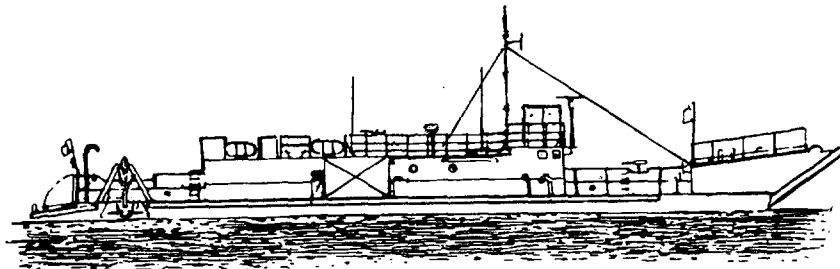


**TECHNICAL MANUAL
OPERATOR'S, ORGANIZATIONAL,
DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL**

**OPERATOR MAINTENANCE INSTRUCTIONS
FOR AUXILIARY EQUIPMENT**

**LANDING CRAFT UTILITY
LCU 1671-1679
NSN 1905-01-009-1056**



This manual supersedes TM 55-1905-220-14-9, 8 September 1980

**HEADQUARTERS, DEPARTMENT OF THE ARMY
17 JULY 1984**

CHANGE

NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 15 JANUARY 1992

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

LANDING CRAFT UTILITY
LCU 1671-1679
NSN 1905-01-009-1056

Approved for public release; distribution is unlimited

TM 55-1905-220-14-9, 17 July 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
4-995/4-996	4-995/4-996
4-1009 and 4-1010	4-1009 and 4-1010
4-1059 through 4-1113/4-1114	4-1059 through 4-1114
----	4-1114.1 through 4-1114.3/4-1114.4
4-1147 through 4-1170	4-1147 through 4-1170
4-1171 through 4-1180	----
4-1277 through 4-1279/4-1280	4-1277 through 4-1279/4-1280
4-1283 through 4-1285/4-1286	4-1283 through 4-1285/4-1286
4-1311 and 4-1312	4-1311 and 4-1312
4-1329 through 4-1332	4-1329 through 4-1332
4-1367 and 4-1368	4-1367 and 4-1368
----	4-1368.1 through 4-1368.12
4-1371 and 4-1372	4-1371 and 4-1372
4-1375 through 4-1378	4-1375 through 4-1378
4-1435 and 4-1436	4-1435 and 4-1436
4-1463 and 4-1464	4-1463 and 4-1464
----	4-1464.1/4-1464.2
4-1467 through 4-1470	4-1467 through 4-1470
4-1473 and 4-1474	4-1473 and 4-1474
4-1479 and 4-1480	4-1479 and 4-1480
----	4-1498.1 through 4-1498.16
4-1499 through 4-1510	4-1499 through 4-1510
4-1521 through 4-1551/4-1552	4-1521 through 4-1552
----	4-1552.1 through 4-1552.9/4-1552.10
Index-1 and Index-2	Index-1 and Index-2

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

Official:

Chief of Staff

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
00393

DISTRIBUTION:

To be distributed in accordance with DA Form 12-25E, (qty rqr block no. 1060)

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 lines 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).

b

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.

WARNING

- 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.

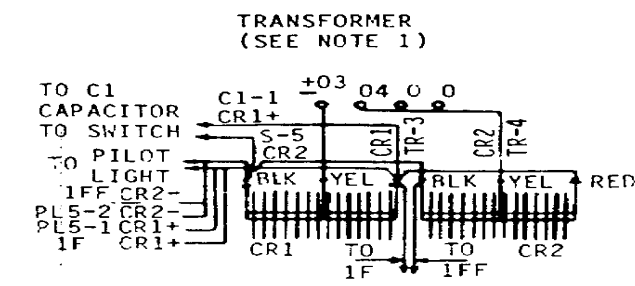
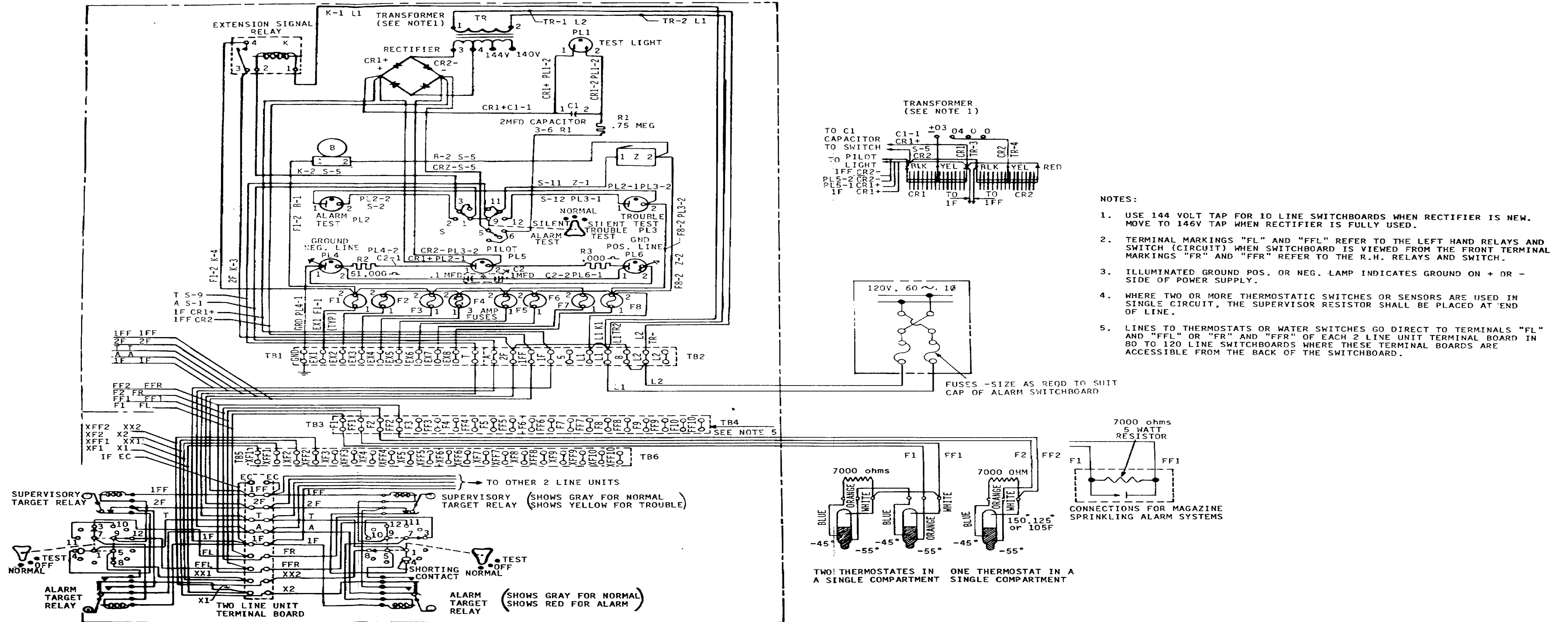
- Refrigerant-12 is practically odorless and nontoxic. It is not necessary to wear a gas mask when servicing equipment in which it is contained unless the conditions necessary for the decomposition of R-12 to phosgene gas exist.
- Never use a torch or attempt a repair on a line containing R-12 until 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 1,000F (557.80°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, take 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:

d

WARNING

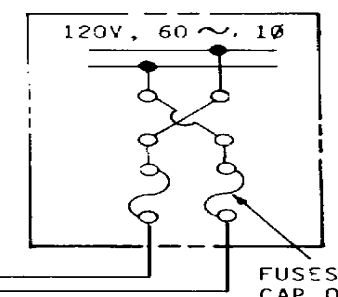
- a. Introduce drops of sterile mineral oil into the eyes as an irrigant.
 - b. If irritation continues at all, wash the eyes with a weak boric acid solution, or a sterile salt solution not to exceed 2% sodium chloride.
- Should liquid R-12 come in contact with the skin, treat the injury the same as 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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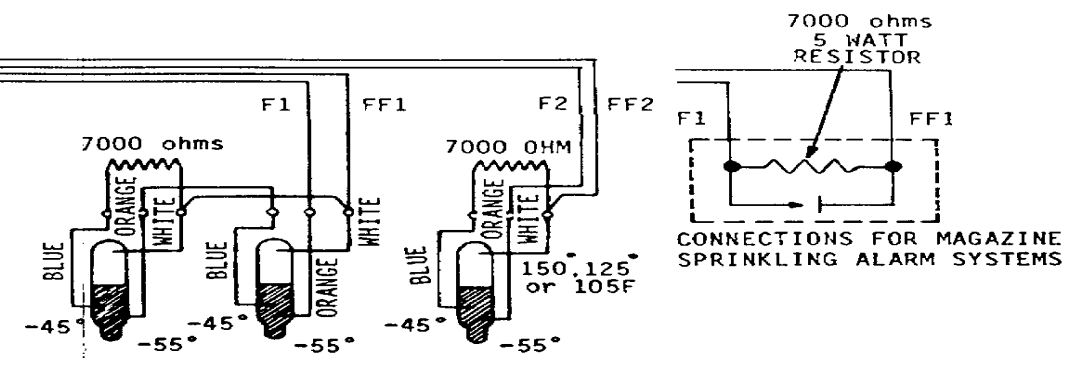


NOTES:

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.



FUSES - SIZE AS REQD TO SUIT CAP OF ALARM SWITCHBOARD



TWO THERMOSTATS IN A SINGLE COMPARTMENT ONE THERMOSTAT IN A SINGLE COMPARTMENT

FO-1. Alarm Switchboard Wiring Diagram.

FP-1/(FP-2 blank)

TECHNICAL MANUAL
NO. 55-1905-220-14-9

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 17 July 1984

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

LANDING CRAFT UTILITY
LCU 1671-1679
NSN 1905-01-009-1056

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

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

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		Page
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APPENDIX A.	REFERENCES	A-1
APPENDIX B.	MAINTENANCE ALLOCATION CHART	B-1
INDEX		Index-1

CHAPTER 4
OPERATOR MAINTENANCE INSTRUCTIONS FOR
AUXILIARY EQUIPMENT (CONTINUED)

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

4-35. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

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.

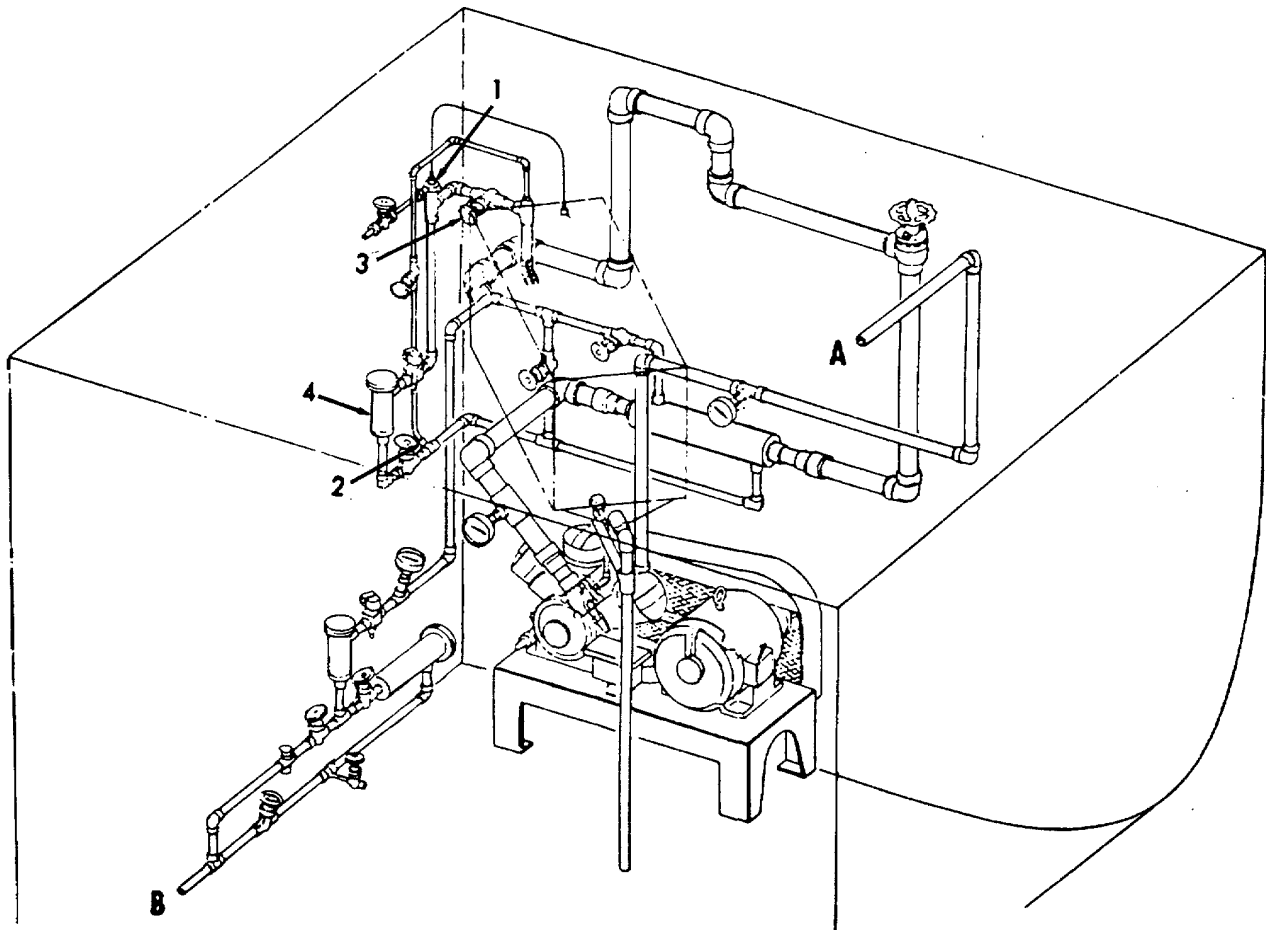
(3) Close the cut-out valve on the outlet side.

(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.

4-35. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

- (6) Plug openings to exclude air and 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

4-35. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

This task covers:

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

INITIAL SETUP:

Test Equipment

NONE

References

Paragraph 4-29r Leak Detection
4-36.6 Tubing Maintenance

Special Tools

NONE

Equipment Condition Condition Description

NONE

Material/Parts

Gasket kit Y13455-1

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

Observe safety precautions in paragraph 4-29d.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSPECTION

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

4-977

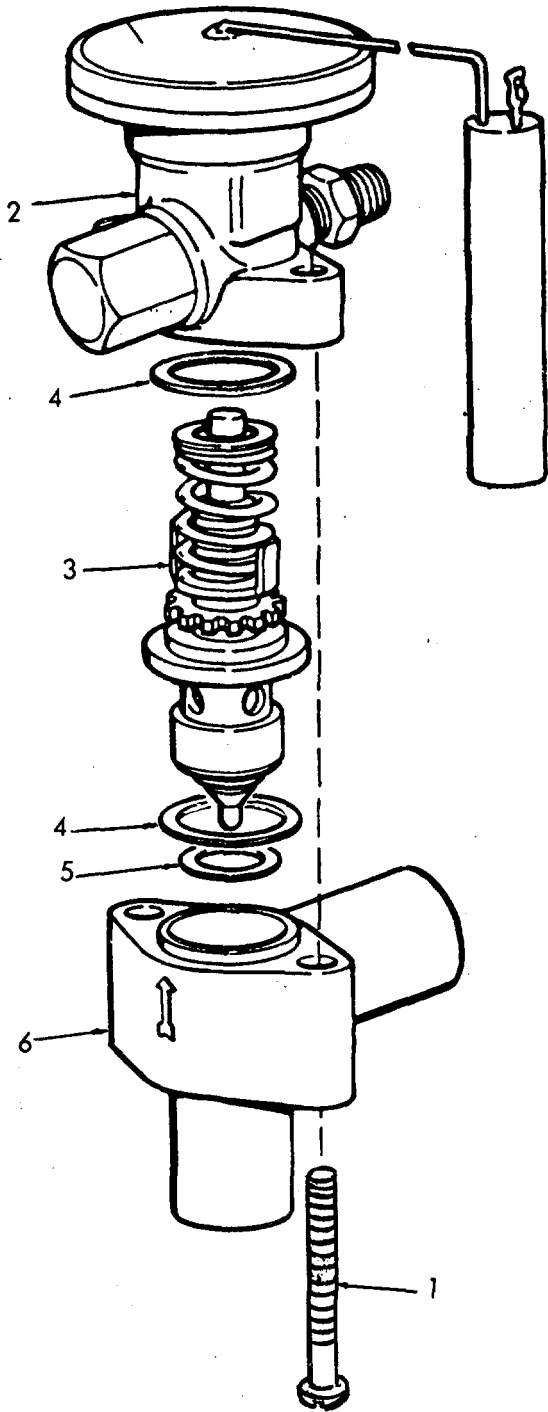
4-35. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

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 assem- bly.	<p>a. The two lugs on the cage assembly fit into the grooves provided for them in the power assem- bly.</p> <p>b. The gear wheel on the cage assem- bly meshes with the ad- justing stem gear inside the power assembly.</p> <p>c. Do not force the valve together.</p>

4-35. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION ITEM ACTION REMARKS

REPAIR (Cont)



4-35. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
		2. Install bulb	
	f. Screws (1)	Install	d. Make the cage fit properly before tightening body flange.

REMOVAL/INSTALLATION

- 3. Remove valve in accordance with procedure in paragraph 4-35b.

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.

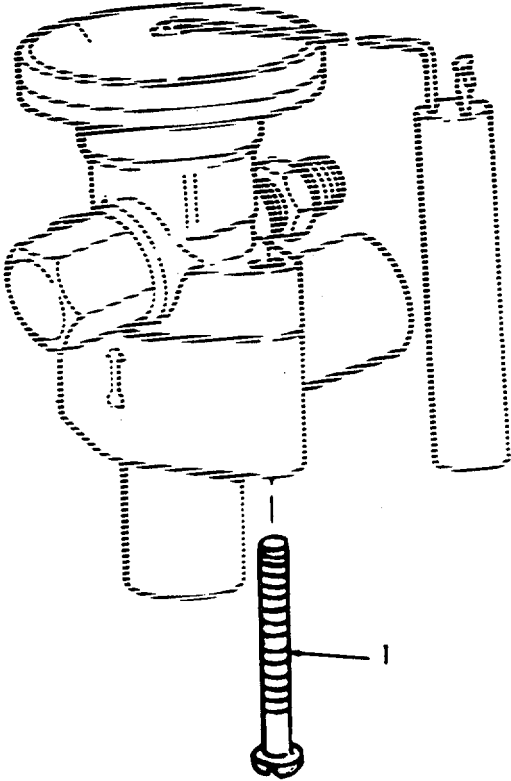
ADJUSTMENT

- 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 super-heat.
 - 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.

4-35. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR (Cont)



4-36. MISCELLANEOUS VALVES AND HEADERS - MAINTENANCE INSTRUCTIONS.

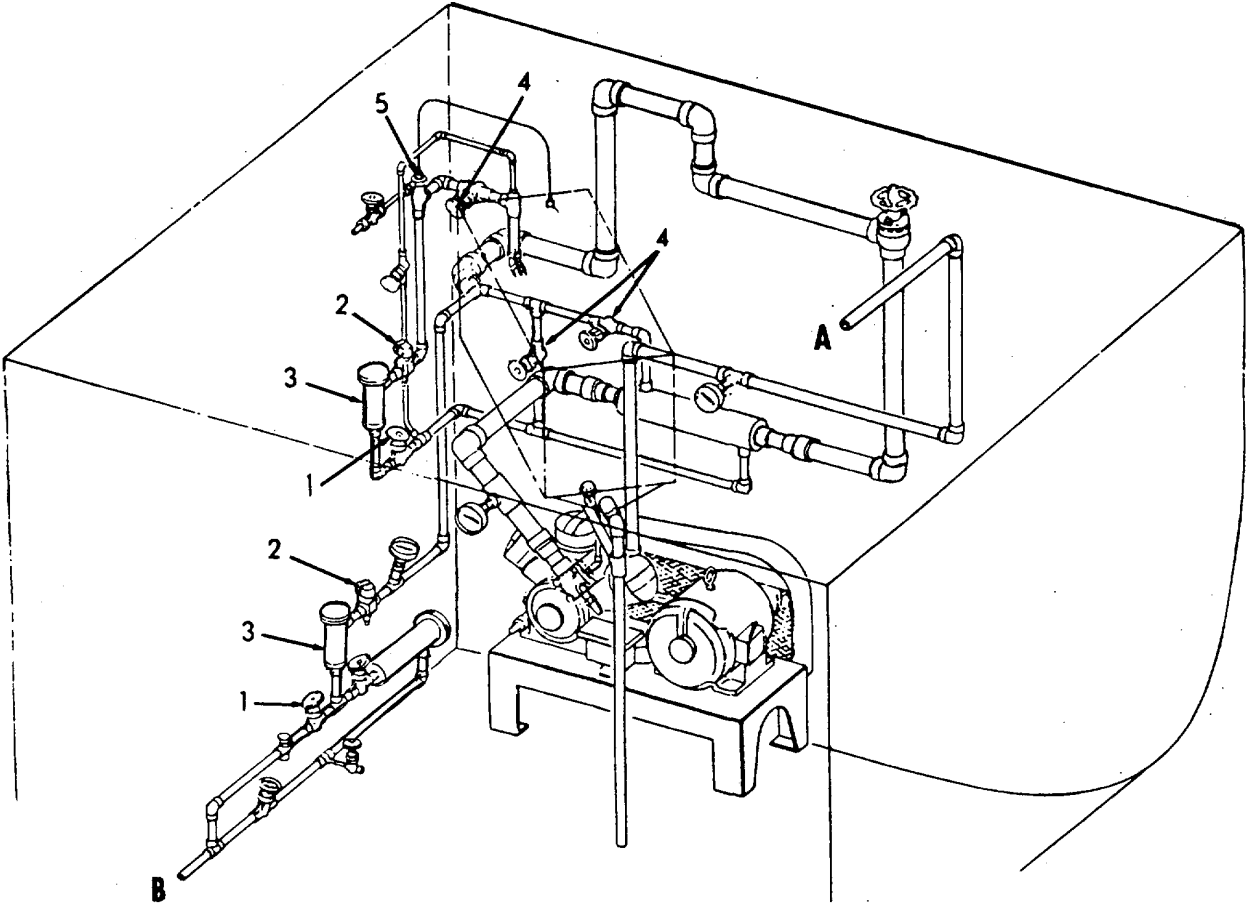
a. Pumping down to replace liquid solenoid valve proceed as follows:

- (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:

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Liquid Solenoid Valve	4-36.1
Receiver	4-36.2
Heat Interchanger	4-36.3
Water Regulating Valve	4-36.4
Thermometers	4-36.5
Refrigerant Tubing	4-36.6
Packless Valves	4-36.7
Controller	4-36.8

4-36. 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

4-983/(4-984 blank)

4-36.1. LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

This task covers:

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

INITIAL SETUP:

Test Equipment

NONE

References

- Paragraph 4-29r Leak Detection
- 4-36.6 Tubing Maintenance
- 4-36.7 Valve Maintenance

Special Tools

NONE

Equipment

Condition	Condition Description
NONE	

Material/Parts

Gasket kit 4810-01-046-8558

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

Observe safety precautions in paragraph 4-29d 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	<ol style="list-style-type: none"> 1. Inspect for a clicking noise. 2. Inspect for signs of damage. 	Indicates a defective coil.

4-36.1. LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR

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

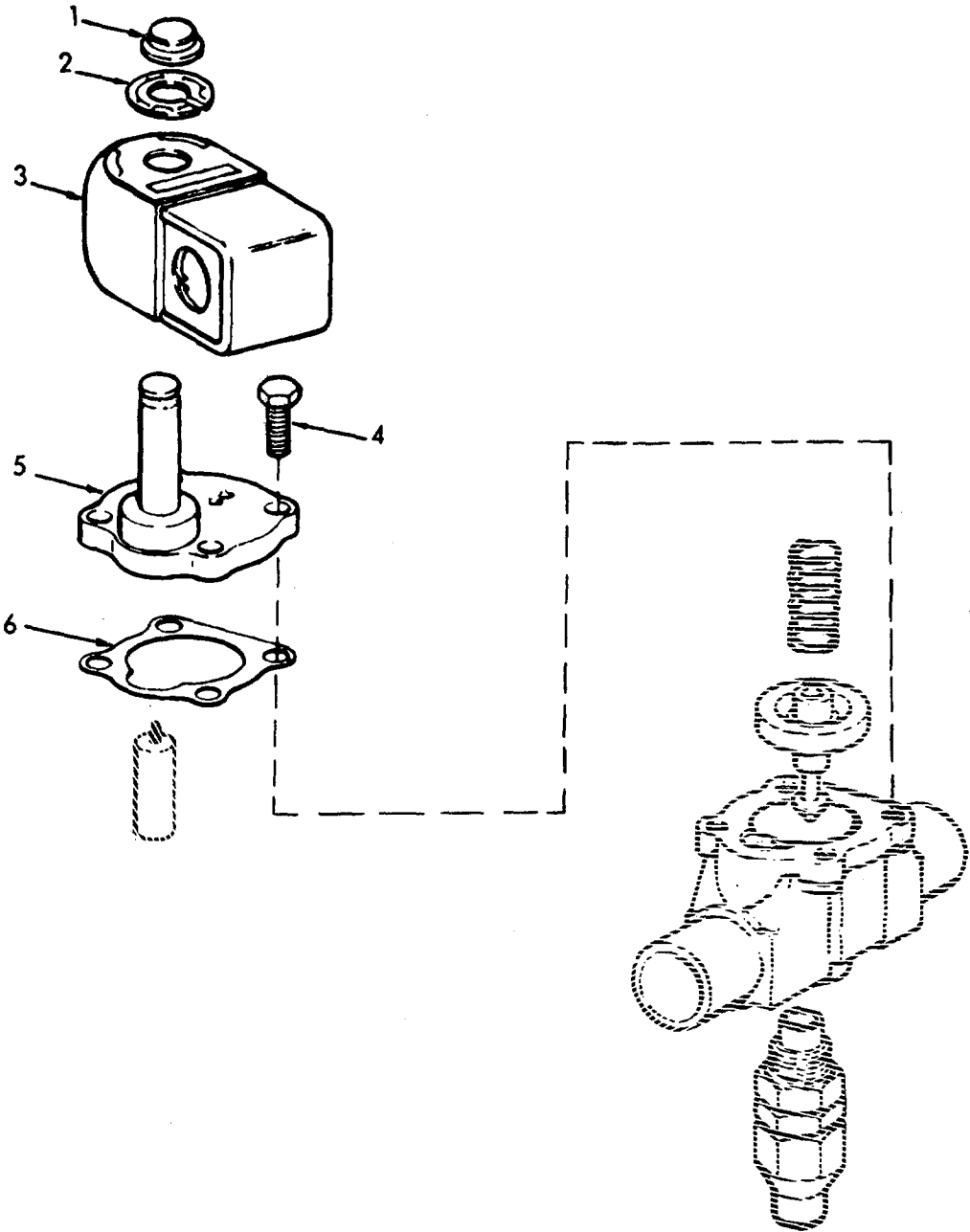
Pump down strainer and controls as described in paragraph 4-36a.

- | | | |
|---|---------|-----------------|
| a. Screws (4) | Remove. | |
| b. Enclosing tube assembly (5) and gasket (6) | Remove. | Discard gasket. |

4-36.1. LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR (Cont)



4-36.1. LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
	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.

4-36.2. RECEIVER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

This task covers:

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

INITIAL SETUP:

Test Equipment
NONE

References
Paragraph
4-29r Leak Detection
4-36.6 Tubing Maintenance
4-36.7 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 4-29d.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSPECTION

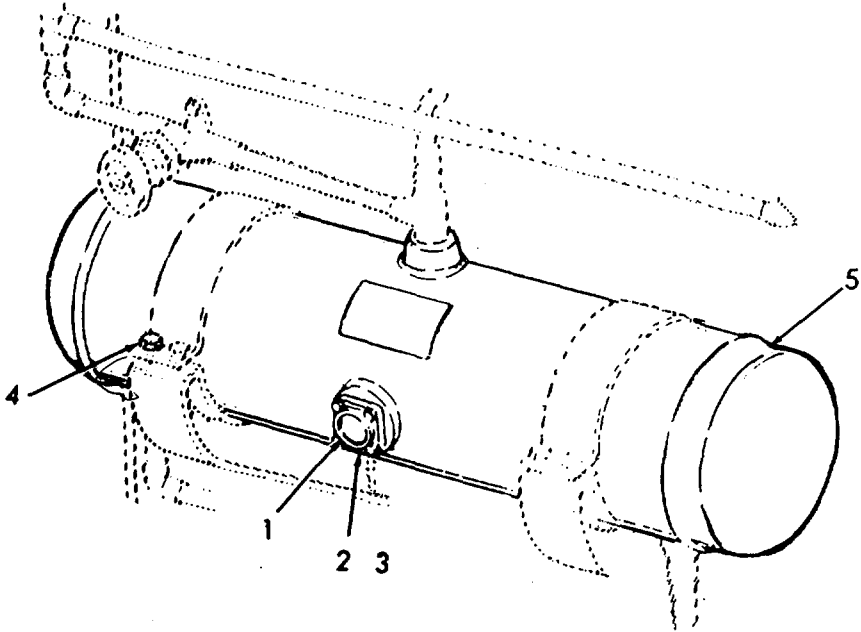
1. Receiver	a. Tubing	Inspect for breaks, cracks, dents, and leaks.	
	b. Sight glass	Inspect for leaks and signs of damage.	
	c. Receiver	Inspect for breaks, cracks, dents, and leaks.	

REPAIR

2. Sight glass	a. Screws (1)	Remove.	
	b. Sight glass (2) and gasket (3)	Replace.	

4-36.2. RECEIVER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	c. Screws (1)	Install.	
REPLACE			
3. Receiver	a. Screws (4)	Remove.	
	b. Tubing	1. Unsolder. 2. Move.	Refer to paragraph 4-36.6 for procedure.
	c. Receiver (5)	Replace.	
	d. Tubing	Reconnect.	
	e. Screws (4)	Install.	

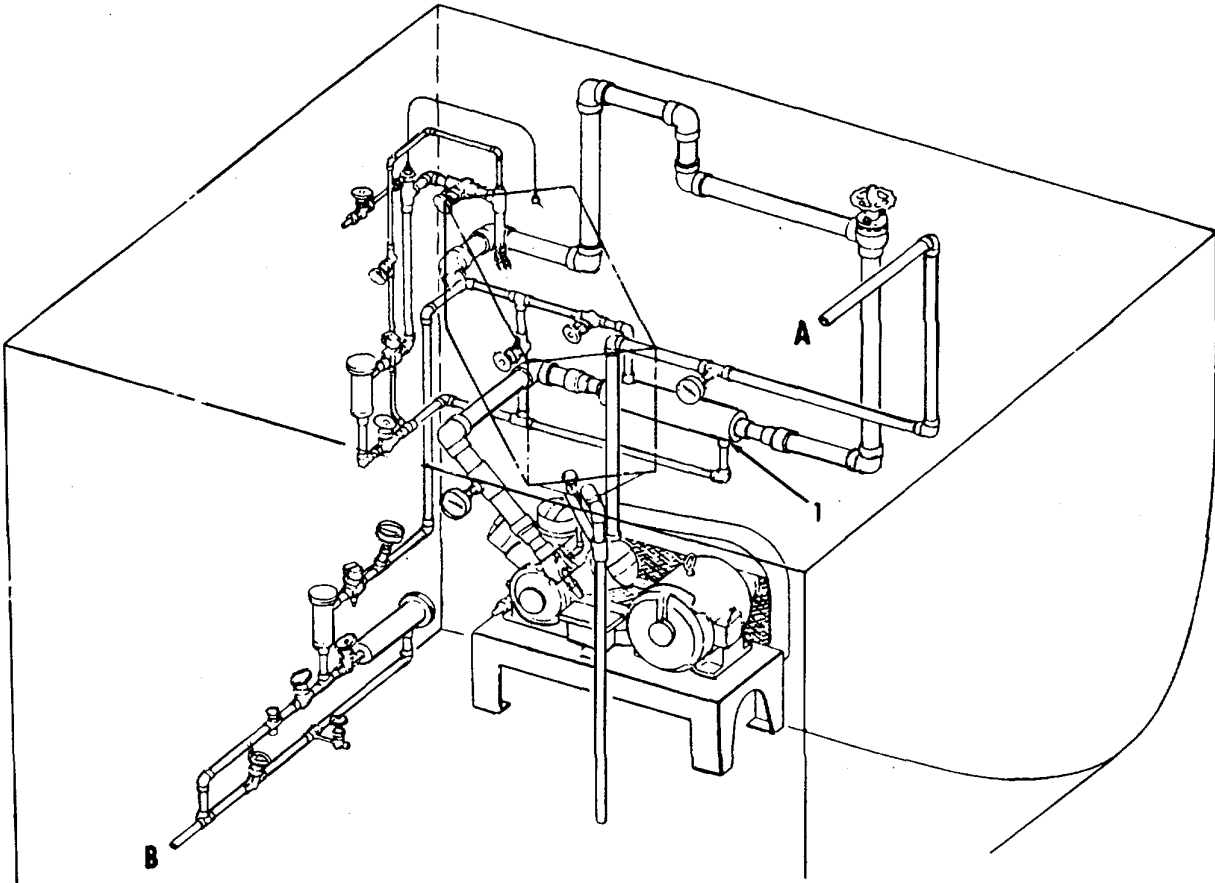


4-36.3. HEAT INTERCHANGER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPLACE

2.	Tubing	1. Unsolder. 2. Remove. 3. Reconnect.	In accordance with standard procedures and refer to paragraph 4-36.6 .
----	--------	---	--



4-36.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS

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.

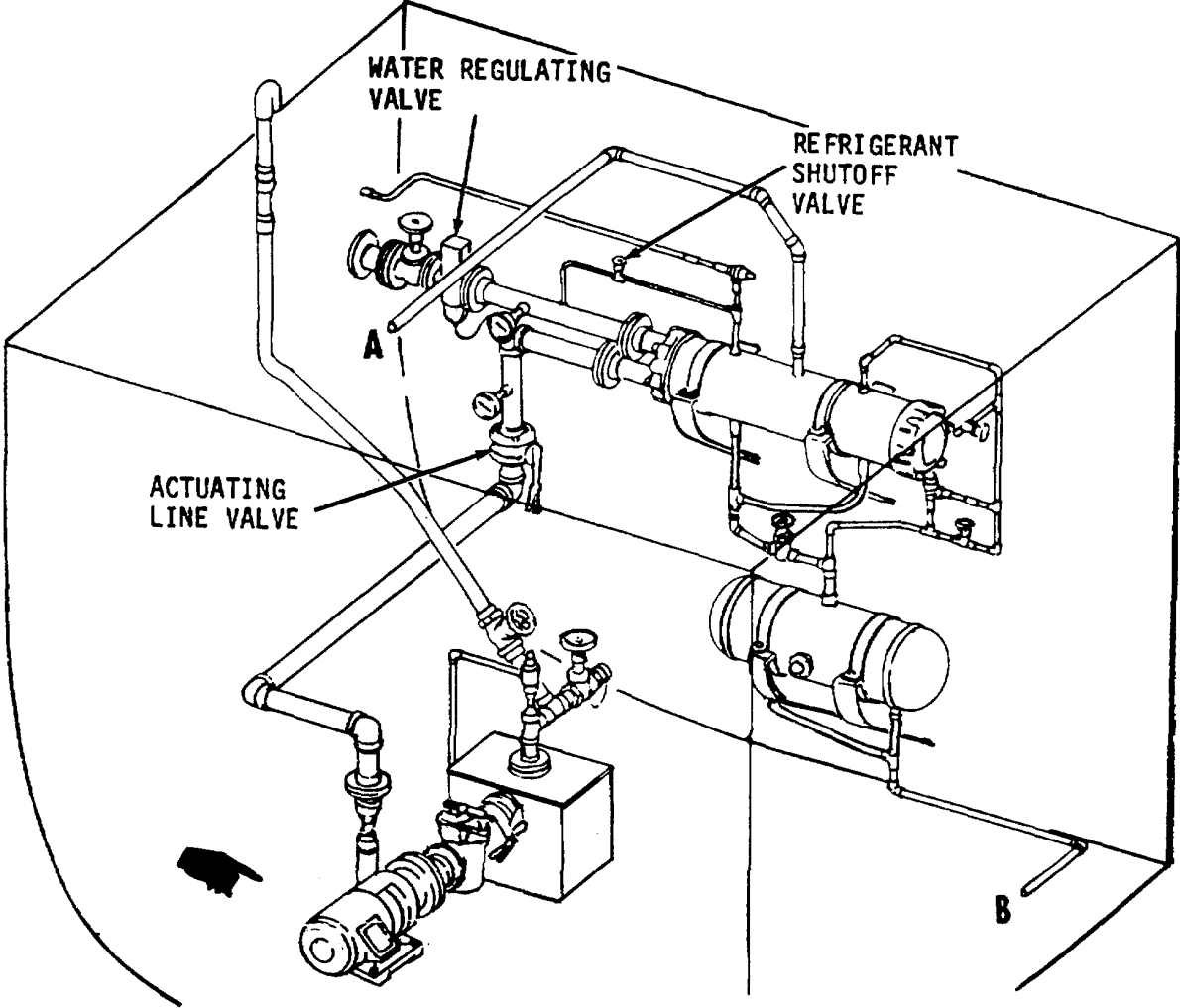
e. Increase water flow through condenser reduces head pressure. When head pressure decreases, the range spring expands moving the valve seat in the closing direction and reducing water flow.

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.

4-36.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)



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4-36.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

This task covers:

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

INITIAL SETUP

Test Equipment

NONE

References

Paragraph
 4-29e(5) Pump Down
 4-29r 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 4-29d.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSPECTION

- | | | | |
|---------------------------|-----------|---|--|
| 1. Water regulating valve | a. Tubing | Inspect for breaks, cracks, dents, and leaking. | |
| | 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. |
|----|-------------------------|----------------------------|-------------|

4-36.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

SERVICE (Cont)

- | | | | |
|--|---------------------------------|---------|--|
| | b. Four round headed screws (1) | Remove. | |
|--|---------------------------------|---------|--|

CAUTION

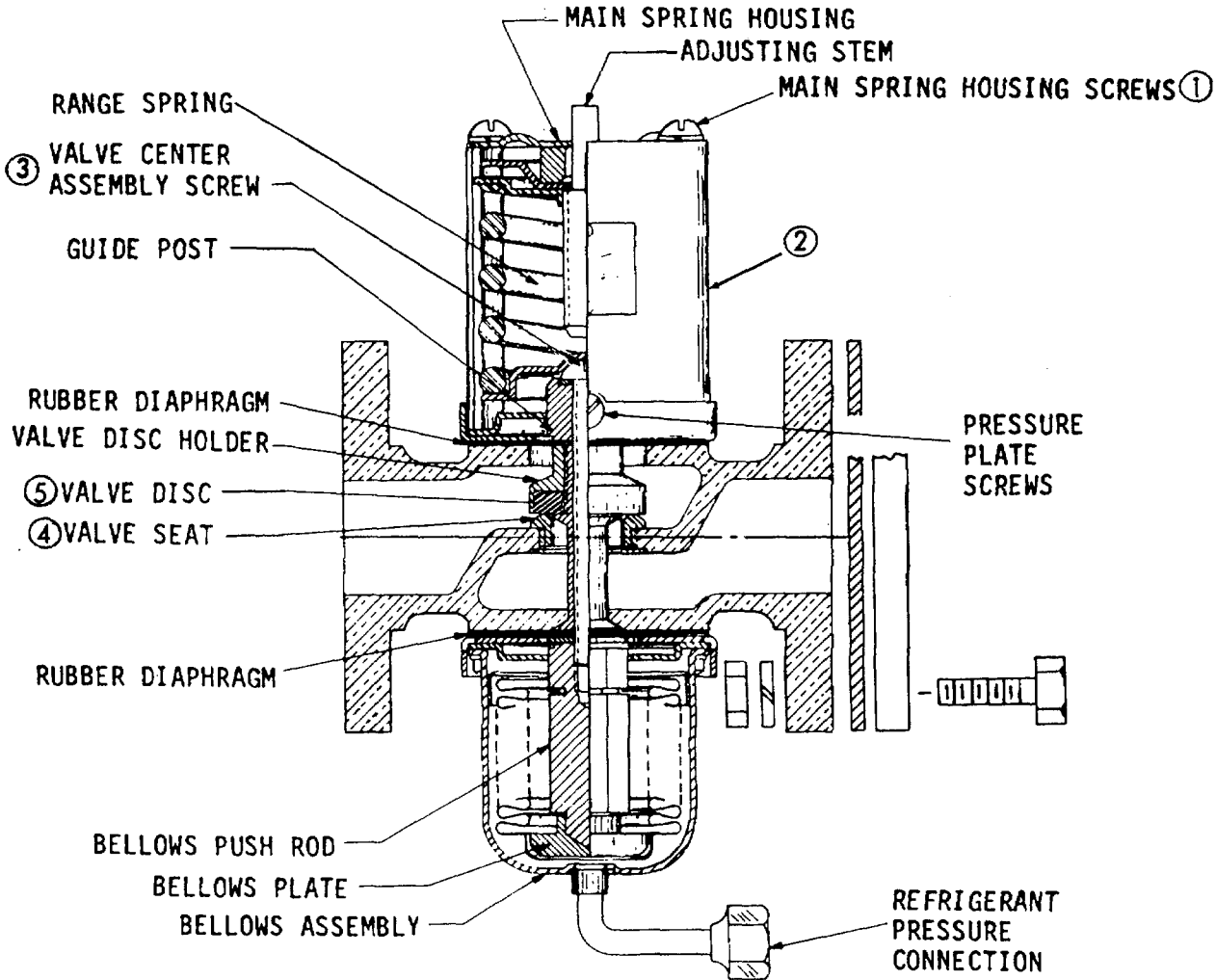
Do not remove pressure plate screws on side of housing. Complete housing assembly is removed as one unit, thus valve adjustment is not changed.

- | | | | |
|--|---------------------------------------|----------|---|
| | 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. | |

4-36.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

SERVICE (Cont)



4-36.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

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
plate
screws
(6) | Reassemble. |
| j. | Valve
center
assembly
screw
(3) | Install. |
| k. | Valve
assembly
(2) and
screws
(1) | Install. |

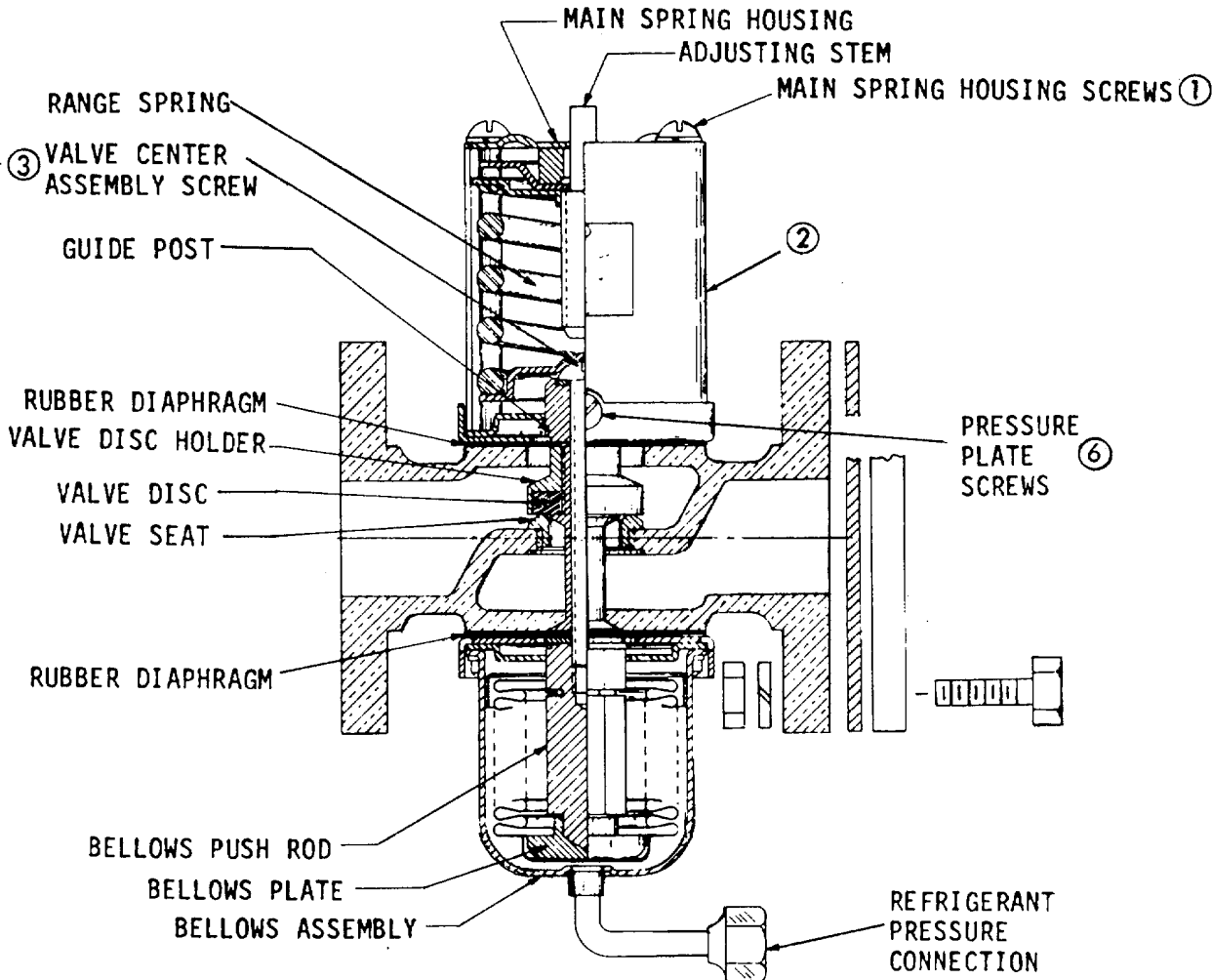
NOTE

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).

4-36.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

SERVICE (Cont)



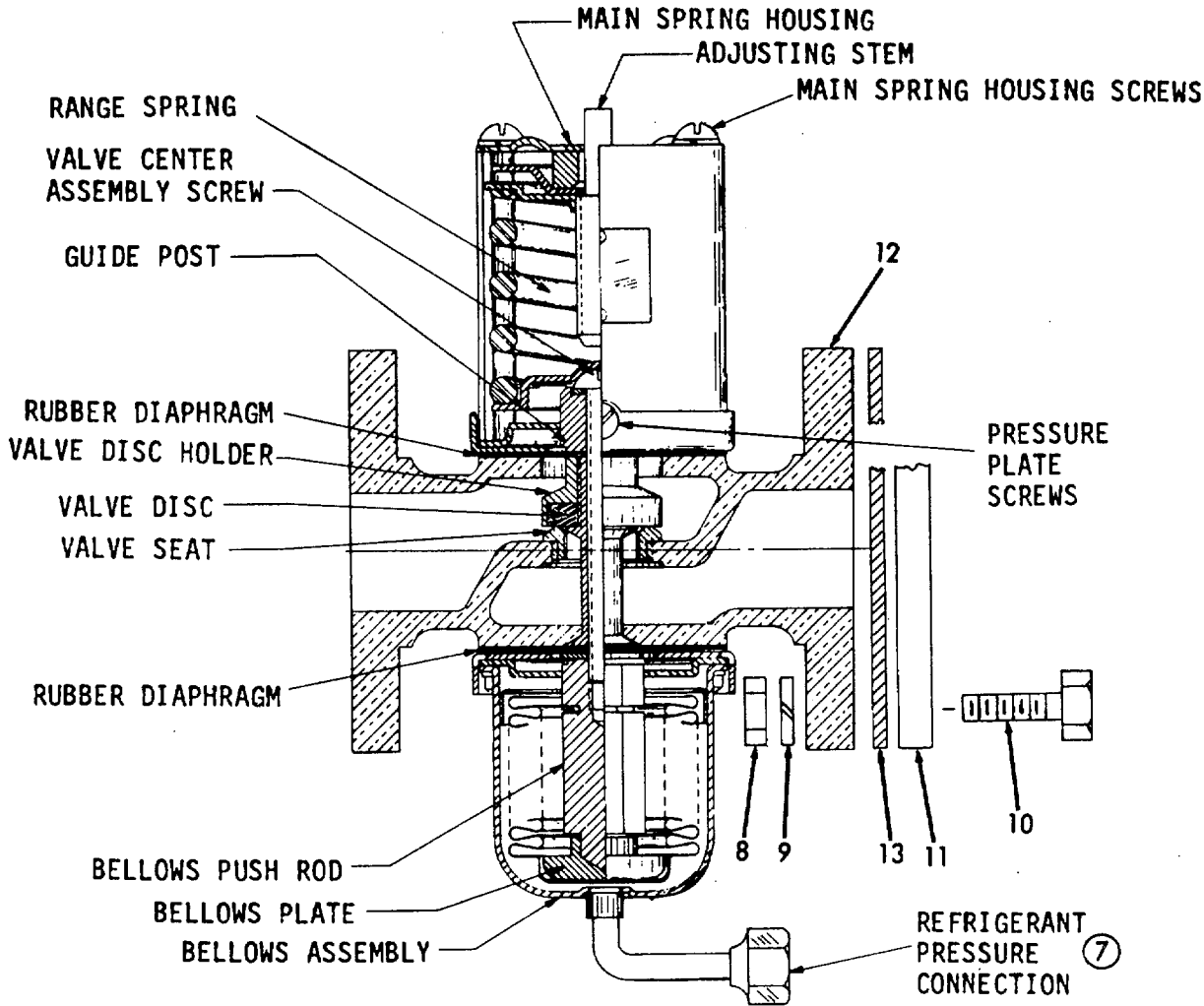
4-36.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

LOCATION	ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REPLACE</div>	a. Refrigerant pressure connection (7)	1. Shut off supply to valve. 2. Disconnect.	
	b. Nuts (8), lock-washers (9), and screws (10)	Remove.	
	c. Flanges (11)	Separate.	
	d. Valve (12) and gaskets (13)	Remove.	Discard gaskets.
	e. Valve (12), gaskets (13), flanges (11), screws (10), lock-washers (9), and nuts (8)	Reassemble.	Use new gaskets.
	f. Refrigerant pressure connection (7)	1. Reconnect. 2. Turn on supply valve.	

4-36.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPLACE (Cont)



4-36.4. WATER REGULATING VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

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

References

Paragraph 4-35.6 Tubing 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. Thermo- meters	a. Tubing	Inspect for breaks, cracks, and leaks.	
	b. Thermo- meter	Inspect for broken glass, and inaccurate readings.	

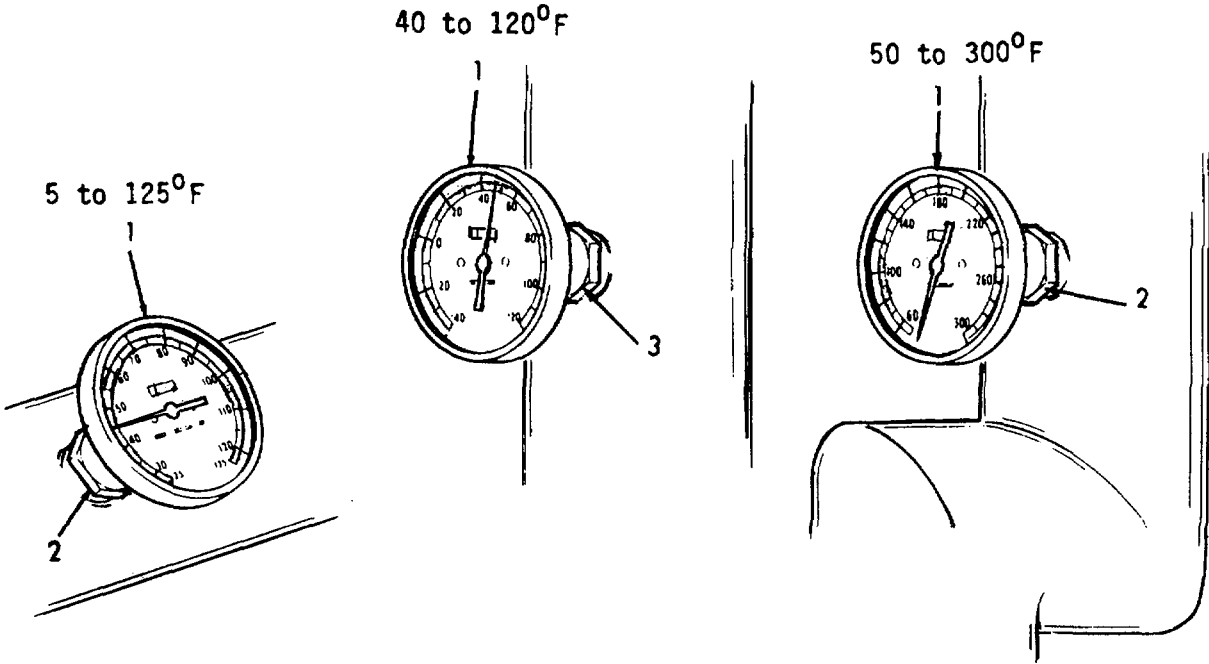
REPLACE

2.	a. Thermo- meter (1)	Unscrew from socket (2).	Use two wrenches.
	b. Thermo- meter (1)	Replace.	

4-36.5. THERMOMETERS - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPLACE (Cont)



4-36.6. REFRIGERANT TUBING - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS

- a. Repair refrigerant piping as follows:
 - b. Use a solder having a melting point of approximately 11600 F (626.70C) 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

4-36.6. REFRIGERANT TUBING - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

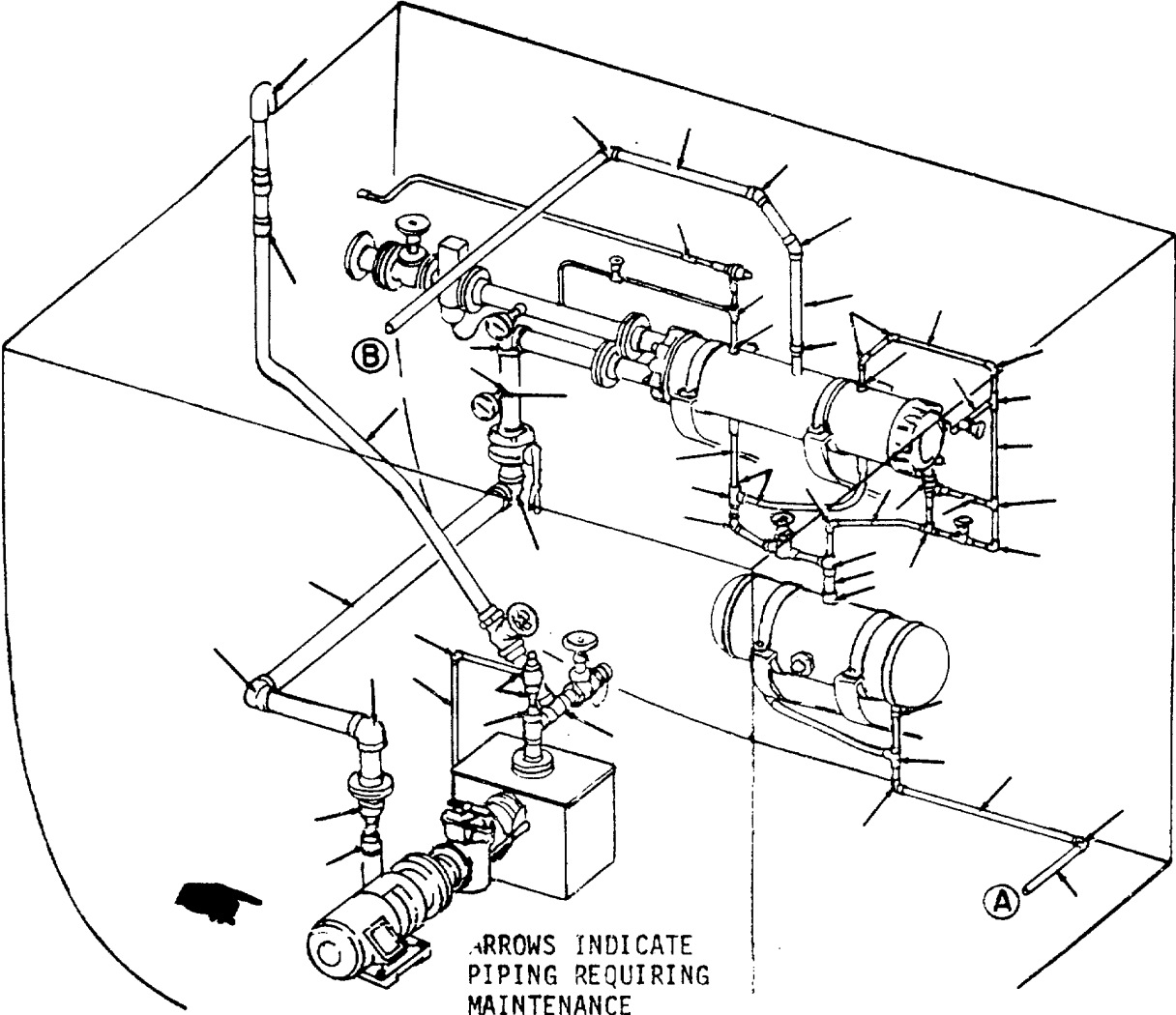
all burrs and dents to avoid internal restrictions and to permit proper fit with companion fittings. If tubing is cut with a hack saw, use a fine-tooth blade, preferably 32-teeth per inch.

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.

1. 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.

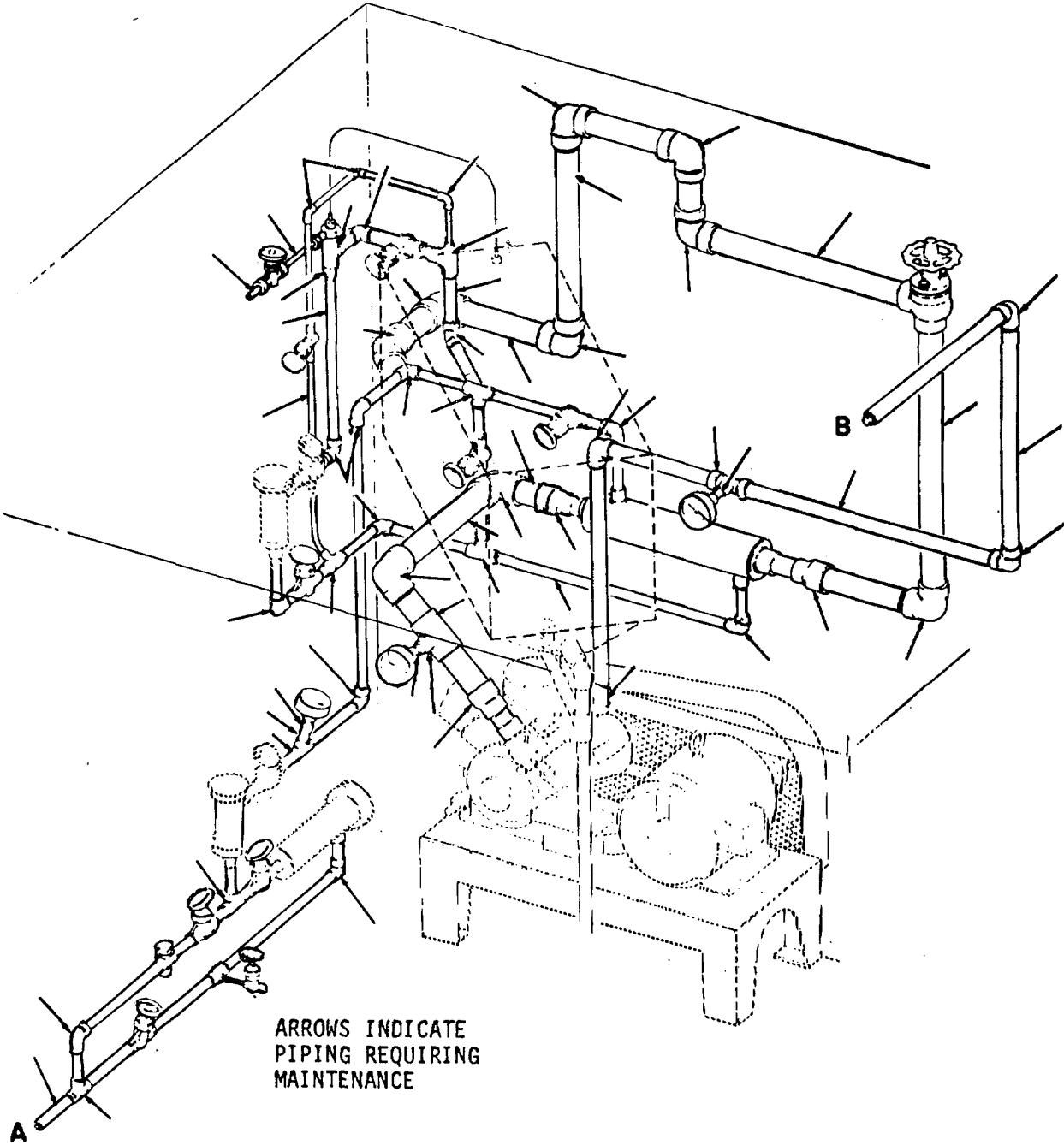
m. The piping requiring maintenance is shown in the following figures:

4-36.6. REFRIGERANT TUBING - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

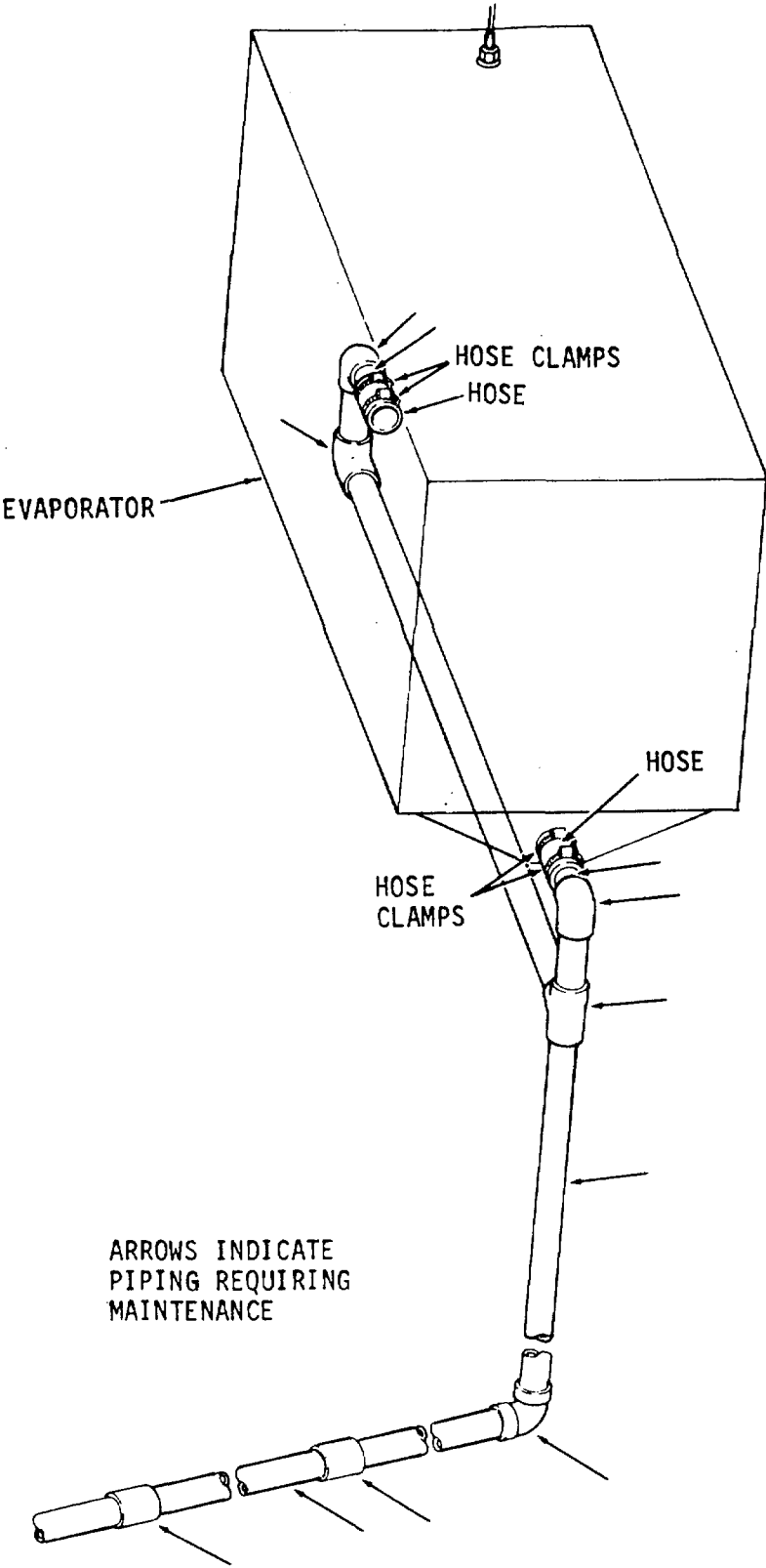


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4-36.6. REFRIGERANT TUBING - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)



4-36.6. REFRIGERANT TUBING - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)



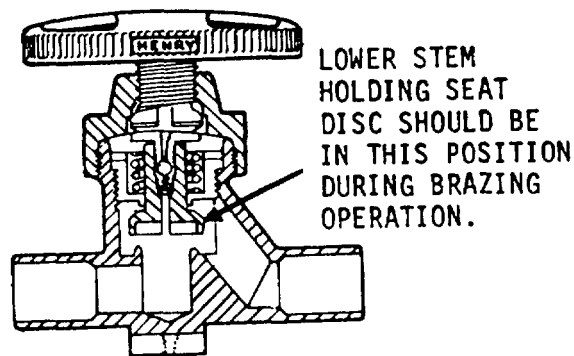
4-36.7. PACKLESS VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

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 counterclockwise until stem backseats. If handwheel is in closed position, diaphragms will not anchor properly in bonnet and proper seal will 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.



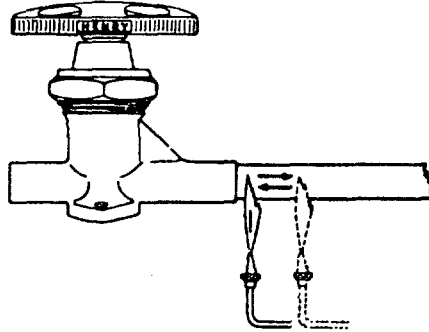
(3) Thoroughly clean end of tubing and socket connection on valve body.

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

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

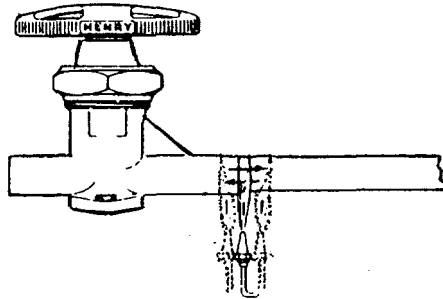
4-36.7. PACKLESS VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

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

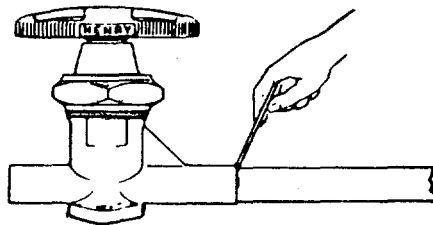


(7) After preheating, gradually fan torch flame toward valve port.

(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.

4-36.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Removal
- c. Repair
- d. 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 WARNING.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

WARNING

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

INSPECTION

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> 1. Controller (external) | <ul style="list-style-type: none"> a. Enclosure | <ul style="list-style-type: none"> 1. Inspect for breaks, cracks, dents and bending. 2. Insure all mounting hardware is tight. |
|--|--|--|

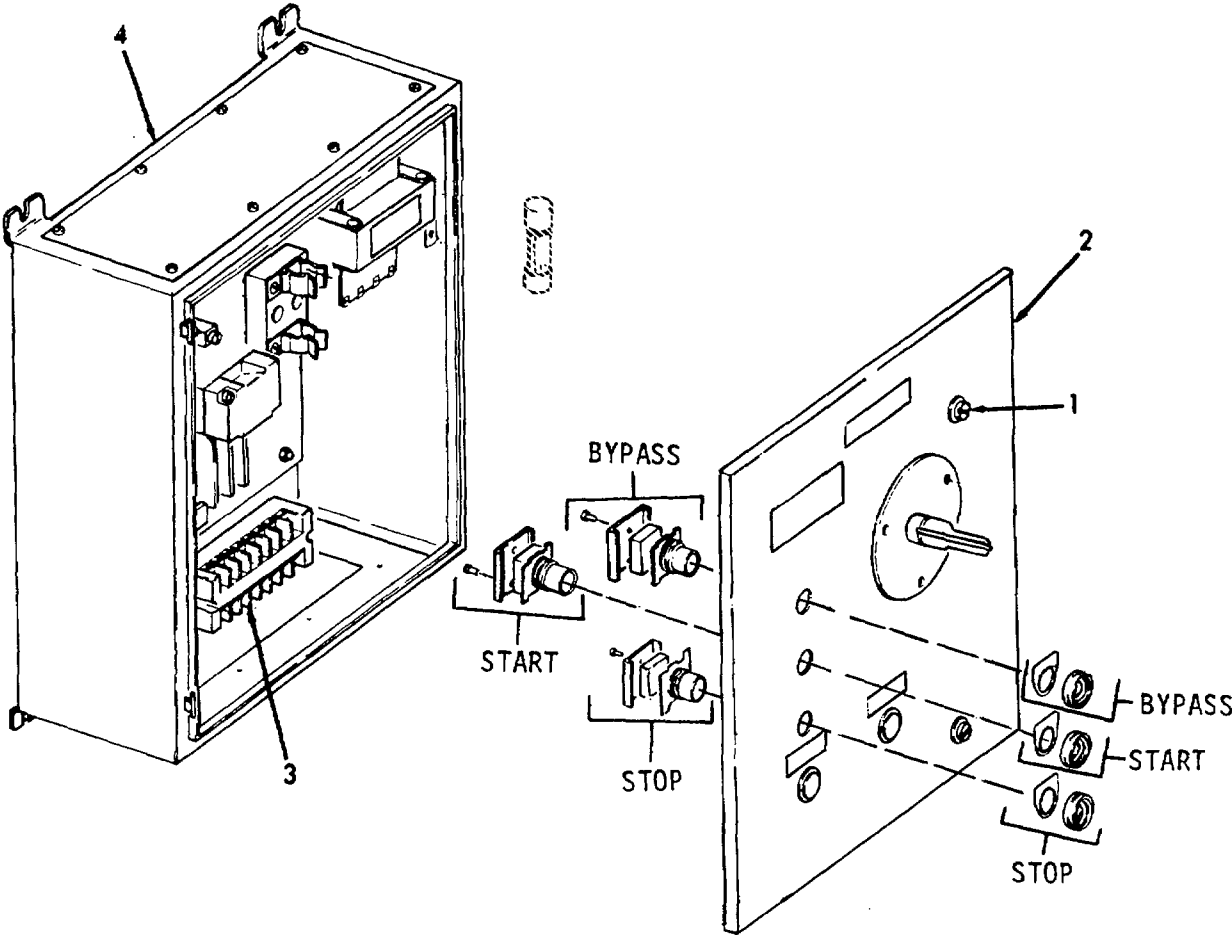
4-36.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	b. Wiring	Inspect for wear, fraying, and damage.	
	c. Switches	Inspect for signs of failure or improper operation.	
2. Controller	a. Contactors, relays, and starters	<ol style="list-style-type: none"> 1. Inspect for worn contact tip material. 2. Inspect for cleanliness. 3. Insure all mounting hardware is tight. 	
	b. Wiring	<ol style="list-style-type: none"> 1. Inspect for wear, fraying and damage 2. Insure all terminals are tight. 	
	c. Switches	<ol style="list-style-type: none"> 1. Inspect for signs of failure. 2. Insure all mounting hardware is tight. 	
	d. Fuses and fuse Blocks	<ol style="list-style-type: none"> 1. Inspect for defective components. 2. Insure all mounting hardware is tight. 	
	e. Terminal block	<ol style="list-style-type: none"> 1. Inspect for breaks, and cracks. 2. Insure all mounting hardware is tight. 	

4-36.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

REMOVAL

- | | | | |
|---------------|-----------------------|--|--|
| 3. Controller | a. Captive screws (1) | Rotate counterclockwise 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. | |



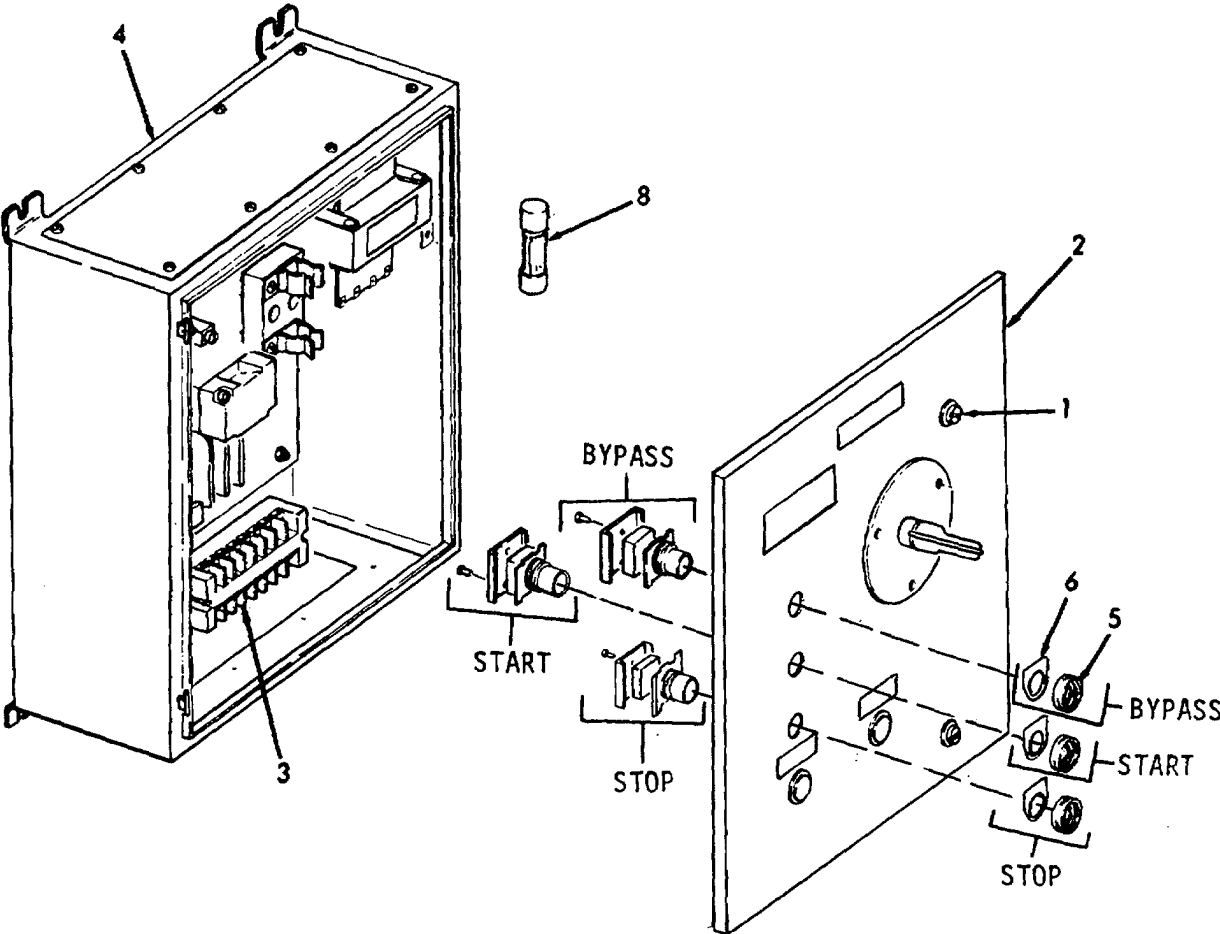
4-36.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
4. Pushbutton switches	a. Wiring	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.	

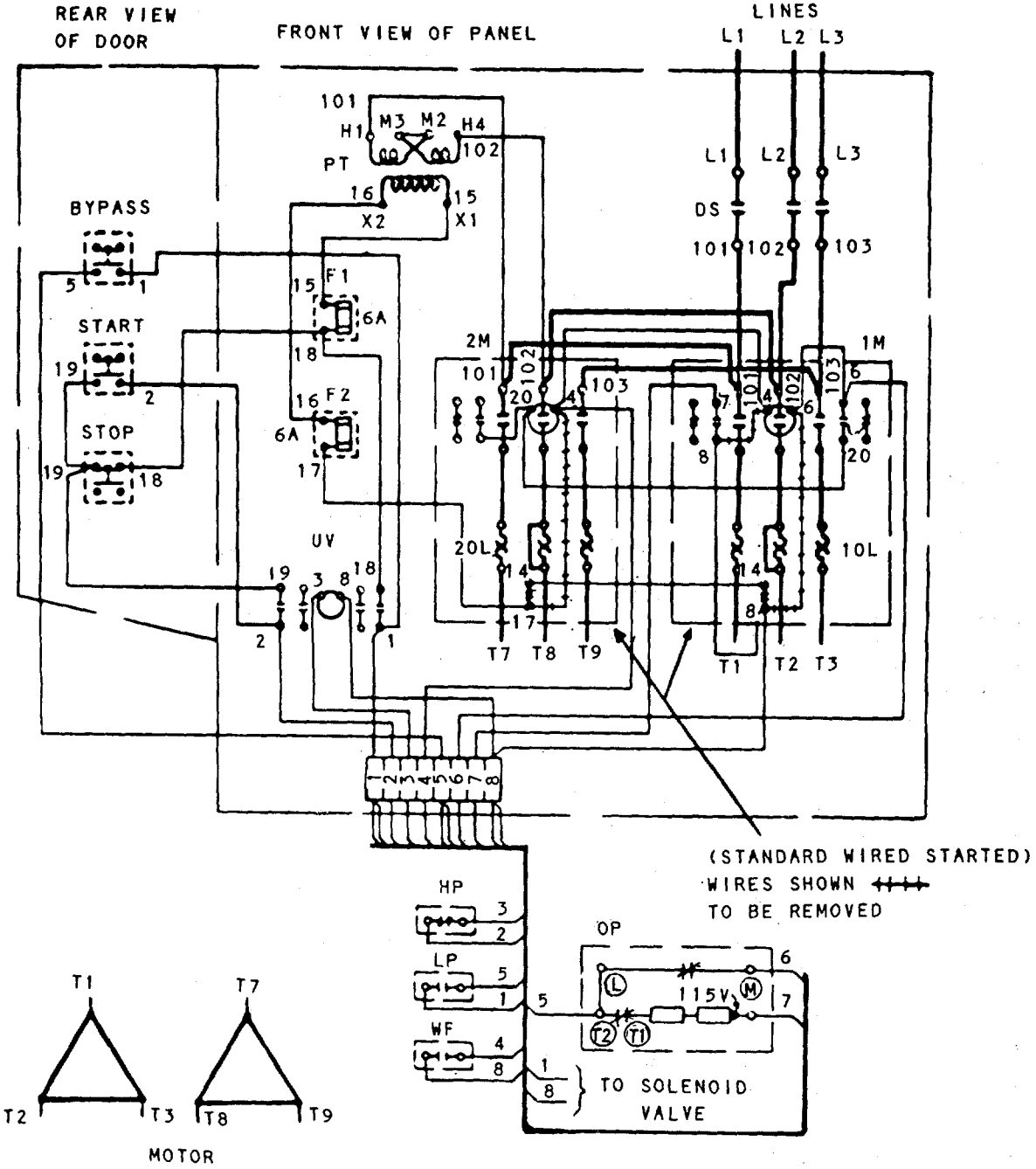
4-36.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSTALLATION (Cont)



4-36.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)



4-36.8. CONTROLLER - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS
(Continued)

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.

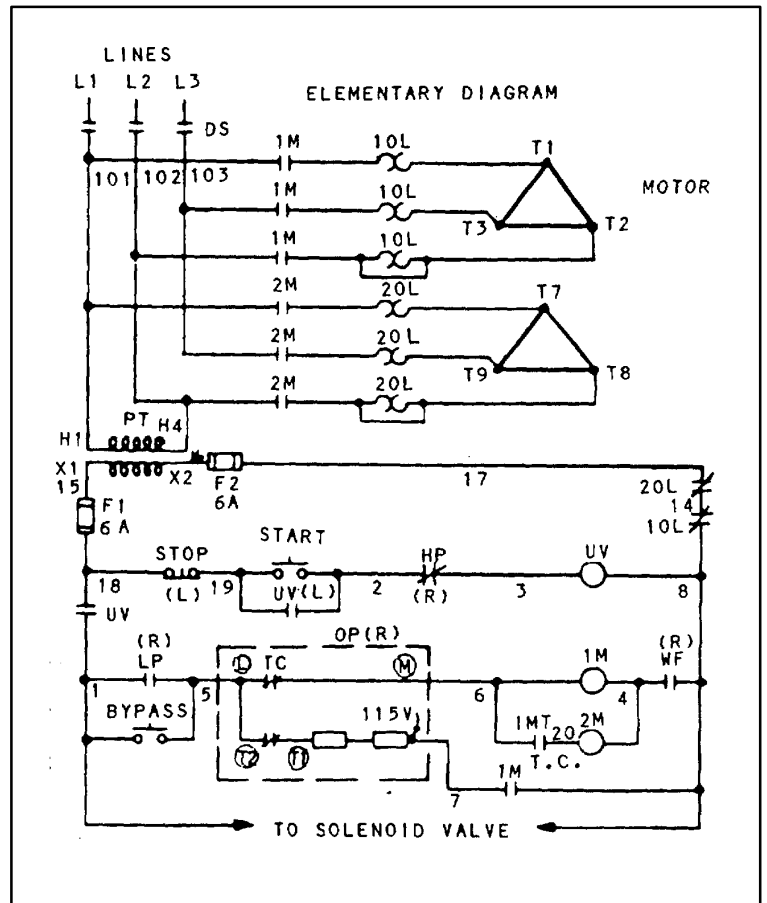
AFTER A TIME INTERVAL, INT WILL CLOSE TO ENERGIZE 2M TO CONNECT OTHER MOTOR WINDING ACROSS THE LINE. AFTER A SET TIME, IF THE MOTOR HAS NOT DEVELOPED SUFFICIENT OIL PRESSURE. THE REMOTE OP SWITCH WILL FUNCTION TO DE-ENERGIZE "M" DISCONNECTING THE MOTOR.

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 SWITCH
- (WF) WATER FAILURE SWITCH
- (OP) LOW OIL PRESSURE SWITCH WITH TIMER

4-37. COMMISSARY SPACE EQUIPMENT - MAINTENANCE INSTRUCTIONS.

The following is a index to the maintenance procedures.

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Refrigerator/Freezer	4-38
Drinking Fountain	4-39
Milk Dispenser	4-40
Coffee Maker	4-41
Washer/Dryer	4-42
Sanitizing Sink Heater	4-43
Galley Range	4-44
Toaster	4-45

4-1023

4-38. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS.

This task covers:

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

INITIAL SETUP :

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment Condition Condition Description
NONE

Material/Parts
NONE

Special Environmental Conditions
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. 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).

4-1024

4-38. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
		2. Inspect for signs of abnormal operation.	
	b. Internal	Inspect for cleanliness.	
3. Freezer	a. Operation	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.	

SERVICE

CAUTION

Do not use strong soap, abrasive or steel wool when cleaning. The surface finishes will be damaged.

4. Refrigerator/Freezer	a. Exterior.	Clean.	Use a soft cloth moistened with warm water and mild soap. Wipe dry.
	b. Interior.	Clean.	Use a soft cloth moistened with warm water and mild soap. 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	Remove frost build up.	Turn freezer off, open door, and use fan.
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4-38. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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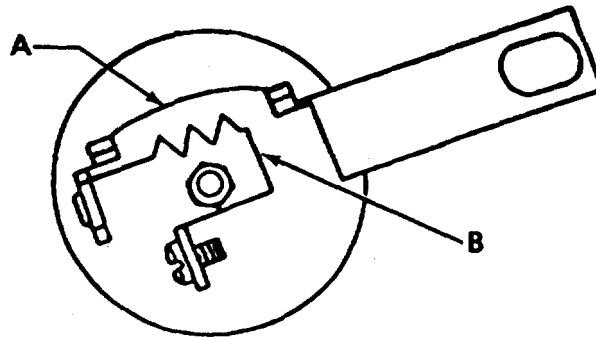
REPAIR

5. Overload protector

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 bi-metallic metal strip (A) and a heater coil (B) inside. The heater coil is made 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, stopping 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.



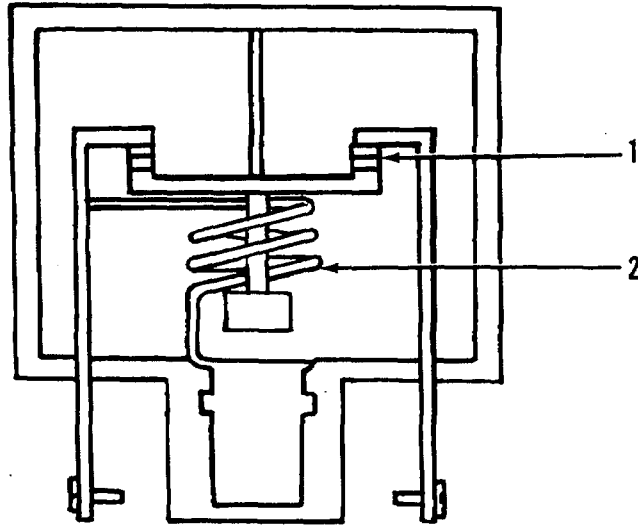
4-38. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

6. Relay

The relay has a magnetic coil (2) which activates a movable contact, (1) 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.



7. Motor
therefore,
condenser
fan

If the condenser fan is inoperative, there is no air flow through the condenser, the unit continues to run to maintain temperature. If, visually, the fan is not running, remove the lead wires from the junction box terminals, connect test lead cord, plug into a separate circuit. If fan does not operate, replace with new fan.

4-38. REFRIGERATOR/FREEZER - MAINTENANCE INSTRUCTIONS (Continued).

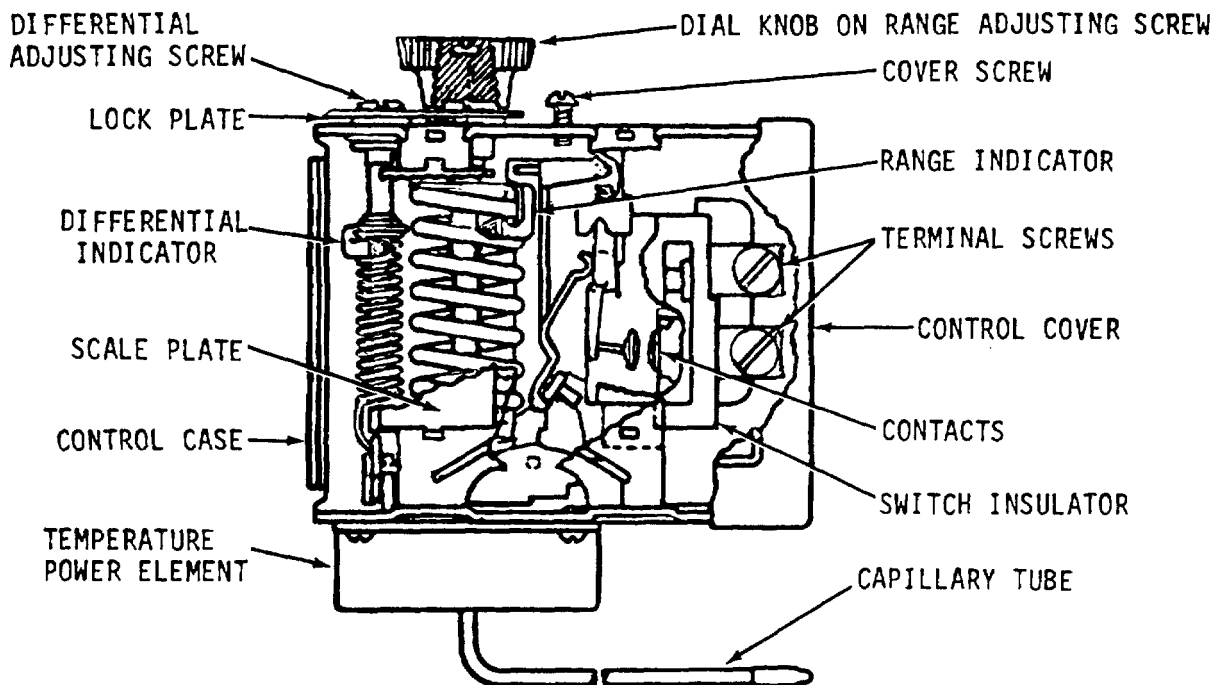
LOCATION	ITEM	ACTION	REMARKS
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ADJUSTMENT

8. Control

If unit does not operate, the control cut-in temperature may be set lower than the temperature desired inside the refrigerator. (The control should start the refrigerator when inside temperature is 43°F (6.1°C), on freezers 5°F (-15.0°C). Turn dial knob on range adjusting screw counterclockwise until range indicator reaches 43°F (6.1°C) and unit will start. When temperature inside refrigerator reaches 37°C (2.8°C), on freezers 0°F (-17.80C), turn the differential adjusting screw counterclockwise until the unit shuts off.

1. Disconnect power supply to refrigerator. Unplug power cord from wall receptacle and/or turn power off at fuse disconnect switch.
2. Remove leads from control terminal screws.
3. Disconnect control feeler bulb and capillary tube, from clamp, inside refrigerator, and pull same out, from inside refrigerator.
4. Remove control from bracket and install new control.



4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS..

This task covers:

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

INITIAL SETUP :

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment Condition Condition Description
NONE

Material/Parts
NONE

Special Environmental Conditions
NONE

Personnel Required

General Safety Instructions

1

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	Inspect for proper flow. supply 4-1029	

4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
c.	Drains	Inspect for signs of poor drainage.	
SERVICE			
2. Drain	a. Screw and strainer (1)	1. Remove. 2. Clean.	Use a brush to clean waste water outlet.
	b. Strainer and screw (1)	Install.	
3. Condenser	a. Screws (2)	Remove.	
	b. Front panel (3)	Remove.	Slide panel down and off.
	c. Condenser (4)	Clean.	a. Clean with a brush or vacuum cleaner.

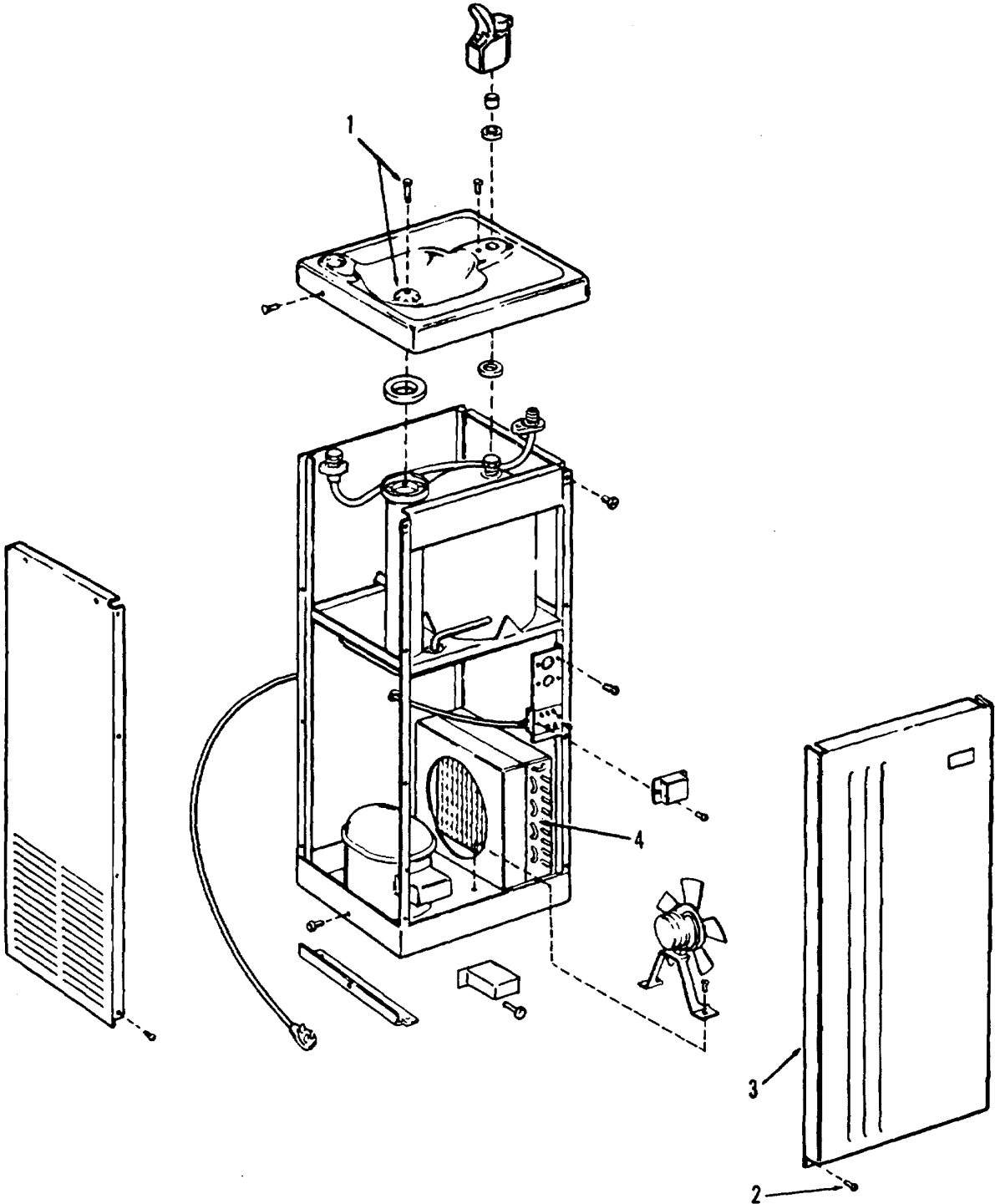
WARNING

Wear eye protection when using compressed air. Do not use over 35 PSI line pressure.

- b. Blow compressed air from the fan blade to the outside.
- c. Remove all dirt and lint accumulations.

4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
SERVICE (Cont)			



4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
SERVICE (Cont)			
	d. Front panel (3) and screws (2)	Replace.	
4.	Bubbler valve	Clean.	<ol style="list-style-type: none"> 1. Use clean water and mild detergent. 2. Rinse thoroughly.

REPAIR

NOTE

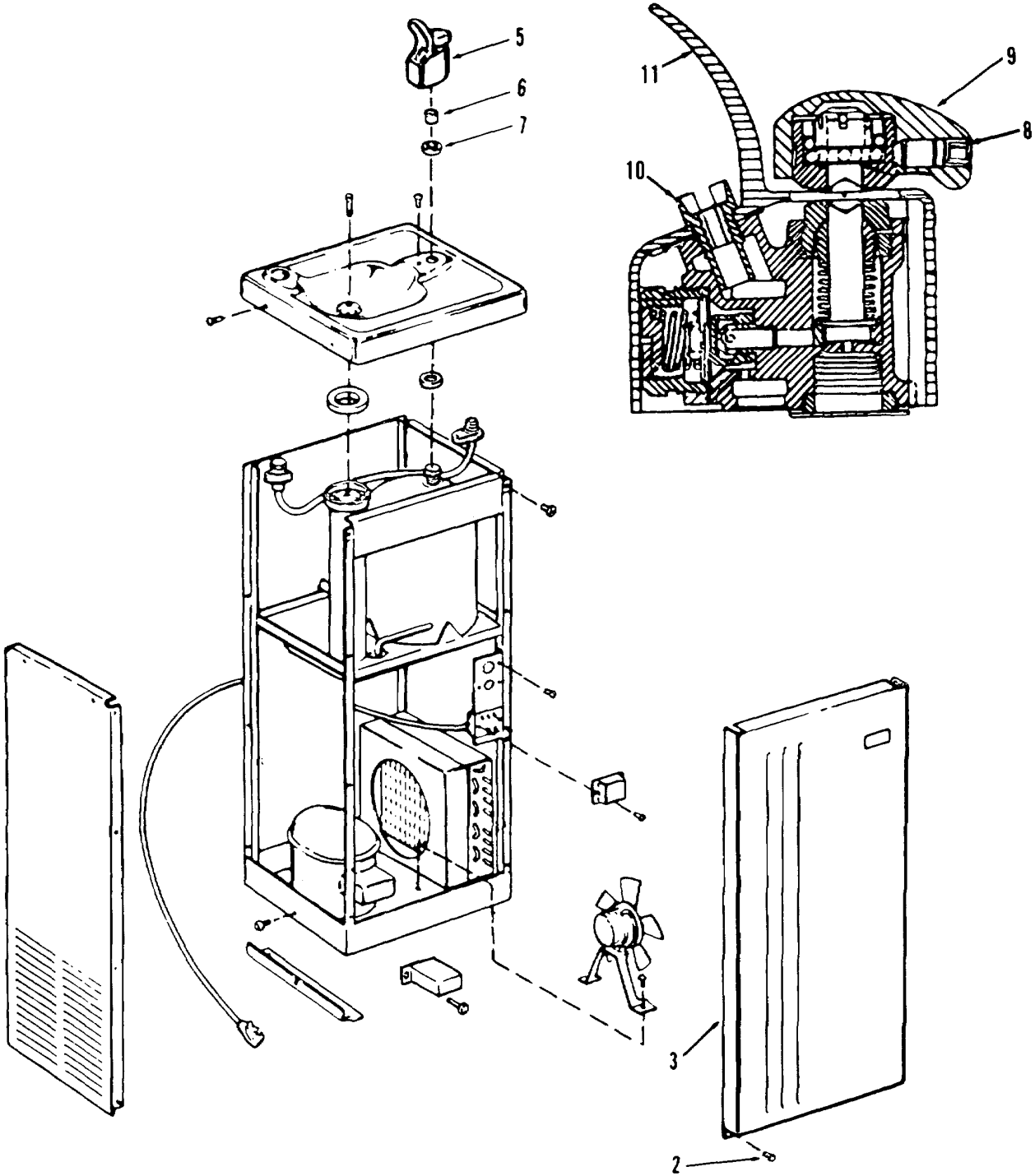
Make sure the incoming source of water is shut off.

5. Bubbler Valve	a. Bubbler valve (5)	Unscrew.
	b. Gasket (6) and washer (7)	Remove.
	c. Setscrew (8)	Loosen.
	d. Valve handle (9)	Remove.
	e. Nozzle assembly (10)	Remove.
	f. Bubbler guard (11)	Remove.
	g. Bubbler valve needed.	Disassemble and replace items (12 thru 39) as needed.

4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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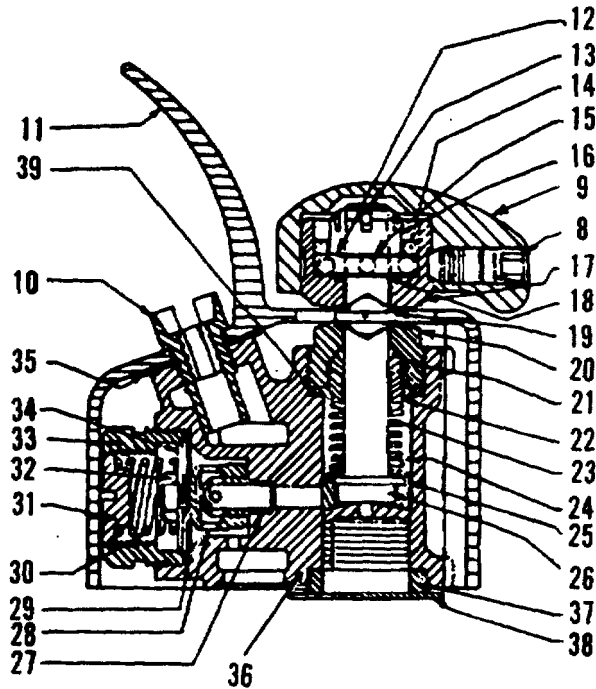
REPAIR (Cont)



4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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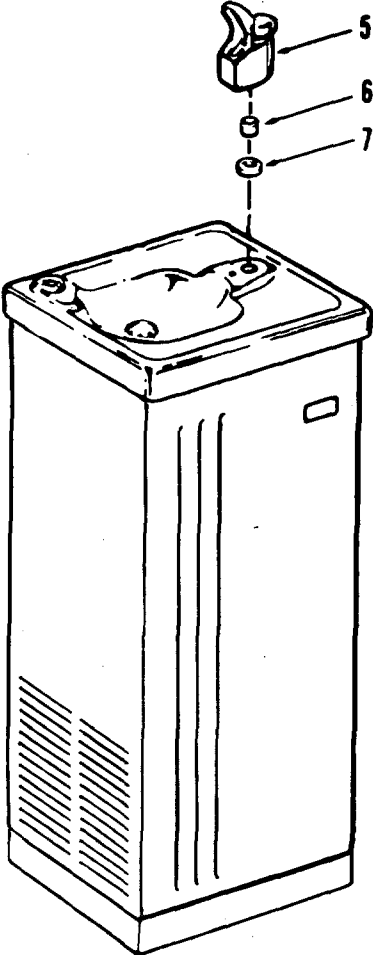
REPAIR (Cont)



- | | | | |
|----|-------------------------|----|-----------------------|
| 8 | Setscrew | 24 | Valve Stem |
| 9 | Valve Handle | 25 | Seat Retainer |
| 10 | Nozzle Assembly | 26 | Valve Seat |
| 11 | Bubbler Guard | 27 | Regulating Piston |
| 12 | Ball Thrust Washer | 28 | Piston Sleeve |
| 13 | Cotter Pin | 29 | Diaphragm Assembly |
| 14 | Felt Washer (Large) | 30 | Diaphragm Spring |
| 15 | Ball Bearing Assembly | 31 | Adjusting Screw |
| 16 | Valve Stem Nut | 32 | Hex Nut |
| 17 | Handle Bushing | 33 | Diaphragm Nut |
| 18 | Felt Washer (Small) | 34 | Diaphragm Stop Washer |
| 19 | Roller Bearing Assembly | 35 | Washer |
| 20 | Cam Packing Nut | 36 | Valve Body Assembly |
| 21 | Stem Packing | 37 | Gasket |
| 22 | Packing Gland | 38 | Gasket |
| 23 | Valve Spring | 39 | Packing Nut Washer |

4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	h. Bubbler guard (11)	Install.	
	i. Nozzle assembly (10)	Install.	
	j. Valve handle (9) and setscrew (8)	Install and tighten.	
	k. Washer (7), gasket (6), and bubbler valve (5)	Install	



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4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

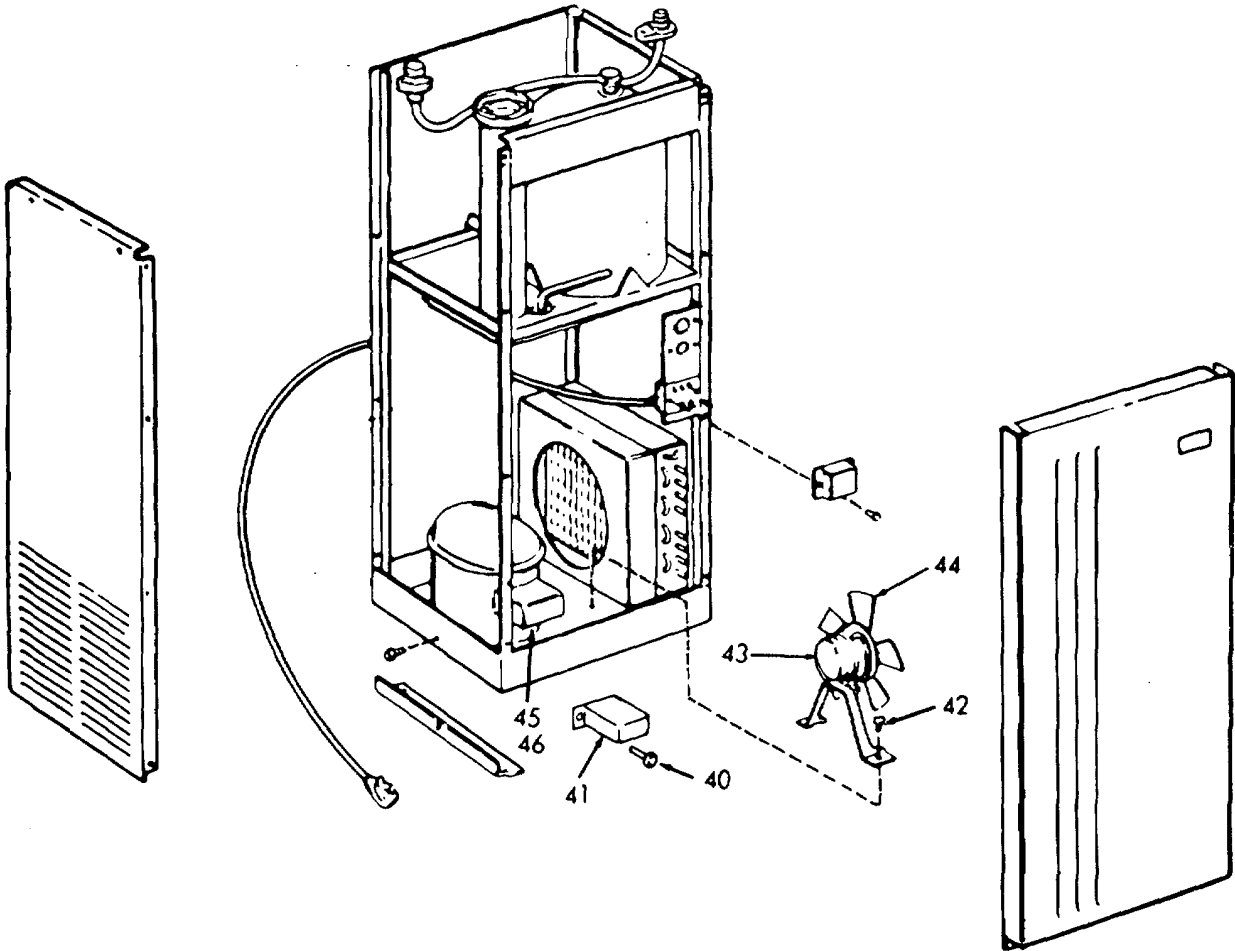
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
6. Motor (fan)	a. Screws (40)	Remove.	Refer to schematic on page 4-1038.
	b. Compressor cover (41)	Remove.	
	c. Wiring	Tag and disconnect.	
	d. Screws (42)	Remove.	
	e. Motor bracket (43) and fan (44)	Remove and disassemble.	
	f. Fan (44), motor bracket (43), and screws (42)	Install.	
	g. Wiring	Reconnect and remove tags.	
	h. Compressor cover (41) and screws (40)	Install	
7. Starting relay and overload protection	a. Screws (40)	Remove.	Refer to schematic on page 4-1038.
	b. Compressor cover (41)	Remove.	
	c. Wiring	Tag and disconnect.	

4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

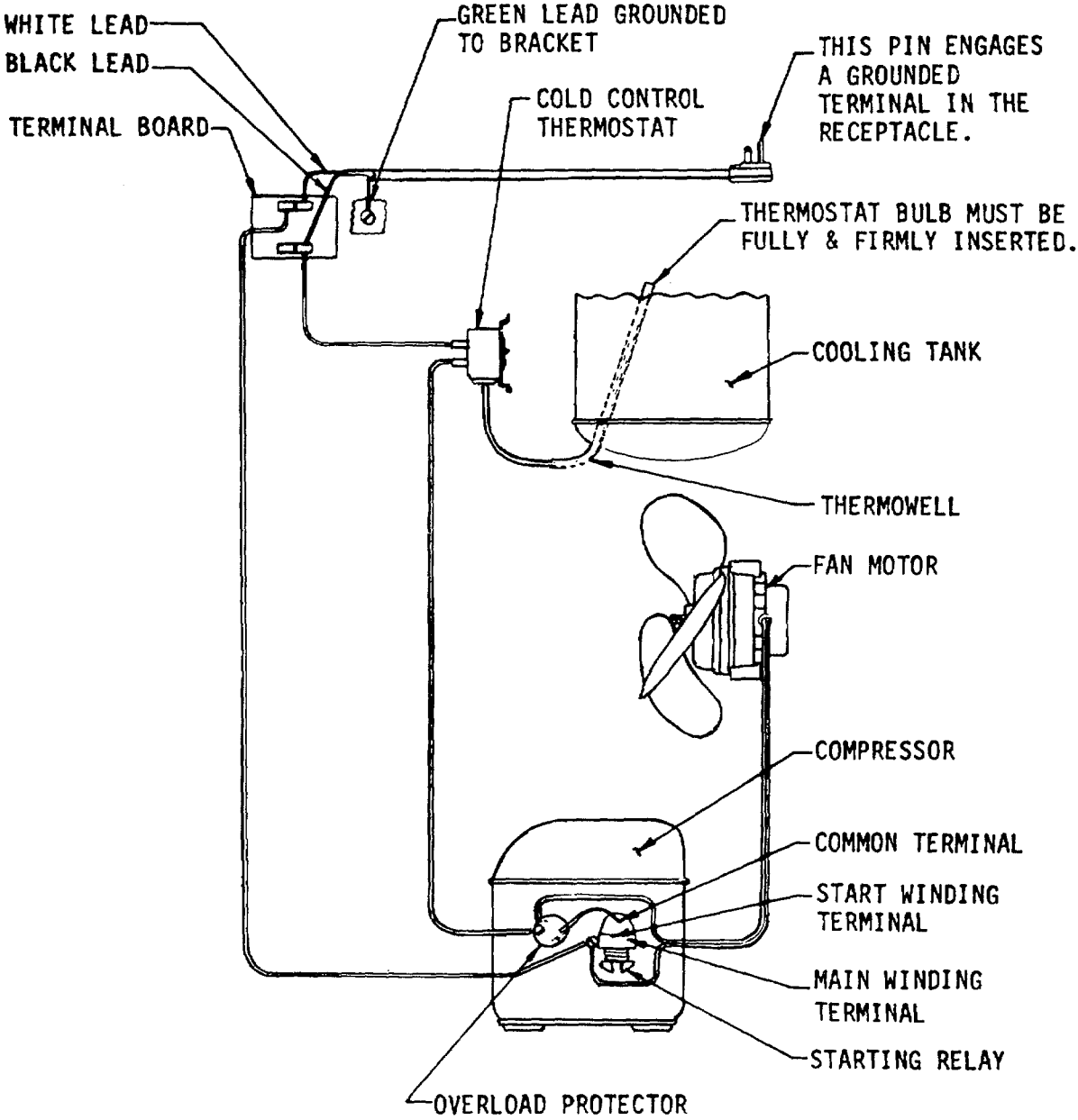
- d. Starting relay (45), and/or overload protection (46) Replace.
- e. Wiring Reconnect and remove tags.
- f. Compressor cover (41) and screws (40) Install.



4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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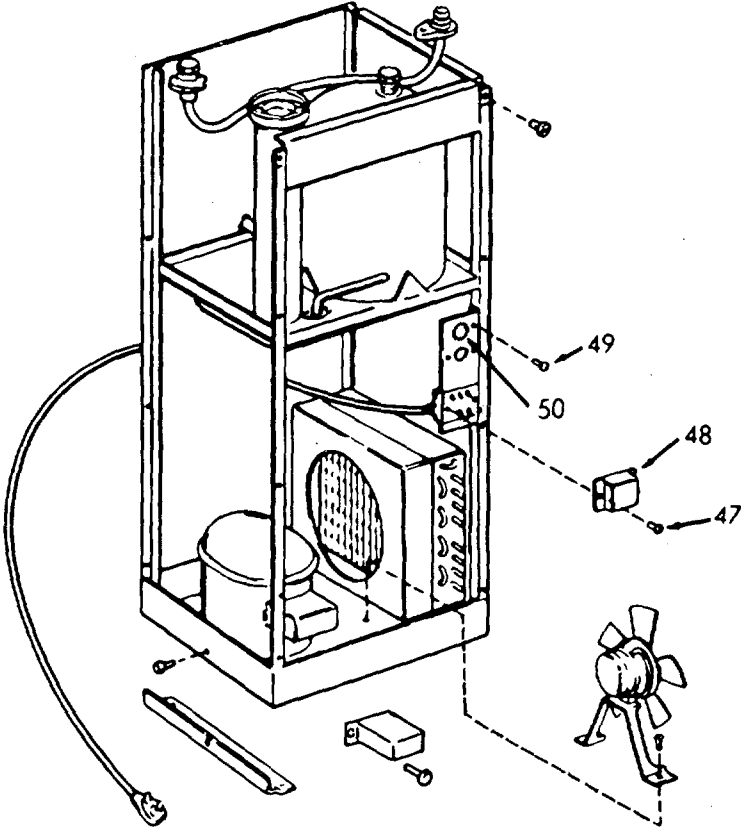
REPAIR (Cont)



ELECTRICAL SCHEMATIC

4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
8. Cold Control thermostat	a. Screws (47)	Remove.	
	b. Terminal cover (48)	Remove.	
	c. Wiring	Tag and disconnect.	Refer to schematic on page 4-1038.
	d. Screws (49)	Remove.	
	e. Cold control (50)	Replace.	
	f. Screws (49)	Install.	



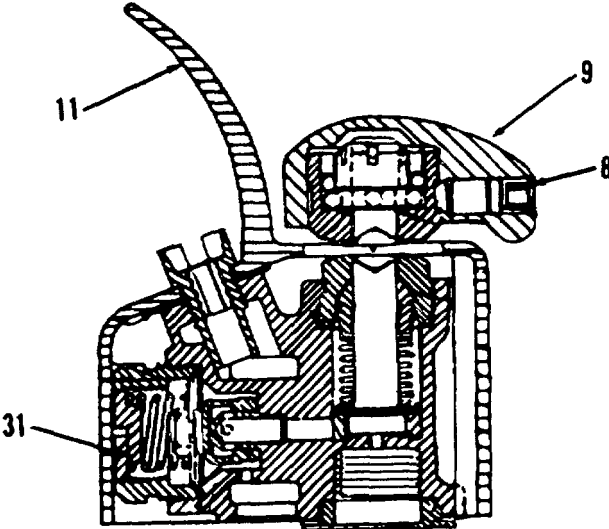
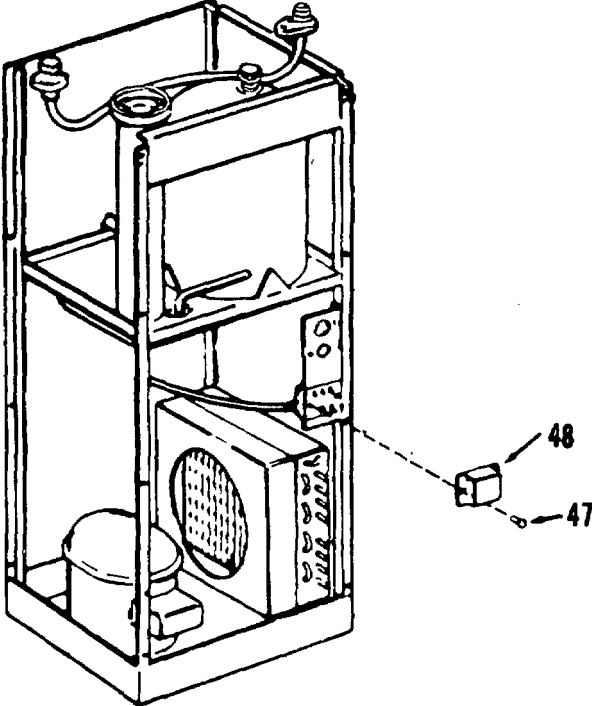
4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	g. Wiring tags.	Reconnect and remove	
	h. Terminal cover (48) and screws (47)	Install	
ADJUSTMENT			
9. Bubbler valve	a. Setscrew (8)	Loosen.	
	b. Valve handle (9)	Remove.	
	c. Bubbler guard (11)	Remove.	
	d. Adjusting screw (31)	Adjust.	Turn adjusting screw clockwise to raise stream or counterclockwise to lower stream.
4-1040			

4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

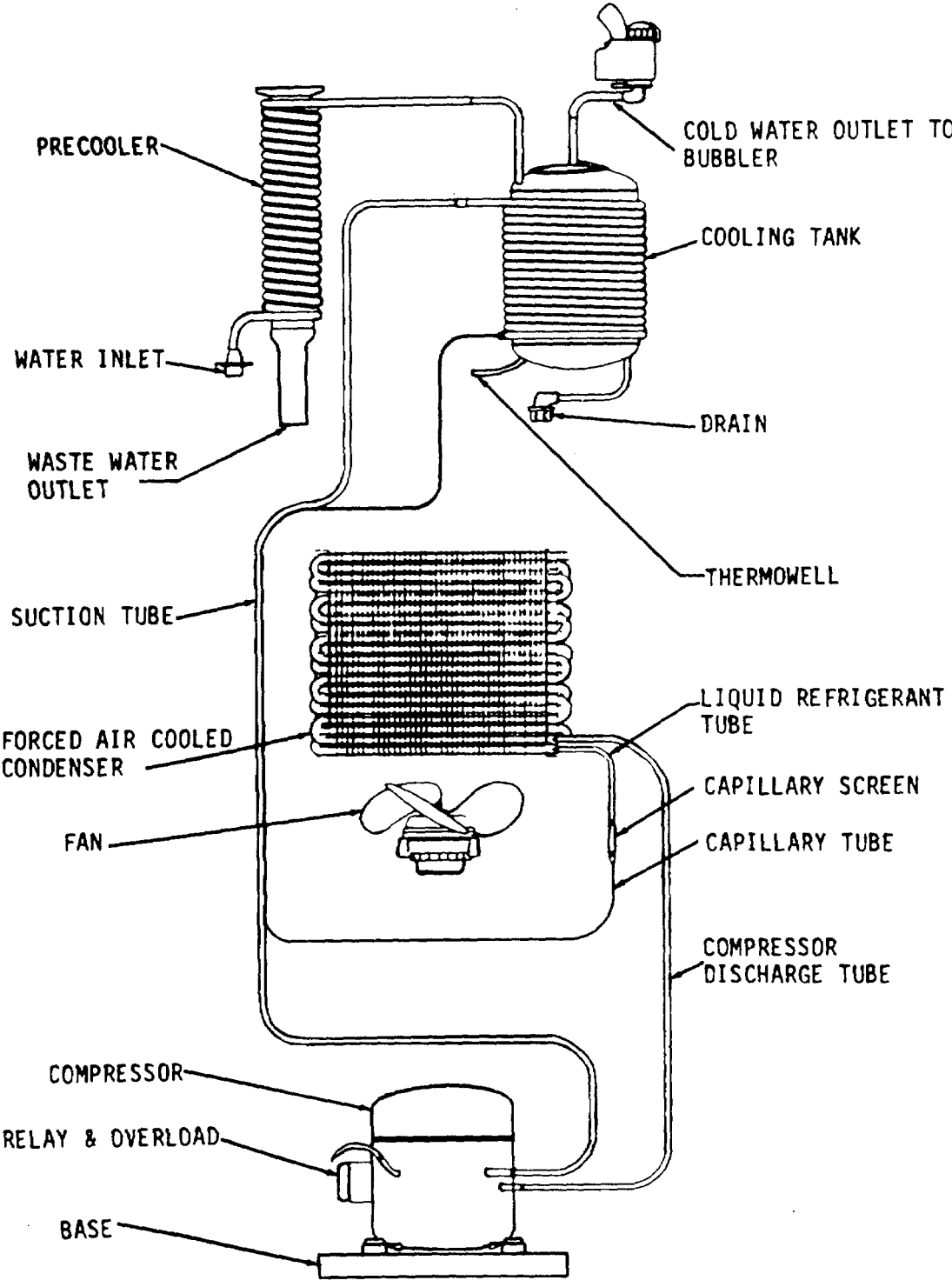
LOCATION	ITEM	ACTION	REMARKS
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ADJUSTMENT (Cont)



4-39. DRINKING FOUNTAIN - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
ADJUSTMENT (Cont)			



4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS.

This task covers:

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

INITIAL SETUP :

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment Condition Condition Description
NONE

Material/Parts
Adhesive (B.F. Goodrich
No. A 851)
Permagum

Special Environmental Conditions
NONE

Personnel Required

General Safety Instructions

2

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
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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. |

(4-1043 blank)/4-1044

4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	c. Cabinet	<ol style="list-style-type: none"> 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 rim and glass.
 - 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 in opposite direction in which indicating hand is to be moved until hand stands at proper position.

4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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ADJUSTMENTS (Cont)

- c. Replace rim and glass.

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 20); 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. Retaining bar (1) and milk can (2) | Remove. |
| | d. Dispensing tube (3) | Remove and disconnect. |
| | e. Mounting bolts | Remove. |
| | f. Milk dispenser | Remove. |

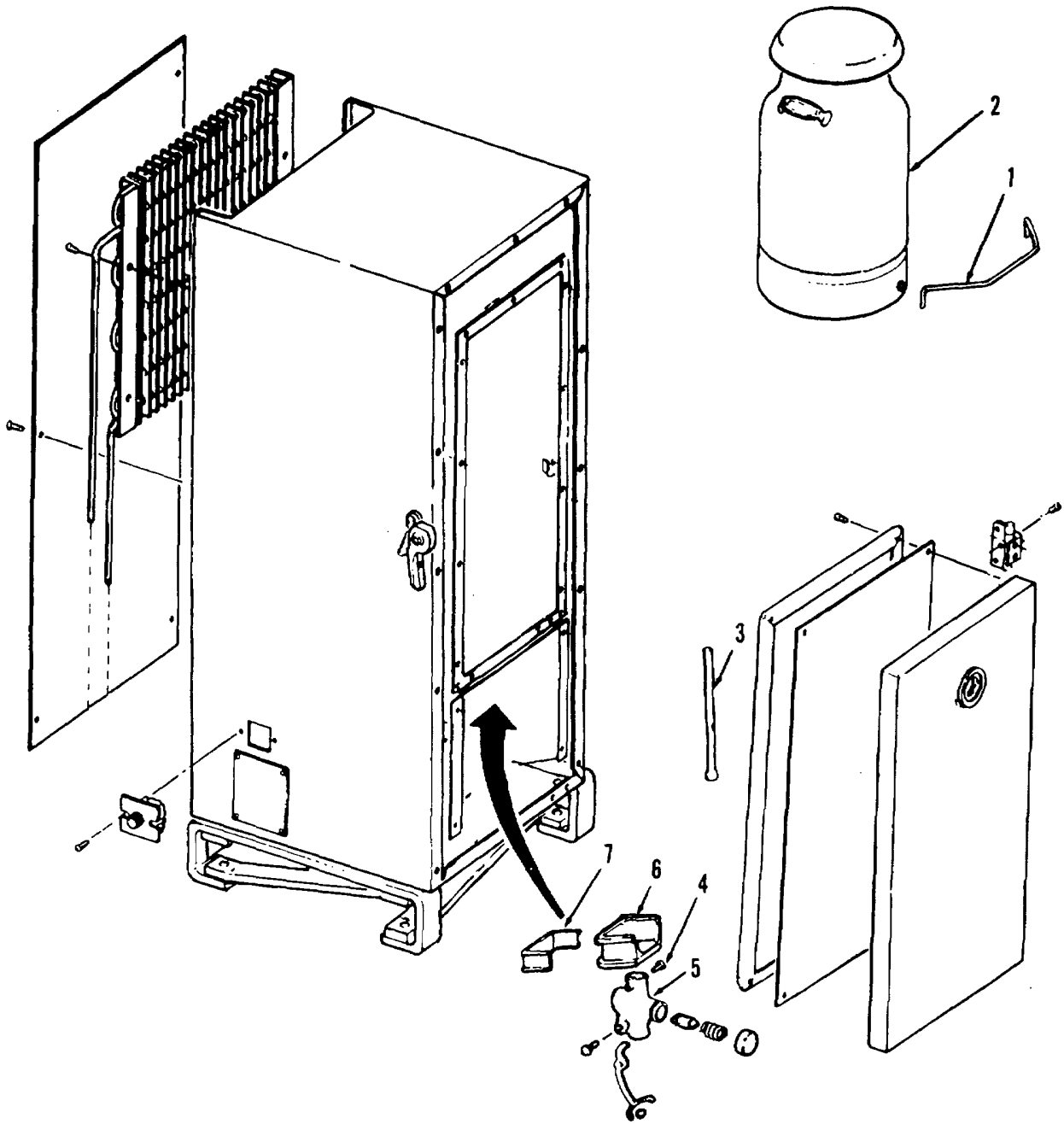
REPAIR

- | | | |
|------------------------|---------------------|--------------------------------|
| 5. Push Valve assembly | a. Setscrews (4) | Remove. |
| | b. Valve (5) | Remove from valve holder (6). |
| | c. Valve holder (6) | Pull from closure molding (7). |

4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS.

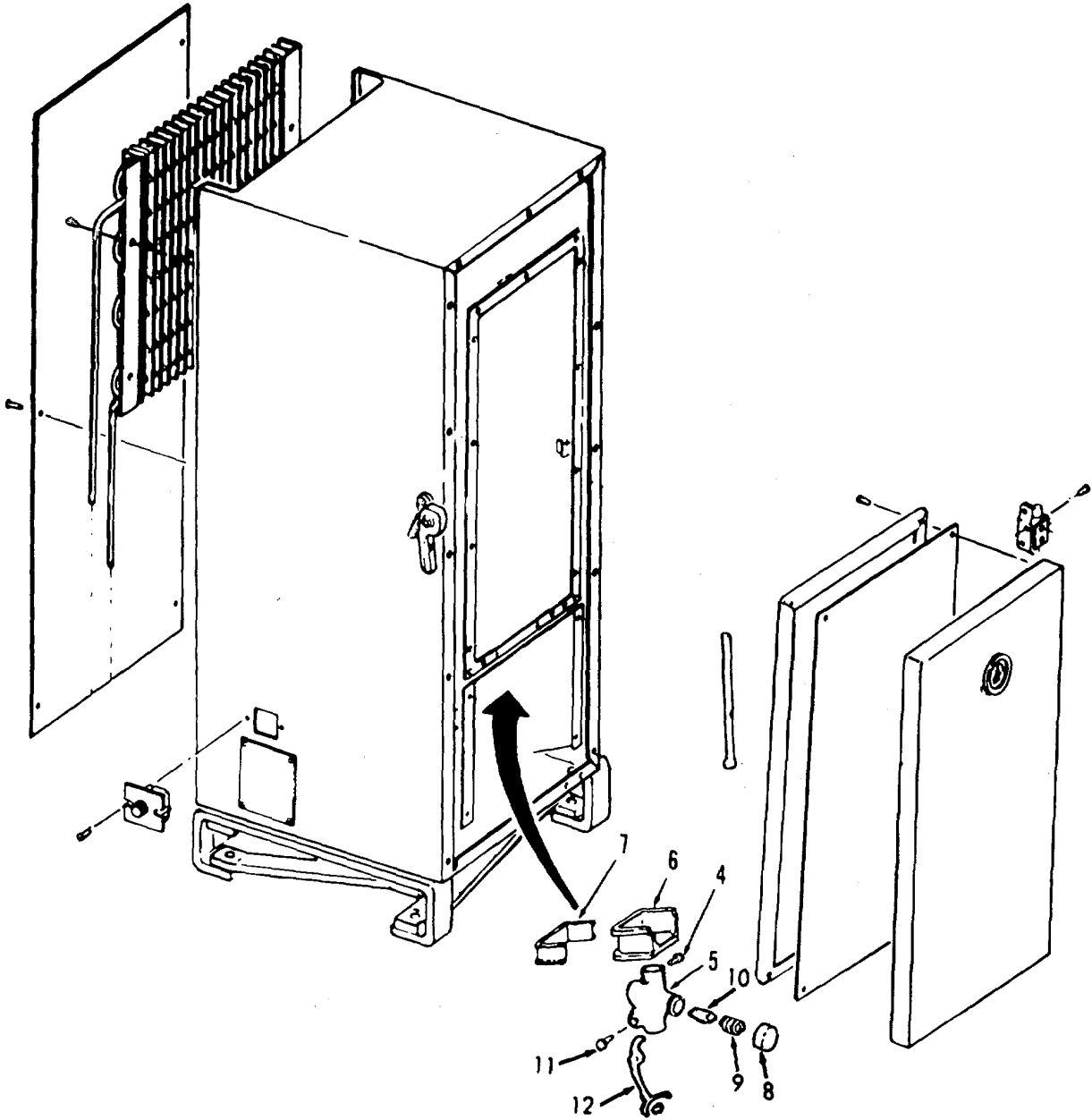
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Valve spring cap (8)	Unscrew.	
	e. Valve spring (9) and valve slide (10)	Remove.	
	f. Shoulder bolt (11)	Remove.	
	g. Valve arm (12)	Remove.	
	h. Bumpers (13)	Replace.	If missing.
	i. Valve arm (12) and shoulder bolt (11)	Replace.	
	j. Valve slide (10), spring (9), and cap (8)	Install.	
	k. Valve holder (6)	Install in closure molding (7).	
	l. Valve (5)	Install in valve holder (6).	
	m. Setscrews (4)	Install.	

4-1048

4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



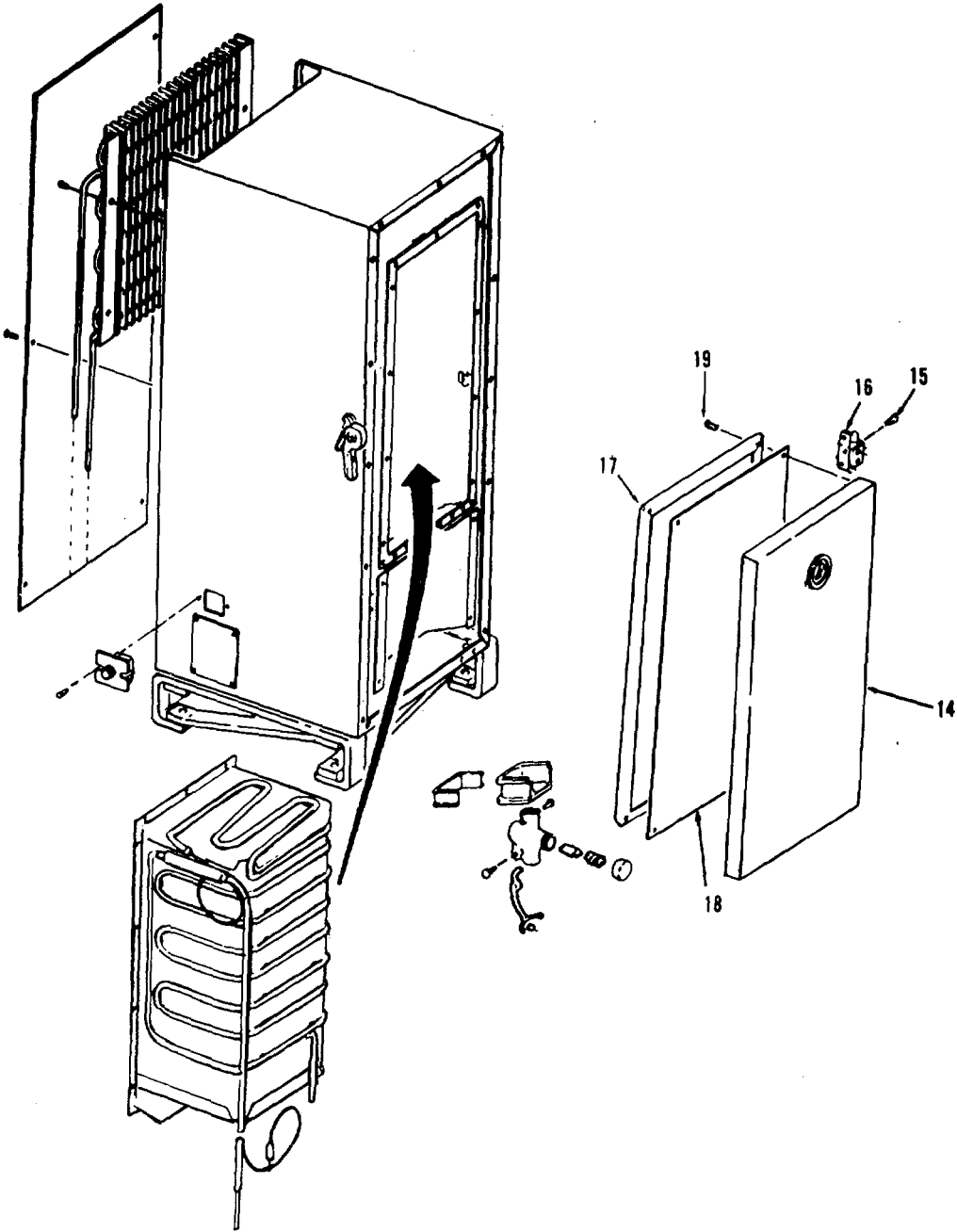
4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
6. Door Gasket	a. Door (14)	Open, and support.	
	b. Snap-on hinge covers	Remove.	
	c. Screws (15)	1. Remove. 2. Lift door from hinge (16) and remove.	
	d. Gasket (17)	1. Remove adhesive hold- ing lip of gasket to door panel (18). 2. Pull end of gasket free.	
	e. Screws (19)	Remove. gasket, and	Screws attach door pan to door.
	f. Gasket (17)	Remove.	
	g. Gasket (17), door pan (18), door (14), and screws (19)	Reassemble.	Position straight flap of gasket between shell and door pan mating sur- faces. Install screws. Care- fully apply ad- hesive to moisture-seal, loosen end of door gasket to door pan.

4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR (Cont)



4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	h. Door (14)	Place on hinge (16) and install screws (15).	Support door.
	i. Snap-on hinge covers	Install.	
7. Temperature control	a. Screws (20)	Remove.	
	b. Repair panel (21)	Remove.	
	c. Wiring	Remove.	Refer to schematic on page 4-1054.
	d. Sensing element coil (23).	Remove from control well tube (22) on the cooling	
	e. Screws (24) and temperature control (25)	Remove.	
	f. Temperature control (25) and screws (24)	Install	
	g. Sensing element	Feed into control well tube (22) until sensing elements bottoms.	Seal opening with bulk perm-agum.
	h. Wiring	Reconnect.	Refer to schematic on page 4-1054.
4-1052			

4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Continued).

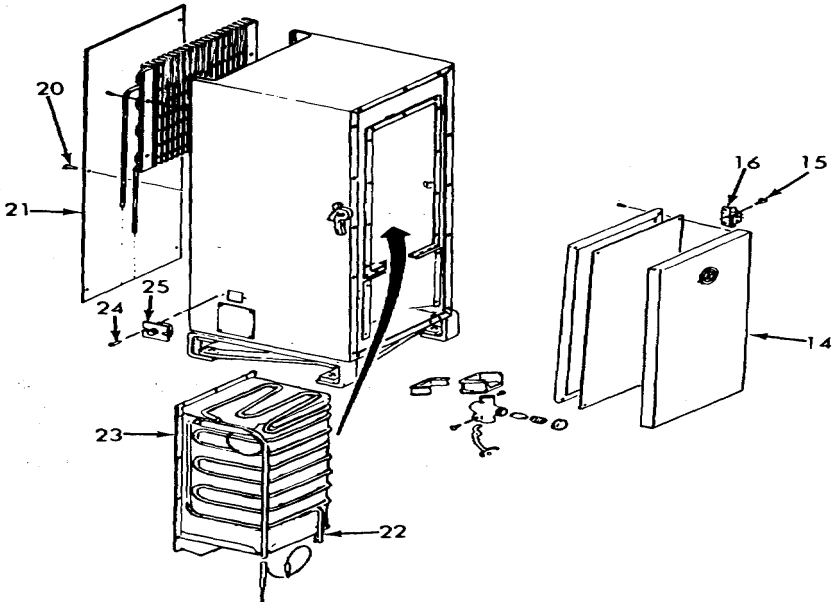
LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

- i. Rear panel (21) and screws (20)
- Install.

INSTALLATION

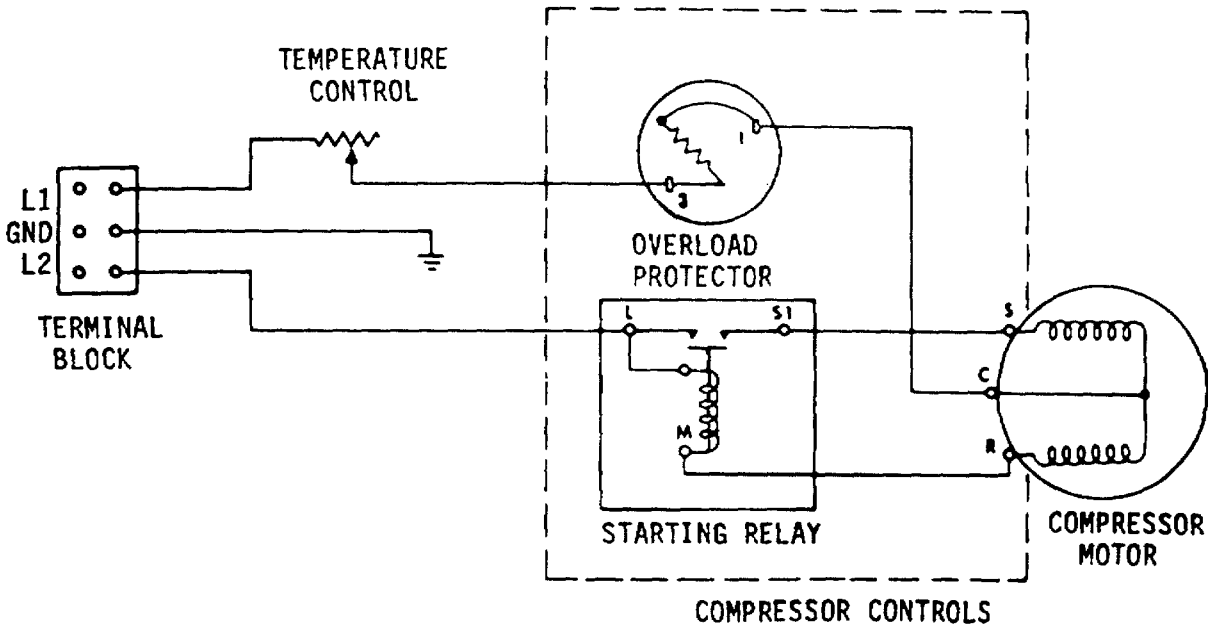
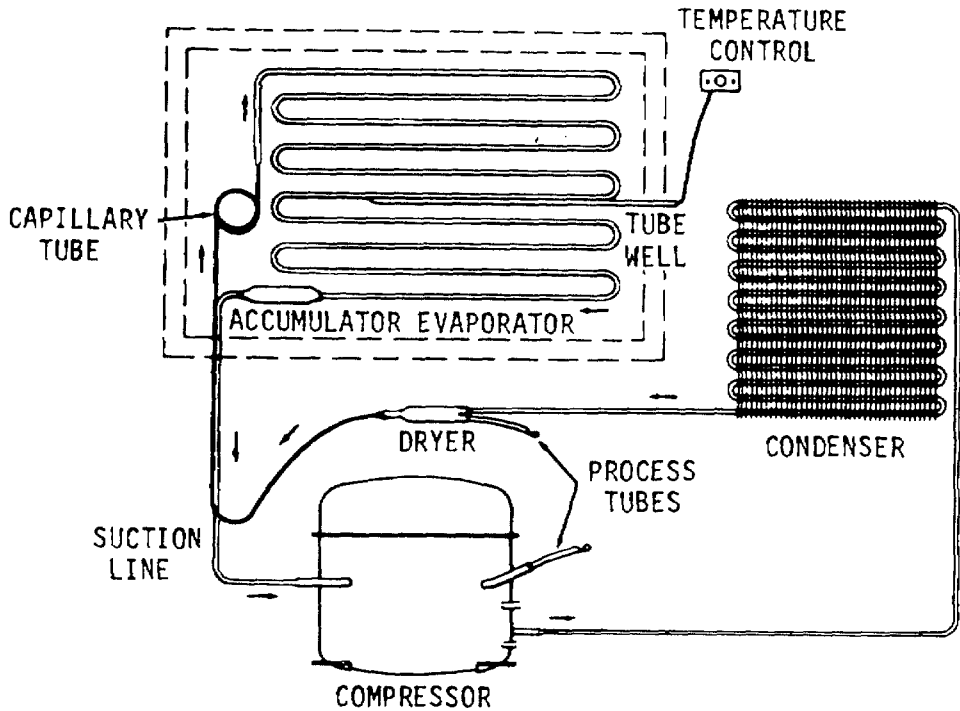
- 8. Milk Dispenser
 - a. Milk dispenser, and mounting bolts.
 - b. Power Cord
- Install.



4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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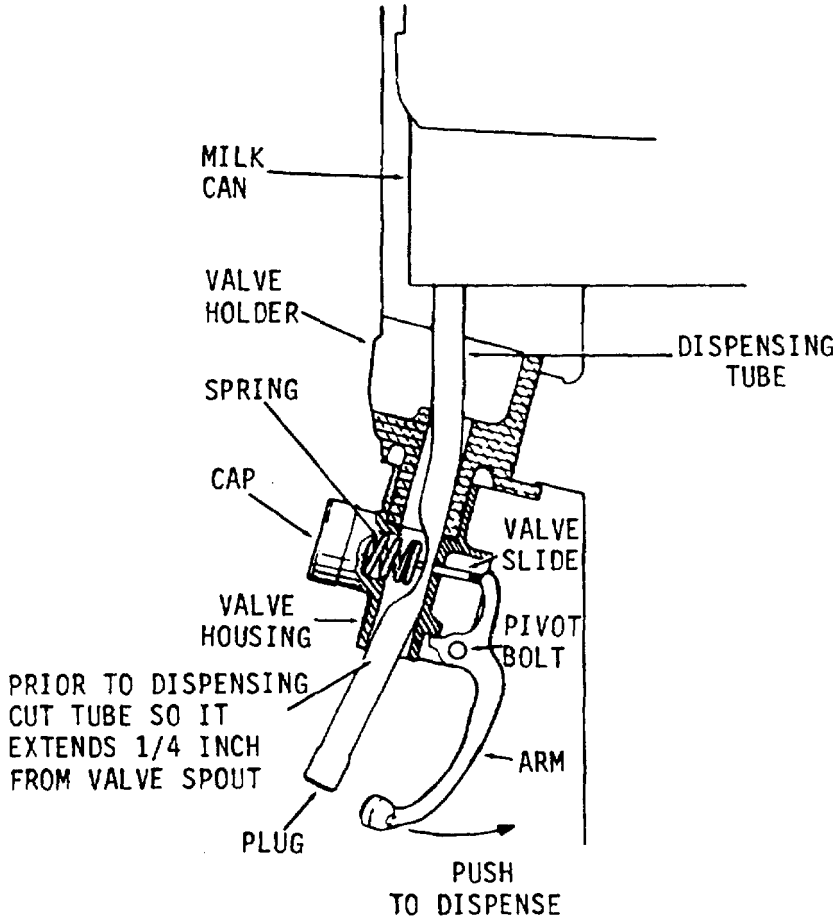
INSTALLATION (Cont)



4-40. MILK DISPENSER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSTALLATION (Cont)



4-1055/(4-1056 blank)

4-41. COFFEE MAKER - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection b. Replace 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

1

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. |

4-41. COFFEE MAKER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPLACE

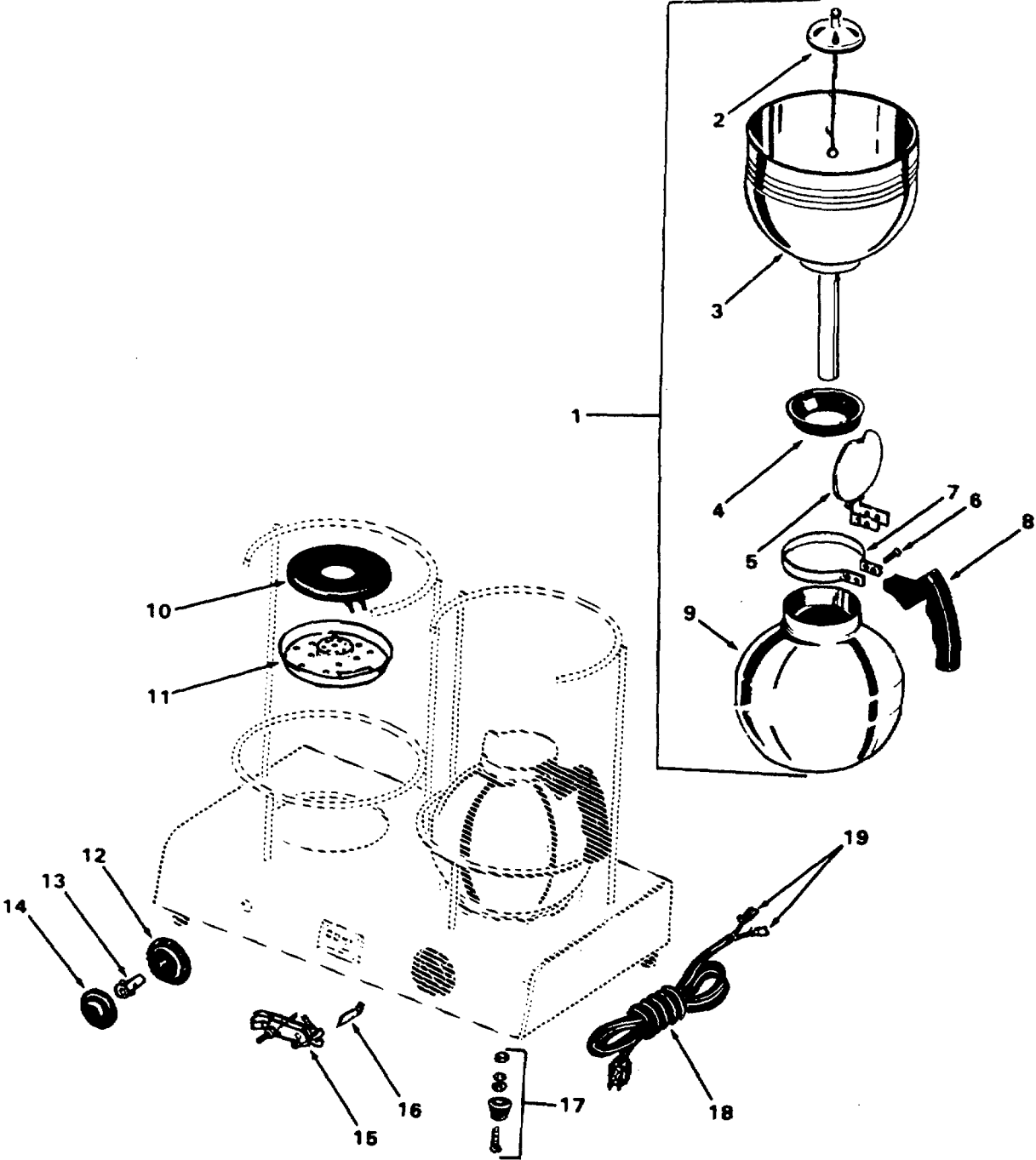
- | | | | |
|----|---|-------------------------------|--|
| 2. | Electric cord set | Remove. | |
| 3. | Repair electric coffee maker using the following parts: | | |
| | 1 | Stainless steel vacuum brewer | |
| | 2 | Stainless steel filter | |
| | 3 | Upper bowl | |
| | 4 | Rubber bushing | |
| | 5 | 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 | |

4-1058

4-41. COFFEE MAKER - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
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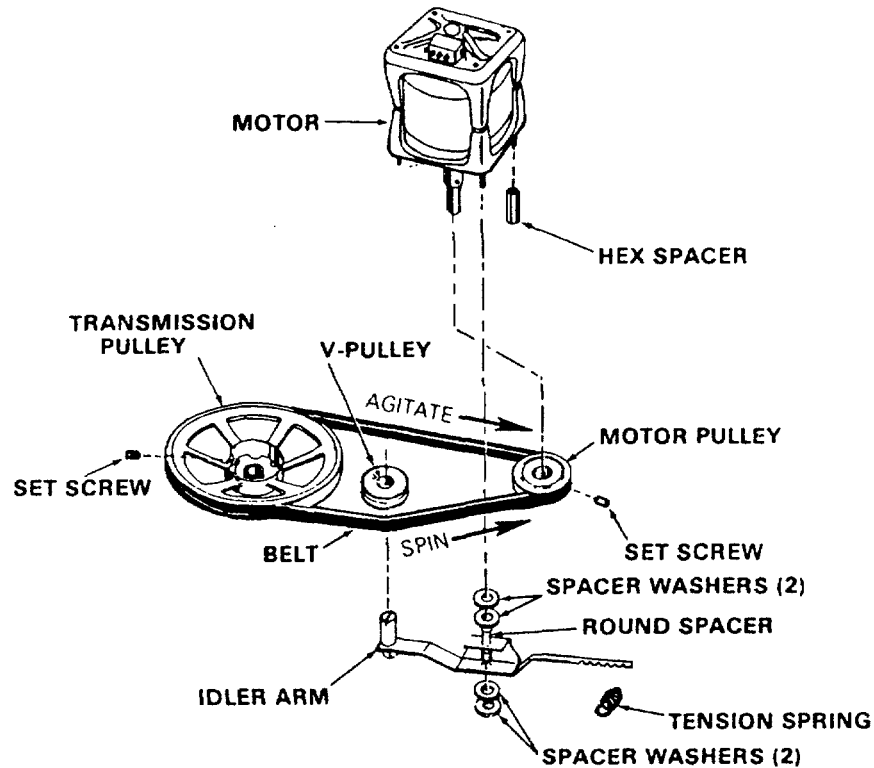
REPAIR (Cont)



4-42. 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.

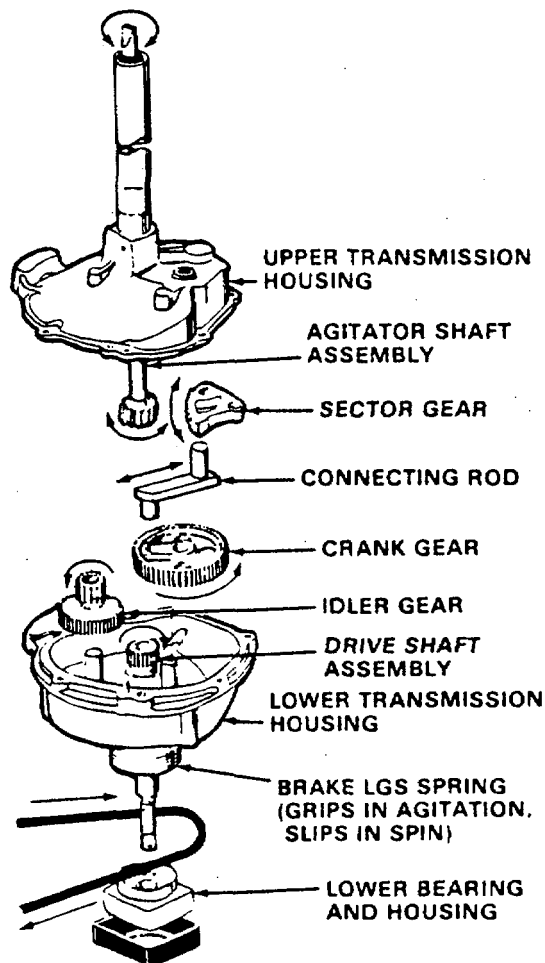


Spin and agitation are accomplished by reversing motor operation. Proper operation of the drive mechanism is dependent on correct calibration of the idler arm tension spring.

(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.

4-42. 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.

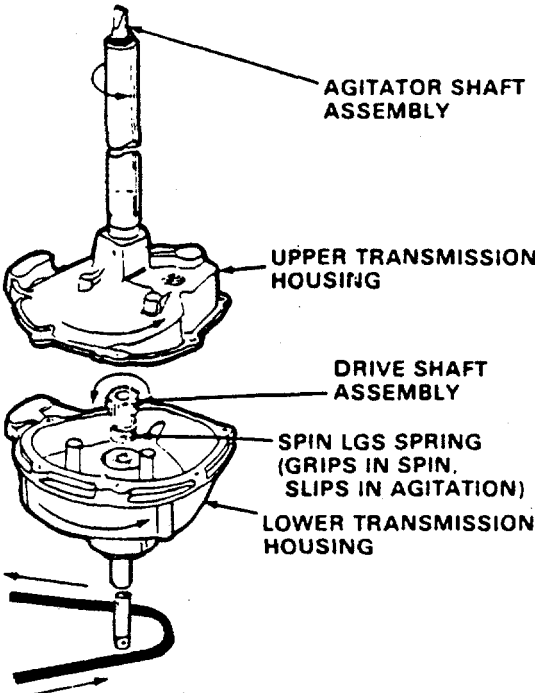
NOTE

The spin tub will rotate slightly during agitation.

(2) Spin Operation.

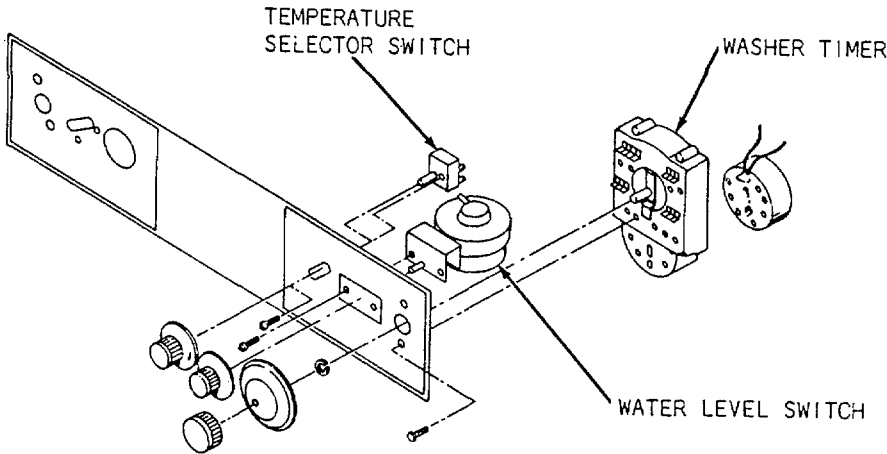
(a) To accomplish spin, the drive shaft assembly is turned counter-clockwise. The spin LGS spring, which slips easily in agitation (clockwise rotation), now grips drive shaft pinion gear. This turns entire gear case counter-clockwise, which in turn drives the basket. The large brake LGS spring offers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

4-42. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).



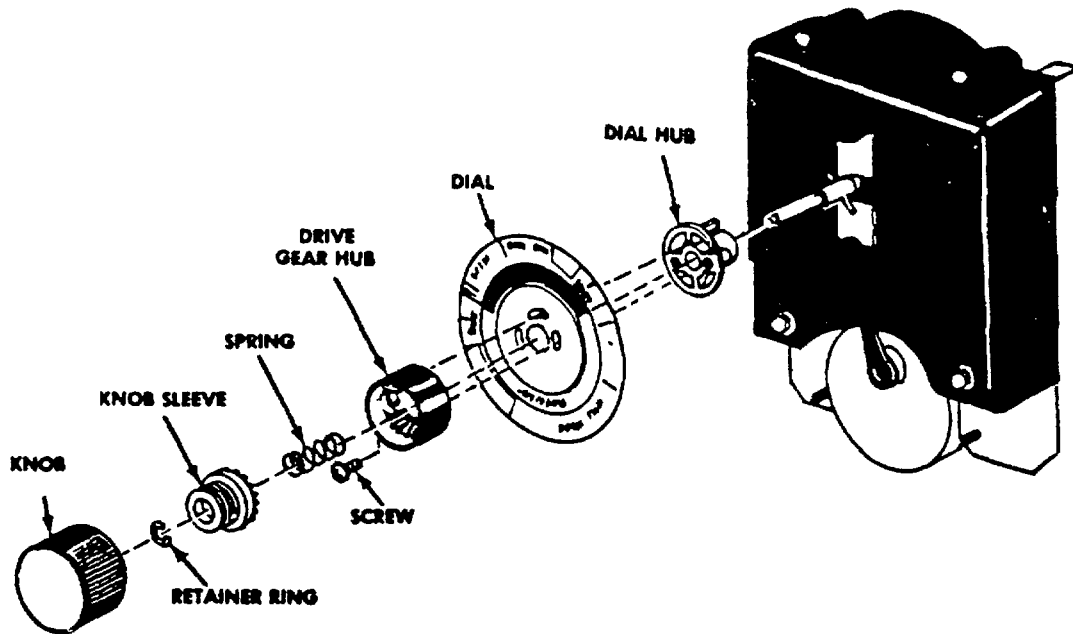
(b) In spin, the direction of pull is across the spring loaded idler arm roller. The idler arm senses the load and controls belt tension to provide a gradual increase in speed as water is extracted.

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



4-42. 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) **Temperature Selector Switch.** This control is used to select the desired water temperature for washing.

4-42. WASHER/DRYER - MAINTENANCE INSTRUCTIONS (Continued).

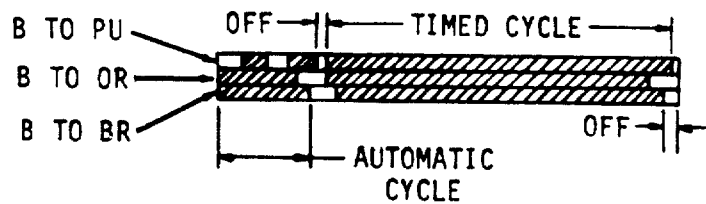
b. Dryer Operation.

(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 RIGHT 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 contact 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 following 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.

4-42. 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.

4-42. 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 allows 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.

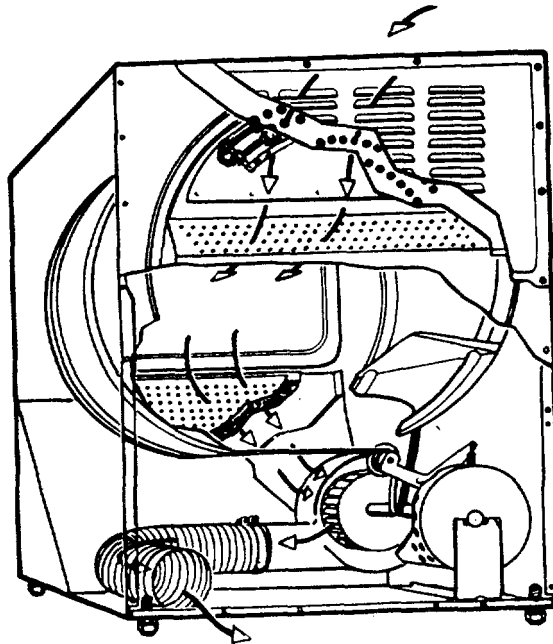
(a) The cycle end buzzer sounds for approximately 1 second at the end of either cycle indicating to the user that the clothing should be removed from the dryer at that time, to avoid wrinkling. Cycle end buzzer operation is as follows:

4-42. 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.



4-42. 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:

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Exterior Cabinet Removal	4-42.1
Washer Mechanism	4-42.2
Dryer Mechanism	4-42.3
Washer/Dryer Controls	4-42.4

4-42.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS.

This task covers:

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

INITIAL SETUP:

Test Equipment

NONE

References

NONE

Special Tools

NONE

Equipment

<u>Condition</u>	<u>Condition Description</u>
------------------	------------------------------

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

Observe WARNING in procedure.

4-42.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

WARNING

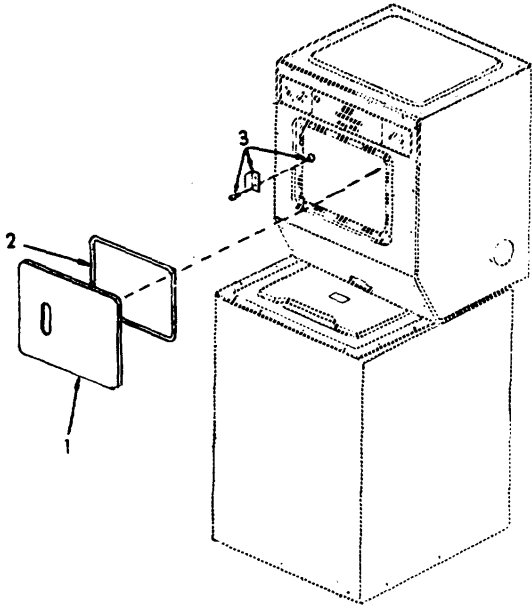
In order to prevent injury, tag and place the circuit breaker in the OFF position.

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. |

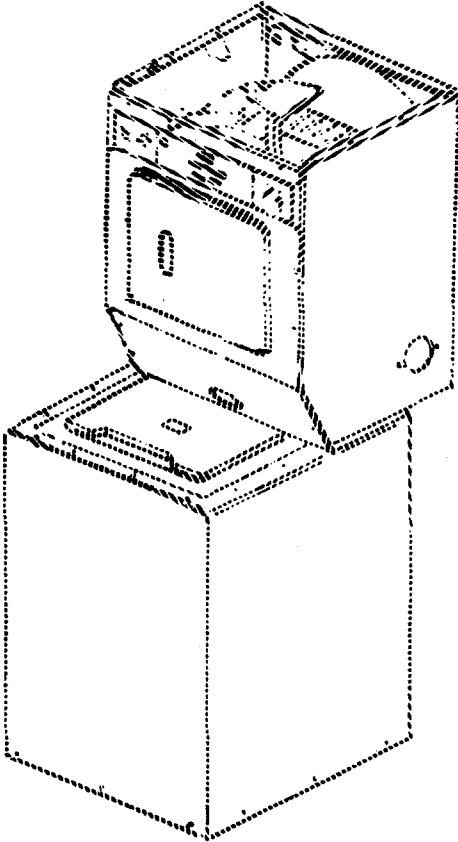
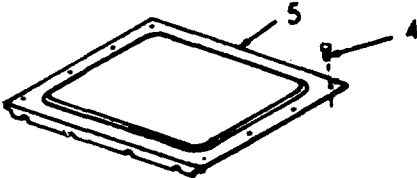


4-42.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REMOVAL

- 4. Dryer top
 - a. Screws (4) Remove.
 - b. Dryer top (5) Remove.



4-42.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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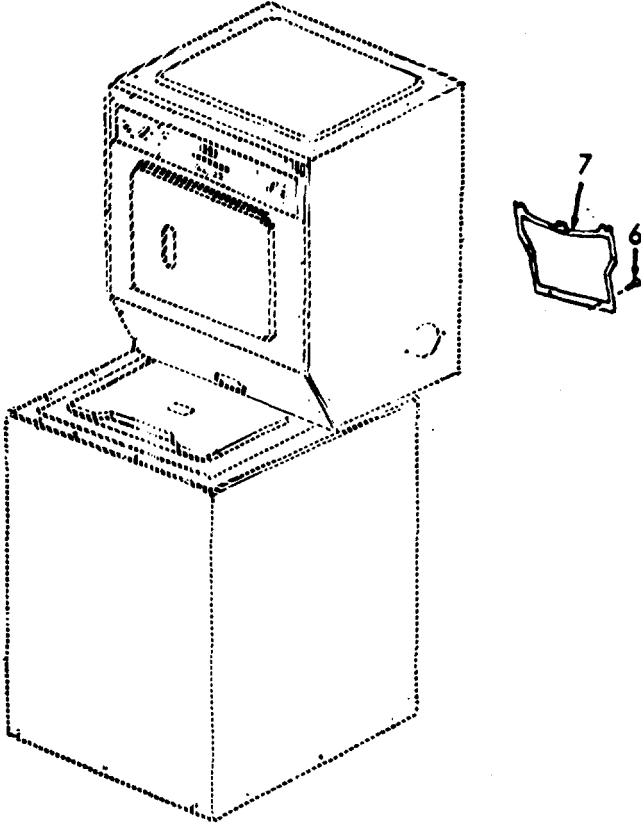
REMOVAL (Cont)

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.



4-42.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REMOVAL (Cont)

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.

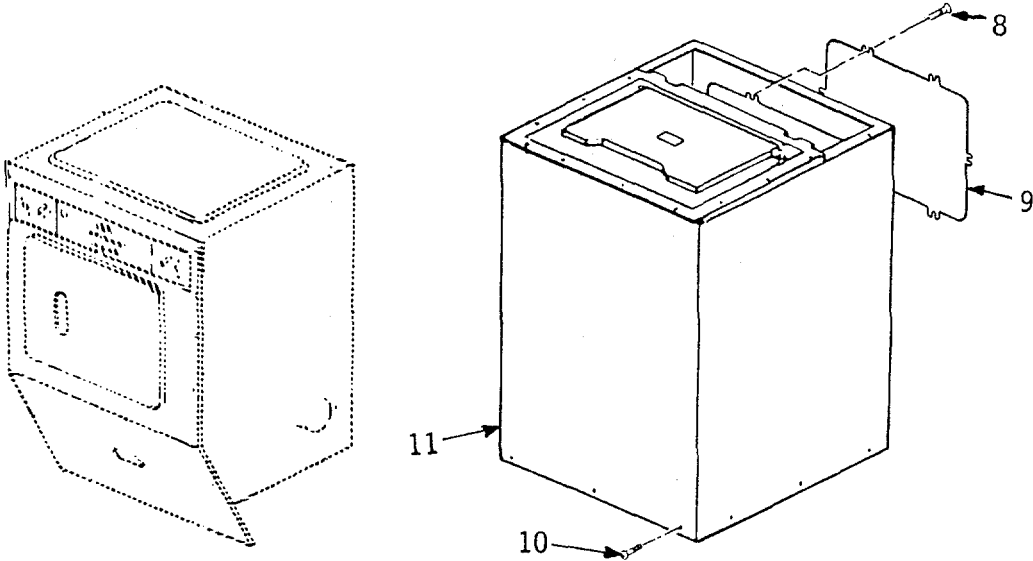
- a. Screws (8) Remove.
- b. Panel (9) Remove.

7. Washer front panel

NOTE

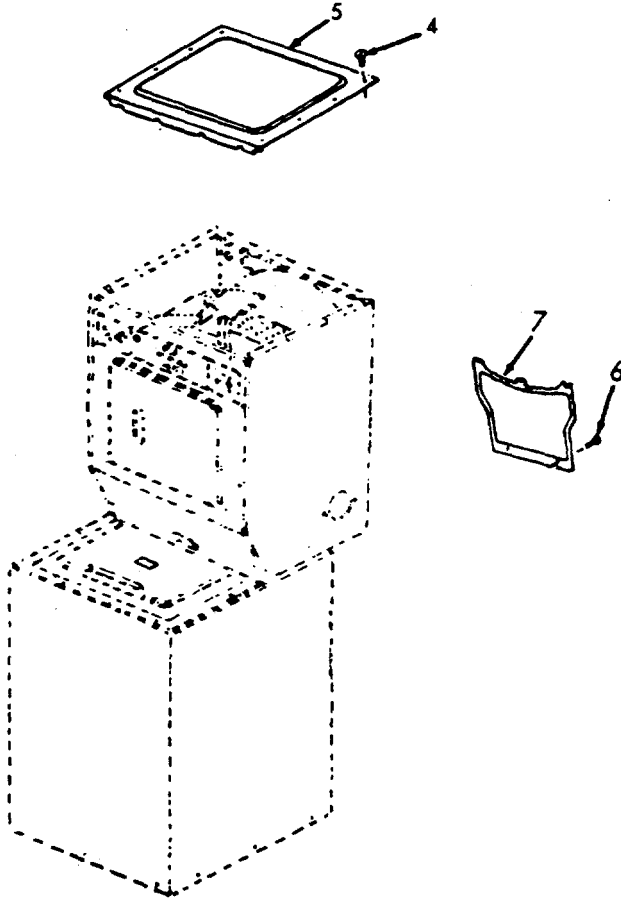
Remove for access to washer mechanism (refer to paragraph 4-42.2) for maintenance instruction.

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



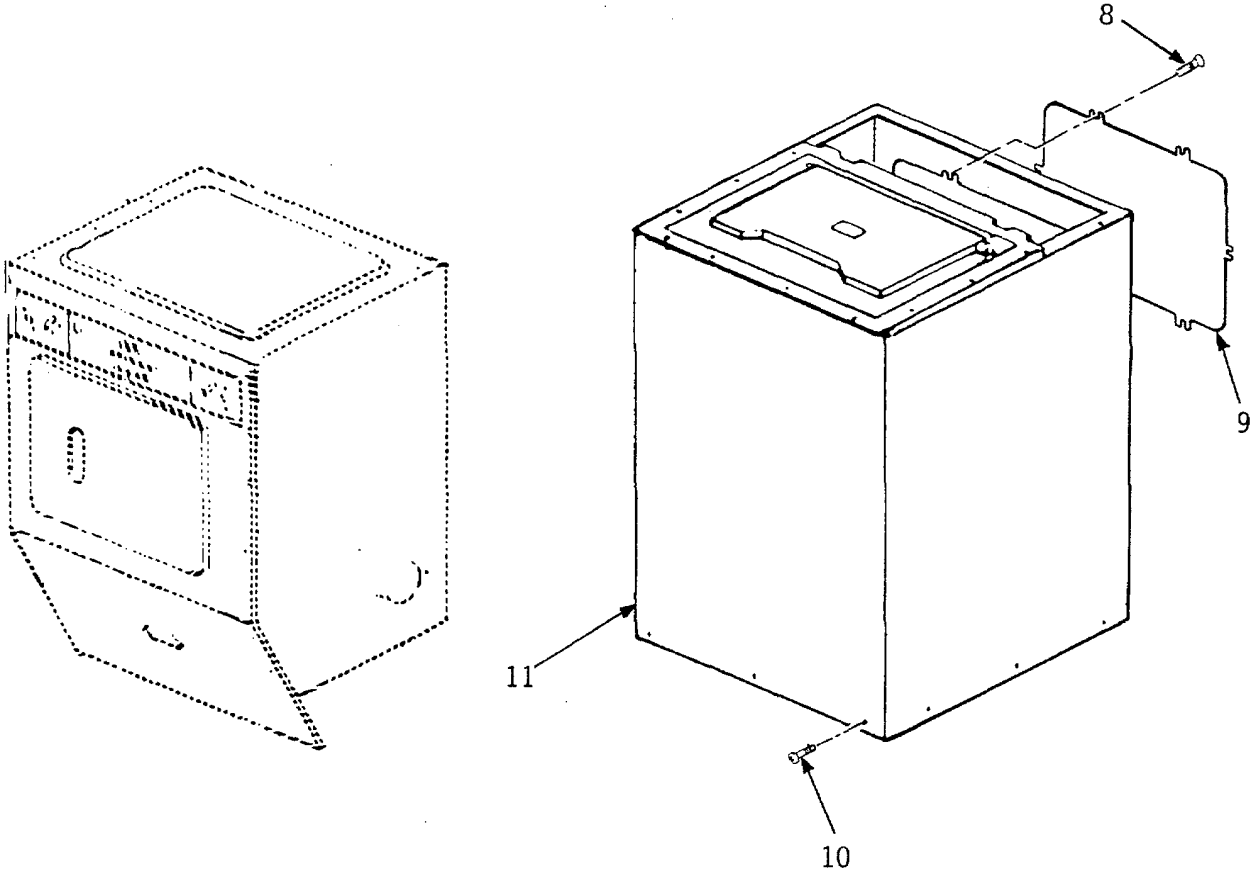
4-42.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Continued).

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.	



4-42.1. EXTERIOR CABINET REMOVAL - MAINTENANCE INSTRUCTIONS (Continued).

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



4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

This task covers:

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

INITIAL SETUP:

Test Equipment

References

Paragraph
4-42a Operation of slipping
belt clutch mechanism.

Special Tools

Equipment Condition Condition Description

Spring compression tool
Torque wrench
Tub support puller

Paragraph
4-42.1 Exterior Cabinet removal

Material/Parts

Special Environmental Conditions

Belts
Gaskets
Seals

NONE

Personnel Required

General Safety Instructions

1 Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
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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.

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	c. Agitation	Inspect for proper operation.	Refer to agitation instructions in paragraph 4-42a .
	d. Water level	Inspect for high water level.	
SERVICE			
2.	Tub	Clean inside of tub	

REPAIR

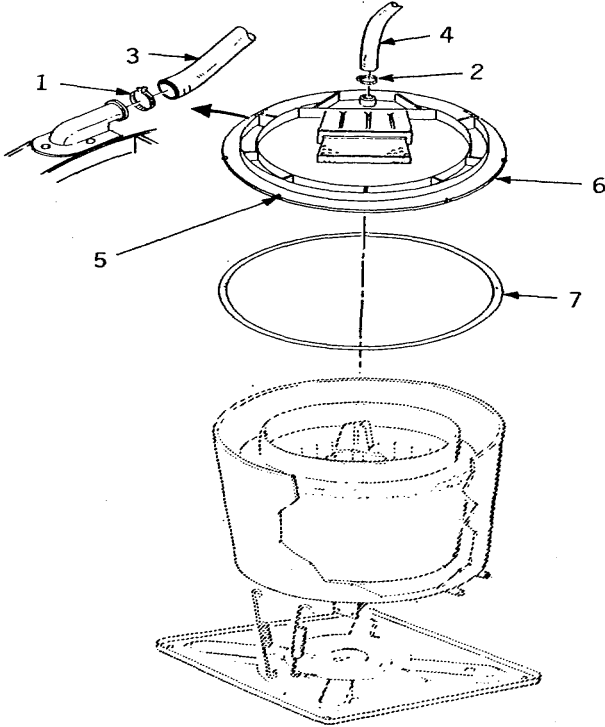


Disconnect unit from electrical source before proceeding with maintenance.

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.	

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

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.	



4-42.2. 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.	

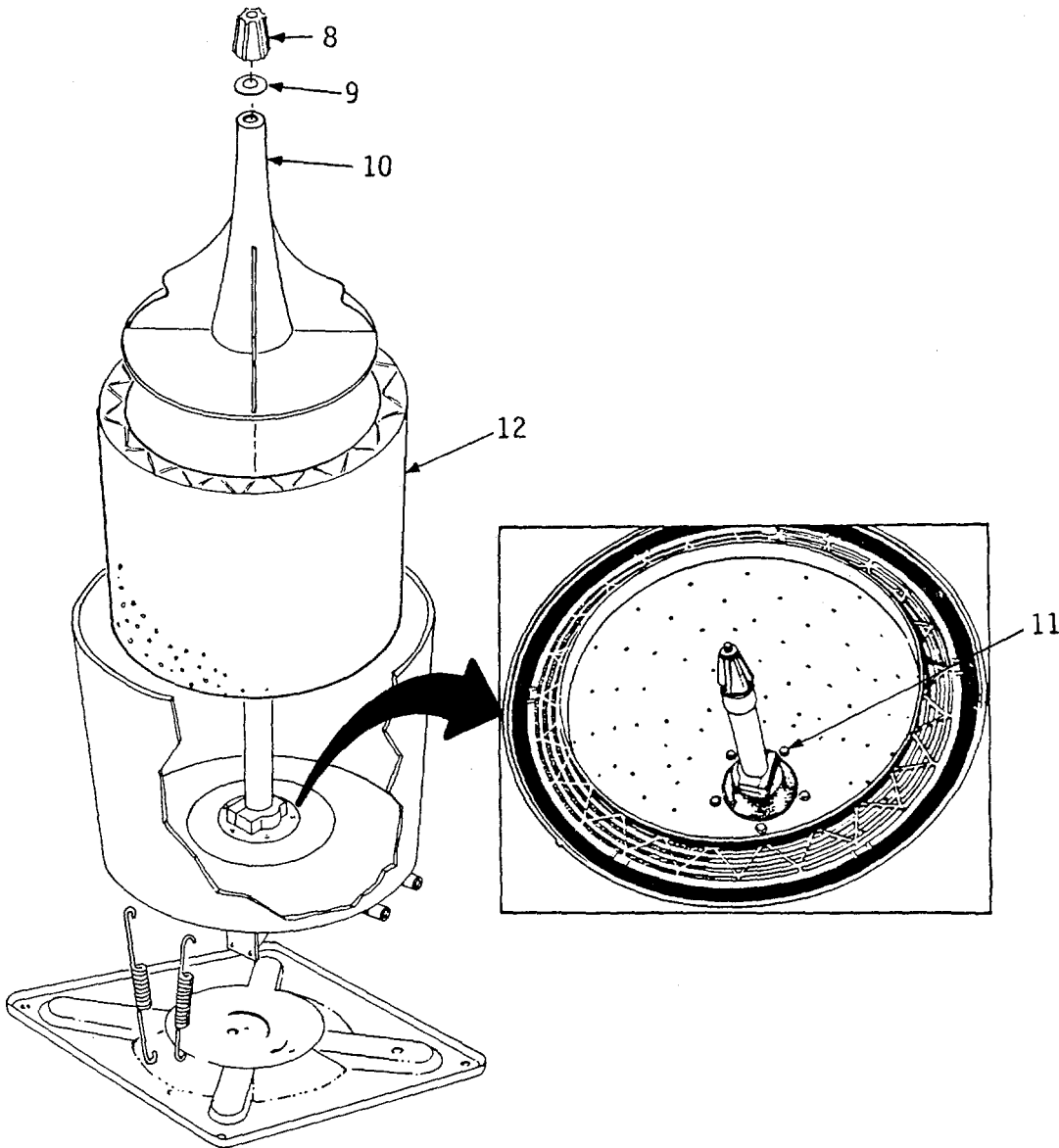
Change 1 4-1078

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

- f. Agitator (10)
washer (9) and
agitator cap
(8) Install.
- g. Splash tub
Cover Install. Refer to step 3 .



4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

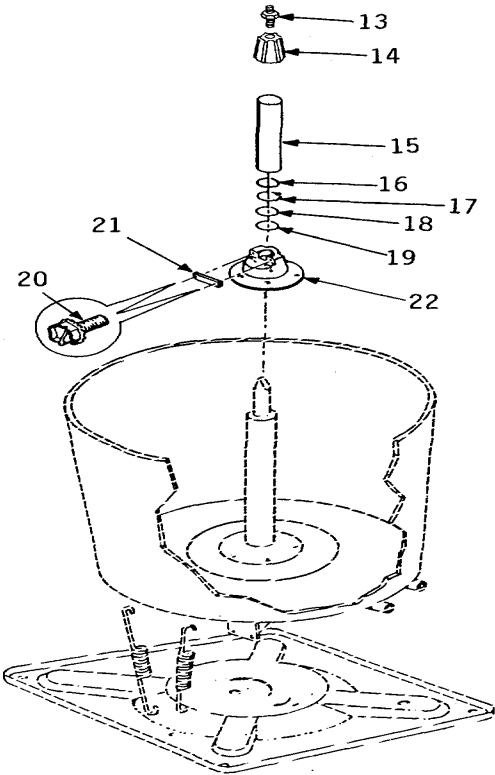
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
5. Trunnion	a. Splash tub cover.	Remove.	Refer to step 3 .
	b. Spin tub	Remove.	Refer to step 4 .
	c. Stud bolt (13) drive block (14) and vinyl sleeve (15)	Remove.	
	d. Upper lip seal (16), retaining ring (17), spacer washer (18) and thrust washer (19)	Remove.	
	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.	

Change 1 4-1080

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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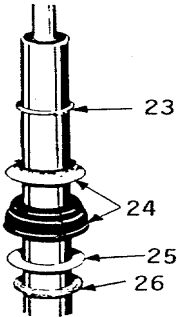
REPAIR (Cont)



- | | | | |
|----|---|----------|-------------------|
| 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 . |

4-42.2. 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 .		

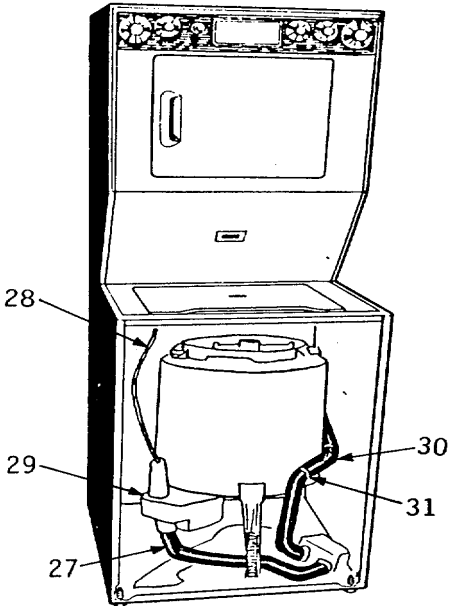


4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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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 4-22.1.
	c. Hoses (27 and 28)	Remove from bottom trap (29)	
	d. Rear access panel	Remove.	Refer to paragraph 4-22.1.
	e. Drain hose (30)	Remove from coupler inside of cabinet.	
	f. Drain hose retaining clamps (31)	Remove.	



4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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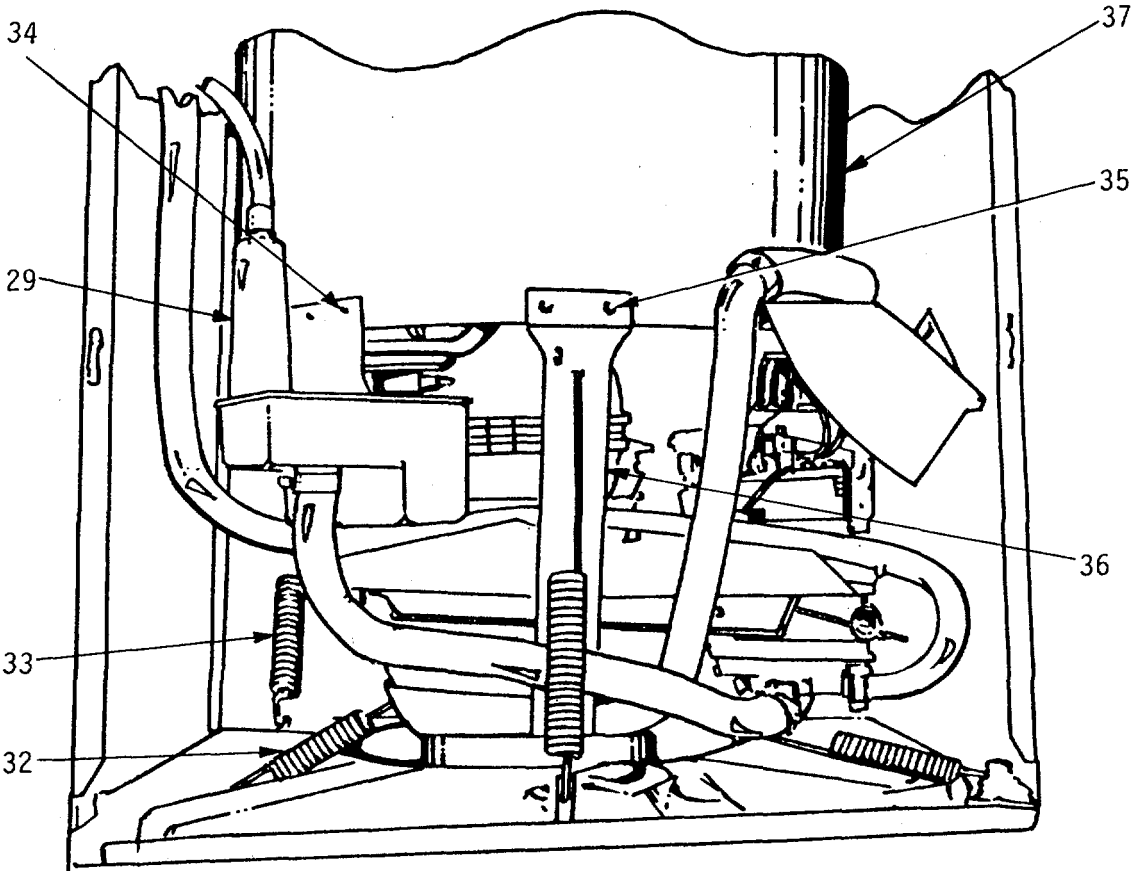
REPAIR (Cont)

- | | | | |
|----|---|--|--|
| 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. | |

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



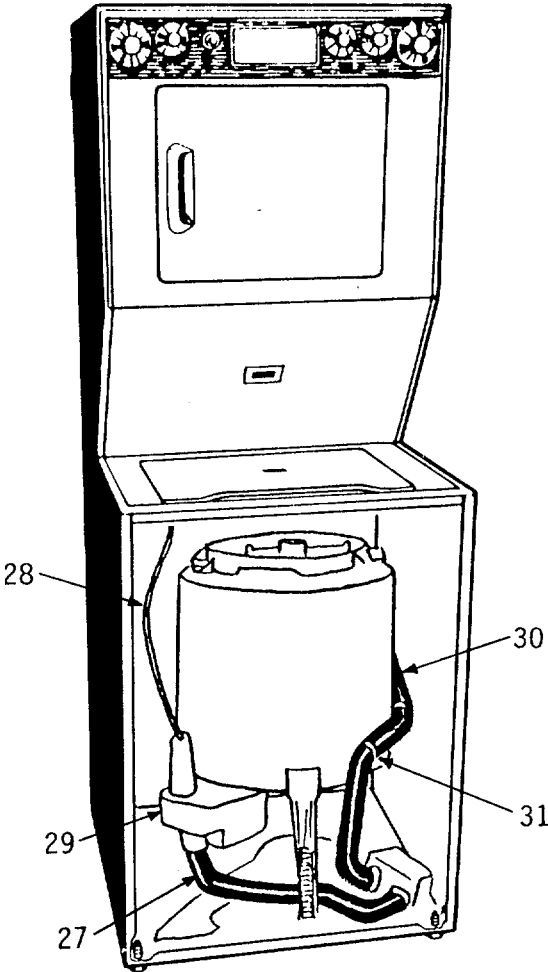
4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	o. Drain hose (30) and retaining clamps (31)	Install.	
	p. Rear access panel	Install.	Refer to paragraph 4-22.1
	q. Hoses (27 and 28)	Install.	
	r. Front panel (30) and retaining	Install.	Refer to paragraph 4-22.1.
	s. Seal, assembly, trunnion, spin tub and splash tub cover	Install.	Refer to steps 6,5,4 and 3 respectively.

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



Change 1 4-1087

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

8. Bearing
Housing

NOTE

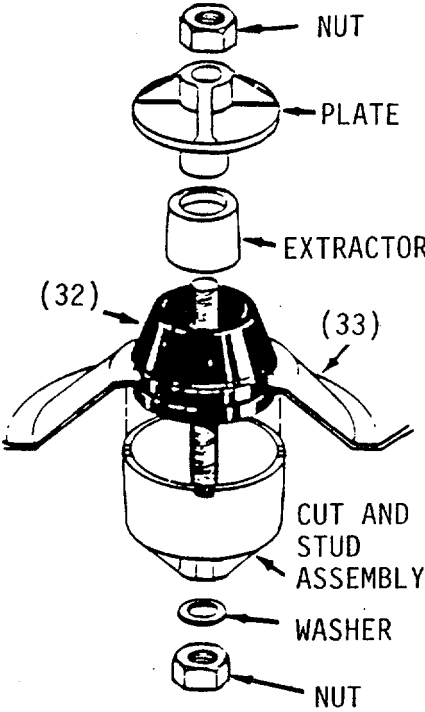
The bearing assembly is pressed into the bottom of the splash tub. Remove for replacement when changing the splash tub.

- | | |
|--------------------------------|---|
| <p>a. Bearing housing (32)</p> | <ol style="list-style-type: none"> 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. |
|--------------------------------|---|

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



NOTE

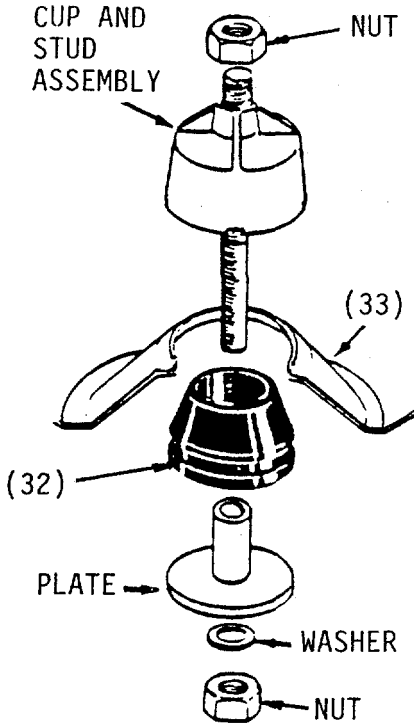
In the event the transmission spin shaft becomes scored due to a worn tub bearing, an oversize bearing kit is available which eliminates the necessity of removing the upper housing and spin shaft assembly.

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

- | | | | |
|--|-------------------------|---|--|
| | b. Bearing housing (32) | <ol style="list-style-type: none">1. Apply liquid detergent to outside of bearing housing assembly and install into bottom of splash tub 9.2. 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. | |
|--|-------------------------|---|--|

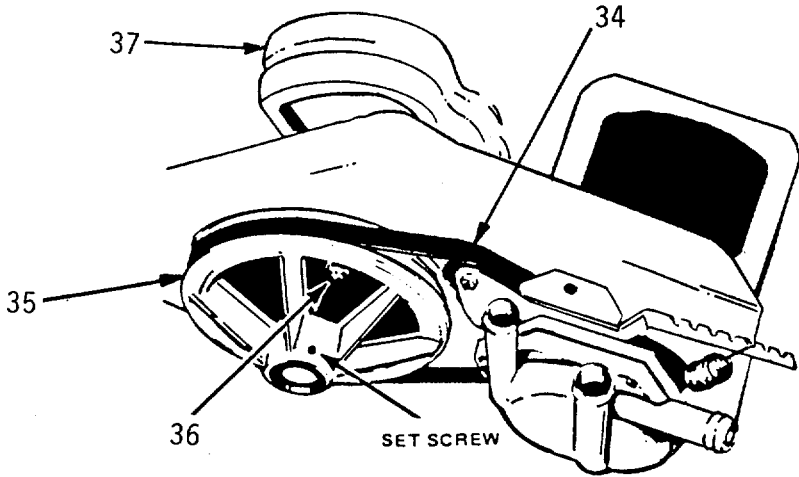


4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

9. Transmission	a. Splash tub	Remove.	Refer to step 7.
	b. Belt drive (34)	Remove.	
	c. Transmission pulley (35)	Remove.	
	d. Transmission hold down bolts (36)	Remove.	
	e. Transmission (37)	Remove.	



4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

NOTE

During a transmission repair, carefully examine each component for wear, scoring or other damage. Replace all damaged parts, including gaskets and seals.

- | | | | |
|----|---|-------------------------------|---------------|
| f. | Pipe plug (38)
drain oil. | Remove and | |
| g. | Screws (39)
places | Remove from six | |
| h. | Lower housing
assembly (40)
and upper hous-
ing assembly
(41) | Separate.
dowel pins (38). | Do not remove |
| i. | Sector gear
(42), connect-
ing rod (43),
crank gear (44)
and idler gear
(45) | Remove. | |

NOTE

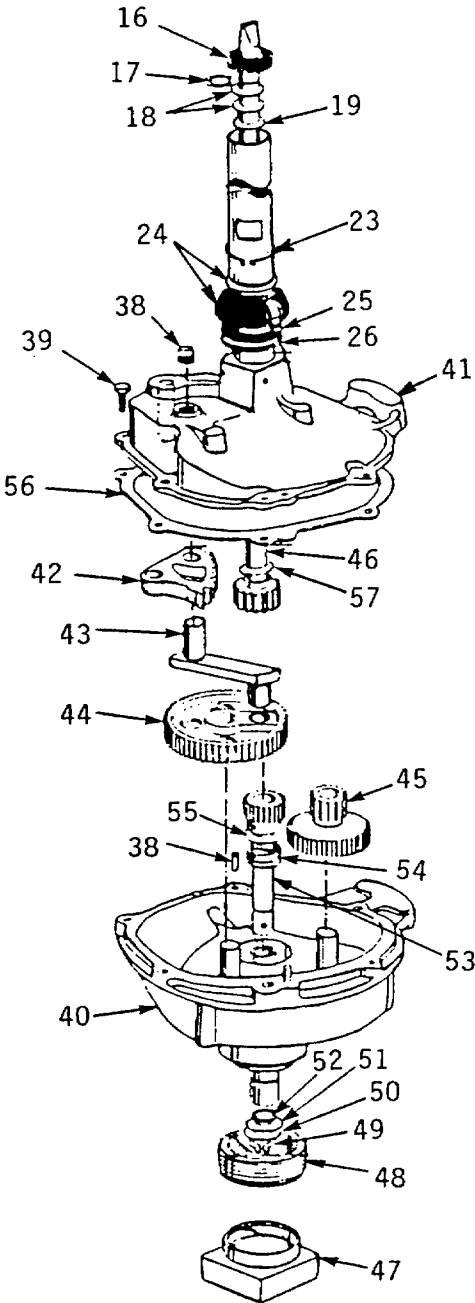
The sector and crank gears are subject to improper positioning during reassembly. Observe the position of the sector gear.

- | | | | |
|----|--|---------|--|
| 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. | |

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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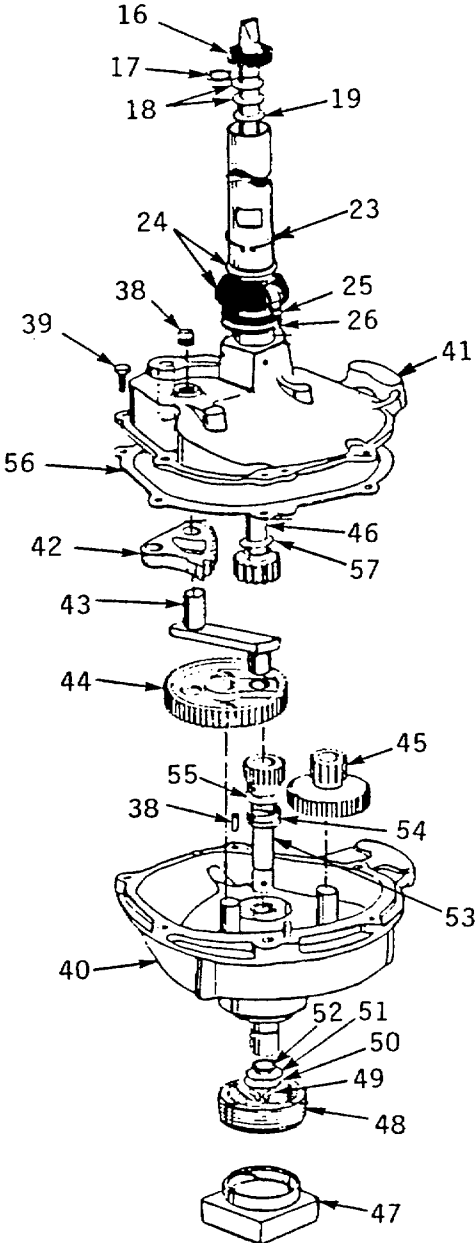
REPAIR (Cont)

- | | |
|--|--------------------------|
| 1. 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) clockwise to disengage small LGS spring (54). | Pull up and out. Turn |
| p. Thrust washer (55), gasket (56) and spacer washer (57) | Remove and replace. |
| q. Agitator shaft assembly (46) assembly (41). | Install in upper housing |
| 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. |

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



Change 1 4-1905

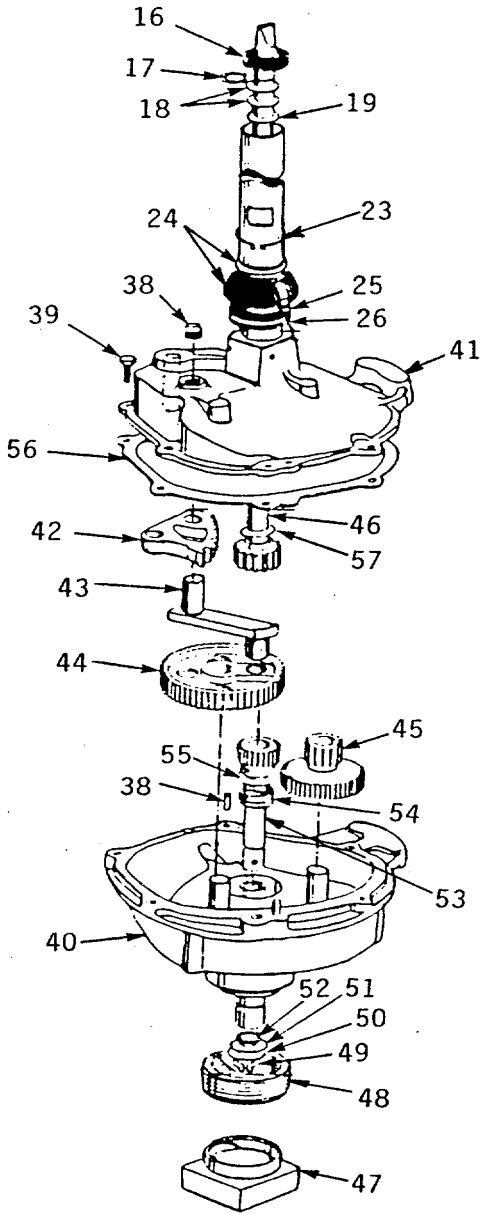
4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	t. Small LGS spring (54) assembly (53).	Install on lower shaft	
	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 (38).	
	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.	

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

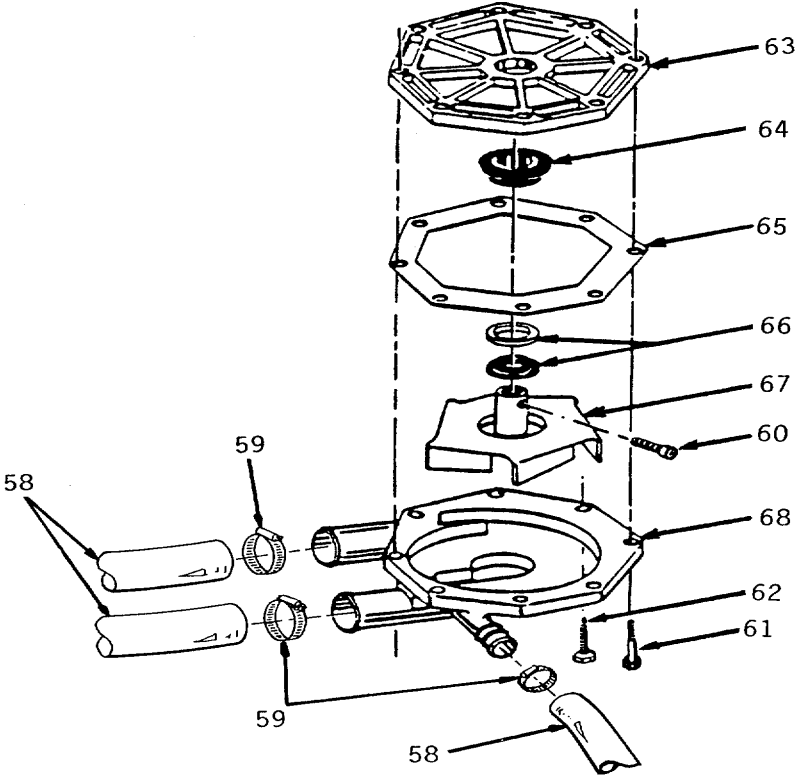


4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
10. Pump panel	a. Washer front graph 4-42.1.	Remove.	Refer to para-
	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.		

4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	m. Cover screws (62)	Install. in location.	Position pump
	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 4-42.1.

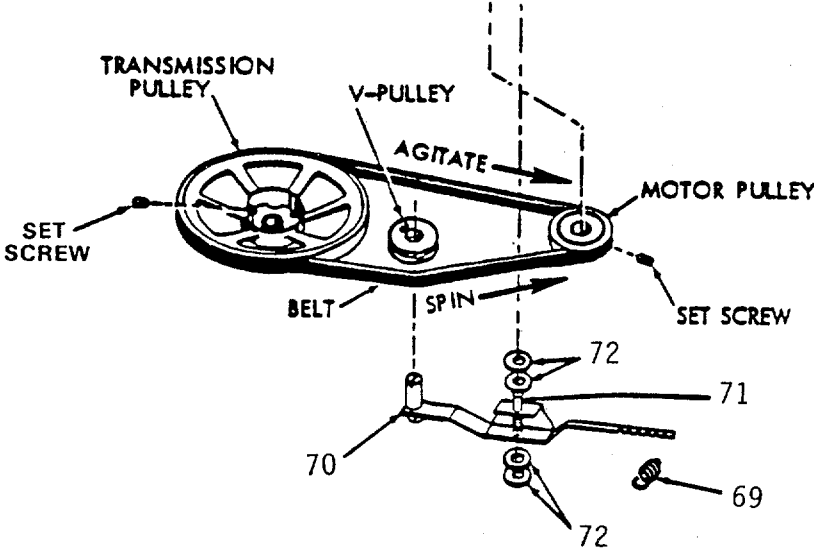


4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

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).	



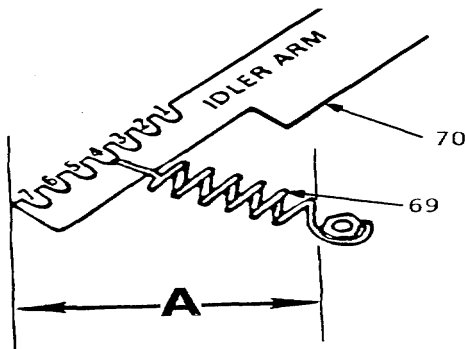
4-42.2. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Spacer washers (72)	Remove two above and below the arm.	
	e. Spacer washers (72)	Lightly grease and install.	
	f. Idler arm (70) and install.	Slide over spacer (71)	
	g. Tension spring (69)	Install.	Use new spring if over stretched
	h. Pump assembly	Install. 10.	Refer to step

ADJUSTMENT

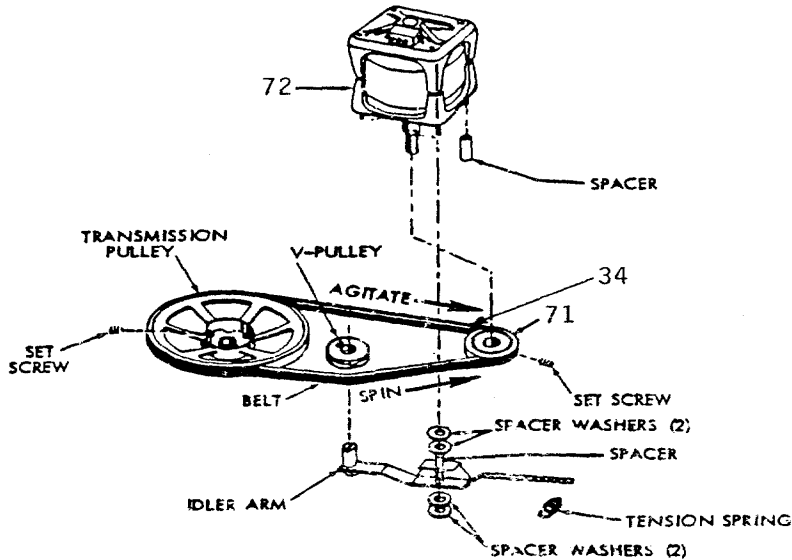
12. Idler arm
- a. Tension spring (69) Install in number four (4) slot on idler arms (70).
 - b. Dimension "A" Measure in inches.

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.



4-42.2. 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) leads and remove.	Disconnect motor	
	e. Motor (72) and install.	Reconnect leads	
	f. Idler arm assembly	Install.	Refer to step 11.
	g. Drive belt (34)	Install.	
	h. Pump assembly	Install	Refer to step 11.



4-42.3 DRYER MECHANISM - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Testing b. Removal c. Installation

INITIAL SETUP:

Test Equipment

NONE

References

Para 4-42.4 Washer/Driver schematics.

Special Tools

NONE

Equipment

<u>Condition</u>	<u>Condition Description</u>
<u>Para</u>	

4-42.1 Exterior Cabinet removal.

Material/Parts

Drive belts
Thermal fuse
Water level safety switch

Special Environmental Conditions

NONE

Personnel Required

1

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. |

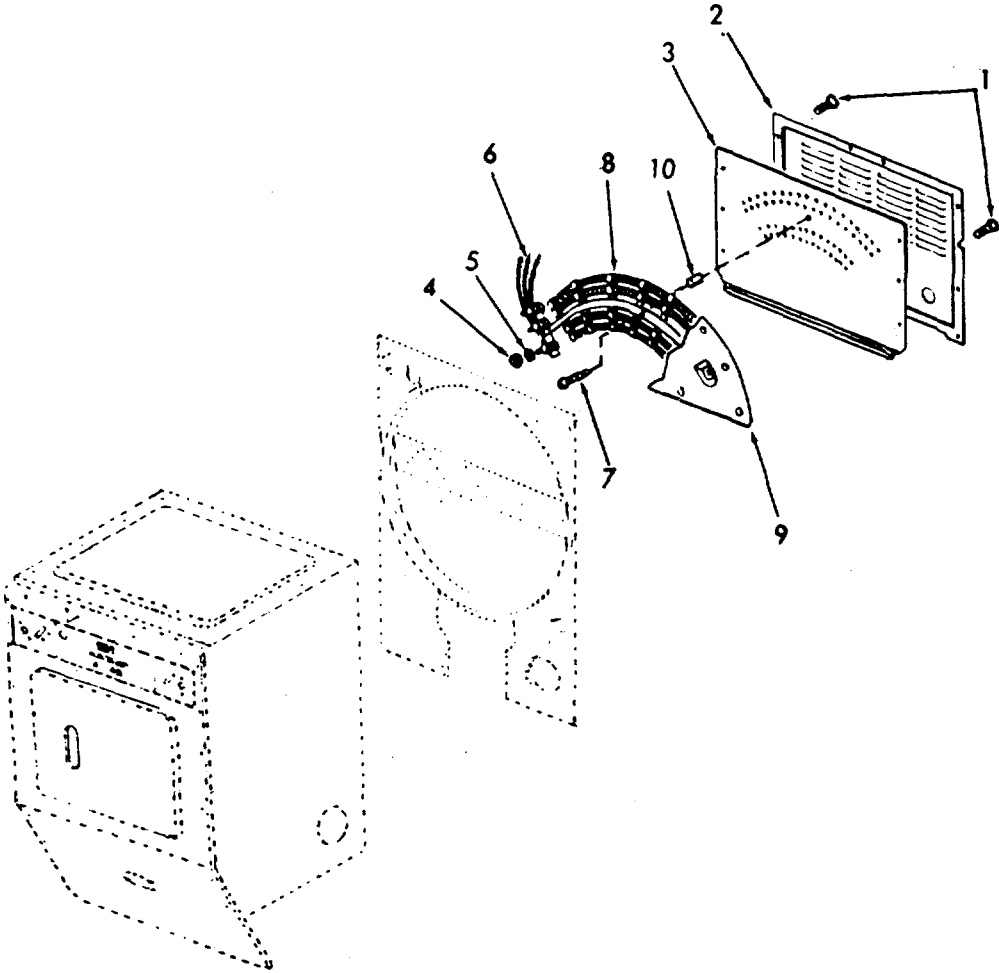
4-42.3. WASHER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

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 4-1114.2
	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.	

4-42.3. DRYER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-43.2. DRYER MECHANISM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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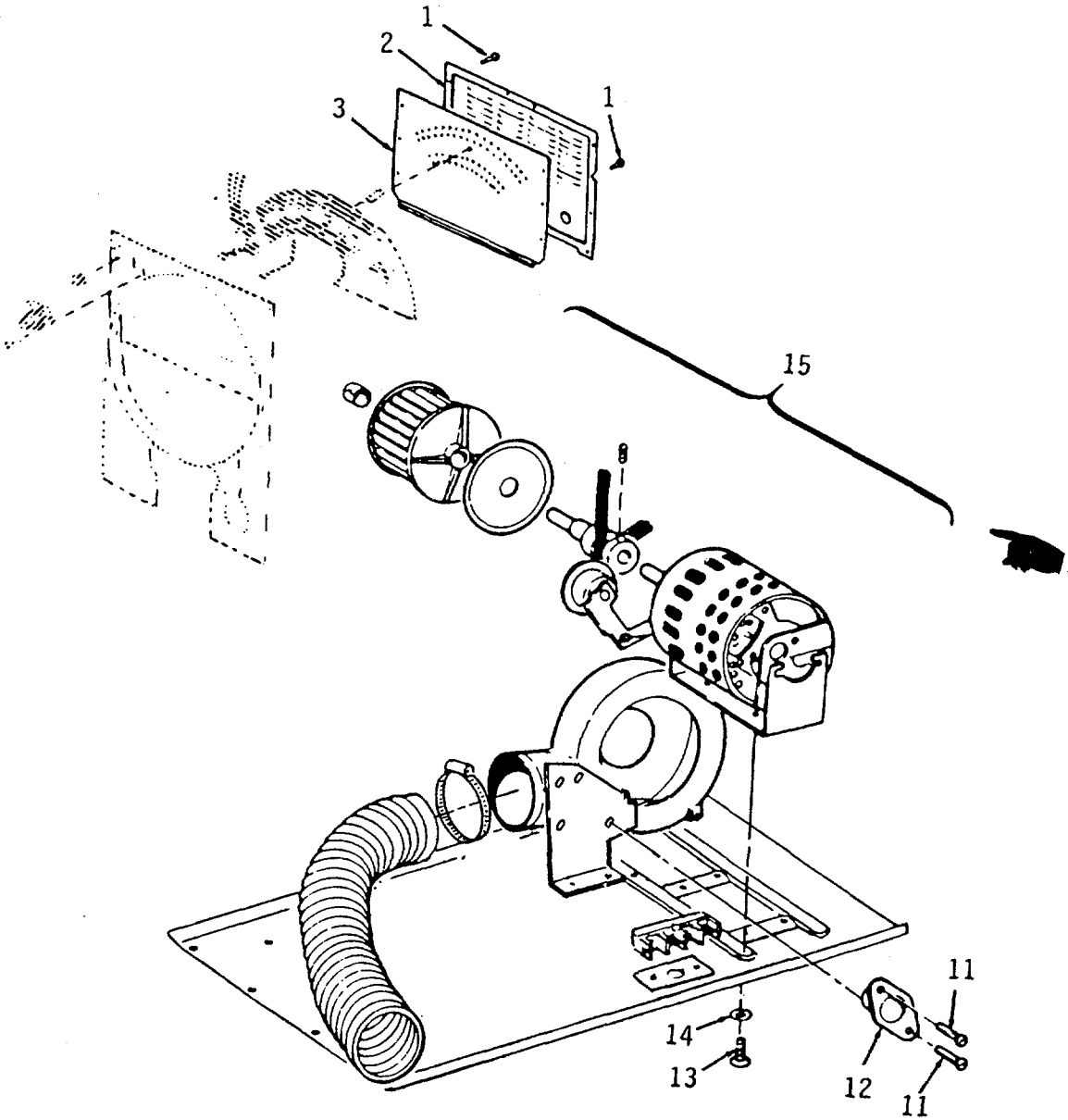
REPAIR (Cont)

	j. Heater support panel (3), vent panel (2), and screws (1)	Install.	
4. Control thermostat	a. Wiring	Disconnect.	Refer to schematic on page 4-1114.2 .
	b. Screws (11)	Remove.	
	c. Control thermostat (12)	Replace.	
	d. Screws (11)	Install.	
5. Drive	e. Wiring	Reconnect.	Refer to schematic on page 4-1114.2 .
	a. Motor wiring belt	Tag and disconnect.	
	b. Screws (13) and washer (14)	Remove.	
	c. Motor and blower assembly (15)	Remove.	

4-42.3. DRYER MECHANISM INSTRUCTIONS(Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



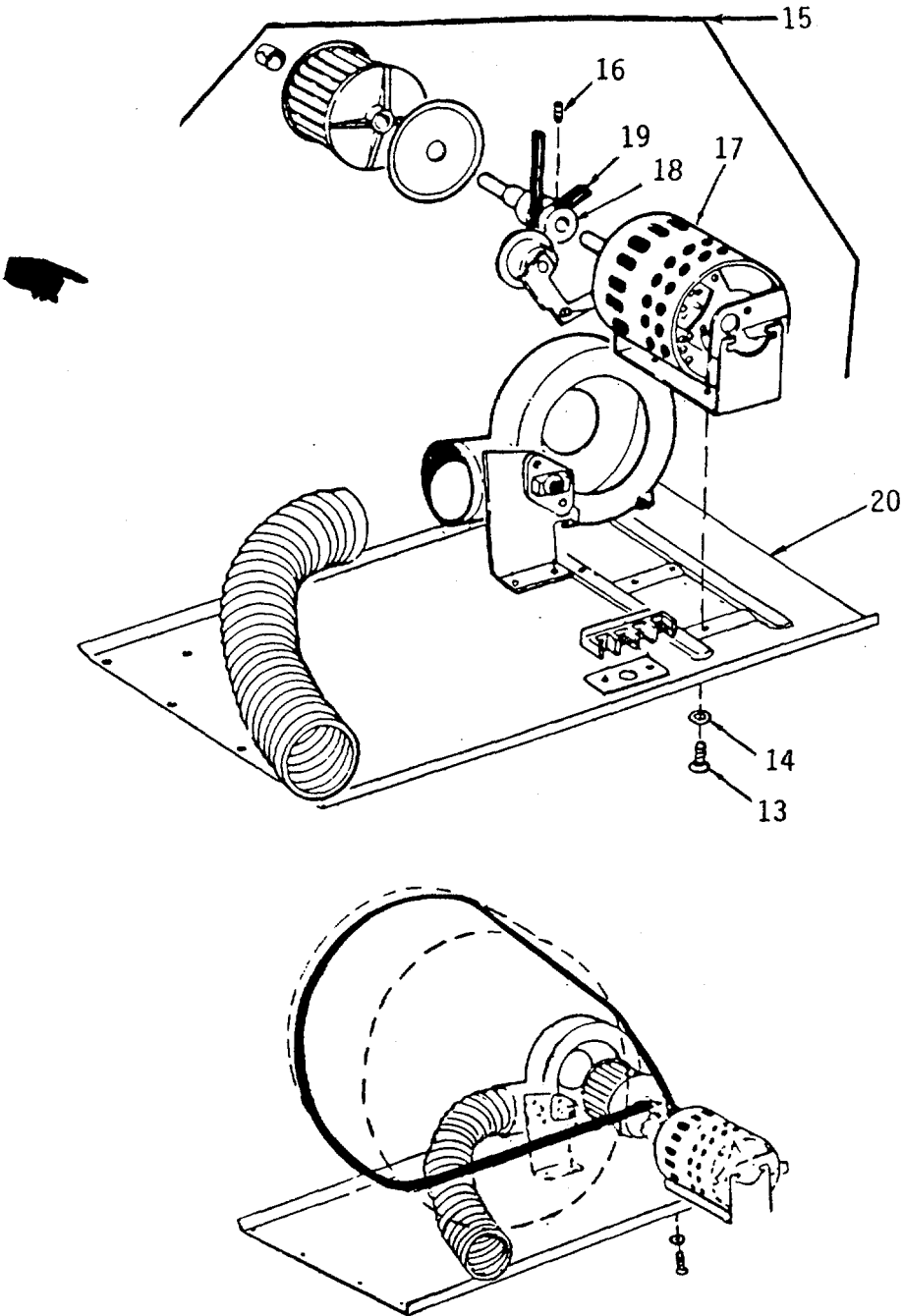
4-42.3. DRYER MECHANISM INSTRUCTIONS(Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Setscrews (16)	Remove.	
	e. Motor (17) (18).	Slide out of drive sheave	
	f. Drive belt (19)	Remove.	
	g. Drive belt (19)	Install.	
	h. Motor (17)	Insert in drive sheave (18).	
	i. Motor and blower as- sembly (15)	Place on base.	
	j. Screws (13) and washers (14)	Install.	
	k. Setscrews (16)	Tighten.	
	l. Motor wiring	Reconnect and remove tags.	Refer to sche- matic on page 4-1114.2 .

4-42.3. DRYER MECHANISM INSTRUCTIONS(Continued)

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR (Cont)



4-42.3 DRYER MECHANISM - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Repair

INITIAL SETUP:

Test Equipment

NONE

References

NONE

Special Tools

<u>Equipment Condition</u>	<u>Condition Description</u>
4-42.1	Exterior Cabinet removal.

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

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.

INSPECTIONS

- | | | |
|-------------|-----------------|----------------------------------|
| 1. Controls | a. All controls | Inspection for proper operation. |
|-------------|-----------------|----------------------------------|

NOTE

Repair of Dryer and Washer controls require removal of dryer top panel. Refer to paragraph 4-42-1.

REPAIR

- | | | | |
|----------------|---------------|---------------------|---------------------------------------|
| 2. Dryer timer | a. Wiring | Tag and disconnect. | Refer to schematic on page 4-1114.2 . |
| | b. Knob (1) | Pull off. | |
| | c. Screws (2) | Remove. | |

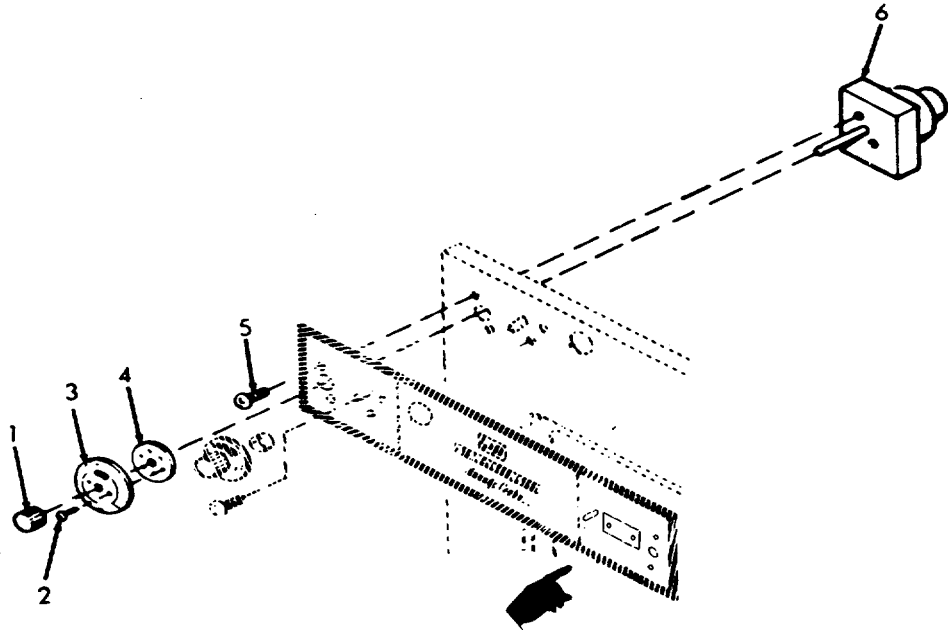
Change 1 4-1110

4-42.3. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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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 remove tags. | Reconnect and on page 4-1114.2. | Refer to schematic |

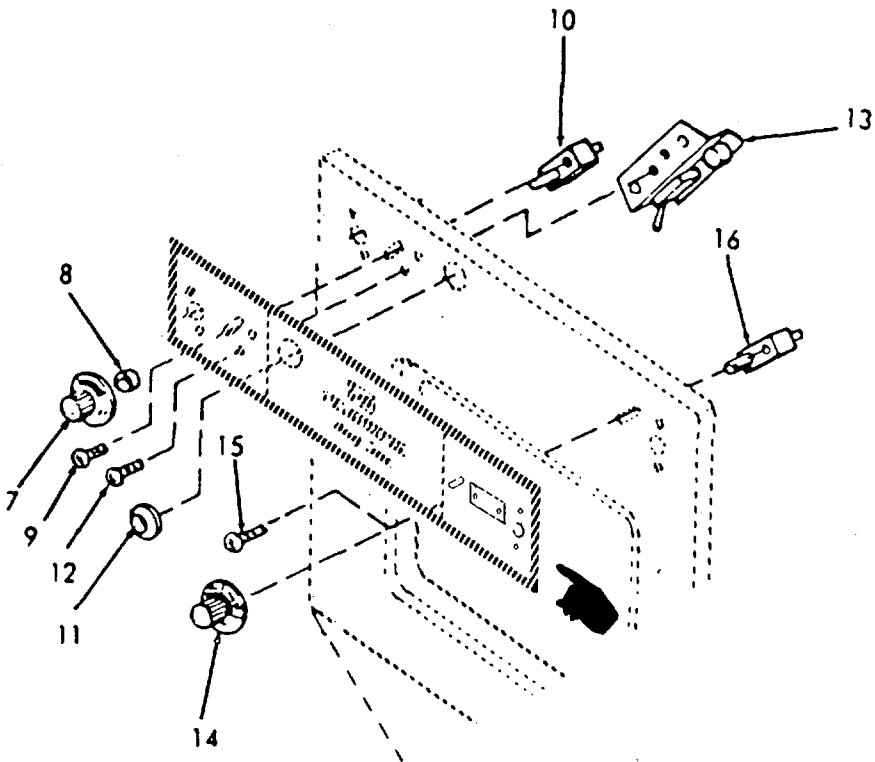


4-42.3. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
3. Dryer fabric selector switch	a. Wiring nect.	Tag and discon- on page 4-1114.2.	Refer to schematic
	b. Knob (7)	Remove,	
	c. Knob retainer clip (8)	Remove.	
	d. Screws (9)	Remove.	
	e. Switch (10)	Replace.	
	f. Screws (9)	Install.	
	g. Knob retainer clip (8) and knob (7)	Install.	
	h. Wiring	Reconnect and remove tags.	Refer to schematic on page 4-1114.2
4. Dryer door and pushbutton start switch	a. Wiring nect.	Tag and discon- on page 4-1114.2.	Refer to schematic
	b. Knob (11)	Remove.	
	c. Screws (12)	Remove.	
	d. Switch (13)	Replace.	
	e. Screws (12)	Install.	
	f. Knob (11)	Install.	
	g. Wiring remove tags.	Reconnect and on page 4-1114.2.	Refer to schematic

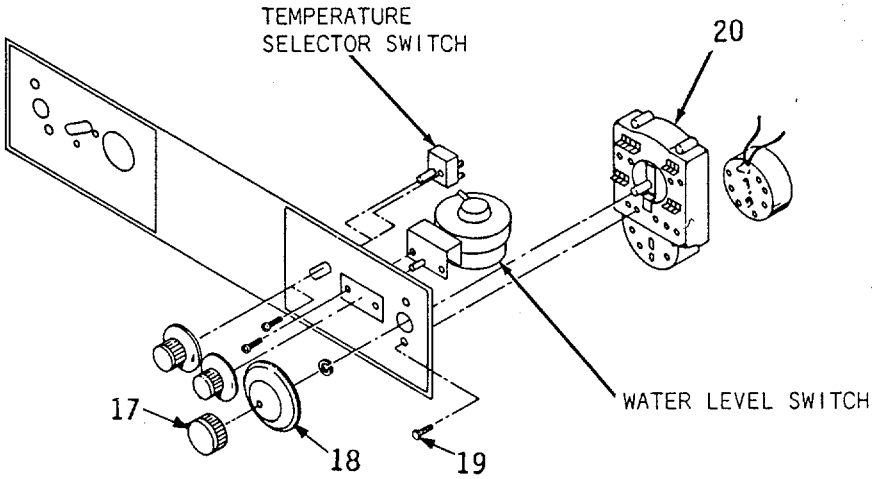
4-42.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
5. Water temperature selector switch	a. Wiring.	Tag and disconnect.	Refer to schematic on page 4-1114.3.
	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 4-1114.3.



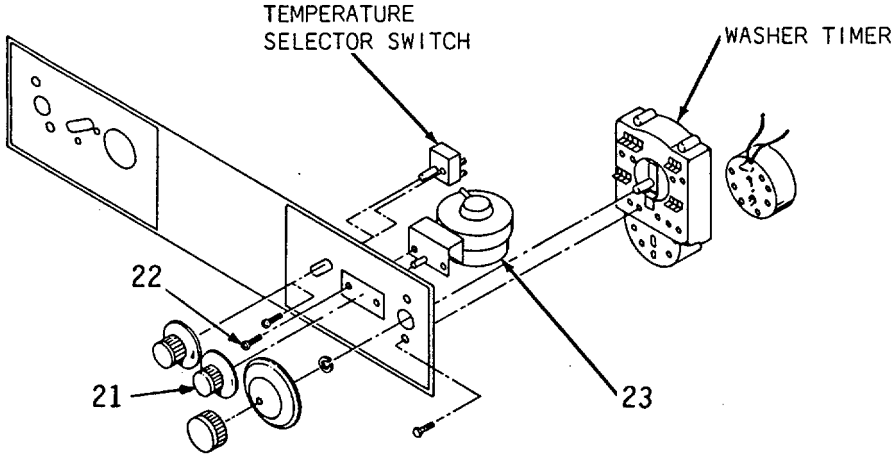
4-42.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
6. Washer Timer	a. Wiring	Tag and disconnect.	Refer to schematic on page 4-1114.3.
	b. Knob (17)	Turn counter-clockwise to remove	
	c. Dial (18)	Remove.	
	d. Screw (19)	Remove.	Transfer wires to replacement timer.
	e. Timer (20)	Remove and replace 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.	



4-42.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
7. Water level switch	a. Wiring	Tag and disconnect.	Refer to schematic on page 4-1114.3.
	b. Knob (21)	Pull off.	
	c. Screws (22)	Remove.	Transfer wires and pressure tube to replacement switch.
	d. Water level switch (23)	Remove.	
	e. Screws (22)	Install.	
	f. Knob (21)	Install.	



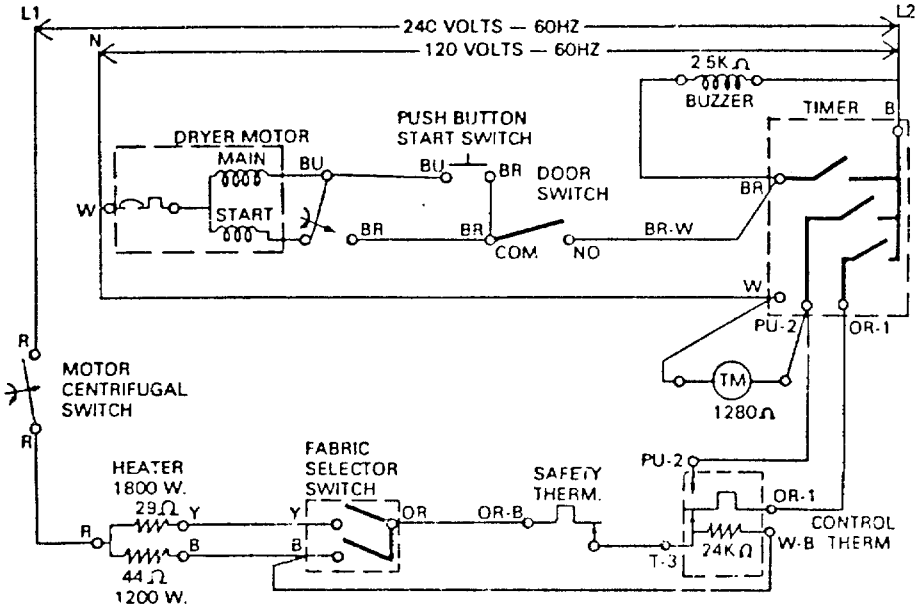
4-42.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

DRYER SCHEMATIC

B-BR	MOTOR	B-OR-1	HEATER	B-PU-2	TIMER MOTOR	SWITCH FUNCT.	TERM	MACHINE FUNCTION
							2	AUTOMATIC DRY
							4	
							6	
							8	
							10	
							12	
							14	
							16	
							18	
							20	
							22	TIMED DRY
							24	
							26	
							28	
							30	
							32	
							34	
							36	
							38	
							40	
							42	COOL DOWN
							44	
							46	
							48	
							50	
							52	
							54	
							56	COOL DOWN
							58	

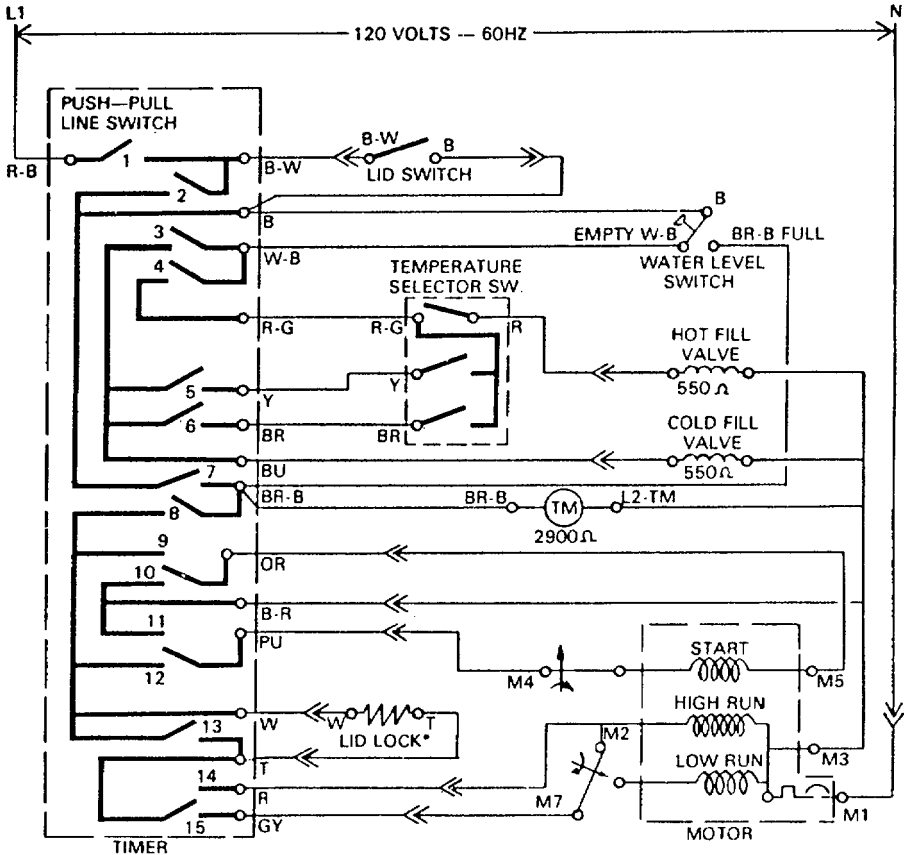


4-42.4. WASHER/DRYER CONTROLS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

WASHER SCHEMATIC



Change 1 4-1114.3/(1114.4 blank)

4-43. SANITIZING SINK HEATER - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Replace
- c. Repair
- 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
 Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------



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. Piping Inspect for leaks.
 - c. Control box Inspect for signs of damage.

4-43. SANITIZING SINK HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
2.	a. Wiring	Tag and disconnect.	
	b. Piping	Shut off. valves	
	c. Piping	Disconnect.	
	d. Heater	Replace.	
	e. Piping	Reconnect.	
	f. Wiring	Reconnect and remove tags.	
	g. Piping	Turn on. valves	

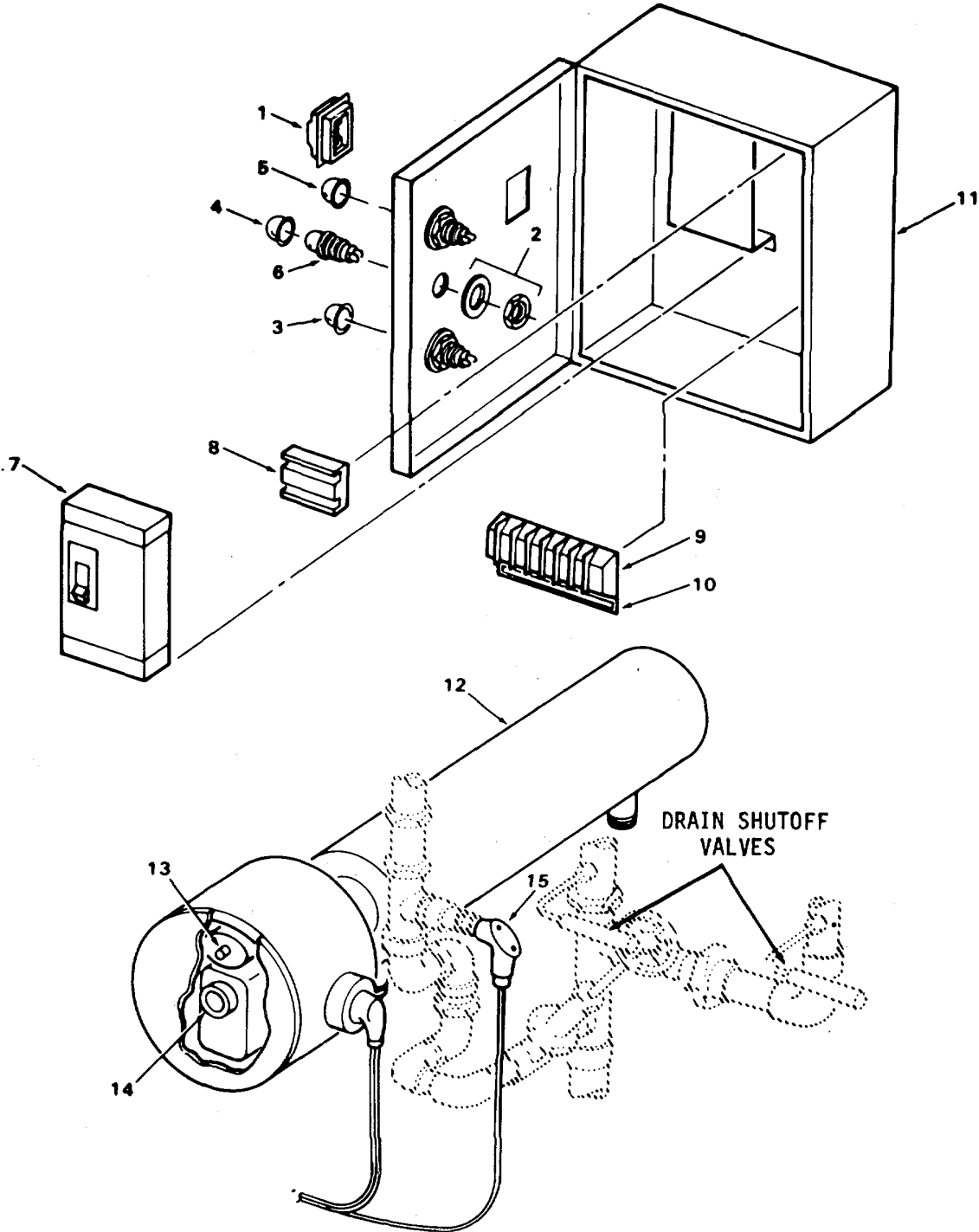
REPAIR

3. Repair or replace components as required.
- 1 Circuit breaker boot
 - 2 Lamp holder
 - 3 Red lens
 - 4 Green lens
 - 5 Amber lens
 - 6 Lamp
 - 7 20 amp 120 volt 2 pole circuit breaker
 - 8 SPDT relay
 - 9 Terminal block
 - 10 Marker strip
 - 11 Sink control heater box
 - 12 Heating element
 - 13 Thermal cutout (opens at 2050F)
 - 14 60-205°F thermostat
 - 15 180°F heater thermostwitch

4-43. SANITIZING SINK HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Repair
- c. Adjustment

INITIAL SETUP:

Test Equipment

NONE

References

NONE

Special Tools

Thermocouple or accurate oven thermometer

Equipment

<u>Condition</u>	<u>Condition Description</u>
NONE	

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
-----------------	-------------	---------------	----------------



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. |

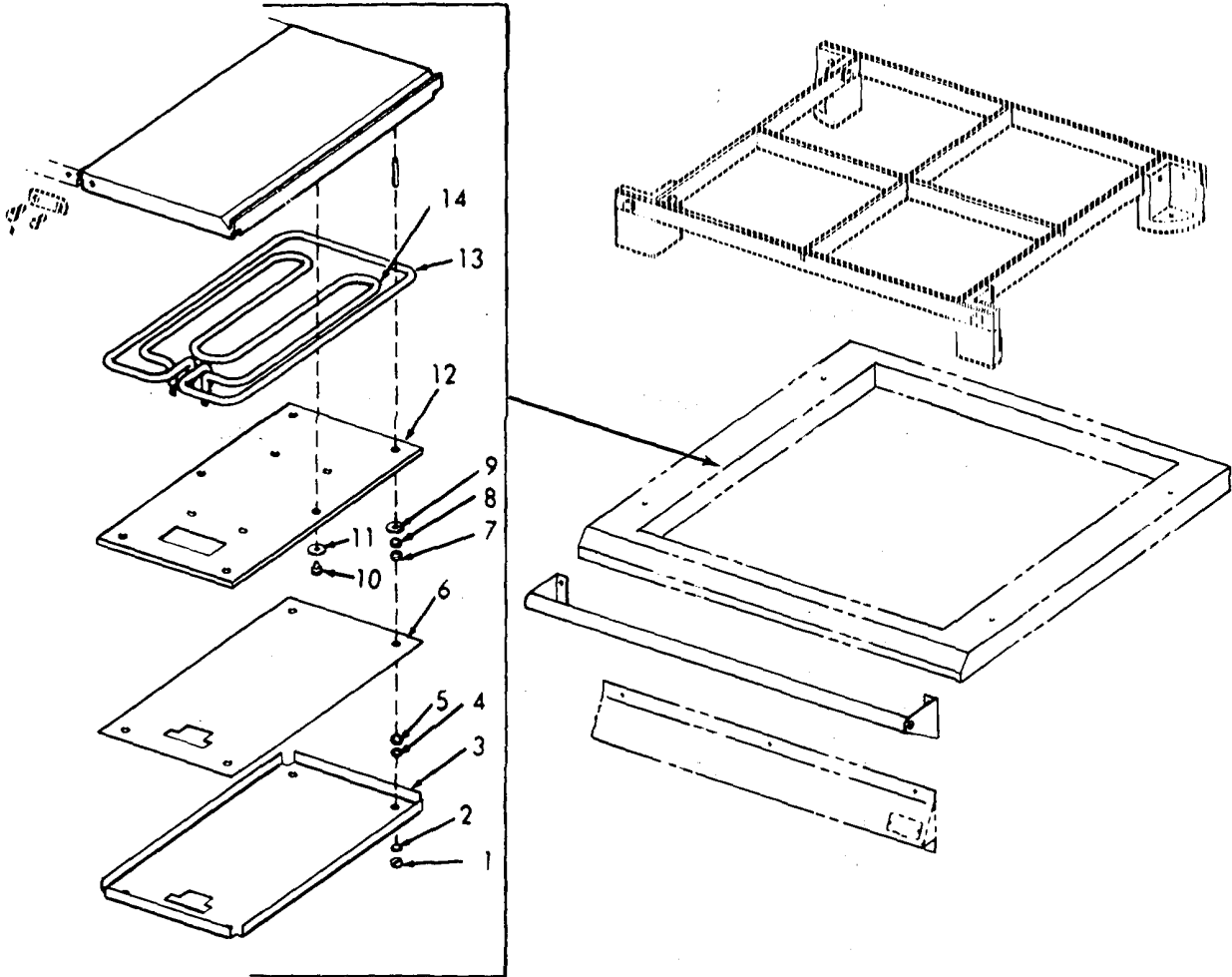
4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Cook top heating element	a. Cook top	Lift up at front and prop in a convenient 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 4-1132.

4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



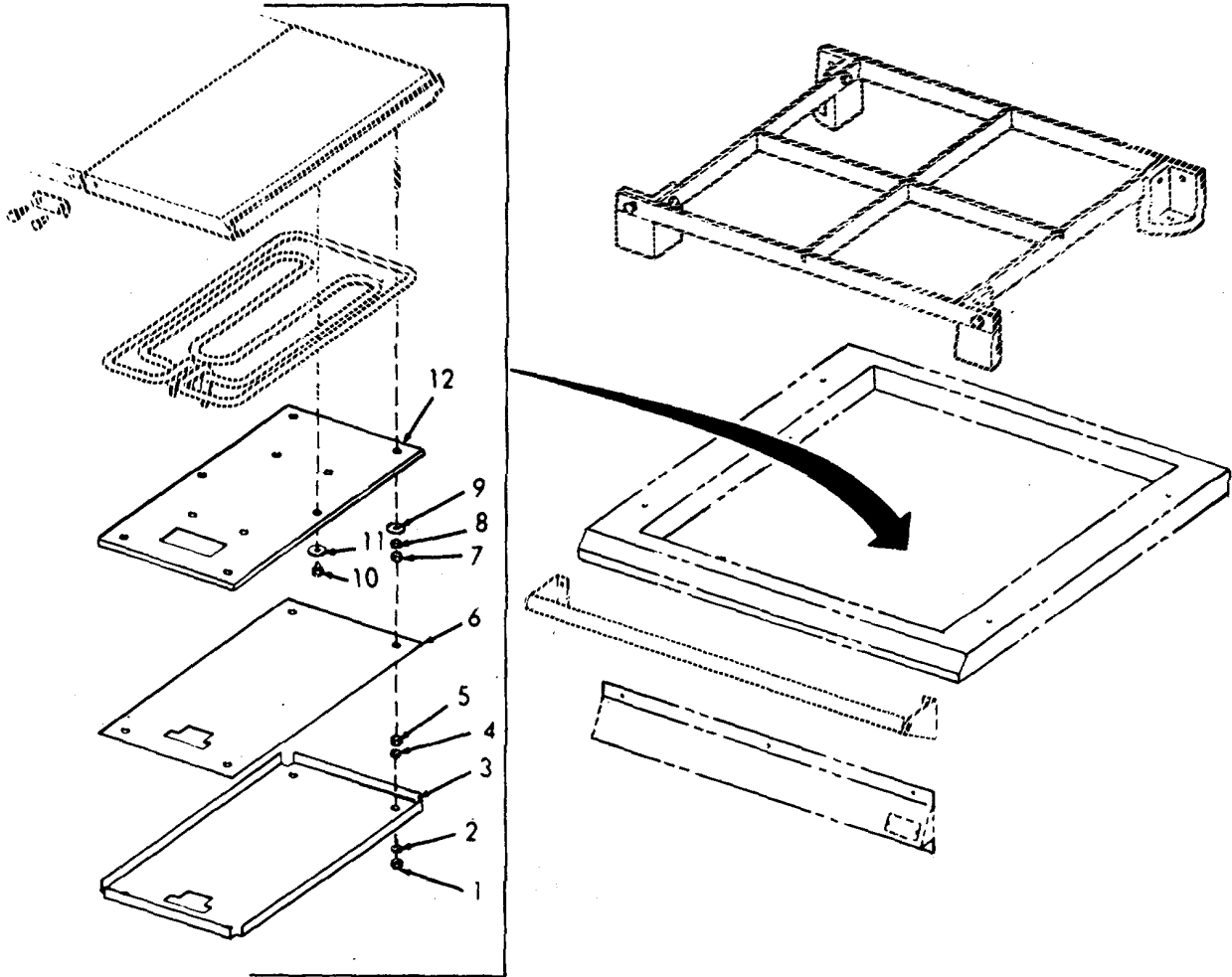
4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

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.	

4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-1123

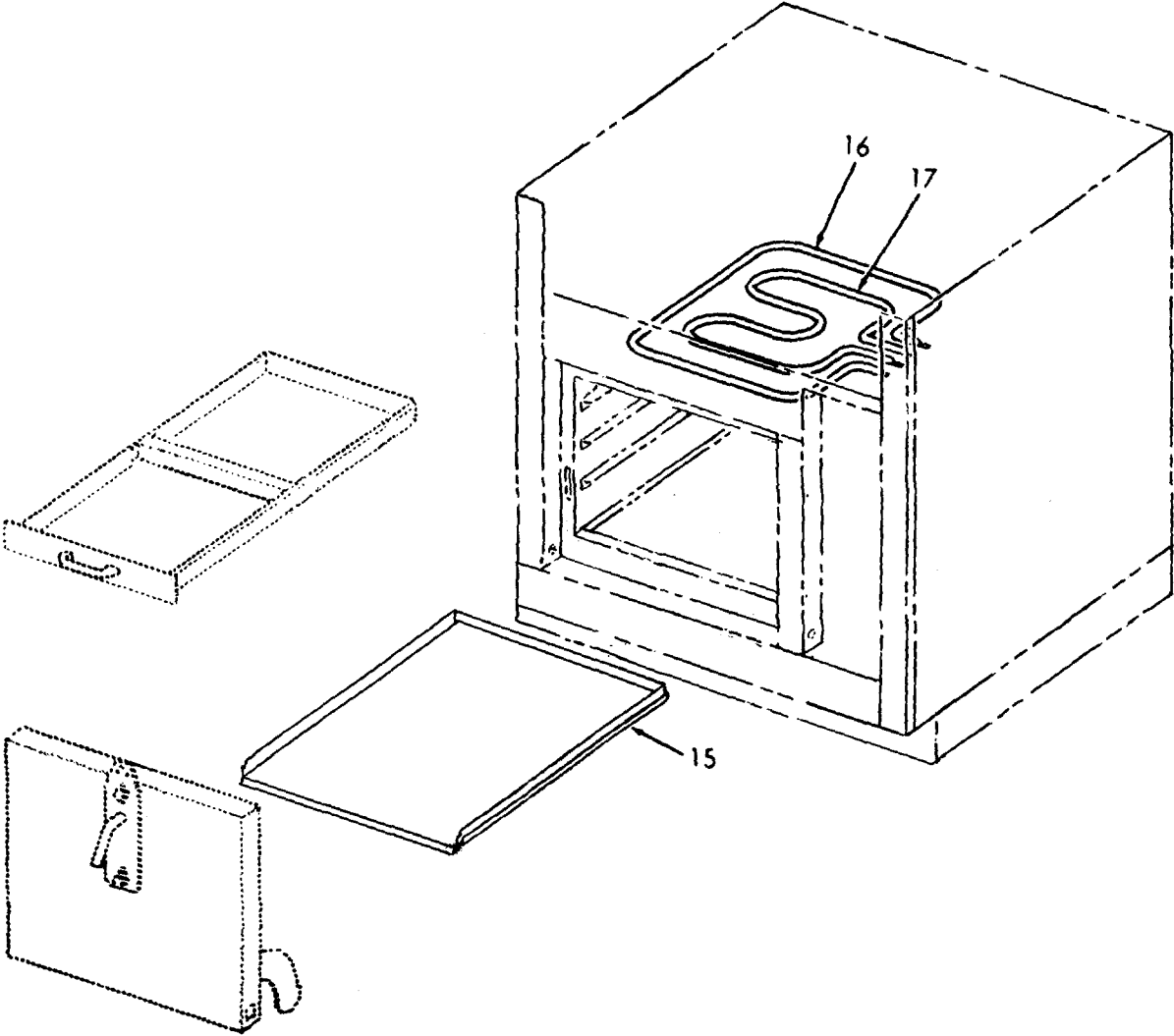
4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

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 tags.	Reconnect and remove	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.		

4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

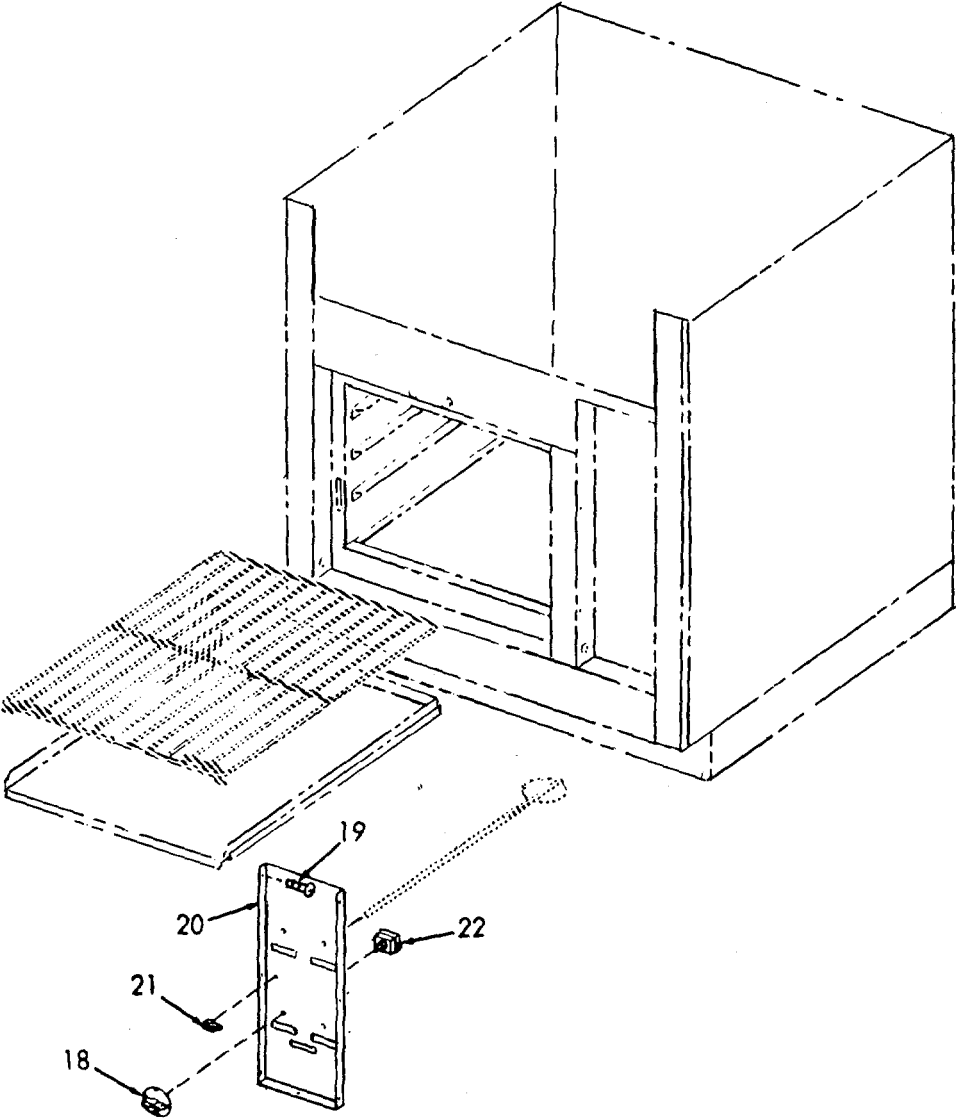
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
4. Three heat switch	a. Switch knob (18)	Pull off.	
	b. Retaining nut and washer	Remove.	
	c. Screws (19)	Remove six screws attaching control panel (20).	
	d. Allen screws and damper knob (21)	Remove.	
	e. Control panel (20)	Pull forward 20 inches (51 cm)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

4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

m. Switch knob (18) Install.



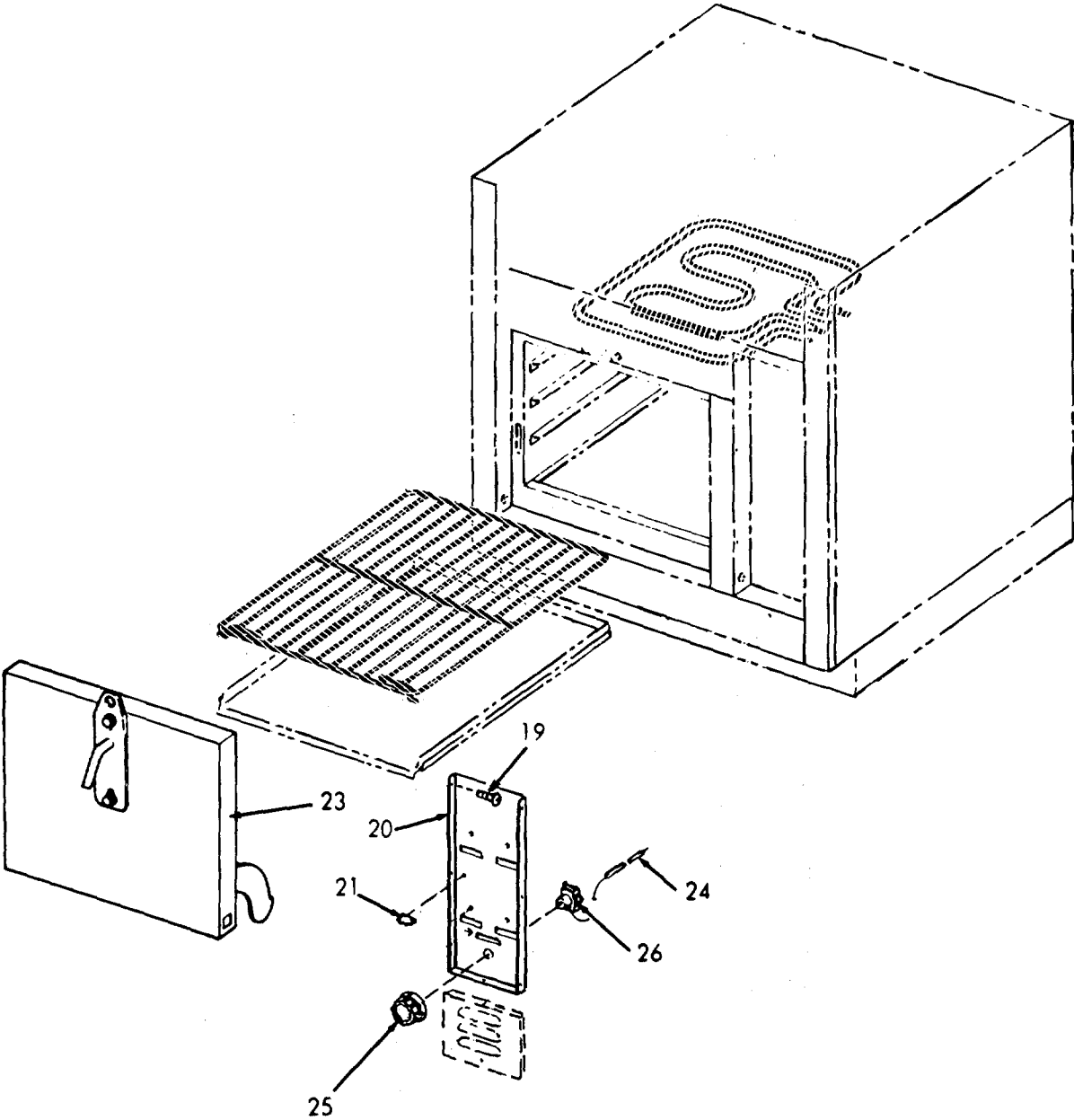
4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

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. Thermostat bulb (24)	<ol style="list-style-type: none"> 1. Slide bulb forward and clip capillary 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 4-1132.
	g. Knob (25)	Pull off.	
	h. Screws	Remove to free thermostat from control panel (20).	
	i. Thermostat (26)	Replace.	
	j. Screws (20)	Install to attach thermostat to control panel (20).	
	k. Knob (25) Install.		
l. Wiring	Reconnect and remove tags.		

4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

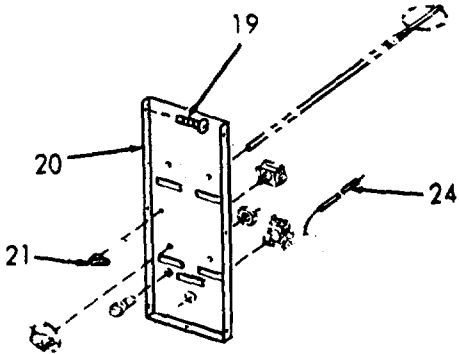
LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	m. Thermostat bulb (24)	Install.	<ul style="list-style-type: none"> a. Care should be taken during installation to avoid bending the capillary tube to a radius smaller than 2 inches (5 cm). b. Do not bend the capillary tube where it joins the thermosensing bulb.
	n. Control panel (20)	Replace.	
	o. Allen screws and damper knob (21)	Install.	
	p. Screws (19)	Install.	



4-44. 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 foremost 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 4000F.	

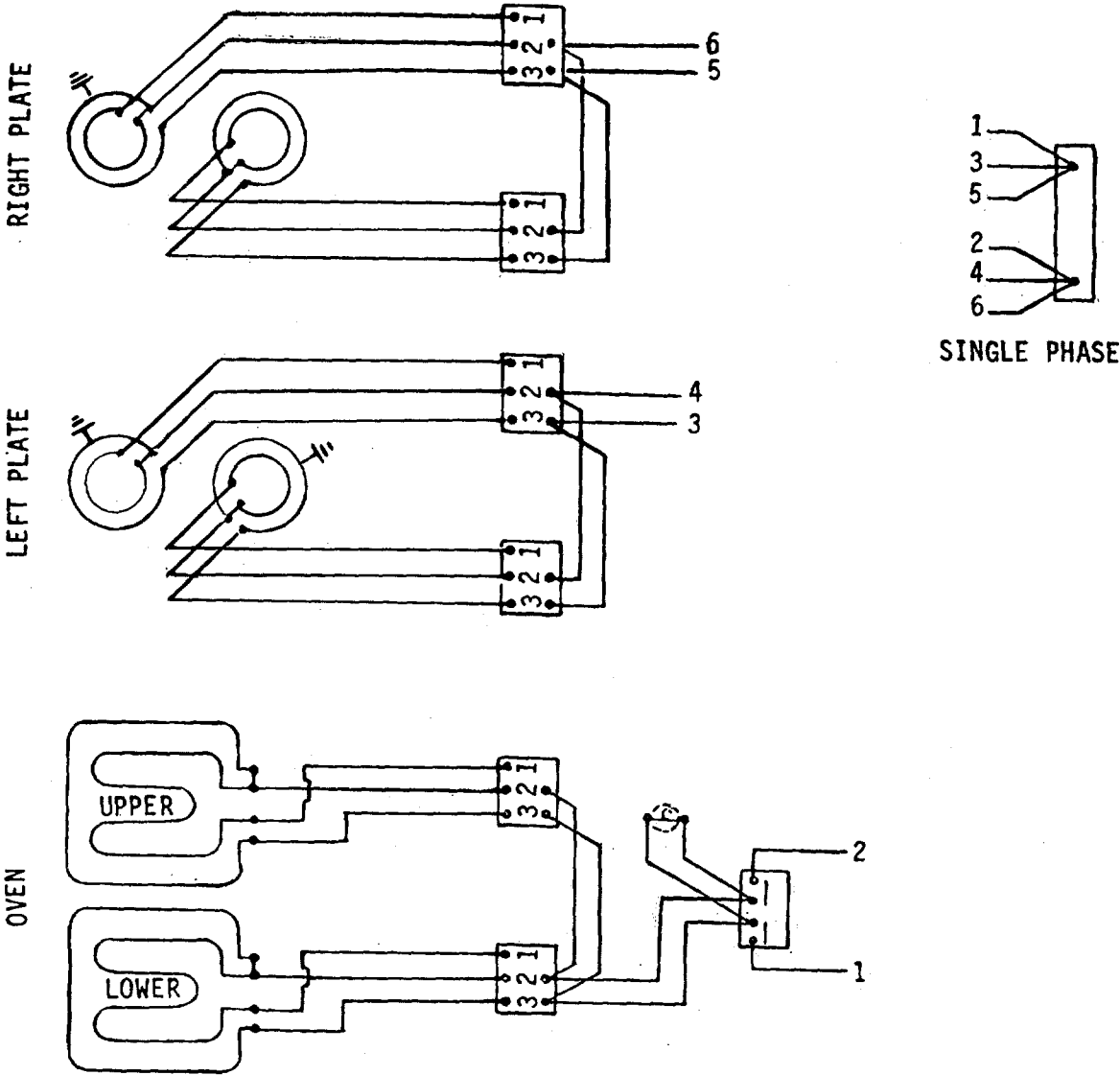
NOTE

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.

4-44. GALLEY RANGE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

ADJUSTMENT (Cont)



4-45. TOASTER - 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 in procedure.

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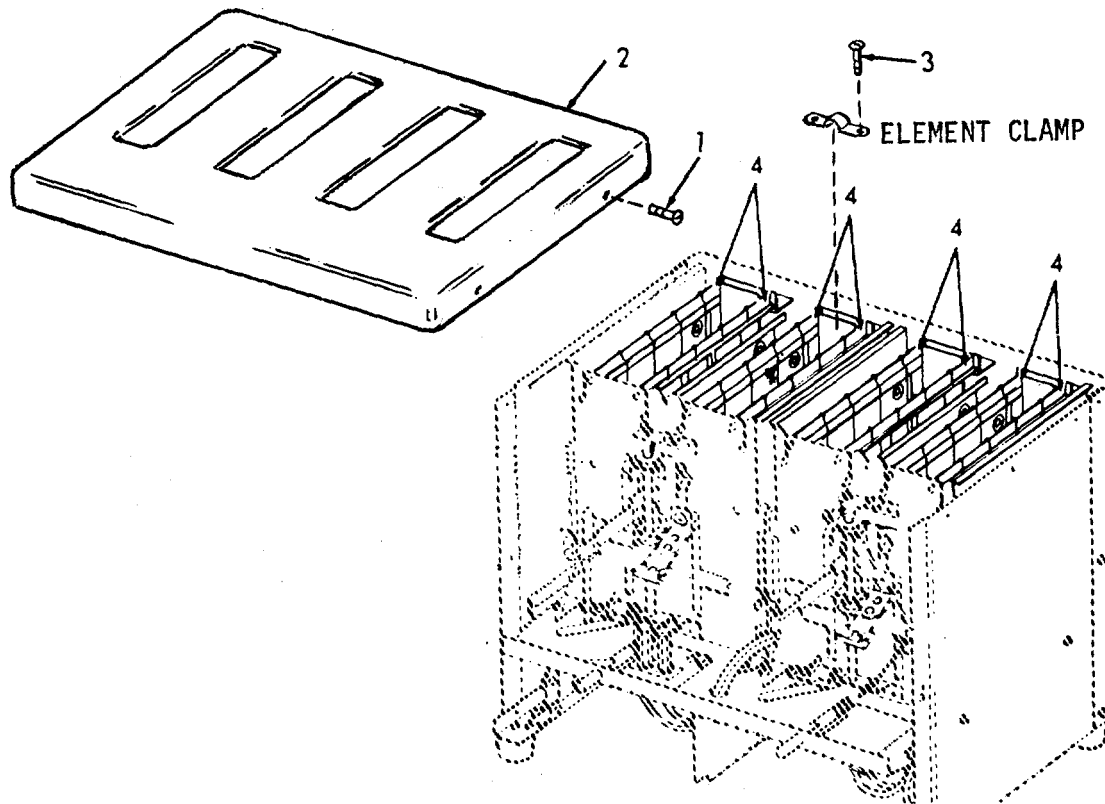
In order to prevent shock and possible injury, remove power cord from the source of electrical power.

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.

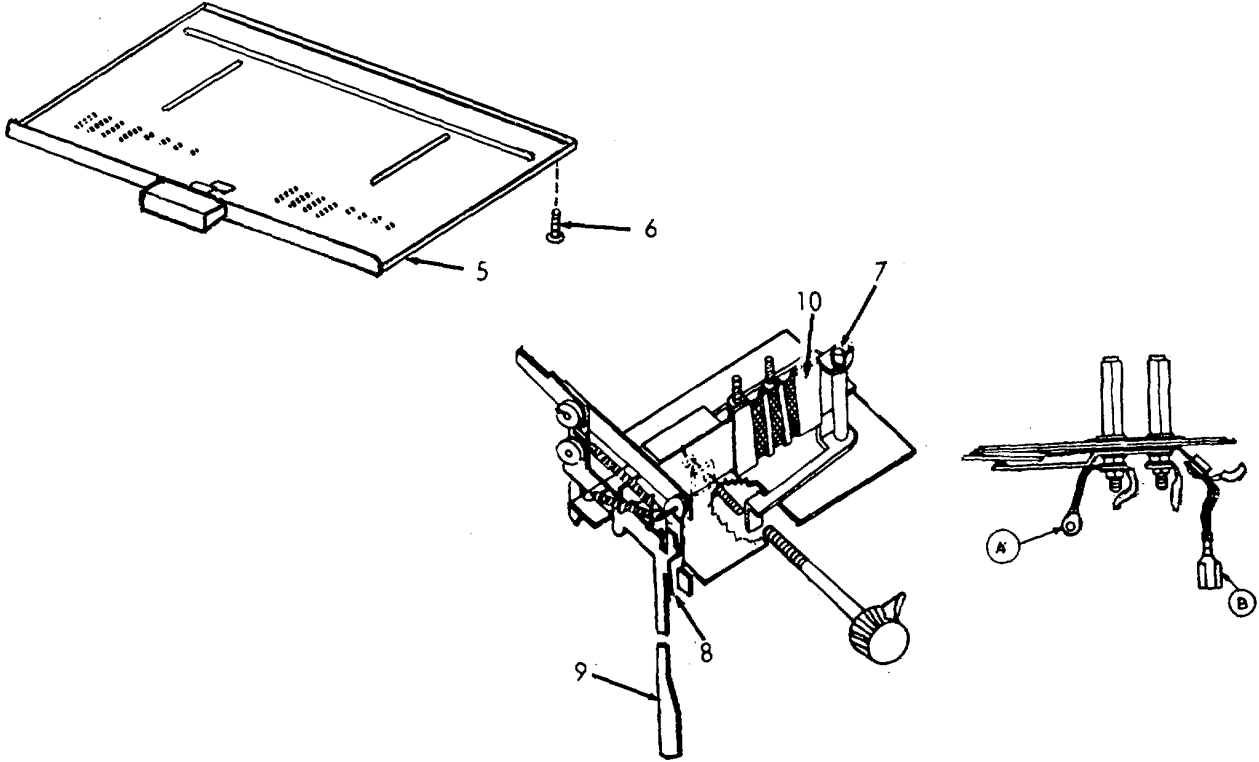
4-45. TOASTER - MAINTENANCE INSTRUCTIONS (Continued).

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.	



4-45. 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)	<ol style="list-style-type: none"> 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.	

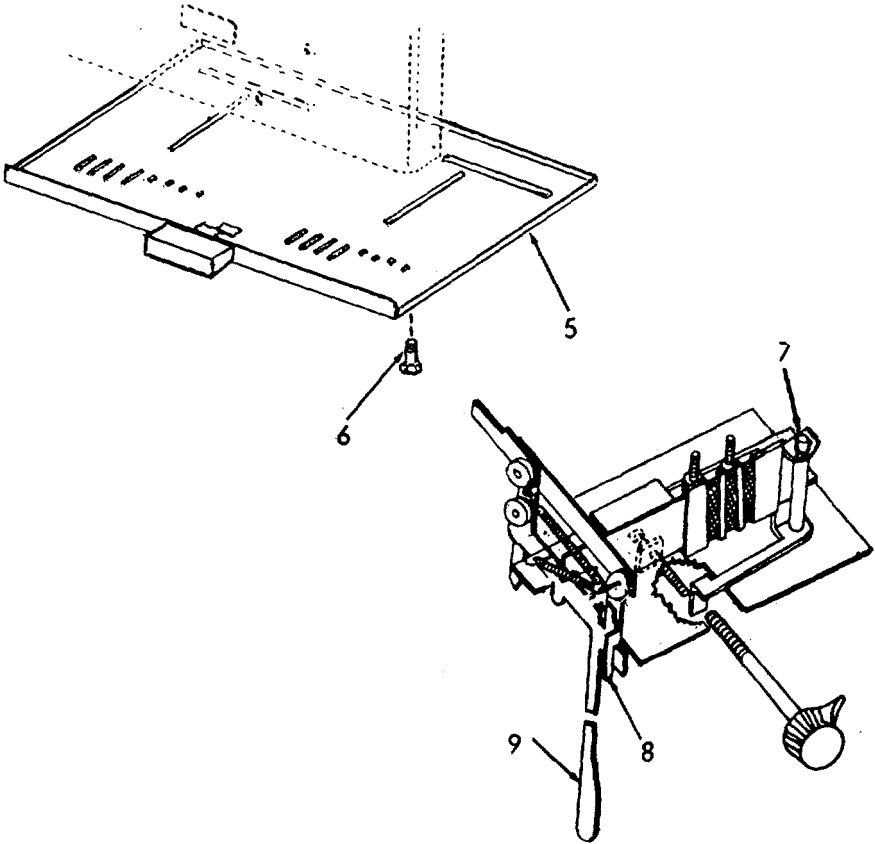


4-45. TOASTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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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.

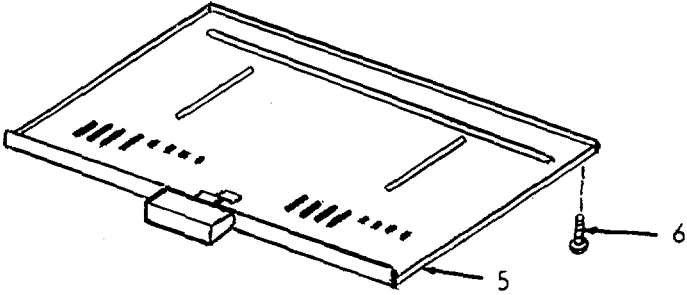
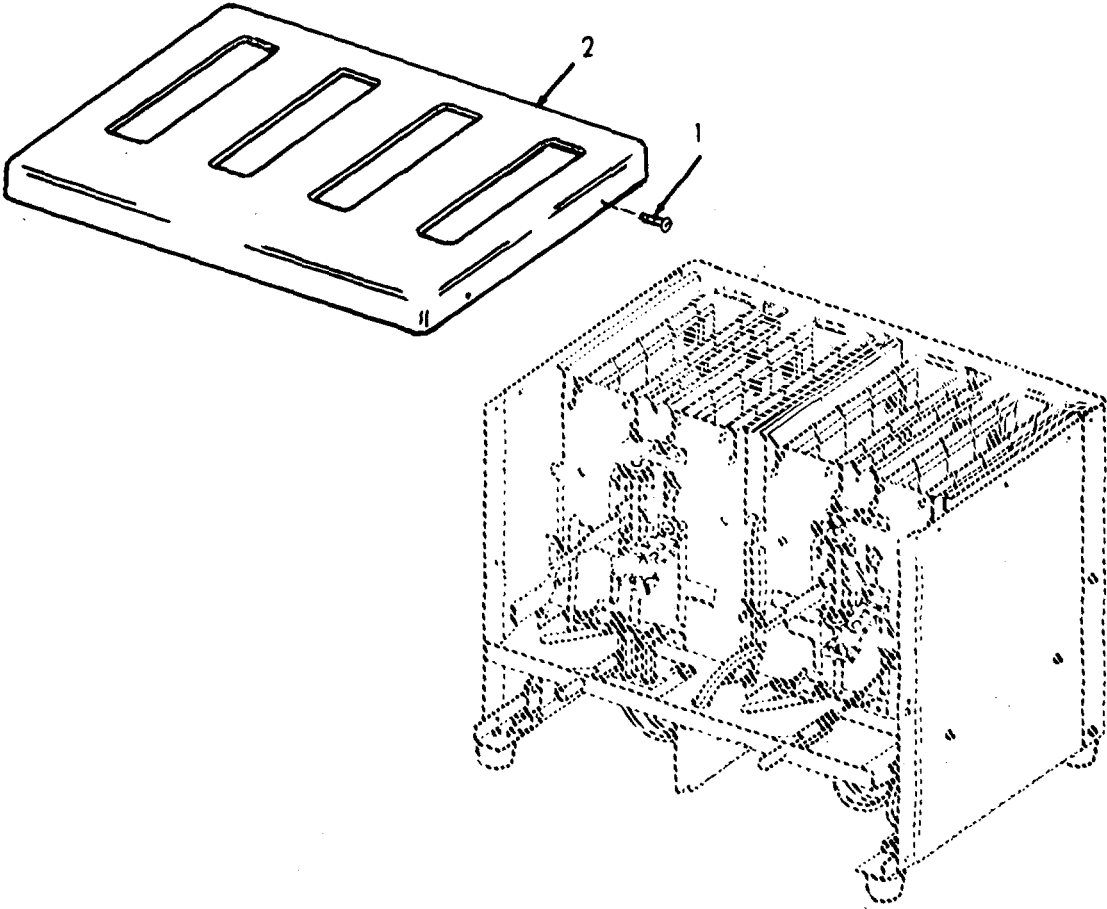


4-45. TOASTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

- 4. Timing unit
 - a. Screws (1) Remove.
 - b. Top (2) Lift off.



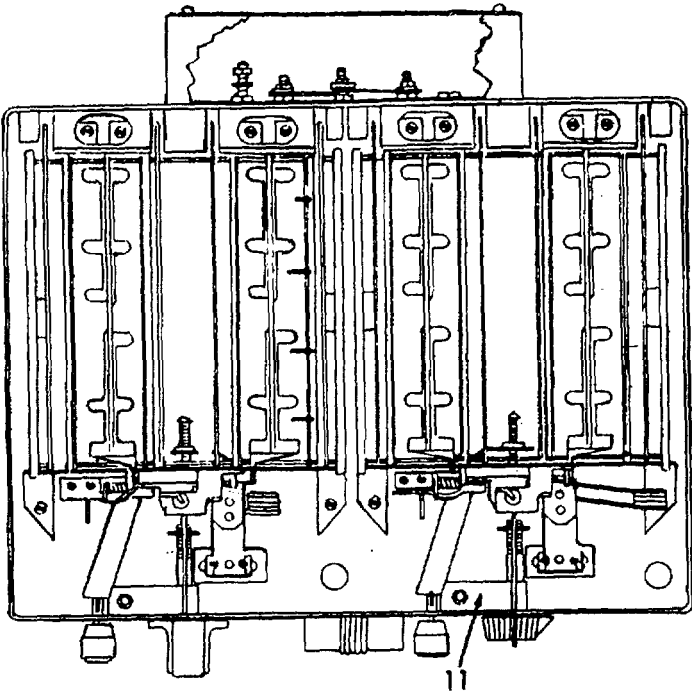
- c. Screws (6) and crumb tray (5) Remove.

4-45. TOASTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

- d. Friction spring (11) Remove.
- e. Wiring Remove three wires.
- f. Screws Remove screws that hold timer in place.

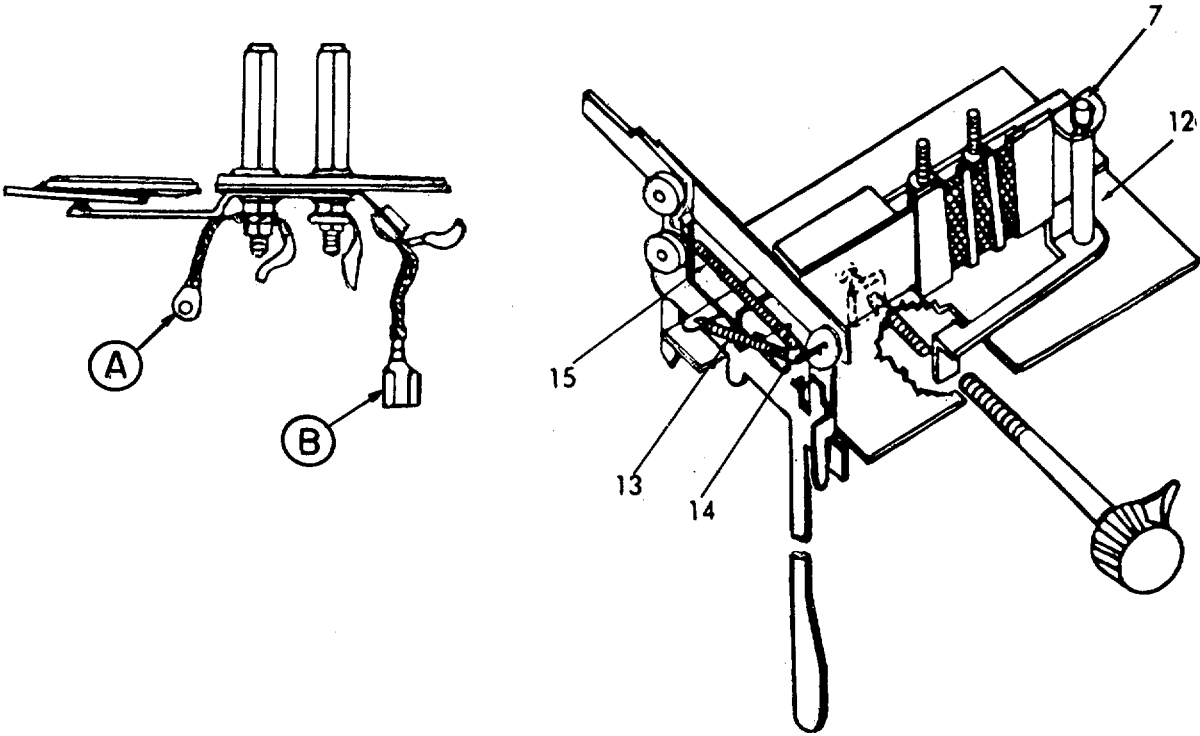


4-45. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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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).

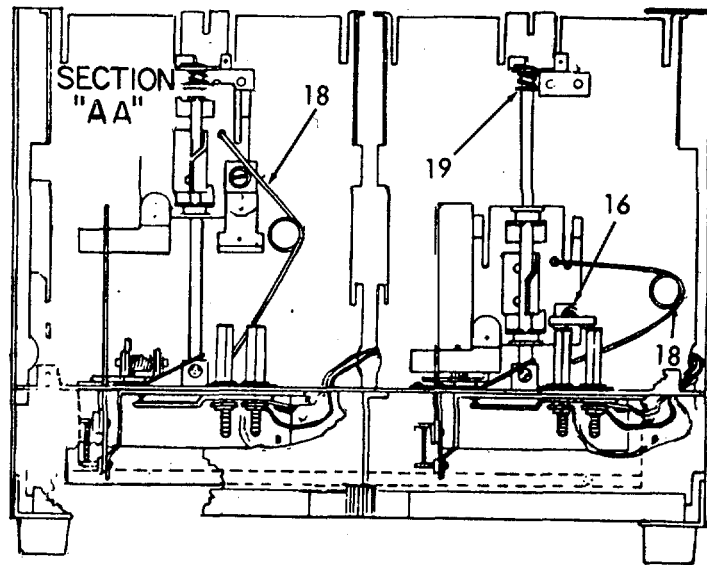


4-45. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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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. | |

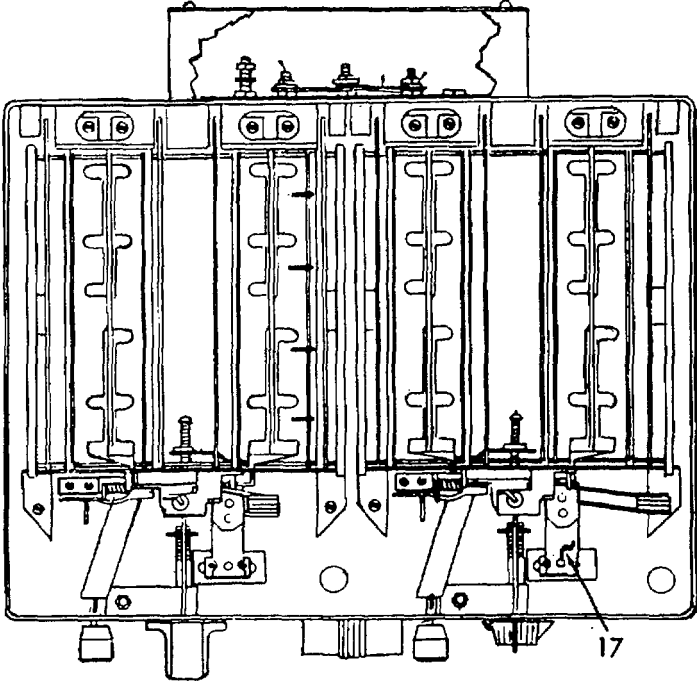


4-1140

4-45. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-1141

4-45. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

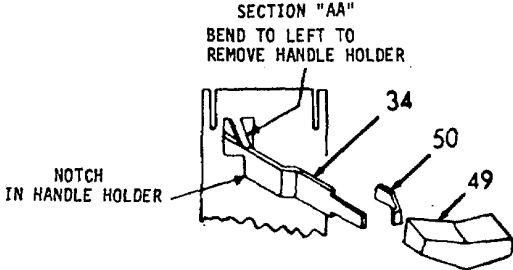
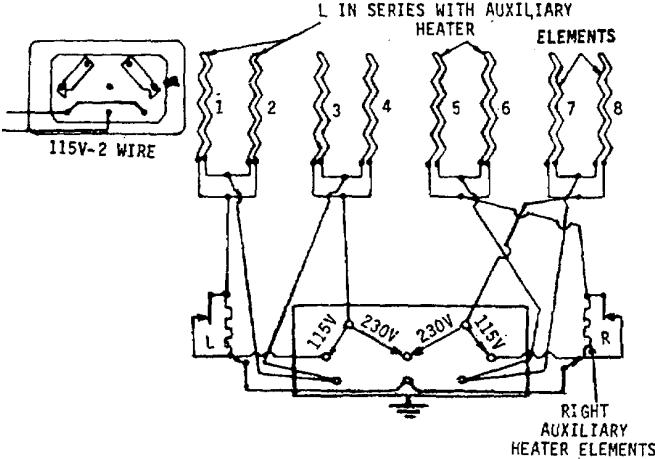
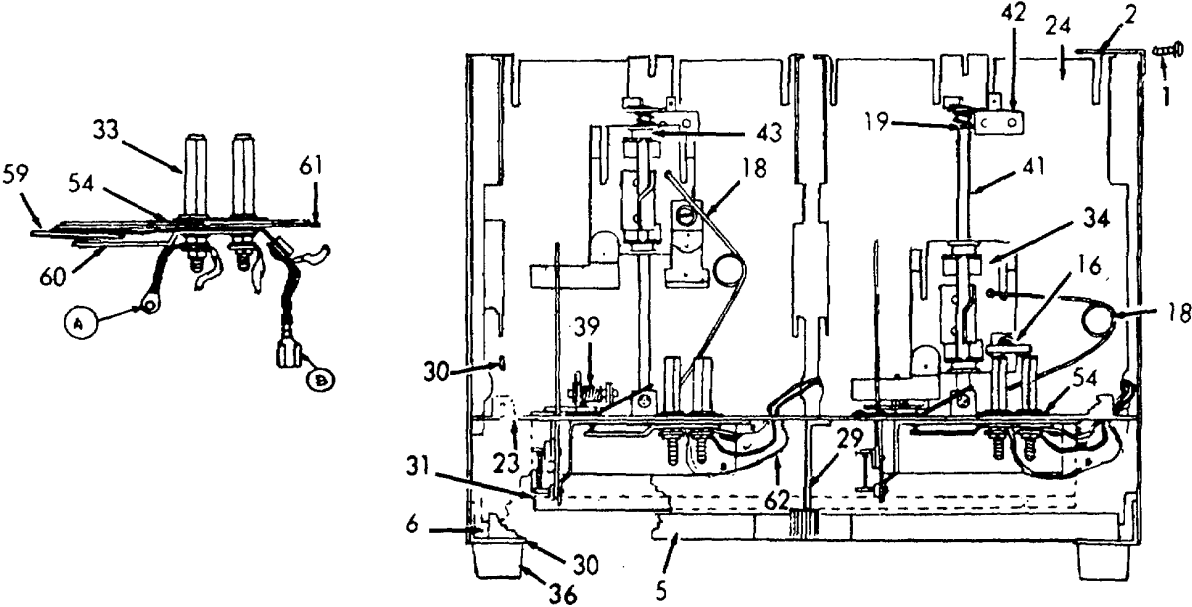
1	Screws		
2	Top		
5	Crumb tray less handle		
6	Crumb tray screws		
16	Switch screw and lockwasher		
18	Pop-up spring		
19	Bumper spring		
23	Inside bottom		
24	Front Baffle		
29	Bottom section baffle		
30	End spacers		
31	Back wire cover		
33	Bottom stud with contact		
34	Basket slide with handle holder 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		

4-1142

4-45. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-45. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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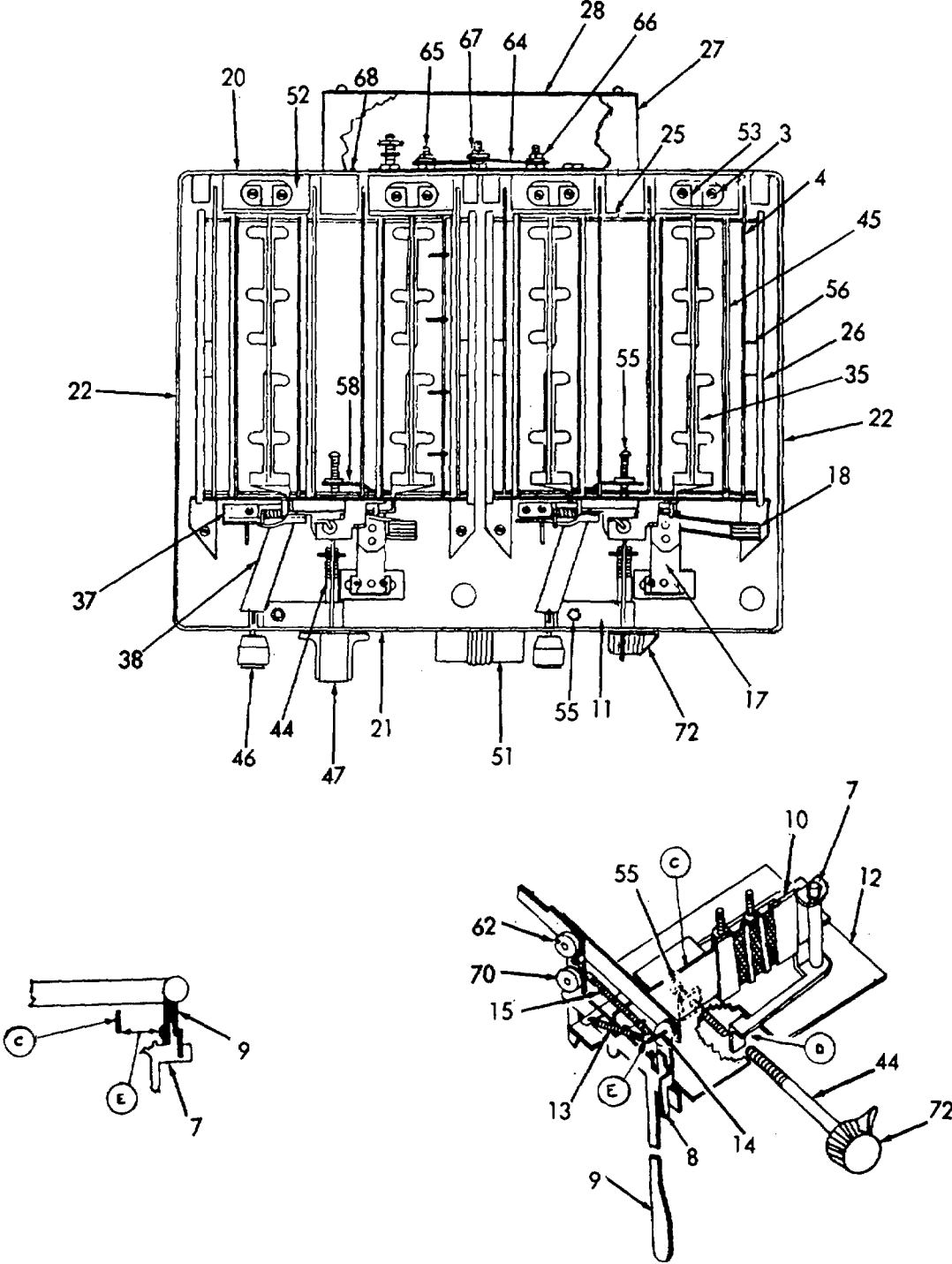
REPAIR (Cont)

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	Auxiliary heater for bread toaster
11	Friction spring
12	Timer bracket with stud
13	Springs
14	Screw 3/48 x 1/2
15	Springs
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

4-45. TOASTER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-46. 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.

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Fire Fighting System	4-46.1
Fire Alarm Panel	4-46.2
Cylinder Assembles	4-46.3

WARNING

- Fire extinguishing agent is hazardous and toxic to humans. Do not breathe halon.
- 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.
- Engine Room: Flashing light and a horn will sound when halon system is activated.

Change 1 4-1147

4-46.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS

This task covers:

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

INITIAL SETUP:

Test Equipment

Volt-ohm meter

References

Paragraph
4-46.2 Fire Alarm Panel
4-46.3 Cylinder

Special Tools

NONE

Equipment

<u>Condition</u>	<u>Condition Description</u>
NONE	

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

3

General Safety Instructions

Observe WARNINGS in para 4-46.

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. System	a. General	<ol style="list-style-type: none"> 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 sensors	Inspect for signs of damage.	

4-46.1. 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 4-46.3 .
	e. Nozzle	Check that nozzle has not been moved.	
	f. Fire alarm panel	Inspect.	Refer to para 4-46.2 .
	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 sensors		Wipe head with a cotton swab, or soft cloth and water.	
3. Fire alarm panel		Refer to para 4-64.2 .	
4. Cylinders		Refer to para 4-46.3 .	

4-46.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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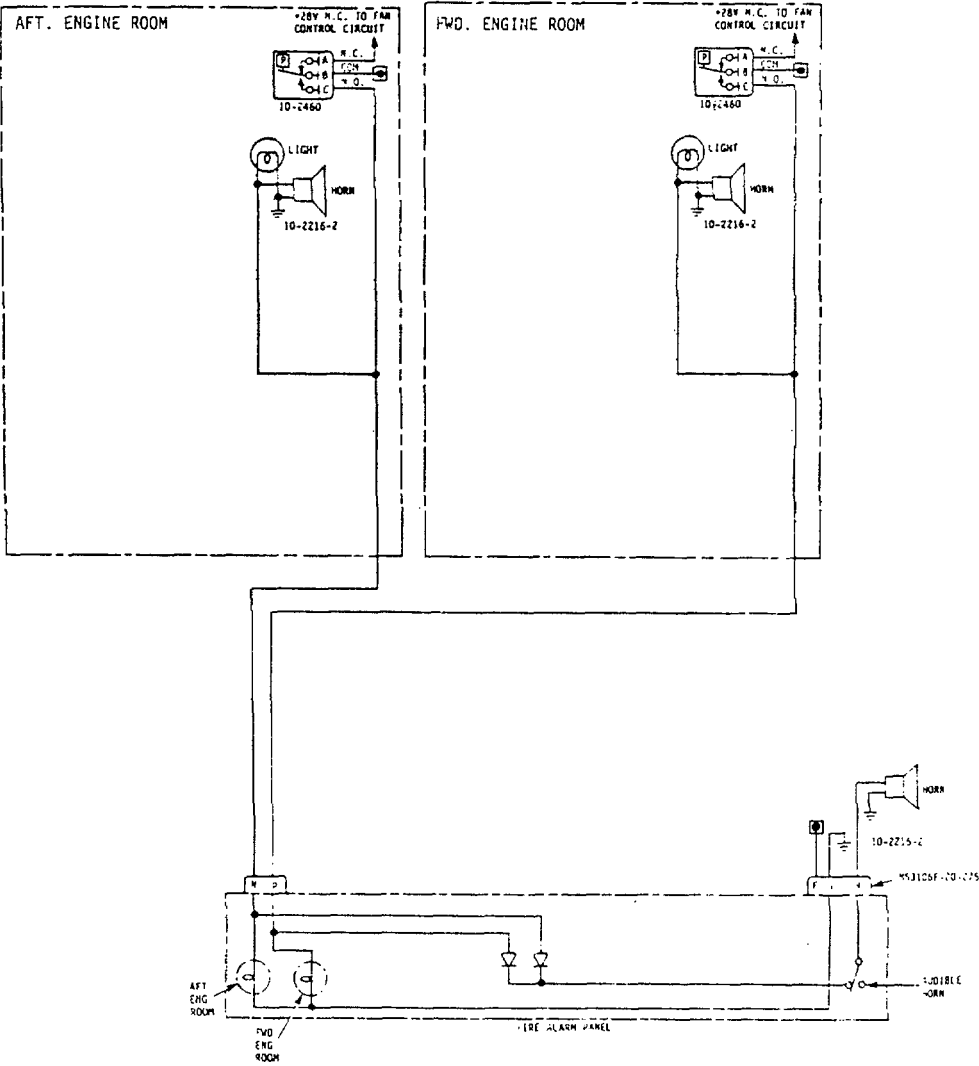
TEST

5. System

NOTE

For overall test procedures refer to paragraph 4-46.2.

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



4-46.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

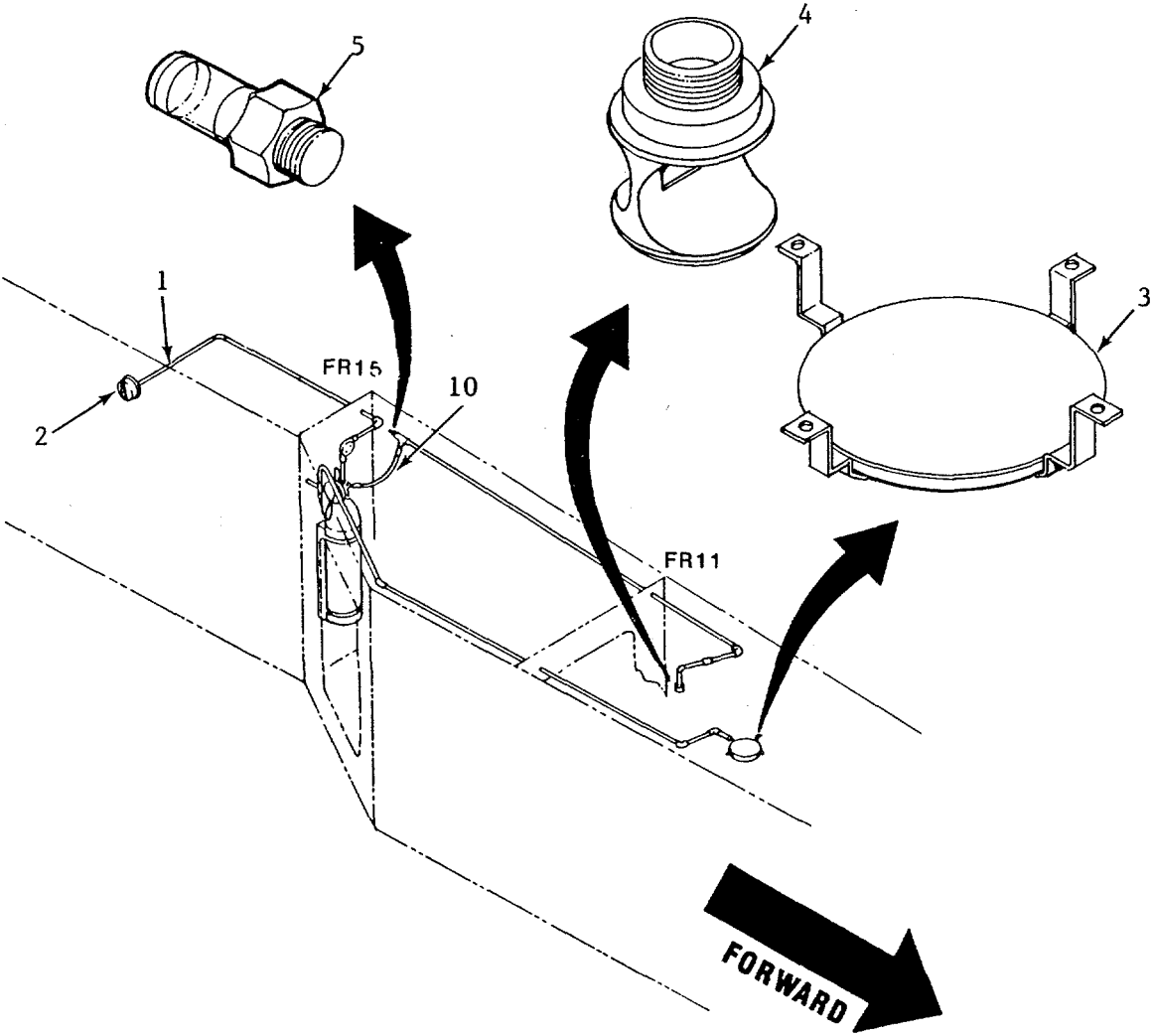
LOCATION	ITEM	ACTION	REMARKS
REPLACE			
6. System	a. Utility cable 8 feet long (1)	Replace	As required.
	b. Pull box handle (2)	Replace	As required.
	c. Heat sensor (3)	Replace	As required.
	d. Nozzle (4)	Replace	As required.
	e. Discharge indicator (5)	Replace	As required.
	f. Utility cable 35 feet long (6)	Replace	As required.
	g. Utility cable 8 feet long (7)	Replace	As required.
	h. Pressure operated switch (8)	Replace	As required.
	i. Pull box handle (9)	Replace	As required.
	j. Hose assembly (10)	Replace	As required.

Change 1 4-1151

4-46.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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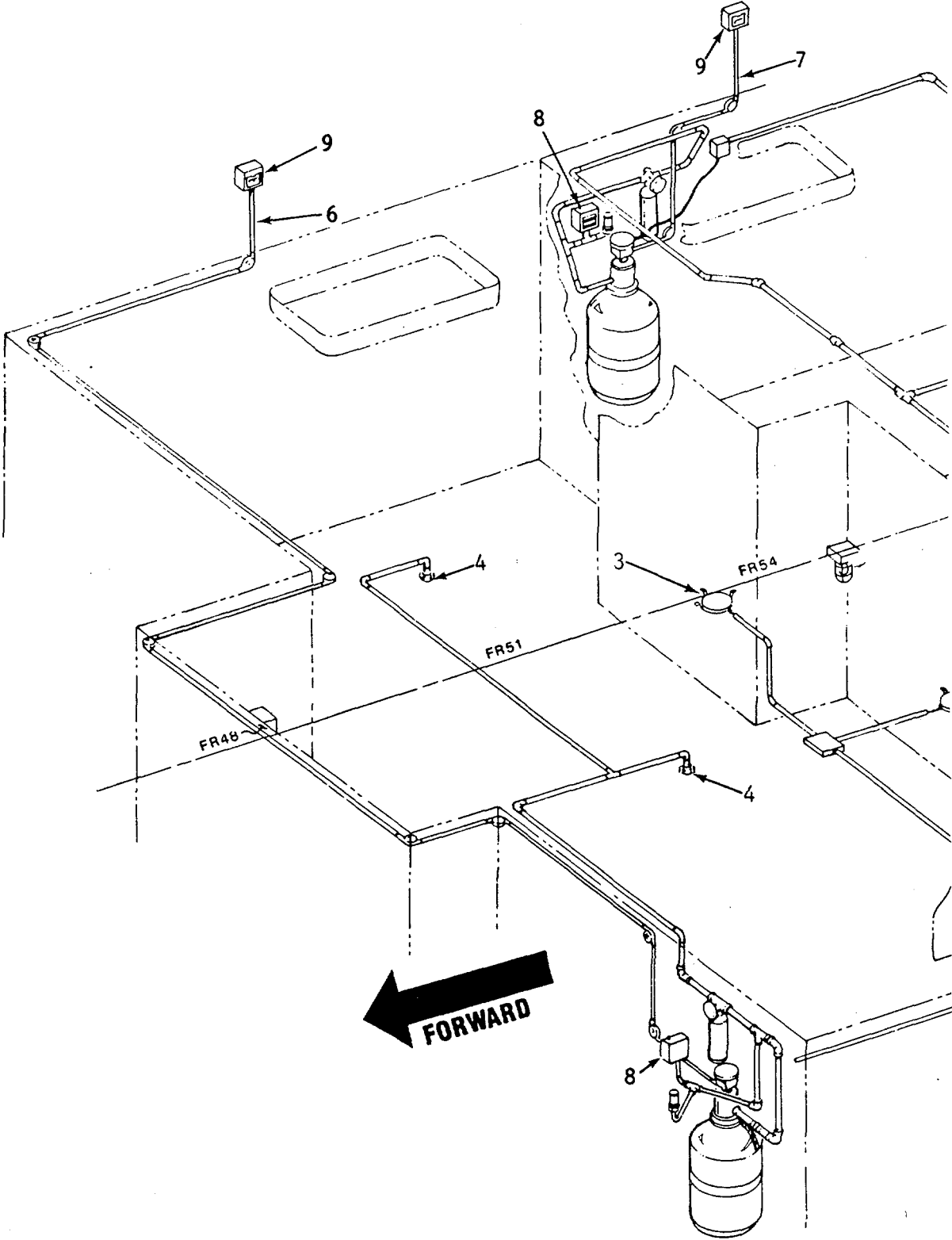
REPLACE (Cont'd)



4-46.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION ITEM ACTION REMARKS

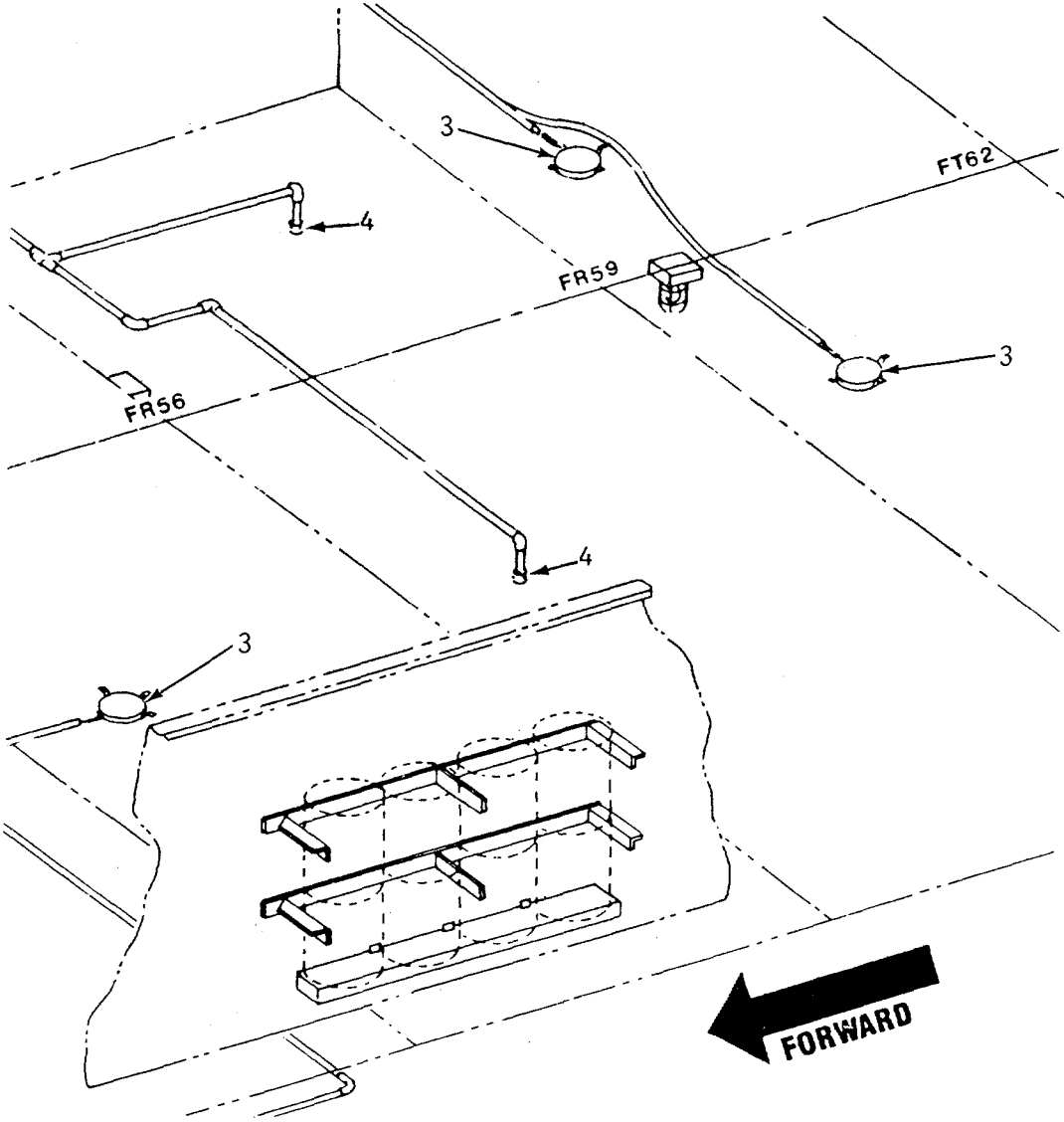
REPLACE (Cont'd)



4-46.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont'd)



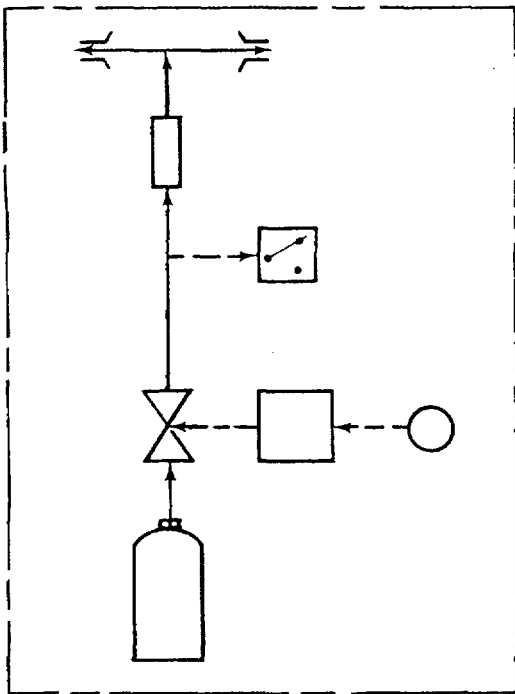
4-46.1. FIRE FIGHTING SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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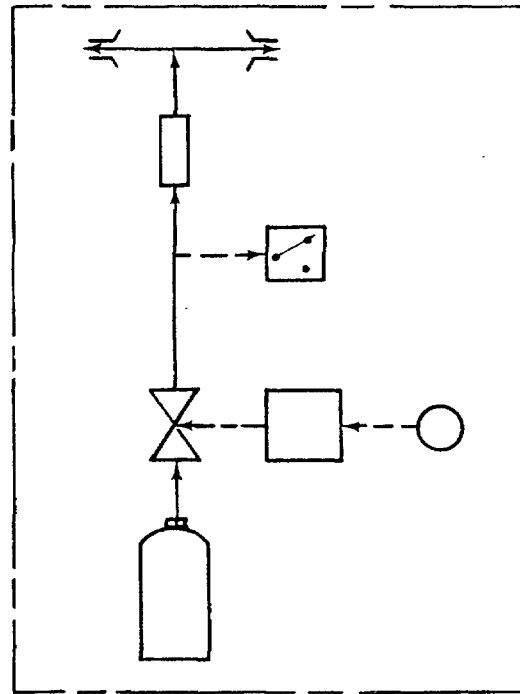
REPLACE (Cont'd)

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

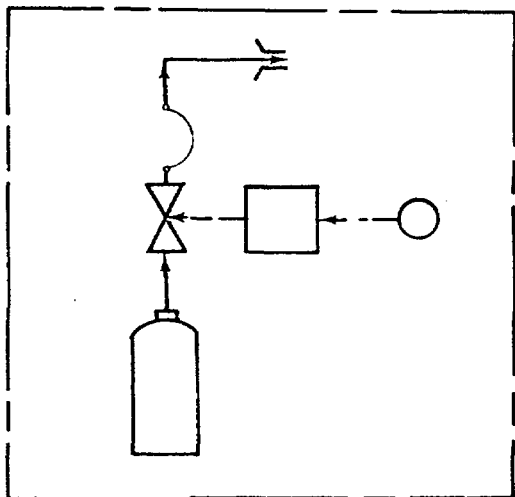
AFT. ENGINE ROOM











FWD. ENGINE ROOM



FLAMMABLE LIQUIDS STRM.



LEGEND

-  NOZZLE
-  CYLINDER VALVE
-  PRESSURE ACCUMULATOR
-  PRESSURE SWITCH
-  HOSE ASSEMBLY
-  HEAT SENSOR
-  PNEUMATIC CONTROL HEAD
-  HALON CYLINDER

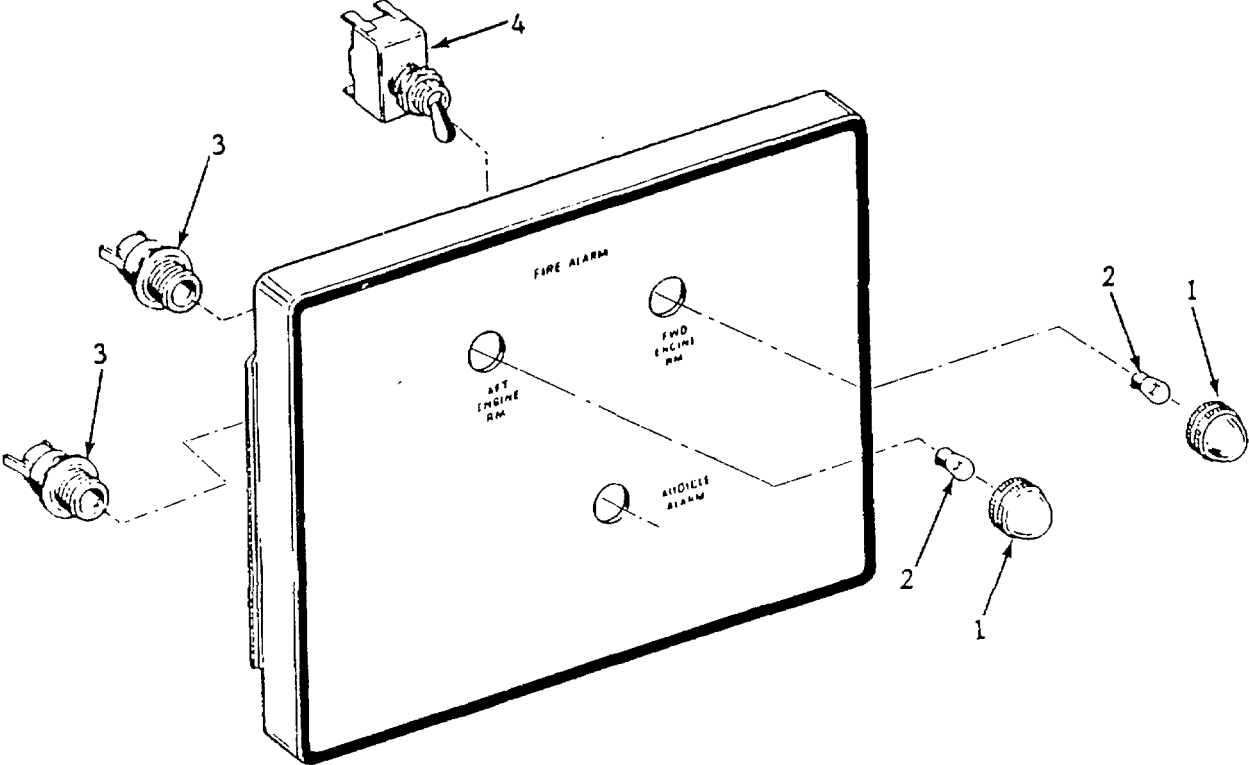
4-46.2. FIRE ALARM PANEL - MAINTENANCE INSTRUCTIONS (Continued).

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(1)	Remove	Refer to page 4-1158.
	b. Lamp(2)	Remove	
	c. Lens cap(1)	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 4-1159

4-46.2. FIRE ALARM PANEL - INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)

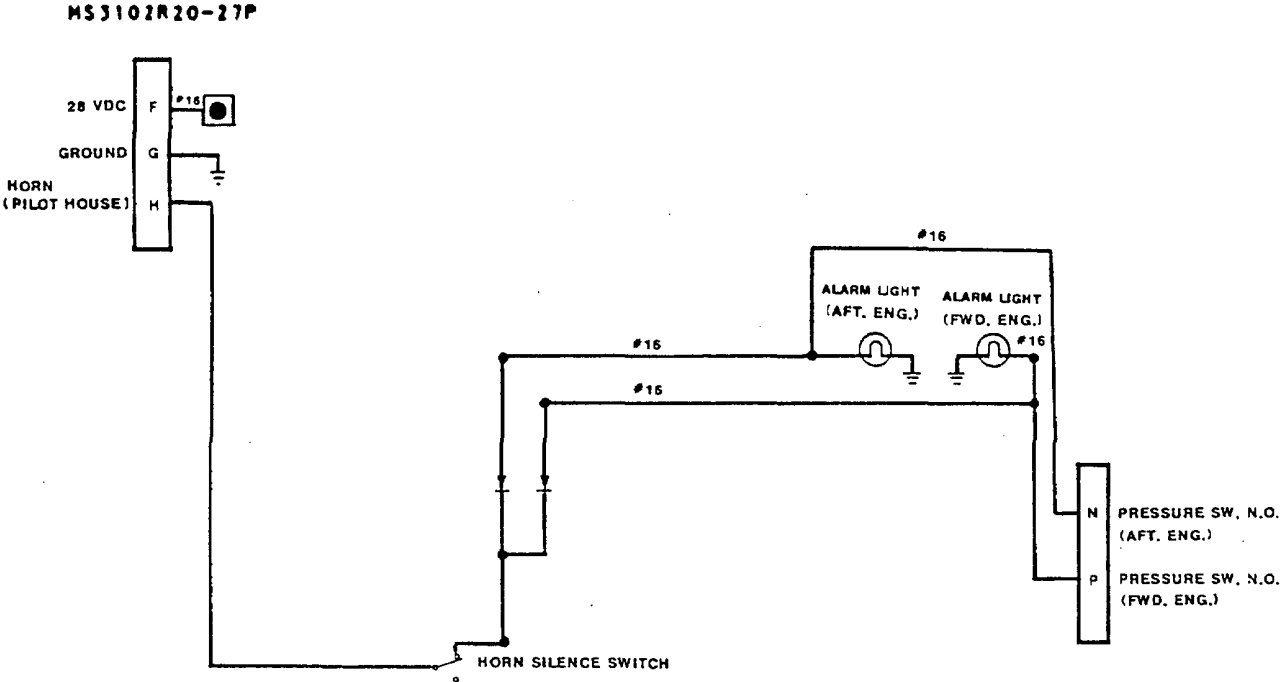


Change 1 4-1158

4-46.2. FIRE ALARM PANEL - INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)

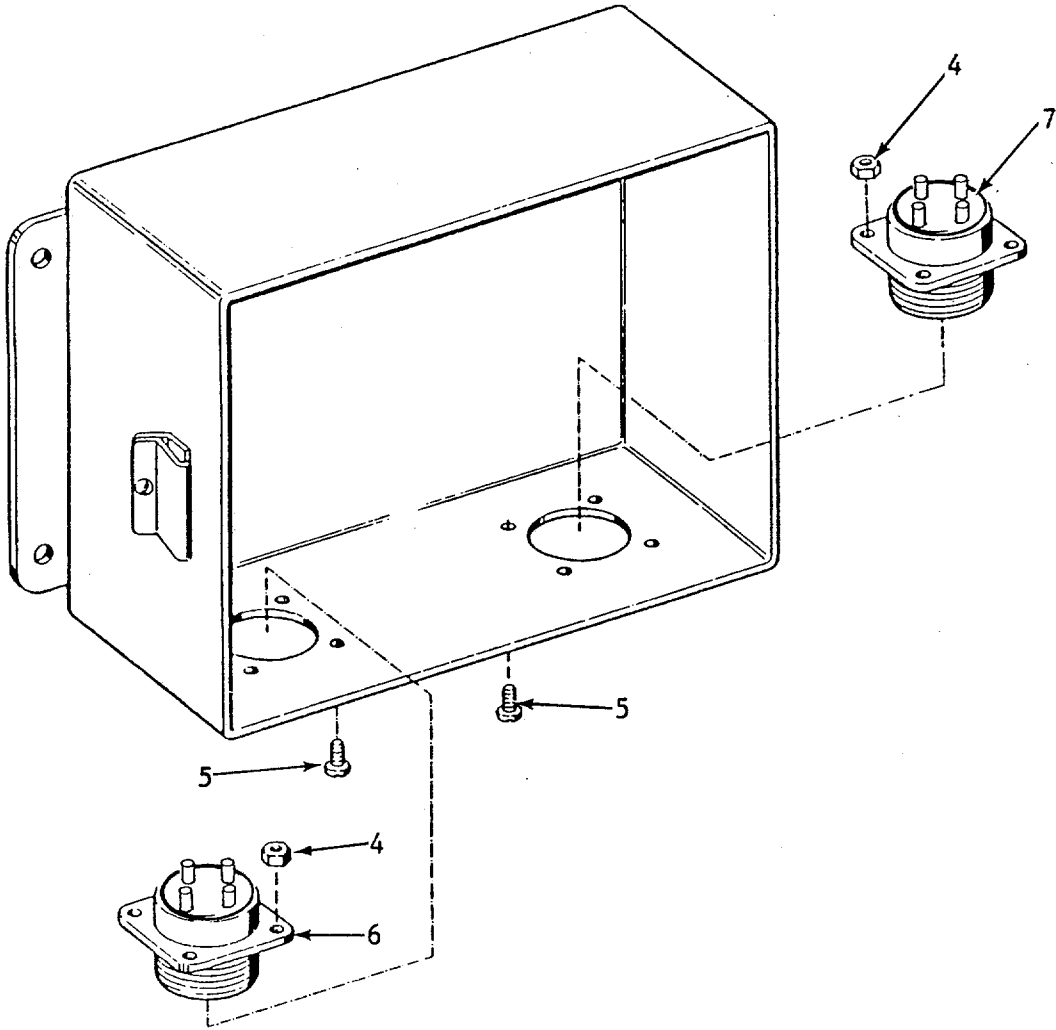


NOTE: ALL WIRING IS #20 AWG, EXCEPT WHERE MARKED #16.

Change 1 4-1159

4-46.2. FIRE ALARM PANEL - INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
5. Connectors	a. Wiring	Tag and disconnect	Refer to schematic on page 4-1159 .
	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.	



4-46.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
		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.

4-46.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS (Continued).

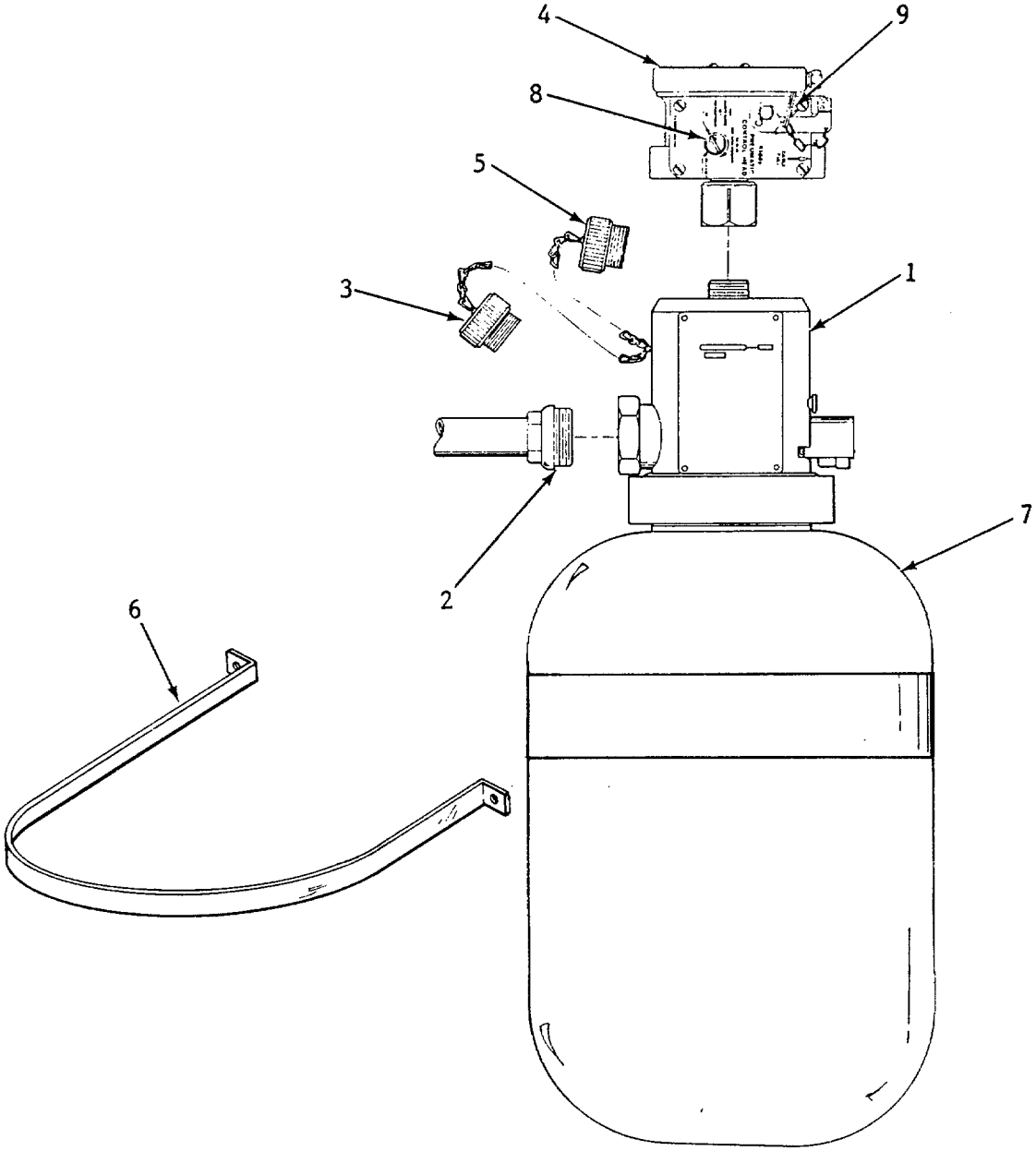
LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	c. Control head(4)	Disconnect from cylinder valve.	
	d. Protective cap(5)	Attach to top of cylinder valve.	
	e. Bracket(6)	Remove	
	f. Cylinder(7)	Remove	
	g. New cylinder(7)	Check weight.	See step 4
	h. Indicator and reset stem(8) action has been taken.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

Change 1 4-1163

4-46.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont'd)



Change 1 4-1164

4-46.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



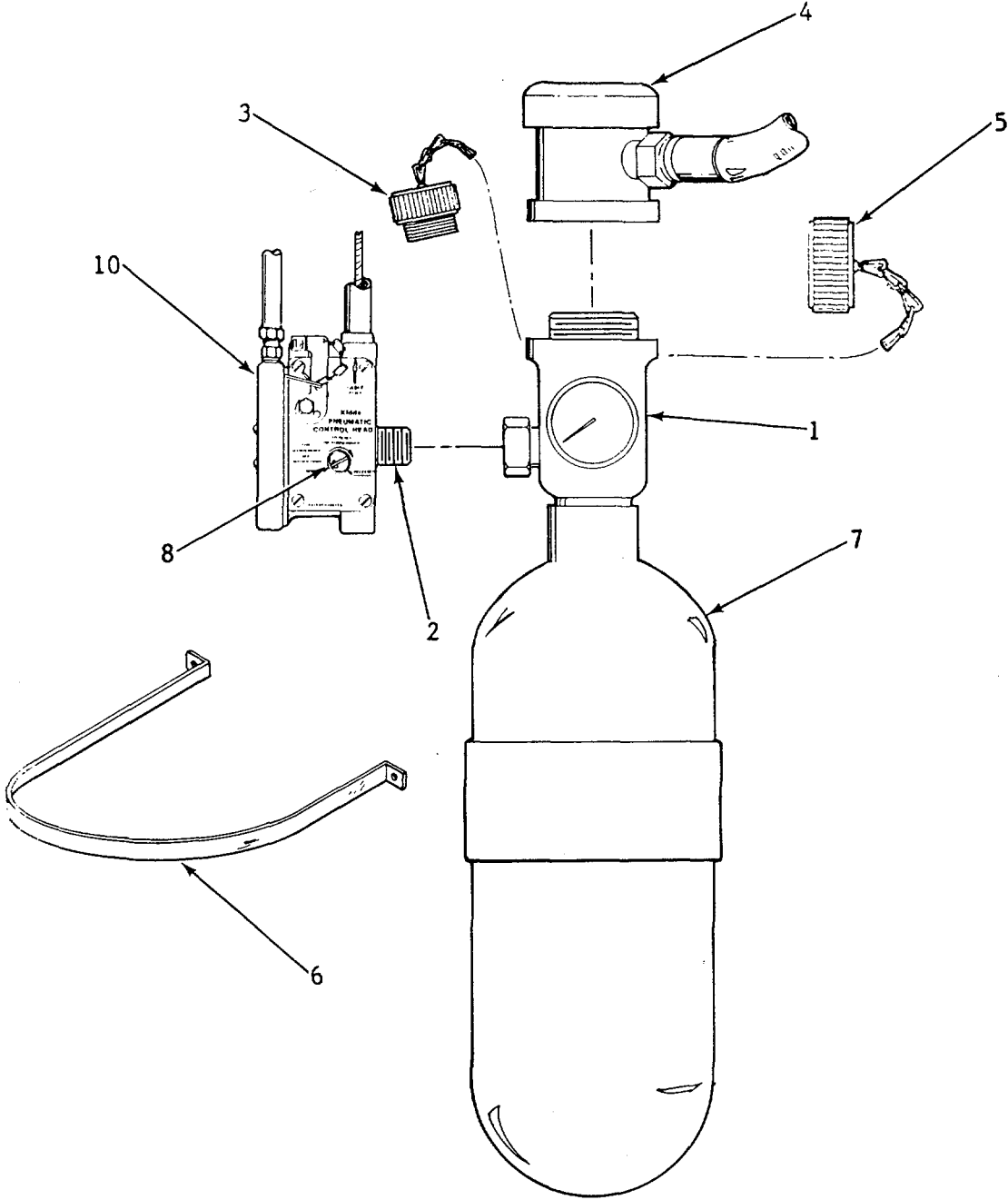
Do not install new cylinder until indicator and reset stem (8) on control head (10) has been set to position, SET.

3. Cylinder valve, and plain nut discharge head (flammable liquids storeroom).	a. Control head (1)	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

4-46.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont'd)



4-46.3. 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.	
	l. 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	

Change 1 4-1168

4-46.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
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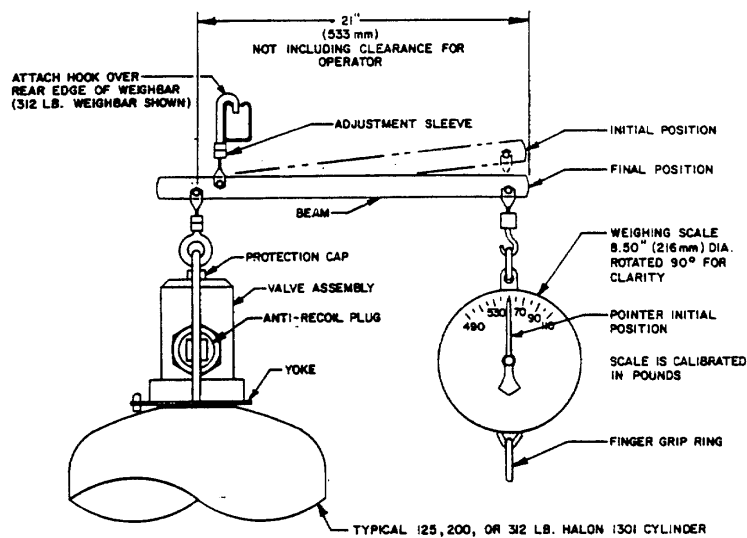
TEST

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	NOMINAL EMPTY		NOMINAL CHARGED		LBS	KG
	FILL	RANGE	WEIGHT	WEIGHT	MIN FILL	MAX FILL		
UNITS	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:



4-46.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS (Cont).

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.	

4-46.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS (Cont).

This task covers:

a. Inspection b. Repair c. Replace

INITIAL SETUP:

Test Equipment

NONE

References
Paragraph

4-46.2

Halon Control Panel -
Test

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
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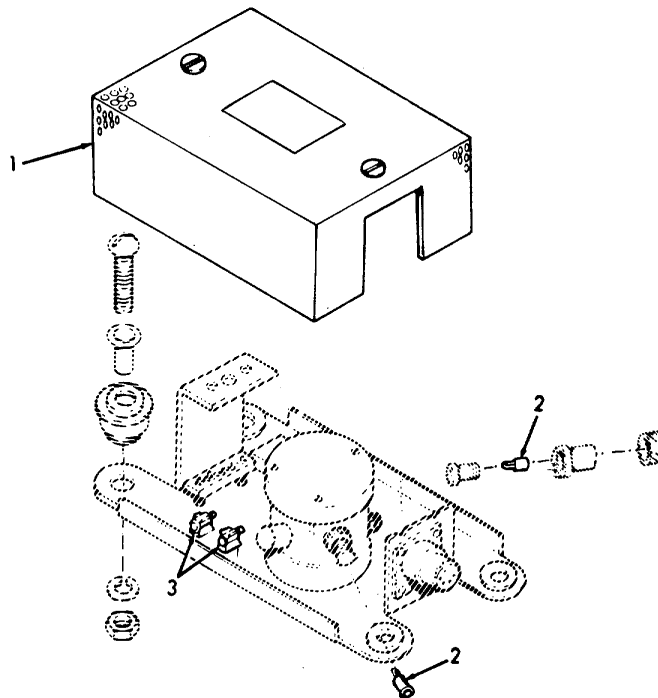
INSPECTION

1. Smoke detector	a. Wiring	Inspect for signs of damage.	
	b. Housing	Inspect for dents, and signs of damage.	
	c. Detector	Insure proper operation.	Refer to para 4-46.2 .

4-1171

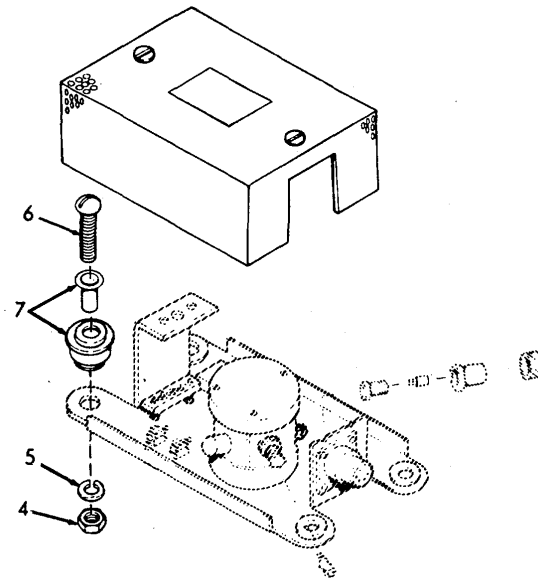
4-46.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Lamps	a. Lockscrews and cover (1)	Unscrew and remove.	
	b. Lamps (2)	Remove both lamps.	
	c. Lamps (3)	1. Remove. 2. Replace both lamps.	
	d. Lamps (2)	Install both new lamps.	Perform test in paragraph 4-46.2 .
	e. Cover and lockscrews (1)	Install.	



4-46.3. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
3. Smoke Detector	a. Connector and cable	Disconnect and remove.	
	b. Nuts (4), lockwashers (5), screws (6), and mounting parts (7)	Remove.	
	c. Smoke detector	Replace.	
	d. Screws (6), mounting parts (7), lockwashers (5), and nuts (4)	Install.	
	e. Cable and connector	Reconnect.	



4-46.4. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS

This task covers:

- a. Inspection b. Replace c. Test

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
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Do not attempt any repairs on a filled cylinder, valve, and nozzles.

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 4-46.1.
	c. Cylinders (valves, nozzles) from storage.	1. Inspect for signs of damage. 2. Perform weight test.	See Step 4.

4-1175

4-46.4. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
		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 safety lock pin is properly installed.	
		4. Insure that the safety lock wire is not installed.	

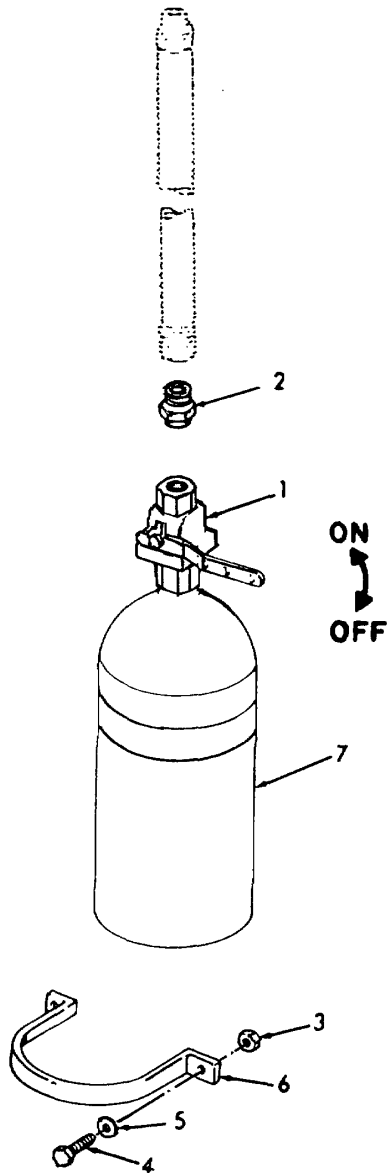
REPLACE

2. Cylinders and valve assemblies	a. Ball valve (1)	Place handle in the OFF position.	
	b. Hoses and adapter (2)	Disconnect.	
	c. Remote control cables	Disconnect.	
	d. Nuts (3), screws (4), flat washers (5), and bracket (6)	Remove.	
	e. Cylinder (7)	Remove.	
	f. New cylinder	Check weight.	See Step 4.
	g. Cylinder (7)	Install.	

4-46.4. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



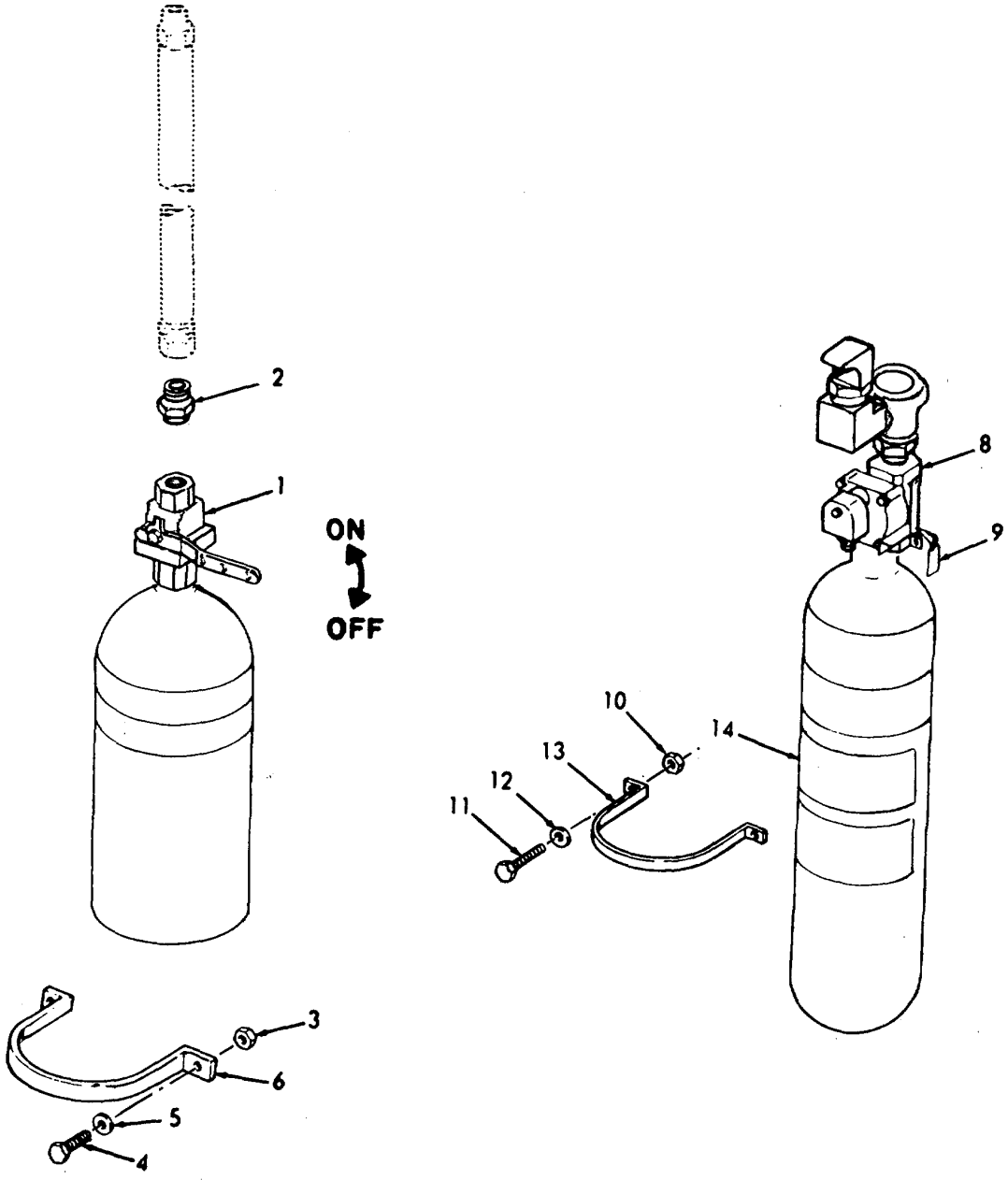
4-46.4. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)'			
	h. Bracket (6), screws (4), flat washers (5), and nuts (3)	Install.	
	i. Hoses and adaptors (2)	Install.	
	j. Ball valve (1)	Place handle in the ON position	
	k. Remote control cables	Reconnect.	
3. Cylinder, valve, and nozzle assembly	a. Power cable	Disconnect from solenoid valve (8).	
	b. Safety lock pin (9)	Make sure it is inserted.	
	c. Remote control cables	Disconnect.	
	d. Nuts (10), screws (11), flat washers (12), and bracket (13)	Remove.	
	e. Cylinder (14)	Remove.	
	f. New cylinder	Check weight.	See Step 4.
	g. Cylinder (14)	Install.	
	h. Bracket (13), screws (11), flat washers (12), and nuts (10)	Install	

4-46.4. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS

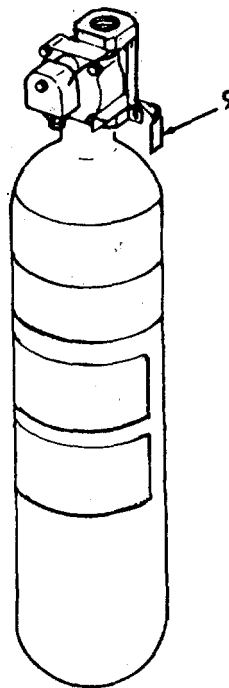
LOCATION	ITEM	ACTION	ITEM	REMARKS
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REPLACE (Cont)



4-46.4. CYLINDER ASSEMBLIES - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	i. Remote control cable	Reconnect.	
	j. Power cable	Reconnect.	
	k. Safety lock pin (9)	Remove.	



TEST

4. Cylinders Weigh all cylinders upon receipt and every six months thereafter, to insure no abnormal leakage. This includes installed cylinders.

	Weight Filled		Weight Halon	
CYLINDER AND VALVE	69.5 lbs	31.5 kg	35.0 lbs	15.9 kg
CYLINDER, VALVE AND NOZZLE	12.5 lbs	5.7 kg	4.7 lbs	2.1 kg

4-47. INTERIOR COMMUNICATION SYSTEM- MAINTENANCE INSTRUCTIONS

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

DESCRIPTION	PARAGRAPH
Amplifier/Loudspeakers	4-47.1
Sound Powered Phones	4-47.2
Loud Hailer	4-47.3
Call System Major Components	4-47.4
Voice Tube	4-47.5

- b. Refer to paragraph 4-48 for the alarm switchboard.

4-47.1. AMPLIFIER/LOUDSPEAKER - MAINTENANCE INSTRUCTIONS.

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

<u>Equipment</u>	<u>Condition</u>	<u>Condition Description</u>
	<u>Para</u>	

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe WARNING in procedure.

4-47.1. AMPLIFIER/LOUDSPEAKER- MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
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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.	Refer to Direct Support Maintenance.
		2. Inspect for proper sound reproduction.	
		3. Inspect for signs of faulty operation.	
	b. Loudspeaker	Inspect for proper sound reproduction.	
	c. Power speaker	1. Inspect for signs of damage.	
		2. Inspect for proper sound reproduction.	

TEST

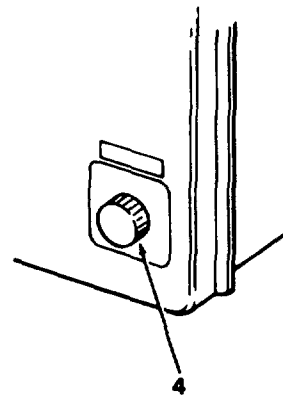
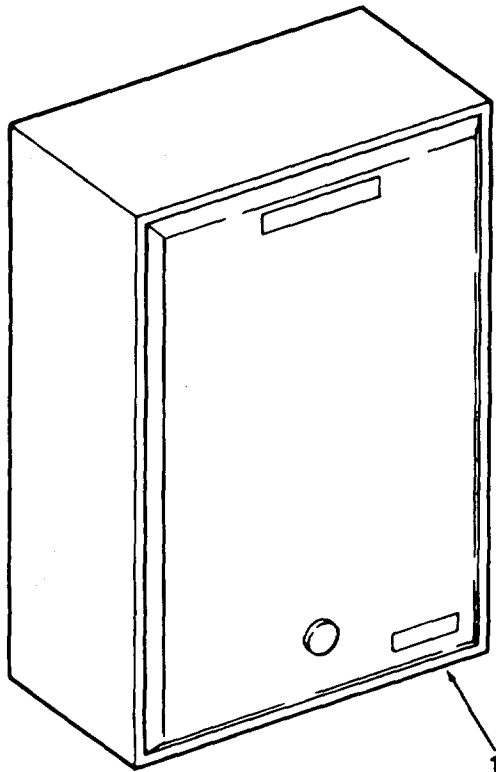
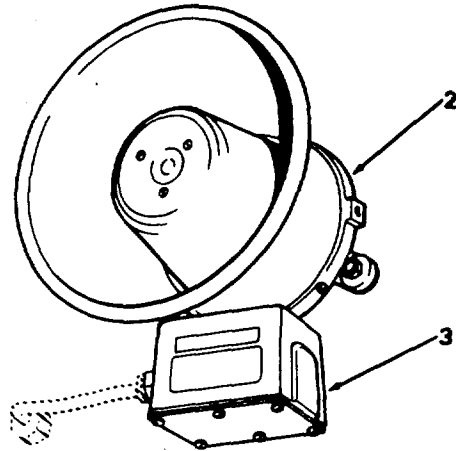
2. System	Operate system.
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REPAIR

3. Loud-Speakers and power horns (2)	a. Loudspeaker (1)	Replace.	If necessary.
	b. Power horn	Replace.	If necessary.
	c. Transformer (3)	Replace.	If necessary.
	d. Control (L-pad) (4)	Replace.	If necessary.

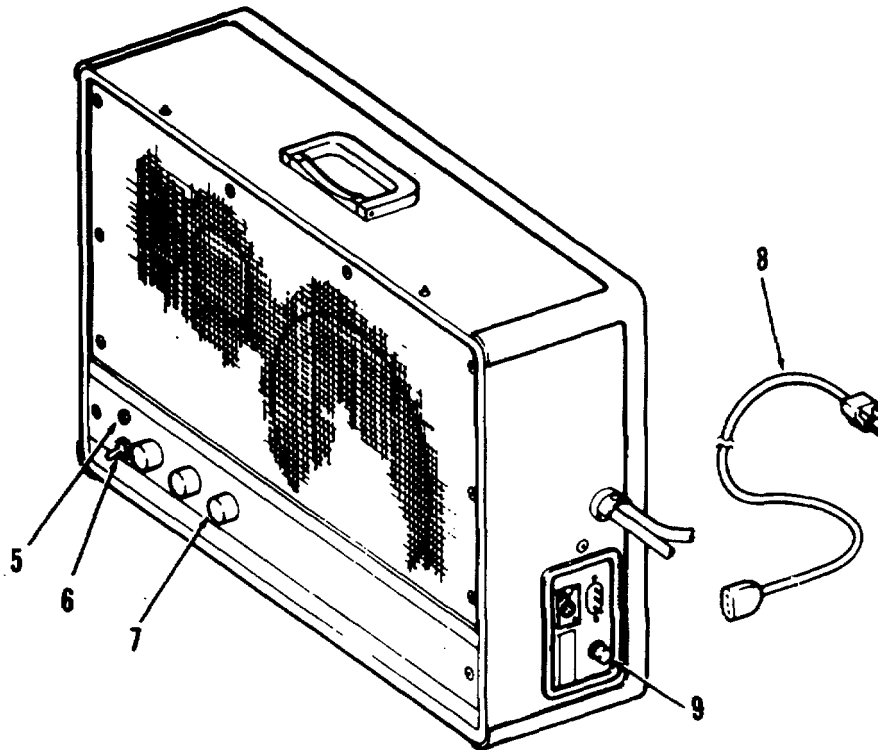
4-47.1. AMPLIFIER/LOUDSPEAKER- MAINTENANCE INSTRUCTIONS (Cont).

REPAIR (Cont)



4-47.1. AMPLIFIER/LOUDSPEAKER- MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
4. Amplifier 5)	a. Pilot lamp	Replace.	If necessary.
	b. Switch (6)	Replace.	If necessary.
	c. Pointer knob (7)	Replace.	If necessary.
	d. Power cord (8)	Replace.	If necessary.
	e. Fuse (9)	Replace.	If necessary.



4-47.2. SOUND POWERED PHONES- MAINTENANCE INSTRUCTIONS

This task covers:

a. Inspection

b. Test

c. Repair

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

NONE

LOCATION	ITEM	ACTION	REMARKS
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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.

4-47.2. SOUND POWERED PHONES- MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
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TEST

2. Establish communication with other areas. Make sure the sound reproduction is satisfactory.

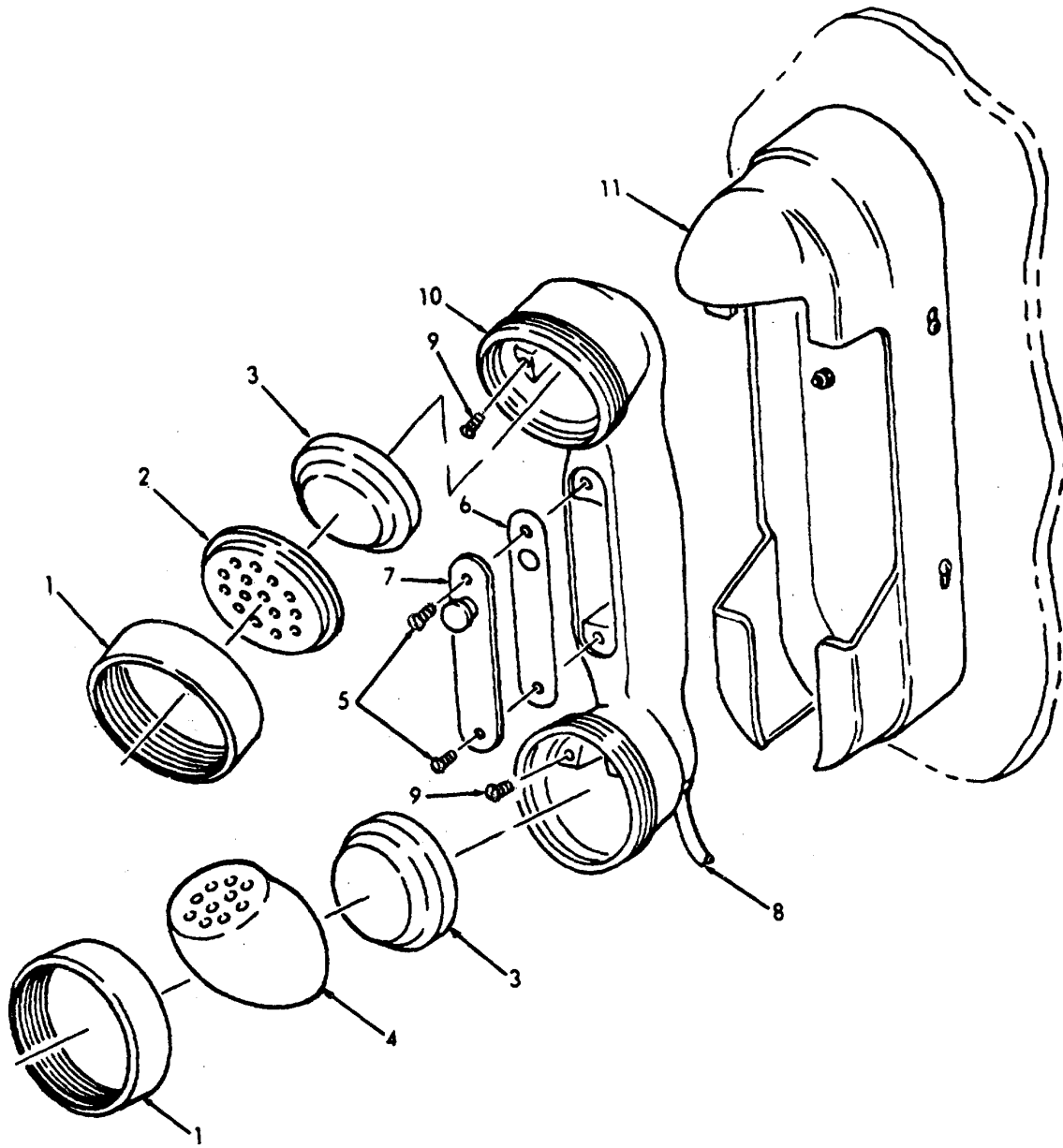
REPAIR

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.

4-47.2. SOUND POWERED PHONES- MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



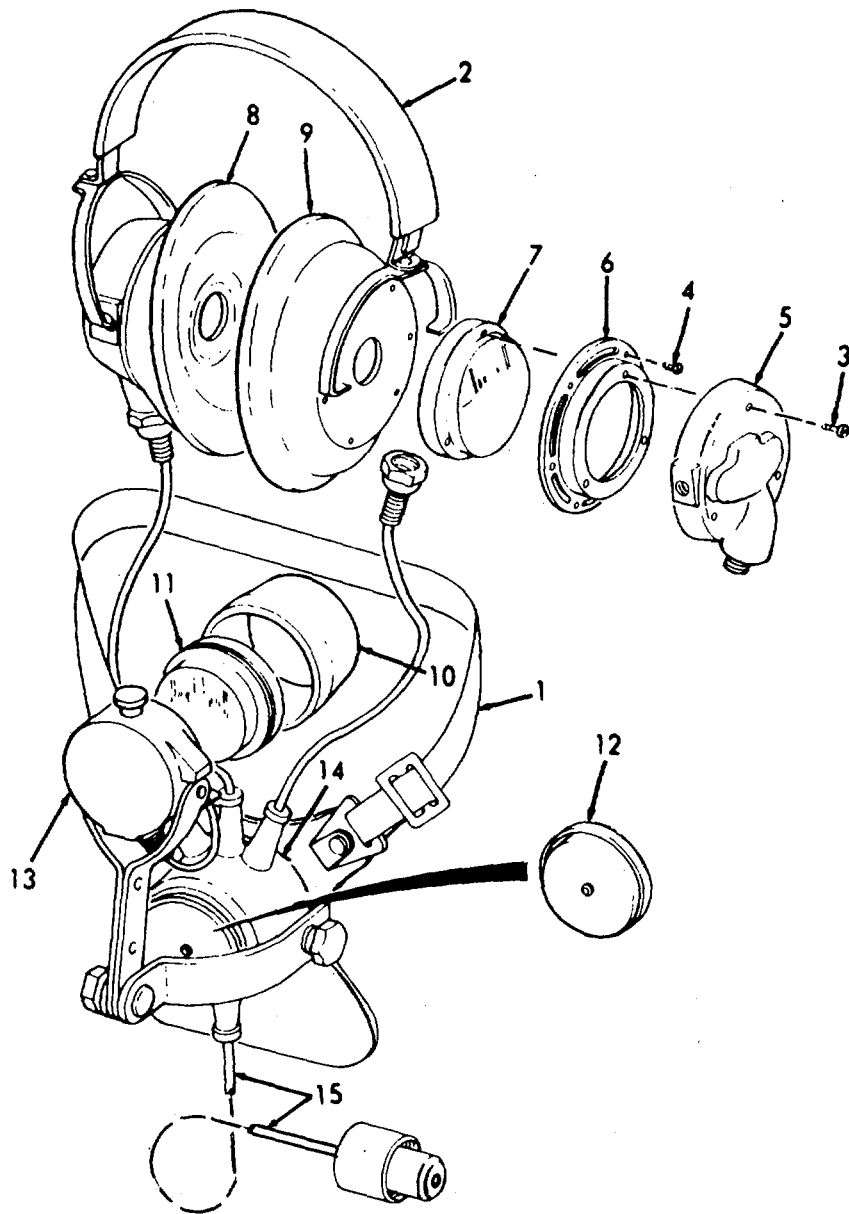
4-47.2. SOUND POWERED PHONES- MAINTENANCE INSTRUCTIONS

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.

4-47.2. SOUND POWERED PHONES- MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

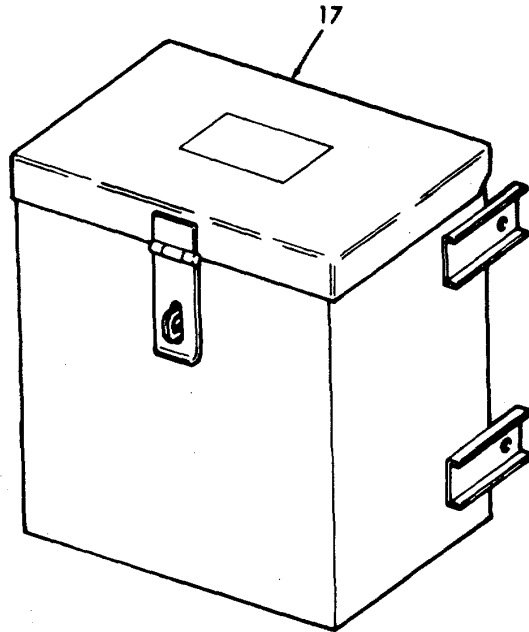
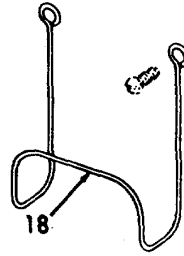
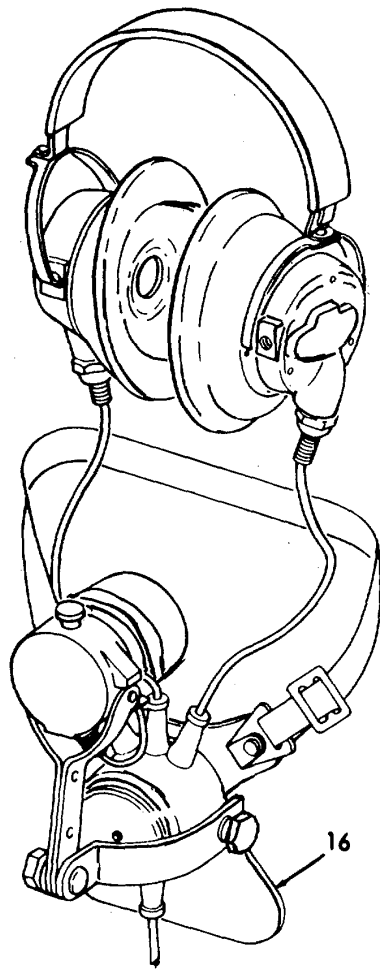


4-47.2. SOUND POWERED PHONES- MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
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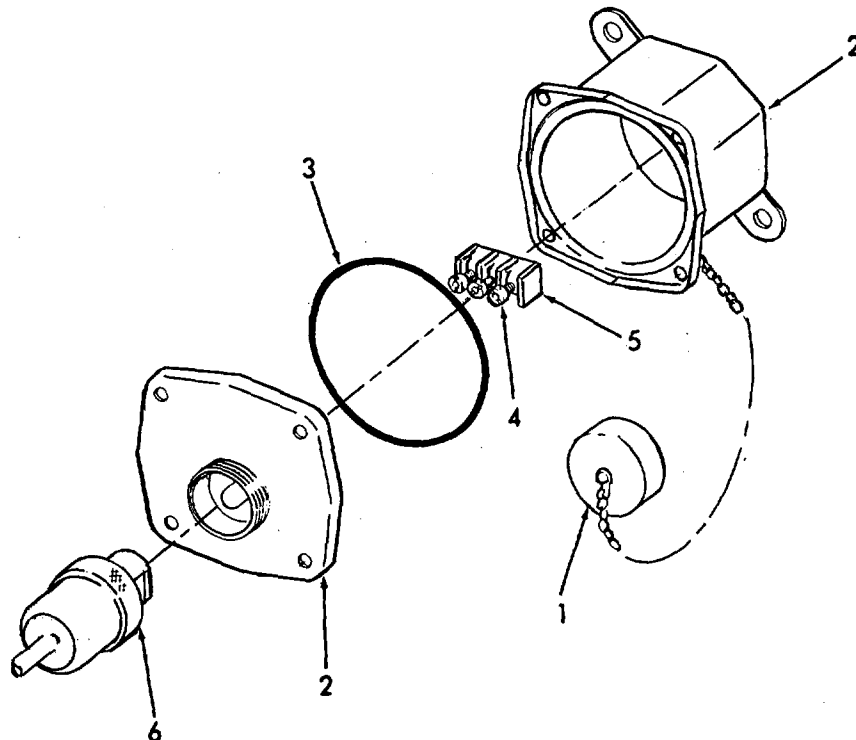
REPAIR (Cont)

p.	Chest plate (16)	Replace.	If needed.
q.	Locker (17)	Replace or repair.	If needed.
r.	Hook (18)	Replace or repair.	If needed.



4-47.2. SOUND POWERED PHONES- MAINTENANCE INSTRUCTIONS

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.



4-47.3. 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 loud-speaker, 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 removeable. 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 machine 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 lug forms a part of the horn assembly, but it is hollow and fitted with a cover. The interior of this lug 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 lug 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.

4-47.3. LOUD HAILER- MAINTENANCE INSTRUCTIONS

(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 addition 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 in such areas may cause the loud hailer to squeal or howl.

(2) Quick Reference Data.

(a) Electrical 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 loud- speaker 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

4-47.3. LOUD HAILER- MAINTENANCE INSTRUCTIONS

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 to 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 driver 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.

4-47.3. LOUD HAILER- MAINTENANCE INSTRUCTIONS

(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.

4-47.3. LOUD HAILER- MAINTENANCE INSTRUCTIONS

(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.

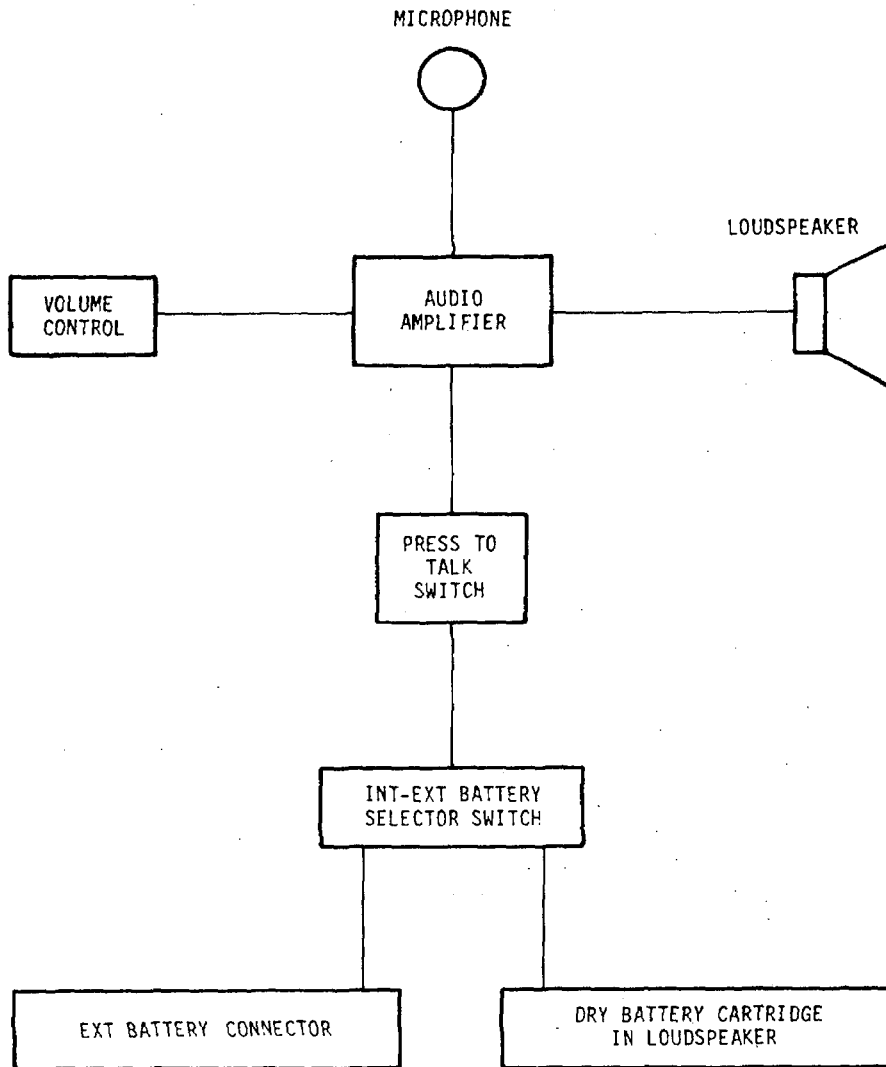
a Hold the loud hailer up to the mouth with the microphone as close as possible. Actuate the trigger switch, with the first and second fingers of the hand that is grasping the handle. If the system feeds back, back off the volume control until feedback stops. If, however, there is no feedback to start 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.

4-47.3. LOUD HAILER- MAINTENANCE INSTRUCTIONS (Cont).

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.



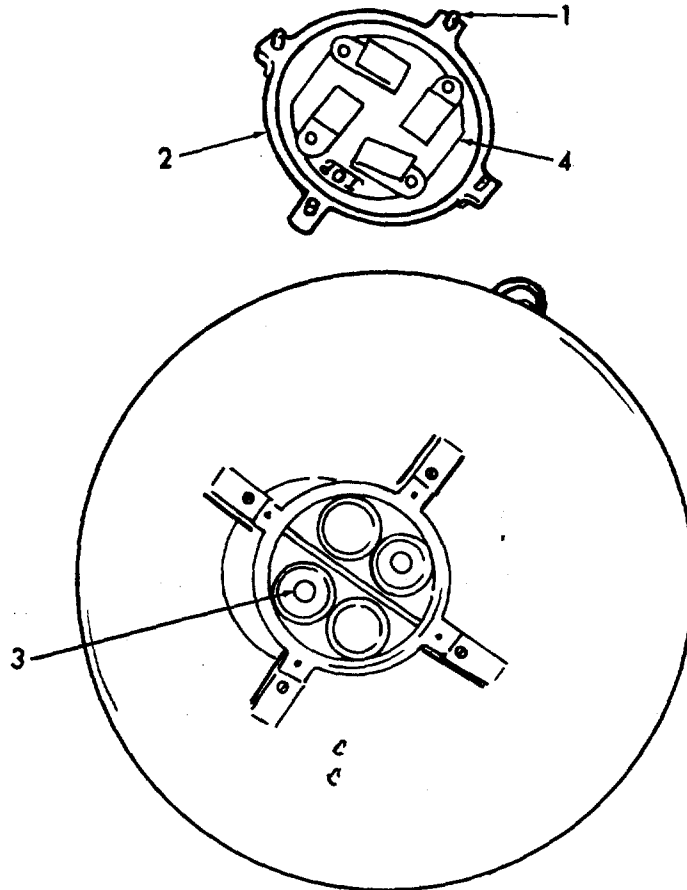
4-47.3. LOUD HAILER- MAINTENANCE INSTRUCTIONS (Cont).

(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 their 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.)



4-47.3. 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.

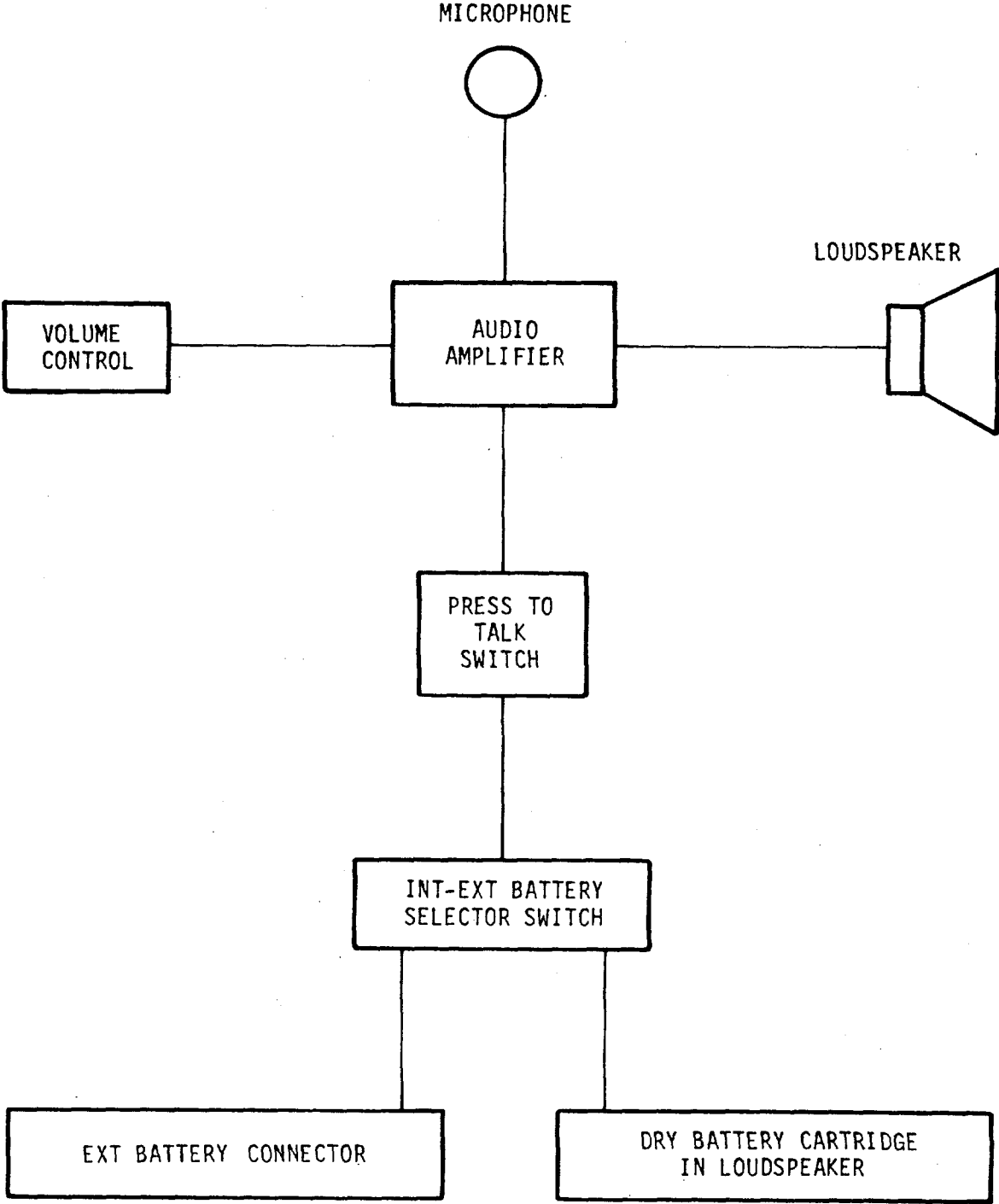
(1) Overall Functional Description.

(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.

4-47.3. LOUD Hailer - MAINTENANCE INSTRUCTIONS (Continued).



Public Address Set Type AN/PIC -2

4-47.3. 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 screws, 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.

4-47.3. 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.

4-47.3. 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.

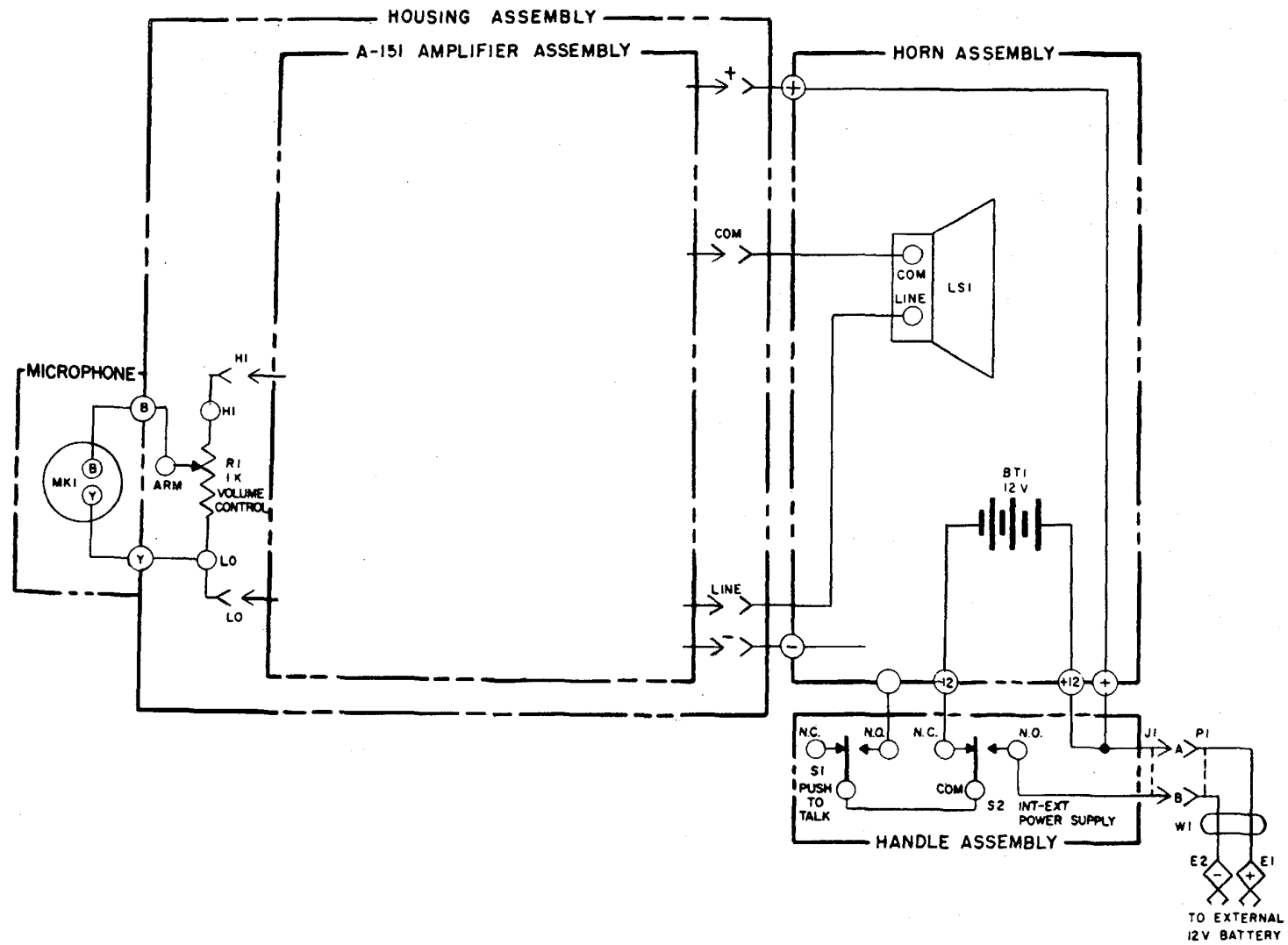
- 1 Hold the loud hailer in the normal talking position, operate the trigger switch and advance the volume control while counting into the microphone "1, 2, 3, 4," etc. The reproduced voice from the horn should be clear and intelligible at any setting of the volume control and the intensity should increase 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".

4-47.3. 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	Volume control at maximum setting.	Loud hailer feeds back and howls. hard wall.
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.

4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).



4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

This task covers:

- | | |
|---------------|-----------|
| a. Inspection | c. Test |
| 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
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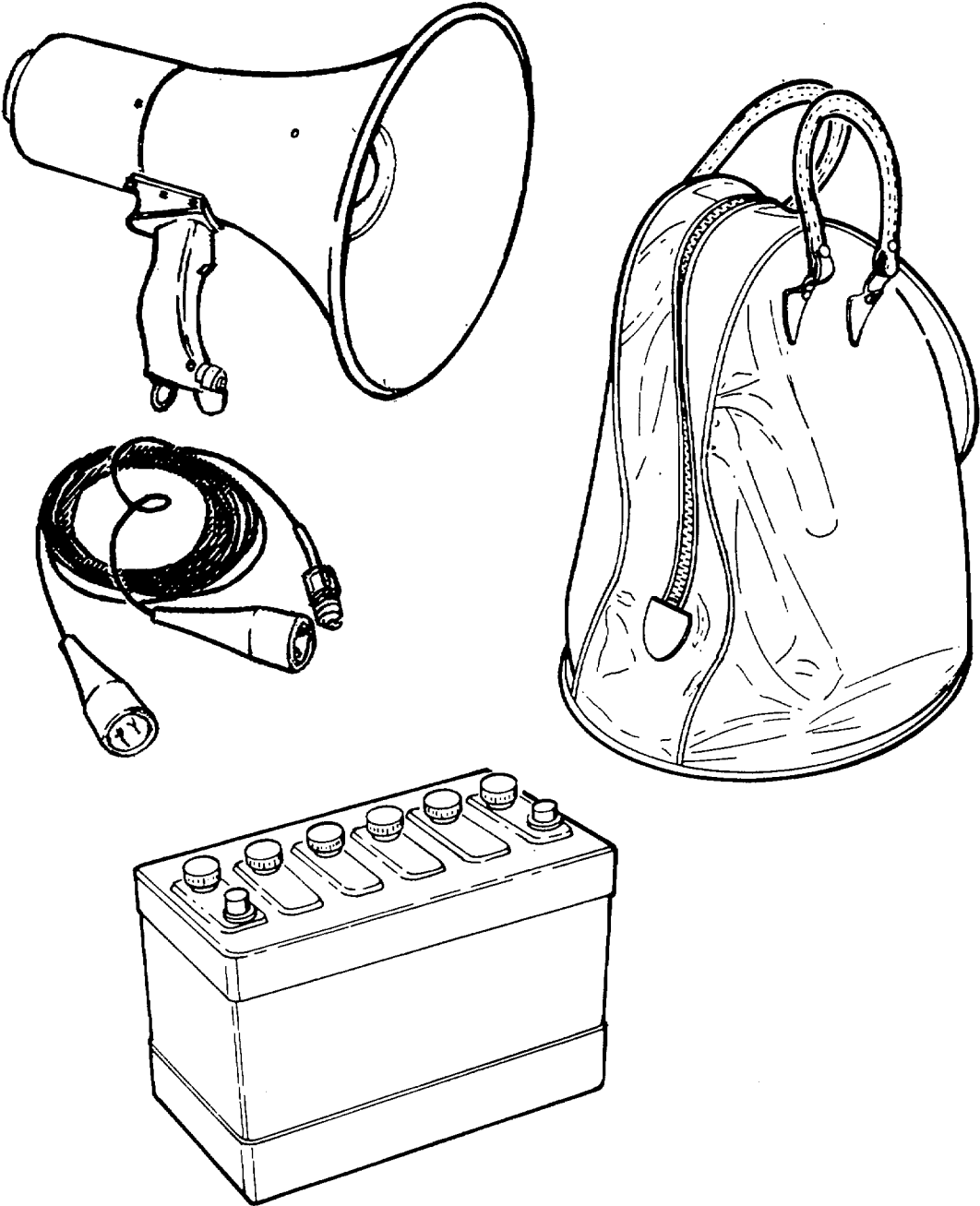
INSPECTION

1. Loud hailer	a. Microphone	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.	

4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION (Cont)



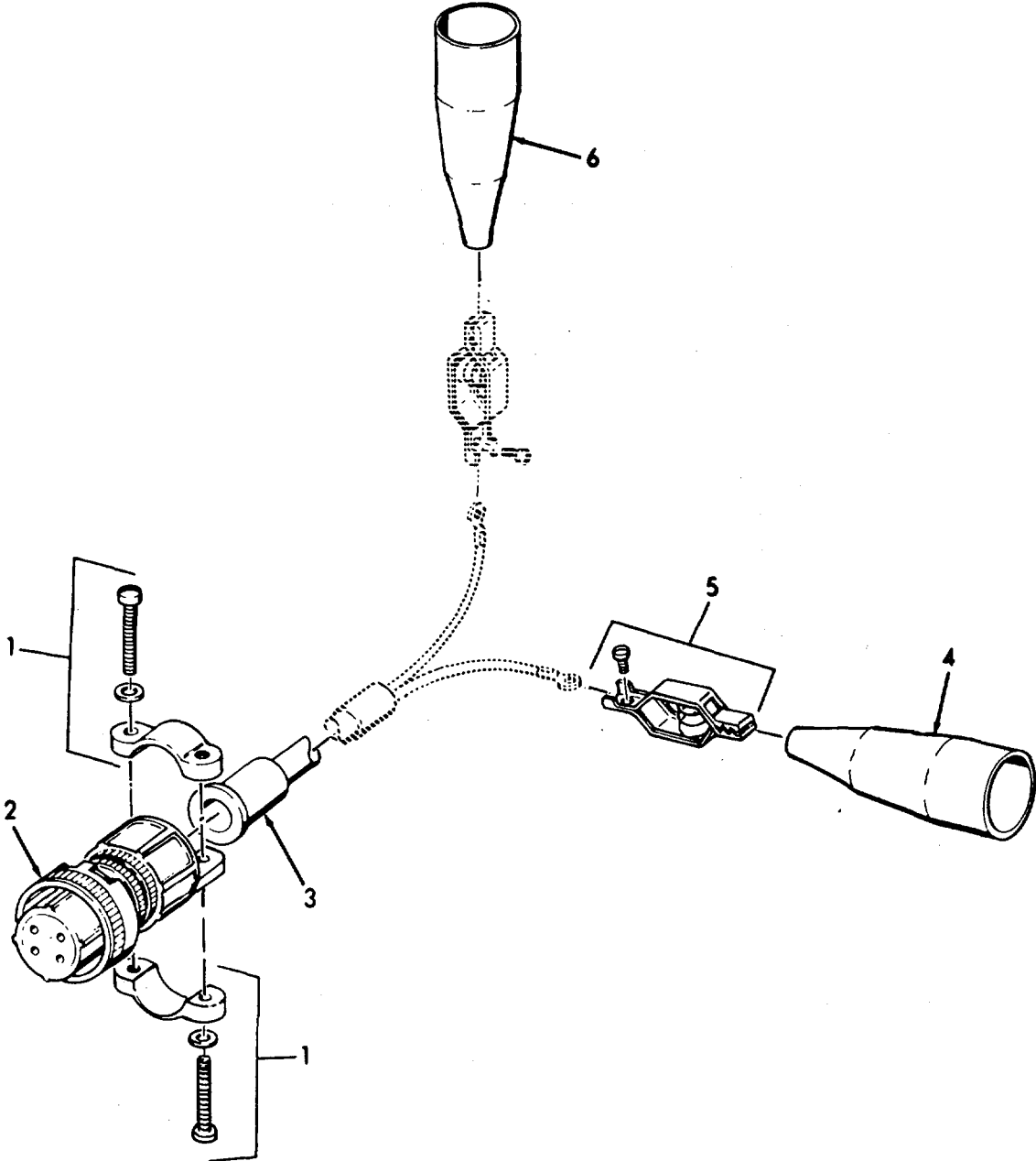
4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

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 4-47.3a(4) and 4-47.3d.	
TEST			
	3.	Refer to paragraph 4-47.3e.	
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.

4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



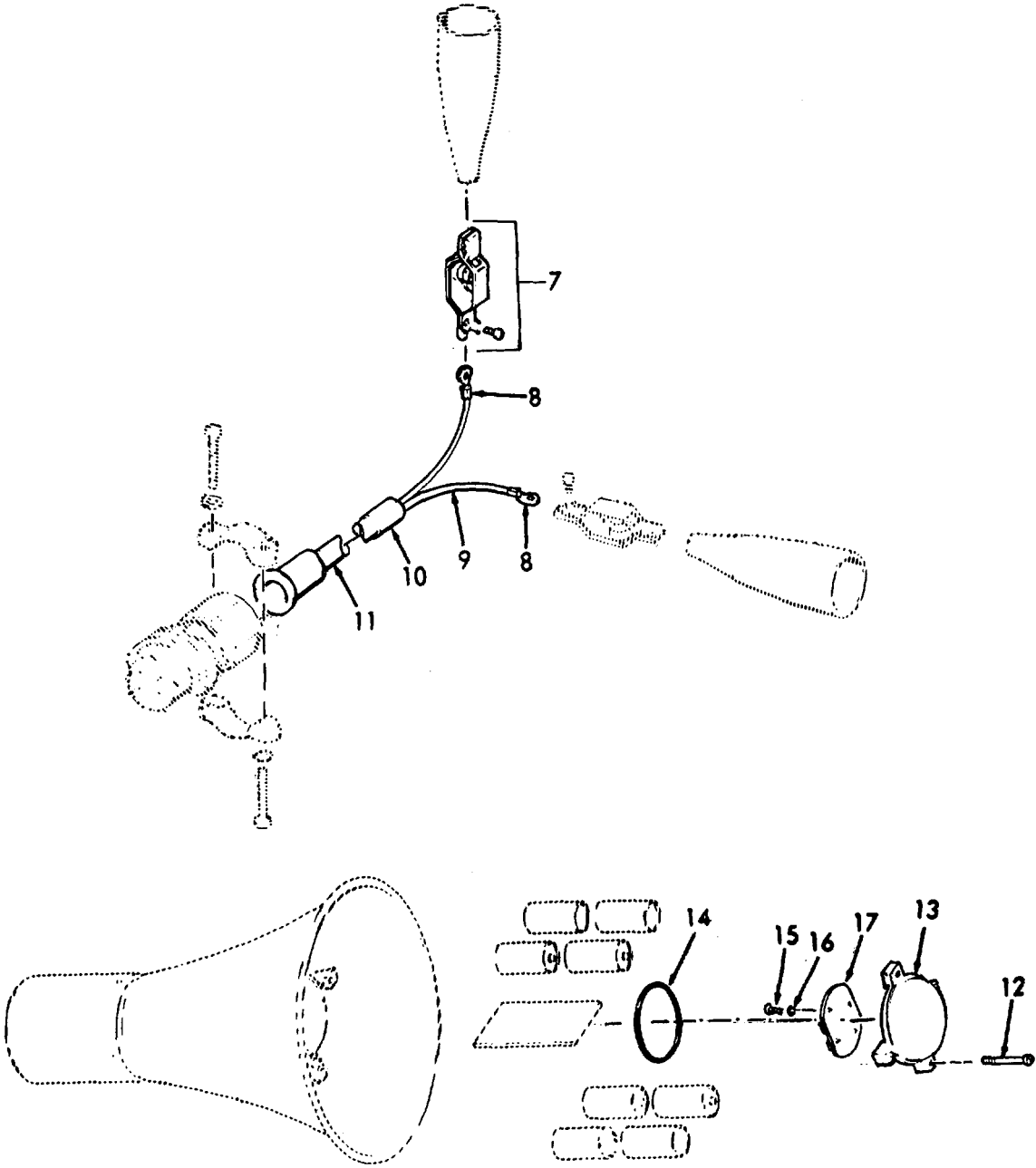
4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

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)	<ol style="list-style-type: none"> 1. Disassemble. 2. Inspect the springs on the contact boards. 3. Inspect contacts for corrosion. 	<p>If necessary.</p> <p>Make certain that they have not become deformed.</p> <ol style="list-style-type: none"> a. Blackening of silver plate is normal. It is not necessary to remove it. b. Clean with metal polish.

4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



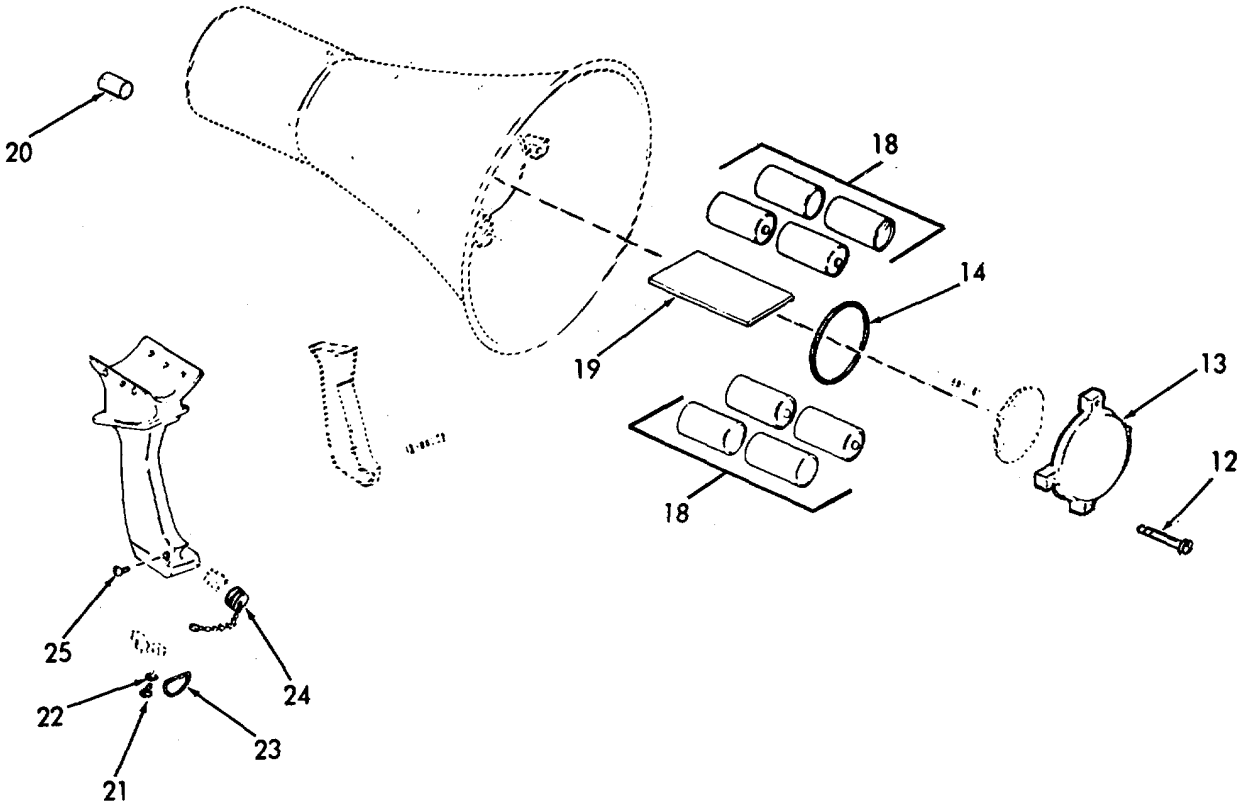
4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
			c. If badly corroded return to Direct Support Maintenance.
	d. Batteries (18)	1. Remove. 2. Install new batteries in accordance with outline on separator (19).	Discard.
	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), lock-washer (22), and D ring (23)	Replace.	If necessary.
	b. Chain and cap (24) and screw (25)	Replace.	If necessary.

4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



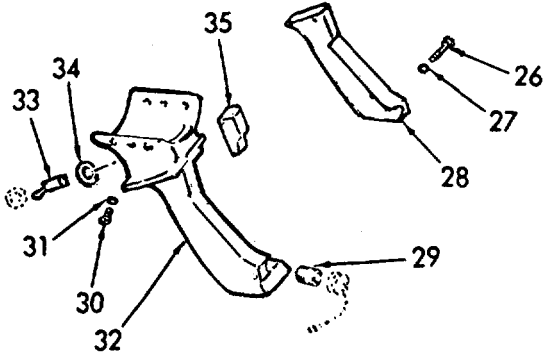
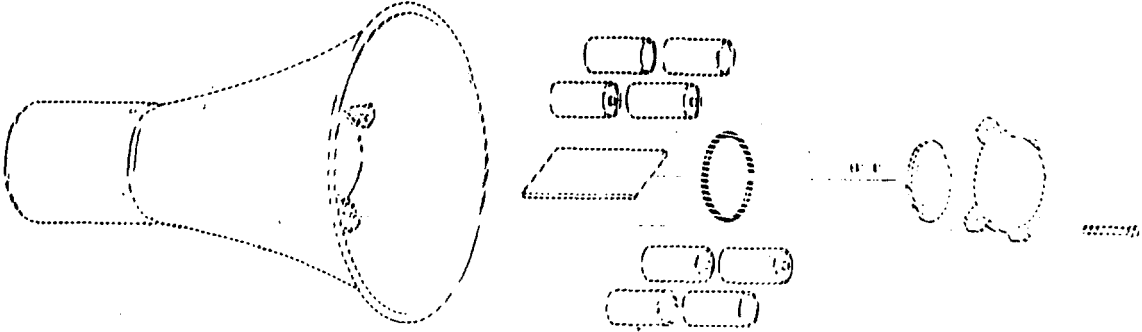
4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)	c. Screws (26) and lock-washers (27)	Remove.	
	d. Handle cover (28)	Remove.	
	e. Connector receptacle (29)	Replace. b.	a. If necessary. Refer to wiring diagram on page 4-1217.
	f. Screws (30) and lock-washers (31)	Remove.	
	g. Handle (32)	Remove.	
	h. Toggle Switch (33) and designation plate (34)	Replace.	Refer to wiring diagram on page 4-1217.
	i. Trigger switch (35)	Replace.	
	j. Handle (32), screws (30), and lock-washers (31)	Replace.	

4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION ITEM ACTION REMARKS

REPAIR (Cont)

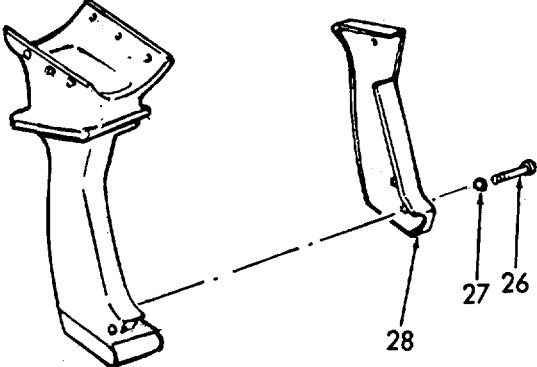


4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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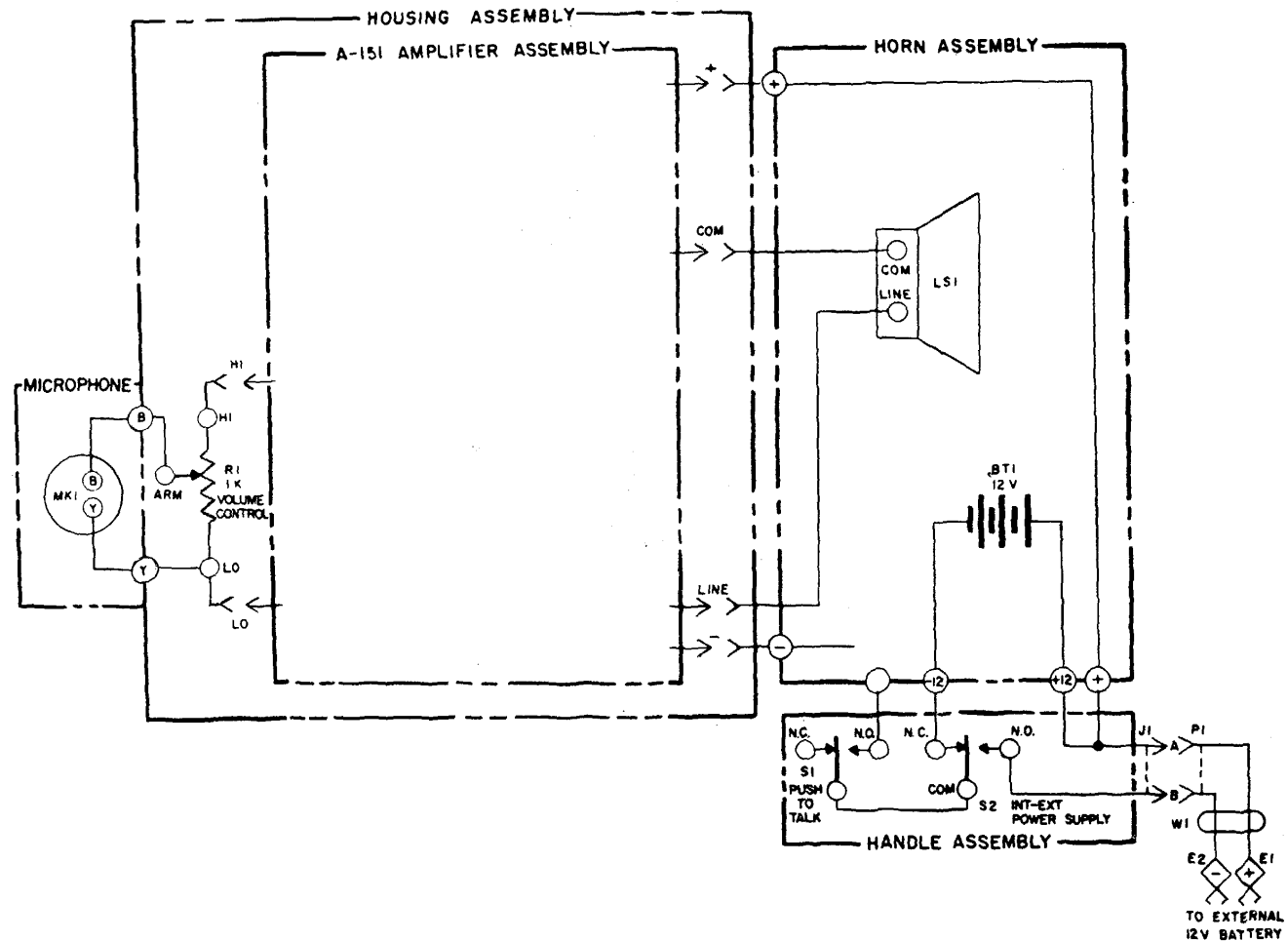
REPAIR (Cont)

- k. Handle cover (28), screws (26), and lock-washers (27)



4-47.3. LOUD HAILER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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4-1217/(4-1218 blank)

4-47.4. CALL SYSTEM MAJOR COMPONENTS - 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
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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.

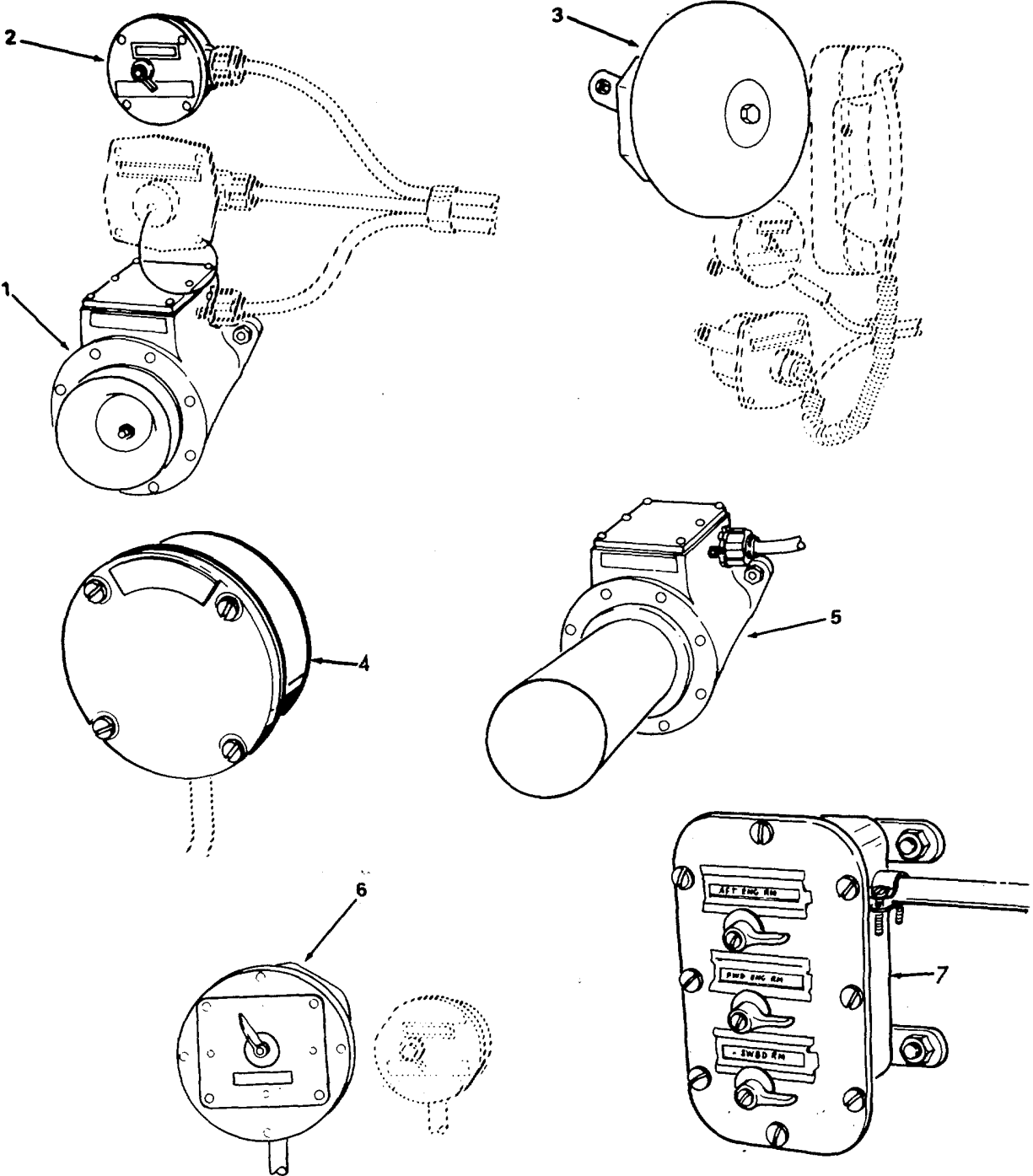
4-47.4. CALL SYSTEM MAJOR COMPONENTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	d. Connection boxes	1. Inspect for breaks, cracks, 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.

4-47.4. CALL SYSTEM MAJOR COMPONENTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)

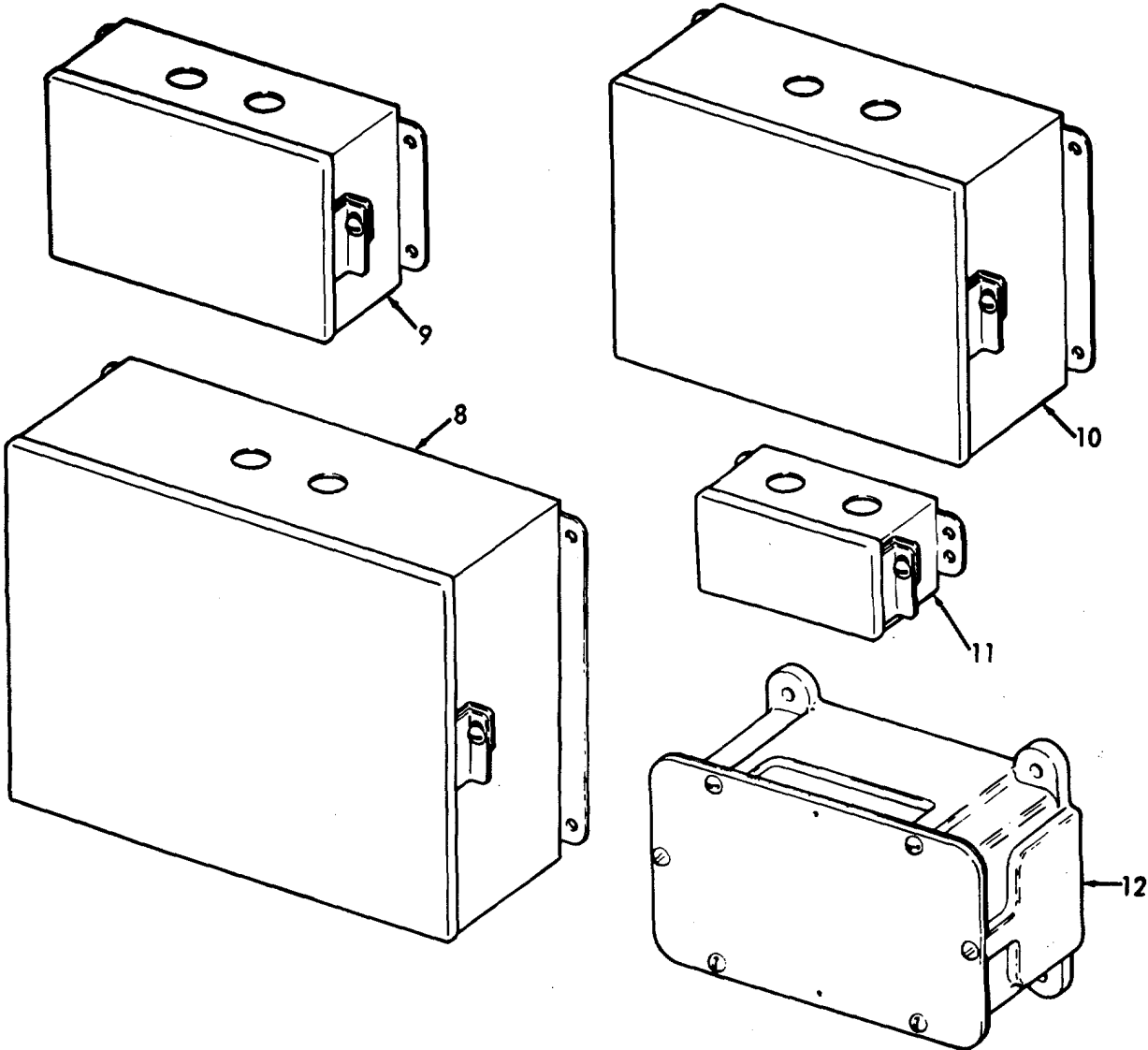


4-47.4. CALL SYSTEM MAJOR COMPONENTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)

	h. Connection boxes (8, 9, 10, 11, and 12)	Replace.	As needed.
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4-47.5. VOICE TUBES - 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

NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. Voice tube	All parts	<ol style="list-style-type: none"> 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. 	
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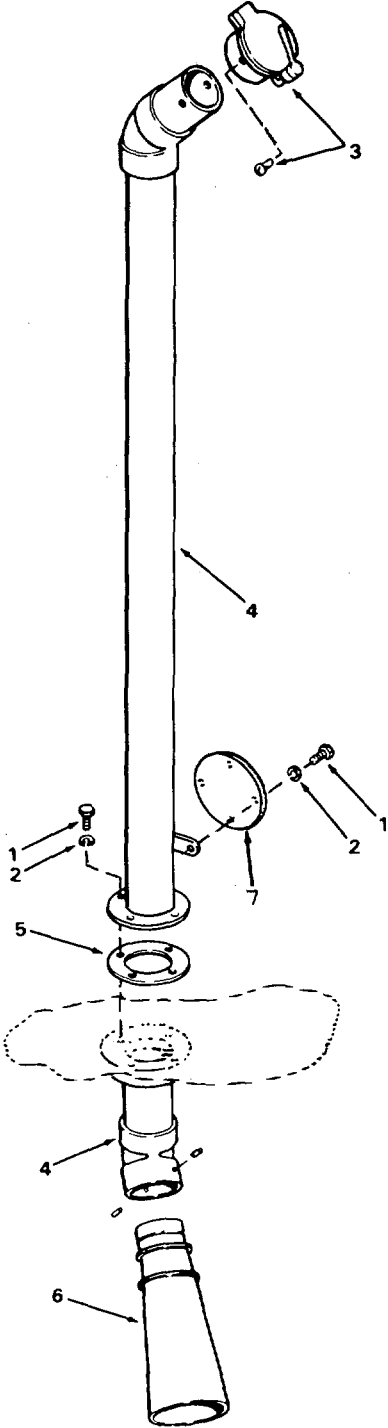
4-47.5. VOICE TUBES - MAINTENANCE INSTRUCTIONS (Continued).

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.

4-47.5. VOICE TUBES - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-48. 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.

4-48. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS (Continued).

(c) Circuit diagram.

- 1 From a study of the wiring diagram (Foldout 1), 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.

4-48. 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 d 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 displayed 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 case the circuit affected should be cut out as soon as possible in order that the 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".

4-48. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS (Continued).

(3) Trouble Alarm Operation.

(a) If 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 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. and then 12 hours at 100 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 1) 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 operate. This current is approximately .012 amperes.

4-48. 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.

4-48. 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

4-48. 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 lamp.

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.

4-48. 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.

4-48. 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 1)), 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

4-48. 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 will 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.

4-48. 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 a 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 a 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 as soon as discovered.

(2) Two Line Units.

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

4-48. 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 is 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 checked 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.

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Alarm Switchboard	4-48.1
2-Line Alarm Panel	4-48.2

4-1237/(4-1238 blank)

4-48.1. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Repair

INITIAL SETUP:

Test Equipment

NONE

References

Paragraph
4-48

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
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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 paragraph 4-48.

4-1239

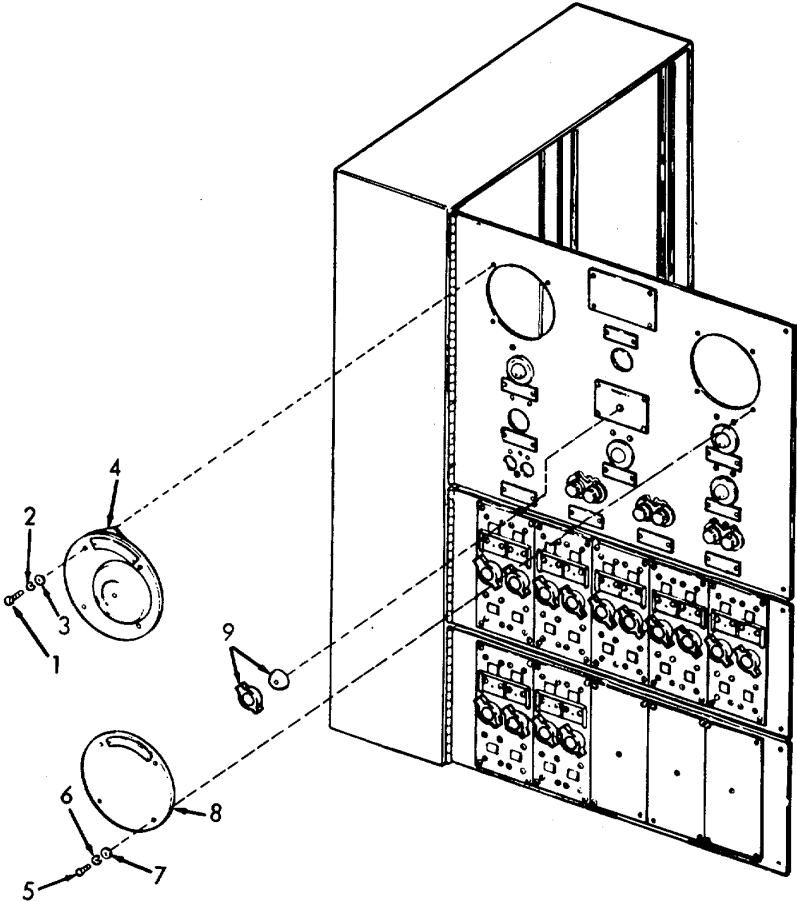
4-48.1. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS (Continued).

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.	

4-48.1. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



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

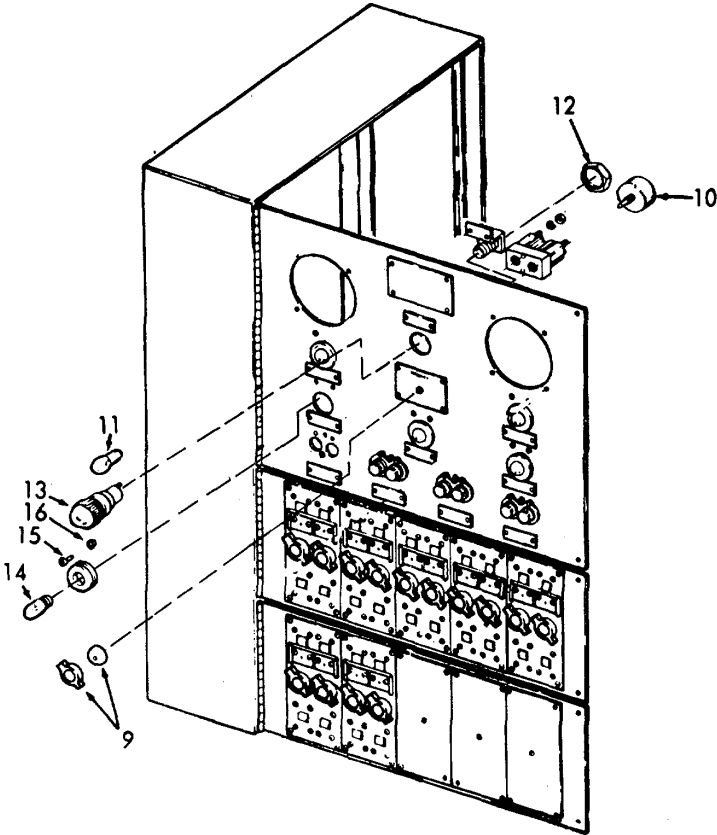
4-48.1. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS (Continued).

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.	

4-48.1. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



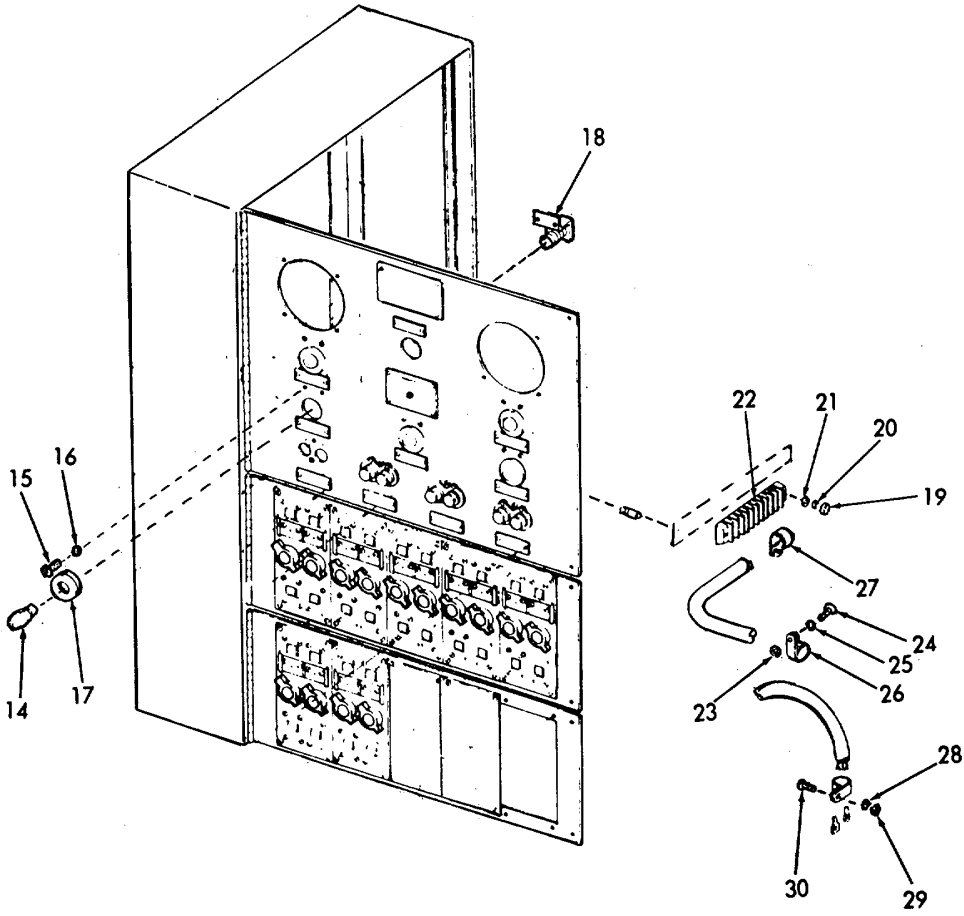
4-48.1. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Rubber grommet (17) and socket (18)	Replace.	
	e. Screws (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. Flatwashers (21), lock-washers (20), and nuts (19)	Install.	
	e. Wiring	Reconnect.	
8. Cables	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.	

4-48.1. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



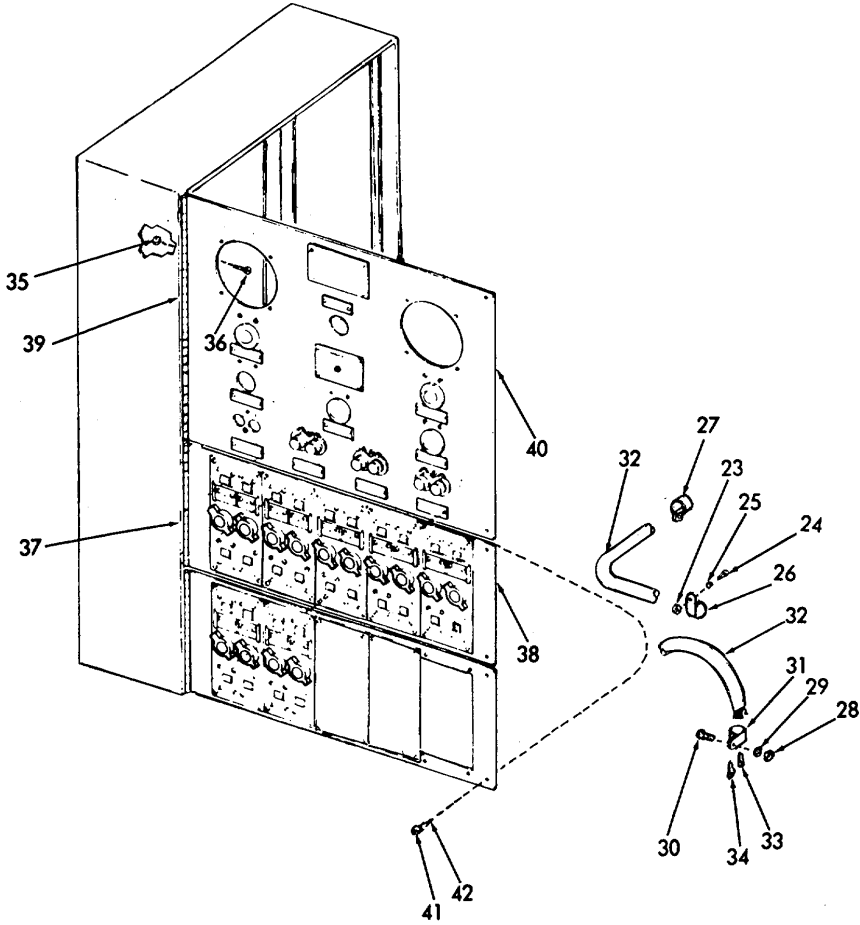
4-48.1. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS (Continued).

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 retainers (42)	Replace.	As needed.

4-48.1. ALARM SWITCHBOARD - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-1247/(4-1248 blank)

4-48.2. TWO-LINE ALARM PANEL - MAINTENANCE INSTRUCTIONS.

This task covers:

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

INITIAL SETUP :

Test Equipment

NONE

References

Paragraph
4-48

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	<ul style="list-style-type: none"> 1. Inspect for signs of damage. 2. Inspect for missing identification cards. 	
	b. Targets	Perform tests.	Refer to paragraph 4-48.

4-48.2. TWO-LINE ALARM PANEL - 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 1.	
	c. Alarm panel (3)	Remove.	

REPAIR

NOTE

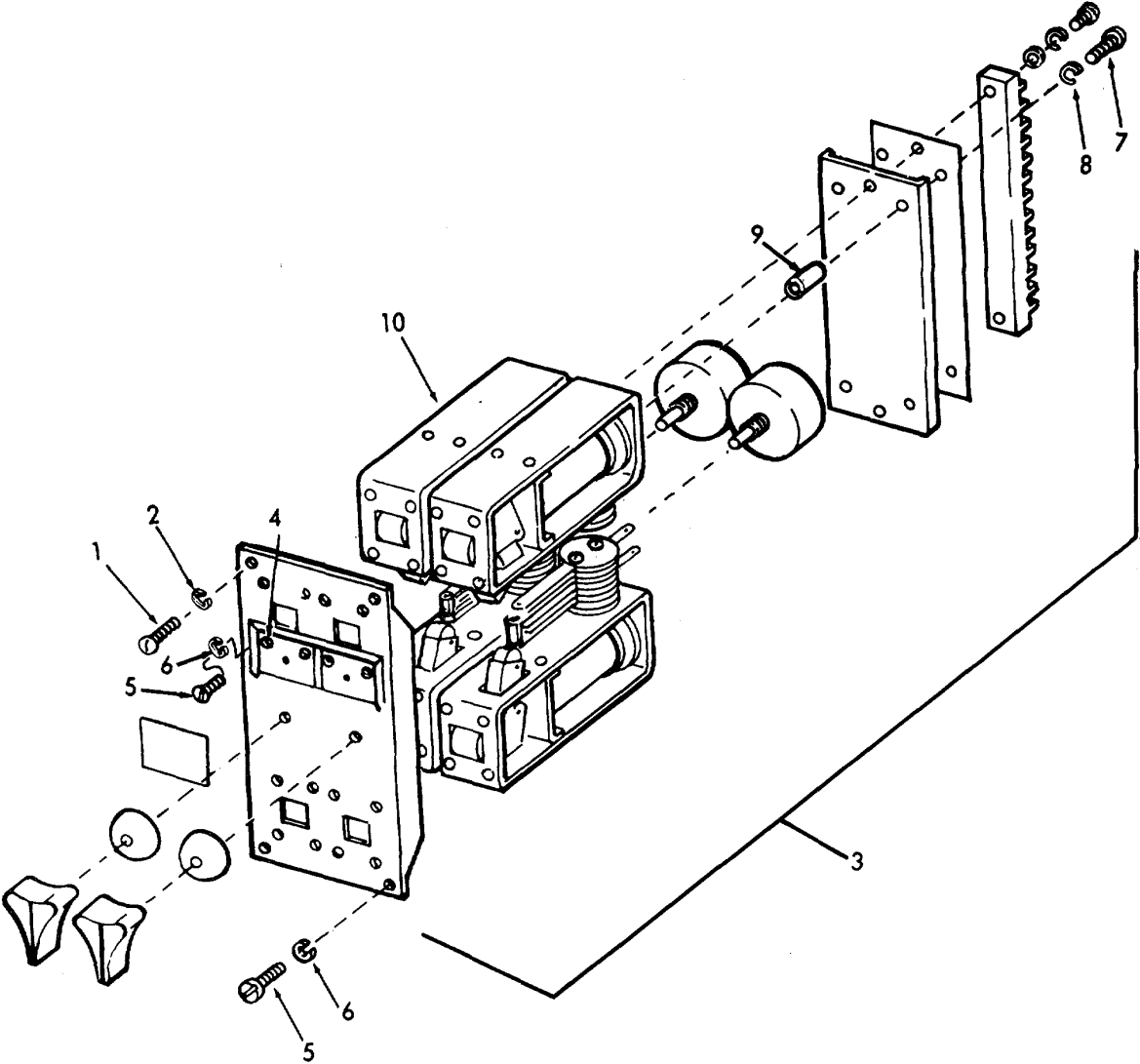
Refer to wiring diagram (Foldout 1) when performing all repairs.

3. Supervisory 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), screws (7), and lock-washers (8)	Install.	

4-48.2. TWO-LINE ALARM PANEL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



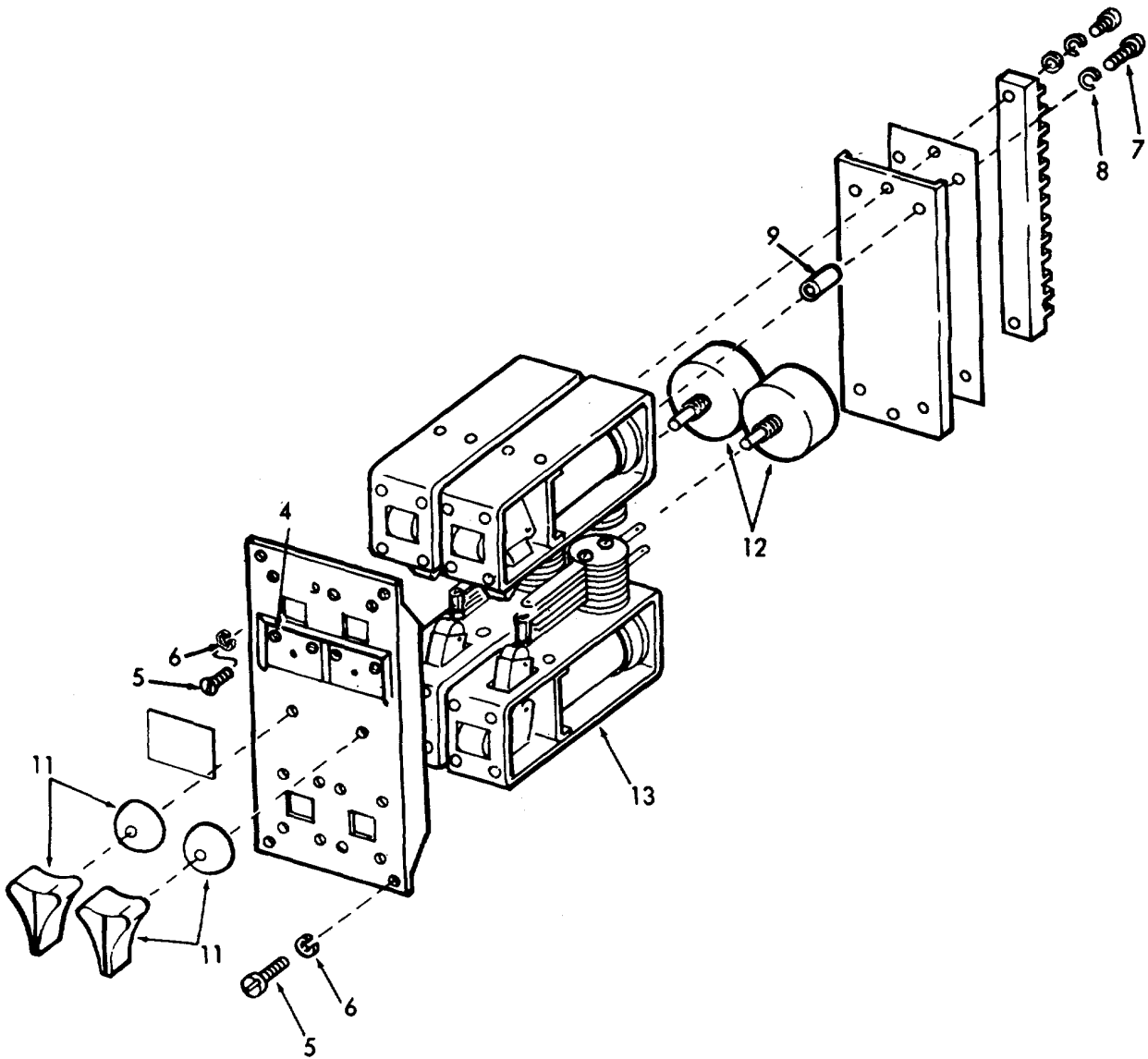
4-48.2. TWO-LINE ALARM PANEL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	g. Screws (5), Install. and lock-washers (6)		
	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)	Install.	
	e. Wiring	Resolder.	
5. Alarm	a. Screws (5), relay washers (6)	Remove four places. and lock-	
	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. Spacers (9), screws (7), and lock-washers (8)	Install.	
	f. Screws (5), and lock-washers (6)	Install.	

4-48.2. TWO-LINE ALARM PANEL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR (Cont)



4-48.2. TWO-LINE ALARM PANEL - 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	

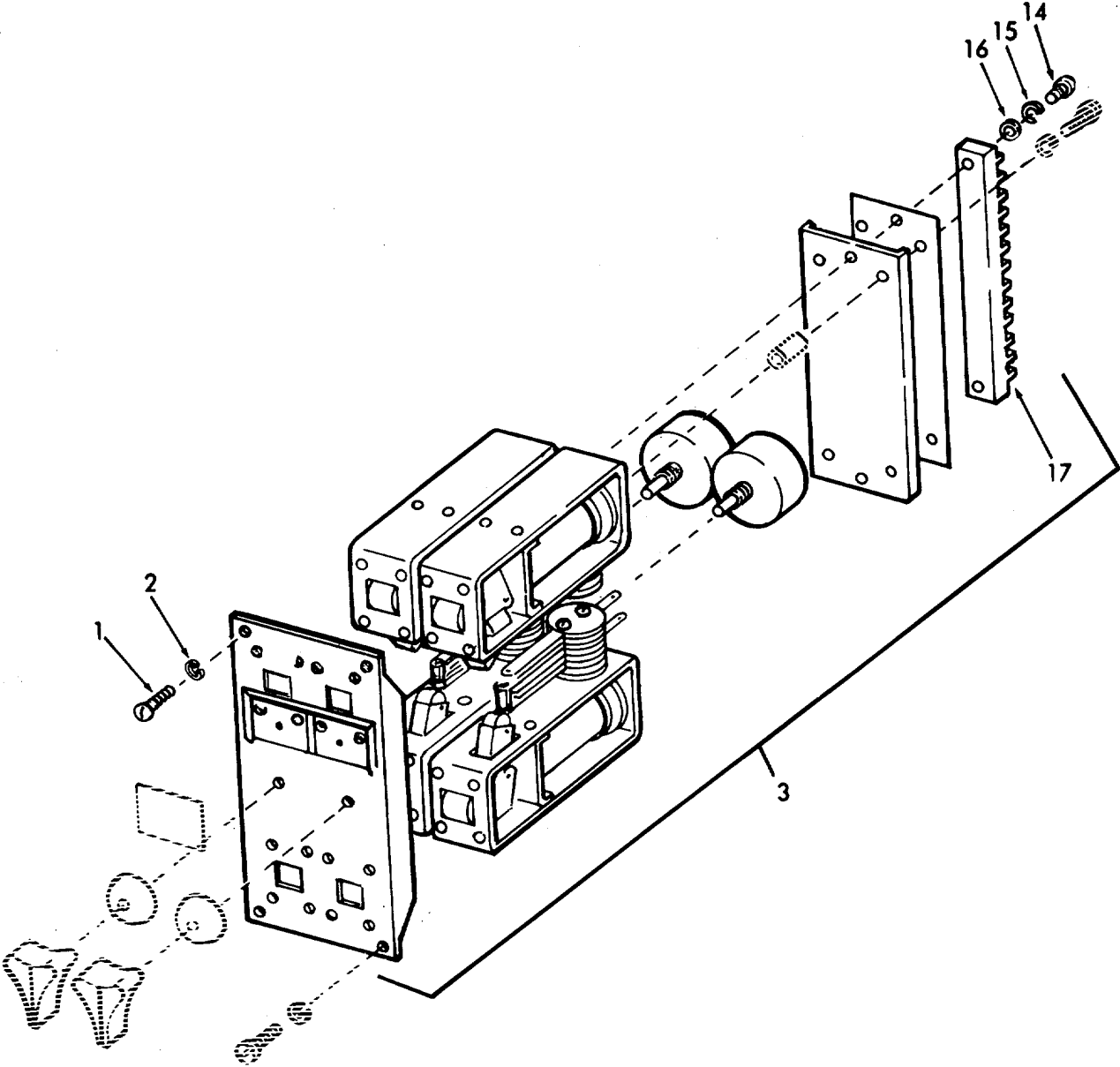
INSTALLATION

7. Alarm panel	a. Alarm panel (3)	Install.	
	b. External wiring to terminal strip	Reconnect.	Refer to wiring diagram in Fold-out 1.
	c. Lockwashers (2) and screws (1)	Install	

4-48.2. TWO-LINE ALARM PANEL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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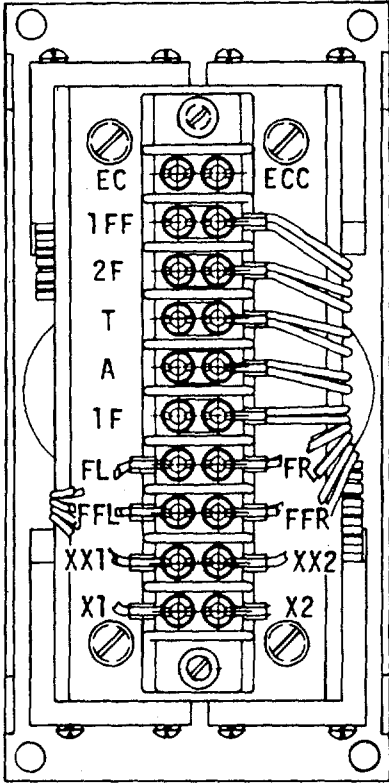
INSTALLATION (Cont)



4-48.2. TWO-LINE ALARM PANEL - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSTALLATION (Cont)



Wiring View of Terminal Strip

4-49. ELECTRONIC AND NAVIGATION SYSTEMS - MAINTENANCE INSTRUCTIONS.

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

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Electronics Foundations	4-49.1
Navigation Horn	4-49.2
24 Volt Distribution Panel	4-49.3

b. Refer to paragraph 4-50 for the UHF Antenna System Maintenance.

4-49.1. ELECTRONIC FOUNDATIONS - 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
Make sure all electronic equipment is secured.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

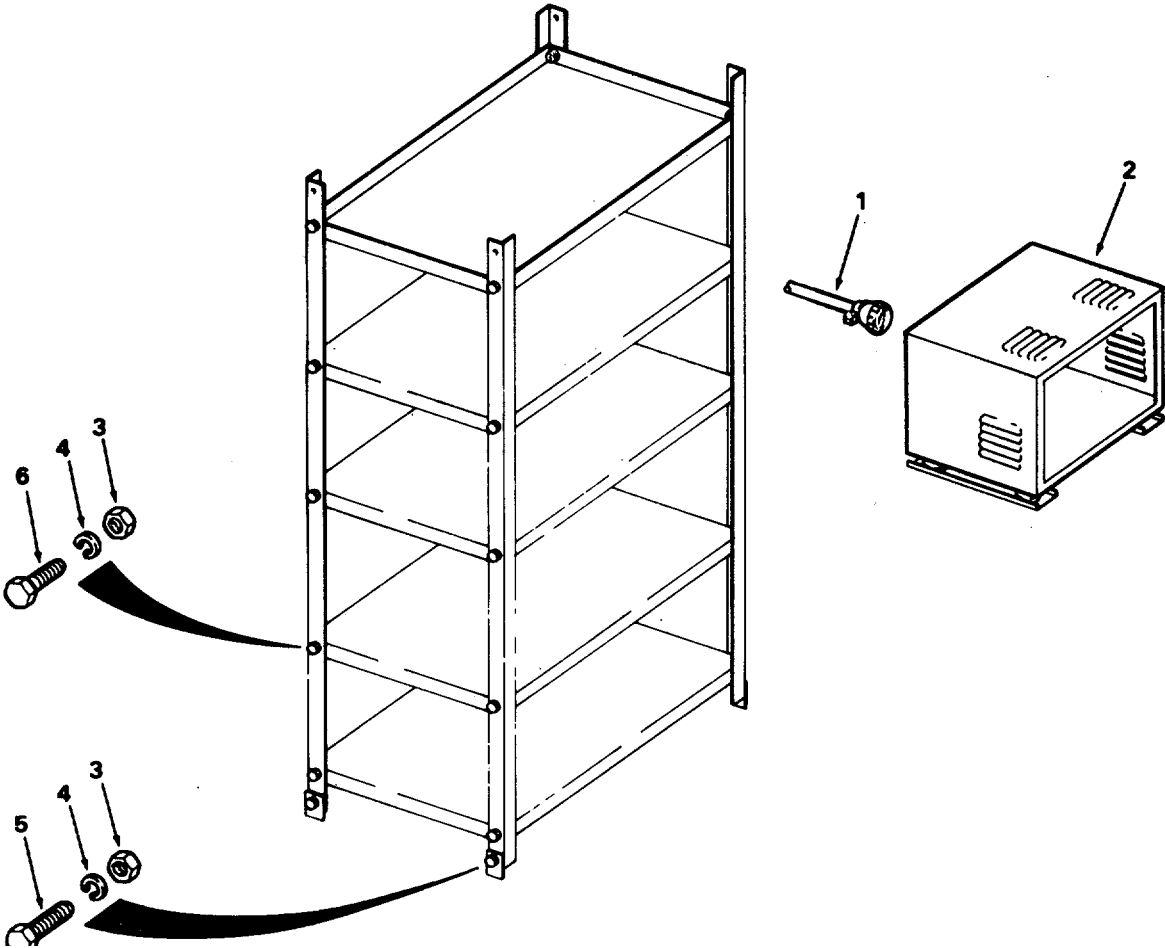
INSPECTION

1. Electronic foundation	All parts	1. Inspect for breaks, cracks, bends, and dents. 2. Insure all hardware is tight.	
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4-1257

4-49.1. ELECTRONIC FOUNDATIONS - MAINTENANCE INSTRUCTIONS (Continued).

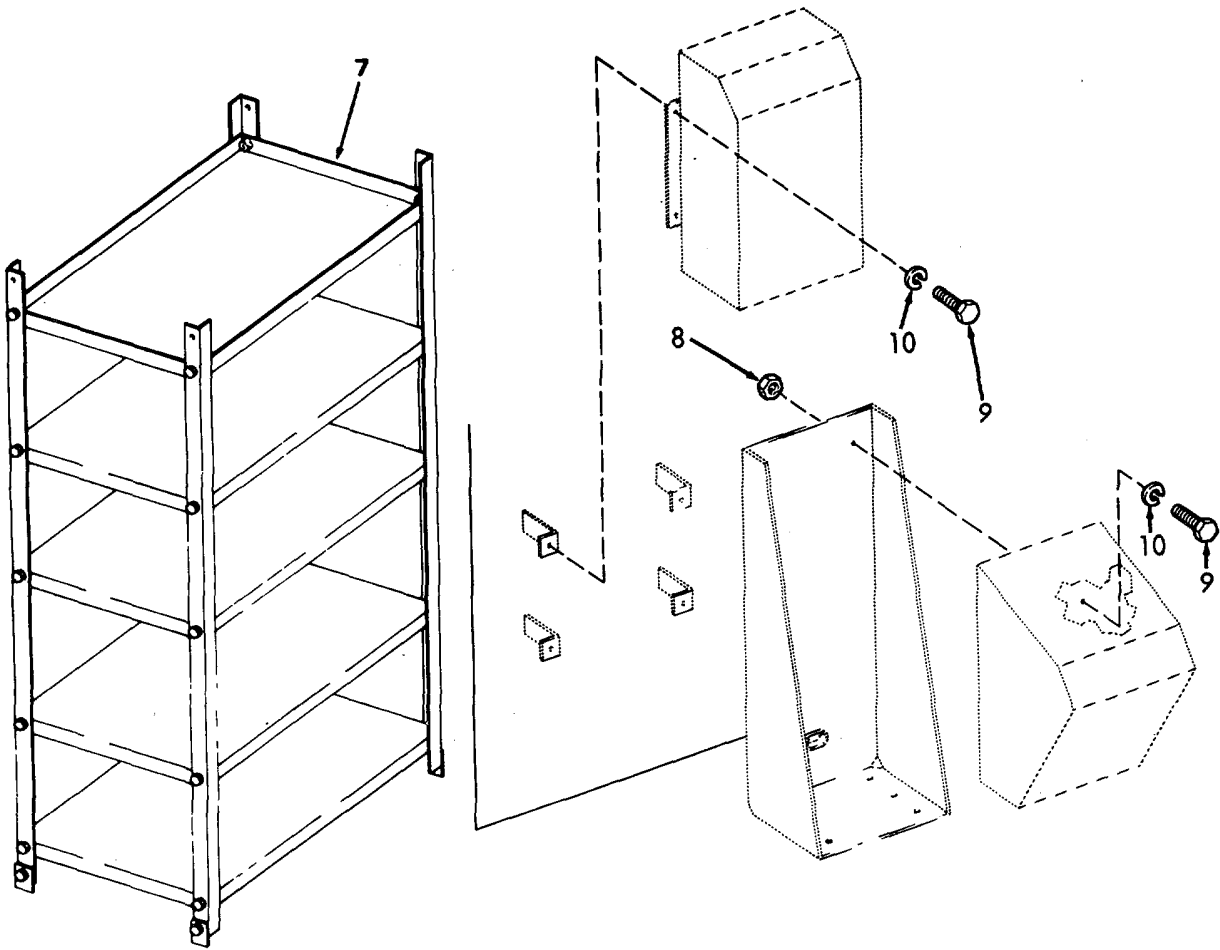
LOCATION	ITEM	ACTION	REMARKS
	REPAIR		
2.	a. Coaxial plug connector (1)	Replace or repair.	If necessary.
	b. Cabinet (AN/URR)(2)	Replace or repair.	If necessary.
	c. Nuts (3), lockwashers (4), and screws (5 or 6)	Replace	If necessary.



4-49.1. ELECTRONIC FOUNDATIONS - MAINTENANCE INSTRUCTIONS (Continued).

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

REPAIR (Cont)



4-49.2. 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 Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

2

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

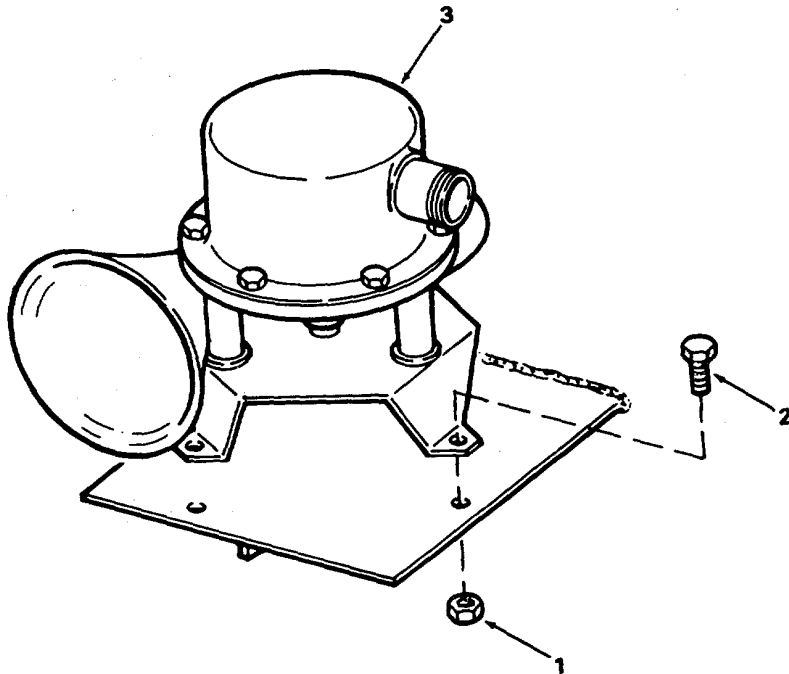
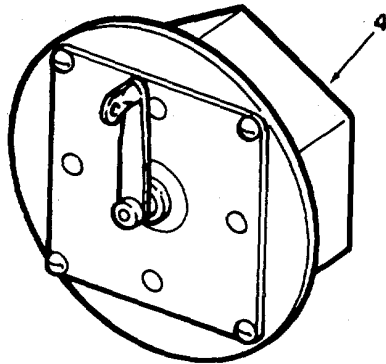
1. Navigation horn	a. Switch	1. Inspect for proper operation. 2. Inspect for damage.
	b. Horn	1. Inspect for proper operation. 2. Inspect for damage. 3. Insure all hardware is tight.

TEST

2.	Horn	Operate.
----	------	----------

4-49.2. NAVIGATION HORN - MAINTENANCE 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.



4-49.3. 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
----------	------	--------	---------



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
 - 1. Inspect for missing and knobs.
 - 2. Inspect for proper operation

4-50. VHF ANTENNA-SYSTEM - MAINTENANCE INSTRUCTIONS.

This task covers:
 a. Inspection

INITIAL SETUP :

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

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

WARNING

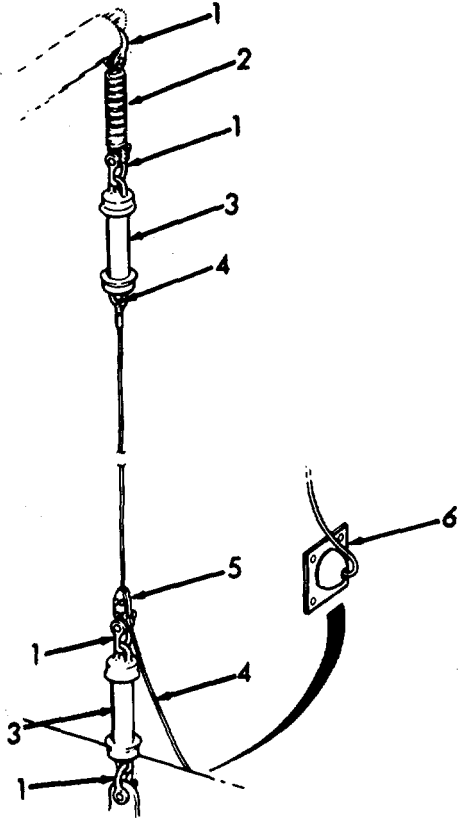
In order to avoid serious burns, and severe shock, tag all transmitting devices and place in the OFF position. .

INSPECTION

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

4-50. 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.	



4-51. OIL/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS.

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

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
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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.

4-52. PIPING SYSTEMS - MAINTENANCE INSTRUCTIONS.

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

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Sewage System	4-15
Pipe Hangers	4-53
Fire, Bilge, and Ballast	4-54
Machinery Cooling and Keel Coolers	4-55
Lube Oil	4-56
Diesel Oil Stowage Tank	4-57
Diesel Oil	4-53
Diesel Oil Coolers	4-59
Duplex Strainer	4-60
Washdown Countermeasure	4-61
Engine Exhaust	4-62
Oil/Water Separator	4-63
Fresh and Flush Water	4-64
Deck Fittings	4-65

4-1267

4-53. PIPE HANGERS - EXHAUST - MAINTENANCE INSTRUCTIONS.

This task covers:
 a. Inspection

INITIAL SETUP :

<u>Test Equipment</u>	<u>References</u>
NONE	NONE
<u>Special Tools</u>	<u>Equipment Condition</u> <u>Condition Description</u>
NONE	NONE
<u>Material/Parts</u>	<u>Special Environmental Conditions</u>
NONE	NONE
<u>Personnel Required</u>	<u>General Safety Instructions</u>
1	NONE

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

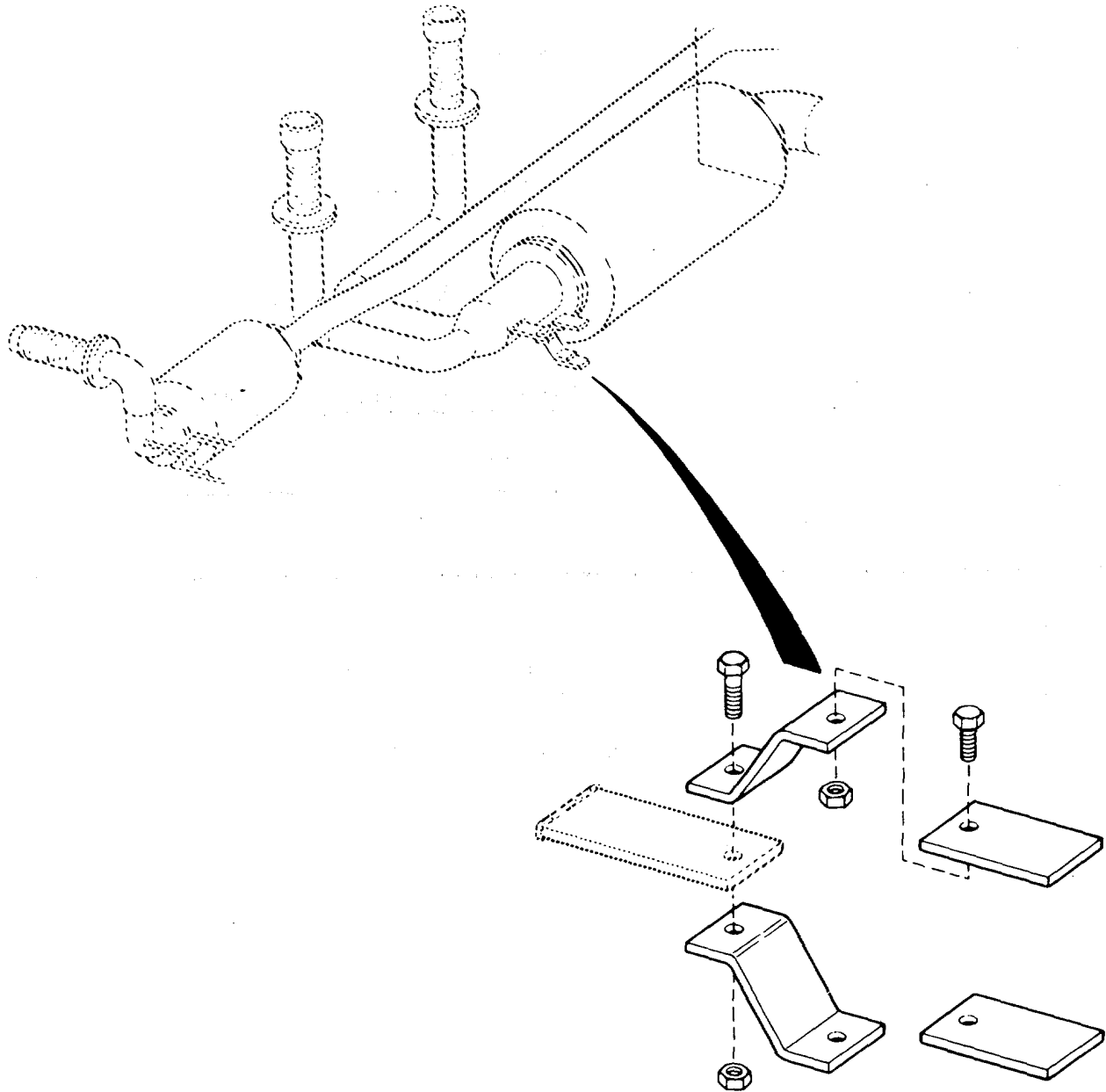
INSPECTION

1. Pipe hangers	Hardware	1. Inspect for missing parts. 2. Insure all hardware is tight.	
-----------------	----------	---	--

4-53. PIPE HANGERS - EXHAUST - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSPECTION (Cont)



4-54. FIRE, BILGE, AND BALLAST SYSTEM - MAINTENANCE INSTRUCTIONS.

The following is an index to the maintenance procedures.

DESCRIPTION	PARAGRAPH
Fire System Piping	4-54.1
Ballast System Piping	4-54.2
Bilge System Piping	4-54.3
Gage Piping	4-54.4
Simplex Strainer	4-54.5
Wye Strainer	4-54.6
Fog Nozzle	4-54.7

4-54.1. FIRE CONTROL SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection b. Repair**
-

INITIAL SETUP:

Test Equipment

NONE

References

Paragraph

4-54.5

Simplex Strainer

Special Tools

AS NEEDED
Pipe soldering tools

Equipment

Condition Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

Observe standard safety procedures for soldering piping. Observe WARNING in procedure.

4-54.1. FIRE CONTROL SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION			
1. Fire	a. Hose station	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Inspect for missing parts. 2. Insure all parts are functioning properly. 	
2. Flange couplings	Couplings	Insure all hardware is tight.	
3. Magazine control piping	a. Magazine drain	<ol style="list-style-type: none"> 1. Inspect for leaks. 2. Inspect for proper operation. 	
	b. Sprinkler	Inspect for breaks, and leaking.	
4. Hose connections	Hose cap and chain	Inspect for damage or missing parts.	

4-54.1. FIRE CONTROL SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

REPAIR

5. Fire station	a. Fog applicator (1)	Replace.	If necessary.
	b. Fog applicator brackets (2) and screws (3)	Replace.	If necessary.
	c. Hose (4)	Replace.	If necessary.
	d. Clip (5) and clip belt (6)	Replace.	If necessary.
	e. Nozzle (7)	Replace.	If necessary.

WARNING

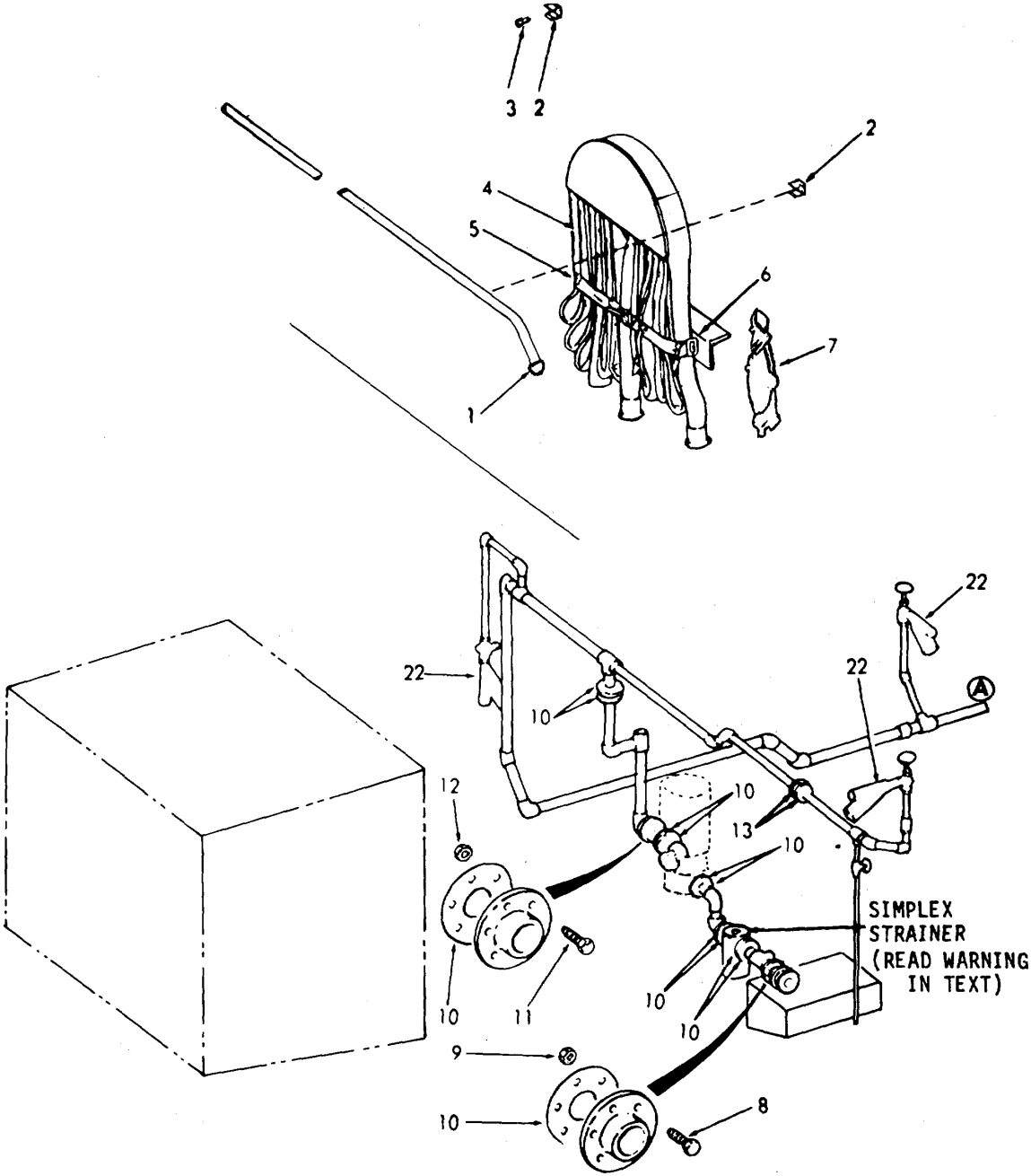
Make sure the valve closest to the sea chest is closed when changing gaskets on either side of the simplex strainer. This will eliminate the possible flooding of the bilges.

6. Flange couplings	Cap head hex screws (8, 11, 14, 16, and 19), nuts (9, 12, 15, 17, and 20), and gaskets (10, 13, 18, and 21)	Replace.	If necessary.
7. In-line marine strainers	Strainer (22)	1. Replace. 2. Clean if possible.	If necessary.
8. Magazine sprinklers	Sprinkler (23)	Replace.	If necessary.
9. Magazine drain	Chain and cap (24)	Replace.	If necessary.

4-54.1. FIRE CONTROL SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

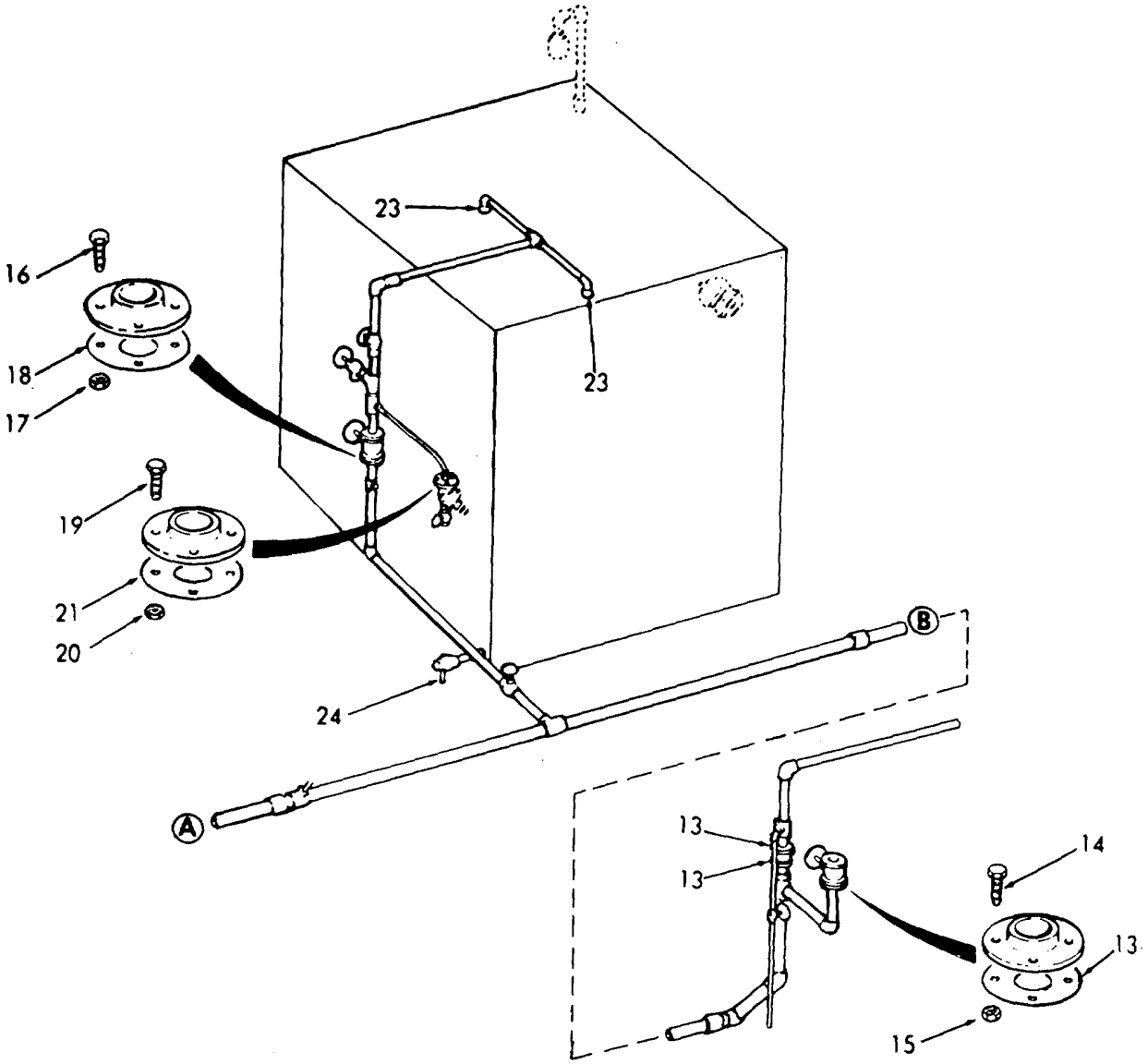
LOCATION ITEM ACTION REMARKS

REPAIR (Cont)



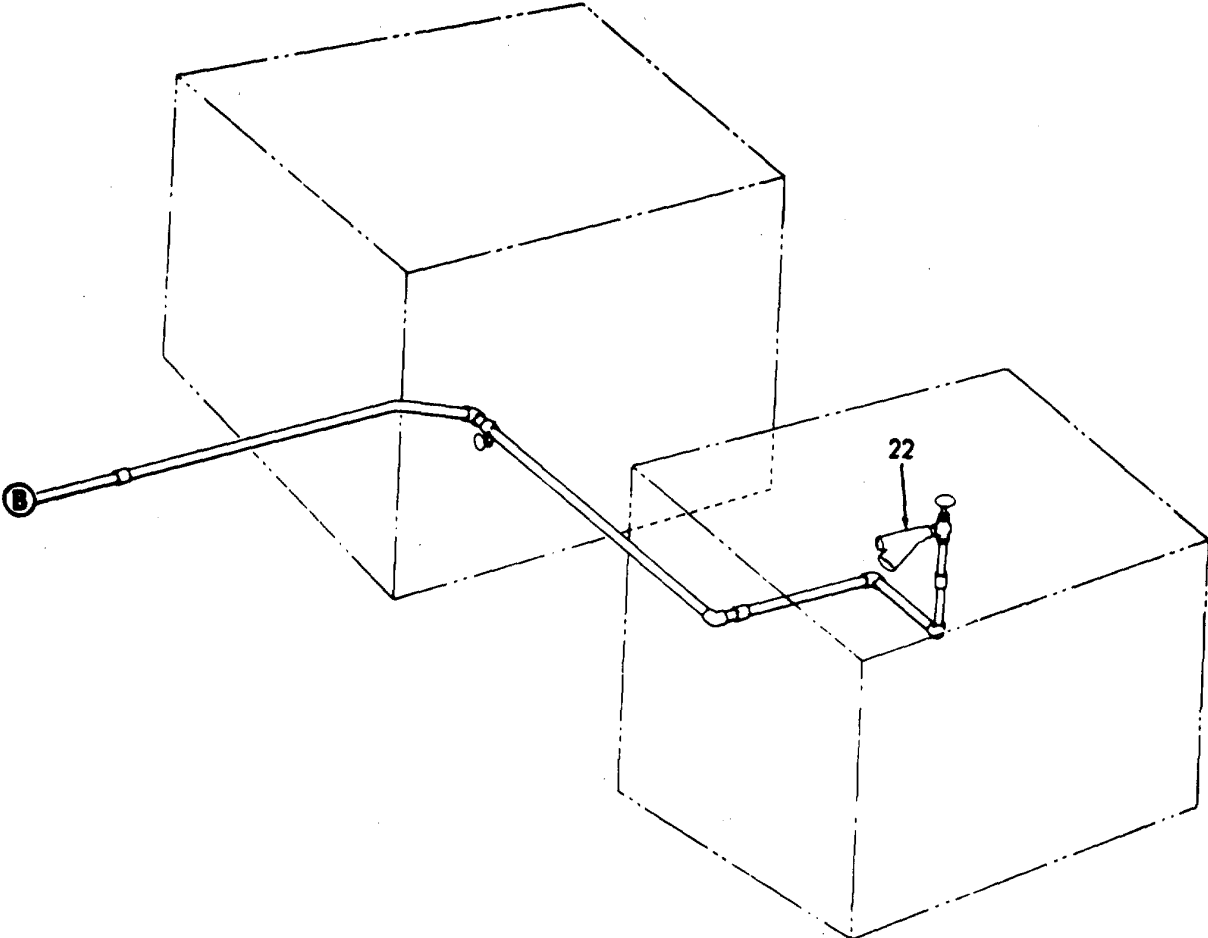
4-54.1. FIRE CONTROL SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

REPAIR (Cont)



4-54.1. FIRE CONTROL SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

REPAIR (Cont)



4-54.2. BALLAST SYSTEM - PIPING - 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

NONE

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSPECTION

1. Ballast piping	a. Gaskets	Inspect for leaks.	
	b. Piping	Inspect for dents, breaks, or cracks and leaking.	Refer to Direct Support Maintenance.
	c. Valves	Inspect for wear, and leaking.	

REPAIR

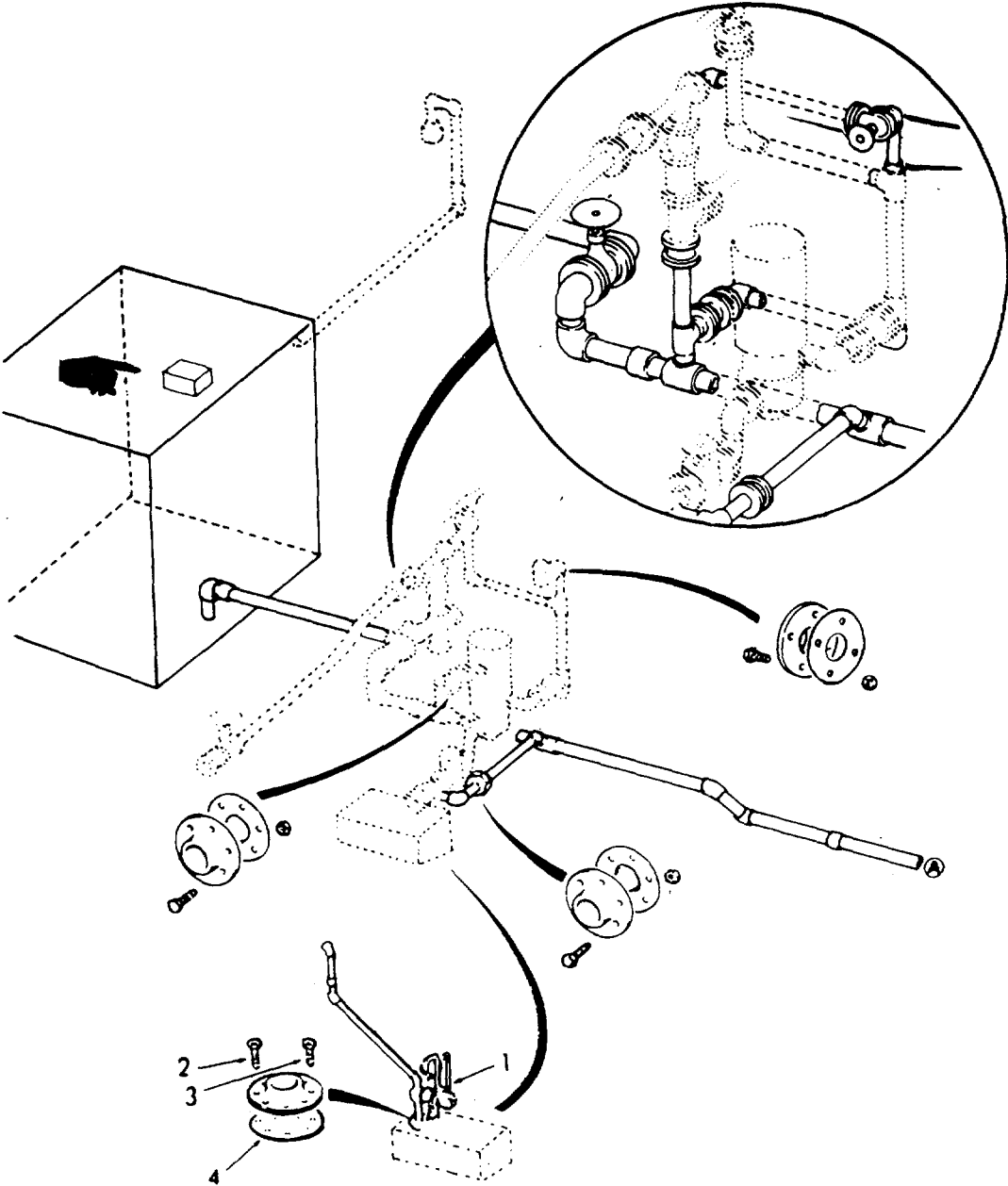
2.	a. Hose swivel adapter (1)	Replace.	If necessary.
	b. Screws 1/2-13x2 (2)	Replace.	If necessary.
	c. Screws 1/2-13x2 (3)	Replace.	If necessary.

4-54.2. BALLAST SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

	d. Gasket 1-1/2 inch (4)	Replace.	If necessary.
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4955-251

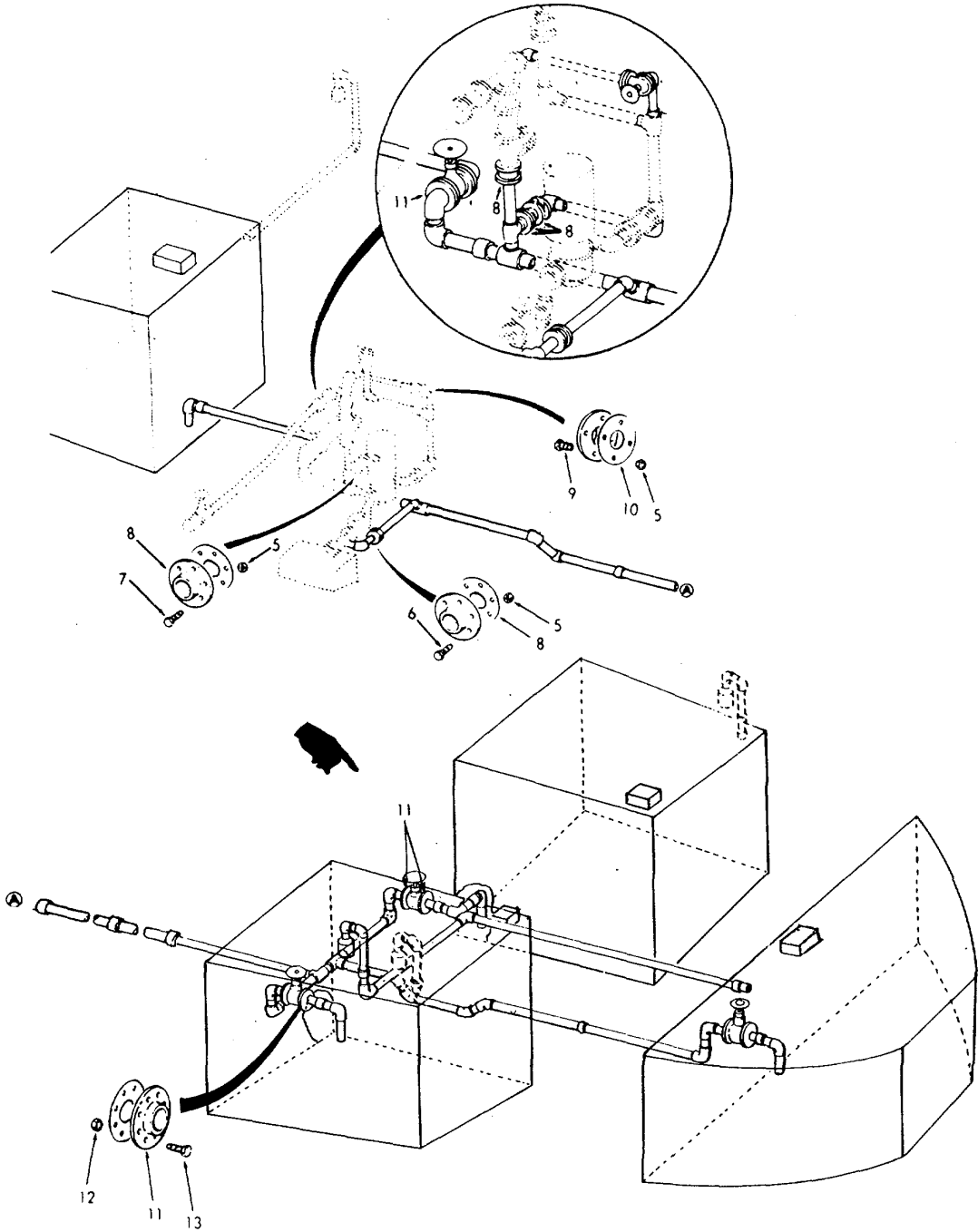
4-54.2. BALLAST SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
	REPAIR (Cont)		
	e. Plain nut (5)	Replace.	If necessary.
	f. Screws (6)	Replace.	If necessary.
	g. Screws (7)	Replace.	If necessary.
	h. Gasket 3 inch 1/16 (8)	Replace.	If necessary.
	i. Screw (9)	Replace.	If necessary.
	j. Gasket 2x 1/16 inch (10)	Replace.	If necessary.
	k. Gasket 4x 1/16 (11)	Replace.	If necessary.
	l. Plain nut (12)	Replace.	If necessary.
	m. Screws (13)	Replace.	If necessary.

4-54.2. BALLAST SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continue).

LOCATION ITEM ACTION REMARKS

REPAIR (Cont)



4-54.3. BILGE SYSTEM - PIPING - 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

NONE

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSPECTION

1. Bilge piping	a. Gaskets	Inspect for leaks.	
	b. Hoses and clamps	Inspect for leaks and lose clamps.	
	c. Piping	Inspect for dents, breaks, or cracks and leaking.	Refer to Direct Support Maintenance.
	d. Valves	Inspect for wear, and leaking.	
	e. Strainers	Inspect for clogging, damaged or missing parts.	

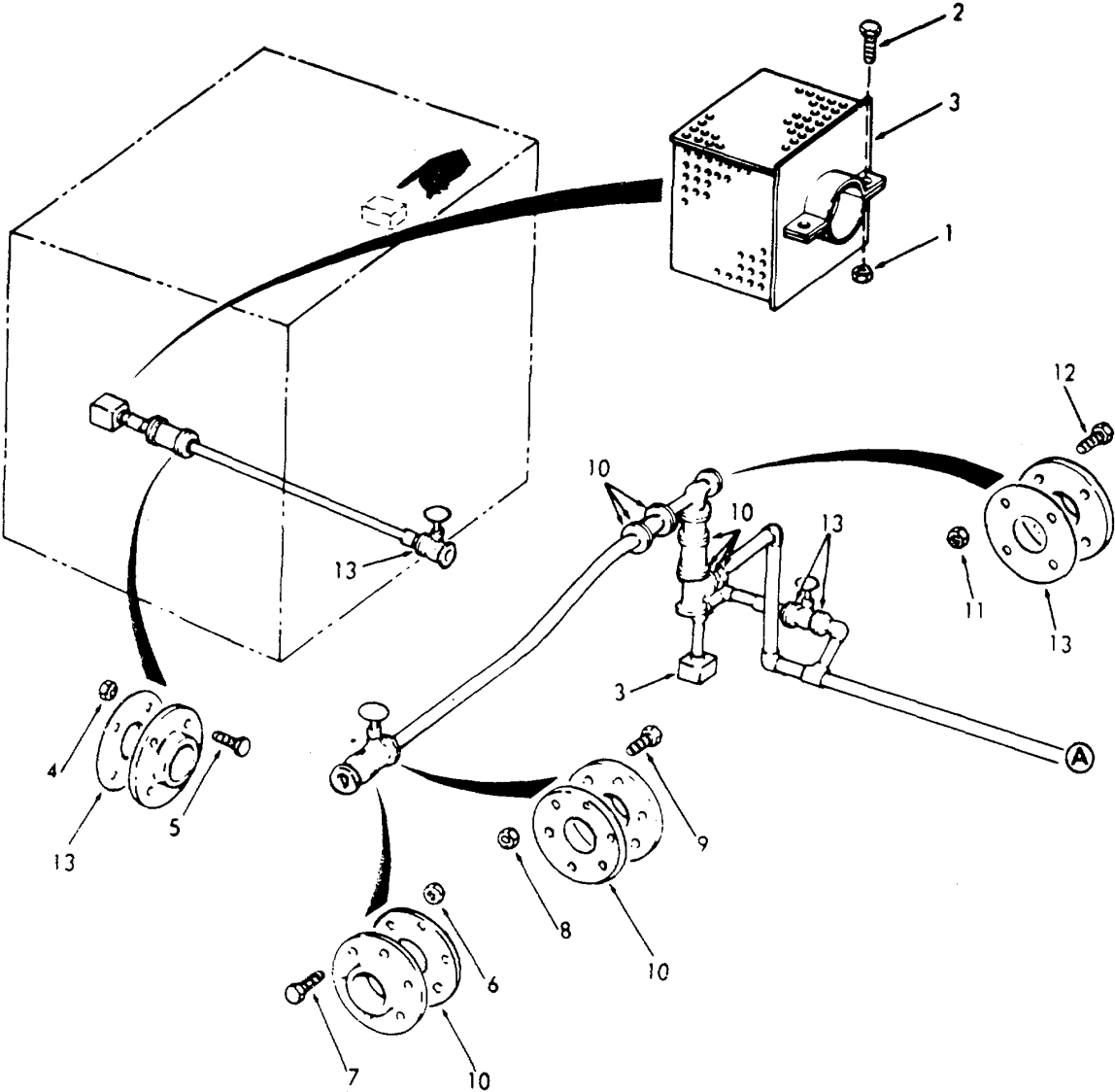
4-54.3. BILGE SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2.	a. Nut (1)	Replace.	If necessary.
	b. Screw (2)	Replace.	If necessary.
	c. Strainer (3)	Replace or clean.	If necessary.
	d. Plain nut (4)	Replace.	If necessary.
	e. Screw (5)	Replace.	If necessary.
	f. Plain nut (6)	Replace.	If necessary.
	g. Screw (7)	Replace.	If necessary.
	h. Plain nut (8)	Replace.	If necessary.
	i. Screw (9)	Replace.	If necessary.
	j. Gasket 3 inch (10)	Replace.	If necessary.
	k. Plain nut (11)	Replace.	If necessary.
	l. Screw (12)	Replace.	If necessary.
	m. Gasket 2 inch (13)	Replace.	If necessary.
	n. Plain nut (14)	Replace.	If necessary.
	o. Screw (15)	Replace.	If necessary.
	p. Gasket 2-1/2 inch (16)	Replace.	If necessary.
	q. Hose clamp (17)	Replace.	If necessary.
	r. Suction hose (18)	Replace.	If necessary.

4-54.3. BILGE SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
	s. Discharge hose (19)	Replace.	If necessary.
	t. Nut (20)	Replace.	If necessary.
	u. Screw (21)	Replace.	If necessary.

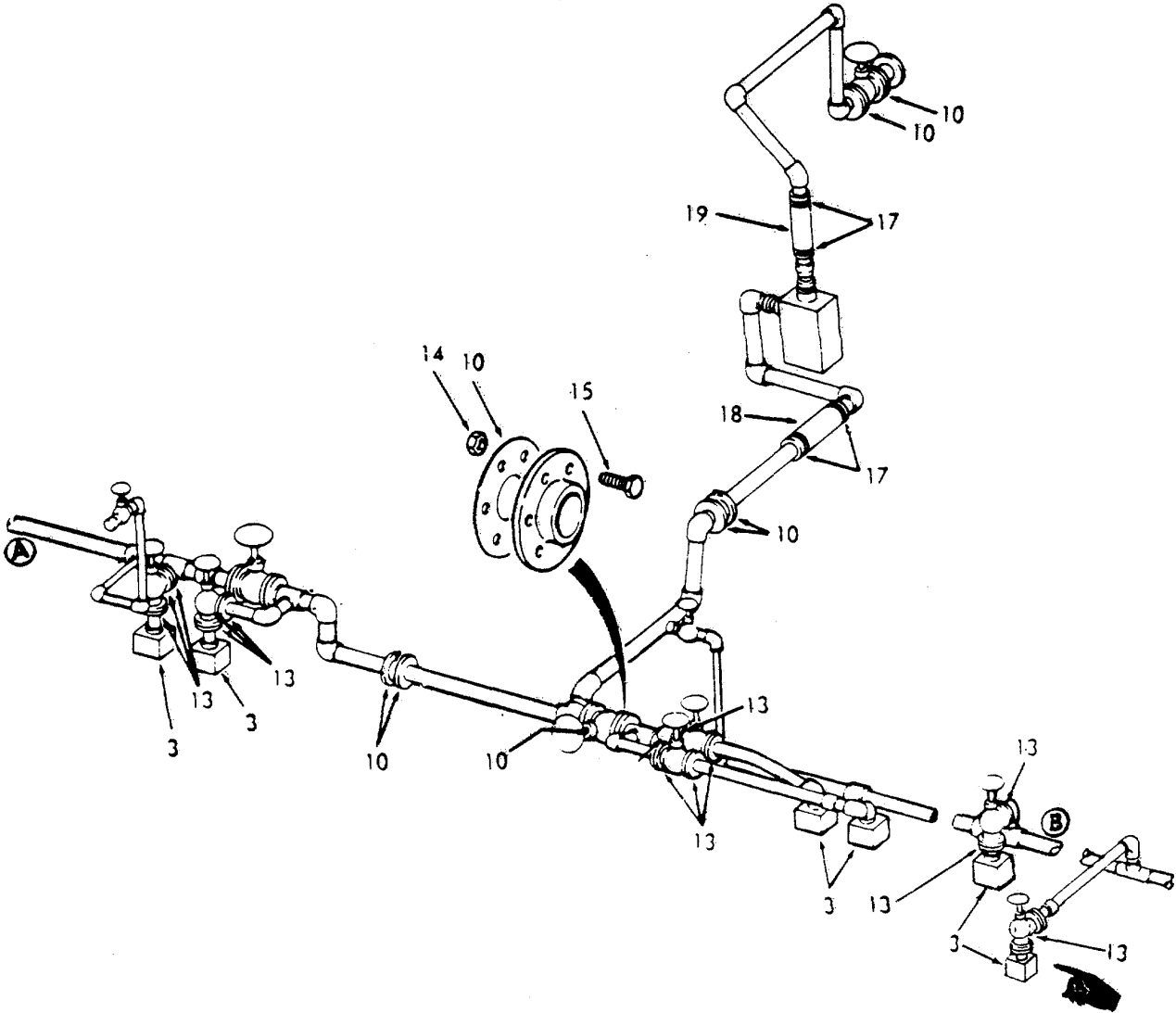
REPAIR (Cont)



4-54.3. BILGE SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR

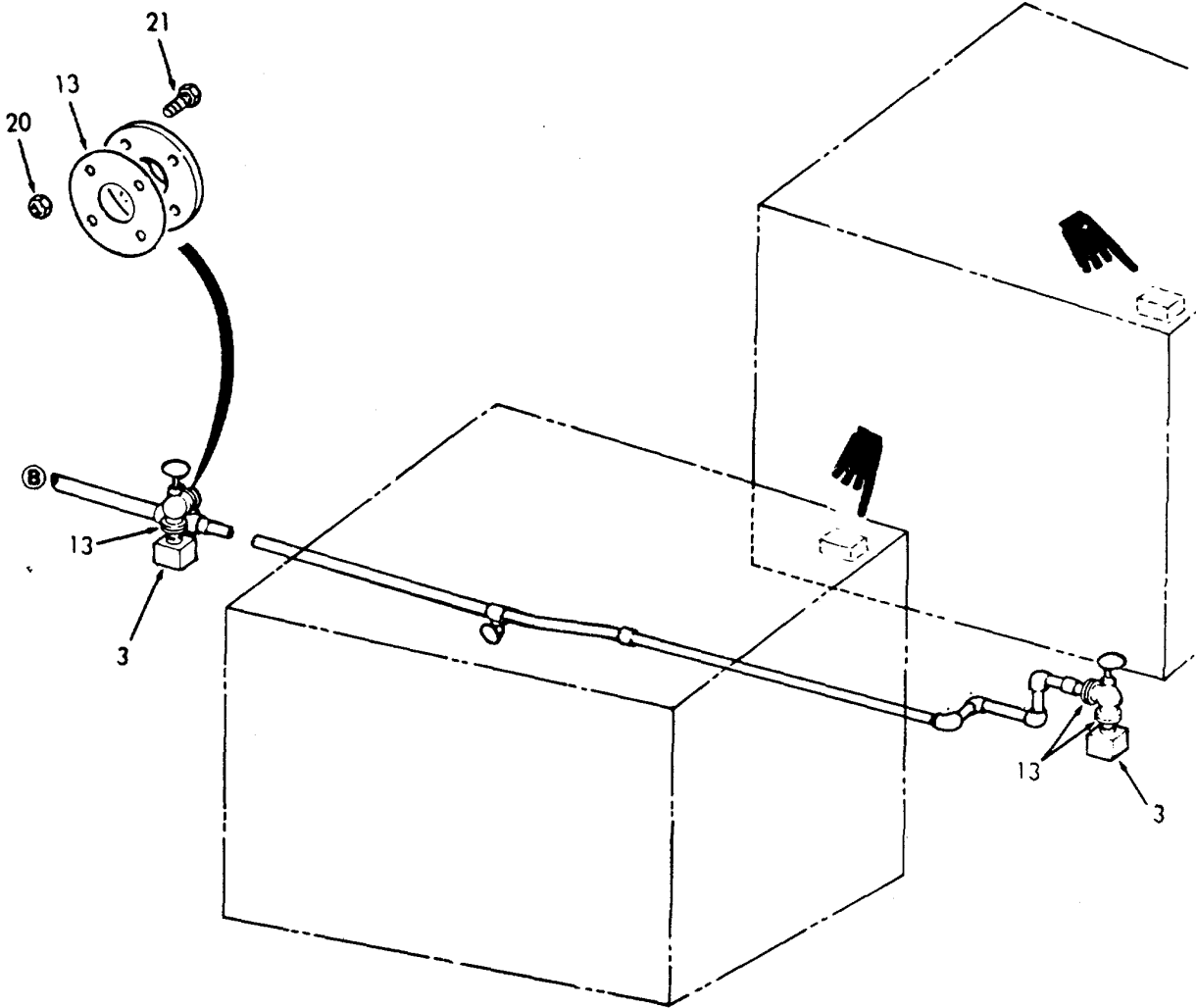


4955-167

4-54.3. BILGE SYSTEM - PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR (Cont)



4955-254

Change 1 4-1285/(4-1286 blank)

4-54.4. GAGE PIPING - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Repair

INITIAL SETUP :

Test Equipment

NONE

References

Paragraph 4-54.6 Wye Strainer

Special Tools

Pipe soldering tools.

Equipment Condition Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

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	<ol style="list-style-type: none"> 1. Inspect for breaks, cracks or bends. 2. Inspect for leaks.
	c. Valves	<ol style="list-style-type: none"> 1. Inspect for defective operation. 2. Inspect for leaks.

4-54.4. GAGE PIPING - MAINTENANCE INSTRUCTIONS (Continued).

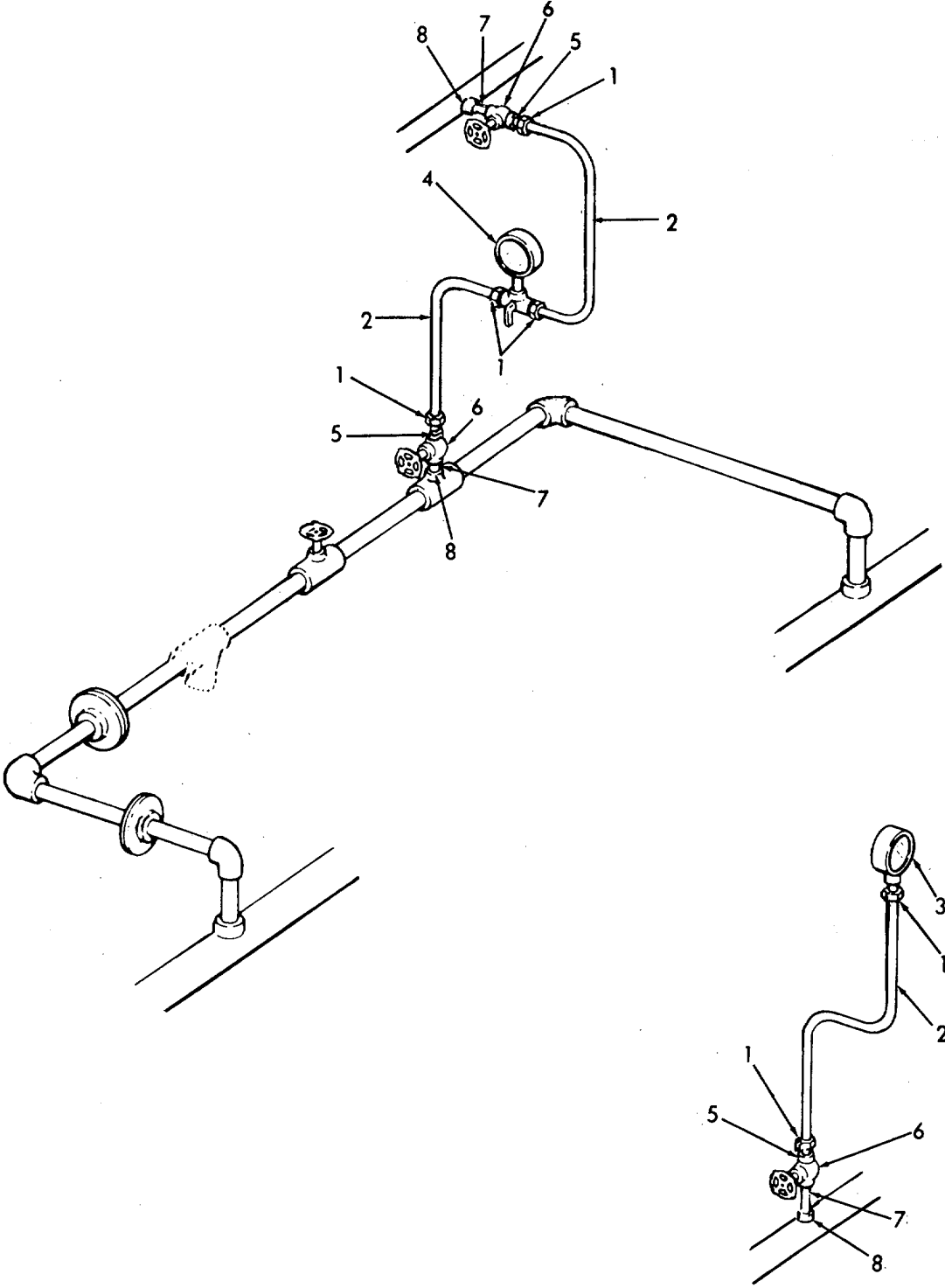
REPAIR

- | | | | |
|--------------------------------|----------------------|---------------------|------------------|
| 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. |

4-54.4 GAGE PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-54.4. GAGE PIPING - MAINTENANCE INSTRUCTIONS (Continued).

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			
7. Flanges	a. Nuts (10) and screws (11)	Remove.	
	b. Flange (12) and gasket (13)	Separate.	Discard gasket.
	d. Flange (12), gasket (13), screws (11), and nuts (10)	Reassemble.	Use new gasket.
8. Solder connections			

NOTE

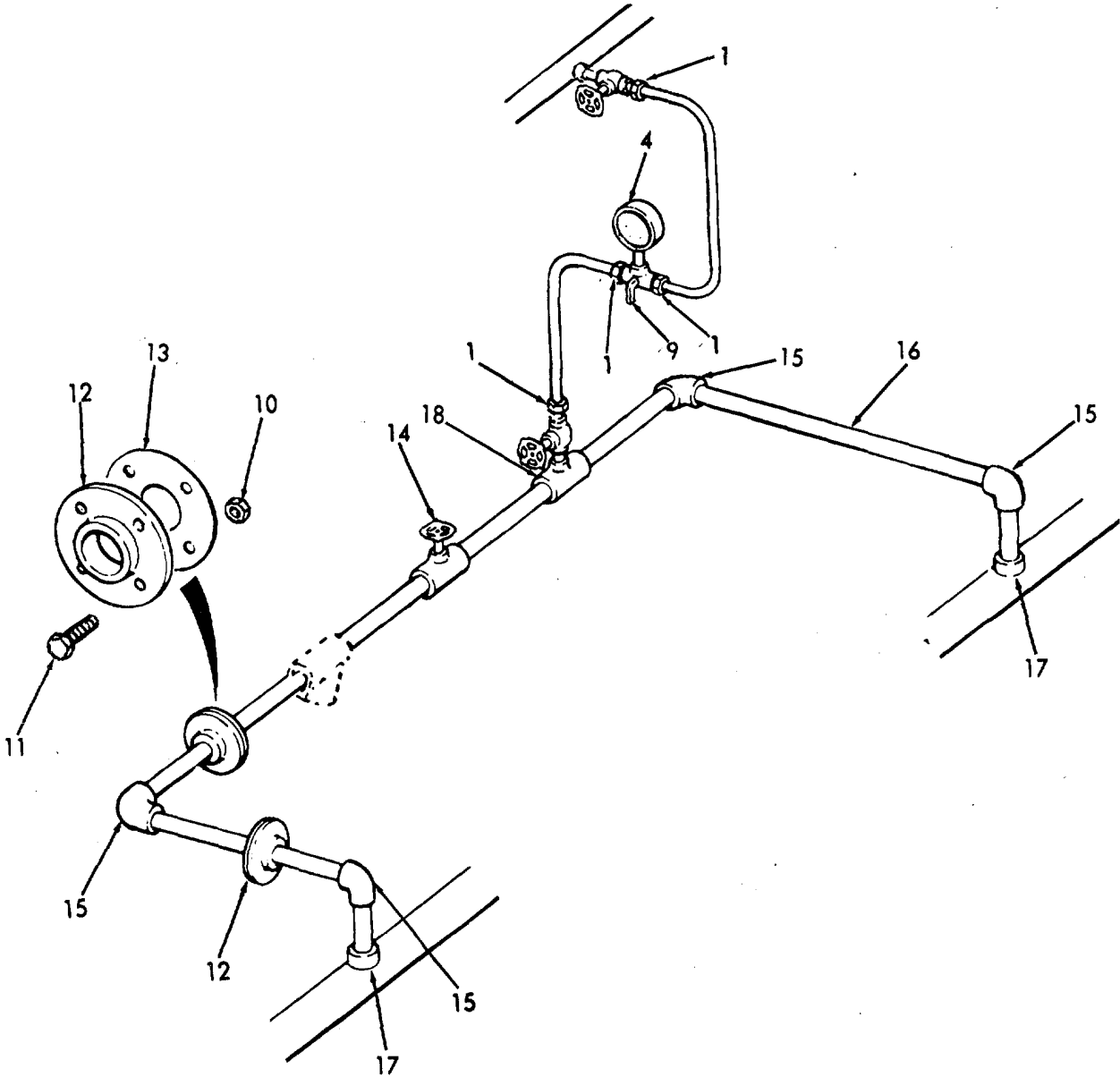
Unsolder connection in accordance with standard practices. Do not heat valves excessively as they can be damaged.

a. Valves (14)	Replace.	If necessary.
b. Elbows (15)	Replace.	If necessary.
d. Tubing (16)	Replace.	If necessary.
d. Couplings (17)	Replace.	If necessary.
e. Tee (18)	Replace.	If necessary.

4-54.4 GAGE PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-1291/(4-1292 blank)

4-54.5. SIMPLEX STRAINER - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Service
- c. 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

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARK
----------	------	--------	--------

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

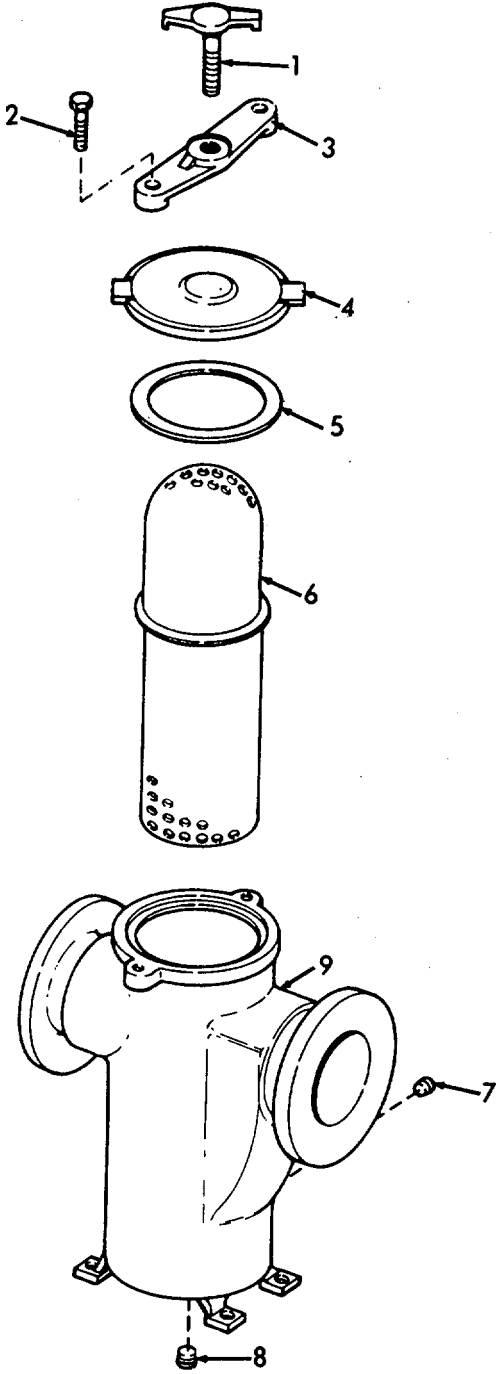
Make sure the valve closest to the sea chest is closed. This will eliminate the possibility of flooding the bilges.

4-54.5. SIMPLEX STRAINER - MAINTENANCE INSTRUCTIONS.

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.	

4-54.5. SIMPLEX STRAINER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
	SERVICE (Cont)		



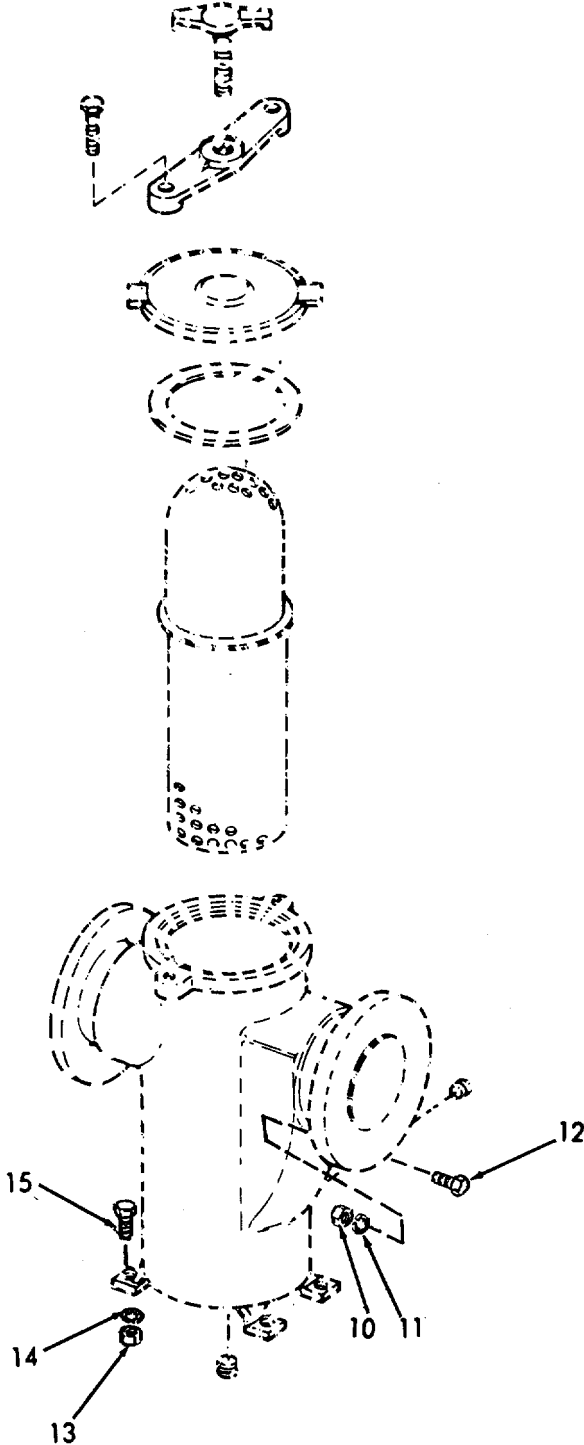
4-54.5. SIMPLEX STRAINER - MAINTENANCE INSTRUCTIONS.

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	

4-54.5. SIMPLEX STRAINER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



4-54.6. WYE STRAINER - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection

b. Service

INITIAL SETUP

Test Equipment

NONE

References

Paragraph
4-54.4 Gage Piping

Special Tools

NONE

Equipment Condition

NONE

Condition Description

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARK
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INSPECTION

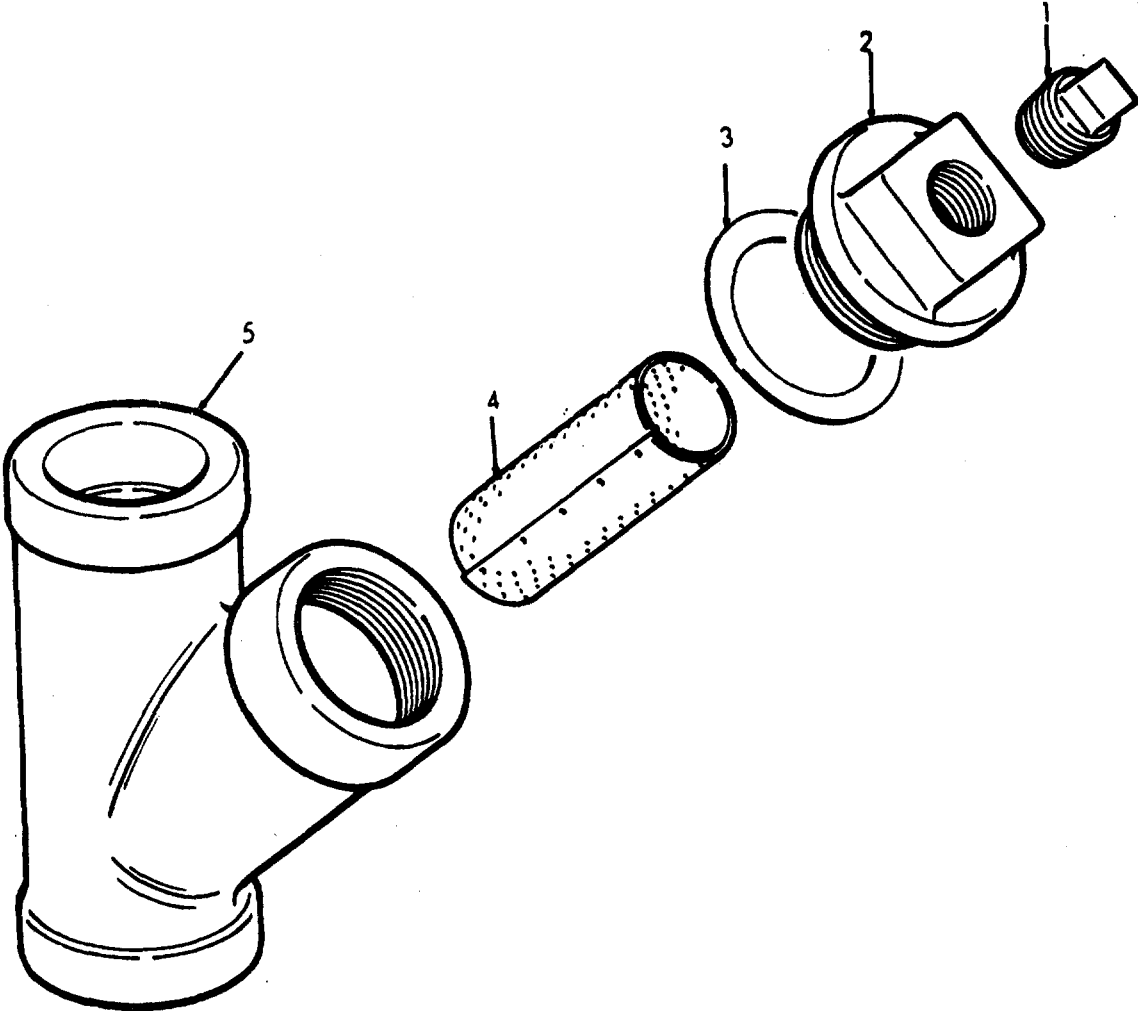
1. Wye strainer	a. Body cracks and leaks.	Inspect for breaks,	
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SERVICE

2.	a. Pipe plug (1)	Remove.	Drain.
	b. Cover (2) and gasket (3)	Remove.	Discard gasket.
	d. Screen basket (4)	1. Remove. 2. Clean. 3. Replace.	

4-54.6. WYE STRAINER - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
SERVICE (Cont)			
	d. Cover (2) and gasket (3)	Install.	
	e. Pipe plug (1)	Install.	



4-54.7. FOG NOZZLE - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection

b. Service

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	REMARK
----------	------	--------	--------

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.

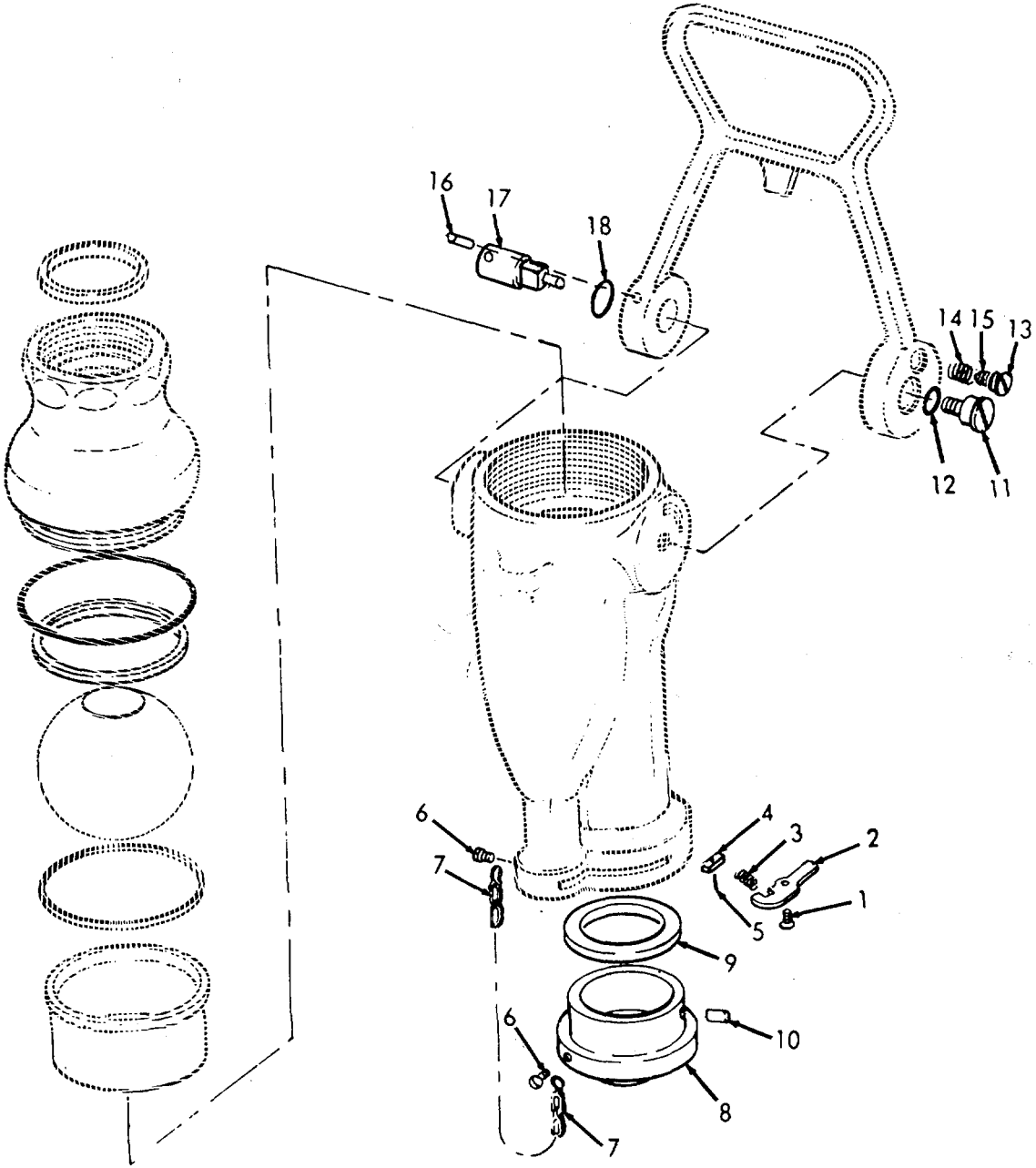
4-54.7. FOG NOZZLE - MAINTENANCE INSTRUCTIONS.

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

4-54.7. FOG NOZZLE - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



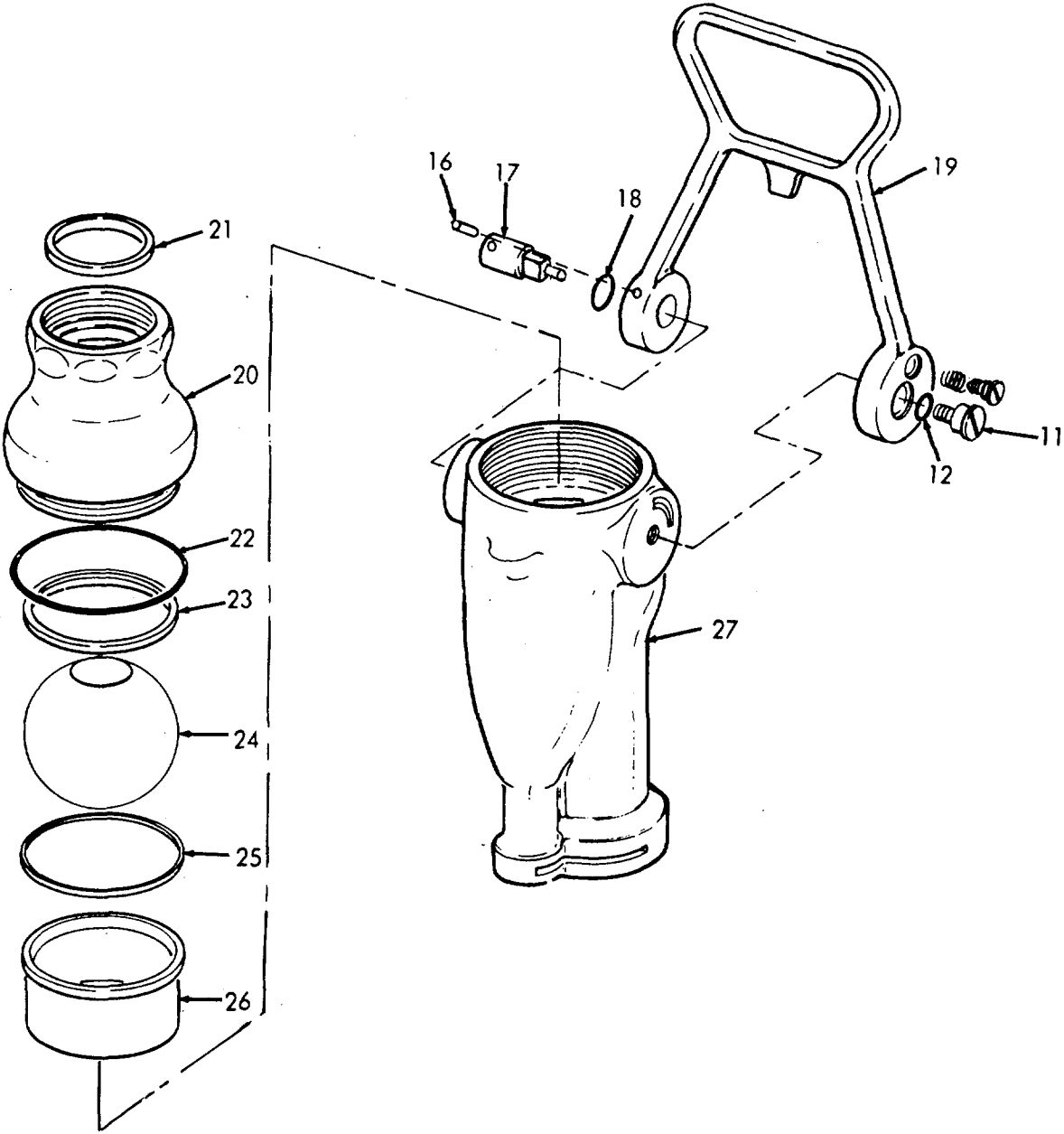
4-1303

4-54.7. FOG NOZZLE - MAINTENANCE INSTRUCTIONS.

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.

4-54.7. FOG NOZZLE - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
	REPAIR (Cont)		



4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection

b. Repair

INITIAL SETUP

Test Equipment

NONE

References

NONE

Special Tools

Pipe soldering tools

Equipment Condition

NONE

Condition Description

Material/Parts

NONE

Special Environmental Conditions

Do not drain cooling water into bilges.

Personnel Required

1

General Safety Instructions

Observe standard safety procedures for soldering pipe.

LOCATION	ITEM	ACTION	REMARK
INSPECTION			
1. Machinery cooling (Generator)	a. Valves	Inspect for leaking.	
	b. Flexible hose	Inspect for breaks, cracks and leaks.	
	c. Hose clamps	Inspect for damage.	
2. Expansion tanks	a. Flexible hoses	Inspect for breaks, cracks and leaks.	
	b. Hose clamp	Inspect for damage.	
	c. Water sight indicator	Inspect for breaks, cracks and leaks.	
	d. Piping	Inspect for breaks, cracks and leaks.	

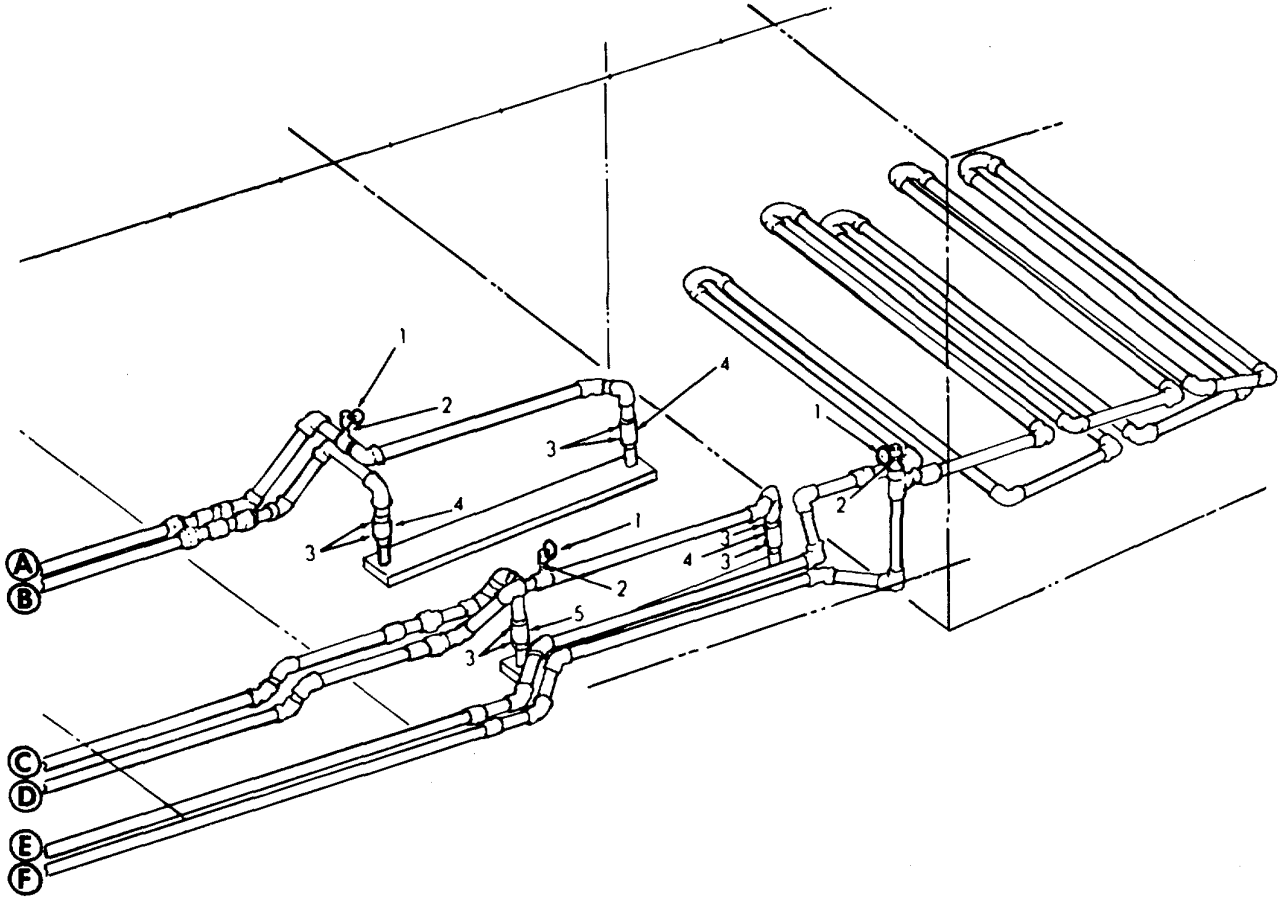
4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
REPAIR - GENERATOR			
4. Gate valves	a. Gate valve (1)	Replace.	If necessary.
	b. Tubing copper-nickel 3/8 ID (2)	Replace.	If necessary.
5. Hoses, flexible	a. Hose clamps (3)	Replace.	If necessary.
	b. Hose 1.5 inch ID (4)	Replace.	If necessary.
	c. Hose 1.9 inch ID (5)	Replace.	If necessary.
	d. Hose 1.6 inch ID (6)	Replace.	If necessary.
REPAIR - EXPANSION TANK PIPING			
6. Expansion tank	a. Pipe nipple (1)	Replace.	If necessary.
	b. Pipe bushing (2)	Replace.	If necessary.
	c. Plug (3)	Replace.	If necessary.
	d. Pipe tee (4)	Replace.	If necessary.
	e. Nipple (5)	Replace.	If necessary.
	f. Elbow (6)	Replace.	If necessary.
	g. Hose clamps (7)	Replace.	If necessary.
	h. Suction hose (8)	Replace.	If necessary.
	i. Copper tube 5/8 ID (9)	Replace.	If necessary.

4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.
(Continued)

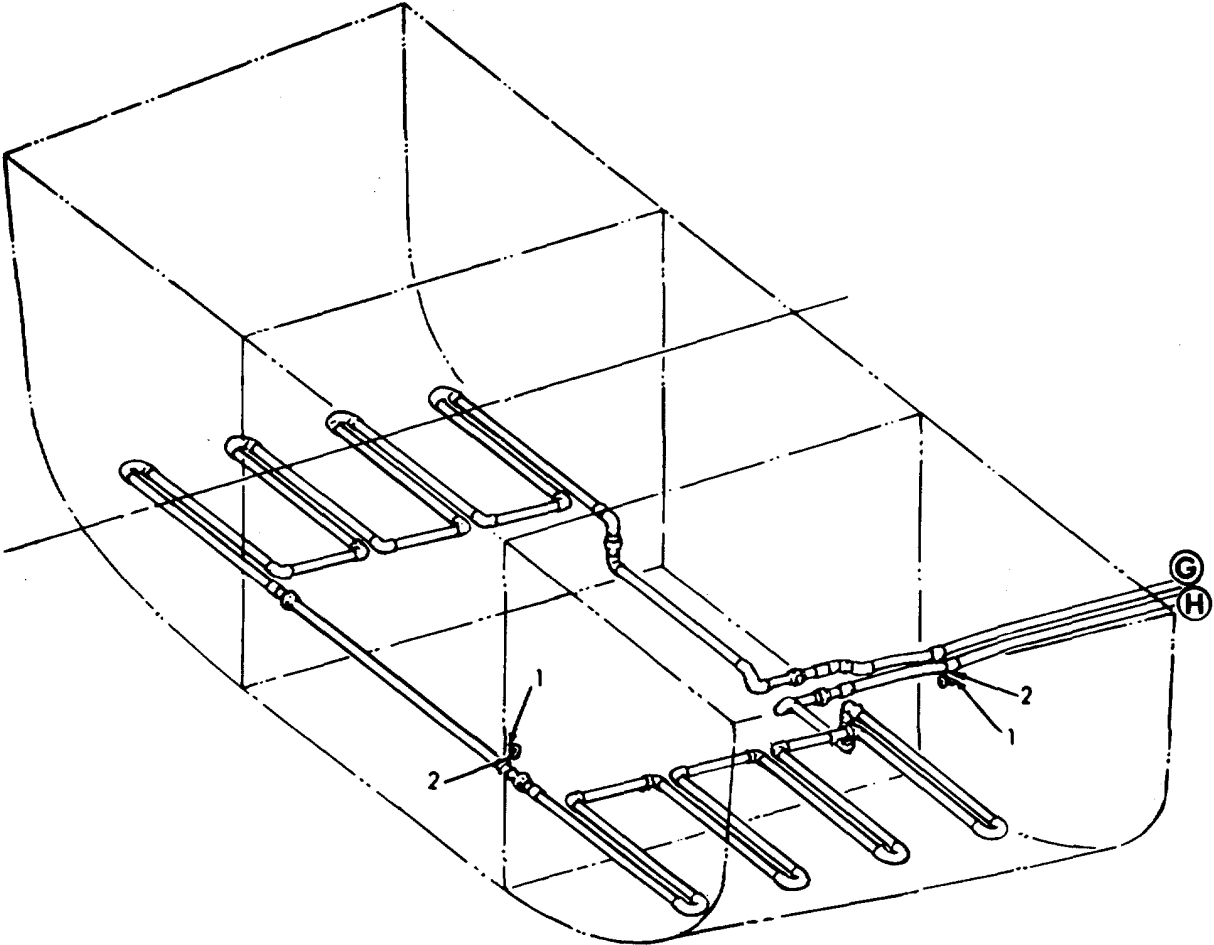
LOCATION	ITEM	ACTION	REMARKS
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REPAIR - GENERATOR PIPING (Cont)



4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.
(Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR - GENERATOR PIPING (Cont)			

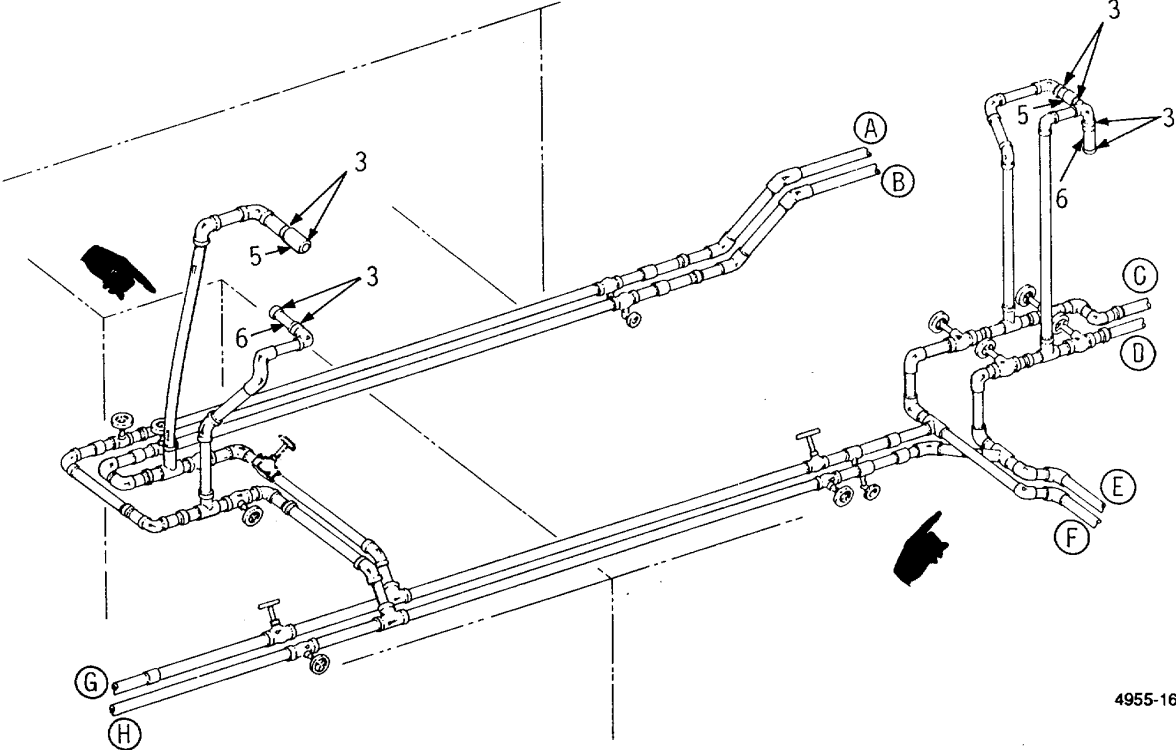


4-1310

4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.
(Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR - GENERATOR PIPING (Cont)



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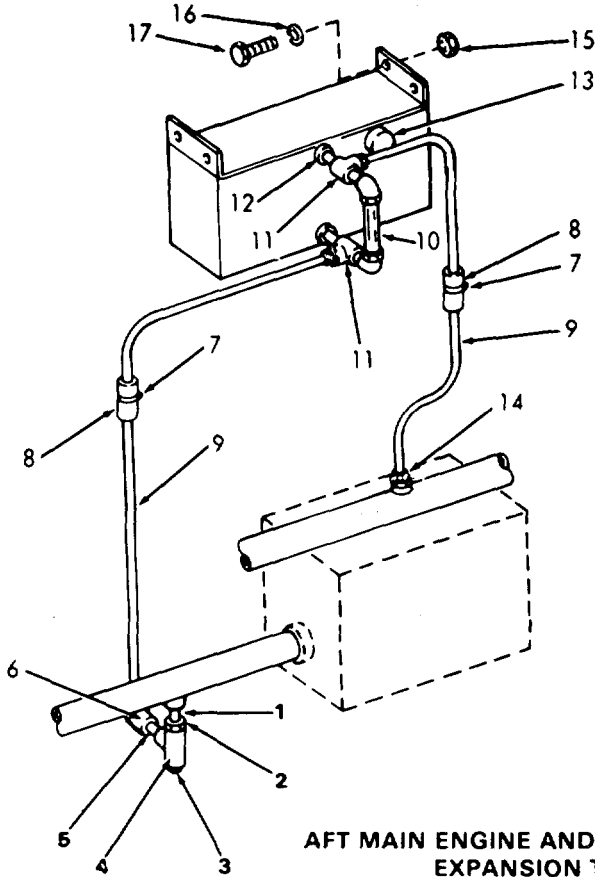
4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.
(Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR - EXPANSION TANK PIPING (Cont)			
	j. Water sight indicator (10)	Replace.	If necessary.
	k. Tee (11)	Replace.	If necessary.
	l. Nipple (12)	Replace.	If necessary.
	m. Pipe cap (13)	Replace,	If necessary.
	n. Reducing bushing (14)	Replace.	if necessary.
	o. Nuts (15)	Replace.	If necessary.
	p. Lockwashers (16)	Replace.	If necessary.
	q. Screws (17)	Replace.	If necessary.
	r. Hose clamps (18)	Replace.	If necessary.
	s. Hose (19)	Replace.	If necessary.
	t. Close pipe nipples (20)	Replace.	If necessary.
REPAIR - PROPULSION			
7.	a. Hose clamps (1)	Replace.	if necessary.
	b. Discharge hose 3.5 inch I.D. (2)	Replace.	if necessary.
	c. Nuts (3)	Replace.	If necessary.
	d. Screws (4)	Replace.	If necessary.
	e. Flange gasket 3 inch (5)	Replace.	If necessary.

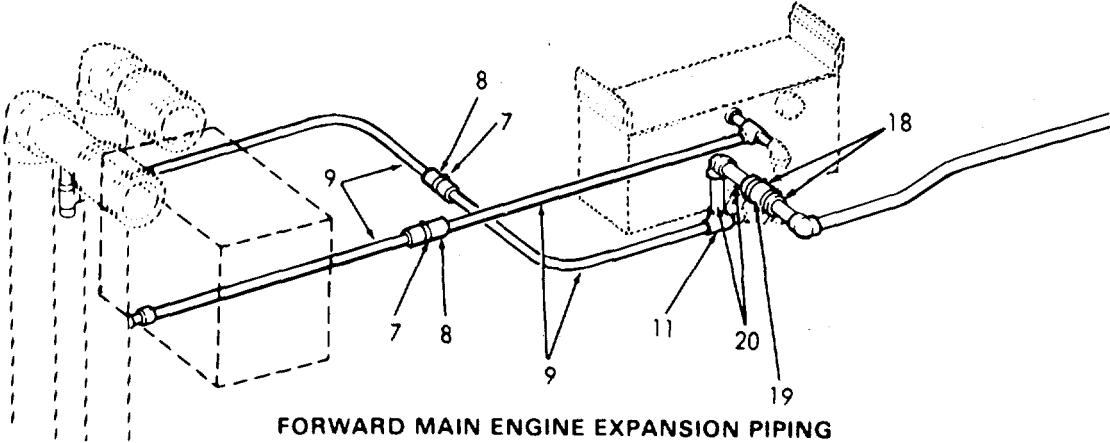
4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPAIR - EXPANSION TANK PIPING (Cont)



AFT MAIN ENGINE AND GENERATOR ENGINES EXPANSION TANK PIPING



FORWARD MAIN ENGINE EXPANSION PIPING

4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.

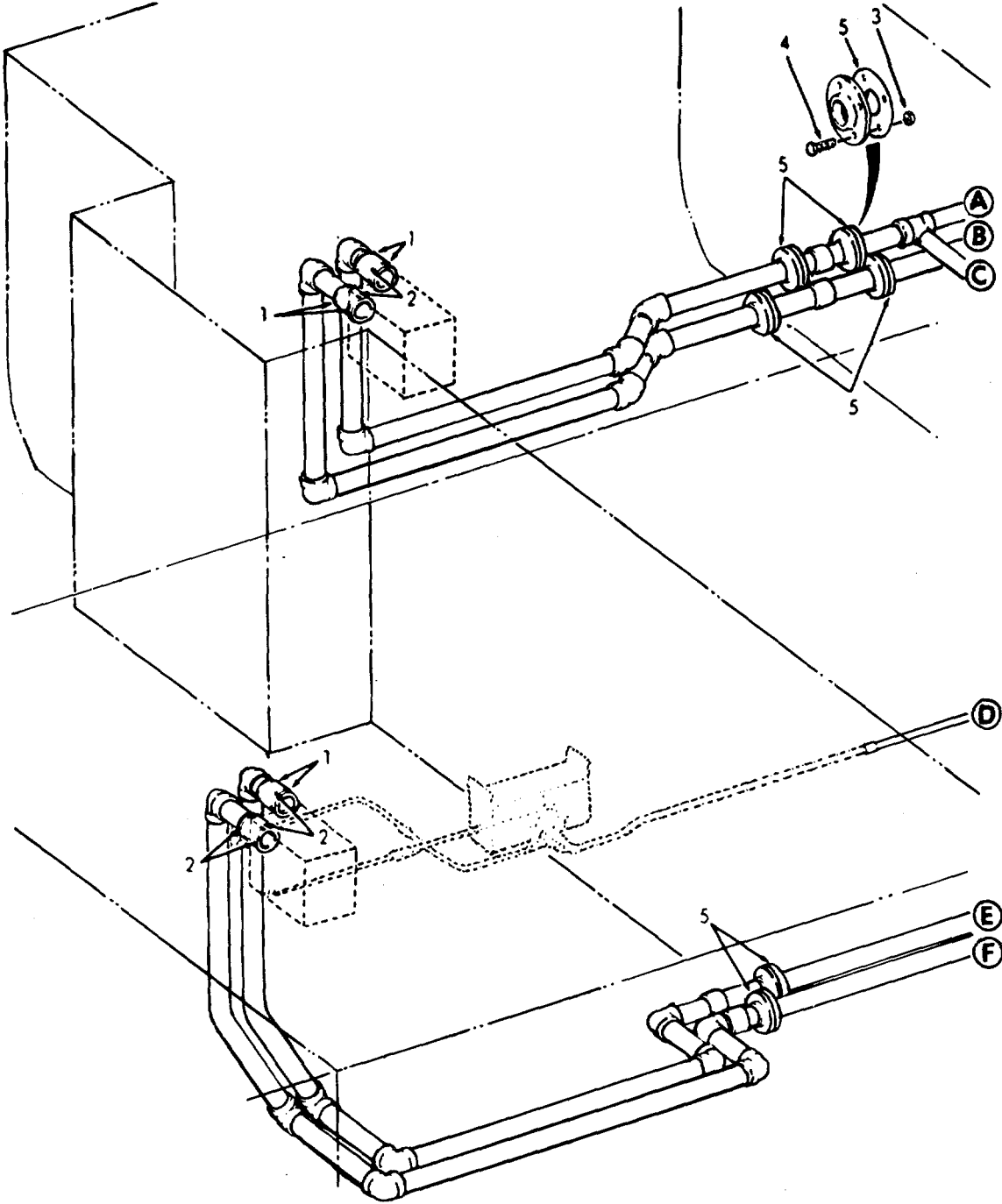
LOCATION	ITEM	ACTION	REMARKS
REPAIR - PROPULSION (Cont)			
	f. Flange gasket 2-1/2 inch (6)	Replace.	if necessary.
	g. Discharge hose 2-1/2 inch ID (7)	Replace.	if necessary.
	h. Hose clamps (8)	Replace.	if necessary.
	i. Flange gasket 2 inch ID (9)	Replace.	if necessary.
	j. Hoses (10)	Replace.	If necessary.
	k. Hose clamps (11)	Replace.	If necessary.
	l. Hose 1 inch (12)	Replace.	if necessary.
	m. Hose clamps (13)	Replace.	if necessary.

4-1314

4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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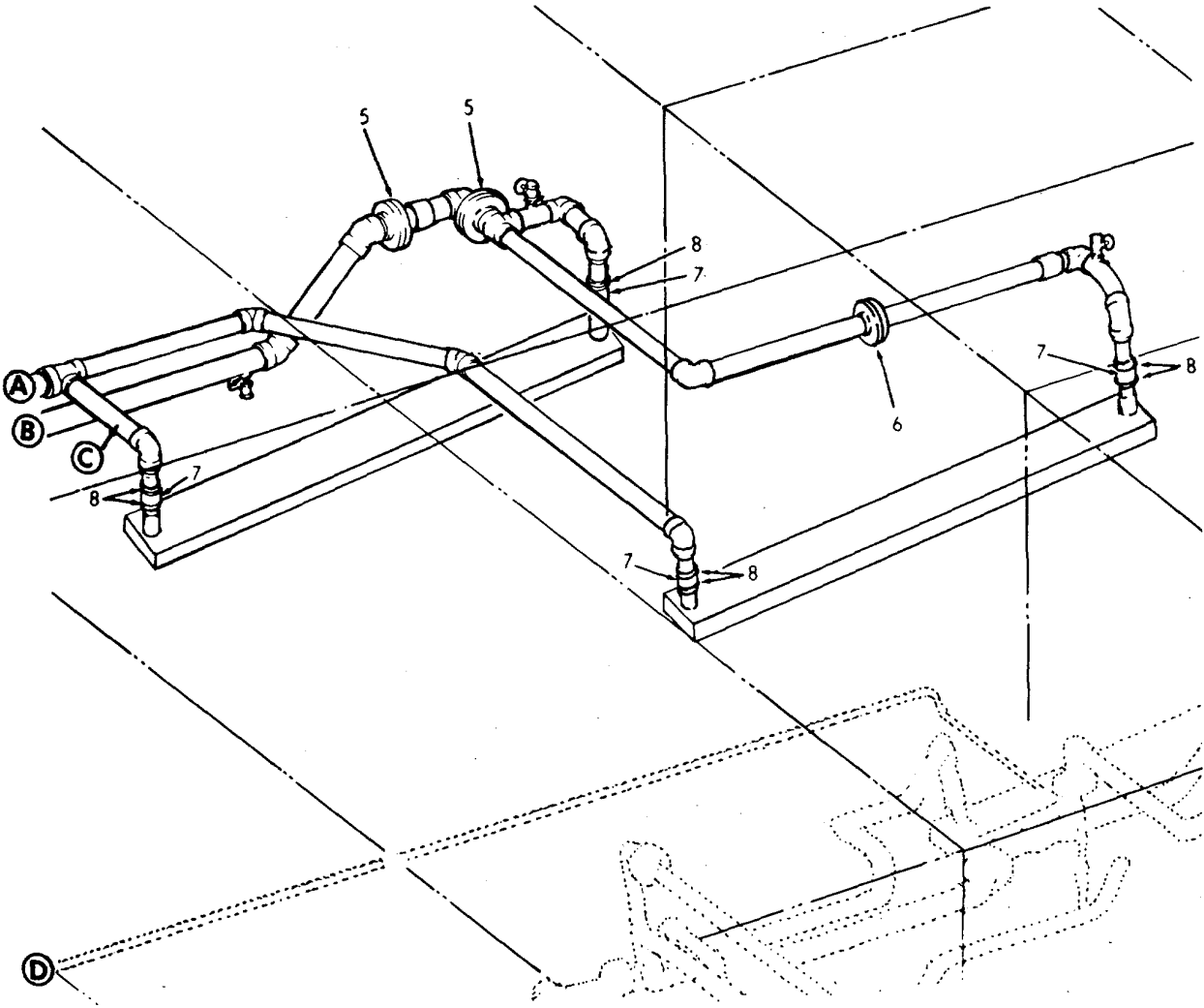
REPAIR - PROPULSION (Cont)



4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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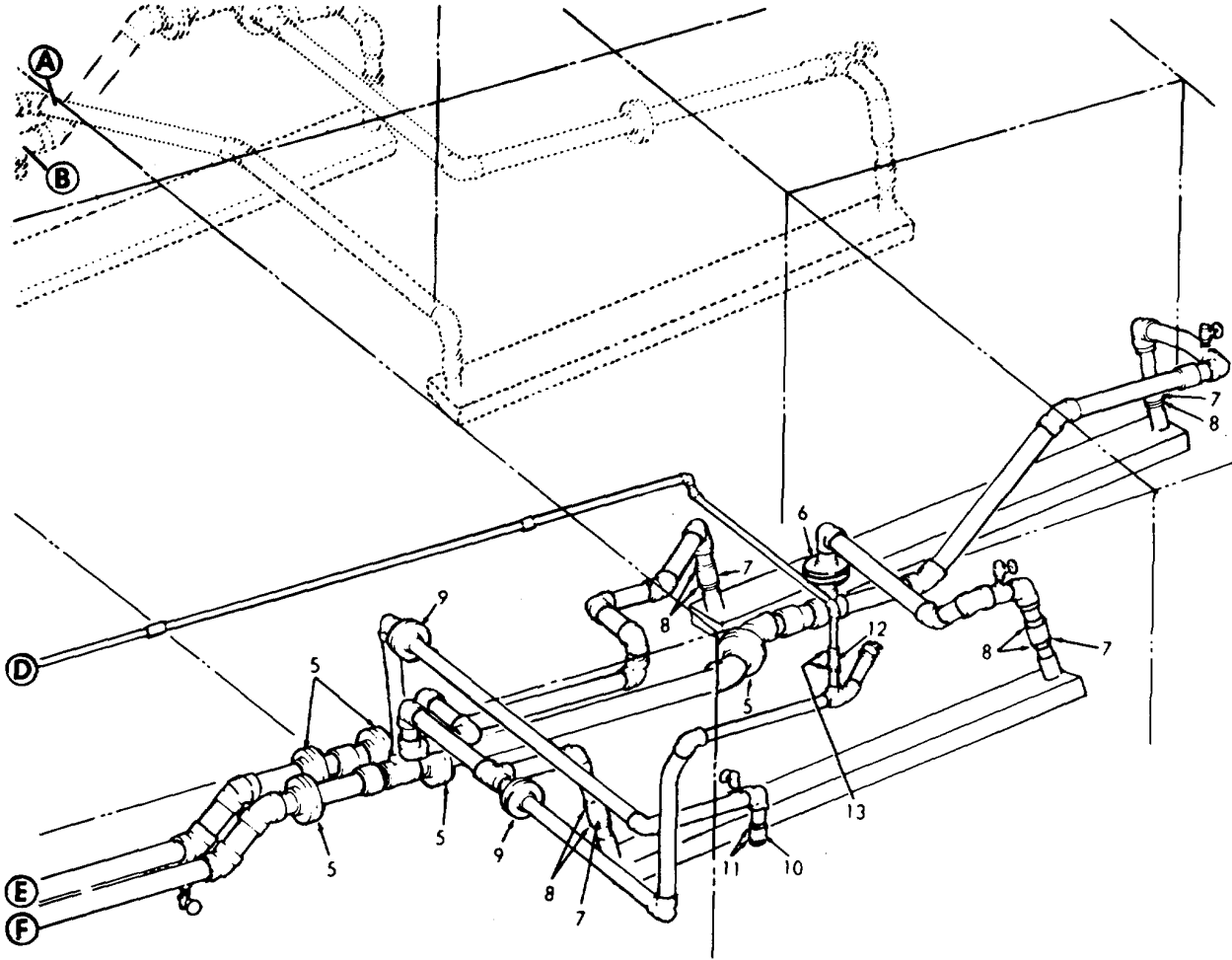
REPAIR - PROPULSION (Cont)



4-55. MACHINERY COOLING AND KEEL COOLERS - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPAIR - PROPULSION (Cont)



4-1317

4-56. LUBE OIL SYSTEM PIPING - MAINTENANCE INSTRUCTIONS.

The following is a list of the lube oil system maintenance procedures.

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Lube Oil Stowage Tank	4-56.1
Lube Oil Transfer Piping	4-56.2
Standby Lube Oil Piping	4-56.3

4-56.1. LUBE OIL STOWAGE TANK - 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

Do not drain oil into bilges. Use oil separator and recovery system to collect used oil.

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. Lube oil stowage tank	a. Tank cracks and leaks.	Inspect for breaks, Support Maintenance.	Refer to Direct
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4-56.1. LUBE OIL STOWAGE TANK - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	b. Hand hole plate	1. Inspect for leaks. 2. Insure all hardware is tight.	
	c. Liquid level gage	Inspect for proper operation.	
REPAIR			
2. Hand hole plate	a. Nuts (1), flatwashers (2)	Remove.	
	b. Hand hole plate (3), and gasket (4)	Remove.	Discard gasket.
	c. Gasket (4) and hand hole plate (3)	Replace.	Use new gasket.
	d. Flatwashers (2), and nuts (1)	Replace.	
3. Liquid level gage	a. Gage (5)	1. Unscrew and remove. 2. Disassemble and replace the following as necessary: (a) Head assembly (6). (b) Key (7). (c) Housing and gear assy (8). (d) Escutcheon pin (9).	

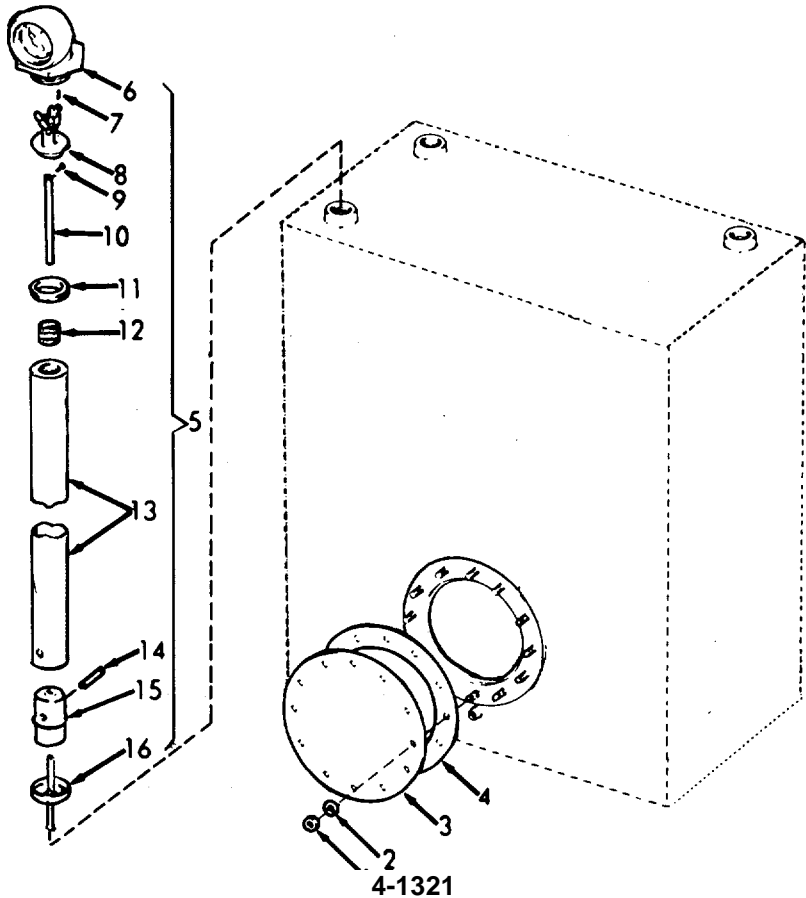
4-56.1. LUBE OIL STOWAGE TANK - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

- (e) Level ribbon (10).
- (f) Locknut (11).
- (g) Nipple (12).
- (h) Tube (13).
- (i) Swivel pin (14).
- (j) Float assy (15).
- (k) Tube cap (16).

b. Gage (5) Replace.



4-56.2. LUBE OIL TRANSFER PIPING - 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

Do not drain oil into bilges. Use oil separator and recovery system to collect used oil.

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. Lube oil transfer piping	a. Generator and anchor winch engine drains	Inspect for breaks, cracks and leaks.
	b. Hose assemblies	Inspect for breaks, cracks and leaks.
	c. Tank fill pipe	Inspect for breaks, cracks and leaks.
	d. Tank vent pipe	Inspect for breaks, cracks and leaks.
	e. Piping	Inspect for breaks, cracks and leaks.

4-56.2. LUBE OIL TRANSFER PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	f. Portable sump pump	Inspect for proper operation.	
REPAIR			
2. Engine drains (generator)	a. Dust cap (1)	Replace.	If necessary.
	b. Quick disconnect coupling (2)	Replace.	If necessary.
	c. Elbow (3)	Replace.	If necessary.
	d. Bushing (4)	Replace.	If necessary.
3. Engine drain (anchor winch) connect coupling (2)	a. Dust cap (1)	Replace.	If necessary.
	b. Quick dis-	Replace.	If necessary.
	c. Bulkhead connector (5)	Replace.	If necessary.
	d. Hose assembly (6)	Replace.	If necessary.
	e. Oil pan connector (7)	Replace.	If necessary.
4. Hose assemblies	a. Hose 3/4 inch (8)	Replace.	If necessary.
	b. Hose 1/2 inch (9)	Replace.	If necessary.
	c. Adaptors (10)	Replace.	If necessary.

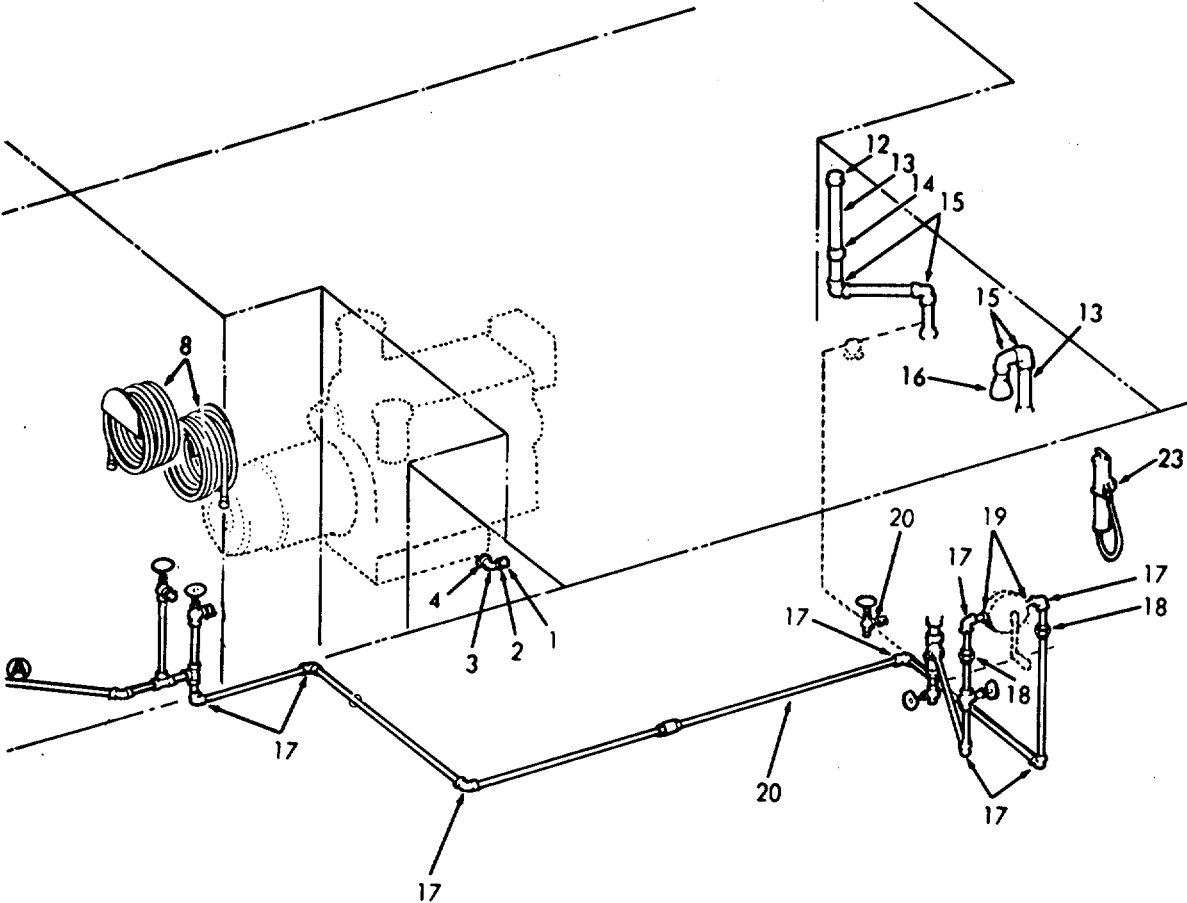
4-56.2. LUBE OIL TRANSFER PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Quick dis-connect females (11)	Replace.	If necessary.
5. Tank fill pipe	a. Pipe cap (12)	Replace.	If necessary.
	b. Pipe 1-1/2 inch (13)	Replace.	If necessary.
	c. Coupling (14)	Replace.	If necessary.
	d. Elbows (15)	Replace.	If necessary.
6. Tank vent	a. Air escape pipe (16)	Replace.	If necessary. terminal
	b. Elbows (15)	Replace.	If necessary.
	c. Pipe 1-1/2 inch (13)	Replace.	If necessary.
7. Piping	a. Elbows (17)	Replace.	If necessary.
	b. Unions (18)	Replace.	If necessary.
	c. Bushings (19)	Replace.	If necessary.
	d. Pipe 1/2 inch (20)	Replace.	If necessary.
	e. Pipe 3/4 inch (21)	Replace.	If necessary.
	f. Pipe 3/4 inch (22)	Replace.	If necessary.
8. Portable sump pump	Pump (23)	Replace.	If necessary.

4-56.2. LUBE OIL TRANSFER PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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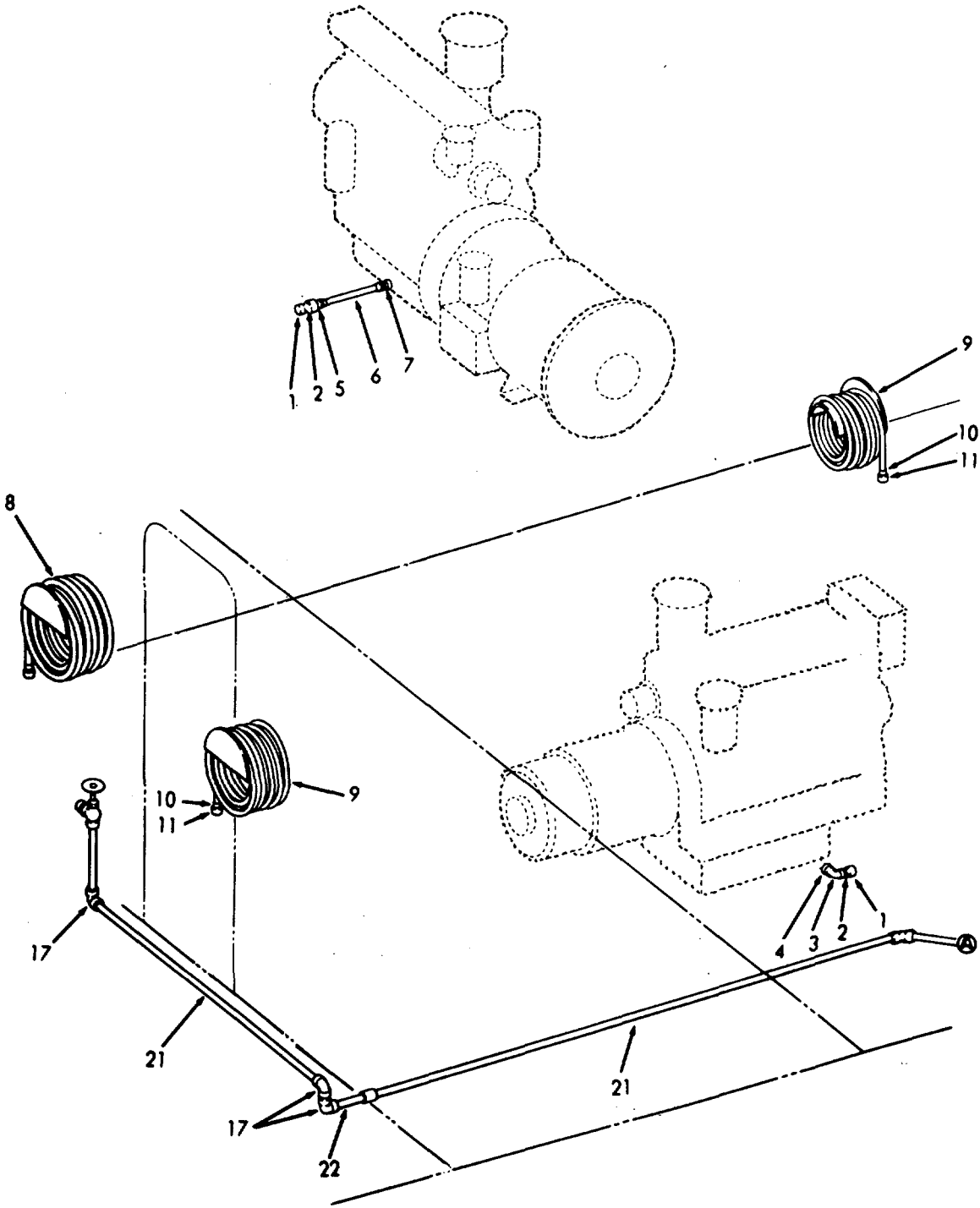
REPAIR (Cont)



4-56.2. LUBE OIL TRANSFER PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-56.3. STANDBY LUBE OIL PIPING - 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

Do not drain oil into bilges. Use oil separator and recovery system to collect used oil.

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. Standby lube oil piping	Piping	Inspect for breaks, cracks, bends and leaks.	Refer to Direct Support Maintenance.
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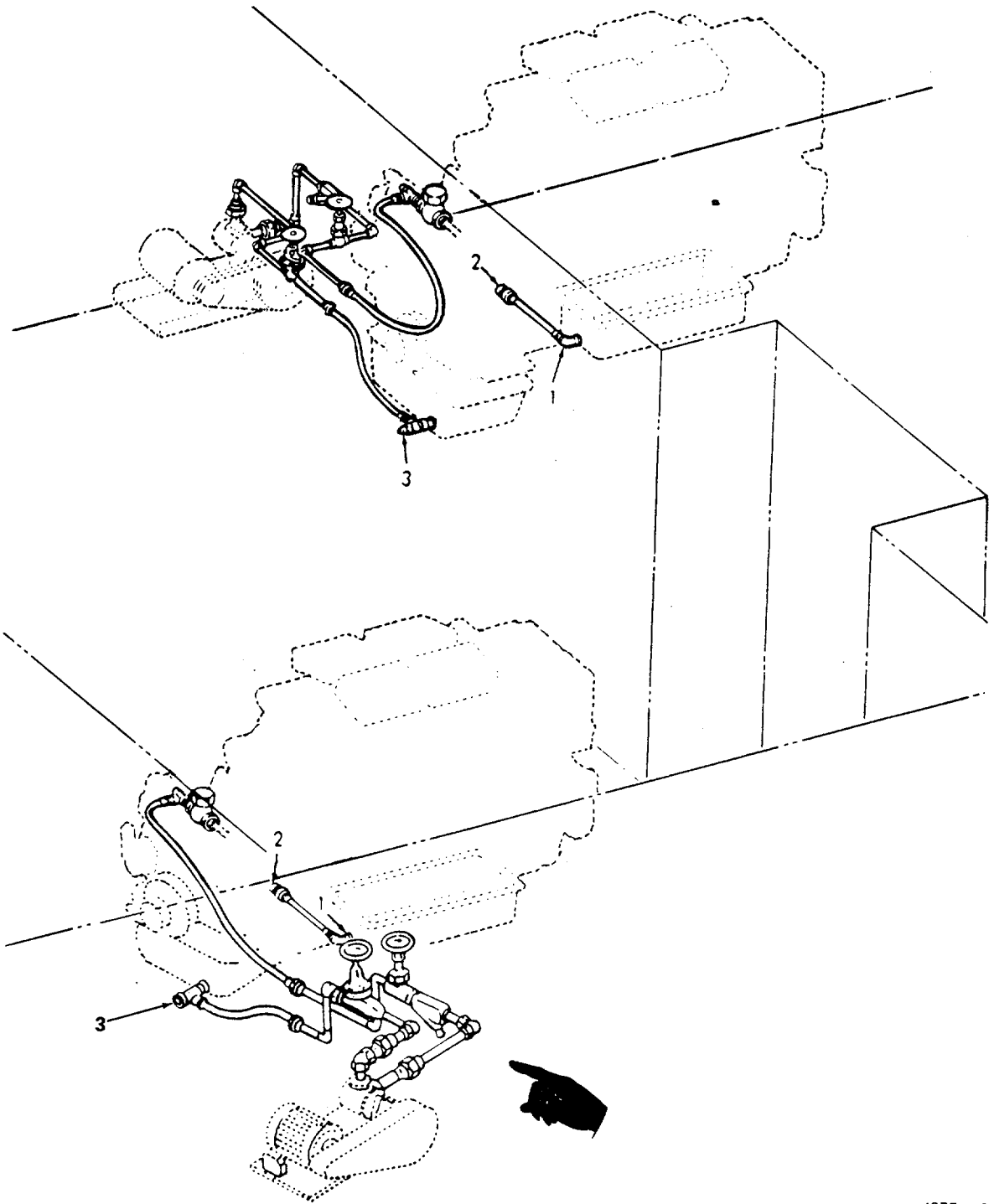
REPAIR

2.	a. Oil pan connectors (1)	Replace.	If necessary.
	b. Dust caps (2)	Replace.	If necessary.
	c. Pipe plug (3)	Replace.	If necessary.

4-56.3. STANDBY LUBE OIL PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR



4-57. DIESEL OIL STORAGE TANK - 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

Do not diesel drain oil into bilges.

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. Tank	Flanges	Inspect for leaking gaskets.	
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REPAIR

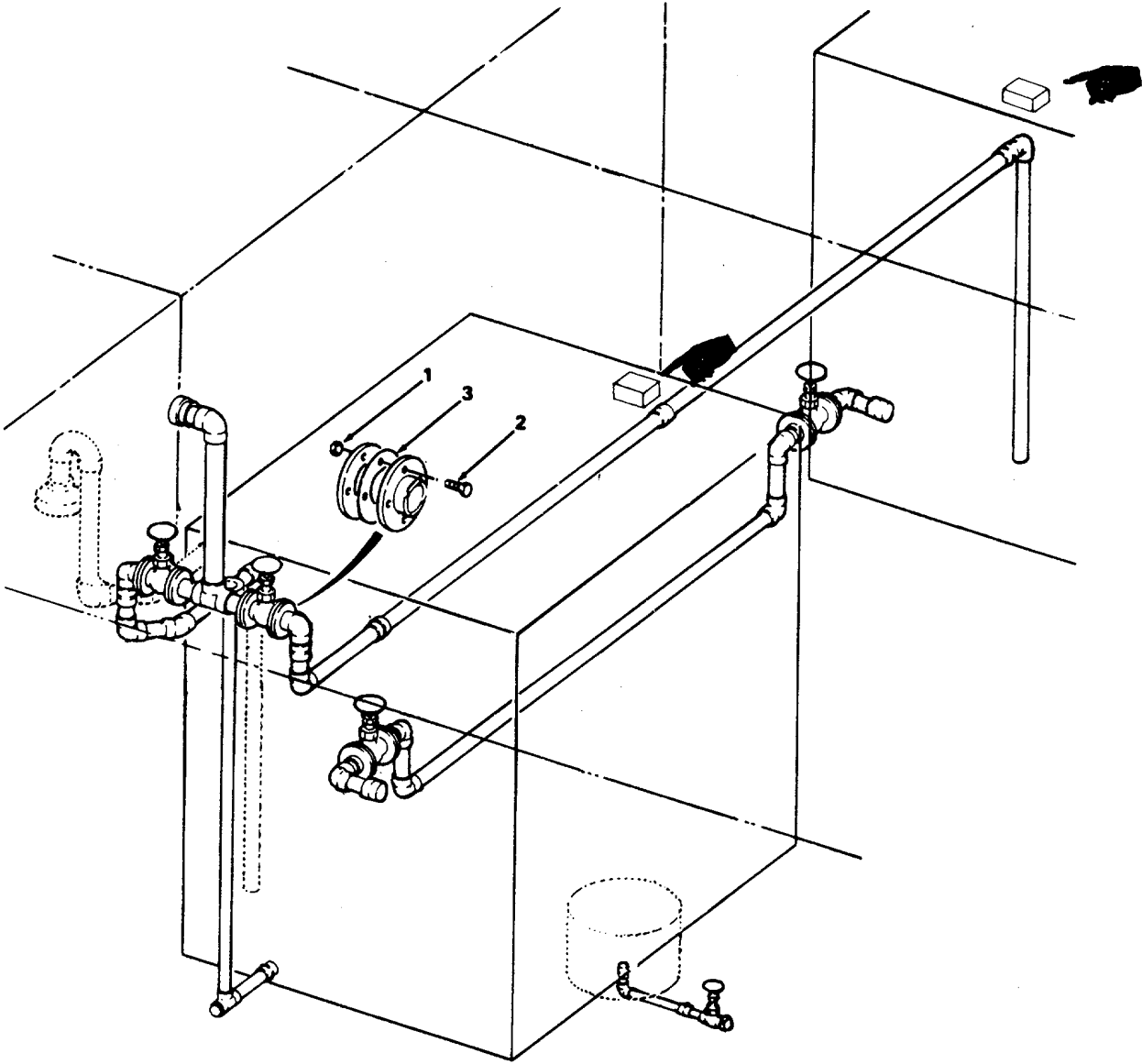
2.	a. Nuts (1), and screws (2)	Remove.	
	b. Gasket (3)	Replace.	Use a new gasket.
	c. Screws (2), and nuts (1)	Install.	

4-1330

4-57. DIESEL OIL STORAGE TANK - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4955-255

4-58. DIESEL OIL PIPING - 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

Do not diesel drain oil into bilges.

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

INSPECTION

1. Piping	a. Valves	1. Inspect for breaks, cracks and leaks. 2. Inspect for proper operation.
	b. Flow switch operation.	Inspect for proper operation.
	c. Piping	Inspect for breaks, cracks, bends, and leaks.

REPAIR

2.	a. Coupling (1)	Replace.	If necessary.
	b. Elbow 1 inch (2)	Replace.	If necessary.

4-58. DIESEL OIL PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	c. Elbow 1 inch (3)	Replace.	If necessary.
	d. Valve 3 way 1 inch (4)	Replace.	If necessary.
	e. Valve 3 way 3/4 inch (5)	Replace.	If necessary.
	f. Nuts (6)	Replace.	If necessary.
	g. Lockwashers (7)	Replace.	If necessary.
	h. Screws (8)	Replace.	If necessary.
	i. Reducing bushing (9)	Replace.	If necessary.
	j. Flow switch (10)	Replace.	If necessary.
	k. Elbow 3/8 inch (11)	Replace.	If necessary.
	l. Elbow 1/2 inch (12)	Replace.	If necessary.
	m. Check lift valve 3/8 inch (13)	Replace.	If necessary.
	n. Connector female (14)	Replace.	If necessary.
	o. Hose assem- bly 3/8 inch (15)	Replace.	If necessary.
	p. Elbow (16)	Replace.	If necessary.
	q. Elbow (17)	Replace.	If necessary.
	r. Elbow (18)	Replace.	If necessary.
	s. Reducing insert (19)	Replace.	If necessary.

4-58. DIESEL OIL PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	t. Tee 3/4 inch (20)	Replace.	If necessary.
	u. Tee 3/4 inch (21)	Replace.	If necessary.
	v. Reducing insert (22)	Replace.	If necessary.
	w. Hose assem- bly 1/2 inch (23)	Replace.	If necessary.
	x. Elbow 1/2 inch (24)	Replace.	If necessary.
	y. Reducing insert (25)	Replace.	If necessary.
	z. Tube 1/4 inch (26)	Replace.	If necessary.
	aa. Union (27)	Replace.	If necessary.
	ab. Reducing bushing (28)	Replace.	If necessary.
	ac. Union (29)	Replace.	If necessary.
	ad. Tube 1/2 inch (30)	Replace.	If necessary.
	ae. Pipe 1 inch (31)	Replace.	If necessary.
	af. Tube 3/4 inch (32)	Replace.	If necessary.
	ag. Reducing insert (33)	Replace.	If necessary.

4-58. DIESEL OIL PIPING - MAINTENANCE INSTRUCTIONS (Continued).

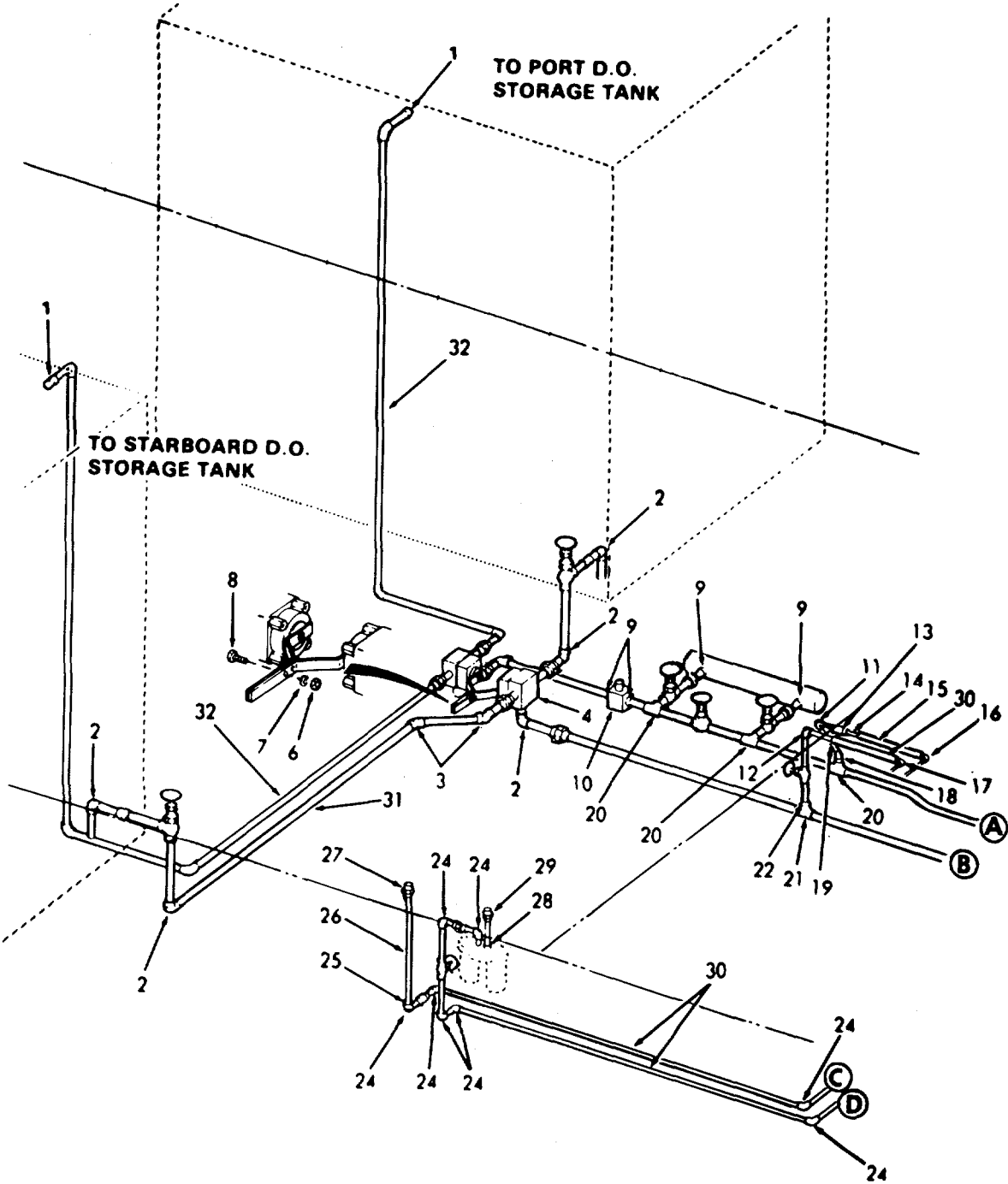
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	ah. Reducing insert (34)	Replace.	If necessary.
	ai. Female connector 3/8 inch (35)	Replace.	If necessary.
	aj. Female connector 1/2 inch (36)	Replace.	If necessary.
	ak. Coupling 3/8 inch (37)	Replace.	If necessary.
	al. Union (38)	Replace.	If necessary.
	am. Tube 3/8 inch (39)	Replace.	If necessary.

4-1335

4-58. DIESEL OIL PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR (Cont)



4-59. DIESEL OIL COOLING PIPING - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Repair

INITIAL SETUP:

Test Equipment

NONE

References

Paragraph

4-13.4 Pump Motor Repair
4-60 Duplex Strainer

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
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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.

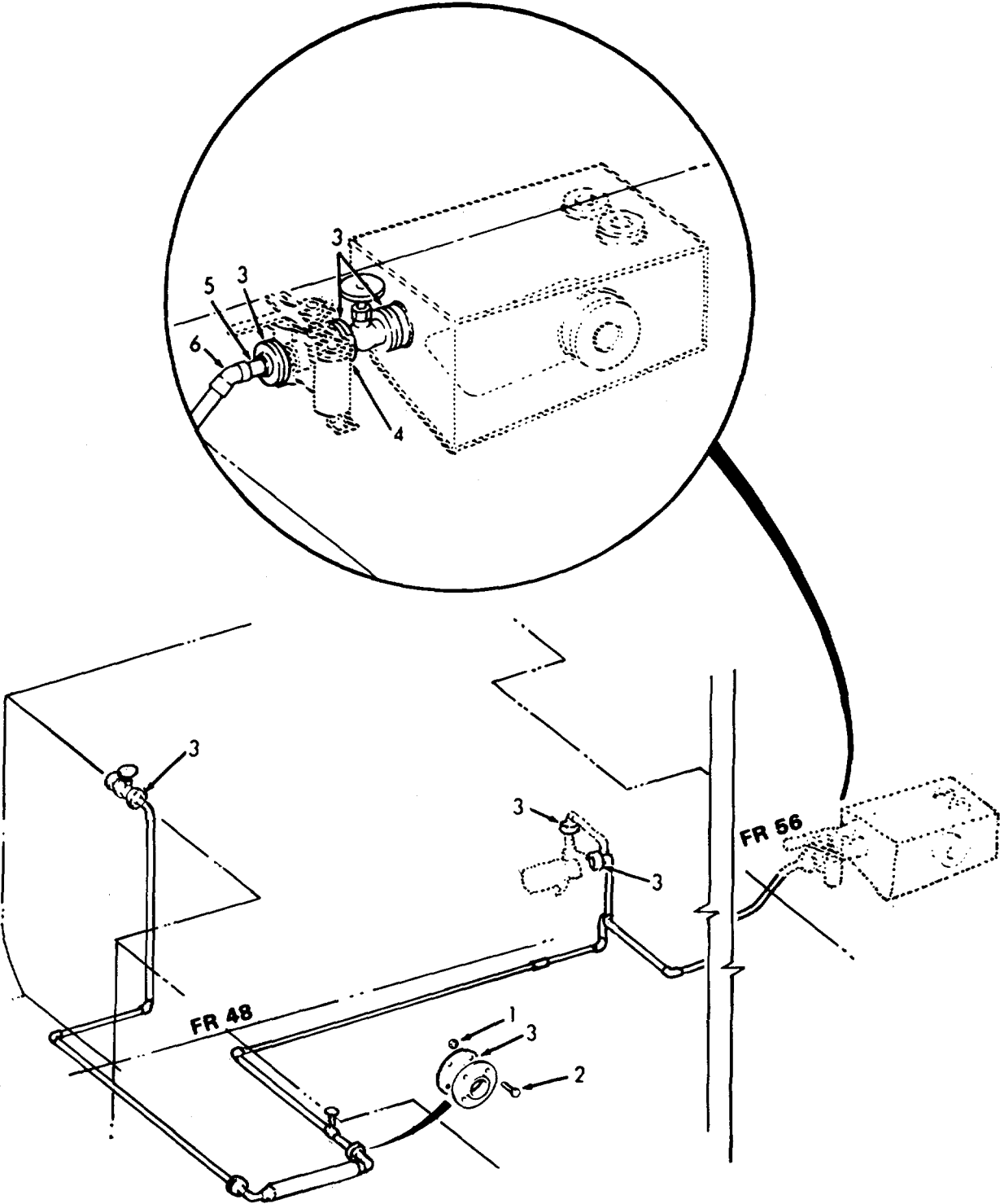
INSPECTION

- | | | | |
|------------------------------|--------------------|--|--------------------------|
| 1. Diesel oil cooling piping | a. Piping | Inspect for breaks, cracks, and leaks. | |
| | b. Duplex strainer | Inspect. | Refer to paragraph 4-60. |
| | c. Flanges | Inspect for leaks. | |

4-59. DIESEL OIL COOLING PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-60. DUPLEX STRAINER - 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

NONE

LOCATION	ITEM	ACTION	REMARKS
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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. |
|--------------------|----------|--|

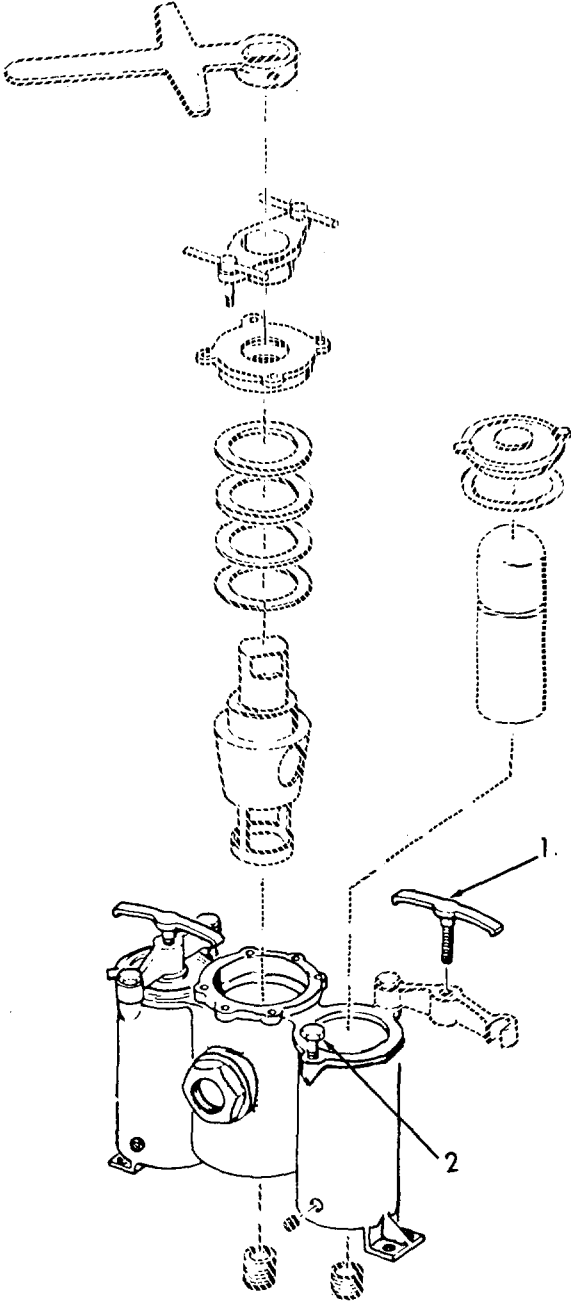
REPAIR

- | | | |
|----|-------------------|---------|
| 2. | a. Yoke screw (1) | Loosen. |
| | b. Stud (2) | Loosen. |

4-60. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-1343

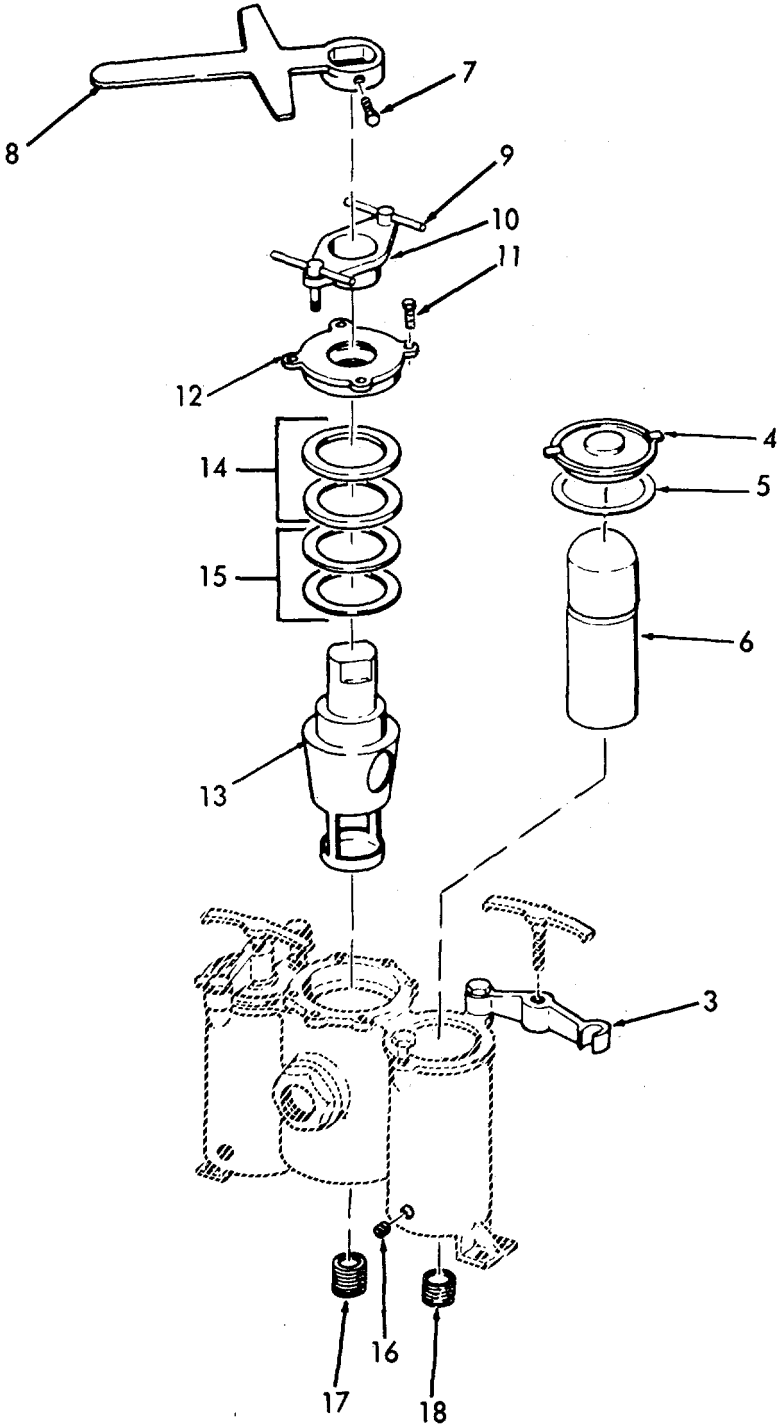
4-60. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Continued).

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.

4-60. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



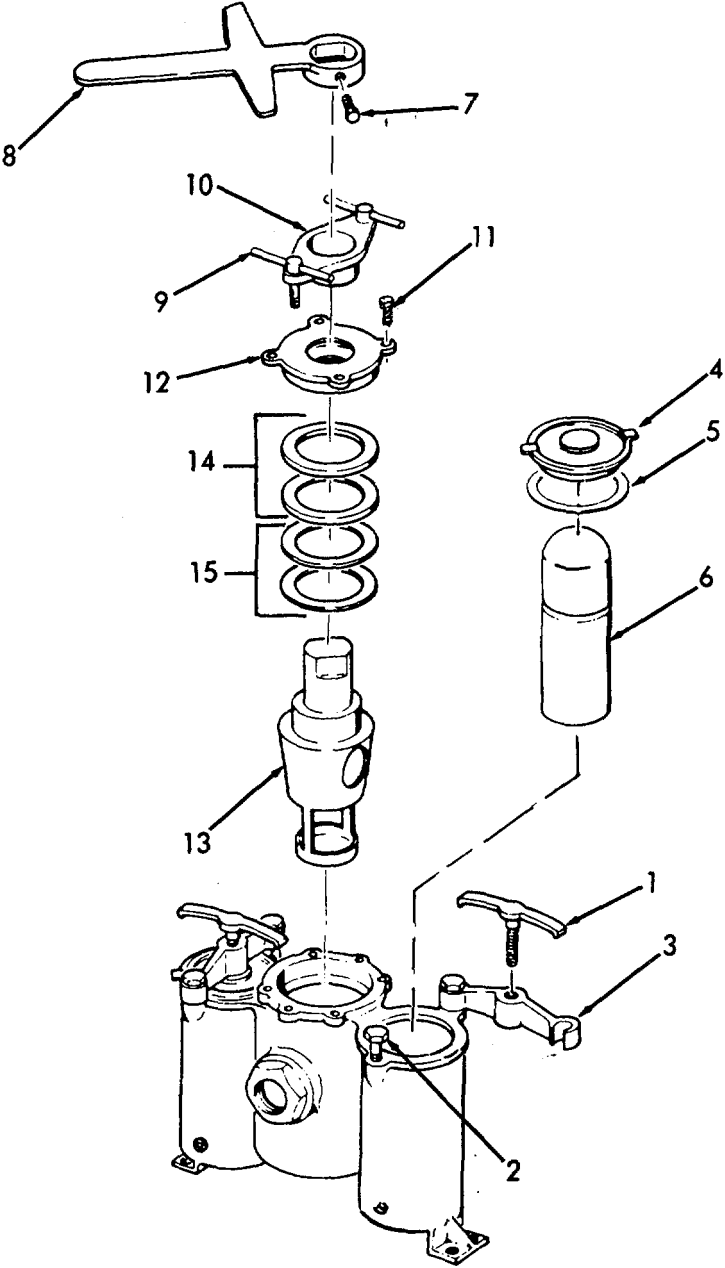
4-60. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	s. Brass washers (15), packing rings (14), and bronze key (13)	Reassemble. ring.	Use new packing
	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), stud (2).	1. Install under 2. Tighten stud (2).	
	z. Yoke screw (1)	Tighten.	

4-60. DUPLEX STRAINER - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-61. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS

This task covers:

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

INITIAL SETUP

Test Equipment

NONE

References

NONE

Special Tools

Pipe soldering

Equipment Condition Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. Washdown system	a. Nozzle	Inspect for damage.	
	b. Gate valve operation.	Inspect for proper	
	c. Butterfly valve	Inspect for proper operation.	
	d. Piping	Inspect for bends, breaks, cracks, and leaks.	

REPLACE

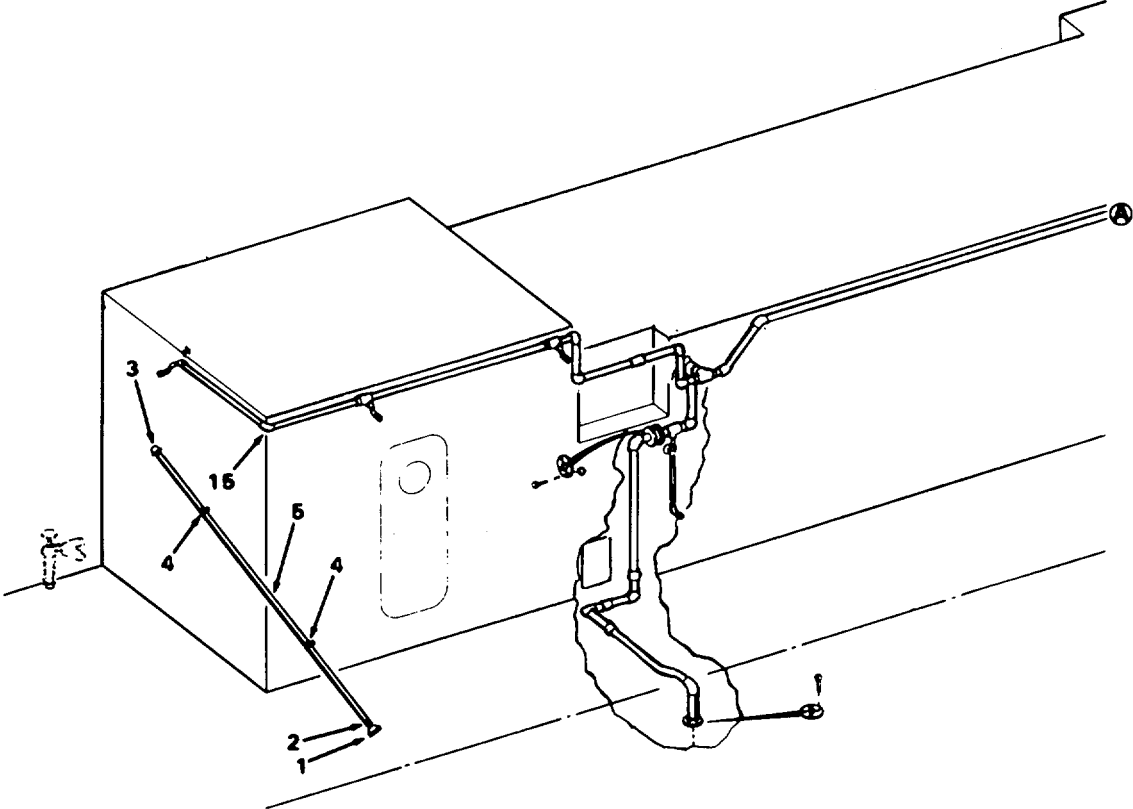
2.	a. Nozzles P1/2 inch (1)	Replace.	If necessary.
	b. Reducing coupling (2)	Replace.	If necessary.

4-61. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)

c.	Female hose connections (3)	Replace.	If necessary.
d.	Boat hook holders (4)	Replace.	If necessary.
e.	Aluminum tubing (5)	Replace.	If necessary.



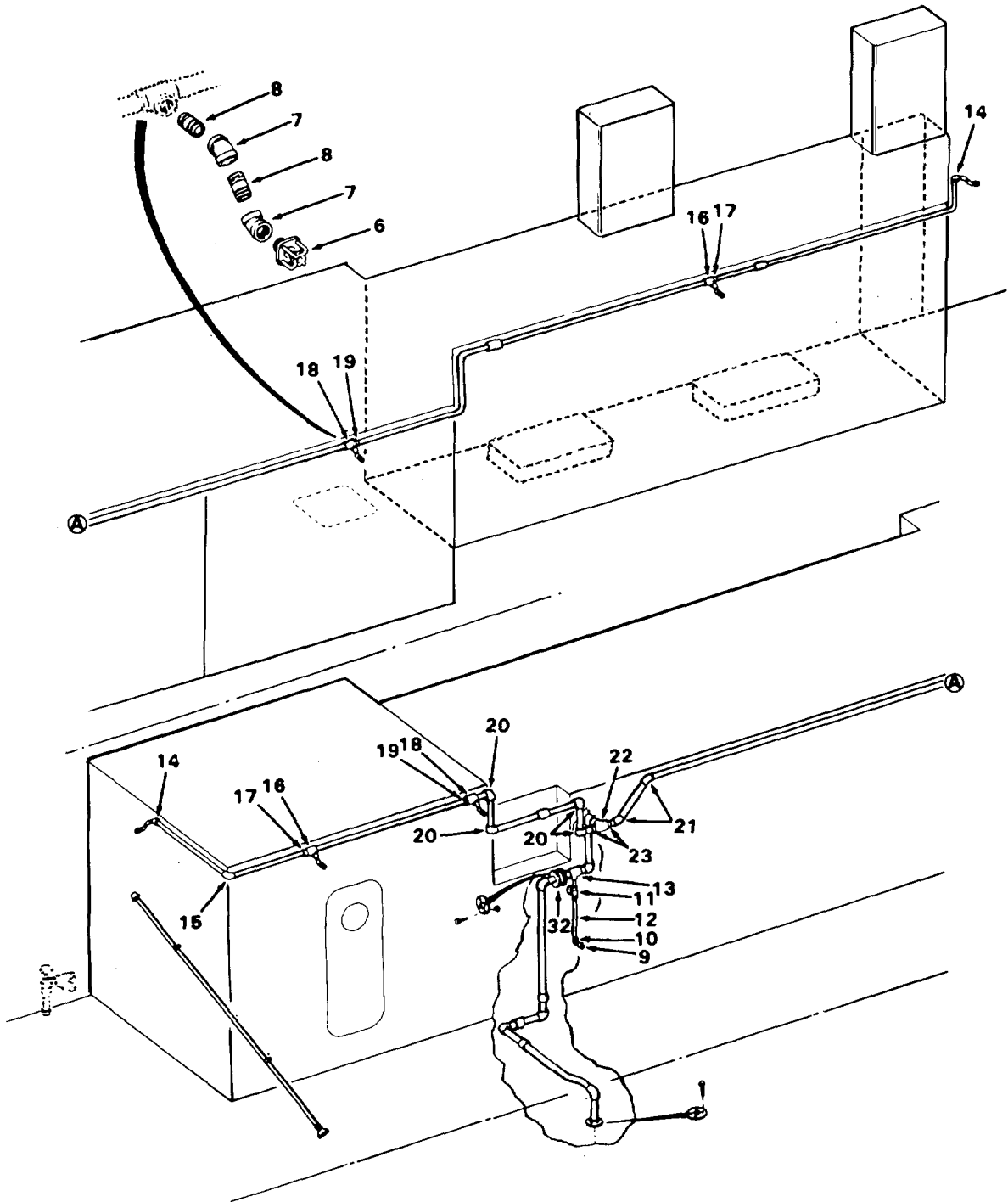
4-61. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	f. Nozzles G1/2 inch (6)	Replace.	If necessary.
	g. Elbows (7)	Replace.	If necessary.
	h. Pipe nipples (8)	Replace.	If necessary.
	i. Sleeve (9)	Replace.	If necessary.
	j. Elbows (10)	Replace.	If necessary.
	k. Gate valve (11)	Replace.	If necessary.
	l. Copper tubing 1/2 inch ID (12)	Replace.	If necessary.
	m. Reducing tee (13)	Replace.	If necessary.
	n. Reducing elbow (14)	Replace.	If necessary.
	o. Elbow (15)	Replace.	If necessary.
	p. Tees (16)	Replace.	If necessary.
	q. Reducers (17)	Replace.	If necessary.
	r. Reducing tees (18)	Replace.	If necessary.
	s. Reducers (19)	Replace.	If necessary.
	t. Elbows (20)	Replace.	If necessary.
	u. Elbows (21)	Replace.	If necessary.
	v. Tee (22)	Replace.	If necessary.
	w. Reducer (23)	Replace.	If necessary.

4-61. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



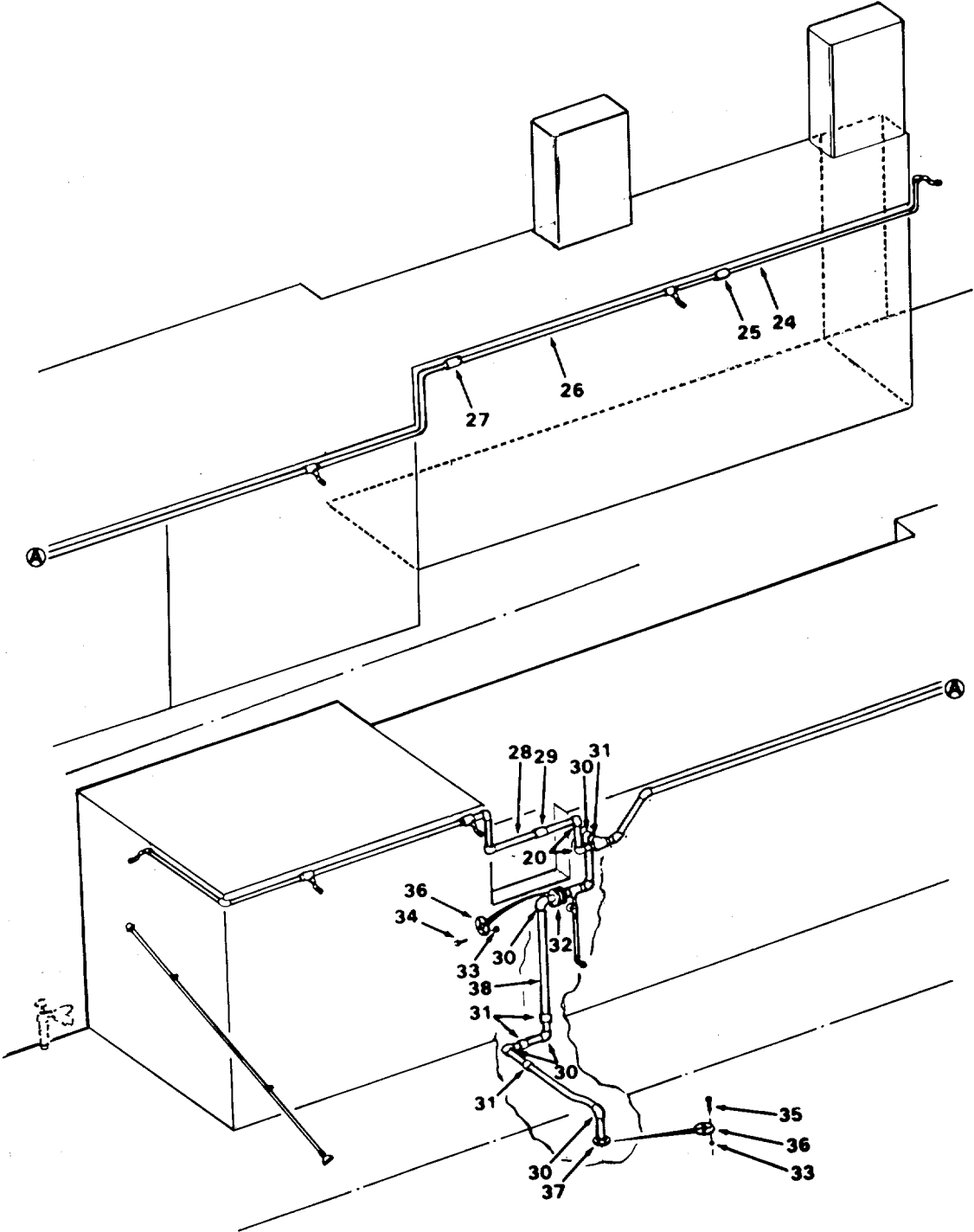
4-61. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	x. Copper tubing 1 inch ID (24)	Replace.	If necessary.
	y. Coupling (25)	Replace.	If necessary.
	z. Copper tubing 1-1/4 inch ID (26)	Replace.	If necessary.
	aa. Coupling (27)	Replace.	If necessary.
	ab. Copper tubing 1-1/2 inch ID (28)	Replace.	If necessary.
	ac. Couplings (29)	Replace.	If necessary.
	ad. Elbows (30)	Replace.	If necessary.
	ae. Sleeves (31)	Replace.	If necessary.
	af. Butterfly valve (32)	Replace.	If necessary.
	ag. Nuts (33)	Replace.	If necessary.
	ah. Screws (34)	Replace.	If necessary.
	ai. Screws (35)	Replace.	If necessary.
	aj. Flanges (36)	Replace.	If necessary.
	ak. Gasket (37)	Replace.	If necessary.
	al. Copper tubing 2 inch ID (38)	Replace.	If necessary.

4-61. WASHDOWN COUNTERMEASURE SYSTEM - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



4-62. EXHAUST SYSTEM PIPING - MAINTENANCE INSTRUCTIONS

The following is a list of the exhaust system main tenance procedures.

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Exhaust Piping Insulation	4-62.1
Exhaust Piping	4-62.2

4-62.1. EXHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Replace

INITIAL SETUP

<u>Test Equipment</u>	<u>References</u>
NONE	NONE
<u>Special Tools</u>	<u>Equipment Condition</u> <u>Condition Description</u>
NONE	NONE
<u>Material/Parts</u>	<u>Special Environmental Conditions</u>
NONE	NONE
<u>Personnel Required</u>	<u>General Safety Instruction</u>
1	NONE

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
INSPECTION			
1. Exhaust piping	Insulation	Inspect for damage.	

4-62.1. EXHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
2.	a. Lagging clip (1)	Replace.	If necessary.
	b. Glass tape cloth (2)	Replace.	necessary.
	c. Glass tape cloth (3)	Replace.	If necessary.
	d. Thermal pipe insulation 14 inx4 in THK (4)	Replace.	If necessary.
	e. Thermal pipe insulation 22 inx4 in THK (5)	Replace.	If necessary.
	f. Thermal pipe insulation 4 inx3-1/2 in THK (6)	Replace.	If necessary.
	g. Thermal pipe insulation 8 inx4 in THK (7)	Replace.	If necessary.
	h. Thermal pipe insulation 3-1/2 inx 4 in THK (8)	Replace.	If necessary.
	i. Thermal pipe insulation 3 inx3-1/2 in THK (9)	Replace.	If necessary.
	j. Metal on pipe insula- tion 3-1/2 inx2 in THK x 36 in long (10)	Replace.	If necessary.

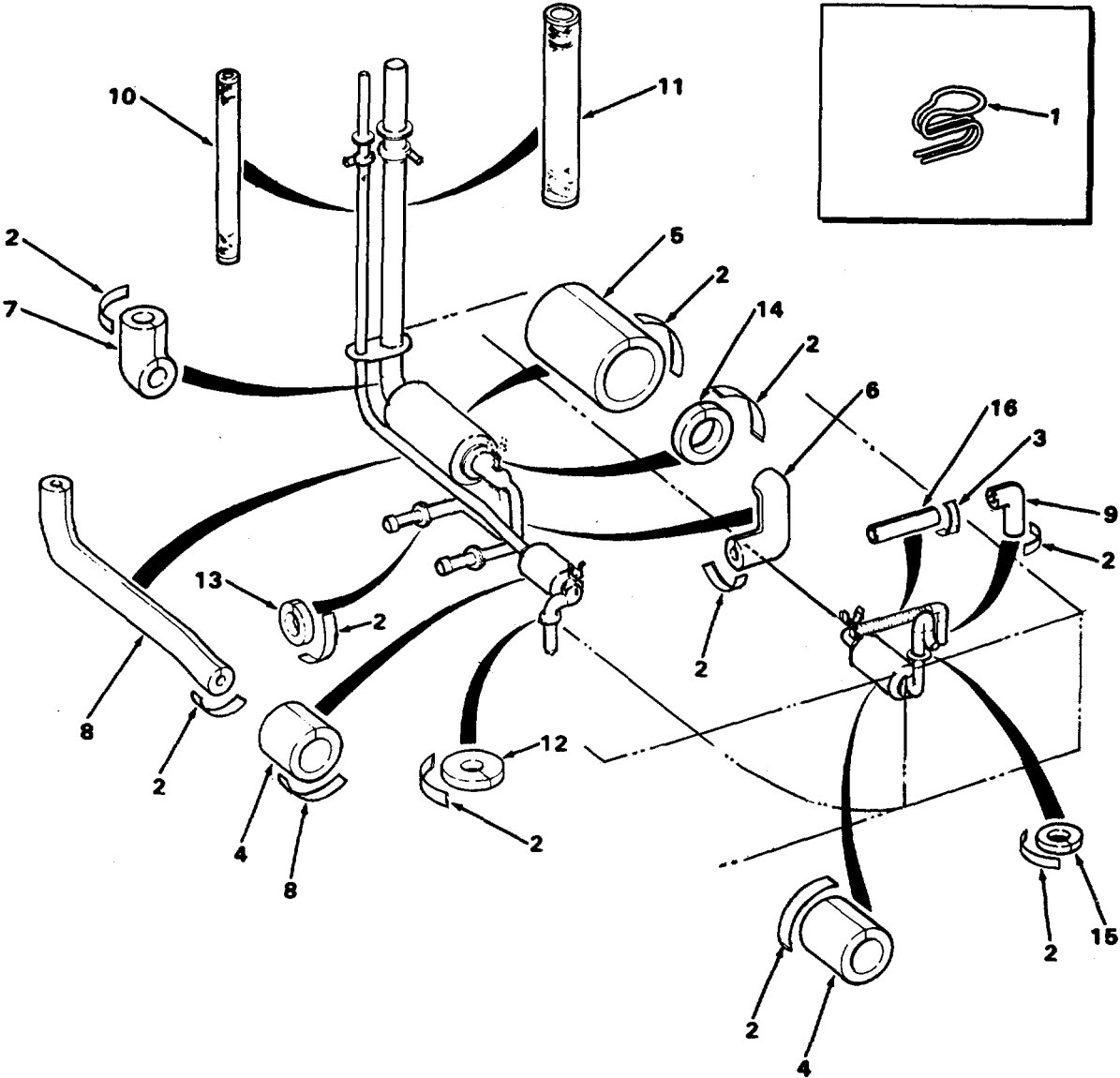
4-62.1. EXHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	k. Metal on pipe insulation 8 in x 2 in THK x 36 in long (11)	Replace.	If necessary.
	1. Thermal pipe insulation 8-1/2 ID x 3-1/2 in THK (12)	Replace.	If necessary.
	m. Thermal pipe insulation 9 ID x 3-1/2 in THK (13)	Replace.	If necessary.
	n. Thermal pipe insulation 13-1/2 ID x 4 in THK (14)	Replace.	If necessary.
	o. Thermal pipe insulation 7-1/2 ID x 3-1/2 in THK (15)	Replace.	If necessary.
	p. Thermal felt insulation (16)	Replace.	If necessary.

4-62.1. EXHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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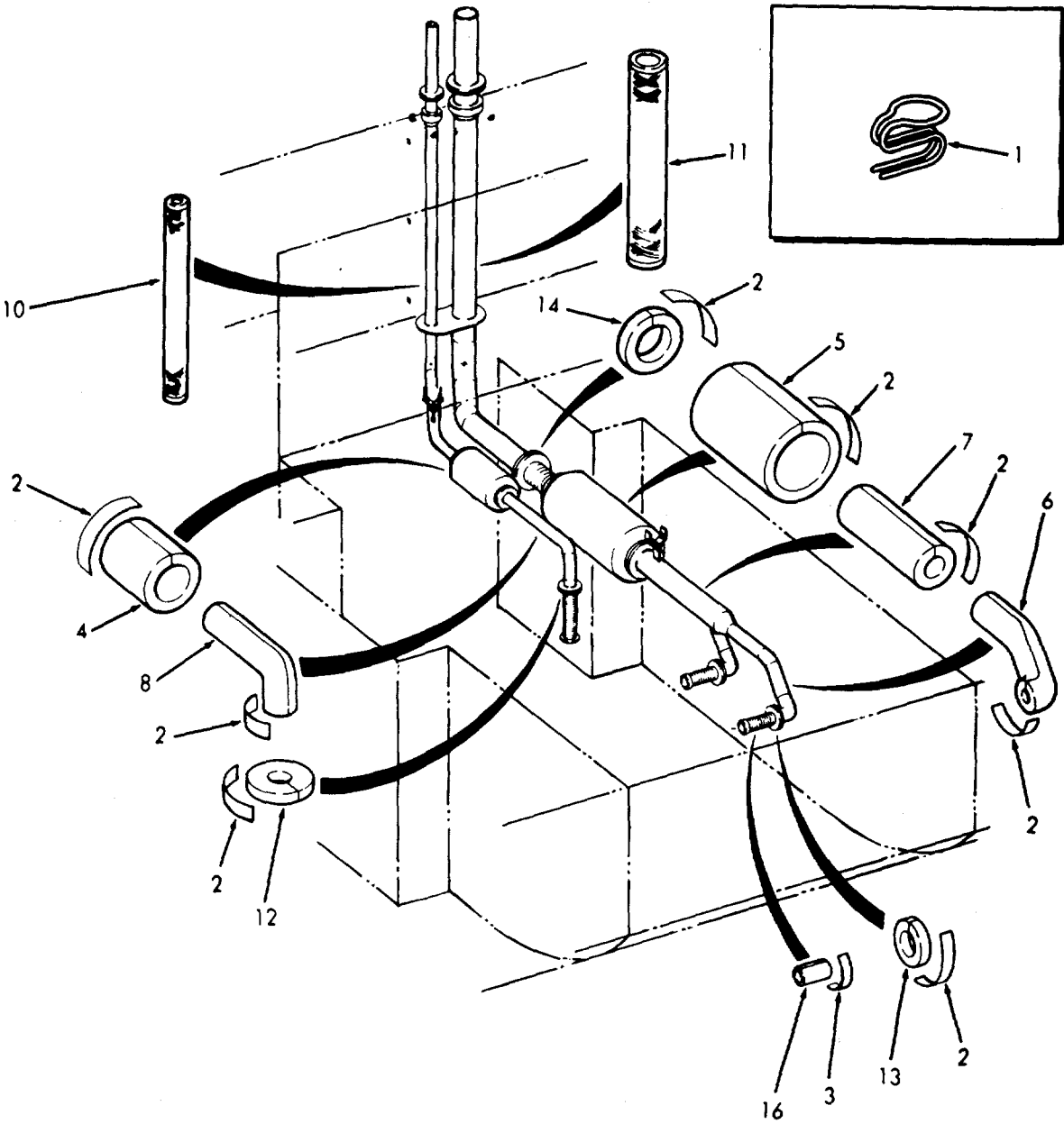
REPLACE (Cont)



4-62.1. EXHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



4-62.1. EXHAUST PIPING INSULATION - 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 in this procedure.

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

WARNING

In order to avoid serious burns make sure all parts have been sufficiently cooled.

1. Exhaust piping	a. Mufflers	Inspect for breaks, cracks, and leaks.
	b. Weather caps operation.	Inspect for proper operation.
	c. Flexible Hose	Inspect for leaks.
	d. Piping	Inspect for breaks, cracks, and leaks.

4-62.1. EXHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Forward engine room	a. Flexible hose assembly (1)	Replace.	If necessary.
	b. Nuts (2)	Replace.	If necessary.
	c. Screws (3)	Replace.	If necessary.
	d. Gaskets (4)	Replace.	If necessary.
	e. Flexible hose assembly (5)	Replace.	If necessary.
	f. Nuts (6)	Replace.	If necessary.
	g. Screws (7)	Replace.	If necessary.
	h. Gaskets (8)	Replace.	If necessary.
	i. Mufflers (9)	Replace.	If necessary.
	j. Weather cap (10)	Replace.	If necessary.
	k. Weather cap (11)	Replace.	If necessary.
	l. Screw (12)	Replace.	If necessary.
	m. Insulation tape (13)	Replace.	If necessary.
	n. Screws (14)	Replace.	If necessary.
	o. Lockwashers (15)	Replace.	If necessary.
	p. Gaskets (16)	Replace.	If necessary.
	q. Gaskets (17)	Replace.	If necessary.
	r. Flexible hose assembly (18)	Replace.	If necessary.
	s. Gasket (19)	Replace.	If necessary.

4-62.2. EXHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	t. Muffler (20)	Replace.	If necessary.
	u. Nuts (21)	Replace.	If necessary.
	v. Lockwashers (22)	Replace.	If necessary.
	w. Flatwashers (23)	Replace.	If necessary.
	x. Washers (24)	Replace.	If necessary.
	y. Packing (25)	Replace.	If necessary.
	z. Gaskets (26)	Replace.	If necessary.
3. Aft engine room	a. Nuts (1)	Replace.	If necessary.
	b. Lockwashers (2)	Replace.	If necessary.
	c. Flatwashers (3)	Replace.	If necessary.
	d. Washers (4)	Replace.	If necessary.
	e. Packing (5)	Replace.	If necessary.
	f. Gaskets (6)	Replace.	If necessary.
	g. Flexible hose assembly (7)	Replace.	If necessary.
	h. Nuts (8)	Replace.	If necessary.
	i. Screws (9)	Replace.	If necessary.
	j. Gaskets (10)	Replace.	If necessary.
	k. Muffler (11)	Replace.	If necessary.
	l. Flexible hose assembly (12)	Replace.	If necessary.
	m. Nuts (13)	Replace.	If necessary.

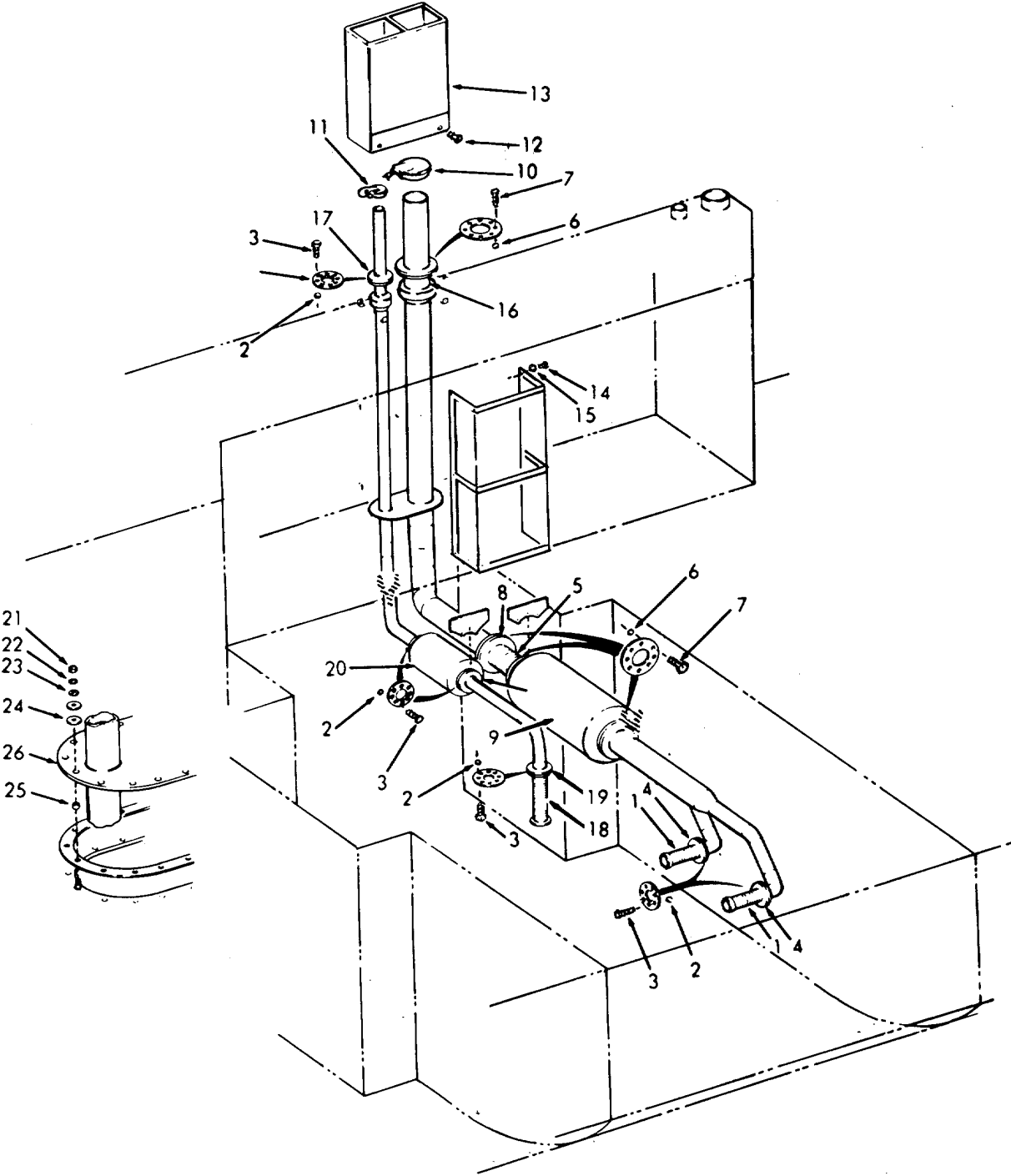
4-62.2. EXHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	n. Screws (14)	Replace.	If necessary.
	o. Gaskets (15)	Replace.	If necessary.
	p. Muffler (16)	Replace.	If necessary.
	q. Weather cap (17)	Replace.	If necessary.
	r. Weather cap (18)	Replace.	If necessary.
	s. Screws (19)	Replace.	If necessary.
	t. Insulation tape (20)	Replace.	If necessary.
	u. Flexible hose assembly (21)	Replace.	If necessary.
	v. Gasket (22)	Replace.	If necessary.
	w. Muffler (23)	Replace.	If necessary.
	x. Washers (24)	Replace.	If necessary.
	y. Packing (25)	Replace.	If necessary.
	z. Gaskets (26)	Replace.	If necessary.

4-62.2. EXHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION ITEM ACTION REMARKS

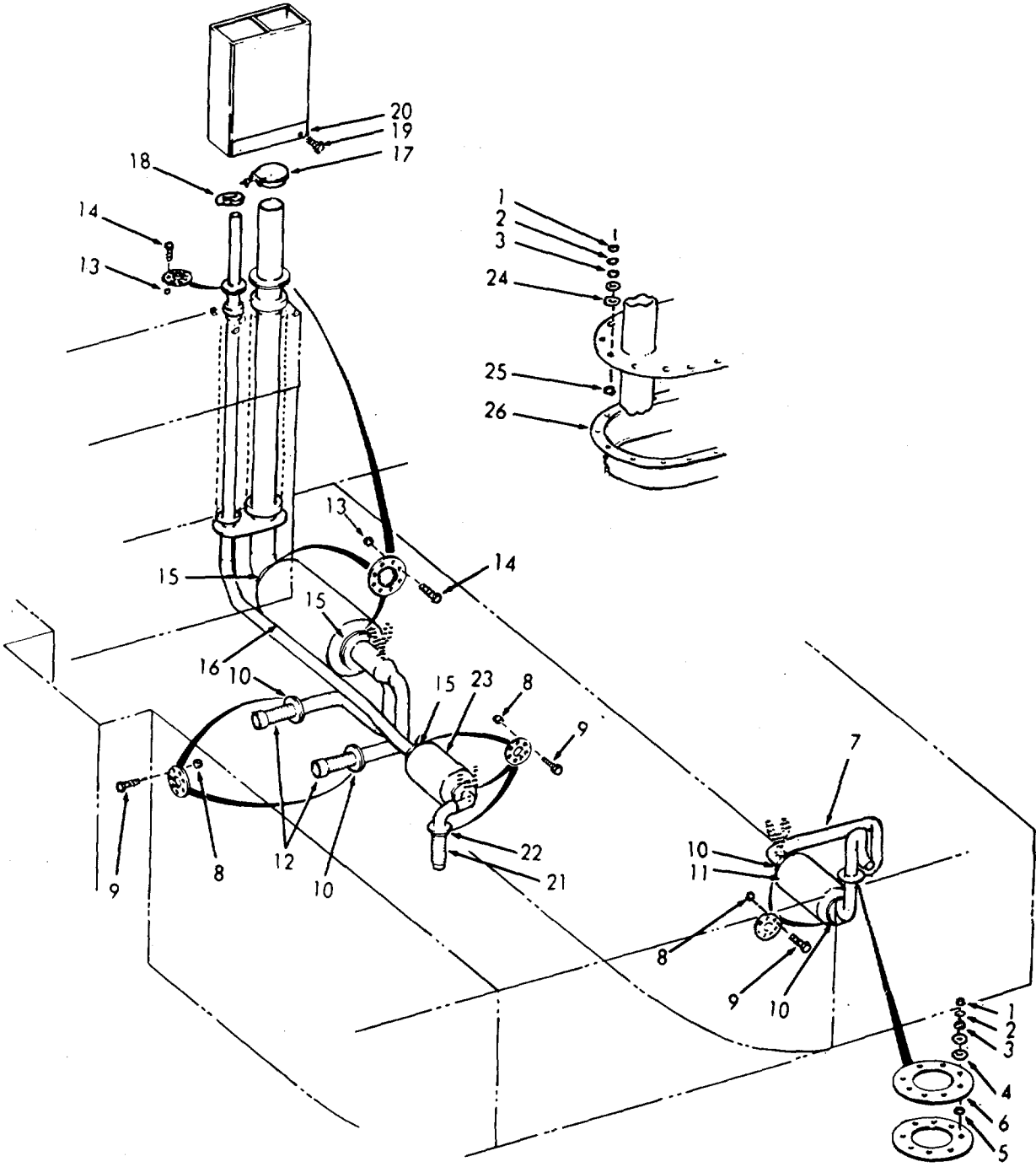
REPAIR (Cont)



4-62.2. EXHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-63. EXFHAUST PIPING INSULATION - MAINTENANCE INSTRUCTIONS (Continued)

This task covers:

a. Inspection

b. Replace

c. Repair

INITIAL SETUP

Test Equipment

NONE

References

TM 55-2090-201-14&P

Special Tools

NONE

Equipment

Condition Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

Do not drain oil into bilges.
Collect oil and dispose of properly.

Personnel Required

1

General Safety Instructions

NONE

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.	

4-63. 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

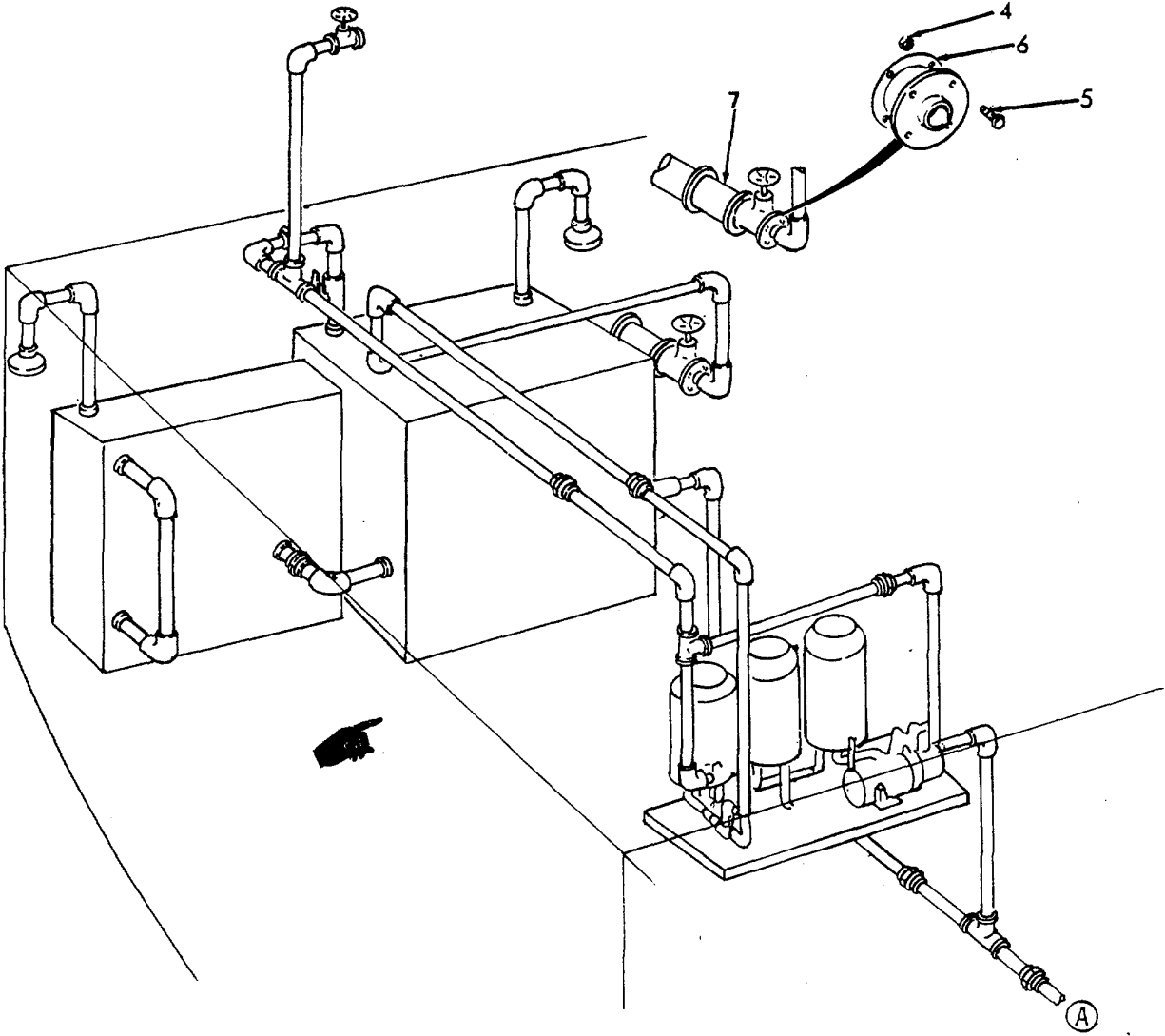
- | | | | |
|---------------|---------------|----------|---------------|
| 1. Water gage | Gage (1) | Replace. | If necessary. |
| 2. Hose | Hose (2) | Replace. | If necessary. |
| 3. Strainers | Strainers (3) | Replace. | If necessary. |

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. |

4-63. OIL/WATER SEPARATOR PIPING SYSTEM - MAINTENANCE INSTRUCTIONS.

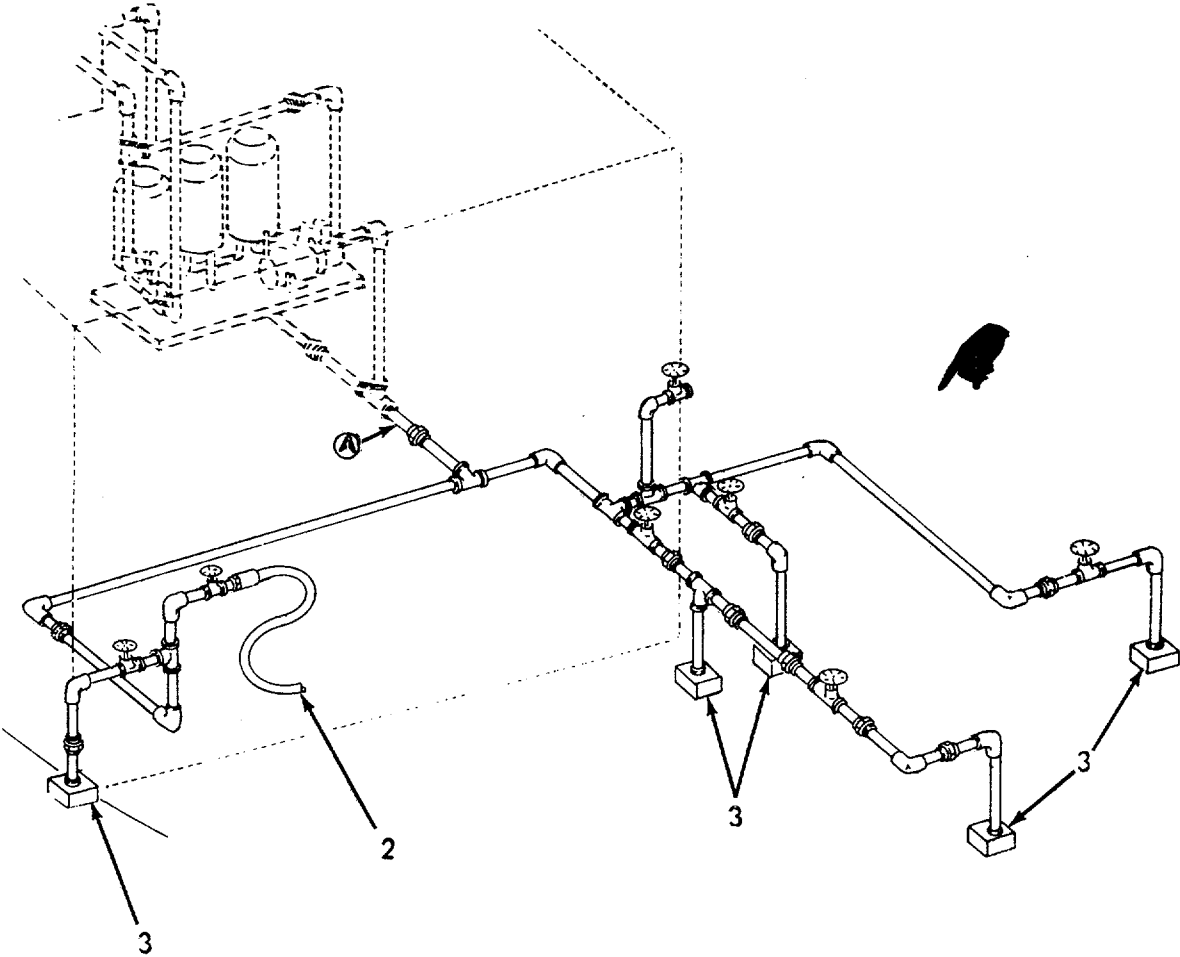
REPAIR (Cont)



4-63. OIL/WATER SEPARATOR PIPING SYSTEM - MAINTENANCE INSTRUCTIONS.

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-63. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS.

This task covers:

- | | | |
|----------------------|-------------------|------------------------|
| a. Inspection | c. Removal | e. Installation |
| 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

Observe CAUTION in procedure.

LOCATION	ITEM	ACTION	REMARKS
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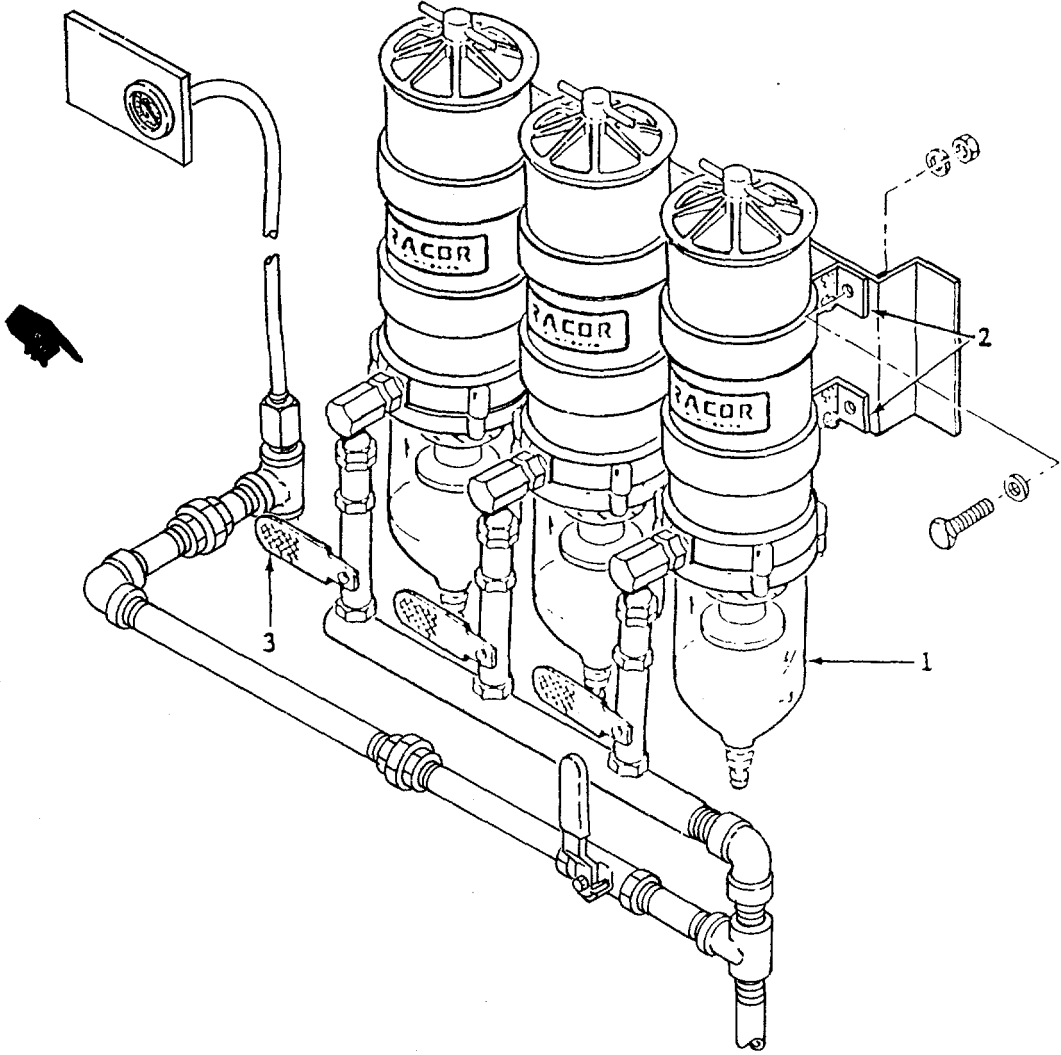
INSPECTION

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.

4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION (cont)



4955-172

c.	Ball valve assembly (3)	Check for leaks.
----	-------------------------	------------------

4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
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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)

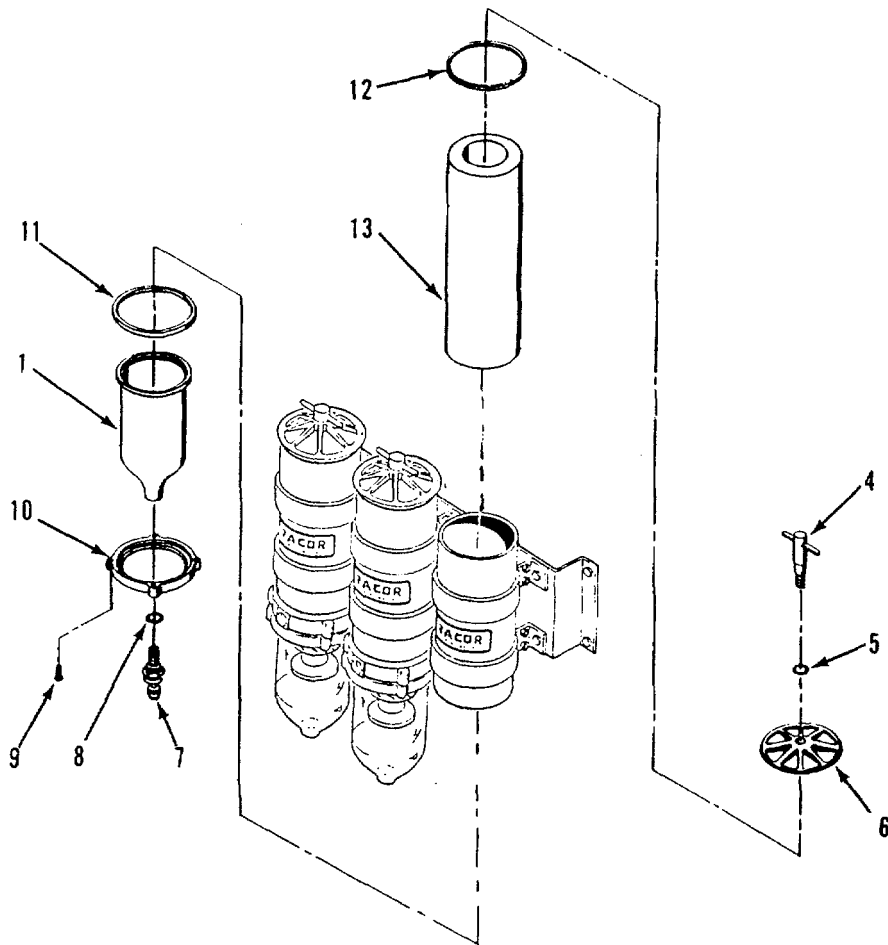
2.	a. T- handle (4) O-ring (5) and lid (6)	Remove	
	b. Drain valve (7)	Remove and drain unit completely. Flush unit with clean diesel fuel.	
	c. Bowl retainer screws (9) retaining ring (10), and bowl(l)	Remove.	If an excessive amount of contami- nation is present in bowl.
	d. Bowl gasket (11).	Remove	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	

4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
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SERVICE (Cont'd)

- | | | | |
|----|--|--|------------------------------|
| i. | Drain valve (7) and O-ring (8). | Install. | Replace O-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. | |



Change 1 4-1368.4

4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
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REMOVAL

NOTE

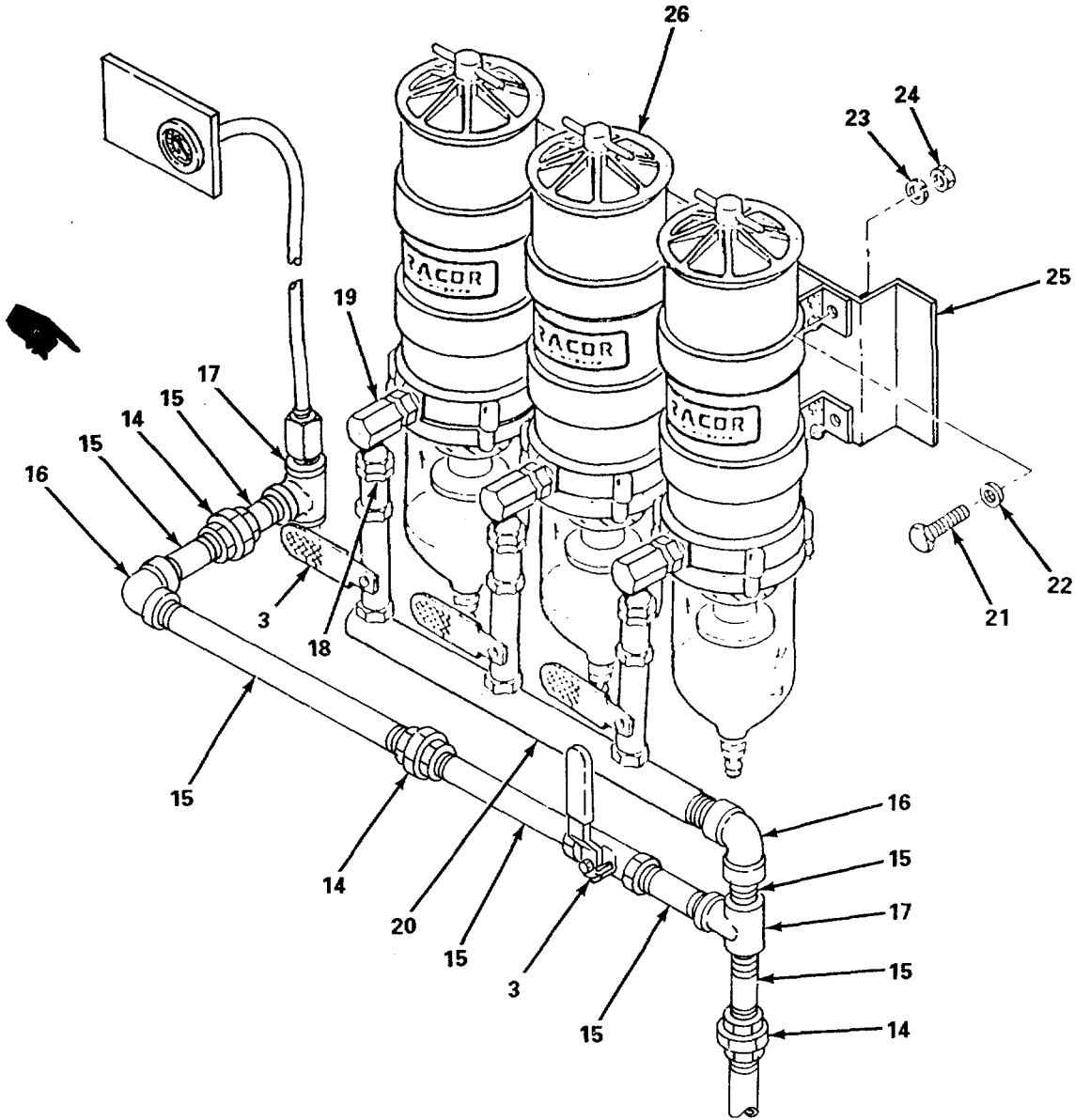
Ensure that the fuel supply valves are secured before removing the fuel filter/water separator.

- | | | | |
|----|---|----------------------------------|-----------------------------------|
| 3. | a. Unions (14), pipes (15), elbows (16) and tees (17). | Remove. | Use rags to clean fuel oil spill. |
| | b. Ball valve (3), straight fitting (18), elbow (19) and manifold (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. | |

4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont't).

LOCATION	ITEM	ACTION	REMARKS
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REMOVAL (cont'd)



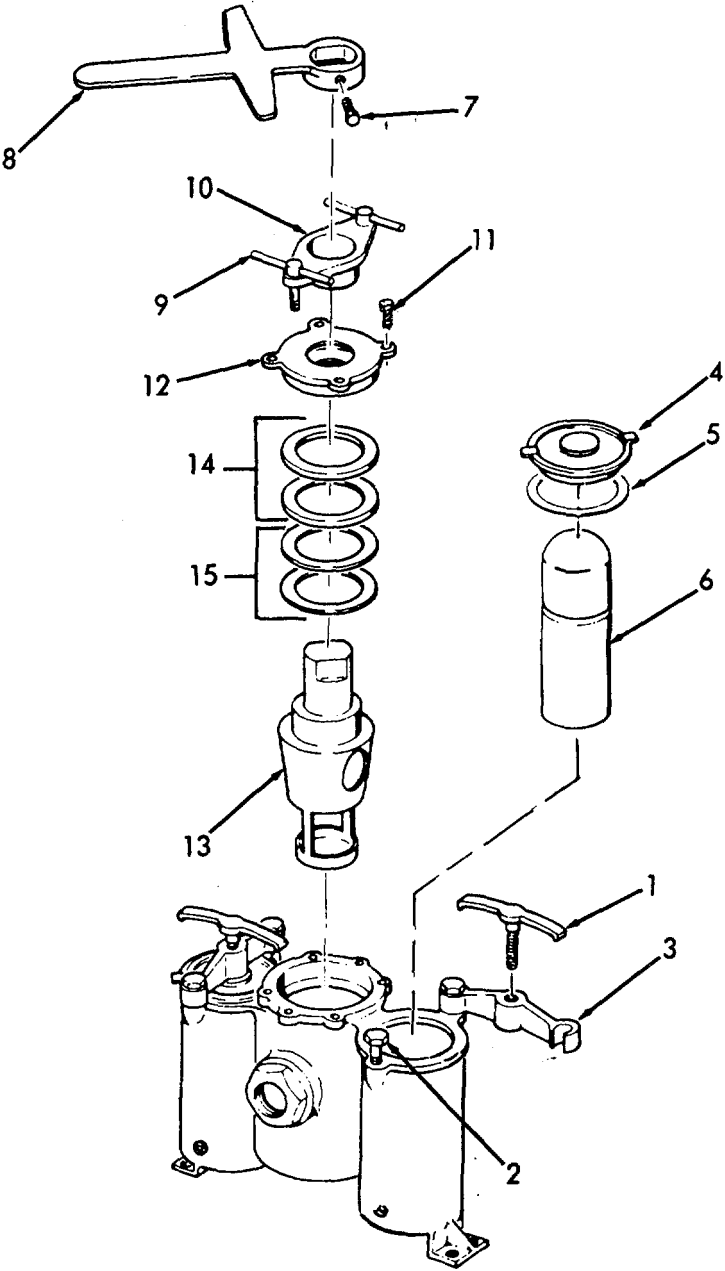
4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont'd).

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 O-ring (8)	Remove.	Drain oil into suitable container. Discard O-ring.
	d. T-handle (4), O-ring (5) and lid (6).	Remove	Inspect O-ring and discard if worn.
	e. Lid gasket (12) and element (13).	Remove from outer cylinder (30).	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 ball gasket (35).	Remove.	Inspect check ball gasket and discard if worn.
	h. Base (36) and gasket (37).	Remove.	Inspect gasket and discard if worn.

4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont'd)



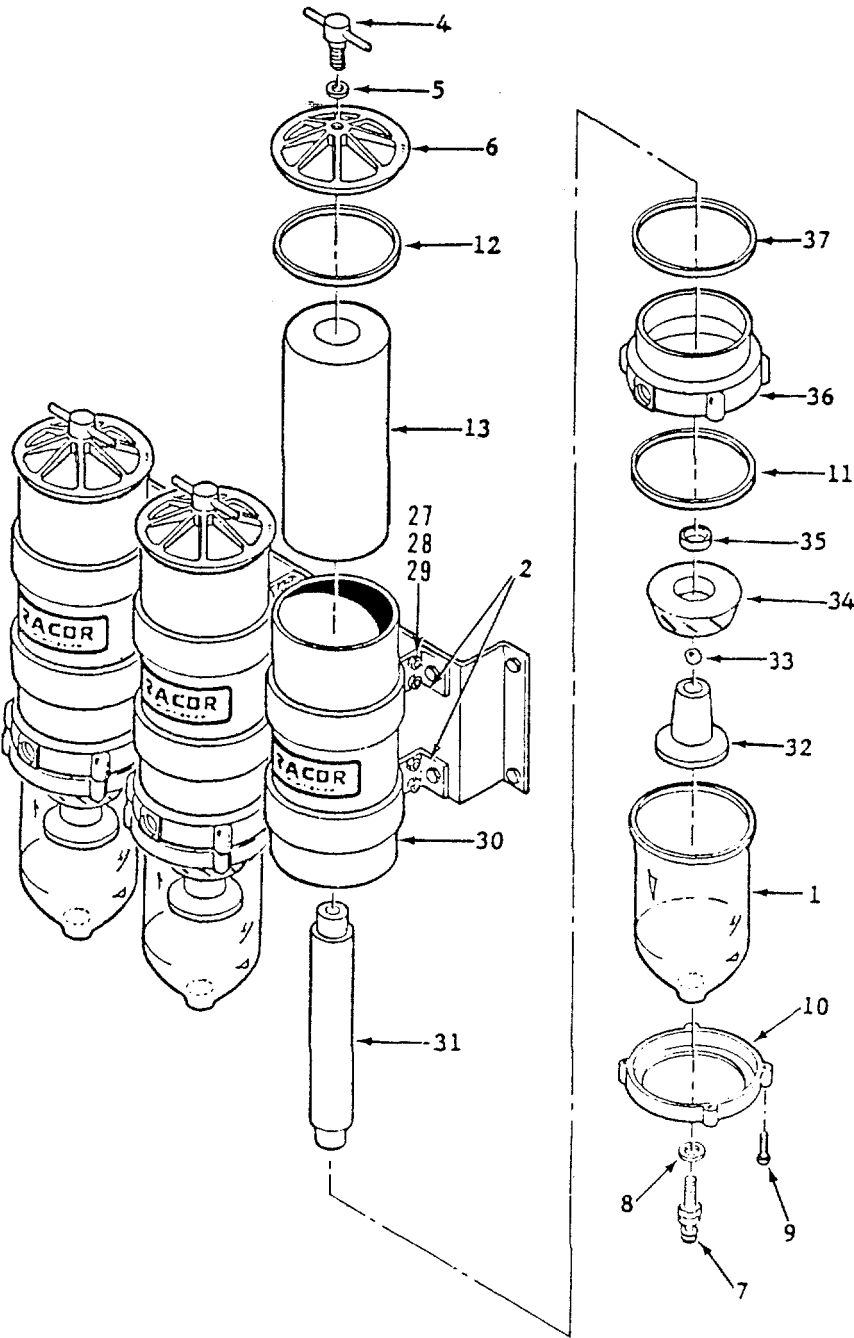
4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

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 ball (33), conical baffle (34), and check ball gasket (35).	Assemble and install.	Use new check ball gasket if necessary.
	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 O-ring.
	o. Bracket clamps (2).	Install.	
	p. Carriage bolt (27) lock nut (28) and flat washer (29).	Fasten.	

4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
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INSTALLATION (Cont'd)



4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

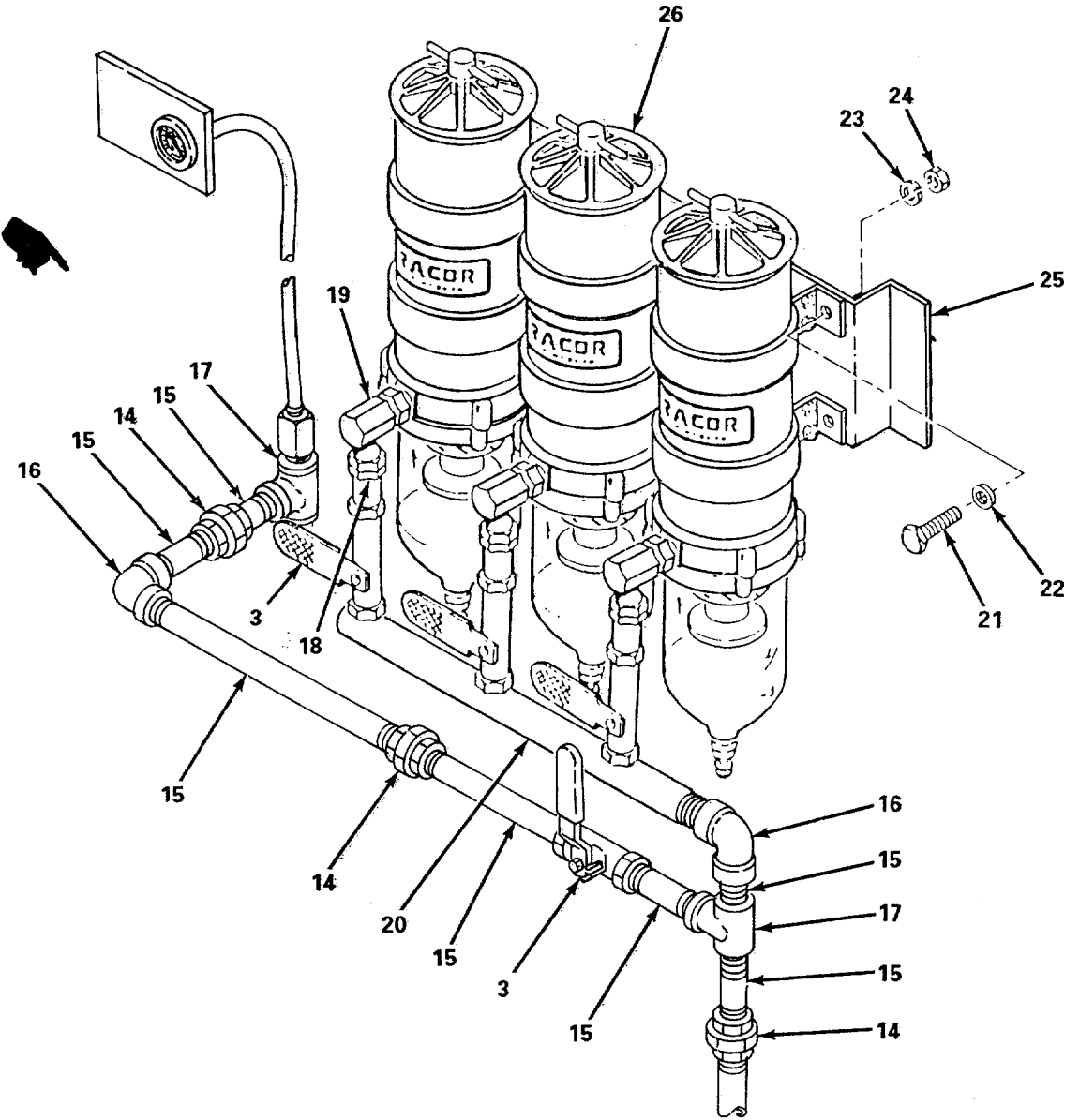
LOCATION	ITEM	ACTION	REMARKS
INSTALLATION (Cont'd)			
5.	a. Filter/Separator assembly (26).	Install on double bracket (25).	
	b. Hex bolt (21), flat washer (22), lockwasher (23), and hex nut (24).	Install.	
	c. Elbow (19), straight fitting (18), ball valve (3) and manifold (20).	Install.	
	d. Tees (17), elbows (16), pipes (15) and unions (14).	Install.	

Change 1 4-1368.11

4-63.1. FUEL FILTER/WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
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INSTALLATION (Cont'd)



4-64. FRESH AND FLUSH WATER SYSTEM - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection

b. Replace

INITIAL SETUP:

Test Equipment
NONE

References
Paragraph
4-54.6

Wye Strainer

Special Tools
NONE

Equipment Condition
NONE

Condition Description

Material/Parts
NONE

Special Environmental Conditions
NONE

Personnel Required
1

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

1. Fresh and flush water	a. Pressure gage	1. Inspect for proper operation.
	b. Pressure tank	2. Inspect for damage. Inspect for breaks, cracks, and leaks.
	c. Liquid level gage	Inspect for breaks, cracks and leaks.
	d. Storage tank leaking pet cocks.	Inspect for damaged or
	e. Pressure switch	Inspect for signs of damage.
	f. Automatic air charging control	Inspect for signs of damage.

4-64. FRESH AND FLUSH WATER SYSTEM - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont'd)			
	g. Wye strainer	Inspect.	Refer to para 4-54.6 .
	h. Water closet	Inspect for leaking or defective hoses.	
2. Fill hose and cabinet	a. Cabinet	Inspect for damage.	
	b. Hose	Inspect for leaks, cracks and breaks.	

REPLACE

NOTE

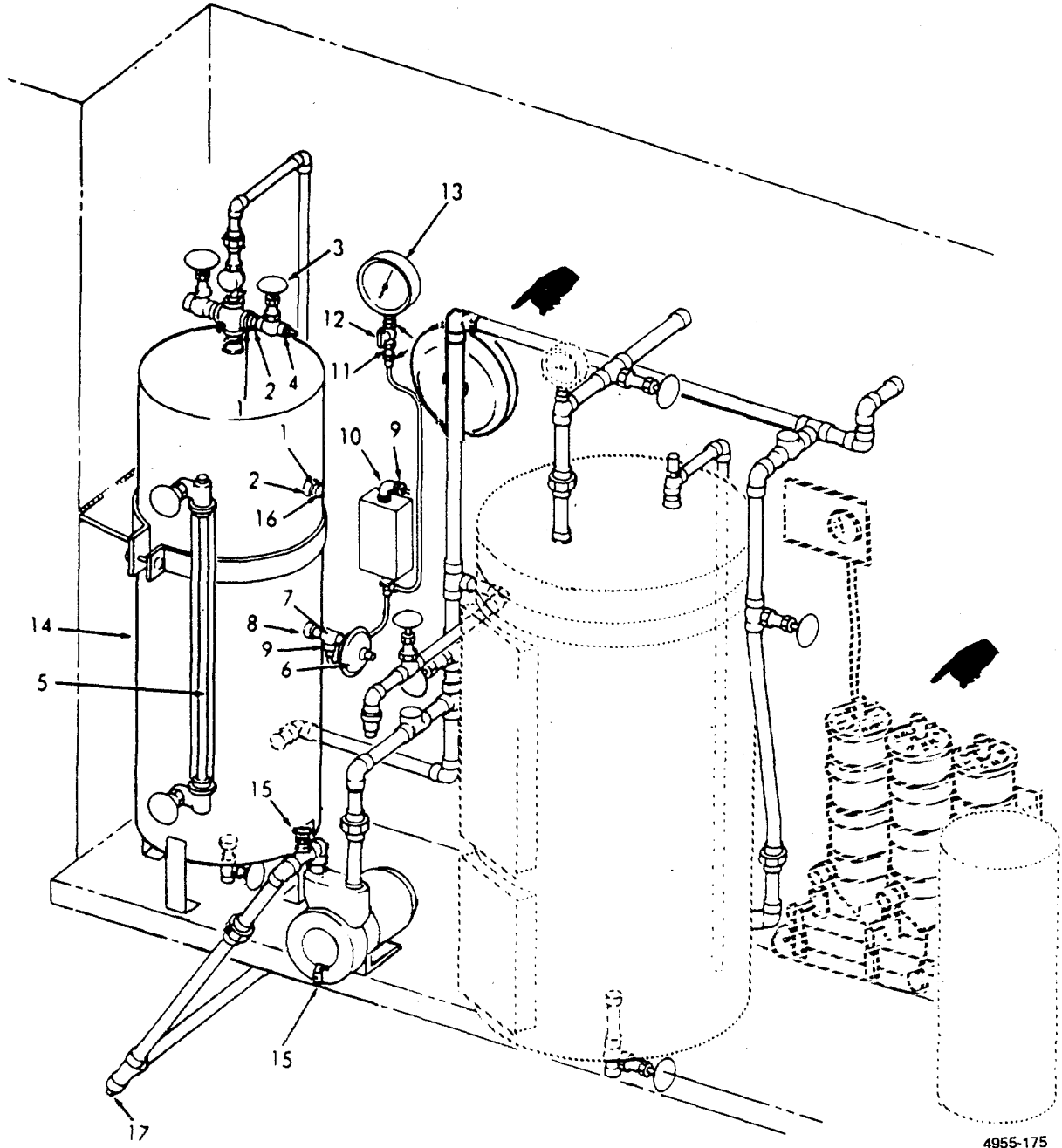
Prior to working on the system, shutdown the fresh and flush water system.

3. Fresh and flush water	a. Pipe nipple (1)	Replace.	If required.
	b. Reducer bushing (2)	Replace.	If required.
	c. Globe valve (3)	Replace.	If required.
	d. Snifter valve (4)	Replace.	If required.
	e. Liquid level gage (5)	Replace.	If required.
	f. Automatic air charging control (6)	Replace.	If required.
	g. Tee (7)	Replace.	If required.
	h. Nipple (8)	Replace.	If required.
	i. Pipe nut (9)	Replace.	If required.
	j. Elbow (10)	Replace.	If required.

4-64. FRESH AND FLUSH WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE



4955-175

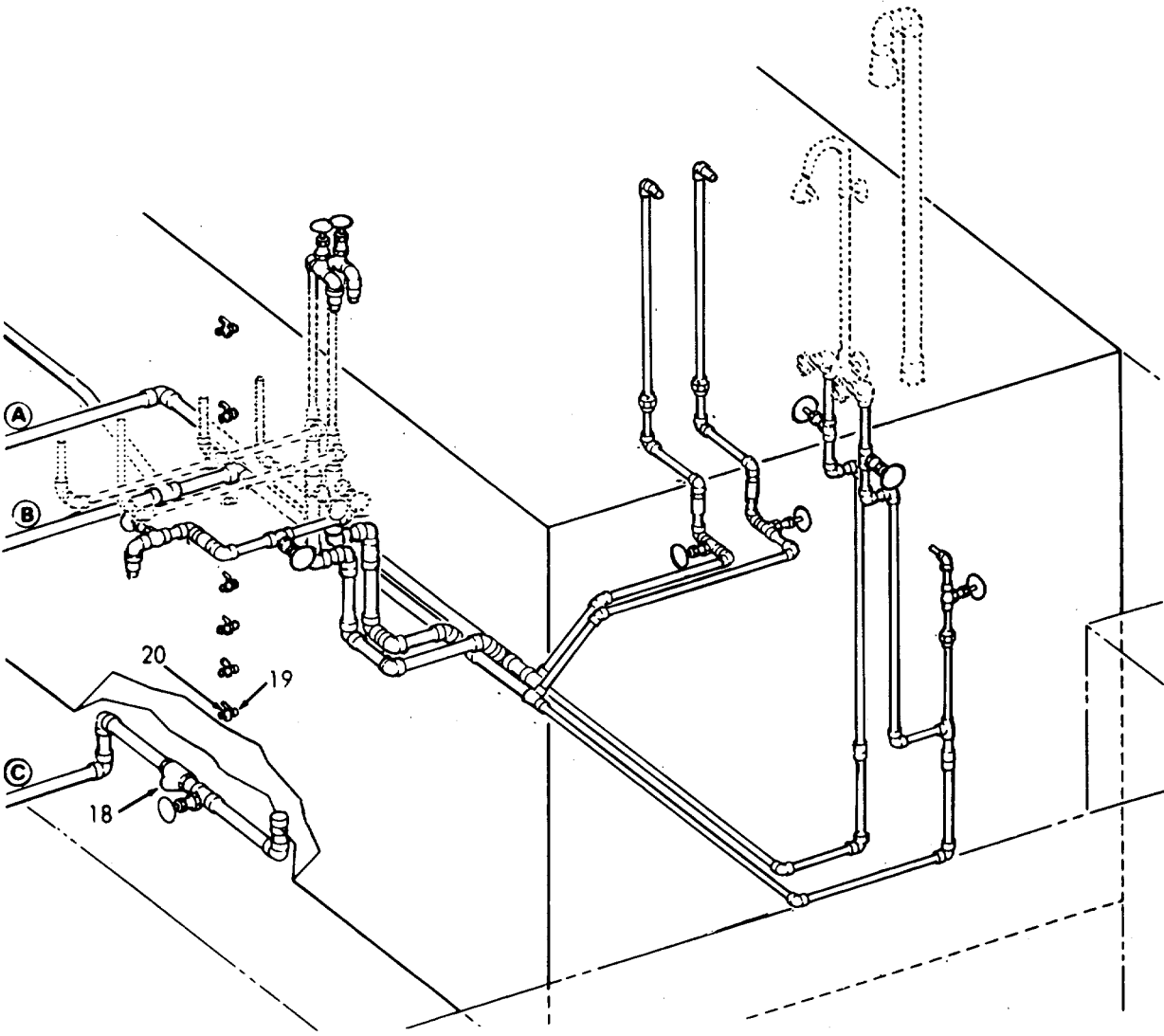
4-64. FRESH AND FLUSH WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	k. Connector (11)	Replace.	If required.
	l. Female cock gage (12)	Replace.	If required.
	m. Pressure gage (13)	Replace.	If required.
	n. Fresh water pressure tank (14)	Replace.	If required.
	o. Petcock (15)	Replace.	If required.
	p. Pressure switch (16)	Replace.	If required.
	q. Square plug (17)	Replace.	If required.
	r. Wye Strainer (18)	Refer to paragraph 4-54.6 .	
	s. Coupling (19)	Replace.	If required.
	t. Petcock (20)	Replace.	If required.
	u. Double female hose coupling (21)	Replace.	If required.
	v. Hose increaser (22)	Replace.	If required.
	w. Hose (23)	Replace.	If required.
	x. Nut (24)	Replace.	If required.
	y. Lockwasher (25)	Replace.	If required.

4-64. FRESH AND FLUSH WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



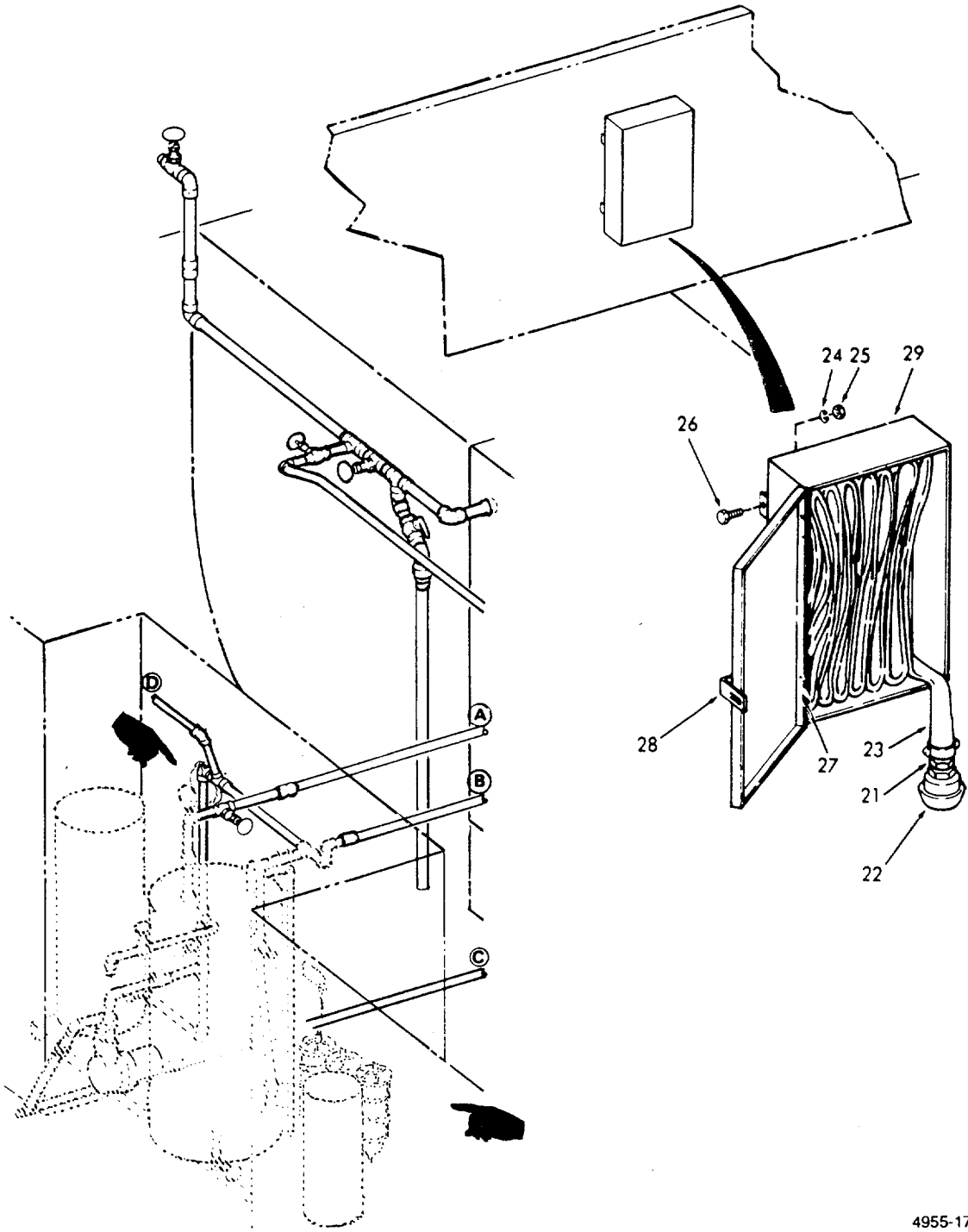
4-64. FRESH AND FLUSH WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	z. Screw (26)	Replace.	If required.
	aa. Cabinet hinge (27)	Replace.	If required.
	ab. Safety hasp (28)	Replace.	If required.
	ac. Cabinet (29)	Replace.	If required.
	ad. Hose cap with chain (30)	Replace.	If required.
	ae. Hose clamp (31)	Replace.	f required.
	af. Rubber hose (32)	Replace.	If required.
	ag. Wye strainer (33)	Replace.	Refer to para 4-54.6 .
	ah. Screw (34)	Replace.	If required.
	ai. Gasket (35)	Replace.	If required.
	aj. Screw (36)	Replace.	If required.
	ak. Gasket (37)	Replace.	If required.
	al. Flat head screw (38)	Replace.	If required.
	am. Strainer plate (39)	Replace.	If required.
	an. Pressure switch (40)	Replace.	If required.

4-64. FRESH AND FLUSH WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

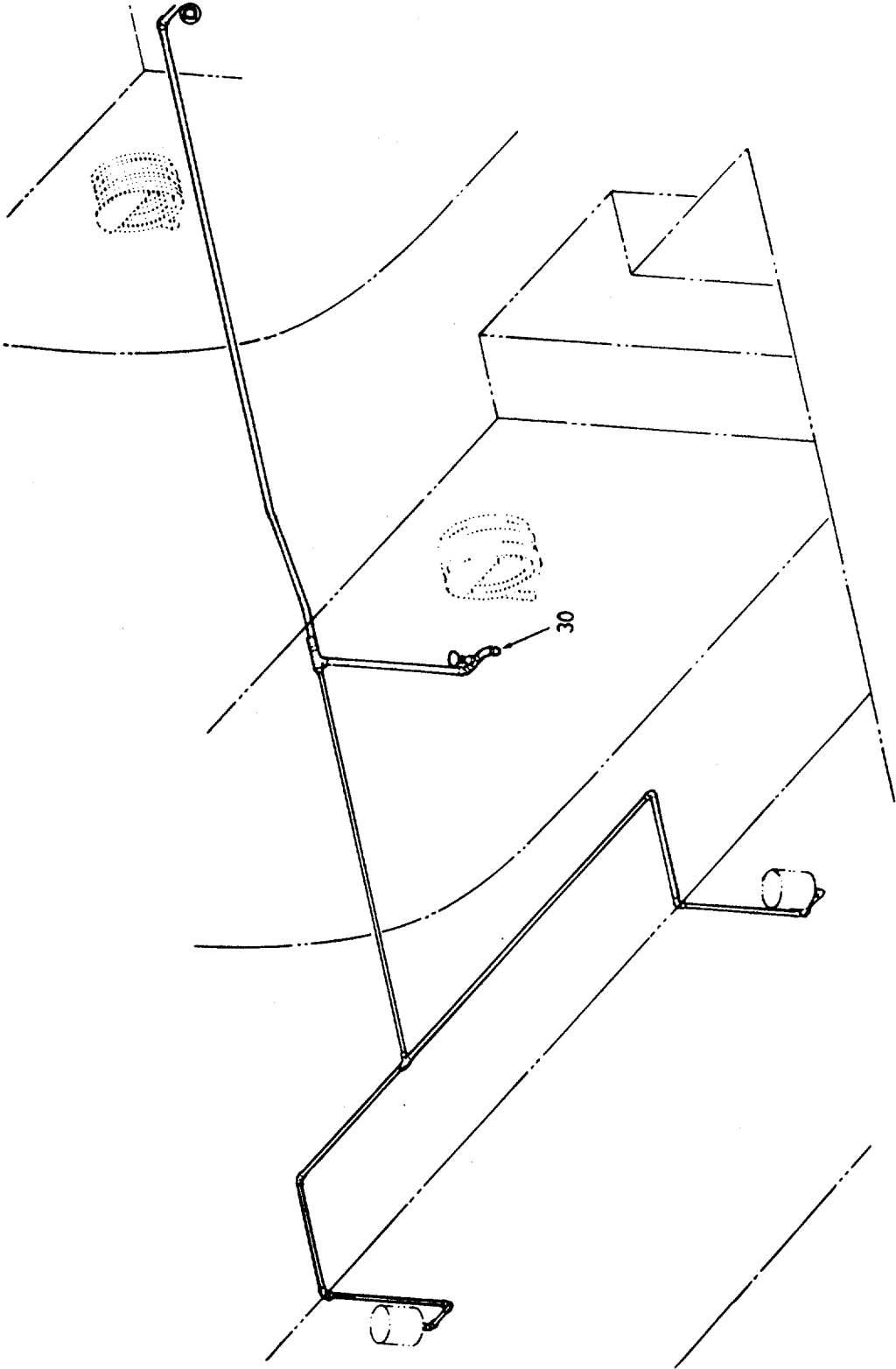
LOCATION	ITEM	ACTION	REMARKS
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REPLACE



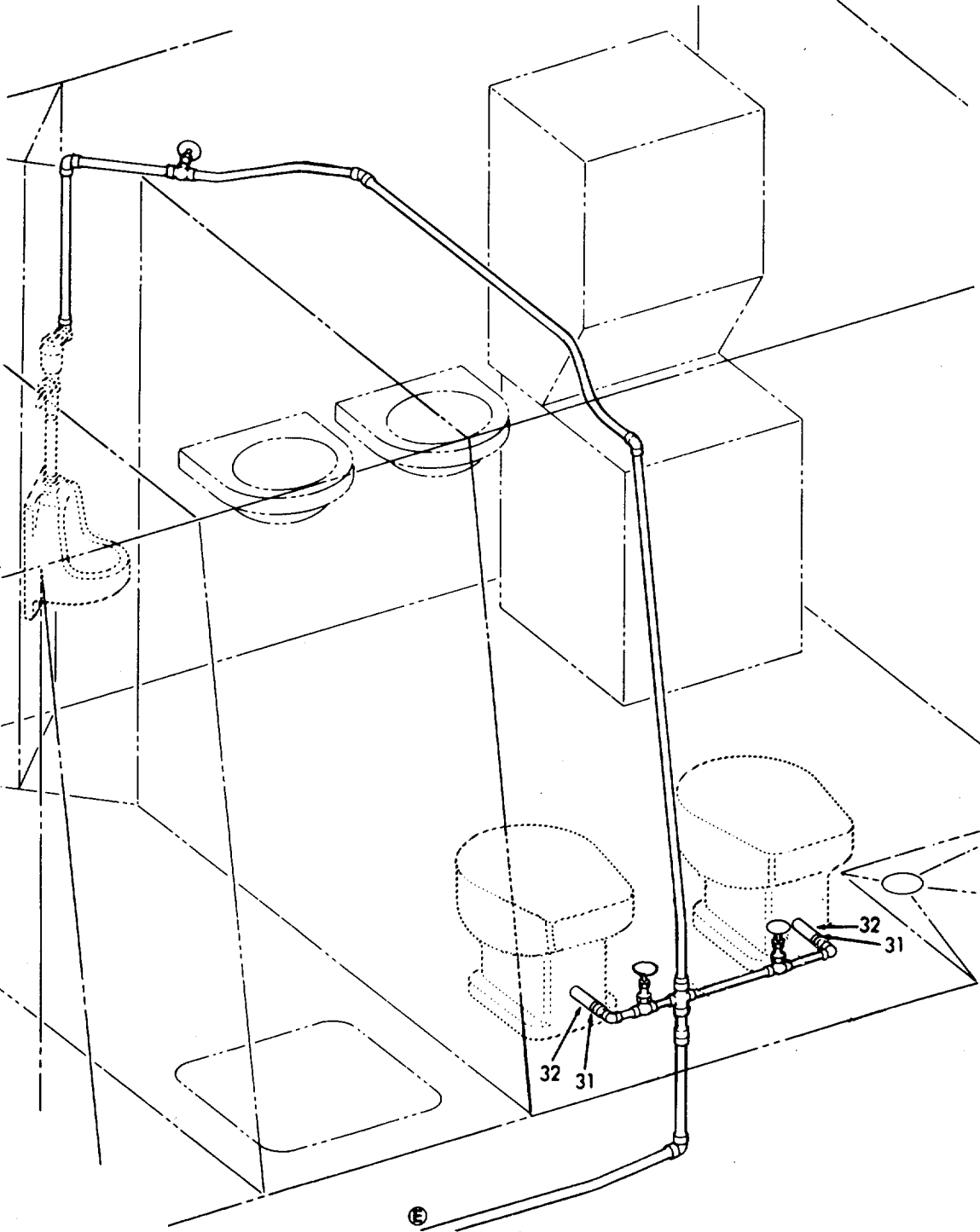
4955-176

4-64. FRESH AND FLUSH WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).



4-64. FRESH AND FLUSH WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

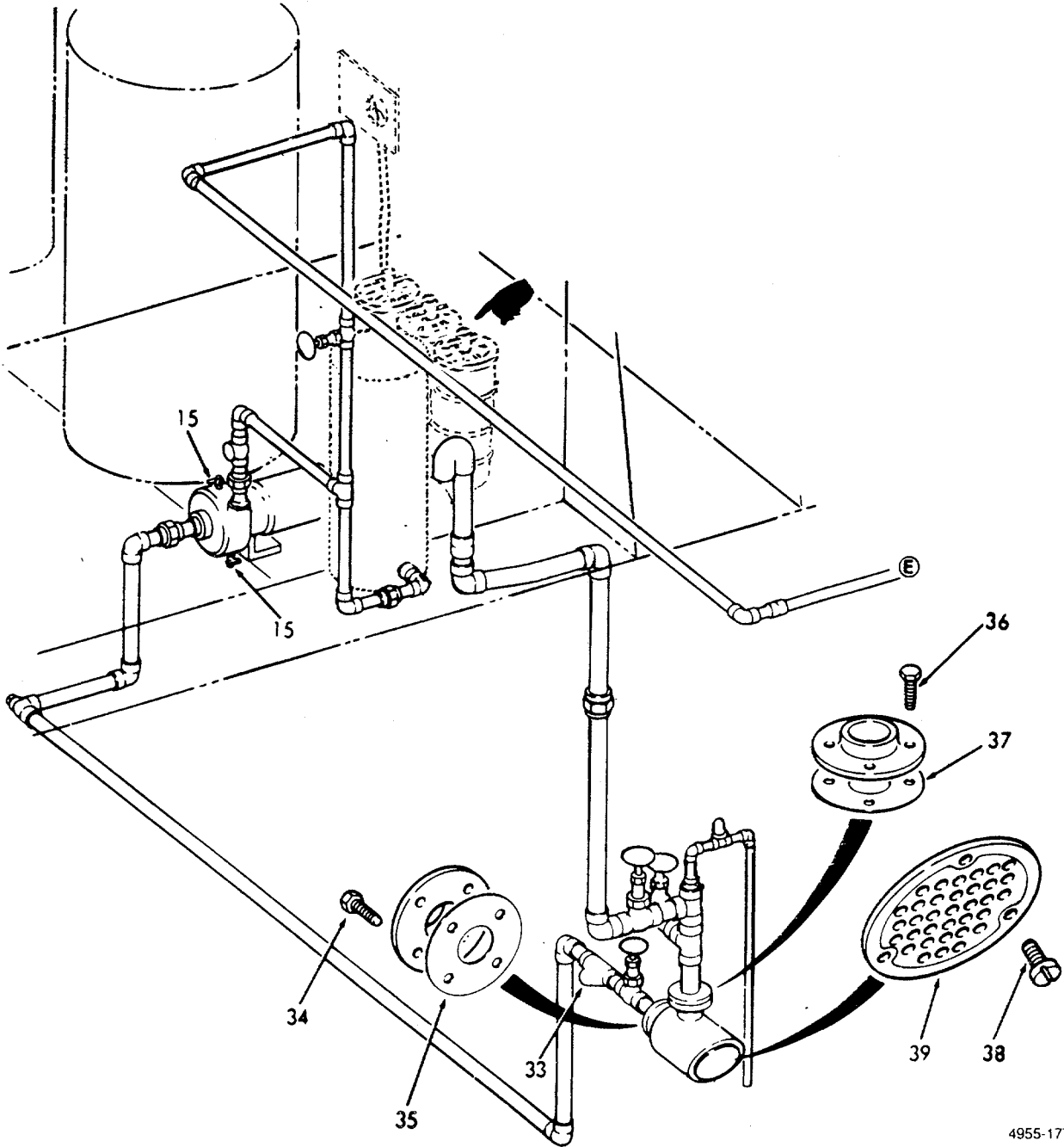
LOCATION	ITEM	ACTION	REMARKS
	REPLACE		



4-64. FRESH AND FLUSH WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)

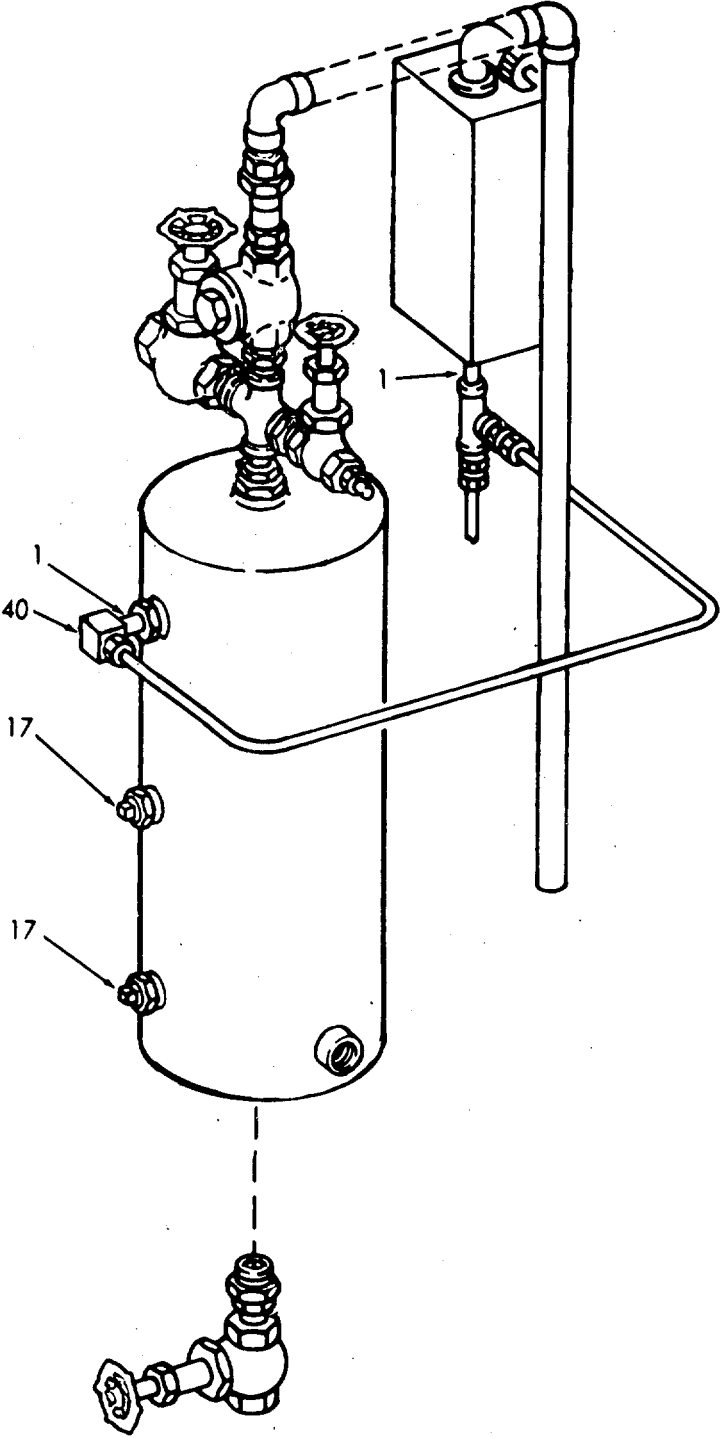


4955-177

4-64. FRESH AND FLUSH WATER SEPARATOR - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



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4-1379

4-65. DECK FITTINGS - MAINTENANCE INSTRUCTIONS.

The following is a list of the maintenance procedures:

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Reach Rods - Ballast Suction Valve	4-65.1
Reach Rods - Diesel Oil Shutoff Valve	4-65.2
Reach Rods - Bilge Suction Header Isolation Valve	4-65.3
Reach Rods - Magazine Sprinkler Valve	4-65.4

4-65.1. REACH RODS - BALLAST SUCTION VALVE - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection b. Replace c. Repair

INITIAL SETUP:

<u>Test Equipment</u> NONE	<u>References</u> NONE
<u>Special Tools</u> NONE	<u>Equipment Condition</u> NONE
<u>Material/Parts</u> NONE	<u>Condition Description</u>
<u>Personnel Required</u> 1	<u>Special Environmental Conditions</u> NONE
	<u>General Safety Instructions</u> NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

- | | |
|-------------------------|----------------------------------|
| 1. Reach rods All parts | 1. Inspect for signs of damage. |
| | 2. Inspect for proper operation. |

4-1381

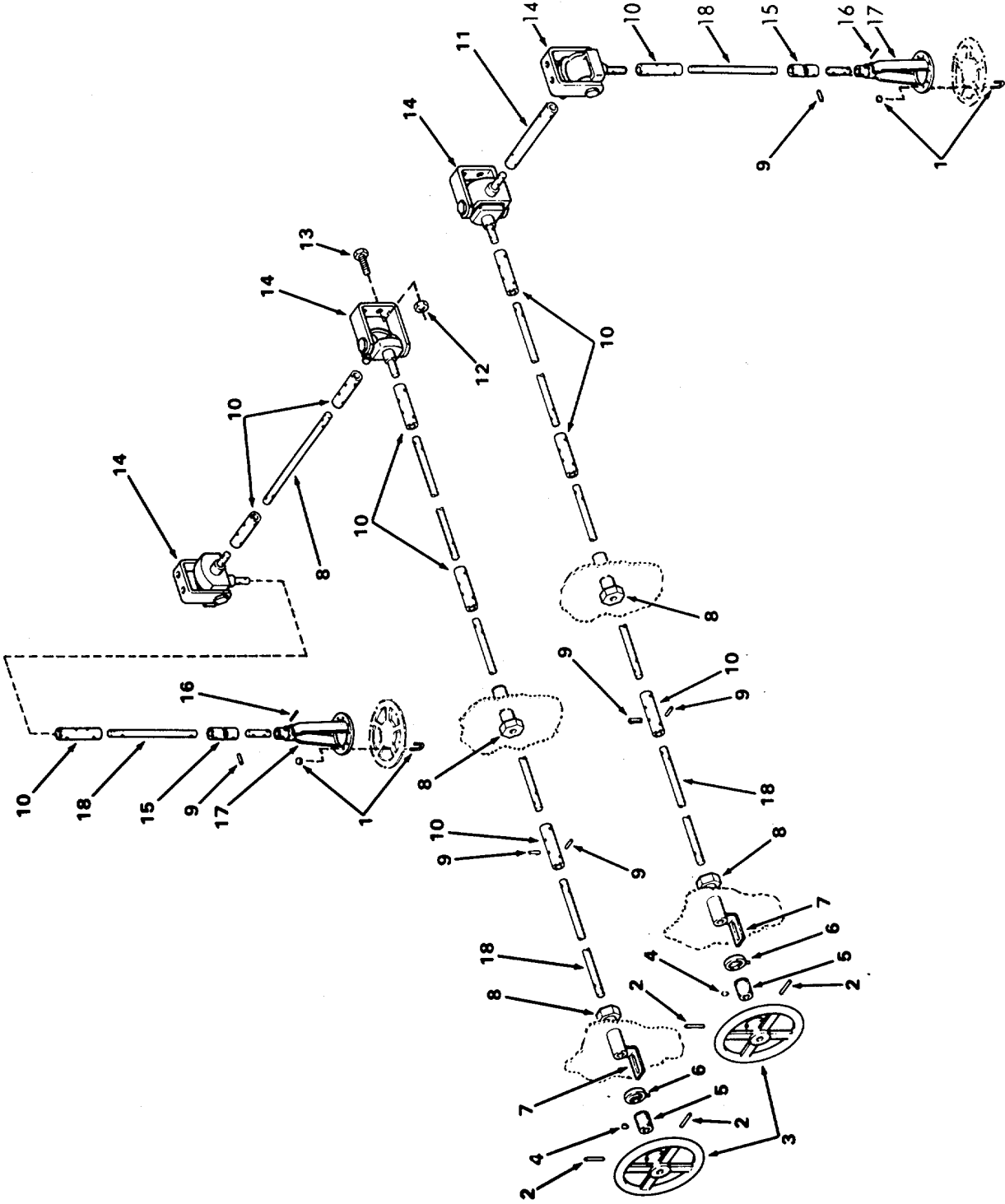
4-65.1. REACH RODS - BALLAST SUCTION VALVE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
2.	a. U-bolts with nuts (1)	Replace.	If necessary.
	b. Slotted pins 2-1/4 long (2)	Replace.	If necessary.
	c. Hand wheel (3)	Replace.	If necessary.
	d. Setscrew (4)	Replace.	If necessary.
	e. Shaft slave (5)	Replace.	If necessary.
	f. Brass pointer (6)	Replace.	If necessary.
	g. Indicator plates (7)	Replace.	If necessary.
	h. Stuffing box (8)	Replace.	If necessary.
	i. Slotted pins 1-1/4 long (9)	Replace.	If necessary.
	j. Coupling (10)	Replace.	f necessary.
	k. Extension coupling (11)	Replace.	If necessary.
	l. Self-locking nuts (12)	Replace.	If necessary.
	m. Screws (13)	Replace.	If necessary.
	n. Hinged joint with bracket (14)	Replace.	If necessary.

4-65.1. REACH RODS - BALLAST SUCTION VALVE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE



4-65.1. REACH RODS - BALLAST SUCTION VALVE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
	o. Universal joint (15)	Replace.	If necessary.
	p. Slotted pin (1-1/8 long) (16)	Replace.	If necessary.
	q. Handwheel coupling (1;)	Replace.	If necessary.
	r. Steel shaft (18)	Replace.	If necessary.
REPAIR			
3.	Repair in accordance with existing procedures.		

4-65.2. REACH RODS - DIESEL OIL SHUTOFF VALVE - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection

b. Replace

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
1

General Safety Instructions
NONE

LOCATION

ITEM

ACTION

REMARKS

INSPECTION

1. Reach rods All parts

1. Inspect for signs of damage.

2. Inspect for proper operation.

4-1385

4-65.2. REACH RODS - DIESEL OIL SHUTOFF VALVE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
2.	a. Deck boxes (1)	Replace.	If necessary.
	b. U-bolts with nuts (2)	Replace.	If necessary.
	c. Slotted pins 1-1/4 long (3)	Replace.	If necessary.
	d. Couplings (4)	Replace.	If necessary.
	e. Self-locking nuts (5)	Replace.	If necessary.
	f. Screws (6)	Replace.	If necessary.
	g. Hinged joint with bracket (7)	Replace.	If necessary.
	h. Universal joint (8)	Replace.	If necessary.
	i. Handwheel coupling (9)	Replace.	If necessary.
	j. Steel shaft (10)	Replace.	If necessary.

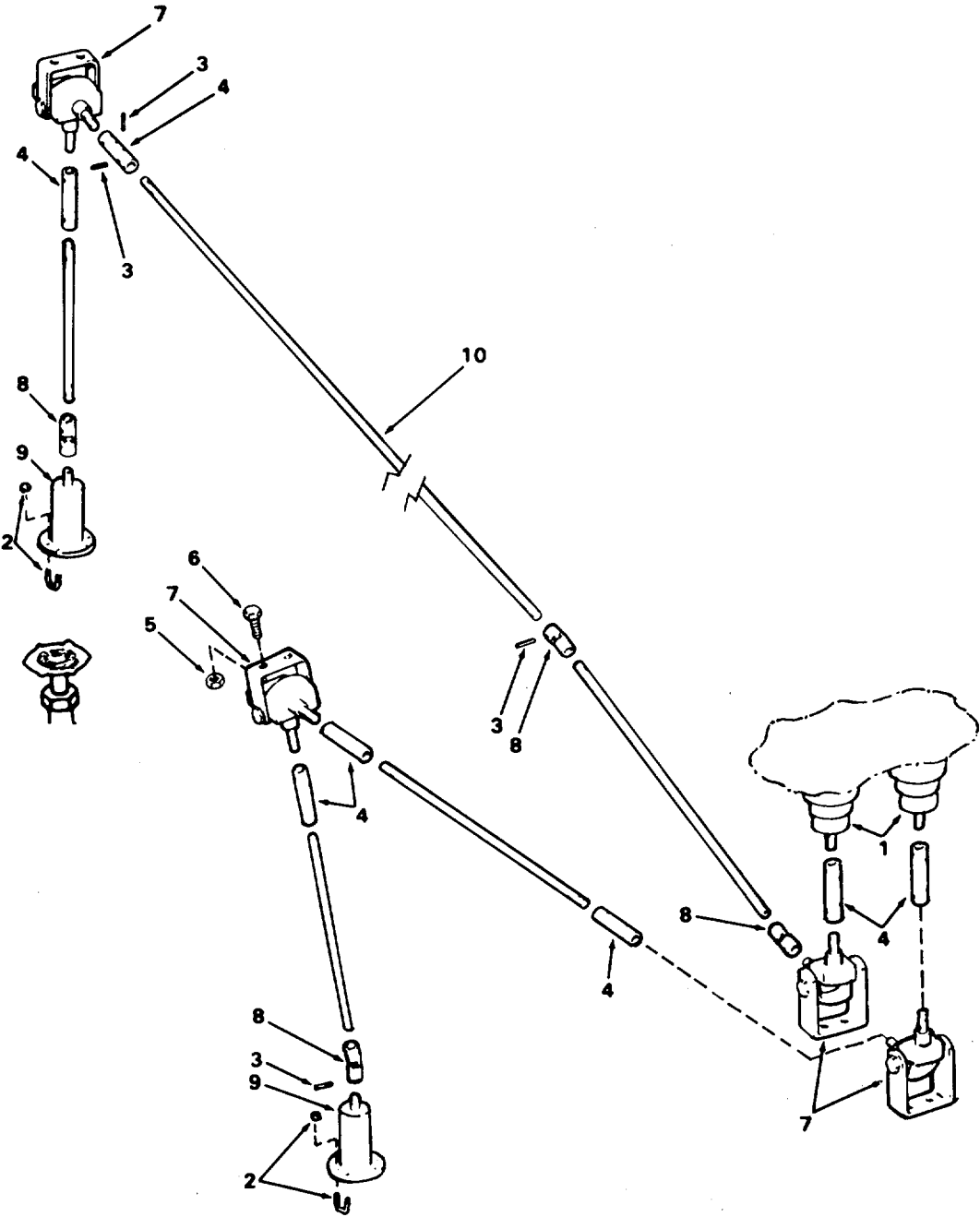
REPAIR

3. Repair in accordance with existing procedures.

4-65.2. REACH RODS - DIESEL OIL SHUTOFF VALVE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPLACE (Cont)



4-65.2. REACH RODS - BILGE SUCTION HEADER ISOLATION VALVE - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection

b. Replace

c. Repair

INITIAL SETUP:

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment Condition
NONE

Condition Description

Material/Parts
NONE

Special Environmental Conditions
NONE

Personnel Required
1

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

- | | | | |
|-------------------------|----------------------------------|--|--|
| 1. Reach rods All parts | 1. Inspect for signs of damage. | | |
| | 2. Inspect for proper operation. | | |

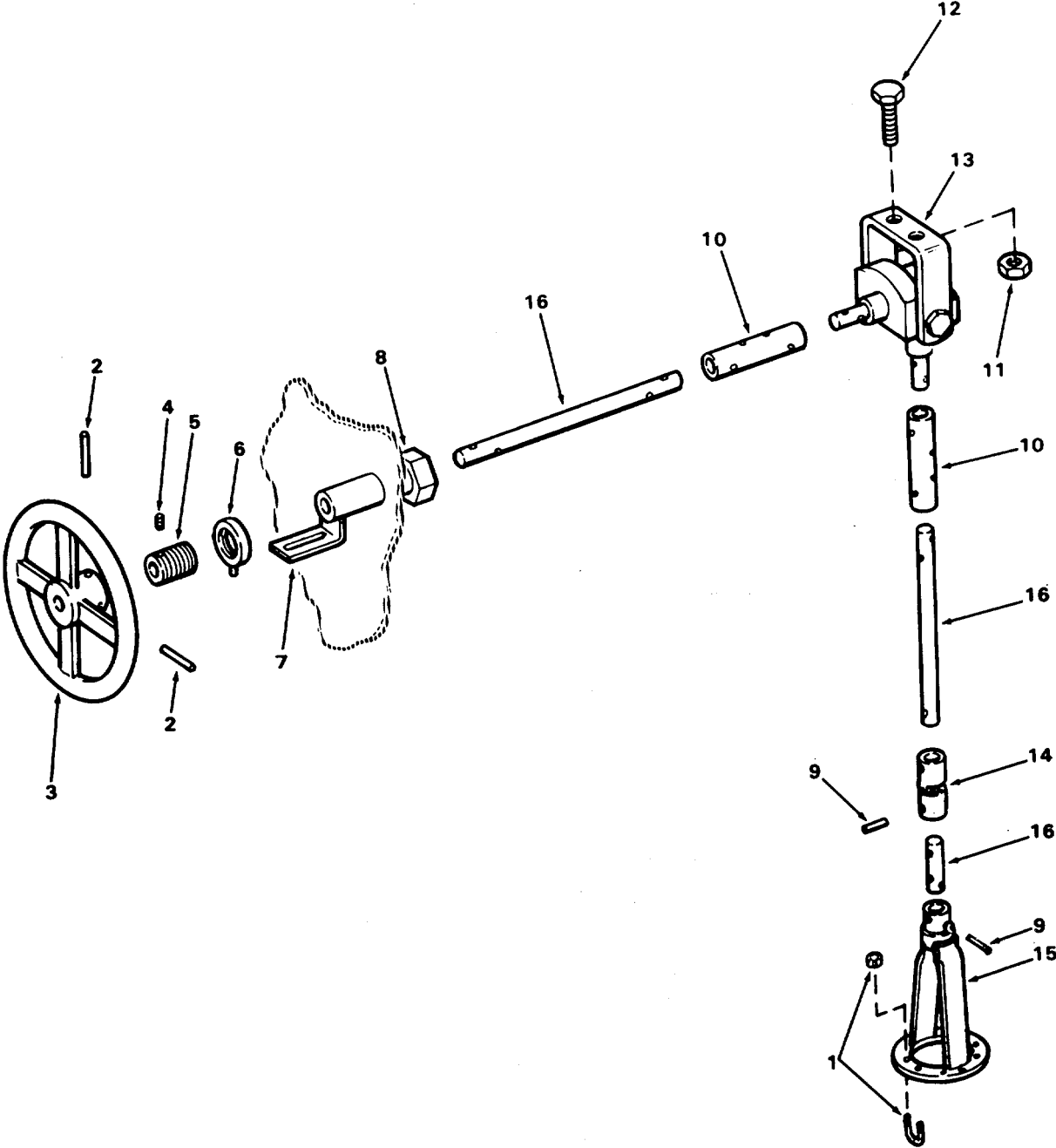
REPLACE

- | | | | |
|----|--------------------------------|----------|---------------|
| 2. | a. U-bolts with nuts (1) | Replace. | If necessary. |
| | b. Slotted pins 2-1/4 long (2) | Replace. | If necessary. |
| | c. Handwheel (3) | Replace. | If necessary. |

4-65.3. REACH RODS - BILGE SUCTION HEADER ISOLATION VALVE - MAINTENANCE INSTRUCTIONS

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



4-65.3. REACH RODS - DIESEL OIL SHUTOFF VALVE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont.)			
	d. Setscrew (4)	Replace.	If necessary.
	e. Shaft sleeve (5)	Replace.	If necessary.
	f. Brass pointer (6)	Replace.	If necessary.
	g. Indicator plates (7)	Replace.	If necessary.
	h. Stuffing box (8)	Replace.	If necessary.
	i. Slotted pins 1-1/4 long (9)	Replace.	If necessary.
	j. Coupling (10)	Replace.	If necessary.
	k. Self-locking nuts (11)	Replace.	If necessary.
	l. crews (12)	Replace.	If necessary.
	m. Hinged joint with bracket (13)	Replace.	If necessary.
	n. Universal joint (14)	Replace.	If necessary.
	o. Handwheel coupling (15)	Replace.	If necessary.
	p. Steel shaft (16)	Replace.	If necessary.

REPAIR

3. Repair in accordance with existing procedures.

4-65.2. REACH RODS - MAGAZINE SPRINKLER VALVE - MAINTENANCE INSTRUCTIONS.

This task covers:

a. Inspection

b. Replace

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
1

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

- | | |
|-------------------------|---|
| 1. Reach rods All parts | 1. Inspect for signs of damage.

2. Inspect for proper operation. |
|-------------------------|---|

4-1391

4-65.4. REACH RODS - MAGAZINE SPRINKLER VALVE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
2.	a. Deck boxes (1)	Replace.	If necessary.
	b. U-bolts with nuts (2)	Replace.	If necessary.
	c. Slotted pins 1-1/4 long (3)	Replace.	If necessary.
	d. Couplings (4)	Replace.	If necessary.
	e. Universal joint (5)	Replace.	If necessary.
	f. Self-locking Nuts (6)	Replace.	If necessary.
	g. Screws (7)	Replace.	If necessary.
	h. Hinged joint with bracket (8)	Replace.	If necessary.
	i. Handwheel coupling (9)	Replace.	If necessary.
	j. Steel shaft (10)	Replace.	If necessary.

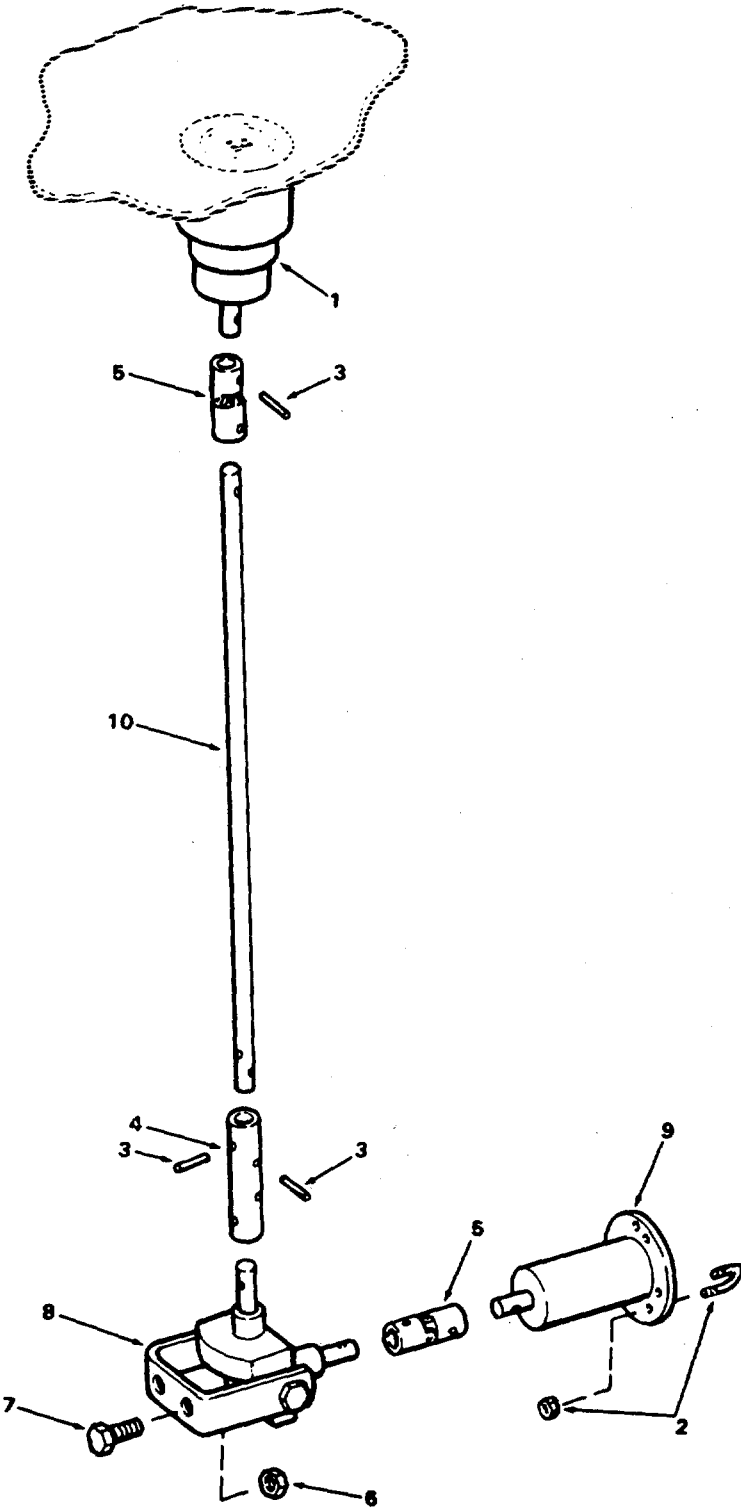
REPAIR

3. Repair in accordance with existing procedures.

4-65.4. REACH RODS - MAGAZINE SPRINKLER VALVE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



4-66. TANKS AND VOIDS - MAINTENANCE INSTRUCTIONS.

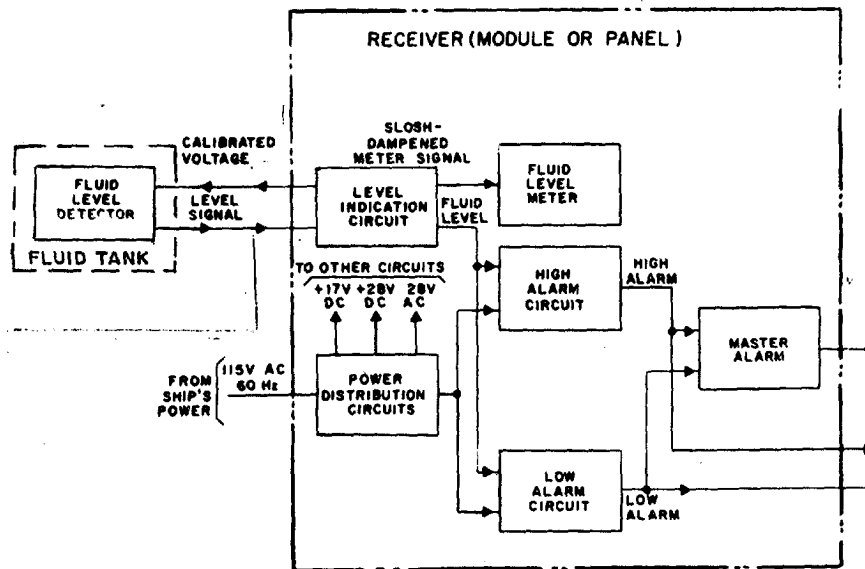
a. Purpose of Equipment.

(1) Tank level indicator (TLI) systems provide a means of determining 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.



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4-66. 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.

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Tank Level Indication Receiver	4-66.1
Transmitter	4-66.2
Cable Assembly	4-66.3
Penetration Assembly	4-66.4

4-1395

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS.

a. General.

Receivers convert the electrical signals generated by the fluid level detection devices (transmitters) to deflections on meters calibrated in gallons.

b. Detailed Block Diagram.

(1) Receiver Module.

(a) The circuits stages that perform the level indication when using a receiver module are shown below. The +17-volt dc level generated by the power distribution circuits is applied to CALIBRATE potentiometer R5 located in the level indication circuit on the receiver module. The connection of CALIBRATE potentiometer R5 is such that it forms a voltage divider with serially connected transmitters located in the tank. The setting of CALIBRATE potentiometer R5 is adjusted to cause a selected portion of the +17-volt dc level to be applied as a calibrated voltage level across the transmitters. The amplitude of the calibrated voltage level is that which produces maximum deflection of fluid level meter M1 on the receiver module when the fluid level is at its maximum.

(b) A float on the transmitter causes a portion of the calibrated voltage that is proportional to the height of the float is fed Ago to ON-OFF-FULL REF. switch contacts S1-C. During operation, ON-OFF-FULL REF. switch S1 is in the ON position and the level signal is applied to slosh dampening network R1-R2-C1. Slosh dampening network R1-R2-C1 integrates any changes in the level signal amplitude and thereby compensates for variations caused by the sloshing of fluid in the tank. The slosh-dampened meter signal at the output of the net-work is fed to the plus terminal of fluid level meter M1. The minus terminal of meter M1 is connected directly on the 17-volt return via a jumper connection.

(c) Fluid level meter M1 on the receiver module is deflected by an amount determined by the amplitude of the signal. In On-OFF-FULL REF. switch S1 is placed in the FULL REF. positin, the full calibrated voltage output of CALIBRATE potentiometer R5 is connected through resistor R3, when simulates the resistance of resistor in the transmitter, to the slosh dampening network in place of the fluid level signal. With the full calibrated voltage applied to the meter, CALIBRATE potentiometer R5 is set at the position that corresponds to maximum meter deflection.

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

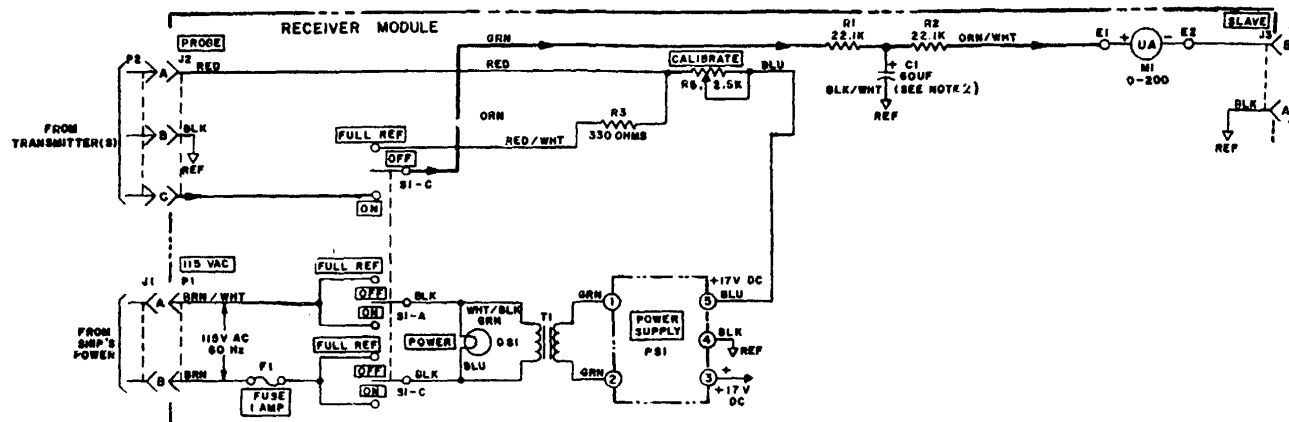
(2) Receiver Power Panel.

The distribution of ac and dc power in typical receiver modules is shown below. Ship's 115 volt, 60 Hz ac power is applied over two leads to ON-OFF-FULL REF switch S1. One lead is connected through protective FUSE, 1 AMP fuse F1, the other lead directly. When the switch is placed in either the ON or FULL REF position, the ac input is connected across power lamp DS1 to the primary of transformer T1. The power lamp lights and transformer T1 produces a stepped down ac voltage at its secondary. The stepped down voltage is applied to non-repairable, plug-in power supply PS1. Power supply PS1 develops +17-volt and current limited +17-volt dc output levels, which are distributed as shown.

(3) Receiver Schematic.

Refer to the figure below for schematic diagram.

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).



NOTES:

- 1 INDICATES EQUIPMENT MARKING.
- 2 CAPACITOR C1 PROVIDES ELECTRONIC DAMPENING TO COMPENSATE FOR FLUID SLOSHING IN TANK. 60 UF VALUE SHOWN PROVIDES APPROX. 3/4 SECOND RESPONSE TIME. INCREASE CAPACITANCE RATING IF ADDITIONAL COMPENSATION IS REQUIRED.
- 3 INDICATES PRIMARY SIGNAL PATH.
- 4 INDICATES SECONDARY, TEST.

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

This task covers:

- | | |
|---------------|------------------------------|
| a. Inspection | c. Repair |
| b. Test | d. Adjustment and Alignments |

INITIAL SETUP:

Test Equipment

NONE

References
Paragraph

4-66.2 Transmitter

Special Tools

Sound Powered Phone System
Soldering iron 25W maximum

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
-----------------	-------------	---------------	----------------

INSPECTION

- | | | | |
|----------------------|-------------------------|---|----------------------------|
| 1. Tank level system | a. Receiver | 1. Inspect for signs of damage.

2. Inspect for proper operation. | |
| | b. Transmitter Inspect. | | Refer to paragraph 4-66.2. |

TEST

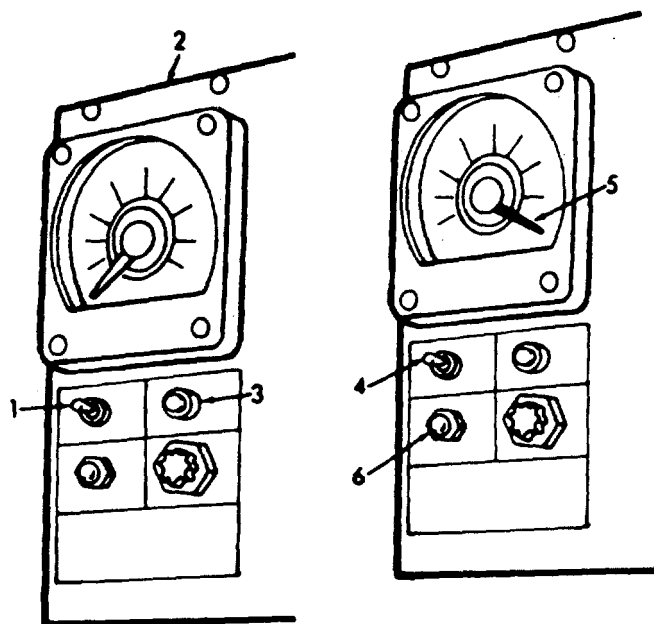
- | | |
|-------------|---|
| 2. Receiver | a. Test the system by comparing meter readings, with soundings taken in a tank. |
|-------------|---|

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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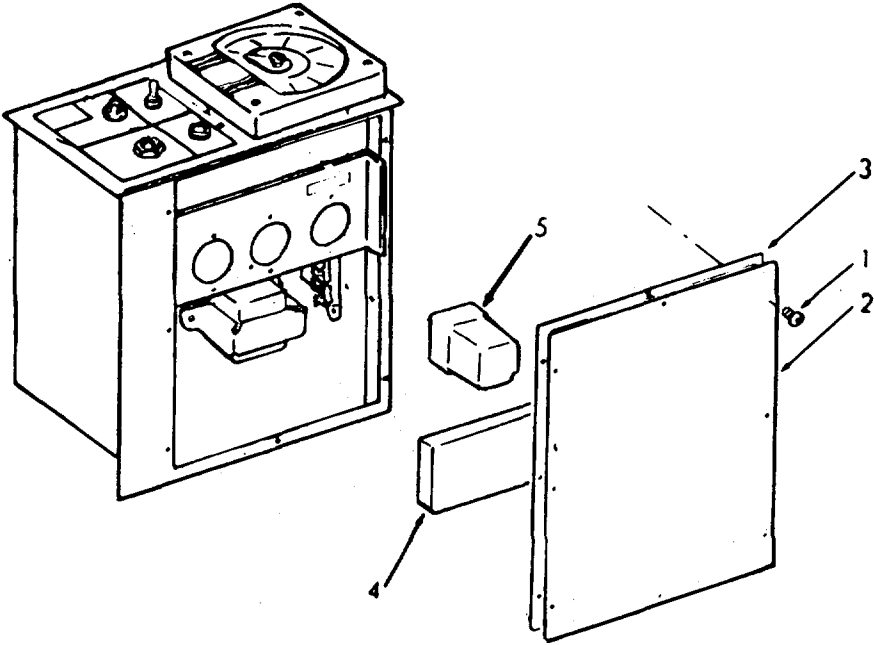
TEST (Cont)

- b. Place on-off-full ref. switch (1) on receiver panel (2) to the ON position.
- c. The power lamp (3) on the receiver panel (2) will light.
- d. To monitor the fluid level place the on-off-full ref. switch (4) to the full ref. position.
- e. Observe that the fluid level meter (5) on the receiver deflects to the full-scale calibration of the meter.
- f. If it does not, adjust the calibrate potentiometer (6) to achieve proper deflection.
- g. Return the on-off-full ref. switch (4) to the ON position.
- h. Observe fluid level meter (5) deflection to determine the fluid level in the associated tank.



4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
3. Covers	a. Screws (1)	Remove.	
	b. Cover (2), and gasket (3)	Remove.	Discard gasket.
	c. Cover shock cushion (4)	Replace.	
	d. Gasket (3) and cover (2)	Install.	
	e. Screws (1)	Install.	
4. Power supply	Power supply (5)	Unplug and replace.	



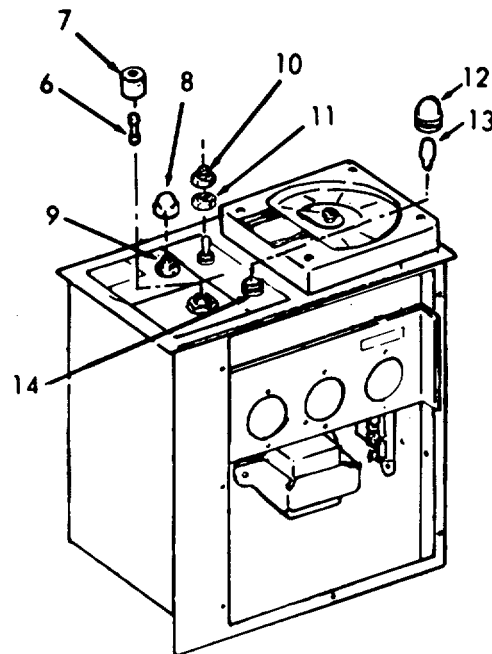
4-1401

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
5. Fuse and holder	a. Fuse (6)	Twist cap and remove fuse.	
	b. Wiring	Unsolder.	Use a 25 watt max soldering iron.
	c. Fuse holder (7)	Unscrew nut and replace.	
	d. Wiring	Solder	Refer to schematic on page 4-1398.
6. Potentiometer	a. Wiring	Unsolder.	Use a 25 watt max soldering iron.
	b. Locking nut (8)	Remove.	
	c. Potentiometer (9)	Replace.	
	d. Locking nut (8)	Install.	
	e. Wiring	Solder.	Refer to schematic on page 4-1398.
7. Switches	a. Wiring	Unsolder.	Use a 25 watt max soldering iron.
	b. Switch boot (10)	Remove.	
	c. Locknut and switch (11)	Replace.	
	d. Wiring	Solder.	Refer to schematic on page 4-1398.
	e. Switch boot (10)	Install.	

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
8. Lamp and Lamp holder	a. Lens cap (12)	Remove.	
	b. Lamp (13)	Remove/replace.	
	c. Wiring	Unsolder.	Use a 25 watt max soldering iron.
	d. Lamp holder (14)	Replace.	
	e. Wiring	Solder.	Refer to schematic on page 4-1398.
	f. Lamp (13)	Install.	
	g. Lens cap (12)	Install.	



4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

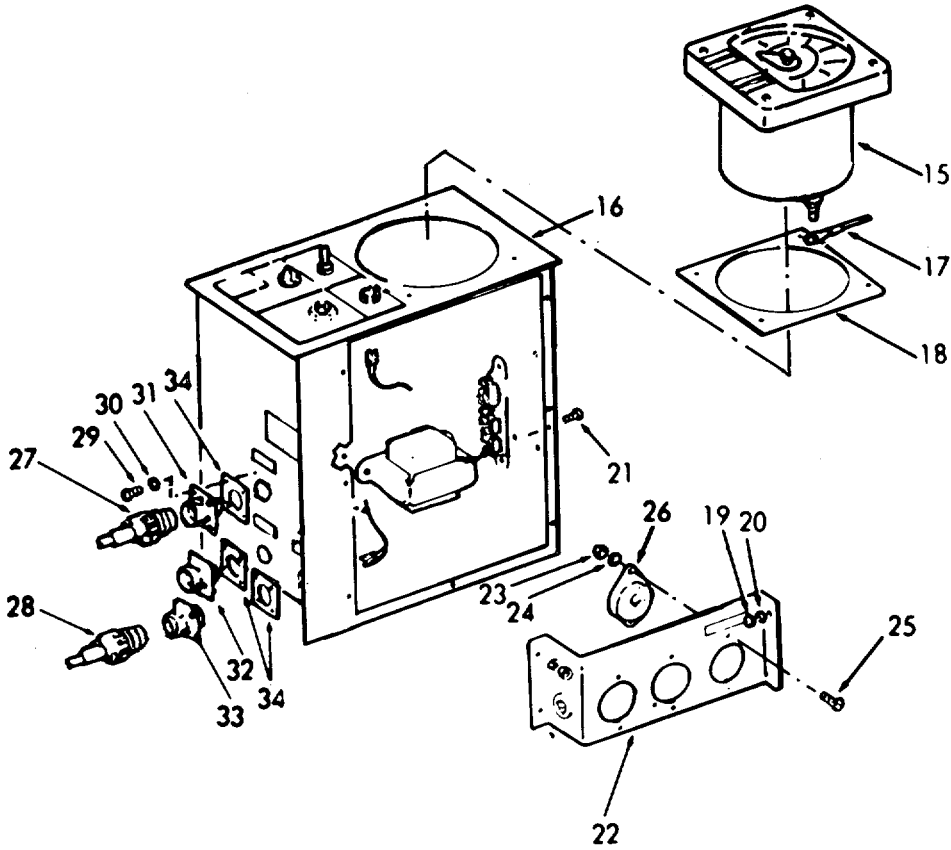
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
9. Meter	a. Mounting nuts	Remove.	
	b. Meter (15)	1. Remove from housing (16).	
		2. Remove wiring (17).	
	c. Meter (15) and gasket (18)	Replace.	Replace gasket.
	d. Wiring (17)	Reconnect.	
	e. Mounting nuts	Install.	
10. Power Supply socket	a. Nuts (19), lockwashers (20), and screws (21)	Remove.	
	b. Bracket (22)	Remove.	
	c. Wiring	Unsolder.	
	d. Nuts (23), lockwashers (24), and screws (25)	Remove.	
	e. Socket (26)	Replace.	
	f. Screws (25), lockwashers (24), and nuts (23)	Install.	
	g. Wiring	Reconnect.	
	h. Bracket (22), screws (21), lockwashers (20), and nuts (19)	Install.	

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

11. Connector plug or receptacle	a. Incoming cable (27 or 28)	Disconnect.	
	b. Screws (29), lockwashers (30)	Remove.	
	c. Receptacle (31, 32 or 33) and gasket (34)	Withdraw from housing.	
	d. Wiring	Unsolder.	Refer to schematic on page 4-1398.

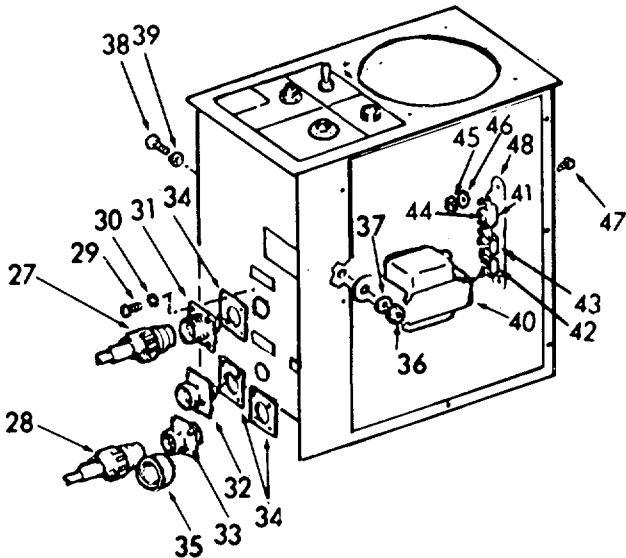


4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	e. Gasket (34), receptacle (31, 32 or 33)	Replace.	
	f. Wiring	Reconnect.	
	g. Screws (29) and lock- washers (30)	Install.	
	h. Incoming cable (27 or 28)	Install.	
	i. Receptale protective cap (35)	Replace if necessary.	
12. Trans- Former	a. Nuts (36), lockwashers (37), screws (38), and lockwashers (39)	Remove.	
	b. Wiring	Disconnect.	
	c. Transformer (40)	Replace.	
	d. Wiring	Reconnect.	
	e. Screws (38), lockwashers (39), lock- washers (37), and nuts (36)	Install.	
13. Terminal strip and as- sociated Parts	a. Wiring soldering iron.	Unsolder.	Use a 25 watt max
	b. Capacitor (60 uf 50 VDC) (41)	Unsolder.	If necessary.

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
	REPAIR (Cont)		
	c. Resistors (22.1K) (42 and 43)	Unsolder.	If necessary.
	d. Resistor (330 ohm) (44)	Unsolder.	If necessary.
	e. Nuts (45), lockwashers (46), and screws (47)	Remove.	
	f. Terminal strip (9 pin) (48)	Replace.	
	g. Screws (47), lockwashers (46), and nuts (45)	Install.	



4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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ADJUSTMENTS AND ALIGNMENTS

14. GENERAL.

a. Adjustment and alignments for the TLI systems are performed during initial installation, when testing 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.



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 panel 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 describe 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.

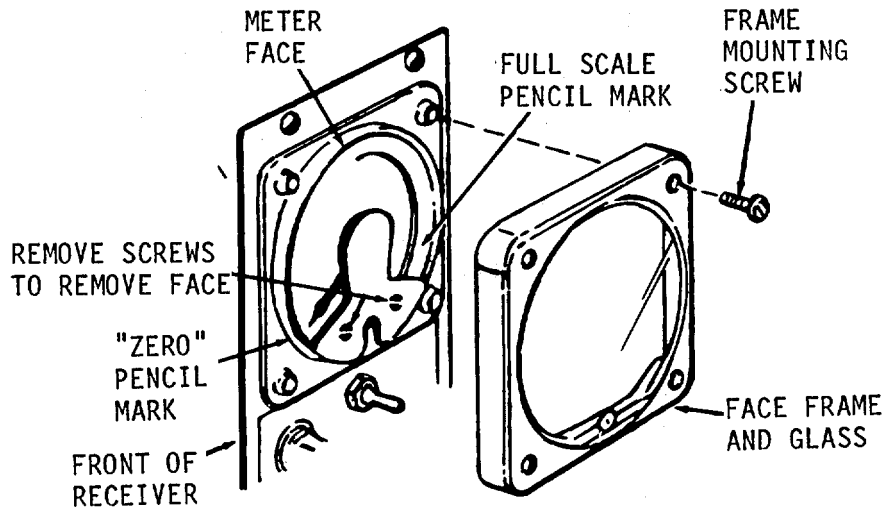
(a) To zero adjust a meter, using a screwdriver, adjust the ZERO adjustment screw on the front of the meter to its mid-position (if meter has no O-mark) or to the setting that causes deflection to the O-mark (if meter has one). If there is no O-mark, remove the four frame mounting screws securing the face frame and glass to the

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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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 a 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

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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ADJUSTMENTS AND ALIGNMENTS (Cont)
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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), 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 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 alongside of the O-mark in the zero adjustment procedure (paragraph 4-66.1-4b(3)).

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1671 - 1679 CLASS		TANK SOUNDING TABLE										FUEL OIL 2-46-2-F		
V.C.G.	SOUNDING IN FEET	0	1	2	SOUNDING IN INCHES								10	11
					3	4	5	6	7	8	9			
	8													
	7													
4.54'	6	1679	1702	1725										
4.04'	5	1402	1425	1448	1471	1494	1517	1540	1563	1586	1609	1632	1655	
3.54'	4	1125	1148	1171	1194	1217	1240	1263	1286	1309	1332	1355	1378	
3.04'	3	848	871	894	917	940	963	986	1009	1032	1055	1078	1101	
2.54'	2	571	594	617	640	663	636	709	732	755	778	801	824	
2.04'	1	294	317	340	363	386	409	432	455	478	501	524	547	
1.54'	0	17	40	63	86	109	132	155	178	201	224	247	270	

NOTE:

- * Capacity Full: 1731.3 Gallons - Capacity 95 percent Full: 1644.7 Gallons
- Amount of Liquid Remaining at Lowest Point of Suction: 17.3 Gallons
- Height of Striker Plate Above Lowest Point of Tank: 3/4 Inch
- Length of Sounding Tube, Striker Plate to Upper Terminal: 7.42 Feet

* Capacity Limited by Vent

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1671 - 1679 CLASS		TANK SOUNDING TABLE										FUEL OIL 2-46-1-F	
V.C.G.	SOUNDING IN FEET	SOUNDING IN INCHES											
		0	1	2	3	4	5	6	7	8	9	10	11
	8												
	7												
4.54'	6	1679	1702	1725									
4.04'	5	1402	1425	1448	1471	1494	1517	1540	1563	1586	1609	1632	1655
3.54'	4	1125	1148	1171	1194	1217	1240	1263	1286	1309	1332	1355	1378
3.04'	3	848	871	894	917	940	963	986	1009	1032	1055	1078	1101
2.54'	2	571	594	617	640	663	636	709	732	755	778	801	824
2.04'	1	294	317	340	363	386	409	432	455	478	501	524	547
1.54'	0	17	40	63	86	109	132	155	178	201	224	247	270

NOTE:

1. * Capacity Full: 1731.3 Gallons - Capacity 95 percent Full: 1644.7 Gallons
2. Amount of Liquid Remaining at Lowest Point of Suction: 17.3 Gallons
3. Height of Striker Plate Above Lowest Point of Tank: 3/4 Inch
4. Length of Sounding Tube, Striker Plate to Upper Terminal: 7.42 Feet

* Capacity Limited by Vent

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)
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LCU 1671 - 1679 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

8

7

NOTE

6

NO SOUNDING TUBE INSTALLED. LIQUID LEVEL INDICATED BY GAGE.

5

4

3

2

1

0

NOTE:

1. Capacity Full: 209 Gallons - Capacity 95 percent full: 198.6 Gallons
2. Amount of Liquid Remaining at Lowest Point of Suction: 0 Gallons
3. Height of Striker Plate Above Lowest Point of Tank: None
4. Length of Sounding Tube, Striker Plate to Upper Terminal: None

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1671 - 1679 CLASS

TANK SOUNDING TABLE

FRESH WATER
2-40-0-W

SOUNDING V.C.G.IN FEET	SOUNDING IN INCHES												
	0	1	2	3	4	5	6	7	8	9	10	11	
4.52'	8												
4.02'	7												
3.52'	6												
3.02'	5												
2.77'	4												
2.52'	3												
2.27'	2												
2.02'	1												
1.77'	0												

NOTE:

1. Capacity Full - 4166.6 Gallons
2. Amount of Liquid Remaining at Lowest Point of Suction: 53.5 Gallons
3. Lowest Trycock is 6 inches above lowest point of tank.
4. No sounding tube, Tand has Trycocks.

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1671 - 1679 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													
	7													
3.97'	6	2288	2322	2357	2392	2426	2461	2496	2530	2565				
3.47'	5	1875	1909	1943	1978	2012	2046	2081	2115	2150	2184	2219	2253	
2.97'	4	1464	1498	1532	1566	1601	1635	1669	1703	1737	1772	1806	1840	
2.47'	3	1056	1090	1124	1158	1192	1226	1260	1294	1328	1362	1396	1430	
1.96'	2	652	685	719	753	786	820	854	887	921	955	989	1023	
1.42'	1	253	283	316	350	383	417	450	484	517	551	585	618	
.75'	0	15	26	38	52	67	84	103	124	146	170	196	224	

NOTE:

1. Capacity Full - 2565 Gallons (Capacity Limited by Vent)
2. Amount of Liquid remaining at Lowest Point of Suction: 38 Gallons
3. Height of Striker Plate Above Lowest Point of Tank: 1-1/4 Inches
4. Length of Sounding Tube, Striker Plate to Upper Terminal: 7.21 Feet

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1671 - 1679 CLASS

TANK SOUNDING TABLE

S. W. BALLAST
2-18-2-W

SOUNDING V.C.G.IN FEET	SOUNDING IN INCHES												
	0	1	2	3	4	5	6	7	8	9	10	11	
8													
4.65'	7	3050	3085	3120	3155	3190							
4.10'	6	2500	2542	2583	2625	2667	2708	2750	2800	2850	2900	2950	3000
3.55'	5	2000	2041	2082	2122	2163	2204	2245	2288	2331	2374	2417	2460
2.98'	4	1510	1550	1590	1630	1670	1710	1750	1792	1834	1876	1918	1960
2.40'	3	1045	1084	1123	1162	1202	1241	1280	1317	1356	1394	1432	1470
1.83'	2	628	664	699	735	771	806	842	876	910	944	978	1012
1.29'	1	265	295	325	355	385	415	445	476	507	538	569	600
.73'	0	12	31	50	70	92	114	135	157	179	200	222	244

NOTE:

1. Capacity Full - 3190 Gallons
2. Amount of Liquid Remaining at Lowest Point of Suction: 44 Gallons
3. Height of Striker Plate Above Lowest Point of Tank: 3/4 Inch
4. Length of sounding tube, Striker Plat to Upper Terminal: 7.33 Feet

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU 1671 - 1679 CLASS

TANK SOUNDING TABLE

S. W. BALLAST
2-18-1-W

SOUNDING V.C.G.IN FEET	SOUNDING IN INCHES												
	0	1	2	3	4	5	6	7	8	9	10	11	
8													
4.65'	7	3050	3085	3120	3155	3190							
4.10'	6	2500	2542	2583	2625	2667	2708	2750	2800	2850	2900	2950	3000
3.55'	5	2000	2041	2082	2122	2163	2204	2245	2288	2331	2374	2417	2460
2.98'	4	1510	1550	1590	1630	1670	1710	1750	1792	1834	1876	1918	1960
2.40'	3	1045	1084	1123	1162	1202	1241	1280	1317	1356	1394	1432	1470
1.83'	2	628	664	699	735	771	806	842	876	910	944	978	1012
1.29'	1	265	295	325	355	385	415	445	476	507	538	569	600
.73'	0	12	31	50	70	92	114	135	157	179	200	222	244

NOTE:

1. Capacity Full - 3190 Gallons
2. Amount of Liquid Remaining at Lowest Point of Suction: 44 Gallons
3. Height of Striker Plate Above Lowest Point of Tank: 3/4 Inch
4. Length of sounding tube, Striker Plat to Upper Terminal: 7.33 Feet

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

ADJUSTMENTS AND ALIGNMENTS (Cont)

LCU	TANK SOUNDING TABLE										S. W. BALLAST 2-8-0-W				
V.C.G.	SOUNDING IN FEET	0	1	2	SOUNDING IN INCHES						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	322	399	478	566	676	786	907	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'

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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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 (l) for each successive gallonage increment to be calibrated.

NOTE

At 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.

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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ADJUSTMENTS AND ALIGNMENTS (Cont)
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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 Module Adjustment. To perform the installation (alarm) adjustments for receiver modules, proceed as follows:

(a) Place the ON-OFF-FULL REF switch on the front panel of the receiver being calibrated in the ON position.

(b) Place the NORMAL-SIMULATE switch on the side of the receiver module in the SIMULATE position.

(c) 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.

(d) Adjust the LOW ALARM control until the alarm just begins sounding at the alarm box, alarm bell, or other alarm indicating device.

(e) Adjust the FLOAT SIMULATOR control to bring meter deflection to the desired high-level alarm setting marked on the meter face.

4-66.1. TANK LEVEL INDICATION - RECEIVER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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ADJUSTMENTS AND ALIGNMENTS (Cont)
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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.

- (f) Adjust the HIGH ALARM control until the alarm just begins sounding at the alarm box, alarm bell, or other alarm indicating device.
- (g) Place the NORMAL-SIMULATE switch in the NORMAL position.
- (h) Place the ON-OFF-FULL REF switch to the OFF position.
- (i) Disconnect the cables to the receiver module.
- (j) Using the eight mounting screws, secure the right side cover of the receiver module removed when the receiver module meter was calibrated.
- (k) Install the receiver module in the mounting rack.
- (1) Reconnect all cables.

4-1421/ blank(4-1422)

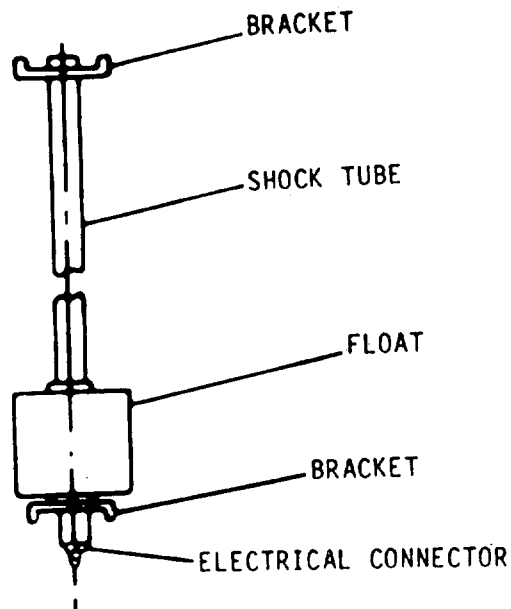
4-66.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS

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.

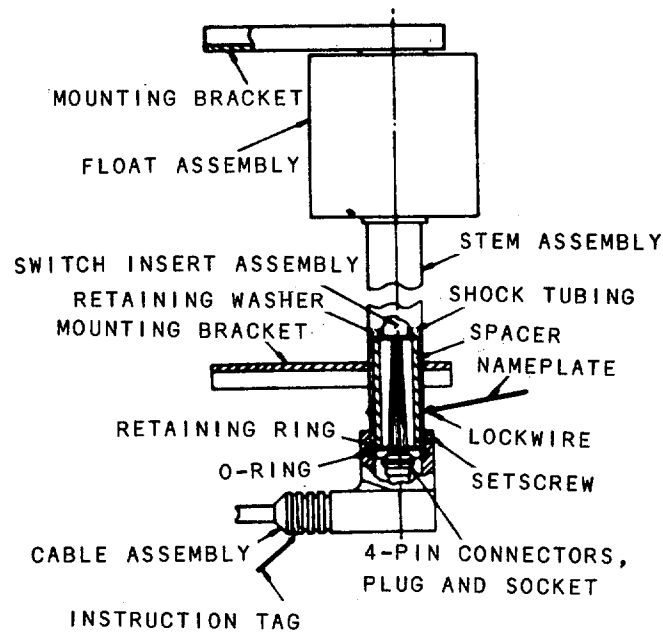


4-1423

4-66.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS (Continued).

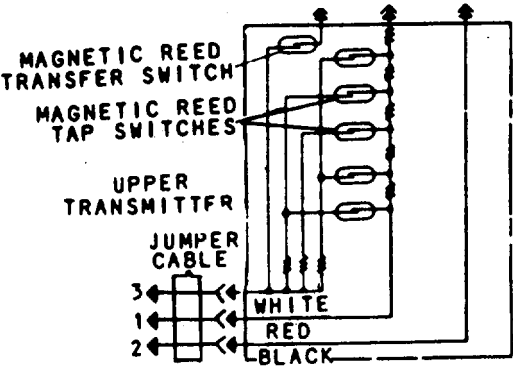
b. Functional Description.

(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.

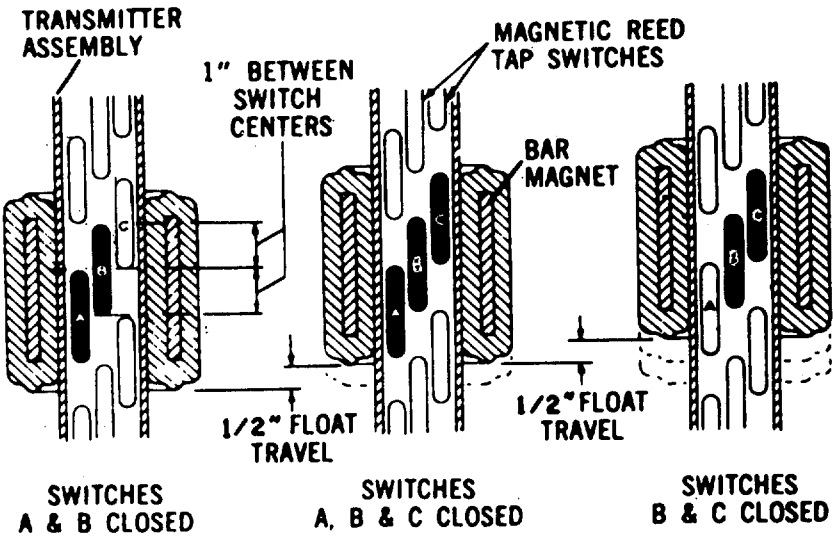


(2) As shown in the schematic diagram below, which illustrates two interconnected transmitters the tap switches are sequentially connected through series resistance to a common conductor. This conductor connects through the jumper cable to a receiver module or receiver panel via ship's wiring. The top 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.

4-66.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS (Continued).

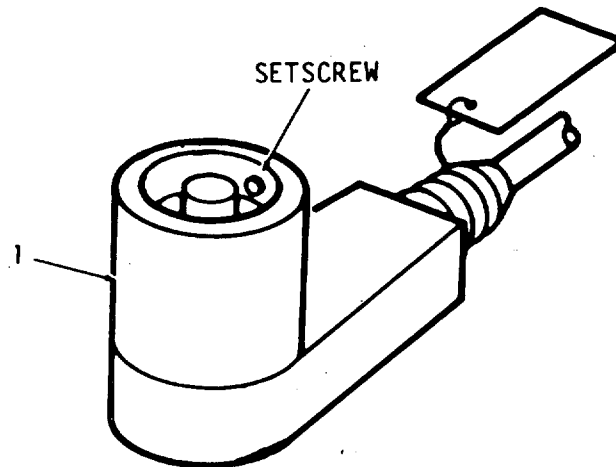


(3) As the fluid level in the tank that houses the transmitter moves up and down, the float moves up and down. Bar magnets in the float operate tap switches in a two-at-a-time, three-at-a-time, two-at-a-time sequence as the float moves. When two adjacent tap switches are closed, the effective electrical 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.



4-66.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
INSPECTION			
1. Transmitter	a. Cable	Inspect.	Refer to paragraph 4-66.3.
	b. Transmitter	Inspect for signs of wear.	
TEST			
2.		Refer to paragraph 4-66.1 for test and adjustment procedures.	
REPLACEMENT			
3. Receivers	On/Off switch	Place switch in the OFF position, and tag.	
4. Transmitter	a. Cable assembly (1)	Loosen setscrews and disconnect.	



4-1427

4-66.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPLACEMENT (Cont)

- | | |
|--|---------|
| b. Nuts (2),
lockwashers
(3), flat-
washers (4),
and screws
(5) | Remove. |
|--|---------|

CAUTION

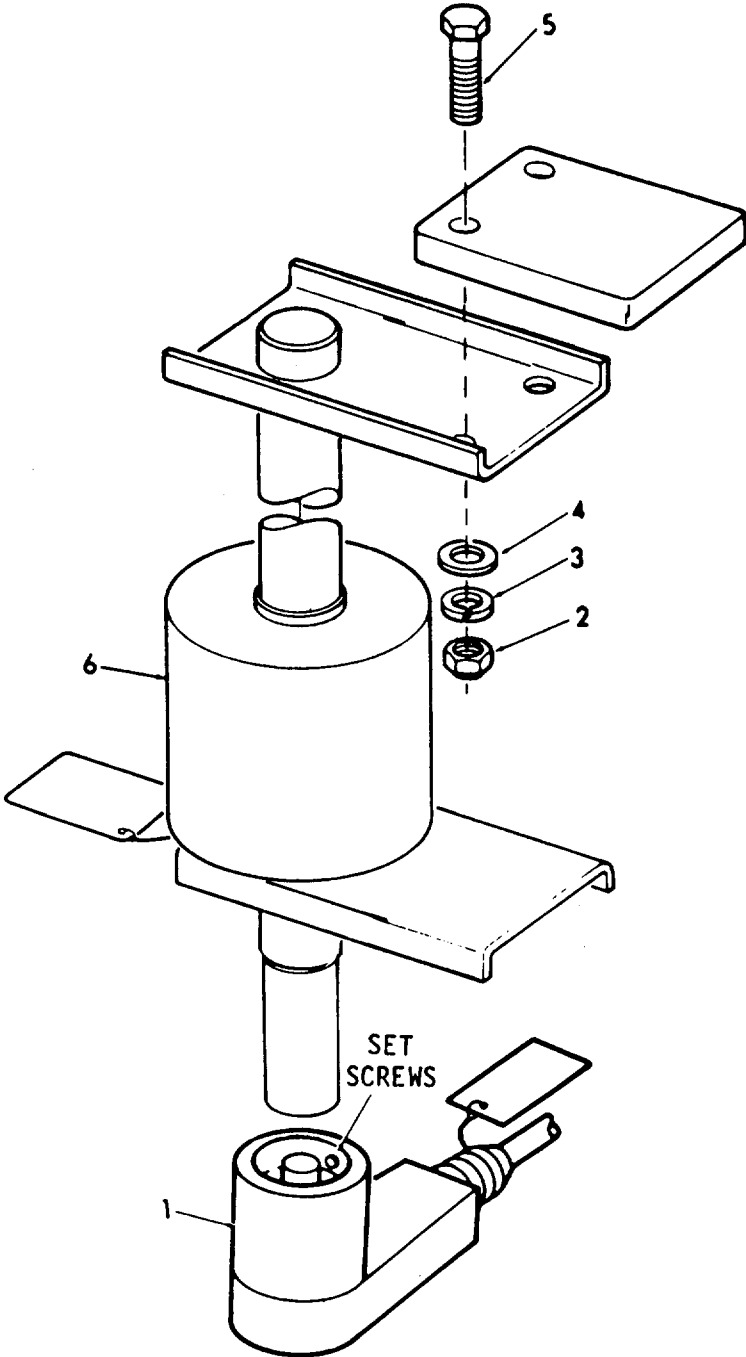
Do not remove the mounting bracket assemblies from the bulkhead, sounding tube, or ladder. Removing the mounting bracket assemblies may affect fluid meter calibration.

- | | |
|---|------------------------------------|
| c. Transmitter
(6) | Remove and replace. |
| d. Screws (5),
flatwashers
(4), lock-
washers (3),
and nuts (2) | Install. |
| e. Cable assem-
bly (1) | Install and tighten
set screws. |

4-66.2. TANK LEVEL INDICATION - TRANSMITTER - MAINTENANCE INSTRUCTIONS (Continued).

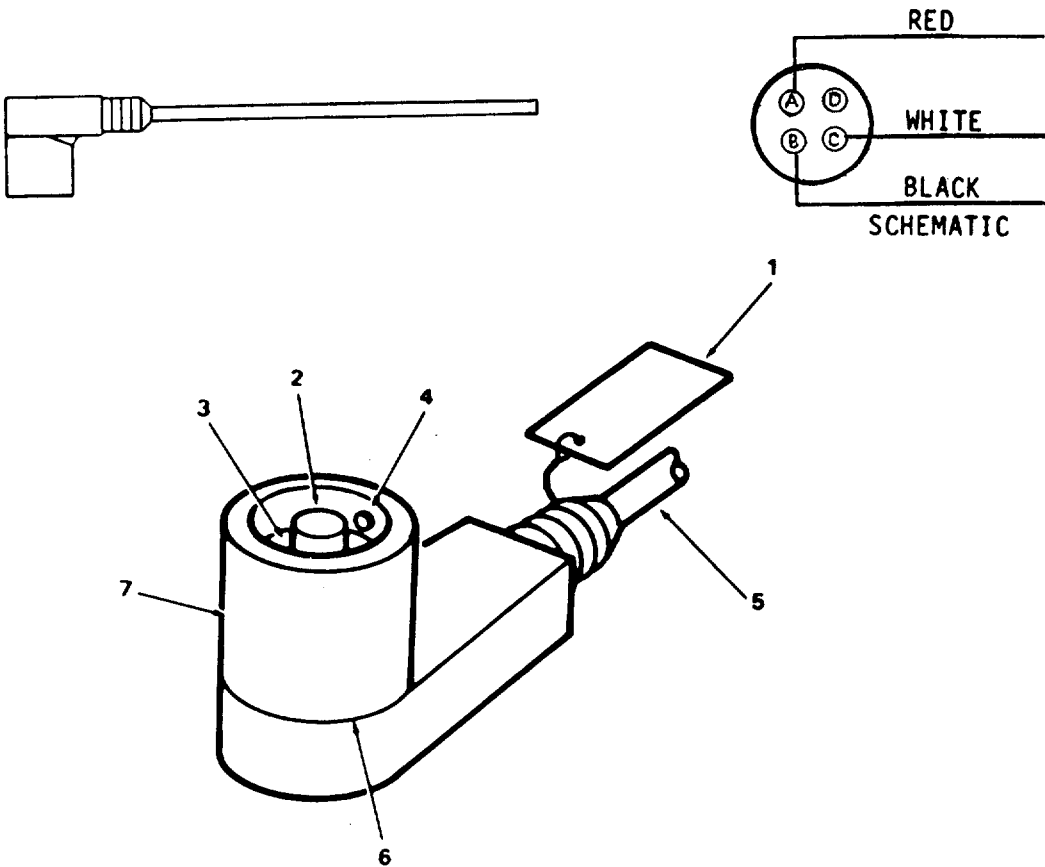
LOCATION	ITEM	ACTION	REMARK
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REPLACEMENT (Cont)

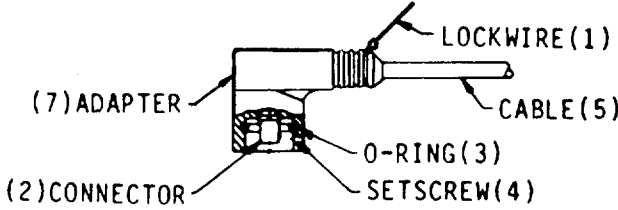


4-66.3. TANK LEVEL INDICATION - CABLE - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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



4-66.4. PENETRATION ASSEMBLY - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection

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

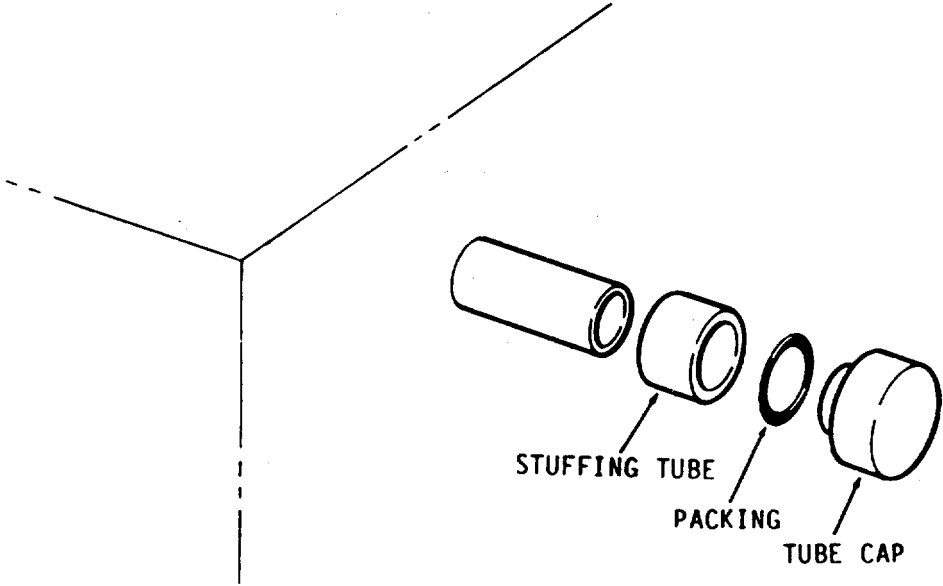
General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARK
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INSPECTION

- 1. Penetration assembly

Inspect for damaged, missing, or loose parts.



4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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. Thermostats	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.

4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

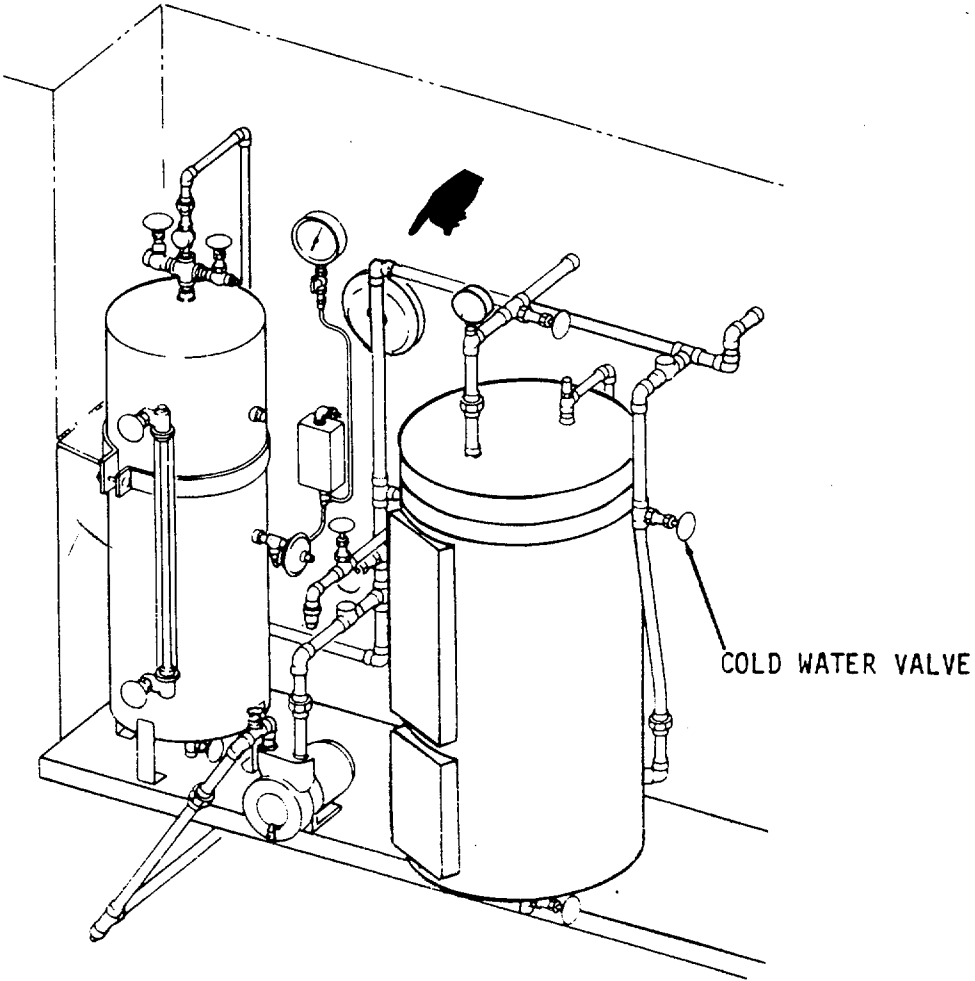
LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)

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.
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4955-178

4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)

NOTE

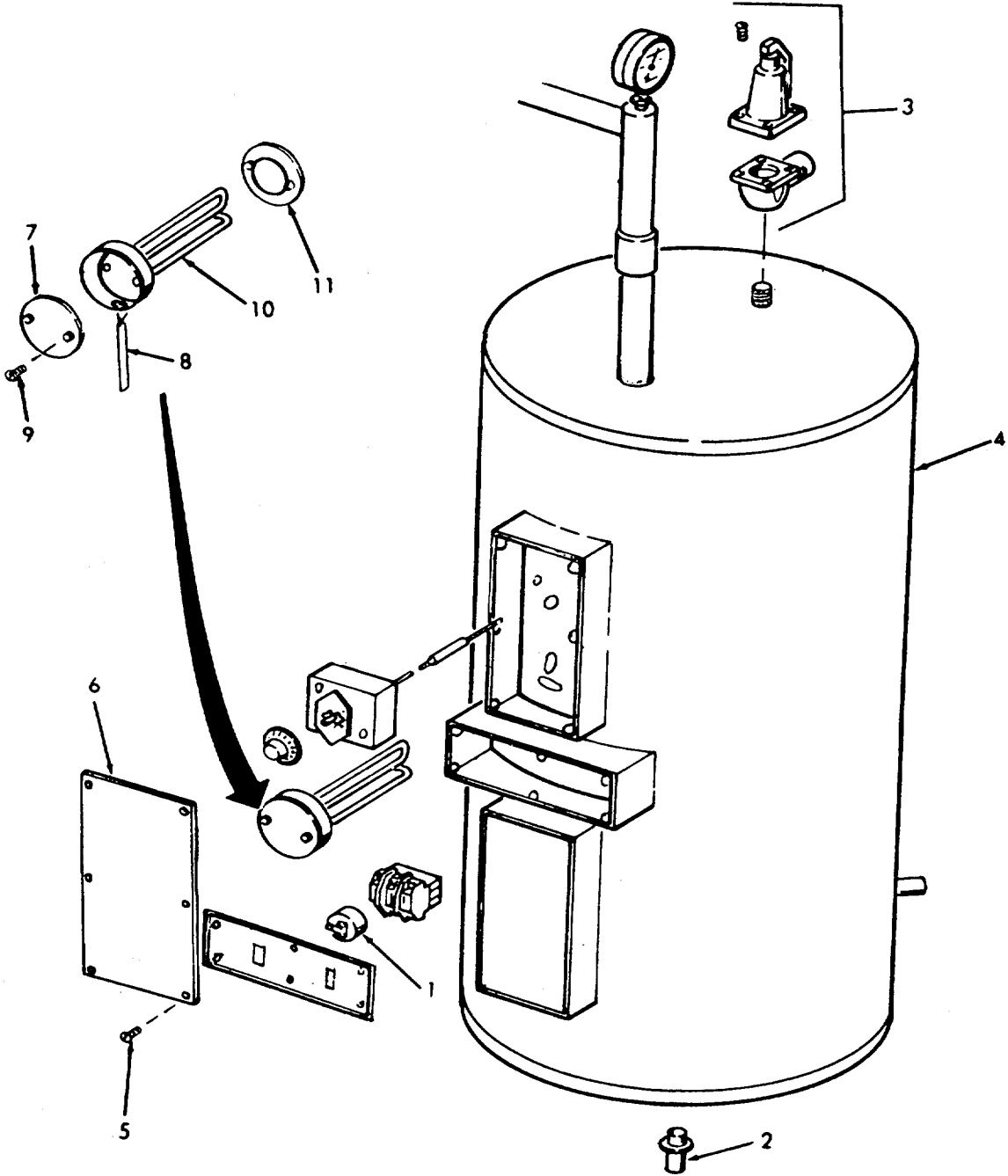
The removal and installation of the upper and lower heating elements are identical.

3. Hot water heater	a. Heating elements (upper and lower)	<ol style="list-style-type: none"> 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). 5. Open drain (2). 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). 12. Insert new heating element (10) and gasket (11). 13. Install four screws (9). 	<p>Allow air to enter the hot water tank (4).</p> <p>Drain water from tank (4).</p> <p>Discard gasket.</p> <p>Use new gasket.</p>
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4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)



4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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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).

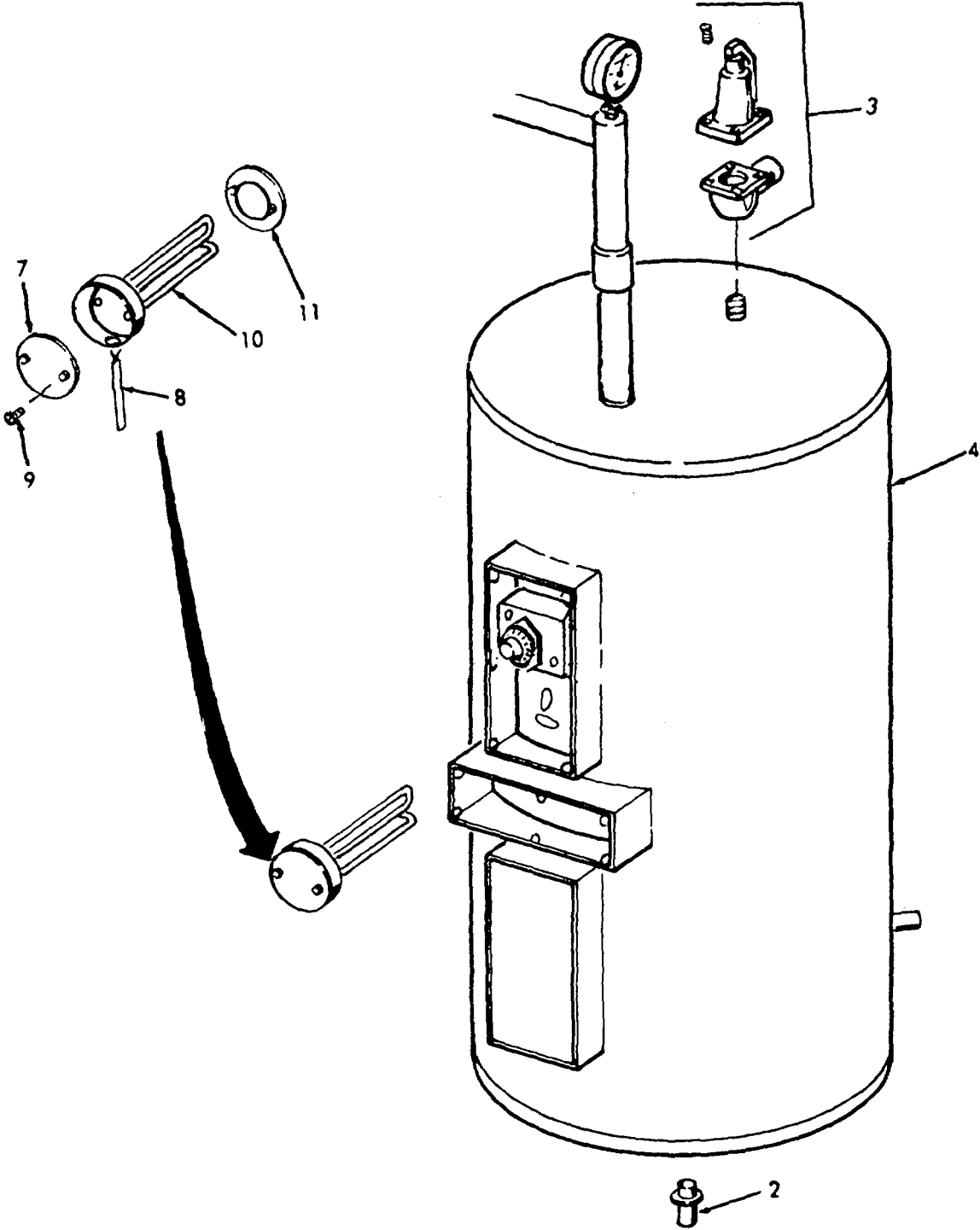
NOTE

- 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.

4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)



4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
----------	------	--------	--------

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

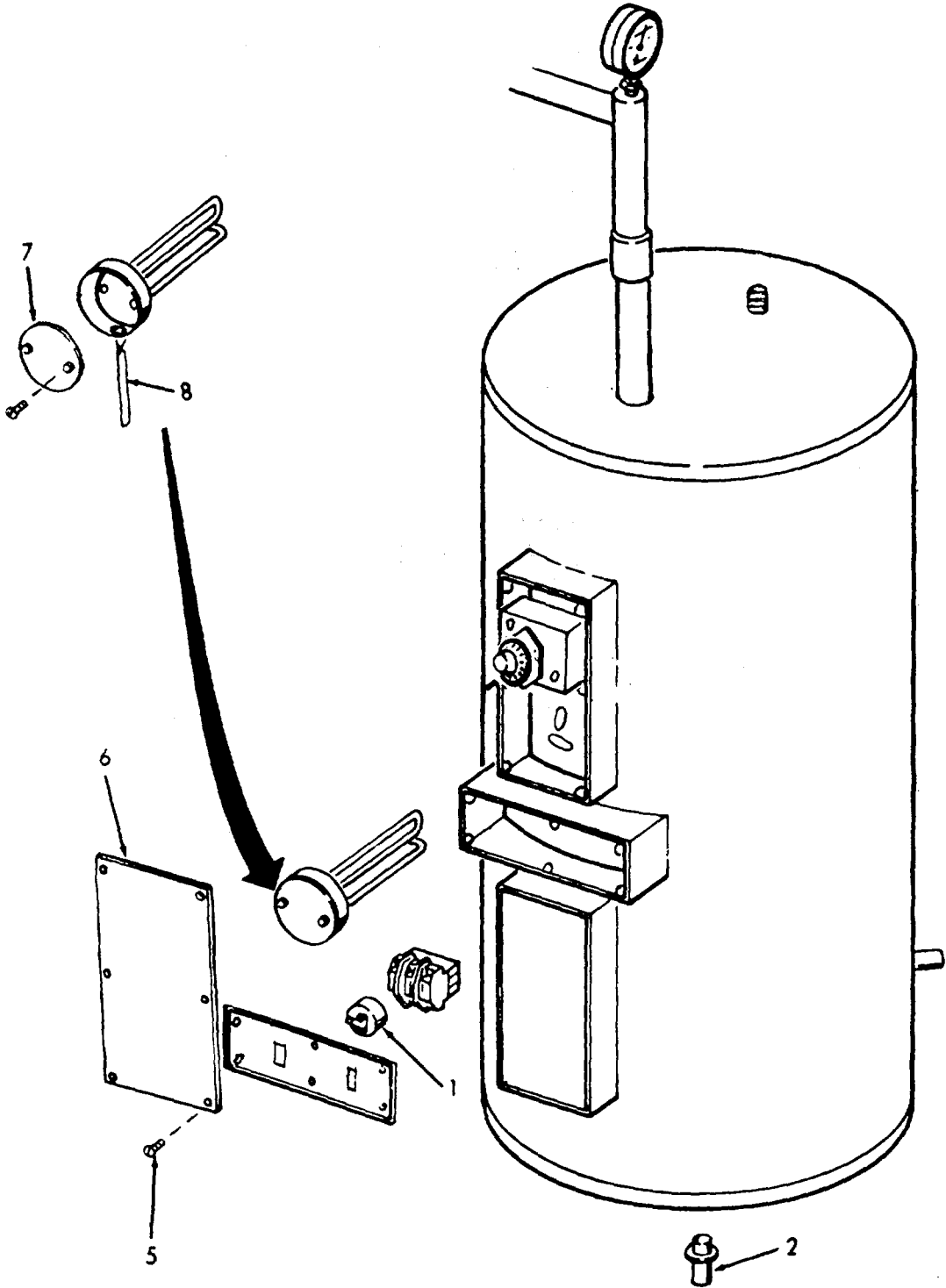
Before starting the hot water heater make sure the tank is filled, the heating elements are surrounded with water, failure to do so will burn the heating elements out.

- 22. Place ON-OFF safety switch (1) in the ON position.

4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)



4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
----------	------	--------	--------

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.

- | | |
|-----------------------------|---|
| <p>b. Thermostat switch</p> | <ol style="list-style-type: none"> 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. 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). |
|-----------------------------|---|

Pull off dial without changing the setting.

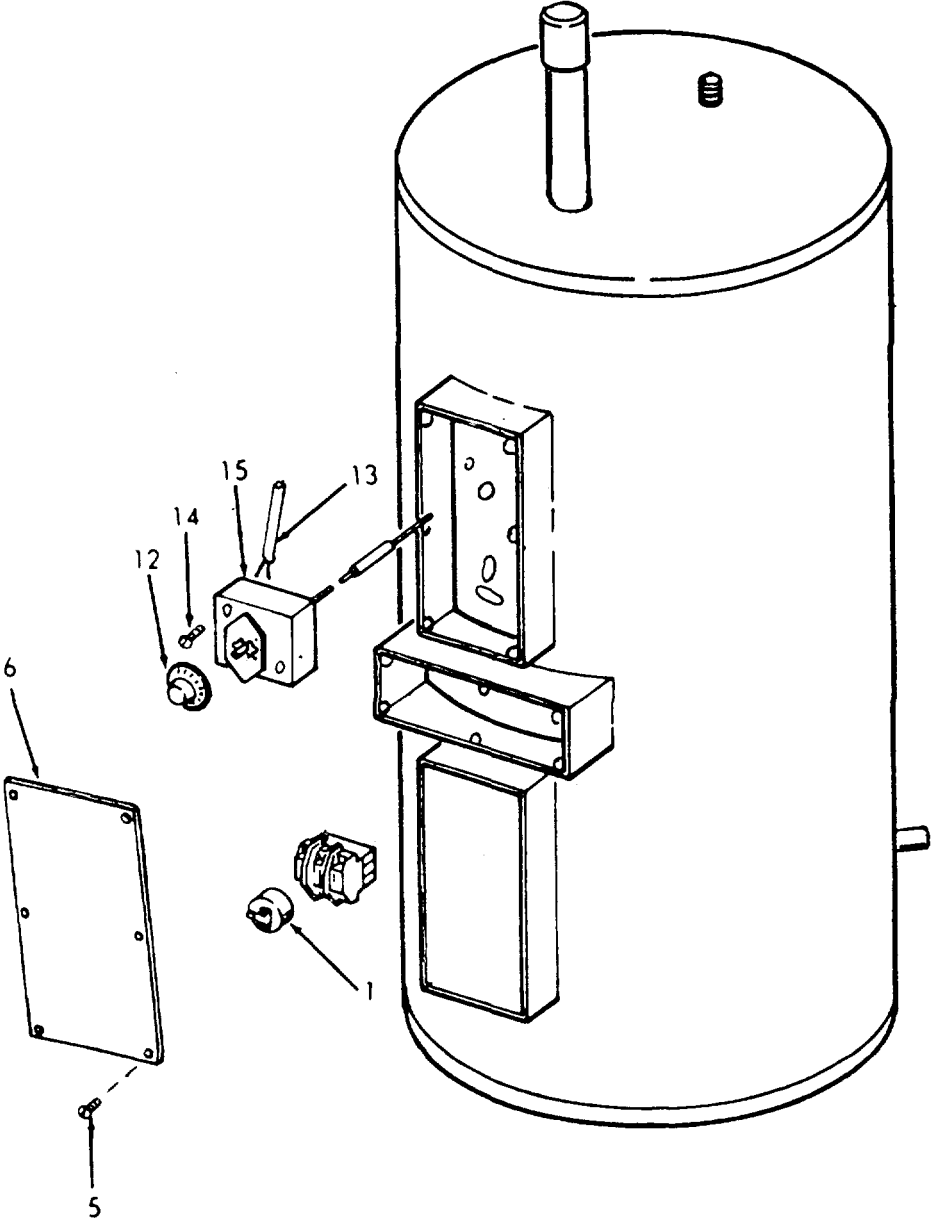
4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)

10. Install dial (12).
Adjust dial to desired temperature.

11. Place ON-OFF safety switch (11) in the ON position.



4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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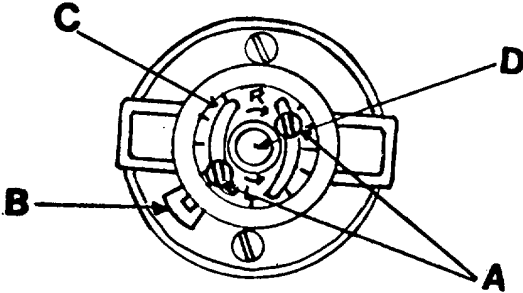
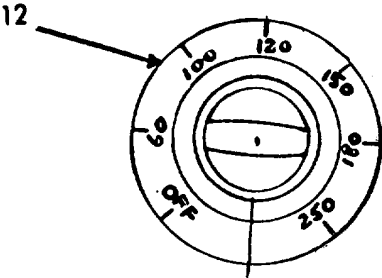
REPAIR (Cont)

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.

4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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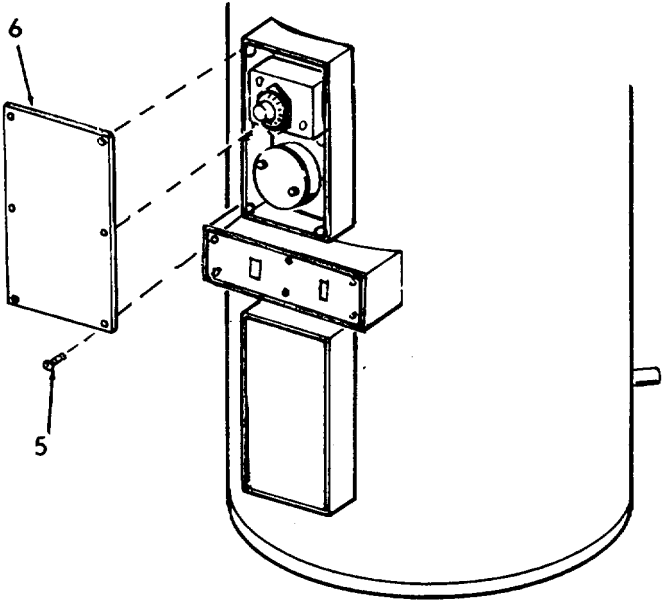
REPAIR (Cont)



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).



4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)

WARNING

To prevent possible shock and injury, tag and place disconnect switch in the OFF position.

- | | |
|-------------------------|--|
| c. ON-OFF safety switch | <ol style="list-style-type: none"> 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/OFF Safety switch is operated with power ON, the magnetic contactors should function.

- | | |
|------------------------|---|
| d. Magnetic contactors | <ol style="list-style-type: none"> 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). |
|------------------------|---|

4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

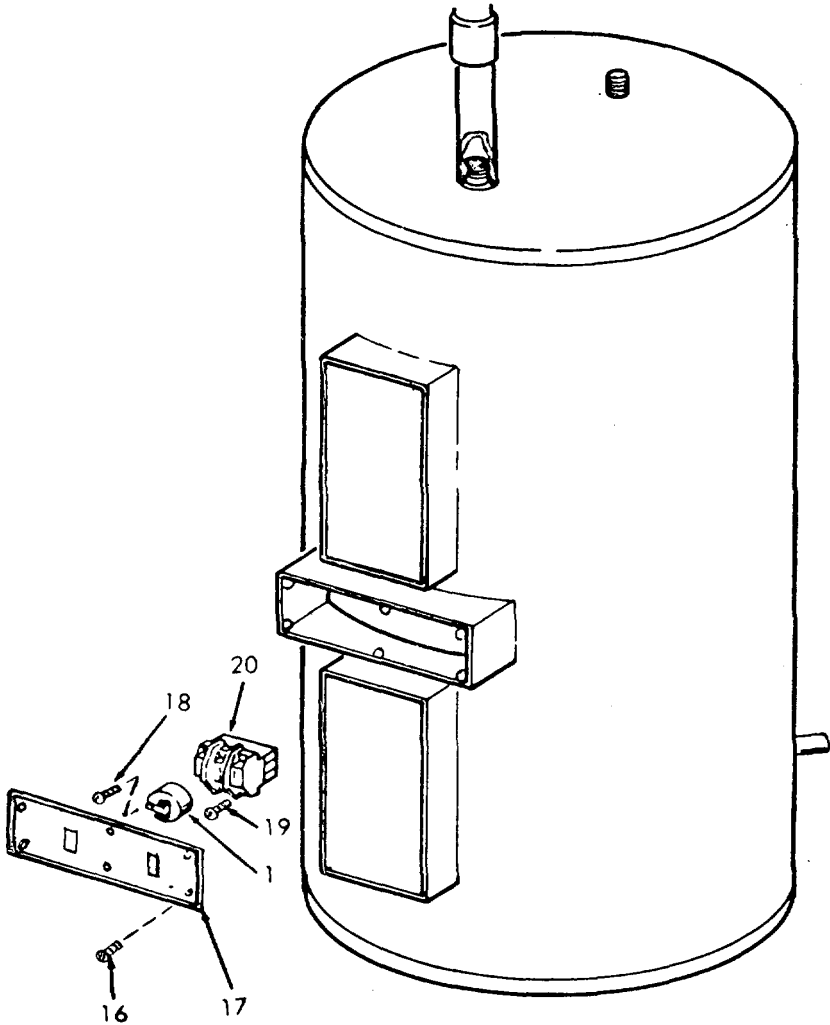
LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)

6. Tag and disconnect wires from the magnetic contactor (20).

7. Remove and replace magnetic contactor (20).

Because of the design of this contactor, it is more desirable to replace than to rebuild.

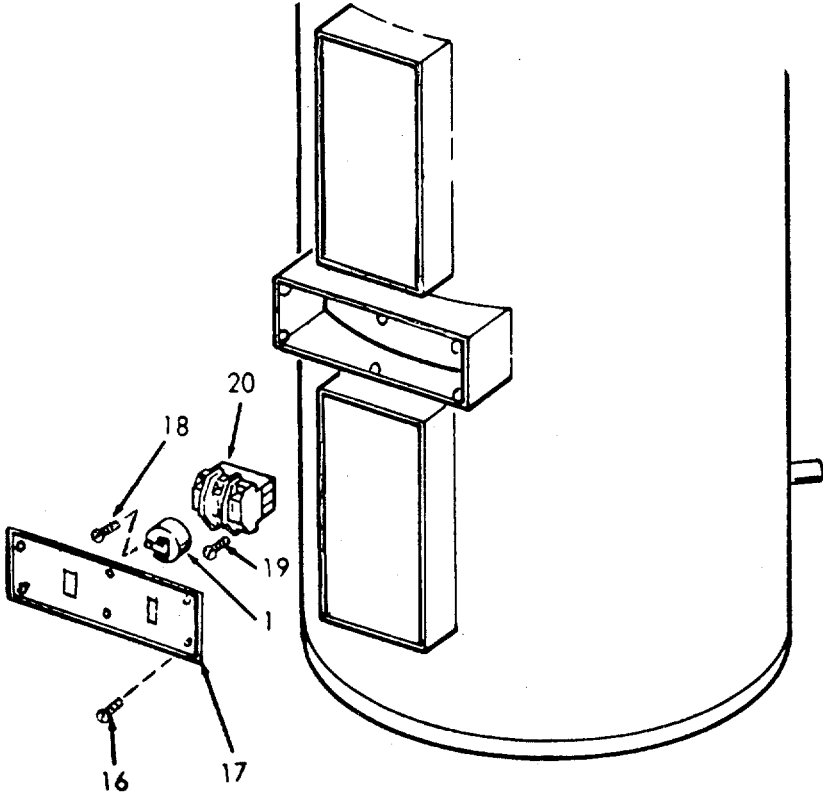


4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)

- 8. Remove tags and reconnect wiring to magnetic contactor (20).
- 9. Install 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.



4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)

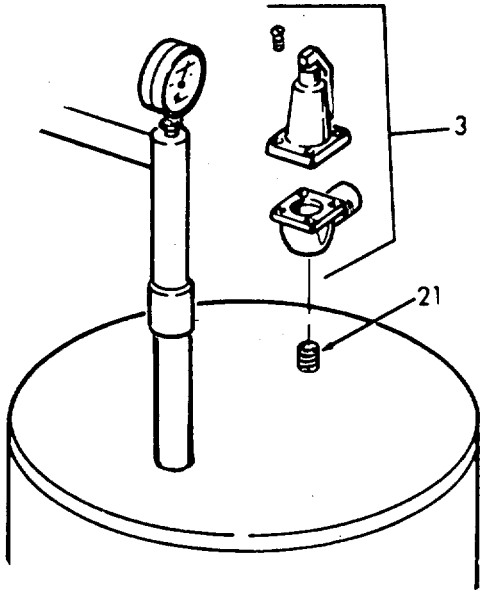
WARNING

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). | |



4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)

f. Hot water outlet and thermometer (22).	1. Remove thermometer and thermometer 2. Disconnect piping (23).	Replace if defective.	
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

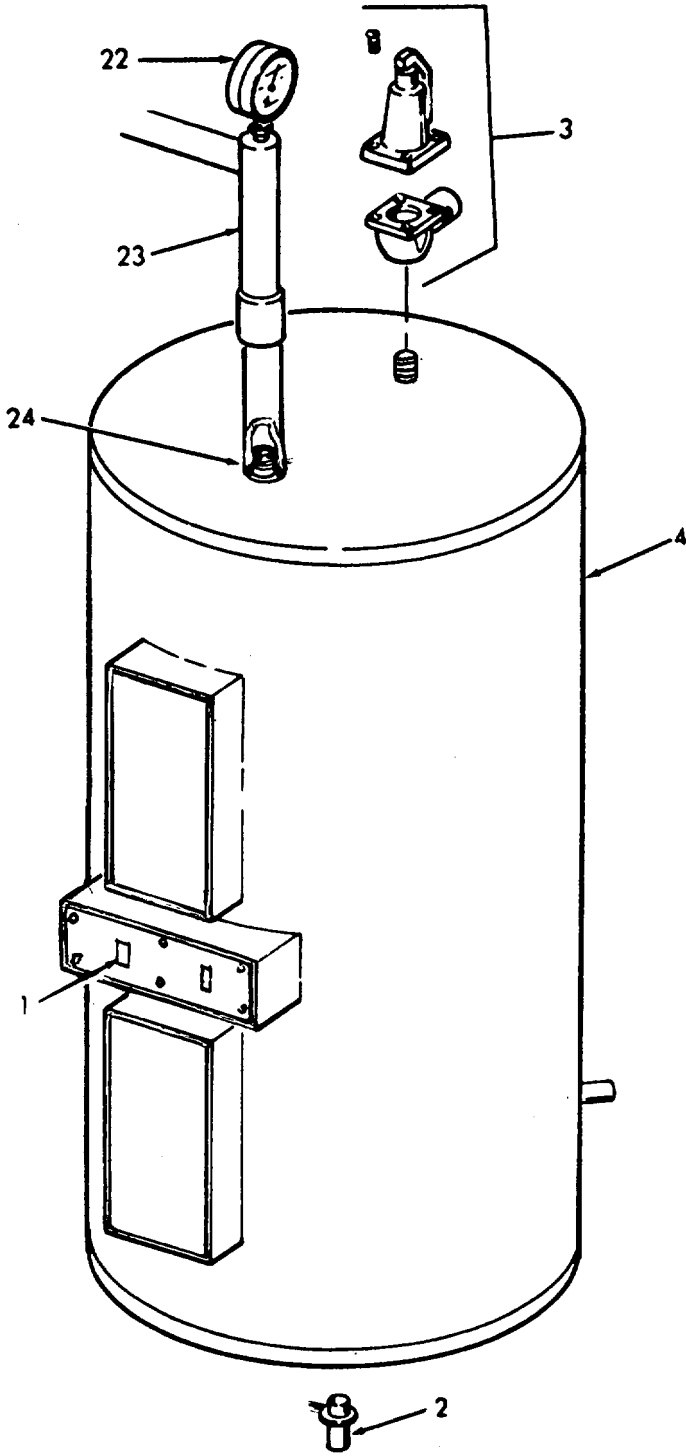
In order to repair the cold water inlet and the drain, the hot water heater must be drained.

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).

4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)



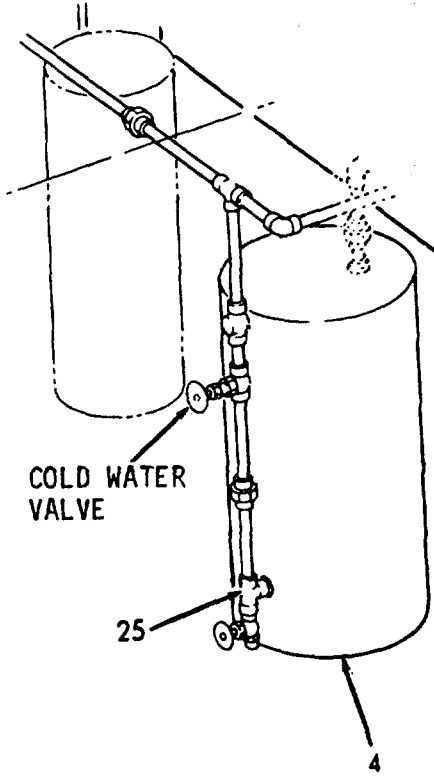
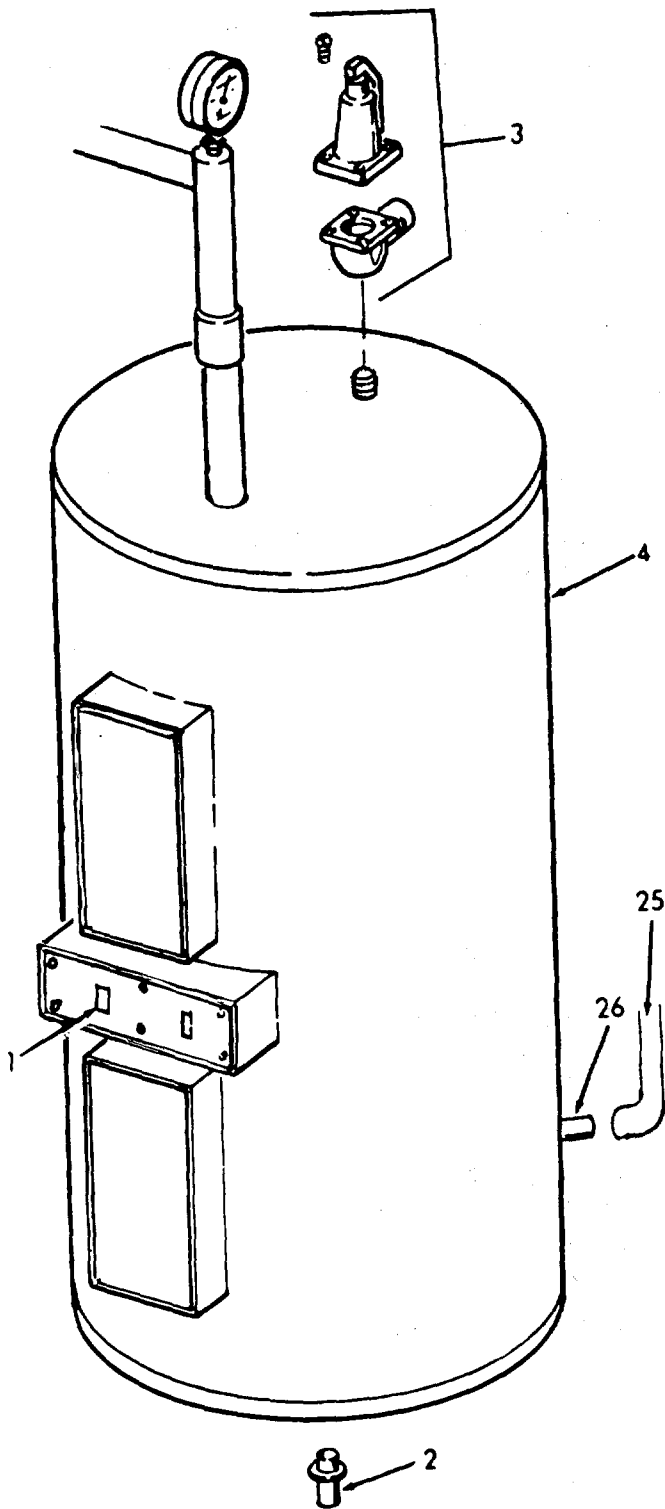
4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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 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.
		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).	

4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont.)



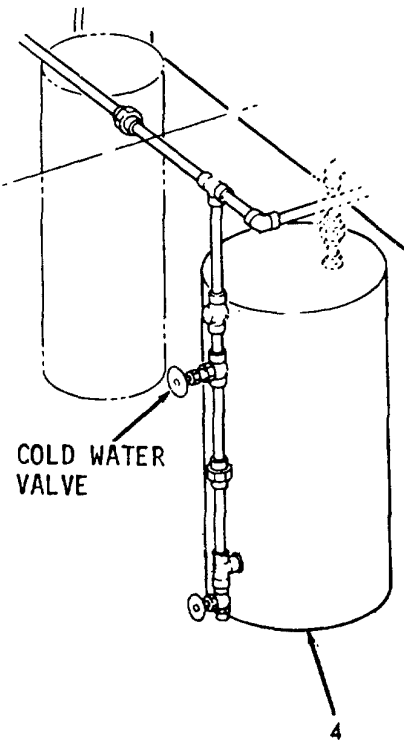
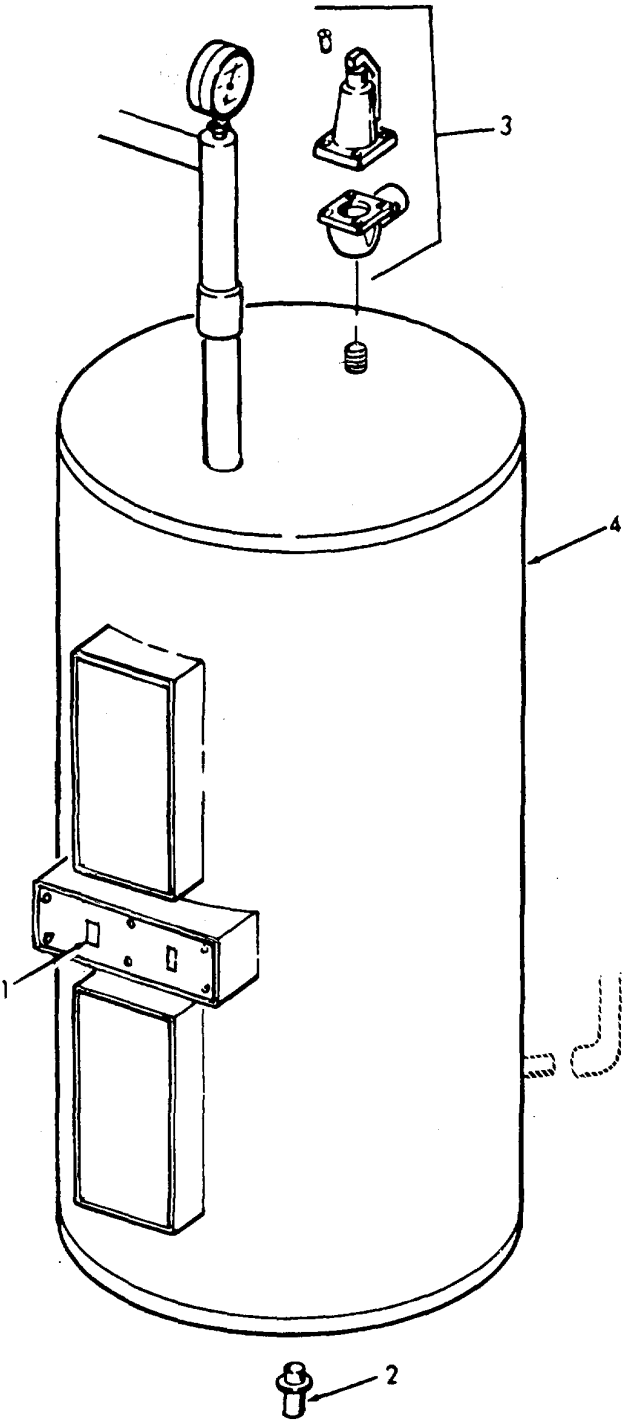
4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
REPAIR (Cont)			
		4. Open relief valve (3).	Allow air to enter tank (4).
		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. valve (3).	<ul style="list-style-type: none"> <li>a. As tank (4) fills, air will escape from relief <li>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.	

4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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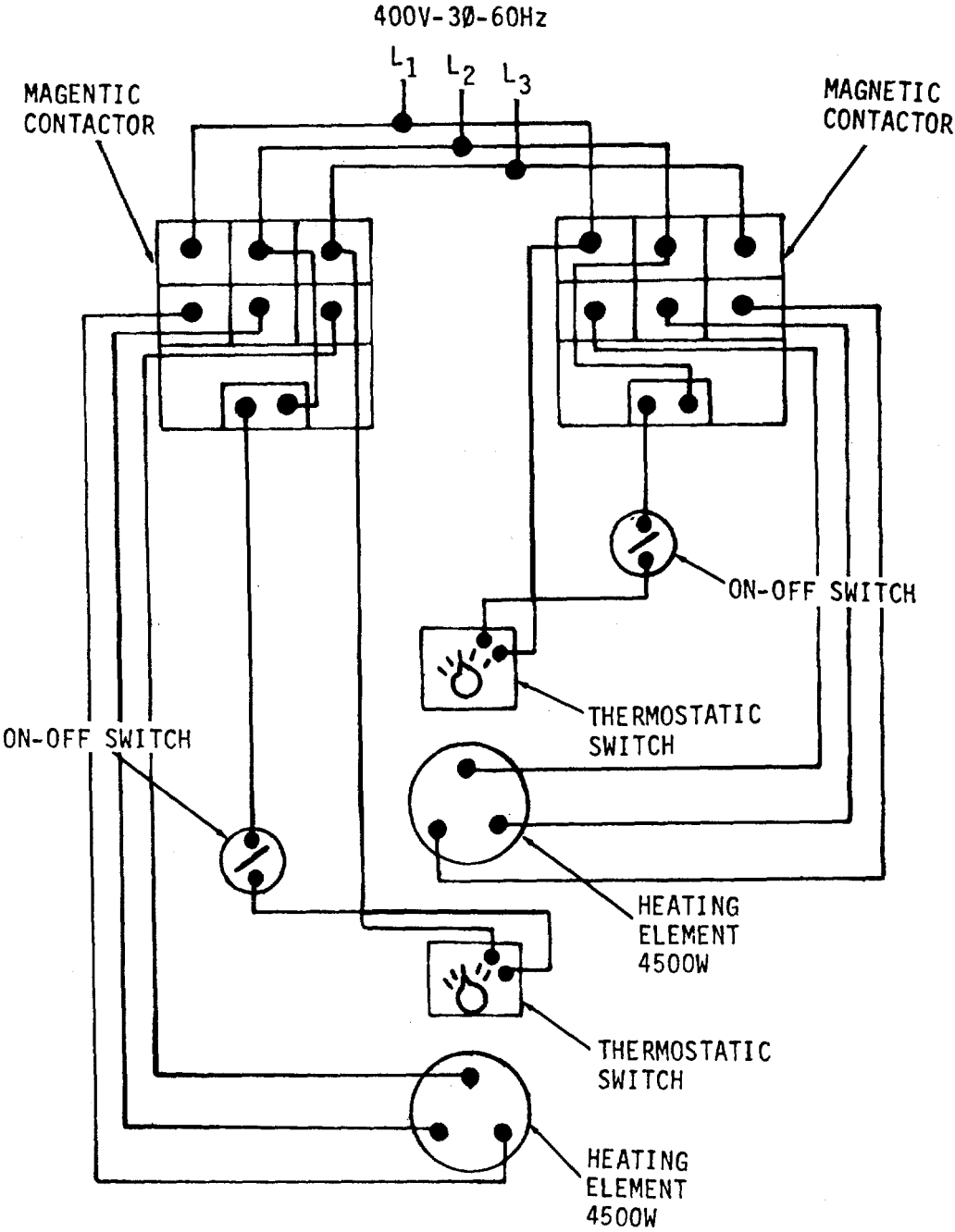
REPAIR (Cont.)



4-67. HOT WATER HEATER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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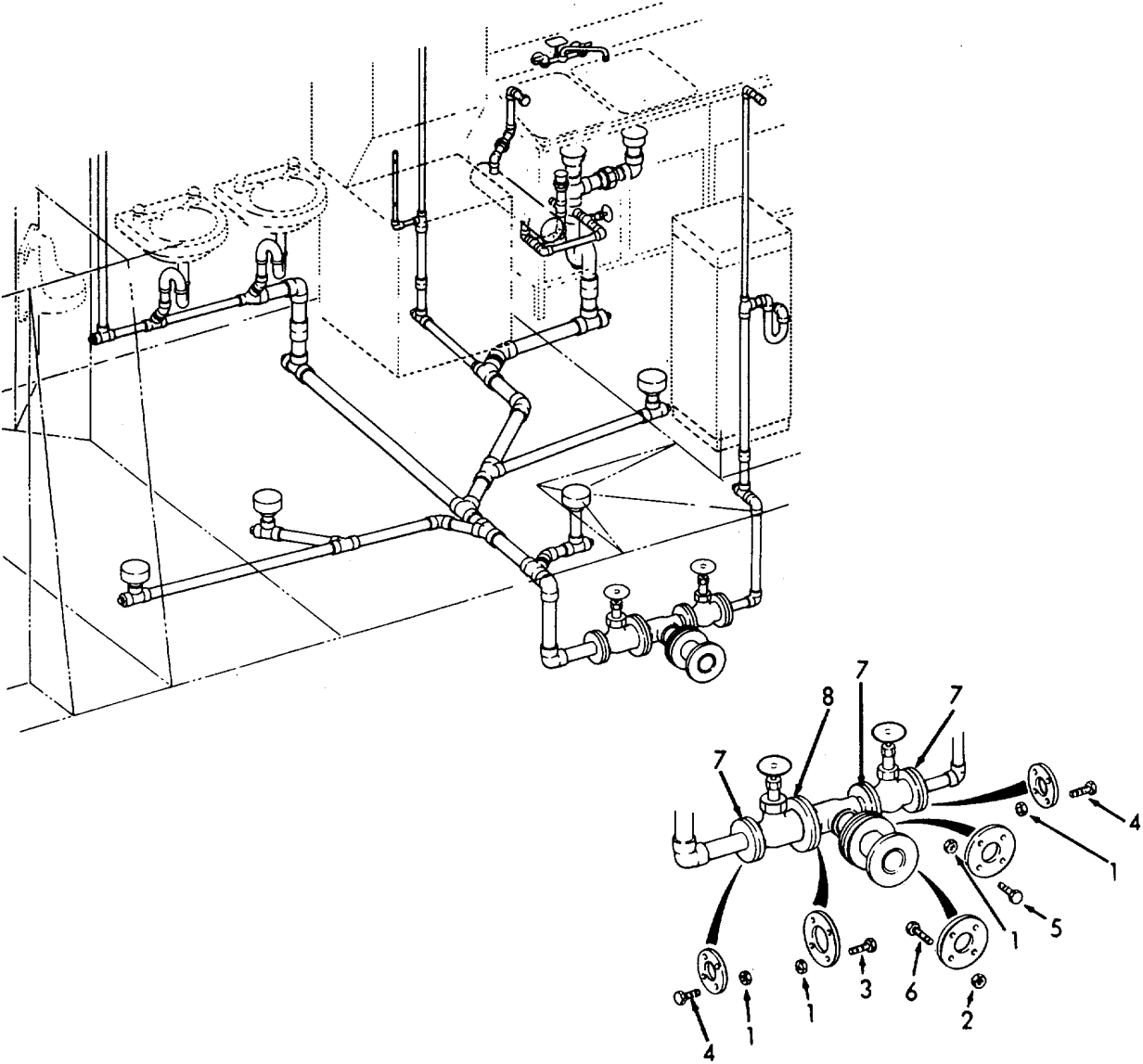
REPAIR (Cont)



WIRING DIAGRAM

4-68. PLUMBING AND DECK DRAINS - MAINTENANCE INSTRUCTIONS (Continued).

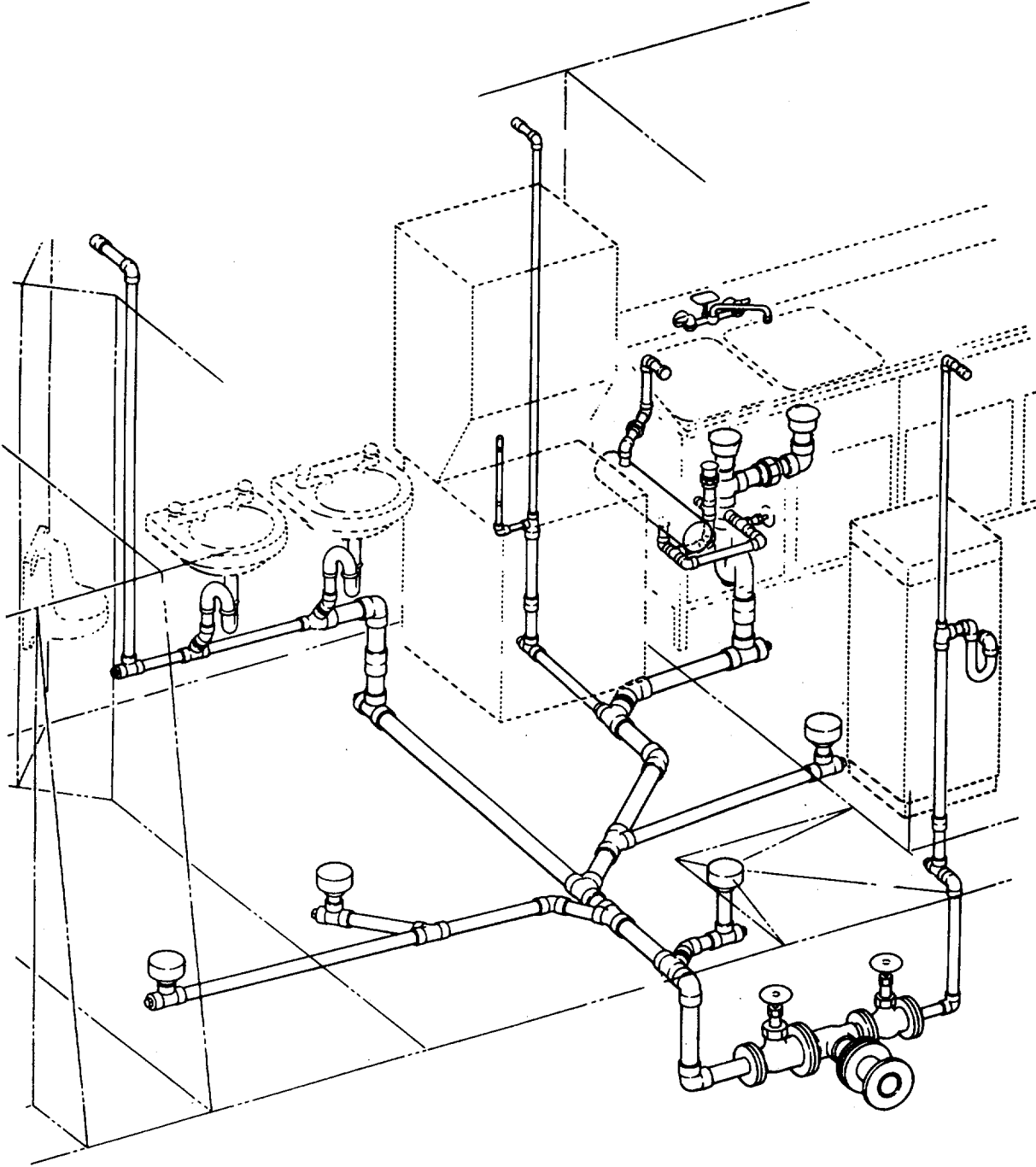
LOCATION	ITEM	ACTION	REMARK
REPAIR	2. Flanges		
	a. Nuts (1 and 2)	Remove.	If necessary.
	b. Screws (3, 4, 5, and 6)	Remove.	If necessary.
	c. Gaskets (7, and 8)	Replace.	If necessary.



4-68. PLUMBING AND DECK DRAINS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)



4-68. PLUMBING AND DECK DRAINS - MAINTENANCE INSTRUCTIONS (Continued).

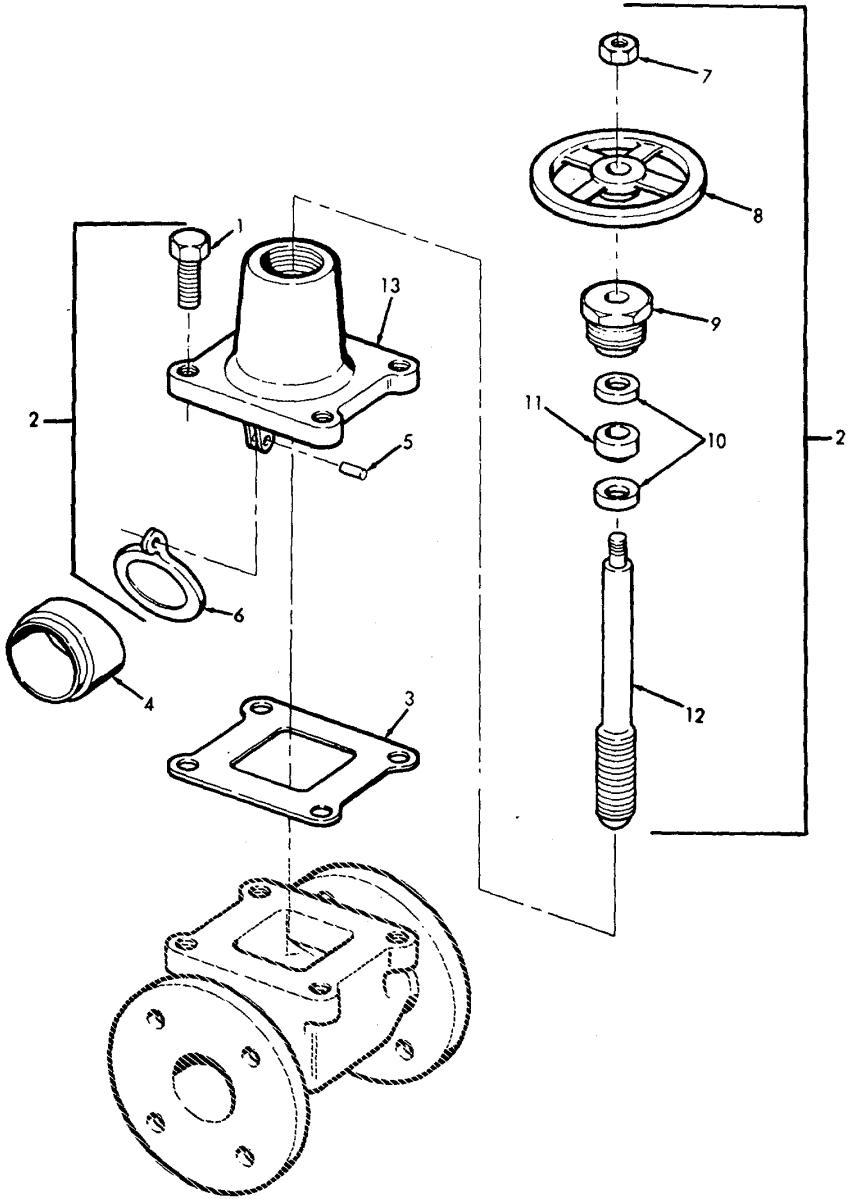
LOCATION	ITEM	ACTION	REMARK
REPAIR (Cont)			
3. Scupper valves	a. Screws (1)	Remove.	
	b. Hand wheel and bonnet assembly (2)	Remove.	
	c. Gasket (3)	Remove.	Discard.
	d. Valve sleeve (4)	Remove.	
	e. Pin (5) and flap valve (6)	Remove.	
	f. Nut (7) and handwheel (8)	Remove.	
	g. Gland nut (9)	Remove.	
	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.		

4-68. PLUMBING AND DECK DRAINS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
----------	------	--------	--------

REPAIR (Cont.)

- m. Handwheel and bonnet assembly (2) and gasket (3)
- n. Screws (1) Install.
Use new gasket.



4-69. VENT AND SOUNDINGS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
<u>Test Equipment</u>		<u>References</u>	
NONE		NONE	
<u>Special Tools</u>		<u>Equipment Condition</u>	<u>Condition Description</u>
NONE		NONE	
<u>Material/Parts</u>		<u>Special Environmental Conditions</u>	
NONE		NONE	
<u>Personnel Required</u>		<u>General Safety Instructions</u>	
1		NONE	

LOCATION	ITEM	ACTION	REMARK
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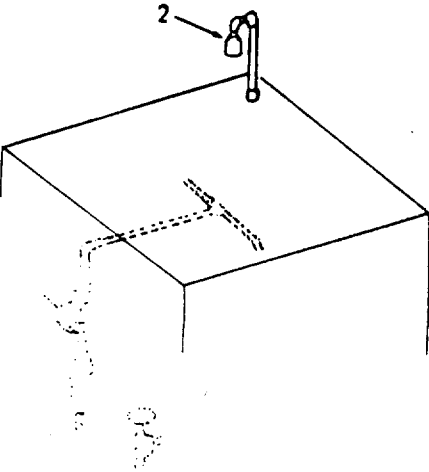
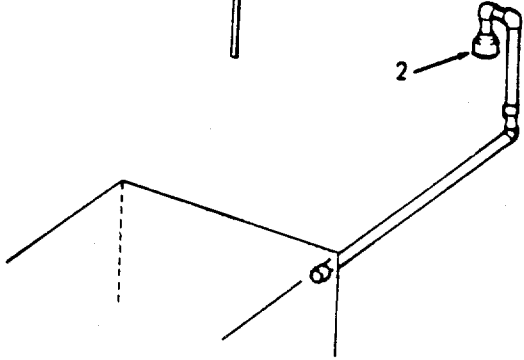
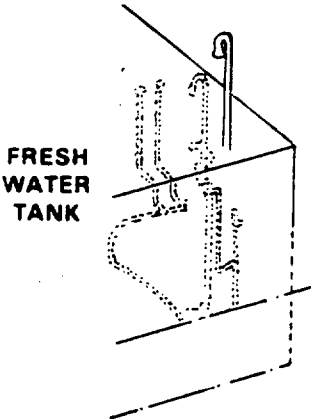
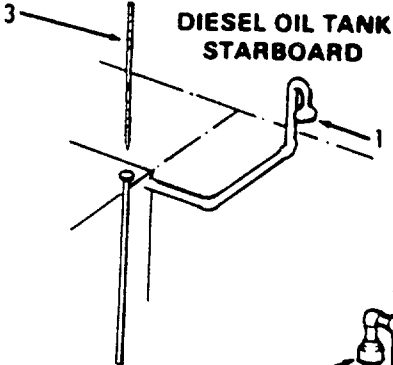
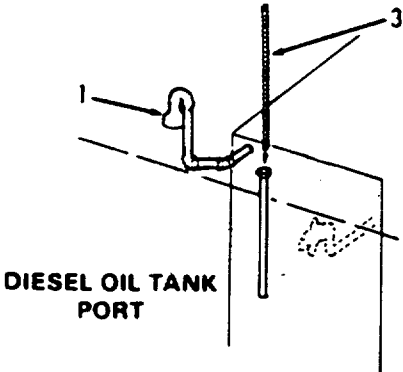
INSPECTION

- | | | |
|----------------------------|-------------------|--|
| 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 | Inspect for proper operation. |

REPAIR

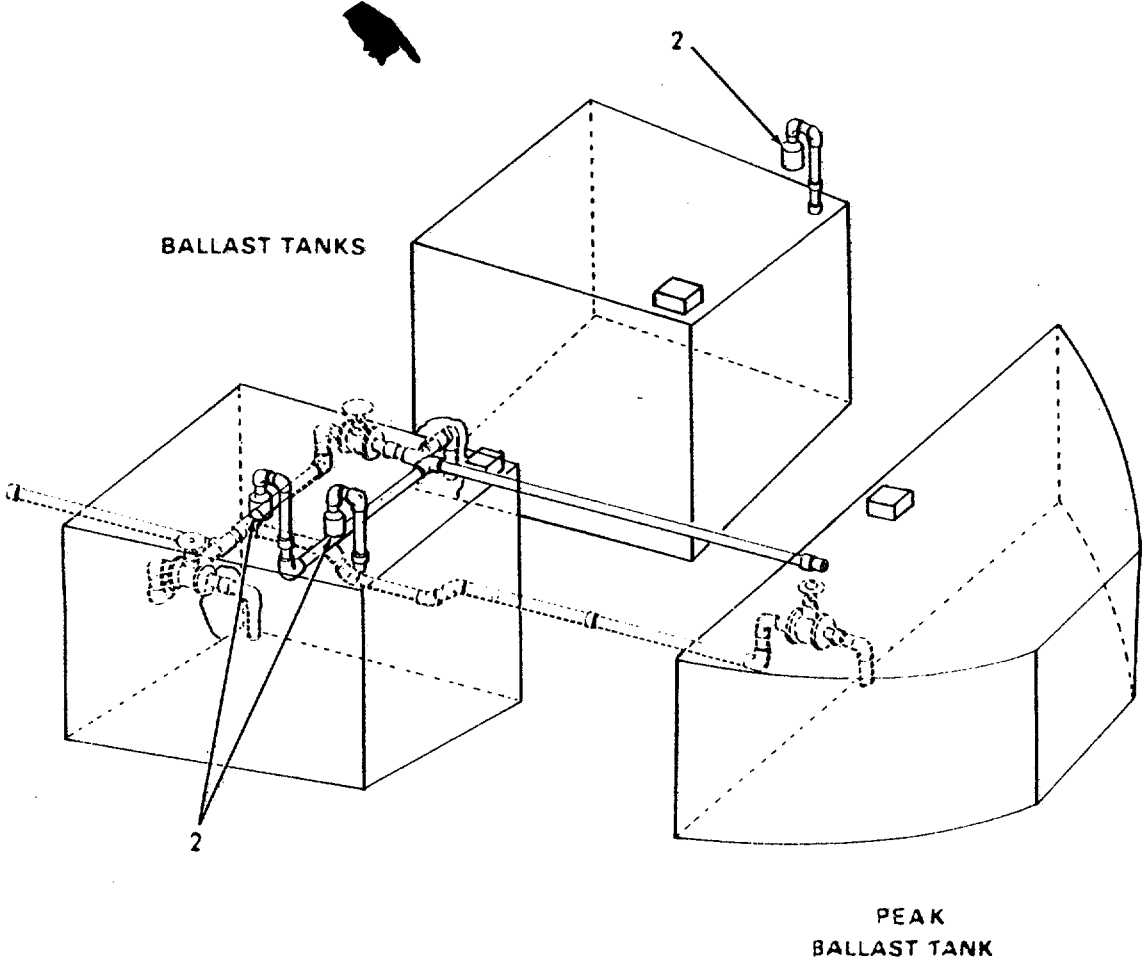
- | | | | |
|-------------------|------------------------------|----------|---------------|
| 2. Vents | a. Ball vent valves (1) | Replace. | If necessary. |
| | b. Inverted check valves (2) | Replace. | If necessary. |
| 3. Sounding tapes | Tapes (3) | Replace. | If necessary. |

4-69. VENTS AND SOUNDINGS - MAINTENANCE INSTRUCTIONS.



MAGAZINE TANK

4-69. VENTS AND SOUNDINGS - MAINTENANCE INSTRUCTIONS (Continued).



4955-285

Change 1 4-1464

4-70. HULL AND OUTFIT.

The following is an index to the maintenance procedures.

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Stanchions and Railings	4-71
Furniture and Misc. Furnishings	4-72
Portable Air Compressor	4-73
Doors, Hatches, Scuttles and Manholes	4-74
Windscreen and Airports	4-75
Mooring and Towing Fillings	4-76
High Intensity Light	4-77
Windshield Wiper	4-78
Searchlight	4-79
Lashing Gear	4-80

Change 1 4-1464.1/(4-1464.2 Blank)/

4-71. 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

<u>Condition</u>	<u>Condition Description</u>
NONE	

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARK
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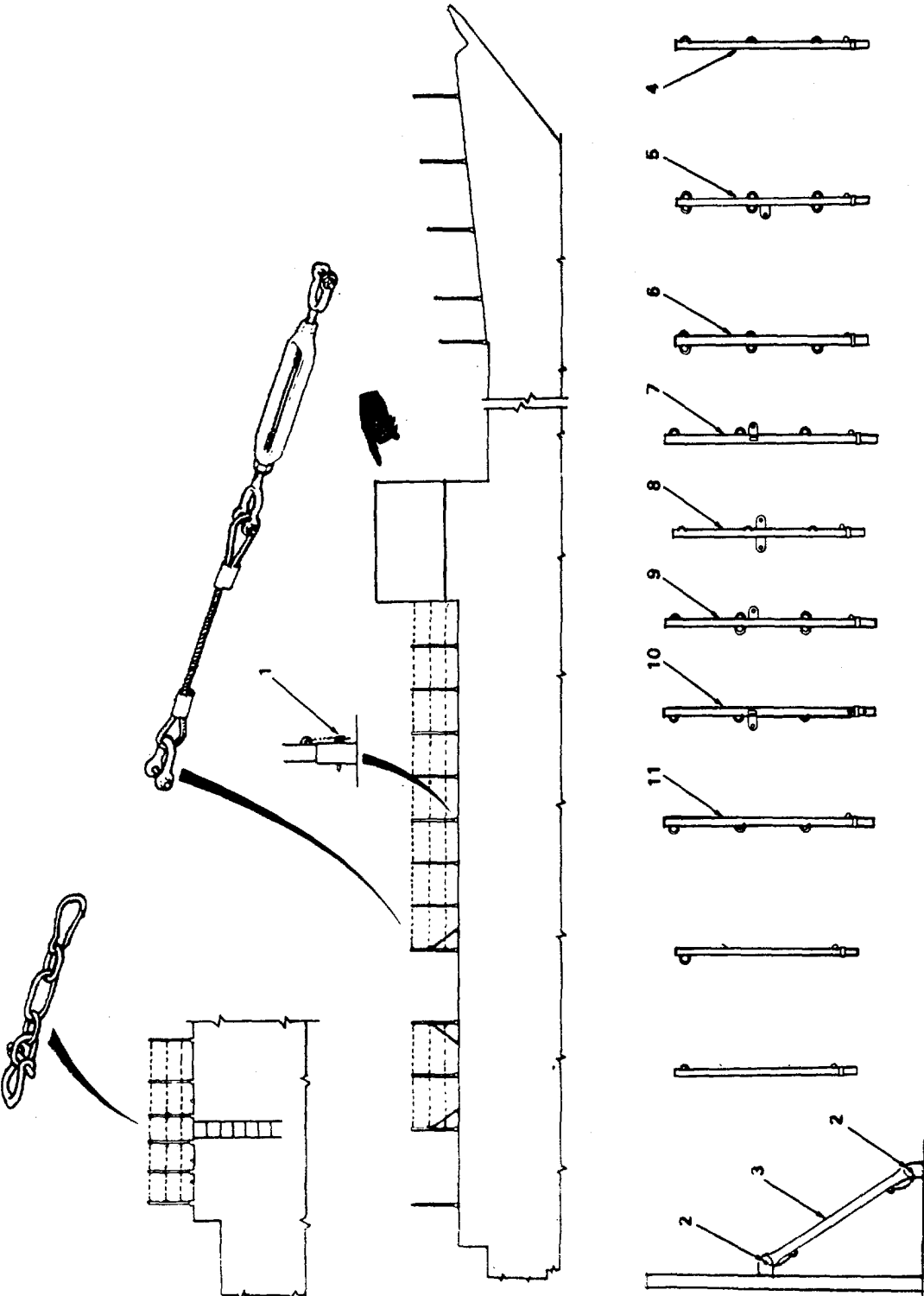
INSPECTION

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.

4-71. STANCHIONS AND RAILINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
REPLACE			
2.	a. Toggle pin 1/2 x 3 inch long bronze w/6 inch galvanized steel chain (1)	Replace	If necessary.
	b. Toggle pin 1/2 x 2 inch long bronze w/6 inch galvanized steel chain (2)	Replace.	If necessary.
	c. Brace stanchion 2 feet 5 inch long (3)	Replace.	If necessary.
	d. Stanchion 3 feet 8 inch long Type A (4)	Replace.	If necessary.
	e. Stanchion 3 feet 8 inch long Type B and C (5)	Replace.	If necessary.
	f. Stanchion 3 feet 8 inch long Type D (6)	Replace.	If necessary.
	g. Stanchion 4 feet 1/2 inch long Type F-F1 (7)	Replace.	If necessary.
	h. Stanchion 3 feet 8 inch long Type G-G1 (8)	Replace.	If necessary.
	i. Stanchion 4 feet 1/2 inch long Type H (9)	Replace.	If necessary.
	j. Stanchion 3 feet 8 inch long Type I (10)	Replace.	If necessary.
	k. Stanchion 4 feet 1/2 inch long Type K (11)	Replace.	If necessary.

4-71. STANCHIONS AND RAILINGS - MAINTENANCE INSTRUCTIONS (Continued).

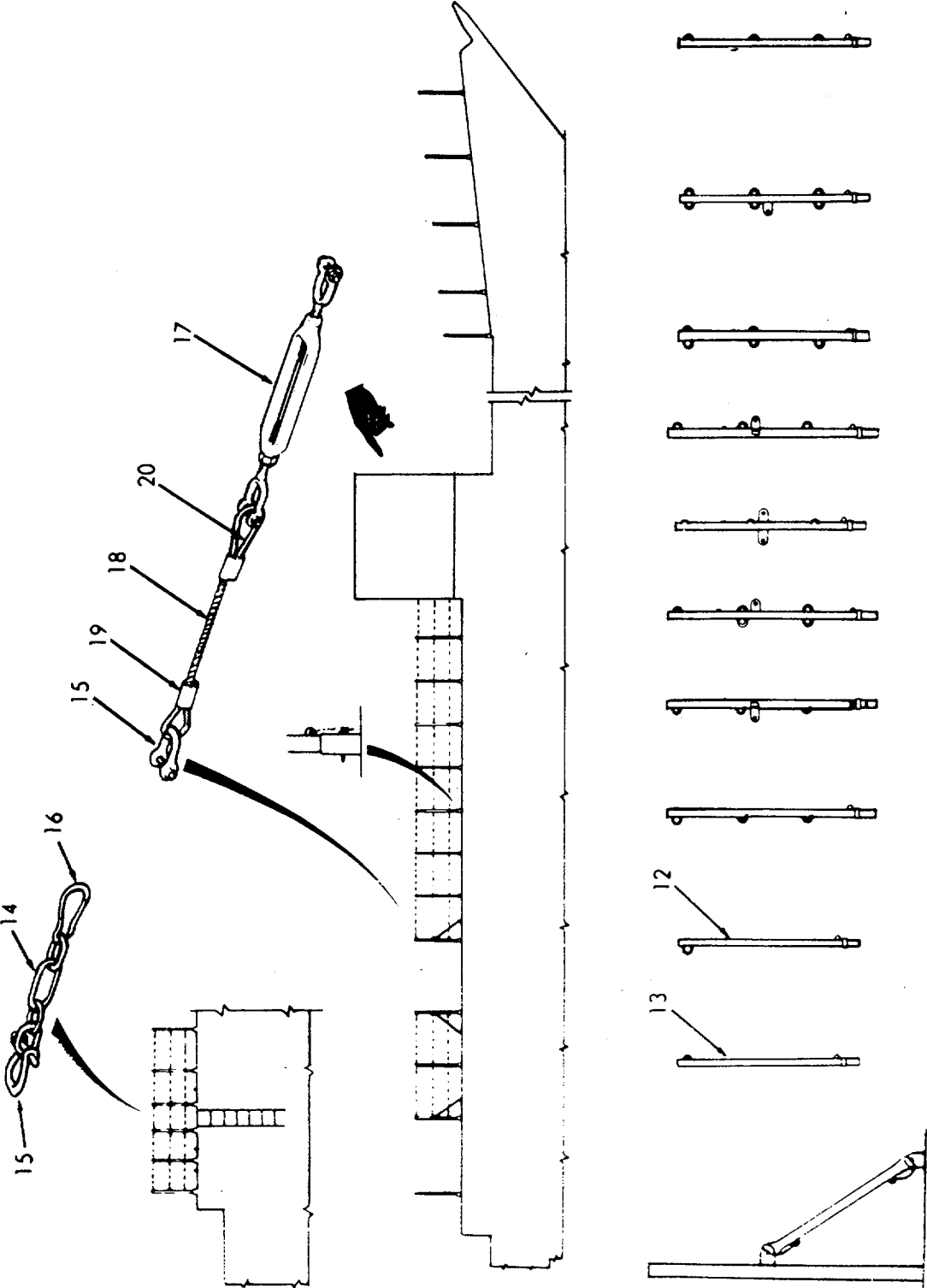


Change 1 4-1467

4-71. STANCHIONS AND RAILINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
REPLACE (Cont)			
	l. Stanchion 3 feet 6 inch long Type L (12)	Replace	If necessary.
	m. Stanchion 3 feet 6 inch long Type M (13)	Replace.	If necessary.
	n. 5/16 inch proof coil cut to suit chain (14)	Replace.	If necessary.
	o. 3/8 inch galvanized steel shackle anchor (15)	Replace.	If necessary.
	p. Stainless steel safety snap (16)	Replace.	If necessary.
	q. 1/2 inch thread galvanized steel 6 inch take up jaw and jaw turnbuckle (17)	Replace.	If necessary.
	r. 1/4 inch wire rope 7x19 aircraft cable 7000 pound galvanized steel (18)	Replace.	If necessary.
	s. Nico press sleeve 1/4 inch galvanized steel (19)	Replace.	If necessary.
	t. 1/4 inch galvanized steel wire rope thimble (20)	Replace.	If necessary.

4-71. STANCHIONS AND RAILINGS - MAINTENANCE INSTRUCTIONS (Continued).



4-72. 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	REMARK
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INSPECTION

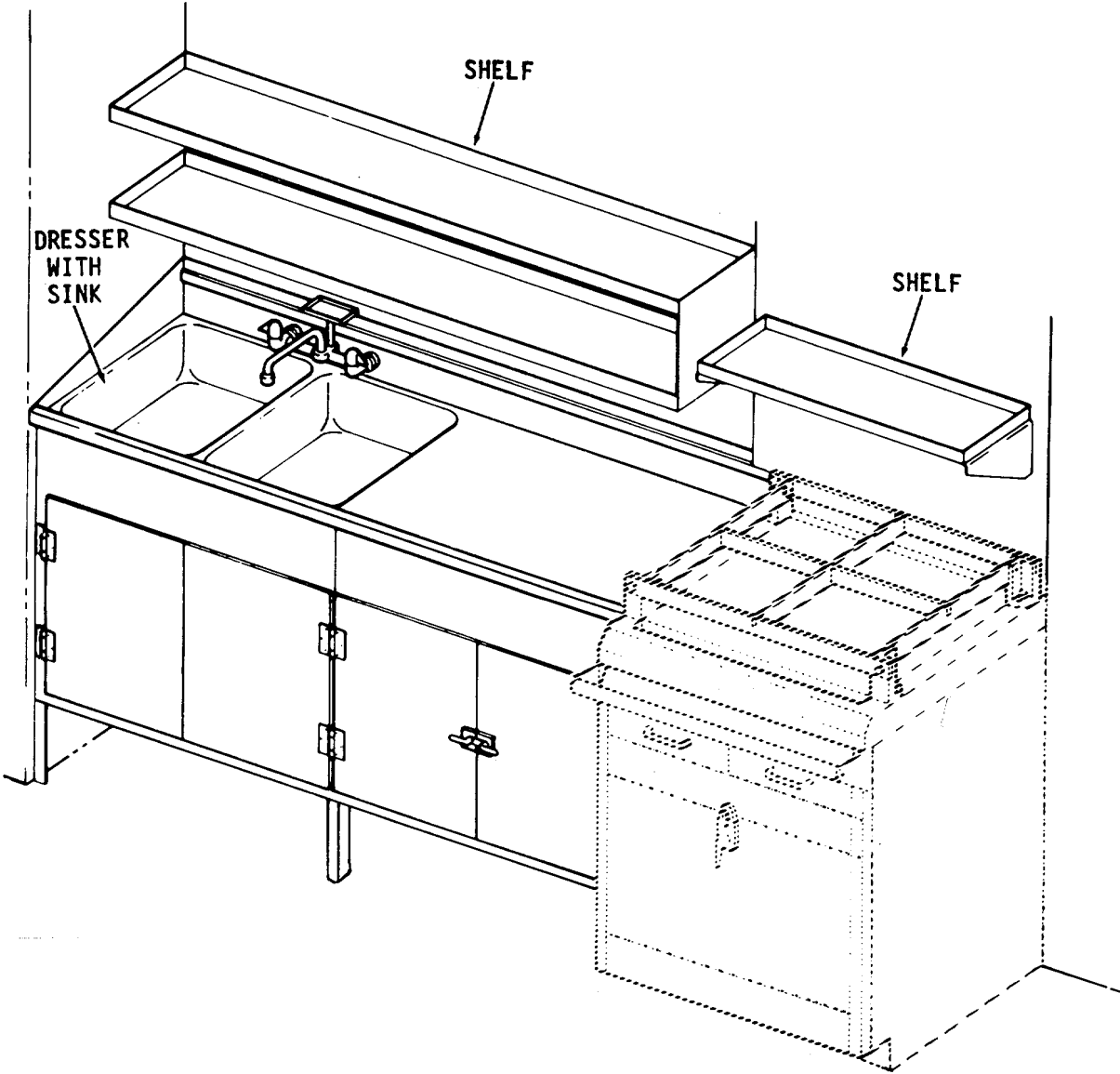
1. Galley and messroom	a. Shelves Support Maintenance.	1. Inspect for damage.	Refer to Direct
		2. Insure all hardware is tight.	
	b. Dresser with sinks	1. Inspect for damage. Support Maintenance.	Refer to Direct
		2. Insure all hardware is tight.	
	c. Galley dresser	1. Inspect for damage. Support Maintenance.	Refer to Direct
		2. Insure all hardware is tight.	

4-1470

4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
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INSPECTION (Cont)



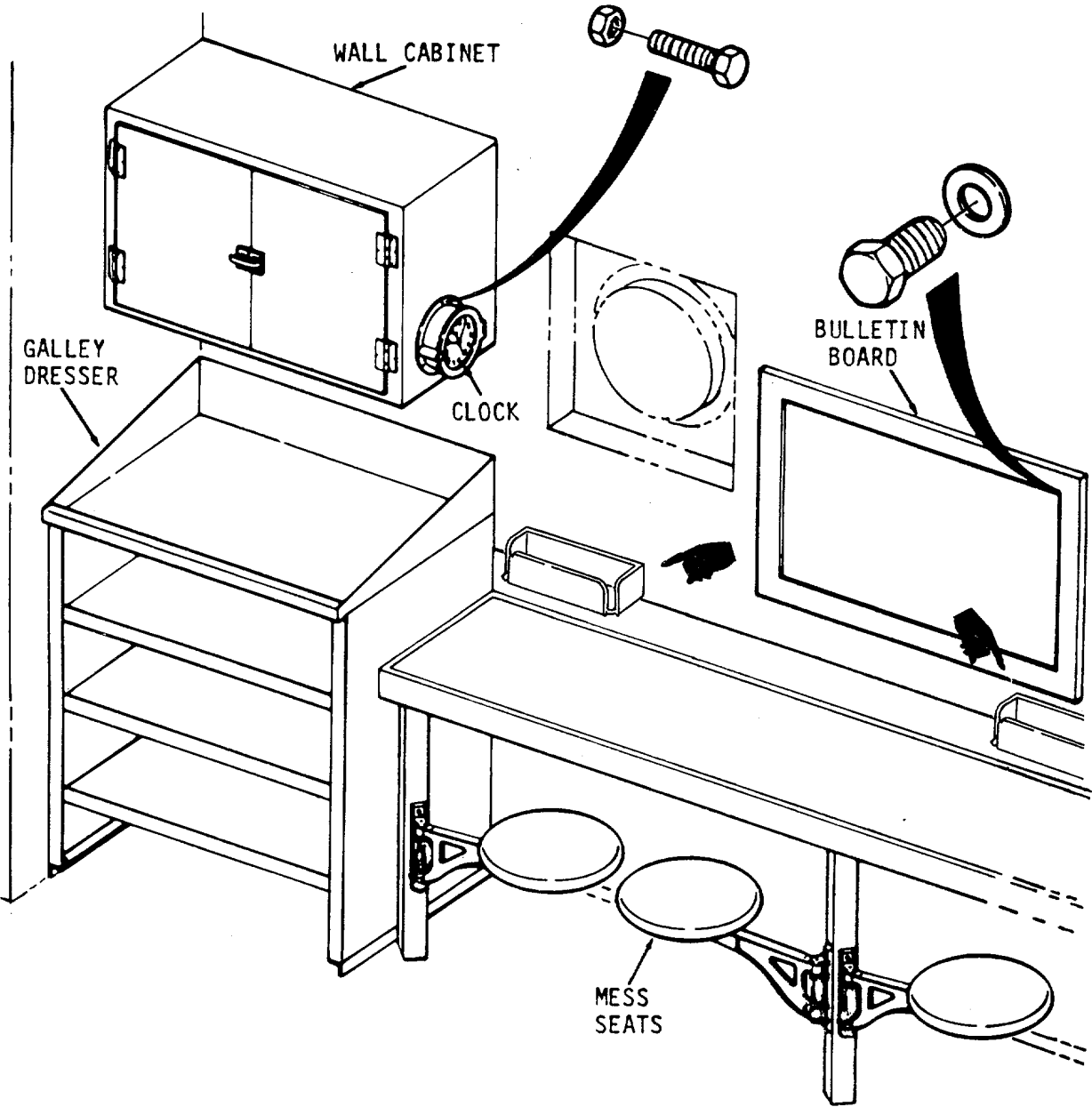
4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
INSPECTION (Cont)			
	d. Mess counter	1. Inspect for damage. 2. Insure all hardware is tight.	Refer to Direct Support Maintenance.
	e. Wall cabinet	1. Inspect for damage. 2. Insure all hardware is tight.	Refer to Direct Support Maintenance.
	f. Clock	1. Inspect for damage. 2. Insure all hardware is tight. 3. Inspect for proper operation	
	g. Mess seats	1. Inspect for damage. 2. Insure all hardware is tight.	
	h. Bulletin board	1. Inspect for damage. 2. Insure all hardware is tight.	

4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
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INSPECTION (Cont)



4955-182

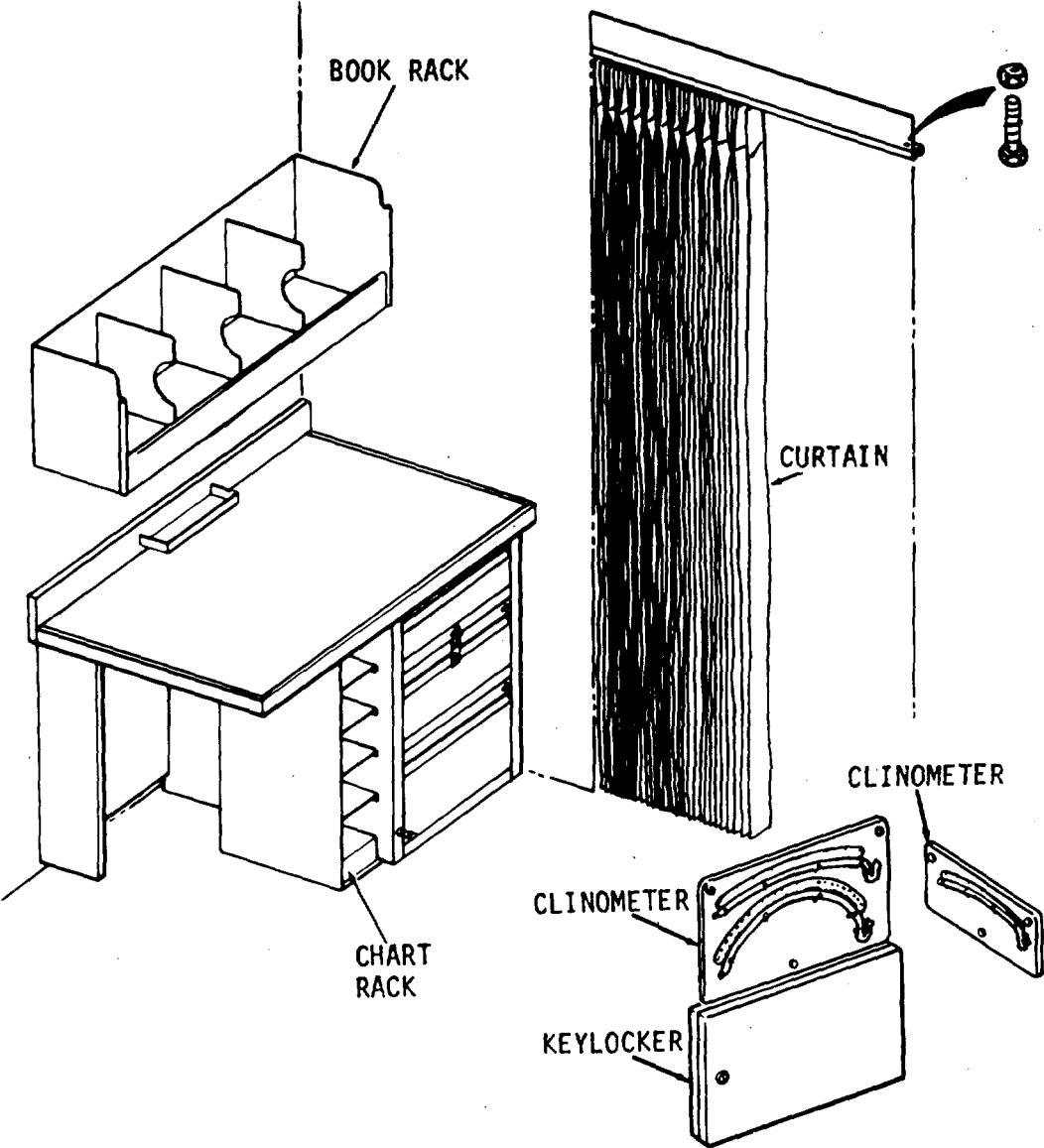
4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
INSPECTION (Cont)			
2. Pilot house and deck house	a. Book rack	1. Inspect for damage. 2. Insure all hardware is tight.	
	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. containers 2. Insure all hardware is tight.	
	g. Pilothouse	1. Inspect for damage. stool 2. Insure all hardware is tight.	
	h. Portable	1. Inspect for damage. flag locker 2. Insure all hardware is tight.	

4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
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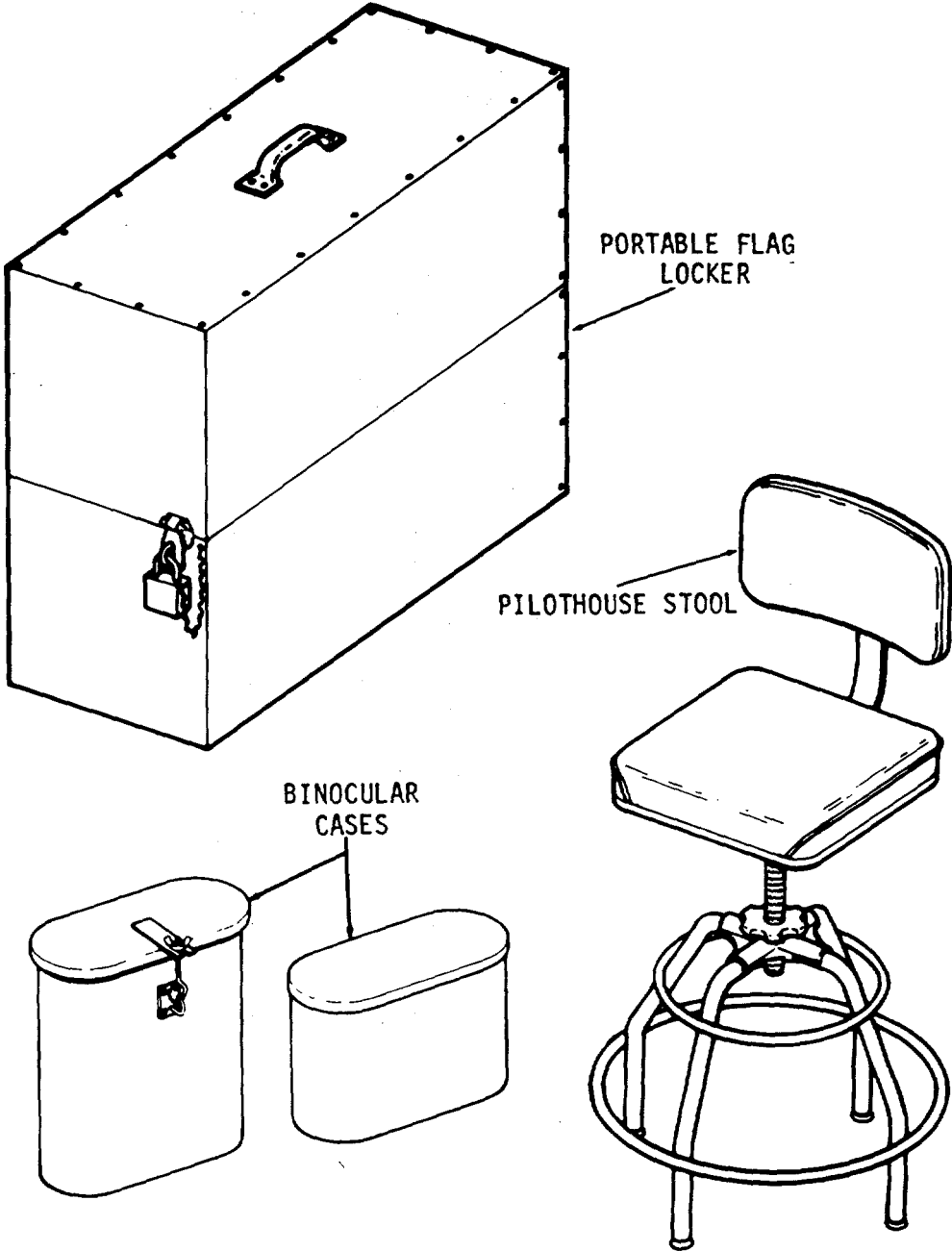
INSPECTION (Cont)



4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
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INSPECTION (Cont)



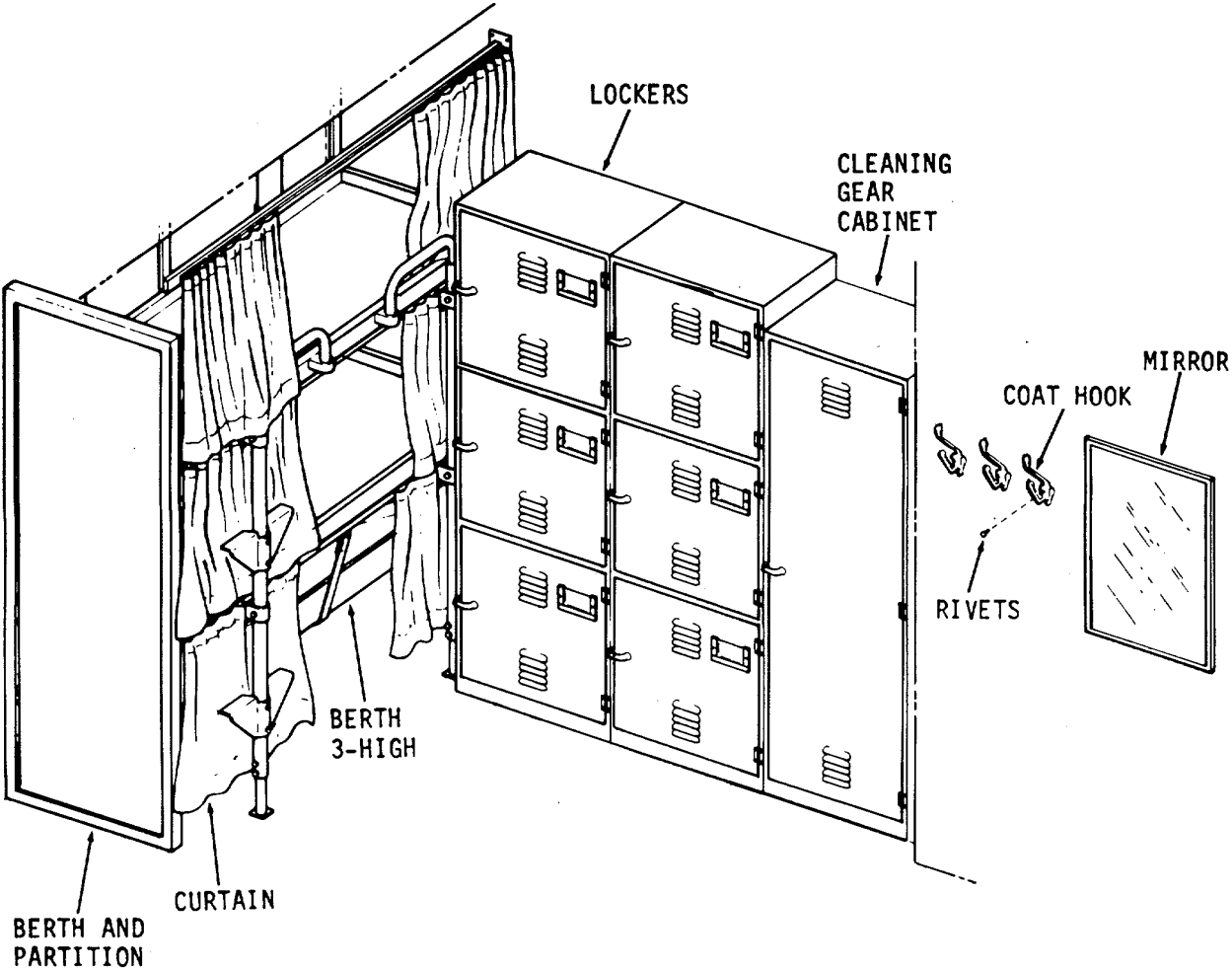
4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
INSPECTION (Cont)			
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.	
	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.	

4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
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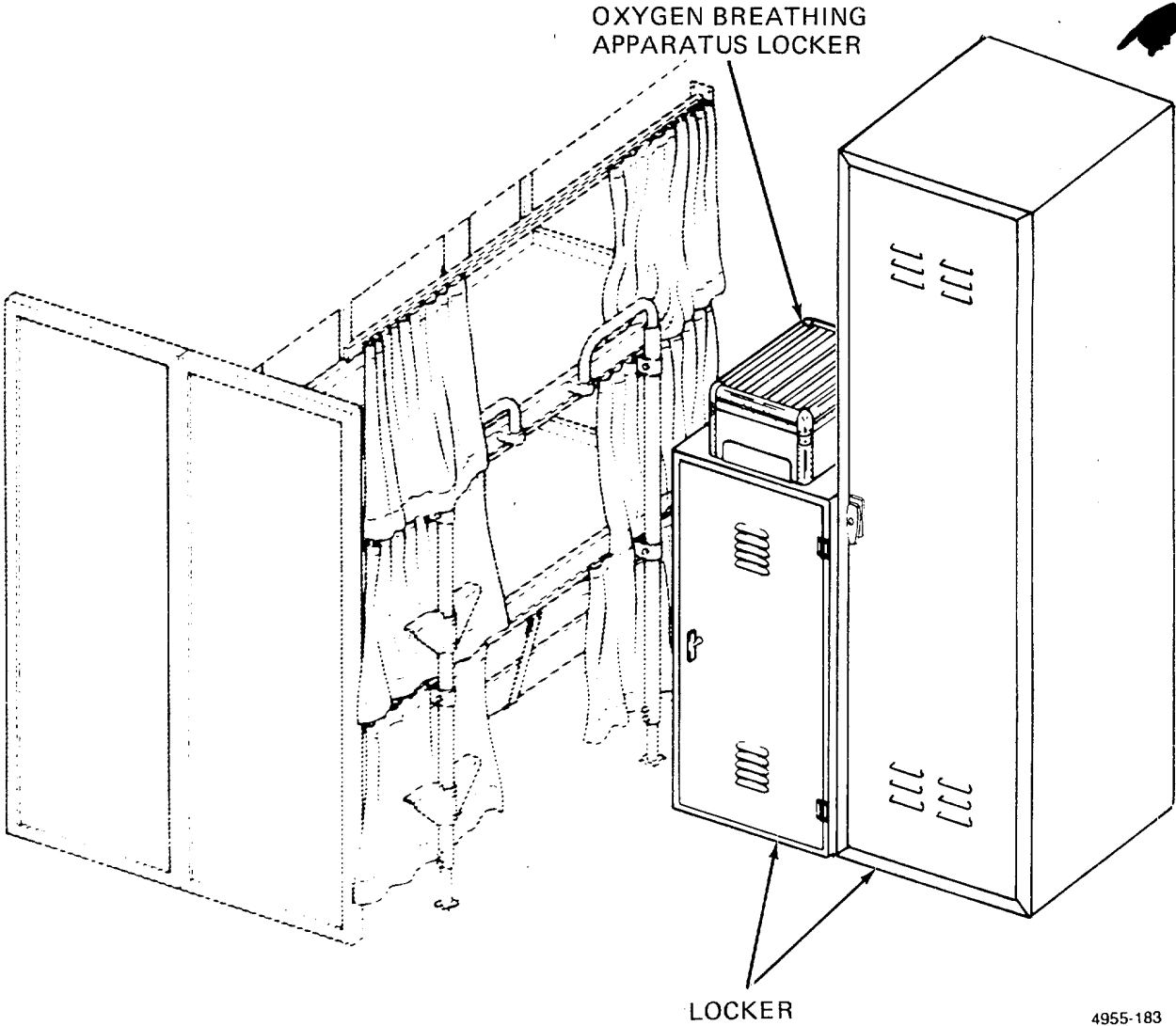
INSPECTION (Cont)



4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
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INSPECTION (Cont)

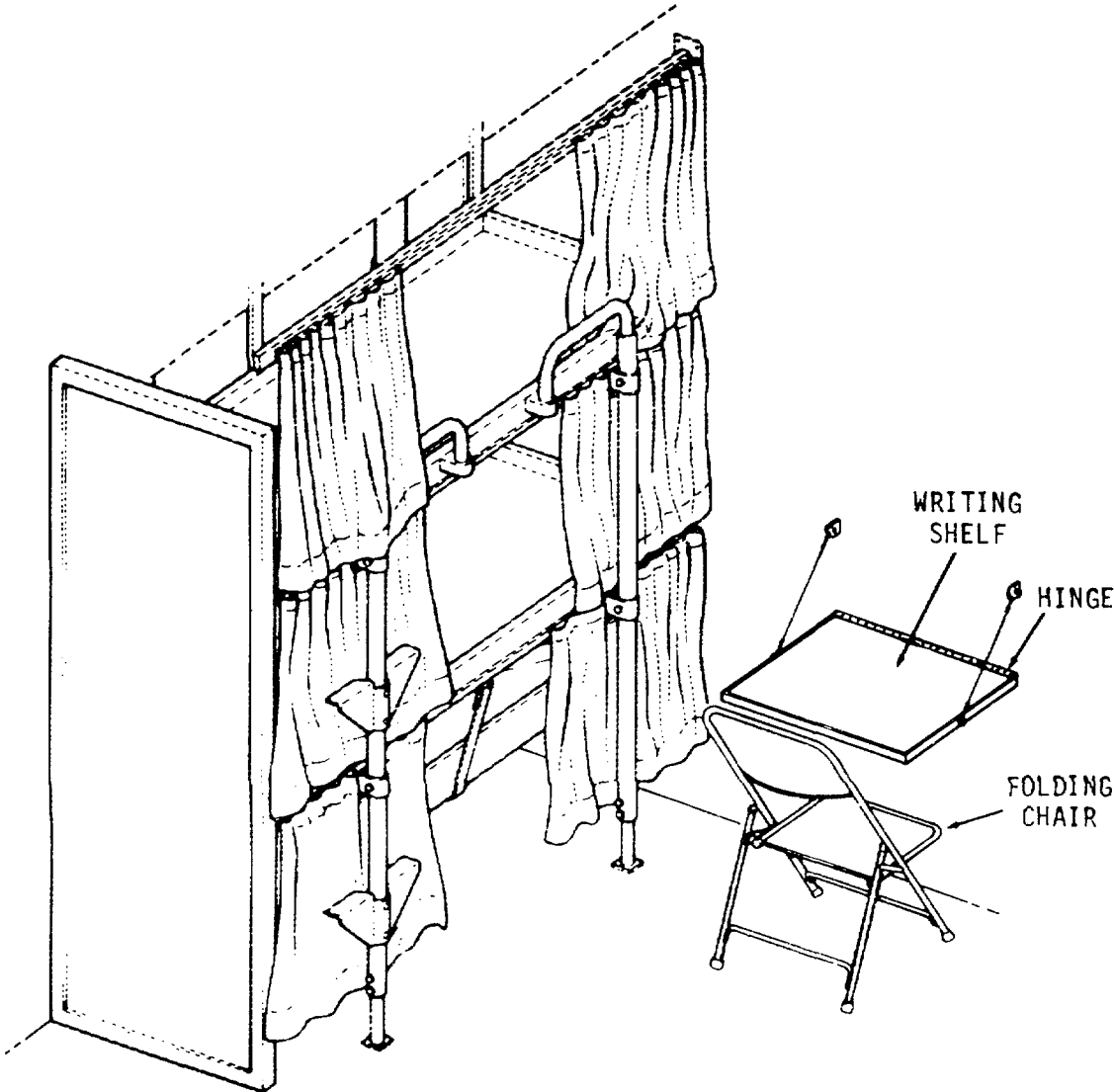


4955-183

4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS .

LOCATION	ITEM	ACTION	REMARK
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INSPECTION (Cont)



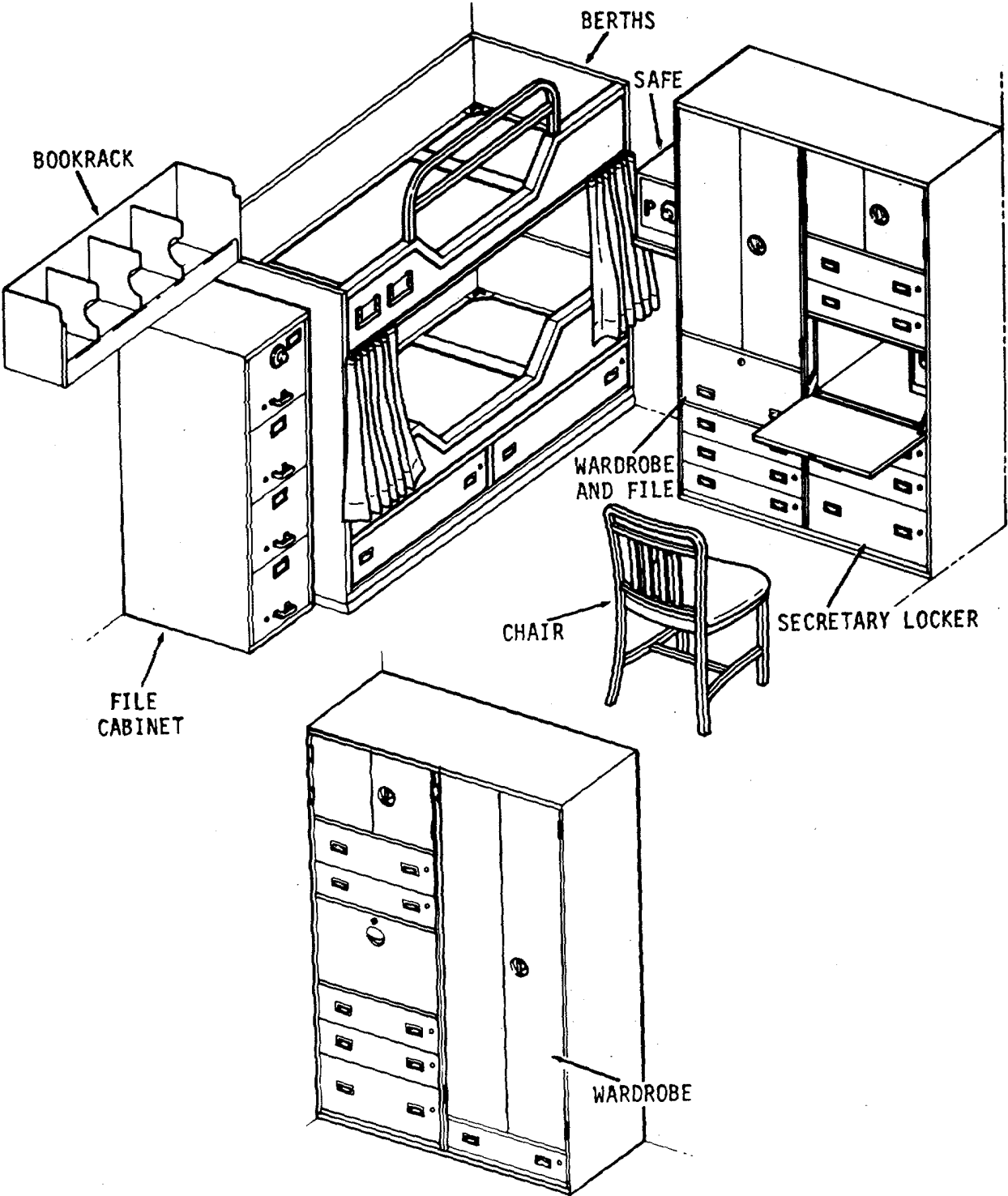
4-1480

4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
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.	
	d. Safe	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	e. Wardrobes	1. Inspect for damage.	
		2. Insure all hardware is tight.	
	f. Secretary	1. Inspect for damage. locker	
		2. Insure all hardware is tight.	

4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
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4-72. FURNITURE AND MISCELLANEOUS FURNISHINGS - MAINTENANCE INSTRUCTIONS (Cont).

LOCATION	ITEM	ACTION	REMARKS
REPLACE			
5. Clock	a. Nuts and screws	Remove.	
	b. Clock	Replace.	
	c. Screws and nuts	Install.	
6. Mess seats	a. Mounting hardware	Remove.	
	b. Seats	Replace.	
	c. Mounting hardware	Install.	
7. Bulletin board	a. Screws and flatwashers	Remove.	
	b. Bulletin board	Replace.	
	c. Flatwashers and screws	Install.	
8. Curtain	a. Curtain	Unhook and remove.	
	b. Nuts and screws	Remove.	
	c. Curtain rod	Replace.	
	d. Screws and nuts	Install.	
	e. Curtain	Replace.	

4-73. PORTABLE AIR COMPRESOR - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Replace
- c. Repair

INITIAL SETUP:

Test Equipment
NONE

References
NONE

Special Tools
Arbor Press
Piston pin removal tools
Ring compressor

Equipment Condition	Condition Description
NONE	

Material/Parts
Oil, MIL-L-2104
Type OE/HDO-20

Special Environmental Conditions
Use the oil separation and recovery system to collect drained oil.

Personnel Required
1

General Safety Instructions
Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS
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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. |

4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

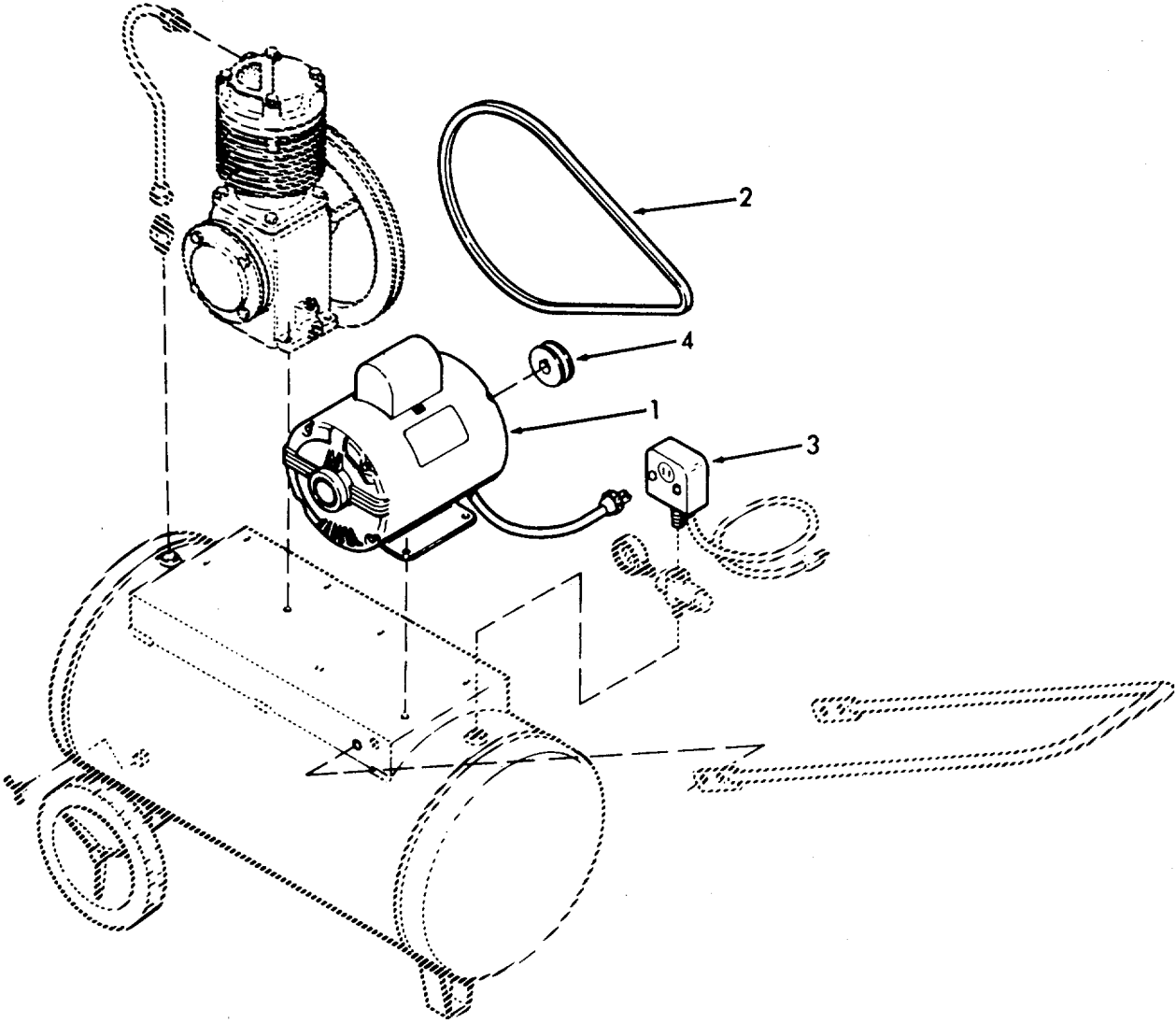
LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	d. Compressor	Inspect for signs of damage.	
	e. Tank	Inspect for breaks, dents and signs of damage.	
REPLACE			
2. Belts	a. Motor mount- Loosening hardware		
	b. Motor (1)	Slide to loosen belt (2).	
	c. Belt (2)	Replace with new belt.	
	d. Motor (1) and hardware	1. Move motor to tighten belt.	
3. Motor	a. Motor power plug	2. Tighten hardware. Remove from pressure switch (3).	
	b. Motor mount- Remove. ing hardware.		
	c. Belt (2)	Remove.	
	d. Motor (1)	Remove.	Remove.
	e. Pulley (4)	Loosen setscrew and remove key and pulley. Install new motor.	
	f. Motor (1) and hardware		
	g. Pulley (4)	Install.	
	h. Belt (2)	1. Install. 2. Move motor to tighten belt. 3. Tighten hardware.	

4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)

- i. Motor power Install. plug



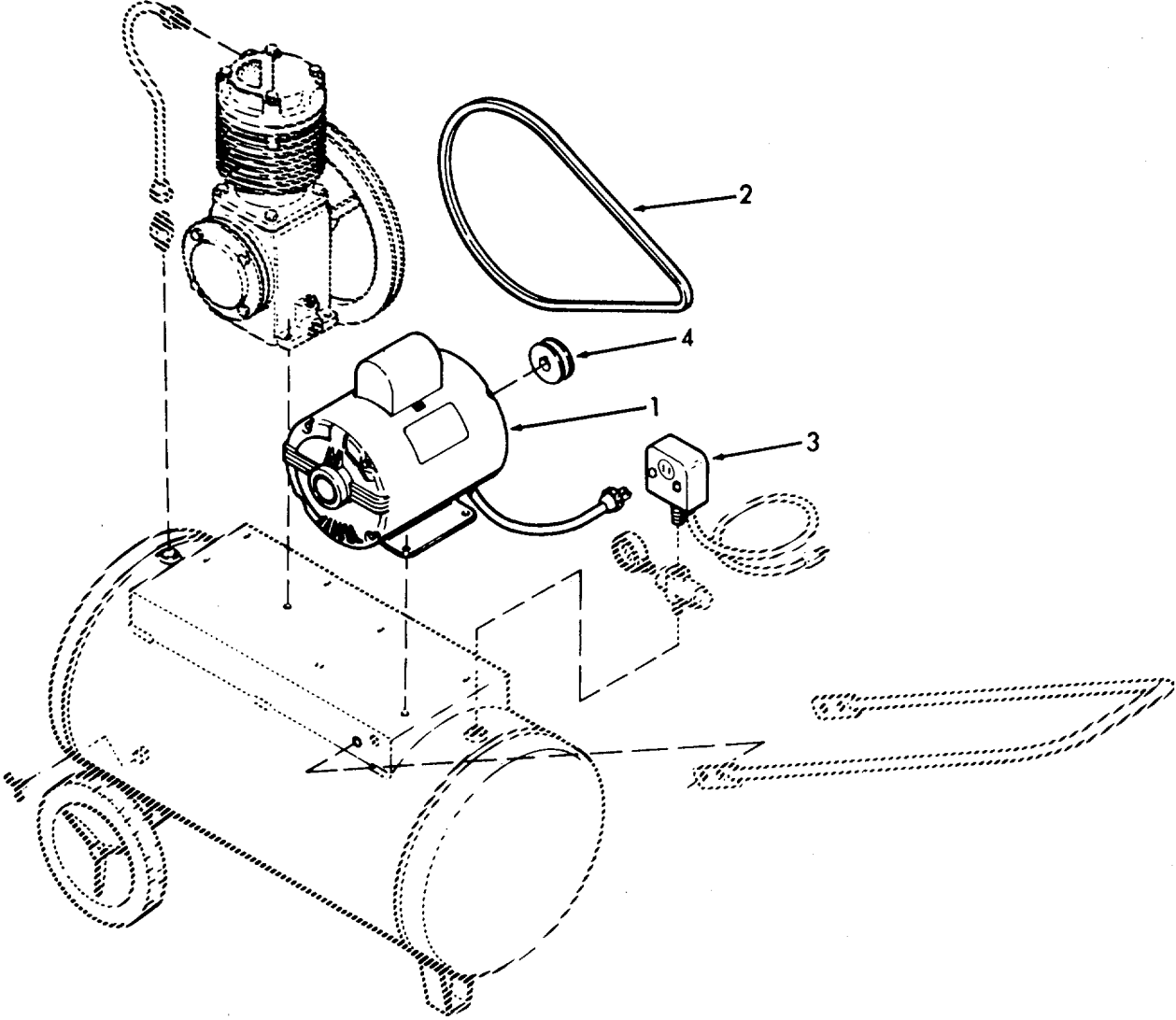
4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
4. Pressure switch/ gauge	a. Motor power plug	Remove from pressure switch (3).	
	b. Gage (5)	Remove.	
	c. Pressure	Remove. switch (3)	
	d. Manifold (6)	Remove.	
	e. Power cord (7)	Replace.	If necessary.
	f. Manifold (6)	Install.	
	g. Gage (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 mounting hardware (10)	Replace with new compressor.	
	e. Exhaust tube and tube nuts (8)	Install and tighten.	
	f. Belt (2)	Install.	Refer to step 2 .

4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

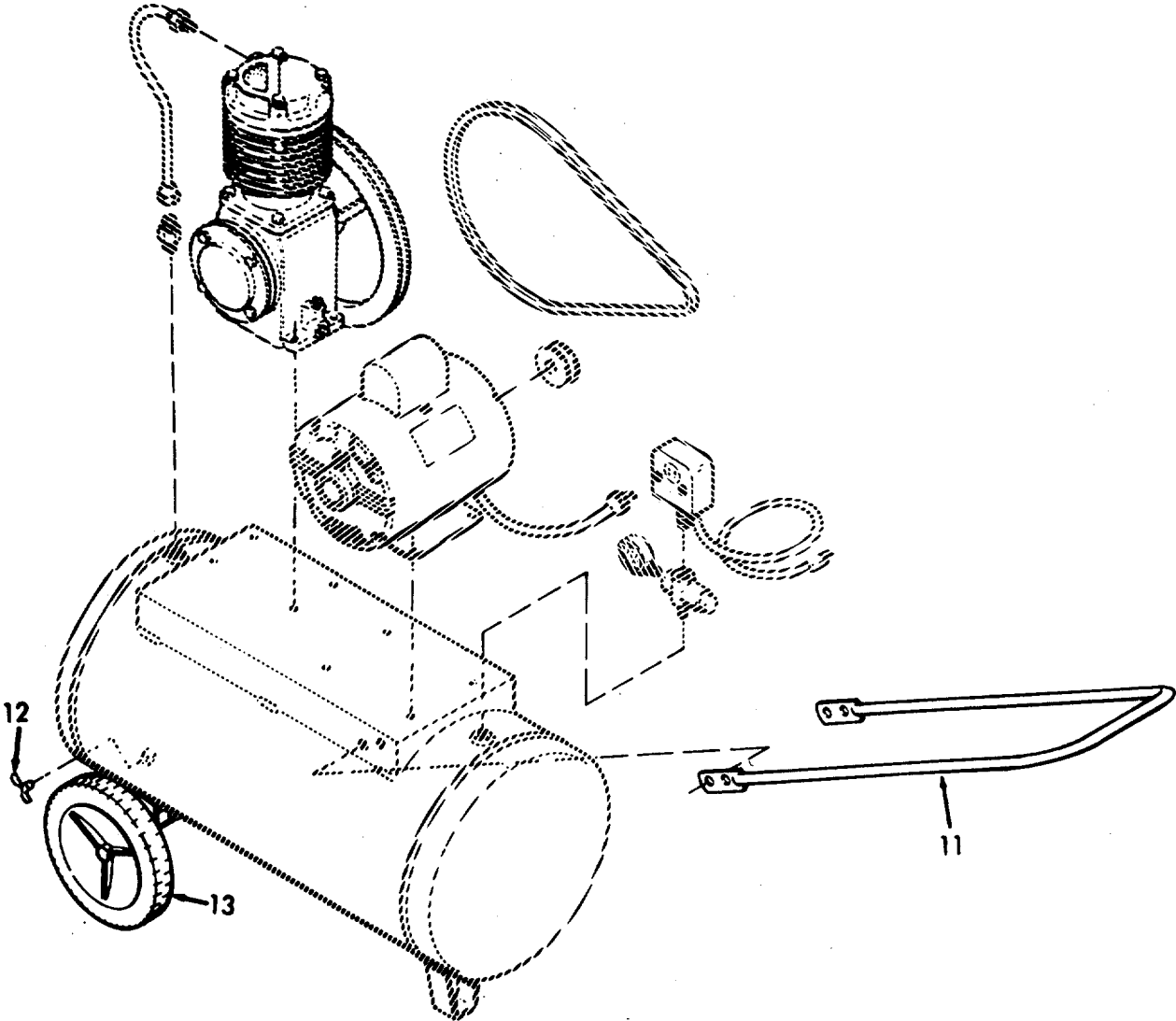
LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



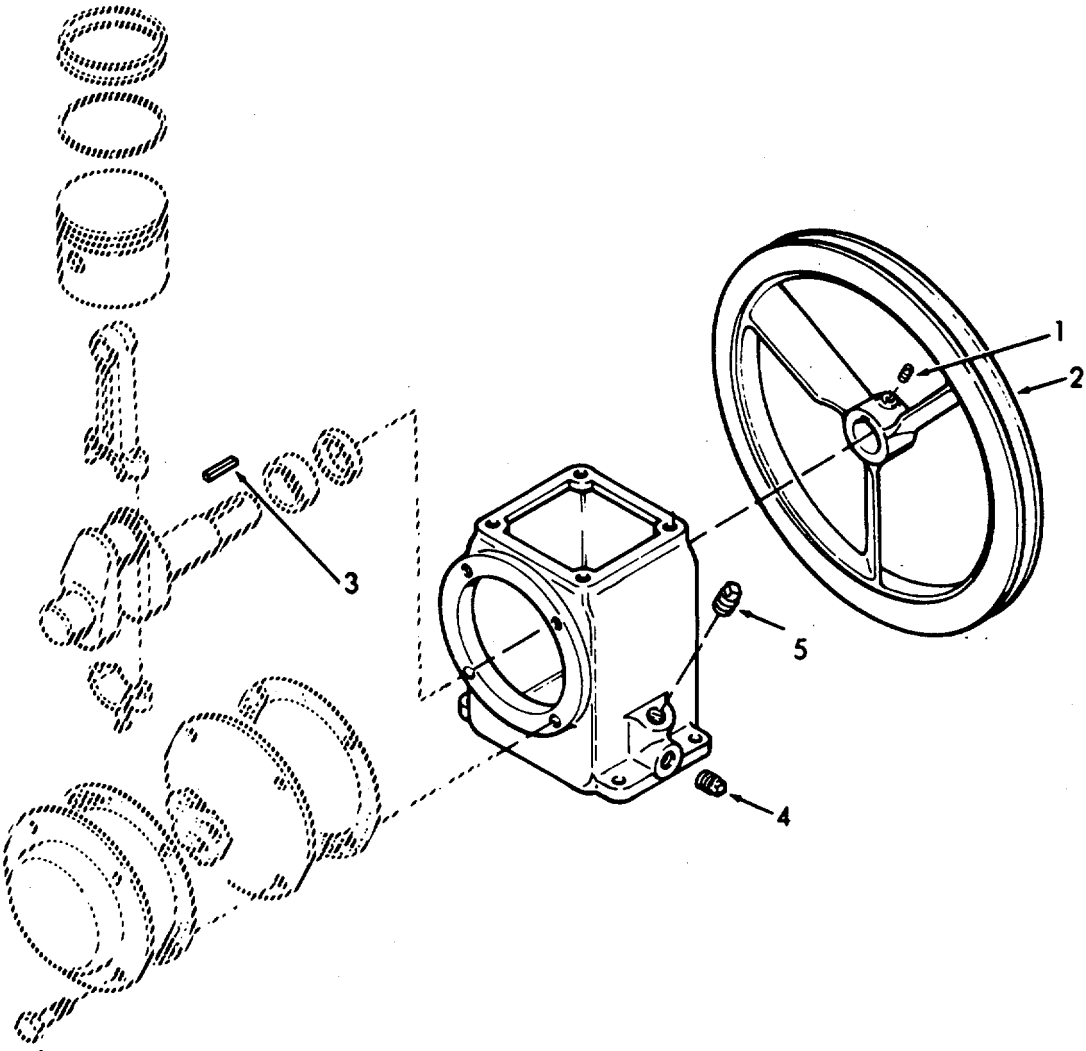
4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

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.



4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

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.



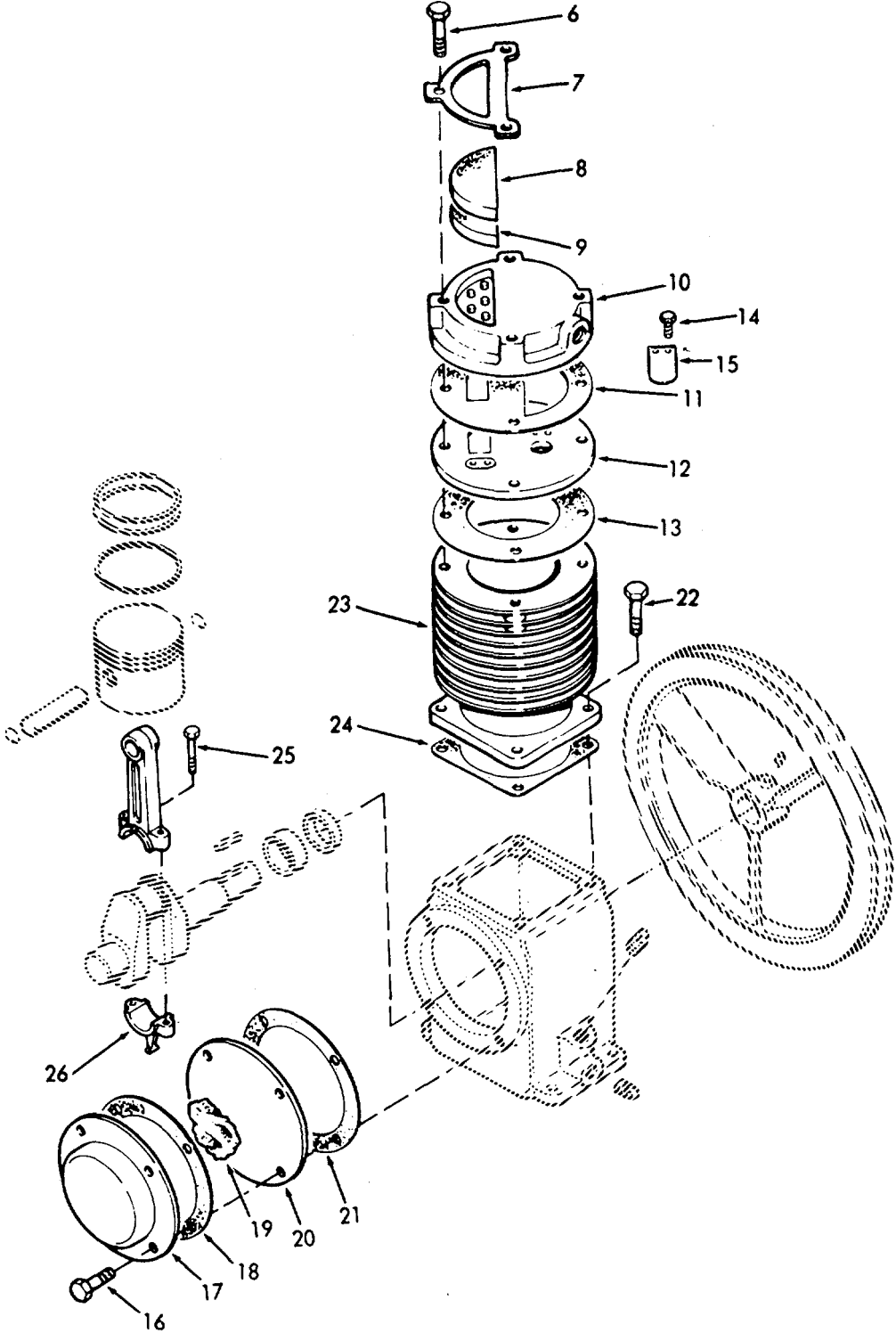
4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
	REPLACE (Cont)		
	e. Screws (6)	Remove 3 places.	
	f. Filter re- tainer (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 roll- ing 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 gas- ket (24)	Remove.	Discard gasket.
	k. Connecting rod bolts (25)	Loosen.	
	l. Connecting rod lower bearing shell (26)	Remove.	

4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



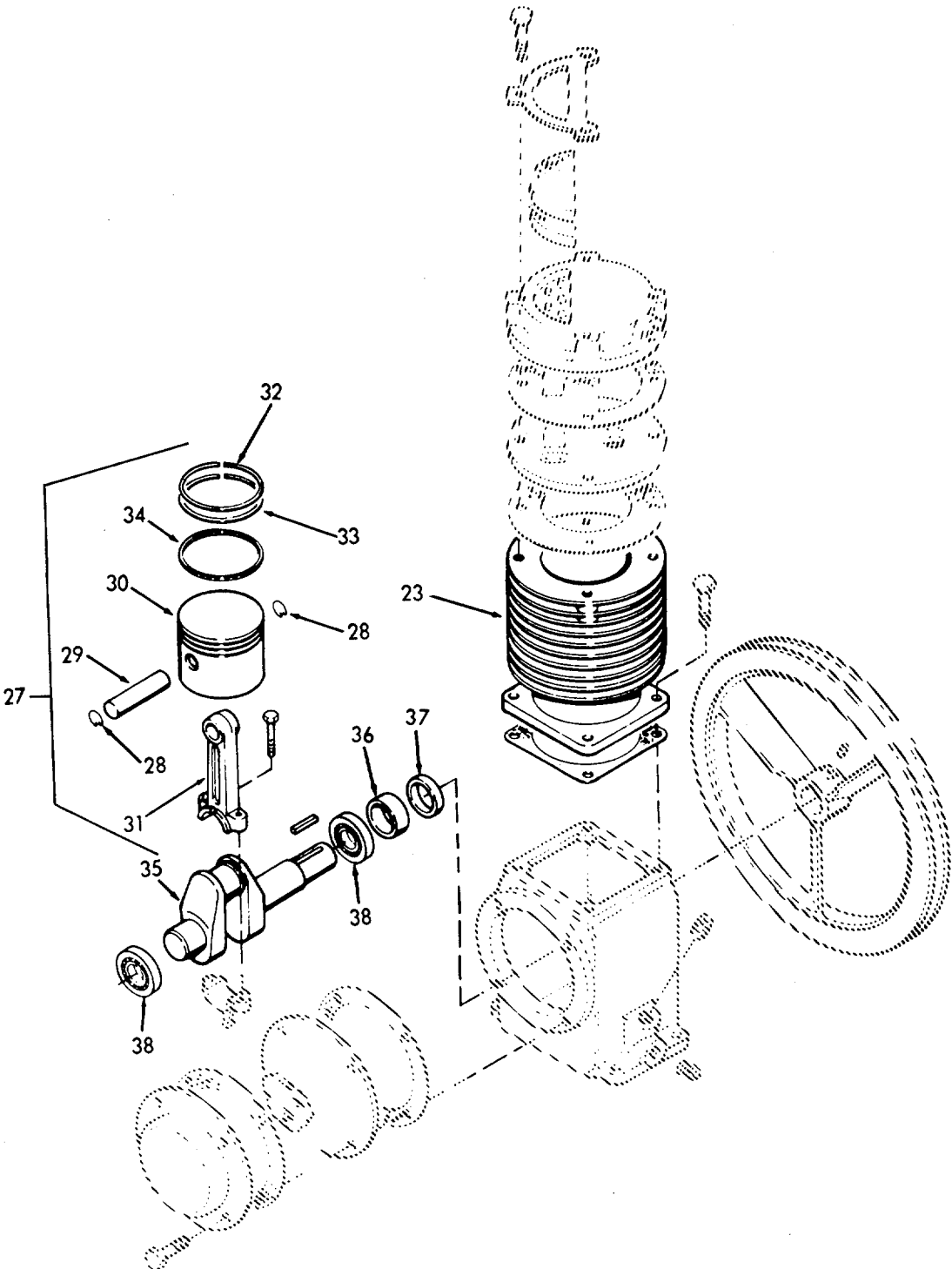
4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REPLACE (Cont)</div>	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) is located.	1. Disassemble. 2. Clean grooves. 3. Reassemble. 4. Reinstall. Reassemble.	Remember how the compression rings were located, and where the break
	p. Connecting rod (31), piston (30), piston pin (29), and retaining rings (28)		
	q. Crankshaft (35), bearing sleeve (36), oil seal (37), and bearings (38)	1. Disassemble new oil seal, and bearings. 2. Reassemble.	Replace with
	r. Piston assembly (27) assembly.	Install in cylinder (23).	Coat lightly with oil before

4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



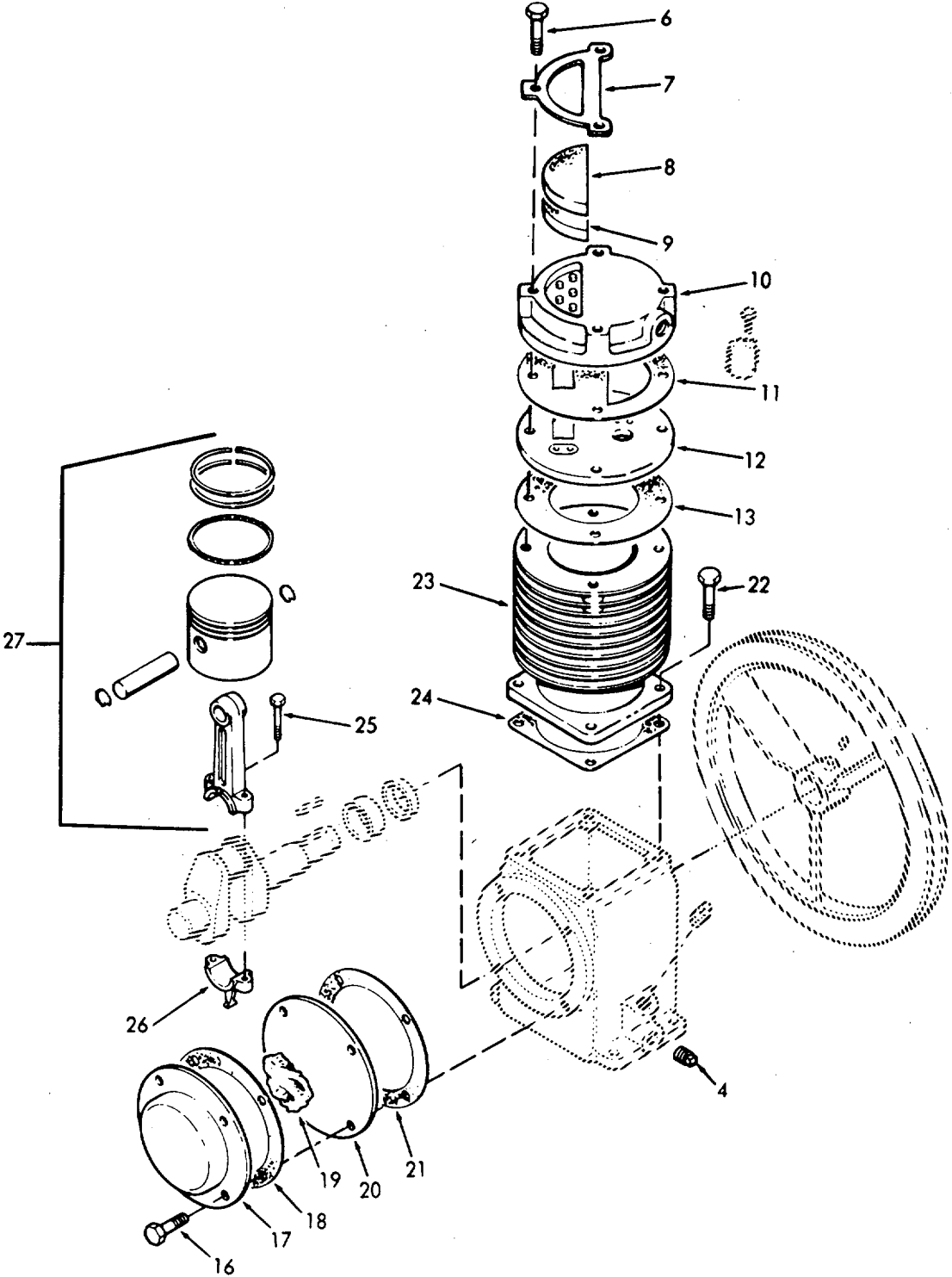
4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

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.	

4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)

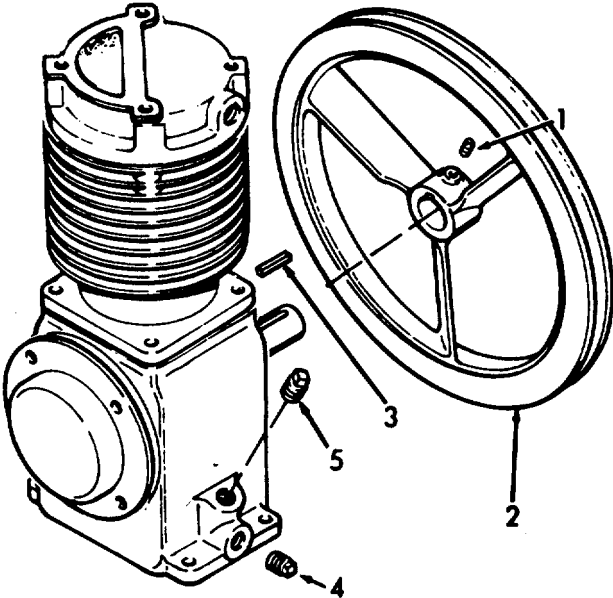


4-73. PORTABLE AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)

- y. Flywheel (2) and key (3) Install.
- z. Setscrew (1) Tighten.
- aa. Fill plug (5) 1. Fill with oil. 2. Install plug. Approximately 1 quart.



4-73.1. AIR HORN AIR COMPRESSOR HOSES, FITTINGS AND PIPING - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Repair

INITIAL SETUP:

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment Condition Condition Description
NONE

Materials/Parts
NONE

Special Environmental Conditions
NONE

Personnel required
1

General Safety Instructions
Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION



In order to avoid the possibility of shock, make sure the power to the compressor is disconnected.

- | | | |
|-------------------------------|----------------------|---|
| 1. Hoses, fittings and piping | a. Pressure gage | 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. |

**4-73.1. AIR HORN COMPRESSOR HOSES, FITTINGS AND PIPING - MAINTENANCE
INSTRUCTIONS (Continued).**

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
2. Hoses, fitting and piping	a. Elbow 1/2	Replace. inch (1)	If necessary.
	b. Reducer (2)	Replace.	If necessary.
	c. Pipe 1/2 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 1/2 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.

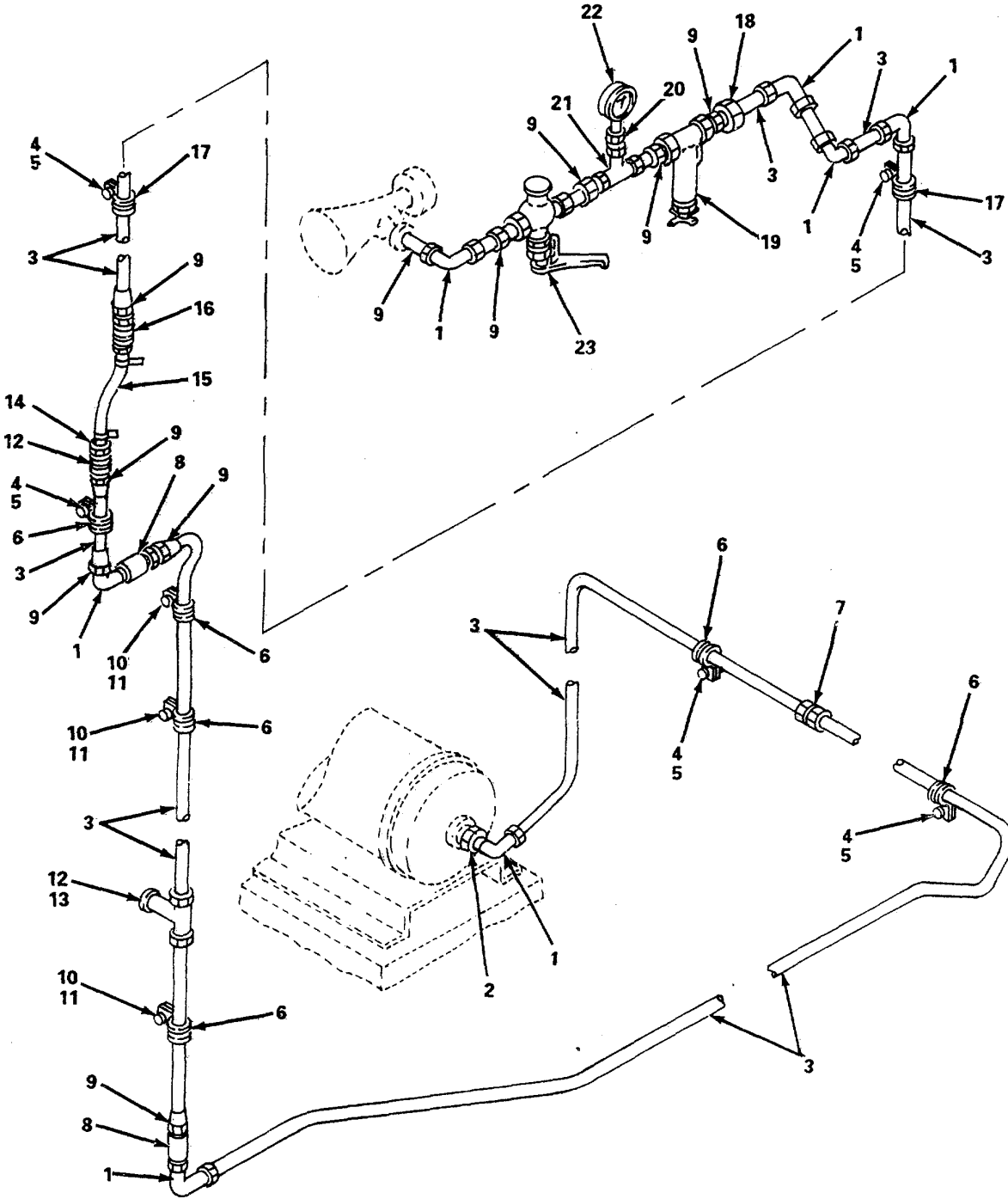
**4-73.1. AIR HORN COMPRESSOR HOSES, FITTINGS AND PIPING - MAINTENANCE
INSTRUCTIONS (Continued).**

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 gage (22)	Replace.	If necessary.
	w. Manual valve (23)	Replace.	If necessary.

4-73.1. AIR HORN COMPRESSOR HOSES, FITTINGS AND PIPING - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-73.2. AIR HORN COMPRESSOR - MAINTENANCE INSTRUCTIONS .

This task covers:

- a. Inspection
- b. Replace
- c. Repair

INITIAL SETUP:

Test Equipment
NONE

References
Table 2-16 TM 55-1905-220-1

Special Tools
Arbor Press
Piston pin removal tools
Ring compressor

Equipment
Condition Condition Description
NONE

Material/Parts
Oil, MIL-L-2104
Type OE/HDO-20

Special Environmental Conditions
Use the oil separation and recovery system to collect drained oil.

Personnel Required
1

General Safety Instructions
Observe WARNING in this procedure.

LOCATION	ITEM	ACTION	REMARKS
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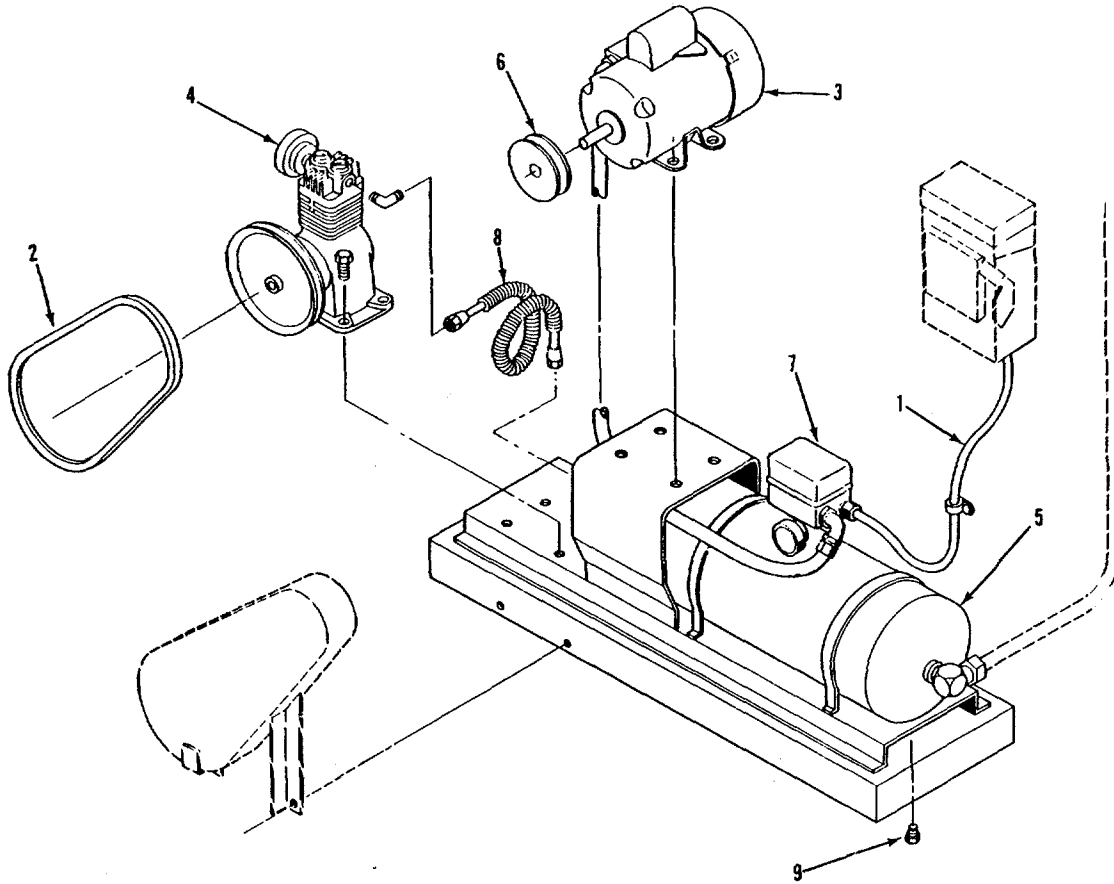
In order to avoid the possibility of shock, make sure the power to the compressor is disconnected.

INSPECTION

1. Air Horn air com-	a. Power cable (1)	Inspect for breaks, wear, and damage. pressor
	b. Drive belt (2)	Inspect for breaks, wear, and damage.
	c. Motor (3) damage.	Inspect for signs of

4-73.2. AIR HORN COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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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 mounting hardware Loosen.

4-73.2. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
	b. Motor (3) (2).	Slide to loosen belt	
	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 mount- ing hardware	Remove.	
	b. Belt (2)	Remove.	
	c. Motor (3)	Remove.	
	d. Pulley (6)	Loosen setscrew and remove pulley.	
	e. Motor (3) and hardware	Install new motor.	
	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.	

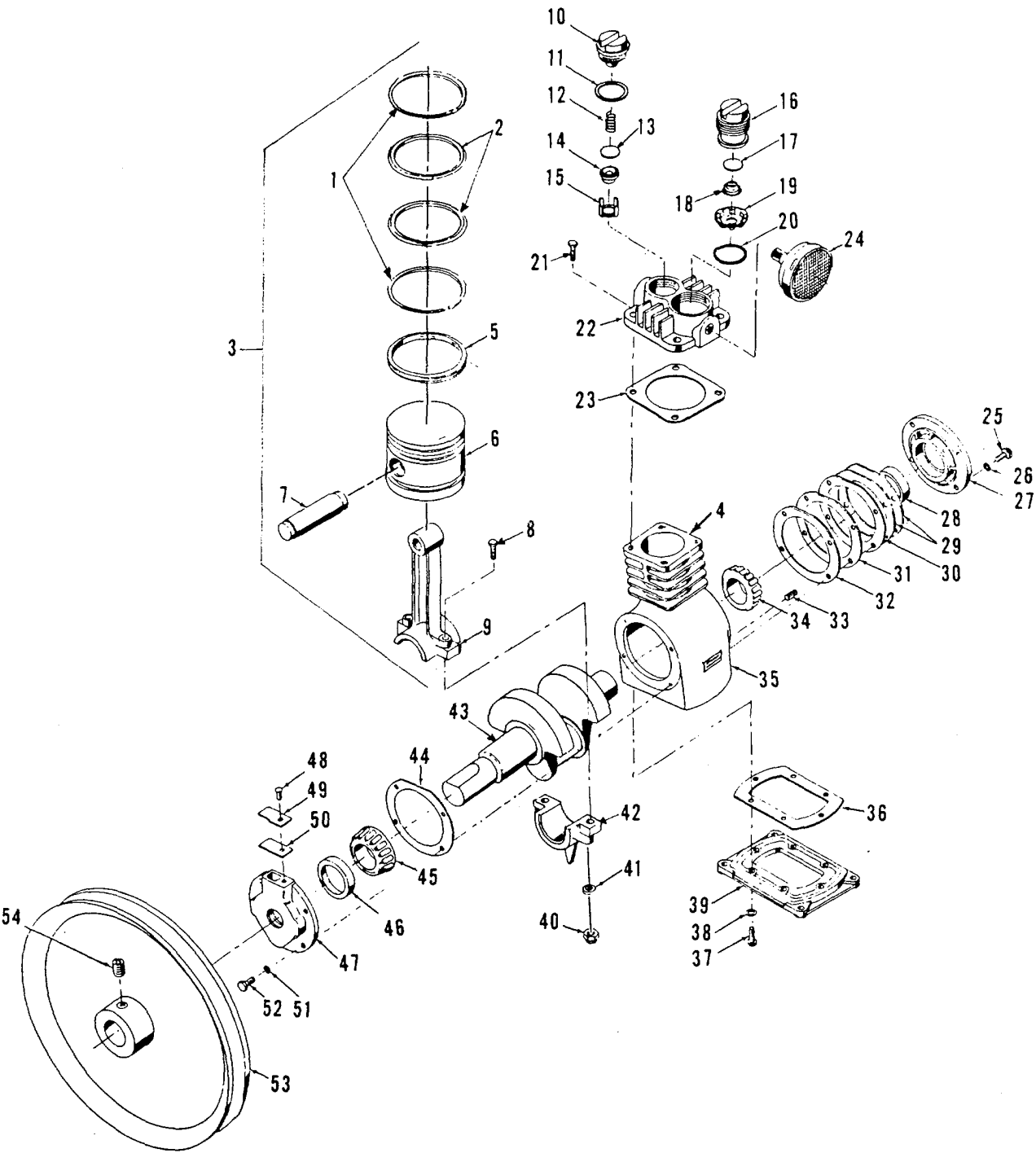
4-73.2. AIR HORN COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
5. Compressor	c. Pressure switch (7) assembly	Install.	
	d. Power cables (1)	Install.	
	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.	
6. Drain plug	e. Belt (2)	Install.	Refer to step 2 .
	a. Drain plug (9)	Replace.	If necessary.

Change 1 4-1498.8

4-73.2. AIR HORN COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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4-73.2. AIR HORN COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR			
7. Compressor	a. Setscrew (54)	Loosen.	
	b. Flywheel (53)	Remove.	
	c. Drain plug (33)	Drain oil into a suitable container.	Dispose of oil properly. Torque @ 70 ft-lbs dry threads.
	d. Suction seat valve (16)	Remove.	
	e. Disc valve (17)	Remove.	
	f. Spring valve (18)	Remove.	
	g. Bumper valve (19)	Remove.	
	h. Gasket valve (20)	Remove.	
	i. Bumper 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.	

4-73.2. AIR HORN COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

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- 220-14-1.
	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.	

4-73.2. AIR HORN COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
	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.	

REPAIR (Cont)

4-73.2. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

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. 2. Clean grooves. 3. Reassemble. 4. Reinstall.	Remember how the compression Rings were located, and where the break is located.
	at. Connecting rod (9), piston (6) and piston pin (7)	Reassemble.	
	au. Crankshaft (43)	Remove, Check, and reinstall.	
	av. Crankshaft (43) assembly	Install into Compressor housing (35)	Coat lightly with oil before
	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.	

4-73.2. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

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.	

4-73.2. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	bn. Bearing carrier (47), washers (48), and bolts (49)	Install.	
	bo. Valve-crankcase breather (50)	Install.	
	bp. Bumper-crankcase 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.	

4-73.2. AIR HORN AIR COMPRESSOR - MAINTENANCE INSTRUCTIONS (Continued).

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
<p>The diagram illustrates the assembly of the air compressor. The main view shows the compressor unit with a flywheel (53) attached to the side. A drain plug (33) is located at the bottom of the unit. A detailed view of the flywheel shows a setscrew (54) used to secure it and a fill plug (55) for oil. The setscrew (54) is shown being tightened against the flywheel.</p>			
cg.	Drain plug (33)	Install.	
ch.	Flywheel (53)	Install.	
ci.	Setscrew (54)	Tighten.	
cj.	Fill plug (55) 1/4 pint	Fill with oil.	Approximately

4-74. DOORS, HATCHES, SCUTTLES AND MANHOLES - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection**
- b. Repair**
- c. 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
2

General Safety Instructions
Dog hatch or secure door while working on them.

LOCATION	ITEM	ACTION	REMARKS
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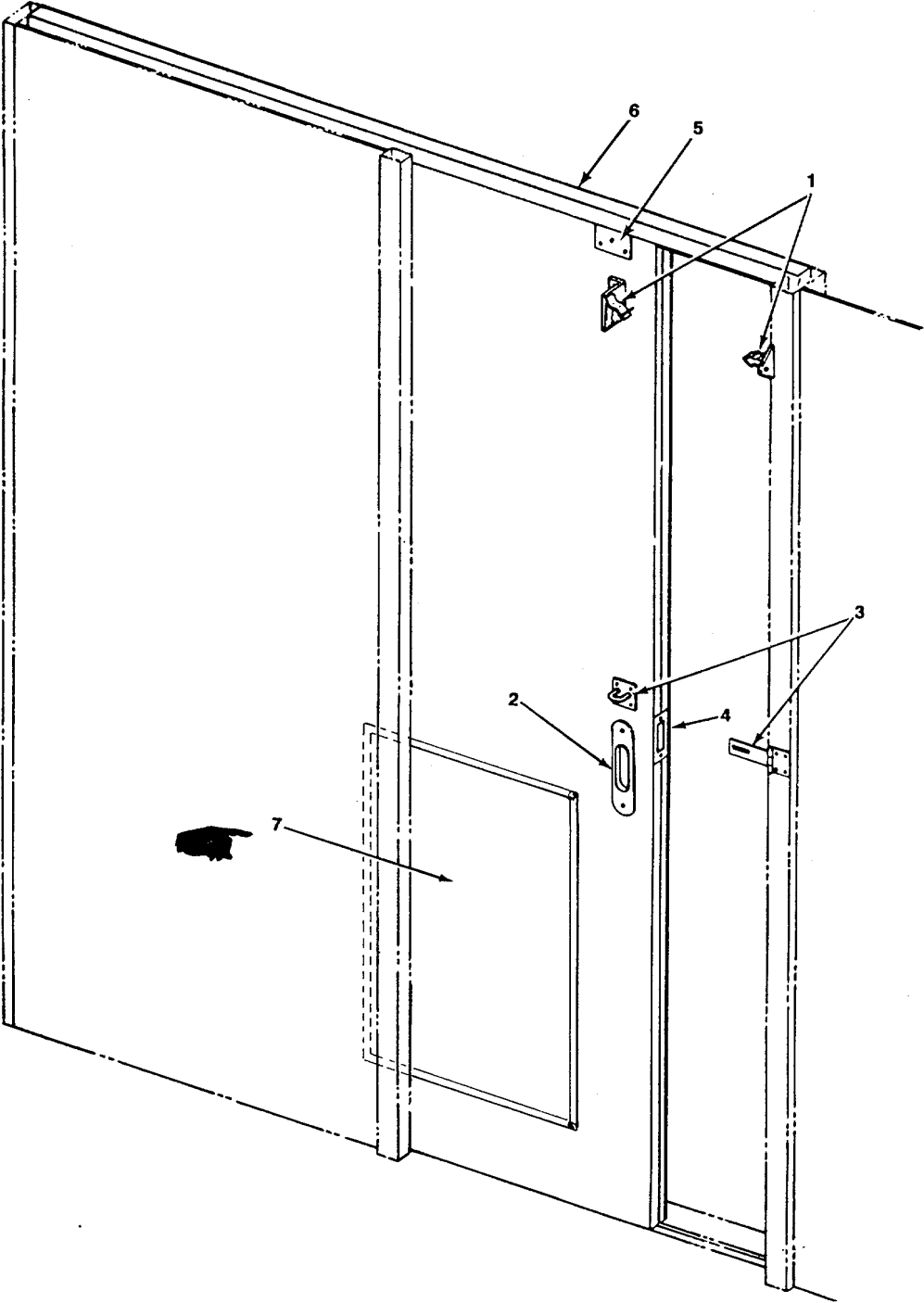
INSPECTION

1. Doors	a. Water tight doors	1. Inspect for bends, warping, and damage. 2. Insure proper operation.	For maintenance refer to Direct Support Maintenance.
	b. Sliding doors	1. Inspect for bends, warping, and damage. 2. Insure proper operation.	

4-74. DOOR, HATCHES, SCUTTLES AND MANHOLES - MAINTENANCE INSTRUCTIONS (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont'd)			
2. Hatches	Hatches	<ol style="list-style-type: none"> 1. Inspect for bends, warping, and damage. Inspect for leaks. 2. Insure proper operation. 	For maintenance refer to Direct Support Maintenance.
3. Scuttle	<ol style="list-style-type: none"> a. Scuttle b. Latches 	<ol style="list-style-type: none"> 1. Inspect for bends, warping, and damage. Inspect for leaks. 2. Insure proper operation. Inspect for broken or missing parts.	For maintenance refer to Direct Support Maintenance.
4. Manholes	Manholes	<ol style="list-style-type: none"> 1. Inspect for leaks. 2. Insure all hardware is tight. 	
REPAIR			
5. Sliding door	<ol style="list-style-type: none"> a. Door stop and holder (1) b. Flush door pull (2) c. Hasp and staple (3) d. Catch (4) e. Hanger (5) f. Track (6) g. Kickout panel (7) 	Replace. Replace. Replace. Replace. Replace. Replace.	If necessary. If necessary. If necessary. If necessary. If necessary. If damaged.

4-74. DOORS, HATCHES, SCUTTLES AND MANHOLES - MAINTENANCE
INSTRUCTIONS (Continued).

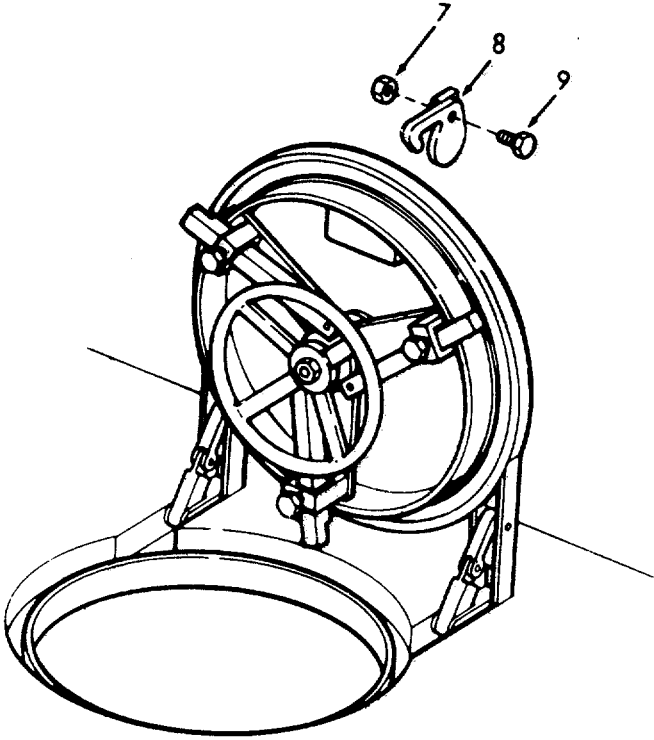


4-74. DOOR, HATCHES, SCUTTLES AND MANHOLES - MAINTENANCE INSTRUCTIONS (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

6. Scuttles	a. Nut (7)	Replace.	If necessary.
	b. Holder (8)	Replace.	If necessary.
	c. Screw (9)	Replace.	If necessary.

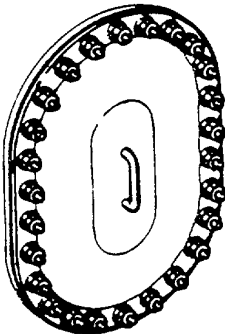


4-74. DOOR, HATCHES, SCUTTLES AND MANHOLES - MAINTENANCE INSTRUCTIONS (Cont'd).

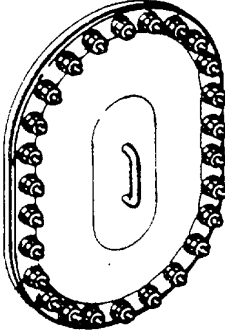
LOCATION	ITEM	ACTION	REMARKS
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REPLACE

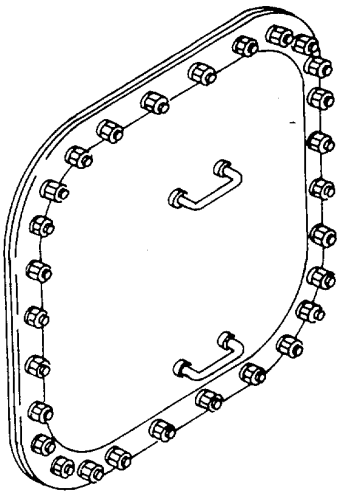
7. Manholes Replace manhole or gaskets if necessary.



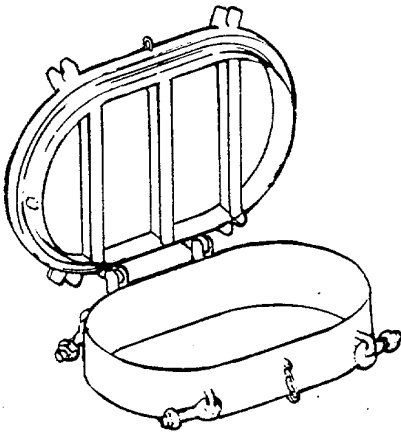
SALT WATER BALLAST TANK



DIESEL OIL TANK



RAMP WINCH ROOM



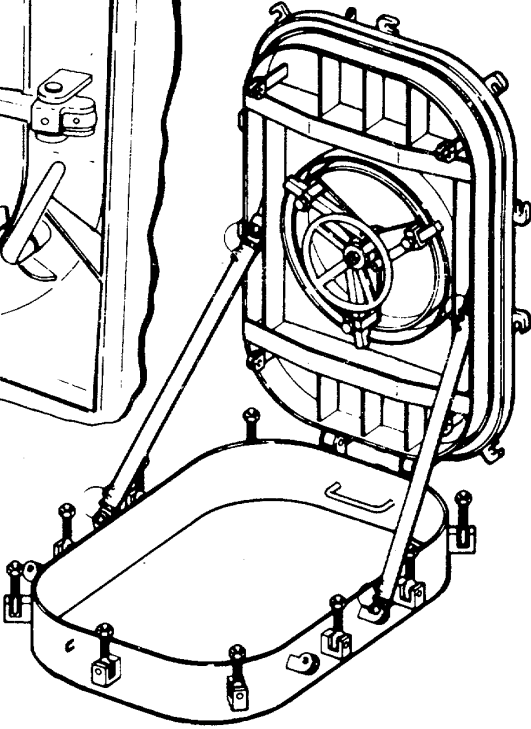
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4-74. DOOR, HATCHES, SCUTTLES AND MANHOLES - MAINTENANCE INSTRUCTIONS (Cont'd).

LOCATION	ITEM	ACTION	REMARKS
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WATERTIGHT DOOR
(TYPICAL)



HATCH
(TYPICAL)

4-75. CONNING TOWER AND AIRPORTS - MAINTENANCE

This task covers:

a. Inspection

b. Replace/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
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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 damage components. 2. Insure all hardware is tight.	
2. Airports	a. Hardware	Inspect for missing or damaged parts.	
	b. Screens	Inspect for damage.	

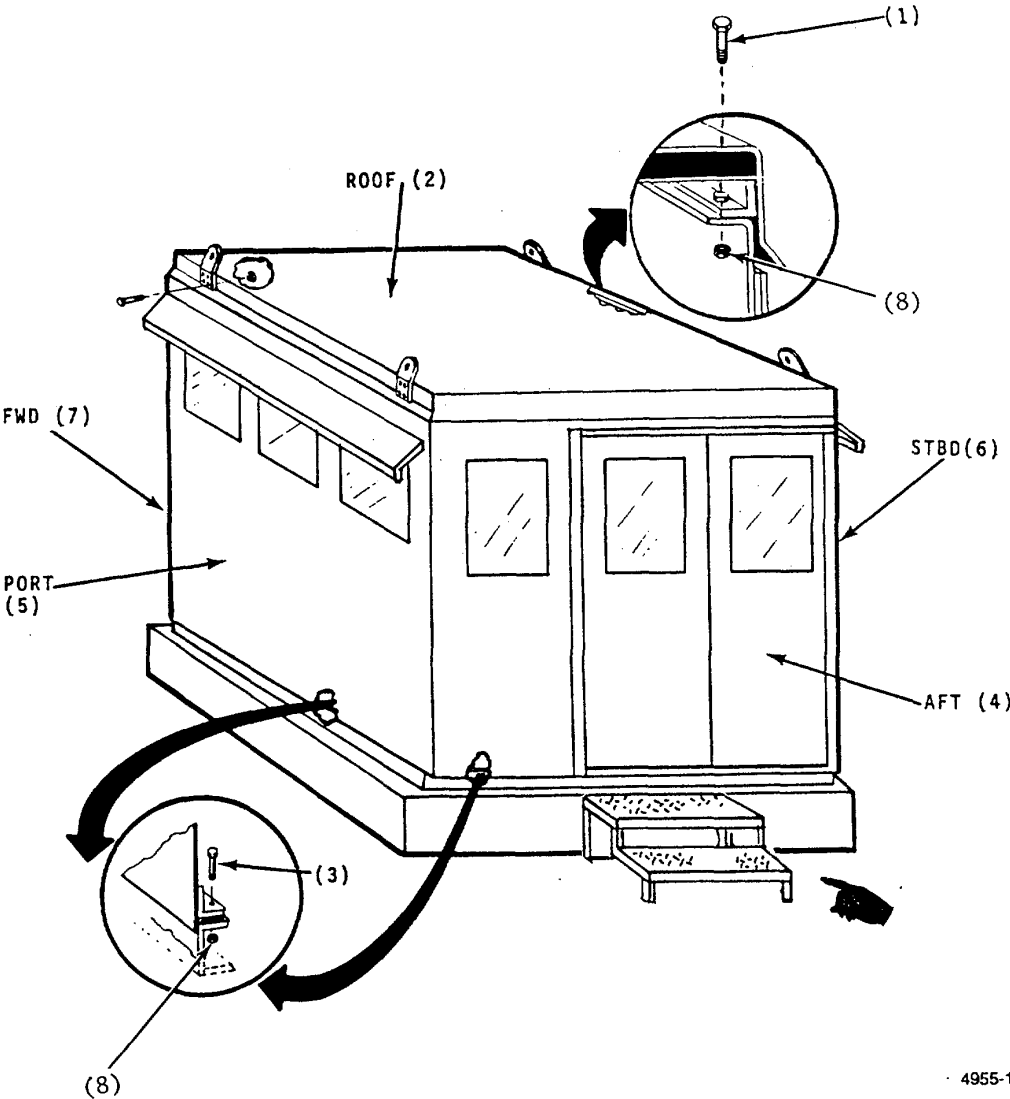
4-75. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS (Continued).

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 (2), (4), (5), (6), (7)	Repair or Replace	As required
	b. Plain hexnut and screw, (1), (3), (8),	Replace	As required
	c. Windows	Replace	As required
	d. Hinged window adjusters (pair)	Replace	As required

4-75. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION ITEM ACTION REMARKS

REPLACE/REPAIR (Cont)



4955-186

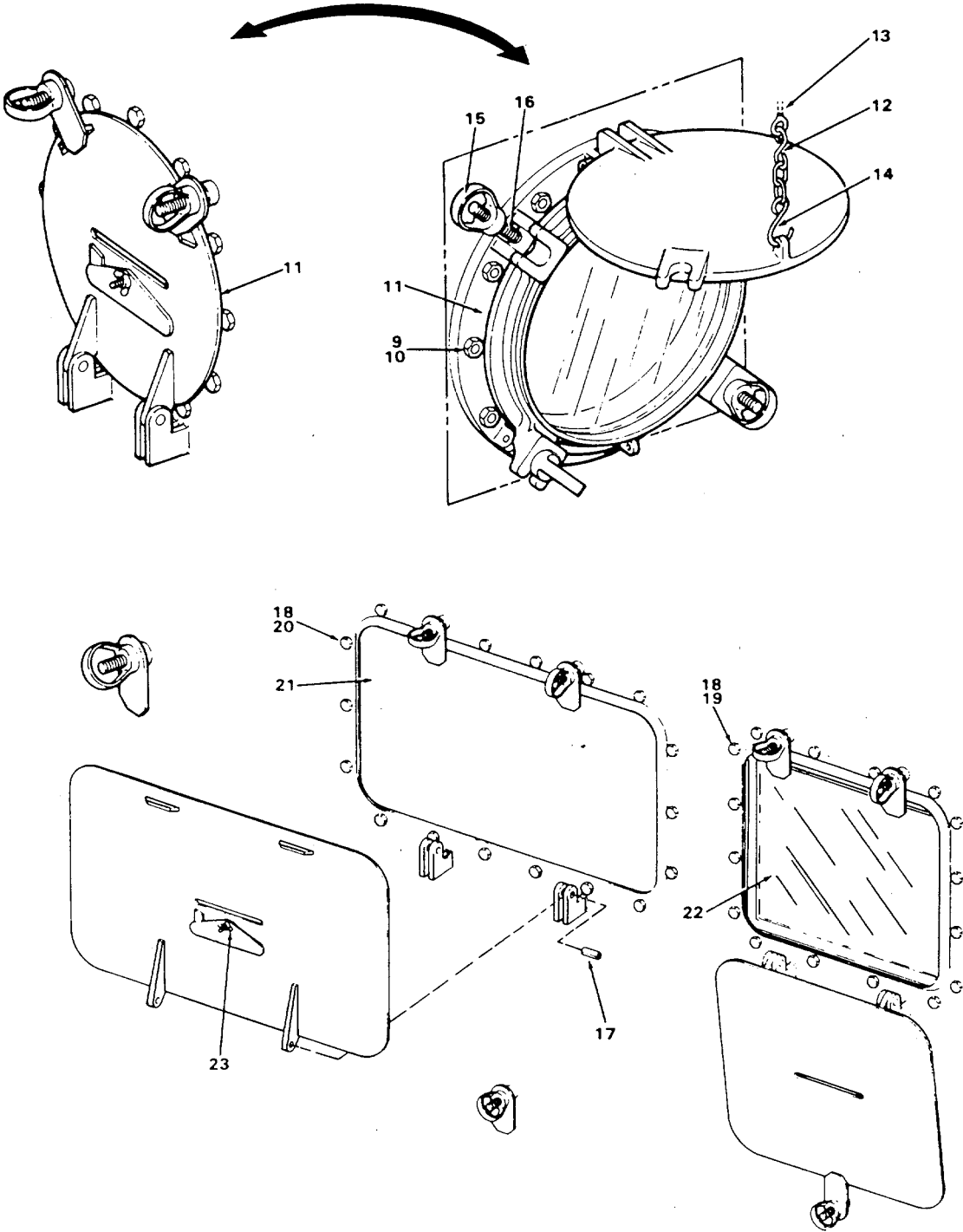
4-75. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE/REPAIR (Cont)			
4. Airports	a. Selflocking nut (9)	Replace.	As required.
	b. Hexhead cap screw (10)	Replace.	As required.
	c. Airport w/18 mesh screen and cover (11)	Repair or Replace.	As required.
	d. 1/4 inch twist chain link (12)	Replace.	As required.
	e. Eyebolt (13)	Replace.	As required.
	f. Hook (14)	Replace.	As required.
	g. Ring nut (15)	Replace.	As required.
	h. Shoulder stud (16)	Replace.	As required.
	i. Spring pin (17)	Replace.	As required.
	j. Selflocking nut (18)	Replace.	As required.
	k. Screw (19)	Replace.	As required.
	l. Screw (20)	Replace.	As required.
	m. 26x15 inch fixed window (21)	Replace.	As required.
	n. Sliding vertical window (22)	Replace.	As required.
	o. Wing nut (23)	Replace.	As required.

4-75. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS (Continued).

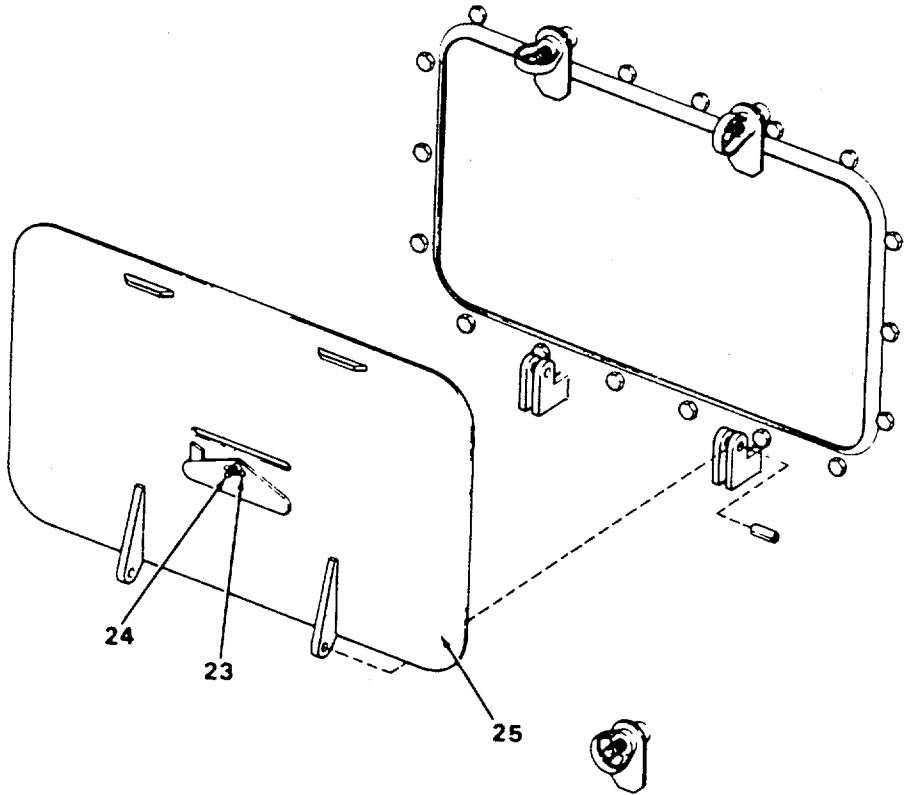
LOCATION ITEM ACTION REMARKS

REPLACE/REPAIR (Cont)



4-75. CONNING TOWER AND AIRPORTS - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE/REPAIR (Cont)			
	p. Screw (24)	Replace.	As required.
	q. Battle cover window (25)	Replace.	As required.



4-76. MOORING AND TOWING FITTINGS - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection

INITIAL SETUP

Test Equipment
NONE

References
NONE

Special Tools
NONE

Equipment Condition Condition Description
NONE

Material/Parts
NONE

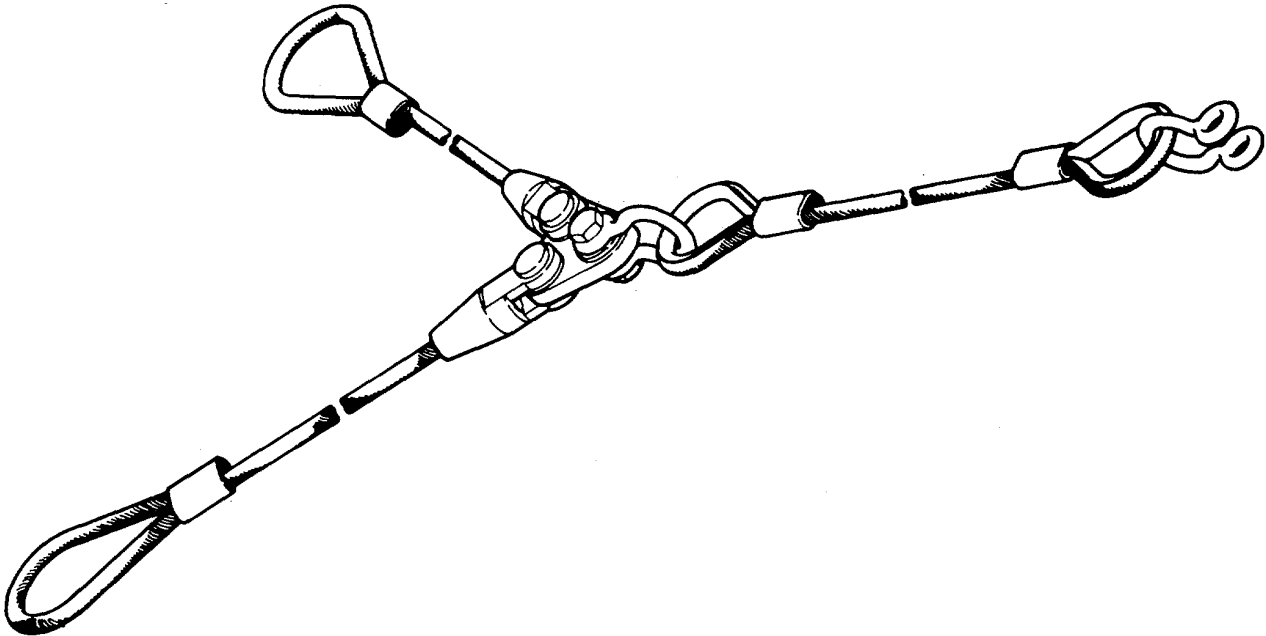
Special Environmental Conditions
NONE

Personnel Required
1

General Safety Instructions
NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION



4-77. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS.

This task covers:

- a. Inspection
- b. Test
- c. Replace
- 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. |

4-77. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
INSPECTION (Cont)			
	e. Wiring	Inspect for worn or damaged wiring.	
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		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	<ol style="list-style-type: none"> 1. Disconnect wiring and replace. 2. Reconnect wiring. 3. Test. 	
	b. Battery	<ol style="list-style-type: none"> 1. Disconnect wiring and replace. 2. Reconnect wiring. 3. Charge battery for at least 24 hours. 4. Test light. 	

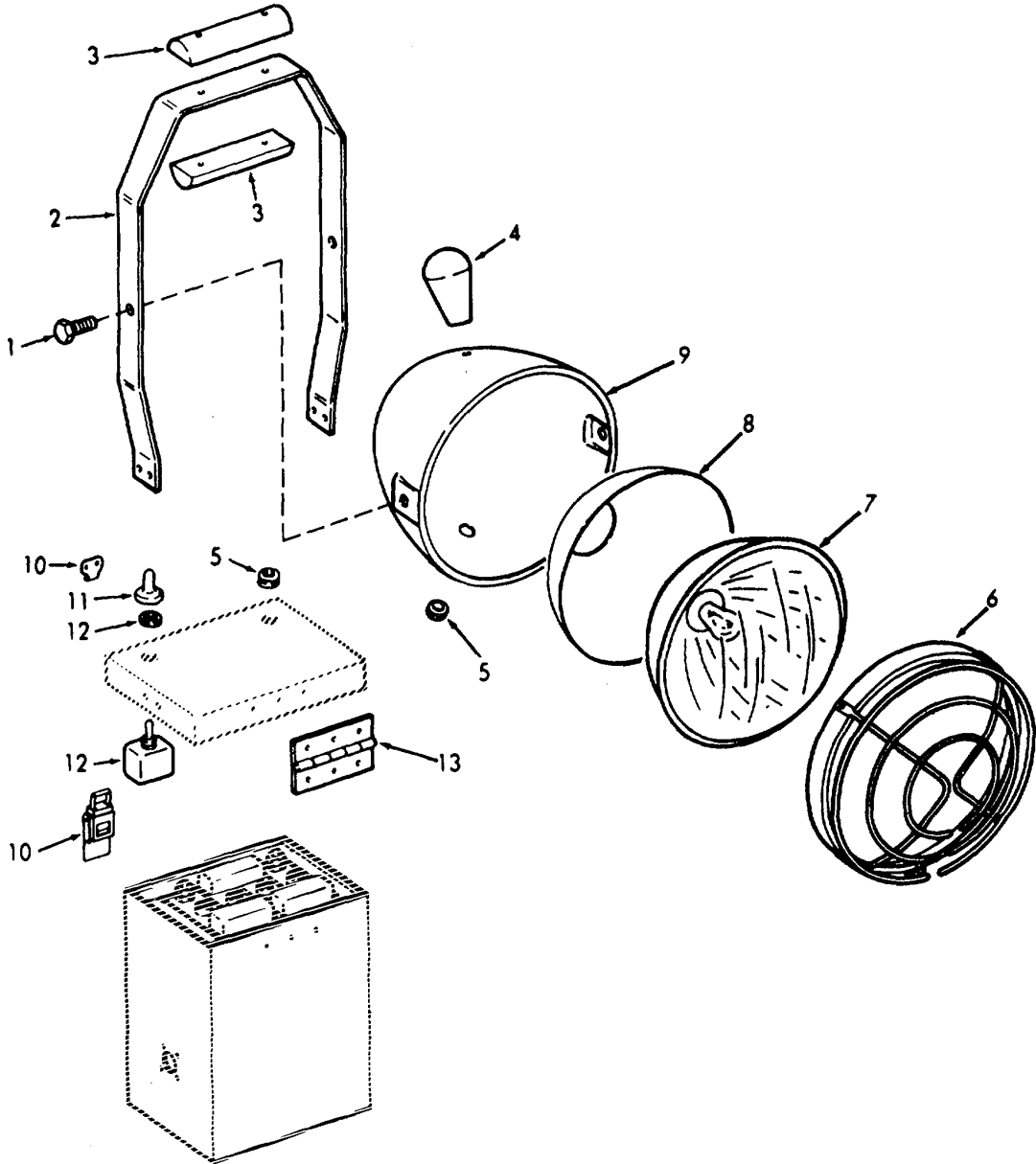
4-77. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

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. all 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.

4-77. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

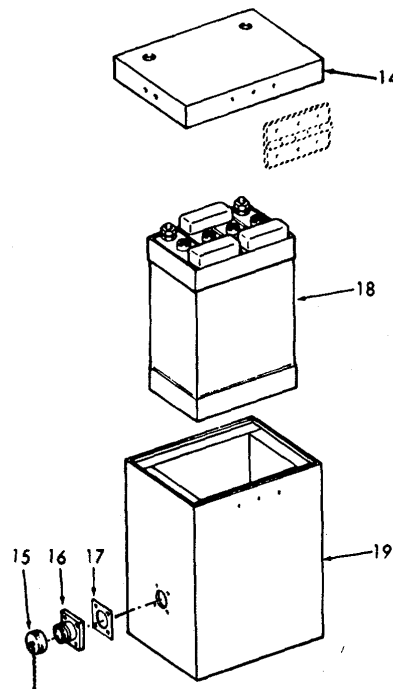
LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-77. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

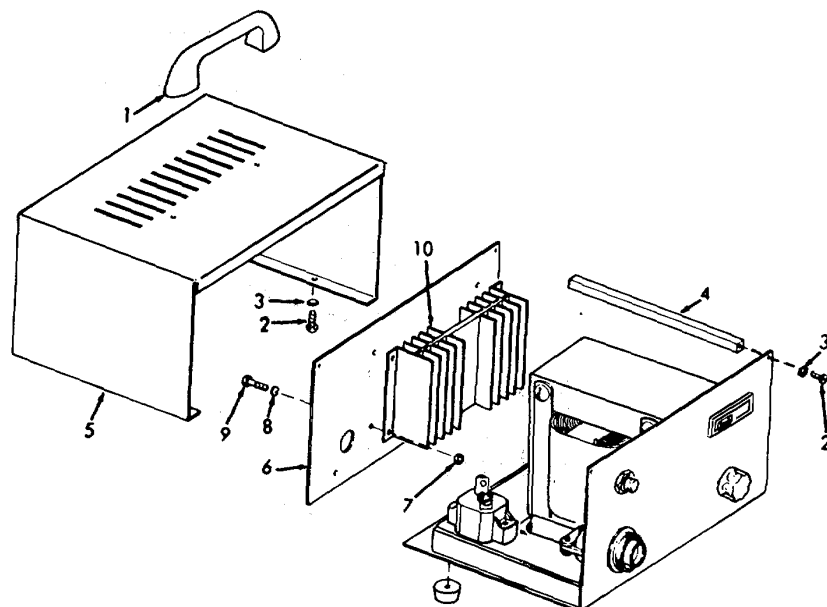
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	n. Cover (14)	Repair by replacement.	As required.
	o. Dust cap (15)	Repair by replacement.	As required.
	p. Connector (16)	Repair by replacement.	As required.
	q. Gasket (17)	Repair by replacement.	As required.
	r. LR4/80 battery assembly (18)	Repair by replacement.	As required.
	s. Case (19)	Repair by replacement.	As required.



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4-77. 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 sin (10)	Repair by replacement.	As required.



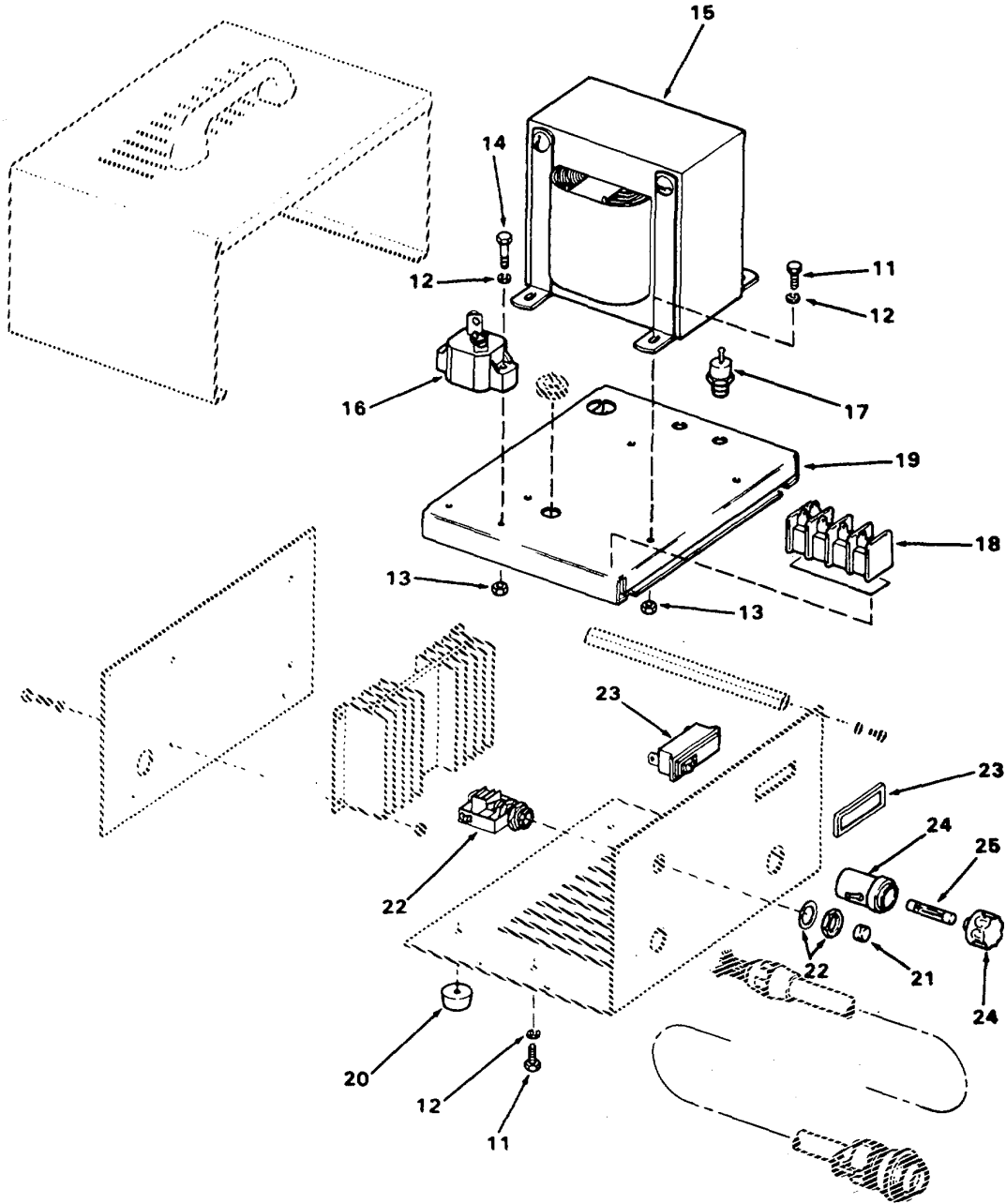
4-77. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

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.

4-77. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



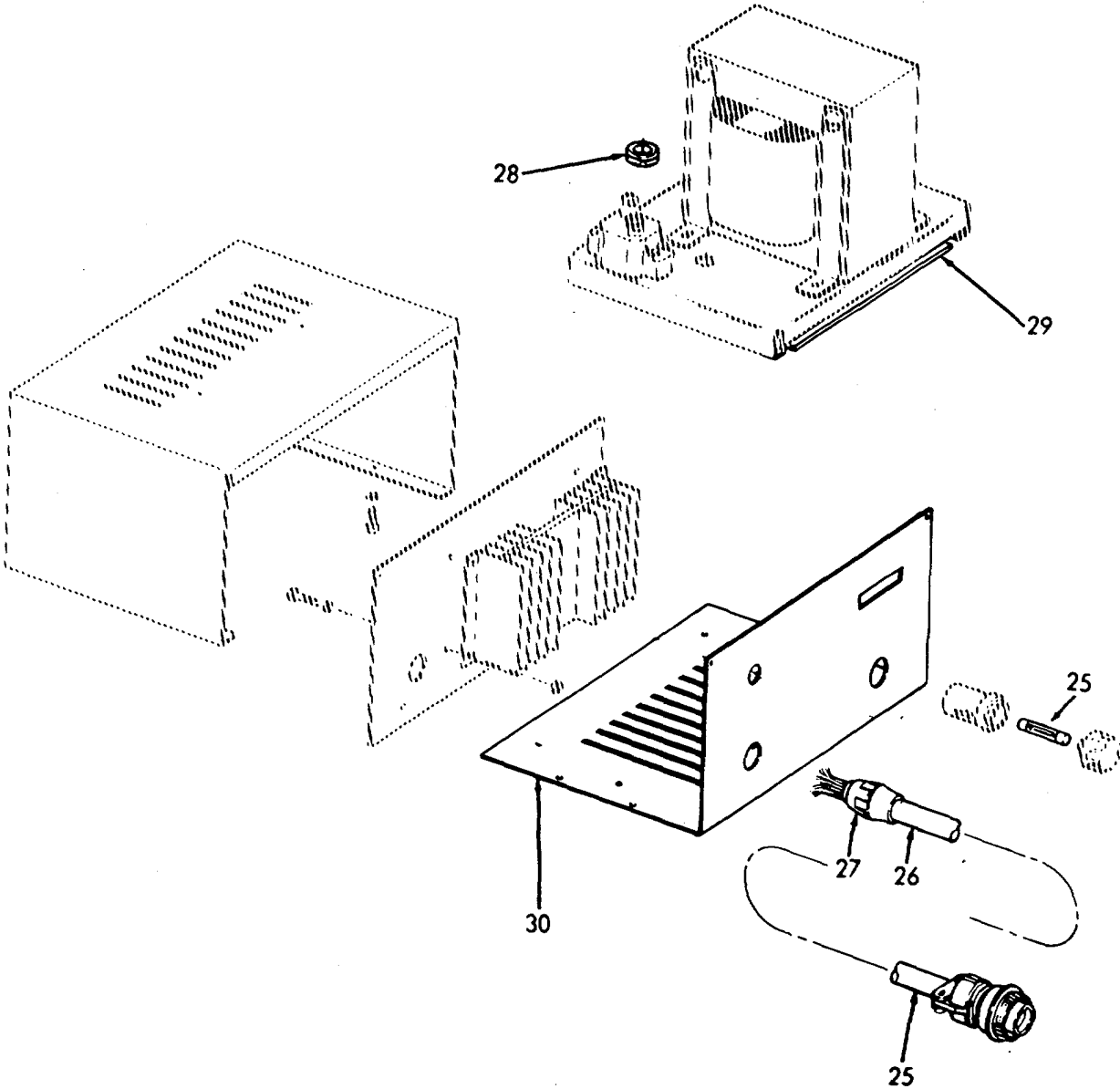
4-77. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

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.

4-77. HIGH INTENSITY LIGHT - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-78. WINDSHIELD WIPER - MAINTENANCE INSTRUCTION.

The following is an index to the maintenance procedures.

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Windshield Wiper Control (Pilothouse)	4-78.1
Windshield Wiper Assembly (Pilothouse)	4-78.2
Windshield Wiper Motor (Pilothouse)	4-78.3
Windshield Wiper Control (Conning Tower)	4-78.4
Windshield Wiper Assembly (Conning Tower)	4-78.5

4-78.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS.

This task covers:

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

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 WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
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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.	

4-78.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS
(Pilothouse) (Continued) .

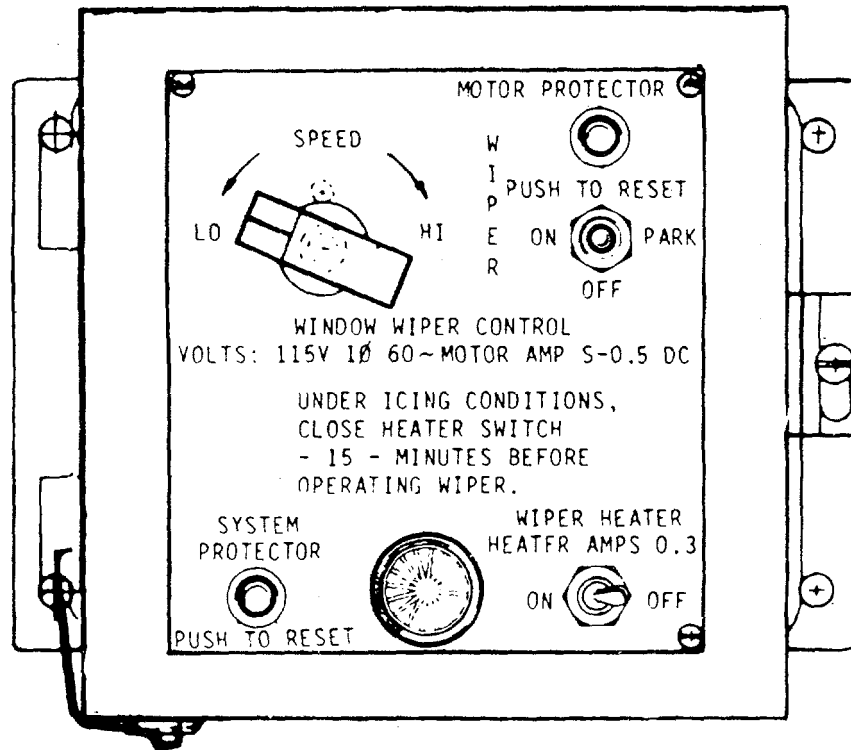
LOCATION	ITEM	ACTION	REMARKS
TEST			
2. System	a. Wiper	<ol style="list-style-type: none"> 1. Place the ON-OFF-PARK switch in the ON position. 2. Adjust SPEED from HI to LO. 3. Place the ON-OFF-PARK switch in the OFF position. 4. Joggle the ON-OFF-PARK switch in the PARK position. 5. Place the WIPER HEATER switch in the ON position. 6. Place the WIPER HEATER switch in the OFF position. 	<p>Does the wiper move back and forth? See step 4.</p> <p>Does the speed of the wiper increase or decrease? See step 9.</p> <p>Does the wiper stop? See step 4.</p> <p>Does the wiper park in the desired position? See step 4.</p> <ol style="list-style-type: none"> 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. a. Does the indicator lamp go out. See step 8. b. Does the wiper arm cool? See step 6

4-78.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS
(Pilothouse)

LOCATION	ITEM	ACTION	REMARKS
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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. |
|------------|--|------------------------------|

4-78.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

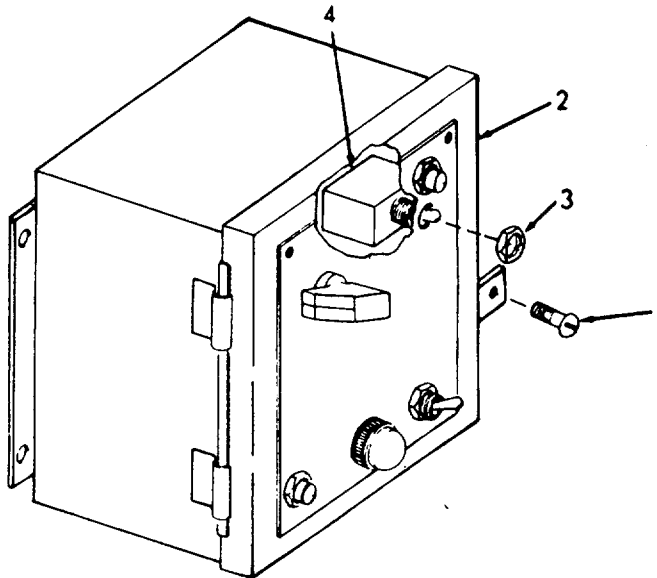
LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

NOTES

- Tag all wiring prior to disconnecting.
- Use a soldering iron with a maximum rating of 25 watts.
- Refer to schematic on page 4-1530.

4. ON-OFF-PARK switch	a. Wiring	Disconnect.
	b. Locknut (3)	Remove.
	c. Switch (4)	Remove and install new switch.
	d. Locknut (3)	Install.
	e. Wiring	Reconnect.



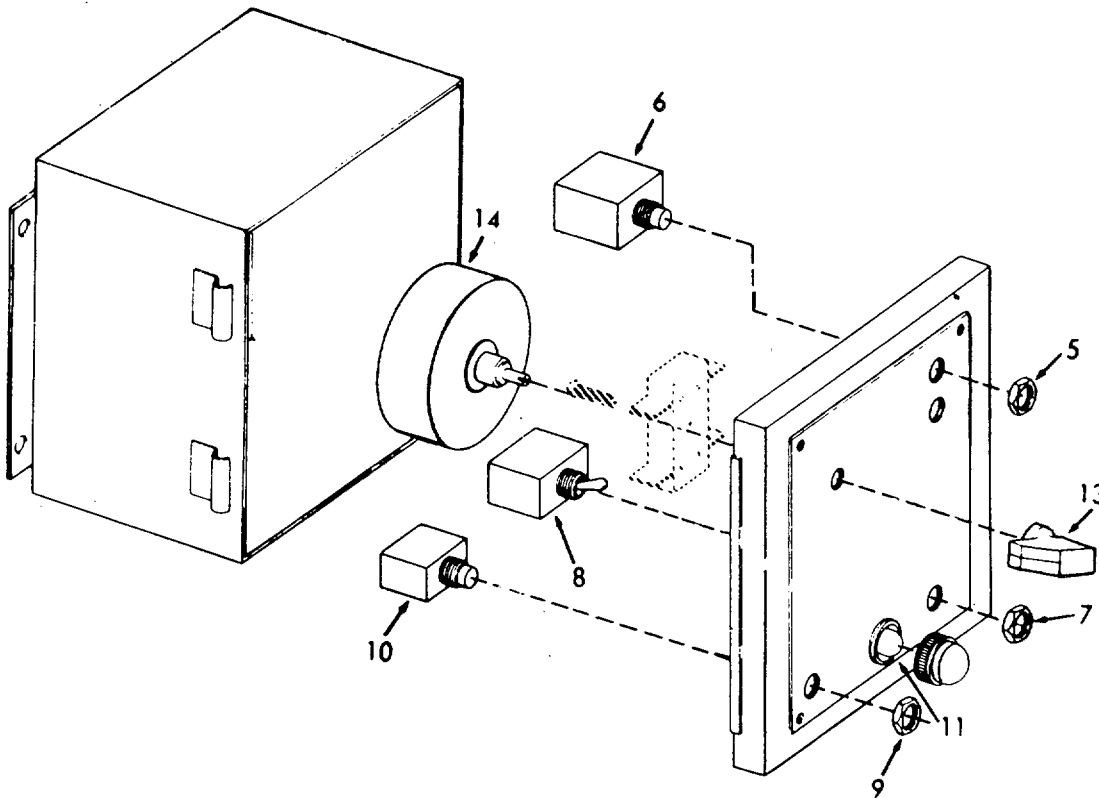
Change 1 4-1525

4-78.1. 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.

4-78.1. 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.	



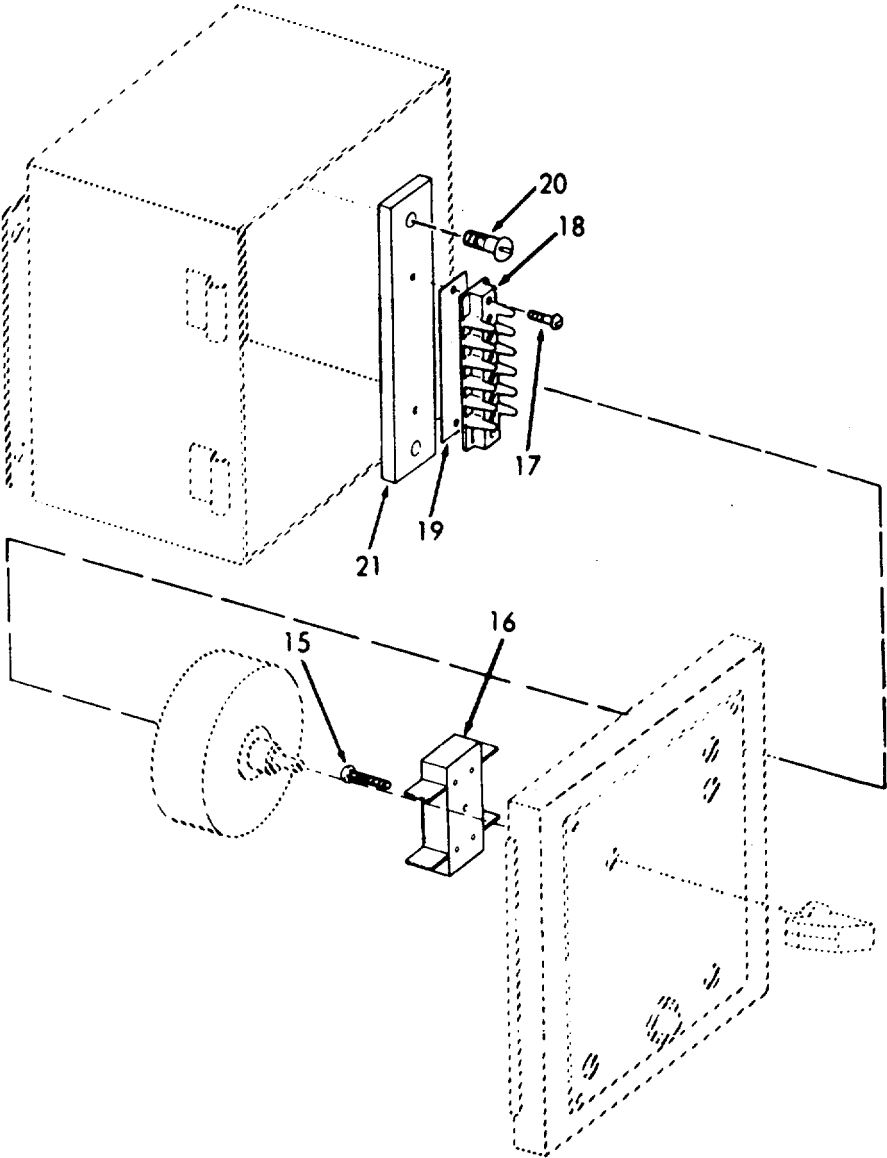
4-78.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

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 (177)	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.	

4-78.1. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS (Pilothouse) (Cont inued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-78.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse).

This task covers:

a. Inspection

b. Replace

c. Repair

INITIAL SETUP:

Test Equipment

NONE

References

Paragraph
4-78.1 Windshield Wiper Control

Special Tools

NONE

Equipment

Condition Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

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

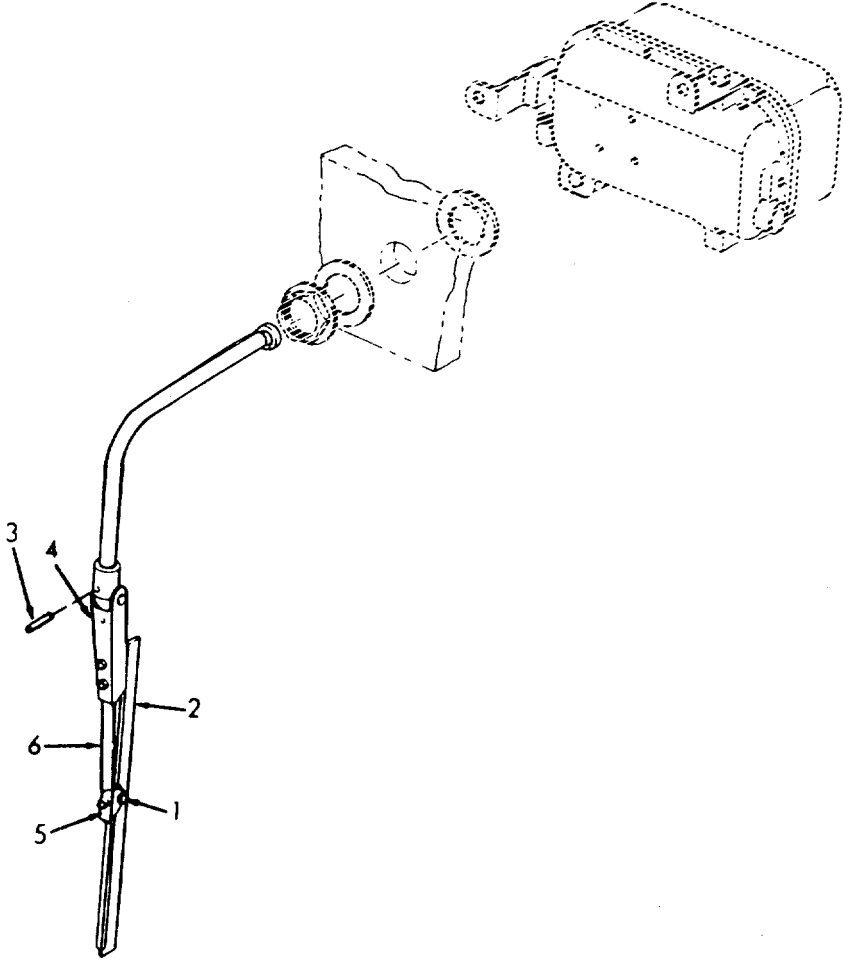
- | | | |
|------------------------------|----------------|--|
| 1. Windshield wiper assembly | a. Wiper blade | Inspect for breaks, cracks, and signs of wear. |
|------------------------------|----------------|--|

4-78.2. 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 assembly (5)	Remove.	
	d. Lower arm (6)	Replace.	Bend and cut to proper angle and length.

4-78.2. 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.	



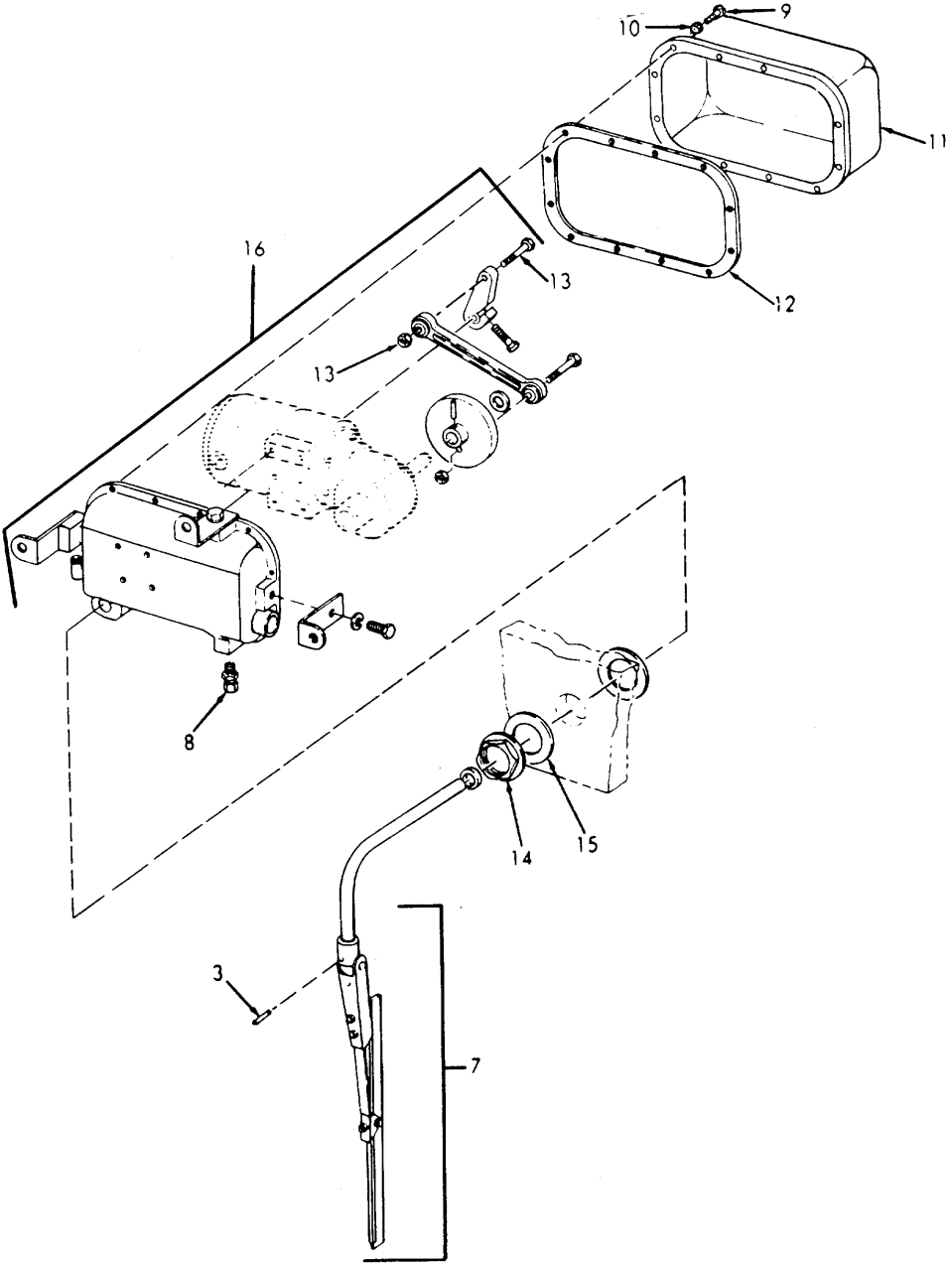
4-78.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (C ontinued).

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 4-78.1 .
	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.	Wiper assembly is removed through bulkhead without removal of heated arm assembly from motor assembly.
		2. Remove.	
	3. Replace.		
	j. Bulkhead washer (15) and gland nut (14)	Install.	

4-78.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPLACE (Cont)



4-78.2. 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 4-78.1 .
	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.

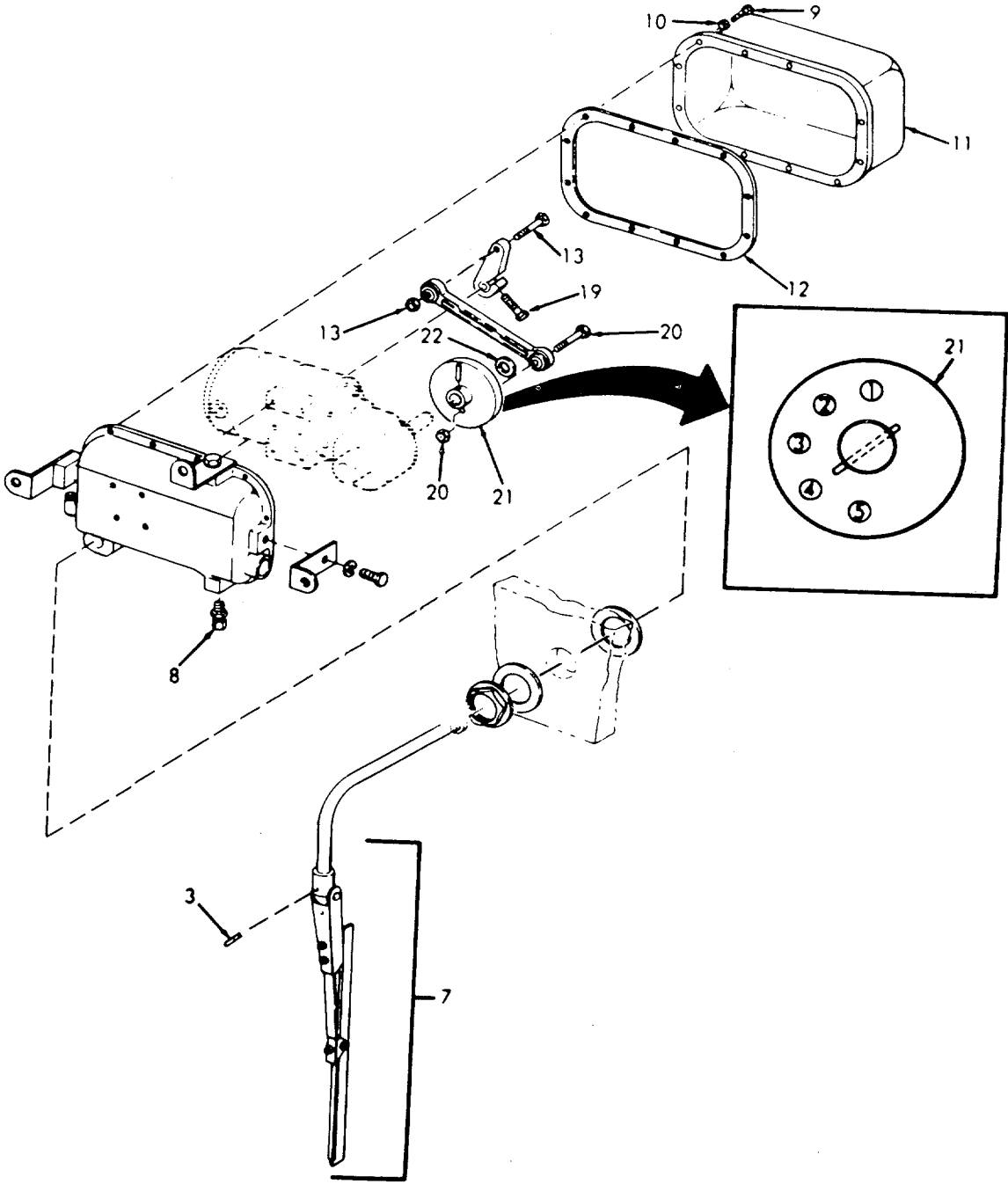
ARM TRAVEL CHART

<u>Hole</u>	<u>Total Travel</u>	
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

4-78.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION ITEM ACTION REMARKS

REPLACE (Cont)



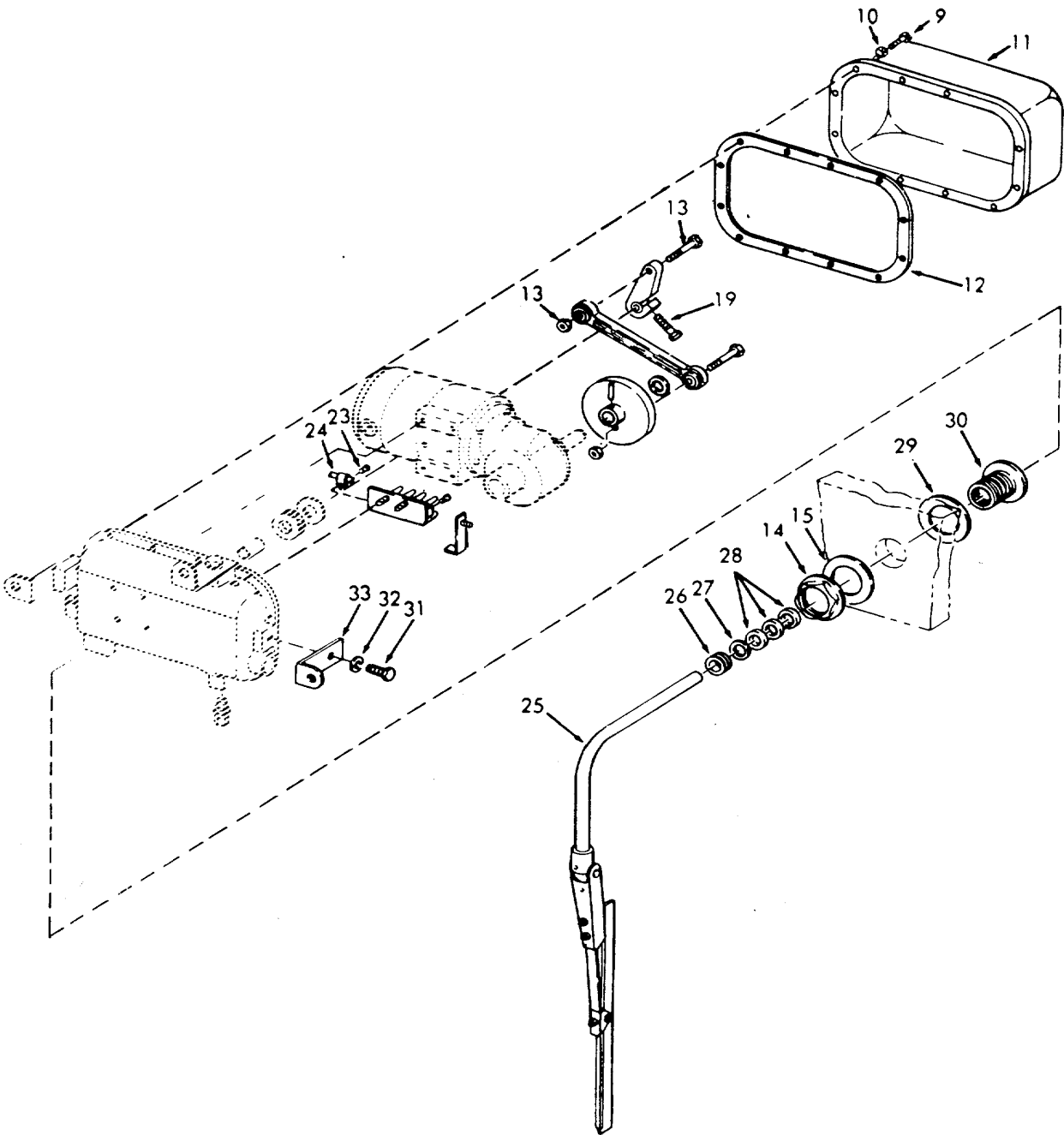
4-78.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

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.	

4-78.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

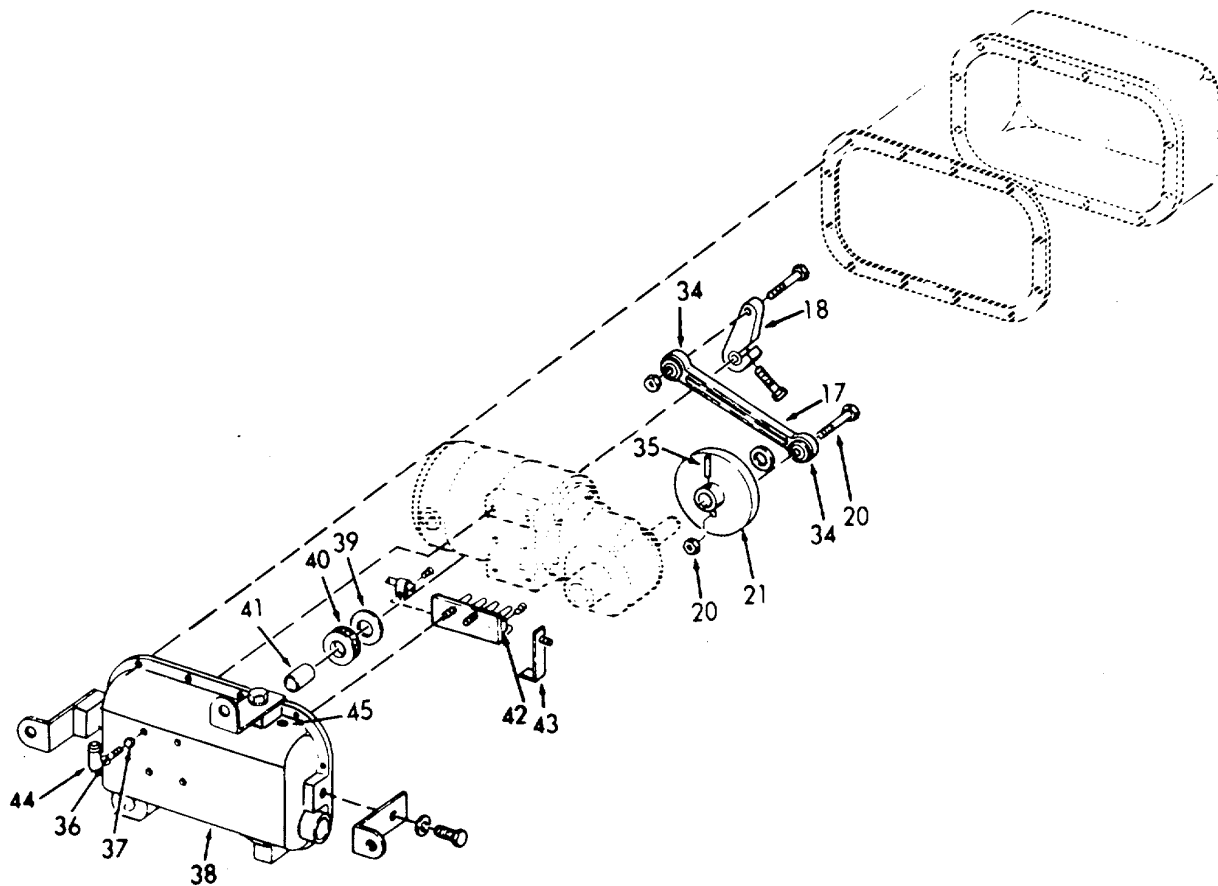


4-78.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

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 (35)	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.	

4-78.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	t. Motor crank Install. disc (21) and pin (35)		
	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.	



4-78.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

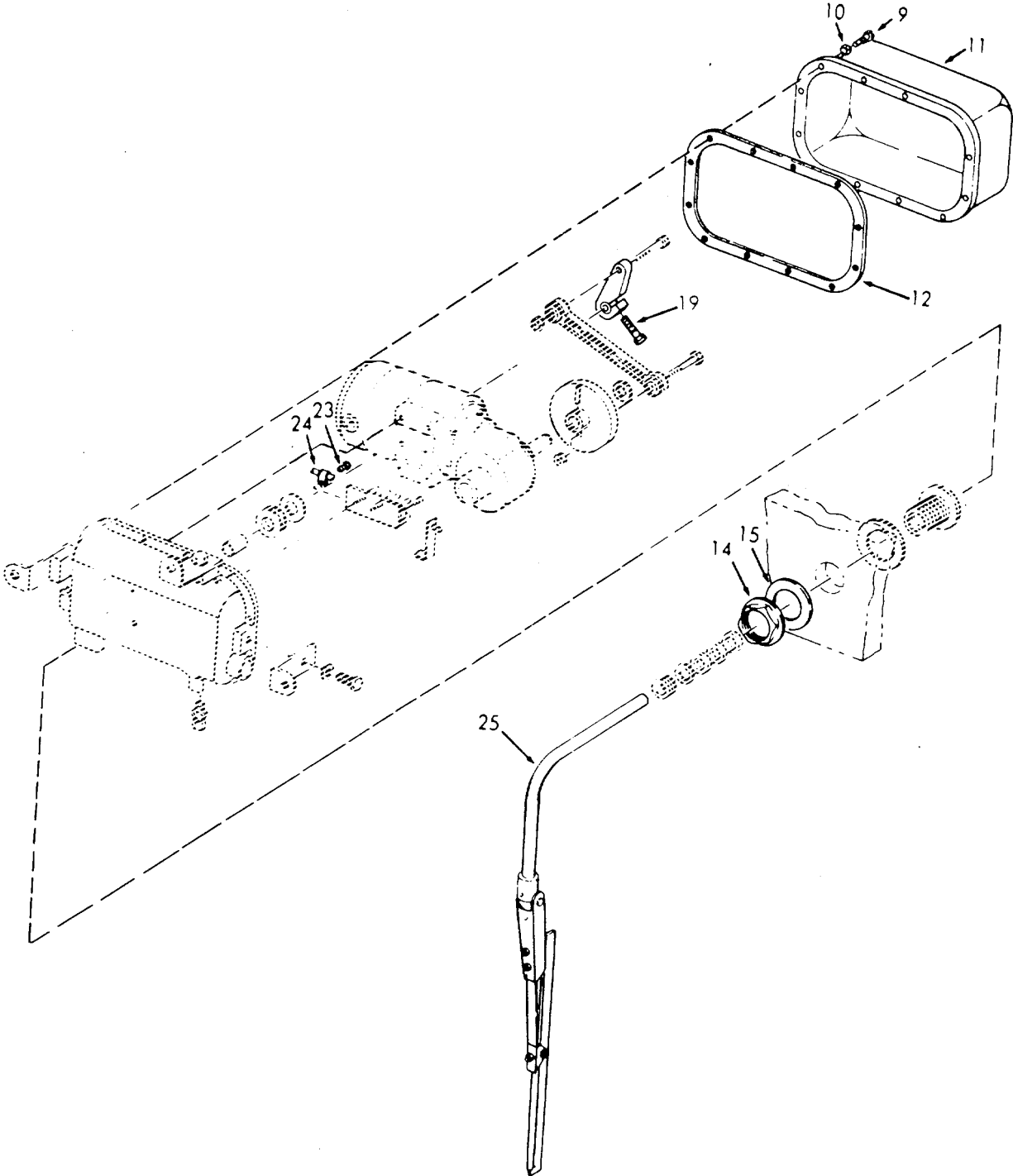
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	w. Arm (25)	Install.	
	x. Bulkhead gland washer (15) and nut (14)	Install.	
	y. Tangent screw (19)	Adjust.	Used to adjust centering of arm sweep.
	z. Heated arm assembly wiring-screw (23) and clamp (24)	Install and connect wiring.	
	aa. Gasket (12) and cover (11)	Install.	Use new gasket.
	ab. Washers (10) and screws (9)	Install	

Change 1 4-1542

4-78.2. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR (Cont)



4-78.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse).

This task covers:

a. Inspection

b. Repair

INITIAL SETUP:

Test Equipment

NONE

References

NONE

Special Tools

NONE

Equipment

Condition Condition Description

NONE

Material/Parts

Grease Type MD

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

NONE

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

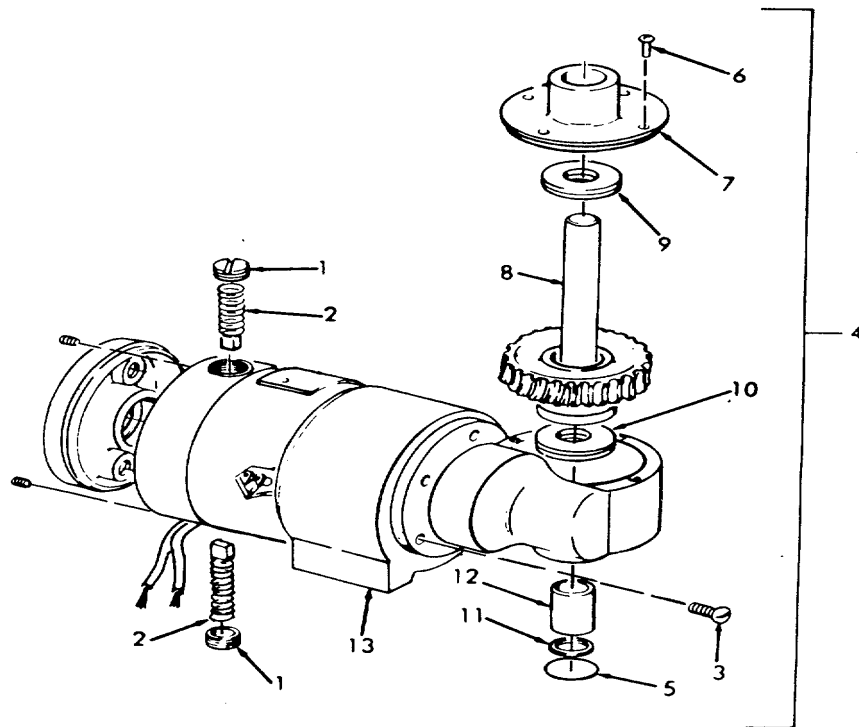
1. Motor and gear housing	a. Brushes and brush holders	1. Inspect for damage. 2. Inspect for wear.
	b. Motor	Inspect for signs of overheating.
	c. Gear case	Inspect for leaking.

REPAIR

2.	a. Brush caps (1) and brush and spring assemblies (2)	Remove.
	b. Screws (3)	Remove.
	c. Gear housing (4)	Remove from motor.

4-78.3. 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).	



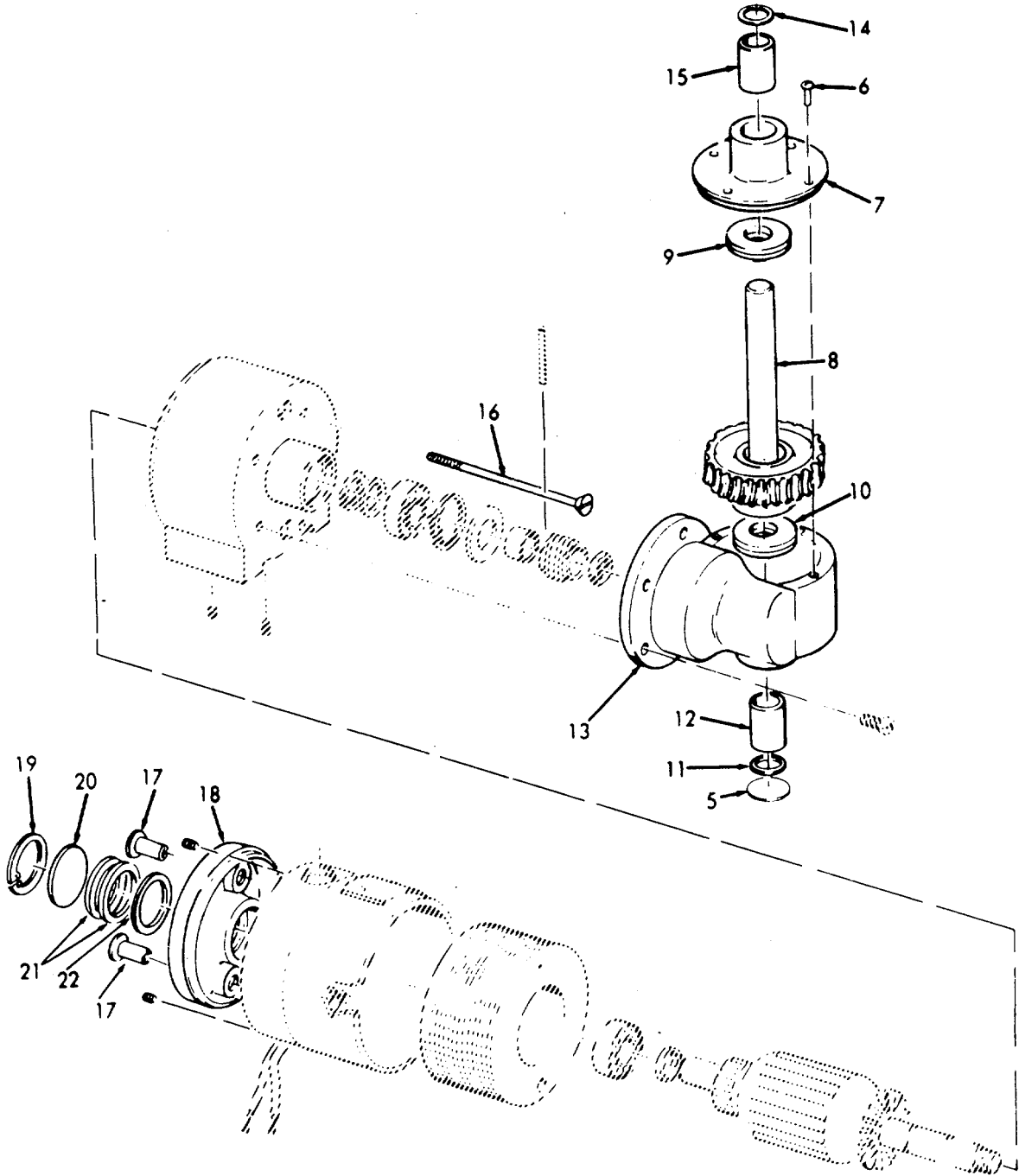
4-78.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

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.	

4-78.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-78.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

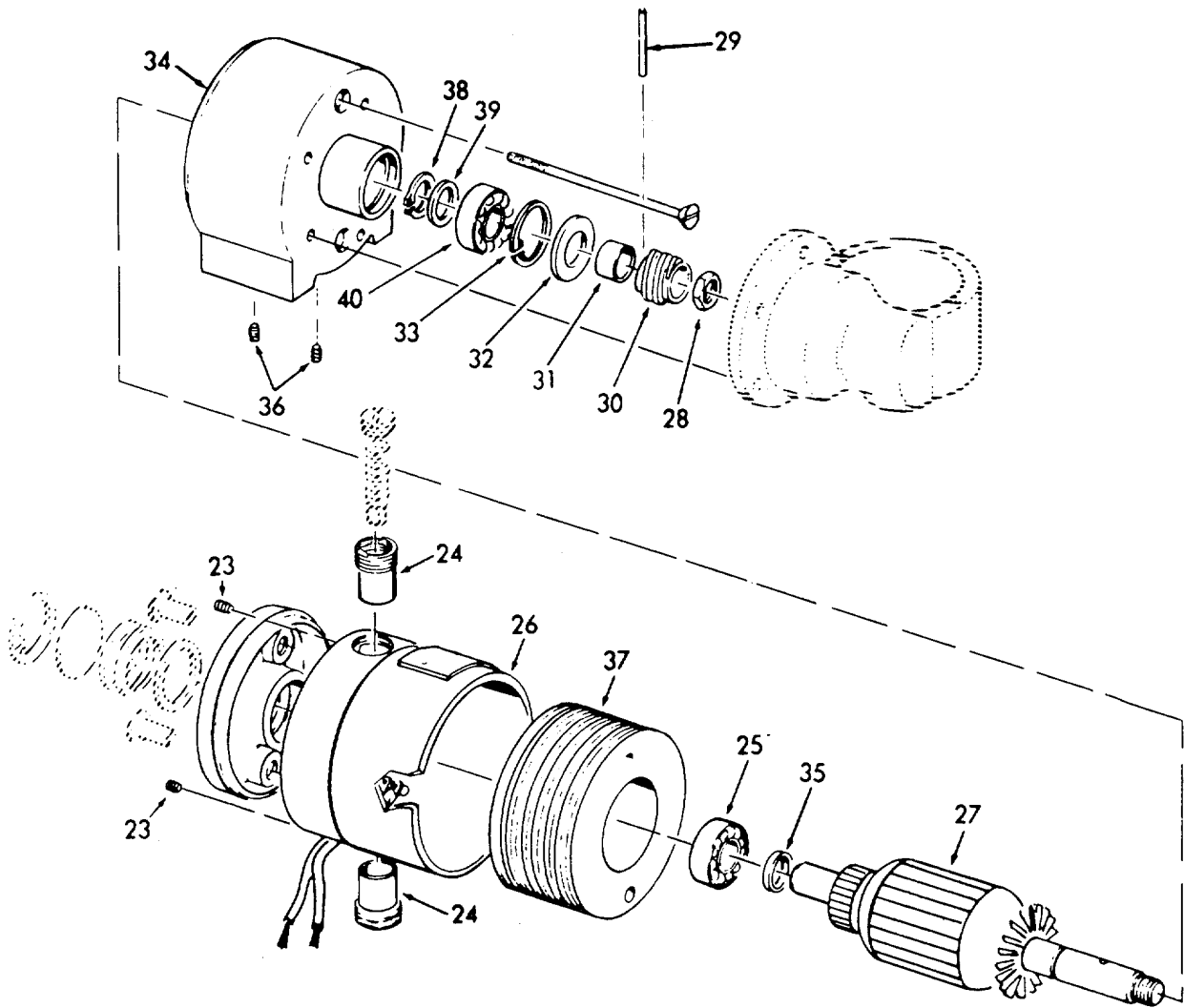
LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	d. Setscrews (23) and brush tubes (24)	Remove.	
	e. Bearing (25)	Remove from rear cap (18).	If necessary.
	f. Housing (26)	Remove.	
	g. Armature (27)	1. Clamp. 2. Remove nut (28).	Do not damage armature.
	h. Pin (29) and gear (30)	Remove.	
	i. Worm spacer 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).	

4-78.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)

- p. Rear spacer (35) Install on armature (27).
- q. Armature (27) Insert in front housing (34).
- r. Snap ring (33) Install.

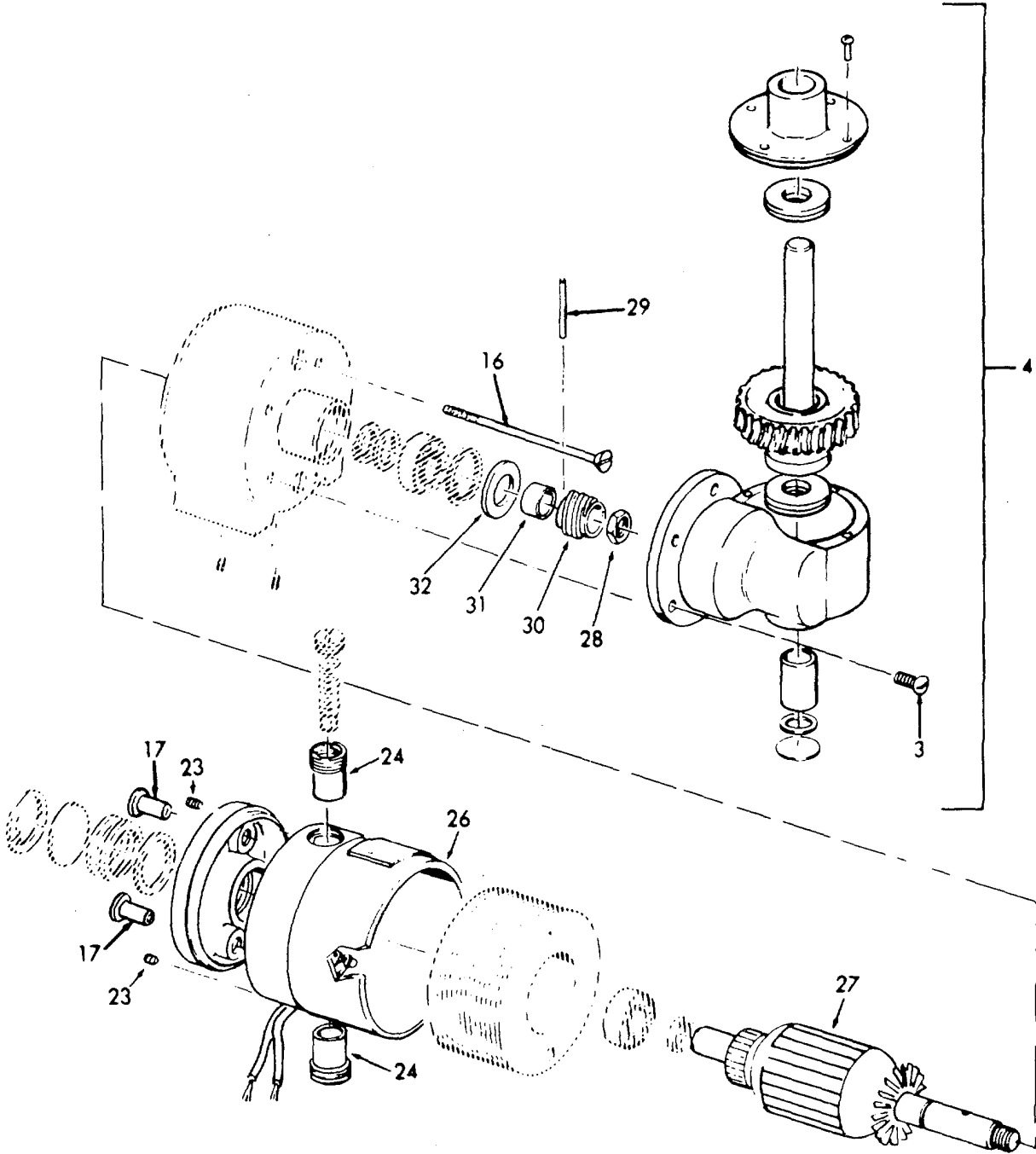


4-78.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

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 gear housing	a. Gear housing (4)	Lubricate.	Use grease type MD.
	b. Screws (3)	Install.	
	c. Brush and spring assemblies (2) and brush caps (1)	Install.	

4-78.3. WINDSHIELD WIPER MOTOR - MAINTENANCE INSTRUCTIONS (Pilothouse) (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			



4-78.4. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS (Conning tower).

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

1

General Safety Instructions

Observe WARNING in procedure.

LOCATION	ITEM	ACTION	REMARKS
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INSPECTION

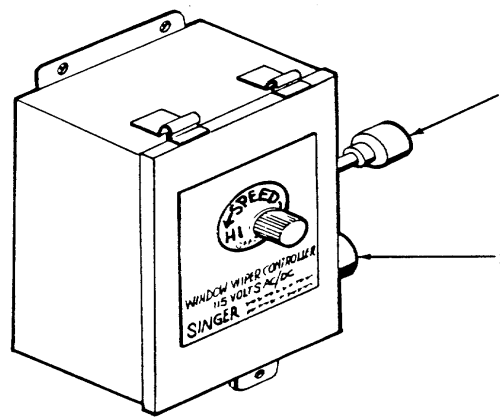
1. Control	a. Case	Inspect for signs of damage.	
	b. Controls	Inspect for damage or improper operation.	See test.

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 does not stop, see Location 3.

4-78.4. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS (Conning tower).

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 4-78.5 .
		2. Does the blade wipe properly?	If not, refer to paragraph 4-78.5 .



REPAIR

3. Wiper controller

WARNING

In order to avoid electrical snock and possible injury, place and tag the circuit breaker in the OFF position.

NOTE

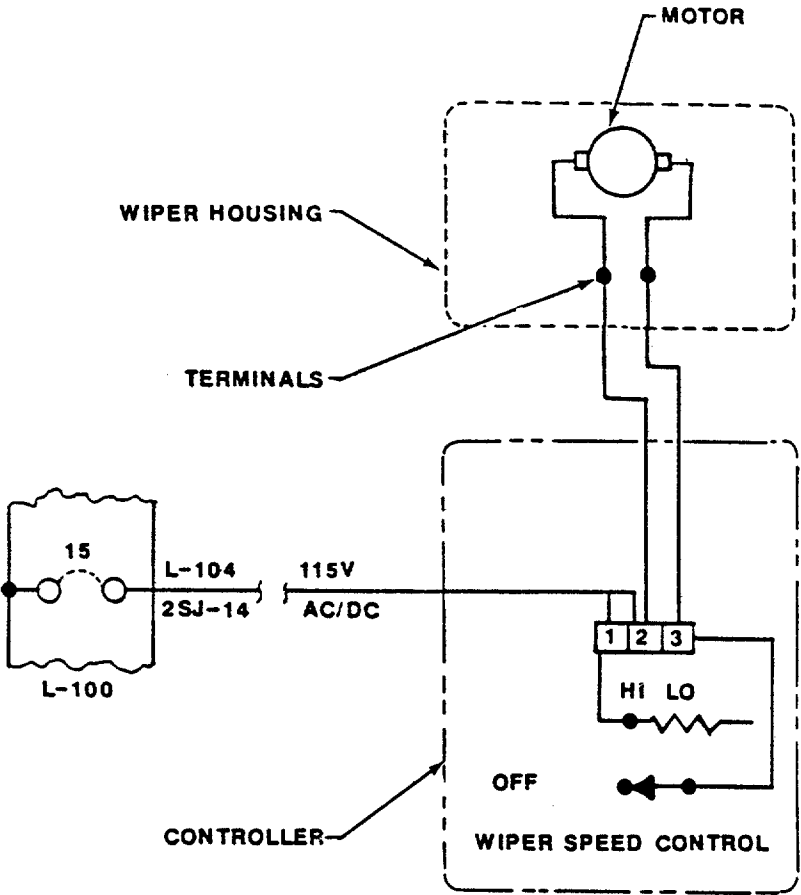
Tag all wiring prior to disconnecting.

Controller	a. Connectors (1) and (2)	Disconnect from power source and from window wiper.	Refer to wiring diagram on following page.
------------	---------------------------	---	--

4-78.4. WINDSHIELD WIPER CONTROL - MAINTENANCE INSTRUCTIONS (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARKS
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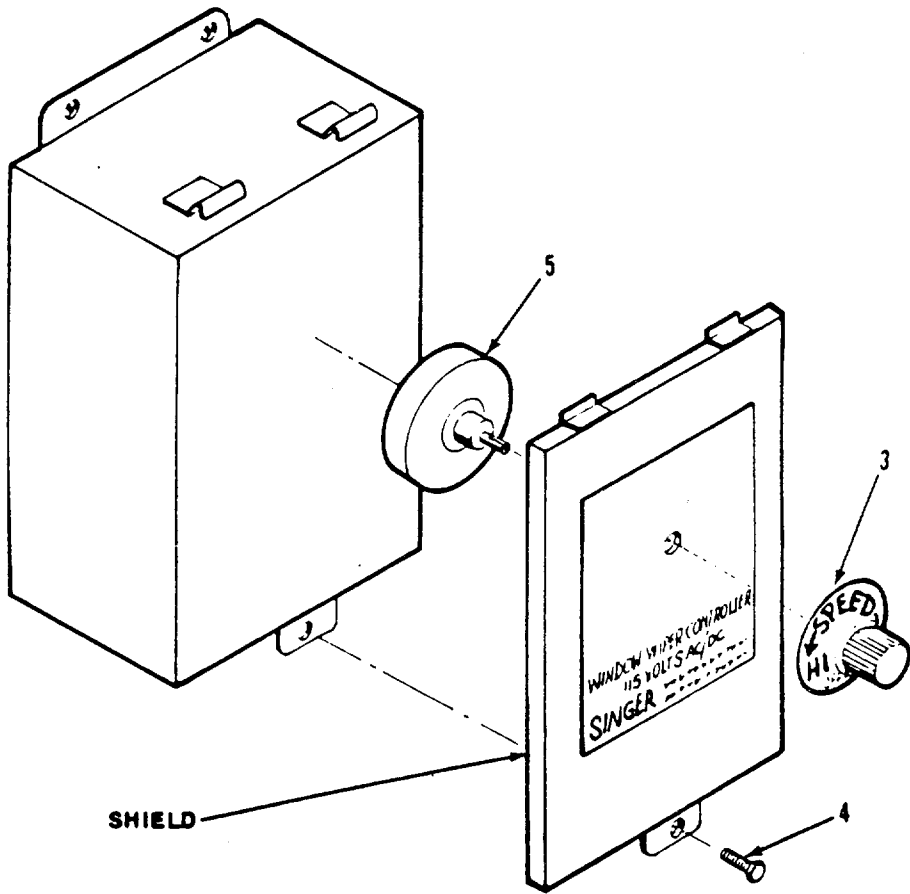
REPAIR (Cont)



- b. Rheostat knob (3) Loosen set screw and remove.
- c. Screw (4) Remove screw and front shield.
- d. Rheostat (5) Remove and install new rheostat.

4-78.4. 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.	



Change 1 4-1552.3

4-78.5. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS.
 (Conning tower) (Continued).

This task covers:

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

INITIAL SETUP

Test Equipment

NONE

References

Paragraph
4-78.4 Windshield Wiper Control

Special Tools

NONE

Equipment

<u>Condition</u>	<u>Condition Description</u>
NONE	

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

General Safety Instructions

Observe WARNING in procedure

<u>LOCATION</u>	<u>ITEM</u>	<u>ACTION</u>	<u>REMARKS</u>
-----------------	-------------	---------------	----------------

<u>INSPECTION</u>

- | | | |
|------------------------------|---------------------------|--|
| 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. |

Change 1 4-1552.4

4-78.5. 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 4-78.4 .
b. Screws (2)	Remove.	
c. Wiper blade (3)	Remove and replace wiper blade with new unit.	

Change 1 4-1552.5

4-78.5. 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:

ARM TRAVEL CHART

<u>Hole</u>	<u>Degrees of Total Travel</u>
1	70°
2	67°
3	65°
4	62°
5	60°
6	55°
7	53°
8	51°
9	44°
10	41°

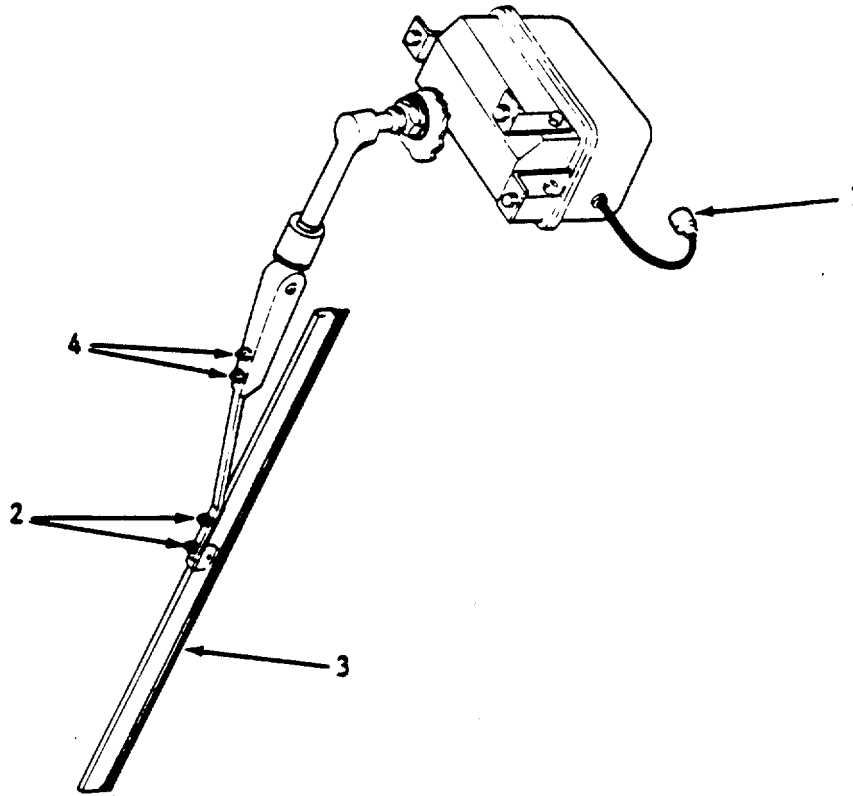
- g. Circuit breaker Remove tag and place breaker in ON position.

Change 1 4-1552.6

4-78.5. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS.
 (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARKS
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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.

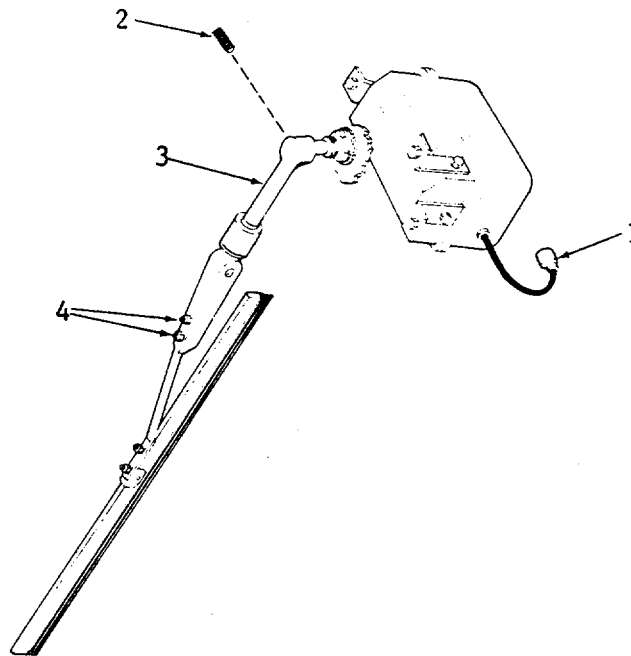
Change 1 4-1552.7

4-78.5. WINDSHIELD WIPER ASSEMBLY - MAINTENANCE INSTRUCTIONS.
 (Continued).

LOCATION	ITEM	ACTION	REMARKS
----------	------	--------	---------

REPAIR (Cont)

- | | | | |
|----|------------------|---|---|
| a. | Connector (1) | Disconnect to wiper controller. | Refer to wiring diagram in paragraph 4-78.4 . |
| 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. | |



4-78.4. WINDSHIELD WIPER CONTROL- MAINTENANCE INSTRUCTIONS . (Conning tower) (Continued).

LOCATION	ITEM	ACTION	REMARK
----------	------	--------	--------

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 | (1) Disconnect from wiper controller, arm assembly, power source and conning tower.

(2) Reinstall new motor and gear housing. | Discard old unit. Refer to 4-78.5, location 3 . |
| b. Circuit | Remove tags and place breaker in ON position. | Test in accordance with paragraph 4-78.4 . |

Change 1 4-1552.9/(4-1552.10 blank)

4-79. SEARCHLIGHT - MAINTENANCE INSTRUCTIONS.

The following is an index to the maintenance procedures.

<u>DESCRIPTION</u>	<u>PARAGRAPH</u>
Mounting and Yoke Assembly	4-79.1
Hood Assembly	4-79.2
Shutter Assembly	4-79.3
Drum Assembly	4-79.4

4-79.1. SEARCHLIGHT - MOUNTING AND YOKE ASSEMBLY - MAINTENANCE INSTRUCTIONS.

This task covers:

- | a. Inspection | b. Service | c. Repair |
|----------------------|-------------------|------------------|
|----------------------|-------------------|------------------|

INITIAL SETUP

Test Equipment
NONE

References
NONE

Special Tools
NONE

<u>Equipment</u>	<u>Condition</u>	<u>Condition Description</u>
	NONE	

Material/Parts
Grease MIL-G-7118

Special Environmental Conditions
NONE

Personnel Required
1

General Safety Instructions
NONE

4-1553

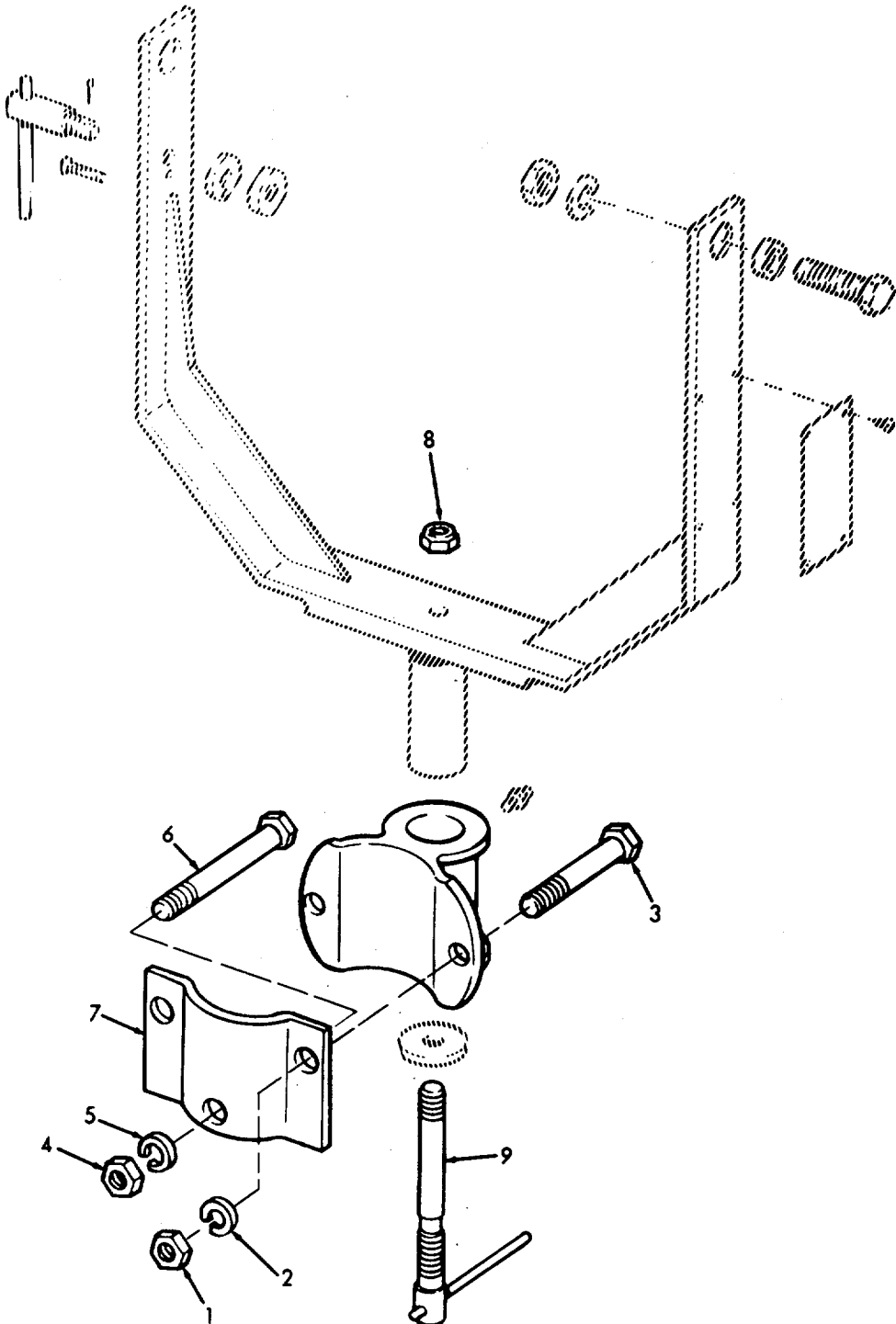
**4-79.1. SEARCHLIGHT - MOUNTING AND YOKE ASSEMBLY - MAINTENANCE
INSTRUCTIONS (Continued)**

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. Self-locking nut (8)	Replace.	As required.
	i. Horizontal clamp (9)	Replace.	As required.

4-79.1. SEARCHLIGHT - MOUNTING AND YOKE ASSEMBLY - MAINTENANCE
INSTRUCTIONS (Continued)

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



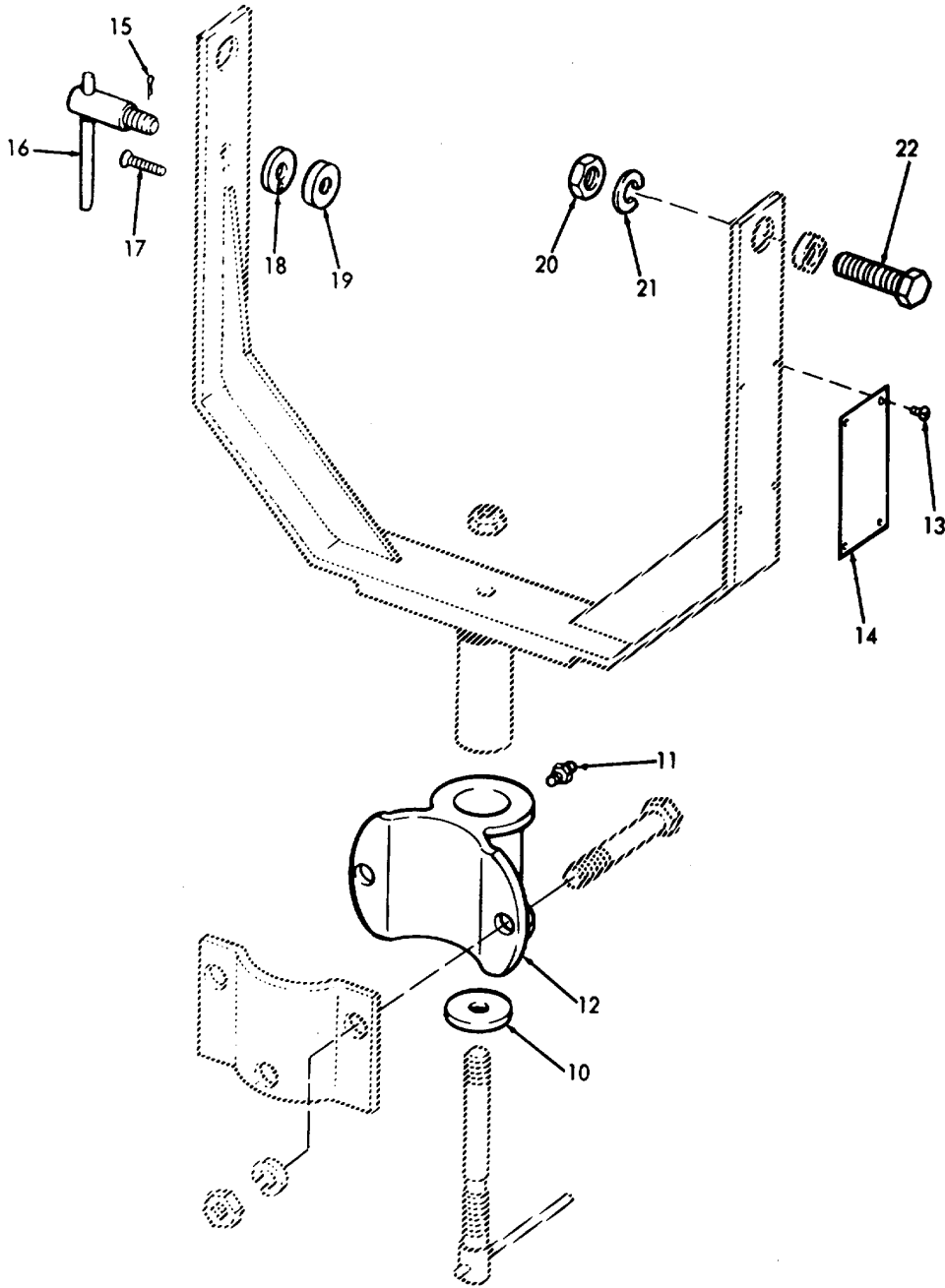
**4-79.1. SEARCHLIGHT - MOUNTING AND YOKE ASSEMBLY - MAINTENANCE
INSTRUCTIONS (Continued)**

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.

4-79.1. SEARCHLIGHT - MOUNTING AND YOKE ASSEMBLY - MAINTENANCE
INSTRUCTIONS (Continued)

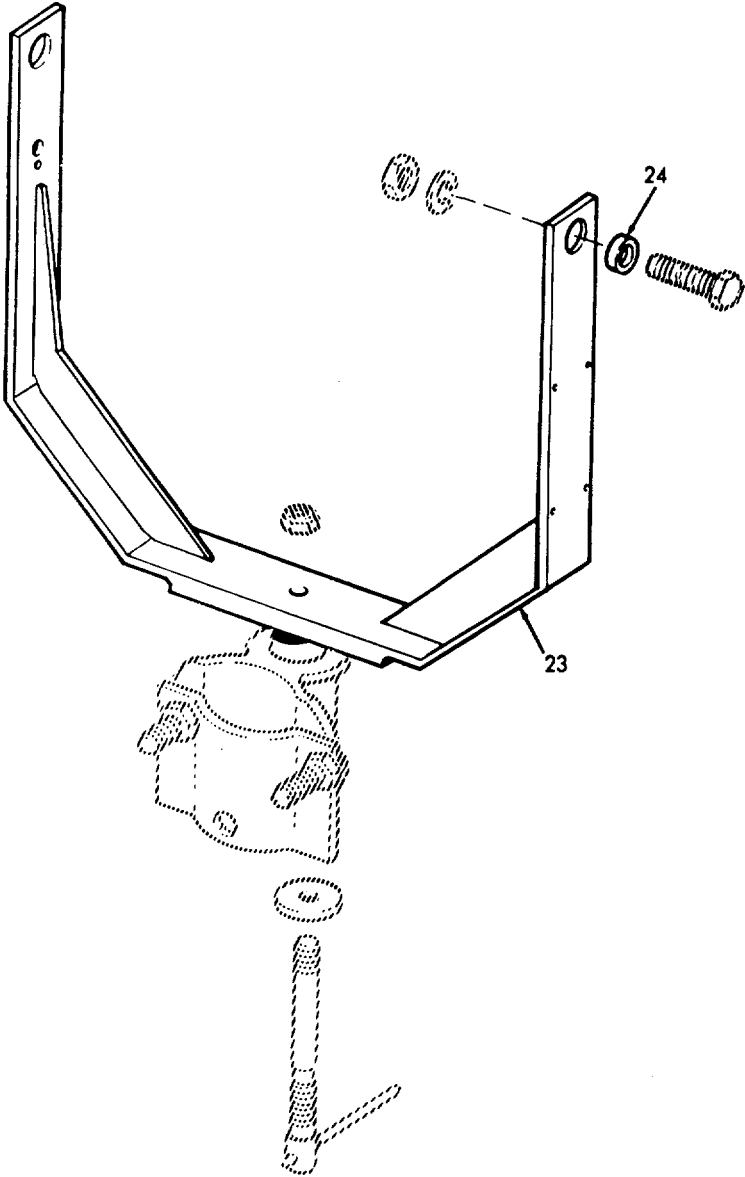
LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



4-79.1. 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.



4-79.2. SEARCHLIGHT - HOOD ASSEMBLY - 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
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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.	

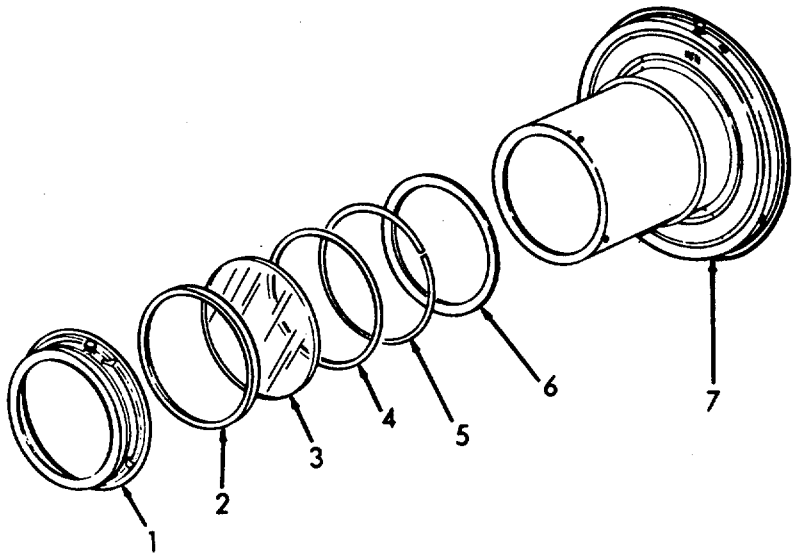
REPLACE

2.	a. Knurled nut and boss hood cap (1)	Replace	As required.
	b. Retainer ring (2)	Replace	As required

4-1560/(4-1559 blank)

4-79.2. 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 gas-ket (4)	Replace.	As required.
	h. Slip ring (5)	Replace.	As required.
	i. Steel dia-phragm (6)	Replace.	As required.
	j. Searchlight hood (7)	Replace.	As required.



4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS.

This task covers:

- | | |
|----------------------|-------------------|
| a. Inspection | c. Service |
| b. Replace | d. Repair |

INITIAL SETUP

Test Equipment

NONE

References

Paragraph
4-79.4 Drum Assembly - Lamp
Replacement and
Servicing.

Special Tools

NONE

Equipment

<u>Condition</u>	<u>Condition Description</u>
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
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WARNING

In order to avoid possible burns, make sure the searchlight has cooled sufficiently.

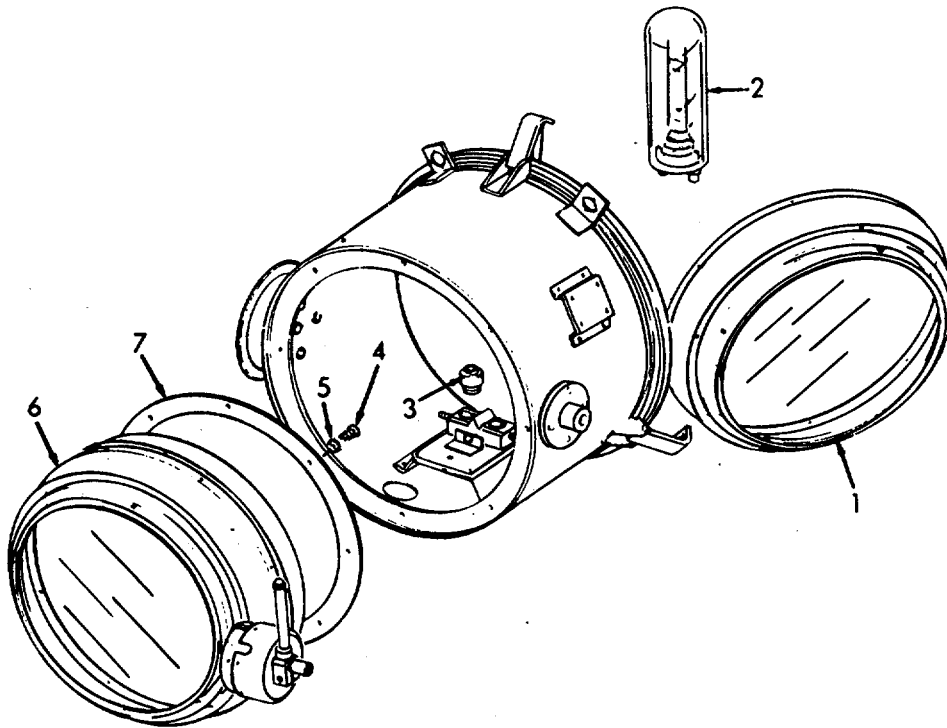
INSPECTION

- | | | |
|------------------------|------------|--|
| 1. Shutter
assembly | a. Lens | Inspect for breaks,
cracks, and scratches. |
| | b. Shutter | Inspect for binding and
improper operation. |

4-1562

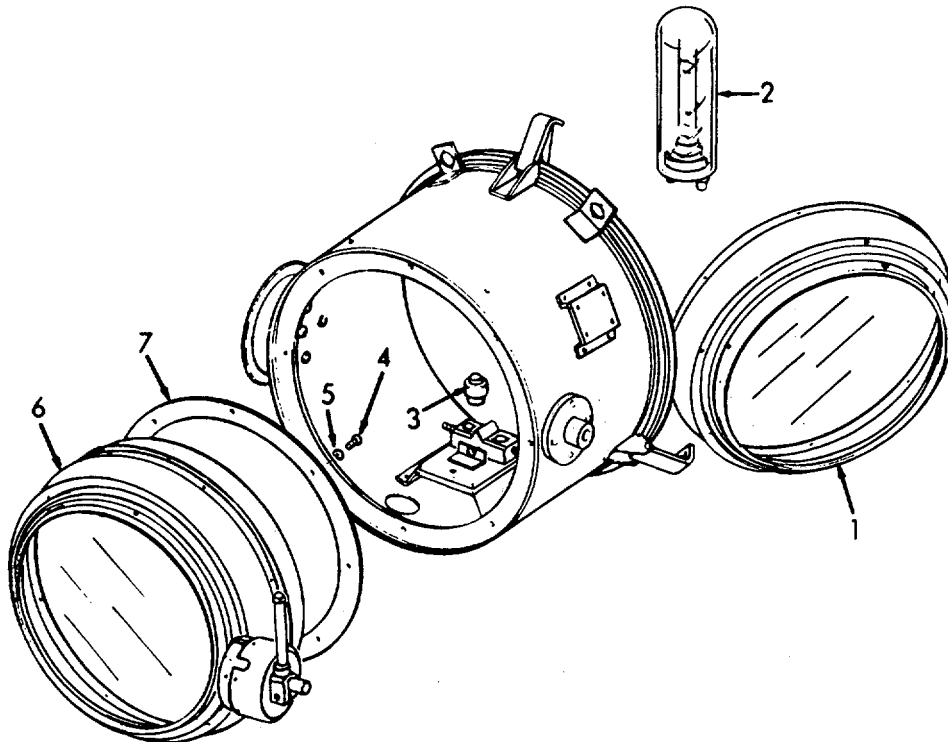
4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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 lock-washers (5)	Remove.	
	e. Shutter assembly (6)	Remove.	
	f. Gasket (7)	Remove.	Discard.



4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPLACE (Cont)			
	g. Gasket (7)	Install.	
	h. Shutter assembly (6)	Install.	
	i. Screws (4) and lock-washers (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.	



4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

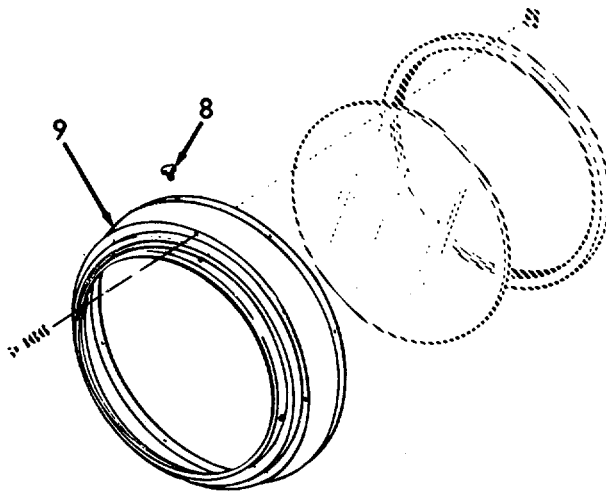
LOCATION	ITEM	ACTION	REMARKS
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SERVICE

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 1/4 inch and pull off. |
| | c. Lens | Clean. |
| | d. Adapter ring (9) | Install. |
| | e. Knurled | Tighten knobs (8) |



4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

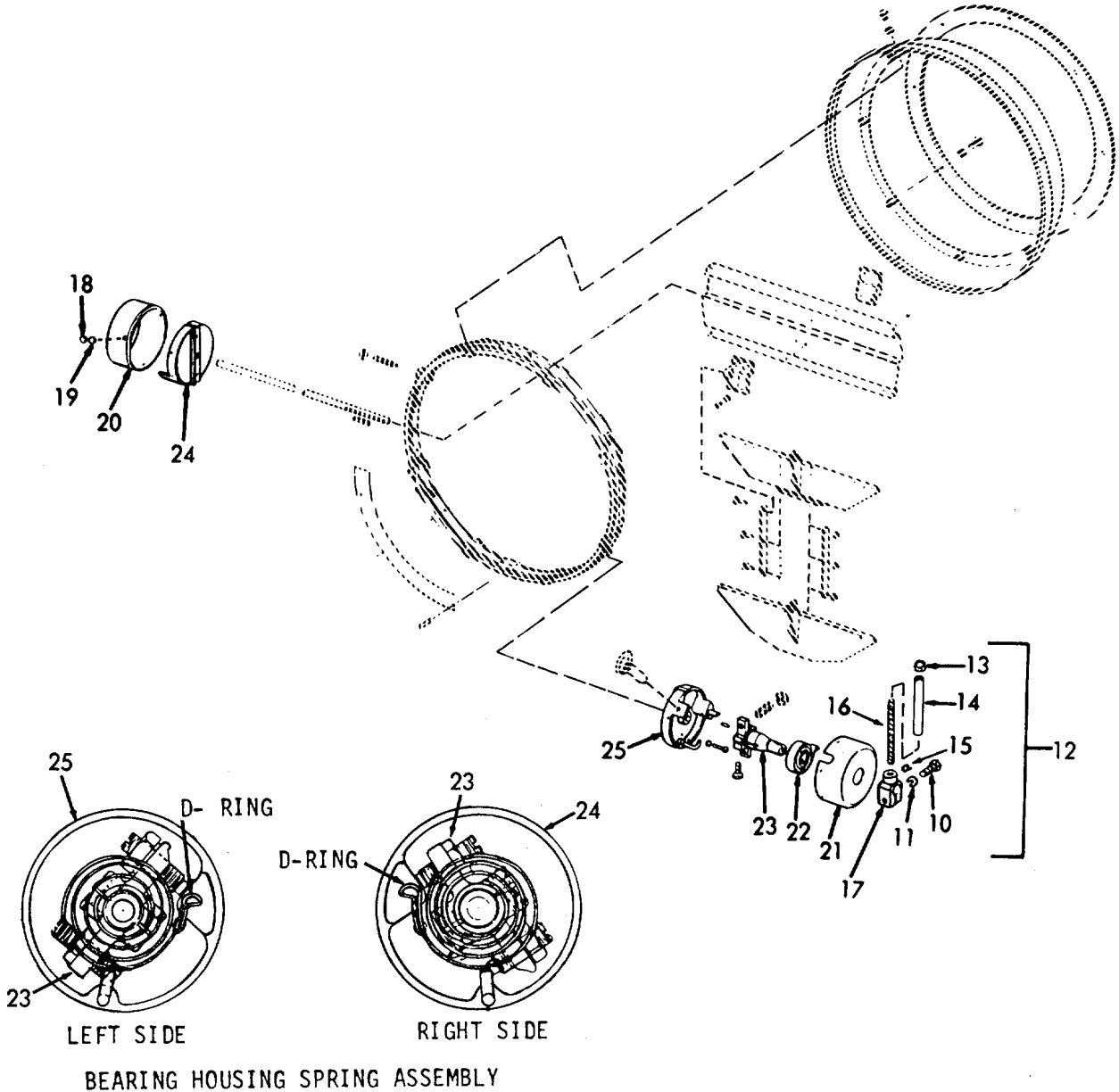
LOCATION	ITEM	ACTION	REMARKS
REPAIR			
4. Shutter handle(s)	a. Screw (10) and lock-washer (11)	Loosen.	
	b. Handle assembly (12)	Remove.	
	c. Cap nut (13) and phenolic handle (14)	Remove.	
	d. Setscrew (15), rod (16), and clamp (17)	1. Disassemble 2. Reassemble	
	e. Handle assembly (12), screw (10), 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).	

4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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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



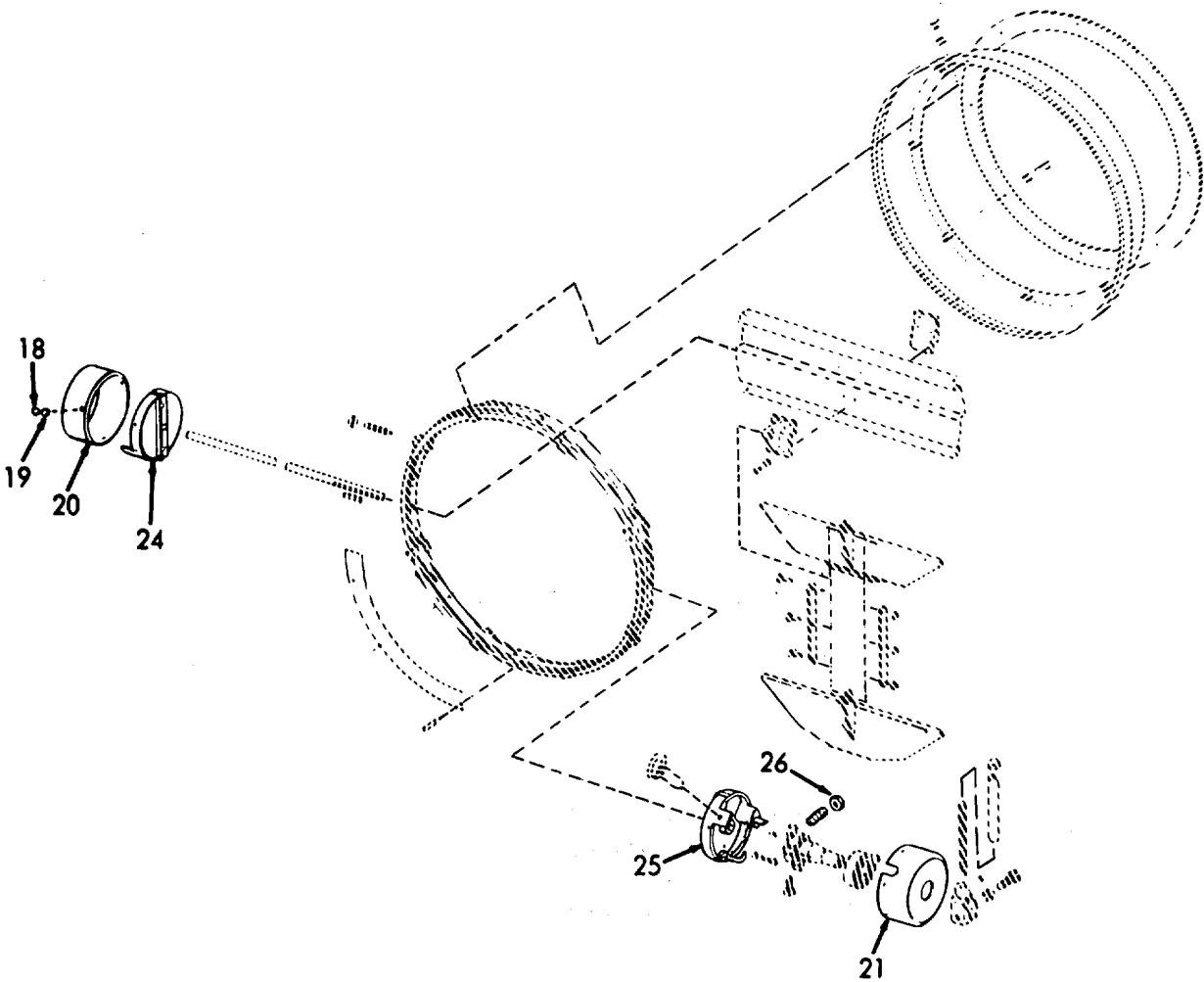
4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
		6. Rotate until the opening slips over the pin in the bearing housing (24 or 25).	<ul style="list-style-type: none"> 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 lock-washers (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.	

4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



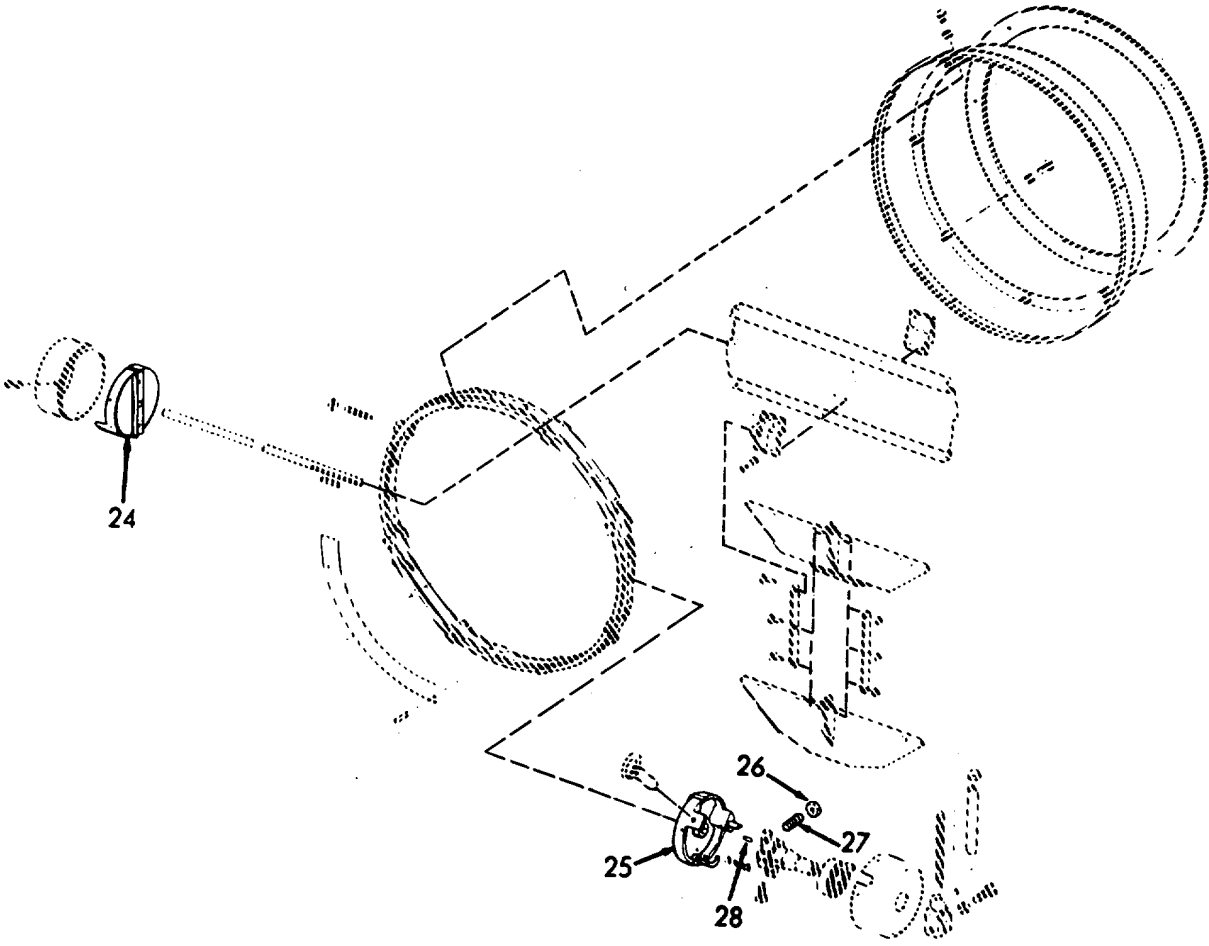
4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)	d. Four bumper screws(s) (27) and insert (28)	<ol style="list-style-type: none"> 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 1/2 turn so that the shutter blades still appear closed, but do not actually touch each other. 	<p>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.</p>
	e. Nut(s) (26)	Tighten.	<ol style="list-style-type: none"> 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)

4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



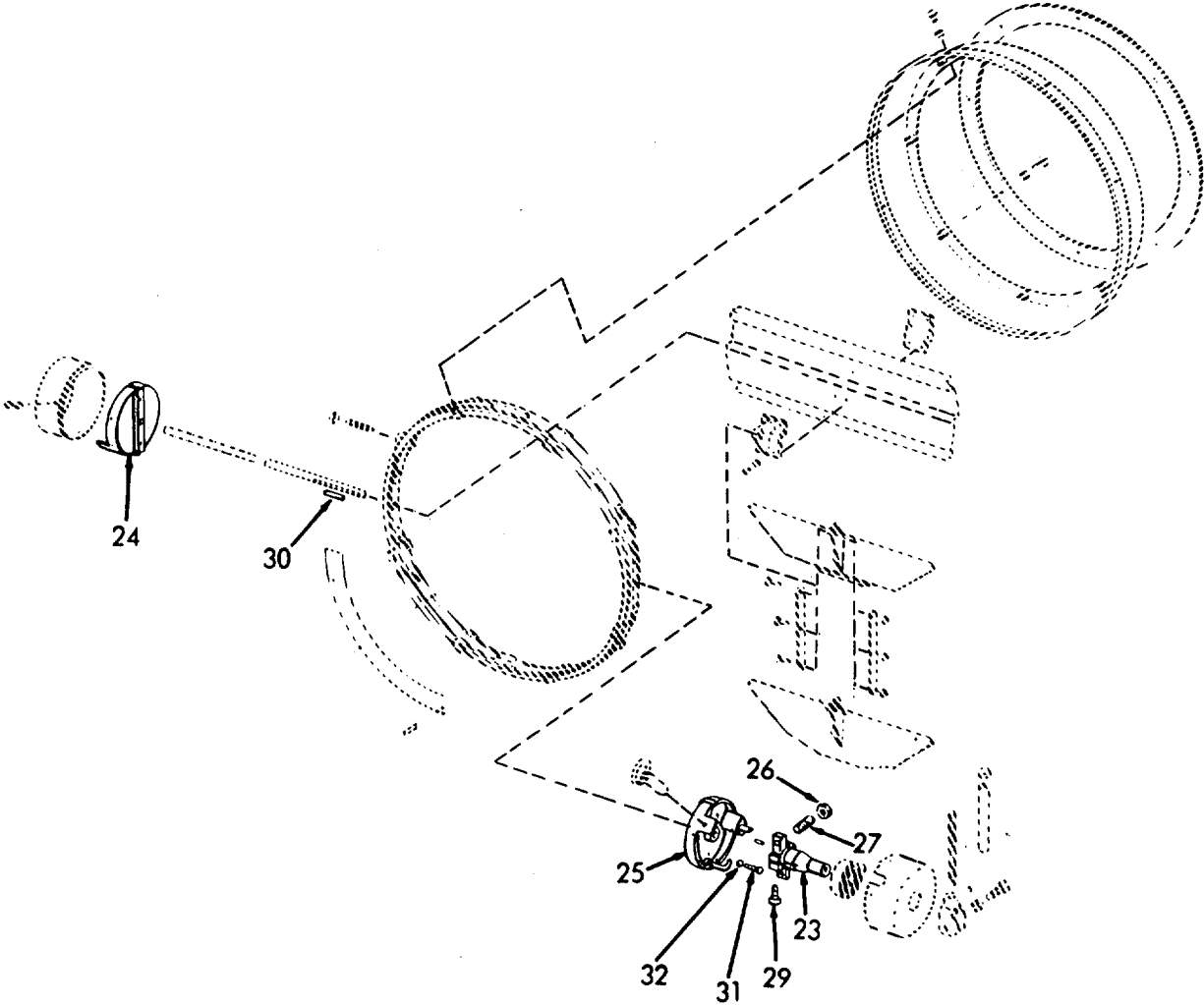
4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
REPAIR (Cont)			
	f. Third and fourth bumper screws (27)	<ol style="list-style-type: none"> 1. Open shutter blades fully so they are at 90 degrees to the front lens. 2. Adjust the remaining bumper screws until the insert just touches the flat surface of the bearing housings (24 or 25). 	In this position a minimum amount of the beams will be blocked out.
	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 housing	a. Shutter handle	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 lock-washer (32)	Remove.	

4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARKS
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REPAIR (Cont)



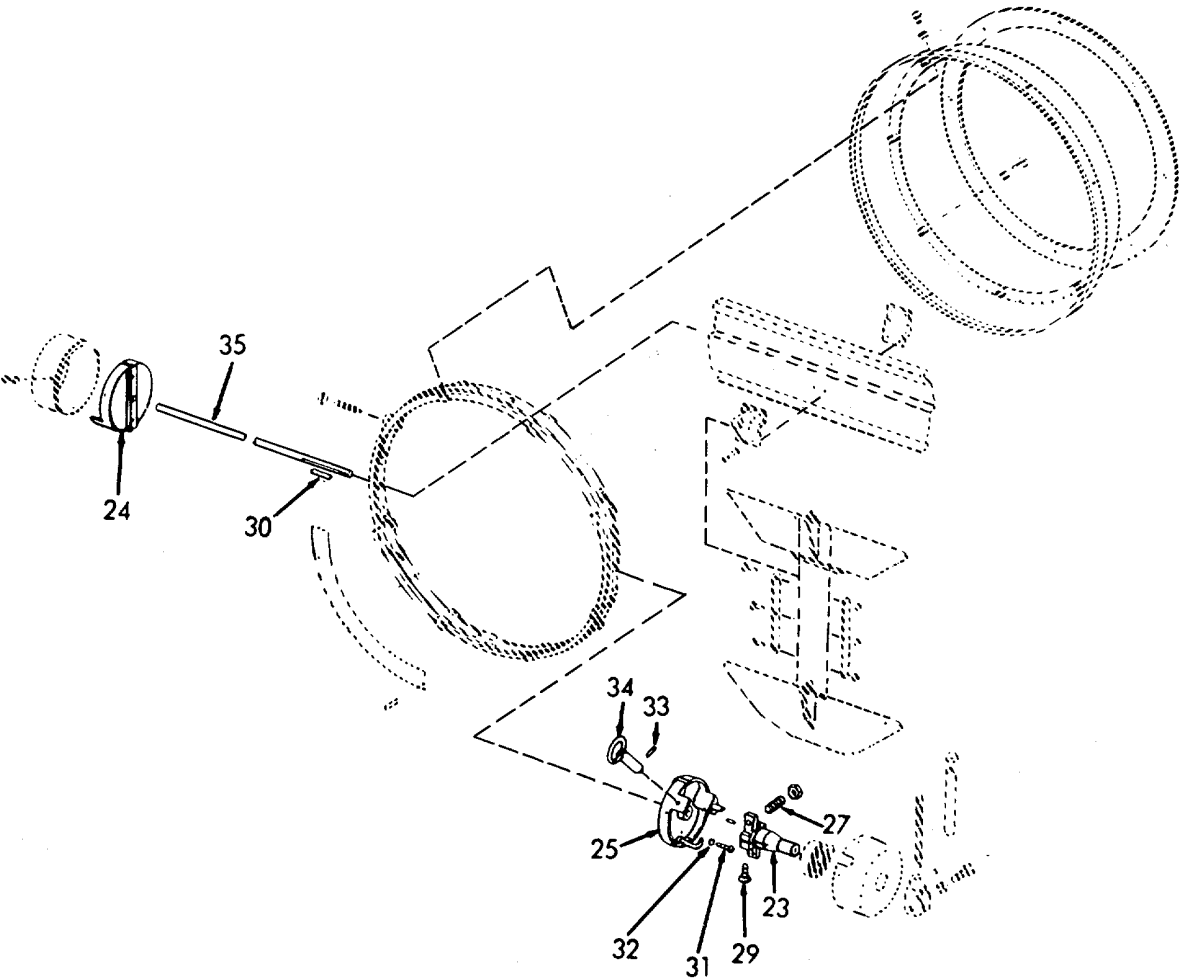
4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

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 lock-washer (32)	Install.	
	i. Stop lever (23) and key (30)	Install.	
	j. Screw (29)	Install.	
	k. Bumper Screws (27)	Adjust	Refer to step 6.
	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.	

4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)



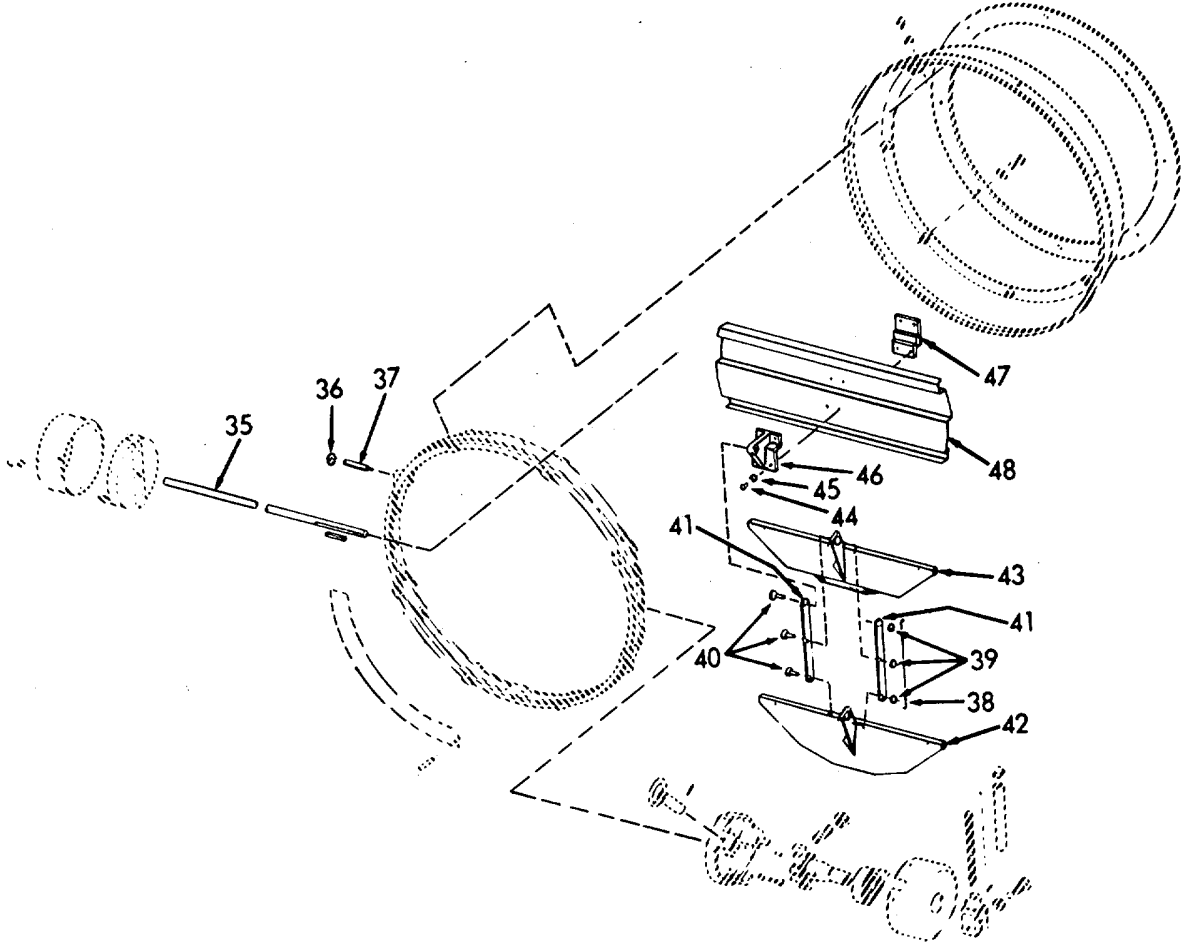
4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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.

4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)



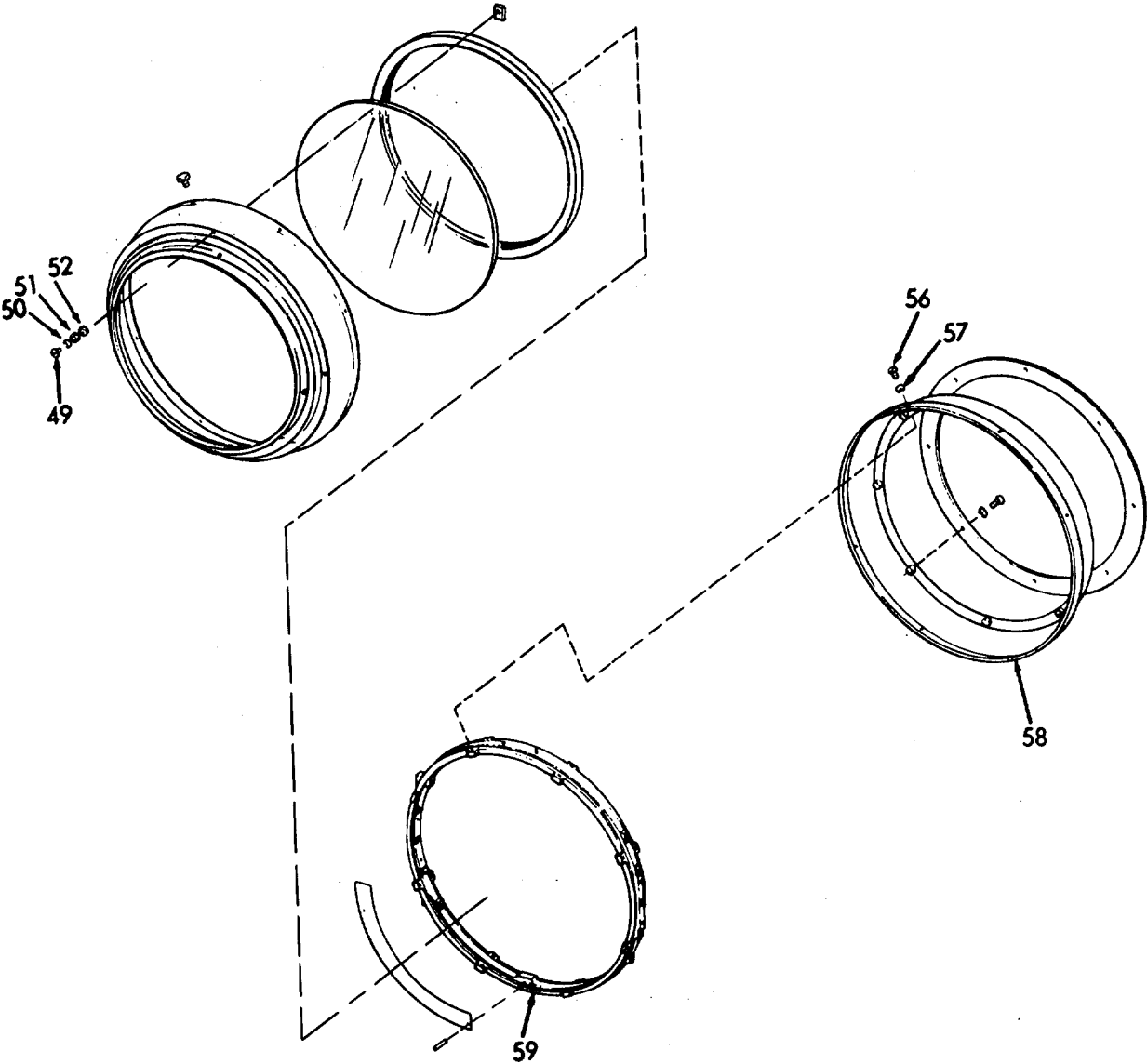
4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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.	

4-79.3. SEARCHLIGHT - SHUTTER - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)



4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS.

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	REMARK
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WARNING

In order to avoid possible burns, make sure the searchlight and lamp are cooled.

INSPECTION

- | | | |
|------------------|---------|--|
| 1. Drum assembly | a. Drum | <ul style="list-style-type: none"> 1. Inspect for bends, breaks, cracks, and dents. 2. Make sure all catches are functioning properly. |
|------------------|---------|--|

4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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. (1)	a. Thumb screw	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.

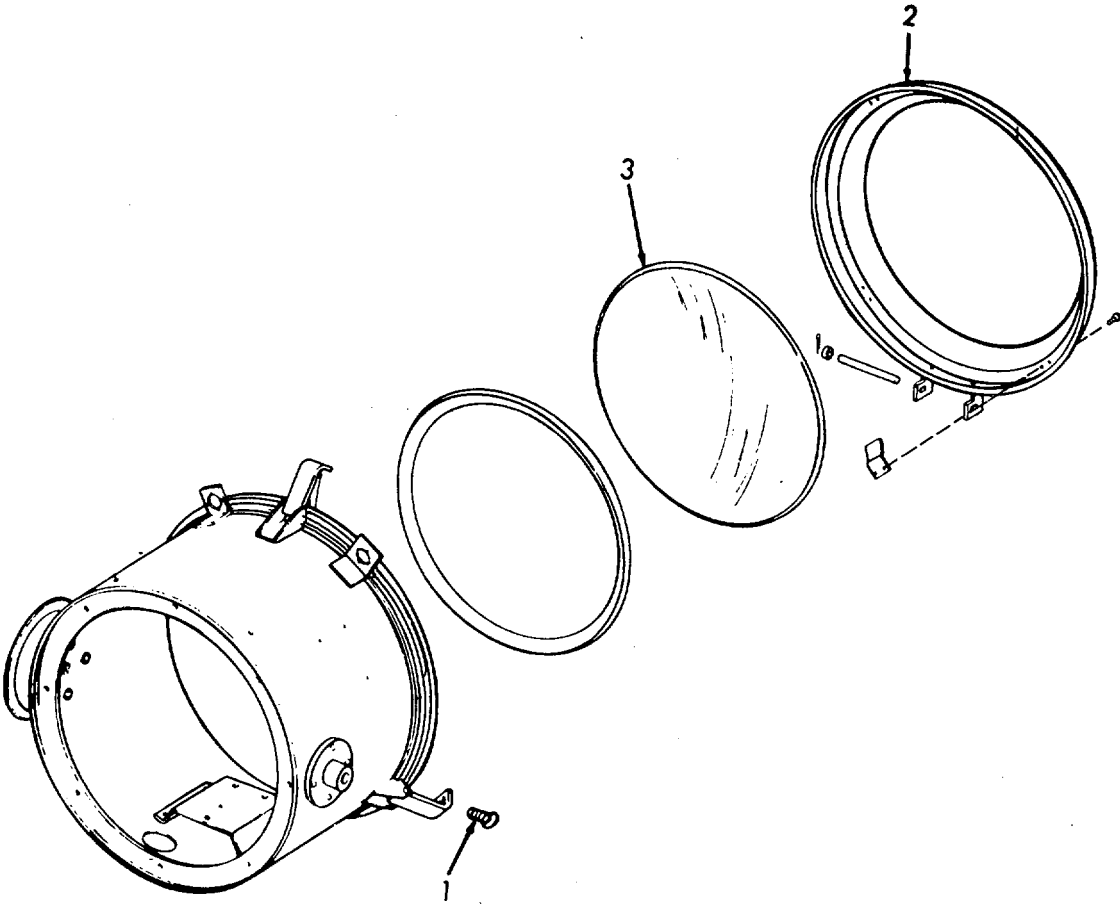
c. Reflector (3)	Clean.	1. Use mild soap and water.
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4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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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.	



4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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), lockwashers (5), and nuts (4)	Install.	
	f. Dome (2) with clamps.	Raise and secure	
	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.

4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

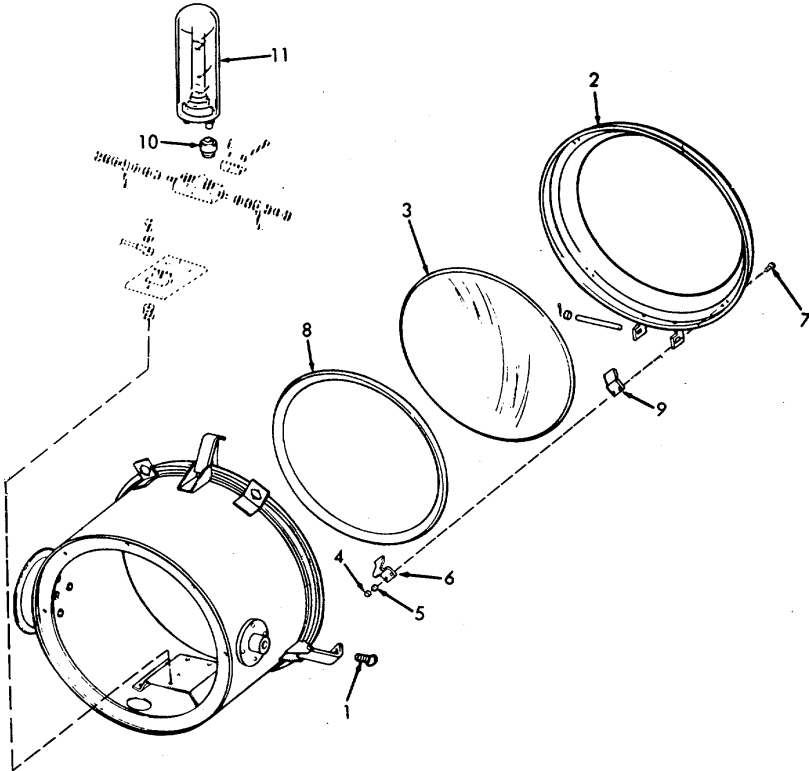
LOCATION	ITEM	ACTION	REMARK
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REPLACE (Cont)

NOTE

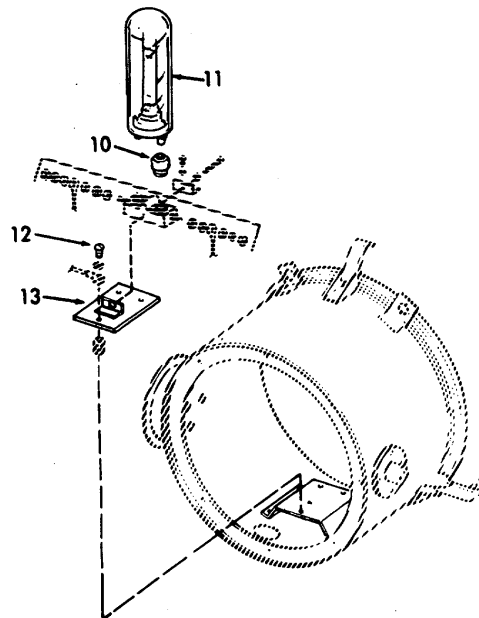
This is to adapt to manufacturing tolerances, and dimension change due to heat.

- b. Carefully insert posts of replacement lamp in socket.
- c. Pull down until sholders on posts touch top of sockets.



4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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 lamp holder 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.

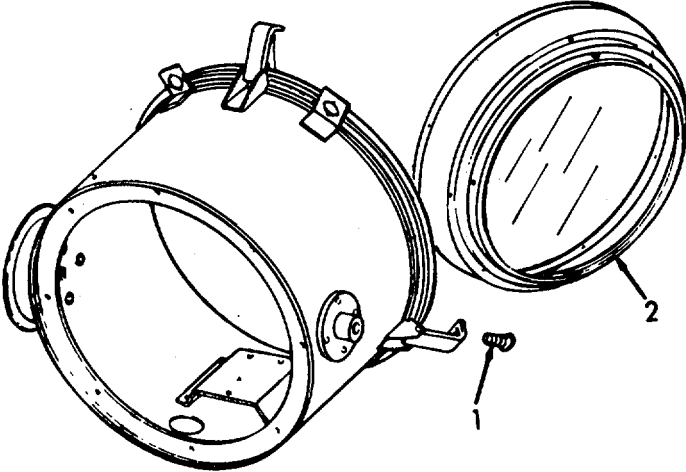


4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPLACE (Cont)

- h. Dome (2) Raise and secure with clamps.
- i. Thumbscrews (1) Tighten.



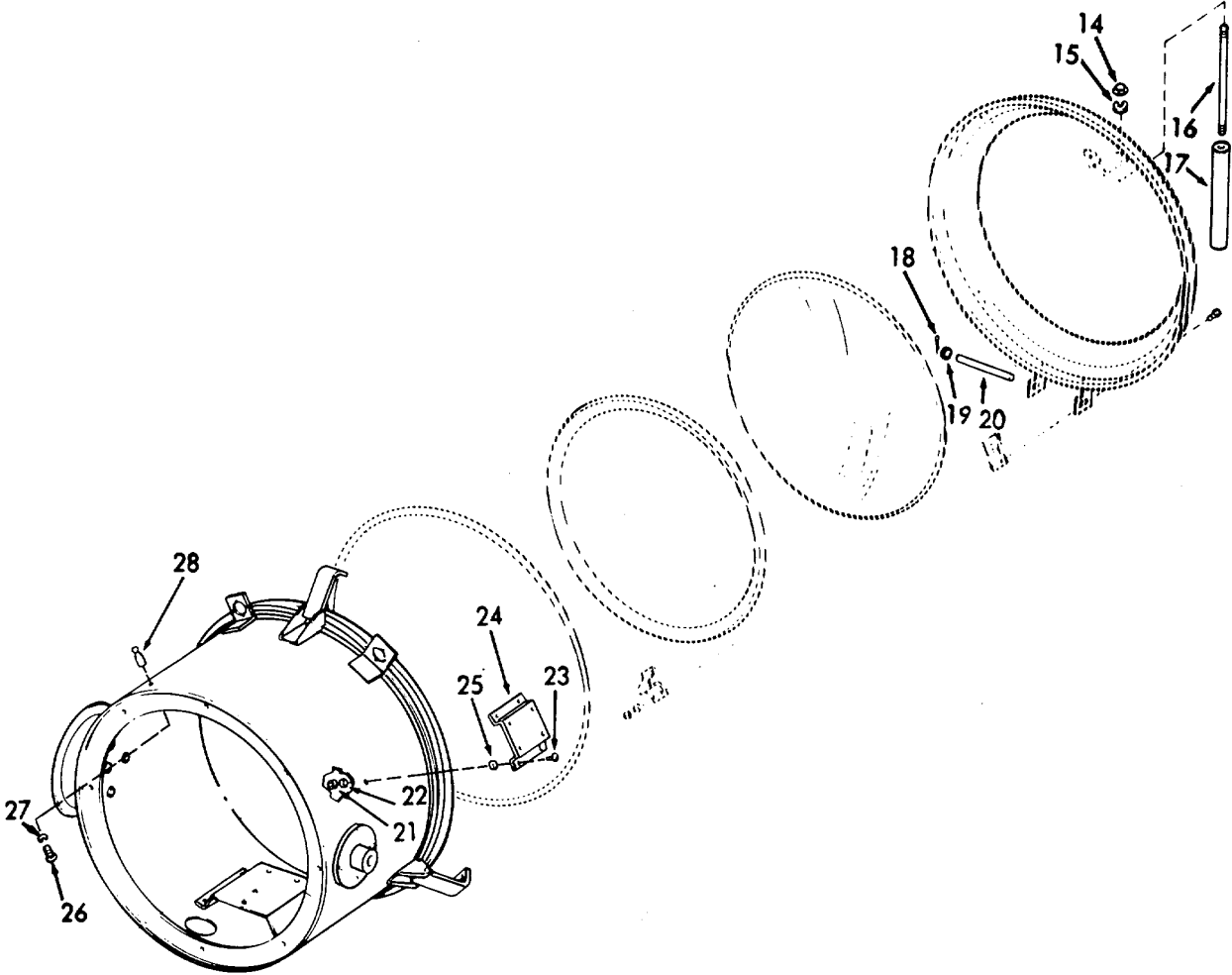
4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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.	

4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)



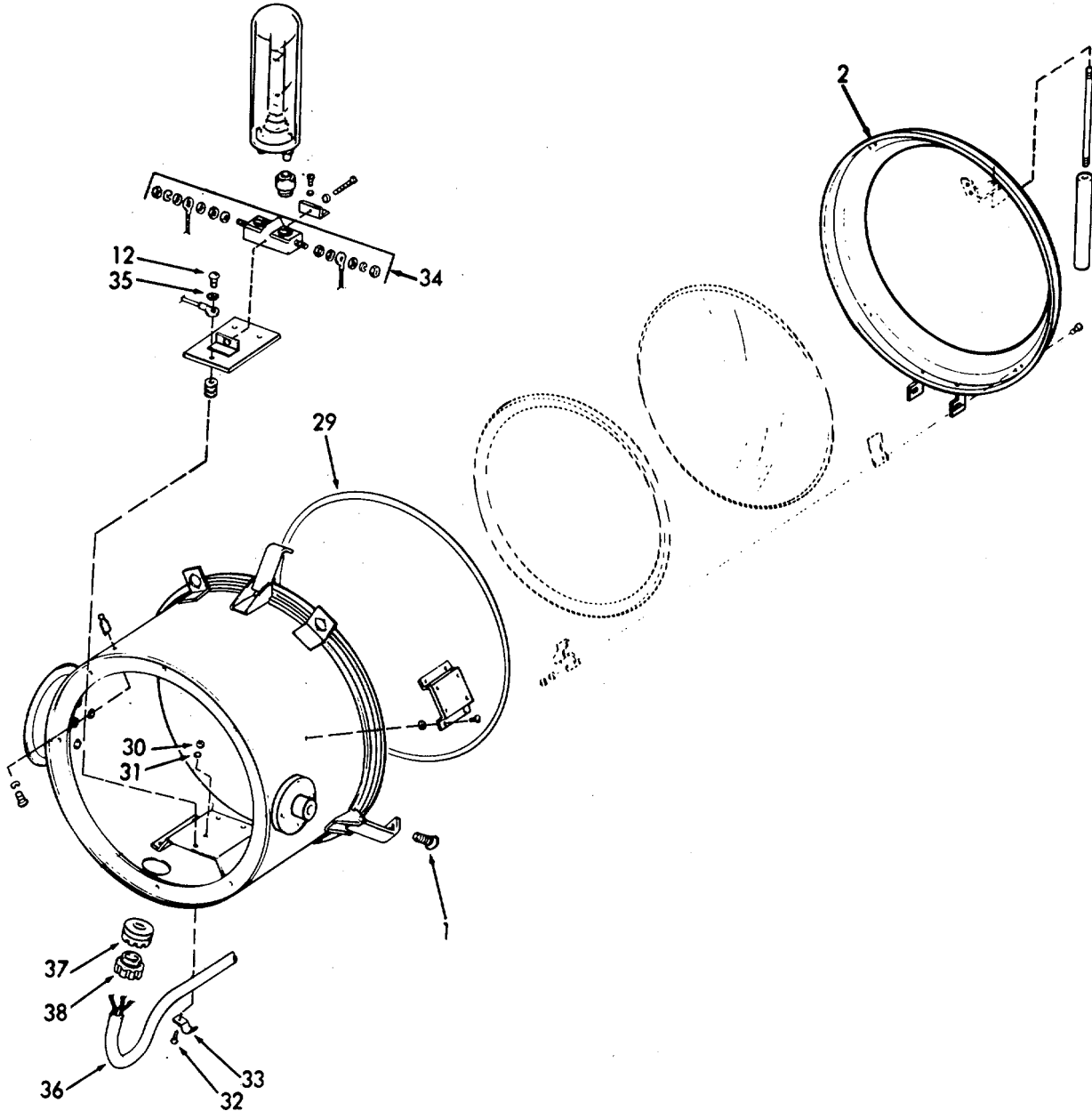
4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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.	
	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.	

4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)



4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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-flat-washer (41), screw (42), lockwasher (43), and bracket (44)	Replace.	If necessary.
	f. Spacers (39), socket support (13), and screws (12)	Replace.	
	g. Screw (12), flat-lockwasher (35), and ground wire	Install.	

4-79.4. SEARCHLIGHT - DRUM ASSEMBLY - MAINTENANCE INSTRUCTIONS (Continued).

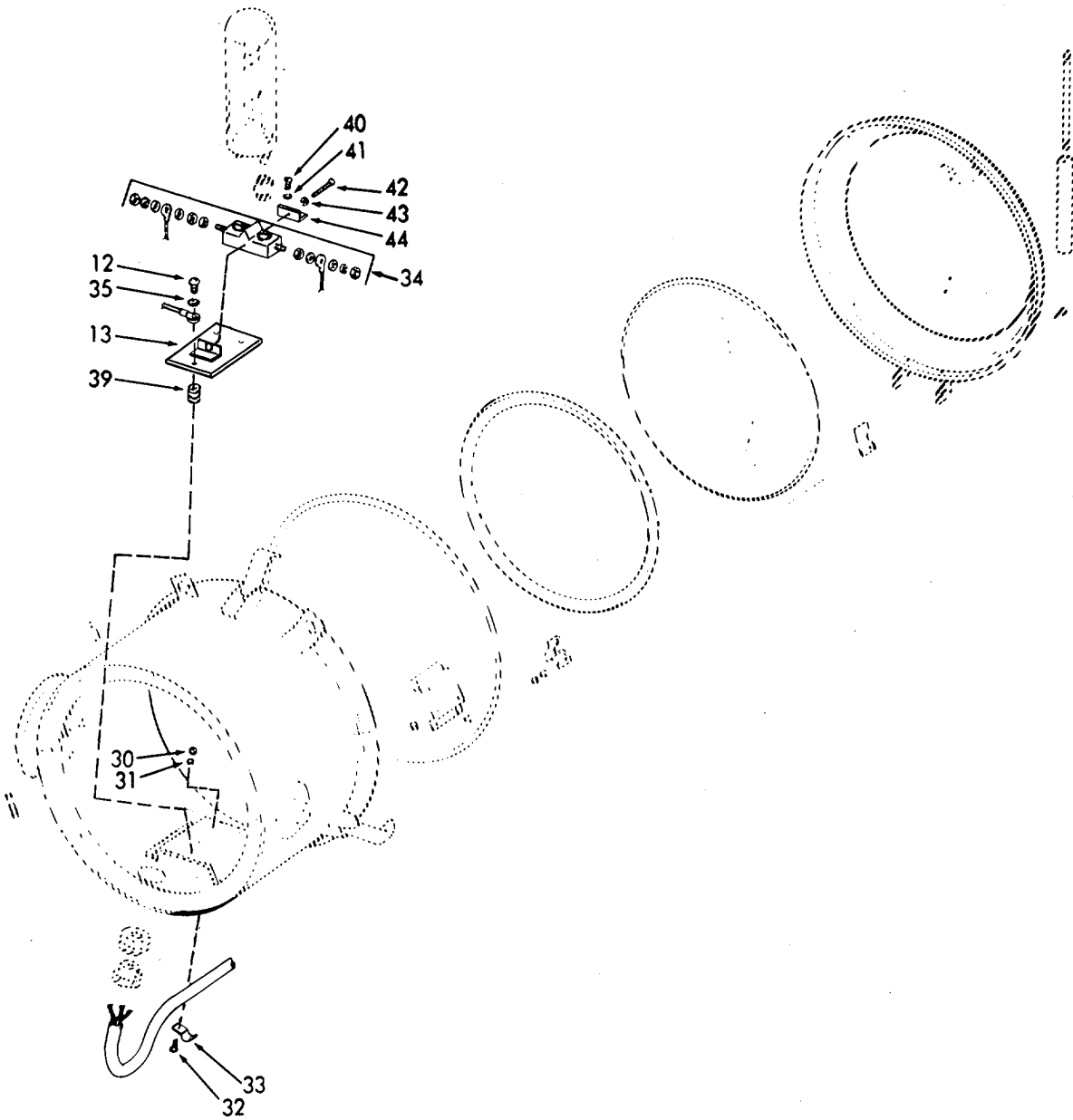
LOCATION	ITEM	ACTION	REMARK
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REPAIR (Cont)

h. Wiring

Install.

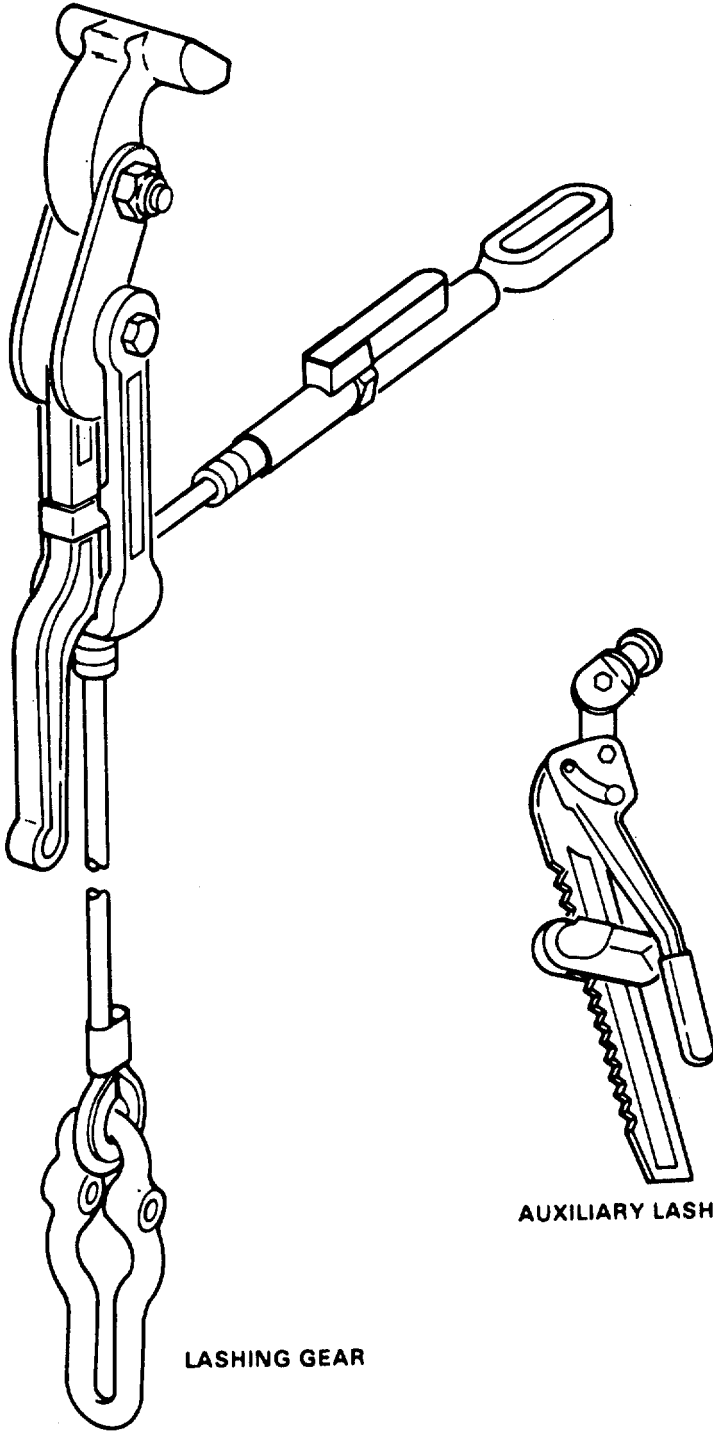
Refer to step 10.



4-80. LASHING GEAR - MAINTENANCE INSTRUCTIONS (Continued).

LOCATION	ITEM	ACTION	REMARK
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REPLACE Cont)



APPENDIX A
REFERENCES

Refer to Volume 12.

A-1/(A-2 blank)

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 maintenance 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 precision 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 equipment or system.
- (8) Replace. The act of substituting a serviceable like type part, subassembly or module (component or assembly) for an unserviceable 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 serviceability 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 prescribed 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 tool 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					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
1146	Thermal Expansion Valve	Inspect Replace	.2 1.5						
1150	Miscellaneous Valves and Headers								
1151	Liquid Solenoid Valve	Inspect Replace Repair	.5 1.0 2.0						
1152	Receiver	Inspect Replace Repair	.5 1.0 1.0						
1153	Heat Interchanger	Inspect Replace	.5 3.0						
1154	Water Regulating Valve	Inspect Service Replace Adjust	.5 .5 2.0 .5						
1155	Thermometer	Inspect Replace	.5 .5						
1156	Controller	Inspect Replace Repair	.5 2.0 1.5						
1200	Commissary Space Equipment								
1210	Refrigerator/ Freezer	Service Inspect Replace Repair	1.0 .4 3.0		6.0 30.0 10.0				
1220	Toaster	Inspect Replace	.1 .5						
1230	Drinking Fountain	Inspect Service Replace Repair	.3 1.0 3.5 2.8						
1240	Milk Dispenser	Inspect Service Replace Repair	.3 .6 2.0 1.5		4.0 3.0				
1250	Coffee Maker	Inspect Replace	.1 1.5						
1260	Washer/Dryer	Inspect Replace Repair	2.0 12.0 10.0						
1270	Sanitizing Sink Heater	Inspect Replace Repair	.2 3.0 2.0						

SECTION II MAINTENANCE ALLOCATION CHART (CONTINUED)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
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/ Extinguishing System and Fixed Halon 1301	Inspect	.5						
		Service	1.0						
		Test	.5		8.0				
		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					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
1845	Diesel Oil Coolers	Inspect	1.0						
		Replace	1.5						
		Repair	1.5		10.0				
1846	Duplex Strainer	Inspect			.5				
		Service			.5				
		Replace	2.0						
1850	Washdown Counter-Measure Piping System	Repair	2.0						
		Inspect	1.0						
		Replace	20.0						
1870	Engine Exhaust Piping System	Repair	2.0						
		Inspect	1.0						
		Replace	1.0		20.0				
1890	Oil/Water Separator Piping	Replace	1.0		20.0				
		Repair	2.0		18.0				
		Inspect	1.0						
1895	Deck Fittings	Replace			4.5				
		Repair	1.5		10.0				
		Inspect	1.0						
1900	Tanks and Voids	Replace			20.0				
		Repair	2.0		18.0				
		Inspect	1.0						
1905	Receiver	Inspect	.5						
		Test	.5						
		Replace			6.0				
		Repair	5.5		5.5				
		Adjust	1.5						
		Inspect	.5						
1911	Transmitter	Test	.5						
		Replace	6.0						
		Inspect	1.0						
1912	Cables	Replace	4.5						
		Inspect	1.0						
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						
1920	Hot Water Heater	Inspect	.5						
		Replace			20.0				
		Repair	2.0		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						

SECTION II MAINTENANCE ALLOCATION CHART (CONTINUED)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
2200	Hull and Outfit								
2210	Stanchions and Railings	Inspect	1.0						
		Replace	20						
2213	Furniture and Miscellaneous Furnishings	Inspect	1.0						
		Replace	1.5		7.5				
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						
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						

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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

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigram = .035 ounce
 1 dekagram = 10 grams = .35 ounce
 1 hectogram = 10 dekagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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