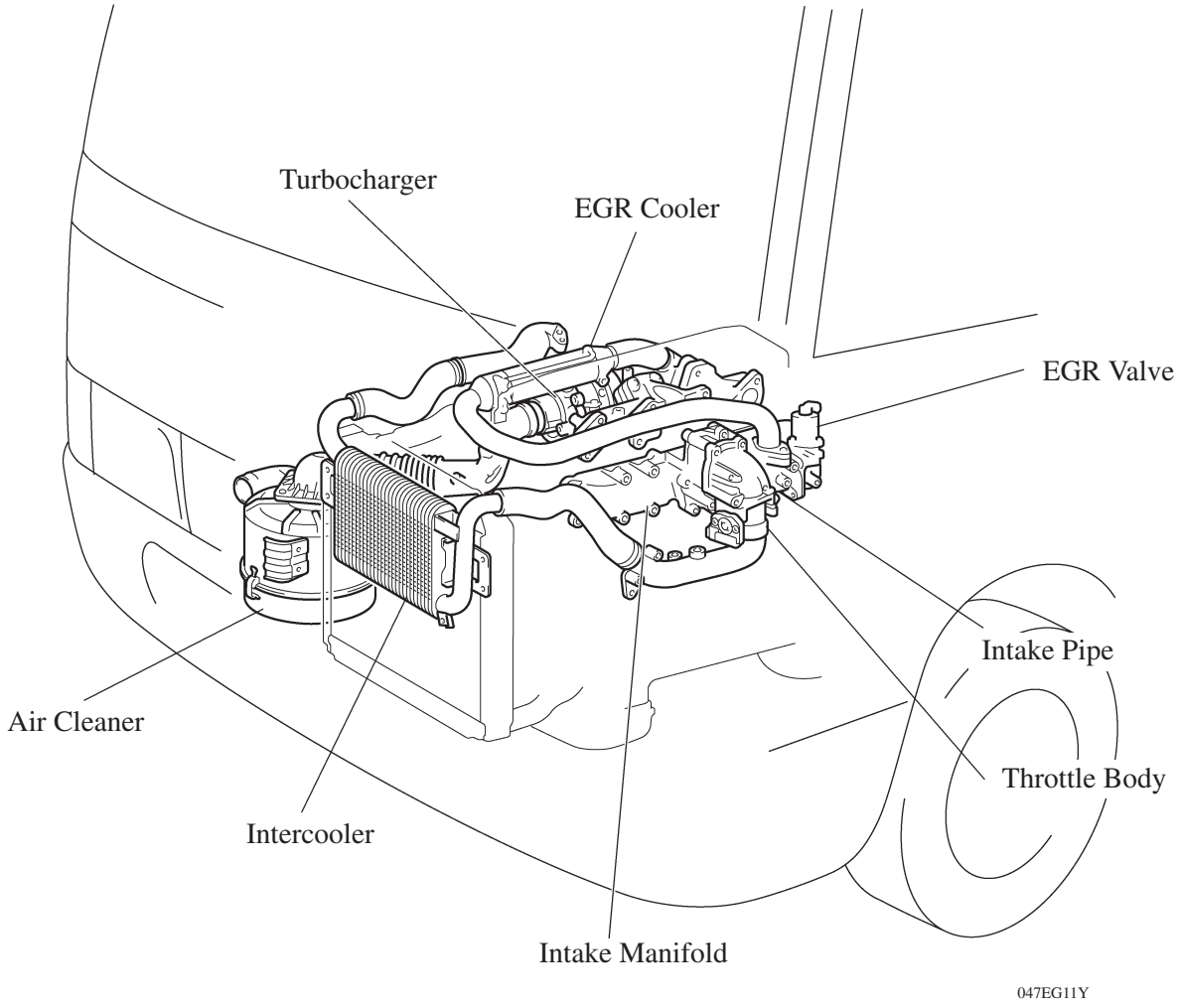
7. Intake System

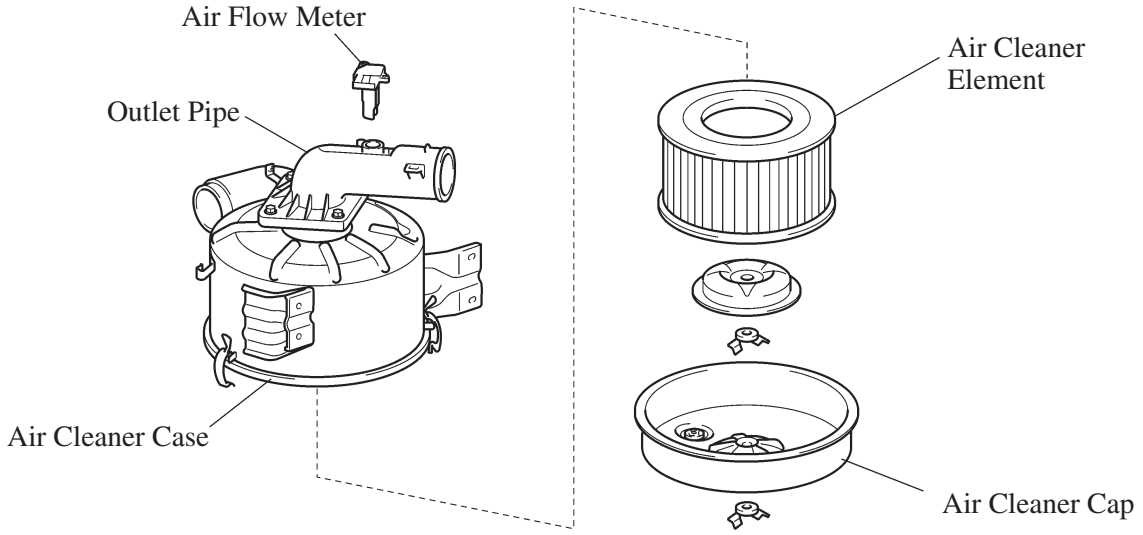
General

- The air cleaner outlet pipe is made of lightweight plastic.
- An intake manifold made of lightweight aluminum alloy is used.
- A throttle body is used in front of the intake manifold.
- The EGR valve is constantly closed and the EGR does not operate.
- A variable nozzle vane type turbocharger is used.



Air Cleaner

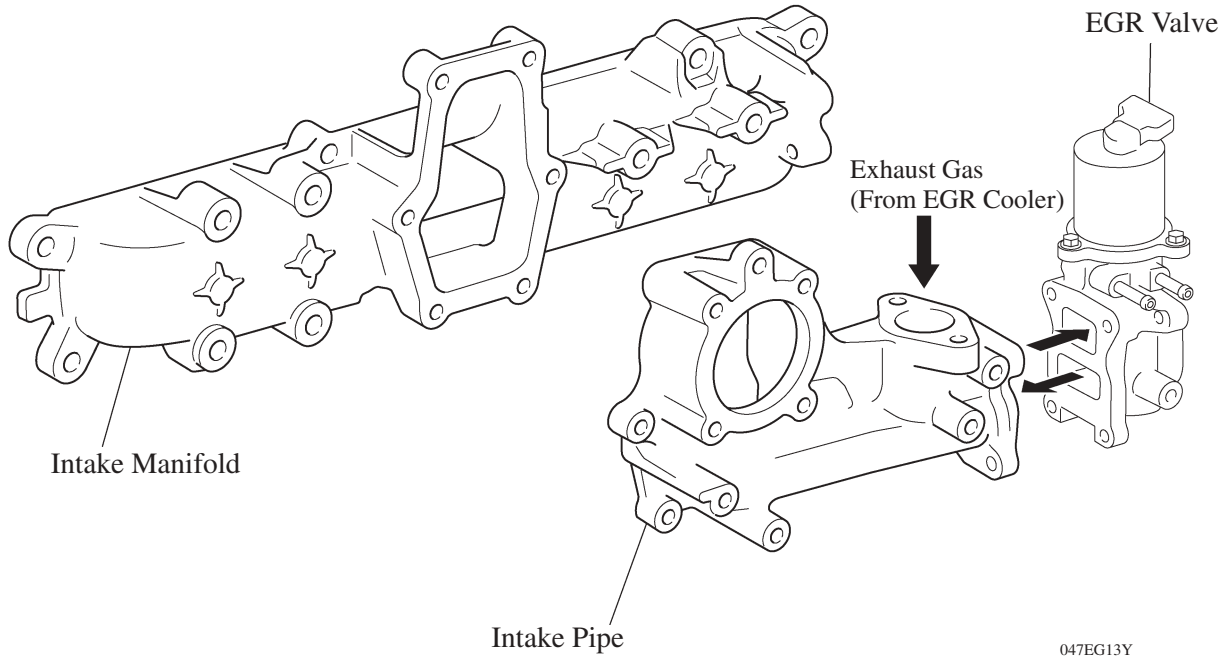
- A plastic air cleaner outlet pipe is used.
- An air flow meter is provided on the outlet pipe.



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Intake Manifold and Intake Pipe

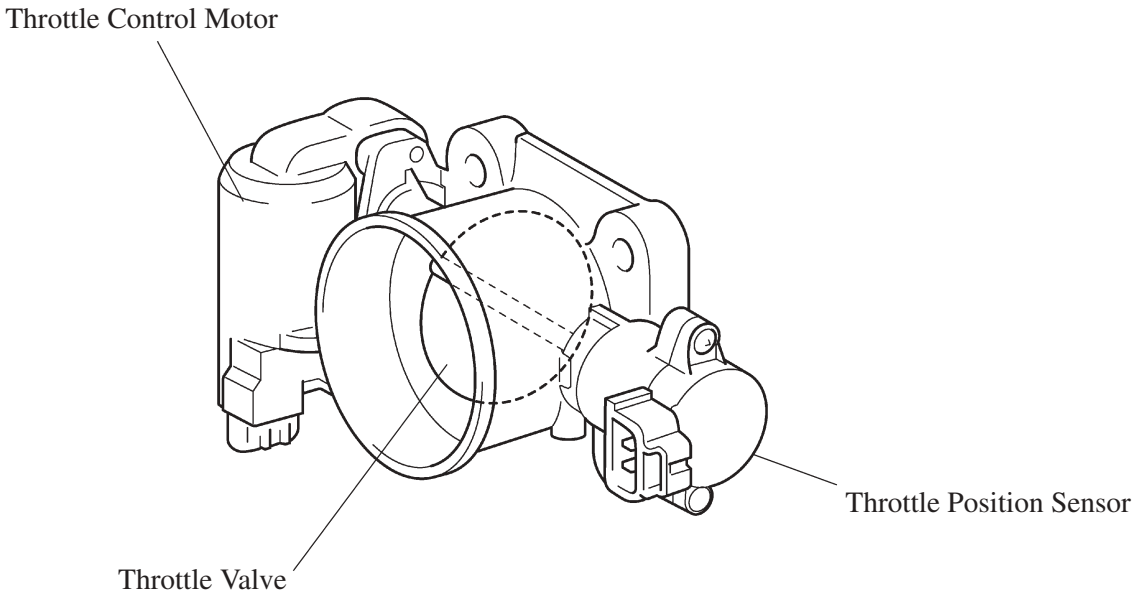
- An intake manifold made of lightweight aluminum alloy is used. The shape of the ports has been optimized in order to ensure the proper intake air volume throughout all operating ranges, ensure better combustion efficiency, and minimize exhaust emissions.
- The intake pipe is provided before the intake manifold. In the intake pipe, an EGR passage is provided between the EGR cooler and EGR valve, and between the EGR valve and the intake manifold.



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Throttle Body

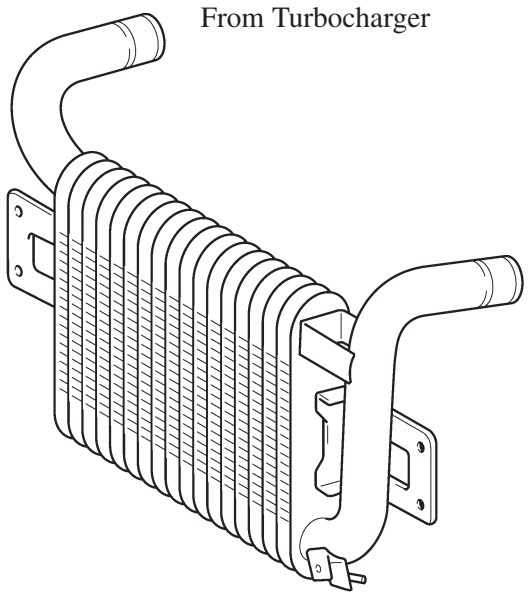
- The throttle body equipped with a rotary solenoid type throttle control motor is used.
- The signals provided by the engine ECU open and close the throttle valve by actuating a throttle control motor, in order to control the intake air mass.
- A non-contact type throttle position sensor is used in the throttle body.
- When the engine stops or the exhaust retarder is operating, the throttle valve is entirely closed in order to minimize noise.



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Intercooler

- An air-cooled intercooler is used to lower the intake air temperature in order to minimize exhaust emissions and produce high power output. In addition, a stamped tank has been brazed onto the intercooler to ensure reliability.
- A large core has been provided in front of the radiator to maximize cooling performance. Ample distance has been provided between the intercooler and the engine to minimize the pressure loss from the cooling air.

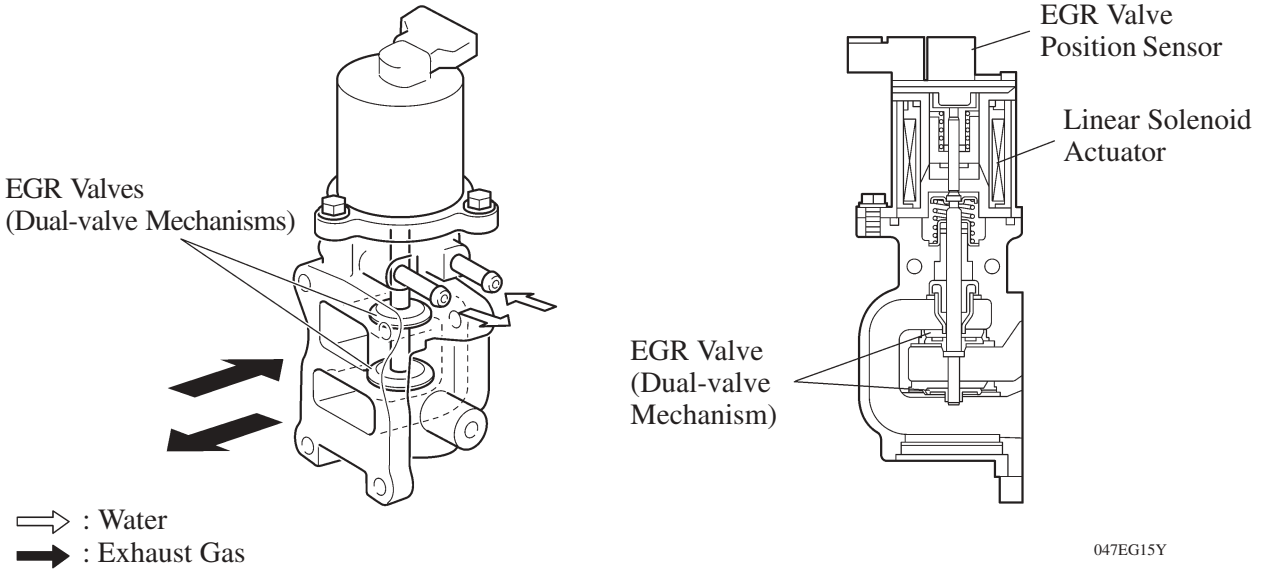


▶ Specifications ◀

Cooling System		Air-cooled
Core Shape		Fin & Tube Type
Core Size	Width	369.1 mm (14.5 in.)
	Height	175.0 mm (6.9 in.)
	Depth	65.0 mm (2.6 in.)
Fin Pitch		3.5 mm (0.14 in.)

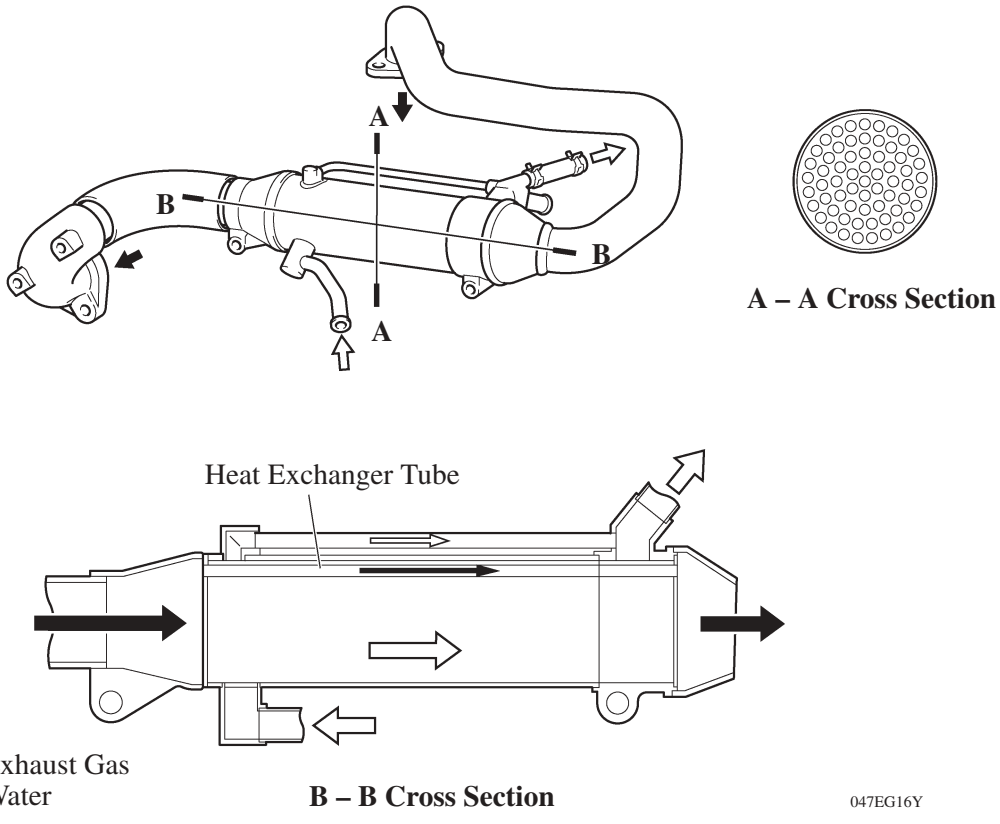
EGR Valve

- A linear solenoid type EGR valve is used. Also, a dual-valve mechanism is used to cancel the effects of the exhaust pressure during actuation in order to realize quick response.
- An EGR valve position sensor is provided in the EGR valve. This sensor enables EGR valve control at a higher level of precision by detecting the amount of lift of the EGR valve.



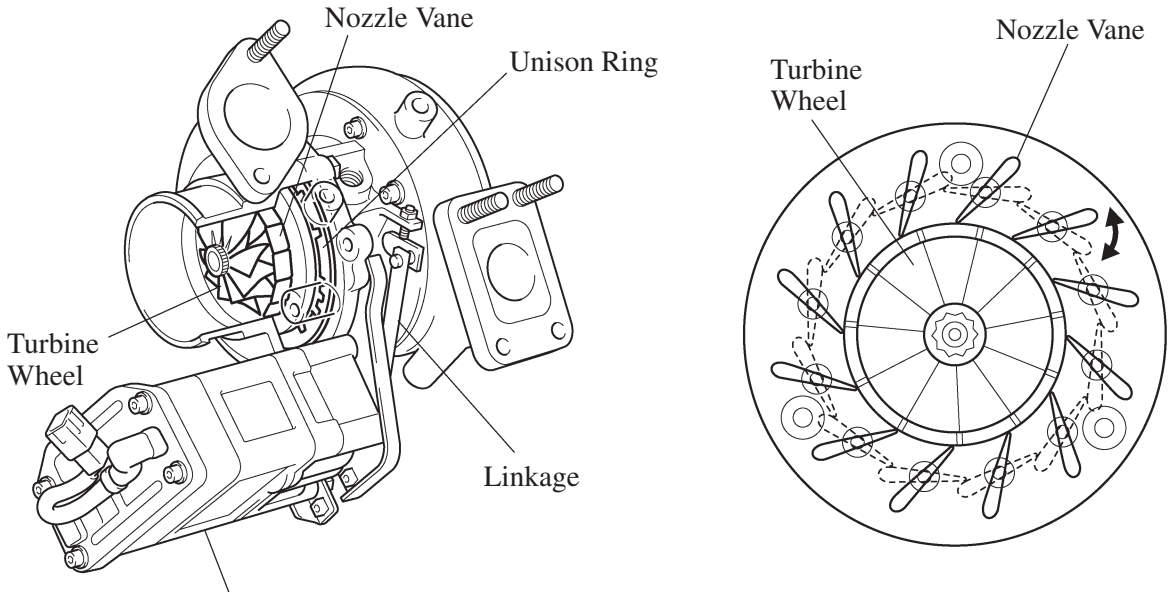
EGR Cooler

A water-cooled, multi-tube type EGR cooler is used. That lowers the exhaust gas temperature to recirculate the great amount of exhaust gas, realizing the reduction of NOx.
There are 63 heat exchanger tubes in the EGR cooler, and exhaust gas goes through each tube. Around the heat exchanger tubes runs the water and absorbs the temperature of the exhaust gas through the tubes.



Turbocharger

- A variable nozzle vane type turbocharger is used.
- The variable nozzle vane type turbocharger consists primarily of a turbine wheel, compressor wheel, nozzle vane, unison ring, linkage, DC motor and turbo motor driver. The DC motor and turbo motor driver are integrated.
- This turbocharger has realized great improvements in low-speed torque, maximum output, fuel consumption, and emission reduction. These improvements have been accomplished through variable control of the nozzle vane position, and an optimal velocity of the exhaust gas inflow to the turbine wheel at all times in response to the engine condition.
- The engine ECU outputs a signal to the turbo motor driver, which actuates the DC motor, to control the nozzle vane position. Also, the turbo motor driver detect the position of the nozzle vane. For details, see page 60.



- The exhaust gas from the exhaust manifold goes through the nozzle vane inside the turbo charger housing, and flows to the exhaust pipe through the turbine wheel. The speed of the turbine wheel (supercharging pressure) differs depending on the flow velocity of the exhaust gas going through the turbine wheel and the flow velocity of the exhaust gas is controlled by the opening angle of the nozzle vane. In such a time like idling, when the exhaust gas is less, the nozzle vane is almost fully closed, but as there is a slight clearance between the nozzle vanes, the exhaust gas flows through this clearance to the exhaust pipe. Therefore, there is no bypass as the conventional type turbocharger.

