

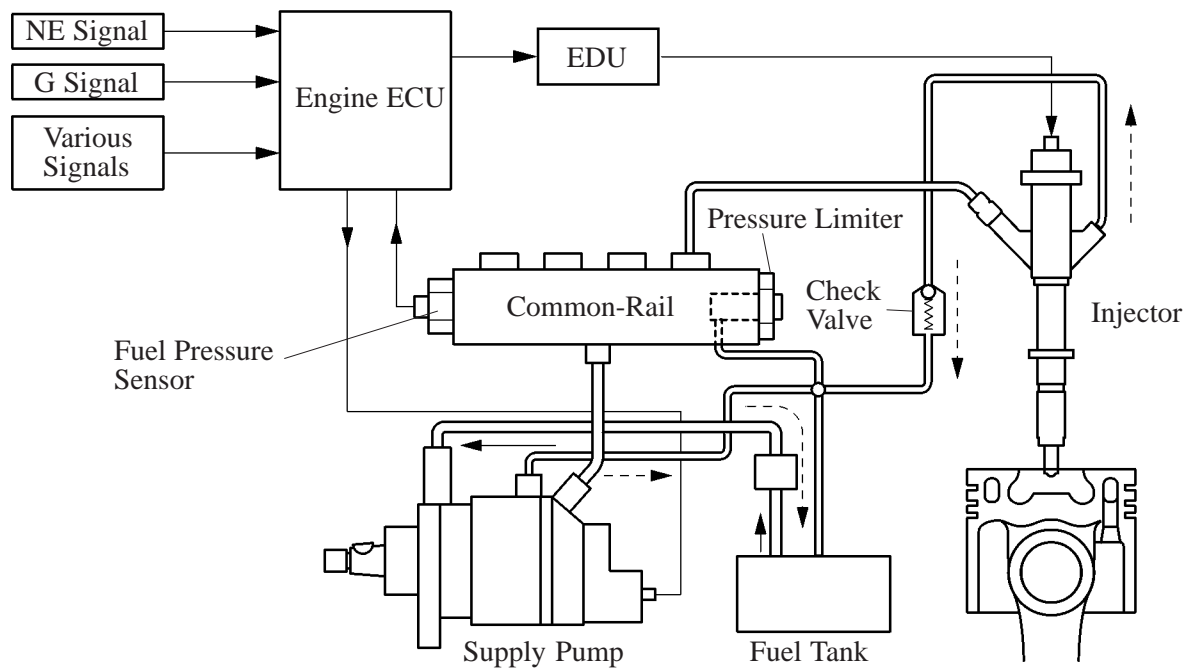
## ■ FUEL SYSTEM

### 1. General

A common-rail system has been adopted in the fuel injection system. In this system, the highly pressurized fuel that is supplied by the supply pump is stored in the common-rail, and the engine ECU sends signals to the injectors via the EDU (Electronic Driver Unit) in order to control the injection timing and injection volume.

- An electric control type supply pump has been adopted.
- By storing fuel at a high pressure (20 to 135 MPa), the engine peak torque during the pumping of the fuel under high load conditions has been restrained, thus reducing the vibration and noise of the fuel injection system.
- Compact and saving electric injectors are used.

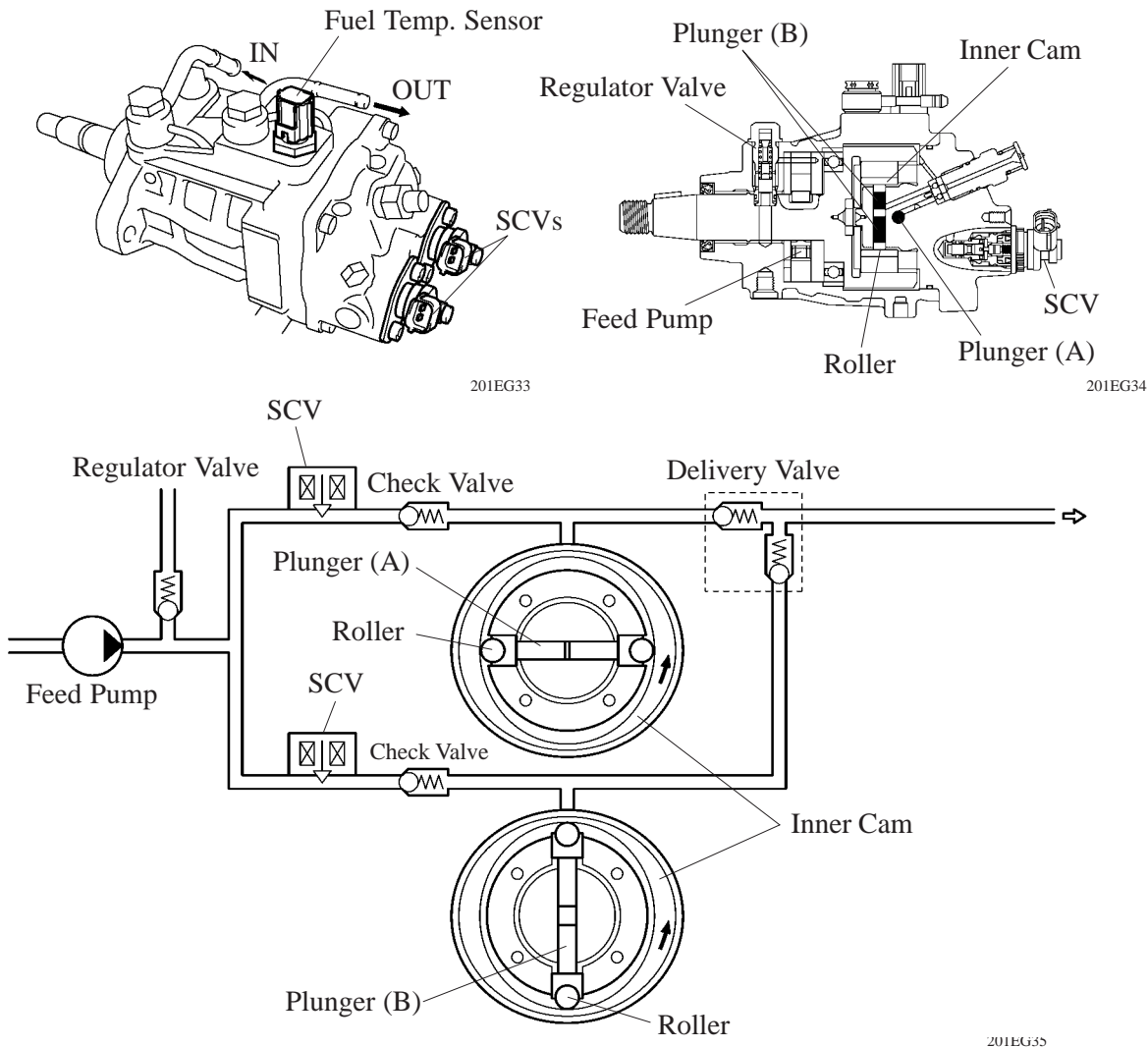
#### ► System Diagram ◀



2. Supply Pump

General

- The supply pump is a tandem type that have two functions of fuel suction and fuel delivery. This pump achieves both the high-pressure pumping of fuel and the reduction of driving torque fluctuation.
- The supply pump mainly consists of a pump body (inner cam, roller, two plungers), two SCVs (Suction Control Valves), and a feed pump.  
The pump body contains two plungers that are placed in series inside the inner cam: plunger A (horizontal) and plunger B (vertical).



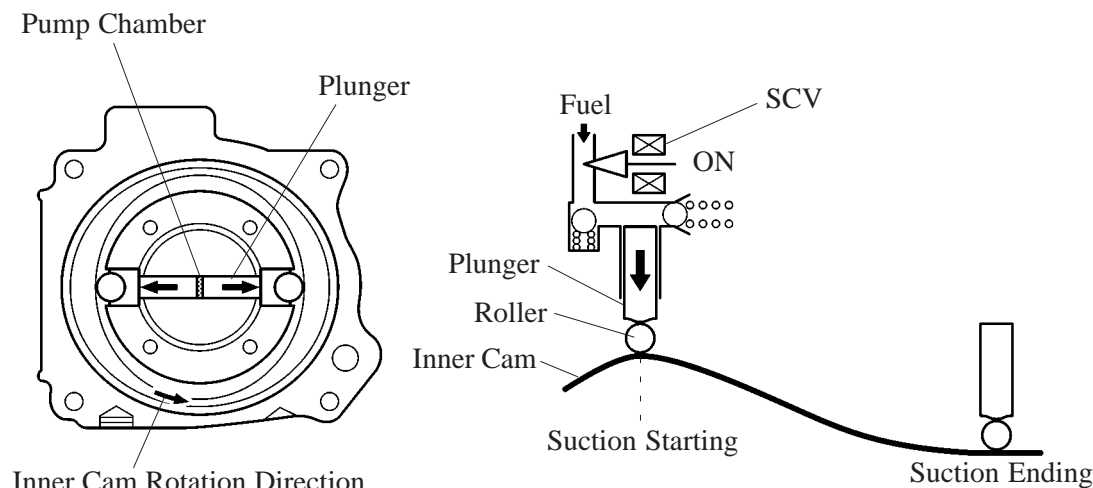
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Function of Component

Components		Function
Feed Pump		Pumps fuel to two plungers.
Regulator Valve		Regulates fuel pressure in pump.
SCV		Controls volume of fuel drawn in to plungers.
Pump Body	Inner Cam	Drives two plungers.
	Plunger (A, B)	Effects suction and pumping of fuel.
Delivery Valve		Pumps fuel to common-rail.

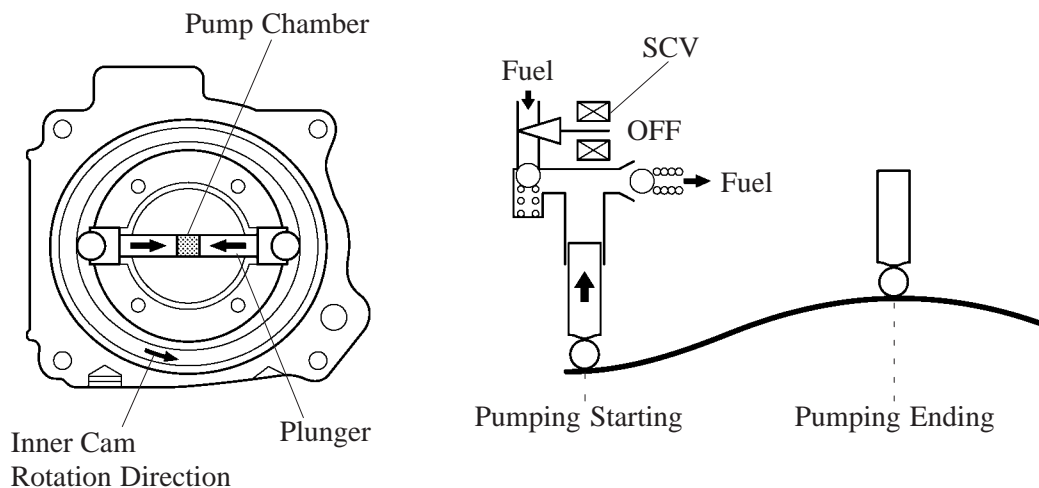
## Operation

- The plunger becomes positioned at the shorter diameter of the inner cam. When the inner cam rotates from this position, the suction stroke starts as the plunger expands with the fuel pressure created by the feed pump.



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- The plunger becomes positioned at the longer diameter of the inner cam. When the inner cam rotates from this position, the pumping stroke starts as plunger is pushed by the inner cam.

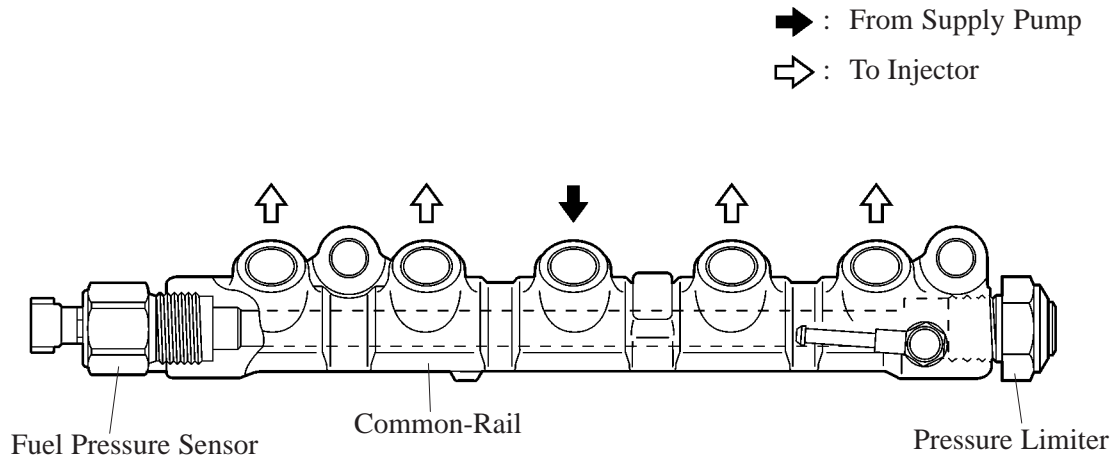


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- The suction and pumping of fuel is effected by repeating these strokes. However, because the volume of fuel drawn in by the plunger is regulated by the engine ECU via SCV, the plunger stops upon having drawn in the regulated amount of fuel. Thereafter, the inner cam resumes pumping. To regulate the volume of fuel drawn in by the plunger, the engine ECU calculates the target common-rail pressure in accordance with the vehicle driving conditions and controls the SCV so that the target value is achieved by the output of the fuel pressure sensor.

### 3. Common-Rail

- The fuel pressure sensor calculates the fuel pressure and outputs the resultant signal to the engine ECU.
- When the fuel pressure in the common-rail is abnormally high, the pressure limiter leaks the fuel to the fuel tank to reduce pressure.



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#### Service Tip

- Fuel pressure sensor has its sealing portion plastic-deformed in order to keep sealing performance, so do not reuse it after disassembling.
- Do not disassemble the pressure limiter because its operating pressure has been adjusted at manufacture.
- If parts that affect the alignment has been changed, make sure to replace the pipe with a new one as well. The parts that require the replacement of a pipe are listed below.

Injection Pipe: Injector, Common-Rail, Cylinder Head

Fuel Inlet Pipe: Supply Pump, Common-Rail, Cylinder Block, Water Pump, Cylinder Head

For details, refer to the 1CD-FTV Engine Repair Manual (Pub. No. RM866E)

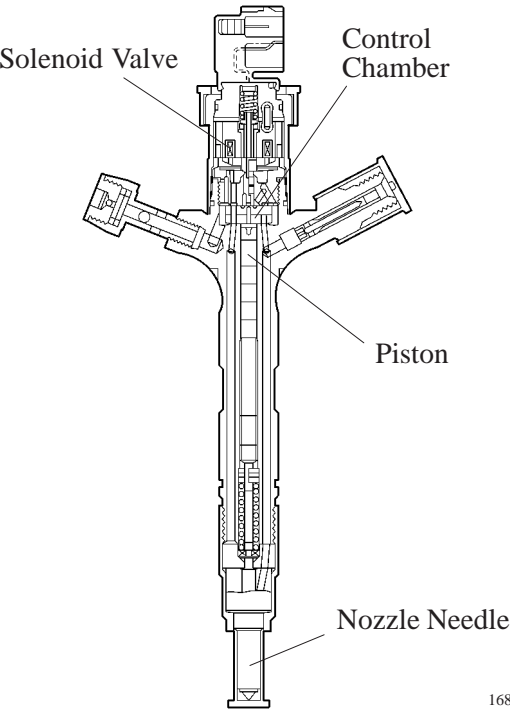
4. Injector

General

An injector consists of a nozzle needle, piston, and solenoid valve.

► Specification ◀

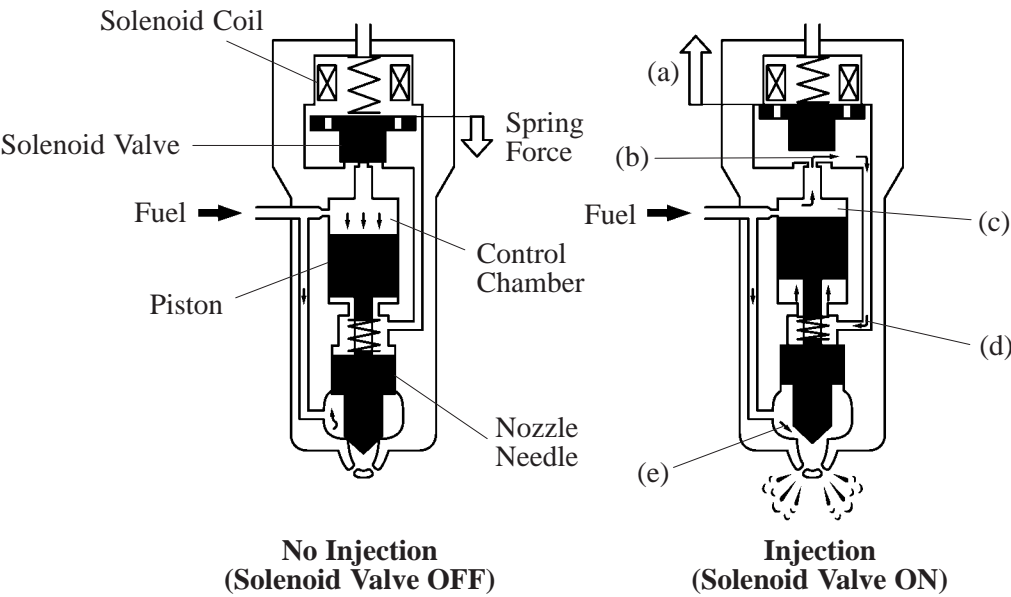
Injection Hole	6
Injection Pressure	135 MPa (1377 kgf/cm <sup>2</sup> )



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Operation

- (a) When electrical current is applied to the solenoid coil, it pulls the solenoid valve up.
- (b) The orifice of the control chamber opens, allowing the fuel to flow out.
- (c) The fuel pressure in the control chamber drops.
- (d) Simultaneously, fuel flows from the orifice to the bottom of the piston and raises the piston up (to enhance response).
- (e) As a result, the piston raises the nozzle needle to inject fuel.



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