

GENERAL COOLING SYSTEM SERVICING

DESCRIPTION

The basic liquid cooling system consists of a radiator, water pump, thermostat, cooling fan, pressure cap, heater (if equipped), various connecting hoses, and cooling passages in the block and cylinder head. In addition, many cars use a fan clutch, which may incorporate a thermostatic control, or a flexible fan blade, or both, to reduce noise and power requirements at higher engine speeds. Some models, with exhaust emission control, use a thermostatic vacuum switch to advance ignition timing in the event of overheating. Coolant recovery systems are being used more commonly to prevent loss of the recommended permanent (ethylene glycol) type, year round, anti-freeze.

MAINTENANCE

DRAINING

Remove radiator cap, open heater control valve to maximum heat position (if equipped), open drain cocks or remove plugs in bottom of radiator and in engine block. In-line engines usually have one plug or cock, while V-engines will have two, one in each bank of cylinders.

CLEANING

A good cleaning compound will remove most rust and scale. Follow manufacturer's instructions in the use of the cleaner. If considerable rust and scale will have to be removed, flushing will be necessary. Also, clean radiator air passages by blowing out with compressed air from back to front of radiator.

FLUSHING

CAUTION — Pontiac uses an aluminum plastic radiator on some models (identified by a note below the filler neck). Material used for cleaning and flushing must be compatible with aluminum, according to manufacturer's recommendations.

Back flushing is a very effective means of removing rust and scale from a cooling system. For best results, the radiator, engine, and heater core should be flushed separately. To flush radiator, connect flushing gun to water outlet of radiator and disconnect water inlet hose. Use a leadaway hose, connected to radiator inlet, to prevent flooding the engine. Use air in short bursts only as a clogged radiator could be easily damaged. Continue flushing until water runs clear. To flush engine, first remove thermostat and replace housing. Connect flushing gun to water outlet of engine. Disconnect heater hoses from engine. Flush using short air bursts until water runs clean. Flush heater core as described for radiator. Make sure heater valve is set to maximum heat position before flushing heater.

REFILLING

Engine should be running while refilling cooling system to prevent air from being trapped in the engine block. After system is full, continue running engine until thermostat is open, then recheck fill level. Do not overfill system. Refer to appropriate article for correct cooling system capacity.

THERMOSTAT

Visually inspect thermostat for corrosion and proper sealing of valve and seat. If satisfactory, suspend thermostat and a thermometer in a container with a 50/50 mixture of anti-freeze and water (AMC recommends 100% anti-freeze). See Fig. 1.

Do not allow either thermostat or thermometer to touch bottom of container as this concentration of heat could cause an incorrect reading. Heat water until thermostat just begins to open.

NOTE — AMC recommends placing a .003" feeler gauge between thermostat valve and seat. When valve begins to open, feeler gauge will slip out easily.

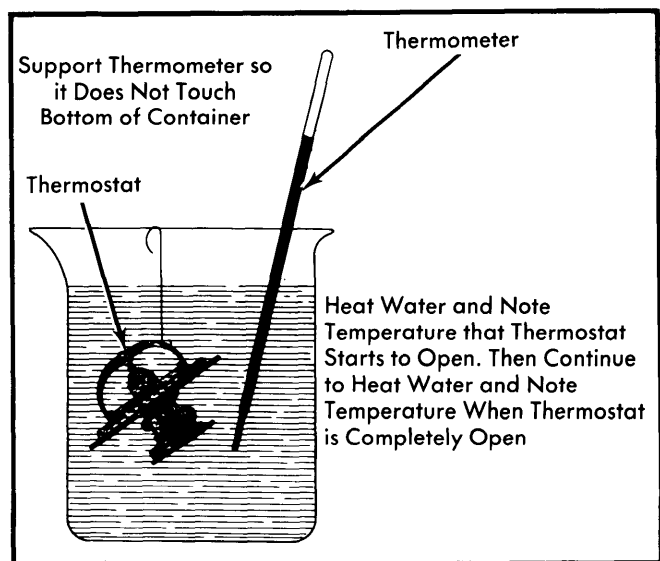


Fig. 1 Thermostat Test

Read temperature on thermometer. This is the initial opening temperature and should be within specifications. Continue heating water until thermostat is fully open and note temperature. This is the fully opened temperature. If either reading is outside of specifications, replace thermostat, as it is not adjustable.

NOTE — Chevrolet recommends hanging thermostat in 33% solution at 25° above temperature stamped on thermostat valve, agitating solution to distribute heat; valve should open. Remove thermostat from solution and place in similar solution at 10° below stamped temperature; valve should close.

PRESSURE TESTING

A pressure testing tool is used to test both radiator cap and complete cooling system. Test as follows, following tool manufacturer's instructions.

Radiator Cap — Visually inspect radiator cap, dip cap in water and connect to tester. Pump tester to bring pressure to upper limit of cap specifications. If cap fails to hold pressure within specifications, replace cap.

Engine Cooling Systems

GENERAL COOLING SYSTEM SERVICING (Cont.)

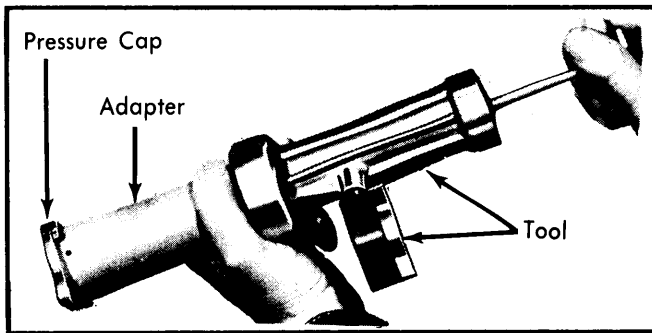


Fig. 2 Testing Pressure Cap

Cooling System — With engine not running, wipe radiator filler neck seat clean. Fill radiator to correct level. Attach tester to radiator and pump until pressure is at upper limit of radiator rating. If pressure drops, inspect for external leaks. If no leaks are apparent, detach tester and run engine until normal operating temperature is obtained. Reattach tester and observe. If pressure builds up immediately, a possible leak exists from a faulty head gasket or crack.

CAUTION — Pressure may build up fast. Release any excess pressure above the upper limit of pressure cap specifications or cooling system damage may result.

If there is no immediate pressure build up, pump tester to within system pressure range (on radiator cap). Vibration of gauge pointer indicates compression or combustion leak into cooling system. Isolate leak by shorting each spark plug wire to cylinder block. Gauge pointer should stop or decrease vibration when leaking cylinder is shorted.

CAUTION — Do not disconnect spark plug wires while engine is operating, or operate engine with spark plug shorted for more than 1 minute as catalytic converter may be damaged.

Remove engine and transmission (automatic only) oil dipsticks and check if water globules appear in oil. If so, a serious internal leak is indicated. If all checks are negative and system holds pressure for 2 minutes, there are no serious leaks in system.

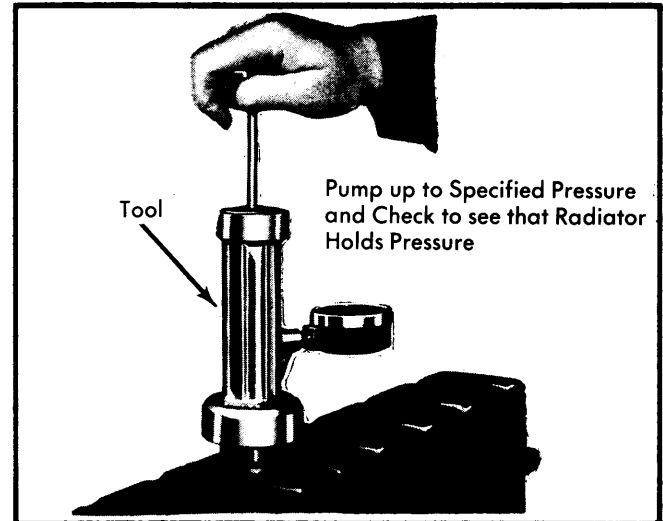


Fig. 3 Pressure Testing Cooling System

ANTI-FREEZE CONCENTRATION

Test anti-freeze concentration using a suitable anti-freeze tester. The tester should have a temperature compensating feature, as failing to take temperature into consideration could cause an error as large as 30°F. Follow tester manufacturer's instructions for correct use of tester.

COOLANT RECOVERY SYSTEMS

American Motors
Chrysler Corp.
Ford Motor Co.
General Motors

DESCRIPTION

A coolant recovery system differs from other cooling systems in that an overflow bottle is connected to the radiator overflow hose. The overflow bottle is transparent or translucent to permit checking of coolant level without removing radiator cap. No adjustment or test is required except keeping vent hole or hose clean and checking pressure relief of radiator cap.

OPERATION

As coolant temperature rises and pressure in system exceeds pressure relief valve of radiator cap, due to expansion of coolant, excess coolant flows into overflow bottle. As engine cools and coolant contracts, vacuum is formed in system, drawing coolant, stored in overflow bottle, back into radiator. As a result, in a properly maintained cooling system, the only coolant losses will be through evaporation.

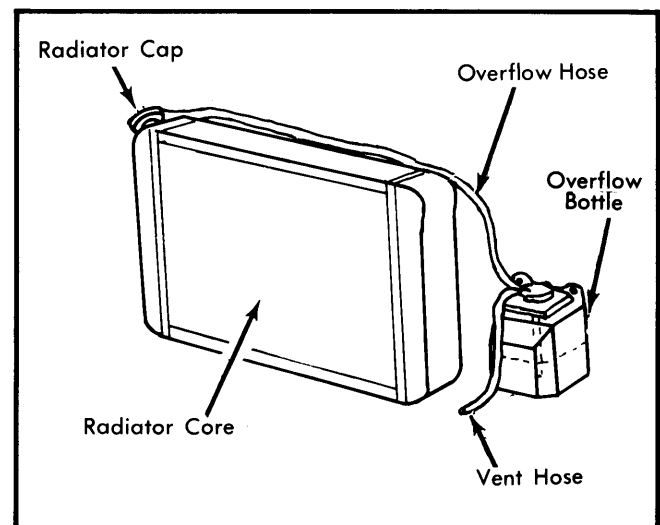


Fig. 4 Coolant Recovery System