ELECTRO-MOTIVE DIVISION • GENERAL MOTORS CORPORATION
SERVICE DEPARTMENT

MAINTENANCE INSTRUCTION

THERMOSTATIC VALVE

DESCRIPTION

The thermostatic valve, Fig. 1, is a diverting valve used to maintain a constant temperature at the diesel engine coolant outlet. When an engine is started and cold, the valve causes all coolant to bypass the heat exchanger in the engine cooling system. After warmup, part of the heated coolant is routed through the heat exchanger and part is bypassed. The coolant which bypassed the heat exchanger is then mixed with the cold coolant returned from the heat exchanger before entering the engine. Thermostatic valve action mixing the coolant maintains the desired engine coolant temperature. When coolant from the engine reaches the nominal temperature of the particular thermostatic valve, the valve closes the bypass side entirely, and all the coolant will flow through the heat exchanger.

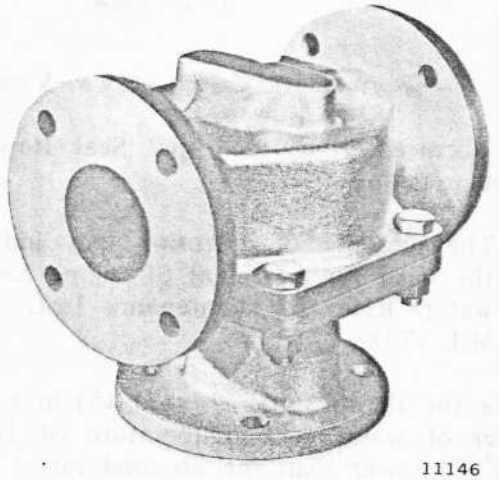


Fig. 1 – Typical Thermostatic Valve

The thermostatic valves covered in this Maintenance Instruction are similar in construction and all models operate the same. The differences between models involve dimensions and the number and sensitivity of the thermostatic elements. Refer to Service Data section for part number and temperature data.

OPERATION

The thermostatic valve contains thermostatic element assemblies that hold valve sleeves in the bypass position by spring tension when cold coolant from the engine passes over the elements. As coolant temperature increases, a thermostatic material that is highly sensitive to temperature expands to develop pressure that overcomes the force of the return spring. The thermostatic material drives a molded synthetic rubber plug into a reduced diameter piston guide that by extruding action multiplies the travel of the plug. The plug drives a piston that forces the valve sleeves to open the valve outlet to the heat exchanger and at the same time constrict the bypass opening. This action is shown in Fig. 2.

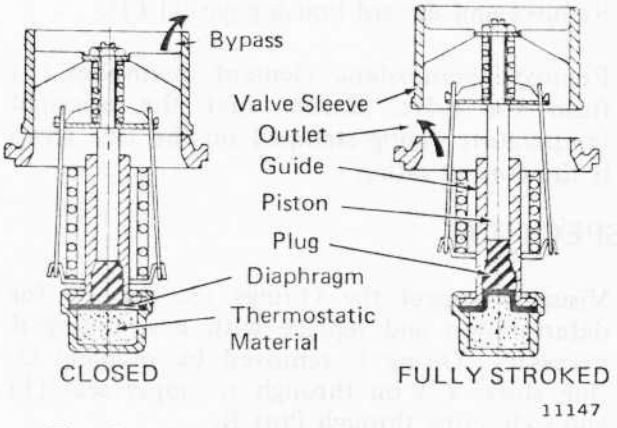


Fig. 2 – Thermostatic Element Assembly

MAINTENANCE

Maintenance of the thermostatic valve should be performed at intervals prescribed in the applicable Scheduled Maintenance Program or at any time improper cooling of the engine is evident. Improper cooling may be due to thermostatic valve O-ring deterioration or malfunction of the thermostatic elements.

*This bulletin is revised and supersedes previous issues of this number.

DISASSEMBLY

To perform an inspection of the thermostatic valve, it may be necessary to remove the entire valve from the cooling system piping. However, on some installations and under some circumstances it may be easier to remove only the bolted housing and its attached piping from the valve. If the entire valve is to be removed, it is advisable to tag or otherwise mark the pipe flanges with the letter appearing at the adjacent valve flange. The letter "A" identifies the valve inlet flange. The letter appears on the bolted housing. The letter "B" identifies the outlet to the bypass piping. The letter "C" identifies the outlet to the heat exchanger.

Due to different valve body housing configurations, the location of some bolts and flanges are such that the disassembly and assembly sequence may be altered. Refer to Fig. 3 for a general location arrangement.

1. Unbolt and carefully remove housing (6, Fig. 3) from the valve body. Do not drop or otherwise damage the thermostatic elements within the valve.

2. Remove and discard housing gasket (4).

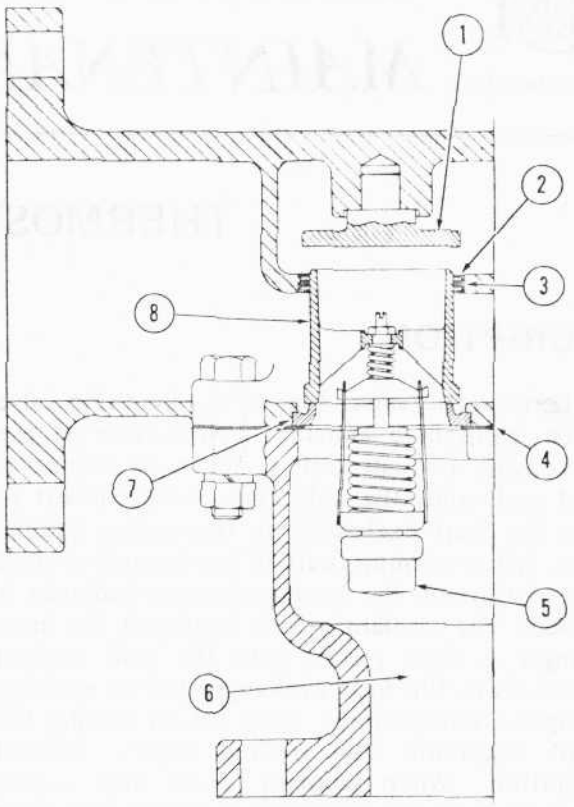
3. Remove thermostatic element assemblies (5) from the valve. Ensure that the nominal temperature rating stamped on the side strap is the correct rating.

INSPECTION

1. Visually inspect the O-rings (3, Fig. 3) for deterioration and replace with new O-ring if necessary. O-ring is removed by pressing O-ring sleeve (2) on through to upper seat (1) and extracting through Port B.

NOTE: Original equipment O-ring is 5/16" thick and should be easily removed with O-ring sleeve. On valve assemblies equipped with replacement O-rings which are 7/16" thick, it will be necessary to cut and collapse the O-ring sleeve to clear the gap between the valve body and the upper seat.

2. Inspect valve sleeve (8), lower seat (7), and upper seat (1). If the valve sleeve or lower seat is pitted, the thermostatic element assembly (5) should be replaced with a new assembly. If the upper seat (1) is lightly pitted, it may be touched up. However, if deep pitting has occurred, refer to Upper Seat Replacement procedure.



1. Upper Seat
2. Channel Type O-Ring Sleeve
3. O-Ring
4. Gasket
5. Thermostatic Element Assembly
6. Element Housing
7. Lower Seat
8. Valve Sleeve

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Fig. 3 – Thermostatic Valve Cutaway View

NOTE: The presence of corrosion may indicate the need for treatment of engine cooling water. Refer to Maintenance Instruction M.I. 1748.

3. Place the thermostatic element (5) in a container of water at a temperature of 10° F (5.5° C) lower than the nominal rating indicated on the side strap. Use the element to stir the water for three to five minutes. The valve sleeve (8) should remain seated tightly against the lower seat (7).

4. Mount a dial indicator on the thermostatic element to obtain a reading of valve sleeve (8) travel. Fabricate a support that will allow the thermostatic valve to be submerged in water.

5. Place the thermostatic element in a container of water at a temperature 15° F (8.3° C) higher than the nominal rating of the element

and stir the water with the element. Ensure that the movement of the dial indicator pointer is smooth. If the valve sleeve rises with decided jerks, the element can be expected to malfunction completely within a short time and should be replaced with a new thermostatic element assembly.

6. After 3 to 5 minutes, observe the dial indicator. If travel (gap between valve sleeve and lower seat) is less than 0.375" (9.52 mm), replace with a new thermostatic element assembly.

7. Place the thermostatic element in a container of cool water to verify that the valve sleeve (8) will return to the seated position.

UPPER SEAT REPLACEMENT

If the upper seat (1, Fig. 3) is lightly pitted, it may be touched up. However, if deep pitting has occurred, replace upper seat with a new upper seat as follows:

1. With the valve disassembled, carefully apply a pry bar through Port B to the upper seat as shown in Fig. 4. Try to pry upper seat from housing. If not successful, perform Step 2. If upper seat can be removed with pry bar, proceed to Step 3.

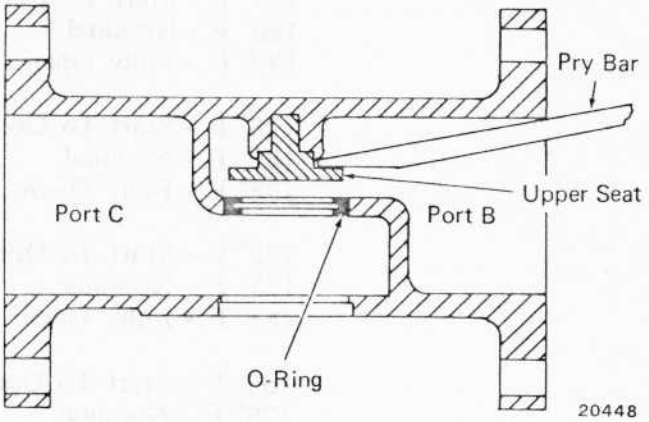

Fig. 4 – Upper Valve Seat Removal With Pry Bar

2. Drill a 5/16" hole, approximately 3/4" deep, into upper seat and tap with a 3/8"-16 NC thread. Insert a 3/8"-16 NC hex head bolt with a washer, 1/4" into upper seat, as shown in Fig. 5. Apply grease between hex head bolt and washer. As the bolt head is turned against the spanner bar, the upper seat will be drawn out.

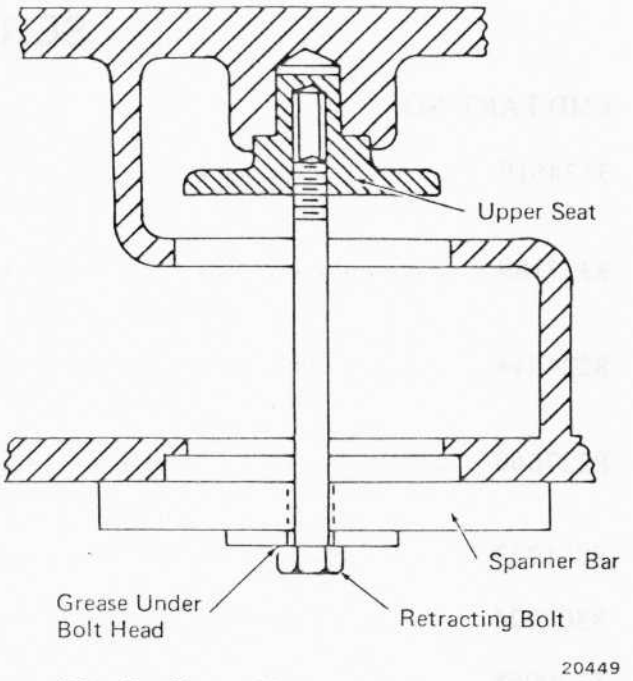

Fig. 5 – Upper Valve Seat Removal With Retracting Bolt

3. Install a new upper seat. Ensure there is sufficient interference to require a moderate press fit.

4. Install a new O-ring and O-ring sleeve.

ASSEMBLY

Perform the following procedure to reassemble the thermostatic valve.

1. Insert O-rings in the O-ring sleeve.

2. Place the thermostatic element assembly valve sleeves in through the O-rings. A small amount of grease at the leading edge of the valve sleeves will allow them to enter more easily.

3. Place a new gasket between the element housing and the valve body.

4. Replace the valve in the cooling system piping, if removed. Use new gaskets at each flanged connection.

5. Replace the thermostatic element in the valve and reassemble element housing.

NOTE: Torque 1/2" bolts to 50 ft-lbs (67.79 N·m). Torque 5/8" bolts to 85 ft-lbs (115.24 N·m).

SERVICE DATA

EMD PART NO.	TEMPERATURE DATA
3324519	170° F - Mid-Position Temp. Setting
3327189	180° F - Mid-Position Temp. Setting
8224544	160° F - Bypass Outlet Close
8227668	111° F - Start To Open 130° F - Fully Open
8261223	160° F - Nominal
8307024	160° F - Nominal
8320068	180° F - Mid-Position Temp. Setting
8326972	175° F - Start To Open 180° F - Nominal 190° F - Fully Open
8344089	170° F - Start To Open 175° F - Nominal 185° F - Fully Open
8370139	175° F - Start To Open 180° F - Nominal 190° F - Fully Open
8378593	178° F - Start To Open 185° F - Nominal 198° F - Fully Open
8393955	170° F - Start To Open 175° F - Nominal 185° F - Fully Open
8394034	165° F - Start To Open 170° F - Nominal 180° F - Fully Open
8394262	165° F - Start To Open 170° F - Nominal 180° F - Fully Open
8394263	165° F - Start To Open 170° F - Nominal 180° F - Fully Open

SERVICE DATA (CONT'D)

8395402	170° F - Start To Open 175° F - Nominal 185° F - Fully Open
8407382	105° F - Nominal
8411354	155° F - Start To Open 160° F - Nominal 170° F - Fully Open
8411472	155° F - Start To Open 160° F - Nominal 170° F - Fully Open
8413628	165° F - Start To Open 170° F - Nominal 180° F - Fully Open
9080483	175° F - Start To Open 180° F - Nominal 190° F - Fully Open
9081988	188° F - Start To Open 195° F - Nominal 208° F - Fully Open
9081989	188° F - Start To Open 195° F - Nominal 208° F - Fully Open
9083634	175° F - Start To Open 180° F - Nominal 190° F - Fully Open

Litho in U.S.A.