■ENGINE CONTROL SYSTEM

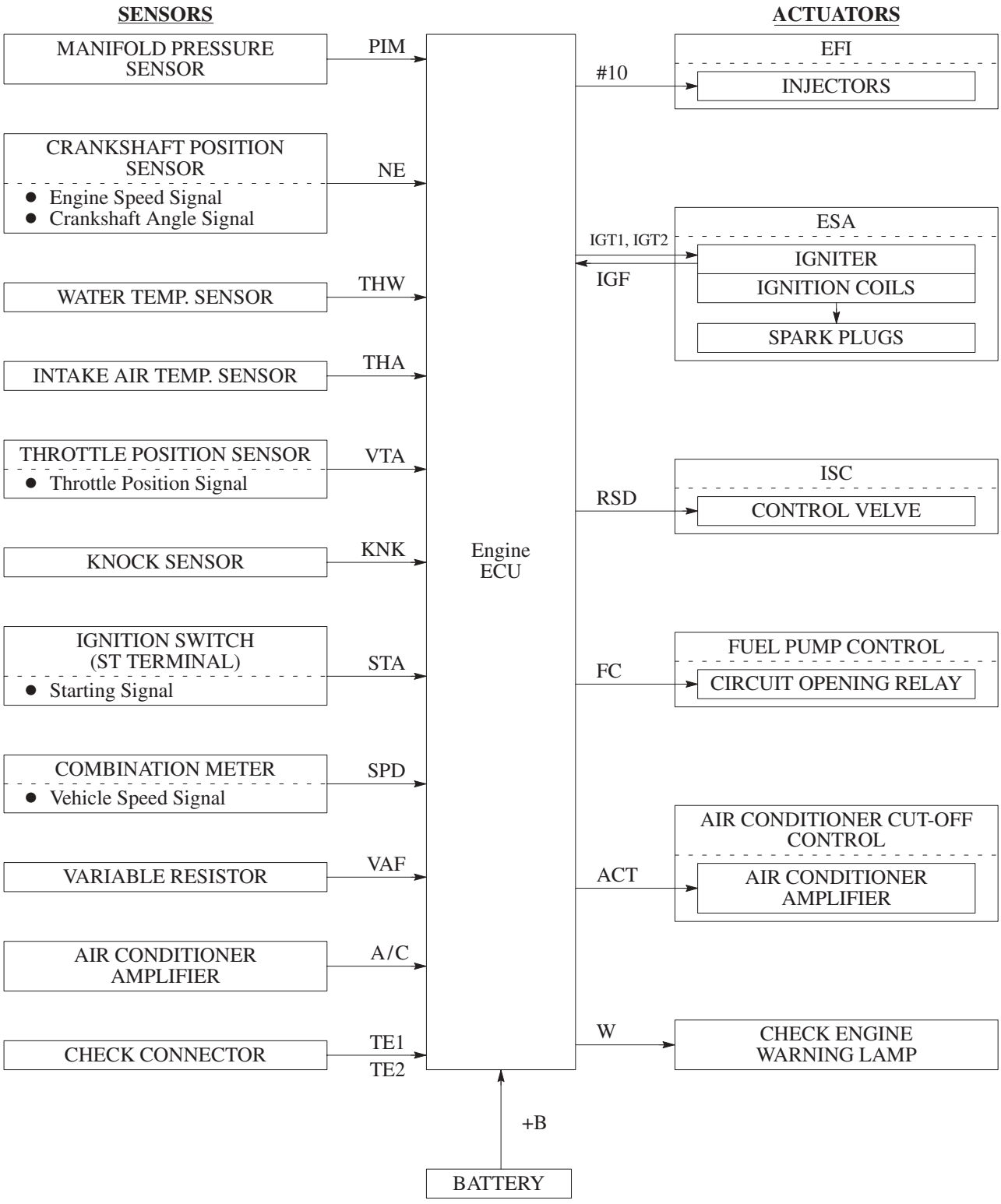
1. General

The engine control system for the 3RZ-FE engine has following system.

System	Outline
EFI (Electronic Fuel Injection)	● A D-type EFI system is used, which indirectly detects intake air volume by manifold pressure sensor. ● The fuel injection system is a simultaneous all-injection system.
ESA (Electronic Spark Advance)	Ignition timing is determined by the engine ECU based on signals from various sensors. The engine ECU corrects ignition timing in response to engine knocking.
ISC (Idle Speed Control)	A rotary solenoid type ISC valve controls the fast idle and idle speeds.
Fuel Pump Control	Fuel pump operation is controlled by signals from the engine ECU based on the engine speed signal (NE).
Air Conditioner Cut-off Control	By controlling the air conditioner compressure in accordance with the throttle valve opening angle and the vehicle speed, driveability is maintained.
Diagnosis	When the engine ECU detects malfunction, the ECU diagnoses and memorizes the failed section.
Fail-Safe	When the engine ECU detects a malfunction, the ECU stops or controls the engine according to the date already stored in memory.

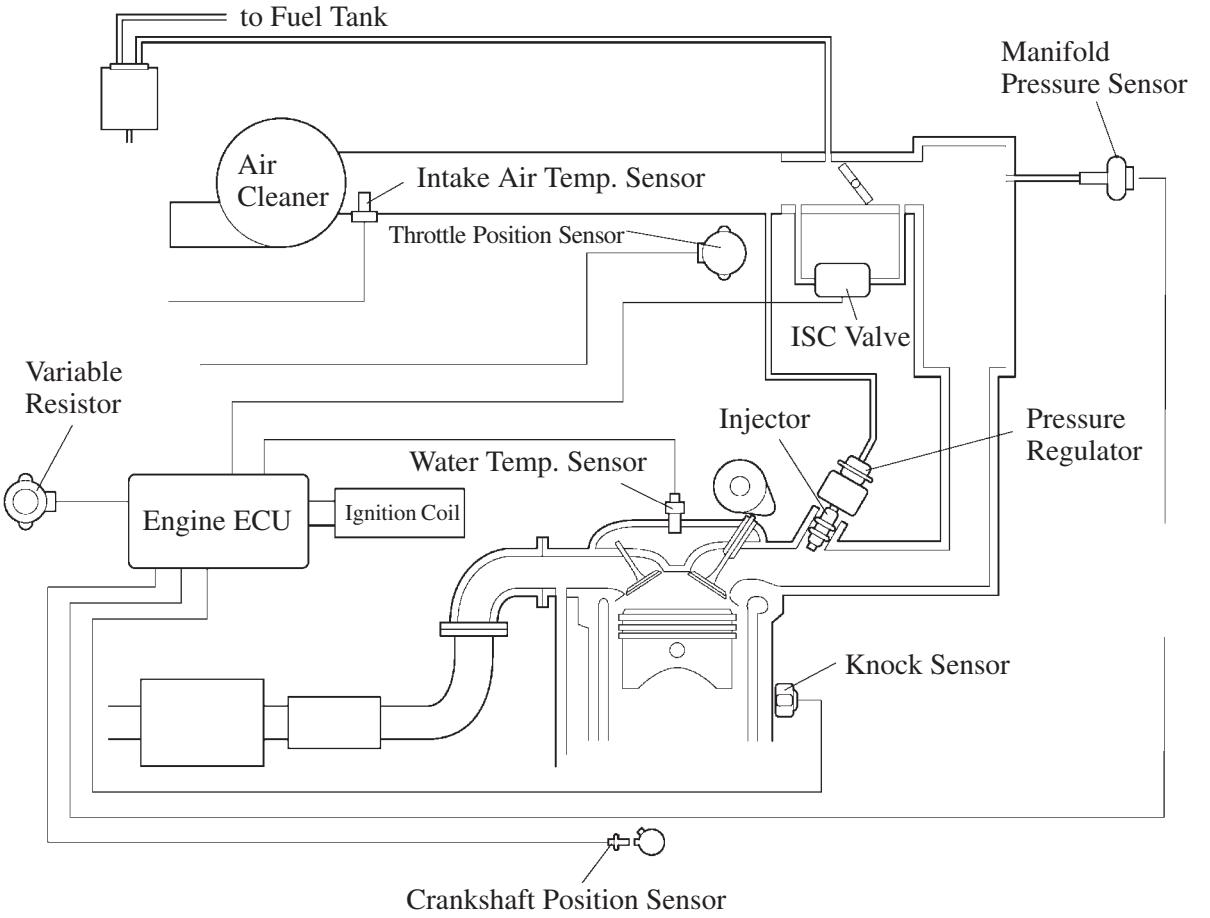
2. Construction

The configuration of the engine control system of the 3RZ-FE engine is as shown in the following chart.

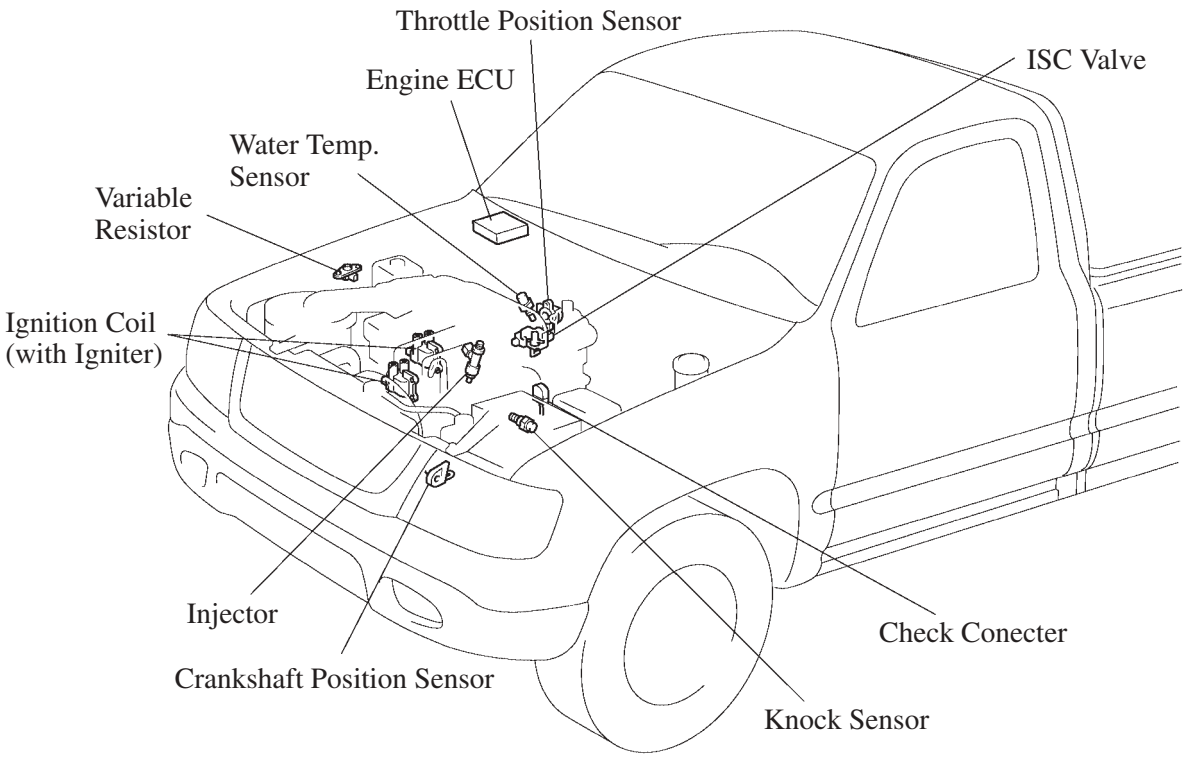


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3. Engine Control System Diagram



4. Layout of Main Component



LHD Model

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5. Main Components of Engine Control System

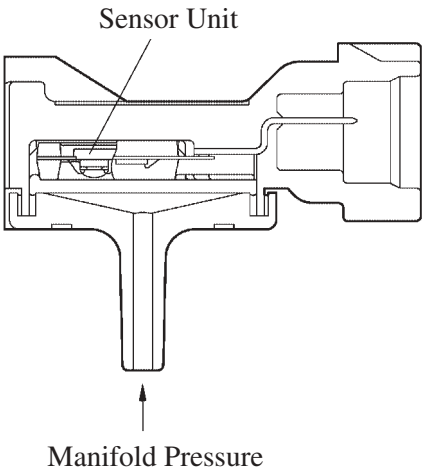
General

The main components of the 3RZ-FE engine control system are as follows:

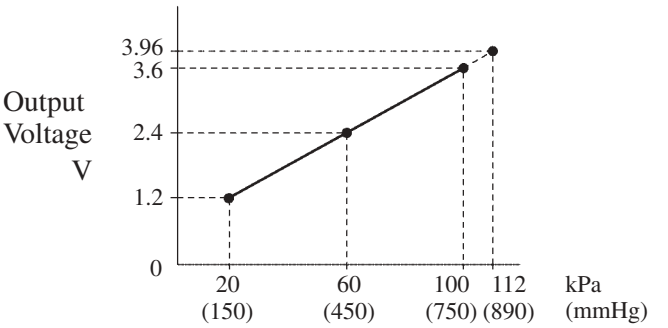
Components	Outline	Quantity
Engine ECU	16-bit CPU	1
Manifold Pressure Sensor	Semiconductor Type	1
Crankshaft Position Sensor (Rotor Teeth)	Pick-up Coil Type (36-2)	1
Variable Resistor	—	1
Throttle Position Sensor	Linear Type	1
Knock Sensor	Built-in Piezoelectric Element Type	1
Injector	4-Hole Type	4
ISC Valve	Rotary Solenoid Type (2-coil Type)	1

Manifold Pressure Sensor

The manifold pressure sensor consists of a semiconductor, which utilizes the characteristic of a silicon chip that changes its electrical resistance when pressure is applied to it. The sensor converts the pressure into an electrical signal, and sends it to the engine ECU in an amplified form.



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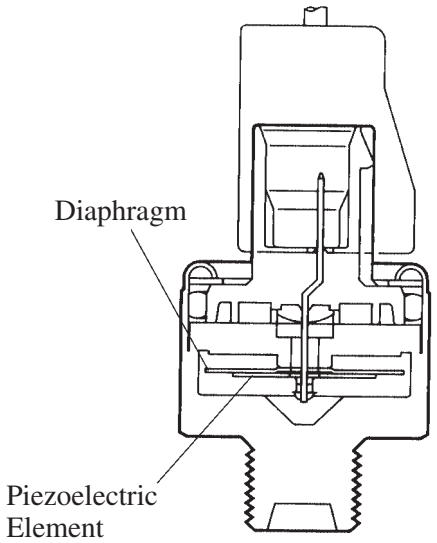


Manifold Pressure Sensor Output Characteristics

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Knock Sensor

The knock sensor is installed in the cylinder block.
When the frequency that is generated by the knocking in the cylinder block coincides with the natural frequency of the piezoelectric in the sensor, both frequencies resonate to generate voltage.
This voltage is then output to the engine ECU in the form of a signal.

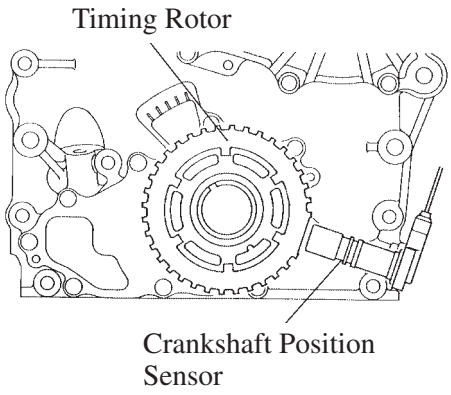


Knock Sensor Cross Section

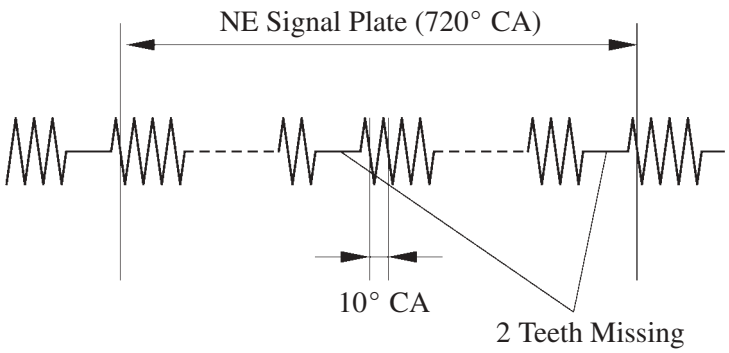
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Crankshaft Position Sensor

The timing rotor of the crankshaft consists of 34 teeth, with 2 teeth missing. The crankshaft position sensor outputs the crankshaft rotation signals every 10°, and the missing teeth are used to determine the top-dead-center.



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Diagnosis

When the engine ECU detects a malfunction, the engine ECU makes a diagnosis and memorizes the failed section. Furthermore, check engine warning lamp in the combination meter illuminates or blinks to inform the driver. The engine will also store the DTCs (Diagnosis Trouble Codes) of the malfunctions.
The DTCs can be accessed by connecting the SST (09843-18020) to the check connector terminal TE1 and E1, and reading the blinking of the check engine warning lamp.
For details, refer to see the 3RZ-FE engine Repair Manual (Pub. No. RM908E).

Fail Safe

When the engine ECU detects a malfunction, the engine ECU stops or controls the engine according to the data already stored in the memory.
For details, refer to see the 3RZ-FE engine Repair Manual (Pub. No. RM908E).