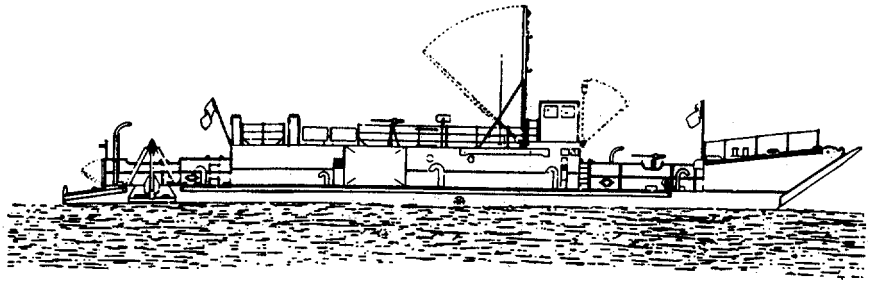
TECHNICAL MANUAL
OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

OPERATOR MAINTENANCE INSTRUCTIONS FOR AUXILIARY EQUIPMENT

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



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HEADQUARTERS, DEPARTMENT OF THE ARMY
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TECHNICAL MANUAL

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WASHINGTON, D. C. , 9 October 1984

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

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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

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CHAPTER 4
OPERATOR MAINTENANCE INSTRUCTIONS FOR AUXILIARY EQUIPMENT (CONTINUED)

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

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

a. General.

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

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

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

NOTE

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

b. Pumping Down.

To replace the thermal expansion valve, proceed as follows:

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

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

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

(4) Disassemble valve.

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

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

(6) Plug openings to exclude air moisture.

(7) Install and reassemble thermal expansion valve.

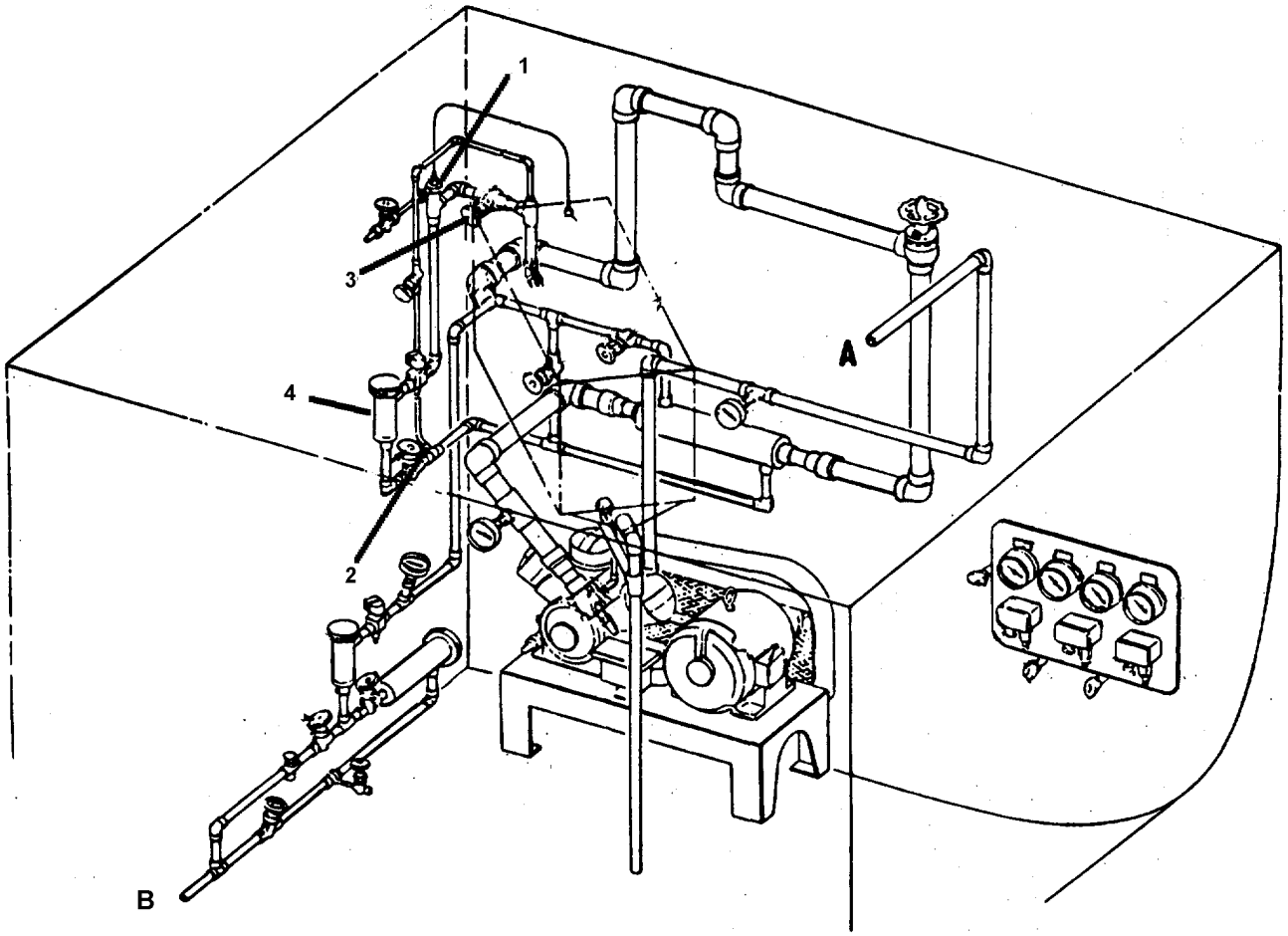
(8) Loosen strainer cover.

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

(10) Quickly tighten strainer cover.

(11) Open cut-out valves.

(12) Resume normal operation.



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

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

This task covers:

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

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

Gasket kit Y13455-1

Personnel Required

1

References

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

Equipment Condition Condition Description

NONE

Special Environmental Conditions

NONE

General Safety Instructions

Observe safety precautions in paragraph 4-28d .

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

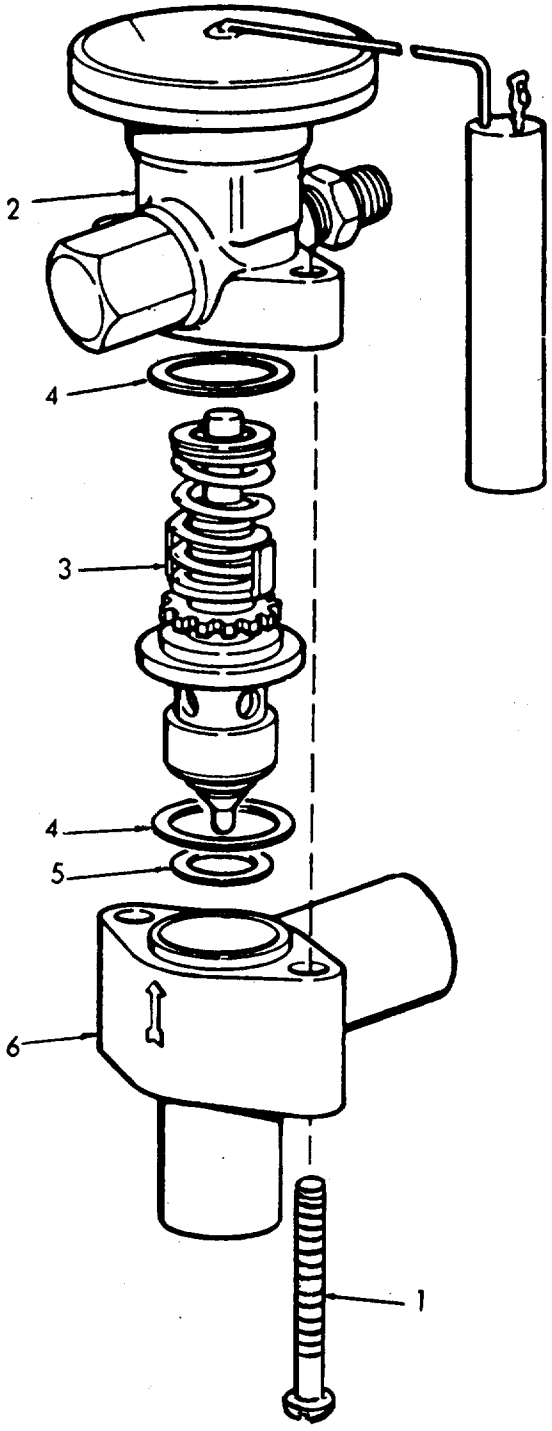
4-34. THERMAL EXPANSION VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

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

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

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



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

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

NOTE

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

ADJUSTMENT

4.

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

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

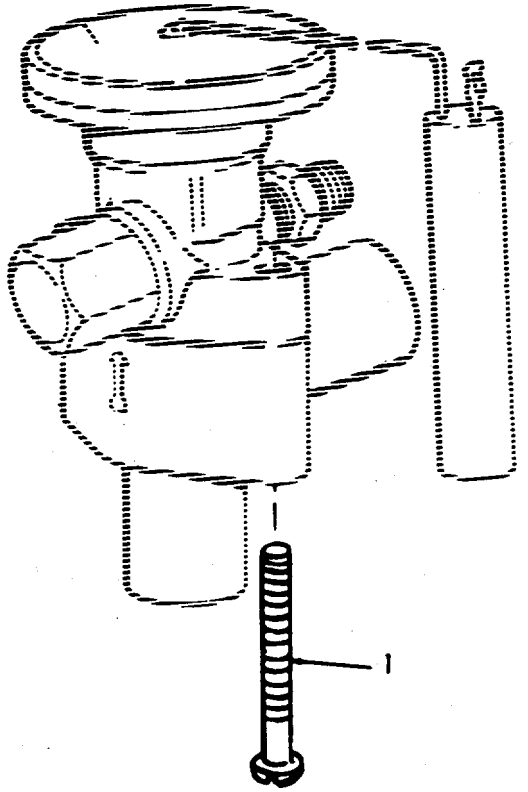
c. Turning stem to left increases refrigerant flow and lowers superheat. Two turns of stem will change superheat about 1°F (-17.2°C). Adjust two turns at a time.

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

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

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)



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

LOCATION	ITEM	ACTION	REMARKS

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

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

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

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

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

(5) Plug openings to exclude air and moisture.

(6) Install liquid line solenoid.

(7) Loosen strainer cover.

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

(9) Quickly tighten strainer cover.

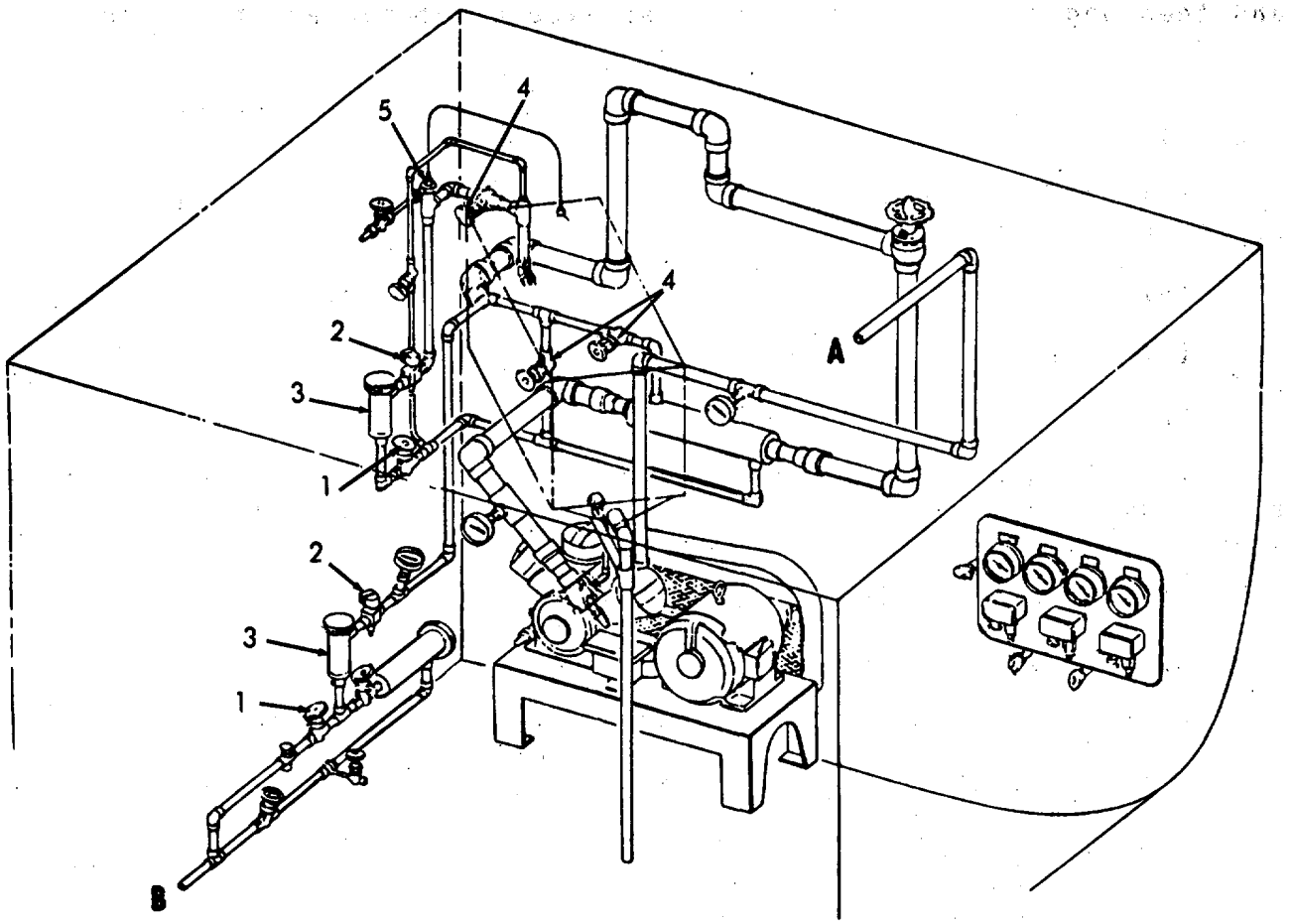
(10) Open cut-out valves.

(11) Resume normal operation.

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

DESCRIPTION	PARAGRAPH
Liquid Solenoid Valve	4-35.1
Receiver	4-35.2
Heat Interchanger	4-35.3
Water Regulating Valve	4-35.4
Thermometers	4-35.5
Refrigerant Tubing	4-35.6
Packless Valves	4-35.7
Controller	4-35.8

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



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

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

This task covers:

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

INITIAL SETUP:

Test Equipment

NONE

Special Tools

NONE

Material/Parts

Gasket kit 4810-01-046-8558

Personnel Required

1

References

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

Equipment

Condition	Condition Description
	NONE

Special Environmental Conditions

NONE

General Safety Instructions

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

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

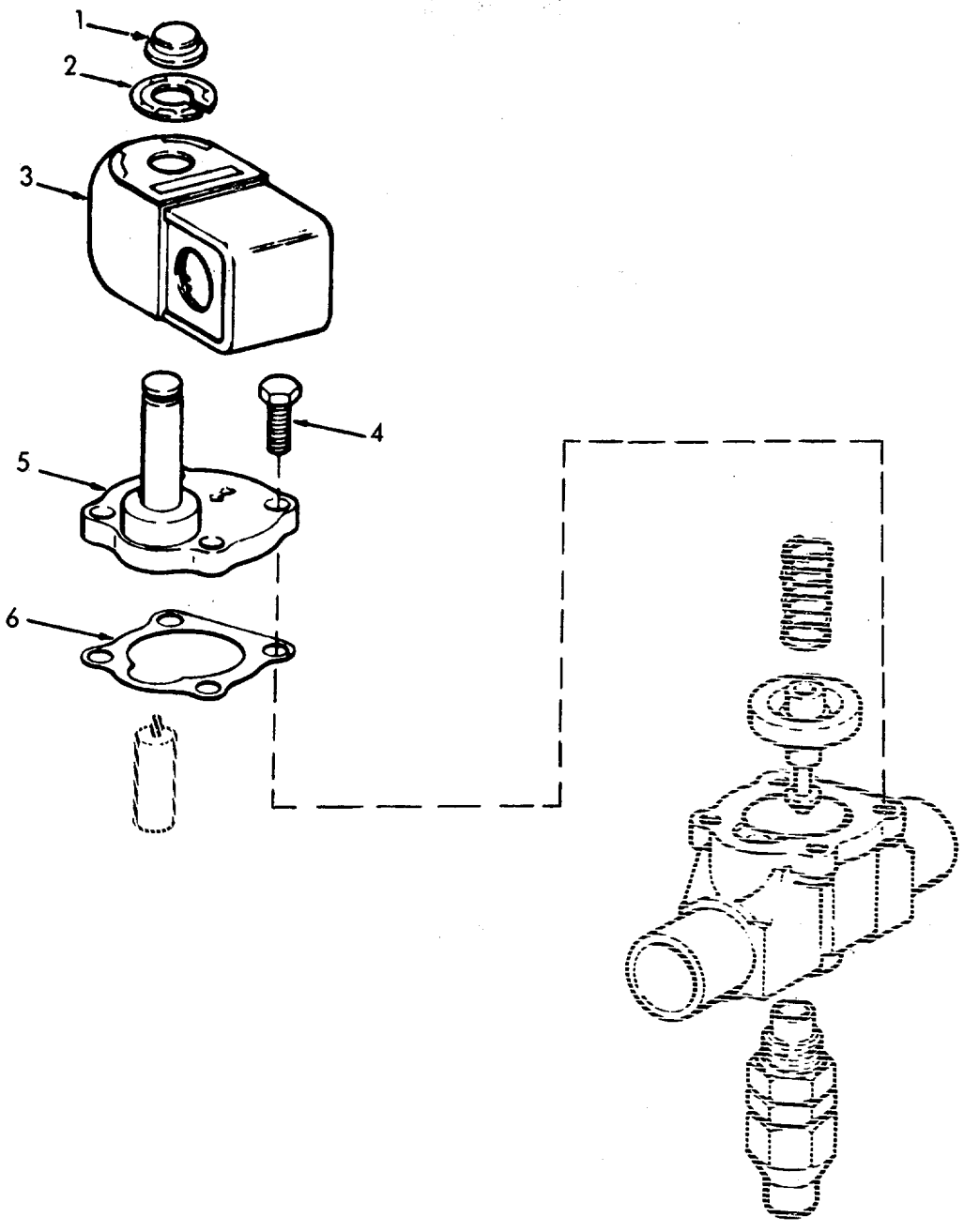
4-35.1. LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

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

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

LOCATION	ITEM	ACTION	REMARKS

REPAIR (Cont)

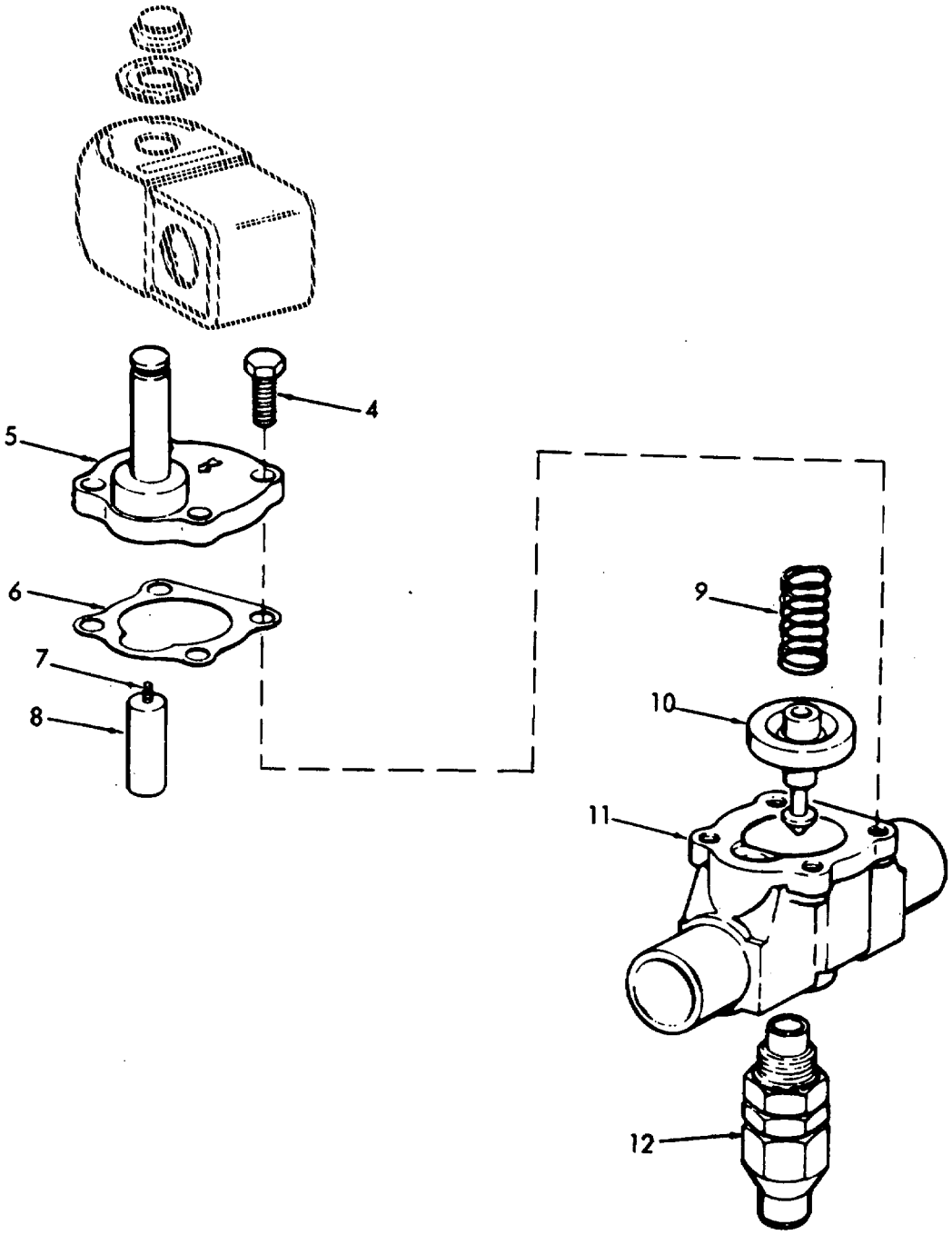


4-35. 1. LIQUID SOLENOID VALVE - AIR CONDITIONING - MAINTENANCE INSTRUCTIONS (Continued).

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

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

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



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

This task covers:

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

INITIAL SETUP:

Test Equipment

NONE

References

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

Special Tools

NONE

Equipment Condition Condition Description

NONE

Material/Parts

NONE

Special Environmental Conditions

NONE

Personnel Required

1

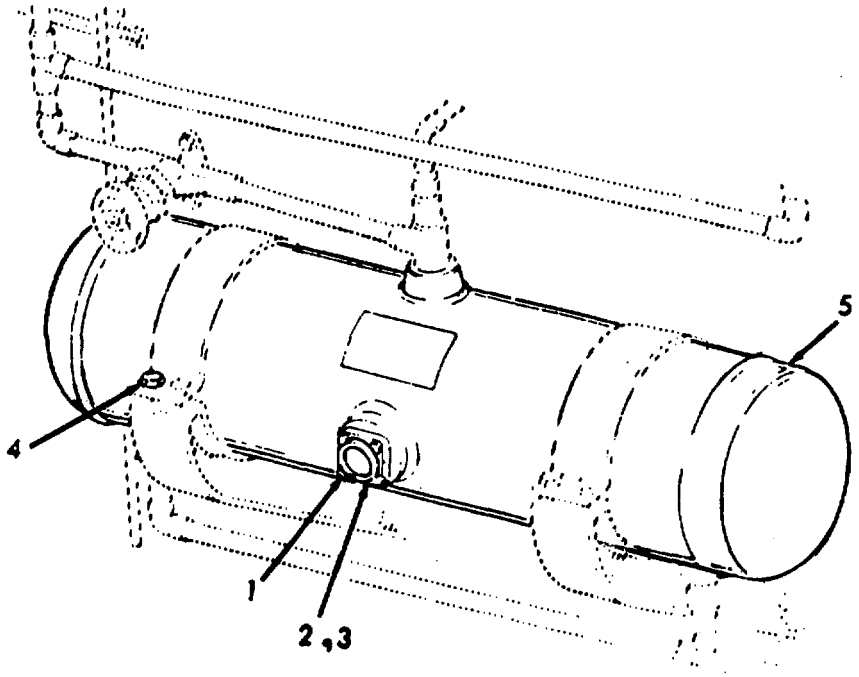
General Safety Instructions

Observe safety precautions in paragraph 4-28d .

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

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

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



4-961

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

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

This task covers:

a. Inspection **b. Replace**

INITIAL SETUP:

Test Equipment
NONE

Special Tools
NONE

Material/Parts
NONE

Personnel Required
1

References

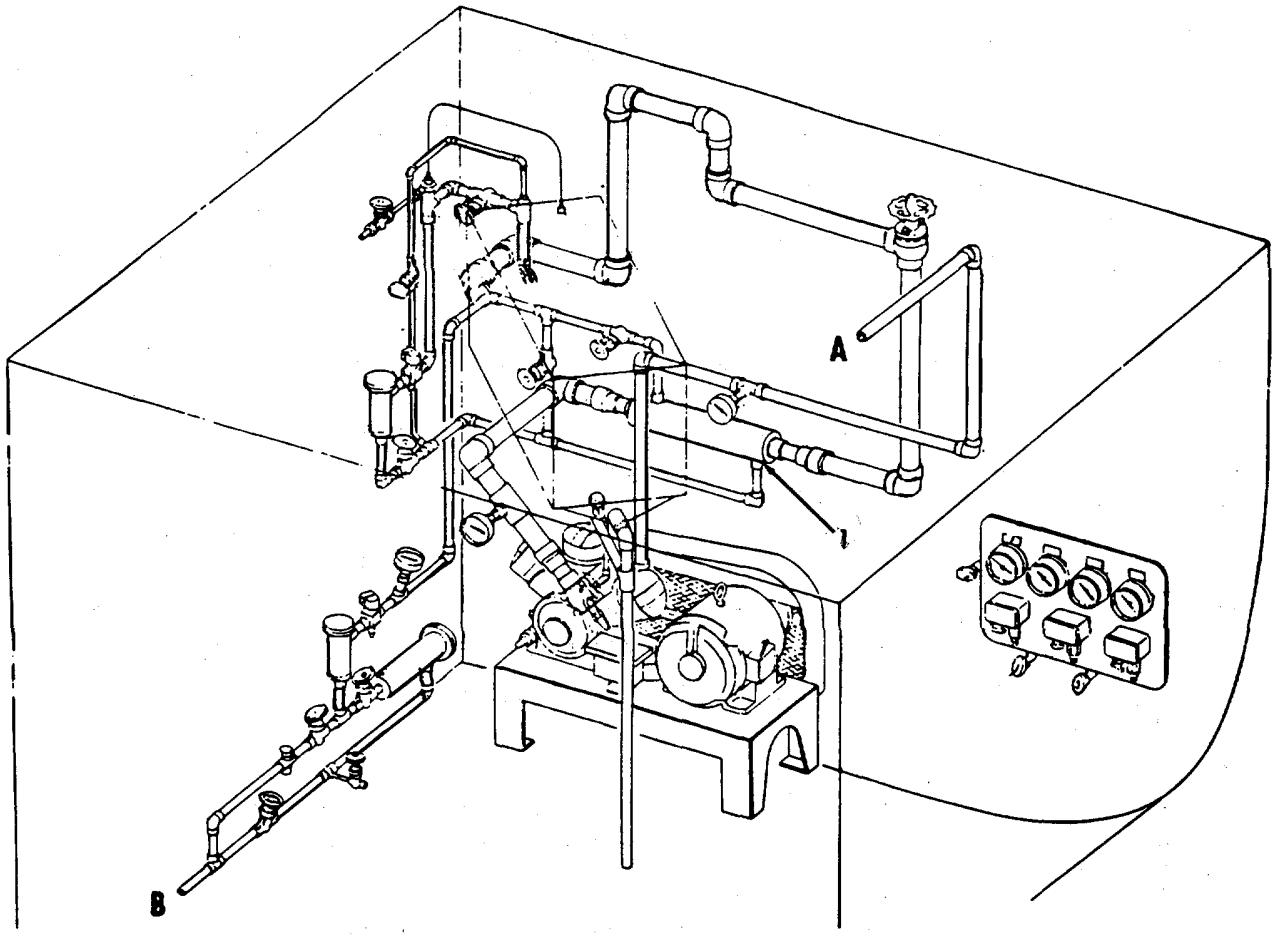
Paragraph	
4-28r	Leak Detection
4-35.6	Tubing Maintenance

Equipment
Condition Condition Description
NONE

Special Environmental Conditions
NONE

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

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

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

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