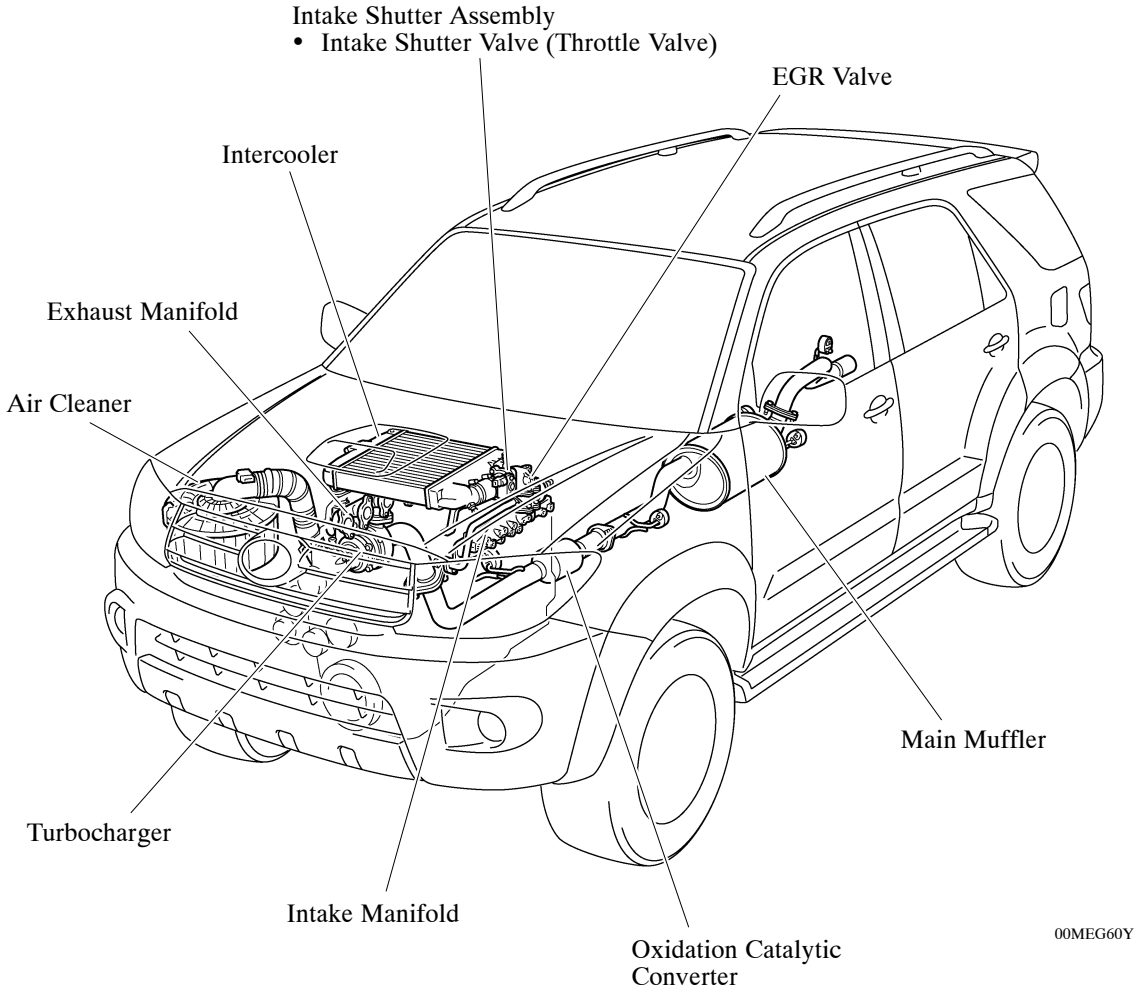
■ INTAKE AND EXHAUST SYSTEM

1. General

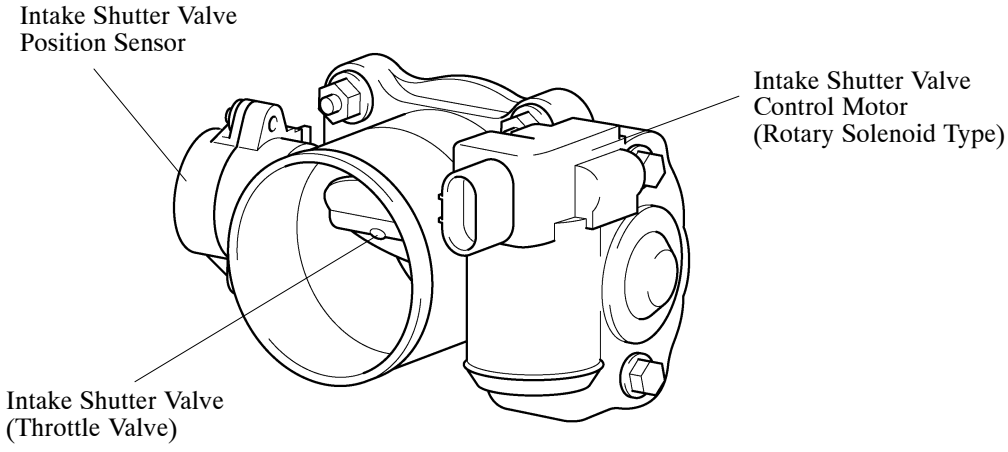
- An intake shutter valve (throttle valve) equipped with an intake shutter valve control motor (rotary solenoid type) is used.
- On the models with 1KD-FTV engine, swirl control valves are provided in the intake manifold.
- A stainless steel exhaust pipe is used for weight reduction and improved rust resistance.
- On the models with 1KD-FTV engine, an air-cooled intercooler is used.
- An EGR control is used. For details of EGR control, see page EG-206.
- On the models with 1KD-FTV engine, a variable nozzle vane type turbocharger is used.
- On the models with 2KD-FTV engine, an air-cooled type turbocharger is used.
- On the models for high altitude country, and models with 1KD-FTV engine compliant with EURO III and Tier 1 emission regulations and 2KD-FTV High Version engine, an oxidation catalytic converter is used.



Models with 1KD-FTV Engine

2. Intake Shutter Assembly

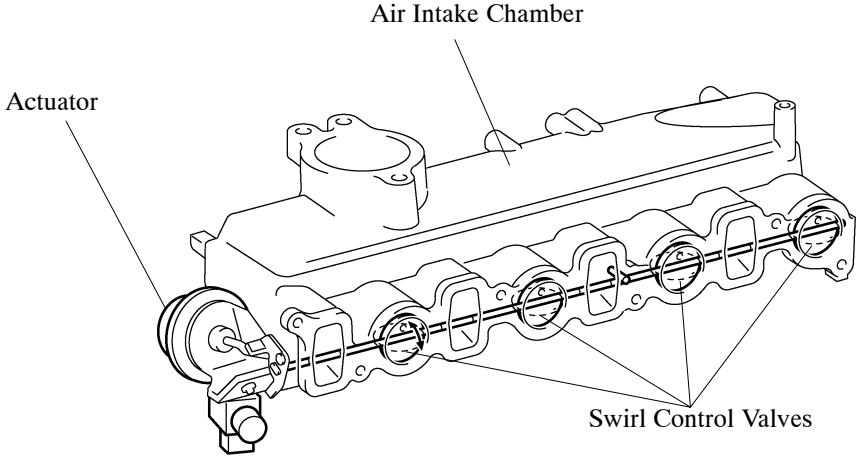
An intake shutter valve (throttle valve) equipped with an intake shutter valve control motor (rotary solenoid type) is used to improve EGR performance and to reduce the vibration and noise when stopping the engine. The intake shutter valve control motor (rotary solenoid type) makes the intake shutter valve (throttle valve) respond quickly.



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3. Intake Manifold

- An intake manifold provided with an air intake chamber is used in order to reduce the swirl variances between the cylinders.
- On the models with 1KD-FTV engine, a vacuum-actuated swirl control valve is provided in one of the two intake ports provided for each cylinder. The swirl control valve consists of a stainless steel shaft and an actuator, which are integrated in the valve.

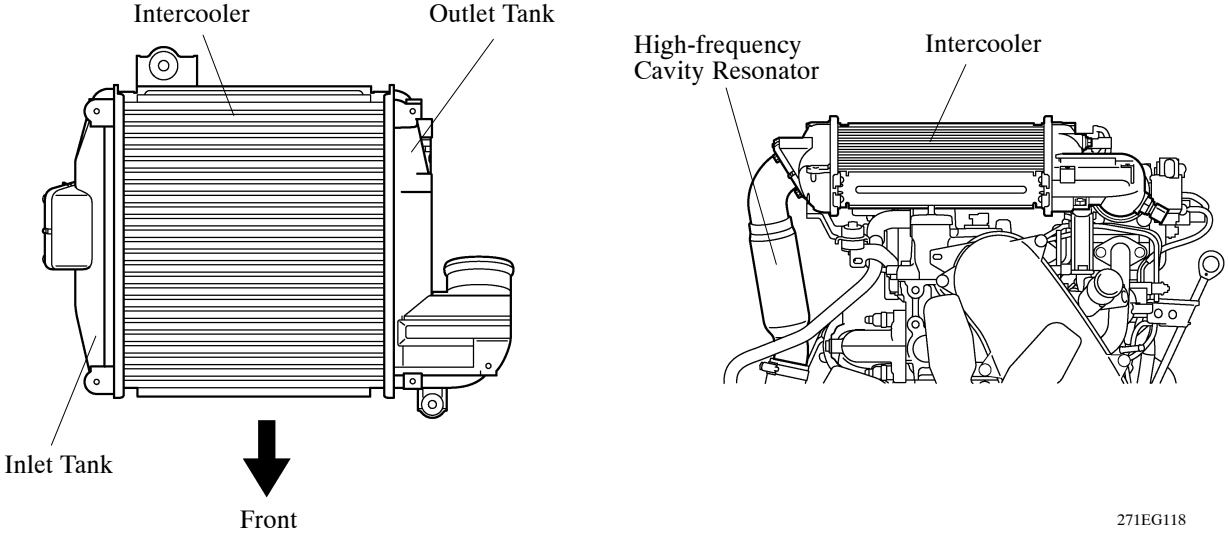


1KD-FTV Engine

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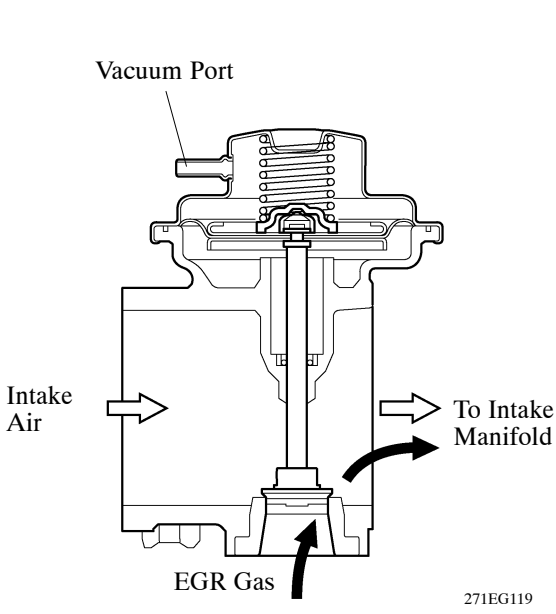
4. Intercooler

- On the models with 1KD-FTV engine, an air-cooled intercooler is used in order to lower the intake air temperature, improve engine performance, and to achieve cleaner exhaust gas emissions. It is located directly on top of the engine.
- The intercooler and the inlet tank are made of aluminum and the outlet tank is made of plastic for weight reduction.
- A dual construction, high-frequency cavity resonator is used for the pipe between the turbocharger and the intercooler.

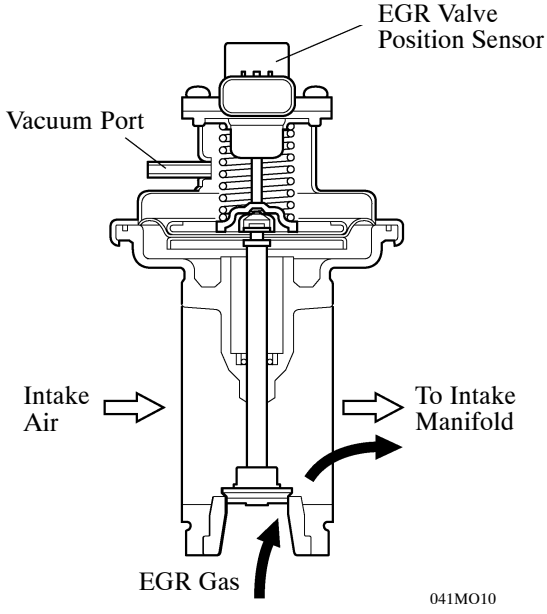


5. EGR Valve

- An EGR valve is provided midstream in the intake air passage. By cooling the EGR valve in this manner, a greater volume of exhaust gas can be processed.
- On the models with 2KD-FTV High Version engine, an EGR valve position sensor has been provided in the EGR valve in order to directly measure the actual amount of the valve opening. This measurement is then input into the ECM in order to improve the precision of EGR control.



1KD-FTV Engine

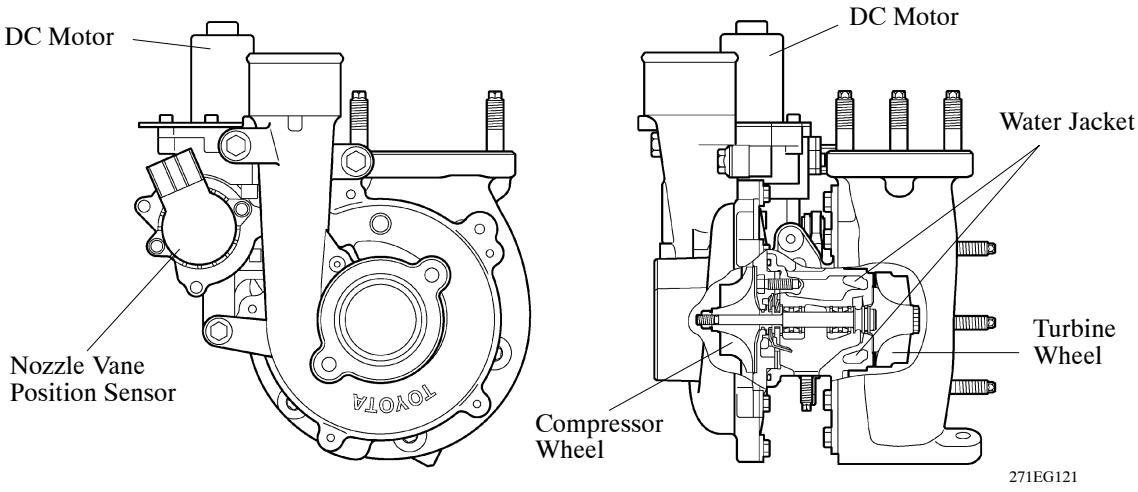


2KD-FTV High Version Engine

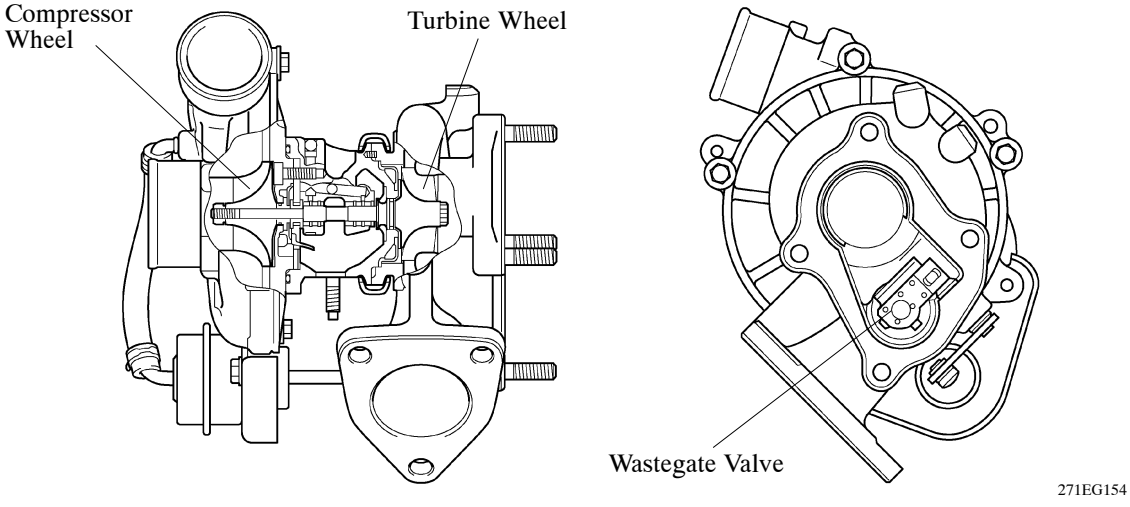
6. Turbocharger

General

- On the models with 1KD-FTV engine, a variable nozzle vane type turbocharger is used. A water jacket is provided in the bearing housing to improve the cooling performance of the turbocharger.
- On the models with 2KD-FTV engine, a lightweight and compact air-cooled type turbocharger is used. To control the turbo pressure, this turbocharger is provided with a wastegate valve and an actuator that operates mechanically in accordance with the turbo pressure.



Models with 1KD-FTV Engine



Models with 2KD-FTV High Version Engine

Service Tip

Models with 2KD-FTV High Version Engine

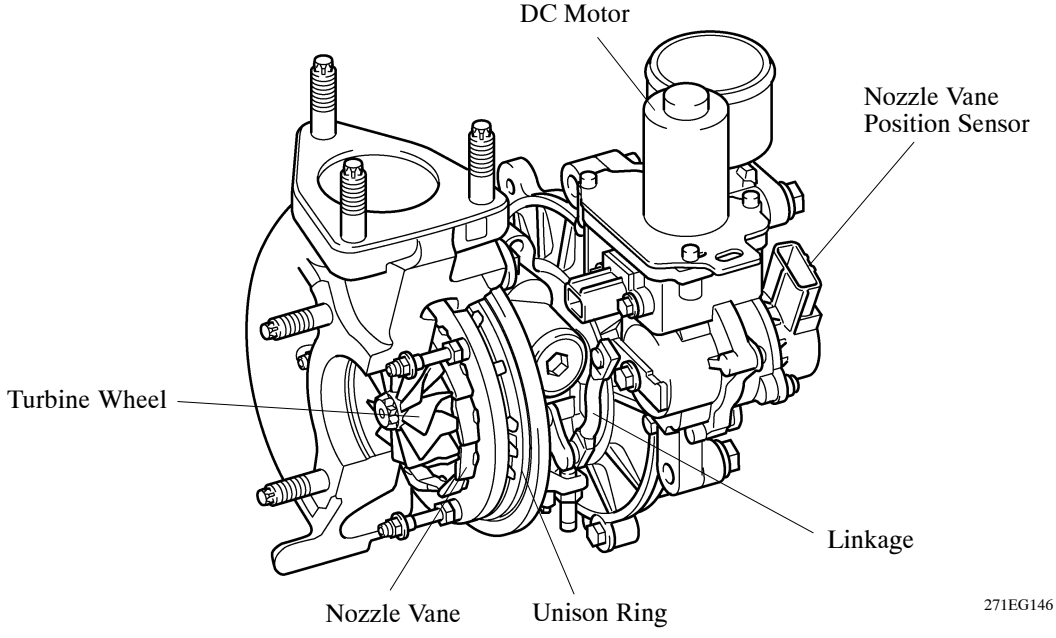
The ECM determines altitude using the atmospheric pressure sensor. If the sensor indication value is approx. 85 kPa or less (altitude: higher than approximately 1500 m), the ECM lowers the preset maximum engine speed*, in order to prevent the turbine wheel from racing when the vehicle is driven in high altitude areas (where the atmospheric pressure is low). Therefore, the preset maximum engine speed is lower than standard. However, this is not an engine malfunction. For details, refer to the Fortuner/Hilux RSW4 Repair Manual.

*: Varies in accordance with altitude. As the altitude increases (the atmospheric pressure sensor indication value decreases), the preset maximum engine speed is decreased.

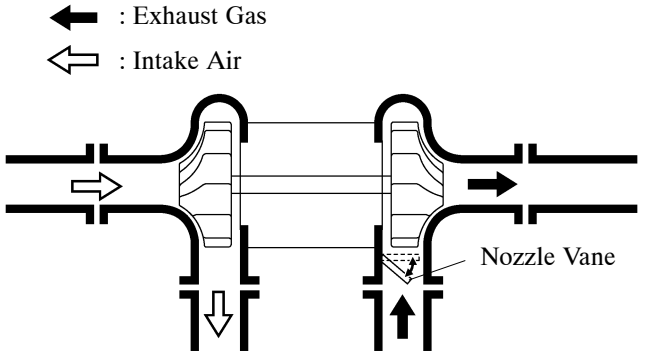
EG

Variable Nozzle Vane Type Turbocharger

- Variable nozzle vane type turbocharger consists primarily of an impeller, turbine, nozzle vane, unison ring, DC motor and nozzle vane position sensor.
- This turbocharger has achieved 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 at all times in response to the engine condition.
- The ECM outputs a signal to the turbo motor driver, which actuates the DC motor, to control the nozzle vane position. For details on the turbocharger control, see page EG-201.

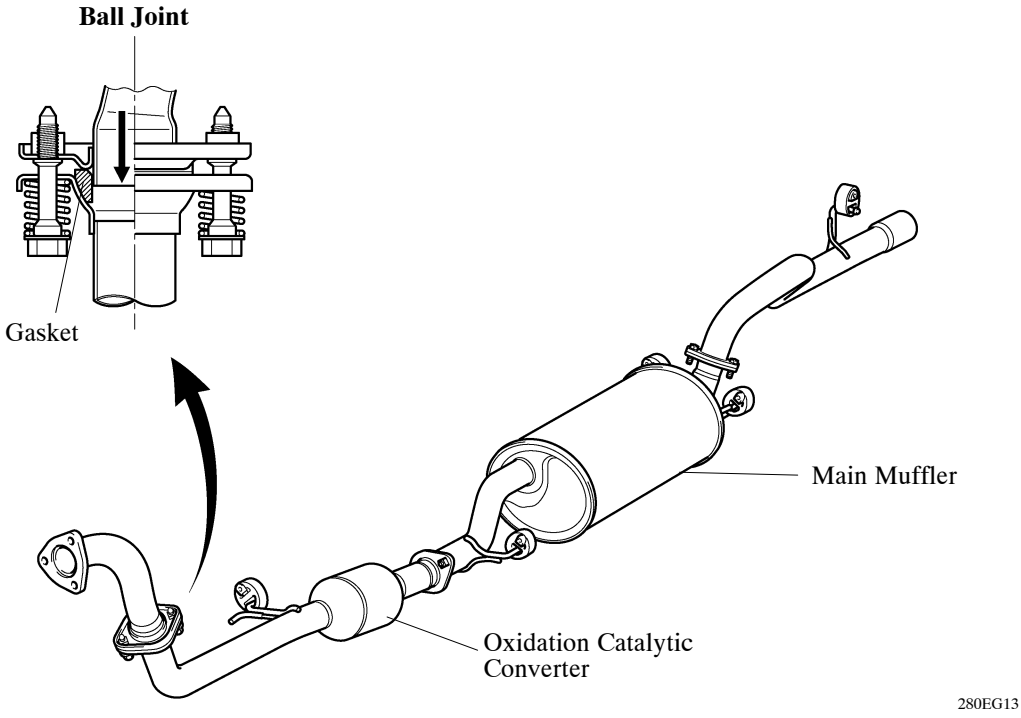


- The exhaust gas from the exhaust manifold goes through the nozzle vane inside the turbo charger housing, and flows to the exhaust pipe through the turbine. The speed of the turbine (supercharging pressure) differs depending on the flow velocity of the exhaust gas going through the turbine and the flow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

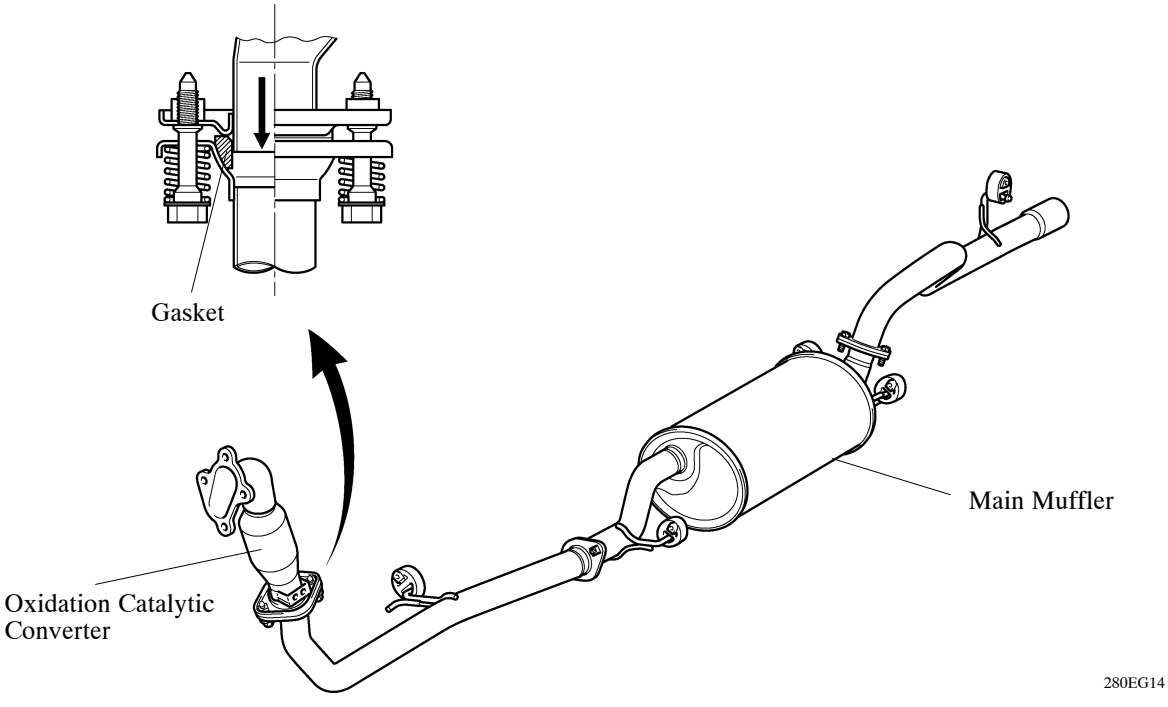


7. Exhaust Pipe

- A stainless steel exhaust pipe is used for weight reduction and improved rust resistance.
- A ball joint is used to join the front exhaust pipe and exhaust manifold. As a result, a simple and reliable construction for reducing vibration has been achieved.
- On the models for high altitude country, and models with 1KD-FTV engine compliant with EURO III and Tier 1 emission regulations and 2KD-FTV High Version engine, the oxidation catalytic converter is used to clean the exhaust gas particulates, HC, and CO.



Models with 1KD-FTV Engine Compliant with EURO III and Tier 1 Emission Regulations, and Models for High Altitude Country



2KD-FTV High Version Engine