

Wheels: John of Dayton has a concern about his 1992 Chevrolet S-10 pickup truck. He states that the temperature gauge stays at about 100° yet his heater seems to be supplying hot air indicating to him that the engine is operating at the correct temperature. John asks if there is a problem with the engine cooling system or the temperature gauge?

Halderman: Let's start with the basics first and then how to diagnose where the problem may be located. The thermostat in the engine controls the flow of coolant through the engine cooling system and radiator. When the engine is cold, the water pump (also called a coolant pump) circulates the coolant through the coolant passages in the cylinder block and cylinder head(s). When the coolant temperature rises to the opening temperature of the thermostat, the coolant then flows through the radiator and is drawn back into the engine. The thermostat is fully open about 20° higher than the operating temperature. For example, John's Chevrolet truck is equipped with a 195° thermostat which starts to open at 195° and is fully open at about 215°. Therefore, the coolant temperature should be between these two temperatures if everything is okay.

Wheels: Now that we know how the cooling system is supposed to work, how can John determine if the problem is the cooling system or the dash temperature gauge?

Halderman: To determine if the engine is reaching normal operating temperature, drive the truck about 7 miles and then stop, raise the hood and touch the upper radiator hose. It should be so hot you should not be able to keep your hand on the hose due to the temperature of the hose. If the hose is hot yet you are able to comfortably hold the hose, then the thermostat is defective and should be replaced.

If the engine is reaching normal operating temperature, consult a professional to determine if the fault is due to a defective sending unit (sensor) or dash unit (gauge). The technician will likely disconnect the sensor wire and attach a jumper wire to the wire with the ignition on (engine off). Most temperature gauge sending units use a negative temperature coefficient thermistor. This means that the resistance of the sensor decreases as the temperature of the sensor increases. By using a jumper wire attached to the sensor wire, when it is touched to metal, this represents low resistance to the dash gauge and the needle should read as high as possible toward the hot side of the scale. When the jumper is not connected, the resistance in the circuit is extremely high (infinity) and the dash gauge needle should drop to read as cold as possible. This procedure tests the electrical wiring between the sending unit (sensor) and the dash unit. If this test indicates that the dash unit is working correctly, and the engine is operating at normal operating temperature, then the fault is due to a defective sending unit (sensor).

