

# M AINTENANCE I NSTRUCTION

## AUTOMATIC DRAIN VALVE 9523127

### DESCRIPTION

The automatic drain valve, Fig. 1, is located in the compressor/temperature switch manifold water supply piping. The automatic drain valve provides protection for the cooling system if an engine has not been manually drained. A thermostat mounted in the drain valve body activates the drain valve when descending coolant temperature reaches 7° C (45° F). The switch will reset at 12° C (55° F) on ascending coolant temperature.

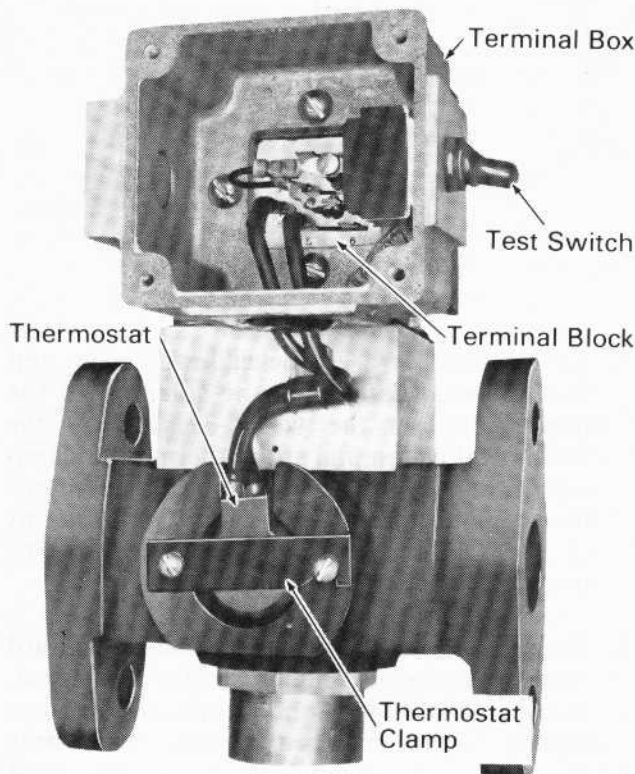


Fig.1 - Automatic Drain Valve 9523127

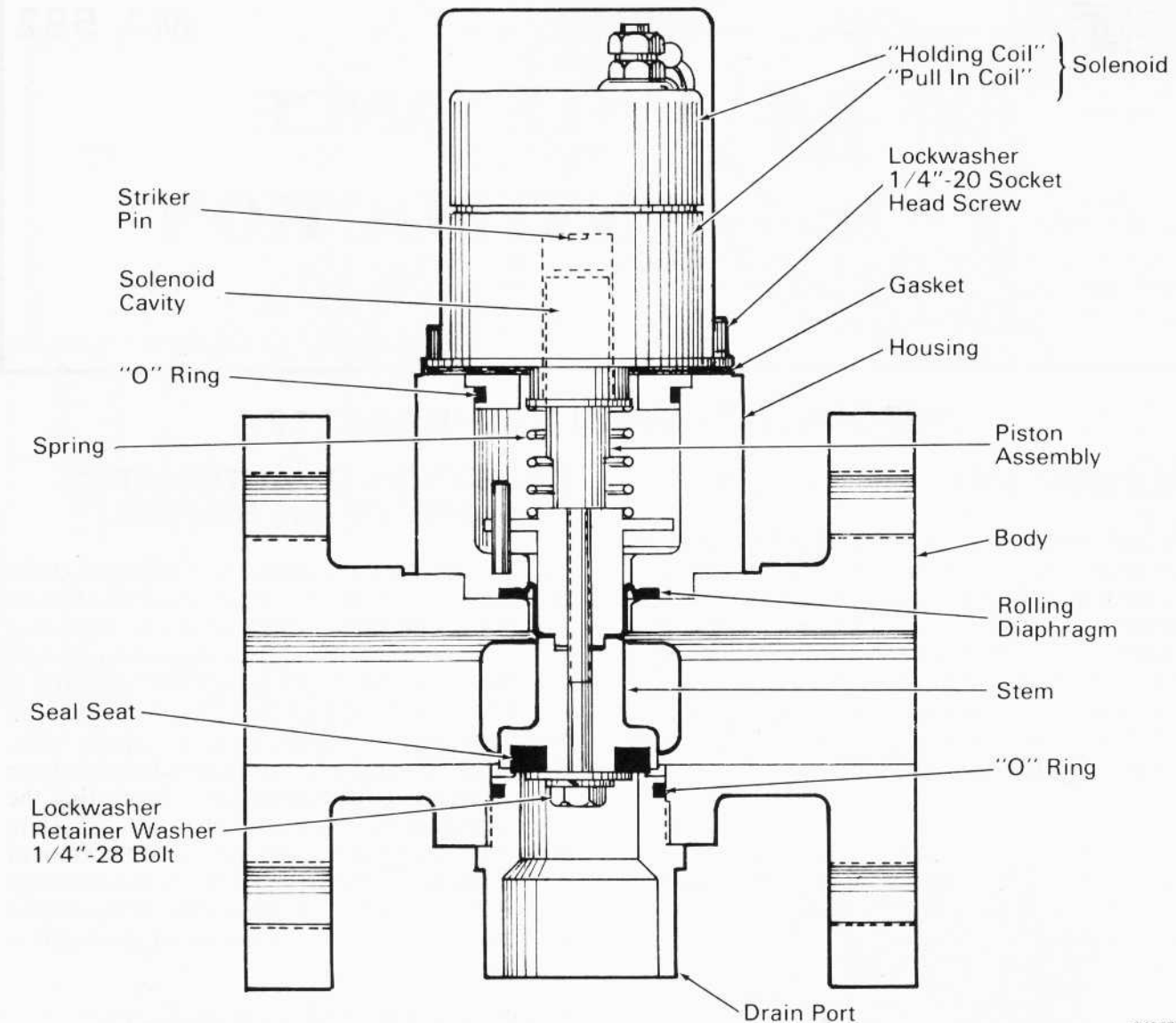
### OPERATION OF AUTOMATIC COOLANT DRAIN SYSTEM

Engine shutdown energizes the automatic drain valve circuitry. When coolant temperature falls to 7° C (45° F), an internal thermostat trips, activating the automatic drain valve. The entire cooling system will then drain within 10-12 minutes. An AUTO DRAIN COLD WATER FILL SWITCH is provided to electrically override the automatic drain valve, closing the drain valve for re-filling a drained engine or to facilitate cold water filling. Restarting the engine re-activates the automatic cooling system drain circuitry to provide protection in the event of future shutdown. The system is interlocked through the engine fuel pump circuit so that the automatic drain valve cannot be activated when the engine is running.

### OPERATION OF AUTOMATIC DRAIN VALVE

Refer to cross-section of automatic drain valve in Fig. 2. When the drain valve solenoid is energized, current passes through a parallel network made up of a "pull in" coil and a "holding" coil. Energizing the coils produces a magnetic field which causes the piston and attached stem and seal mechanism to move quickly into the solenoid cavity. When the piston reaches the top of the solenoid cavity, the piston strikes the striker pin and opens the "pull in" coil circuit. The "pull in" coil with the "holding" coil are required to raise the piston, stem, and seal mechanism and open the drain port. Once opened, the "holding" coil is sufficient to hold the valve in the open position.

A replaceable rubber seal mounted in the automatic drain valve stem assembly is used to seal the drain port. A renewable rolling diaphragm seal is used between the stem and the housing at the top of the valve.



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Fig.2 – Automatic Drain Valve Cross-Section

A test switch is provided on the automatic drain valve to check operation of the device. Operating the test switch will energize the coils, causing the valve to operate and drain coolant. Releasing the test switch, de-energizes the coils and draining ceases.

## AUTOMATIC DRAIN VALVE MAINTENANCE

### DISASSEMBLY

Refer to Figs. 1 and 2 during disassembly procedure.

1. Place automatic drain valve on a bench.
2. Remove terminal box cover plate.
3. Remove two 1/4"-20 socket head screws and lockwashers that attach the solenoid to the housing. Loosen the two 10-32 screws of the thermostat clamp and swing thermostat clamp out of the way to free the thermostat. Remove the solenoid, terminal box, and thermostat as an assembly. The alignment bushing can also be removed at this time.
4. Push piston and stem assembly gently downward until the seat seal contacts the drain port seat. Remove the 1/4"-28 bolt, lockwasher, and retainer washer from piston and stem assembly by using a 7/16" socket wrench operated through the drain port.
5. Remove drain port and stem assembly.

- Remove the remaining two 1/4"-20 socket head screws that attach the housing to the body. Remove the housing. Lift the piston assembly from the housing assembly.

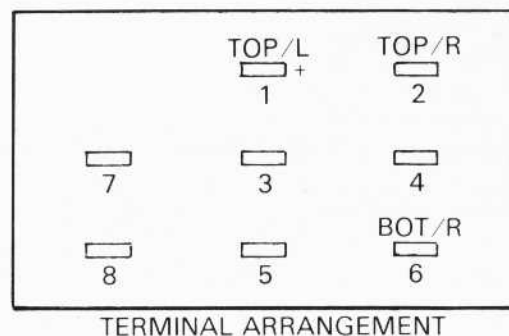
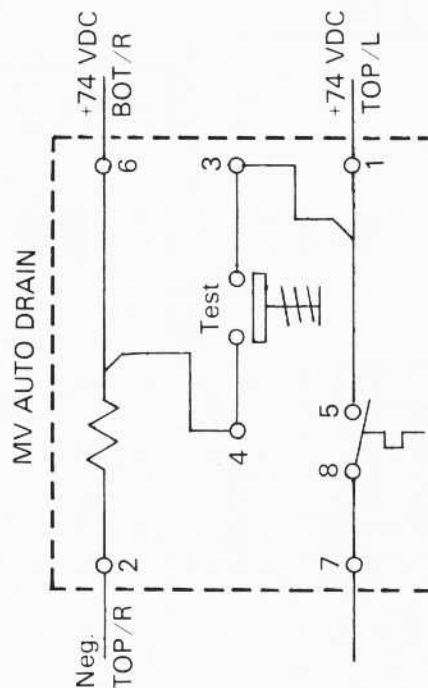
## INSPECTION

Refer to Figs. 1 and 2 during inspection procedure.

- Remove all sealing compound from components.
- Clean all parts to remove foreign material. If necessary, polish the portion of piston assembly that fits into solenoid cavity and the diaphragm bore in the housing and body.

## SOLENOID, TEST SWITCH, AND THERMOSTAT CHECK

- Visually inspect solenoid, particularly the solenoid cavity. If solenoid is heavily corroded or striker pin operation is sticky, the solenoid should be replaced with a new solenoid.
- Hi-pot test the terminals of the solenoid with 400 VAC rms at 60 Hz for 1 minute. If solenoid does not pass this test, solenoid should be replaced with a new solenoid.
- Bench test the solenoid coils, test switch, and thermostat as an assembly as follows:
  - Place piston assembly in solenoid cavity. Position the piston so that approximately 6 mm (1/4") gap remains between the top of the piston and the striker pin.
  - Remove thermostat lead from terminal 8 of terminal block and connect to terminal 6. Refer to Fig. 3. In older automatic drain valves, this is the thermostat lead with the in-line splice.
  - Connect a 74 VDC supply line equipped with a 0-15 amp ammeter to terminal 1 and apply the negative lead to terminal 2.
  - Operate the test switch. Solenoid should energize and pull the piston assembly solidly against the top of the solenoid cavity, contacting the striker pin and de-energizing the "pull in" coil. Carefully monitor the ammeter during this operation. An initial current surge indicates both coils are properly energized. The current level should immediately reduce to less than one amp after the "pull in" coil has been switched off by the action of the piston assembly against the striker pin.



24884

Fig.3 - Magnet Valve Schematic And Terminal Arrangement

- Check the thermostat with the solenoid by immersing thermostat in water chilled to approximately 4° C (40° F). Within a few seconds, the thermostat should close, energizing the solenoid. Remove the thermostat from the water and thermostat should reset in several seconds.
- Remove thermostat lead from terminal 6 of terminal block and connect to terminal 8.

## REASSEMBLY

Reassemble automatic drain valve using the following procedure. A repair kit is available which contains all parts normally required for rebuilding the automatic drain valve. Refer to Service Data for automatic drain valve repair kit part number and refer to Fig. 4 for repair kit contents.

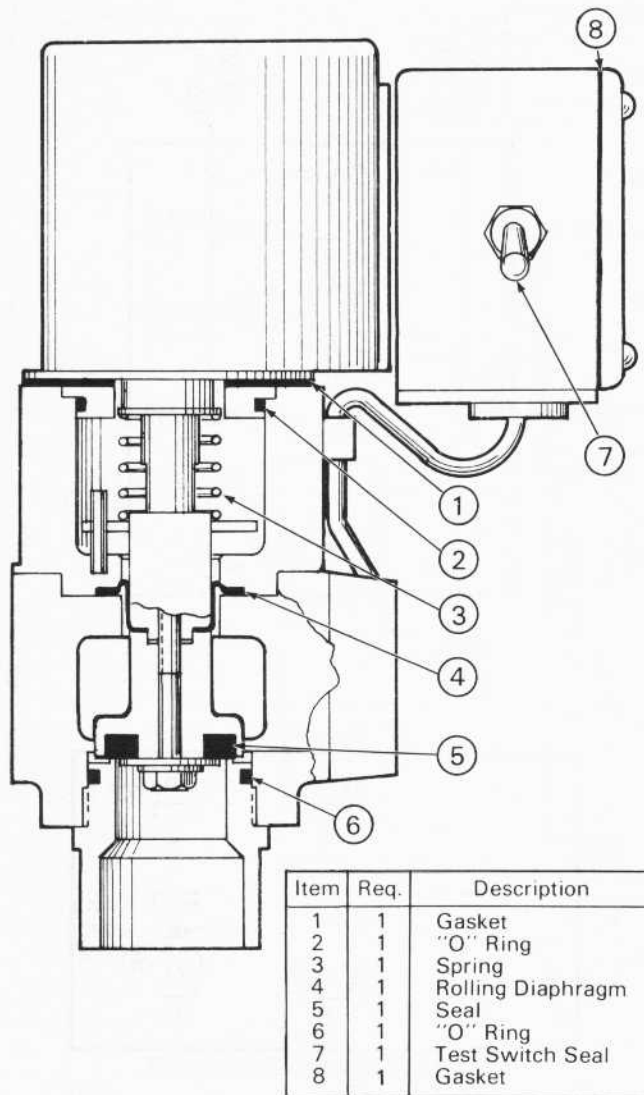


Fig.4 - Automatic Drain Valve  
Repair Kit 9523106

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Refer to Figs. 1 and 2 during reassembly procedure.

1. Re-insert piston assembly over guide pins in housing assembly.
2. Apply a light coat of petroleum jelly to rolling diaphragm (item 4 of repair kit) and position rolling diaphragm over piston assembly pilot and into retaining groove in housing.
3. Assemble housing assembly to valve body so that counterbored hole in the housing assembly is positioned on the same side as the thermostat. Ensure diaphragm seal is free to rotate in the housing assembly groove.
4. Apply a light coat of petroleum jelly to seat seal (item 5 of repair kit). Coat stem assembly 1/4"-28 retaining bolt with RTV compound. Install seat seal in stem assembly and insert retaining bolt, retaining washer, and lockwasher into stem assembly.
5. Thread retaining bolt into piston assembly. After bolt is started, push piston assembly down until piston assembly nears the bottom of the housing. Ensure the rolling diaphragm is not twisted and torque retaining bolt to 6 N·m (50 in.-lbs). If rolling diaphragm twisted after tightening retaining bolt, loosen the housing retaining bolts, to allow rolling diaphragm to untwist, and retorque housing retaining bolt to 6 N·m (50 in.-lbs).
6. Apply a light coat of petroleum jelly to alignment bushing "O" ring (item 2 of repair kit) and assemble alignment bushing.
7. Install spring (item 3 of repair kit).
8. Assemble thermostat assembly with gasket (item 1 of repair kit). Torque retaining bolts to 6 N·m (50 in.-lbs). Reinstall thermostat into cavity in the body and hole in place with thermostat clamp.
9. Apply a light coat of petroleum jelly to drain port "O" ring (item 6 of repair kit) and assembly drain port.
10. Remove test switch and check seal. Apply a new seal if required (item 7 of repair kit).
11. Apply terminal box cover plate with gasket (item 8 of repair kit).
12. When reinstalling automatic drain valve to cooling system, install two gaskets (8448504).

### SERVICE DATA

Automatic Drain Valve Repair Kit	9523106
RTV Compound, 170 g (6 oz) Cartridge	8345495

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