THERMOSTATIC AIR CLEANERS – ALL MODELS

DESCRIPTION

All passenger cars use a system for preheating the air entering the carburetor. This device is part of the air cleaner and maintains the air temperature at a point where the carburetor can be calibrated much leaner to reduce hydrocarbon (HC) emissions and also improve warm-up operations and reduce carburetor icing.

System consists of an air cleaner assembly, intregal air control door, vacuum control temperature sensor, vacuum motor, heat shroud (on exhaust manifold) with connecting pipe and vacuum hoses. Some models use additional controls, such as vacuum traps and cold weather modulators.

Some General Motors 151" 4-Cylinder engines use a thermostatic air cleaner system that does not use a vacuum motor to control the air control door. Door is controlled by a thermostatic spring only.

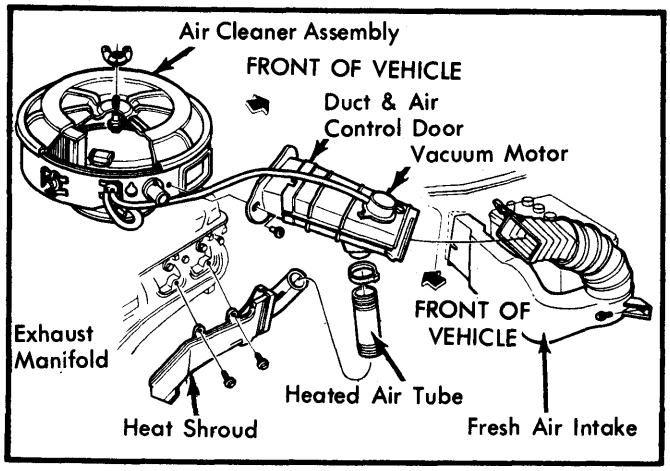

Fig. 1 Typical Thermostatic Air Cleaner Assembly (Ford Motor Co. V8 Shown, Other Makes, Models and Engines are Similar)

OPERATION

When temperature of air entering air cleaner is less than the setting of temperature sensor, sensor closes to allow engine vacuum to operate vacuum motor which closes damper assembly to outside air. Air is then drawn from around exhaust manifold, through heat shroud and into air cleaner as heated air. As air inside air cleaner warms, sensor valve begins to open. This bleeds off vacuum to vacuum motor. As vacuum to vacuum motor drops, air control door begins to open, allowing outside air to enter air cleaner. When air entering air cleaner reaches a specificed temperature, air control door opens completely, thus closing off heated air from around exhaust manifold.

On some General Motors 151" 4-Cylinder engines, the air control door will be in the heated air position whenever the temperature is 50°F or below. The door will be in the full outside air position (closed to heated air) whenever the sensor temperature is 110°F or above.

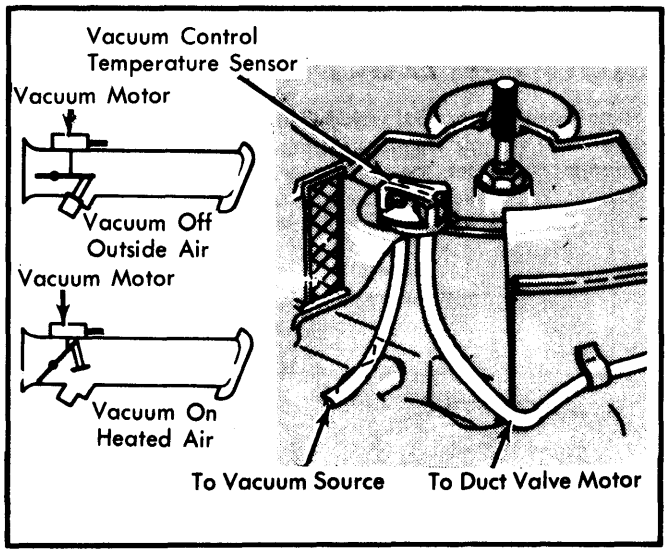

Fig. 2 Thermostatic Air Cleaner Assembly Showing Vacuum Control Temperature Sensor and Vacuum Motor with Air Control Door

DELAY VALVE (GENERAL MOTORS V6 ENGINES ONLY)

On some General Motors V6 engines, a delay valve is used on the thermostatic air cleaner. During cold weather operation, and when under full or hard acceleration, the delay valve will postpone opening the air control door to outside air. The engine will continue to receive heated air for a short period to improve driveability.

VACUUM TRAP (GENERAL MOTORS VEHICLES ONLY)

Some General Motors vehicles are equipped with a built-in vacuum trap, designed to hold the air control door in the heated air position during full throttle if outside air is below 70°F. The length of time that the air control door is held closed depends on outside air temperature. The vacuum trap can be identified by a check valve in the small orifice leg of the temperature sensor.

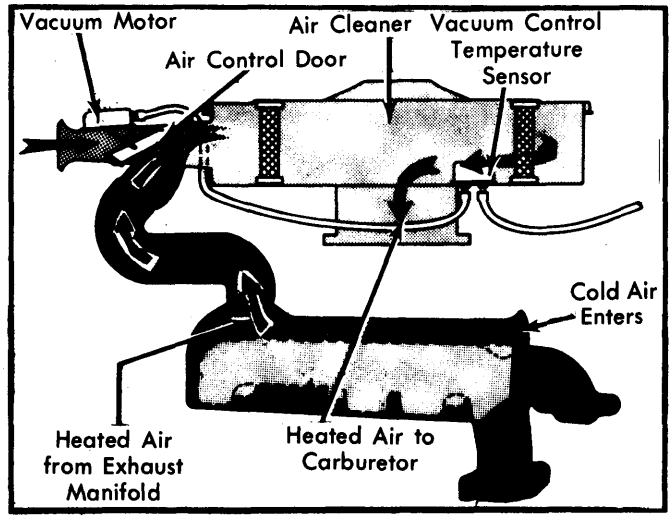

Fig. 3 Thermostatic Air Cleaner Assembly Showing Air Flow into Carburetor

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THERMOSTATIC AIR CLEANERS – ALL MODELS (Cont.)

COLD WEATHER MODULATOR (FORD MOTOR CO. ONLY)

Some Ford Motor Co. vehicles have a vacuum modulator located in the air cleaner. During engine operations in cold weather, it prevents the air cleaner duct door from opening to non-heated intake air. When available outside air is above 55°F, the cold weather modulator does not operate.

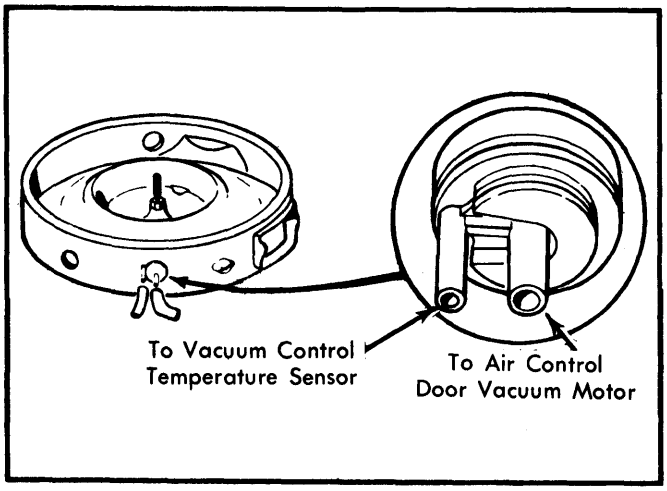

Fig. 4 Cold Weather Modulator Ford Motor Co. Only

TESTING

NOTE – *See specifications tables for correct specifications when performing the following tests.*

VACUUM CONTROL TEMPERATURE SENSOR TEST

1) Tape a thermometer close to the vacuum control temperature sensor, located inside the air cleaner. Leave wing nuts off of top of air cleaner so top can be removed quickly to check thermometer while performing tests.

2) With a cold engine, temperature below vacuum control temperature sensor specifications, check air control door in air cleaner. It should be in the fully open position (open to outside air).

3) Start engine and let run. As soon as engine starts, door should go to full heated air position (closed to outside air). Watch air control door. When door reaches full open position (outside air only), quickly take air cleaner top off and read thermometer. Compair thermometer reading with specifications. If reading is not to specifications, perform vacuum motor test before replacing sensor.

Vacuum Control Temperature Sensor Specifications

Application	Air Door Closing Temp. (°F)	Air Door Opening Temp. (°F)
American Motors		
151" 4-Cyl.	77	①123
258" 6-Cyl.	40	80
Buick③		
Skylark	77	①123
All Others	85	①115
Cadillac		
252" V6	85	115
All Others	85	②100
Chevrolet③		
Chevette	80	①100
Citation	77	①123
All Others	80	①100
Chrysler Corp.		
1.7L 4-Cyl.	50	85
All Others	50	100
Ford Motor Co.		
Sensor Color Code		
Brown	60	90
Black or Pink	60	100
Blue or Yellow	60	115
Oldsmobile		
151" 4-Cyl.③	77	123
231" V6	79	131
305" V8	79	131
All Others	86	131
Pontiac③		
Phoenix	77	123
All Others	79	123

① – ±20°F.
② – All except Electronic Fuel Injection Models.
③ – Some General Motors 151" 4-Cyl. engines do not use a vacuum motor on air control door. Door is controlled by thermostatic spring only. At 50°F, door is open to heated air only. At 110°F door is open to outside air only.

VACUUM MOTOR TEST

1) With engine not running, air cleaner may be removed for this test. Disconnect vacuum hose from vacuum motor.

2) Connect an external vacuum pump to vacuum motor. Apply specificed vacuum for Door Fully Closed, *see Door Fully Closed Less Than In. Hg in Air Control Door Opening Vacuum specifications table.*

3) Air control door should remain closed to outside air (open to heated air from shroud around exhaust manifold).

4) Next, apply specified vacuum for Door Fully Open In. Hg, *see Air Control Door Opening Vacuum specifications table.* Air control door should open to outside air (closed to heated air).

5) Apply 20 in. Hg to vacuum motor and pinch off hose. Vacuum should not leak down more than 10 in. Hg in 5 minutes. If vacuum motor fails any of these checks, replace it.

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THERMOSTATIC AIR CLEANERS – ALL MODELS (Cont.)

COLD WEATHER MODULATOR (FORD MOTOR CO. ONLY)

1) On normally open modulators (blue, green or black), cool modulator to 40°F by spraying the vacuum control temperature sensor with R-12 refrigerant. On normally closed modulators (yellow), warm vacuum control temperature sensor to above 70°F.

CAUTION – *Do not spray R-12 around a running engine or any other heat source. Heated R-12 vapors will create poisonous phosgene gas. Always perform this step in a well ventilated area.*

2) Connect an external vacuum source between modulator and the vacuum gauge, using a 24" length of ¼" I.D. vacuum hose.

3) Apply a minimum of 16 in. Hg to vacuum motor side of modulator. Modulator must not leak down to less than 5 in. Hg in 30 seconds. If it does, replace the modulator.

4) On normally open modulators, warm modulator to at least 70° F (for blue modulator), 80° F (green modulator) or 45° F (black modulator). On normally closed modulators (yellow), cool temperature sensor with R-12 refrigerant to below 40° F. If vacuum holds at these temperatures, modulator is not functioning and must be replaced.

Air Control Door Opening Vacuum

Application	①Door Fully Closed Less Than In. Hg	②Door Fully Open Max. In. Hg
American Motors		
151" 4-Cyl.		7
258" 6-Cyl.		4
Buick④	4	7
Cadillac	4-6	③
Chevrolet④		7
Chrysler Corp.		
1.7L 4-Cyl.	2	4
All Others	5.5	8.5
Ford Motor Co.		
Oldsmobile		
151" 4-Cyl.④		5-7
All Others		5-7
Pontiac④		7

① – Closed to outside air (heated air position).
② – Closed to heated air (outside air position).
③ – Manifold vacuum.
④ – Some General Motors 151" 4-Cyl. engines do not use a vacuum motor.

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