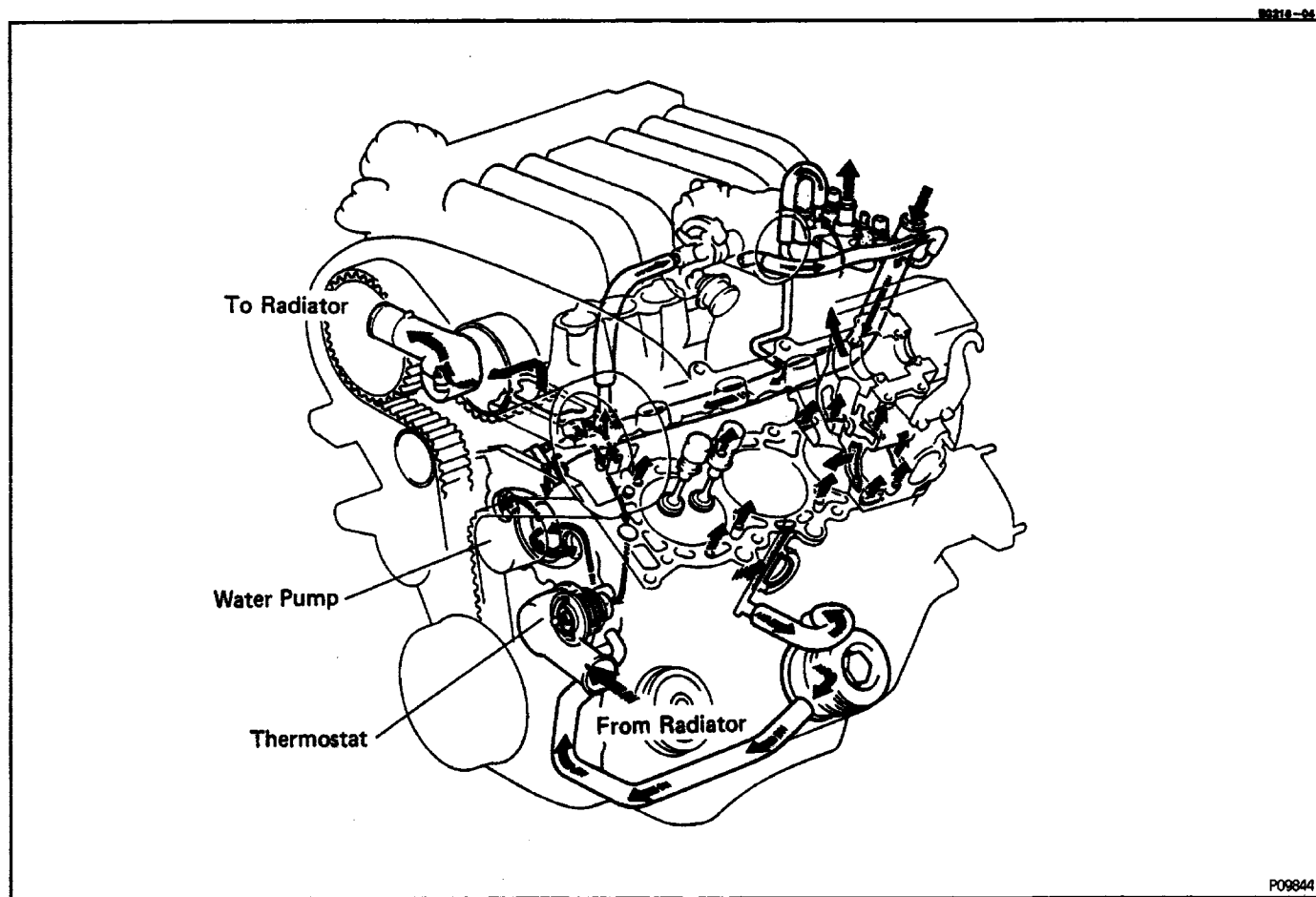


COOLING SYSTEM

DESCRIPTION

This engine is cooled by a pressurized water forced circulation cooling system equipped with a thermostatically controlled bypass valve mounted on the inlet side.

OPERATION



The cooling system is composed of the water jacket (inside the cylinder block and cylinder head), radiator, water pump, thermostat, cooling fan, fluid coupling, hoses and other components. Engine coolant, which has been heated in the water jacket, is drawn into the radiator by the water pump. The radiator is cooled by air drawn in by the cooling fan and by the air flow from the vehicle's forward motion. This in turn cools the coolant in the radiator. The coolant is then drawn into the water pump and then discharged back to the cylinder block. The water jacket is a network of channels in the outer area of the cylinder block and cylinder head. It is designed so that the engine coolant flowing through it can provide adequate cooling to the areas subjected to the highest thermal stresses, in particular, the cylinders and combustion chambers, during engine operation.

RADIATOR

The radiator, mounted at the front of vehicle, consists of upper and lower tanks and a core connecting the 2 tanks.

The core contains many tubes through which engine coolant flows from the upper tank to the lower tank. Air passing over the radiator fins cools the heated engine coolant flowing through the radiator. The upper tank has an inlet for engine coolant from the water jacket and it has a filler inlet. It also has a hose attached through which excess engine coolant or steam can flow. The lower tank has an outlet for the engine coolant and a drain cock. Automatic transmission models include an automatic transmission fluid cooler.

RADIATOR CAP

The radiator cap is a pressure type cap which seals the radiator, resulting in pressurization of the radiator as the coolant expands. The pressurization prevents the engine coolant from boiling even when the engine coolant temperature exceeds 100° C (212° F).

A relief valve (pressurization valve) and a vacuum valve (negative pressure valve) are built into the radiator cap. The relief valve opens and lets steam escape out of the overflow pipe when the pressure generated in the cooling system exceeds the limit (engine coolant temperature: 110– 120°C, 230 – 248°F, pressure: 58.8 – 103.0 kPa, 0.6 – 1.05 kgf/cm², 8.5 – 14.9 psi). The vacuum valve opens to allow engine coolant to enter in order to alleviate the vacuum which develops in the engine coolant system after the engine has stopped and the engine coolant temperature drops.

RADIATOR RESERVOIR

The radiator reservoir is used to catch engine coolant which overflows the cooling system as a result of volumetric expansion when the engine coolant is heated. When the engine coolant temperature drops, engine coolant in the radiator reservoir returns to the radiator, thus keeping the radiator full at all times and avoiding needless engine coolant loss. To find out if the engine coolant needs to be replenished, check the radiator reservoir level.

WATER PUMP

The water pump is used for forced circulation of engine coolant through the cooling system. It is mounted on the front of the engine block and driven by the timing belt.

THERMOSTAT

The thermostat has a wax type bypass valve and is mounted in the water inlet housing. The thermostat includes a type of automatic valve operated by fluctuations in the engine coolant temperature. When the engine coolant temperature is low, the valve closes to prevent the engine coolant flowing to the radiator, thus permitting the engine to warm up rapidly. When the bypass valve opens the bypass circuit, the engine coolant continues to circulate inside the engine, quickly and uniformly warming up to the operating temperature.

When the engine coolant temperature is high, the valve opens and the engine coolant flows to the radiator where it is cooled. When the wax inside the thermostat is heated, it expands and thus creates pressure which overpowers the force of the spring which keeps the valve closed. When the wax cools, its contraction allows the force of the spring to take effect once more, closing the valve. The thermostat in this engine operates at a temperature of 82°C (180°F).