

COOLING SYSTEM

06

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COOLING SYSTEM

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GENERAL INFORMATION

Description

The cooling system regulates engine operating temperature. It allows the engine to reach normal operating temperature as quickly as possible, maintains normal operating temperature and prevents overheating.

The cooling system also provides a means of heating the passenger compartment. The cooling system is pressurized and uses a centrifugal water pump to circulate coolant throughout the system.

The cooling system consists of the following components:

- Radiator
- Coolant
- Coolant pump
- Electric cooling fans
- Electric cooling fans control module
- Thermostat
- Coolant reservoir
- Hoses and clamps
- Coolant temperature sensor
- Heater core

Operation

The primary purpose of a cooling system is to maintain engine temperature in a range that will provide satisfactory engine performance and emission levels under all expected driving conditions. It also provides hot water (coolant) for heater performance and cooling for automatic transmission oil. It does this by transferring heat from engine metal to coolant, moving this heated coolant to the radiator, and then transferring this heat to the ambient air.

Specifications

Torque Specifications

DESCRIPTION	TORQUE (N·m)
Coolant Pump Mounting Bolts	15
Radiator Support Mounting Bolts	5
Coolant Fan Mounting Bolts	5
Thermostat Mounting Bolts	15

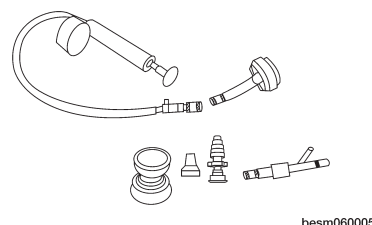
Fluid Specifications

DESCRIPTION	CAPACITY (L)
Cooling System	7.0

GENERAL INFORMATION

Special Tools

Cooling System Pressure Tester



دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

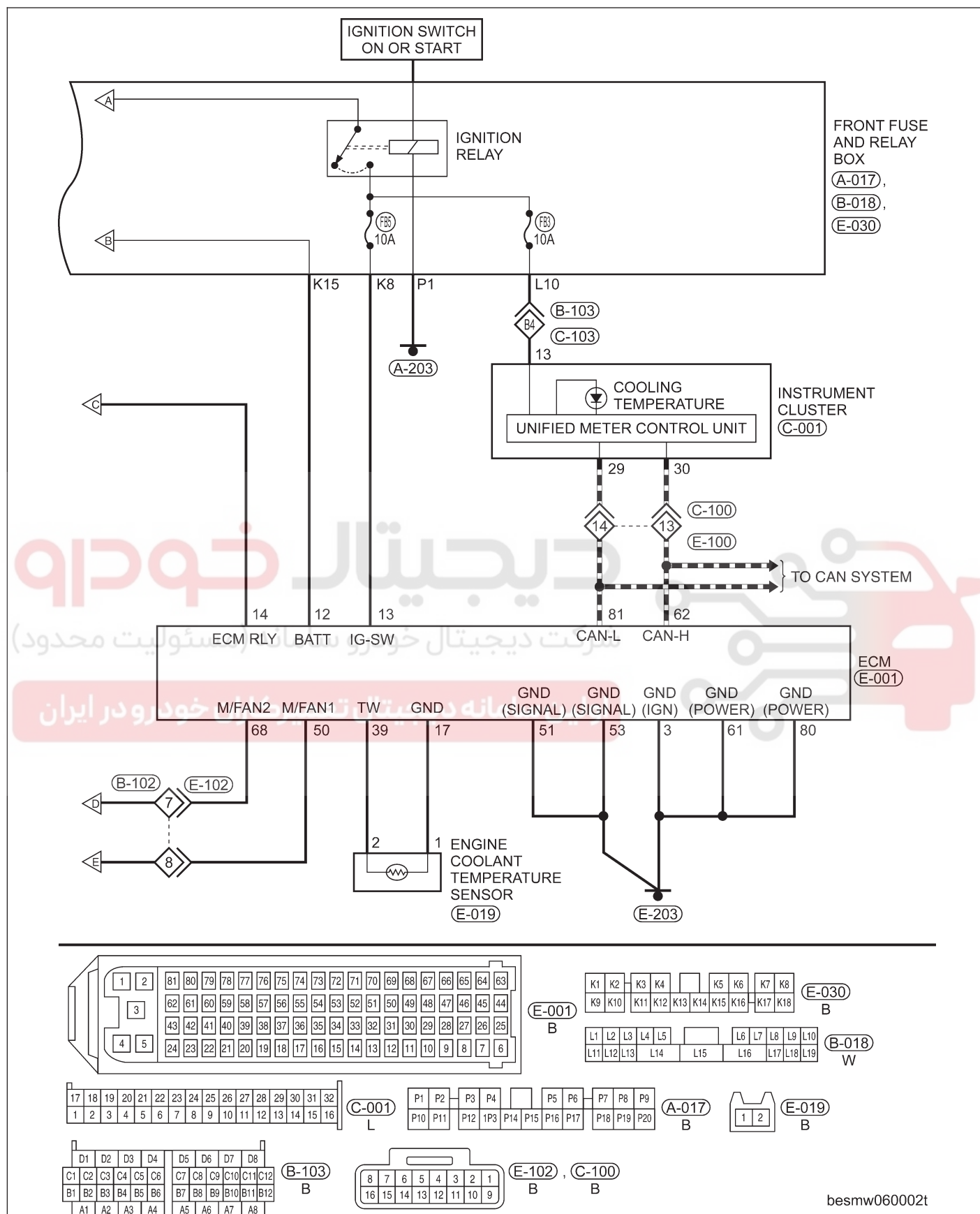
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



Electrical Schematics

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Cooling System (Page 2 of 2)



DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING

Cooling System Pressure Test

WARNING!

Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

CAUTION:

Do not pressurize the cooling system beyond the maximum pressure listed in the specifications table in this section, or cooling system components can be damaged.

1. Turn the engine off.
2. Check the engine coolant level. Adjust the coolant level as necessary.
3. Attach the pressure tester to the coolant recovery reservoir. Install a pressure test pump to the quick-connect fitting of the test adapter.
4. Pressurize the engine cooling system to 111 kPa. Observe the gauge reading for approximately 2 minutes. Pressure should not drop during this time. If the pressure drops within this time, inspect for leaks and repair as necessary.
5. If no leaks are found and the pressure drops, the pressure relief cap may be leaking. Install a new pressure relief cap and retest the system.
6. If no leaks are found after a new pressure relief cap is installed, and the pressure drops, the leak may be internal to the radiator transmission cooler (if equipped). Inspect the coolant for transmission fluid and the transmission fluid for coolant. Repair as necessary.
7. If there is no contamination of the coolant or transmission fluid, the leak may be internal to the engine. Inspect the coolant for engine oil and the engine oil for coolant.
8. Release the system pressure by loosening the pressure relief cap. Check the coolant level and adjust as necessary.

Cooling System Concentration Test

CAUTION:

Do not mix types of coolant, corrosion protection will be severely reduced.

Coolant concentration should be checked when any additional coolant is added to the cooling system or after a coolant drain, flush and refill. The coolant mixture offers optimum engine cooling and protection against corrosion when mixed to a freeze point of -37°C to -46°C. The use of a hydrometer or a refractometer can be used to test coolant concentration.

ON-VEHICLE SERVICE

Cooling System Draining and Filling

Cooling System Draining Procedure

WARNING!

Do not loosen the radiator drain plug with the cooling system hot and under pressure. Serious burns from coolant can occur.

Perform the following procedure when draining the cooling system:

1. DO NOT remove the pressure cap first.
2. With the engine cold, raise and support the vehicle on a hoist and locate the radiator drain plug.
3. Attach one end of a hose to the drain plug. Put the other end into a clean container. Open the drain plug and drain the coolant from the radiator.
4. Tighten the radiator drain plug.

Cooling System Filling Procedure

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CAUTION:

Failure to purge air from the cooling system can result in an overheating condition and severe engine damage.

Perform the following procedure when filling the cooling system:

1. Fill the system using the proper mixture of antifreeze/coolant and water. Fill the coolant recovery reservoir to the service line and install the pressure cap.
2. With the heater control in the HEAT position, start and operate the engine with coolant recovery reservoir cap in place.
3. Add coolant to the coolant recovery reservoir as necessary. Only add coolant to the coolant recovery reservoir when the engine is cold. Coolant level in a warm engine will be higher due to thermal expansion.

Thermostat

Description

A pellet-type thermostat controls the operating temperature of the engine by controlling the amount of coolant flow to the radiator. On the engine the thermostat is closed below 90°C. Above this temperature, coolant is allowed to flow to the radiator. This provides quick engine warm up and overall temperature control.

Operation

The wax pellet is located in a sealed container at the spring end of the thermostat. When heated, the pellet expands, overcoming closing spring tension and water pump pressure to force the valve to open.

Removal & Installation

WARNING!

Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

1. Drain the cooling system (See Cooling System Draining Procedure in Section 06 Cooling System).
2. Remove the thermostat mounting bolts.
(Tighten: Thermostat mounting bolts to 15 N·m)
3. Remove the thermostat and gasket.

ON-VEHICLE SERVICE

4. Installation is in the reverse order of removal.

Installation Notes:

- Verify the cooling system is filled to proper specifications.

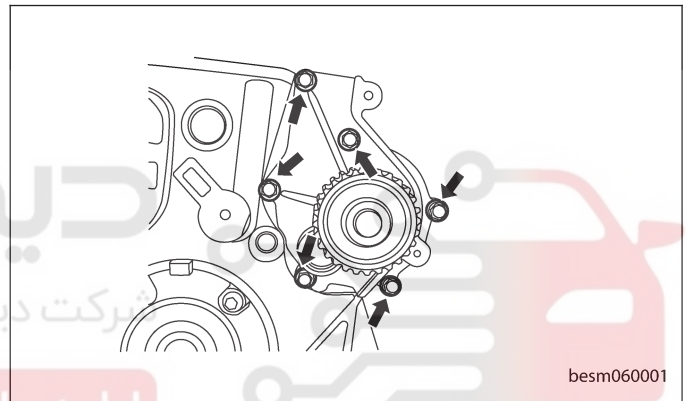
Coolant Pump

Removal & Installation

WARNING!

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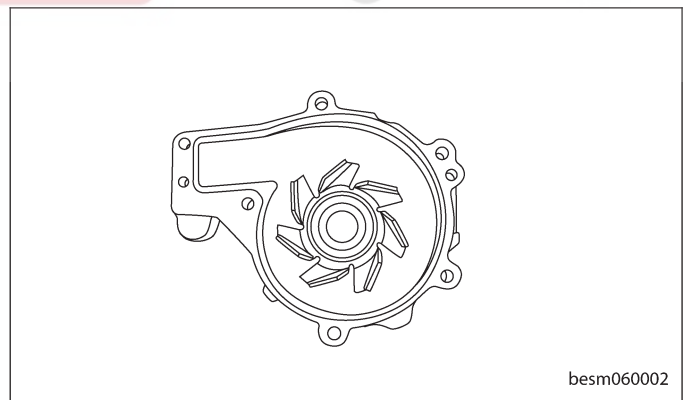
1. Drain the cooling system (See Cooling System Draining Procedure in Section 06 Cooling System).
2. Remove the timing belt (See Timing Belt Removal & Installation in Section 02 Engine).
3. Remove the coolant pump mounting bolts.
(Tighten: Coolant pump mounting bolts to 15 N·m)



4. Remove the water pump and gasket.
5. Installation is in the reverse order of removal.

Installation Notes:

- Verify the cooling system is filled to proper specifications.



Radiator

Description

The radiator is a cross-flow type (horizontal tubes) with design features that provide greater strength, as well as sufficient heat transfer capabilities to keep the engine coolant within operating temperatures.

Operation

The radiator functions as a heat exchanger, using air flow across the exterior of the radiator tubes. Heat from the coolant is then transferred from the radiator into the moving air.

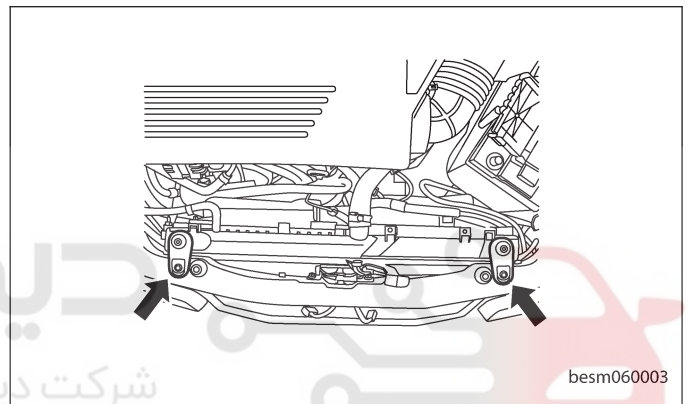
ON-VEHICLE SERVICE

Removal & Installation

WARNING!

Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

1. Disconnect the negative battery cable.
2. Drain the cooling system (See Cooling System Draining and Filling in Section 06 Cooling System).
3. Disconnect the upper radiator hose from the radiator.
4. Disconnect the lower radiator hose from the radiator.
5. Disconnect the cooling fan electrical connector.
6. Remove the cooling fan (See Cooling Fan Removal & Installation in Section 06 Cooling).
7. Remove the radiator support mounting bolts and the two radiator supports.
(Tighten: Radiator support mounting bolts to 5 N·m)



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8. Remove the radiator from the engine compartment.
9. Installation is in the reverse order of removal.

Installation Notes:

- Verify the cooling system is filled to proper specifications.

Cooling Fan**Description**

The radiator cooling fans are dual-speed electric motor driven fans. The radiator fan assembly includes two electric motors, two five-blade fans, and a support shroud that is attached to the radiator. The radiator fans are serviced as an assembly.

Operation

Radiator fan operation is controlled by the Engine Control Module (ECM), with inputs from the following:

- Engine coolant temperature sensor
- Automatic transaxle oil temperature
- A/C head pressure

The ECM controls the fan through either the high or low speed fan relay. The ECM provides a ground to the relay's control circuit.

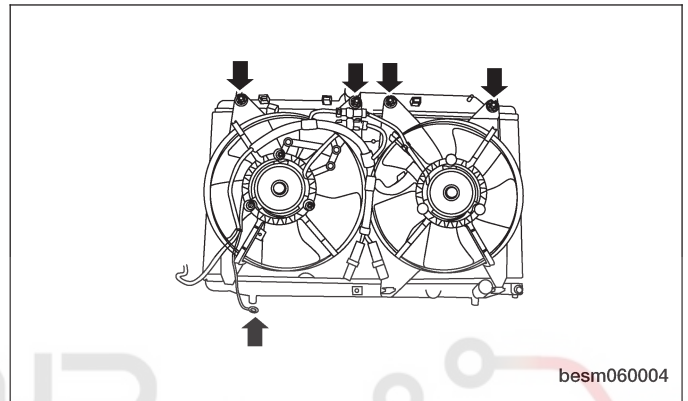
ON-VEHICLE SERVICE

Removal & Installation

WARNING!

Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

1. Disconnect the negative battery cable.
2. Drain the cooling system (See Cooling System Draining Procedure in Section 06 Cooling System).
3. Disconnect the upper radiator hose from the radiator.
4. Disconnect the cooling fan electrical connector and the cooling fan ground cable connected to the body.
5. Remove the cooling fan mounting bolts to the radiator.
(Tighten: Cooling fan mounting bolts to 5 N·m)



6. Remove the radiator fan from the engine compartment.
7. Remove the cooling fan from its support, if necessary.
8. Installation is in the reverse order of removal.

Installation Notes:

- Verify the cooling system is filled to proper specifications.