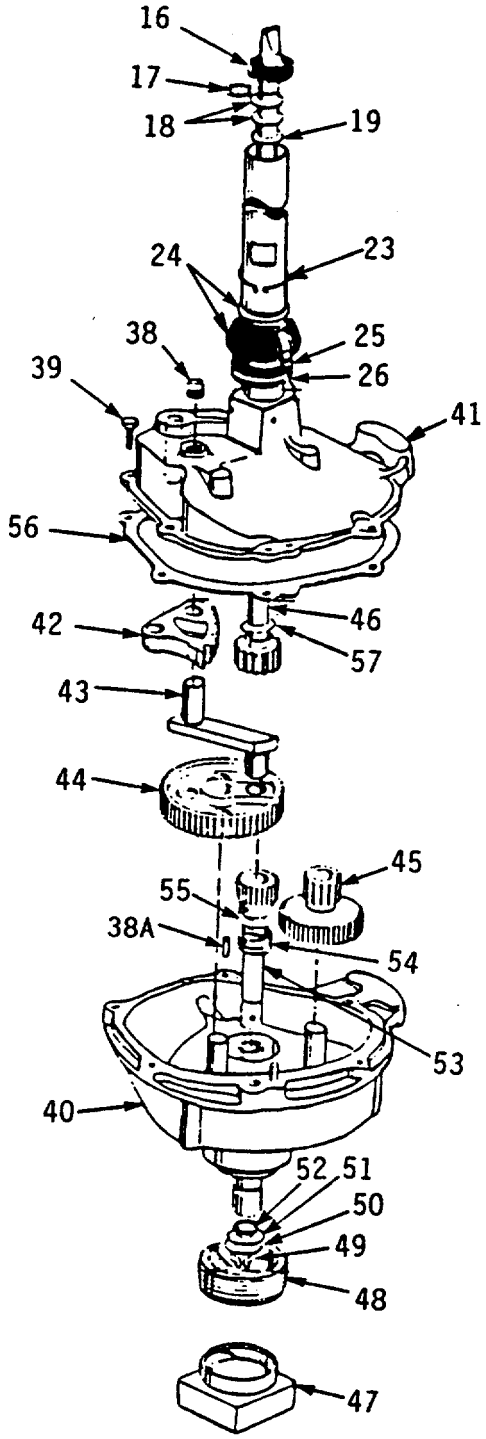
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	t. Small LGS spring (54)	Install on lower shaft assembly (53).	
	u. Lower shaft assembly (53) (40).	Install in lower housing assembly	
	v. Lower lip seal (52), thrust washer (51) spacer washer (50) and snap ring (49)	Install all on lower shaft assembly (40).	End play of lower shaft assembly should not exceed 0.020 inch.
	w. Idler gear (45), and crank gear (44)	Install.	
	x. Sector gear (42)	Install with embossed date code up.	
	y. Connecting rod (43)	Install.	
	z. Upper housing (41) and lower housing (40) assemblies	Align with dowel pins (38A).	
	aa. Screws (39)	Secure housing together.	Tighten to 120-180 in lbs. torque.
	ab. Large LGS spring (48) and lower bearing housing (47)	Install.	
	ac. Pipe plug (38)	Fill the transmission with 32 ounces of transmission oil. Install pipe plug.	

4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

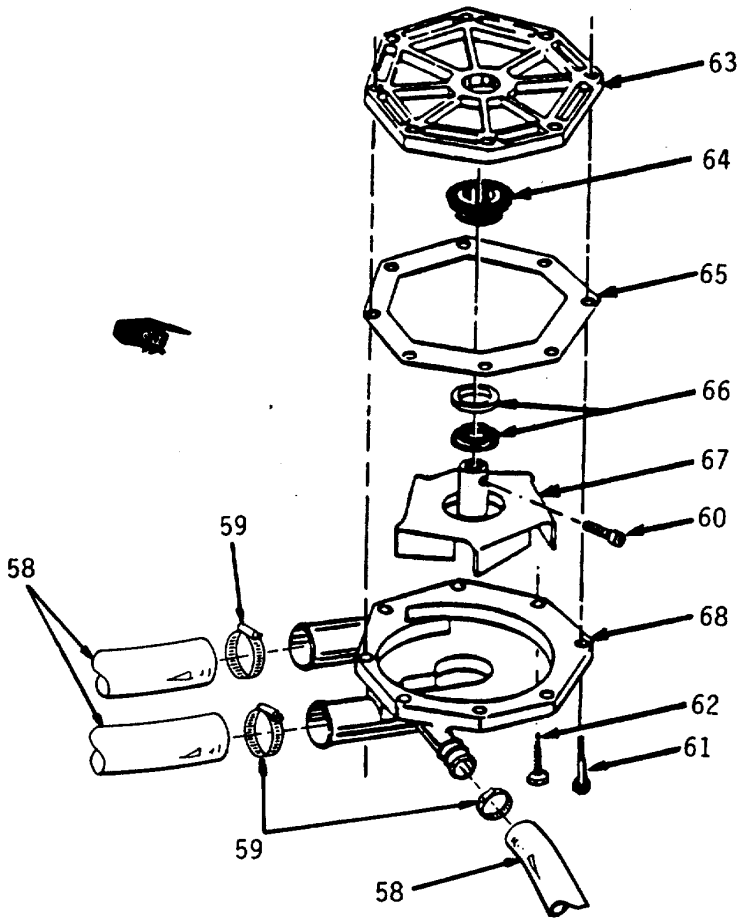


4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
10. Pump	a. Washer front panel	Remove.	Refer to paragraph 4-41.1 .
	b. Hoses (58) and clamps (59)	Remove.	
	c. Impeller screw (60)	Remove.	Use 9/64 inch allen wrench.
	d. Mounting screws (61) to remove.	Remove, and pull down pump	
	e. Cover screws (62)	Remove.	
	f. Pump cover (63)	Remove.	
	g. Seal assembly (64), gasket (65), and seat assembly (66)	Remove and replace if worn.	
	h. Impeller (67) and pump housing (68)	Remove.	
	i. Impeller (67) housing (68).	Install in	
	j. Seat assembly (66) and gasket (65)	Install.	
	k. Seal assembly (64) install.	Lubricate with liquid soap and	
	l. Pump cover	Install.	

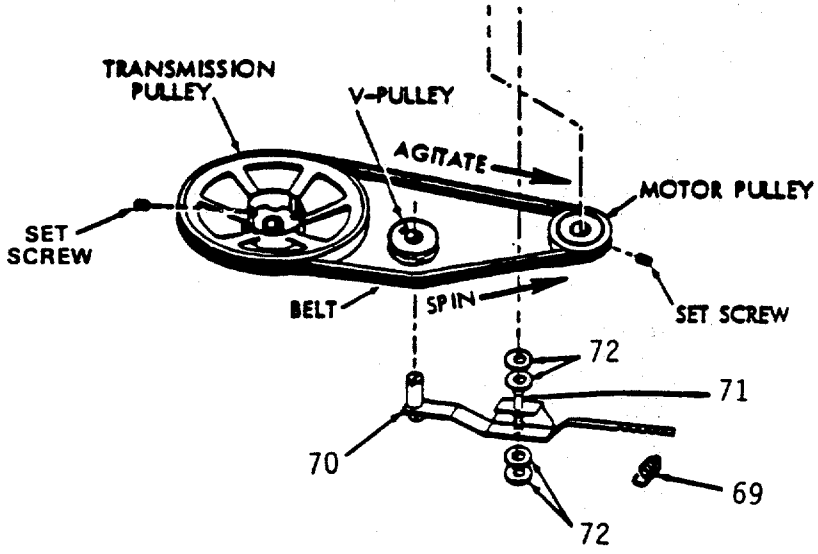
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	m. Cover screws (62)	Install.	Position pump in location.
	n. Mounting screws (61)	Install.	
	o. Impeller screw (60)	Install.	
	p. Hoses (58) and clamps (59)	Install.	
	q. Washer front panel	Install.	Refer to paragraph 4-41.1 .



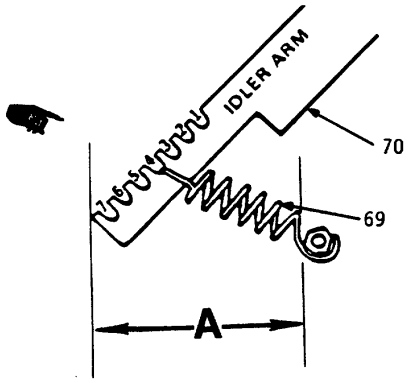
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Continued).			
11. Idler Arm	a. Pump assembly	Remove.	Refer to step 10.
	b. Tension spring (69)	Remove.	
	c. Idler arm (70)	Slide off the round spacer (71).	



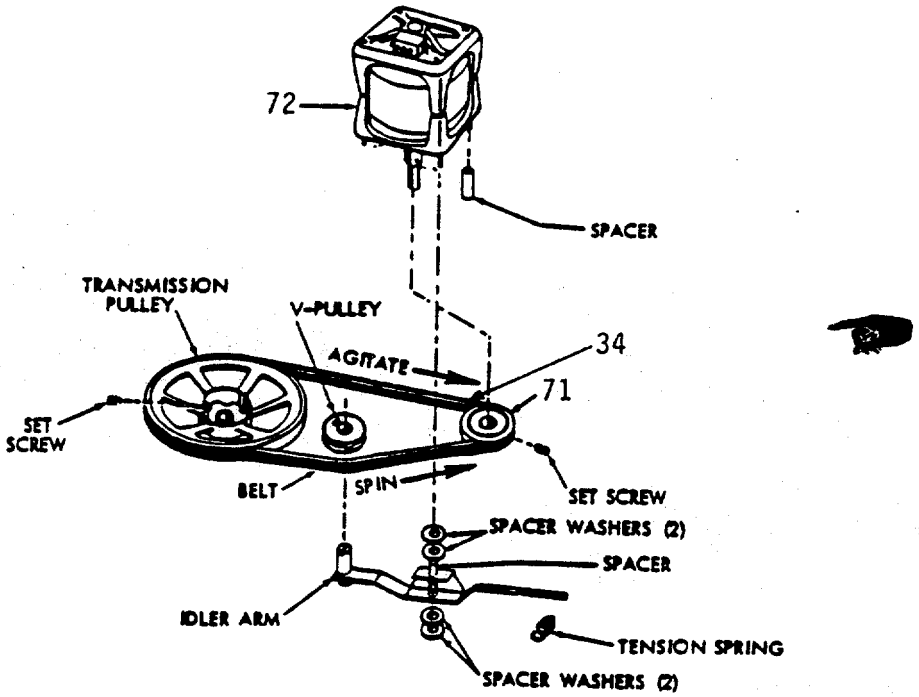
4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Continued).			
	d. Spacer washers (72)	Remove two above and below the arm.	
	e. Spacer washers (72)	Lightly grease and install.	
	f. Idler arm (70)	Slide over spacer (71) and install.	
	g. Tension spring (69)	Install.	Use new spring if over stretched
	h. Pump assembly 10.	Install.	Refer to step
ADJUSIMENT			
12. Idler arm	a. Tension spring (69)	Install in number four (4) slot on idler arms (70).	
	b. Dimension "A"	Measure in inches.	If Dimension "A" measures 3-1/4in. Use idler notch No.1, 3-1/8in. Use idler notch No.2, 3-in. Use idler notch No.3, 2-7/8in. Use idler notch No.4, 2-3/4in. Use idler notch No.5, 2-5/8in. Use idler notch No.6, 2-1/2in. Use idler notch No.7.



4-41.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
13. Motor	a. Pump assembly	Remove.	Refer to step 10.
	b. Drive belt (34)	Remove from motor pulley (71).	
	c. Idler arm assembly	Remove.	Refer to step 11.
	d. Motor (72)	Disconnect motor leads and remove.	
	e. Motor (72)	Reconnect leads and install.	
	f. Idler arm assembly	Insta1.	Refer to step 11.
	g. Drive belt (34)	Install.	
	h. Pump assembly	Install.	Refer to step 11.



4-41.3. DRYER MECHANISM - MAINTENANCE INSTRUCTIONS

This task covers:

a. Inspection **b. Service** **c. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

Drive belts
Thermal fuse
Water level safety switch

Personnel Required

1

References

Para 4-41.4 Washer/Driver schematics.

Equipment Condition Para | Condition Description

4-41.1 Exterior Cabinet removal.

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

In order to prevent injury, tag and place the circuit breaker in the OFF position.

INSPECTION

1. Dryer	a. Drive belt	Inspect for breaks, cracks, and fraying.	
	b. Electrical components	Inspect for signs of damage.	

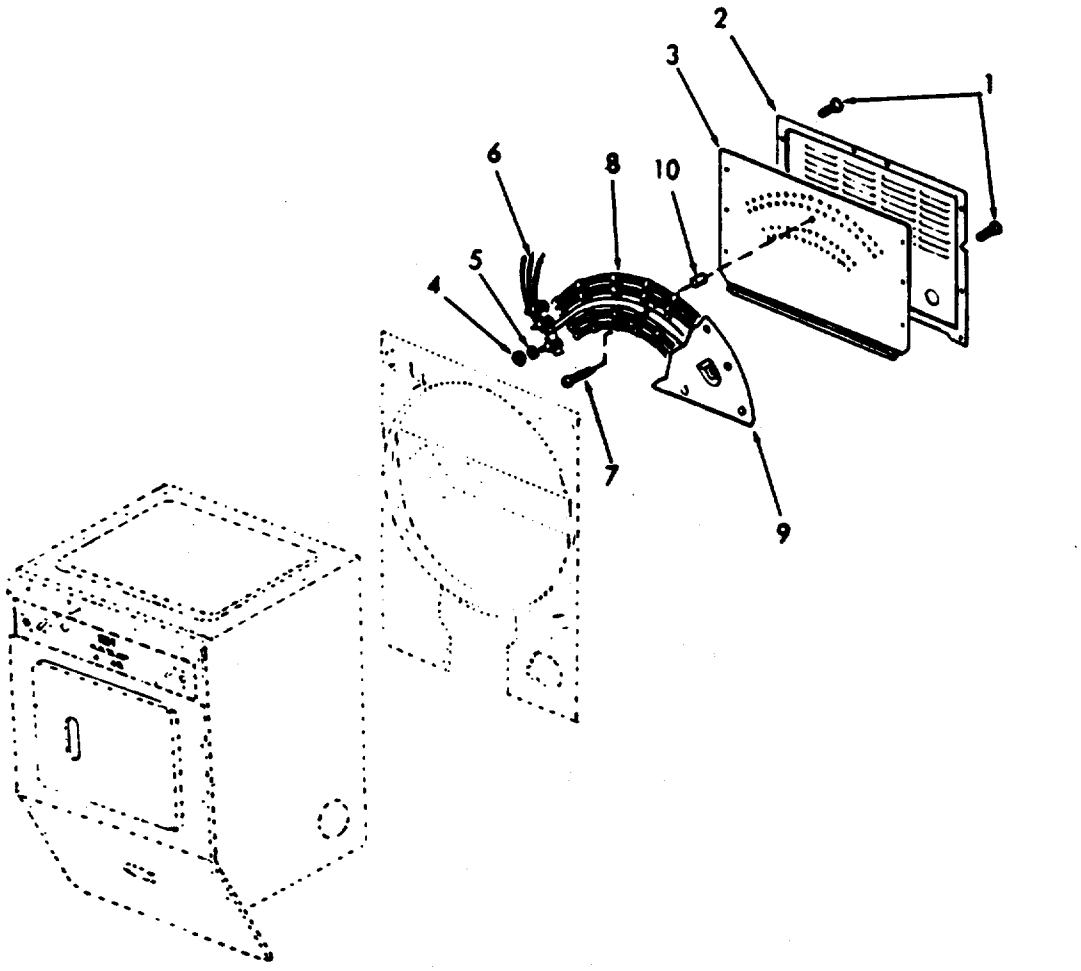
4-41.3. DRYER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
SERVICE			
2.	a. Lint filter	Clean.	
	b. Overall	Clean.	
REPAIR			
3. Heating element	a. Screws (1)	Remove.	
	b. Louvered vent panel (2)	Remove.	
	c. Heater support panel (3)	Remove.	
	d Wiring	Tag.	Refer to schematic on page 4-1082.2.
	e. Nuts (4), washers (5), and wiring harness (6)	Remove.	
	f. Screws (7), heater (8), spacers (9), and heater shield (10)	Disassemble from support panel (3).	
	g. Heater (8)	Replace.	
	h. Heater (8), heater shield (10), support panel (3), spacers (9), and screws (7)	Reassemble.	
	i. Wiring harness (6), washers (5), and nuts (4)	1. Install. 2. Remove tags.	

4-41.3. DRYER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



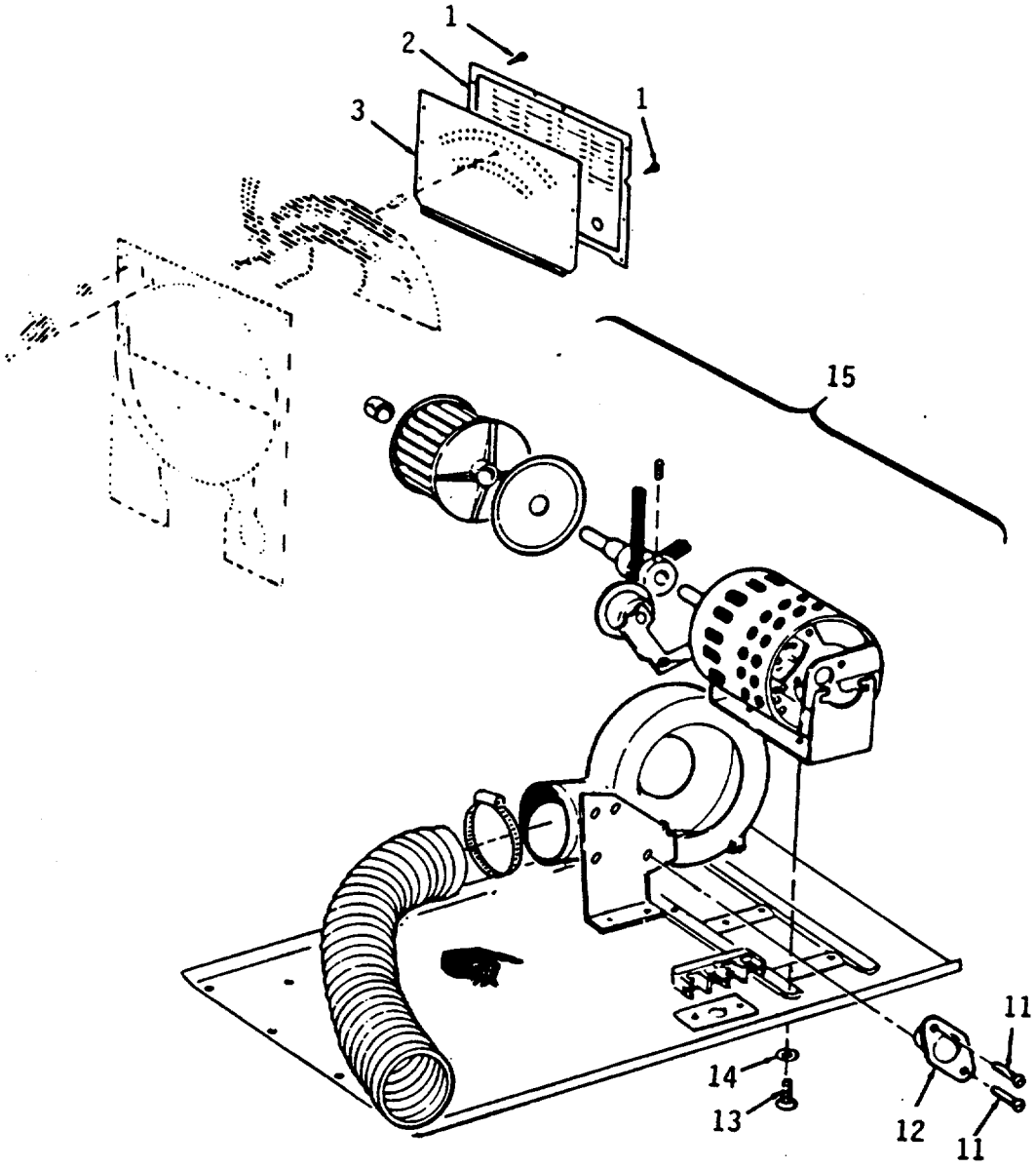
4-41.3. DRYER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	j. Heater support panel (3), vent panel (2), and screws (1)	Install.	
4. Control thermostat	a. Wiring	Disconnect.	Refer to schematic on page 4-1082.2.
	b. Screws (11)	Remove.	
	c. Control thermostat (12)	Replace.	
	d. Screws (11)	Install.	
	e. Wiring	Reconnect.	
5. Drive belt	a. Motor wiring	Tag and disconnect.	Refer to schemmatic on page 4-1082.2.
	b. Screws (13) and washer (14)	Remove.	
	c. Motor and blower assembly (15)	Remove.	

4-41.3. DRYER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



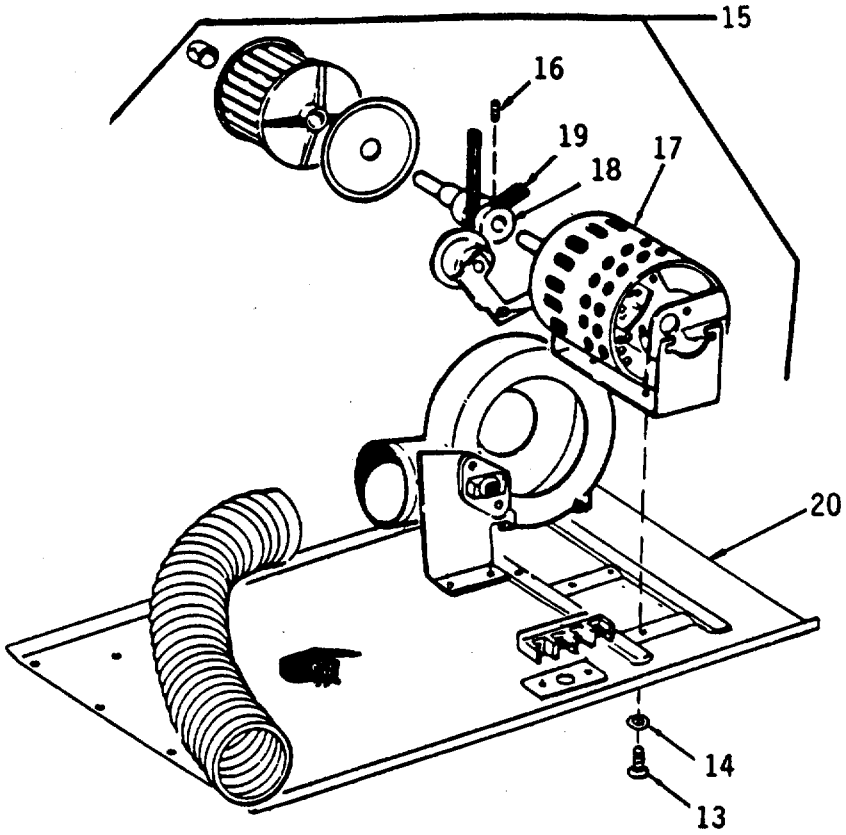
4-41.3. DRYER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

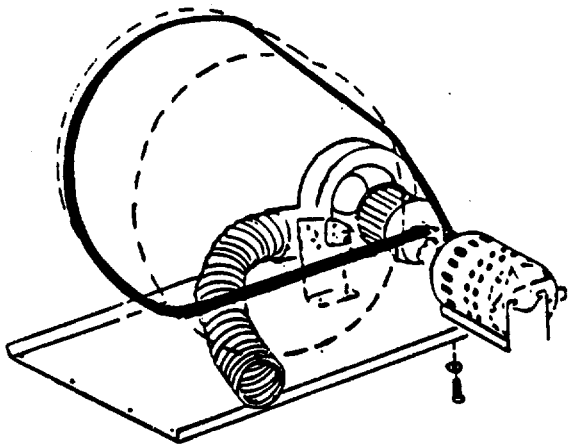
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Setscrews (16)	Remove.	
	e. Motor (17)	Slide out of drive sheave (18).	
	f. Drive belt (19)	Remove.	
	g. Drive belt (19)	Install	
	h. Motor (17)	Insert in drive sheave (18).	
	i. Motor and blower assembly (15)	Place on base.	
	j. Screws (13) and washers (14)	Install.	
	k. Setscrews (16)	Tighten.	
	l. Motor wiring	Reconnect and remove tags.	Refer to schematic on page 4-1082.2.

4-41.3. DRYER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)





4-41.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS

This task covers:

a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

Para

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition Condition Description

4-41.1 Exterior Cabinet removal.

Special Environmental Conditions

NONE

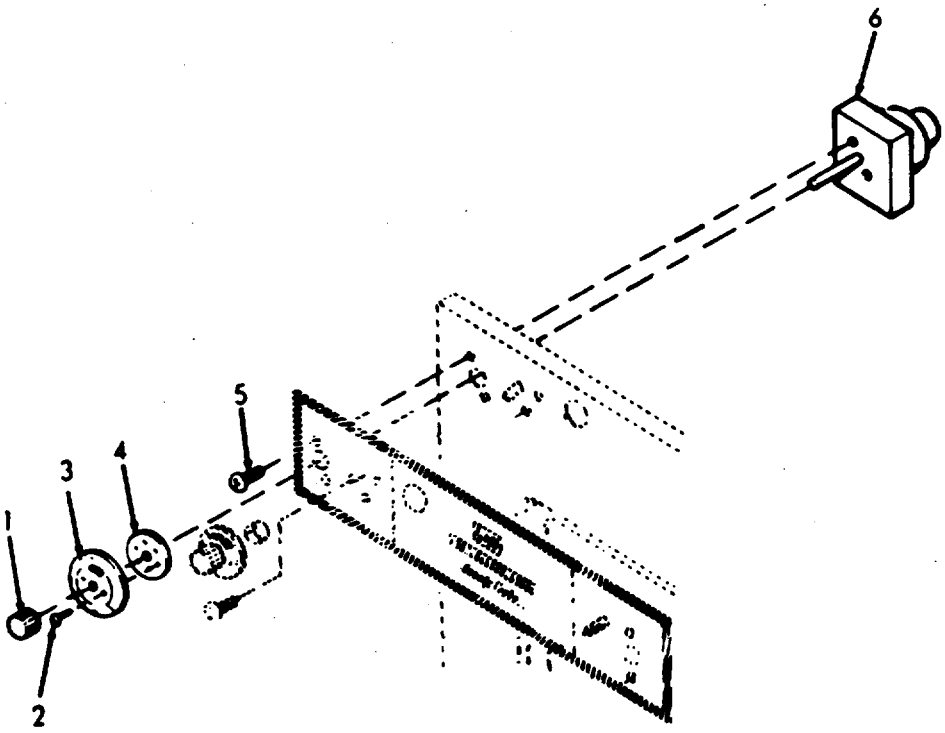
General Safety Instructions

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
		WARNING	
		In order to prevent injury, tag and place the circuit breaker in the OFF position.	
INSPECTION			
1. Controls	a. All controls	Inspection for proper operation.	
		NOTE	
Repair of Dryer and Washer controls require removal of dryer top panel. Refer to paragraph4-41.1 .			
REPAIR			
2. Dryer timer	a. Wiring	Tag and disconnect.	Refer to schematic on page 4-1082.2.
	b. Knob (1)	Pull off.	
	c. Screws (2)	Remove.	

4-41.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Dial (3) and dial hub (4)	Remove.	
	e. Screws (5)	Remove.	
	f. Dryer timer (6)	Remove and replace with new timer.	
	g. Screws (5)	Install.	
	h. Dial (3), dial hub (4), and screws (2)	Install.	
	i. Knob (1)	Install.	
	j. Wiring	Reconnect and remove tags.	Refer to schematic on page 4-1082.2.

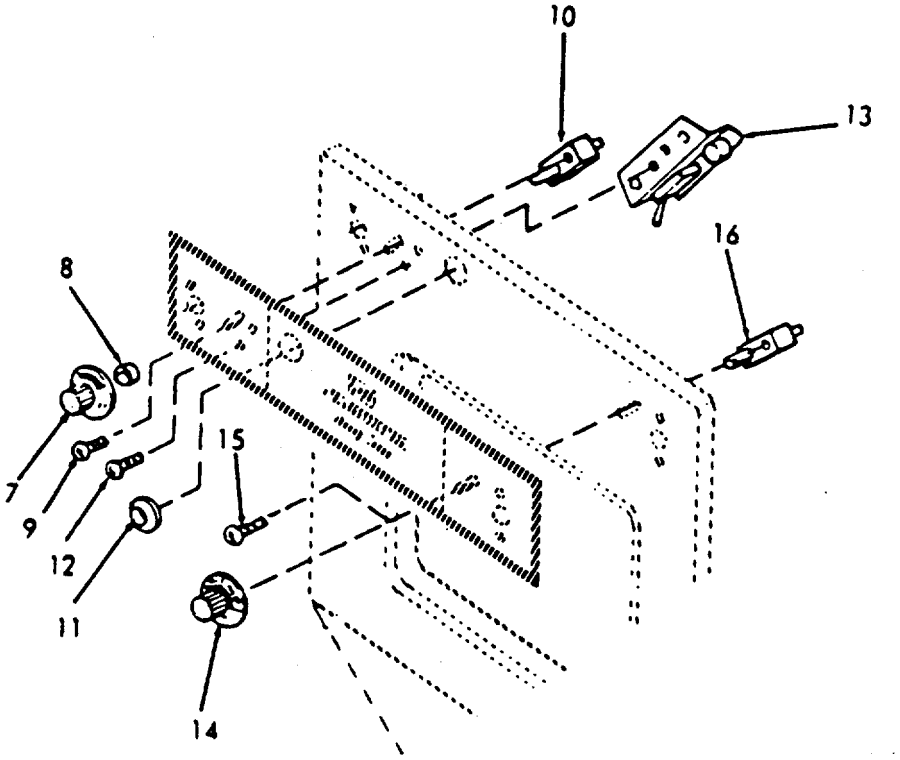


4-41.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
3. Dryer fabric selector switch	a. Wiring	Tag and disconnect.	Refer to schematic on page 4-1082.2
	b. Knob (7)	Remove,	
	c. Knob retainer clip (8)	Remove.	
	d. Screws (9)	Remove.	
	e. Switch (10)	Replace.	
	f. Screws (9)	Instal1.	
	g. Knob retainer clip (8) and knob (7)	Install.	
	h. Wiring remove tags.	Reconnect and on page 4-1082.2	Refer to schematic on page 4-1082.2.
4. Dryer door and pushbutton start switch	a. Wiring.	Tag and disconnect.	Refer to schematic on page 4-1082.2.
	b. Knob (11)	Remove.	
	c. Screws (12)	Remove.	
	d. Switch (13)	Replace.	
	e. Screws (12)	Install.	
	f. Knob (11)	Install.	
	g. Wiring	Reconnect and remove tags.	Refer to schematic on page 4-1082.2

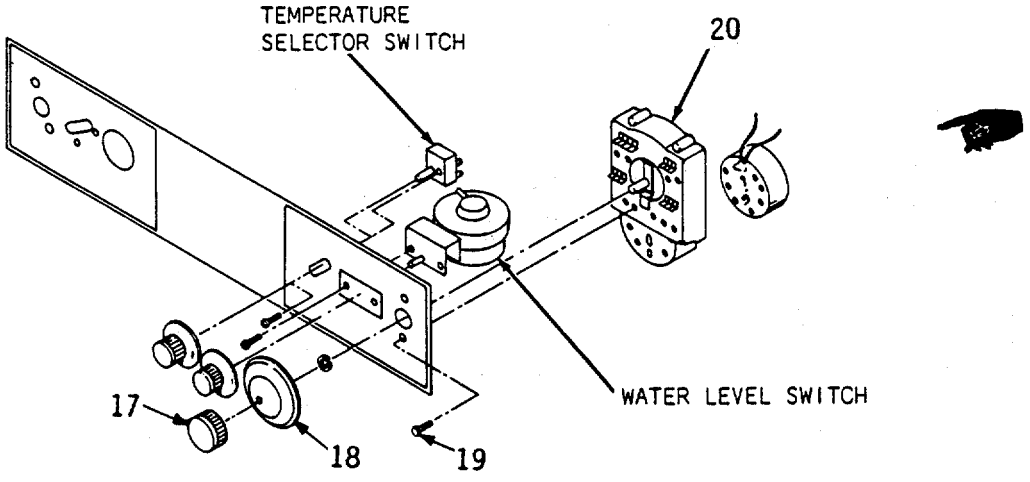
4-41.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
5. Water temperature selector switch	a. Wiring.	Tag and disconnect.	Refer to schematic on page 4-1082.3 .
	b. Knob (14)	Remove.	
	c. Screws (15)	Remove.	
	d. Switch (16)	Remove and replace with new switch.	Transfer wires to replacement switch.
	e. Screws (15)	Install.	
	f. Knob (14)	Install.	
	g. wiring	Reconnect and remove tags.	Refer to schematic on page 4-1082.3 .



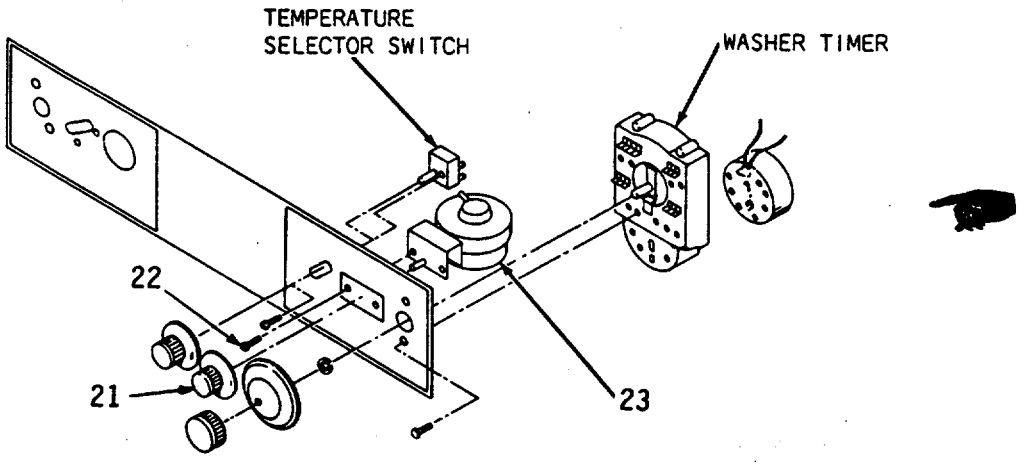
4-41.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
6. Washer Timer	a. Wiring	Tag and disconnect.	Refer to schematic on page 4-1082.3 .
	b. Knob (17)	Turn counter-clockwise to remove	
	c. Dial (18)	Remove.	
	d. Screw (19)	Remove.	
	e. Timer (20)	Remove and replace.	Transfer wires to replacement timer.
	f. Screws (19)	Install.	
	g. Dial	Install.	Note dial pointer in relation to "T" stamped on timer shaft end for proper location.
	h. Knob (17)	Install and turn clockwise to secure.	



4-41.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
7. Water level switch	a. Wiring	Tag and disconnect.	Refer to shemmatic on page 4-1082.3.
	b. Knob (21)	Pull off.	
	c. Screws (22)	Remove.	
	d. Water level switch (23)	Remove.	Transfer wires and pressure tube to replacement switch.
	e. Screws (22)	Install.	
	f. Knob (21)	Install.	

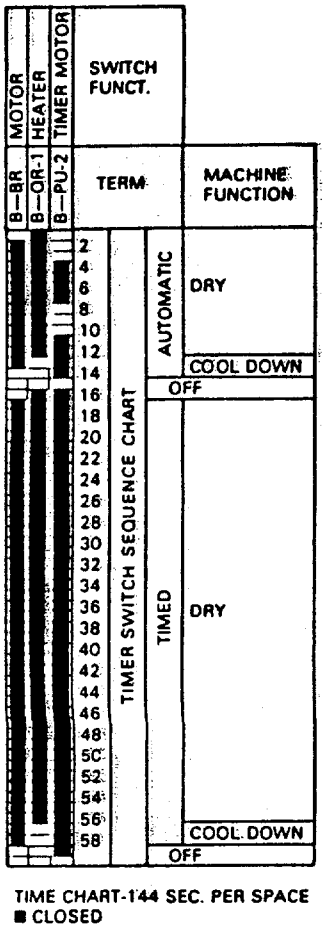


4-41.4. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).

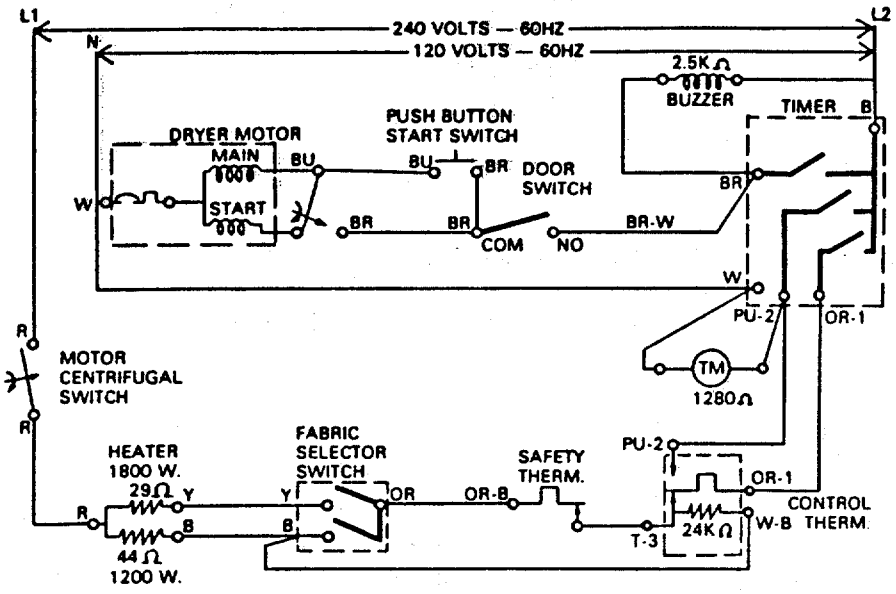
LOCATION	ITEM	ACTION	REMARKS

REAIR (Cont)

DRYER SCHEMATIC



TIME CHART-144 SEC. PER SPACE
■ CLOSED



SCHEMATIC NOTES

- TIMER SWITCH
- INTEGRAL COMPONENT CONNECTION
- HARNESS WIRING
- TERMINAL CONNECTION
- CABINET CONNECTOR TERMINAL
- MOTOR OVERLOAD PROTECTOR
- (TM) TIMER MOTOR

FABRIC SELECTOR SWITCH

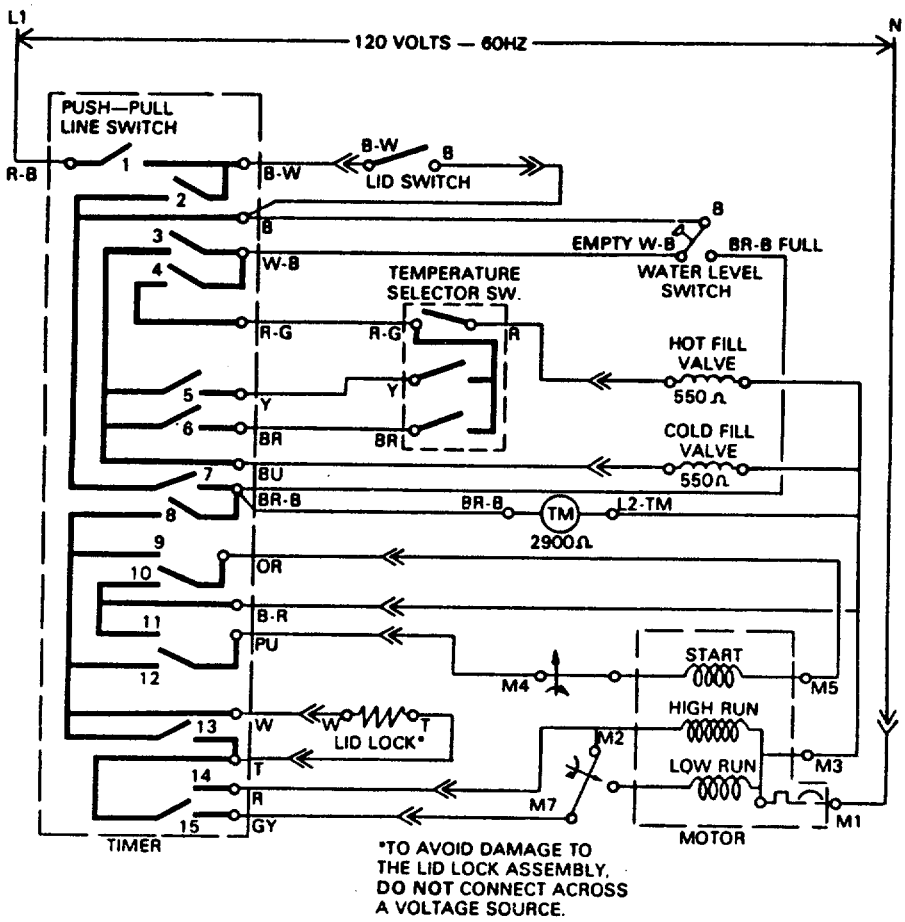
SWITCH POSITION	OR-Y	OR-B
REGULAR-PERM. PRESS	X	X
DELICATE-SHEER	X	
NO HEAT-AIR FLUFF		

4-41.4. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

WASHER SCHEMATIC



SCHEMATIC NOTES

- TIMER SWITCH
- INTEGRAL COMPONENT CONNECTION
- HARNESS WIRING
- TERMINAL CONNECTION
- CABINET CONNECTOR TERMINAL
- MOTOR OVERLOAD PROTECTOR
- (TM) TIMER MOTOR

TEMPERATURE SELECTOR SWITCH

SWITCH POSITION	RG-R	RG-Y	RG-BR
HOT WASH-WARM RINSE	X		X
COLD WASH-COLD RINSE		X	X
WARM WASH-COLD RINSE	X	X	
HOT WASH-COLD RINSE	X		

4-42. SANITIZING SINK HEATER - MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection **b. Replace** **c. Repair**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material /Parts
NONE

Personnel Required
1

References
NONE

Equipment Condition
Condition Description
NONE

Special Environmental Conditions
NONE

General Safety Instructions
Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
		WARNING	
		In order to avoid shock and possible serious injury, place and tag circuit breaker in the OFF position.	
INSPECTION			
1. Heater	a. Wiring	Inspect for breaks and signs of damage.	
	b. Control box	Inspect for signs of damage.	
	c. Thermometer	Inspect for damage.	

4-42. SANITIZING SINK HEATER - MAINTENANCE INSTRUCTIONS (Continued).

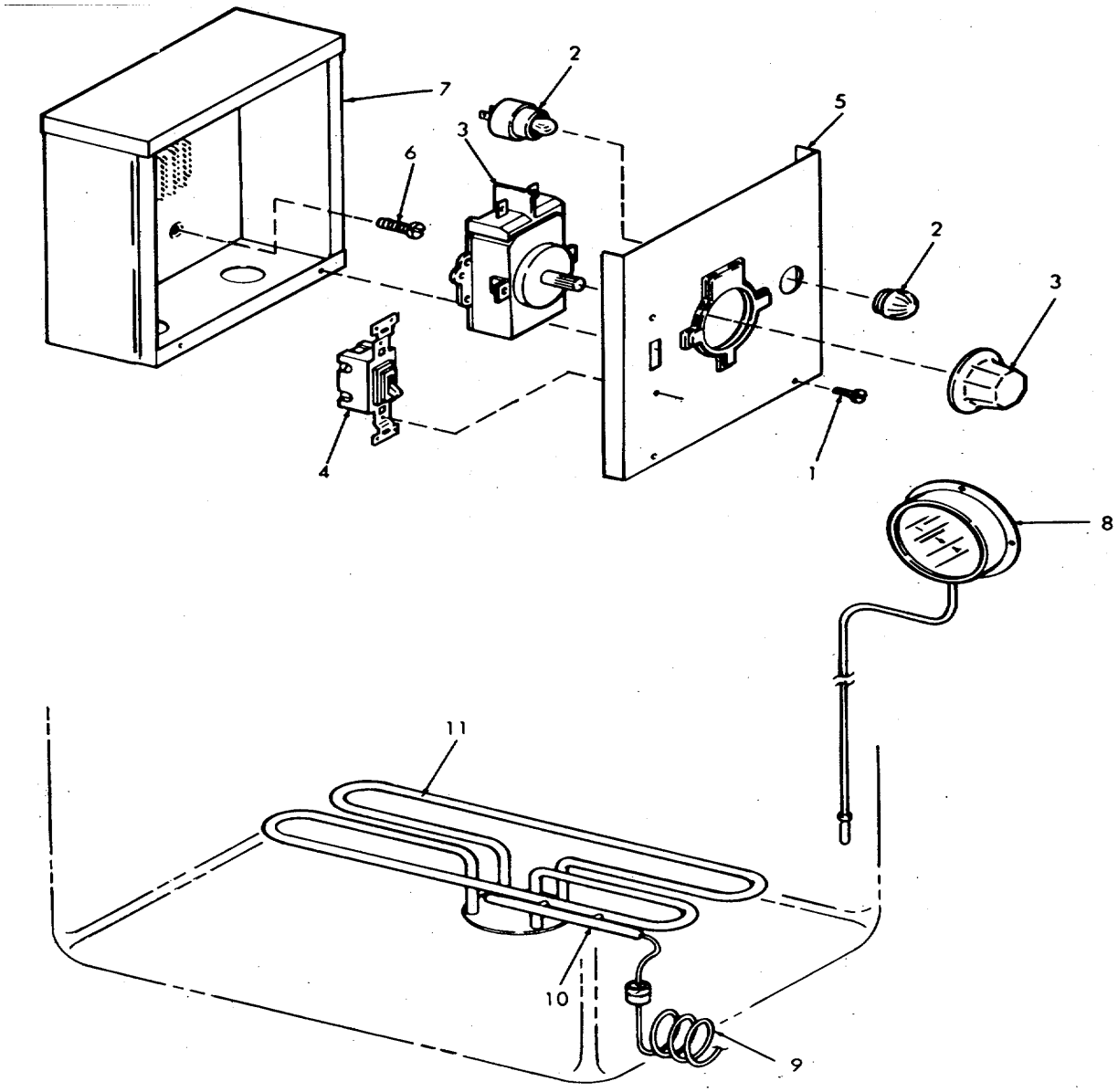
LOCATION	ITEM	ACTION	REMARKS
REPLACE			
2.	a. Wiring	Tag and disconnect.	
	b. Heater	Replace.	
	c. Control box	Replace.	
REPAIR			
3.	Repair or replace components as required.		

1 Round head slotted screw
2 Pilot light
3 Hi-Thermo and Di-thermo control
4 Double pole switch
5 Enclosure cover
6 Round head slotted screw
7 Enclosure
8 Temperature dial
9 Capillary tubing
10 Capillary bulb
11 Immersion element

4-42. SANITIZING SINK HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection **b. Repair** **c. Adjustment**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
Thermocouple or accurate oven thermometer

Material/Parts
NONE

Personnel Required
1

References
NONE

Equipment Condition
NONE

Special Environmental Conditions
NONE

General Safety Instructions
Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
		WARNING	
		In order to avoid shock and possible serious injury, place and tag disconnect switch in the OFF position.	
INSPECTION			
1. Heater	a. Wiring	Inspect for breaks and signs of damage.	
	b. Oven	Inspect for proper operation.	
	c. Cook top	Inspect for proper operation.	

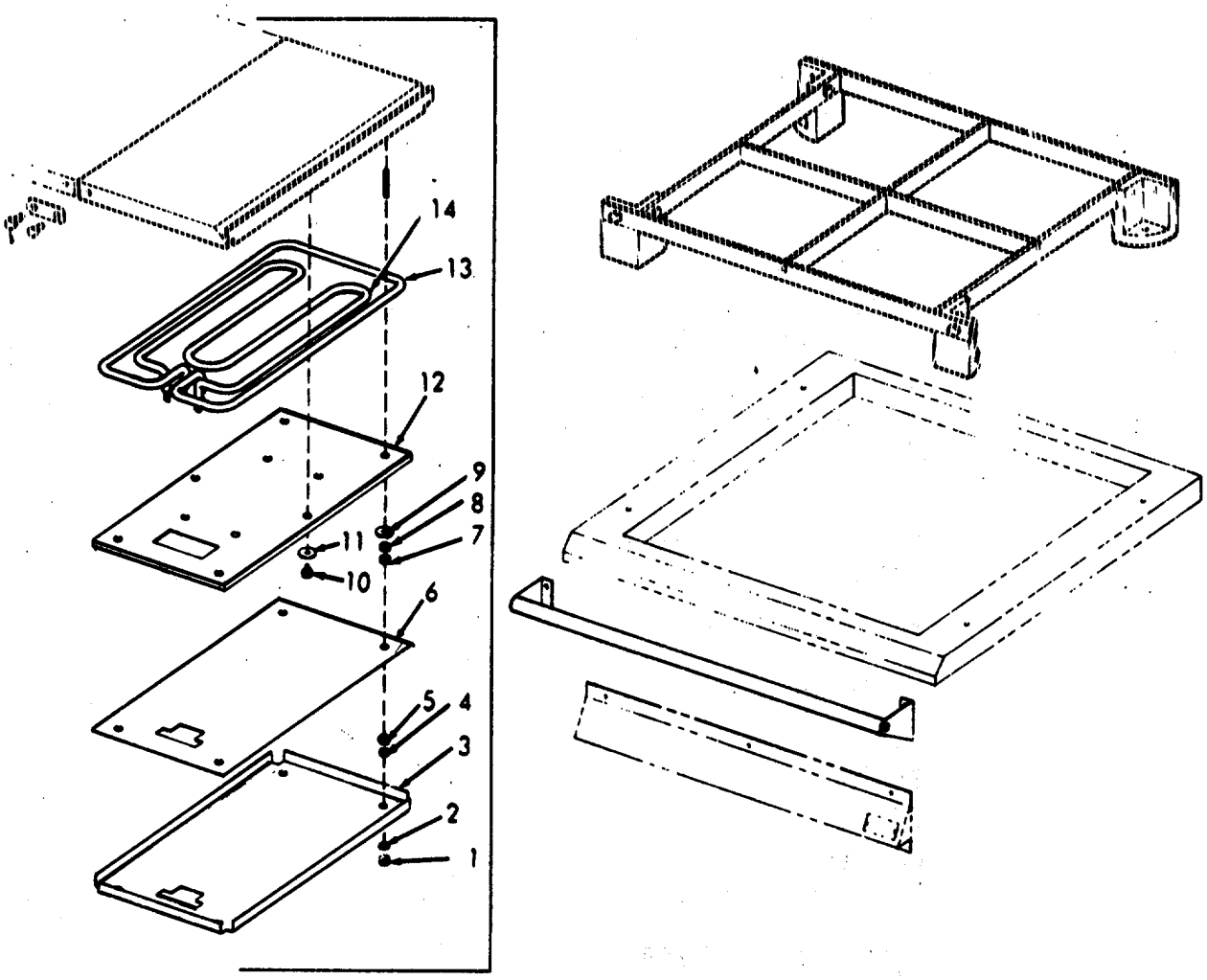
4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Cook top heating element	a. Cook top	Lift up at front and prop in a convient position.	
	b. Nuts (1) and lock-washers (2)	Remove.	
	c. Outside baffle shield (3)	Remove.	
	d. Lock-washers (4) and nuts (5)	Remove.	
	e. Inside baffle (6)	Remove.	
	f. Nuts (7), lock-washers (8), and flat washers (9)	Remove.	
	g. Screws (10) and flat washers (11)	Remove.	
	h. Clamp plate (12)	Remove.	
	i. Heating elements (13 or 14)	Replace defective element.	Refer to schematic on page 4-1100 .

4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



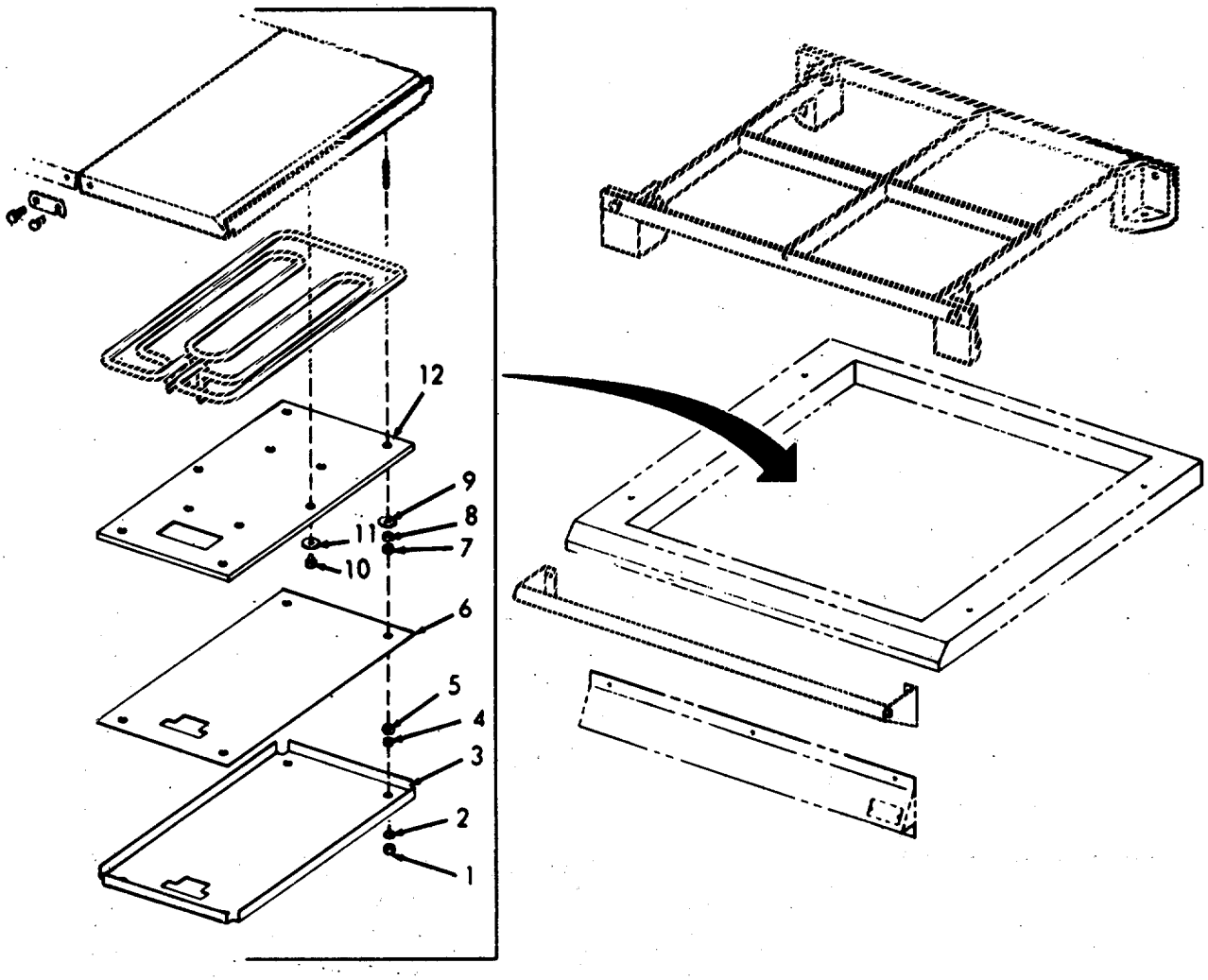
4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	j. Clamp plate (12), screws (10), and flat washers (11)	Install.	
	k. Flat washers (9), lock-washers (8), and nuts (7)	Install.	
	l. Inside baffle (6), lock-washers (4), and nuts (5)	Install.	
	m. Outside baffle shield (3), lock-washers (2), and nuts. (1)	Install.	
	n. Wiring	Make sure wires will not short against element terminals.	
	o. Cook top	Lower into place.	

4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



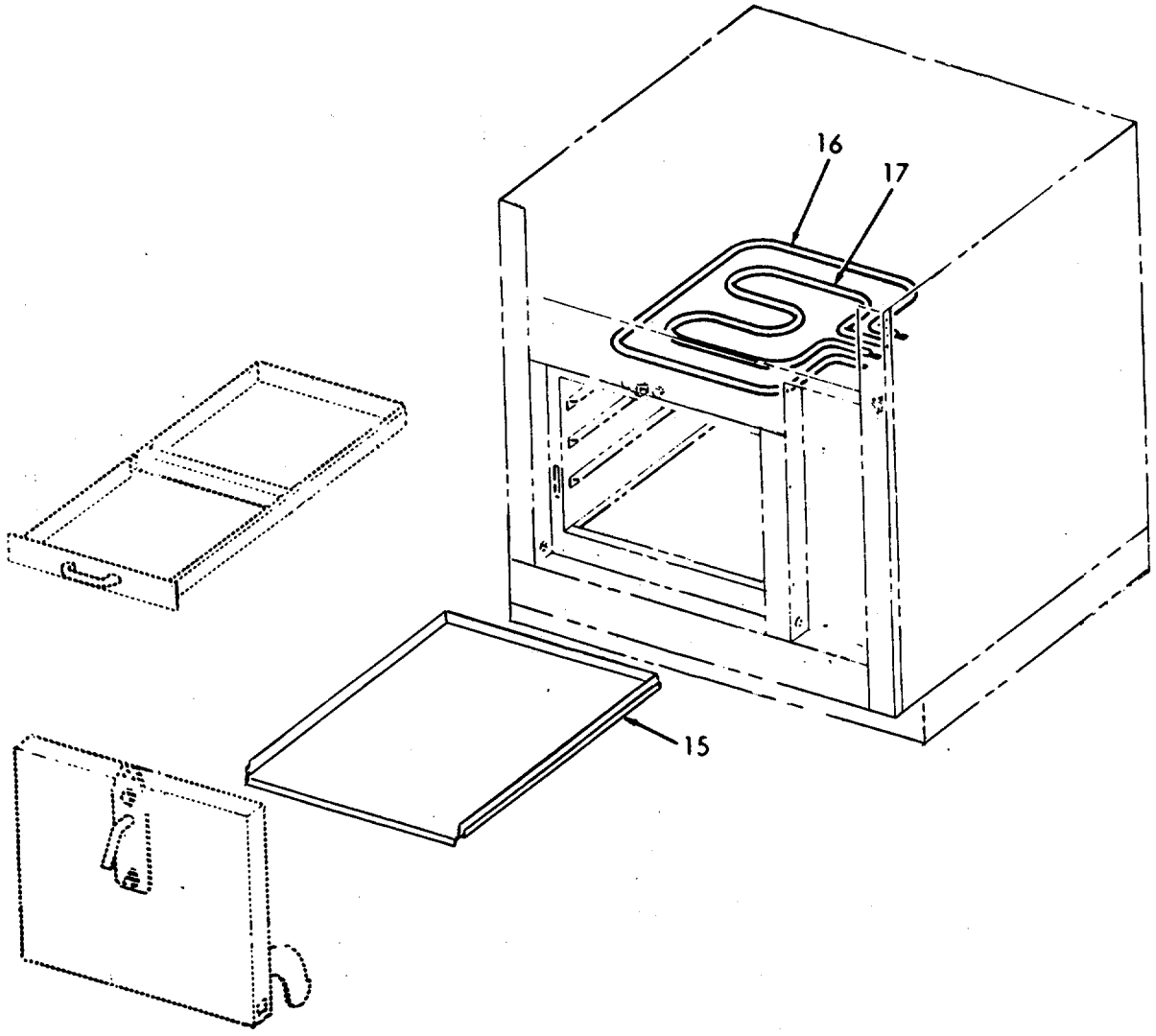
4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
3. Oven Heating element	a. Baffle deck (15)	Remove.	
	b. Screws	Remove four screws holding heater element to oven.	
	c. Screws	Remove four screws holding element wall retainer.	
	d. Element assembly	Slide out until wiring terminals are accessible.	
	e. Wiring	Tag and disconnect.	Refer to schematic on page 4-1132.
	f. Element assembly	Remove.	
	g. Element (16 or 17)	Remove by spreading burner bar clips.	
	h. Wiring	Reconnect and remove tags.	Refer to schematic on page 4-1132.
	i. Element assembly	Install.	
	j. Screws	Install screws holding element wall retainer.	
	k. Screws	Install screws holding heater element to oven.	
	l. Baffle deck (15)	Install.	

4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-1093

4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

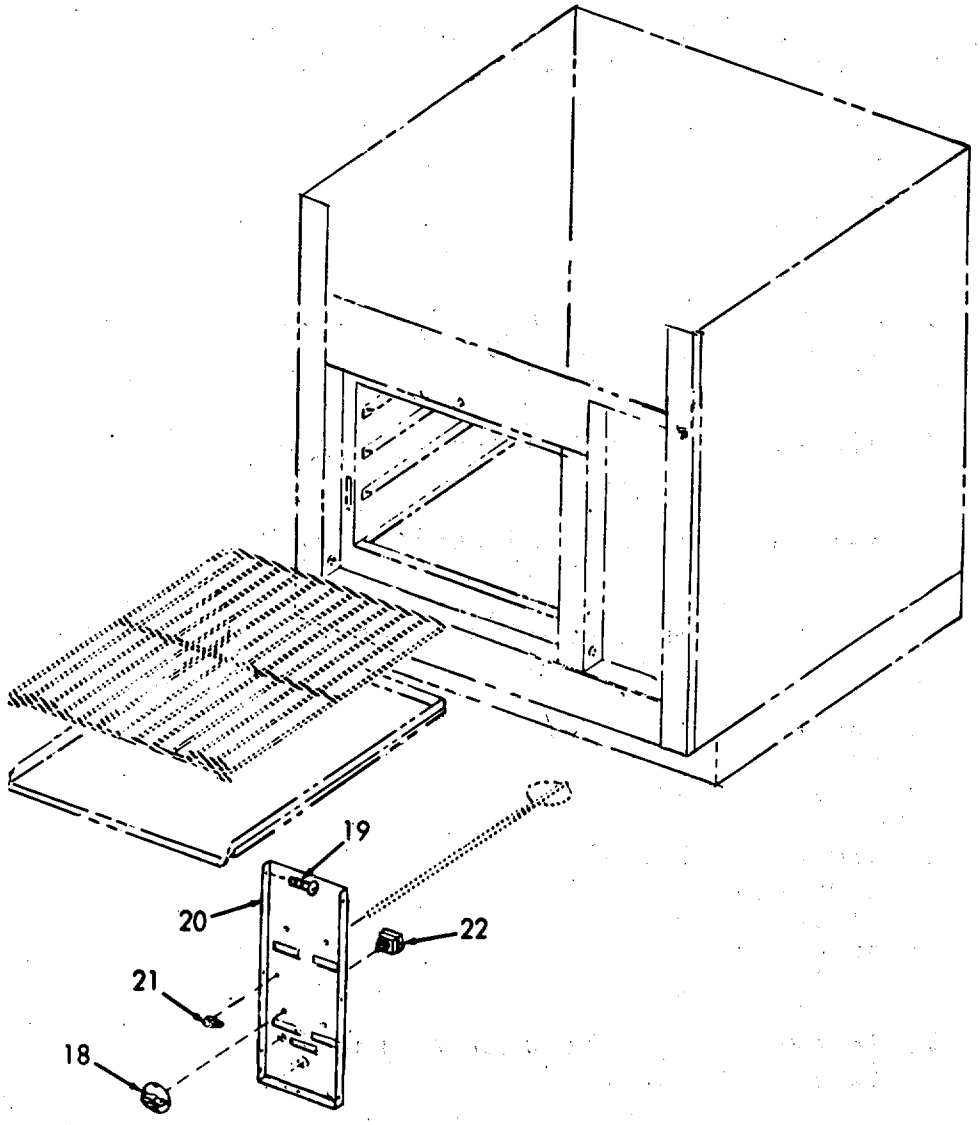
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
4. Three Heat switch	a. Switch knob (18)	Pull off.	
	b. Retaining nut and washer	Remove.	
	c. Screws (19)	Remove six screws attaching control panel (20).	
	d. Allen screws and damper knob (21)	Remove.	
	e. Control panel (20)	Pull forward 20 inches (51 cm)	
	f. Wiring	Tag and disconnect from switch (22).	
	g. Switch (22)	Remove and replace with new switch.	
	h. Wiring	Reconnect and remove tags .	
	i. Control panel (20)	Replace.	
	j. Damper knob and allen screws (21)	Install.	
	k. Screws (19)	Install control panel (20).	
	l. Retaining nut and washer	Install.	

4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

	m. Switch knob (18)	Install.	



4-1095

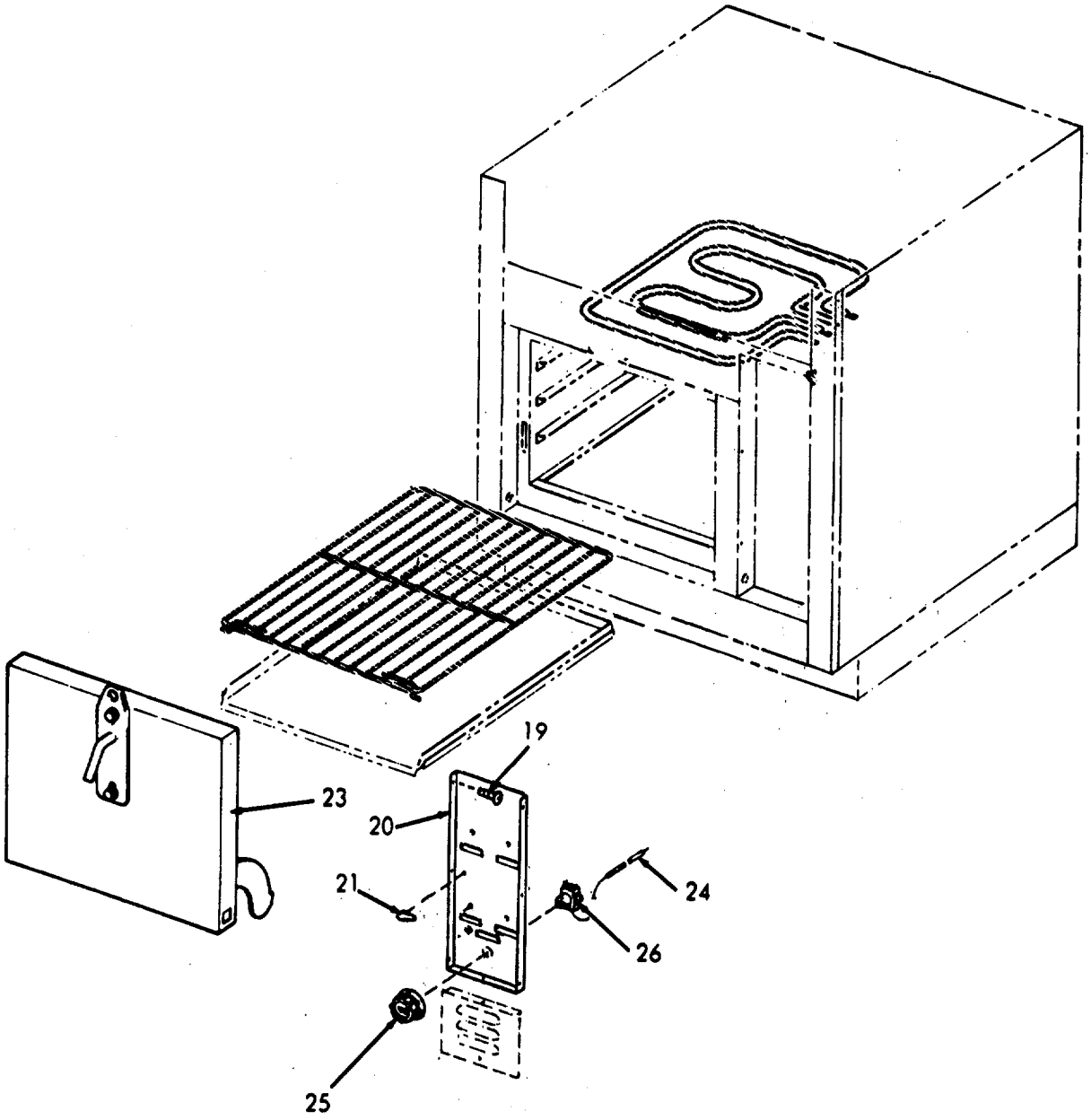
4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
5. Oven Thermostat	a. Screws (19)	Remove.	
	b. Allen screws and damper knob (21)	Remove.	
	c. Control panel (20)	Pull forward 20 inches (51 cm).	
	d. Oven door (23)	Open.	
	e. Thermo-stat bulb (24)	1. Slide bulb forward and clip capllary tube through slotted retaining clip. 2. Make an elongated 45° bend in the thermostat bulb and feed through the oven wall.	
	f. Wiring	Tag and disconnect.	Refer to schematic on page 4-1100.
	g. Knob (25)	Pull off.	
	h. Screws	Remove to free thermostat from control panel (20).	
	i. Thermo-stat (26)	Replace.	
	j. Screws	Install to attach thermo-stat to control panel (20).	
	k. Knob (25)	Install.	
	l. Wiring	Reconnect and remove tags.	

4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

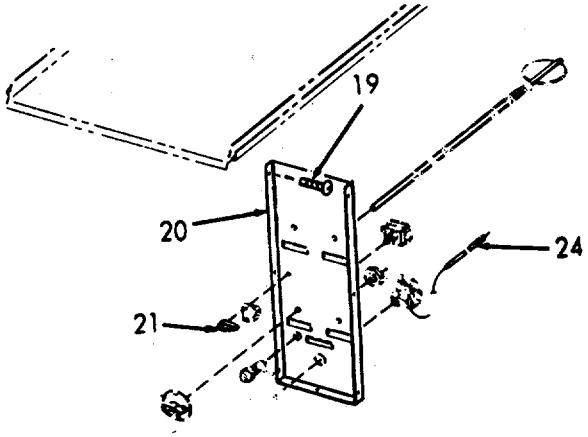
REPAIR (Cont)



4-1097

4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	m. Thermo-stat bulb (24)	Install.	a. Care should be taken during in-stallation to avoid bending the capillary tube to a radius smaller than 2 inches (5 cm). b. Do not bend the capil-lary tube where it joins the thermo-sensing bulb.
	n. Control panel (20)	Replace.	
	o. Allen screws and damper knob (21)	Install.	
	p. Screws (19)	Install.	



4-1098

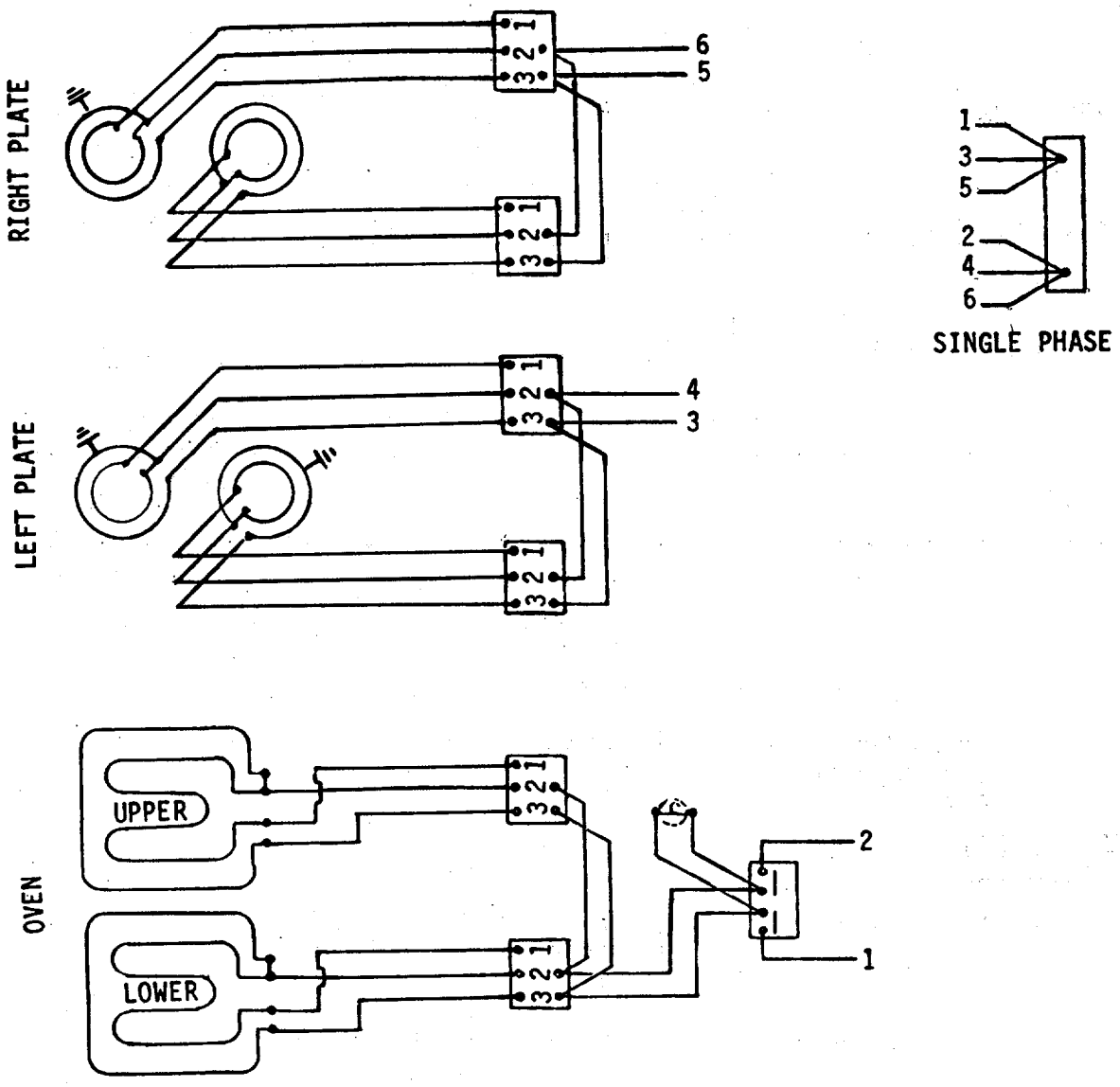
4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
ADJUSTMENT			
6.	Oven thermostat	a. Place a thermocouple or oven thermometer at the center of the oven 4 inches above the baffle deck. b. Set oven thermostat to 375° and allow one hour to gain steady temperature. (Turn upper switch OFF and lower switch on HIGH). c. If at the end of one hour the temperature reading is between 350 and 400°F the calibration is correct. If the reading is above or below these figures, proceed to recalibrate. d. Pull off the thermostat knob being careful not to rotate the dial or the dial hub. e. Loosen slightly the two formost screws. f. Hold the dial hub firmly and rotate the calibration plate clockwise if the temperature is below 350°F and counterclockwise if the temperature is above 400°F. **NOTE** The calibration plate has a scale and the letters "L" (lower) and "R" (raise). The scale on the calibration plate is marked at intervals of approximately 20°F.	

4-43. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENT (Cont)



4-44. TOASTER - MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment	References
NONE	NONE
Special Tools	**Equipment Condition** **Condition Description**
NONE	NONE
Material/Parts	**Special Environmental Conditions**
NONE	NONE
Personnel Required	**General Safety Instructions**
1	Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

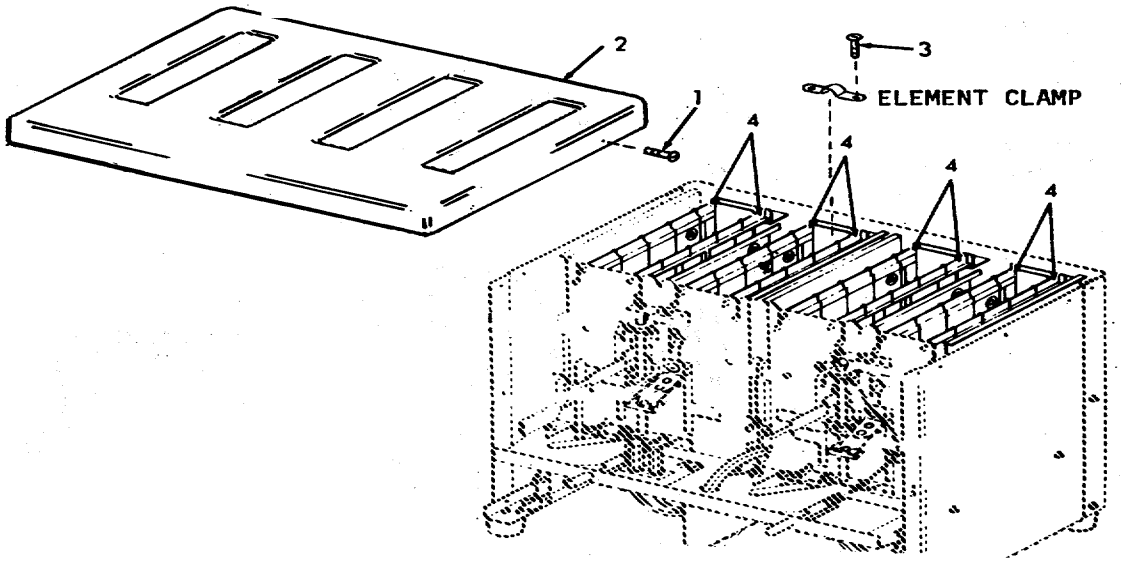
In order to prevent shock and possible injury, remove power cord from the source of electrical power.

INSPECTION

1.	Toaster	a. Wiring	Inspect for breaks, cracks, and signs of wear.
		b. Housing	Inspect for breaks, dents and signs of damage.
		c. Operation	Inspect for proper operation.

4-44. TOASTER - MAINTENANCE INSTRUCTIONS (Continued).

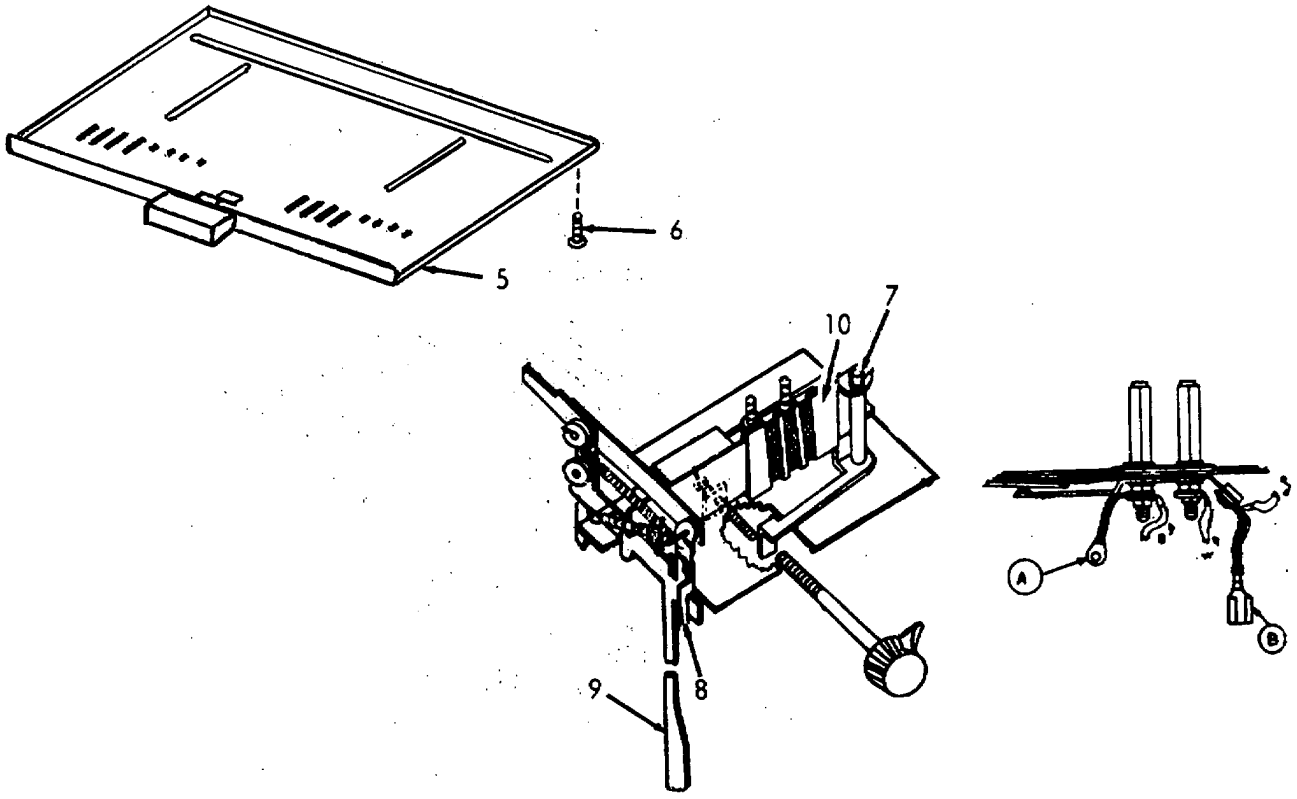
LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Element	a. Screws (1)	Remove.	
	b. Top (2)	Remove.	
	c. Element clamp screw (3)	Loosen screw at top of defective element.	Do not remove.
	d. Element (4)	1. Lift out.	
		2. Install.	a. Connect clip to top and back of toaster. b. Be sure bottom of element is in slot at bottom.
	e. Screw (3)	Tighten.	
	f. Top (2) and screws (1)	Install.	



4-1102

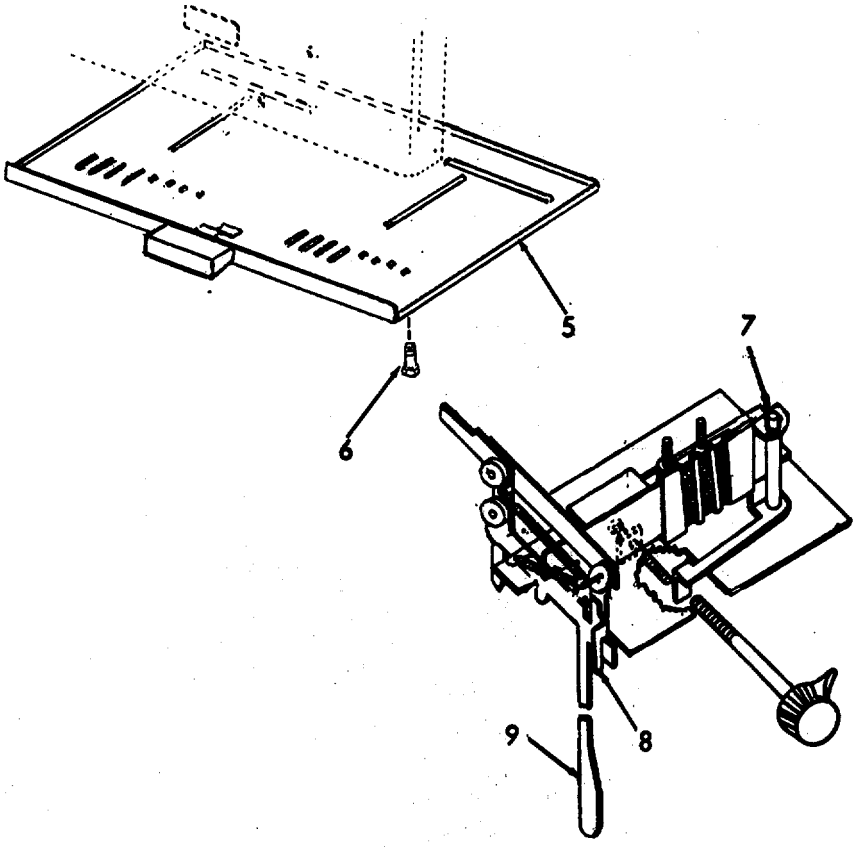
4-44. TOASTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
3. Auxiliary Heater	a. Crumb tray (5) and screws (6)	Remove.	
	b. Wires A and B	Disconnect.	
	c. Spring lock (7)	Remove.	
	d. Shunt switch arm (8)	1. Push back to clear reset lever (9). 2. Bend arm that switch is attached to (bend to right).	
	e. Auxiliary heater (10)	Replace with new auxiliary heater.	



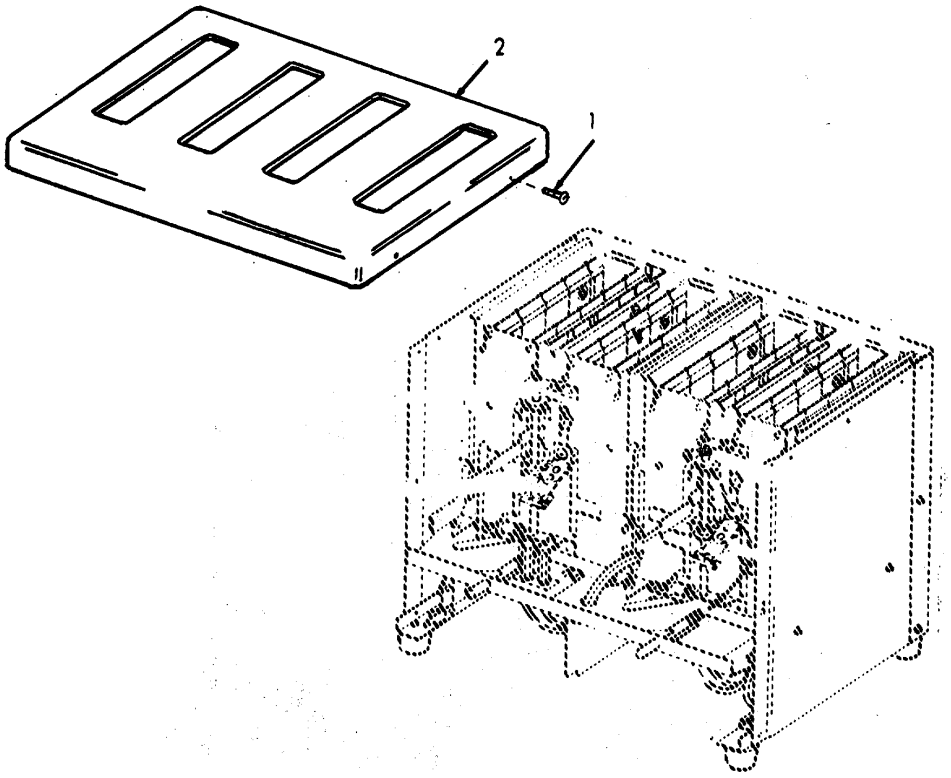
4-44. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	f. Shunt switch arm (8) and reset lever (9)	Relocate.	
	g. Spring lock (7)	Install.	
	h. Wiring	Install.	
	i. Crumb tray (5) and screws (6)	Install.	

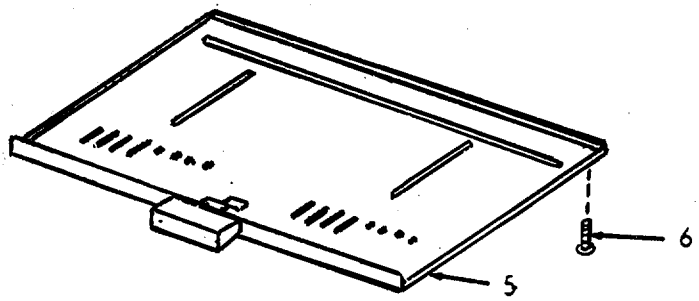


4-44. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
4. Timing unit	a. Screws (1)	Remove.	
	b. Top (2)	Lift off.	

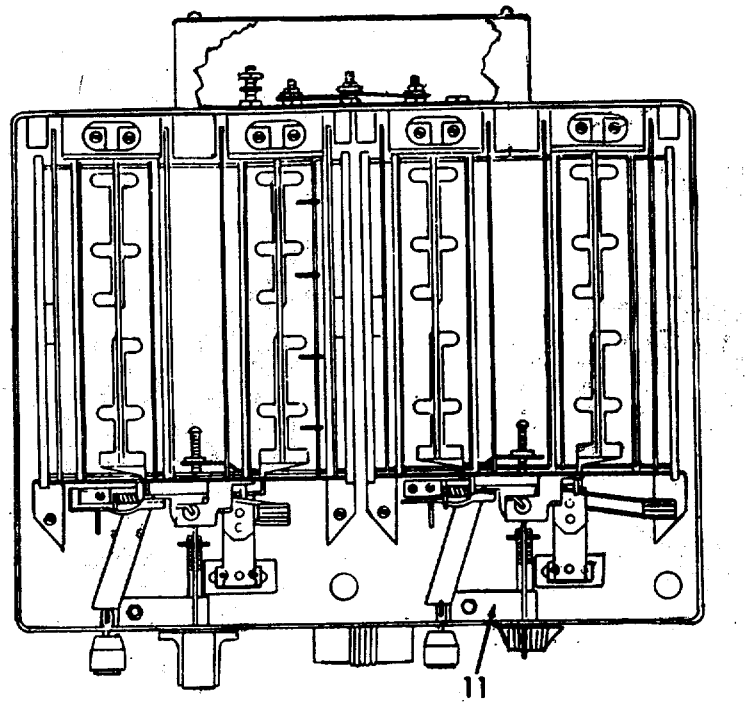


	c. Screws (6) and crumb tray (5)	Remove.	



4-44. TOASTER - MAINTENANCE INSTRUCTIONS.

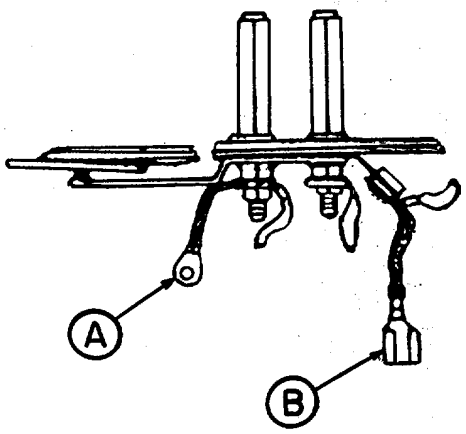
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Friction spring (11)	Remove.	
	e. Wiring	Remove three wires.	
	f. Screws	Remove screws that hold timer in place.	

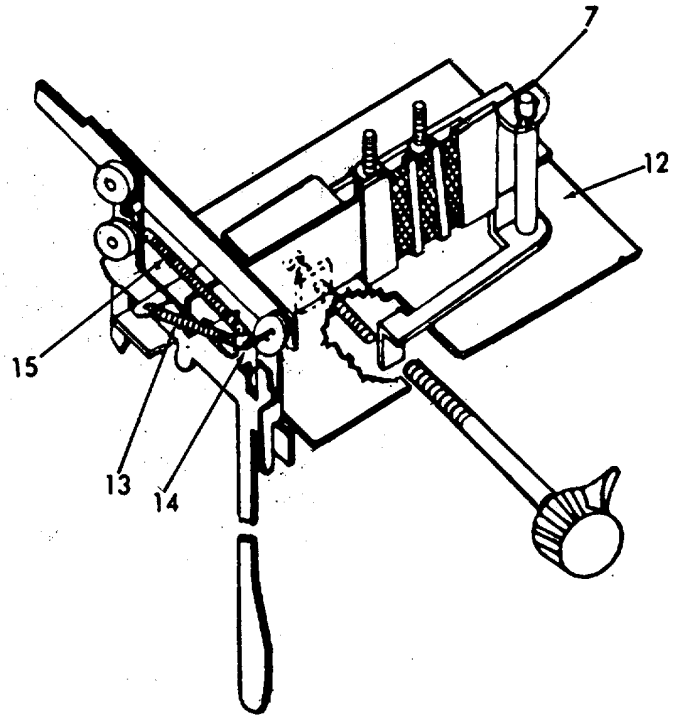


4-1106

4-44. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	g. Timer (12)	Remove.	
	h. Wires A & B	Disconnect.	
	i. Spring lock (7)	Remove and replace.	
	j. Spring (13)	Remove from screw (14).	
	k. Spring (15)	Remove from screw (14).	

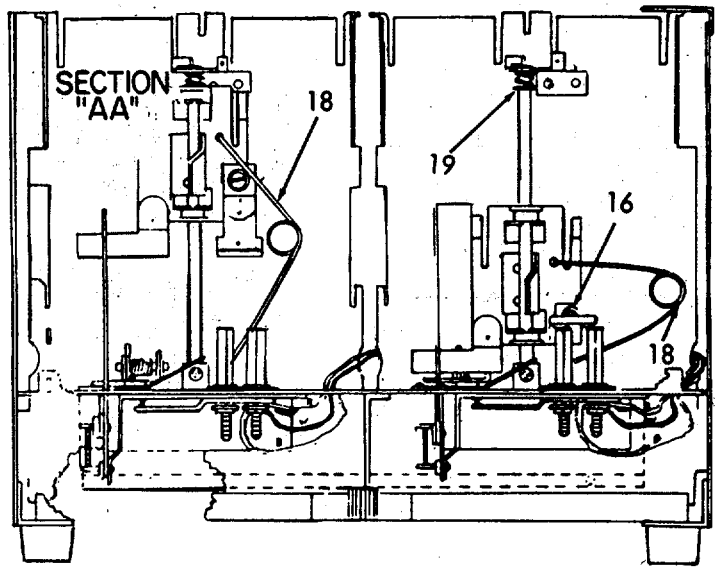




4-1107

4-44. TOASTER - MAINTENANCE INSTRUCTIONS.

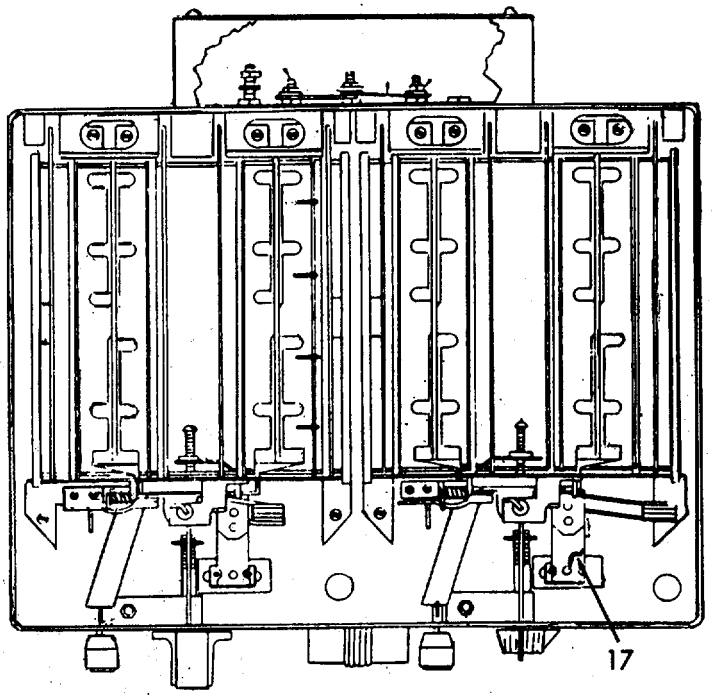
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
5. Top main Switch	a. Switch screw and nut (16)	Remove.	
	b. Switch (17)	Replace.	
	c. Switch screw and nut (16)	Install.	
6. Pop-up spring	Spring (18)	Replace if necessary.	
7. Bumper spring	Spring (19)	Replace if necessary.	



4-44. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-1109

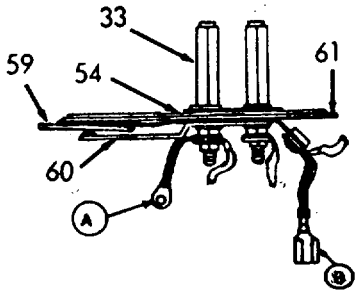
4-44. TOASTER - MAINTENANCE INSTRUCTIONS.

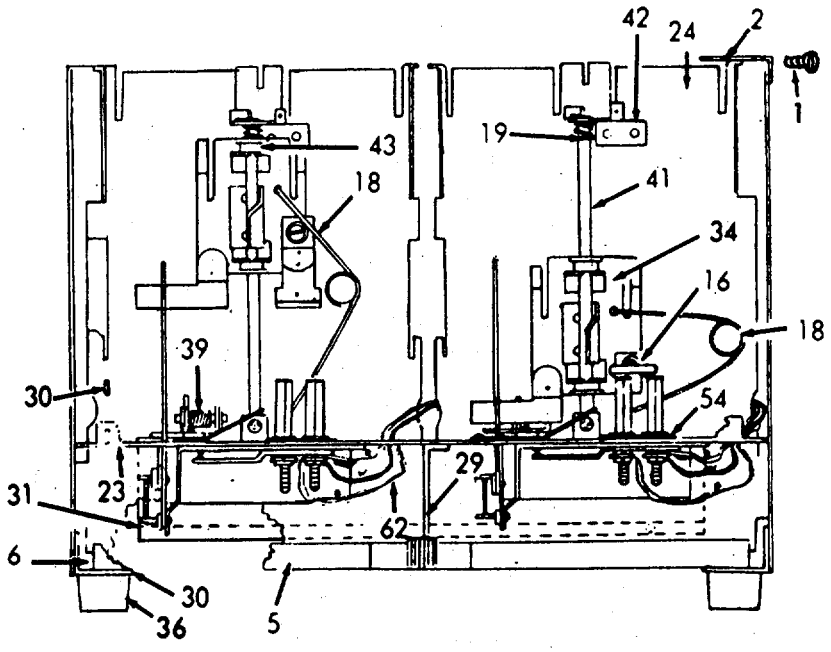
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
1	Screws		
2	Top		
5	Crumb tray less handle		
6	Crumb tray screws		
16	Switch screw and lockwasher		
18	Pop-up spring		
19	Bumper spring		
23	Inside bottom		
24	Front Baffle		
29	Bottom section baffle		
30	End spacers		
31	Back wire cover		
33	Bottom stud with contact		
34	Basket slide with handle holder and reset arm only		
36	Plastic leg		
39	Basket catch spring		
41	Guide rod (small dia.)		
42	Guide rod holder		
43	Oiless bushing		
49	Winding handle (V-shaped) with spring		
50	Winding handle spring		
54	Contact mica		
59	Top shunt contact on stainless strips		
60	Bottom shunt contact on steel strips		
61	Mica strip		
62	Copper jumper wire-long-give length		

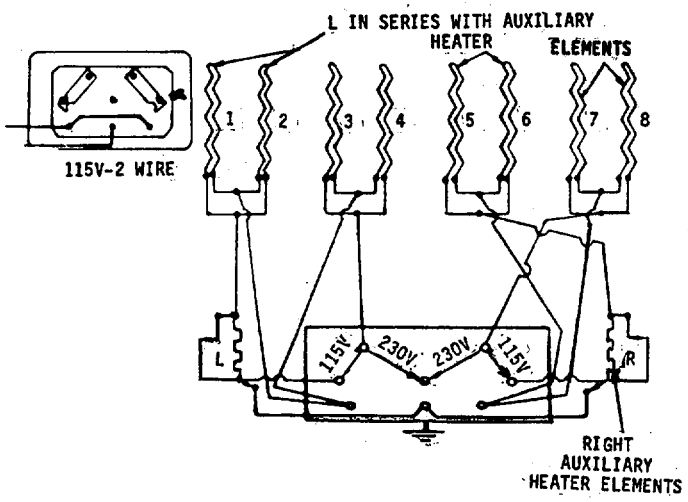
4-44. TOASTER - MAINTENANCE INSTRUCTIONS

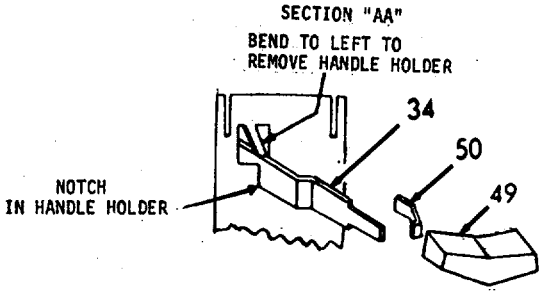
LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)









4-44. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS

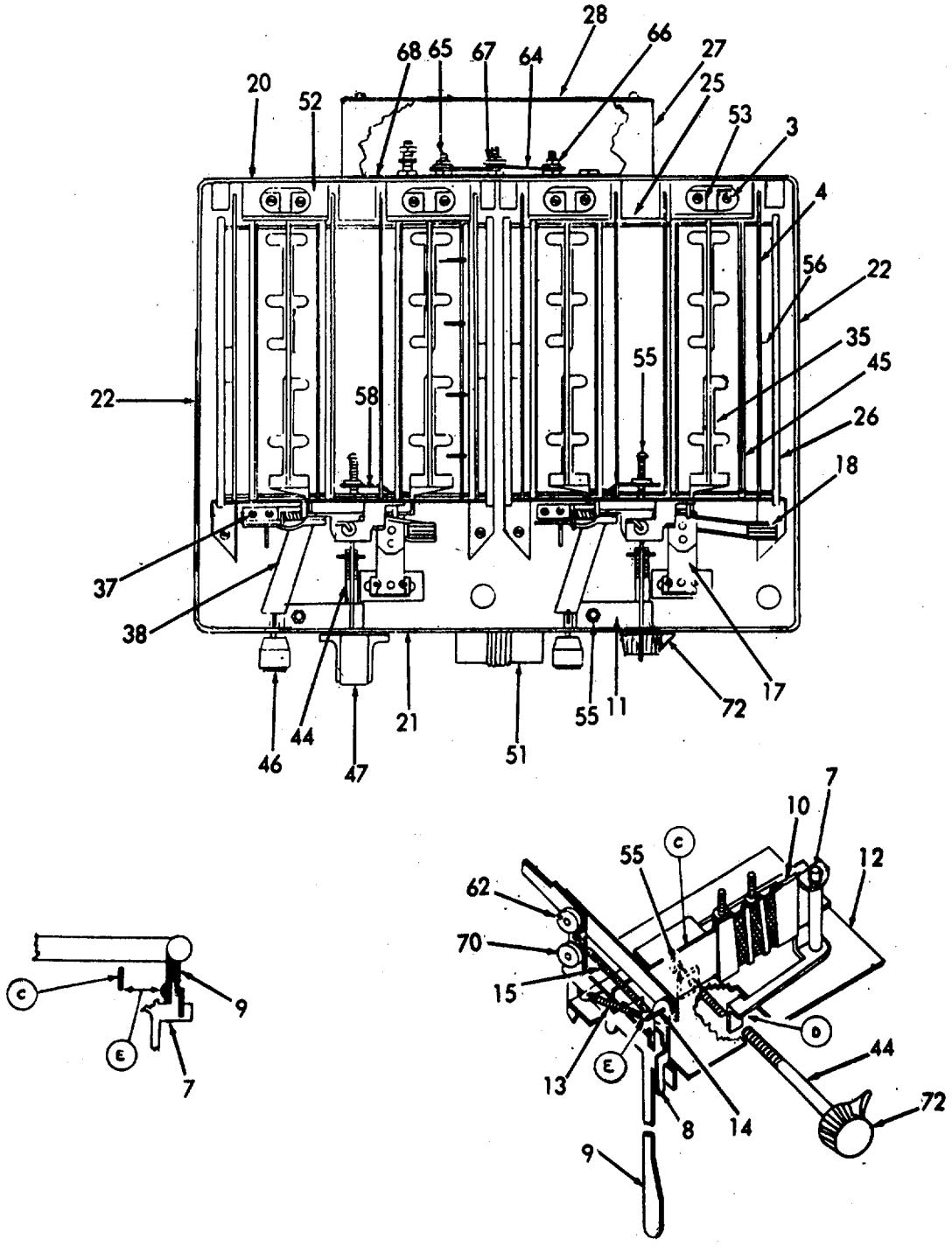
REPAIR (Cont)

3	Element clamp screw
4	120V element for 120V, 230V bread toaster, not 208V
7	Spring lock
8	Shunt switch arm
9	Reset lever
10	Auxillary heater for bread toaster
11	Friction spring
12	Timer bracket with stud
13	Springs
14	Screw 3/48 x 1/2
15	Spri ngs
17	Top main switch complete
18	Pop-up spring
20	Back
21	Front
22	End
25	Back baffle
26	Element baffle with bushing
27	Terminal box
28	Terminal box cover
35	Bread support
37	Basket catch only
38	Basket catch assembly complete
44	Timer shaft
45	Guard wire assembly
46	Trip knob (plastic)
47	Handle (winding) plastic
51	Crumb tray handle (less screws)
52	Back element holder complete less lead wire
53	Element clamp left or right
55	Screw and nut
56	Porcelain bushing for terminal block and side spacer
58	Stopper with nut, do not adjust
62	Copper jumper wire-long-give length
64	Jumper metal
65	Terminal studs
66	8-32 nut
67	Cup washers
68	Mica terminal insulator
70	Screw 3/48 x 5/16
72	Time adjustor knob

4-44. TOASTER - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-45. FIRE DETECTION/EXTINGUISHING SYSTEM - MAINTENANCE INSTRUCTIONS

a. This paragraph describes the maintenance instructions for the HALON 1301 System.

b. The following is an index to the maintenance procedures.

DESCRIPTION	PARAGRAPH
Fire Fighting System	4-45.1
Fire Alarm Panel	4-45.2
Cylinder Assembles	4-45.3

WARNING

- Fire extinguishing agent is hazardous and toxic to humans. Do not breathe nalon.
- Batteries located in the pilothouse must be kept charged at all times. Failure to do so, will cause system to fail.
- Do not enter room if walls feel hot. Fire may be smoldering.

4-45.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection
b. Service
c. Test
d. Replace

INITIAL SETUP:

Test Equipment
Volt-ohm meter

Special Tools
NONE

Material/Parts
NONE

Personnel Required
3

References
Paragraph
4-45.2 Fire Alarm Panel
4-45.3 Cylinder Assemblies

Equipment
Condition Condition Description
NONE

Special Environmental Conditions
NONE

General Safety Instructions
Observe WARNINGS in para 4-45.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. System	a. General	1. Insure all components are installed properly.	
		2. Inspect for worn or damaged wiring.	
		3. Inspect all piping for breaks, cracks, dents, and bends.	
	b. Heat detectors	Inspect for signs of damage.	

4-45.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
	c. Lights	Inspect for signs of damage.	
	d. Cylinders, valves, etc.	Inspect for signs of damage.	Refer to para 4-45.3 .
	e. Nozzle	Check that nozzle has not been moved.	
	f. Fire alarm panel	Inspect.	Refer to para 4-45.2 .
	g. Pressure switches	Inspect for signs of damage.	
	h. Horns	Inspect for signs of damage.	
	i. Tubing	Inspect for signs of dents, etc.	
SERVICE			
2. Heat detectors		Wipe head with a cotton swab, or soft cloth and water.	
3. Fire alarm panel		Refer to para 4-45.2 .	
4. Cylinders		Refer to para 4-45.3 .	

4-45.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

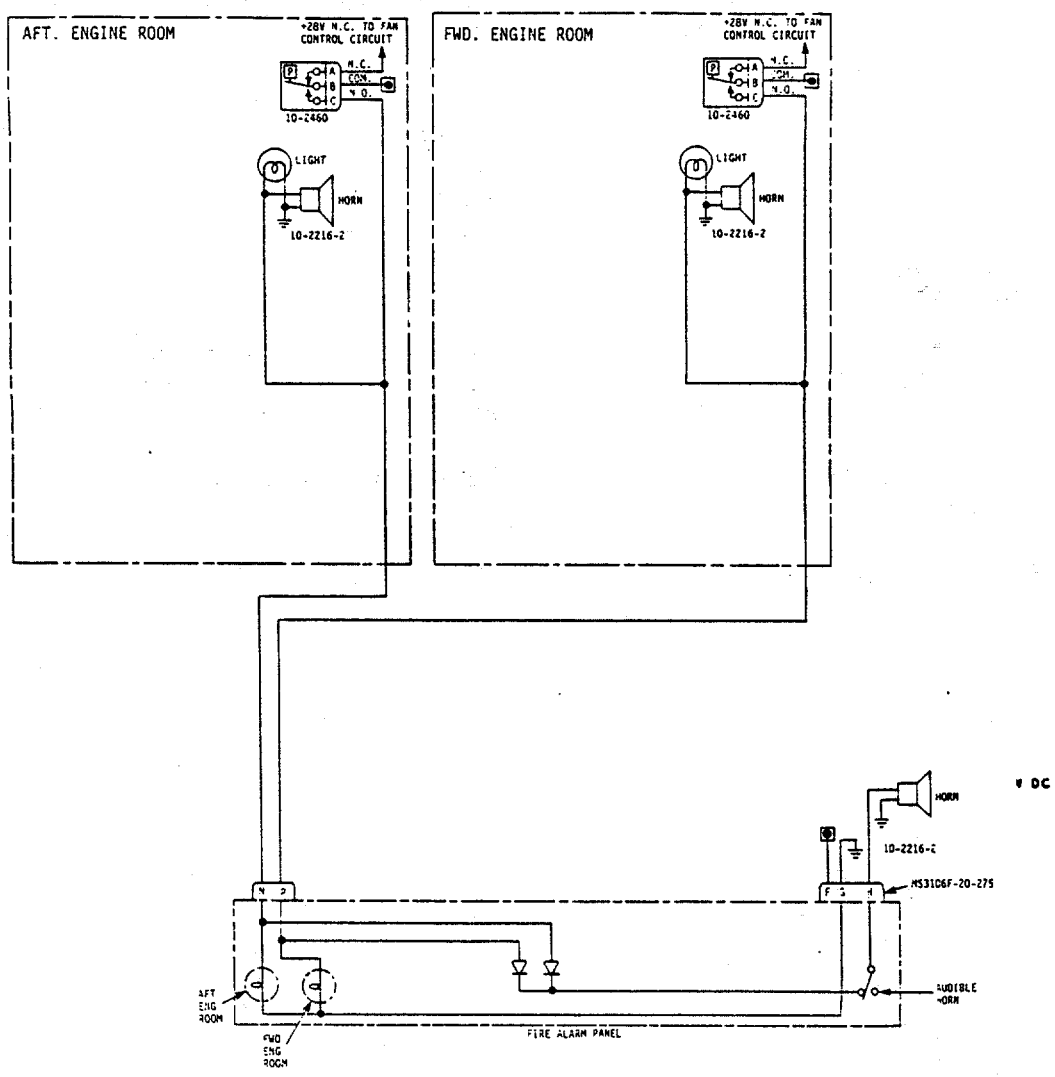
TEST

5. System

NOTE

For overall test procedures refer to paragraph 4-45.2 .

	All components	Using a VOM, check for 28VDC at the two locations marked COM on schematic.



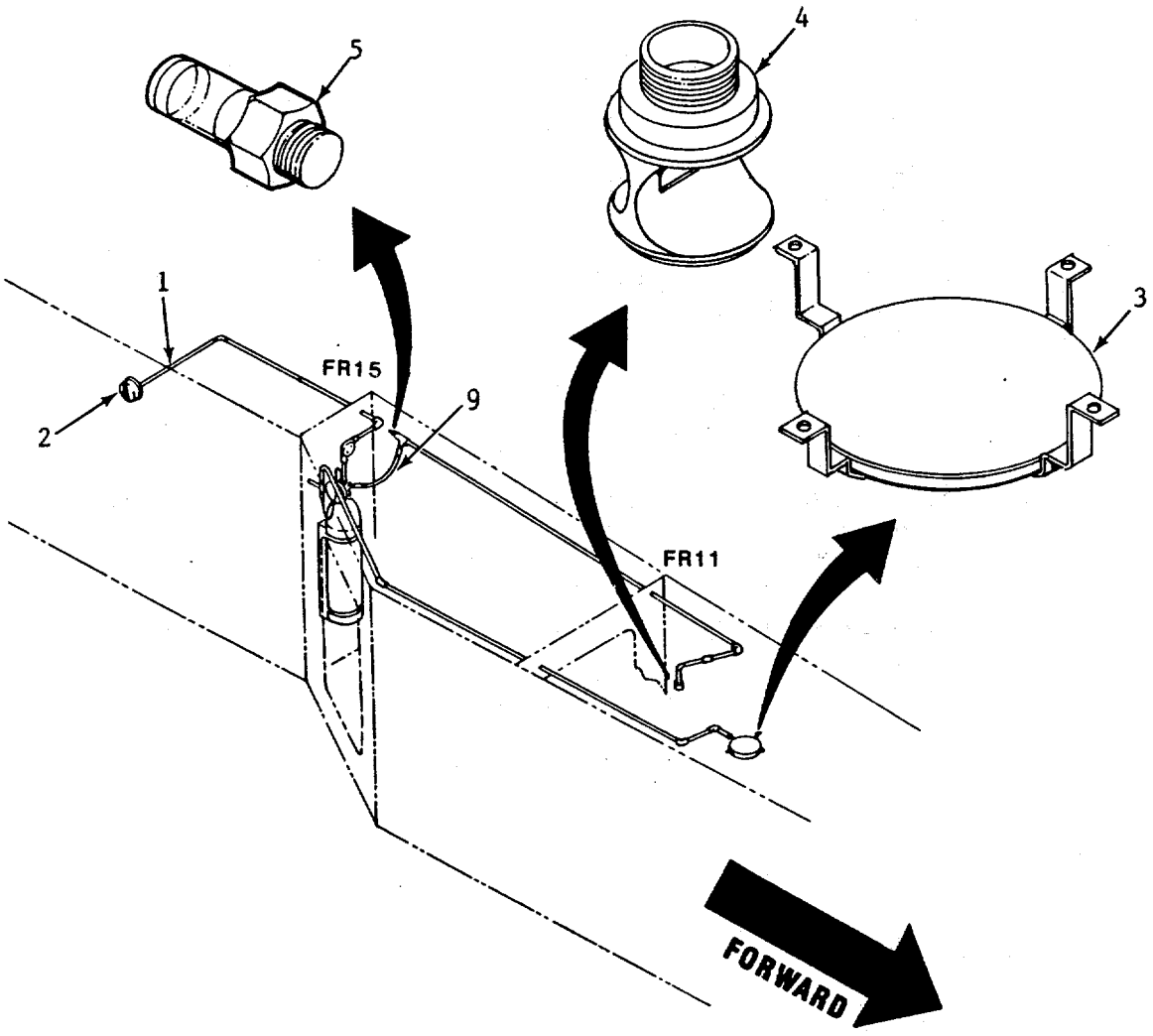
4-45.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
6. System	a. Utility cable 8 feet long (1)	Replace	As required.
	b. Pull box handle (2)	Replace	As required.
	c. Heat sensor (3)	Replace	As required.
	d. Nozzle (4)	Replace	As required.
	e. Discharge indicator (5)	Replace	As required.
	f. Utility cable 25 feet long (6)	Replace	As required.
	g. Utility cable 8 feet long (7)	Replace	As required.
	h. Pressure operated switch (8)	Replace	As required.
	i. Hose assembly (9)	Replace	As required.

4-45-1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

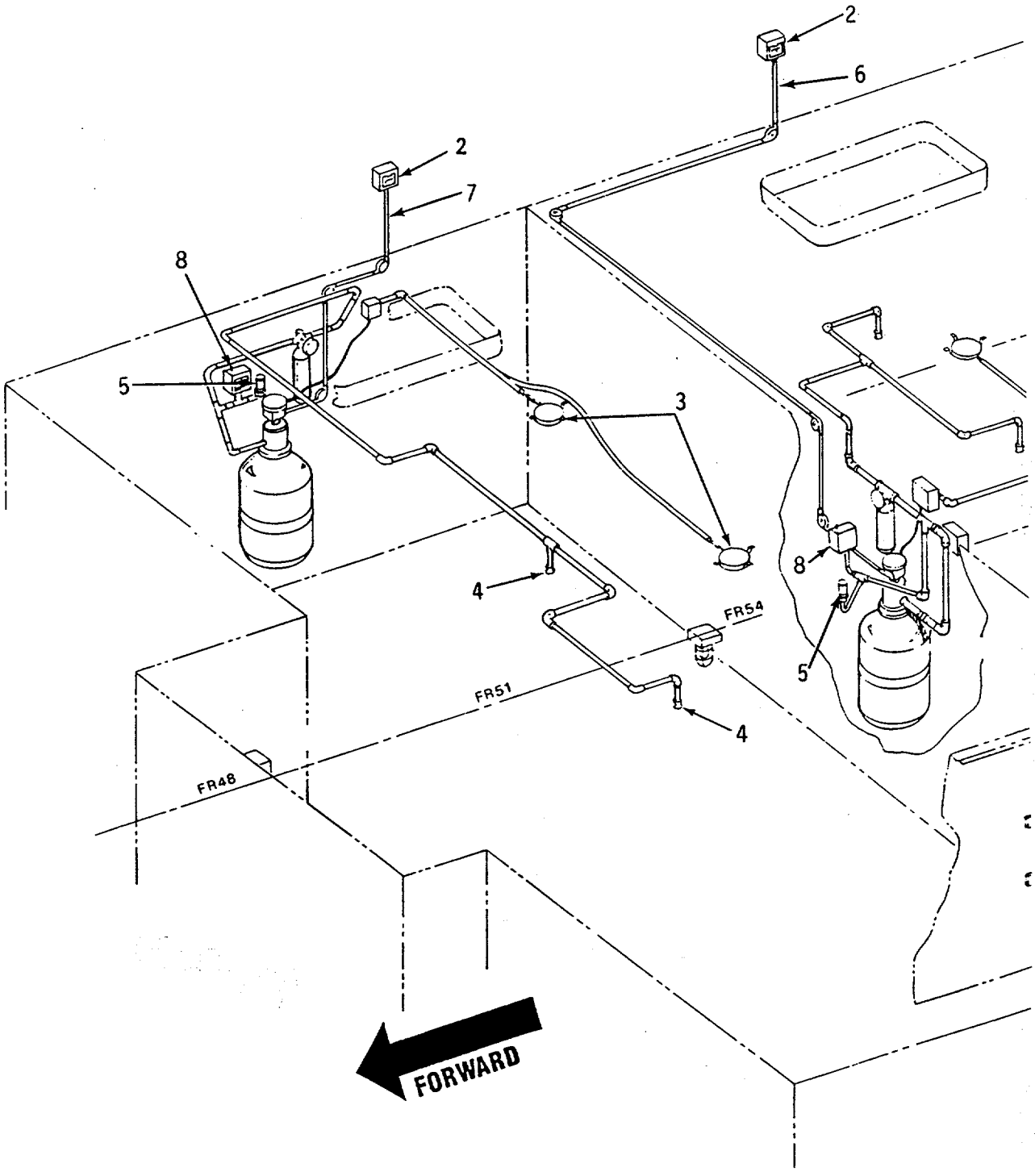
REPLACE (Cont'd)



4-45-1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

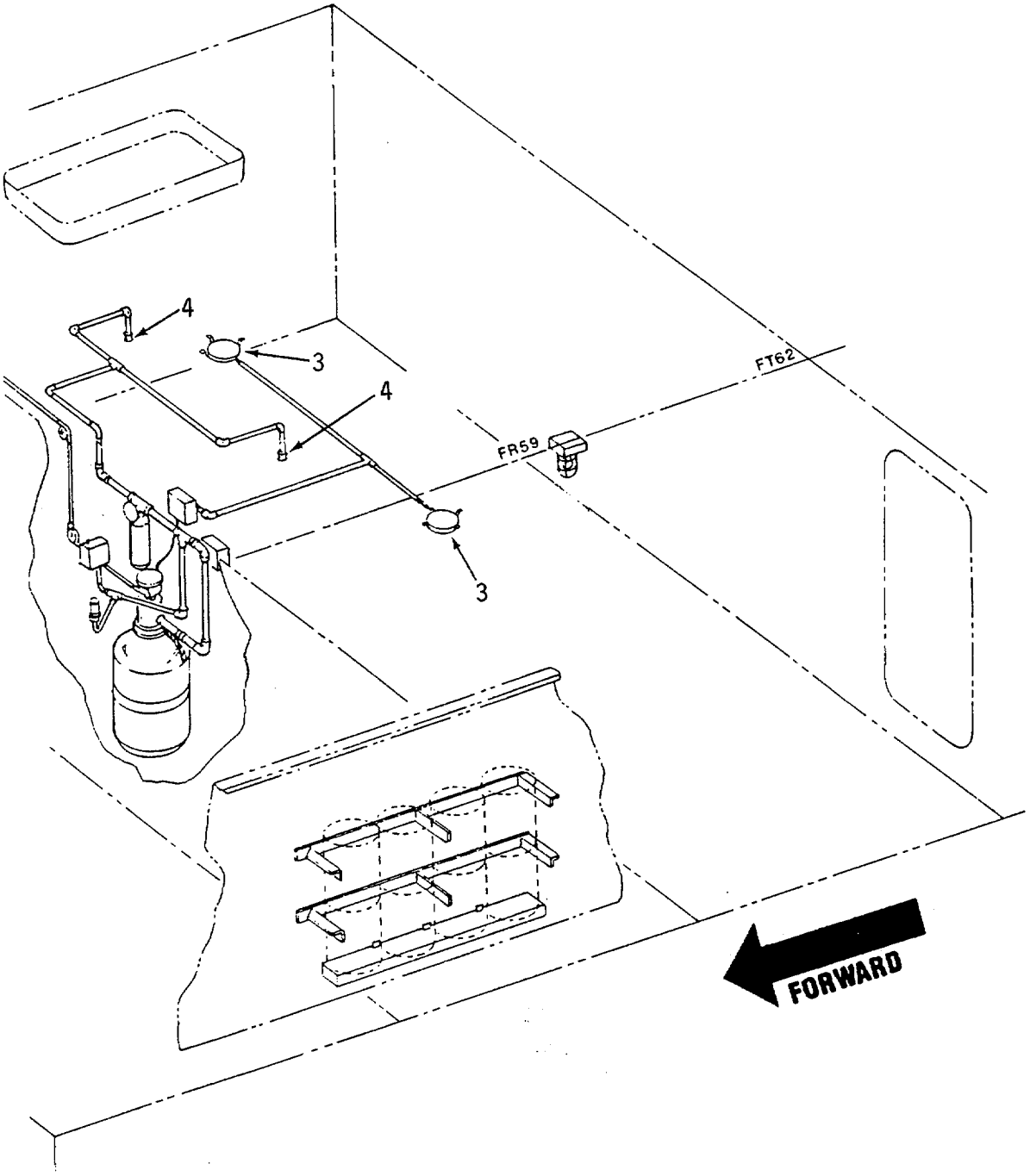
REPLACE (Cont'd)



4-45-1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

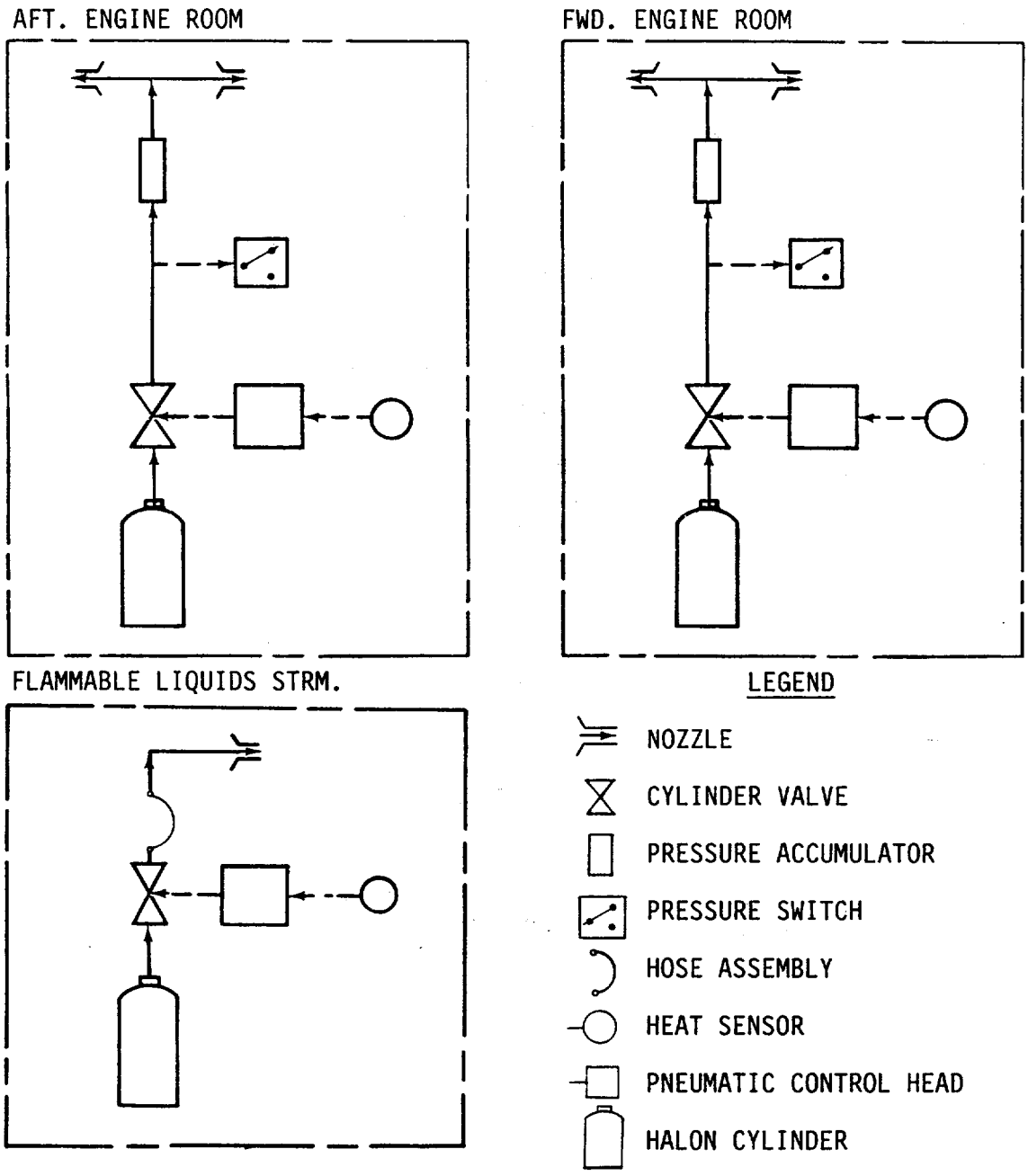
REPLACE (Cont'd



4-45-1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

REPLACE (Cont)

Schematic of Halon systems in the engine rooms and liquids storeroom.



4-45.2. FIRE ALARM PANEL - MAINTENANCE INSTRUCTIONS

This task covers:

a. Inspection **b. Test** **c. Replace**

INITIAL SETUP

Test Equipment

NONE

References

NONE

Special Tools

Soldering iron 25 watt maximum

Equipment Condition: Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

Observe WARNINGS in para 4-45 .

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Fire alarm panel	a. Lamps/lens caps	Inspect for missing or defective.	
	b. Switch (toggle)	Inspect for proper operation.	

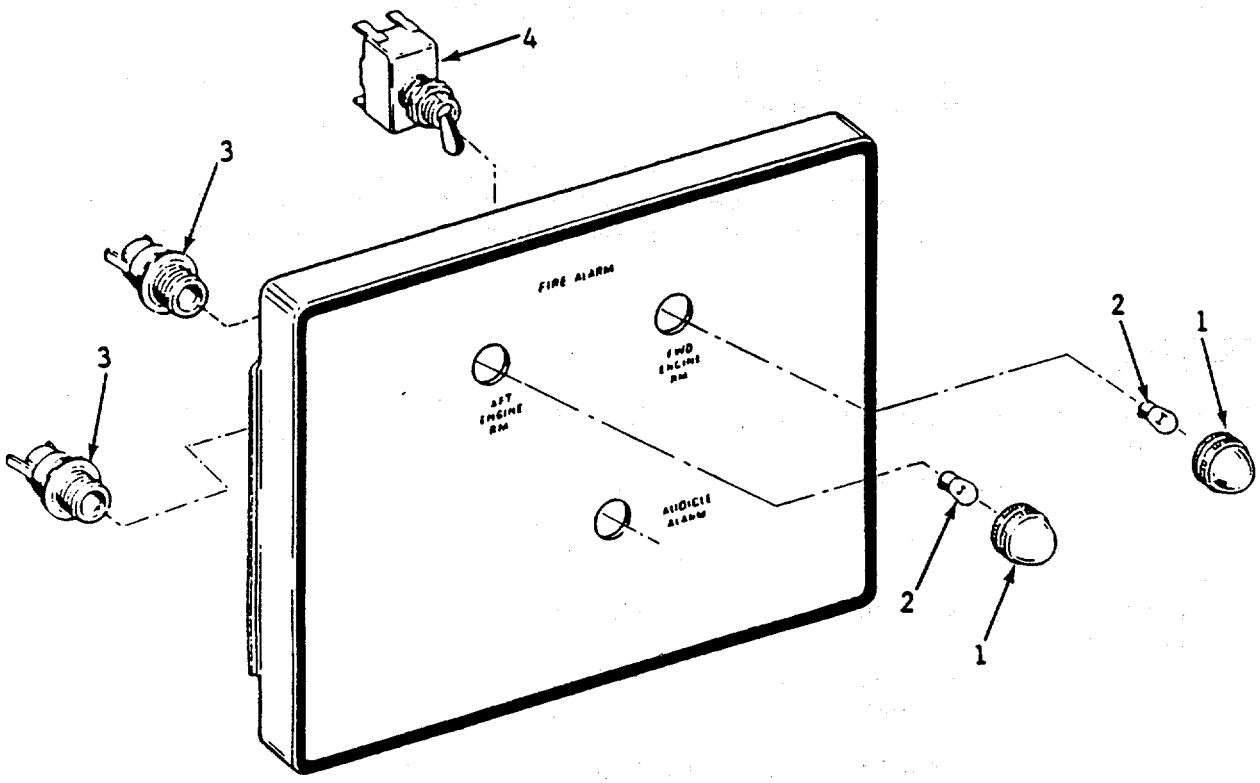
4-45.2. FIRE ALARM PANEL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
TEST			
2. Fire alarm panel	a. Lights - Activate pressure switch in aft engine room. The lamp for aft engine room will light.		
	b. Audible Alarm - By placing the switch in the ON position, will activate the pilothouse horn.		
	c. Conduct the same tests for the light and audible alarm of the forward engine room.		
	d. Upon completion of tests, reset audible alarm switch to desired position, and reset the pressure switches by depressing the buttons located on top of the switchboxes.		
REPLACE			
3. Lens and lamps	a. Lens cap (l)	Remove	Refer to page 4-1126 .
	b. Lamp (2)	Remove	
	c. Lens cap (l)	Install	
4. Lamp holder	a. Wiring	Unsolder	
	b. Locknut and lampholder (3)	Replace	
	c. Toggle switch (4)	Replace	
	d. Wiring	Resolder	Refer to schematic, page 4-1127

4-45.2. FIRE ALARM PANEL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

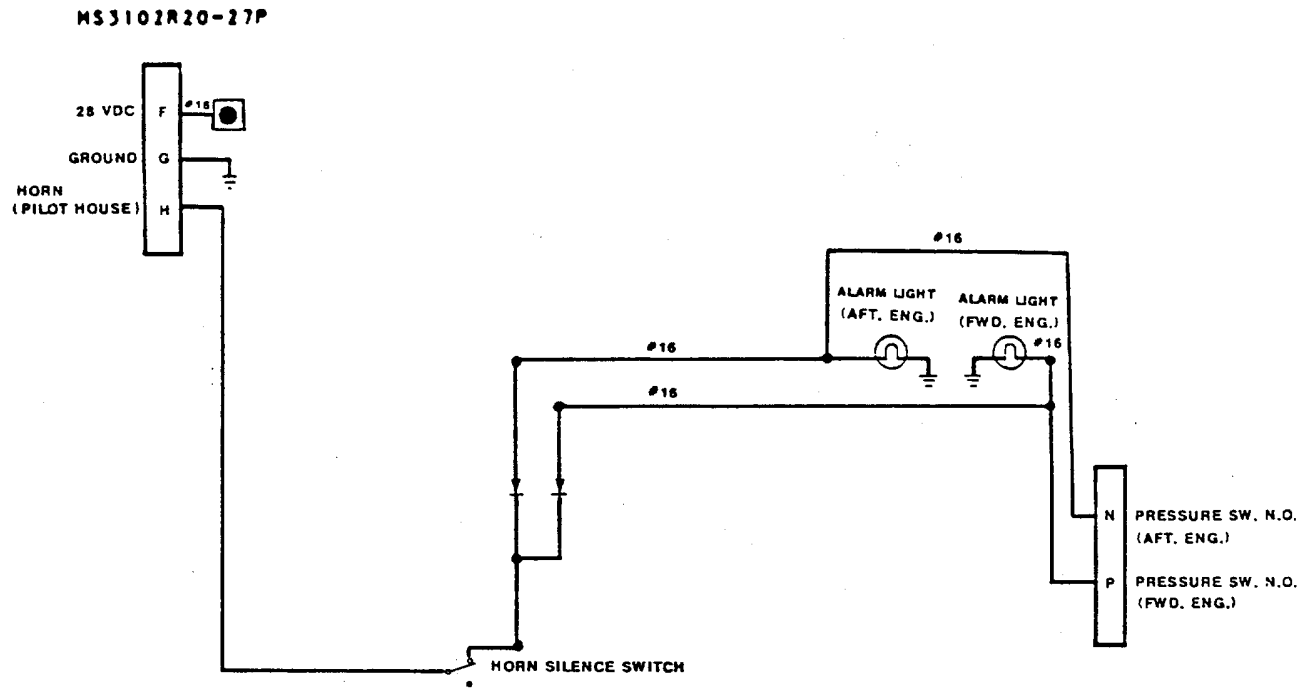
REPLACE Cont



4-45.2. FIRE ALARM PANEL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

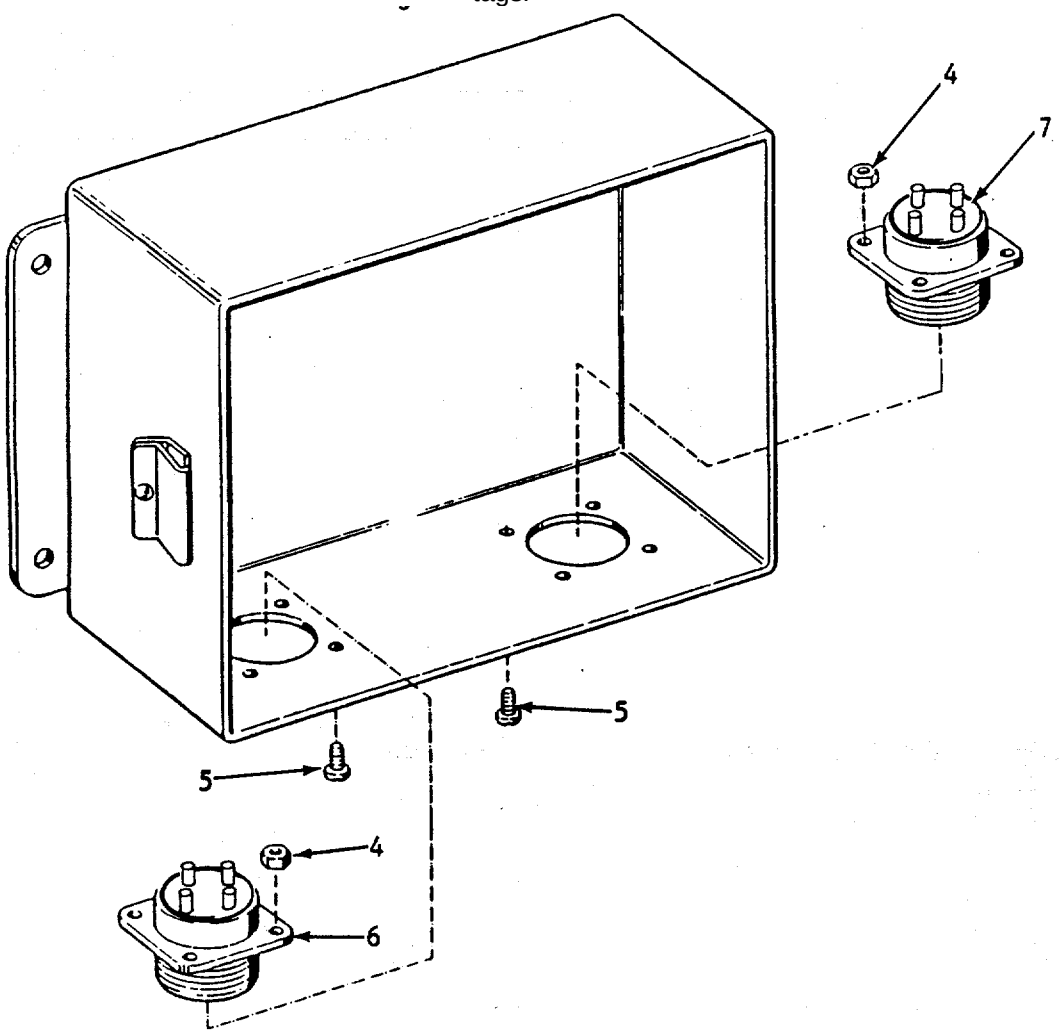
REPLACE (Cont)



NOTE: ALL WIRING IS #20 AWG, EXCEPT WHERE MARKED #16.

4-45.2. FIRE ALARM PANEL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont'd)			
5. Connectors	a. Wiring	Tag and disconnect	Refer to schematic, page 4-1127
	b. Nuts(4) and screws(5)	Remove	
	c. Connector (6 or 7)	Replace with a new connector.	
	d. Screws (5) and nuts (4)	Install	
	e. Wiring	Reconnect and remove tags.	



4-45.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS.

This task covers:
a. Pre-Inspection b. Replace c. Test

INITIAL SETUP

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
NONE

Equipment Condition / Condition Description
NONE

Special Environmental Conditions
NONE

General Safety Instructions
Observe WARNING.

LOCATION	ITEM	ACTION	REMARKS
		WARNING Do not perform repairs on a filled cylinder, or cylinder valve.	
INSPECTION			
1. Cylinder assemblies	a. Piping	Inspect for breaks cracks and dents.	Refer to Direct Support Maintenance
	b. Hoses	Inspect for breaks, cracks and signs of damage.	Replace, refer to para 4-45.1 .
	c. Cylinders (valves, Nozzles) from storage.	1. Inspect for signs of damage. 2. Perform weight test. See Step 4 .	

4-45.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS. (Continued)

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont'd)			
		3. Insure that the safety lock pin is properly installed.	
		4. Insure that the safety lock wire is installed.	
	d. Cylinders installed	1. Inspect for signs of damage.	
		2. Perform weight test.	See step 4.
		3. Insure that the anti-recoil plug and protective cap are firmly attached to the cylinder valve.	
REPLACE			
		WARNING	
	Do not install new cylinder until indicator and reset stem (8) on control head (4) has been set to position, SET.		
2. Cylinder, valve, and control head assembly (aft and fwd engine rooms)	a. Cylinder valve (1)	Disconnect pipe (2) at discharge outlet.	
	b. Anti-recoil plug (3)	Attach to discharge outlet.	

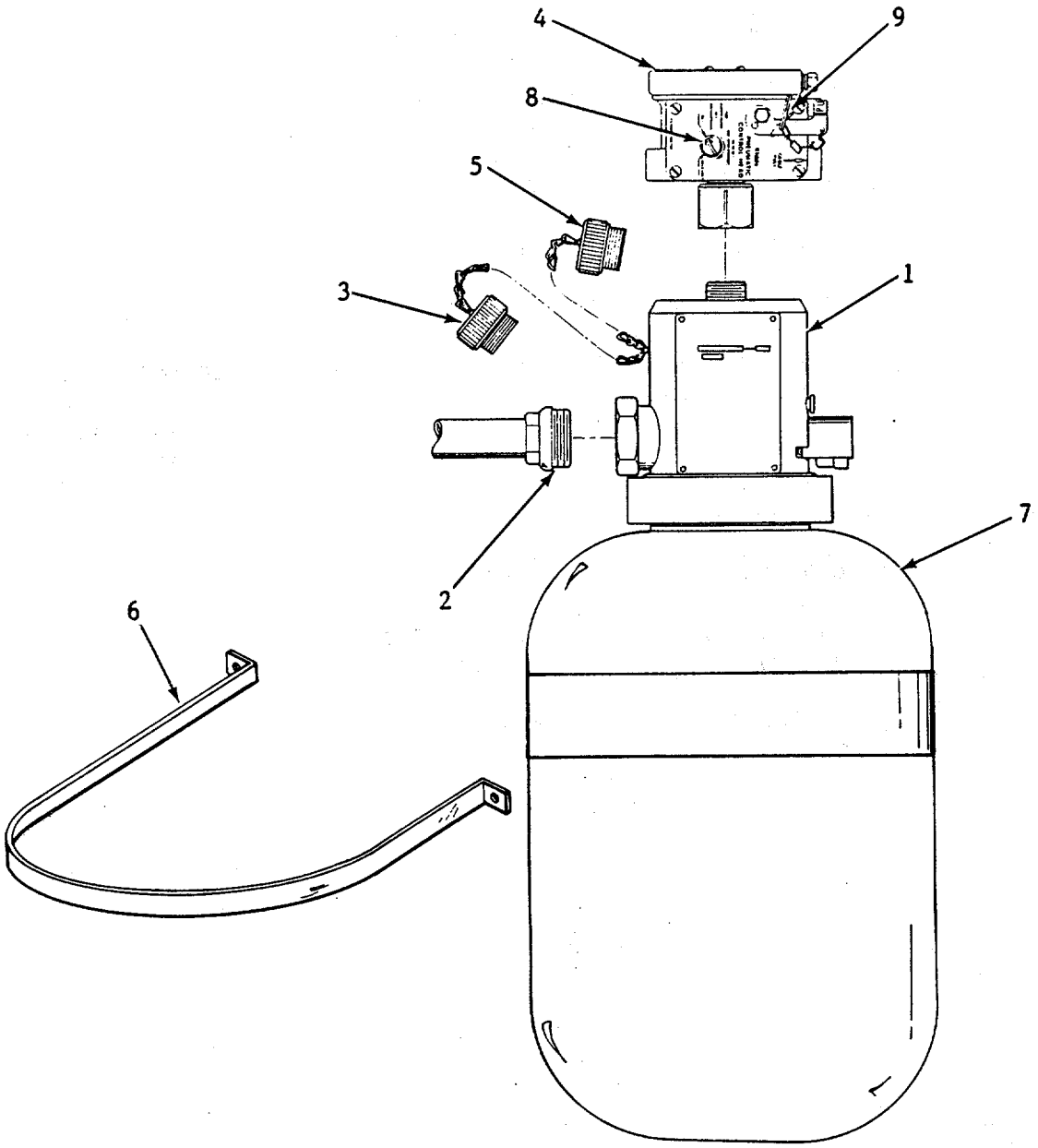
4-45.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS. (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont'd)			
	c. Control head(4)	Disconnect from cylinder valve.	
	d. Protective cap(5)	Attach to top of cylinder valve.	
	e. Bracket(6)	Remove	
	f. Cylinder(7)	Remove	
	g. New cylinder(7)	Check weight.	See step 4
	h. Indicator and reset stem(8)	Set to position, SET.	Do not install new cylinder until this action has been taken.
	i. Cylinder(7)	Install	
	j. Bracket(6)	Install	
	k. Safety locking pin(9)	Check that pin is inserted.	
	1. Protective cap(5)	Remove	

4-45.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS. (Continued)

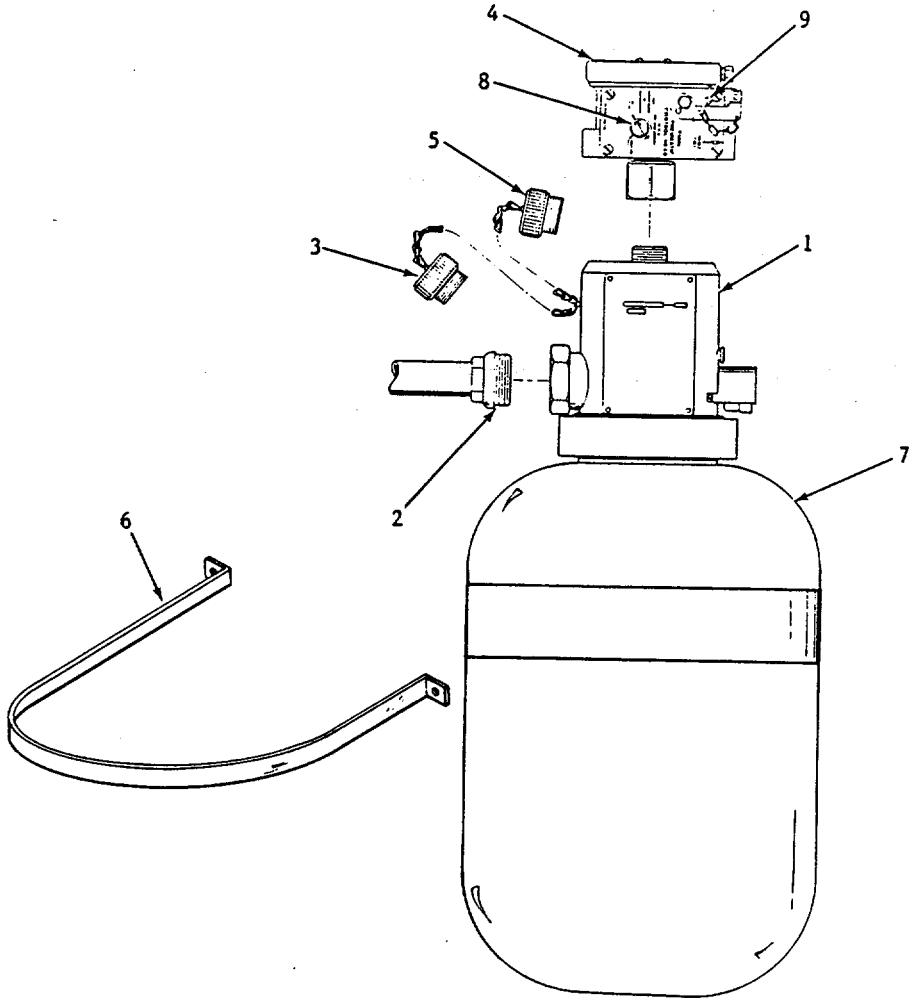
LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont'd)



4-45.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS. (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont'd)			
	m. Control head (4)	Attach to top of cylinder valve.	
	n. Anti-recoil plug (3)	Remove	
	o. Discharge pipe (2)	Attach to cylinder valve (1).	
	p. Cylinder	New cylinder has been installed.	



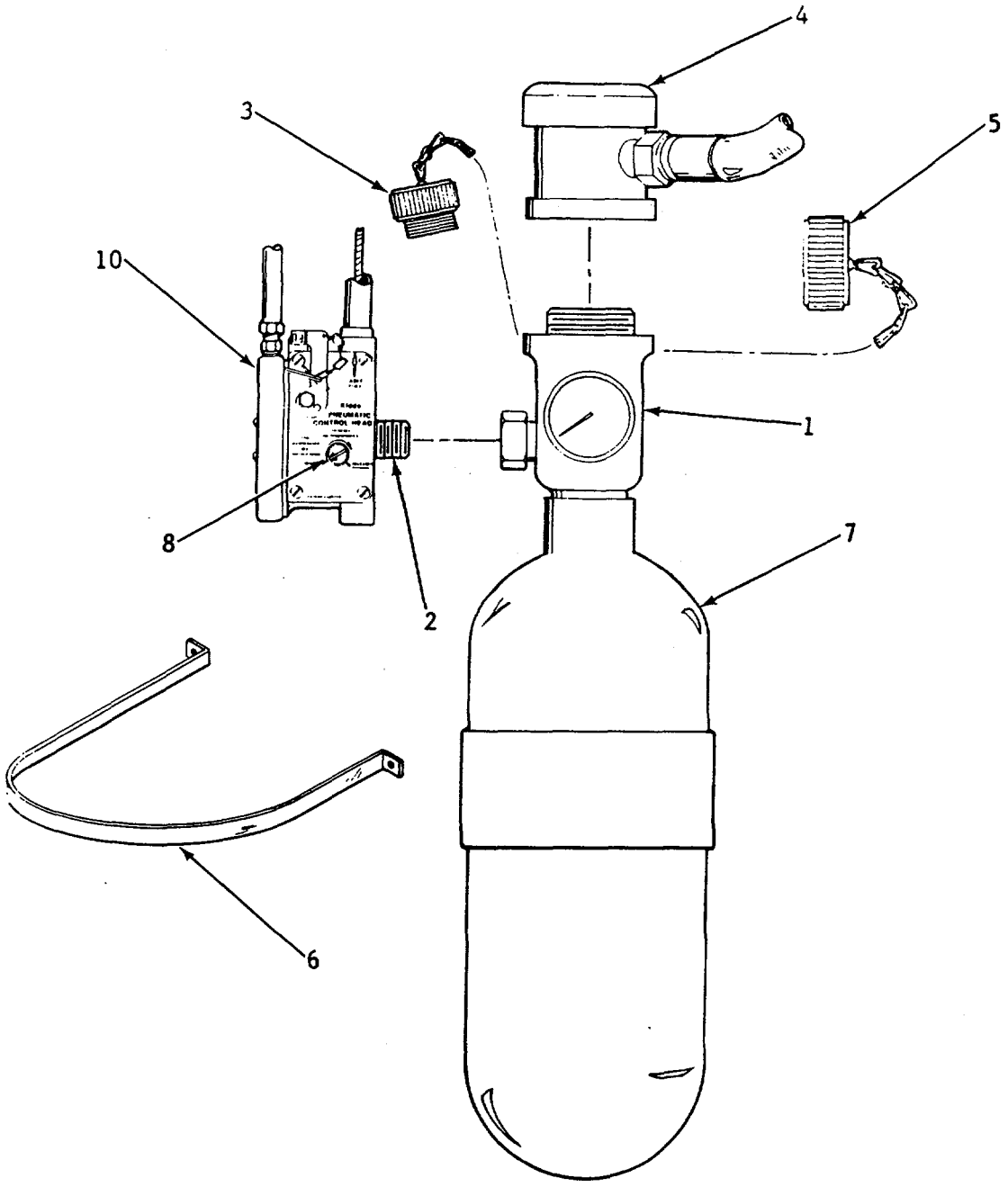
4-45.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS. (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont'd)			
	WARNING Do not install new cylinder until indicator and reset stem (8) on control head (10) has been set to position, SET.		
3. Cylinder valve, and plain nut discharge head (flammable liquids storeroom).	a. Control head (10)	Disconnect from cylinder valve (1)	
	b. Anti-recoil plug (3)	Attach to cylinder valve.	
	c. Plain nut discharge head (4).	Disconnect from cylinder valve.	
	d. Protective cap (5)	Attach to top of cylinder valve.	
	e. Bracket (6)	Remove	
	f. Cylinder (7)	Remove	
	g. New Cylinder (7)	Check weight	See step 4

4-45.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS. (Continued)

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont'd)



4-45.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS. (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont'd)			
	h. Indicator and reset stem (8)	Set to position, SET	Do not install new cylinder until this action has been taken.
	i. Cylinder (7)	Install	
	j. Bracket (6)	Install	
	k. Safety locking pin (9)	Check that pin is inserted.	
	1. Protective cap (5)	Remove	
	m. Plain nut discharge head (4)	Attach to top of cylinder valve.	
	n. Anti-recoil plug (3)	Remove	
	o. Control head (10)	Attach to side of cylinder valve	

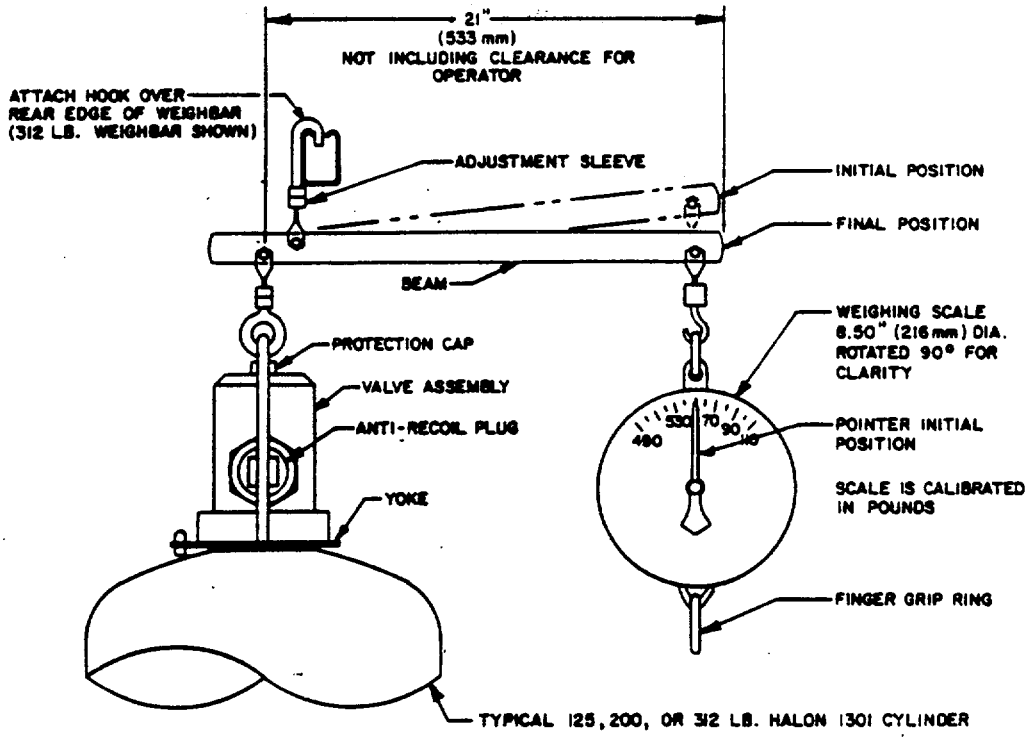
4-45.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS. (Continued)

LOCATION	ITEM	ACTION	REMARKS
TEST			
4. Cylinders	a.	Weigh all cylinders upon receipt and every six months thereafter, to insure no abnormal leakage. This includes installed cylinders.	

WEIGHTS

CYLINDER & VALVE	HALON 1301 FILL RANGE		NOMINAL EMPTY WEIGHT		NOMINAL CHARGED WEIGHT			
					MIN FILL		MAX FILL	
UNITS	LBS	KG	LBS	KG	LBS	KG	LBS	KG
AFT & FWD ENG RMS	80-125	36-57	88	40	168	77	213	97
FLAMMABLE LIQUID STRM	21-40	10-18	57	26	78	35	97	44

b. To prepare cylinder for weighing, proceed as follows:



4-45.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS. (Continued)

LOCATION	ITEM	ACTION	REMARKS

(1) Remove pneumatic control head from cylinder valve and attach protective cap.

(2) Disconnect discharge connection to cylinder valve, if in engine rooms, or to plain nut discharge head if in flammable liquids storeroom. Attach anti-recoil plug.

(3) Loosen cylinder strap holding cylinder to frame.

(4) Attach hook located directly over the cylinder, to beam (see illustration above).

(5) Place yoke under cylinder valve.

(6) Use adjustment sleeve to bring beam to initial position.

(7) Pull down on finger grip ring until beam is in final position.

(8) Read cylinder weight on weighing scale.

(9) If weight does not fall within the ranges in above tables, it indicates leakage.

c. Reinstall halon cylinder to operating condition

All data on pages 4-1139 thru 4-1148 deleted.

4-46. INTERIOR COMMUNICATION SYSTEM - MAINTENANCE INSTRUCTIONS.

a. The following is an index to the maintenance procedures.

b. Refer to paragraph 4-47 for the alarm switchboard.

4-46.1. AMPLIFIER/LOUDSPEAKER - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Test** **c. Repair**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
Soldering iron 25 watt maximum

Material/Parts
NONE

Personnel Required
1

References
NONE

Equipment
Condition Condition Description
NONE

Special Environmental Conditions
NONE

General Safety Instructions
Observe WARNING in procedure.

4-46.1. AMPLIFIER/LOUDSPEAKER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
		WARNING To eliminate injury or possible shock, tag and place the circuit breaker in the OFF position.	
INSPECTION			
1. Amplifier/ loud-speaker	a. Amplifier	1. Inspect for missing or defective lamps, knobs, and switches.	
		2. Inspect for proper sound reproduction.	Refer to Direct Support Maintenance.
		3. Inspect for signs of faulty operation.	
	b. Loudspeaker	Inspect for proper sound reproduction.	
TEST			
2.	System	Operate system.	

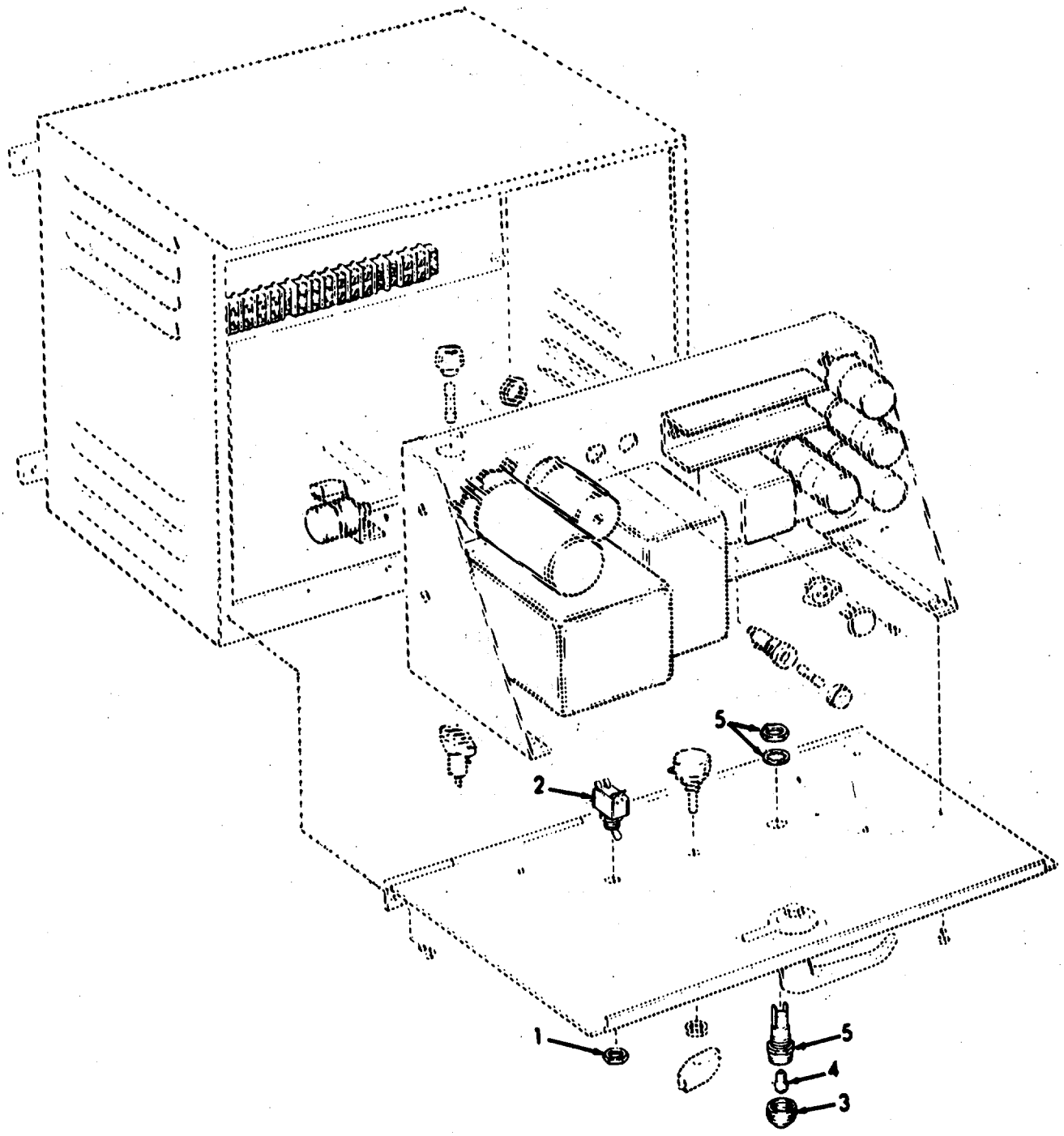
4-46.1. AMPLIFIER/LOUDSPEAKER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
	NOTE Use a soldering iron with a maximum rating of 25 watts.		
3. Switch	a. Nut (1)	Remove.	
	b. Switch (2)	Remove.	
	c. Wiring	1. Disconnect.	
		2. Reconnect to new switch.	
	d. Switch (2)	Install.	
	g. Nut (1)	Install.	
4. Lamp and lamp. holder	a. Lens cap (3)	Remove.	
	b. Lamp (4)	Remove.	
	c. Wiring	Disconnect.	
	d. Nut, spacer and lamp holder (5)	1. Disassemble.	
		2. Replace.	
		3. Reassemble.	
	e. Wiring	Reconnect.	
	f. Lamp (4)	Install.	
	g. Lens cap (3)	Install.	

4-46.1. AMPLIFIER/LOUDSPEAKER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



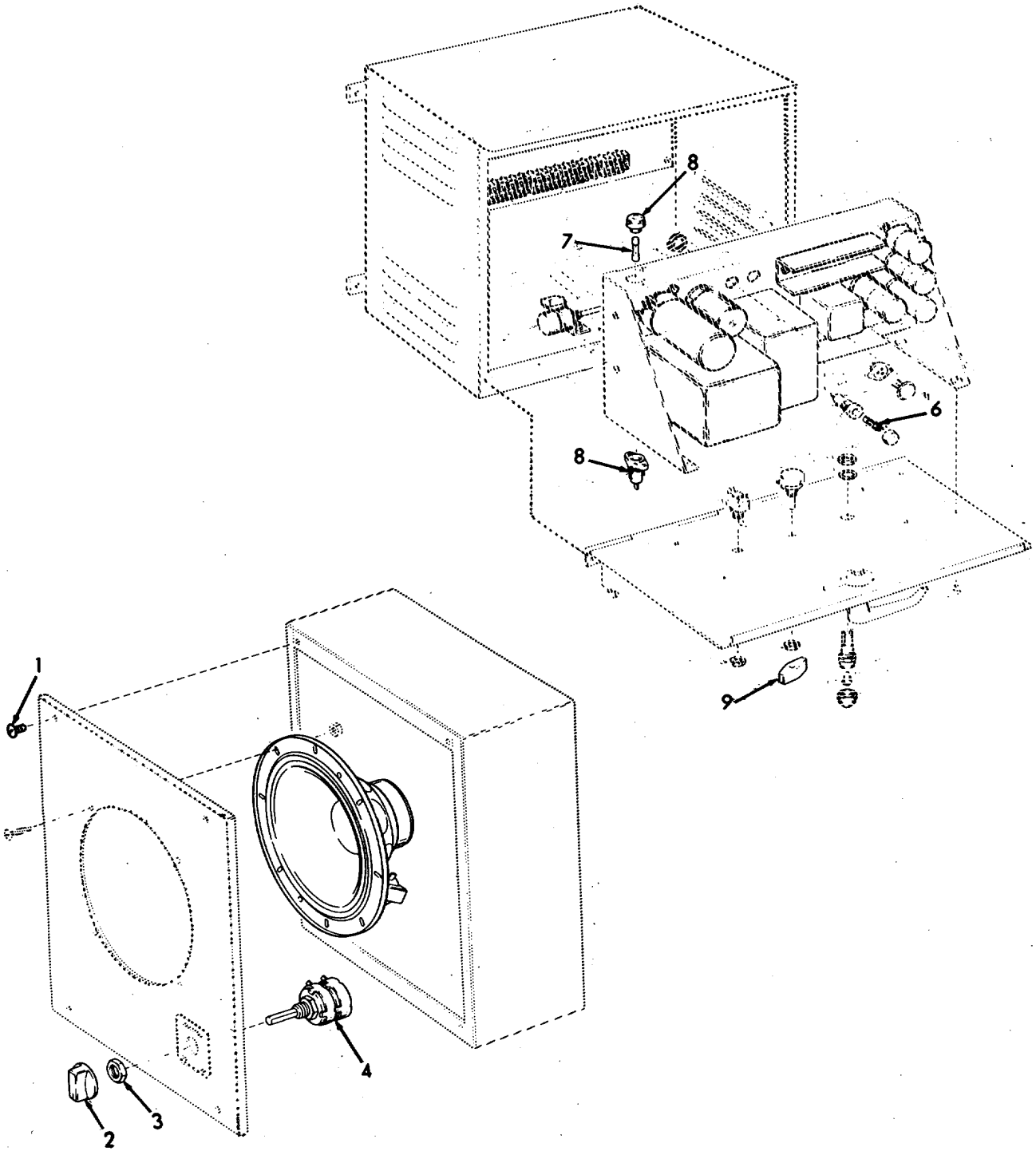
4-46.1. AMPLIFIER/LOUDSPEAKER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
5. Fuses	a. Fuses (6 or 7)	Twist cap and replace.	
	b. Fuse holder (8)	1. Unsolder.	
		2. Replace.	
		3. Resolder.	
6. Knob	Knob (9)	Replace.	
7. Loud-speaker volume control	a. Screws (1)	Remove.	
	b. Knob (2)	Remove.	
	c. Wiring	Unsolder.	
	d. Nut (3)	Remove.	
	e. Volume con-trol (4)	Replace.	
	f. Nut (3)	Install.	
	g. Wiring	Resolder.	
	h. Knob (2)	Install.	
	i. Screws (1)	Install.	

4-46.1. AMPLIFIER/LOUDSPEAKER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-46.2. SOUND POWERED PHONES - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Test** **c. Repair**

INITIAL SETUP:

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment Condition
Condition Description
NONE

Material/Parts
NONE

Special Environmental Conditions
NONE

Personnel Required
2

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Sound powered phones	a. Handset	1. Inspect for damaged or missing parts.	
		2. Inspect for breaks, cracks., and damaged wiring.	
	b. Chest-head set	1. Inspect for damaged or missing parts.	
		2. Inspect for breaks, cracks, and damaged wiring.	
	c. Jack box and plug	Inspect for damaged or missing parts.	

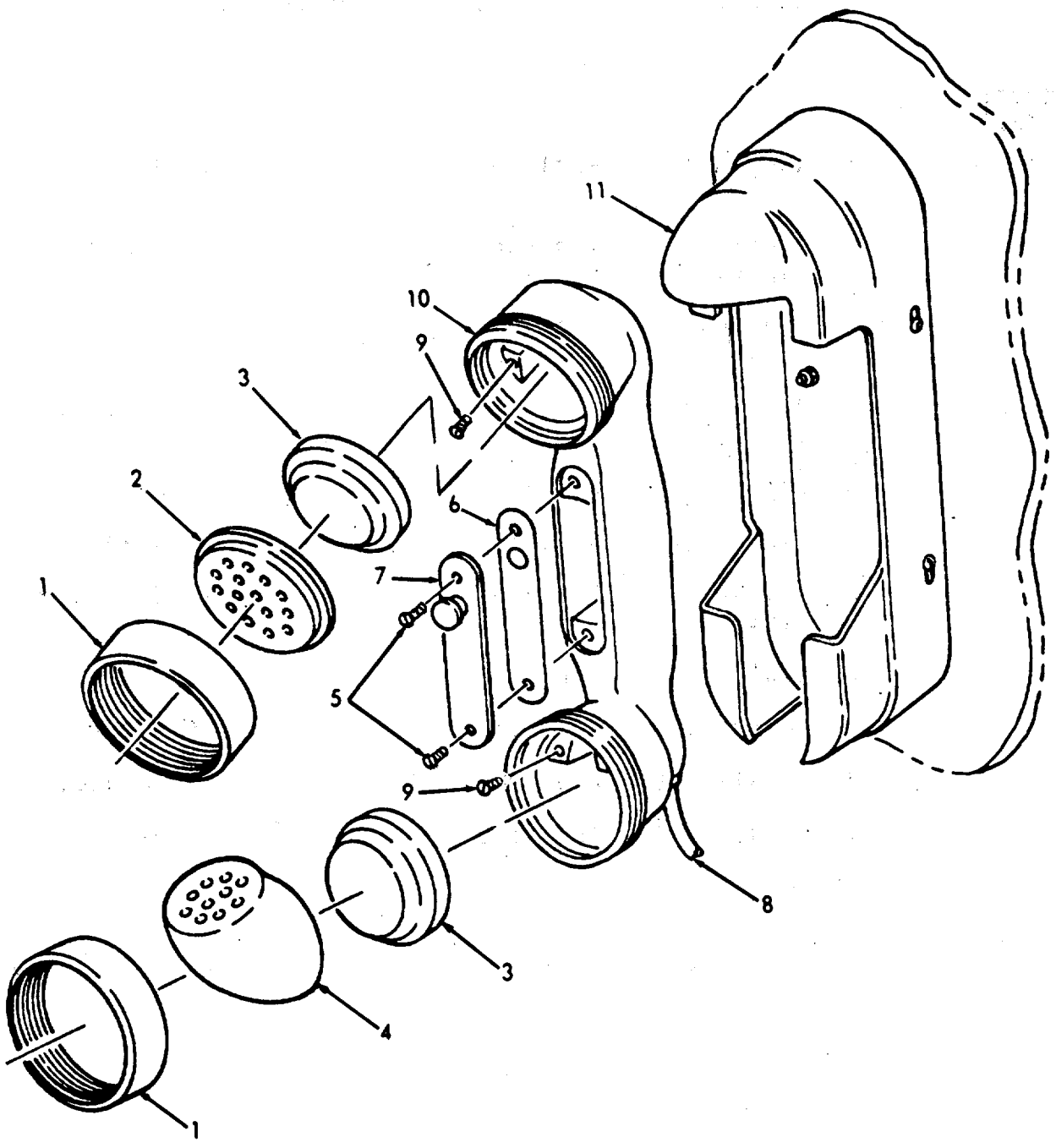
4-46.2. SOUND POWERED PHONES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
TEST			
2.	Establish communication with other areas. Make sure the sound reproduction is satisfactory.		
REPAIR			
3. Handset	a. Retaining ring (1)	Replace.	If needed.
	b. Receiver ear cap (2)	Replace.	If needed.
	c. Sound powered unit (3)	Replace.	If needed.
	d. Mouthpiece (4)	Replace.	If needed.
	e. Screws (5)	Replace.	If needed.
	f. Gasket (6)	Replace.	If needed.
	g. Pushbutton switch (7)	Replace.	If needed.
	h. Cable (8)	Replace.	If needed.
	i. Screw (9)	Replace.	If needed.
	j. Handle (10)	Replace.	If needed.
	k. Holder (11)	Replace.	If needed.

4-46.2. SOUND POWERED PHONES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



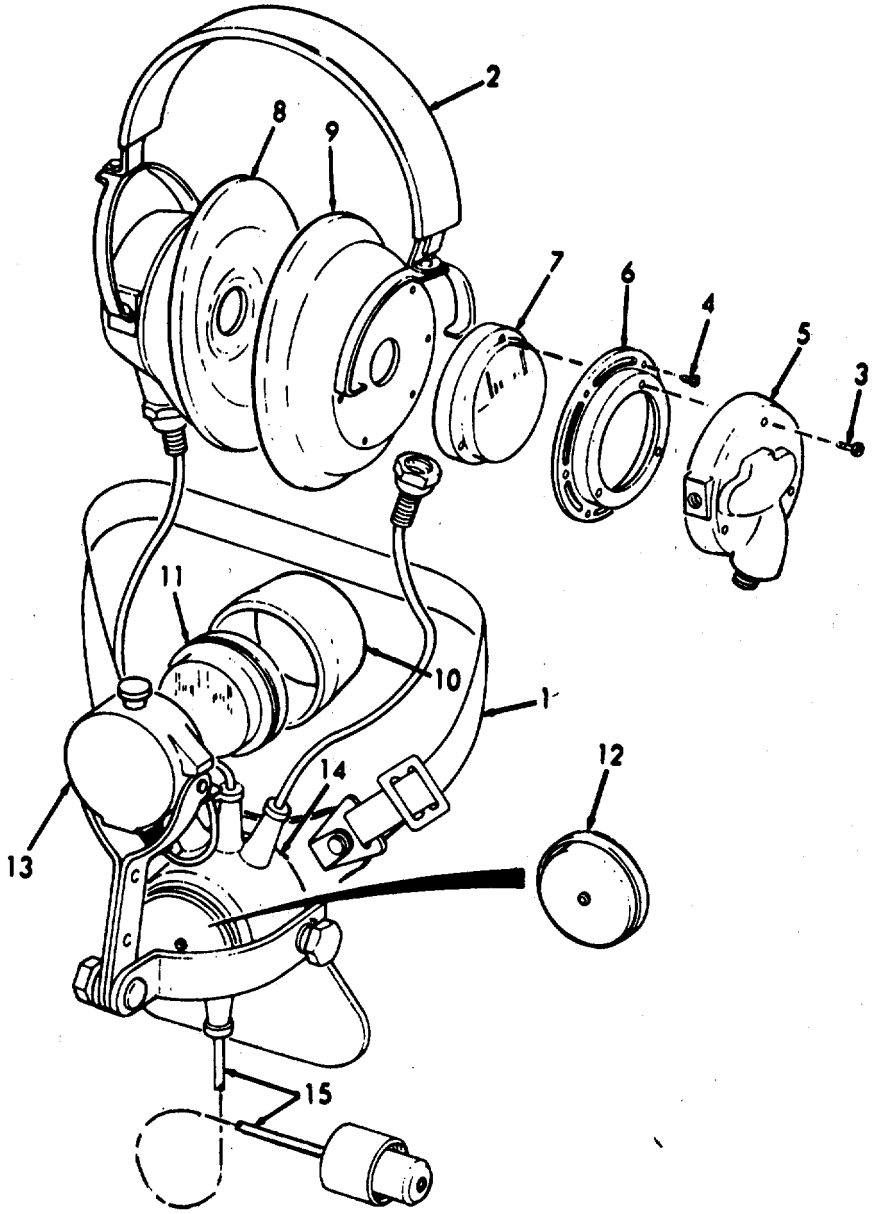
4-46.2. SOUND POWERED PHONES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
4. Chest-head set	a. Belt assembly (1)	Replace.	If needed.
	b. Headband assembly (2)	Replace.	If needed.
	c. Screws (3)	Replace.	If needed.
	d. Screws(4)	Replace.	If needed.
	e. Receiver housing (5)	Replace.	If needed.
	f. Mounting ring (6)	Replace.	If needed.
	g. Receiver power unit (7)	Replace.	If needed.
	h. Ear cushion left (8)	Replace.	If needed.
	i. Ear cushion right (9)	Replace.	If needed.
	j. Rubber mouth piece (10)	Replace.	If needed.
	k. Transmitter power unit (11)	Replace.	If needed.
	l. Backplate (12)	Replace.	If needed.
	m. Transmitter housing (13)	Replace.	If needed.
	n. Junction box (14)	Replace.	If needed.
	o. Jack and cable assembly (15)	Replace.	If needed.

4-46.2. SOUND POWERED PHONES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



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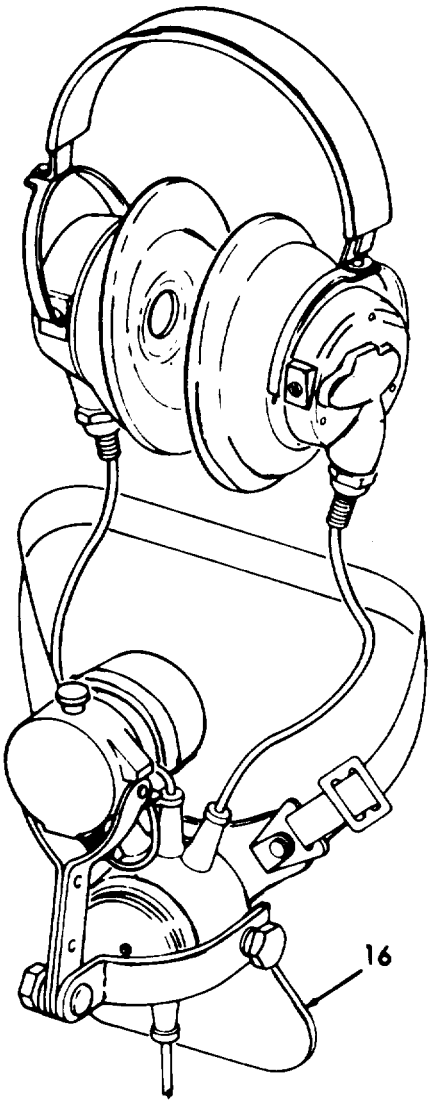
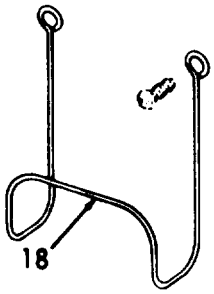
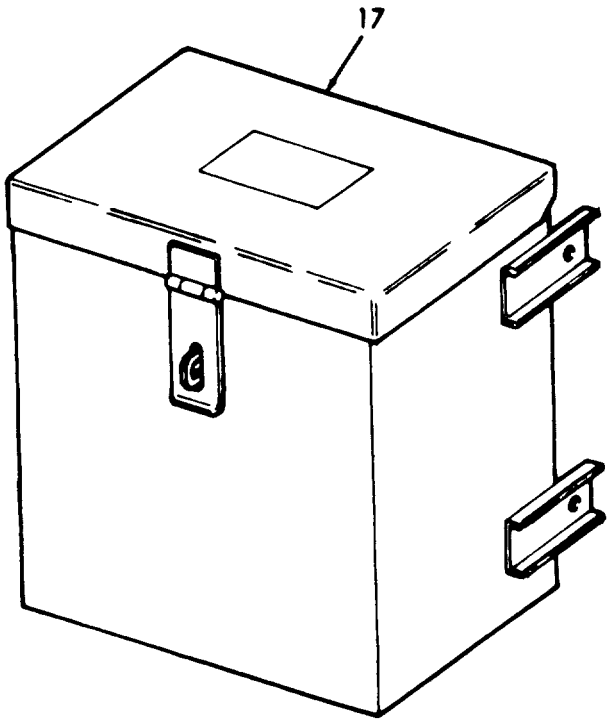
4-46.2. SOUND POWERED PHONES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	p. Chest plate (16)	Replace.	If needed.
	q. Locker (17)	Replace or repair.	If needed.
	r. Hook (18)	Replace or repair.	If needed.

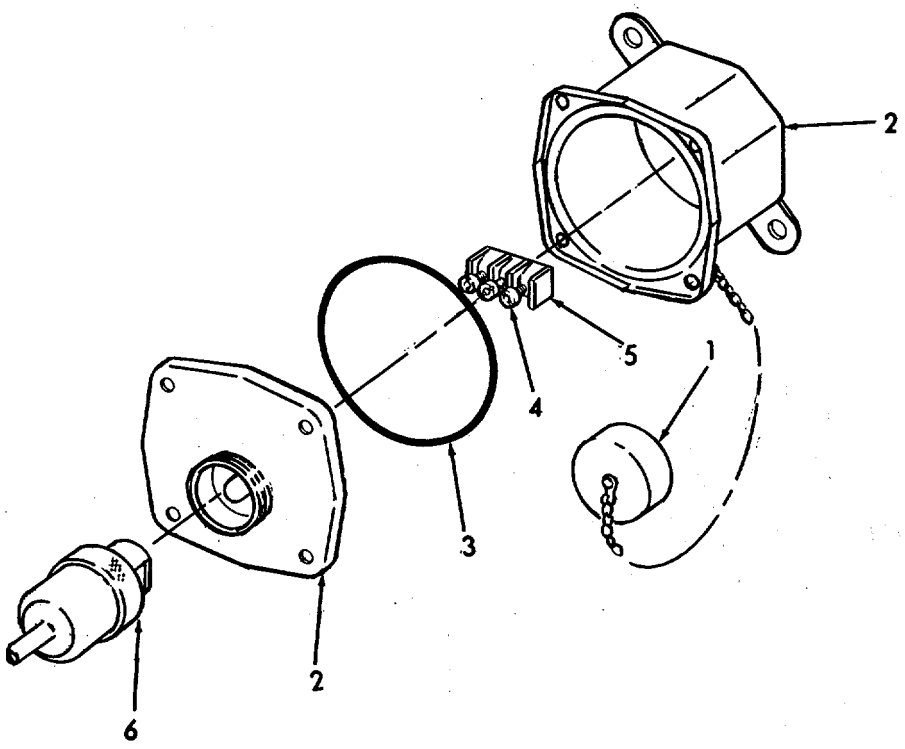






4-46.2. SOUND POWERED PHONES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
5. Jack box and plug	a. Chain and cap assembly (1)	Replace.	If needed.
	b. Cover (2)	Replace.	If needed.
	c. Preformed packing (3)	Replace.	If needed.
	d. Nuts (4)	Replace.	If needed.
	e. Terminal block (5)	Replace.	If needed.
	f. Plug (6)	Replace or repair.	If needed.



4-1163

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS.

a. General.

(1) Functional Description.

(a) This loud hailer is used to amplify the human voice just as does any public address system, for the purpose of talking to personnel over distances too far for the unaided voice to be understood, or to permit the talker's voice to be heard in noisy locations. For portable operation no other equipment or power source is required, as the loud hailer contains its own dry cell batteries. Where limited portability is practicable, the electrical power may be supplied to the loud hailer from a 12 volt storage battery through the accessory power cable furnished with the equipment.

(b) This equipment is suitable for use in exposed locations. It will withstand vibration and salt spray and is built to perform under extremes of temperatures and high humidity. The driver unit, microphone, amplifier enclosure, and battery enclosure are watertight.

(c) This loud hailer consists essentially of a horn loudspeaker, a microphone, a transistor amplifier, eight (size D) batteries, and a pistol-grip handle with trigger switch. These elements are combined in one unit assembly. To use the unit, grasp the pistol grip handle with one hand and raise the unit so that the rubber microphone mouthpiece is almost touching the mouth, and direct the horn in the direction it is desired to communicate. The hand grasping the handle operates the trigger switch which activates the loud hailer, and the talker speaks into the microphone in a strong command voice. As soon as the message is finished the trigger switch is released. The handle is so designed and located that the whole assembly balances perfectly on the grasping hand, thus requiring a minimum of effort to tilt the unit up or down.

(d) The assembly is designed to provide ease of access for servicing or repair. The microphone unit is mounted within a grille housing on the rear, which is easily removable. The amplifier is contained in a cylindrical housing, which is also easily removable from the rest of the assembly, the amplifier cartridge being held within by three machines screws.

(e) With the rear housing removed, the loudspeaker driver unit mechanism is also accessible. The horn assembly is secured to the driver mechanism, and contains within it a molded plastic lug. The lung forms a part of the horn assembly, but it is hollow and fitted with a cover. The interior of this lung is designed as a battery-cartridge, so that when the cover is removed the required dry cell batteries can be inserted in the spaces provided. As the interior of the lung and its cover contain contact springs, it is only necessary to screw the cover on again to make the necessary electrical connections to the batteries.

(f) The pistol-grip handle is secured to the driver unit-horn assembly with screws. It contains the trigger switch, a toggle switch to transfer from internal batteries to external storage battery connection, and a receptacle for external power cable plug. These handle components and the wiring are readily accessible by the removal of the plate on one side of the handle.

(g) In additional to the two control switches referred to, a volume control is mounted on the rear housing directly under the microphone grille. This control permits reducing the amplification of the system. This may be necessary when the loud hailer is used in enclosed areas, as the reflection of sound is such areas may cause the loud hailer to squeal or howl.

(2) Quick Reference Data.

(a) E1ectrical ratings - rated power output is 10 v.a. at 10% distortion or less.

(b) Input impedance - 400 ohms.

(c) Output impedance - 16 ohms.

(d) Amplifier voltage gain - 47 db

(e) Power supply - Eight 1.5 v Type BA-30 dry cell batteries in series providing 12 volts of internal supply, or an external 12 v storage battery. In lieu of BA-30 dry cells, commercial types, such as D-99 or No. 950 flashlight cells, may be used.

b. Operation.

(1) Functional Operation.

(a) The loud hailer is a self-contained assembly consisting of a microphone and amplifier, a loudspeaker, and a battery supply. It is essentially a portable p.a. system with a microphone connected to the amplifier input and the loudspeaker connected to the amplifier output. The amplifier is activated for use by operation of the trigger switch in the pistol grip handle. Speech signals from the microphone are amplified and impressed on the loudspeaker.

(b) In conventional p.a. systems a microphone cannot be placed in close proximity to a loudspeaker when both are connected to the same amplifier, as uncontrollable howling and squealing will occur. This is caused by acoustic feedback of sound energy from the loudspeaker to the microphone of the system. This loud hailer, however, is specially designed to eliminate this undesirable acoustic feedback to the greatest practical extent by balancing out a sufficient

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

proportion of the sound energy fed back to the microphone so that in normal operating conditions in exterior spaces, acoustic feedback is not a problem. The operator should be aware however that reflecting surfaces, bulkheads, and the like tend td reduce this balancing effect against acoustic feedback.

(c) The microphone used in this loud hailer is magnetic type. A volume control is connected between the microphone and the amplifier input for adjustment of the overall amplification of the system. The amplifier is designed specifically for efficient transmission of speech and is a 3-stage transformer coupled transistor type. The loudspeaker section consists of a semi-folded horn design which serves as an acoustic load on the diver unit. The driver unit is a permanent magnet moving coil type with molded phenolic diaphragm.

(d) D.C. power from the self contained dry batteries in the center section of "lung" of the loudspeaker horn is selected by operating a toggle switch in the base of the pistol grip handle to the proper position. This power is switched on and off by a trigger switch located in the forward part of the handle. To transfer the power supply from internal batteries to the external battery, the toggle switch is operated to the "EXT" position. The power from the external battery is supplied through an external battery cable which is fitted with a connector which mates with a receptacle in the bottom of the handle. The other end of the cable is fitted with spring clips suitable for connecting to the terminals of a 12 v storage battery and fitted with rubber insulating boots - red on the positive clip and black on the negative clip.

(e) The internal dry cell batteries also produce 12 volts when they are fresh. This voltage gradually decreases with use, but the dry cells have sufficient capacity to furnish the equivalent of 2000 ten-second messages before a lowering of output becomes unacceptable. From a practical standpoint they can be used much longer depending upon how much decrease in output is considered tolerable by the user. The usable life of these batteries is extended to the maximum if the trigger switch is never operated except when a message is being delivered, and released immediately at the end of the message. Otherwise current is drawn from the batteries unnecessarily, thus decreasing their life.

(f) Operation from the external storage battery is not as restrictive, as the battery can be recharged when the voltage drops to the discharge value. The terminal voltage of a good storage battery also remains more constant when a load is drawn, hence the available output of the loud hailer will always be close to the maximum value when using an external storage battery, until the battery approaches the discharge state. The output of the loud hailer will then start to fall off more rapidly than it does when the dry cell battery is approaching the end of its capacity.

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

(g) When using the loud hailer it will be observed that the output is noticeably sensitive to both the strength of the voice and the distance between the talker's lips and the microphone diaphragm. It is essential, therefore, that the operator speaks in a strong command voice and as close to the microphone protecting grille as possible - if part of the face touches the aperture it is protected from injury by the rubber mouthpiece. It is perhaps safer when operating on the deck of a vessel at sea to keep part of the rubber mouthpiece in contact with the area near the talker's mouth. However the microphone aperture must not be closed off substantially by the mouth as this will tend to muffle the voice, and may induce acoustic feedback.

(h) The tendency for acoustic feedback to occur is reduced to the greatest practical extent in this loud hailer. Generally it will not be a problem, but certain conditions of use or operation will tend to start howling or squealing. For instance, the slotted openings in the microphone housing are an important part of the design that provides the required margin against acoustic feedback. The operator should never cup one of his hands around the microphone grille when the unit is activated, as this partially closes off some of these slots. Acoustic feedback will also tend to start if the horn is directed down to the deck or directed close to a hard wall or bulkhead. These conditions should be avoided in operation. If however they are unavoidable, as for instance when it is necessary to use the loud hailer below decks, the volume control knob is backed off (turned counterclockwise) until the feedback stops, then advanced gradually until a point is reached where maximum volume without feedback is obtained.

(2) Preparation for Use. No preparation is required to use this loud hailer unless it is desired to use an external 12 volt storage 'battery to conserve the internal batteries. To use this external supply first operate the toggle switch in the handle to "EXT". Plug the external battery cable connector into the receptacle in the base of the handle and screw up the locking ring. Connect the battery clip marked "plus" to the positive post of the battery and the one marked "minus" to the negative 12 volt post. The unit is now ready for use.

(3) Operating procedures.

(a) This loud hailer is designed to perform one function - to amplify the human voice with good intelligibility so that speech can be understood by personnel either over distances too far for the unaided voice to be understood or in noisy areas where the human voice cannot override the interfering noises.

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

(b) Description of controls. There are three controls on this equipment. The trigger switch located in the front of the pistol-grip handle closes the battery supply circuit to the equipment. The toggle switch in the base of the handle permits selection of either internal dry batteries (when operated to "INT") or external battery supply (when operated to "EXT"). The volume control is operated by the knob located on the rear housing directly under the microphone grille.

(c) Sequence of operation. To operate the loud hailer effectively proceed as follows:

1 Internal or external power supply.

a Decide whether internal or external battery supply is to be used. For general use, during which short, intermittent messages are delivered, the internal battery is satisfactory and most convenient. When extended use and long messages are anticipated use an external battery.

b Operate the toggle switch to "INT" for use with internal battery.

c Operate the toggle switch to "EXT" for use with an external battery. Plug the external battery cable into the receptacle in the handle and secure with the locking ring. Connect the battery clips observing proper polarity to a 12 volt storage battery.

2 Use of loud hailer.

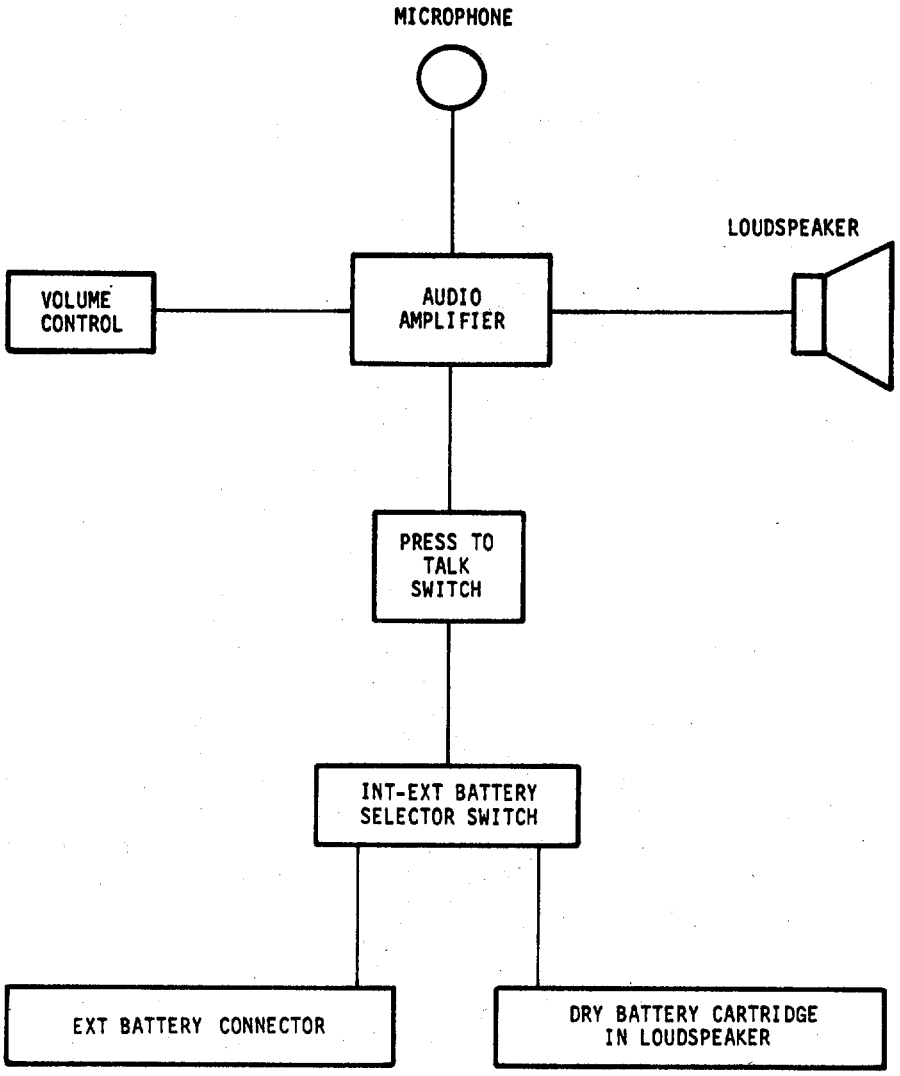
a Hold the loud hailer up to the mouth with the microphone as close as possible. Actuate the trigger switch, with the first and second fingers of the hand that is grasping the handle. If the system feeds back, back off the volume control until feedback :stops. If, however, there is no feedback to start with, as will occur if there are no reflecting surfaces, increase the volume setting as far as possible without feedback starting. It is advisable to-talk test (1, 2, 3, 4, etc.) while making these adjustments. Release the trigger switch as soon as the adjustment is satisfactory.

b This switch is to be operated, only when it is necessary to transmit a message, and should then be released immediately. This is particularly important when operating from the internal dry battery, in order to obtain the maximum battery life.

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

3 Message delivery. To deliver a message, direct the horn toward the listening personnel. Press the trigger, then speak in a strong command voice into the microphone. Do not speak fast or run words together, but enunciate each word distinctly.

4 After use. If the external battery has been used, remove the battery clips and unplug the cable. Return the toggle switch to the "INT" position. The equipment may now be stowed away.



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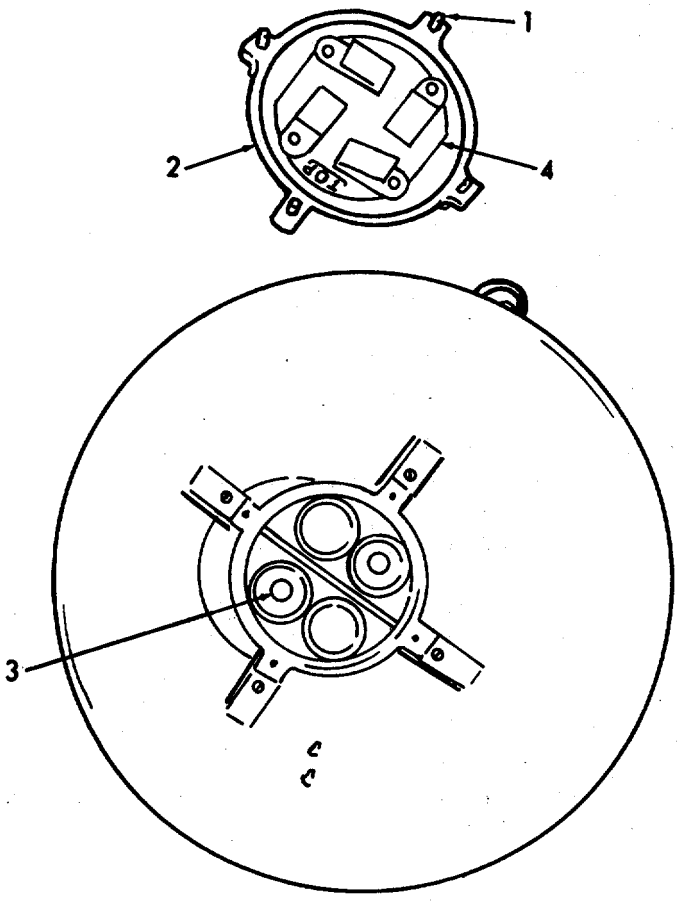
4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

(4) Operator's Maintenance.

(a) Maintenance checks and inspection made frequently by the operator will ensure dependable operation. This equipment has no built in test features.

(b) Operator's checks and adjustments. The internal batteries must be replaced when run down beyond there useful life, as described in paragraph c. At this time other preventative maintenance may be performed, as described in the following steps.

1 Battery inspection. Unloosen the four captive screws (1) and remove the lung cover assembly (2). The eight dry cell batteries (3), can be easily removed. At this time inspect the battery contact springs in evidences of poor contact surfaces. Clean up with metal polish if necessary, unless the springs are badly corroded, and in this event the whole contact plate (4) should be replaced. (Refer to Direct Support Maintenance.)



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4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

2 Volume control. Check tightness of the volume control knob set screw periodically, if the knob shows a tendency to be loose, tighten the set screw.

3 External battery cable. Keep the external battery cable free of dirt and corrosion. The spring clips may show a white deposit after being in use for some time. Clean this off with a knife or sandpaper and apply a thin coat of petrolatum to reduce corrosive effects of battery electrolyte .

Also check the cord connector before use to be sure there is no dirt or foreign material blocking the contacts.

c. Principles of Operation.

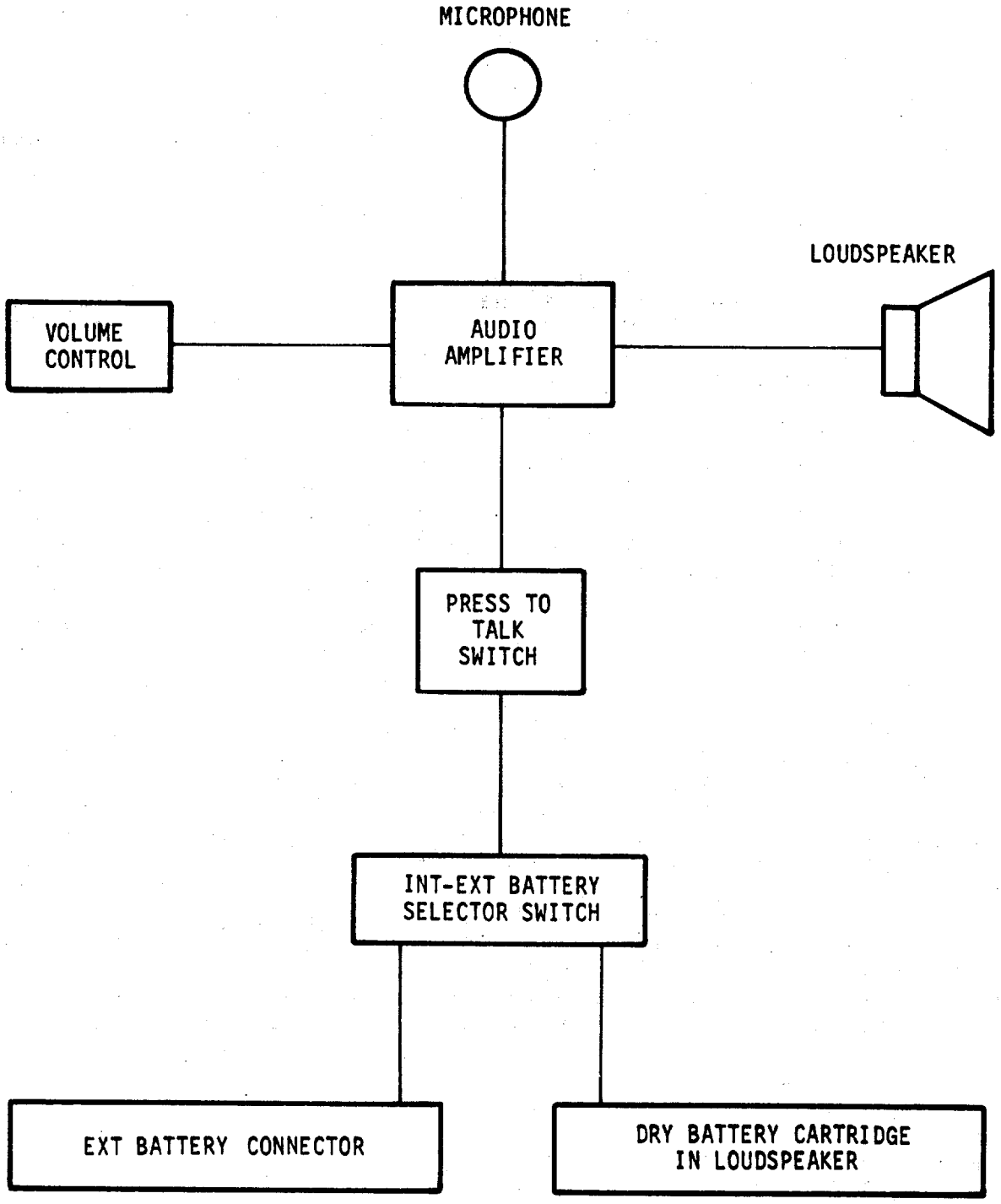
(1) Overall Functional Description.

(a) The loud hailer system is shown functionally in the block diagram. Briefly, the loud hailer consists of a loudspeaker horn assembly bolted to the sound chamber body of the driver unit. The center section or lung of the horn assembly is hollow, the interior containing eight flashlight batteries and means of making proper connections to them. A watertight cylindrical housing with the amplifier assembly within it fits over the sound chamber from the rear, and encloses the driver unit. The amplifier assembly is bolted into brackets at the base of the housing, in such a manner that the power transistors are in thermal contact with the housing. The volume control is mounted in the housing with its knob directly under the microphone enclosure. This enclosure is a grilled cup which is secured by three screws to a bracket on the housing. The microphone cartridge is supported on three cushioned studs and is held in place by a flange in the rubber mouthpiece, which in turn is mounted in the front opening of the grilled enclosure.

(b) The pistol grip handle is secured under the center of balance of the assembly, by screws into both the sound chamber body and into the horn. This handle houses the battery control switches referred to previously and the external battery receptacle.

(c) The speech amplifier is a transistor amplifier, actuated by a microphone and driving a loudspeaker. Power to energize the amplifier is derived either from an internal dry batteries or from an external battery, preferably a 12 volt storage battery. This power is controlled by the PRESS-TO-TALK trigger switch. Either power source is selected by the INT-EXT battery selector switch. The amount of amplification of the speech signal from the microphone is regulated by the VOLUME CONTROL.

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).



Public Address Set Type AN/PIC -2
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4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

(2) Functional Sections.

(a) D.C. power circuits.

1 12 volt d.c. power is selected from either the internal or external batteries by the operation of the toggle switch, S2, to the desired position. This does not apply d.c. power to the amplifier however. The Press-to-Talk switch S1 supplies d.c. power to the amplifier only when it is held closed.

2 The current drain from the batteries is very small when S1 is closed and-no signal is applied to the microphone. The current is maximum when the loudest signal is being amplified, as the collector current of the output stage varies with the strength of the amplified signal.

3 External battery power is obtained thru the receptacle J1 into which the external battery cable is plugged. Both internal and external batteries furnish a nominal 12 volts. The dry cell voltage will fall off with use while that from the storage battery will remain close to 12 volts until the discharge state is approached. Somewhat greater power output at a given distortion content is possible with the external storage battery, because the voltage remains more constant and because the internal resistance is lower-than that of the dry cell batteries.

(b) Battery cartridge or lung assembly. Eight D size cells (type BA-30) fit into the lung, four on either side of the separator, on which outlines the cells shown the correct inserting position of each. The lung cover assembly, contains a contact spring board, similar to that in the lung. This cover assembly is held to the lung' by four captive scows, with an "O" ring, in the joining surface to prevent entry of water. The upper leg of the cover and the top leg of the lung are marked "TOP", as the cover assembly must be put on in this orientation so that the cover contact springs will connect the battery cells correctly. In addition, the upper leg on cover is longer than the other three, and the recess in the top leg of lung is correspondingly greater to aid in orienting the cover properly.

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

(c) Pistol-grip handle assembly.

1 In addition to providing a means of holding the loud hailer at its center of balance, this handle also incorporates the controls for the battery supplies. The handle, is provided with a cover, held by three screws, trigger switch is normally open until actuated by the *trigger. To apply battery power to the amplifier, the two-position toggle switch selects either the circuit from the internal battery, or from the external battery receptacle, the position being indicated on the switch plate "INT" and "EXT" respectively. External battery power is furnished to the receptacle thru the external battery cable, when the latter is connected to a 12 volt storage battery, by means of the spring clips. The positive clip is marked with a plus sign, and is insulated by a red rubber boot. The negative clip is insulated by a black rubber boot. It is important that each clip be connected to the battery post of the same corresponding polarity, as the amplifier will not operate with the polarity reversed. The battery posts should be clean and the clips adjusted so as to bite into the metal and the posts.

2 The handle is provided with a "D" ring, which a carrying strap or a safety lanyard may be fastened. The cap and chain assembly for the battery receptacle is secured under one of the "D" ring mounting screws.

d. Preventative Maintenance.

(1) After long periods of storage, particularly at elevated temperatures, check the condition of the dry cells and the contact springs in the battery holder. Inspect the microphone housing particularly. The opening to the microphone should be kept free of dust, foreign matter, grease and oil and salt crystals. The microphone grille cover should be removed occasionally and any such accumulated material as above should be removed. The salt crystals left by the evaporation of salt water and spray should be dissolved with fresh water and rinsed away after which the parts should be dried with a soft cloth or tissue.

(2) It is well to inspect the interior pistol-grip handle occasionally by removing the handle cover to see that no salt or foreign matter has accumulated around the trigger or other parts in the interior. The power receptacle should likewise be inspected and cleaned when necessary.

(3) After a time sand particles, cinders or the like may accumulate at the base of the horn. It is advisable to invert the horn once in a while and shake out any foreign matter of this nature.

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

e. Performance Standards.

(1) Performance standards of the equipment and its supply in terms of resistance measurements, voltage measurements, and other operating parameters are given in detail in Chapter 5.

(2) However a practical qualitative check of the loud hailer performance can be made at any time without the use of measuring instruments by giving the equipment a simple operational test.

(a) Simple operational test.

1 Hold the loud hailer in the normal talking position, operate the trigger switch and advance the volume control while counting into the microphone "1, 2, 3, 4," etc. The reproduced voice from the horn should be clear and intelligible at any setting of the volume control and the intensity should increase gradually as the volume control is advanced. If this test is made in a location free of reflecting walls or the like, operation should be normal right up to the maximum setting of the volume control without acoustic feedback causing a howl or squeal.

2 With the volume control still at its maximum setting an indication of the normal amplification may be obtained by directing the horn towards a hard wall a few feet away or towards a floor. If the amplification of the loud hailer is up to normal this test will cause the system to break into acoustic feedback. With a normally functioning unit the acoustic feedback can be stopped by backing off the volume control from maximum.

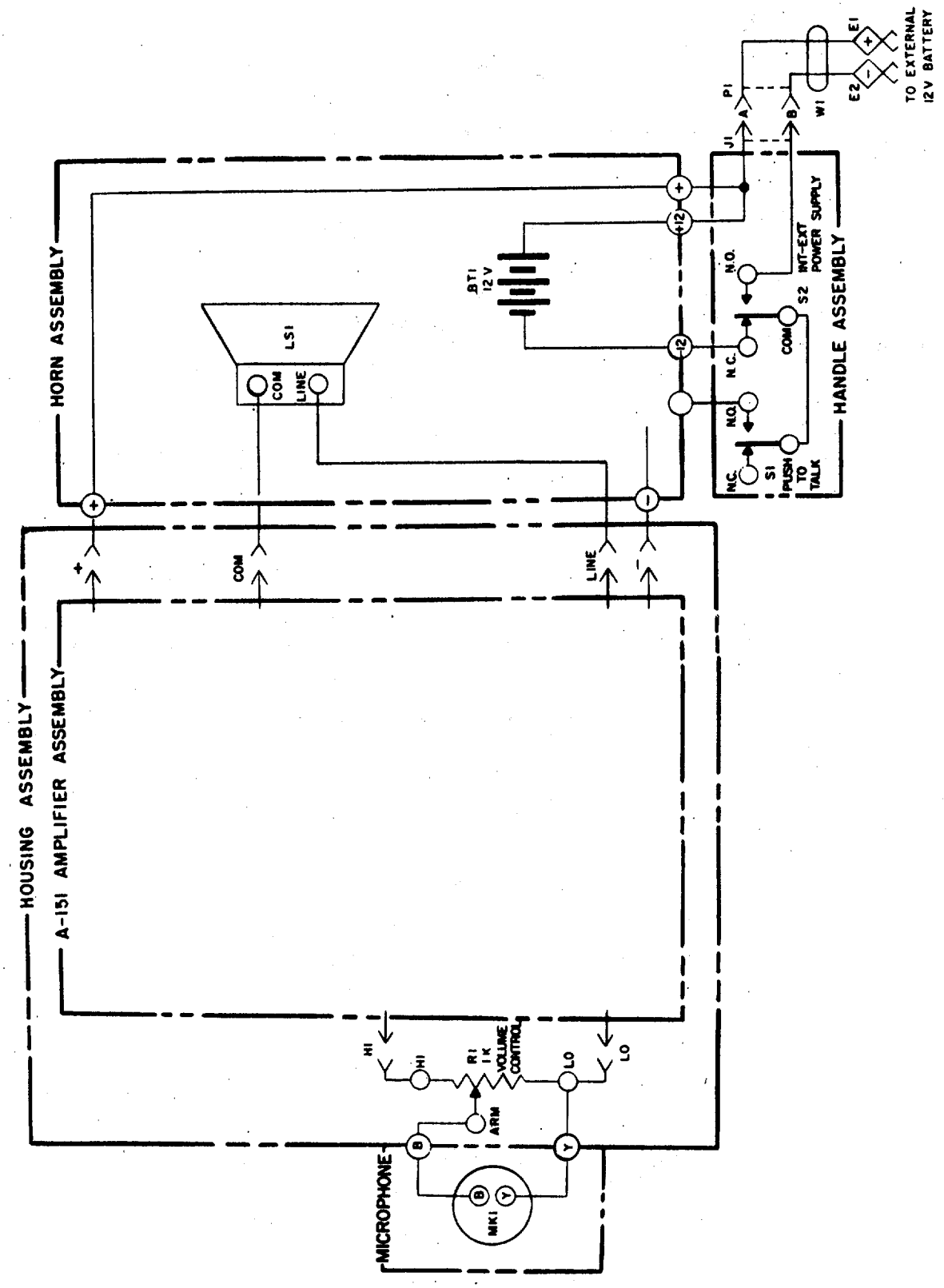
3 This test can be made both with the internal batteries as the power source or with an external 12 v storage battery, so that both battery supply circuits can be checked by this simple operational test. As described in previous sections, when the internal batteries are used the toggle switch on the back of the pistol-grip handle should be operated in "INT". To use an external 12 v storage battery connect it with the battery extension cable to the receptacle in the handle and operate the battery transfer switch to "EXT".

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

(b) Quick operational check. A condensed listing of the above test are given below. The particular test, the control settings for the test, and the normal operation to be expected are arranged in columnar form. IF desired this table may be used as a check off list for performing the simple operational test at any time.

TEST	CONTROL SETTING	NORMAL OPERATION
Normal speech into microphone outdoors.	Volume control below maximum setting.	Clear undistorted reproduction. Less than maximum volume.
Normal speech into microphone outdoors.	Volume control at maximum setting.	Clear undistorted reproduction. Full volume reproduced.
Normal speech into microphone, horn pointed at a hard wall.	Volume control at maximum setting.	Loud hailer feeds back and howls.
Normal speech into microphone, horn pointed at a hard wall.	Volume control backed off.	Howling stops well before volume control reaches minimum setting. Speech reproduction at lower volume than maximum but clear and undistorted.

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).



4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

This task covers:

a. Inspection
b. Service
c. Test
d. Repair

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

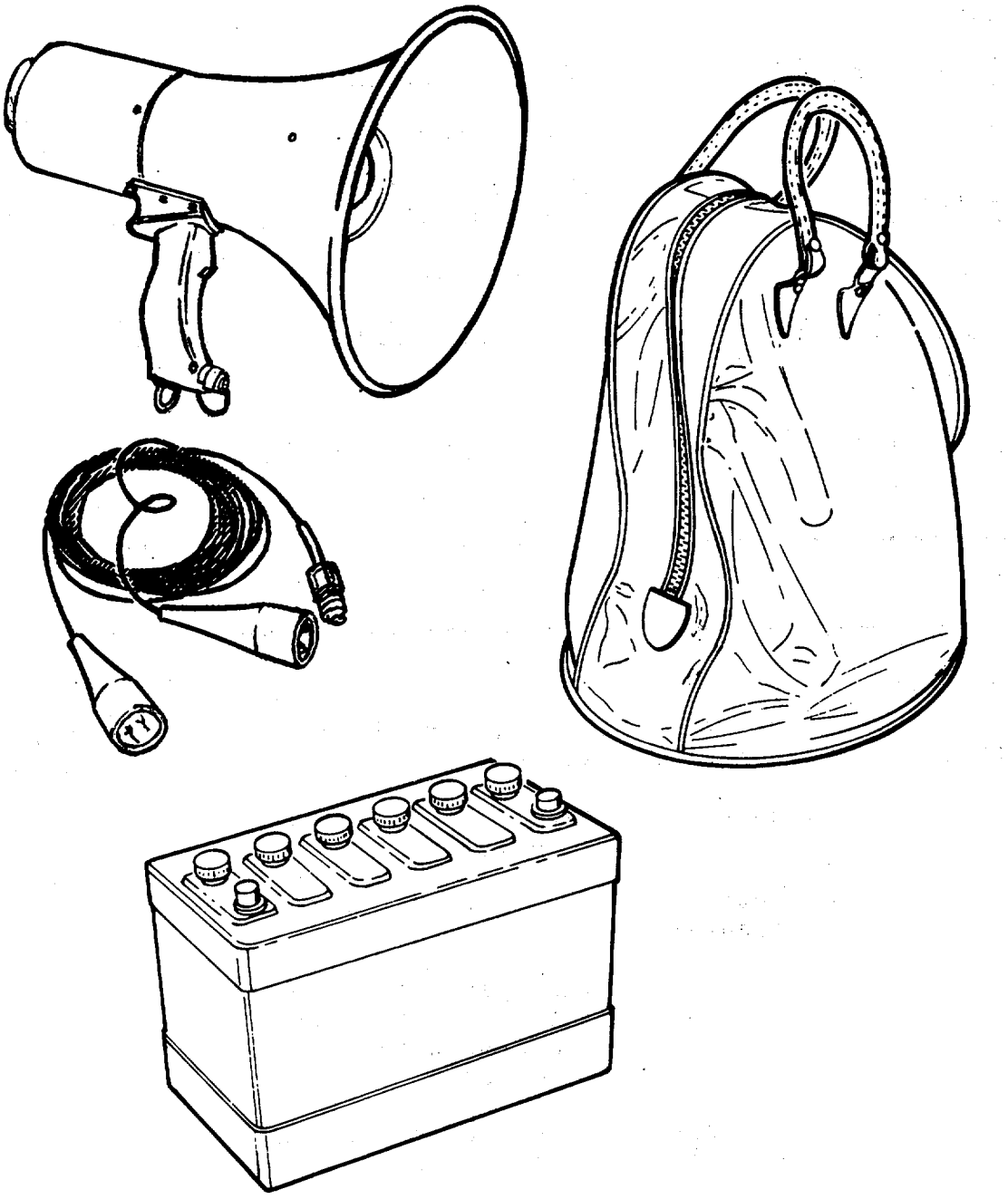
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Loud hailer	a. Micro-phone	Inspect for signs of damage.	Refer to Direct Support Maintenance.
	b. Handle.	Inspect for signs of damage.	
	c. Loud-speaker	1. Inspect for dents, and bends.	
		2. Inspect for damage or corrosion around battery compartment lung.	
	d. Battery (12 V)	1. Inspect for signs of damage.	

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

INSPECTION (Cont)



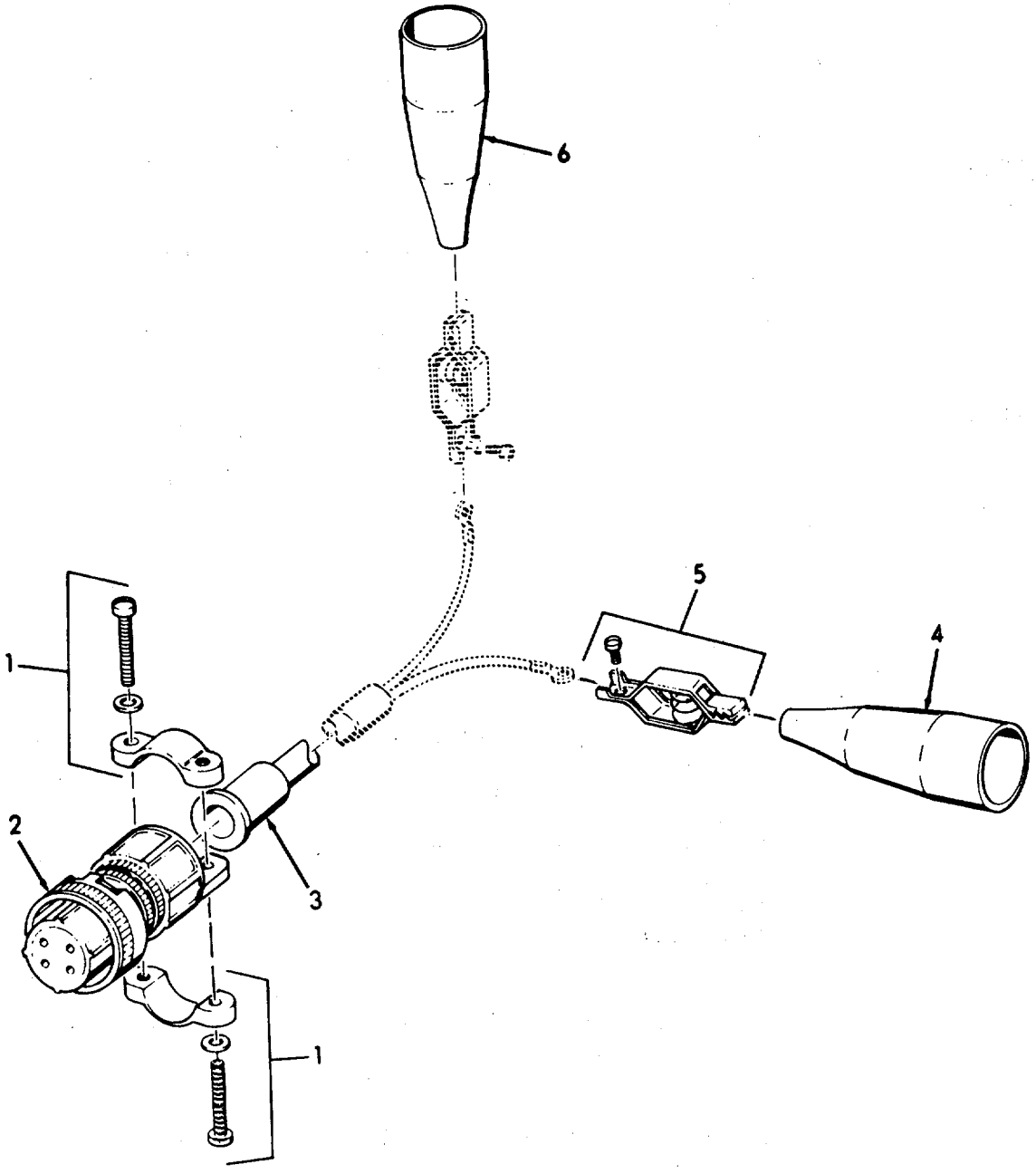
4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
		2. Check for proper water level.	
		3. Check for sufficient charge.	
	e. Carrying case	Inspect for signs of damage.	
SERVICE			
2.	Refer to paragraph 4-46.3a (4) and 4-46.3d .		
TEST			
3.	Refer to paragraph 4-46.3e .		
REPAIR			
4. External cable assembly	a. Cable clamp (1)	Repair or replace.	If necessary.
	b. Electrical connector (2)	Repair or replace.	If necessary.
	c. Cable bushing (3)	Repair or replace.	If necessary.
	d. Black battery clip insulator (4)	Repair or replace.	If necessary.
	e. Negative (-) clip (5)	Repair or replace.	If necessary.
	f. Red battery clip insulator (6)	Repair or replace.	If necessary.

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



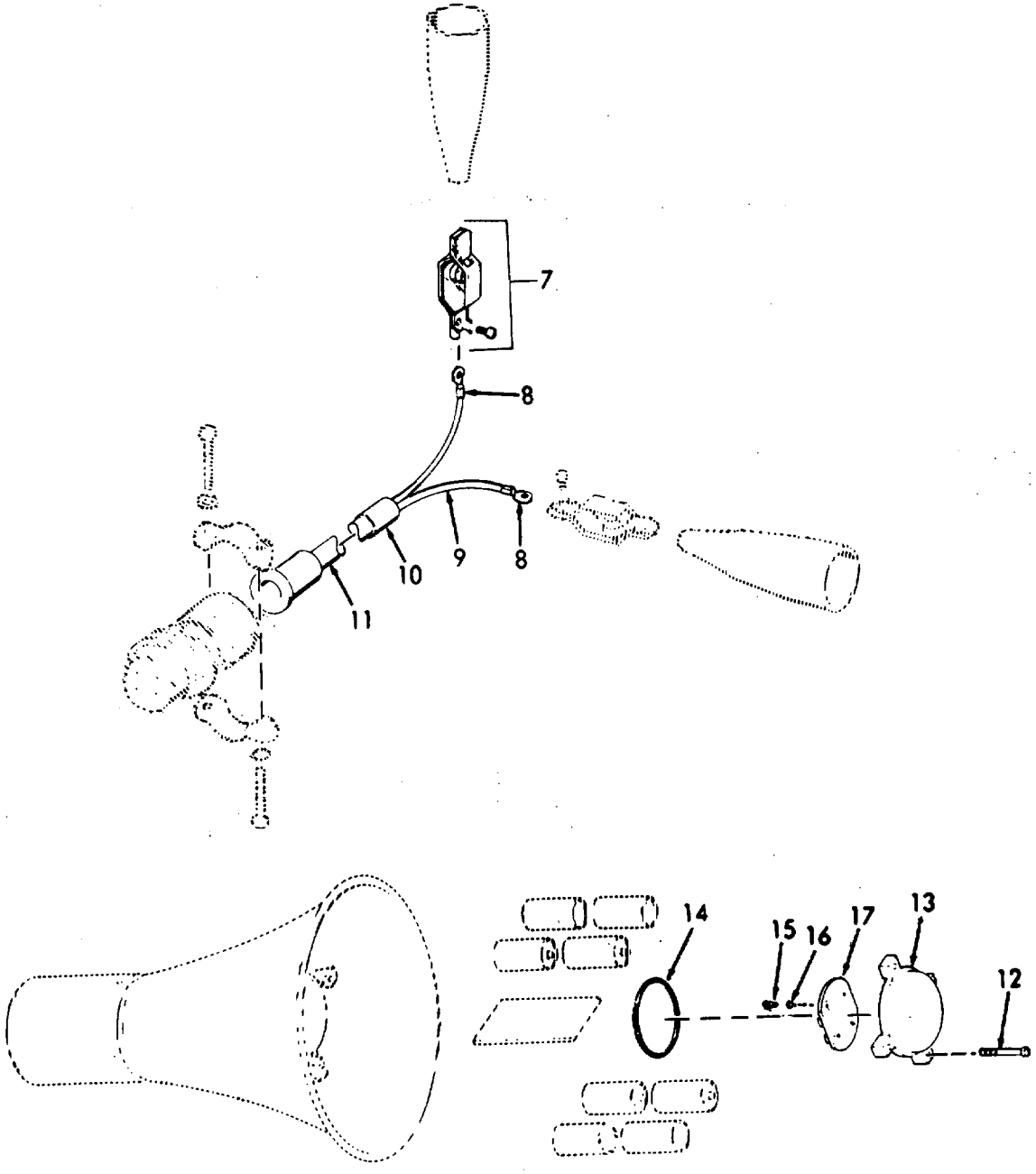
4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	g. Positive (+) clip (7)	Repair or replace.	If necessary.
	h. Terminal lugs (8)	Repair or replace.	If necessary.
	i. Sleeving (9)	Repair or replace.	If necessary.
	j. Sleeving (10)	Repair or replace.	If necessary.
	k. Cable (11)	Repair or replace.	If necessary.
5. Battery Lung	a. Screws (12)	Remove.	
	b. Cover (13) and preformed packing (14)	Remove.	
	c. Screws (15), lock-washers (16), and contact boards (17)	1. Disassemble. 2. Inspect the springs on the contact boards. 3. Inspect contacts for corrosion.	If necessary. Make certain that they have not become deformed. a. Blackening of silver plate is normal. It is not necessary to remove it. b. Clean with metal polish.

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



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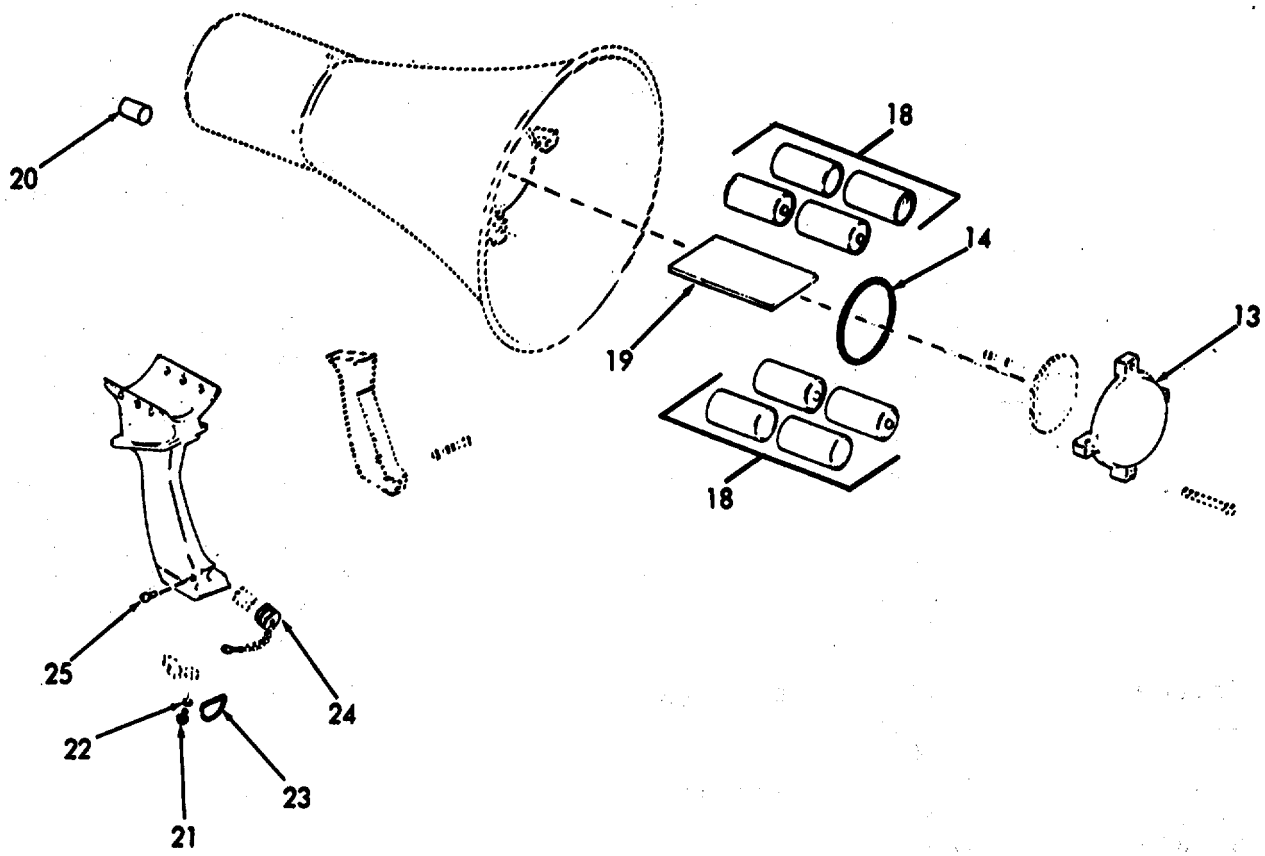
4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
			c. If badly corroded return to Direct Support Maintenance.
	d. Batteries (18)	1. Remove.	Discard.
		2. Install new batteries in accordance with outline on separator (19).	
	e. Cover (13) and preformed packing (14)	Install using screws (12).	1. Align upper leg of cover and top leg of lung TOP markings. This will orientate the cover contact springs and the battery terminals correctly.
			2. The upper leg on cover is longer than the other three legs, to ease in orientation.
6. Volume control	Knob (20)	Replace.	
7. Pistol-grip handle	a. Screw (21), lockwasher (22), and D ring (23)	Replace.	If necessary.
	b. Chain and cap (24) and screw (25)	Replace.	If necessary.

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-1185

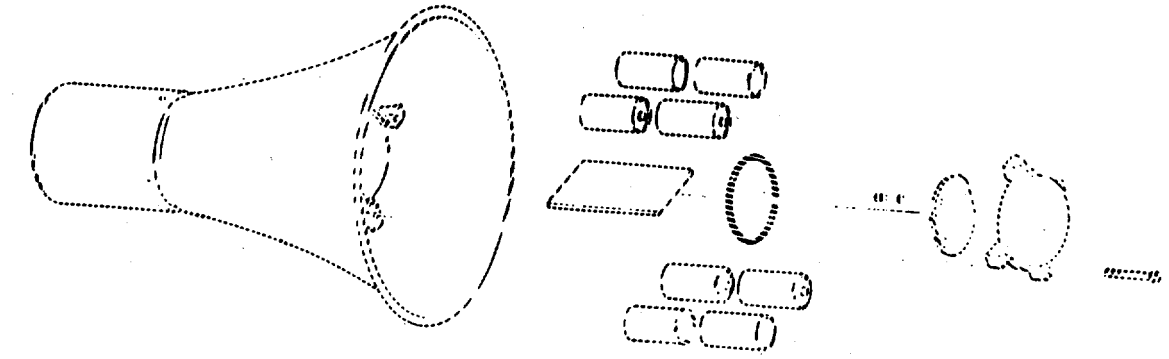
4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

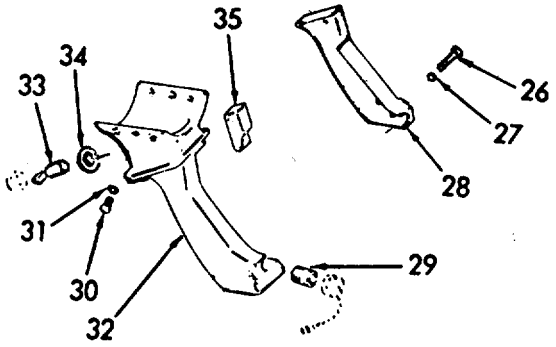
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	c. Screws (26) and lock-washers (27)	Remove.	
	d. Handle cover (28)	Remove.	
	e. Connector recep-tacle (29)	Replace.	a. If necessary. b. Refer to wiring diagram on page 4-1189.
	f. Screws (30) and lock-washers (31)	Remove.	
	g. Handle (32)	Remove.	
	h. Toggle switch (33) and desig-nation plate (34)	Replace.	Refer to wiring dia-gram on page 4-1189.
	i. Trigger switch (35)	Replace.	
	j. Handle (32), screws (30), and lock-washers (31)	Replace.	

4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

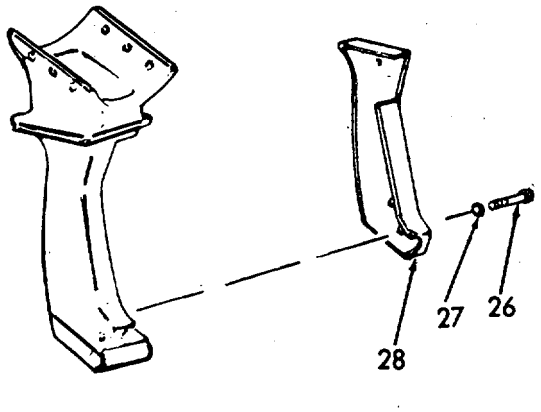
REPAIR (Cont)





4-46.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

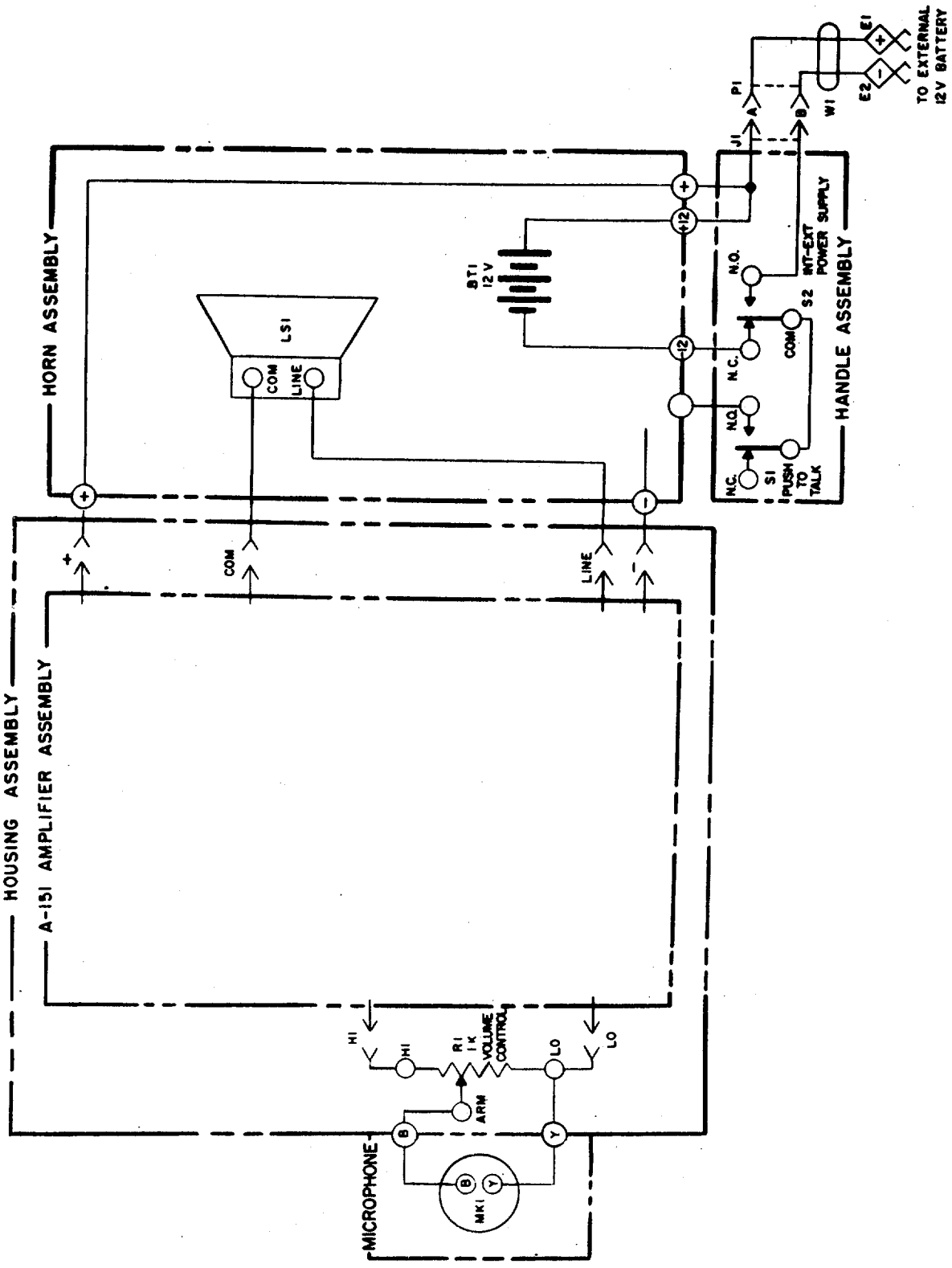
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	k. Handle cover (28), screws (26), and lock-washers (27)	Replace.	



4-1188

4-46.3. LOUD HAILER-MAINTENANCE INSTRUCTIONS (CONTINUED)

LOCATION	ITEM	ACTION	REMARKS



4-1189/(4-1190 blank)

4-46.4. CALL SYSTEM MAJOR COMPONENTS-MAINTENANCE INSTRUCTIONS.

This task covers:

a. Pre-Inspection **b. Replace**

LOCATION	ITEM	ACTION	REMARKS

INITIAL SETUP

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition / Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Call system	a. Switches	1. Inspect for worn, broken or inoperative parts.	
		2. Inspect for bent or broken boxes.	
	b. Horns	1. Inspect for breaks, cracks and dents.	
		2. Inspect for proper operation.	
	c. Buzzer	1. Inspect for breaks, cracks and dents.	
		2. Inspect for proper operation.	

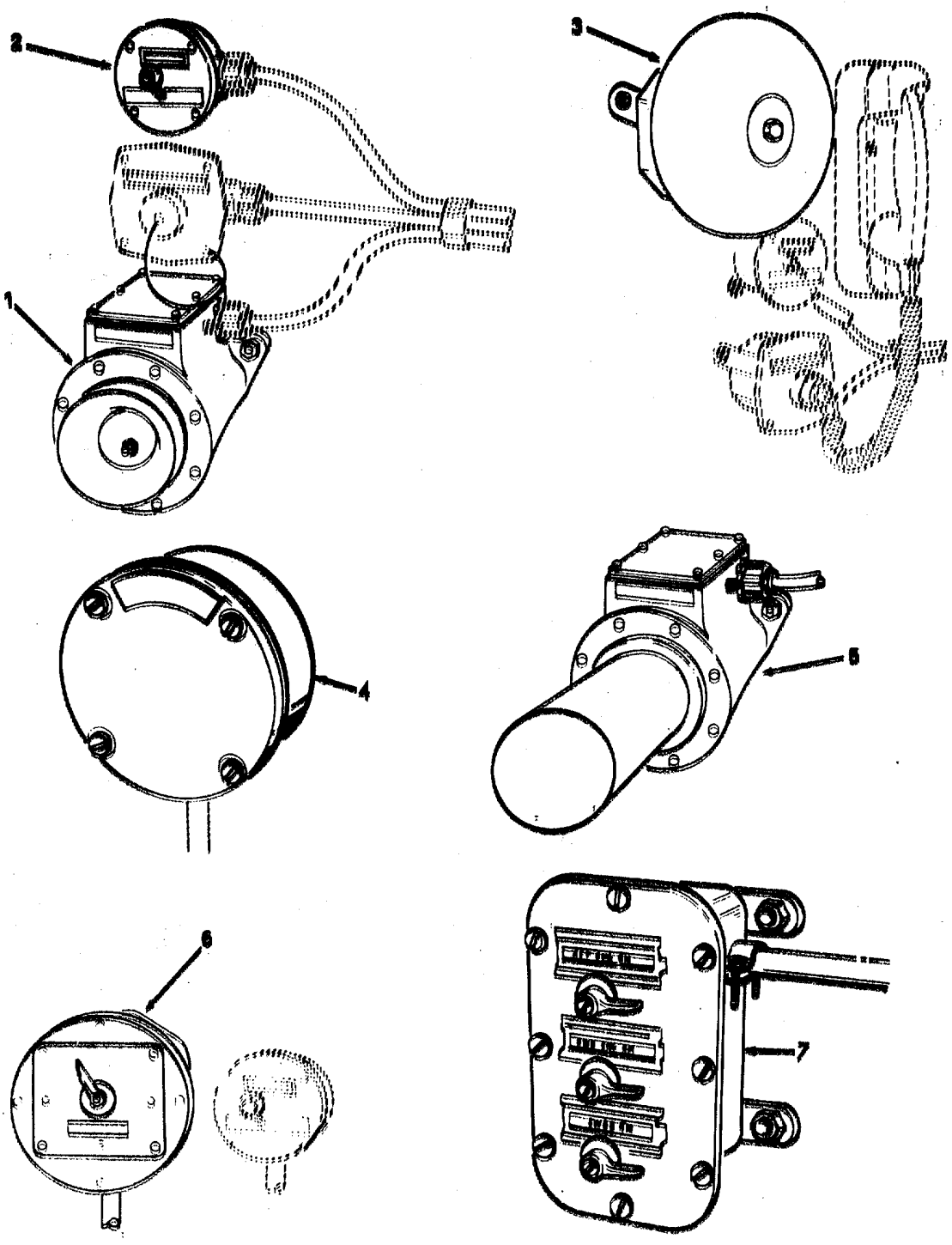
4-46.4. CALL SYSTEM MAJOR COMPONENTS-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	d. Connection boxes	1. Inspect for breaks, bracks, and dents.	
		2. Inspect for signs of corrosion.	
REPLACE			
2.	a. Cease fire horn (1)	Replace.	As needed.
	b. Rotary switch (2)	Replace.	As needed.
	c. Call system bell (3)	Replace.	As needed.
	d. Call system buzzer (4)	Replace.	As needed.
	e. Engine room call system horn (5)	Replace.	As needed.
	f. Rotary switch (6)	Replace.	As needed.
	g. Switch box (7)	Replace.	As needed.

4-46.3. LOUD HAILER-MAINTENANCE INSTRUCTIONS (CONTINUED)

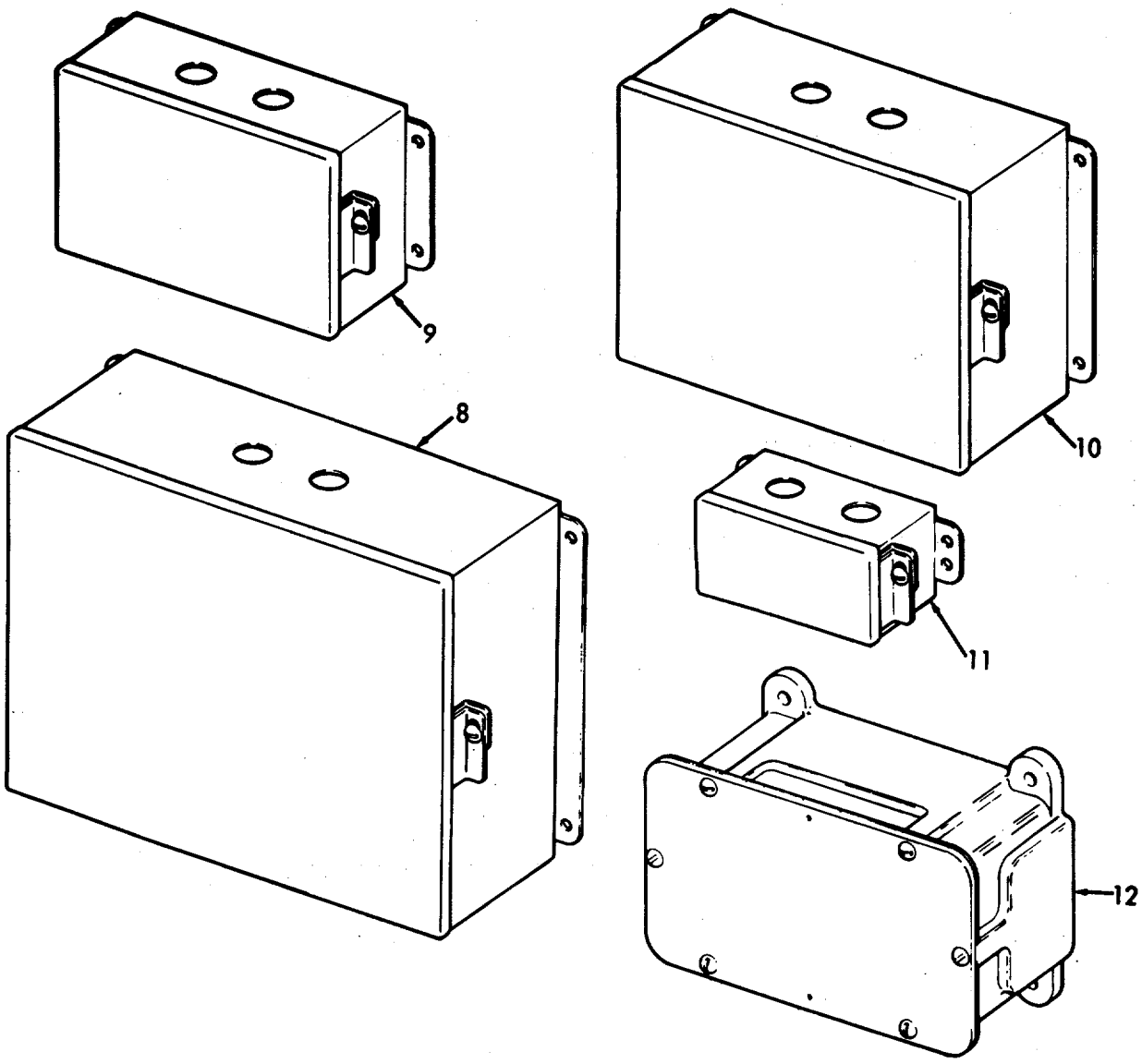
LOCATION	ITEM	ACTION	REMARKS

REPLACE



4-46.3. LOUD HAILER-MAINTENANCE INSTRUCTIONS (CONTINUED)

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	h. Connection boxes (8, 9, 10, 11, and 12)	Replace.	As needed.



4-46.5. VOICE TUBES-MAINTENANCE INSTRUCTIONS.

This task covers:
a. Pre-Inspection **b. Repair**

INITIAL SETUP

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Voice tube	All parts	1. Inspect for bends, breaks, cracks, and dents. 2. Inspect for missing or damage. 3. Insure deck access cover is not missing. 4. Inspect for leaking gasket.	

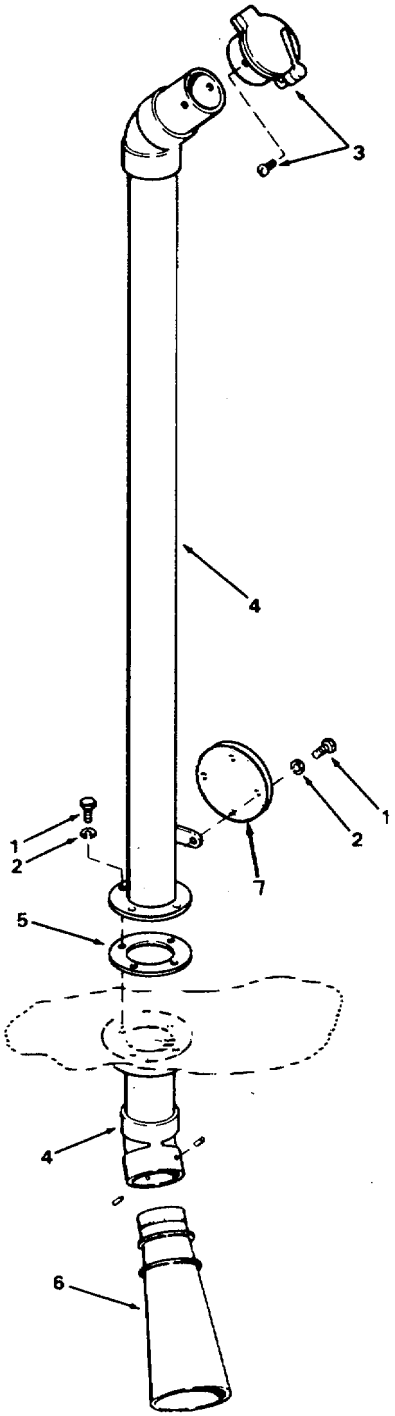
4-46.4. VOICE TUBES-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2.	a. Screws (1) and lock-washers (2)	Replace.	If needed.
	b. Mouth piece cover and screws (3)	Replace or repair.	If needed.
	c. Voice tube (4)	Replace or repair.	If needed.
	d. Gasket (5)	Replace.	If needed.
	e. Megaphone (6)	Replace or repair.	If needed.
	f. Deck access cover (7)	Replace or repair.	If needed.

4-46.3. LOUD HAILER-MAINTENANCE INSTRUCTIONS (CONTINUED)

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS.

a. General.

(1) The Alarm Switchboard is an electrical system installed aboard ship for the detection and warning of a variety of important functions or conditions that require continuous monitoring. For example: low engine oil pressure, high engine temperature, high magazine temperature, magazine sprinkler operation, high sewage level, gyro compass failure and other functions. Various contact making sensors are used. The magazine high temperature alarm uses mercury-operated thermostats. It will detect an overheated condition in the magazine long before serious fire actually occurs.

(2) The magazine sprinkling alarm system is installed aboard ship for detection and warning when water is present in the sprinkling system, whether the presence of water is due to opening of the magazine group control valve, or by leakage past the valve. The system depends upon the flooding of a water switch which is connected to the piping on the dry side of the magazine group control valve.

(3) Warning is also given when trouble or failure occurs in the alarm circuit and indicates which section of the equipment is involved.

(a) The alarm switchboard.

1 The system is designed to operate on 120 volts D.C. and is obtained by rectifying (within the panel) an interior communication supply of 120 volts A.C.

2 The top section of the alarm switchboard is the alarm panel. On this panel are mounted the audible alarm and trouble signal as well as miscellaneous test equipment common to all circuits.

3 The lower section or sections of the alarm switchboard are line panels. Each line supervises two lines mounted together on a plate. As many line panels are installed as are necessary to care for the total number of contact maker circuits installed aboard ship.

(b) Contact makers. Supervised, normally open, contact makers installed in various shipboard systems operate individual alarm circuits to give trouble indications associated with these systems, such as high temperature, high and low pressure, high and low level etc. A 7000 ohm, 5 watt resistor is connected across the terminals of the last contact maker associated with that line to complete the individual alarm supervisory circuit.

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS

(c) Circuit diagram.

1 From a study of the wiring diagram (Foldout 6), it will be seen that when the circuit is in normal operating condition, the supervisory relay is energized and pulled in. The supervisory resistor associated with the contact maker is in the circuit, and while the alarm relay is also in the circuit, it is not energized sufficiently to close its armature. Short-circuiting of the resistor by closing the contact maker will increase the current in the circuit. This increase in current flowing is enough to increase the magnetic energy of the alarm relay to a point where it will operate its armature, thereby causing the alarm bell to ring and an indicator to be set to indicate the particular circuit in alarm condition. Since the normal operating current is just sufficient to hold the supervisory relay armature operated, an open circuit in the wiring causes the supervisory relay to drop out, which in turn will operate a buzzer and cause a yellow target to show, indicating the particular circuit in trouble.

2 The resistor is the supervisor of the circuit. Because of the presence of this resistor it is possible to maintain the supervisory relay energized and the alarm relay to all intents not energized. (The alarm relay is, of course, partially energized but not sufficiently to operate.) By this arrangement, it is possible to make the system a closed circuit system that will give a positive warning in case a contact maker closes, and will also supervise itself and give an equally positive warning if for any reason a break or a failure should occur.

3 The current flowing under normal operating conditions, that is with the supervisory relay operated, the supervisory resistor in the circuit, and the alarm target relay open, is called the supervisory current, and in this system is approximately .012 amperes.

b. Operation of an Alarm System.

(1) Placing of System in Service.

(a) Assuming that an alarm system is properly installed and connected, all that is necessary to place the system in service is: first, make sure that all switches on the alarm switchboard are in the normal position; and second, close the alarm supply switch located on the interior communication switchboard. Closing this supply switch will energize the entire alarm system.

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

(b) A pilot light, PL5, is mounted on the alarm panel at the top section of the alarm switchboard. Failure of this pilot light at any time should be checked immediately. It means either that the lamp is defective and needs replacing, or, far more important, that the source of supply has failed and the entire alarm system is out of service.

(c) If the system is being switched into service for the first time or has been out of service for some time it will be desirable to make certain that everything is in working order This may be done as outlined in paragraph entitled, “Routine Tests”.

(2) Alarm Operation.

(a) If the alarm bell, B, rings, examination of the unit panels will show at least one red target delayed in the opening marked “Alarm”. This red target, by means of the nameplate above it, will indicate which equipment is affected. As soon as the location of the alarm is determined, the alarm switchboard operator should throw the circuit test switch immediately above the exposed red target to the "Off" or Cut-Out position. Throwing this switch will stop the alarm signal, cut the circuit affected out of the system, and restore the rest of the system to normal operation so that it will be ready to report an alarm in any other alarm circuit. The thrown switch and the yellow target will serve as a reference designation until the system and circuit affected are restored to normal.

(b) This sequence of operation does not take into consideration the ship’s regulations in regard to handling alarm conditions. The time intervals may be modified to care for these regulations but in any fuse the circuit affected should be cut out as soon as possible order that tile rest of the system may be restored to normal, for the following reason. If one circuit has given an alarm a subsequent alarm on any other circuit will be reported only by the red indicator swinging into view which, in a time of stress or excitement, might easily be overlooked. Cutting out the circuit affected will reset the red target signal, substitute the yellow target and restore the rest of the circuits to normal, after which, both the red indicator and the alarm bell will operate in case of alarm in another location.

(c) When the equipment and circuit affected are restored to normal, the circuit may be switched back into service by returning the line circuit test switch to the normal position.

(d) If one or more alarms should operate, and the examination of the equipment designated discloses no trouble, the operation of these alarms is probably due to grounds on the circuit affected. See paragraph e entitled "Grounds".

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

(3) Trouble Alarm Operation.

(a) It the trouble buzzer, Z, operates, examination of the unit panels will show one or more yellow targets showing. This is an indication that the circuit on which the target is displayed is open and out of order.

(b) The circuit in trouble should be disconnected by throwing the switch to "Off" for the same reason that it would be disconnected for an alarm condition. When the circuit has been repaired, it can be switched back into operation by simply returning the associated line switch to the normal position.

(4) Operation in Case of Grounds. Positive and negative ground detector lights are provided on the alarm panel at the top section on of the alarm switchboard. Under normal conditions both ground lamps are darkened. If either the positive or negative ground detector lamp glows, this is an indication of a ground in the + or - side of the power supply. For removal of these grounds, see paragraph e "Grounds". ANY REPLACEMENT LAMPS MUST BE AGED. To age lamps, operate, 24 hours at 180 volts A.C.

c. Description of Operating Circuits

(1) The electrical operation of the supervisory alarm system may be understood by a study of the wiring diagrams (Foldout 1). These diagrams show the complete wiring of the alarm switchboard and the wiring for a two line alarm unit. Other line alarm units are wired in exactly the same manner. The number of contact makers may be varied as required.

(2) Supervisory circuit.

(a) Referring to the wiring diagrams (Foldout 6) the supervisory circuit may be traced from the positive (red) terminal of the full wave selenium rectifier, through the winding of the alarm target relay, through the line unit test switch to the “FL” side of the line circuit. The circuit enters one side of the contact maker, through the supervisory resistor to the other side of the contact maker to the "FFL" side of the line. The circuit continues through the line unit test switch, through the supervisory target relay coil to the negative terminal of the rectifier

(b) With the current flowing in this circuit as outlined, the supervisory relay is energized sufficiently to operate its armature, the alarm relay is also energized but not sufficiently to operate its armature, and the supervisory resistor is in the circuit holding the current down to a point where the alarm target relay will not operates. This current is approximately .012 amperes.

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

(c) With everything normal, the supervisory current will maintain all of the circuits of the alarm system in the condition just described. Closure of the contact maker will cause the system to operate as an alarm. A failure of the supervisory current in any circuit will cause the associated supervisory relay to release and notify the attending personnel by both the audible and a visual indication that the circuit is out of order. See paragraph b(3).

(3) Alarm Circuits.

(a) Operation of the system as an alarm is as follows: If any contact maker closes, thereby shunting the supervisory resistance out of the circuit, the current flowing in the line circuit will rise to a value (.043 amperes) sufficient to cause the complete energization of the alarm target relay.

(b) The armature of the alarm relay mechanically operates a rotating target which exposes a red signal on the front of one of the two line alarm units. This red signal designates by means of the nameplate above it, the equipment in which contact maker has closed.

(c) The armature of the alarm target relay closes a circuit from one side of the supply (terminal "L1") through the coil of the extension signal relay, K, at the top of the panel, through the normally closed contact of the silent alarm test switch, S, at the top of the panel to terminal "A". The circuit continues to the closed contact of the alarm relay, terminal "2F" of the two line unit, "2F" of the alarm switchboard, and thence to "L2" terminal, which is the other side of the system supply. This will cause the extension signal relay to operate.

(d) The operation of the extension signal relay, K, closes the circuit from one side of the A.C. supply to Terminal "L1" through the alarm bell through the extension signal relay closed contact to terminals "2F" and "L2" on the other side of the supply, causing the alarm bell to operate.

(e) Terminals and wiring are provided for extension signals if required. There are four such sets of terminals marked: "EX1 EX2"; "EX3 EX4"; "EX5 EX6" and "EX7 EX8". Each leg of each extension signal circuit is fused with a 3 ampere fuse mounted in the fuse indicator on the top panel.

(4) Trouble Circuits.

(a) Operation as a trouble alarm is as follows: Failure of the supervisory current in any circuit will de-energize the supervisory relay on that circuit, allowing the relay armature to drop out, showing a yellow target. This closes the circuit to the common trouble buzzer.

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

(b) The circuit of the common trouble buzzer, Z, may be traced from terminal "L1" to one side of the buzzer, through the buzzer to the closed contact of silent trouble test switch, S, terminal "T" of the alarm switchboard, terminal "T" of the two line alarm units, the closed contact of the line unit switch of each two line alarm unit, the closed contact of each supervisory target relay, terminal "2F" of each two line alarm unit, terminal "2F" on the alarm switchboard to terminal "L2" which is the other side of the source of supply.

(c) The circuits described in paragraph b and c are the normal operative circuits. The rest of the circuits are for testing purposes and are described under paragraph d entitled "Routine Tests".

d. Routine Tests.

(1) The supervisory alarm system is designed to require very little attention. Almost any trouble that may affect the system will give both an audible and a visual signal in the form of either an alarm or trouble alarm. However, the system is so arranged that periodic tests of all circuits may be made easily and quickly from the alarm switchboard. This procedure tests only the panel and the line unit modules. External wiring must be checked at the panel for insulation resistance and (most important) continuity.

(2) Silent Alarm Test.

(a) A three-position rotary silent test switch, S, is centrally mounted on the alarm panel at the top of the alarm switchboard. Normally, this switch is maintained in the central or "Normal" position. For this test, it is operated to the "Silent Alarm Test" position. This action disconnects the extension signal relay, K, controlling the alarm bell, B, and connects the "Alarm Test" light, PL2, into the circuit in place of the bell. Whenever the test switch is thrown to either silent test position, the "Test Light", PL1, on the panel will flash.

(b) In order to test the capacity of each circuit to function as an alarm: first, place the silent test switch, S, in the "Silent Alarm Test" position, then place the circuit test switch on the two line unit in "Test" position. The "Alarm Test" lamp will then glow if the circuit is in proper condition. To turn off the "Alarm Test" lamp, PL2, return the station to normal.

(c) If the "Alarm Test" lamp, PL2, fails to glow, the circuit is out of order. This condition may be due to one of several reasons. First, the armature of the alarm target relay may be binding. To check, remove the two line unit on which the affected unit is mounted, and inspect the alarm target relay. If the relay is in good working order, the armature will pull in against the magnet core and the

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

contacts above the coil will close when the line circuit test switch is placed in the alarm test position. If the armature does not close, it may be due to dirt or foreign matter on the pivots of the armature and target assembly, between the target drum and the drum mount, or on the drag link between the armature and the target drum. It may also be due to a dirty "make" contact or poor adjustment of the "make" contact of the line circuit test switch when in the alarm test position.

(d) Second, if cleaning and freeing the armature and target assembly does not cause the armature to close when the line circuit test switch is thrown to the test position, and the circuit is in all other respects normal, the coil of the alarm target relay is defective and should be replaced with a new one.

(e) Third, if the alarm target relay armature is in good order, failure of the "Alarm Test" lamp, PL2, to glow may be due to poor contact in the make springs of the alarm target relay. These springs must be adjusted to make good contact.

(f) Fourth, if the alarm target relay and the line circuit and silent test switches are in good order, the trouble may be due to loose connections in any of the following places: the connections on the line circuit test switch or either connection of the alarm test 1 amp.

NOTE

When the silent alarm test switch, S, is placed in the "Silent Alarm Test" position, the extension signal relay, K, controlling the alarm bell, B, is disconnected from the circuit, and the "Alarm Test" light, PL2, is operated directly from the contact of the alarm target relay.

(3) Description of Silent Alarm Test Circuits.

(a) When the silent alarm test switch, S, is placed in the "Silent Alarm Test" position, the switch opens the circuit to the extension signal relay, K, and holds it open so that the relay and alarm bell, B, will not operate while the alarm switchboard is being tested.

(b) The operation of the silent alarm test switch, S, also closes the circuit for the "Test Light", PL1, from the positive (red) terminal of the rectifier, CR1, to a 2 mfd capacitor, C1. The other side of the capacitor is connected to a .75 meg resistor, R1, and through the make contacts of the silent alarm test switch to the negative rectifier terminal. The test light which is an NE79 neon lamp is connected across the 2 mfd capacitor, C1. The lamp will flash with the silent alarm test switch in either silent test position, serving as a warning that one audible signal or the other is out of service.

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

(c) The flashing operates on the principle of a relaxation oscillator. Upon closing the switch contacts, the D.C. voltage slowly charges the capacitor, C1, through the resistor, R1. When the ignition voltage is reached the lamp will flash, discharging the capacitor, at which time a charge will again build up on the capacitor causing the lamp to flash again. This cycle will repeat itself as long as the switch is in either the "Silent Alarm Test" or the "Silent Trouble Test" position.

(d) With the silent alarm test switch in the "Silent Alarm Test" position, the individual circuits are tested by throwing the associated line circuit test switch to the "Test" position. The operation of the circuit test switch short-circuits the line and, as a result, the current flow is increased just as it would have been had the contact maker shorted its supervisory resistor. The alarm target relay now becomes fully operated, displays its red target and completes the circuit and illuminates the "Alarm Test" lamp, PL2.

(e) The "Alarm Test" lamp, PL2, circuit starts with the source of supply at terminal "L1", going through the "Alarm Test" lamp, PL2, continuing to the "make contacts" of the silent alarm test switch, S, through the "make contacts" of the alarm target relay, back to terminal "2F" of the two line alarm unit, continuing to terminal "2F" on the alarm switchboard, then to terminal "L2", the other side of the source of supply. The source of supply is 120V 60 cycle single phase A.C. originating from the local machinery space of the interior communication switchboard.

(4) Silent Trouble Test.

(a) For this test the silent alarm test switch, S, is operated to the "Silent Trouble Test" position. Throwing the switch cuts the trouble buzzer, Z, out of the circuit and connects the "Trouble Test" light, PL3, into the circuit. The "Test Light", PL1, will flash as in the "Silent Alarm Test".

(b) When the silent alarm test switch, S, is in the "Silent Trouble Test" position each supervisory circuit is tested by throwing the line circuit test switch SLOWLY from "Normal" to "Off" position. Moving this switch slowly will show the yellow target on the unit panel directly above the "Off" circuit test switch and the "Trouble Test" lamp, PL3, on the alarm panel will flash momentarily. The yellow target associated with the circuit will show as long as the switch is left in the "Off" position, but the "Trouble Test" lamp will darken as soon as the switch is fully operated.

(c) If the yellow targets do not show, the circuit is out of order and this condition may be due to one of several reasons.

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

(d) First, if the "Trouble Test" lamp, PL3, does not flash properly, the trouble may be due to the supervisory target relay contacts not making good electrical contact. These contacts should be adjusted to make good electrical contact when the supervisory relay armature is not operated. The supervisory target relay is the top relay on the two line unit panel.

(e) Second, if the supervisory relay contacts are not closing properly, the relay armature may be binding due to dirt or foreign matter. Any such dirt or foreign matter should be removed and the armature adjusted to close and open easily without bind.

(f) Third, if the relay contacts and armature are adjusted and operating properly, and the yellow targets still fail to show when the circuit test switch is being thrown, the trouble may be due to residual magnetism in the core of the relay coil. This must be corrected by replacing either the relay coil or the complete relay.

(5) Description of Silent Trouble Test Circuits.

(a) When the alarm panel test switch, S, is thrown from normal to the “Silent Trouble Test” position, the swinger 9 (see wiring diagram (Foldout 6)), of the switch, transfers the circuit “T” from the buzzer, Z, to the “Trouble Test” light, PL3; also, the swinger 5 applies negative voltage to energize the flashing circuit of “Test Light”, PL1.

(b) This operation of the switch opens the circuit to the trouble buzzer and prevents its operation as long as the switch is maintained in this position. It also switches the “Trouble Test” lamp, PL3, into the circuit in place of the buzzer, Z.

(c) The operation of the "make" spring completes the circuits to the "Test Light", PL1, and causes it to operate the same as it does on the silent alarm test.

(d) With the silent alarm test switch, S, in the "Silent Trouble Test" position, the individual line circuits are tested for trouble operation by moving the line circuit test switch SLOWLY from "Normal" to "Off" position. As this switch is moved, the first part of its operation opens both sides to the line circuit, thus breaking the supervisory current in that circuit. As the supervisory relay drops out, it completes a circuit to the "Trouble Test" light, PL3, on the alarm panel.

(e) The circuit for the "Trouble Test" lamp, PL3, may be traced from the source of supply, terminal "L1", through the "Trouble Test" lamp, PL3, to contacts 9 and 12 of the "Silent Trouble Test", switch, S, through the contacts 1 and 4 of the two line unit test switch, through the contact of the supervisory target relay to the

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

terminal "2F" of the two line unit, back to terminal "2F" on the alarm switchboard; then to terminal "L2" to the other side of the 120V A.C. source of supply.

(f) As the circuit test switch is moved to "Off" position, contacts 1 and 4 are opened, thus darkening the "Trouble Test" lamp, PL3. Careful manipulation of the circuit test switch wi1l cause the "Trouble Test" lamp to glow steadily, otherwise it will glow only momentarily.

CAUTION

Silent Alarm Test Switch

Upon completion of the "Silent Alarm Test" and the "Silent Trouble Test" (or either one if conducted without the other), care should be taken to see that all test switches are returned to normal.

The silent alarm test switch, S, mounted in the top section of the Alarm Switchboard, locks in both test positions and must be returned to normal manually. A warning is provided by the "Test Light" PL1, which will flash intermittently as long as the switch is in either test position. This warning is provided because leaving this test switch in either test position will render one or the other of the audible alarm signals useless.

e. Grounds.

(1) A multiple ground is the term used to indicate more than one ground on the same side of the system; that is, more than one positive or more than one negative ground. Simultaneous grounds are those that occur on opposite sides of the system at the same time.

(2) Single or Multiple Grounds.

(a) Lighting of negative ground lights (full brilliance). This indicates a single or multiple ground on FF1, FF2, FF3, etc.

(b) Lighting of positive ground lights (full brilliance). This indicates a single or multiple ground on F1, F2, F3, etc.

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

(c) Location of single or multiple grounds.

1 In order to locate a ground, throw the circuit test switch momentarily to the "Off" position. The switch causing the ground lamp to go out has ground on either the positive or negative side of its line, depending on which ground lamp was lighted.

2 If the lamp fails to go out, a multiple ground is in the circuit. Throw the circuit test switches to the "OFF" position one after another, but do not return them to “Normal” immediately. If the ground lamp darkens, the last circuit test switch operated has a ground on its line. Return the rest of the circuit test switches to normal one by one. If the ground lamp glows brightly again, there is also a ground on the line of that switch.

(3) Simultaneous Grounds.

(a) Determination of simultaneous grounds. Simultaneous grounds have no immediate ground lamp indication, but instead, send in a false alarm. When an alarm is indicated, and on throwing the circuit test switch to the “Off” position, the negative ground lamp is lighted and there is a simultaneous ground on the circuit.

(b) Location of simultaneous grounds. The one ground is on the L2 side of the unit which sent in the false alarm. The second ground can be located by throwing the remaining circuit test switches momentarily to the “Off” position until the negative lamp, PL4, goes out. The circuit test switch which causes the lamp to go out has ground on its L2 line.

(4) Switchboard Grounds. If the ground lamp still glows after testing for single or multiple grounds, the ground must be in the internal wiring of the switchboard. Such grounds will have to be located by inspection and corrected immediately.

(f) Maintenance.

(1) The supervisory alarm system is designed so as to require very little routine maintenance. Almost anything that can happen to the system will give a warning of some kind or another. Faults should be corrected all soon as discovered.

(2) Two Line Units.

The two line units which are mounted on the alarm switchboard require no maintenance other than replacements or adjustments shown to be necessary by routine tests.

4-47. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

CAUTION

No oil of any kind should be used anywhere on the two line units or the assemblies of which these units are composed. These units are energized with 120V A.C. and depend upon the minimum electrical clearances for insulation. Oil used anywhere on the assemblies in very likely to break down these clearances and cause flashovers and short circuits.

(3) Alarm Panel.

(a) The alarm panel door should be opened periodically and all electrical connections choked for proper tightness. Wiring should be checked at the same time for chafing.

(b) All lamps should be kept in operating condition. Defective bulbs should be replaced immediately upon discovery. All lamps except the type NE 79 (Neon) “Test Light”, PL1, are Type VG-7 (Neon) lamps. Sockets for these lamps should be checked occasionally to see that the socket contacts are clean and making good contact with the lamps. The trouble buzzer, Z, should be tested periodically and kept in proper adjustment. All securing screws should be kept tight.

g. The following is an index of the maintenance instructions.,

DESCRIPTION	PARAGRAPH
Alarm Switchboard	4-47.1
2-Line Alarm Panel	4-47.2

4-47.1. ALARM SWITCHBOARD-MAINTENANCE INSTUCTIONS

This task covers:

a. Inspection **b. Repair**

INITIAL SETUP

Test Equipment

NONE

References

Paragraph	
4-47	Alarm Switchboard - Service, Test and Wiring

Special Tools

Soldering iron 25 watt maximum

Equipment Condition: NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS
		WARNING To prevent possible shock and injury tag and place circuit breaker in the OFF position.	
INSPECTION			
1. Switch-board	a. Panel	Inspect for signs of damage.	
	b. Switch	Inspect for proper operation.	
	c. Lamps	Perform tests.	Refer to para-graph 4-47.

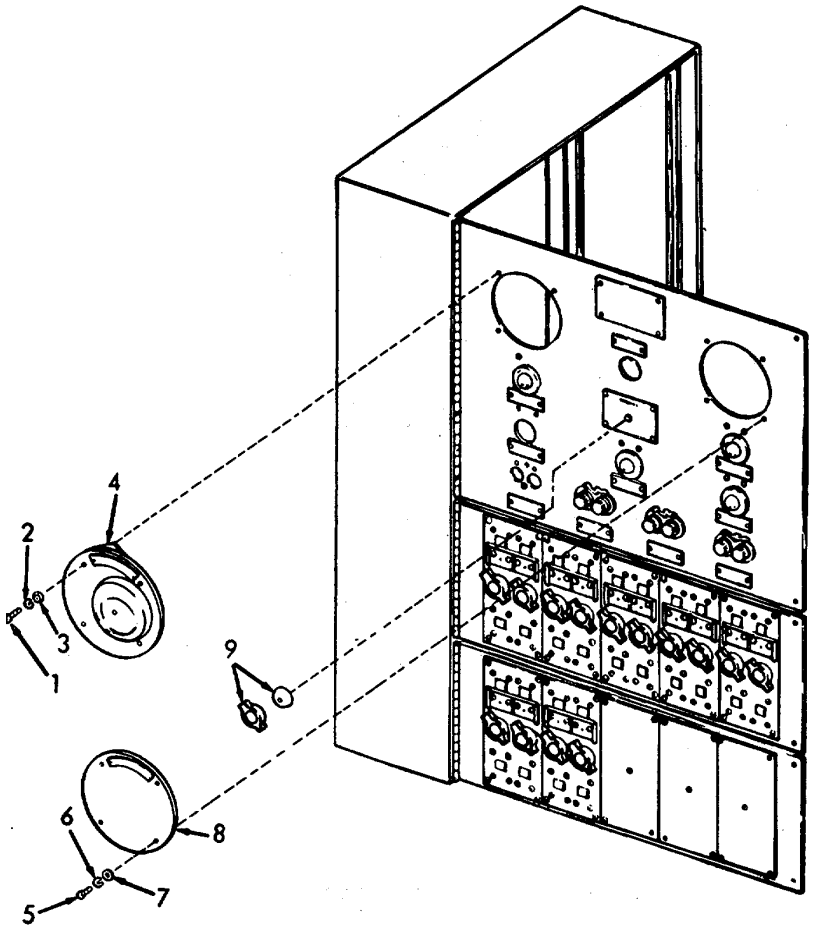
4-47.1. ALARM SWITCHBOARD-MAINTENANCE INSTUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
	NOTE		
	Refer to wiring diagram (Foldout 1) when performing all repairs.		
2. Bell	a. Wiring	Disconnect.	
	b. Screws (1), lockwashers (2), and flatwashers (3)	Remove.	
	c. Bell (4)	Remove and install new bell.	
	d. Screws (1), lockwashers (2), and flatwashers (3)	Install.	
	e. Wiring	Reconnect.	
3. Buzzer	a. Wiring	Disconnect.	
	b. Screws (5), lockwashers (6), and flatwashers (7)	Remove.	
	c. Buzzer (8)	Remove and replace.	
	d. Screws (5), lockwashers (6), and flatwashers (7)	Install.	
	e. Wiring	Reconnect.	

4-47.1. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (CONTINUED)

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4. Switch	a. Wiring	Tag and disconnect.	
	b. Knob and nut (9)	Remove.	

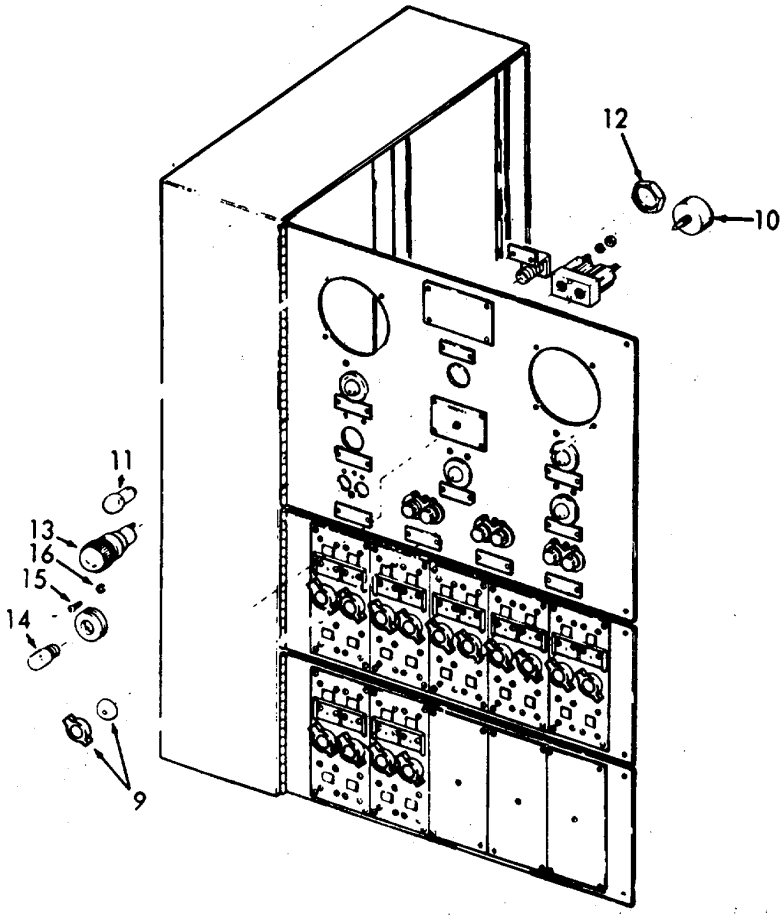
4-47.1. ALARM SWITCHBOARD-MAINTENANCE INSTUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	c. Switch (10)	Replace.	
	d. Nut and knob (9)	Install.	
	e. Wiring	Reconnect and remove tag.	
5. TEST LIGHT and Socket	a. Lens cover	Unscrew and remove.	
	b. Lamp (11)	Twist and remove.	
	c. Wiring	Unsolder.	
	d. Nut (12)	Remove.	
	e. Light socket (13)	Remove and install new light socket.	
	f. Nut (12)	Install.	
	g. Wiring	Resolder.	
	h. Lamp (11)	1. Aging.	Age lamp by operation for 24 hours at 20 MA, (24 hours at 180 VAC) and 24 hours at 10 MA (12 hours at 100 VAC).
		2. Install.	
	i. Lens cover	Install.	
6. Lamps neon and sockets	a. Lamp (14)	Twist and remove.	
	b. Wiring	Unsolder.	
	c. Screws (15) and lock-washers (16)	Remove.	

4-47.1. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (CONTINUED)

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



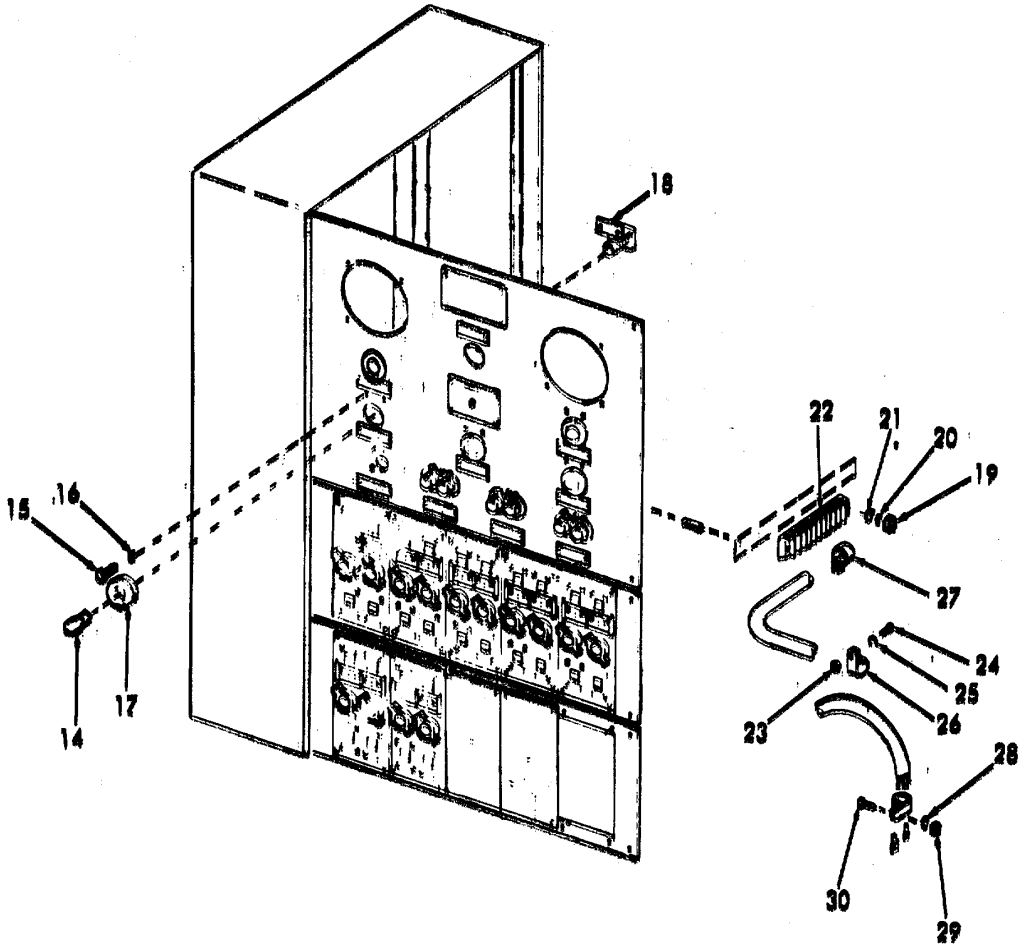
4-47.1. ALARM SWITCHBOARD-MAINTENANCE INSTUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Rubber grommet 17) and socket (18)	Replace	
	e. Screw (15) and lock-washers (16)	Install.	
	f. Wiring	Resolder.	
	g. Lamp (14)	Install.	
7. Terminal strip	a. Wiring	Tag and disconnect.	
	b. Nuts (19), lockwashers (20), and flatwashers (21)	Remove.	
	c. Terminal strip (22)	Replace.	
	d. F1atwashers (21), lock-washers (20), and nuts (19)	Install.	
	e. Wiring	Reconnect.	
8. Cable	a. Nuts (23), screws (24), and lock-washers (25)	Remove.	
	b. Cable clamp (26 and 27)	Remove.	
	c. Nut (28), lockwasher (29), and screw (30)	Remove .	

4-47.1. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-1217

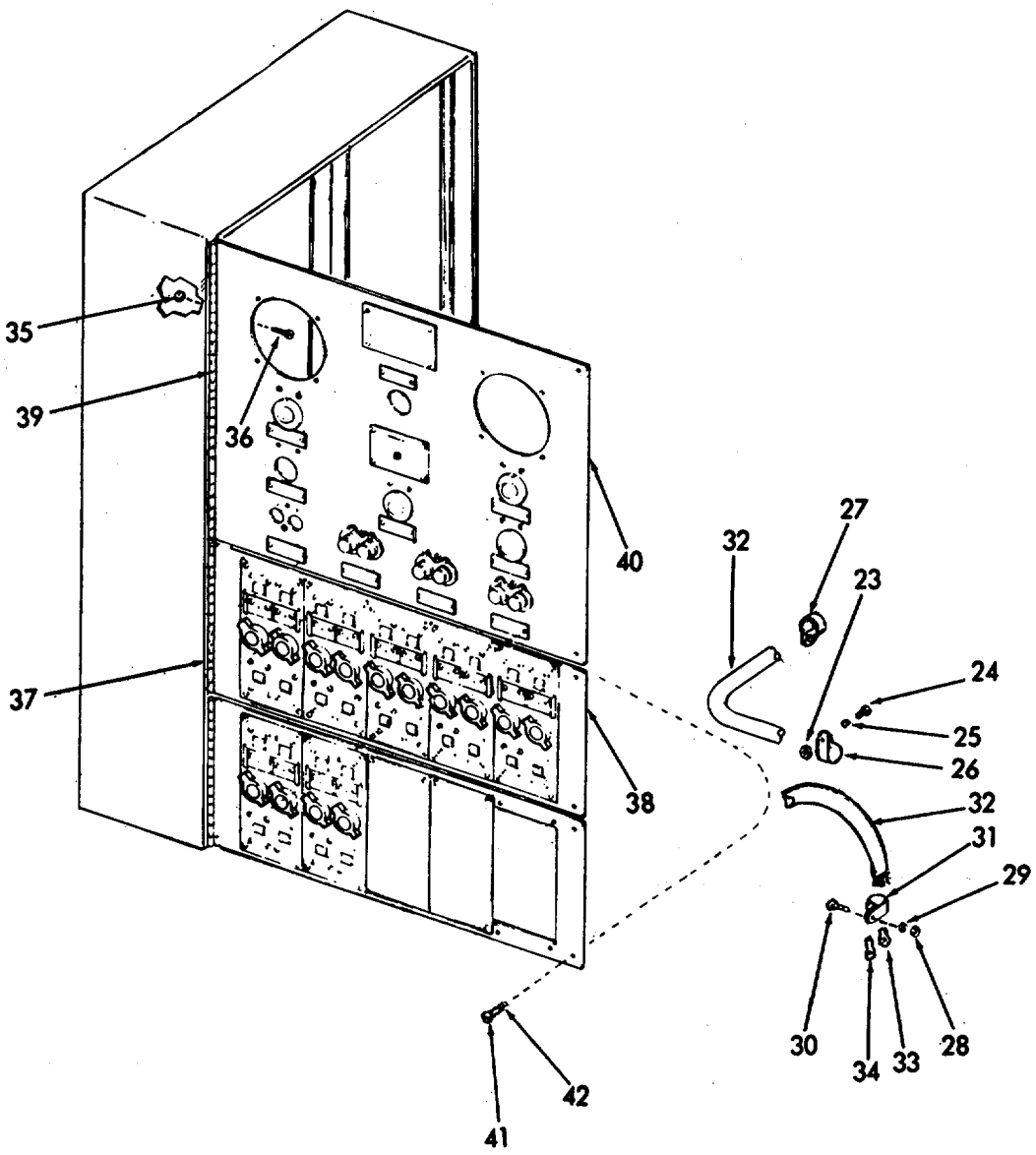
4-47.1. ALARM SWITCHBOARD-MAINTENANCE INSTUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Cable clamp (31)	Remove.	
	e. Cable (32)	Replace.	Use terminal lugs (33 and 34) as needed.
	f. Cable clamp (31), screw (30), lock-washer (29), and nut (28)	Install.	
	g. Cable clamps (26 and 27), screws (24), lockwashers (25) and nuts (23)	Install.	
9. Hinges, long and short	a. Nuts (35) and screws (36)	Remove.	As needed.
	b. Short hinge (37)	Replace on panel (38).	
	c. Long hinge (39)	Replace on panel (40).	
10. Captive screws	Captive screws (41) and re-tainers (42)	Replace.	As needed.

4-74.1. ALARM SWITCHBOARD-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-47.2. TWO-LINE ALARM PANEL-MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **c. Repair**
b. Removal **d. Installation**

INITIAL SETUP

Test Equipment
NONE

References
Paragraph 4-47 — Alarm Switchboard-Service, Test and Wiring

Special Tools
Soldering iron 25 watt maximum

Equipment Condition
Condition Description
NONE

Material/Parts
NONE

Special Environmental Conditions
NONE

Personnel Required
1

General Safety Instructions
Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS
		WARNING To prevent possible shock and injury, tag and place circuit breaker in the OFF position.	
INSPECTION			
1. Alarm panel	a. Panel	1. Inspect for signs of damage.	
		2. Inspect for missing identification cards.	
	b. Targets	Perform tests.	Refer to paragraph 4-47 .

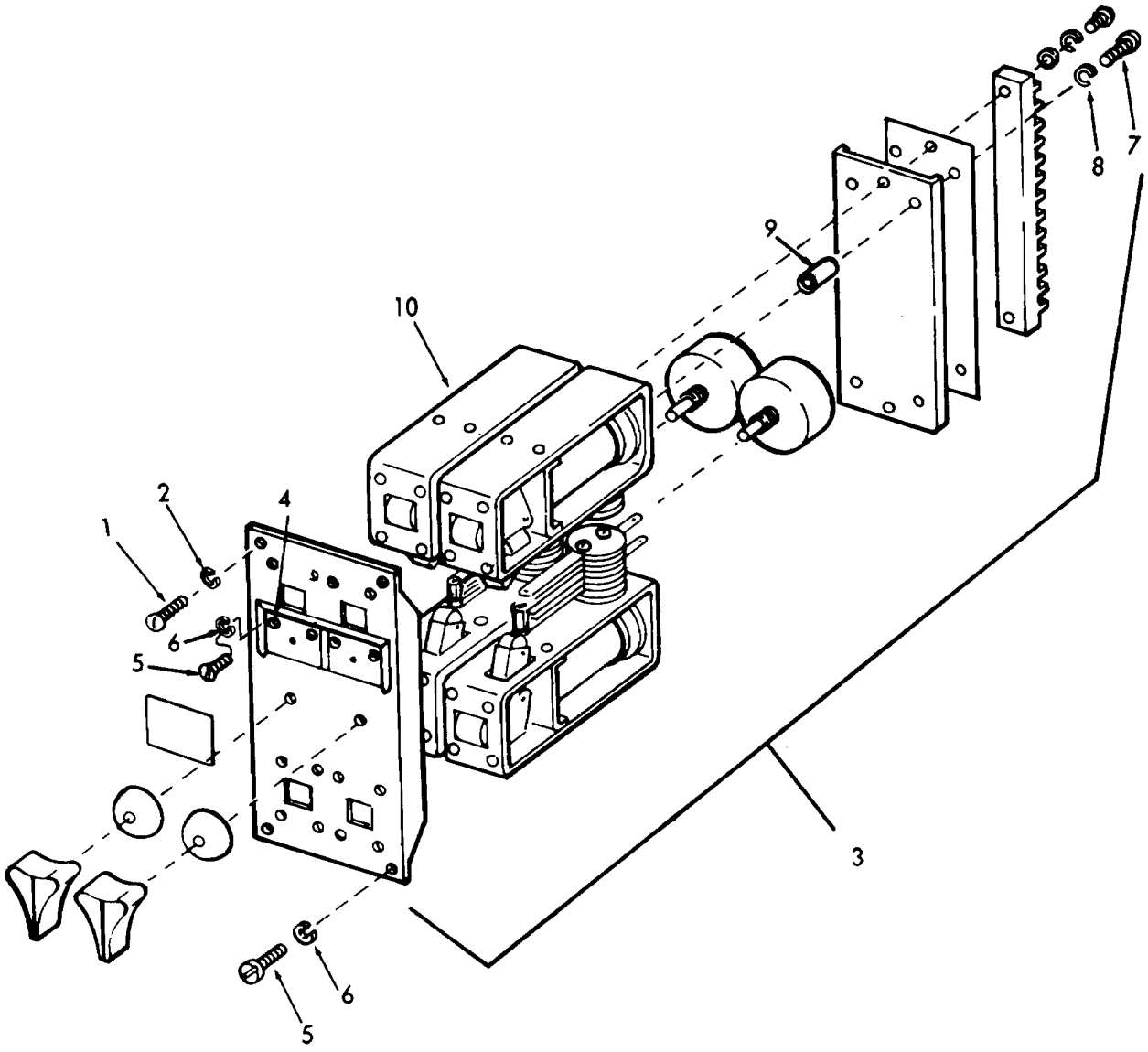
4-47.2. TWO-LINE ALARM PANNEL-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REMOVAL			
2.	a. Screws (1) and lock-washers (2)	Remove.	
	b. External wiring to terminal strip	Tag and disconnect.	Refer to wiring diagram in Fold-out 6.
	c. Alarm panel (3)	Remove.	
REPAIR			
		NOTE Refer to wiring diagram (Foldout 1) when performing all repairs.	
3. Super-visory relay	a. Screws (4)	Remove two places.	Behind ident cards.
	b. Screws (5), and lock-washers (6)	Remove two places.	
	c. Screws (7) and lock-washers (8)	Remove.	
	d. Spacers (9)	Remove.	
	e. Relay (10)	1. Remove. 2. Unsolder wiring. 3. Replace. 4. Resolder wiring. 5. Install	
	f. Spacers (9), Install. screws (7), and lock-washers (8)		

4-47.2 TWO-LINE ALARM PANNEL-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-1223

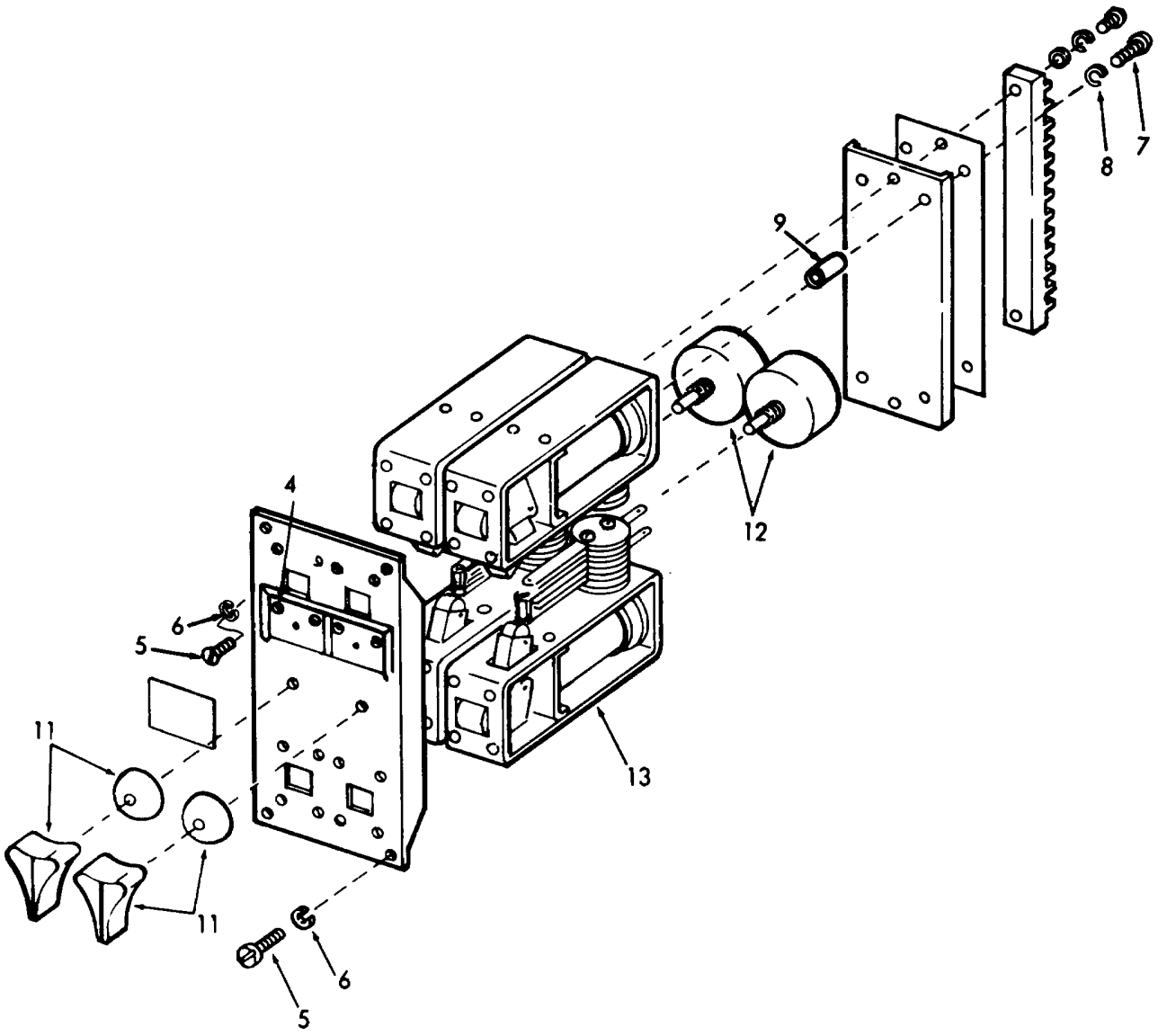
4-47.2. TWO-LINE ALARM PANNEL-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	g Screws (5), and lock-washers (6)	Install,	
	h. Screws (4)	Install.	
4. Switch(s)	a. Wiring	Unsolder,	
	b. Knob and nut (11)	Remove.	
	c. Switch (12)	Remove and install new switch .	
	d. Nut and knob (11)	Instal1.	
	e. Wiring	Resolder.	
5. Alarm relay	a. Screws (5), and lock-washers (6)	Remove four places.	
	b. Screws (7), and lock-washers (8)	Remove.	
	c. Spacers (9)	Remove.	
	d. Relay (13)	1. Remove. 2. Unsolder wiring. 3. Replace. 4. Resolder wiring, 5. Install.	
	e. Splicers (9), Screws (7), and lock washers (8)	Install.	
	f. Screws (5), and lock-washers (6)	Install.	

4-47.2. TWO-LINE ALARM PANNEL-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-1225

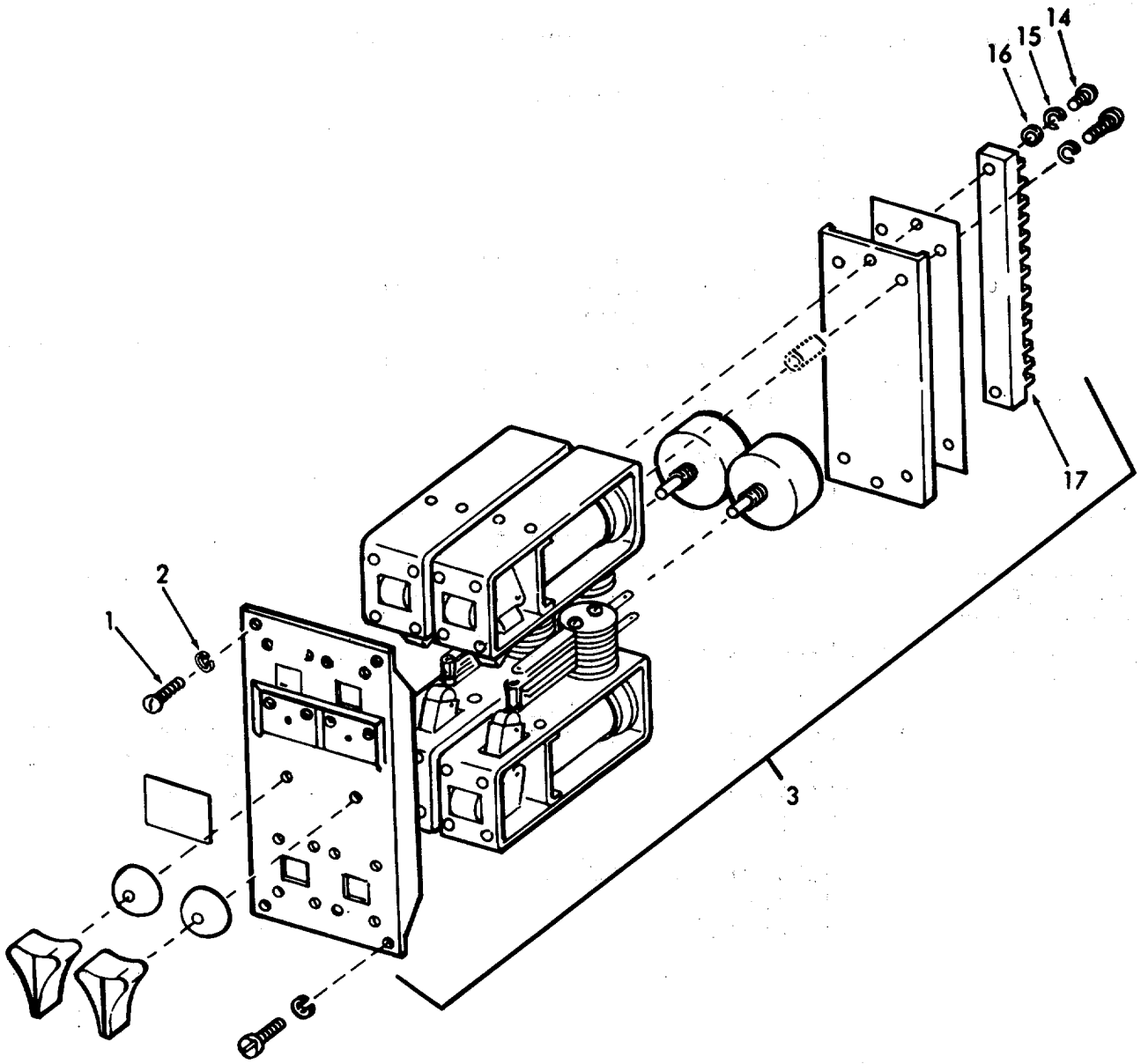
4-47.2. TWO-LINE ALARM PANNEL-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
6. Terminal strip	a. Wiring	Tag and disconnect.	
	b. Screws (14), lockwashers (15), and flatwashers (16)	Remove.	
	c. Terminal strip (17)	Remove and replace with a new terminal strip.	
	d. Screws (14), lockwashers (15) and flatwashers (16)	Install.	
	e. Wiring	Reconnect.	
INSTALLATION			
7. Alarm Panel	a. Alarm panel (3)	Install.	
	b. External wiring to terminal strip	Reconnect.	Refer to wiring diagram in Fold-out 6.
	c. Lockwashers (2) and screws (1)	Install	

4-47.2. TWO-LINE ALARM PANNEL-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

INSTALLATION (Cont)

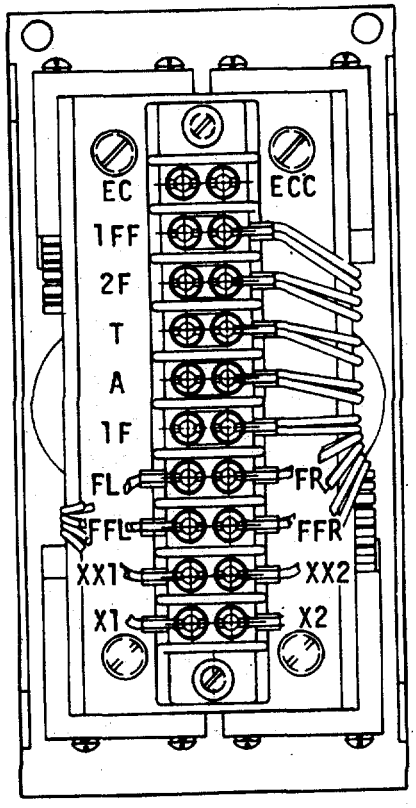


4-1227

4-47.2. TWO-LINE ALARM PANEL-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

INSTALLATION (Cont)



Wiring View of Terminal Strip

4-1228

4-48. ELECTRONIC AND NAVIGATION SYSTEMS-MAINTENANCE INSTRUCTIONS.

a. The following is an index to the maintenance procedures.

b. Refer to paragraph 4-49 for the UHF Antenna System Maintenance.

4-48.1. ELECTRONIC FOUNDATIONS-MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Repair**

INITIAL SETUP

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
NONE

Equipment
Condition Condition Description
NONE

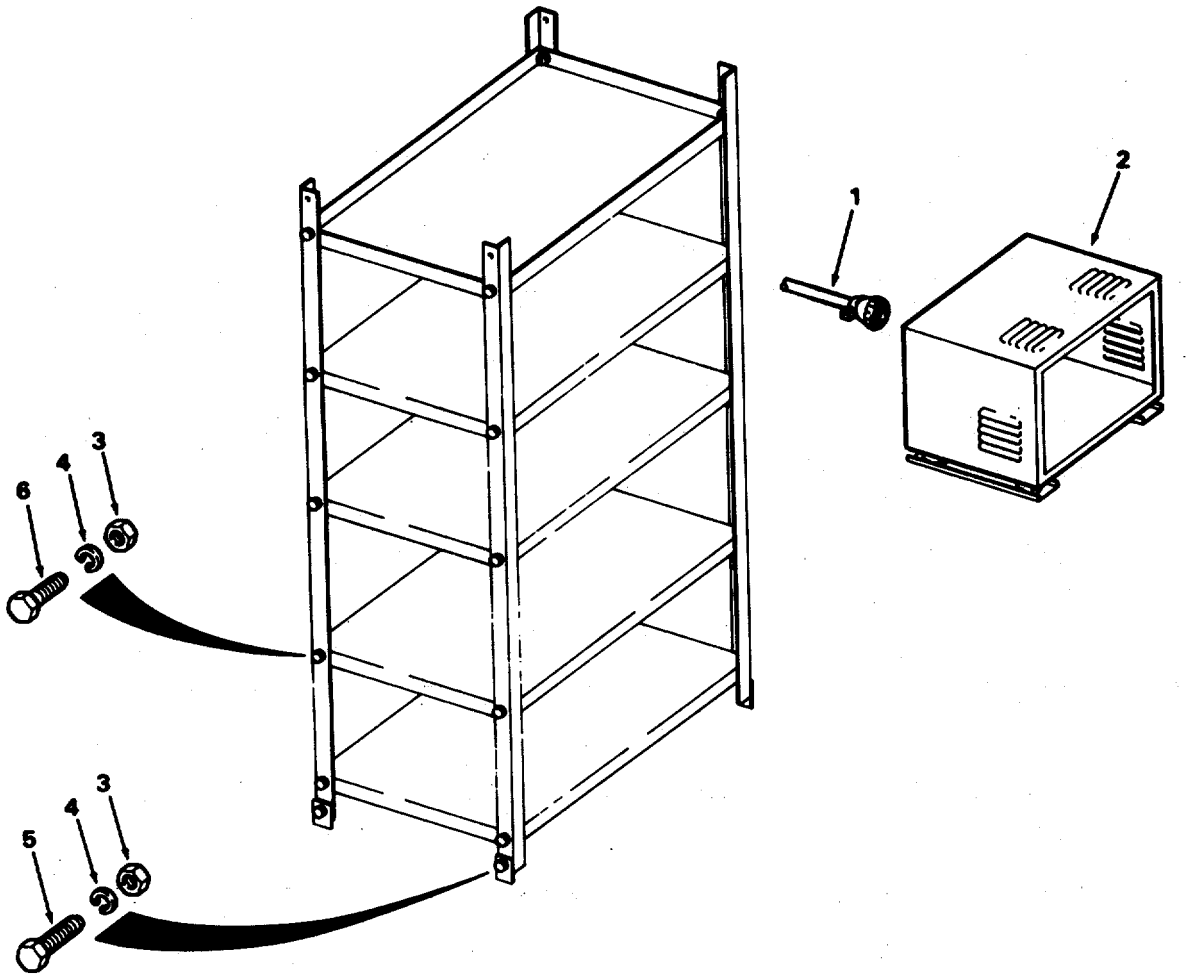
Special Environmental Conditions
NONE

General Safety Instructions
Make sure all electronic equipment is secured.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1.	Electronic foundation	All parts	1. Inspect for breaks, cracks, bends, and dents. 2. Insure all hardware is tight.	

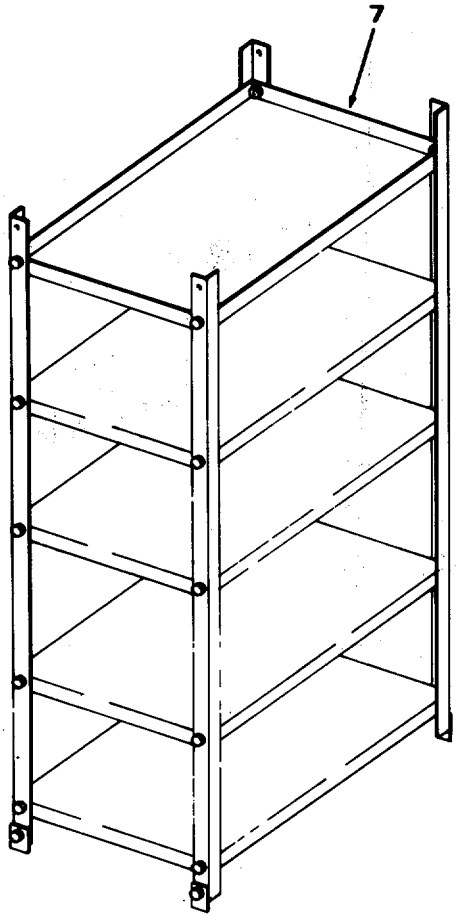
4-48.1. ELECTRONIC FOUNDATIONS MAINTENANCE INSTRUCTIONS (Continued).

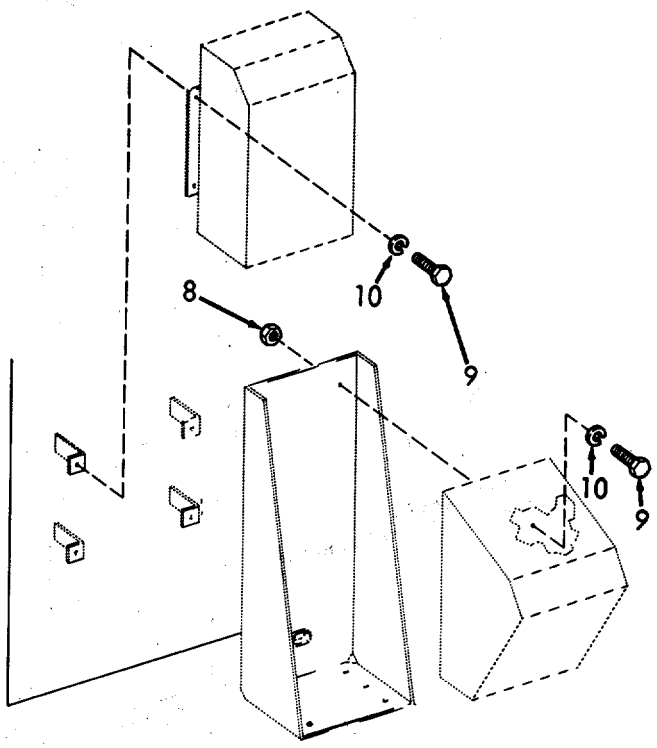
LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2.	a. Coaxial plug connector (1)	Replace or repair.	If necessary.
	b. Cabinet (AN/URR) (2)	Replace or repair.	If necessary.
	c. Nuts (3), lockwashers (4), and screws (5 or 6)	Replace or repair.	If necessary.



4-48.1. ELECTRONIC FOUNDATIONS MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Equipment rack (7)	Replace or repair.	If necessary.
	e. Nuts (8), screws (9), and lock-washers (10)	Replace or repair.	If necessary.





4-48.2. NAVIGATION HORN-MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Test** **c. Repair**

INITIAL SETUP

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment Condition Condition Description
NONE

Material/Parts
NONE

Special Environmental Conditions
NONE

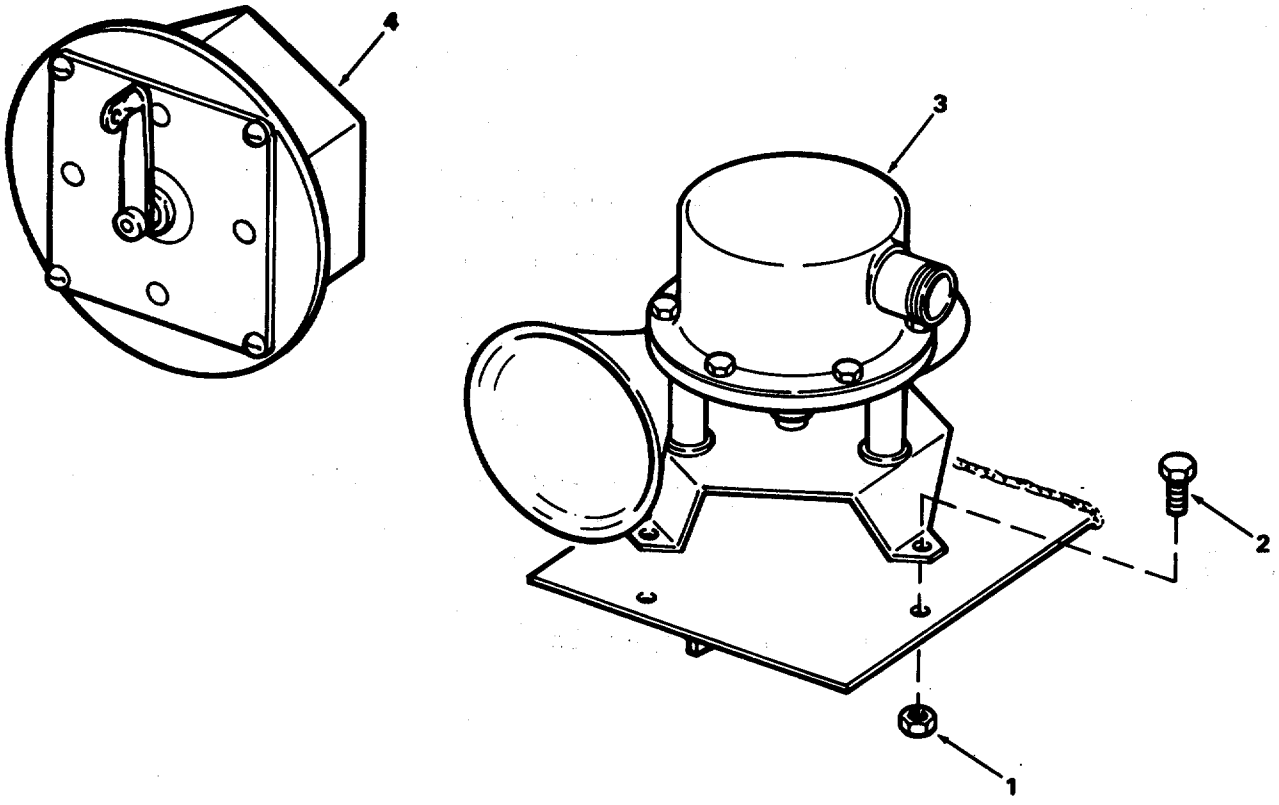
Personnel Required
2

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Navigation horn	a. Switch	1. Inspect for proper operation. 2. Inspect for damage.	
	b. Horn	1. Inspect for proper operation. 2. Inspect for damage. 3. Insure all hardware is tight.	
TEST			
2. Horn	Operate.		

4-48.2. NAVIGATION HORN-MANTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
3.	a. Wiring	Disconnect.	
	b. Nuts (1) and screws (2)	Remove	
	c. Horn (3)	Remove and replace.	
	d. Screws (2) and nuts (1)	Install.	
	e. Wiring	Reconnect.	
	f. Switch (4)	Remove and replace.	If defective.



4-1233

4-48.3. 24 VOLT DISTRIBUTION SYSTEM-MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Repair**

INITIAL SETUP

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment Condition Condition Description
NONE

Material/Parts
NONE

Special Environmental Conditions
NONE

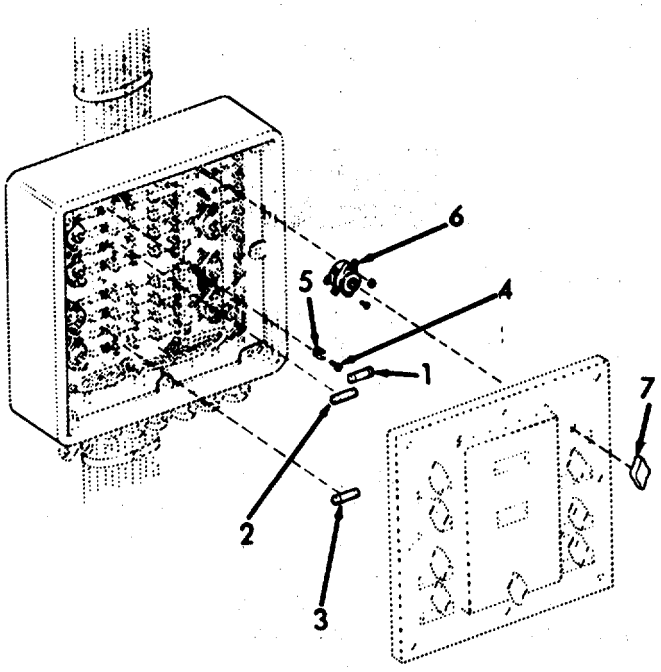
Personnel Required
1

General Safety Instructions
Observe WARNING.

LOCATION	ITEM	ACTION	REMARKS
		WARNING Possible shock and injury may occur, disconnect batteries, tag and place circuit breaker for the battery charger in the OFF position.	
INSPECTION			
1. Panel	a. Panel	Inspect for breaks, dents and other signs of damage.	
	b. Switches and knobs	1. Inspect for missing knobs. 2. Inspect for proper operation	

4-48.3. 24 VOLT DISTRIBUTION SYSTEM-MANTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	c. Wiring	Inspect for signs of damage.	
REPAIR			
2.	a. Fuses (1, 2, or 3)	Replace.	If necessary.
	b. Screws (4), and clips (5)	Replace.	If necessary.
	c. Rotary switch (6), and knob (7)	1. Disconnect wires. 2. Replace. 3. Reconnect wires.	



4-1235

4-49. VHF ANTENNA SYSTEM-MAINTENANCE INSTRUCTIONS.

This task covers: **a. Inspection**

INITIAL SETUP

Test Equipment
NONE

References
NONE

Equipment
Special Tools
Condition Condition Description
NONE
NONE

Material /Parts
NONE

Special Environmental Conditions
NONE

Personnel Required
1

General Safety Instructions
Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

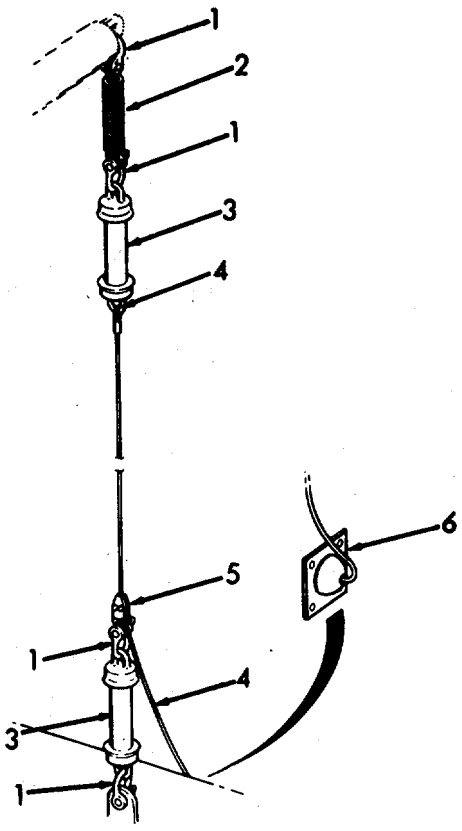
In order to avoid serious burns, and severe shock, tag all transmitting devices and place in the OFF position.

INSPECTION

1. Antenna systems	a. Shackles (1)	corrosion.	Inspect for wear and
	b. Spring (2)		Inspect for wear and corrosion.
	c. Insulators (3)		Inspect for breaks, cracks, and corrosion.

4-49. VHF ANTENNA SYSTEM-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	d. Wire (4)	Inspect for breaks, and corrosion.	Bronze wire will turn green.
	e. Clamp (5)	1. Inspect for missing hardware. 2. Inspect for damage.	
	f. Entrance insulators (6)	1. Inspect for breaks, cracks, and corrosion. 2. Insure all hardware is tight.	



4-1237

4-50. OIL/WATER SEPARATOR-MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **c. Replace**
b. Service **d. Repair**

INITIAL SETUP

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment
Condition Condition Description
NONE

Material/Parts
NONE

Special Environmental Conditions
NONE

Personnel Required
1

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS

NOTE

- Refer to TM 55-2090-201-14&P for all maintenance procedures.
- All maintenance for crew and organizational in the referenced manual, shall be considered crew for the landing craft.

4-51. PIPING SYSTEMS - MAINTENANCE INSTRUCTIONS.

The following is an index to the piping system maintenance procedures.

4-52. PIPE HANGERS - MAINTENANCE INSTRUCTIONS .

This task covers:

a. Inspection

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

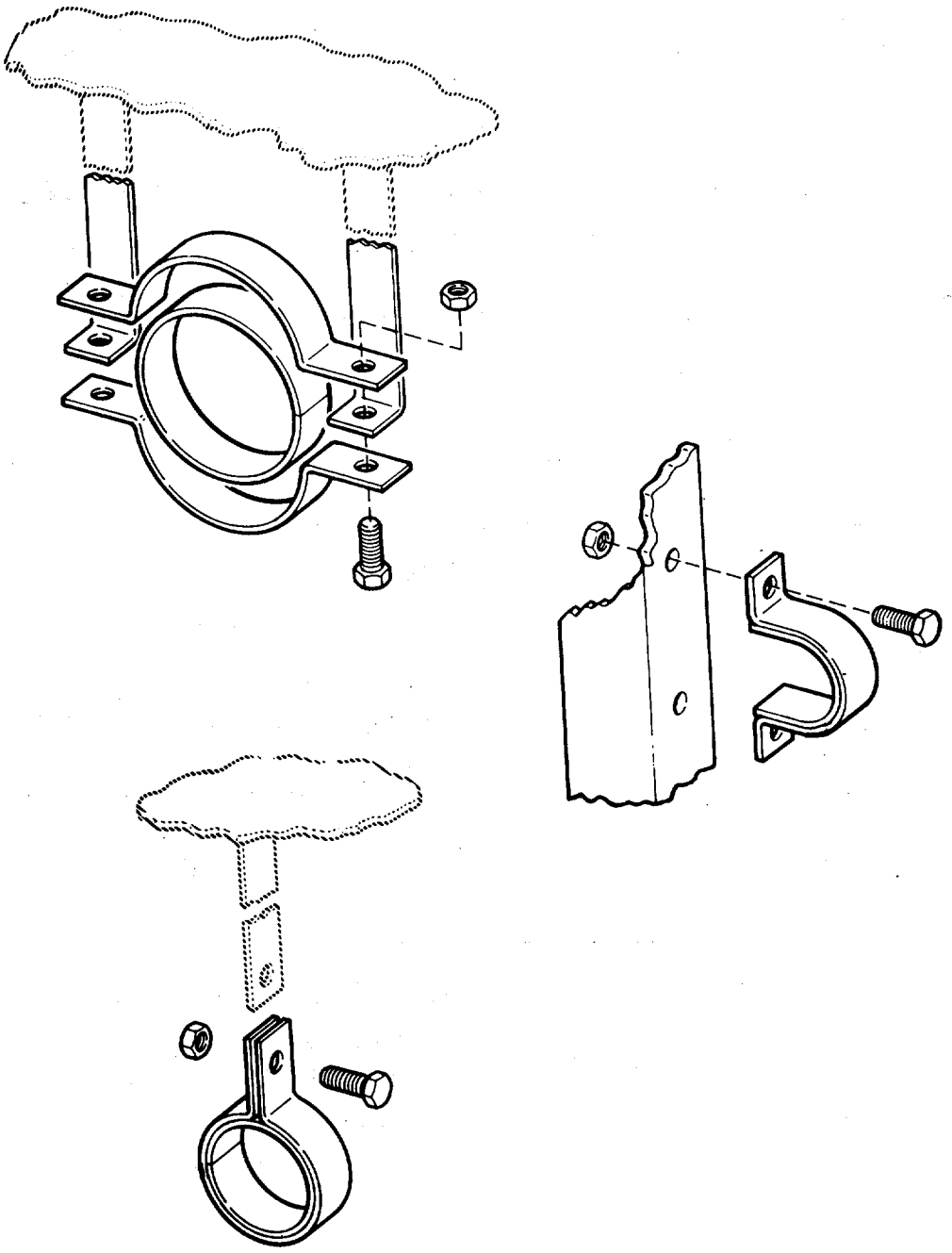
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Pipe hangers	Hardware	1. Inspect for missing parts. 2. Insure all hardware is tight.	

4-52. PIPE HANGERS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARKS

INSPECTION (Cont)



4-53. FIRE, BILGE, AND BALLAST SYSTEM - MAINTENANCE INSTRUCTIONS.

The following is an index to the maintenance procedures.

4-53.1. FIRE, BILGE, AND BALLAST -,PI,PING SYSTEM - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment

NONE

Condition

AS NEEDED
Pipe soldering tools

Material/Parts

NONE

Personnel Required

1

References

Paragraph	
4-53.3	Simplex Strainer

Equipment

Condition	Condition Description
NONE	

Special Environmental Conditions

NONE

General Safety Instructions

Observe standard safety procedures for soldering piping.

4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

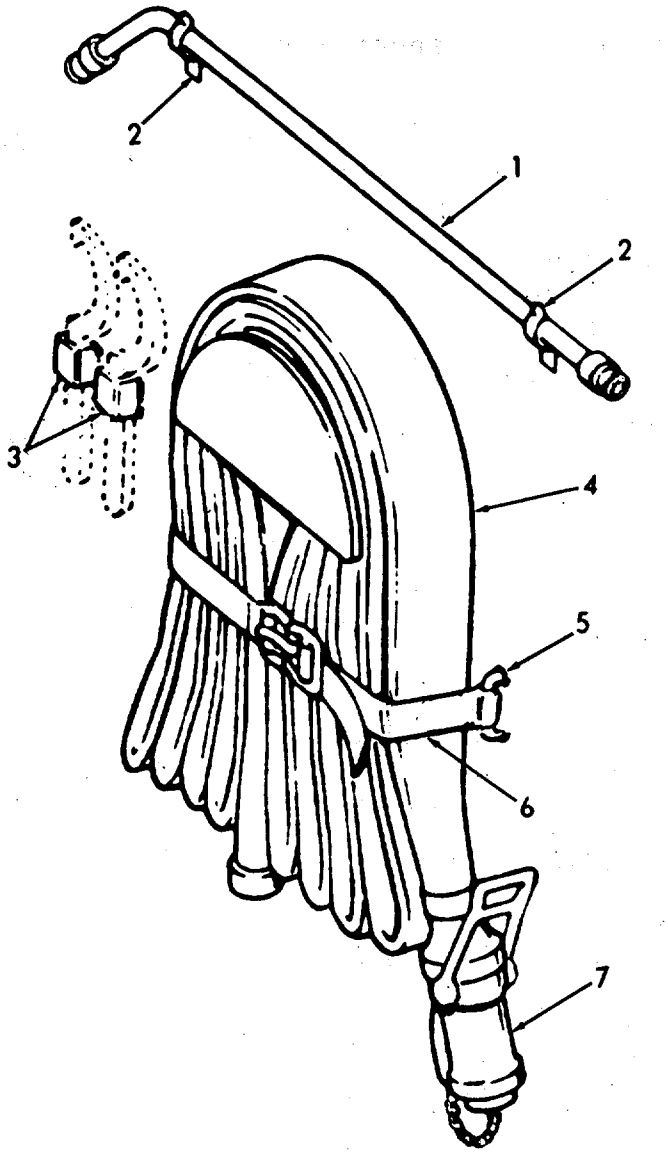
LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Fire	a. Hose station	1. Inspect for wear, breaks, and damaged hose ends. 2. Inspect for signs of decay due to improper drying.	
	b. Quick release belt	Inspect for wear and damaged parts.	
	c. Fog applicator	Inspect for bends, breaks, and signs of damage.	
	d. Mounting hardware	Inspect for damage.	
	e. General	1. Inspect for missing parts. 2. Insure all parts are functioning properly.	
2. Drain lines Aft Engine Room	a. Valves	1. Inspect for leaks. 2. Inspect for proper operation.	
	b. Piping	Inspect for bends, breaks, and leaking.	
3. Flange couplings	Couplings	Insure all hardware is tight.	
4. Magazine control piping	a. Valves	1. Inspect for leaks. 2. Inspect for proper operation.	
	b. Piping	Inspect for bends, breaks, and leaking.	

4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTIQN (Cont.)			
5. Sea chest vent	a. Valves	1. Inspect for leaks.	
		2. Inspect for proper operation.	
	b. Piping	Inspect for bends, breaks, and leaking.	
6. Electric bilge pump	a. Stop cock	Inspect for proper operation.	
	b. Simplex strainer	Inspect for proper operation.	Refer to para 4-53.3 .
7. Bilge strainers	Hardware	Insure all hardware is tight.	
8. Hose connections	Hose cap and chain	Inspect for damage or missing parts.	
9. Engine driven bilge pump	Hoses and hose clamps.	1. Inspect for cracks, breaks, and leaking.	
		2. Insure that the hose clamps are tight.	
REPAIR			
10. Fire Station	a. Fog applicator (1)	Replace.	If necessary.
	b. Fog applicator brackets (2)	Replace.	If necessary.
	c. Spanner wrench brackets (3)	Replace.	If necessary.
	d. Hose (4)	Replace.	If necessary.

4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
	e. Clip (5) and clip belt (6)	Replace.	If necessary.
	f. Nozzle (7)	Replace.	If necessary.



4-53.1. FFRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
11. Drain lines			
		NOTE	
	All piping at this level of maintenance is 1/2 inch copper-nickel with solder joints. Use existing procedures for soldering.		
	a. Coupling (8)	Replace.	If necessary.
	b. Elbow (9)	Replace.	If necessary.
	c. Valve (10)	Replace.	If necessary.
	d. Piping (11)	Replace.	If necessary.
12. Flange Couplings	Cap head hex screws (12, 14 16, and 18) and nuts (13, 15, 17, and 19)	Replace.	If necessary.
13. Magazine control piping		NOTE	
	All piping at this level of maintenance is 1/4 inch brass.		
	a. Valve (20)	Replace.	If necessary.
	b. Tube (21)	Replace.	If necessary.
	c. Tee (22)	Replace.	If necessary.
	d. Gate valve (23)	Replace.	If necessary.
	e. Coupling (24)	Rep-lace.	If necessary
	f. Connector (25)	Replace.	If necessary.
	g. Adapter (26) Replace.		If necessary.

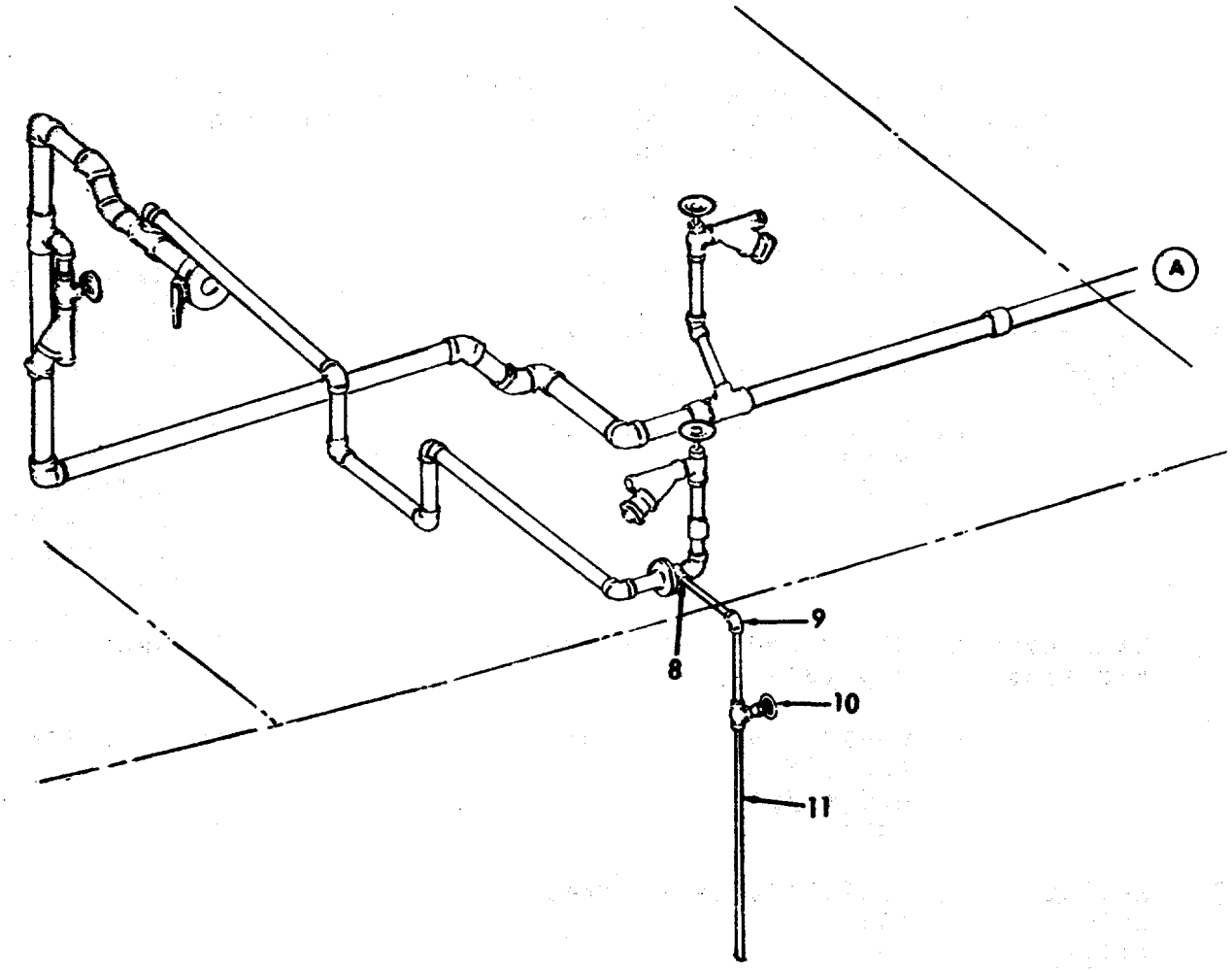
4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
RE£PAIR (Cont.)			
	h. Reach rod (26A)	Replace.	
14. Sea chest vent			
	NOTE		
	All piping at this level of maintenance is 1/2 inch copper-nickel with solder joints. Use existing procedures for soldering.		
	a. Tubing (27)	Replace.	If necessary.
	b. Elbow (28)	Replace.	If necessary.
15. Electric Bilge pump	a. Stop cock (29)-	Replace.	If necessary.
	b. Simplex strainer (30)	Replace.	a. If. necessary. b. Refer to para 4-53.3 . for maintenance.
16. Hose con-Nections	a. Chain and cap (31) Replace.		If necessary.
	b. Chain and cap (32), and nipple (33)	Replace.	If necessary.
17. Engine Driven bilge pump	a. Cable clamps (34)	Remove.	
	b. Hose (35)	Replace	Hose is 3-1/2 inch-.
	or c. Hose (36)	Replace	Hose is 2-7/8 inch.

4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)

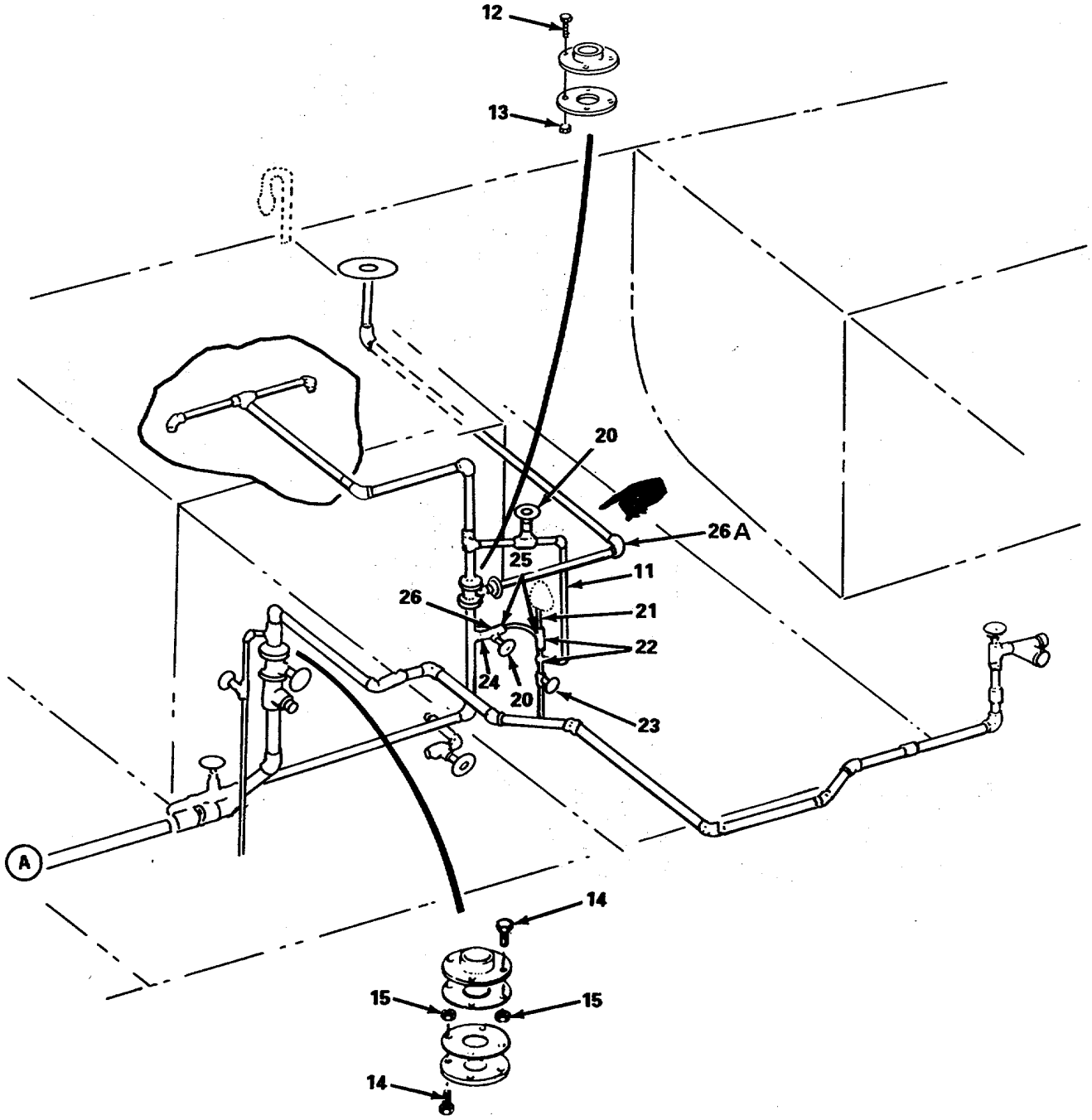


4-1248

4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

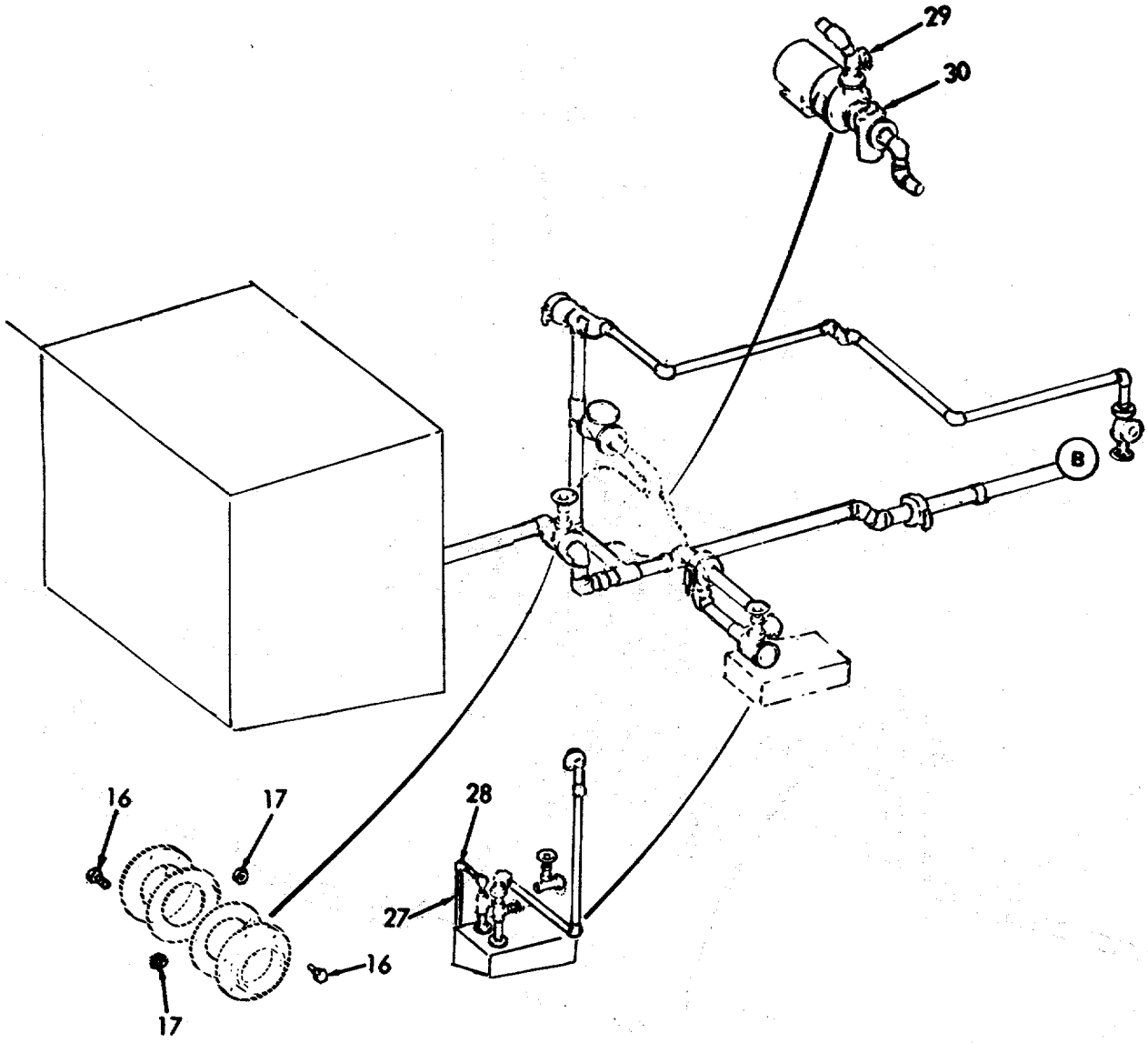
REPAIR (Cont.)



4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)

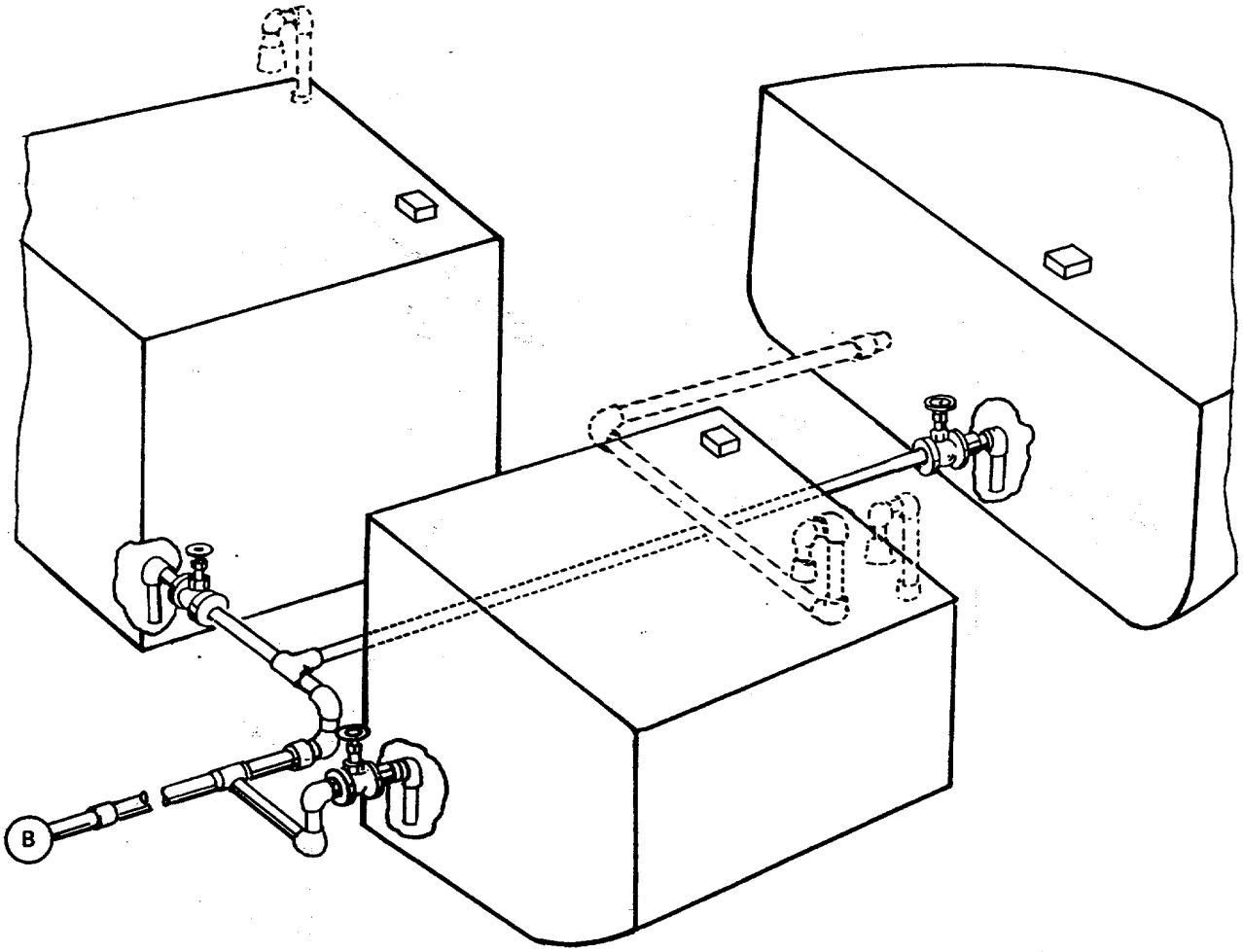


4-1250

4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)|



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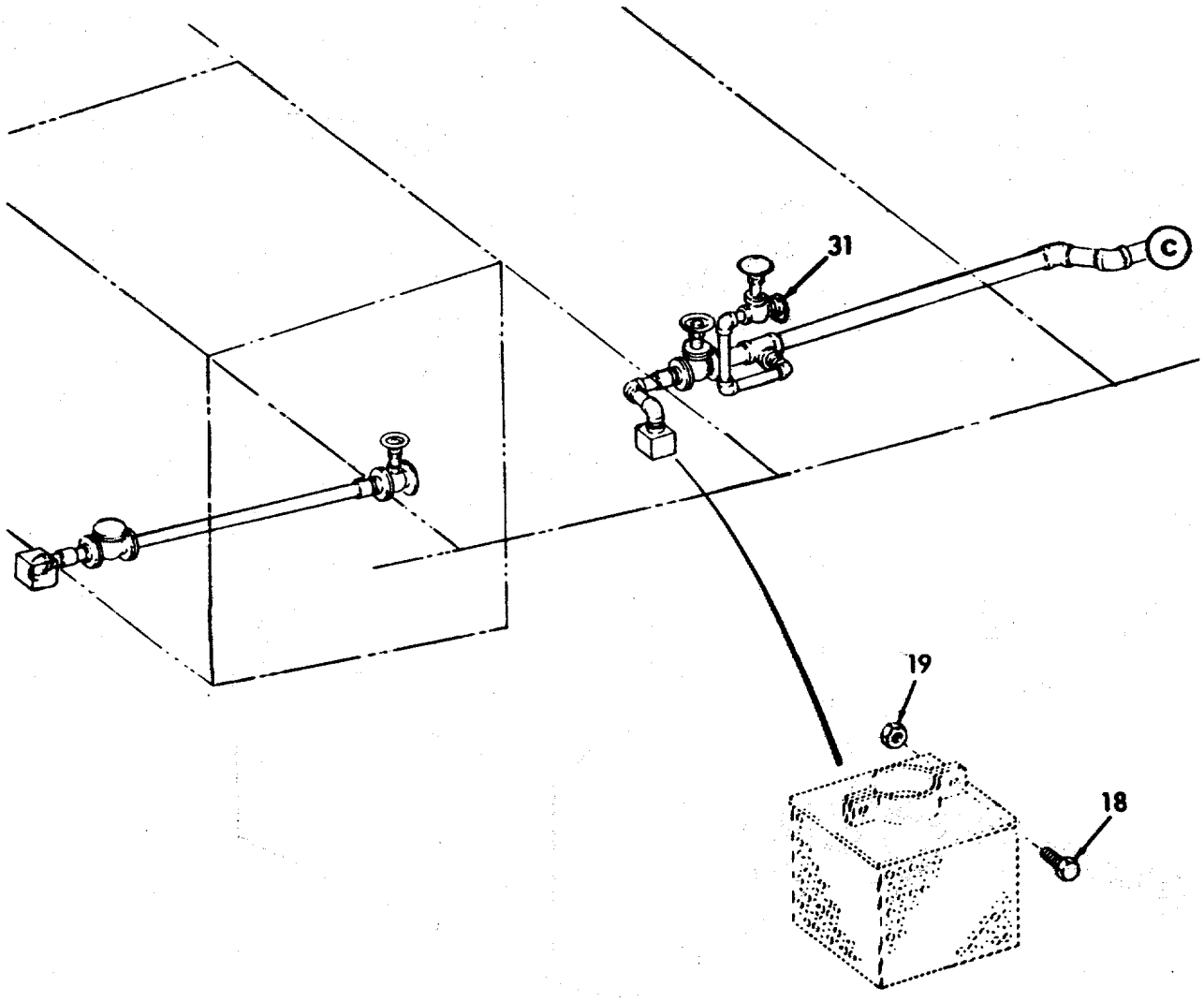
4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)

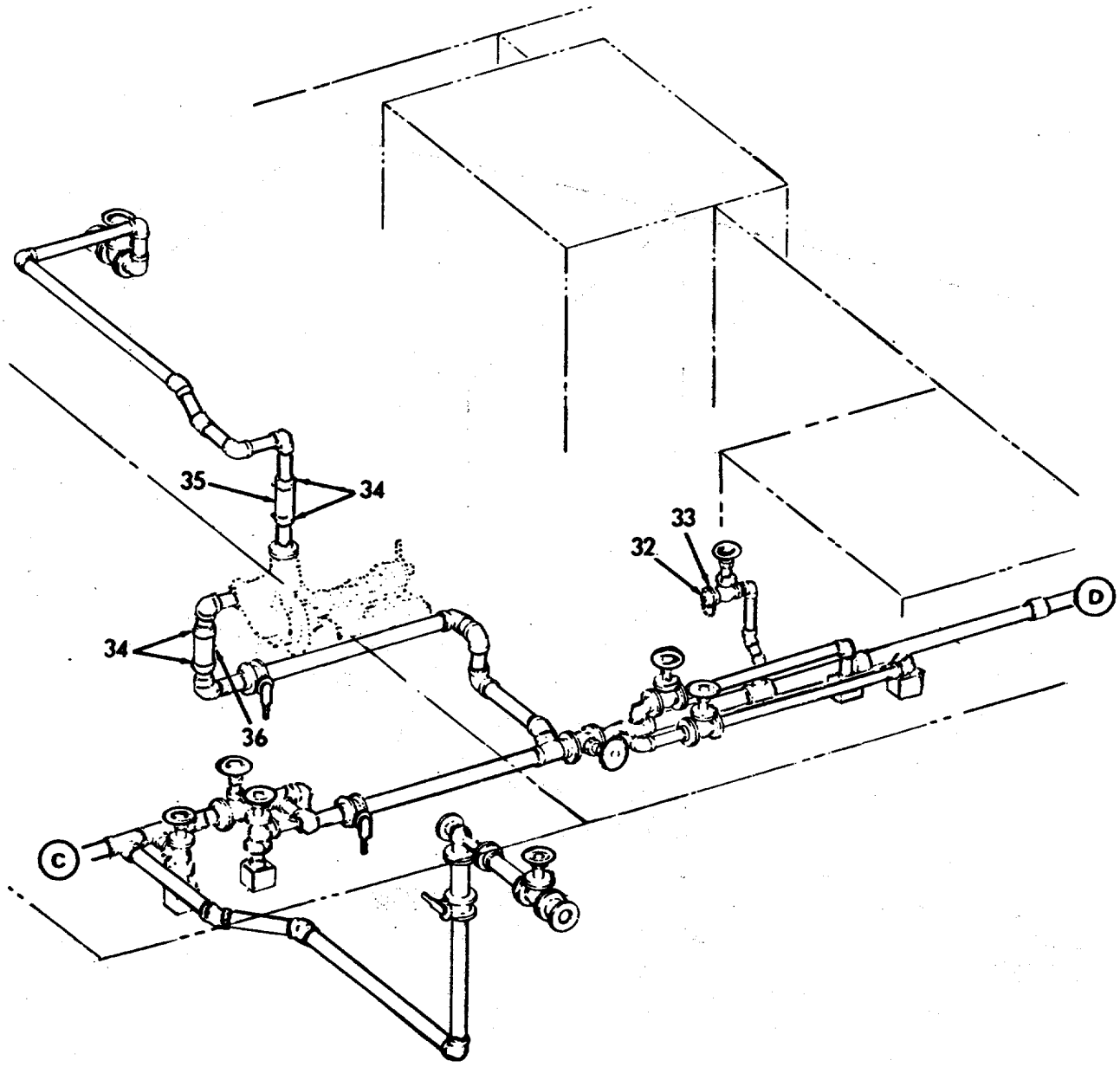


4-1252

4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

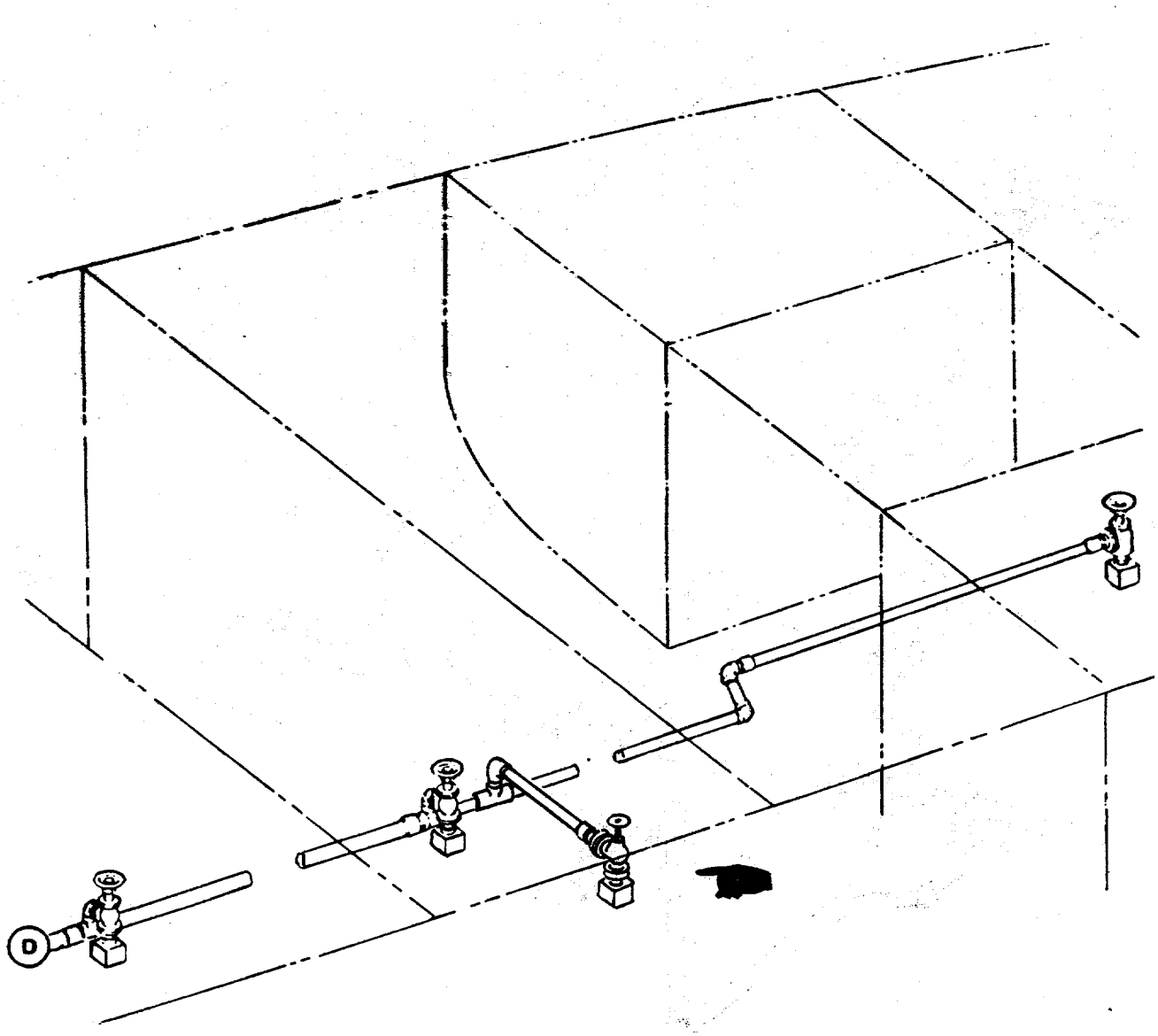
REPAIR (Cont.)



4-53.1. FIRE, BILGE, AND BALLAST - PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)



4-53.2. GAGE PIPING - MAINTENANCE INSTRUCTIONS .

This task covers:

a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

Pipe soldering. tools.

Material /Parts

NONE

Personnel Required

1

References

Paragraph	
4-53.4	Wye Strainer

Equipment Condition — Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe standard safety procedures for soldering piping.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Gage piping	a. Gage	Inspect for defective or broken gages.	
	b. Piping	1. Inspect for breaks, cracks or bends.	
		2. Inspect for leaks.	
	c. Valves	1. Inspect for defective operation.	
		2. Inspect for leaks.	

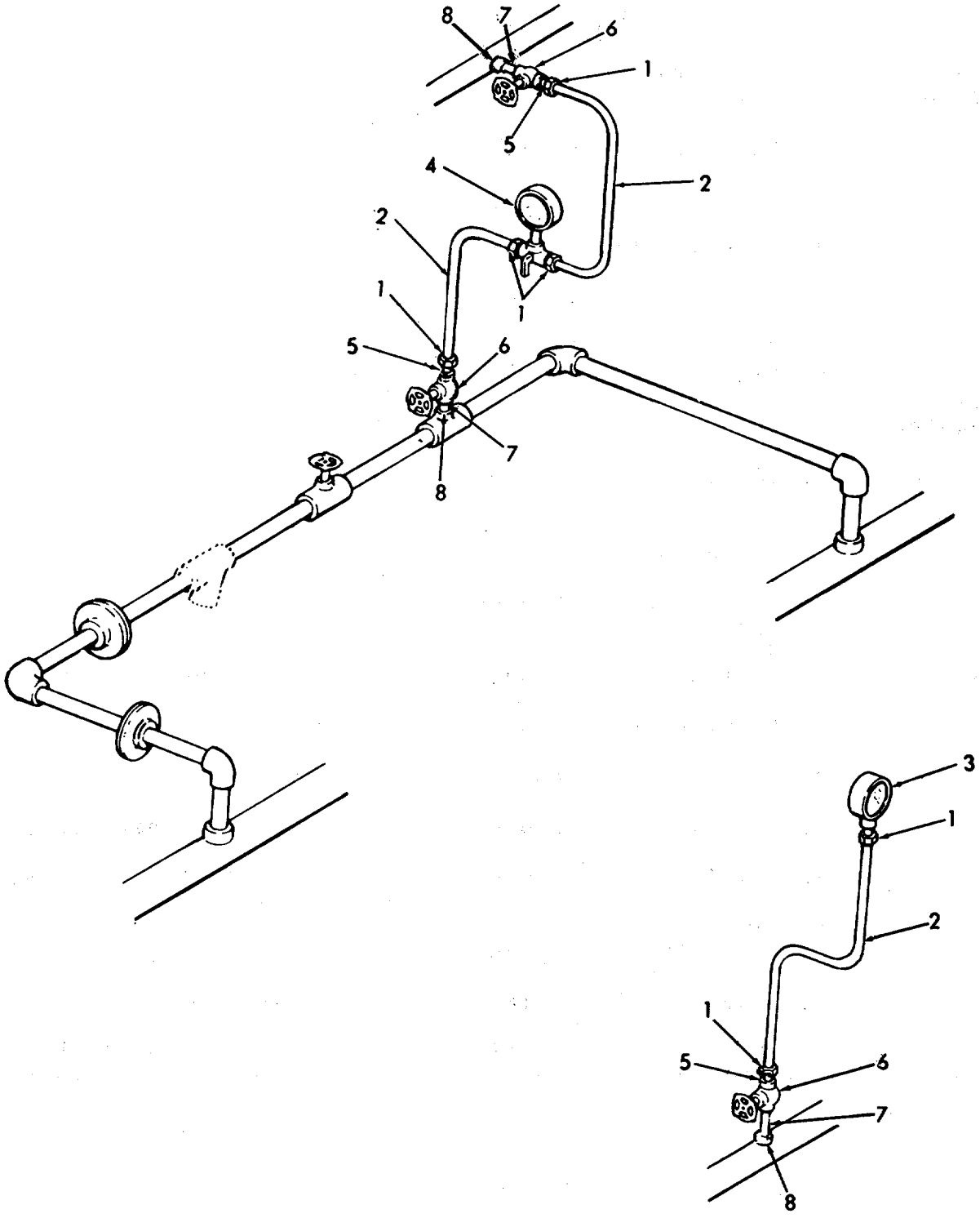
4-53.2. GAGE PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Gages (free standing)	a. Connectors (1)	Loosen.	
	b. Tubing (2)	Remove.	
	c. Gage (3)	Replace.	
	d. Tubing (2)	Install.	
	e. Connectors (1)	Tighten.	
3. Gages (valve mounted)	a. Gage (4)	Remove and replace.	
4. Tubing	a. Connectors (1)	Loosen	
	b. Tubing (2)	Replace.	
	c. Connectors (1)	Tighten.	
5. Gate valves	a. Tubing	Remove.	Refer to step 4.
	b. Adapter (5)	Remove.	
	c. Valve (6)	Remove.	
	d. Tubing (7)	Remove.	If necessary.
	e. Coupling (8)	Remove.	If necessary.
	f. Valve (6)	Replace.	
	g. Adapter (5)	Install.	
	h. Tubing	Install	Refer to step 4.

4-53.2. GAGE PIPING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



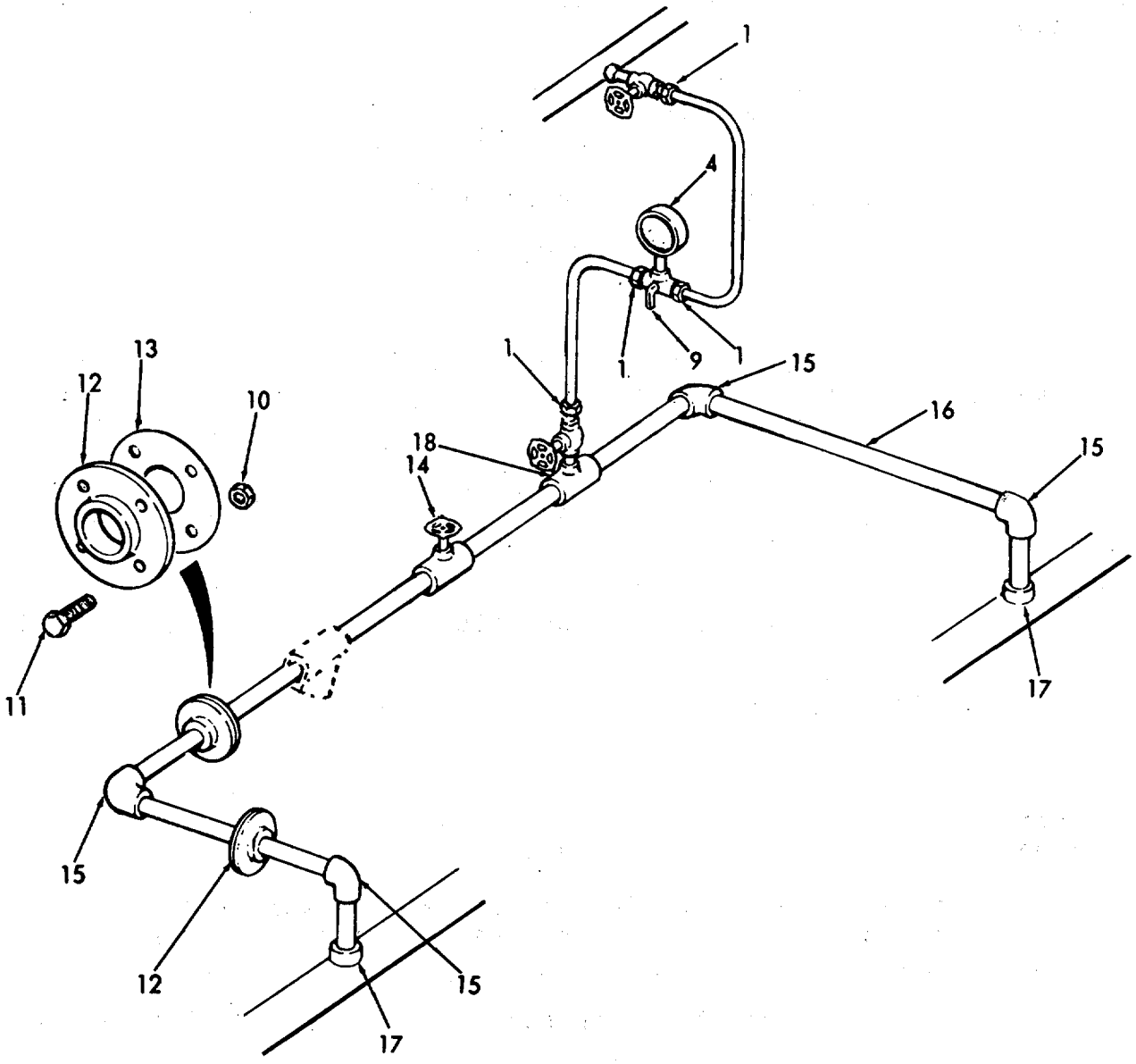
4-53.2. GAGE PIPING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
6. Three-way Valve	a. Connectors (1)	Loosen.	
	b. Valve (9) and gage (4)	1. Remove.	
		2. Disassemble.	
	c. Gage (4) and valve (9)	1. Reassemble.	
		2. Install	
	d. Connectors (1)	Tighten.	
7. Flanges	a. Nuts (10) and screws (11)	Remove.	
	b. Flange (12) and gasket (13)	Separate.	Discard gasket.
	c. Flange (12), gasket (13), screws (11), and nuts (10)	Reassemble.	Use new gasket.
8. Solder connec-tions			
		NOTE	
	Unsolder connection in accordance with standard practices. Do not heat valves excessively as they can be damaged.		
	a. Valves (14)	Replace.	If necessary.
	b. Elbows (15)	Replace.	If necessary.
	c. Tubing (16)	Replace.	If necessary.
	d. Couplings (17)	Replace.	If necessary.
	e. Tee (18)	Replace	If necessary.

4-53.2. GAGE PIPING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-53.3. SIMPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Cont).

This task covers:

a. Inspection **b. Service** **c. Replace**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Simplex strainer	a. Body	1. Inspect for leaks, breaks, and cracks.	
		2. Insure all hardware is tight.	
	b. Flanges	Inspect for leaks.	
SERVICE			
2.			

WARNING

Make sure the valve closest to the sea chest is closed. This will eliminate the possibility of flooding the bilges.

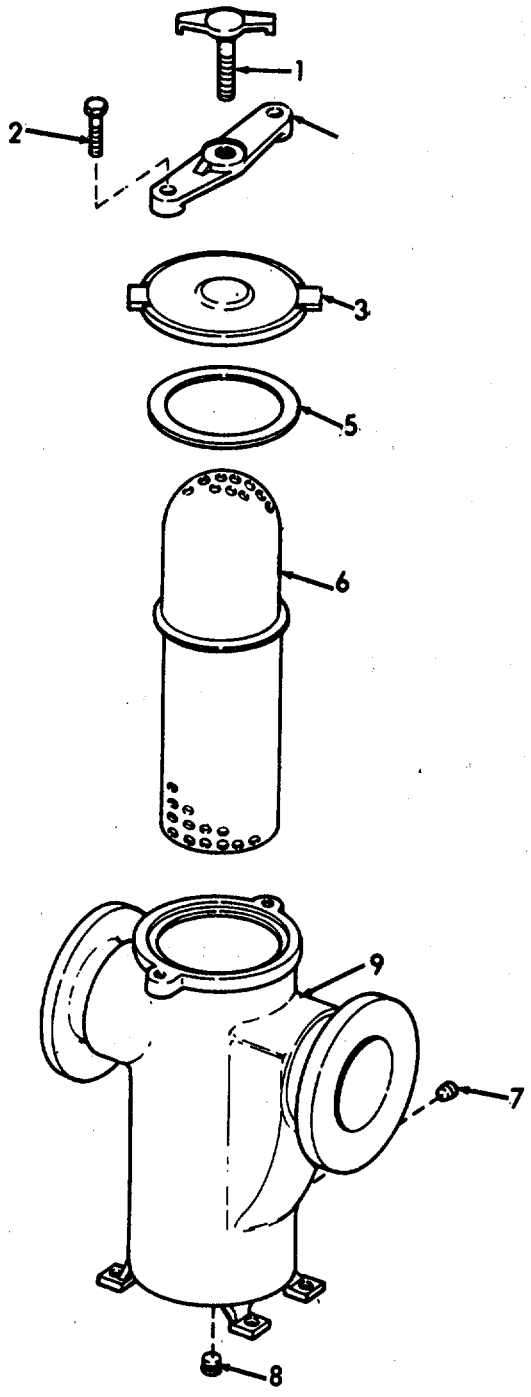
4-53.3. SIMPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
SERVICE (Cont)			
	a. Yoke screw (1)	Loosen.	
	b. Screws (2)	Remove.	
	c. Yoke (3)	Remove.	
	d. Cap (4) and gasket (5)	Remove.	Discard gasket.
	e. Strainer basket (6)	1. Remove. 2. Clean.	
	f. Pipe plugs (7 or 8)	Remove either to drain body (9).	
	g. Strainer basket (6)	Install.	
	h. Gasket (5) and cap (4)	1. Reassemble. 2. Install.	Use new gasket.
	i. Yoke (3) and screws (2)	Install.	
	j. Yoke screw (1)	Tighten.	
	k. Open valves	Check for leaking.	

4-53.3. SIMPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

SERVICE (Cont)



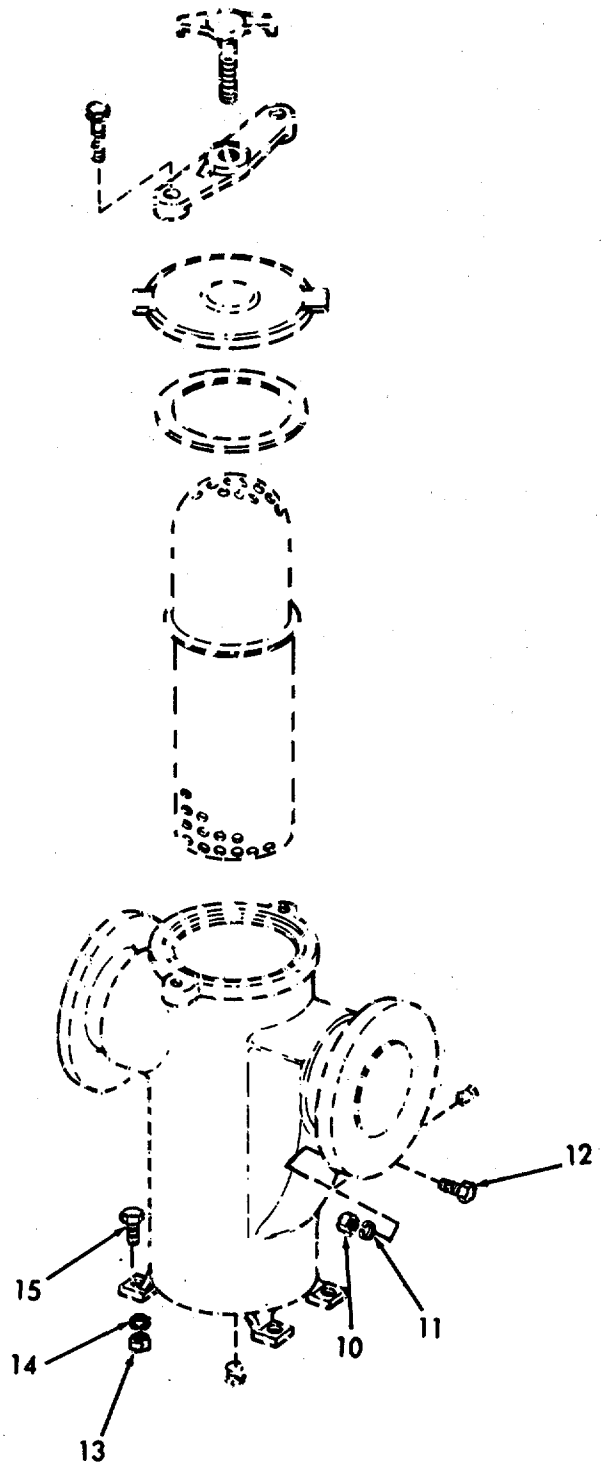
4-53.3. SIMPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
3.	a. Nuts (10), lockwashers (11) and screws (12)	Remove.	
	b. Nuts (13), lockwashers (14) and screws (15)	Remove.	
	c. Simplex strainer and gasket	Replace.	Use new gasket.
	d. Screws (15), lockwashers (14) and nuts (13)	Install.	
	e. Screws (12), lockwashers (11) and nuts (10)	Install	

4-53.3. SIMPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



4-53.4. WYE STRAINER - MAINTENANCE INSTRUCTIONS (Cont).

This task covers:
a. Inspection **b. Service**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
Paragraph 4-53.2 Gage Piping

Equipment Condition Condition Description
NONE

Special Environmental Conditions
NONE

General Safety Instructions
NONE

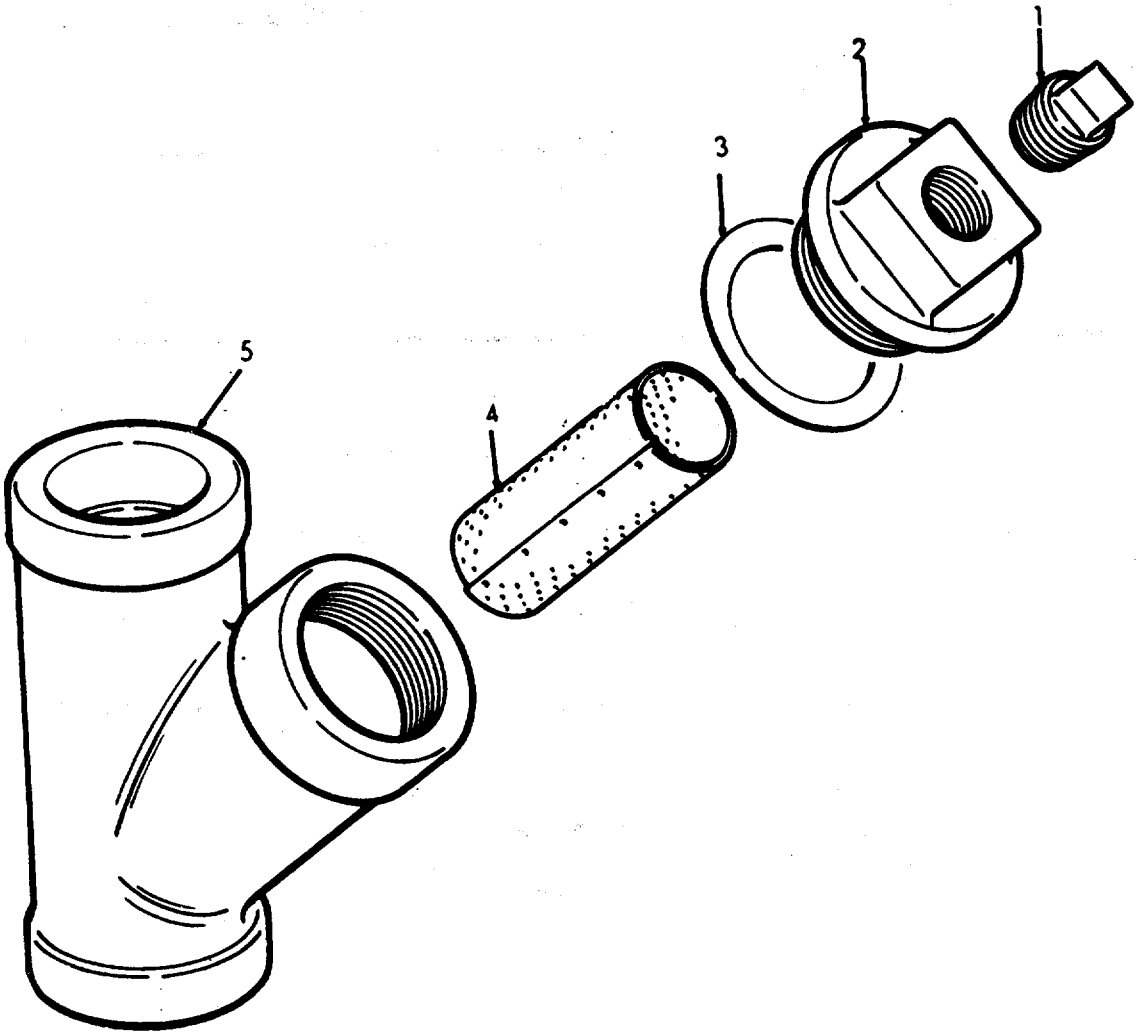
LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Wye strainer	a. Body	Inspect for breaks, cracks and leaks.	
SERVICE			
2.	a. Pipe plug (1)	Remove.	Drain.
	b. Cover (2) and gasket (3)	Remove.	Discard gasket.
	c. Screen basket (4)	1. Remove. 2. Clean. 3. Replace.	

4-53.4. WYE STRAINER - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

SERVICE (Cont)

d.	Cover (2) and gasket (3)	Install.
e.	Pipe plug (1)	Install.



4-53.5. FOG NOZZLE - MAINTENANCE INSTRUCTIONS (Cont).

This task covers:
a. Inspection **b. Service**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
NONE

Equipment Condition / Condition Description
NONE

Special Environmental Conditions
NONE

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Fog nozzle	a. Body	1. Inspect for breaks, cracks, and leaks.	
		2. Inspect for proper operation.	
	b. Nozzle tip	1. Inspect for broken, or missing parts.	
		2. Inspect for leaks.	
		3. Inspect for proper operation.	
	c. Applicator	Inspect for breaks, cracks, bends and leaking .	Replace.
	d. Hoses	Inspect for breaks, cracks, and leaks.	Replace.

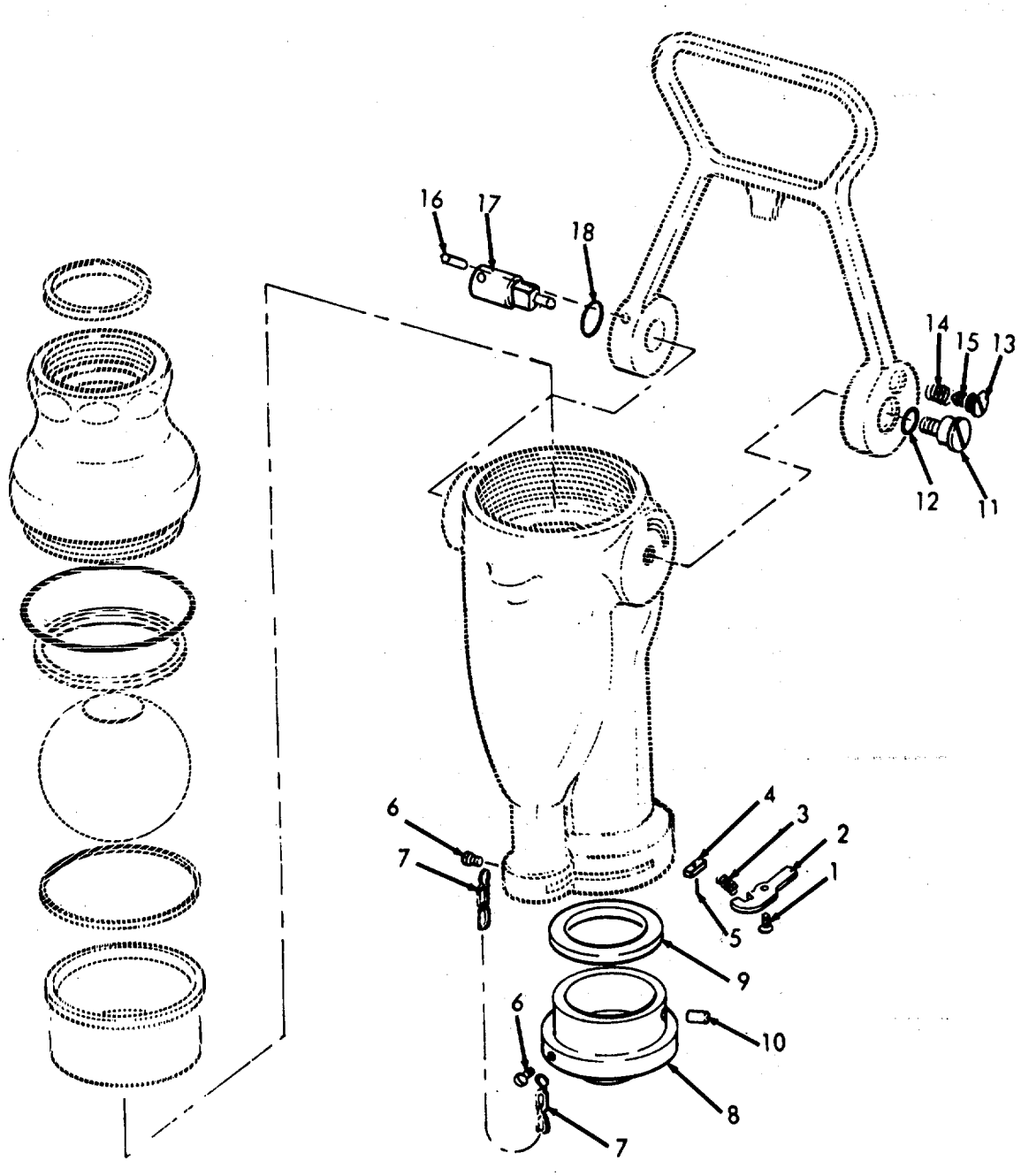
4-53.5. FOG NOZZLE - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Nozzle tip	a. Screw (1), nozzle latch (2), latch spring (3), bayonet joint pin (4), and joint re-taining pin (5)	Replace.	All of these items must be replaced to repair nozzle tip.
	b. Screws (6) and chain (7)	Repair.	As necessary.
	c. Nozzle tip (8), gasket (9) and bayonet joint pin (10)	Repair or replace.	As necessary.
3. Valve (handle and ball)	a. Screw (11) and 0-ring (12)	Remove.	Discard 0-ring.
	b. Plunger spring screw (13), spring (14), and plunger (15)	Replace.	If necessary.
	c. Roll pin (16)	Drive out.	
	d. Handle shaft (17), and 0-ring (18)	Remove.	Discard O-ring.

4-53.5. FOG NOZZLE - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



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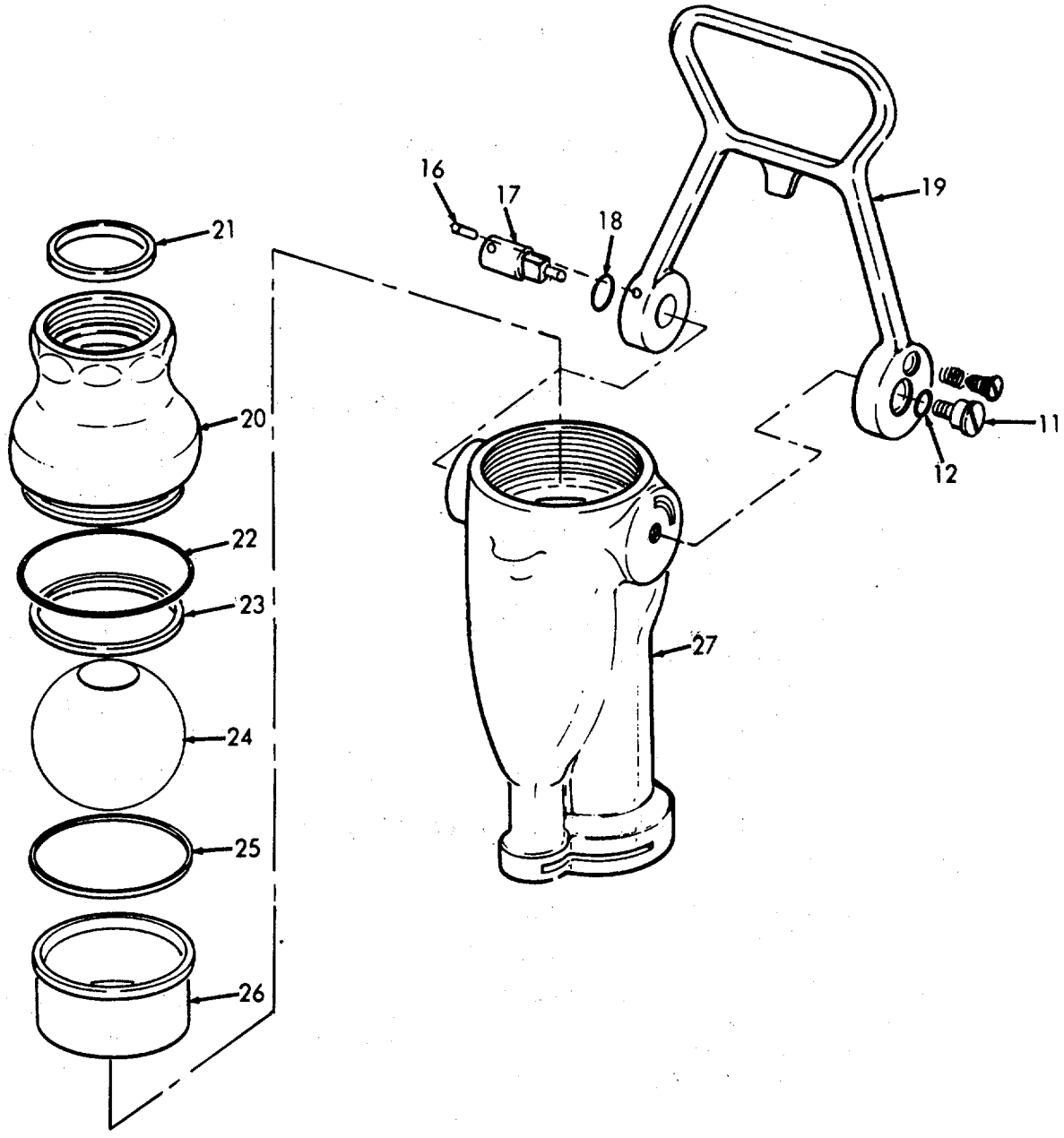
4-53.5. FOG NOZZLE - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	e. Handle (19)	Remove.	
	f. Hose end (20) and gasket (21)	Remove.	Discard gasket.
	g. O-ring (22), rear ball seat (23), ball (24), ball seat ring (25), and ball seat (26)	Remove from body (27).	Discard O-ring.
	h. Ball seat (26), ball seat ring (25), ball (24), and rear ball seat (23)	Install on body (27).	Make sure shaft handle side of ball is towards the proper side.
	i. Handle (19), O-ring (12), and screws (11)	Install.	Use new O-ring.
	j. O-ring (18)	Install.	Use new O-ring.
	k. Shaft handle (17)	Align with slot in ball.	
	l. Roll pin (16)	Install.	
	m. O-ring (22), hose end (20) , and gasket (21)	Install.	Use new O-ring and gasket.

4-53.5. FOG NOZZLE - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-54. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

Pipe soldering tools

Material /Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: NONE

Condition Description

Special Environmental Conditions

Do not drain cooling water into bilges.

General Safety Instructions

Observe standard safety procedures for soldering pipe.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
		NOTE All piping larger than 3/8 copper (solder) is maintained by Direct Support Maintenance.	
1. Expansion tanks	a. Tank	Inspect for breaks, cracks and leaks.	
	b. Sight gage	Inspect for breaks, cracks and leaks.	
	c. Outlet piping	Inspect for breaks, cracks and leaks.	
	d. Return piping	Inspect for breaks, cracks and leaks.	

4-54. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
2. Flexible hoses	Clamps	Inspect for damage.	Hoses are replaced by Direct Support Maintenance.
3. Flange couplings	Couplings	Insure all hardware is tight.	
REPAIR			
4. Vent lines			

NOTE

All piping at this level of maintenance is 1/2 inch copper with solder joints. Use existing procedures for soldering.

a. Piping (1)	Replace.	If necessary.
b. Elbows (2)	Replace.	If necessary.
c. Tees (3)	Replace.	If necessary.
d. Bushings (4)	Replace.	If necessary.
e. Unions (5)	Replace.	If necessary.

5. Return piping

NOTE

All piping at this level of maintenance is 5/16 inch copper nickel with solder joints. Use existing procedures for soldering.

Piping (6)	Replace.	If necessary.

6. Outlet piping

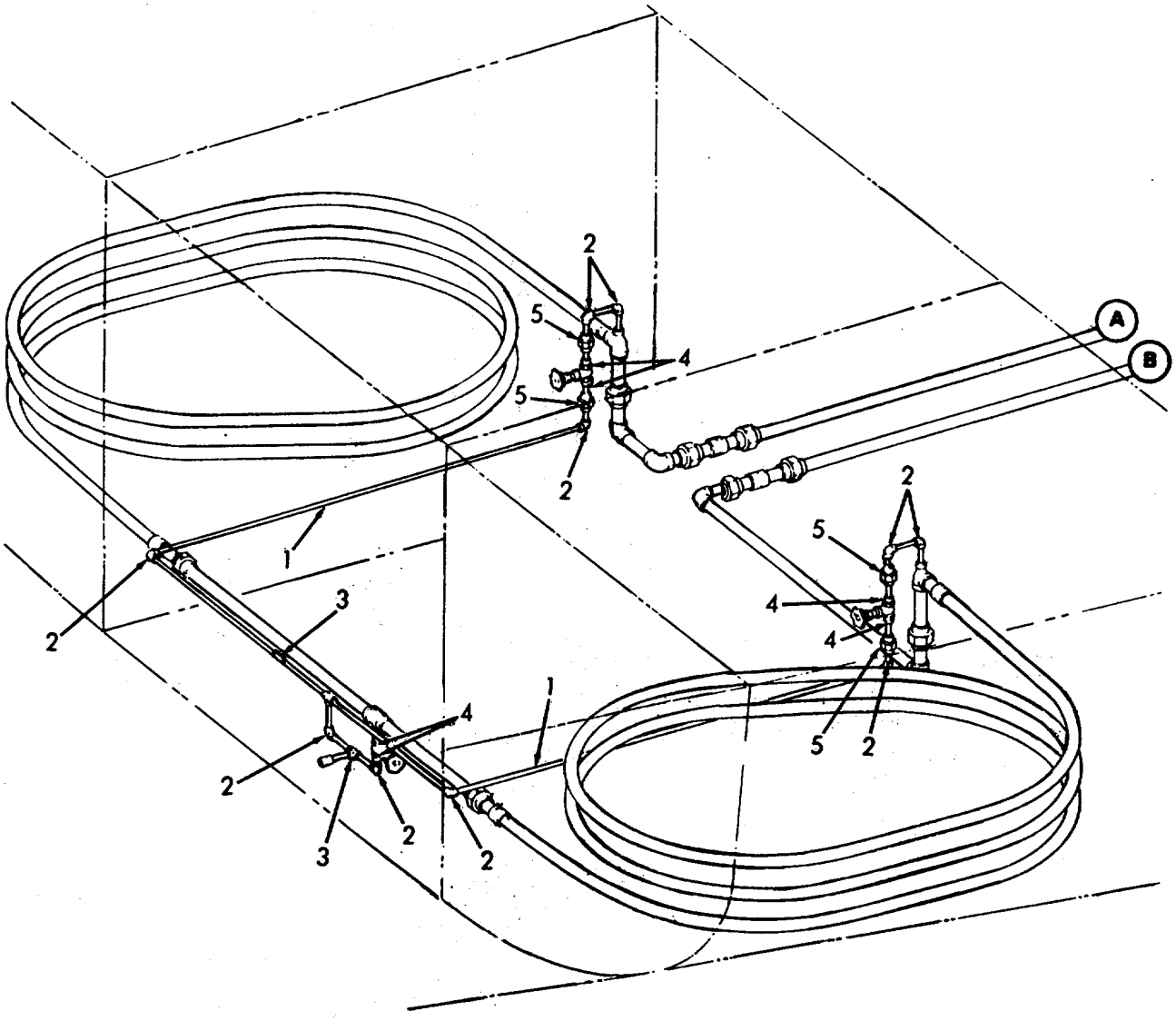
NOTE

All piping at this level of maintenance is 3/8 inch copper-nickel with solder joints. Use existing procedures for soldering.

4-54. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



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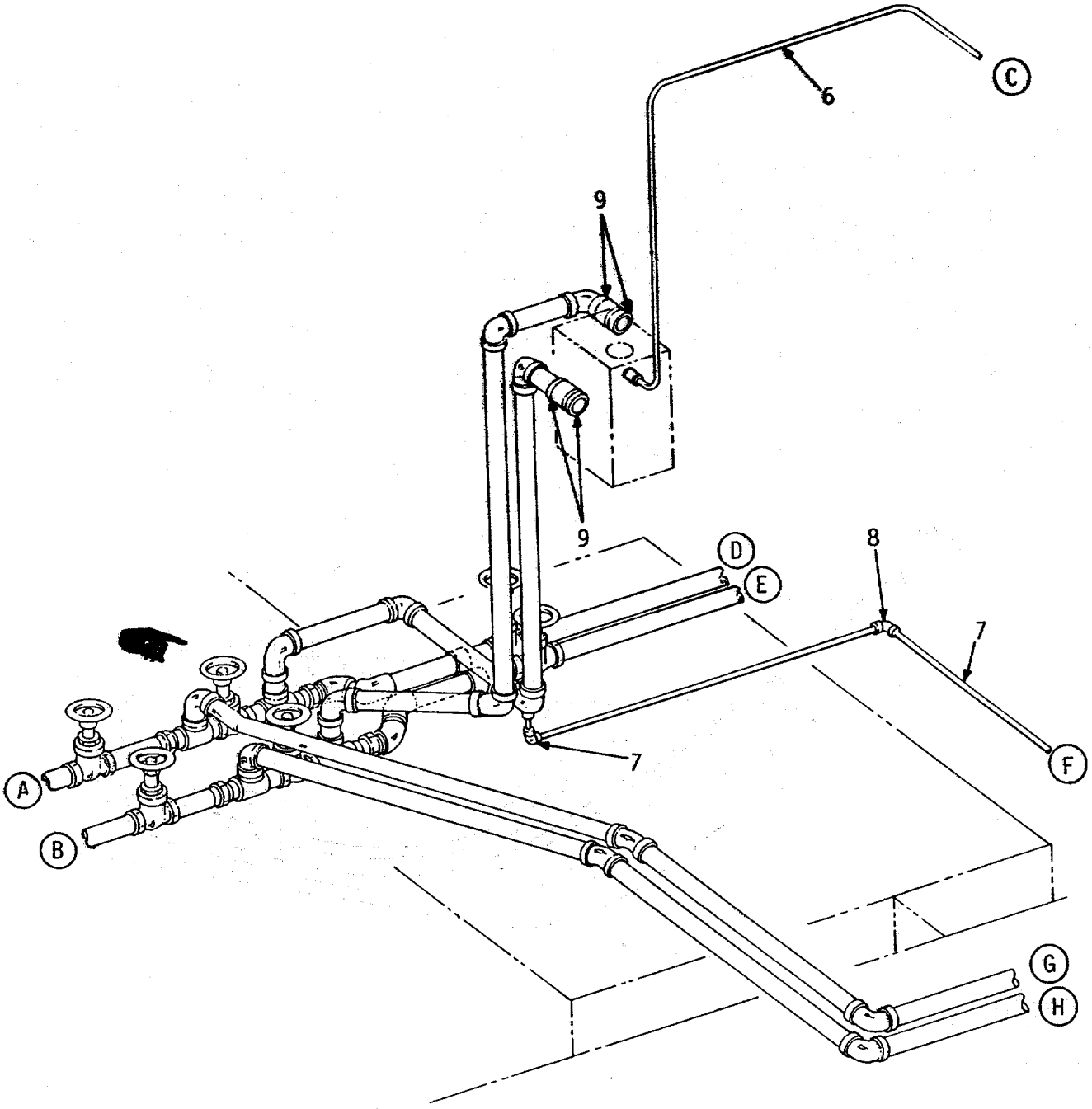
4-54. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

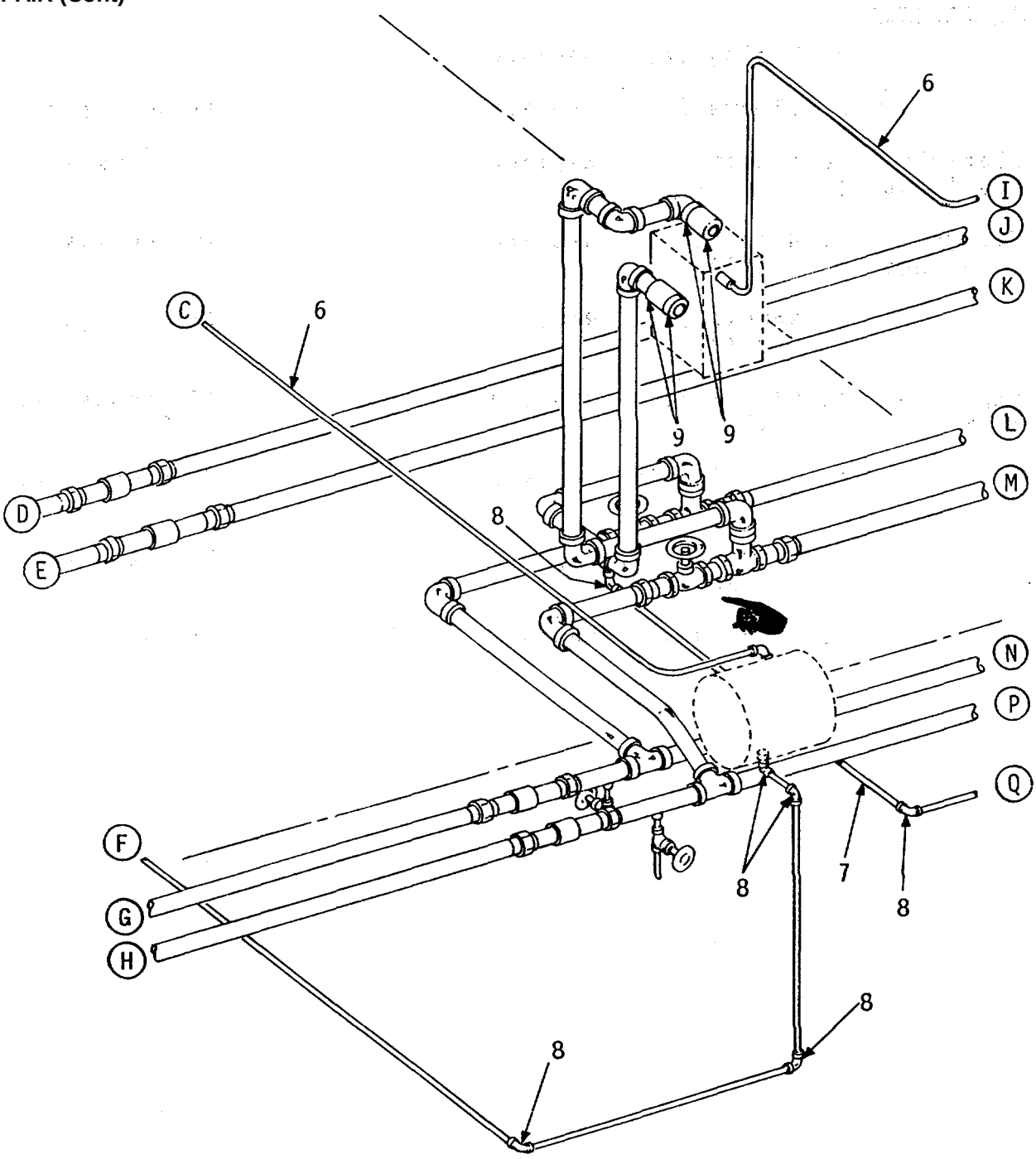
REPAIR (Cont)



4-54. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



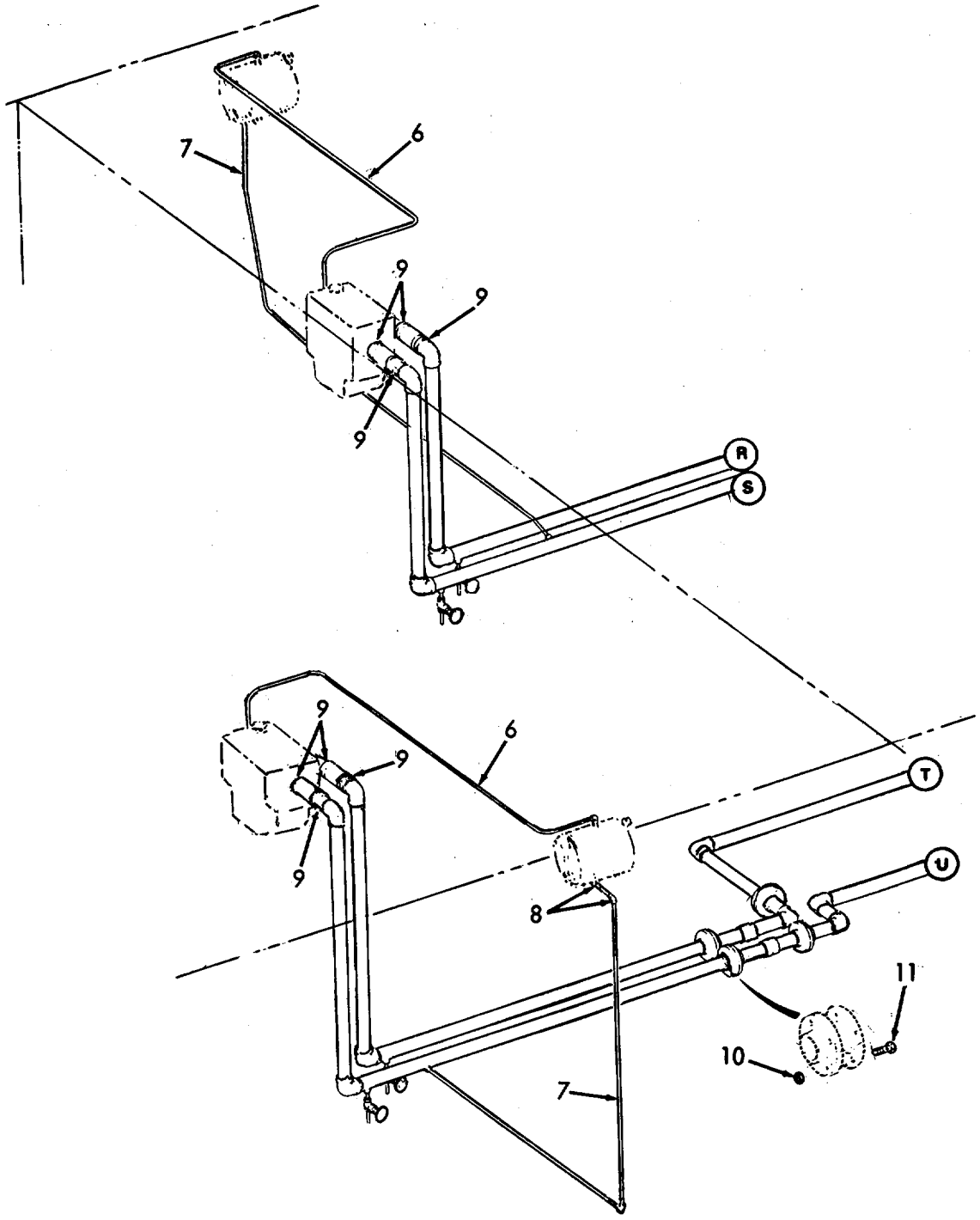
4-54. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	a. Piping (7)	Replace.	If necessary.
	b. Elbows (8)	Replace.	If necessary.
7. Flexible couplings	Hose clamps (9)	Replace.	If necessary.
8. Flange couplings	a. Nuts (10 and 12)	Replace.	If necessary.
	b. Screws (11 and 13)	Replace.	If necessary.
9. Expansion tank	a. Plug (fill) (14)	Replace.	If necessary.
	b. Plug (drain) (15)	Replace.	If necessary.
	c. Coupling (16 and 17)	Replace.	If necessary.
	d. Sight gage (18)	Replace.	If necessary.

4-54. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

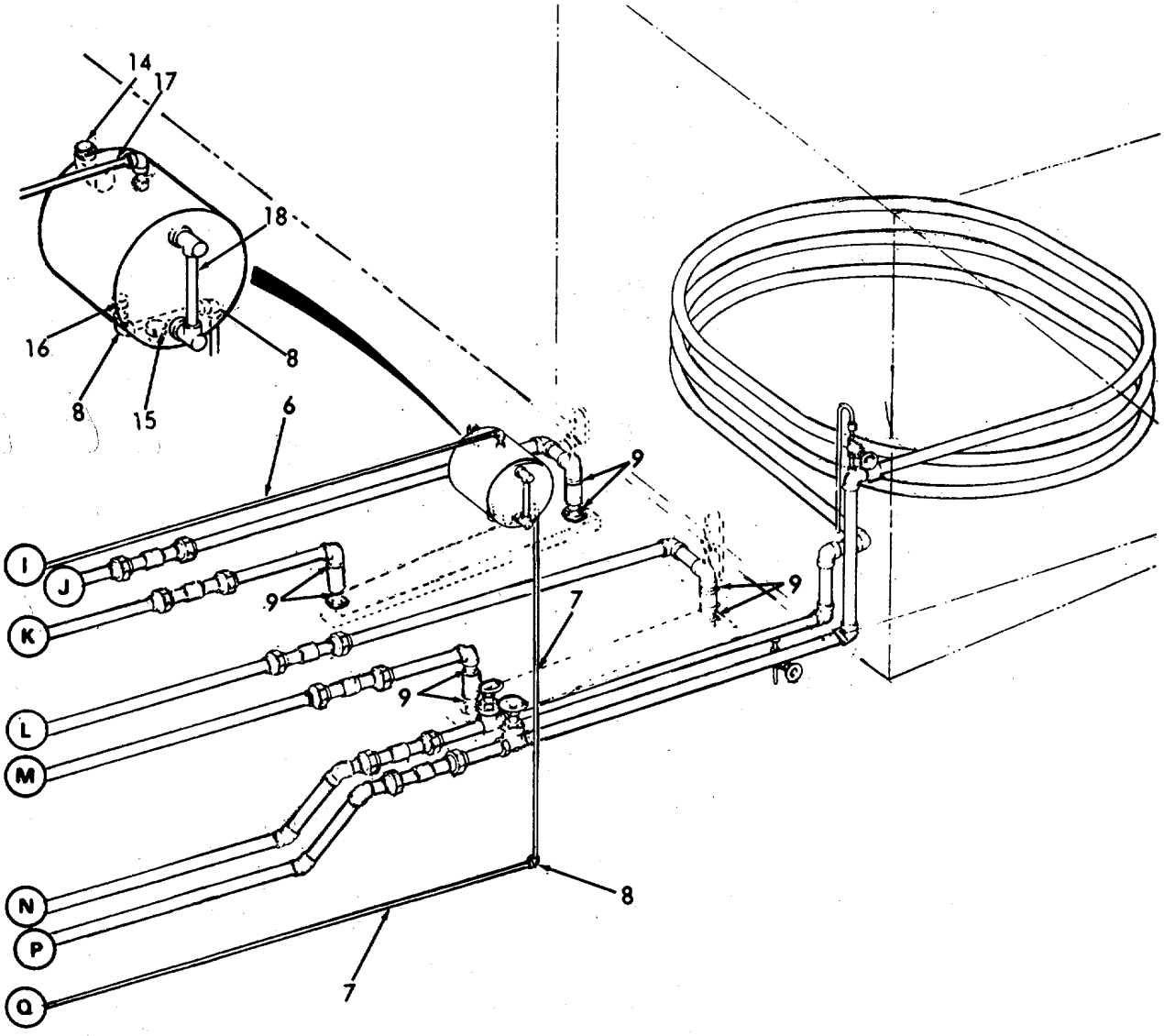


4-1283

4-54. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

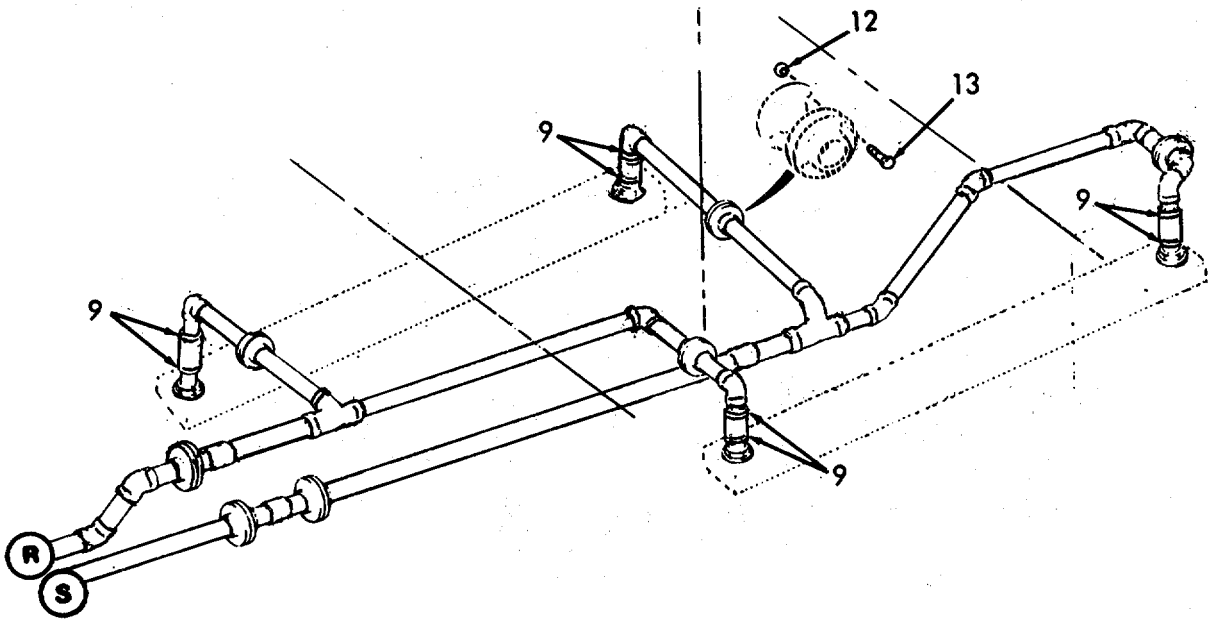


4-1284

4-54. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

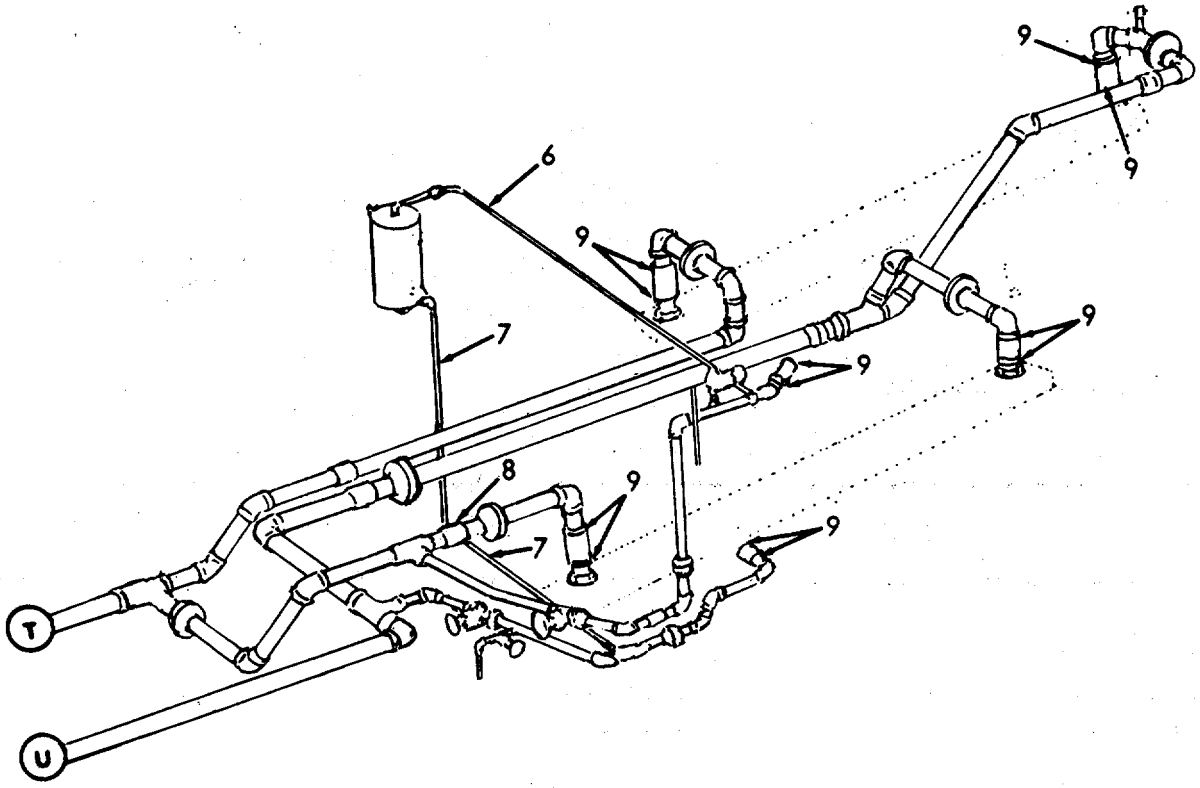


4-1285

4-54. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-1286

4-55. LUBE OIL PIPING SYSTEM - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
Pipe soldering tools

Material/Parts
NONE

Personnel Required
1

References
Paragraph
4-14 Lube Oil Pump
4-53.4 Wye Strainer

Equipment
Condition Condition Description
NONE

Special Environmental Conditions
Do not drain oil into bilges. Use oil separator and recovery system to collect used oil.

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Lube oil outlet hoses stations	a. Hose	Inspect for breaks, and cracks	
	b. Valve	1. Inspect for cracks, and leaks. 2. Inspect for proper operation.	
	c. Elbows	Inspect for breaks, cracks and leaks.	
	d. Piping	Inspect for breaks, cracks and leaks.	

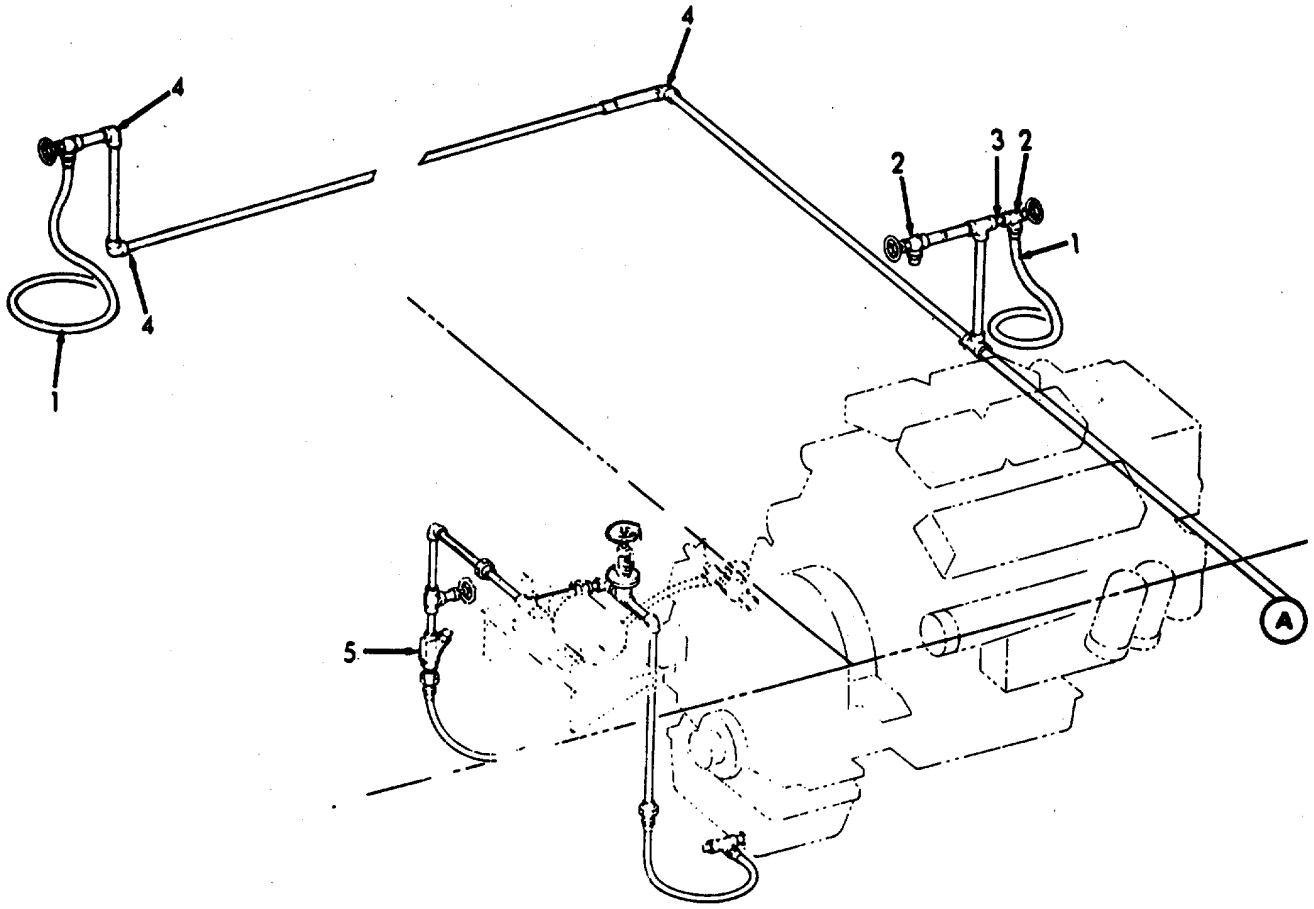
4-55. LUBE OIL PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
2. Lube oil tank and pump	a. Valve.	1. Inspect for breaks, cracks and leaks. 2. Inspect for proper operation.	
	b. Union	Inspect for leaking.	
	c. Pump	Inspect.	Refer to paragraph 4-14 .
	d. Pipe cap	Remove.	Clean out sediment.
3. Wye strainer	Strainer	Inspect.	Refer to paragraph 4-53.4 .
REPAIR			
5. Outlet hose stations	a. Hose (1)	Replace.	If necessary.
	b. Valves (2)	Replace.	If necessary.
	c. Nipples (3)	Replace.	If necessary.
	d. Elbows (4)	Replace.	If necessary.
6. Wye strainer	Strainer (5)	Repair and clean.	Refer to paragraph 4-53.4 .
7. Lube oil pump and tank	a. Pump (6)	Repair.	Refer to paragraph 4-14 .
	b. Union (7)	Replace.	If necessary.
	c. Pipe cap. (8)	Replace.	If necessary.
	d. Angle valve (9)	Replace.	If necessary.

4-55. LUBE OIL PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

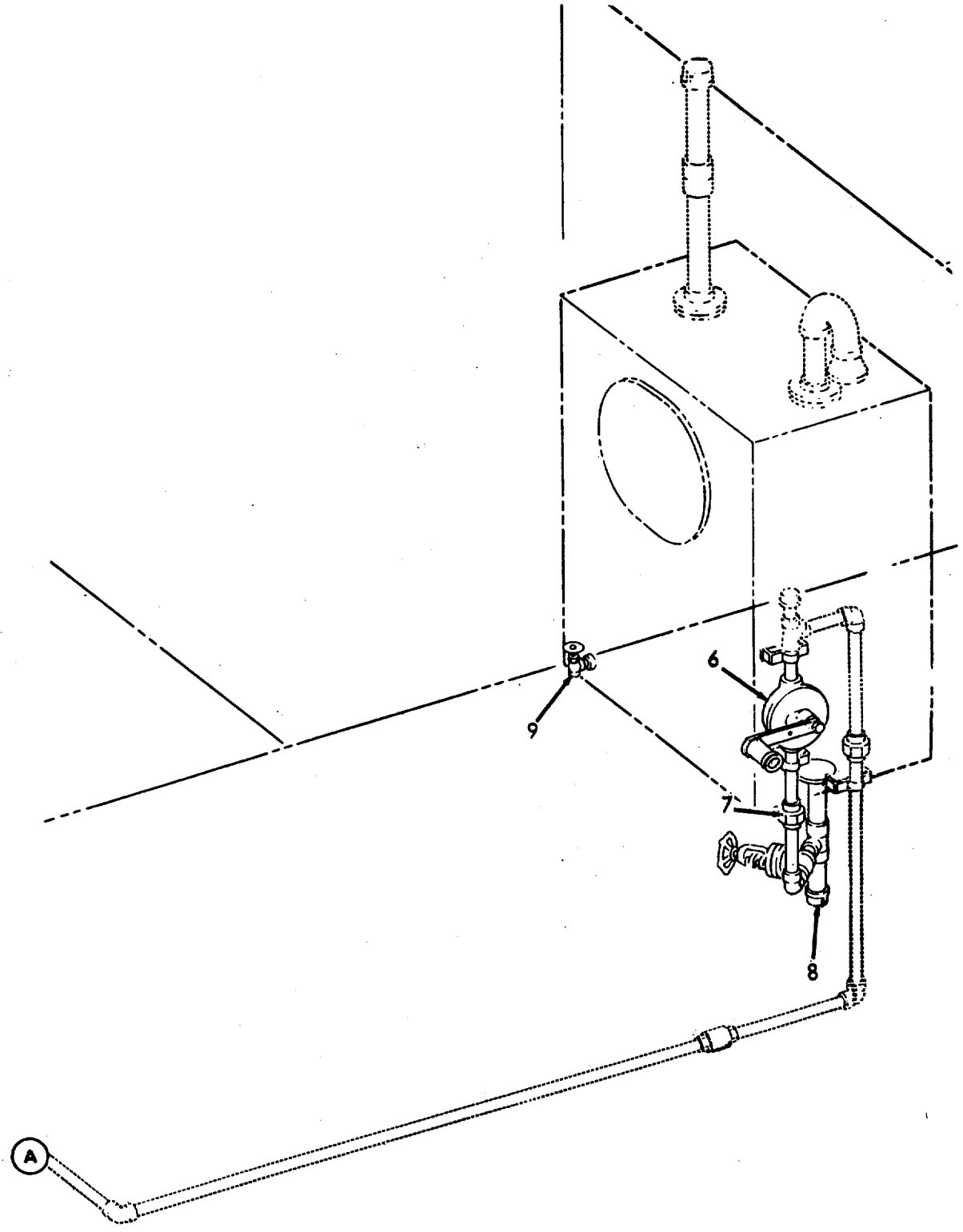


4-1289

4-55. LUBE OIL PIPING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-56. DIESEL OIL STOWAGE TANK - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

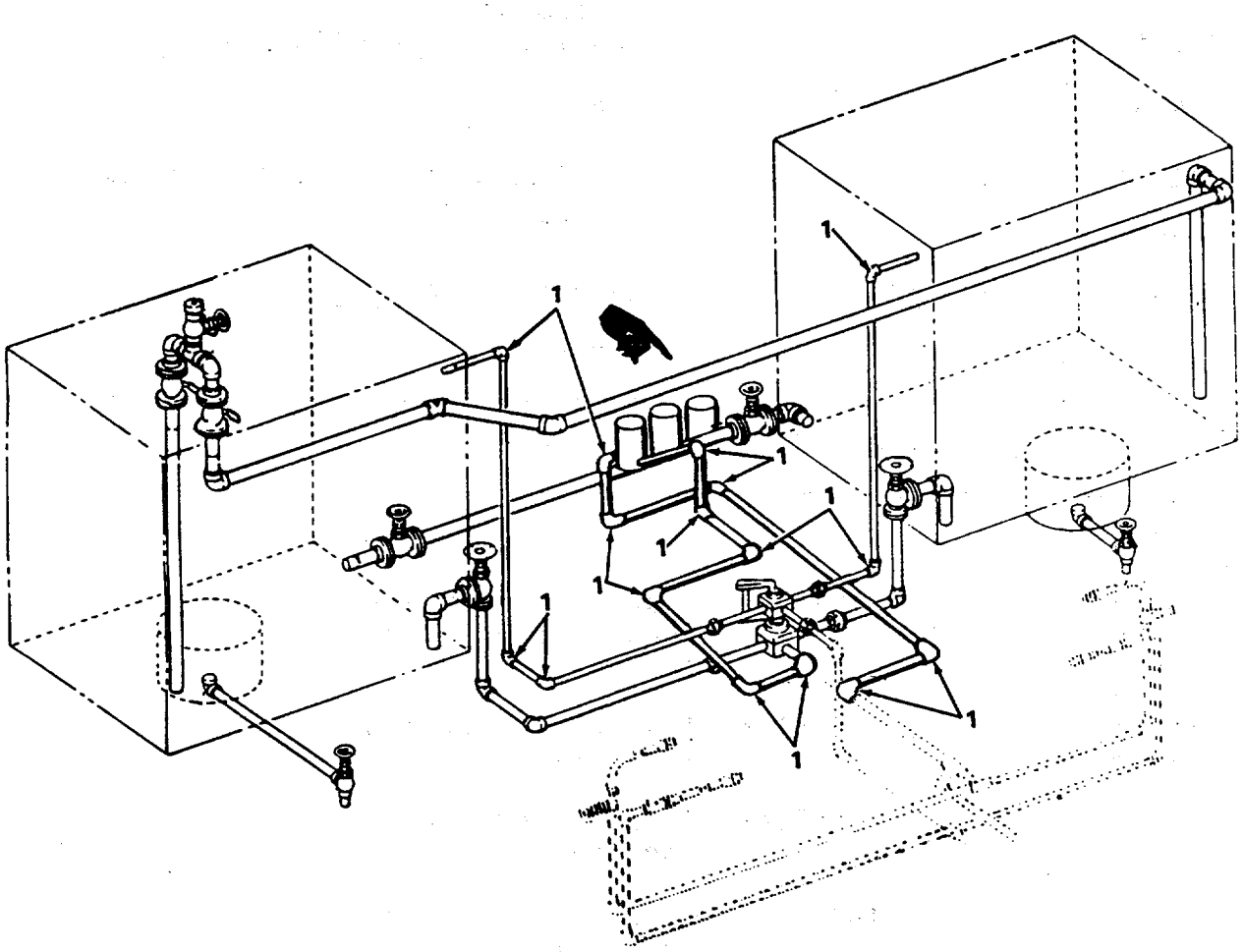
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Stowage tank	Return piping	Inspect for breaks, cracks and leaks.	
REPAIR			
2.	Elbows (1)	Replace.	If necessary.

4-56. DIESEL OIL STOWAGE TANK - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS

REPAIR



4-57. DIESEL OIL PIPING SYSTEM - MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
NONE

Equipment Condition
Condition Description
NONE

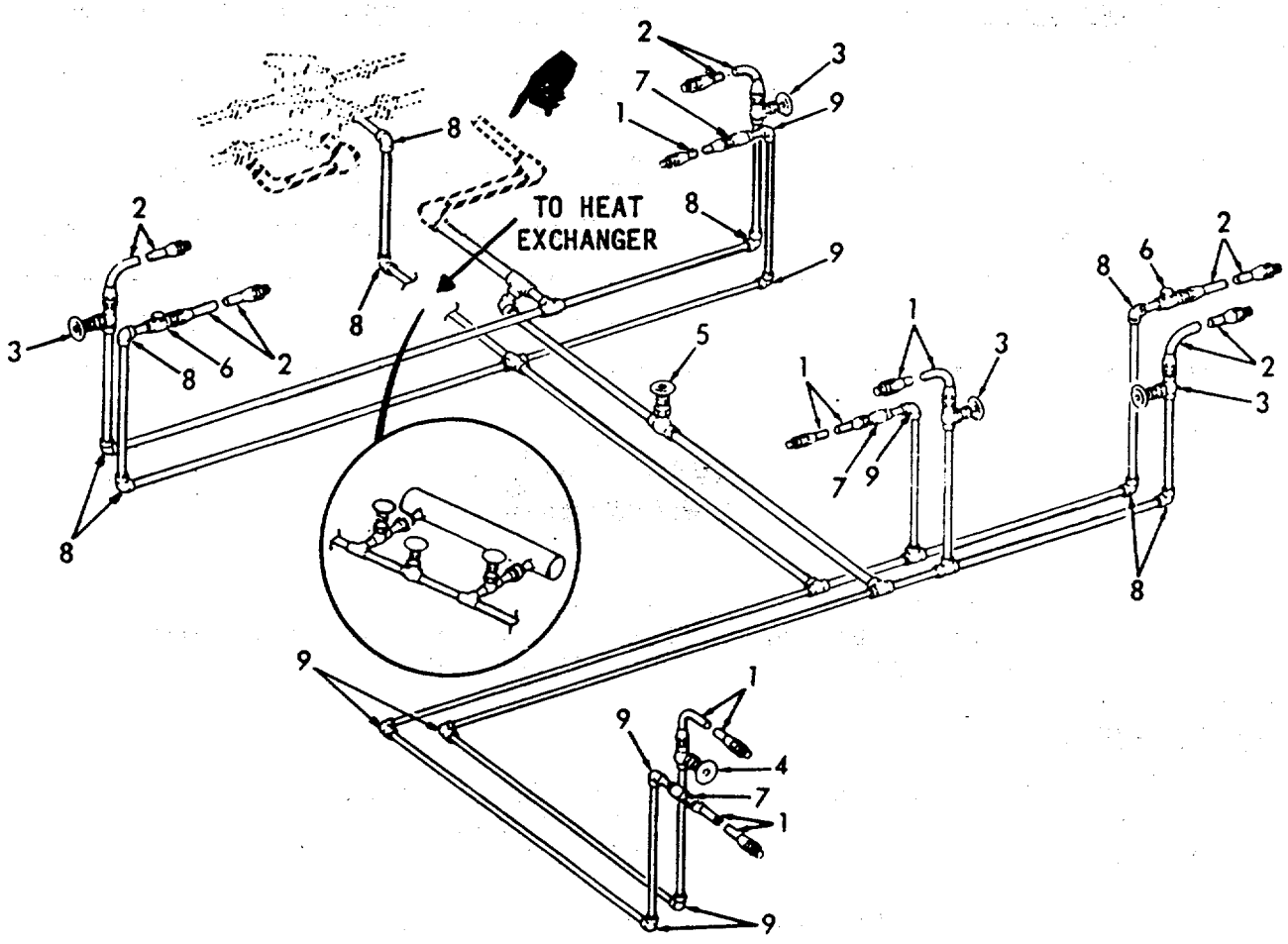
Special Environmental Conditions
NONE

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Engine (Propulsion, Generator, or Anchor Winch)	a. Flexible hoses	Inspect for breaks, cracks, bends, and leaks.	
	b. Globe valves	Inspect for cracks and leaks.	
	c. Lift valves and leaks.	Inspect for cracks	
	d. Piping (elbows)	Inspect for cracks and leaks.	
REPAIR			
2.	a. Flexible hose (1 and 2)	Replace.	If necessary.

4-56. DIESEL OIL STOWAGE TANK - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	b. Globe valves (3, 4 and 5)	Replace.	If necessary.
	c. Lift valves (6 and 7)	Replace.	If necessary.
	d. Elbows (8 and 9)	Replace.	If necessary.



4-58. DIESEL OIL COOLING PIPING - MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection **b. Repair** **c. Replace**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
Paragraph
4-13.4 Pump Motor Repair
4-59 Duplex Strainer

Equipment
Condition Condition Description
NONE

Special Environmental Conditions
Do not drain cooling water into bilges.

General Safety Instructions
Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

Prior to disassembly, make sure the valve at the sea cock is properly closed. If not the craft and lives may be lost from possible sinking.

INSPECTION

1.	Diesel oil cooling piping	a. Piping	Inspect for breaks, cracks, bends and leaking.
		b. Valves gate	Inspect for breaks, cracks, bends and leaking.

4-56. DIESEL OIL STOWAGE TANK - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	c. Valves globe	Inspect for breaks, cracks, bends and leaking.	
	d. Heat exchanger	Inspect for breaks, cracks, bends and leaking.	
	e. Hose fittings	Inspect for breaks, cracks, bends and leaking.	
	f. Strainer	Inspect for breaks, cracks, bends and leaking.	
	g. Pump	Inspect.	Refer to paragraph 4-13.4 .
REPAIR			
2. Pump	Pump and motor	Repair.	Refer to paragraph 4-13.4 .
3. Duplex strainer	Strainer	Repair.	Refer to paragraph 4-59 .
REPLACE			
4. Diesel oil cooling piping	a. Elbows (1)	Replace.	If necessary.
	b. Swing check valve (2)	Replace.	If necessary.
	c. Pipe 1-1/2 inch (3)	Replace.	If necessary.
	d. Elbow (4)	Replace,	If necessary.
	e. Union (5)	Replace.	If necessary.
	f. Nipple 1-1/2 inch (6)	Replace.	If necessary.

4-56. DIESEL OIL STOWAGE TANK - MAINTENANCE INSTRUCTIONS.

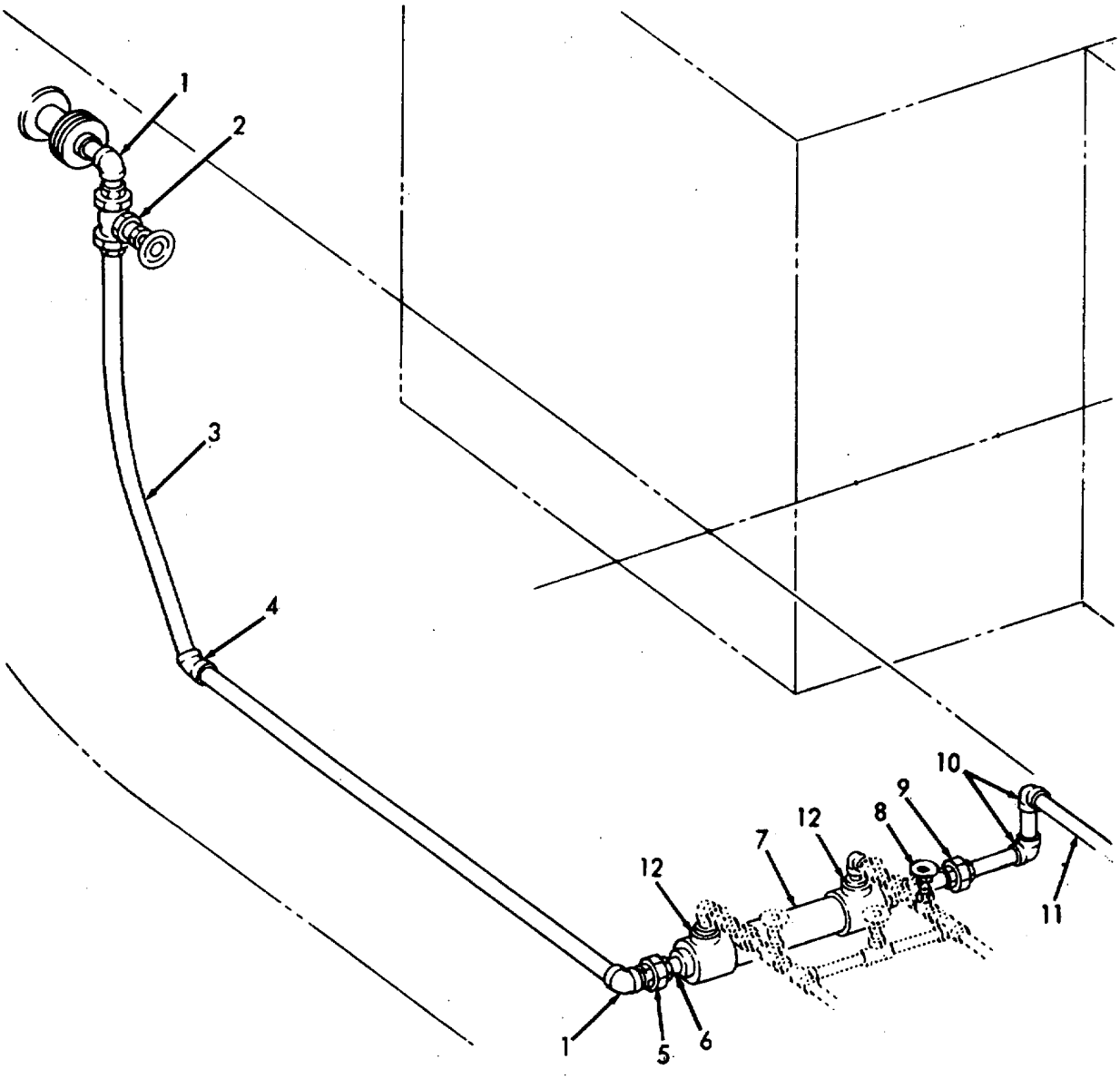
LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	g. Heat exchanger (7)	Replace.	If necessary.
	h. Adapter (8)	Replace.	If necessary.
	i. Elbow (9)	Replace.	If necessary.
	j. Elbow (10)	Replace.	If necessary.
	k. Pipe 1 inch (11)	Replace.	If necessary.
	l. Bushing (12)	Replace.	If necessary.
	m. Union 1/2 inch (13)	Replace.	If necessary.
	n. Gate valve (14)	Replace.	If necessary.
	o. Tee (15)	Replace.	If necessary.
	p. Gate valve (16)	Replace.	If necessary.
	q. Pipe (17)	Replace.	If necessary.
	r. Elbow (18)	Replace.	If necessary.
	s. Nipple 1/2 inch (19)	Replace.	If necessary.
	t. Tee (20)	Replace.	If necessary.
	u. Nipple 1 inch (21)	Replace.	If necessary.
	v. Tee (22)	Replace.	If necessary.
	w. Pipe cap (23)	Replace.	If necessary.
	x. Union (24)	Replace.	If necessary.
	y. Reducer (25)	Replace.	If necessary.

4-58. DIESEL OIL COOLING PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	z. Elbow (26)	Replace.	If necessary.
	aa. Pipe 2 inch (27)	Replace.	If necessary.
	ab. Elbow (28)	Replace.	If necessary.
	ac. Return bend (29)	Replace.	If necessary.
	ad. Pipe sleeve (30)	Replace.	If necessary.
	ae. Globe valve (31)	Replace.	If necessary.
	af. Ted (32)	Replace.	If necessary.
	ag. Elbow (33)	Replace.	If necessary.
	ah. Relief valve (34)	Replace.	If necessary.
	ai. Tee (35)	Replace.	If necessary.
	aj. Hose fittings (36)	Replace.	If necessary.
	ak. Nut (37)	Replace.	If necessary.
	al. Screw (38)	Replace.	If necessary.
	am. Flange (39)	Replace.	If necessary.
	an. Screw flathead (40)	Replace.	If necessary.
	ao. Strainer (41)	Replace.	If necessary.
	ap. Flange (42)	Replace.	If necessary.
	aq. Glove valve (43)	Replace.	If necessary.

4-58. DIESEL OIL COOLING PIPING - MAINTENANCE INSTRUCTIONS (Continued).

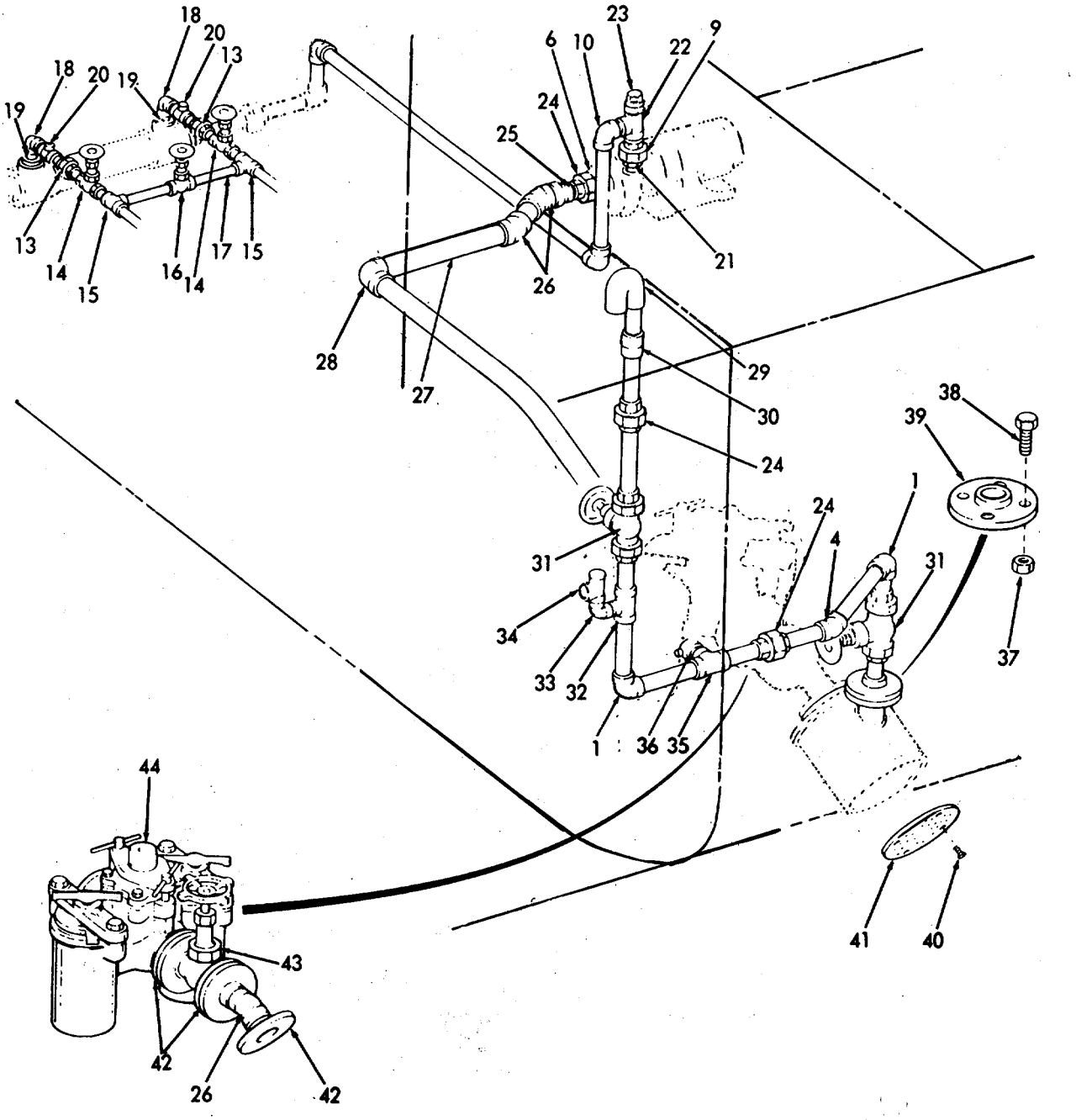
LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	ar. Duplex strainer (44)	Refer to para 4-59 .	



4-58. DIESEL OIL COOLING PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



4-59. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
NONE

Equipment
Condition Condition Description
NONE

Special Environmental Conditions
NONE

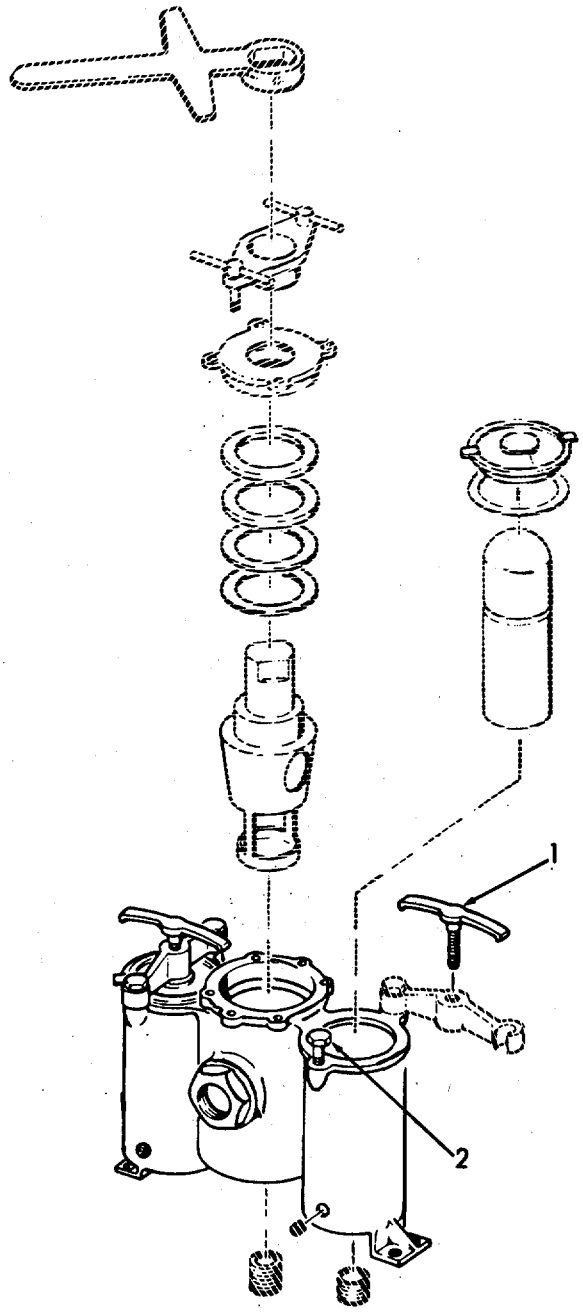
General Safety Instructions
Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS
		WARNING Prior to disassembly, make sure the valve at the sea cock is properly closed. If not the craft and lives may be lost from possible sinking.	
INSPECTION			
1. Duplex strainer	Strainer	Inspect for breaks, cracks, and leaks.	
REPAIR			
2.	a. Yoke screw (1)	Loosen.	
	b. Stud (2)	Loosen.	

4-59. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



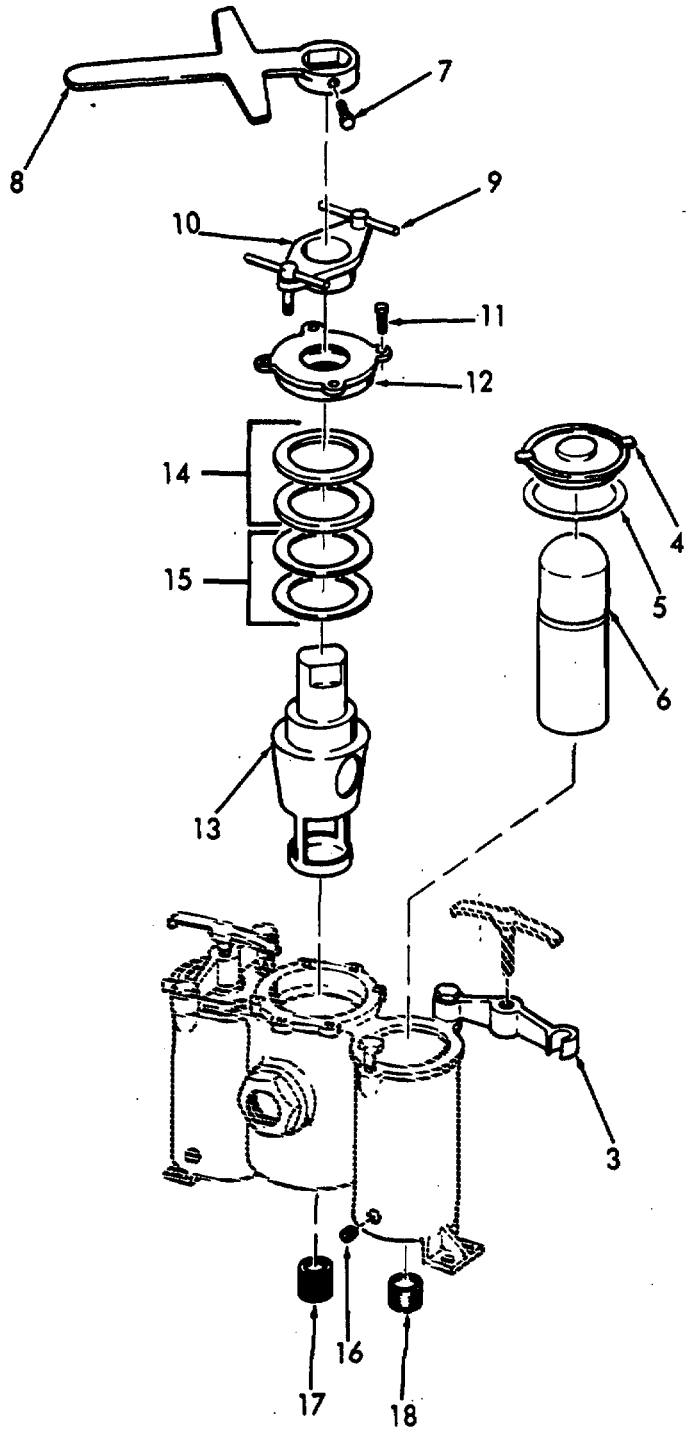
4-59. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	c. Strainer yoke (3)	Remove.	
	d. Cover (4)	Remove.	
	e. Gasket (5)	Remove.	Discard.
	f. Basket (6)	Remove.	
	g. Setscrew (7)	Loosen.	
	h. Handle (8)	Remove.	
	i. T-bolts (9)	Loosen and remove.	
	j. Locking flange (10)	Remove.	
	k. Screws (11)	Remove.	
	l. Packing gland (12)	Remove.	
	m. Bronze key (13)	Remove.	
	n. Packing rings (,14)	Remove.	Discard.
	o. Brass washers (15)	Remove.	
	p. Pipe plugs (16)	Remove.	If necessary.
	q. Pipe plugs (17)	Remove.	If necessary.
	r. Pipe plugs (18)	Remove.	If necessary.

4-59. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



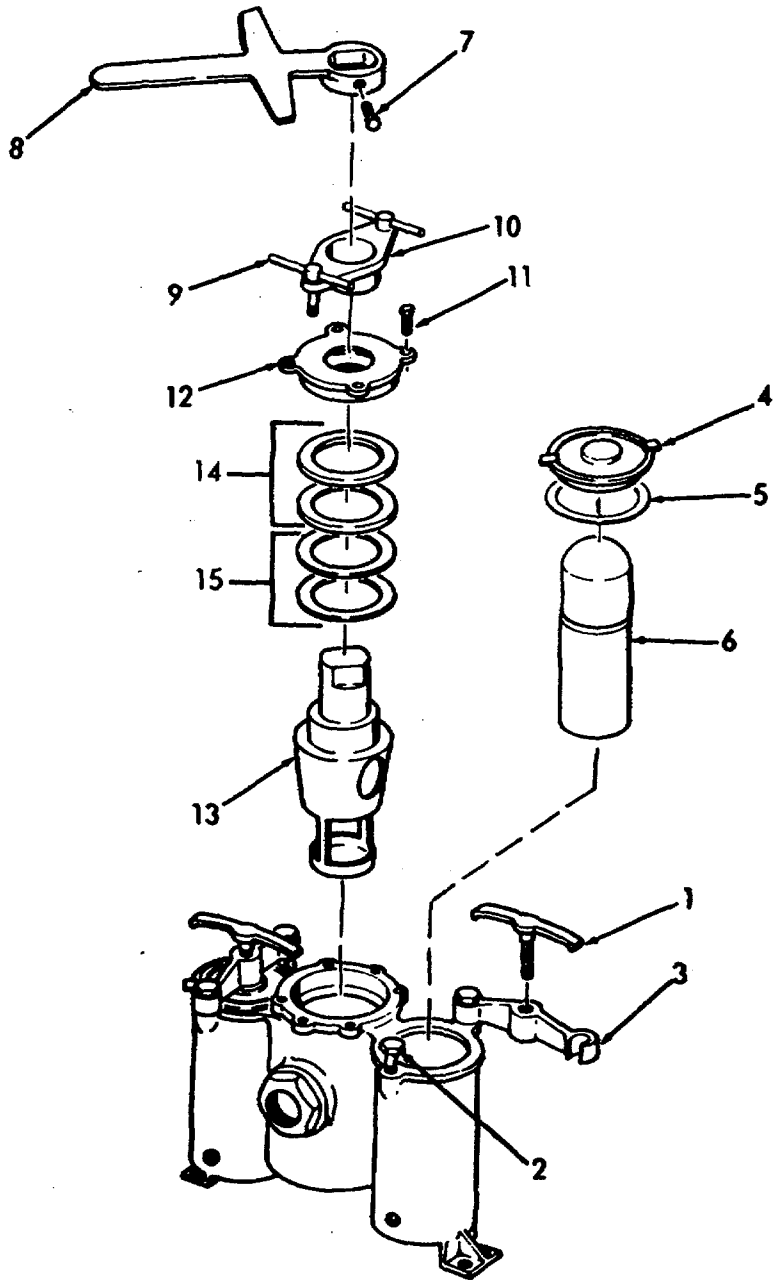
4-59. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	s. Brass washers (15), packing rings (14), and bronze key (13)	Reassemble.	Use new packing ring.
	t. Packing gland (12) and screws (11)	Install.	
	u. Locking flange (10), and T-bolts (9)	Install.	
	v. Handle (8), and setscrew (7)	Install and tighten.	
	w. Basket (6)	Insert.	
	x. Cover (4), and gasket (5)	Install.	Use new gasket.
	y. Yoke (3),	1. Install under stud (2). 2. Tighten stud (2).	
	z. Yoke screw (1)	Tighten.	

4-59. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-59.1. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Replace**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
Pipe soldering

Material/Parts
NONE

Personnel Required
1

References
NONE

Equipment Condition
Condition Description
NONE

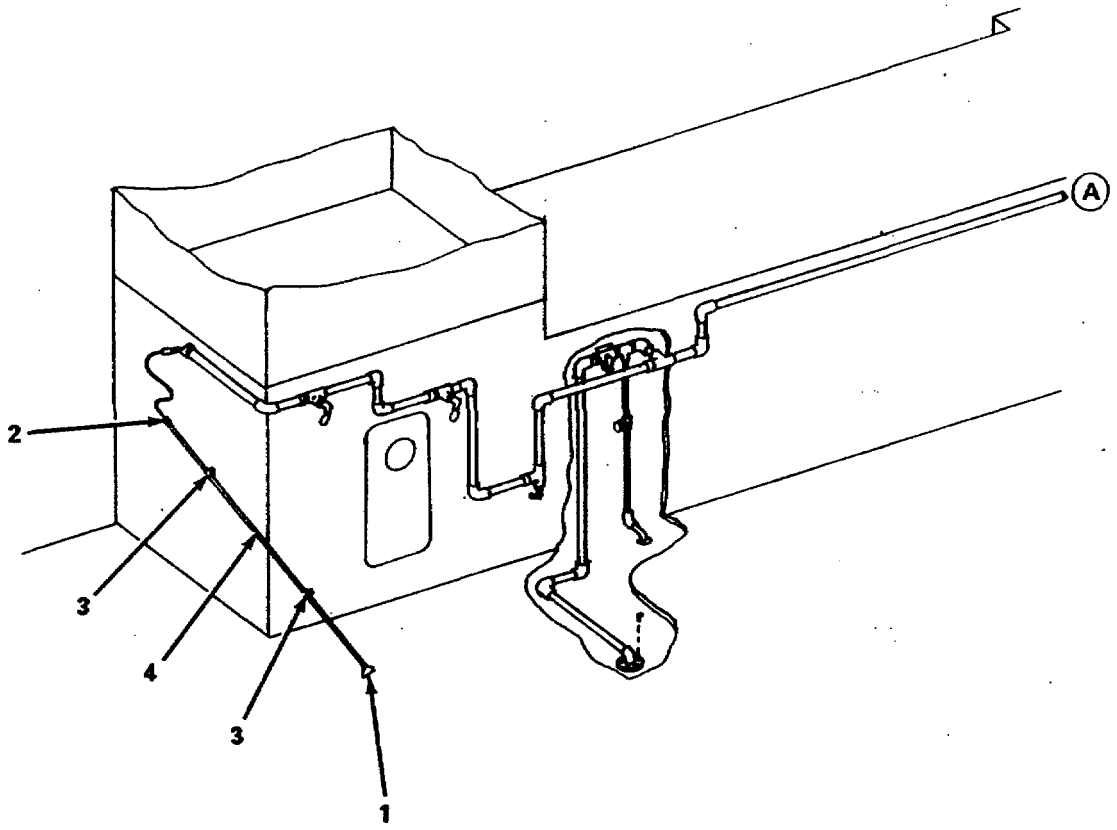
Special Environmental Conditions
NONE

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Washdown system	a. Nozzles	Inspect for damage.	
	b. Gate valve	Inspect for proper operation.	
	c. Butterfly valve	Inspect for proper operation.	
	d. Piping	Inspect for bends, breaks, cracks, and leaks.	
REPLACE			
2.	a. Nozzles P1/2 inch (1)	Replace.	If necessary.

4-59.1. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	b. Female hose connections (2)	Replace.	If necessary.
	c. Spring clamps (3)	Replace.	If necessary.
	d. Copper pipe (4)	Replace.	If necessary.



4951-038

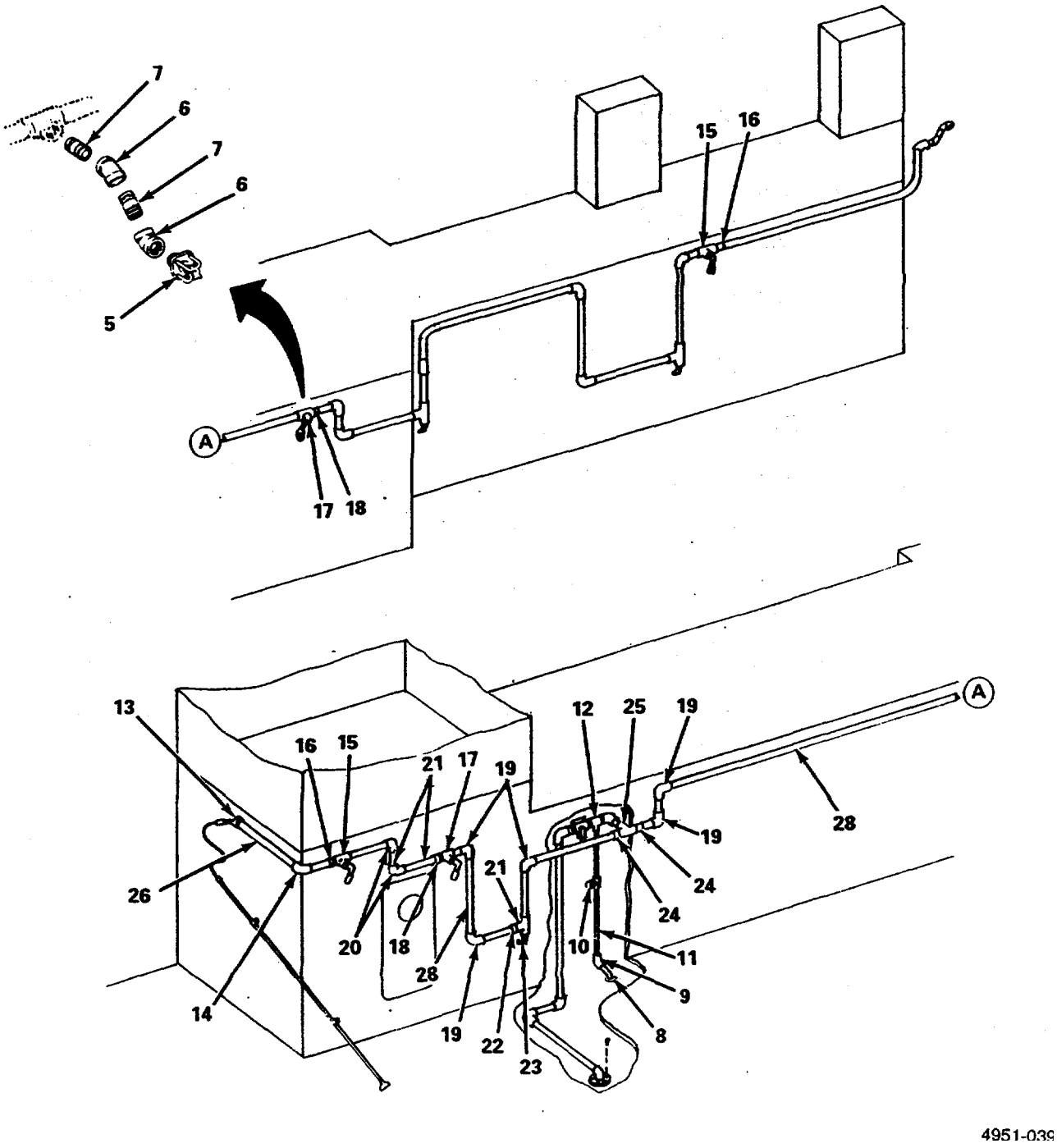
4-59.1. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	e. Nozzles G1/2 inch (5)	Replace.	If necessary.
	f. Elbows (6)	Replace.	If necessary.
	g. Pipe nipples (7)	Replace.	If necessary.
	h. Sleeve (8)	Replace.	If necessary.
	i. Elbows (9)	Replace.	If necessary.
	j. Gate valve (10)	Replace.	If necessary.
	k. Copper tubing 1/2 inch ID (11)	Replace.	If necessary.
	l. Reducing tee (12)	Replace.	If necessary.
	m. Reducing elbow (13)	Replace.	If necessary.
	n. Elbow (14)	Replace.	If necessary.
	o. Tees (15)	Replace.	If necessary.
	p. Reducers (16)	Replace.	If necessary.
	q. Reducing tees (17)	Replace.	If necessary.
	r. Reducers (18)	Replace.	If necessary.
	s. Elbows (19)	Replace.	If necessary.
	t. Elbows (20)	Replace.	If necessary.
	u. Tee (21)	Replace.	If necessary.
	v. Adapter (22)	Replace.	If necessary.
	w. Drain cock (23)	Replace.	If necessary.
	x. Reducer (24)	Replace.	If necessary.
	y. Tee (25)	Replace.	If necessary.

4-59.1. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



4951-039

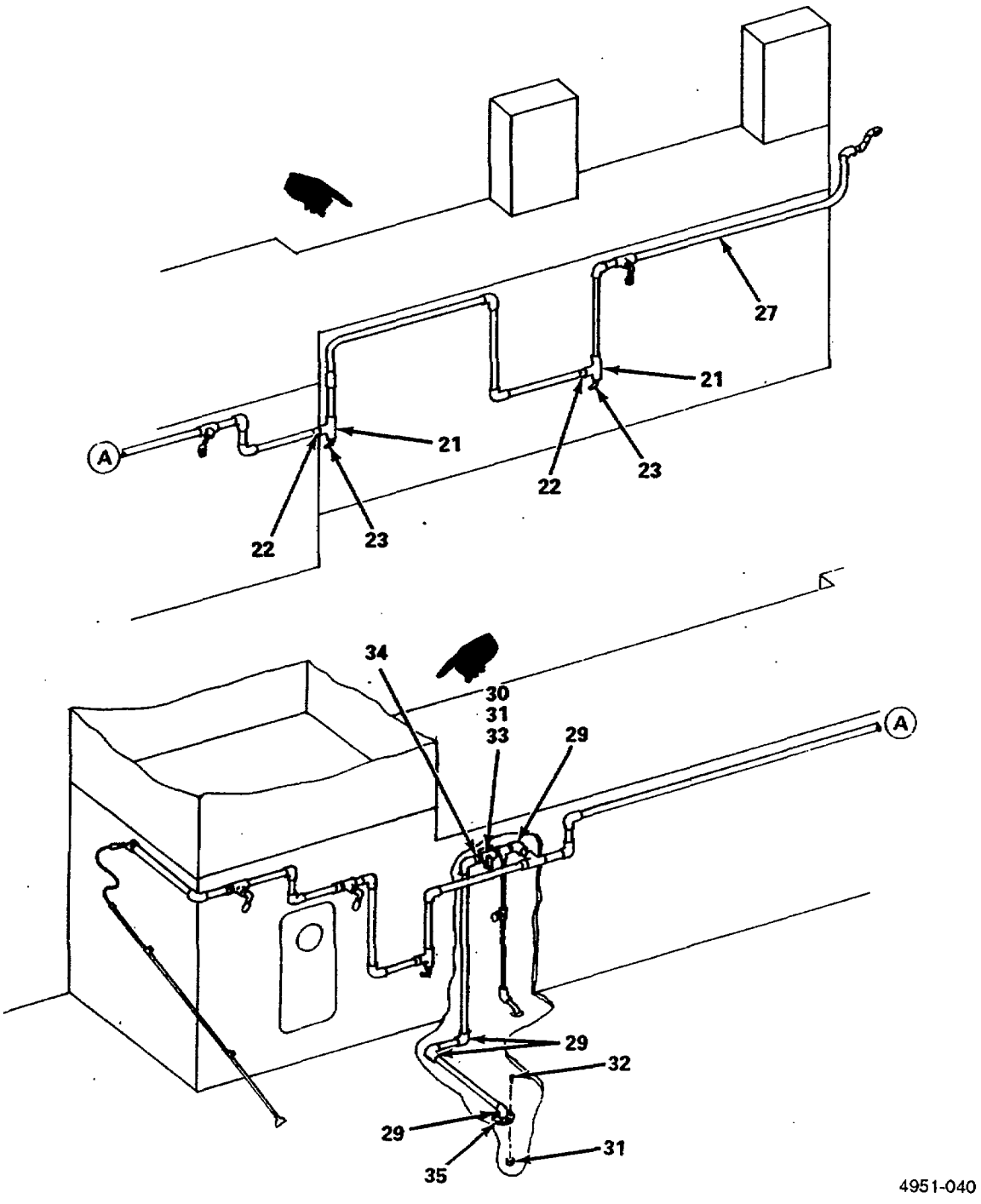
4-59.1. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	z. Copper tubing 1 inch ID (26)	Replace.	If necessary.
	aa. Copper tubing 1-1/4 inch ID (27)	Replace.	If necessary.
	ab. Copper tubing 1-1/2 inch ID (28)	Replace.	If necessary.
	ac. Elbows (29)	Replace.	If necessary.
	ad. Butterfly valve (30)	Replace.	If necessary.
	ae. Nuts (31)	Replace.	If necessary.
	af. Screws (32)	Replace.	If necessary.
	ag. Screws (33)	Replace.	If necessary.
	ah. Flanges (34)	Replace.	If necessary.
	ai. Gasket (35)	Replace.	If necessary.
	aj. Copper tubing 2 inch ID (36)	Replace.	If necessary.

4-59.1. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



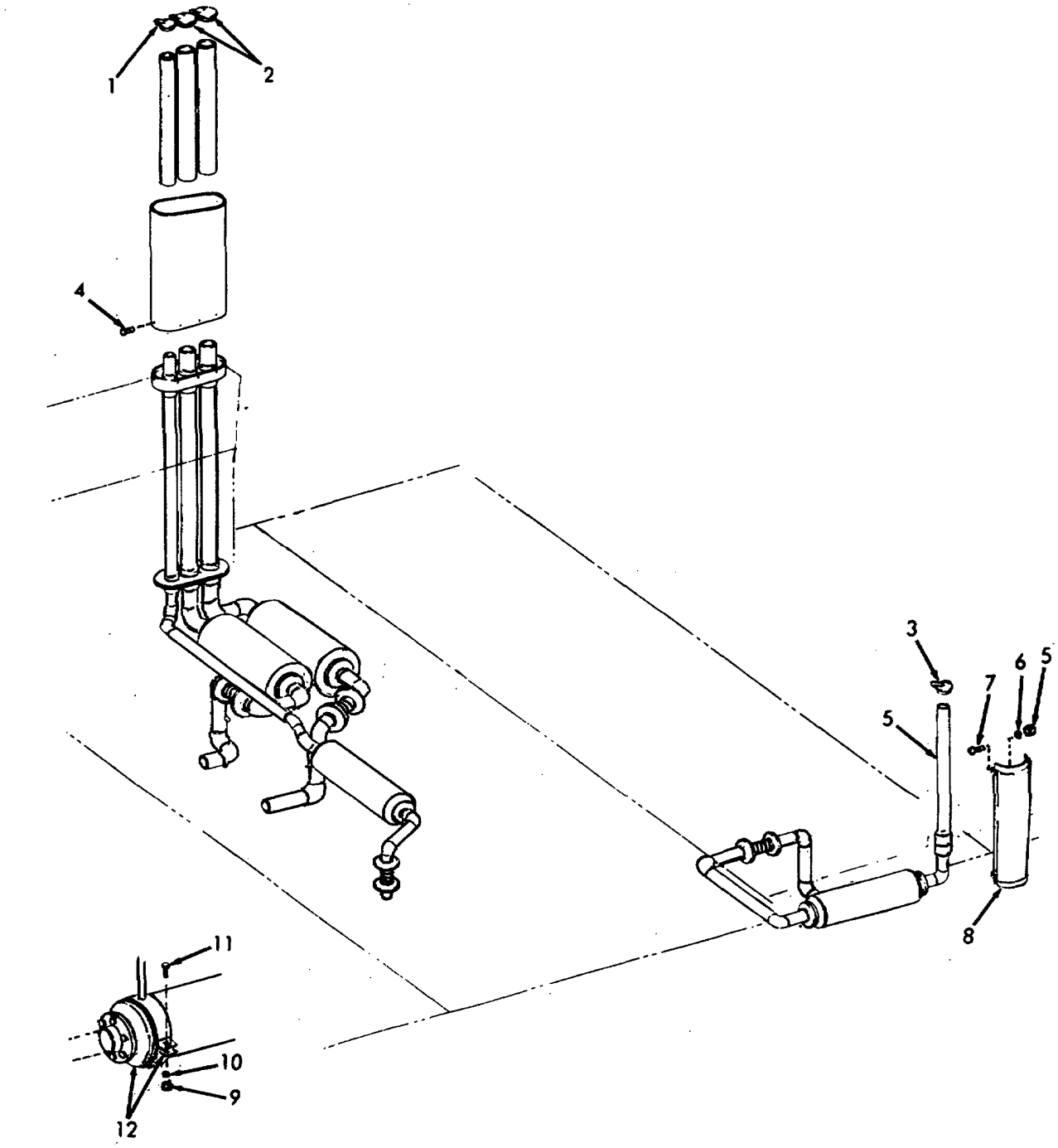
4-60. ENGINE EXHAUST PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Exhaust piping	a. Weather caps (1, 2, or 3)	Replace.	If necessary.
	b. Screws (4)	Replace.	If necessary.
3. Exhaust guard	a. Nuts (5), lockwashers (6), and screws (7)	Remove.	
	b. Exhaust guard (8)	Replace.	If necessary.
	c. Screws (7), lockwashers (6) and nuts (5)	Install.	
4. Hangers	a. Nuts (9), lockwashers (10), and screws (11)	Remove.	
	b. Hanger (12)	Support exhaust manifolds and replace.	
	c. Screws (11), lockwashers (10), and nuts (9)	Install.	

4-60. ENGINE EXHAUST PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

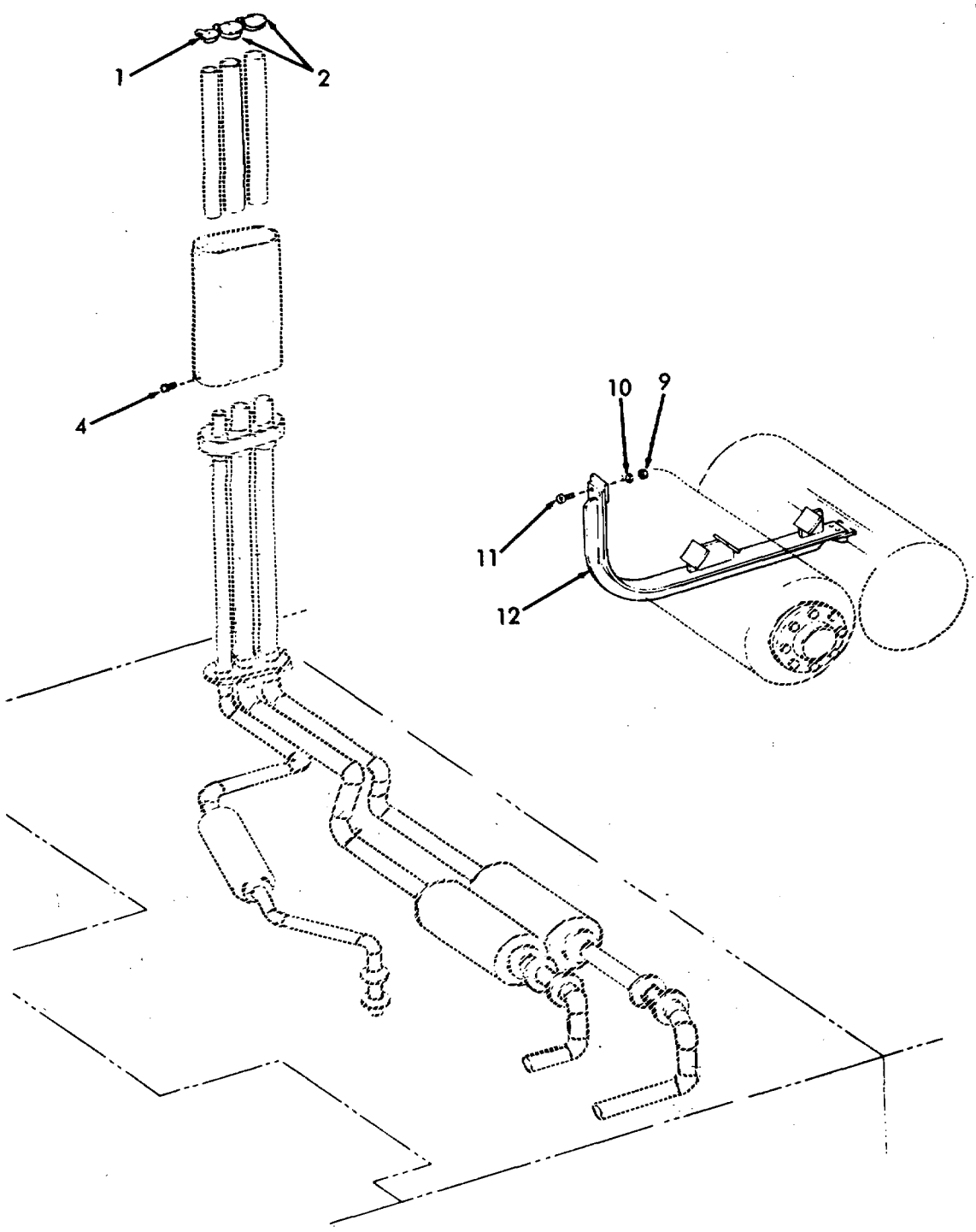
REPAIR (Cont)



4-60. ENGINE EXHAUST PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-61. OIL/WATER SEPARATOR PIPING SYSTEM - MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection **b. Replace** **c. Repair**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
TM 55-2090-201-14&P

Equipment
Condition Condition Description
NONE

Special Environmental Conditions
Do not drain oil into bilges. Collect oil and dispose of properly.

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
	NOTE Secure the Oil/Water Separator prior to working on the system.		
INSPECTION			
1. Piping	a. Tank	Inspect for leaks.	Refer to Direct Support Maintenance.
	b. Oil/Water Separator	Inspect.	Refer to TM 55-2090-201-14&P.
	c. Water gage	Inspect for breaks, cracks, and leaks.	
	d. Piping	Inspect for breaks, cracks, bends and leak.	Refer to Direct Support Maintenance.
	e. Flange	Inspect for leaking gasket.	

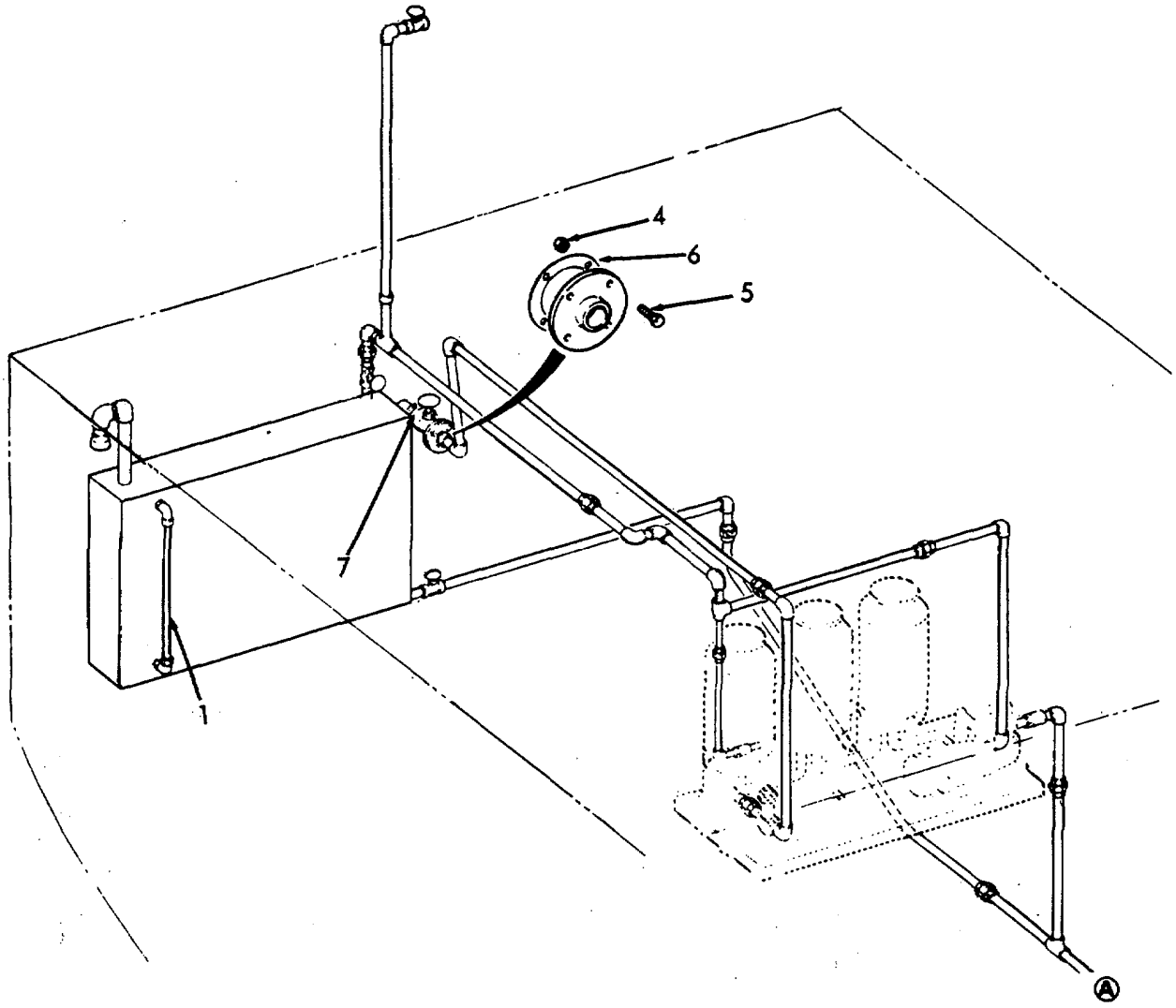
4-61. OIL/WATER SEPARATOR PIPING SYSTEM - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	f. Strainers	Inspect for damage, and fouling.	
	g. Hoses	Inspect for wear, breaks, and cracking.	
REPLACE			
1. Water gage	Gage (1)	Replace.	If necessary.
2. Hose	Hose (2)	Replace.	If necessary.
3. Strainers	Strainers (3)	Replace.	If necessary.
REPAIR			
4. Flange	a. Nuts (4) and screws (5)	Remove.	
	b. Gasket (6)	Replace.	
	c. Screws (5) and nuts (4)	Replace.	
	d. Screws (7)	Replace.	If necessary.

4-61. OIL/WATER SEPARATOR PIPING SYSTEM - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS

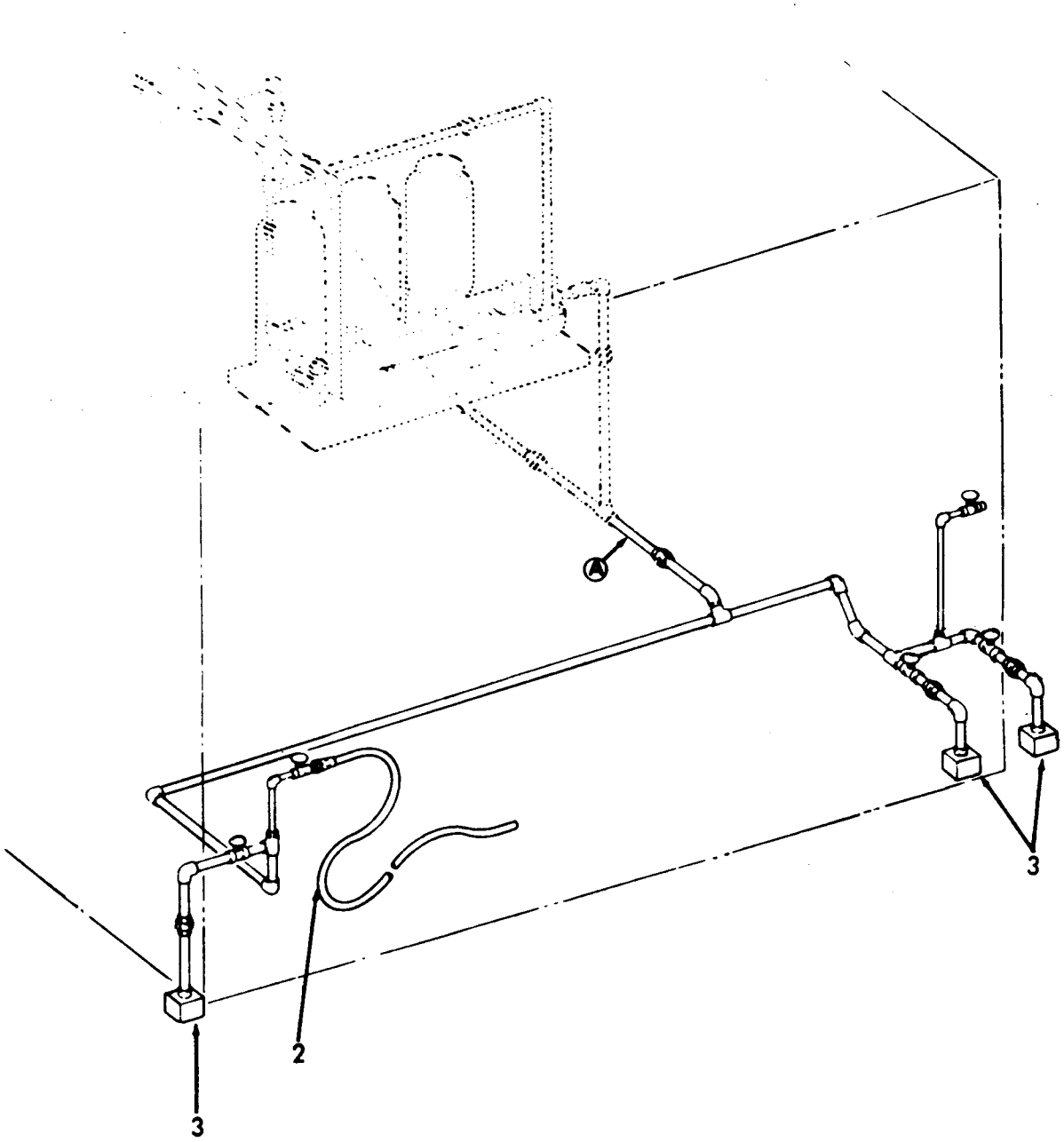
REPAIR (Cont)



4-61. OIL/WATER SEPARATOR PIPING SYSTEM - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-61.1 FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

This task covers:

a. Inspection
b. Service
c. Removal
d. Repair
e. Installation

INITIAL SETUP

Test Equipment

NONE

References

NONE

Special Tools

NONE

Equipment Condition Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

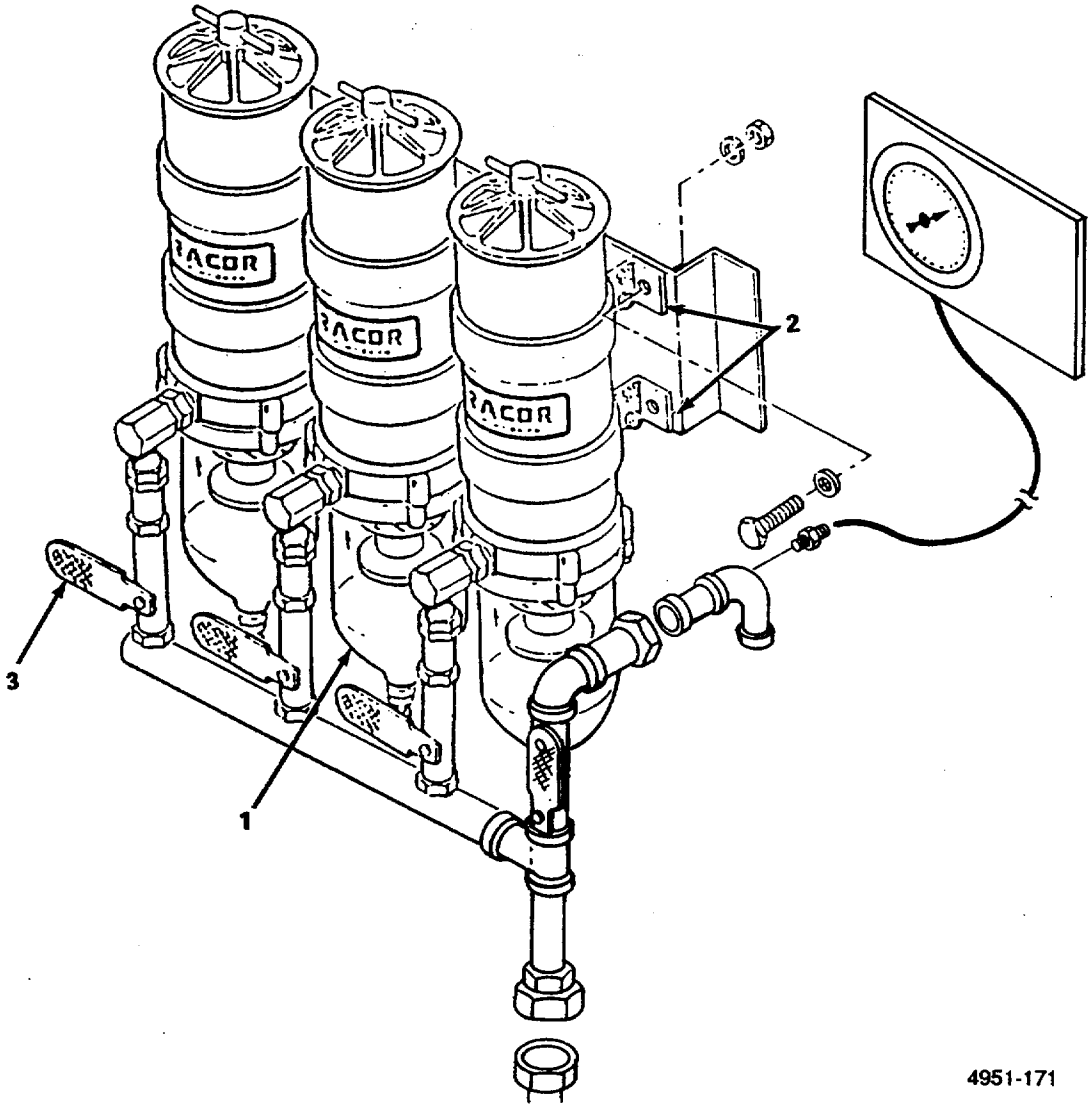
Observe CAUTION in procedure.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Filter/ separator assembly	a. Bowl (1)	1. Inspect for accumulation of filtered deposits.	
		2. Check for dents and cracks.	
	b. Bracket clamps (2)	Check for looseness. Tighten as required.	

4-61.1 FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS

INSPECTION (Cont)



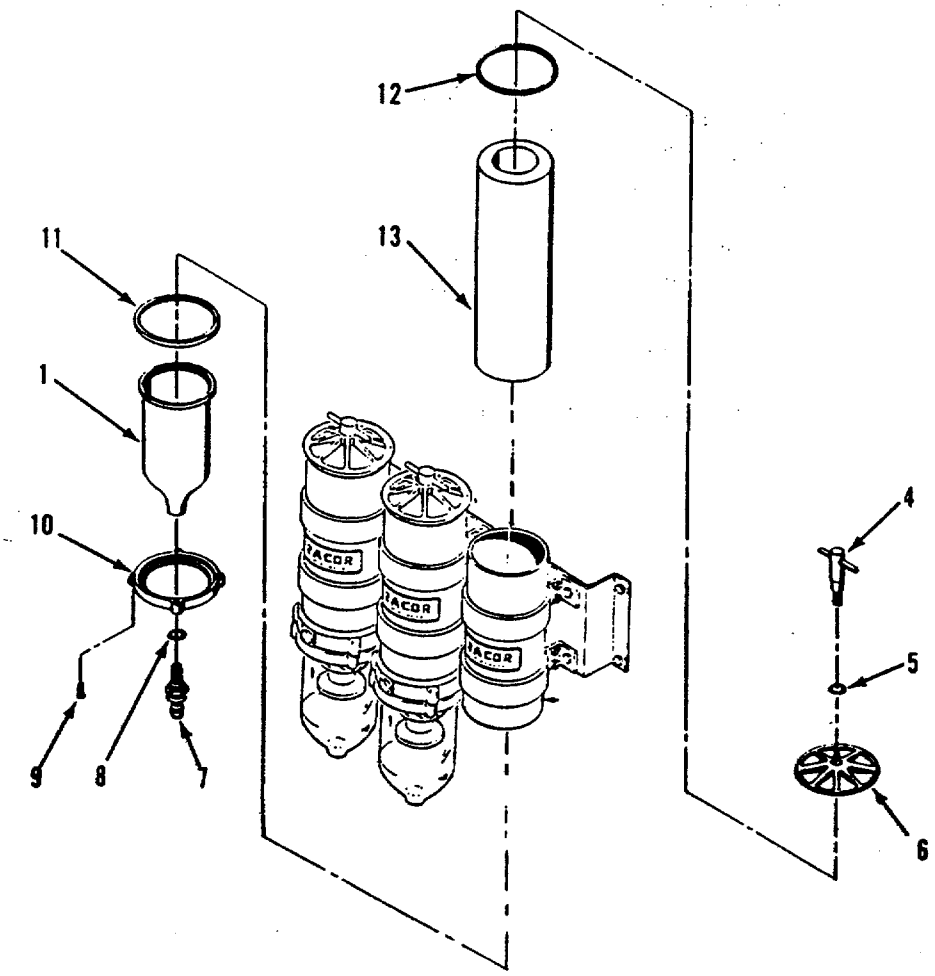
c.	Ball valve assembly (3)	Check for leaks.	

4-61.1 FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
SERVICE	**CAUTION**		
	Two units of the fuel filter/water separator must be in operation during main engine operation		
	NOTE		
	Single units of the fuel filter/water separator may be changed during engine operation		
	Vacuum Gage(4) is used to determine if adequate fuel pressure is available. Fuel Filter/Water Separator service is required when vacuum is greater than 10 inches Hg (Red Zone)		
2.	a. T-handle (4) 0-ring (5) and lid (6)	Remove	
	b. Drain valve (7)	Remove and drain unit completely. Flush unit with clean diesel fuel.	
	c. Bowl retainer screws (9) retaining ring (10), and bowl(1)	Remove.	If an excessive amount of contamination is present in bowl.
	d. Bowl gasket (11).	Remove	Discard old gasket and replace with new one.
	e. Bowl (1)	Clean	Use clean diesel fuel.
	f. Lid gasket (12) and element (13)	Remove and replace with new parts	Discard old parts.
	g. Bowl gasket (11)	Install	
	h. Retaining ring (10) and bowl retaining screws (9)	install	

4-61.1 FUEL FILTER;WATER SEPARATOR - MAINTENANCE INSTRUCTIONS.(Cont'd).

LOCATION	ITEM	ACTION	REMARKS
SERVICE (Cont'd)			
	i. Drain valve (7) and 0-ring (8).	Install.	Replace 0-ring if necessary.
	j. System	Prime by pouring clean diesel fuel into unit until full.	
	k. Lid (6), O-ring (5), and T-handle (4).	Install.	



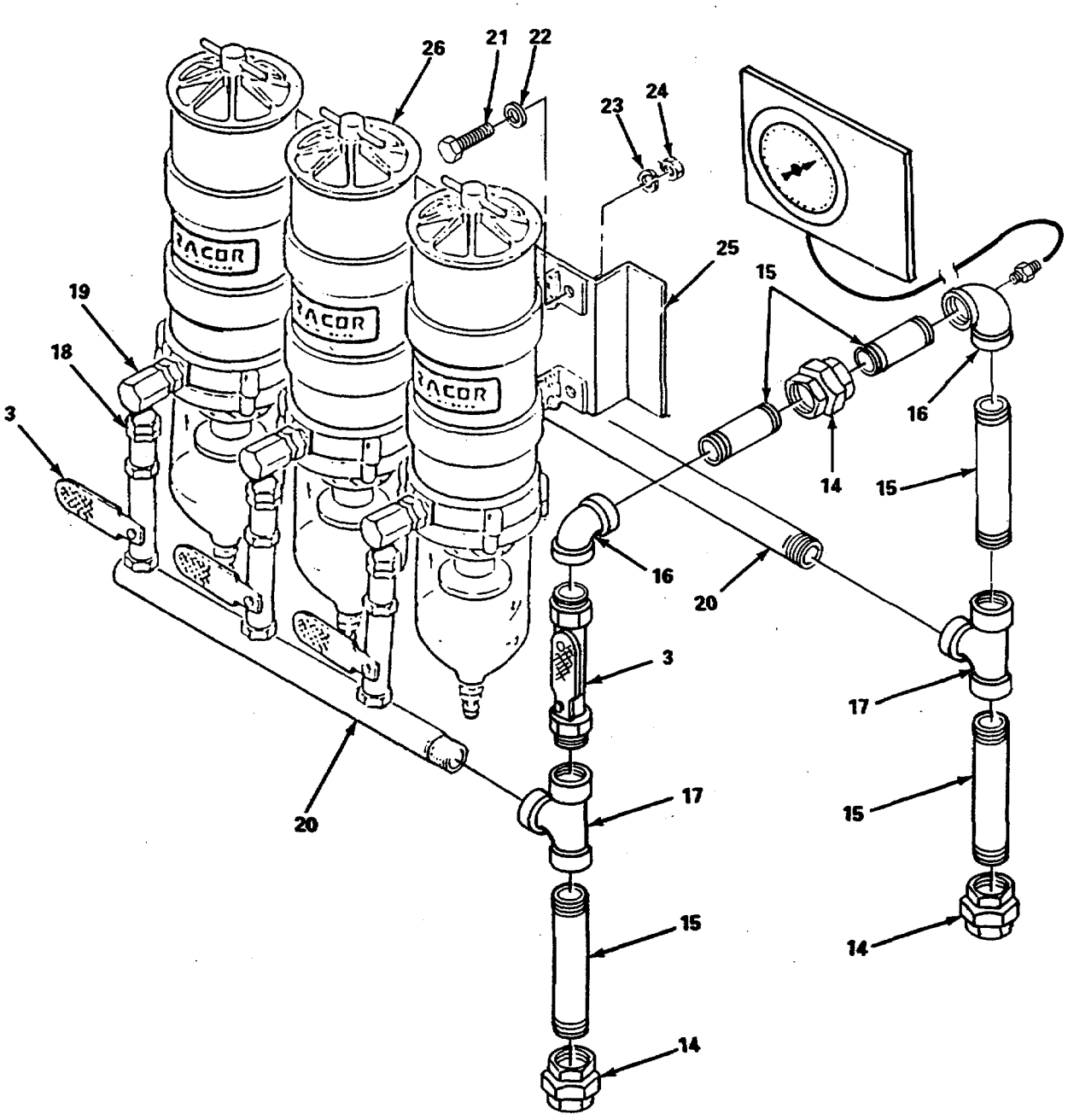
4-61.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
REMOVAL			
	NOTE Ensure that the propulsion unit is not in operation and the fuel supply valves are secured before removing the fuel filer/water separator.		
3.	a. Unions (14), pipe (15). elbows (16), tees (17), and ball valve (3).	Remove.	Use rags to clean fuel oil spill.
	b. Ball valve (3), straight fitting (18), elbow (19) and manifolds (20).	Remove.	
	c. Hex bolt (21), flat washer (22) lock washer (23) and hex nut (24).	Remove from double bracket (25).	
	d. Filter/Separator assembly (26).	Remove.	

4-61.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS

REMOVAL (cont'd)



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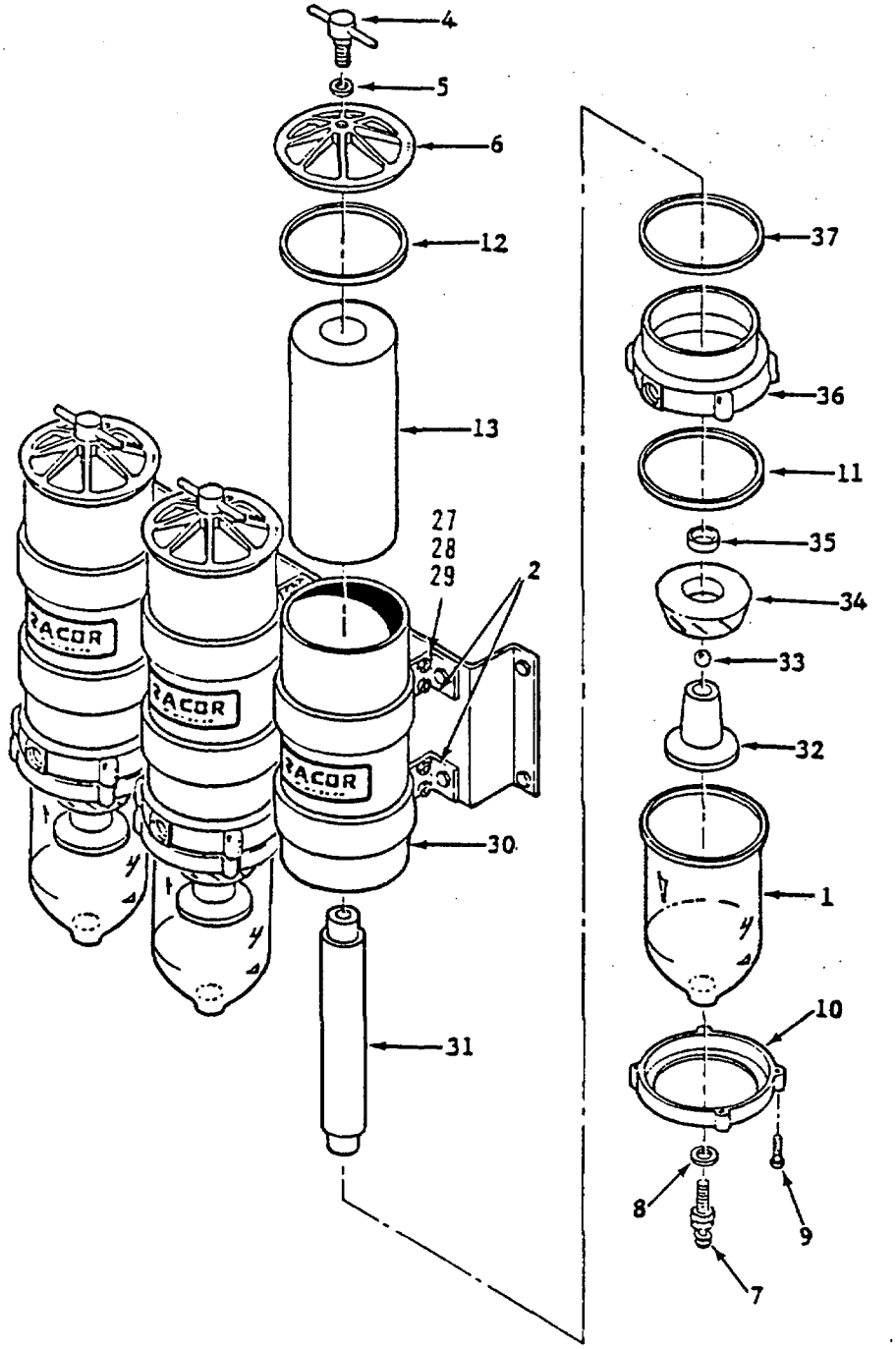
4-61.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
4.	a. Carriage bolt (27), lock nut (28) and flat washer (29).	Remove.	
	b. Bracket clamps (2).	Remove.	
	c. Drain valve (7) and 0-ring (8) Discard O-ring.	Remove.	Drain oil into suitable container.
	d. T-handle (4), 0-ring (5) and lid (6).	Remove	Inspect 0-ring and discard if worn.
	e. Lid gasket (12) and element (13). (30).	Remove from outer cylinder	Inspect gasket and element. Discard.
	f. Bowl retaining screws (9), bowl ring (10), bowl (1) and bowl gasket (11).	Remove.	Inspect bowl gasket and discard if worn.
	g. Return tube (31) turbine centrifuge (32), check ball (33), conical baffle (34) and check bal1 gasket (35).	Remove.	Inspect check ball gasket and discard if worn.
	h. Base (36) and gasket (37).	Remove.	Inspect gasket and discard if worn.

4-61.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont'd)



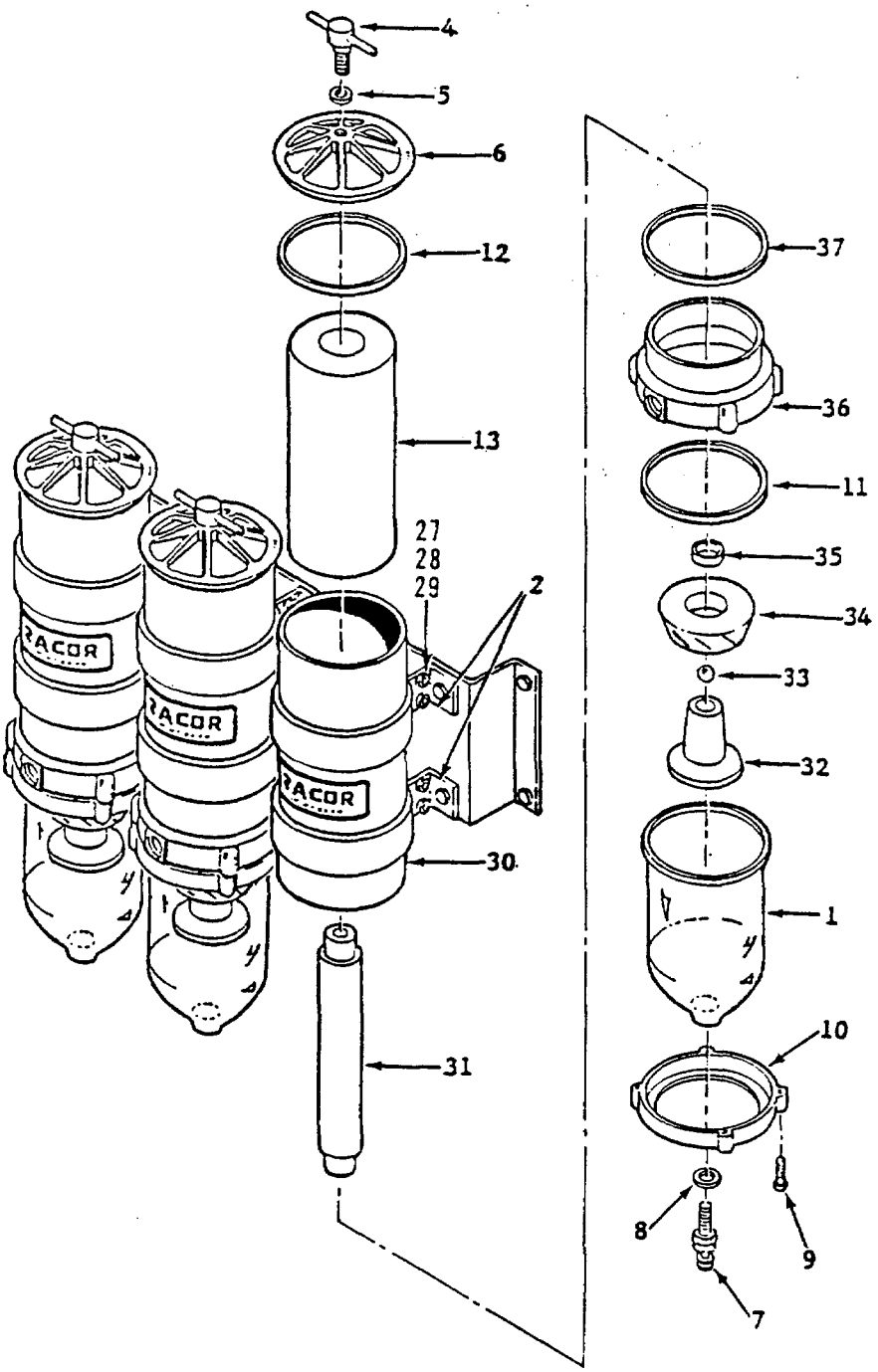
4-61.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont'd)			
	i. Base (36) and gasket (37).	Install.	Use new gasket if necessary.
	j. Return tube (31), turbine centrifuge (32), check bal1 (33), conical baffle (34), and check ball gasket (35).	Assemble and install.	Use new check ball gasket if necess-ary.
	k. Bowl gasket (11), bowl (1), bowl ring (10) and retaining screws (9).	Assemble and install.	Use new bowl gasket if necessary.
	l. Element (13) and lid gasket (12).	Install.	Use new lid gasket if necessary.
	m. Lid (6), O-ring (5) and T-handle (4).	Install.	Use new O-ring if necessary.
	n. O-ring (8) and drain valve (7).	Install.	Use new 0-ring.
	o. Bracket clamps (2).	Install.	
	p. Carriage bolt (27) lock nut (28) and flat washer (29).	Fasten.	

4-61.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont'd)



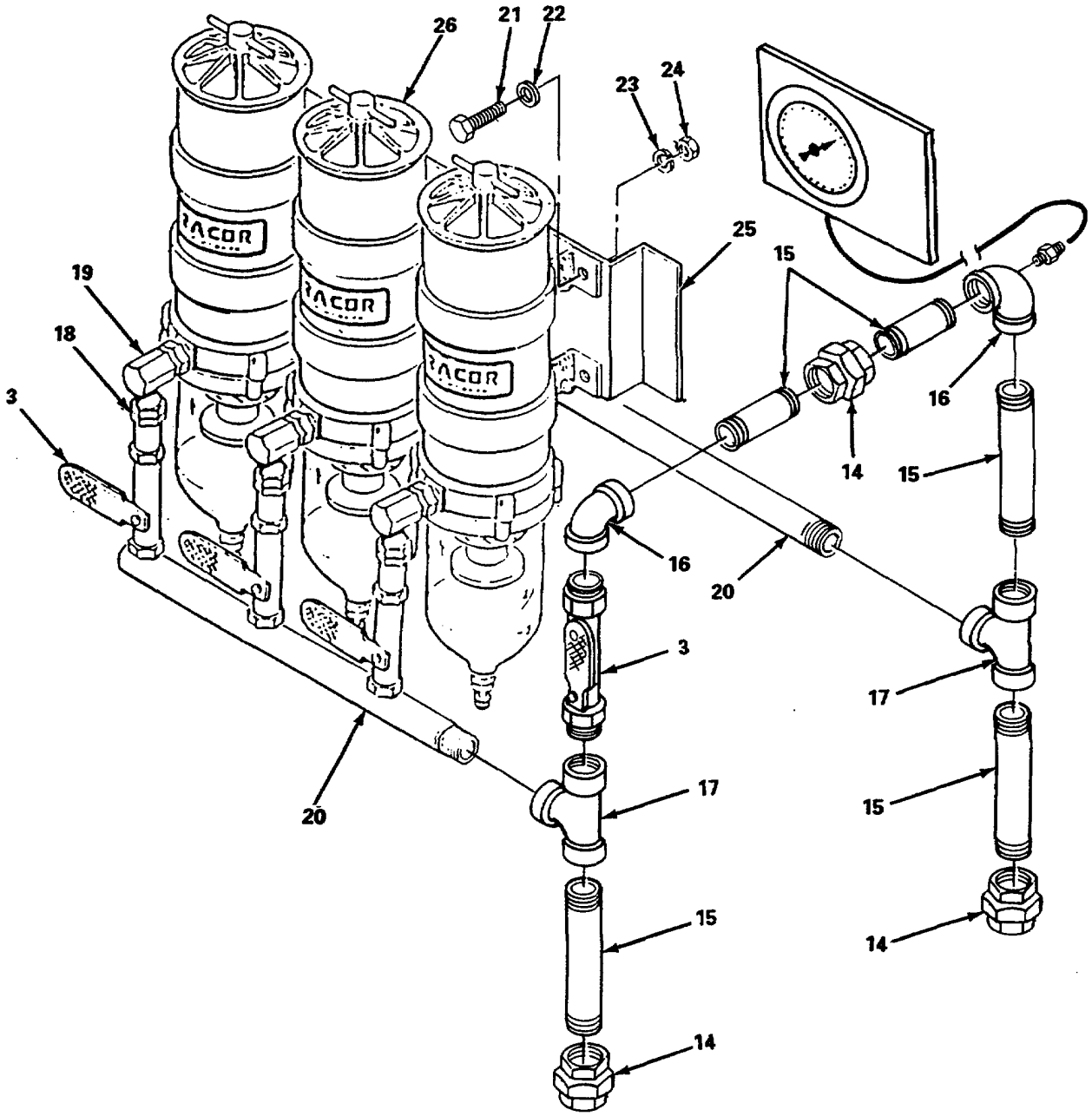
4-61.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
INSTALLATION			
5.	a. Filter/Separator assembly (26).	Install on double bracket (25).	
	b. Hex bolt (21), flat washer (22), lockwasher (23), and hex nut (24).	Install.	
	c. Elbow (19), straight fitting (18), ball valve (3) and manifolds (20).	Install.	
	d. Tees (17). Elbows (16). pipes (15). ball valve (3) and unions (14).	Install.	

4-61.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS

INSTALLATION (cont'd)



4951-173

4-61.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
3. Fresh water	a. Hose	Inspect for breaks, cracks, and leaks.	
	b. Vacuum breaker	1. Inspect for leaks.	
		2. Inspect for proper operation	
	c. Valves	Inspect for leaks.	
	d. Piping	Inspect for breaks, cracks, bends and leaks .	
4. Shaft seal Tank	a. Vacuum breaker	Inspect for leaks.	
	b. Valves	Inspect for leaks.	
	c. Piping	Inspect for breaks, cracks, bends, and leaks.	
REPAIR			
5. Lavetory, hose fitting, and washer/ dryer			
		NOTE	
	• Prior to performing repairs, shutdown the system.		
	• The following piping is 1.5 inch copper. Use appropriate soldering procedures.		
	a. Elbow reducing (1)	Replace.	If necessary.
	b. Elbows (2)	Replace.	If necessary.
	c. Hose valve (3)	Replace.	If necessary.
	d. Tubing (4)	Replace.	If necessary.

4-62. FRESH AND FLUSH WATER SYSTEM - MAINTENANCE INSTRUCTIONS. (Cont'd).

This task covers:
a. Inspection **b. Repair**

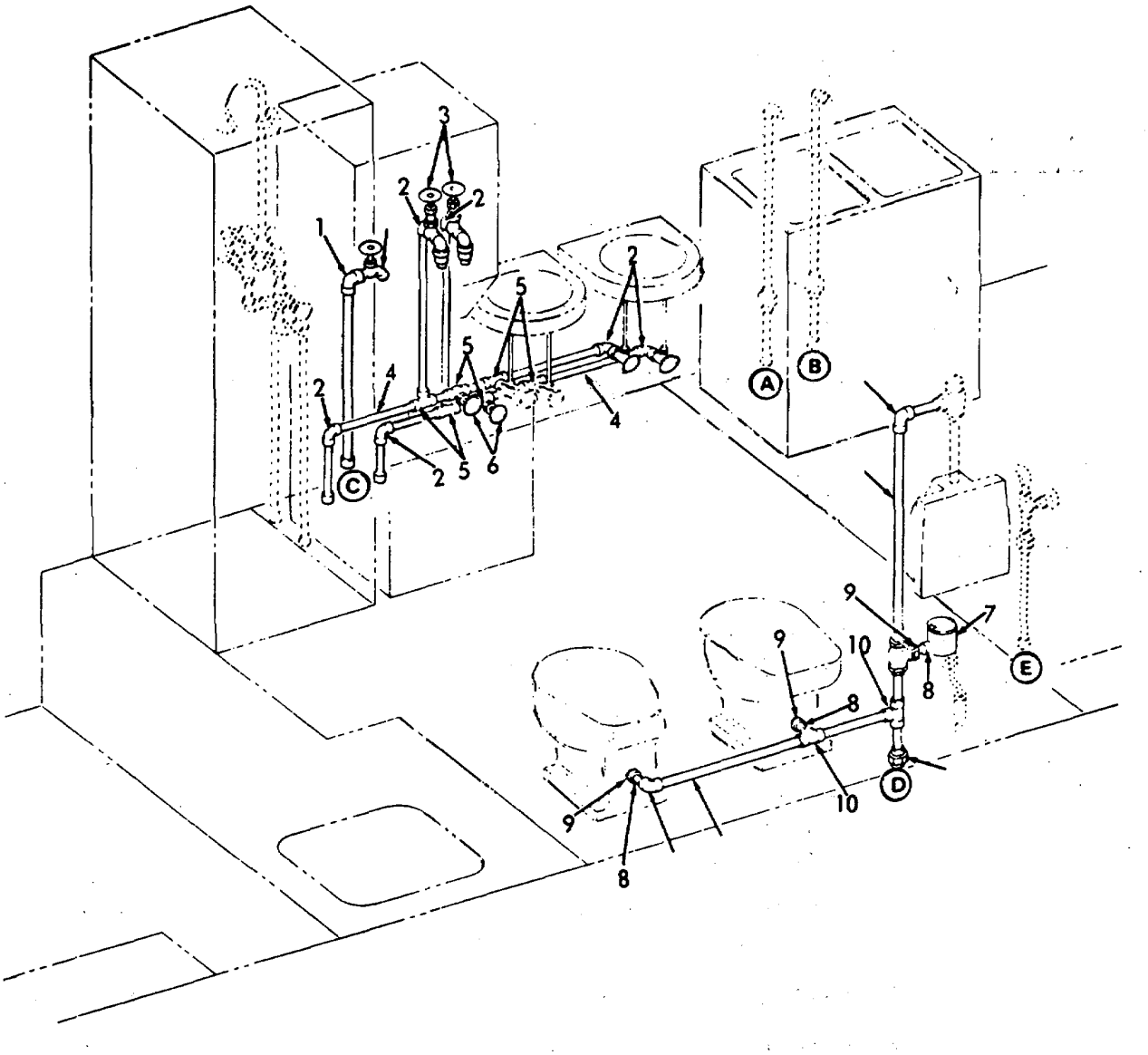
INITIAL SETUP:

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	e. Tee (bronze) (5)	Replace.	If necessary.
	f. Gate valve (6)	Replace.	If necessary.
6. Urinal and water closet	a. Solenoid valve (7)	Replace.	If necessary.
	b. Bronze adapter (8)	Replace.	If necessary.
	c. Brass nipple (9)	Replace.	If necessary.
	d. Bronze tee (10)	Replace.	If necessary.
	e. Gate valve (11)	Replace.	If necessary.
7. Fresh water	NOTE The following piping is 3/8 inch copper. Use appropriate soldering procedures.		
	a. Hose valve (12)	Replace.	If necessary.
	b. Anti-siphon vacuum breaker (13)	Replace.	If necessary.
	c. Bronze tee (14)	Replace.	If necessary.
	d. Tubing (15)	Replace.	If necessary.
	e. Bronze tee (16)	Replace.	If necessary.
	f. Globe valve (17)	Replace.	If necessary.

4-62. FRESH AND FLUSH WATER SYSTEM - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS

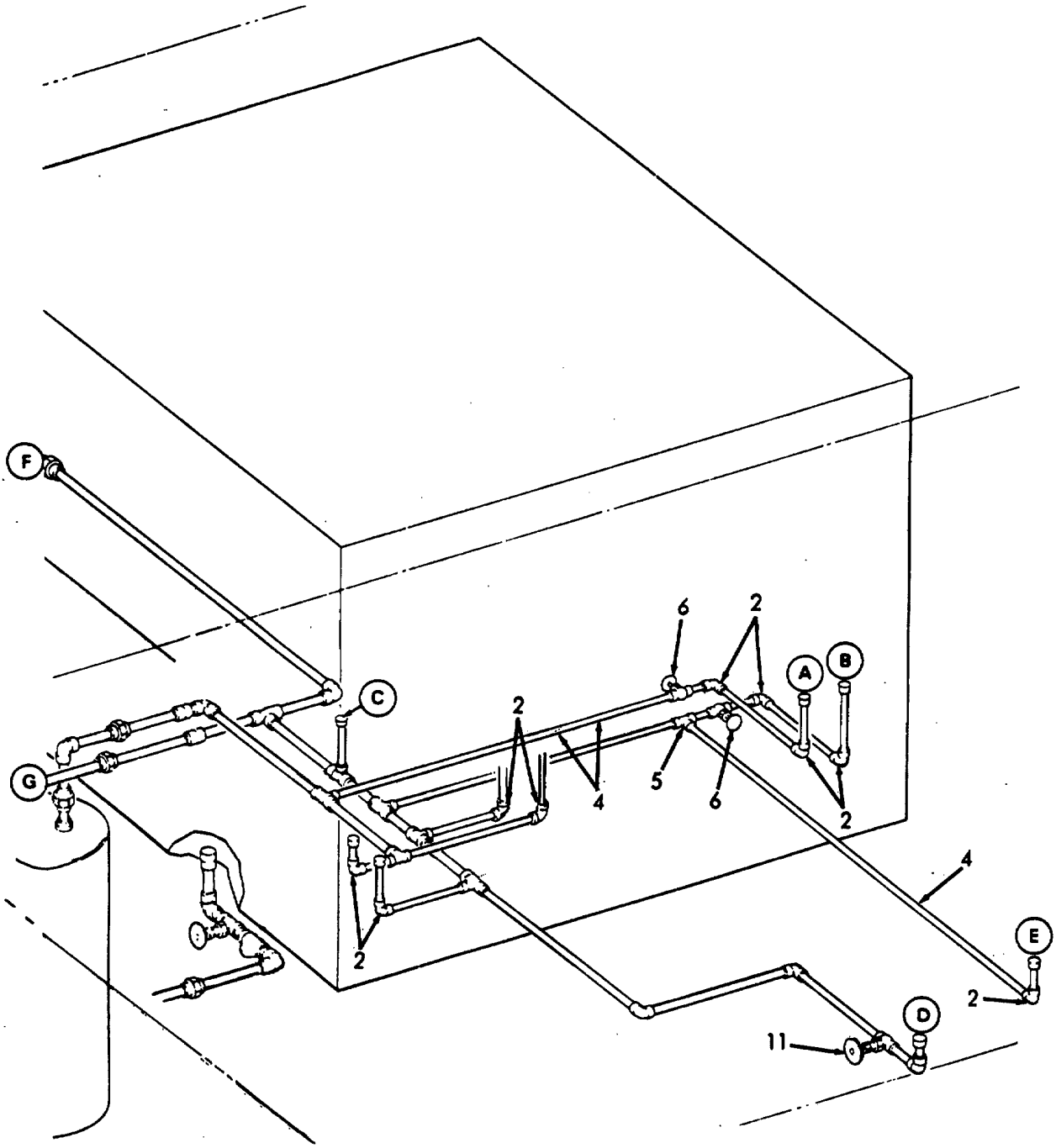
REPLACE (Cont)



4-62. FRESH AND FLUSH WATER SYSTEM - MAINTENANCE INSTRUCTIONS.(Cont'd).

LOCATION	ITEM	ACTION	REMARKS

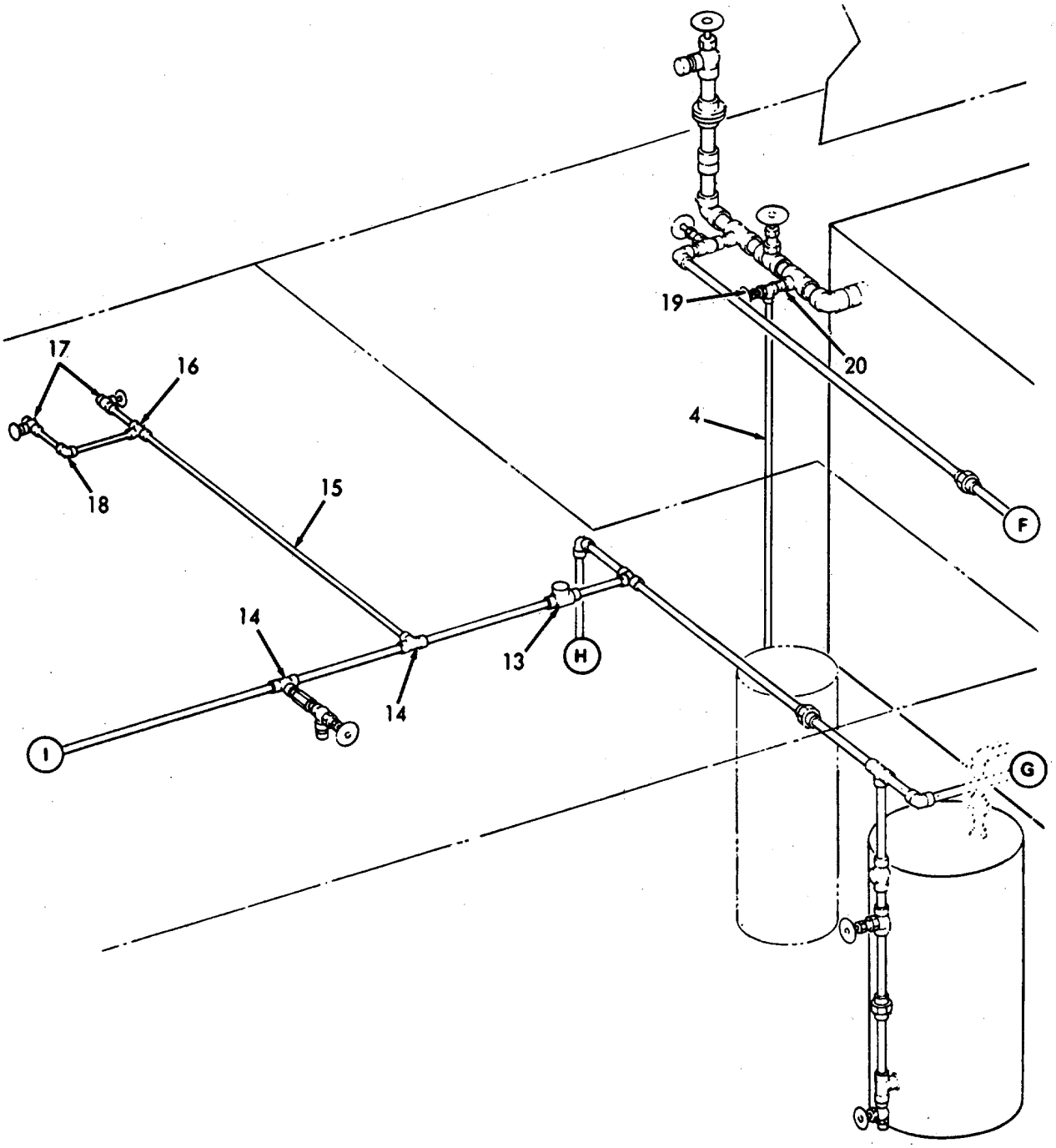
REPLACE (Cont)



4-62. FRESH AND FLUSH WATER SYSTEM - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



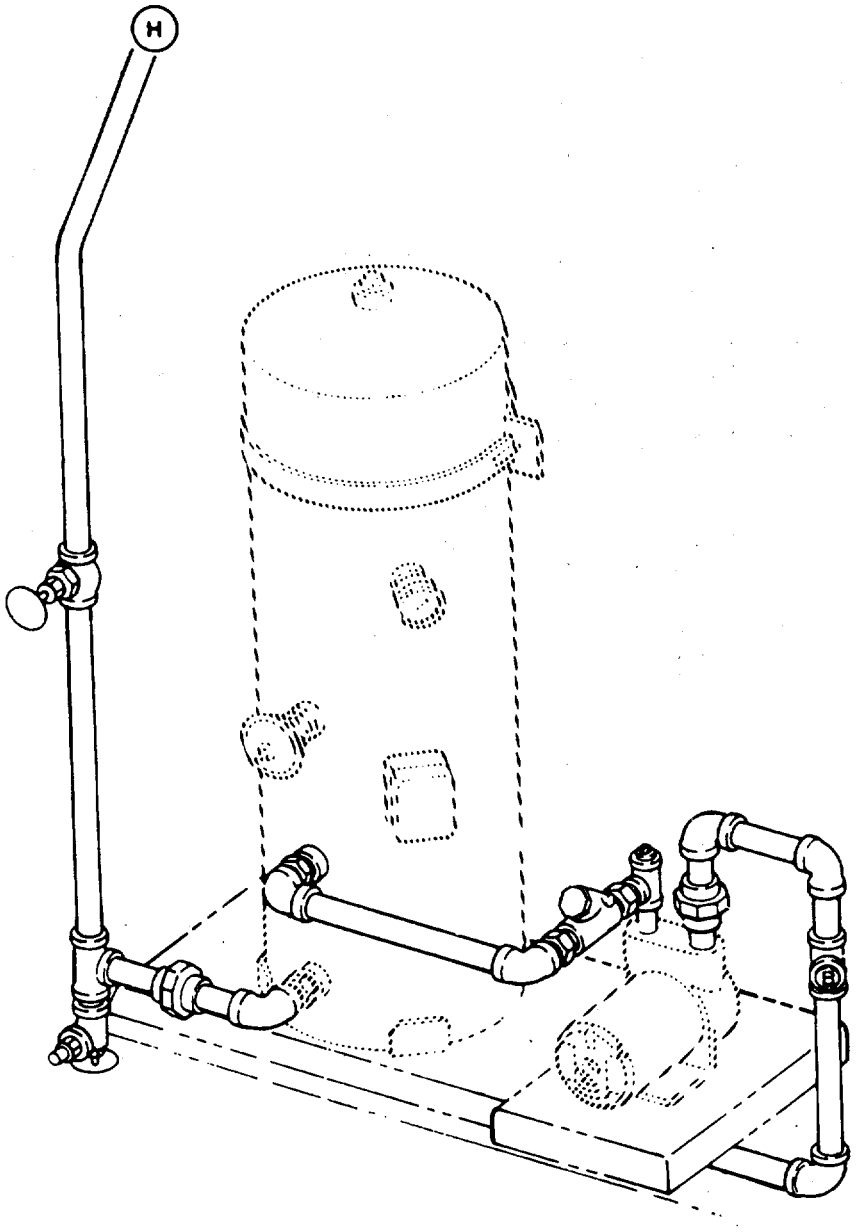
4-62. FRESH AND FLUSH WATER SYSTEM - MAINTENANCE INSTRUCTIONS. (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	i. Bronze reducer (20)	Replace.	If necessary.
8. Fresh Water	a. Bronze coupler (21)	Replace.	If necessary.
	b. Bronze tee (22)	Replace.	If necessary.
9. Shaft seal Tand	a. Brass pipe (23)	Replace.	If necessary.
	b. Bronze tee (24)	Replace.	If necessary.
	c. Gate valve (25)	Replace.	If necessary.
	d. Vacuum breaker (26)	Replace.	If necessary.
	e. Bronze tee (27)	Replace.	If necessary.

4-62. FRESH AND FLUSH WATER SYSTEM-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)

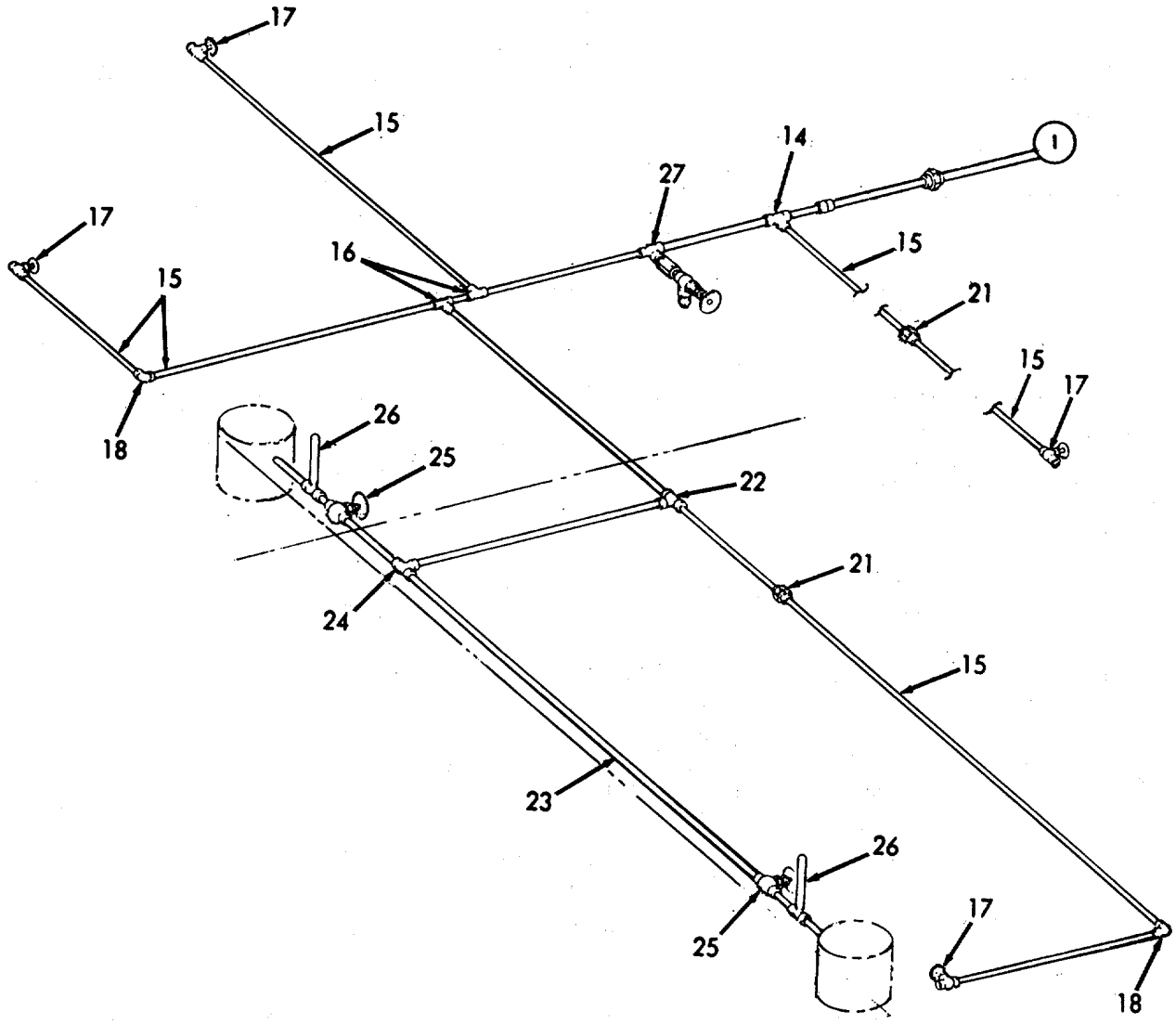


4-1323

4-62. FRESH AND FLUSH WATER SYSTEM-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



4-1324

4-63. DECK FITTINGS-DIESEL OIL SHUTOFF-MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

NONE

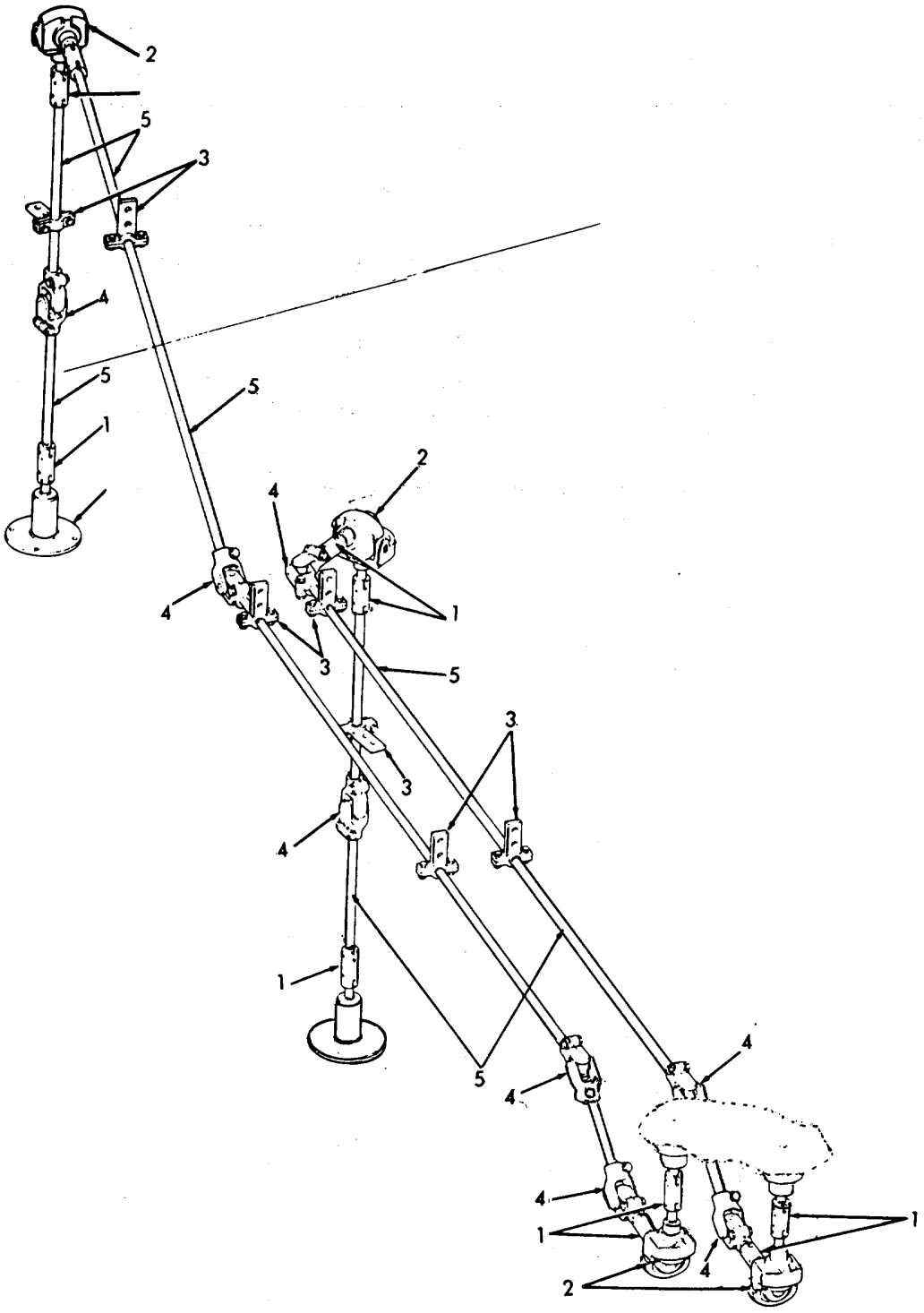
LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Stowage tank	Return piping elbow	Inspect for break, cracks, and leaks.	
2. Reach rods	a. Couplings	Insure all hardware is tight.	
	b. Gear assembly	Insure all hardware is tight.	
	c. Hanger rod	Insure all hardware is tight.	
	d. Joint tanker	Insure all hardware is tight.	
	e. Rods	Inspect for bends.	

4-63. DECK FITTINGS-DIESEL OIL SHUTOFF-MAINTENANCE INSTRUCTIONS. (Continued).

REPAIR

1. Reach rods	a.	Couplings (1)	Repair or replace.	If necessary.
	b.	Gear assembly (2)	Repair or replace.	If necessary.
	c.	Hanger rod (3)	Repair or replace.	If necessary.
	d.	Joint tanker (4)	Repair or replace.	If necessary.
	e.	Rods (5)	Repair or replace.	If necessary.

4-63. DECK FITTINGS-DIESEL OIL SHUTOFF-MAINTENANCE INSTRUCTIONS. (Continued).



4-64. TANKS AND VOIDS-MAINTENANCE INSTRUCTIONS.

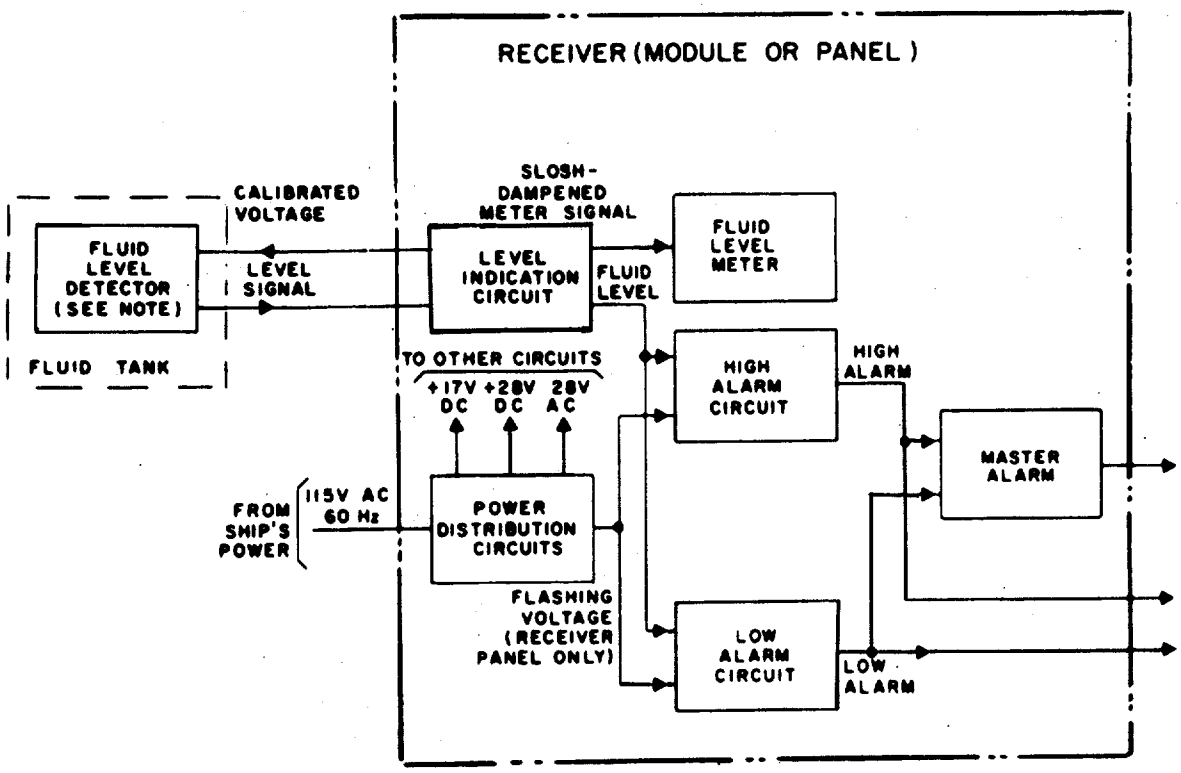
a. Purpose of Equipment.

(1) Tank level indicator (TLI) systems provide a means of deter-mining the levels of fluids stored in shipboard fluid tanks. The level of fluid is indicated on meters contained in system components distributed throughout the ship. Meter deflection is continuous.-

(2) Electrical signals representing the fluid level that has been detected can also be examined to determine whether the fluid level lies within predetermined values in the associated tanks. If the fluid level falls below or rises above these predetermined values, audible, visual and/or electrical signal alarm indications provided at TLI system are components and at other shipboard locations.

b. Overall Block Diagram-Functional Operation.

(1) A level indication circuit housed within a receiver module or receiver panel develops a calibrated voltage that is fed over ship's wiring to connect to a fluid level detector in the tank. The fluid level detector is comprised of one transmitter. The type of transmitter comprising the fluid level detector is determined by the size of the tank and the type of fluid level indication that is desired.



4-64. TANKS AND VOIDS-MAINTENANCE INSTRUCTIONS.

(2) The arrangement of transmitters within the tank provides the generation of a level signal, the voltage amplitude of which is proportional to the level of the fluid being measured. The level signal is connected to the level indication circuit in the receiver. The level indication circuit processes the level signal to compensate the signal for amplitude variations that result from the sloshing of the fluid level in the tank, rather than from changes in the actual level. A slosh-dampened meter signal that results from this processing is applied to a fluid level meter on the receiver.

(3) Each alarm circuit, whether high or low, compares the amplitude of the fluid level signal with the amplitude of a preselected, adjustable internally generated threshold signal. The threshold signal establishes the value above which a high alarm circuit establishes an alarm condition or below which a low alarm circuit establishes an alarm condition. Establishing an alarm condition develops an applicable high or. low alarm signal. The high and low alarm signal energize a lamp on the receiver panel.

(4) The voltages used for the operation of the circuits described above are generated in power distribution circuits. The power distribution circuits produce a-c and d-c potentials by-processing 115-volt, 60 Herz (Hz) ac ship's power.

c. The following is a list of maintenance procedures.

DESCRIPTION	PARAGRAPH
Tank Level Indication Receiver	4-64.1
Transmitter	4-64.2
Cable Assembly	4-64.3
Penetration Assembly	4-64.4

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS.

a. General.

(1) Receivers convert the electrical signals generated by the fluid level detection devices (transmitters) to deflections on meters calibrated in gallons.

(2) The receiver also examines electrical signal levels to develop an alarm condition if the fluid level in the tank rises above or falls below preselected levels. The alarm provides both audible and visual indications.

b. Detailed Block Diagram.

(1) Receiver Panel. (See Foldout 2.)

(a) The stages that perform the level indication, alarm detection, and alarm indication functions for a given tank when using a receiver panel are shown below. A potential of +17 volts dc is applied through calibration network RP1-R1 contained on a receiver panel control module that is associated with the tank whose contents--are to be indicated. The calibration network contains Calibrate potentiometer RP1 which is adjusted for full-scale deflection of fluid level meter M, the meter on the receiver panel that is associated with the control module. The adjustment of this potentiometer produces a calibrate voltage that is dropped across the fluid level detection device(s).

(b) A portion of the calibrate voltage applied across the full fluid level detection device(s) appears as a level signal at the out-put of the device(s). The portion of the calibrate voltage (and, therefore, the amplitude of the level signal) is determined by the height of the fluid level in the tank. The level signal is applied through normally closed contacts of calibrate switch S1 on the same control module to slosh dampening network R2-R3-C1. The slosh dampening network intergrates the signal to produce a slosh dampened meter signal. As a result of the intergrating action, the effect of the sloshing of fluid in the tank is minimized.

(c) The slosh dampened meter signal is applied to fluid level meter M(1) directly via a jumper connected between terminals 4 and 5 on the terminal board associated with the meter. The signal produces deflection on the meter that is proportional to the height of the fluid level in the tank. The meter is calibrated to provide the desired indication.

(d) The fluid level signal that determines the magnitude of meter deflection is also applied to alarm circuits in the control module (one high-level alarm circuit and one low-level alarm circuit). The high-level alarm circuit is in an alarm circuit position on the control module: the low-level alarm circuit in an alarm circuit position .

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

(e) Blocking diode CR1 in the high alarm circuit applies the fluid level signal to gate bias network R5-CRZ1. Filter C2-R4 shunts high frequency amplitude changes in the signal to ground in order to prevent the alarm circuit from responding to changes caused by transient signals. Under normal (no alarm) conditions, gate bias network R5-CRZ1 combines with threshold bias network RP2-R6-R7 to maintain threshold detector Q1 in a cutoff state. Threshold select potentiometer RP2 in threshold bias network RP2-R6-R7 is adjusted to cause threshold detector Q1 to conduct only when the input to gate bias network R5-CRZ1 exceeds a value that corresponds to an alarm condition.

(f) When threshold detector Q1 does conduct (there is an excessively high fluid level in the tank), switch Q2 is turned on. With switch Q2 turned on, a current path is completed for relay driver Q3-Q4 that energized relay K1. Protective diode CR9, connected across the coil or relay K1, provides reverse EMF suppression and protects relay driver Q3-Q4 transistors from reverse current flow.

(g) When relay K1 is energized, one set of transfer contacts connect the +17 volt dc supply to changing network Rll-R12-R13-C3. Changing network Rll-R12-R13-C3 develops a positive going high alarm pulse when the +17 volt dc level rises at its input. Blocking diode CR6 steers the high alarm pulse to relay driver Q1-CR5 on the power supply and master alarm module PS( ). The PS1 module is associated with the operation of control modules CM1 to CM7. Receipt of the high alarm pulse by relay driver S1-CR5 on the power supply and master alarm module causes the relay driver to energize relays K1 and K2 on that module.

(h) When relay K1 on the power supply and master alarm module is energized, the A contact set closes. Closing of these contacts completes a holding path that maintains relays K1 and K2 in the energized state after the high alarm pulse delays. The B contacts of relay K1 connect the flashing voltage developed by the power distribution circuits containing the flashing option to the normally open B contact of relay K1 in the control module. With relay K1 in the control module energized, the flashing voltage is connected to HIGH LEVEL lamp L( )-A on the receiver panel. The HIGH ALARM lamp on the receiver panel flash on and off in response to this input.

(i) At the same time that the contacts of relay K1 in the power supply and master alarm module enable the flashing of the alarm lamps, one set of contacts of energized relay K2 on that module connect a ground that sounds an audible alarm on the receiver panel.

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

(j) If an ALARM SILENCE switch on the receiver panel is pressed, the holding path for relays K1 and K2 on power supply and master alarm modules PS( ) is interrupted. Relays K1 and K2 are thereby deenergized. The B contact set of relay K1 then returns to its normally closed position, switching a steady-state +28 volt dc level in place of the flashing voltage. As a result, the flashing of the alarm lamps now switches to a steadily lighted condition. At the same time, the A and B contact sets of relay K2 transfer and open the current paths for the audible alarm on the receiver panel and open the alarm contact closure for the remote alarm. The high alarm lamps remain in the steadily lighted state until the condition that caused the alarm is removed. When the alarm condition is removed, switch Q2 on the control module returns to the off state and relay K1 on the control module is deenergized, open-circuiting the alarm lamps.

(k) The circuit configuration of the low alarm circuit, connected in the alarm circuit position is essentially identical to the high alarm circuit with the exception of the arrangement of jumpers on the control module. In a low-alarm circuit configuration, gate bias network R15-CRZ2 and threshold bias network RP3-R16-R17 function as do their counterparts in the high-alarm circuit; thus threshold detector Q5 turns switch Q6 on causing relay driver Q7-Q8 to energize relay K2, when the fluid level signal exceeds a level selected by the setting of Threshold Select potentiometer RP3. However, in the low alarm circuit, the exceeding of the threshold level indicates a normal (not alarm) state. As a result, the fact that relay K2 is energized represents a normal condition.

(l) If the fluid level in the tank drops below the height set by the adjustment of Threshold Select potentiometer RP3 in the threshold bias network RP3-R16-R17, threshold detector Q5 turns switch Q6 off, interrupting the current path for relay driver Q7-Q8, and deenergizing relay K2. When relay K2 is deenergized, the jumper arrangement at the contacts of the relay causes the production of the low alarm pulse by differentiator R21-R22-R23-C5. The low alarm pulse then duplicates the effects of the high alarm pulse with the exception that the LOW ALARM lamp, rather that the HIGH ALARM lamp, flashes.

(m) If CALIBRATE switch S1, a pushbutton on the control module is pressed, the full calibrate voltage at the output of calibration network RP1-R1 on the control module is substituted for the output of the fluid detection device(s) on the level signal line. Calibrate potentiometer RP1 in calibration network RP1-R1 is then adjusted to produce full-scale deflection on fluid level meter M( ) as indicated above. A FLOAT SIMULATOR potentiometer is provided on each receiver panel for checking the operation of the receiver panel circuits and for performing adjustments of the threshold selector potentiometers in control module alarm circuits. This potentiometer is connected to the

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

terminal board associated with a given control module in place of the connections that are normally made to the fluid level detector (transmitter and/or level links). Adjustment of the FLOAT SIMULATOR there-after can be accomplished to develop signals that simulate the different values possible for level signals.

(2) Receiver Power.

(a) The distribution of ac and dc power in a typical receiver panel is shown below. Ship's 115 volt, 60 Hz ac power is applied through FUSE, 2 AMP fuse F1 to ON-OFF switch S1. When the switch is placed in the ON position, the ac input is connected across POWER lamp DS1 and to the primary of transformers T1.

(b) The ac voltage at the secondary of transformer T1 is applied to full-wave bridge rectifier CR1 thru CR4 on power supply and master alarm module PS-1. The rectified output of the bridge rectifier is limited by resistor R1 located on the module and filtered by capacitor C1 mounted on the frame of the receiver panel. The filtered voltage is fed to voltage regulator microcircuit chip V1 to develop a regulated +17 volt dc output. Capacitor C1 on power supply and master alarm module PS-1 provides additional filtering for the supply.

(c) The ac voltage-at the secondary of transformer T2 is jumpered as shown.

c. Detailed Circuit Description.

(1) Refer to Foldout 3 for the overall schematic.

(2) Power Supply and Master Alarm Modules PS1.

(a) One power supply and master alarm modules are supplied with a receiver panel. As shown below, the: module is comprised of two circuits, a power supply and master alarm circuit. The operation of the power supply circuit elements is described in paragraph 4-64.lb(2). The operation of the master alarm circuit is as follows:

(b) Alarm signals are applied at pin 7 of the module for application through diode CR1 across resistor R1 to the base of relay driver transistor Q1. The presence of the alarm signal, which is a positive-going pulse produces conduction in transistor Q1. When transistor Q1 conducts, it provides a current path from a return line at pin 8 of the module through the coils of relays K1 and K2 to the positive power supply voltage at pin 12. Current flowing over this path energizes the two relays. When the A contacts of relay K1 close in response to the energizing of the relay, a bypass is provided around transistor Q1. This bypass serves as a holding path for the relay

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

coil after the delay of the alarm signal pulse. Diode CR6 connected across the relay coils protects transistor Q1 from voltages generated by the reverse current flow produced when the electromagnetic field of the relays collapses.

(3) High and Low Alarm Control Modules.

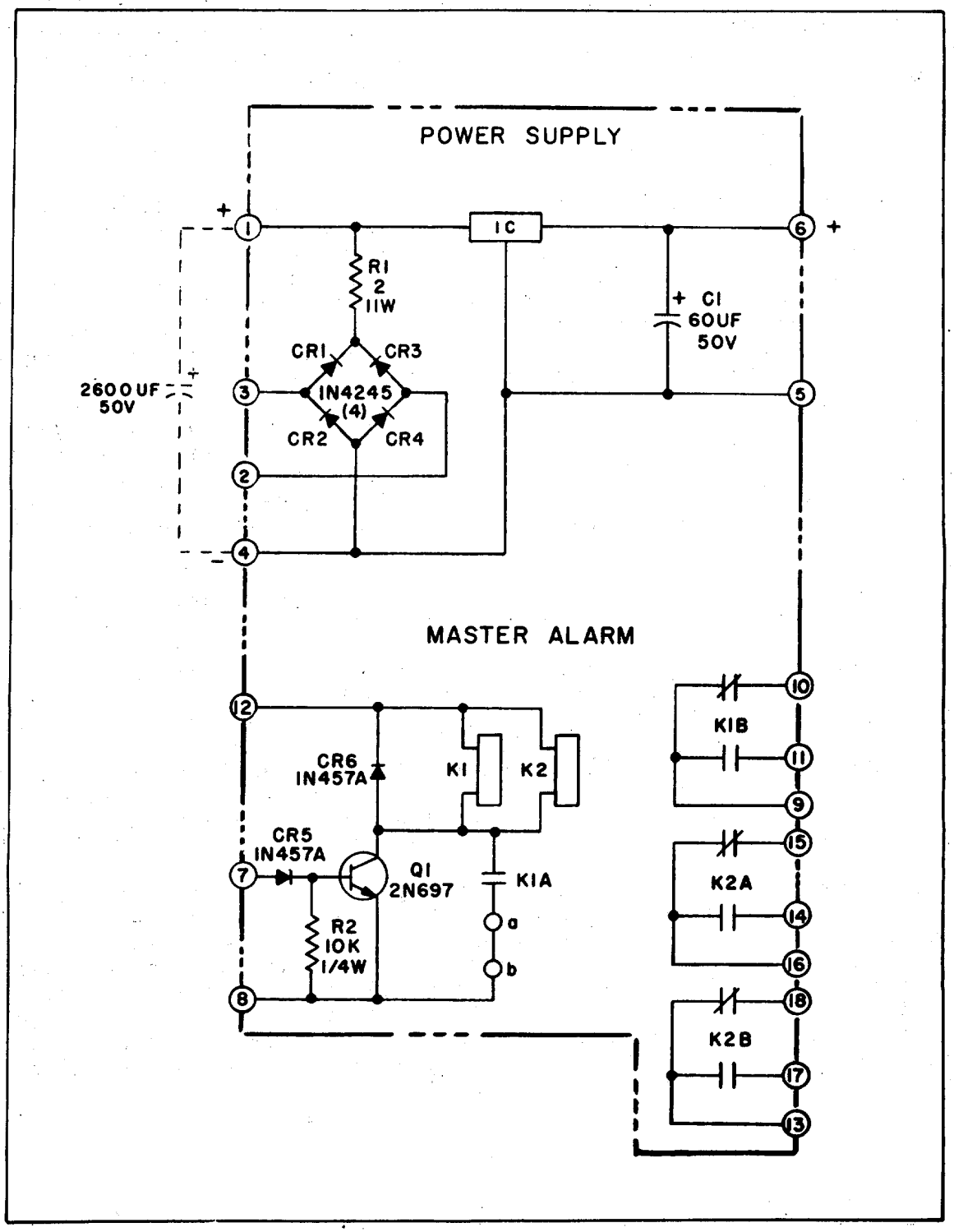
In the level indication circuit of the control module, RP1 and resistor R1 from a voltage divider with the transmitter and/or level link combination that is connected to terminal 2 of the module. Adjusting the setting of the potentiometer changes the portion of the +17 volt dc supply at pin 1 that is connected across-the level detector as a calibrated voltage. The potentiometer is set to produce a maximum deflection of the meter(s) associated with the control module when the fluid level in the tank is at a maximum value.

(4) The output of the fluid level detector (a level voltage) is fed to pin 3 of the control module to be dropped across resistor R2 and capacitor C1. This RC combination is an intergrating network that smoothes or dampens fluid transients. The voltage to which capacitor C1 charges is fed through resistor R3 to the meters(s) connected at pin 4.

(5) The level voltage is also fed to the input network of threshold detector stage Q1 via steering diode D1 in alarm circuit No. l. Capacitor C2 and resistor R4 filter the level voltage for application through resistor R5 to the gate of junction field-effect transistor (J-FET)Q1. The source of J-FETQ1 is biased by the output of a voltage divider network consisting of potentiometer RP2 and resistors R7 and R6. The amplitude of this bias is established by the setting of potentiometer RP2 which is adjusted for the desired level alarm threshold of the tank fluid. The gate of J-FETQ1 is at a bias voltage maintained by the transmitter. Zener diode CRZ1 protects the input from voltage levels that rise above 20 volts.

(6) When the level voltage at the gate exceeds the bias at the source, drain current flows from J-FETQ1, turning on switch Q2. When switch Q2 is turned on, current flows through voltage divider resistors R8 and R9 and into transistor Q2. The voltage at the intersection of resistors R8 and R9 is then sufficiently positive to produce conduction in relay driver Q3-Q4. Relay driver Q3 and Q4 is a power amplifier that energizes relay K1 when current flows. Diode CR9 connected across the coil of relay K1 suppresses reverse current flow that could damage transistors Q3 and Q4.

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).



Power Supply and Master Alarm Module PS1(PS2), Schematic Diagram

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

(7) When relay K1 is energized, the K1D contacts close connecting +17-volts dc across a charging network made up of resistors R11, R12, and R13 and capacitor C3. When the +17-volt dc is initially applied, the voltage at the intersection of resistors R12 and R13 rises sufficiently to bring a relay driver on the power supply and master alarm module into conduction. A capacitor C3 charges, the voltage at the intersection of resistors R12 and R13 drips below the cut-off level of the external relay driver. Diode CR6 steers the voltage at the intersection of resistors R12 and R13 to the external relay driver.

(8) With relay K1 energized and the normally open K1B contacts closed, the flashing voltage at pin 17 is switched to pin 16 for connection to the HIGH LEVEL alarm lamp outside the module. When the alarm is acknowledged by pressing the ALARM SILENCE switch on the receiver front panel, the flashing voltage at pin 17 switches to a steady state voltage that maintains the HIGH LEVEL lamp steadily lighted until relay K1 is deenergized (the alarm condition is removed).

This task covers:

a. Inspection
b. Test
c. Repair
d. Adjustment and Alignments

INITIAL SETUP:

Test Equipment

NONE

Special Tools

Sound Powered Phone System
Soldering iron 25W maximum

Material/Parts

NONE

Personnel Required

2

References

Para 4-64.2 Transmitter

Equipment Condition Para | Condition Description

NONE

Special Environmental Conditions

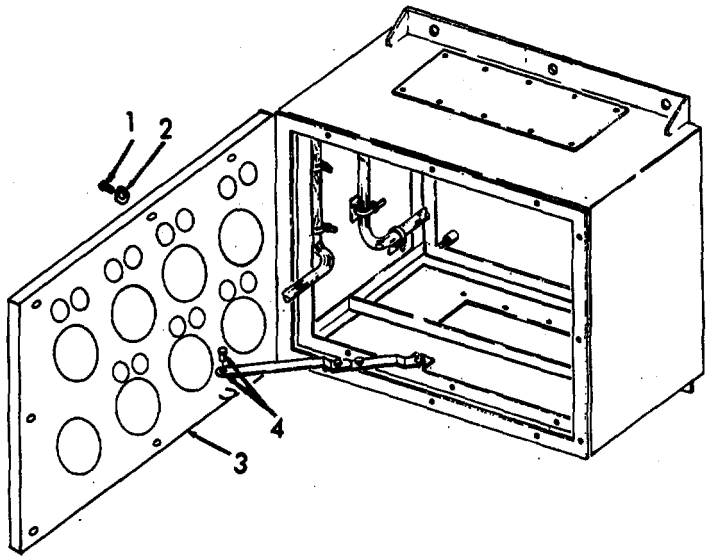
NONE

General Safety Instructions

Observe WARNINGS in procedure.

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Tank level system	a. Receiver	1. Inspect for signs of damage.	
		2. Inspect for proper operation.	
	b. Transmitter	Inspect.	Refer to paragraph 4-64.2 .
TEST			
2. Receiver	Test the system by comparing meter readings, with soundings taken in a tank. Refer to Operating Instruction in Chapter 2.		
REPAIR			
3. Box assembly	a. Captive screws (1) and sealing washer (2)	Loosen.	
	b. Door (3)	Swing open.	
	c. Cover arm (4)	Remove from door.	



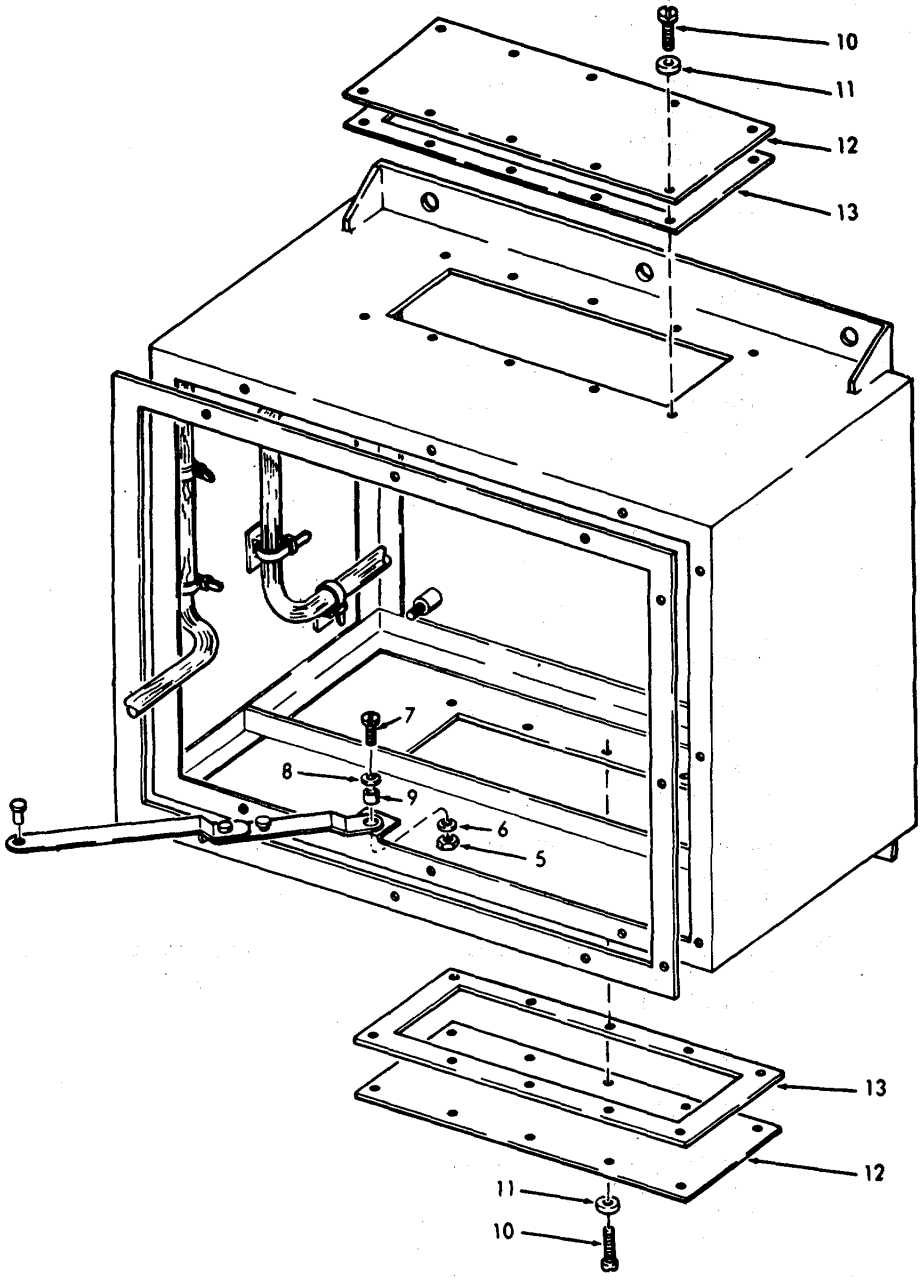
4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Nut (5) lockwasher (6), screw (7), lock-washer (8), and pivot bushing (9)	Remove.	
	e. Cover arm (4)	Replace.	
	f. Screw (7), lockwasher (8), pivot bushing (9), lockwasher (6), and nut (5)	Install.	
	g. Cover arm (4)	Attach to door.	
	h. Door (3)	Close.	
	i. Captive screw (1) and sealing washer (2)	Tighten.	
	j. Screws (10) and sealing washers (11)	Remove.	
	k. Access panel (12) and gasket (13)	Remove.	Discard gasket if damaged.
	l. Gasket (13) and access panel (12)	Install.	
	m. Screws (10) and sealing washers (11)	Install.	

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



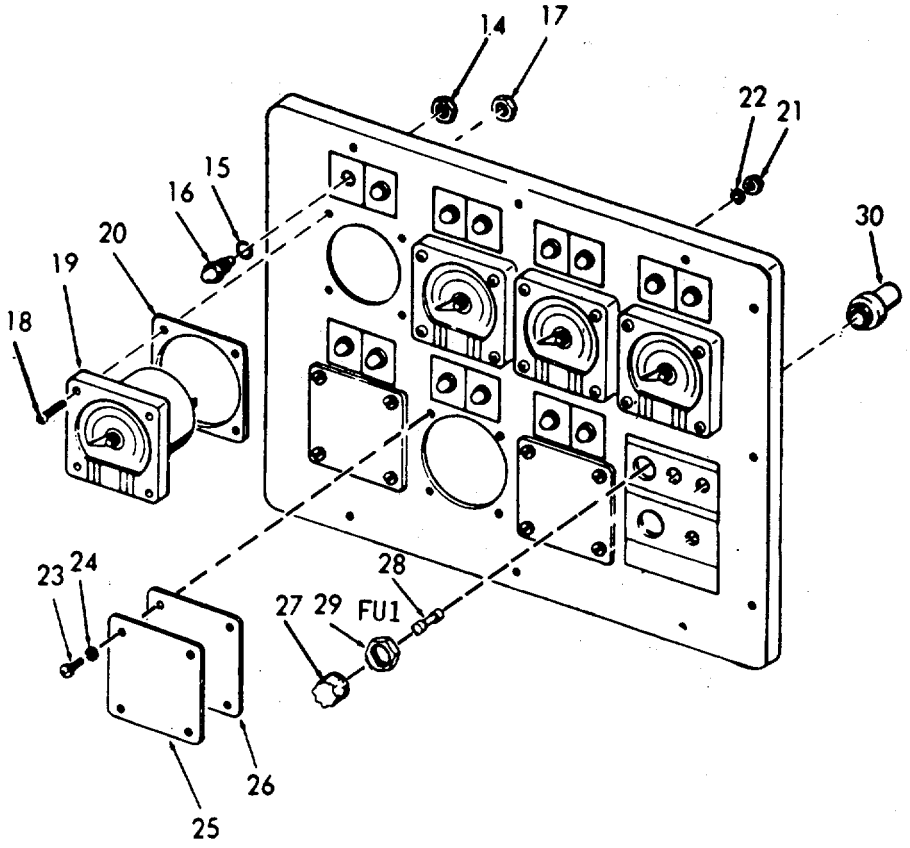
4-1339

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
4. High/Low lamps	a. Wiring	Unsolder.	
	b. Nuts (14), lamp holder (15), and insulating tubing (16)	Replace.	
	c. Wiring	Solder.	
5. Meter	a. Wiring	Unsolder.	
	b. Nuts (17) and screws (18)	Remove.	
	c. Meter (19) and gasket (20)	Remove and install new meter and gasket.	
	d. Screws (18) and nuts (17)	Install.	
	e. Wiring	Reconnect.	
6. Meter cover plate	a. Nuts (21), lockwashers (22), screws (23), and sealing washers (24)	Remove.	
	b. Cover plate (25) and gasket (26)	Remove and install new cover plate and new gasket.	
	c. Screws (23), sealing washers (24), lockwashers (22) and nuts (21)	Install.	

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
7. Fuse holder	a. Wiring	Remove.	
	b. Fuse cap (27)	Remove.	
	c. Fuse (28)	Remove.	
	d. Nut (29) and fuse holder (30) holder.	Remove nut and fuse holder and install new nut and fuse	
	e. Fuse (28)	Install.	
	f. Fuse cap (27)	Install.	
	g. Wiring	Reconnect.	



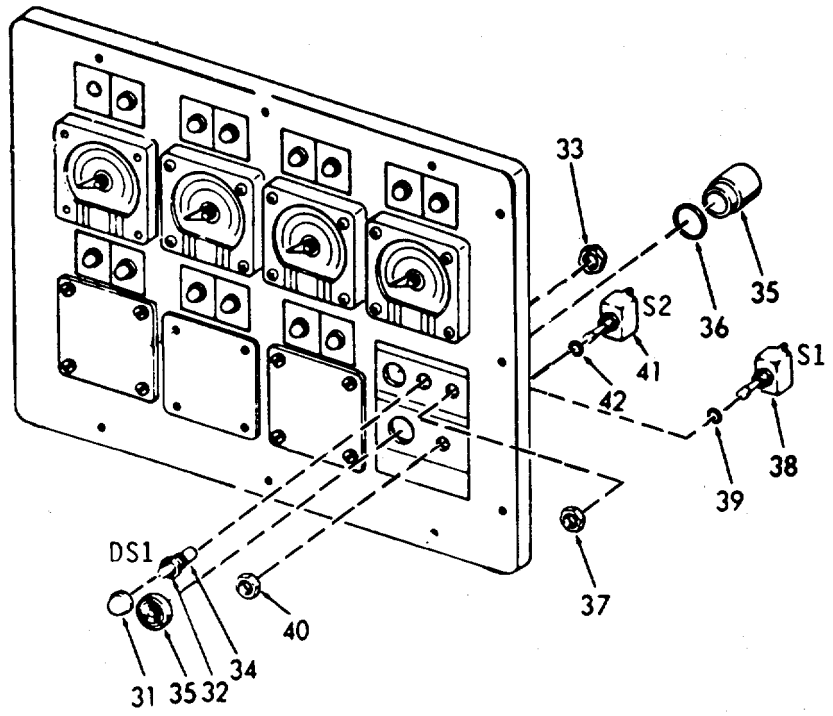
4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
8. POWER ON lamp	a. Wiring	Remove.	
	b. Lens cap (31)	Remove.	
	c. Lamp (32)	Remove.	
	d. Nut (33) and lamp holder (34)	Remove and replace with same or new.	
	e. Lamp (32)	Install.	
	f. Lens cap (31)	Install.	
	g. Wiring	Reconnect.	
9. Sonalert alarm	a. Wiring	Remove.	
	b. Alarm (35) and pre-formed packing (36)	Remove and replace with new packing.	
	c. Wiring	Replace.	
10. POWER ON Switch (S1) (DPST)	a. Wiring	Remove.	
	b. Nut (37), switch (38), and pre-formed packing (39)	Remove and install new packing.	
	c. Wiring	Reconnect.	
11. ALARM SILENCE switch (S2) (SPST)	a. Wiring	Remove.	
	b. Nut (40), switch (41), and pre-formed packing (42)	Replace.	
	c. Wiring	Replace.	

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



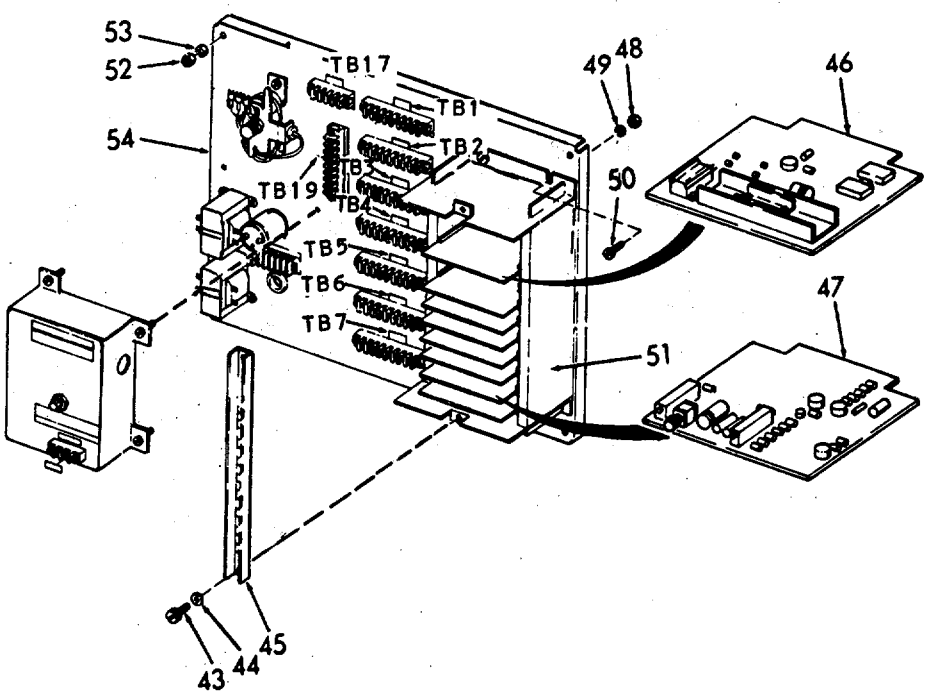
4-1343

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
12. Printed circuit cards (Power supply, control modules)	a. Screws (43 and sealing washer (44)	Remove.	
	b. Retaining bar (45)	Remove.	
	c. Power supply printed circuit card (46)	Remove.	If necessary.
	d. Control module printed circuit card (47)	Replace.	As necessary.
	e. Retaining bar (45)	Instal1.	
	f. Screws (43) and sealing washer (44)	Install.	
	NOTE There are no repairable parts on the printed circuit cards. Refer to the Foldout 4 and Foldout 5 drawings for part locations.		
13. Printed circuit card holder	a. Nuts (48), lockwashers (49) and screws (50)	Remove.	
	b. Holder (51)	1. Hold and disconnect wiring.	Refer to schematic.
		2. Remove and replace with new holder (51).	

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

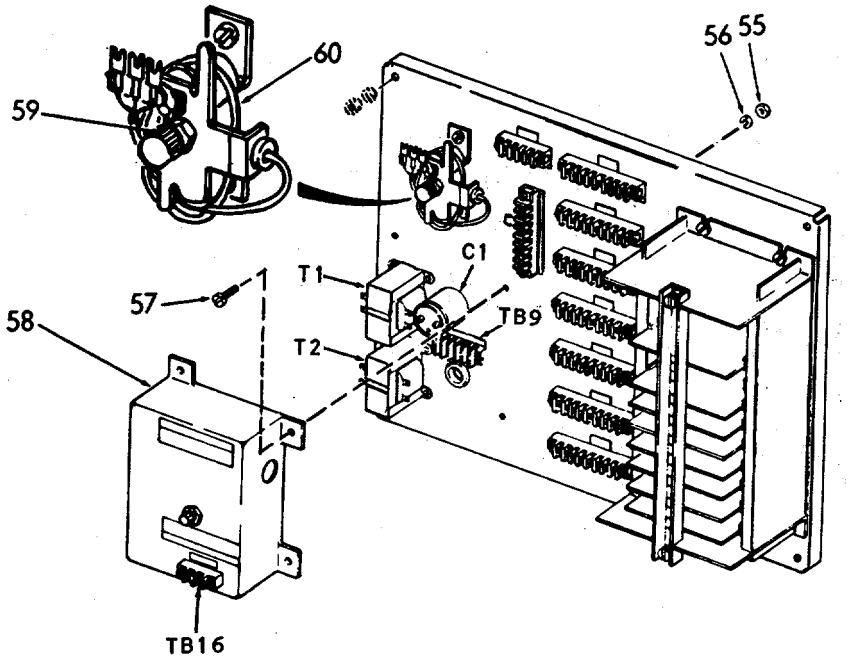
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
		3. Reconnect wiring.	
	c. Screws (50), 1ockwashers (49), and nuts (48)	Install.	
14. Panel	a. Wiring	Tag and disconnect.	
	b. Nuts (52) and lock-washers (53)	Remove.	
	c. Panel (54)	Replace.	
	d. Lockwashers (53) and nuts (52)	Install.	
	e. Wiring	Reconnect.	



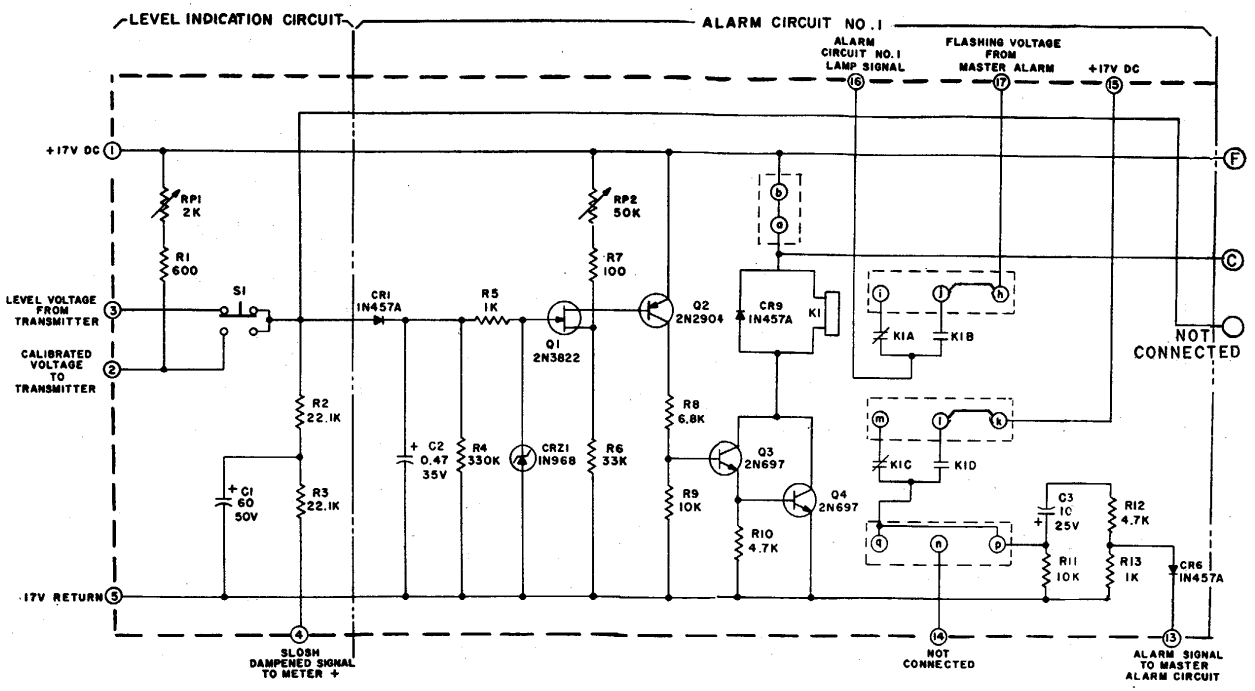
4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
15. High voltage shield	a. Nuts (55), lockwashers (56), and screws (57)	Remove.	
	b. Shield (58)	Replace.	
	c. Screws (57), 1ockwashers (56), and nuts (55)	Install.	
16. Float simulator potentio-meter 2.5 K	a. Knob (59)	Remove.	
	b. Wiring	Disconnect.	
	c. Potentio-meter (60)	Replace.	
	d. Wiring	Reconnect.	
	e. Knob (59)	Install.	

FLOAT SIMULATOR POTENTIOMETER



4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).



NOTES:

1. UNLESS OTHERWISE INDICATED: RESISTANCE VALUES ARE IN OHMS, ¼ WATT; CAPACITANCE VALUES ARE IN UF.

RECEIVER PANEL CONTROL MODULES, SCHEMATIC DIAGRAM

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS AND ALIGNMENTS

17. GENERAL.

a. Adjustment and alignments for the TLI systems are performed during initial installation, when troubleshooting procedures indicate that a control is out of adjustment, and whenever a meter is replaced or repair is made in an alarm circuit in a receiver module or receiver panel. Adjustments and alignments consist of meter calibration procedures (which include zero adjustment, full-scale deflection adjustment, and fluid level calibrations) and alarm adjustments.

WARNING

When performing adjustment and alignment procedures in fluid tanks that contain or have contained in-flammable or explosive fluids, ground the tank and observe all precautions for a hazardous area.

b. Meter Calibrations.

(1) Fluid level meters on the receiver modules and receiver panels of a TLI system-have their calibration marks made at the factory on the basis of data supplied by the installing activity or can be marked in by ship's personnel during installation or during replacement for corrective maintenance purposes. The following calibration instructions provide a means of calibrating the zero, full-scale deflection, and intermediate fluid level markings on 4-1/2 inch square meters.

(2) The instructions provided for the calibration procedures described a procedure in which meter calibrations are initially made in pencil on unmarked meter faces and then with a more permanent marking device.

(3) Zero Adjustment. Before other calibration or adjustment procedures are performed, meters shall be zero adjusted in accordance with the procedure below.

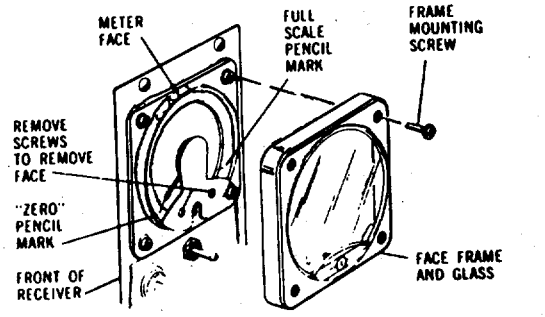
(a) To zero adjust a meter, using a screwdriver, adjust the ZERO adjustment screw on the front of the meter to its mid-position (if meter has no 0-mark) or to the setting that caused deflection to the O-mark (if meter has one). If there is no O-mark, remove the four frame mounting screws securing the face frame and glass to the

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS AND ALIGNMENTS (Cont)

meter, remove the face frame and glass, and make a pencil mark at the location of the meter needle. Do not replace the frame and glass until the completion of meter adjustment procedures.



(4) Full-scale Deflection Adjustment.

Following the performance of the zero adjustment, perform the full-scale deflection adjustment on receiver modules, proceed as follows:

(a) Hold the ON-OFF-FULL REF toggle :switch on the front panel of the receiver module in the FULL REF position.

(b) Using a screwdriver, adjust the CALIBRATE control to the setting that causes deflection to the full scale mark.

(c) Release the ON-OFF-FULL REF toggle switch to the OFF position.

c . Fluid Level Calibration.

Following the performance of zero and full-scale deflection adjustments, the marking for intermediate tank fluid levels is accomplished. One of two types of calibration procedures (dry-tank or liquid-in tank) are employed either to make the marks or to

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS AND ALIGNMENTS (Cont)

determine the current values at which the marks should be made at the factory. All procedures require an empty fluid tank. While this does not normally present a problem, during installation procedures it obviously can on an operational ship. It will be necessary to wait for an opportunity to empty a tank before calibrating its associated meter.

(1) Dry Tank Calibration. To calibrate a meter in a dry tank, proceed as follows:

(a) Position one man at the tank for which the meter is being calibrated and a second man at the meter.

(b) Provide the two men performing the calibration procedure with a means of intercommunicating (sound powered telephones).

(c) Determine the gallonage increments for which indications are to be provided on the meter.

(d) Using the sounding, table or tank capacity curve for the tank on which the calibration is being performed, interpolate the height in feet and inches at which the gallonage increments determined in step (c) are found. Refer to tank sounding tables.

(e) Place the ON-OFF-FULL REF switch (receiver modules) or the ON-OFF switch (receiver panels), whichever is applicable, in the ON position.

(f) Suspend a sounding tape vertically alongside the transmitter in the tank.

(g) Align the sounding tape so that the dimension determined from the sounding table or tank cap capacity curve for the gallonage for a full tank (100 percent of capacity) is at the top of the tank.

(h) As determined by whether a transmitter is at the bottom of the tank, read the dimension of the sounding tape, at the center of the float on the transmitter, or

(i) Using the sounding table or tank capacity curve, interpolate the gallonage equivalent to the dimension read in step (h).

(j) Mark the gallonage interpolated in step (i) as the lowest level indicated by the meter along side of the O-mark in the zero adjustment procedure (paragraph 4-66.lb(3).

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1667 CLASS — TANK SOUNDING TABLE — FUEL OIL 2-47-1-F

V.C.G	SOUNDING IN FEET	SOUNDING IN INCHES 0	1	2	3	4	5	6	7	8	9	10	11
	8												
	7												
4.53'	6	1662	1685	1708	1731	1754	1777						
4.03'	5	1386	1409	1432	1455	1478	1501	1524	1547	1570	1593	1616	1639
3.53'	4	1110	1133	1156	1179	1202	1225	1248	1271	1294	1317	1340	1363
3.03'	3	834	857	880	903	926	949	972	995	1018	1041	1064	1089
2.53'	2	558	581	604	726	650	673	696	719	742	765	788	811
2.03'	1	282	305	328	351	374	397	420	443	466	489	512	535
1.53'	0	6	29	52	75	98	121	144	167	190	213	236	259

NOTE:

1. Total Capacity-1786 Gallons
2. Hgt. of Striking Above Lowest Point of Tank-.2500".
3. Total Length of Sounding Tube-
4. Hgt. of Lowest Point of Tank Above Base Line-1.521'.

4-64.1. TANK LEVEL INDICATION-RECEIVER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1667 CLASS — TANK SOUNDING TABLE — FUEL OIL 2-47-1-F

V.C.G.	SOUNDING IN FEET	SOUNDING IN INCHES 0	1	2	3	4	5	6	7	8	9	10	11
	8												
	7												
4.53'	6	1624	1646	1668	1691	1713	1736						
4.03'	5	1354	1376	1399	1421	1444	1466	1489	1511	1534	1556	1579	1601
3.53'	4	1084	1107	1129	1152	1174	1197	1219	1242	1264	1286	1309	1331
3.03'	3	815	837	860	882	904	927	949	972	994	1017	1039	1062
2.53'	2	545	567	590	612	635	657	680	702	725	747	770	792
2.03'	1	275	298	320	343	365	388	410	433	455	478	500	522
1.53'	0	6	28	51	73	96	118	140	163	185	208	230	258

NOTE:

1. Total Capacity-1745 Gallons
2. Hgt. of Striking Above Lowest Point of Tank-.2500".
3. Total Length of Sounding Tube-
4. Hgt. of Lowest Point of Tank Above Base Line-1.521'.

4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1667 CLASS TANK SOUNDING TABLE LUBE OIL TANK

V.C.G.	SOUNDING IN FEET	SOUNDING IN INCHES 0	1	2	3	4	5	6	7	8	9	10	11
	8												
	7												
	6												
	5												
	4	215											
	3	161	166	170	175	179	184	188	193	197	202	206	211
	2	108	112	117	121	125	130	134	139	143	148	152	157
	1	54	58	63	67	72	76	81	85	90	94	99	103
	0	.4	5	9	13	18	22	87	31	36	40	45	49

NOTE:

1. Total Capacity - 215.Gallons
2. Hgt. of Striking Above Lowest Point of Tank - .1875".
3. Total Length of Sounding Tube -
4. Hgt. of Lowest Point of Tank Above Base Line - 2.9583'.

4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1667 CLASS | TANK SOUNDING TABLE | FRESH WATER 2-40-0-W

V.C.G.	SOUNDING IN FEET	SOUNDING IN INCHES 0	1	2	3	4	5	6	7	8	9	10	11
	8												
	7												
4.65'	6				4306		4404						
4.15'	5				3621								
3.65'	4				2931								
3.15'	3				2242								
2.65'	2				1552						1897		
2.15'	1				862						1207		
1.65'	0				172						517		

NOTE:

1. Total Capacity - 4404 Gallons
2. Hgt. of Striking Above Lowest Point of Tank - .1875".
3. Total Length of Sounding Tube - None
4. VCG is Shown in Feet Starting 3" Above Bottom of Tank
5. Hgt. of Lowest Point of Tank Above Base Line -

4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)|

LCU 1667 CLASS | TANK SOUNDING TABLE | S.W. BALLAST 2-66-0-W

V.C.G.	SOUNDING IN FEET	SOUNDING IN INCHES 0	1	2	3	4	5	6	7	8	9	10	11
	8												
4.46'	7	2674	2708	2742	2775								
3.96'	6	2269	2301	2335	2369	2402	2436	2470	2504	2438	2572	2606	2640
3.46'	5	1860	1894	1928	1962	1996	2030	2063	2097	2131	2165	2199	2233
2.95'	4	1453	1487	1521	1555	1589	1623	1657	1690	1724	1758	1792	1826
2.45'	3	1046	1080	1114	1148	1182	1216	1250	1284	1318	1351	1385	1419
1.94'	2	639	673	707	741	775	809	843	877	911	945	979	1012
1.40'	1	234	267	301	334	368	402	436	470	504	538	572	606
.73'	0	.4	2	7	14	26	41	60	84	110	139	169	201

NOTE:

1. Total Capacity - 2775 Gallons
2. Hgt. of Striking Above Lowest Point of Tank - .7500".
3. Total Length of Sounding Tube -
4. Hgt. of Lowest Point of Tank Above Base Line - 0.6875'

4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1667 CLASS — TANK SOUNDING TABLE — S. W. BALLAST 2-18-2-W

V.C.G.	SOUNDING IN FEET	SOUNDING IN INCHES 0	1	2	3	4	5	6	7	8	9	10	11
	8												
4.36'	7	2801	2845	2889	2933	2978	3023	3068	3113	3158	3190		
3.82'	6	2286	2328	2370	2412	2454	2497	2540	2583	2626	2670	2713	2757
3.28'	5	1798	1838	1878	1918	1958	1998	2039	2079	2120	2161	2203	2244
2.76'	4	1344	1380	1417	1454	1491	1529	1567	1605	1643	1681	1720	1759
2.25'	3	932	964	997	1030	1064	1097	1132	1166	1201	1236	1272	1308
1.77'	2	570	598	626	655	684	714	744	774	805	836	868	899
1.32'	1	269	292	314	338	362	386	411	436	462	488	515	542
.89'	0	50	64	79	95	112	129	148	166	186	206	227	248

NOTE:

1. Total Capacity - 3190 Gallons
2. Hgt. of Striking Above Lowest Point of Tank - 4.1250'.
3. Total Length of Sounding Tube - 7.7083"
4. Hgt. of Lowest Point of Tank Above Base Line - 0.6375'

4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1667 CLASS | TANK SOUNDING TABLE | S. W. BALLAST 2-18-1-W

V.C.G.	SOUNDING IN FEET	SOUNDING IN INCHES 0	1	2	3	4	5	6	7	8	9	10	11
	8												
4.36'	7	2801	2845	2889	2933	2978	3023	3068	3113	3158	3190		
3.82'	6	2286	2328	2370	2412	2454	2497	2540	2583	2626	2670	2713	2757
3.28'	5	1798	1838	1878	1918	1958	1998	2039	2079	2120	2161	2203	2244
2.76'	4	1344	1380	1417	1454	1491	1529	1567	1605	1643	1681	1720	1759
2.25'	3	932	964	997	1030	1064	1097	1132	1166	1201	1236	1272	1308
1.77'	2	570	598	626	655	684	714	744	774	805	836	868	899
1.32'	1	269	292	314	338	362	386	411	436	462	488	515	542
.89'	0	50	64	79	95	112	129	148	166	186	206	227	248

NOTE:

1. Total Capacity - 3190 Gallons
2. Hgt. of Striking Above Lowest Point of Tank - 4.1250".
3. Total Length of Sounding Tube - 7.7083"
4. Hgt. of Lowest Point of Tank Above Base Line - 0.6375'

4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1667 CLASS — TANK SOUNDING TABLE — S. W. BALLAST 2-8-0-W

V.C.G.	SOUNDING IN FEET	SOUNDING IN INCHES 0	1	2	3	4	5	6	7	8	9	10	11
	8												
	7												
	6												
5.10'	5	2474	2513	2543	2574	2605	2623	2631	2641				
4.56'	4	1751	1815	1878	1942	2007	2071	2136	2200	2262	2318	2370	2422
3.93'	3	1017	1075	1135	1195	1255	1316	1377	1438	1500	1562	1625	1689
3.20'	2	432	469	508	555	594	640	688	729	791	845	902	959
2.43'	1	120	137	156	176	199	222	248	274	303	333	364	397
1.64'	0	11	15	19	25	32	39	47	56	67	78	90	104

NOTE:

1.Total Capacity - 2641 Gallons

2.Hgt. of Striking Above Lowest Point of Tank - 7.3750".

3.Total Length of Sounding Tube - None

4.Hgt. of Lowest Point of Tank Above Base Line - 1.3125'

4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS AND ALIGNMENTS (Cont)

(k) Manually raise the float of the transmitter until the float center is at the dimensional equivalent on the sounding tape of the next higher desired gallonage increment interpolated in step (d).

(l) Mark the meter face with a pencil at the point of meter deflection and label it with the applicable gallonage increment or record the current value, whichever is applicable.

*(m) Repeat procedures outlined in steps (k) and (1) for each successive gallonage increment to be calibrated.

NOTE

A gallonage increments corresponding to low- and high-level alarm points interpolated from the sounding table, mark or record the points of deflection on the meter face in pencil.

(n) Upon completion of the making of the pencil markings for the full range of tank indications, mark over the pencil marks in ink or with some other permanent marker.

(o) Reassemble the face frame and glass to the meter and secure them with the frame mounting screws and lockwashers.

(2) Liquid-In-Tank Calibration. To calibrate a meter in a fluid tank to which fluid can be added, proceed as follows:

(a) Place the ON-OFF-FULL REF switch or the ON-OFF switch, whichever is applicable, in the ON position.

(b) Fill the tank with known increments of water, marking the meter face in pencil at the deflection point that is realized for appropriate fluid level indications or recording the current value, whichever is applicable.

(c) Upon completion of the calibration in pencil for the full range of tank indications, mark over the pencil marks in ink or with some other permanent marker.

(d) Reassemble the face frame and glass to the meter and secure with the frame mounting screws and lockwashers.

4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS AND ALIGNMENTS (Cont)

d. Alarm Adjustments.

(1) General. Following the calibration of the meters of the receiver modules and receiver panels during installation or corrective maintenance procedures and whenever a repair is made to an alarm circuit in a receiver module or receiver panel control module, the TLI system is adjusted to establish the levels of operation of high- and low-level alarms. The procedure for the adjustment of high- and low-level alarm operation is determined by whether the receiver being adjusted is a receiver module or a receiver panel. Procedures for each adjustment type follow. In both procedural types, it is assumed that the indication level at which alarms are to be operated have been determined and marked or recorded during the calibration of the meter.

(2) Receiver Panel Adjustment. To perform the installation (alarm) adjustments for receiver modules, proceed as follows:

(a) Place the ON-OFF switch on the front panel in the OFF position.

(b) Disconnect the red, black, and white cable leads connecting to terminals 1, 2, and 3 on the terminal board associated with the receiving circuits being adjusted.

(c) Disconnect the float simulator cable from terminals 1, 2, and 3 on the float simulator terminal board.

(d) Connect the red lead of the float simulator cable to terminal 1 of the terminal board associated with the receiver circuits being adjusted.

(e) Connect the black lead of the float simulator cable to terminal 2 of the terminal board associated with the receiver circuits being adjusted.

(f) connect the green lead of the floating simulator cable to terminal 3 of the terminal board associated with the receiver circuits being adjusted.

NOTE

Perform steps (g) and (h) for those tanks, the receiver circuits for which include low level alarm capabilities.

4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS AND ALIGNMENTS (Cont)

(g) Adjust the FLOAT SIMULATOR control to bring meter deflection to the desired low-level alarm setting marked on the meter face.

NOTE

If a low-level alarm occurs in a tank in which a level link is used, adjust the FLOAT SIMULATOR control to bring meter deflection to a point slightly (3/16 to 1/4 inch) below the alarm setting marked on the meter.

(h) Adjust Alarm Circuit Threshold Adjust potentiometer on the low-level alarm control module printed circuit board associated with the meter that has deflected until the LOW LEVEL lamp for that meter just lights.

NOTE

Perform steps (i) and (j) only for those tanks, the receiver circuits for which include high level alarm capabilities.

(i) Adjust the FLOAT SIMULATOR control to bring meter deflection to the desired high-level alarm setting marked on the meter face.

NOTE

If a high-level alarm occurs in a tank in which a level link is used, adjust the FLOAT SIMULATOR control to bring meter deflection to a point slightly (3/16 to-1/4 inch) below the alarm setting marked on the meter.

(j) Adjust Alarm Circuit Threshold Adjust potentiometer on the high-level alarm control module printed circuit board associated with the meter that has deflected until the HIGH LEVEL lamp for that meter just lights.

(k) Place the ON-OFF switch to the OFF position.

(l) Disconnect the float simulator cable leads from the terminal board for the receiver circuits being adjusted and connect them to the float simulator terminal board.

4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

ADJUSTMENTS AND ALIGNMENTS (Cont)

(m) Connect the transmitter cable to the terminal board associated with the receiver circuits that have been adjusted, connecting the red lead to terminal 1, and black lead to terminal 2, and the white lead to terminal 3.

(n) Close the front cover of the receiver panel and secure it with the captive screws.

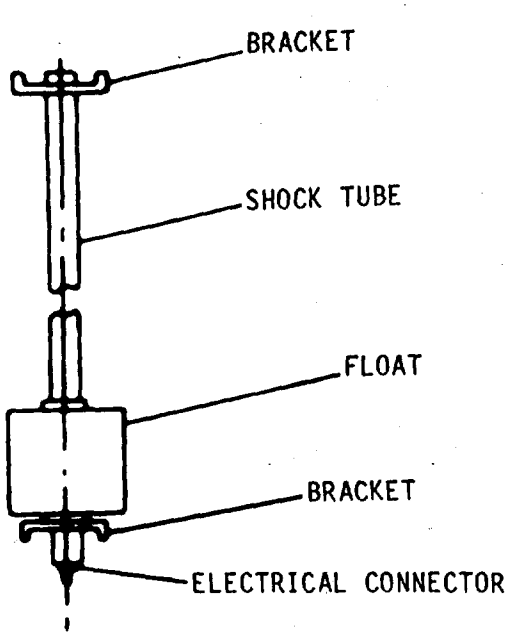
4-64.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS (Continued).

a. GENERAL.

(1) The transmitter consists of a network of voltage divider resistors and magnetic reed switches which are contained in silicon rubber potted in a mylar tube that is surrounded by a neoprene tube and all mounted in a stainless steel tube. Electrical leads connecting to the resistors and magnetic reed switches are brought to electrical connectors located at the bottom of the transmitter.

(2) A cylindrical float assembly located on the stainless steel tube is free to move up and down the tube within limits established by pairs of brackets that are integral with the transmitters. The bracket pairs on the tube are used as mounting surfaces for the installation of transmitters in the fluid tank.

(3) The transmitter is used in single-transmitter installation in which fluid levels at the top of the tank can be indicated, but fluid levels can be indicated only to a minimum point that lies above the bottom of the tank.



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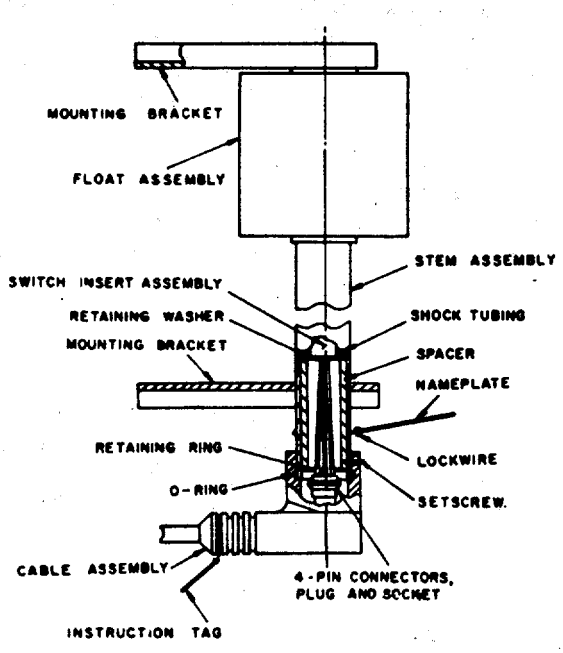
4-64.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS (Continued).

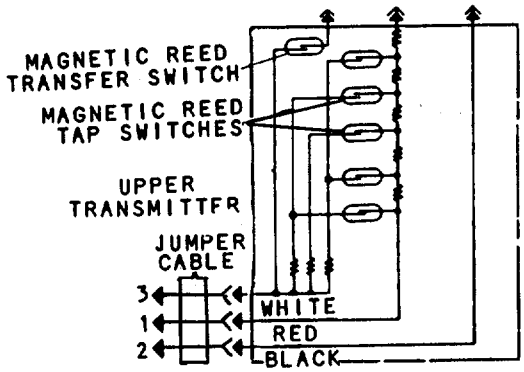
b. Functional Description.

(1) As shown in the cross section view below a typical transmitter contains a voltage divider resistor network that extends the full length of a transmitter subassembly. Magnetic reed switches are tapped at one-inch intervals along the height of the resistor network.

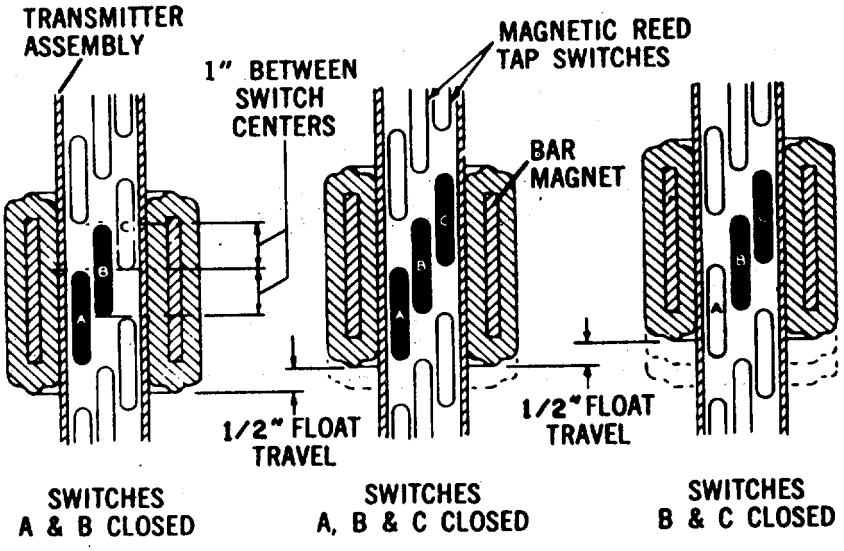


(2) As shown in the schematic diagram below, which illustrates two interconnected transmitters the tap switches are sequentially connected through series resistance to a common conductor. This conductor connects through the jumper cable to a receiver module or receiver panel via ship's wiring. The top and bottom of the voltage divider resistor network are connected across the calibration voltage from the calibration network in the receiver panel or receiver module.

4-64.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS (Continued).



(3) As the fluid level in the tank that houses the transmitter moves up and down, the float moves up and down. Bar magnets in the float operate tap switches in a two-at-a-time, three-at-a-time, two-at-a-time sequence as the float moves. When two adjacent tap switches are closed, the effective electrical tap point on the voltage divider network is halfway between the two switches. As the magnetic float closes the next tap switch (with the first two remaining in the closed position), the effective tap point is halfway between the first and third tap switches; that is, at the middle switch of the three. This middle point is one-half inch from the effective tap point established when only two tap switches were closed. As a result, voltage drops are read in half-inch increments of float travel.



4-64.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS (Cont).

This task covers:

a. Inspection
b. Test
c. Replacement

INITIAL SETUP:

Test Equipment
NONE

References
Paragraph
4-64.1 Receiver, Test and Adjustments.

Special Tools

NONE

Equipment
Condition Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

2

General Safety Instructions

Observe WARNINGS in procedure.

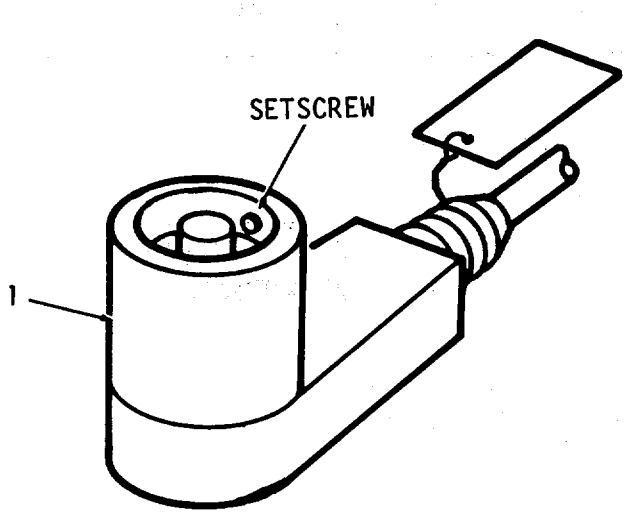
LOCATION	ITEM	ACTION	REMARKS

WARNING

Observe all precautions for working in a hazardous area when removing a transmitter fluid tank containing flammable or explosive fluids.

4-64.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Transmitter	a. Cable	Inspect.	Refer to paragraph 4-64.3 .
	b. Transmitter	Inspect for signs of wear.	
TEST			
2.		Refer to paragraph 4-64.1 for test and adjustment procedures.	
REPLACEMENT			
3. Receivers	On/Off switch	Place switch in the OFF position, and tag.	
4. Transmit-	a. Cable assembly (1)	Loosen setscrews and disconnect.	



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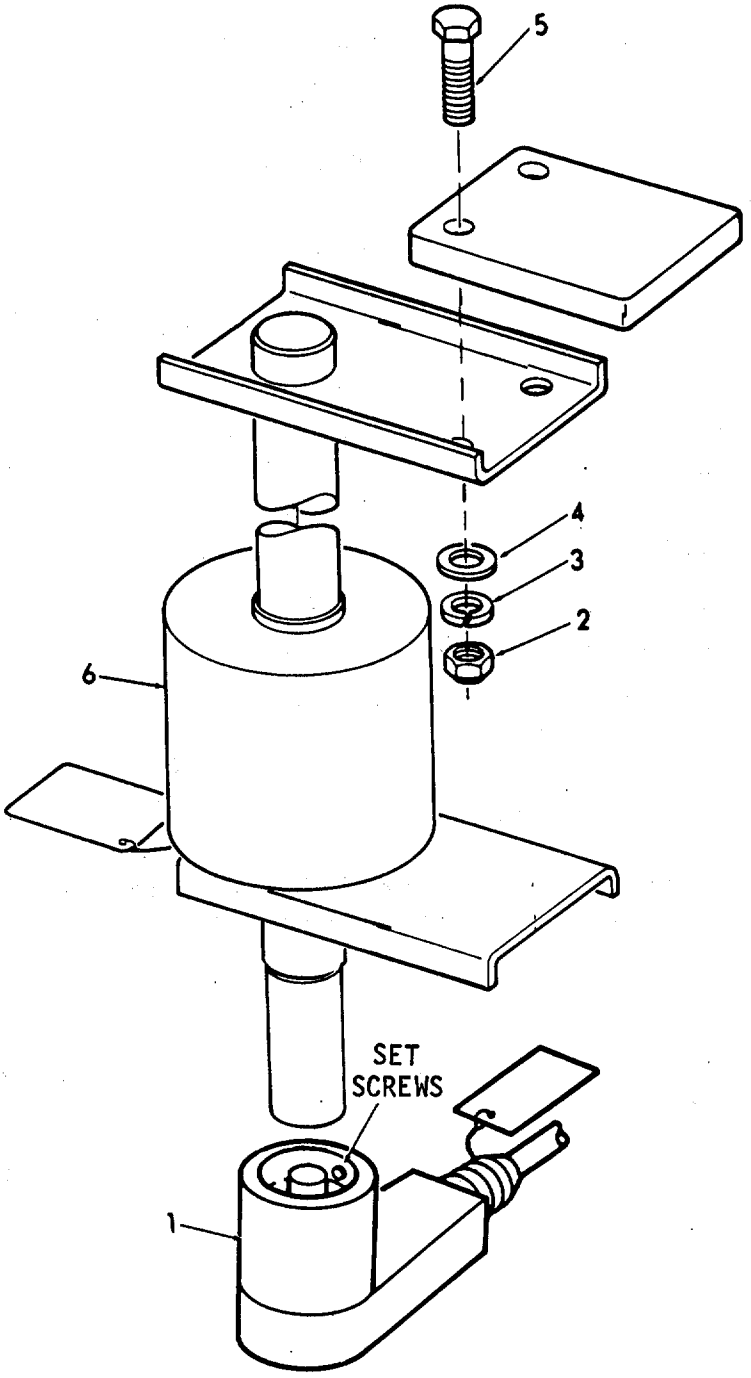
4-64.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACEMENT (Cont)			
	b. Nuts (2), lockwashers (3), flat-washers (4), and screws (5)	Remove.	
		CAUTION Do not remove the mounting bracket assemblies from the bulkhead, sounding tube, or ladder. Removing the mounting bracket assemblies may affect fluid meter calibration.	
	c. Transmitter (6)	Remove and replace.	
	d. Screws (5), flatwashers (4), lock-washers (3), and nuts (2)	Install.	
	e. Cable assem-lby (1)	Install and tighten set screws.	

4-64.2. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACEMENT (Cont)



4-64.3. TANK LEVEL INDICATION - CABLE - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection
b. Repair

INITIAL SETUP

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

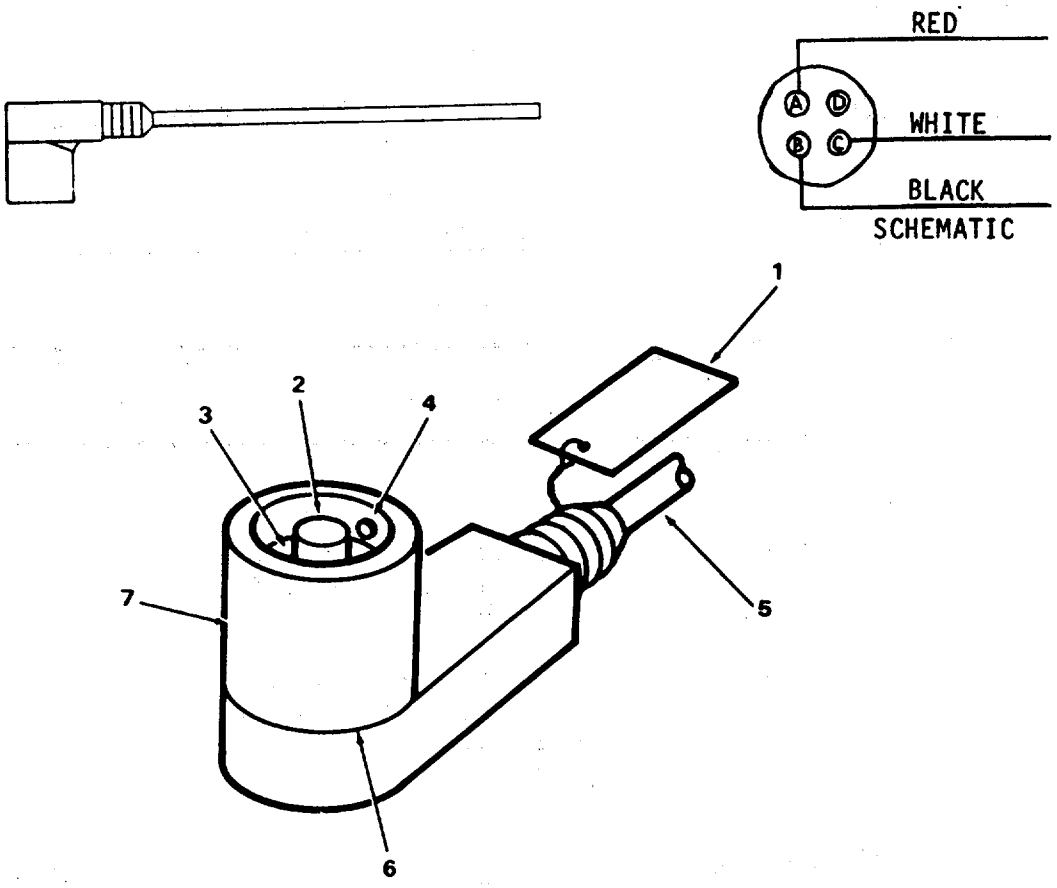
General Safety Instructions

NONE

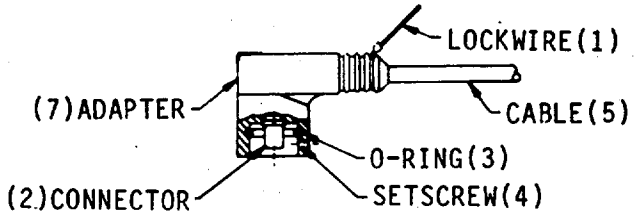
LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Cable	a. Cable	Inspect for breaks, cracks, and deterioration.	
	b. Connector	Inspect for breaks and cracks, and signs of leaking.	
REPLACE			
2.	a. Tag and lockwire (1)	Replace.	If necessary.
	b. Connector (2)	Replace.	If necessary.
	c. Preformed packing (3)	Replace.	If necessary.
	d. Setscrews (4)	Replace.	If necessary.

4-64.3. TANK LEVEL INDICATION - CABLE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	e. Cable (5)	Replace.	If necessary.
	f. Molding compound (6)	Replace.	If necessary.
	g. Adapter (7)	Replace.	If necessary.



TYPICAL CONNECTOR PARTS LOCATION



4-64.4. PENETRATION ASSEMBLY - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection

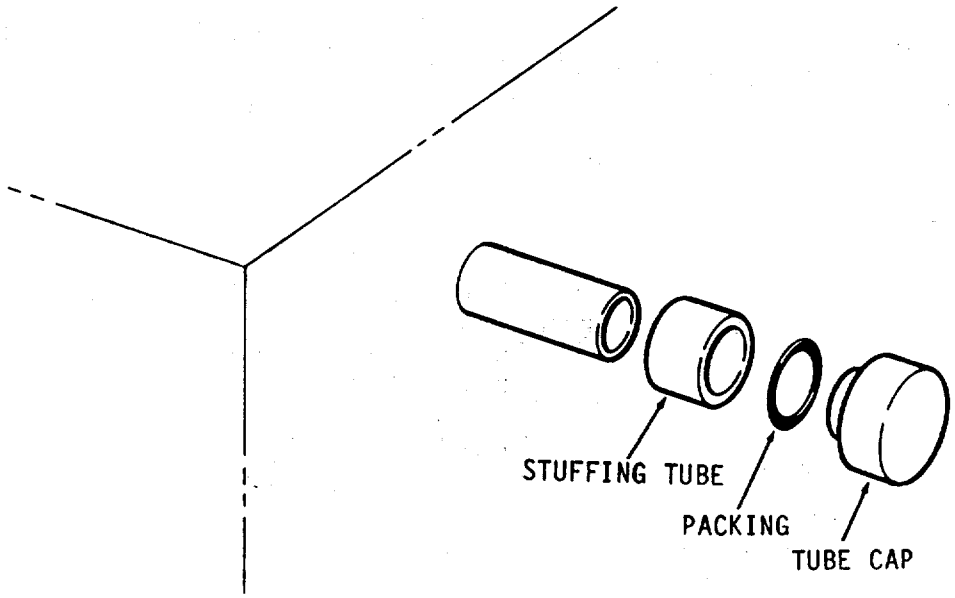
INITIAL SETUP:

Test Equipment	References
NONE	NONE
Special Tools	Equipment Condition / Condition Description
NONE	NONE
Material/Parts	Special Environmental Conditions
NONE	NONE
Personnel Required	General Safety Instructions
1	NONE

LOCATION	ITEM	ACTION	REMARKS

INSPECTION

1.	Penetration assembly	Inspect for damaged, missing, or loose parts.	



4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection
b. Repair

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNINGS in this procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

To prevent possible shock and injury, tag and place disconnect switch in the OFF position.

INSPECTION

1. Hot water heater	a. Hot water heater	1. Inspect for dents, and cracks.	
		2. Inspect for leaks.	
		3. Inspect for proper operation.	
		4. Make sure tank is full of water.	
		5. Insure mounting hardware is tight.	

4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	b. Cold water inlet	1. Inspect for leaks. 2. Inspect for breaks and cracks.	
	c. Hot water outlet	1. Inspect for leaks. 2. Inspect for breaks and cracks.	
	d. Relief valve	1. Inspect for air leaks. 2. Inspect for water leaks.	
	e. Heating element	Check for temperature set on the thermostat.	
	f. Thermo-stats	Check that the water is the temperature set on the on the thermostat.	
	g. Wiring	1. Inspect for loose connections. 2. Inspect for broken, frayed or worn wiring.	
	h. OFF/ON safety switch	Check that water commences heating	
REPAIR			

WARNING

- To prevent shock and possible injury, tag and place disconnect switch in the OFF position.
- Make sure the cold water valve is shut off, failure to do so can result in severe scalding.

4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

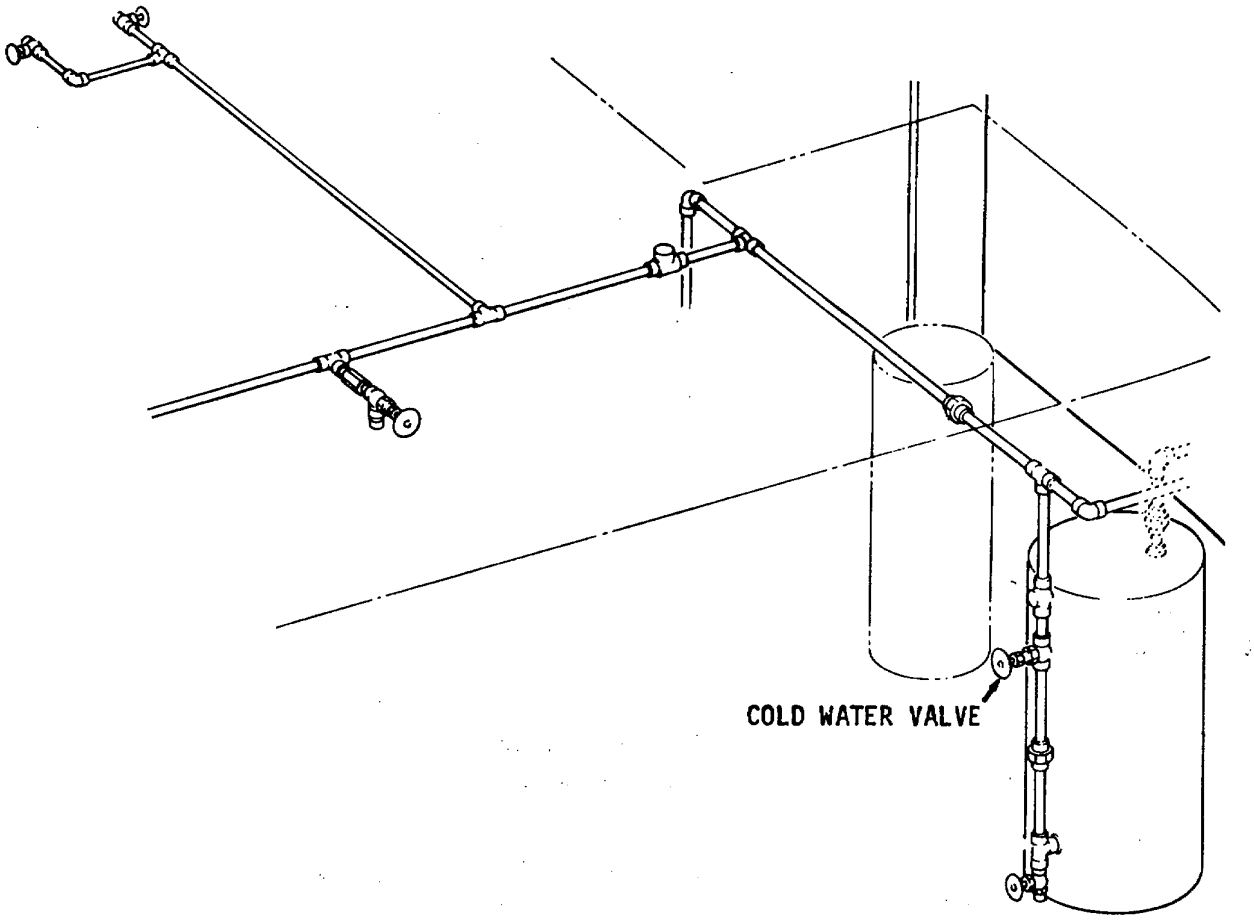
LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

NOTE

Estimated dry weight (empty) is 270 lbs (122.5 kg).

2	Fresh and flush water piping	Cold water supply valve	Turn cold water valve clockwise to close, before starting to work on the hot water heater.	



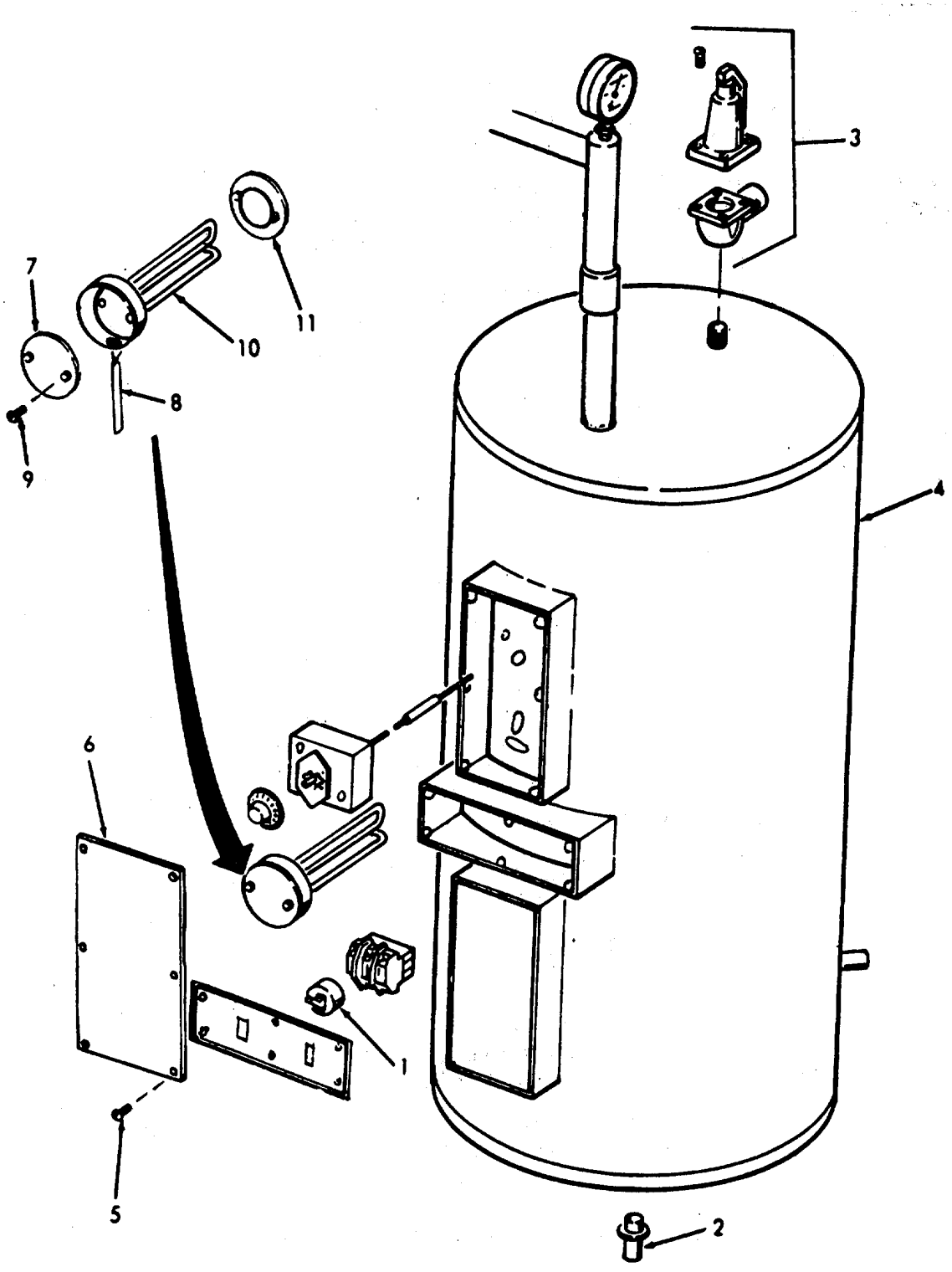
4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont).			
		NOTE The removal and installation of the upper and lower heating elements are identical.	
3. Hot water heater	a. Heating elements (upper and lower)	1 Turn cold water supply valve clockwise to shut off water supply.	
		2 Place the ON-OFF safety switch (1) in the OFF position.	
		3. Attach hose to drain (2).	
		4. Open relief valve (3)	Allow air to enter the hot water tank (4).
		5. Open drain (2).	Drain water from tank (4).
		6. Tag and disconnect external wiring.	
		7. Remove screws (5) and cover plate (6).	
		8. Remove cover (7).	
		9. Tag and disconnect wires (8).	
		10. Remove four screws (9)	
		11. Remove heating element (10) and gasket (11).	Discard gasket.
		12. Insert new heating element (10) and gasket (11).,	Use new gasket.
		13. Install four screws (9).	

4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



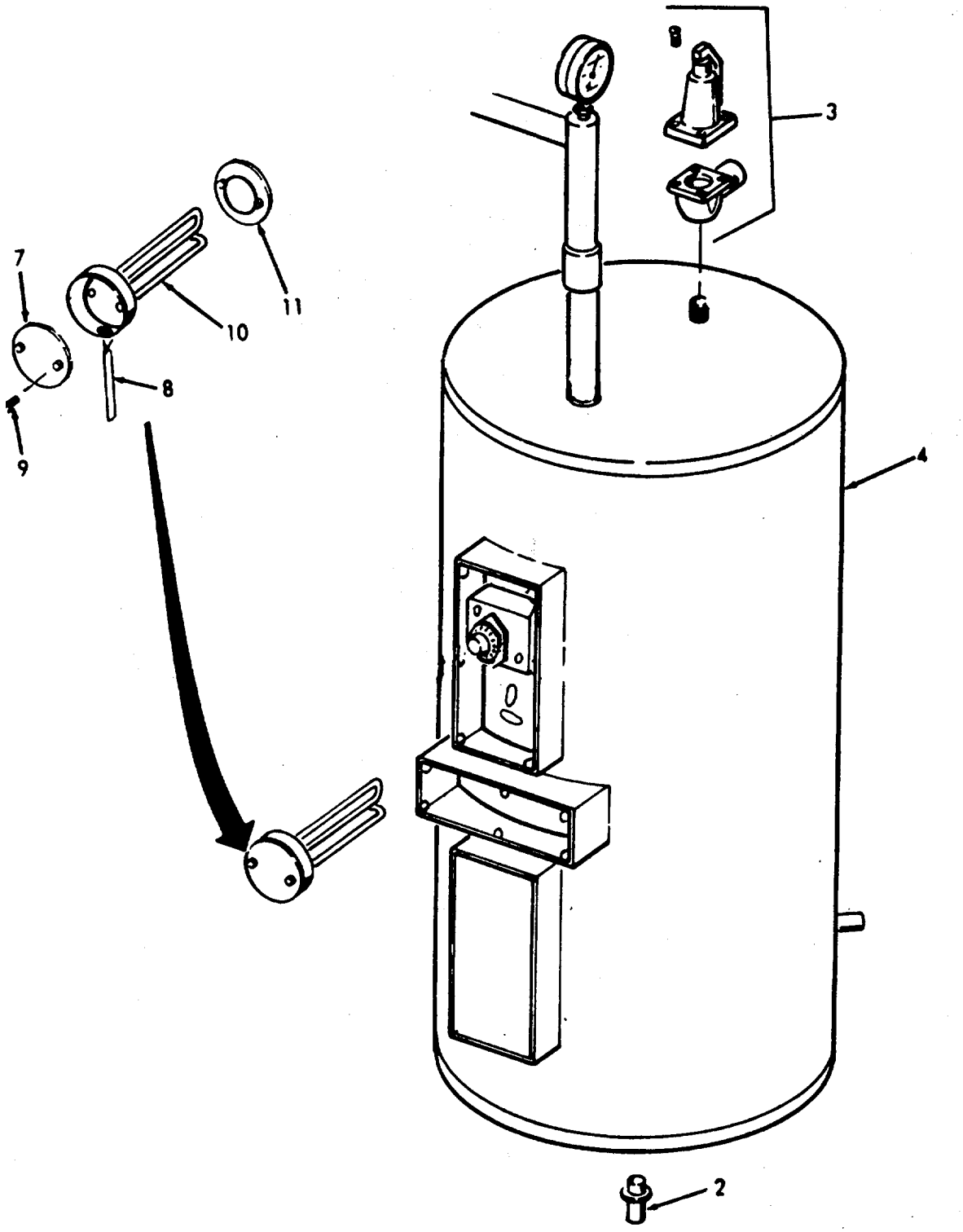
4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
		14. Remove tags, and reconnect wires (8).	
		15. Close drain (2).	
		16. Install cover (7).	
		17. Turn cold water valve counterclockwise to open and fill tank (4) with fresh water.	a. As tank (4) fills, check for leaks, from newly installed gasket (11) and heating element (10). NOTE If leaking occurs STOP, turn off water supply, open drain, drain tank, and install new gasket and heating element. b. As tank (4) fills, air will escape from relief valve (3). c. When water flows from relief valve (3) the tank (4) is full.

4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



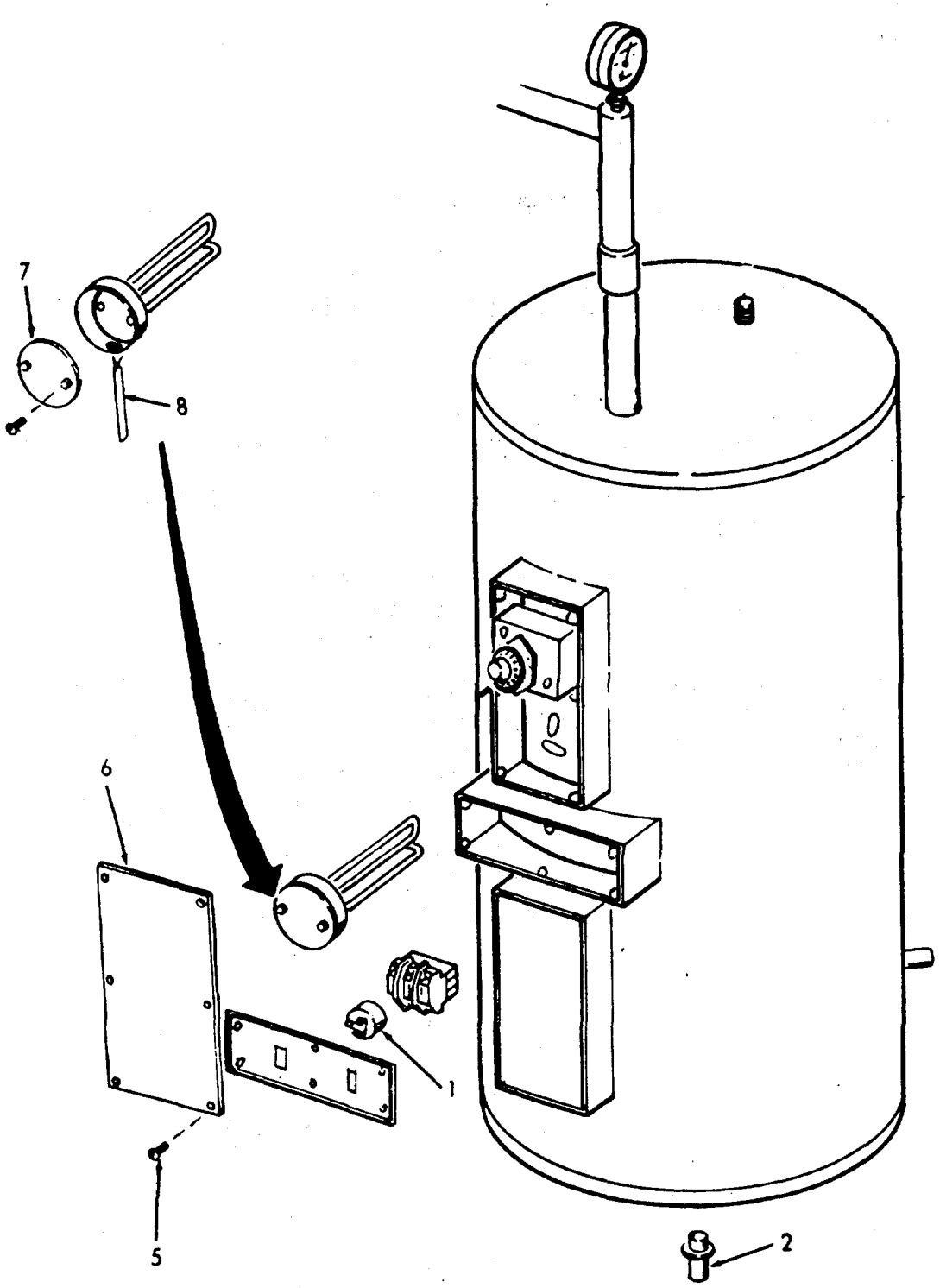
4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
		18. Install cover plate (6) and screws (5).	
		19. Close relief valve (3).	
		20. Remove tags and reconnect external wiring.	
		21. Remove hose from drain (2).	
		CAUTION Before starting the hot water heater make sure the tank is filled, the heating elements are surrounded with water, failure to do so will burn the heating elements out.	
		22. Place ON-OFF safety switch (1) in the ON position.	

4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

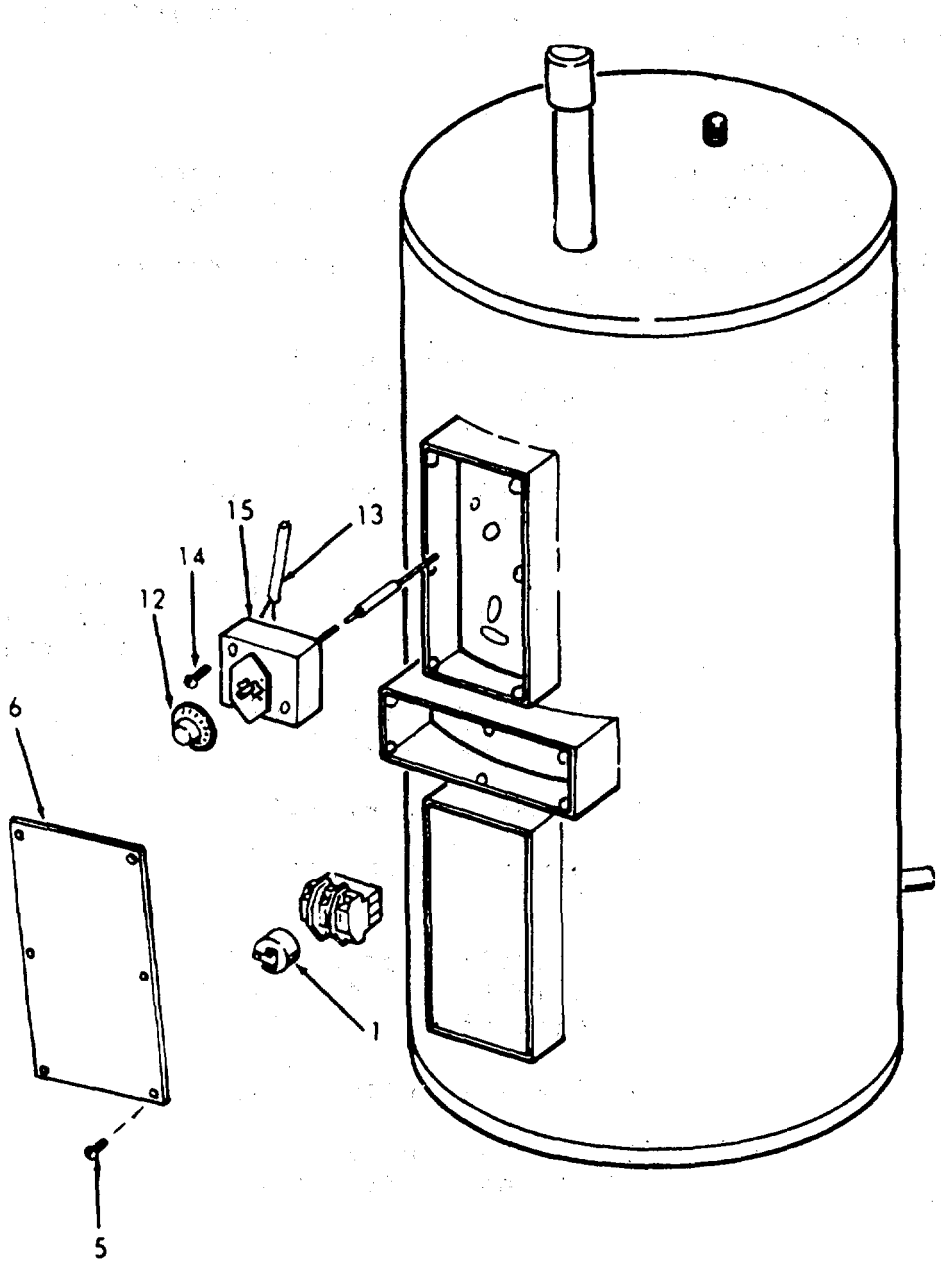


4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
		WARNING To prevent shock and possible injury, tag and place disconnect switch in the OFF position.	
		NOTE • The removal and installation of the upper and lower thermostatic switches are identical. • Water does not have to be drained to replace the thermostatic switches.	
b.	Thermo-stat switch	1. Place the ON-OFF safety switch (1) in the OFF position.	
		2. Remove screws (5) and cover plate (6).	
		3. Turn thermostat dial (12) to OFF and pull off.	Pull off dial without chang-ing the setting.
		4. Tag and disconnect two #18 wires (13).	
		5. Remove screws (14).	
		6. Remove thermostat switch (15).	
		7. Install thermostat switch (15) into well carefully.	
		8. Install screws (14).	
		9. Remove tags and reconnect #18 wires (13).	

4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
		10. Install dial (12).	Adjust dial to desired temperature.
		11. Place ON-OFF safety switch (11) in the ON position.	



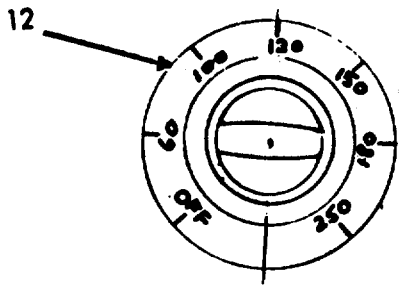
4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

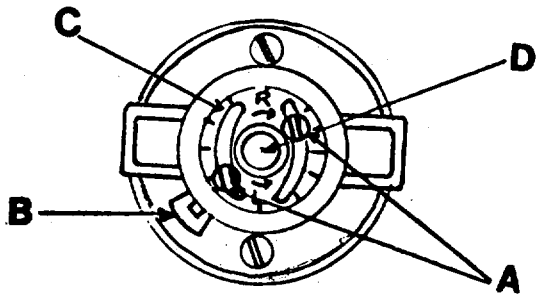
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)I			
		12. Calibrate thermostat as follows:	
		(a) Set thermostat dial at 140°F.	
		(b) Obtain temperature of water in heater. The difference between the dial setting and temperature of the water is the number of °F the thermostat is "out".	
		(c) Set dial (12) to temperature noted on thermometer.	
		(d) Pull off dial (12) without changing the setting.	
		(e) Loosen the two calibration screws (A).	
		(f) Hold the cam (B) stationary and revolve the calibration plate (C) and adjusting screw (D) clockwise if the water temperature in the heater is below the dial setting, and counterclockwise if the temperature in the heater is above the dial setting. The thermostat will snap when its adjustment is the same as the water temperature. Each calibration mark equals 12°F.	
		(g) Tighten calibration screws (A) carefully and replace dial (12). Rotate the dial (12) up and down. It should cut in and out at the same temperature of the water in the heater.	
		(h) Move dial to 140° and let heater heat up. It may be necessary to make a further slight adjustment.	

4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (cont.)

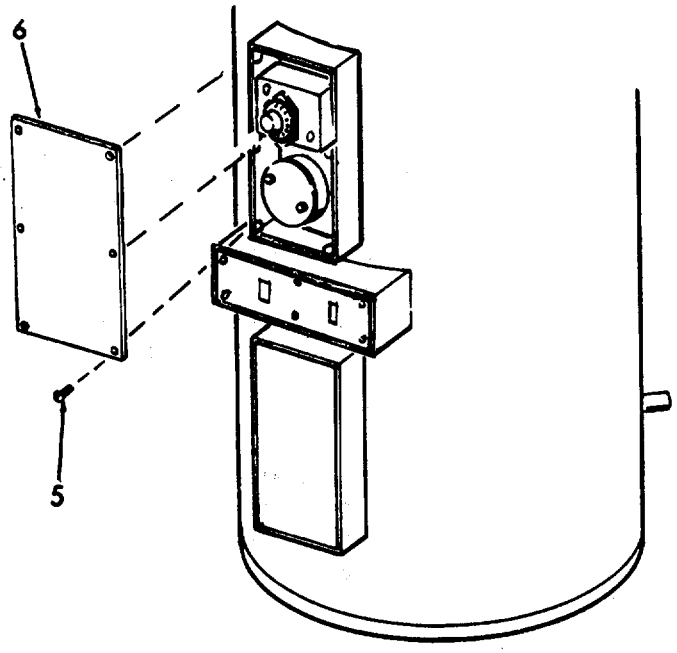




NOTE

It is also possible to obtain temperature of water in heater by lifting test lever on relief valve and measuring the temperature of the water coming through the discharge.

13. Install cover plate (6) and screws (5).



4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)

WARNING

To prevent possible shock and injury, tag and place disconnect switch in the OFF position.

c.	ON-OFF safety switch	1. Remove external wiring. 2. Remove Screws (16) and cover plate (17). 3. Remove screws (18). 4. Remove and replace ON-OFF safety switch (1). 5. Install screws (18). 6. Install cover plate (17) and screws (16). 7. Install external wiring.	

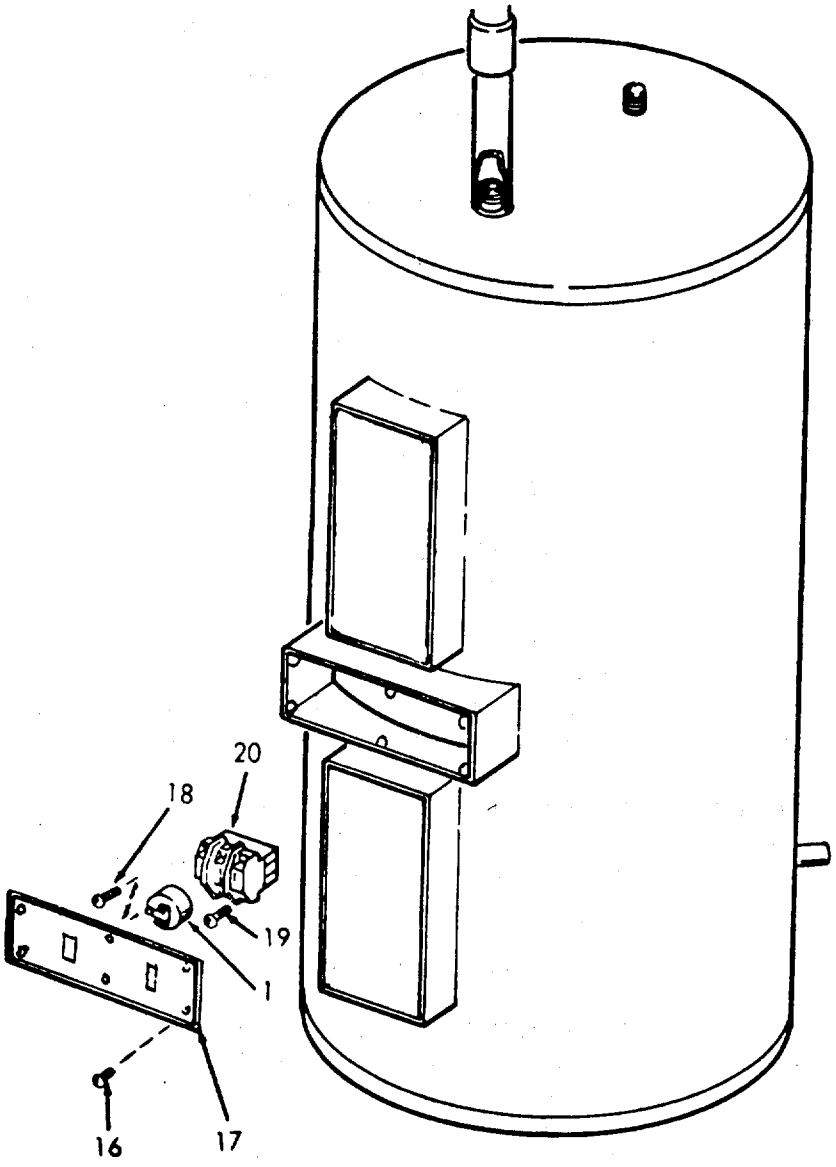
NOTE

When the ON/OF'F Safety switch is operated with power ON, the magnetic contactors should function.

d.	Magnetic contac-tors	1. Remove external wiring. 2. Remove screws (16) and cover plate (17). 3. Remove screws (18). 4. Remove ON-OFF safety switch (1) and tag and disconnect attaching wires. 5. Remove screws (19).	

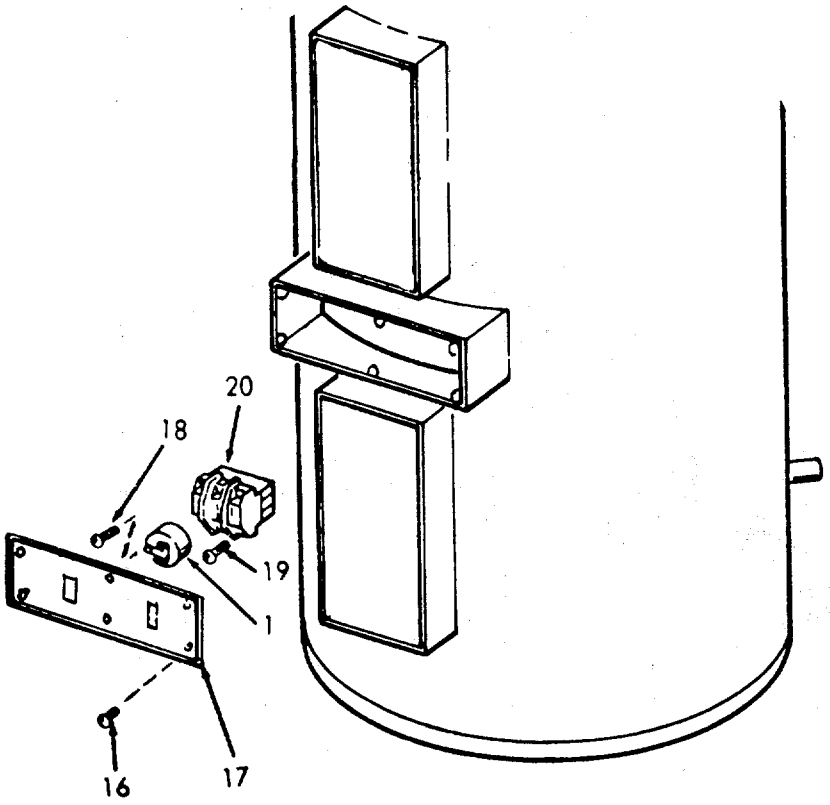
4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
		6. Tag and disconnect wires from the magnetic contractor (20).	
		7. Remove and replace magnetic contactor (20).	Because of the design of this contactor, it is more desirable to replace than to rebuild.



4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
		8. Remove tags and reconnect wiring to magnetic contactor (20).	
		9. Instal1 screws (19).	
		10. Remove tags, connect wires and install ON-OFF safety switch (1).	
		11. Install screws (18).	
		12. Install cover plate (17) and screws (16).	
		13. Install external wiring.	



4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)

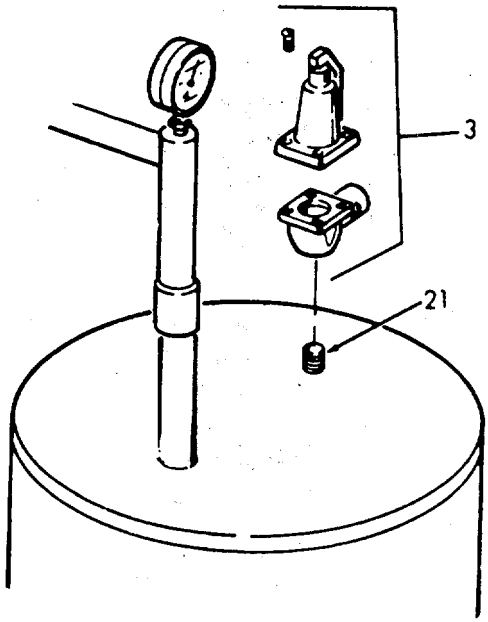
WARNING

Make sure the cold water supply valve is shut off, failure to do so can result in severe scalding.

NOTE

Before working on hot water heater piping turn the cold water supply valve off.

e.	Relief valve and outlet	1. Unscrew and remove relief valve (3).	Clean and replace.
		2. Unscrew and remove relief valve outlet (21).	
		3. Install relief valve outlet (21).	
		4. Install relief valve (3).	



4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
	f. Hot water outlet and thermometer	1. Remove thermometer (22).	Replace if defective.
		2. Disconnect piping (23).	
		3. Replace hot water outlet (24).	3/4 brass pipe.
		4. Reconnect piping (23).	
		5. Install thermometer (22).	

WARNING

- To prevent shock and possible injury, tag and place disconnect switch in the OFF position.
- Make sure the cold water valve is shut off, failure to do so can result in severe scalding.

NOTE

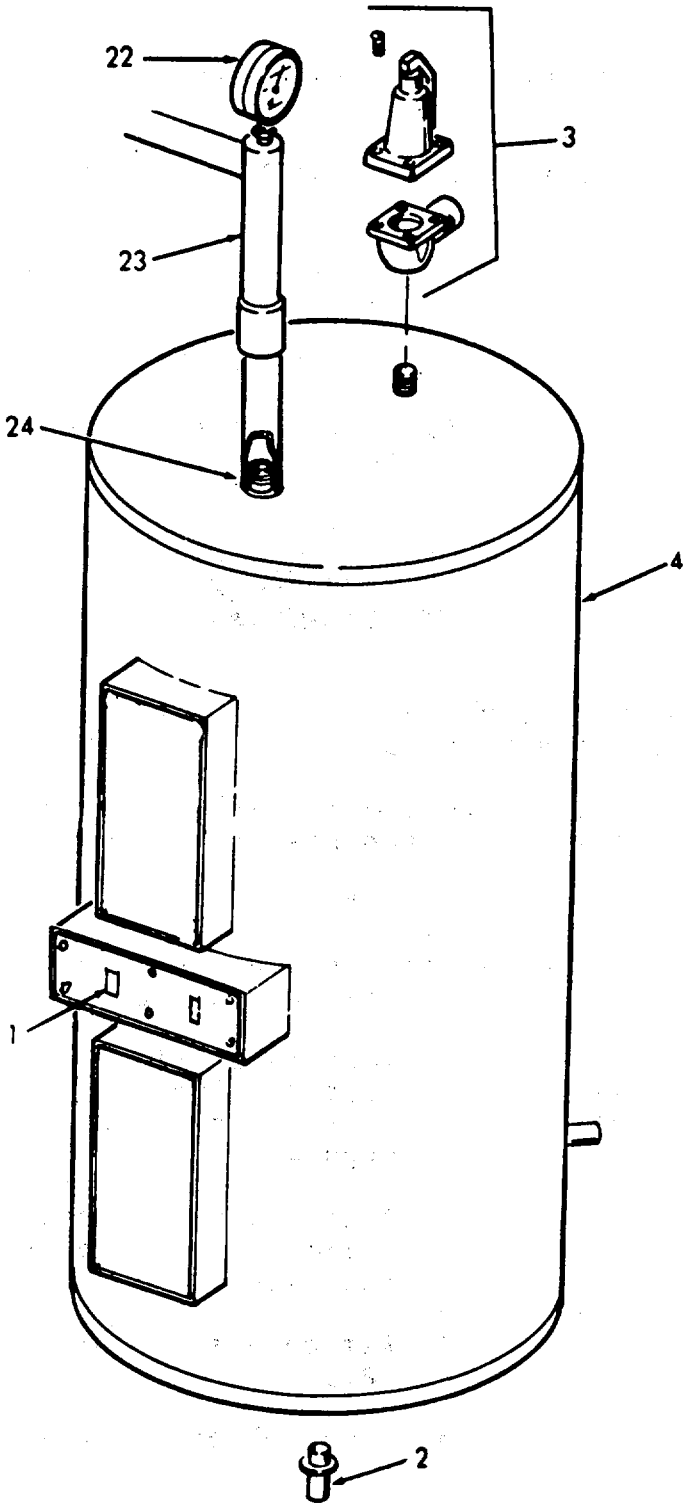
In order to repair the cold water inlet and the drain, the hot water heater must be drained.

	g. Cold water inlet	1. Turn cold water supply valve clockwise to shut off water supply.	
		2. Place ON-OFF safety switch (1) in the OFF position.	
		3. Attach hose to drain (2).	
		4. Open relief valve (3).	Allow air to enter tank (4).

4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)



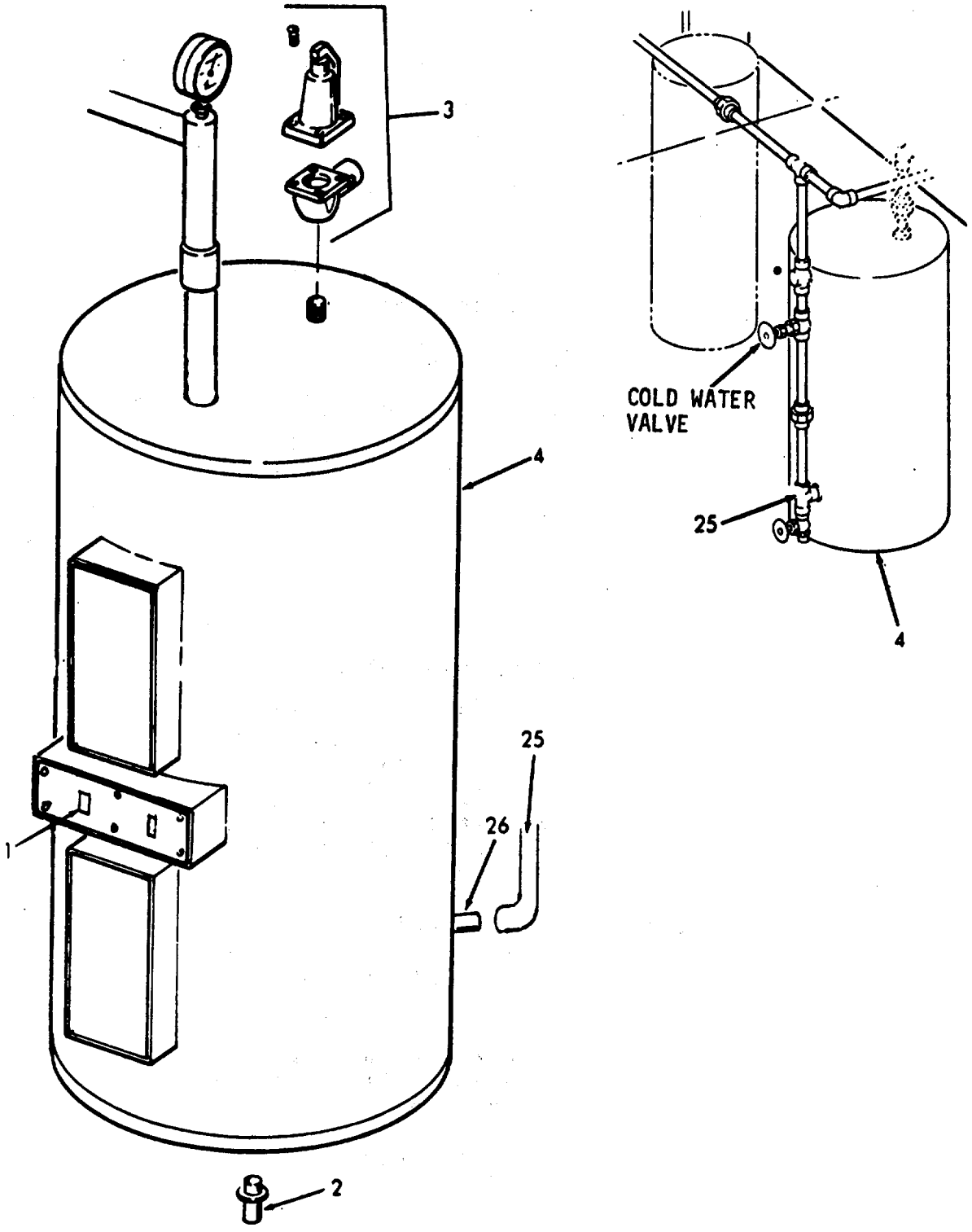
4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
		5. Open drain (2).	Drain tank (4).
		6. Disconnect piping (25).	
		7. Replace cold water inlet (26).	3/4 brass pipe.
		8. Reconnect piping (25).	
		9. Close drain (2).	
		10. Turn cold water valve counterclock-wise to open and fill tank (4) with fresh water.	a. As tank (4) fills, air will escape from relief valve (3). b. When water flows from relief valve (3) the tank (4) is full.
		11. Close relief valve (3).	
		12. Remove hose from drain (2).	
		13. Place ON-OFF safety switch (1) in the ON position.	
	h. Drain	1. Turn cold water supply valve clockwise to shut off water supply.	
		2. Place ON-OFF safety switch (1) in the OFF position.	
		3. Attach hose to drain (2).	

4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)



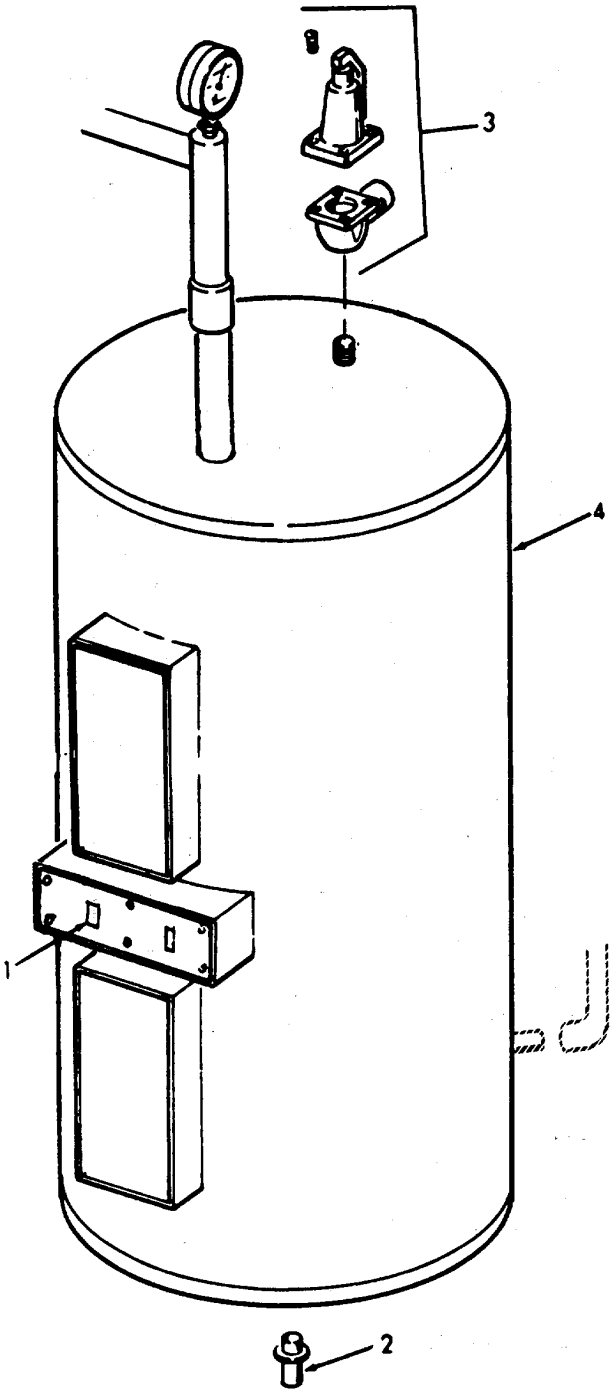
4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

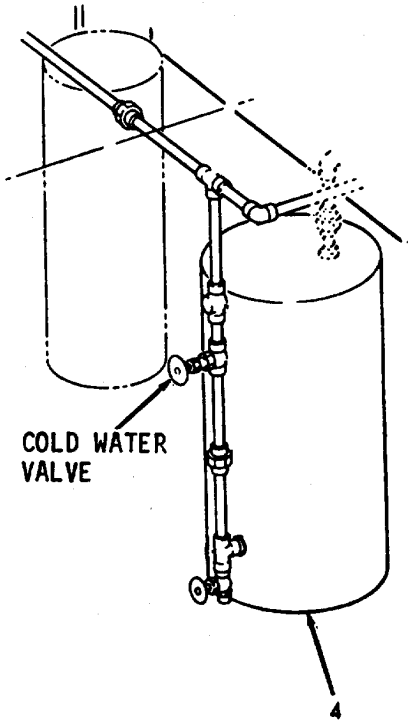
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
		4. Open relief valve (3). enter tank (4).	Allow air to
		5. Open drain (2).	Drain tank (4).
		6. Remove hose from drain (2).	
		7. Replace drain (2).	3/4 copper silicon pipe.
		8. Close drain (2).	
		9. Turn cold water valve counterclockwise to open and fill tank (4) with fresh water.	a. As tank (4) fills, air will escape from relief valve (3). b. When water flows from relief valve (3) the tank (4) is full.
		10. Close relief valve (3).	
		11. Place ON-OFF safety switch (1) in the ON position.	

4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR

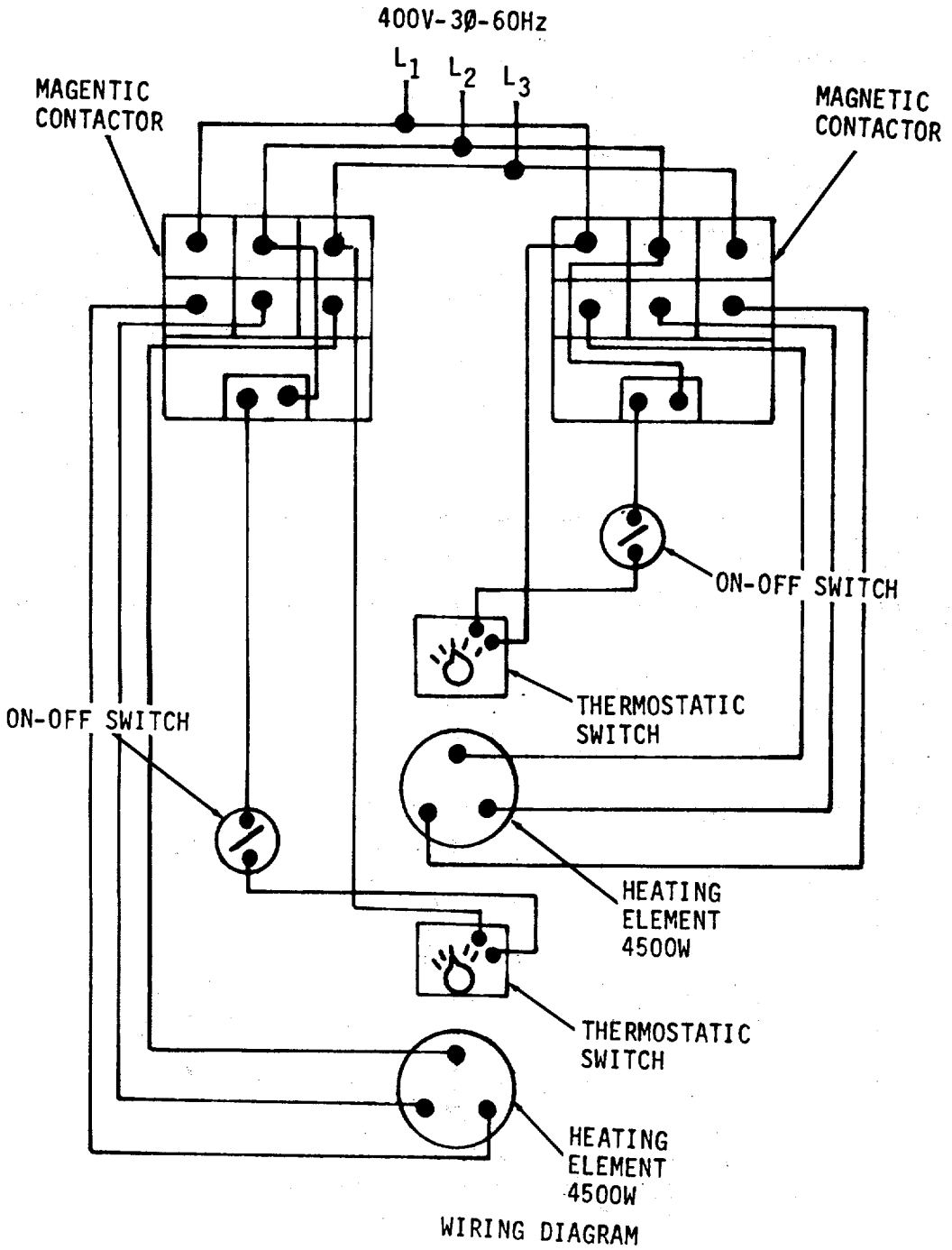




4-65. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)



WIRING DIAGRAM

4-66. PLUMBING AND DECK DRAINS - MAINTENANCE INSTRUCTIONS .

This task covers:

a. Inspection b. Repair

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

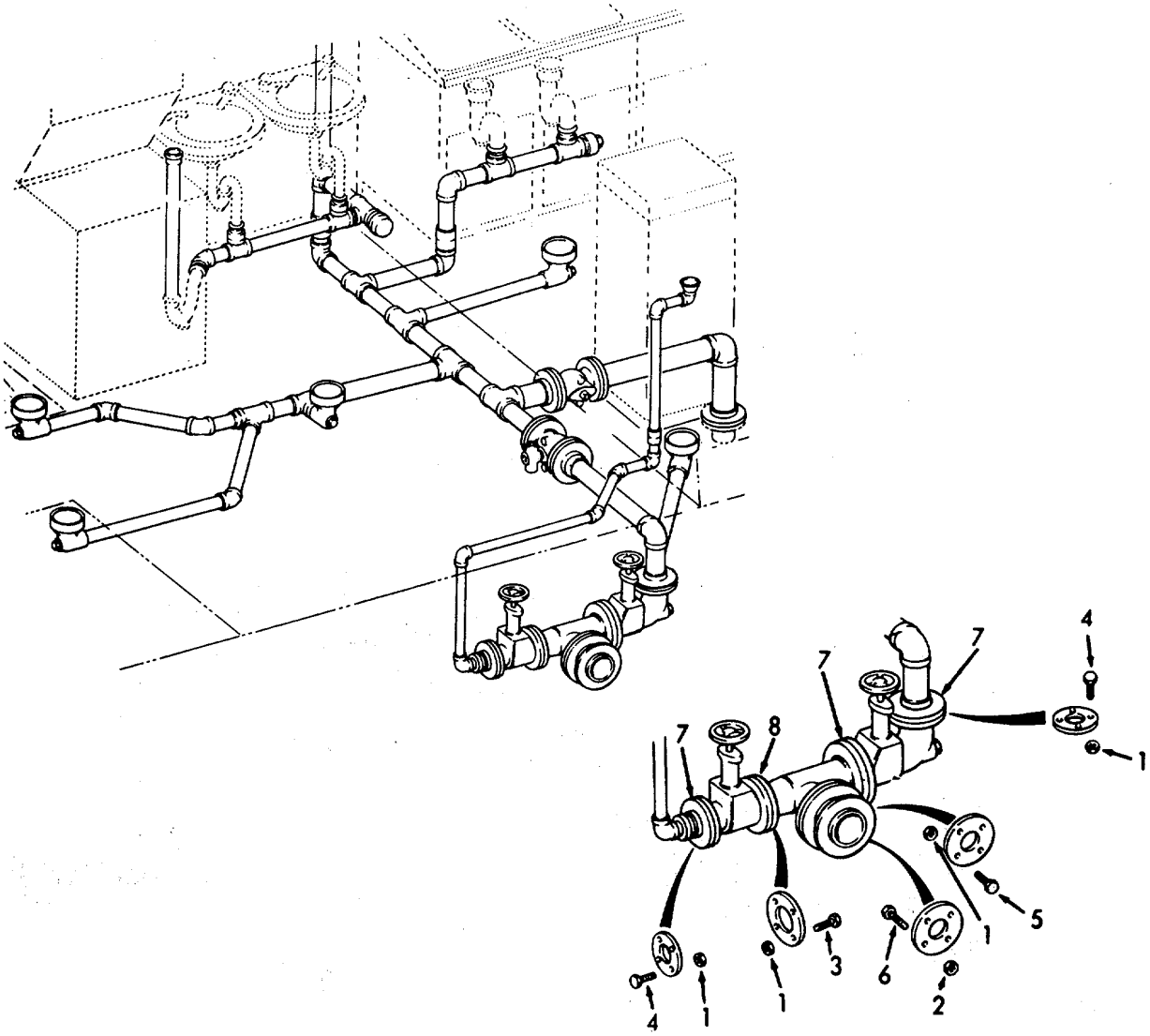
General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Plumbing and deck drains	a. Piping	Inspect for breaks, cracks, and leaks.	
	b. Valves	1. Inspect for breaks, cracks, and leaks.	
		2. Check for proper operation.	
	c. Deck drains	1. Inspect for breaks, cracks, and leaks.	
		2. Inspect for accumu- lated dirt, etc.	Clean.
	d. Scupper valves	Inspect for breaks, cracks, and leaks.	

4-66. PLUMBING AND DECK DRAINS - MAINTENANCE INSTRUCTIONS (Continued).

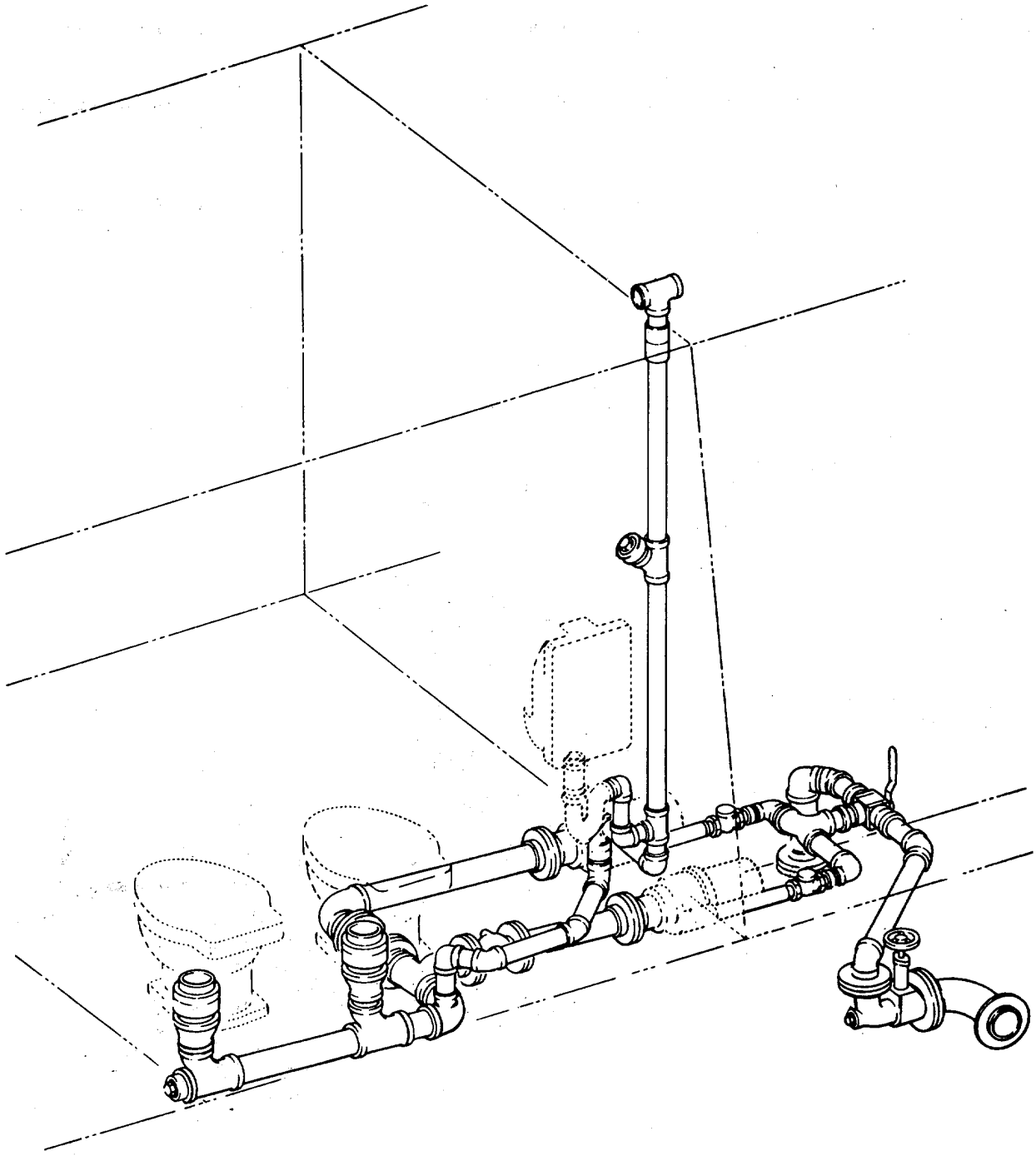
LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Flanges	a. Nuts (1 and 2)	Remove.	If necessary.
	b. Screws (3, 4, 5, and 6)	Remove.	If necessary.
	c. Gaskets (7, and 8)	Replace.	If necessary.



4-66. PLUMBING AND DECK DRAINS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)

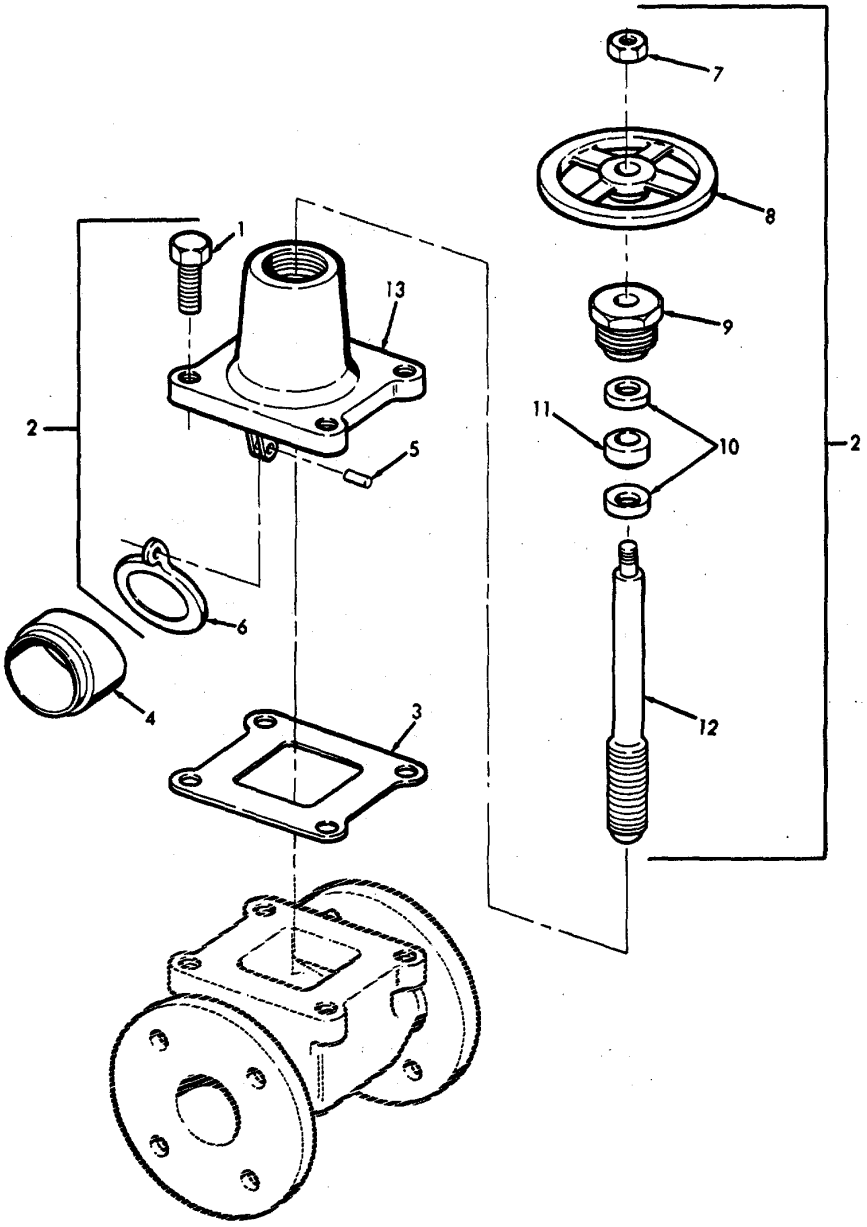


4-66. PLUMBING AND DECK DRAINS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
3. Scupper valves	a. Screws (1)	Remove.	
	b. Hand wheel and bonnet assembly (2)	Remove.	
	c. Gasket (3)	Remove.	Discard.
	d. Valve sleeve (4)	Remove.	
	e. Pin (5) and flap valve (6)	Remove.	
	f. Nut (7) and handwheel (8)	Remove.	
	g. Gland nut (9)	Remove.	
	h. Glands (10), packing (11), stem (12), and bonnet (13)	1. Disassemble. 2. Replace packing, and glands. 3. Reassemble.	
	i. Gland nut (9)	Install.	
	J. Handwheel (8) and nut (7)	Install.	
	k. Flap valve (6) and pin (5)	Install.	
	l. Valve sleeve (4)	Install.	

4-66. PLUMBING AND DECK DRAINS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
	m. Handwheel and bonnet assembly (2) and gasket (3)	Assemble.	Use new gasket.
	n. Screws (1)	Install.	



4-67. VENTS AND SOUNDINGS - MAINTENANCE INSTRUCTIONS .

This task covers:

a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment-, Condition Condition Description

NONE

Special Environmental Conditions

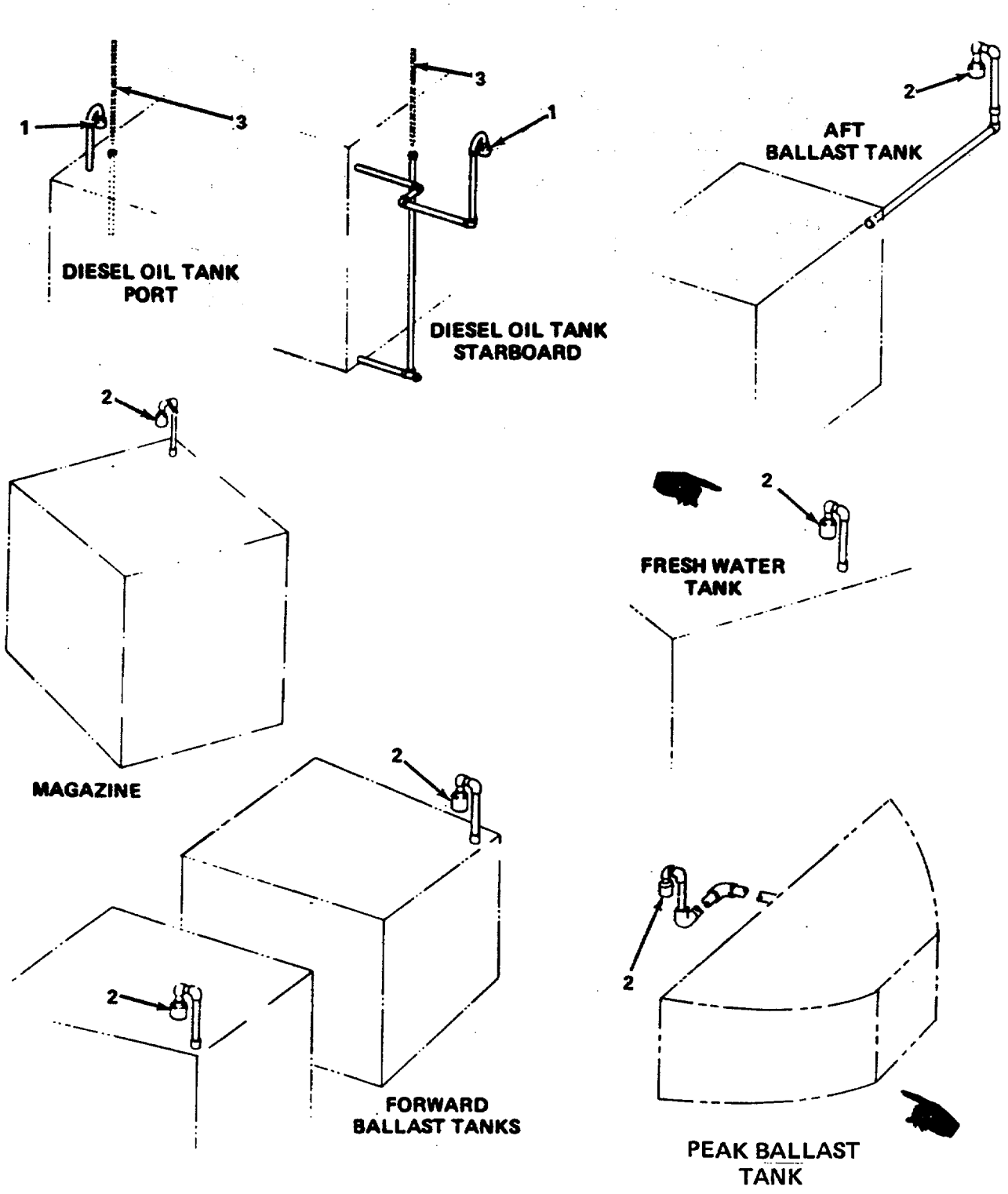
NONE

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Vent and sounding tubes	a. Vents	Inspect for breaks, cracks, bends, and signs of leaking air.	
	b. Sounding tubes	Inspect for breaks, cracks, dents, and leaks.	
	c. Vent valves operation.	Inspect for proper	
REPAIR			
2. Vents	a. Ball vent valves (1)	Replace.	If necessary.
	b. Inverted check valves (2)	Replace.	If necessary.
3. Sounding tapes	Tapes (3)	Replace	If necessary,

4-67. VENTS AND SOUNDINGS - MAINTENANCE INSTRUCTIONS.



4-68. HULL AND OUTFIT.

The following is an index to the maintenance procedures.

4-69. STANCHIONS AND RAILINGS - MAINTENANCE INSTRUCTIONS

This task covers:

a. Inspection **b. Replace**

INITIAL SETUP

Test Equipment
NONE

References
Volume 2, Chapter 2 - Removal and Installation of Stanchions and Railings .

Special Tools
NONE

Equipment Condition Condition Description
NONE

Material /Parts
NONE

Special Environmental Conditions
NONE

Personnel Required
1

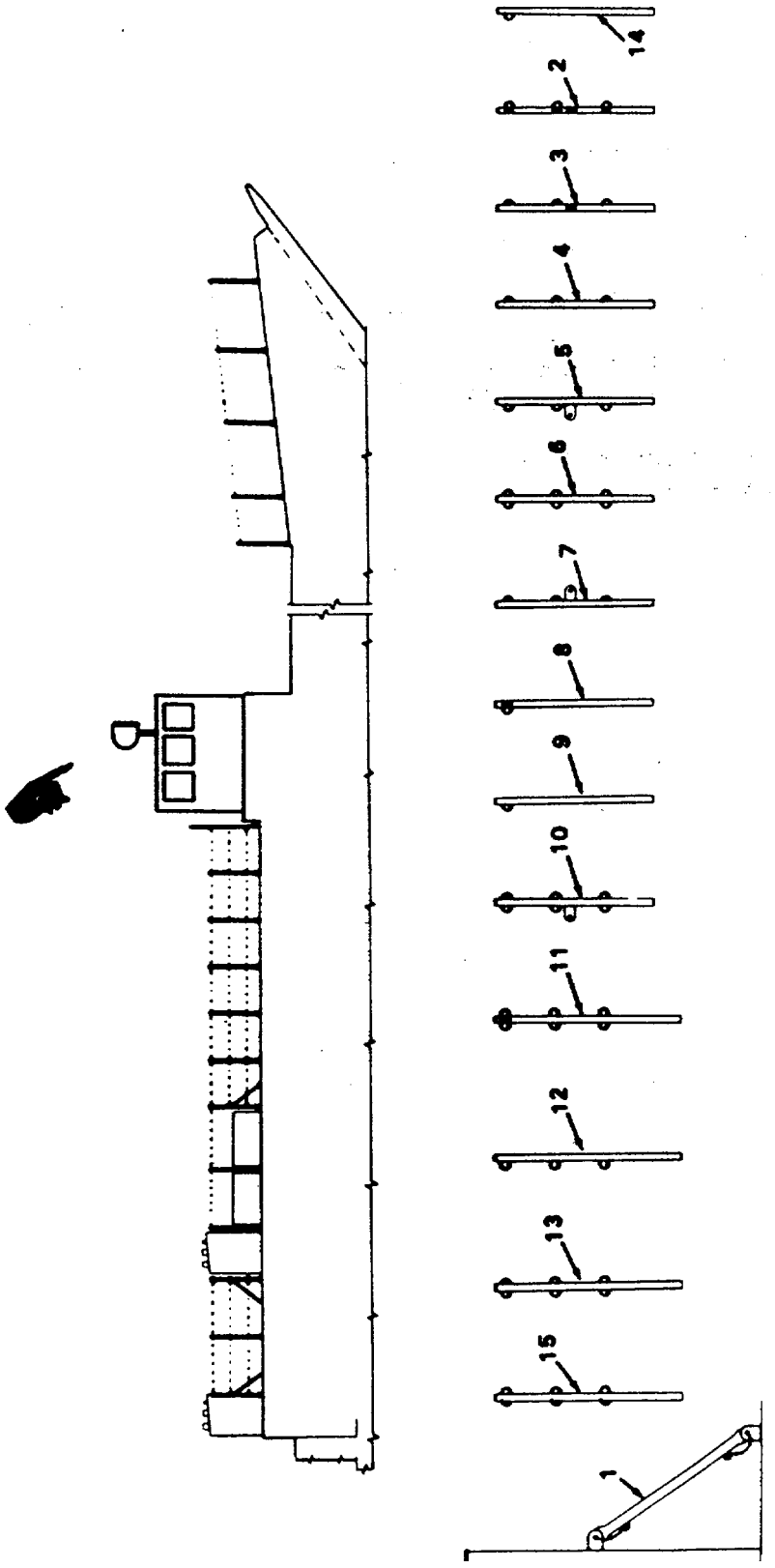
General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Stanchions and railings	a. Toggle pins	Inspect for broken or missing pins.	
	b. Stanchions	Inspect for bent, broken, or missing parts.	
	c. Boat snaps	Inspect for broken or missing snaps.	
	d. Turnbuckles	Inspect for broken or missing turnbuckles .	

4-69. STANCHIONS AND RAILINGS - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
2.	a. Toggle pin with stanchion brace (1)	Replace.	If necessary.
	b. Type C-1 stanchion (2)	Replace.	If necessary.
	c. Type C stanchion (3)	Replace.	If necessary.
	d. Type A stanchion (4)	Replace.	If necessary.
	e. Type A-1 stanchion (5)	Replace.	If necessary.
	f. Type F stanchion (6)	Replace.	If necessary.
	g. Type B stanchion (7)	Replace.	If necessary.
	h. Type N-1 stanchion (8)	Replace.	If necessary.
	i. Type N stanchion (9)	Replace.	If necessary.
	j. Type E stanchion (10)	Replace.	If necessary.
	k. Type G .stanchion (11)	Replace.	If necessary.
	1. Type H stanchion (12)	Replace.	If necessary.
	m. Type K stanchion (13)	Replace.	If necessary.
	n. Type O stanchion (14)	Replace.	If necessary.
	o. Type M stanchion (15)	Replace.	If necessary.

4-69. STANCHIONS AND RAILINGS - MAINTENANCE INSTRUCTIONS

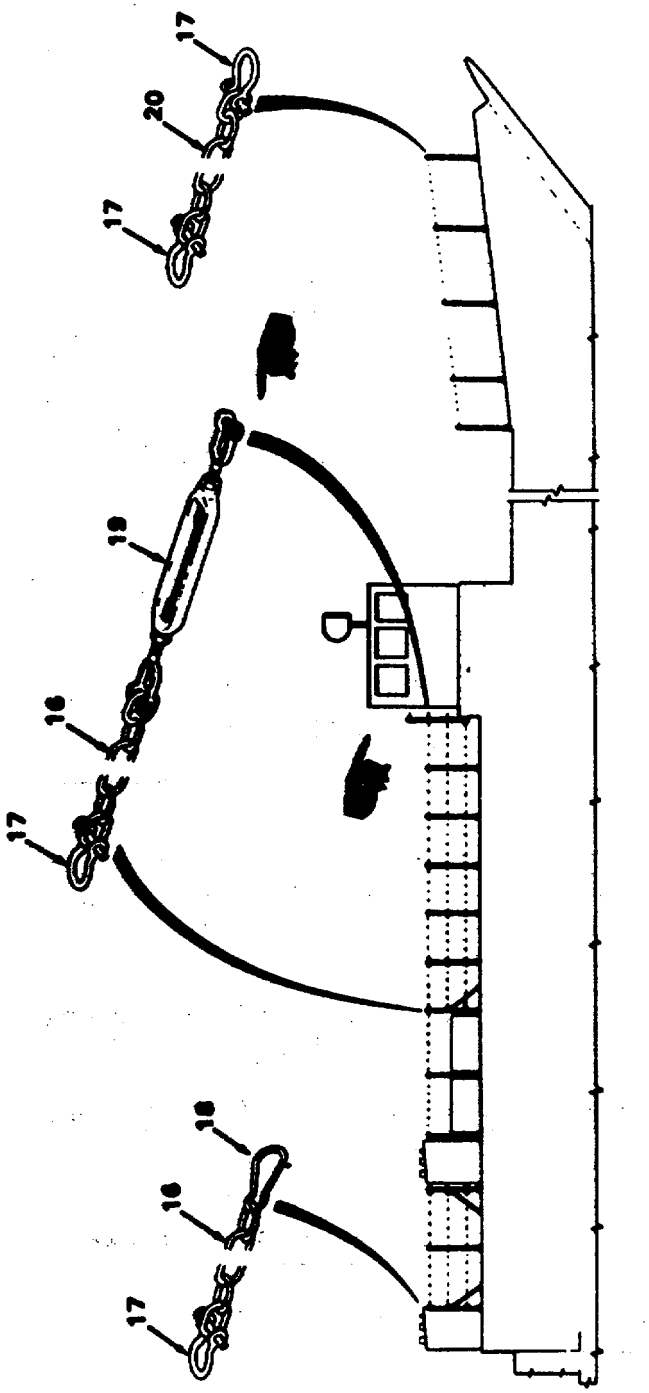


4951-176

4-69. STANCHIONS AND RAILINGS - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	p. 1/4 Close chain link (16)	Replace.	If necessary.
	q. 5/16 Anchor shackle (17)	Replace.	If necessary.
	r. Boat snap (18)	Replace.	If necessary.
	s. 3/8 x 4-1/2 Jaw and eye turnbuckle (19)	Replace.	If necessary.
	t. 5/16 close chain link (20)	Replace.	If necessary.

4-69. STANCHIONS AND RAILINGS - MAINTENANCE INSTRUCTIONS



4951-177

4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Replace**

INITIAL SETUP

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment
Condition Condition Description
NONE'

Material/Parts
NONE

Special Environmental Conditions
NONE

Personnel Required
1

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Galley and messroom	a. Shelfs	1. Inspect for damage.	Refer to Direct Support Maintenance .
		2. Insure all hardware is tight.	
	b. Dresser sink	1. Inspect for damage.	Refer to Direct Support Maintenance .
		2. Insure ail hardware is tight.	
	c. Bowl/cup stowage racks	1. Inspect for damage.	Refer to Direct Support Maintenance .
		2. Insure all hardware is tight.	

4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	d. Stowage dresser	1. Inspect for damage.	Refer to Direct Support Maintenance.
		2. Insure all hardware is tight.	
	e. Mess counter	1. Inspect for damage.	Refer to Direct Support Maintenance.
		2. Insure all hardware is tight.	
	f. Wall cabinet	1. Inspect for damage.	Refer to Direct Support Maintenance.
		2. Insure all hardware is tight.	
	g. Clock	1. Inspect for damage.	
		2. Insure all hardware is tight.	
		3. Inspect for proper operation	
	h. Mess seats	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	i. Condiment tray	1. Inspect for damage.	
		2. Insure all hardware is tight.	
2. Pilot house and deck house	a. Book rack	1. Inspect for damage.	
		2. Insure all hardware- is tight.	

4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	b. Chart rack	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	c. Curtain	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	d. Clinometers	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	e. Key locker	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	f. Binocular	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	g. Pilothouse stool	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	h. Bulletin board	1. Inspect for damage.	
		2. Insure all hardware is tight.	
3. Crew berthing space	a. Berths	1. Inspect for damage	
		2. Insure all hardware is tight.	
	b. Lockers	1. Inspect for damage.	
		2. Insure all hardware is tight.	

4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	c. Mirror	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	d. Coat hooks	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	e. Oxygen breathing apparatus	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	f. Writing shelf	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	g. Folding chair	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	h. Curtain rods and curtains	1. Inspect for damage.	
		2. Insure all hardware is tight.	
4. Officers stateroom	a. Book rack	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	b. File cabinet	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	c. Berths	1. Inspect for damage.	
		2. Insure all hardware is tight.	

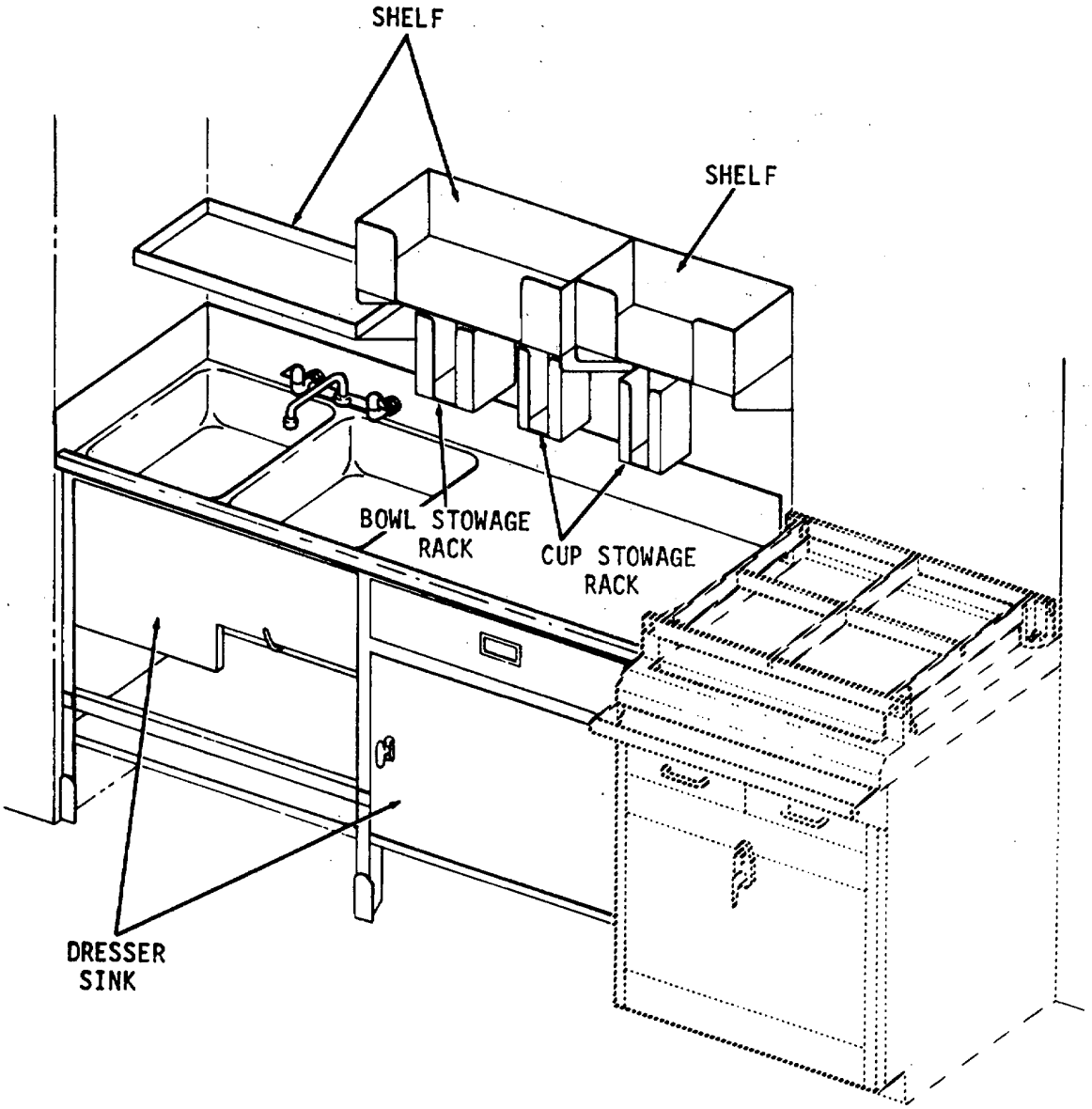
4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	e. Wardrobes	1. Inspect for damage. 2. Insure all hardware is tight.	
	f. Secretary locker	1. Inspect for damage. 2. Insure all hardware is tight.	
	g. Curtain rods and curtains	1. Inspect for damage. 2. Insure all hardware is tight.	
REPLACE			
5. Galley and mess room	a. Clock	Replace.	If necessary.
	b. Condiment tray	Replace.	If necessary.
	c. Mess seats	Replace.	If necessary.

4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

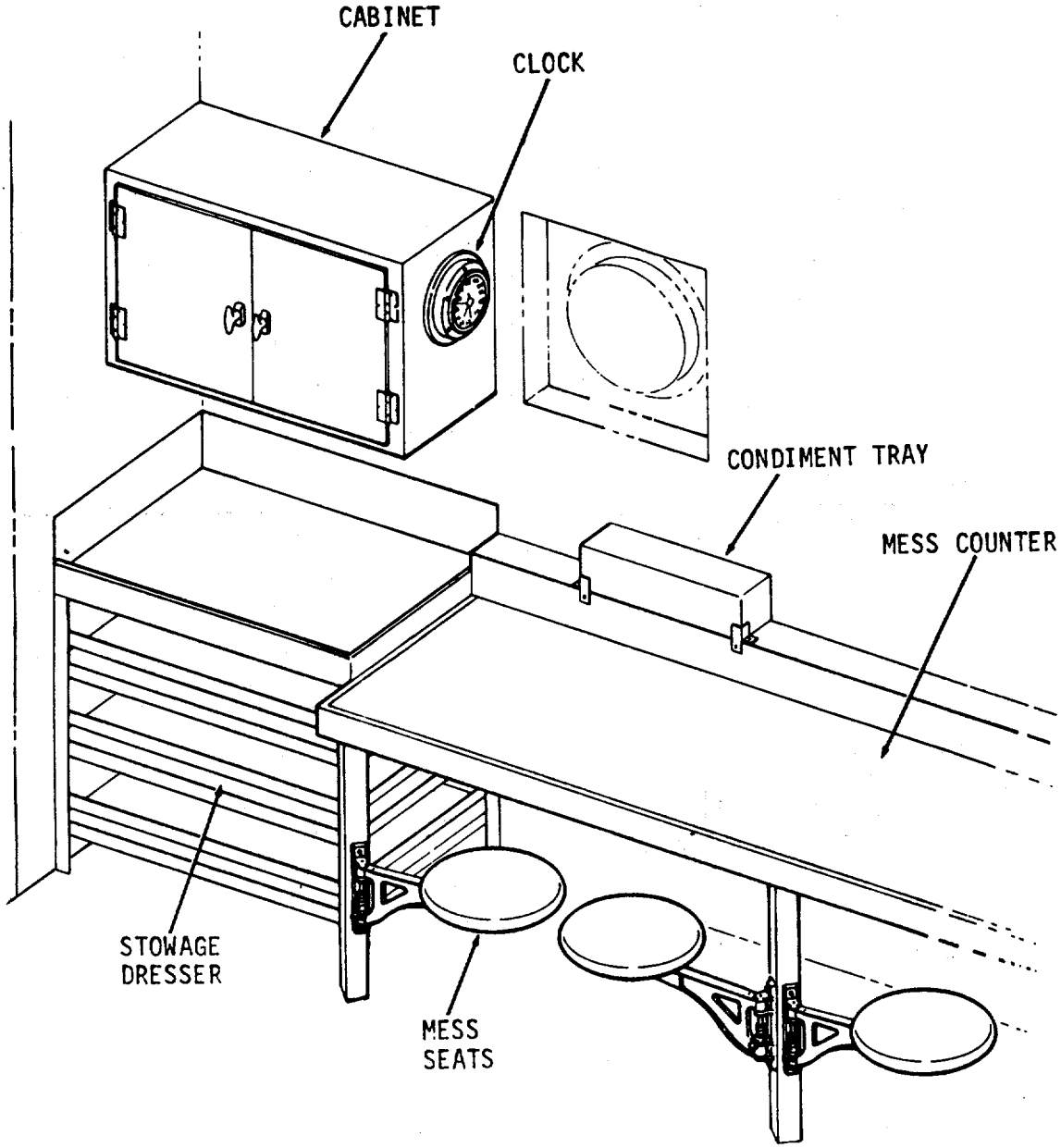
REPLACE (Cont)



4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



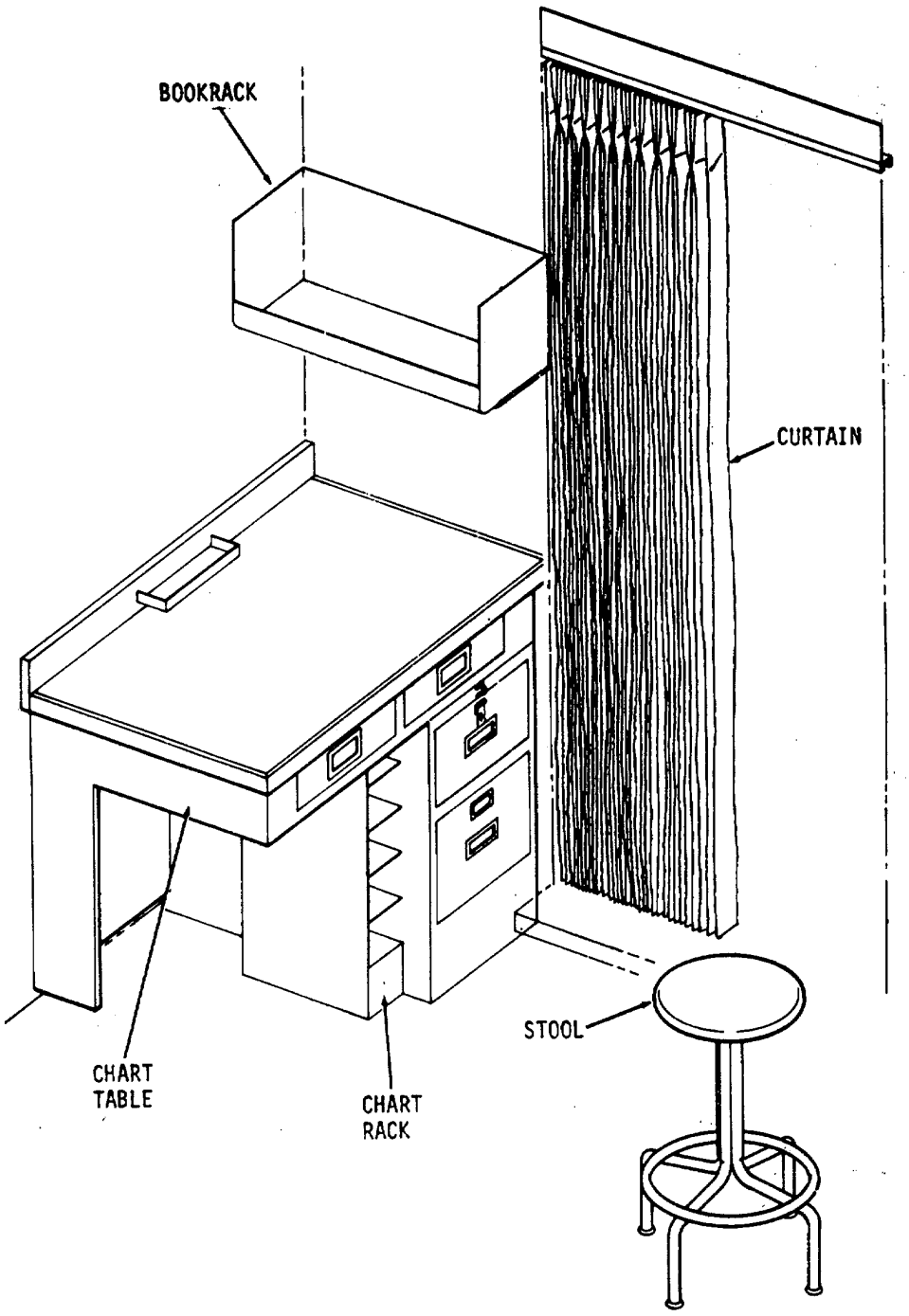
4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
6. Pilot house and deck house	a. Book rack	Replace.	If necessary.
	b. Chart rack	Replace.	If necessary.
	c. Curtain	Replace.	If necessary.
	d. Stool	Replace.	If necessary.
	e. Clinometers	Replace.	If necessary.
	f. Key locker	Replace.	If necessary.
	g. Binocular cases	Replace.	If necessary.
	h. Bulletin board	Replace.	If necessary.

4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

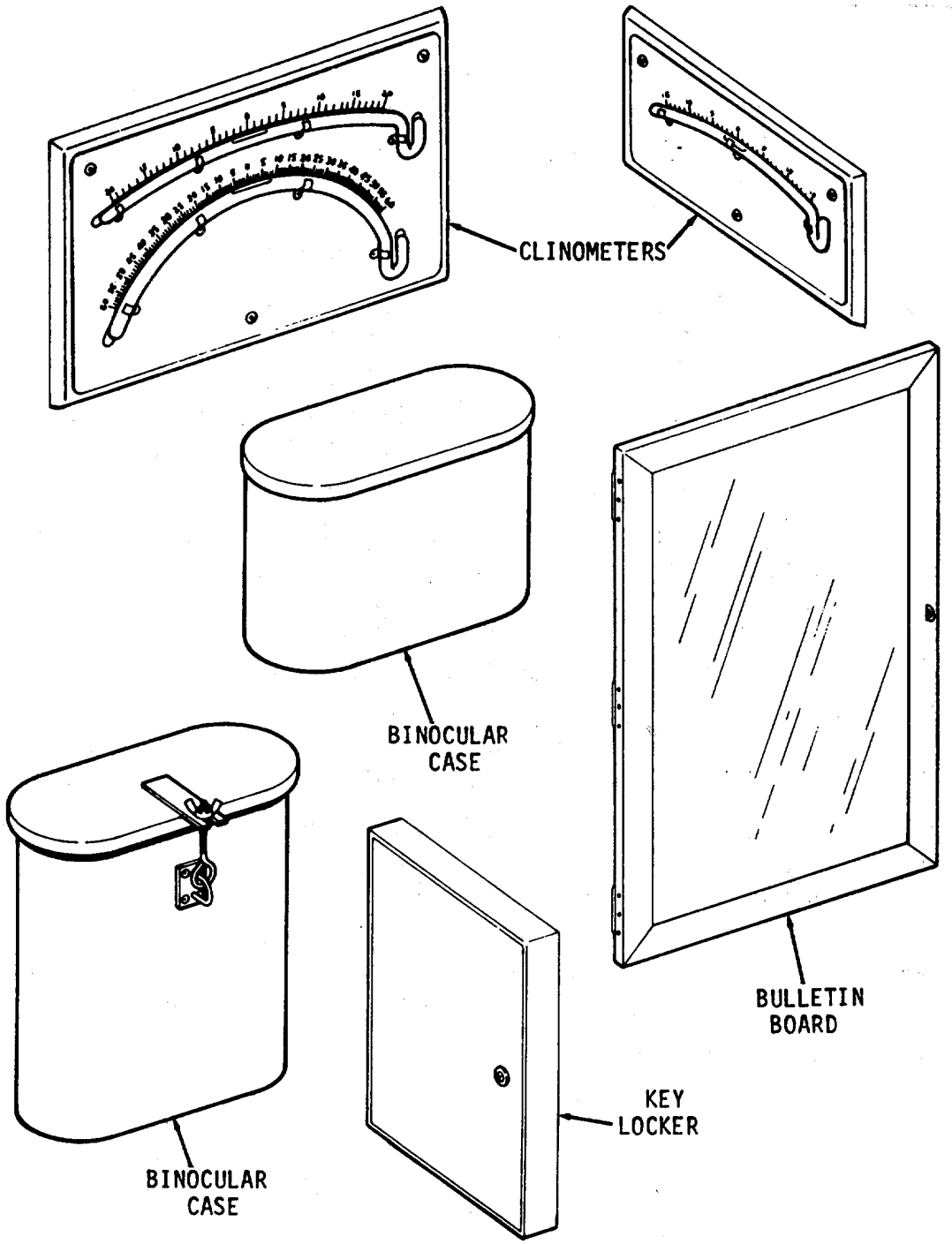
REPLACE (Cont)



4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



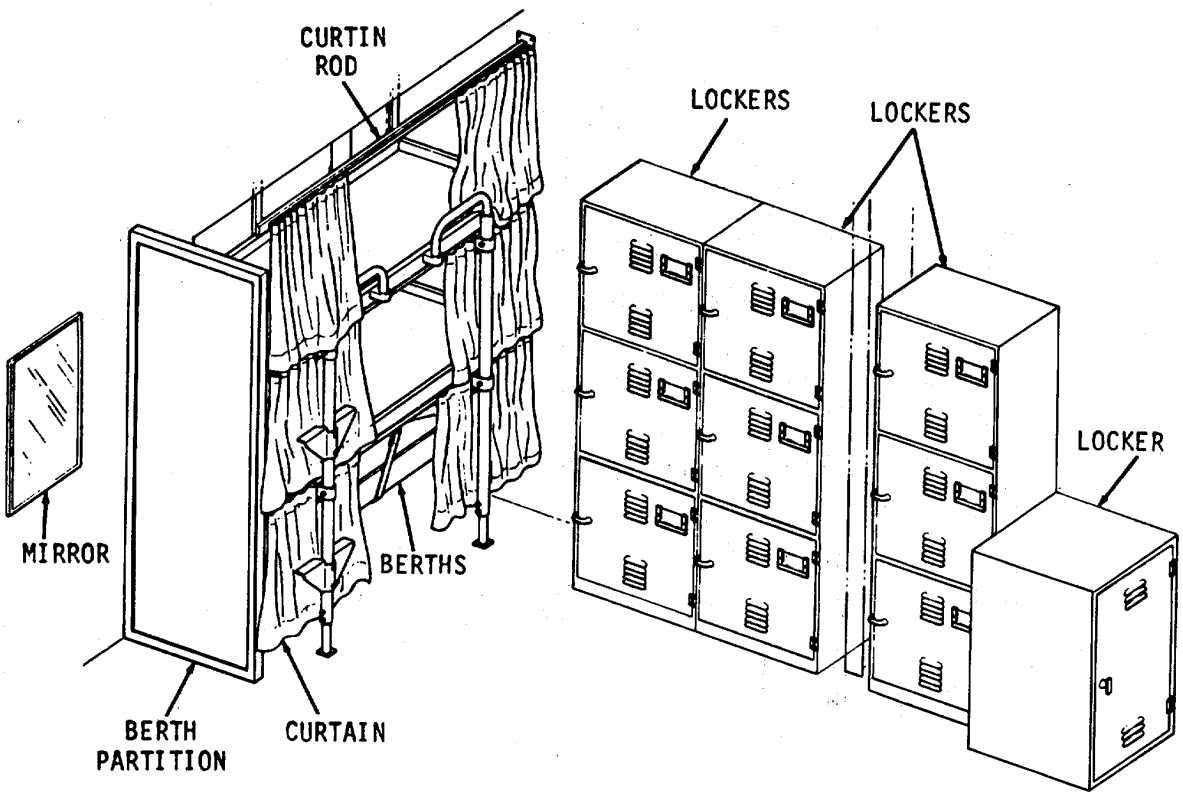
4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
7. Crew berthing space	a. Mirror	Replace.	If necessary.
	b. Curtain	Replace.	If necessary.
	c. Curtain rod	Replace.	If necessary.
	d. Berth partician	Replace.	If necessary.
	e. Berths	Replace.	If necessary.
	f. Lockers	Replace.	If necessary.
	g. Oxygen breathing apparatus locker	Replace.	If necessary.
	h. Cleaning locker	Replace.	If necessary.
	i. Coat hooks	Replace.	If necessary.
	j. Writing shelf	Replace.	If necessary.
	k. Chair	Replace	If necessary.

4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

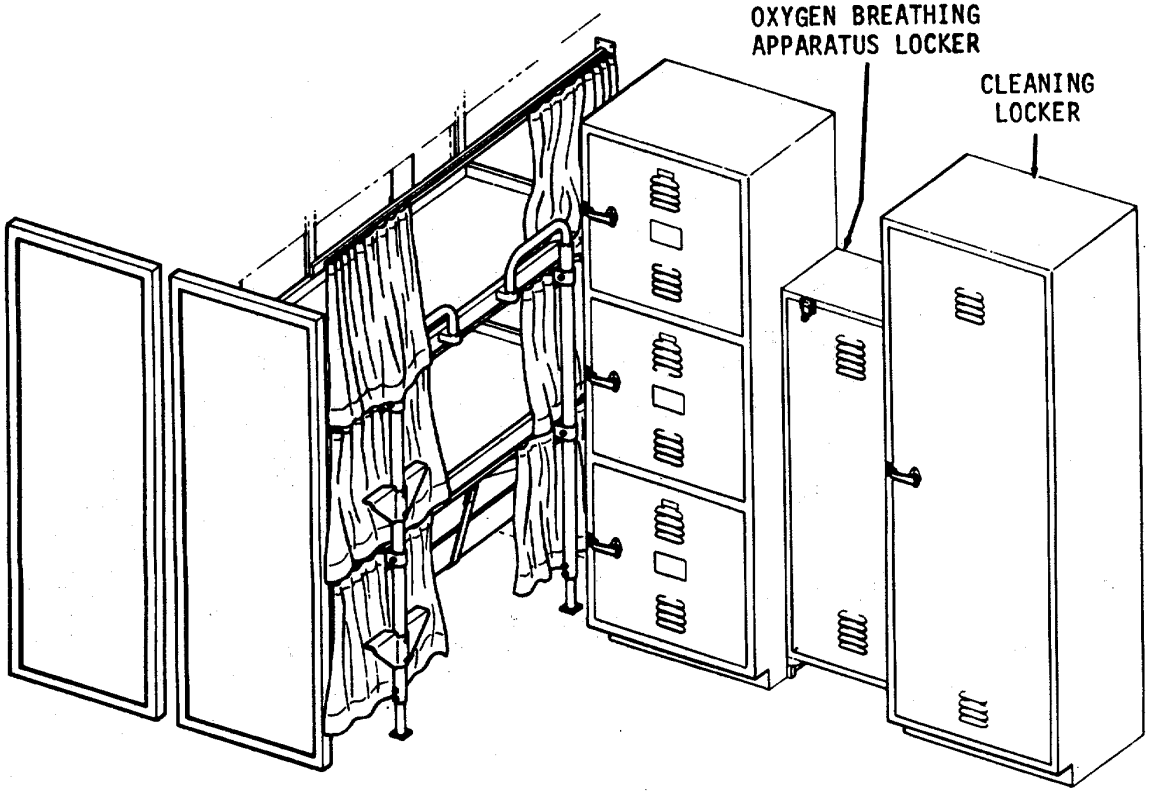
REPLACE (Cont)



4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)

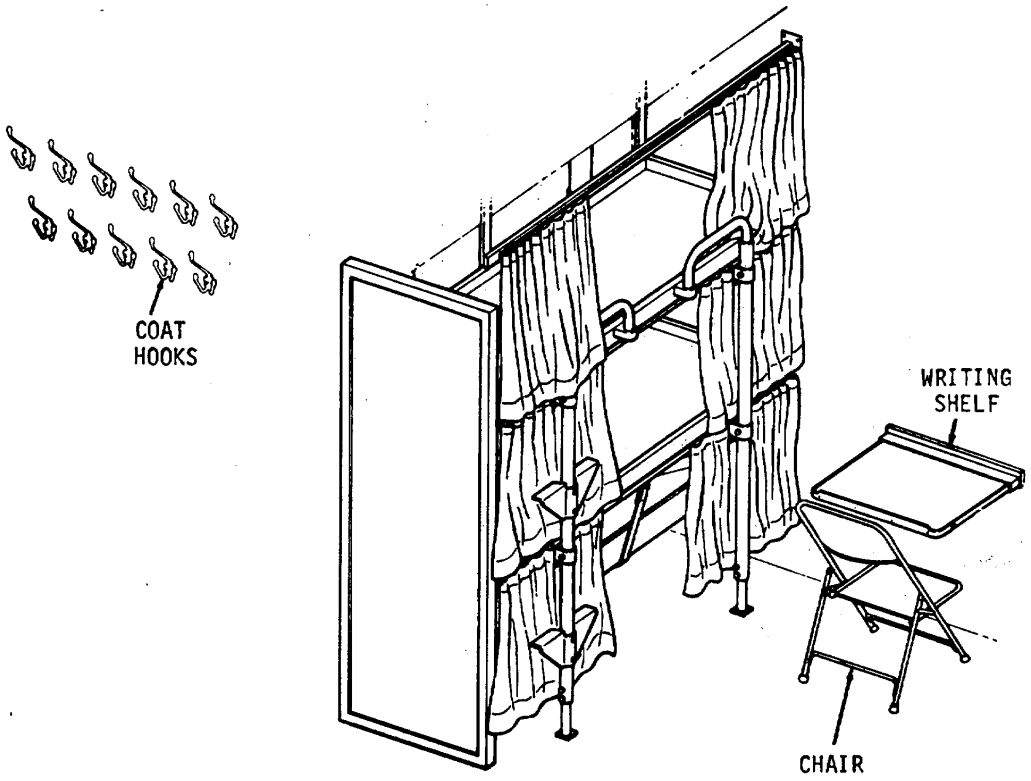


4-1422

4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

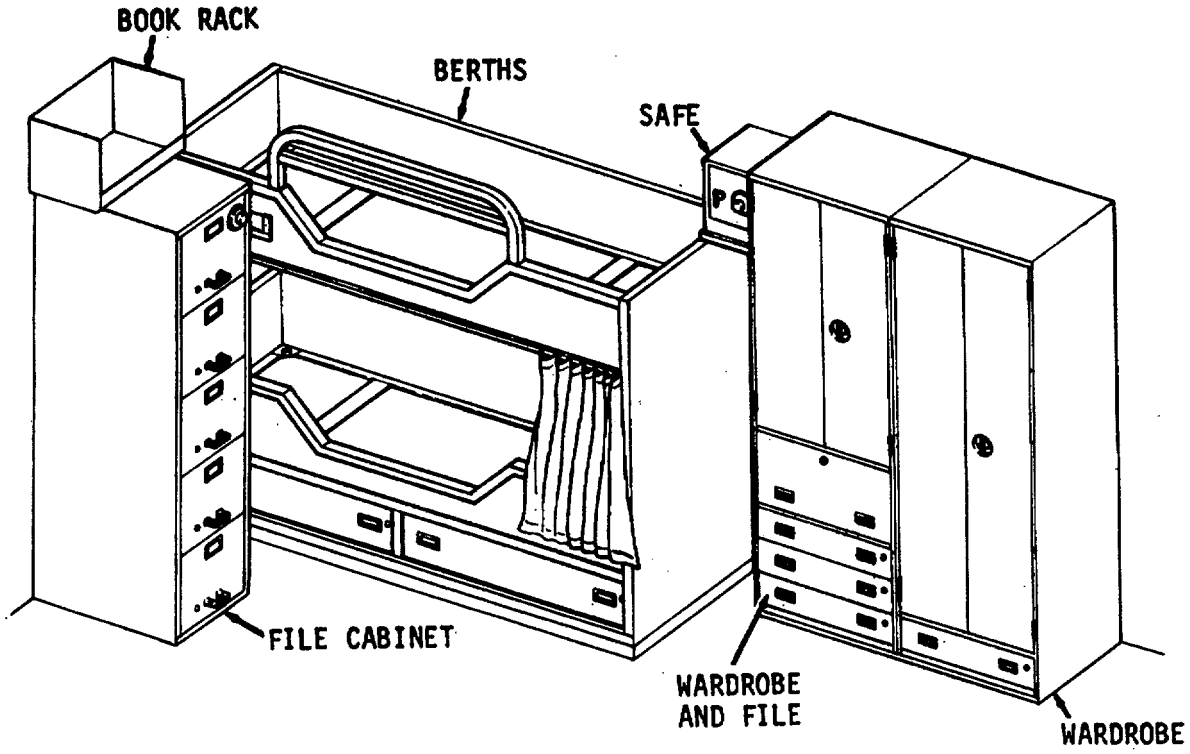
REPLACE (Cont)



4-1423

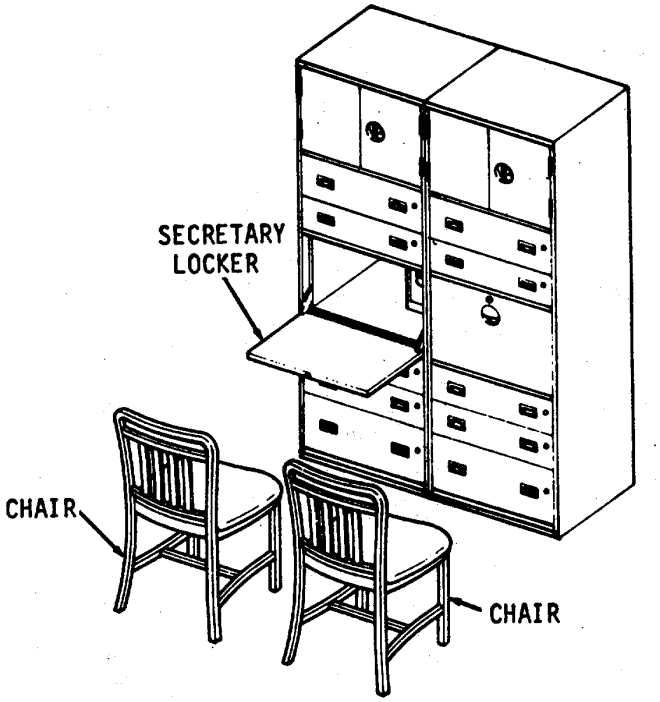
4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
8. Officers stateroom	a. File cabinet	Replace.	If necessary.
	b. Book rack	Replace.	If necessary.
	c. Berths	Replace.	If necessary.
	d. Safe	Replace.	If necessary.
	e. Wardrobe and file	Replace.	If necessary.
	f. Wardrobe	Replace.	If necessary.



4-70. FURNITURE AND MISCELLANEOUS FURNISHINGS- MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	g. Secretary locker	Replace.	If necessary.
	h. Chairs	Replace	If necessary.



4-71.2. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS

This task covers:

a. Inspection **b. Replace** **c. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

Arbor Press
Piston pin removal tools
Ring compressor

Material/Parts

Oil, MIL-L-2104
Type 0E/HD0-20

Personnel Required

1

References

NONE

Equipment
Condition Condition Description

NONE

Special Environmental Conditions

Use the oil separation and recovery system to collect drained oil.

General Safety Instructions

Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

In order to avoid the possibility of shock. make sure the power cord is not plugged into a source of power.

INSPECTION

1.	Portable air compressor	a.	Power cord	Inspect for breaks, wear, and damage.
		b.	Drive belts	Inspect for breaks, wear, and damage.
		c.	Motor	Inspect for signs of damage.

4-62. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

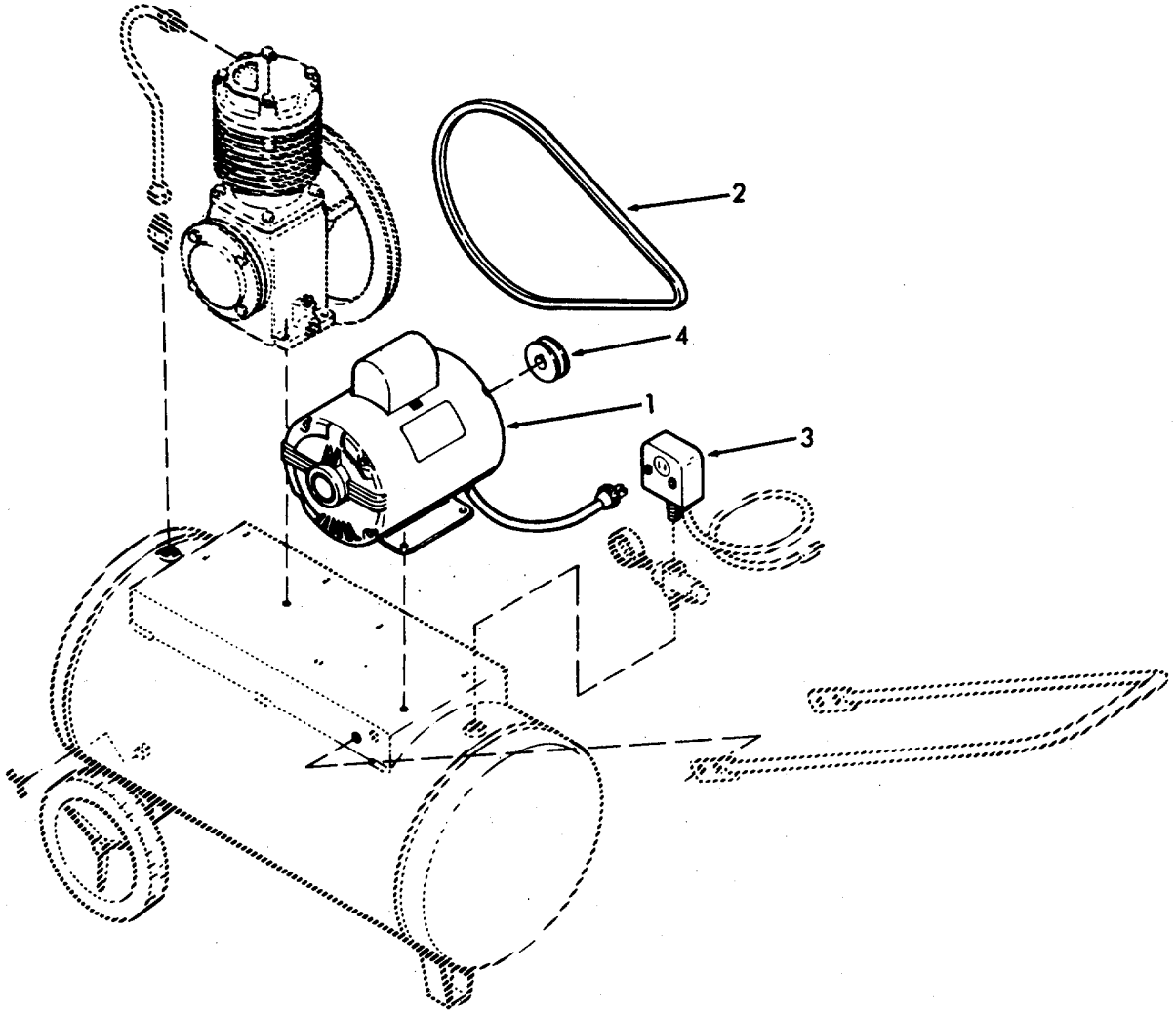
LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	d. Compressor	Inspect for signs of damage.	
	e. Tank	Inspect for breaks, dents and signs of damage.	
REPLACE			
2. Belts	a. Motor mounting hardware	Loosen.	
	b. Motor (1)	Slide to loosen belt (2).	
	c. Belt (2)	Replace with new belt.	
	d. Motor (1) and hardware	1. Move motor to tighten belt.	
		2. Tighten hardware.	
3. Motor	a. Motor power plug	Remove from pressure switch (3).	
	b. Motor mounting hardware.	Remove.	
	c. Belt (2)	Remove.	
	d. Motor (1)	Remove.	
	e. Pulley (4)	Loosen setscrew and remove key and pulley.	
	f. Motor (1) and hardware	Install new motor.	
	g. Pulley (4)	Install.	
	h. Belt (2)	1. Install.	
		2. Move motor to tighten belt.	
		3. Tighten hardware.	

4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)

	i. Motor power plug	Install.	



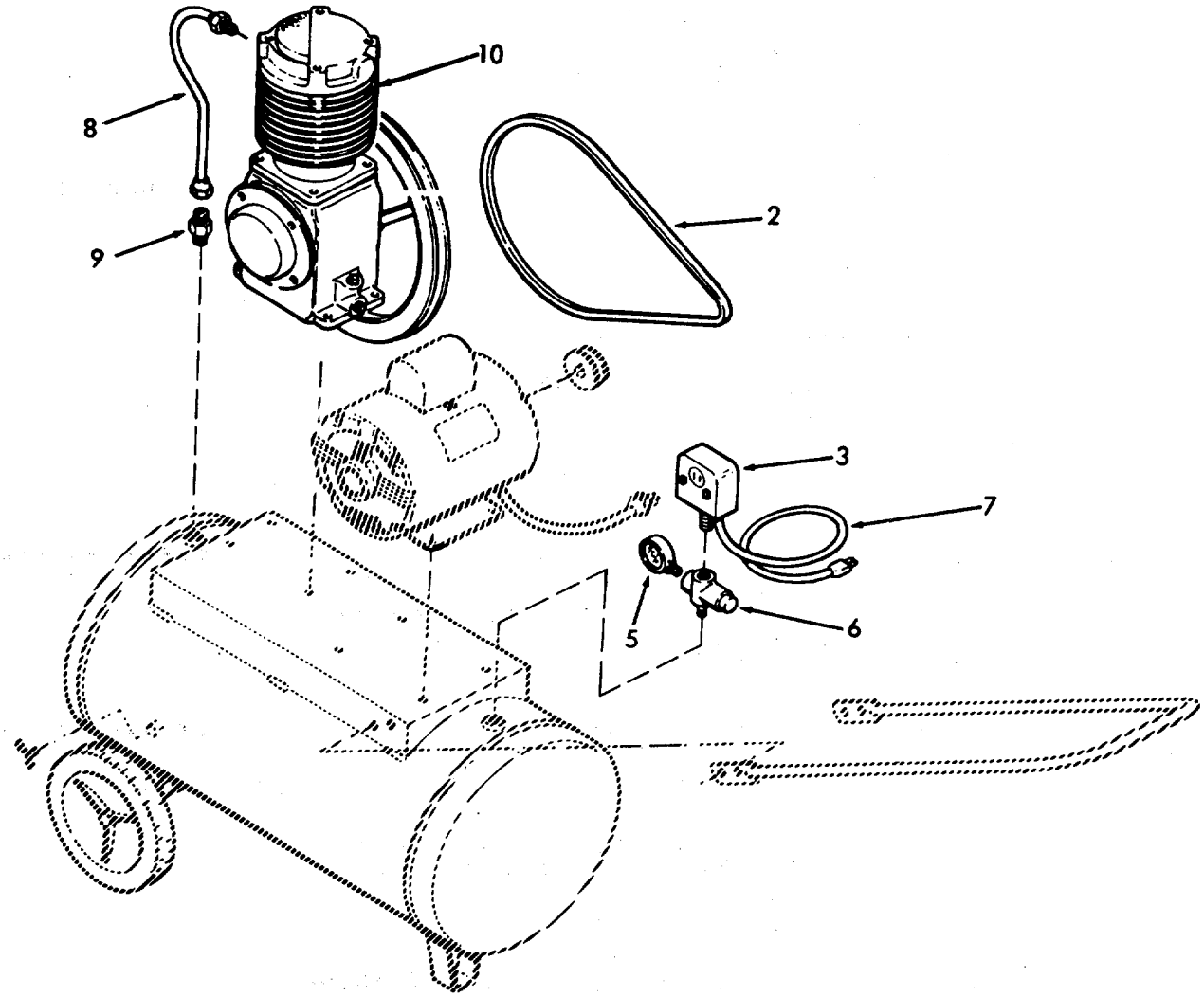
4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
4. Pressure switch/ Gauge	a. Motor power plug	Remove from pressure switch (3).	
	b. Gauge (5)	Remove.	
	c. Pressure switch (3)	Remove.	
	d. Manifold (6)	Remove.	
	e. Power cord (7)	Replace.	If necessary.
	f. Manifold (6)	Install.	
	g. Gauge (5)	Install.	
	h. Pressure switch (3)	Install.	
	i. Motor power plug	Install.	
5. Compressor	a. Belt (2)	Remove.	Refer to step 2.
	b. Tube nuts and exhaust tube (8)	Loosen and remove.	
	c. Unloader check valve (9)	Remove.	If necessary.
	d. Compressor and mount-ing hard-ware (10)	Replace with new compressor.	
	e. Exhaust tube and tube nuts (8)	Install and tighten.	
	f. Belt (2)	Install.	Refer to step 2.

4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

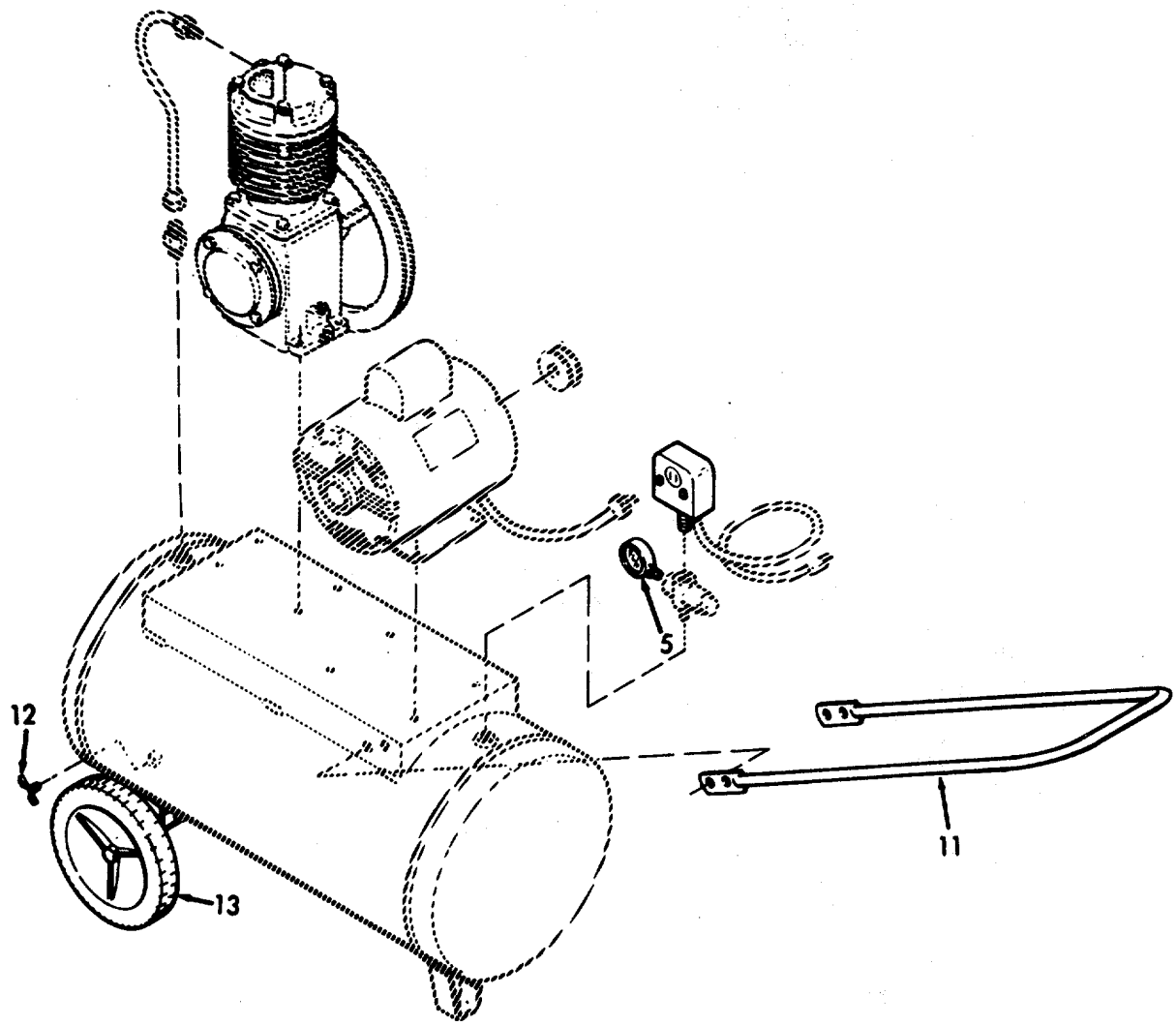
LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



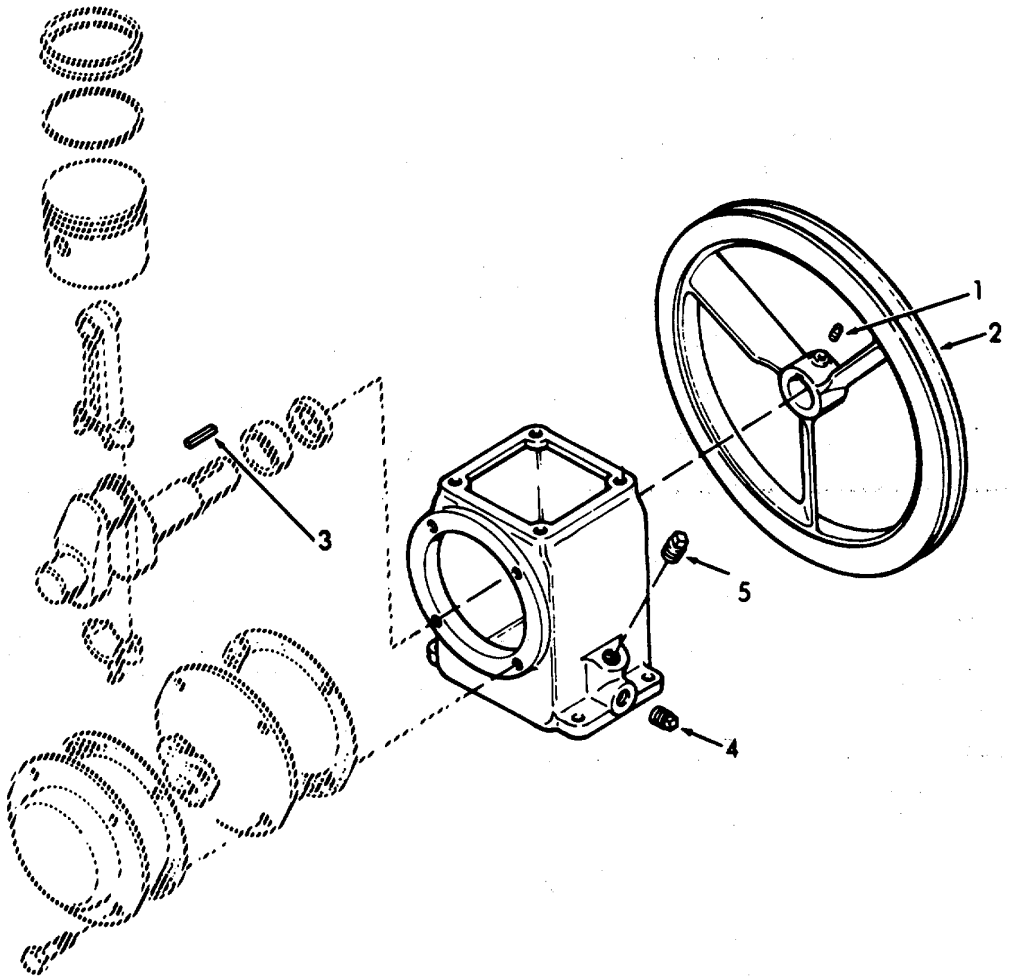
4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
6. Handle	a. Mounting hardware and handle (11)	Replace.	If necessary.
7. Drain cock	Drain cock (12)	Replace.	If necessary.
8. Wheels	Wheels (13)	Replace.	If necessary.



4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
9. Compressor	a. Setscrews (1)	Loosen.	
	b. Flywheel (2)	Remove.	
	c. Key (3)	Remove.	
	d. Drain plug (4) and fill plug (5)	Drain oil into a suitable container.	Dispose of oil properly.



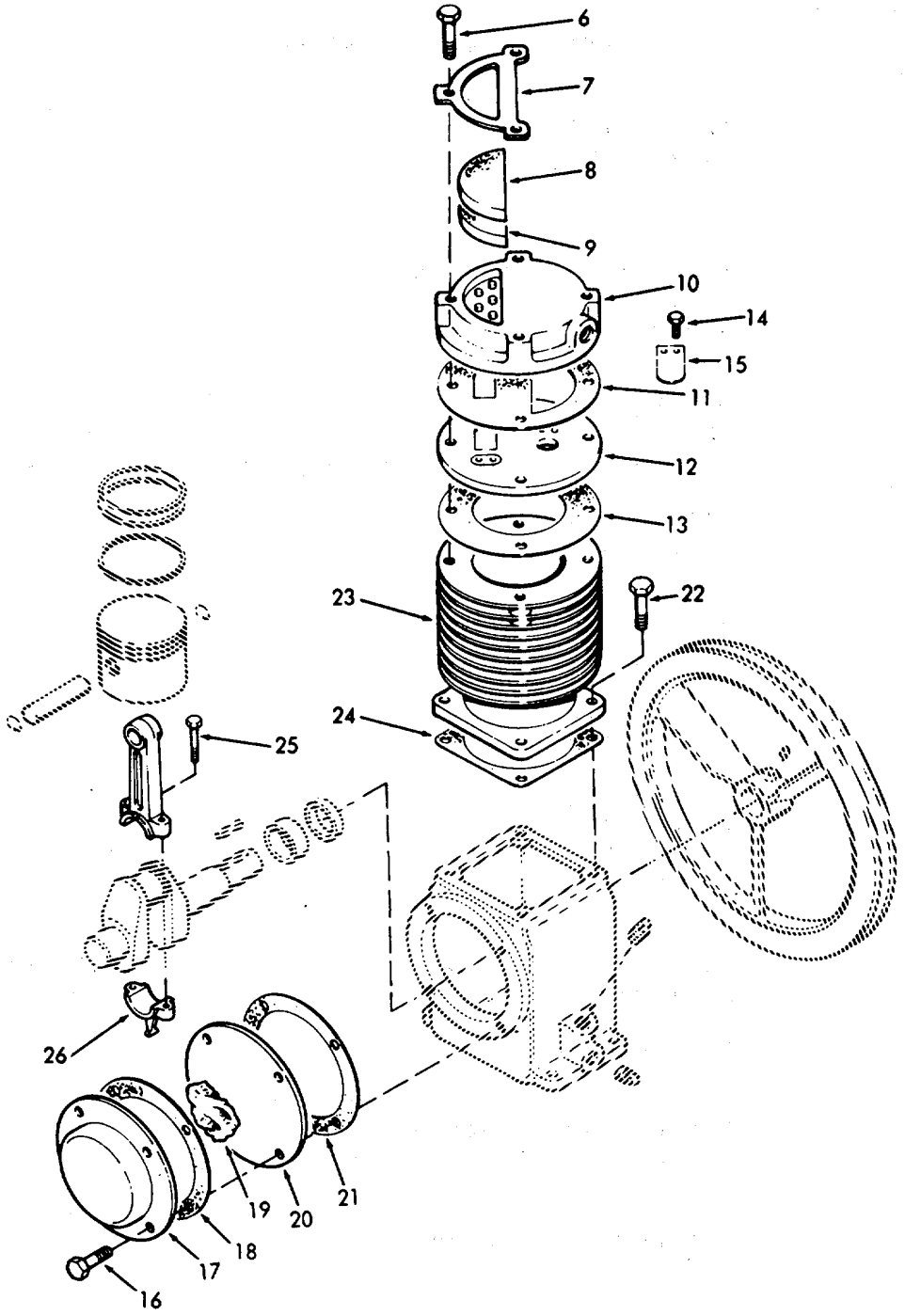
4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	e. Screws (6)	Remove 3 places.	
	f. Filter retainer (7), filter (8), and silencer (9)	Remove.	Clean filter.
	g. Valve reed head (10), plate gasket (11), plate (12), and gasket (13)	Remove.	
	h. Thread rolling screws (14) and reed valve (15)	Remove from plate (12).	If necessary.
	i. Screws (16), breather chamber (17), cover gasket (18), breather element (19), crankcase cover (20), and gasket (21)	Remove.	Discard gaskets.
	j. Screws (22), cylinder (23), and flange gasket (24)	Remove.	Discard gasket.
	k. Connecting rod bolts (25)	Loosen.	
	l. Connecting rod lower bearing shell (26)	Remove.	

4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



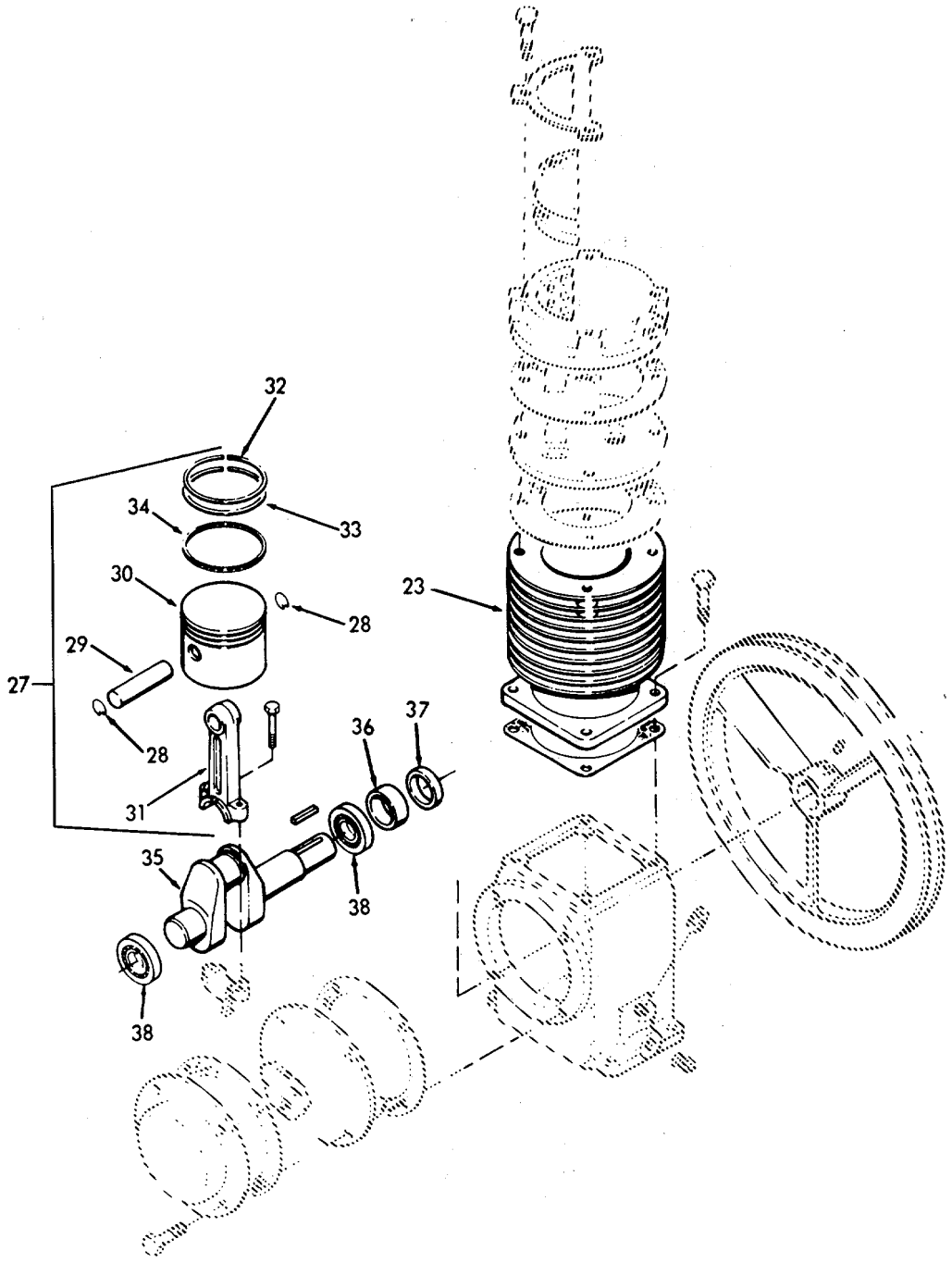
4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	m. Piston assembly (27)	Remove.	
	n. Retaining rings (28), piston pin (29), piston (30), and connecting rod (31)	Disassemble.	
	o. Piston (30), compression rings (32, 33), and oil ring (34)	1. Disassemble.	Remember how the compression rings were located, and where the break is located.
		2. Clean grooves.	
		3. Reassemble.	
		4. Reinstall.	
	p. Connecting rod (31), piston (30), piston pin (29), and retaining rings (28)	Reassemble.	
	q. Crankshaft (35), bearing sleeve (36), oil seal (37), and bearings (38)	1. Disassemble	Replace with new oil seal, and bearings.
		2. Reassemble.	
	r. Piston assembly (27)	Install in cylinder (23).	Coat lightly with oil before assembly.

4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



4-1435

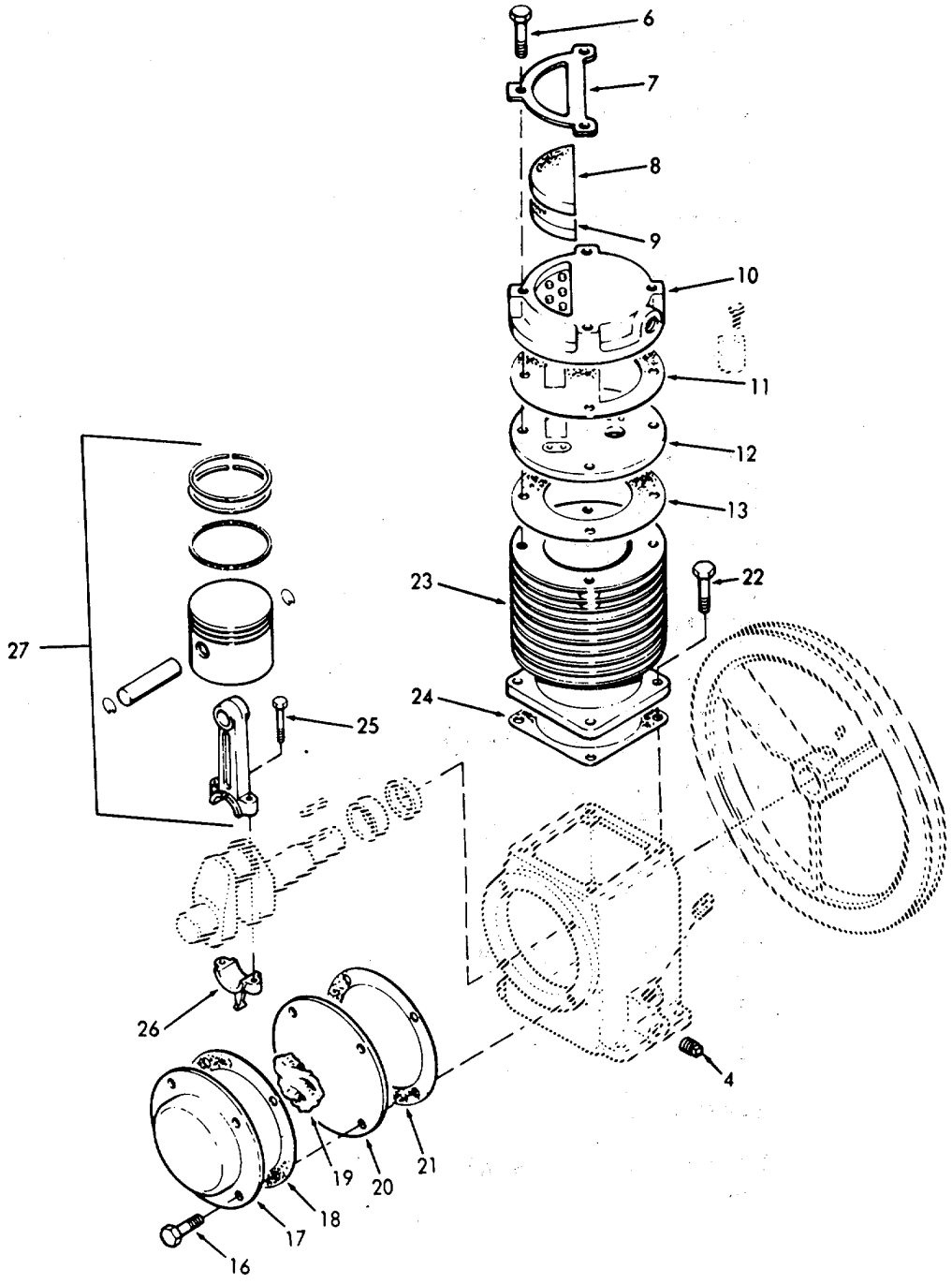
4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	s. Piston assembly (27), cylinder (23), gasket (24), and screws (22)	Install.	Tighten screws evenly.
	t. Connecting rod bolts (25) and connecting rod lower bearing shell (26)	Install.	
	u. Gasket (21), crankcase cover (20), breather element (19), cover gasket (18), breather chamber (17), and screws (16)	Install.	
	v. Gasket (13), plate (12), plate gasket (11), valve reed head (10), and screws (6)	Install.	
	w. Silencer (9), filter (8), filter retainer (7), and the remaining screws (6)	Install.	
	x. Drain plug (4)	Install.	

4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS

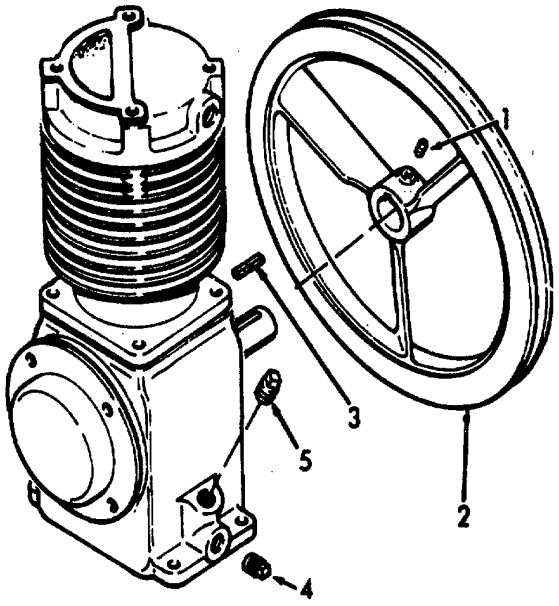
REPLACE (Cont)



4-1437

4-71. PORTABLE AIR COMPRESSOR-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	y. Flywheel (2) and key (3)	Install.	
	z. Setscrew (1)	Tighten.	
	aa. Fill plug (5)	1. Fill with oil.	Approximately 1 quart.
		2. Install plug.	



4-1438

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

This task covers:

a. Inspection **b. Replace** **c. Repair**

INITIAL SETUP

Test Equipment
NONE

Special Tools
Arbor Press
Piston pin removal tools
Ring compressor

Material/Parts
Oil, MIL-L-2104
Type OE/HDO

Personnel Required
1

References
Table 2-16 TM 55-1905-219-1

Equipment
Condition Condition Description
NONE

Special Environmental Conditions
Use the oil separation and recovery system to collect drained oil.

General Safety Instructions
Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

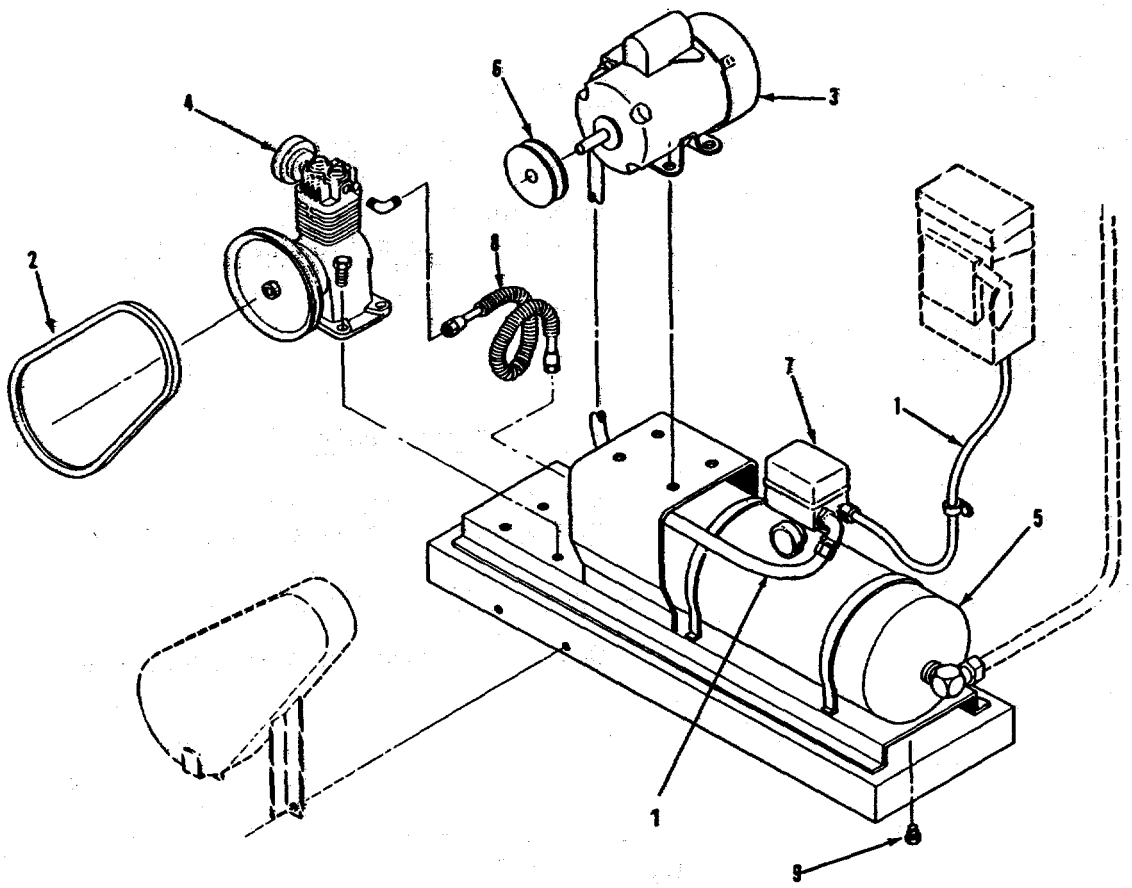
In order to avoid the possibility of shock, make sure the power to the compressor is disconnected.

INSPECTION

1.	Air Horn air compressor	a. Power cable (1)	Inspect for breaks, wear, and damage.
		b. Drive belt (2)	Inspect for breaks, wear, and damage.
		c. Motor (3)	Inspect for signs of damage.

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS



INSPECTION- (Cont)

	d. Compressor (4)	Inspect for signs of damage.	
	e. Air Tank (5)	Inspect for breaks, dents and signs of damage.	
REPLACE			
2. Belts	a. Motor mount ing hardware	Loosen.	

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

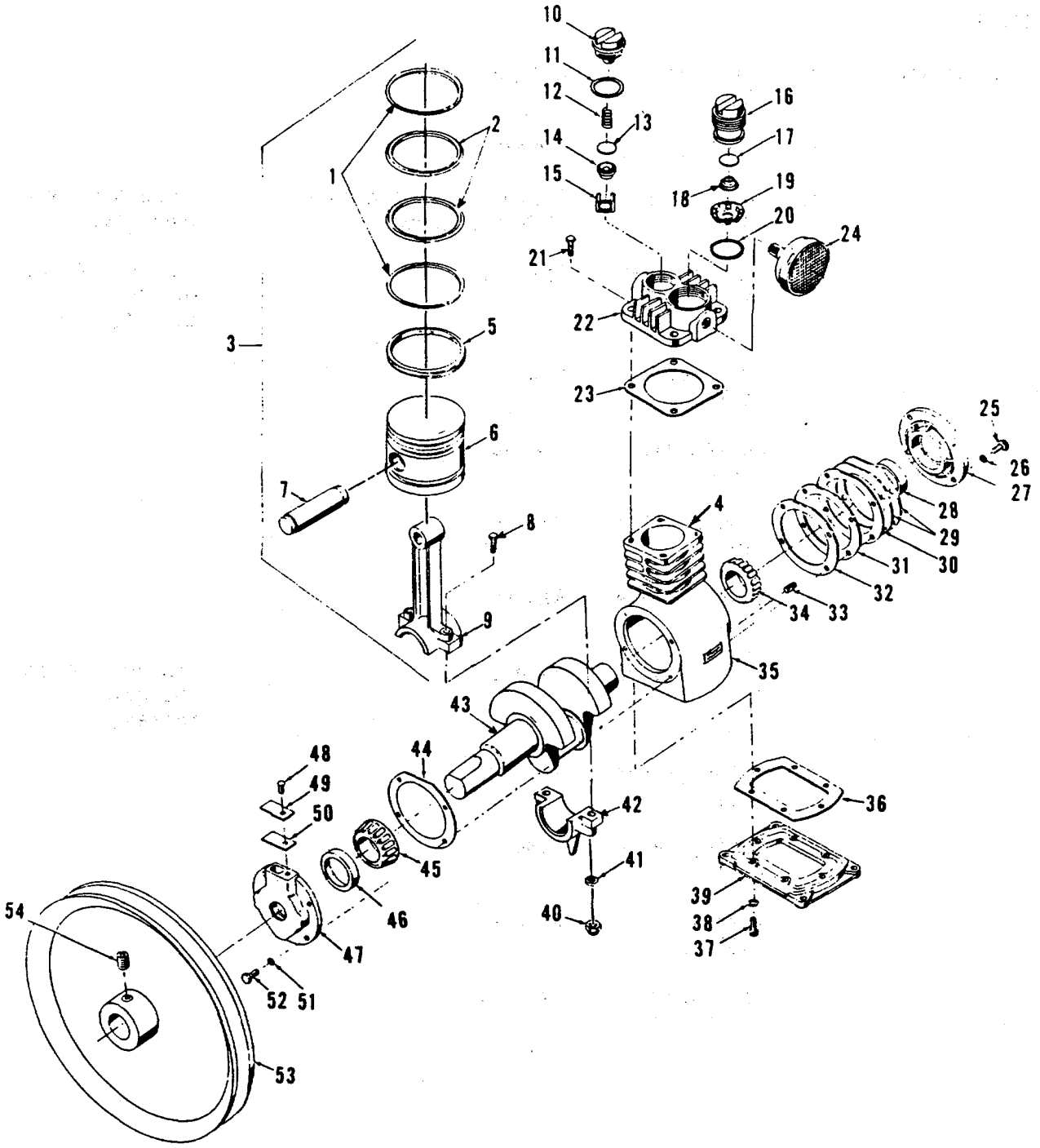
LOCATION	ITEM	ACTION	REMARKS
	b. Motor (3)	Slide to loosen belt (2).	
	c. Belt (2)	Replace with new belt.	If necessary
	d. Motor (3) and hardware	1. Move motor to tighten belt.	
		2. Tighten hardware	
3. Motor	a. Motor mounting hardware	Remove.	
	b. Belt (2)	Remove.	
	c. Motor (3)	Remove.	
	d. Pulley (6)	Loosen setscrew and remove pulley.	
	e. Motor (3)	Install new motor. and hardware	
	f. Pulley (6)	Install.	
	g. Belt (2)	1. Install.	
		2. Move motor to tighten belt.	
		3. Tighten hardware.	
	h. Power cable (1)	Install.	
REPLACE (Cont)			
4. Pressure switch/gage safety valve assembly	d. Power cables (1)	Remove from pressure switch (7) assembly.	
	b. Pressure switch (7) assembly	Remove.	

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
	c. Pressure switch (7) assembly	Install.	
	d. Power cables (1)	Install.	
5. Compressor	a. Belt (2)	Remove.	Refer to step 2 .
	b. Tube nuts and exhaust tube (8)	Loosen and remove.	
	c. Compressor and mounting hardware (4)	Replace with new compressor.	
	d. Exhaust tube and tube nuts (8)	Install and tighten.	
	e. Belt (2)	Install.	Refer to step 2.
6. Drain plug	a. Drain plug (9)	Replace.	If necessary.

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS



4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
7. Compressor	a. Setscrew (51)	Loosen.	
	b. Flywheel (53)	Remove.	
	c. Drain plug (33)	Drain oil into a suitable container.	Dispose of oil properly.
	d. Suction seat valve (16)	Remove.	Torque @ 70 ft-lbs dry threads.
	e. Disc valve (17}	Remove.	
	f. Spring valve (18)	Remove.	
	g. Bumper valve (19)	Remove.	
	h. Gasket valve (20)	Remove.	
	i. Bunper valve (10)	Remove.	Torque @ 85 ft-lbs dry threads.
	j. Valve gasket (11)	Remove.	
	k. Spring valve (12)	Remove.	
	l. Disc valve (13)	Remove.	
	m. Seat valve discharge (14)	Remove.	

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	n. Valve guide (15)	Remove.	
	o. Head bolts (21)	Remove 4 places.	
	p. Head (22)	Remove.	
	q. Head gasket (23)	Remove.	
	r. Filter assembly (24)	Remove.	Clean filter. See para Table 2-16 TM 55-1905-219-14-1.
	s. Bolts (52)	Remove.	
	t. Washers (51)	Remove.	
	u. Bearing carrier (47)	Remove.	
	v. Drive Pin (48)	Remove.	
	w. Bumper-Crank case breather valve (49)	Remove.	
	x. Valve crank case breather (50)	Remove.	
	y. Bearing cup (46)	Remove.	
	z. Cone bearing (45)	Remove.	
	aa. Bearing shim (44)	Remove.	
	ab. Bolts (25) & washer (26)	Remove.	
	ac. Bearing carrier (27)	Remove.	

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	ad. Bearing cup (28)	Remove.	
	ae. Bearing shims (29)	Remove.	
	af. Bearing shim (30)	Remove.	
	ag. Bearing shim (31)	Remove.	
	ah. Bearing shim (32)	Remove.	
	ai. Cone bearing (34)	Remove.	
	aj. Bolts (37) & washer (38)	Remove.	
	ak. Oil pan (39)	Remove.	
	al. Oil pan gasket (36)	Remove.	
	am. Connecting rod locknut (40)	Remove.	
	an. Connecting rod washers (41)	Remove.	
	ao. Connecting rod lower bearing shell (42)	Remove.	
	ap. Connecting rod bolts (8)	Remove.	
	aq. Piston assembly (3)	Remove.	

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	ar. Piston pin (7) piston (6) and connecting rod (9)	Disassemble.	
	as. Piston springs (1) piston compression Rings (2) and Oil Rings (5)	1. Disassemble.	Remember how the compression Rings were located, and where the break is located.
		2. Clean grooves.	
		3. Reassemble.	
		4. Reinstall.	
	at. Connecting rod (9), piston (6) and piston pin (7)	Reassemble.	
	au. Crankshaft (43)	Remove, Check, and reinstall.	
	av. Crankshaft (43)	Install into Compressor housing (35)	Coat lightly with oil before assembly
	aw. Piston Assembly (3)	Install into Cylinder. (4)	
	ax. Connecting Rod (9)	Position onto Crankshaft journal.	
	ay. Connecting rod Bolts (8)	Install.	
	az. Connecting rod lower bearing shell (42)	Install.	

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

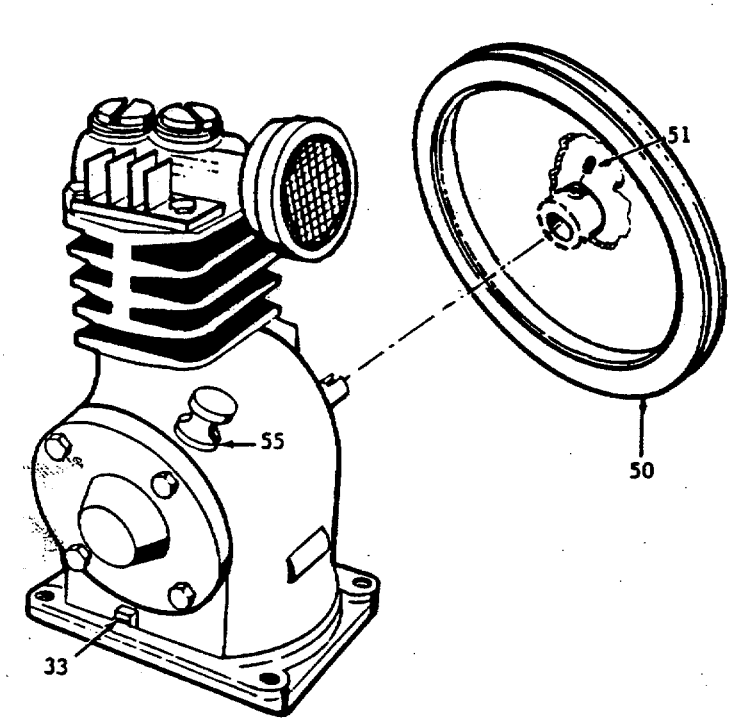
LOCATION	ITEM	ACTION	REMARKS
REPAIR- (Cont)			
	ba. Connecting rod washers (41) and locknuts (40)	Install.	Torque to 6 ft-lbs dry threads
	bb. Oil pan gasket (36)	Install.	Use new gasket
	bc. Oil pan, (39), washers (38), and bolts (37)	Install and tighten.	Torque to 7 ft-lbs. dry threads
	bd. Cone bearing (34)	Install.	
	be. Bearing shim (32)	Install.	
	bf. Bearing shim (31)	Install.	
	bg. Bearing shim (30)	Install.	
	bh. Bearing shims (29)	Install.	
	bi. Bearing cup (28)	Install.	
	bj. Bearing carrier (27), washers (26), and bolts (25)	Install.	Torque to 6 ft-lbs dry threads
	bk. Bearing shim (44)	Install.	
	bl. Cone bearing (45)	Install.	
	bm. Bearing cup (46)	Install.	

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	bn. Bearing carrier (47), washers (48), and bolts (49)	Install.	
	bo. Valve-crankcase breather (50)	Install.	
	bp. Bumper-crank case breather valve (49)	Install.	
	bq. Drive pin (48)	Install.	
	br. Filter assembly (24)	Assembly and Install.	
	bs. Head gasket (23)	Install.	Use new head gasket
	bt. Head (22)	Install.	
	bu. Head bolts (21)	Install 4 places.	Tighten down evenly
	bv. Valve guide (15)	Install.	
	bw. Discharge valve seat (14)	Install.	
	bx. Disc valve (13)	Install.	
	by. Spring valve (12)	Install.	
	bz. Valve gasket (11)	Install.	
	ca. Bumper valve (10)	Install.	Torque @ 85 ft-lbs dry threads
	cb. Gasket valve (20)	Install.	

4.71.1. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	cc. Bumper valve (19)	Install.	
	cd.. Spring valve (18)	Install.	
	ce. Disc valve (17)	Install.	



	cf. Suction valve seat (16)	Install.	Torque @ 70 ft-lbs dry threads
	cg. Drain plug (33)	Install.	
	ch. Flywheel (50)	Install.	
	ci. Setscrew (51)	Tighten.	
	cj. Fill plug (55)	Fill with oil.	Approximately 1/4 pint

4-71.2. AIR HORN AIR COMPRESSOR HOSES, FITTINGS AND PIPING-MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection **b. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
		WARNING In order to avoid the possibility of shock. make sure the power to the compressor is disconnected.	
1. Air Horn air compressor, hoses, fittings and piping	a. Pressure gauge	1. Inspect for proper operation 2. Inspect for damage.	
	b. Manual valve	Inspect for proper operation.	
	c. Air strainer	Inspect for brakes, cracks, and leaks.	
	d. Low pressure hose	Inspect for breaks, cracks, and leaks.	

4-71.2. AIR HORN AIR COMPRESSOR HOSES, FITTINGS AND PIPING-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Hoses, fitting and piping	a. Elbow ½ inch (1)	Replace.	If necessary.
	b. Reducer (2)	Replace.	If necessary.
	c. Pipe ½ inch (3)	Replace.	If necessary.
	d. Hexhead capscrew (4)	Replace.	If necessary.
	e. Hex nut (5)	Replace.	If necessary.
	f. Clamp (6)	Replace.	If necessary.
	g. Union (7)	Replace.	If necessary.
	h. Bar 1 inch (8)	Replace.	If necessary.
	i. Male connector ½ inch (9)	Replace.	If necessary.
	j. Hexhead capscrew (10)	Replace.	If necessary.
	k. Lockwasher (11)	Replace	If necessary.
	l. Quick disconnect coupling socket (12)	Replace.	If necessary.

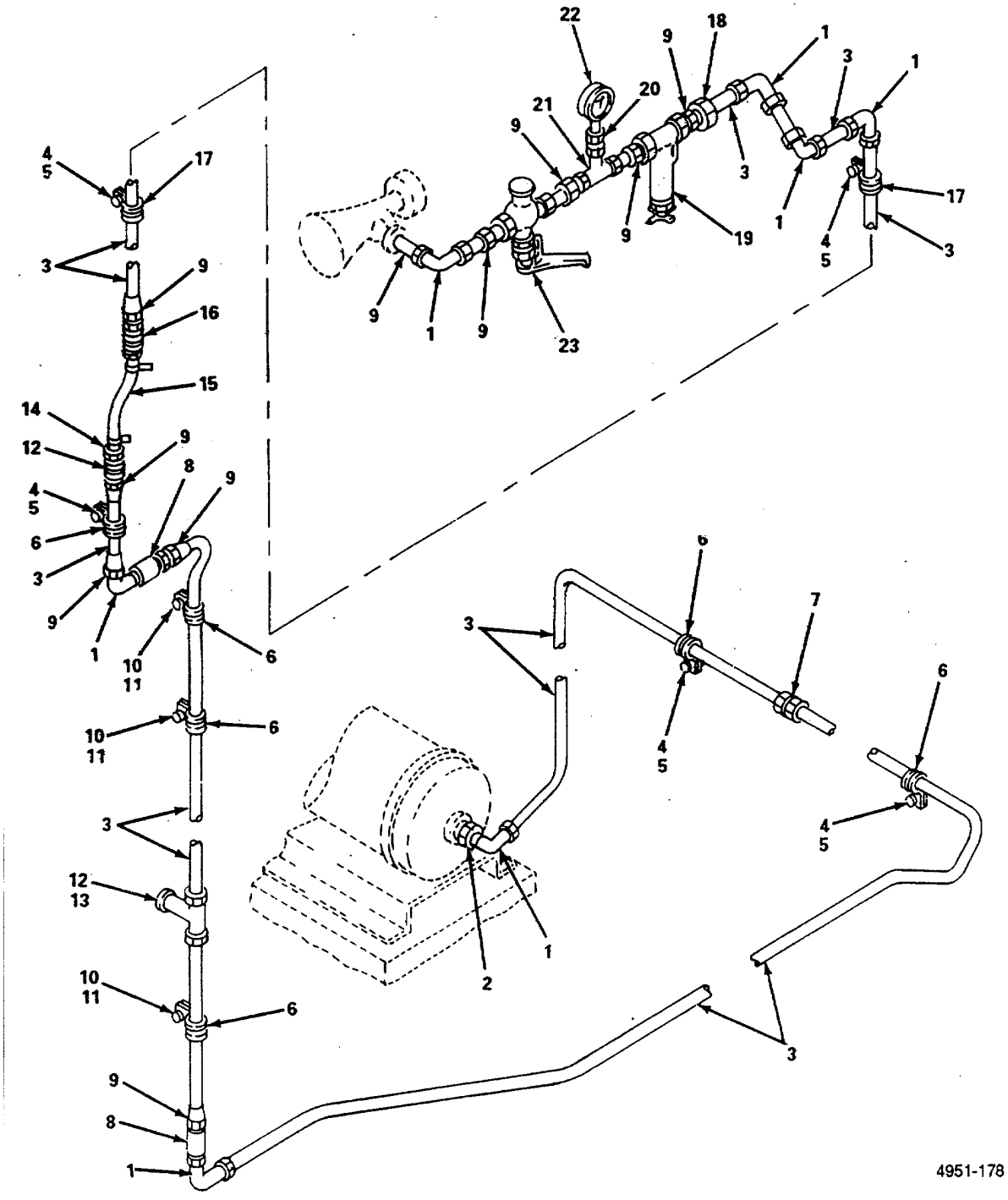
4-71.2. AIR HORN AIR COMPRESSOR HOSES, FITTINGS AND PIPING-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	m. Tee (13)	Replace.	If necessary.
	n. Plug w/hose stem connection (14)	Replace.	If necessary.
	o. Low pressure hose (15)	Replace.	If necessary.
	p. Female pipe fitting (16)	Replace.	If necessary.
	q. Clamp (17)	Replace.	If necessary.
	r. Union (18)	Replace.	If necessary.
	s. Air strainer (19)	Replace.	If necessary.
	t. Pipe connector (20)	Replace.	If necessary.
	u. Tee (21)	Replace.	If necessary.
	v. Pressure gauge (22)	Replace.	If necessary.
	w. Manual valve (23)	Replace.	If necessary.

4-71.2. AIR HORN AIR COMPRESSOR HOSES, FITTINGS AND PIPING-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-72. DOORS, HATCHES, SCUTTLES AND MANHOLES-MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection **b. Repair** **c. Replace**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

2

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

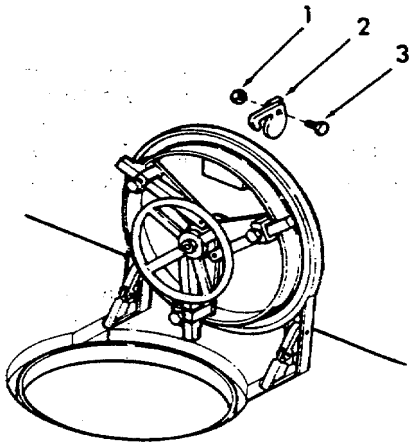
General Safety Instructions

Dog hatch or secure door while working on them.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Doors	a. Water tight doors	1. Inspect for bends, warping, and damage.	For maintenance refer to Direct Support Maintenance.
		2. Insure proper operation.	
	b. Sliding doors	1. Inspect for bends, warping, and damage.	For maintenance refer to Direct Support Maintenance.
		2. Insure proper operation.	

4-72. DOORS, HATCHES, SCUTTLES AND MANHOLES-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
2. Hatches *	Hatches	1. Inspect for bends, warping, and damage. Inspect for leaks. 2. Insure proper operation.	For maintenance refer to Direct Support Maintenance.
3. Scuttle	a. Scuttle	1. Inspect for bends, warping, and damage. Inspect for leaks. 2. Insure proper operation.	For maintenance refer to Direct Support Maintenance.
	b. Latches	Inspect for broken or missing parts.	
4. Manholes	Manholes	1. Inspect for leaks. 2. Insure all hardware is tight.	
REPAIR			
5. Scuttles	a. Nut (1)	Replace.	If necessary.
	b. Holder (2)	Replace.	If necessary.
	c. Screw (3)	Replace.	If necessary.



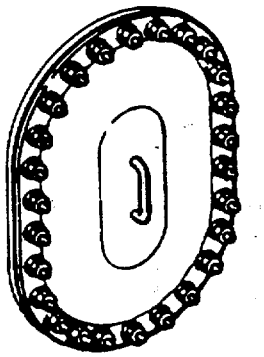
4-72. DOORS, HATCHES, SCUTTLES AND MANHOLES-MAINTENANCE INSTRUCTIONS

(Continued).

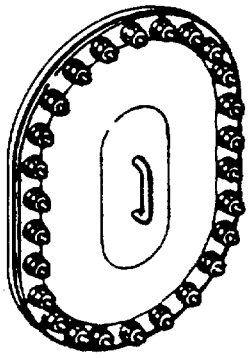
LOCATION	ITEM	ACTION	REMARKS

REPLACE

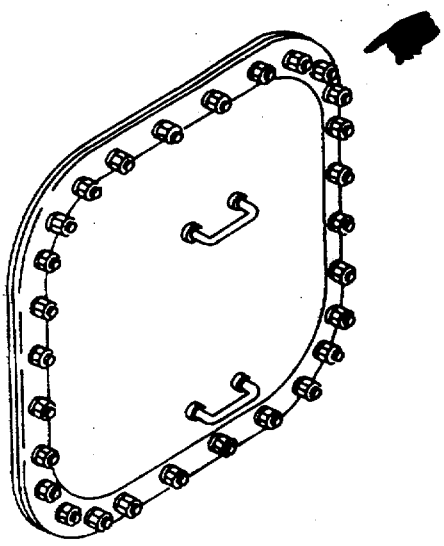
6. Manholes — Replace manhole or gaskets if necessary.



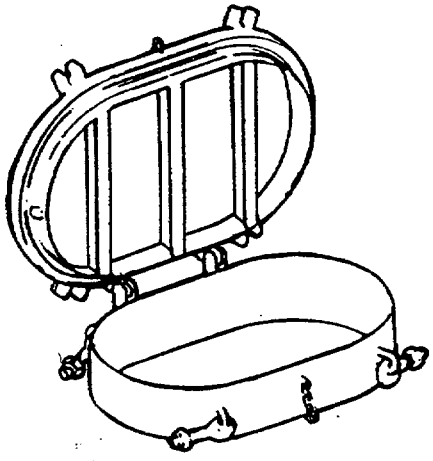
SALT WATER BALLAST TANK



DIESEL OIL TANK



RAMP WINCH ROOM



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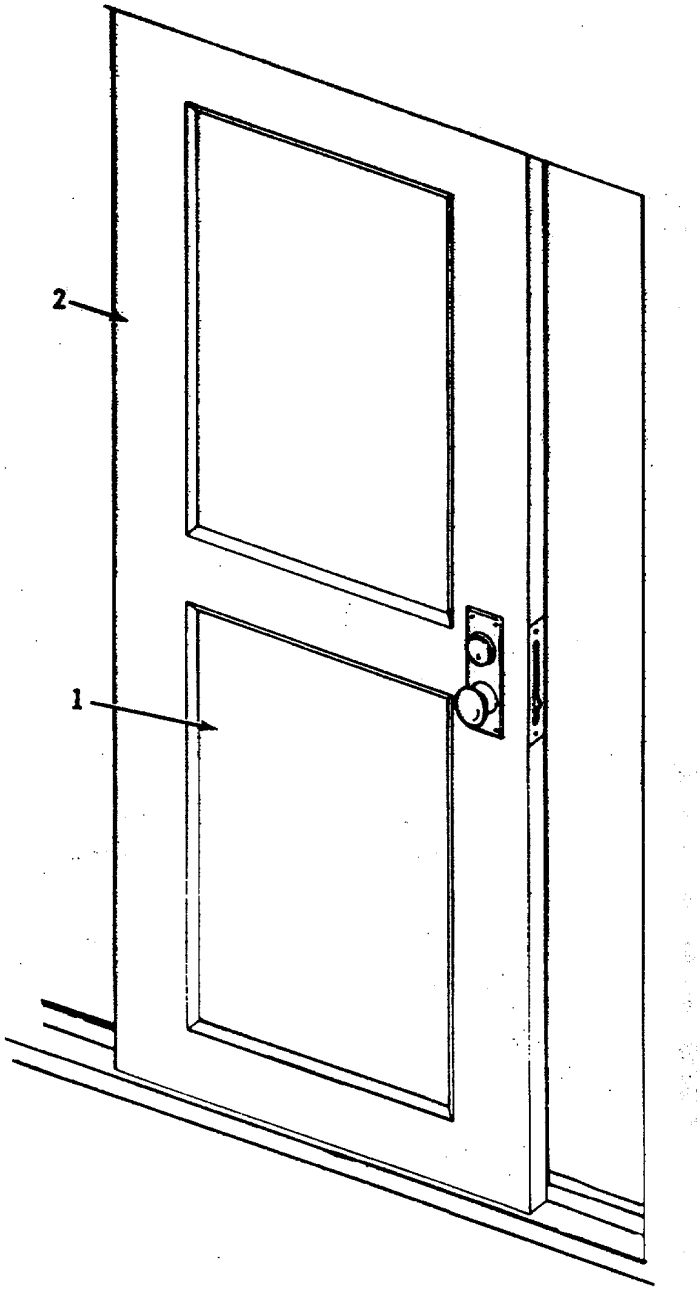
4-72. DOORS, HATCHES, SCUTTLES AND MANHOLES-MAINTENANCE INSTRUCTIONS. (Cont).

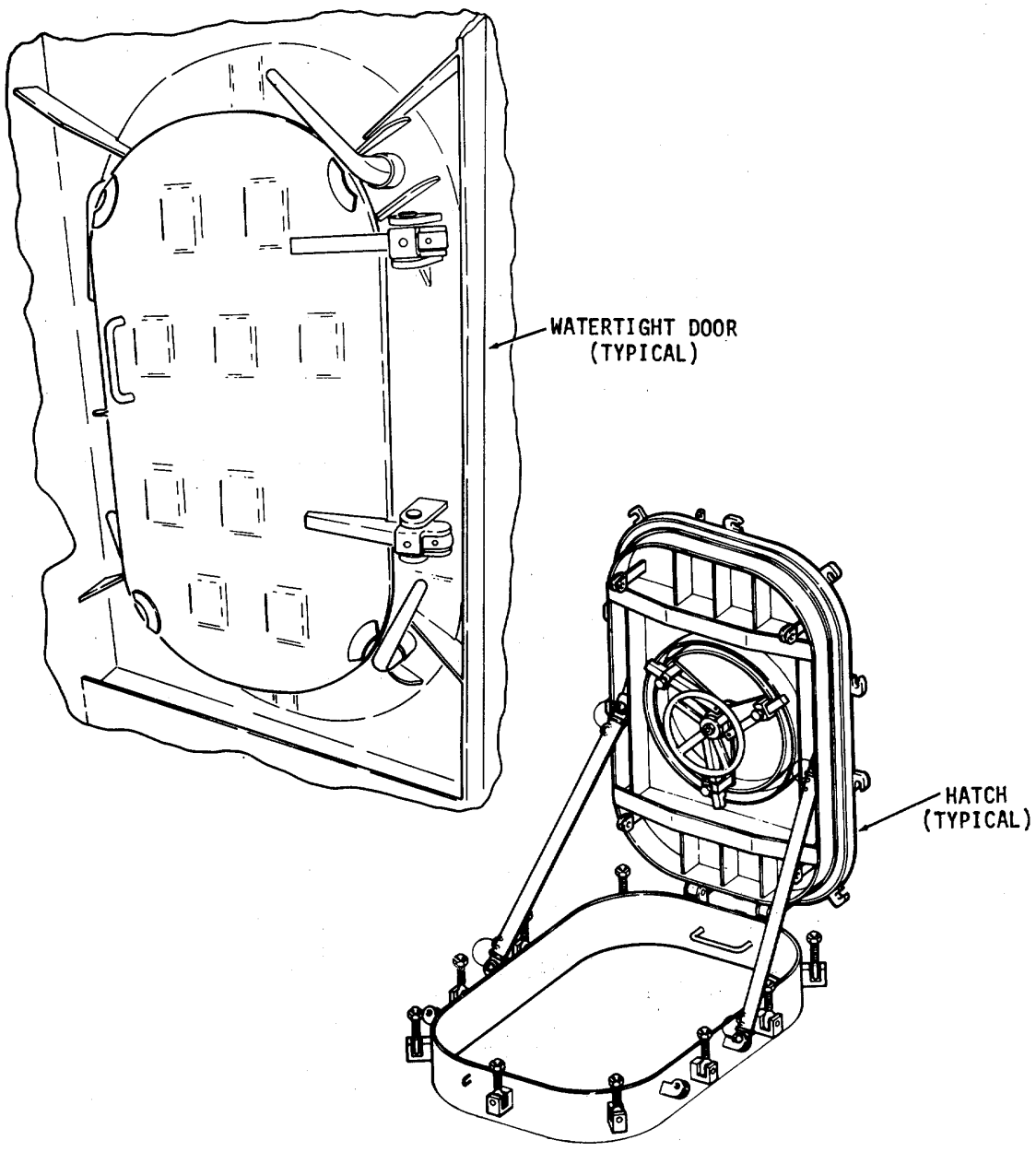
LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
7. Sliding door	Kickout panel(l)	Replace.	
	Sliding door(2)	Replace If damaged	



4-72. DOORS, HATCHES, SCUTTLES AND MANHOLES-MAINTENANCE INSTRUCTIONS. (Cont).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



4-73. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS.

This task covers:
a. Inspection b. Replace/Repair

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
NONE

Equipment Condition / Condition Description
NONE

Special Environmental Conditions
NONE

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Conning Tower	a. Windows	1. Inspect for breaks and cracks.	
		2. Inspect for severe scratching.	
	b. Hinged window adjusters	Inspect for bends and damage.	
	c. Hardware	1. Inspect for missing or damaged components.	
		2. Insure all hardware is tight.	
2. Airports	a. Hardware	Inspect for missing or damaged parts.	
	b. Screens	Inspect for damage.	

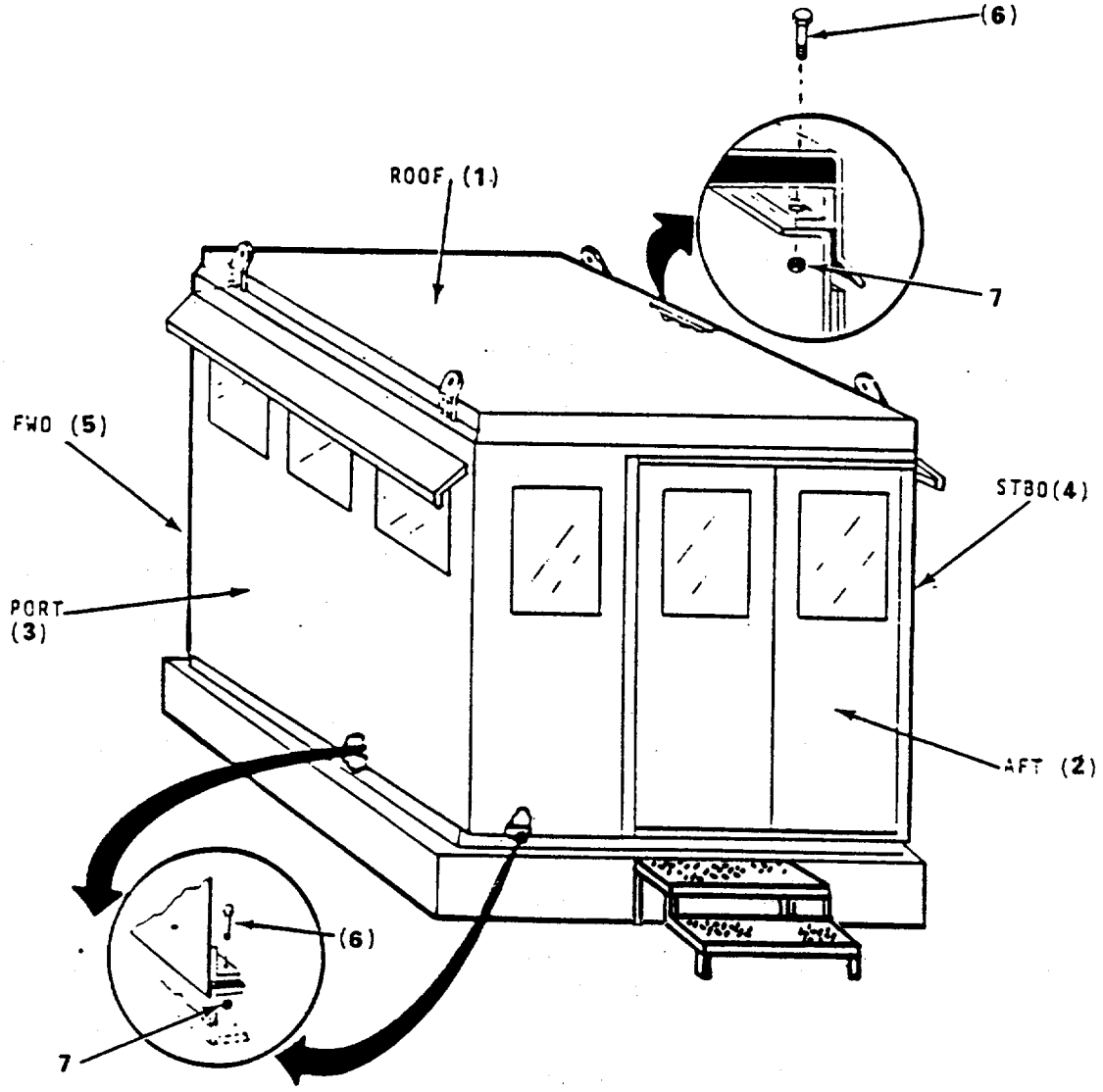
4-73. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	c. Windows	Inspect for damage.	
	d. Battle covers	Inspect for damage	
REPLACE/REPAIR			
3. Conning Tower	a. Portable panels (1), (2). (3). (4). (5)	Repair or Replace	As required
	b. Plain hexnut and screw. (6). (7)	Replace	As required
	c. Windows	Replace	As required
	d. Hinged window adjusters (pair)	Replace	As required

4-73. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE/REPAIR (Cont)



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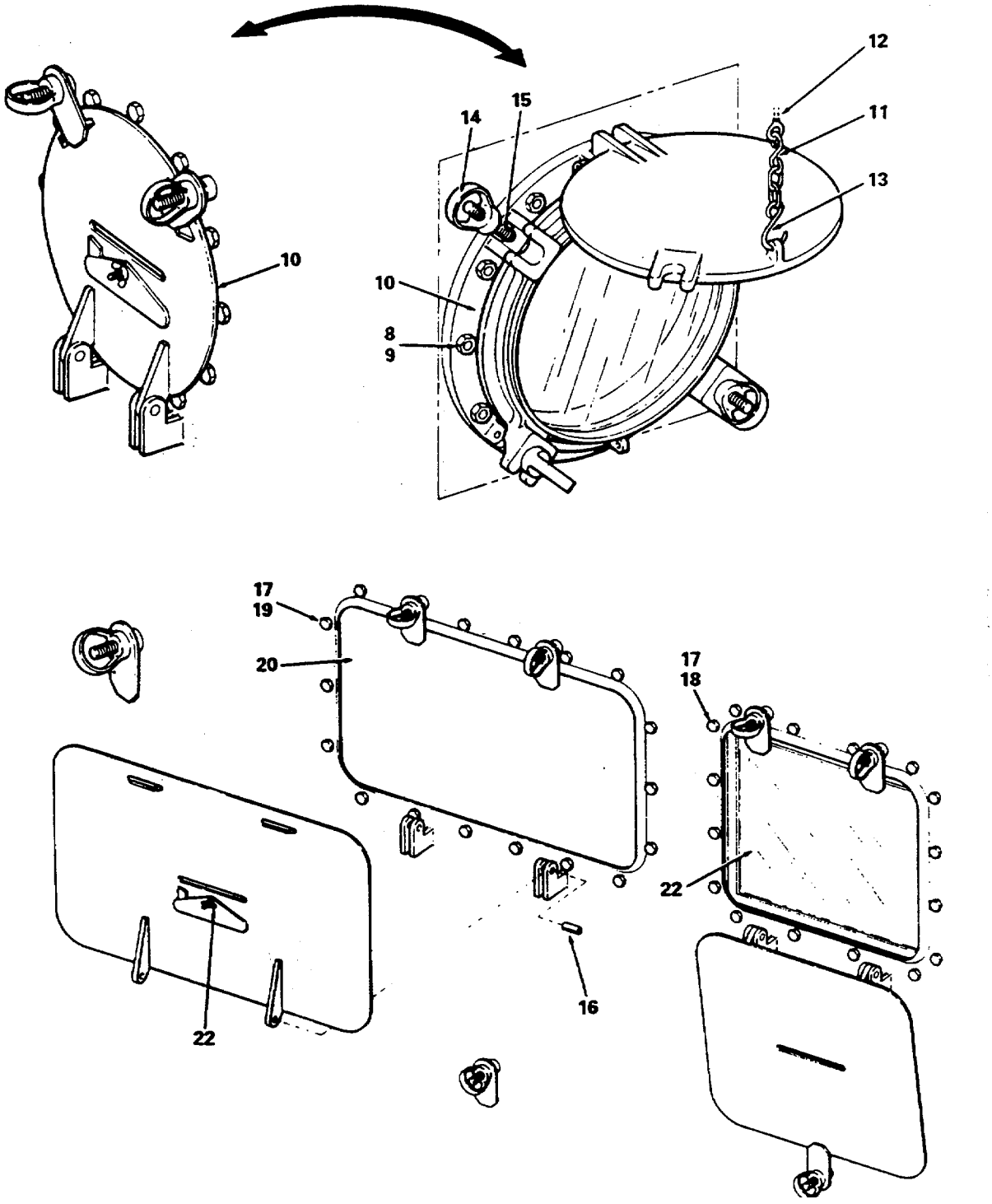
4-73. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE/REPAIR (Cont)			
4. Airports	a. Selflocking nut (8)	Replace.	As required.
	b. Hexhead cap screw (9)	Replace.	As required.
	c. Airport w/18 mesh screen and cover (10)	Repair or Replace.	As required.
	d. 1/4 inch twist chain link (11)	Replace.	As required.
	e. Eyebolt (12)	Replace.	As required.
	f. Hook (13)	Replace.	As required.
	g. Ring nut (14)	Replace.	As required.
	h. Shoulder stud (15)	Replace.	As required.
	i. Spring pin (16)	Replace.	As required.
	j. Selflocking nut (17)	Replace.	As required.
	k. Screw (18)	Replace.	As required.
	l. Screw (19)	Replace.	As required.
	m. 26xl5 inch fixed window (20)	Replace.	As required.
	n. Sliding vertical window (21)	Replace.	As required.
	o. Wing nut (22)	Replace.	As required.

4-73. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE/REPAIR (Cont)



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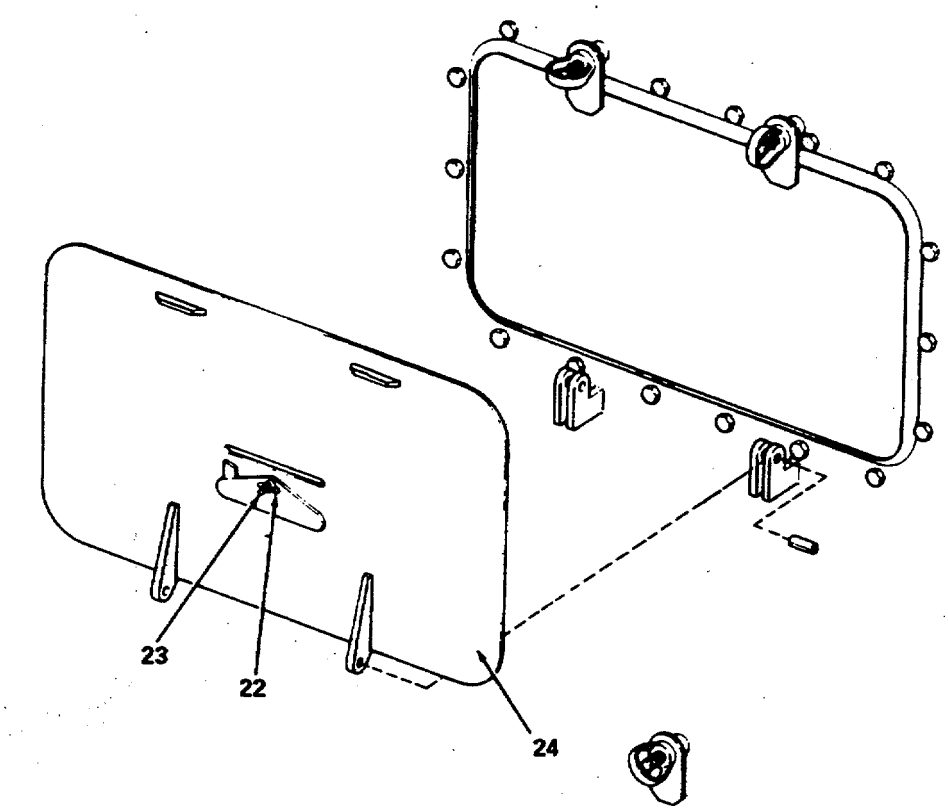
4-73. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE/REPAIR (Cont)			
	p. Screw (23)	Replace.	As required.
	q. Battle cover window (24)	Replace.	As required.



4-74. MOORING AND TOWING FITTINGS - MAINTENANCE INSTRUCTIONS.

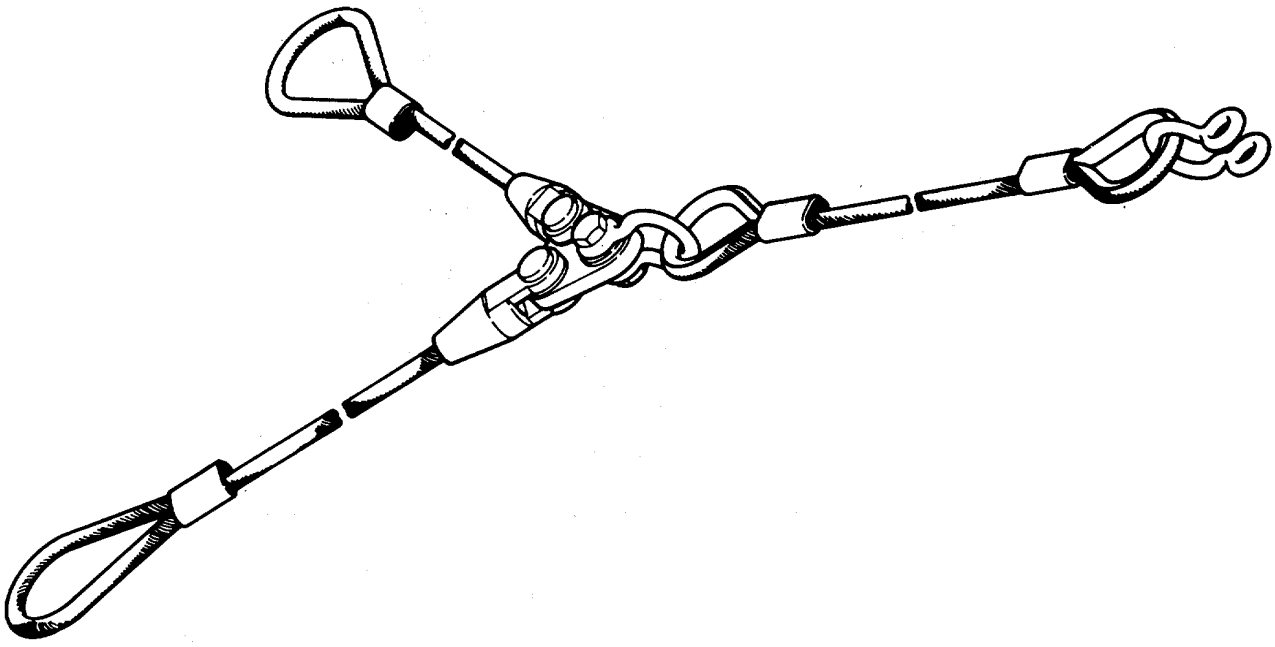
This task covers:

a. Inspection

INITIAL SETUP:

Test Equipment	References
NONE	NONE
Special Tools	Equipment Condition / Condition Description
NONE	NONE
Material /Parts	Special Environmental Conditions
NONE	NONE
Personnel Required	General Safety Instructions
1	NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1.	Towing fitting	a. Inspect for signs of damage, wear or corrosion. b. Inspect for missing hardware.	



4-75. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS.

This task covers:

a.	**Inspection**	**c.**	**Replace**
b.	**Test**	**d.**	**Repair**

INITIAL SETUP:

Test Equipment

Hydrometer
Test meter

References

NONE

Special Tools

NONE

Equipment Condition

Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Light	a. Lamp	1. Inspect for damage.	
		2. Inspect for dark spots.	
	b. Housing and lamp guard	Inspect for damage.	
	c. Case	1. Inspect for damage.	
		2. Inspect for broken hinges and clamp.	
	d. Battery	1. Inspect for breaks, cracks, and signs of leaking.	
		2. Inspect for proper water level.	

4-75. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	e. Wiring aged wiring.	Inspect for worn or dam-	
2. Battery Charger	a. Fuse	Inspect for blown fuse.	
	b. Switches	Inspect for proper operation.	
	c. Cables	Inspect for breaks, cracks, and signs of damage.	
	d. Case	Inspect for dents and signs of damage.	
TEST			
3. Light	Test light for proper operation, and brilliance of lamp over an extended period of time.		
4. Battery charger	Plug into light. Check that the battery charger will maintain the charge level of the light.		
5. Battery	Check for specific gravity of at least 1260.		
REPLACE			
6. Light	a. Lamp	1. Disconnect wiring and replace. 2. Reconnect wiring. 3. Test.	
	b. Battery	1. Disconnect wiring and replace. 2. Reconnect wiring. 3. Charge battery for at least 24 hours. 4. Test light.	

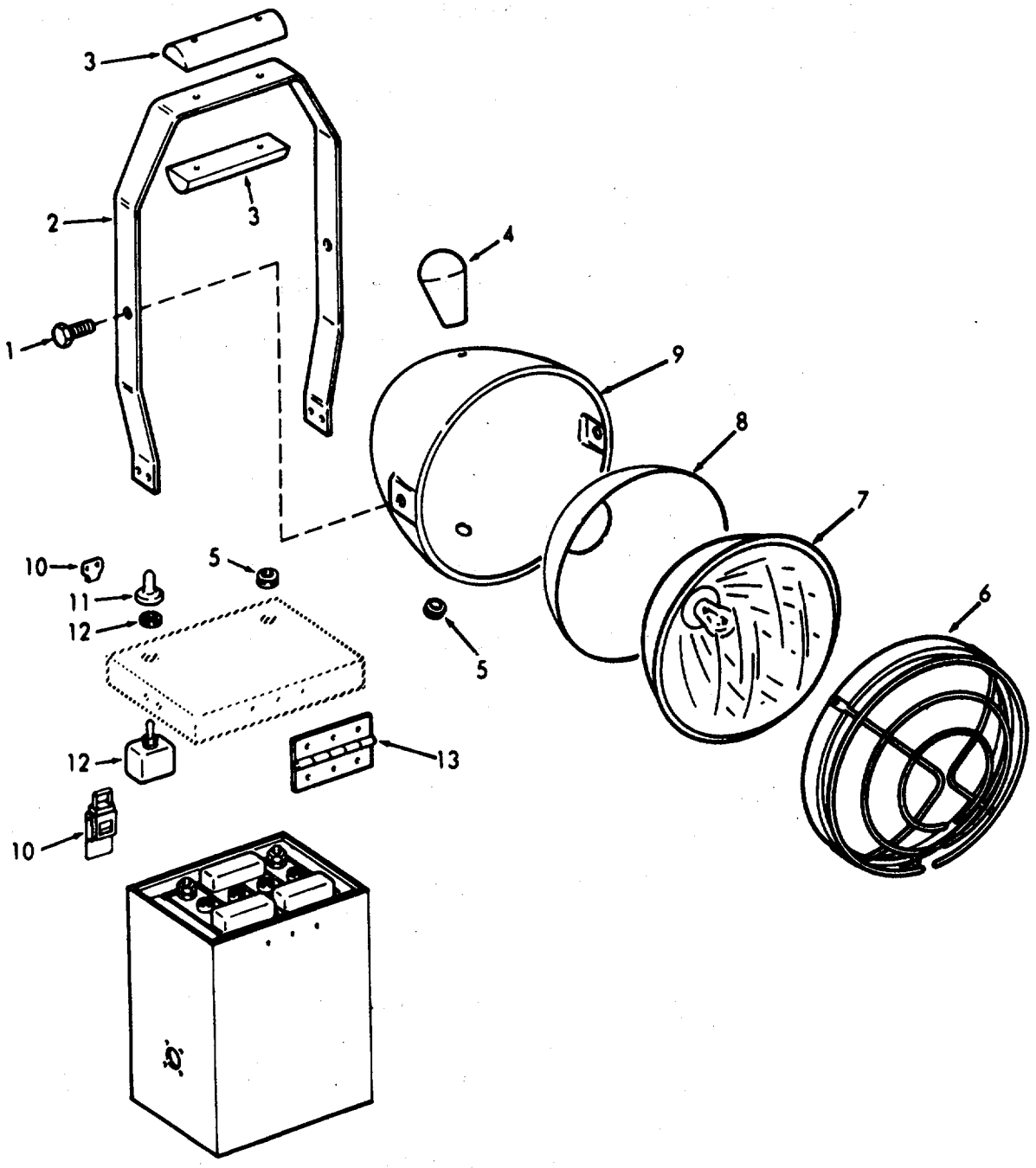
4-75. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
7. Battery charger	a. Fuse	Remove and replace if blown.	Use an identical fuse.
	b. Unit	Unplug and remove.	
REPAIR			
8. Light	a. Hex head bolt (1)	Repair by replacement.	As required.
	b. Handle (2)	Repair by replacement.	As required.
	c. Grip (3)	Repair by replacement.	As required.
	d. Ball knob (4)	Repair by replacement.	As required.
	e. Rubber grommet (5)	Repair by replacement.	As required.
	f. Bezel-guard assembly (6)	Repair by replacement.	As required.
	g. 56 par lamp (7)	Repair by-replacement.	As required.
	h. Support ring (8)	Repair by replacement.	As required.
	i. Lamp housing (9)	Repair by replacement.	As required.
	j. Compression spring catch (10)	Repair by replacement.	As required.
	k. Switch seal (11)	Repair by replacement.	As required.
	l. Toggle switch (12)	Repair by replacement.	As required.
	m. Swaged hinge (13)	Repair by replacement.	As required.

4-75. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

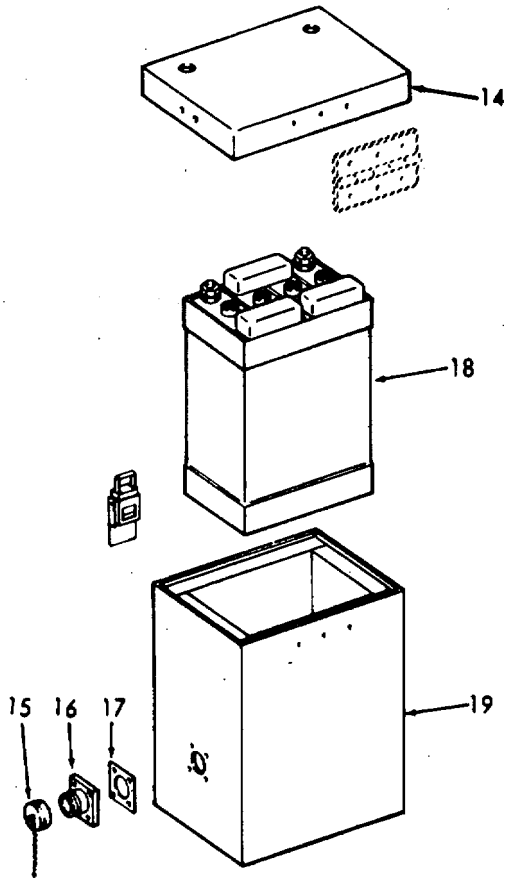
LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



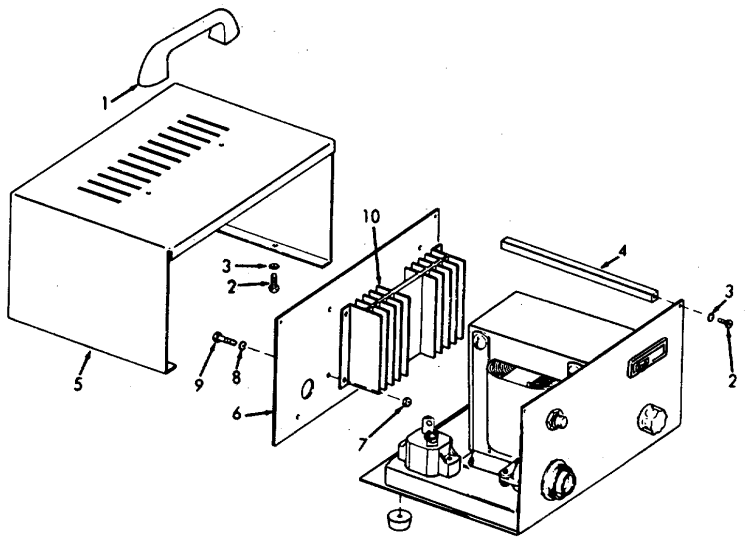
4-75. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	n. Cover (14)	Repair by replacement.	As required.
	o. Dust cap (15)	Repair by replacement.	As required.
	p. Connector (16)	Repair by replacement.	As required.
	q. Gasket (17)	Repair by replacement.	As required.
	r. LR4/80 battery assembly (18)	Repair by replacement.	As required.
	s. Case (19)	Repair by replacement.	As required.



4-75. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
8. Battery charger	a. Handle (1)	Repair by replacement.	As required.
	b. Slotted pan screw (2)	Repair by replacement.	As required.
	c. Lockwasher (3)	Repair by replacement.	As required.
	d. Stand-off (4)	Repair by replacement.	As required.
	e. Cover (5)	Repair by replacement.	As required.
	f. Rear panel (6)	Repair by replacement.	As required.
	g. Plain hex nut (7)	Repair by replacement.	As required.
	h. Split lock-washer (8)	Repair by replacement.	As required.
	i. Pan head machined screw (9)	Repair by replacement.	As required.
	j. Heat sink (10)	Repair by replacement.	As required.



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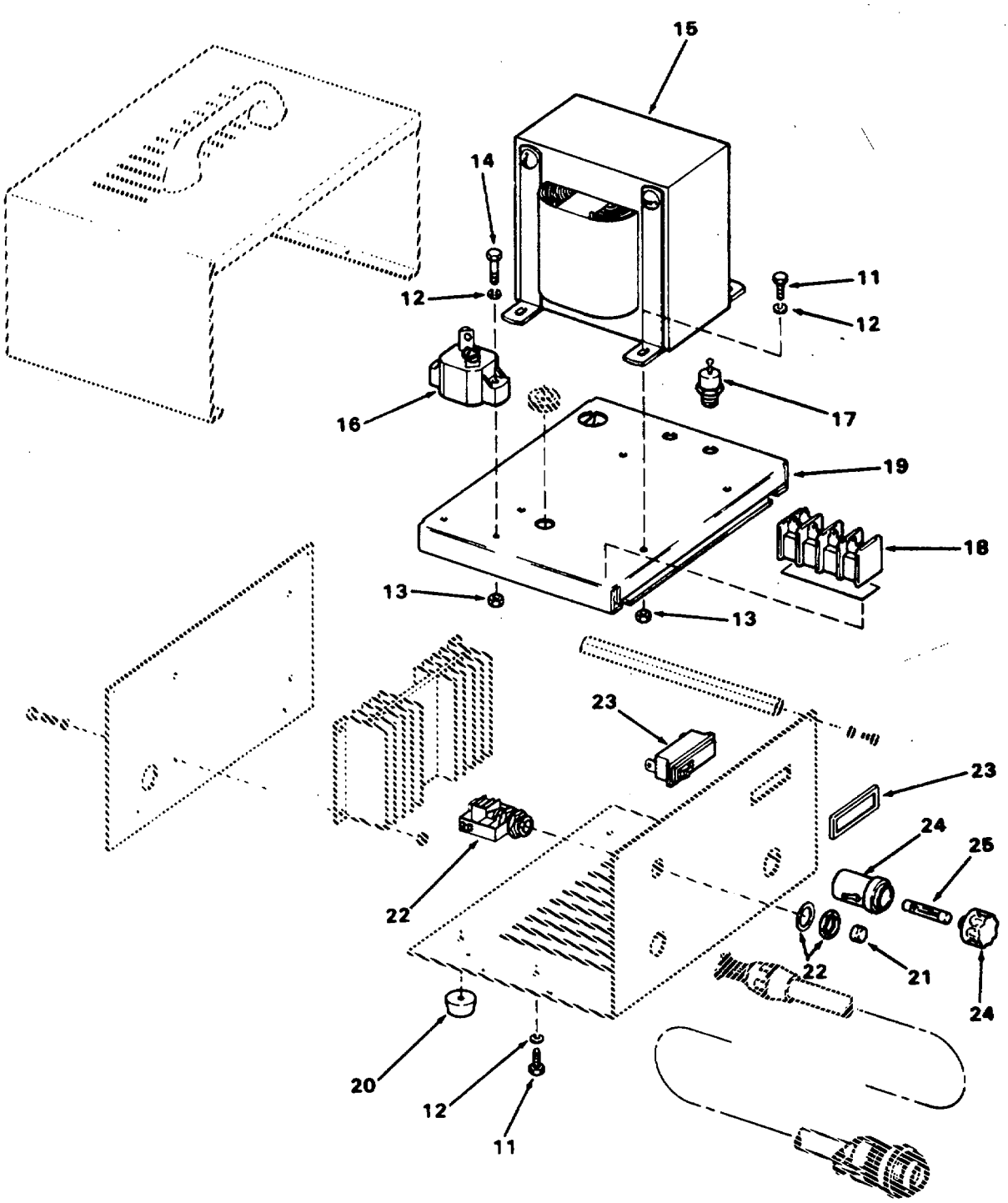
4-75. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	k. Pan head machined screw (11)	Repair by replacement.	As required.
	l. Plain hex machined nut (12)	Repair by replacement.	As required.
	m. Split lock washer (13)	Repair by replacement.	As required.
	n. Pan head machined screw (14)	Repair by replacement.	As required.
	o. Power transformer (15)	Repair by replacement.	As required.
	p. Rectifier (16)	Repair by replacement.	As required.
	q. Rectifier with mounting (17)	Repair by replacement.	As required.
	r. Terminal block (18)	Repair by replacement.	As required.
	s. Chassis (19)	Repair by replacement.	As required.
	t. Foot assembly (20)	Repair by replacement.	As required.
	u. Translucent cap (21)	Repair by replacement.	As required.
	v. Pushbutton switch (22)	Repair by replacement.	As required.
	w. Slide switch (23)	Repair by replacement.	As required.
	x. Fuse holder (24)	Repair by replacement.	As required.

4-75. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



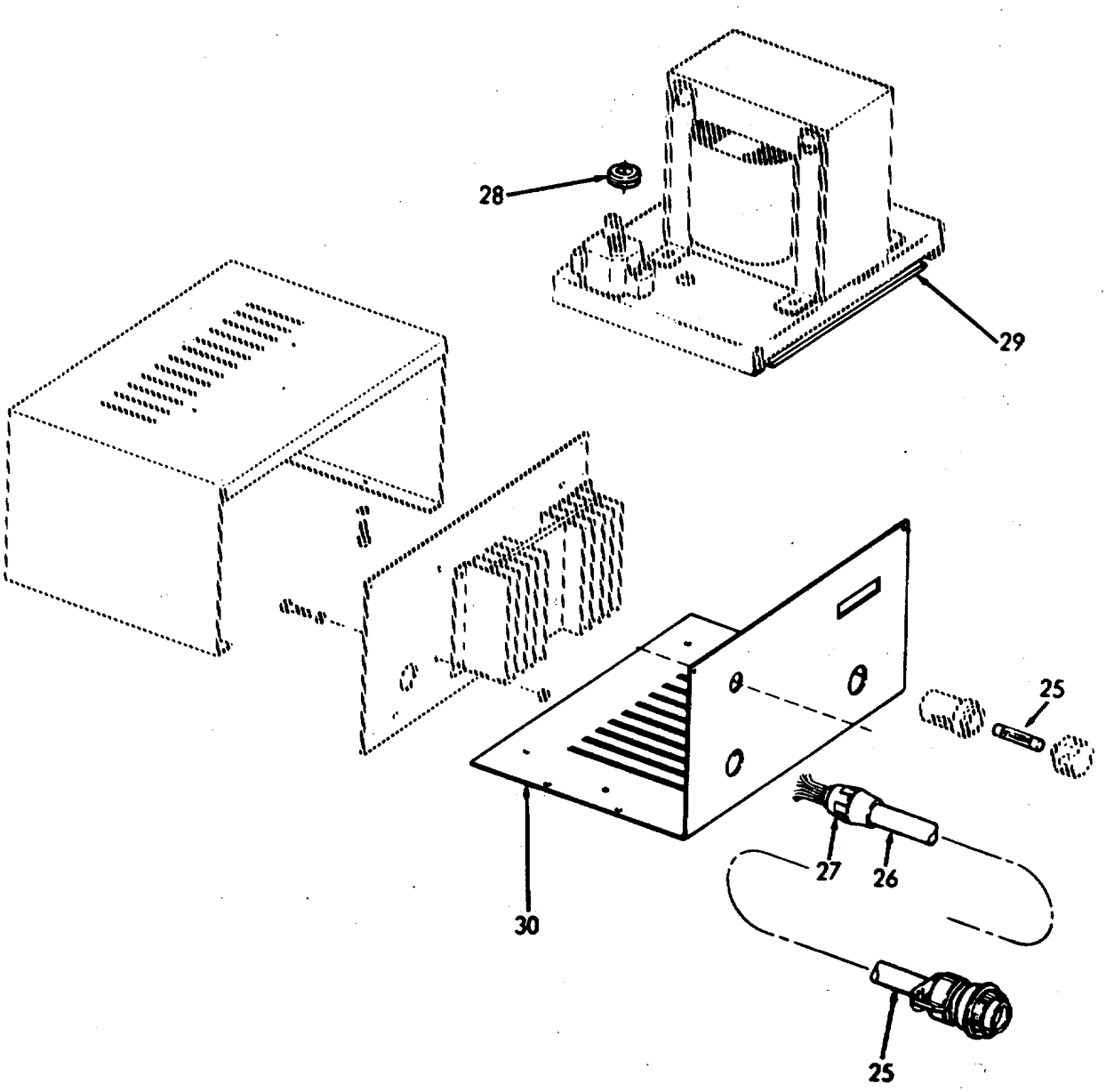
4-75. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	y. Nonrenewable fuse (25)	Repair by replacement.	As required.
	z. Output cable assembly (26)	Repair by replacement.	As required.
	aa. Bushing (27)	Repair by replacement.	As required.
	ab. Grommet (28)	Repair by replacement.	As required.
	ac. 8 amp cut PC board assembly (29)	Repair by replacement.	As required.
	ad. Front panel (30)	Repair by replacement.	As required.

4-75. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-76. WINDSHIELD WIPER - MAINTENANCE INSTRUCTION..

The following is an index to the maintenance procedures.

4-76.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS.

INITIAL SETUP:

Test Equipment

NONE

Special Tools

Soldering iron 25 watt maximum

Material/ Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in procedure.

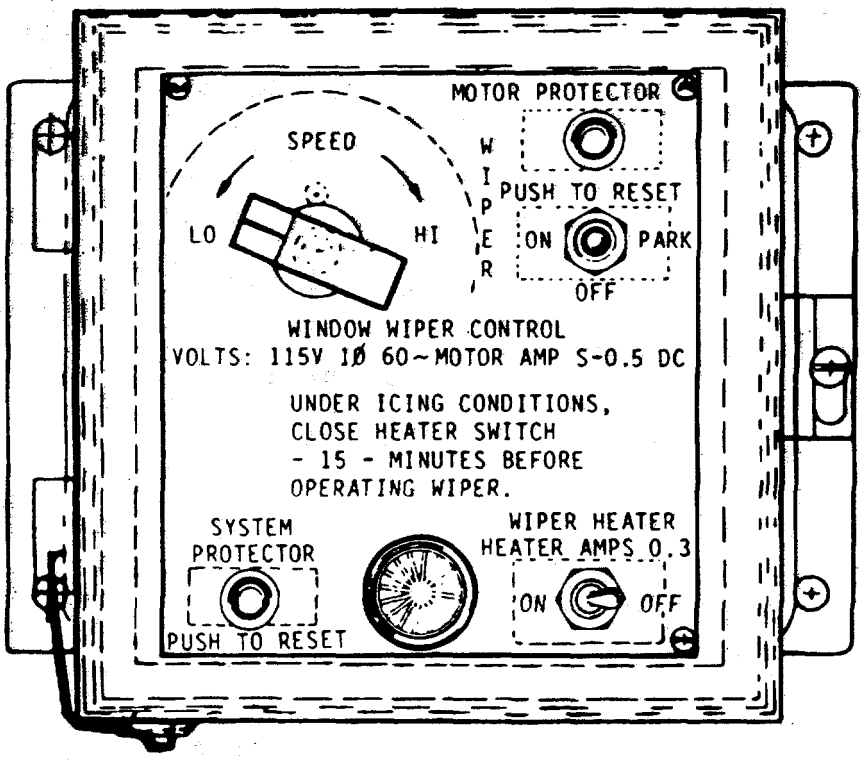
LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Control	a. Case	Inspect for signs of damage.	
	b. Controls	Inspect for damage or improper operation.	See test.
	c. Indicator	Inspect for proper illumination.	

4-76.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS. (Pilothouse) (Continued)

LOCATION	ITEM	ACTION	REMARKS
TEST			
2. System	a. Wiper	1. Place the ON-OFF-PARK switch in the ON position.	Does the wiper move back and forth? See step 4.
		2. Adjust SPEED from HI to LO.	Does the speed of the wiper increase or decrease? See step 9.
		3. Place the ON-OFF-PARK switch in the OFF position.	Does the wiper stop? See step 4.
		4. Joggle the ON-OFF-PARK switch in the PARK position.	Does the wiper park in the desired position? See step 4.
		5. Place the WIPER HEATER switch in the ON position.	a. Does the arm of the wiper get warm in approximately 15 minutes? See step 6. b. Does the indicator lamp light? See step 8.
		6. Place the WIPER HEATER switch in the OFF position.	a. Does the indicator lamp go out. See step 8. b. Does the wiper arm cool? See step 6

4-76.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS. (Pilothouse)

LOCATION	ITEM	ACTION	REMARKS
TEST (Cont)			
	b. Wiper blade	1. When operating does the blade move back and forth when the arm is moving?	Refer to step 5.
		2. Does the blade wipe properly?	Replace blade.



REPAIR

WARNING

In order to avoid electrical shock and possible injury, place and tag the circuit breaker in the OFF position.

3. Control	Cover securing screw (1) and cover (2	Loosen and swing cover open.	

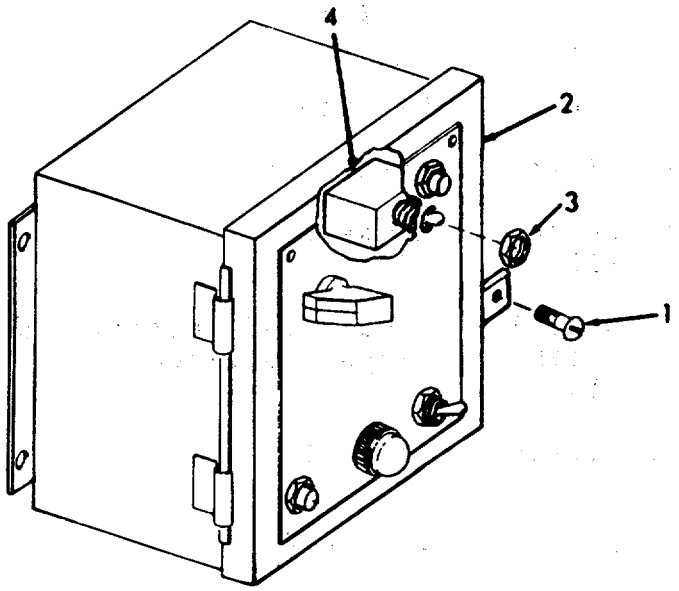
4-76.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS. (Pilothouse) (Continued)

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

- Tag all wiring prior to disconnecting.
- Use a soldering iron with a maximum rating of 25 watts.
- Refer to schematic on page 4-1470.

4.	ON-OFF-PARK switch	a. Wiring	Disconnect.
		b. Locknut (3)	Remove.
		c. Switch (4)	Remove and install new switch.
		d. Locknut (3)	Instal1.
		e. Wiring	Reconnect.

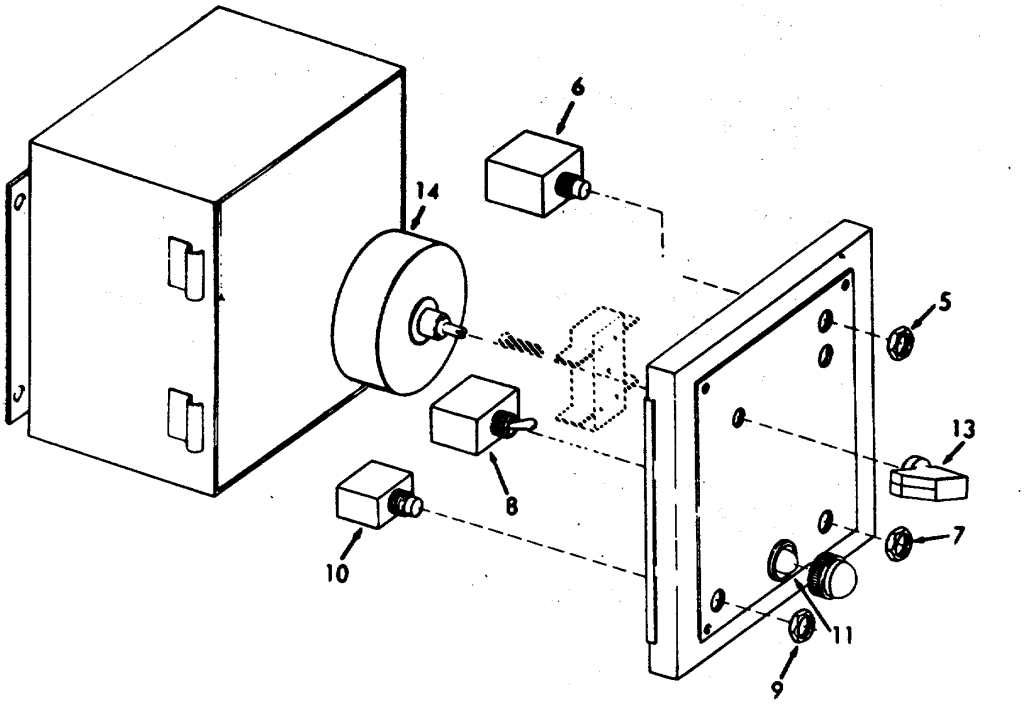


4-76.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS. (Pilothouse) (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
5. Motor protector	a. Wiring	Disconnect	
	b. Locknut (5)	Remove.	
	c. Circuit breaker (6)	Remove and install new circuit breaker.	
	d. Locknut (5)	Install.	
	e. Wiring	Reconnect.	
6. Wiper heater ON-OFF switch	a. Wiring	Disconnect.	
	b. Locknut (7)	Remove.	
	c. Switch (8)	Remove and install new switch.	
	d. Locknut (7)	Install.	
	e. Wiring	Reconnect.	
7. System protector	a. Wiring	Disconnect.	
	b. Locknut (9)	Remove.	
	c. Circuit breaker (10)	Remove and install new circuit breaker.	
	d. Locknut (9)	Install.	
	e. Wiring	Reconnect.	
8. Indicator lamp	a. Wiring	Disconnect.	
	b. Lamp (11)	Replace.	If necessary.

4-76.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS. (Pilothouse) (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	c. Lamp assembly (12)	Replace.	
	d. Wiring	Reconnect.	
9. SPEED-HI-LO	a. Wiring	Disconnect.	
	b. Knob (13)	Loosen setscrew and remove.	
	c. Powerstat (14)	Remove and install new powerstat.	
	d. Knob (13)	Install and tighten setscrew.	
	e. Wiring	Reconnect.	



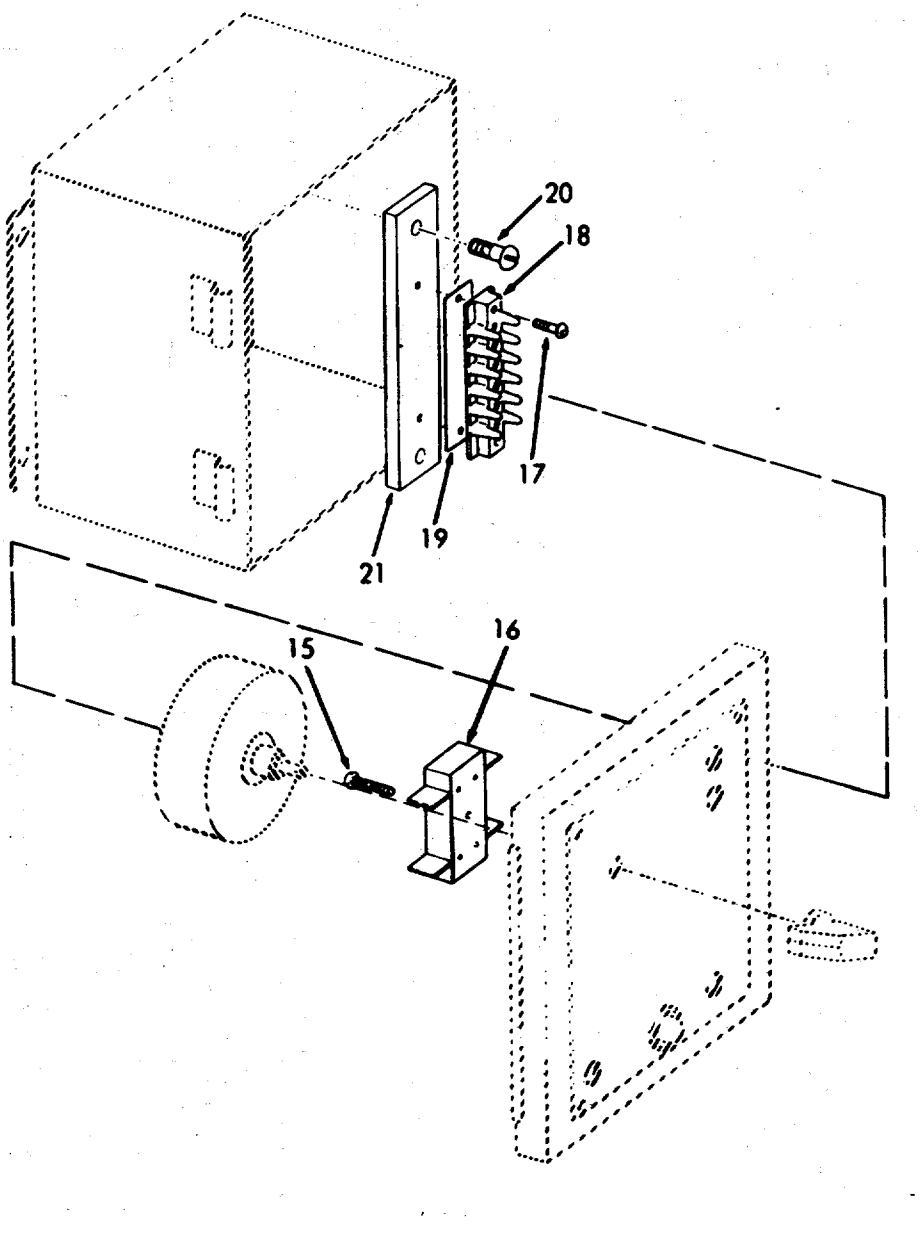
4-76.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS. (Pilothouse) (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
10. Rectifier	a. Wiring	Disconnect.	
	b. Screws (15)	Remove.	
	c. Rectifier (16)	Remove and install with new rectifier.	
	d. Screws (15)	Install.	
	e. Wiring	Reconnect	
11. Terminal block	a. Wiring	Disconnect	
	b. Screws (17)	Remove.	
	c. Terminal strip (18)	Remove.	
	d. Number board (19)	Remove.	
	e. Screws (20)	Remove.	If necessary.
	f. Mounting pad (21)	Remove.	If necessary.
	g. Number board (19)	Install.	
	h. Terminal strip (18)	Install.	
	i. Screws (17)	Install.	
	j. Wiring	Reconnect.	

4-76.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS. (Pilothouse) (Continued)

LOCATION	ITEM	ACTION	REMARKS

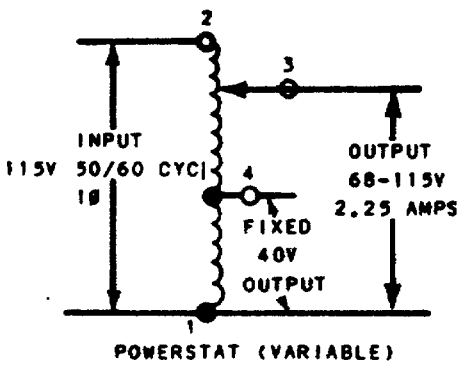
REPAIR (Cont)

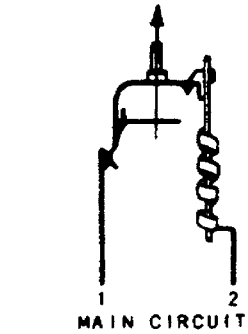


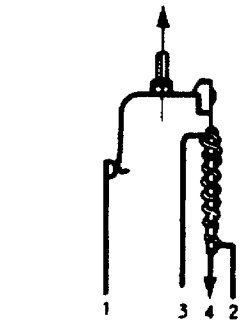
4-76.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS.
(Pilothouse) (Continued)

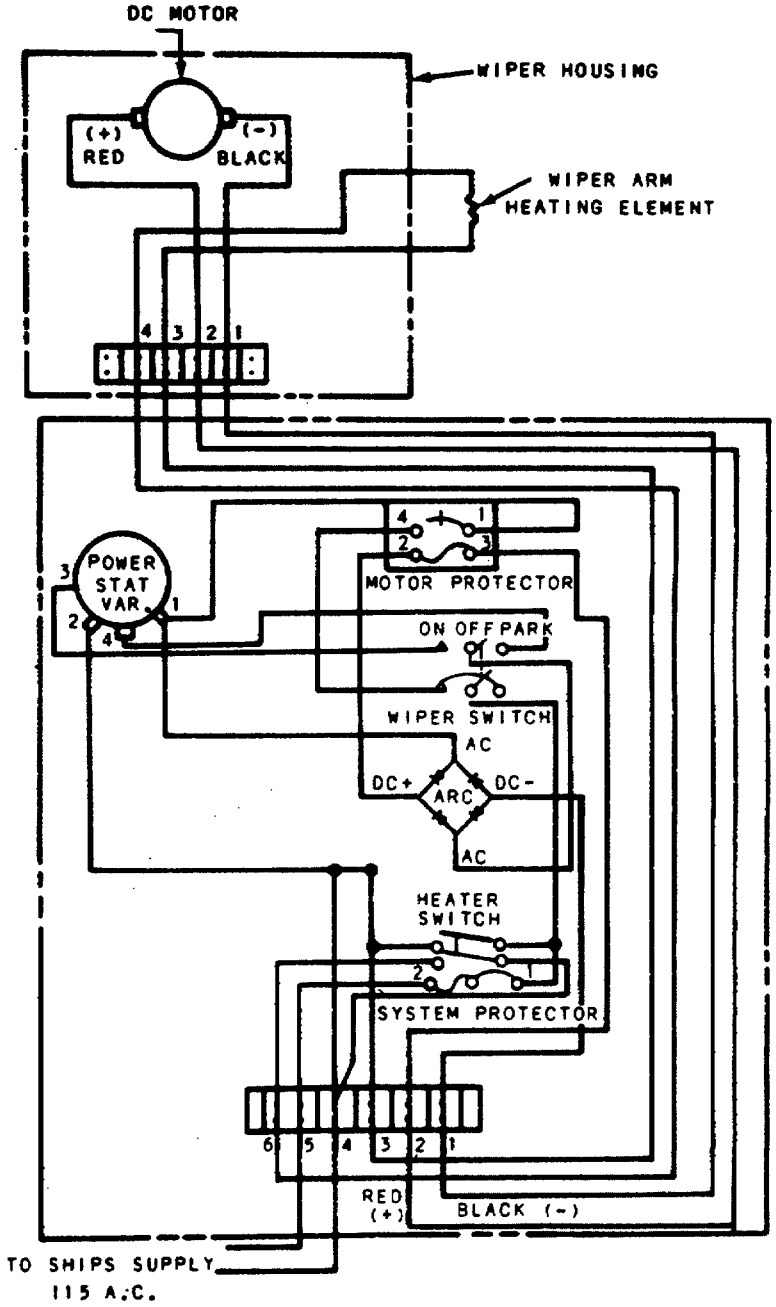
LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)









4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS. (Pilothouse) (Continued)

This task covers:
a. Inspection **b. Replace** **c. Repair**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References
Paragraph
4-76.1 Windshield Wiper Control Equipment

Condition Condition Description
NONE

Special Environmental Conditions
NONE

General Safety Instructions
Observe WARNING in procedure

LOCATION	ITEM	ACTION	REMARKS

WARNING

In order to avoid electrical shock and possible injury, place and tag the circuit breaker in the OFF position.

INSPECTION

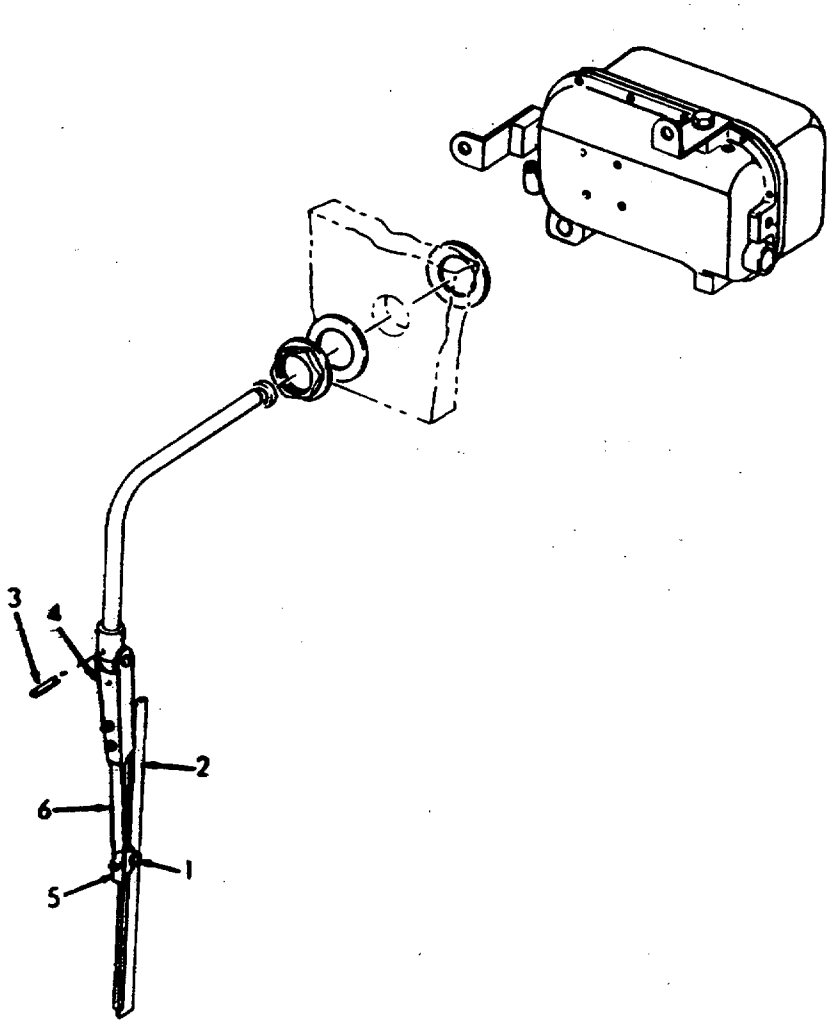
1. Windshield wiper assembly	a. Wiper blade	Inspect for breaks, cracks, and signs of wear.	

4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS. (Pilothouse) (Continued)

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	b. Heated arm	1. Inspect for breaks, cracks and bends.	
		2. Inspect for heating after 15 minutes.	
		3. Inspect for proper travel.	
	c. Housing	1. Inspect for cracks, breaks, dents and leaks.	
		2. Inspect for noise during operation.	
REPLACE			
2. Wiper blade	a. Screw and nut (1)	Remove.	
	b. Wiper blade (2)	Remove and install new wiper blade.	
	c. Screw and nut (1)-	Install.	
3. Lower arm assembly	a. Roll pin (3)	Remove.	
	b. Clevis and clamp (4)	Remove.	
	c. Screw, lock-nut and clevis as-sembly (5)	Remove.	
	d. Lower arm (6)	Replace.	Bend and cut to pro-per angle and length.

4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS. (Pilothouse) (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	e. Clevis assembly, screw, and locknut (5)	Install.	
	f. Clevis and clamp (4)	Install.	
	g. Roll pin (3)	Install.	



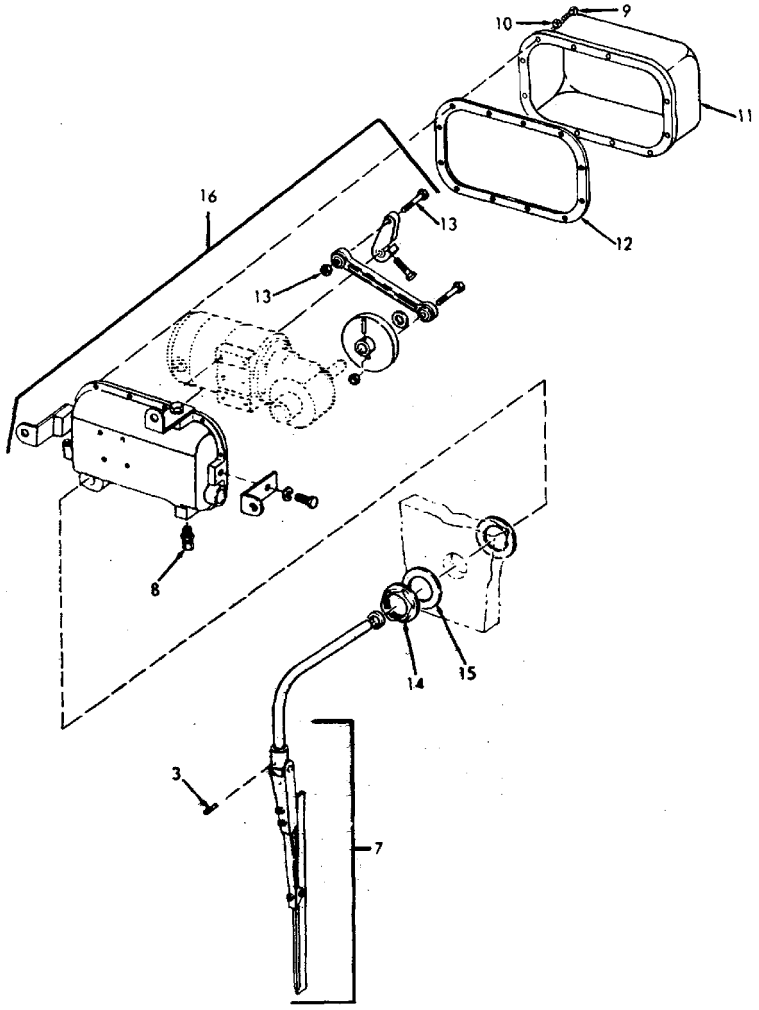
4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS. (Pilothouse) (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
4. Lower arm assembly	a. Roll pin (3)	Remove.	
	b. Lower arm assembly (7)	Remove.	
	c. Drain plug (8)	Remove.	Drain condensate into a suitable container.
	d. Screws (9) and lock-washers (10)	Remove.	
	e. Cover (11) and gasket (12)	Remove.	Discard gasket.
	f. Wiring	Disconnect external wiring.	Refer to schematic in paragraph 4-76.1 .
	g. Bolt and nut (13)	Remove.	Wiper arm is now free to move.
	h. Bulkhead gland nut (14) and washer (15)	Remove.	
	i. Wiper assembly (16	1. Remove mounting hardware. 2. Remove. 3. Replace.	Wiper assembly is removed through bulkhead without removal of heated arm assembly from motor assembly.
	j. Bulkhead washer (15) and gland nut (14)	Install.	

4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	k. Bolt and nut (13)	Install.	Connects connecting rod (17) and drive lever (18).
	l. Wiring	Reconnect external wiring.	Refer to schematic in paragraph 4-76.1 .
	m. Gasket (12) and cover (11)	Install.	Use new gasket.
	n. Screws (9) and lock-washers (10)	Install.	
	o. Drain plug (8)	Install.	
	p. Lower arm assembly (7) and roll pin (3)	Install.	
	q. Tangent screw (19)	Adjust.	Used to adjust centering of arm sweep.
	r. Bolt and nut (20), motor crank disc (21), and spacer (22)	Adjust.	See below.

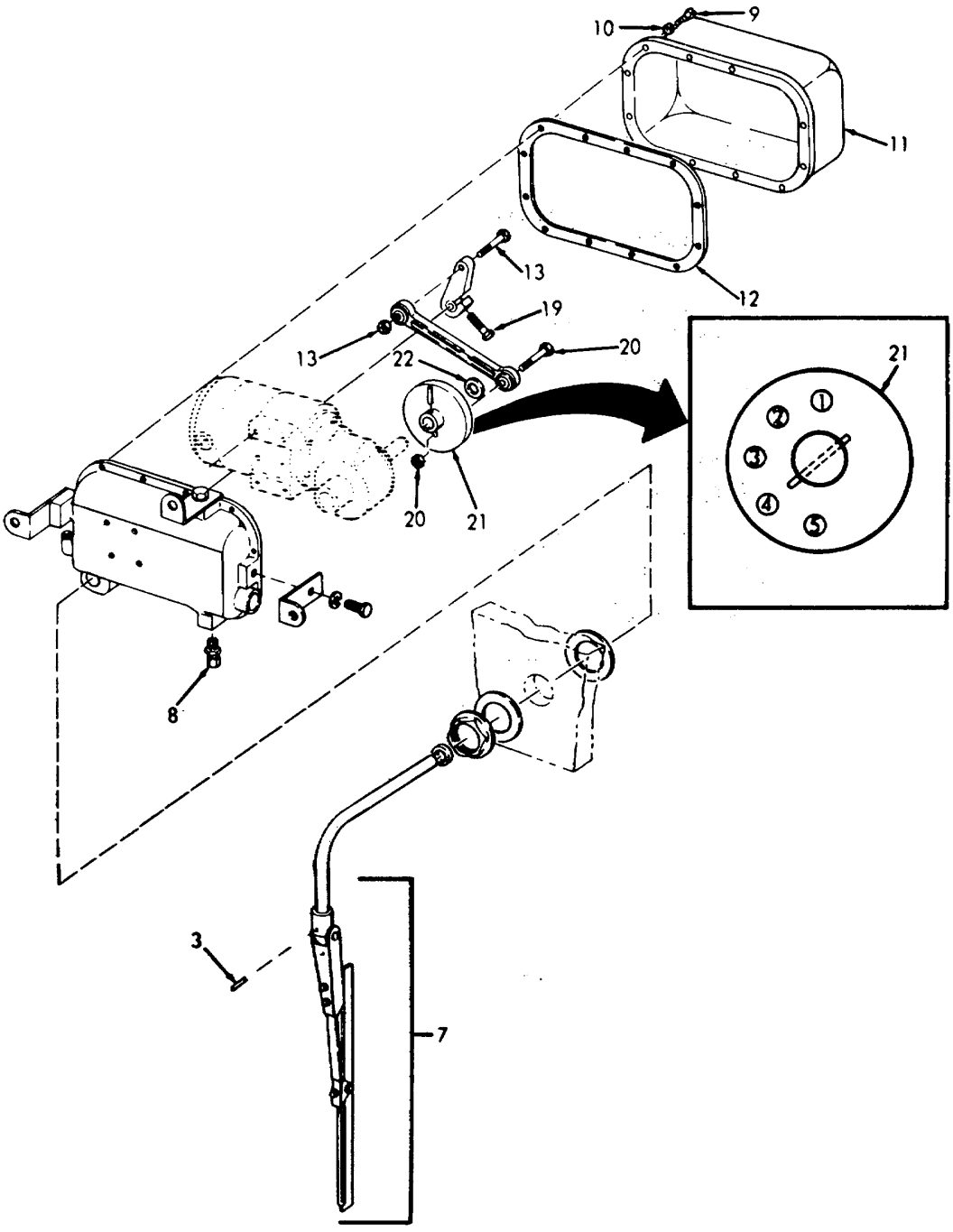
ARM TRAVEL CHART

Hole	Total Travel	
1	70 in	177.8 cm
2	67 in	170.2 cm
3	65 in	165.1 cm
4	62 in	157.5 cm
5	60 in	152.4 cm

4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



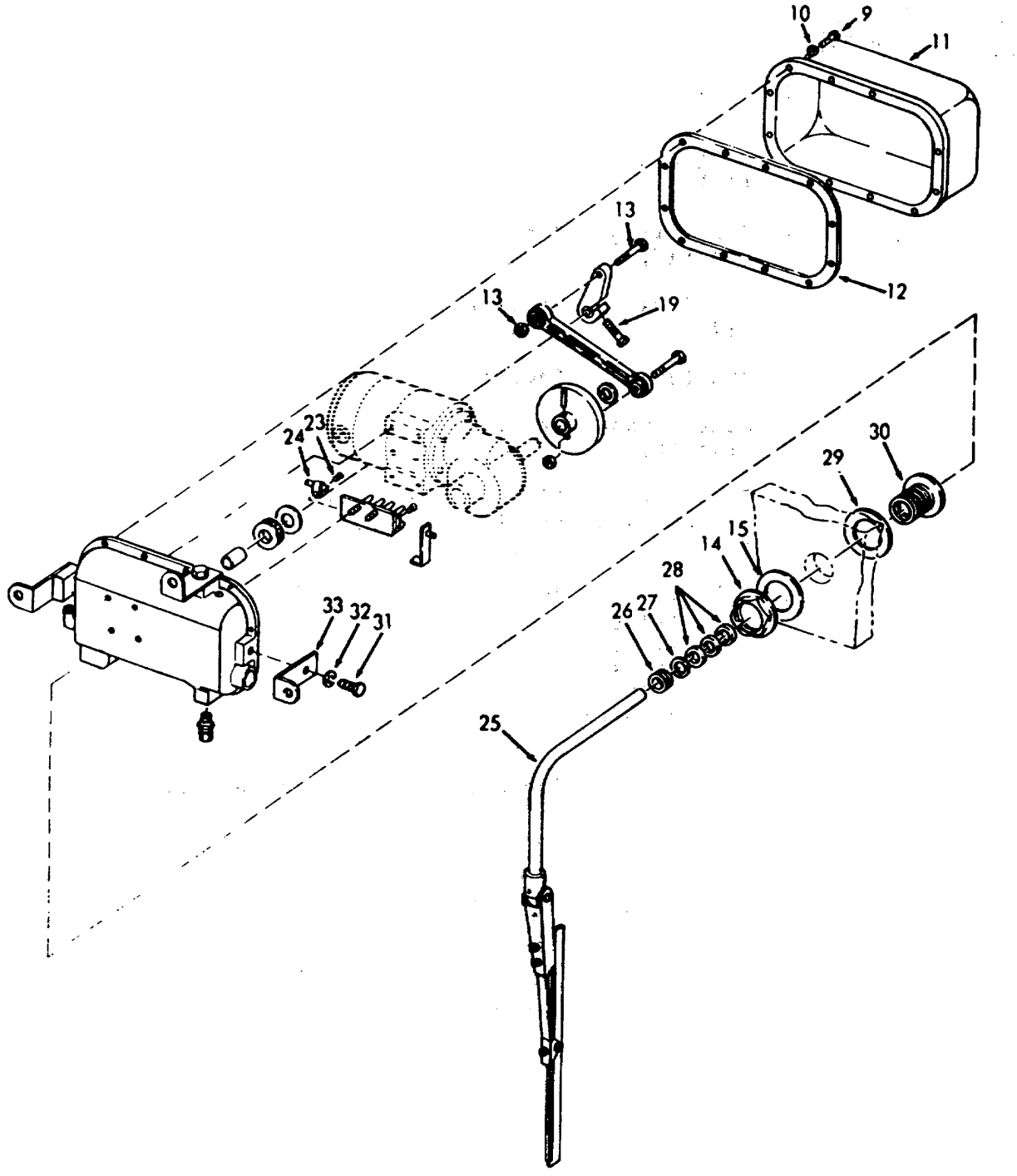
4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
5.	a. Screws (9) and washers (10)	Remove.	
	b. Cover (11) and gasket (12}	Remove.	Discard gasket.
	c. Heated arm assembly wiring screw (23) and clamp (24)	Remove.	
	d. Tangent screw (19)	Loosen.	
	e. Bulkhead gland nut (14) and washer (15)	Remove.	
	f. Arm (25)	Remove.	
	g. Gland nut (26), flat-washer (27), teflon packing rings (28), gland washer (29), and bulkhead gland body (30)	Disassemble.	If necessary.
	h. Foot bolts (31), lock-washers (32), and motor housing foots (33)	Remove.	If necessary.
	i. Bolt and nut (13)	Remove.	

4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

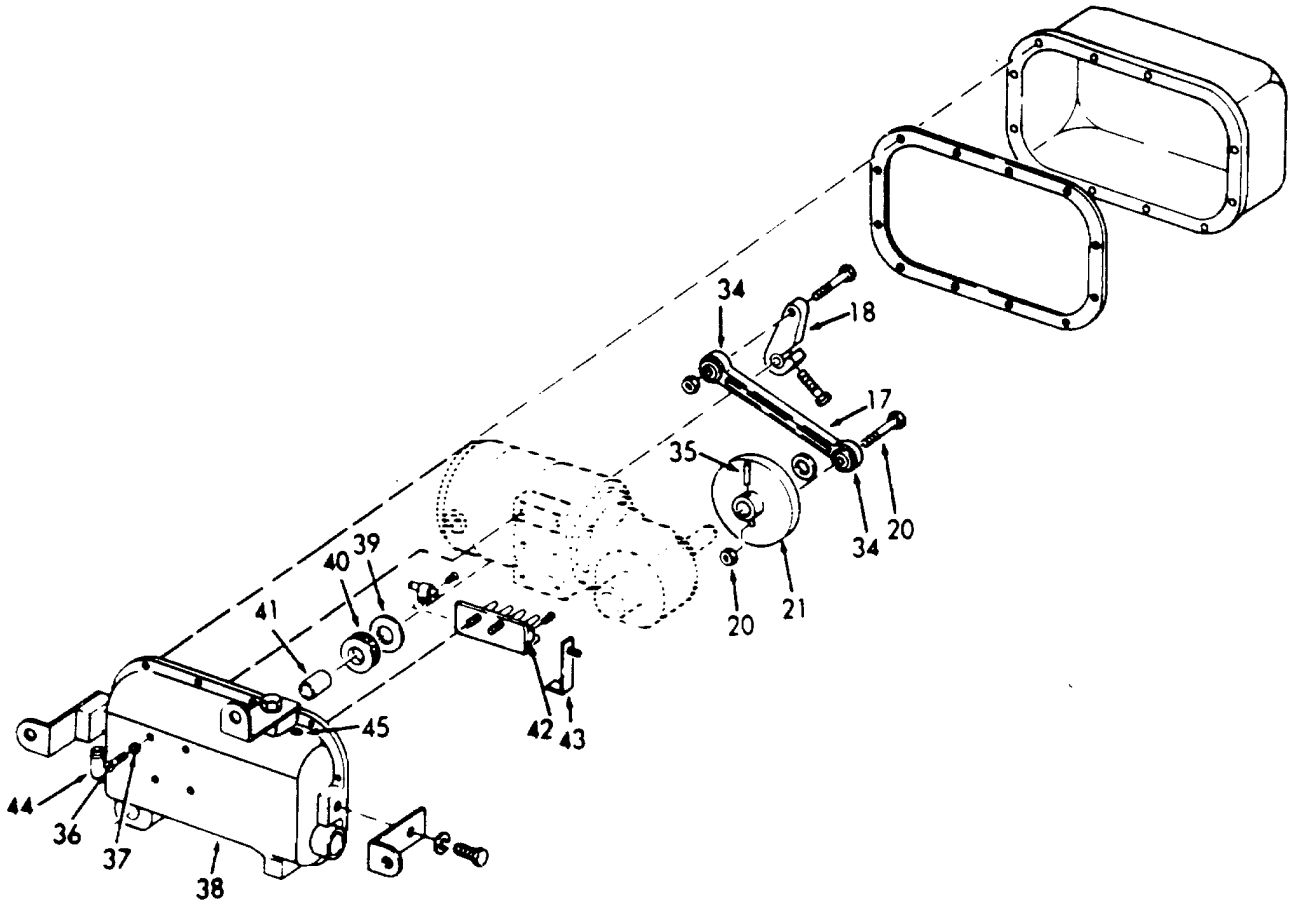


4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	j. Drive lever (18)	Remove.	
	k. Bolt and nut (20)	Remove.	
	l. Connecting rod (17)	Remove.	
	m. Bearings (34)	Replace.	If necessary.
	n. Pin (351	Remove.	
	o. Motor crank disc (21)	Remove.	
	p. Screws (36) and washers (37)	Disassemble motor housing (38) and motor.	
	q. Ball bearing see-wiring ring (39), ball bearing (40), and bronze bushing (41).	Remove.	If necessary.
	r. Terminal strip (42), grounding strip (43), oil cup (44), and oil plug (45)	Replace.	If necessary.
	s. Motor housing (38), motor, screws (36), and washers (37)	Assemble.	

4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	t. Motor crank disc (21) and pin (35)	Install.	
	u. Connecting rod (17), bolt and nut (20), and spacer (22)	Assemble.	Refer to step 4o for adjustments.
	v. Connecting rod (17), bolt and nut (13), and drive lever (18)	Assemble.	



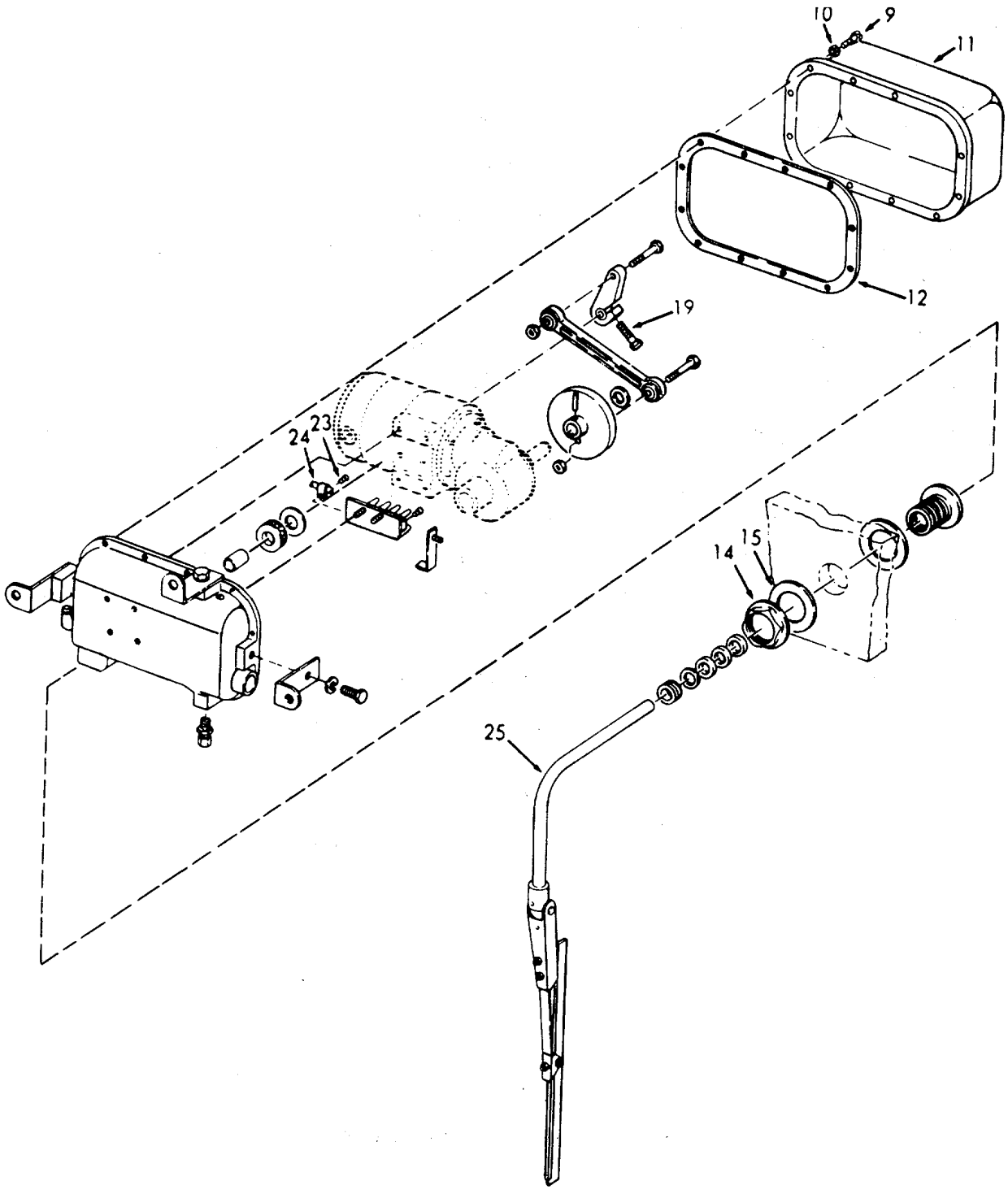
4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	w. Arm (25)	Install.	
	x. Bulkhead gland washer (15) and nut (14)	Install.	
	y. Tangent screw (19)	Adjust.	Used to adjust centering of arm sweep.
	z. Heated arm assembly wiring-screw (23) and clamp (24)	Install and connect wiring.	
	aa. Gasket (12) and cover (11)	Install.	Use new gasket.
	ab. Washers (10) and screws (9)	Install.	

4-76.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-76.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS. (Pilothouse)

This task covers:

a. Inspection **b. Repair**

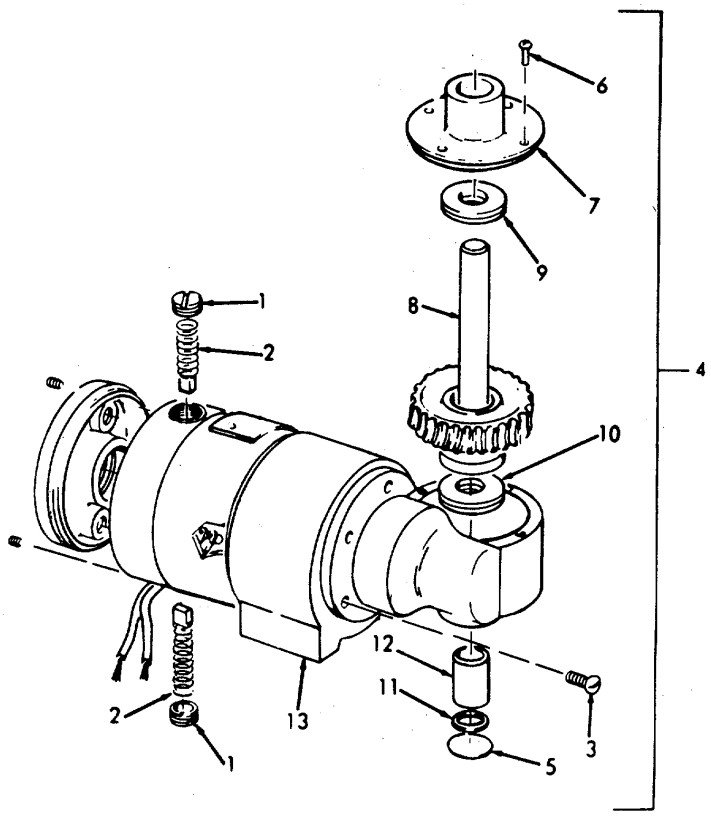
INITIAL SETUP:

Test Equipment	References
NONE	NONE
Special Tools	**Equipment Condition** / **Condition Description**
NONE	NONE
Material/Parts	**Special Environmental Conditions**
Grease Type MD	NONE
Personnel Required	**General Safety Instructions**
1	NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Motor and gear housing	a. Brushes and brush holders	1. Inspect for damage. 2. Inspect for wear.	
	b. Motor	Inspect for signs of overheating.	
	c. Gear case	Inspect for leaking.	
REPAIR			
2.	a. Brush caps (1) and brush and spring assemblies (2)	Remove.	
	b. Screws (3)	Remove.	
	c. Gear housing (4)	Remove from motor.	

4-76.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
3. Gear box	a. Gear seal plug (5)	Remove.	
	b. Screws (6)	Remove.	
	c. Gear head cap (7)	Remove.	
	d. Shaft and gear assembly (8)	Remove.	
	e. Two each spacer washers (9 and 10)	Remove.	
	f. Seal washer (11) and bushing (12)	Press out of housing (13).	



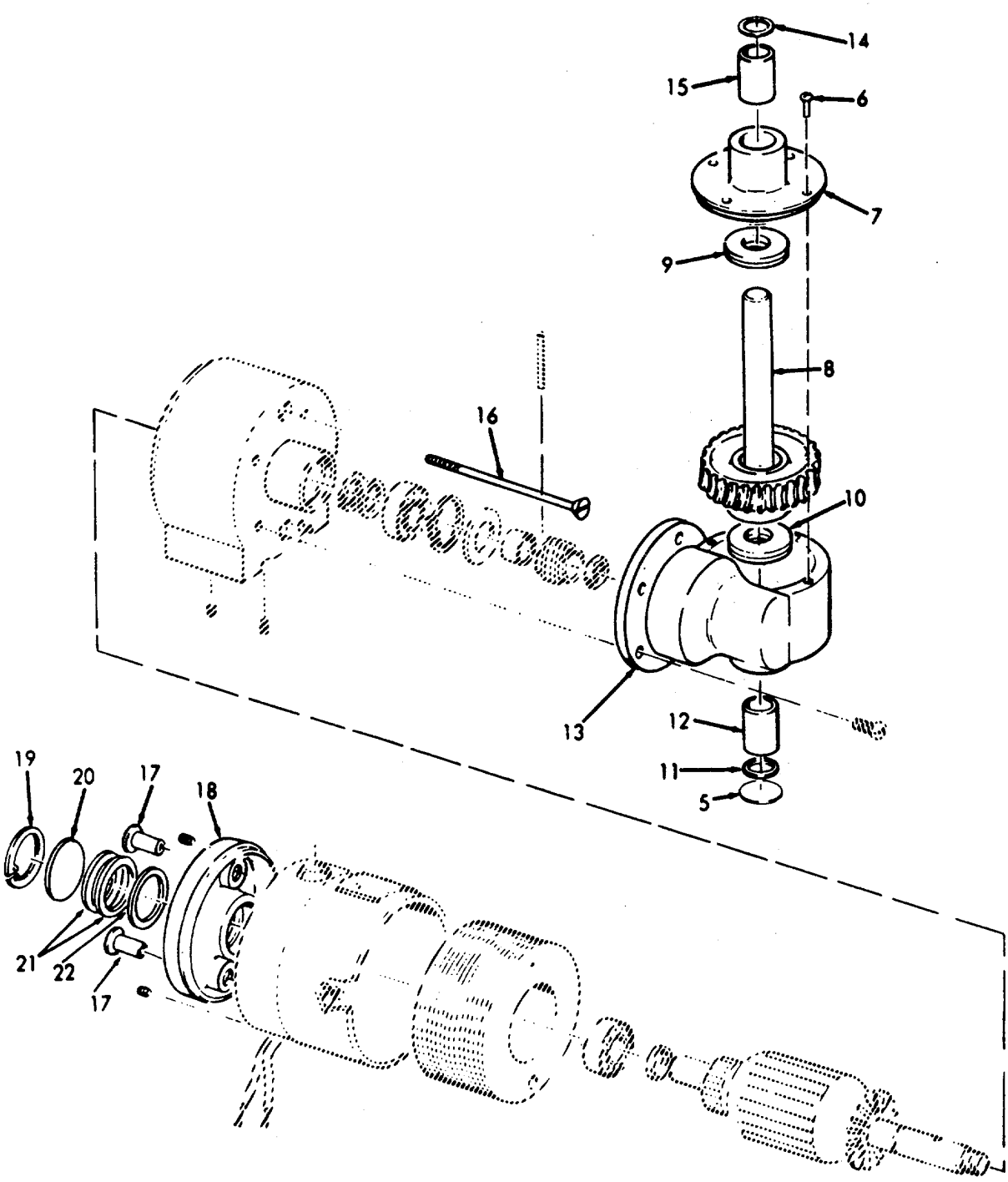
4-76.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	g. Seal (14) and bushing (15)	Press out of cap (7).	
	h. Bushing (15) and seal (14)	Press into cap (7).	
	i. Bushing (12) and seal washer (11)	Press into housing (13).	
	j. Shaft and gear assembly (8) and two each spacer washers (9 and 10)	Assemble.	
	k. Shaft and gear assembly (8), housing (13), gear head cap (7), and screws (6)	Assemble.	
	l. Gear seal plug (5)	Install.	
4. Motor	a. Screws (16) and screw binders (17)	Remove.	
	b. Rear cap (18)	Remove.	
	c. Snap ring (19), rear disc (20), spacer washers (21 and 22)	1. Remove from rear cap (18). 2. Reassemble.	

4-76.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

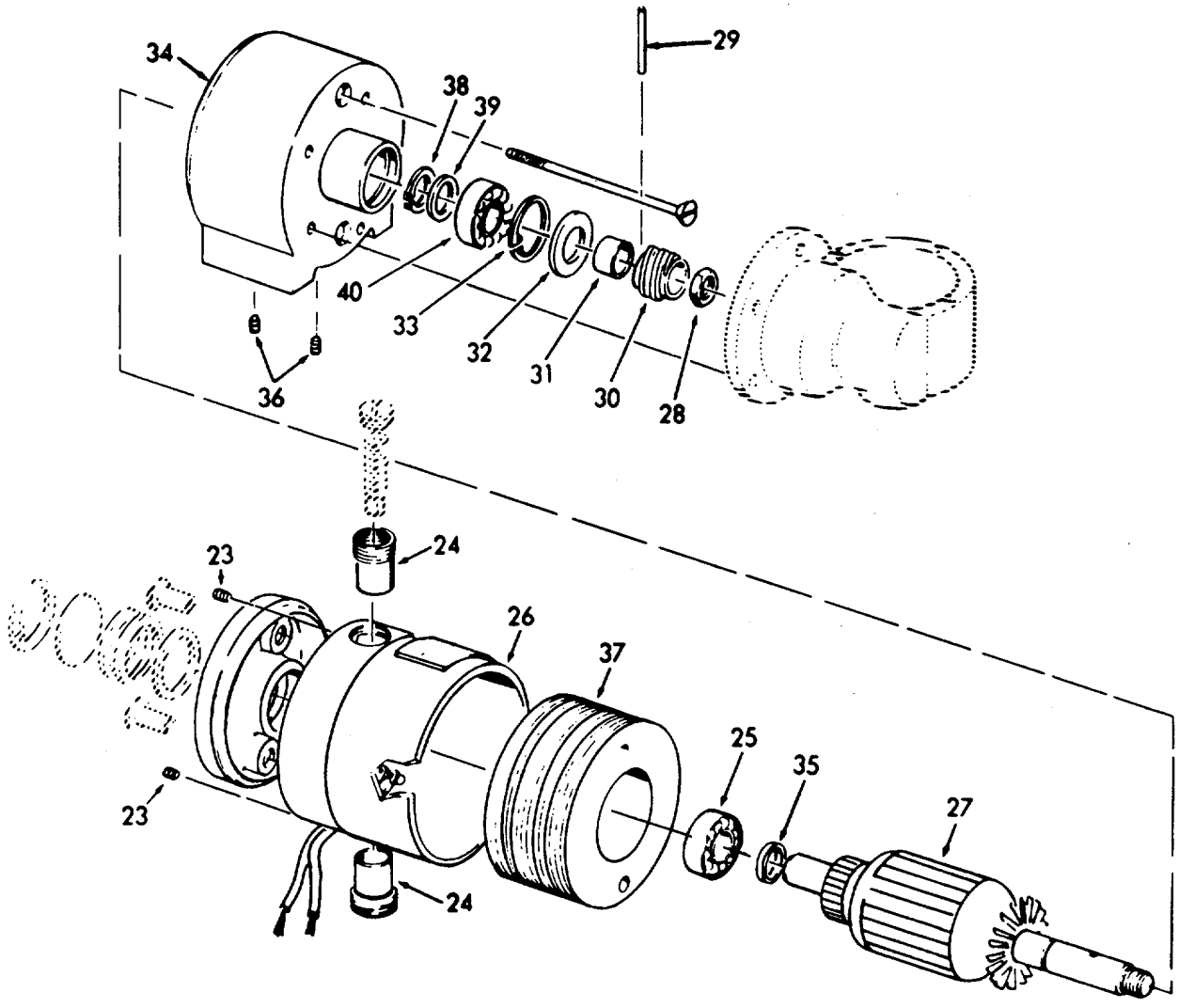


4-76.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Setscrews (23) and brush tubes (24)	Remove.	
	e. Bearing (25)	Remove from rear cap (18).	If necessary.
	f. Housing (26)	Remove.	
	g. Armature (27)	1. Clamp.	Do not damage armature.
		2. Remove nut (28).	
	h. Pin (29) and gear (30)	Remove.	
	i. Worm spacer sleeve (31) and slinger (32)	Remove.	
	j. Snap ring (33)	Remove.	
	k. Armature (27)	Remove from front housing (34).	
	l. Rear spacer (35)	Remove from armature (27).	
	m. Setscrews (36) and field (37)	Remove from front housing (34).	
	n. Snap ring (38), washer (39), and bearing (40)	Remove.	If necessary.
	o. Field (37) and set-screws (36)	Install in front housing (34).	

4-76.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	p. Rear spacer (35)	Install on armature (27).	
	q. Armature (27)	Insert in front housing (34).	
	r. Snap ring (33)	Install.	



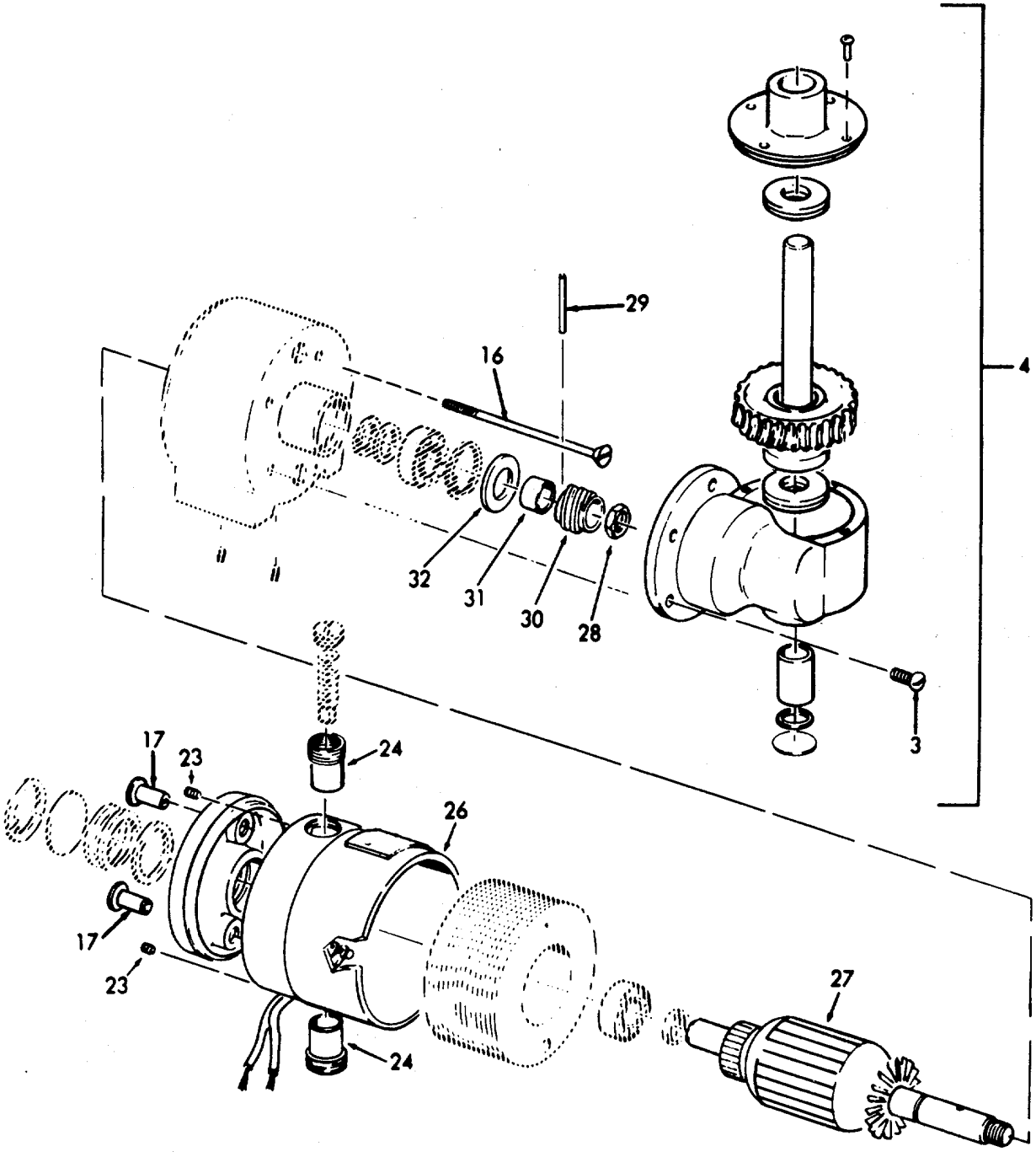
4-76.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	s. Slinger (32), worm spacer sleeve (31)	Install.	
	t. Gear (30) and pin (29)	Install.	
	u. Armature (27) and nut (28)	Assemble.	Do not damage armature.
	v. Housing (26)	Install.	
	w. Brush tubes (24) and setscrews (22)	Install.	
	x. Rear cap (18)	Install.	
	y. Screws (16) and screw binders (17)	Install.	
5. Motor and a. gear housing	Gear housing (4)	Lubricate.	Use grease type MD.
	b. Screws (3)	Install.	
	c. Brush and spring assemblies (2) and brush caps (1)	Install.	

4-76.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-76.4. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS. (Conning tower)

This task covers:

a. Inspection **b. Test** **c. Repair**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

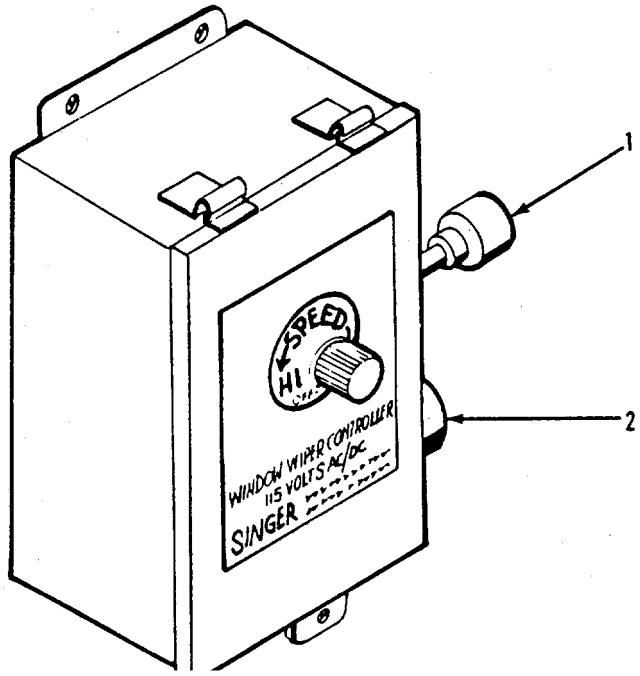
General Safety Instructions

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Control	a. Case	Inspect for signs of damage.	
	b. Controls	Inspect for damage or improper operation.	See test.
TEST			
2. System	a. Wiper Control	1. Turn HI-LO-OFF switch to the HI position.	Does the wiper move back and forth? See Location 3.
		2. Adjust Speed from HI to LO.	If wiper speed increases, See Location 3.
		3. Place the HI-LO-OFF Switch in the OFF position.	If wiper doesn't not stop, see Location 3.

4-76.4. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARKS
TEST (Cont)			
	b. Wiper blade	1. When operating does the blade move back and forth when the arm is moving?	If not, refer to paragraph 4-76.5 .
		2. Does the blade wipe properly?	If not, refer to paragraph 4-76.5 .



REPAIR

3. Wiper controller

WARNING

In order to avoid electrical shock and possible injury, place and tag the circuit breaker in the OFF position.

NOTE

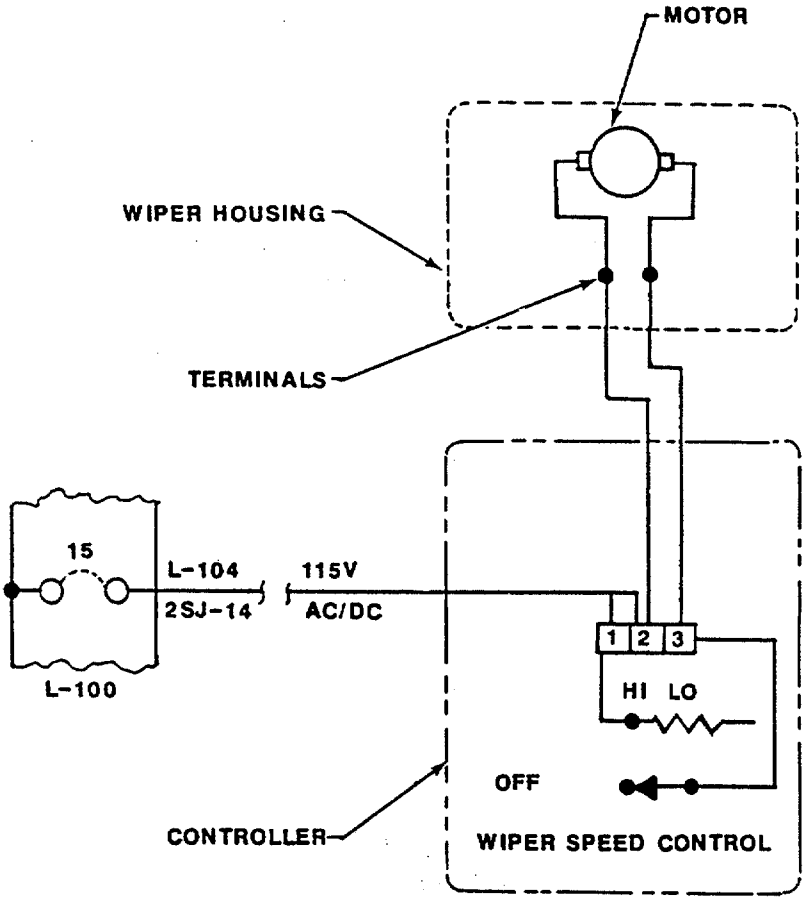
Tag all wiring prior to disconnecting.

Controller	a. Connectors (1) and (2)	Disconnect from power source and from window wiper.	Refer to wiring diagram on following page.

4-76.4. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



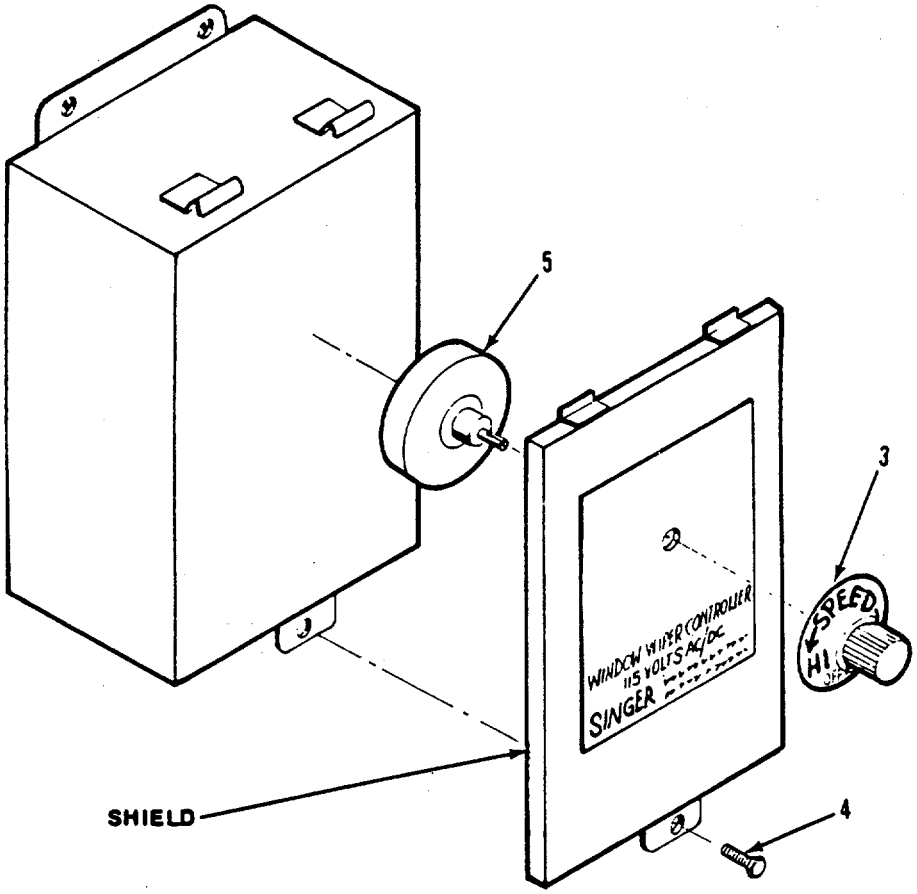
b.	Rheostat knob (3)	Loosen set screw and remove.	
c.	Screw (4) and front shield.	Remove screw	
d.	Rheostat (5)	Remove and install new rheostat.	

4-76.4. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

e.	Screw (4)	Install shield and tighter screw.
f.	Rheostat knob (3).	Install.
g.	Connectors (1) and (2)	Reconnect.
h.	Circuit breaker.	Remove tag and place breaker in ON position.



4-76.5. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS. (Conning tower) (Continued).

This task covers:

a. Inspection
b. Replace
c. Repair

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

Paragraph 4-76.4 . Windshield Wiper Control

Equipment Condition Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in procedure

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Windshield wiper assembly	a. Wiper blade	Inspect for breaks, and cracks, and signs of wear.	
	b. Arm assembly	Inspect for breaks, cracks and signs of wear.	
	c. Motor and gear housing	Inspect for breaks, cracks and signs of wear.	

4-76.5. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

2. Wiper blade

WARNING

In order to avoid electrical shock and possible injury, place and tag circuit breaker in the OFF position.

NOTE

Tag all wiring prior to disconnecting.

a.	Connector (1)	Disconnect to wipe controller.	Refer to wiring diagram in paragraph 4-76.4 .
b.	Screws (2)	Remove.	
c.	Wiper blade (3)	Remove and replace wiper blade with new unit.	

4-76.5. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Screws (2)	Mount new wiper blade using the two screws.	Adjust blade to fit flat upon window.
	e. Connector (1)	Reconnect to wiper controller.	
	f. Screws (4)	Adjust blade travel using following chart:	
	g. Circuit breaker	Remove tag and place breaker in ON position.	

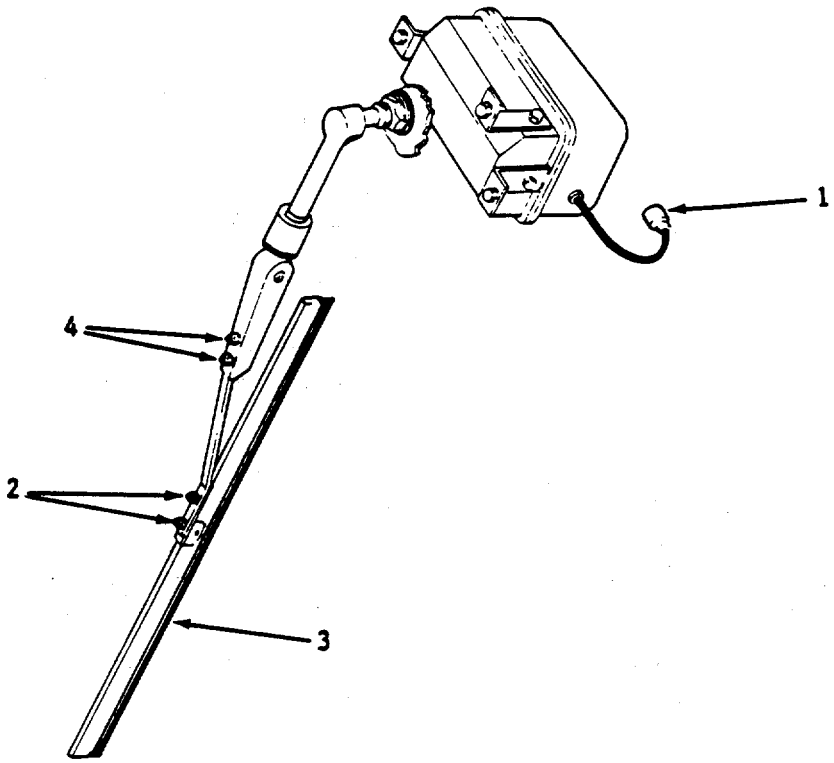
ARM TRAVEL CHART

Hole	Degrees of Total Travel
1	70°
2	67°
3	65°
4	62°
5	60°
6	55°
7	53°
8	51°
9	44°
10	41°

4-76.5. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



3. Arm assembly

WARNING

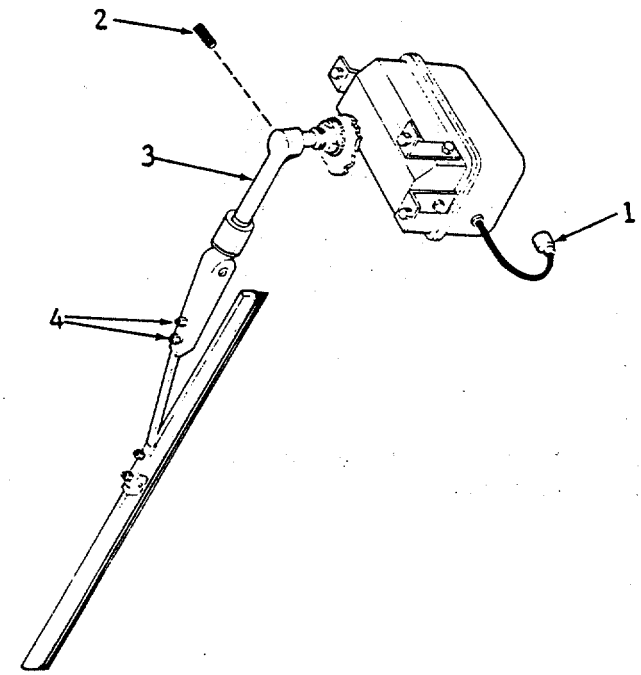
In order to avoid electrical shock and possible injury, place and tag circuit breaker in the OFF position.

NOTE

Tag all wiring prior to disconnecting.

4-76.5. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	a. Connector (1)	Disconnect to wiper controller.	Refer to wiring diagram in paragraph 4-76.4 .
	b. Set screw (2)	Remove screw and slide arm assembly (3) from wiper arm shaft.	
	c. Arm assembly (3)	Mount new arm assembly on wiper arm shaft with set screw (2).	
	d. Connector (1)	Reconnect to wiper controller.	
	e. Screws (4)	Adjust wiper blade using Arm Travel Chart, above.	
	f. Circuit breaker	Remove tag and place breaker in ON position.	



4-76.5. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
Motor and gear housing		**WARNING** In order to avoid electrical shock and possible injury, place and tag circuit breaker in the OFF position.	
		NOTE Tag all wiring prior to disconnecting.	
	a. Motor and gear housing bly,	(1) Disconnect from wiper controller, arm assem- power source and conning tower.	Discard old unit. Refer to 4-76.5, location 3.
		(2) Reinstall new motor and gear housing.	
	b. Circuit	Remove tags and place breaker in ON position.	Test in accor- dance with paragraph 4-76.4 .

4-77. SEARCHLIGHT - MAINTENANCE INSTRUCTIONS.

The following is an index to the maintenance procedures.

4-77.1. SEARCHLIGHT - MOUNTING AND YOKE ASSEMBLY - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection
b. Service
c. Repair

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

Grease MIL-G-7118

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

NONE

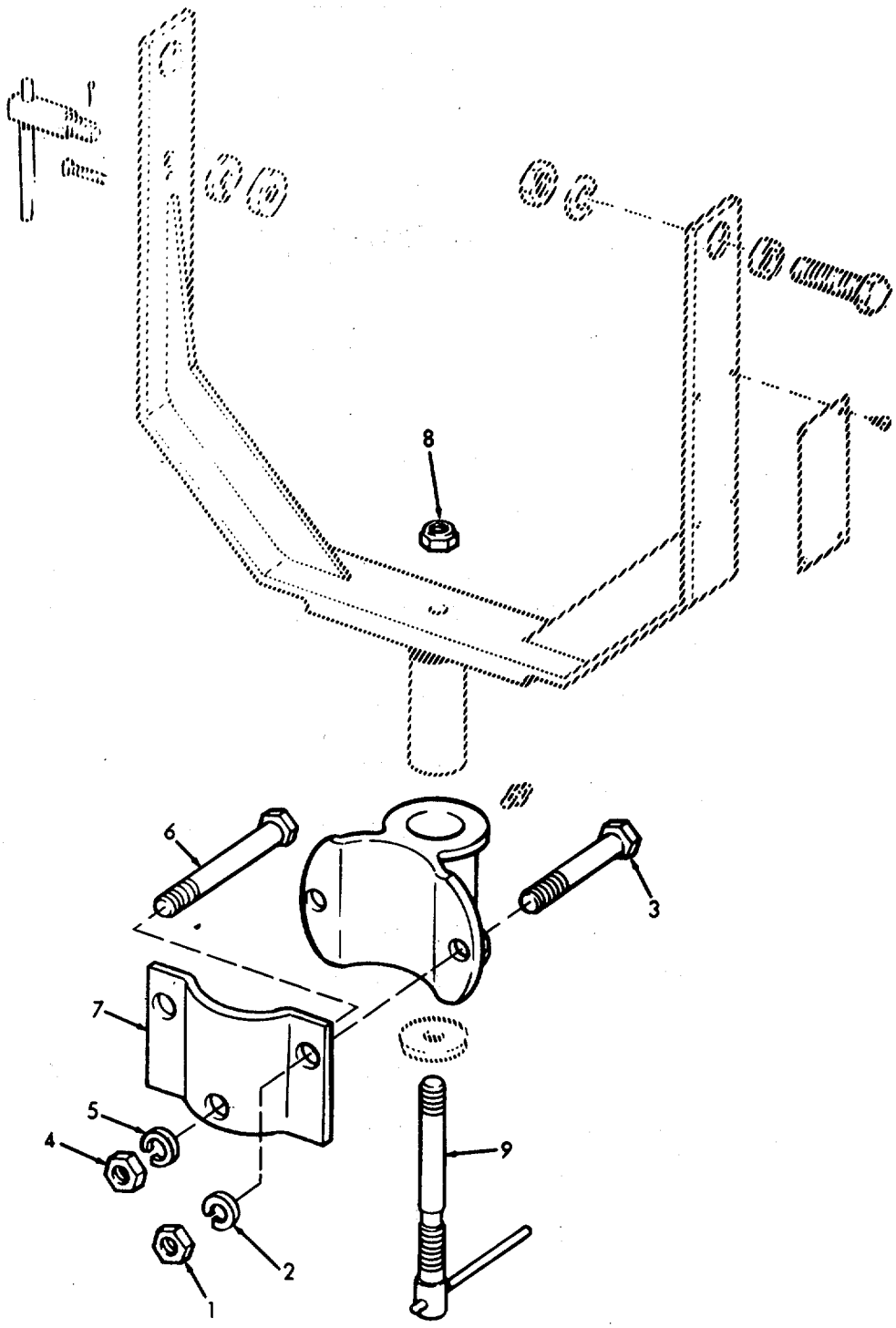
4-77.1. SEARCHLIGHT - MOUNTING AND YOKE ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Yoke and mounting	a. Yoke	1. Inspect for bents, and damage.	
		2. Insure all hardware is tight.	
	b. Mounting	1. Inspect for bents, and damage.	
		2. Insure all hardware is tight.	
SERVICE			
2.	a. Lubrication fitting	Lubricate.	Use grease MIL-G-7118.
REPAIR			
3.	a. Plain jam hex nut (1)	Replace.	As required.
	b. Lockwasher (2)	Replace.	As required.
	c. Hex head cap screw (3)	Replace.	As required.
	d. Plain hex nut (4)	Replace.	As required.
	e. Lockwasher (5)	Replace.	As required.
	f. Hex head cap screw (6)	Replace.	As required.
	g. Clamp (7)	Replace.	As required.
	h. Selflocking nut (8)	Replace.	As required.
	i. Horizontal clamp (9)	Replace.	As required.

4-77.1. SEARCHLIGHT-MOUNTING AND YOKE ASSEMBLY-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)



4-1495

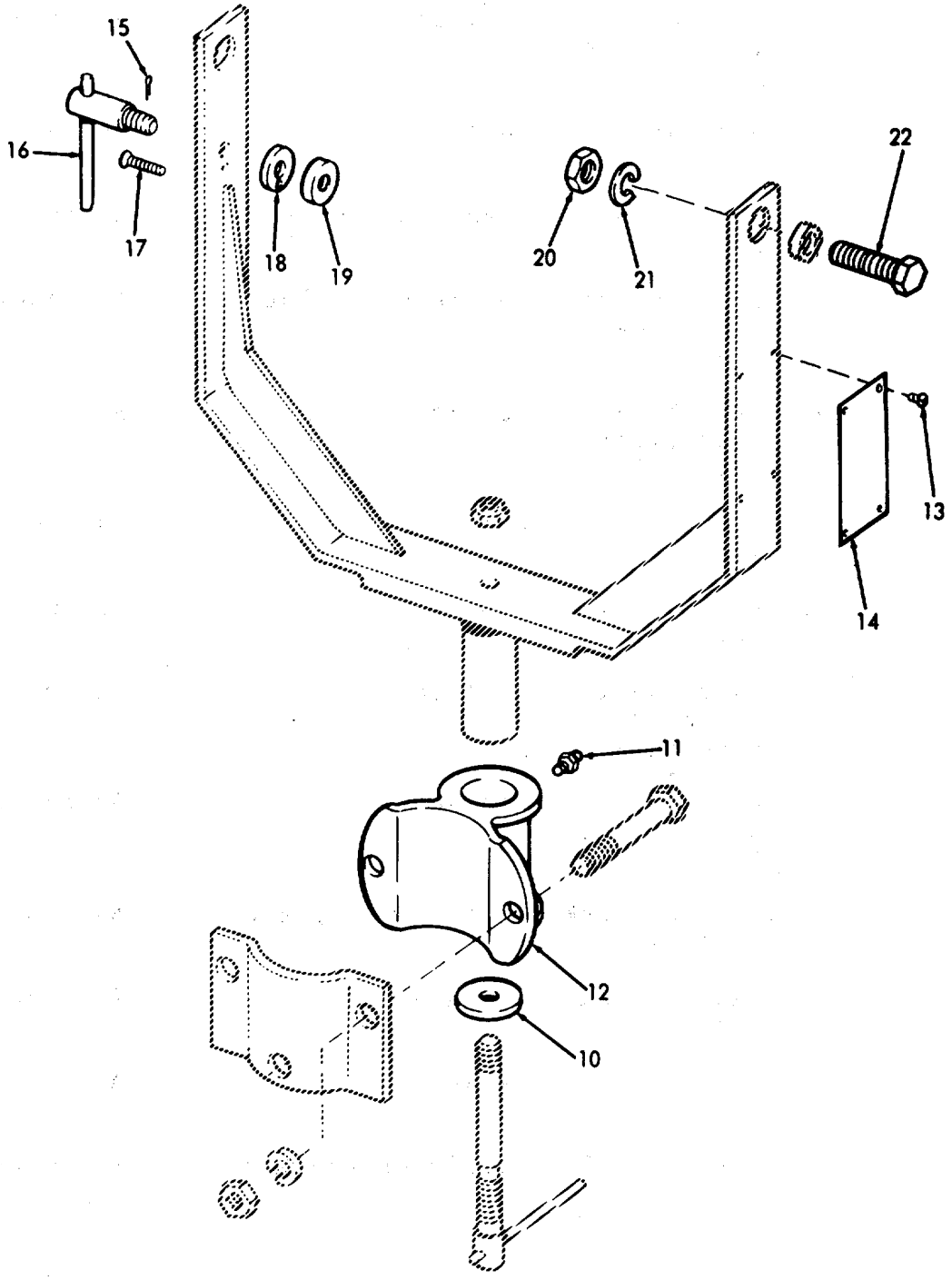
4-77.1. SEARCHLIGHT-MOUNTING AND YOKE ASSEMBLY-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
	j. Horizontal clamp washer (10)	Replace.	As required.
	k. Lubrication fitting (11)	Replace.	As required.
	l. Yoke socket (12)	Repair or replace.	As required.
	m. Type U round head drive screw (13)	Repair or replace.	As required.
	n. Searchlight identification plate (14)	Replace.	As required.
	o. Cotter pin (15)	Replace.	As required.
	p. Vertical clamp (16)	Replace.	As required.
	q. Countersunk flat head screw (17)	Replace.	As required.
	r. Vertical spacer clamp (18)	Replace.	As required.
	s. Vertical lock clamp (19)	Repair or replace.	As required.
	t. Plain hex nut (20)	Replace.	As required.
	u. Lockwasher (21)	Replace.	As required.
	v. Trunnion bolt (22)	Repair or replace.	As required.

4-77.1. SEARCHLIGHT-MOUNTING AND YOKE ASSEMBLY-MAINTENANCE INSTRUCTIONS (Continued).

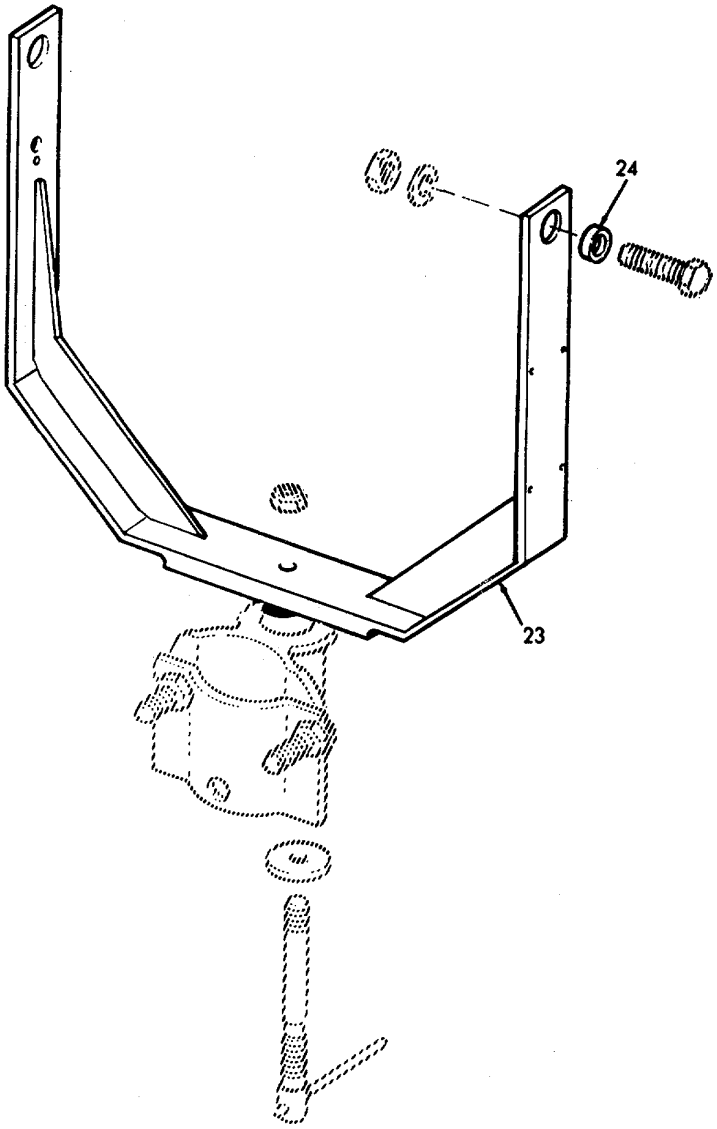
LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)



4-77.1. SEARCHLIGHT-MOUNTING AND YOKE ASSEMBLY-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
	w. Searchlight yoke assembly (23)	Repair or replace.	As required.
	x. Bushing (24)	Replace.	As required.



4-77.2. SEARCHLIGHT-HOOD ASSEMBLY-MAINTENANCE INSTRUCTIONS (Continued).

This task covers:

a. Inspection **b. Replace**

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

NONE

Personnel Required

1

References

NONE

Equipment Condition: Condition Description

NONE

Special Environmental Conditions

NONE

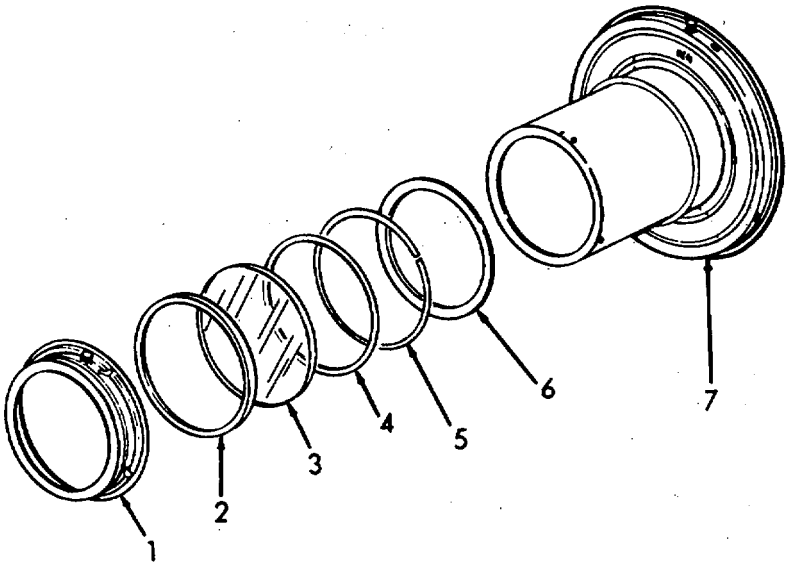
General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Hood assembly	a. Lens	1. Inspect for missing lens.	
		2. Inspect for cracks or scratches.	
	b. Hood	Inspect for dents, breaks or cracks.	
REPLACE			
2.	a. Knurled nut and boss hood cap (1)	Replace	As required.
	b. Retainer ring (2)	Replace	As required.

4-77. 2. SEARCHLIGHT-HOOD ASSEMBLY-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont.)			
	c. Amber glass filter (3)	Replace.	As required.
	d. Clear glass filter (3)	Replace.	As required.
	e. Green glass filter (3)	Replace.	As required.
	f. Red glass filter (3)	Replace.	As required.
	g. Rubber gasket (4)	Replace.	As required.
	h. Slip ring (5)	Replace.	As required.
	i. Steel diaphragm (6)	Replace.	As required.
	j. Searchlight hood (7)	Replace.	As required.



4-1501

4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

This task covers:

a. Inspection **b. Replace**
c. Service **d. Repair**

INITIAL SETUP:

Test Equipment

NONE

References

Paragraph	
4-77.4	Drum Assembly-Lamp Replacement and Servicing.

Special Tools

NONE

Equipment Condition: NONE

Material/Parts

Glass cleaner
Lubricating oil MIL-L-15016

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

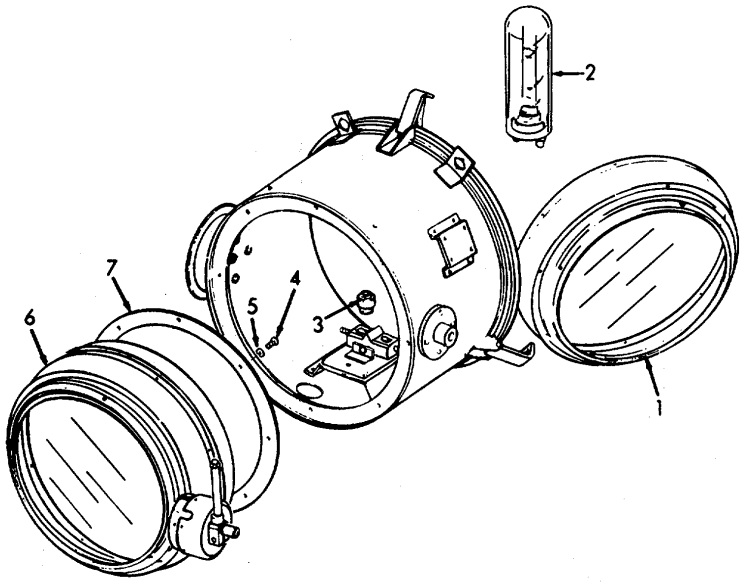
In order to avoid possible burns, make sure the searchlight has cooled sufficiently.

INSPECTION

1.	Shutter assembly	a. Lens	Inspect for breaks, cracks, and scratches.
		b. Shutter	Inspect for binding and improper operation.

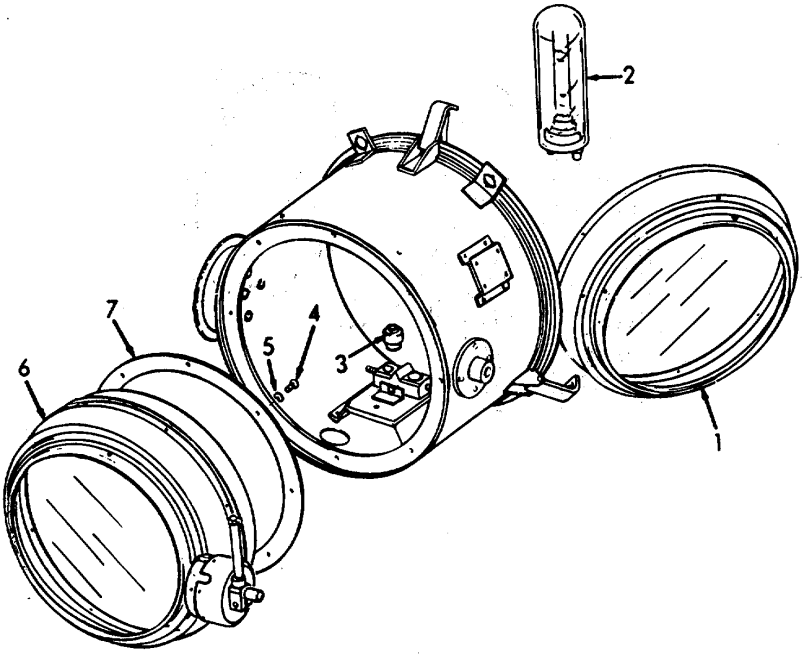
4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
2.	a. Dome assembly (1)	Unlatch and lower.	
	b. Lamp (2)	1. Loosen knurled nuts (3) by rotating counterclockwise.	
		2. Remove lamp.	
	c. Searchlight	1. Rotate to the vertical position in trunnion.	
		2. Lock clamp.	
	d. Screws (4) and lockwashers (5)	Remove.	
	e. Shutter assembly (6)	Remove.	
	f. Gasket (7)	Remove.	Discard.



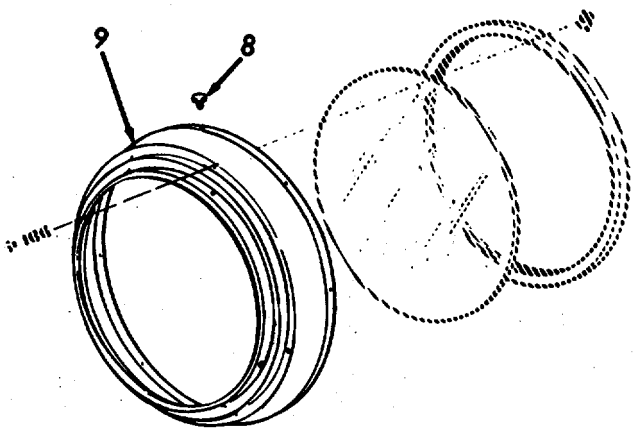
4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont.)			
	g. Gasket (7)	Install.	
	h. Sutter assembley (6)	Install.	
	i. Screws (4) and lockwashers (5)	Install.	
	j. Searchlight	Rotate to horizontal position in trunnion and clamp.	
	k. Lamp (2)	1. Insert in socket. 2. Tighten knurled nuts (3) by rotating clockwise.	
	l. Dome assembly (1)	Raise and latch.	



4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
SERVICE			
	NOTE		
	The lens should be cleaned with a good commercial grade glass cleaner.		
3.	a. Knurled knobs (8)	Loosen one or two turns.	
	b. Adapter ring (9)	Rotate counterclockwise about ¼ inch and pull off.	
	c. Lens	Clean.	
	d. Adapter ring (9)	Install.	
	e. Knurled knobs (8)	Tighten.	



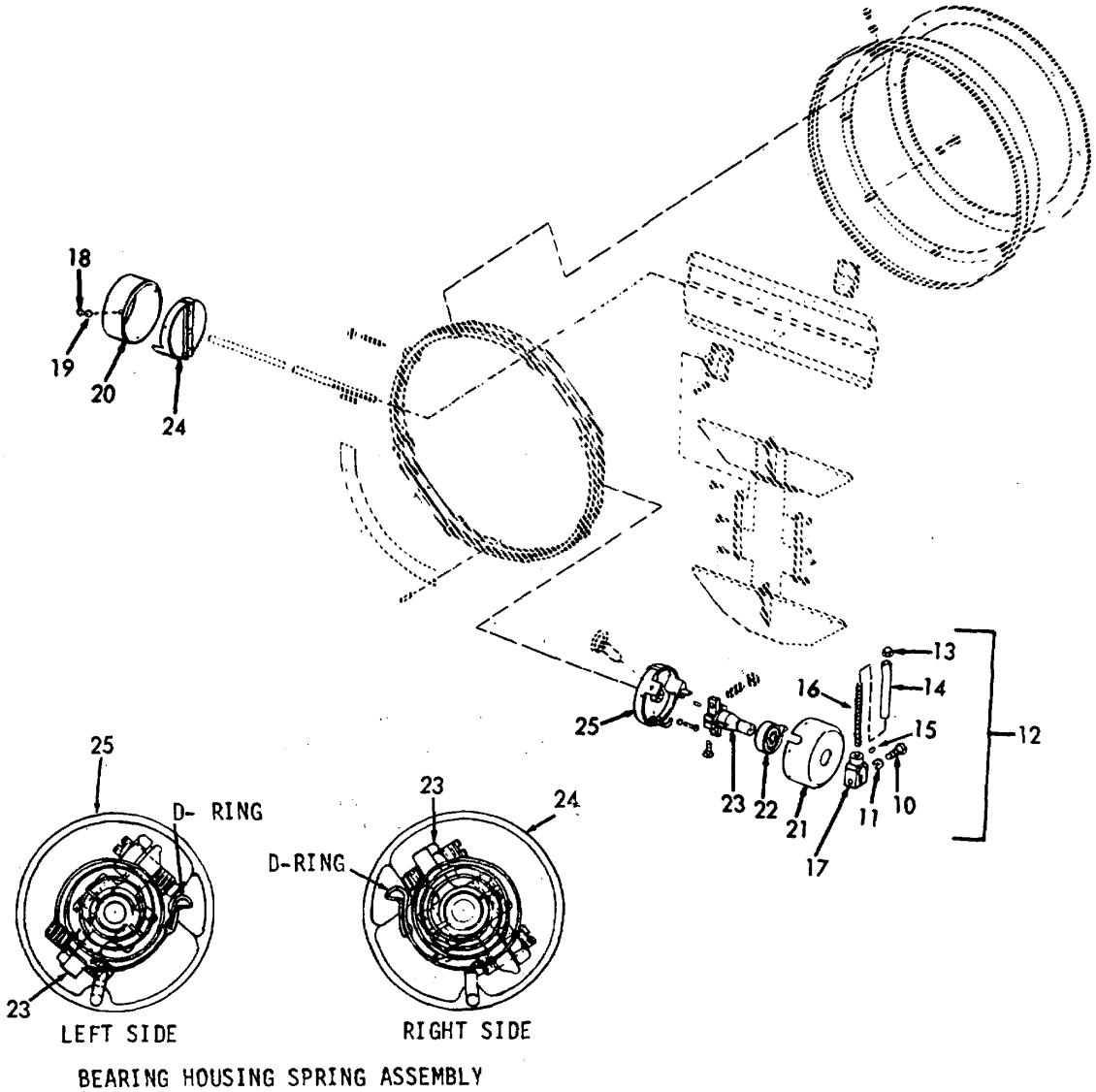
4-1505

4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
4. Shutter handle(s)	a. Screw (10) and lock-washer (11)	Loosen.	
	b. Handle assembly (12)	Remove.	
	c. Cap nut (13) and phenolic handle (14)	Remove.	
	d. Setscrew (15), rod (16), and clamp (17)	1. Disassemble 2. Reassemble	
	e. Handle assembly (12), screw (10), and lock-washer (11)	Install.	
5. Shutter spring(s)	a. Shutter handle	Remove.	Refer to step 4.
	b. Screws (18) and lock-washer (19)	Remove.	
	c. Cover (20 and/or 21)	Remove.	
	d. Spring (22)	1. Pull straight out simultaneously from stop lever (23), and pin in bearing housing (24 or 25). 2. Close the shutter blades. 3. Slide the inside end of the new spring into the slot on the stop lever (23).	

4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
		4. Assemble spring as shown below: 5. Move the outer end of the spring (D ring) around in the direction that tends to enlarge the spiral..	



BEARING HOUSING SPRING ASSEMBLY

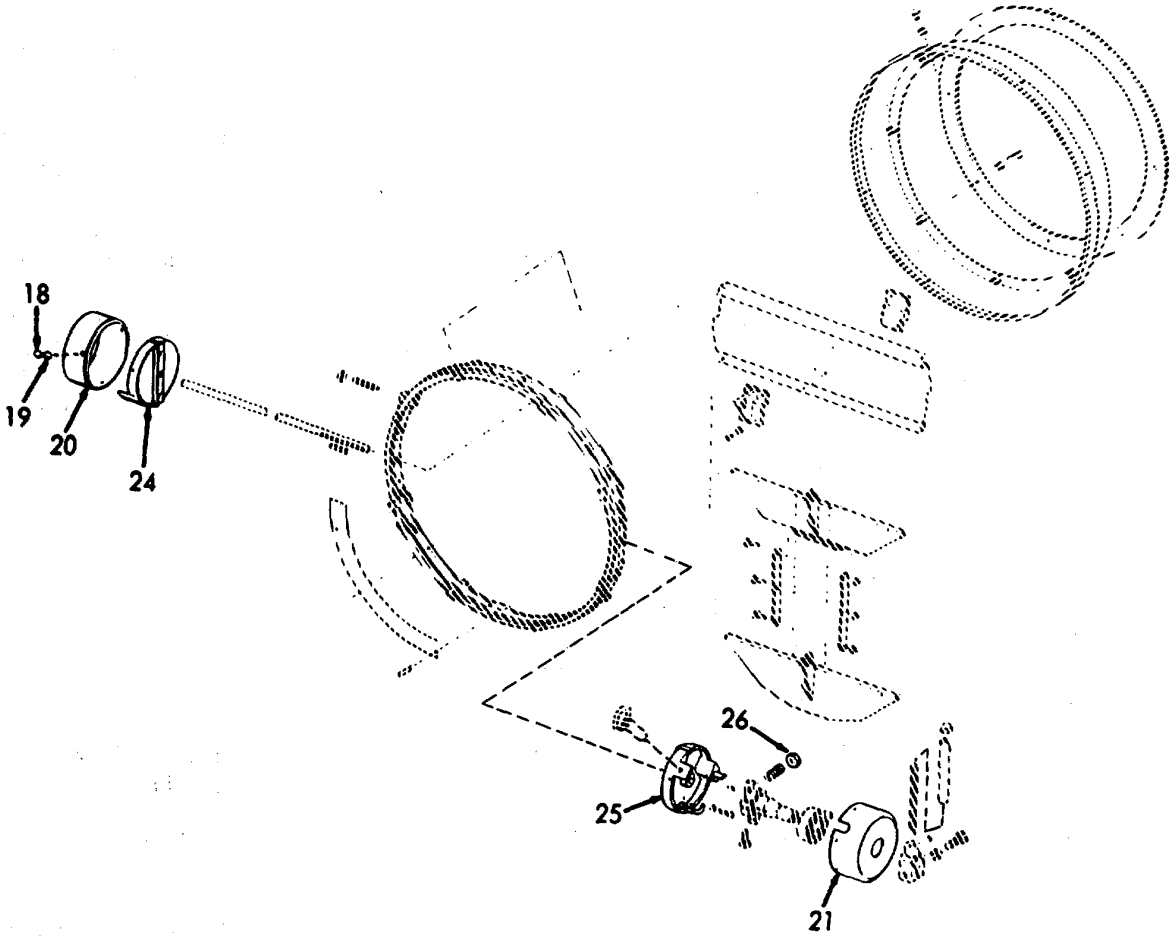
4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
		6. Rotate until the opening slips over the pin in the bearing housing (24 or 25).	a. Check to see that when the blades are opening that the spiral of the spring tends to enlarge or open on. b. Check to see that spring action returns the blades when released quickly to the completely closed position.
	e. Cover (20 and/or 21)	Install.	
	f. Screws (18) and lockwashers (19)	Install.	
	g. Shutter handle	Replace.	Refer to step 4.
	h. Lubricate	Hole in bearing housing (24 or 25).	Use oil MIL-L-15016.
6. Bumper Screws	a. Shutter handle	Remove.	Refer to step 4.
	b. Shutter spring	Remove.	Refer to-step 5.
	c. Nut(s) (26)	Remove.	

4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)



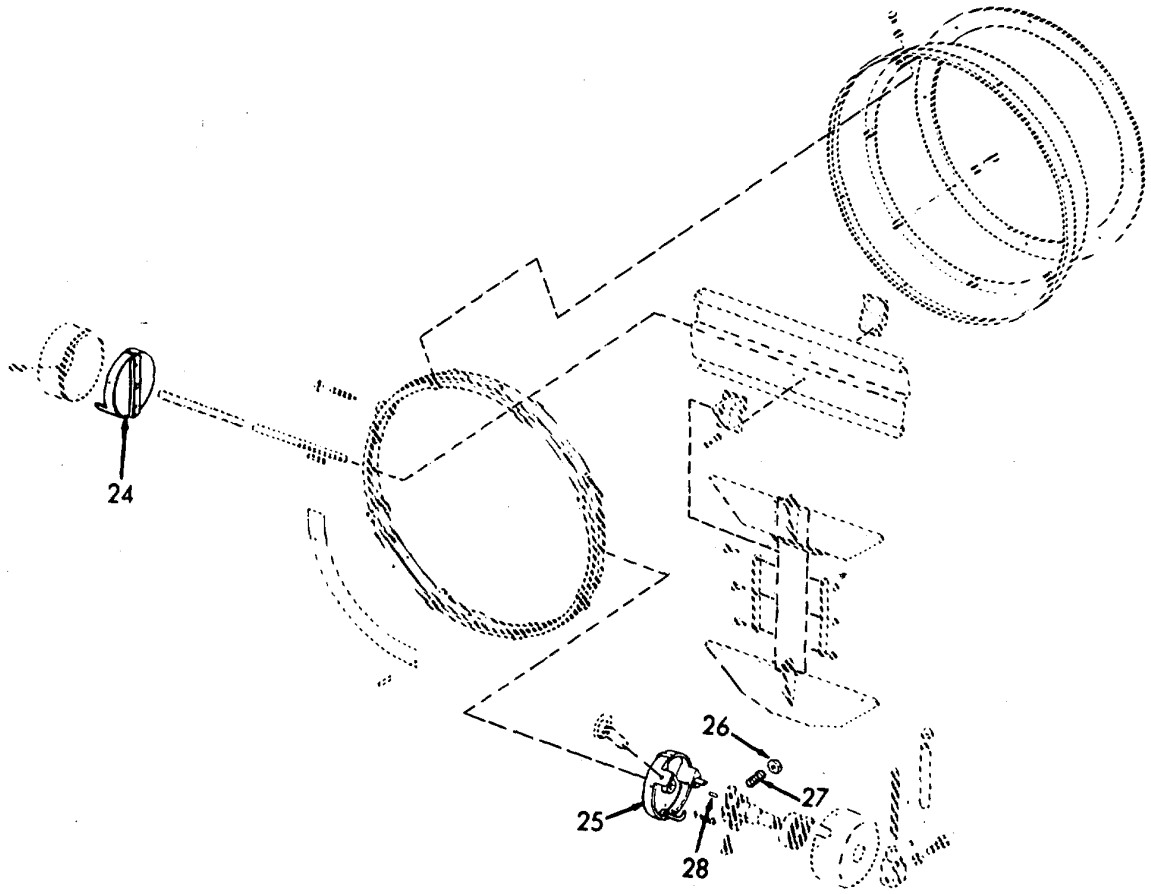
4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
	d. Four bumper screws(s) (27) and insert (28)	1. Remove. 2. Close the shutter blades. 3. Screw in one bumper screw until the insert in the end of the bumper screw just reaches the flat surface of the bearing housing (24 or 25). 4. Screw bumper screw in approximately another ½ turn so that the shutter blades still appear closed, but do not actually touch each other.	The object of this procedure is to have the force of the blades, when they are closing absorbed by the insert and not by having one blade strike another.
	e. Nut(s) (26)	Tighten.	1. Adjust the second bumper screw on the other-side of shutter so that its insert just touches the bearing housing assembly when the blades are closed. 2. Tighten nut (26)

4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont.)



4-1511

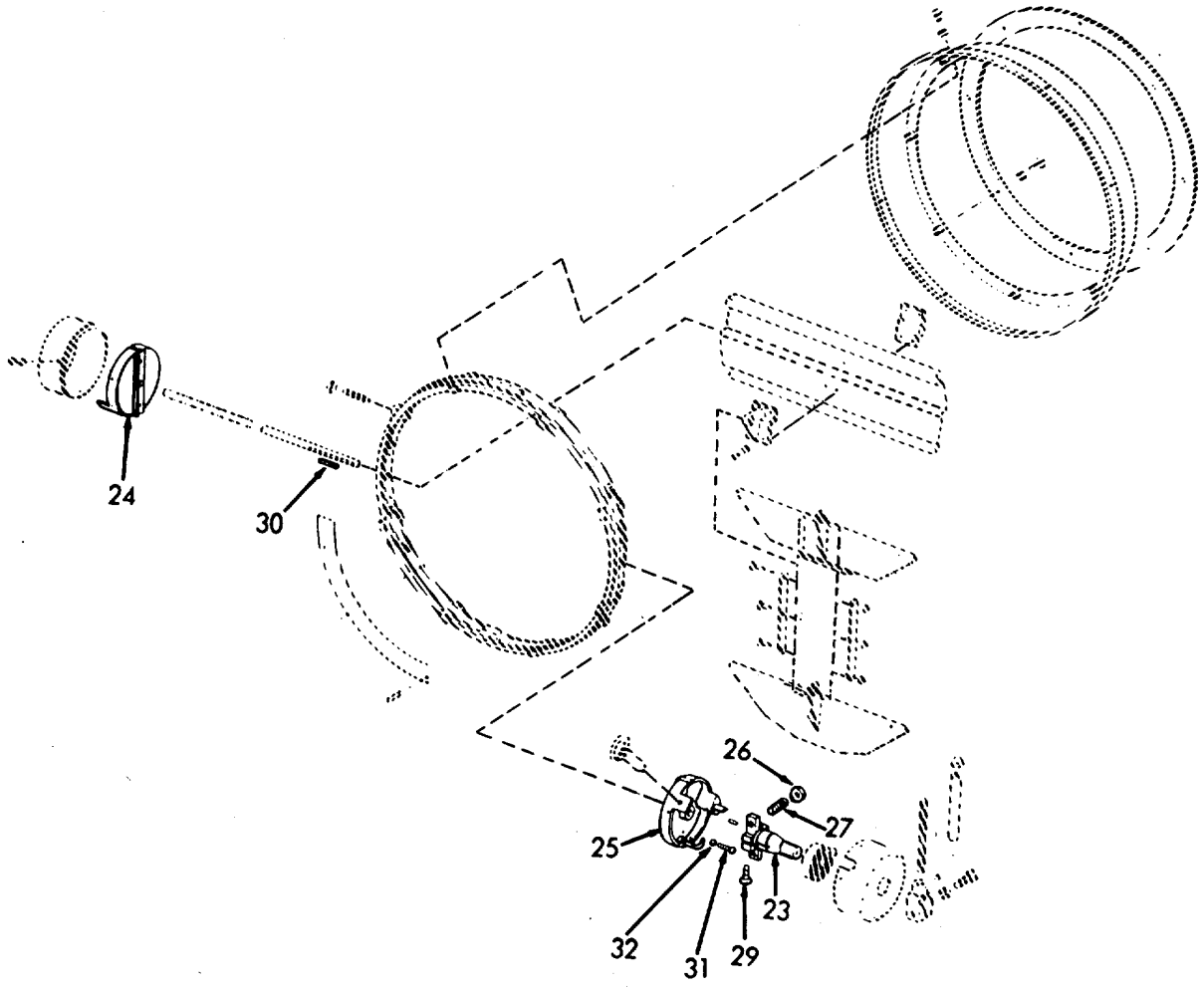
4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont.)			
	f. Third and fourth bumper screws (27)	1. Open shutter blades fully so they are at 90 degrees to the front lens.	In this position a minimum amount of the beams will be blocked out.
		2. Adjust the remaining bumper screws until the insert just touches the flat surface of the bearing housings (24 or 25).	
	g. Nuts (26)	Tighten.	These bumper screws will now stop the movement of the blades at the fully open position.
	h. Shutter spring	Install.	Refer to step 5.
	i. Shutter handle	Install.	Refer to step 4.
7. Shutter Bearing	a. Shutter handle housing	Remove.	Refer to step 4.
	b. Shutter spring	Remove.	Refer to step 5.
	c. Screw (29)	Remove.	
	d. Stop lever (23) and key (30)	Remove.	
	e. Screw (31) and lockwasher (32)	Remove.	

4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-1513

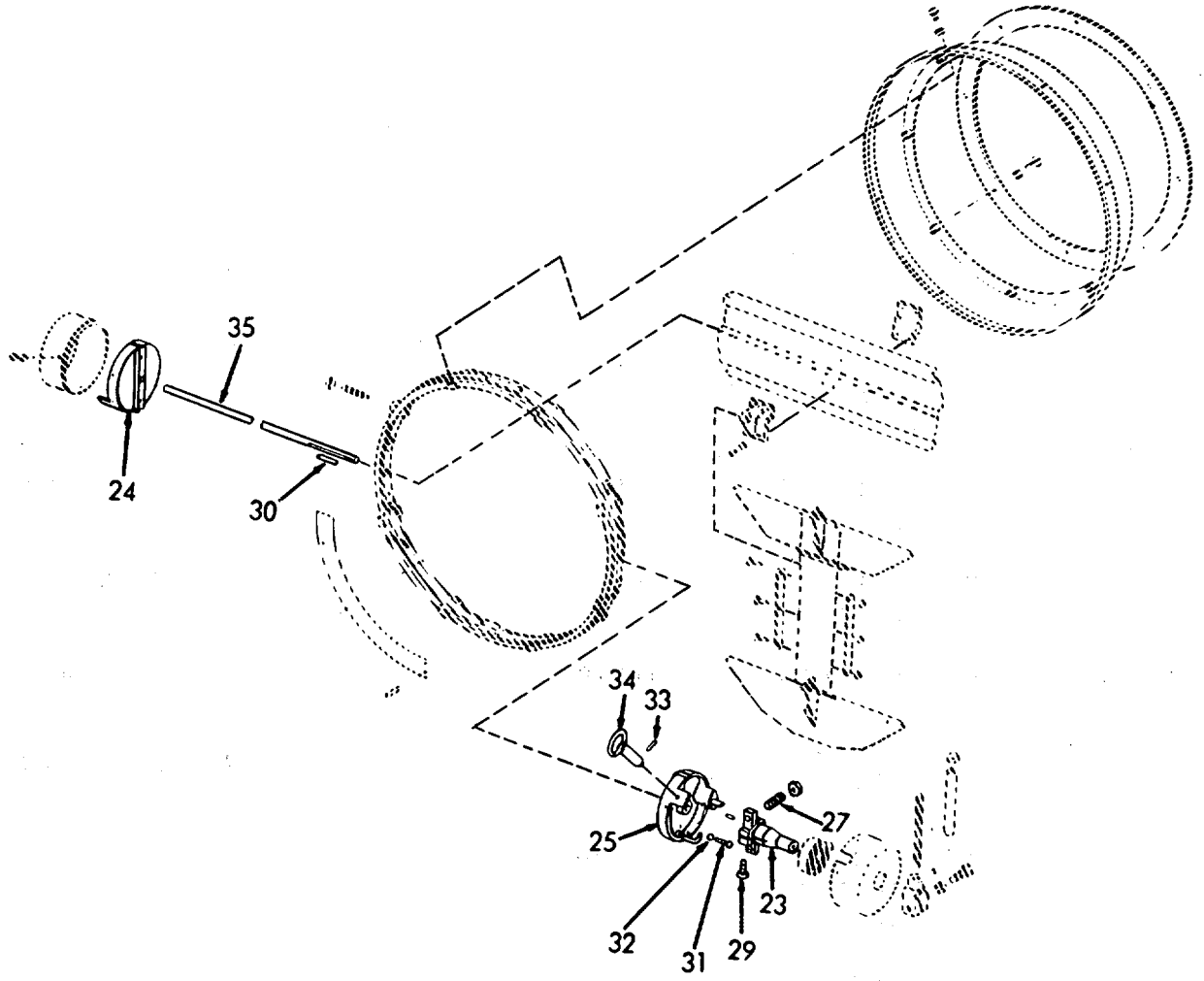
4-77.3. SEARCHLIGHT-SHUTTER-MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	f. Bearing housing (24 or 25)	Remove.	
	g. Lock assembly (33) and setscrew (34)	Remove.	If necessary.
	h. Bearing housing (24 or 25), screw (31), and lockwasher (32)	Install.	
	i. Stop lever (23) and key (30)	Install.	
	j. Screw (29)	Install.	
	k. Bumper screws (27)	Adjust.	Refer to step D.
	l. Shutter spring	Install.	Refer to step 5.
	m. Shutter handle	Install.	Refer to step 4.
8. Shutters	a. Shutter handle	Remove.	Refer to step 4.
	b. Shutter spring	Remove.	Refer to step 5.
	c. Shutter bearing housing	Remove.	Refer to step 6.
	d. Center blade rod (35)	Remove.	

4-77.2. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

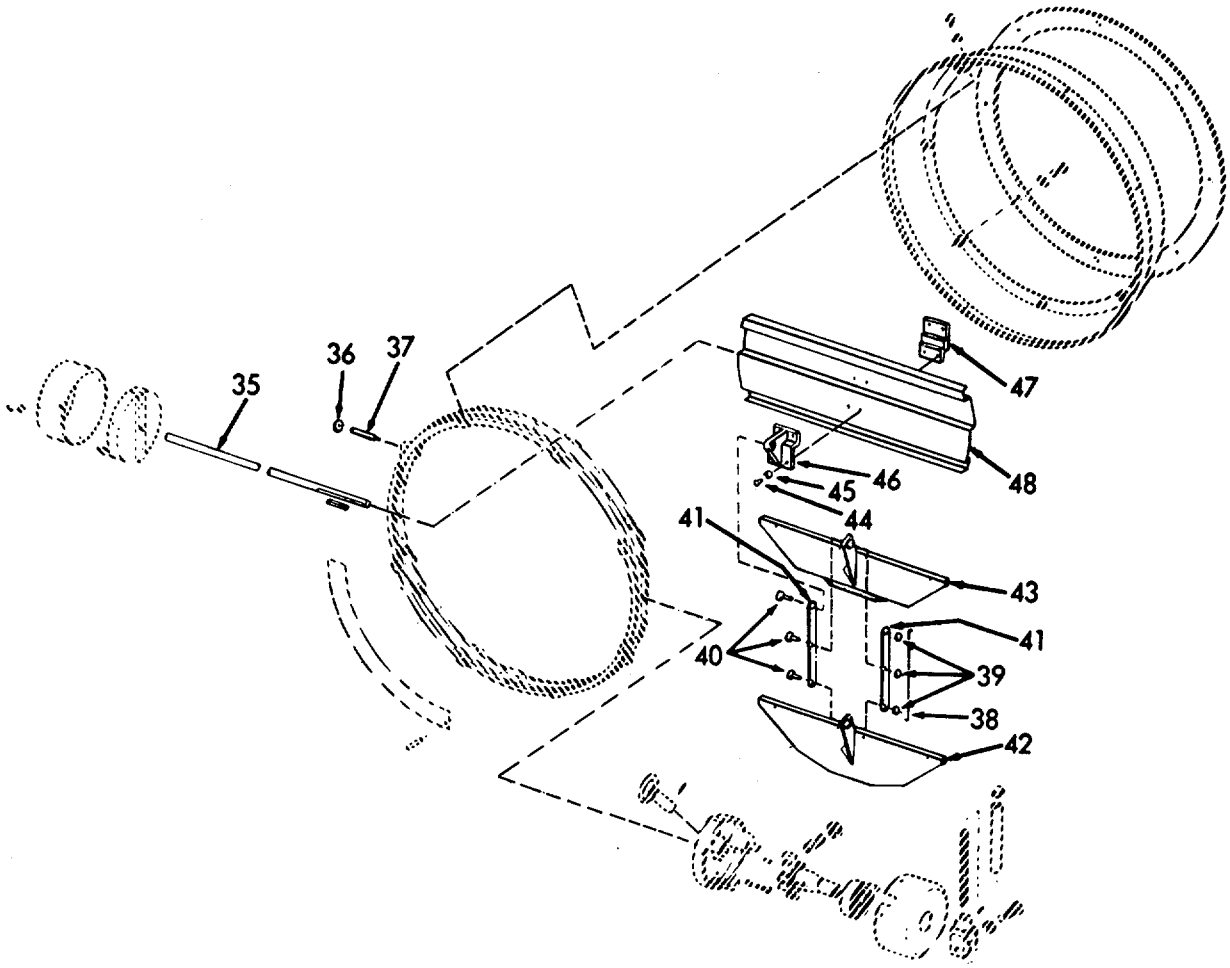


4-77.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	e. Nut (36) and bearing screws (37)	Loosen and remove.	
	f. Safety wire (38), flat-washers (39), pins (40), and connecting rods (41)	Replace.	If necessary.
	g. Small shutter blades (42) and medium shutter blades (43)	Replace.	If necessary.
	h. Screws (44), lockwashers (45), front support (46), and rear support (47)	Replace.	If necessary.
	i. Center blade (48)	Replace.	If necessary.
	j. Bearing screws (37) and nuts (36)	Install.	
	k. Center blade rod (35)	Install.	
	l. Shutter bearing housing	Install.	Refer to step 6.

4.77.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			



4-1517

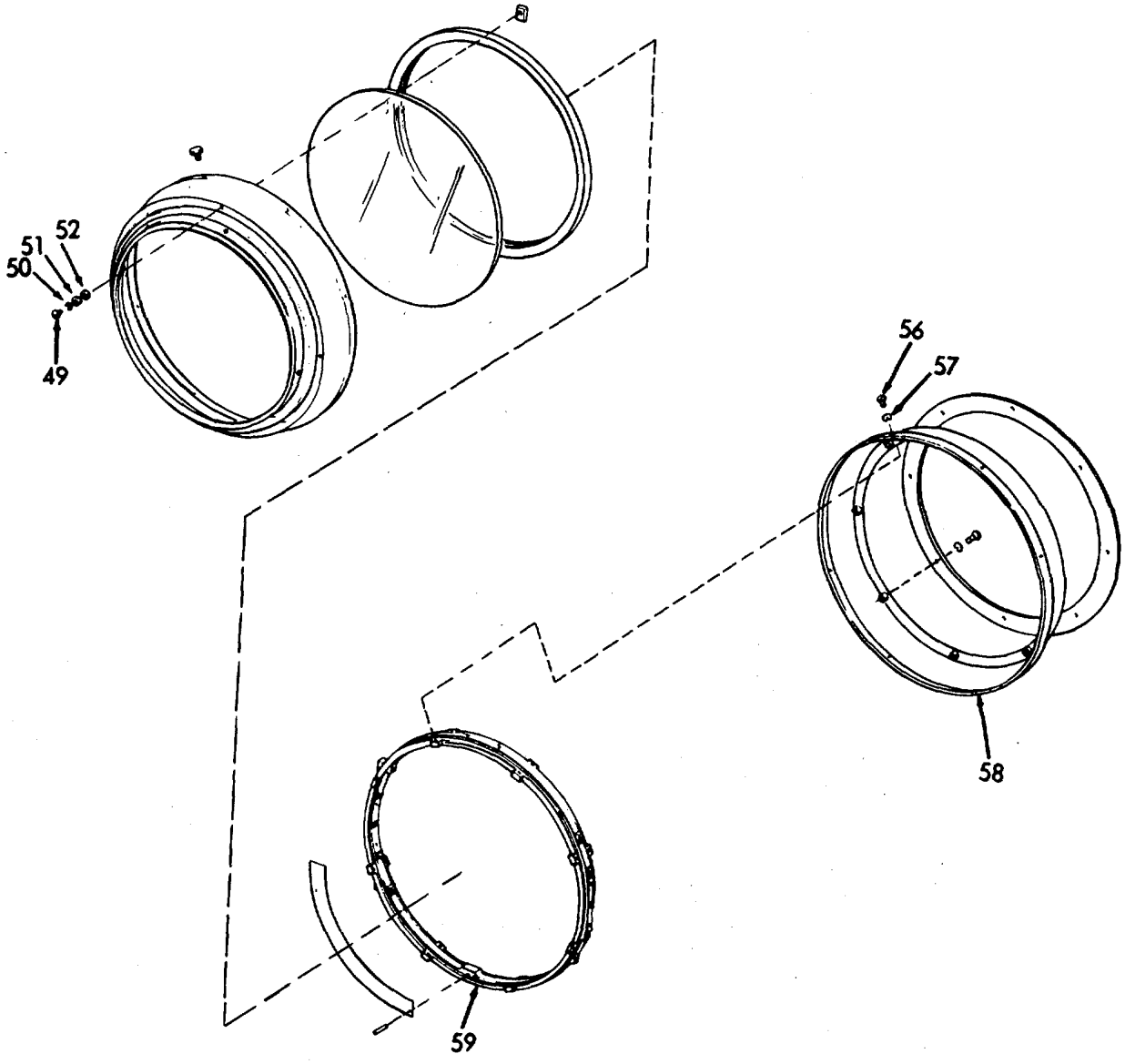
4.77.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	m. Shutter spring	Install.	Refer to step 5.
	n. Shutter handle	Install.	Refer to step 6.
9. Lens	a. Screw (49), lockwasher (50), flat-washer (51), gasket (52), and lens clamp (53)	Disassemble.	
	b. Adapter ring (9), lens (54), and gasket (55)	1. Disassemble. 2. Reassemble.	
	c. Screw (49), lockwasher (50), flat-washer (51), gasket (52), and lens clamp (53)	Reassemble.	
10. Shutter Flange	a. Screws (56), and lock-washers (57)	Remove.	
	b. Shutter flange (58) and center ring (59)	1. Disassemble. 2. Reassemble.	
	c. Screws (56) and lock-washers (57)	Install.	

4.77.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



4-77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS

This task covers:

a. Inspection
b. Service
c. Replace
d. Repair

INITIAL SETUP

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment
Condition Condition Description
NONE

Material /Parts
Detergent soap
Liquid wax

Special Environmental Conditions
NONE

Personnel Required
1

General Safety Instructions
Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS

WARNING

In order to avoid possible burns, make sure the searchlight and lamp are cooled.

INSPECTION

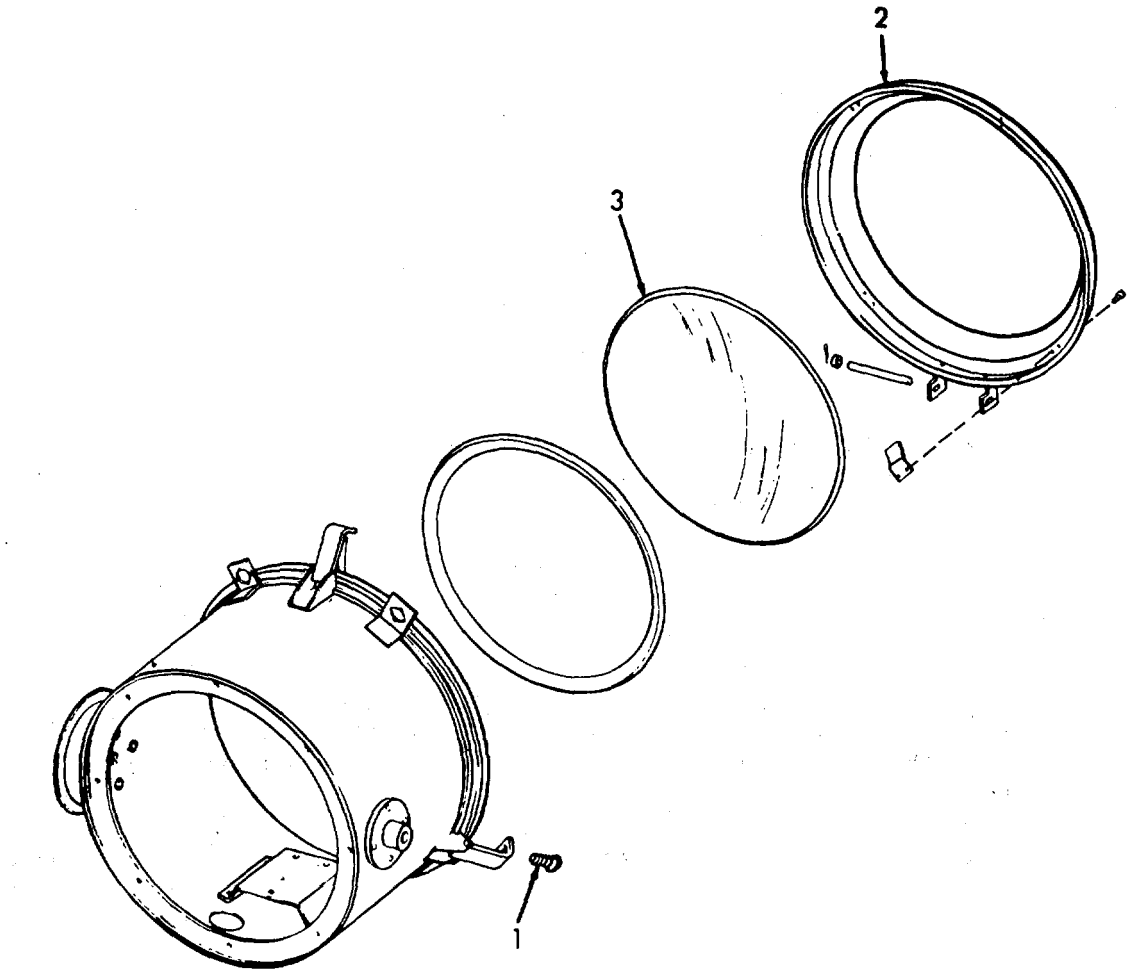
1. Drum assembly	a. Drum	1. Inspect for bends, breaks, cracks, and dents. 2. Make sure all catches are functioning properly.	

4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	b. Reflector	1. Inspect for cracks, and damage.	
		2. Inspect for accumulation of dirt.	
	c. Lamp	1. Inspect for darkened areas.	
		2. Insure lamp operates	
		3. Inspect for proper focus.	See step 4f.
	d. Sights	Inspect for damage or missing parts.	
SERVICE			
2.	a. Thumb screw (1)	Loosen.	
	b. Dome assembly clamps	Swing away to lower dome (2).	
		CAUTION Never attempt to remove any specks of dirt with a tool, and never use any waste or cloth that contains any matter that might scratch the reflecting surface.	
	c. Reflector (3)	Clean.	1. Use mild soap and water.

4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
SERVICE (Cont)			
			2. Rinse thoroughly with clean water.
			3. If this is not successful use a high grade commercial liquid wax.
	d. Dome assembly (2)	Raise and secure with clamps.	
	e. Thumbscrews (1)	Tighten.	



4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
3. Reflector	a. Thumbscrews (1)	Loosen.	
	b. Dome (2)	Release clamps and lower.	
	c. Nuts (4), lockwashers (5), front clamps (6), and screws (7)	Remove.	
	d. Reflector cushion (8), reflector (3), and rear clamp (9)	Remove and install.	
	e. Screws (7), front clamp (6), lock-washers (5), and nuts (4)	Install.	
	f. Dome (2)	Raise and secure with clamps.	
	g. Thumbscrews (1)	Tighten.	
4. Lamp	a. Dome (2)	Release and lower.	
	b. Socket clamp (10)	Loosen.	Turn knurled nuts counterclockwise.
	c. Lamp (11)	Remove and install.	a. One socket is fixed and the other is free to move.

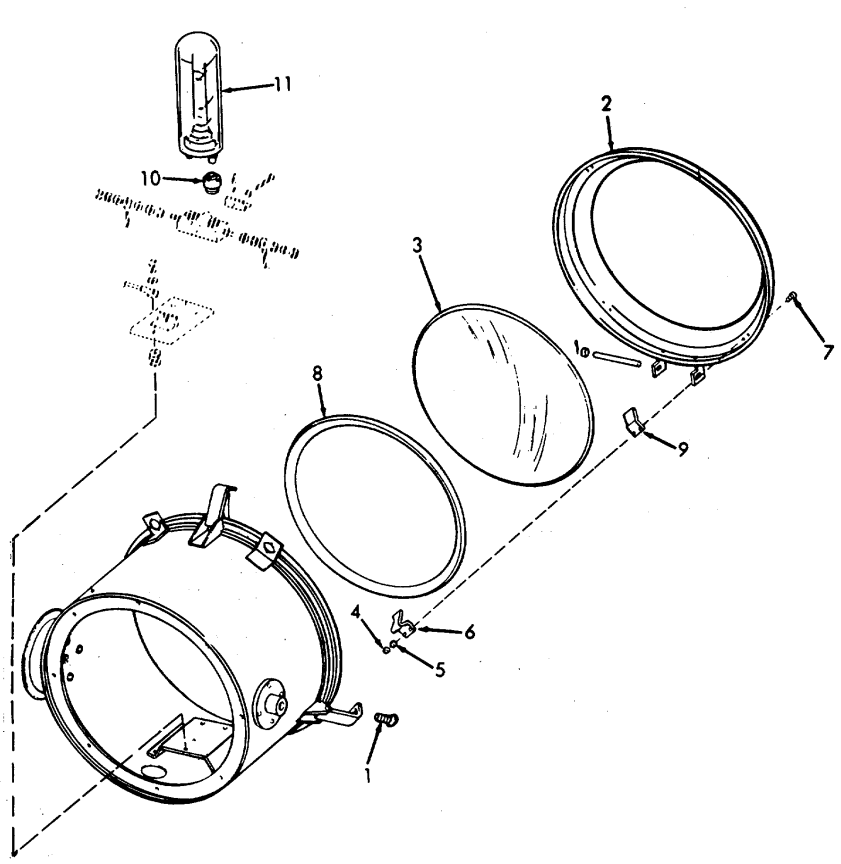
4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)

NOTE

This is to adapt to manufacturing tolerances, and dimension change due to heat.

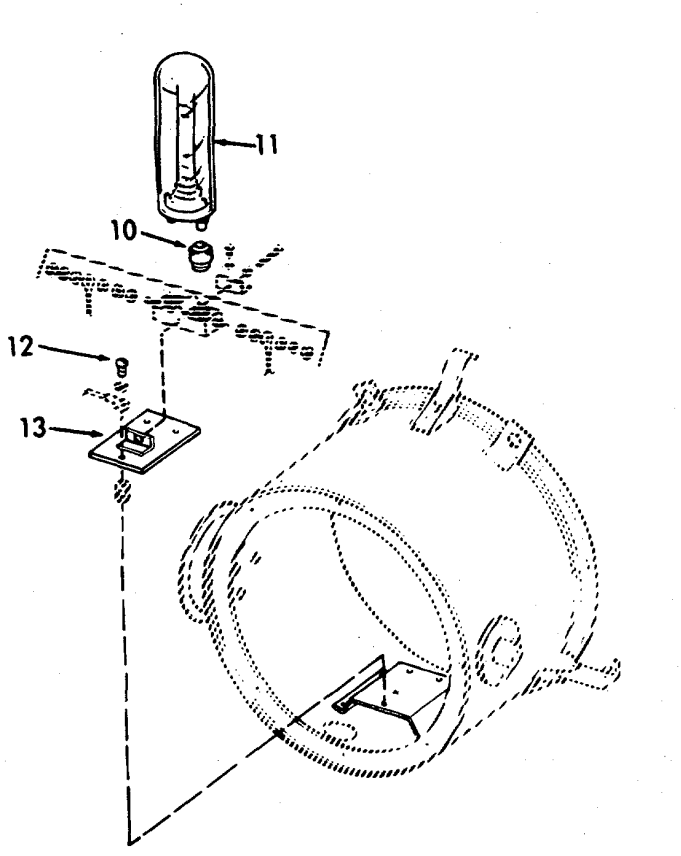


b. Carefully insert posts of replacement lamp in socket.

c. Pull down until shoulders on posts touch top of sockets.

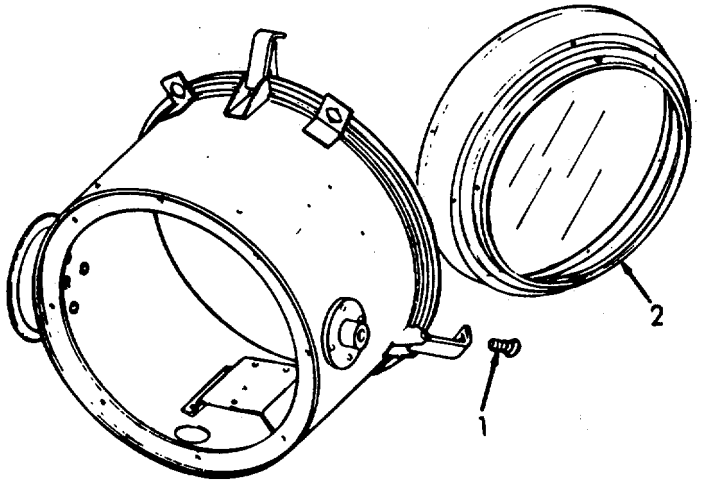
4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	d. Loose socket clamps (10)	Tighten.	
	e. Lamp (11)	Pivot in other socket until the loose socket is centered within its confined freedom.	
	f. Socket clamp (10)	Tighten remaining clamp.	
	g. Lamp (11)	Focus.	Focus of the searchlight is fixed at the time of manufacture and under ordinary conditions should not be changed. Focus can be changed by loosening the three screws (12) and moving the entire lampholder on adjustable support (13) as required to center the filament of the lamp in the axis of the reflector. Project the light beam on a screen or vertical surface a minimum distance of 55 feet (16.8 m) away and move the adjustable base forward and backward until the smallest and clearest image of the filament appears. Tighten all screws.



4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	h. Dome (2)	Raise and secure with clamps.	
	i. Thumbscrews (1)	Tighten.	



4-1527

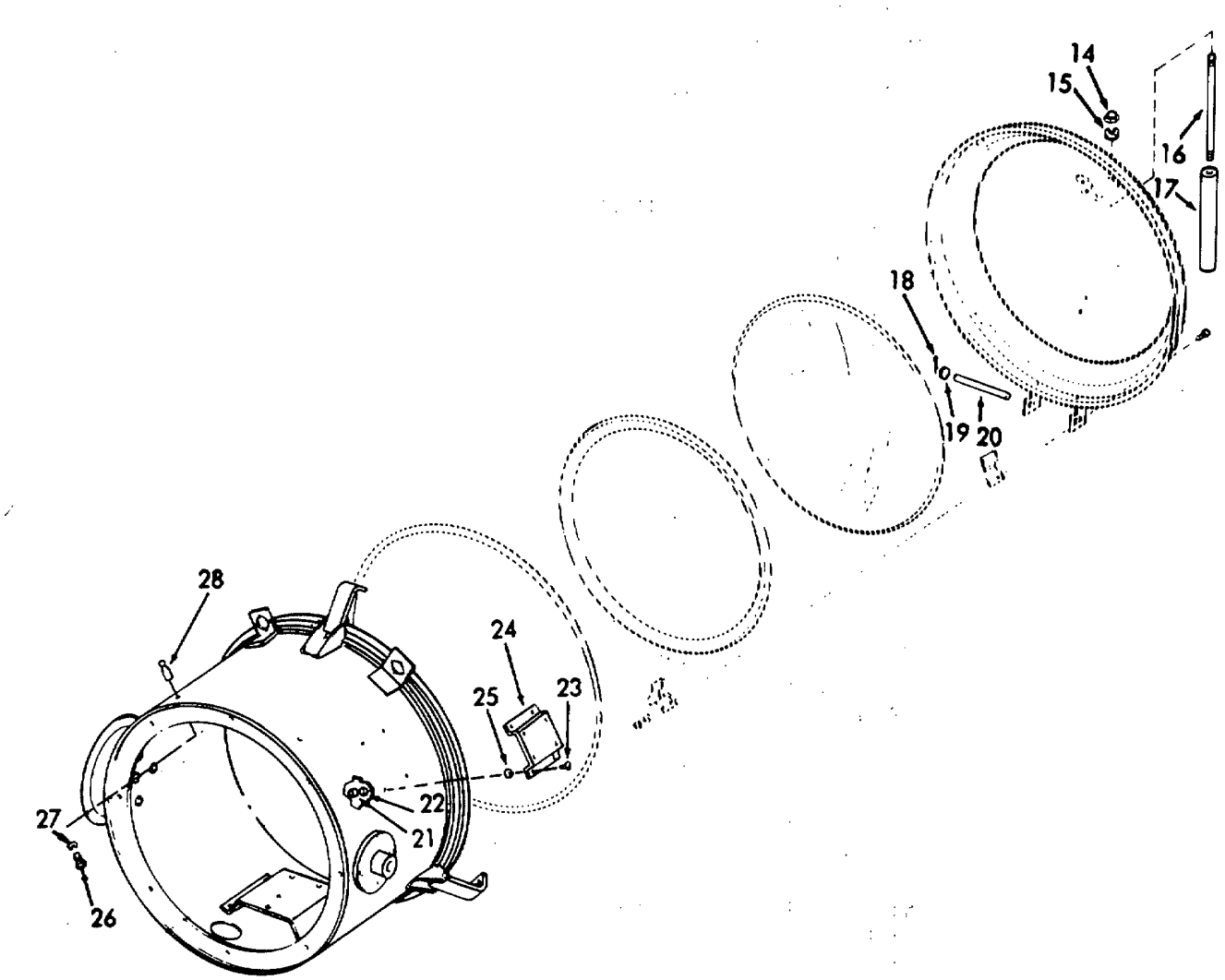
4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
5. Door handle	a. Capnuts (14) and lock-washers (15)	Remove.	
	b. Rod (16) and handle (17)	Replace.	
	c. Capnuts (14) and lock-washers (15)	Install.	
6. Dome hinge	a. Cotter pins (18) and lockwashers (19)	Remove.	
	b. Hinge pin (20)	Replace	
	c. Cotter pins (18) and flatwashers (19)	Install.	
7. Infrared viewer brackets	a. Nuts (21) and lock-washers (22)	Remove.	
	b. Screws (23), bracket (24), and gasket (25)	Replace.	Use new gasket.
	c. Nuts (21) and lock-washers (22)	Install.	
8. Front sight	Screws (26), lockwashers (27), and sight (28)	Replace.	

4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



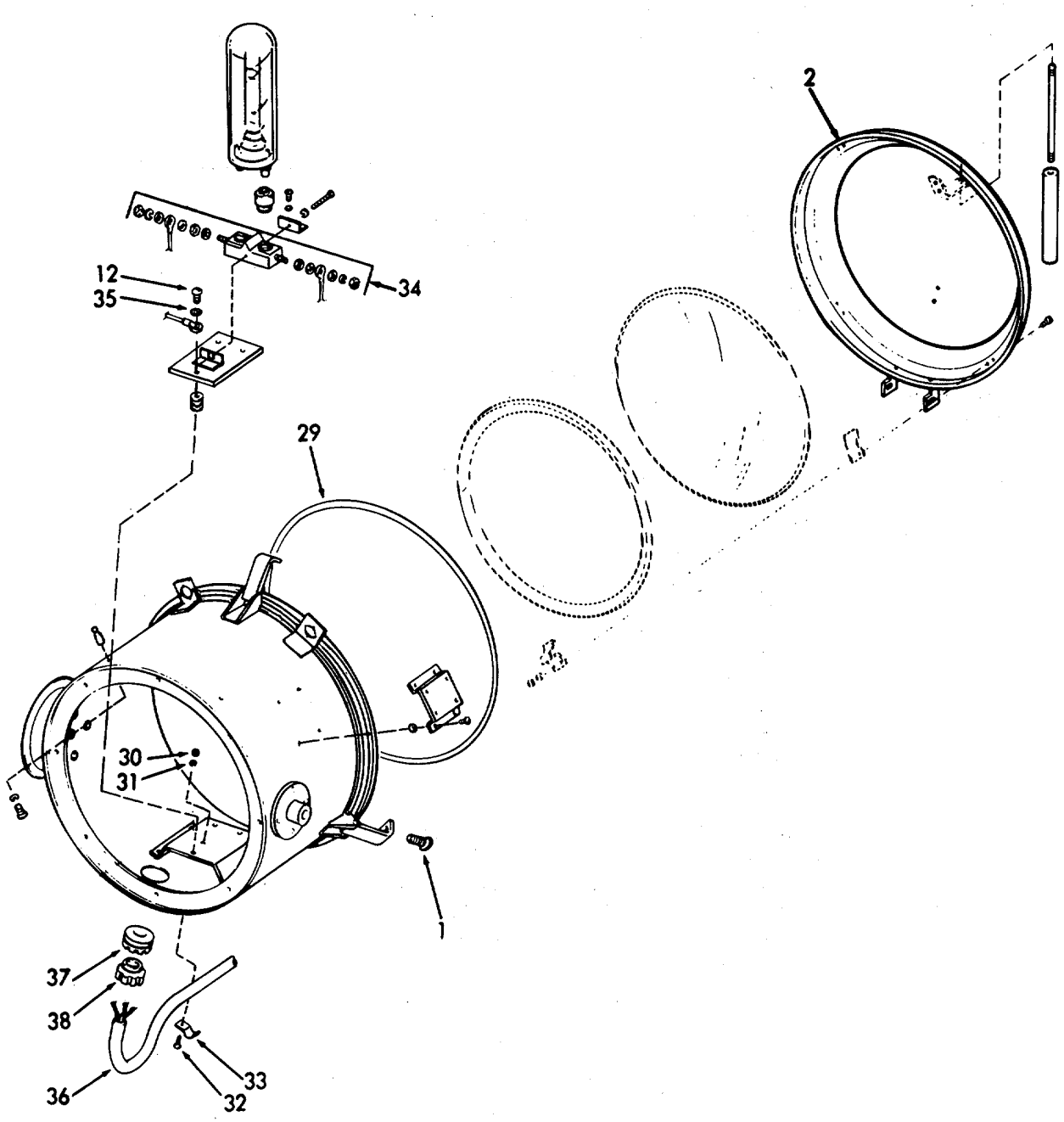
4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
9. Door Gasket	a. Thumbscrews (1)	Loosen.	
	b. Dome assembly (2)	Lower.	
	c. Gasket (29)	Replace.	Use new gasket.
	d. Dome assembly (2)	Raise and secure with clamps.	
	e. Thumbscrews (1)	Tighten.	
10. Lamp socket wiring	a. Nut (30), lockwasher (31), screw (32), and clamp (33)	Remove.	
	b. Nut, lockwashers, and wire terminations (34)	Remove.	
l	c. Screw (12), lock-flat-washer (35), and ground wire	Remove.	
	d. Cable (36) packing (37), and stuffing tube (38)	1. Disassemble. 2. Remove and install new cable. 3. Reassemble.	
	e. Ground wire, screw (12), and lock-flat-washer (35)	Replace.	

4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

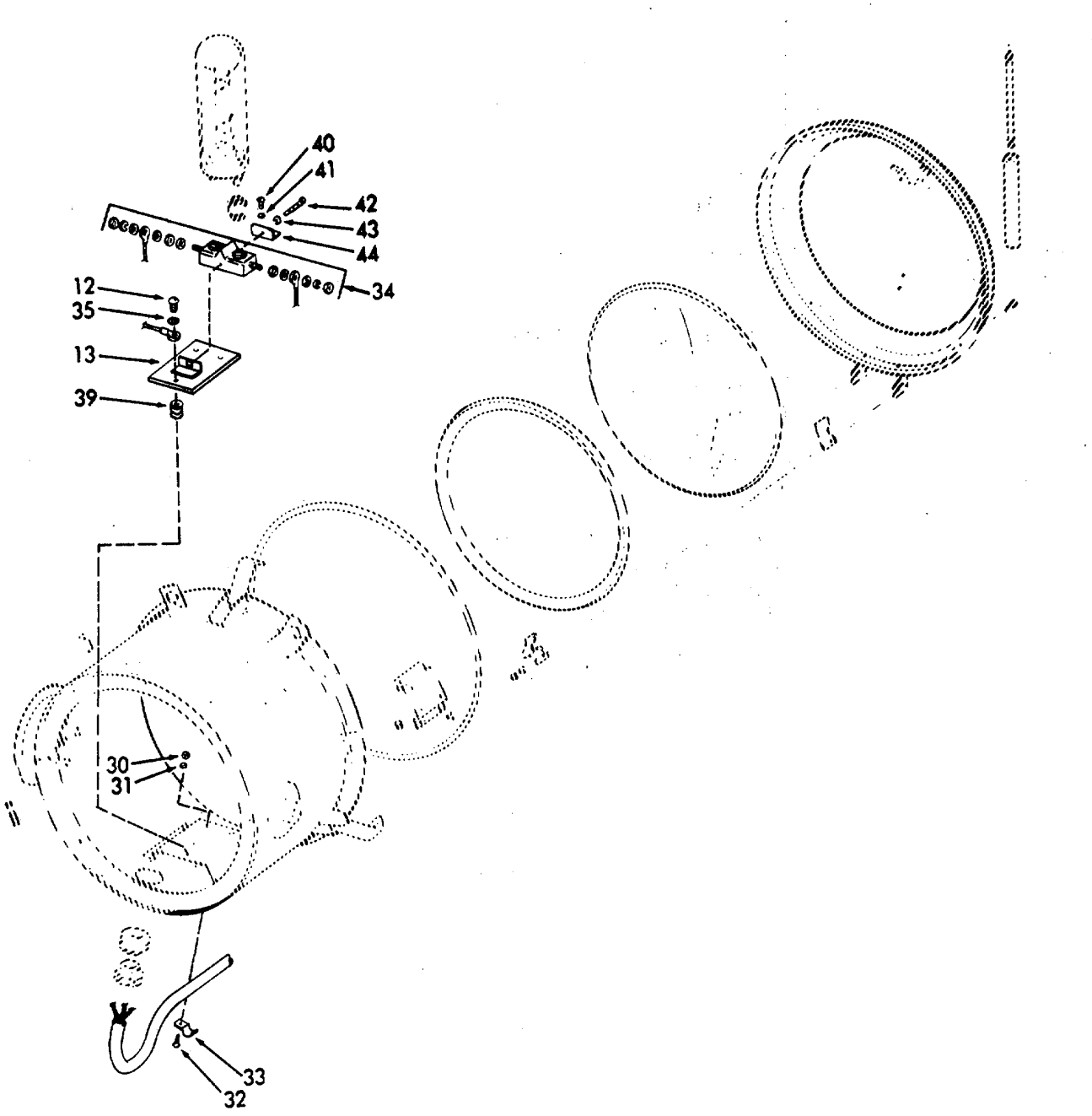


4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	f. Wire terminations, .nuts, and lockwashers (34)	Replace.	
	g. Screws (32), clamp (33), lockwasher (31), and nut (30)	Replace.	
11. Lamp socket	a. Wiring.	Remove.	Refer to step 10 .
	b. Screws (12)	Remove.	
	c. Screw (12), flat-lockwasher (35), and ground wire	Remove.	
	d. Socket support (13) and spacers (39)	Remove.	
	e. Screws (40), lock-flatwasher (41), screw (42); lockwasher (43), and bracket (44)	Replace.	If necessary.
	f. Spacers (39), socket support (13), and screws (12)	Replace.	
	g. Screw (12), flatlockwasher (35), and ground wire	Install.	

4.77.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	h. Wiring	Install.	Refer to step 10 .



4-78. LASHING GEAR - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection **b. Replace**

INITIAL SETUP

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment Condition
Condition Description
NONE

Material/Parts
NONE

Special Environmental Conditions
NONE

Personnel Required
1

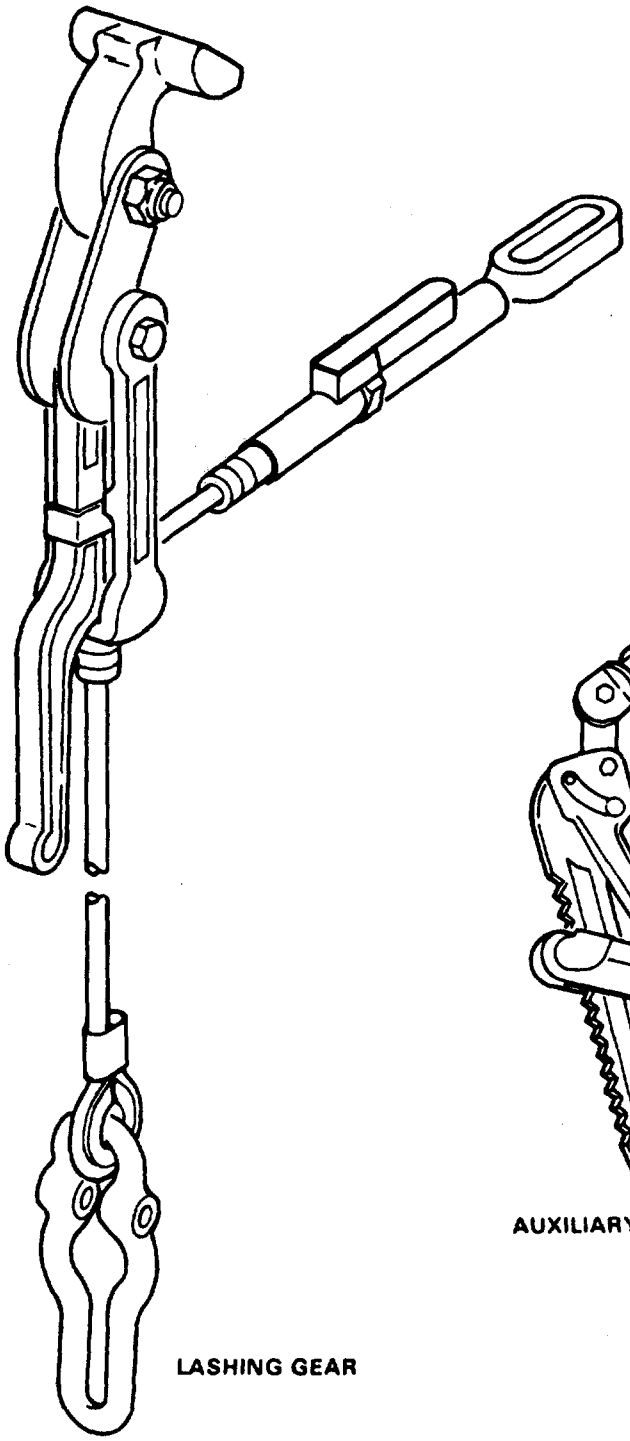
General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1.	Lashing gear	a. Inspect for breaks, cracks, bends and worn parts.	
		b. Insure all parts function properly.	
REPLACE			
2.		Replace all defective gear.	

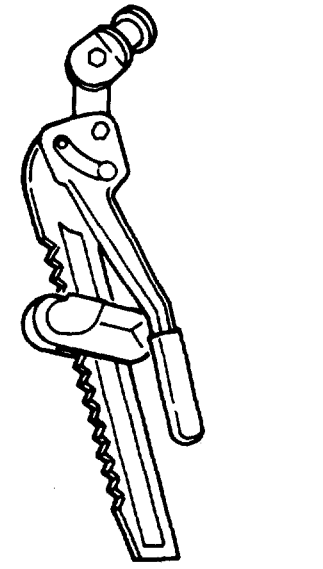
4-78. LASHING GEAR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS

REPLACE (Cont)



LASHING GEAR



AUXILIARY LASHING GEAR

APPENDIX A

REFERENCES

Refer to Volume 12.

APPENDIX 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. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component and the work measurement time required to perform the functions by the designated maintenance level. The implementation of the maintenance functions upon the end item or components will be consistent with the assigned maintenance functions.

c. Section III lists the tools and test equipment required for each maintenance function as referenced from Section II.

d. Section IV lists the remarks referenced from Section II.

B-2. EXPLANATION OF COLUMNS IN SECTION II.

a. Column (1), Group Number. Column 1 lists group numbers to identify related components, assemblies, subassemblies, and modules with their next higher assembly. The applicable groups are listed in the MAC in disassembly sequence beginning with the first group removed.

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

c. Column (3), Maintenance Functions. This column lists the functions to be performed on the item listed in Column 2. The mainteance functions are defined as follows:

(1) Inspect. To determine serviceability of an item by comparing its physical, mechanical, or electrical characteristics with established standards through, examination.

(2) Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item, and comparing those characteristics with prescribed standards.

(3) 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.

B-2. EXPLANATION OF COLUMNS IN SECTION II (Continued).

(4) Adjust. To maintain within prescribed limits, by grinding into proper or exact position, or by setting the operating characteristics to specified parameters.

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

(6) Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in percision measurement. Consist of comparison of two instruments, one of which is a certified standard of known accuracy to detect and adjust any discrepancy in the accuracy of the instrument being compared.

(7) Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipmenmt or system.

(8) Replace. The act of subsituting a servicable like type part, subassembly or module (component or assembly) for an unservicable counterpart.

(9) Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing remachining or resurfacing) to restore servicability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system..

(10) Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as perscribed by maintenance standards in appropriate technical manuals. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to a like-new condition.

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

d. Column (4), Maintenance Level. This column is made up of subcolumns for each category of maintenance. Work time figures are listed in these subcolumns for the lowest level of maintenance authorized to perform the function listed in Column 3. These figures indicate the average active time required to perform the maintenance function at the indicated category of maintenance under typical field operating conditions.

B-2. EXPLANATION OF COLUMNS IN Section II (Continued).

e. Column (5), Tools and Equipment. This column is provided for referencing by code, the common tool sets (not individual tools) special tools, test and support equipment required to perform the designated functions.

f. Column (6), Remarks. This column is provided for referencing by code of the remarks pertaining to the designated functions.

B-3. EXPLANATION OF COLUMNS IN Section III.

a. Column (1), Reference Code. The tool and test equipment referenced code correlates with a maintenance function on the identified end item or component.

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

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

d. Column (4), National/NATO Stock Number. The National or NATO stock number of the too or test equipment.

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

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
1146	Thermal Expansion Valve	Inspect	.2						
		Replace	1.5						
		Repair	1.0						
		Adjust	.6						
1150	Miscellaneous Valves and Headers								
1151	Liquid Solenoid Valve	Inspect	.5						
		Replace	1.0						
		Repair	2.0						
1152	Receiver	Inspect	.5						
		Replace	1.0						
		Repair	1.0						
1153	Heat Interchanger	Inspect	.5						
		Replace	3.0						
1154	Water Regulating Valve	Inspect	.5						
		Service	.5						
		Replace	2.0						
		Adjust	.5						
1155	Thermometer	Inspect	.5						
		Replace	.5						
1156	Controller	Inspect	.5						
		Replace	2.0						
		Repair	1.5						
1200	Commissary Space Equipment								
1210	Refrigerator/ Freezer	Service	1.0		6.0				
		Inspect	.4						
		Replace	3 0		30.0				
		Repair	3.0		10.0				
1220	Toaster	Inspect	.1						
		Replace	.5						
		Repair	1.5						
1230	Drinking -Fountain	Inspect	.3						
		Service	1.0						
		Replace	3. 5						
		Repair	2.8						
1240	Milk Dispenser	Inspect	.3		4.0				
		Service	.6						
		Replace	2.0						
		Repair	1.5		3.0				
1250	Coffee Maker	Inspect	.1						
		Replace	.5						
		Repair	1.5						
1260	Washer/Dryer	Inspect	2.0						
		Service	.3						
		Replace	12.0						
		Repair	2.5		10.0				
1270	Sanitizing Sink Heater	Inspect	.2						
		Replace	3.0						
		Repair	2.0						

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
1280	Galley Range	Inspect	.2						
		Replace	30.0						
		Repair	5.0						
1300	Washroom Fixtures	Inspect	.2						
		Replace	1.5						
		Repair	1.0						
1400	Firefighting System								
1410	Fire Detection/ Extinquising System and Fixed	Inspect	.5						
		Service	1.0						
		Test	.5		8.0				
	Halon 1301	Replace	1.0		7.5				
		Repair	2.5		5.5				
1500	Interior Communication System	Inspect	.5						
		Service	1.2						
		Test	.5						
		Replace			8.5				
		Repair	2.0		11.0				
1510	Alarm Panel	Inspect	.5						
		Test	1.0						
		Replace			30.0				
		Repair	5.0		20.0				
1600	Electronic/ Navigation Systems	Inspect	1.0						
		Test	1.5						
		Replace			25.0				
		Repair	2.0		12.0				
1610	VHF Antenna	Inspect	1.0						
		Replace			10.0				
		Repair			13.5				
1700	Oil/Water Separation System	Inspect	.5						
		Service	1.5						
		Replace	20.0						
		Repair	2.0		13.5				
		Overhaul			20.0				
1800	Piping Systems								
1801	Pipe Hangers	Inspect	1.0						
		Replace			5.0				
1810	Fire, Bilge and Ballast Piping System	Inspect	1.0						
		Replace			25.0				
		Repair	2.0		18.0				
1822	Machinery Cooling Keel Coolers	Inspect	1.0						
		Replace			25.0				
		Repair	2.0		18.0				
1830	Lube Oil Piping System	Inspect	1.0						
		Replace			20.0				
		Repair	2.0		18. 0				
1832	Diesel Oil Storage Tank Piping System	Inspect	1.0						
		Replace			20.0				
		Repair	2.0		18.0				
1840	Diesel Oil Piping	Inspect	1.0						
		Replace			20.0				
		Repair	2.0		18.0				

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
1845	Diesel Oil Coolers	Inspect	1.0						
		Replace	1.5						
		Repair	10.0						
1846	Duplex Strainer	Inspect	.5						
		Service	.5						
		Replace	2.0						
		Repair	2.0						
1870	Engine Exhaust Piping System	Inspect	1.0						
		Replace			20.0				
		Repair	2.0		18.0				
1890	Oil/Water Separator Piping	Inspect	1.0						
		Replace	1.0		20.0				
		Repair	2.0		18.0				
1895	Deck Fittings	Inspect	1.0						
		Replace			4.5				
		Repair	1.5		10.0				
1900	Tanks and Voids	Inspect	1.0						
		Replace			20.0				
		Repair	2.0		18.0				
1905	Receiver	Inspect	.5						
		Test	.5						
		Replace			6.0				
		Repair	5.5		5.5				
		Adjust	1.5						
1911	Transmitter	Inspect	.5						
		Test	.5						
		Replace	6.0						
1912	Cables	Inspect	1.0						
		Replace	4.5						
1913	Brackets	Inspect	1.0						
		Replace	4.5						
1914	Tank Penetrations	Inspect	.5						
		Repair	4.5						
1915	Hot Water Heater	Inspect	.5						
		Replace			20.0				
		Repair	5.0						
2000	Plumbing and Deck Drains	Inspect	1.0						
		Replace			8.0				
		Repair	2.0						
2100	Vents and Sounding Tubes	Inspect	1.0						
		Replace			10.0				
		Repair	2.0						
2200	Hull and Outfit								
2210	Stanchions and Railings	Inspect	1.0						
		Replace	20.0						
2213	Furniture and Miscellaneous Furnishings	Inspect	1.0						
		Replace	1.5		7.5				

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
2214	Portable Air Compressor	Inspect	.5						
		Replace	1.0						
		Repair	2.5						
2215	Doors, Hatches, Scuttles and Manholes	Inspect	1.0						
		Replace	6.0		12.0				
		Repair	2.5		12.0				
2216	Windows and Airports	Inspect	1.0						
		Replace	6.0						
		Repair	1.5						
2217	Mooring and Towing Fittings	Inspect	1.0						
		Replace	12.0						
2218	High Intensity Lights	Inspect	1.0						
		Test	.5						
		Replace	2.0						
		Repair	3.5						
2219	Windshield Wipers	Inspect	.5						
		Test	.5						
		Replace	2.5						
		Repair	1.5						
2220	Searchlight	Inspect	.2						
		Service	.7						
		Repair	2.5						
		Replace	1.5						
2221	Vehicle Lashing Gear	Inspect	1.0						
		Replace	4.5						
		Repair	6.5						

INDEX

INDEX (Continued)

INDEX (Continued)

INDEX (Continued)

INDEX (Continued)

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By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25D, Operator Maintenance requirements for Marine Equipment, All.

* U.S. GOVERNMENT PRINTING OFFICE: 1984-764-120/10032

NOTES:

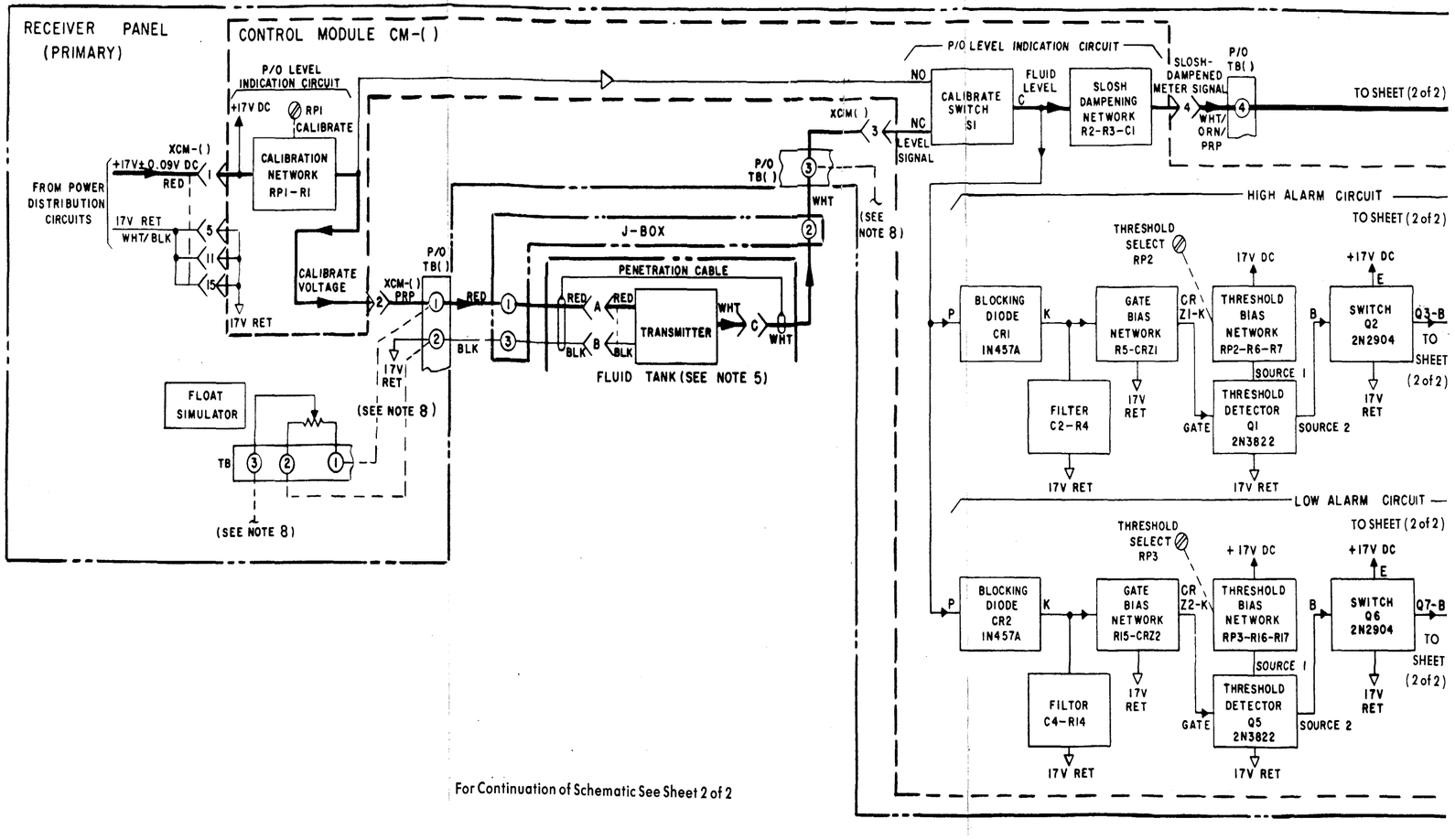
1. ▭ INDICATES EQUIPMENT MARKING.
2. ▬▶ INDICATES MAIN SIGNAL FLOW PATH.
3. —▶ INDICATES ALARM SIGNAL FLOW PATH.
4. —▷ INDICATES TEST OR CALIBRATION SIGNAL FLOW PATH.

LOW ALARM
NOT USED
NOT USED
NOT USED
USED
*USED (TWO)
**USED

*SECOND OF TWO ALARM CIRCUITS ACHIEVED BY MAKING JUMPER CONNECTIONS SHOWN IN NOTE 6 OR 7, AS APPLICABLE.

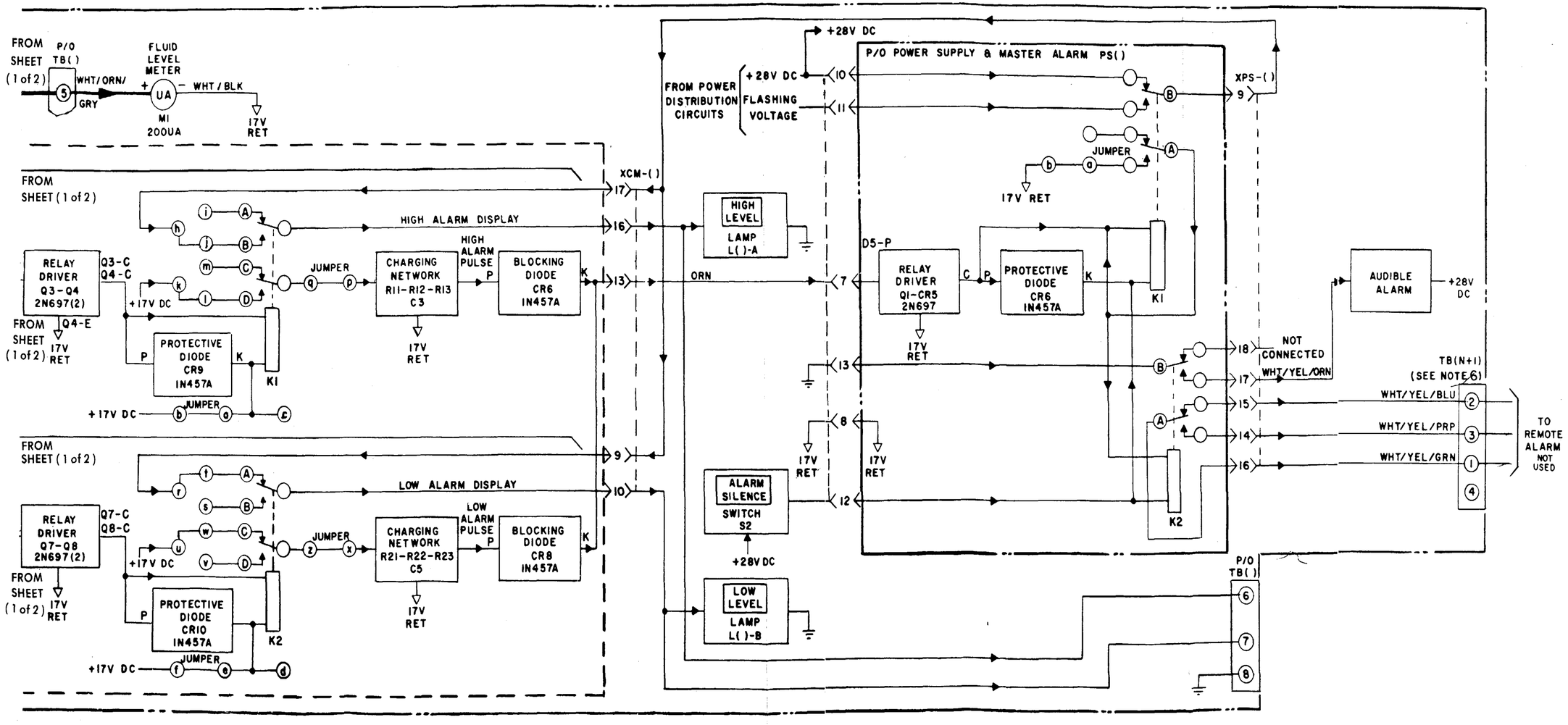
**LOW ALARM CIRCUIT ACHIEVED BY MAKING JUMPER CONNECTIONS SHOWN IN NOTE 6. LOW ALARM CIRCUIT SHOWN ON THIS DIAGRAM NOT INCLUDED.

5. TANK TRANSMITTER AND CABLE ARRANGEMENT IS TYPICAL.
6. N = NUMBER OF TRANSMITTERS PROCESSED BY RECEIVER PANEL.
7. REFERENCE DESIGNATIONS SHOWN WITH PARENTHESES ( ), HAVE NUMERICAL VALUE ASSOCIATED WITH LOCATION OF CIRCUIT ARRANGEMENT SHOWN ON ACTUAL RECEIVER PANEL.
8. CONNECTIONS FROM TB( ) TERMINALS ARE CONNECTED TO FLOAT SIMULATOR FOR CHECK OUT AND ADJUSTMENT PROCEDURES.

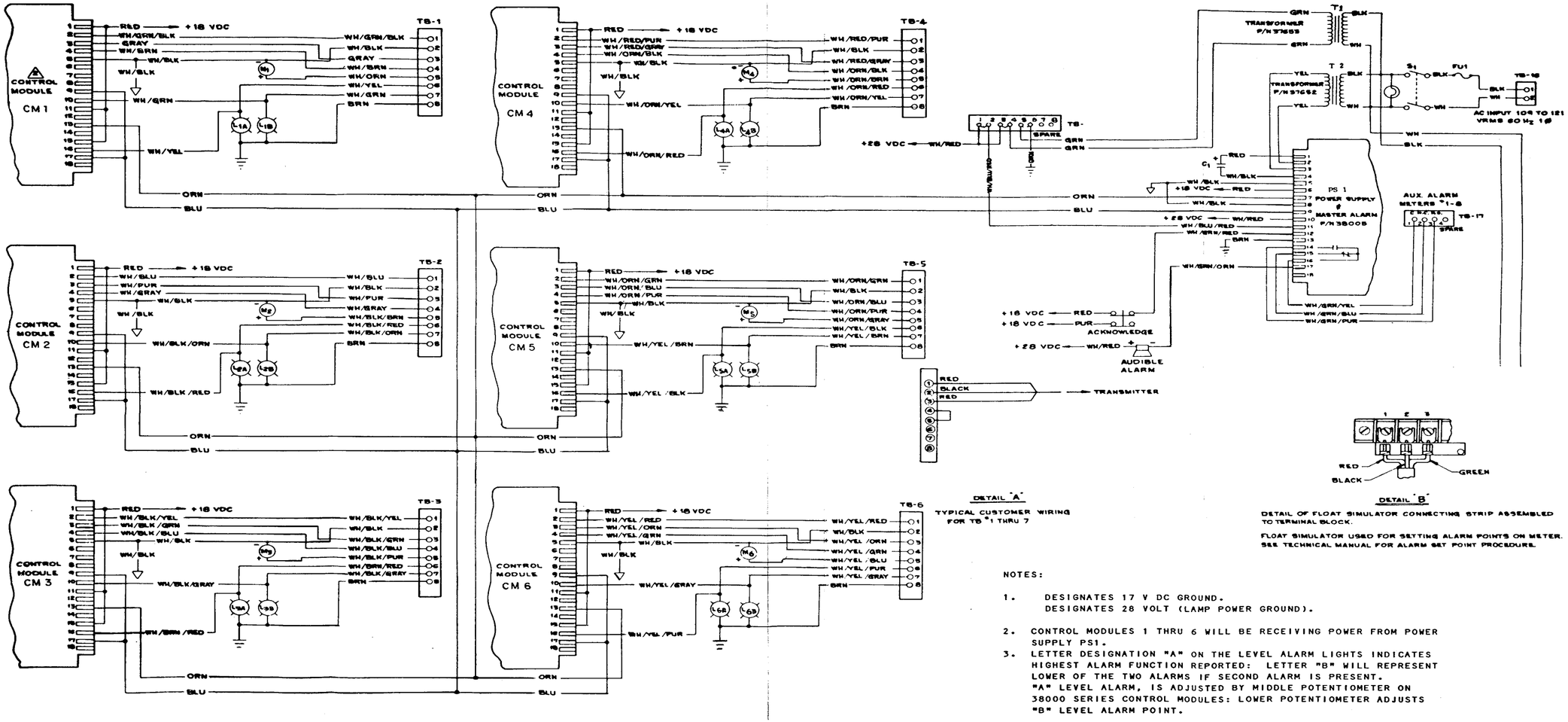


For Continuation of Schematic See Sheet 2 of 2

FO-2. Receiver Panel Installation, Servicing Block Diagram (Sheet 1 of 2)



FO-2. Receiver Panel Installation, Servicing Block Diagram (Sheet 2 of 2)



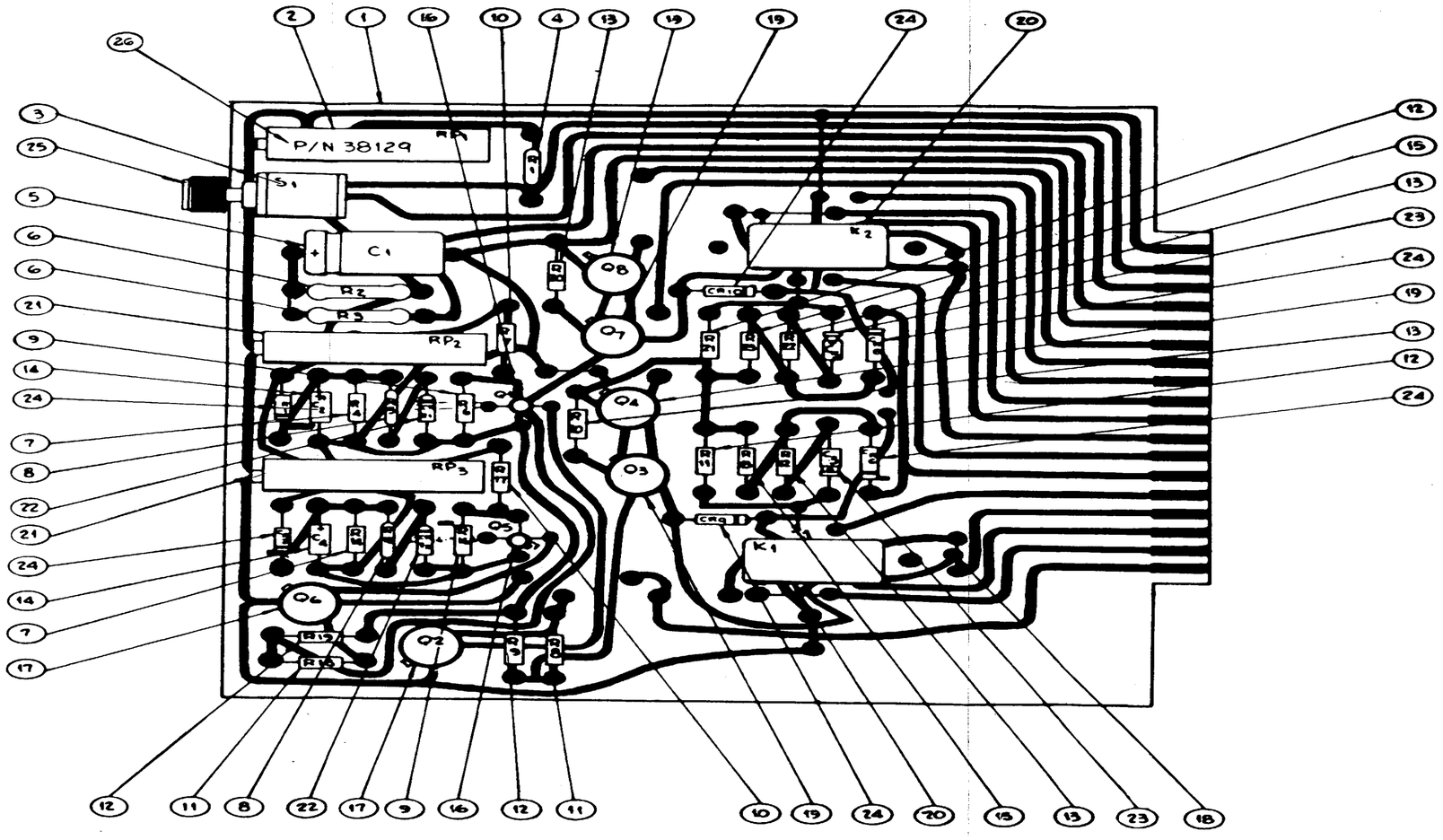
DETAIL OF FLOAT SIMULATOR CONNECTING STRIP ASSEMBLED TO TERMINAL BLOCK.

FLOAT SIMULATOR USED FOR SETTING ALARM POINTS ON METER. SEE TECHNICAL MANUAL FOR ALARM SET POINT PROCEDURE.

NOTES:

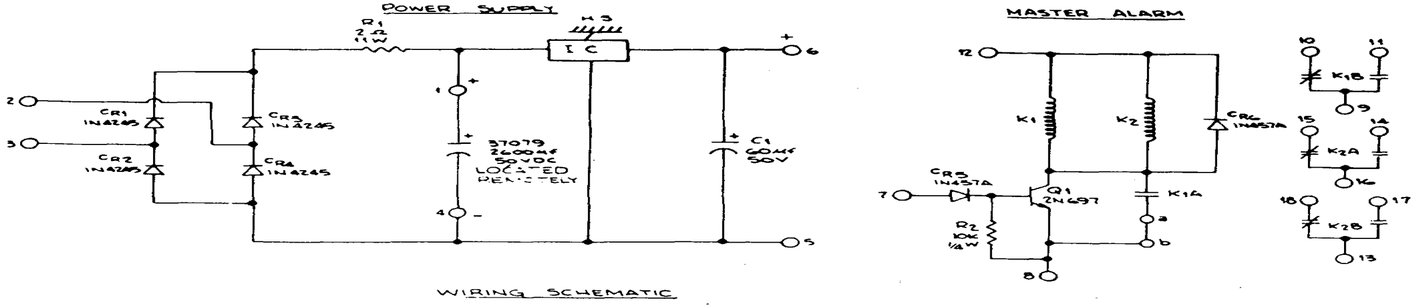
1. DESIGNATES 17 V DC GROUND.
   DESIGNATES 28 VOLT (LAMP POWER GROUND).
2. CONTROL MODULES 1 THRU 6 WILL BE RECEIVING POWER FROM POWER SUPPLY PS1.
3. LETTER DESIGNATION "A" ON THE LEVEL ALARM LIGHTS INDICATES HIGHEST ALARM FUNCTION REPORTED: LETTER "B" WILL REPRESENT LOWER OF THE TWO ALARMS IF SECOND ALARM IS PRESENT. "A" LEVEL ALARM, IS ADJUSTED BY MIDDLE POTENTIOMETER ON 38000 SERIES CONTROL MODULES: LOWER POTENTIOMETER ADJUSTS "B" LEVEL ALARM POINT.

FO-3. Wiring Schematic



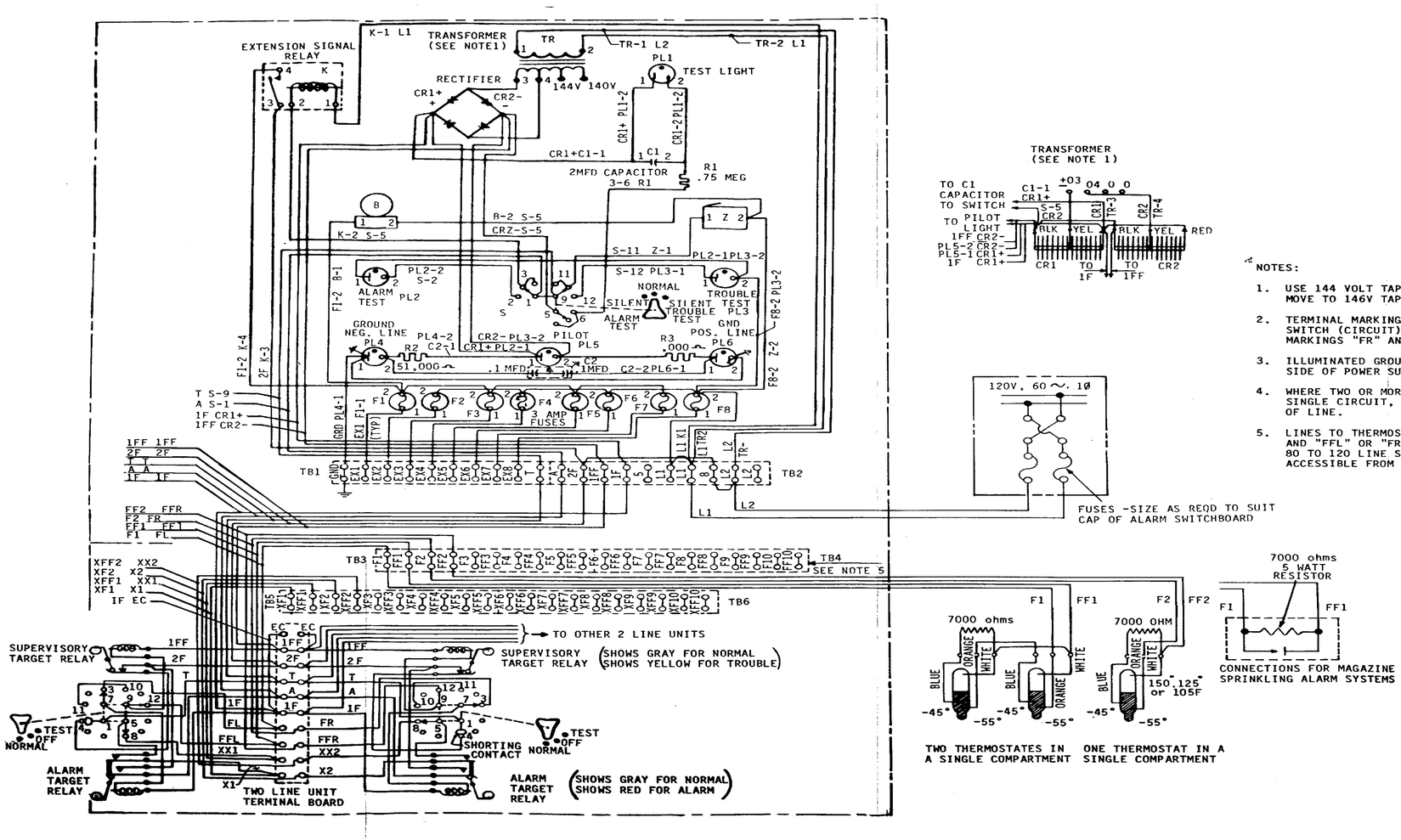
ITEM NO	NOMENCLATURE OR DESCRIPTION
1	PC BOARD
2	POTENTIOMETER
3	PUSHBUTTON SWITCH
4	RESISTOR 600 OHM
5	CAPACITOR 600 uf 50V
6	RESISTOR 22.1K
7	RESISTOR 330K 1/4W
8	RESISTOR 1K OHM
9	RESISTOR 22 K 1/4W
10	RESISTOR 100 OHM 1/4W
11	RESISTOR 6.8K 1/4W
12	RESISTOR 10K 1/4W
13	RESISTOR 4.7K 1/4W
14	CAPACITOR .47 35V
15	RESISTOR 1K 1/4W
16	TRANSISTOR 2N3822
17	TRANSISTOR 2N2904
18	JUMPER WIRE #22 AWG
19	TRANSISTOR 2N697
20	RELAY 26.5 VDC 700 OHM
21	POTENTIOMETER
22	ZENER DIODE
23	CAPACITOR 10 uf 25V
24	DIODE 1N457A
25	SNAP-ON BUTTON
26	NAMEPLATE,P/N

FO-4. Control Modules, Part No. 38139, 38129, 38149, 38119, 38159, and 38100 (Typical)



ITEM NO	NOMENCLATURE OR DESCRIPTION
1	PC BOARD
2	TRANSISTOR 2N697
3	DIODE IN457A
4	RESISTOR 10K 1/4W
5	RELAY 26.5VDC 700 OHM
6	CAPACITOR 60 uf 50 V
7	DIODE IN4245
8	RESISTOR 2 OHM 11W
9	PAN HD SCREW, #6-32
10	LOCKWASHER #6
11	NUT-HEX #6-32
12	VOLTAGE REGULATOR
13	HEATSINK
14	THERMAL COMPOUND
15	JUMPER WIRE #22 AWG
16	NAMEPLATE, P/N

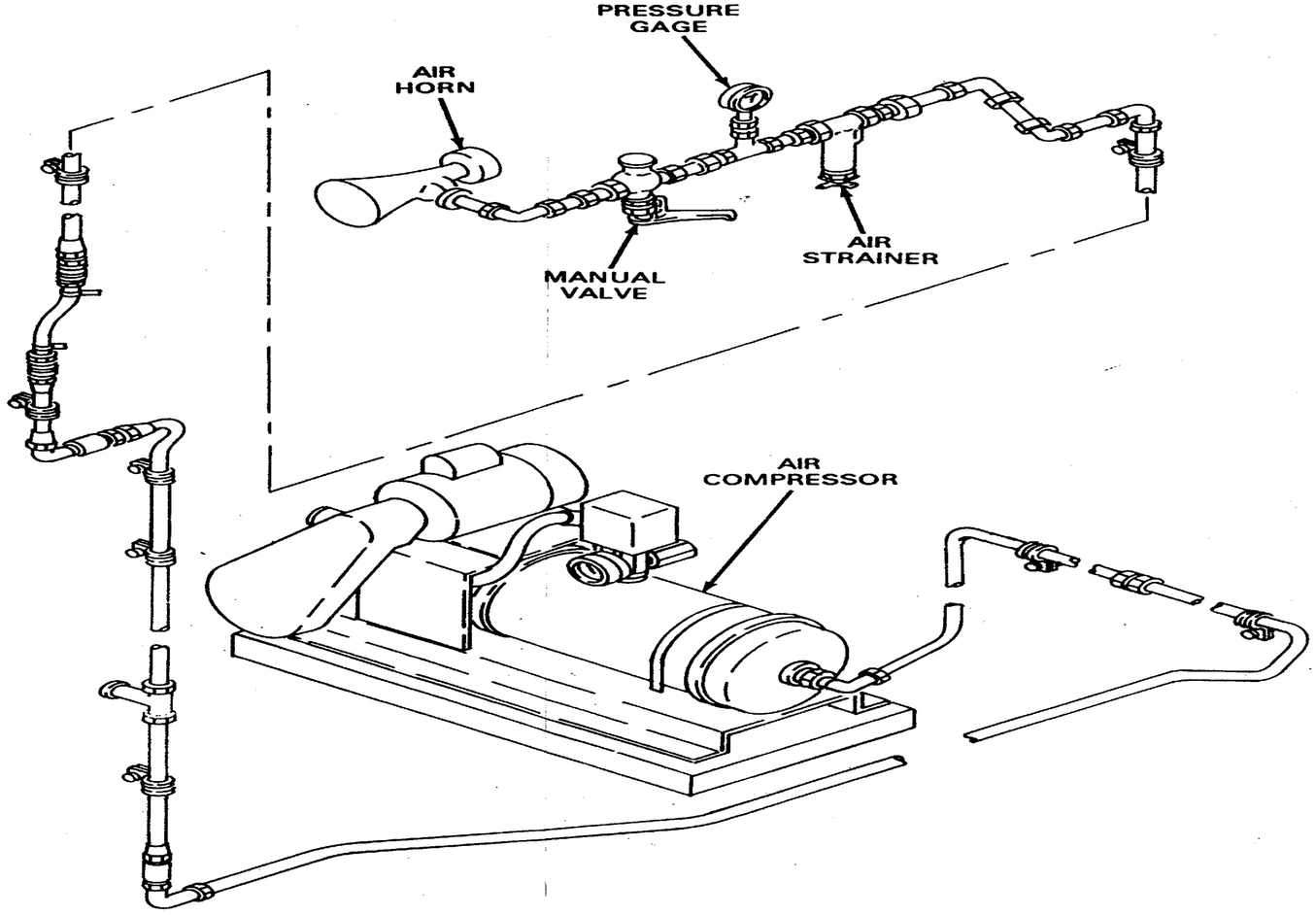
FO-5. Power Supply and Master Alarm Module,
Part No. 38005



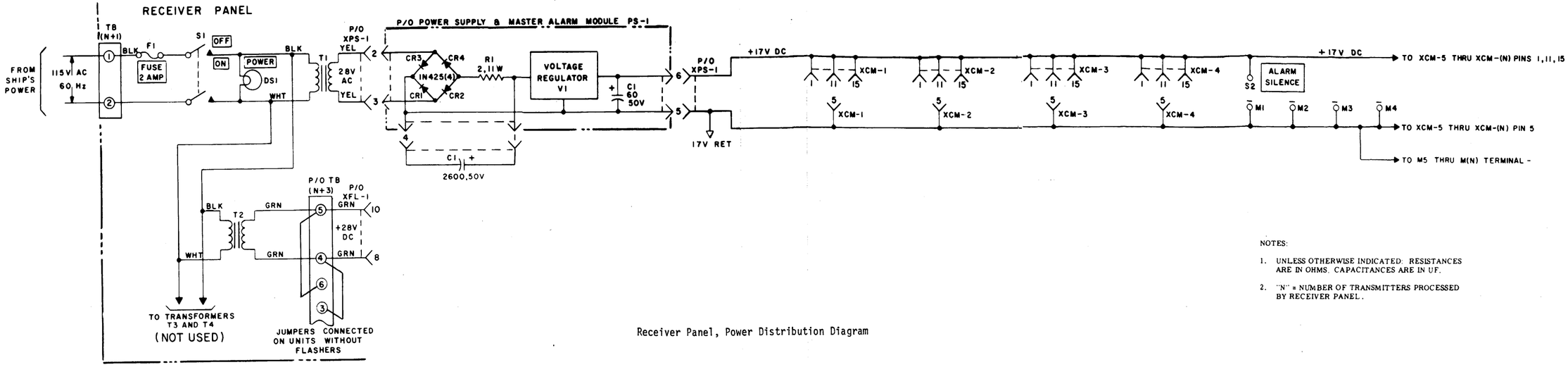
NOTES:

1. USE 144 VOLT TAP FOR 10 LINE SWITCHBOARDS WHEN RECTIFIER IS NEW. MOVE TO 146V TAP WHEN RECTIFIER IS FULLY USED.
2. TERMINAL MARKINGS "FL" AND "FFL" REFER TO THE LEFT HAND RELAYS AND SWITCH (CIRCUIT) WHEN SWITCHBOARD IS VIEWED FROM THE FRONT TERMINAL MARKINGS "FR" AND "FFR" REFER TO THE R.H. RELAYS AND SWITCH.
3. ILLUMINATED GROUND POS. OR NEG. LAMP INDICATES GROUND ON + OR - SIDE OF POWER SUPPLY.
4. WHERE TWO OR MORE THERMOSTATIC SWITCHES OR SENSORS ARE USED IN SINGLE CIRCUIT, THE SUPERVISOR RESISTOR SHALL BE PLACED AT END OF LINE.
5. LINES TO THERMOSTATS OR WATER SWITCHES GO DIRECT TO TERMINALS "FL" AND "FFL" OR "FR" AND "FFR" OF EACH 2 LINE UNIT TERMINAL BOARD IN 80 TO 120 LINE SWITCHBOARDS WHERE THESE TERMINAL BOARDS ARE ACCESSIBLE FROM THE BACK OF THE SWITCHBOARD.

FO-6. Alarm Switchboard Wiring Diagram



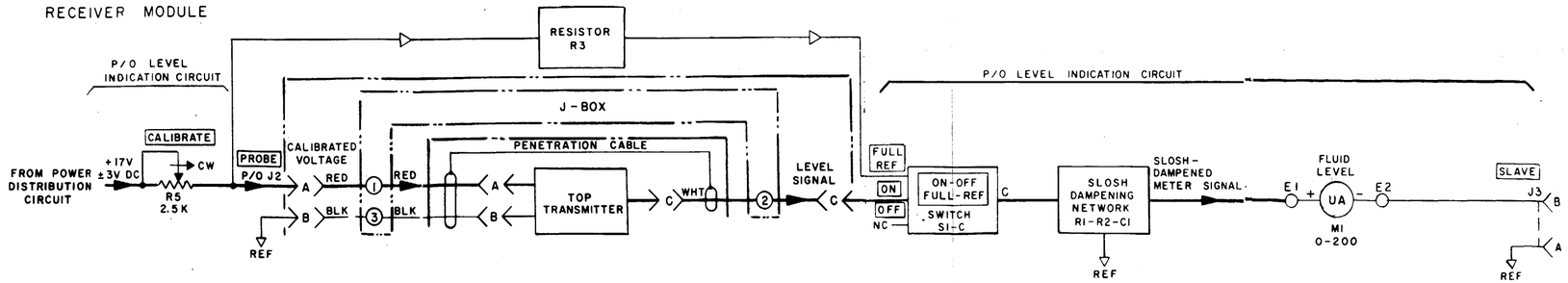
FO-7. Air Horn, Air Compressor System



Receiver Panel, Power Distribution Diagram

NOTES:

1. UNLESS OTHERWISE INDICATED: RESISTANCES ARE IN OHMS. CAPACITANCES ARE IN UF.
2. "N" = NUMBER OF TRANSMITTERS PROCESSED BY RECEIVER PANEL.



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3. ──▶ INDICATES ALARM SIGNAL FLOW PATH.
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5. HI-LO RECEIVER MODULE ALARM CIRCUITS ARE SHOWN. ON DUAL-ALARM RECEIVER MODULES, HIGH LEVEL LAMP DS3, LOW LEVEL LAMP DS2, AND ALARM RELAY K1 ARE OMITTED. AND CONNECTIONS TO SENS-PAKS Z1 AND Z2 ARE AS FOLLOWS:

SENS-PAK Z1

PIN	CONNECTS TO
1	+17V DC
2	DC REFERENCE
3	S2 - WIPER
4	HIGH ALARM R7
5	
6	J4-G
7	J4-J
8	J4-H
9	J4-K
10	J4-M
11	J4-L

SENS-PAK Z2

PIN	CONNECTS TO
1	+17V DC
2	DC REFERENCE
3	S2 - WIPER
4	LOW ALARM R6
5	
6	J4-A
7	J4-C
8	J4-B
9	J4-D
10	J4-F
11	J4-E

6. ON NO-ALARM RECEIVER MODULE ONLY THOSE CIRCUIT ELEMENTS (WITH THE EXCEPTION OF SIM. SW SWITCH S2) THAT LIE IN THE MAIN SIGNAL FLOW PATH ARE INCLUDED.

FO-1. Receiver Panel, Power Distribution Diagram; and Receiver Module Installation, Servicing Block Diagram

NOTES:

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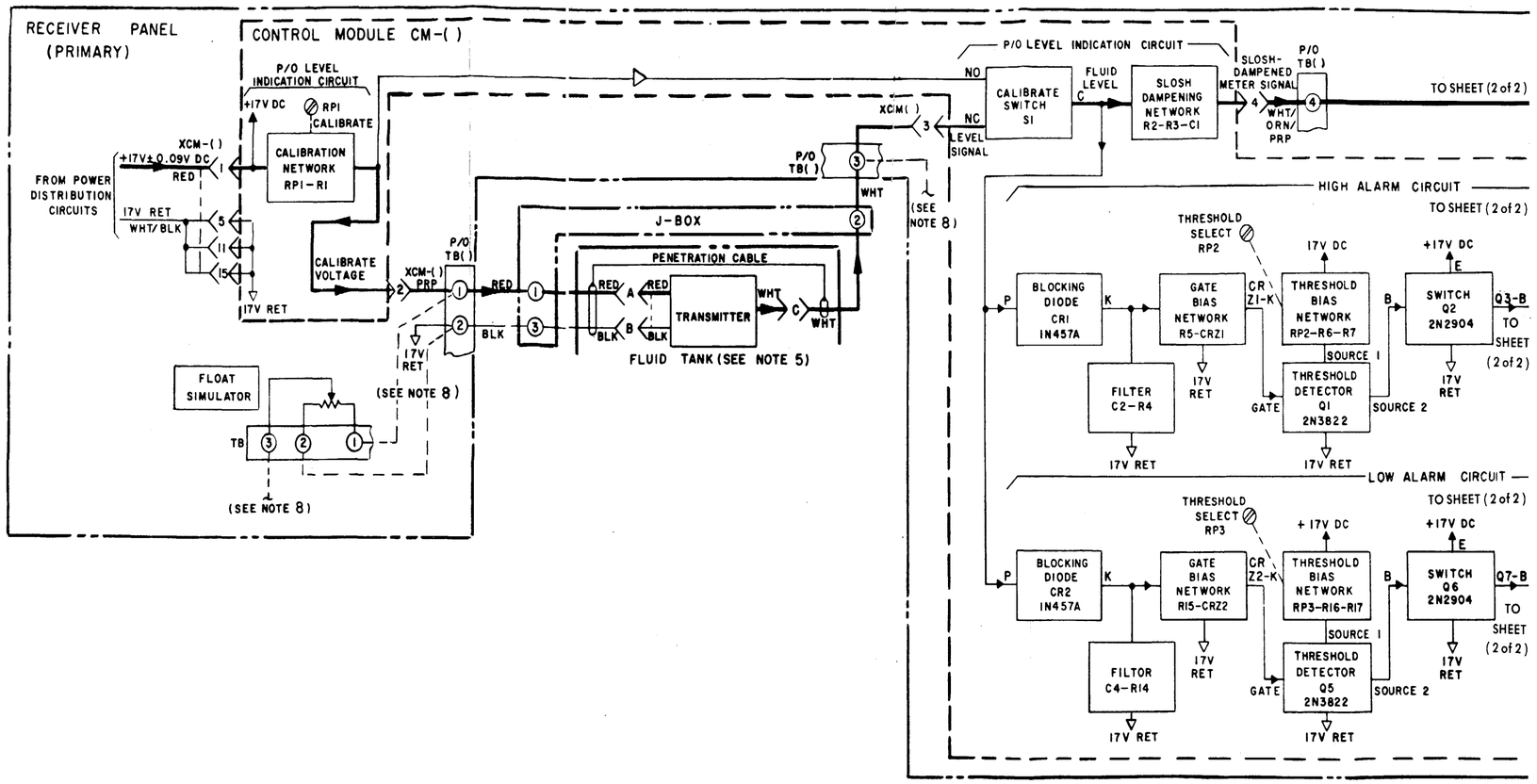

FO-2. Receiver Panel Installation, Servicing Block Diagram (Sheet 1 of 2)

TEAR ALONG PERFORATED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.

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BE EXACT PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

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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

PIN: 046296-001